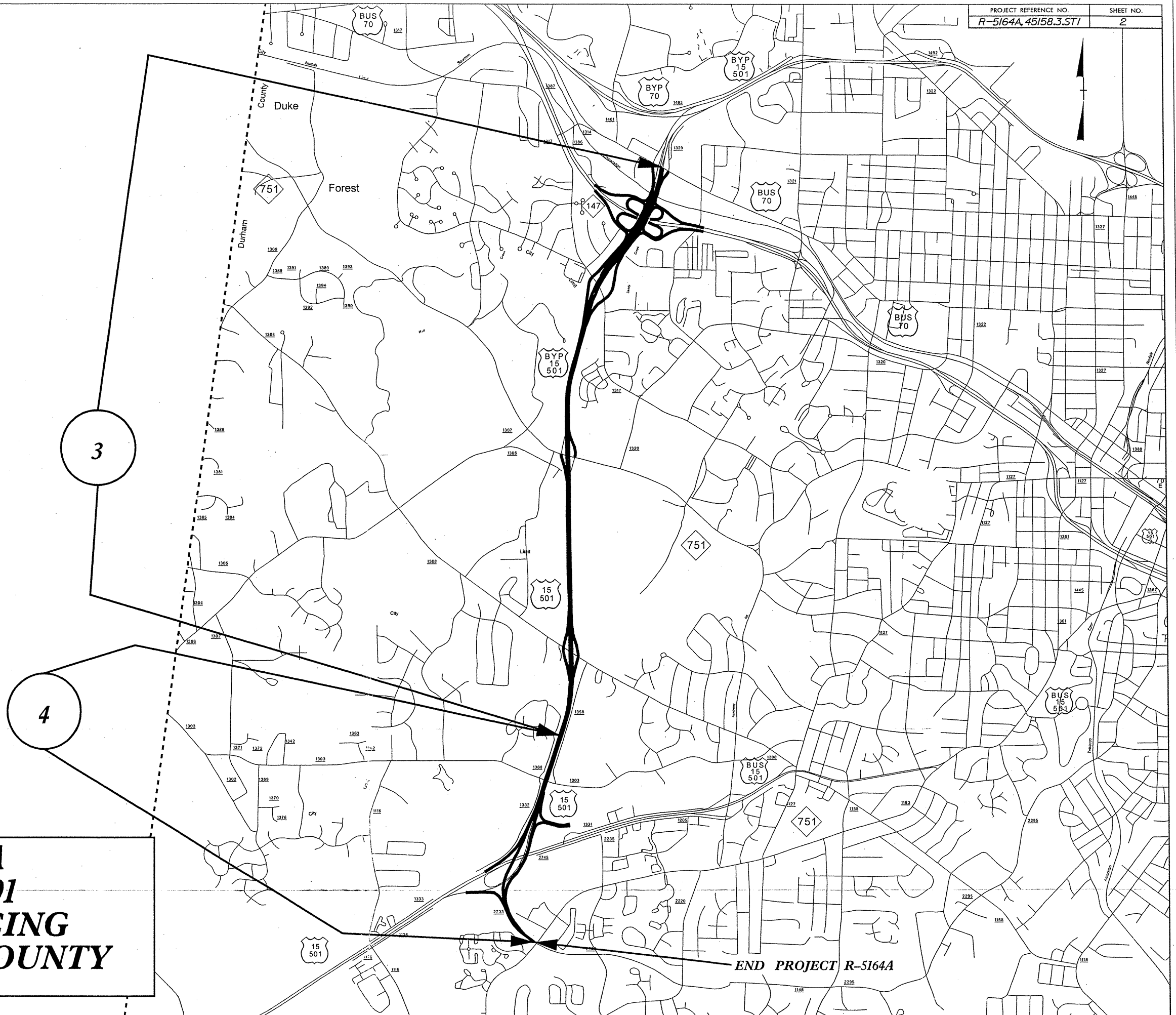


BEGIN PROJECT R-5164A

**R-5164A  
I-85 AND NC 147  
RESURFACING  
DURHAM COUNTY**



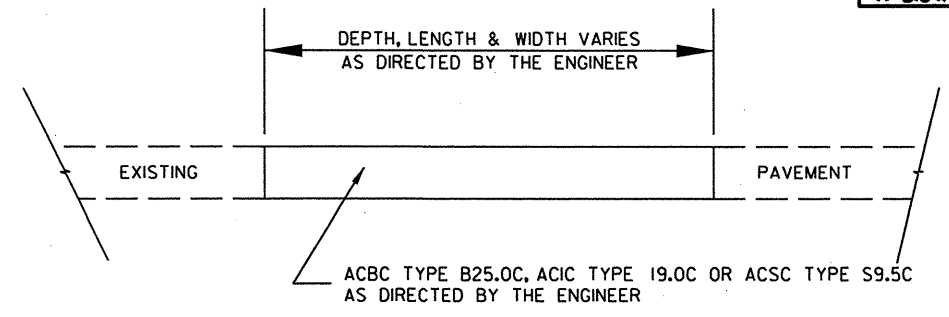
**R-5164A  
US 15/501  
RESURFACING  
DURHAM COUNTY**



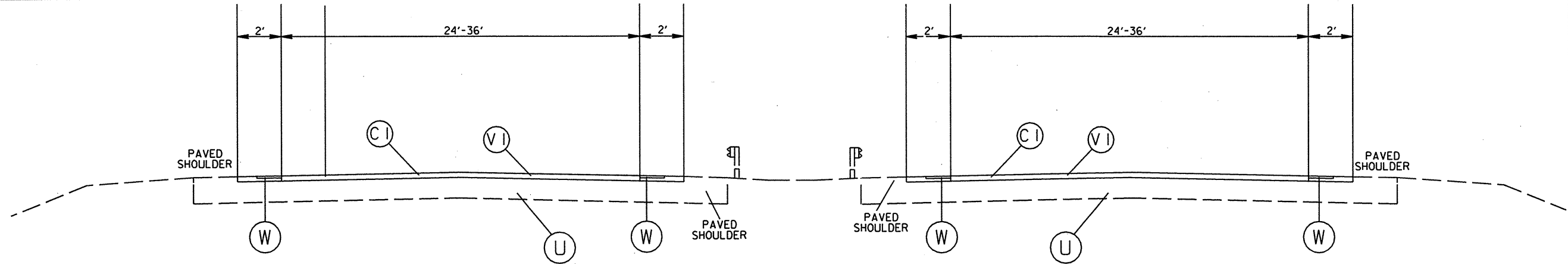
END PROJECT R-5164A

# PAVEMENT SCHEDULE

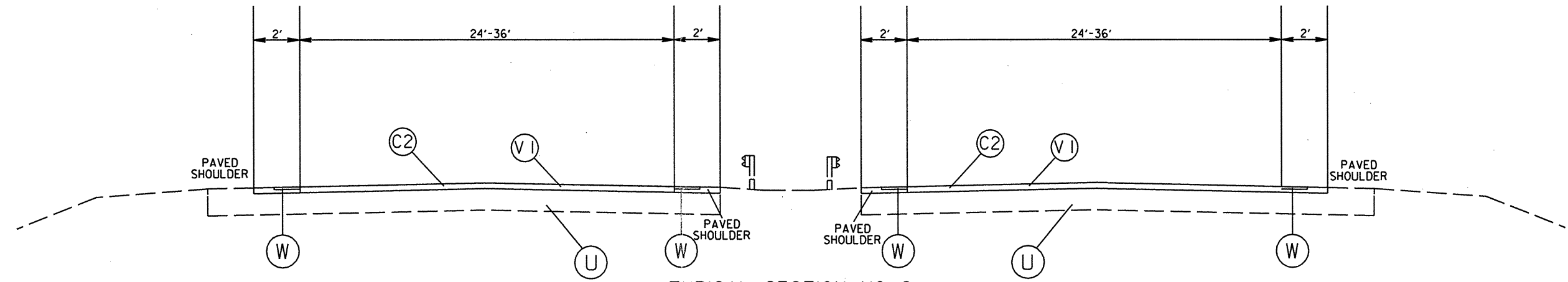
(C1)	PROP. APPROX. 2" ASPH. CONC. SURFACE COURSE, TYPE S9.5D, AT AN AVERAGE RATE OF 224 LBS. PER SQ. YD.
(C2)	PROP. APPROX. 2" ASPH. CONC. SURFACE COURSE, TYPE S9.5C, AT AN AVERAGE RATE OF 224 LBS. PER SQ. YD.
(C3)	PROP. APPROX. 1.5" ASPH. CONC. SURFACE COURSE, TYPE S9.5C, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YD.
(D1)	PROP. APPROX. 2.5" ASPH. CONC. INTERMEDIATE COURSE, TYPE 119.0C, AT AN AVERAGE RATE OF 285 LBS. PER SQ. YD.
(U)	EXISTING PAVEMENT
(V1)	MILL 2" IN DEPTH
(V2)	MILL 4" IN DEPTH
(W)	MILLED RUMBLE STRIPS



PATCHING EXISTING PAVEMENT



TYPICAL SECTION NO. 1



TYPICAL SECTION NO. 2

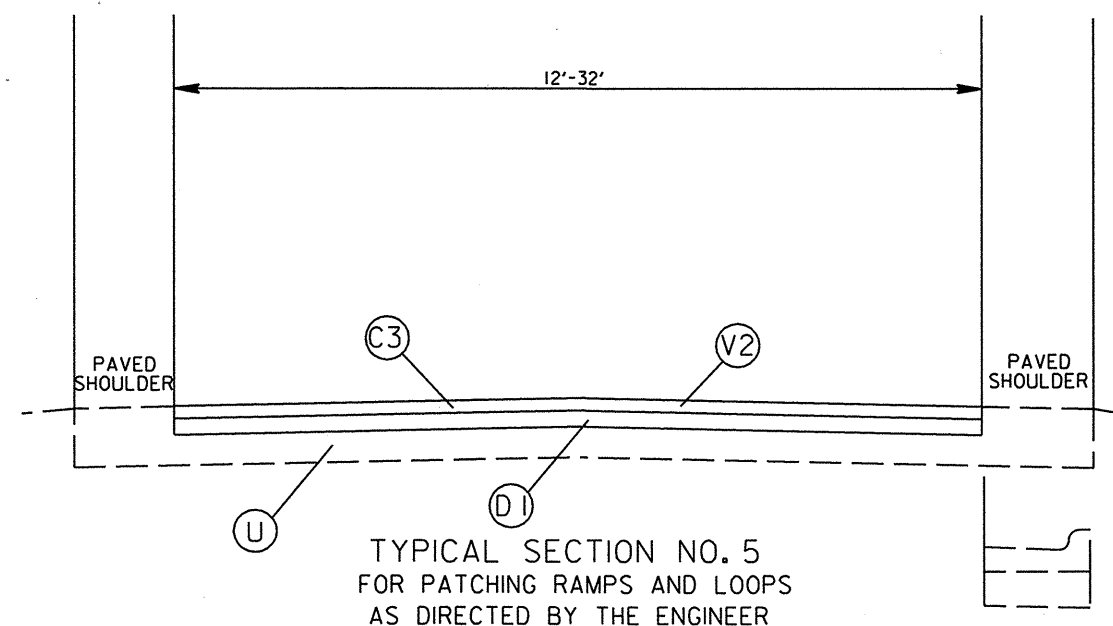
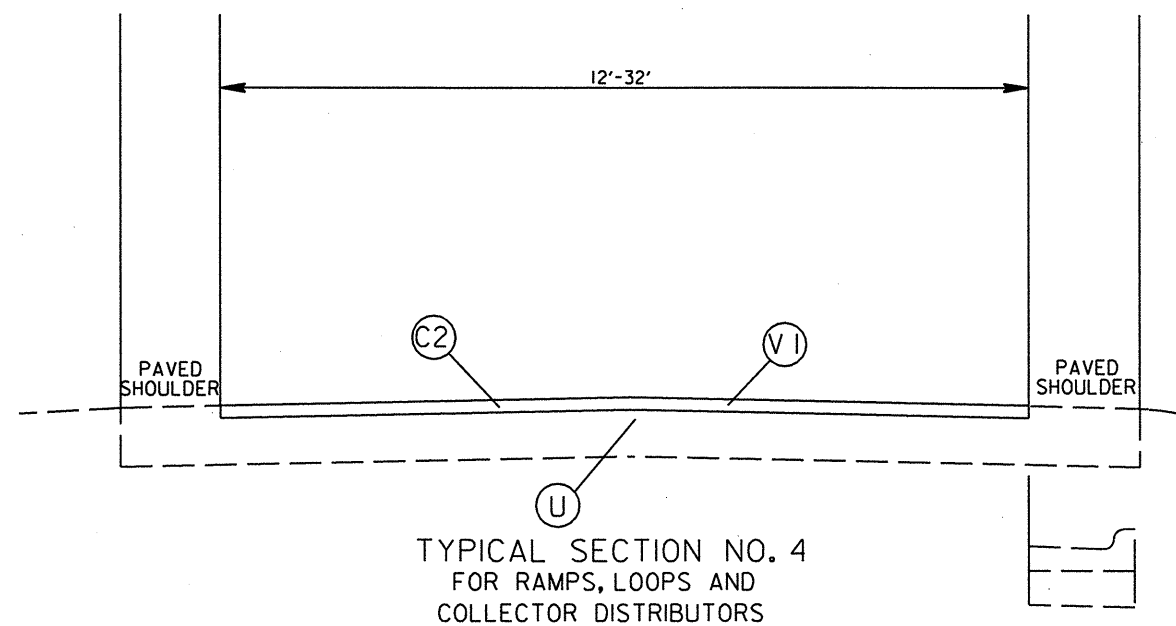
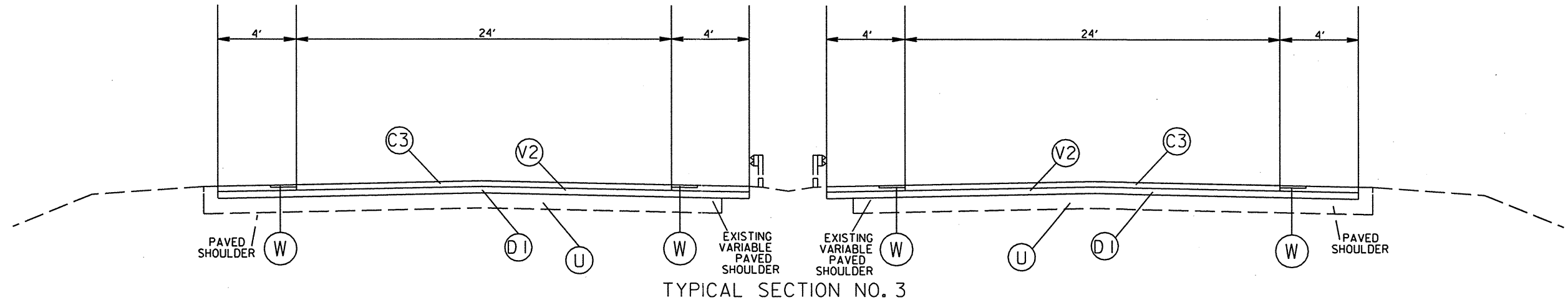
# PAVEMENT SCHEDULE

(C1)	PROP. APPROX. 2" ASPH. CONC. SURFACE COURSE, TYPE S9.5D, AT AN AVERAGE RATE OF 224 LBS. PER SQ. YD.
(C2)	PROP. APPROX. 2" ASPH. CONC. SURFACE COURSE, TYPE S9.5C, AT AN AVERAGE RATE OF 224 LBS. PER SQ. YD.
(C3)	PROP. APPROX. 1.5" ASPH. CONC. SURFACE COURSE, TYPE S9.5C, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YD.
(D1)	PROP. APPROX. 2.5" ASPH. CONC. INTERMEDIATE COURSE, TYPE I19.0C, AT AN AVERAGE RATE OF 285 LBS. PER SQ. YD.
(U)	EXISTING PAVEMENT
(V1)	MILL 2" IN DEPTH
(V2)	MILL 4" IN DEPTH
(W)	MILLED RUMBLE STRIPS

## 2006 ROADWAY ENGLISH STANDARD DRAWINGS

The following Roadway Standards as appear in "Roadway Standard Drawings" Highway Design Branch - N. C. Department of Transportation - Raleigh, N. C., Dated July 18, 2006 are applicable to this project and by reference hereby are considered a part of these plans:

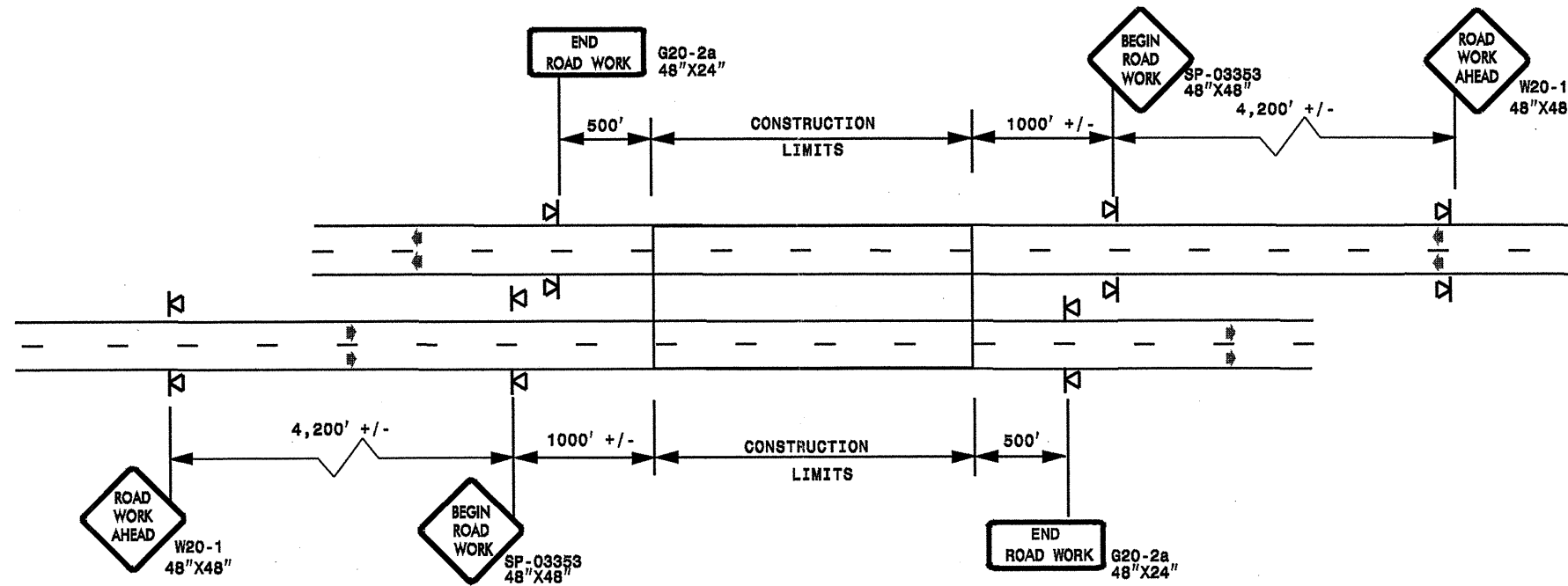
STD.NO.	TITLE
DIVISION 6 - ASPHALT BASES AND PAVEMENTS	
665.01	Milled Rumble Strips - Asphalt Pavements





**ADVANCE WORK ZONE WARNING SIGNING FOR FREEWAYS (4 LANES OR GREATER)**

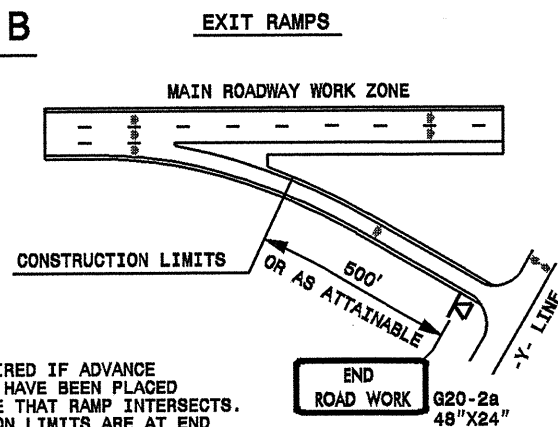
**DETAIL A**



STATE OF NORTH CAROLINA  
DEPT. OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
RALEIGH, N.C.

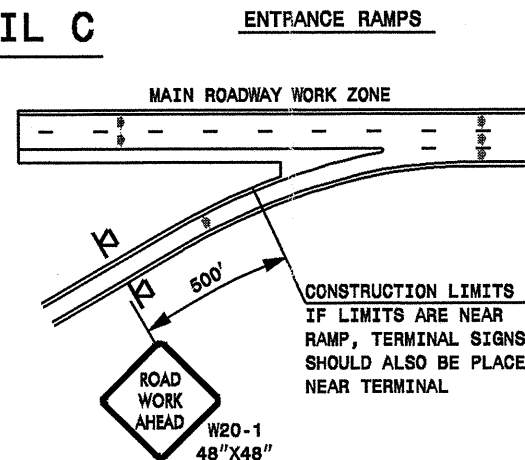
**ROADWAYS INTERSECTING ALONG FREEWAY WORK ZONE (Y-LINES)**

**DETAIL B**



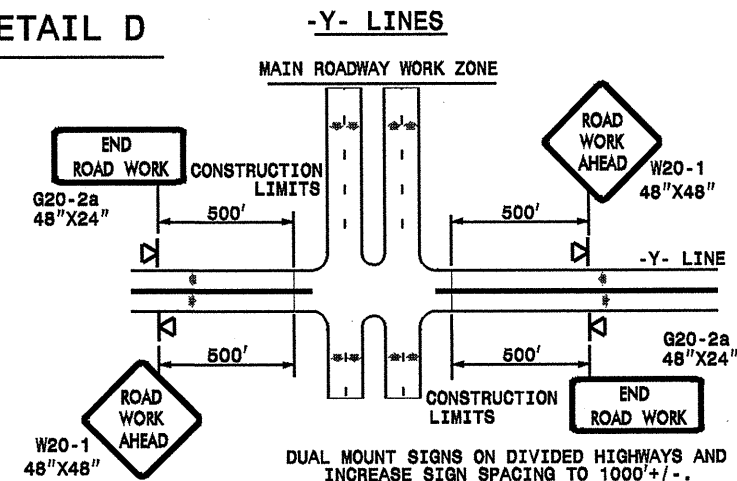
NOTE:  
SIGN NOT REQUIRED IF ADVANCE  
WARNING SIGNS HAVE BEEN PLACED  
ALONG -Y- LINE THAT RAMP INTERSECTS.  
IF CONSTRUCTION LIMITS ARE AT END  
OF RAMP, PLACE SIGN AT END OF RAMP.

**DETAIL C**



CONSTRUCTION LIMITS  
IF LIMITS ARE NEAR  
RAMP, TERMINAL SIGNS  
SHOULD ALSO BE PLACED  
NEAR TERMINAL

**DETAIL D**



DUAL MOUNT SIGNS ON DIVIDED HIGHWAYS AND  
INCREASE SIGN SPACING TO 1000'+/-.

**DETAIL DRAWING  
FOR FREEWAYS  
WORK ZONE WARNING SIGNS  
(SHORT-DURATION LANE CLOSURES)**

**GENERAL NOTES**

- USE FLUORESCENT ORANGE SHEETING (TYPE VII OR HIGHER) ON ALL ADVANCE WORK ZONE SIGNS.
- DO NOT INSTALL ADVANCE WARNING SIGNS MORE THAN 3 DAYS PRIOR TO BEGINNING OF WORK.
- ALL SIGN SPACING DIMENSIONS ARE APPROXIMATE, FIELD ADJUST AS NECESSARY OR AS DIRECTED.
- USE PORTABLE WORK ZONE SIGNS ONLY WITH PORTABLE WORK ZONE SIGN STANDS SPECIFICALLY DESIGNED FOR ONE ANOTHER. PORTABLE WORK ZONE SIGNS MAY BE ROLL UP OR APPROVED COMPOSITE.
- PROVIDE PORTABLE WORK ZONE SIGN STANDS, PORTABLE SIGNS AND SIGN SHEETING WHICH ARE LISTED ON THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION'S APPROVED PRODUCT LIST OR ACCEPTED AS TRAFFIC QUALIFIED BY THE TRAFFIC CONTROL UNIT.
- \*\* TWO-WAY UNDIVIDED ADVANCE WARNING SIGN CONFIGURATION MAY BE USED ON MULTI-LANE FACILITIES WHERE CONDITIONS LIMIT THE USE OF DUAL MOUNTED SIGNS AS DETERMINED BY THE ENGINEER.

**LEGEND**

- ▶ PORTABLE SIGN
- ➔ DIRECTION OF TRAFFIC FLOW

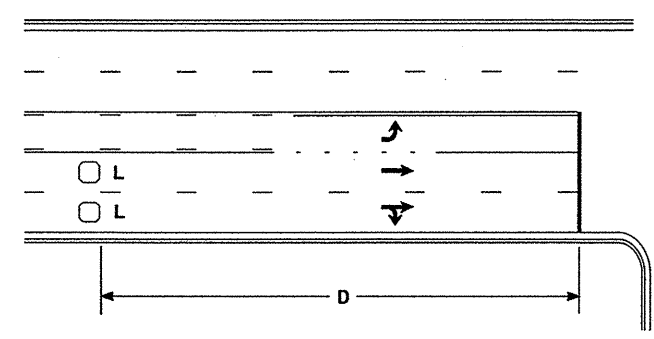
SHEET 1 OF 1

APPROVED: _____	DATE: _____	DETAIL DRAWING FOR FREEWAYS WORK ZONE WARNING SIGNS	
SEAL 	SCALE: NONE		
	DATE:		
	DWG. BY:		
	DESIGN BY:		
REVIEWED BY:	REVISIONS	7-98	10/01
		10-98	03/04
		01/01	11/04

04-NOV-2009 16:07 s:\station\cvs\esur\facimg\030509\resur\facimg\2010\div05\c202493\_451583st1.r-5164a\_freewayesgreatJuly2006.portable.dgn psey@more AT WZT237502



### High Speed Detection [≥40 mph (64 km/hr)]

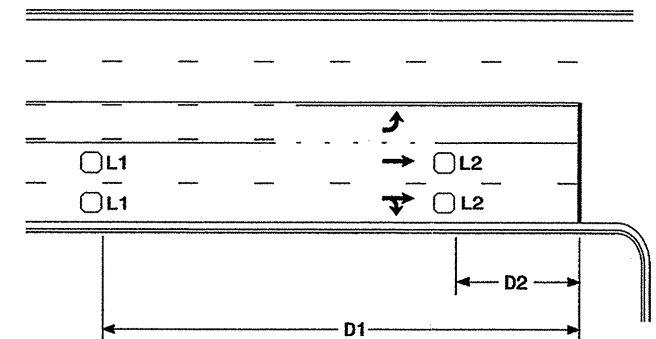


Speed Limit mph (km/hr)	D ft (m)
40 (64)	250 (75)
45 (72)	300 (90)
50 (80)	355 (110)
55 (88)	420 (130)

L = 6ft X 6ft (1.8m X 1.8m)  
Wired in series for TS1  
Controllers  
Wired separately for TS2,  
170, and 2070L Controllers

Volume Density Operation

OR

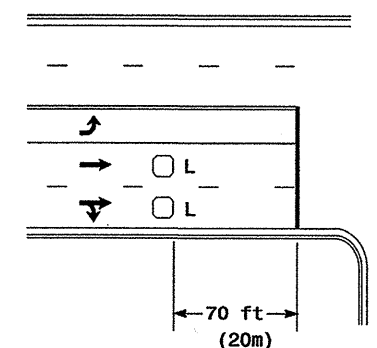


Speed Limit mph (km/hr)	D1 ft (m)	D2 ft (m)
40 (64)	250 (75)	80 (25)
45 (72)	300 (90)	90 (27)
50 (80)	355 (110)	100 (30)
55 (88)	420 (130)	110 (35)

L1 = 6ft X 6ft  
(1.8m X 1.8m)  
Wired in series  
L2 = 6ft X 6ft  
(1.8m X 1.8m)  
Wired in series

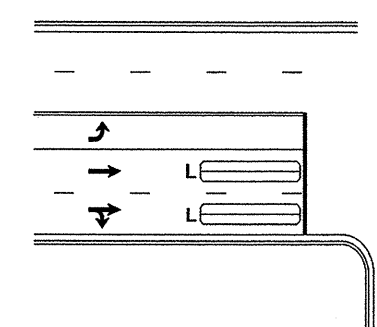
"Stretch" Operation

### Low Speed Detection [≤35 mph (56 km/hr)]



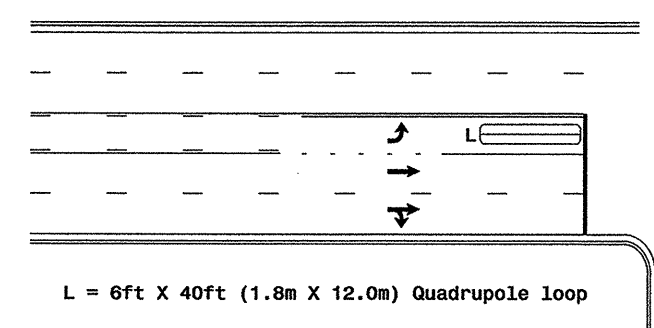
L = 6ft X 6ft (1.8m X 1.8m)  
Wired in series

OR



L = 6ft X 40ft (1.8m X 12.0m)  
Quadrupole loop, wired separately

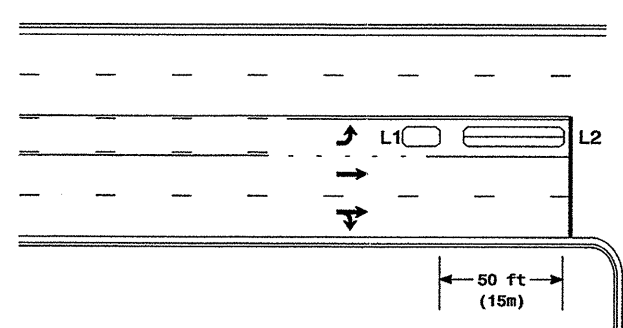
### Left Turn Lane Detection



L = 6ft X 40ft (1.8m X 12.0m) Quadrupole loop

Presence Loop Detection

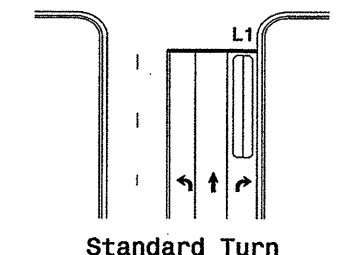
OR



L1 = 6ft X 15ft (1.8m X 4.6m) Queue detector  
L2 = 6ft X 40ft (1.8m X 12.0m) Quadrupole loop

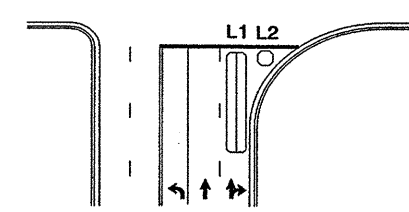
Queue Loop Detection

### Right Turn Lane Detection

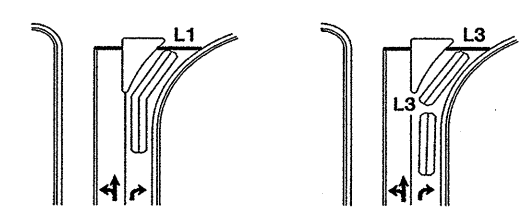


Standard Turn

L1 = 6ft X 40ft (1.8m X 12.0m) Quadrupole loop  
L2 = 6ft X 6ft (1.8m X 1.8m) [Minimum] Presence loop  
Wired separately  
L3 = 6ft X 20ft (1.8m X 6.0m) Quadrupole loop  
Wired in series

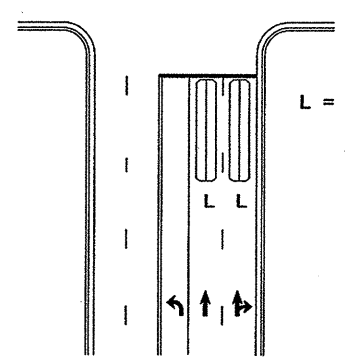


Wide Radius Turn



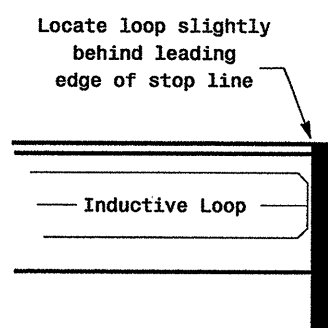
Channelized Turn

### Side Street Detection



L = 6ft X 40ft (1.8m X 12.0m)  
Quadrupole loop  
Wired to separate  
detectors/channels

### Presence Loop Placement at Stop Lines



Note:  
Loop may be located in advance  
of stop line when stop line is  
greater than 15' (4.5m) from edge  
of intersecting roadway; or, when  
loop detects a permissive or  
protected/permissive left turn.

### Recommended Number of Turns

Single 6' X 6' (1.8m X 1.8m)  
loop (wired separately):

Length of Lead-in ft (m)	Number of Turns
< 250 (75)	3
250-375 (75-115)	4
375-525 (115-160)	5
> 525 (160)	6

Quadrupole loops: Use 2-4-2 turns  
6' X 15' (1.8m X 4.6m) Loops:  
Lead-in < 150' (45 m), use 2 turns  
Lead-in > 150' (45 m), use 3 turns

19-DEC-2006 14:29  
sets: signal&lt;br>turn  
19-DEC-2006 14:29  
sets: signal&lt;br>turn  
19-DEC-2006 14:29  
sets: signal&lt;br>turn

#### Typical Loop Locations

PLAN DATE: June 2006	REVIEWED BY:
PREPARED BY: P. L. Alexander	REVIEWED BY:
SCALE: N/A	REVISIONS:
	INITIALS: [Signature]
	DATE: [Date]

SIG. INVENTORY NO.

STATE OF NORTH CAROLINA  
DEPT. OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
RALEIGH, N.C.

11-08

ENGLISH DETAIL DRAWING FOR  
**INDUCTIVE DETECTION LOOPS**

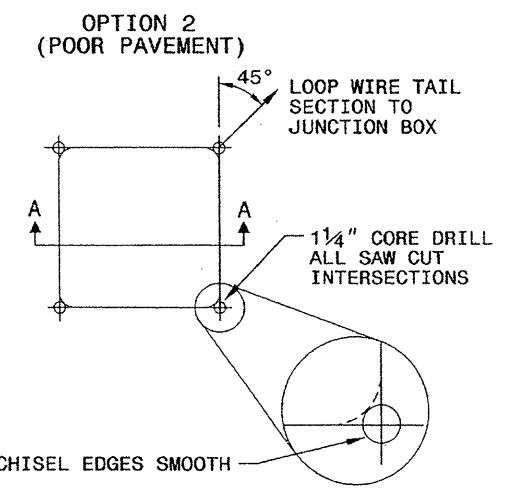
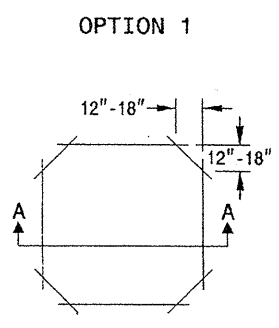
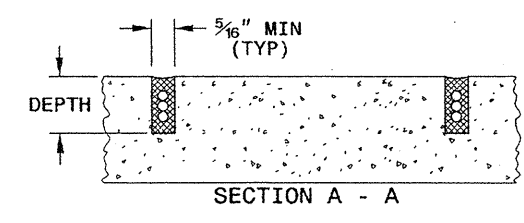
SHEET 1 OF 3  
**1725D01**

**CONVENTIONAL 4-SIDED LOOP**

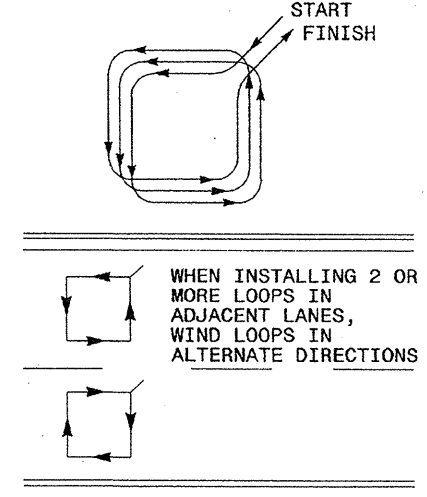
**SAW CUT OPTIONS**

**SAW SLOT DEPTH CHART**

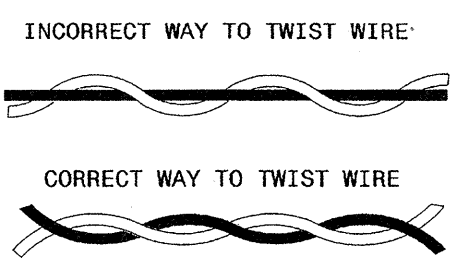
DEPTH (IN)	NO. OF WIRE TURNS				
	2	3	4	5	6
CONCRETE	2.0	2.0	2.5	2.5	3.0
ASPHALT	2.0	2.5	3.0	3.0	3.0



**LOOP WINDING METHOD**



**LOOP WIRE TWISTING METHOD**

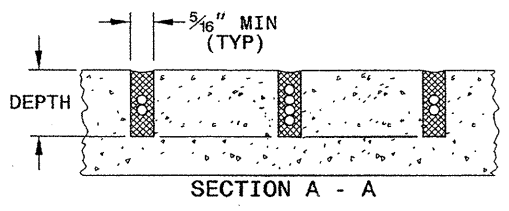
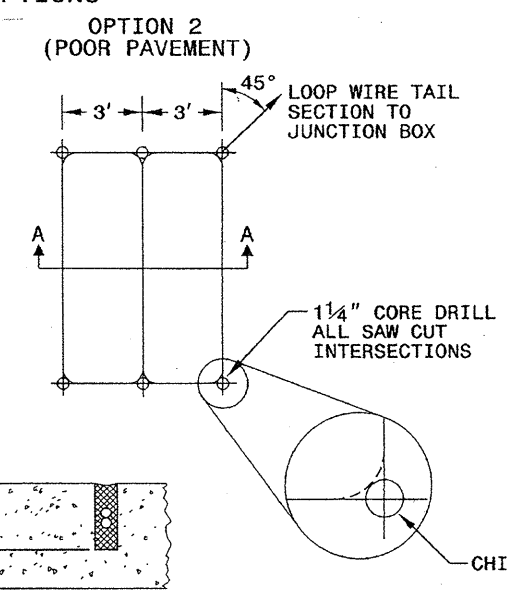
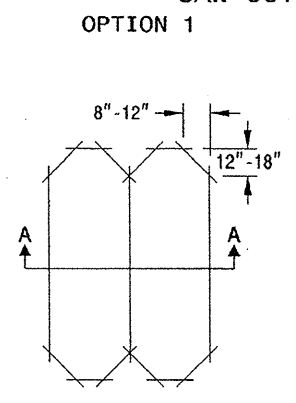


**NOTES**

- OVERLAP SAW CUTS AT CORNERS AND INTERSECTION POINTS TO ENSURE UNIFORM SAW SLOT DEPTH.
- MAINTAIN 12" SPACING BETWEEN LOOP WIRE TAIL SECTIONS.
- WIRE LOOPS CONNECTED TO THE SAME DETECTOR CHANNEL IN SERIES.
- LOCATE LOOPS IN CENTER OF LANES UNLESS OTHERWISE SHOWN ON PLANS OR APPROVED BY ENGINEER.

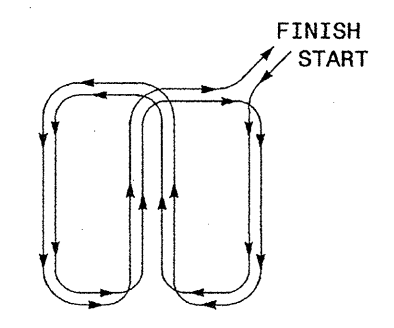
**QUADRUPOLE LOOP**

**SAW CUT OPTIONS**



DEPTH IS 2.5" FOR CONCRETE AND 3.0" FOR ASPHALT

**LOOP WINDING METHOD**



STATE OF NORTH CAROLINA  
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DIVISION OF HIGHWAYS  
RALEIGH, N.C.

11-08

ENGLISH DETAIL DRAWING FOR  
**INDUCTIVE DETECTION LOOPS**

SHEET 1 OF 3  
**1725D01**

See Plate for Title

Prepared in the Offices of:

750 N. Greenfield Parkway  
Garner, NC 27529

SEAL

SIGNATURE: *Michael Dean* DATE: 4/24/08

24-Hour 2008 05:28  
111850-Standard plate sheets 1725D01.mxd 2/20/08  
20111116



STATE OF NORTH CAROLINA  
 DEPT. OF TRANSPORTATION  
 DIVISION OF HIGHWAYS  
 RALEIGH, N.C.

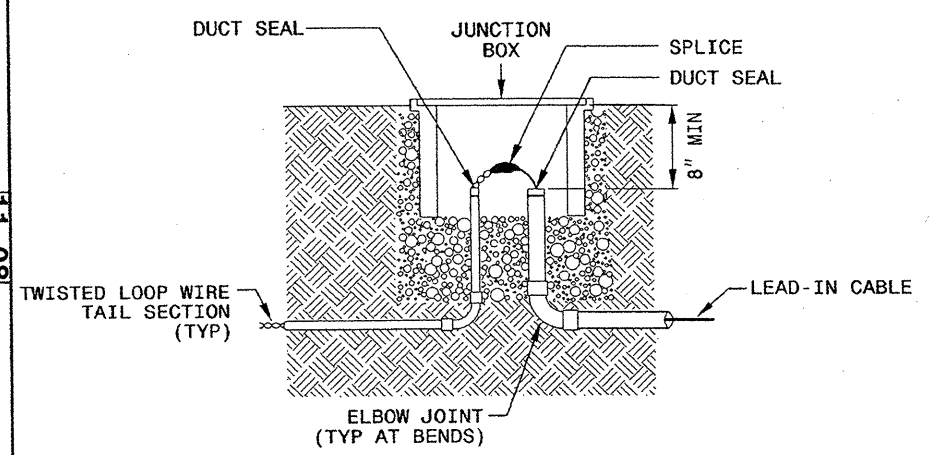
11-08

ENGLISH DETAIL DRAWING FOR  
**INDUCTIVE DETECTION LOOPS**  
 LOOP WIRE DETAILS

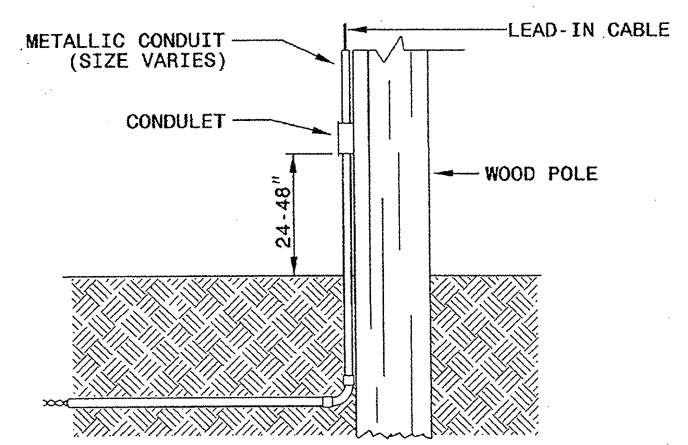
SHEET 2 OF 3  
**1725D01**

**LOOP WIRE SPLICE POINT DETAILS**

**LOOP WIRE AT JUNCTION BOX**



**LOOP WIRE AT POLE**

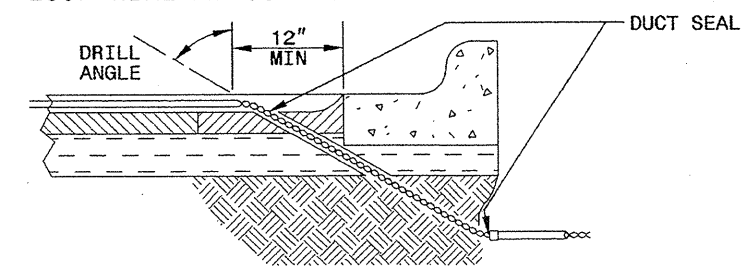


**NOTE**

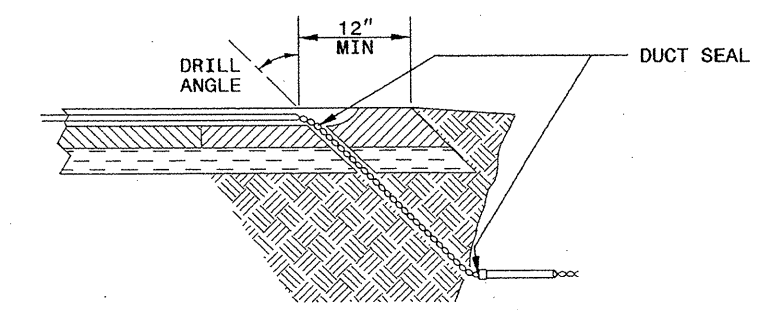
SPLICE ALL LOOP WIRE TAIL SECTIONS/LEAD-IN CABLE IN JUNCTION BOXES OR APPROVED CONDULETS.

**LOOP WIRE PAVEMENT EDGE DETAILS**

**LOOP WIRE AT CURB & GUTTER SECTION**



**LOOP WIRE AT PAVEMENT SECTION**



**NOTES**

- DO NOT EXCAVATE UNDER CURB AND GUTTER SECTIONS FOR CONDUIT INSTALLATION.
- TWIST LOOP WIRE TAIL SECTIONS FROM WHERE LOOP WIRE TAIL LEAVES SAW CUT TO JUNCTION BOX, INCLUDING THROUGH CONDUIT.
- BEFORE SEALING LOOPS, INSTALL DUCT SEAL WHERE LOOP WIRE TAIL SECTION LEAVES SAW CUT IN PAVEMENT AND AT ENTRANCE OF CONDUIT TO JUNCTION BOX.

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 RALEIGH, N.C.

11-08

ENGLISH DETAIL DRAWING FOR  
**INDUCTIVE DETECTION LOOPS**  
 LOOP WIRE DETAILS

SHEET 2 OF 3  
**1725D01**

See Plate for Title

Prepared in the Offices of:

Intelligent Transportation Systems & Signals Unit  
 750 N. Greenfield Parkway  
 Garner, NC 27529

SEAL

Milton J. Dean 11/24/08  
 SIGNATURE DATE

24-nov-2008 08:29  
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 zml 11/18

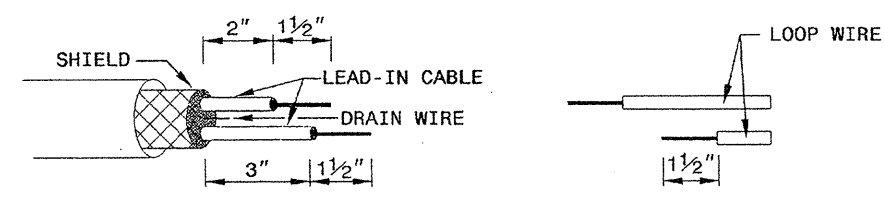
STATE OF NORTH CAROLINA  
DEPT. OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
RALEIGH, N.C.

11-08

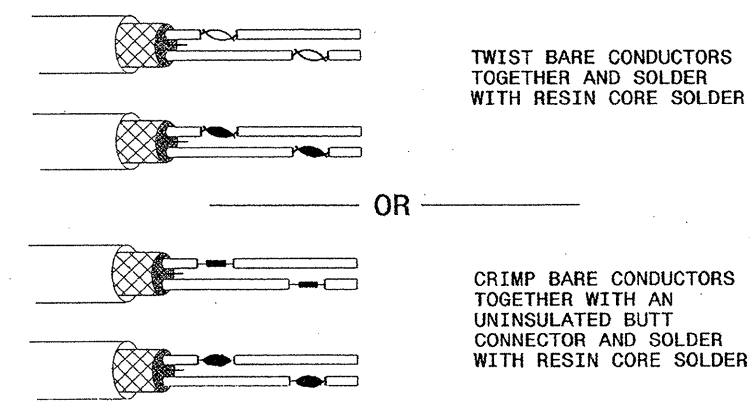
ENGLISH DETAIL DRAWING FOR  
**INDUCTIVE DETECTION LOOPS**  
SPlicing FOR LEAD-IN CABLE AND LOOP WIRE

SHEET 3 OF 3  
**1725D01**

**STEP 1. STRIP LOOP WIRE AND LEAD-IN CABLE**

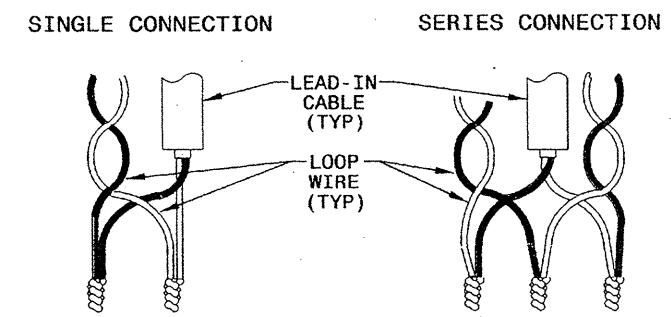


**STEP 2. CONNECT AND SOLDER**

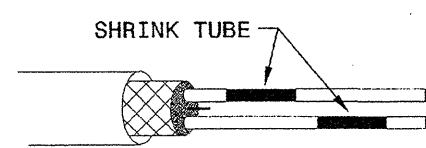


BOND SHIELD DRAIN WIRE AT SPLICE SECTIONS (DO NOT GROUND)

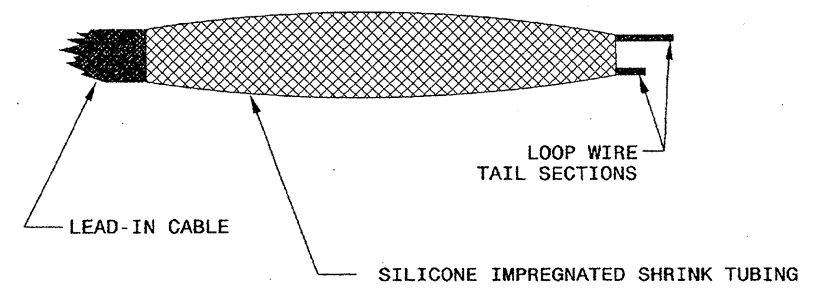
**LOOP WIRE AND LEAD-IN CABLE CONNECTION DETAILS**



**STEP 3. INSULATE EACH SOLDER JOINT SEPARATELY**



**STEP 4. ENVIRONMENTALLY PROTECT SPLICE**



STATE OF NORTH CAROLINA  
DEPT. OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
RALEIGH, N.C.

11-08

ENGLISH DETAIL DRAWING FOR  
**INDUCTIVE DETECTION LOOPS**  
SPlicing FOR LEAD-IN CABLE AND LOOP WIRE

SHEET 3 OF 3  
**1725D01**

See Plate for Title

Prepared in the Offices of:

Intelligent Transportation Systems & Signals Unit  
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

750 N. Greenfield Parkway  
Garner, NC 27529

SEAL

Milton L. Dean 11/24/08  
SIGNATURE DATE

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