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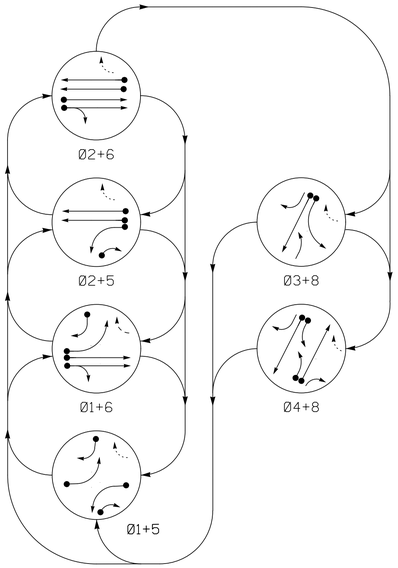
PROJECT REFERENCE NO.	SHEET NO.
C-5703	Sig.68.0

6 Phase Fully Actuated w/ Alternate Phasing Operation and Emergency Vehicle Preemption Gastonia Signal System

DEFAULT PHASING DIAGRAM

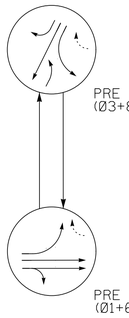


PHASING DIAGRAM DETECTION LEGEND

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

DEFAULT EV PREEMPT PHASES

(Medium Priority)

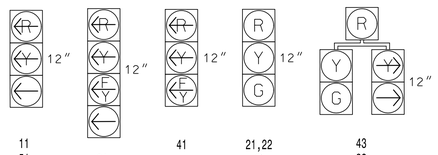


DEFAULT PHASING TABLE OF OPERATION

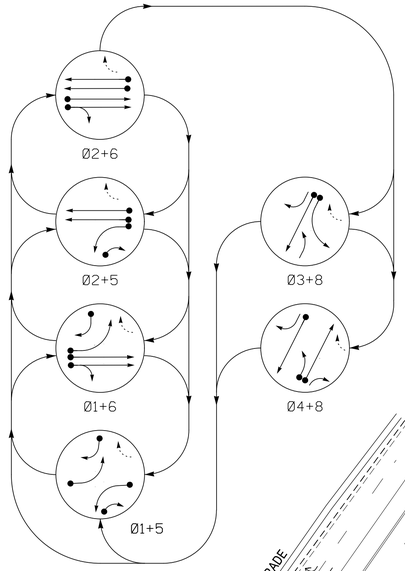
SIGNAL FACE	PHASE								
	Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3+8	Ø4+8	PRE 3	PRE 5	FLASH
11	←	←	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	←	~~R~~
21, 22	R	R	G	G	R	R	R	R	Y
31	~~R~~	~~R~~	~~R~~	~~R~~	←	F Y	←	~~R~~	~~R~~
41	~~R~~	~~R~~	~~R~~	~~R~~	F Y	F Y	~~R~~	~~R~~	~~R~~
42	R	R	R	R	G	R	R	R	R
43	R ⁄ →	R	R ⁄ →	R	R	G	R	R	R
51	←	~~R~~	←	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~
61, 62	R	G	R	G	R	R	R	G	Y
81	R	R	R	R	G	G	G	R	R
82	R ⁄ →	R ⁄ ←	R	R	G	G	G	R	R

SIGNAL FACE I.D.

All Heads L.E.D.

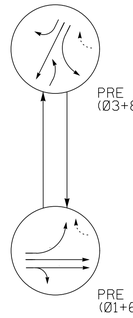


ALTERNATE PHASING DIAGRAM



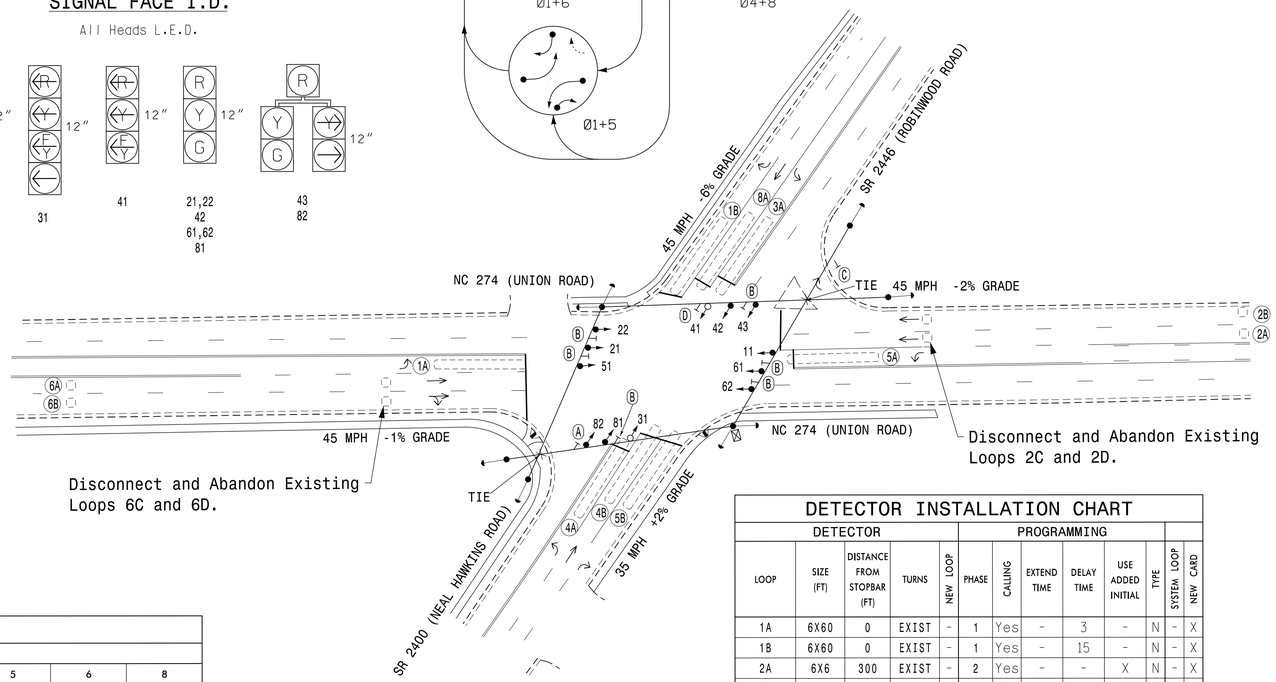
ALTERNATE EV PREEMPT PHASES

(Medium Priority)



ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE								
	Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3+8	Ø4+8	PRE 3	PRE 5	FLASH
11	←	←	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	←	~~R~~
21, 22	R	R	G	G	R	R	R	R	Y
31	~~R~~	~~R~~	~~R~~	~~R~~	←	~~R~~	←	~~R~~	~~R~~
41	~~R~~	~~R~~	~~R~~	~~R~~	F Y	F Y	~~R~~	~~R~~	~~R~~
42	R	R	R	R	G	R	R	R	R
43	R ⁄ →	R	R ⁄ →	R	R	G	R	R	R
51	←	~~R~~	←	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~
61, 62	R	G	R	G	R	R	R	G	Y
81	R	R	R	R	G	G	G	R	R
82	R ⁄ →	R ⁄ ←	R	R	G	G	G	R	R



DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING						
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
1A	6X60	0	EXIST	-	1	Yes	-	3	-	N	-	X
1B	6X60	0	EXIST	-	1	Yes	-	15	-	N	-	X
2A	6X6	300	EXIST	-	2	Yes	-	-	X	N	-	X
2B	6X6	300	EXIST	-	2	Yes	-	-	X	N	-	X
3A	6X60	+10	EXIST	-	3	Yes	-	3	-	N	-	X
4A	6X60	+10	EXIST	-	4	Yes	-	3	-	N	-	X
4B	6X60	+10	EXIST	-	4	Yes	-	-	-	N	-	X
5A	6X60	+5	EXIST	-	5	Yes	-	3	-	N	-	X
5B	6X60	+10	EXIST	-	5	Yes	-	15	-	N	-	X
6A	6X6	300	EXIST	-	6	Yes	-	-	X	N	-	X
6B	6X6	300	EXIST	-	6	Yes	-	-	X	N	-	X
8A	6X60	+5	EXIST	-	8	Yes	-	-	-	N	-	X

TIMING CHART

FEATURE	PHASE						
	1	2	3	4	5	6	8
Min Green *	7	12	7	7	7	12	7
Walk *	-	-	-	-	-	-	-
Ped Clear	-	-	-	-	-	-	-
Veh. Extension *	1.0	6.0	2.0	2.0	1.0	6.0	2.0
Max 1 *	20	45	25	25	20	45	25
Yellow	3.0	4.7	3.1	5.1	3.0	4.6	5.1
Red Clear	3.9	2.8	2.3	2.5	3.5	2.8	2.5
Red Revert	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Actuations B4 Add *	-	-	-	-	-	-	-
Seconds /Actuation *	-	1.5	-	-	-	1.5	-
Max Initial *	-	34	-	-	-	34	-
Time Before Reduction *	-	15	-	-	-	15	-
Time To Reduce *	-	30	-	-	-	30	-
Minimum Gap	-	3.0	-	-	-	3.0	-
Locking Detector	-	X	-	-	-	X	-
Recall Position	-	MIN RECALL	-	-	-	MIN RECALL	-
Dual Entry	-	-	-	X	-	-	X
Simultaneous Gap	X	X	X	X	X	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.

EV PREEMPT

FUNCTION	PRE 3	PRE 5
Exit Phase(s)	4+8	2+6
Preempt Override	OFF	OFF
Delay Time	0	0
Ped Clear Through Yellow	N	N
Terminate Phases	N	N
Entrance Walk	-	-
Entrance Ped Clear	-	-
Entrance Min Green	1	1
Entrance Yellow Change	25.5*	25.5*
Entrance Red Clear	25.5*	25.5*
Minimum Dwell Time	10	10
Preempt Input Extension Time **	2	2
Preempt Max Time	120	120
Exit Yellow Change	25.5*	25.5*
Exit Red Clear	25.5*	25.5*

* Time defaults to time used for phase during normal operation
** Program Timing on GPS Detection Unit

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and/or phase 5 may be lagged.
4. Phase 3 may be lagged.
5. Set all detector units to presence mode.
6. In the event of loop replacement, refer to the current ITS and Signal Design Manual and submit a Plan of Record to the Signal Design Section.
7. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
8. Pavement markings are existing.
9. The City Engineer or their representative will determine the hours of use for each phasing plan.
10. Reposition existing signal heads 11, 21, 22, 51, 61, and 62.
10. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
11. Install new cabinet on the existing cabinet foundation.
12. All new cabinets and base extenders shall be black in color. See Project Special Provisions for details.
13. Remove existing "Left Turn Yield on Green" ball sign-(R10-12).
14. Install GPS emergency preemption system per manufacturer's instructions to achieve preemption needed, as shown in phasing diagram.
15. City of system data:
    Controller Asset #0245.

LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
▭↓	Pedestrian Signal Head With Push Button & Sign	■↓
○	Signal Pole with Guy	●
○	Signal Pole with Sidewalk Guy	●
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
----------	2-in Underground Conduit	----------
N/A	Right of Way	----------
→	Directional Arrow	→
Ⓐ	"RIGHT TURN SIGNAL" Sign (R10-10)	Ⓐ
Ⓑ	Street Name Sign (D3-1)	Ⓑ
Ⓒ	"YIELD" Sign (R1-2)	Ⓒ
Ⓓ	Left Arrow "ONLY" Sign (R3-5L)	Ⓓ

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

NC 274 (Union Road) at SR 2400 (Neal Hawkins Road) and SR 2446 (Robinwood Road)
Division 12 Gaston County Gastonia

PLAN DATE: May 2021 REVIEWED BY: SL Phillips
PREPARED BY: CF Davis REVIEWED BY: KP Baumann

SCALE 0 50 1"=50'

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN
DocuSigned by: SIGNATURE 3/11/2022 DATE
SIG. INVENTORY NO. 12-0245

PLANS PREPARED IN THE OFFICE OF:
Kimley»Horn
NC License #F-0102
421 Fayetteville Street, Suite 600
Raleigh, NC 27601
(919) 677-2000

3/9/2022 11:14:27 AM Danielle.Curri ***kimley-horn.com*SE_RAL14*RAL_TPTD*_ITS*011035569 Gastonia Signal Systems Signals*54 - Signal Design*0120245-2021.dgn

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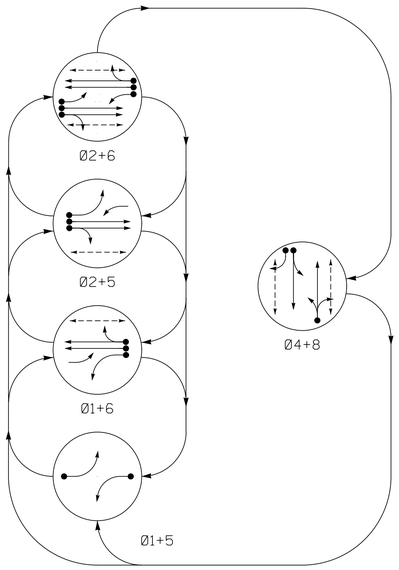
PROJECT REFERENCE NO.	SHEET NO.
C-5703	Sig.69.0

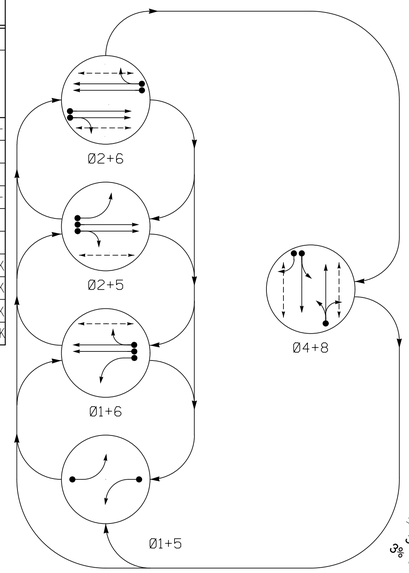
DEFAULT PHASING DIAGRAM



DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø4+8	FLASH
11	~~←~~	~~←~~	~~F Y~~	~~F Y~~	~~R~~	~~Y~~
21, 22	R	R	G	G	R	Y
41, 42	R	R	R	R	G	R
51	~~←~~	~~F Y~~	~~←~~	~~F Y~~	~~R~~	~~Y~~
61, 62	R	G	R	G	R	Y
81, 82	R	R	R	R	G	R
P21, P22	DW	DW	W	W	DW	DRK
P41, P42	DW	DW	DW	DW	W	DRK
P61, P62	DW	W	DW	W	DW	DRK
P81, P82	DW	DW	DW	DW	W	DRK

ALTERNATE PHASING DIAGRAM



ALTERNATE PHASING TABLE OF OPERATION

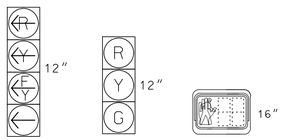
SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø4+8	FLASH
11	~~←~~	~~←~~	~~R~~	~~R~~	~~R~~	~~Y~~
21, 22	R	R	G	G	R	Y
41, 42	R	R	R	R	G	R
51	~~←~~	~~R~~	~~←~~	~~R~~	~~R~~	~~Y~~
61, 62	R	G	R	G	R	Y
81, 82	R	R	R	R	G	R
P21, P22	DW	DW	W	W	DW	DRK
P41, P42	DW	DW	DW	DW	W	DRK
P61, P62	DW	W	DW	W	DW	DRK
P81, P82	DW	DW	DW	DW	W	DRK

PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE I.D.

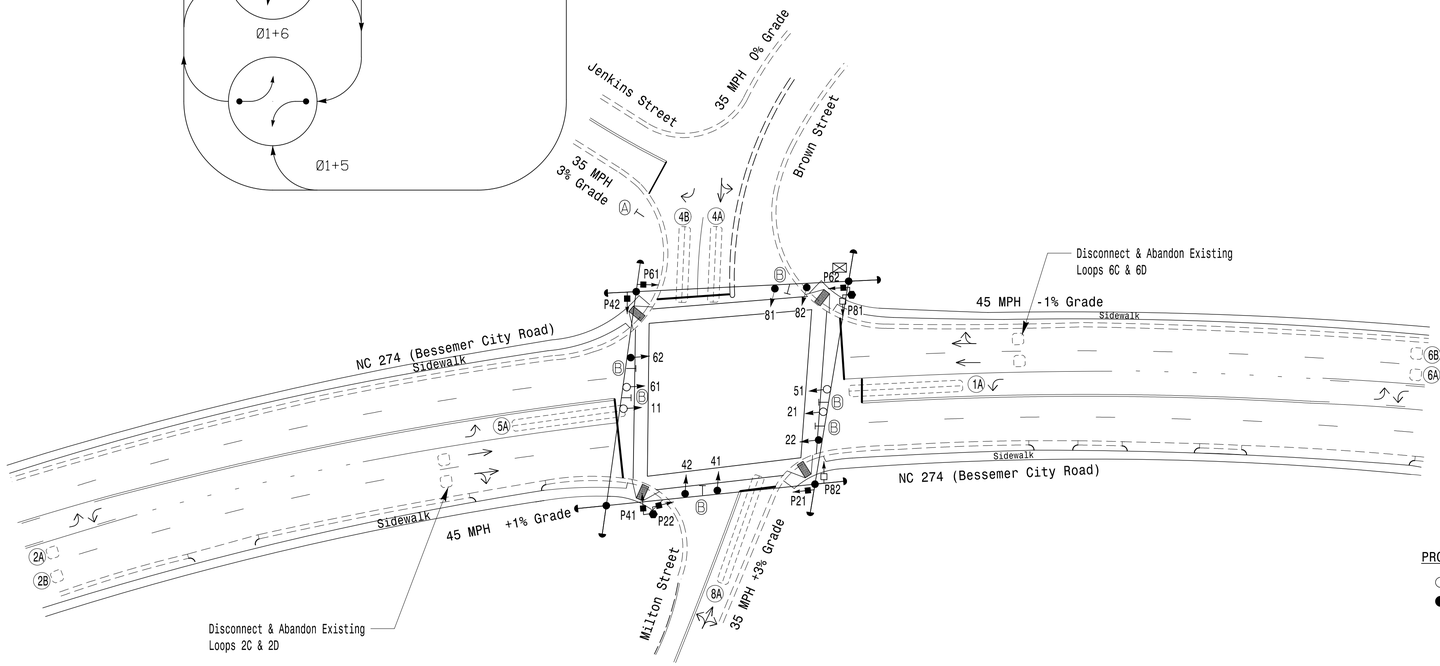
All Heads L.E.D.



11
51

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

P21, P22
P41, P42
P61, P62
P81, P82



TIMING CHART

FEATURE	PHASE 1	2	4	5	6	8
Min Green *	7	12	7	7	12	7
Walk *	-	7	7	-	7	7
Ped Clear	-	20	22	-	23	21
Veh. Extension *	1.0	6.0	2.0	2.0	6.0	1.0
Max 1 *	15	55	25	15	55	25
Yellow	3.0	4.6	3.8	3.0	4.6	3.8
Red Clear	2.8	1.6	2.2	2.9	1.6	2.2
Red Revert	2.0	2.0	2.0	2.0	2.0	2.0
Actuations B4 Add *	-	-	-	-	-	-
Seconds /Actuation *	-	1.5	-	-	1.5	-
Max Initial *	-	34	-	-	34	-
Time Before Reduction *	-	15	-	-	15	-
Time To Reduce *	-	30	-	-	30	-
Minimum Gap	-	3.0	-	-	3.0	-
Locking Detector	-	X	-	-	X	-
Recall Position	-	MIN RECALL	-	-	MIN RECALL	-
Dual Entry	-	-	X	-	-	X
Simultaneous Gap	X	X	X	X	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.

DETECTOR INSTALLATION CHART

DETECTOR LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
1A	6X60	+5	2-4-2	-	1	Yes	-	10 *	-	N	-	X
					6 #	Yes	-	3	-	G	-	X
2A	6X6	300	EXIST	-	2	Yes	-	-	X	N	-	X
2B	6X6	300	EXIST	-	2	Yes	-	-	X	N	-	X
4A	6X40	+3	2-4-2	-	4	Yes	-	3	-	N	-	X
4B	6X40	+3	2-4-2	-	4	Yes	-	15	-	N	-	X
5A	6X60	+5	2-4-2	-	5	Yes	-	10*	-	N	-	X
					2 #	Yes	-	3	-	G	-	X
6A	6X6	300	EXIST	-	6	Yes	-	-	X	N	-	X
6B	6X6	300	EXIST	-	6	Yes	-	-	X	N	-	X
8A	6X60	+5	2-4-2	-	8	Yes	-	3	-	N	-	X

* Reduce Delay to 3 seconds during Alternate Phasing operation.
# Disable Phase call for loop during Alternate Phasing operation.

5 Phase
Fully Actuated w/
Alternate Phasing Operation
Gastonia Signal System

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and/or phase 5 may be lagged.
4. Set all detector units to presence mode.
5. In the event of loop replacement, refer to the current ITS and Signal Design Manual and submit a Plan of Record to the Signal Design Section.
6. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
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. Pavement markings are existing.
10. The City Engineer or their representative will determine the hours of use for each phasing plan.
11. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
12. Install new cabinet on the existing cabinet foundation.
13. All new cabinets and base extenders shall be black in color. See Project Special Provisions for details.
14. All proposed pedestrian signal heads shall be black in color. See Project Special Provisions for details.
15. Disconnect and abandon existing loops 2C, 2D, 6C, and 6D.
16. Reconnect lead-in cable to separate loops 2A, 2B, 6A, and 6B,as shown.
17. City system data:
    Controller Asset # 0264.

LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Type II Signal Pedestal	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
(A)	"STOP" Sign (R1-1)	(A)
(B)	Street Name Sign (D3-1)	(B)

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

NC 274 (Bessemer City Road) at Brown Street and Milton Street

Division 12 Gaston County Gastonia

PLAN DATE: May 2021 REVIEWED BY: SL Phillips
PREPARED BY: SP Pennington REVIEWED BY: KP Baumann

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

North Carolina Professional Seal 044434 Engineer Kevin P. Baumann

DocuSigned by: 5B67BA0B9B5B427...
SIGNATURE 3/11/2022 DATE

SIG. INVENTORY NO. 12-0264

PLANS PREPARED IN THE OFFICE OF:
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NC License #F-0102
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Raleigh, NC 27601
(919) 677-2000

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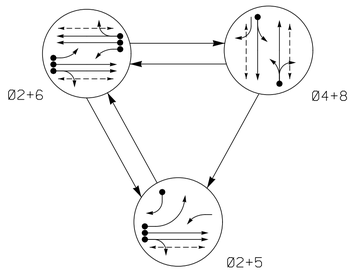
PROJECT REFERENCE NO.	SHEET NO.
C-5703	Sig.70.0

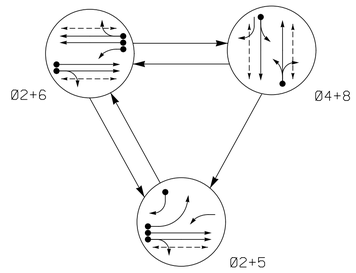
DEFAULT PHASING DIAGRAM



DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2+5	Ø2+6	Ø4+8	FLASH
21,22	G	G	R	Y
41	R	R	G	R
42	R→	R	G	R
51	←~~R~~	F~~Y~~	~~R~~	~~Y~~
61	F~~Y~~	F~~Y~~	~~R~~	~~Y~~
62,63	R	G	R	Y
81,82	R	R	G	R
P21,P22	W	W	DW	DRK
P41,P42	DW	DW	W	DRK
P61,P62	DW	W	DW	DRK
P81,P82	DW	DW	W	DRK

ALTERNATE PHASING DIAGRAM

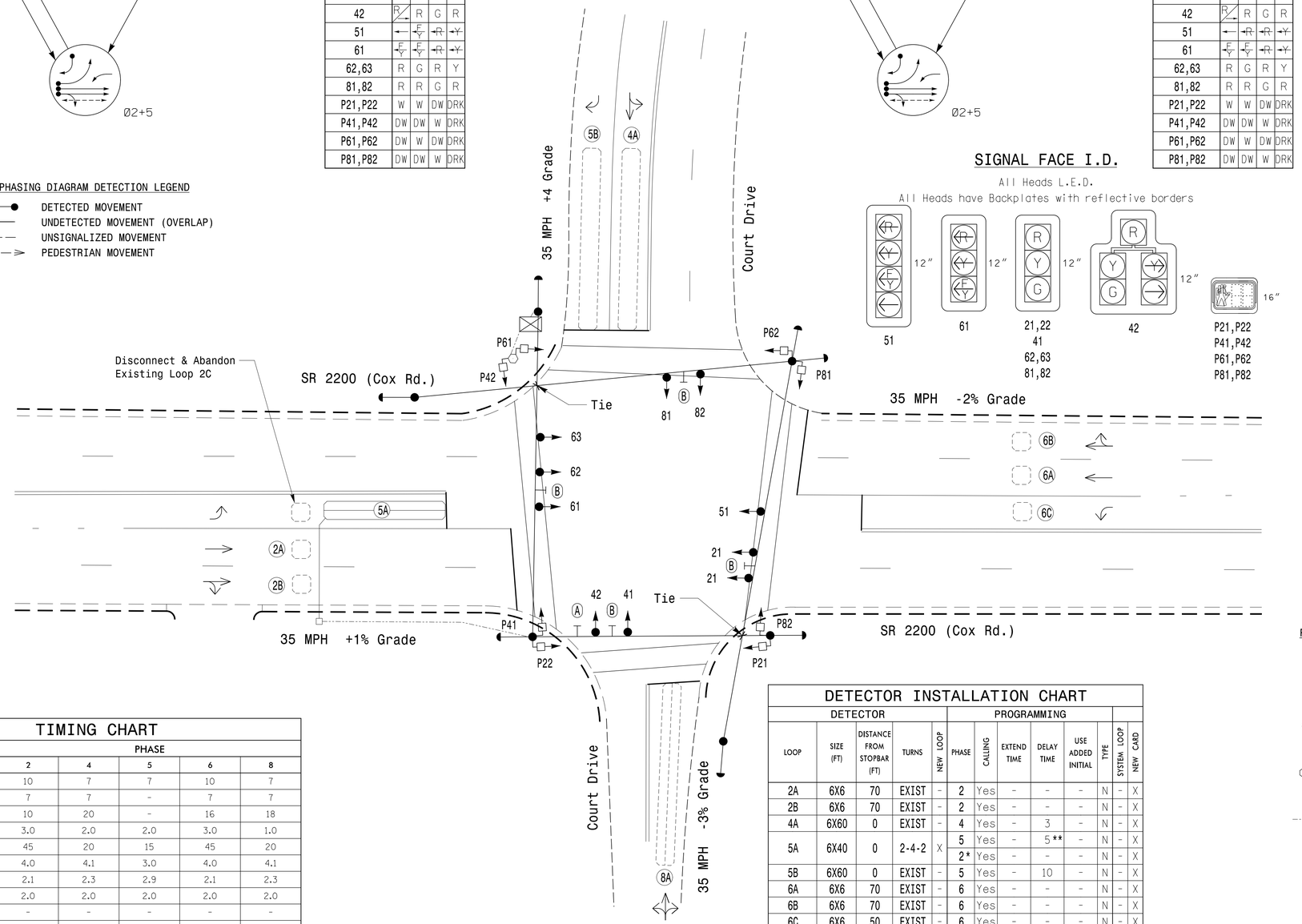


ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2+5	Ø2+6	Ø4+8	FLASH
21,22	G	G	R	Y
41	R	R	G	R
42	R→	R	G	R
51	←~~R~~	~~R~~	~~R~~	~~Y~~
61	F~~Y~~	F~~Y~~	~~R~~	~~Y~~
62,63	R	G	R	Y
81,82	R	R	G	R
P21,P22	W	W	DW	DRK
P41,P42	DW	DW	W	DRK
P61,P62	DW	W	DW	DRK
P81,P82	DW	DW	W	DRK

PHASING DIAGRAM DETECTION LEGEND

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



SIGNAL FACE I.D.

All Heads L.E.D.
All Heads have Backplates with reflective borders

TIMING CHART

FEATURE	PHASE 2	4	5	6	8
Min Green *	10	7	7	10	7
Walk *	7	7	-	7	7
Ped Clear	10	20	-	16	18
Veh. Extension *	3.0	2.0	2.0	3.0	1.0
Max 1 *	45	20	15	45	20
Yellow	4.0	4.1	3.0	4.0	4.1
Red Clear	2.1	2.3	2.9	2.1	2.3
Red Revert	2.0	2.0	2.0	2.0	2.0
Actuations B4 Add *	-	-	-	-	-
Seconds /Actuation *	-	-	-	-	-
Max Initial *	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-
Time To Reduce *	-	-	-	-	-
Minimum Gap	-	-	-	-	-
Locking Detector	X	-	-	X	-
Recall Position	MIN RECALL	-	-	MIN RECALL	-
Dual Entry	-	X	-	-	X
Simultaneous Gap	X	X	X	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.

DETECTOR INSTALLATION CHART

DETECTOR LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
2A	6X6	70	EXIST	-	2	Yes	-	-	-	N	-	X
2B	6X6	70	EXIST	-	2	Yes	-	-	-	N	-	X
4A	6X60	0	EXIST	-	4	Yes	-	3	-	N	-	X
5A	6X40	0	2-4-2	X	5	Yes	-	5**	-	N	-	X
					2*	Yes	-	-	-	N	-	X
5B	6X60	0	EXIST	-	5	Yes	-	10	-	N	-	X
6A	6X6	70	EXIST	-	6	Yes	-	-	-	N	-	X
6B	6X6	70	EXIST	-	6	Yes	-	-	-	N	-	X
6C	6X6	50	EXIST	-	6	Yes	-	-	-	N	-	X
8A	6X60	0	2-4-2	-	8	Yes	-	5	-	N	-	X

* Disable phase call for loop during Alternate Phasing Operation
** Reduce delay to 3 seconds during Alternate Phasing Operation

3 Phase
Fully Actuated
w/ Alternate Phasing Operation
Gastonia Signal System

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 5 may be lagged.
4. Set all detector units to presence mode.
5. In the event of loop replacement, refer to the current ITS and Signal Design Manual and submit a Plan of Record to the Signal Design Section.
6. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
7. Pavement markings are existing.
8. The City Engineer or their representative will determine the hours of use for each phasing plan.
9. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
10. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
11. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
12. Disconnect and abandon existing loop 2C.
13. Install new cabinet on the existing cabinet foundation.
14. All new cabinets and base extenders shall be black in color. See Project Special Provisions for details.
15. All proposed pedestrian pedestals and pushbutton posts shall be black in color. See Project Special Provisions for details.
16. All proposed pedestrian signal heads shall be black in color. See Project Special Provisions for details.
17. City of system data:
    Controller Asset #0270.

LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
▭↓	Pedestrian Signal Head With Push Button & Sign	■↓
○)	Signal Pole with Guy	●)
○)	Signal Pole with Sidewalk Guy	●)
⬡	Type II Signal Pedestal	●
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
·····	2-in Underground Conduit	·····
N/A	Right of Way	– – – –
→	Directional Arrow	→
Ⓐ	"RIGHT TURN SIGNAL" Sign (R10-10R)	Ⓐ
Ⓑ	Street Name Sign (D3-1)	Ⓑ

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

SR 2200 (Cox Rd.)
at
Court Drive

Division 12 Gaston County Gastonia

PLAN DATE:	May 2021	REVIEWED BY:	SL Phillips
PREPARED BY:	CF Davis	REVIEWED BY:	KP Baumann

SCALE 0 20 1"=20'

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN

DocuSigned by: 3/11/2022
SIGNATURE DATE

SIG. INVENTORY NO. 12-0270

PLANS PREPARED IN THE OFFICE OF:
Kimley»Horn
NC License #F-0102
421 Fayetteville Street, Suite 600
Raleigh, NC 27601
(919) 677-2000

3/9/2022 11:16:59 AM Danielle.Curri
K:\kimley-horn.com#SE_RAL1#RAL_TPTO#_ITS#01036569 Gastonia Signal Systems# Signals#54 - Signal Design#6120270-2021.dgn

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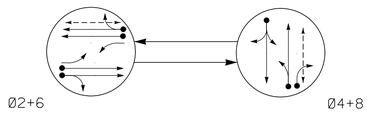
PROJECT REFERENCE NO.	SHEET NO.
C-5703	Sig.71.0

PHASING DIAGRAM



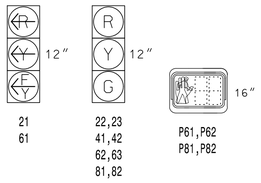
PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION			
SIGNAL FACE	PHASE Ø2+6	PHASE Ø4+8	FLASH
21	~~G~~	~~R~~	~~Y~~
22, 23	G	R	Y
41, 42	R	G	R
61	~~G~~	~~R~~	~~Y~~
62, 63	G	R	Y
81, 82	R	G	R
P61, P62	W	DW	DRK
P81, P82	DW	W	DRK

SIGNAL FACE I.D.

All Heads L.E.D.



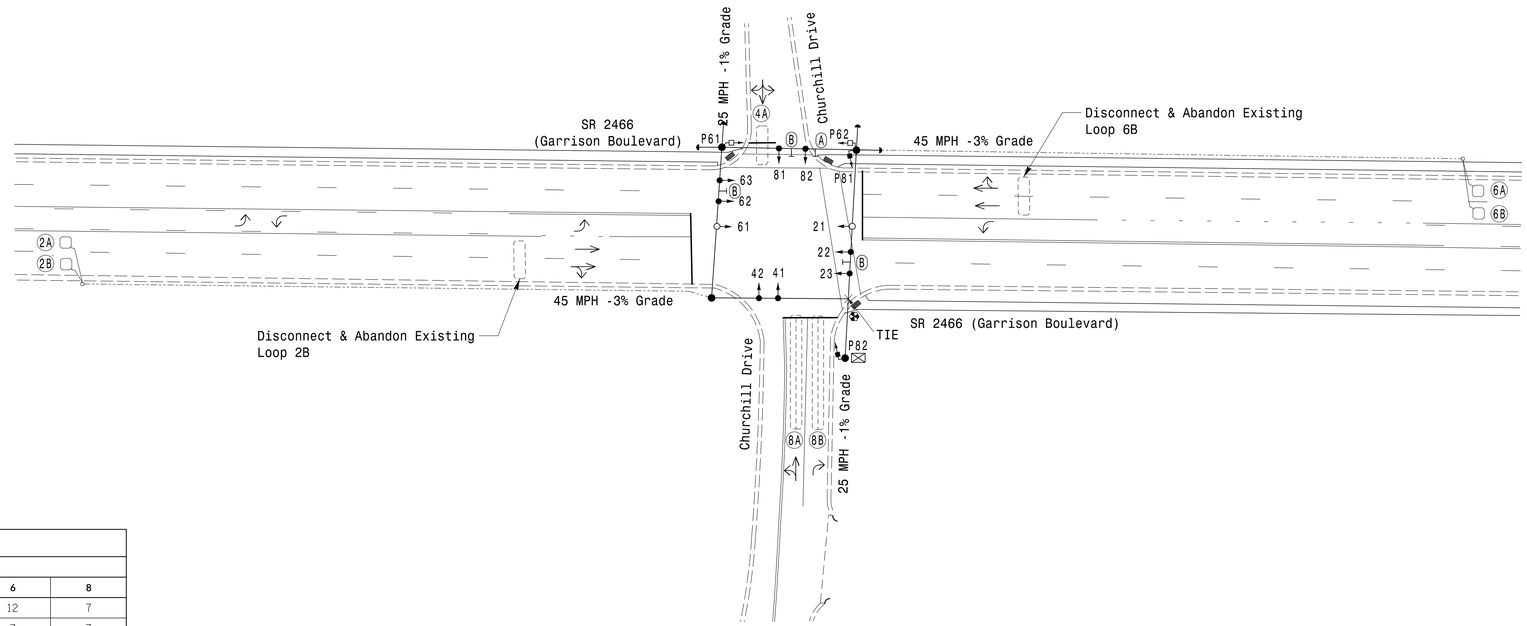
DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
2A	6X6	300	6	X	2	Yes	-	-	X	N	-	X
2B	6X6	300	6	X	2	Yes	-	-	X	N	-	X
4A	6X20	+10	EXIST	-	4	Yes	-	-	-	N	-	X
6A	6X6	300	6	X	6	Yes	-	-	X	N	-	X
6B	6X6	300	6	X	6	Yes	-	-	X	N	-	X
8A	6X60	0	2-4-2	-	8	Yes	-	-	-	N	-	X
8B	6X60	0	2-4-2	-	8	Yes	-	-	-	N	-	X

2 Phase
Fully Actuated
Gastonia Signal System

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Reposition existing signal heads numbered 22, 23, 62, and 63.
4. Set all detector units to presence mode.
5. In the event of loop replacement, refer to the current ITS and Signal Design Manual and submit a Plan of Record to the Signal Design Section.
6. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
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. Remove existing Left Arrow "ONLY" Signs-(R3-5L).
10. Pavement markings are existing.
11. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
12. Disconnect and abandon existing loops 2B and 6B.
13. Install new cabinet on the existing cabinet foundation.
14. All new cabinets and base extenders shall be black in color. See Project Special Provisions for details.
15. Existing signal heads 21, 22, 61, and 62 have been relabeled to 22, 23, 62, and 63, respectively.
16. All proposed pedestrian signal heads shall be black in color. See Project Special Provisions for details.
17. City system data:
    Controller Asset #0276.



TIMING CHART

FEATURE	PHASE 2	PHASE 4	PHASE 6	PHASE 8
Min Green *	12	7	12	7
Walk *	-	-	7	7
Ped Clear	-	-	11	20
Veh. Extension *	6.0	2.0	6.0	1.0
Max 1 *	60	20	60	20
Yellow	4.8	3.2	4.8	3.2
Red Clear	2.3	3.5	2.3	3.5
Red Revert	2.0	2.0	2.0	2.0
Actuations B4 Add *	-	-	-	-
Seconds /Actuation *	1.5	-	1.5	-
Max Initial *	34	-	34	-
Time Before Reduction *	15	-	15	-
Time To Reduce *	30	-	30	-
Minimum Gap	3.0	-	3.0	-
Locking Detector	X	-	X	-
Recall Position	MIN RECALL	-	MIN RECALL	-
Dual Entry	-	X	-	X
Simultaneous Gap	X	X	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	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Type I Pushbutton Post	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
(A)	Right Arrow "ONLY" Sign (R3-5R)	(A)
(B)	Street Name Sign (D3-1)	(B)

Signal Upgrade

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

PLANS PREPARED IN THE OFFICE OF:
Kimley»Horn
NC License #F-0102
421 Fayetteville Street, Suite 600
Raleigh, NC 27601
(919) 677-2000

SCALE
0 40
1"=40'

SR 2466 (Garrison Boulevard) at Churchill Drive

Division 12 Gaston County Gastonia

PLAN DATE:	May 2021	REVIEWED BY:	SL Phillips
PREPARED BY:	DM Curri	REVIEWED BY:	KP Baumann

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN

DocuSigned by:
3/11/2022
DOCUMENTONLY SIGNATURE DATE

SIG. INVENTORY NO. 12-0276

3/9/2022 11:16:19 AM Danielle.Curri \\kimley-horn.com\SE_RAL1\RAL_TPTO_ITS\011036569 Gastonia Signal System\S4 - Signal Design\12076-2021.dgn

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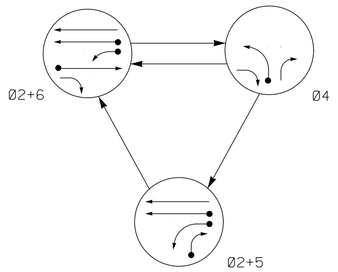
PROJECT REFERENCE NO.	SHEET NO.
C-5703	Sig.72.0

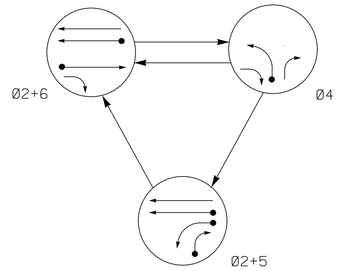
DEFUALT PHASING DIAGRAM



DEFAULT PHASING TABLE OF OPERATION

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

ALTERNATE PHASING DIAGRAM



ALTERNATE PHASING TABLE OF OPERATION

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

DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
2A	6X6	300	EXIST	-	2	Yes	-	-	X	N	-	X
4A	6X40	0	2-4-2	-	4	Yes	-	-	-	N	-	X
5A	6X40	0	2-4-2	-	5	Yes	-	10*	-	N	-	X
					2#	Yes	-	3	-	G	-	X
5B	6X40	0	2-4-2	-	5	Yes	-	15	-	N	-	X
6A	6X6	300	EXIST	-	6	Yes	-	-	X	N	-	X
S1	6X6	+320	EXIST	-	SYS	Yes	-	-	-	N	X	X
S2	6X6	+320	EXIST	-	SYS	Yes	-	-	-	N	X	X

* Reduce delay to 3 sec. during Alternate Phasing operation.
\# Disable Phase call for loop during Alternate Phasing operation.

3 Phase
Fully Actuated w/
Alternate Phasing Operation
Gastonia Signal System

NOTES

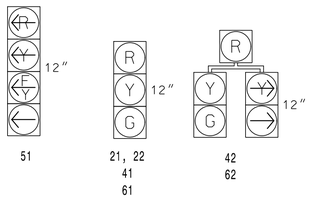
1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 5 may be lagged.
4. Set all detector units to presence mode.
5. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
6. Pavement markings are existing.
7. The City Engineer or their representative will determine the hours of use for each phasing plan.
8. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
9. Install new cabinet on the existing cabinet foundation.
10. All new cabinets and base extenders shall be black in color. See Project Special Provisions for details.
11. Loop 4B has been relabeled to 5B.
12. City of system data:
    Controller Asset #0310.

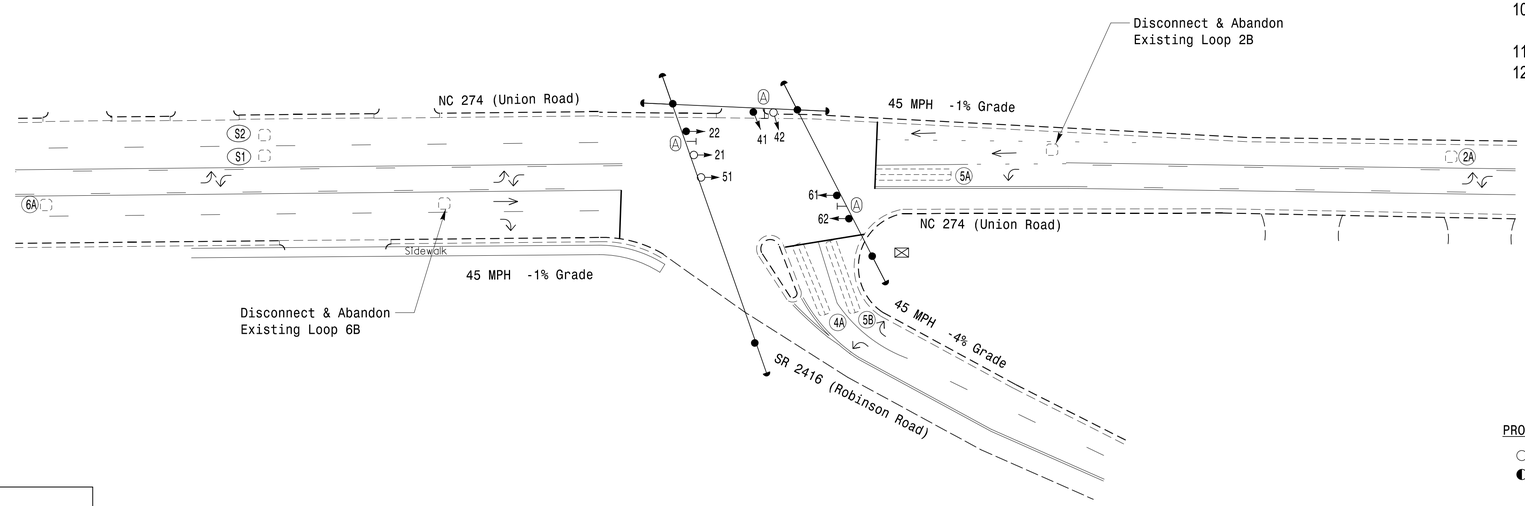
PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE I.D.

All Heads L.E.D.





TIMING CHART

FEATURE	PHASE 2	4	5	6
Min Green *	12	10	7	12
Walk *	-	-	-	-
Ped Clear	-	-	-	-
Veh. Extension *	6.0	2.0	2.0	6.0
Max 1 *	45	30	15	45
Yellow	4.6	3.0	3.0	4.6
Red Clear	2.1	3.3	2.6	2.1
Red Revert	2.0	2.0	2.0	2.0
Actuations B4 Add *	-	-	-	-
Seconds /Actuation *	2.5	-	-	2.5
Max Initial *	34	-	-	34
Time Before Reduction *	15	-	-	15
Time To Reduce *	30	-	-	30
Minimum Gap	3.0	-	-	3.0
Locking Detector	X	-	-	X
Recall Position	MIN RECALL	-	-	MIN RECALL
Dual Entry	-	-	-	-
Simultaneous Gap	X	X	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	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
	Pedestrian Signal Head With Push Button & Sign	
○	Signal Pole with Guy	●
○	Signal Pole with Sidewalk Guy	●
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
----------	2-in Underground Conduit	-·-·-·-
N/A	Right of Way	— — — —
→	Directional Arrow	→
Ⓐ	Street Name Sign (D3-1)	Ⓐ

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

NC 274 (Union Road)
at
SR 2416 (Robinson Road)

Division 12 Gaston County Gastonia

PLAN DATE: May 2021 REVIEWED BY: SL Phillips
PREPARED BY: SP Pennington REVIEWED BY: KP Baumann

REVISIONS | INIT. | DATE

SCALE 0 40 1"=40'

NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN

DocuSigned by:
SIGNATURE 3/11/2022 DATE
SIG. INVENTORY NO. 12-0310

PLANS PREPARED IN THE OFFICE OF:
Kimley»Horn
NC License #F-0102
421 Fayetteville Street, Suite 600
Raleigh, NC 27601
(919) 677-2000

750 N.Greenfield Pkwy,Garner,NC 27529

3/9/2022 11:14:29 AM Danielle.Curri ***kimley-horn.com***SE_RAL14*RAL_TPTO*_ITS*01103569 Gastonia Signal System*s Signals*S4 - Signal Design*01203I0-2021.dgn

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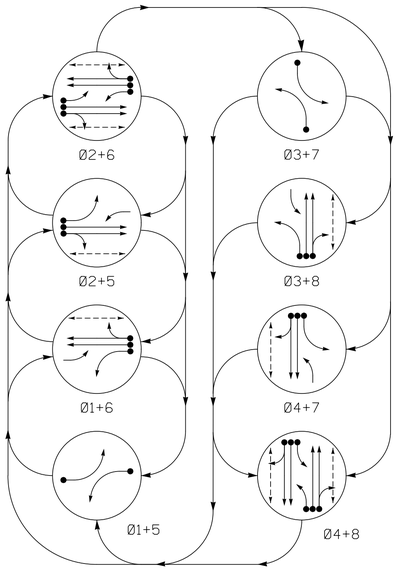
PROJECT REFERENCE NO.	SHEET NO.
C-5703	Sig.73.0

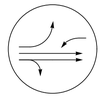
8 Phase Fully Actuated w/ Alternate Phasing Operation and Emergency Vehicle Preemption Gastonia Signal System

DEFAULT PHASING DIAGRAM



DEFAULT EV PREEMPT PHASES

(Medium Priority)

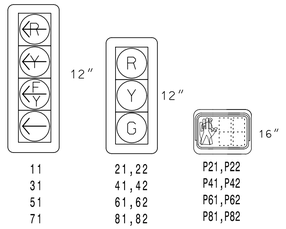


PRE 3
(Ø2+5)

SIGNAL FACE I.D.

All Heads L.E.D.

All Heads have Backplates with reflective borders



11
31
51
71

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

P21,P22
P41,P42
P61,P62
P81,P82

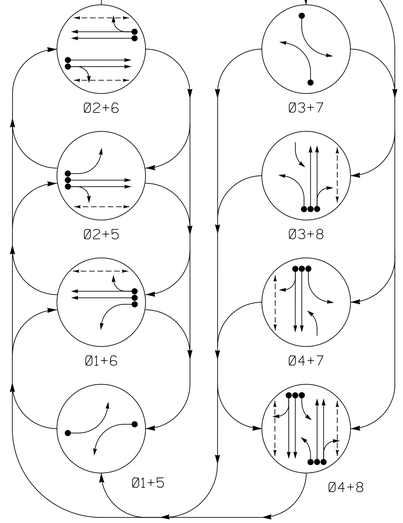
DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE 1+5	1+6	2+5	2+6	3+7	3+8	4+7	4+8	PRE 3	FLASH
11	←	←	F	F	R	R	R	R	R	Y
21,22	R	R	G	G	R	R	R	R	G	Y
31	R	R	R	R	←	←	F	R	R	R
41,42	R	R	R	R	R	R	G	G	R	R
51	←	F	←	F	R	R	R	R	←	Y
61,62	R	G	R	G	R	R	R	R	R	Y
71	R	R	R	R	←	F	←	F	R	R
81,82	R	R	R	R	R	G	R	G	R	R
P21,P22	DW	DW	W	W	DW	DW	DW	DW	DW	DRK
P41,P42	DW	DW	DW	DW	DW	DW	W	W	DW	DRK
P61,P62	DW	W	DW	W	DW	DW	DW	DW	DW	DRK
P81,P82	DW	DW	DW	DW	DW	W	DW	W	DW	DRK

ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE 1+5	1+6	2+5	2+6	3+7	3+8	4+7	4+8	PRE 3	FLASH
11	←	←	R	R	R	R	R	R	R	Y
21,22	R	R	G	G	R	R	R	R	G	Y
31	R	R	R	R	←	←	F	R	R	R
41,42	R	R	R	R	R	R	G	G	R	R
51	←	R	←	R	R	R	R	R	←	Y
61,62	R	G	R	G	R	R	R	R	R	Y
71	R	R	R	R	←	F	←	F	R	R
81,82	R	R	R	R	R	G	R	G	R	R
P21,P22	DW	DW	W	W	DW	DW	DW	DW	DW	DRK
P41,P42	DW	DW	DW	DW	DW	DW	W	W	DW	DRK
P61,P62	DW	W	DW	W	DW	DW	DW	DW	DW	DRK
P81,P82	DW	DW	DW	DW	DW	W	DW	W	DW	DRK

ALTERNATE PHASING PHASING DIAGRAM



ALTERNATE EV PREEMPT PHASES

(Medium Priority)

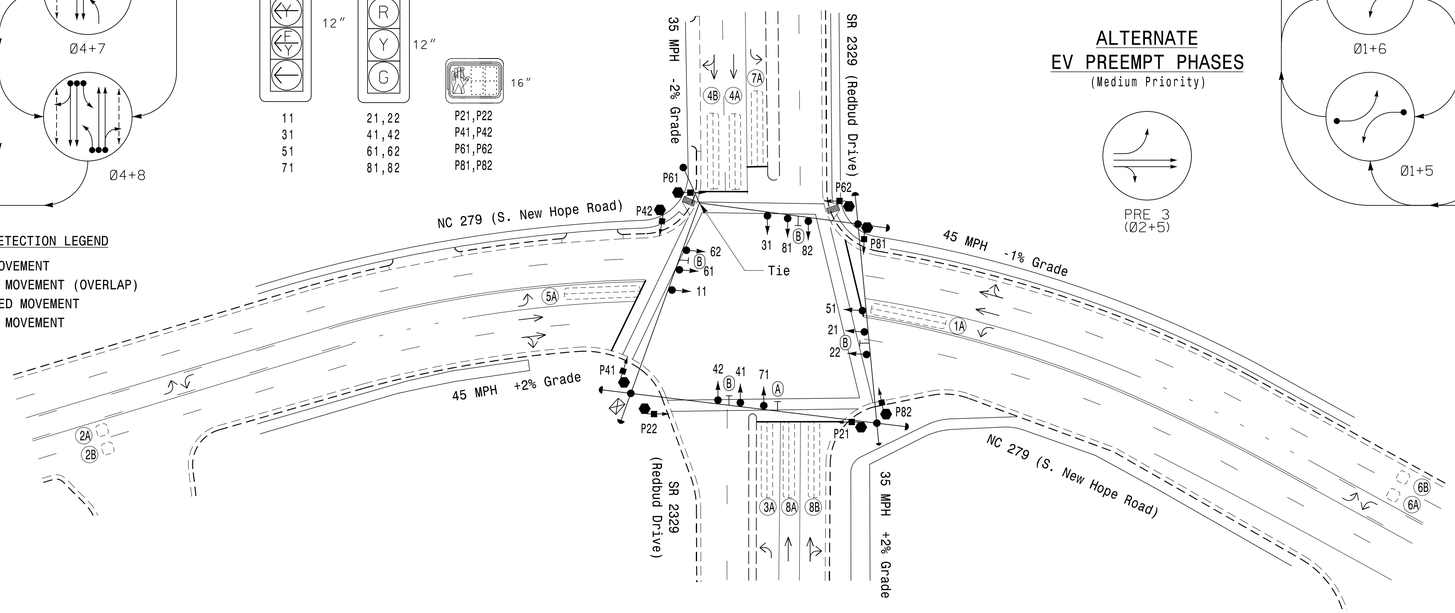
PRE 3
(Ø2+5)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and/or phase 5 may be lagged.
4. Phase 3 and/or phase 7 may be lagged.
5. Set all detector units to presence mode.
6. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
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. Pavement markings are existing.
10. The City Engineer or their representative will determine the hours of use for each phasing plan.
11. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
12. Install new cabinet on the existing cabinet foundation.
13. All new cabinets and base extenders shall be black in color. See Project Special Provisions for details.
14. Install GPS emergency preemption system per manufacturer's instructions to achieve preemption needed, as shown in phasing diagram.
15. City of system data:
    Controller Asset #0326.

PHASING DIAGRAM DETECTION LEGEND

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



LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
□	Pedestrian Signal Head With Push Button & Sign	■
⬡	Type II Signal Pedestal	●
○	Signal Pole with Guy	●
○	Signal Pole with Sidewalk Guy	●
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	▩
□	Junction Box	■
----------	2-in Underground Conduit	----------
N/A	Right of Way	----------
→	Directional Arrow	→
N/A	Curb Ramp	♿
Ⓐ	No U-Turn Sign (R3-4)	Ⓐ
Ⓑ	Street Name Sign (D3-1)	Ⓑ

TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6	7	8
Min Green *	7	12	7	7	7	12	7	7
Walk *	-	7	-	7	-	7	-	7
Ped Clear	-	28	-	22	-	17	-	28
Veh. Extension *	2.0	6.0	2.0	2.0	2.0	6.0	2.0	2.0
Max 1 *	15	90	20	55	25	90	25	55
Yellow	3.0	4.6	3.0	4.0	3.0	4.6	3.0	4.0
Red Clear	2.8	1.9	3.3	2.6	3.1	1.9	3.2	2.6
Red Revert	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Actuations B4 Add *	-	-	-	-	-	-	-	-
Seconds /Actuation *	-	1.5	-	-	-	1.5	-	-
Max Initial *	-	34	-	-	-	34	-	-
Time Before Reduction *	-	15	-	-	-	15	-	-
Time To Reduce *	-	30	-	-	-	30	-	-
Minimum Gap	-	3.0	-	-	-	3.0	-	-
Locking Detector	-	X	-	-	-	X	-	-
Recall Position	-	MIN RECALL	-	-	-	MIN RECALL	-	-
Dual Entry	-	-	-	X	-	-	-	X
Simultaneous Gap	X	X	X	X	X	X	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.

DETECTOR INSTALLATION CHART

DETECTOR LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
1A	6X40	0	2-4-2	-	1	Yes	-	10*	-	N	-	X
					6#	Yes	-	3	-	G	-	X
2A	6X6	300	EXIST	-	2	Yes	-	-	X	N	-	X
2B	6X6	300	EXIST	-	2	Yes	-	-	X	N	-	X
3A	6X40	0	2-4-2	-	3	Yes	-	10	-	N	-	X
					8	Yes	-	-	-	N	-	X
4A	6X40	0	2-4-2	-	4	Yes	-	-	-	N	-	X
4B	6X40	0	2-4-2	-	4	Yes	-	10	-	N	-	X
5A	6X40	0	2-4-2	-	5	Yes	-	10*	-	N	-	X
					2#	Yes	-	3	-	G	-	X
6A	6X6	300	EXIST	-	6	Yes	-	-	X	N	-	X
6B	6X6	300	EXIST	-	6	Yes	-	-	X	N	-	X
7A	6X40	0	2-4-2	-	7	Yes	-	10	-	N	-	X
					4	Yes	-	-	-	N	-	X
8A	6X40	0	2-4-2	-	8	Yes	-	-	-	N	-	X
8B	6X40	0	2-4-2	-	8	Yes	-	10	-	N	-	X

* Reduce Delay to 3 seconds during Alternate Phasing operation.
# Disable Phase call for loop during Alternate Phasing operation.

EV PREEMPT

FUNCTION	PRE 3
Exit Phase(s)	2+6
Preempt Override	OFF
Delay Time	0
Ped Clear Through Yellow	Y
Terminate Phases	N
Entrance Walk	1
Entrance Ped Clear	255*
Entrance Min Green	1
Entrance Yellow Change	25.5*
Entrance Red Clear	25.5*
Minimum Dwell Time	7
Preempt Input Extension Time **	2
Preempt Max Time	120
Exit Yellow Change	25.5*
Exit Red Clear	25.5*

* Time defaults to time used for phase during normal operation
** Program Timing on GPS Detection Unit

PLANS PREPARED IN THE OFFICE OF:
Kimley»Horn
NC License #F-0102
421 Fayetteville Street, Suite 600
Raleigh, NC 27601
(919) 677-2000

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

NC 279 (S. New Hope Road)
at
SR 2329 (Redbud Drive)

Division 12 | Gaston County | Gastonia

PLAN DATE: May 2021 | REVIEWED BY: SL Phillips
PREPARED BY: CF Davis | REVIEWED BY: KP Baumann

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 044434 KEVIN P. BAUMANN

DocuSigned by: 3/11/2022
SIGNATURE DATE

SIG. INVENTORY NO. 12-0326

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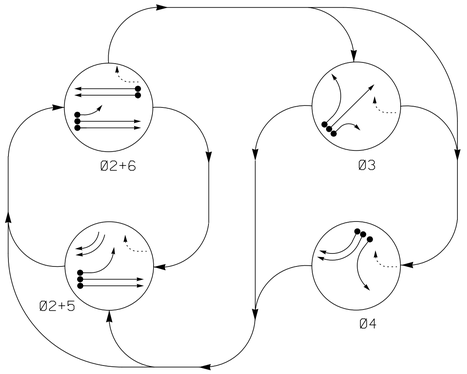
PROJECT REFERENCE NO.	SHEET NO.
C-5703	Sig.74.0

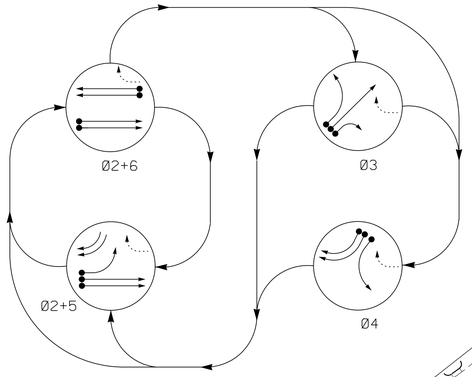
DEFAULT PHASING DIAGRAM



DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2+5	Ø2+6	Ø3	Ø4	FLASH
21,22	G	G	R	R	Y
31	R	R	G	R	R
32	R	R	G	R	R
41	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~
42,43	→	R	R	→	R
51	←	~~R~~	~~R~~	~~R~~	~~Y~~
61,62,63	R	G	R	R	Y

ALTERNATE PHASING DIAGRAM



ALTERNATE PHASING TABLE OF OPERATION

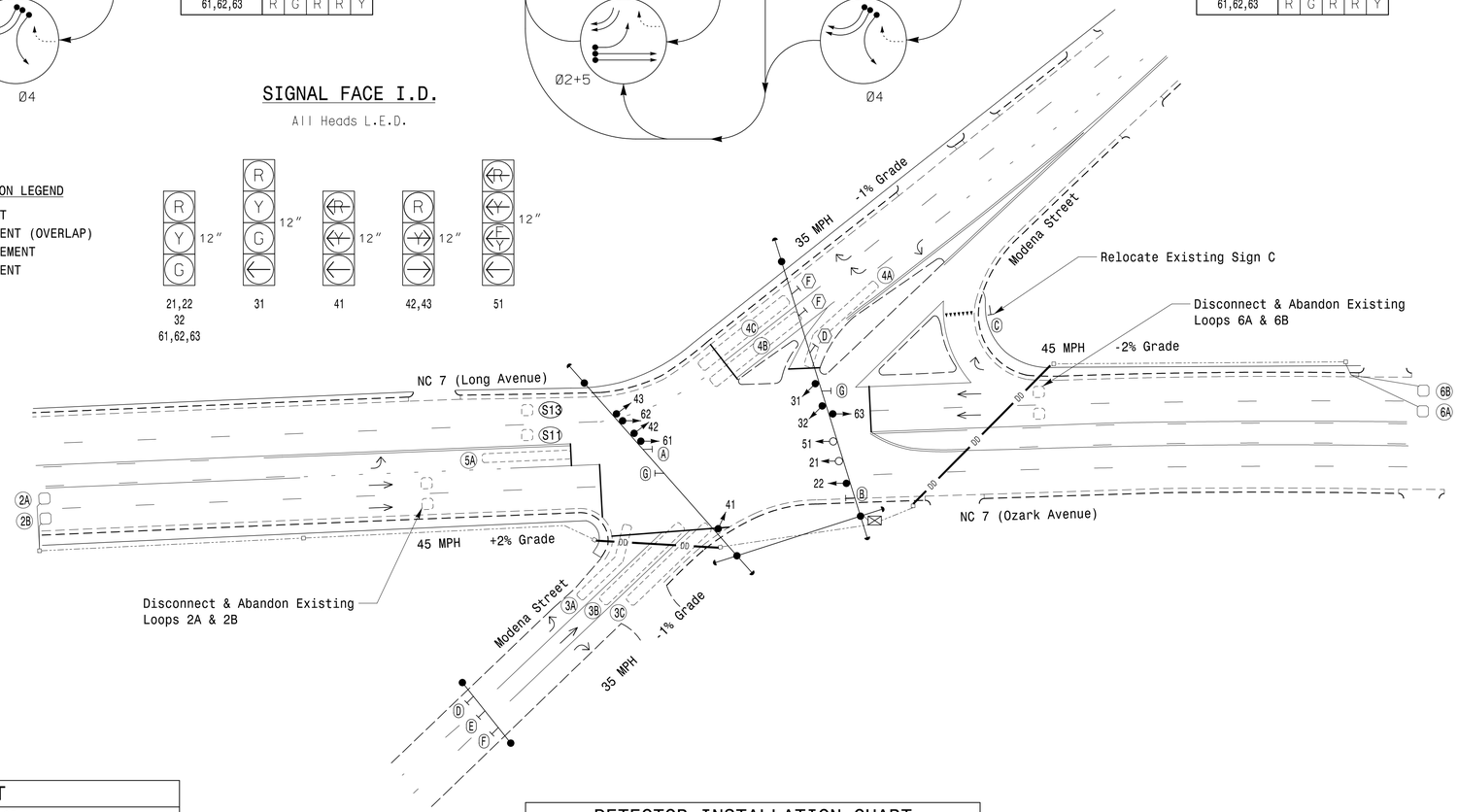
SIGNAL FACE	PHASE Ø2+5	Ø2+6	Ø3	Ø4	FLASH
21,22	G	G	R	R	Y
31	R	R	G	R	R
32	R	R	G	R	R
41	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~
42,43	→	R	R	→	R
51	←	~~R~~	~~R~~	~~R~~	~~Y~~
61,62,63	R	G	R	R	Y

SIGNAL FACE I.D.

All Heads L.E.D.

PHASING DIAGRAM DETECTION LEGEND

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



TIMING CHART

FEATURE	PHASE 2	3	4	5	6
Min Green *	12	7	7	7	12
Walk *	-	-	-	-	-
Ped Clear	-	-	-	-	-
Veh. Extension *	6.0	1.0	1.0	1.0	6.0
Max 1 *	60	25	20	15	60
Yellow	4.7	3.9	3.0	3.0	4.7
Red Clear	2.6	2.8	1.8	3.9	2.6
Red Revert	2.0	2.0	2.0	2.0	2.0
Actuations B4 Add *	-	-	-	-	-
Seconds /Actuation *	1.5	-	-	-	1.5
Max Initial *	34	-	-	-	34
Time Before Reduction *	15	-	-	-	15
Time To Reduce *	30	-	-	-	30
Minimum Gap	3.0	-	-	-	3.0
Locking Detector	X	-	-	-	X
Recall Position	MIN RECALL	-	-	-	MIN RECALL
Dual Entry	-	-	-	-	-
Simultaneous Gap	X	X	X	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.

DETECTOR INSTALLATION CHART

DETECTOR LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
2A	6X6	300	5	X	2	Yes	-	-	X	N	-	X
2B	6X6	300	5	X	2	Yes	-	-	X	N	-	X
3A	6X60	+5	EXIST	-	3	Yes	-	-	-	N	-	X
3B	6X60	+5	EXIST	-	3	Yes	-	-	-	N	-	X
3C	6X60	+5	EXIST	-	3	Yes	-	10	-	N	-	X
4A	6X60	0	EXIST	-	4	Yes	-	-	-	N	-	X
4B	6X60	+10	EXIST	-	4	Yes	-	5	-	N	-	X
4C	6X60	+10	EXIST	-	4	Yes	-	10	-	N	-	X
5A	EXIST	0	EXIST	-	5	Yes	-	5 *	-	N	-	X
					2#	Yes	-	3	-	C	-	X
6A	6X6	300	5	X	6	Yes	-	-	X	N	-	X
6B	6X6	300	5	X	6	Yes	-	-	X	N	-	X
S11	6X6	+200	EXIST	-	-	No	-	-	-	N	X	X
S13	6X6	+200	EXIST	-	-	No	-	-	-	N	X	X

* Reduce Delay to 3 seconds during Alternate Phasing operation.
# Disable Phase call for loop during Alternate Phasing operation.

4 Phase
Fully Actuated
w/ Alternate Phasing Operation
Gastonia Signal System

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 5 may be lagged.
4. Reposition existing signal head numbered 22.
5. Set all detector units to presence mode.
6. In the event of loop replacement, refer to the current ITS and Signal Design Manual and submit a Plan of Record to the Signal Design Section.
7. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
8. Pavement markings are existing.
9. The City Engineer or their representative will determine the hours of use for each phasing plan.
10. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
11. Install new cabinet on the existing cabinet foundation.
12. All new cabinets and base extenders shall be black in color. See Project Special Provisions for details.
13. City of system data:
    Controller Asset #0331.

LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
⊓↓	Pedestrian Signal Head With Push Button & Sign	■↓
○	Signal Pole with Guy	●
○	Signal Pole with Sidewalk Guy	●
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
----	2-in Underground Conduit	----
— DD —	Directional Drill	N/A
N/A	Right of Way	— — — —
→	Directional Arrow	→
Ⓐ	No Left Turn Sign (R3-2)	Ⓐ
Ⓑ	No Right Turn Sign (R3-1)	Ⓑ
Ⓒ	"YIELD" Sign (R1-2)	Ⓒ
Ⓓ	Left Arrow "ONLY" Sign (R3-5)	Ⓓ
Ⓔ	Thru Arrow "ONLY" Sign (R3-5a)	Ⓔ
Ⓕ	Right Arrow "ONLY" Sign (R3-5R)	Ⓕ
Ⓖ	Street Name Sign (D3-1)	Ⓖ

Signal Upgrade

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

PLANS PREPARED IN THE OFFICE OF:
Kimley»Horn
NC License #F-0102
421 Fayetteville Street, Suite 600
Raleigh, NC 27601
(919) 677-2000

NC 7 (Long Avenue / Ozark Avenue) at Modena Street

Division 12 Gaston County Gastonia

PLAN DATE:	May 2021	REVIEWED BY:	SL Phillips
PREPARED BY:	CF Davis	REVIEWED BY:	KP Baumann

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN

DocuSigned by: 3/11/2022
SIGNATURE DATE

SIG. INVENTORY NO. 12-0331

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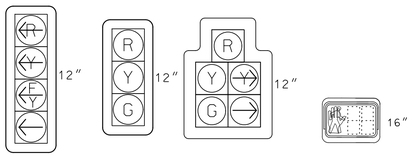
C-5703	Sig.75.0

SIGNAL FACE I.D.

All Heads L.E.D.

All heads have backplates with reflective borders



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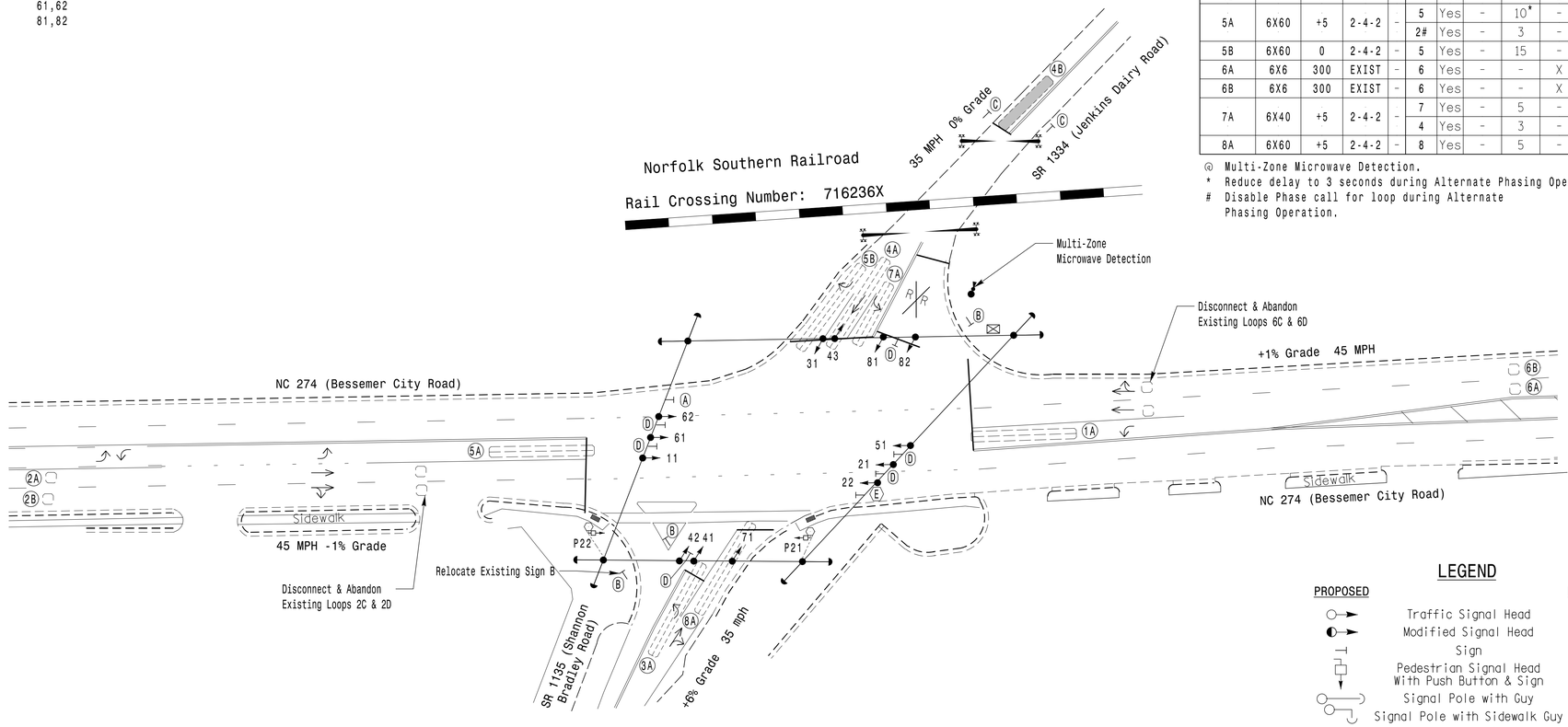
31	41,43		
51	61,62		
71	81,82		



DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
1A	6X60	0	2-4-2	-	1	Yes	-	10*	-	N	-	X
					6#	Yes	-	3	-	G	-	X
2A	6X6	300	EXIST	-	2	Yes	-	-	X	N	-	X
2B	6X6	300	EXIST	-	2	Yes	-	-	X	N	-	X
3A	6X60	+10	2-4-2	-	3	Yes	-	5	-	N	-	X
					8	Yes	-	3	-	N	-	X
4A	6X60	0	2-4-2	-	4	Yes	-	-	-	N	-	X
4B	@	@	@	-	4	Yes	-	-	3	N	-	X
5A	6X60	+5	2-4-2	-	5	Yes	-	10*	-	N	-	X
					2#	Yes	-	3	-	G	-	X
5B	6X60	0	2-4-2	-	5	Yes	-	15	-	N	-	X
6A	6X6	300	EXIST	-	6	Yes	-	-	X	N	-	X
6B	6X6	300	EXIST	-	6	Yes	-	-	X	N	-	X
7A	6X40	+5	2-4-2	-	7	Yes	-	5	-	N	-	X
					4	Yes	-	3	-	N	-	X
8A	6X60	+5	2-4-2	-	8	Yes	-	5	-	N	-	X

@ Multi-Zone Microwave Detection.
* Reduce delay to 3 seconds during Alternate Phasing Operation.
\# Disable Phase call for loop during Alternate Phasing Operation.

8 Phase
Fully Actuated
w/ Alternate Phasing Operation
and Railroad Preemption
Gastonia Signal System

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. This location contains railroad preemption phasing. Do not program for late night flashing operation.
3. Phase 1 and/or phase 5 may be lagged.
4. Phase 3 and/or phase 7 may be lagged.
5. Set all detector units to presence mode.
6. In the event of loop replacement, refer to the current ITS and Signal Design Manual and submit a Plan of Record to the Signal Design Section.
7. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
8. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
9. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
10. This intersection uses Microwave detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.
11. Pavement markings are existing.
12. Ensure flashing operation does not alter operation of blankout sign.
13. The City Engineer or their representative will determine the hours of use for each phasing plan.
14. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
15. Disconnect and abandon existing loops 2C, 2D, 6C, and 6D.
16. Install new cabinet on the existing cabinet foundation.
17. All new cabinets and base extenders shall be black in color. See Project Special Provisions for details.
18. All proposed pedestrian signal heads shall be black in color. See Project Special Provisions for details.
19. All proposed pedestrian pedestals and pushbutton posts shall be black in color. See Project Special Provisions for details.
20. Reconnect lead-in cable to separate loops 2A, 2B, 6A, & 6B, as shown.
21. City of system data:
    Controller Asset #0335.

TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6	7	8
Min Green *	7	12	7	7	7	12	7	7
Walk *	-	7	-	-	-	-	-	-
Ped Clear	-	30	-	-	-	-	-	-
Veh. Extension *	1.0	6.0	2.0	2.0	1.0	6.0	2.0	2.0
Max 1 *	15	55	15	20	15	55	15	20
Yellow	3.0	4.6	3.0	3.8	3.0	4.6	3.0	3.8
Red Clear	4.2	3.5	3.1	2.6	4.3	3.5	2.6	2.6
Red Revert	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Actuations B4 Add *	-	-	-	-	-	-	-	-
Seconds /Actuation *	-	1.5	-	-	-	1.5	-	-
Max Initial *	-	34	-	-	-	34	-	-
Time Before Reduction *	-	15	-	-	-	15	-	-
Time To Reduce *	-	30	-	-	-	30	-	-
Minimum Gap	-	3.0	-	-	-	3.0	-	-
Locking Detector	-	X	-	-	-	X	-	-
Recall Position	-	MIN RECALL	-	-	-	MIN RECALL	-	-
Dual Entry	-	-	-	X	-	-	-	X
Simultaneous Gap	X	X	X	X	X	X	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.

RR PREEMPT

FUNCTION	PRE 1
Exit Phase(s)	4+8
Preempt Override	ON
Delay Time	0
Ped Clear Trough Yellow	Y
Terminate Phases	N
Track Clear Reservice	Y
Entrance Walk	1
Entrance Ped Clear	5
Entrance Min Green	1
Entrance Yellow Change	4.6
Entrance Red Clear	4.3
Track Clear Min Green	23
Track Clear Yellow Change	3.8
Track Clear Red Clear	2.6
Min Dwell Time	10
Exit Yellow Change	25.5*
Exit Red Clear	25.5*

* Time defaults to time used for phase during normal operation

THIS SIGNAL WAS DESIGNED FOR ADVANCE PREEMPTION

LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
N/A	Railroad Tracks	
N/A	Railroad Gate and Flasher	
	Type II Signal Pedestal	

(A)	"DO NOT ENTER - TRAIN" Fiber Optic Blankout Sign	(A)
(B)	"YIELD" Sign (R1-2)	(B)
(C)	"TRUCKS STOP HERE ON RED" Sign	(C)
(D)	Street Name Sign (D3-1)	(D)
(E)	Right "TURNING VEHICLES" Yield "TO" Pedestrians Sign (R10-15R)	(E)
	Microwave Detection Zone	

PLANS PREPARED IN THE OFFICE OF:
Kimley»Horn
NC License #F-0102
421 Fayetteville Street, Suite 600
Raleigh, NC 27601
(919) 677-2000

Signal Upgrade - Sheet 1 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

NC 274 (Bessemer City Road)
at
SR 1334 (Jenkins Dairy Road) /
SR 1135 (Shannon Bradley Road)
Division 12 Gaston County Gastonia

PLAN DATE:	May 2021	REVIEWED BY:	SL Phillips
PREPARED BY:	DM Curri	REVIEWED BY:	KP Baumann

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN
Docusigned by
SIGNATURE 3/11/2022 DATE
SIG. INVENTORY NO. 12-0335

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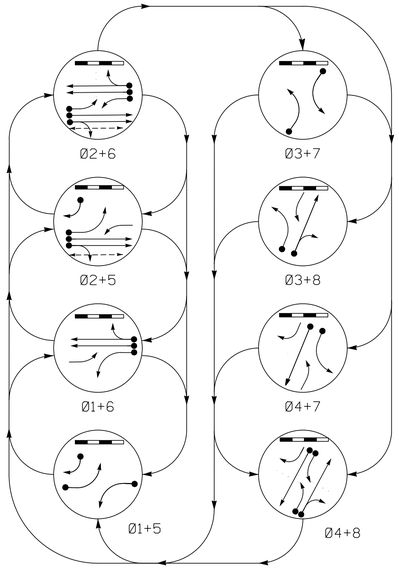
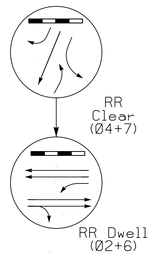
PROJECT REFERENCE NO.	SHEET NO.
C-5703	Sig.75.1

DEFAULT PHASING DIAGRAM



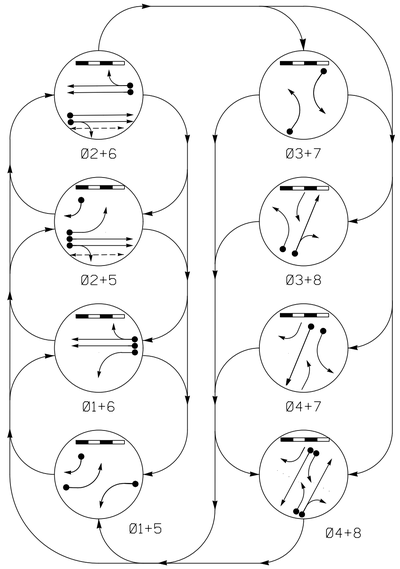
DEFAULT RAIL PREEMPT PHASES



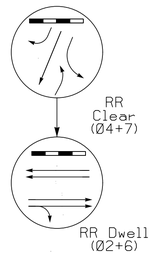
PHASING DIAGRAM DETECTION LEGEND

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

ALTERNATE PHASING DIAGRAM



ALTERNATE RAIL PREEMPT PHASES



PHASING DIAGRAM DETECTION LEGEND

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

DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE											
	Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3+7	Ø3+8	Ø4+7	Ø4+8	RR ADD	RR DEL	FLASH
11	~~←~~	~~←~~	~~F↓~~	~~F↓~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~F↓~~	~~Y~~
21,22	R	R	G	G	R	R	R	R	R	G	Y
31	~~R~~	~~R~~	~~R~~	~~R~~	~~←~~	~~←~~	~~F↓~~	~~F↓~~	~~F↓~~	~~R~~	~~R~~
41,43	R	R	R	R	R	R	G	G	G	R	R
42	R↓/→	R	R↓/→	R	R	R	G	G	G	R	R
51	~~←~~	~~F↓~~	~~←~~	~~F↓~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~Y~~
61,62	R	G	R	G	R	R	R	R	R	G	Y
71	~~R~~	~~R~~	~~R~~	~~R~~	~~←~~	~~F↓~~	~~←~~	~~F↓~~	~~←~~	~~R~~	~~R~~
81, 82	R	R	R	R	R	G	R	G	R	R	R
P21,P22	DW	DW	W	W	DW	DW	DW	DW	DW	DW	DRK
SIGN Ⓐ	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	✳

✳ SEE NOTE 12

ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE											
	Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3+7	Ø3+8	Ø4+7	Ø4+8	RR ADD	RR DEL	FLASH
11	~~←~~	~~←~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~Y~~
21,22	R	R	G	G	R	R	R	R	R	G	Y
31	~~R~~	~~R~~	~~R~~	~~R~~	~~←~~	~~←~~	~~F↓~~	~~F↓~~	~~F↓~~	~~R~~	~~R~~
41,43	R	R	R	R	R	R	G	G	G	R	R
42	R↓/→	R	R↓/→	R	R	R	G	G	G	R	R
51	~~←~~	~~R~~	~~←~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~Y~~
61,62	R	G	R	G	R	R	R	R	R	G	Y
71	~~R~~	~~R~~	~~R~~	~~R~~	~~←~~	~~F↓~~	~~←~~	~~F↓~~	~~←~~	~~R~~	~~R~~
81, 82	R	R	R	R	R	G	R	G	R	R	R
P21,P22	DW	DW	W	W	DW	DW	DW	DW	DW	DW	DRK
SIGN Ⓐ	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	✳

✳ SEE NOTE 12

8 Phase
Fully Actuated
w/ Alternate Phasing Operation
and Railroad Preemption
Gastonia Signal System

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. This location contains railroad preemption phasing. Do not program for late night flashing operation.
3. Phase 1 and/or phase 5 may be lagged.
4. Phase 3 and/or phase 7 may be lagged.
5. Set all detector units to presence mode.
6. In the event of loop replacement, refer to the current ITS and Signal Design Manual and submit a Plan of Record to the Signal Design Section.
7. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
8. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
9. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
10. This intersection uses Microwave detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.
11. Pavement markings are existing.
12. Ensure flashing operation does not alter operation of blankout sign.
13. The City Engineer or their representative will determine the hours of use for each phasing plan.
14. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
15. Disconnect and abandon existing loops 2C, 2D, 6C, and 6D.
16. Install new cabinet on the existing cabinet foundation.
17. All new cabinets and base extenders shall be black in color. See Project Special Provisions for details.
18. All proposed pedestrian signal heads shall be black in color. See Project Special Provisions for details.
19. All proposed pedestrian pedestals and pushbutton posts shall be black in color. See Project Special Provisions for details.
20. Reconnect lead-in cable to separate loops 2A, 2B, 6A, & 6B, as shown.
21. City of system data:
    Controller Asset #0335.

\\kimley-horn.com\SE_RAL1\RAL_TPTO_ITS\011036569 Gastonia Signal System\3 Signals\54 - Signal Design\C120335-2021g1.dgn
3/9/2022 11:14:10 AM Danielle.Curri

Signal Upgrade - Sheet 2 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PLANS PREPARED IN THE OFFICE OF:
Kimley»Horn
NC License #F-0102
421 Fayetteville Street, Suite 600
Raleigh, NC 27601
(919) 677-2000

Prepared For:
Transportation Mobility and Safety Division
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

NC 274 (Bessemer City Road)
at
SR 1334 (Jenkins Dairy Road) /
SR 1135 (Shannon Bradley Road)

Division 12 | Gaston County | Gastonia

PLAN DATE:	May 2021	REVIEWED BY:	SL Phillips
PREPARED BY:	DM Curri	REVIEWED BY:	KP Baumann

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN

DocuSigned by:
SIGNATURE 3/11/2022 DATE

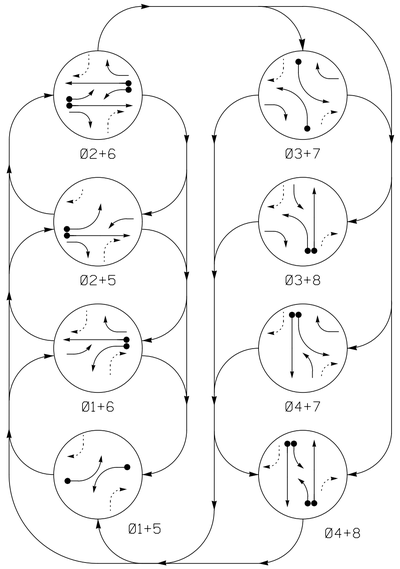
SIG. INVENTORY NO. 12-0335

DocuSign Envelope ID: F58B15C2-40E6-45BE-9C45-A2A9EFAC85F4

PROJECT REFERENCE NO.	SHEET NO.
C-5703	Sig.76.0

8 Phase Fully Actuated w/ Alternate Phasing Operation and Emergency Vehicle Preempetion Gastonia Signal System

DEFAULT PHASING DIAGRAM



DEFAULT EV PREEMPT PHASES

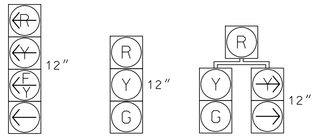
(Medium Priority)

DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3+7	Ø3+8	Ø4+7	Ø4+8	PRE3	FLASH
11	←●	←●	←○	←○	←R	←R	←R	←R	←○	←Y
21	R	R	G	G	R	R	R	R	G	Y
22	R	R	G	G	R→	R→	R	R	G	Y
31	←R	←R	←R	←R	←	←	←○	←○	←R	←R
41, 42	R	R	R	R	R	R	G	G	R	R
51	←	←○	←	←○	←R	←R	←R	←R	←	←Y
61	R	G	R	G	R	R	R	R	R	Y
62	R	G	R	G	R→	R→	R	R	R	Y
71	←R	←R	←R	←R	←	←○	←	←○	←R	←R
81, 82	R	R	R	R	R	G	R	G	R	R

SIGNAL FACE I.D.

All Heads L.E.D.



11
31
51
71

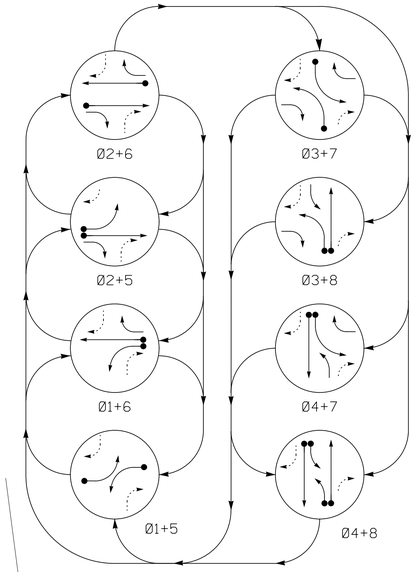
21
41, 42
61
81, 82

22
62

PHASING DIAGRAM DETECTION LEGEND

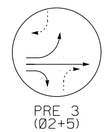
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

ALTERNATE PHASING DIAGRAM



ALTERNATE EV PREEMPT PHASES

(Medium Priority)



ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3+7	Ø3+8	Ø4+7	Ø4+8	PRE3	FLASH
11	←●	←●	←R	←R	←R	←R	←R	←R	←R	←Y
21	R	R	G	G	R	R	R	R	G	Y
22	R	R	G	G	R→	R→	R	R	G	Y
31	←R	←R	←R	←R	←	←	←○	←○	←R	←R
41, 42	R	R	R	R	R	R	G	G	R	R
51	←	←R	←	←R	←R	←R	←R	←R	←	←Y
61	R	G	R	G	R	R	R	R	R	Y
62	R	G	R	G	R→	R	R→	R	R	Y
71	←R	←R	←R	←R	←	←○	←	←○	←R	←R
81, 82	R	R	R	R	R	G	R	G	R	R

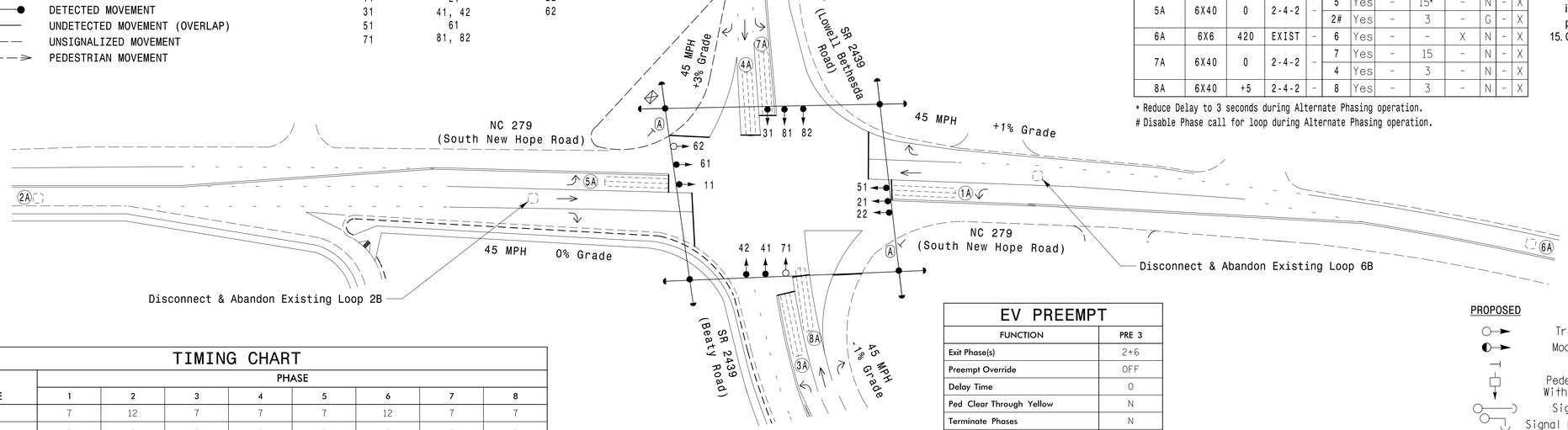
DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
1A	6X40	0	2-4-2	-	1	Yes	-	15*	-	N	-	X
					6#	Yes	-	3	-	G	-	X
2A	6X6	420	EXIST	-	2	Yes	-	-	X	N	-	X
3A	6X40	0	2-4-2	-	3	Yes	-	15	-	N	-	X
					8	Yes	-	3	-	N	-	X
4A	6X40	0	2-4-2	-	4	Yes	-	3	-	N	-	X
5A	6X40	0	2-4-2	-	5	Yes	-	15*	-	N	-	X
					2#	Yes	-	3	-	G	-	X
6A	6X6	420	EXIST	-	6	Yes	-	-	X	N	-	X
7A	6X40	0	2-4-2	-	7	Yes	-	15	-	N	-	X
					4	Yes	-	3	-	N	-	X
8A	6X40	+5	2-4-2	-	8	Yes	-	3	-	N	-	X

* Reduce Delay to 3 seconds during Alternate Phasing operation.
\# Disable Phase call for loop 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. Phase 1 and/or phase 5 may be lagged.
4. Phase 3 and/or phase 7 may be lagged.
5. Set all detector units to presence mode.
6. Pavement markings are existing.
7. The City Engineer or their representative will determine the hours of use for each phasing plan.
8. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
9. Disconnect and abandon existing loops 2B and 6B
10. Install new cabinet on the existing cabinet foundation.
11. All new cabinets and base extenders shall be black in color. See Project Special Provisions for details.
12. Existing signal heads 42 & 43 have been relabeled to 41 & 42, respectively.
13. Existing loops 4A & 4B have been relabeled to 7A & 4A, respectively.
14. Install GPS emergency preemption system per manufacturer's instructions to achieve preemption needed, as shown in phasing diagram.
15. City of system data:
    Controller Asset #0357.



TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6	7	8
Min Green *	7	12	7	7	7	12	7	7
Walk *	-	-	-	-	-	-	-	-
Ped Clear	-	-	-	-	-	-	-	-
Veh. Extension *	2.0	6.0	2.0	2.0	2.0	6.0	2.0	2.0
Max 1 *	20	50	15	30	20	50	15	30
Yellow	3.0	4.5	3.0	4.6	3.0	4.5	3.0	4.6
Red Clear	3.3	1.9	2.8	1.5	2.9	1.9	2.1	1.5
Red Revert	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Actuations B4 Add *	-	-	-	-	-	-	-	-
Seconds /Actuation *	-	2.5	-	-	-	2.5	-	-
Max Initial *	-	46	-	-	-	46	-	-
Time Before Reduction *	-	15	-	-	-	15	-	-
Time To Reduce *	-	30	-	-	-	30	-	-
Minimum Gap	-	5.1	-	-	-	5.1	-	-
Locking Detector	-	X	-	-	-	X	-	-
Recall Position	-	MIN RECALL	-	-	-	MIN RECALL	-	-
Dual Entry	-	-	-	X	-	-	-	X
Simultaneous Gap	X	X	X	X	X	X	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.

EV PREEMPT

FUNCTION	PRE 3
Exit Phase(s)	2+6
Preempt Override	OFF
Delay Time	0
Ped Clear Through Yellow	N
Terminate Phases	N
Entrance Walk	0
Entrance Ped Clear	0
Entrance Min Green	1
Entrance Yellow Change	25.5*
Entrance Red Clear	25.5*
Minimum Dwell Time	10
Preempt Input Extension Time **	2
Preempt Max Time	75
Exit Yellow Change	25.5*
Exit Red Clear	25.5*

* Time defaults to time used for phase during normal operation
** Program Timing on GPS Detection Unit

LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
▭↓	Pedestrian Signal Head With Push Button & Sign	■↓
○	Signal Pole with Guy	●─
○⤵	Signal Pole with Sidewalk Guy	●⤵
▭	Inductive Loop Detector	┈┈
⊠	Controller & Cabinet	⊠
□	Junction Box	■
┈┈	2-in Underground Conduit	┈┈
N/A	Right of Way	┈┈
→	Directional Arrow	→
Ⓐ	"YIELD" Sign (R1-2)	Ⓐ

Signal Upgrade

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

NC 279 (South New Hope Road) at SR 2439 (Beaty Road / Lowell Bethesda Road)

Division 12 | Gaston County | Gastonia

PLAN DATE: May 2021 | REVIEWED BY: SL Phillips
PREPARED BY: DM Curri | REVIEWED BY: KP Baumann

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN

DocuSigned by: SIGNATURE 3/11/2022 DATE

SIG. INVENTORY NO. 12-0357

PLANS PREPARED IN THE OFFICE OF:
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Raleigh, NC 27601
(919) 677-2000

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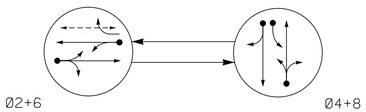
PROJECT REFERENCE NO.	SHEET NO.
C-5703	Sig.77.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

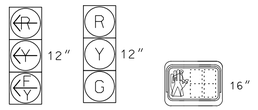
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2+6	PHASE Ø4+8	FLASH
21, 22, 23	G	R	Y
41	~~R~~	~~Y~~	~~R~~
42, 43	R	G	R
61, 62	G	R	Y
81, 82	R	G	R
P61, P62	W	DW	DRK

SIGNAL FACE I.D.

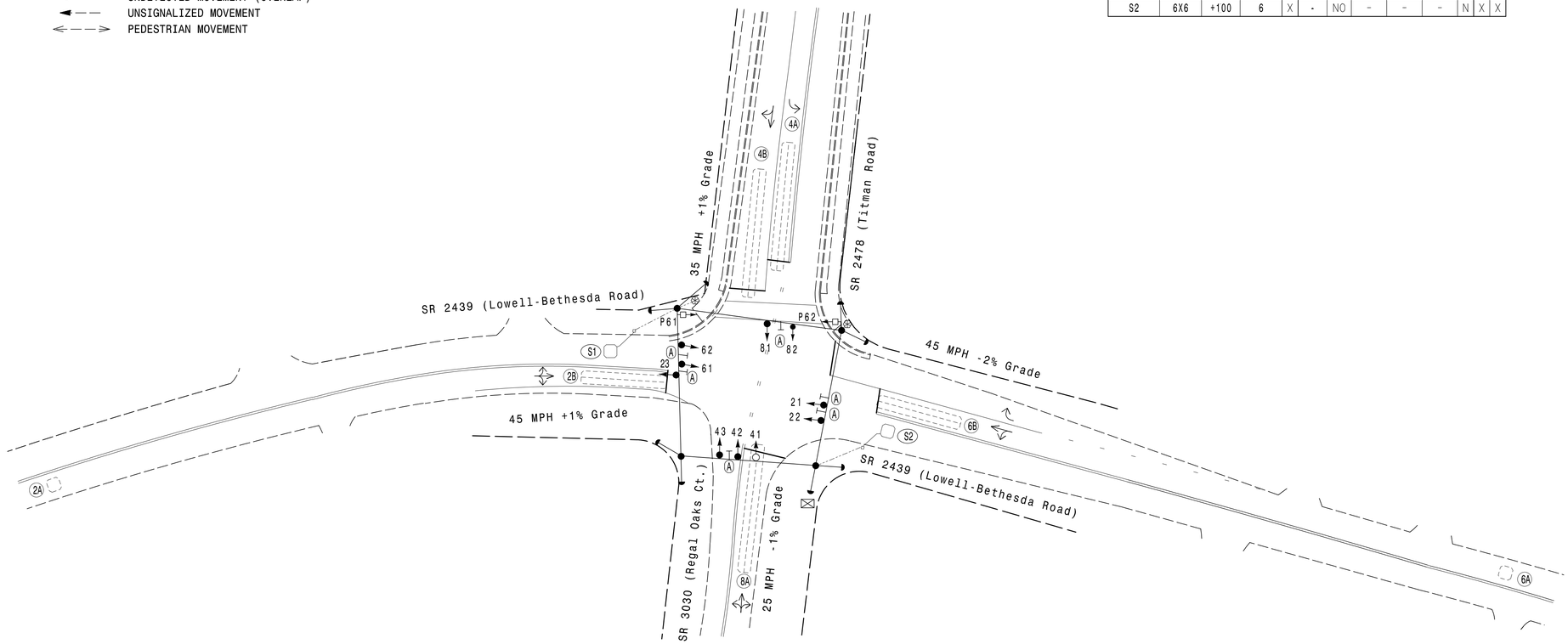
All Heads L.E.D.



41 | 21, 22, 23, 42, 43, 61, 62, 81, 82 | P61, P62

DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
2A	6X6	300	EXIST	-	2	Yes	-	-	-	N	-	X
2B	6X40	0	2-4-2	-	2	Yes	2	5	-	G	-	X
4A	6X60	+3	2-4-2	-	4	Yes	-	3	-	N	-	X
4B	6X60	+3	2-4-2	-	4	Yes	-	15	-	N	-	X
6A	6X6	300	EXIST	-	6	Yes	-	-	-	N	-	X
6B	6X40	0	2-4-2	-	6	Yes	2	5	-	G	-	X
8A	6X60	+3	2-4-2	-	8	Yes	-	5	-	N	-	X
S1	6X6	+100	6	X	-	NO	-	-	-	N	X	X
S2	6X6	+100	6	X	-	NO	-	-	-	N	X	X



TIMING CHART

FEATURE	PHASE 2	PHASE 4	PHASE 6	PHASE 8
Min Green *	12	10	12	10
Walk *	-	-	7	-
Ped Clear	-	-	10	-
Veh. Extension *	6.0	4.0	6.0	4.0
Max 1 *	100	35	100	35
Yellow	4.7	3.8	4.7	3.8
Red Clear	1.3	1.8	1.3	1.8
Red Revert	2.0	2.0	2.0	2.0
Actuations B4 Add *	-	-	-	-
Seconds /Actuation *	-	-	-	-
Max Initial *	-	-	-	-
Time Before Reduction *	15	-	15	-
Time To Reduce *	40	-	40	-
Minimum Gap	3.0	-	3.0	-
Locking Detector	-	-	-	-
Recall Position	MIN RECALL	-	MIN RECALL	-
Dual Entry	-	X	-	X
Simultaneous Gap	X	X	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.

2 Phase
Fully Actuated
Gastonia Signal System

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. In the event of loop replacement, refer to the current ITS and Signal Design Manual and submit a Plan of Record to the Signal Design Section.
5. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
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. Pavement markings are existing.
9. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
10. Install new cabinet on the existing cabinet foundation.
11. All new cabinets and base extenders shall be black in color. See Project Special Provisions for details.
12. Existing signal heads 41 and 42 have been relabeled to 42 and 43.
13. All proposed pedestrian signal heads shall be black in color. See Project Special Provisions for details.
14. All proposed pedestrian pedestals and pushbutton posts shall be black in color. See Project Special Provisions for details.
15. City system data:
    Controller Asset #0373.

LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Type I Pushbutton Post	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
A	Street Name Sign (D3-1)	A

PLANS PREPARED IN THE OFFICE OF:
Kimley»Horn
NC License #F-0102
421 Fayetteville Street, Suite 600
Raleigh, NC 27601
(919) 677-2000

Signal Upgrade

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

SCALE 0 30 1"=30'

SR 2439 (Lowell-Bethesda Road)
at
SR 2478 (Titman Road) and
SR 3030 (Regal Oaks Ct)

Division 12 Gaston County Gastonia

PLAN DATE:	May 2021	REVIEWED BY:	SL Phillips
PREPARED BY:	SP Pennington	REVIEWED BY:	KP Baumann

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN

DocuSigned by: 3/11/2022
SIGNATURE DATE

SIG. INVENTORY NO. 12-0373

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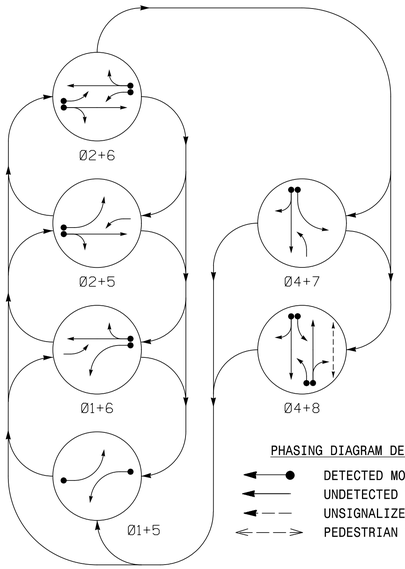
\\kimley-horn.com\SE_RAL1\RAL_TPTO_ITS\011036569 Gastonia Signal System\3 Signals\54 - Signal Design\0120373-2021.dgn

PROJECT REFERENCE NO.	SHEET NO.
C-5703	Sig.78.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

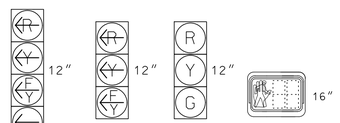
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø4+7	Ø4+8	FLASH
11	←	←	F Y	F Y	~~R~~	~~R~~	~~Y~~
21,22	R	R	G	G	R	R	Y
41,42	R	R	R	R	G	G	R
51	←	F Y	←	F Y	~~R~~	~~R~~	~~Y~~
61,62	R	G	R	G	R	R	Y
71	~~R~~	~~R~~	~~R~~	~~R~~	←	F Y	~~R~~
81	~~R~~	~~R~~	~~R~~	~~R~~	F Y	F Y	~~R~~
82,83	R	R	R	R	R	G	R
P81,P82	DW	DW	DW	DW	DW	W	DRK

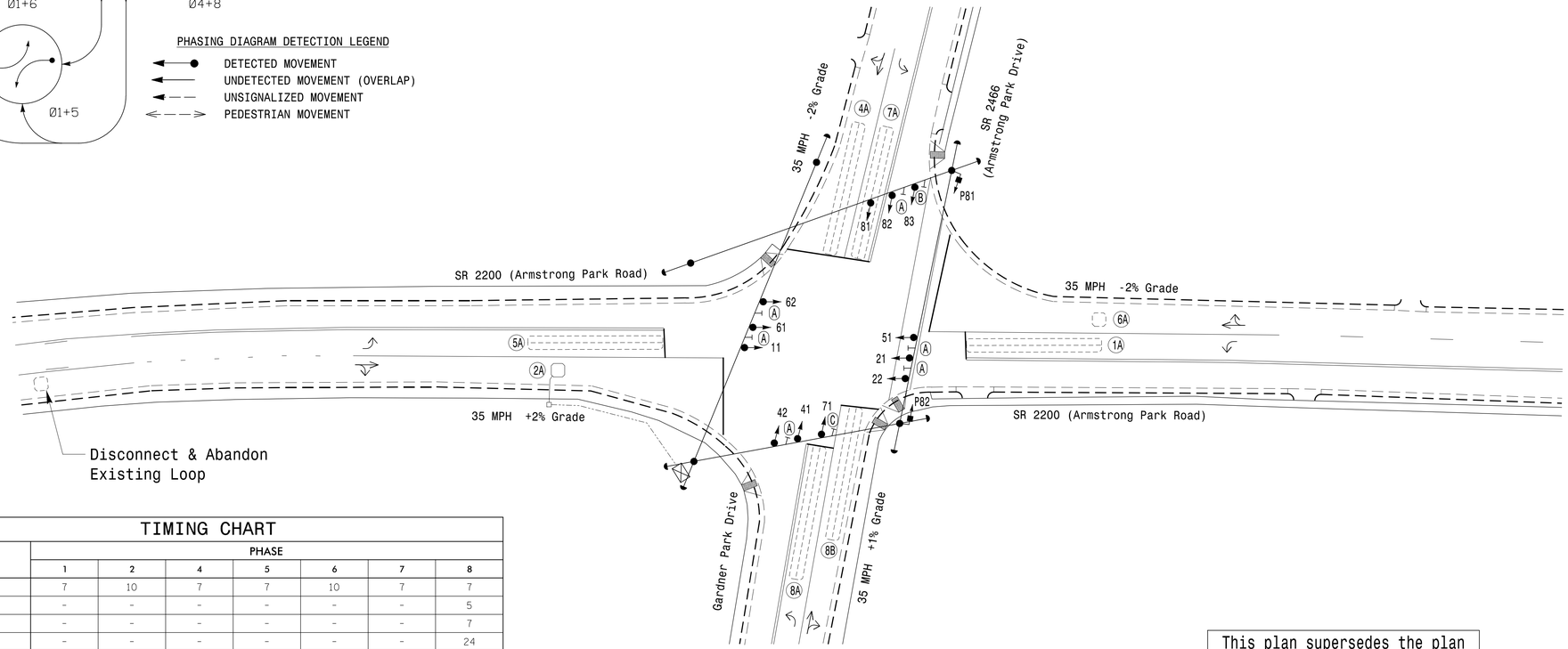
SIGNAL FACE I.D.

All Heads L.E.D.



DETECTOR INSTALLATION CHART

DETECTOR LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
1A	6X60	0	2-4-2	-	1	Yes	-	15	-	N	-	X
					6	Yes	-	-	-	N	-	X
2A	6X6	70	6	X	2	Yes	-	-	-	N	-	X
4A	6X60	0	2-4-2	-	4	Yes	-	10	-	N	-	X
5A	6X60	0	2-4-2	-	5	Yes	-	15	-	N	-	X
					2	Yes	-	3	-	G	-	X
6A	6X6	70	EXIST	-	6	Yes	-	-	-	N	-	X
7A	6X60	0	2-4-2	-	7	Yes	-	15	-	N	-	X
					4	Yes	-	3	-	N	-	X
8A	6X60	0	2-4-2	-	8	Yes	-	3	-	N	-	X
8B	6X60	0	2-4-2	-	8	Yes	-	10	-	N	-	X



TIMING CHART

FEATURE	PHASE 1	2	4	5	6	7	8
Min Green *	7	10	7	7	10	7	7
Delayed Green	-	-	-	-	-	-	5
Walk *	-	-	-	-	-	-	7
Ped Clear	-	-	-	-	-	-	24
Veh. Extension *	2.0	3.0	2.0	2.0	3.0	2.0	2.0
Max 1 *	15	90	45	15	90	25	45
Yellow	3.0	4.0	4.0	3.0	4.0	3.0	4.0
Red Clear	2.4	2.4	1.8	3.1	2.4	1.9	1.8
Red Revert	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Actuations B4 Add *	-	-	-	-	-	-	-
Seconds /Actuation *	-	-	-	-	-	-	-
Max Initial *	-	-	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-	-	-
Time To Reduce *	-	-	-	-	-	-	-
Minimum Gap	-	-	-	-	-	-	-
Locking Detector	-	X	-	-	X	-	-
Recall Position	-	MIN RECALL	-	-	MIN RECALL	-	-
Dual Entry	-	-	X	-	-	-	X
Simultaneous Gap	X	X	X	X	X	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.

6 Phase
Fully Actuated
Gastonia Signal System

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and/or phase 5 may be lagged.
4. Phase 7 may be lagged.
5. Set all detector units to presence mode.
6. In the event of loop replacement, refer to the current ITS and Signal Design Manual and submit a Plan of Record to the Signal Design Section.
7. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
8. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
9. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
10. Pavement markings are existing.
11. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
12. Disconnect and abandon existing loop 2A and re-cut new loop as shown on plan.
13. Install new cabinet on the existing cabinet foundation.
14. All new cabinets and base extenders shall be black in color. See Project Special Provisions for details.
15. City system data:
    Controller Asset #0609.

LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
⊓↓	Pedestrian Signal Head With Push Button & Sign	■↓
○	Signal Pole with Guy	●○
○	Signal Pole with Sidewalk Guy	●○
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
----------	2-in Underground Conduit	----------
N/A	Right of Way	----------
→	Directional Arrow	→
N/A	Curb Ramp	N/A
Ⓐ	Street Name Sign (D3-1)	Ⓐ
Ⓑ	Right "Turning Vehicles" Yield to Pedestrian Sign (R10-15R)	Ⓑ
Ⓒ	Left "Turning Vehicles" Yield to Pedestrian Sign (R10-15L)	Ⓒ

This plan supersedes the plan signed and sealed on 5/23/2022

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Signal Upgrade

Prepared For: Transportation Mobility and Safety Division — North Carolina Department of Transportation — Signal Design Section

750 N.Greenfield Pkwy,Garner,NC 27529

SR 2200 (Armstrong Park Road) at SR 2466 (Armstrong Park Drive)/ Gardner Park Drive

Division 12 Gaston County Gastonia

PLAN DATE:	May 2021	REVIEWED BY:	SL Phillips
PREPARED BY:	CF Davis	REVIEWED BY:	KP Baumann

REVISIONS	INIT.	DATE

SCALE 0 30 1"=30'

NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN

DocuSigned by: 6/22/2022 — SIGNATURE / DATE

SIG. INVENTORY NO. 12-0609

PLANS PREPARED IN THE OFFICE OF:
Kimley»Horn
NC License #F-0102
421 Fayetteville Street, Suite 600
Raleigh, NC 27601
(919) 677-2000

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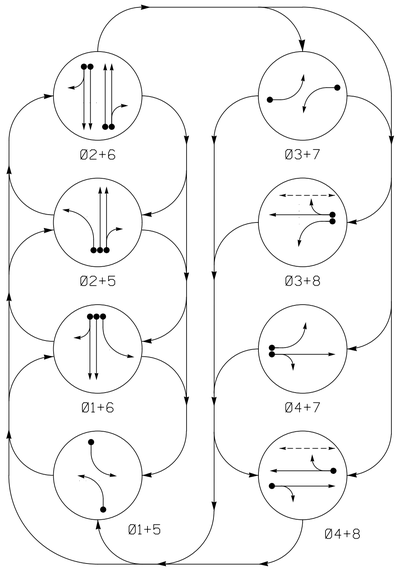
PROJECT REFERENCE NO.	SHEET NO.
C-5703	Sig.79.0

PHASING DIAGRAM

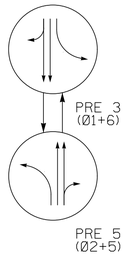


PHASING DIAGRAM DETECTION LEGEND

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

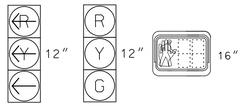
EV PREEMPT PHASES

(Medium Priority)



SIGNAL FACE I.D.

All Heads L.E.D.



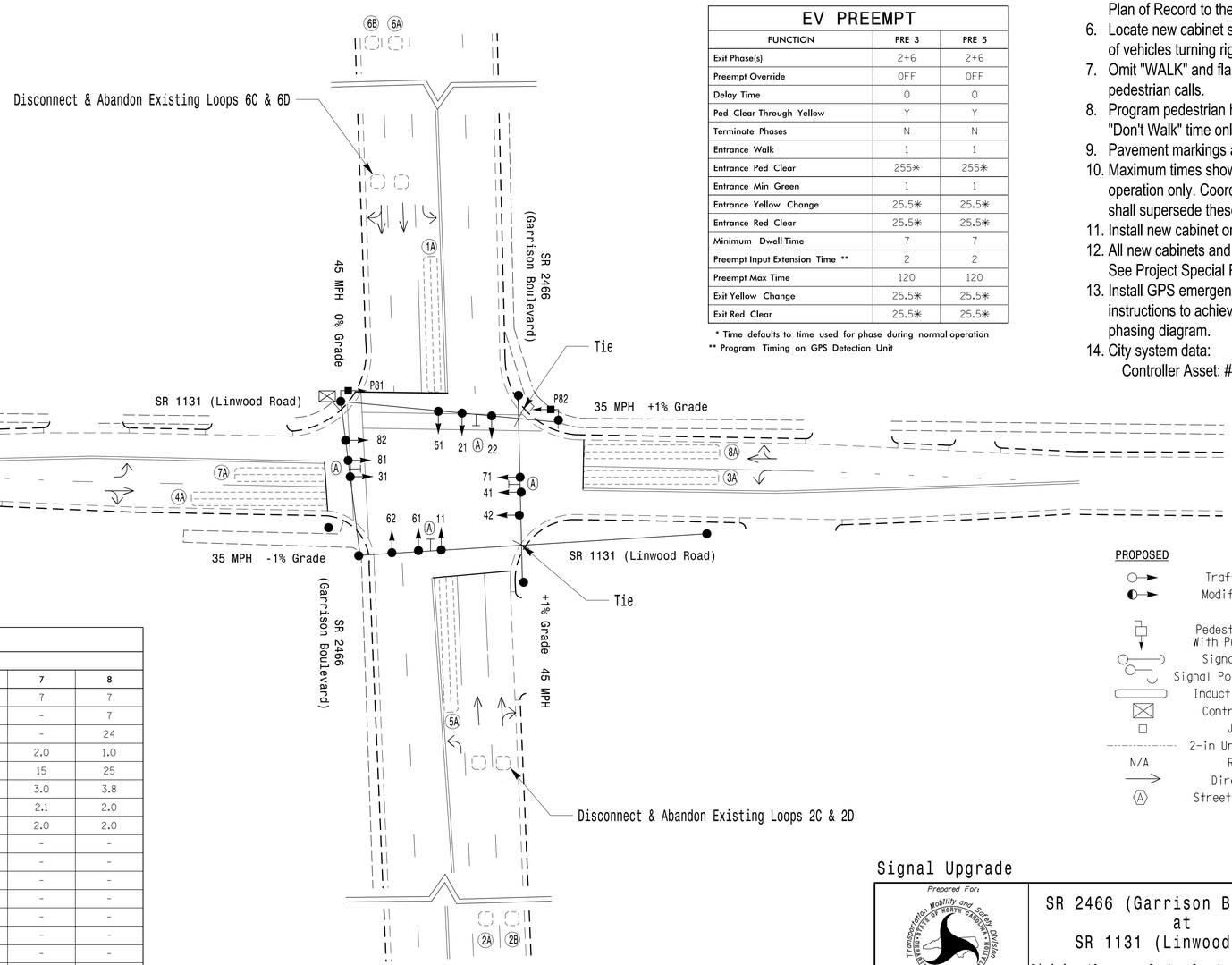
11	21, 22	P81, P82
31	41, 42	
51	61, 62	
71	81, 82	

TABLE OF OPERATION

SIGNAL FACE	PHASE										
	Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3+7	Ø3+8	Ø4+7	Ø4+8	PRE3	PRE5	FLASH
11	←	←	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	←	~~R~~	~~R~~
21, 22	R	R	G	G	R	R	R	R	R	G	Y
31	~~R~~	~~R~~	~~R~~	~~R~~	←	←	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~
41, 42	R	R	R	R	R	R	G	G	R	R	R
51	←	~~R~~	←	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	←	~~R~~
61, 62	R	G	R	G	R	R	R	R	R	G	R	Y
71	~~R~~	~~R~~	~~R~~	~~R~~	←	~~R~~	←	~~R~~	~~R~~	~~R~~	~~R~~
81, 82	R	R	R	R	R	G	R	G	R	R	R
P81,P82	DW	DW	DW	DW	DW	W	DW	W	DW	DW	DRK

DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
1A	6X60	0	2-4-2	-	1	Yes	-	3	-	N	-	X
2A	6X6	300	EXIST	-	2	Yes	-	-	X	N	-	X
2B	6X6	300	EXIST	-	2	Yes	-	-	X	N	-	X
3A	6X60	0	2-4-2	-	3	Yes	-	-	-	N	-	X
4A	6X60	0	2-4-2	-	4	Yes	-	10	-	N	-	X
5A	6X60	0	2-4-2	-	5	Yes	-	3	-	N	-	X
6A	6X6	300	EXIST	-	6	Yes	-	-	X	N	-	X
6B	6X6	300	EXIST	-	6	Yes	-	-	X	N	-	X
7A	6X40	0	2-4-2	-	7	Yes	-	-	-	N	-	X
8A	6X60	0	2-4-2	-	8	Yes	-	10	-	N	-	X



EV PREEMPT

FUNCTION	PRE 3	PRE 5
Exit Phase(s)	2+6	2+6
Preempt Override	OFF	OFF
Delay Time	0	0
Ped Clear Through Yellow	Y	Y
Terminate Phases	N	N
Entrance Walk	1	1
Entrance Ped Clear	255*	255*
Entrance Min Green	1	1
Entrance Yellow Change	25.5*	25.5*
Entrance Red Clear	25.5*	25.5*
Minimum Dwell Time	7	7
Preempt Input Extension Time **	2	2
Preempt Max Time	120	120
Exit Yellow Change	25.5*	25.5*
Exit Red Clear	25.5*	25.5*

* Time defaults to time used for phase during normal operation

** Program Timing on GPS Detection Unit

8 Phase
Fully Actuated
w/ Emergency Vehicle Preemption
Gastonia Signal System

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Disconnect & Abandon existing loops 2C, 2D, 6C, and 6D.
4. Set all detector units to presence mode.
5. In the event of loop replacement, refer to the current ITS and Signal Design Manual and submit a Plan of Record to the Signal Design Section.
6. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
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. Pavement markings are existing.
10. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
11. Install new cabinet on the existing cabinet foundation.
12. All new cabinets and base extenders shall be black in color. See Project Special Provisions for details.
13. Install GPS emergency preemption system per manufacturer's instructions to achieve preemption needed, as shown in phasing diagram.
14. City system data:
    Controller Asset: #0632

LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
	Sign	
□↓	Pedestrian Signal Head With Push Button & Sign	■↓
○↓	Signal Pole with Guy	●↓
○↓	Signal Pole with Sidewalk Guy	●↓
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
-----	2-in Underground Conduit	-----
N/A	Right of Way	———
→	Directional Arrow	→
Ⓐ	Street Name Sign (D3-1)	Ⓐ

TIMING CHART

FEATURE	PHASE							
	1	2	3	4	5	6	7	8
Min Green *	7	12	7	7	7	12	7	7
Walk *	-	-	-	-	-	-	-	7
Ped Clear	-	-	-	-	-	-	-	24
Veh. Extension *	1.0	6.0	1.0	1.0	1.0	6.0	2.0	1.0
Max 1 *	15	45	15	25	15	45	15	25
Yellow	3.0	4.4	3.0	3.9	3.0	4.5	3.0	3.8
Red Clear	2.1	1.0	2.6	1.6	2.3	1.0	2.1	2.0
Red Revert	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Actuations B4 Add *	-	-	-	-	-	-	-	-
Seconds /Actuation *	-	1.5	-	-	-	1.5	-	-
Max Initial *	-	34	-	-	-	34	-	-
Time Before Reduction *	-	15	-	-	-	15	-	-
Time To Reduce *	-	30	-	-	-	30	-	-
Minimum Gap	-	3.0	-	-	-	3.0	-	-
Locking Detector	-	X	-	-	-	X	-	-
Recall Position	-	MIN RECALL	-	-	-	MIN RECALL	-	-
Dual Entry	-	-	-	-	-	-	-	-
Simultaneous Gap	X	X	X	X	X	X	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.

Signal Upgrade

PLANS PREPARED IN THE OFFICE OF:
Kimley»Horn
NC License #F-0102
421 Fayetteville Street, Suite 600
Raleigh, NC 27601
(919) 677-2000

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

SR 2466 (Garrison Boulevard)
at
SR 1131 (Linwood Road)

Division 12 | Gaston County | Gastonia

PLAN DATE:	May 2021	REVIEWED BY:	SL Phillips
PREPARED BY:	DM Curri	REVIEWED BY:	KP Baumann

SCALE: 0 30, 1"=30'

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN

DocuSigned by: SIGNATURE 3/11/2022 DATE

SIG. INVENTORY NO. 12-0632

3/9/2022 11:13:36 AM Danielle.Curri \\kimley-horn.com\SE_RAL1\RAL_TPTO_ITS\01103569 Gastonia Signal System\8 Signals\54 - Signal Design\8120632-2021.dgn

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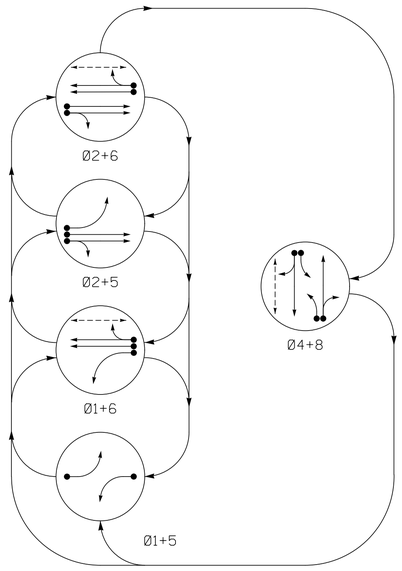
PROJECT REFERENCE NO.	SHEET NO.
C-5703	Sig.80.0

5 Phase Fully Actuated Gastonia Signal System

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

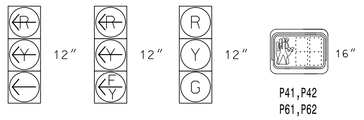
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø4+8	FLASH
11	↚	↚	R̸	R̸	R̸	R̸
21,22	R	R	G	G	R	Y
41	R̸	R̸	R̸	R̸	F̸Y	R̸
42,43	R	R	R	R	G	R
51	↚	R̸	↚	R̸	R̸	R̸
61,62	R	G	R	G	R	Y
81	R̸	R̸	R̸	R̸	F̸Y	R̸
82,83	R	R	R	R	G	R
P41,P42	DW	DW	DW	DW	W	DRK
P61,P62	DW	W	DW	W	DW	DRK

SIGNAL FACE I.D.

All Heads L.E.D.



11
51

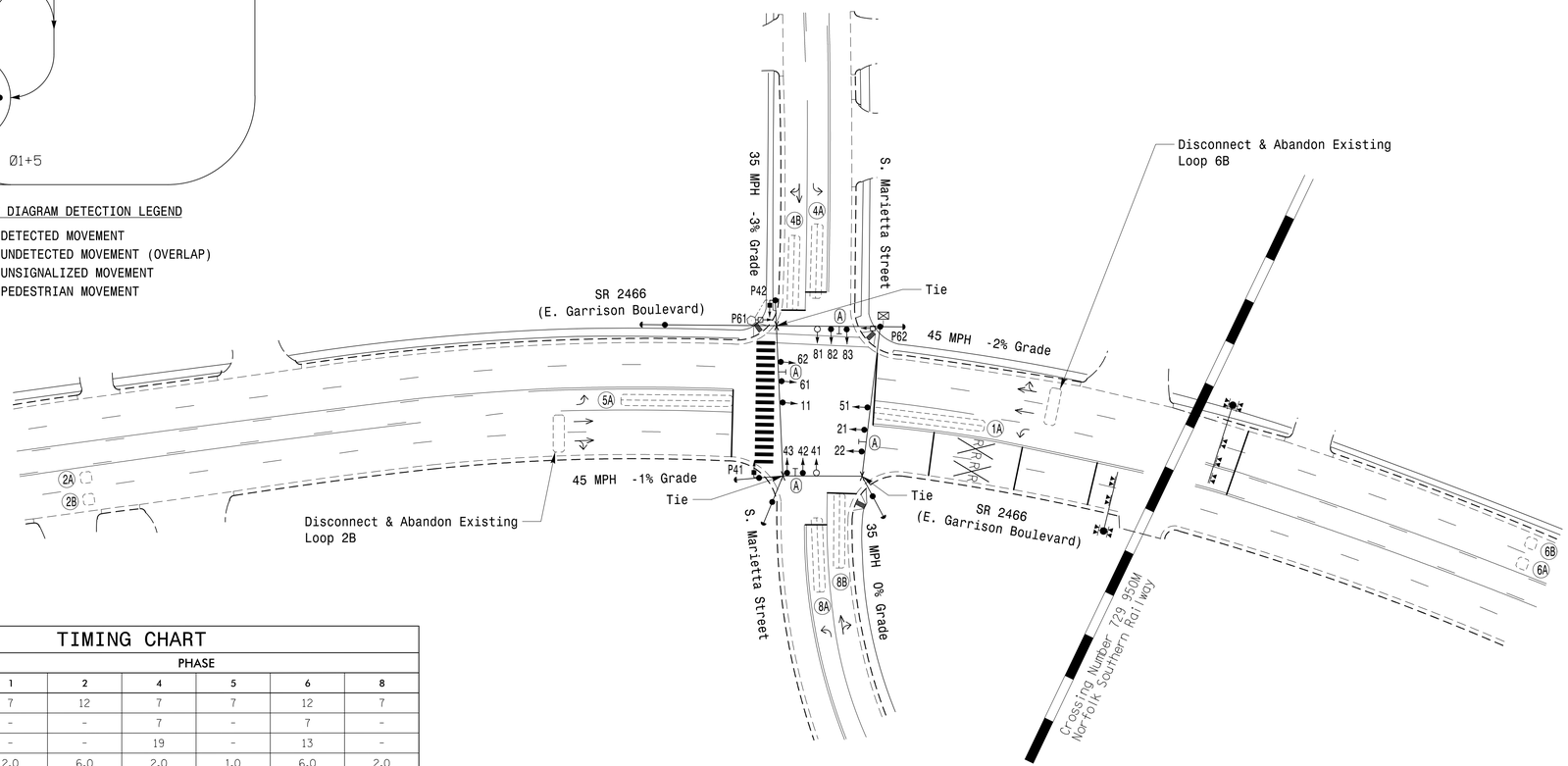
41
81

21,22
42,43
61,62
82,83

P41,P42
P61,P62

DETECTOR INSTALLATION CHART

DETECTOR LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
1A	6X60	0	2-4-2	-	1	Yes	-	-	-	N	-	X
2A	6X6	345	EXIST	-	2	Yes	-	-	X	N	-	X
2B	6X6	345	EXIST	-	2	Yes	-	-	X	N	-	X
4A	6X40	+5	2-4-2	-	4	Yes	-	-	-	N	-	X
4B	6X40	0	2-4-2	-	4	Yes	-	-	-	N	-	X
5A	6X60	0	2-4-2	-	5	Yes	-	-	-	N	-	X
6A	6X6	345	EXIST	-	6	Yes	-	-	X	N	-	X
6B	6X6	345	EXIST	-	6	Yes	-	-	X	N	-	X
8A	6X60	+5	2-4-2	-	8	Yes	-	-	-	N	-	X
8B	6X60	0	2-4-2	-	8	Yes	-	-	-	N	-	X



NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and/or phase 5 may be lagged.
4. Reposition existing signal heads numbered 42, 43, 82, & 83.
5. In the event of loop replacement, refer to the current ITS and Signal Design Manual and submit a Plan of Record to the Signal Design Section.
6. Set all detector units to presence mode.
7. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
8. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
9. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
10. Pavement markings are existing.
11. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
12. Disconnect and abandon existing loops 2B & 6B.
13. Install new cabinet on the existing cabinet foundation.
14. All new cabinets and base extenders shall be black in color. See Project Special Provisions for details.
15. Reconnect lead-in cable to separate loops 2A, 2B, 6A & 6B, as shown.
16. Existing signal heads 41, 42, 81, & 82 have been relabeled to 42, 43, 82, & 83, respectively.
17. All proposed pedestrian signal heads shall be black in color. See Project Special Provisions for details.
18. All proposed pedestals and pushbutton posts shall be black in color. See Project Special Provisions for details.
19. City of system data:
    Controller Asset #0633.

LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Type II Signal Pedestal	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
N/A	Railroad Tracks	
N/A	Railroad Cantilever	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
N/A	Curb Ramp	
A	Street Name Sign (D3-1)	A

TIMING CHART

FEATURE	PHASE 1	2	4	5	6	8
Min Green *	7	12	7	7	12	7
Walk *	-	-	7	-	7	-
Ped Clear	-	-	19	-	13	-
Veh. Extension *	2.0	6.0	2.0	1.0	6.0	2.0
Max 1 *	15	55	30	15	55	30
Yellow	3.0	4.6	4.1	3.0	4.7	4.1
Red Clear	1.9	1.0	2.0	2.3	1.0	2.0
Red Revert	2.0	2.0	2.0	2.0	2.0	2.0
Actuations B4 Add *	-	-	-	-	-	-
Seconds /Actuation *	-	1.5	-	-	1.5	-
Max Initial *	-	39	-	-	39	-
Time Before Reduction *	-	15	-	-	15	-
Time To Reduce *	-	30	-	-	30	-
Minimum Gap	-	3.8	-	-	4.8	-
Locking Detector	-	X	-	-	X	-
Recall Position	-	MIN RECALL	-	-	MIN RECALL	-
Dual Entry	-	-	X	-	-	X
Simultaneous Gap	X	X	X	X	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.

Signal Upgrade

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

SR 2466 (E. Garrison Boulevard)
at
S. Marietta Street

Division 12 Gaston County Gastonia

PLAN DATE:	May 2021	REVIEWED BY:	SL Phillips
PREPARED BY:	CF Davis	REVIEWED BY:	KP Baumann

REVISIONS	INIT.	DATE

SCALE 0 40 1"=40'

N

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN

DocuSigned by: 3/11/2022
SIGNATURE DATE

SIG. INVENTORY NO. 12-0633

PLANS PREPARED IN THE OFFICE OF:
Kimley»Horn
NC License #F-0102
421 Fayetteville Street, Suite 600
Raleigh, NC 27601
(919) 677-2000

750 N.Greenfield Pkwy,Garner,NC 27529

3/9/2022 11:16:24 AM Daniel.Curri
\\kimley-horn.com\SE_RAL1\RAL_TPTO_ITS\011036569 Gastonia Signal System\9 Signals\54 - Signal Design\F120633-2021.dgn

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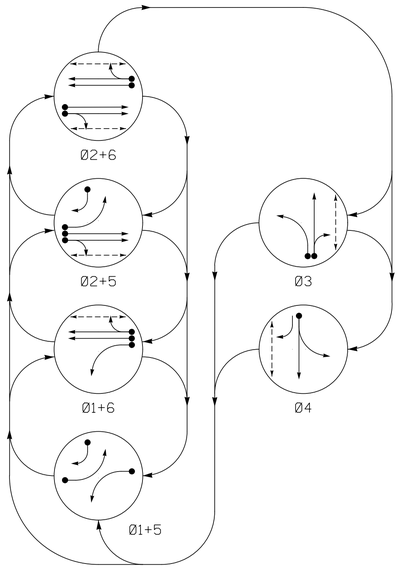
PROJECT REFERENCE NO.	SHEET NO.
C-5703	Sig.81.0

6 Phase Fully Actuated Gastonia Signal System

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

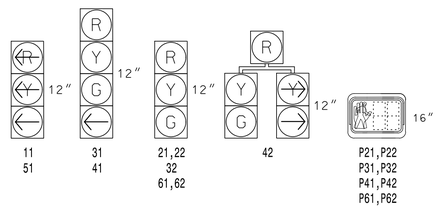
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3	Ø4	FLASH
11	←	←	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~
21,22	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~~
61,62	R	G	R	G	R	R	Y
P21,P22	DW	DW	W	W	DW	DW	DRK
P31,P32	DW	DW	DW	DW	W	DW	DRK
P41,P42	DW	DW	DW	DW	DW	W	DRK
P61,P62	DW	W	DW	W	DW	DW	DRK

SIGNAL FACE I.D.

All Heads L.E.D.

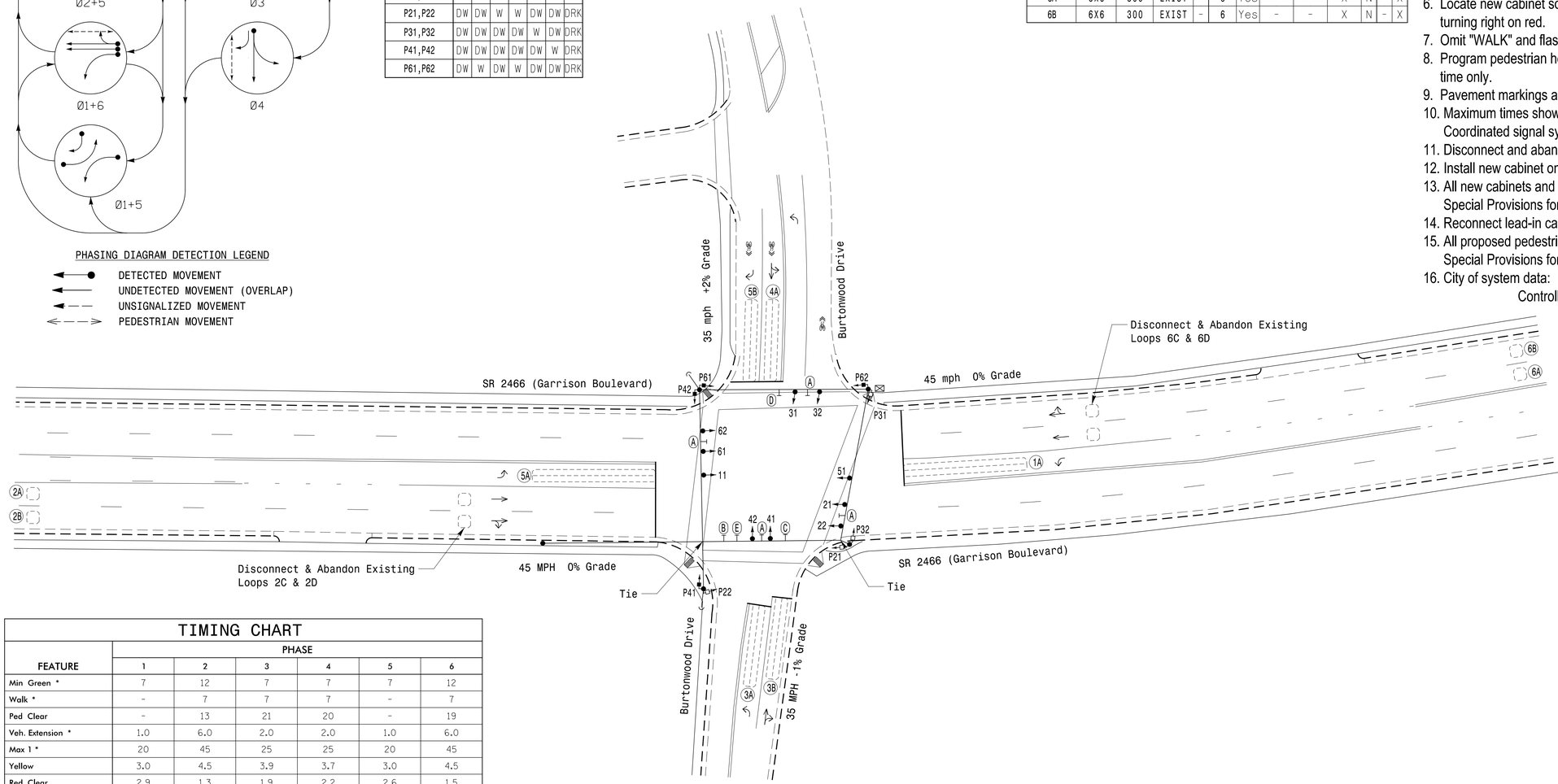


DETECTOR INSTALLATION CHART

DETECTOR LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
1A	6X60	0	2-4-2	-	1	Yes	-	-	-	N	-	X
2A	6X6	300	EXIST	-	2	Yes	-	-	X	N	-	X
2B	6X6	300	EXIST	-	2	Yes	-	-	X	N	-	X
3A	6X40	0	2-4-2	-	3	Yes	-	-	-	N	-	X
3B	6X40	0	2-4-2	-	3	Yes	-	-	-	N	-	X
4A	6X40	0	2-4-2	-	4	Yes	-	-	-	N	-	X
5A	6X60	0	2-4-2	-	5	Yes	-	-	-	N	-	X
5B	6X40	0	2-4-2	-	5	Yes	-	-	-	N	-	X
6A	6X6	300	EXIST	-	6	Yes	-	-	X	N	-	X
6B	6X6	300	EXIST	-	6	Yes	-	-	X	N	-	X

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and/or phase 5 may be lagged.
4. The order of phase 3 and phase 4 may be reversed.
5. Set all detector units to presence mode.
6. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
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. Pavement markings are existing.
10. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
11. Disconnect and abandon existing loops 2C, 2D, 6C, and 6D.
12. Install new cabinet on the existing cabinet foundation.
13. All new cabinets and base extenders shall be black in color. See Project Special Provisions for details.
14. Reconnect lead-in cable to separate loops 2A, 2B, 6A, and 6B, as shown.
15. All proposed pedestrian signal heads shall be black in color. See Project Special Provisions for details.
16. City of system data:
    Controller Asset #0634.



LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
□↓	Pedestrian Signal Head With Push Button & Sign	■↓
⬡	Type II Signal Pedestal	⬢
○	Signal Pole with Guy	●
○	Signal Pole with Sidewalk Guy	●
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
----------	2-in Underground Conduit	----------
N/A	Right of Way	------
→	Directional Arrow	→
N/A	Curb Ramp	
Ⓐ	Street Name Sign (D3-1)	Ⓐ
Ⓑ	"NO TURN ON RED" Sign (R10-11)	Ⓑ
Ⓒ	Combined Through and Left Arrow Sign (R3-6L)	Ⓒ
Ⓓ	Left Arrow "ONLY" Sign (R3-5L)	Ⓓ
Ⓔ	Right Arrow "ONLY" SIGN (R3-5R)	Ⓔ
N/A	Sharrow	

TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6
Min Green *	7	12	7	7	7	12
Walk *	-	7	7	7	-	7
Ped Clear	-	13	21	20	-	19
Veh. Extension *	1.0	6.0	2.0	2.0	1.0	6.0
Max 1 *	20	45	25	25	20	45
Yellow	3.0	4.5	3.9	3.7	3.0	4.5
Red Clear	2.9	1.3	1.9	2.2	2.6	1.5
Red Revert	2.0	2.0	2.0	2.0	2.0	2.0
Actuations B4 Add *	-	-	-	-	-	-
Seconds /Actuation *	-	1.5	-	-	-	1.5
Max Initial *	-	34	-	-	-	34
Time Before Reduction *	-	15	-	-	-	15
Time To Reduce *	-	30	-	-	-	30
Minimum Gap	-	3.0	-	-	-	3.0
Locking Detector	-	X	-	-	-	X
Recall Position	-	MIN RECALL	-	-	-	MIN RECALL
Dual Entry	-	-	-	-	-	-
Simultaneous Gap	X	X	X	X	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

PLANS PREPARED IN THE OFFICE OF:
Kimley»Horn
NC License #F-0102
421 Fayetteville Street, Suite 600
Raleigh, NC 27601
(919) 677-2000

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

SCALE 0 30 1"=30'

SR 2466 (Garrison Boulevard) at Burtonwood Drive

Division 12 Gaston County Gastonia

PLAN DATE:	May 2021	REVIEWED BY:	SL Phillips
PREPARED BY:	MC Burke	REVIEWED BY:	KP Baumann

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN

DocuSigned by: 3/11/2022
DOCUMENTS NOT SIGNATURE DATE

SIG. INVENTORY NO. 12-0634

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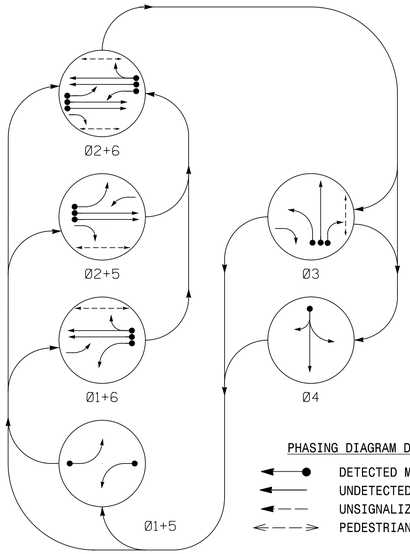
PROJECT REFERENCE NO.	SHEET NO.
C-5703	Sig.82.0

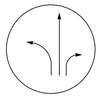
6 Phase Fully Actuated w/ Alternate Phasing Operation and Emergency Vehicle Preemption Gastonia Signal System

DEFAULT PHASING DIAGRAM



DEFAULT EV PREEMPT PHASES

(Medium Priority)



PRE 3
(Ø3)

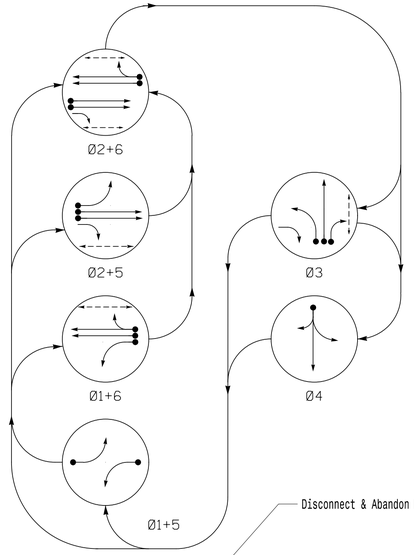
DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3	Ø4	PRE 3	FLASH
11	←-	←-	F Y	F Y	-R	-R	-R	-Y
21	R	R	G	G	R	R	R	Y
22	R	R	G	G	R/→	R	R	Y
31	R	R	R	R	G ←	R	G ←	R
32, 33, 34	R	R	R	R	G	R	G	R
41	R	R	R	R	R	G ←	R	R
42	R	R	R	R	R	G	R	R
51	←-	F Y	←-	F Y	-R	-R	-R	-Y
61, 62	R	G	R	G	R	R	R	Y
P21, P22	DW	DW	W	W	DW	DW	DW	DRK
P31, P32	DW	DW	DW	DW	W	DW	DW	DRK
P61, P62	DW	W	DW	W	DW	DW	DW	DRK

ALTERNATE PHASING TABLE OF OPERATION

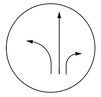
SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3	Ø4	PRE 3	FLASH
11	←-	←-	-R	-R	-R	-R	-R	-Y
21	R	R	G	G	R	R	R	Y
22	R	R	G	G	R/→	R	R	Y
31	R	R	R	R	G ←	R	G ←	R
32, 33, 34	R	R	R	R	G	R	G	R
41	R	R	R	R	R	G ←	R	R
42	R	R	R	R	R	G	R	R
51	←-	-R	←-	-R	-R	-R	-R	-Y
61, 62	R	G	R	G	R	R	R	Y
P21, P22	DW	DW	W	W	DW	DW	DW	DRK
P31, P32	DW	DW	DW	DW	W	DW	DW	DRK
P61, P62	DW	W	DW	W	DW	DW	DW	DRK

ALTERNATE PHASING DIAGRAM



ALTERNATE EV PREEMPT PHASES

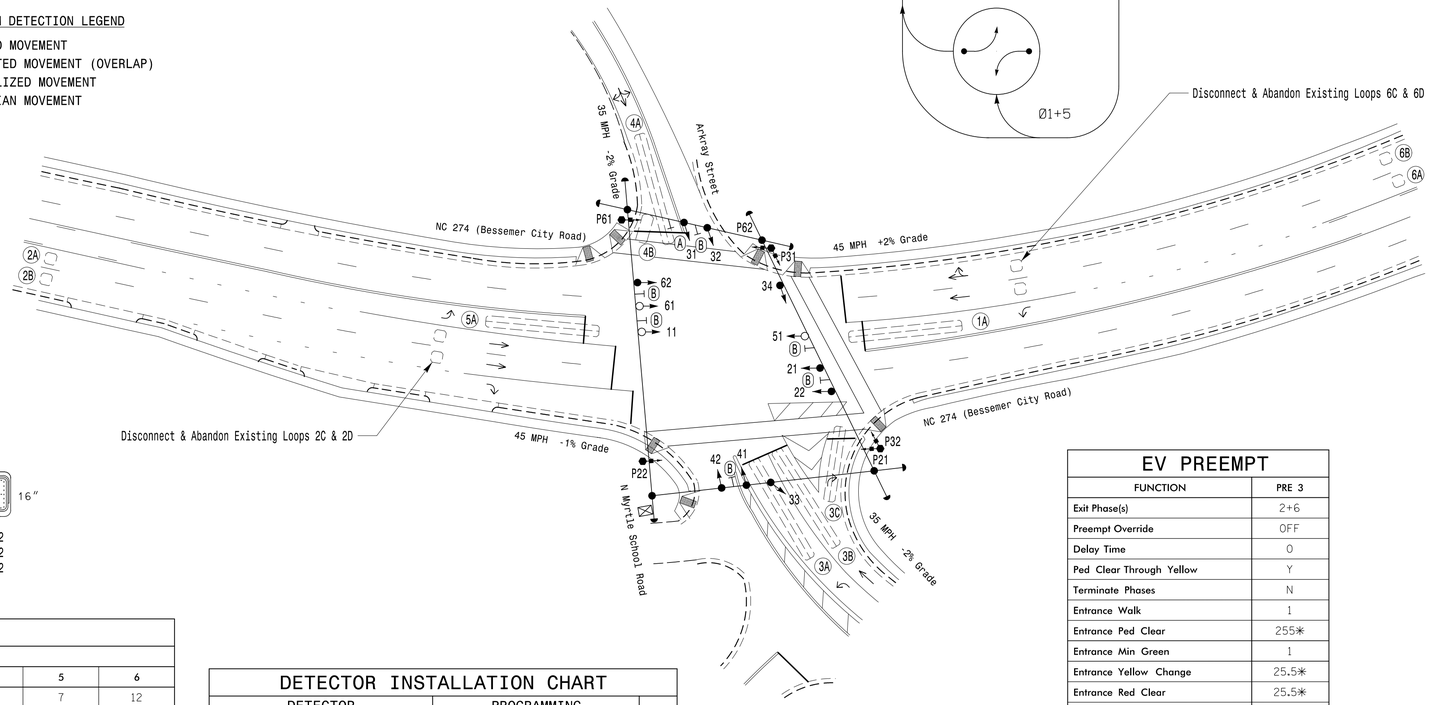
(Medium Priority)



PRE 3
(Ø3)

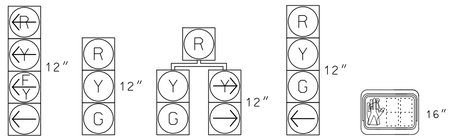
PHASING DIAGRAM DETECTION LEGEND

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



SIGNAL FACE I.D.

All Heads L.E.D.



11
51

21
32,33,34
42
61,62

22

31
41

P21, P22
P31, P32
P61, P62

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and/or phase 5 may be lagged.
4. The order of phase 3 and phase 4 may be reversed.
5. Set all detector units to presence mode.
6. In the event of loop replacement, refer to the current ITS and Signal Design Manual and submit a Plan of Record to the Signal Design Section.
7. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
8. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
9. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
10. Pavement markings are existing.
11. The City Engineer or their representative will determine the hours of use for each phasing plan.
12. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
13. Install new cabinet on the existing cabinet foundation.
14. All new cabinets and base extenders shall be black in color. See Project Special Provisions for details.
15. Disconnect and abandon existing loops 2C, 2D, 6C, and 6D.
16. Reposition existing signal head 62.
17. Install GPS emergency preemption system per manufacturer's instructions to achieve preemption needed, as shown in phasing diagram.
18. Reconnect lead-in cable to separate loops 2A, 2B, 6A, and 6B, as shown.
19. Existing signal heads 22 and 23 have been relabeled to 21 and 22, respectively.
20. City system data:
    Controller Asset: #0636

TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6
Min Green *	7	12	7	7	7	12
Walk *	-	7	7	-	-	7
Ped Clear	-	30	22	-	-	18
Veh. Extension *	1.0	6.0	1.0	1.0	1.0	6.0
Max 1 *	15	55	15	20	15	55
Yellow	3.0	4.6	4.0	4.0	3.0	4.6
Red Clear	3.2	1.9	3.0	2.6	2.6	1.9
Red Revert	2.0	2.0	2.0	2.0	2.0	2.0
Actuations B4 Add *	-	-	-	-	-	-
Seconds /Actuation *	-	1.5	-	-	-	1.5
Max Initial *	-	34	-	-	-	34
Time Before Reduction *	-	15	-	-	-	15
Time To Reduce *	-	30	-	-	-	30
Minimum Gap	-	3.0	-	-	-	3.0
Locking Detector	-	X	-	-	-	X
Recall Position	-	MIN RECALL	-	-	-	MIN RECALL
Dual Entry	-	-	-	-	-	-
Simultaneous Gap	X	X	X	X	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.

DETECTOR INSTALLATION CHART

DETECTOR LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
1A	6X60	+5	2-4-2	-	1	Yes	-	10*	-	N	-	Y
					6#	Yes	-	3	-	C	-	Y
2A	6X6	300	EXIST	-	2	Yes	-	-	X	N	-	Y
2B	6X6	300	EXIST	-	2	Yes	-	-	X	N	-	Y
3A	6X60	0	2-4-2	-	3	Yes	-	-	-	N	-	Y
3B	6X60	0	2-4-2	-	3	Yes	-	-	-	N	-	Y
3C	6X40	+5	2-4-2	-	3	Yes	-	15	-	N	-	Y
4A	6X60	+5	2-4-2	-	4	Yes	-	5	-	N	-	Y
4B	6X15	+5	EXIST	-	4	Yes	-	10	-	N	-	Y
5A	6X60	+5	2-4-2	-	5	Yes	-	10*	-	N	-	Y
					2#	Yes	-	3	-	C	-	Y
6A	6X6	300	EXIST	-	6	Yes	-	-	X	N	-	Y
6B	6X6	300	EXIST	-	6	Yes	-	-	X	N	-	Y

* Reduce Delay to 3 seconds during Alternate Phasing operation.
\# Disable Phase call for loop during Alternate Phasing operation.

EV PREEMPT

FUNCTION	PRE 3
Exit Phase(s)	2+6
Preempt Override	OFF
Delay Time	0
Ped Clear Through Yellow	Y
Terminate Phases	N
Entrance Walk	1
Entrance Ped Clear	255*
Entrance Min Green	1
Entrance Yellow Change	25.5*
Entrance Red Clear	25.5*
Minimum Dwell Time	7
Preempt Input Extension Time **	2
Preempt Max Time	120
Exit Yellow Change	25.5*
Exit Red Clear	25.5*

* Time defaults to time used for phase during normal operation.
** Program Timing on GPS Detection Unit.

LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
⬡	Type II Signal Pedestal	⬢
□	Pedestrian Signal Head With Push Button & Sign	■
○	Signal Pole with Guy	●
○	Signal Pole with Sidewalk Guy	●
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
-----	2-in Underground Conduit	-----
N/A	Right of Way	-----
→	Directional Arrow	→
Ⓐ	Left Turn Only Sign (R3-5L)	Ⓐ
Ⓑ	Street Name Sign (D3-1)	Ⓑ

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

NC 274 (Bessemer City Road) at Arkray St. & Myrtle School Road

Division 12 Gaston County Gastonia

PLAN DATE:	May 2021	REVIEWED BY:	SL Phillips
PREPARED BY:	CF Davis	REVIEWED BY:	KP Baumann

REVISIONS	INIT.	DATE

SCALE: 0 40 — 1"=40'

NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN

DocuSigned by: SIGNATURE 3/11/2022 DATE

SIG. INVENTORY NO. 12-0636

PLANS PREPARED IN THE OFFICE OF:
Kimley»Horn
NC License #F-0102
421 Fayetteville Street, Suite 600
Raleigh, NC 27601
(919) 677-2000

3/9/2022 11:14:12 AM Danielle.Curri ***kimley-horn.com***E_RAL1***RAL_TPTD***_ITS***011036569 Gastonia Signal Systems***3 Signals***54 - Signal Design***C120636-2021.dgn

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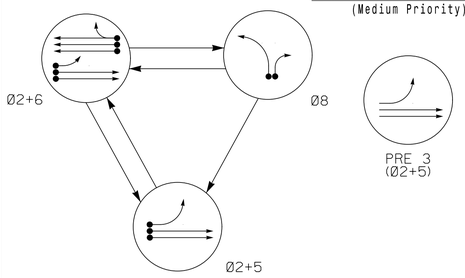
PROJECT REFERENCE NO.	SHEET NO.
C-5703	Sig.83.0

DEFAULT PHASING DIAGRAM

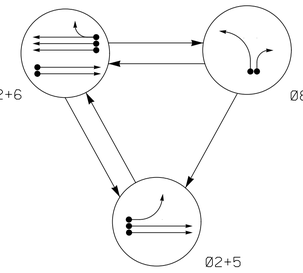


DEFAULT EV PREEMPT PHASES
(Medium Priority)

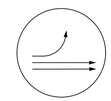
DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2+5	Ø2+6	Ø8	PRE 3	FLASH
21, 22	↑	↑	R	↑	Y
51	←	←F	←R	←	←Y
61, 62, 63	R	G	R	R	Y
81, 82, 83	R	R	G	R	R

ALTERNATE PHASING DIAGRAM



ALTERNATE EV PREEMPT PHASES
(Medium Priority)



ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2+5	Ø2+6	Ø8	PRE 3	FLASH
21, 22	↑	↑	R	↑	Y
51	←	←R	←R	←	←Y
61, 62, 63	R	G	R	R	Y
81, 82, 83	R	R	G	R	R

DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
2A	6X6	90	EXIST	-	2	Yes	-	-	-	N	-	X
2B	6X6	90	EXIST	-	2	Yes	-	-	-	N	-	X
5A	6X60	+5	2-4-2	-	5	Yes	-	5**	-	N	-	X
					2*	Yes	-	-	-	N	-	X
6A	6X6	90	EXIST	-	6	Yes	-	-	-	N	-	X
6B	6X6	90	EXIST	-	6	Yes	-	-	-	N	-	X
6C	6X6	90	EXIST	-	6	Yes	-	-	-	N	-	X
8A	6X40	0	2-4-2	-	8	Yes	-	-	-	N	-	X
8B	6X40	0	2-4-2	-	8	Yes	-	-	-	N	-	X
S1	6X6	+125	EXIST	-	-	No	-	-	-	N	X	X
S2	6X6	+125	EXIST	-	-	No	-	-	-	N	X	X

* Disable phase call for loop during Alternate Phasing Operation.
** Reduce delay to 3 seconds during Alternate Phasing Operation.

3 Phase Fully Actuated w/ Alternate Phasing Operation and Emergency Vehicle Preemption Gastonia Signal System

NOTES

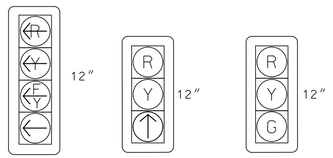
1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 5 may be lagged.
4. Reposition existing signal heads numbered 21 and 22.
5. Disconnect and abandon existing loop 2A.
6. Set all detector units to presence mode.
7. In the event of loop replacement, refer to the current ITS and Signal Design Manual and submit a Plan of Record to the Signal Design Section.
8. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
9. Pavement markings are existing.
10. The City Engineer or their representative will determine the hours of use for each phasing plan.
11. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
12. Existing loops 2B and 2C have been relabeled to 2A and 2B, respectively.
13. Install new cabinet on the existing cabinet foundation.
14. All new cabinets and base extenders shall be black in color. See Project Special Provisions for details.
15. Reconnect lead-in cable to separate loops 2A & 2B, 6A, 6B & 6C, as shown.
16. Existing phase 4 has been changed to phase 8 on this plan. Change all signal heads, pedestrian signal heads, pedestrian push buttons, and loops as needed to achieve the phasing shown.
17. Install GPS emergency preemption system per manufacturer's instructions to achieve preemption needed, as shown in phasing diagram.
18. City system data:
    Controller Asset #0902.

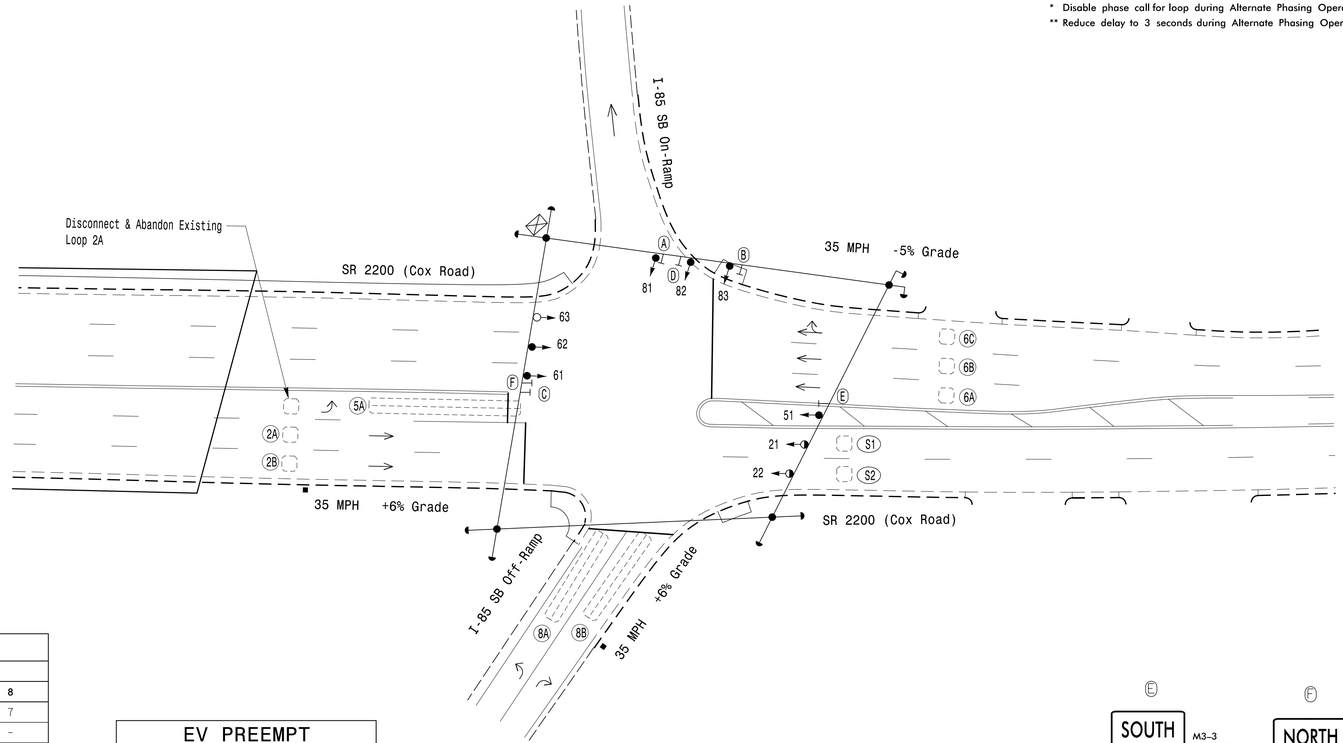
PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE I.D.

All Heads L.E.D.
All Heads have Backplates with reflective borders





TIMING CHART

FEATURE	PHASE 2	5	6	8
Min Green *	10	7	10	7
Walk *	-	-	-	-
Ped Clear	-	-	-	-
Veh. Extension *	3.0	2.0	3.0	2.0
Max 1 *	45	15	45	30
Yellow	4.2	3.0	4.2	3.5
Red Clear	2.1	2.6	2.1	1.9
Red Revert	2.0	2.0	2.0	2.0
Actuations B4 Add *	-	-	-	-
Seconds /Actuation *	-	-	-	-
Max Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Locking Detector	X	-	X	-
Recall Position	MIN RECALL	-	MIN RECALL	-
Dual Entry	-	-	-	-
Simultaneous Gap	X	X	X	X

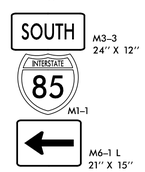
* These values may be field adjusted. Do not adjust Min Green and Extension times for phases 2 and 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

EV PREEMPT

FUNCTION	PRE 3
Exit Phase(s)	2+6
Preempt Override	OFF
Delay Time	0
Ped Clear Through Yellow	N
Terminate Phases	N
Entrance Walk	-
Entrance Ped Clear	-
Entrance Min Green	1
Entrance Yellow Change	25.5*
Entrance Red Clear	25.5*
Minimum Dwell Time	7
Preempt Input Extension Time **	2
Preempt Max Time	120
Exit Yellow Change	25.5*
Exit Red Clear	25.5*

* Time defaults to time used for phase during normal operation
** Program Timing on GPS Detection Unit

(E)



(F)

LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
□↓	Pedestrian Signal Head With Push Button & Sign	■↓
○→	Signal Pole with Guy	●→
○↷	Signal Pole with Sidewalk Guy	●↷
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
·····	2-in Underground Conduit	·····
N/A	Right of Way	———
→	Directional Arrow	→
Ⓐ	Left Arrow "ONLY" Sign (R3-5L)	Ⓐ
Ⓑ	Right Arrow "ONLY" Sign (R3-5R)	Ⓑ
Ⓒ	No Left Turn Sign (R3-2)	Ⓒ
Ⓓ	Street Name Sign (D3-1)	Ⓓ

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

SR 2200 (Cox Rd.) at I-85 Southbound Ramps

Division 12 Gaston County Gastonia

PLAN DATE:	May 2021	REVIEWED BY:	SL Phillips
PREPARED BY:	SP Pennington	REVIEWED BY:	KP Baumann

REVISIONS	INIT.	DATE

SCALE: 0 30 — 1"=30'

NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN

DocuSigned by:
SIGNATURE 3/11/2022 DATE

SIG. INVENTORY NO. 12-0902

PLANS PREPARED IN THE OFFICE OF:
Kimley»Horn
NC License #F-0102
421 Fayetteville Street, Suite 600
Raleigh, NC 27601
(919) 677-2000
750 N.Greenfield Pkwy.Garner,NC 27529

3/9/2022 11:17:03 AM Danielle.Curri ***kimley-horn.com***E_RAL1***RAL_TPTO***_ITS***01103569 Gastonia Signal Systems***Signals***54 - Signal Design***0120902-2021.dgn

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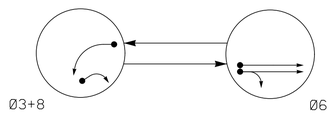
PROJECT REFERENCE NO.	SHEET NO.
C-5703	Sig.84.0

PHASING DIAGRAM



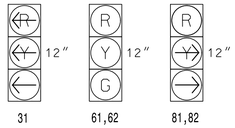
PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION			
SIGNAL FACE	PHASE Ø3+8	PHASE Ø6	PHASE FLASH
31	←	←R	←R
61,62	R	G	Y
81,82	→	R	R

SIGNAL FACE I.D.

All Heads L.E.D.



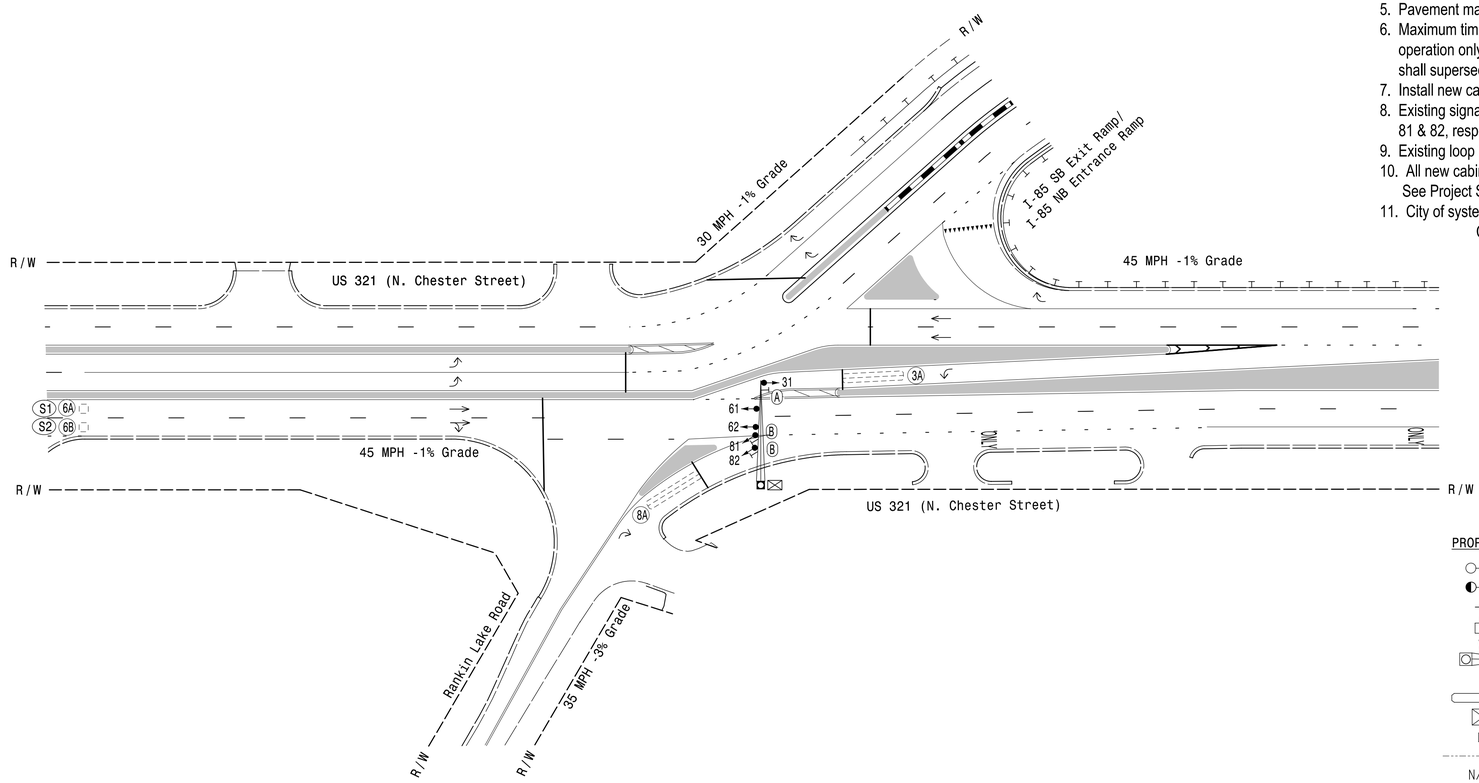
DETECTOR INSTALLATION CHART

DETECTOR						PROGRAMMING						
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
3A	6X40	0	2-4-2	-	3	Yes	-	-	-	N	-	X
6A/S1	6X6	300	EXIST	-	6	Yes	-	-	X	N	X	X
6B/S2	6X6	300	EXIST	-	6	Yes	-	-	X	N	X	X
8A	6X40	0	2-4-2	-	8	Yes	-	15	-	N	-	X

2 Phase
Fully Actuated
Gastonia Signal System

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. 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. Pavement markings are existing.
6. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
7. Install new cabinet on the existing cabinet foundation.
8. Existing signal heads 32 & 33 have been relabeled to 81 & 82, respectively.
9. Existing loop 3B has been relabeled to 8A.
10. All new cabinets and base extenders shall be black in color. See Project Special Provisions for details.
11. City of system data:
    Controller Asset #0921.



LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
□↓	Pedestrian Signal Head With Push Button & Sign	■↓
	Metal Pole with Mastarm	
	Inductive Loop Detector	
⊠	Controller & Cabinet	⊠
□	Junction Box	■
	2-in Underground Conduit	
N/A	Right of Way	
→	Directional Arrow	→
N/A	Guardrail	
Ⓐ	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	Ⓐ
Ⓑ	Right Arrow "ONLY" Sign (R3-5R)	Ⓑ

TIMING CHART

FEATURE	PHASE 3	PHASE 6	PHASE 8
Min Green *	7	12	7
Walk *	-	-	-
Ped Clear	-	-	-
Veh. Extension *	2.0	6.0	2.0
Max 1 *	25	90	25
Yellow	3.0	4.6	3.0
Red Clear	3.4	3.0	3.4
Red Revert	2.0	2.0	2.0
Actuations B4 Add *	-	-	-
Seconds /Actuation *	-	1.5	-
Max Initial *	-	34	-
Time Before Reduction *	-	15	-
Time To Reduce *	-	30	-
Minimum Gap	-	3.0	-
Locking Detector	-	X	-
Recall Position	-	MIN RECALL	-
Dual Entry	X	-	X
Simultaneous Gap	X	X	X

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

3/9/2022 11:15:38 AM Daniella.Curri ⁂kimley-horn.com⁂SE_RAL1⁂RAL_TPTO⁂_ITS⁂011036569 Gastonia Signal System⁂9 Signals⁂54 - Signal Design⁂E20921-2021.dgn

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

US 321 (N. Chester Street) at Rankin Lake Road

Division 12 Gaston County Gastonia

PLAN DATE:	May 2021	REVIEWED BY:	SL Phillips
PREPARED BY:	CF Davis	REVIEWED BY:	KP Baumann

REVISIONS	INIT.	DATE

SCALE 0 50 1"=50'

NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN

DocuSigned by: 3/11/2022
SIGNATURE DATE

SIG. INVENTORY NO. 12-0921

PLANS PREPARED IN THE OFFICE OF:
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421 Fayetteville Street, Suite 600
Raleigh, NC 27601
(919) 677-2000

750 N.Greenfield Pkwy,Garner,NC 27529

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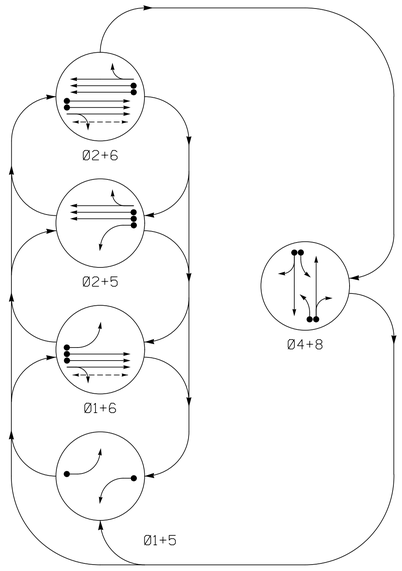
PROJECT REFERENCE NO.	SHEET NO.
C-5703	Sig.85.0

5 Phase
Fully Actuated
w/ Emergency Vehicle Preemption
Gastonia Signal System

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

EV PREEMPT PHASES
(Medium Priority)

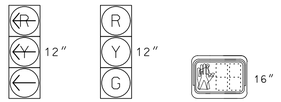
PRE 3
(Ø2+5)

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø4+8	PRE 3	FLASH
11	←	←	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~
21,22,23	R	R	G	G	R	G	Y
41,42	R	R	R	R	G	R	R
51	←	~~R~~	←	~~R~~	~~R~~	←	~~R~~
61,62,63	R	G	R	G	R	R	Y
81,82	R	R	R	R	G	R	R
P61,P62	DW	W	DW	W	DW	DW	DRK

SIGNAL FACE I.D.

All Heads L.E.D.



11
51

21,22,23
41,42
61,62,63
81,82

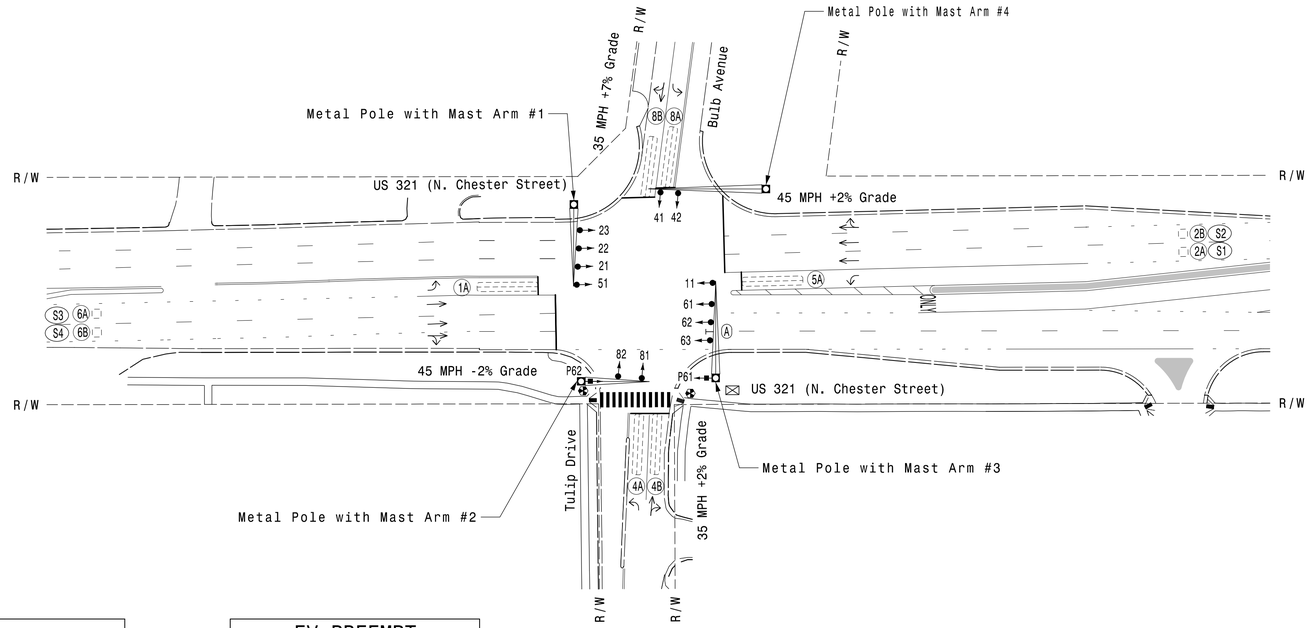
P61,P62

DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING						
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
1A	6X40	0	2-4-2	-	1	Yes	-	-	-	N	-	X
2A/S1	6X6	300	EXIST	-	2	Yes	-	-	X	N	X	X
2B/S2	6X6	300	EXIST	-	2	Yes	-	-	X	N	X	X
4A	6X40	0	2-4-2	-	4	Yes	-	-	-	N	-	X
4B	6X40	0	2-4-2	-	4	Yes	-	-	-	N	-	X
5A	6X40	0	2-4-2	-	5	Yes	-	-	-	N	-	X
6A/S3	6X6	300	EXIST	-	6	Yes	-	-	X	N	X	X
6B/S4	6X6	300	EXIST	-	6	Yes	-	-	X	N	X	X
8A	6X40	0	2-4-2	-	8	Yes	-	-	-	N	-	X
8B	6X40	0	2-4-2	-	8	Yes	-	-	-	N	-	X

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and/or phase 5 may be lagged.
4. Set all detector units to presence mode.
5. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
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. Pavement markings are existing.
9. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
10. Install new cabinet on the existing cabinet foundation.
11. Install GPS emergency preemption system per manufacturer's instructions to achieve preemption needed, as shown in phasing diagram.
12. All new cabinets and base extenders shall be black in color. See Project Special Provisions for details.
13. City of system data:
    Controller Asset #0922.



LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
□↓	Pedestrian Signal Head With Push Button & Sign	■↓
○	Signal Pole with Guy	●
○↓	Signal Pole with Sidewalk Guy	●↓
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
·····	2-in Underground Conduit	·····
N/A	Right of Way	———
→	Directional Arrow	→
○▭	Metal Pole with Mastarm	■▭
⊛	Type I Pushbutton Post	⊛
Ⓐ	"DO NOT BLOCK INTERSECTION" Sign (R10-7)	Ⓐ

TIMING CHART

FEATURE	PHASE 1	2	4	5	6	8
Min Green *	7	12	7	7	12	7
Walk *	-	-	-	-	4	-
Ped Clear	-	-	-	-	12	-
Veh. Extension *	2.0	6.0	2.0	3.0	6.0	2.0
Max 1 *	20	90	25	20	90	25
Yellow	3.0	4.3	3.7	3.0	4.7	3.7
Red Clear	3.3	1.2	2.7	3.1	1.4	2.7
Red Revert	2.0	2.0	2.0	2.0	2.0	2.0
Actuations B4 Add *	-	-	-	-	-	-
Seconds /Actuation *	-	1.5	-	-	1.5	-
Max Initial *	-	34	-	-	34	-
Time Before Reduction *	-	15	-	-	15	-
Time To Reduce *	-	30	-	-	30	-
Minimum Gap	-	3.0	-	-	3.0	-
Locking Detector	-	X	-	-	X	-
Recall Position	-	MIN RECALL	-	-	MIN RECALL	-
Dual Entry	-	-	X	-	-	X
Simultaneous Gap	X	X	X	X	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.

EV PREEMPT

FUNCTION	PRE 3
Exit Phase(s)	2+6
Preempt Override	OFF
Delay Time	0
Ped Clear Through Yellow	Y
Terminate Phases	N
Entrance Walk	1
Entrance Ped Clear	255*
Entrance Min Green	1
Entrance Yellow Change	25.5*
Entrance Red Clear	25.5*
Minimum Dwell Time	7
Preempt Input Extension Time **	2
Preempt Max Time	120
Exit Yellow Change	25.5*
Exit Red Clear	25.5*

* Time defaults to time used for phase during normal operation
** Program Timing on GPS Detection Unit

PLANS PREPARED IN THE OFFICE OF:
Kimley»Horn
NC License #F-0102
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Raleigh, NC 27601
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Signal Upgrade

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

SCALE
0 50
1"=50'

US 321 (N. Chester Street)
at
Bulb Avenue / Tulip Drive

Division 12 Gaston County Gastonia

PLAN DATE:	May 2021	REVIEWED BY:	SL Phillips
PREPARED BY:	CF Davis	REVIEWED BY:	KP Baumann

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN

DocuSigned by:
SIGNATURE 3/11/2022 DATE

SIG. INVENTORY NO. 12-0922

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\\kimley-horn.com\SE_RAL1\RAL_TPTO_ITS\011036569 Gastonia Signal System\3 Signals\54 - Signal Design\E12022-2021.dgn

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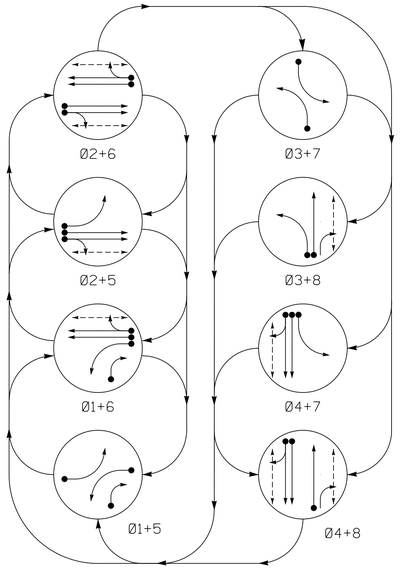
PROJECT REFERENCE NO.	SHEET NO.
C-5703	Sig.86.0

8 Phase
Fully Actuated
w/ Emergency Vehicle Preemption
Gastonia Signal System

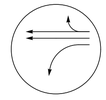
PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

EV PREEMPT PHASES
(Medium Priority)



PRE 3
(Ø1+6)

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3+7	Ø3+8	Ø4+7	Ø4+8	PRE 3	FLASH
11	←	←	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	←	~~R~~
21,22	R	R	G	G	R	R	R	R	R	Y
31	~~R~~	~~R~~	~~R~~	~~R~~	←	←	~~R~~	~~R~~	~~R~~	~~R~~
41,42	R	R	R	R	R	R	G	G	R	R
51	←	~~R~~	←	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~
61,62	R	G	R	G	R	R	R	R	G	Y
71	~~R~~	~~R~~	~~R~~	~~R~~	←	~~R~~	←	~~R~~	~~R~~	~~R~~
81	R	R	R	R	R	G	R	G	R	R
82	R/→	R/→	R	R	R	G	R	G	R	R
P21,P22	DW	DW	W	W	DW	DW	DW	DW	DW	DRK
P41,P42	DW	DW	DW	DW	DW	DW	W	W	DW	DRK
P61,P62	DW	W	DW	W	DW	DW	DW	DW	DW	DRK
P81,P82	DW	DW	DW	DW	DW	W	DW	W	DW	DRK

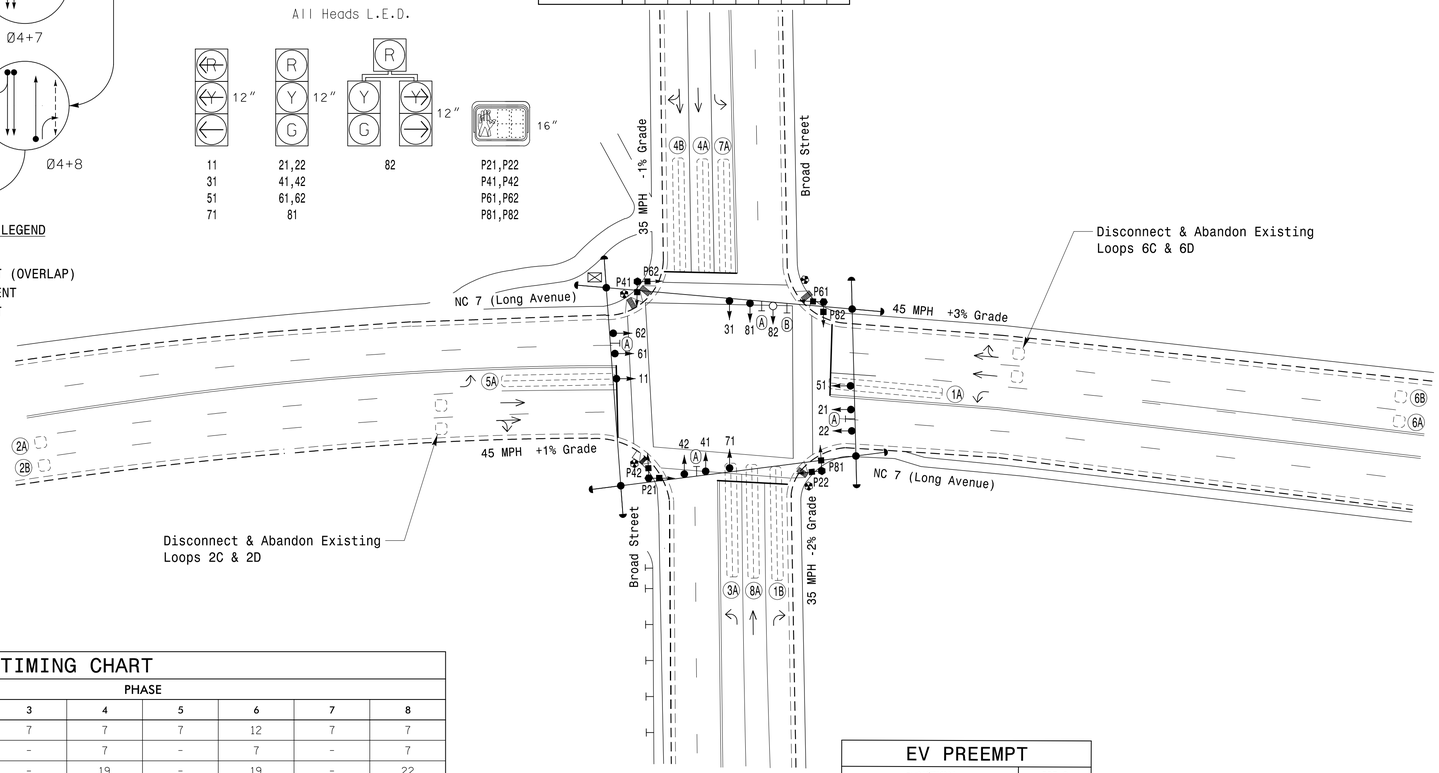
SIGNAL FACE I.D.

All Heads L.E.D.

11	21,22	82	P21,P22
31	41,42		P41,P42
51	61,62		P61,P62
71	81		P81,P82

DETECTOR INSTALLATION CHART

DETECTOR LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
1A	6X60	0	2-4-2	-	1	Yes	-	3	-	N	-	X
1B	6X60	+10	2-4-2	-	1	Yes	-	15	-	N	-	X
2A	6X6	300	EXIST	-	2	Yes	-	-	X	N	-	X
2B	6X6	300	EXIST	-	2	Yes	-	-	X	N	-	X
3A	6X60	+10	2-4-2	-	3	Yes	-	3	-	N	-	X
4A	6X60	0	2-4-2	-	4	Yes	-	-	-	N	-	X
4B	6X60	0	2-4-2	-	4	Yes	-	10	-	N	-	X
5A	6X60	0	2-4-2	-	5	Yes	-	3	-	N	-	X
6A	6X6	300	EXIST	-	6	Yes	-	-	X	N	-	X
6B	6X6	300	EXIST	-	6	Yes	-	-	X	N	-	X
7A	6X60	0	2-4-2	-	7	Yes	-	3	-	N	-	X
8A	6X60	+10	2-4-2	-	8	Yes	-	-	-	N	-	X



TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6	7	8
Min Green *	7	12	7	7	7	12	7	7
Walk *	-	7	-	7	-	7	-	7
Ped Clear	-	19	-	19	-	19	-	22
Veh. Extension *	2.0	6.0	1.0	1.0	1.0	6.0	1.0	1.0
Max 1 *	15	45	15	25	15	45	15	25
Yellow	3.0	4.4	3.0	3.9	3.0	4.3	3.0	4.0
Red Clear	2.6	1.5	2.8	3.9	2.8	1.6	2.8	1.9
Red Revert	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Actuations B4 Add *	-	-	-	-	-	-	-	-
Seconds /Actuation *	-	1.5	-	-	-	1.5	-	-
Max Initial *	-	34	-	-	-	34	-	-
Time Before Reduction *	-	15	-	-	-	15	-	-
Time To Reduce *	-	30	-	-	-	30	-	-
Minimum Gap	-	3.0	-	-	-	3.0	-	-
Locking Detector	-	X	-	-	-	X	-	-
Recall Position	-	MIN RECALL	-	-	-	MIN RECALL	-	-
Dual Entry	-	-	-	-	-	-	-	-
Simultaneous Gap	X	X	X	X	X	X	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.

EV PREEMPT

FUNCTION	PRE 3
Exit Phase(s)	2+6
Preempt Override	OFF
Delay Time	0
Ped Clear Through Yellow	Y
Terminate Phases	N
Entrance Walk	1
Entrance Ped Clear	255*
Entrance Min Green	1
Entrance Yellow Change	25.5*
Entrance Red Clear	25.5*
Minimum Dwell Time	7
Preempt Input Extension Time **	2
Preempt Max Time	120
Exit Yellow Change	25.5*
Exit Red Clear	25.5*

* Time defaults to time used for phase during normal operation
** Program Timing on GPS Detection Unit

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and/or phase 5 may be lagged.
4. Phase 3 and/or phase 7 may be lagged.
5. Set all detector units to presence mode.
6. In the event of loop replacement, refer to the current ITS and Signal Design Manual and submit a Plan of Record to the Signal Design Section.
7. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
8. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
9. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
10. Pavement markings are existing.
11. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
12. Disconnect and abandon existing loops 2C, 2D, 6C, & 6D.
13. Existing loop 8B has been relabeled to 1B.
14. Reconnect lead-in cable to separate loops 2A, 2B, 6A, & 6B, as shown.
15. Install new cabinet on the existing cabinet foundation.
16. Install GPS emergency preemption system per manufacturer's instructions to achieve preemption needed, as shown in phasing diagram.
17. All new cabinets and base extenders shall be black in color. See Project Special Provisions for details.
18. City of system data:
    Controller Asset #0923.

LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
□↓	Pedestrian Signal Head With Push Button & Sign	■↓
⊛	Type I Pushbutton Post With Sign	●
⬡	Type II Signal Pedestal	⬢
○	Signal Pole with Guy	●
○	Signal Pole with Sidewalk Guy	●
N/A	Guardrail	⊥⊥
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
----------	2-in Underground Conduit	----------
N/A	Right of Way	– – – – –
→	Directional Arrow	→
Ⓐ	Street Name Sign (D3-1)	Ⓐ
Ⓑ	Right Turn "ONLY" Sign (R3-5)	Ⓑ

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

PLANS PREPARED IN THE OFFICE OF:
Kimley»Horn
NC License #F-0102
421 Fayetteville Street, Suite 600
Raleigh, NC 27601
(919) 677-2000

NC 7 (Long Avenue) at Broad Street

Division 12 | Gaston County | Gastonia

PLAN DATE:	May 2021	REVIEWED BY:	SL Phillips
PREPARED BY:	CF Davis	REVIEWED BY:	KP Baumann

REVISIONS	INIT.	DATE

SCALE 1"=40' (0 — 40)

NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN

DocuSigned by: 5DC7D8A6C6B4... SIGNATURE 3/11/2022 DATE

SIG. INVENTORY NO. 12-0923

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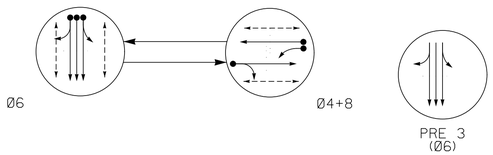
PROJECT REFERENCE NO.	SHEET NO.
C-5703	Sig.87.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

EV PREEMPT PHASES

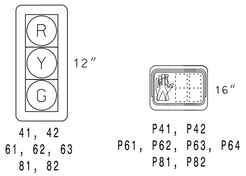
(Medium Priority)

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø6	PHASE Ø4+8	PHASE PRE 3	PHASE FLASH
41, 42	R	G	R	R
61, 62, 63	G	R	G	Y
81, 82	R	G	R	R
P41, P42	DW	W	DW	DRK
P61, P62, P63, P64	W	DW	DW	DRK
P81, P82	DW	W	DW	DRK

SIGNAL FACE I.D.

All Heads L.E.D.



41, 42
61, 62, 63
81, 82

P41, P42
P61, P62, P63, P64
P81, P82

DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
4A	6X40	0	2-4-2	-	4	Yes	-	-	-	N	-	X
6A	6X6	70	EXIST	-	6	Yes	-	-	-	N	-	X
6B	6X6	70	EXIST	-	6	Yes	-	-	-	N	-	X
6C	6X6	70	EXIST	-	6	Yes	-	-	-	N	-	X
8A	6X40	0	2-4-2	-	8	Yes	-	-	-	N	-	X
8B	6X40	0	2-4-2	-	8	Yes	-	-	-	N	-	X

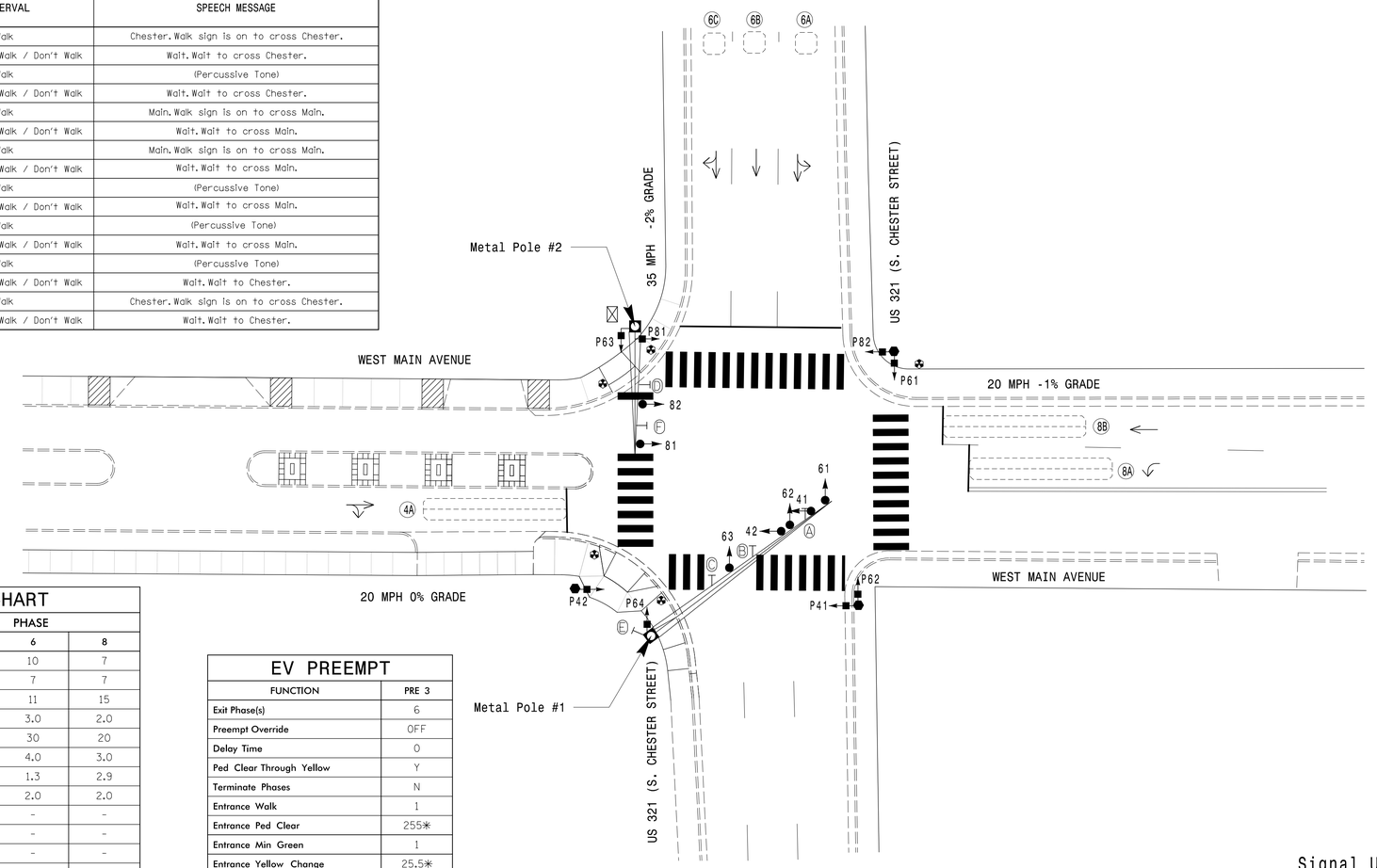
2 Phase
Fully Actuated w/
Emergency Vehicle Preemption
Gastonia Signal System

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. 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. 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. This intersection features accessible pedestrian signals utilizing percussive tone walk indications and/or speech messages.
8. Pavement markings are existing.
9. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
10. Install new cabinet on the existing cabinet foundation.
11. All new cabinets and base extenders shall be black in color. See Project Special Provisions for details.
12. Install GPS emergency preemption system per manufacturer's instructions to achieve preemption needed, as shown in phasing diagram.
13. City system data:
    Controller Asset #0924.

ACCESSIBLE PEDESTRIAN SIGNAL OPERATION

SIGNAL FACE	VOICE	TONES	INTERVAL	SPEECH MESSAGE
P41	X	-	Walk	Chester. Walk sign is on to cross Chester.
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Chester.
P42	-	X	Walk	(Percussive Tone)
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Chester.
P61	X	-	Walk	Main. Walk sign is on to cross Main.
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Main.
P62	X	-	Walk	Main. Walk sign is on to cross Main.
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Main.
P63	-	X	Walk	(Percussive Tone)
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Main.
P64	-	X	Walk	(Percussive Tone)
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to cross Main.
P81	-	X	Walk	(Percussive Tone)
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to Chester.
P82	X	-	Walk	Chester. Walk sign is on to cross Chester.
	X	-	Flashing Don't Walk / Don't Walk	Wait. Wait to Chester.



TIMING CHART

FEATURE	PHASE 4	PHASE 6	PHASE 8
Min Green *	7	10	7
Walk *	7	7	7
Ped Clear	15	11	15
Veh. Extension *	2.0	3.0	2.0
Max 1 *	20	30	20
Yellow	3.0	4.0	3.0
Red Clear	2.9	1.3	2.9
Red Revert	2.0	2.0	2.0
Actuations B4 Add *	-	-	-
Seconds /Actuation *	-	-	-
Max Initial *	-	-	-
Time Before Reduction *	-	-	-
Time To Reduce *	-	-	-
Minimum Gap	-	-	-
Locking Detector	-	X	-
Recall Position	-	MIN RECALL	-
Dual Entry	X	-	X
Simultaneous Gap	X	X	X

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

EV PREEMPT

FUNCTION	PRE 3
Exit Phase(s)	6
Preempt Override	OFF
Delay Time	0
Ped Clear Through Yellow	Y
Terminate Phases	N
Entrance Walk	1
Entrance Ped Clear	255*
Entrance Min Green	1
Entrance Yellow Change	25.5*
Entrance Red Clear	25.5*
Minimum Dwell Time	7
Preempt Input Extension Time **	2
Preempt Max Time	120
Exit Yellow Change	25.5*
Exit Red Clear	25.5*

* Time defaults to time used for phase during normal operation
** Program Timing on GPS Detection Unit

LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
□↓	Pedestrian Signal Head With Push Button & Sign	■↓
⊛	Type I Pushbutton Post	⊛
⬡	Type II Signal Pedestal	⬢
◎◺	Metal Pole with Mastarm	◎◺
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
----------	2-in Underground Conduit	----------
N/A	Right of Way	----------
→	Directional Arrow	→
Ⓐ	Combined Through and Left Arrow Sign (R3-6L)	Ⓐ
Ⓑ	Through Arrow "ONLY" Sign (R3-5A)	Ⓑ
Ⓒ	Combined Through and Right Arrow Sign (R3-6R)	Ⓒ
Ⓓ	No Right Turn Sign (R3-1)	Ⓓ
Ⓔ	No Left Turn Sign (R3-2)	Ⓔ
Ⓕ	"ONE WAY" Sign (R6-1L)	Ⓕ

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Signal Upgrade

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

US 321 (S. CHESTER ST.)
AT
WEST MAIN AVENUE

Division 12 Gaston County Gastonia

PLAN DATE: May 2021 REVIEWED BY: SL Phillips
PREPARED BY: SP Pennington REVIEWED BY: KP Baumann

REVISIONS	INIT.	DATE

SCALE 0 20 1"=20'

NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN

DocuSigned by: SIGNATURE 3/11/2022 DATE

SIG. INVENTORY NO. 12-0924

PLANS PREPARED IN THE OFFICE OF:
Kimley»Horn
NC License #F-0102
421 Fayetteville Street, Suite 600
Raleigh, NC 27601
(919) 677-2000
750 N.Greenfield Pkwy,Garner,NC 27529

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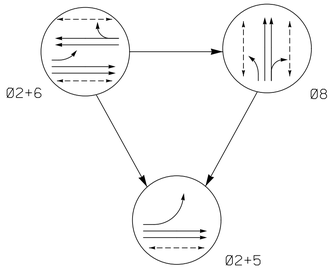
PROJECT REFERENCE NO.	SHEET NO.
C-5703	Sig.88.0

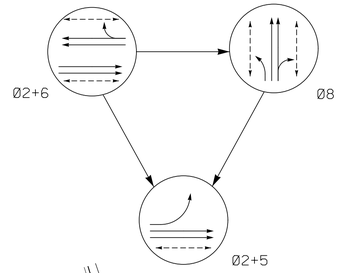
DEFAULT PHASING DIAGRAM



DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	Ø2+5	Ø2+6	Ø8	FLASH
21,22	↑	↑	R	Y
51	←	←FY	~~R~~	~~Y~~
61,62,63	R	G	R	Y
81,82,83	R	R	G	R
P21,P22	W	W	DW	DRK
P61,P62	DW	W	DW	DRK
P81,P82 P83,P84	DW	DW	W	DRK

ALTERNATE PHASING DIAGRAM



ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	Ø2+5	Ø2+6	Ø8	FLASH
21,22	↑	↑	R	Y
51	←	~~R~~	~~R~~	~~Y~~
61,62,63	R	G	R	Y
81,82,83	R	R	G	R
P21,P22	W	W	DW	DRK
P61,P62	DW	W	DW	DRK
P81,P82 P83,P84	DW	DW	W	DRK

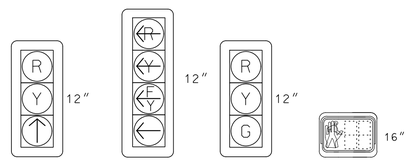
PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE I.D.

All Heads L.E.D.

* Backplates with reflective borders



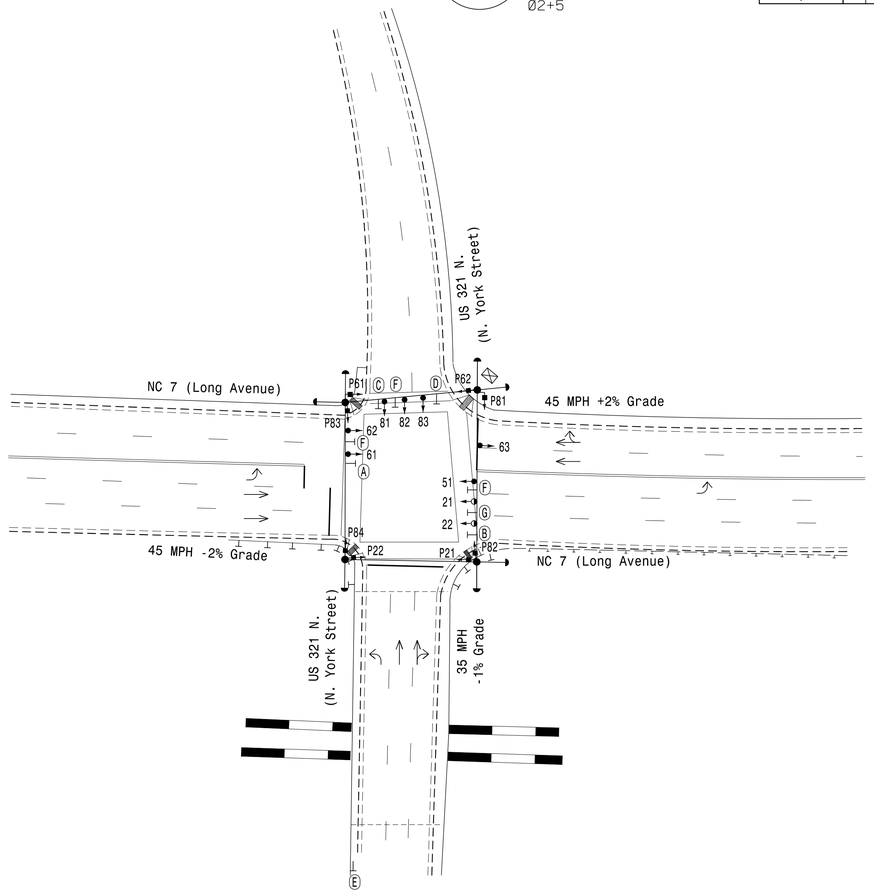
21,22 *

51 *

61,62,63 *
81,82,83 *

P21,P22
P61,P62
P81,P82
P83,P84

See note 7.



TIMING CHART

FEATURE	PHASE 2	5	6	8
Min Green *	12	7	12	7
Walk *	4	-	4	4
Ped Clear	14	-	12	19
Veh. Extension *	-	-	-	-
Max 1 *	45	15	45	30
Yellow	4.7	3.0	4.7	3.9
Red Clear	1.1	2.4	1.1	1.7
Red Revert	2.0	2.0	2.0	2.0
Actuations B4 Add *	-	-	-	-
Seconds /Actuation *	-	-	-	-
Max Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Locking Detector	-	-	-	-
Recall Position	PED/MAX	MAX RECALL	PED/MAX	PED/MAX
Dual Entry	-	-	-	-
Simultaneous Gap	X	X	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.

3 Phase
Pre-Timed
w/ Alternate Phasing Operation
Gastonia Signal System

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 5 may be lagged.
4. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
5. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
6. Pavement markings are existing.
7. Install backplate with reflective border on signal head 63.
8. The City Engineer or their representative will determine the hours of use for each phasing plan.
9. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
10. Install new cabinet on the existing cabinet foundation.
11. Existing phase 4 has been changed to phase 8 on this plan. Change all signal heads, pedestrian signal heads, pedestrian push buttons, and loops as needed to achieve the phasing shown.
12. All new cabinets and base extenders shall be black in color. See Project Special Provisions for details.
13. City of system data:
    Controller Asset #0925.

LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
⊣□	Pedestrian Signal Head With Sign	■
○	Signal Pole with Guy	●
○	Signal Pole with Sidewalk Guy	●
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
·-·-·	2-in Underground Conduit	·-·-·
N/A	Right of Way	— — —
→	Directional Arrow	→
N/A	Guardrail	⊥⊥
Ⓐ	No Left Turn Sign (R3-2)	Ⓐ
Ⓑ	No Right Turn Sign (R3-1)	Ⓑ
Ⓒ	Left Arrow "ONLY" Sign (R3-5L)	Ⓒ
Ⓓ	"NO TURN ON RED" Sign (R10-11)	Ⓓ
Ⓔ	"LEFT LANE MUST TURN LEFT" Sign (R3-7I)	Ⓔ
Ⓕ	Street Name Sign (D3-1)	Ⓕ
Ⓖ	One Way Sign (R6-1)	Ⓖ

Signal Upgrade

PLANS PREPARED IN THE OFFICE OF:
Kimley»Horn
NC License #F-0102
421 Fayetteville Street, Suite 600
Raleigh, NC 27601
(919) 677-2000

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

US 321 N. (N. York Street)
at
NC 7 (Long Avenue)

Division 12 Gaston County Gastonia

PLAN DATE:	May 2021	REVIEWED BY:	SL Phillips
PREPARED BY:	CF Davis	REVIEWED BY:	KP Baumann

REVISIONS	INIT.	DATE

N
SCALE 0 40 1"=40'

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEITH P. BAUMANN

DocuSigned by:
SIGNATURE 3/11/2022 DATE

SIG. INVENTORY NO. 12-0925

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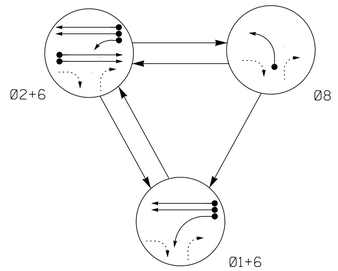
PROJECT REFERENCE NO.	SHEET NO.
C-5703	Sig.89.0

3 Phase Fully Actuated w/ Alternate Phasing Operation and Emergency Vehicle Preemption Gastonia Signal System

DEFAULT PHASING DIAGRAM



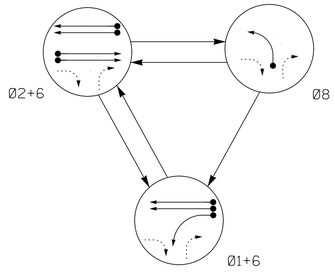
DEFAULT EV PREEMPT PHASES

(Medium Priority)

DEFAULT PHASING TABLE OF OPERATION

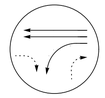
SIGNAL FACE	PHASE Ø1+6	Ø2+6	Ø8	PRE3	FLASH
11	←	~~F Y~~	~~R~~	←	~~Y~~
21,22	R	G	R	R	Y
61,62	G	G	R	G	Y
81, 82	R	R	G	R	R

ALTERNATE PHASING DIAGRAM



ALTERNATE EV PREEMPT PHASES

(Medium Priority)



ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+6	Ø2+6	Ø8	PRE3	FLASH
11	←	~~R~~	~~R~~	←	~~Y~~
21,22	R	G	R	R	Y
61,62	G	G	R	G	Y
81, 82	R	R	G	R	R

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 may be lagged.
4. Set all detector units to presence mode.
5. Pavement markings are existing.
6. The City Engineer or their representative will determine the hours of use for each phasing plan.
7. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
8. Install new cabinet on the existing cabinet foundation.
9. All new cabinets and base extenders shall be black in color. See Project Special Provisions for details.
10. Reconnect lead-in cable to separate loops 6A & 6B, as shown.
11. Install GPS emergency preemption system per manufacturer's instructions to achieve preemption needed, as shown in phasing diagram.
12. Existing phase 4 has been changed to phase 8 on this plan. Change all signal heads, pedestrian signal heads, pedestrian push buttons, and loops as needed to achieve the phasing shown.
13. City system data:
    Controller Asset #0928.

PHASING DIAGRAM DETECTION LEGEND

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

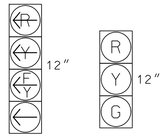
DETECTOR INSTALLATION CHART

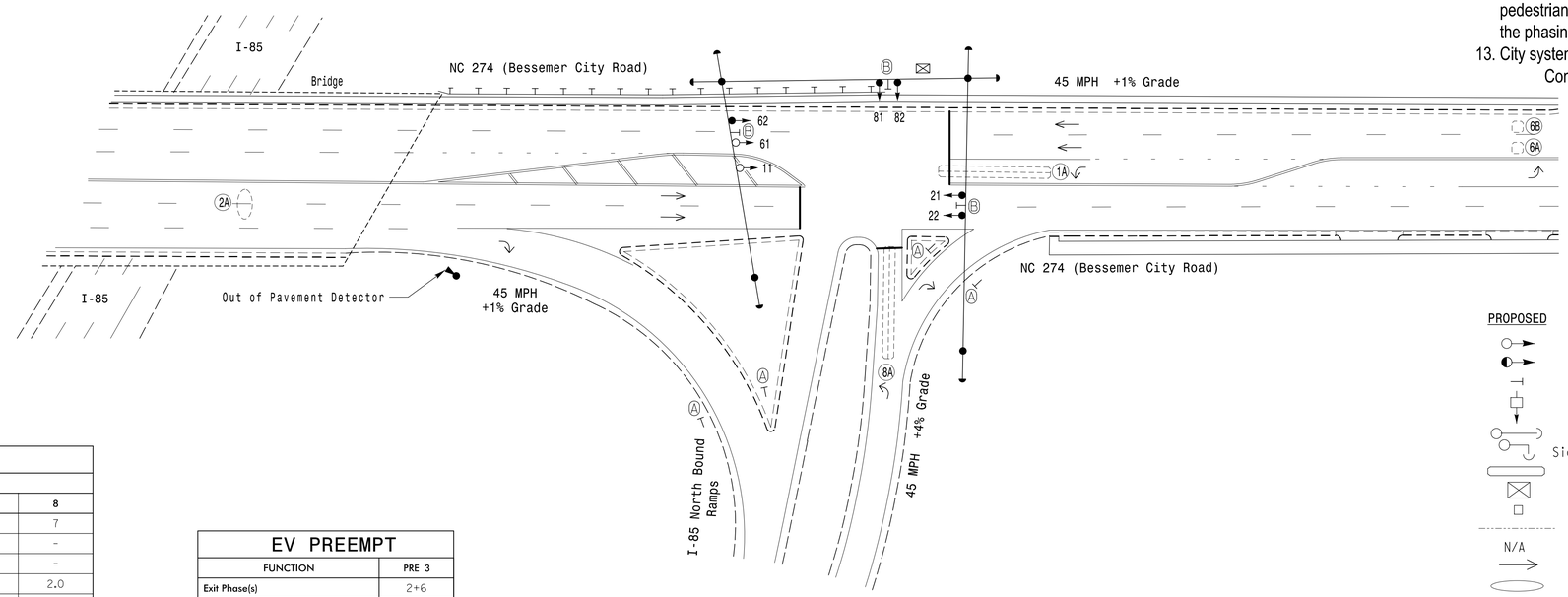
DETECTOR LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
1A	6X60	+5	2-4-2	-	1	Yes	-	10 *	-	N	-	X
					6#	Yes	-	3	-	C	-	X
✳2A	N/A	300	N/A	-	2	Yes	-	-	X	N	-	X
6A	6X6	300	EXIST	-	6	Yes	-	-	X	N	-	X
6B	6X6	300	EXIST	-	6	Yes	-	-	X	N	-	X
8A	6X60	0	2-4-2	-	8	Yes	-	3	-	N	-	X

✳ Microwave Detection
* Disable Delay during Alternate Phasing operation.
\# Disable Phase call for loop during Alternate Phasing operation.

SIGNAL FACE I.D.

All Heads L.E.D.





LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
□↓	Pedestrian Signal Head With Push Button & Sign	■↓
○—	Signal Pole with Guy	●—
○⤵	Signal Pole with Sidewalk Guy	●⤵
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
·-·-·	2-in Underground Conduit	·-·-·
N/A	Right of Way	— — —
→	Directional Arrow	→
⬭	Microwave Detection Area	⬭
⋈	Out of Pavement Detector	⋈
Ⓐ	"YIELD" Sign (R1-2)	Ⓐ
Ⓑ	Street Name Sign (D3-1)	Ⓑ

TIMING CHART

FEATURE	PHASE 1	2	6	8
Min Green *	7	15	15	7
Walk *	-	-	-	-
Ped Clear	-	-	-	-
Veh. Extension *	1.0	6.0	6.0	2.0
Max 1 *	15	90	90	25
Yellow	3.0	4.4	4.4	3.0
Red Clear	2.6	1.3	1.3	2.6
Red Revert	2.0	2.0	2.0	2.0
Actuations B4 Add *	-	-	-	-
Seconds /Actuation *	-	1.5	1.5	-
Max Initial *	-	34	34	-
Time Before Reduction *	-	15	15	-
Time To Reduce *	-	40	40	-
Minimum Gap	-	3.0	3.0	-
Locking Detector	-	X	X	-
Recall Position	-	MIN RECALL	MIN RECALL	-
Dual Entry	-	-	-	-
Simultaneous Gap	X	X	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.

EV PREEMPT

FUNCTION	PRE 3
Exit Phase(s)	2+6
Preempt Override	OFF
Delay Time	0
Ped Clear Through Yellow	N
Terminate Phases	N
Entrance Walk	-
Entrance Ped Clear	-
Entrance Min Green	1
Entrance Yellow Change	25.5✳
Entrance Red Clear	25.5✳
Minimum Dwell Time	7
Preempt Input Extension Time **	2
Preempt Max Time	120
Exit Yellow Change	25.5✳
Exit Red Clear	25.5✳

* Time defaults to time used for phase during normal operation
** Program Timing on GPS Detection Unit

Signal Upgrade

Prepared For: Transportation Mobility and Safety Division, North Carolina Department of Transportation, Signal Design Section
1750 N.Greenfield Pkwy,Garner,NC 27529

NC 274 (Bessemer City Road) at I-85 Northbound Ramp & Loop

Division 12 Gaston County Gastonia

PLAN DATE: May 2021 REVIEWED BY: SL Phillips
PREPARED BY: SP Pennington REVIEWED BY: KP Baumann

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

PLANS PREPARED IN THE OFFICE OF:
Kimley»Horn
NC License #F-0102
421 Fayetteville Street, Suite 600
Raleigh, NC 27601
(919) 677-2000

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN

DocuSigned by: 3/11/2022
SIGNATURE DATE

SIG. INVENTORY NO. 12-0928

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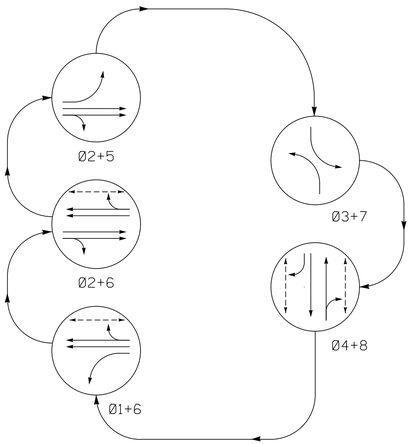
PROJECT REFERENCE NO.	SHEET NO.
C-5703	Sig.90.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

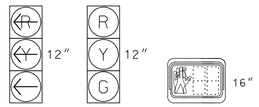
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

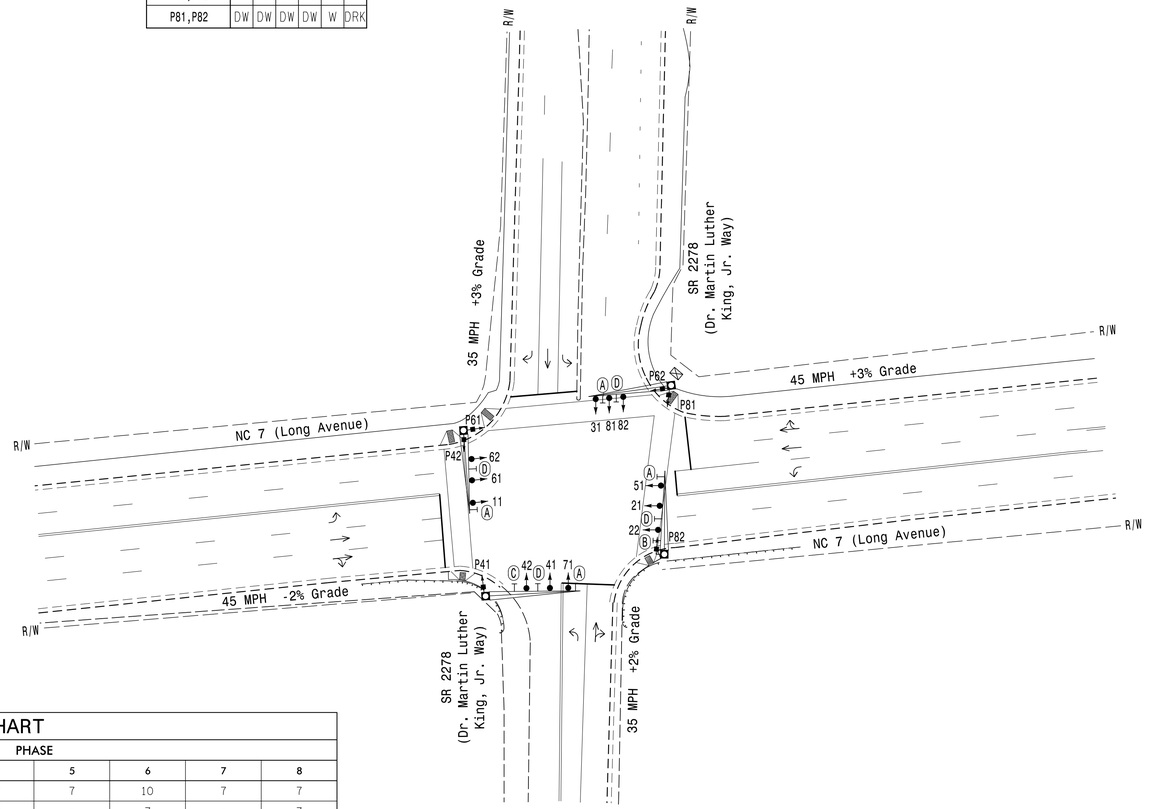
SIGNAL FACE	PHASE Ø1+6	Ø2+6	Ø2+5	Ø3+7	Ø4+8	FLASH
11	←	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~
21,22	R	G	G	R	R	Y
31	~~R~~	~~R~~	~~R~~	←	~~R~~	~~R~~
41,42	R	R	R	R	G	R
51	~~R~~	~~R~~	←	~~R~~	~~R~~	~~R~~
61,62	G	G	R	R	R	Y
71	~~R~~	~~R~~	~~R~~	←	~~R~~	~~R~~
81,82	R	R	R	R	G	R
P41,P42	DW	DW	DW	DW	W	DRK
P61,P62	W	W	DW	DW	DW	DRK
P81,P82	DW	DW	DW	DW	W	DRK

SIGNAL FACE I.D.

All Heads L.E.D.



11	21,22	P41,P42
31	41,42	P61,P62
51	61,62	P81,P82
71	81,82	



LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
□	Pedestrian Signal Head With Push Button & Sign	■
	Metal Pole with Mastarm	
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	■
□	Junction Box	■
·-·-·	2-in Underground Conduit	·-·-·
→	Directional Arrow	→
N/A	Guardrail	
N/A	Curb Ramp	
Ⓐ	Left Arrow "ONLY" Sign (R3-5L)	Ⓐ
Ⓑ	"NO TURN ON RED" Sign (R10-11)	Ⓑ
Ⓒ	Right Arrow "ONLY" Sign (R3-5R)	Ⓒ
Ⓓ	Street Name Sign (D3-1)	Ⓓ

TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6	7	8
Min Green *	7	10	7	7	7	10	7	7
Walk *	-	-	-	7	-	7	-	7
Ped Clear	-	-	-	17	-	23	-	20
Veh. Extension *	-	-	-	-	-	-	-	-
Max 1 *	20	45	20	25	20	45	20	25
Yellow	3.0	4.7	3.0	3.7	3.0	4.3	3.0	3.7
Red Clear	2.6	1.7	2.8	1.8	3.1	1.9	2.6	1.8
Red Revert	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Actuations B4 Add *	-	-	-	-	-	-	-	-
Seconds /Actuation *	-	-	-	-	-	-	-	-
Max Initial *	-	-	-	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-	-	-	-
Time To Reduce *	-	-	-	-	-	-	-	-
Minimum Gap	-	-	-	-	-	-	-	-
Locking Detector	-	-	-	-	-	-	-	-
Recall Position	MAX RECALL	MAX RECALL	MAX RECALL	PED/MAX	MAX RECALL	PED/MAX	MAX RECALL	PED/MAX
Dual Entry	-	-	-	-	-	-	-	-
Simultaneous Gap	X	X	X	X	X	X	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.

5 Phase
Pre-Timed
Gastonia Signal System

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. During coordination, phase 1+6 or phase 2+5 may be lagged.
4. Phase 3+7 may be lagged.
5. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
6. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
7. Pavement markings are existing.
8. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
9. Install new cabinet on the existing cabinet foundation.
10. All new cabinets and base extenders shall be black in color. See Project Special Provisions for details.
11. City of system data:
    Controller Asset #0929.

PLANS PREPARED IN THE OFFICE OF:
Kimley»Horn
NC License #F-0102
421 Fayetteville Street, Suite 600
Raleigh, NC 27601
(919) 677-2000

Signal Upgrade

Prepared For:
Transportation Mobility and Safety Division
STATE OF TRANSPORTATION
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

NC 7 (Long Avenue)
at
SR 2278 (Dr. Martin Luther King, Jr. Way)
Division 12 Gaston County Gastonia

PLAN DATE:	May 2021	REVIEWED BY:	SL Phillips
PREPARED BY:	CF Davis	REVIEWED BY:	KP Baumann

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN

DocuSigned by: 3/11/2022
SIGNATURE DATE

SIG. INVENTORY NO. 12-0929

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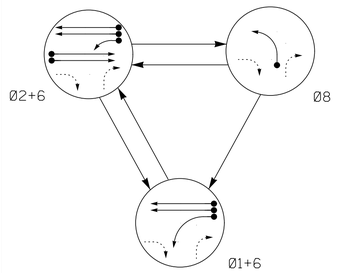
PROJECT REFERENCE NO.	SHEET NO.
C-5703	Sig.91.0

DEFAULT PHASING DIAGRAM



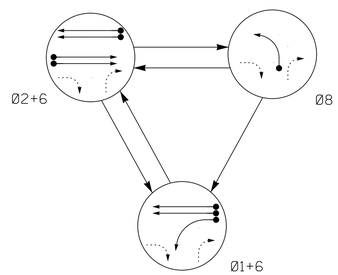
DEFAULT EV PREEMPT PHASES

(Medium Priority)

DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+6	PHASE Ø2+6	PHASE Ø8	PHASE PRE3	PHASE FLASH
11	←	~~F Y~~	~~R~~	←	~~Y~~
21,22	R	G	R	R	Y
61, 62	G	G	R	G	Y
81, 82	R	R	G	R	R

ALTERNATE PHASING DIAGRAM



ALTERNATE EV PREEMPT PHASES

(Medium Priority)

ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+6	PHASE Ø2+6	PHASE Ø8	PHASE PRE3	PHASE FLASH
11	←	~~F~~	~~R~~	←	~~Y~~
21,22	R	G	R	R	Y
61, 62	G	G	R	G	Y
81, 82	R	R	G	R	R

3 Phase
Fully Actuated w/
Alternate Phasing Operation and
Emergency Vehicle Preemption
Gastonia Signal System

NOTES

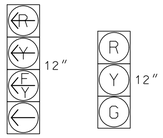
1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 may be lagged.
4. Set all detector units to presence mode.
5. Pavement markings are existing.
6. The City Engineer or their representative will determine the hours of use for each phasing plan.
7. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
8. Install new cabinet on the existing cabinet foundation.
9. All new cabinets and base extenders shall be black in color. See Project Special Provisions for details.
10. Install GPS emergency preemption system per manufacturer's instructions to achieve preemption needed, as shown in phasing diagram.
11. Existing phase 4 has been changed to phase 8 on this plan. Change all signal heads, pedestrian signal heads, pedestrian push buttons, and loops as needed to achieve the phasing shown.
12. City system data:
    Controller Asset #0931.

PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE I.D.

All Heads L.E.D.



11

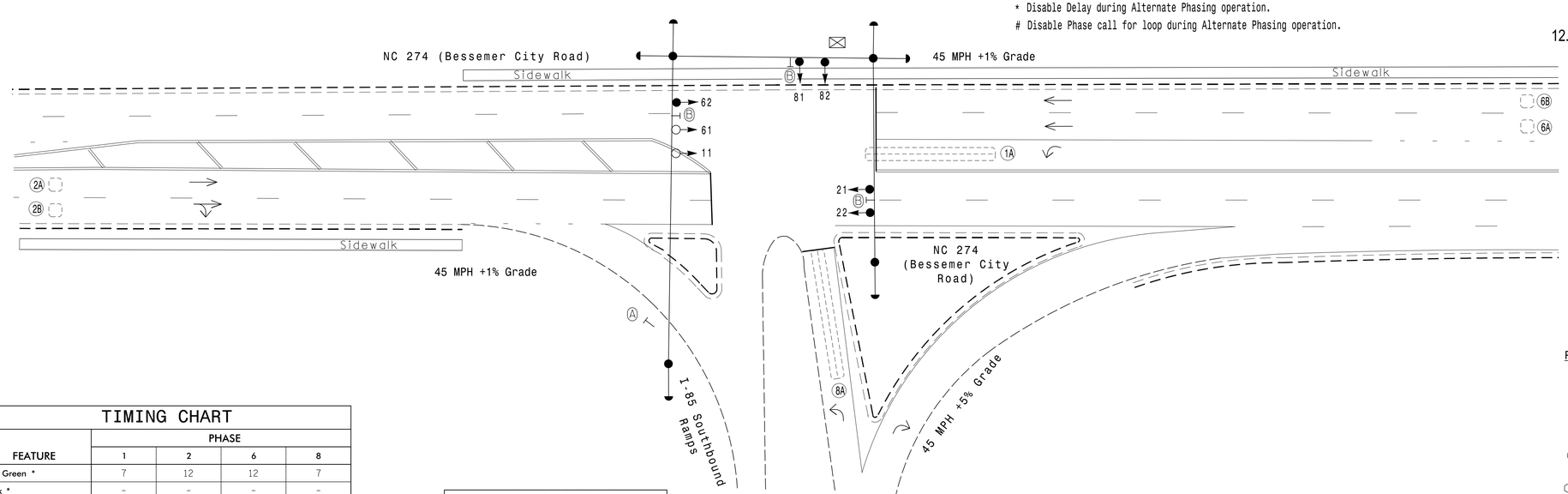
21, 22
61, 62
81, 82

DETECTOR INSTALLATION CHART

DETECTOR LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
1A	6X60	+5	2-4-2	-	1	Yes	-	10*	-	N	-	X
					6#	Yes	-	3	-	G	-	X
2A	6X6	300	EXIST	-	2	Yes	-	-	X	N	-	X
2B	6X6	300	EXIST	-	2	Yes	-	-	X	N	-	X
6A	6X6	300	EXIST	-	6	Yes	-	-	X	N	-	X
6B	6X6	300	EXIST	-	6	Yes	-	-	X	N	-	X
8A	6X60	0	2-4-2	-	8	Yes	-	-	-	N	-	X

* Disable Delay during Alternate Phasing operation.

\# Disable Phase call for loop during Alternate Phasing operation.



TIMING CHART

FEATURE	PHASE 1	PHASE 2	PHASE 6	PHASE 8
Min Green *	7	12	12	7
Walk *	-	-	-	-
Ped Clear	-	-	-	-
Veh. Extension *	2.0	6.0	6.0	2.0
Max 1 *	20	100	100	30
Yellow	3.0	4.4	4.4	3.0
Red Clear	2.3	1.2	1.2	2.6
Red Revert	2.0	2.0	2.0	2.0
Actuations B4 Add *	-	-	-	-
Seconds /Actuation *	-	1.5	1.5	-
Max Initial *	-	34	34	-
Time Before Reduction *	-	15	15	-
Time To Reduce *	-	40	40	-
Minimum Gap	-	3.0	3.0	-
Locking Detector	-	X	X	-
Recall Position	-	MIN RECALL	MIN RECALL	-
Dual Entry	-	-	-	-
Simultaneous Gap	X	X	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.

EV PREEMPT

FUNCTION	PRE 3
Exit Phase(s)	2+6
Preempt Override	OFF
Delay Time	0
Ped Clear Through Yellow	N
Terminate Phases	N
Entrance Walk	-
Entrance Ped Clear	-
Entrance Min Green	1
Entrance Yellow Change	25.5*
Entrance Red Clear	25.5*
Minimum Dwell Time	7
Preempt Input Extension Time **	2
Preempt Max Time	120
Exit Yellow Change	25.5*
Exit Red Clear	25.5*

* Time defaults to time used for phase during normal operation

** Program Timing on GPS Detection Unit

LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
□↓	Pedestrian Signal Head With Push Button & Sign	■↓
○	Signal Pole with Guy	●
○⤵	Signal Pole with Sidewalk Guy	●⤵
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
----------	2-in Underground Conduit	----------
N/A	Right of Way	— — — — —
→	Directional Arrow	→
Ⓐ	"YIELD" Sign (R1-2)	Ⓐ
Ⓑ	Street Name Sign (D3-1)	Ⓑ

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

NC 274 (Bessemer City Road) at I-85 Southbound Ramp & Loop

Division 12 Gaston County Gastonia

PLAN DATE: May 2021 REVIEWED BY: SL Phillips
PREPARED BY: SP Pennington REVIEWED BY: KP Baumann

REVISIONS	INIT.	DATE

SCALE 0 30 1"=30'

NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN

DocuSigned by: 3/11/2022
SIGNATURE DATE

SIG. INVENTORY NO. 12-0931

PLANS PREPARED IN THE OFFICE OF:
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NC License #F-0102
421 Fayetteville Street, Suite 600
Raleigh, NC 27601
(919) 677-2000

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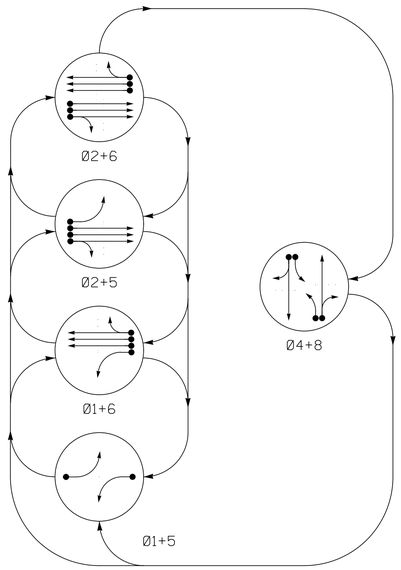
PROJECT REFERENCE NO.	SHEET NO.
C-5703	Sig.92.0

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+8	FLASH
11	~~←~~	~~←~~	~~R~~	~~R~~	~~R~~	~~R~~
21, 22, 23	R	R	G	G	R	Y
41, 42	R	R	R	R	G	R
51	~~←~~	~~R~~	~~←~~	~~R~~	~~R~~	~~R~~
61, 62, 63	R	G	R	G	R	Y
81, 82	R	R	R	R	G	R

SIGNAL FACE I.D.

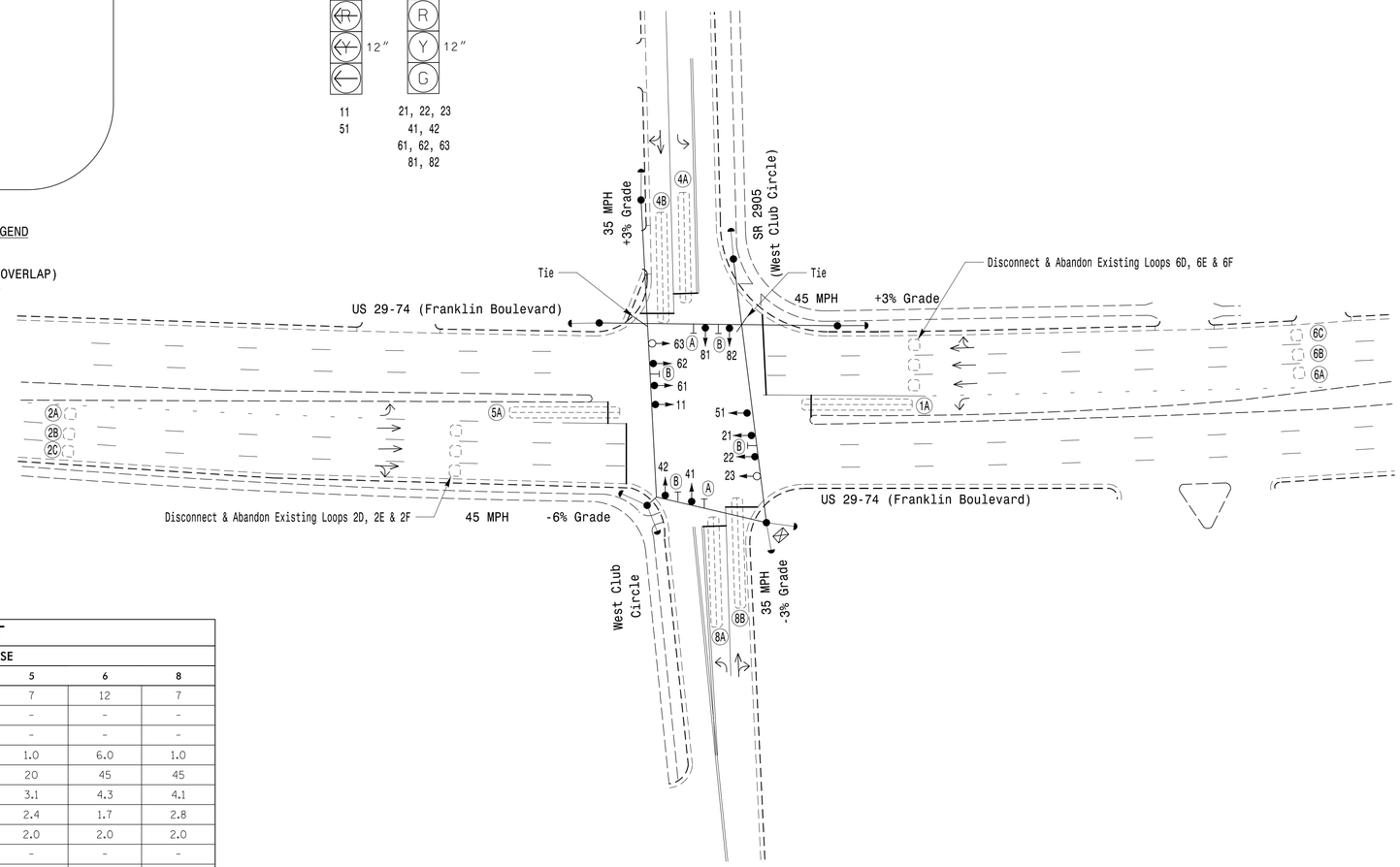
All Heads L.E.D.

11
51

21, 22, 23
41, 42
61, 62, 63
81, 82

DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING						
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
1A	6x60	+5	2-4-2	-	1	Yes	-	-	-	N	-	X
2A	6X6	300	EXIST	-	2	Yes	-	-	X	N	-	X
2B	6X6	300	EXIST	-	2	Yes	-	-	X	N	-	X
2C	6X6	300	EXIST	-	2	Yes	-	-	X	N	-	X
4A	6x60	+5	2-4-2	-	4	Yes	-	-	-	N	-	X
4B	6x60	+5	2-4-2	-	4	Yes	-	-	-	N	-	X
5A	6x60	+5	2-4-2	-	5	Yes	-	-	-	N	-	X
6A	6X6	300	EXIST	-	6	Yes	-	-	X	N	-	X
6B	6X6	300	EXIST	-	6	Yes	-	-	X	N	-	X
6C	6X6	300	EXIST	-	6	Yes	-	-	X	N	-	X
8A	6x60	+5	2-4-2	-	8	Yes	-	-	-	N	-	X
8B	6x60	+5	2-4-2	-	8	Yes	-	-	-	N	-	X



TIMING CHART

FEATURE	PHASE 1	2	4	5	6	8
Min Green *	7	12	7	7	12	7
Walk *	-	-	-	-	-	-
Ped Clear	-	-	-	-	-	-
Veh. Extension *	2.0	6.0	2.0	1.0	6.0	1.0
Max 1 *	20	45	25	20	45	45
Yellow	3.0	5.1	4.1	3.1	4.3	4.1
Red Clear	2.9	1.7	2.8	2.4	1.7	2.8
Red Revert	2.0	2.0	2.0	2.0	2.0	2.0
Actuations B4 Add *	-	-	-	-	-	-
Seconds /Actuation *	-	1.0	-	-	1.0	-
Max Initial *	-	34	-	-	34	-
Time Before Reduction *	-	15	-	-	15	-
Time To Reduce *	-	30	-	-	30	-
Minimum Gap	-	3.0	-	-	3.0	-
Locking Detector	-	X	-	-	X	-
Recall Position	-	MIN RECALL	-	-	MIN RECALL	-
Dual Entry	-	-	X	-	-	X
Simultaneous Gap	X	X	X	X	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.

5 Phase
Fully Actuated
Gastonia Signal System

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and/or phase 5 may be lagged.
4. Reposition existing signal heads numbered 21, 22, 61, and 62.
5. Disconnect and abandon existing loops 2D, 2E, 2F, 6D, 6E, and 6F.
6. Set all detector units to presence mode.
7. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
8. In the event of loop replacement, refer to the current ITS and Signals Design Manual and submit a Plan of Record to to the Signal Design Section.
9. Pavement markings are existing.
10. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
11. Install new cabinet on the existing cabinet foundation.
12. All new cabinets and base extenders shall be black in color. See Project Special Provisions for details.
13. Reconnect lead-in cable to separate loops 2A, 2B, 2C, 6A, 6B, and 6C,as shown.
14. City system data:
    Controller Asset #0942

LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
▯↓	Pedestrian Signal Head With Push Button & Sign	■↓
○	Signal Pole with Guy	●
○	Signal Pole with Sidewalk Guy	●
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
·····	2-in Underground Conduit	·-·-·
N/A	Right of Way	— — —
→	Directional Arrow	→
Ⓐ	Left Arrow "ONLY" Sign (R3-5L)	Ⓐ
Ⓑ	Street Name Sign (D3-1)	Ⓑ

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

US 29-74 (Franklin Boulevard)
at
SR 2905 (West Club Circle)

Division 12 | Gaston County | Gastonia

PLAN DATE: May 2021 | REVIEWED BY: SL Phillips
PREPARED BY: DM Curri | REVIEWED BY: KP Baumann

REVISIONS	INIT.	DATE

SCALE: 0 40 — 1"=40'

NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN

DocuSigned by: 3/11/2022
SIGNATURE DATE

SIG. INVENTORY NO. 12-0942

PLANS PREPARED IN THE OFFICE OF:
Kimley»Horn
NC License #F-0102
421 Fayetteville Street, Suite 600
Raleigh, NC 27601
(919) 677-2000

750 N.Greenfield Pkwy,Garner,NC 27529

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Gastonia Signal System\3 Signals\54 - Signal Design

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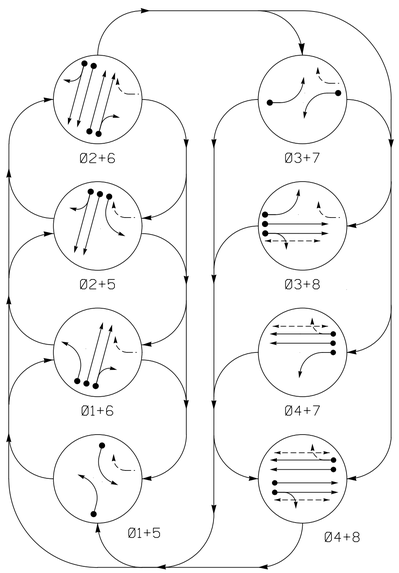
PROJECT REFERENCE NO.	SHEET NO.
C-5703	Sig.93.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

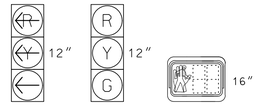
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	03+7	03+8	04+7	04+8	FLASH
11	~~←~~	~~←~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~
21,22	R	R	G	G	R	R	R	R	Y
31	~~R~~	~~R~~	~~R~~	~~R~~	~~←~~	~~←~~	~~R~~	~~R~~	~~R~~
41,42	R	R	R	R	R	R	G	G	R
51	~~←~~	~~R~~	~~←~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~
61,62,63,64	R	G	R	G	R	R	R	R	Y
71	~~R~~	~~R~~	~~R~~	~~R~~	~~←~~	~~R~~	~~←~~	~~R~~	~~R~~
81,82	R	R	R	R	R	G	R	G	R
P41,P42	DW	DW	DW	DW	DW	DW	W	W	DRK
P81,P82	DW	DW	DW	DW	DW	W	DW	W	DRK

SIGNAL FACE I.D.

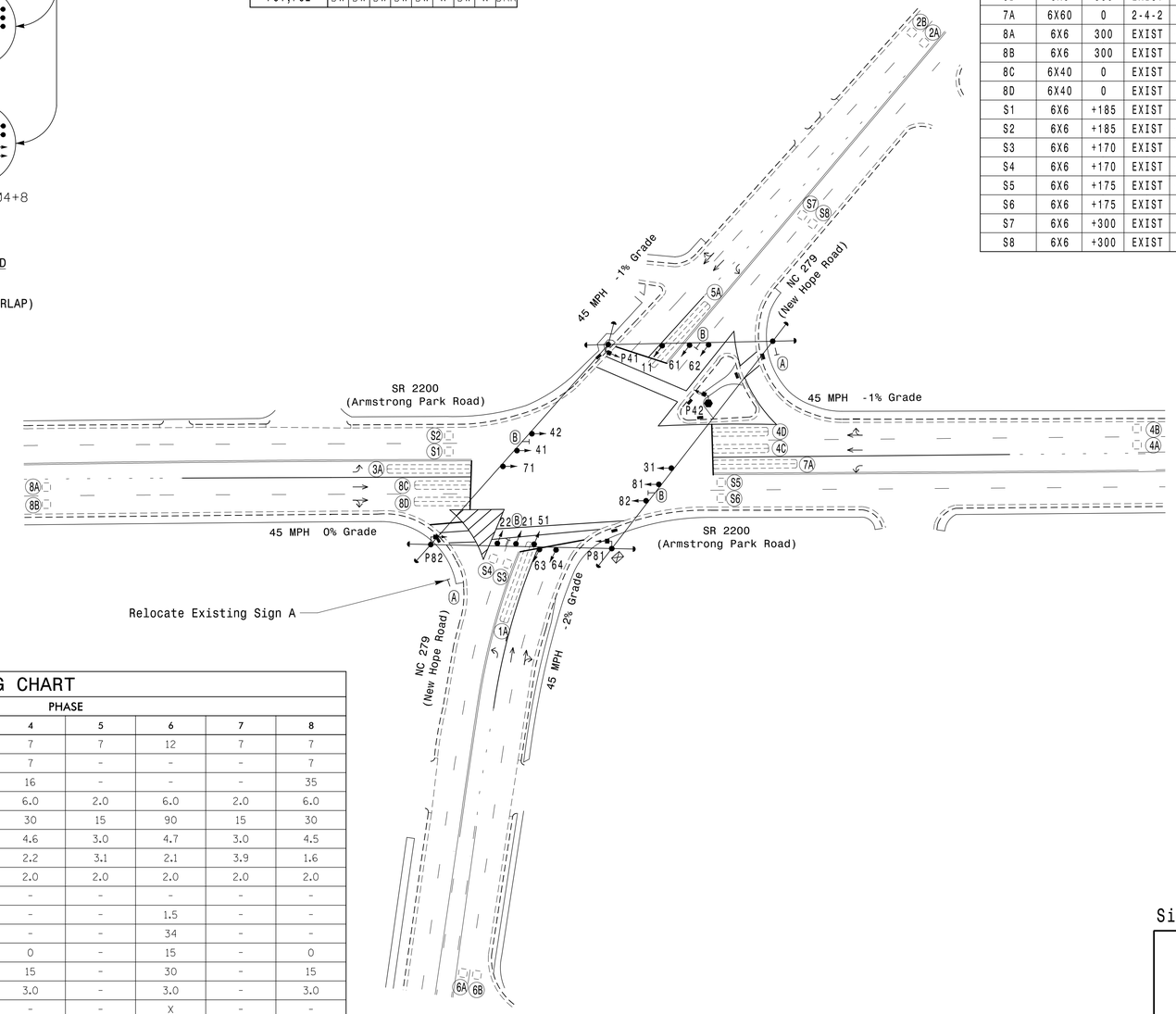
All Heads L.E.D.



11	21,22	P41,P42
31	41,42	P81,P82
51	61,62	
71	63,64	
	81,82	

DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
1A	6X60	+5	2-4-2	-	1	Yes	-	3	-	N	-	X
2A	6X6	300	EXIST	-	2	Yes	-	-	X	N	-	X
2B	6X6	300	EXIST	-	2	Yes	-	-	X	N	-	X
3A	6X60	0	2-4-2	-	3	Yes	-	-	-	N	-	X
4A	6X6	300	EXIST	-	4	Yes	-	-	-	N	-	X
4B	6X6	300	EXIST	-	4	Yes	-	-	-	N	-	X
4C	6X40	0	2-4-2	-	4	Yes	2	5	-	N	-	X
4D	6X40	0	2-4-2	-	4	Yes	2	5	-	N	-	X
5A	6X60	+5	2-4-2	-	5	Yes	-	3	-	N	-	X
6A	6X6	300	EXIST	-	6	Yes	-	-	X	N	-	X
6B	6X6	300	EXIST	-	6	Yes	-	-	X	N	-	X
7A	6X60	0	2-4-2	-	7	Yes	-	-	-	N	-	X
8A	6X6	300	EXIST	-	8	Yes	-	-	-	N	-	X
8B	6X6	300	EXIST	-	8	Yes	-	-	-	N	-	X
8C	6X40	0	EXIST	-	8	Yes	2	5	-	N	-	X
8D	6X40	0	EXIST	-	8	Yes	2	5	-	N	-	X
S1	6X6	+185	EXIST	-	SYS	No	-	-	-	N	X	X
S2	6X6	+185	EXIST	-	SYS	No	-	-	-	N	X	X
S3	6X6	+170	EXIST	-	SYS	No	-	-	-	N	X	X
S4	6X6	+170	EXIST	-	SYS	No	-	-	-	N	X	X
S5	6X6	+175	EXIST	-	SYS	No	-	-	-	N	X	X
S6	6X6	+175	EXIST	-	SYS	No	-	-	-	N	X	X
S7	6X6	+300	EXIST	-	SYS	No	-	-	-	N	X	X
S8	6X6	+300	EXIST	-	SYS	No	-	-	-	N	X	X



TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6	7	8
Min Green *	7	12	7	7	7	12	7	7
Walk *	-	-	-	7	-	-	-	7
Ped Clear	-	-	-	16	-	-	-	35
Veh. Extension *	2.0	6.0	2.0	6.0	2.0	6.0	2.0	6.0
Max 1 *	15	90	15	30	15	90	15	30
Yellow	3.0	4.6	3.0	4.6	3.0	4.7	3.0	4.5
Red Clear	2.4	2.3	3.9	2.2	3.1	2.1	3.9	1.6
Red Revert	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Actuations B4 Add *	-	-	-	-	-	-	-	-
Seconds /Actuation *	-	1.5	-	-	-	1.5	-	-
Max Initial *	-	34	-	-	-	34	-	-
Time Before Reduction *	-	15	-	0	-	15	-	0
Time To Reduce *	-	30	-	15	-	30	-	15
Minimum Gap	-	3.0	-	3.0	-	3.0	-	3.0
Locking Detector	-	X	-	-	-	X	-	-
Recall Position	-	MIN RECALL	-	-	-	MIN RECALL	-	-
Dual Entry	-	-	-	-	-	-	-	-
Simultaneous Gap	X	X	X	X	X	X	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.

8 Phase Fully Actuated Gastonia Signal System

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and/or phase 5 may be lagged.
4. Phase 3 and/or phase 7 may be lagged.
5. Set all detector units to presence mode.
6. In the event of loop replacement, refer to the current ITS and Signal Design Manual and submit a Plan of Record to the Signal Design Section.
7. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
8. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
9. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
10. Pavement markings are existing.
11. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
12. Install new cabinet on the existing cabinet foundation.
13. All new cabinets and base extenders shall be black in color. See Project Special Provisions for details
14. Reconnect lead-in cable to separate loops S1, S2, S3, S4, S5, S6, S7 & S8,as shown.
15. City system data:
    Controller Asset #0986.

LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
□↓	Pedestrian Signal Head With Push Button & Sign	■↓
⬡	Type II Signal Pedestal	⬢
○	Signal Pole with Guy	●
○	Signal Pole with Sidewalk Guy	●
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
·····	2-in Underground Conduit	·····
→	Directional Arrow	→
(A)	"YIELD" Sign (R1-2)	(A)
(B)	Street Name Sign (D3-1)	(B)

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

NC 279 (New Hope Road) at SR 2200 (Armstrong Park Road)

Division 12 Gaston County Gastonia

PLAN DATE:	May 2021	REVIEWED BY:	SL Phillips
PREPARED BY:	DM Curri	REVIEWED BY:	KP Baumann

REVISIONS	INIT.	DATE

SCALE 0 50 1"=50'

NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN

DocuSigned by: 3/11/2022
SIGNATURE DATE

SIG. INVENTORY NO. 12-0986

PLANS PREPARED IN THE OFFICE OF:
Kimley»Horn
NC License #F-0102
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Raleigh, NC 27601
(919) 677-2000
750 N.Greenfield Pkwy,Garner,NC 27529

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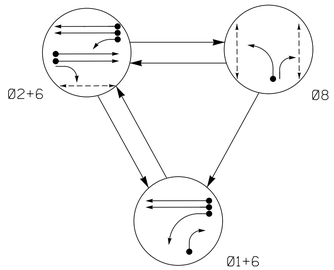
PROJECT REFERENCE NO.	SHEET NO.
C-5703	Sig.94.0

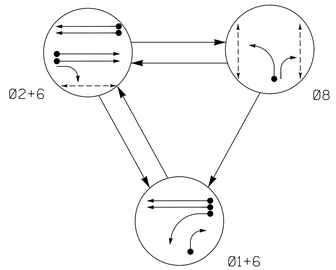
DEFAULT PHASING DIAGRAM



DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+6	PHASE Ø2+6	PHASE Ø8	PHASE FLASH
11	←	~~F Y~~	~~R~~	~~Y~~
21,22	R	G	R	Y
61,62	G	G	R	Y
81,82	R	R	G	R
83	R/→	R	G	R
P21,P22	DW	W	DW	DRK
P81,P82 P83,P84	DW	DW	W	DRK

ALTERNATE PHASING DIAGRAM



ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+6	PHASE Ø2+6	PHASE Ø8	PHASE FLASH
11	←	~~R~~	~~R~~	~~Y~~
21,22	R	G	R	Y
61,62	G	G	R	Y
81,82	R	R	G	R
83	R/→	R	G	R
P21,P22	DW	W	DW	DRK
P81,P82 P83,P84	DW	DW	W	DRK

DETECTOR INSTALLATION CHART

DETECTOR LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
1A	6X40	0	2-4-2	-	1	Yes	-	15*	-	N	-	X
					6#	Yes	-	3	-	G	-	X
1B	6X40	0	2-4-2	-	1	Yes	-	-	-	N	-	X
2A	6X6	300	EXIST	-	2	Yes	-	-	X	N	-	X
2B	6X6	300	EXIST	-	2	Yes	-	-	X	N	-	X
6A	6X6	300	EXIST	-	6	Yes	-	-	X	N	-	X
6B	6X6	300	EXIST	-	6	Yes	-	-	X	N	-	X
8A	6X40	0	2-4-2	-	8	Yes	-	3	-	N	-	X

* Disable Delay during Alternate Phasing operation.
# Disable Phase call for loop during Alternate Phasing operation.

3 Phase
Fully Actuated w/
Alternate Phasing Operation
Gastonia Signal System

NOTES

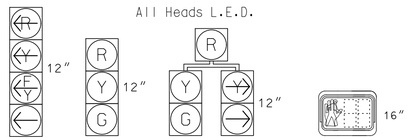
1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 may be lagged.
4. Set all detector units to presence mode.
5. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
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. Pavement markings are existing.
9. The City Engineer or their representative will determine the hours of use for each phasing plan.
10. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
11. Install new cabinet on the existing cabinet foundation.
12. All new cabinets and base extenders shall be black in color. See Project Special Provisions for details.
13. Reconnect lead-in cable to separate loops 2A, 2B, 6A & 6B, as shown.
14. City system data:
    Controller Asset # 0990.

PHASING DIAGRAM DETECTION LEGEND

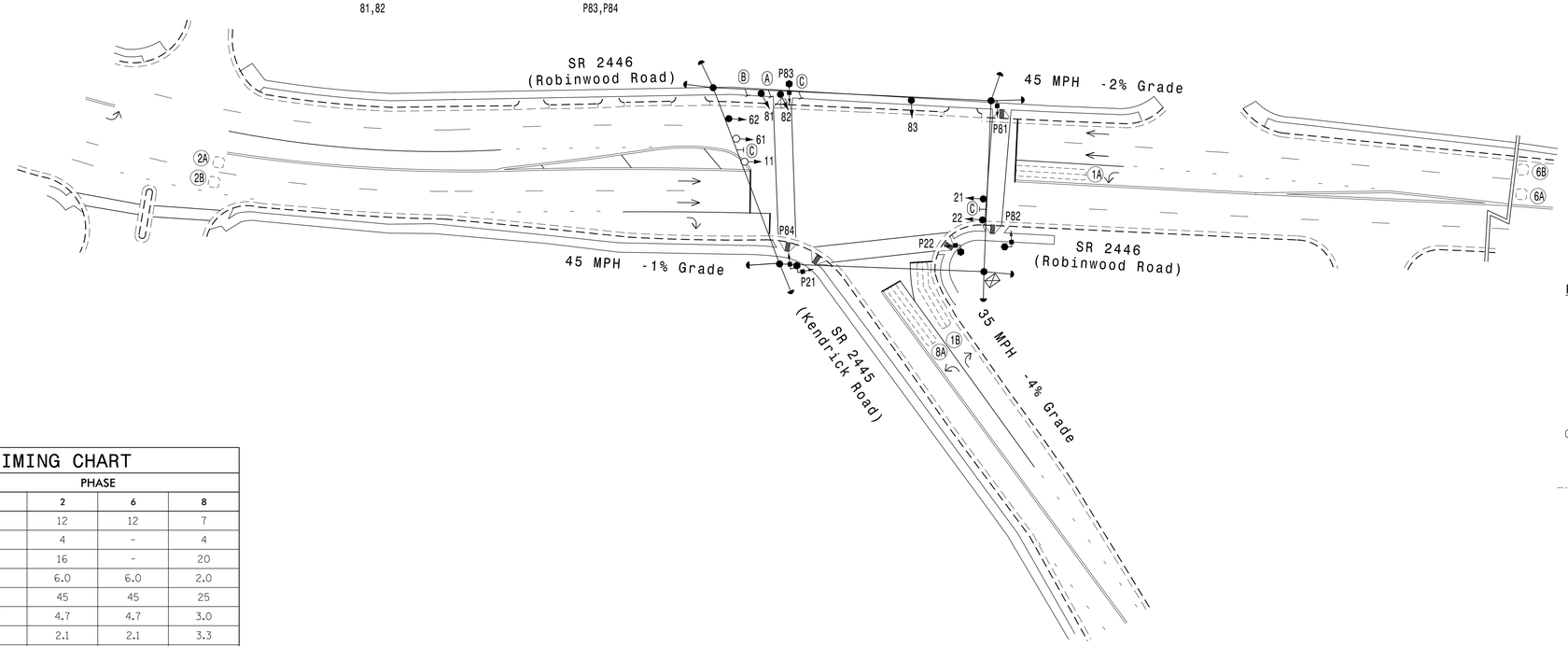
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

SIGNAL FACE I.D.

All Heads L.E.D.



11 | 21,22 61,62 81,82 | 83 | P21,P22 P81,P82 P83,P84



LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
⊓	Pedestrian Signal Head With Push Button & Sign	■
○	Signal Pole with Guy	●
○	Signal Pole with Sidewalk Guy	●
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
----------	2-in Underground Conduit	----------
N/A	Right of Way	— — — —
→	Directional Arrow	→
⬡	Type II Signal Pedestal	⬢
Ⓐ	Left-Arrow Only Sign (R3-5L)	Ⓐ
Ⓑ	Yield to Pedestrians Sign (R10-15L)	Ⓑ
Ⓒ	Street Name Sign (D3-1)	Ⓒ

TIMING CHART

FEATURE	PHASE 1	PHASE 2	PHASE 6	PHASE 8
Min Green *	7	12	12	7
Walk *	-	4	-	4
Ped Clear	-	16	-	20
Veh. Extension *	2.0	6.0	6.0	2.0
Max 1 *	15	45	45	25
Yellow	3.0	4.7	4.7	3.0
Red Clear	3.3	2.1	2.1	3.3
Red Revert	2.0	2.0	2.0	2.0
Actuations B4 Add *	-	-	-	-
Seconds /Actuation *	-	1.5	1.5	-
Max Initial *	-	34	34	-
Time Before Reduction *	-	15	15	-
Time To Reduce *	-	30	30	-
Minimum Gap	-	3.0	3.0	-
Locking Detector	-	X	X	-
Recall Position	-	MIN RECALL	MIN RECALL	-
Dual Entry	-	-	-	-
Simultaneous Gap	X	X	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.

Signal Upgrade

PLANS PREPARED IN THE OFFICE OF:
Kimley»Horn
NC License #F-0102
421 Fayetteville Street, Suite 600
Raleigh, NC 27601
(919) 677-2000

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

SCALE 0 40 1"=40'

SR 2446 (Robinwood Road)
at
SR 2445 (Kendrick Road)

Division 12 | Gaston County | Gastonia

PLAN DATE:	May 2021	REVIEWED BY:	SL Phillips
PREPARED BY:	CF Davis	REVIEWED BY:	KP Baumann

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN

DocuSigned by: 3/11/2022
SIGNATURE DATE

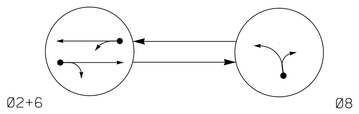
SIG. INVENTORY NO. 12-0990

3/9/2022 11:14:36 AM Danielle.Curri ***kimley-horn.comE_RAL*RAL_TPTD$_ITS$011036569 Gastonia Signal System$9 Signals$54 - Signal Design$0120990-2021.dgn

DocuSign Envelope ID: F58B15C2-40E6-45BE-9C45-A2A9EFAC85F4

PROJECT REFERENCE NO.	SHEET NO.
C-5703	Sig.95.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

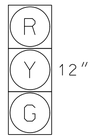
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2+6	PHASE Ø8	PHASE FLASH
21,22	G	R	Y
61,62	G	R	Y
81,82	R	G	R

SIGNAL FACE I.D.

All Heads L.E.D.



21, 22
61, 62
81, 82

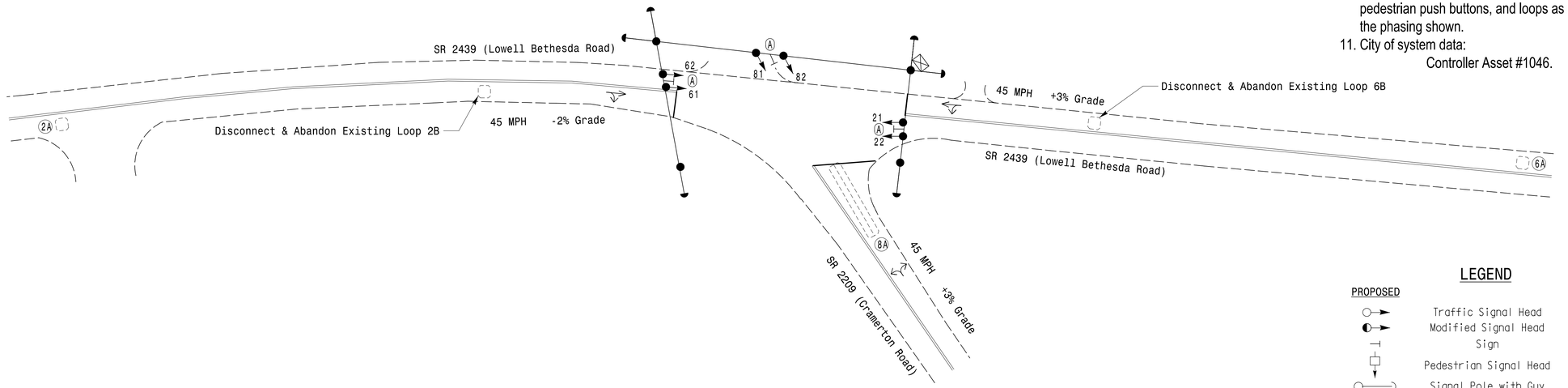
DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
2A	6X6	300	EXIST	-	2	Yes	-	-	X	N	-	X
6A	6X6	300	EXIST	-	6	Yes	-	-	X	N	-	X
8A	6X40	0	2-4-2	-	8	Yes	-	-	-	N	-	X

2 Phase
Fully Actuated
Gastonia Signal System

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. 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. Pavement markings are existing.
6. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
7. Disconnect and abandon existing loops 2B and 6B.
8. Install new cabinet on the existing cabinet foundation.
9. All new cabinets and base extenders shall be black in color. See Project Special Provisions for details.
10. Existing phase 4 has been changed to phase 8 on this plan. Change all signal heads, pedestrian signal heads, pedestrian push buttons, and loops as needed to achieve the phasing shown.
11. City of system data:
    Controller Asset #1046.



LEGEND

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

TIMING CHART

FEATURE	PHASE 2	PHASE 6	PHASE 8
Min Green *	12	12	7
Walk *	-	-	-
Ped Clear	-	-	-
Veh. Extension *	6.0	6.0	2.0
Max 1 *	45	45	20
Yellow	4.7	4.7	3.0
Red Clear	1.6	1.6	2.6
Red Revert	2.0	2.0	2.0
Actuations B4 Add *	-	-	-
Seconds /Actuation *	2.5	2.5	-
Max Initial *	34	34	-
Time Before Reduction *	15	15	-
Time To Reduce *	30	30	-
Minimum Gap	3.0	3.0	-
Locking Detector	X	X	-
Recall Position	MIN RECALL	MIN RECALL	-
Dual Entry	-	-	-
Simultaneous Gap	X	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.

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

SR 2439 (Lowell Bethesda Rd)
at
SR 2209 (Cramerton Rd)

Division 12 Gaston County Gastonia

PLAN DATE:	May 2021	REVIEWED BY:	SL Phillips
PREPARED BY:	DM Curri	REVIEWED BY:	KP Baumann

SCALE	REVISIONS	INIT.	DATE
0 30 1"=30'			

NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN

Docusigned by: 3/11/2022
SIGNATURE DATE

SIG. INVENTORY NO. 12-1046

PLANS PREPARED IN THE OFFICE OF:
Kimley»Horn
NC License #F-0102
421 Fayetteville Street, Suite 600
Raleigh, NC 27601
(919) 677-2000

3/9/2022 11:14:38 AM Danielle.Curri \\kimley-horn.com\SE_RAL1\RAL_TPTD_ITS\01036569 Gastonia Signal System\9 Signals\54 - Signal Design\012046-2021.dgn

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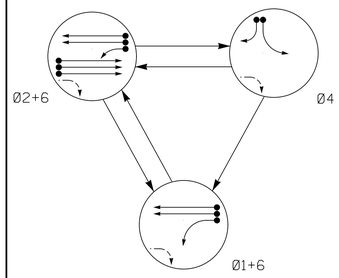
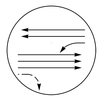
PROJECT REFERENCE NO.	SHEET NO.
C-5703	Sig.96.0

DEFAULT PHASING DIAGRAM



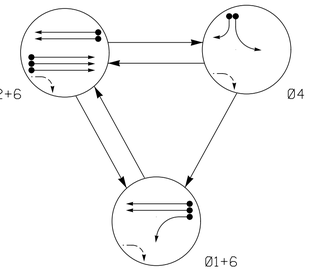
DEFAULT EV PREEMPT PHASES
(Medium Priority)



DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+6	Ø2+6	Ø4	PRE 3	FLASH
11	←	←FY	←R	←FY	←Y
21, 22, 23	R	G	R	G	Y
41,42,43,44	R	R	G	R	R
61, 62	↑	↑	R	↑	Y

ALTERNATE PHASING DIAGRAM



ALTERNATE EV PREEMPT PHASES
(Medium Priority)

ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+6	Ø2+6	Ø4	PRE 3	FLASH
11	←	←R	←R	←R	←Y
21, 22, 23	R	G	R	G	Y
41,42,43,44	R	R	G	R	R
61, 62	↑	↑	R	↑	Y

DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING						
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
1A	6X60	0	2-4-2	-	1	Yes	-	5 *	-	N	-	X
					6#	Yes	-	-	-	N	-	X
2A	6X6	90	EXIST	-	2	Yes	-	-	-	N	-	X
2B	6X6	90	EXIST	-	2	Yes	-	-	-	N	-	X
2C	6X6	90	EXIST	-	2	Yes	-	-	-	N	-	X
4A	6X60	0	2-4-2	-	4	Yes	-	-	-	N	-	X
4B	6X60	0	2-4-2	-	4	Yes	-	5	-	N	-	X
6A	6X6	60	EXIST	-	6	Yes	-	-	-	N	-	X
6B	6X6	60	EXIST	-	6	Yes	-	-	-	N	-	X

* Reduce Delay to 3 seconds during Alternate Phasing operation.
# Disable Phase call for loop during Alternate Phasing operation.

3 Phase
Fully Actuated
w/ Alternate Phasing Operation and Emergency Vehicle Preemption
Gastonia Signal System

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 may be lagged.
4. Reposition existing signal heads numbered 21 and 22.
5. Set all detector units to presence mode.
6. In the event of loop replacement, refer to the current ITS and Signal Design Manual and submit a Plan of Record to the Signal Design Section.
7. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
8. Pavement markings are existing.
9. The City Engineer or their representative will determine the hours of use for each phasing plan.
10. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
11. Install new cabinet on the existing cabinet foundation.
12. All new cabinets and base extenders shall be black in color. See Project Special Provisions for details.
13. Reconnect lead-in cable to separate loops 2A, 2B, 2C, 6A & 6B, as shown.
14. Existing signal head 43 has been relabeled to 44.
15. Install GPS emergency preemption system per manufacturer's instructions to achieve preemption needed, as shown in phasing diagram.
16. Install Louver in existing signal head 44.
17. City system data:
    Controller Asset #1086.

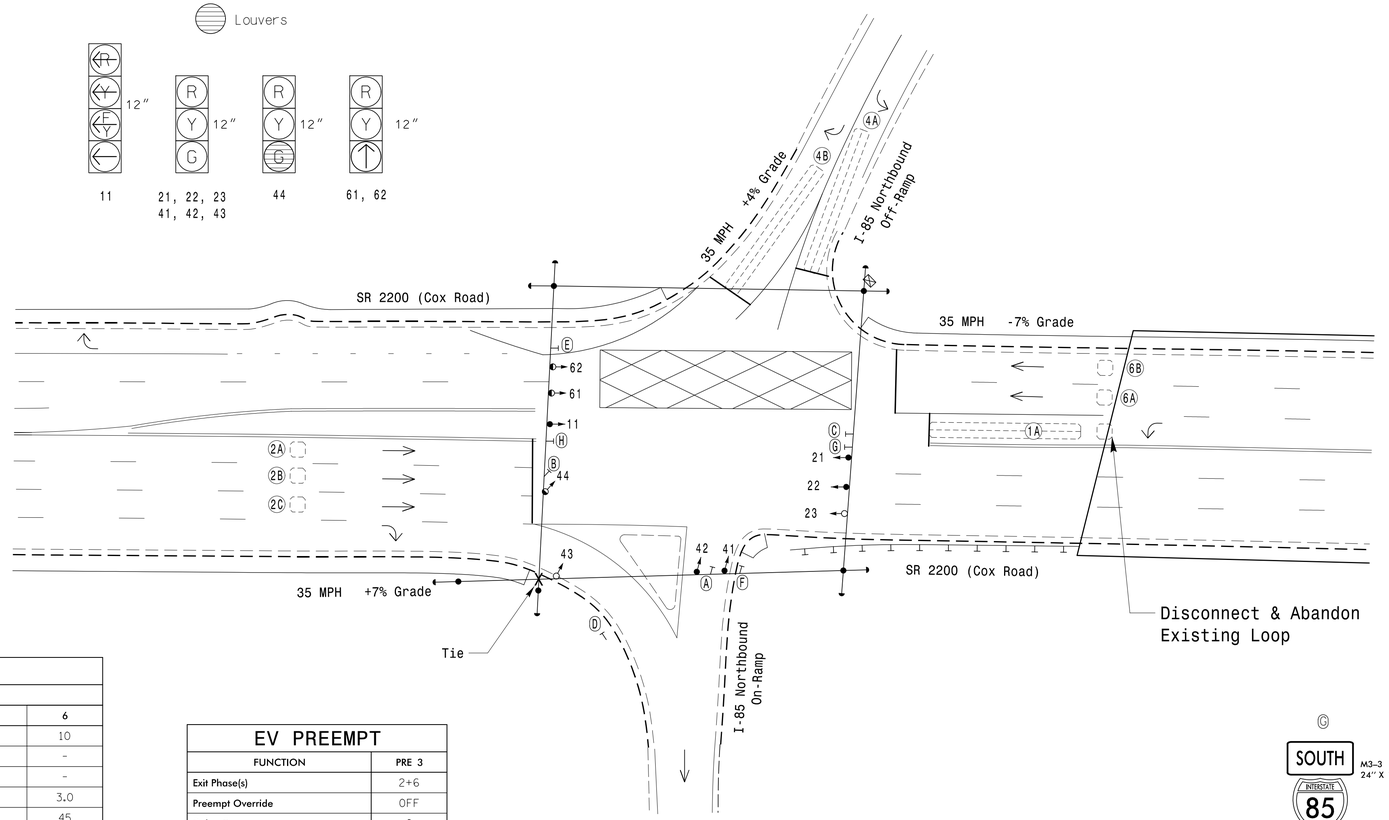
PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE I.D.

All Heads L.E.D.

Louvers



TIMING CHART

FEATURE	PHASE 1	2	4	6
Min Green *	7	10	7	10
Walk *	-	-	-	-
Ped Clear	-	-	-	-
Veh. Extension *	1.0	3.0	2.0	3.0
Max 1 *	15	45	25	45
Yellow	3.2	4.4	3.0	4.4
Red Clear	3.1	2.8	2.6	2.8
Red Revert	2.0	2.0	2.0	2.0
Actuations B4 Add *	-	-	-	-
Seconds /Actuation *	-	-	-	-
Max Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Locking Detector	-	X	-	X
Recall Position	-	MIN RECALL	-	MIN RECALL
Dual Entry	-	-	-	-
Simultaneous Gap	X	X	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.

EV PREEMPT

FUNCTION	PRE 3
Exit Phase(s)	2+6
Preempt Override	OFF
Delay Time	0
Ped Clear Through Yellow	N
Terminate Phases	N
Entrance Walk	-
Entrance Ped Clear	-
Entrance Min Green	1
Entrance Yellow Change	25.5*
Entrance Red Clear	25.5*
Minimum Dwell Time	7
Preempt Input Extension Time **	2
Preempt Max Time	120
Exit Yellow Change	25.5*
Exit Red Clear	25.5*

* Time defaults to time used for phase during normal operation
** Program Timing on GPS Detection Unit

LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
Ⓐ	Left Arrow "ONLY" Sign (R3-5L)	Ⓐ
Ⓑ	Right Arrow "ONLY" Sign (R3-5R)	Ⓑ
Ⓒ	No Left Turn Sign (R3-2)	Ⓒ
Ⓓ	"YIELD" Sign (R1-2)	Ⓓ
Ⓔ	"DO NOT BLOCK INTERSECTION" Sign (R10-7)	Ⓔ
Ⓕ	Street Name Sign (D3-1)	Ⓕ

Ⓒ
SOUTH
INTERSTATE 85
M1-1
M3-3 24" X 12"
M6-3 21" X 15"

Ⓗ
NORTH
INTERSTATE 85
M1-1
M3-1 24" X 12"
M6-1 21" X 15"

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

SR 2200 (Cox Road)
at
I-85 Northbound Ramps

Division 12 Gaston County Gastonia

PLAN DATE:	May 2021	REVIEWED BY:	SL Phillips
PREPARED BY:	DM Curri	REVIEWED BY:	KP Baumann

REVISIONS	INIT.	DATE

SCALE 0 30 1"=30'

NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN

DocuSigned by: 3/11/2022
SIGNATURE DATE

SIG. INVENTORY NO. 12-1086

PLANS PREPARED IN THE OFFICE OF:
Kimley»Horn
NC License #F-0102
421 Fayetteville Street, Suite 600
Raleigh, NC 27601
(919) 677-2000

3/9/2022 11:17:07 AM Danielle.Curri
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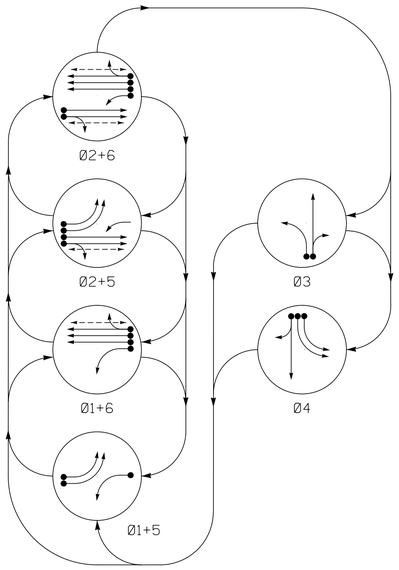
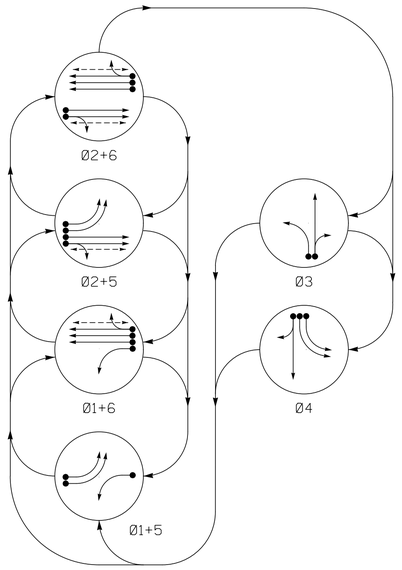
PROJECT REFERENCE NO.	SHEET NO.
C-5703	Sig.97.0

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 Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3	Ø4	FLASH
11	←●	~~←~~	~~←Y~~	~~←Y~~	~~←R~~	~~←R~~	~~←Y~~
21, 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, 42	~~←R~~	~~←R~~	~~←R~~	~~←R~~	~~←R~~	~~←~~	~~←R~~
43, 44	R	R	R	R	R	G	R
51, 52	~~←~~	~~←R~~	~~←~~	~~←R~~	~~←R~~	~~←R~~	~~←R~~
61, 62, 63	R	G	R	G	R	R	Y
P21, P22	DW	DW	W	W	DW	DW	DRK
P61, P62	DW	W	DW	W	DW	DW	DRK

ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3	Ø4	FLASH
11	←●	←●	~~←R~~	~~←R~~	~~←R~~	~~←R~~	~~←Y~~
21, 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, 42	~~←R~~	~~←R~~	~~←R~~	~~←R~~	~~←R~~	~~←~~	~~←R~~
43, 44	R	R	R	R	R	G	R
51, 52	~~←~~	~~←R~~	~~←~~	~~←R~~	~~←R~~	~~←R~~	~~←R~~
61, 62, 63	R	G	R	G	R	R	Y
P21, P22	DW	DW	W	W	DW	DW	DRK
P61, P62	DW	W	DW	W	DW	DW	DRK

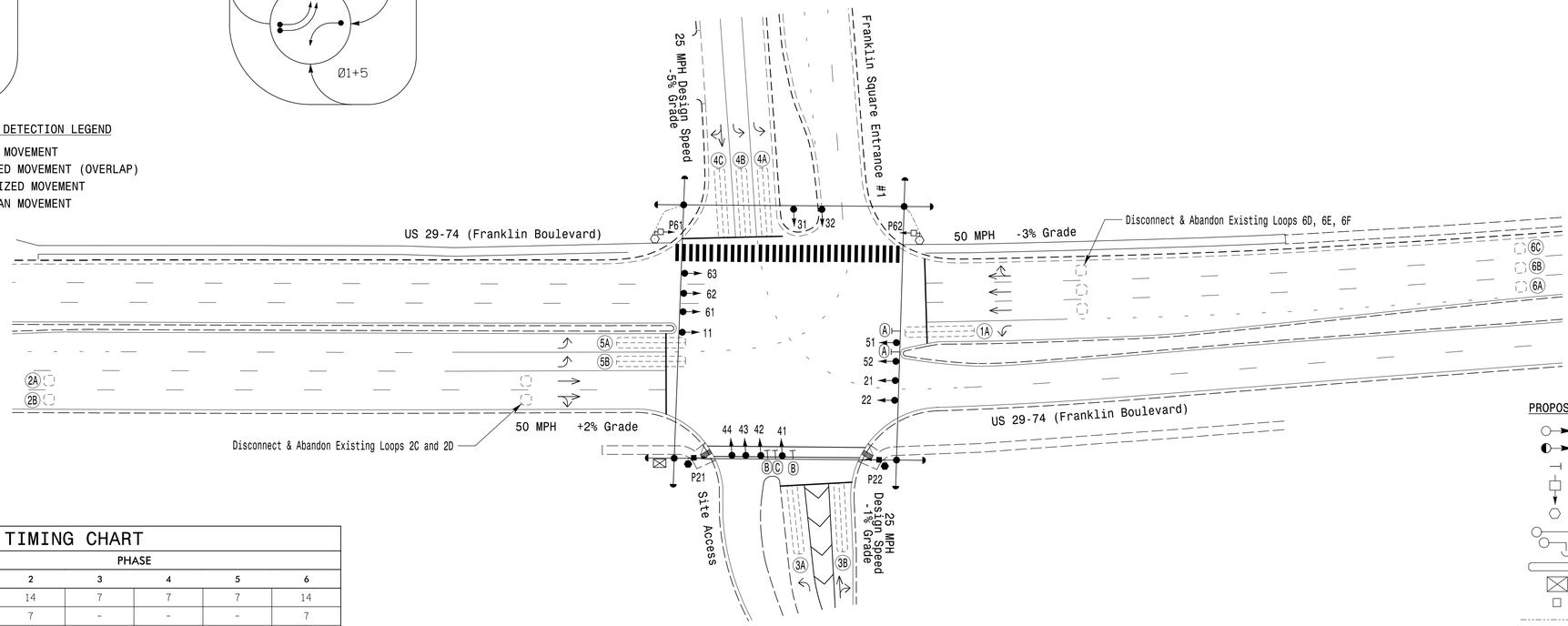
DETECTOR INSTALLATION CHART

DETECTOR LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
1A	6X40	+10	2-4-2	-	1	Yes	-	5*	-	N	-	X
					6#	Yes	-	-	-	G	-	X
2A	6X6	355	EXIST	-	2	Yes	-	-	X	N	-	X
2B	6X6	355	EXIST	-	2	Yes	-	-	X	N	-	X
3A	6X40	0	2-4-2	-	3	Yes	-	-	-	N	-	X
3B	6X40	0	2-4-2	-	3	Yes	-	-	-	N	-	X
4A	6X40	0	2-4-2	-	4	Yes	-	-	-	N	-	X
4B	6X40	0	2-4-2	-	4	Yes	-	-	-	N	-	X
4C	6X40	0	2-4-2	-	4	Yes	-	-	-	N	-	X
5A	6X40	+10	2-4-2	-	5	Yes	-	-	-	N	-	X
5B	6X40	+10	2-4-2	-	5	Yes	-	-	-	N	-	X
6A	6X6	355	EXIST	-	6	Yes	-	-	X	N	-	X
6B	6X6	355	EXIST	-	6	Yes	-	-	X	N	-	X
6C	6X6	355	EXIST	-	6	Yes	-	-	X	N	-	X

* Disable delay during Alternate Phasing Operation.
\# Disable phase call for loop during Alternate Phasing Operation.

6 Phase Fully-Actuated with Alternate Phasing Operation Gastonia Signal System

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and/or phase 5 may be lagged.
4. The order of phase 3 and phase 4 may be reversed.
5. Set all detector units to presence mode.
6. Disconnect & abandon existing loops 2C, 2D, 6D, 6E, and 6F.
7. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
8. Install new cabinet on existing cabinet foundation.
9. All new cabinets and base extenders shall be black in color. See Project Special Provisions for details.
10. All proposed pedestrian signal heads shall be black in color. See Project Special Provisions for details.
11. All proposed pedestrian pedestals and pushbutton posts shall be black in color. See Project Special Provisions for details.
12. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
13. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
14. Pavement markings are existing.
15. The City Engineer or their representative will determine the hours of use for each phasing plan.
16. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
17. City system data:
    Controller Asset #1105



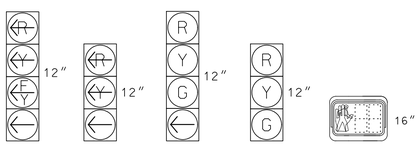
TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6
Min Green *	7	14	7	7	7	14
Walk *	-	7	-	-	-	7
Ped Clear	-	23	-	-	-	41
Veh. Extension *	2.0	6.0	2.0	2.0	2.0	6.0
Max 1 *	20	60	25	25	20	60
Yellow	3.0	5.1	3.2	3.5	3.0	5.1
Red Clear	3.6	1.8	3.3	3.2	3.7	1.8
Red Revert	2.0	2.0	2.0	2.0	2.0	2.0
Actuations B4 Add *	-	-	-	-	-	-
Seconds /Actuation *	-	1.5	-	-	-	1.0
Max Initial *	-	40	-	-	-	40
Time Before Reduction *	-	15	-	-	-	15
Time To Reduce *	-	30	-	-	-	30
Minimum Gap	-	3.1	-	-	-	3.1
Locking Detector	-	X	-	-	-	X
Recall Position	-	MIN RECALL	-	-	-	MIN RECALL
Dual Entry	-	-	-	-	-	-
Simultaneous Gap	X	X	X	X	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.

SIGNAL FACE I.D.

All Heads L.E.D.



LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
▯↓	Pedestrian Signal Head With Push Button & Sign	■↓
⬡	Type II Signal Pedestal	⬢
○—○	Signal Pole with Guy	●—●
○—○	Signal Pole with Sidewalk Guy	●—●
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
------	2-in Underground Conduit	------
N/A	Right of Way	———
→	Directional Arrow	→
N/A	Curb Ramp	
Ⓐ	Left Turn Signal Sign (R10-10L)	Ⓐ
Ⓑ	Left Arrow "ONLY" Sign (R3-5L)	Ⓑ
Ⓒ	Street Sign (D3-1)	Ⓒ

Signal Upgrade

PLANS PREPARED IN THE OFFICE OF:
Kimley»Horn
NC License #F-0102
421 Fayetteville Street, Suite 600
Raleigh, NC 27601
(919) 677-2000

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

SCALE 0 40 1"=40'

US 29-74 (Franklin Blvd.) at Franklin Square Entrance #1 / Site Access

Division 12 Gaston County Gastonia

PLAN DATE:	May 2021	REVIEWED BY:	SL Phillips
PREPARED BY:	DM Curri	REVIEWED BY:	KP Baumann

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN

DocuSigned by: 3/11/2022
SIGNATURE DATE

SIG. INVENTORY NO. 12-1105

\\kimley-horn.com\SE_RAL1\RAL_TPTO_ITS\01036569 Gastonia Signal Systems\Signals\S4 - Signal Design\121105-2021.dgn
11:12:31 AM Danielle.Curri
3/9/2022

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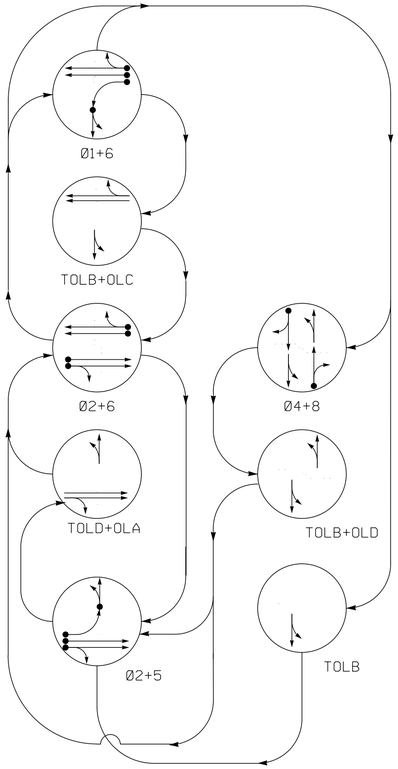
PROJECT REFERENCE NO.	SHEET NO.
C-5703	Sig.98.0

7 Phase Fully Actuated w/ 2 Timed Overlaps and Emergency Vehicle Preemption Gastonia Signal System

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

EV PREEMPT PHASES

(Medium Priority)

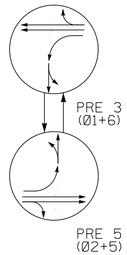


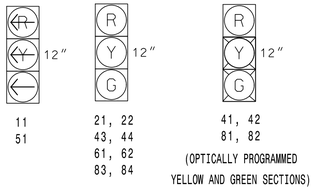
TABLE OF OPERATION

SIGNAL FACE	PHASE										
	Ø2+5	Ø2+6	Ø1+6	Ø4+8	TOLD+OLA	TOLB+OLC	TOLB+OLD	TOLB	PRE 3	PRE 5	FLASH
11	←R	←R	←	←R	←R	←R	←R	←R	←	←R	←R
21, 22	G	G	R	R	G	R	R	R	R	G	Y
✳ 41, 42	R	R	G	G	R	G	G	G	G	R	R
43, 44	R	R	R	G	R	R	R	R	R	R	R
51	←	←R	←R	←R	←R	←R	←R	←R	←	←R	←R
61, 62	R	G	G	R	R	G	R	R	G	R	Y
✳ 81, 82	G	R	R	G	G	R	G	R	R	G	R
83, 84	R	R	R	G	R	R	R	R	R	R	R

✳ See Note 13

SIGNAL FACE I.D.

All Heads L.E.D.



11
51

21, 22
43, 44
61, 62
83, 84

41, 42
81, 82

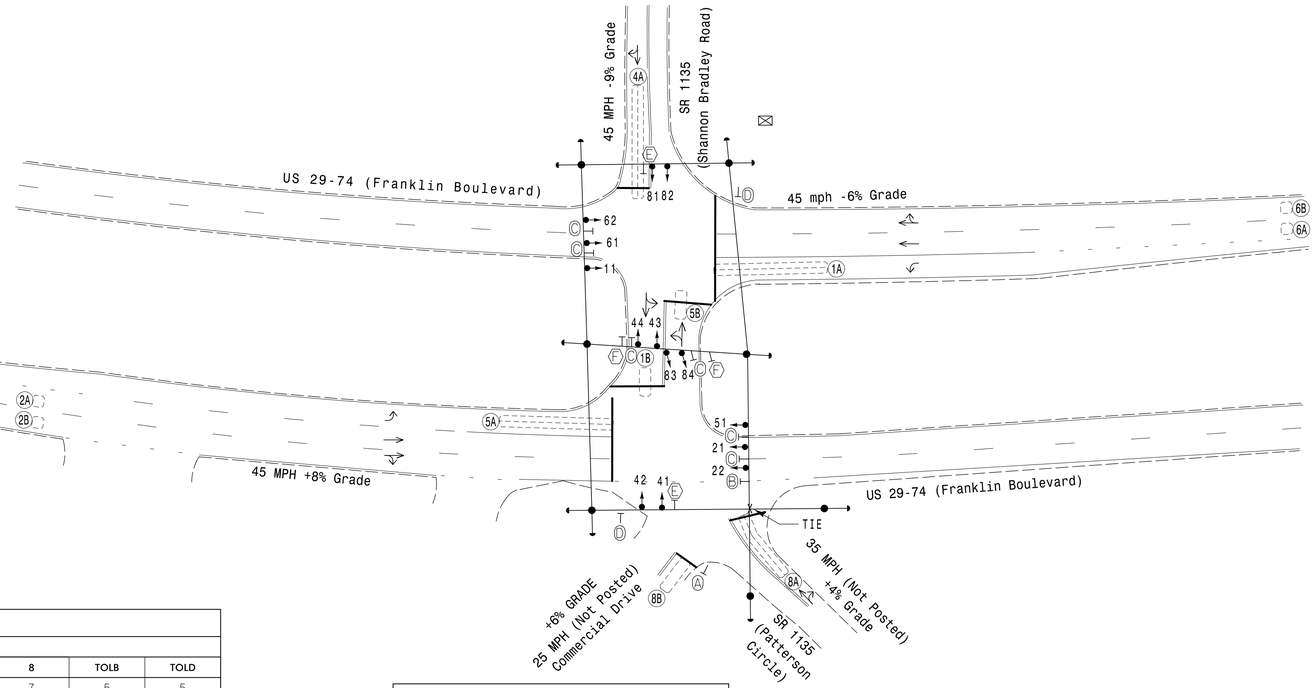
(OPTICALLY PROGRAMMED YELLOW AND GREEN SECTIONS)

DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING						
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
1A	6X60	0	2-4-2	-	1	Yes	-	-	-	N	-	X
1B	6X15	+5	EXIST	-	1	Yes	-	3	-	N	-	X
2A	6X6	300	EXIST	-	2	Yes	-	-	X	N	-	X
2B	6X6	300	EXIST	-	2	Yes	-	-	X	N	-	X
4A	6X60	+5	2-4-2	-	4	Yes	-	3	-	N	-	X
5A	6X60	0	2-4-2	-	5	Yes	-	-	-	N	-	X
5B	6X15	+5	EXIST	-	5	Yes	-	3	-	N	-	X
6A	6X6	300	EXIST	-	6	Yes	-	-	X	N	-	X
6B	6X6	300	EXIST	-	6	Yes	-	-	X	N	-	X
8A	6X40	0	2-4-2	-	8	Yes	-	3	-	N	-	X
8B	6X20	0	EXIST	-	8	Yes	-	3	-	N	-	X

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. In the event of loop replacement, refer to the current ITS and Signal Design Manual and submit a Plan of Record to the Signal Design Section.
5. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
6. Pavement markings are existing.
7. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
8. Install new cabinet on the existing cabinet foundation.
9. All new cabinets and base extenders shall be black in color. See Project Special Provisions for details.
10. Install GPS emergency preemption system per manufacturer's instructions to achieve preemption needed, as shown in phasing diagram.
11. Existing signal heads 11, 23, 24, 31, 45, 46, 47, 48 have been relabeled to 51, 61, 62, 11, 81, 82, 83, 84, respectively.
12. Existing loops 1A, 1B, 2C, 2D, 3A, 3B, 4B, 4C have been relabeled to 5A, 5B, 6A, 6B, 1A, 1B, 8A, 8B respectively.
13. Signal heads numbered 41, 42, 81, and 82 are tethered.
14. City system data:
    Controller Asset #: 1124.



LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
▯	Pedestrian Signal Head With Push Button & Sign	■
○	Signal Pole with Guy	●
○	Signal Pole with Sidewalk Guy	●
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
----------	2-in Underground Conduit	----------
N/A	Right of Way	----------
→	Directional Arrow	→
Ⓐ	"STOP" Sign (R1-1)	Ⓐ
Ⓑ	"NO TURN ON RED" Sign (R10-11)	Ⓑ
Ⓒ	Street Name Sign (D3-1)	Ⓒ
Ⓓ	"ONE WAY" Sign (R6-1L)	Ⓓ
Ⓔ	Combined Through and Left Arrow Sign (R3-6L)	Ⓔ
Ⓕ	"ONE WAY" Sign (R6-1R)	Ⓕ

TIMING CHART

FEATURE	PHASE						TOLB	TOLD
	1	2	4	5	6	8		
Min Green *	7	12	7	7	12	7	5	5
Walk *	-	-	-	-	-	-	-	-
Ped Clear	-	-	-	-	-	-	-	-
Veh. Extension *	2.0	6.0	1.0	2.0	6.0	1.0	0.0	0.0
Max 1 *	20	120	20	25	120	20	N/A	N/A
Yellow	3.1	3.9	5.5	3.0	5.1	5.5	4.1	3.7
Red Clear	3.0	1.5	3.0	1.1	1.0	1.3	2.6	2.6
Red Revert	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Actuations B4 Add *	-	-	-	-	-	-	-	-
Seconds /Actuation *	-	1.5	-	-	1.5	-	-	-
Max Initial *	-	34	-	-	34	-	-	-
Time Before Reduction *	-	15	-	-	15	-	-	-
Time To Reduce *	-	40	-	-	40	-	-	-
Minimum Gap	-	3.0	-	-	3.0	-	-	-
Locking Detector	-	X	-	-	X	-	-	-
Recall Position	-	MIN RECALL	-	-	MIN RECALL	-	-	-
Dual Entry	-	-	X	-	-	X	-	-
Simultaneous Gap	X	X	X	X	X	X	X	X

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

EV PREEMPT

FUNCTION	PRE 3	PRE 5
Exit Phase(s)	2+6	2+6
Preempt Override	OFF	OFF
Delay Time	0	0
Ped Clear Through Yellow	N	N
Terminate Phases	N	N
Entrance Walk	-	-
Entrance Ped Clear	-	-
Entrance Min Green	1	1
Entrance Yellow Change	25.5✳	25.5✳
Entrance Red Clear	25.5✳	25.5✳
Minimum Dwell Time	7	7
Preempt Input Extension Time **	2	2
Preempt Max Time	120	120
Exit Yellow Change	25.5✳	25.5✳
Exit Red Clear	25.5✳	25.5✳

* Time defaults to time used for phase during normal operation
** Program Timing on GPS Detection Unit

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

US 29-74 (Franklin Boulevard) at SR 1135 (Shannon Bradley Road)/ Patterson Circle & Commercial Drive

Division 12 Gaston County Gastonia

PLAN DATE: May 2021 REVIEWED BY: SL Phillips

PREPARED BY: SP Pennington REVIEWED BY: KP Baumann

REVISIONS | INIT. | DATE

SCALE 0 40 1"=40'

NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN

DocuSigned by: 3/11/2022
SIGNATURE DATE

SIG. INVENTORY NO. 12-1124

PLANS PREPARED IN THE OFFICE OF:
Kimley»Horn
NC License #F-0102
421 Fayetteville Street, Suite 600
Raleigh, NC 27601
(919) 677-2000

750 N.Greenfield Pkwy,Garner,NC 27529

3/9/2022 11:14:18 AM Daniella.Curri ✱✱kimley-horn.com✱SE_RAL1✱RAL_TPTD✱_ITS✱011036569 Gastonia Signal System✱9 Signals✱54 - Signal Design✱121124-2021.dgn

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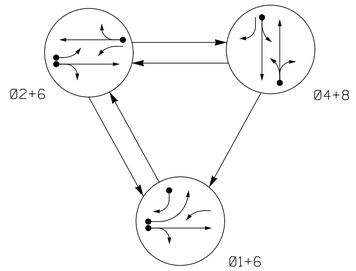
PROJECT REFERENCE NO.	SHEET NO.
C-5703	Sig.99.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

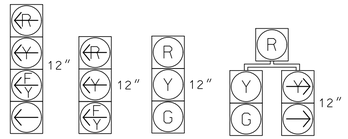
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+6	PHASE Ø2+6	PHASE Ø4+8	FLASH
11	←	F Y	R	Y
21	F Y	F Y	R	Y
22, 23	R	G	R	Y
41, 42	R	R	G	R
61, 62	G	G	R	Y
81	R	R	G	R
82	R/←	R	G	R

SIGNAL FACE I.D.

All Heads L.E.D.



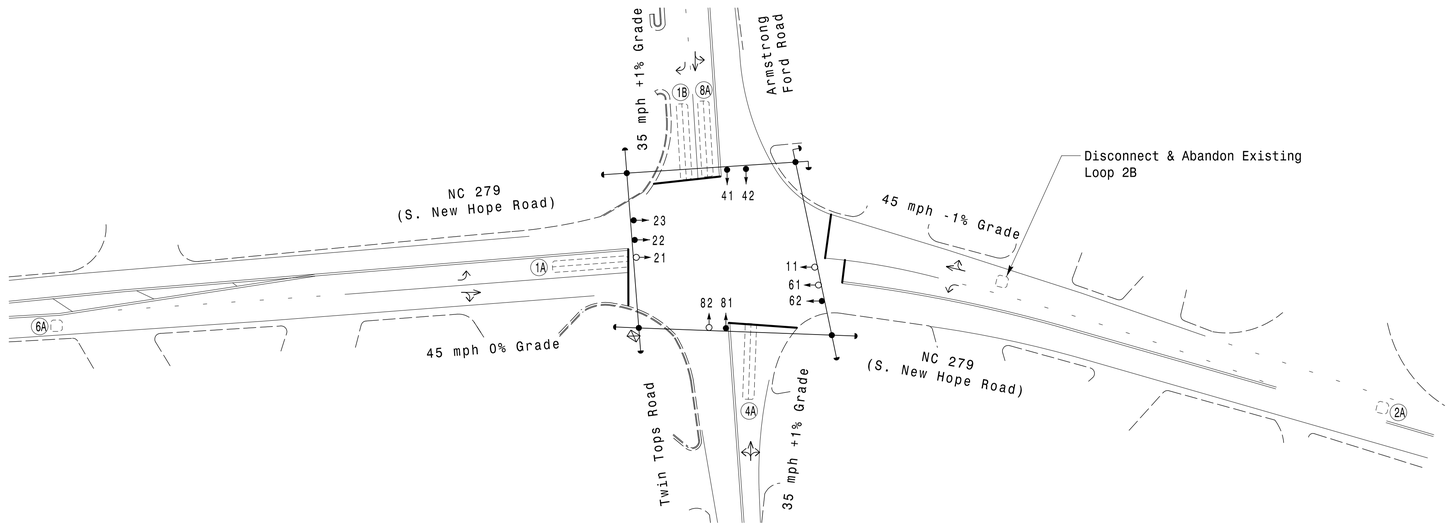
DETECTOR INSTALLATION CHART

DETECTOR						PROGRAMMING						
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
1A	6X40	0	2-4-2	-	1	Yes	-	15	-	N	-	X
					6	Yes	-	3	-	G	-	X
1B	6X40	0	2-4-2	-	1	Yes	-	15	-	N	-	X
2A	6X6	300	EXIST	-	2	Yes	-	-	X	N	-	X
4A	6X40	0	2-4-2	-	4	Yes	-	3	-	N	-	X
6A	6X6	300	EXIST	-	6	Yes	-	-	X	N	-	X
8A	6X40	0	2-4-2	-	8	Yes	-	3	-	N	-	X

3 Phase
Fully Actuated
Gastonia Signal System

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 may be lagged.
4. Set all detector units to presence mode.
5. In the event of loop replacement, refer to the current ITS and Signal Design Manual and submit a Plan of Record to the Signal Design Section.
6. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
7. Pavement markings are existing.
8. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
9. Install new cabinet on the existing cabinet foundation.
10. All new cabinets and base extenders shall be black in color. See Project Special Provisions for details.
11. Disconnect and abandon existing loop 2B.
12. Existing signal head 21 and 22 have been relabeled to 22 and 23, respectively.
13. Existing loop 8B has been relabeled to 1B.
14. City system data:
    Controller Asset #1195.



LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
□↓	Pedestrian Signal Head With Push Button & Sign	■↓
○—	Signal Pole with Guy	●—
○—○	Signal Pole with Sidewalk Guy	●—●
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
----------	2-in Underground Conduit	----------
N/A	Right of Way	----------
→	Directional Arrow	→

TIMING CHART

FEATURE	PHASE 1	2	4	6	8
Min Green *	7	12	7	12	7
Walk *	-	-	-	-	-
Ped Clear	-	-	-	-	-
Veh. Extension *	2.0	6.0	2.0	6.0	2.0
Max 1 *	15	45	20	45	20
Yellow	3.0	4.6	3.8	4.6	3.8
Red Clear	2.1	1.3	1.5	1.3	1.5
Red Revert	2.0	2.0	2.0	2.0	2.0
Actuations B4 Add *	-	-	-	-	-
Seconds /Actuation *	-	2.5	-	2.5	-
Max Initial *	-	34	-	34	-
Time Before Reduction *	-	15	-	15	-
Time To Reduce *	-	30	-	30	-
Minimum Gap	-	3.0	-	3.0	-
Locking Detector	-	X	-	X	-
Recall Position	-	MIN RECALL	-	MIN RECALL	-
Dual Entry	-	-	X	-	X
Simultaneous Gap	X	X	X	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.

Signal Upgrade

PLANS PREPARED IN THE OFFICE OF:
Kimley»Horn
NC License #F-0102
421 Fayetteville Street, Suite 600
Raleigh, NC 27601
(919) 677-2000

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

NC 279 (S. New Hope Road)
at
Twin Tops Road/
Armstrong Ford Road

Division 12 Gaston County Gastonia

PLAN DATE:	May 2021	REVIEWED BY:	SL Phillips
PREPARED BY:	SP Pennington	REVIEWED BY:	KP Baumann

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN

Docusigned by: 3/11/2022
SIGNATURE DATE

SIG. INVENTORY NO. 12-1195

3/9/2022 11:14:40 AM Daniella.Curri \\kimley-horn.com\SE_RAL1\RAL_TPTD_ITS\01036569 Gastonia Signal System\9 Signals\54 - Signal Design\01211195-2021.dgn

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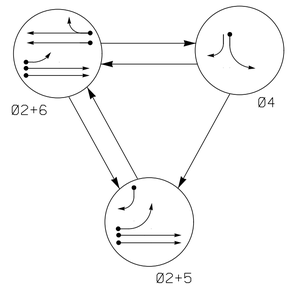
PROJECT REFERENCE NO.	SHEET NO.
C-5703	Sig.100.0

3 Phase
Fully Actuated
w/ Alternate Phasing Operation
Gastonia Signal System

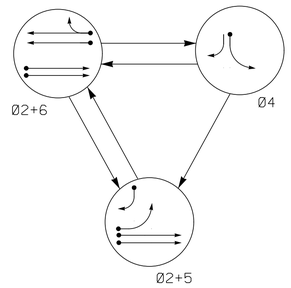
DEFAULT PHASING DIAGRAM



DEFAULT PHASING TABLE OF OPERATION

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

ALTERNATE PHASING DIAGRAM



ALTERNATE PHASING TABLE OF OPERATION

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

DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING						
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
2A	6X6	300	EXIST	-	2	Yes	-	-	X	N	-	X
2B	6X6	300	EXIST	-	2	Yes	-	-	X	N	-	X
4A	6X60	0	2-4-2	-	4	Yes	-	3	-	N	-	X
5A	6X60	0	2-4-2	-	5	Yes	-	15*	-	N	-	X
5B	6X60	0	2-4-2	-	5	Yes	-	15	-	N	-	X
6A	6X6	300	EXIST	-	6	Yes	-	-	X	N	-	X
6B	6X6	300	EXIST	-	6	Yes	-	-	X	N	-	X

* Disable Delay during Alternate Phasing operation.
\# Disable Phase call for loop during Alternate Phasing operation.

NOTES

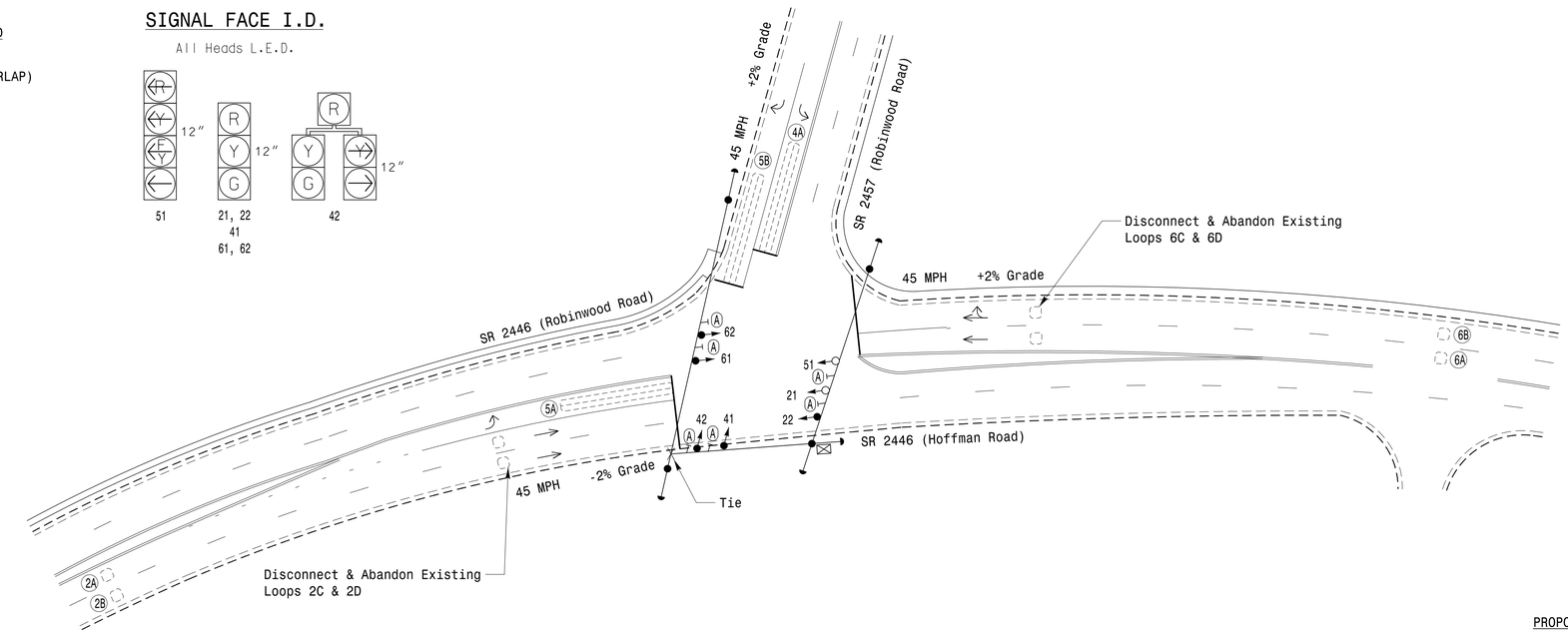
1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Reposition existing signal head numbered 22.
4. Set all detector units to presence mode.
5. In the event of loop replacement, refer to the current ITS and Signal Design Manual and submit a Plan of Record to the Signal Design Section.
6. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
7. Remove existing "Left Turn Yield on Green" ball sign-(R10-12).
8. Pavement markings are existing.
9. The City Engineer or their representative will determine the hours of use for each phasing plan.
10. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
11. Disconnect and abandon existing loops 2C, 2D, 6C, and 6D.
12. Install new cabinet on the existing cabinet foundation.
13. All new cabinets and base extenders shall be black in color. See Project Special Provisions for details.
14. City system data:
    Controller Asset #1209.

PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE I.D.

All Heads L.E.D.



TIMING CHART

FEATURE	PHASE 2	4	5	6
Min Green *	12	12	7	12
Walk *	-	-	-	-
Ped Clear	-	-	-	-
Veh. Extension *	6.0	2.0	1.0	6.0
Max 1 *	45	25	15	45
Yellow	4.7	3.0	3.0	4.7
Red Clear	1.4	2.6	2.4	1.4
Red Revert	2.0	2.0	2.0	2.0
Actuations B4 Add *	-	-	-	-
Seconds /Actuation *	1.5	-	-	1.5
Max Initial *	34	-	-	34
Time Before Reduction *	15	-	-	15
Time To Reduce *	30	-	-	30
Minimum Gap	3.0	-	-	3.0
Locking Detector	X	-	-	X
Recall Position	MIN RECALL	-	-	MIN RECALL
Dual Entry	-	-	-	-
Simultaneous Gap	X	X	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	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
(A)	Street Name Sign (D3-1)	(A)

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

SR 2446 (Robinwood Road/ Hoffman Road) at SR 2457 (Robinwood Road)
Division 12 Gaston County Gastonia

PLAN DATE:	May 2021	REVIEWED BY:	SL Phillips
PREPARED BY:	DM Curri	REVIEWED BY:	KP Baumann

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN

DocuSigned by: 5B67B0A0B5B5427... SIGNATURE 3/11/2022 DATE

SIG. INVENTORY NO. 12-1209

PLANS PREPARED IN THE OFFICE OF:
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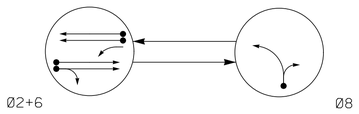
421 Fayetteville Street, Suite 600
Raleigh, NC 27601
(919) 677-2000

3/9/2022 11:14:42 AM Danielle.Curri \\kimley-horn.com\SE_RAL1\#RAL_TPTO_ITS\011036569 Gastonia Signal Systems\3 Signals\54 - Signal Design\012209-2021.dgn

DocuSign Envelope ID: 71A6ECA9-99B4-4A07-8B92-D1E2A58F3BE5

PROJECT REFERENCE NO.	SHEET NO.
C-5703	Sig.101.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

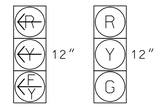
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2+6	PHASE Ø8	PHASE FLASH
21,22	G	R	Y
61	~~F Y~~	~~R~~	~~Y~~
62,63	G	R	Y
81,82	R	G	R

SIGNAL FACE I.D.

All Heads L.E.D.



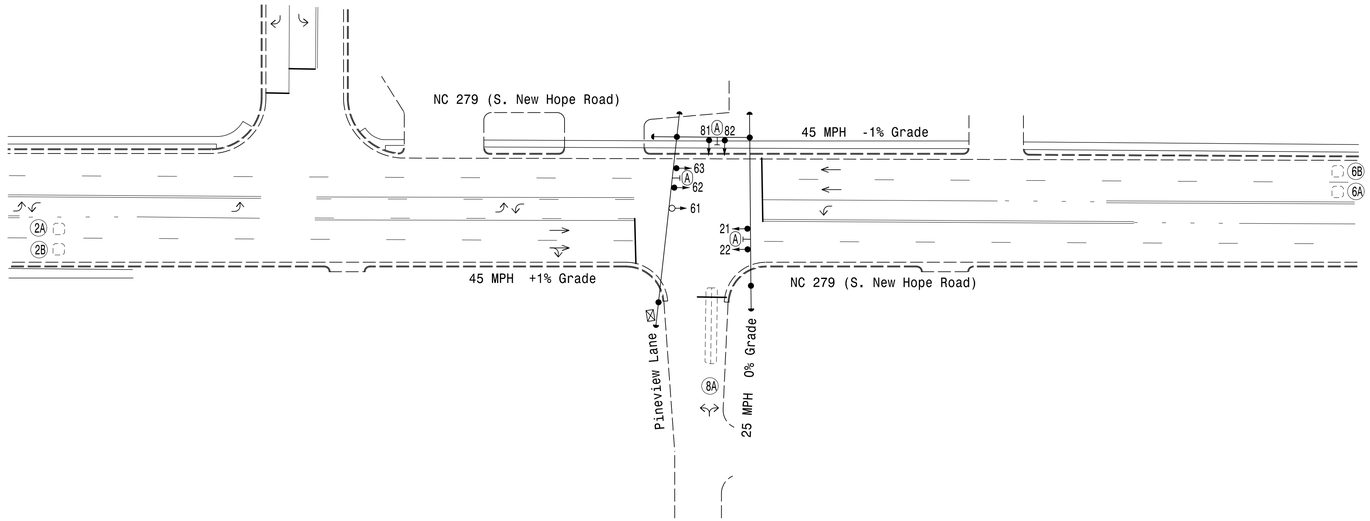
DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING						
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP / NEW CARD
2A	6X6	300	EXIST	-	2	Yes	-	-	X	N	- / X
2B	6X6	300	EXIST	-	2	Yes	-	-	X	N	- / X
6A	6X6	300	EXIST	-	6	Yes	-	-	X	N	- / X
6B	6X6	300	EXIST	-	6	Yes	-	-	X	N	- / X
8A	6X40	+5	2-4-2	-	8	Yes	-	5	-	N	- / X

2 Phase
Fully Actuated
Gastonia Signal System

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Reposition existing signal heads numbered 62 & 63.
4. Set all detector units to presence mode.
5. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
6. Pavement markings are existing.
7. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
8. Install new cabinet on the existing cabinet foundation.
9. All new cabinets and base extenders shall be black in color. See Project Special Provisions for details.
10. Reconnect lead-in cable to separate loops 2A, 2B, 6A, & 6B, as shown.
11. Existing signal heads 61, & 62 have been relabeled to 62, & 63, respectively.
12. Existing phase 4 has been changed to phase 8 on this plan. Change all signal heads, pedestrian signal heads, pedestrian push buttons, and loops as needed to achieve the phasing shown.
13. City of system data:
    Controller Asset #1231.



TIMING CHART

FEATURE	PHASE 2	PHASE 6	PHASE 8
Min Green *	12	12	7
Walk *	-	-	-
Ped Clear	-	-	-
Veh. Extension *	6.0	6.0	2.0
Max 1 *	90	90	30
Yellow	4.6	4.6	3.0
Red Clear	1.0	1.0	2.3
Red Revert	2.0	2.0	2.0
Actuations B4 Add *	-	-	-
Seconds /Actuation *	1.5	1.5	-
Max Initial *	34	34	-
Time Before Reduction *	15	15	-
Time To Reduce *	30	30	-
Minimum Gap	3.0	3.0	-
Locking Detector	X	X	-
Recall Position	MIN RECALL	MIN RECALL	-
Dual Entry	-	-	-
Simultaneous Gap	X	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	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
A	Street Name Sign (D3-1)	A

Signal Upgrade

Prepared For:
Transportation Mobility and Safety Division
North Carolina Department of Transportation
Signal Design Section

750 N.Greenfield Pkwy,Garner,NC 27529

NC 279 (S. New Hope Road)
at
Pineview Lane

Division 12 Gaston County Gastonia

PLAN DATE:	May 2021	REVIEWED BY:	SL Phillips
PREPARED BY:	CF Davis	REVIEWED BY:	KP Baumann

REVISIONS	INIT.	DATE

SCALE 0 40 1"=40'

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN

DocuSigned by: 3/11/2022
SIGNATURE DATE

SIG. INVENTORY NO. 12-1231

PLANS PREPARED IN THE OFFICE OF:
Kimley»Horn
NC License #F-0102
421 Fayetteville Street, Suite 600
Raleigh, NC 27601
(919) 677-2000

3/9/2022 11:16:30 AM Danielle.Curri ***kimley-horn.com*SE_RAL1*RAL_TPTO*_ITS*011035569 Gastonia Signal System*9 Signals*54 - Signal Design*#12231-2021.dgn

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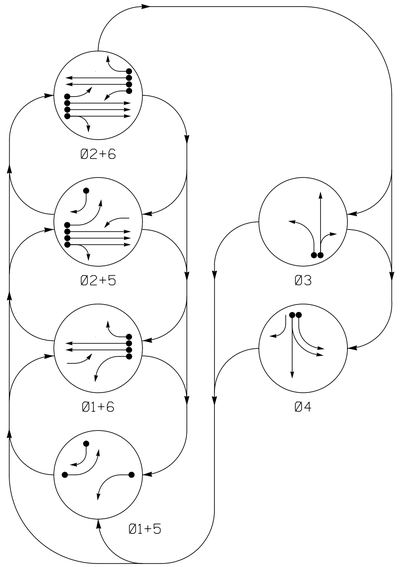
PROJECT REFERENCE NO.	SHEET NO.
C-5703	Sig.102.0

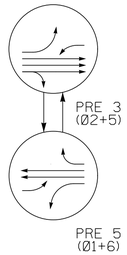
6 Phase Fully Actuated w/ Alternate Phasing Operation and Emergency Vehicle Preemption Gastonia Signal System

DEFAULT PHASING DIAGRAM



DEFAULT EV PREEMPT PHASES

(Medium Priority)



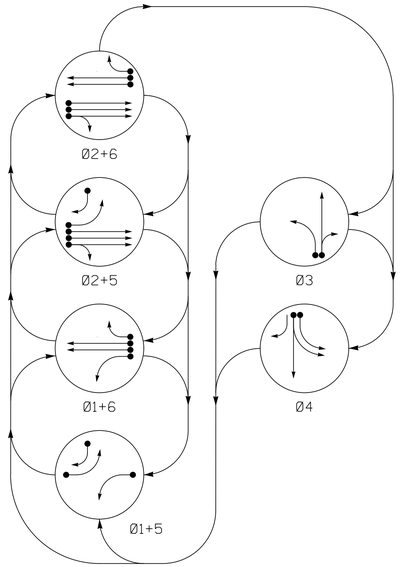
DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE								
	Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3	Ø4	PRE 3	PRE 5	FLASH
11	←	←	~~F~~ Y	~~F~~ Y	~~R~~	~~R~~	~~F~~ Y	←	~~Y~~
21,22,23	R	R	G	G	R	R	G	R	Y
31	R	R	R	R	G ←	R	R	R	R
32	R	R	R	R	G	R	R	R	R
41	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	←	~~R~~	~~R~~	~~R~~
42	R	R	R	R	R	G ←	R	R	R
43	R ↙	R	R ↙	R	R	G	R	R	R
51	←	~~F~~ Y	←	~~F~~ Y	~~R~~	←	~~F~~ Y	←	~~Y~~
61,62,63	R	G	R	G	R	R	R	G	Y

ALTERNATE PHASING TABLE OF OPERATION

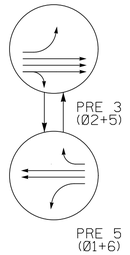
SIGNAL FACE	PHASE								
	Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3	Ø4	PRE 3	PRE 5	FLASH
11	←	←	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	←	~~Y~~
21,22,23	R	R	G	G	R	R	G	R	Y
31	R	R	R	R	G ←	R	R	R	R
32	R	R	R	R	G	R	R	R	R
41	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	←	~~R~~	~~R~~	~~R~~
42	R	R	R	R	R	G ←	R	R	R
43	R ↙	R	R ↙	R	R	G	R	R	R
51	←	~~R~~	←	~~R~~	~~R~~	←	~~R~~	←	~~Y~~
61,62,63	R	G	R	G	R	R	R	G	Y

ALTERNATE PHASING DIAGRAM



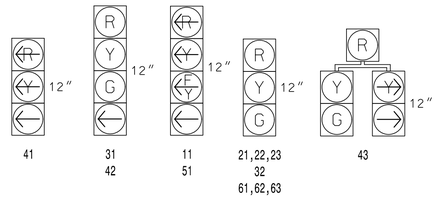
ALTERNATE EV PREEMPT PHASES

(Medium Priority)



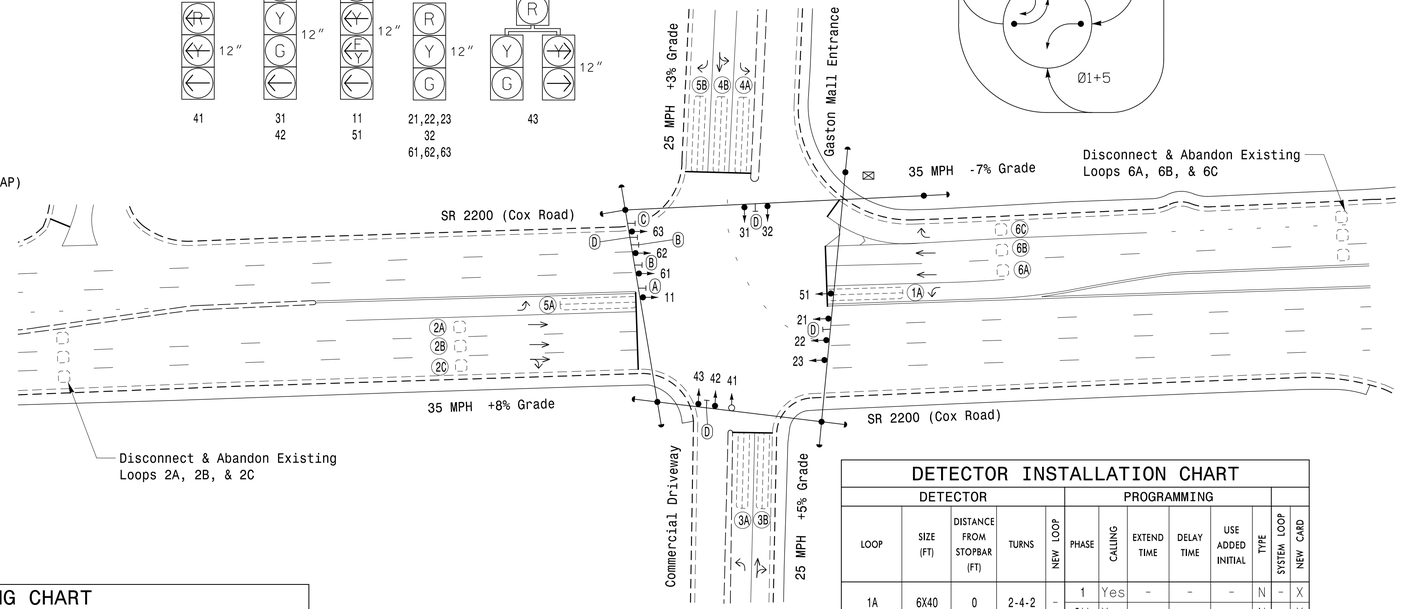
SIGNAL FACE I.D.

All Heads L.E.D.



PHASING DIAGRAM DETECTION LEGEND

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



NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and/or phase 5 may be lagged.
4. The order of phase 3 and phase 4 may be reversed.
5. Reposition existing signal heads numbered 42 & 43.
6. Set all detector units to presence mode.
7. In the event of loop replacement, refer to the current ITS and Signal Design Manual and submit a Plan of Record to the Signal Design Section.
8. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
9. Remove existing Left Arrow "ONLY" sign-(R3-5L) and existing Through Arrow "ONLY" signs-(R3-5A).
10. Pavement markings are existing.
11. The City Engineer or their representative will determine the hours of use for each phasing plan.
12. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
13. Disconnect and abandon existing loops 2A, 2B, 2C, 6A, 6B, and 6C, and relabel existing loops 2D, 2E, 2F, 6D, 6E, and 6F as 2A, 2B, 2C, 6A, 6B, and 6C, respectively.
14. Install new cabinet on the existing cabinet foundation.
15. Existing signal heads 41 & 42 have been relabeled to 42 & 43, respectively.
16. All new cabinets and base extenders shall be black in color. See Project Special Provisions for details.
17. Reconnect lead-in cable to separate loops 2A, 2B, & 2C and 6A, 6B, & 6C, as shown.
18. Install GPS emergency preemption system per manufacturer's instructions to achieve preemption needed, as shown in phasing diagram.
19. City of system data:
    Controller Asset #1238.

LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
□	Pedestrian Signal Head With Push Button & Sign	■
○	Signal Pole with Guy	●
○	Signal Pole with Sidewalk Guy	●
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
----------	2-in Underground Conduit	----------
N/A	Right of Way	– – – – –
→	Directional Arrow	→
Ⓐ	Left Arrow "ONLY" Sign (R3-5L)	Ⓐ
Ⓑ	Through Arrow "ONLY" Sign (R3-5A)	Ⓑ
Ⓒ	Right Arrow "ONLY" Sign (R3-5R)	Ⓒ
Ⓓ	Street Name Sign (D3-1)	Ⓓ

TIMING CHART

FEATURE	PHASE					
	1	2	3	4	5	6
Min Green *	7	12	7	7	7	12
Walk *	-	-	-	-	-	-
Ped Clear	-	-	-	-	-	-
Veh. Extension *	2.0	3.0	2.0	2.0	2.0	3.0
Max 1 *	20	90	30	30	20	90
Yellow	3.2	4.4	3.0	3.1	3.0	4.4
Red Clear	2.4	2.4	3.0	3.2	2.8	2.4
Red Revert	2.0	2.0	2.0	2.0	2.0	2.0
Actuations B4 Add *	-	-	-	-	-	-
Seconds /Actuation *	-	-	-	-	-	-
Max Initial *	-	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-	-
Time To Reduce *	-	-	-	-	-	-
Minimum Gap	-	-	-	-	-	-
Locking Detector	-	X	-	-	-	X
Recall Position	-	MIN RECALL	-	-	-	MIN RECALL
Dual Entry	-	-	-	-	-	-
Simultaneous Gap	X	X	X	X	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.

EV PREEMPT

FUNCTION	PRE 3	PRE 5
Exit Phase(s)	2+6	2+6
Preempt Override	OFF	OFF
Delay Time	0	0
Ped Clear Through Yellow	N	N
Terminate Phases	N	N
Entrance Walk	-	-
Entrance Ped Clear	-	-
Entrance Min Green	1	1
Entrance Yellow Change	25.5*	25.5*
Entrance Red Clear	25.5*	25.5*
Minimum Dwell Time	7	7
Preempt Input Extension Time **	2	2
Preempt Max Time	120	120
Exit Yellow Change	25.5*	25.5*
Exit Red Clear	25.5*	25.5*

* Time defaults to time used for phase during normal operation
** Program Timing on GPS Detection Unit

DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
1A	6X40	0	2-4-2	-	1	Yes	-	-	-	N	-	X
					6**	Yes	-	-	-	N	-	X
2A	6X6	90	EXIST	-	2	Yes	-	-	-	N	-	X
2B	6X6	90	EXIST	-	2	Yes	-	-	-	N	-	X
2C	6X6	90	EXIST	-	2	Yes	-	-	-	N	-	X
3A	6X40	0	2-4-2	-	3	Yes	-	-	-	N	-	X
3B	6X40	0	2-4-2	-	3	Yes	-	10	-	N	-	X
4A	6X40	0	2-4-2	-	4	Yes	-	-	-	N	-	X
4B	6X40	0	2-4-2	-	4	Yes	-	-	-	N	-	X
5A	6X40	0	2-4-2	-	5	Yes	-	-	-	N	-	X
					2**	Yes	-	-	-	N	-	X
5B	6X40	0	2-4-2	-	5	Yes	-	15	-	N	-	X
6A	6X6	90	EXIST	-	6	Yes	-	-	-	N	-	X
6B	6X6	90	EXIST	-	6	Yes	-	-	-	N	-	X
6C	6X6	90	EXIST	-	6	Yes	-	-	-	N	-	X

** Disable Phase call for loop during Alternate Phasing operation.

PLANS PREPARED IN THE OFFICE OF:
Kimley»Horn
NC License #F-0102
421 Fayetteville Street, Suite 600
Raleigh, NC 27601
(919) 677-2000

Signal Upgrade

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

SR 2200 (Cox Road)
at
Gaston Mall Entrance / Commercial Driveway

Division 12 Gaston County Gastonia

PLAN DATE:	May 2021	REVIEWED BY:	SL Phillips
PREPARED BY:	CF Davis	REVIEWED BY:	KP Baumann

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEITH P. BAUMANN

DocuSigned by: 3/11/2022
DOCUSIGNED BY: SIGNATURE DATE

SIG. INVENTORY NO. 12-1238

3/9/2022 11:17:10 AM Danielle.Curri
\\kimley-horn.com\SE_RAL1\RAL_TPTO_ITS\011036569 Gastonia Signal System\3 Signals\54 - Signal Design\C121238-2021.dgn

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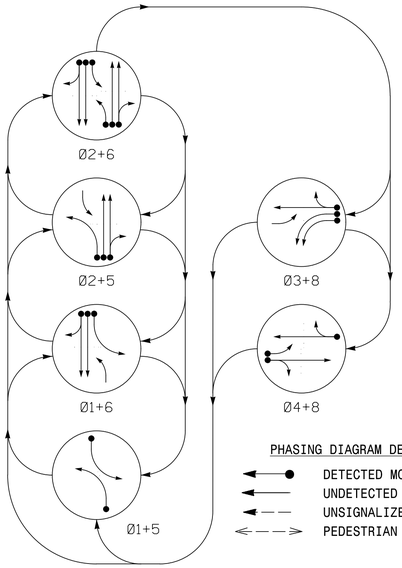
PROJECT REFERENCE NO.	SHEET NO.
C-5703	Sig.103.0

6 Phase
Fully Actuated w/
Alternate Phasing Operation
Gastonia Signal System

DEFAULT PHASING DIAGRAM



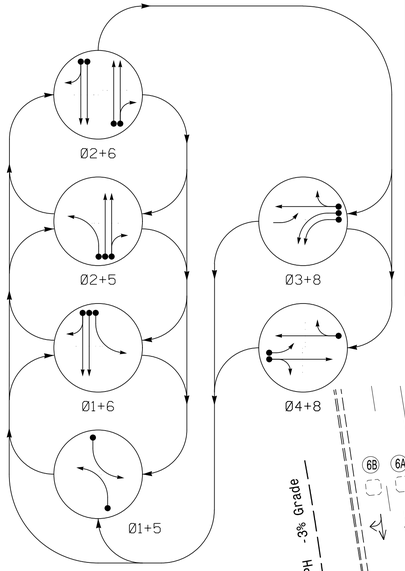
PHASING DIAGRAM DETECTION LEGEND

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

DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3+8	Ø4+8	FLASH
11	~~←~~	~~←~~	~~F Y~~	~~F Y~~	~~R~~	~~R~~	~~Y~~
21, 22	R	R	G	G	R	R	Y
31, 32	~~R~~	~~R~~	~~R~~	~~R~~	~~←~~	~~R~~	~~R~~
41	~~R~~	~~R~~	~~R~~	~~R~~	~~F Y~~	~~F Y~~	~~R~~
42, 43	R	R	R	R	R	G	R
51	~~←~~	~~F Y~~	~~←~~	~~F Y~~	~~R~~	~~R~~	~~Y~~
61, 62	R	G	R	G	R	R	Y
81, 82	R	R	R	R	G	G	R

ALTERNATIVE PHASING DIAGRAM



ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3+8	Ø4+8	FLASH
11	~~←~~	~~←~~	~~R~~	~~R~~	~~R~~	~~R~~	~~Y~~
21, 22	R	R	G	G	R	R	Y
31, 32	~~R~~	~~R~~	~~R~~	~~R~~	~~←~~	~~R~~	~~R~~
41	~~R~~	~~R~~	~~R~~	~~R~~	~~F Y~~	~~F Y~~	~~R~~
42, 43	R	R	R	R	R	G	R
51	~~←~~	~~R~~	~~←~~	~~R~~	~~R~~	~~R~~	~~Y~~
61, 62	R	G	R	G	R	R	Y
81, 82	R	R	R	R	G	G	R

DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
1A	6X40	0	2-4-2	-	1	Yes	-	15*	-	N	-	X
					6#	Yes	-	-	-	N	-	X
2A	6X6	70	EXIST	-	2	Yes	-	-	-	N	-	X
2B	6X6	70	EXIST	-	2	Yes	-	-	-	N	-	X
3A	6X40	0	2-4-2	-	3	Yes	-	3	-	N	-	X
3B	6X40	0	2-4-2	-	3	Yes	-	-	-	N	-	X
4A	6X40	0	2-4-2	-	4	Yes	-	3	-	N	-	X
4B	6X40	0	2-4-2	-	4	Yes	-	10	-	N	-	X
5A	6X40	0	2-4-2	-	5	Yes	-	15*	-	N	-	X
					2#	Yes	-	-	-	N	-	X
6A	6X6	70	EXIST	-	6	Yes	-	-	-	N	-	X
6B	6X6	70	EXIST	-	6	Yes	-	-	-	N	-	X
8A	6X40	0	2-4-2	-	8	Yes	-	10	-	N	-	X

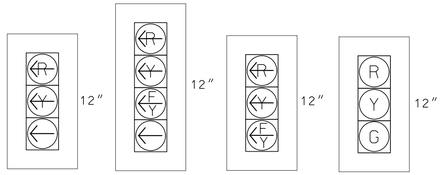
* Reduce Delay to 3 seconds during Alternate Phasing Operation.
\# Disable Phase call for loop during Alternate Phasing operation.

NOTES

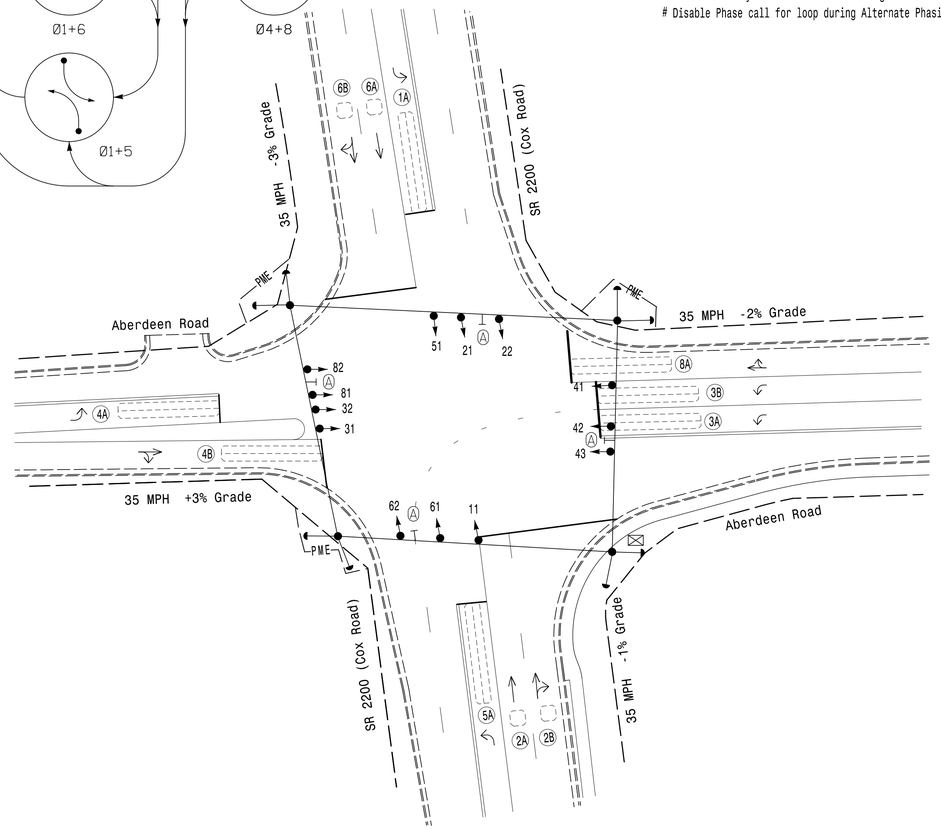
1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and/or phase 5 may be lagged.
4. Phase 3 may be lagged.
5. Set all detector units to presence mode.
6. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
7. Pavement markings are existing.
8. The City Engineer or their representative will determine the hours of use for each phasing plan.
9. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
10. Install new cabinet on the existing cabinet foundation.
11. All new cabinets and base extenders shall be black in color. See Project Special Provisions for details.
12. City system data:
    Controller Asset #1282.

SIGNAL FACE I.D.

All Heads L.E.D.
Backplates with reflective borders



31, 32 | 11, 51 | 41 | 21, 22, 42, 43, 61, 62, 81, 82



TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6	8
Min Green *	7	10	7	7	7	10	7
Walk *	-	-	-	-	-	-	-
Ped Clear	-	-	-	-	-	-	-
Veh. Extension *	2.0	3.0	2.0	2.0	2.0	3.0	2.0
Max 1 *	25	45	25	25	15	45	25
Yellow	3.0	4.1	3.0	4.0	3.0	4.1	4.0
Red Clear	3.3	2.4	2.9	2.6	3.3	2.4	2.6
Red Revert	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Actuations B4 Add *	-	-	-	-	-	-	-
Seconds /Actuation *	-	-	-	-	-	-	-
Max Initial *	-	-	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-	-	-
Time To Reduce *	-	-	-	-	-	-	-
Minimum Gap	-	-	-	-	-	-	-
Locking Detector	-	X	-	-	-	X	-
Recall Position	-	MIN RECALL	-	-	-	MIN RECALL	-
Dual Entry	-	-	-	X	-	-	-
Simultaneous Gap	X	X	X	X	X	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	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
PME	Permanent Maintenance Easement	PME
	Directional Arrow	
A	Street Name Sign (D3-1)	A

Signal Upgrade

PLANS PREPARED IN THE OFFICE OF:
Kimley»Horn
NC License #F-0102
421 Fayetteville Street, Suite 600
Raleigh, NC 27601
(919) 677-2000

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

SCALE 0 30 1"=30'

SR 2200 (Cox Road)
at
Aberdeen Road

Division 12 Gaston County Gastonia

PLAN DATE: January 2022 REVIEWED BY: SL Phillips
PREPARED BY: SP Pennington REVIEWED BY: KP Baumann

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN

DocuSigned by: 3/11/2022
SIGNATURE DATE

SIG. INVENTORY NO. 12-1282

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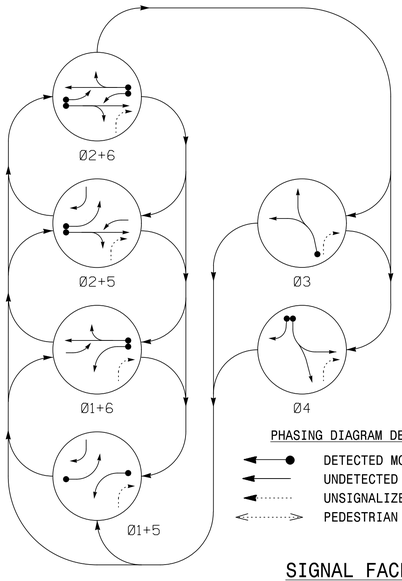
PROJECT REFERENCE NO.	SHEET NO.
C-5703	Sig.104.0

6 Phase
Fully Actuated w/
Alternate Phasing Operation
Gastonia Signal System

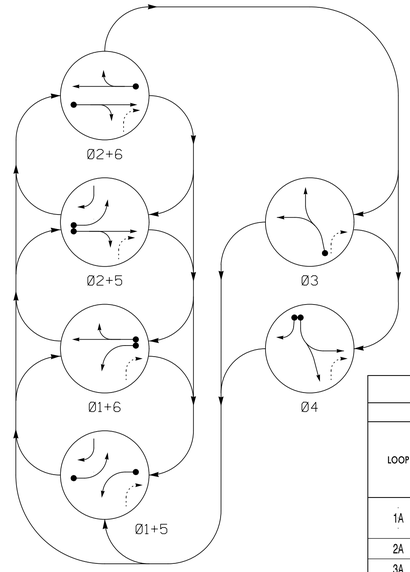
DEFAULT PHASING DIAGRAM



DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3	Ø4	FLASH
11	←	←	~~F Y~~	~~F Y~~	~~R~~	~~R~~	~~Y~~
21,22	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	←	~~F Y~~ ←	~~F Y~~ ←	~~F Y~~	~~R~~	~~R~~	~~Y~~
61,62	R	G	R	G	R	R	Y

ALTERNATE PHASING DIAGRAM



ALTERNATE PHASING TABLE OF OPERATION

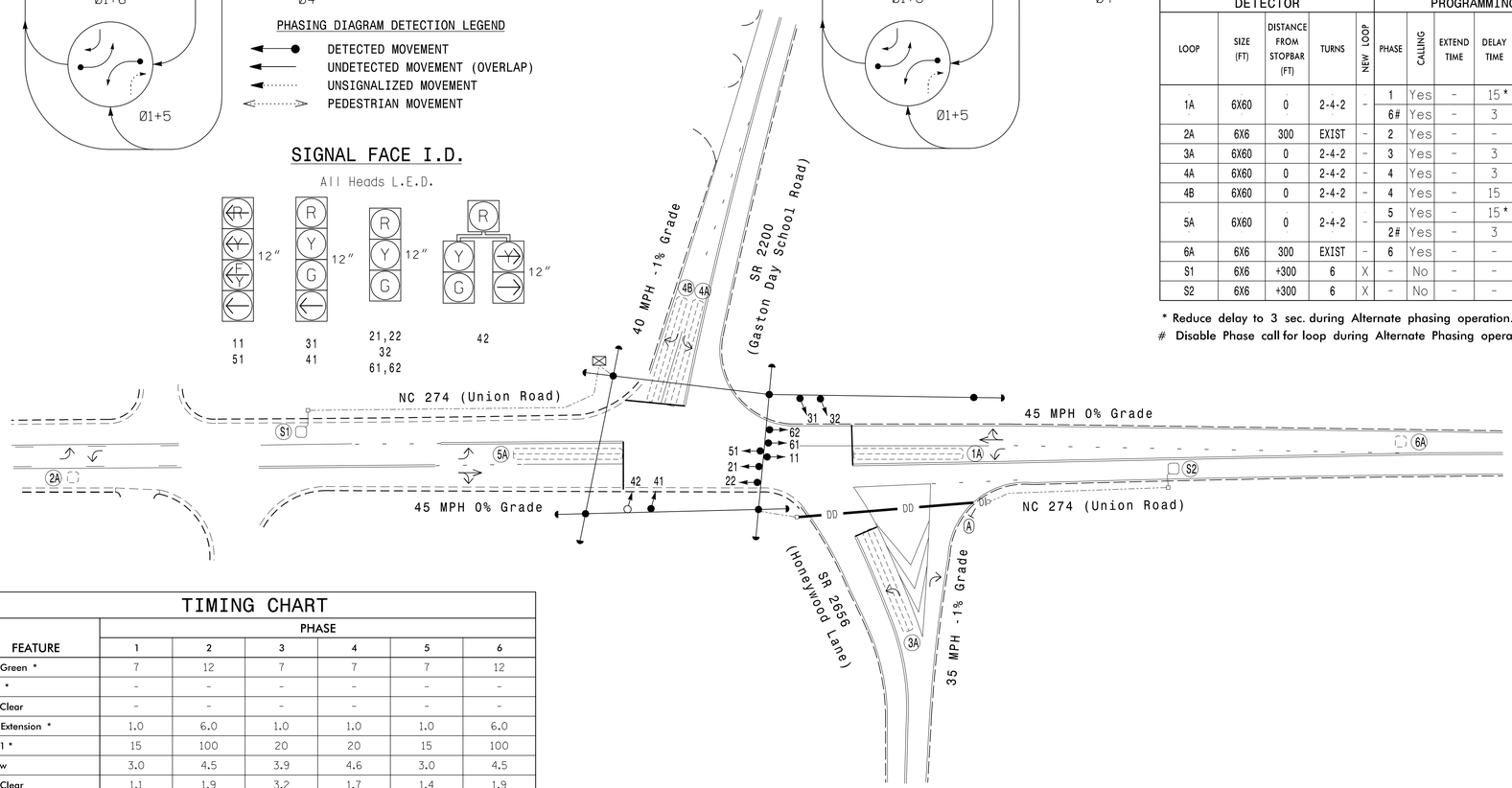
SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3	Ø4	FLASH
11	←	←	~~R~~	~~R~~	~~R~~	~~R~~	~~Y~~
21,22	R	R	G	G	R	R	Y
31	R	R	R	R	G ←	R	R
32	R	R	R	R	G	R	R
41	R	R	R	R	R	G ←	R
42	R → /	R	R → /	R	R	G	R
51	←	~~R~~	←	~~R~~	~~R~~	~~R~~	~~Y~~
61,62	R	G	R	G	R	R	Y

PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE I.D.

All Heads L.E.D.



DETECTOR INSTALLATION CHART

DETECTOR LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
1A	6X60	0	2-4-2	-	1	Yes	-	15 *	-	N	-	X
					6#	Yes	-	3	-	G	-	X
2A	6X6	300	EXIST	-	2	Yes	-	-	X	N	-	X
3A	6X60	0	2-4-2	-	3	Yes	-	3	-	N	-	X
4A	6X60	0	2-4-2	-	4	Yes	-	3	-	N	-	X
4B	6X60	0	2-4-2	-	4	Yes	-	15	-	N	-	X
5A	6X60	0	2-4-2	-	5	Yes	-	15 *	-	N	-	X
					2#	Yes	-	3	-	G	-	X
6A	6X6	300	EXIST	-	6	Yes	-	-	X	N	-	X
S1	6X6	+300	6	X	-	No	-	-	-	N	X	X
S2	6X6	+300	6	X	-	No	-	-	-	N	X	X

* Reduce delay to 3 sec. during Alternate phasing operation.
\# Disable Phase call for loop during Alternate Phasing operation.

TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6
Min Green *	7	12	7	7	7	12
Walk *	-	-	-	-	-	-
Ped Clear	-	-	-	-	-	-
Veh. Extension *	1.0	6.0	1.0	1.0	1.0	6.0
Max 1 *	15	100	20	20	15	100
Yellow	3.0	4.5	3.9	4.6	3.0	4.5
Red Clear	1.1	1.9	3.2	1.7	1.4	1.9
Red Revert	2.0	2.0	2.0	2.0	2.0	2.0
Actuations B4 Add *	-	-	-	-	-	-
Seconds /Actuation *	-	2.5	-	-	-	2.5
Max Initial *	-	34	-	-	-	34
Time Before Reduction *	-	20	-	-	-	20
Time To Reduce *	-	35	-	-	-	35
Minimum Gap	-	3.0	-	-	-	3.0
Locking Detector	-	X	-	-	-	X
Recall Position	-	MIN RECALL	-	-	-	MIN RECALL
Dual Entry	-	-	-	-	-	-
Simultaneous Gap	X	X	X	X	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.

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and/or phase 5 may be lagged.
4. The order of phase 3 and phase 4 may be reversed.
5. Set all detector units to presence mode.
6. In the event of loop replacement, refer to the current ITS and Signal Design Manual and submit a Plan of Record to the Signal Design Section.
7. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
8. Pavement markings are existing.
9. The City Engineer or their representative will determine the hours of use for each phasing plan.
10. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
11. Install new cabinet on the existing cabinet foundation.
12. All new cabinets and base extenders shall be black in color. See Project Special Provisions for details.
13. City of system data:
    Controller Asset #1304.

LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
▯↓	Pedestrian Signal Head With Push Button & Sign	■↓
○→	Signal Pole with Guy	●→
○↘	Signal Pole with Sidewalk Guy	●↘
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
-----	2-in Underground Conduit	-----
N/A	Right of Way	-----
→	Directional Arrow	→
Ⓐ	"YIELD" Sign (R1-2)	Ⓐ

Signal Upgrade

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

PLANS PREPARED IN THE OFFICE OF:
Kimley»Horn
NC License #F-0102
421 Fayetteville Street, Suite 600
Raleigh, NC 27601
(919) 677-2000

SCALE 0 40 1"=40'

NC 274 (Union Road)
at
SR 2200(Gaston Day School Road)
/ SR 2656 (Honeywood Lane)
Division 12 Gaston County Gastonia

PLAN DATE:	May 2021	REVIEWED BY:	SL Phillips
PREPARED BY:	CF Davis	REVIEWED BY:	KP Baumann

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEITH P. BAUMANN

DocuSigned by:
SIGNATURE 3/11/2022 DATE

SIG. INVENTORY NO. 12-1304

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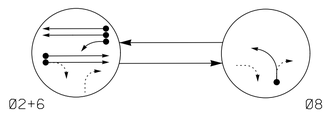
PROJECT REFERENCE NO.	SHEET NO.
C-5703	Sig.105.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

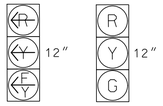
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2+6	PHASE Ø4+8	FLASH
21,22	G	R	Y
61	~~G~~	~~R~~	~~Y~~
62,63	G	R	Y
81,82	R	G	R

SIGNAL FACE I.D.

All Heads L.E.D.



DETECTOR INSTALLATION CHART

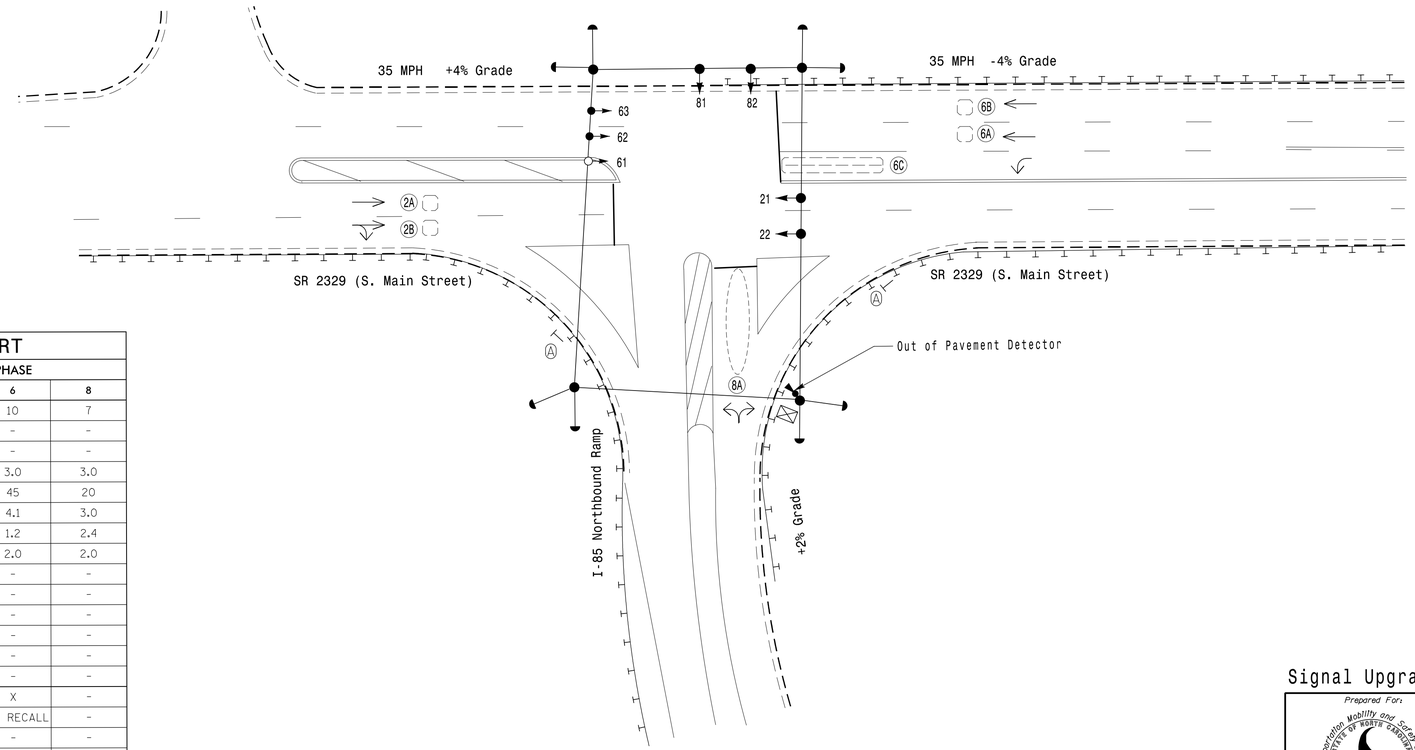
DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTEND TIME	DELAY TIME	USE ADDED INITIAL	TYPE	SYSTEM LOOP	NEW CARD
2A	6X6	70	EXIST	-	2	Yes	-	-	-	N	-	X
2B	6X6	70	EXIST	-	2	Yes	-	-	-	N	-	X
6A	6X6	70	EXIST	-	6	Yes	-	-	-	N	-	X
6B	6X6	70	EXIST	-	6	Yes	-	-	-	N	-	X
6C	6X40	0	2-4-2	-	6	Yes	-	-	-	N	-	X
✳ 8A	N/A	0	N/A	-	8	Yes	-	-	-	N	-	X

✳ Microwave Detection

2 Phase
Fully Actuated
Gastonia Signal System

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Reposition existing signal heads numbered 62 and 63.
4. Set all detector units to presence mode.
5. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
6. Remove existing "Left Turn Signal" sign-(R10-10L)
7. Pavement markings are existing.
8. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
9. Install new cabinet on the existing cabinet foundation.
10. All new cabinets and base extenders shall be black in color. See Project Special Provisions for details.
11. Reconnect lead-in cable to separate loops 2A & 2B and 6A & 6B, as shown.
12. Existing signal heads 61 & 62 have been relabeled to 62 & 63, respectively.
13. Existing phase 4 has been changed to phase 8 on this plan. Change all signal heads, pedestrian signal heads, pedestrian push buttons, and detection zones as needed to achieve the phasing shown.
14. City system data:
    Controller Asset #1319.



TIMING CHART

FEATURE	PHASE 2	PHASE 6	PHASE 8
Min Green *	10	10	7
Walk *	-	-	-
Ped Clear	-	-	-
Veh. Extension *	3.0	3.0	3.0
Max 1 *	45	45	20
Yellow	4.1	4.1	3.0
Red Clear	1.2	1.2	2.4
Red Revert	2.0	2.0	2.0
Actuations B4 Add *	-	-	-
Seconds /Actuation *	-	-	-
Max Initial *	-	-	-
Time Before Reduction *	-	-	-
Time To Reduce *	-	-	-
Minimum Gap	-	-	-
Locking Detector	X	X	-
Recall Position	MIN RECALL	MIN RECALL	-
Dual Entry	-	-	-
Simultaneous Gap	X	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	
	Modified Signal Head	N/A
	Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
N/A	Guardrail	
	Microwave Detection Area	
	Out of Pavement Detector	
	"YIELD" Sign (R1-2)	A

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

PLANS PREPARED IN THE OFFICE OF:
Kimley»Horn
NC License #F-0102
421 Fayetteville Street, Suite 600
Raleigh, NC 27601
(919) 677-2000

SCALE 0 30 1"=30'

SR 2329 (S. Main Street)
at
I-85 Northbound Ramp

Division 12 Gaston County Gastonia

PLAN DATE:	May 2021	REVIEWED BY:	SL Phillips
PREPARED BY:	LL Matney	REVIEWED BY:	KP Baumann

REVISIONS	INIT.	DATE

NORTH CAROLINA PROFESSIONAL SEAL 044434 ENGINEER KEVIN P. BAUMANN

DocuSigned by: 3/11/2022
DOCUSIGNED BY: SIGNATURE DATE

SIG. INVENTORY NO. 12-1319

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