

05/08/09

CONTRACT NO.: WBS ELEMENT: 45458.3.1

DRAWN BY: IGC DATE: 08/04/2011
CHECKED BY: DATE:

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CURRITUCK COUNTY

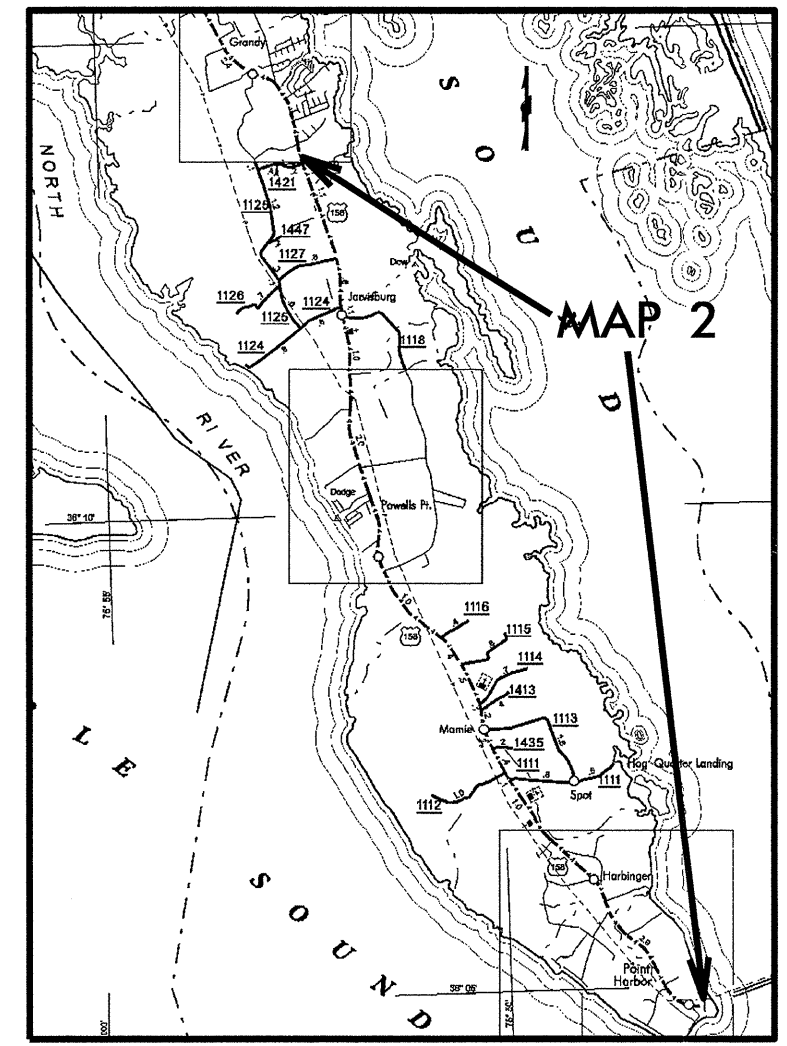
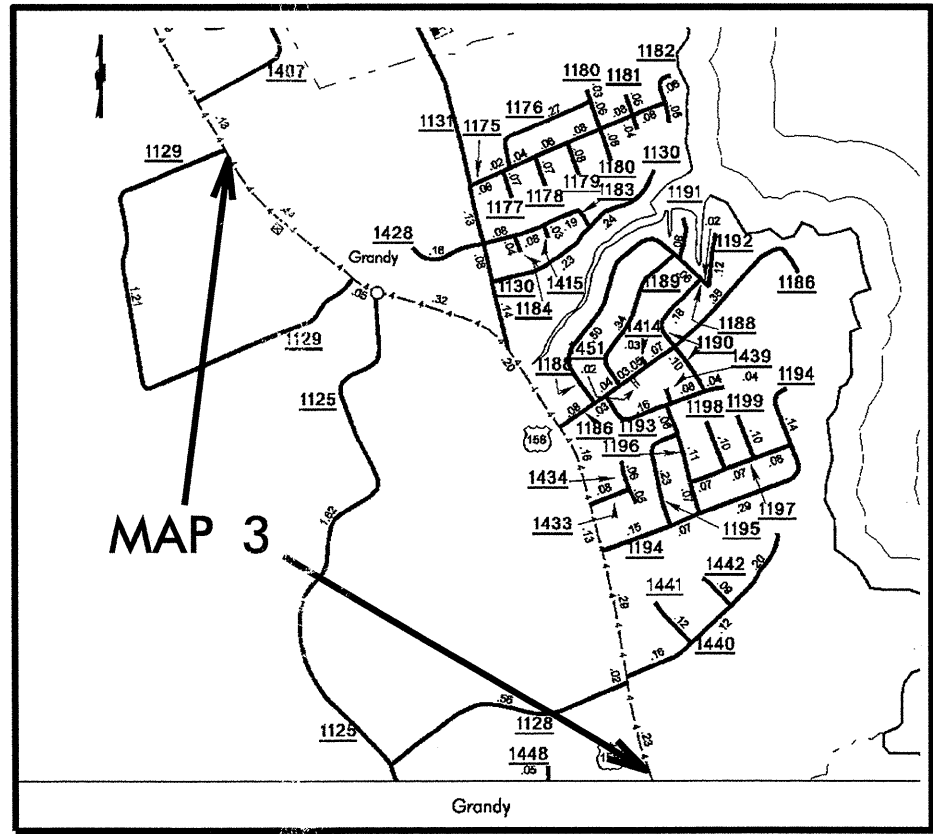
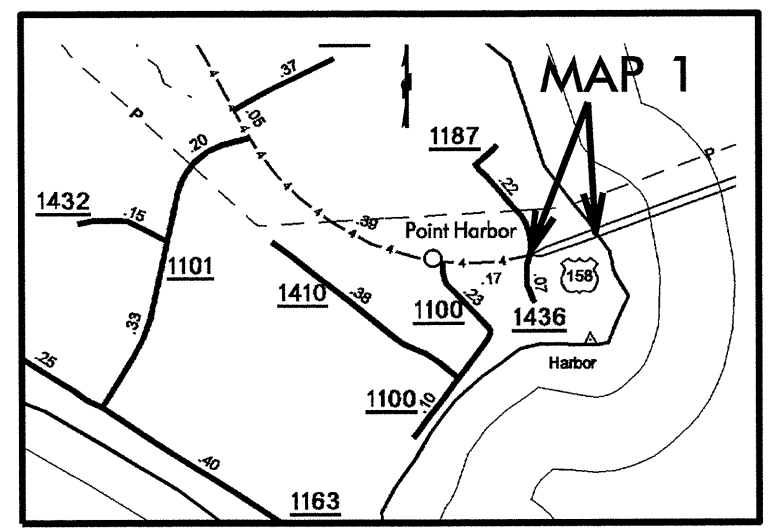
LOCATION: MAP 1 US HWY 158 FROM WRIGHT MEMORIAL BRIDGE TO BEGIN 5 LANE SECTION

MAP 2 US HWY 158 FROM BEGIN 5 LANE SECTION TO BEGIN CURB AND GUTTER IN GRANDY

MAP 3 US HWY 158 FROM BEGIN CURB AND GUTTER TO END CURB AND GUTTER IN GRANDY

TYPE OF WORK: MILLING, RESURFACING & PAVEMENT MARKINGS

STATE	STATE PROJECT REFERENCE NO.	RISKS NO.	TOTAL SHEETS
N.C.	R-5517	1	1
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
45458.3.1	NHS-0158(54)	MAP 1	
45458.3.1	NHS-0158(54)	MAP 2	
45458.3.1	NHS-0158(54)	MAP 3	



NTS

PROJECT LENGTH

LENGTH OF ROADWAY PROJECT MAP 1 = 0.09 MILES
 LENGTH OF ROADWAY PROJECT MAP 2 = 11.75 MILES
 LENGTH OF ROADWAY PROJECT MAP 3 = 1.76 MILES

Prepared in the Office of
DIVISION OF HIGHWAYS
 113 Airport Dr., Edenton NC, 27932

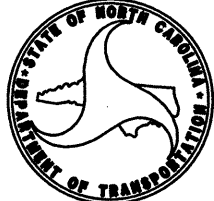
2006 STANDARD SPECIFICATIONS

LETTING DATE:
 November 15, 2011

W.B. HOBBS, P.E.
 DIVISION PROJECT MANAGER

C.E. SLACHTA
 DIVISION PROPOSALS ENGINEER

DIVISION OF HIGHWAYS
 STATE OF NORTH CAROLINA



09/08/09

CONTRACT NO.: WBS ELEMENT: 45458.3.1

DRAWN BY: JGC DATE: 8/4/2011
 CHECKED BY: DATE:

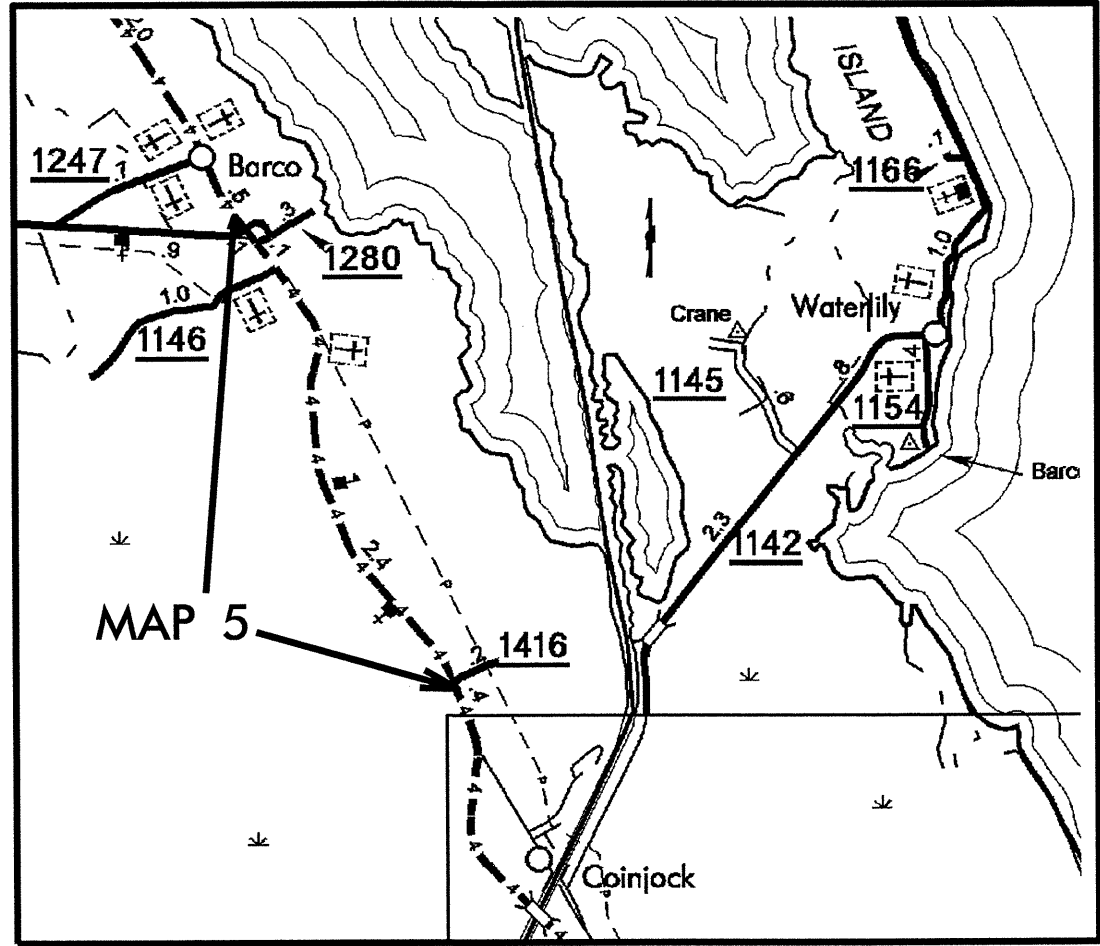
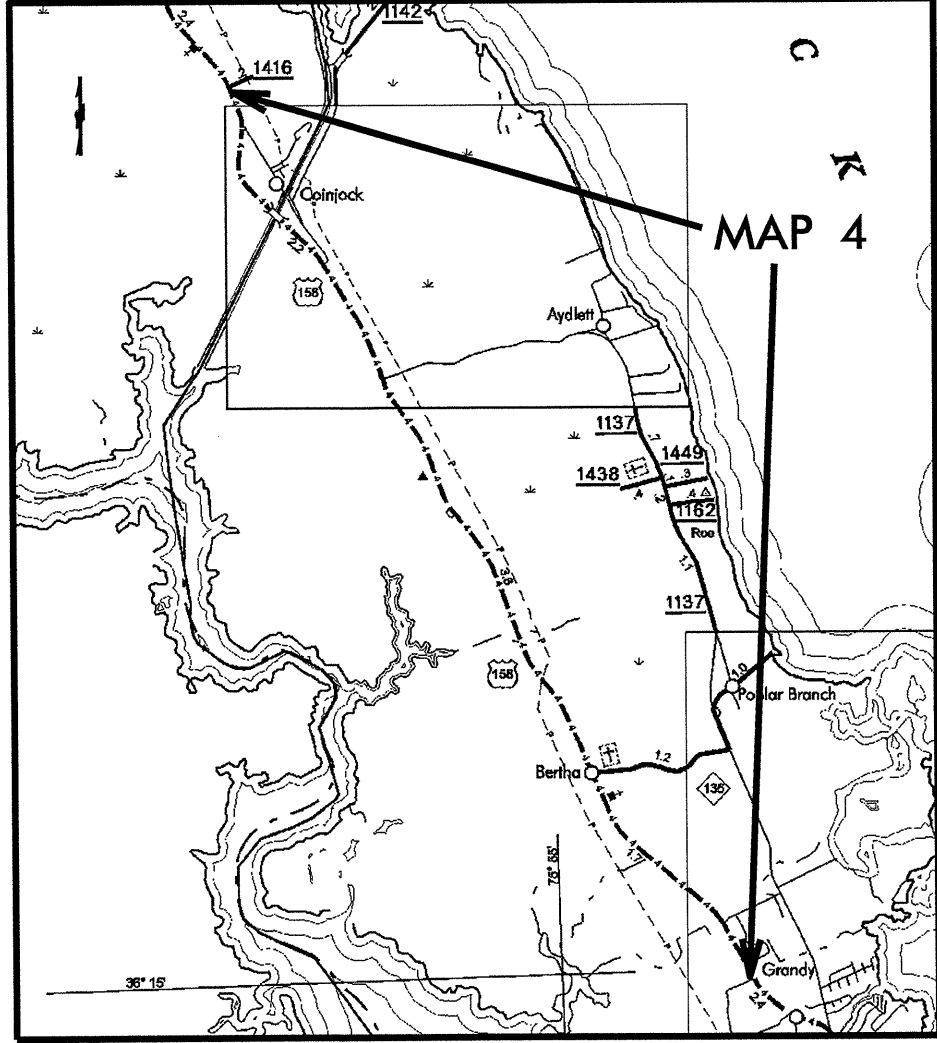
STATE OF NORTH CAROLINA
 DIVISION OF HIGHWAYS

CURRITUCK COUNTY

LOCATION: MAP 4 US HWY 158 FROM END CURB AND GUTTER IN GRANDY
 TO BEGIN CURB AND GUTTER IN COINJOCK
 MAP 5 US HWY 158 FROM BEGIN CURB AND GUTTER IN GRANDY
 TO NC 168

TYPE OF WORK: MILLING, RESURFACING & PAVEMENT MARKINGS

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-5517	2	
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
45458.3.1	NHS-0158(54)	MAP 4	
45458.3.1	NHS-0158(54)	MAP 5	



NTS

PROJECT LENGTH

LENGTH OF ROADWAY PROJECT MAP 4 = 7.91 MILES
 LENGTH OF ROADWAY PROJECT MAP 5 = 2.75 MILES

Prepared in the Office of:
DIVISION OF HIGHWAYS
 113 Airport Dr., Edenton NC, 27932

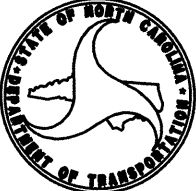
2006 STANDARD SPECIFICATIONS

LETTING DATE: _____

W.B. HOBBS, P.E.
 DIVISION PROJECT MANAGER

C.E. SLACHTA
 DIVISION PROPOSALS ENGINEER

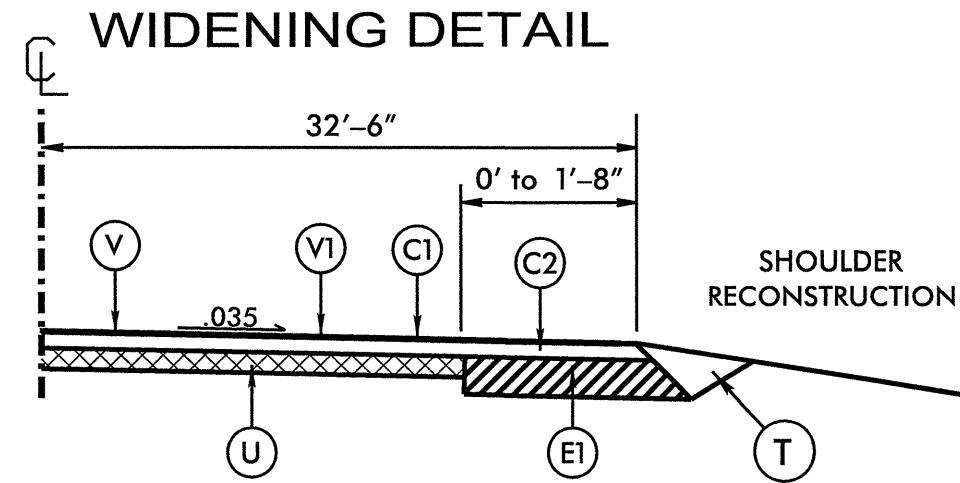
DIVISION OF HIGHWAYS
 STATE OF NORTH CAROLINA



PAVEMENT SCHEDULE

C1	PROP. APPROX. 3/4" OPEN-GRADED ASPHALT FRICTION COURSE, TYPE FC 2 MODIFIED, AT AN AVERAGE RATE OF 90 LBS. PER SQ. YD.
C2	PROP. APPROX. 1 1/2" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5C, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YD. PER INCH OF DEPTH.
E1	PROP. APPROX. 5.5" ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 627 LBS. PER SQ. YD.
T	EARTH MATERIAL
U	EXISTING PAVEMENT.
V	MILLING BITUMINOUS PAVEMENT 3/4" DEPTH.
V1	MILLING BITUMINOUS PAVEMENT 1 1/2" DEPTH.

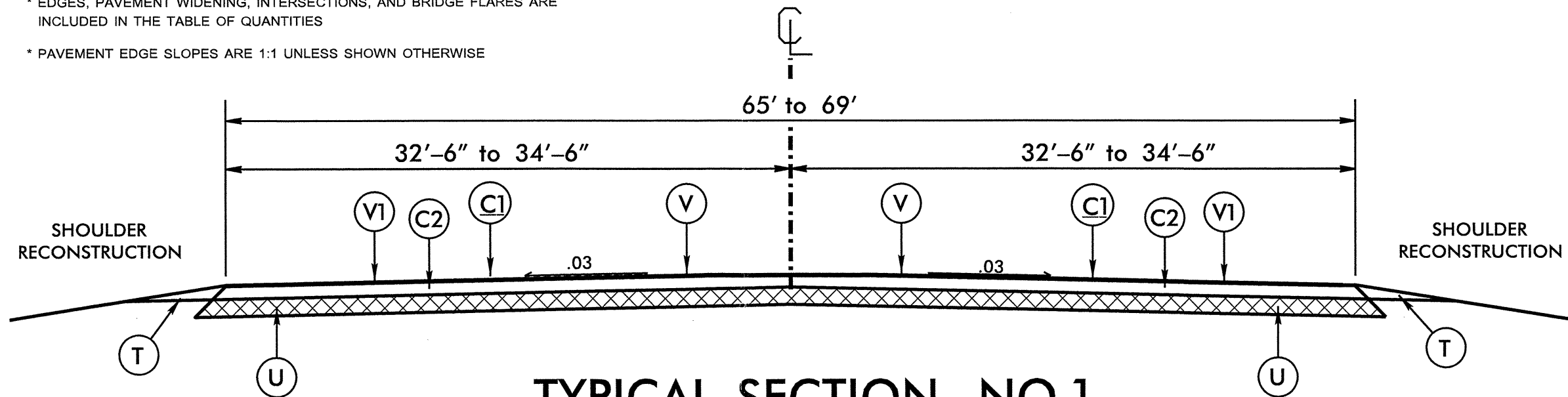
PROJECT REFERENCE NO.	SHEET NO.
R-5517	3



USE WITH MAP #4 FROM STA. 1033+89 TO STA. 1050+13
NORTH BOUND LANE ONLY

NOTES:

- * WHILE MILLING BITUMINOUS PAVEMENT 1 1/2" IN DEPTH, THE CONTRACTOR SHALL USE THE OUTSIDE EDGE OF PAVEMENT OR EDGE OF THE EXISTING CURB & GUTTER AS A REFERENCE POINT TO BEGIN MILLING THE PROPOSED CROSS-SLOPE
- * ALL PAVED S.R. ROADS TO BE RESURFACED TO THE ENDS OF THE RADI., OR AS DIRECTED BY THE ENGINEER
- * EDGES, PAVEMENT WIDENING, INTERSECTIONS, AND BRIDGE FLARES ARE INCLUDED IN THE TABLE OF QUANTITIES
- * PAVEMENT EDGE SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE



TYPICAL SECTION NO.1

USE WITH MAP 2 & MAP 4

NTS

*****SYTIME*****

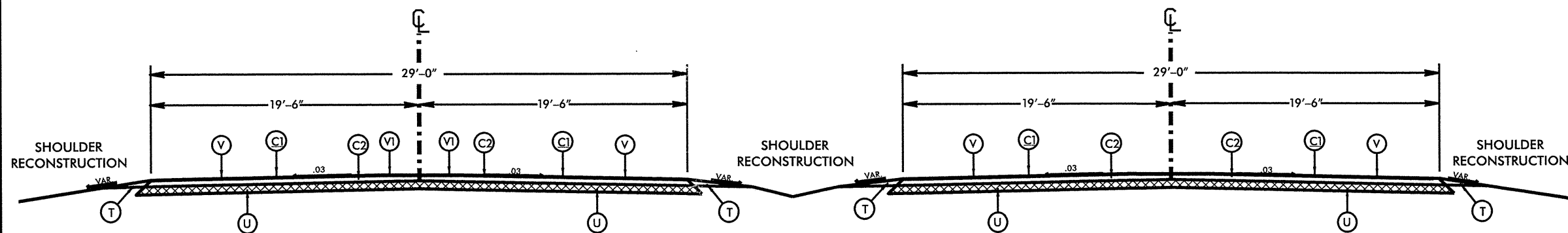
PAVEMENT SCHEDULE

PROJECT REFERENCE NO.	SHEET NO.
R-5517	4

C1	PROP. APPROX. 3/4" OPEN-GRADED ASPHALT FRICTION COURSE, TYPE FC 1 /FC 2 MODIFIED, AT AN AVERAGE RATE OF 90 LBS. PER SQ. YD.
C2	PROP. APPROX. 1 1/2" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5C, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YD. PER INCH OF DEPTH.
T	EARTH MATERIAL
U	EXISTING PAVEMENT.
V	MILLING BITUMINOUS PAVEMENT 3/4" DEPTH.
V1	MILLING BITUMINOUS PAVEMENT .11/2" DEPTH.

NOTES:

- * WHILE MILLING BITUMINOUS PAVEMENT 1 1/2" IN DEPTH, THE CONTRACTOR SHALL USE THE OUTSIDE EDGE OF PAVEMENT OR EDGE OF THE EXISTING CURB & GUTTER AS A REFERENCE POINT TO BEGIN MILLING THE PROPOSED CROSS-SLOPE
- * ALL PAVED S.R. ROADS TO BE RESURFACED TO THE ENDS OF THE RADI., OR AS DIRECTED BY THE ENGINEER
- * EDGES, PAVEMENT WIDENING, INTERSECTIONS, AND BRIDGE FLARES ARE INCLUDED IN THE TABLE OF QUANTITIES
- * PAVEMENT EDGE SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE



TYPICAL SECTION NO.2

USE WITH MAP 1
FROM STA. 0+00 TO STA. 4+89

NTS

PAVEMENT SCHEDULE

PROJECT REFERENCE NO.

R-5517

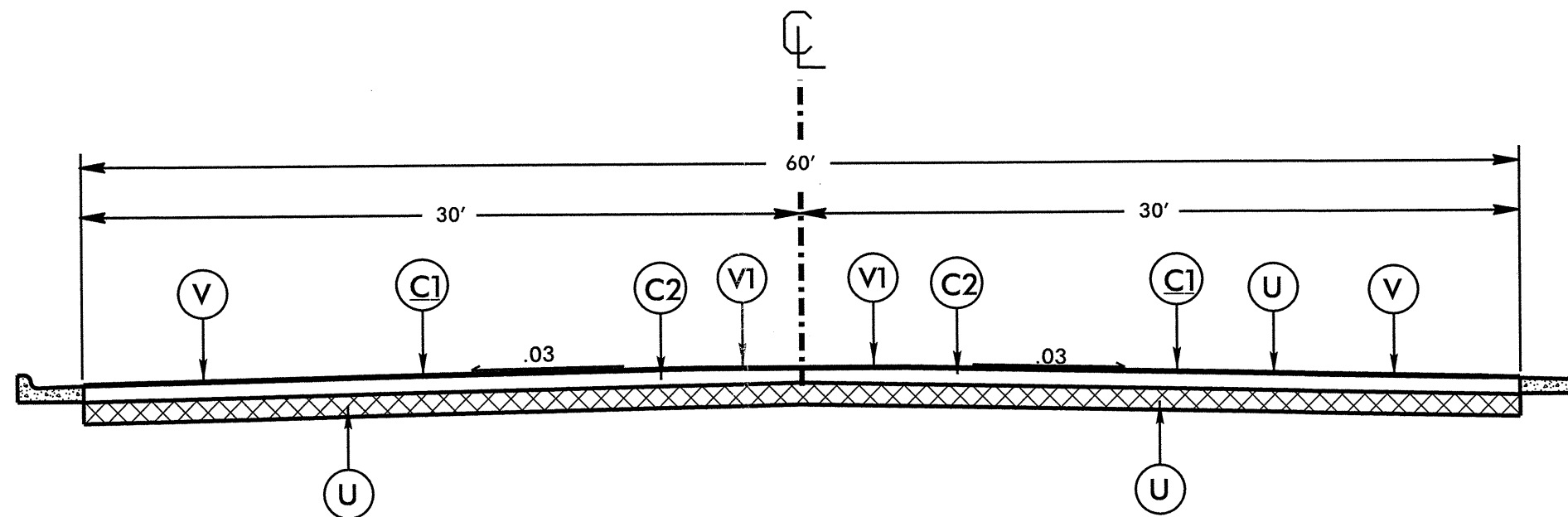
SHEET NO.

5

C1	PROP. APPROX. 3/4" OPEN-GRADED ASPHALT FRICTION COURSE, TYPE FC 1 /FC 2 MODIFIED, AT AN AVERAGE RATE OF 90 LBS. PER SQ. YD.
C2	PROP. APPROX. 1 1/2" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5C, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YD.
U	EXISTING PAVEMENT.
V	MILLING BITUMINOUS PAVEMENT 3/4" DEPTH.
V1	MILLING BITUMINOUS PAVEMENT .11/2" DEPTH.

NOTES:

- * WHILE MILLING BITUMINOUS PAVEMENT 1 1/2" IN DEPTH, THE CONTRACTOR SHALL USE THE OUTSIDE EDGE OF PAVEMENT OR EDGE OF THE EXISTING CURB & GUTTER AS A REFERENCE POINT TO BEGIN MILLING THE PROPOSED CROSS-SLOPE
- * ALL PAVED S.R. ROADS TO BE RESURFACED TO THE ENDS OF THE RADI., OR AS DIRECTED BY THE ENGINEER
- * EDGES, PAVEMENT WIDENING, INTERSECTIONS, AND BRIDGE FLARES ARE INCLUDED IN THE TABLE OF QUANTITIES
- * PAVEMENT EDGE SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE



TYPICAL SECTION NO.3

USE WITH MAP 3 & MAP 5

NTS

PROJECT NO.	SHEET NO.	TOTAL NO.
R-5517	6	

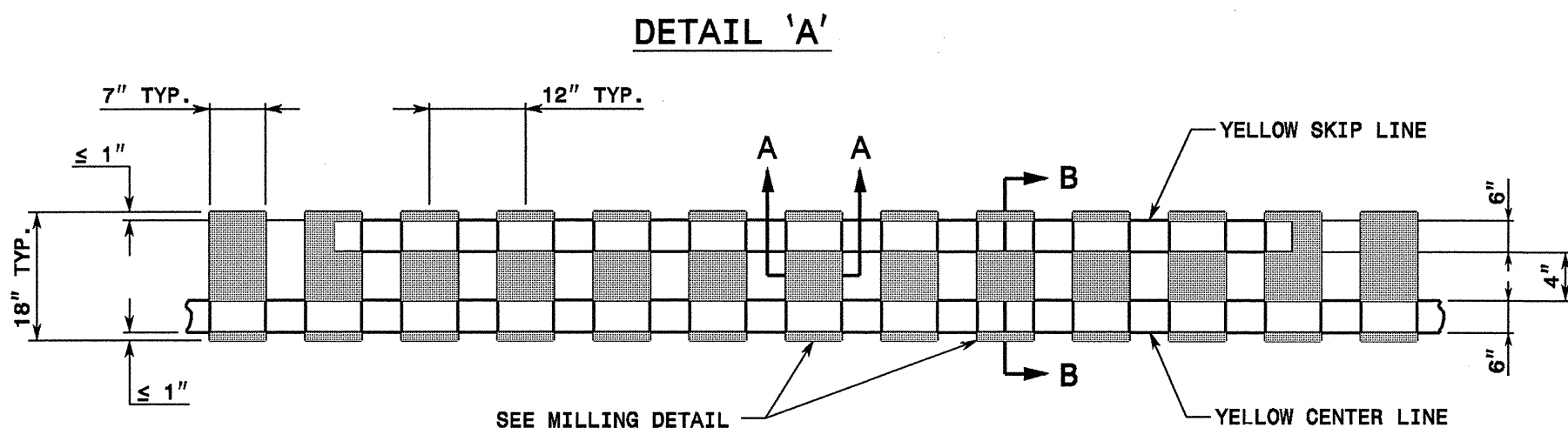
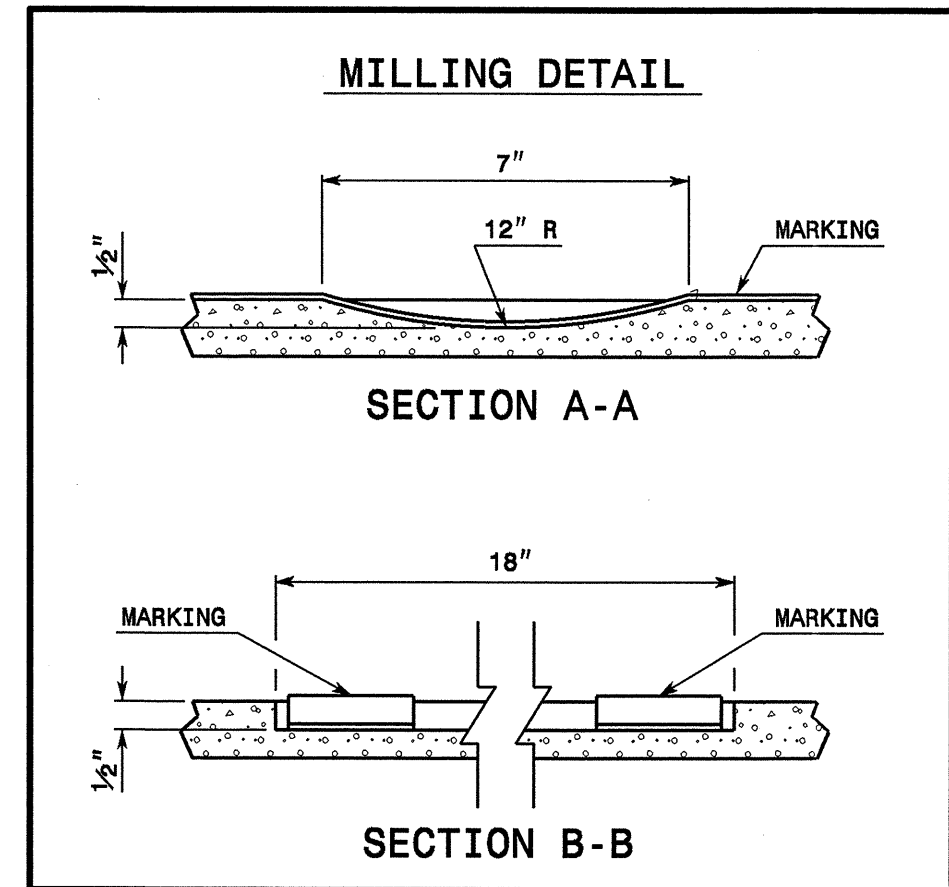
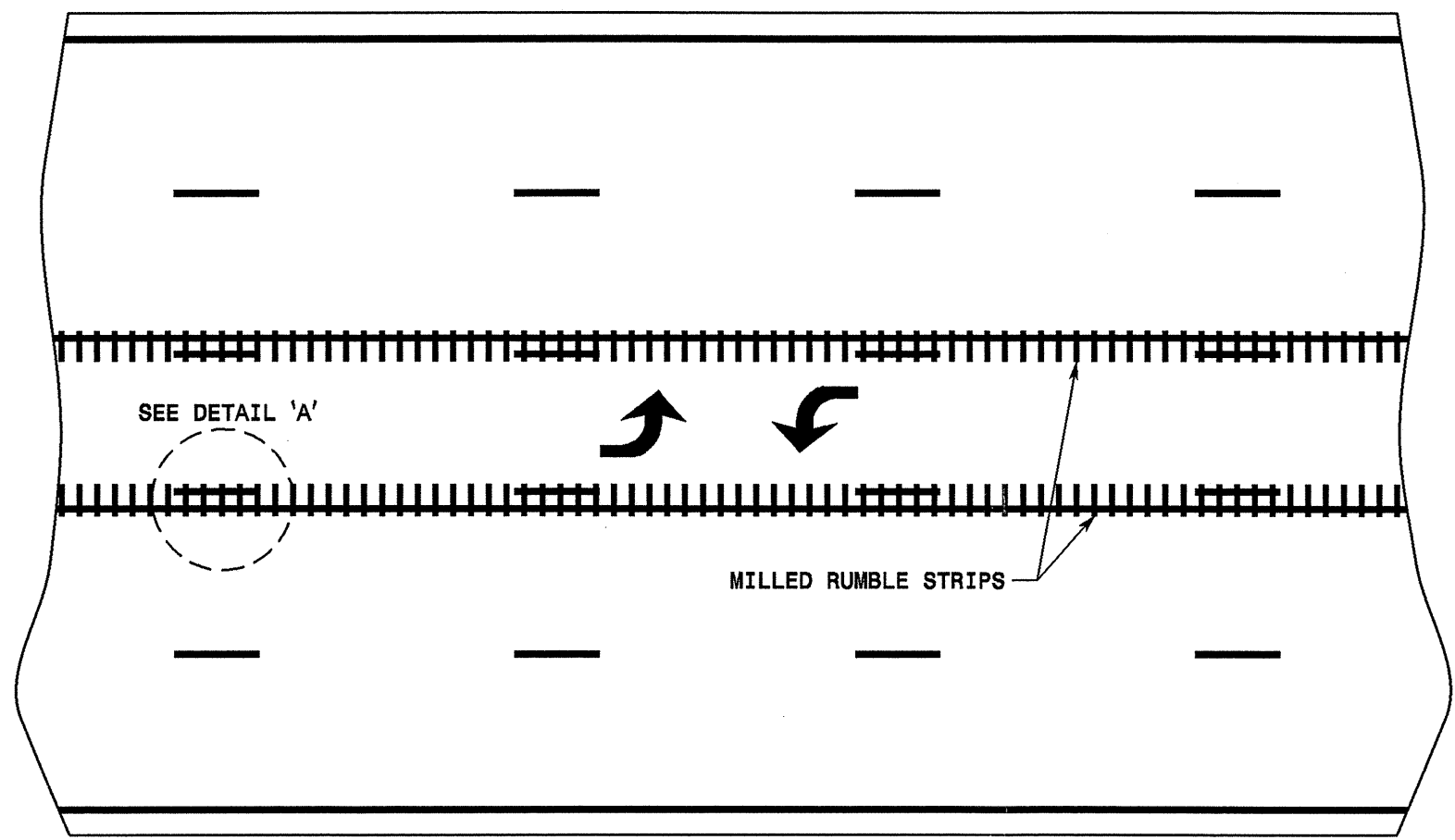
SUMMARY OF QUANTITIES

PROJECT NO	COUNTY	MAP NO	ROUTE	DESCRIPTION	TYP	FINAL SURFACE TESTING REQUIRED	LENGTH MI	WIDTH FT	MOBILIZATION LS	BORROW CY	REMOVAL OF EXISTING ASPHALT PAVEMENT SY	FOUNDATION CONDITIONING MATERIAL, MINOR STRS TON	24" RC PIPE CULVERTS, CLASS III LF	30" RC PIPE CULVERTS, CLASS III LF	INCIDENTAL STONE BASE TON	SHOULDER RECONSTRUCTION SMI	1 1/2" MILLING SY	3/4" MILLING SY	INCIDENTAL MILLING SY	BASE COURSE, B25.0B TON	SURFACE COURSE, S9.5C TON	FOUNDATION CONDITIONING FABRIC SY
R-5517	Currituck	1	US 158	FROM WRIGHT MEMORIAL BRIDGE TO BEGIN 5 LANE SECTION	2	NO	0.09	58	1	10					5	0.18	4,000	4,000			354	
R-5517	Currituck	2	US 158	FROM BEGIN 5 LANE TO CURB AND GUTTER SECTION AT GRANDY	1	NO	11.75	69	*	100	65	11		88	50	23.50	476,373	476,373			44,137	30
R-5517	Currituck	3	US 158	FROM BEGIN CURB & GUTTER TO END CURB & GUTTER AT GRANDY	3	NO	1.75	60	*		55	11	60				63,999	63,999			5,854	20
R-5517	Currituck	4	US 158	FROM END CURB & GUTTER TO BEGIN CURB & GUTTER AT COIN JOCK	1	NO	7.91	65	*	100					100	15.82	301,685	301,685		130	27,766	
R-5517	Currituck	5	US 158	FROM BEGIN CURB & GUTTER SECTION TO NC 168	3	NO	2.75	60	*								103,195	103,195	311		9,258	
GRAND TOTAL							24.25		1	210	120	22	60	88	155	39.50	949,252	949,252	311	130	87,369	50

PROJECT NO	COUNTY	MAP NO	ROUTE	DESCRIPTION	TYP	ASPHALT BINDER FOR PLANT MIX TON	POLYMER MODIFIED ASPHALT BINDER FOR PLANT MIX TON	OGAFC, TYPE FC-2 MOD TON	ASPHALT PLANT MIX, PAVEMENT REPAIR TON	MILLED RUMBLE STRIPS (ASPHALT CEMENT CONCRETE) LF	GENERIC DRAINAGE ITEM (REPAIR MASONRY DRAINAGE STRUCTURE) EA	ADJ. OF METER OR VALVE BOX EA	TEMPORARY SILT FENCE LF	MATTING FOR EROSION CONTROL SY	WATTLE LF	POLYACRYLAMIDE (PAM) LB	SEED & MULCHING AC	UNPAVED TRENCHING (1, 2") LF	JUNCTION BOX (STANDARD SIZE) EA	INDUCTIVE LOOP LF	LEAD-IN CABLE LF
R-5517	Currituck	1	US 158	FROM WRIGHT MEMORIAL BRIDGE TO BEGIN 5 LANE SECTION	2	21	11	180		978		1	100	32	80	7	0.1				
R-5517	Currituck	2	US 158	FROM BEGIN 5 LANE TO CURB AND GUTTER SECTION AT GRANDY	1	2,604	1,308	21,437	34	124,080		1	2,350	376	940	82	17.1				
R-5517	Currituck	3	US 158	FROM BEGIN CURB & GUTTER TO END CURB & GUTTER AT GRANDY	3	345	176	2,880	29	18,480	2	1						100	4	986	200
R-5517	Currituck	4	US 158	FROM END CURB & GUTTER TO BEGIN CURB & GUTTER AT COIN JOCK	1	1,644	828	13,575		83,530		1	1,582	253	633	55	11.5				
R-5517	Currituck	5	US 158	FROM BEGIN CURB & GUTTER SECTION TO NC 168	3	546	323	5,300		29,040	5	1						200	8	1,260	400
GRAND TOTAL						5,160	2,646	43,372	63	256,108	7	5	4,032	661	1,653	144	28.7	300	12	2,246	600

THERMOPLASTIC AND PAINT QUANTITIES

PROJECT NO	COUNTY	MAP NO	ROUTE	DESCRIPTION	TYP	FINAL SURFACE TESTING REQUIRED	LENGTH MI	WIDTH FT	GENERIC TRAFFIC CONTROL ITEM (TRAFFIC CONTROL) LS	4" WHITE PAINT LF	4" YELLOW PAINT LF	24" WHITE PAINT LF	6" WHITE POLYUREA LF	6" YELLOW POLYUREA LF	24" WHITE THERMOPLASTIC LF	THERMOPLASTIC MSG ONLY EA	THERMOPLASTIC MSG SCHOOL EA	POLYUREA LT ARROW EA	POLYUREA STR ARROW EA	POLYUREA RT ARROW EA	POLYUREA STR & RT ARROW EA	POLYUREA LT STR RT ARROW EA	CRYSTAL & RED MARKERS EA	YELLOW & YELLOW MARKERS EA	REMOVAL OF PAVEMENT MARKING LINES (6") LF
R-5517	Currituck	1	US 158	FROM WRIGHT MEMORIAL BRIDGE TO BEGIN 5 LANE SECTION	2	NO	0.09	58	1	3,668	3,912	10	1,223	978	10			2					6		
R-5517	Currituck	2	US 158	FROM BEGIN 5 LANE TO CURB AND GUTTER SECTION AT GRANDY	1	NO	11.75	69	*	465,300	620,400	40	139,590	139,590	40			395					1,551	1,551	
R-5517	Currituck	3	US 158	FROM BEGIN CURB & GUTTER TO END CURB & GUTTER AT GRANDY	3	NO	1.75	60	*	13,860	92,400	810	13,860	23,100	330			69	12	4	9		231	231	
R-5517	Currituck	4	US 158	FROM END CURB & GUTTER TO BEGIN CURB & GUTTER AT COIN JOCK	1	NO	7.91	65	*	313,236	417,648		115,662	104,412				261	3	2			132	1,044	11,250
R-5517	Currituck	5	US 158	FROM BEGIN CURB & GUTTER SECTION TO NC 168	3	NO	2.75	60	*	21,780	145,200	623	7,260	36,300	303	4	24	101	12	2	3	2	363	363	
GRAND TOTAL										817,844	1,279,560	1,483	277,595	304,380	683	4	24	828	27	8	12	2	2,283	3,189	11,250
										2,097,404		581,975		28		877		5,472							



NOTES:
 AFTER MILLING RUMBLE STRIPS, MAKE SURE ROAD SURFACE IS IN PROPER CONDITION FOR ADEQUATE BONDING OF THE NEW POLYUREA MARKINGS.
 PAVEMENT MARKING LINES THAT ARE APPLIED TO THE RUMBLE STRIPS SHOULD NOT HAVE MORE THAN .5" LATERAL DEVIATION.

22-SEP-2011 16:32
 S:\S&US\Standards\Group\Mark\VRUMBLE.DRAWINGS\DIV1\rumble-strip-dwg.dgn
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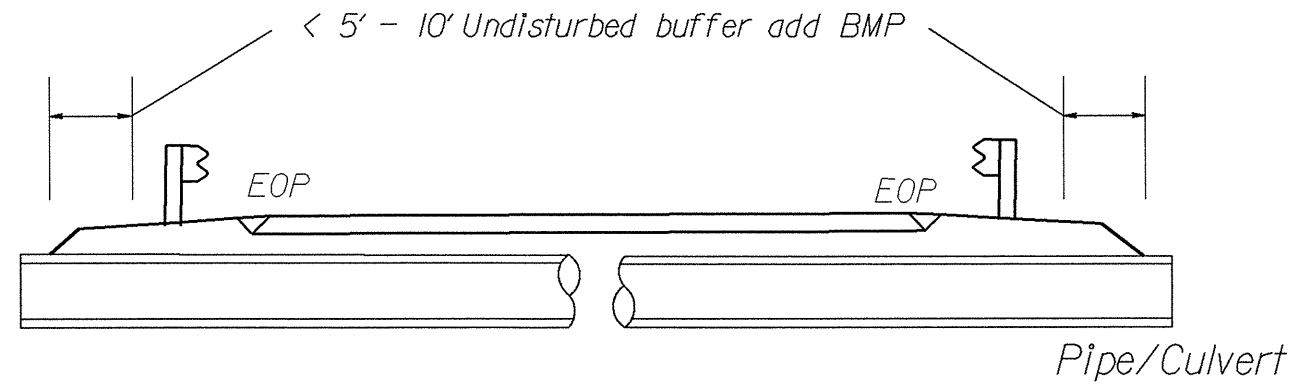
APPROVED: <i>[Signature]</i> DATE: 09/22/11	RUMBLE STRIPE DETAILS FOR A 5-LANE SECTION		
	SCALE: NONE		
	DATE: 09-22-11		REVISIONS
	DWG. BY: MES		
	DESIGN BY: MRM		
REVIEWED BY: CBH			

PROJECT REFERENCE NO. R-5517	SHEET NO. EC-1
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

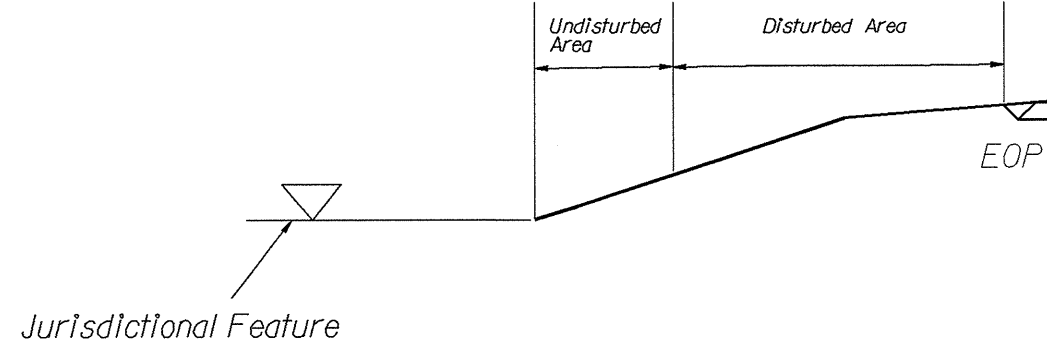
NOTES: Less than 5' - 10' undisturbed buffer from ROW, ditchline, water feature, or drainage inlet, add BMP.

BMP Options: Wattle or Silt Fence

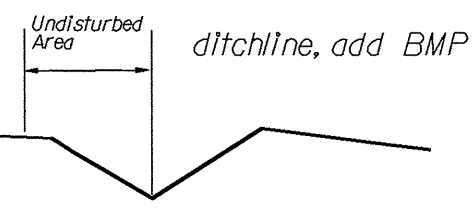
EROSION CONTROL DETAIL



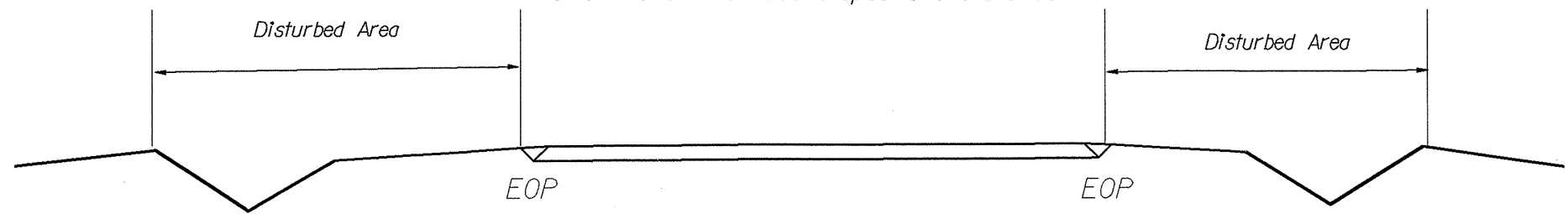
< 5' - 10' Undisturbed buffer from jurisdictional feature add BMP



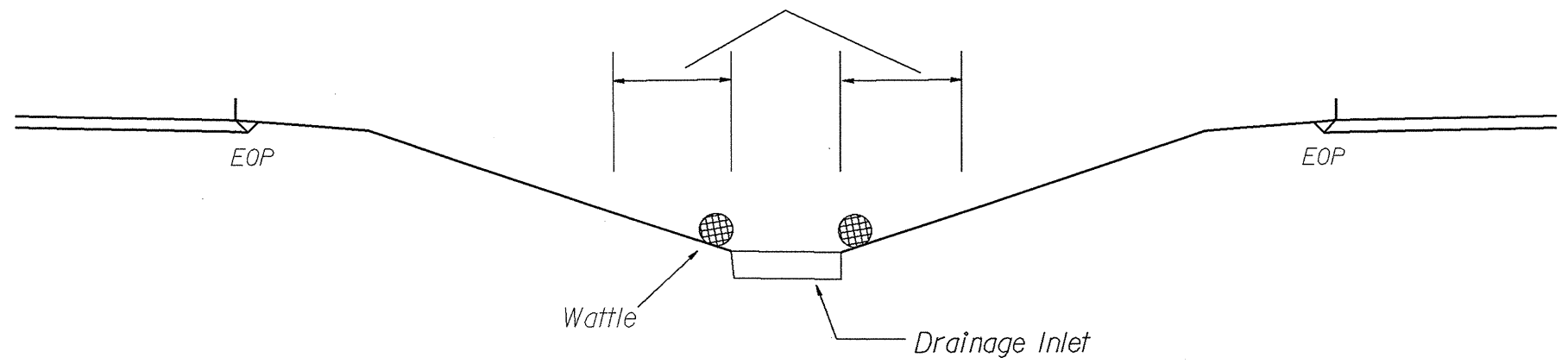
< 5' - 10' Undisturbed buffer from ditchline, add BMP



Use BMP's if shoulders and/or frontslopes and/or ditchline and/or backslopes are disturbed



< 5' - 10' Undisturbed buffer from inlet, add wattle

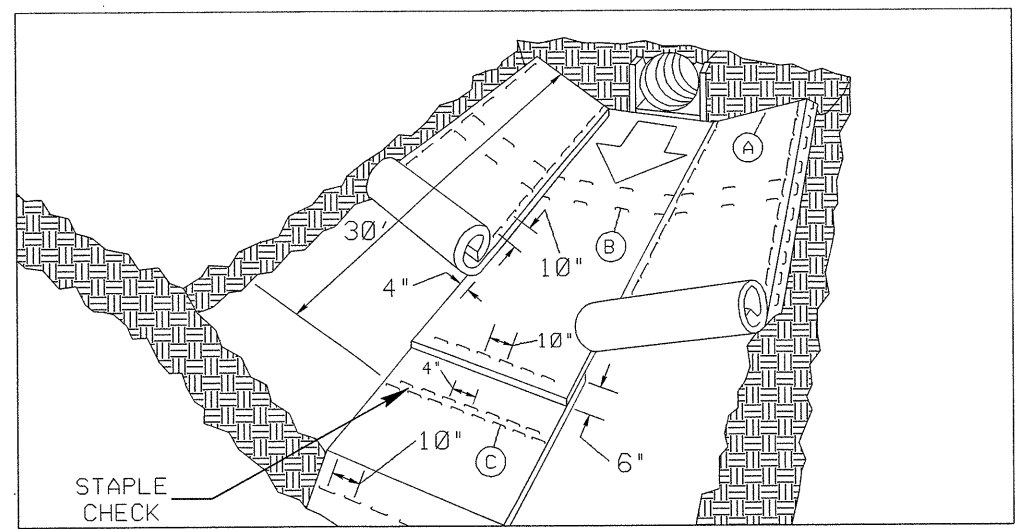


NOT TO SCALE

12-5517

PROJECT REFERENCE NO. 12-5517	SHEET NO. EC-2
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

MATTING INSTALLATION DETAIL



MATTING IN DITCHES

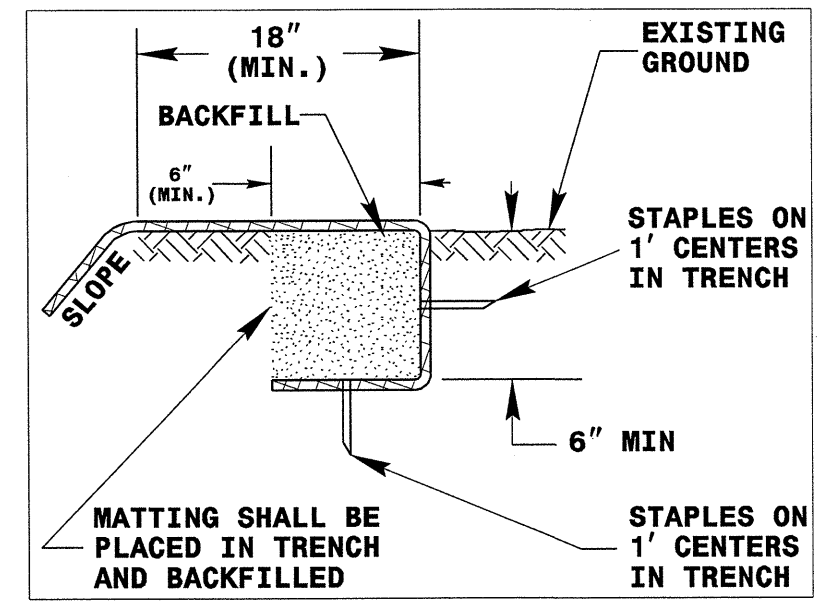
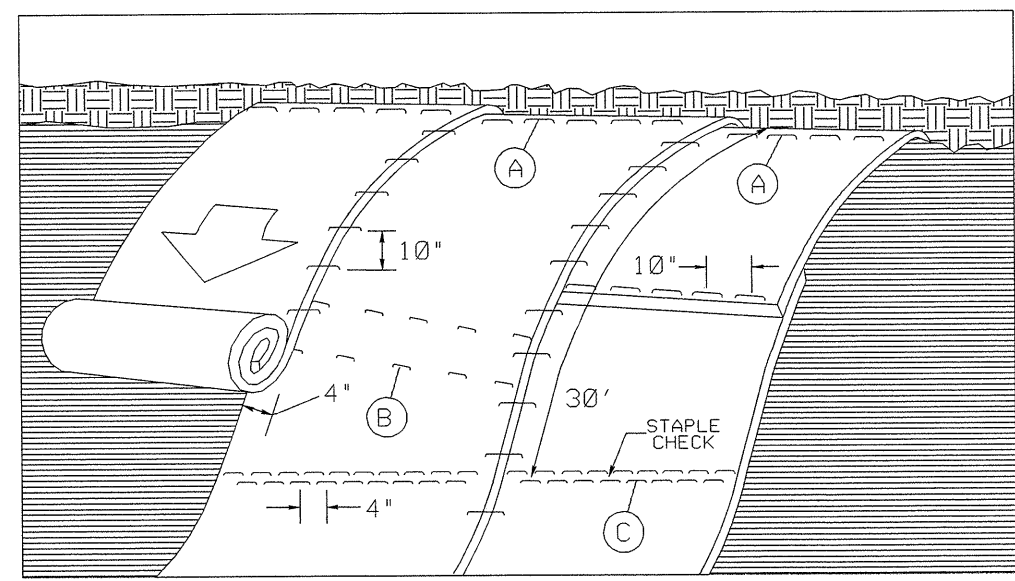


DIAGRAM (A)



MATTING ON SLOPES

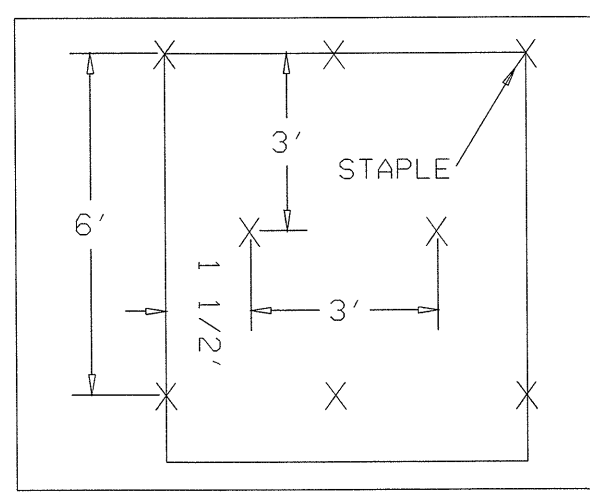


DIAGRAM (B)

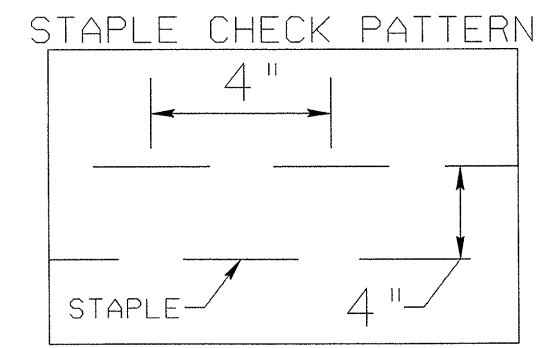


DIAGRAM (C)

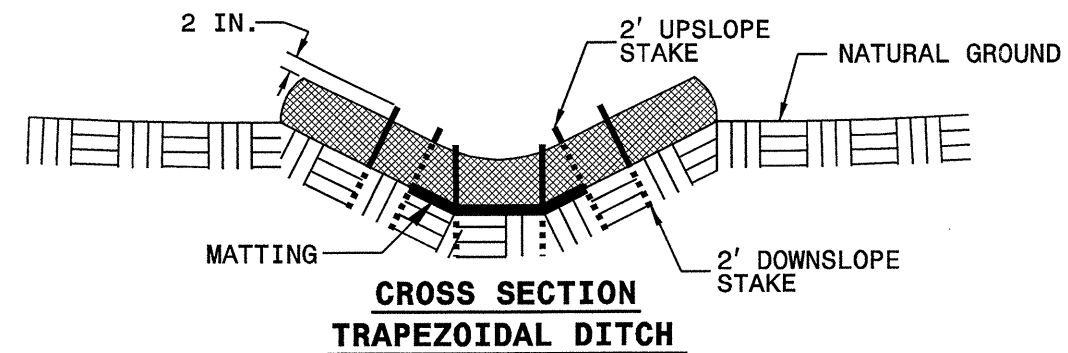
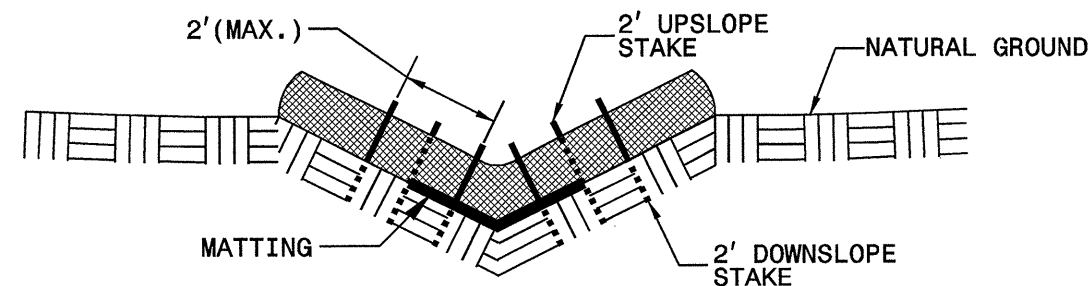
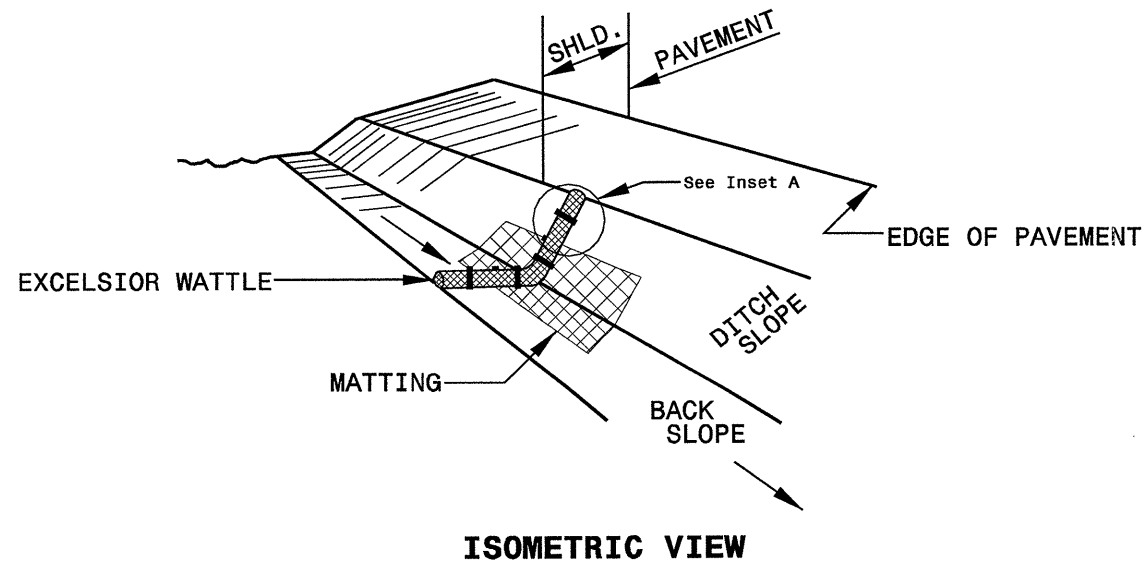
NOTES:
 THIS DETAIL APPLIES TO STRAW, EXCELSIOR, AND PERMANENT SOIL REINFORCEMENT MAT (PSRM) INSTALLATION.
 STAPLES SHALL BE NO. 11 GAUGE STEEL WIRE FORMED INTO A "U" SHAPE WITH A MINIMUM THROAT WIDTH OF 1 INCH AND NOT LESS THAN 6 INCHES IN LENGTH.

NOT TO SCALE

R-5517

PROJECT REFERENCE NO. R-5517	SHEET NO. EC-5
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

WATTLE DETAIL



NOTES:

USE MINIMUM 12 IN. DIAMETER EXCELSIOR WATTLE.

USE 2 FT. WOODEN STAKES WITH A 2 IN. BY 2 IN. NOMINAL CROSS SECTION.

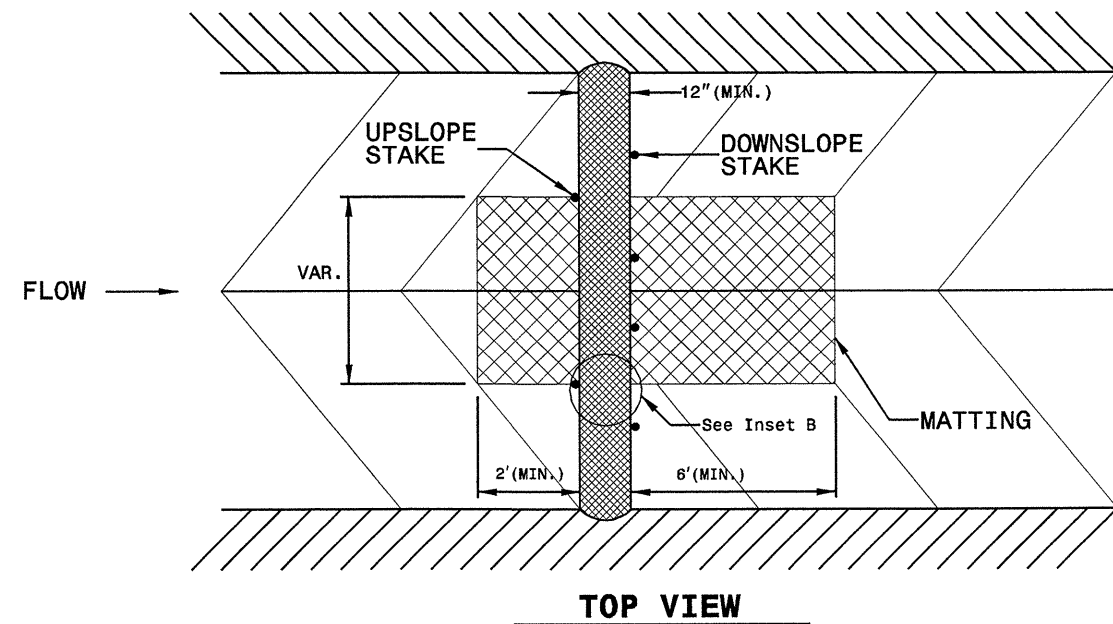
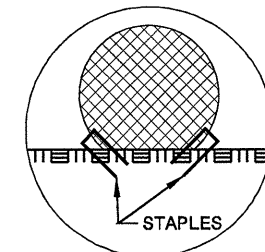
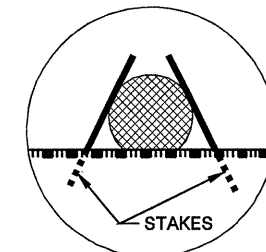
ONLY INSTALL WATTLE(S) TO A HEIGHT IN DITCH SO FLOW WILL NOT WASH AROUND WATTLE AND SCOUR DITCH SLOPES AND AS DIRECTED.

INSTALL A MINIMUM OF 2 UPSLOPE STAKES AND 4 DOWNSLOPE STAKES AT AN ANGLE TO WEDGE WATTLE TO BOTTOM OF DITCH.

PROVIDE STAPLES MADE OF 0.125 IN. DIAMETER STEEL WIRE FORMED INTO A U SHAPE NOT LESS THAN 12" IN LENGTH.

INSTALL STAPLES APPROXIMATELY EVERY 1 LINEAR FOOT ON BOTH SIDES OF WATTLE AND AT EACH END TO SECURE IT TO THE SOIL.

INSTALL MATTING IN ACCORDANCE WITH SECTION 1631 OF THE STANDARD SPECIFICATIONS.








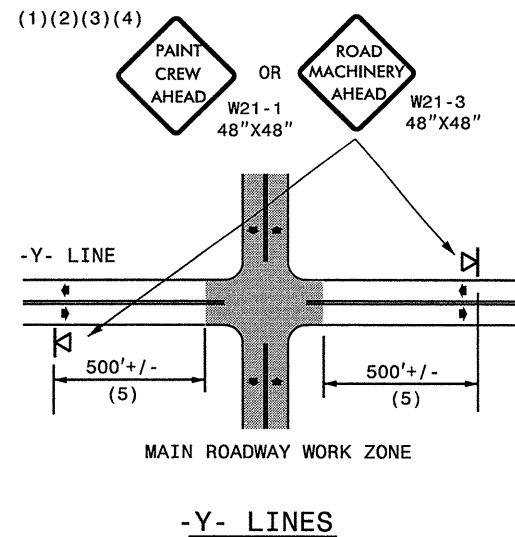
GENERAL NOTES

- (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.

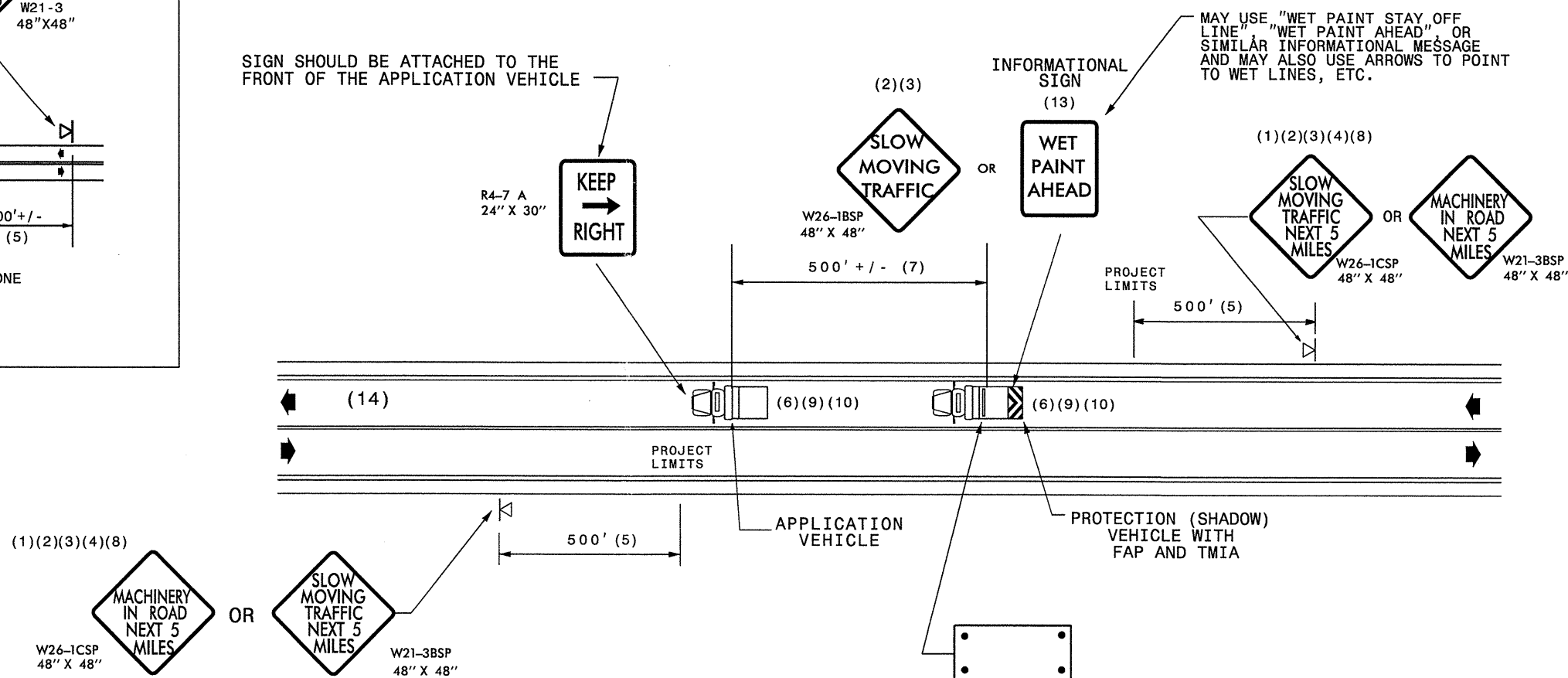
- (7) ADJUST DISTANCE AS NEEDED TO PREVENT MOTORISTS FROM ENTERING SPACE BETWEEN THE APPLICATION AND PROTECTION VEHICLE. DISTANCE CAN BE LENGTHENED TO ACCOMMODATE SIGHT DISTANCE NEEDS.
- (8) ROUND UP MILEAGE TO NEXT WHOLE MILE. WORK ZONE SHOULD NOT EXCEED FIVE (5) MILES IN LENGTH.
- (9) RADIO COMMUNICATION 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

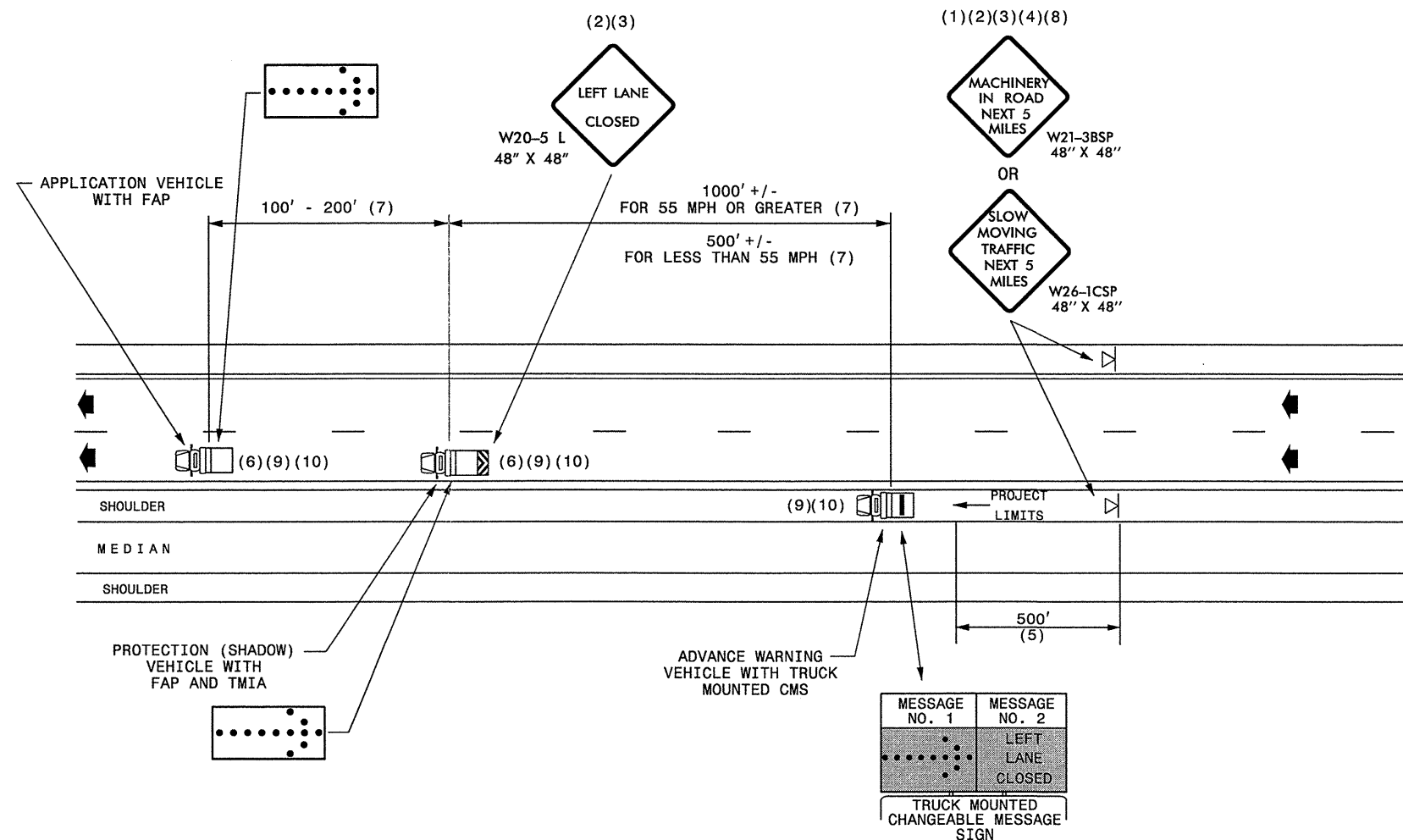
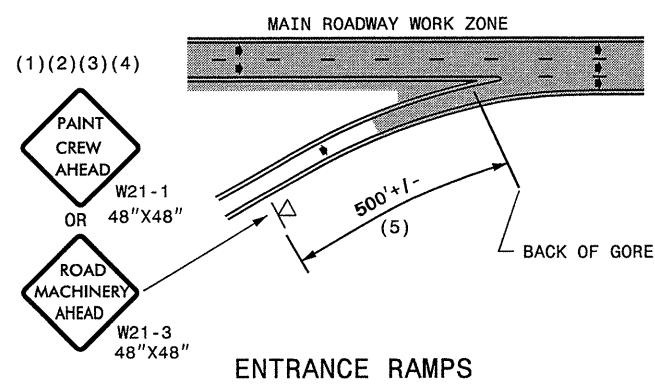
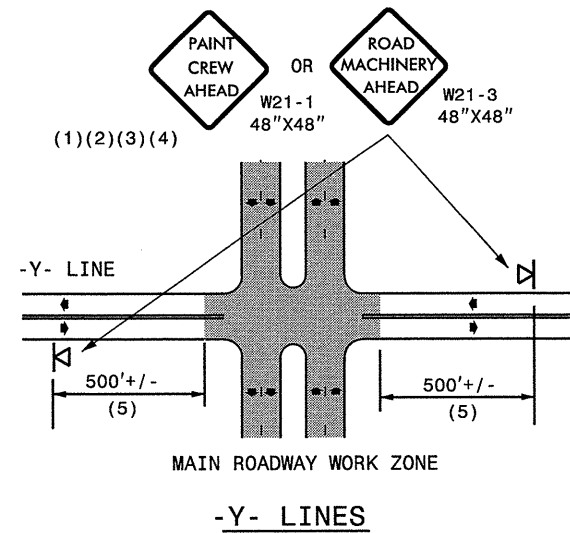
GENERAL NOTES

- (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

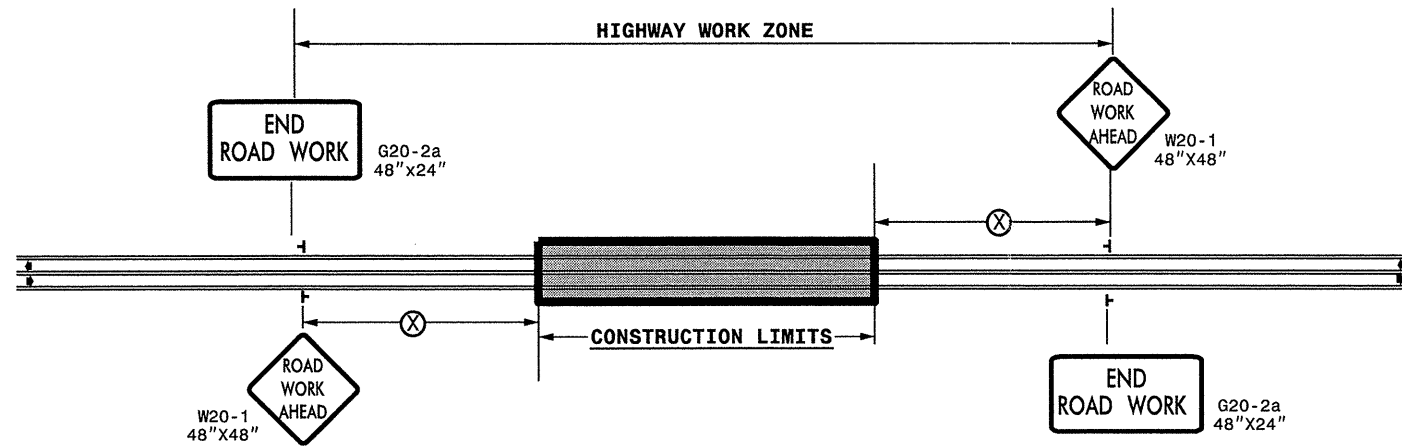


MOVING OPERATION CARAVAN

(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

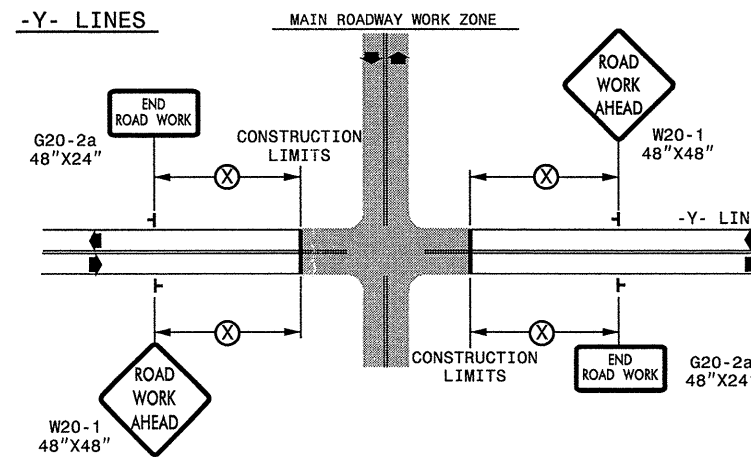
TWO-WAY UNDIVIDED ** (L-LINES)



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

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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

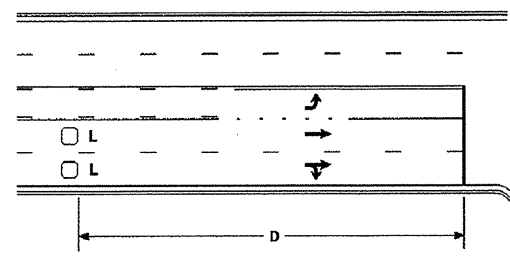
- └ STATIONARY SIGN
- ◀ DIRECTION OF TRAFFIC FLOW

SHEET 1 OF 1

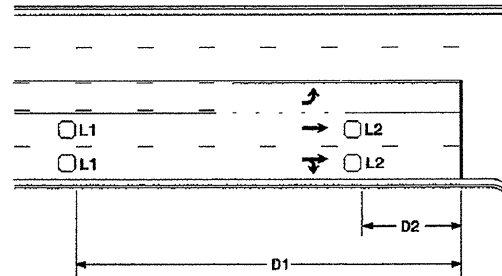
**DETAIL DRAWING FOR
TWO-WAY UNDIVIDED
WORK ZONE WARNING SIGNS**

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: _____	CADD FILE		

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

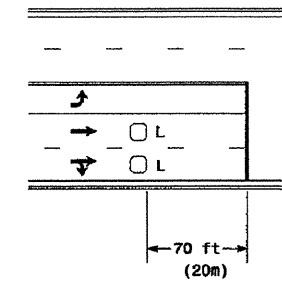
Speed Limit mph (km/hr)	D1 ft (m)	D2 ft (m)
40 (64)	250 (75)	80 (25)
45 (72)	300 (90)	90 (27)
50 (80)	355 (110)	100 (30)
55 (88)	420 (130)	110 (35)

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

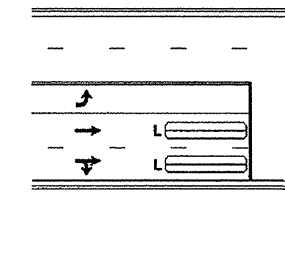
Volume Density Operation

"Stretch" Operation

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



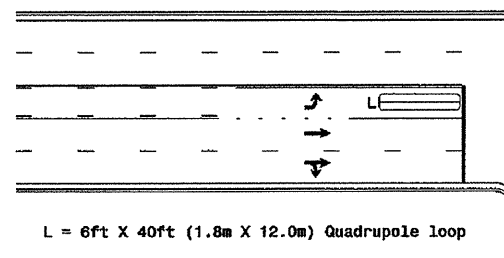
OR



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

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

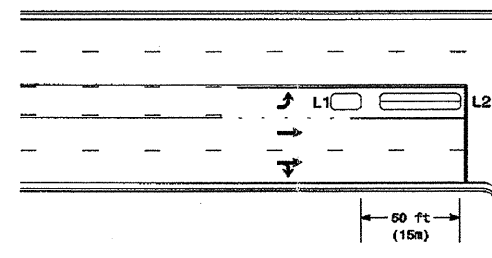
Left Turn Lane Detection



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

Presence Loop Detection

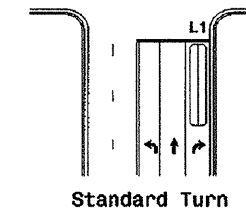
OR



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

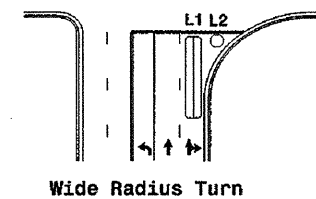
Queue Loop Detection

Right Turn Lane Detection

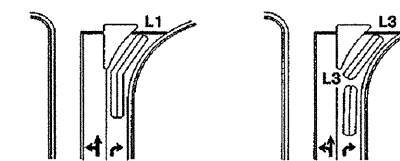


Standard Turn

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

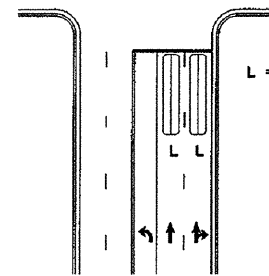


Wide Radius Turn



Channelized Turn

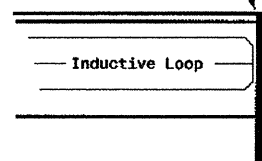
Side Street Detection



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

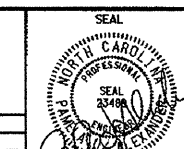
6' X 15' (1.8m X 4.6m) Loops:
Lead-in < 150' (45 m), use 2 turns
Lead-in > 150' (45 m), use 3 turns



Typical Loop Locations

PLAN DATE: June 2006 REVISIONS:
PREPARED BY: P. L. Alexander REVISIONS:
DATE: 12/12/06

SCALE: N/A



SIGNATURE: P. L. Alexander DATE: 12/12/06

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

11-08

ENGLISH DETAIL DRAWING FOR
INDUCTIVE DETECTION LOOPS

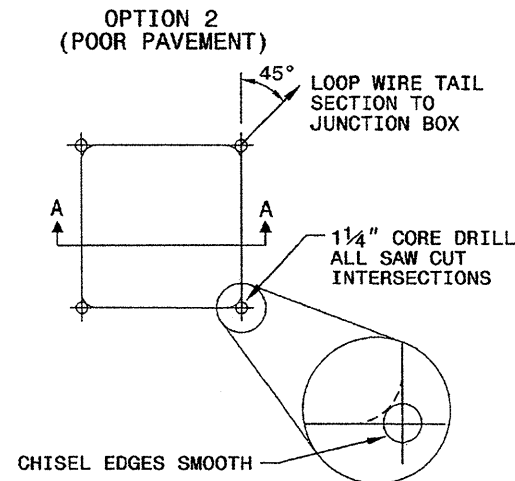
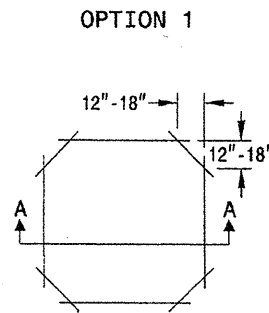
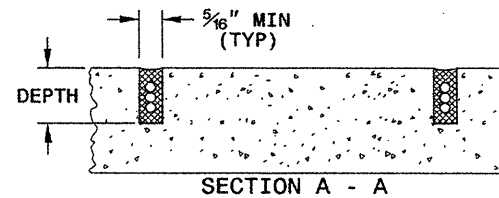
SHEET 1 OF 3
1725D01

CONVENTIONAL 4-SIDED LOOP

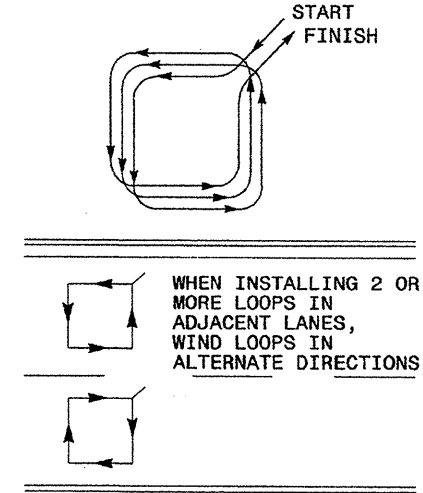
SAW CUT OPTIONS

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

INCORRECT WAY TO TWIST WIRE



CORRECT WAY TO TWIST WIRE

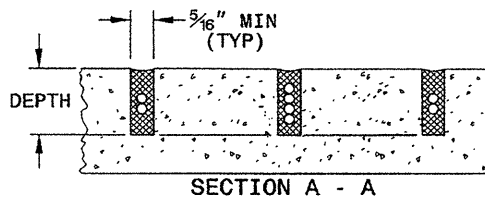
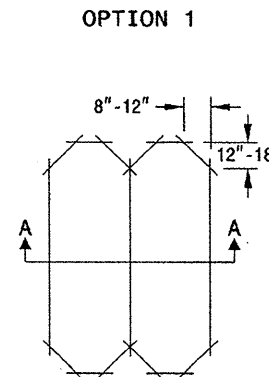


NOTES

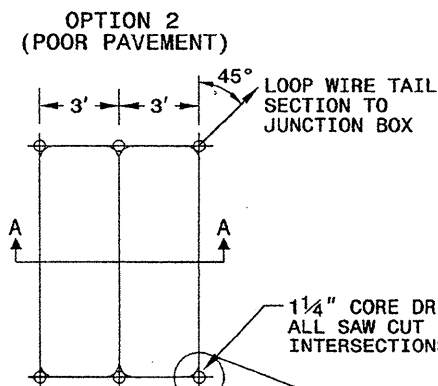
1. OVERLAP SAW CUTS AT CORNERS AND INTERSECTION POINTS TO ENSURE UNIFORM SAW SLOT DEPTH.
2. MAINTAIN 12" SPACING BETWEEN LOOP WIRE TAIL SECTIONS.
3. WIRE LOOPS CONNECTED TO THE SAME DETECTOR CHANNEL IN SERIES.
4. LOCATE LOOPS IN CENTER OF LANES UNLESS OTHERWISE SHOWN ON PLANS OR APPROVED BY ENGINEER.

QUADRUPOLE LOOP

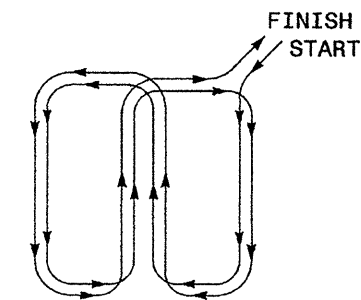
SAW CUT OPTIONS



DEPTH IS 2.5" FOR CONCRETE AND 3.0" FOR ASPHALT



LOOP WINDING METHOD



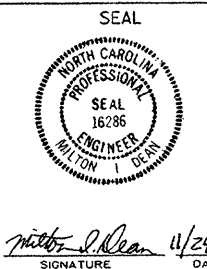
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DIVISION OF HIGHWAYS
RALEIGH, N.C.

11-08

ENGLISH DETAIL DRAWING FOR
INDUCTIVE DETECTION LOOPS

SHEET 1 OF 3
1725D01

See Plate for Title



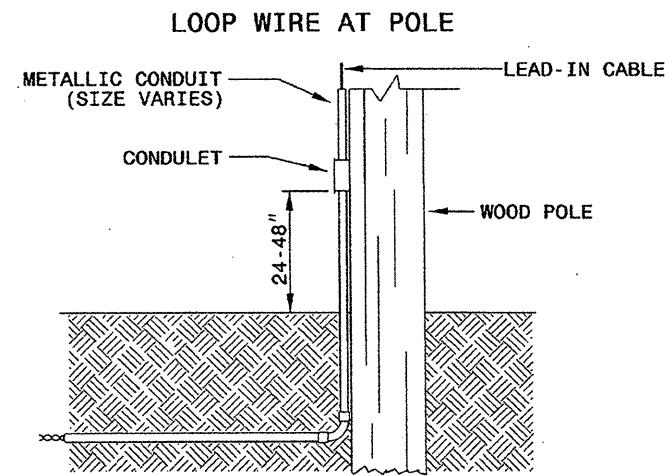
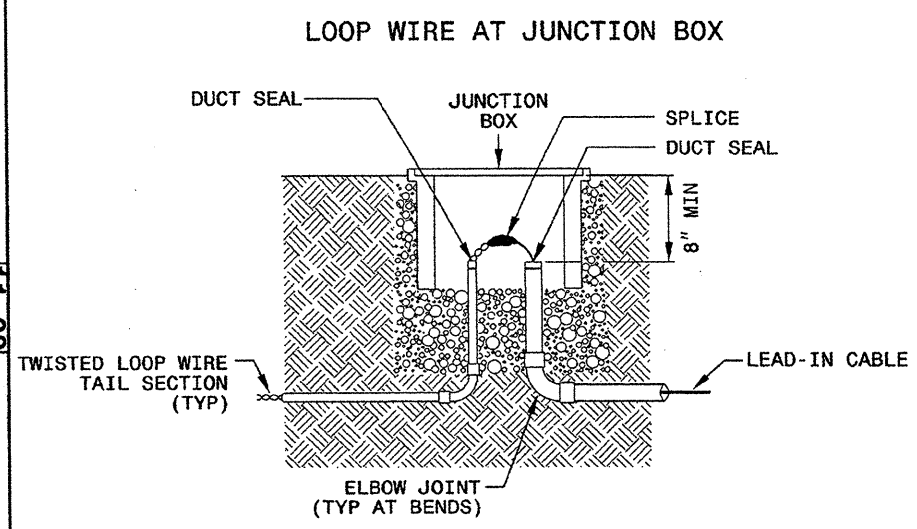
STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

11-08

ENGLISH DETAIL DRAWING FOR
INDUCTIVE DETECTION LOOPS
LOOP WIRE DETAILS

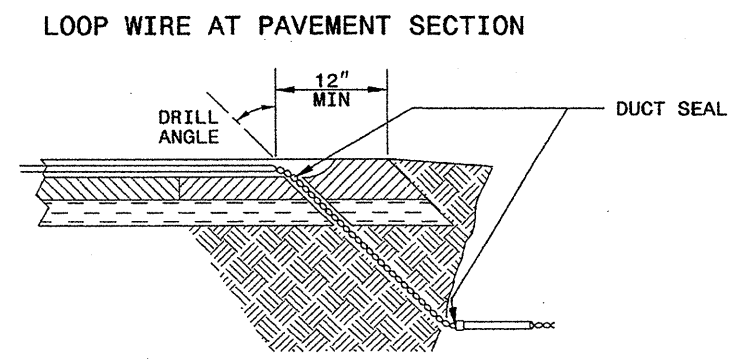
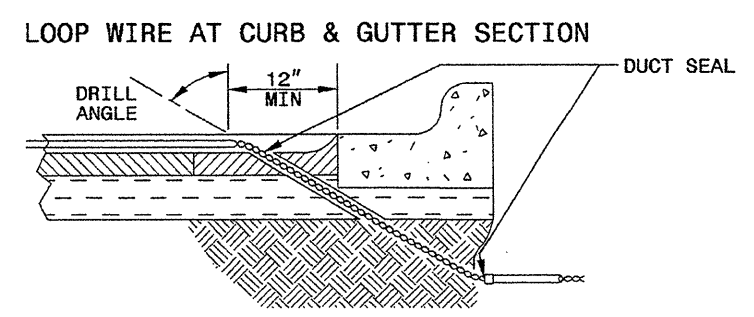
SHEET 2 OF 3
1725D01

LOOP WIRE SPLICE POINT DETAILS



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

LOOP WIRE PAVEMENT EDGE DETAILS



- 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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ENGLISH DETAIL DRAWING FOR
INDUCTIVE DETECTION LOOPS
LOOP WIRE DETAILS

SHEET 2 OF 3
1725D01

See Plate for Title

Prepared in the Offices of:

750 N. Greenfield Parkway
Garner, NC 27529

SEAL

Milton I. Dean 11/24/08
SIGNATURE DATE

24-Nov-2008 09:29
d:\work_files\1725D01\1725D01.dgn
241111

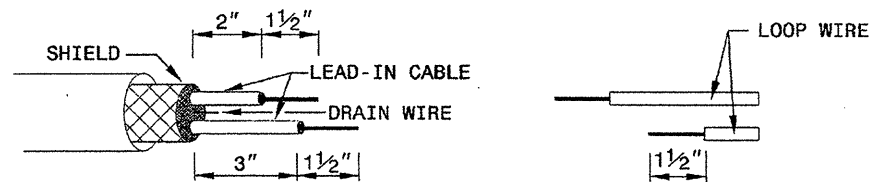
STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

11-08

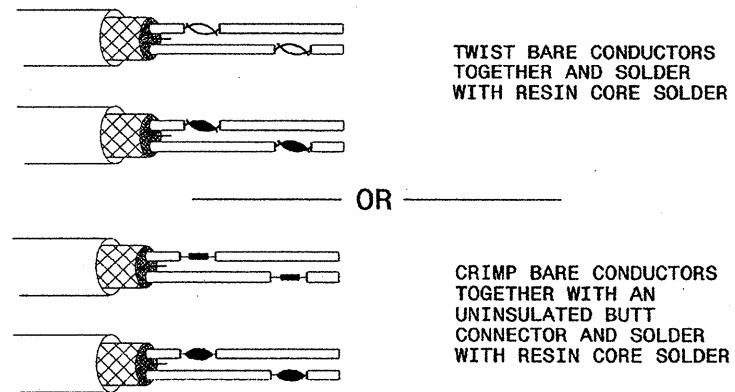
ENGLISH DETAIL DRAWING FOR
INDUCTIVE DETECTION LOOPS
SPlicing FOR LEAD-IN CABLE AND LOOP WIRE

SHEET 3 OF 3
1725D01

STEP 1. STRIP LOOP WIRE AND LEAD-IN CABLE

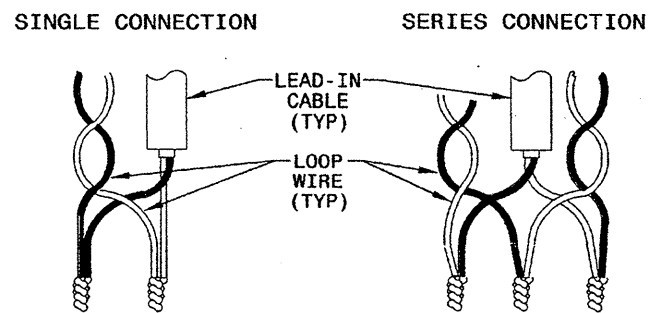


STEP 2. CONNECT AND SOLDER

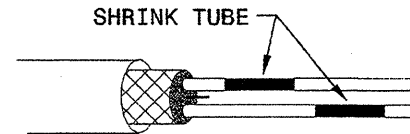


BOND SHIELD DRAIN WIRE AT SPLICE SECTIONS (DO NOT GROUND)

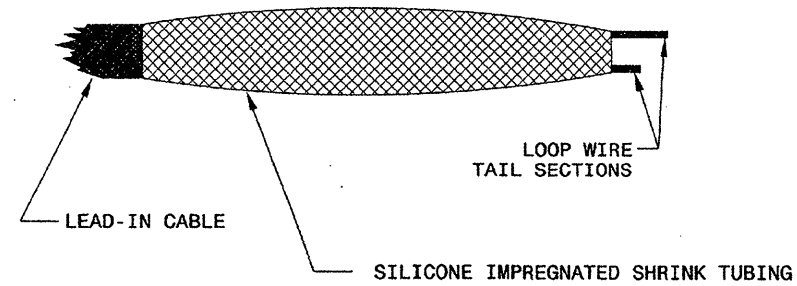
LOOP WIRE AND LEAD-IN CABLE CONNECTION DETAILS



STEP 3. INSULATE EACH SOLDER JOINT SEPARATELY



STEP 4. ENVIRONMENTALLY PROTECT SPLICE



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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

See Plate for Title

Prepared in the Offices of:

750 N. Greenfield Parkway
Garner, NC 27529

SEAL

Milton Alan 11/24/08
SIGNATURE DATE