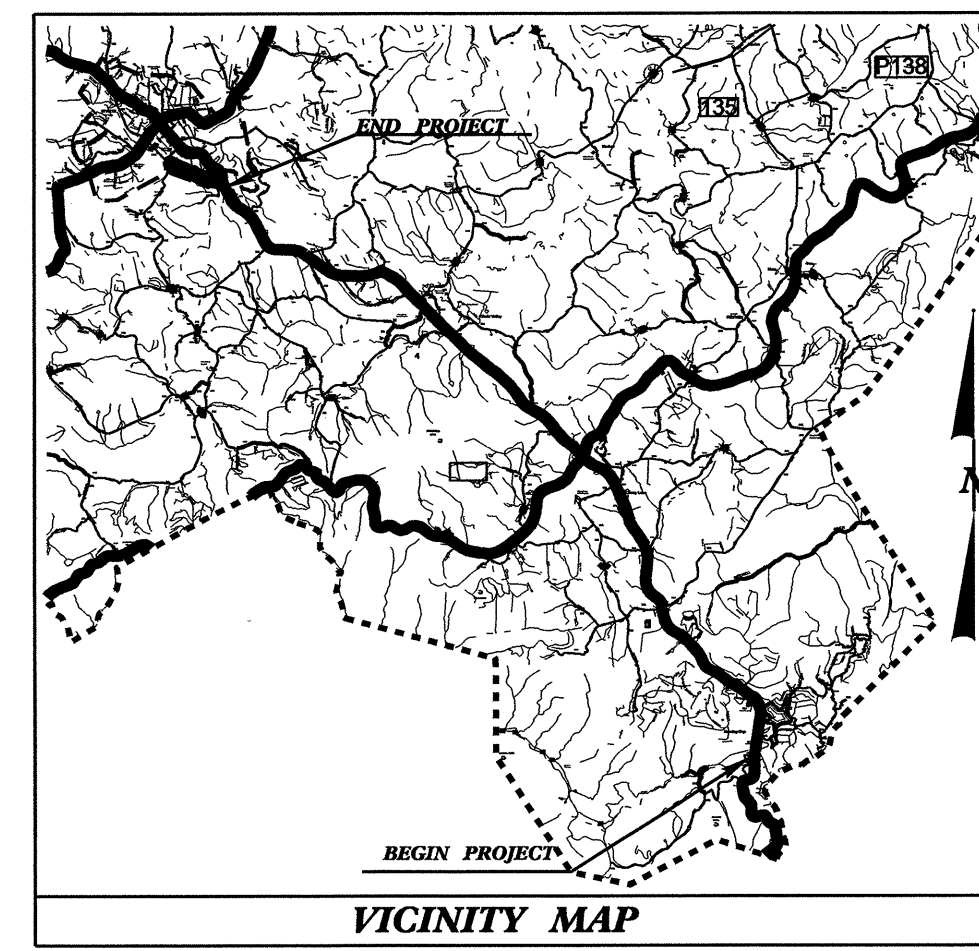


Project No.	Sheet No.
R-3101	Sig. 1

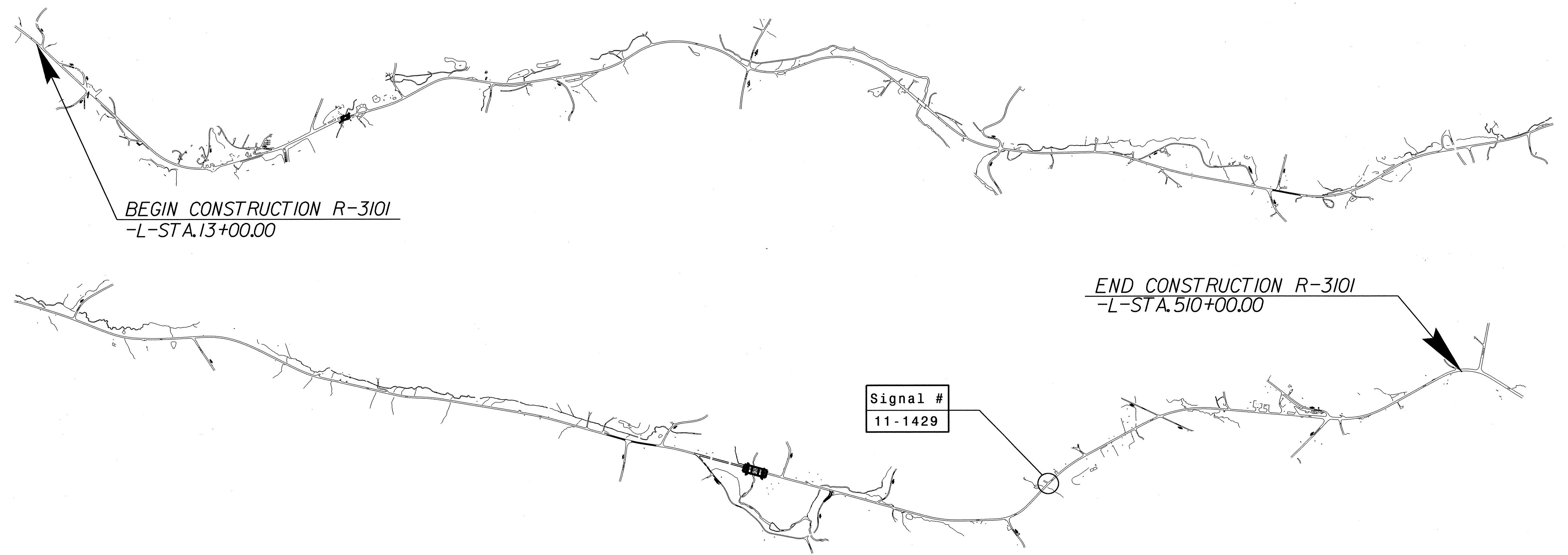
STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS

**ALLEGHANY COUNTY**

LOCATION: US 21 FROM ROARING GAP TO SPARTA  
TYPE OF WORK: TRAFFIC SIGNALS



**TIP PROJECT: R-3101**



Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.

Sheet #	Reference #	Index of Plans	Location/Description
Sig. 1		Title Sheet	US 21 at Memory Lane
Sig. 2-7	11-1429		

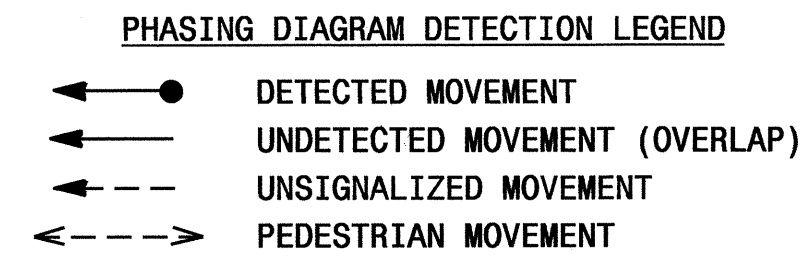
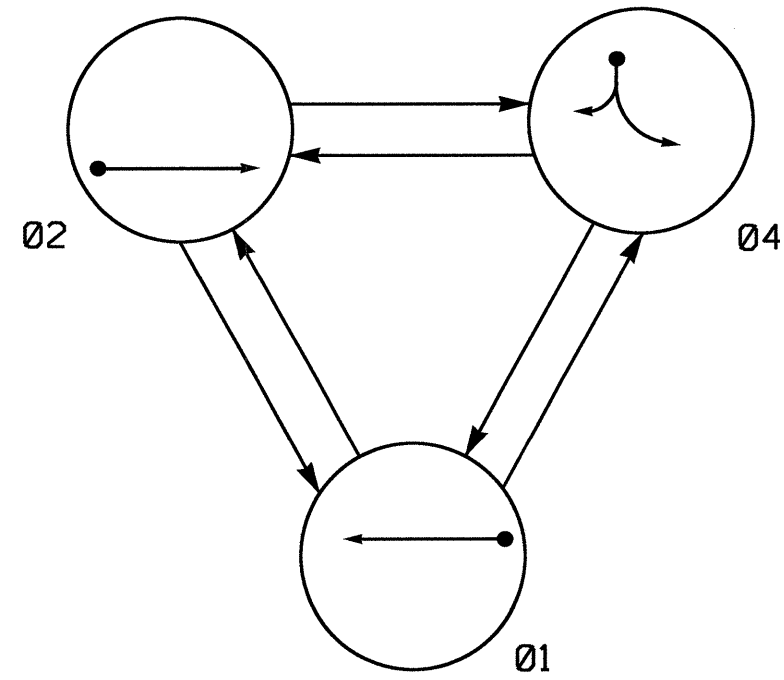
**INTELLIGENT TRANSPORTATION AND SIGNALS UNIT**  
Contacts:  
  
Z.M. Little, PE - Western Region Signals Project Engineer  
G. C. Brown, PE - Signal Equipment Design Engineer

Prepared In the Offices of:

750 N. Greenfield Pkwy, Garner, NC 27529

30-MAY-2013 11:59  
R:\TIP\TIP\Signals\Design\TIPsheet\R3101\_tsh.dgn  
bmy/nd

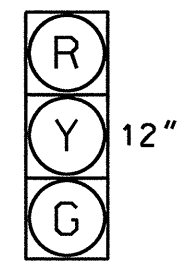
**PHASING DIAGRAM**



SIGNAL FACE	PHASE			
	Ø 1	Ø 2	Ø 4	FLASH
11,12	G	R	R	R
21,22	R	G	R	R
41,42	R	R	G	R

**SIGNAL FACE I.D.**

All Heads L.E.D.



11,12  
21,22  
41,42

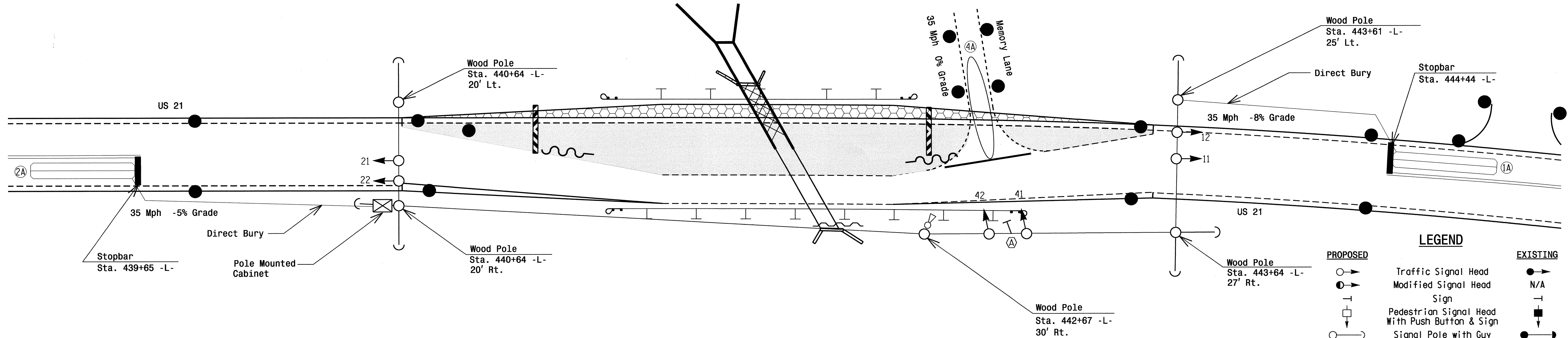
OASIS 2070L LOOP & DETECTOR INSTALLATION CHART													
INDUCTIVE LOOPS						DETECTOR PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD	
1A	6X40	0	2-4-2	Y	1	Y	Y	-	-	-	-	Y	
2A	6X40	0	2-4-2	Y	2	Y	Y	-	-	-	-	Y	
4A	**	0	**	-	4	Y	Y	-	-	10	-	Y	

\*\* Microwave Detection Zone

**3 Phase Fully Actuated Isolated**

**NOTES**

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
2. Do not program signal for late night flashing operation.
3. Program controller to start up in phase 2 red clearance.
4. Set all detector units to presence mode.
5. Program all phases for "Red Rest".



FEATURE	PHASE		
	1	2	4
Min Green 1 *	10	10	10
Extension 1 *	2.0	2.0	2.0
Max Green 1 *	45	45	20
Yellow Clearance	4.5	4.2	3.8
Red Clearance	10.0	10.0	7.0
Red Revert	2.0	2.0	2.0
Walk 1 *	-	-	-
Don't Walk 1	-	-	-
Seconds Per Actuation *	-	-	-
Max Variable Initial *	-	-	-
Time Before Reduction *	-	-	-
Time To Reduce *	-	-	-
Minimum Gap	-	-	-
Recall Mode	-	-	-
Vehicle Call Memory	YELLOW	YELLOW	YELLOW
Dual Entry	-	-	-
Simultaneous Gap	ON	ON	ON

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

PROPOSED	EXISTING
○→	●→
○→	N/A
⊥	⊥
⊥	⊥
○→	○→
○→	○→
⊗	⊗
□	■
- - -	- - -
N/A	- - -
→	→
○	○
○	○
■	■
Ⓐ	Ⓐ

Ⓐ "NO TURN ON RED" Sign (R10-11)

**Temporary Signal 1 - TCP Phase II**

**US 21 at Memory Lane**

Division 11 Alleghany County Sparta

PLAN DATE: April 2013 REVIEWED BY: Z.M. Little

PREPARED BY: B.E. Wynn REVIEWED BY:

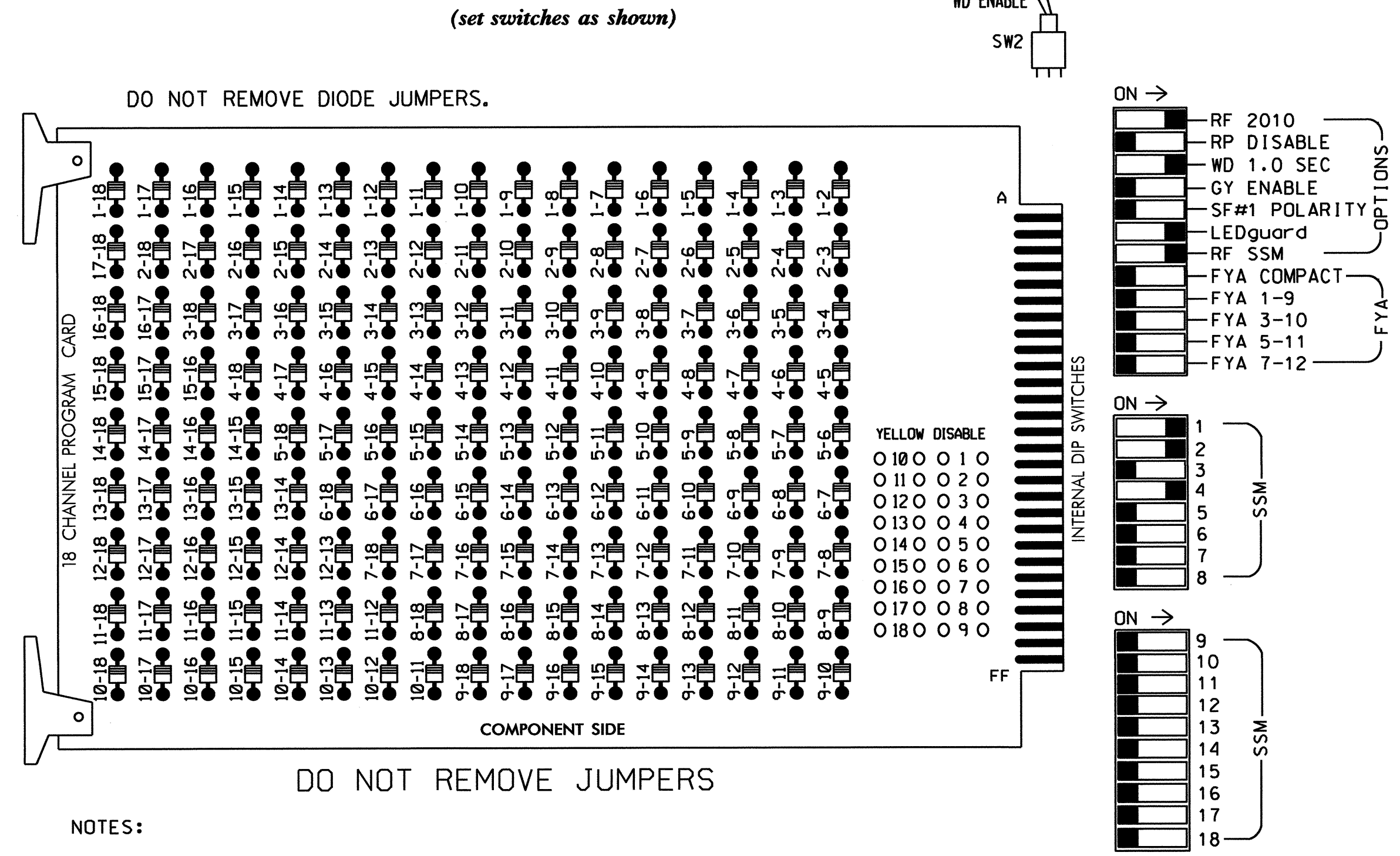
SCALE: 1" = 20'

REVISIONS: INIT. DATE

SIGNATURE: DATE 5/15/13

15-May-2013 08:44 \\p01\work\signal\sig1\1-142911-sig1.dwg, 2013, xxx.dgn

**EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL**  
(set switches as shown)



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

**NOTES**

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Enable Simultaneous Gap-Out for all phases.
- Program phases 1, 2 and 4 for Red Rest.
- Program phase 2 for Startup Red Clear.
- Program phase 2 as First Phases.

**EQUIPMENT INFORMATION**

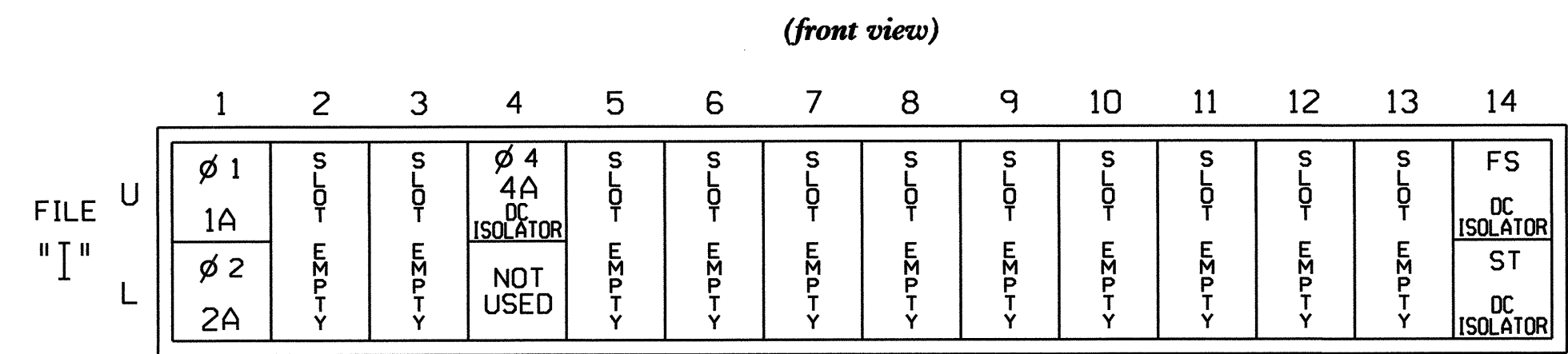
CONTROLLER.....2070L  
 CABINET.....336  
 SOFTWARE.....ECONOLITE OASIS  
 CABINET MOUNT.....POLE  
 OUTPUT FILE POSITIONS...12  
 LOAD SWITCHES USED.....S1,S2,S5  
 PHASES USED.....1,2,4  
 OVERLAPS.....NONE

**SIGNAL HEAD HOOK-UP CHART**

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	11,12	21,22	NU	NU	41,42	NU	NU	NU	NU	NU	NU	NU
RED	125	128			101							
YELLOW	126	129			102							
GREEN	127	130			103							
RED ARROW												
YELLOW ARROW												
GREEN ARROW												

NU = Not Used

**INPUT FILE POSITION LAYOUT**



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

FS = FLASH SENSE  
ST = STOP TIME

Note: Install a model 242 DC isolator in slot 14 for use with microwave detector. See the Accuwave Detector Wiring Detail on sheet 2.

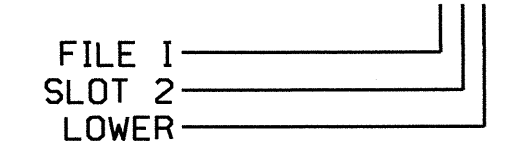
**IMPORTANT:** For proper operation of the Accuwave microwave detector, remove surge protection from T21-7 and TB21-8, and from TB23-7 and TB23-8.

**INPUT FILE CONNECTION & PROGRAMMING CHART**

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A	TB21-1,2	I1U	56	18	1	1	Y	Y			
2A	TB23-1,2	I1L	47	9	22	2	Y	Y			
★ 4A	TB21-7,8	I4U	41	3	4	4	Y	Y			10

★ Microwave Detector, see 'Accuwave Detector Panel Wiring Detail' sheet 2.

INPUT FILE POSITION LEGEND: I2L



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 11-1429T1  
 DESIGNED: April 2013  
 SEALED: 5/15/13  
 REVISED: N/A

Electrical Detail - Sheet 1 of 2 - Temp 1

Electrical and Programming Details For:

Prepared in the Office of:

750 N. Greenfield Pkwy, Garner, NC 27529

US 21 at Memory Lane

Division 11 Alleghany County Sparta

PLAN DATE: May 2013 REVIEWED BY: T. J. J. J.

PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS INIT. DATE

Signature: George C. Brown 5/17/13

SEAL NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 022013 GEORGE C. BROWN

SIG. INVENTORY NO. 11-1429T1

16-MAY-2013 12:27 S:\ITSSU\ITSS\Signal\work\prouse\1g\_Memo\Fr\lck\lnd\11429\_sml.e\l6\_xxx.dgn

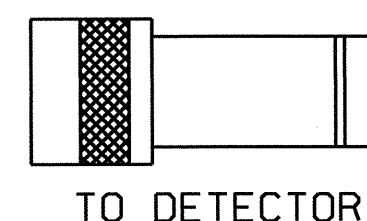


### ACCUWAVE DETECTOR PANEL WIRING DETAIL

(wire as shown)

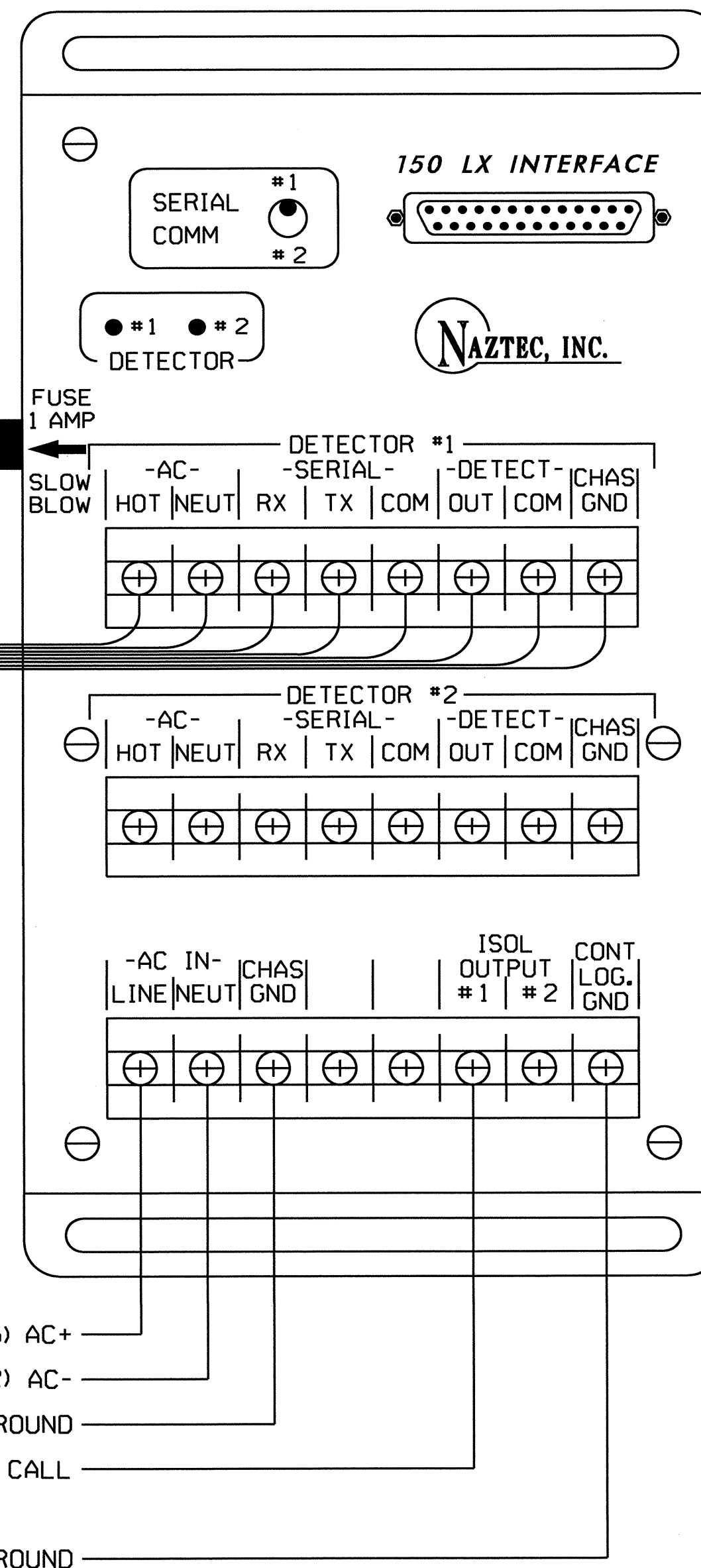
**WIRE LIST FOR ACCUWAVE DETECTOR CABLE**

COLOR	PIN#	SET #	PANEL CONNECTIONS
BLACK	A	SET 1	AC HOT
WHITE	B	SET 1	AC NEUTRAL
SILVER	C	SET 1	CHASSIS GROUND
BROWN	D	SET 4	SERIAL TX
BLACK	E	SET 2,4	SERIAL COMMON
RED	F	SET 2	SERIAL RX
SILVER	N.C.	SET 2,4	NO CONNECTION
BLUE	H	SET 3	DETECTOR COMMON
BLACK	L	SET 3	DETECTOR OUT
YELLOW	M	1/2SET	NO CONNECTION



**NOTES:**

1. Detector is an Accuwave Model 150LX presence detector.
2. Information in the detector cable wire list chart is for cable purchased from Naztec and may vary if purchased from another source.
3. Important: for proper operation of the microwave detector, remove surge protection from TB21-7, TB21-8, TB23-7 and TB23-8 and insert 242 DC Isolator in slot I4.



(T1-5) AC+  
 (T1-2) AC-  
 (T1-1) CHASSIS GROUND  
 (TB21-7) PHASE 4 VEHICLE CALL  
 (TB21-8) LOGIC GROUND

THIS ELECTRICAL DETAIL IS FOR  
 THE SIGNAL DESIGN: 11-1429T1  
 DESIGNED: April 2013  
 SEALED: 5/15/13  
 REVISED: N/A

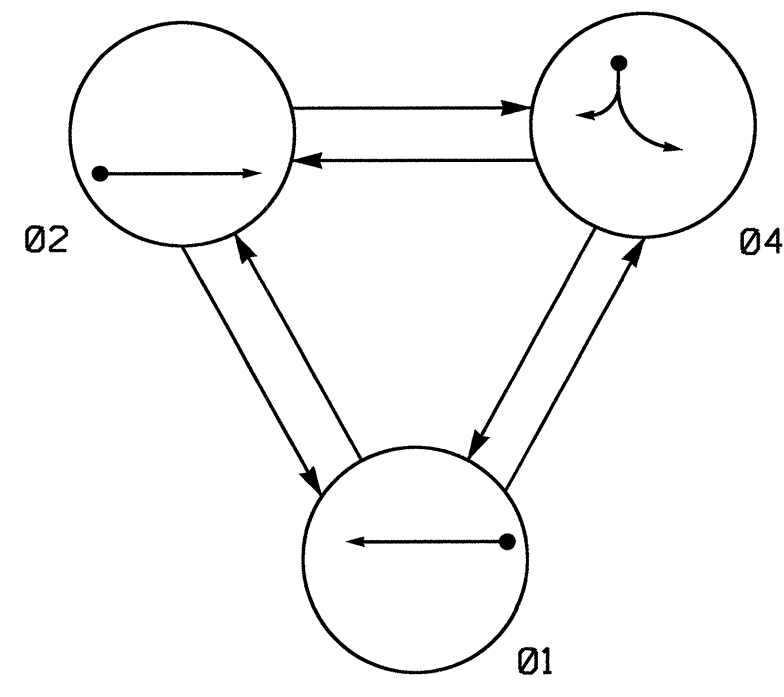
Electrical Detail - Sheet 2 of 2 - Temp 1

Prepared In the Office of: TRANSPORTATION MOBILITY AND SAFETY DIVISION STATE OF NORTH CAROLINA Traffic Management Systems 750 N. Greenfield Pkwy, Corner, NC 27529	<b>US 21</b> at <b>Memory Lane</b> Division 11 Alleghany County Sparta		SEAL GEORGE C. BROWN ENGINEER SEAL 022013
	PLAN DATE: <b>May 2013</b> PREPARED BY: <b>C. Strickland</b>	REVIEWED BY: <b>T. J. J...</b> REVIEWED BY:	

SIG. INVENTORY NO. 11-1429T1

16-MAY-2013 12:28  
 S:\IT\SSJ\WITS\Signd\15\work\pgr\bus651.g Mon6str.rct landw11429\_sml.e1e....dgn  
 25211 1/24/13

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

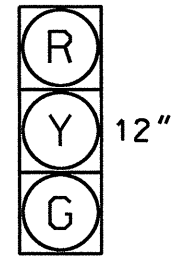
- ←●→ DETECTED MOVEMENT
- ←○→ UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE			
	Ø 1	Ø 2	Ø 4	F L EAST
11,12	G	R	R	R
21,22	R	G	R	R
41,42	R	R	G	R

SIGNAL FACE I.D.

All Heads L.E.D.



- 11,12
- 21,22
- 41,42

OASIS 2070L LOOP & DETECTOR INSTALLATION CHART

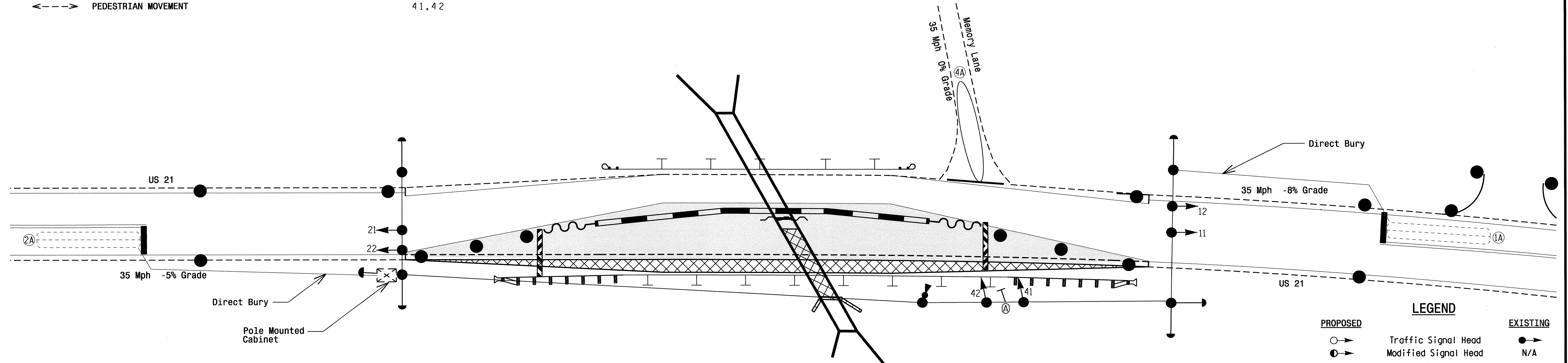
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	DETECTOR PROGRAMMING								
				NEW LOOP	PHASE	CALLING	EXTENSION	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD	
1A	6X40	0	2-4-2	-	1	Y	-	-	-	-	-	-
2A	6X40	0	2-4-2	-	2	Y	Y	-	-	-	-	-
4A	**	0	**	-	4	Y	Y	-	-	10	-	-

\*\* Microwave Detection Zone

3 Phase Fully Actuated Isolated

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
- Do not program signal for late night flashing operation.
- Program controller to start up in phase 2 red clearance.
- Set all detector units to presence mode.
- Program all phases for "Red Rest".



LEGEND

- | PROPOSED | EXISTING |
|----------|----------|
|          |          |
|          |          |
|          |          |
|          |          |
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|          |          |
|          |          |
|          |          |
|          |          |

OASIS 2070L TIMING CHART

FEATURE	PHASE		
	1	2	4
Min Green 1*	10	10	10
Extension 1*	2.0	2.0	2.0
Max Green 1*	45	45	20
Yellow Clearance	4.5	4.2	3.8
Red Clearance	10.0	10.0	7.0
Red Revert	2.0	2.0	2.0
Walk 1*	-	-	-
Don't Walk 1	-	-	-
Seconds Per Actuation*	-	-	-
Max Variable Initial*	-	-	-
Time Before Reduction*	-	-	-
Time To Reduce*	-	-	-
Minimum Gap	-	-	-
Recall Mode	-	-	-
Vehicle Call Memory	YELLOW	YELLOW	YELLOW
Dual Entry	-	-	-
Simultaneous Gap	ON	ON	ON

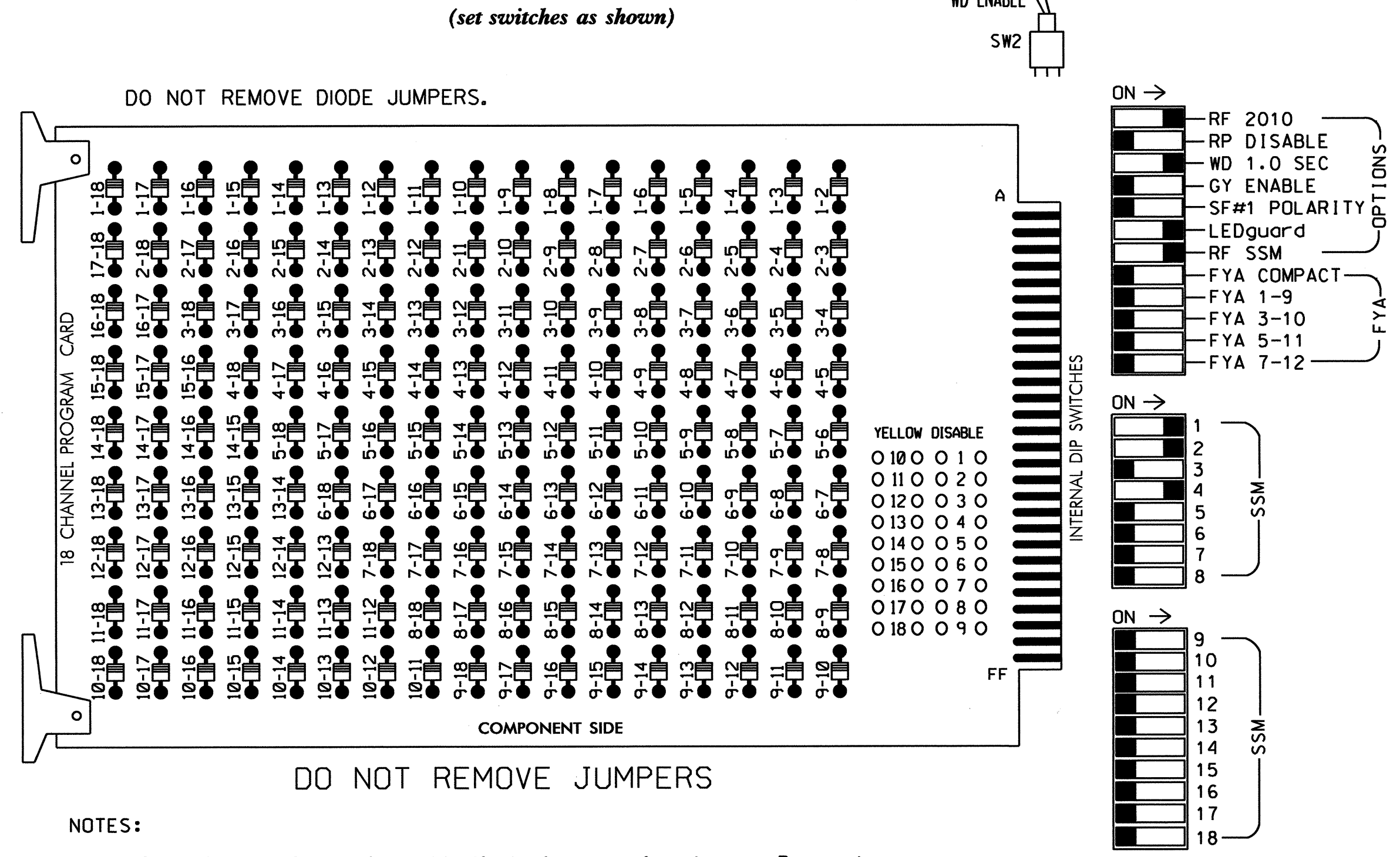
\* These values may be field adjusted. Do not adjust Min Green and Extension times for phases 2 and 4 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

Temporary Signal 2 - TCP Phase II

	<p>US 21 at Memory Lane</p>		
	<p>Division 11 Allegheny County Sparta</p>	<p>PLAN DATE: April 2013</p>	<p>REVIEWED BY: Z.M. Little</p>
	<p>PREPARED BY: B.E. Wynn</p>	<p>REVIEWED BY:</p>	<p>DATE:</p>
	<p>SCALE 1"=20'</p>	<p>REVISIONS</p>	<p>INIT. DATE</p>

15-MAY-2013 08:53 R:\tr-offices\sig\142912.dwg

**EDI MODEL 2018ECL-NC CONFLICT MONITOR  
PROGRAMMING DETAIL**  
(set switches as shown)



**NOTES:**

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

**NOTES**

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Enable Simultaneous Gap-Out for all phases.
3. Program phases 1, 2 and 4 for Red Rest.
4. Program phase 2 for Startup Red Clear.
5. Program phase 2 as First Phases.

**EQUIPMENT INFORMATION**

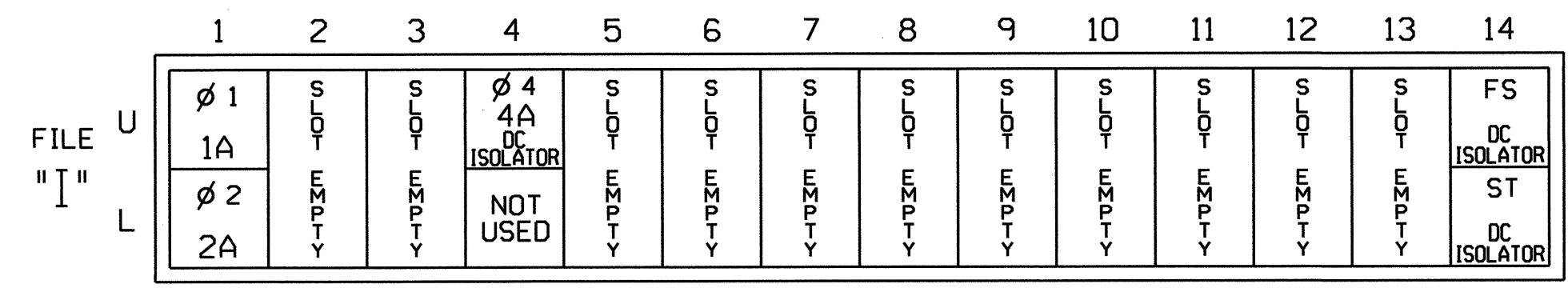
CONTROLLER.....2070L  
 CABINET.....336  
 SOFTWARE.....ECONOLITE OASIS  
 CABINET MOUNT.....POLE  
 OUTPUT FILE POSITIONS...12  
 LOAD SWITCHES USED.....S1,S2,S5  
 PHASES USED.....1,2,4  
 OVERLAPS.....NONE

**SIGNAL HEAD HOOK-UP CHART**

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	11,12	21,22	NU	NU	41,42	NU	NU	NU	NU	NU	NU	NU
RED	125	128			101							
YELLOW	126	129			102							
GREEN	127	130			103							
RED ARROW												
YELLOW ARROW												
GREEN ARROW												

NU = Not Used

**INPUT FILE POSITION LAYOUT**  
(front view)



EX.: 1A, 2A, ETC. = LOOP NO.'S FS = FLASH SENSE ST = STOP TIME

Note: Install a model 242 DC isolator in slot I4 for use with microwave detector. See the Accuwave Detector Wiring Detail on sheet 2.

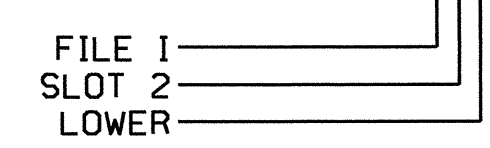
**IMPORTANT:** For proper operation of the Accuwave microwave detector, remove surge protection from T21-7 and TB21-8, and from TB23-7 and TB23-8.

**INPUT FILE CONNECTION & PROGRAMMING CHART**

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A	TB21-1,2	I1U	56	18	1	1	Y	Y			
2A	TB23-1,2	I1L	47	9	22	2	Y	Y			
★ 4A	TB21-7,8	I4U	41	3	4	4	Y	Y			10

★ Microwave Detector, see 'Accuwave Detector Panel Wiring Detail' sheet 2.

INPUT FILE POSITION LEGEND: I2L



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 11-1429T2  
 DESIGNED: April 2013  
 SEALED: 5/15/13  
 REVISED: N/A

Electrical Detail - Sheet 1 of 2 - Temp 2

Electrical and Programming Details For:

Prepared in the Offices of:

750 N. Greenfield Pkwy, Garner, NC 27529

US 21 at Memory Lane

Division 11 Allegheny County Sparta

PLAN DATE: May 2013 REVIEWED BY: T. J. Jm

PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS: INIT. DATE

SIGNATURE: [Signature] DATE: 5/17/13

SEAL: NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 022013 GEORGE C. BROWN

SIG. INVENTORY NO. 11-1429T2

16-May-2013 12:51 S:\4115304\15 Signal\workgroups\sig Manager\11429\_sht\_elec.dwg

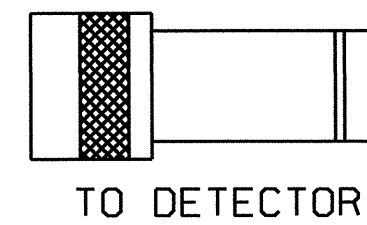


### ACCUWAVE DETECTOR PANEL WIRING DETAIL

(wire as shown)

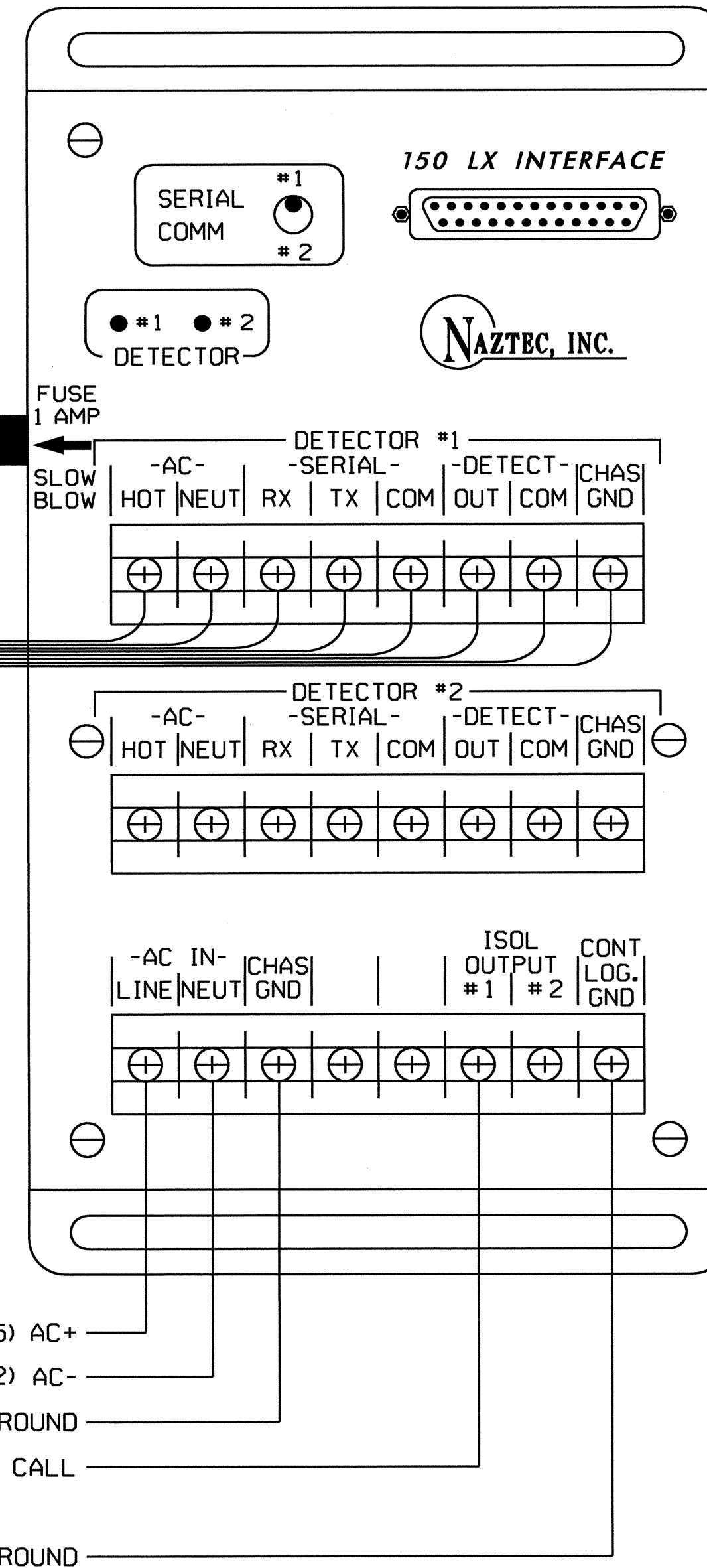
#### WIRE LIST FOR ACCUWAVE DETECTOR CABLE

COLOR	PIN#	SET #	PANEL CONNECTIONS
BLACK	A	SET 1	AC HOT
WHITE	B	SET 1	AC NEUTRAL
SILVER	C	SET 1	CHASSIS GROUND
BROWN	D	SET 4	SERIAL TX
BLACK	E	SET 2,4	SERIAL COMMON
RED	F	SET 2	SERIAL RX
SILVER	N.C.	SET 2,4	NO CONNECTION
BLUE	H	SET 3	DETECTOR COMMON
BLACK	L	SET 3	DETECTOR OUT
YELLOW	M	1/2SET	NO CONNECTION



#### NOTES:

1. Detector is an Accuwave Model 150LX presence detector.
2. Information in the detector cable wire list chart is for cable purchased from Naztec and may vary if purchased from another source.
3. Important: for proper operation of the microwave detector, remove surge protection from TB21-7, TB21-8, TB23-7 and TB23-8 and insert 242 DC Isolator in slot 14.



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 11-1429T2  
 DESIGNED: April 2013  
 SEALED: 5/15/13  
 REVISED: N/A

Electrical Detail - Sheet 2 of 2 - Temp 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:  Prepared In the Offices of:  750 N. Greenfield Pkwy, Garner, NC 27529	<b>US 21 at Memory Lane</b>		SEAL  ENGINEER GEORGE C. BROWN
	Division 11 Alleghany County Sparta	REVIEWED BY: <i>T. Lynn</i>	
PLAN DATE: <b>May 2013</b>	REVIEWED BY: <i>T. Lynn</i>		SIGNATURE: <i>George C. Brown</i> 5/17/13 DATE
PREPARED BY: <b>C. Strickland</b>	REVIEWED BY:		
REVISIONS	INIT.	DATE	SIG. INVENTORY NO. 11-1429T2