

09/08/09

WBS ELEMENT: 45458.3.1

CONTRACT NO.:

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

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CURRITUCK COUNTY

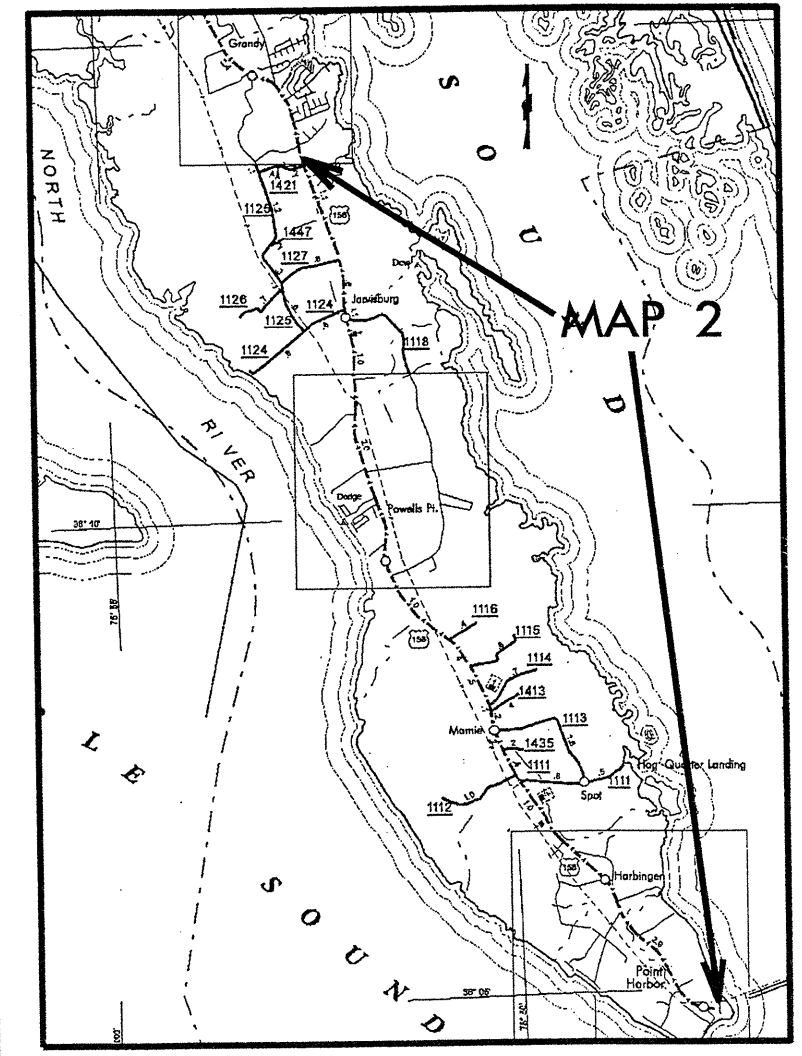
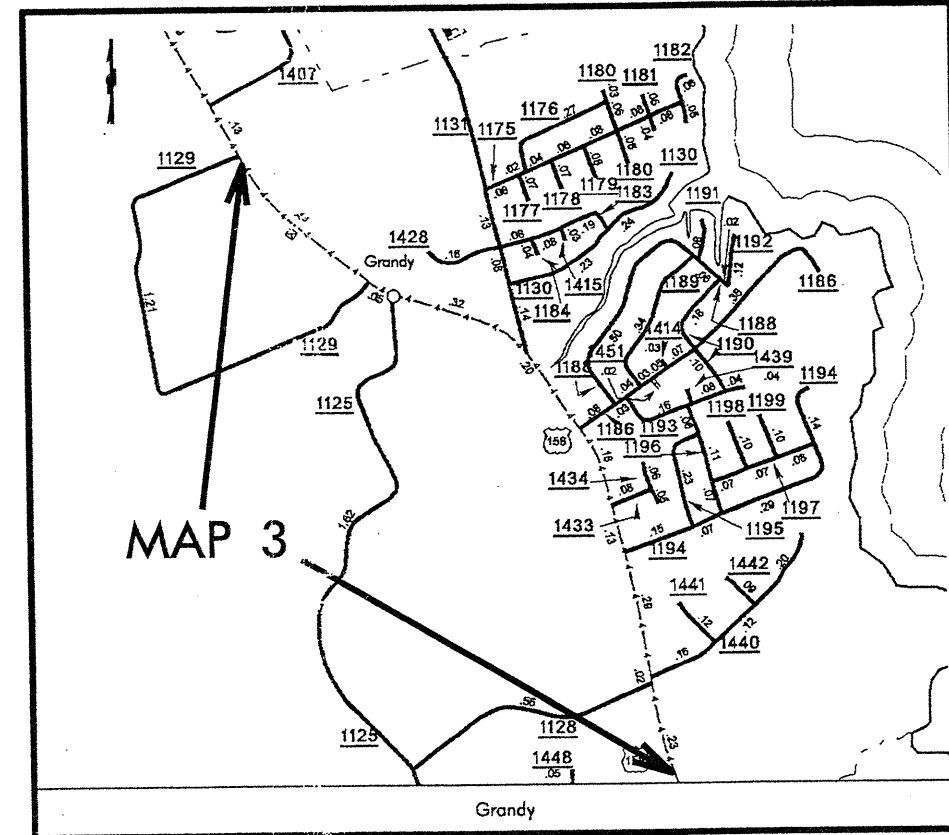
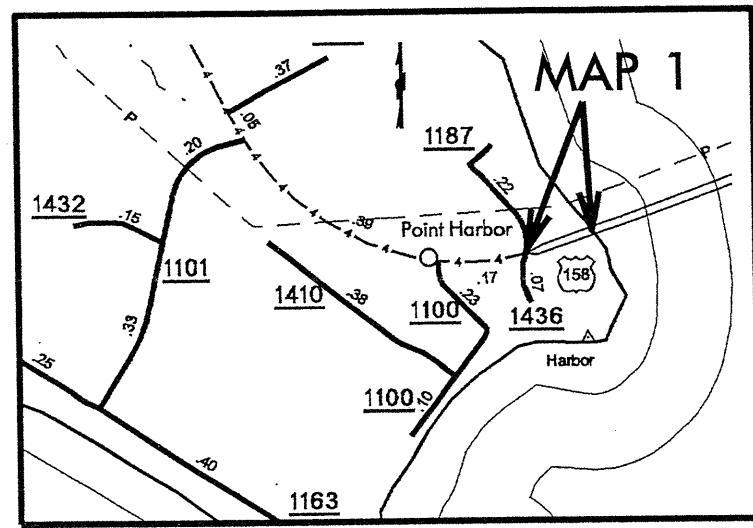
LOCATION: MAP 1 US HWY 158 FROM WRIGHT MEMORIAL BRIDGE TO BEGIN 5 LANE SECTION

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.	SHEET 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: January 17, 2012

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:

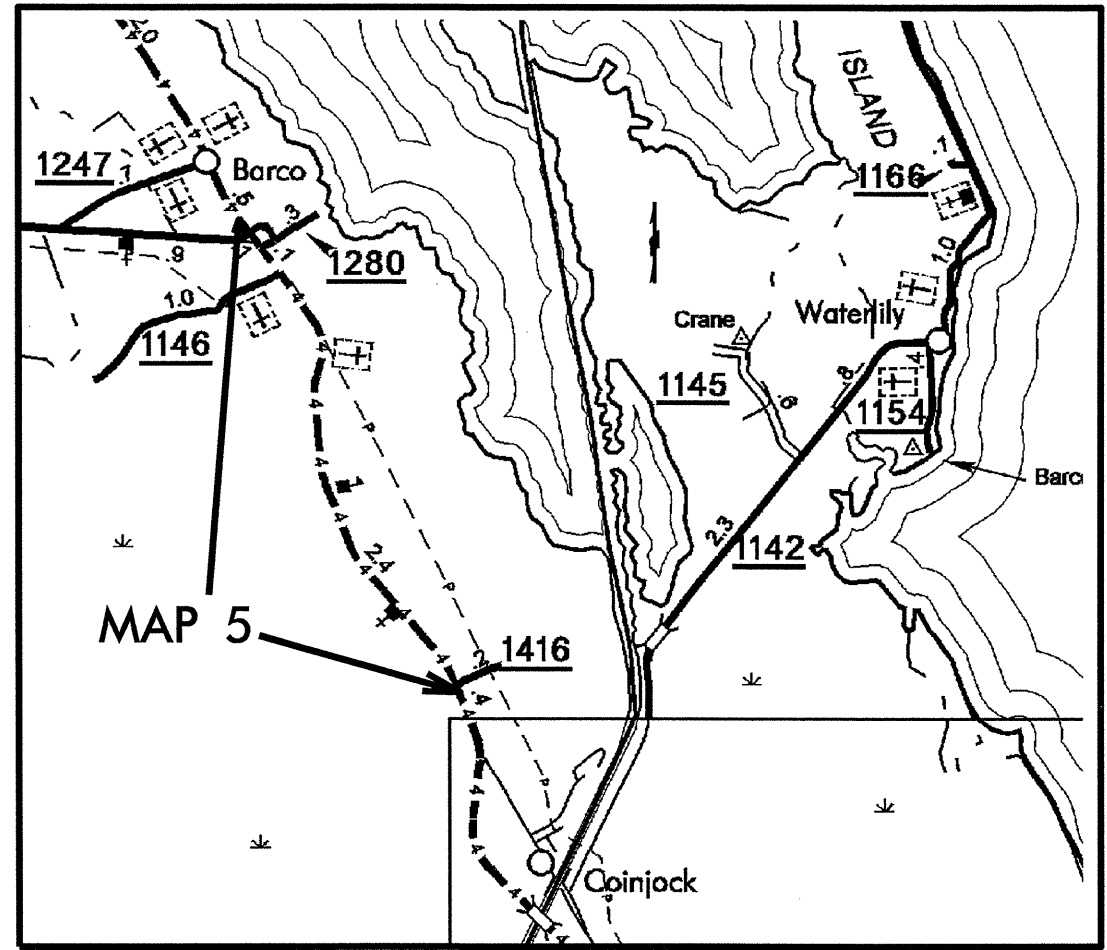
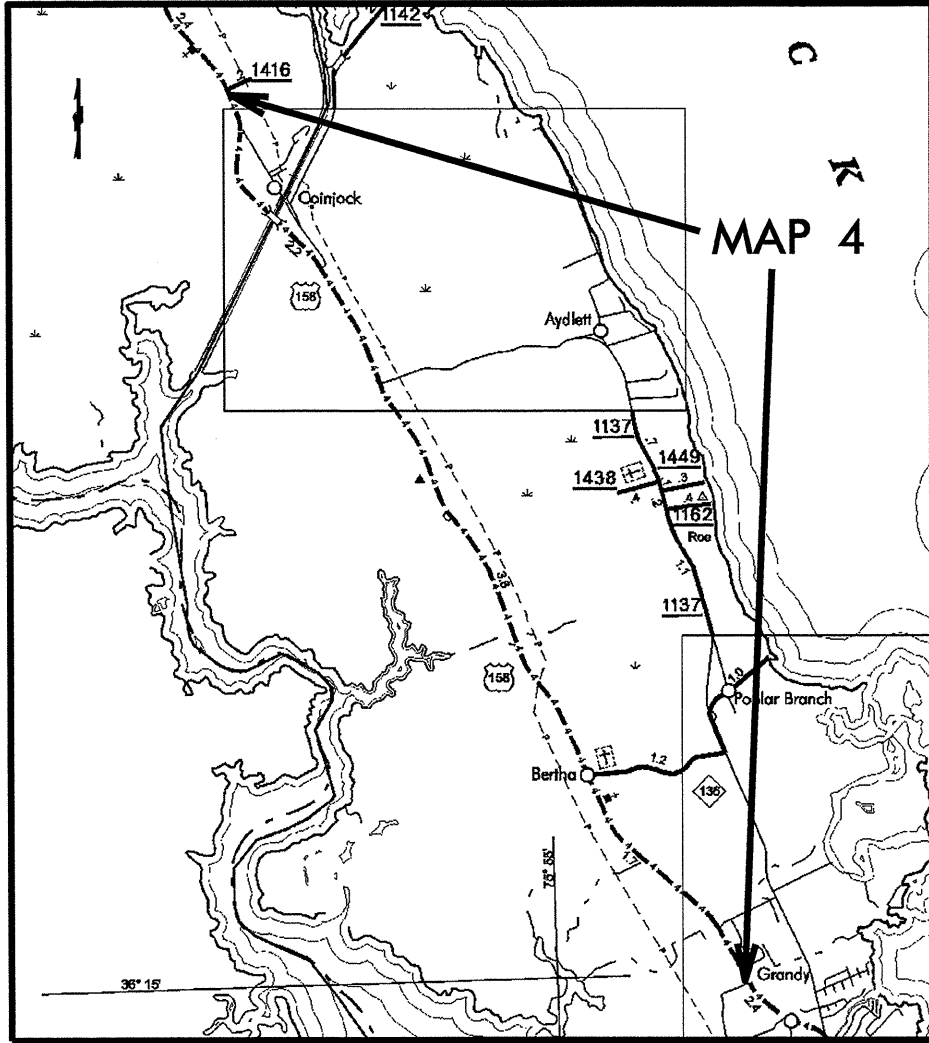
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

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 FUND.	F.A. FUND.	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

PROJECT REFERENCE NO.

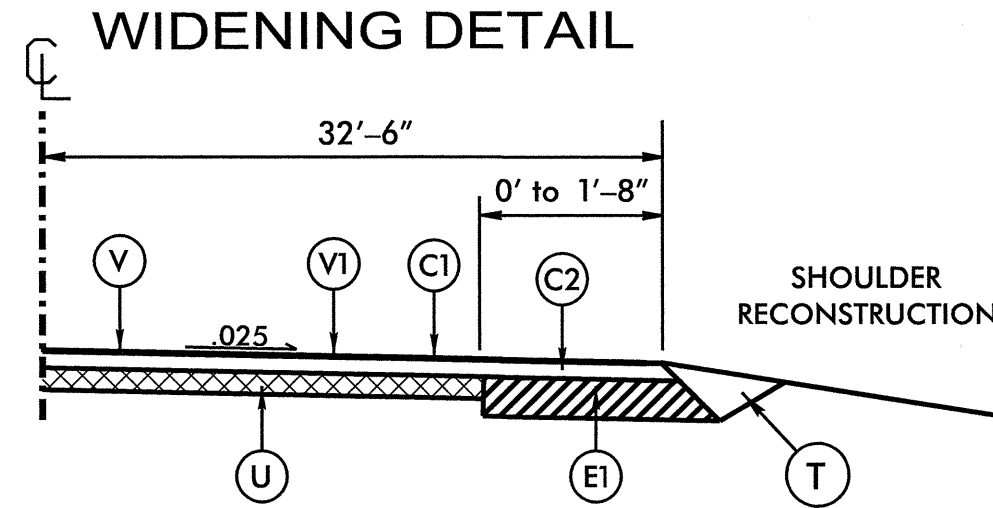
R-5517

SHEET NO.

3

REVISED 11/3/11

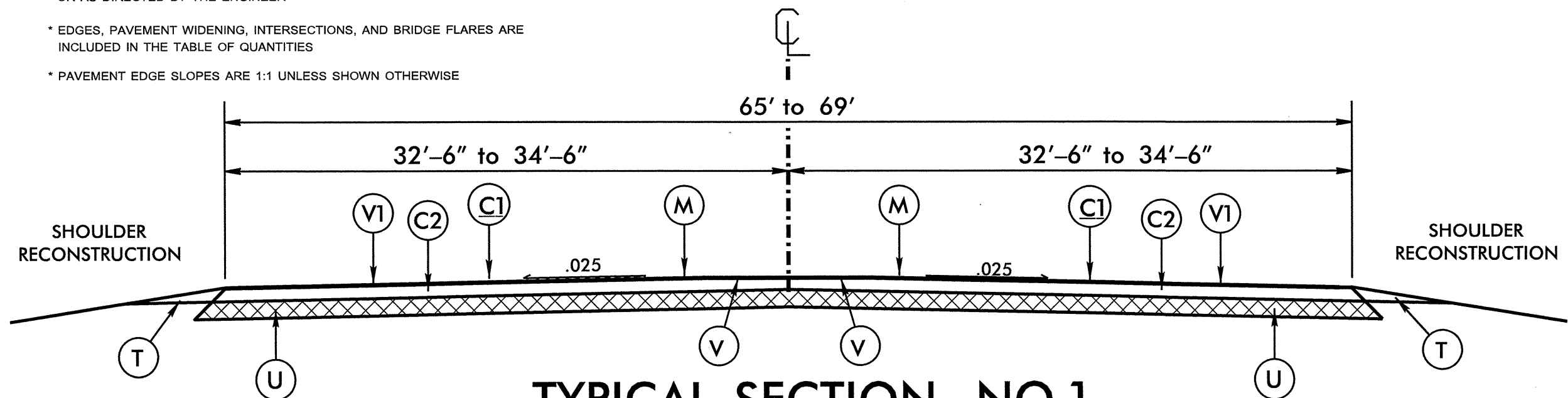
C1	PROP. APPROX. 3/4" OPEN-GRADED ASPHALT FRICTION COURSE, TYPE FC 2 MODIFIED, AT AN AVERAGE RATE OF 90 LBS. PER SQ. YD.
C2	PROP. APPROX. 1 1/2" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5C, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YD. PER INCH OF DEPTH.
E1	PROP. APPROX. 5.5" ASPHALT CONCRETE BASE COURSE,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



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

PAVEMENT SCHEDULE

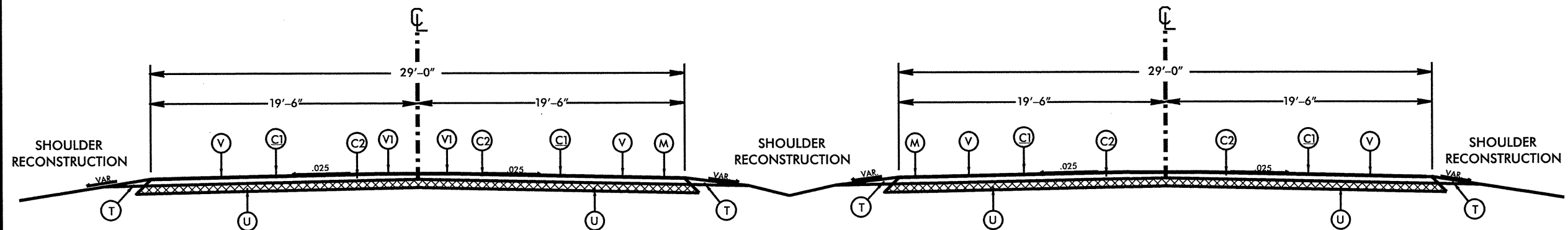
PROJECT REFERENCE NO.	SHEET NO.
R-5517	4

REVISED 11/3/11

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.
M	MILLED RUMBLE STRIPS
T	EARTH MATERIAL
U	EXISTING PAVEMENT.
V	MILLING BITUMINOUS PAVEMENT 3/4" DEPTH.
V1	MILLING BITUMINOUS PAVEMENT 0" TO 1 1/2" 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

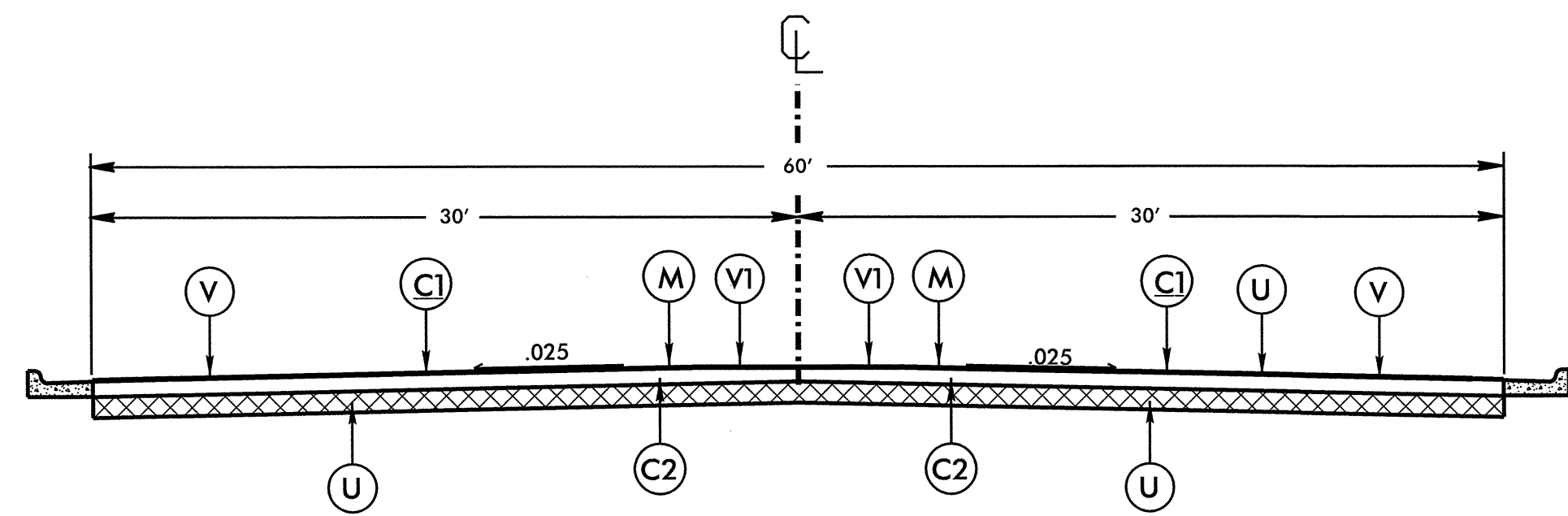
PROJECT REFERENCE NO.	SHEET NO.
R-5517	5

REVISED 11/3/11

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.
M	MILLED RUMBLE STRIPS
U	EXISTING PAVEMENT.
V	MILLING BITUMINOUS PAVEMENT 3/4" DEPTH.
V1	MILLING BITUMINOUS PAVEMENT 0" TO 1 1/2" 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	

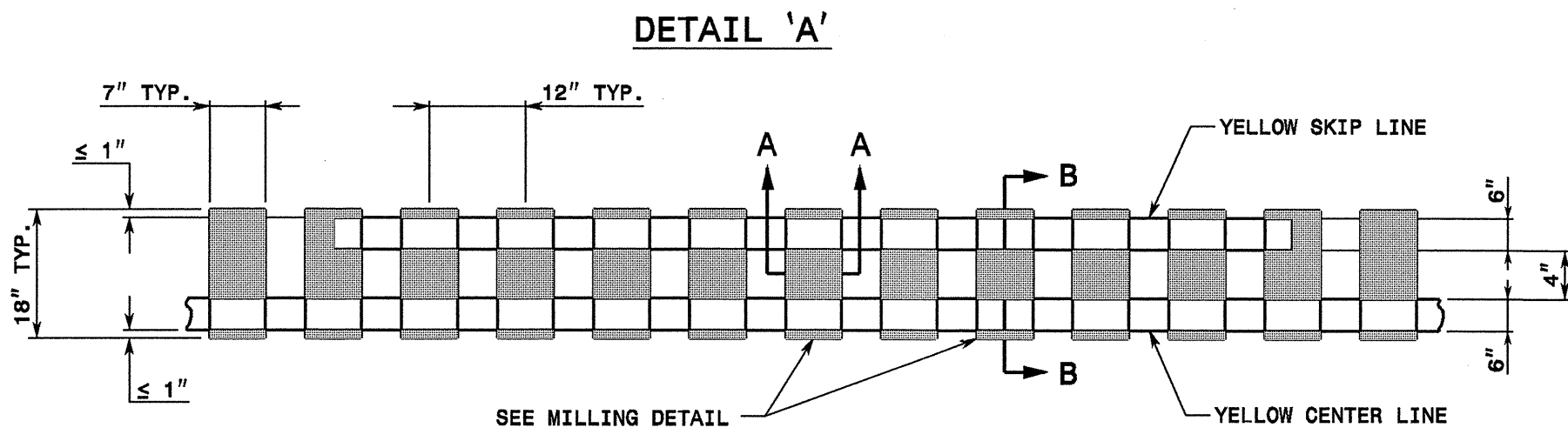
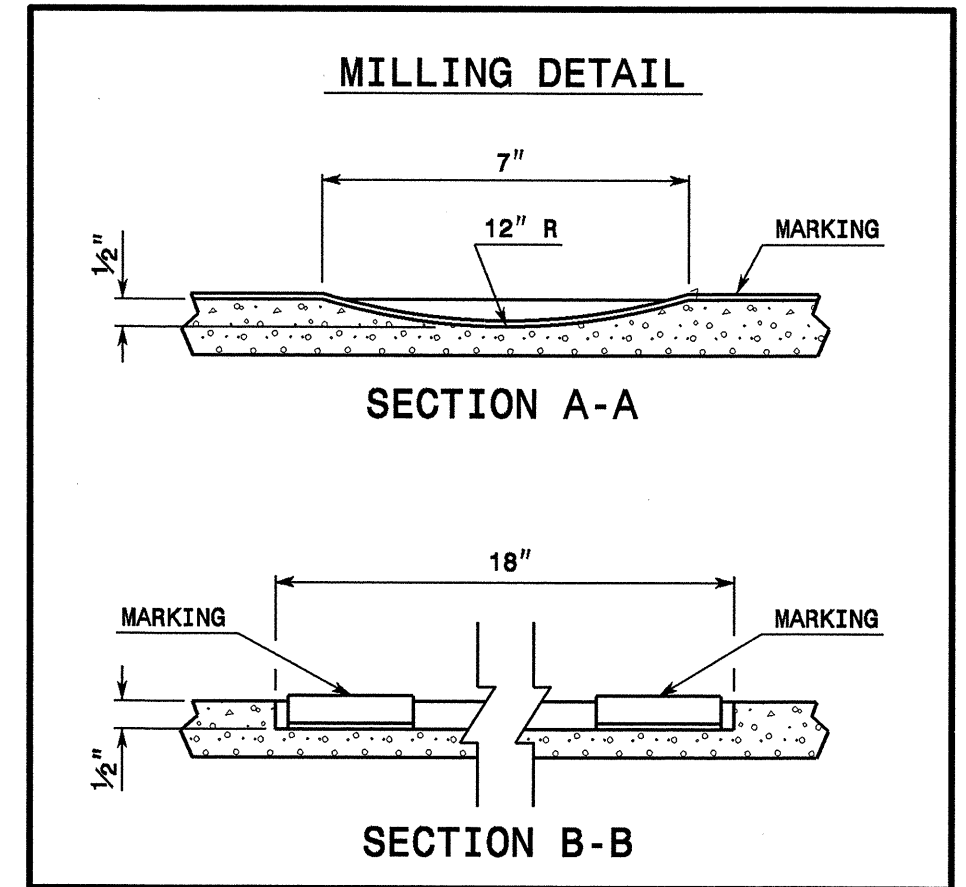
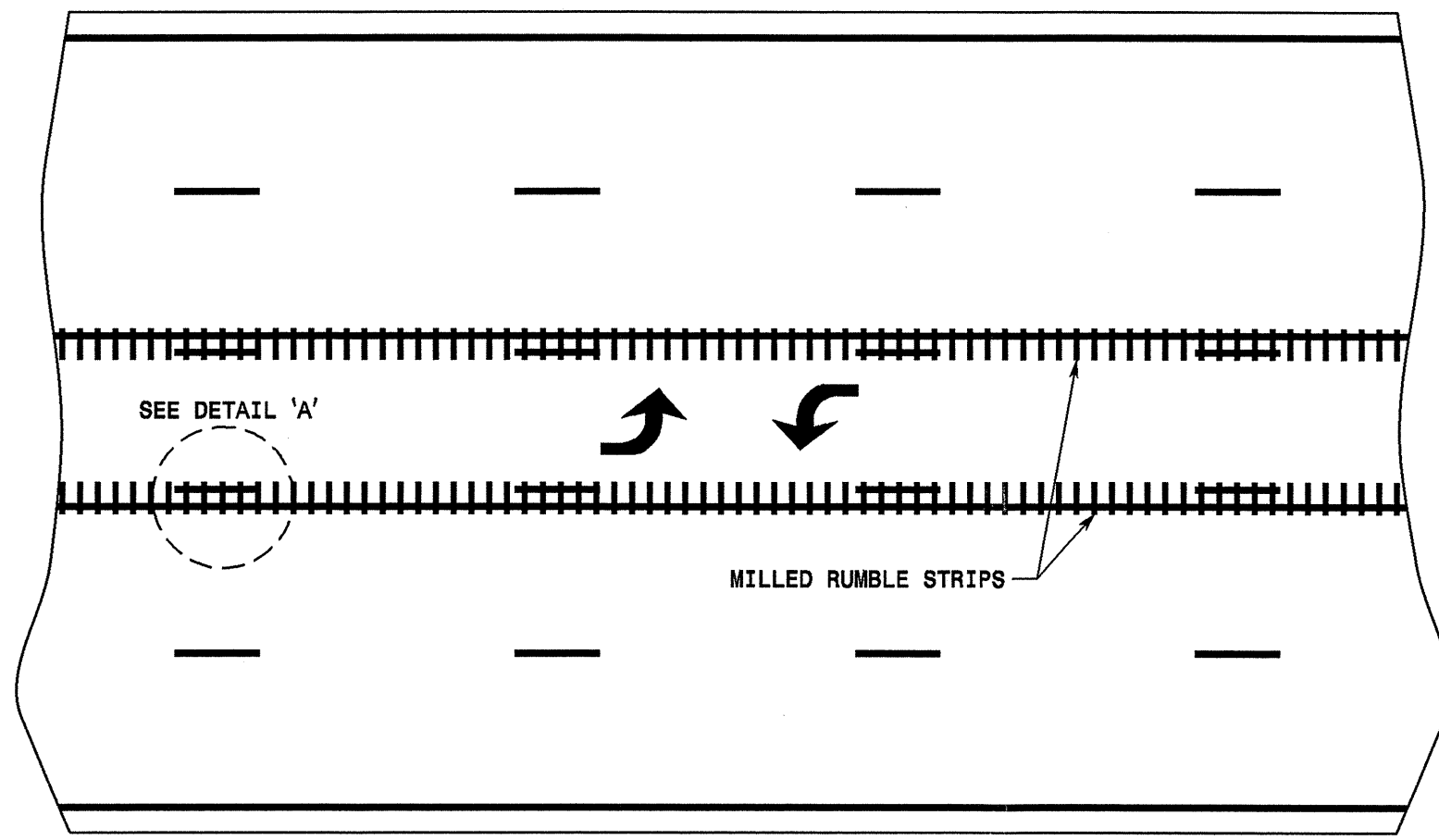
SUMMARY OF QUANTITIES

PROJECT NO	COUNTY	MAP NO	ROUTE	DESCRIPTION	TYP NO	FINAL SURFACE TESTING REQUIRED	LENGTH MI	WIDTH FT	MOBILIZATION LS	BORROW CY	FOUNDATION CONDITIONING MATERIAL, MINOR STRS TON	FOUNDATION CONDITIONING FABRIC SY	18" RC PIPE CULVERTS, CLASS III LF	24" RC PIPE CULVERTS, CLASS III LF	30" RC PIPE CULVERTS, CLASS III LF	INCIDENTAL STONE BASE TON	SHOULDER RECONSTRUCTION SMI	0" - 1 1/2" MILLING SY	3/4" MILLING SY	INCIDENTAL MILLING SY	BASE COURSE, B25.0B TON	SURFACE COURSE, S9.5C TON
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			319
R-5517	Currituck	2	US 158	FROM BEGIN 5 LANE TO CURB AND GUTTER SECTION AT GRANDY	1	NO	11.75	69	*	100	11	30			88	50	23.50	344,667	476,373			44,083
R-5517	Currituck	3	US 158	FROM BEGIN CURB & GUTTER TO END CURB & GUTTER AT GRANDY	3	NO	1.75	60	*		15	36	32	76				63,999	63,999			5,779
R-5517	Currituck	4	US 158	FROM END CURB & GUTTER TO BEGIN CURB & GUTTER AT COINJOCK	1	NO	7.91	65	*	100						100	15.82	232,027	301,685		130	27,489
R-5517	Currituck	5	US 158	FROM BEGIN CURB & GUTTER SECTION TO NC 168	3	NO	2.75	60	*		26	66	32	76	88	155	39.50	103,195	103,195	311	130	9,111
GRAND TOTAL							24.25		1	210	26	66	32	76	88			747,888	949,252		130	86,781

PROJECT NO	COUNTY	MAP NO	ROUTE	DESCRIPTION	TYP NO	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	2'-6" CURB AND GUTTER LF	MASONRY DRAINAGE BOXES (CB) EA	FRAME W/ GRATE AND HOOD (TYPE E) EA	
R-5517	Currituck	1	US 158	FROM WRIGHT MEMORIAL BRIDGE TO BEGIN 5 LANE SECTION	2	19	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	2,600	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	341	176	2,880	29	18,480	2	1						100	4	986	200	40	2	2	
R-5517	Currituck	4	US 158	FROM END CURB & GUTTER TO BEGIN CURB & GUTTER AT COINJOCK	1	1,628	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	538	323	5,300		29,040	5	1						200	8	1,260	400	40	2	2	
GRAND TOTAL						5,126	2,646	43,372	63	256,108	7	5	4,032	661	1,653	144	28.7	300	12	2,246	600	40	2	2	

THERMOPLASTIC AND PAINT QUANTITIES

PROJECT NO	COUNTY	MAP NO	ROUTE	DESCRIPTION	TYP NO	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	THERMOPLASTIC LT ARROW EA	THERMOPLASTIC STR ARROW EA	THERMOPLASTIC RT ARROW EA	THERMOPLASTIC STR & RT ARROW EA	THERMOPLASTIC 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	2,446	2,934	10	1,223	978	10								6		
R-5517	Currituck	2	US 158	FROM BEGIN 5 LANE TO CURB AND GUTTER SECTION AT GRANDY	1	NO	11.75	69	*	418,770	418,770	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	*	41,580	46,200	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 COINJOCK	1	NO	7.91	65	*	346,986	313,236		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	108,900	623	7,260	36,300	303	4	24	101	12	2	3	2	363	363	11,250
GRAND TOTAL										831,562	890,040	1,483	277,595	304,380	683	28	24	828	27	8	12	2	2,283	3,189	11,250
										1,721,602		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&DU\AS\fordar.ds.Gr.ojo\Mark\RUMBLE_DRAWINGS\Div1_rumble-strip-dwg.dgn
 pseyvmore AT 1231502

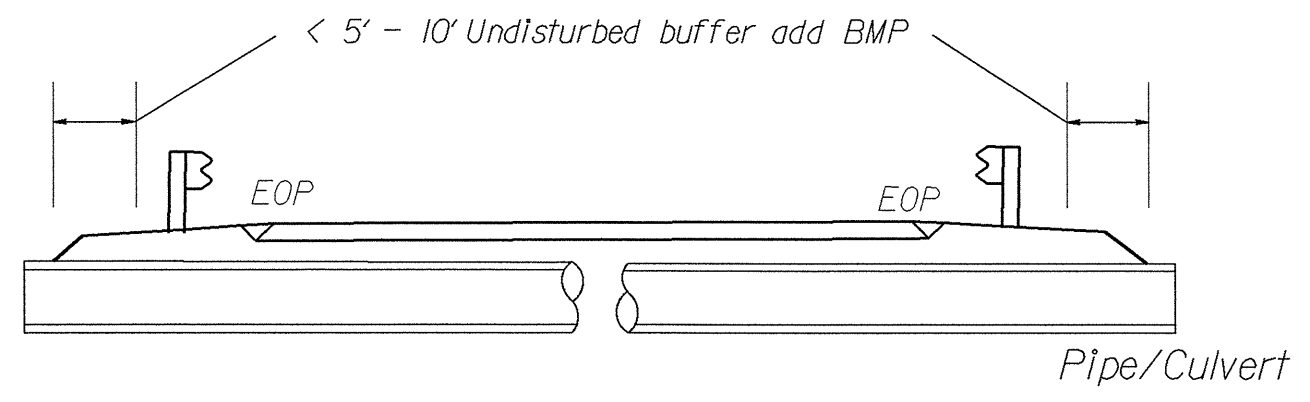
APPROVED: <i>[Signature]</i> DATE: 09/22/11	RUMBLE STRIPE DETAILS FOR A 5-LANE SECTION	
SCALE: NONE DATE: 09-22-11 DWG. BY: MES DESIGN BY: MRM REVIEWED BY: CBH		REVISIONS 1 2 3 4 5

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

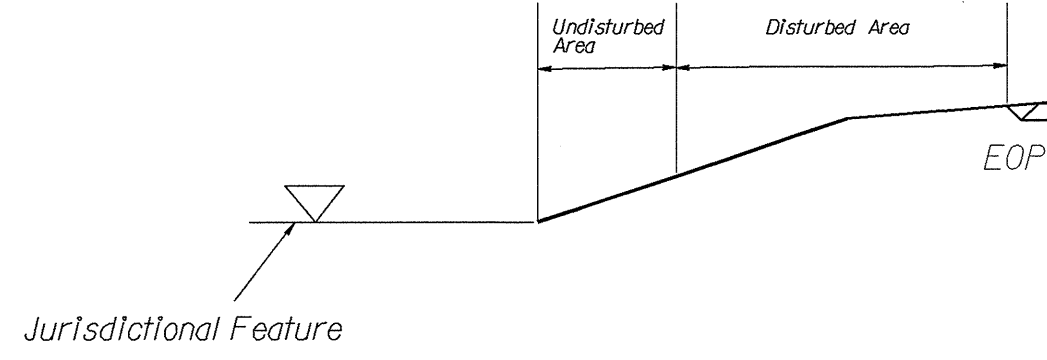
NOTES: Less than 5' - 10' undisturbed buffer from ROW, ditchline, water feature, or drainage inlet, add BMP.

BMP Options: Wattle or Silt Fence

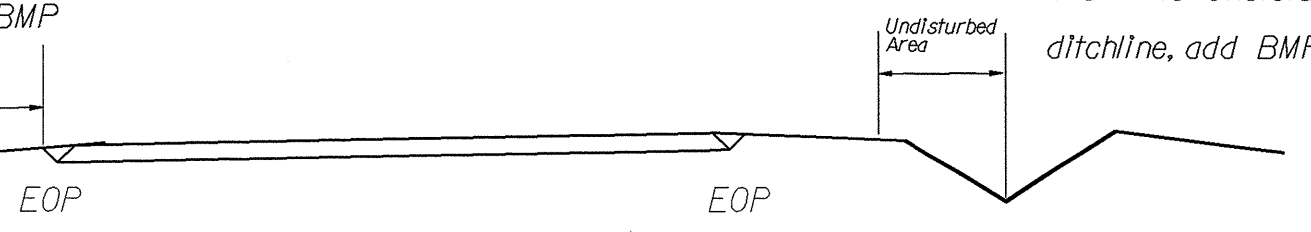
EROSION CONTROL DETAIL



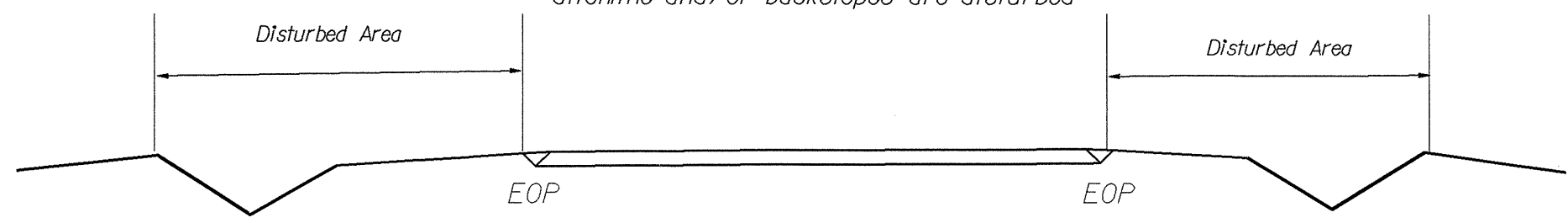
< 5' - 10' Undisturbed buffer from jurisdictional feature add BMP



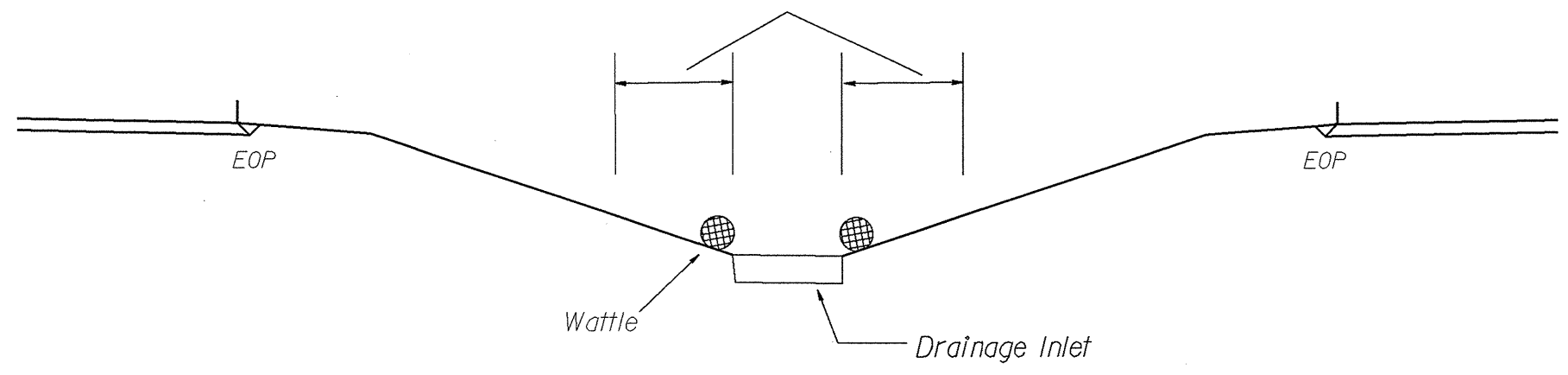
< 5' - 10' Undisturbed buffer from ditchline, add BMP



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



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

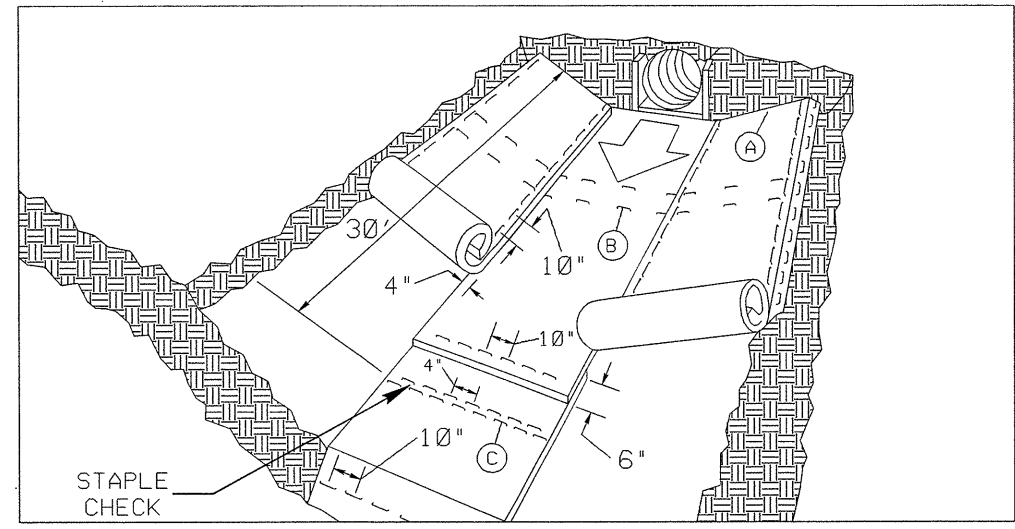


NOT TO SCALE

R-5517

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

MATTING INSTALLATION DETAIL



MATTING IN DITCHES

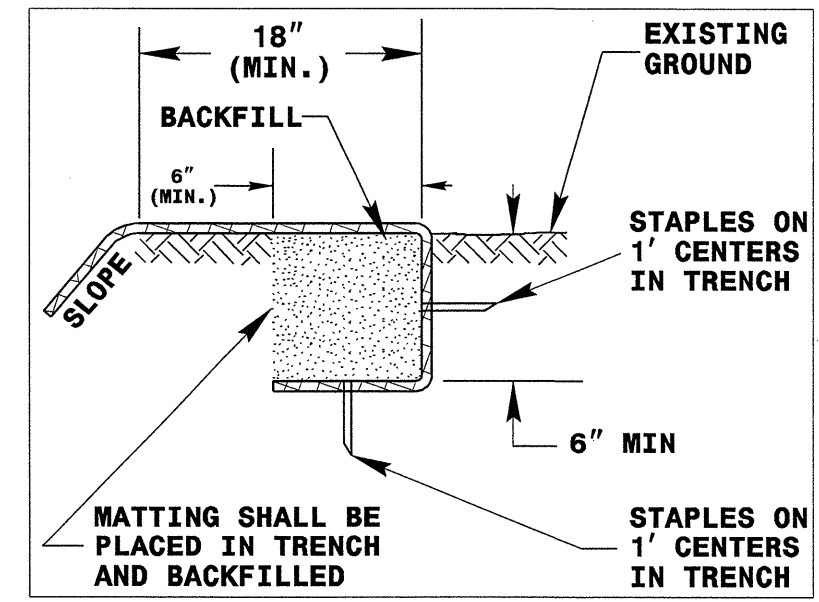
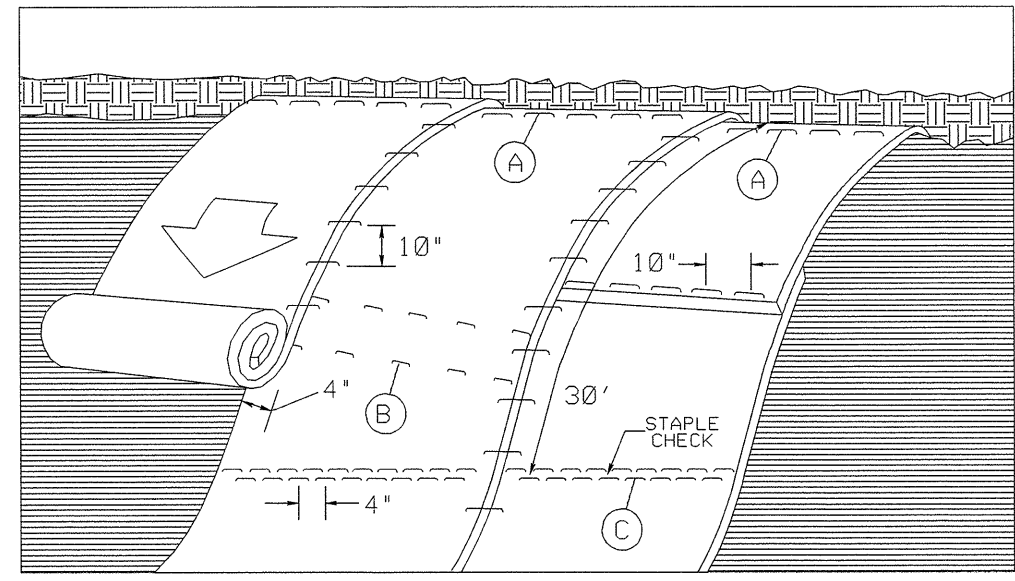


DIAGRAM (A)



MATTING ON SLOPES

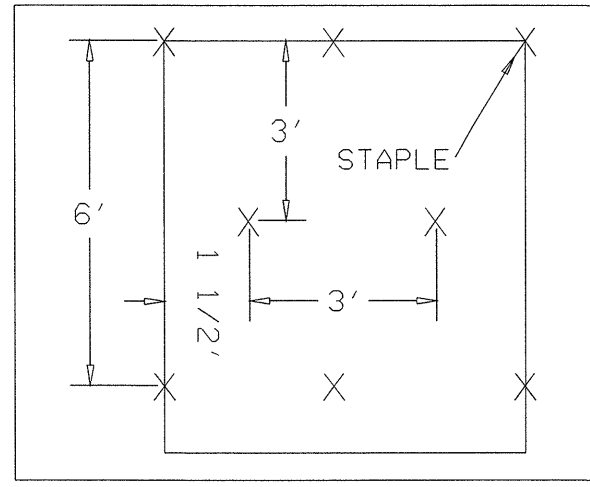


DIAGRAM (B)

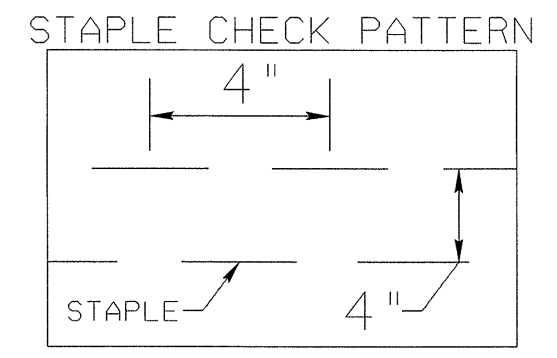


DIAGRAM (C)

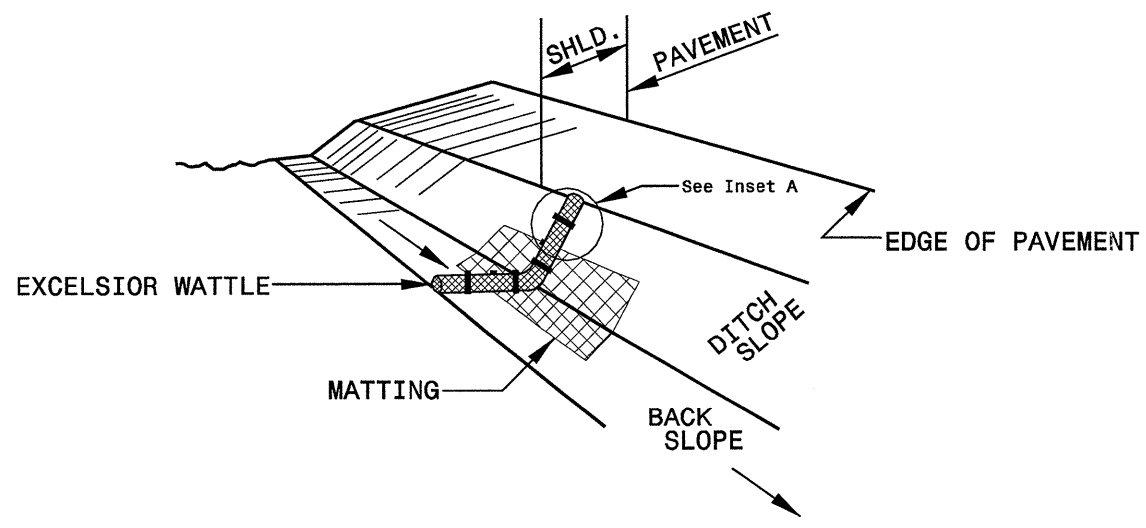
NOTES:
 THIS DETAIL APPLIES TO STRAW, EXCELSIOR, AND PERMANENT SOIL REINFORCEMENT MAT (PSRM) INSTALLATION.
 STAPLES SHALL BE NO. 11 GAUGE STEEL WIRE FORMED INTO A "U" SHAPE WITH A MINIMUM THROAT WIDTH OF 1 INCH AND NOT LESS THAN 6 INCHES IN LENGTH.

NOT TO SCALE

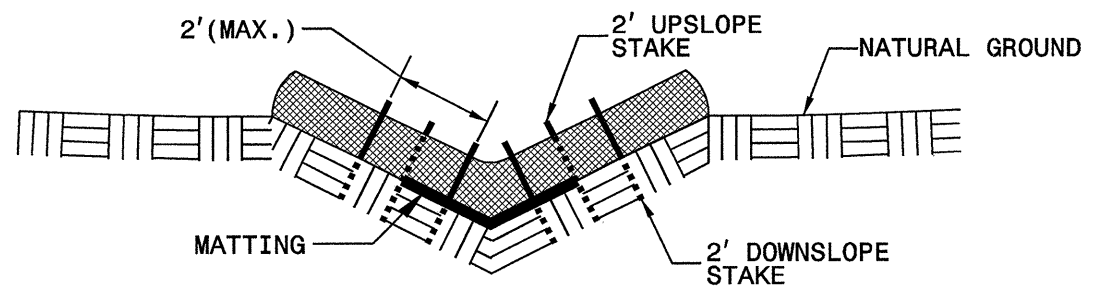
R5517

PROJECT REFERENCE NO. R-5517	SHEET NO. EC-3
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

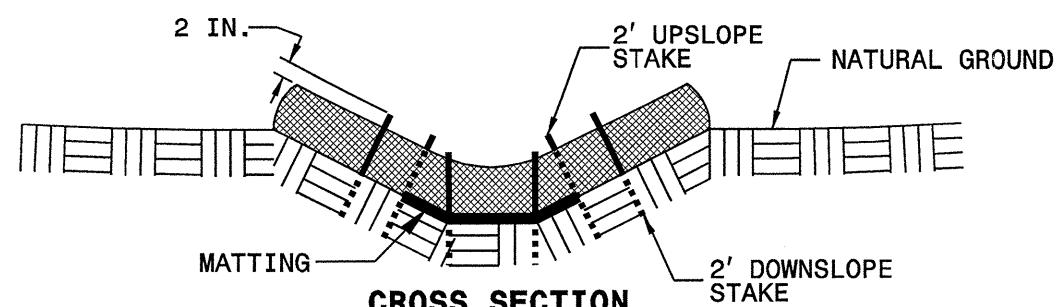
WATTLE DETAIL



ISOMETRIC VIEW

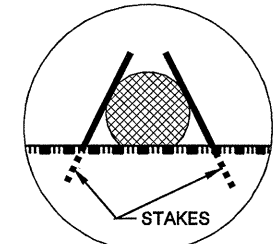


CROSS SECTION VEE DITCH

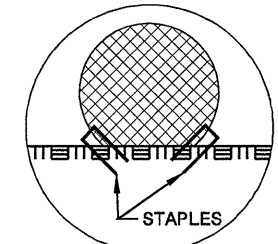


CROSS SECTION TRAPEZOIDAL DITCH

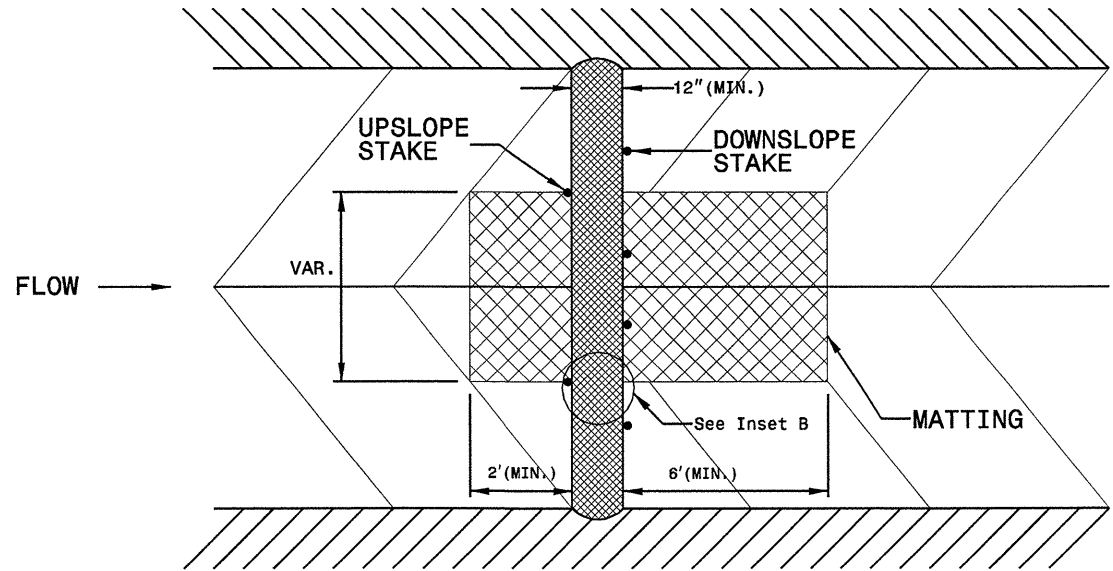
- NOTES:
- USE MINIMUM 12 IN. DIAMETER EXCELSIOR WATTLE.
 - USE 2 FT. WOODEN STAKES WITH A 2 IN. BY 2 IN. NOMINAL CROSS SECTION.
 - ONLY INSTALL WATTLE(S) TO A HEIGHT IN DITCH SO FLOW WILL NOT WASH AROUND WATTLE AND SCOUR DITCH SLOPES AND AS DIRECTED.
 - INSTALL A MINIMUM OF 2 UPSLOPE STAKES AND 4 DOWNSLOPE 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.



INSET A



INSET B








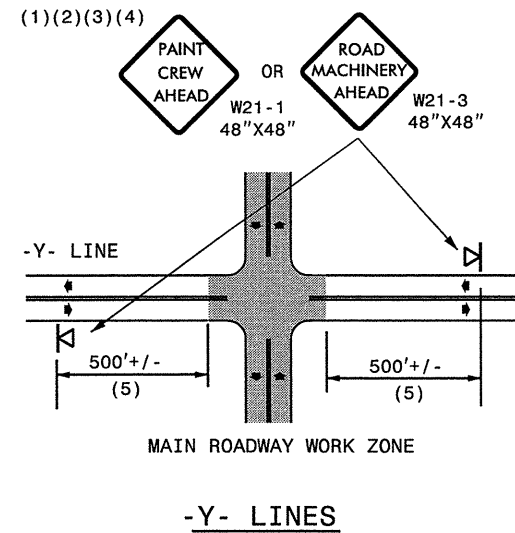
TOP VIEW

GENERAL NOTES

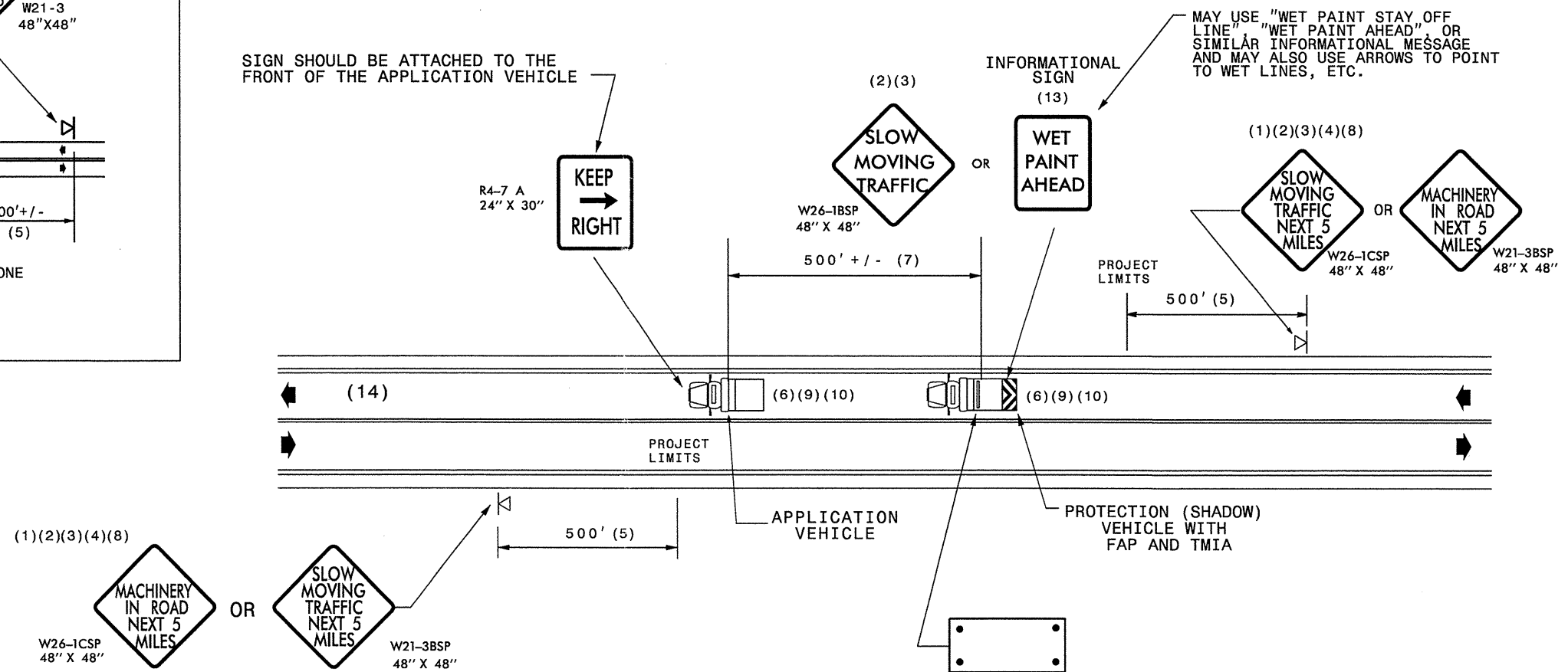
- (1) THE FOLLOWING OPTIONS MAY BE USED FOR ADVANCE WARNING SIGNS:
 - A. TRUCK MOUNTED SIGNS
 - B. TRUCK MOUNTED CHANGEABLE MESSAGE SIGN (CMS)
 - C. GROUND MOUNTED ADVANCE WARNING SIGNS (MUST CIRCLE TO PICK UP SIGNS)
 - D. GROUND MOUNTED CHANGEABLE MESSAGE SIGN (CMS) (MUST USE CIRCLE TO PICK UP SIGNS)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








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IMPLEMENTATION DATE: 07/01/97
REVISED: 11/03/04

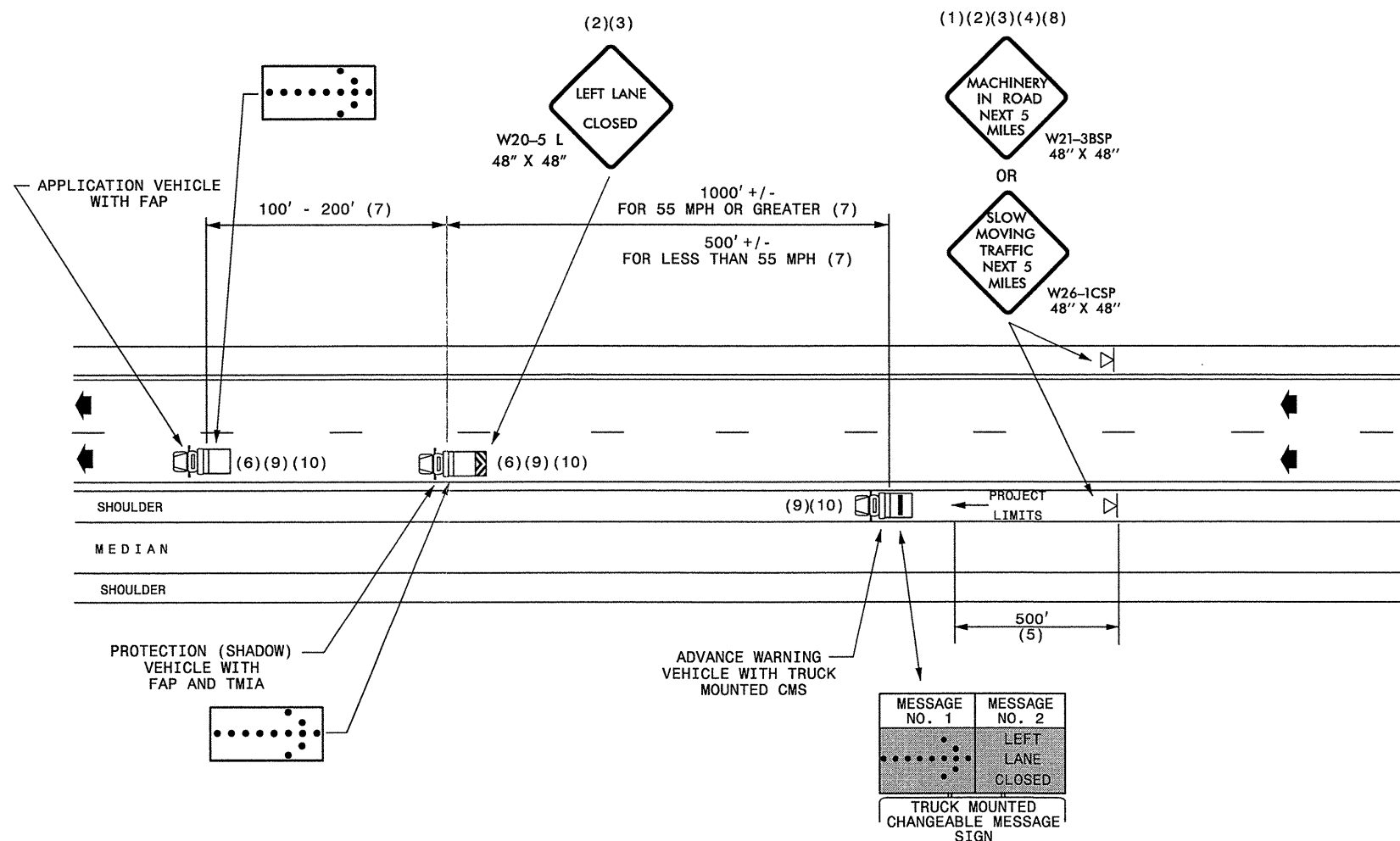
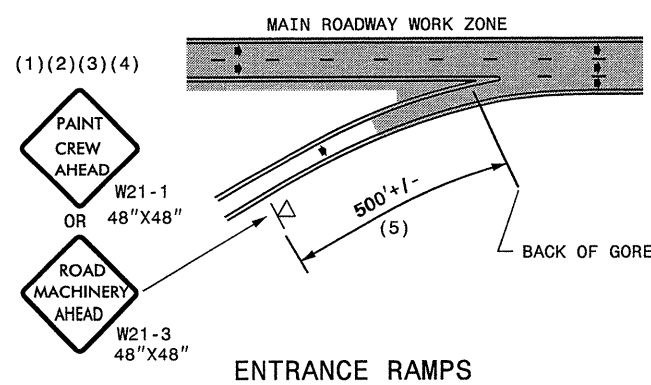
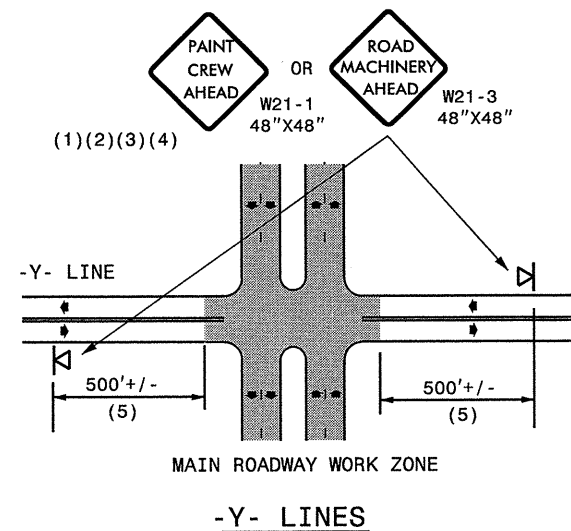
GENERAL NOTES

- (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

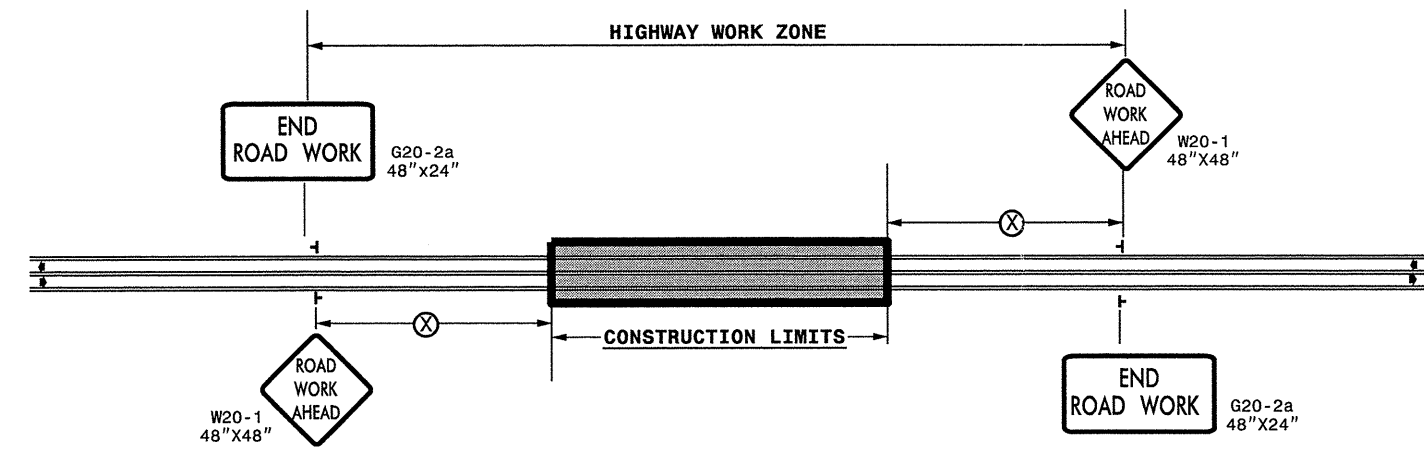


MOVING OPERATION CARAVAN

(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

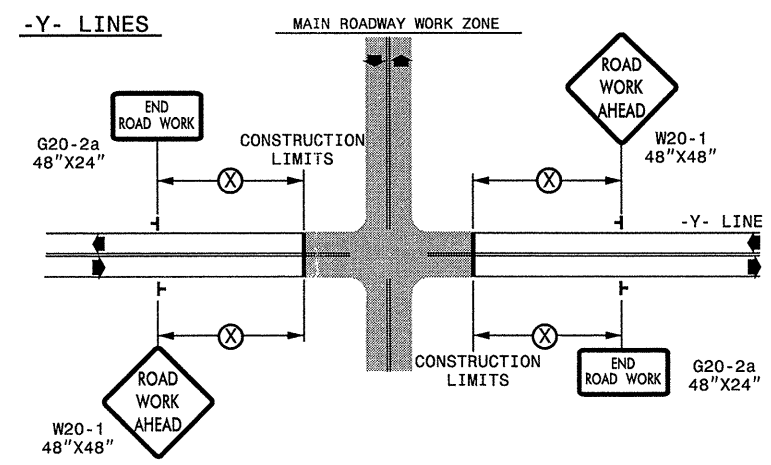
TWO-WAY UNDIVIDED ** (L-LINES)



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

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DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

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



DETAIL DRAWING FOR
TWO-WAY UNDIVIDED
WORK ZONE WARNING SIGNS

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

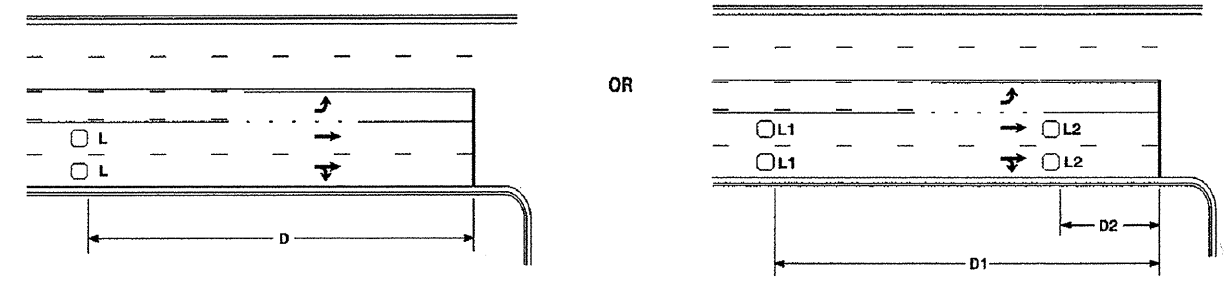
◀ DIRECTION OF TRAFFIC FLOW

SHEET 1 OF 1

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

27-SEP-2011 15:34
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 okpotel AT T244748

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

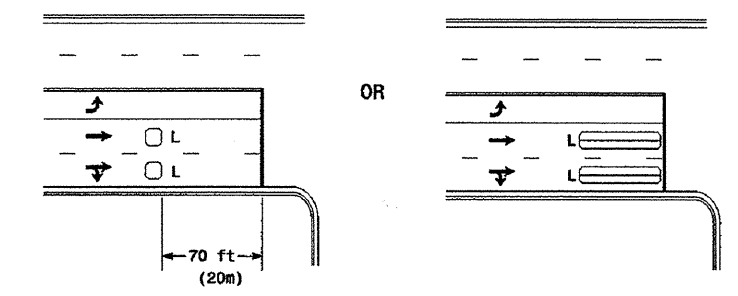
Speed Limit mph (km/hr)	D1 ft (m)	D2 ft (m)
40 (64)	250 (75)	80 (25)
45 (72)	300 (90)	90 (27)
50 (80)	355 (110)	100 (30)
55 (88)	420 (130)	110 (35)

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

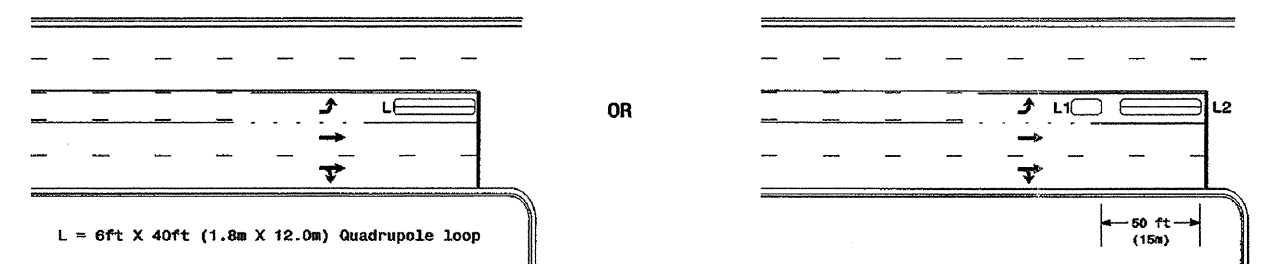
Low Speed Detection [≤35 mph (56 km/hr)]



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



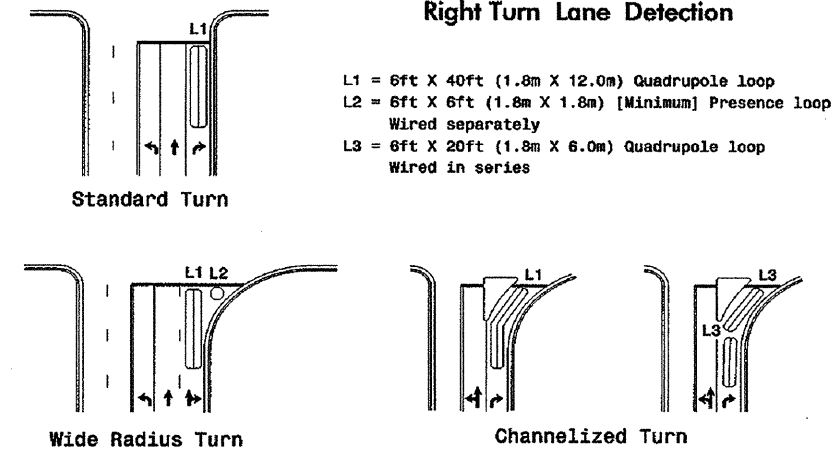
L = 6ft X 40ft (1.8m X 12.0m) Quadrupole loop

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

Presence Loop Detection

Queue Loop Detection

Right Turn Lane Detection



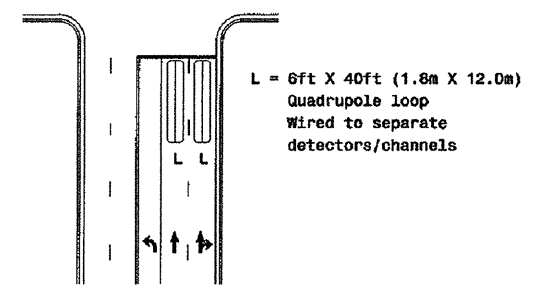
L1 = 6ft X 40ft (1.8m X 12.0m) Quadrupole loop
L2 = 6ft X 6ft (1.8m X 1.8m) [Minimum] Presence loop
Wired separately
L3 = 6ft X 20ft (1.8m X 6.0m) Quadrupole loop
Wired in series

Standard Turn

Wide Radius Turn

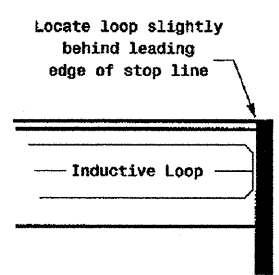
Channelized Turn

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

Inductive Loop

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

	<p>Typical Loop Locations</p>	
	<p>PLAN DATE: JUN 2006 PREPARED BY: P. L. Alexander</p>	<p>REVIEWED BY: REVISIONS: INITIALS: [Signature] DATE: 12/1/06</p>
<p>SCALE: N/A</p>	<p>SIGNATURE: [Signature] DATE: [Blank]</p>	<p>SIB. INVENTORY NO.:</p>

15-400-2008 14129
6x15s slp04rfl10 turn lrm1 loop10p10012006.dgn
12/1/06

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DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

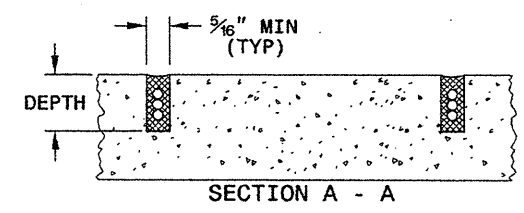
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INDUCTIVE DETECTION LOOPS
ENGLISH DETAIL DRAWING FOR

SHEET 1 OF 3
1725D01

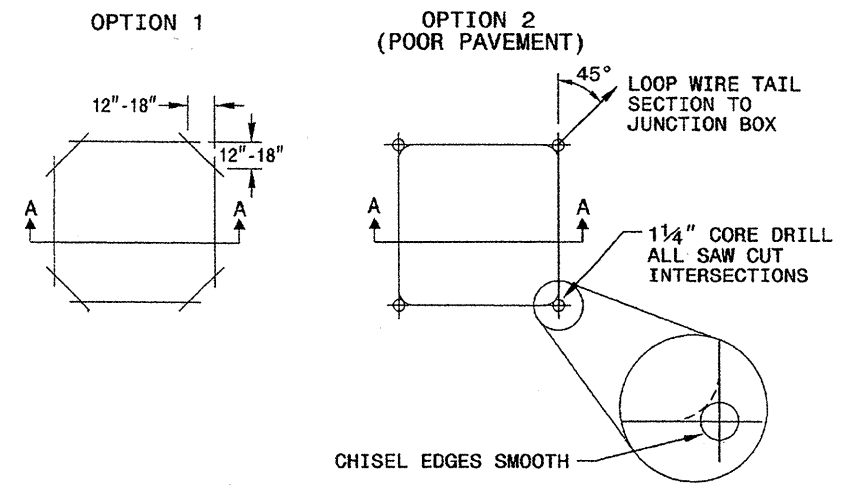
SAW SLOT DEPTH CHART

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

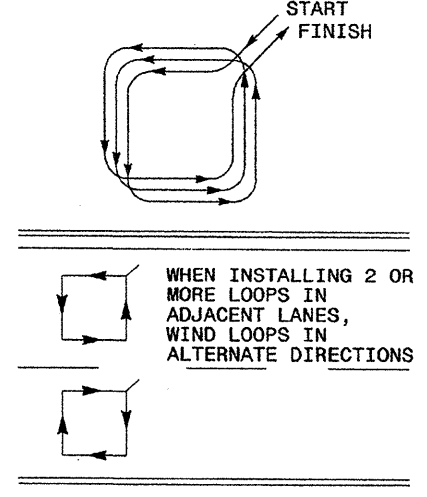


CONVENTIONAL 4-SIDED LOOP

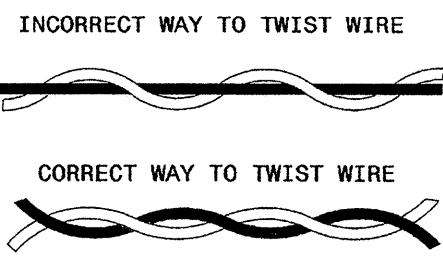
SAW CUT OPTIONS



LOOP WINDING METHOD



LOOP WIRE TWISTING METHOD

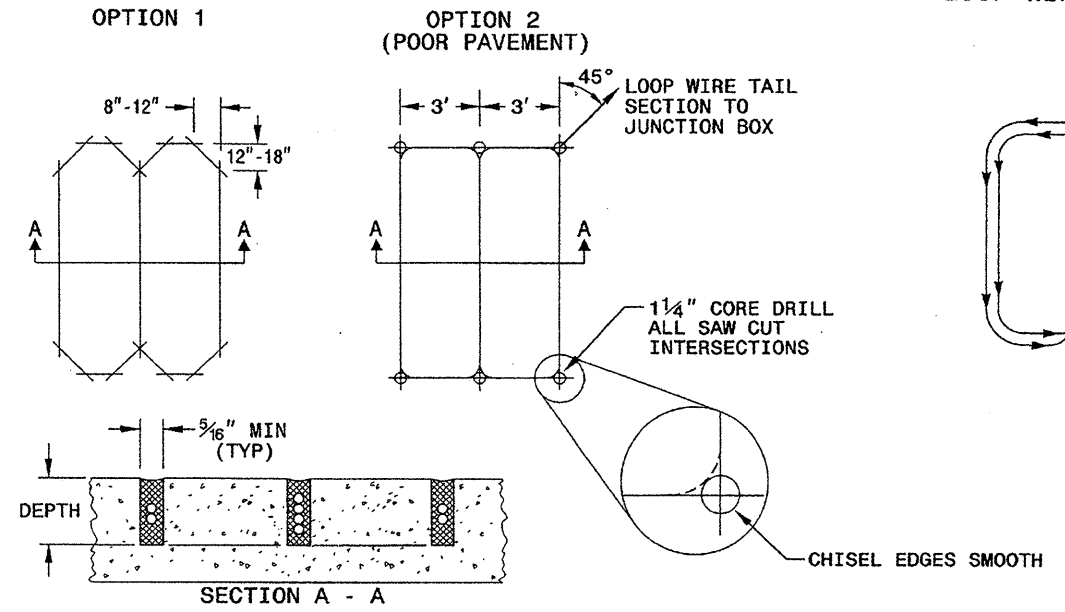


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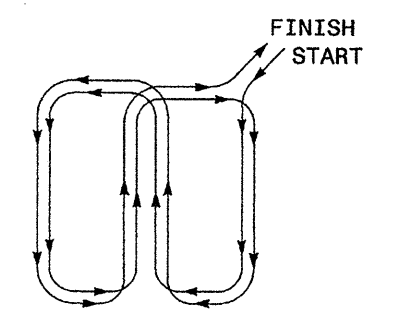
1. OVERLAP SAW CUTS AT CORNERS AND INTERSECTION POINTS TO ENSURE UNIFORM SAW SLOT DEPTH.
2. MAINTAIN 12" SPACING BETWEEN LOOP WIRE TAIL SECTIONS.
3. WIRE LOOPS CONNECTED TO THE SAME DETECTOR CHANNEL IN SERIES.
4. LOCATE LOOPS IN CENTER OF LANES UNLESS OTHERWISE SHOWN ON PLANS OR APPROVED BY ENGINEER.

QUADRUPOLE LOOP

SAW CUT OPTIONS



LOOP WINDING METHOD



DEPTH IS 2.5" FOR CONCRETE AND 3.0" FOR ASPHALT

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DIVISION OF HIGHWAYS
RALEIGH, N.C.

11-08

INDUCTIVE DETECTION LOOPS
ENGLISH DETAIL DRAWING FOR

SHEET 1 OF 3
1725D01

See Plate for Title

Prepared in the Office of:
Intelligent Transportation Systems & Signals Unit
750 N. Greenfield Parkway
Garner, NC 27529

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER
SEAL 16286
WILTON I. DEAN
Signature: *Wilton I. Dean* 4/24/08
DATE

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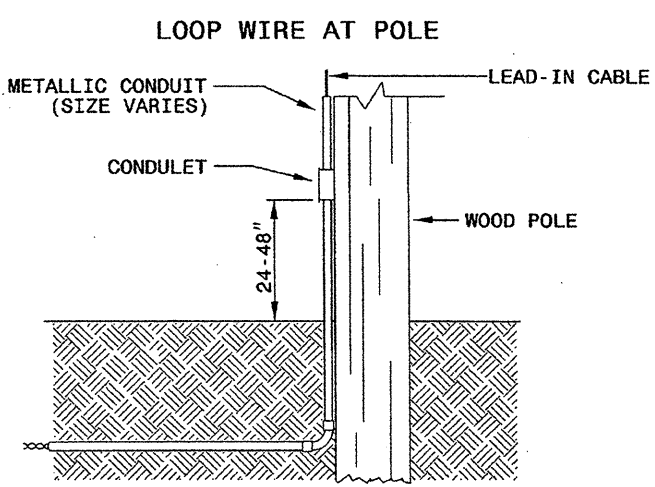
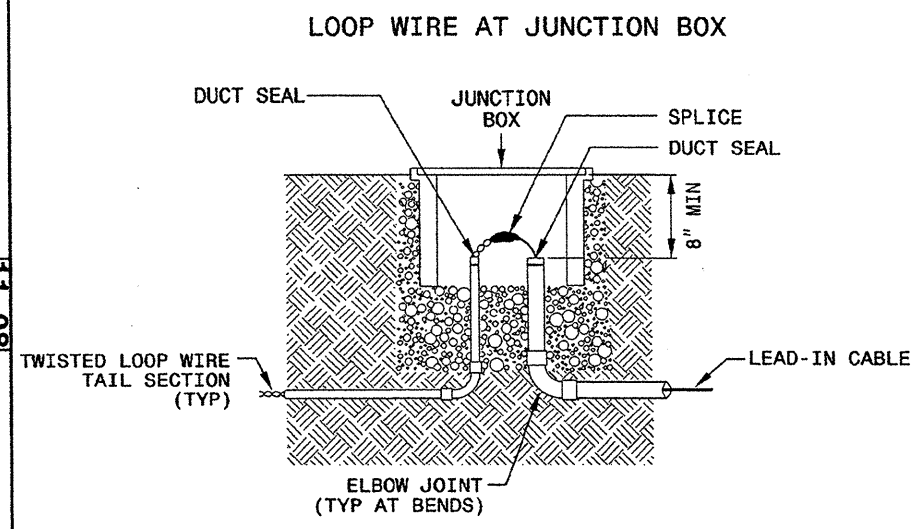
STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

11-08

ENGLISH DETAIL DRAWING FOR
INDUCTIVE DETECTION LOOPS
LOOP WIRE DETAILS

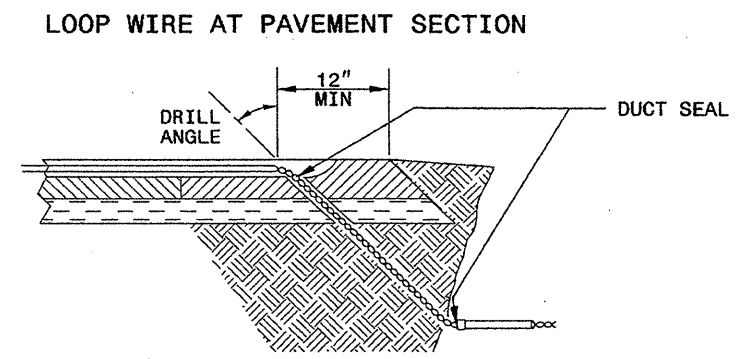
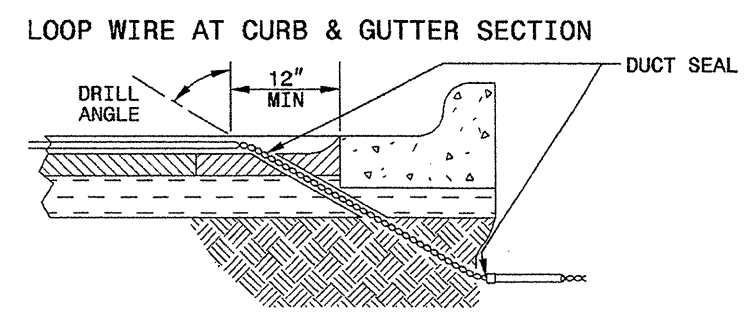
SHEET 2 OF 3
1725D01

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

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.

STATE OF NORTH CAROLINA
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RALEIGH, N.C.

11-08

ENGLISH DETAIL DRAWING FOR
INDUCTIVE DETECTION LOOPS
LOOP WIRE DETAILS

SHEET 2 OF 3
1725D01

See Plate for Title

Prepared in the Offices of:

750 N. Greenfield Parkway
Garner, NC 27529

SEAL

Milton I. Dean 11/24/08
SIGNATURE DATE

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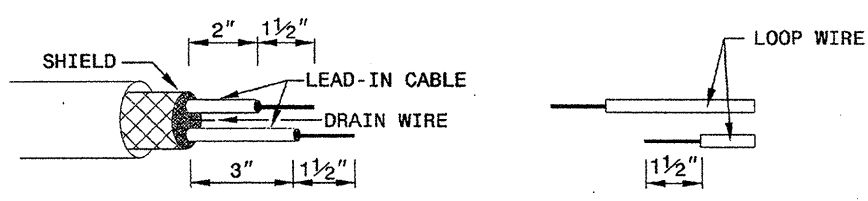
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DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

11-08

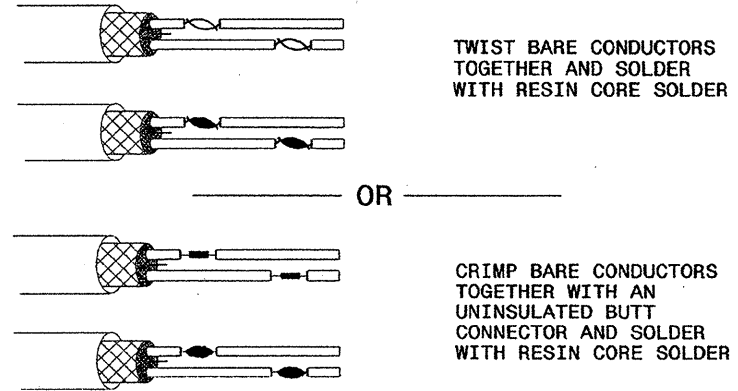
ENGLISH DETAIL DRAWING FOR
INDUCTIVE DETECTION LOOPS
SPlicing FOR LEAD-IN CABLE AND LOOP WIRE

SHEET 3 OF 3
1725D01

STEP 1. STRIP LOOP WIRE AND LEAD-IN CABLE

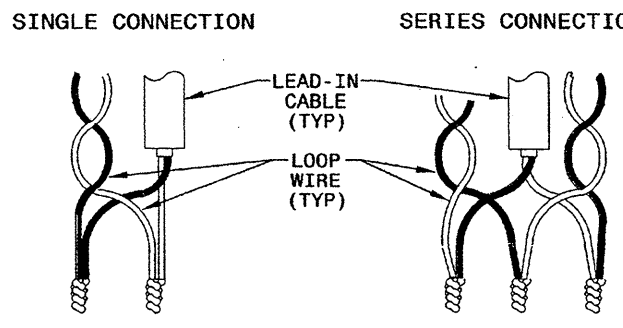


STEP 2. CONNECT AND SOLDER

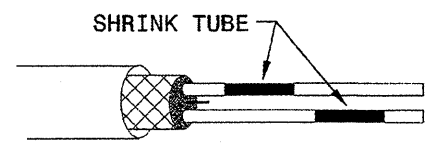


BOND SHIELD DRAIN WIRE AT SPLICE SECTIONS (DO NOT GROUND)

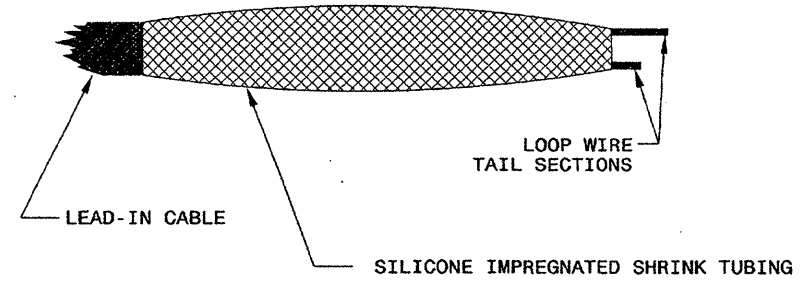
LOOP WIRE AND LEAD-IN CABLE CONNECTION DETAILS



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:

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Garner, NC 27529

SEAL

Milton I. Dean 11/24/08
SIGNATURE DATE

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