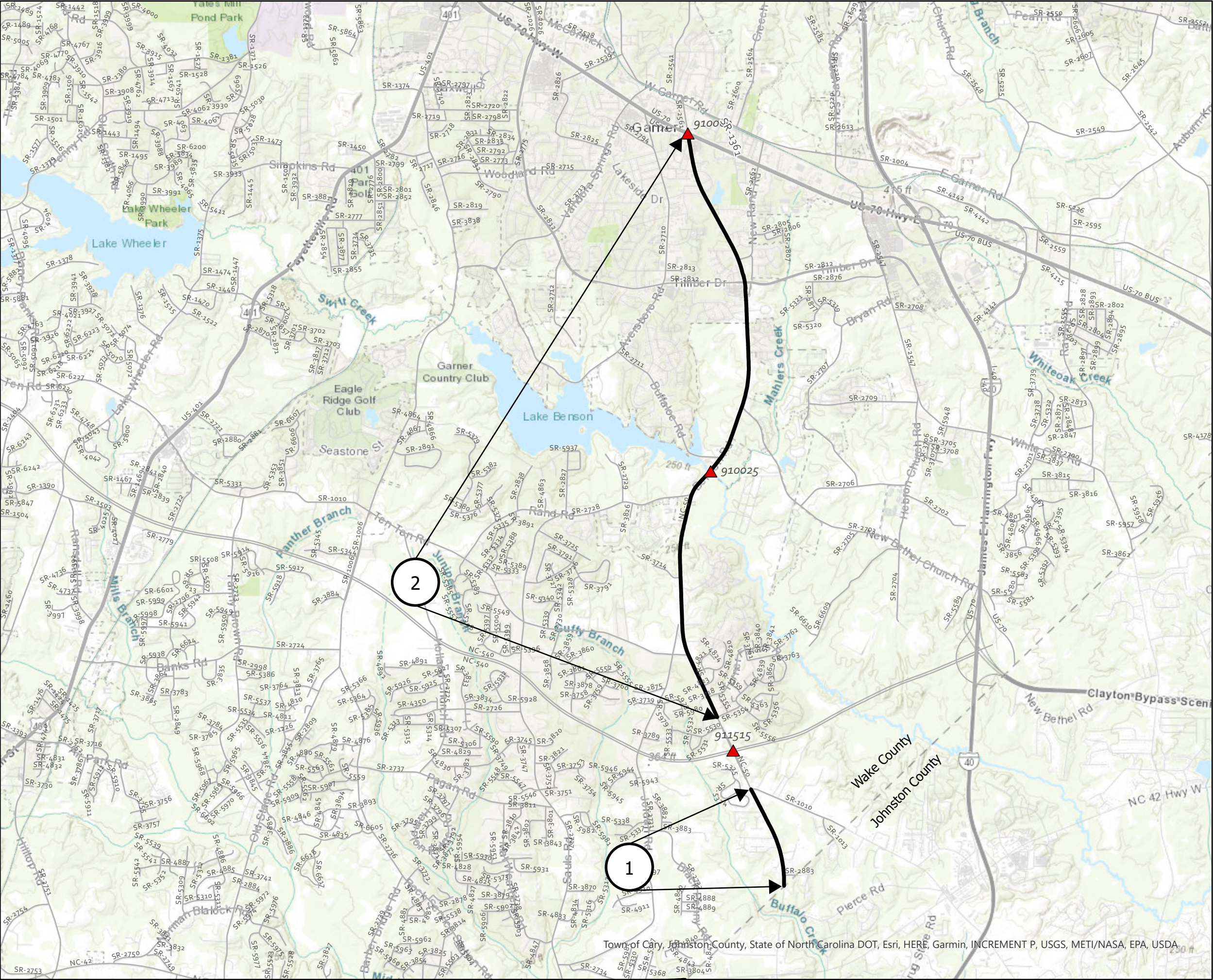


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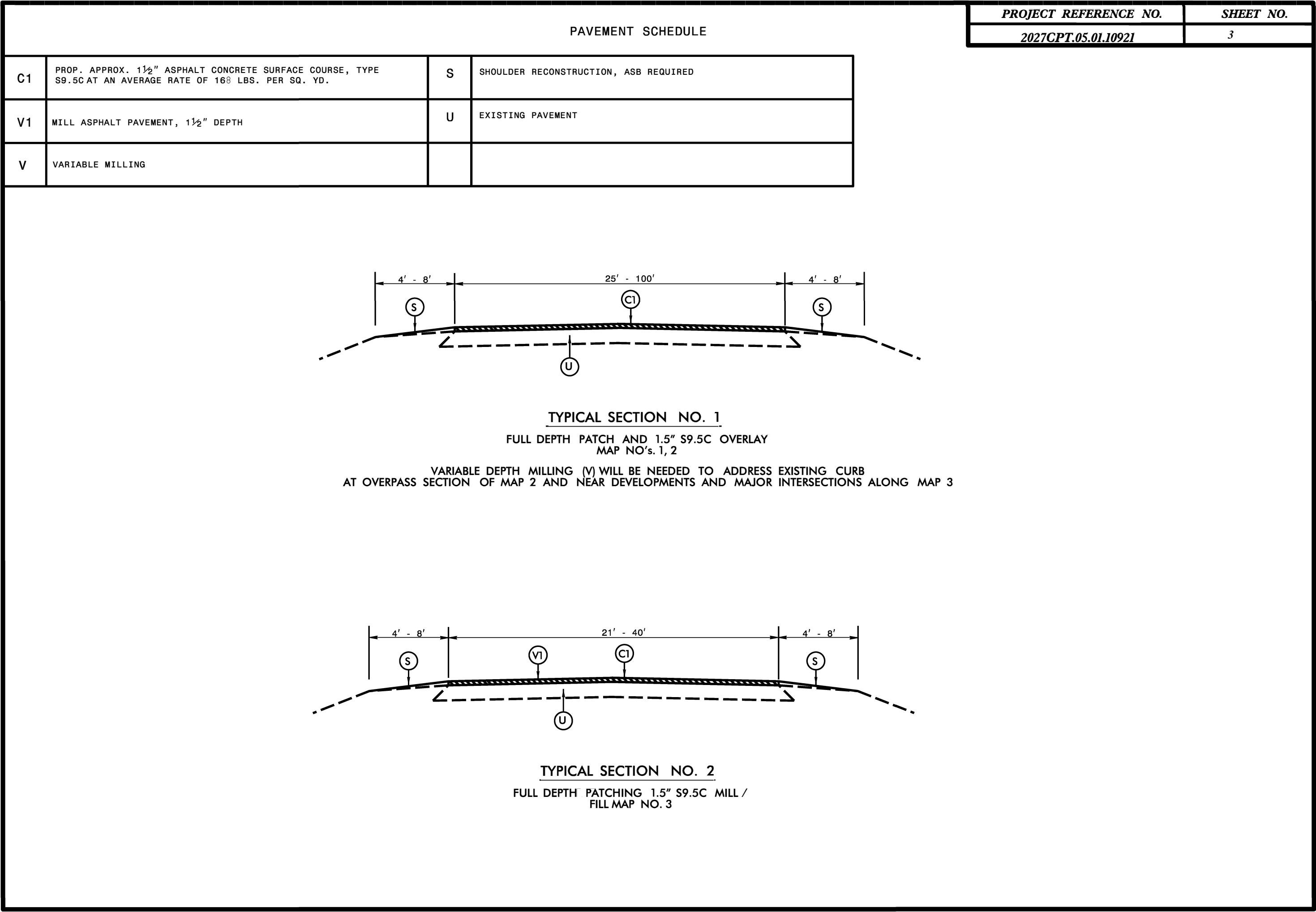
2028 Wake Primary - Wake County	
PROJECT REFERENCE NO.	SHEET NO.
2027CPT.05.01.10921	1

Map 1: NC-50 E (Benson Rd)
From: Johnston County Line
To: SR-1010 (Cleveland School Rd)
MP 0.000-0.945

Map 2: NC-50 S (Benson Rd)
From: SR-5354 (Golden Grain Rd)
To: US 70
MP 1.705-7.46

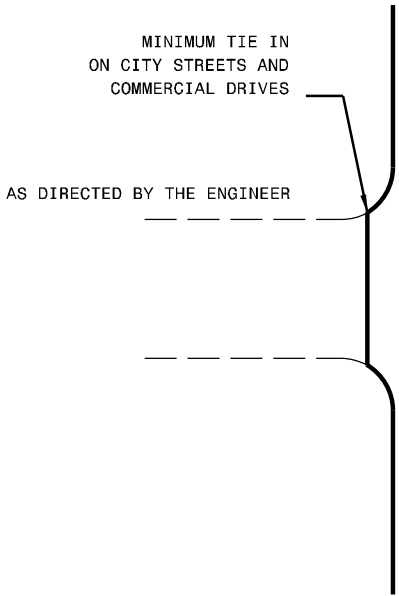
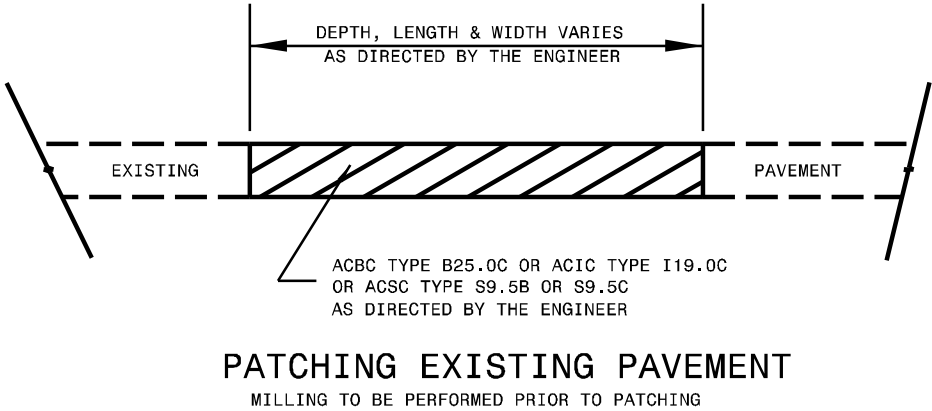
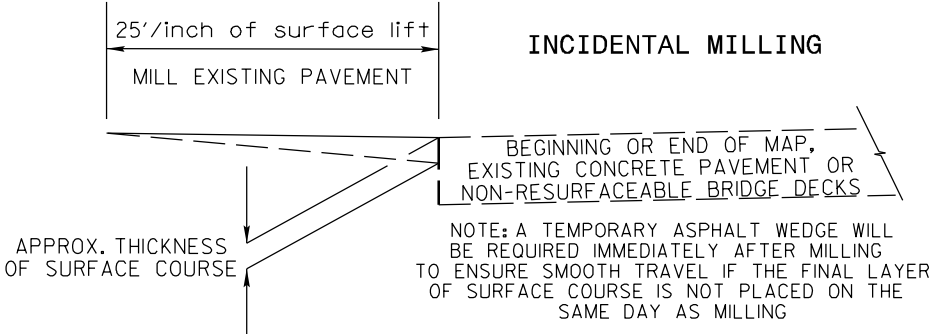
Legend

▲ Bridge Locations

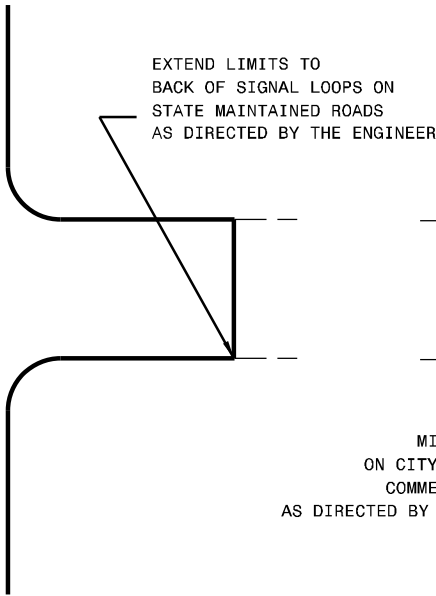


NOTES

ALL UNPAVED S.R. ROADS TO BE RESURFACED 50' FROM EDGE OF PAVEMENT OF MAIN PROJECT
ALL PAVED S.R. ROADS TO BE RESURFACED TO THE ENDS OF THE RADII, OR AS DIRECTED BY THE ENGINEER.
EDGES, PAVEMENT WIDENING, INTERSECTIONS AND BRIDGE FLARES ARE INCLUDED IN THE TABLE OF QUANTITIES.
BRIDGES TO BE RESURFACED AT LOCATIONS AND TO DEPTH AS DIRECTED BY THE ENGINEER.

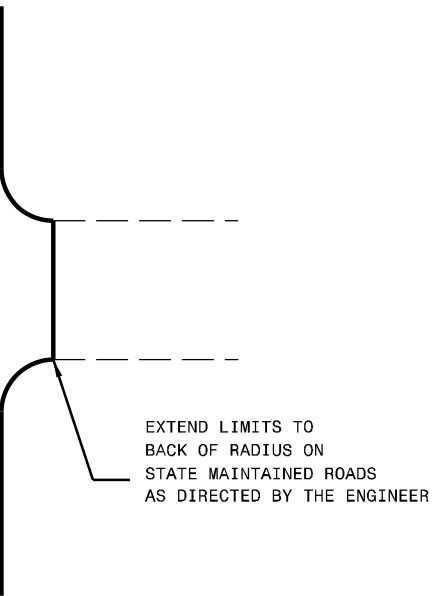


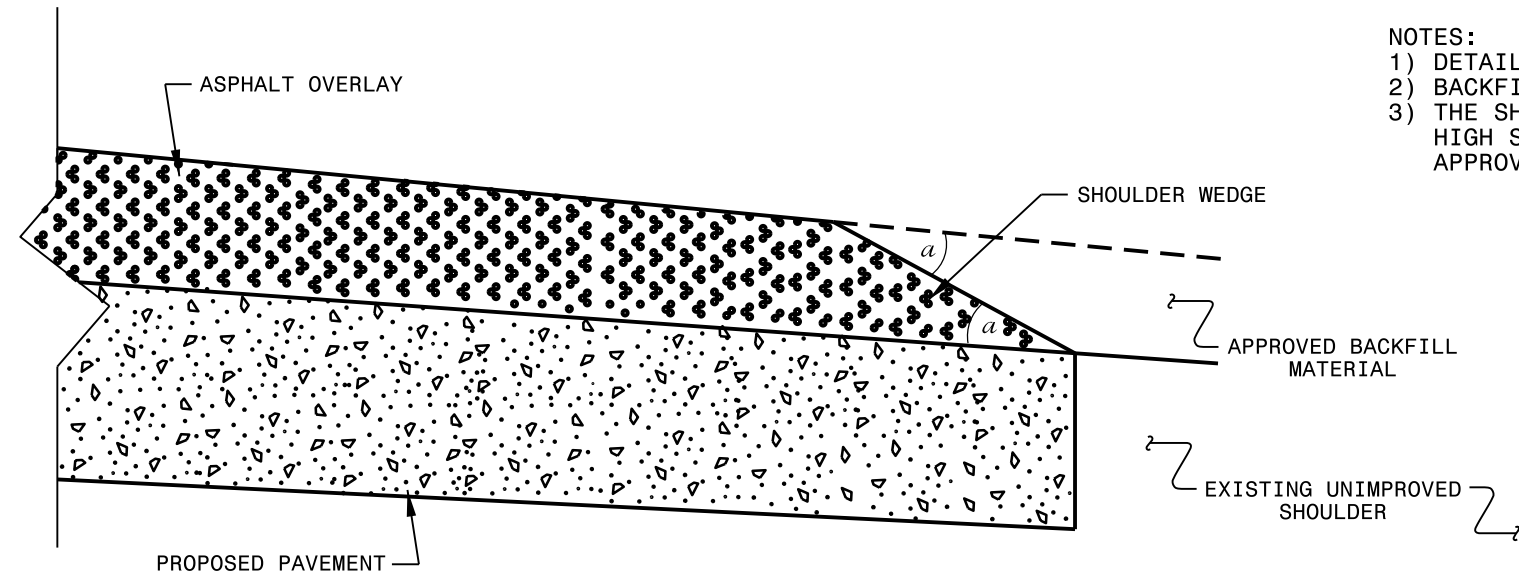
DETAIL OF PROJECT LIMITS AT SIGNALIZED Y LINES



MINIMUM TIE IN ON CITY STREETS AND COMMERCIAL DRIVES AS DIRECTED BY THE ENGINEER

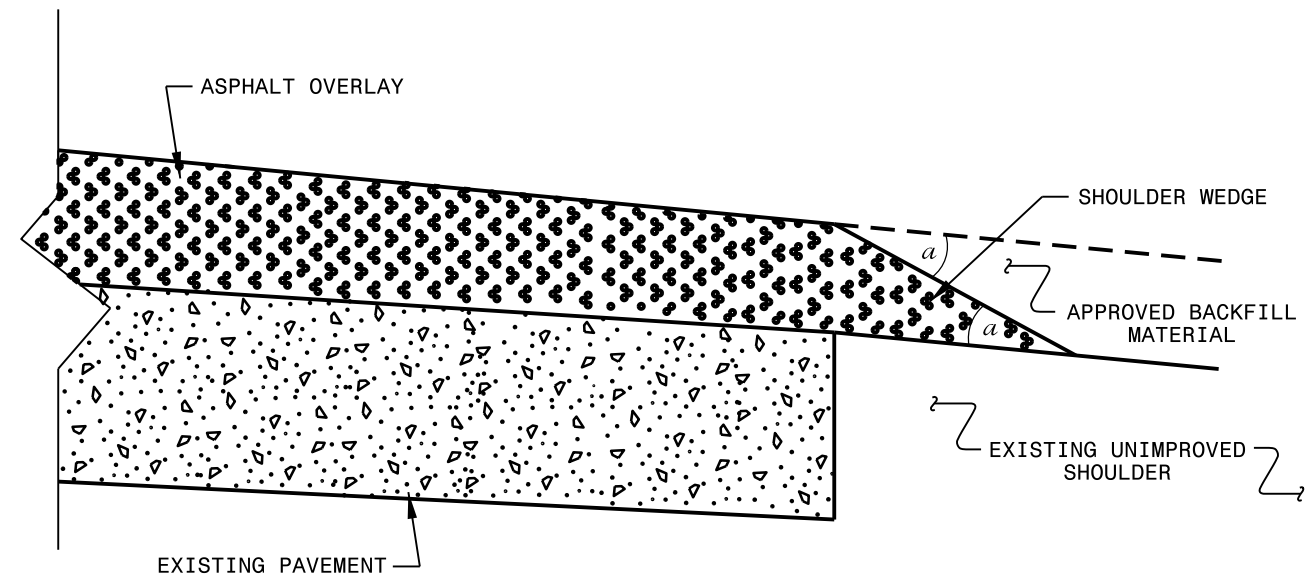
DETAIL OF PROJECT LIMITS AT UNSIGNALIZED Y LINES



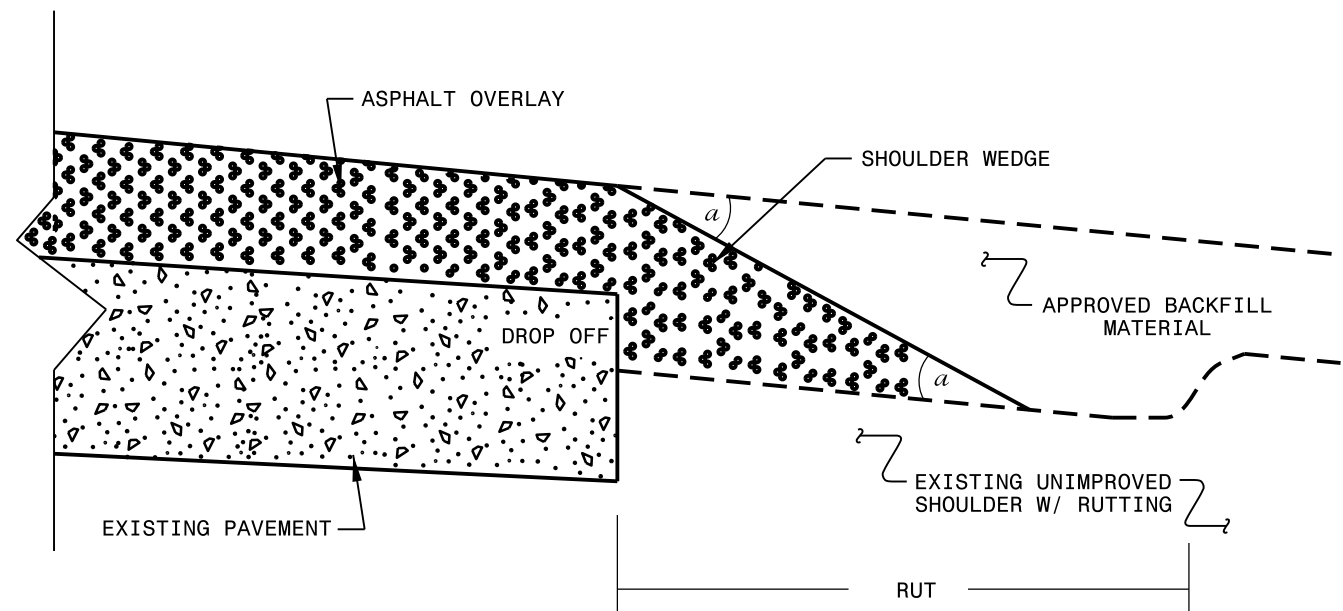


- NOTES:
- 1) DETAIL DOES NOT APPLY TO OGAFB AND ULTRA-THIN BONDED WEARING COURSE.
 - 2) BACKFILL SHOULDER WITH APPROVED MATERIAL.
 - 3) THE SHOULDER WEDGE DEVICE MAY BE DISENGAGED AT PAVED DRIVEWAYS, SIDE STREETS, HIGH SHOULDERS, AND OTHER LOCATIONS NOT FEASIBLE TO CONSTRUCT AS APPROVED BY THE ENGINEER.

SHOULDER WEDGE DETAIL
(Resurfacing Projects w/ Widening or
with Existing Paved Shoulder having no dropoffs)



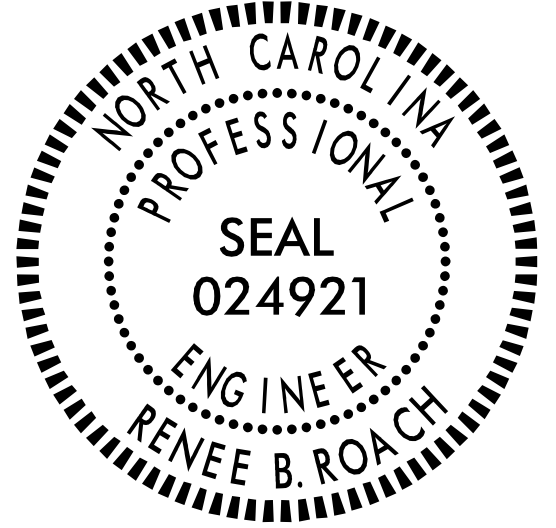
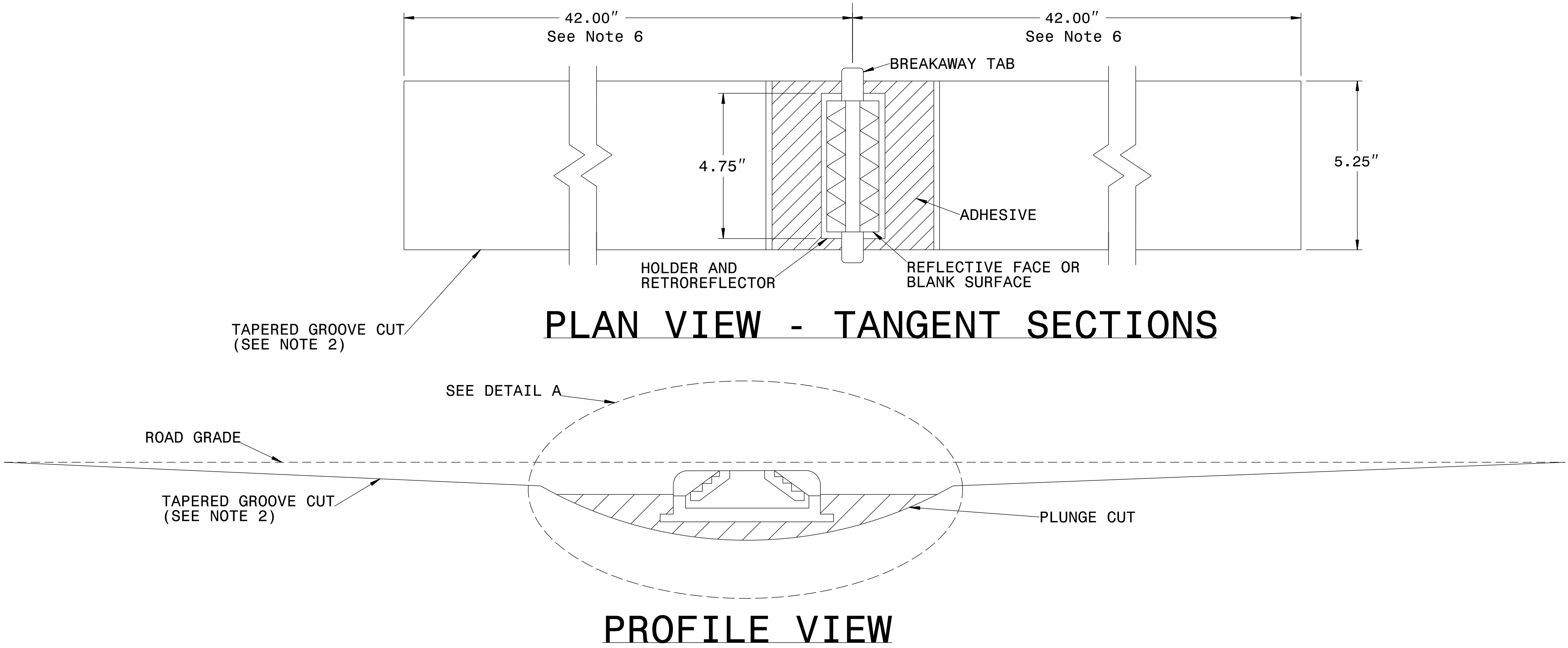
SHOULDER WEDGE DETAIL
(Resurfacing Projects w/ NO Widening)



SHOULDER WEDGE DETAIL
(Resurfacing Adjacent to
Rutted Shoulder)

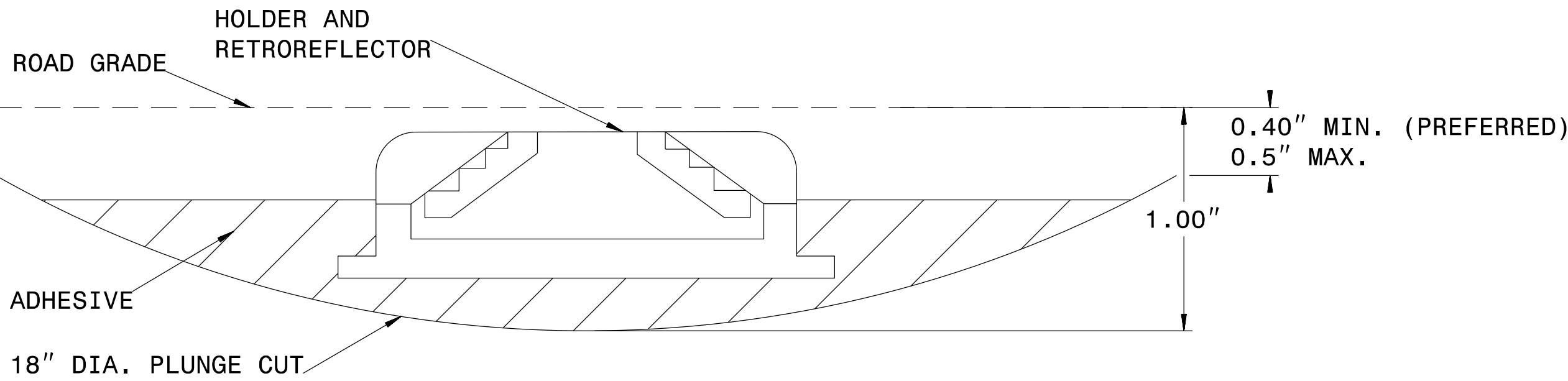
- SHOULDER WEDGE ANGLE = 30°

CONTRACT STANDARDS AND DEVELOPMENT UNIT			
Office 919-707-6950		FAX 919-250-4119	
SHOULDER WEDGE DETAILS			
ORIGINAL BY:	T.SPELL	DATE:	7-19-11
MODIFIED BY:		DATE:	2/2/16
CHECKED BY:		DATE:	
FILE SPEC.:	s:\usr\details\stand\shoulderwedgedetail.dgn		

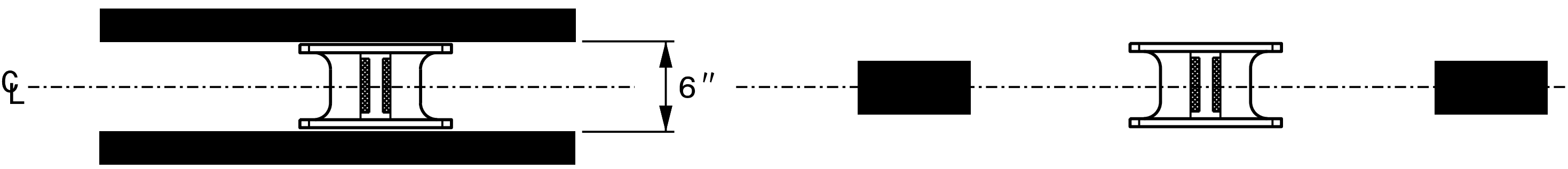


NOTES:

1. ALL GROOVE EDGES SHALL BE AT LEAST 2 INCHES FROM ANY SEAM OR PAVEMENT JOINT
2. GROOVE CUTS MAY BE TAPERED OR BEVELED. TAPERED CUTS SHALL START AT ROAD LEVEL ON EACH END AND TAPER AT A FIXED RATE AS SHOWN ON THE PROFILE VIEW. BEVELED GROOVE CUTS SHALL BE 0.5" MAXIMUM DEPTH (0.4" PREFERRED), AND SHALL BE 0.4" MINIMUM DEPTH AT BOTH ENDS OF THE PLUNGE CUT.
3. GROOVE AND PLUNGE CUT SHALL BE CLEAN AND DRY PRIOR TO PLACEMENT OF ADHESIVE.
4. THE EPOXY ADHESIVE SHALL BE THOROUGHLY MIXED UNTIL IT IS UNIFORM IN COLOR, AND APPLIED IN COLOR, AND APPLIED IN ACCORDANCE WITH THE MANUFACTURER'S INSTALLATION INSTRUCTIONS.
5. MARKER SHALL BE INSTALLED AS PER MANUFACTURER'S INSTALLATION INSTRUCTIONS WITH THE BREAKWAY TABS RESTING ON THE PAVEMENT SURFACE. THE EPOXY SHALL BE FILLED TO THE LEVEL OF THE TOP OF THE MARKER HOLDER. EPOXY SHALL NOT TOUCH THE RETROREFLECTOR.
6. TOTAL GROOVE LENGTH MAY BE SHORTENED TO 54" ON SHARP CURVES IF APPROVED BY THE ENGINEER. GROOVES SHALL NOT OVERLAP WITH LOOP DETECTOR WIRES.



DETAIL A



MARKER SPACING

ADA SUMMARY OF QUANTITIES - TOTALS

WBS Number:	2027CPT.05.01.10921
County:	Wake

Sheet No.
7

WBS Number	County	Municipality	Resurfacing Route	4447000000-E (LF) Pedestrian Channelizing Devices	4600000000-N (EA) Generic Traffic Control Item - Pedestrian Transport Service (Per Trip)	4600000000-N (EA) Generic Traffic Control Item - Audible Warning Devices	2752000000-E (LF) Remove And Replace 2'-6" Concrete Curb & Gutter	2591000000-E (SY) 4" Concrete Sidewalk	2738000000-E (SY) Remove And Replace 4" Concrete Sidewalk	2612500000-N (EA) Remove and Replace Concrete Curb Ramps
2026CPT.05.13.10921.1	Wake	Garner	NC 50 From Johnston Co To US 70	30	5	1	40	5	6	10
GRAND TOTAL				30	5	1	40	5	6	10

ADA SUMMARY OF QUANTITIES - NC 50 FROM JOHNSTON CO TO US 70

Municipality:	Garner
WBS Number:	2027CPT.05.01.10921
County:	Wake

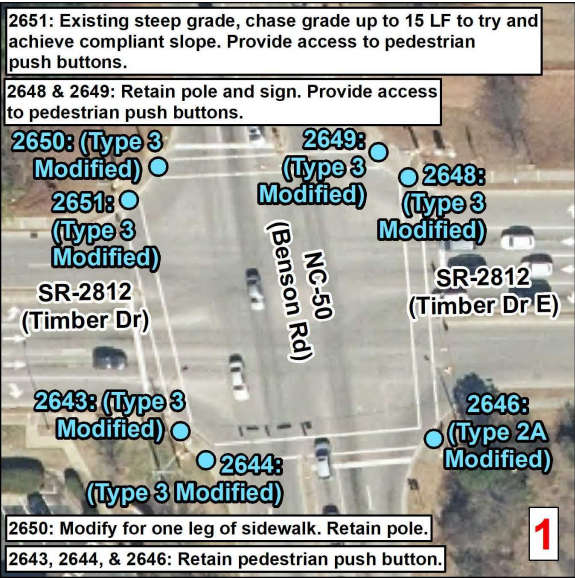
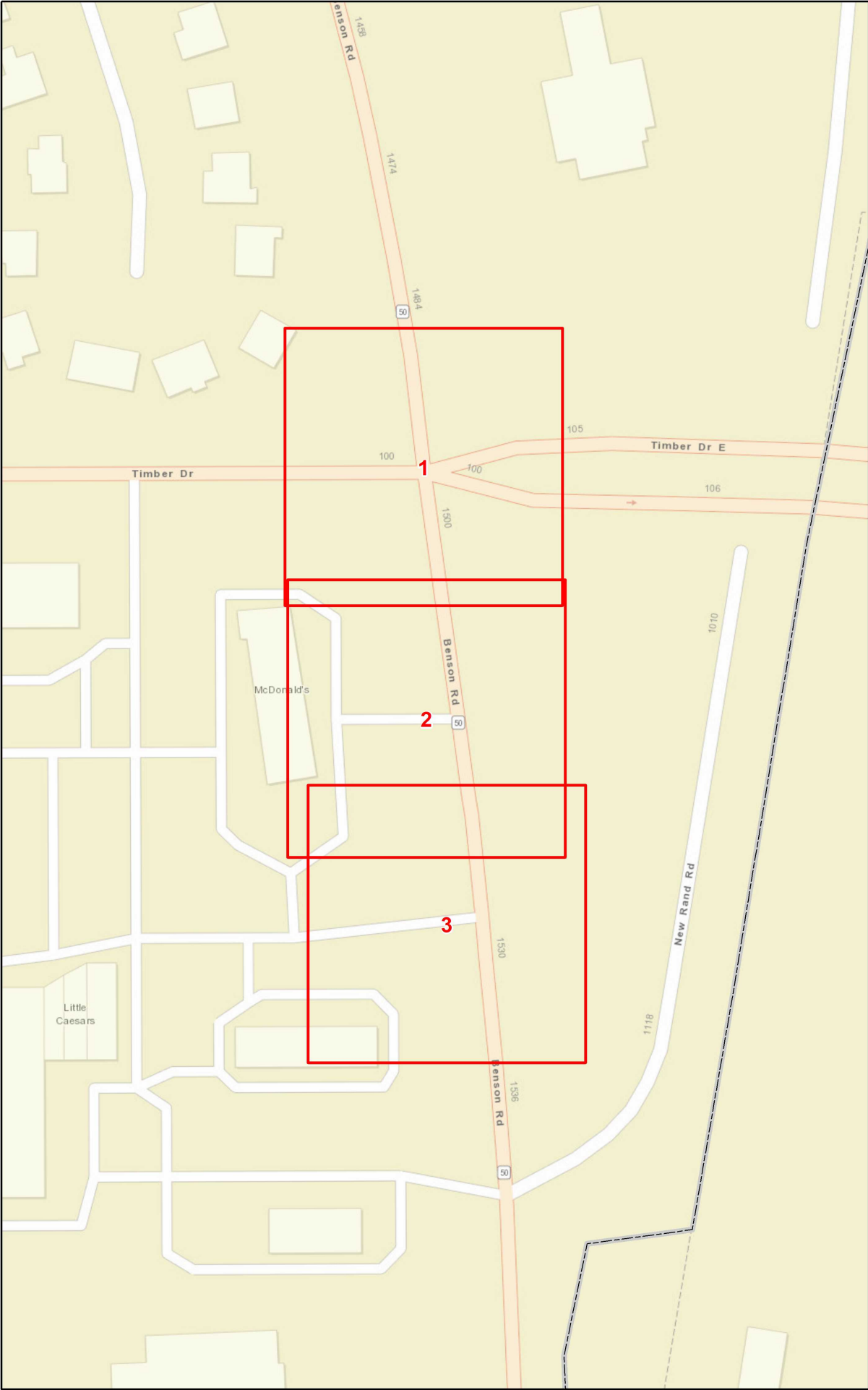
Sheet No.
8

Ramp ID	Inset Map Number	Route 1	Route 2	2752000000-E (LF) Remove And Replace 2'-6" Concrete Curb & Gutter	2591000000-E (SY) 4" Concrete Sidewalk	2738000000-E (SY) Remove And Replace 4" Concrete Sidewalk	2612500000-N (EA) Remove and Replace Concrete Curb Ramps	Improvement Type
2643	1	NC-50 (Benson Rd)	SR-2812 (Timber Dr)				1	Type 3 Modified - 848D0609
2644	1	NC-50 (Benson Rd)	SR-2812 (Timber Dr)				1	Type 3 Modified - 848D0609
2646	1	NC-50 (Benson Rd)	SR-2812 (Timber Dr E)				1	Type 2A Modified - 848.06
2648**	1	NC-50 (Benson Rd)	SR-2812 (Timber Dr E)		2		1	Type 3 Modified - 848D0609
2649	1	NC-50 (Benson Rd)	SR-2812 (Timber Dr E)				1	Type 3 Modified - 848D0609
2650	1	NC-50 (Benson Rd)	SR-2812 (Timber Dr)				1	Type 3 Modified - 848D0609
2651	1	NC-50 (Benson Rd)	SR-2812 (Timber Dr)		3		1	Type 3 Modified - 848D0609
2641	2	NC-50 (Benson Rd)	Timber Crossings Shopping Center (205 Timber Dr) East Entrance				1	Type 1C - 848.06
2642	2	NC-50 (Benson Rd)	Timber Crossings Shopping Center (205 Timber Dr) East Entrance				1	Type 1C - 848.06
2640	3	NC-50 (Benson Rd)	Timber Crossings Shopping Center (205 Timber Dr) South East Entrance				1	Type 1C - 848.06
-	-	-	-	40*	-	6*	-	
Sub-Total for NC 50 From Johnston Co To US 70				40	5	6	10	

*Contingency line item amount provided for adjustments outside of curb ramp pay limits.

**While ramp is compliant upon initial inspection, it is to be improved in order to create a more resilient curb ramp.

Notes: (1) ADA quantity totals are provided on the project 'ADA SUMMARY OF QUANTITIES - TOTALS' page. (2) Construct in accordance with Section 848. Detectable warnings shall be of one of the following materials: engineered plastics, rubber, or composite tile. Additionally, warnings shall be applied directly to the curb ramps by incorporating into the concrete of the curb ramps unless otherwise approved by the Engineer. Surface mounted rubber mats, brick, steel and stamped concrete pavers will not be accepted.



Curb Ramps To Be Repaired

- Retrofit
- Remove and Replace
- New Curb Ramp
- Remove Ramp
- Other

Municipal Boundary

NCHPO Historic Boundary (NR and LHD)

Wake Pri

WBS Number: 2027CPT.05.01.10921

NC 50

From Johnston Co To US 70

NORTH CAROLINA DEPARTMENT
OF TRANSPORTATION
DIVISION 5

Source: NV5 Engineers and Consultants Inc., ESRI, NC OneMap, NCDOT, NCHPO

PROJECT NO.	SHEET NO.
2027CPT.05.01.10921	10

SUMMARY OF QUANTITIES

												1220000000-E	1245000000-E	1260000000-E	1297000000-E	1308000000-E	1330000000-E	1523000000-E	1575000000-E	1704000000-E	2591000000-E	2612500000-N	2738000000-E	2752000000-E	4600000000-N	7444000000-E						
PROJECT NO	COUNTY	MAP NO	ROUTE	DESCRIPTION	TYP NO	LANES	LANE TYPE	LENGTH	WIDTH	BEGIN MP	END MP	INCIDENTAL STONE BASE	SHOULDER RECONSTRUCTION	AGGREGATE SHOULDER BORROW	1½" MILLING	0" TO 1.5" MILLING	INCIDENTAL MILLING	SURFACE COURSE, S9.5C	ASPHALT BINDER FOR PLANT MIX	PATCHING EXISTING PAVEMENT	4" CONCRETE SIDEWALK	REMOVE AND REPLACE CURB RAMPS	REMOVE AND REPLACE SIDEWALK	REMOVE AND REPLACE 2' 6" C&G	PEDESTRIAN TRANSPORT SERVICE	AUDIBLE WARNING DEVICES	INDUCTIVE LOOP SAWCUT					
								MI	FT			TONS	SMI	TON	SY	SY	SY	TONS	TON	TONS	SY	EA	SY	LF	EA	EA	LF					
2027CPT.05.01.10921	Wake	1	NC-50 E / BENSON RD	FROM JOHNSTON CO TO US 70	1	2	2WU	0.945	30	0.000	0.945	50	2.01	185		330	1,058	1,933	116	50							1,200					
2027CPT.05.01.10921	Wake	2	NC-50 E / BENSON RD	FROM JOHNSTON CO TO US 70	1	2	2WU	5.757	30	1.705	7.462	234	9.38	866		5,502	5,154	12,482	744	150	5	10	6	40	5	1	7,752					
2027CPT.05.01.10921	Wake	3	NC-42 E / NC 42 HWY	FROM SR 1006 TO MIDDLE CREEK BRIDGE	2	2	2WU	2.175	24	10.223	12.398	101	4.04	373	35,845		1,579	3,315	198	50							864					
TOTAL FOR PROJ NO. 2027CPT.05.01.10921								8.877				385	15.43	1,424	35,845	5,832	7,791	17,730	1,058	250	5	10	6	40	5	1	9,816					
GRAND TOTAL								8.877				385	15.43	1,424	35,845	5,832	7,791	17,730	1,058	250	5	10	6	40	5	1	9,816					

PROJECT NO.	SHEET NO.
2027CPT.05.01.10921	11

THERMOPLASTIC AND PAINT QUANTITIES

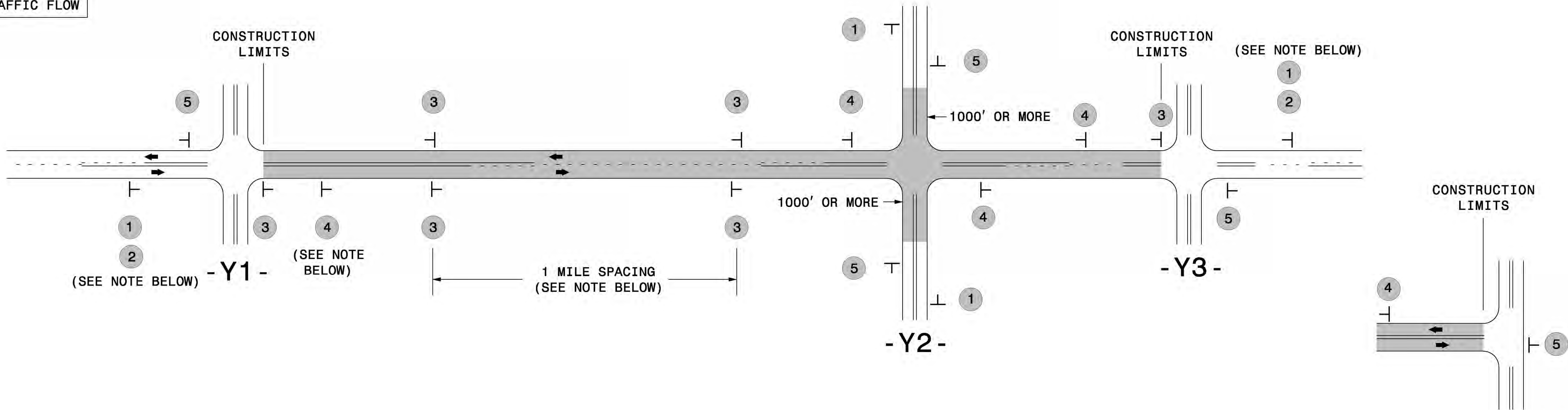
PROJECT NO	COUNTY	MAP NO	ROUTE	DESCRIPTION	TYP NO	LANES	LANE TYPE	LENGTH	WIDTH	BEGIN MP	END MP	4413000000-E WORK ZONE ADVANCE/GE NERAL WARNING SIGNING	4447000000-E PEDESTRIAN CHANNELIZIN G DE- VICES	4457000000-N TEMPORARY TRAFFIC CONTROL	4510000000-N LAW ENFORCEMEN T	4688000000-E 6" X 90 M YELLOW THERMO		4700000000-E 12" X 90 M YELLOW THERMO		4709000000-E 24" X 90 M WHITE THERMO	4720000000-E THERMO MSG ONLY 90 M		4720000000-E THERMO MSG SCHOOL 90 M		THERMO LT ARROW 90 M	THERMO STR & RT ARROW 90 M	THERMO RT ARROW 90 M	THERMO STR ARROW 90 M	THERMO MERGE ARROW 90 M	4890000000-E YIELD LINE PAVEMENT MARKING, 24" 90 MILS	4895000000-N NON-CAST IRON SNOWPLOWA BLE PAVEMENT MARKER - POLYCARBON ATE H-SHAPED							
								MI	FT			SF	LF	LS	HR	LF	LF	LF	LF	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA		
2027CPT.05.01.10921	Wake	1	NC-50 E / BENSON RD	FROM JOHNSTON CO TO US 70	1	2	2WU	0.945	30	0	0.945	120		0.10	40	11,511	9,734	184	180	23	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA							
2027CPT.05.01.10921	Wake	2	NC-50 E / BENSON RD	FROM JOHNSTON CO TO US 70	1	2	2WU	5.757	30	1.705	7.462	656	30	0.51	280	74,900	63,617	1,732	2,360	734	40	12	86	9	40	33	5	22	715									
2027CPT.05.01.10921	Wake	3	NC-42 E / NC 42 HWY	FROM SR 1006 TO MIDDLE CREEK BRIDGE	2	2	2WU	2.175	24	10.223	12.398	244		0.39	80	26,575	23,552	1,973		117			11	3	3					207								
TOTAL FOR PROJ NO. 2027CPT.05.01.10921								8.877				1,020	30.000	1.000	400	112,986	96,903	3,889	2,540	874	40	12	99	14	43	33	5	37	1,032									
								209,889										6,429				194																
GRAND TOTAL								8.877				1,020	30.000	1.000	400	112,986	96,903	3,889	2,540	874	40	12	99	14	43	33	5	37	1,032									
								209,889										6,429				52										194						

SIGNING FOR RESURFACING PROJECTS

LEGEND

STATIONARY SIGN

DIRECTION OF TRAFFIC FLOW



TEE INTERSECTION

MAINLINE (-L-) SIGNING

-Y- LINE SIGNING

SIGNING NOTES AND PLACEMENT PER DIRECTION	1 2 ROAD WORK AHEAD W20-1 48" X 48" NEXT XX MILES W7-3aP 24" X 18" PLACE 1000' PRIOR TO BEGINNING OF CONSTRUCTION LIMITS. ONLY USED ON -Y- LINES IF RESURFACING LIMITS EXTEND 1000' ALONG -Y- LINE. #2 SIGN ONLY USED WHEN CONSTRUCTION LIMITS ARE 2 OR MORE MILES IN LENGTH. ROUND UP TO NEXT WHOLE NUMBER. (NO FRACTIONAL OR DECIMAL NUMBERS)	NO REQUIRED STATIONARY SIGNING FOR THE FOLLOWING -Y- LINE CONDITIONS: 1) LESS THAN 1000' OF RESURFACING ALONG -Y- LINE 2) SUBDIVISION ROADS 3) DEAD END ROADS WHEN PAVING/CONSTRUCTION ACTIVITIES PROCEED ACROSS AN UNSIGNED -Y- LINE, PORTABLE ADVANCE WARNING SIGNS SHALL BE USED ALONG THE -Y- LINE AS SHOWN BELOW. REMOVE UPON COMPLETION OF WORK. ROAD WORK AHEAD W20-1 48" X 48" PLACED 500' IN ADVANCE OF FLAGGER. ROAD WORK AHEAD W20-7 A 48" X 48" PLACED 250' IN ADVANCE OF FLAGGER.
	3 LOW/SOFT SHOULDER SP 13107 48" X 48" - PLACE INITIALLY AT THE CONSTRUCTION LIMITS AND SPACE 1 MILE APART THEREAFTER. - AT TEE INTERSECTIONS INSTALL INITIALLY 1/2 MILE FROM INTERSECTION AND SPACE 1 MILE APART THEREAFTER.	
	4 ROAD UNDER CONST SP 13106 48" X 48" - THESE ARE FOR -Y- LINES THAT ARE "THROUGH" ROADWAYS. - DEAD END AND SUBDIVISION ROADS ARE NOT "THROUGH" ROADWAYS. - INSTALL 500' +/- FROM EACH -Y- LINE APPROACH AS SHOWN ABOVE. - FOR MULTIPLE -Y- LINES THAT ARE SEPARATED BY 0.25 MILES OR LESS, TREAT AS A SINGLE UNIT AND INSTALL WITHIN 500' OF EACH APPROACH. - A MAXIMUM OF 2 SIGN SETS PER MILE. DO NOT INSTALL WHEN -Y- LINES ARE WITHIN 0.5 MILES FROM "END ROAD WORK" SIGN. - FOR TEE INTERSECTIONS, INSTALL WITHIN 500' +/- OF THE INTERSECTION ALONG -L- LINE.	
	5 END ROAD WORK G20-2 A 48" X 24" PLACE 500' FOLLOWING THE END OF CONSTRUCTION LIMITS OR AS SHOWN WHEN WORK ENDS AT A 3-WAY TEE INTERSECTION.	
	THE ABOVE SIGNS ARE ALL THAT ARE REQUIRED FOR A CONTRACTOR TO BEGIN A RESURFACING CONTRACT. ANY ADDITIONAL SIGNS REQUESTED BY NCDOT DIVISIONS SHALL BE INSTALLED WITHIN 7 BUSINESS DAYS OF THE START OF CONTRACT WORK.	
LESS 2 MILES	FOR RESURFACING MAPS WITH CONSTRUCTION LIMITS LESS THAN 2 MILES IN LENGTH, NO STATIONARY SIGNS ARE REQUIRED. USE PORTABLE "ROAD UNDER CONSTRUCTION" OR "ROAD WORK AHEAD" SIGNS IN LIEU OF STATIONARY ADVANCE WARNINGS SIGNS.	

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WORK ZONE TRAFFIC CONTROL

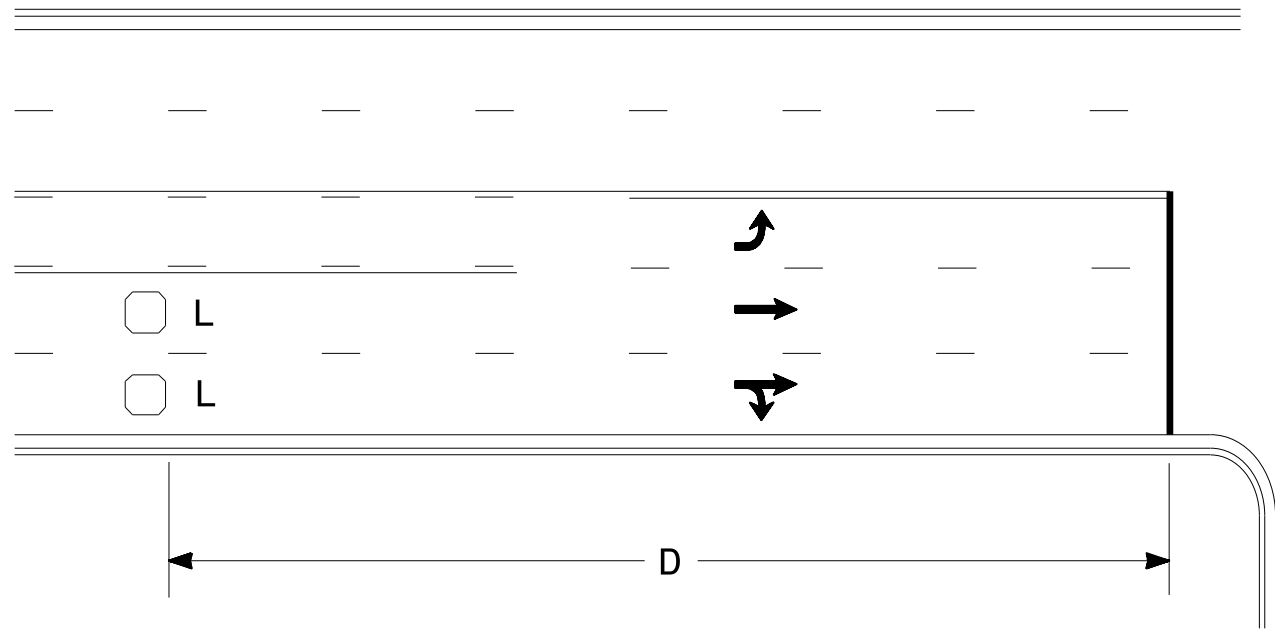
AD



ADVANCE WARNING SIGNS
FOR
RURAL AND SUBURBAN
2-LANE ROADWAY
RESURFACING

High Speed Detection

(≥35 mph)

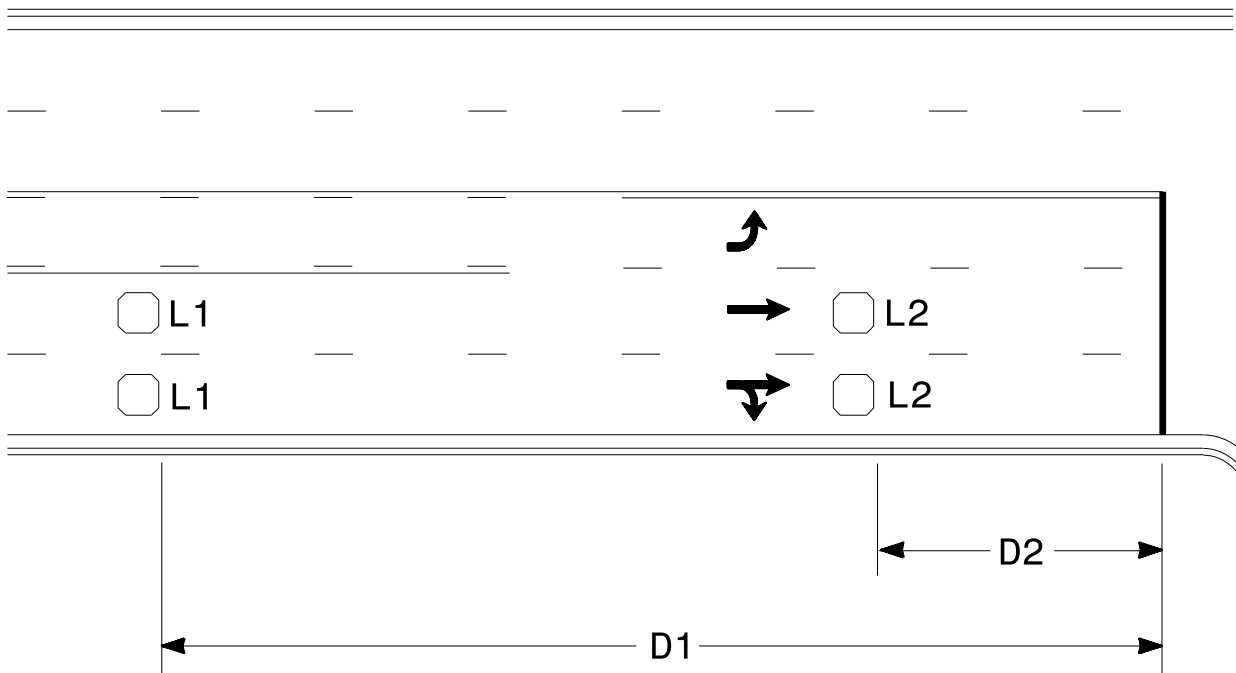


Speed Limit mph	D ft
35	200
40	250
45	300
50	355
55	420
60	475
65	550

L = 6ft X 6ft
Wired separately

Volume Density Operation

OR



Speed Limit mph	D1 ft	D2 ft
40	250	80
45	300	90
50	355	100
55	420	110
60	475	120
65	550	130

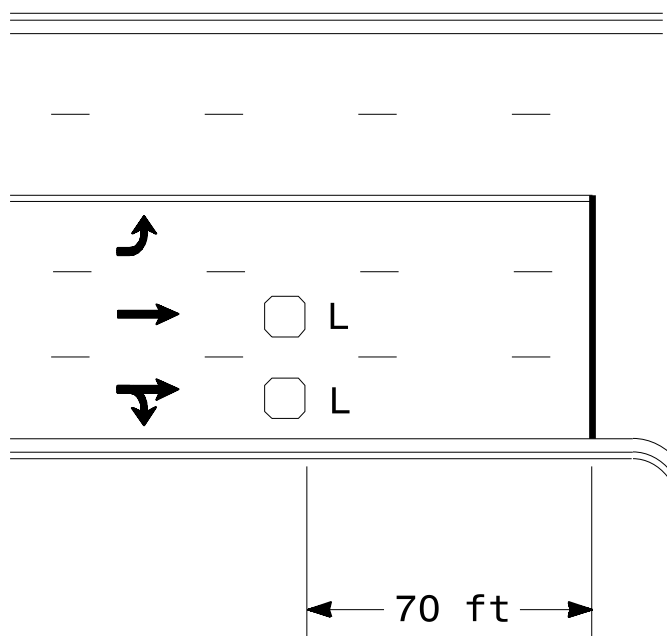
L1 = 6ft X 6ft
Wired in series

L2 = 6ft X 6ft
Wired in series

"Stretch" Operation

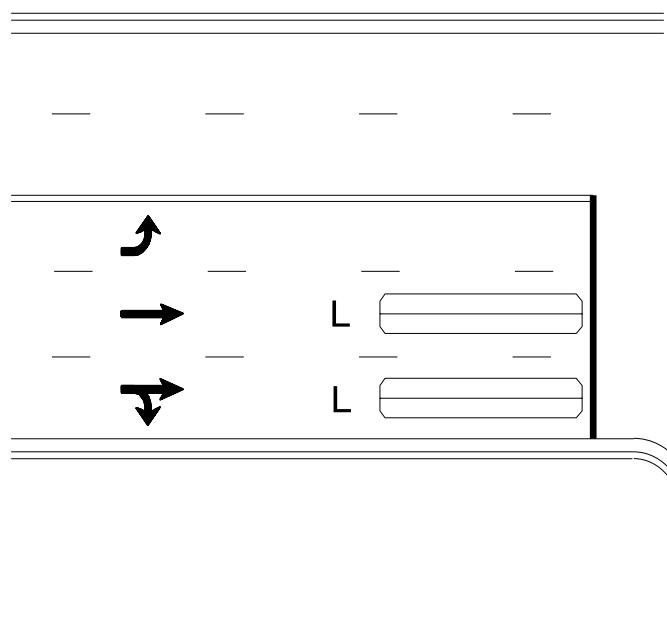
Low Speed Detection

(≤35 mph)



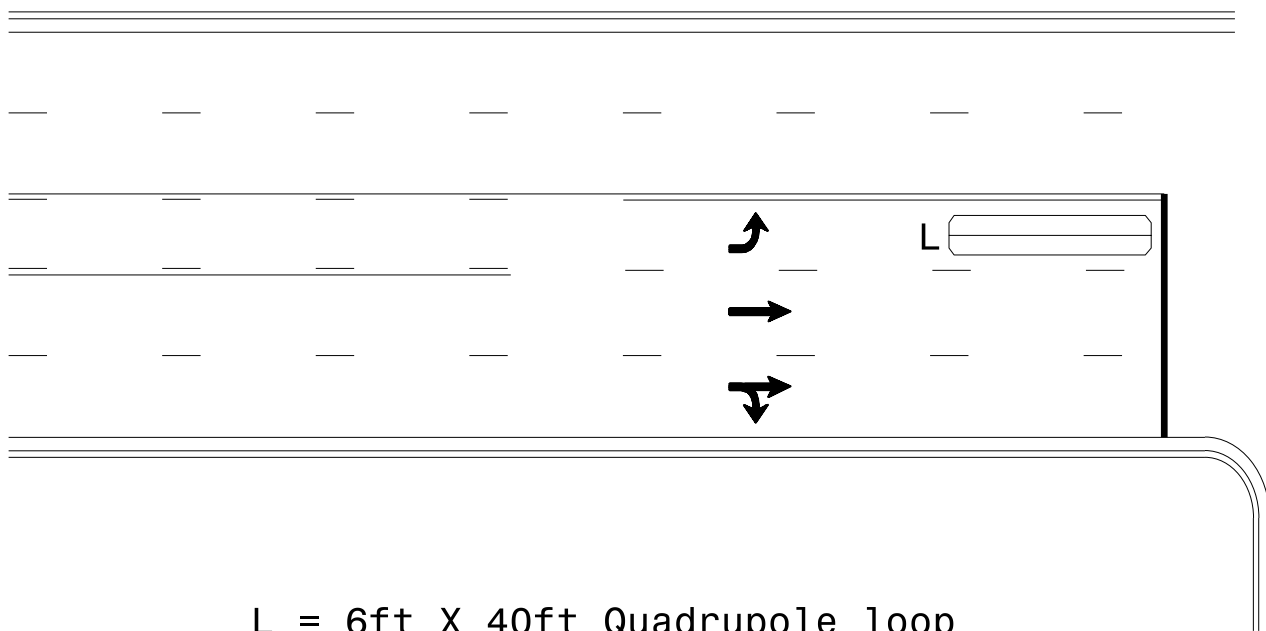
L = 6ft X 6ft
Wired in series

OR



L = 6ft X 40ft
Quadrupole loop, wired separately

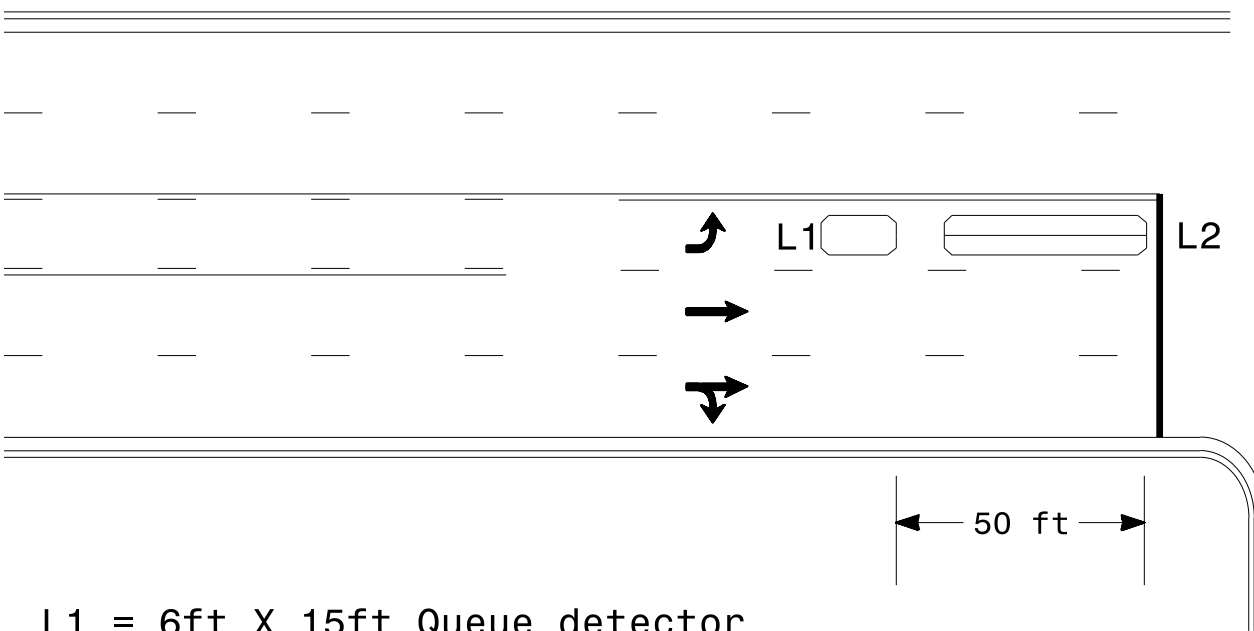
Left Turn Lane Detection



L = 6ft X 40ft Quadrupole loop

Presence Loop Detection

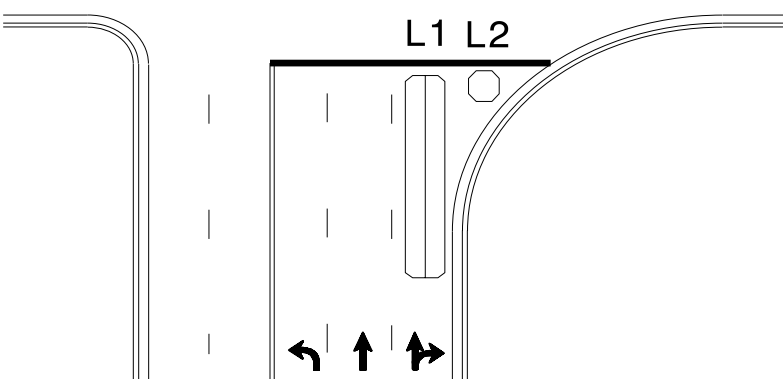
OR



L1 = 6ft X 15ft Queue detector
L2 = 6ft X 40ft Quadrupole loop

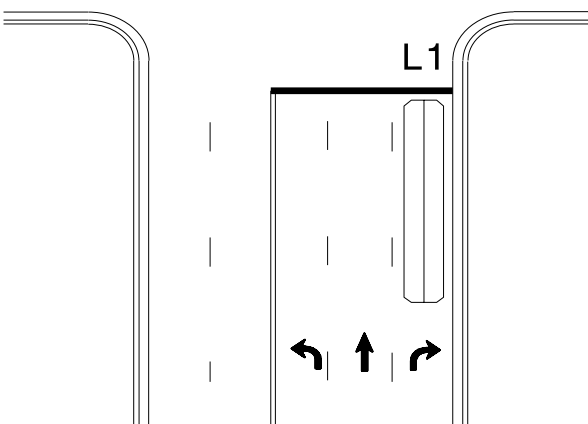
Queue Loop Detection

Right Turn Lane Detection

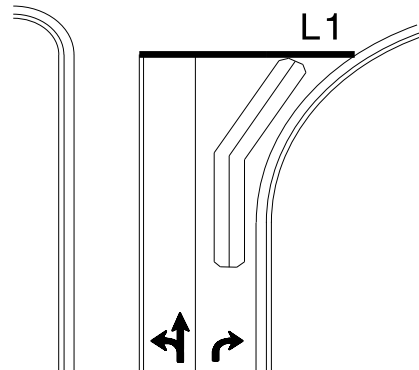


Shared Lane/
Wide Radius Turn

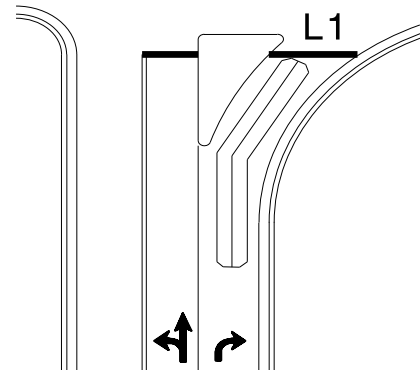
L1 = 6ft X 40ft Quadrupole loop
L2 = 6ft X 6ft [Minimum] Presence loop
Wired separately



Standard Turn

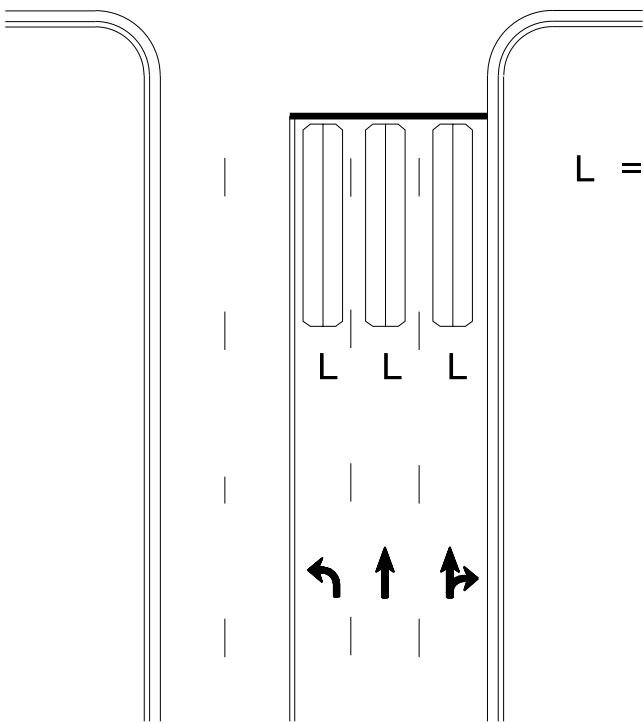


Wide Radius Turn



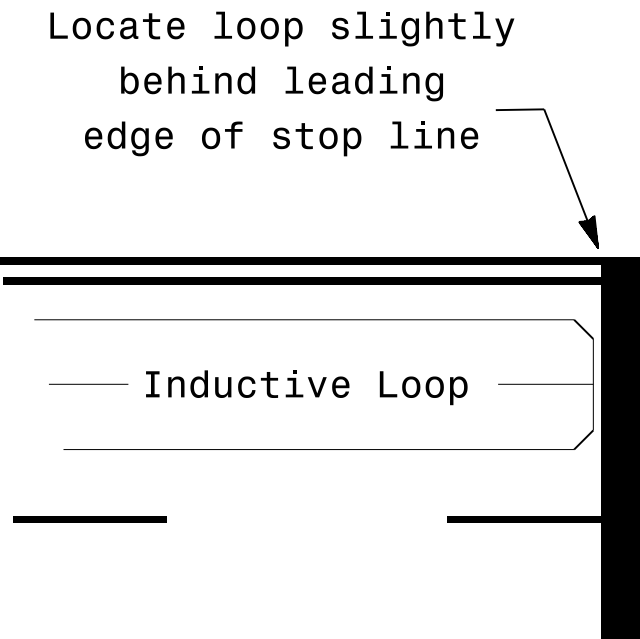
Channelized Turn

Side Street Detection



L = 6ft X 40ft
Quadrupole loop
Wired to separate
detectors/channels

Presence Loop Placement at Stop Lines



- Note:
Loop may be located in advance of stop line under any of the following conditions:
- stop line is greater than 15' from edge of intersecting roadway
 - loop detects a permissive or protected/permissive left turn
 - for an exclusive right turn lane

Recommended Number of Turns

Single 6' X 6' loop
(when wired separately):

Length of Lead-in ft	Number of Turns
< 250	3
250-375	4
375-525	5
> 525	6

Quadrupole loops: Use 2-4-2 turns

6' X 15' Loops:
Lead-in < 150', use 2 turns
Lead-in > 150', use 3 turns

Prepared In the Offices of:

TRANSPORTATION MOBILITY AND SAFETY DIVISION

DEPARTMENT OF TRANSPORTATION

SIGNAL DESIGN SECTION

750 N. Greenfield Pkwy, Garner, NC 27529

SCALE

N/A

Typical Signal Loop Locations

PLAN DATE: September 2025

PREPARED BY: J.A. Lohr

REVISIONS

INIT.

DATE

REVIEWED BY:

REVIEWED BY:

11/25/2025

DATE

SEAL

NORTH CAROLINA

PROFESSIONAL ENGINEER

ROBERT J. ZIEMBA

18084860274A484

SIG. INVENTORY NO.