

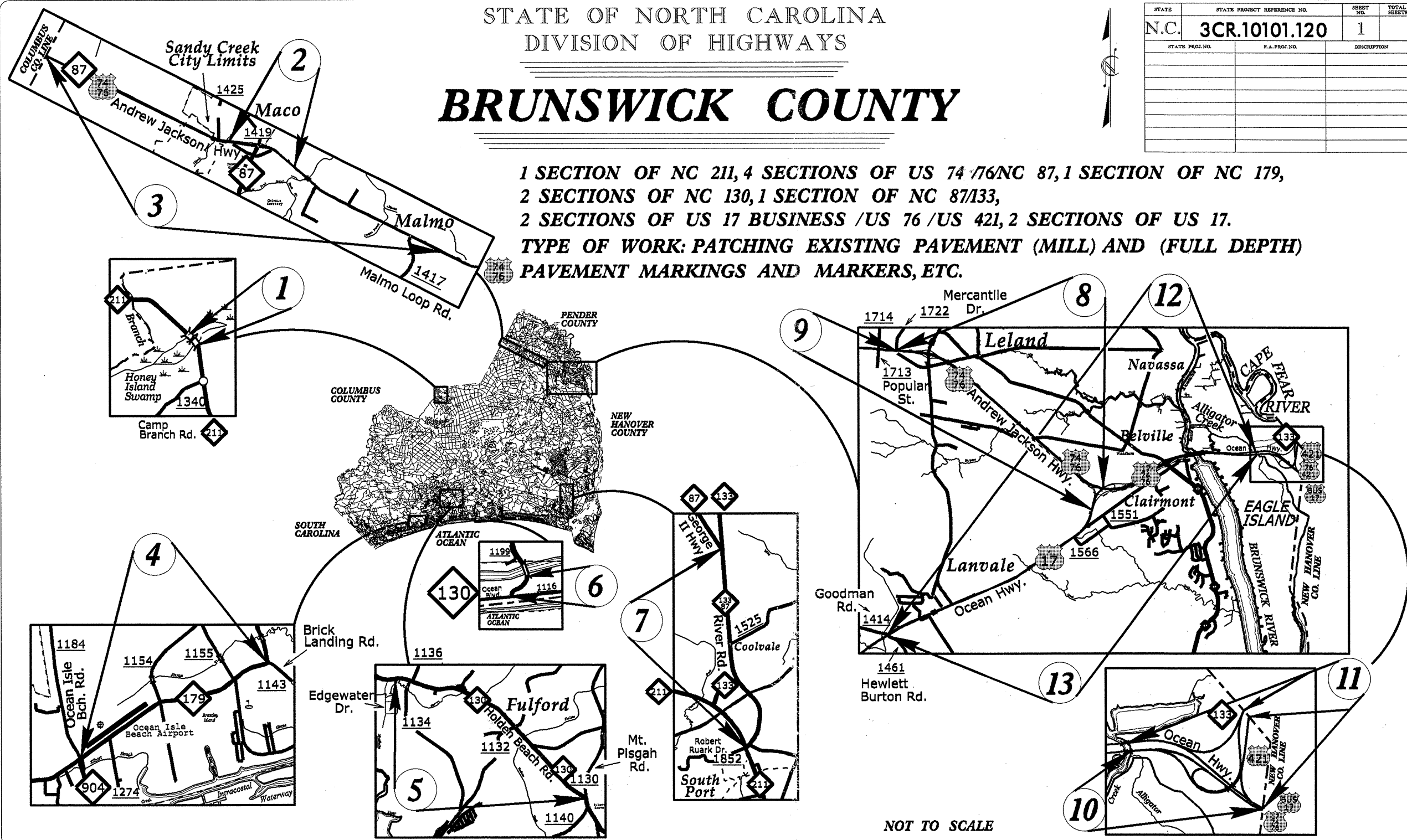
W.B.S. NO.: 3CR.10101.120

STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS

# BRUNSWICK COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	3CR.10101.120	1	
STATE PROJ. NO.	P.A. PROJ. NO.	DESCRIPTION	

1 SECTION OF NC 211, 4 SECTIONS OF US 74 /76/NC 87, 1 SECTION OF NC 179,  
 2 SECTIONS OF NC 130, 1 SECTION OF NC 87/133,  
 2 SECTIONS OF US 17 BUSINESS /US 76 /US 421, 2 SECTIONS OF US 17.  
 TYPE OF WORK: PATCHING EXISTING PAVEMENT (MILL) AND (FULL DEPTH)  
 PAVEMENT MARKINGS AND MARKERS, ETC.



NOT TO SCALE

CONTRACT:

GRAPHIC SCALES

DESIGN DATA

**PROJECT LENGTH**

MAP NO. 1	= 0.20 MI.
MAP NO. 2 (WBL)	= 1.28 MI.
MAP NO. 3 (EBL)	= 6.75 MI.
MAP NO. 4	= 2.24 MI.
MAP NO. 5	= 3.90 MI.
MAP NO. 6	= 0.09 MI.
MAP NO. 7	= 3.31 MI.
MAP NO. 8 (WBL)	= 4.48 MI.
MAP NO. 9 (EBL)	= 4.35 MI.
MAP NO. 10 (NBL)	= 0.75 MI.
MAP NO. 11 (SBL)	= 0.74 MI.
MAP NO. 12 (SBL)	= 7.44 MI.
MAP NO. 13 (NBL)	= 7.44 MI.
<b>TOTAL</b>	<b>= 29.16 MI.</b>

Prepared in the Office of:  
**DIVISION OF HIGHWAYS**  
 5501 Barbados Blvd., Castle Hayne, NC 28429

2006 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:

LETTING DATE:  
SEPTEMBER 20, 2011

HYDRAULICS ENGINEER

SIGNATURE: \_\_\_\_\_ P.E.

ROADWAY DESIGN  
TECHNICIAN

SIGNATURE: \_\_\_\_\_ DNL

SIGNATURE: \_\_\_\_\_

DIVISION OF HIGHWAYS  
STATE OF NORTH CAROLINA

SYSTEMS DCDGN USERNAME

W.B.S. NO.: 3CR.10651.120

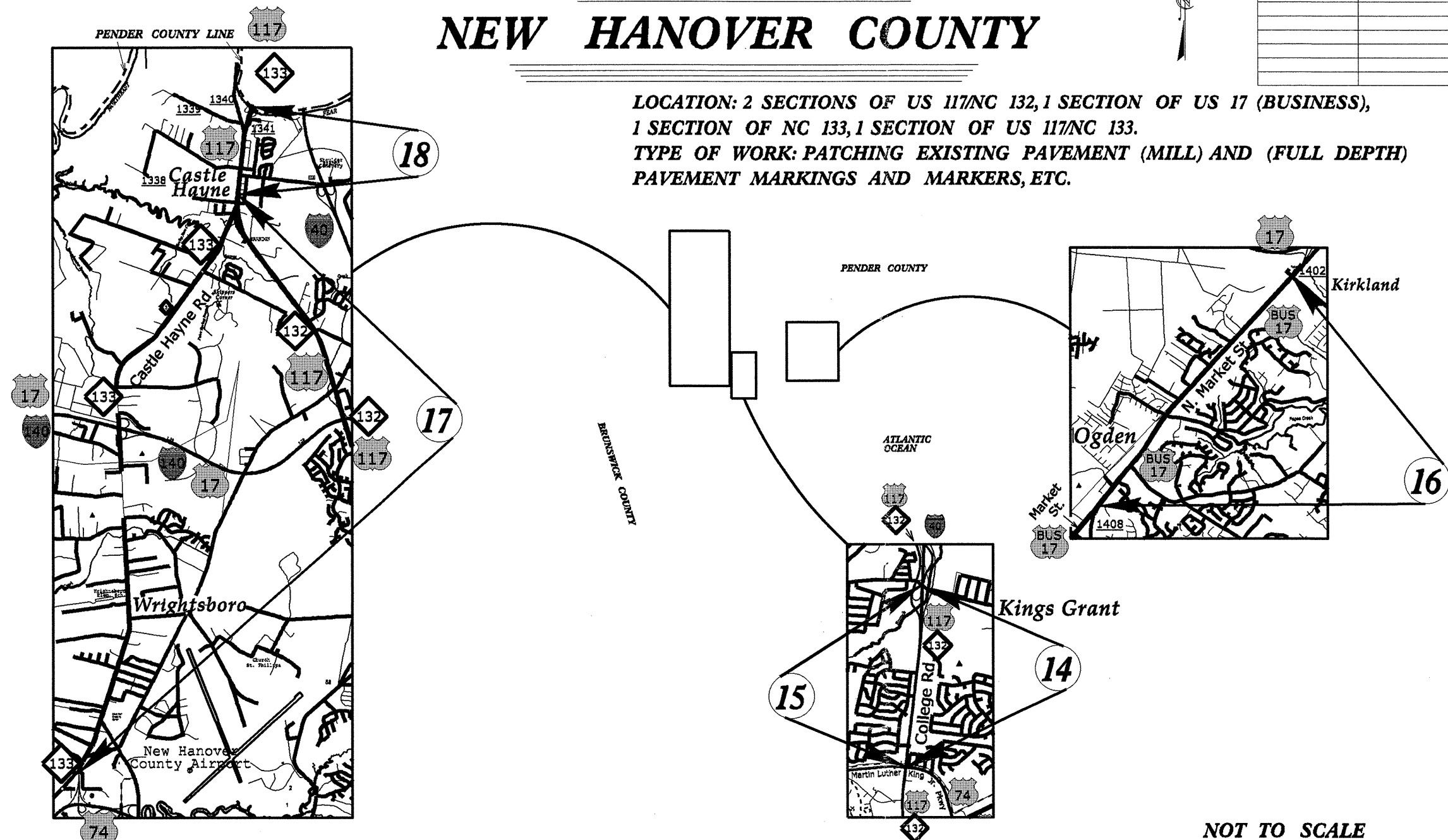
STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS

**NEW HANOVER COUNTY**

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	3CR.10651.120	2	
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	



**LOCATION: 2 SECTIONS OF US 117/NC 132, 1 SECTION OF US 17 (BUSINESS),  
1 SECTION OF NC 133, 1 SECTION OF US 117/NC 133.  
TYPE OF WORK: PATCHING EXISTING PAVEMENT (MILL) AND (FULL DEPTH)  
PAVEMENT MARKINGS AND MARKERS, ETC.**



NOT TO SCALE

CONTRACT:

GRAPHIC SCALES

DESIGN DATA

**PROJECT LENGTH**

MAP NO. 14 (NBL) = 1.11 MI.  
 MAP NO. 15 (SBL) = 1.11 MI.  
 MAP NO. 16 = 3.10 MI.  
 MAP NO. 17 = 6.41 MI.  
 MAP NO. 18 = 1.03 MI.  
**TOTAL = 11.65 MI.**

Prepared in the Office of:  
**DIVISION OF HIGHWAYS**  
 5501 Barbados Blvd., Castle Hayne, NC 28429

2004 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:

LETTING DATE:  
 SEPTEMBER 20, 2011

HYDRAULICS ENGINEER

SIGNATURE: \_\_\_\_\_ P.E.

ROADWAY DESIGN  
 TECHNICIAN  
 DNL

SIGNATURE: \_\_\_\_\_

SIGNATURE: \_\_\_\_\_

DIVISION OF HIGHWAYS  
 STATE OF NORTH CAROLINA

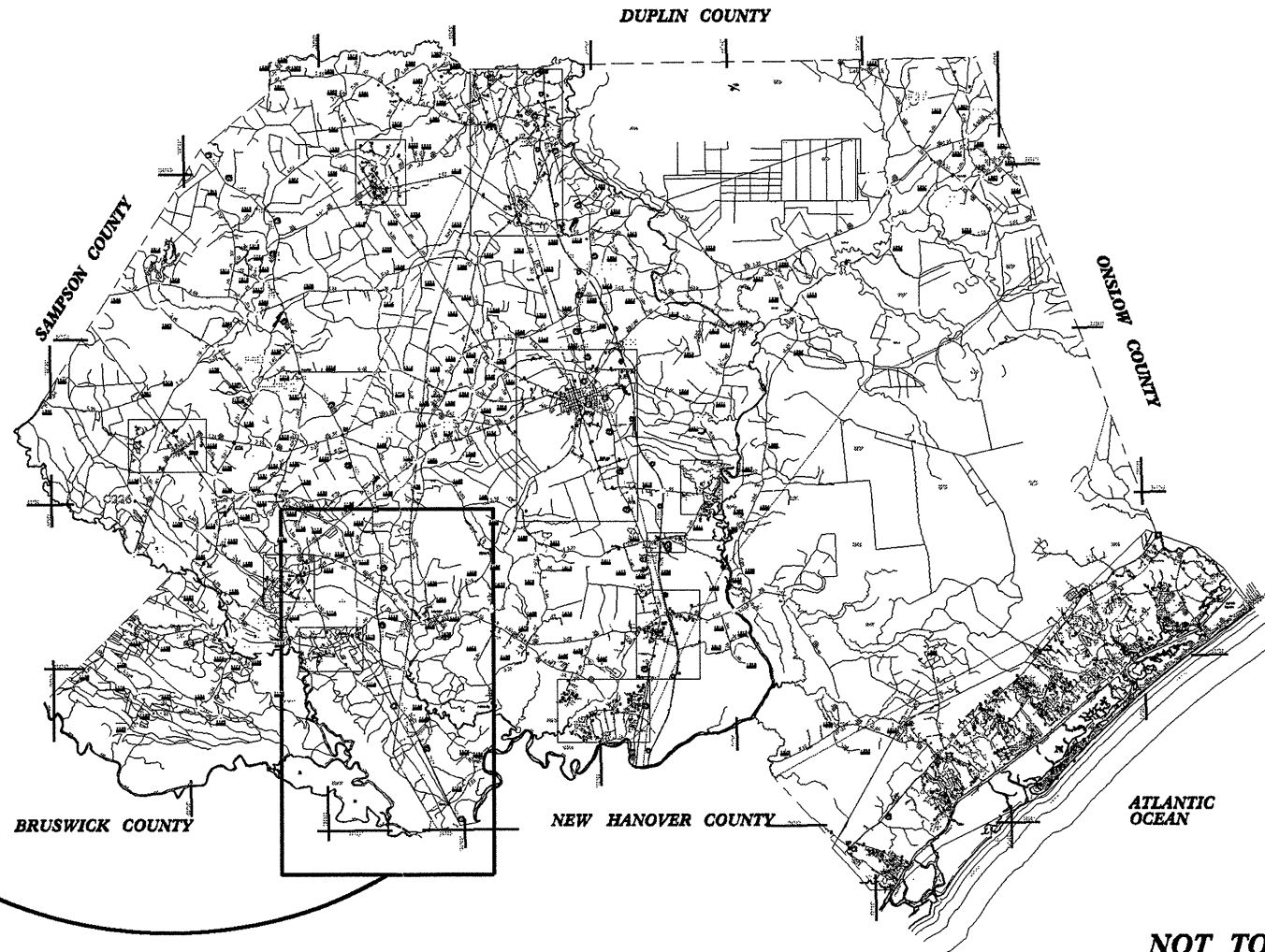
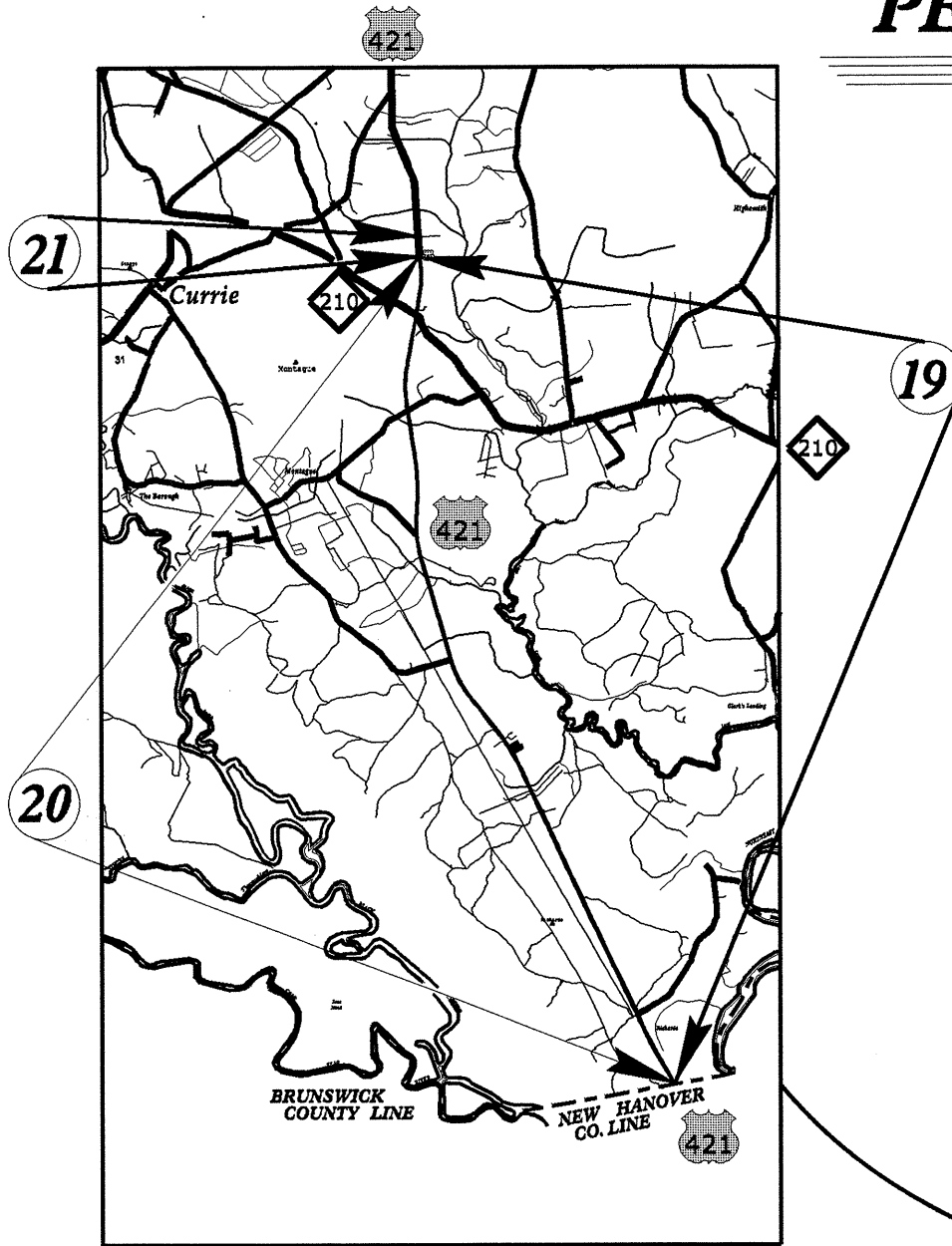
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STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS

**PENDER COUNTY**

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	3CR.10711.120	3	
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	

**LOCATION: 3 SECTIONS OF US 421.**  
**TYPE OF WORK: PATCHING EXISTING PAVEMENT (MILL) AND (FULL DEPTH) PAVEMENT MARKINGS AND MARKERS, ETC.**



NOT TO SCALE

W.B.S.: 3CR.10711.120

CONTRACT:

GRAPHIC SCALES

DESIGN DATA

PROJECT LENGTH

MAP NO. 19 (NBL) = 9.73 MI.  
 MAP NO. 20 (SBL) = 9.73 MI.  
 MAP NO. 21 = 0.06 MI.  
 TOTAL = 9.79 MI.

Prepared in the Office of:  
**DIVISION OF HIGHWAYS**  
 5501 Barbados Blvd., Castle Hayne, NC 28429

2006 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:

LETTING DATE:  
SEPTEMBER 20, 2011

HYDRAULICS ENGINEER

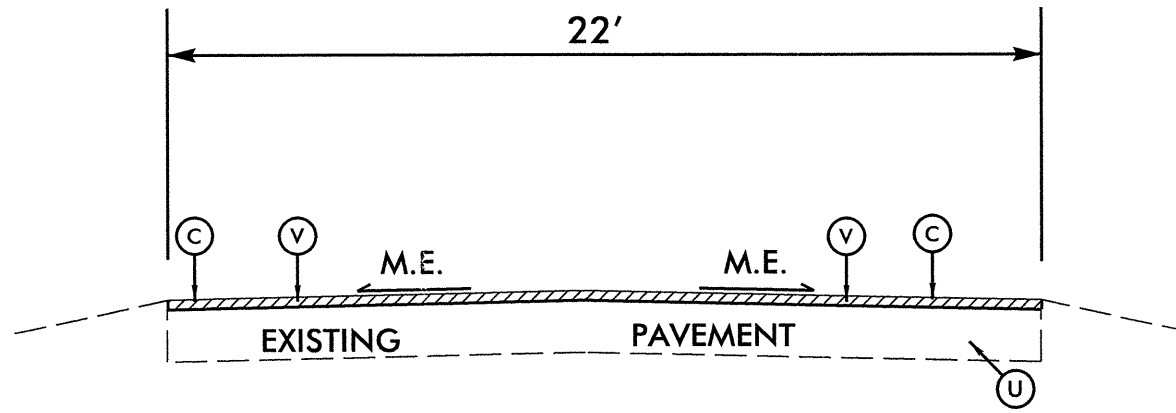
SIGNATURE: \_\_\_\_\_ P.E.

ROADWAY DESIGN  
TECHNICIAN  
D. LA FAVE

DIVISION OF HIGHWAYS  
STATE OF NORTH CAROLINA

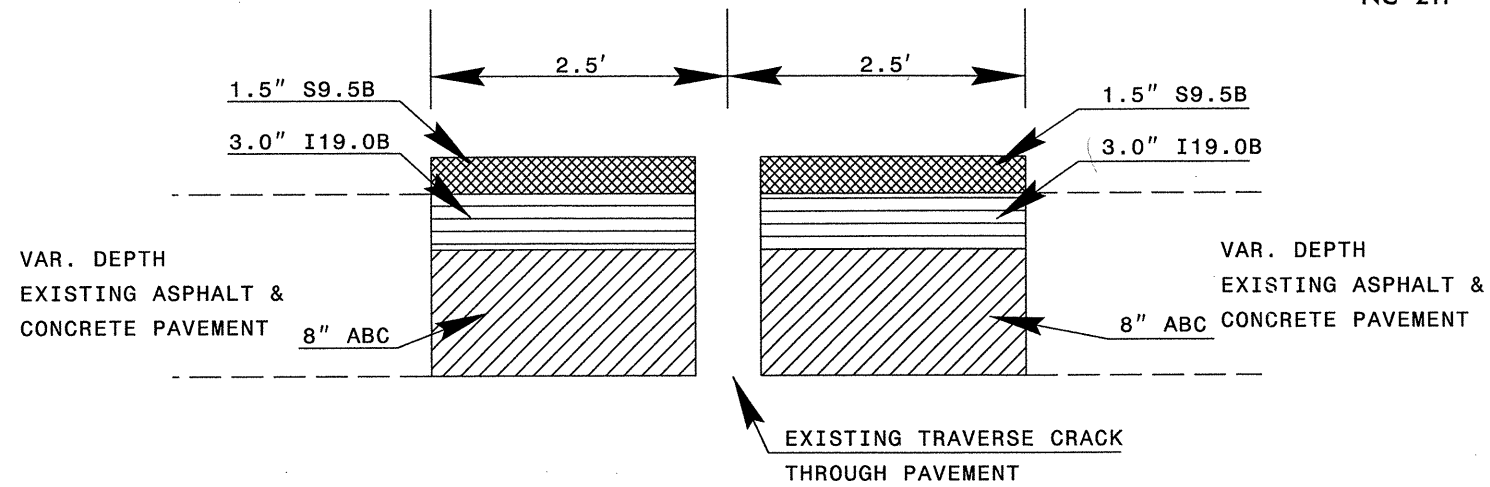
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PAVEMENT SCHEDULE	
C	PROP. APPROX. 2" DEPTH ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 224 LBS. PER SQ. YD.
R	EXISTING CONC. CURB AND GUTTER.
U	EXISTING PAVEMENT.
V	MILLING BITUMINOUS PAVEMENT. 2" DEPTH.



**TYPICAL SECTION NO. 1**

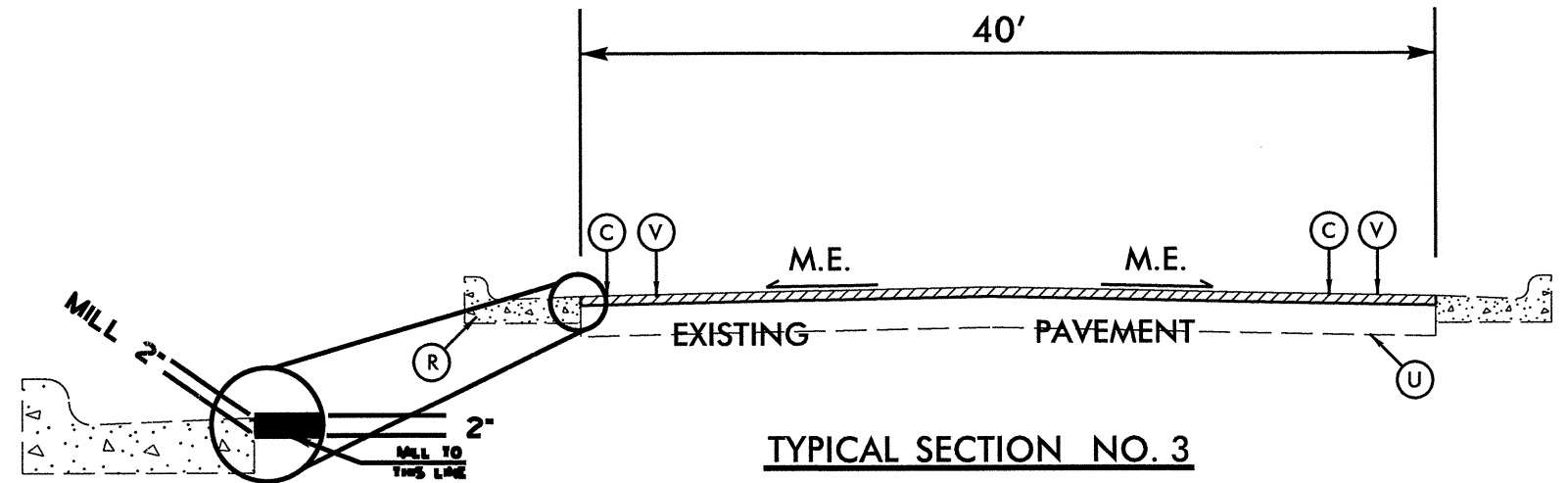
MAP NO. 1  
NC 211



**TYPICAL SECTION NO. 2**  
USE ON MAP NO. 2 AND 3  
SEE JOINT M.P. (MILE POST) TABLE FOR APPROXIMATE LOCATIONS

**JOINT M.P. TABLE**

MAP NO. 2		MAP NO. 3	
M.P.	M.P.	M.P.	M.P.
3.590	4.400	0.059	5.412
4.175	4.475	0.256	5.644
4.228	4.538	1.339	6.132
4.251	4.674	1.349	6.294
4.285	4.717	1.354	6.317
4.331	4.733	1.626	6.424
4.366	4.870	1.634	6.478
		2.197	6.499
		2.410	6.592
		2.451	6.605
		2.570	6.748
		5.308	



**TYPICAL SECTION NO. 3**

MAP NO. 6  
NC 130

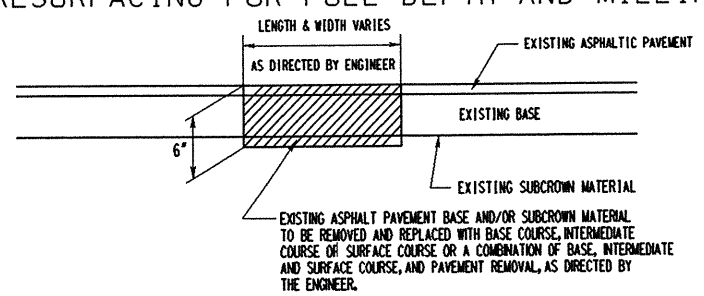
APPROXIMATE LOCATIONS

8/17/99

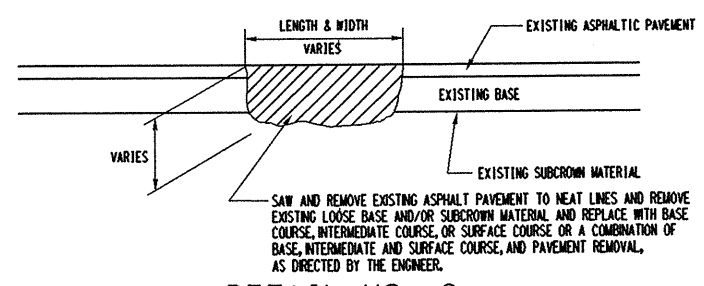
REVISIONS

SYSTEMS  
DESIGN  
GROUP

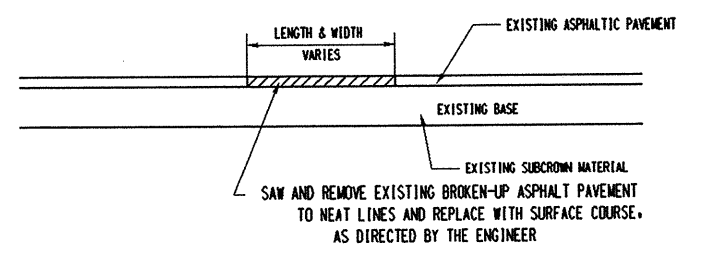
DETAILS OF PATCHING EXISTING PAVEMENT PRIOR TO RESURFACING FOR FULL DEPTH AND MILLING



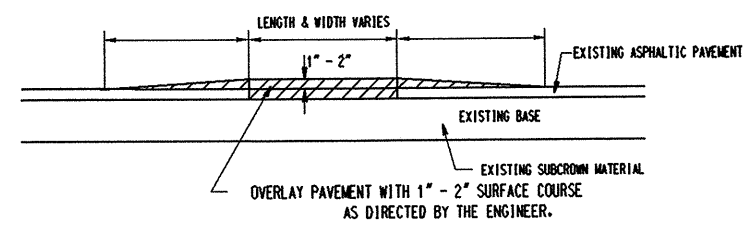
DETAIL NO. 1



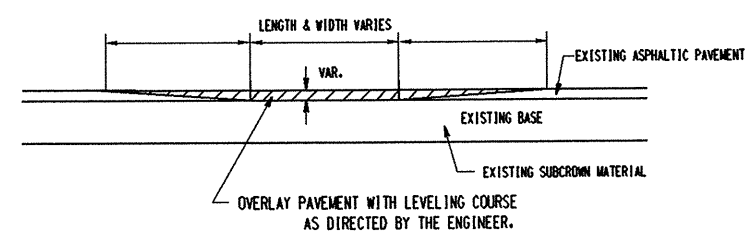
DETAIL NO. 2



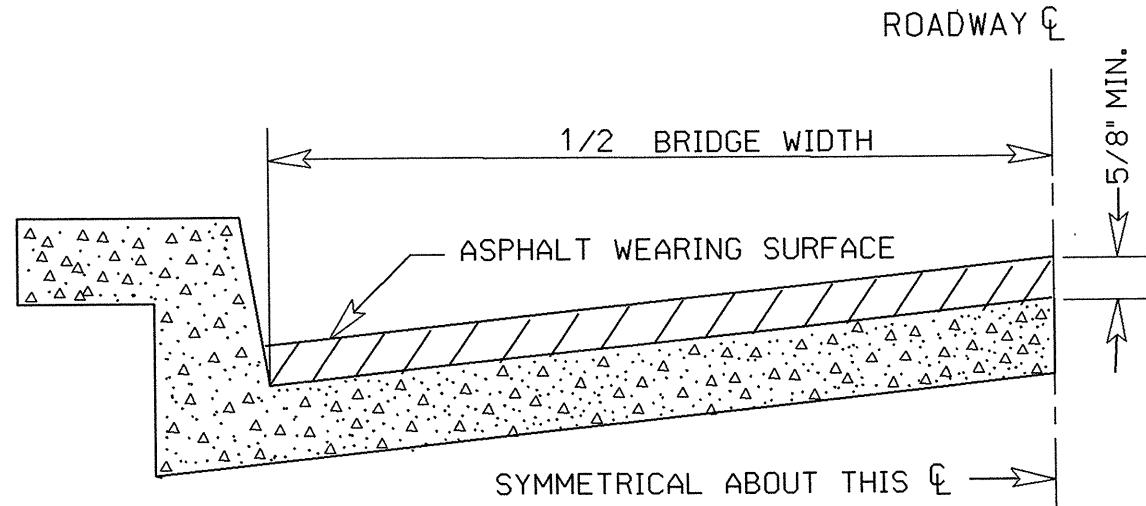
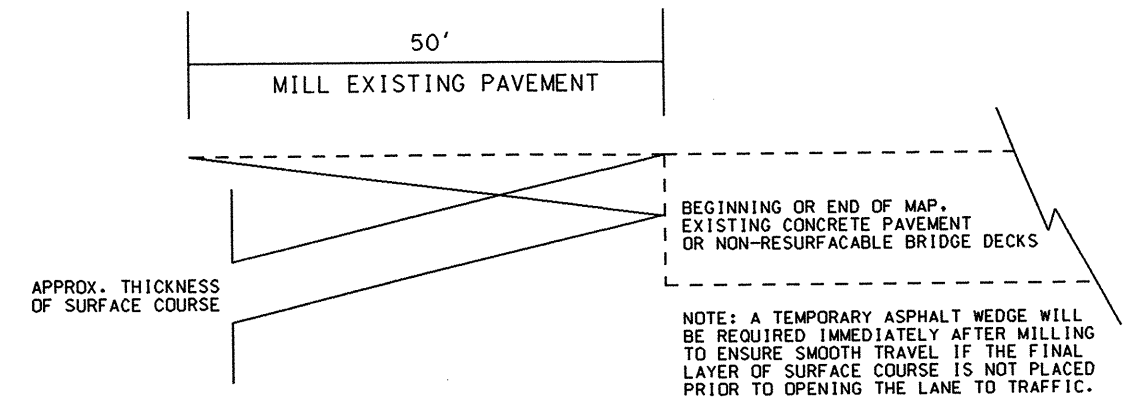
DETAIL NO. 3



DETAIL NO. 4



DETAIL NO. 5



BRIDGE HALF TYPICAL SECTION

FOR BRIDGES WITH FLOOR DRAINS, CARE SHALL BE EXERCISED IN PLACING THE WEARING SURFACE AROUND FLOOR DRAINS SO AS NOT TO HINDER EFFECTIVE DRAINAGE. ALL DRAINS SHALL BE LEFT OPEN.

THE PROPOSED WEARING SURFACE SHALL VARY IN THICKNESS AS NECESSARY TO PROVIDE A SMOOTH RIDING SURFACE. A THICKNESS OF NOT LESS THAN 5/8" SHALL BE PROVIDED. THE MAXIMUM THICKNESS SHALL PREFERABLY BE 1-1/2" UNLESS IT IS IMPRACTICAL TO PROVIDE A SMOOTH RIDING SURFACE OTHERWISE.

REVISIONS

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M.P. = MILL PATCHING,  
SEE MILLING DETAIL NO. 3

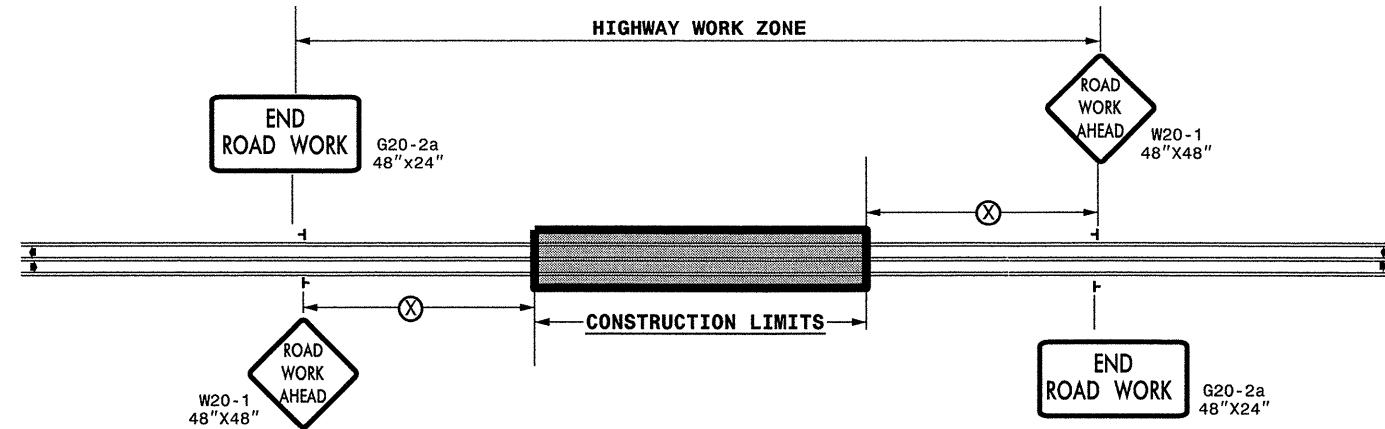
PROJECT NO.	SHEET NO.	TOTAL NO.
3CR.10101.120, 3CR.10651.120 3CR.10711.120	6	

## SUMMARY OF QUANTITIES

PROJECT NO.	COUNTY	MAP NO.	ROUTE	DESCRIPTION	TYP	FINAL SURFACE TESTING REQUIRED	LENGTH MI	WIDTH FT	AGGREGATE BASE COURSE, PAVEMENT REPAIR TON	2" MILLING SY	SURFACE COURSE, S9.5B TONS	LEVELING COURSE, S9.5B TONS	ASPHALT BINDER FOR PLANT MIX TON	ASPHALT PLANT MIX, PAVEMENT REPAIR TON	PATCHING EXISTING PAVEMENT (MILL), S9.5B OR S9.5C TON	PATCHING EXISTING PAVEMENT (FULL DEPTH) TON	PORTABLE LIGHTING LS	INDUCTIVE LOOP LF	
3CR.10101.120	Brunswick	1	NC 211	0.62 MI. WEST OF SR 1340 (CAMP BRANCH RD.) TO 0.79 MILES WEST OF SR 1340 (CAMP BRANCH RD.)	1	NO	0.2	22		1,975	255		15		40	10			
<b>TOTAL FOR MAP NO. 1</b>							<b>0.2</b>			<b>1,975</b>	<b>255</b>		<b>15</b>		<b>40</b>	<b>10</b>			
3CR.10101.120	Brunswick	2	US 74 / US 76 / NC 87 WBL	0.07 MI. WEST OF HOOD CREEK BRIDGE (BRIDGE NO. 5) TO 0.32 MI. EAST OF EASTERN CITY LIMITS OF SANDY CREEK	2	NO	1.28	24	150					130					
<b>TOTAL FOR MAP NO. 2</b>							<b>1.28</b>		<b>150</b>					<b>130</b>					
3CR.10101.120	Brunswick	3	US 74 / US 76 / NC 87 EBL	COLUMBUS COUNTY LINE TO 0.36 MI. EAST OF SR 1417 (MALMO LOOP RD.)	2	NO	6.75	24	250					225					
<b>TOTAL FOR MAP NO. 3</b>							<b>6.75</b>		<b>250</b>					<b>225</b>					
3CR.10101.120	Brunswick	4	NC 179	NC 904 TO SR 1143 (BRICKLANDING RD.)	M.P.	NO	2.24	24							550	25			
<b>TOTAL FOR MAP NO. 4</b>							<b>2.24</b>								<b>550</b>	<b>25</b>			
3CR.10101.120	Brunswick	5	NC 130	SR 1130 (MT. PISGAH RD.) TO 0.18 MI. EAST OF EDGEWATER DR.	M.P.	NO	3.9	24							635	20			
<b>TOTAL FOR MAP NO. 5</b>							<b>3.9</b>								<b>635</b>	<b>20</b>			
3CR.10101.120	Brunswick	6	NC 130	SR 1116 (OCEAN BLVD.) TO INTRACOASTAL WATER WAY (ICWW) BRIDGE	3	NO	0.09	40		2,112	273		16		25	10			
<b>TOTAL FOR MAP NO. 6</b>							<b>0.09</b>			<b>2,112</b>	<b>273</b>		<b>16</b>		<b>25</b>	<b>10</b>			
3CR.10101.120	Brunswick	7	NC 87 / NC 133	NC 211 TO NC 133	M.P.	NO	3.31	30							650	50		300	
<b>TOTAL FOR MAP NO. 7</b>							<b>3.31</b>								<b>650</b>	<b>50</b>		<b>300</b>	
3CR.10101.120	Brunswick	8	US 74 / US 76 WBL	US 17 EXIT-RAMP TO 0.10 MI. WEST OF SR 1722 (MERCANTILE DR.) AT PAVEMENT JOINT	M.P.	NO	4.48	34							1,030	30			
<b>TOTAL FOR MAP NO. 8</b>							<b>4.48</b>								<b>1,030</b>	<b>30</b>			
3CR.10101.120	Brunswick	9	US 74 / US 76 EBL	0.19 MI. EAST OF SR 1713 (POPULAR ST.) TO US 17 ON-RAMP	M.P.	NO	4.35	34							590	25			
<b>TOTAL FOR MAP NO. 9</b>							<b>4.35</b>								<b>590</b>	<b>25</b>			
3CR.10101.120	Brunswick	10	US 17 / US 17 BUSINESS / US 74 / US 421 / NC 133 / US 76 NBL	US 17 / US 17 BUSINESS / US 74 / US 421 / NC 133 / US 76 NBL FROM ALLIGATOR CREEK BRIDGE TO NEW HANOVER COUNTY LINE (INC. RAMPS, LOOPS, AND FLYOVERS)	M.P.	NO	0.75	38							30	5	*		
<b>TOTAL FOR MAP NO. 10</b>							<b>0.75</b>								<b>30</b>	<b>5</b>	<b>1</b>		
3CR.10101.120	Brunswick	11	US 17 / US 17 BUSINESS / US 74 / US 421 / NC 133 / US 76 SBL	US 17 / US 17 BUSINESS / US 74 / US 421 / NC 133 / US 76 SBL FROM NEW HANOVER COUNTY LINE TO ALLIGATOR CREEK BRIDGE (INC. RAMPS, LOOPS, AND FLYOVERS)	M.P.	NO	0.74	38							30	5	*		
<b>TOTAL FOR MAP NO. 11</b>							<b>0.74</b>								<b>30</b>	<b>5</b>	<b>1</b>		
3CR.10101.120	Brunswick	12	US 17 SBL	ALLIGATOR CREEK BRIDGE TO SR 1414 (GOODMAN RD.)	M.P.	NO	7.44	30							1,610	25	*	1,150	
<b>TOTAL FOR MAP NO. 12</b>							<b>7.44</b>								<b>1,610</b>	<b>25</b>	<b>1</b>	<b>1,150</b>	
3CR.10101.120	Brunswick	13	US 17 NBL	SR 1461 (HEWETT-BURTON RD. SE) TO ALLIGATOR CREEK BRIDGE	M.P.	NO	7.44	30							335	25	*	1,150	
<b>TOTAL FOR MAP NO. 13</b>							<b>7.44</b>								<b>335</b>	<b>25</b>	<b>1</b>	<b>1,150</b>	
<b>TOTAL FOR PROJ NO. 3CR.10101.120</b>							<b>42.97</b>		<b>400</b>	<b>4,087</b>	<b>528</b>		<b>31</b>	<b>355</b>	<b>5,525</b>	<b>230</b>	<b>1</b>	<b>2,600</b>	
3CR.10651.120	NewHanover	14	US 117 / NC 132 NBL	US 74 (MLK PARKWAY) TO I-40	M.P.	NO	1.11	36							500	15	*		
<b>TOTAL FOR MAP NO. 14</b>							<b>1.11</b>								<b>500</b>	<b>15</b>	<b>1</b>		
3CR.10651.120	NewHanover	15	US 117 / NC 132 SBL	I-40 TO US 74 (MLK PARKWAY)	M.P.	NO	1.11	36							450	15	*		
<b>TOTAL FOR MAP NO. 15</b>							<b>1.11</b>								<b>450</b>	<b>15</b>	<b>1</b>		
3CR.10651.120	NewHanover	16	US 17 BUSINESS (MARKET ST.)	0.14 MI. NORTH OF SR 1409 (MILITARY CUT-OFF) TO SR 1455 (PORTERS NECK RD.)	M.P.	NO	3.1	60							1,920	25	*	1,125	
<b>TOTAL FOR MAP NO. 16</b>							<b>3.1</b>								<b>1,920</b>	<b>25</b>	<b>1</b>	<b>1,125</b>	
3CR.10651.120	NewHanover	17	NC 133	US 117 TO SR 1310 (DIVISION DR.)	M.P.	NO	6.41	41.5							1,275	50		550	
<b>TOTAL FOR MAP NO. 17</b>							<b>6.41</b>								<b>1,275</b>	<b>50</b>		<b>550</b>	
3CR.10651.120	NewHanover	18	US 117 / NC 133	PENDER COUNTY LINE TO NC 133	M.P.	NO	1.03	36							275	25		400	
<b>TOTAL FOR MAP NO. 18</b>							<b>1.03</b>								<b>275</b>	<b>25</b>		<b>400</b>	
<b>TOTAL FOR PROJ NO. 3CR.10651.120</b>							<b>12.76</b>								<b>4,420</b>	<b>130</b>	<b>1</b>	<b>2,075</b>	
3CR.10711.120	Pender	19	US 421 NBL	NEW HANOVER COUNTY LINE TO END DIVIDED HWY (0.59 MI. NORTH OF NC 210)	M.P.	NO	9.73	32				60	4		1,350	25			
<b>TOTAL FOR MAP NO. 19</b>							<b>9.73</b>						<b>60</b>	<b>4</b>		<b>1,350</b>	<b>25</b>		
3CR.10711.120	Pender	20	US 421 SBL	BEGIN DIVIDED HWY (0.59 MI. NORTH OF NC 210) TO NEW HANOVER COUNTY LINE	M.P.	NO	9.73	32				15	1		850	25			
<b>TOTAL FOR MAP NO. 20</b>							<b>9.73</b>						<b>15</b>	<b>1</b>		<b>850</b>	<b>25</b>		
3CR.10711.120	Pender	21	US 421	BEGIN/END DIVIDED HWY (0.59 MI. NORTH OF NC 210) TO BEGIN 2 LANE (0.65 MI. NORTH OF NC 210)	M.P.	NO	0.06	45							100				
<b>TOTAL FOR MAP NO. 21</b>							<b>0.06</b>								<b>100</b>				
<b>TOTAL FOR PROJ NO. 3CR.10711.120</b>							<b>19.52</b>						<b>75</b>	<b>5</b>		<b>2,300</b>	<b>50</b>		
<b>GRAND TOTAL</b>							<b>75.25</b>		<b>400</b>	<b>4,087</b>	<b>528</b>		<b>75</b>	<b>36</b>	<b>355</b>	<b>12,245</b>	<b>410</b>	<b>1</b>	<b>4,675</b>



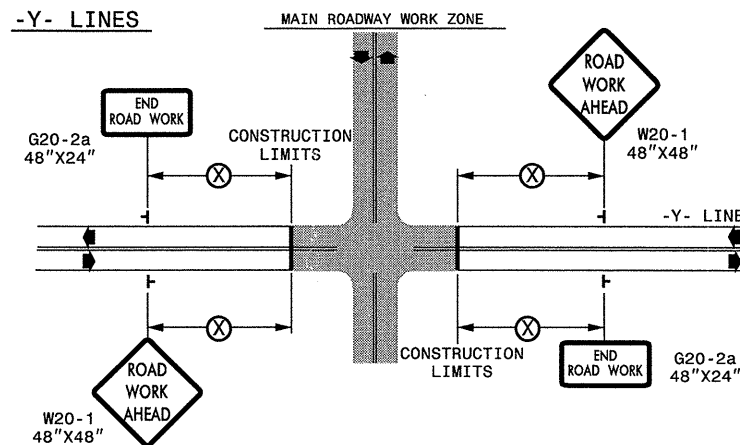
**TWO-WAY UNDIVIDED \*\* (L-LINES)**



POSTED SPEED LIMIT (M.P.H.)	RECOMMENDED MINIMUM SIGN SPACING
≤ 50	500'
≥ 55	1000'

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

**ROADWAYS INTERSECTING ALONG 2 WAY UNDIVIDED WORK ZONE (Y-LINES)**



**GENERAL NOTES**

- USE FLUORESCENT ORANGE SHEETING (TYPE VII OR HIGHER) ON ALL ADVANCED WORK ZONE SIGNS.
- DO NOT INSTALL ADVANCE WARNING SIGNS MORE THAN 3 DAYS PRIOR TO BEGINNING OF WORK.
- SIGNS SHOWN ARE REQUIRED FOR WORK ZONES THAT WILL REMAIN IN EFFECT OVERNIGHT. FOR SHORT-TERM DAILY MAINTENANCE TYPE OPERATIONS, THIS SIGNING APPLICATION IS OPTIONAL; MAY USE ONLY APPLICABLE ROADWAY STANDARD DRAWINGS INSTEAD. HOWEVER, IF THIS SIGNING APPLICATION IS USED, SIGNS MAY BE PORTABLE MOUNTED.
- ALL SIGN SPACING DIMENSIONS ARE APPROXIMATE, FIELD ADJUST AS NECESSARY OR AS DIRECTED.
- USE 3LB STEEL U-CHANNEL POST OR 4" X 4" WOOD POST FOR ALL WORK ZONE SIGNS. 3LB STEEL U-CHANNEL POSTS MUST MEET THE REQUIREMENTS OF STANDARD SPECIFICATION SECTION 1094-1(B), MAY BE GALVANIZED STEEL, OR MAY BE PAINTED GREEN BY THE POST MANUFACTURER. SQUARE STEEL TUBING POSTS HAVING EQUIVALENT STRENGTH OF THE 3 LB STEEL U-CHANNEL POST ARE ALSO ACCEPTABLE FOR USE. ERECT SIGNS PER ROADWAY STANDARD DRAWING 1110.01. PAYMENT FOR WOOD POSTS, 3LB STEEL U-CHANNEL AND SQUARE STEEL TUBING POSTS WITH SIGNS WILL BE MADE ACCORDING TO STANDARD SPECIFICATION "WORK ZONE SIGNS" SECTION 1110.
- WHEN NECESSARY, USE SPLICING IN ACCORDANCE WITH ROADWAY STANDARD DRAWING NO. 1110.01. REMOVE ENTIRE POST WHEN REMOVING SIGNS WITH SPLICED POSTS.
- DO NOT BACK BRACE SIGN SUPPORTS.
- \*\* TWO-WAY UNDIVIDED ADVANCE WARNING SIGN CONFIGURATION MAY BE USED ON URBAN MULTI-LANE FACILITIES WHERE CONDITIONS LIMIT THE USE OF DUAL MOUNTED SIGNS AS DETERMINED BY THE ENGINEER.

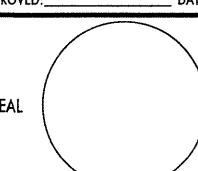

**LEGEND**

┆ STATIONARY SIGN

➔ DIRECTION OF TRAFFIC FLOW

DETAIL DRAWING FOR  
 TWO-WAY UNDIVIDED  
 WORK ZONE WARNING SIGNS

SHEET 1 OF 1

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

30-JUN-2010 08:40  
 \\001\dfs\001\GROUPS-WZTCCC-TMU\WZTC\Resur\fac\ng\2010\Documents\2010-Drawing\1117-C202xxx.wbs\NNN\_2way\_undiv.&.Urban\_Fr.wys\_stationary.dgn  
 sdimler1 AT 12:28:37

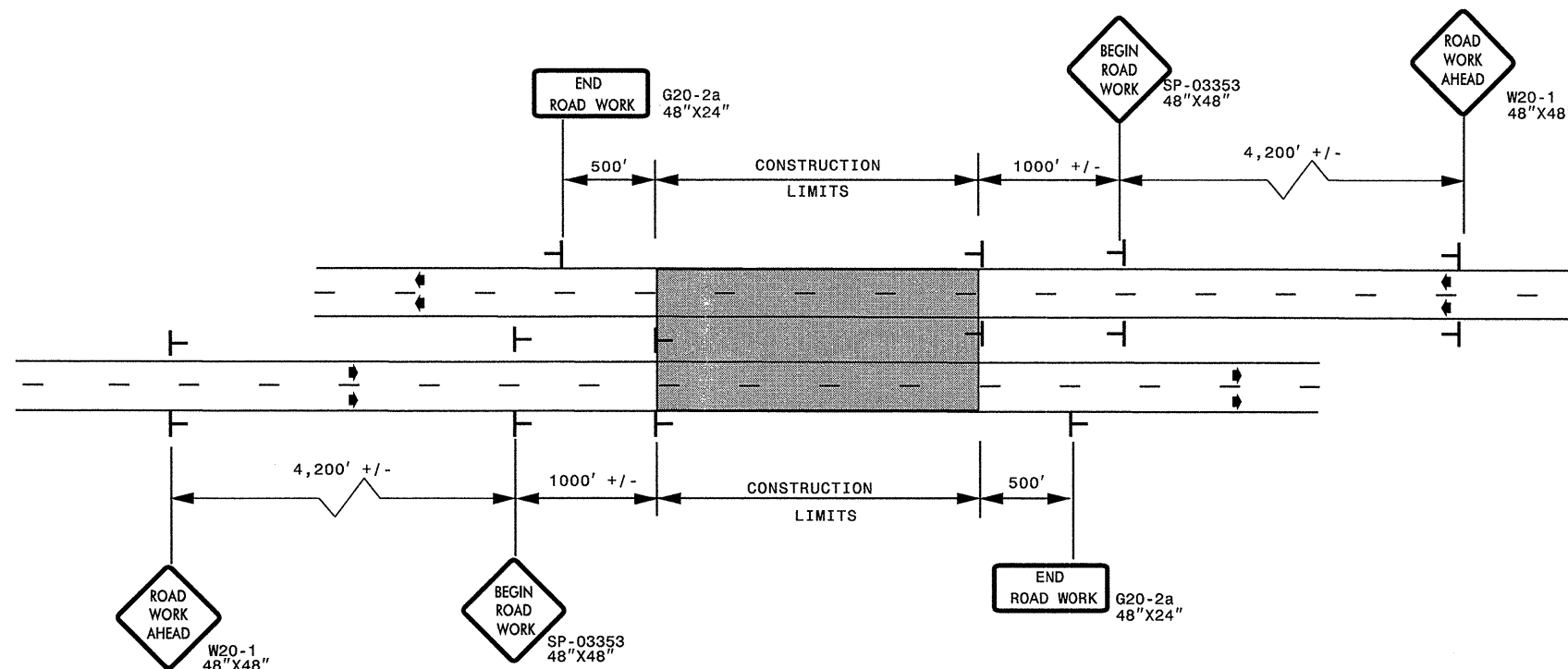


# ADVANCED WORK ZONE WARNING SIGNING FOR FREEWAYS (4 LANES OR GREATER)

3CR.10101.120  
3CR.10651.120  
3CR.10711.120

PROJ. REFERENCE NO.	SHEET NO.

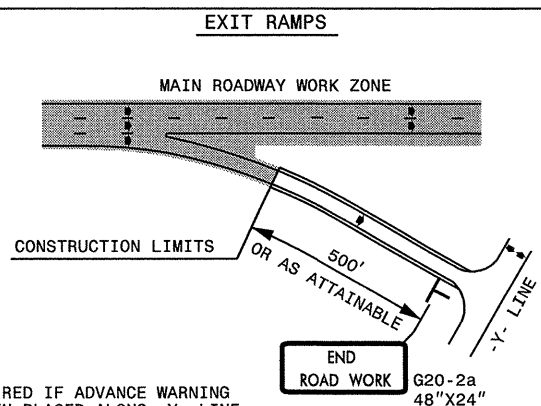
## DETAIL A



LEGEND	
	STATIONARY SIGN
→	DIRECTION OF TRAFFIC FLOW

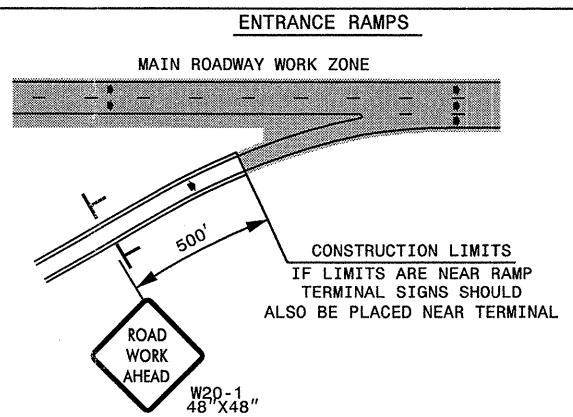
\* USE THE "\$250 SPEEDING PENALTY" SIGN, SPEED LIMIT SIGN, AND ORANGE PANEL; ONLY WHEN A "\$250 SPEEDING PENALTY" ORDINANCE HAS BEEN ISSUED BY THE REGIONAL TRAFFIC ENGINEER.

## DETAIL B



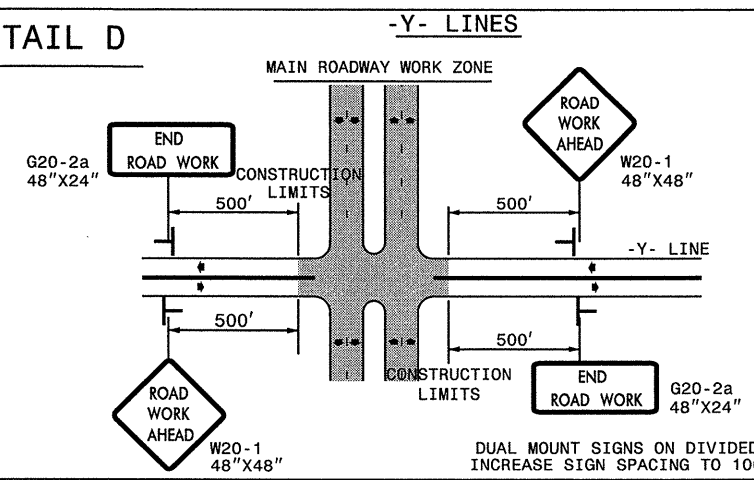
NOTE: SIGN NOT REQUIRED IF ADVANCE WARNING SIGNS HAVE BEEN PLACED ALONG -Y- LINE THAT RAMP INTERSECTS. IF CONSTRUCTION LIMITS ARE AT END OF RAMP, PLACE SIGN AT END OF RAMP.

## 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'+/-.

## GENERAL NOTES

- USE FLUORESCENT ORANGE SHEETING (TYPE VII OR HIGHER) ON ALL ADVANCED WORK ZONE SIGNS.
- DO NOT INSTALL ADVANCE WARNING SIGNS MORE THAN 3 DAYS PRIOR TO BEGINNING OF WORK.
- SIGNS SHOWN ARE REQUIRED FOR WORK ZONES THAT WILL REMAIN IN EFFECT OVERNIGHT. FOR SHORT-TERM DAILY MAINTENANCE TYPE OPERATIONS, THIS SIGNING APPLICATION IS OPTIONAL; MAY USE ONLY APPLICABLE ROADWAY STANDARD DRAWINGS INSTEAD. HOWEVER, IF THIS SIGNING APPLICATION IS USED, SIGNS MAY BE PORTABLE MOUNTED.
- ALL SIGN SPACING DIMENSIONS ARE APPROXIMATE, FIELD ADJUST AS NECESSARY OR AS DIRECTED.
- USE 3LB STEEL U-CHANNEL POST OR 4" X 4" WOOD POST FOR ALL WORK ZONE SIGNS. 3LB STEEL U-CHANNEL POSTS MUST MEET THE REQUIREMENTS OF STANDARD SPECIFICATION SECTION 1094-1(B), MAY BE GALVANIZED STEEL, OR MAY BE PAINTED GREEN BY THE POST MANUFACTURER. SQUARE STEEL TUBING POSTS HAVING EQUIVALENT STRENGTH OF THE 3 LB STEEL U-CHANNEL POST ARE ALSO ACCEPTABLE FOR USE. ERECT SIGNS PER ROADWAY STANDARD DRAWING 1110.01. PAYMENT FOR WOOD POSTS, 3LB STEEL U-CHANNEL AND SQUARE STEEL TUBING POSTS WITH SIGNS WILL BE MADE ACCORDING TO STANDARD SPECIFICATION "WORK ZONE SIGNS" SECTION 1110.
- WHEN NECESSARY, USE SPLICING IN ACCORDANCE WITH ROADWAY STANDARD DRAWING NO. 1110.01. REMOVE ENTIRE POST WHEN REMOVING SIGNS WITH SPLICED POSTS.
- DO NOT BACK BRACE SIGN SUPPORTS.






APPROVED: _____	DATE: _____	<b>ADVANCED WORK ZONE WARNING SIGNS FOR FREEWAYS (4 LANES OR GREATER)</b>	
	SCALE: NONE	REVISIONS	
	DATE: 8/03	03/04	
	DWG. BY: JI		
	DESIGN BY: JI		
	REVIEWED BY: _____		

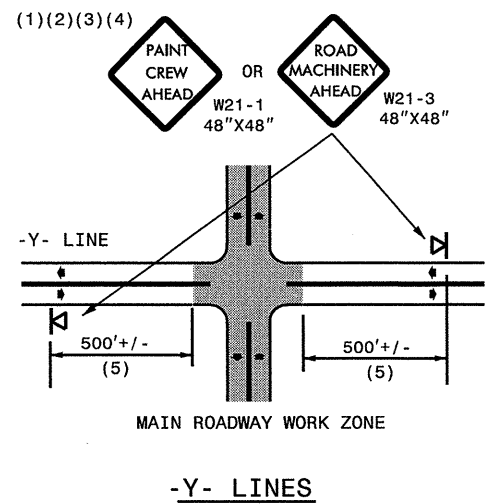
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### GENERAL NOTES

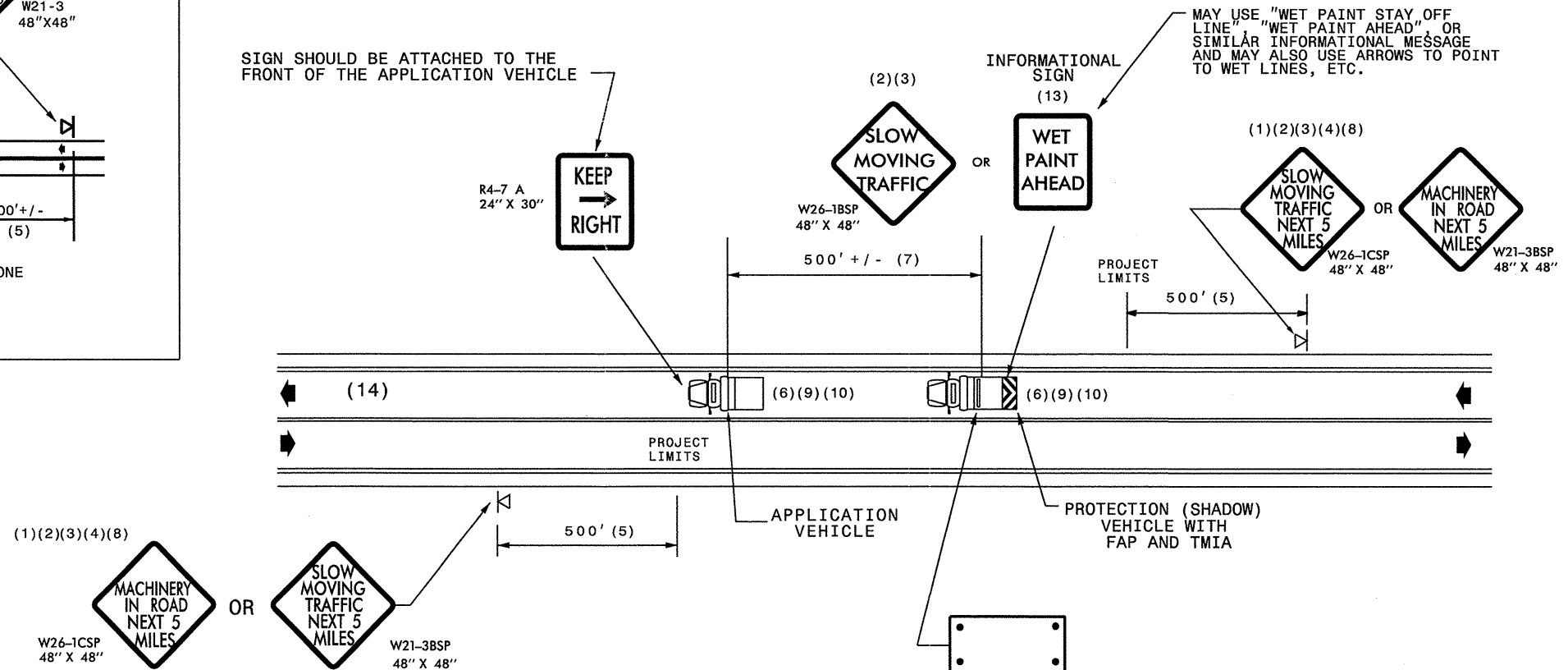
- (1) THE FOLLOWING OPTIONS MAY BE USED FOR ADVANCE WARNING SIGNS:
  - A. TRUCK MOUNTED SIGNS
  - B. TRUCK MOUNTED CHANGEABLE MESSAGE SIGN (CMS)
  - C. GROUND MOUNTED ADVANCE WARNING SIGNS (MUST CIRCLE TO PICK UP SIGNS)
  - D. GROUND MOUNTED CHANGEABLE MESSAGE SIGN (CMS) (MUST USE CIRCLE TO PICK UP SIGNS)
- (2) ALL ADVANCE WARNING SIGNS MUST BE 48" X 48" WITH FLUORESCENT ORANGE TYPE VII, VIII OR IX SHEETING. IF SPACE LIMITATIONS ON SHOULDER PROHIBIT A 48" X 48" SIGN, A SMALLER SIGN CAN BE USED WITH APPROVAL FROM ENGINEER.
- (3) SIGNS ON VEHICLES SHOULD BE MOUNTED A MINIMUM OF ONE (1) FOOT FROM THE GROUND AND SHOULD NOT BLOCK THE MOTORIST'S SIGHT OF THE FLASHING ARROW PANEL AND/OR LIGHTBAR.
- (4) GROUND MOUNTED ADVANCED WARNING SIGNS SHOULD BE MOUNTED A MINIMUM OF ONE (1) FOOT FROM THE GROUND TO BOTTOM OF SIGN.
- (5) SIGN SPACING SHOULD BE ADJUSTED FOR HORIZONTAL AND VERTICAL CURVES, ETC. TO IMPROVE SIGHT DISTANCES.
- (6) ADDITIONAL VEHICLES SHOULD BE USED IN WORK CARAVAN TO FACILITATE DRYING OF PAVEMENT MARKING MATERIAL (TMIA'S ARE OPTIONAL ON THESE ADDITIONAL VEHICLES). HOWEVER, THE FIRST VEHICLE MOTORISTS SEE IN THE TRAVEL LANE SHALL HAVE A TMIA.
- (7) ADJUST DISTANCE AS NEEDED TO PREVENT MOTORISTS FROM ENTERING SPACE BETWEEN THE APPLICATION AND PROTECTION VEHICLE. DISTANCE CAN BE LENGTHENED TO ACCOMMODATE SIGHT DISTANCE NEEDS.
- (8) ROUND UP MILEAGE TO NEXT WHOLE MILE. WORK ZONE SHOULD NOT EXCEED FIVE (5) MILES IN LENGTH.
- (9) RADIO COMMUNICATION BETWEEN VEHICLES IS REQUIRED.
- (10) USE OF A LIGHT BAR ON ALL VEHICLES IS PREFERRED, BUT A ROTATING BEACON MAY BE USED INSTEAD.
- (11) IF WORK IS PERFORMED AT NIGHT, THE WORK AREA MUST BE ILLUMINATED WITH MACHINE AND/OR TOWER LIGHTS AS APPROVED BY THE ENGINEER.
- (12) ALL TRAFFIC CONTROL DEVICES WILL BE CONSIDERED INCIDENTAL TO THE PAY ITEMS FOR PAVEMENT MARKING AND MARKERS.
- (13) INFORMATIONAL SIGNS SHOULD BE ACTIVITY SPECIFIC, i.e. "PAINT CREW IN ROAD". SIGNS MAY BE RECTANGULAR OR DIAMOND SHAPE. SIGN SIZE SHOULD BE BASED ON THE MOTORIST ABILITY TO RECOGNIZE SIGN WHEN TRAVELING FIVE (5) MILES ABOVE POSTED SPEED LIMIT.
- (14) IF A LEAD VEHICLE IS ADDED TO OPERATION, IT SHOULD HAVE THE SAME ADVANCE WARNING SIGNS AS THE APPLICATION VEHICLE SHOWN BELOW.

### LEGEND

-  PORTABLE SIGN. SIGNS MUST BE NCHRP-350 AND NCDOT APPROVED.
-  DIRECTION OF TRAFFIC FLOW
-  APPLICATION VEHICLE WITH LIGHT BAR
-  PROTECTION VEHICLE WITH TRUCK MOUNTED IMPACT ATTENUATOR (TMIA) AND LIGHT BAR (SEE ROADWAY STANDARD NO. 1165.01). TMIA MUST BE NCHRP-350 TEST LEVEL 3 (60+MPH) APPROVED.
-  FLASHING ARROW PANEL, TYPE "B" (60"X30" MIN.), "CAUTION MODE"



SIGN SHOULD BE ATTACHED TO THE FRONT OF THE APPLICATION VEHICLE



## MOVING OPERATION CARAVAN








(OPERATIONS TRAVELING 3 MPH OR FASTER)  
PLACING PAVEMENT MARKING OR MARKERS  
ON TWO-LANE TWO-WAY ROADWAYS

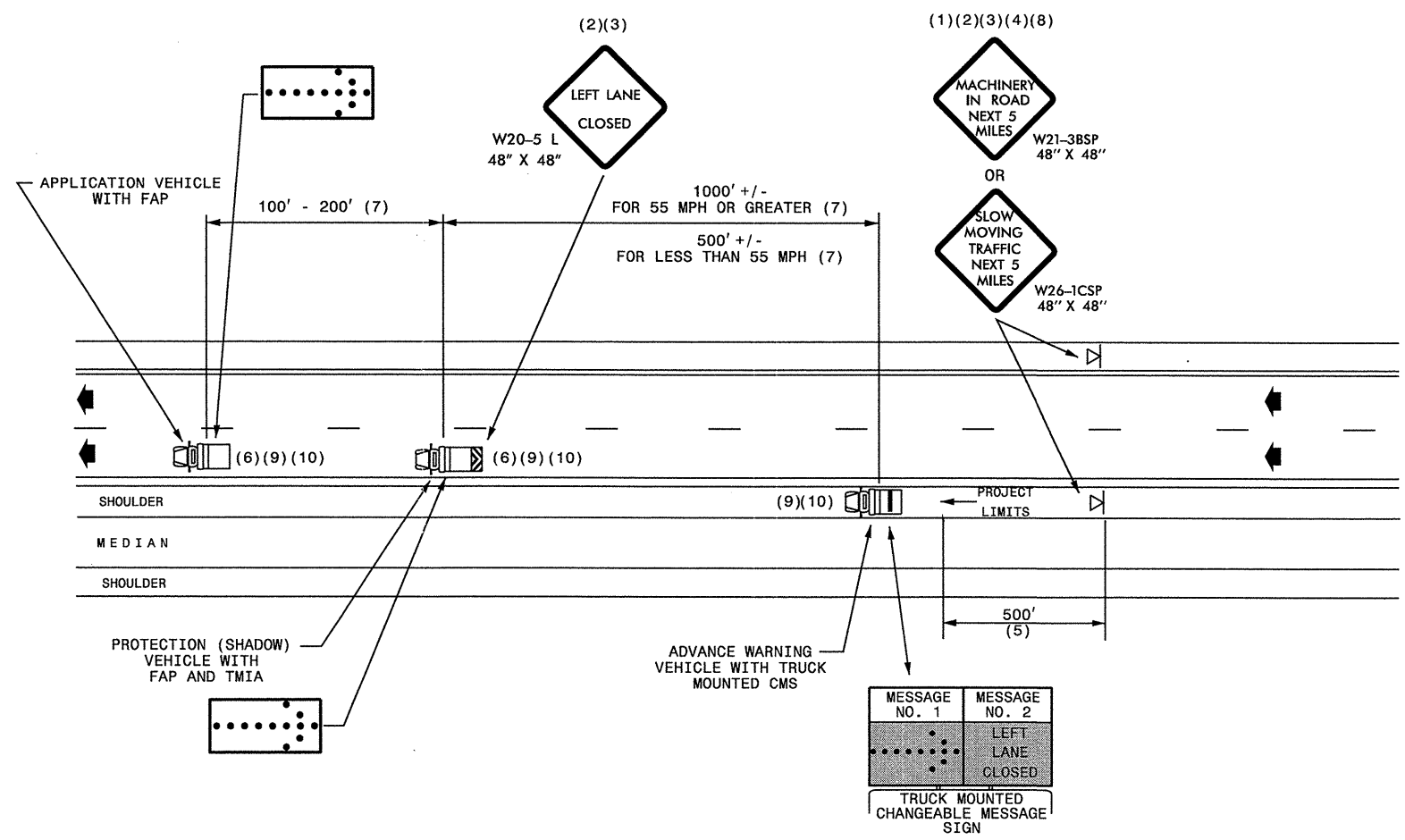
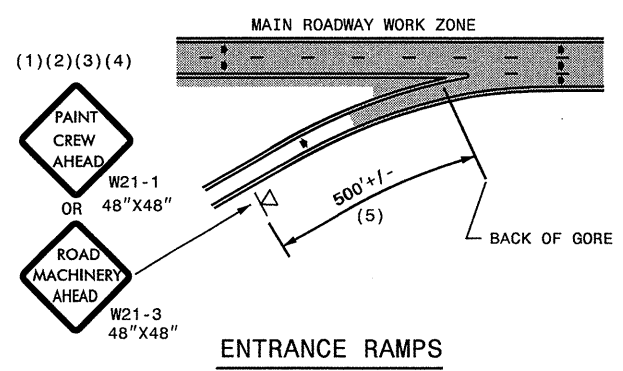
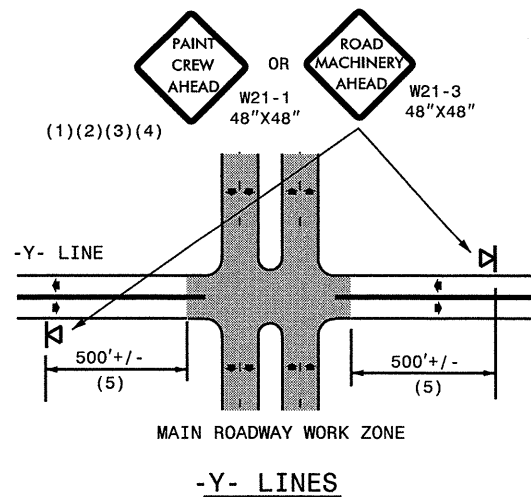
**DRAWING NUMBER 6**  
IMPLEMENTATION DATE: 07/01/97  
REVISED: 11/03/04

## GENERAL NOTES

- (1) THE FOLLOWING OPTIONS MAY BE USED FOR ADVANCE WARNING SIGNS:
  - A. TRUCK MOUNTED SIGNS
  - B. TRUCK MOUNTED CHANGEABLE MESSAGE SIGN (CMS)
  - C. GROUND MOUNTED ADVANCE WARNING SIGNS (MUST CIRCLE TO PICK UP SIGNS)
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- (4) GROUND MOUNTED ADVANCED WARNING SIGNS SHOULD BE MOUNTED A MINIMUM OF FIVE (5) FEET FROM THE GROUND TO BOTTOM OF SIGN.
- (5) SIGN SPACING SHOULD BE ADJUSTED FOR HORIZONTAL AND VERTICAL CURVES, ETC. TO IMPROVE SIGHT DISTANCES.
- (6) ADDITIONAL VEHICLES SHOULD BE USED IN WORK CARAVAN TO FACILITATE DRYING OF PAVEMENT MARKING MATERIAL (TMIA'S ARE OPTIONAL ON THESE ADDITIONAL VEHICLES). HOWEVER, THE FIRST VEHICLE MOTORISTS SEE IN THE TRAVEL LANE SHALL HAVE A TMIA.
- (7) ADJUST DISTANCE AS NEEDED TO PREVENT MOTORISTS FROM ENTERING SPACE BETWEEN THE APPLICATION AND PROTECTION VEHICLE. DISTANCE CAN BE LENGTHENED TO ACCOMMODATE SIGHT DISTANCE NEEDS.
- (8) ROUND UP MILEAGE TO NEXT WHOLE MILE. WORK ZONE SHOULD NOT EXCEED FIVE (5) MILES IN LENGTH.
- (9) RADIO COMMUNICATION BETWEEN VEHICLES IS REQUIRED.
- (10) USE OF A LIGHT BAR ON ALL VEHICLES IS PREFERRED, BUT A ROTATING BEACON MAY BE USED INSTEAD.
- (11) IF WORK IS PERFORMED AT NIGHT, THE WORK AREA MUST BE ILLUMINATED WITH MACHINE AND/OR TOWER LIGHTS AS APPROVED BY THE ENGINEER.
- (12) ALL TRAFFIC CONTROL DEVICES WILL BE CONSIDERED INCIDENTAL TO THE PAY ITEMS FOR PAVEMENT MARKING AND MARKERS.

## LEGEND

-  PORTABLE SIGN. SIGNS MUST BE NCHRP-350 AND NCDOT APPROVED.
-  DIRECTION OF TRAFFIC FLOW
-  APPLICATION VEHICLE WITH LIGHT BAR
-  PROTECTION VEHICLE WITH TRUCK MOUNTED IMPACT ATTENUATOR (TMIA) AND LIGHT BAR (SEE ROADWAY STANDARD NO. 1165.01). TMIA MUST BE NCHRP-350 TEST LEVEL 3 (60+MPH) APPROVED.
-  ADVANCE WARNING VEHICLE WITH TRUCK MOUNTED CHANGEABLE MESSAGE SIGN (CMS) AND LIGHT BAR. MESSAGE SIGN LETTER HEIGHT SHOULD BE A MINIMUM OF 10 INCHES.
-  FLASHING ARROW PANEL, TYPE "B" (60"X30" MIN.), APPROPRIATE DIRECTION INDICATED
-  CHANGEABLE MESSAGE SIGN

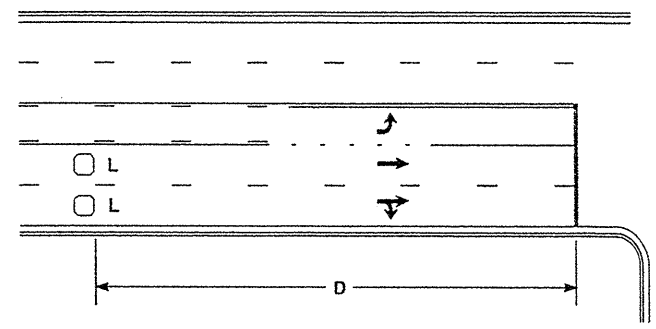


# MOVING OPERATION CARAVAN

(OPERATIONS TRAVELING 3 MPH OR FASTER)  
PLACING PAVEMENT MARKING OR MARKERS  
ON NON-INTERSTATE MULTILANE DIVIDED ROADWAYS

**DRAWING NUMBER 7**  
IMPLEMENTATION DATE: 07/01/97  
REVISED: 11/03/04

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

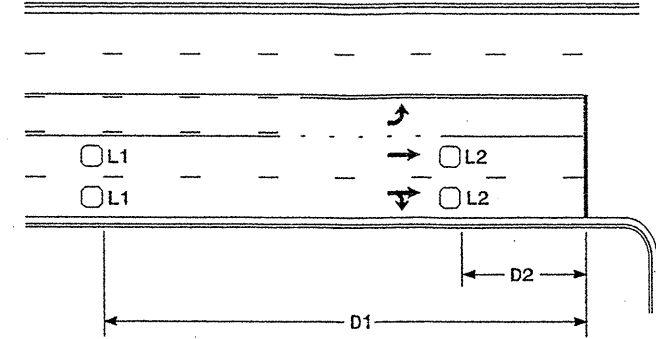


Speed Limit mph (km/hr)	D ft (m)
40 (64)	250 (75)
45 (72)	300 (90)
50 (80)	355 (110)
55 (88)	420 (130)

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

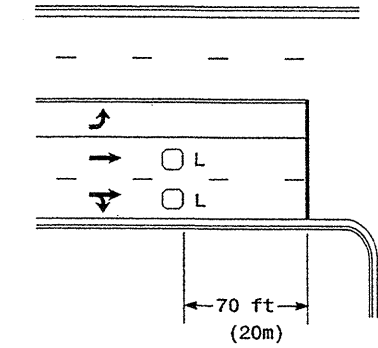


Speed Limit mph (km/hr)	D1 ft (m)	D2 ft (m)
40 (64)	250 (75)	80 (25)
45 (72)	300 (90)	90 (27)
50 (80)	355 (110)	100 (30)
55 (88)	420 (130)	110 (35)

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

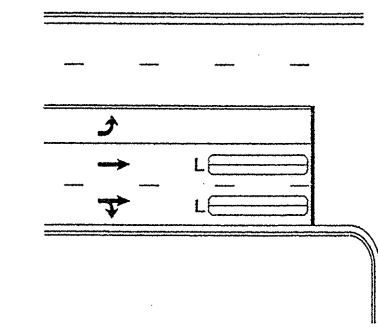
"Stretch" Operation

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



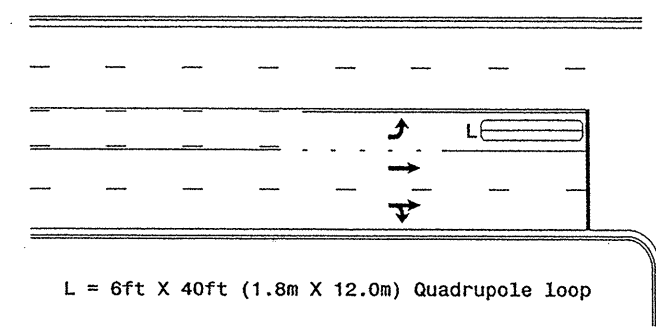
L = 6ft X 6ft (1.8m X 1.8m)  
Wired in series

OR



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

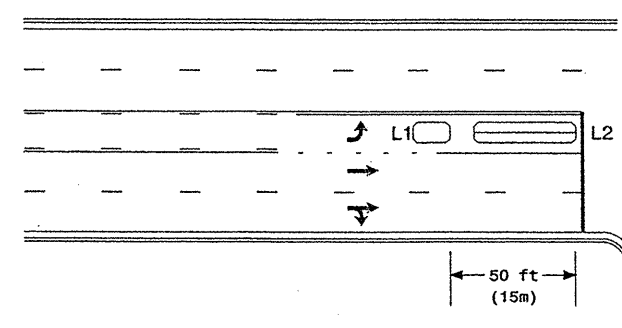
### Left Turn Lane Detection



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

Presence Loop Detection

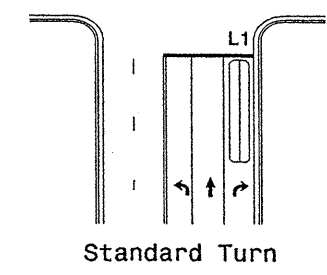
OR



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

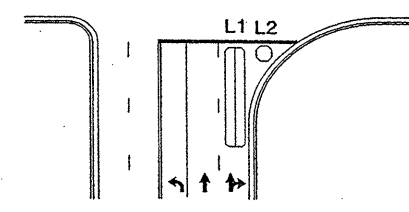
Queue Loop Detection

### Right Turn Lane Detection

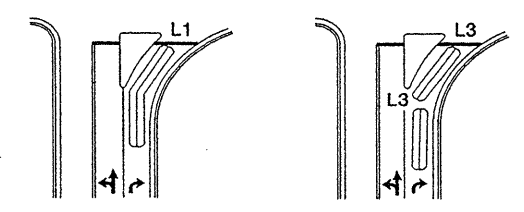


Standard Turn

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

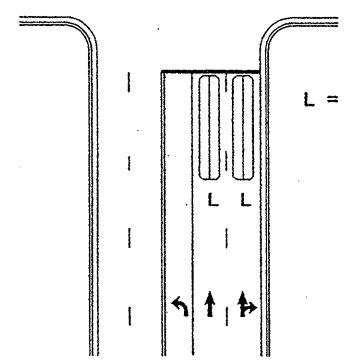


Wide Radius Turn



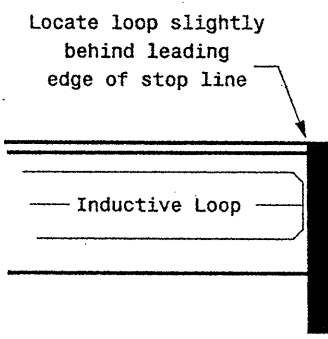
Channelized Turn

### 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



Locate loop slightly  
behind leading  
edge of stop line

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 s:\its\signal\lib\turn\_in\in\loop\typical\2006.dgn p.alexander

#### Typical Loop Locations

PLAN DATE: June 2006		REVIEWED BY:	
PREPARED BY: P. L. Alexander		REVIEWED BY:	
SCALE	N/A	INIT.	DATE
		PL	12/21/06
REVISIONS		INIT.	DATE
1. Revise placement of loops			
SIGNATURE		DATE	
		6/6/06	
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**

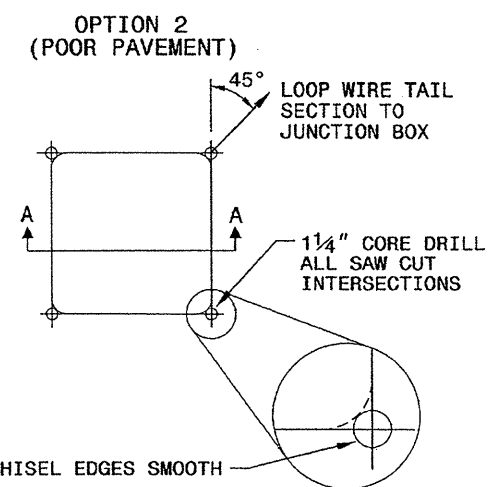
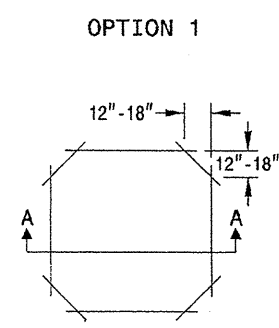
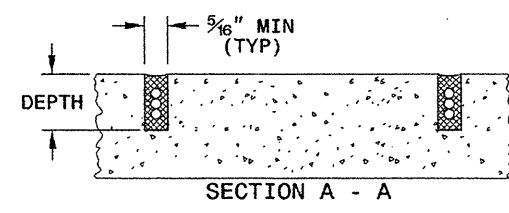
SHEET 1 OF 3  
**1725D01**

**CONVENTIONAL 4-SIDED LOOP**

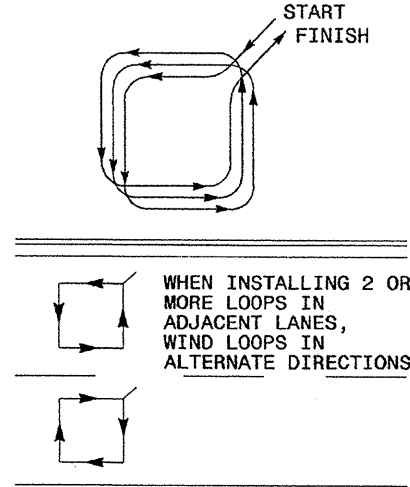
**SAW CUT OPTIONS**

**SAW SLOT DEPTH CHART**

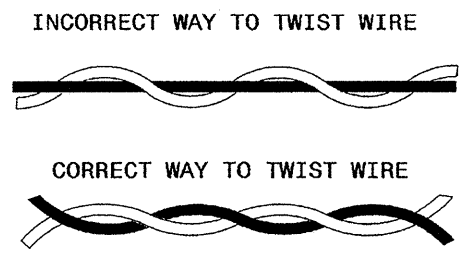
DEPTH (IN)	NO. OF WIRE TURNS				
	2	3	4	5	6
CONCRETE	2.0	2.0	2.5	2.5	3.0
ASPHALT	2.0	2.5	3.0	3.0	3.0



**LOOP WINDING METHOD**



**LOOP WIRE TWISTING METHOD**

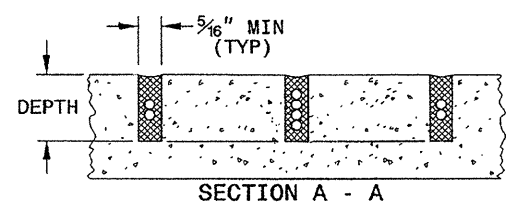
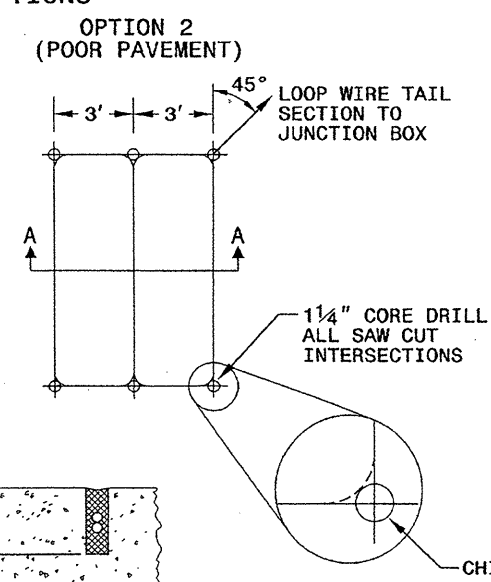
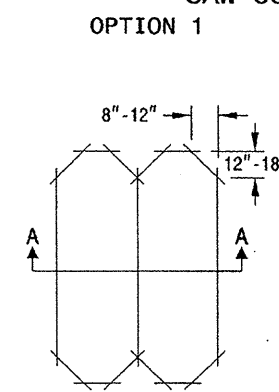


**NOTES**

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

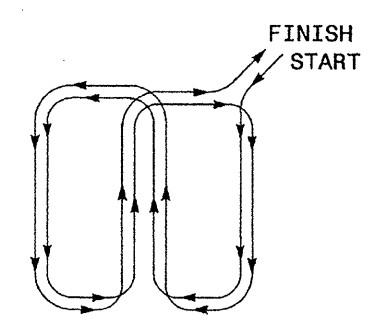
**QUADRUPOLE LOOP**

**SAW CUT OPTIONS**



DEPTH IS 2.5" FOR CONCRETE AND 3.0" FOR ASPHALT

**LOOP WINDING METHOD**



STATE OF NORTH CAROLINA  
DEPT. OF TRANSPORTATION  
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

*William Dean* 4/24/08  
SIGNATURE DATE

24-Nov-2008 09:28  
d:\work\17250-standards\plate sheets\1725D01.mxd\207.dgn  
zml1111c



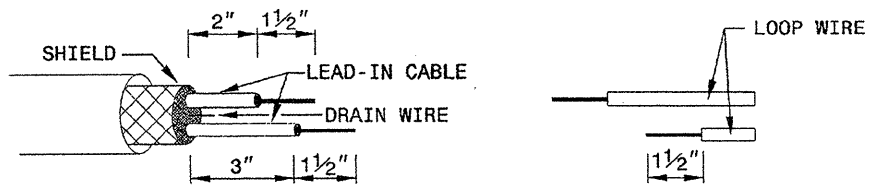
STATE OF NORTH CAROLINA  
DEPT. OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
RALEIGH, N.C.

11-08

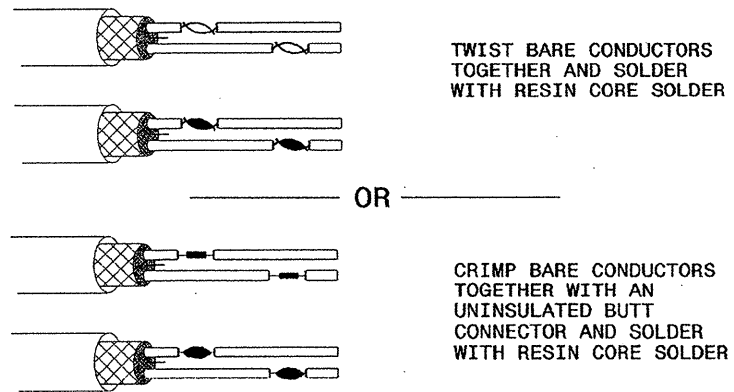
ENGLISH DETAIL DRAWING FOR  
**INDUCTIVE DETECTION LOOPS**  
SPlicing FOR LEAD-IN CABLE AND LOOP WIRE

SHEET 3 OF 3  
**1725D01**

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

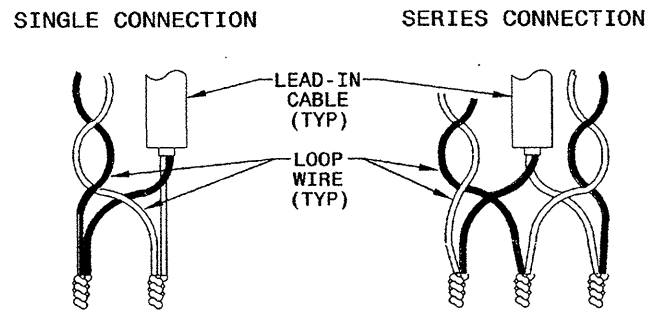


**STEP 2. CONNECT AND SOLDER**

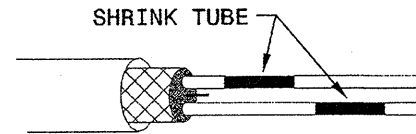


BOND SHIELD DRAIN WIRE AT SPLICE SECTIONS (DO NOT GROUND)

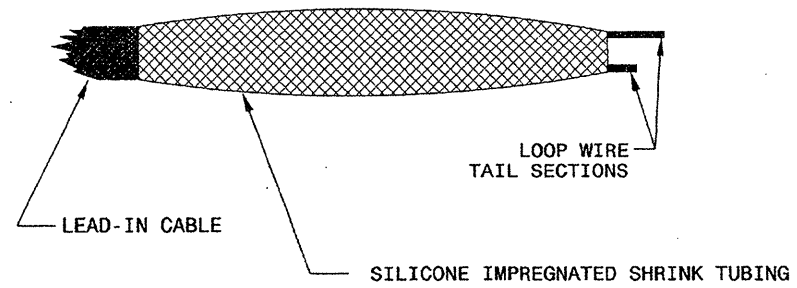
**LOOP WIRE AND LEAD-IN CABLE CONNECTION DETAILS**



**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:

750 N. Greenfield Parkway  
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SEAL

Milton I. Dean 11/24/08  
SIGNATURE DATE