

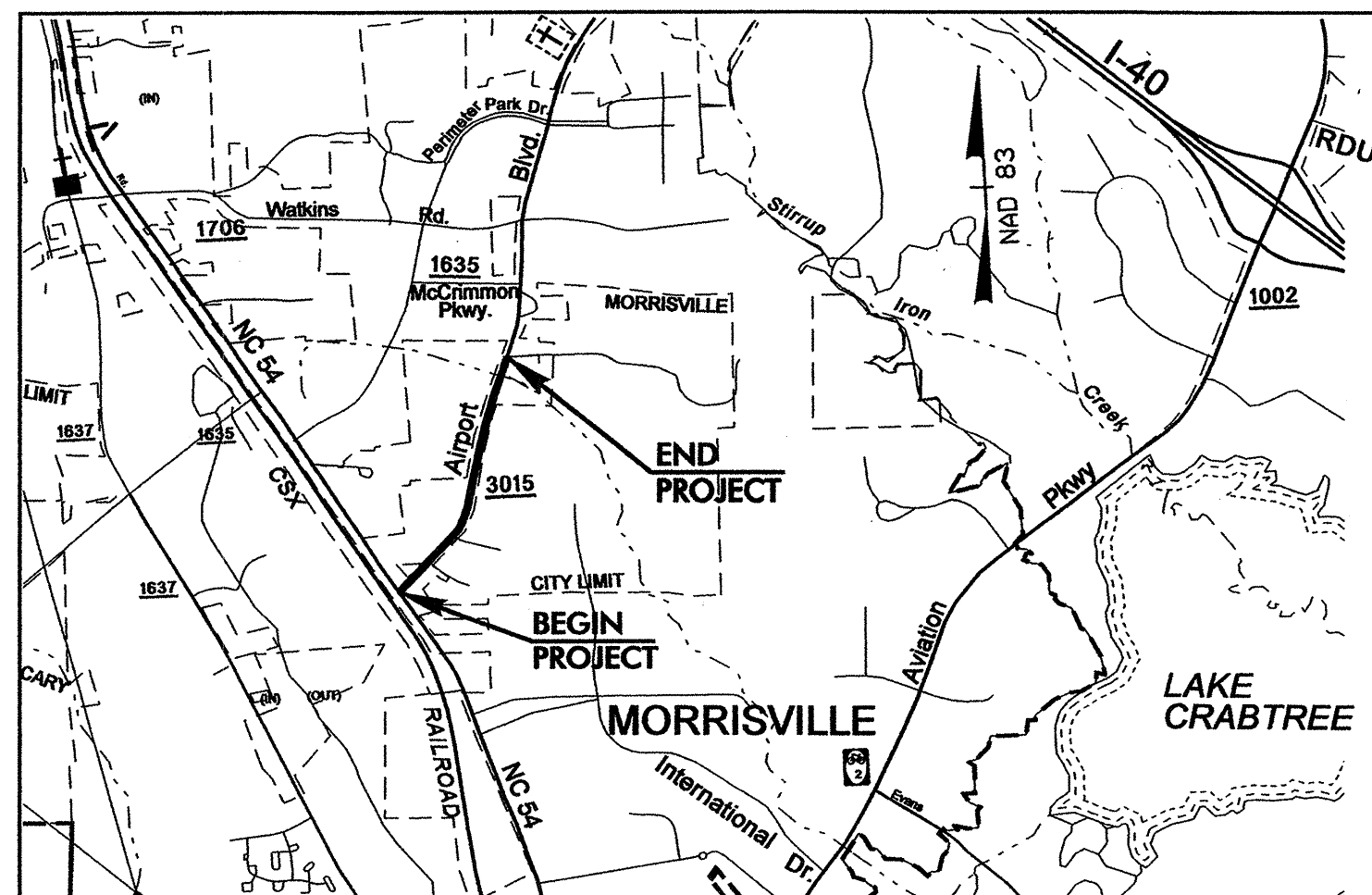
TIP PROJECT: U-3344A

Project No. U-3344A	Sheet No. Sig. 1
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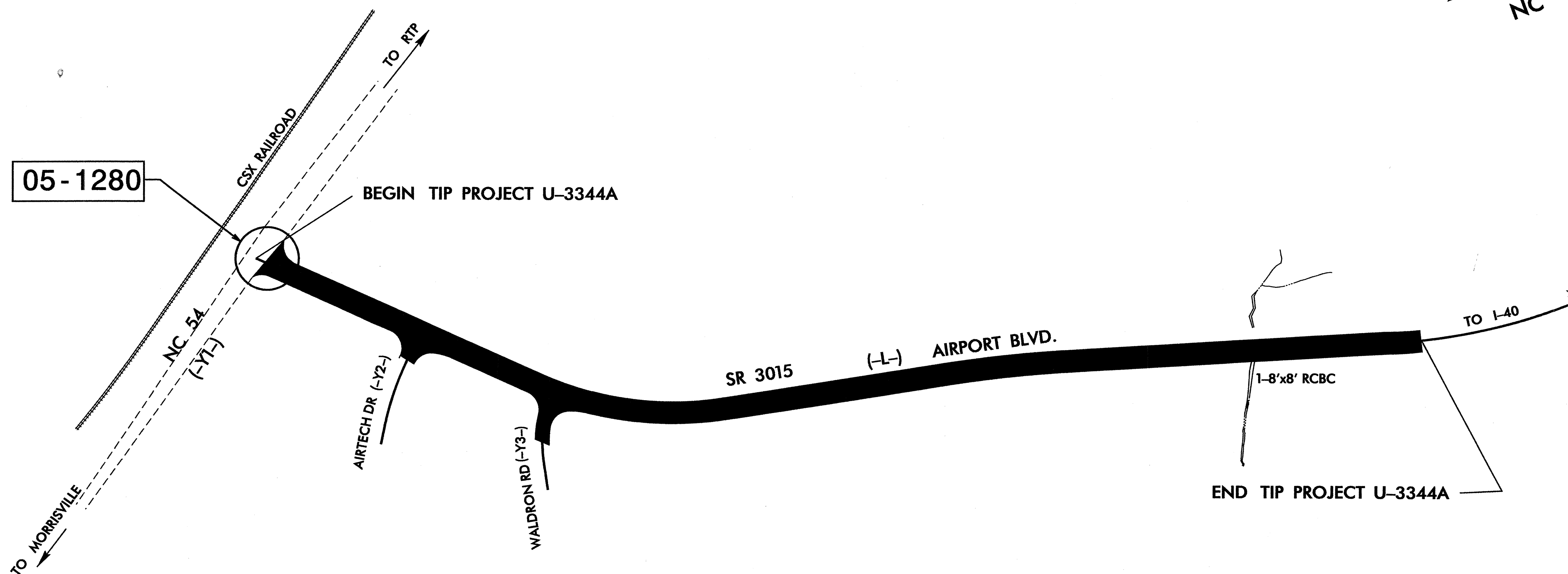
STATE OF NORTH CAROLINA
 DIVISION OF HIGHWAYS
WAKE COUNTY

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

TYPE OF WORK: SIGNALS



VICINITY MAP



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

Index of Plans

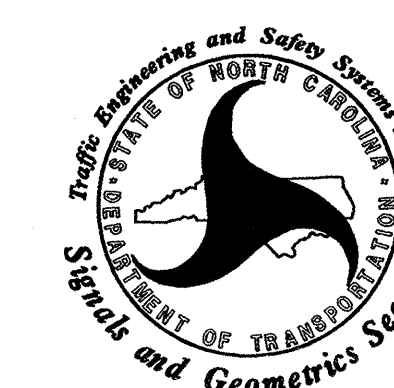
Sheet #	Reference #	Location/Description
Sig. 1	-----	Title Sheet
Sig. 2	05-1280	NC 54 @ SR 3015 (Airport Boulevard)
Sig. 4	-----	Communications Cable Routing Plans

INTELLIGENT TRANSPORTATION SYSTEMS & SIGNALS UNIT

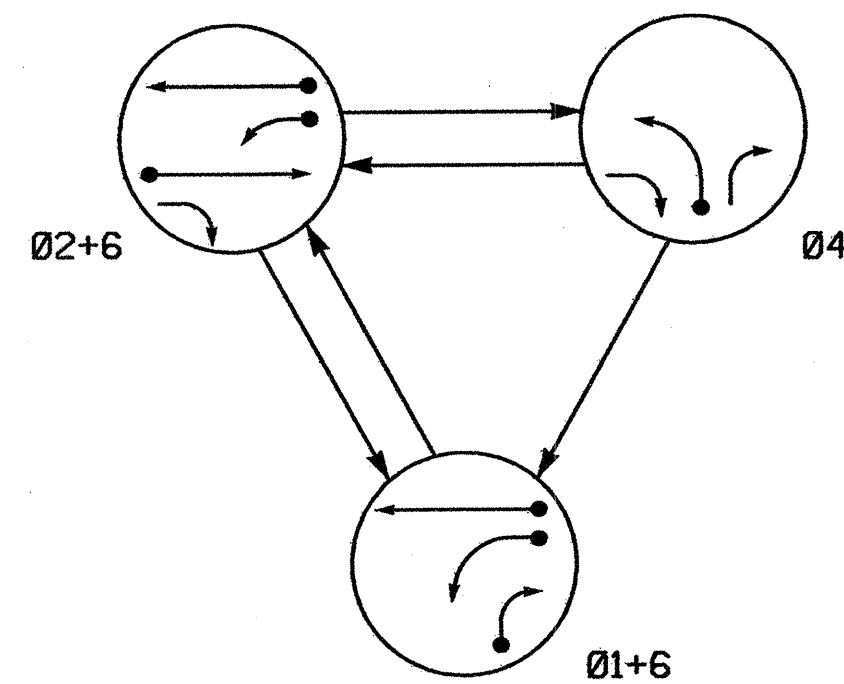
Contacts:

- 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



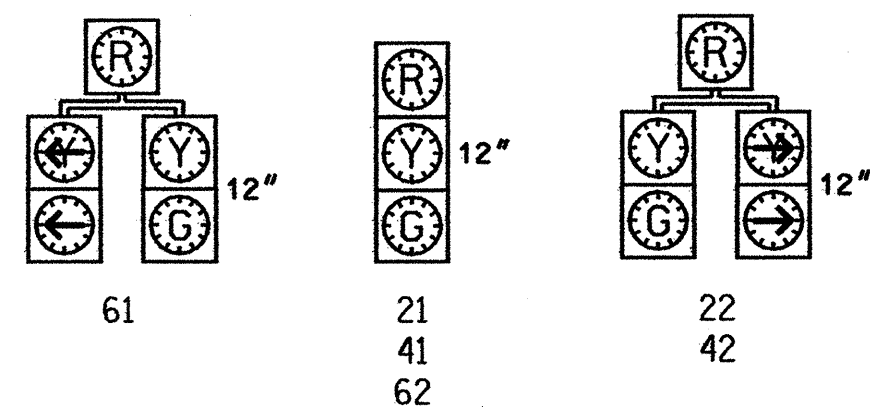
PHASING DIAGRAM



SIGNAL FACE	PHASE			
	Ø 1 + 6	Ø 2 + 6	Ø 4	F L EOP
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.



PHASING DIAGRAM DETECTION LEGEND

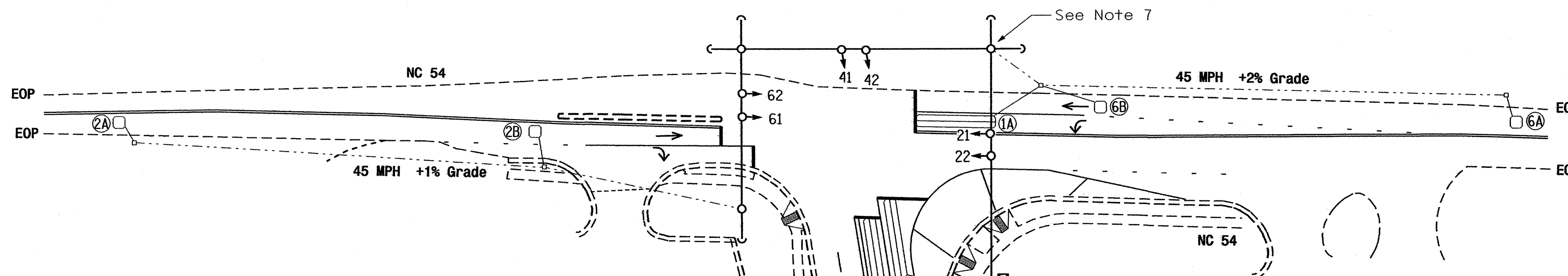
- ←●→ DETECTED MOVEMENT
- ← UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- ←---→ PEDESTRIAN MOVEMENT

LOOP & DETECTOR UNIT INSTALLATION CHART											
2070L CONTROLLER WITH TS-2 CABINET											
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	

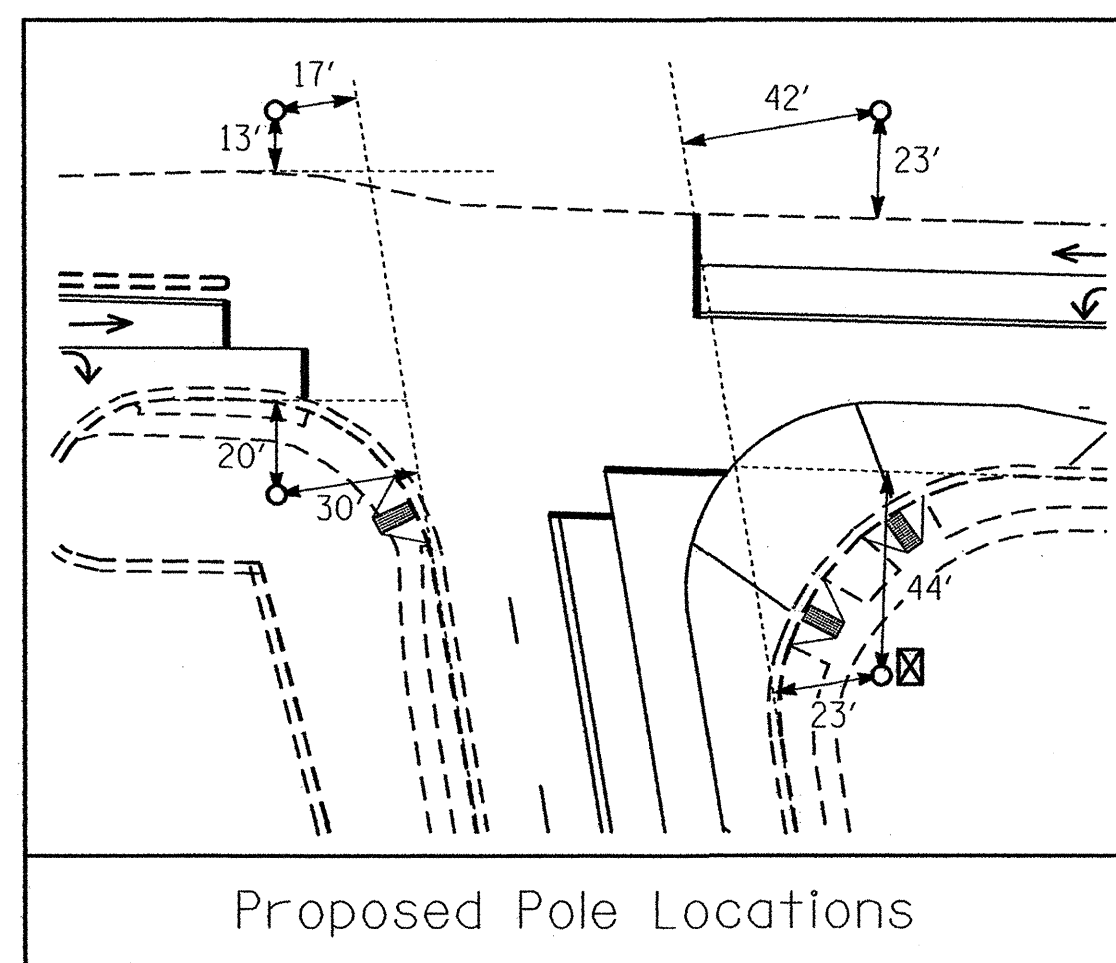
3 Phase Fully Actuated Caryl Signal System

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Phase 1 may be lagged.
- Set all detector units to presence mode.
- Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
- Pavement markings are existing.
- 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.



LEGEND		
PROPOSED		EXISTING
○→	Traffic Signal Head	●→
○→	Modified Signal Head	N/A
○→	Sign	N/A
○→	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	→
→	Pavement Marking Arrow	→

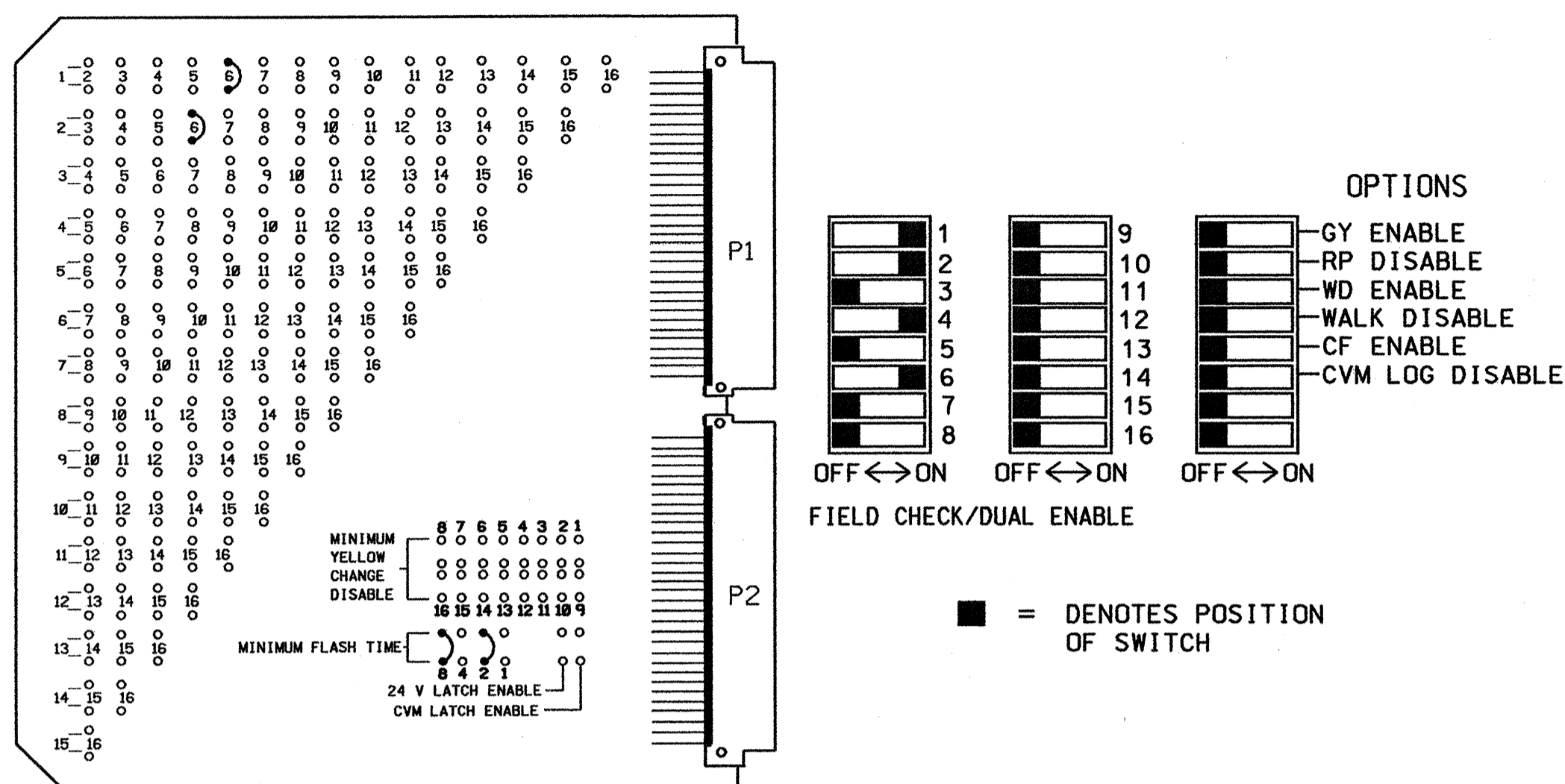
Signal Upgrade

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

15-MAR-2006 11:14 2:44:53 signal\awork\p\proj\33444\p\roadway\p\051280_20041201.dgn

**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 ø1	L1 ø1	L7 ø6	L5 ø2							
	CH2	CH2	CH2	CH2	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY
	L4 ø2	L2 ø6	L8 ø6	L6 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 L10A, L10B
6B	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.

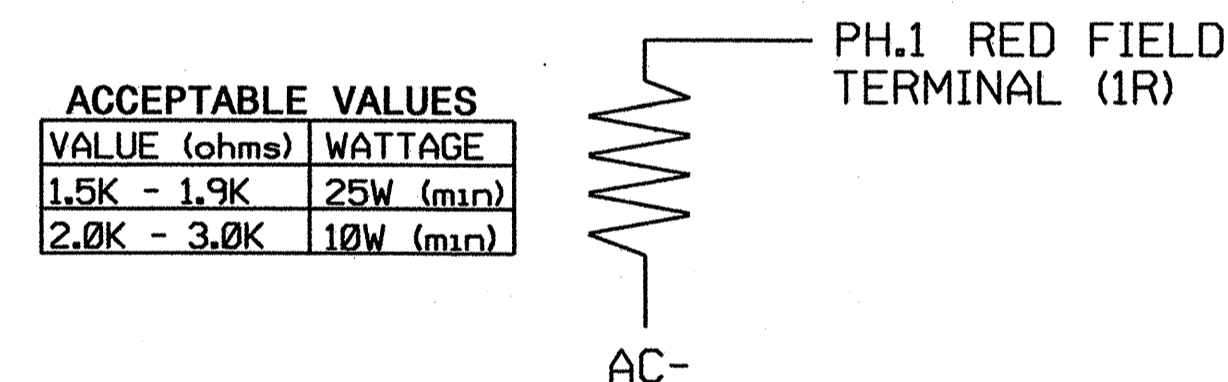
PROGRAM CONTROLLER DETECTORS ACCORDING TO THE SCHEDULE SHOWN IN THE CHART BELOW

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

EQUIPMENT INFORMATION

CONTROLLER.....CONTRACTOR SUPPLIED 2070
CABINETCONTRACTOR 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



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	ø 1
2	ø 2
3	ø 3
4	ø 4
5	ø 5
6	ø 6
7	ø 7
8	ø 8
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

Electrical and Programming Details For:

NC 54 at SR 3015 (Airport Boulevard)

Division 5 Wake County Morrisville

PLAN DATE: 3-22-06 REVIEWED BY: D.T.Joyce

PREPARED BY: D.H. Spaulding REVIEWED BY:

REVISIONS: _____ INIT. DATE

Signature: *D.H. Spaulding* 3/24/06

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

122 N. McDowell St., Raleigh, NC 27603

SIG. INVENTORY NO. 05-1280

- 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

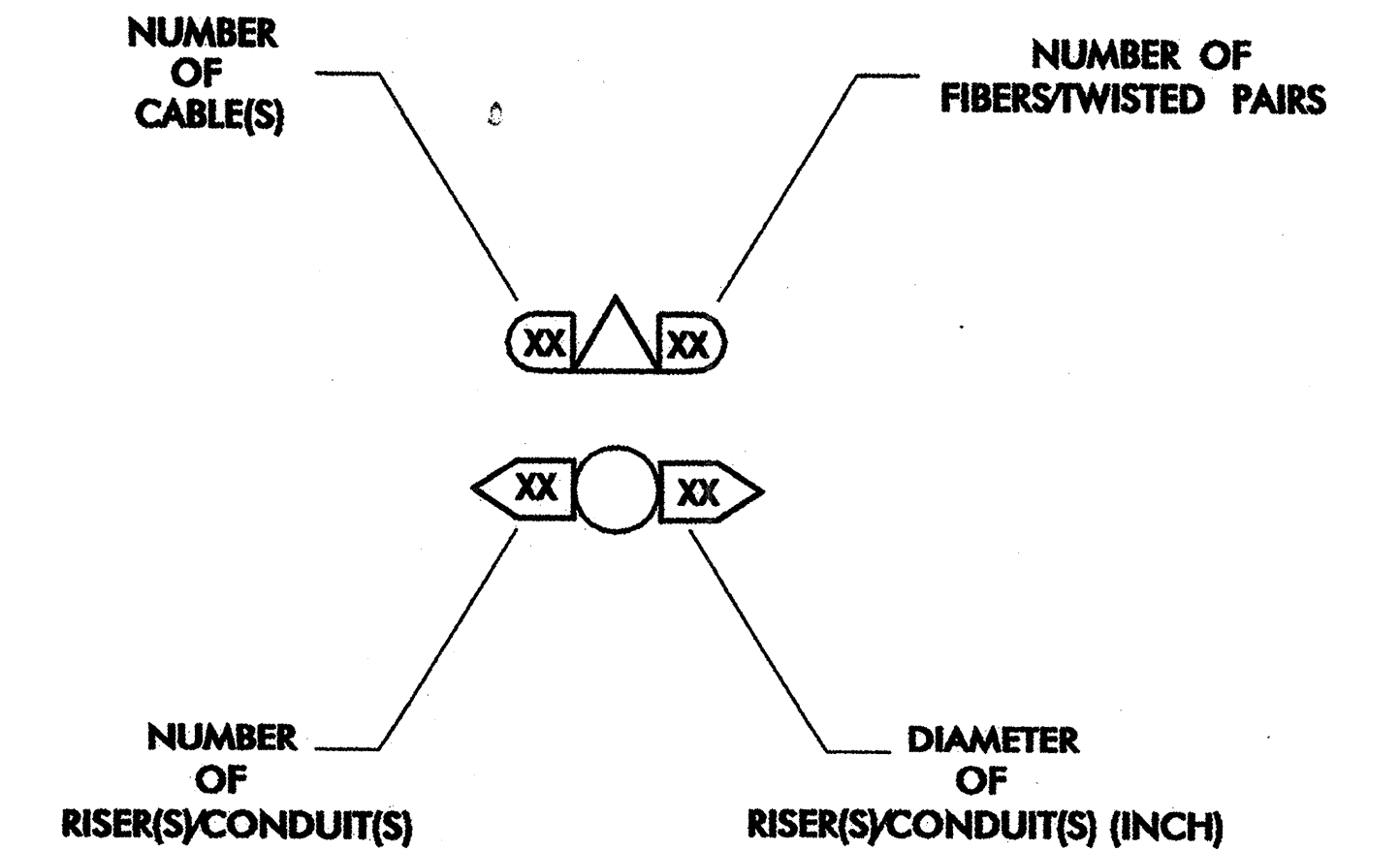
- 34 INSTALL CABINET FOUNDATION
- 35 REMOVE EXISTING CABINET FOUNDATION
- 36 INSTALL CCTV CAMERA ASSEMBLY
- 37 INSTALL CCTV CAMERA WOOD POLE
- 38 INSTALL CCTV CAMERA METAL POLE AND FOUNDATION
- 39 INSTALL JUNCTION BOX
- 40 INSTALL OVERSIZED JUNCTION BOX
- 41 REMOVE EXISTING JUNCTION BOX
- 42 INSTALL 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


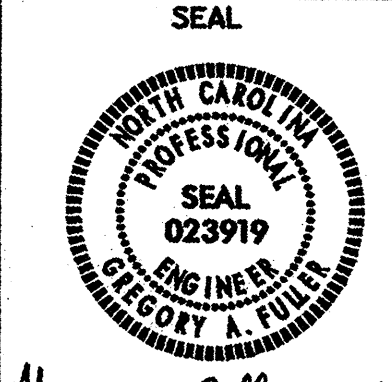

LEGEND

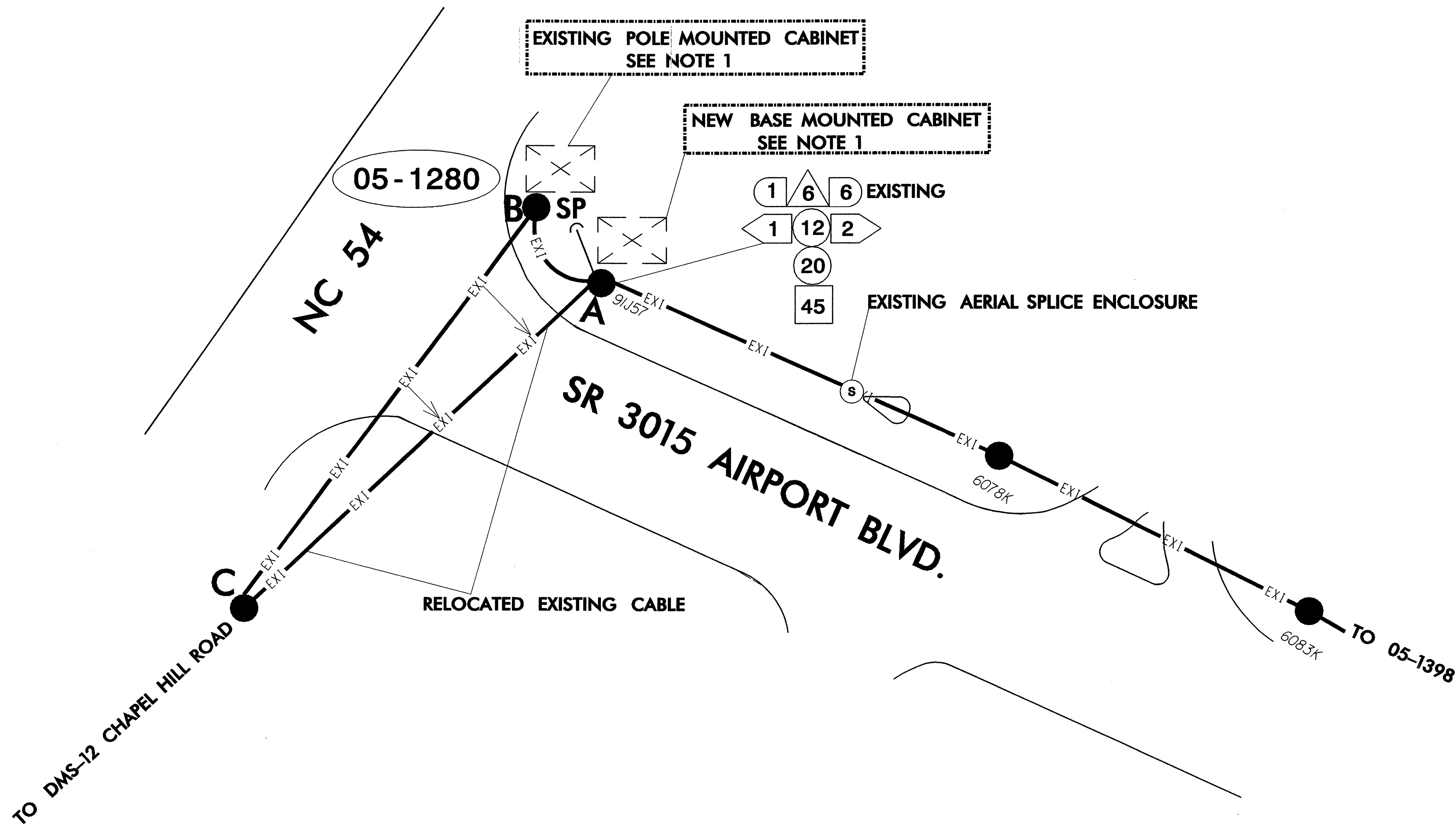
- FO NEW FIBER OPTIC COMMUNICATIONS CABLE
- TWIST PR NEW TWISTED PAIR COMMUNICATIONS CABLE
- EXI EXISTING COMMUNICATIONS CABLE
- REM EXISTING COMMUNICATIONS CABLE TO BE REMOVED
- NEW AERIAL GUY ASSEMBLY
- NEW CONDUIT
- EXISTING CONDUIT
- DD NEW DIRECTIONAL DRILLED CONDUIT
- B&J NEW BORED AND JACKED CONDUIT
- 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
- SP 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)



 Prepared in the Office of: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION Traffic Management Systems 222 N. McDowell St., Raleigh, NC 27603	CONSTRUCTION NOTES		SEAL  GREGORY A. FULLER ENGINEER
	PLAN DATE: _____ PREPARED BY: _____ SCALE: _____ 	REVIEWED BY: _____ REVIEWED BY: G. A. FULLER REVISIONS: _____ INIT. DATE: _____	

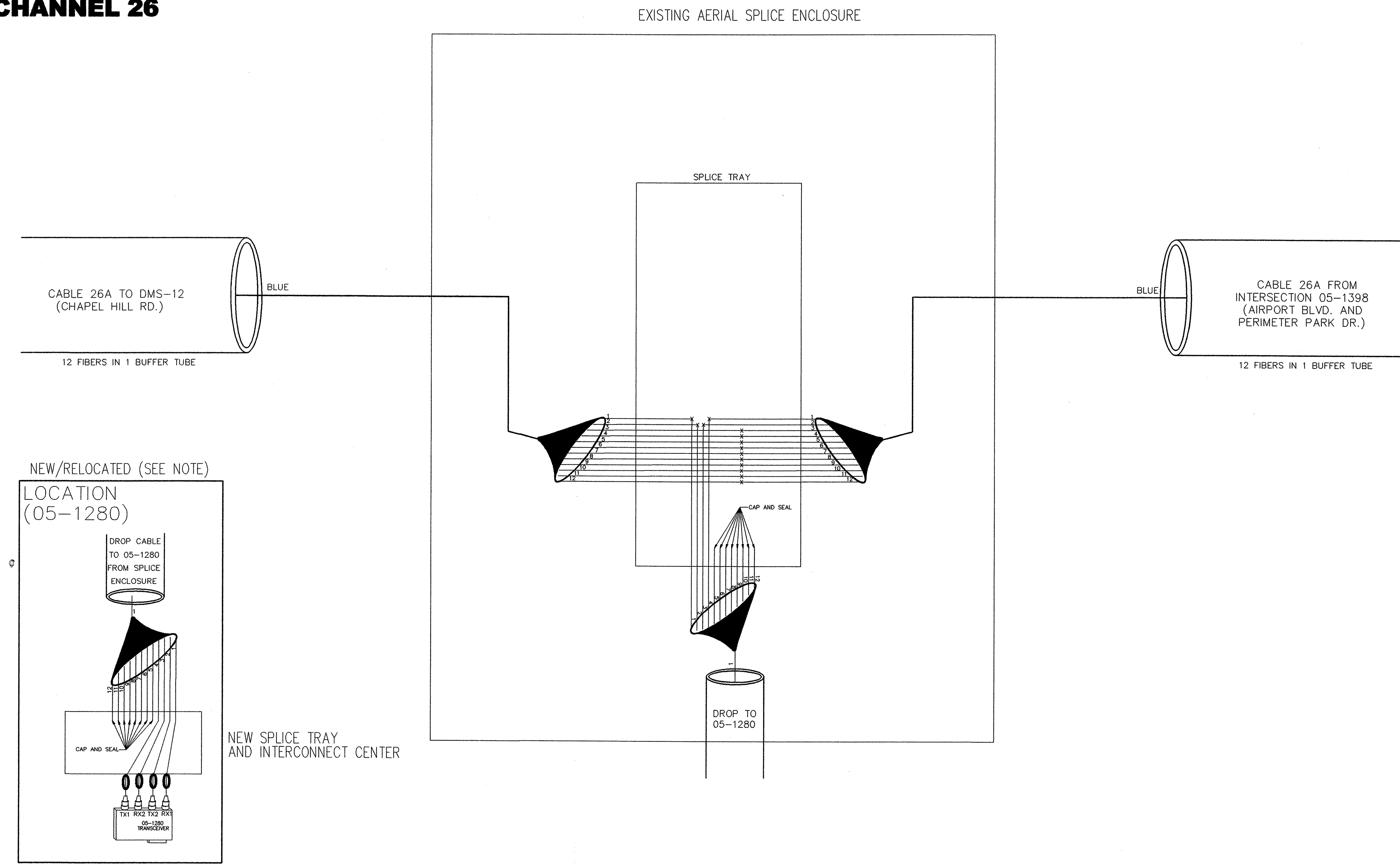


NOTES:

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.

	COMMUNICATIONS CABLE ROUTING PLANS										
	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										
SCALE 	REVISIONS <table border="1"> <tr> <th>NO.</th> <th>DATE</th> <th>DESCRIPTION</th> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </table>	NO.	DATE	DESCRIPTION				INIT. DATE <table border="1"> <tr> <td> </td> <td> </td> </tr> </table>			SIGNATURE DATE 10-10-06 SEAL 14543
NO.	DATE	DESCRIPTION									

**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

	Prepared in the Office of DIVISION 05 WAKE CO. CARY PLAN DATE: OCTOBER 2006 REVIEWED BY: I. N. AVERY REPAIRED BY: P. C. LOUDER REVIEWED BY: G.G. MURR, JR.					
	SCALE 	REVISIONS <table border="1"> <tr> <th>INIT.</th> <th>DATE</th> </tr> <tr> <td> </td> <td> </td> </tr> </table>		INIT.	DATE	
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122 N. McDowell St., Raleigh, NC 27603			DATE 10-10-06			