

**R-5164D
NC 147 DIAMOND GRINDING
AND SHOULDER
REPLACEMENT,
DURHAM COUNTY**

END PROJECT R-5164D

PAVEMENT SCHEDULE	
C1	PROP. APPROX. 1½" S9.5B, AT AN AVG. RATE OF 168 LBS PER SQ. YD.
C2	PROP. APPROX. 1½" S9.5C AT AN AVG. RATE OF 168 LBS PER SQ. YD.
D1	PROP. APPROX. 2½" I19.0B AT AN AVG. RATE OF 285 LBS PER SQ. YD.
D2	PROP. APPROX. 2½" I19.0C AT AN AVG. RATE OF 285 LBS PER SQ. YD.
U	EXISTING PAVEMENT
V1	PROP. 4" MILLING
V2	PROP. 1 1/2" MILLING
Y	PROPOSED DIAMOND GRINDING

BLACK - WHITE COMBINATION
10' WHITE SKIP LINES
10' BLACK SKIP LINES

FOR USE ON CONCRETE PAVEMENTS TO PROVIDE CONTRAST FOR THE WHITE LANE LINE, ALONG THRU LANES AND RAMP LANES.

*NOTE:
 WHERE TWO WIDTHS ARE INDICATED, THE FIRST WIDTH APPLIES TO A "NORMAL" WIDTH LINE, THE SECOND WIDTH APPLIES TO A "WIDE" LINE.

"WIDE" LINES ARE REQUIRED WHEN DESIGNATED IN THE PLANS, OR WHEN DIRECTED BY THE ENGINEER.

8" LINE REMOVAL SHALL BE USED TO REMOVE 100% OF THE 4" TEMPORARY PAINT ON THE CONCRETE SURFACE BY GRINDING METHOD ONLY. ALSO 8" LINE REMOVAL BY GRINDING SHALL BE USED IN THE AREA OF THE BLACK CONTRAST FOR SURFACE PREPARATION.

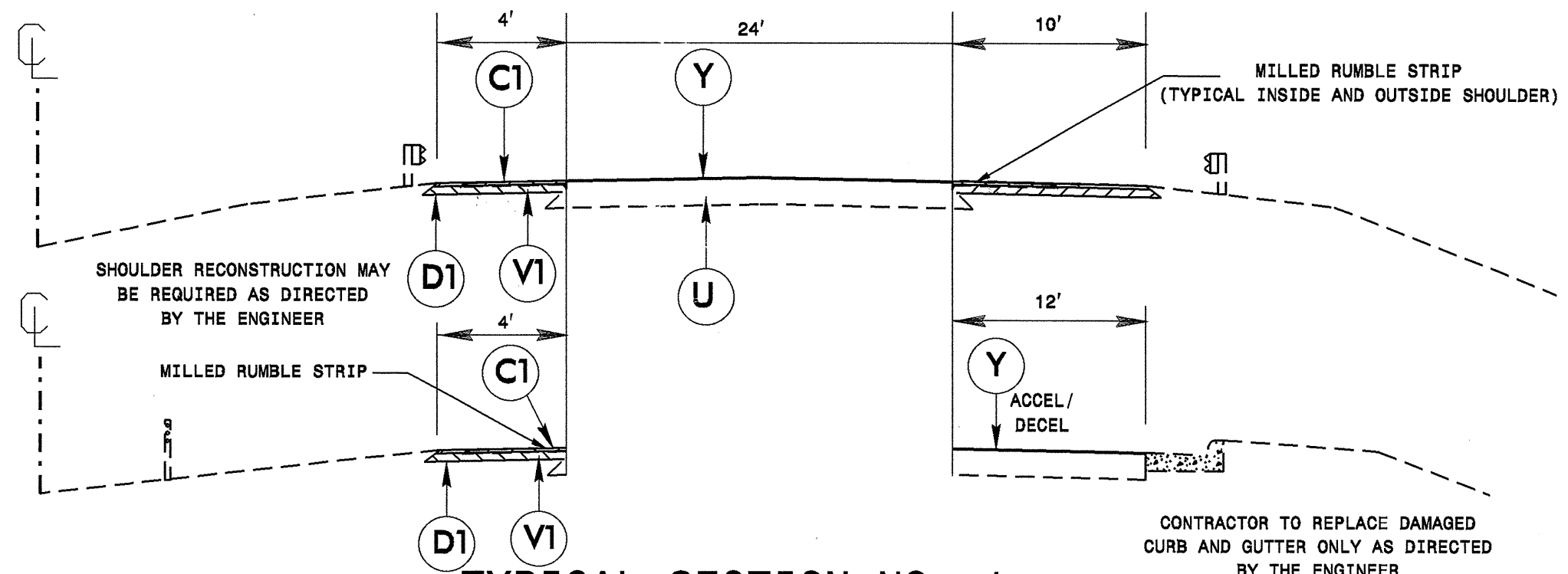
BLACK - WHITE COMBINATION
2' MINI WHITE SKIP LINES
2' MINI BLACK SKIP LINES

FOR USE ON CONCRETE PAVEMENTS TO PROVIDE CONTRAST FOR THE WHITE LANE LINE, ALONG THRU LANES AND RAMP LANES.

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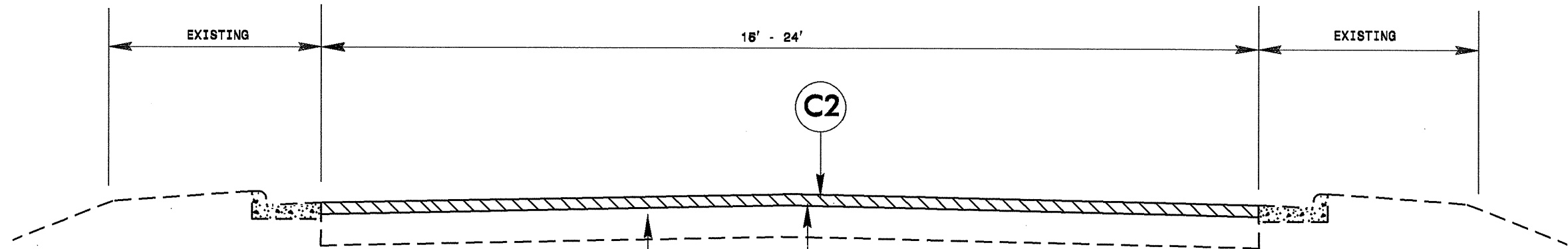
TYPICAL SECTION NO. 1

DIAMOND GRIND EXISTING 24' TRAVEL LANES, AUXILIARY LANES AND RAMPS TO THE BACK OF GORE
 DIAMOND GRINDING OPERATION SHALL BE PERFORMED PRIOR TO JOINT SEALING OPERATION
 ASPHALT SHOULDER PAVING SHALL NOT BE PERFORMED USING A WIDENER. CONTRACTOR SHALL USE 4' PAVER OR PERFORM THIS WORK BEFORE DIAMOND GRINDING TO AVOID TACK AND DEBRIS ON FINAL CONCRETE PAVEMENT SURFACE.

PAVEMENT SCHEDULE

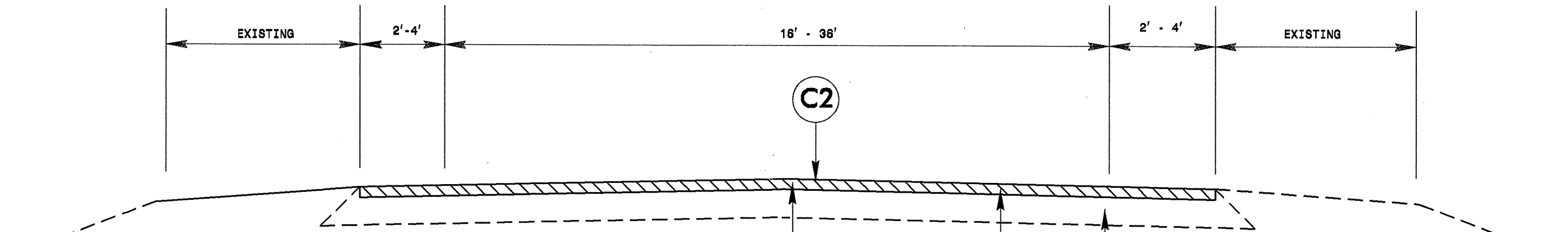
PROJECT REFERENCE NO.	SHEET NO.
R-5164D, 45158.3, ST 4	3

C1	PROP. APPROX. 1½" S9.5B, AT AN AVG. RATE OF 168 LBS PER SQ. YD.	U	EXISTING PAVEMENT
C2	PROP. APPROX. 1½" S9.5C AT AN AVG. RATE OF 168 LBS PER SQ. YD.	V1	PROP. 4" MILLING
D1	PROP. APPROX. 2½" I19.0B AT AN AVG. RATE OF 285 LBS PER SQ. YD.	V2	PROP. 1 1/2" MILLING
D2	PROP. APPROX. 2½" I19.0C AT AN AVG. RATE OF 285 LBS PER SQ. YD.	Y	PROPOSED DIAMOND GRINDING



TYPICAL SECTION NO. 2

* CONTRACTOR SHALL USE THIS TYPICAL FOR THE ASPHALT RAMP AT FAYETTEVILLE ROAD



SHOULDER RECONSTRUCTION MAY
BE REQUIRED AS DIRECTED
BY THE ENGINEER

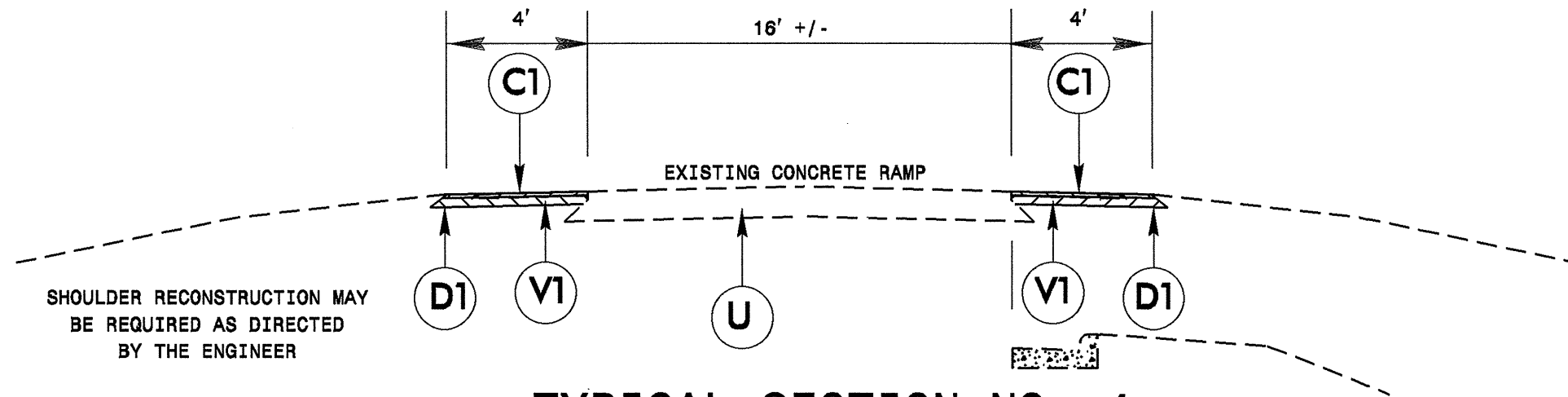
TYPICAL SECTION NO. 3

* CONTRACTOR SHALL USE THIS TYPICAL FOR THE ASPHALT RAMPS AT ELLIS ROAD

PAVEMENT SCHEDULE

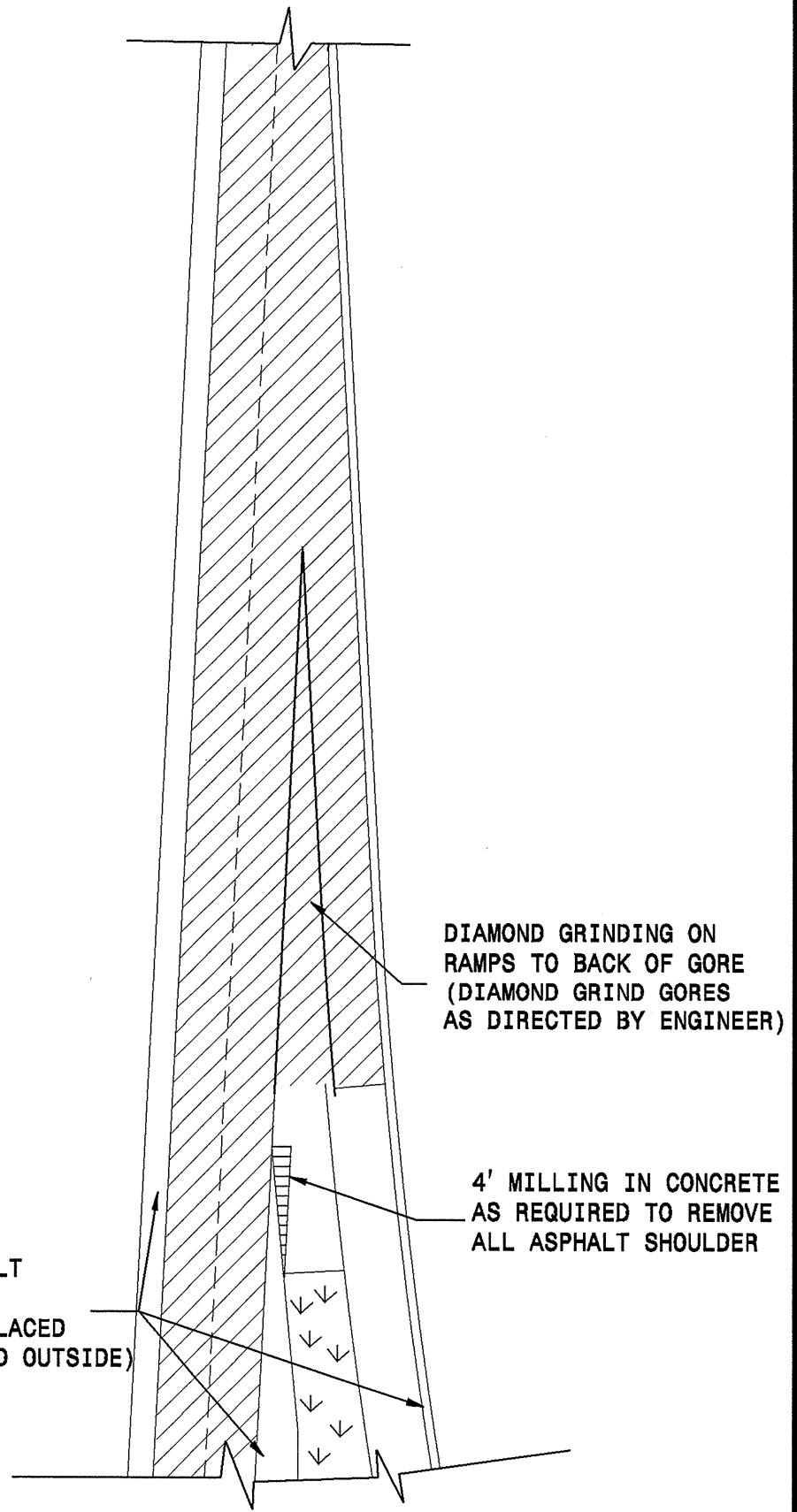
PROJECT REFERENCE NO.	SHEET NO.
R-5164D, 45158.3, ST4	4

C1	PROP. APPROX. 1½" S9.5B, AT AN AVG. RATE OF 168 LBS PER SQ. YD.	U	EXISTING PAVEMENT
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D2	PROP. APPROX. 2½" I19.0C AT AN AVG. RATE OF 285 LBS PER SQ. YD.	Y	PROPOSED DIAMOND GRINDING

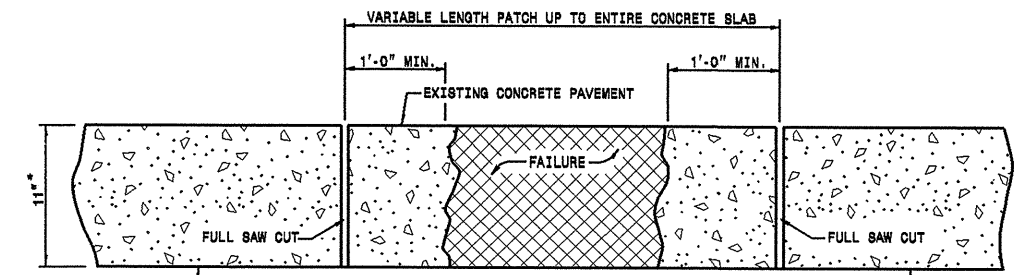


TYPICAL SECTION NO. 4

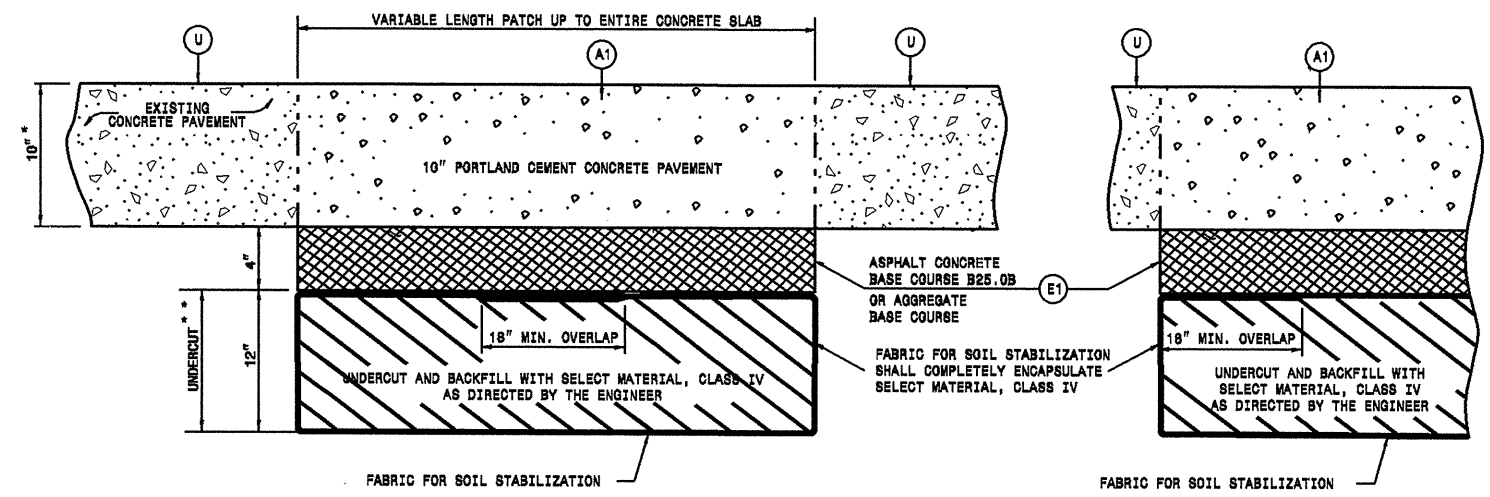
* CONTRACTOR SHALL USE THIS TYPICAL FOR THE CONCRETE RAMP/LOOP WITH ASPHALT SHOULDERS AT BRIGGS



DETAIL FOR LIMITS OF MILLING AND DIAMOND GRINDING AT GORE AREAS



DETAIL OF SAW CUTS



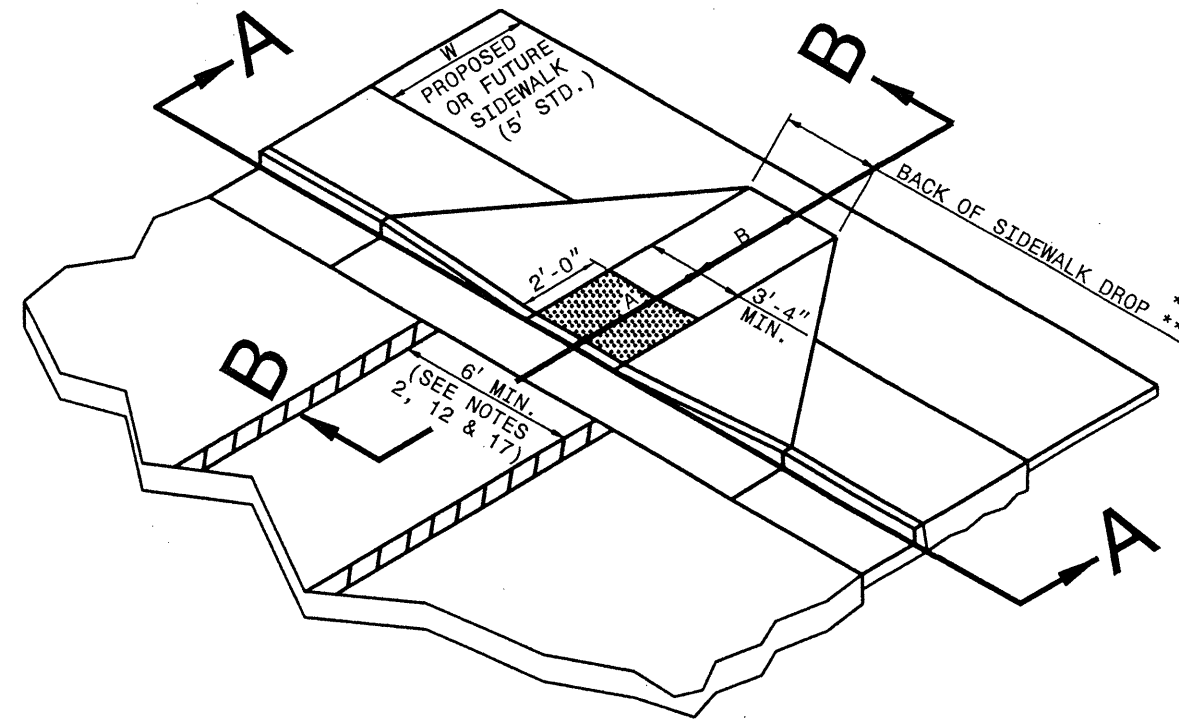
DETAIL OF CONCRETE PAVEMENT REPAIR

* DIMENSIONS ARE APPROXIMATE AND SHOULD BE FIELD VERIFIED
 ** UNDERCUT REQUIRED IN AREAS AS DIRECTED BY THE ENGINEER

PAVEMENT SCHEDULE	
A1	10" PORTLAND CEMENT CONCRETE PAVEMENT THROUGH LANES (WITH DOWELS).
E1	PROP. APPROX. 4" ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 450 LBS. PER SQ. YD. OR 4" AGGREGATE BASE COURSE TO MATCH ADJACENT EXISTING MATERIAL.
U	EXISTING PAVEMENT

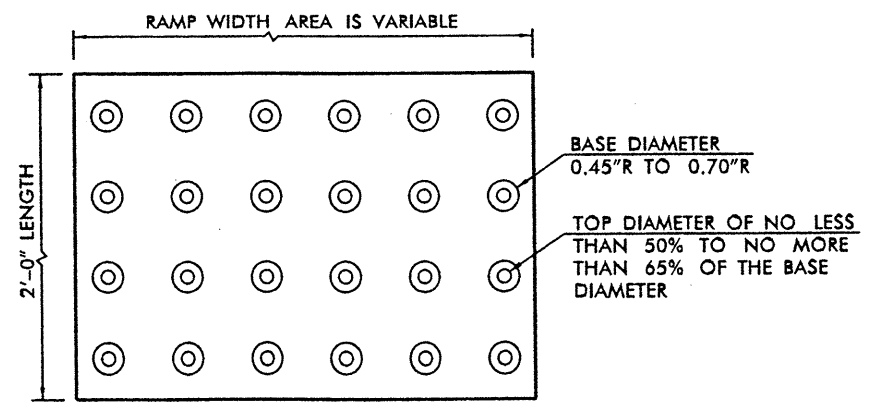
Refer to the North Carolina Department of Transportation "Partial and Full Depth Repair Manual" when Replacing Slabs and when Repairing Concrete Pavement.

DETAIL FOR REPAIR OF CONCRETE PAVEMENT



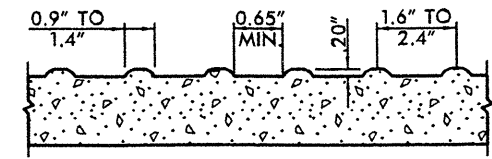
ISOMETRIC VIEW

- NOTES:
1. DETECTABLE WARNING DOMES SHALL COVER 2'-0" LENGTH AND FULL WIDTH OF THE RAMP FLOOR AS SHOWN ON THE DETAILS.
 2. OBTAIN 70% CONTRAST VISIBILITY WITH ADJOINING SURFACE, EITHER LIGHT-ON-DARK, OR DARK-ON-LIGHT SEQUENCE COVERING THE ENTIRE RAMP.

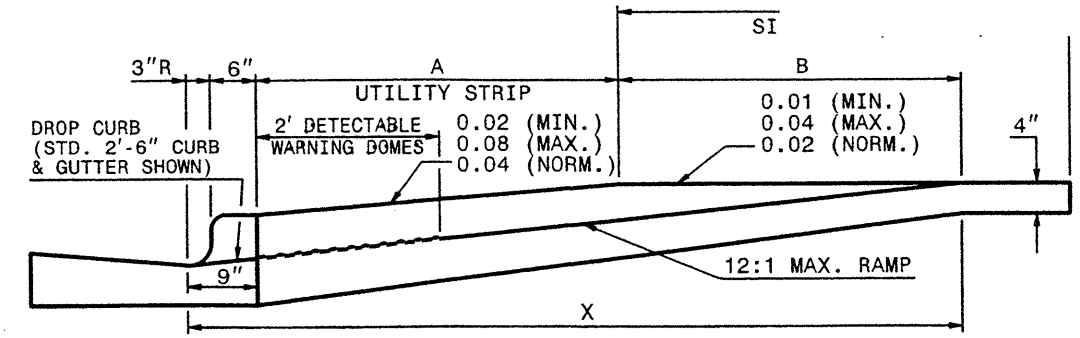


W	A	W+A+9"	X	B
5'	0.0'	5.8'	5.8'	5.0'*
6'	0.0'	6.8'	6.8'	6.0'***
7'	0.0'	7.8'	7.3'	6.5'***
8'	0.0'	8.8'	7.3'	6.5'***
5'	2.0'	7.8'	7.8'	5.0'
5'	2.5'	8.3'	8.1'	4.8'
5'	3.0'	8.8'	8.3'	4.4'
5'	3.5'	9.3'	8.4'	4.1'
5'	4.0'	9.8'	8.6'	3.8'
5'	4.5'	10.3'	8.7'	3.4'
5'	5.0'	10.8'	8.9'	3.1'

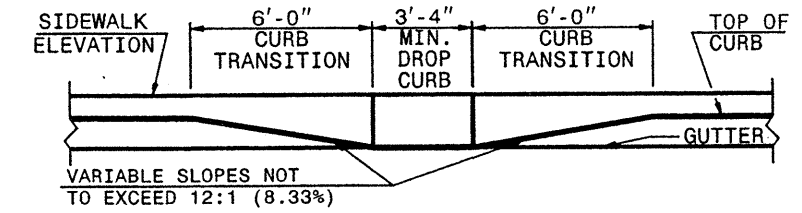
$B = X - (A + 9")$
 B = DISTANCE FROM FRONT EDGE OF SIDEWALK TO BACK POINT OF 12:1 (8.33%) SLOPE.
 * BACK OF SIDEWALK DROP REQUIRED FOR ALL SIDEWALK SLOPES.
 ** BACK OF SIDEWALK DROP REQUIRED FOR SIDEWALK SLOPES 0.04.



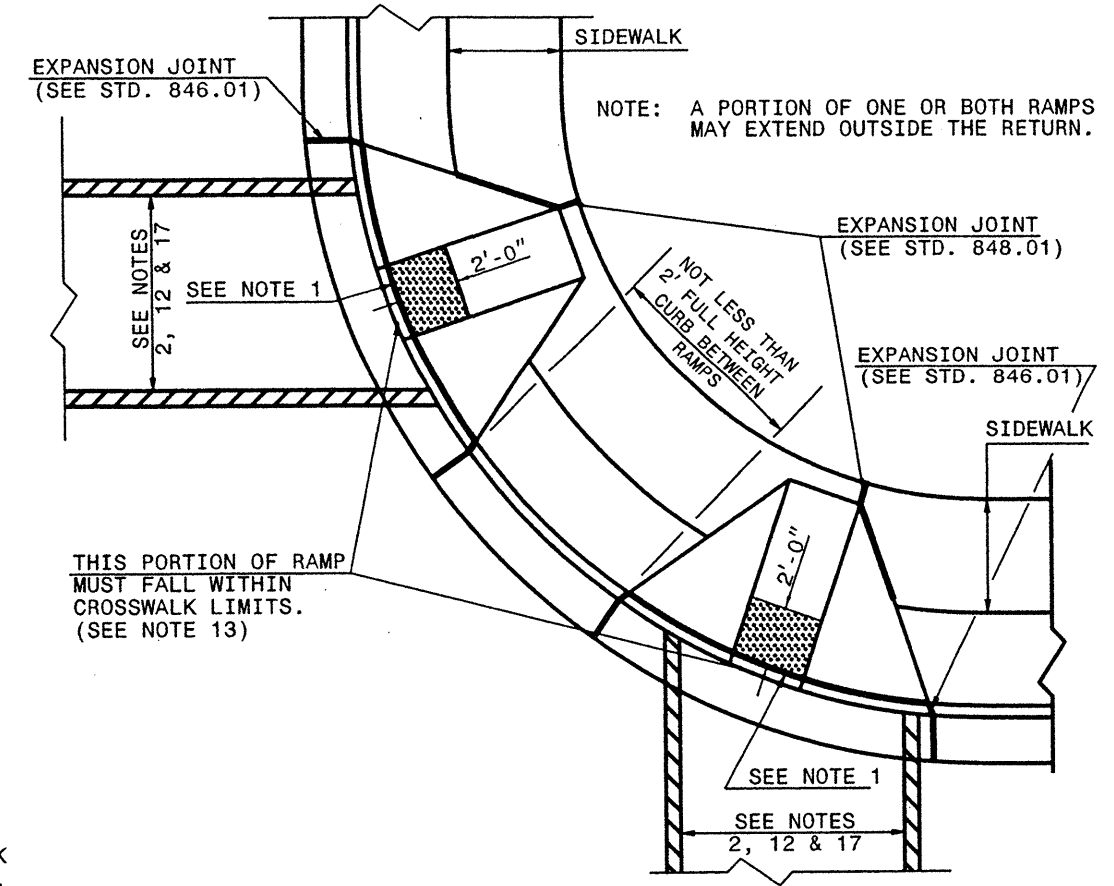
DETECTABLE WARNING DOMES



SECTION B-B



SECTION A-A



PLAN VIEW

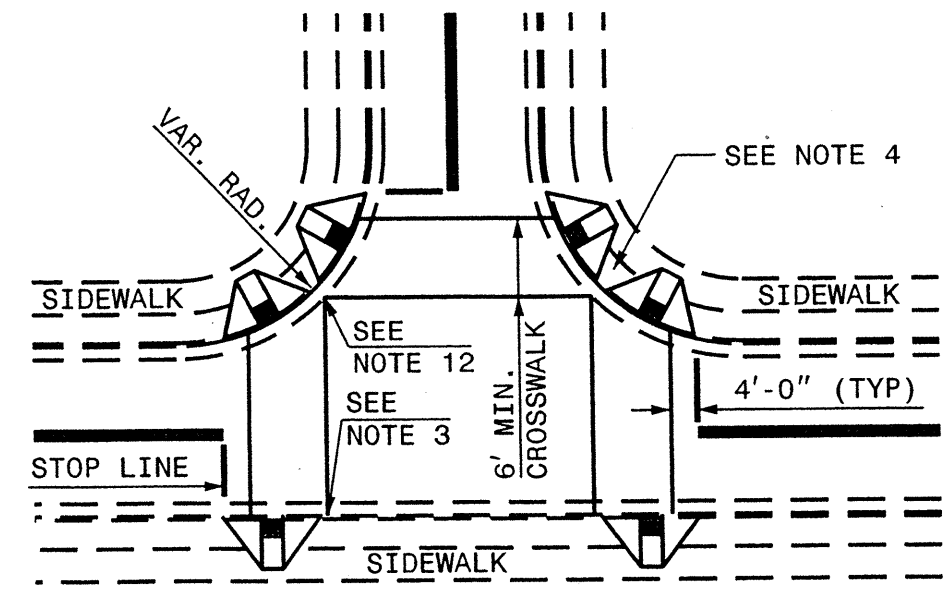
DUAL RAMPS
ANY RADII
(40" MIN. FLOOR WIDTH)

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

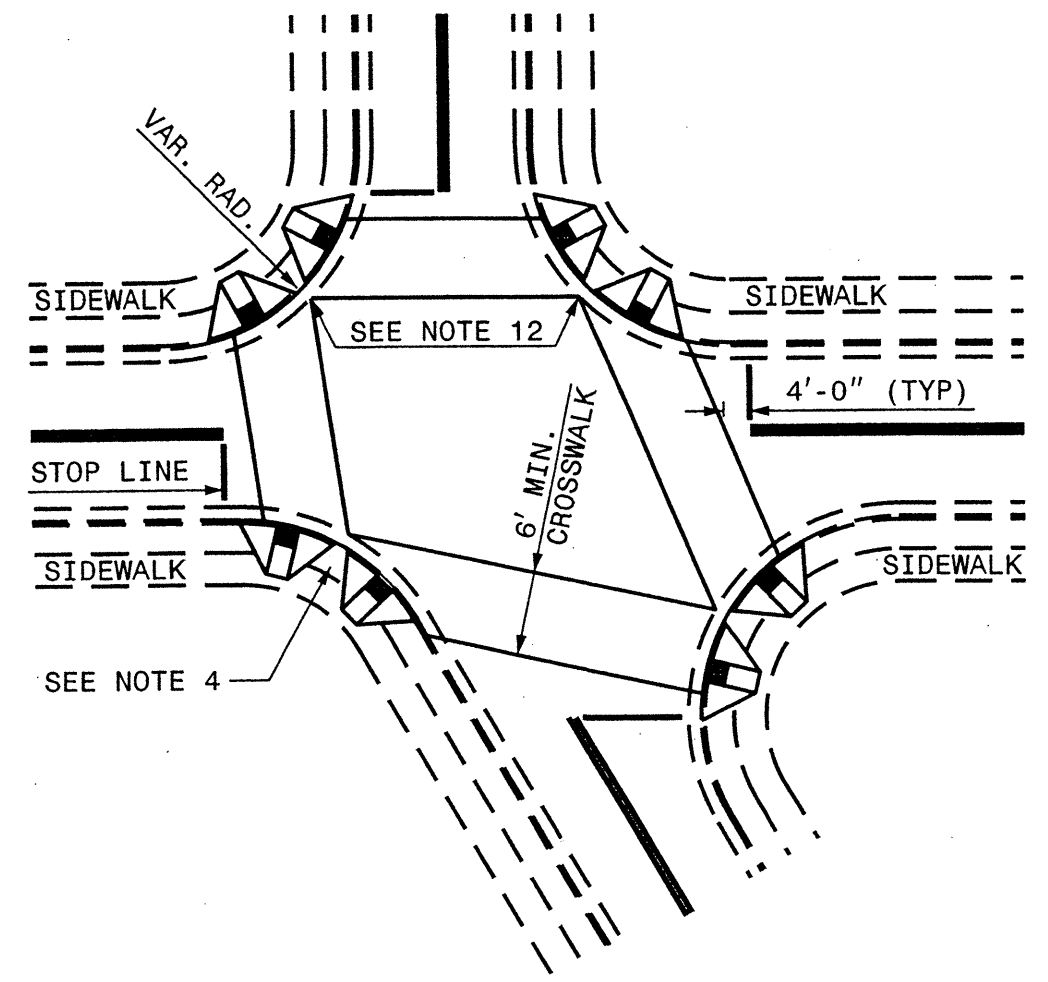
STATE OF
NORTH CAROLINA
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DIVISION OF HIGHWAYS
RALEIGH, N.C.

ENGLISH DETAIL DRAWING FOR
WHEELCHAIR RAMP
PROPOSED CURB AND GUTTER

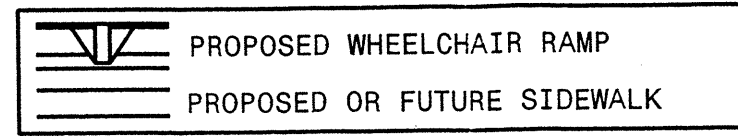
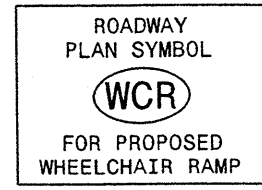
ENGLISH DETAIL DRAWING FOR
WHEELCHAIR RAMP
PROPOSED CURB AND GUTTER



DETAIL SHOWING TYPICAL LOCATION OF WHEELCHAIR RAMPS, PEDESTRIAN CROSSWALKS AND STOP LINES FOR TEE INTERSECTIONS



DETAIL SHOWING TYPICAL LOCATION OF WHEELCHAIR RAMPS, PEDESTRIAN CROSSWALKS AND STOP LINES



ALLOWABLE LOCATIONS

DUAL RAMP RADII.....ANY

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

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

ENGLISH DETAIL DRAWING FOR
WHEELCHAIR RAMP
 PROPOSED CURB AND GUTTER

ENGLISH DETAIL DRAWING FOR
WHEELCHAIR RAMP
 PROPOSED CURB AND GUTTER

NOTES:

1. CONSTRUCT THE WALKING SURFACE WITH SLIP RESISTANTANCE AND A 70% CONTRASTING COLOR TO THE SIDEWALK.
2. CROSSWALK WIDTHS AND CONFIGURATION VARY BUT MUST CONFORM TO TRAFFIC DESIGN STANDARDS.
3. NORTH CAROLINA GENERAL STATUTE 136-44.14 REQUIRES THAT ALL STREET CURBS BEING CONSTRUCTED OR RECONSTRUCTED FOR MAINTENANCE PROCEDURES, TRAFFIC OPERATIONS, REPAIRS, CORRECTION OF UTILITIES OR ALTERED FOR ANY REASON AFTER SEPTEMBER 1, 1973 SHALL PROVIDE WHEELCHAIR RAMPS FOR THE PHYSICALLY DISABLED AT ALL INTERSECTIONS WHERE BOTH CURB AND GUTTER AND SIDEWALKS ARE PROVIDED AND AT OTHER POINTS OF PEDESTRIAN FLOW.

 IN ADDITION, SECTION 228 OF THE 1973 FEDERAL AID HIGHWAY SAFETY ACT REQUIRES PROVISION OF CURB RAMPS ON ANY CURB CONSTRUCTION AFTER JULY 1, 1976 WHETHER A SIDEWALK IS PROPOSED INITIALLY OR IS PLANNED FOR A FUTURE DATE.

 THE AMERICANS WITH DISABILITIES ACT (ADA) OF 1990 EXTENDS TO INDIVIDUALS WITH DISABILITIES. COMPREHENSIVE CIVIL RIGHTS PROTECTIONS SIMILIAR TO THOSE PROVIDED TO PERSONS ON THE BASIS OF RACE, SEX, NATIONAL ORIGIN AND RELIGION UNDER THE CIVIL RIGHTS ACT OF 1964. THESE CURB RAMPS HAVE BEEN DESIGNED TO COMPLY WITH THE CURRENT ADA STANDARDS.
4. PROVIDE WHEELCHAIR RAMPS AT LOCATIONS AS SHOWN ON THE PLANS OR AS DIRECTED BY THE ENGINEER. LOCATE WHEELCHAIR RAMPS AS DIRECTED BY THE ENGINEER WHERE EXISTING LIGHT POLES, FIRE HYDRANTS, DROP INLETS, ETC. AFFECT PLACEMENT. WHERE TWO RAMPS ARE INSTALLED PLACE NOT LESS THAN 2 FEET OF FULL HEIGHT CURB BETWEEN THE RAMPS. PLACE DUAL RAMPS AS NEAR PERPENDICULAR TO THE TRAVEL LANE BEING CROSSED AS POSSIBLE.
5. DO NOT EXCEED 0.08 (12:1) SLOPE ON THE WHEELCHAIR RAMP IN RELATIONSHIP TO THE GRADE OF THE STREET.
6. CONSTRUCT WHEELCHAIR RAMPS 40" (3'-4") OR GREATER FOR DUAL RAMPS.
7. USE CLASS "B" CONCRETE WITH A SIDEWALK FINISH IN ORDER TO OBTAIN A ROUGH NON-SKID TYPE SURFACE.
8. PLACE A 1/2" EXPANSION JOINT WHERE THE CONCRETE WHEELCHAIR RAMP JOINS THE CURB AND AS SHOWN ON STD. DWG. 848.01.
9. PLACE THE INSIDE PEDESTRIAN CROSSWALK LINES NO CLOSER IN THE INTERSECTION BY BISECTING THE INTERSECTION RADII, WITH ALLOWANCE OF A 4' CLEAR ZONE IN THE VEHICULAR TRAVELWAY WHEN ONE RAMP IS INSTALLED. (SEE NOTE 17)
10. COORDINATE THE CURB CUT AND THE PEDESTRIAN CROSSWALK LINES SO THE FLOOR OF THE WHEELCHAIR RAMP WILL FALL WITHIN THE PEDESTRIAN CROSSWALK LINES. PLACE DIAGONAL RAMPS WITH FLARED SIDES SO 24" OF FULL HEIGHT CURB FALLS WITHIN THE CROSSWALK MARKINGS ON EACH SIDE OF THE FLARES.
11. CONSTRUCT THE PEDESTRIAN CROSSWALK A MINIMUM OF 6 FEET. A CROSSWALK WIDTH OF 10 FEET OR GREATER IS DESIRABLE.
12. USE STOP LINES, NORMALLY PERPENDICULAR TO THE LANE LINES, WHERE IT IS IMPORTANT TO INDICATE THE POINT BEHIND WHICH VEHICLES ARE REQUIRED TO STOP IN COMPLIANCE WITH A TRAFFIC SIGNAL, STOP SIGN OR OTHER LEGAL REQUIREMENT. AN UNUSUAL APPROACH SKEW MAY REQUIRE THE PLACEMENT OF THE STOP LINE TO BE PARALLEL TO THE INTERSECTING ROADWAY.
13. TERMINATE PARKING A MINIMUM OF 20 FEET BACK OF PEDESTRIAN CROSSWALK.
14. PLACE ALL PAVEMENT MARKINGS IN ACCORDANCE WITH THE LATEST EDITION OF THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) PUBLISHED BY THE FEDERAL HIGHWAY ADMINISTRATION AND THE NORTH CAROLINA SUPPLEMENT TO THE MUTCD.

PROJECT NO.	SHEET NO.	TOTAL NO.
45158.3.ST4 (R-5164D)	6	

SUMMARY OF QUANTITIES

PROJECT NO	COUNTY	MAP NO	ROUTE	DESCRIPTION	TYP	FINAL SURFACE TESTING REQUIRED	LENGTH MI	WIDTH FT	MILLED RUMBLE STRIPS (CONCRETE SHOULDER) LF	DIAMOND GRINDING PCC PAVEMENT SY	UNDERCUT EXCAVATION CY	BORROW CY	REMOVAL OF EXISTING CONCRETE PAVEMENT SURF SY	FABRIC FOR SOIL STABILIZATION SY	SELECT MATERIAL, CLASS IV TON	SEALING EXIST. PVT. CRACKS, POLYMER PATCH LB	AGGREGATE BASE COURSE TONS	SHOULDER RECONSTRUCTION SMI	4" MILLING SY	1 1/2" MILLING SY	BASE COURSE, B25.0B TONS	INTER-MEDIATE COURSE, H9.0B TONS	INTER-MEDIATE COURSE, H9.0C TONS	SURFACE COURSE, S9.5B TONS
45158.3.ST4	Durham	1	NC-147 SOUTH	FROM PAVEMENT JOINT NORTH OF SR 1322 (BROAD ST) TO PAVEMENT JOINT NORTH OF SR 2028 (TW ALEXANDER)	1, 3, 4	YES	6.8	24	25	115,895	5	40	80	35.00	5	1,200.00	10	2	52,359		10	6,438	1,023	3,795
		1	NC-147 NORTH	FROM PAVEMENT JOINT NORTH OF SR 2028 (TW ALEXANDER) TO JOINT NORTH OF SR 1322 (BROAD ST)	1, 2, 3, 4	YES	6.8	24	25	114,892	10	40	120	70.00	10	1,200.00	15	2	50,677	2,231	15	6,606	615	3,894
TOTAL FOR MAP NO. 1							6.8		50	230,587	15	80	200	105.00	15	2,400.00	25	4	103,036	2,231	25	13,044	1,638	7,689
TOTAL FOR PROJ NO. 45158.3.ST4							6.8		50	230,587	15	80	200	105.00	15	2,400.00	25	4	103,036	2,231	25	13,044	1,638	7,689
GRAND TOTAL							6.8		50	230,587	15	80	200	105.00	15	2,400.00	25	4	103,036	2,231	25	13,044	1,638	7,689

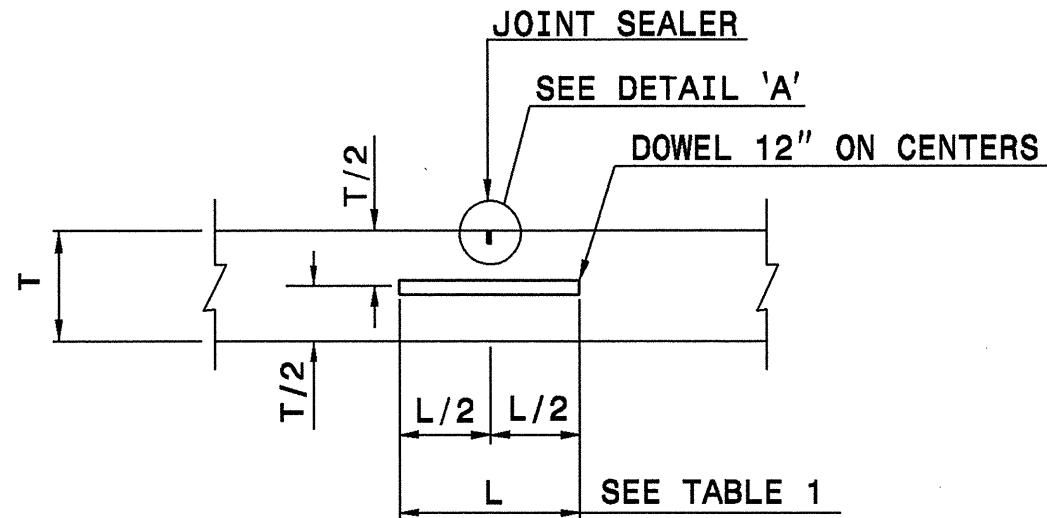
PROJECT NO	COUNTY	MAP NO	ROUTE	DESCRIPTION	TYP	SURFACE COURSE, S9.5C TONS	PG 64-22 PLANT MIX TONS	PG 70-22 PLANT MIX TONS	SEALING EXISTING PAVEMENT CRACKS & JOINTS LB	PATCHING CONCRETE PAVEMENT SPALLS SF	CLASS II CONCRETE DECK REPAIR FOR EPOXY/ASPHALT OVERLAY SF	MILLED RUMBLE STRIPS (ASPHALT CEMENT CONCRETE) LF	10" PORT CEM CONC PAVEMENT, THROUGH LANES (WITH POWER) SY	SURFACE TESTING LS	2'-6" CURB & GUTTER LF	CONCRETE SIDEWALK SY	CONCRETE WHEEL CHAIR RAMPS EA	JOINT CONSTRUCTION, REPAIR & SEALING LF	SEED AND MULCHING AC	UNPAVED TRENCHING (1 COND, 1") LF	JUNCTION BOX (STANDARD SIZE) EA	INDUCTIVE LOOP LF	LEAD-IN CABLE (14-2) LF	EVAZOTE JOINT REPLACEMENT LF	PLACEMENT OF EPOXY OVERLAY SF
45158.3.ST4	Durham	1	NC-147 SOUTH	FROM PAVEMENT JOINT NORTH OF SR 1322 (BROAD ST) TO PAVEMENT JOINT NORTH OF SR 2028 (TW ALEXANDER)	1, 3, 4	603	579	36	90.00	170	170	59,359	80	0.5	130		3	104,913	1.5	75.00	2	796	25	1,654.00	68,198.00
		1	NC-147 NORTH	FROM PAVEMENT JOINT NORTH OF SR 2028 (TW ALEXANDER) TO JOINT NORTH OF SR 1322 (BROAD ST)	1, 2, 3, 4	550	574	33	90.00	169	169	60,179	120	0.5	165	200	11	103,772	1.5	75.00	2	796	25	1,941.00	79,486.00
TOTAL FOR MAP NO. 1						1,153	1,153	69	180.00	339	339	119,538	200	1	295	200	14	208,685	3	150.00	4	1,592	50	3,595.00	147,684.00
TOTAL FOR PROJ NO. 45158.3.ST4						1,153	1,153	69	180.00	339	339	119,538	200	1	295	200	14	208,685	3	150.00	4	1,592	50	3,595.00	147,684.00
GRAND TOTAL						1,153	1,153	69	180.00	339	339	119,538	200	1	295	200	14	208,685	3	150.00	4	1,592	50	3,595.00	147,684.00

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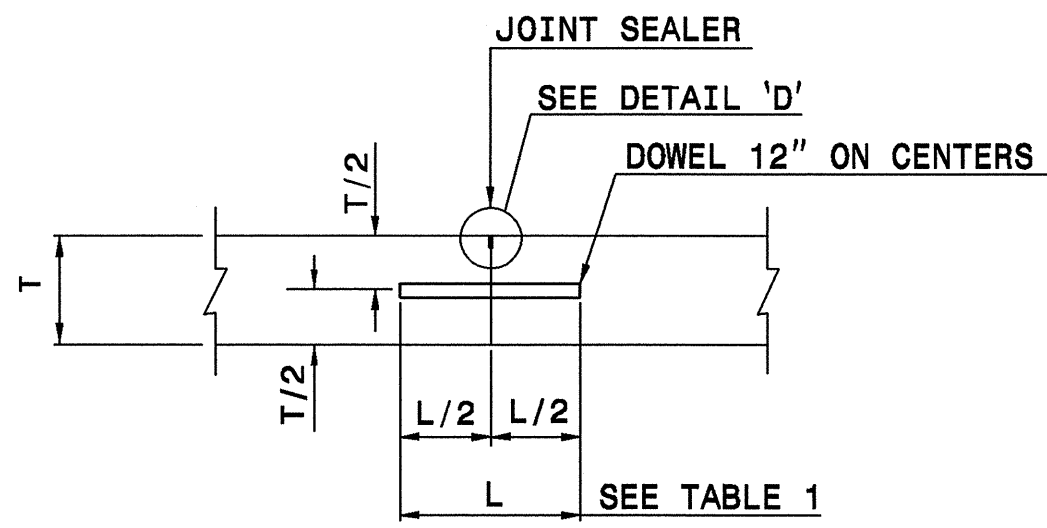
ENGLISH DETAIL DRAWING FOR
CONCRETE PAVEMENT JOINTS
CONSTRUCTION AND CONTRACTION JOINTS

STATE OF
NORTH CAROLINA
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DIVISION OF HIGHWAYS

ENGLISH DETAIL DRAWING FOR
CONCRETE PAVEMENT JOINTS
CONSTRUCTION AND CONTRACTION JOINTS

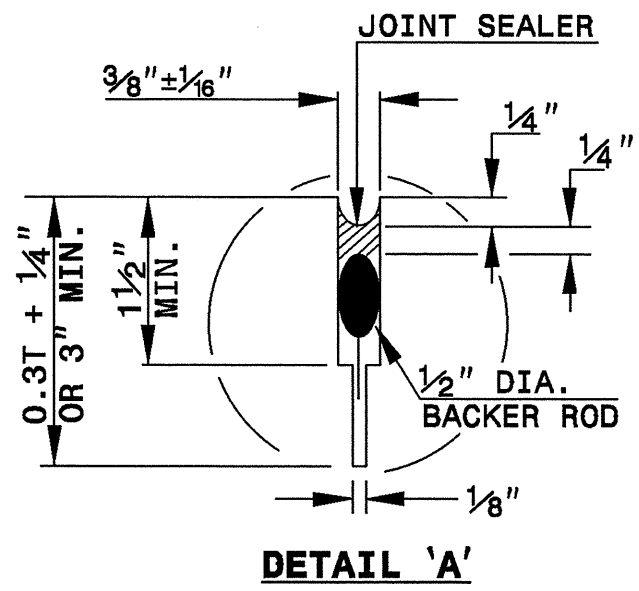


TRANSVERSE CONTRACTION JOINT

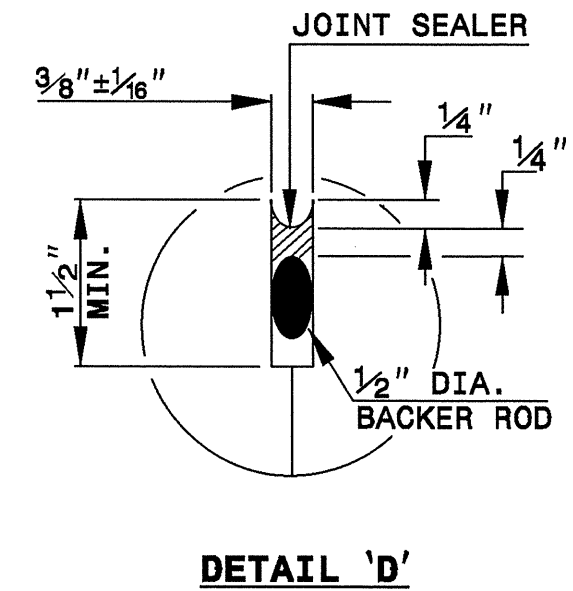


PLANNED TRANSVERSE CONSTRUCTION JOINT

- GENERAL NOTES:
- FORM TRANSVERSE CONTRACTION JOINTS BY SAWING WITH APPROVED EQUIPMENT.
 - SPACE TRANSVERSE CONTRACTION JOINTS AT INTERVALS OF 15'.
 - USE A DOWEL ASSEMBLY OR OTHER APPROVED DOWEL INSERTION TECHNIQUE IN ALL TRANSVERSE CONTRACTION JOINTS. DOWEL ASSEMBLIES ARE COVERED IN DETAIL 700D03.
 - PROVIDE SMOOTH DOWEL BARS. PROVIDE DEFORMED TIE BARS.
 - WHEN UTILIZING AN EARLY ENTRY SAW, CUT THE JOINT TO A MINIMUM DEPTH OF 3".

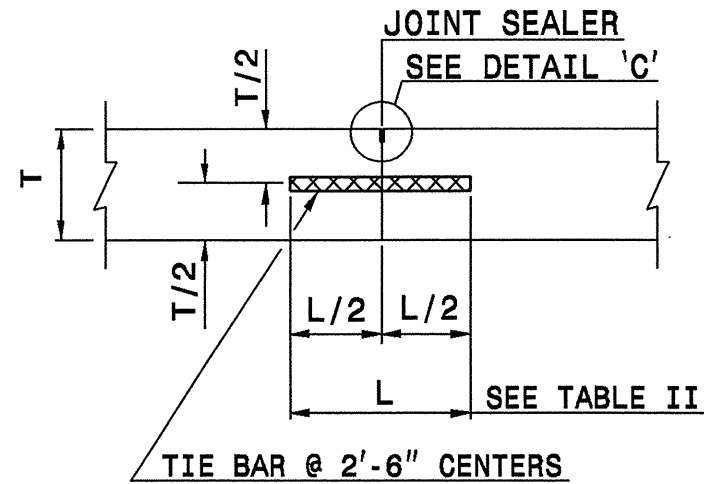


DETAIL 'A'

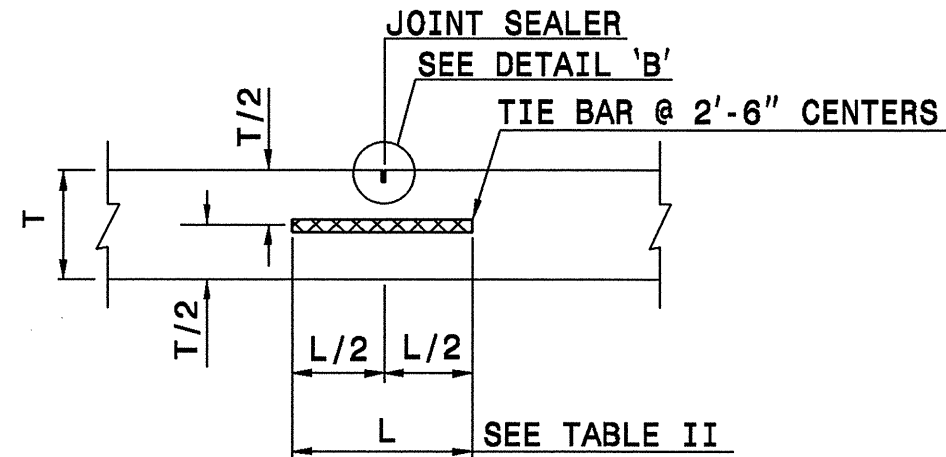


DETAIL 'D'

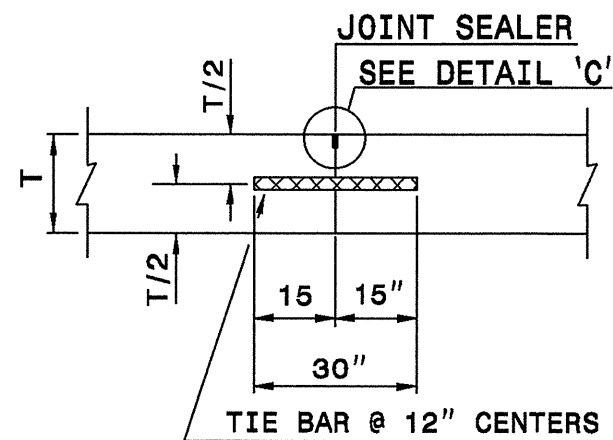
TABLE I - DOWEL BARS		
SLAB THICKNESS	DOWEL BAR "D"	DOWEL LENGTH "L"
8" OR LESS	1"	14"
8 1/2" TO 9 1/2"	1 1/8"	16"
10" TO 10 1/2"	1 1/4"	18"
11" AND ABOVE	1 1/2"	18"



LONGITUDINAL CONSTRUCTION JOINT



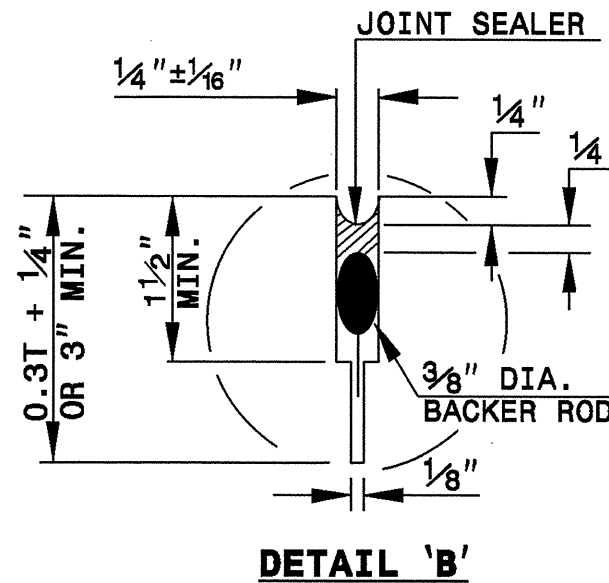
LONGITUDINAL JOINT



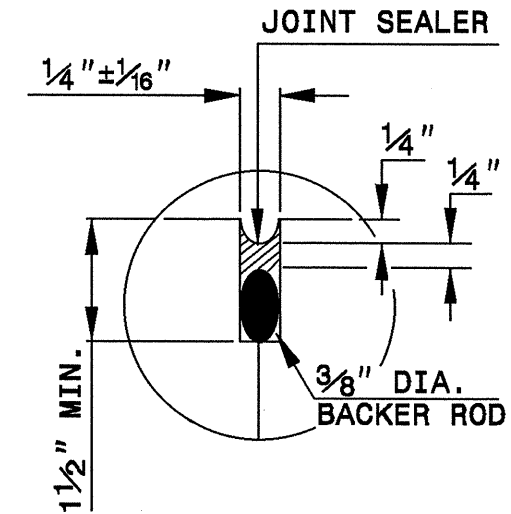
EMERGENCY TRANSVERSE CONSTRUCTION JOINT

GENERAL NOTES:

- CONSTRUCT TRANSVERSE CONSTRUCTION JOINTS AT THE END OF EACH DAY'S OPERATION (PLANNED JOINT) OR WHEN THE PLACING OF CONCRETE IS SUSPENDED FOR MORE THAN 30 MINUTES (EMERGENCY JOINT).
- USE AN APPROVED HEADER AT EMERGENCY JOINTS STD. DWG. 700.04 AND DESIGNED TO PERMIT THE PLACEMENT OF AND CORRECTLY HOLD IN PLACE TIE BARS.
- USE TIE BARS OF THE SAME DIAMETER AS DOWEL BARS FOR EMERGENCY TRANSVERSE CONSTRUCTION JOINTS.
- LOCATE PLANNED TRANSVERSE CONSTRUCTION JOINTS AT THE SPACING REQUIRED FOR CONTRACTION JOINTS. USE AN APPROVED METHOD OF INSTALLING DOWELS IN ALL PLANNED TRANSVERSE CONSTRUCTION JOINTS.
- DO NOT LOCATE EMERGENCY TRANSVERSE CONSTRUCTION JOINTS LESS THAN 6' FROM ANY CONTRACTION JOINT OR PLANNED CONSTRUCTION JOINT.
- DO NOT PLACE TIE BARS IN LONGITUDINAL JOINTS WITHIN 1'-4" OF A TRANSVERSE JOINT.
- WHEN UTILIZING AN EARLY ENTRY SAW, CUT THE JOINT TO A MINIMUM DEPTH OF 3".



DETAIL 'B'



DETAIL 'C'

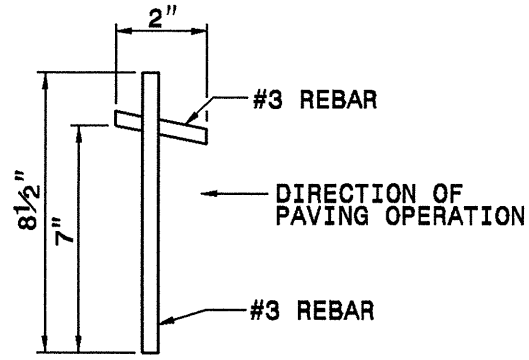
TABLE II - LONGITUDINAL TIE BARS		
SLAB THICKNESS	TIE BAR DIA. "D"	TIE BAR LENGTH "L"
8 1/2" OR LESS	1/2"	30"
9" OR ABOVE	5/8"	30"

STATE OF NORTH CAROLINA
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RALEIGH, N.C.

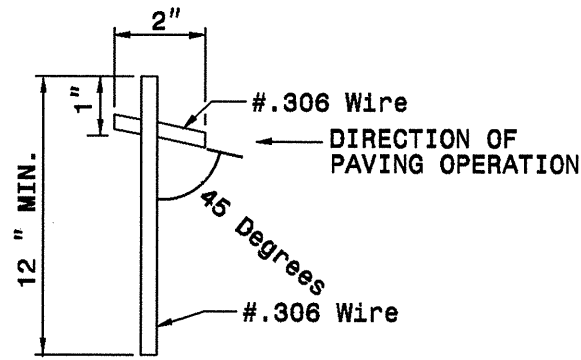
STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

ENGLISH DETAIL DRAWING FOR
DOWEL ASSEMBLY

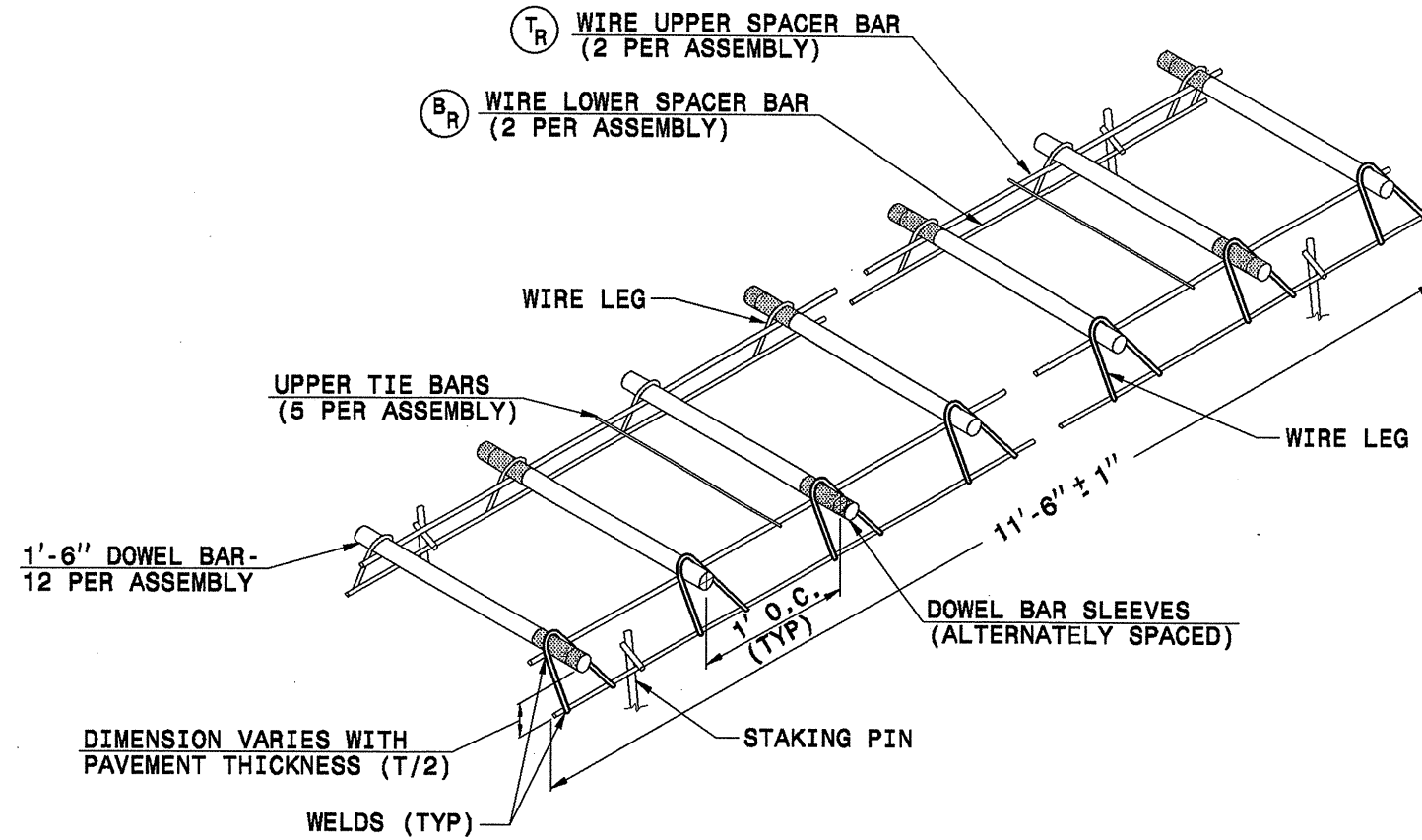
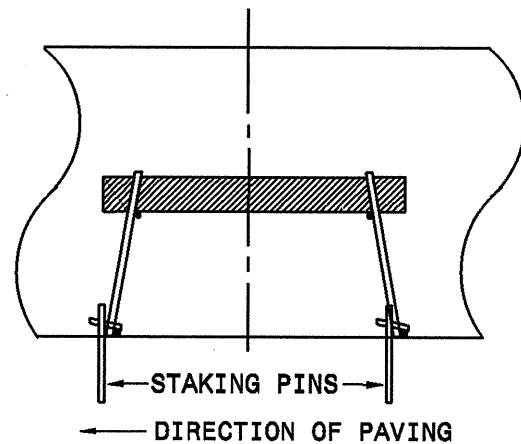
ENGLISH DETAIL DRAWING FOR
DOWEL ASSEMBLY



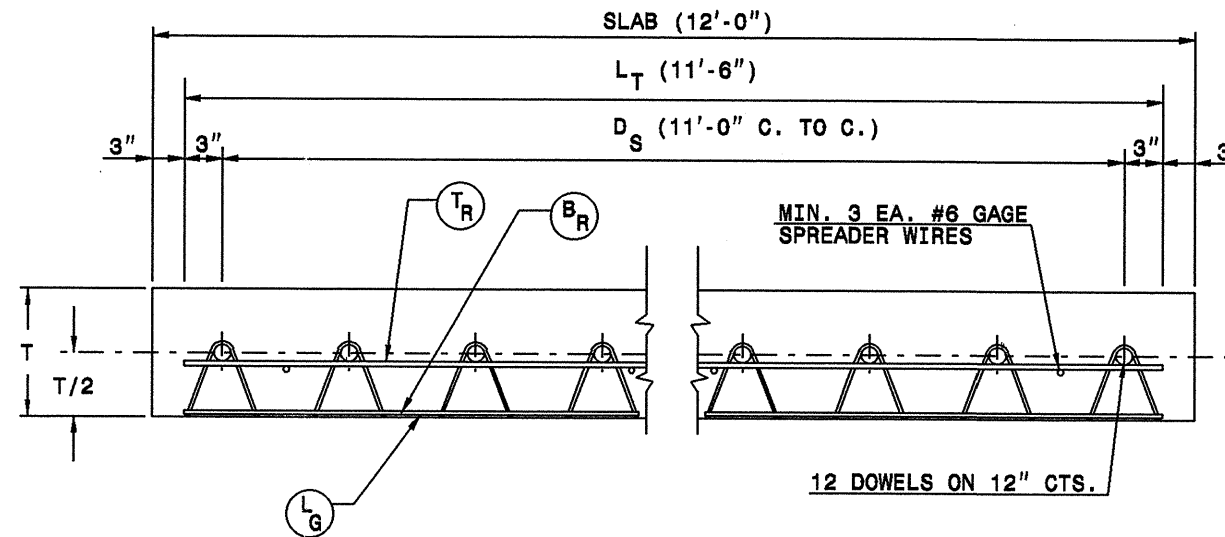
STAKING PIN
(MIN. 8 PER BASKET)



STAKING PIN ALTERNATE
(MIN. 8 PER BASKET)



ISOMETRIC VIEW

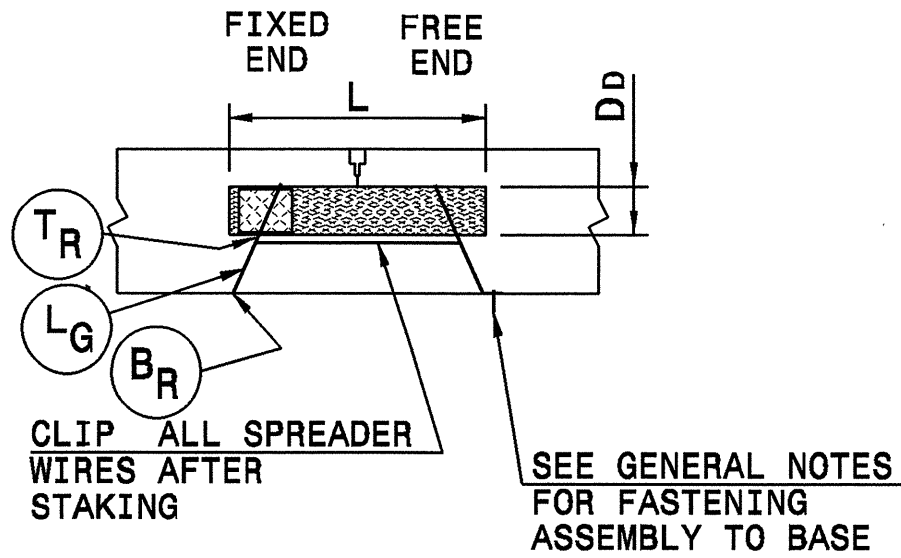


TYPICAL UNIT DIMENSIONS

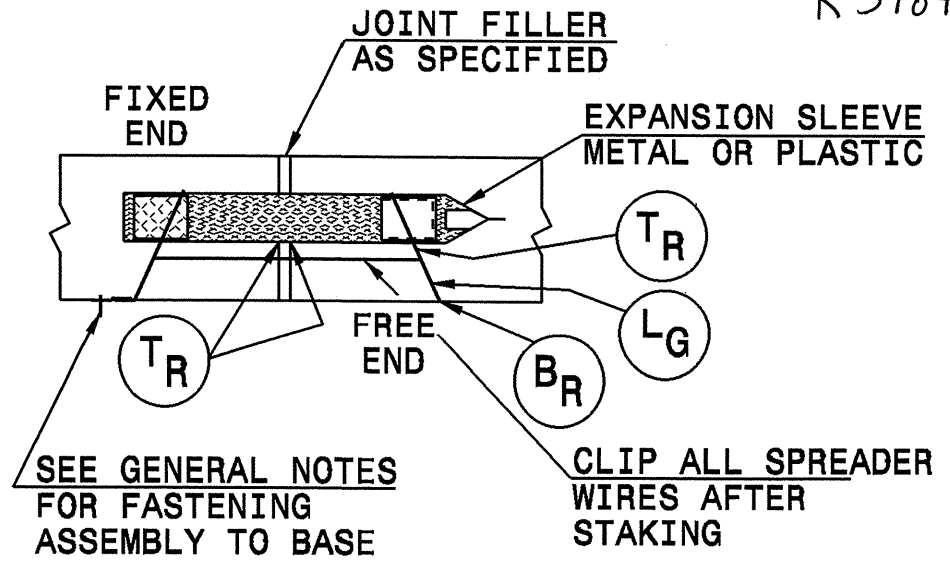
SLAB THICKNESS	"V" LEG ONLY		
	WIRE GAGE		
	T _R	B _R	L _G
8" OR LESS	2	2	2
8 1/2" - 10"	0	2	2
10 1/2" & ABOVE	2/0's	2/0's	2/0's

GENERAL NOTES:

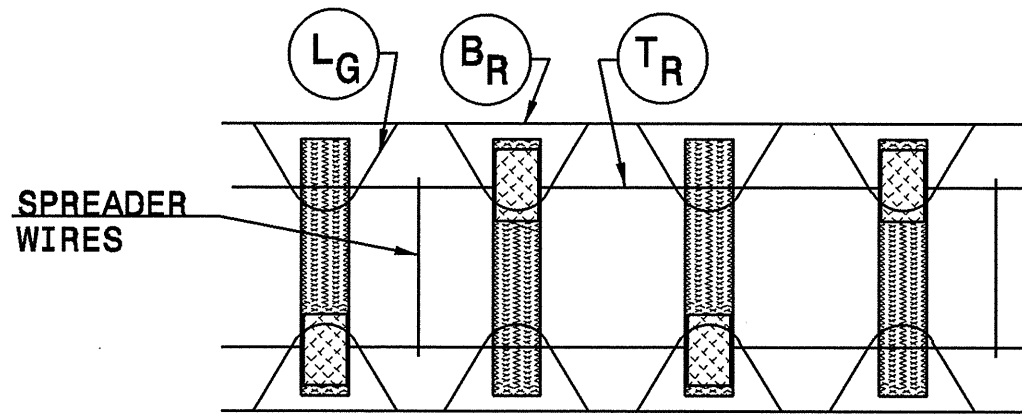
- USE RIGID CONSTRUCTED DOWEL ASSEMBLY CAPABLE OF HOLDING THE DOWEL BAR IN PROPER POSITION DURING PLACEMENT OF CONCRETE AND DESIGNED AS TO PERMIT UNRESTRICTED MOVEMENT OF THE SLAB. USE DOWEL ASSEMBLY APPROVED BY THE ENGINEER PRIOR TO USE.
- USE DOWEL ASSEMBLIES MANUFACTURED WITH DOWELS ALTERNATELY WELDED TO FRAME MEMBERS.
- USE STAKING PIN OR APPROVED ALTERNATE.
- SAW CUT EPOXY COATED DOWELS, BUFFING AS NECESSARY TO FACILITATE PROPER WELDING OF THE DOWEL TO THE ASSEMBLY FRAME. TOUCH UP OF THE BUFFED AREA WILL NOT BE REQUIRED.
- RESISTANCE WELD FRAME MEMBERS; DOWELS AND SPREADER WIRES MAY BE ARC WELDED. WELD IN ACCORDANCE WITH AWS WELDING CODE.
- FULLY DIP THE DOWEL ASSEMBLIES TO ASSURE A COMPLETE COATING OF WAX.
- SEE DETAIL 700D01 FOR DOWEL BAR SIZES.



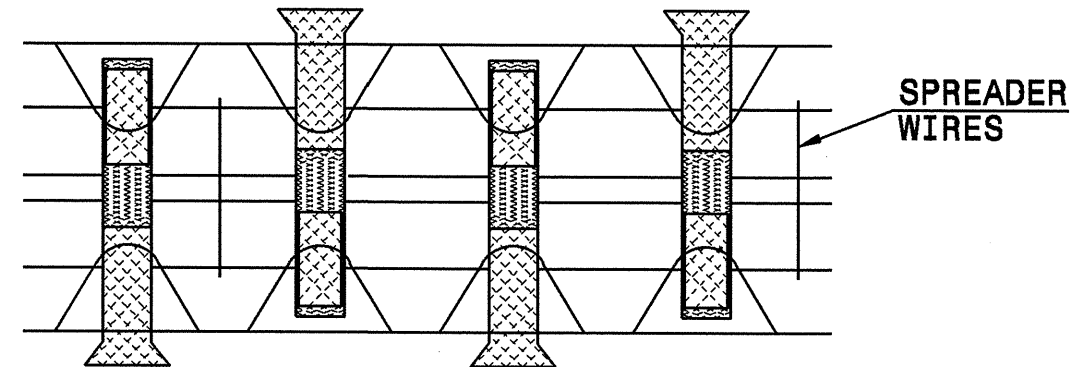
SECTION - CONTRACTION



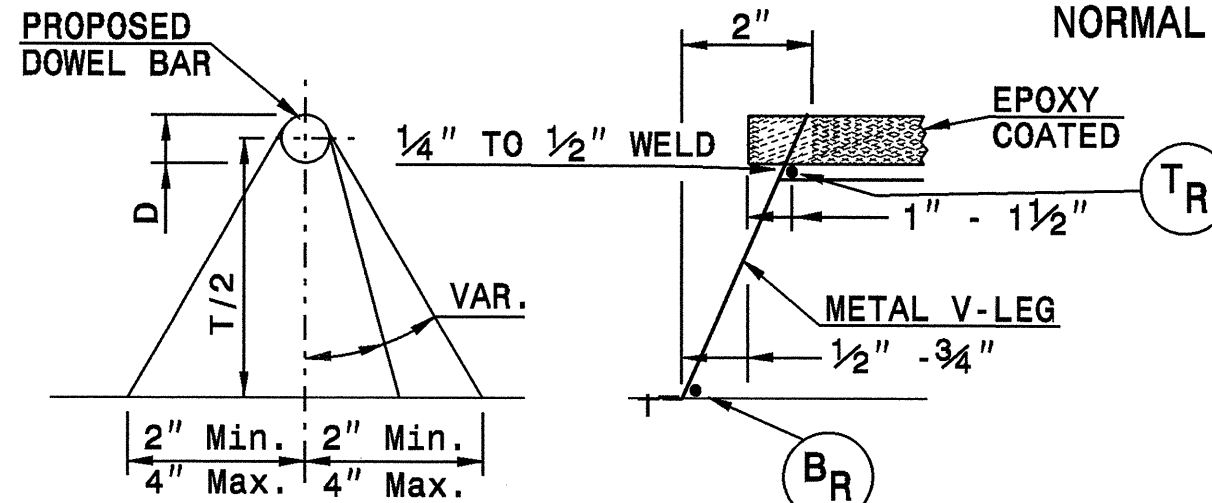
SECTION - EXPANSION



**PARTIAL PLAN CONTRACTION
NORMAL**



**PARTIAL PLAN EXPANSION
NORMAL**



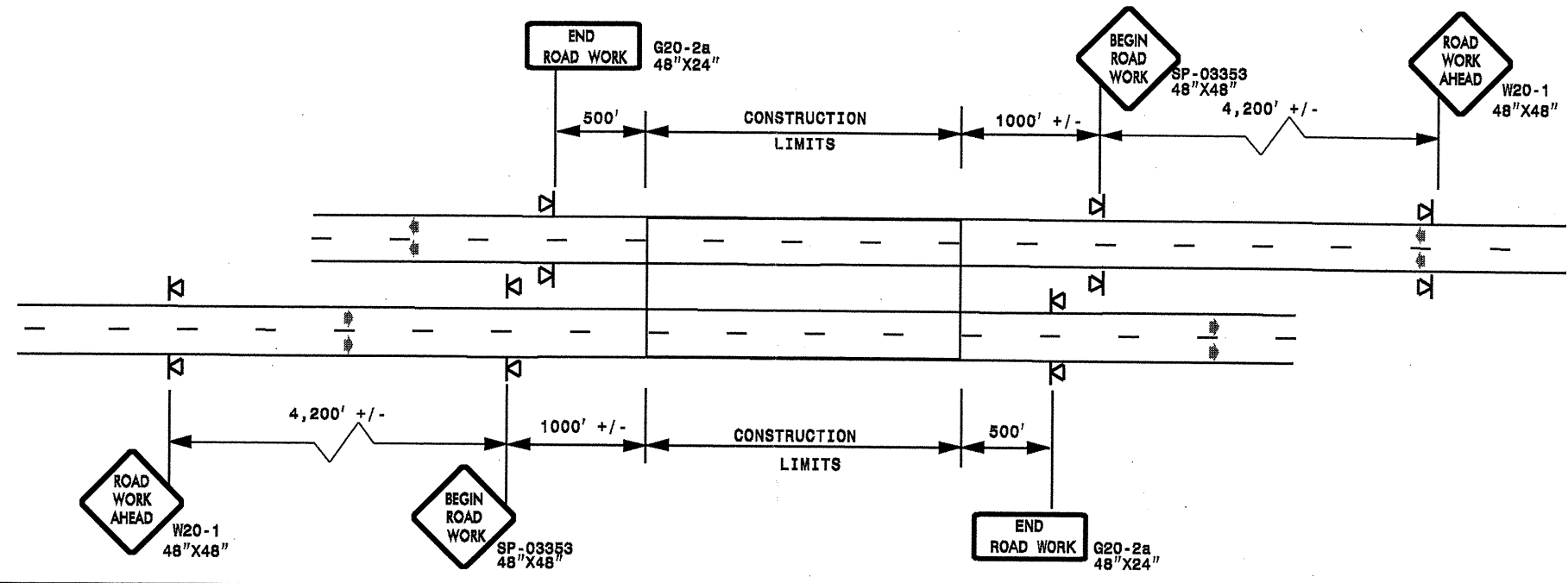
CROSS SECTIONAL VIEWS

ENGLISH DETAIL DRAWING FOR
DOWEL ASSEMBLY

ENGLISH DETAIL DRAWING FOR
DOWEL ASSEMBLY

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

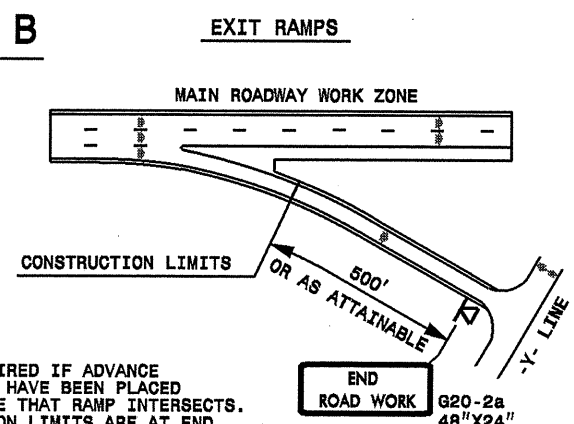
DETAIL A



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

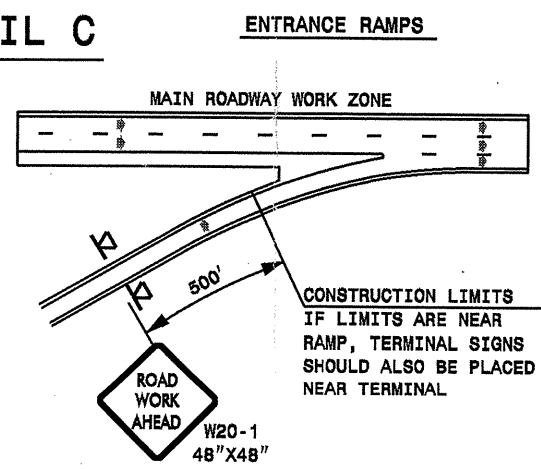
ROADWAYS INTERSECTING ALONG FREEWAY WORK ZONE (Y-LINES)

DETAIL B

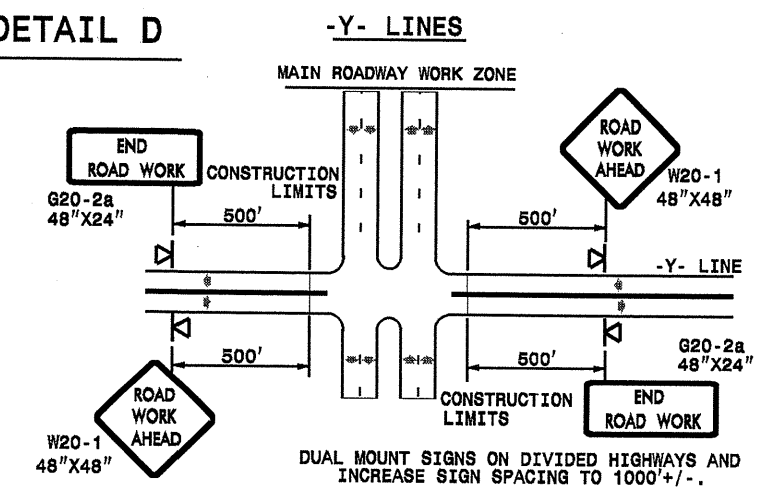


NOTE:
SIGN NOT REQUIRED IF ADVANCE WARNING SIGNS HAVE BEEN PLACED ALONG -Y- LINE THAT RAMP INTERSECTS. IF CONSTRUCTION LIMITS ARE AT END OF RAMP, PLACE SIGN AT END OF RAMP.

DETAIL C



DETAIL D



GENERAL NOTES

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

LEGEND

◀ PORTABLE SIGN

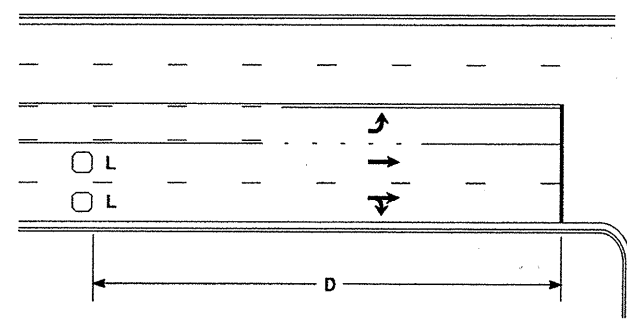
➡ DIRECTION OF TRAFFIC FLOW

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

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

02-JUL-2010 17:40
S:\Signing\esur\facimg_030509\Resur\facimg2010\Div05\C20260_45158.3.ST4_R-5164D.Durham.NC147m\C20260_45158.3.ST4_R-5164D_freelanesgreatJuly2006.parrtable.dgn
pseymore AT WZT237502

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

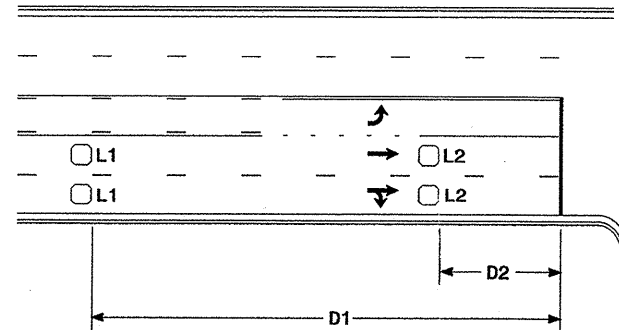


Speed Limit mph (km/hr)	D ft (m)
40 (64)	250 (75)
45 (72)	300 (90)
50 (80)	355 (110)
55 (88)	420 (130)

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

Volume Density Operation

OR

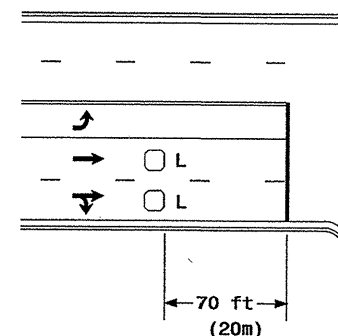


Speed Limit mph (km/hr)	D1 ft (m)	D2 ft (m)
40 (64)	250 (75)	80 (25)
45 (72)	300 (90)	90 (27)
50 (80)	355 (110)	100 (30)
55 (88)	420 (130)	110 (35)

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

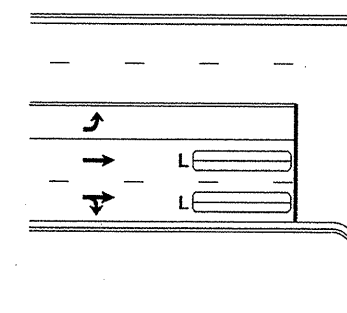
"Stretch" Operation

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



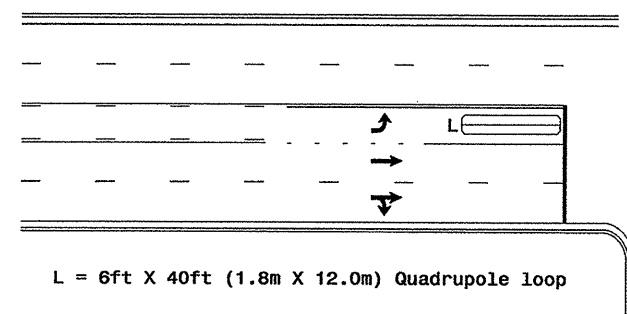
L = 6ft X 6ft (1.8m X 1.8m)
Wired in series

OR



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

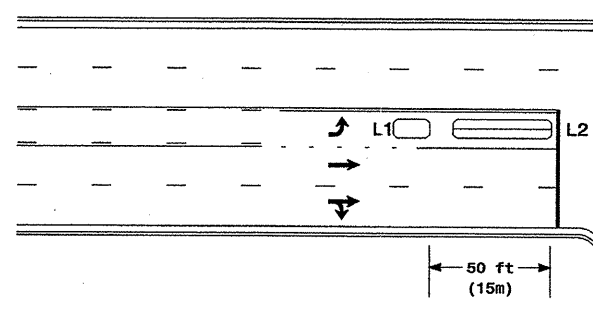
Left Turn Lane Detection



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

Presence Loop Detection

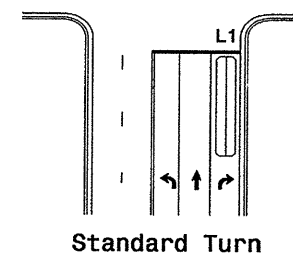
OR



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

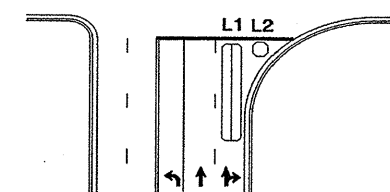
Queue Loop Detection

Right Turn Lane Detection

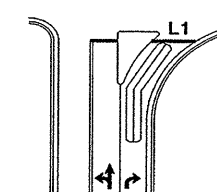


Standard Turn

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

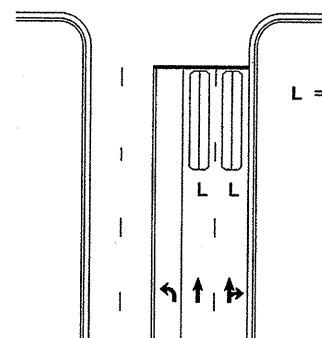


Wide Radius Turn



Channelized Turn

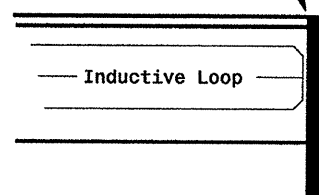
Side Street Detection



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

Presence Loop Placement at Stop Lines

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

Prepared in the Office of:

122 N. McDowell St., Raleigh, NC 27603

SCALE
N/A

Typical Loop Locations

PLAN DATE: June 2006
PREPARED BY: P. L. Alexander
REVISIONS:
✓ Reuse pavement markings

SEAL

SIGNATURE: P. L. Alexander
DATE: 12/19/06

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

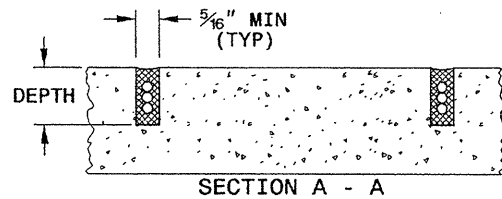
11-08

ENGLISH DETAIL DRAWING FOR
INDUCTIVE DETECTION LOOPS

SHEET 1 OF 3
1725D01

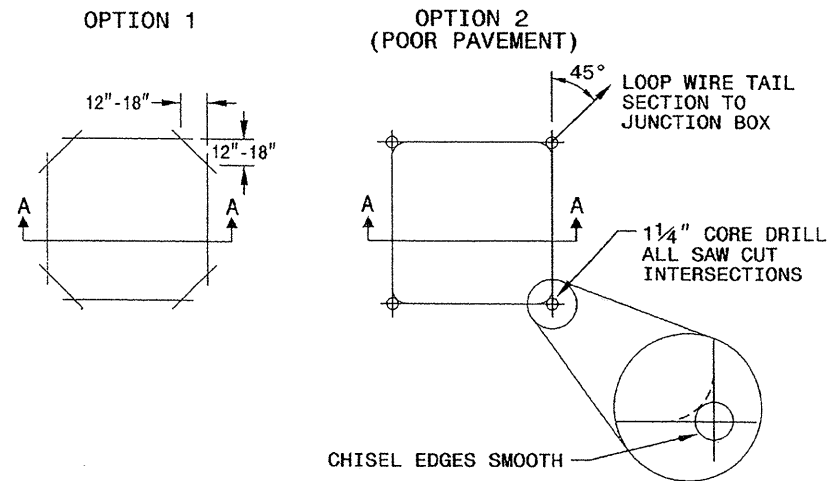
SAW SLOT DEPTH CHART

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

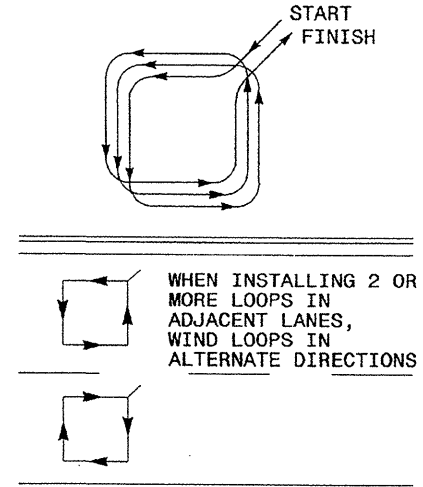


CONVENTIONAL 4-SIDED LOOP

SAW CUT OPTIONS

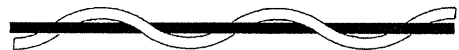


LOOP WINDING METHOD



LOOP WIRE TWISTING METHOD

INCORRECT WAY TO TWIST WIRE



CORRECT WAY TO TWIST WIRE

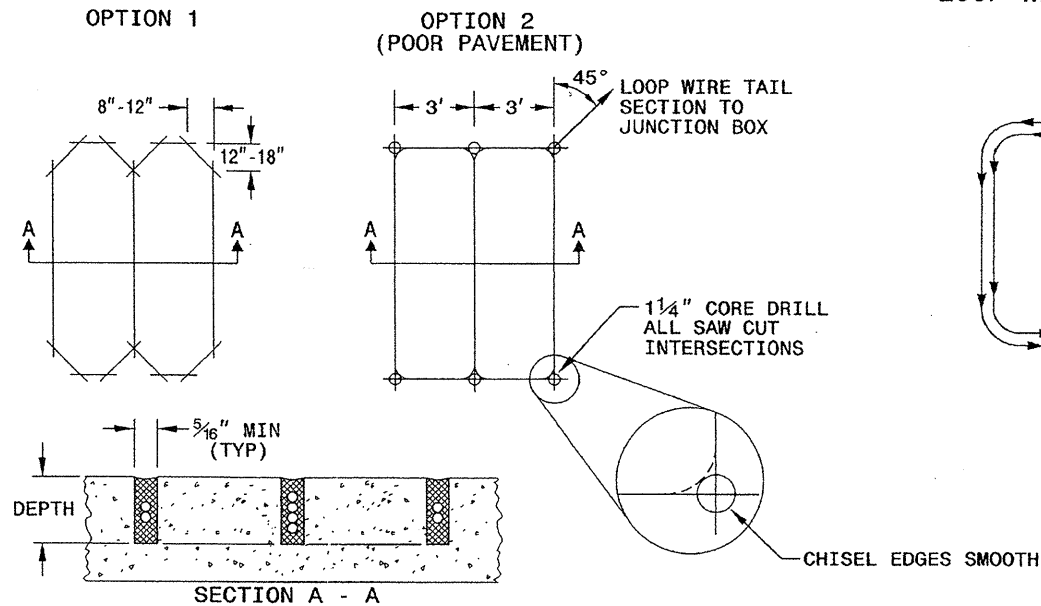


NOTES

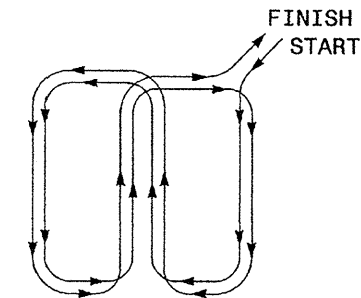
- OVERLAP SAW CUTS AT CORNERS AND INTERSECTION POINTS TO ENSURE UNIFORM SAW SLOT DEPTH.
- MAINTAIN 12" SPACING BETWEEN LOOP WIRE TAIL SECTIONS.
- WIRE LOOPS CONNECTED TO THE SAME DETECTOR CHANNEL IN SERIES.
- LOCATE LOOPS IN CENTER OF LANES UNLESS OTHERWISE SHOWN ON PLANS OR APPROVED BY ENGINEER.

QUADRUPOLE LOOP

SAW CUT OPTIONS



LOOP WINDING METHOD



DEPTH IS 2.5" FOR CONCRETE AND 3.0" FOR ASPHALT

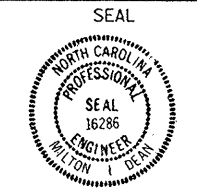
STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

11-08

ENGLISH DETAIL DRAWING FOR
INDUCTIVE DETECTION LOOPS

SHEET 1 OF 3
1725D01

See Plate for Title



Milton J. Dean 4/24/08
SIGNATURE DATE

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

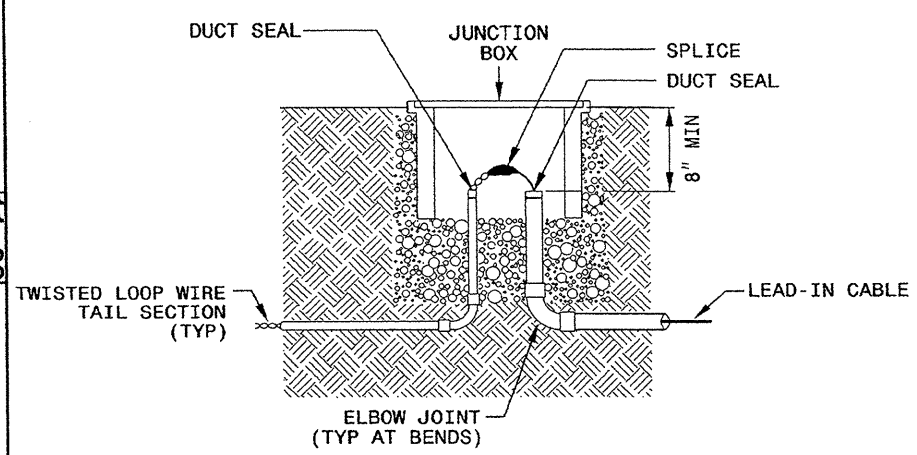
11-08

ENGLISH DETAIL DRAWING FOR
INDUCTIVE DETECTION LOOPS
LOOP WIRE DETAILS

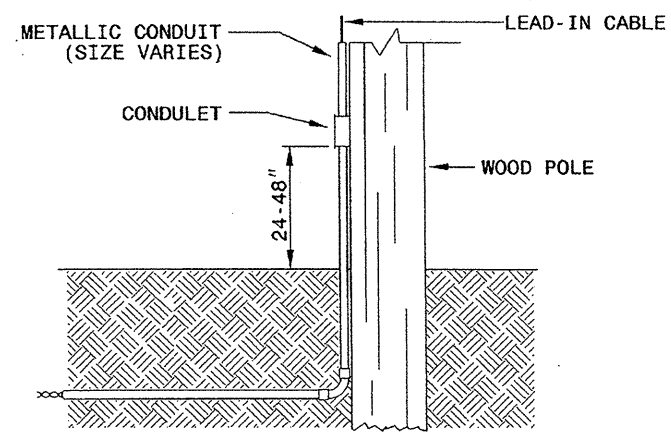
SHEET 2 OF 3
1725D01

LOOP WIRE SPLICE POINT DETAILS

LOOP WIRE AT JUNCTION BOX



LOOP WIRE AT POLE

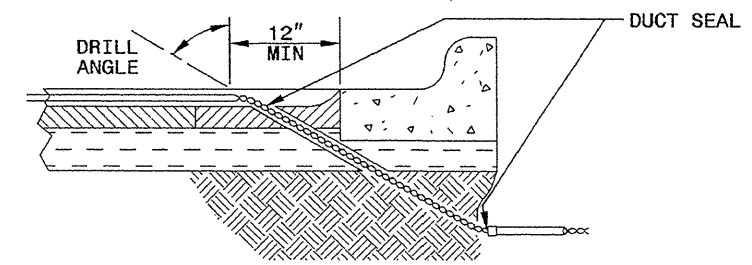


NOTE

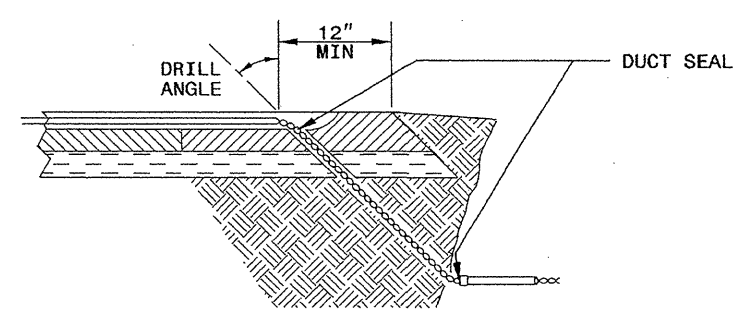
SPLICE ALL LOOP WIRE TAIL SECTIONS/LEAD-IN CABLE IN JUNCTION BOXES OR APPROVED CONDULETS.

LOOP WIRE PAVEMENT EDGE DETAILS

LOOP WIRE AT CURB & GUTTER SECTION



LOOP WIRE AT PAVEMENT SECTION



NOTES

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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DIVISION OF HIGHWAYS
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

24-nov-2008 09:29
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11/18

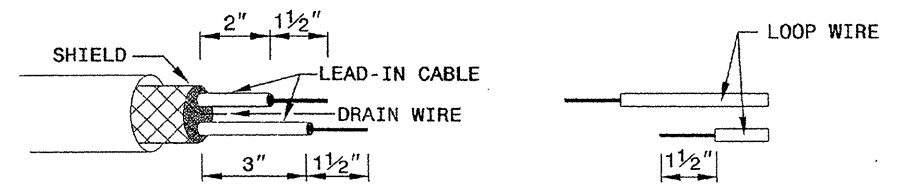
STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

11-08

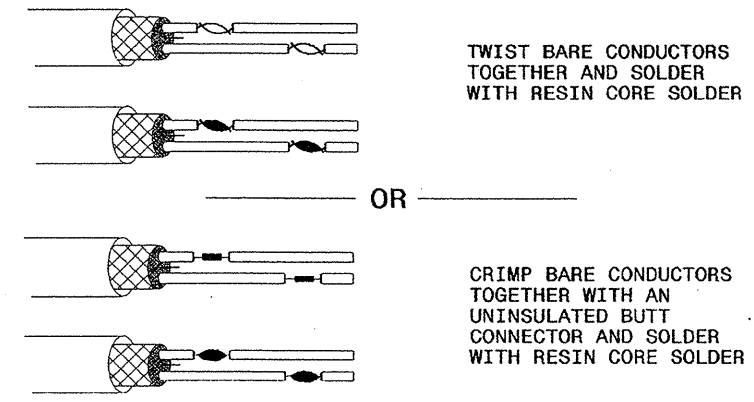
ENGLISH DETAIL DRAWING FOR
INDUCTIVE DETECTION LOOPS
SPlicing FOR LEAD-IN CABLE AND LOOP WIRE

SHEET 3 OF 3
1725D01

STEP 1. STRIP LOOP WIRE AND LEAD-IN CABLE

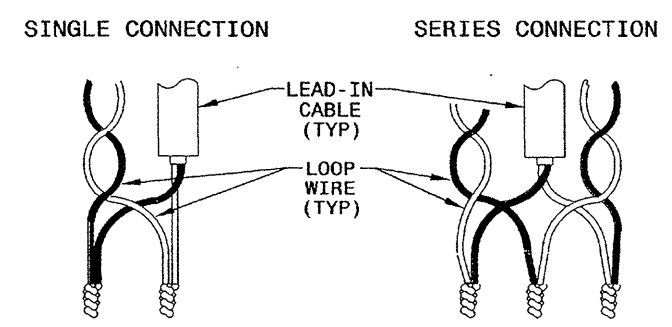


STEP 2. CONNECT AND SOLDER

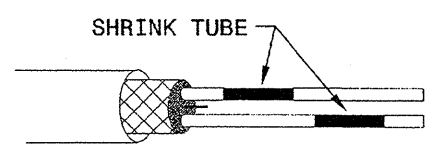


BOND SHIELD DRAIN WIRE AT SPLICE SECTIONS (DO NOT GROUND)

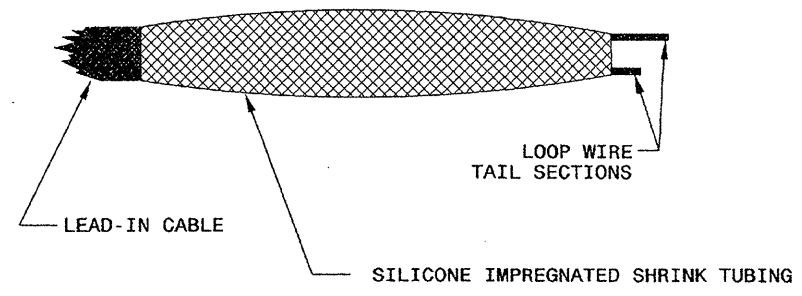
LOOP WIRE AND LEAD-IN CABLE CONNECTION DETAILS



STEP 3. INSULATE EACH SOLDER JOINT SEPARATELY



STEP 4. ENVIRONMENTALLY PROTECT SPLICE



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DIVISION OF HIGHWAYS
RALEIGH, N.C.

11-08

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

SHEET 3 OF 3
1725D01

See Plate for Title

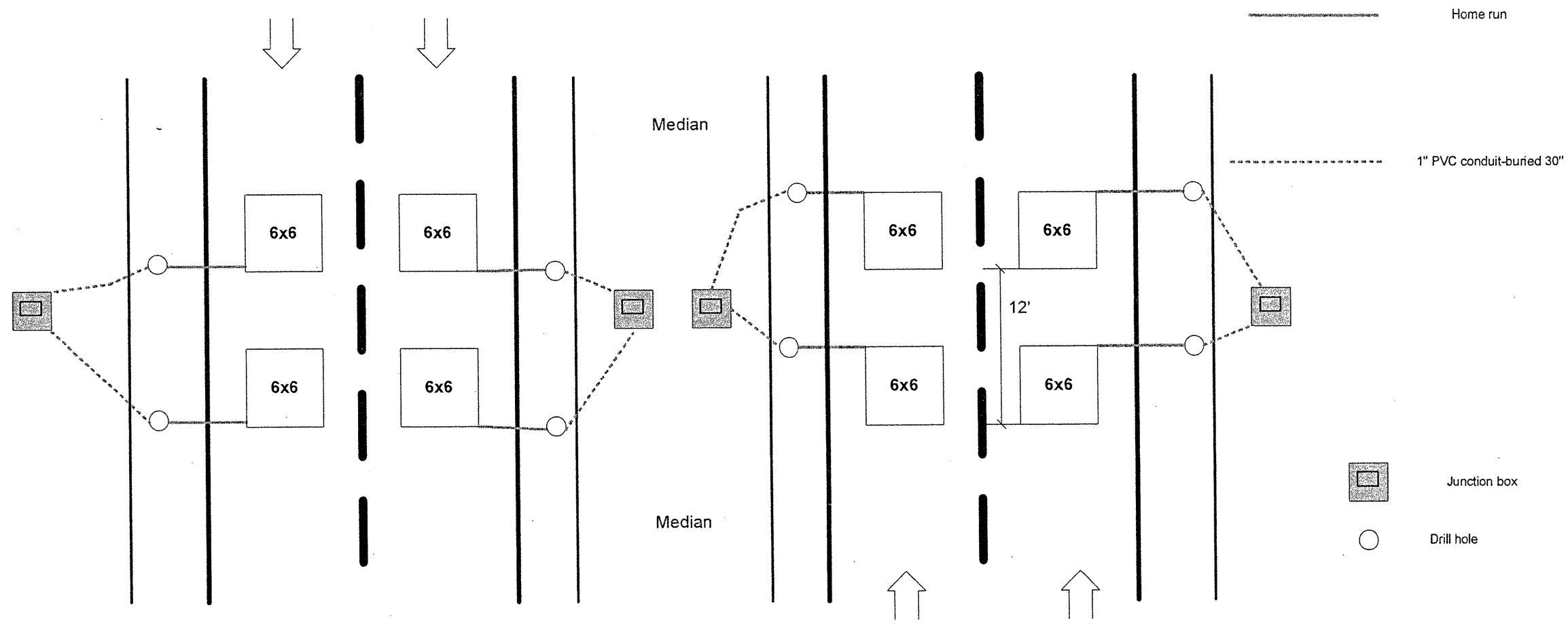
Prepared in the Offices of:

750 N. Greenfield Parkway
Garner, NC 27529

SEAL

Milton Dean 11/24/08
SIGNATURE DATE

A3104: NC147; 0.1 Mile South of SR1171.



Notes

- 1: Detail is not to scale.
- 2: Home run cuts are made on the down stream side of loops and sensors.
- 3: Multiple arrays of sensors will be staggered.
- 4: Pavement trenches are spaced a minimum of 1 foot apart.
- 5: Variations in Sensors and Site Work must be approved by the Electronic Systems Section Supervisor.
6. 10' of excess loop wire to be coiled neatly in each junction box.
7. Each Junction box will be minimum of 6 feet from the shoulder of road.
8. Loops are to be spaced 12 feet from leading edge to leading edge.

North Carolina Department of
Transportation
Transportation Planning Branch
Traffic Survey Unit

STANDARD DETAIL ATR 5a

Preparer: Kevin C. Sullivan 06/09/10
Reviewer: Michael H. Ashbrook