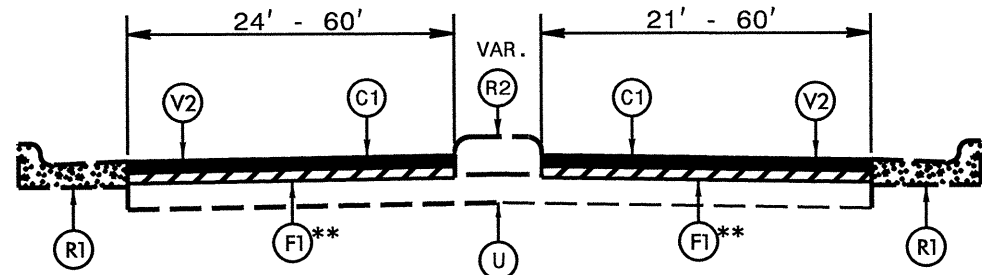






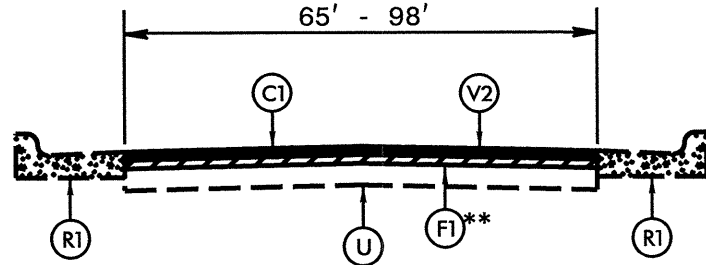
STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS
N.C.	7CR.10411.36, 7CR.20411.36	3	



\*NOTE: MILL 1½" AND FILL 1½" WITH SURFACE COURSE, TYPE S9.5B  
 \*\*NOTE: AST MAT COAT, #78M STONE TO BE USED AT THE DISCRETION OF THE ENGINEER

**TYPICAL SECTION NO. 8**

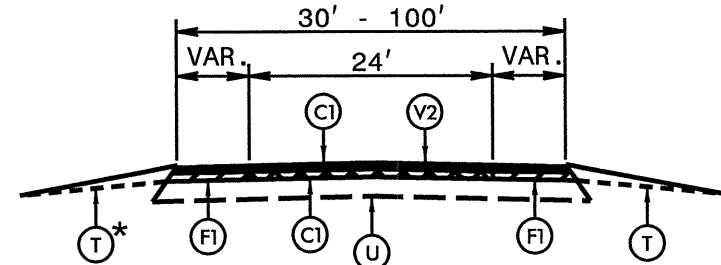
TO BE USED ON MAP 10  
 STA. 0+00 TO STA. 2+60  
 STA. 49+90 TO STA. 54+60  
 STA. 56+65 TO STA. 61+70



\*NOTE: MILL 1½" AND FILL 1½" WITH SURFACE COURSE, TYPE S9.5B  
 \*\*NOTE: AST MAT COAT, #78M STONE TO BE USED AT THE DISCRETION OF THE ENGINEER

**TYPICAL SECTION NO. 9**

TO BE USED ON MAP 10  
 STA. 2+60 TO STA. 49+90  
 STA. 54+60 TO STA. 56+65  
 STA. 61+70 TO STA. 75+75

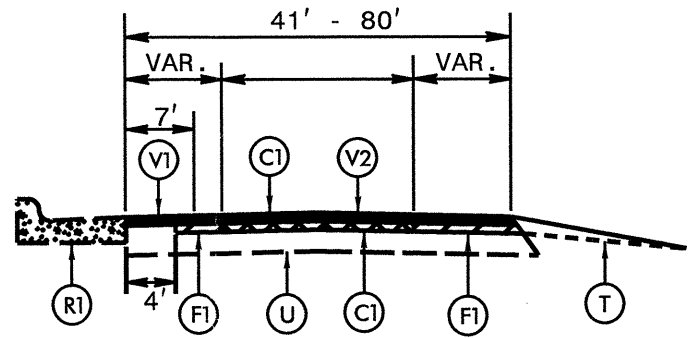


\*NOTE: CONCRETE ISLAND ON:  
 MAP 11: STA. 5+30 TO STA. 11+20  
 MAP 12: STA. 127+10 TO STA. 133+00

- \*\*TYPICAL SECTION CONSTRUCTION SEQUENCE
1. MILL TRAVEL LANE 1½" AND FILL 1½" OF SURFACE COURSE, TYPE S9.5B
  2. OVERLAY SHOULDERS WITH AST MAT COAT, #78M STONE
  3. OVERLAY ENTIRE SURFACE WITH 1½" OF SURFACE COURSE, TYPE S9.5B

**TYPICAL SECTION NO. 10**

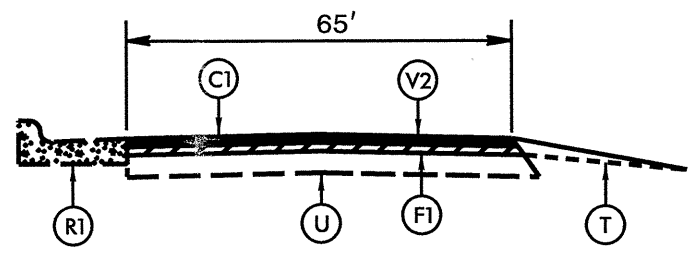
TO BE USED ON MAPS 11 AND 12  
 MAP 11: STA. 5+30 TO STA. 14+30  
 STA. 15+50 TO STA. 19+10  
 STA. 22+05 TO STA. 138+30  
 MAP 12: STA. 0+00 TO STA. 109+05  
 STA. 116+25 TO STA. 122+80  
 STA. 124+00 TO STA. 138+30



- \*\*TYPICAL SECTION CONSTRUCTION SEQUENCE
1. MILL TRAVEL LANE 1½"
  2. PROFILE MILL 0 - 1½"
  3. FILL 1½" OF SURFACE COURSE, TYPE S9.5B
  4. OVERLAY SHOULDERS WITH AST MAT COAT, #78M STONE
  5. OVERLAY ENTIRE SURFACE WITH 1½" OF SURFACE COURSE, TYPE S9.5B

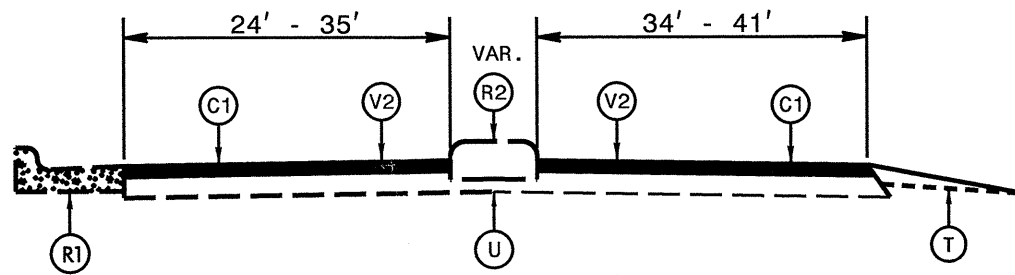
**TYPICAL SECTION NO. 11**

TO BE USED ON MAPS 11 AND 12  
 MAP 11: STA. 14+30 TO STA. 15+50  
 STA. 19+10 TO STA. 22+05  
 MAP 12: STA. 114+60 TO STA. 116+25  
 STA. 122+80 TO STA. 124+00



**TYPICAL SECTION NO. 12**

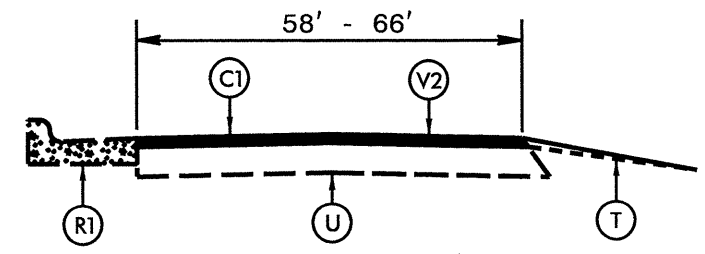
TO BE USED ON MAP 12  
 STA. 112+45 TO STA. 114+60



\*NOTE: MILL 1½" AND FILL 1½" WITH SURFAC COURSE, TYPE S9.5B

**TYPICAL SECTION NO. 13**

TO BE USED ON MAP 13  
 STA. 0+00 TO STA. 2+15



\*NOTE: MILL 1½" AND FILL 1½" WITH SURFAC COURSE, TYPE S9.5B

**TYPICAL SECTION NO. 14**

TO BE USED ON MAP 13  
 STA. 2+15 TO STA. 5+75

\*\*NOTE: EACH MAP MUST BE SPOT MILLED AND FILLED AS DIRECTED BY THE ENGINEER BEFORE PROCEEDING WITH RESURFACING\*\*

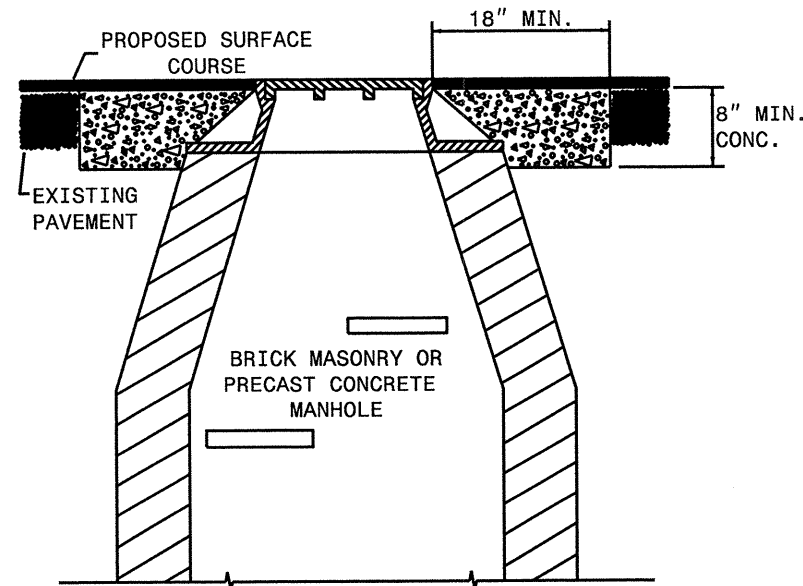
**PAVEMENT SCHEDULE**

C1	PROP. APPROX. 1½" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YD.	
C2	PROP. APPROX. 1½" ASPHALT CONCRETE SURFACE COURSE, TYPE SF9.5A, AT AN AVERAGE RATE OF 165 LBS. PER SQ. YD.	
C3	PROP. APPROX. ¾" OPEN-GRADED ASPHALT FRICTION COURSE, TYPE FC-2 MODIFIED, AT AN AVERAGE RATE OF 90 LBS. PER SQ. YD.	
D	PROP. APPROX. 3" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 342 LBS. PER SQ. YD.	
E	PROP. APPROX. 8" ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 456 LBS. PER SQ. YD. IN EACH OF TWO LAYERS	
F1	AST MAT COAT, #78M STONE	
F2	AST MAT COAT, #67 STONE	
R1	EXISTING CONCRETE STRUCTURE	
R2	EXISTING CONCRETE ISLAND	
T	INCIDENTAL STONE BASE IN LOW SHOULDER AREAS, AS DIRECTED BY THE ENGINEER	
U	EXISTING PAVEMENT.	
V1	0 TO 1½" MILLING	V2 1½" MILLING
V3	3" MILLING	V4 8" MILLING
V5	1½" - 3" MILLING	

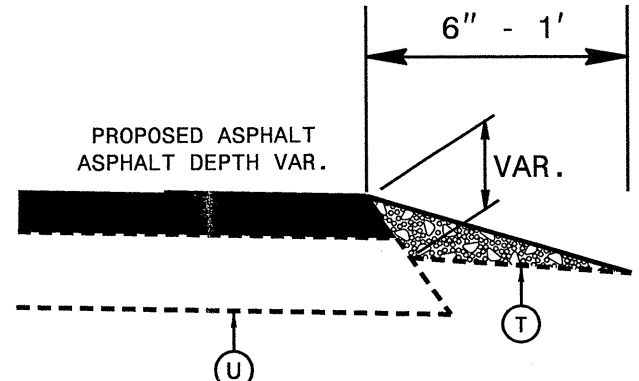
\$\$\$\$\$SYTIME\$\$\$\$\$  
 \$\$\$>\$\$\$\$\$DCGNS\$\$\$\$\$  
 \$\$\$>\$\$\$\$\$USERNAME\$\$\$\$\$



STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS
N.C.	7CR.10411.36, 7CR.20411.36	5	



INCIDENTAL STONE SHOULDER DETAIL



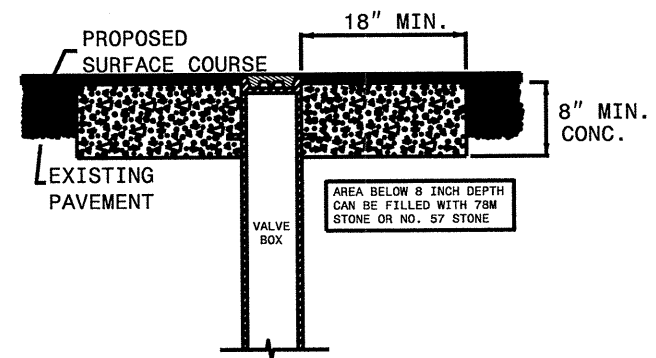
INCIDENTAL MILLING DETAIL

- NOTES:
1. MORTAR SHALL BE MIXED TO NCDOT SPECIFICATIONS.
  2. ALL FAULTY EXISTING BRICKWORK TO BE REMOVED AND REPLACED WITH NEW BRICK MASONRY.
  3. EXCAVATION FOR THE ADJUSTMENT SHALL BE SHEER CUT ON ALL SIDES.
  4. USE RAPID SET GROUT, MORTAR OR CONCRETE AS NOTED IN PROJECT SPECIAL PROVISIONS. CLASS B CONCRETE MAY BE USED WHEN THE ADJUSTMENTS ARE NOT IN THE TRAVEL LANE.

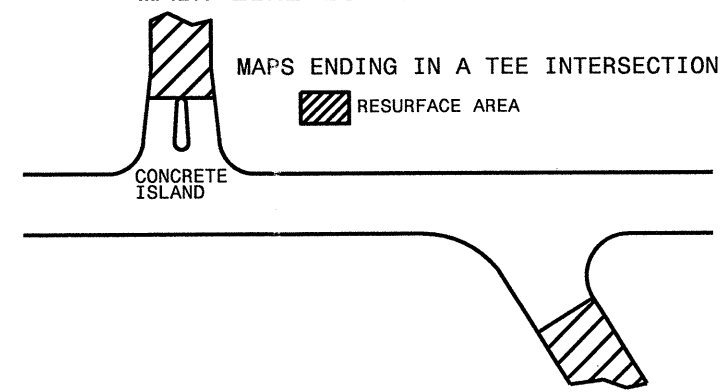
NOTE: ASB OR ABC STONE SHOULD BE PLACE AT THE DISCRETION OF THE ENGINEER

\*\*NOTE: EACH MAP MUST BE SPOT MILLED AND FILLED AS DIRECTED BY THE ENGINEER BEFORE PROCEEDING WITH RESURFACING\*\*

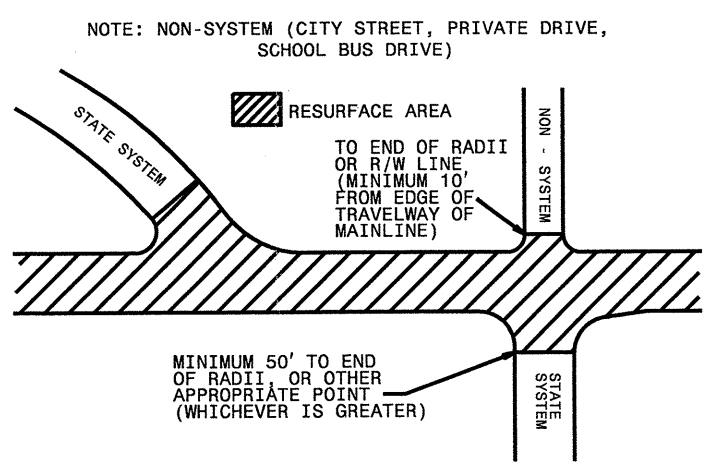
STANDARD CONCRETE ENCASEMENT FOR VALVE CASTINGS IN PAVEMENT



PAVING DETAIL 1  
MAIN LINE IS NOT BEING RESURFACED

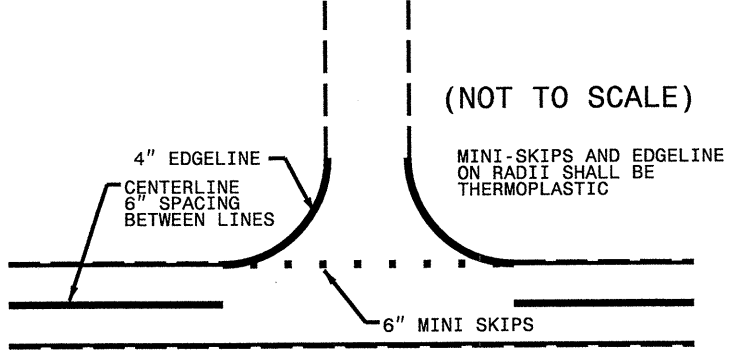


PAVING DETAIL 2  
MAIN LINE IS BEING RESURFACED



USE RAPID SET GROUT, MORTAR, OR CONCRETE CLASS B CONCRETE MAY BE USED WHEN ADJUSTMENTS ARE NOT IN THE TRAVEL LANE.

TO BE USED AT ALL NON-SIGNALIZED INTERSECTIONS



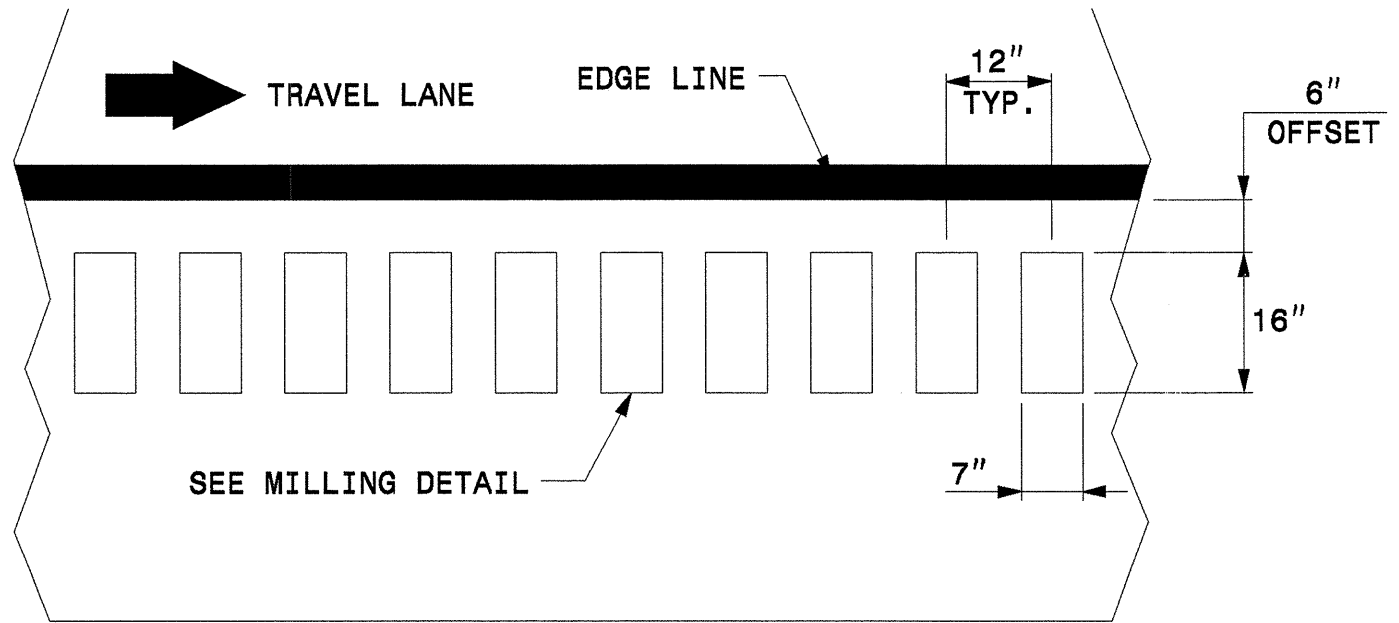
NOTE: MINI SKIPS SHALL BE PLACED ON A 10' CYCLE, CONTAINING AN 8' AND 2' SKIP, THE WIDTH OF THE SKIP SHALL BE 6".

PAVEMENT SCHEDULE

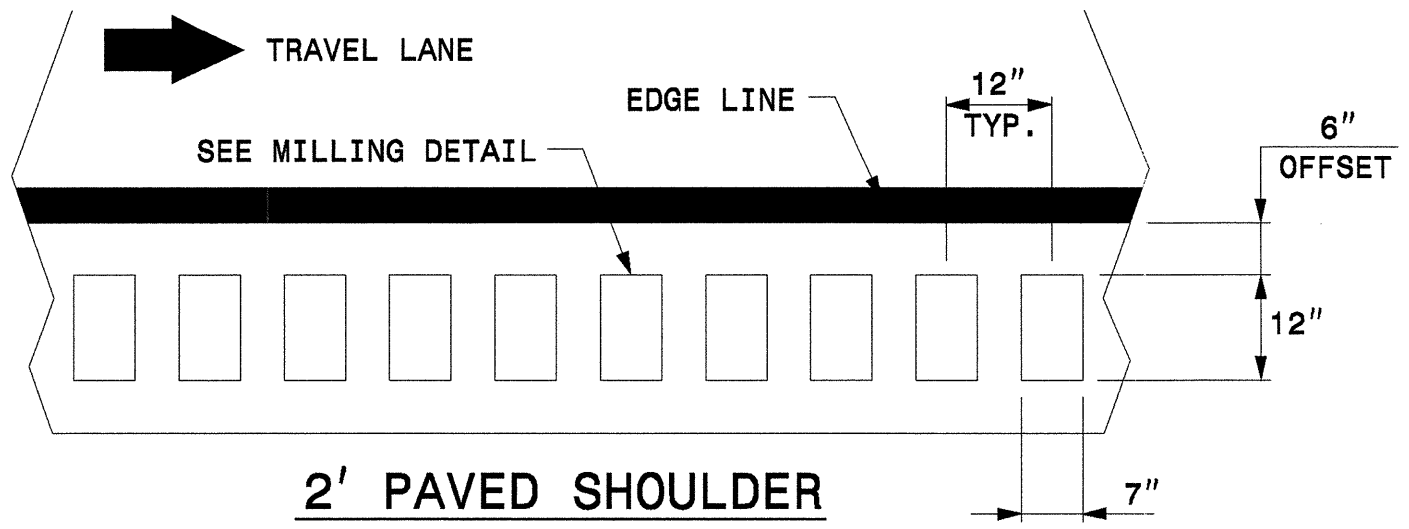
C1	PROP. APPROX. 1 1/2" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YD.	
C2	PROP. APPROX. 1 1/2" ASPHALT CONCRETE SURFACE COURSE, TYPE SF9.5A, AT AN AVERAGE RATE OF 165 LBS. PER SQ. YD.	
C3	PROP. APPROX. 3/4" OPEN-GRADED ASPHALT FRICTION COURSE, TYPE FC-2 MODIFIED, AT AN AVERAGE RATE OF 90 LBS. PER SQ. YD.	
D	PROP. APPROX. 3" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 342 LBS. PER SQ. YD.	
E	PROP. APPROX. 8" ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 456 LBS. PER SQ. YD. IN EACH OF TWO LAYERS	
F1	AST MAT COAT, #78M STONE	
F2	AST MAT COAT, #67 STONE	
R1	EXISTING CONCRETE STRUCTURE	
R2	EXISTING CONCRETE ISLAND	
T	INCIDENTAL STONE BASE IN LOW SHOULDER AREAS, AS DIRECTED BY THE ENGINEER	
U	EXISTING PAVEMENT.	
V1	0 TO 1 1/2" MILLING	V2 1 1/2" MILLING
V3	3" MILLING	V4 8" MILLING
V5	1 1/2" - 3" MILLING	

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STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS
N.C.	7CR.10411.36, 7CR.20411.36	6	

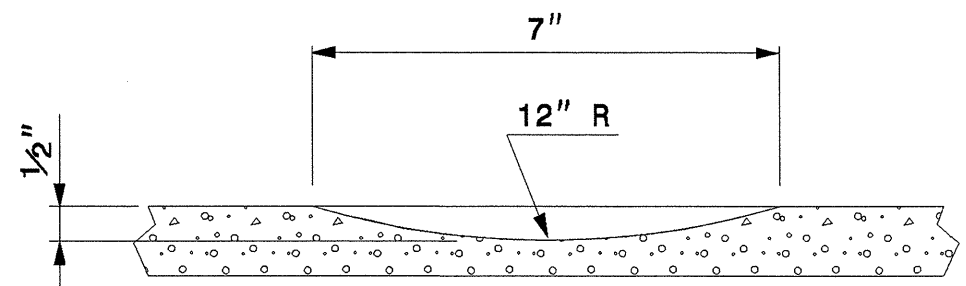


**4' PAVED SHOULDER**

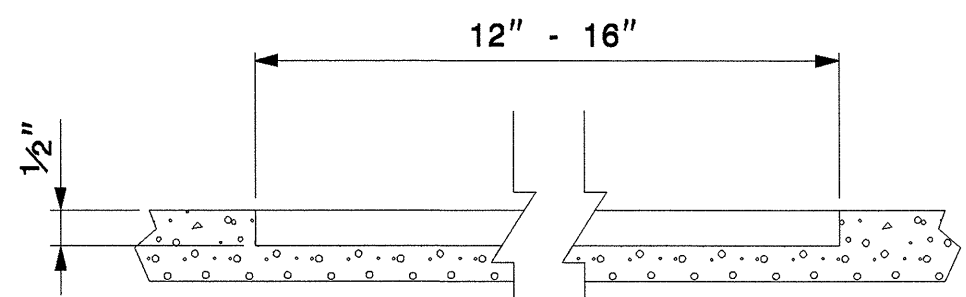


**2' PAVED SHOULDER**


**MILLING DETAIL**



**SECTION A-A'**



**SECTION B-B'**

RUMBLE STRIPS		REVISIONS
SCALE: NONE		
DATE: 04-09		
DWG. BY: DHB		
DESIGN BY: DHB		
REVIEWED BY: CBH		

26-001-2011361  
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 11/11/11 11:11 AM  
 p:\porter







### THERMOPLASTIC AND PAINT QUANTITIES

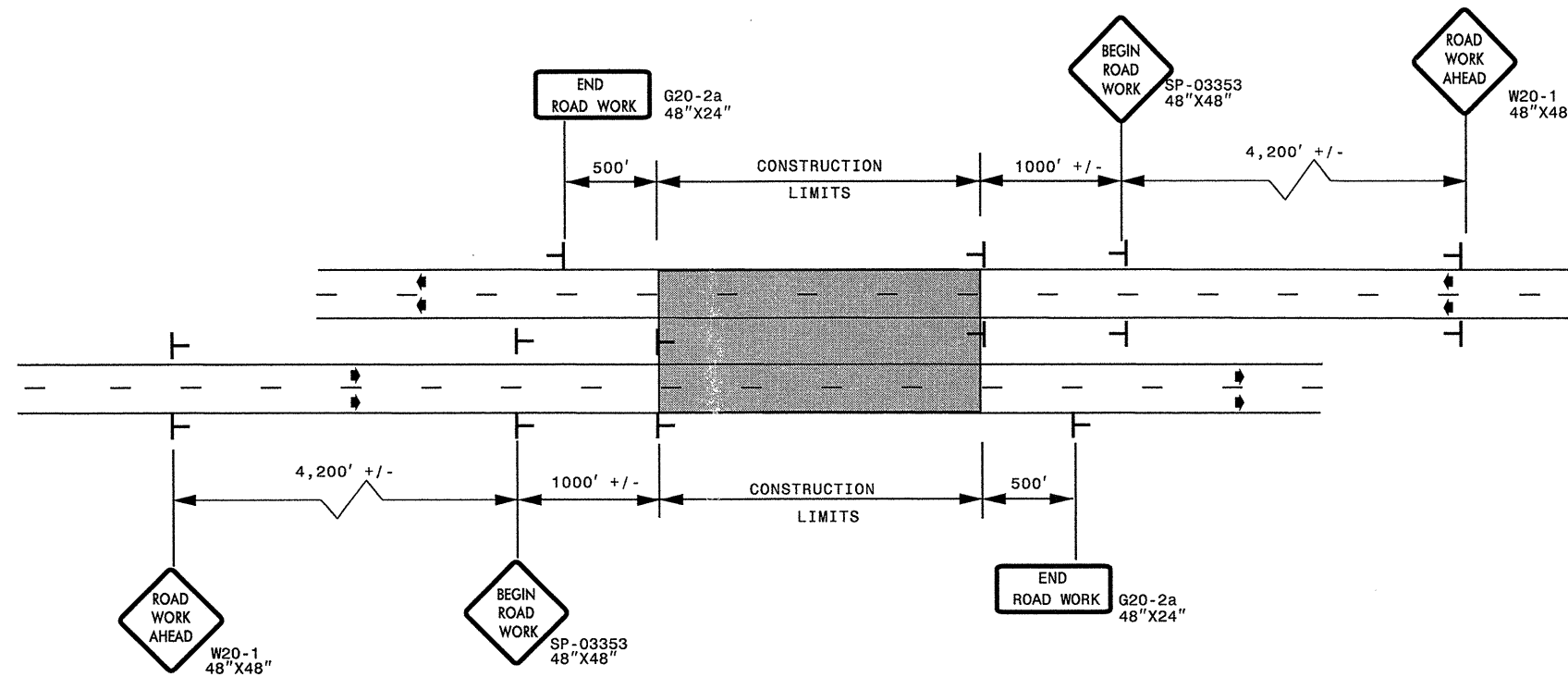
PROJECT NO	COUNTY	MAP NO	ROUTE	DESCRIPTION	LENGTH	WIDTH	4589000000-N	4685000000-E	4686000000-E	4690000000-E	4695000000-E	4697000000-E	4710000000-E	4721000000-E				4725000000-E				4810000000-E	4820000000-E	4825000000-E	4835000000-E	4840000000-N	4845000000-N					4900000000-N	4905000000-N								
							GENERIC TRAFFIC CONTROL ITEM	4" X 90 M WHITE THERMO	4" X 90 M YELLOW THERMO	4" X 120 M WHITE THERMO	4" X 120 M YELLOW THERMO	6" X 120 M WHITE THERMO	8" X 90 M WHITE THERMO	8" X 120 M WHITE THERMO	24" X 120 M WHITE THERMO	THERMO MSG SIGNAL 120 M	THERMO MSG AHEAD 120 M	THERMO MSG SCHOOL 120 M	THERMO MSG ONLY 120 M	THERMO LT ARROW 90 M	THERMO STR ARROW 90 M	THERMO STR & RT ARROW 90 M	THERMO MERGE LEFT ARROW 90 M	THERMO RT ARROW 90 M	THERMO STR & LT ARROW 90 M	4" WHITE PAINT	4" YELLOW PAINT	8" WHITE PAINT	12" YELLOW PAINT	24" WHITE PAINT	PAINT MSG SCHOOL	PAINT LT ARROW	PAINT STR ARROW	PAINT RT ARROW	PAINT STR & RT ARROW	PAINT MERGE LEFT ARROW	YELLOW & YELLOW MARKERS	SNOWPLOWABLE PAVEMENT MARKERS CRYSTAL/RED EA	SNOWPLOWABLE PAVEMENT MARKERS YELLOW/YELLOW EA		
7CR.10411.36	Guilford	1	US 29-70 / I-85 BUSINESS NORTHBOUND	FROM JOINT NORTH OF SR 1113 (KIVETT DRIVE) TO I-85	3.82	34-80	*	19,970	19,970	5,660	196	16		133	24	20			9	6	7	8														325					
		TOTAL FOR MAP NO. 1					3.82			19,970	19,970	5,660	196	16	2,100	133	24	20			9	6	7	8													325				
		2	OFF RAMP	FROM NORTHBOUND 29-70 / I-85 BUSINESS TO SR 1546 (GUILFORD COLLEGE ROAD)	0.149	24-110	*		825	825	400									2																					
		TOTAL FOR MAP NO. 2					0.149			825	825	400									2																				
		3	ON RAMP	FROM SR 1546 (GUILFORD COLLEGE ROAD) TO NORTHBOUND US 29-70 / I-85 BUSINESS	0.193	25-133	*		647	985														3																	
		TOTAL FOR MAP NO. 3					0.193			647	985														3																
		4	ON RAMP	FROM NORTHBOUND US 29-70 / I-85 BUSINESS TO I-85 SOUTHBOUND	0.045	21	*		240	240																															
		TOTAL FOR MAP NO. 4					0.045			240	240																														
		5	OFF RAMP	FROM NORTHBOUND I-85 TO SOUTHBOUND US 29-70 / I-85 BUSINESS	0.497	21-40	*		1,940	2,700																															
		TOTAL FOR MAP NO. 5					0.497			1,940	2,700																														
		6	US 29-70 / I-85 BUSINESS SOUTHBOUND	FROM I-85 TO JOINT NORTH OF SR 1113 (KIVETT DRIVE)	3.413	34-84	*		17,650	17,650	5,409	360			211	12	10			6	12		3	6														300			
		TOTAL FOR MAP NO. 6					3.413			17,650	17,650	5,409	360		2,200	211	12	10			6	12		3	6												2,200	300			
7	OFF RAMP	FROM SOUTHBOUND US 19-70 / I-85 BUSINESS TO SR 1546 (GUILFORD COLLEGE ROAD)	0.129	25-120	*		715	650	116				75					2																							
TOTAL FOR MAP NO. 7					0.129			715	650	116			75						2																						
8	ON RAMP	FROM SR 1546 (GUILFORD COLLEGE ROAD) TO SOUTHBOUND US 29-70 / I-85 BUSINESS	0.111	25-102	*		530	530	111													3																			
TOTAL FOR MAP NO. 8					0.111			530	530	111													3																		
9	NC 68 (WESTCHESTER DRIVE)	FROM SR 1993 (MAIN STREET) TO NON-SYSTEM (CHESTNUT STREET)	2.293	64-79	*				7,615	31,070			180	367				59	8	5		6			1,179	1,100									400	400					
TOTAL FOR MAP NO. 9					2.293				7,615	31,070			180	367					59	8	5		6			1,179	1,100							400	400						
10	NC 68 (EASTCHESTER DRIVE)	FROM SR 1993 (MAIN STREET) TO NON-SYSTEM (CENTENNIAL STREET)	1.436	64-98	*				7,940	18,300			25	734				63	37	11		12			7,940	18,300	25			734	12	63	37	12	11	225	225				
TOTAL FOR MAP NO. 10					1.436				7,940	18,300			25	734					63	37	11		12			7,940	18,300	25			734	12	63	37	12	11	225	225			
11	NC 68 NORTHBOUND	FROM SR 1536 (PENNY ROAD) TO NON-SYSTEM (AMERICHAUSE DRIVE)	2.516	32-80	*		12,110	12,110	7,115	26	14		1,366	411				18	21	2		16			3,321										200						
TOTAL FOR MAP NO. 11					2.516			12,110	12,110	7,115	26	14		1,366	411				18	21	2		16			3,321										200					
12	NC 68 SOUTHBOUND	FROM NON-SYSTEM (MILLWOOD SCHOOL ROAD) TO SR 1536 (PENNY ROAD)	2.62	32-100	*		11,670	11,920	7,714	1,026	42		1,636	574				8	39	31	5	16			3,458										200						
TOTAL FOR MAP NO. 12					2.62			11,670	11,920	7,714	1,026	42		1,636	574				8	39	31	5	16			3,458										200					
TOTAL FOR PROJ NO. 7CR.10411.36					17.222		1	66,297	67,580	42,080	50,978	72	4,300	3,282	2,430	36	30	12	8	198	115	30	17	62	2	15,898	19,400	25		734	12	63	37	12	11	1,650	625				
TOTAL FOR PROJ NO. 7CR.10411.36								133,877	133,877	93,058					86					424						35,298											2,275				
7CR.20411.36	Guilford	13	SR 1003 (NORTH MAIN STREET)	FROM SR 1993 (MAIN STREET) TO FORSYTH COUNTY LINE	0.751	26-69	*	7,345		1,322	6,448	64		278				17		4	2	4			893	1,330		24	22				4		2	75					
TOTAL FOR MAP NO. 13					0.751			7,345		1,322	6,448	64		278					17		4	2	4			893	1,330		24	22			4		2	75					
TOTAL FOR PROJ NO. 7CR.20411.36					0.751		1	7,345		1,322	6,448	64		278					17		4	2	4			893	1,330		24	22			4		2	75					
TOTAL FOR PROJ NO. 7CR.20411.36								7,345		7,770										27						2,223															
GRAND TOTAL					17.973		1	73,642	67,580	43,402	57,426	136	4,300	3,282	2,708	36	30	12	8	215	115	34	19	66	2	16,791	20,730	25	24	756	12	67	37	12	11	2	75	1,650	625		
GRAND TOTAL								141,222	141,222	100,828					86					451						37,521													2,275		



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

PROJ. REFERENCE NO.	SHEET NO.
7CR.10411.36	
7CR.20411.36	

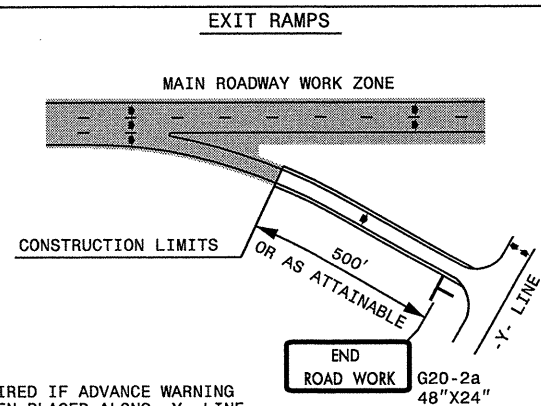
## DETAIL A



LEGEND	
	STATIONARY SIGN
◆	DIRECTION OF TRAFFIC FLOW

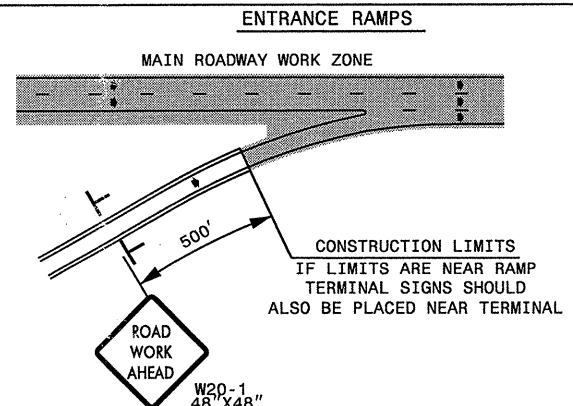
\* USE THE "\$250 SPEEDING PENALTY" SIGN, SPEED LIMIT SIGN, AND ORANGE PANEL; ONLY WHEN A "\$250 SPEEDING PENALTY" ORDINANCE HAS BEEN ISSUED BY THE REGIONAL TRAFFIC ENGINEER.

## DETAIL B



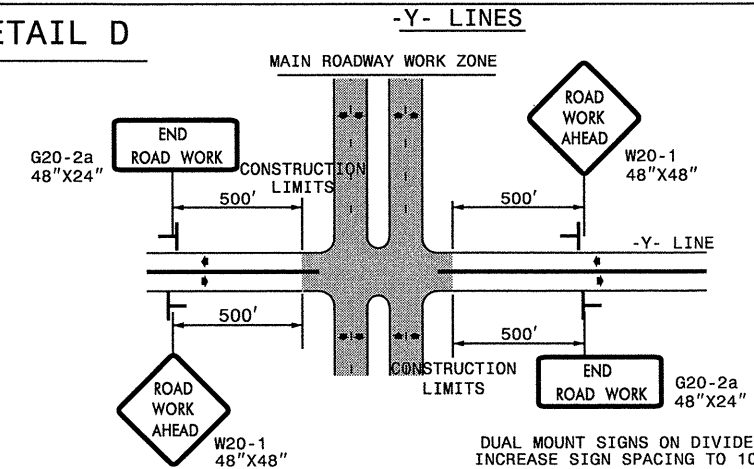
NOTE: SIGN NOT REQUIRED IF ADVANCE WARNING SIGNS HAVE BEEN PLACED ALONG -Y- LINE THAT RAMP INTERSECTS. IF CONSTRUCTION LIMITS ARE AT END OF RAMP, PLACE SIGN AT END OF RAMP.

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

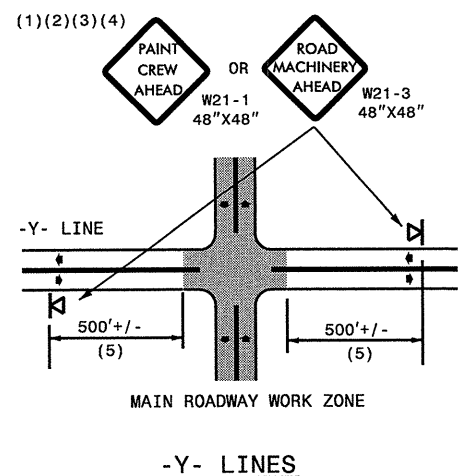
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### GENERAL NOTES

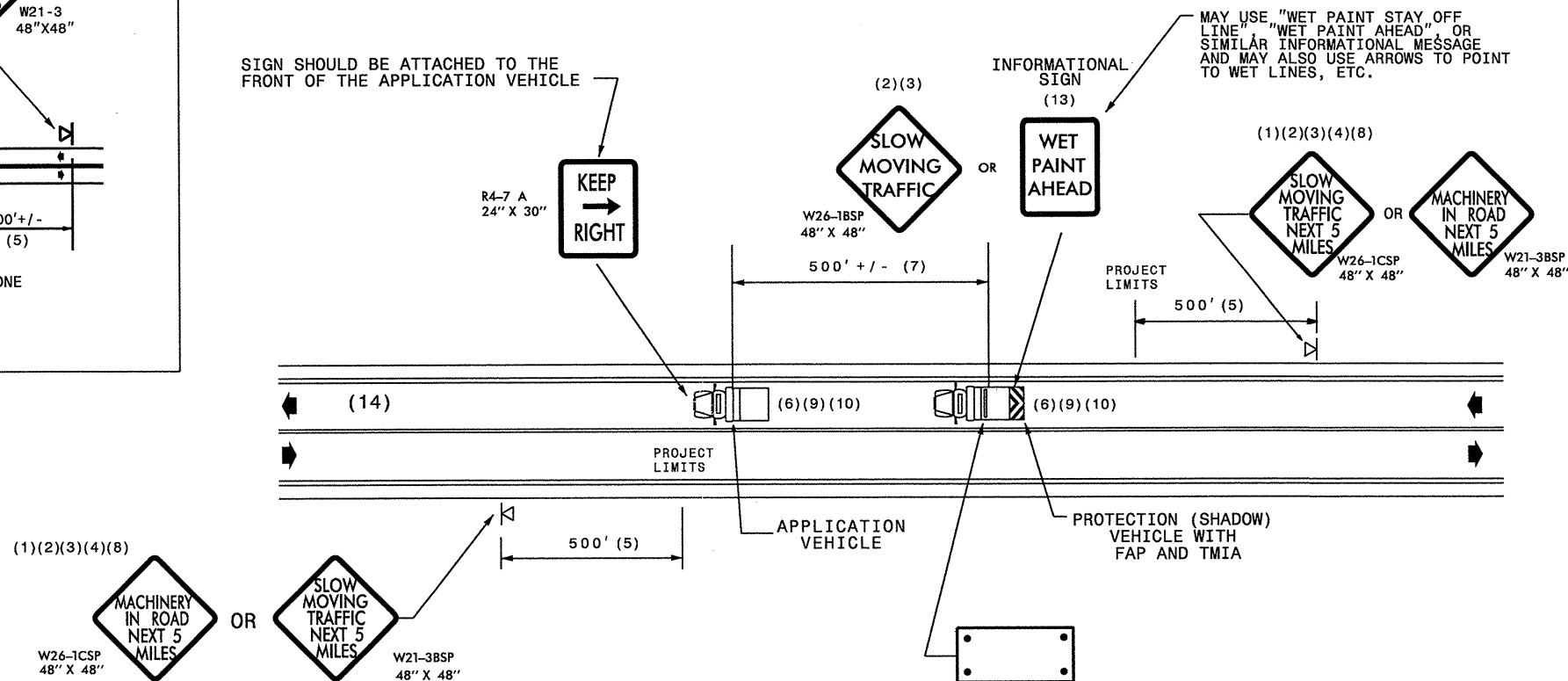
- (1) THE FOLLOWING OPTIONS MAY BE USED FOR ADVANCE WARNING SIGNS:
  - A. TRUCK MOUNTED SIGNS
  - B. TRUCK MOUNTED CHANGEABLE MESSAGE SIGN (CMS)
  - C. GROUND MOUNTED ADVANCE WARNING SIGNS (MUST CIRCLE TO PICK UP SIGNS)
  - D. GROUND MOUNTED CHANGEABLE MESSAGE SIGN (CMS) (MUST USE CIRCLE TO PICK UP SIGNS)
- (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

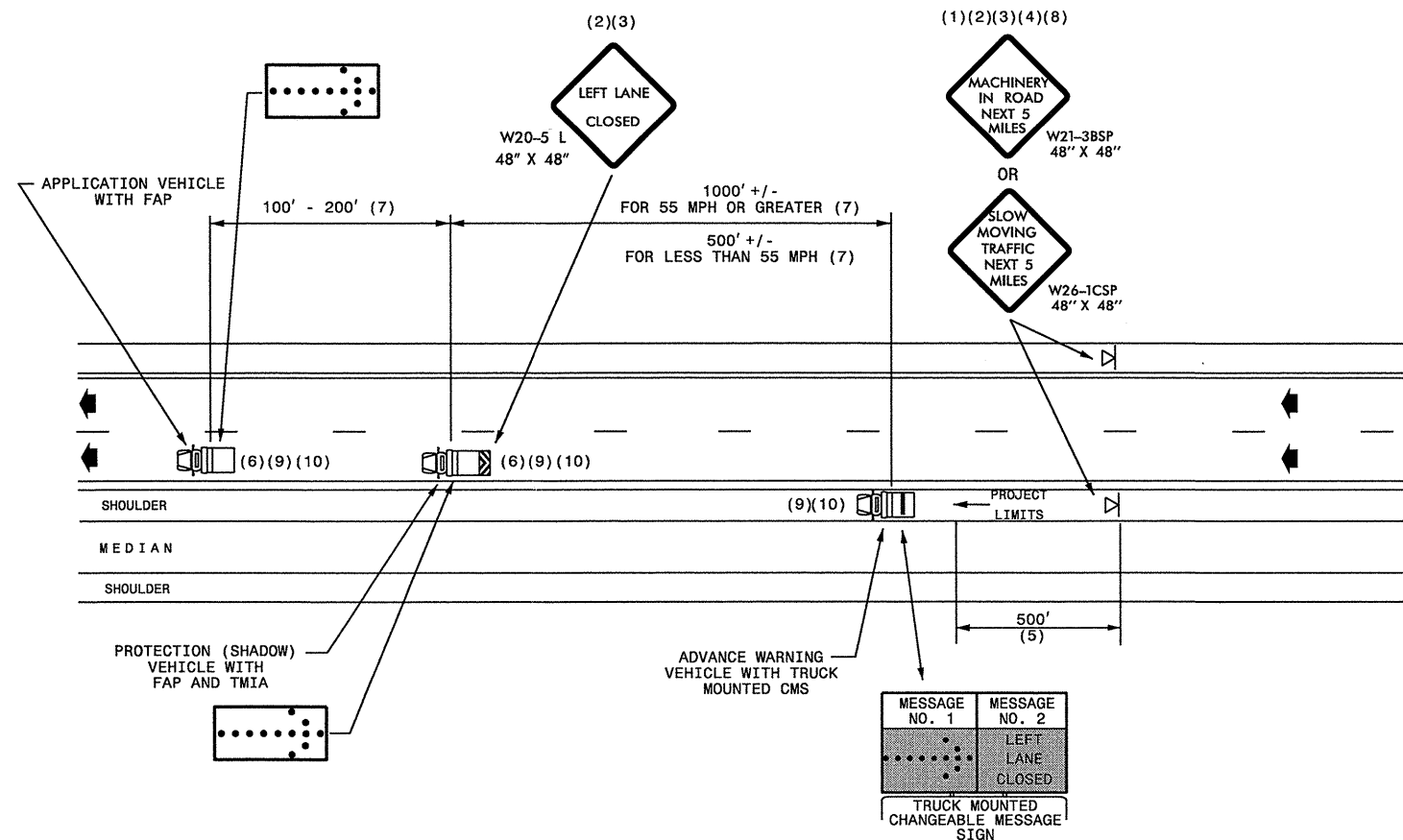
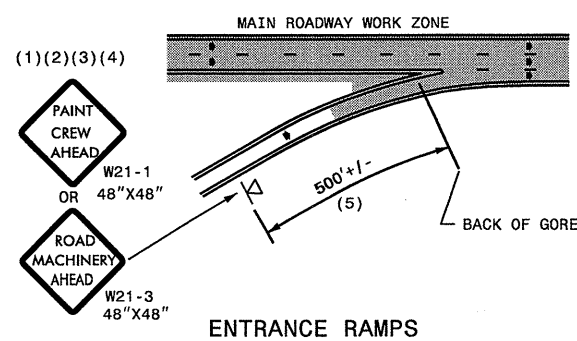
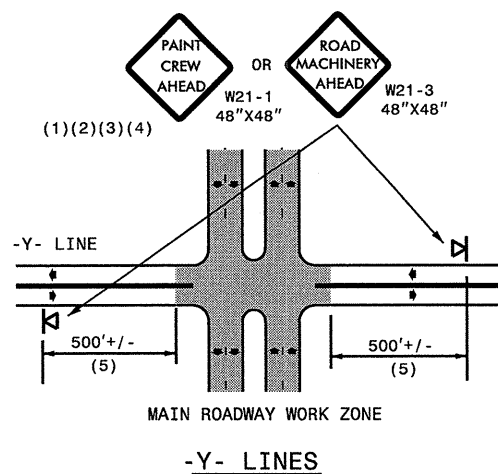
### GENERAL NOTES

- (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)
  - 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 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 ACCOMODATE 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

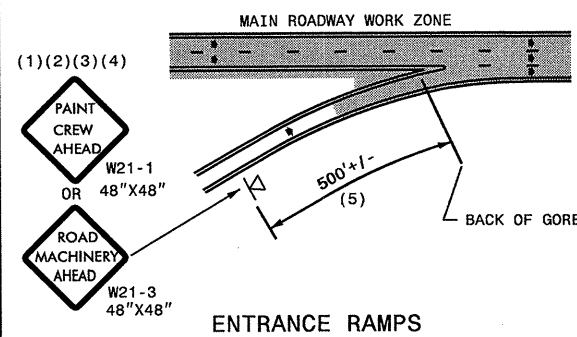
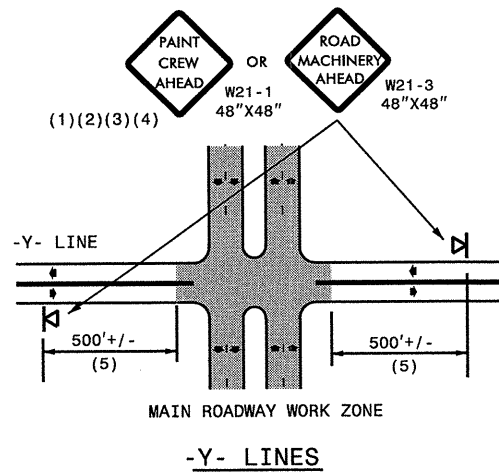
**DRAWING NUMBER 7**  
 IMPLEMENTATION DATE: 07/01/97  
 REVISED: 11/03/04

### GENERAL NOTES

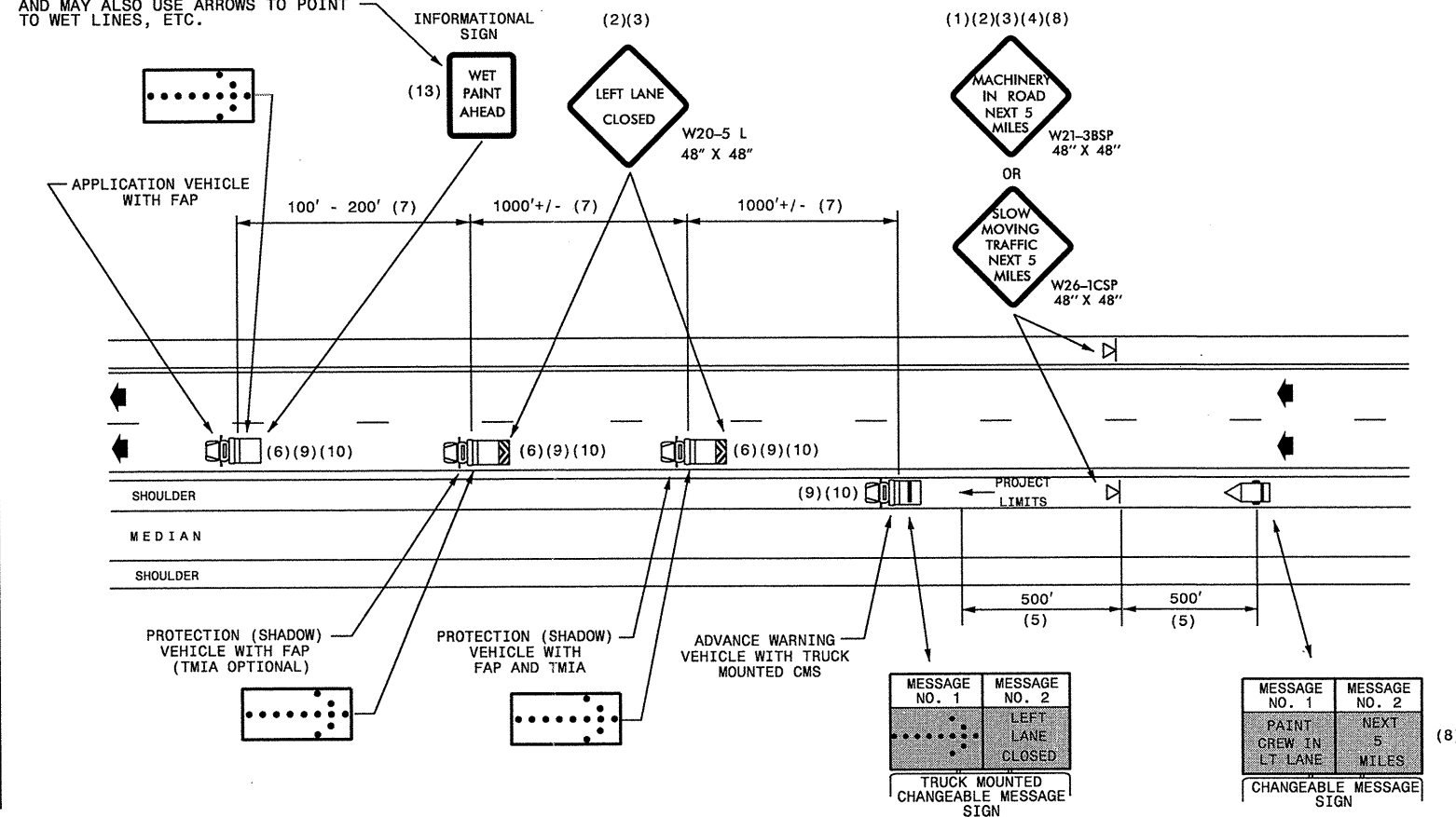
- (1) THE FOLLOWING OPTIONS MAY BE USED FOR ADVANCE WARNING SIGNS:
  - A. TRUCK MOUNTED SIGNS
  - B. TRUCK MOUNTED CHANGEABLE MESSAGE SIGN (CMS)
  - C. GROUND MOUNTED ADVANCE WARNING SIGNS (MUST CIRCLE TO PICK UP SIGNS)
  - D. GROUND MOUNTED CHANGEABLE MESSAGE SIGN (CMS) (MUST USE CIRCLE TO PICK UP SIGNS)
- (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 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.
- (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.

### 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



MAY USE "WET PAINT STAY OFF LINE", "WET PAINT AHEAD", OR SIMILAR INFORMATIONAL MESSAGE AND MAY ALSO USE ARROWS TO POINT TO WET LINES, ETC.

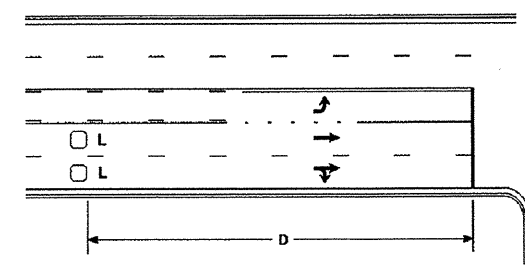


## MOVING OPERATION CARAVAN

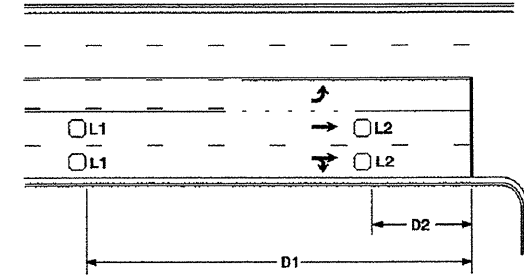
(OPERATIONS TRAVELING 3 MPH OR FASTER)  
PLACING PAVEMENT MARKING OR MARKERS  
ON INTERSTATE ROADWAYS

**DRAWING NUMBER 8**  
IMPLEMENTATION DATE: 11/03/04  
REVISED:

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



OR



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

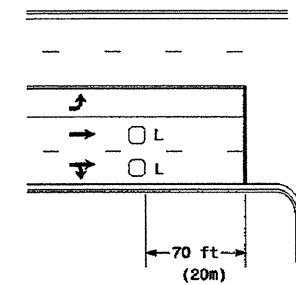
Speed Limit mph (km/hr)	D1 ft (m)	D2 ft (m)
40 (64)	250 (75)	80 (25)
45 (72)	300 (90)	90 (27)
50 (80)	355 (110)	100 (30)
55 (88)	420 (130)	110 (35)

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

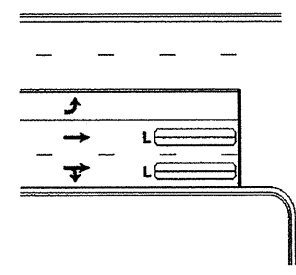
Volume Density Operation

"Stretch" Operation

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



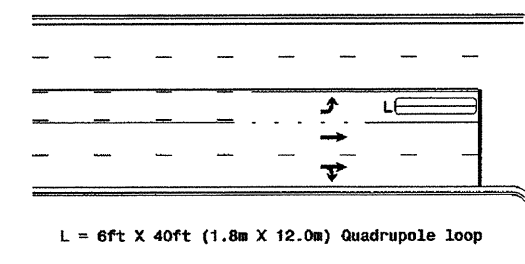
OR



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

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

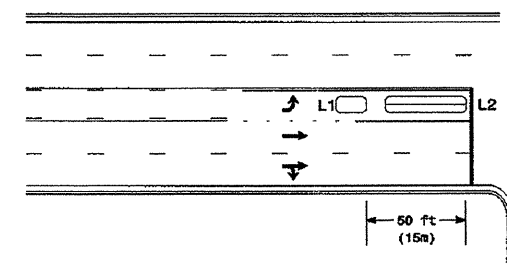
### Left Turn Lane Detection



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

Presence Loop Detection

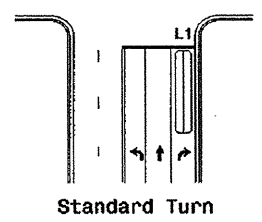
OR



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

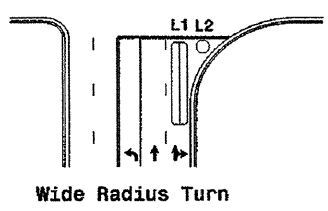
Queue Loop Detection

### Right Turn Lane Detection

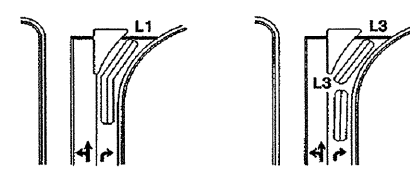


Standard Turn

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

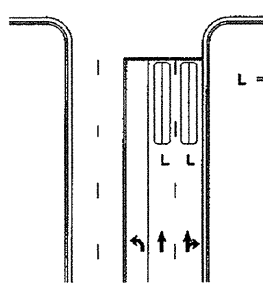


Wide Radius Turn



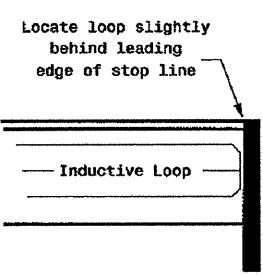
Channelized Turn

### Side Street Detection



L = 6ft X 40ft (1.8m X 12.0m)  
Quadrapole 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

Quadrapole 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

#### Typical Loop Locations

SCALE N/A	<p>PLANNED BY: June 2006</p> <p>PREPARED BY: P. L. Alexander</p> <p>REVISIONS:</p> <p>DATE: 12/1/06</p>	<p>REVIEWED BY:</p> <p>DATE:</p> <p>SIGNATURE:</p> <p>DATE:</p>
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11-400-2006, M22  
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DIVISION OF HIGHWAYS  
RALEIGH, N.C.

11-08

ENGLISH DETAIL DRAWING FOR  
**INDUCTIVE DETECTION LOOPS**

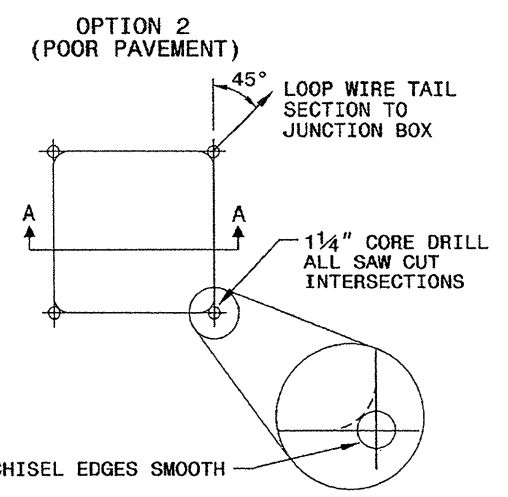
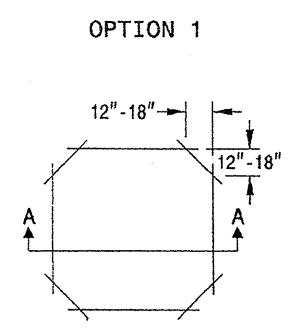
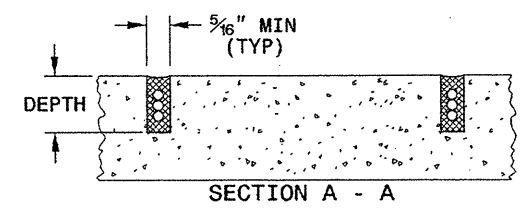
SHEET 1 OF 3  
**1725D01**

**CONVENTIONAL 4-SIDED LOOP**

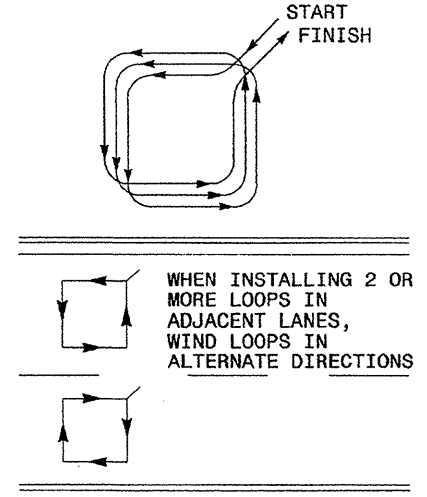
SAW CUT OPTIONS

SAW SLOT DEPTH CHART

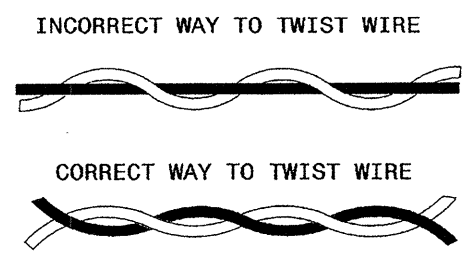
DEPTH (IN)	NO. OF WIRE TURNS				
	2	3	4	5	6
CONCRETE	2.0	2.0	2.5	2.5	3.0
ASPHALT	2.0	2.5	3.0	3.0	3.0



LOOP WINDING METHOD



LOOP WIRE TWISTING METHOD

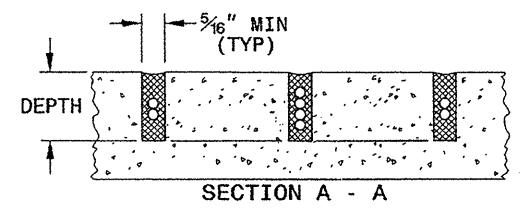
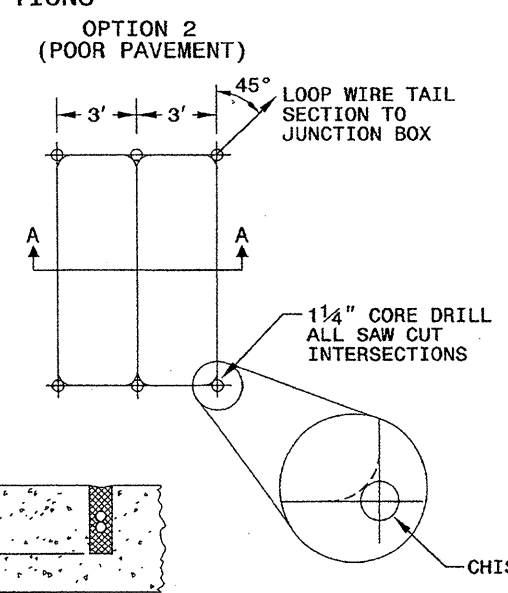
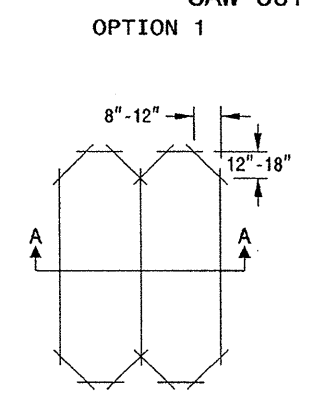


NOTES

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.

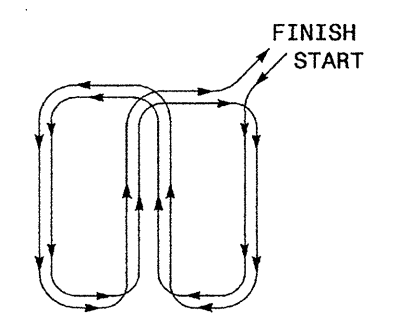
**QUADRUPOLE LOOP**

SAW CUT OPTIONS



DEPTH IS 2.5" FOR CONCRETE AND 3.0" FOR ASPHALT

LOOP WINDING METHOD



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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: *Milton I. Dean* DATE: 1/24/08

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DIVISION OF HIGHWAYS  
RALEIGH, N.C.

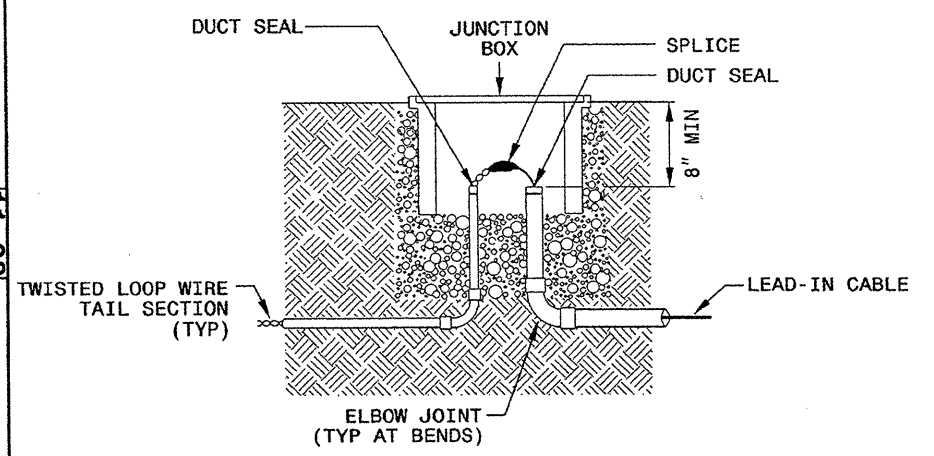
11-08

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

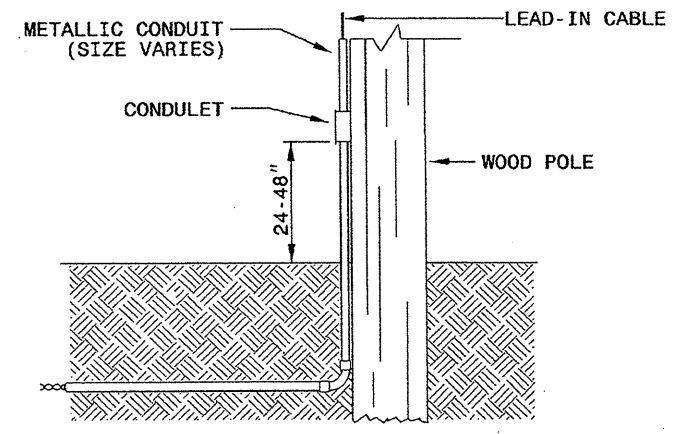
SHEET 2 OF 3  
**1725D01**

**LOOP WIRE SPLICE POINT DETAILS**

**LOOP WIRE AT JUNCTION BOX**



**LOOP WIRE AT POLE**

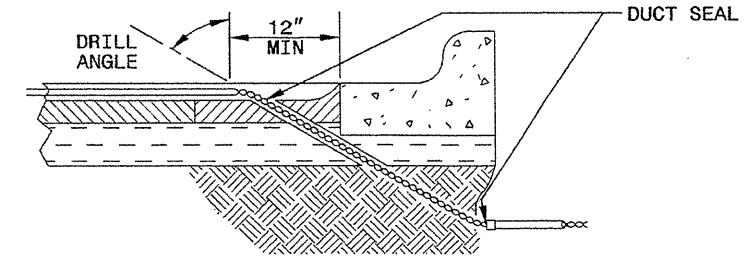


**NOTE**

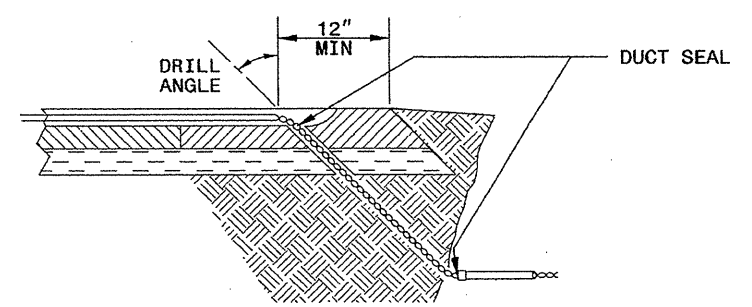
SPLICE ALL LOOP WIRE TAIL SECTIONS/LEAD-IN CABLE IN JUNCTION BOXES OR APPROVED CONDULETS.

**LOOP WIRE PAVEMENT EDGE DETAILS**

**LOOP WIRE AT CURB & GUTTER SECTION**



**LOOP WIRE AT PAVEMENT SECTION**



**NOTES**

1. DO NOT EXCAVATE UNDER CURB AND GUTTER SECTIONS FOR CONDUIT INSTALLATION.
2. TWIST LOOP WIRE TAIL SECTIONS FROM WHERE LOOP WIRE TAIL LEAVES SAW CUT TO JUNCTION BOX, INCLUDING THROUGH CONDUIT.
3. 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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ENGLISH DETAIL DRAWING FOR  
**INDUCTIVE DETECTION LOOPS**  
LOOP WIRE DETAILS

SHEET 2 OF 3  
**1725D01**

See Plate for Title

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Garner, NC 27529

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Milton J. Dean 11/24/08  
SIGNATURE DATE

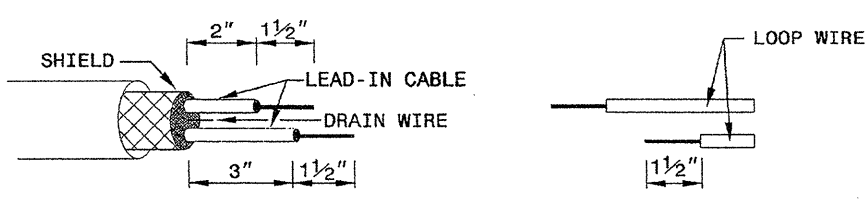
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 RALEIGH, N.C.

11-08

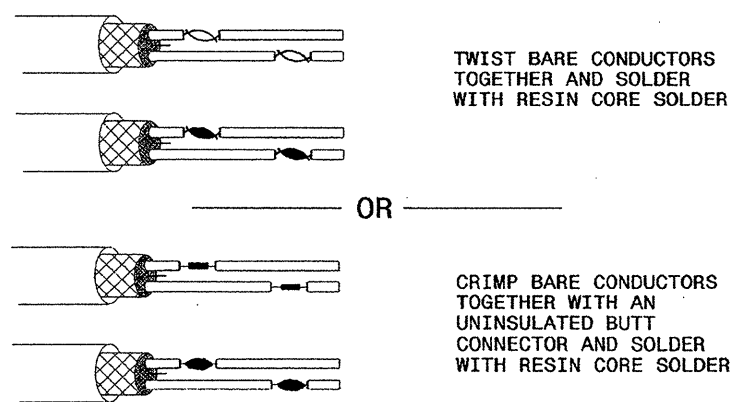
ENGLISH DETAIL DRAWING FOR  
**INDUCTIVE DETECTION LOOPS**  
 SPLICING FOR LEAD-IN CABLE AND LOOP WIRE

SHEET 3 OF 3  
**1725D01**

STEP 1. STRIP LOOP WIRE AND LEAD-IN CABLE

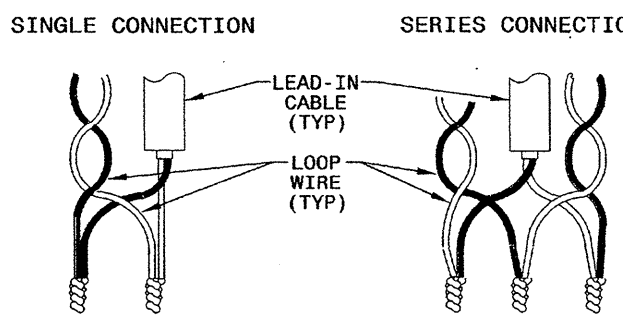


STEP 2. CONNECT AND SOLDER

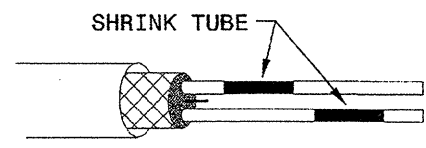


BOND SHIELD DRAIN WIRE AT SPLICE SECTIONS (DO NOT GROUND)

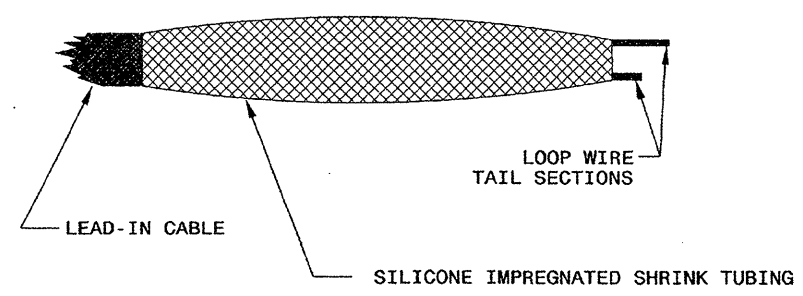
LOOP WIRE AND LEAD-IN CABLE CONNECTION DETAILS



STEP 3. INSULATE EACH SOLDER JOINT SEPARATELY



STEP 4. ENVIRONMENTALLY PROTECT SPLICE



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

SHEET 3 OF 3  
**1725D01**

See Plate for Title

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*Milton I. Dean* 11/24/08  
 SIGNATURE DATE

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