

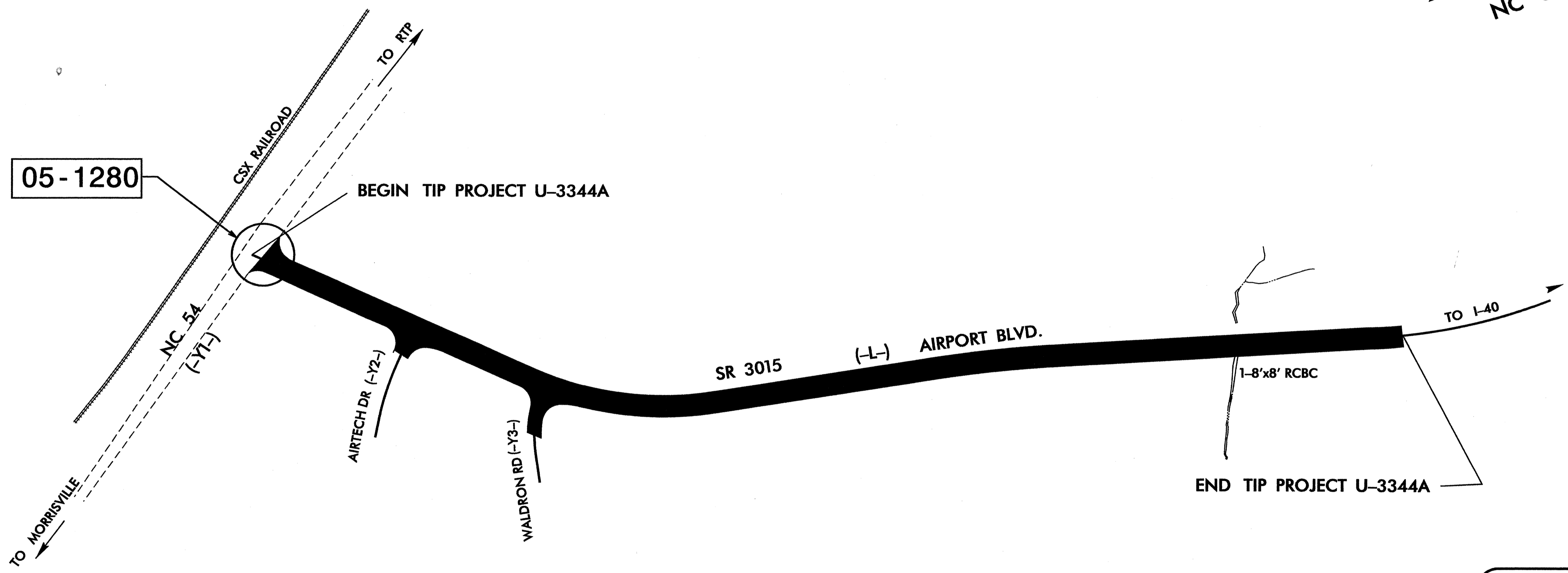
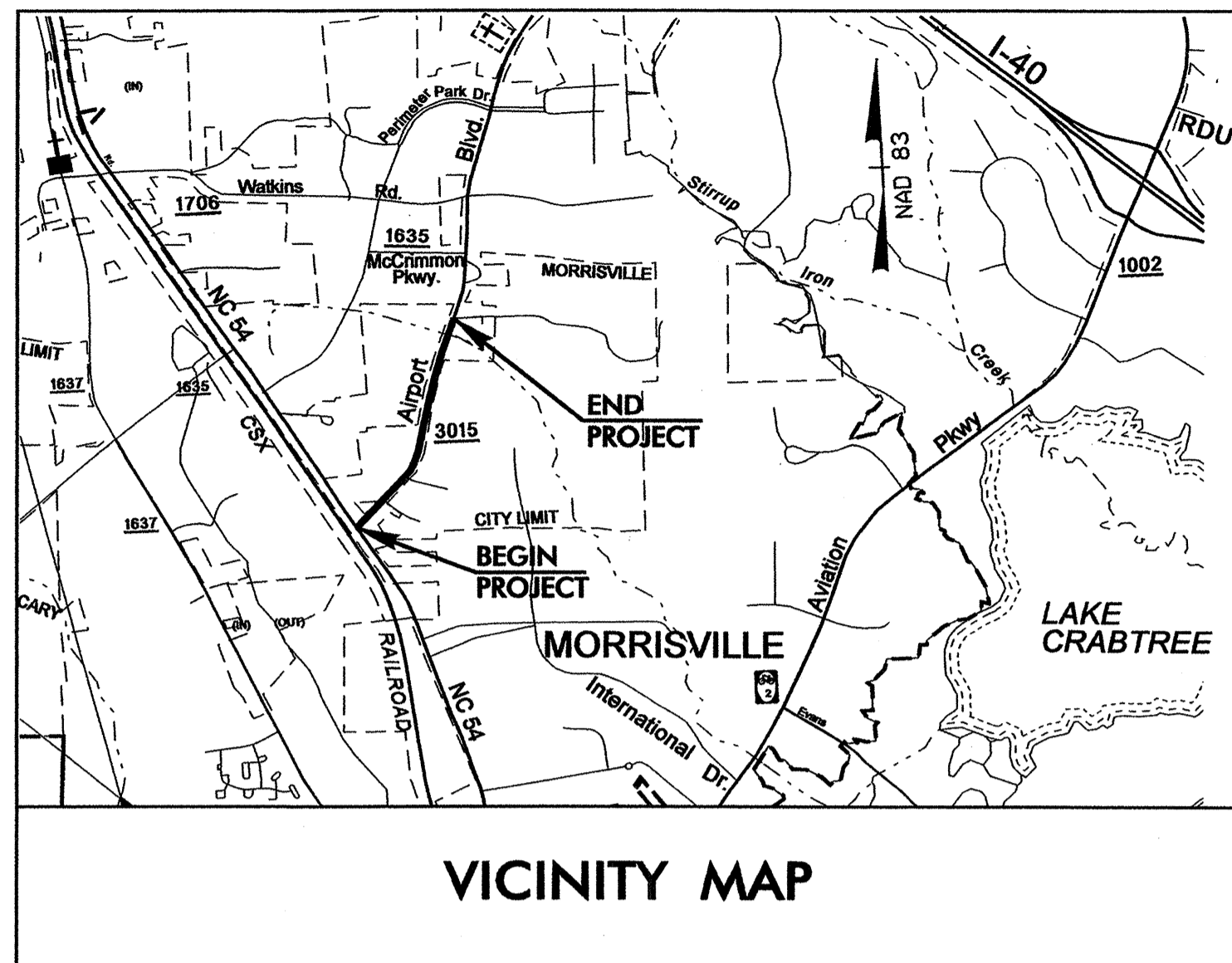
**TIP PROJECT: U-3344A**

Project No.	Sheet No.
U-3344A	Sig. 1

STATE OF NORTH CAROLINA  
 DIVISION OF HIGHWAYS  
**WAKE COUNTY**

**LOCATION: MORRISVILLE - SR 3015 (AIRPORT BLVD.)  
 FROM NC 54 TO McCRIMMON PARKWAY**

**TYPE OF WORK: SIGNALS**



Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006.

**Index of Plans**

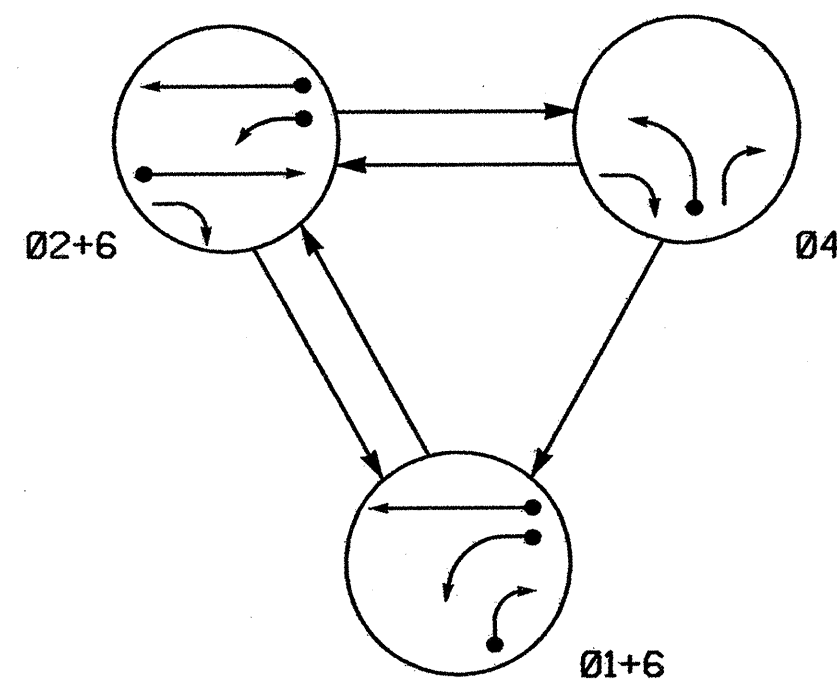
Sheet #	Reference #	Location/Description
Sig. 1	-----	Title Sheet
Sig. 2	05-1280	NC 54 @ SR 3015 (Airport Boulevard)
Sig. 4	-----	Communications Cable Routing Plans

**INTELLIGENT TRANSPORTATION SYSTEMS & SIGNALS UNIT**  
 Contacts:  
 D. Y. Ishak - Signals and Geometrics Contracts Engineer  
 G. C. Brown, PE - Signal Equipment Design Engineer  
 G. G. Murr, Jr., PE - Intelligent Transportation Systems Engineer

Prepared In the Office of:  
 DIVISION OF HIGHWAYS  
 TRAFFIC ENGINEERING AND SAFETY SYSTEMS  
 BRANCH

122 N. McDowell St., Raleigh, NC 27603

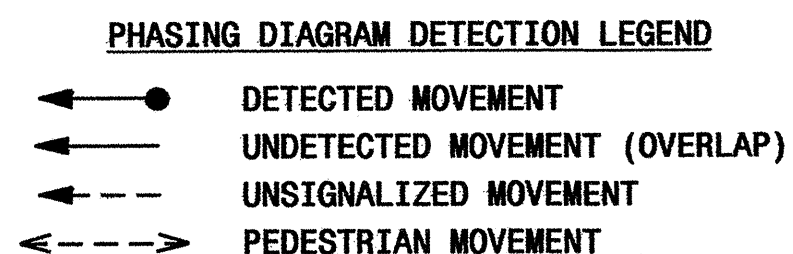
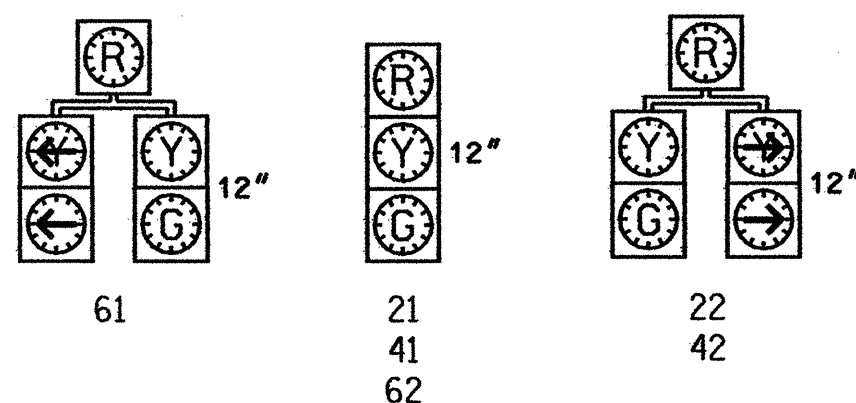
**PHASING DIAGRAM**



SIGNAL FACE	PHASE			
	Ø1+6	Ø2+6	Ø4	F L E D
21	R	G	R	Y
22	R	G	R	Y
41	R	R	G	R
42	R	R	G	R
61	G	G	R	Y
62	G	G	R	Y

**SIGNAL FACE I.D.**

Denotes L.E.D.

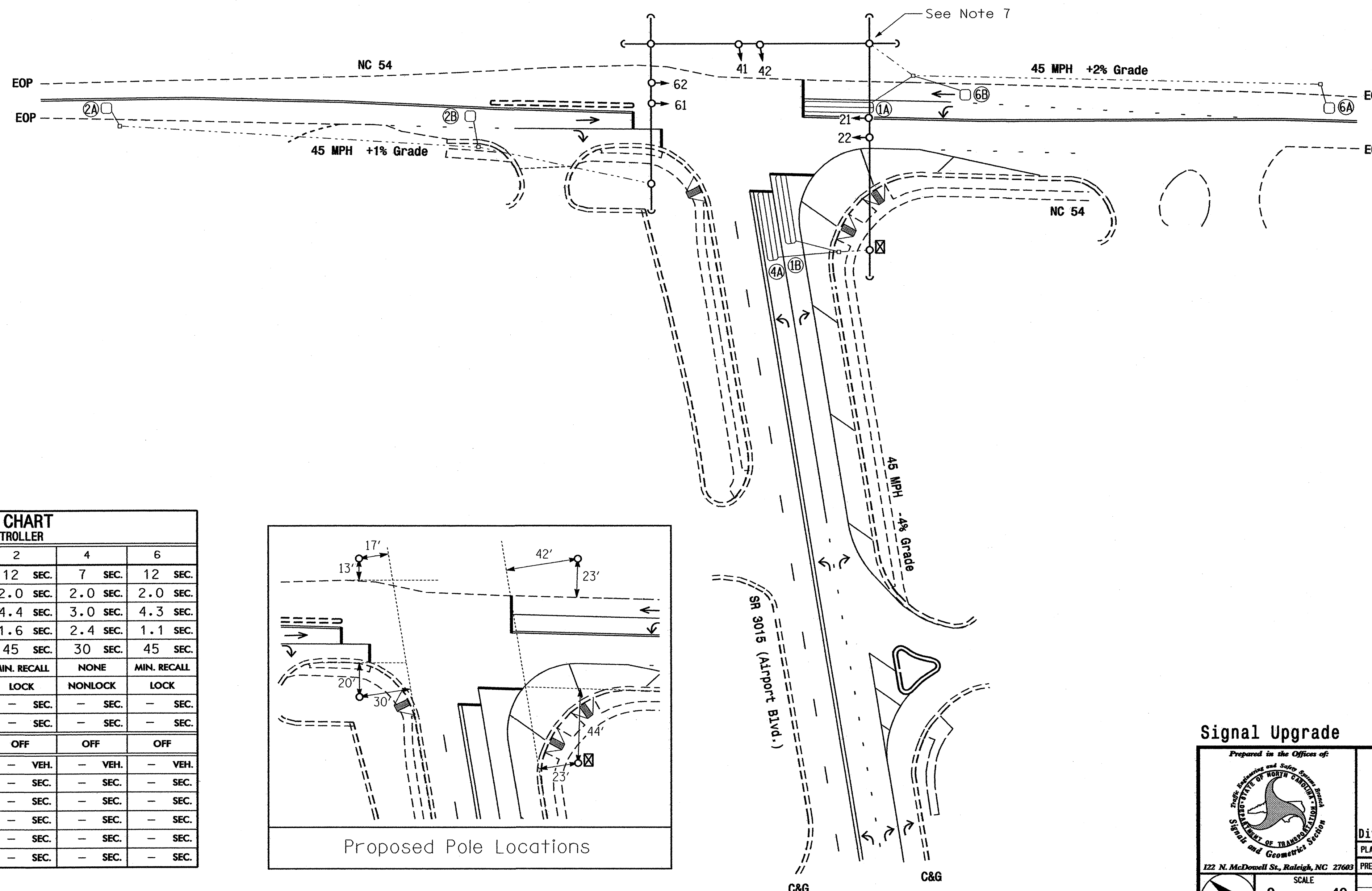


LOOP & DETECTOR UNIT INSTALLATION CHART											
2070L CONTROLLER WITH TS-2 CABINET											
INDUCTIVE LOOPS					DETECTOR UNITS						
LOOP NO.	SIZE (ft)	TURNS	DIST. FROM STOPBAR (ft)	NEW EXISTING	NEMA PHASE	NEW EXISTING	TIMING		PLACE CALL DURING PHASE	INHIBIT DELAY DURING GREEN?	
							FEATURE	TIME			
1A	6X40	2-4-2	0	X	1 X	-	DELAY	15 SEC.	ALL	YES	
1B	6X40	2-4-2	0	X	1 X	-	DELAY	15 SEC.	ALL	YES	
2A	6X6	6	300	X	2 X	-	EXTEND	1.8 SEC.	ALL	NO	
2B	6X6	6	90	X	2 X	-	-	- SEC.	ALL	NO	
4A	6X40	2-4-2	0	X	4 X	-	DELAY	3 SEC.	ALL	YES	
6A	6X6	6	300	X	6 X	-	EXTEND	1.8 SEC.	ALL	NO	
6B	6X6	6	90	X	6 X	-	-	- SEC.	ALL	NO	

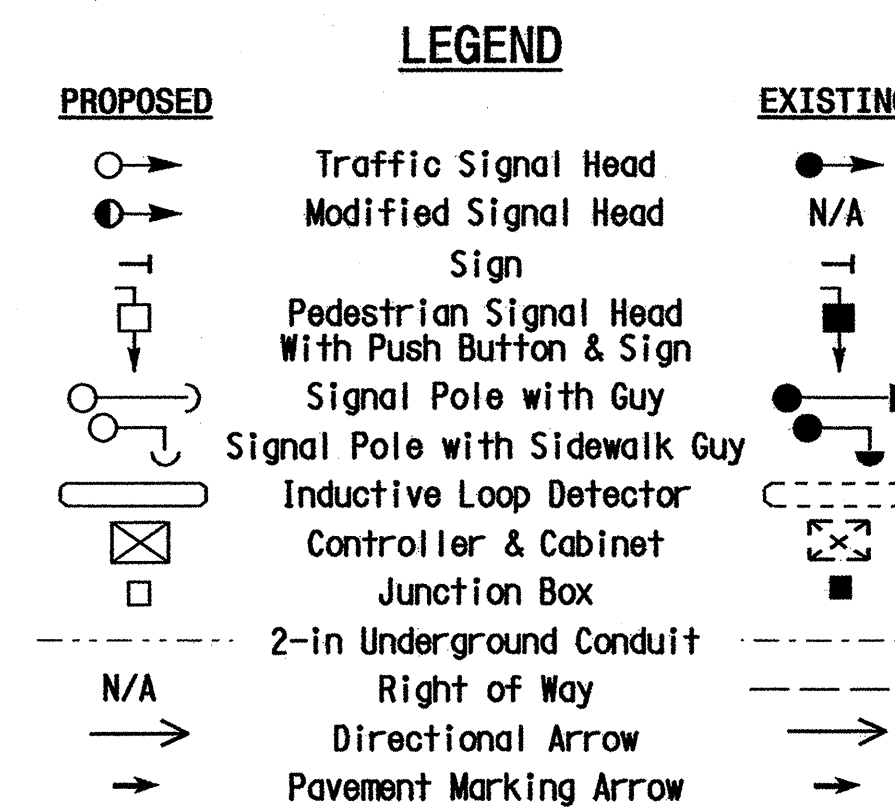
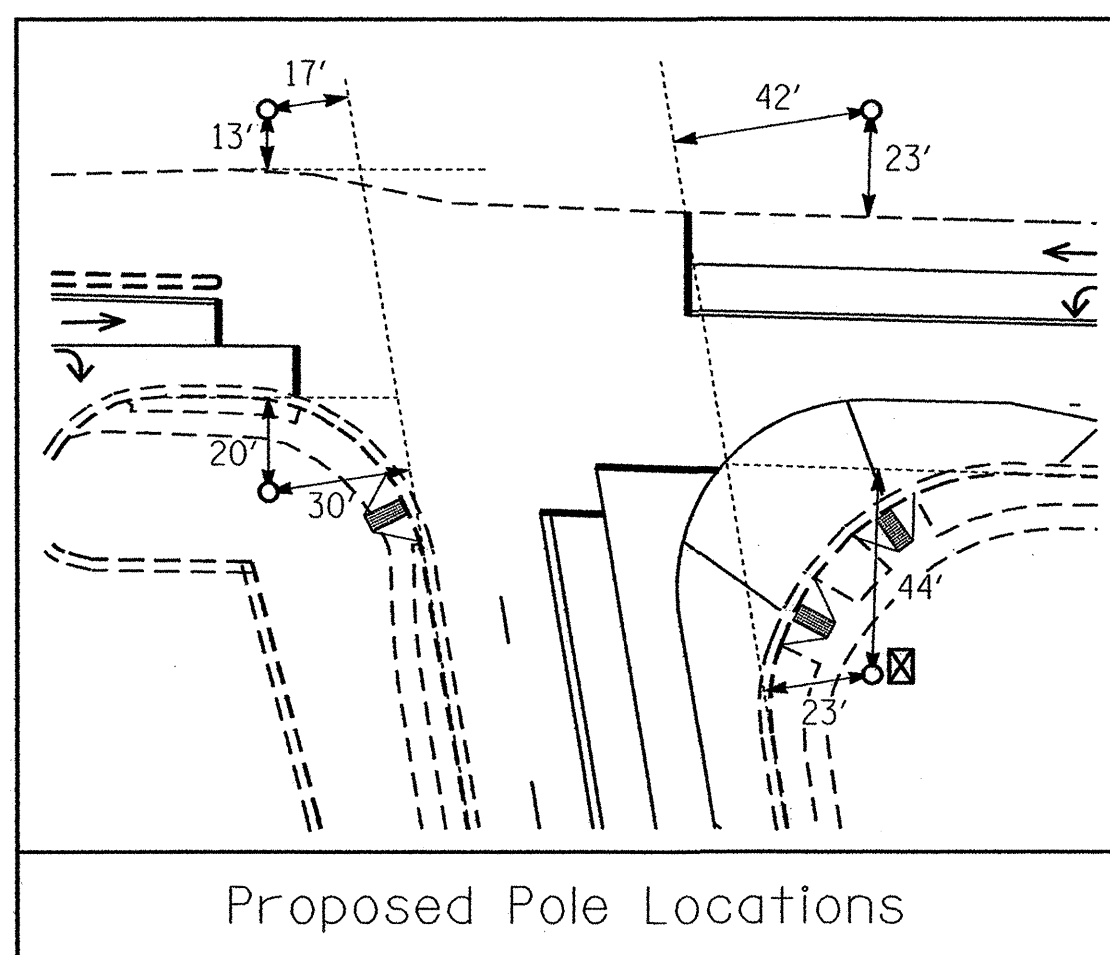
**3 Phase Fully Actuated Cary Signal System**

**NOTES**

1. Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006.
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. Pavement markings are existing.
7. All new wood poles shown on plan may be field adjusted as needed.



TIMING CHART				
2070L CONTROLLER				
PHASE	1	2	4	6
MINIMUM GREEN	7 SEC.	12 SEC.	7 SEC.	12 SEC.
PASSAGE GAP	2.0 SEC.	2.0 SEC.	2.0 SEC.	2.0 SEC.
YELLOW CHANGE INT.	3.0 SEC.	4.4 SEC.	3.0 SEC.	4.3 SEC.
RED CLEARANCE	1.6 SEC.	1.6 SEC.	2.4 SEC.	1.1 SEC.
MAX. I	20 SEC.	45 SEC.	30 SEC.	45 SEC.
RECALL POSITION	NONE	MIN. RECALL	NONE	MIN. RECALL
VEH. CALL MEMORY	NONLOCK	LOCK	NONLOCK	LOCK
WALK	- SEC.	- SEC.	- SEC.	- SEC.
FLASHING DON'T WALK	- SEC.	- SEC.	- SEC.	- SEC.
VOLUME DENSITY	OFF	OFF	OFF	OFF
ACTUATION B4 ADD	- VEH.	- VEH.	- VEH.	- VEH.
SEC. PER ACTUATION	- SEC.	- SEC.	- SEC.	- SEC.
MAX. INITIAL	- SEC.	- SEC.	- SEC.	- SEC.
TIME B4 REDUCTION	- SEC.	- SEC.	- SEC.	- SEC.
TIME TO REDUCE	- SEC.	- SEC.	- SEC.	- SEC.
MINIMUM GAP	- SEC.	- SEC.	- SEC.	- SEC.



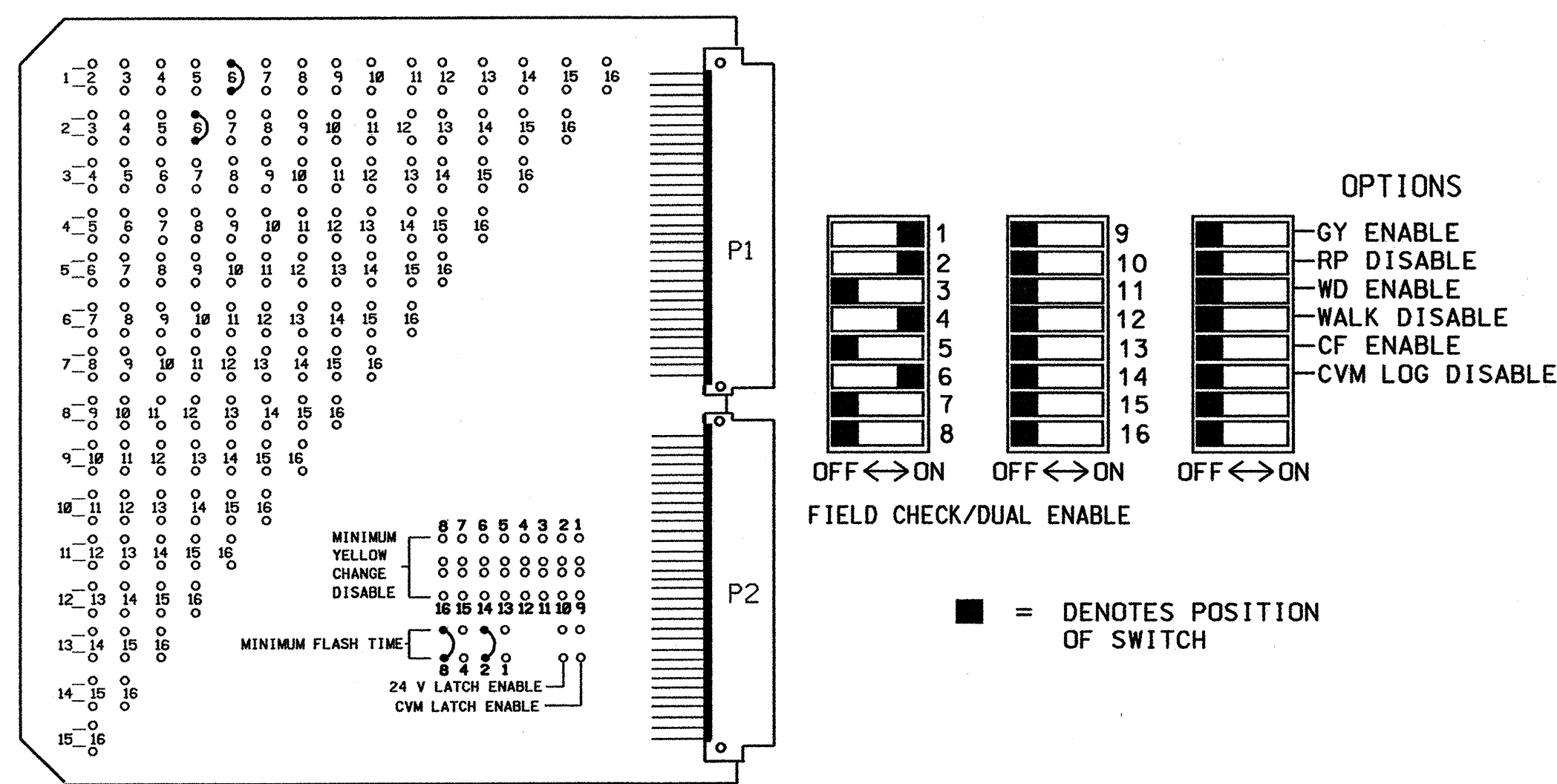
**Signal Upgrade**

	<p><b>NC 54 at SR 3015 (Airport Boulevard)</b></p>		
	<p>Division 5 Wake County / Morrisville</p>		
<p>122 N. McDowell St., Raleigh, NC 27603</p>	<p>PLAN DATE: December 2004</p>	<p>REVIEWED BY:</p>	<p>DATE</p>
<p>PREPARED BY: TS Brown</p>	<p>REVISIONS</p>	<p>REVIEWED BY:</p>	<p>DATE</p>
<p>SCALE 0 40 1"=40'</p>		<p>SIGNATURE DATE</p>	
<p>STG. INVENTORY NO. 05-1280</p>			



**EDI MODEL MMU-16E  
MALFUNCTION MANAGEMENT UNIT  
PROGRAMMING DETAIL**

(program card and set switches as shown below)



MMU PROGRAMMING CARD

**NOTES**

1. TO PREVENT "FLASH-CONFLICT" PROBLEMS, WIRE ALL UNUSED LOAD SWITCHES TO FLASH RED. VERIFY THAT SIGNAL HEADS FLASH IN ACCORDANCE WITH THE SIGNAL PLANS.
2. TO PREVENT RED FAILURES ON UNUSED MONITOR CHANNELS, TIE UNUSED LOAD SWITCH RED OUTPUTS 3,5,7,8,9,10,11,12,13,14,15 & 16 TO LOAD SWITCH AC+ BY INSERTING A JUMPER PLUG IN THE UNUSED LOAD SWITCH SOCKET FROM PIN 1 (LS AC+) TO PIN 3 (RED OUT). MAKE SURE ALL FLASH TRANSFER RELAYS ARE IN PLACE.
3. PROGRAM CONTROLLER TO START UP IN PHASES 2 AND 6 GREEN.
4. SET POWER-UP FLASH TIME TO 10 SECONDS AND IMPLEMENT ON THE MALFUNCTION MANAGEMENT UNIT. SET CONTROLLER POWER-UP FLASH TIME TO 0 SECONDS.
5. ENABLE SIMULTANEOUS GAP-OUT FEATURE, ON CONTROLLER UNIT, FOR ALL PHASES.
6. PROGRAM DETECTORS IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS TO ACCOMPLISH THE DETECTION SCHEMES SHOWN ON THE SIGNAL DESIGN PLANS.
7. PROGRAM DETECTOR CALL DELAY AND EXTENSION TIMING ON THE CONTROLLER, UNLESS OTHERWISE SPECIFIED.
8. SET ALL DETECTOR CARD UNIT CHANNELS TO "PRESENCE" MODE.

9. THE CABINET AND CONTROLLER ARE PART OF THE CARY SIGNAL SYSTEM.

**FIELD CONNECTION HOOK-UP CHART**

PHASE	1	2	3	4	5	6	7	8	2 PED	4 PED	6 PED	8 PED	OLA	OLB	OLC	OLD
SIGNAL HEAD NO.	42,61	21,22	NU	41,42	22	NU	61,62	NU	NU	NU	NU	NU	NU	NU	NU	NU
RED	*	2R		4R		6R										
YELLOW		2Y		4Y		6Y										
GREEN		2G		4G		6G										
RED ARROW																
YELLOW ARROW	1Y			4Y												
GREEN ARROW	1G			4G												

NU = NOT USED  
\* DENOTES INSTALL LOAD RESISTOR. SEE LOAD RESISTOR INSTALLATION DETAIL THIS PAGE.

**DETECTOR RACK SET-UP DETAIL**

INSERT DETECTOR CARDS IN RACK ACCORDING TO THE DETAIL SHOWN BELOW. PARTICULAR DETECTOR CHANNELS WILL CALL PHASES INDICATED.

BIU	CH1	CH1	CH1	CH1	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT
	L3	L1	L7	L5							
	ø1	ø1	ø6	ø2							
	CH2	CH2	CH2	CH2	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY
	L4	L2	L8	L6							
	ø2	ø6	ø6	ø4							

WIRE LOOPS TO TERMINALS ON LOOP PANEL AS SHOWN IN THE CHART BELOW

LOOP NO.	LOOP PANEL TERMINALS
1A	L1A, L1B
	L2A, L2B
1B	L3A, L3B
	L4A, L4B
2A	L5A, L5B
2B	L6A, L6B
4A	L7A, L7B
	L8A, L8B
6A	L9A, L9B
6B	L10A, L10B
	L11A, L11B
	L12A, L12B
	L13A, L13B
	L14A, L14B
	L15A, L15B
	L16A, L16B

**NOTE**  
BE SURE TO PROGRAM DETECTOR TYPES AND TIMERS (EXTEND AND DELAY) AS SHOWN ON THE SIGNAL PLANS.

PROGRAM CONTROLLER DETECTORS ACCORDING TO THE SCHEDULE SHOWN IN THE CHART BELOW

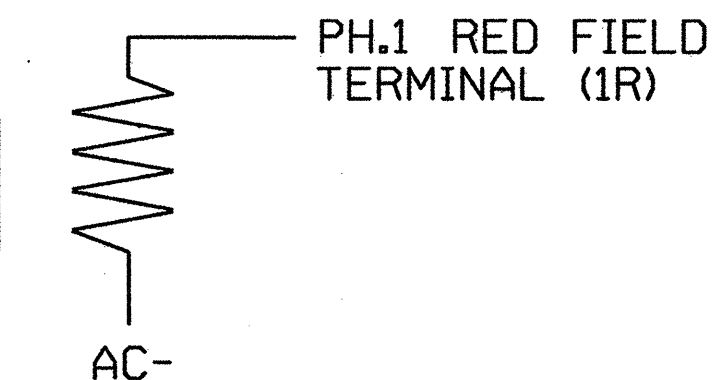
CONTROLLER DETECTOR NO.	FUNCTION	TIMING	
		FEATURE	TIME (SEC)
1	ø1	DELAY	15
2	ø6	—	—
3	ø1	DELAY	15
4	—	—	—
5	ø2	EXTEND	1.8
6	ø2	—	—
7	ø4	DELAY	3
8	—	—	—
9	ø6	EXTEND	1.8
10	ø6	—	—
11	—	—	—
12	—	—	—
13	—	—	—
14	—	—	—
15	—	—	—
16	—	—	—

**EQUIPMENT INFORMATION**

CONTROLLER.....CONTRACTOR SUPPLIED 2070  
CABINET .....CONTRACTOR SUPPLIED TS-2 NC-8A  
SOFTWARE.....ASC/2070  
CABINET MOUNT.....BASE  
LOADBAY POSITIONS.....16  
LOAD SWITCHES USED.....1,2,4,6  
PHASES USED.....1,2,4,6  
OLA.....NOT USED  
OLB.....NOT USED  
OLC.....NOT USED  
OLD.....NOT USED

**LOAD RESISTOR INSTALLATION DETAIL**

ACCEPTABLE VALUES	
VALUE (ohms)	WATTAGE
1.5K - 1.9K	25W (min)
2.0K - 3.0K	10W (min)



NOTE: THE PURPOSE OF THIS RESISTOR IS TO LOAD THE CHANNEL RED MONITOR INPUT IN ORDER FOR THE SIGNAL SEQUENCE MONITOR TO USE THE FULL SIGNAL SEQUENCE MONITORING CAPABILITY ON PHASES THAT DO NOT USE THE RED DISPLAY IN THE FIELD.

**LOAD SWITCH ASSIGNMENT DETAIL**

(program controller according to schedule in chart below)

LOAD SWITCH NUMBER	FUNCTION
1	ø1
2	ø2
3	ø3
4	ø4
5	ø5
6	ø6
7	ø7
8	ø8
9	2 PED
10	4 PED
11	6 PED
12	8 PED
13	OLA
14	OLB
15	OLC
16	OLD

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-1280  
DESIGNED: December 2004  
SEALED: 3-15-06  
REVISED: N/A

**Signal Upgrade**

	<p><b>NC 54</b> at <b>SR 3015 (Airport Boulevard)</b></p>	
	<p>Division 5 Wake County Morrisville</p>	<p>PREPARED BY: <b>D.H. Spaulding</b></p>
<p>PREPARED IN THE OFFICES OF: <b>D.H. Spaulding</b> Signal Management Services 122 N. McDowell St., Raleigh, NC 27603</p>	<p>REVIEWED BY: <b>D.T. Joyce</b></p>	<p>SEAL DATE</p>

24-MP-2006-07-41  
U:\mp\progress\051280\_sm\_e (a\_2006).xx.dgn  
d.spaulding

- 1 INSTALL REA, PE - 22, SHIELDED, TWISTED PAIR COMMUNICATIONS CABLE
- 2 INSTALL REA, PE - 38, (FIGURE 8) SHIELDED, TWISTED PAIR COMMUNICATIONS CABLE
- 3 INSTALL REA, PE - 39, (UNDERGROUND) SHIELDED, TWISTED PAIR COMMUNICATIONS CABLE
- 4 INSTALL SMFO CABLE
- 5 INSTALL MMFO CABLE
- 6 INSTALL FIBER OPTIC DROP CABLE
- 7 INSTALL TRACER WIRE
- 8 TRENCH
- 9 INSTALL PVC CONDUIT
- 10 INSTALL RIGID, GALVANIZED STEEL CONDUIT
- 11 INSTALL RIGID, GALVANIZED STEEL RISER WITH WEATHERHEAD
- 12 INSTALL RIGID, GALVANIZED STEEL RISER WITH FIBER OPTIC CABLE SEAL
- 13 INSTALL OUTER-DUCT POLYETHYLENE CONDUIT
- 14 INSTALL POLYETHYLENE CONDUIT
- 15 DIRECTIONAL DRILL CONDUIT
- 16 BORE AND JACK CONDUIT
- 17 INSTALL CABLE(S) IN EXISTING CONDUIT
- 18 INSTALL CABLE(S) IN NEW CONDUIT
- 19 INSTALL CABLE(S) IN EXISTING RISER
- 20 INSTALL CABLE(S) IN NEW RISER
- 21 INSTALL CABLE(S) IN EXISTING CONDUIT STUB-OUTS
- 22 INSTALL NEW CONDUIT INTO EXISTING CABINET BASE (USE EXISTING CONDUIT STUB-OUTS WHEN AVAILABLE)
- 23 INSTALL NEW RISER INTO EXISTING CABINET BASE (USE EXISTING CONDUIT STUB-OUTS WHEN AVAILABLE)
- 24 INSTALL NEW CONDUIT INTO EXISTING POLE MOUNTED CABINET
- 25 INSTALL NEW RISER INTO EXISTING POLE MOUNTED CABINET
- 26 TERMINATE COMMUNICATIONS CABLE ON EXISTING TELEMETRY INTERFACE PANEL IN TRAFFIC SIGNAL CONTROLLER CABINET
- 27 INSTALL NEW TELEMETRY INTERFACE PANEL IN TRAFFIC SIGNAL CONTROLLER CABINET
- 28 INSTALL INTERCONNECT CENTER, PATCH PANEL, JUMPERS AND FUSION SPlice CABLE IN CABINET
- 29 INSTALL UNDERGROUND SPlice ENCLOSURE
- 30 INSTALL AERIAL SPlice ENCLOSURE
- 31 INSTALL POLE MOUNTED SPlice CABINET
- 32 INSTALL BASE MOUNTED SPlice CABINET
- 33 REMOVE EXISTING SPlice CABINET

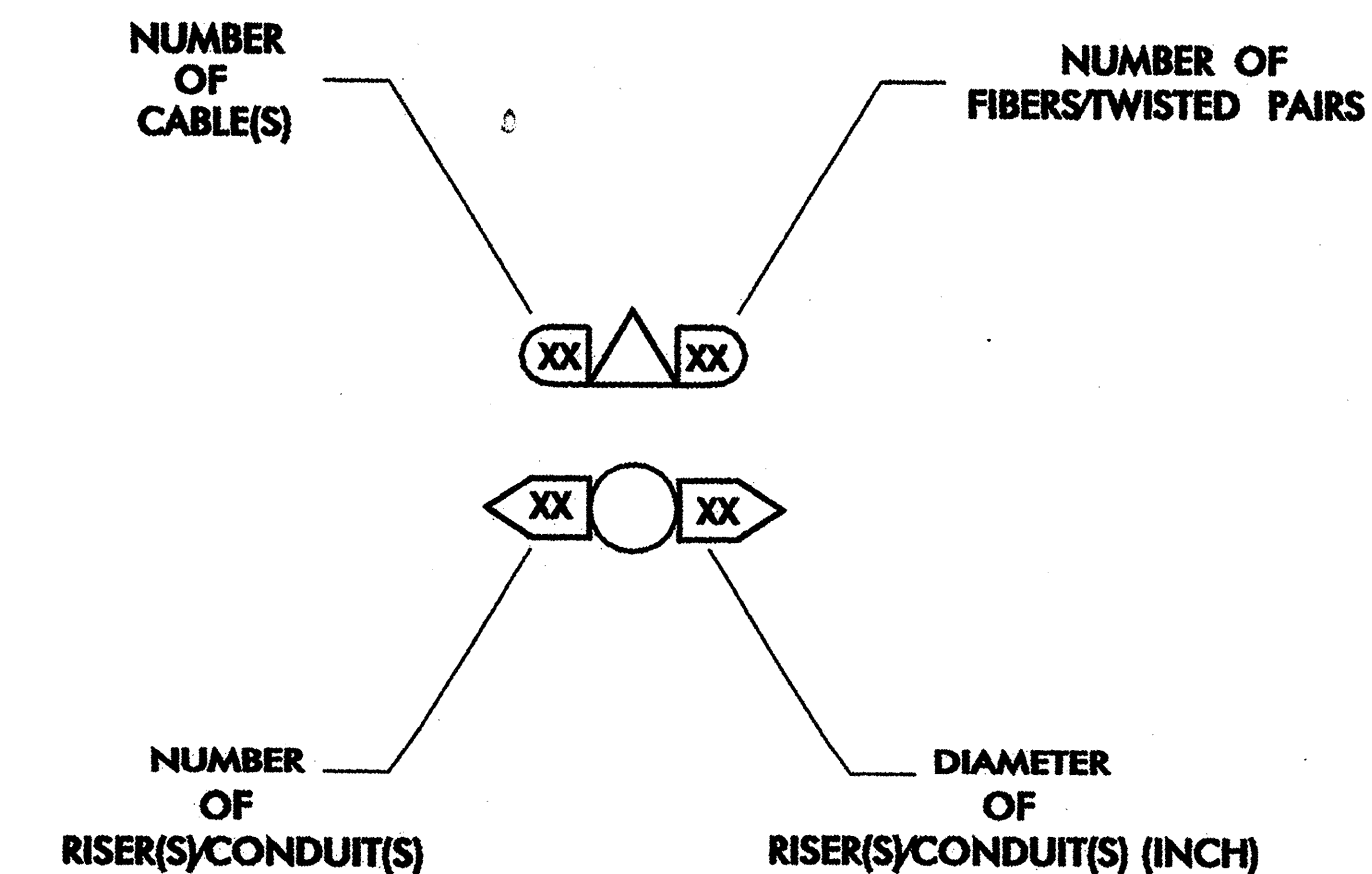
- 34 INSTALL CABINET FOUNDATION
- 35 REMOVE EXISTING CABINET FOUNDATION
- 36 INSTALL CCTV CAMERA ASSEMBLY
- 37 INSTALL CCTV CAMERA WOOD POLE
- 38 INSTALL CCTV CAMERA METAL POLE AND FOUNDATION
- 39 INSTALL JUNCTION BOX
- 40 INSTALL OVERSIZED JUNCTION BOX
- 41 REMOVE EXISTING JUNCTION BOX
- 42 INSTALL WOOD POLE
- 43 REMOVE EXISTING WOOD POLE
- 44 INSTALL AERIAL GUY ASSEMBLY
- 45 INSTALL STANDARD GUY ASSEMBLY
- 46 INSTALL SIDEWALK GUY ASSEMBLY
- 47 INSTALL MESSENGER CABLE
- 48 REMOVE EXISTING COMMUNICATIONS AND MESSENGER CABLE
- 49 REMOVE EXISTING MESSENGER CABLE
- 50 INSTALL TELEPHONE SERVICE
- 51 INSTALL CABLE STORAGE RACKS (SNOW SHOES) AND STORE 100 FEET OF CABLE
- 52 INSTALL DELINEATOR MARKER
- 53 STORE 20 FEET OF COMMUNICATIONS CABLE
- 54 LASH CABLE(S) TO EXISTING SIGNAL/COMMUNICATIONS CABLE
- 55 LASH CABLE(S) TO EXISTING MESSENGER CABLE
- 56 LASH CABLE(S) TO NEW MESSENGER CABLE
- 57 MODIFY EXISTING ELECTRICAL SERVICE
- 58 INSTALL NEW ELECTRICAL SERVICE

**LEGEND**

- FO NEW FIBER OPTIC COMMUNICATIONS CABLE
- TWIST PR NEW TWISTED PAIR COMMUNICATIONS CABLE
- EXI EXISTING COMMUNICATIONS CABLE
- REM EXISTING COMMUNICATIONS CABLE TO BE REMOVED
- NEW AERIAL GUY ASSEMBLY
- NEW CONDUIT
- EXISTING CONDUIT
- DD NEW DIRECTIONAL DRILLED CONDUIT
- B&J NEW BORED AND JACKED CONDUIT
- NEW JUNCTION BOX
- EXISTING JUNCTION BOX
- NEW WOOD POLE
- EXISTING WOOD POLE
- AERIAL SPlice ENCLOSURE
- NEW METAL POLE
- EXISTING METAL POLE
- NEW CCTV ASSEMBLY
- NEW STANDARD GUY ASSEMBLY
- NEW SIDEWALK GUY ASSEMBLY
- NEW CABLE STORAGE RACKS (SNOW SHOES)
- EXISTING CONTROLLER AND CABINET
- EXISTING SPlice CABINET
- NEW SPlice CABINET
- SIGNAL POLE
- XX-XXXX SIGNAL INVENTORY NUMBER

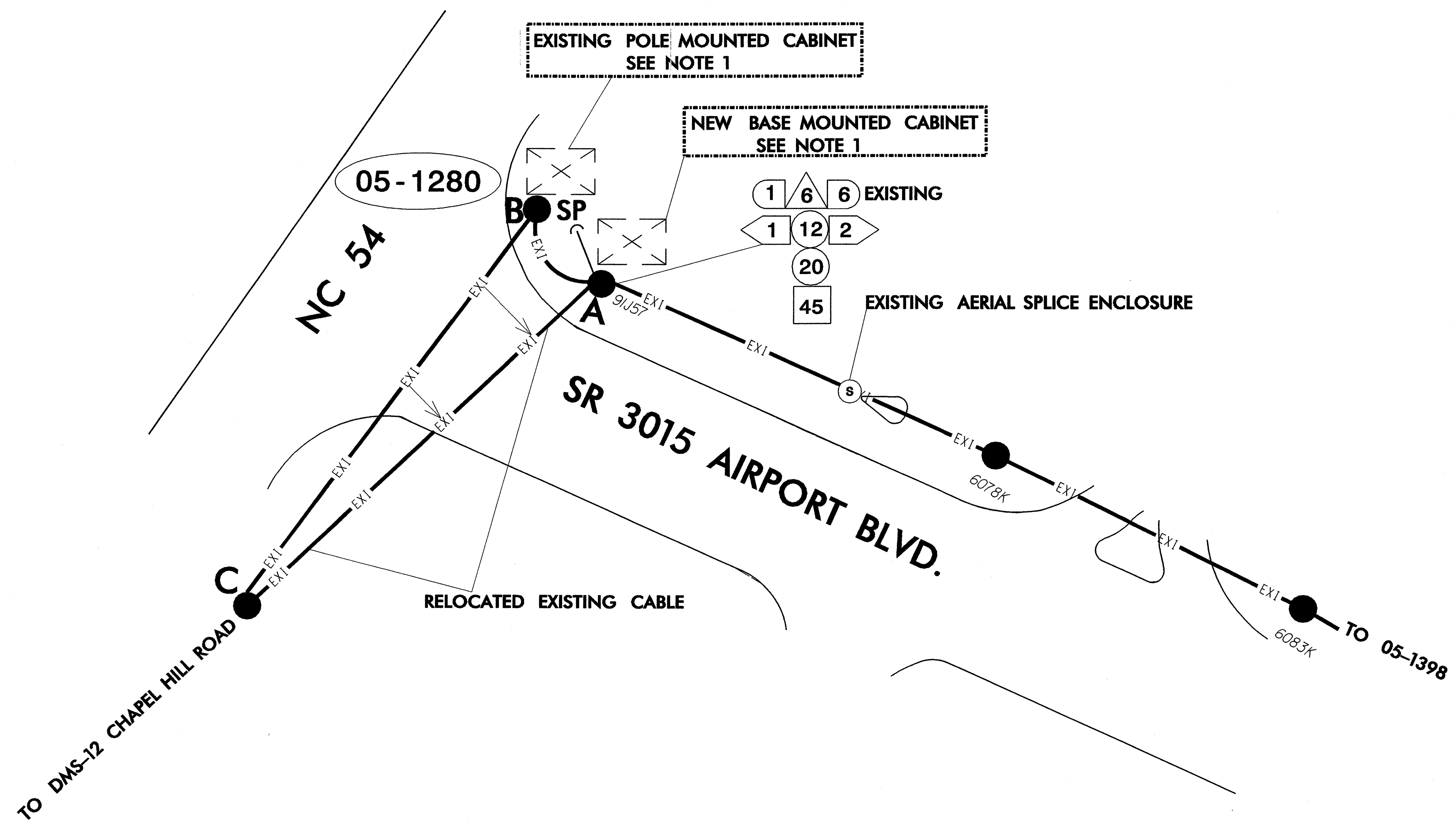
**CONSTRUCTION NOTE SYMBOLOGY KEY**

- XX INDICATES NUMBER OF CABLES, LOOPS, ETC.
- XX INDICATES NUMBER OF FIBERS PER CABLE, TWISTED PAIRS PER CABLE, ETC.
- XX INDICATES NUMBER OF RISER(S)/CONDUIT(S)
- XX INDICATES DIAMETER OF RISER(S)/CONDUIT(S) (INCH)



	<b>CONSTRUCTION NOTES</b>		SEAL
	222 N. McDowell St., Raleigh, NC 27603 PREPARED BY:	REVIEWED BY: <b>G. A. FULLER</b>	
SCALE: 0	REVISIONS:	INIT. DATE:	SIGNATURE: <i>Gregory A. Fuller</i> DATE: 10/31/02
CADD File name:			



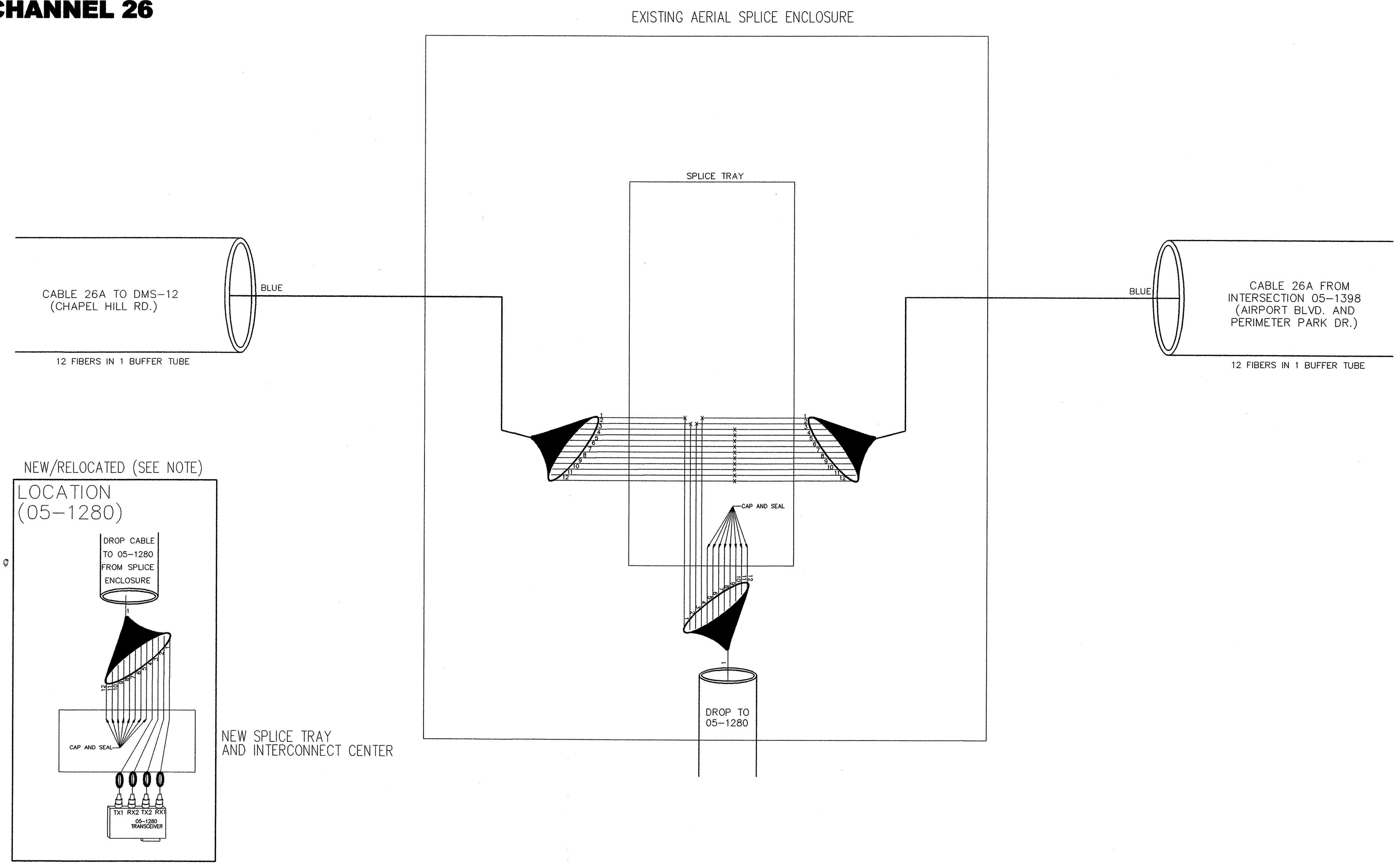


**NOTES:**

1. LOCATE AND REMOVE DROP CABLE FROM THE EXISTING POLE MOUNTED CABINET AND REROUTE TO THE NEW BASE MOUNTED CABINET
2. LOCATE FIBER OPTIC CABLE (12 FIBER) LEAVING THE EXISTING AERIAL SPLICE ENCLOSURE AND HEADING TOWARDS "DYNAMIC MESSAGE SIGN-12". THE CABLE IS PRESENTLY ATTACHED ON POLES "A", "B", AND "C". AFTER THE CABLE IS LOCATED AND IDENTIFIED, RELOCATE THE CABLE SO THAT IT NO LONGER IS ATTACHED TO POLE "B". UTILIZE POLES "A", AND "C" ONLY.

	<b>COMMUNICATIONS CABLE ROUTING PLANS</b>		
	DIVISION 05 WAKE COUNTY CARY PLAN DATE: OCTOBER 2006 REVIEWED BY: I. N. AVERY	PREPARED BY: P. C. LOUDER REVIEWED BY: G. G. MURR, JR., PE	

**05-1280  
CHAPEL HILL RD. AND AIRPORT  
BLVD.  
CHANNEL 26**



- NOTES:
1. TERMINATE DROP CABLE IN NEW BASE MOUNTED CABINET
  2. FURNISH MERIDIAN 2300M DATA MULTIDROP SELF-HEALING OPTICAL RING MODEM TRANSCEIVER. RETURN EXISTING TRANSCEIVER TO TOWN OF CARY

<p>222 N. McDowell St., Raleigh, NC 27603</p>	<p>Prepared in the Office of:</p>		
	<p>DIVISION 05 WAKE CO. CARY</p> <p>PLAN DATE: OCTOBER 2006 REVIEWED BY: I. W. AVERY</p> <p>REPAIRED BY: P. C. LOUDER REVIEWED BY: G.G. MURR, JR.</p>		
<p>SCALE</p> <p>0</p>	<p>REVISIONS</p>	<p>INIT.</p>	<p>DATE</p>
<p>SIGNATURE</p> <p>CADD F11 ename</p>		<p>10-10-06</p> <p>DATE</p>	