DESIGN DATA				
Traffic	Average Daily			
Current	Pass: 12060	Trucks: 3980	Total: 16040	
Preventative Maintenance				

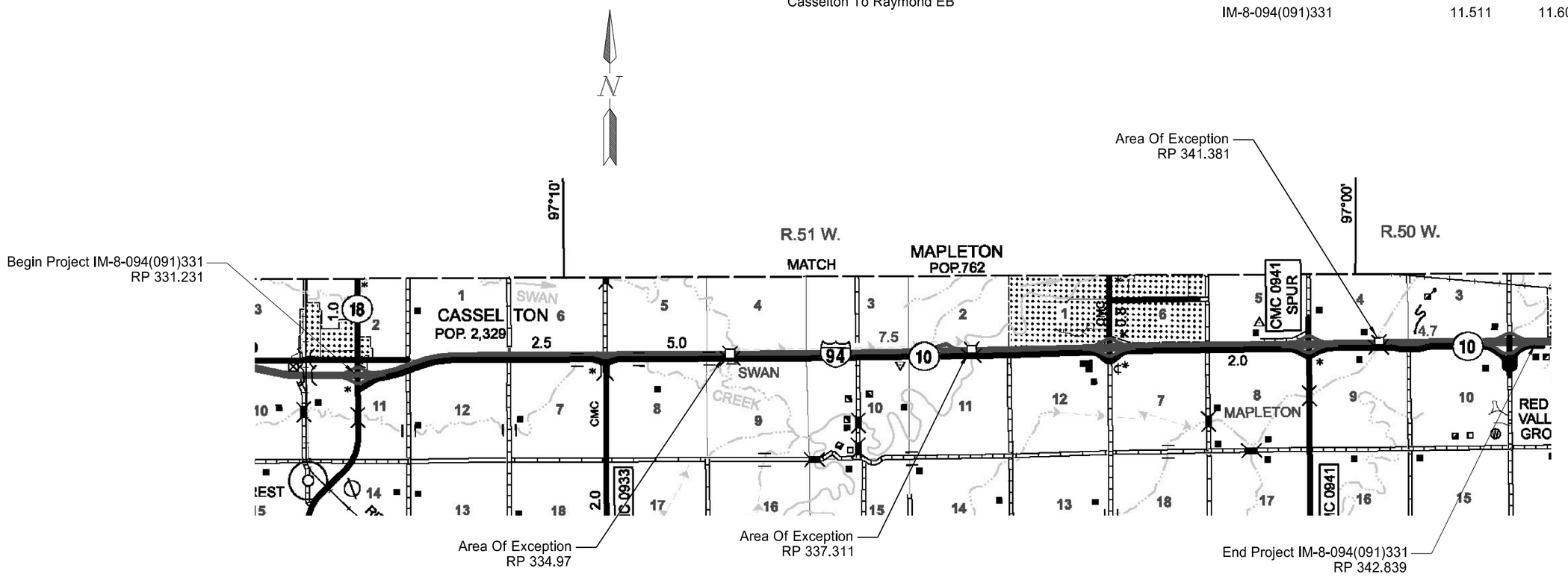
	STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
	ND	IM-8-094(091)331	21278	1	1

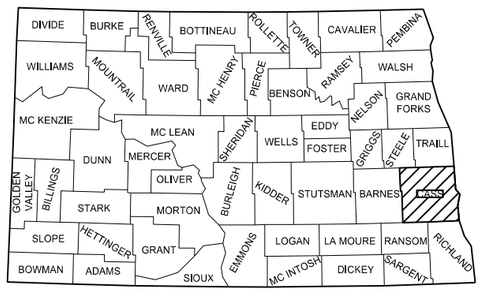
JOB # 36
NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

IM-8-094(091)331
Cass County
CPR-Shoulder Rehabilitation
Casselton To Raymond EB

GOVERNING SPECIFICATIONS:
2014 Standard Specifications adopted by the North Dakota Department of Transportation and the Supplemental Specifications effective on the date the project is advertised.

PROJECT NUMBER \ DESCRIPTION	NET MILES	GROSS MILES
IM-8-094(091)331	11.511	11.608





STATE COUNTY MAP

DESIGNERS

Justin Oss, P.E.

APPROVED DATE 2/8/16

Kevin Gorder, P.E.
Fargo District
ND DEPARTMENT OF TRANSPORTATION

I hereby certify that the attached plans were prepared by me or under my direct supervision and that I am a duly registered professional engineer under the laws of the state of ND.

APPROVED DATE 2/5/16

Justin Oss, P.E.
NDDOT DIV-DIST OR CONSULTANT FIRM

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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-8-094(091)331	2	1

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D-550-2	Longitudinal Joint Details
D-550-3	Transverse Contraction Joint Details
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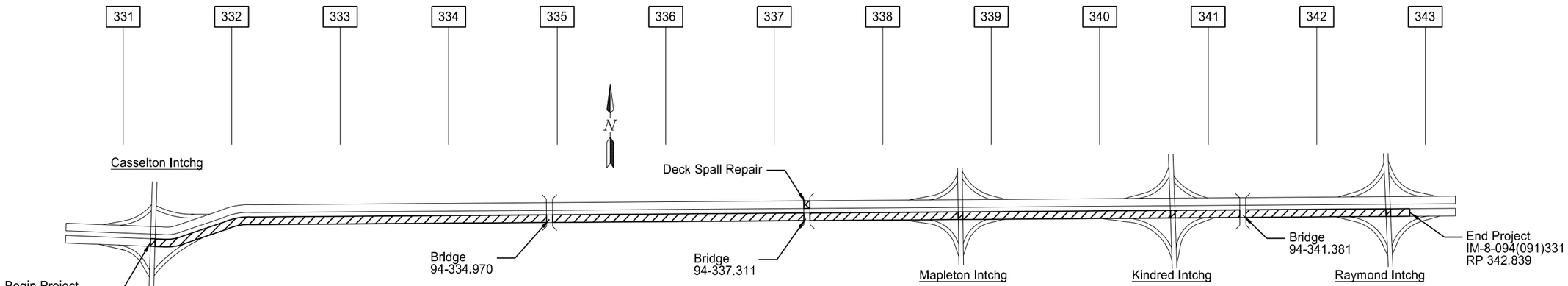
D-704-5	Construction Sign Detail
D-704-7	Breakaway Systems for Construction Zone Signs - Perforated Tube
D-704-8	Breakaway Systems for Construction Zone Signs - U-Channel Post
D-704-9	Construction Sign Details - Terminal and Guide Signs
D-704-10	Construction Sign Details - Regulatory Signs
D-704-11	Construction Sign Details - Warning Signs
D-704-12	Shoulder Closure Tapers
D-704-13	Barricade and Channelizing Device Details
D-704-14	Construction Sign Punching and Mounting Details
D-704-35	Sign Layout for One Lane Closure - Interstate System
D-760-1	Rumble Strips Interstate Highways
D-762-2	Interstate Pavement Marking 4 Lane Divided Highway

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(091)331	4	1



CPR Work/Shoulder Rehab

Deck Spalls

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Scope of Work
Casselton to Raymond EB I-94

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-8-094(091)331	6	1

NOTES

GENERAL NOTES

411-P01 MILLING PAVEMENT SURFACE: The shoulder rehabilitation consists of milling 1" of asphalt on the existing shoulders and overlaying one inch; reestablishing the tight butt joint between the asphalt shoulders and concrete mainline. All shoulder millings will become property of the contractor.

570-P01 CONCRETE PAVEMENT REPAIR: An additional 20% has been added to the quantities for CONCRETE PAVEMENT REPAIR – FULL DEPTH – DOWELED, DOWEL BARS, SPALL REPAIR – PARTIAL DEPTH, RANDOM PCC CRACK CLEANING AND SEALING, and CONC PVMT REPAIR-SPOT FULL DEPTH to be used as directed by the engineer.

570-P02 CONCRETE PAVEMENT REPAIRS: Use Salvaged Base Course to repair areas where existing base material is removed with the concrete. Place base course so that the base layer is level and uniform. Restoring the grade and edgedrain, if impacted, will not be paid separately, but will be included in 570 bid items.

570-P03 CONCRETE PAVEMENT REPAIR – SPOT FULL DEPTH: The spot full depth repairs for all pavement thicknesses will be paid for under the bid item CONC PVMT REPAIR – SPOT FULL DEPTH.

650-P01 DECK SPALL REPAIR: The work in the WB lane of I-94 consists of two deck spall repairs on the Maple River Structure at RP 337.335, as shown in the detail sheets. The removal requirements for the west spall shall conform to Class 4 as per NDDOT Spec 650.04 B.5. The class of removal for the east spall shall be determined in the field by the engineer. Concrete placement and curing procedures will follow 650.03 B on the east repair. The NDDOT AE3 concrete mix design that is approved for the full depth repairs will be used on the class 4 repair.
The contractor will be required to contain all spall removal material. The type of containment system utilized shall prevent any material from falling into the Maple River system. All work associated with containing, removing and disposing deck spall material shall be included in the unit bid price for DECK SPALL REPAIR.

704-P01 TRAFFIC CONTROL DEVICES: The traffic control devices list has been developed using the following layouts on the Standard Drawing for traffic control:
D-704-35, for one lane closure on the Interstate System

The required traffic control signs and devices for two interstate lane closures (one in each direction) will be measured and paid for at the Contract Unit Price for each device. Lane closures will be limited to 6 miles. Quantities are based on a 6 Mile closure (two will be required) for EB I-94 and for the length of the Maple River structure on WB for the deck spall repair. All costs associated with relocating the lane closures between sites, phases, and additional devices required to accommodate the contractor's operation, shall be at the contractor's expense.

704-P02 MAINTENANCE & PROTECTION OF TRAFFIC FOR CONCRETE PAVEMENT REPAIRS: In full depth removal areas vertical panels shall be spaced at 10 feet on centerline roadway until the concrete has been replaced. A minimum of two vertical panels shall be used at each full depth removal area.

Type I Barricades shall be placed in front of each open area or as directed by the Engineer. The barricades shall not encroach onto the traffic lane.

The concrete pavement repairs and striping must be completed for the entire length of one lane closure before starting any work in the adjacent lane or next phase.

704-P03 CONSTRUCTION TRAFFIC: The contractor's construction traffic required for concrete pavement repair shall be limited to access at interchanges only. Construction traffic will not be permitted to operate in the median nor will access from one roadway to the other roadway, through the median, be permitted.

762-P01 PERMANENT STRIPING: All permanent striping shall be along the same alignment and offset as the existing striping to ensure all existing striping is obliterated. Any existing striping remaining after the grooving operation for permanent striping has been completed shall be obliterated at the contractor's expense. All labor, materials, and equipment used to install new centerline striping in this manner shall be included in the unit bid price for "PREFORMED PATTERNED PVMT MK 4IN LINE – GROOVED."

ESTIMATE OF QUANTITIES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-8-094(091)331	8	1

SPEC	CODE	ITEM DESCRIPTION	UNIT	MAINLINE	TOTAL
103	0100	CONTRACT BOND	L SUM	1	1
411	0105	MILLING PAVEMENT SURFACE	SY	16,616	16,616
430	0500	COMMERCIAL GRADE HOT MIX ASPHALT	TON	920	920
570	0240	DOWELED CONTRACTION JOINT ASSEMBLY	LF	1,040	1,040
570	0424	DOWEL BARS	EA	1,483	1,483
570	0700	CONC PVMT REPAIR-SPOT FULL DEPTH	SF	673	673
570	0709	11IN CONCRETE PAVEMENT REPAIR-FULL DEPTH-DOWELED	SY	98	98
570	0710	10IN CONC PVMT REPAIR-FULL DEPTH-DOWELED	SY	750	750
570	0713	8IN CONCRETE PAVEMENT REPAIR-FULL DEPTH-DOWELED	SY	1,052	1,052
570	0966	RANDOM PCC CRACK CLEANING & SEALING	LF	406	406
570	1512	SPALL REPAIR-PARTIAL DEPTH	SF	1,822	1,822
650	0805	DECK SPALL REPAIR	SF	42	42
702	0100	MOBILIZATION	L SUM	1	1
704	0100	FLAGGING	MHR	500	500
704	1000	TRAFFIC CONTROL SIGNS	UNIT	2,326	2,326
704	1050	TYPE I BARRICADE	EA	20	20
704	1052	TYPE III BARRICADE	EA	8	8
704	1060	DELINEATOR DRUMS	EA	57	57
704	1067	TUBULAR MARKERS	EA	230	230
704	1081	VERTICAL PANELS-BACK TO BACK	EA	50	50
704	1087	SEQUENCING ARROW PANEL-TYPE C	EA	2	2
760	0005	RUMBLE STRIPS - ASPHALT SHOULDER	MILE	23.216	23.216
762	1104	PVMT MK PAINTED 4IN LINE	LF	122,538	122,538
762	1305	PREFORMED PATTERNED PVMT MK 4IN LINE-GROOVED	LF	15,318	15,318

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-8-094(091)331	10	1

BASIS OF ESTIMATE

Permanent Pavement Marking

EB 331.231 to 342.835		
Type	Basis	Quantity (LF)
CL - Preformed Patterned Pvmt MK 4IN Line - Grooved	Skips @ 1,320 LF/MI	15,318
Edgelines - Pvmt MK Painted 4IN Line	10,560LF/MI/ Direction	122,538

CPR Data

Pav. Thickness	FULL DEPTH(SY)	SPOT FULL DEPTH (SF)
11"	82	489
10"	625	72
8"	877	0
20%	1901.6	672.9

	DB (EA)	BASKET (LF)	SPALL (SF)	RC (LF)
	1,236	866	1,518	338
20%	1483	1040	1822	406

Shoulder Rehab/Milling

Begin RP	End RP	length	LT shoulder width	RT shoulder width	Area (SF)
331.824	332.132	1626.24	4	10	22767.36
332.132	332.351	1156.32	2	8	11563.2
332.351	332.468	617.76	4	10	8648.64
332.468	332.709	1272.48	2	8	12724.8
332.709	332.826	617.76	4	10	8648.64
332.826	333.155	1737.12	2	8	17371.2
333.155	333.519	1921.92	4	10	26906.88
334.118	334.323	1082.4	4	10	15153.6
334.499	334.812	1652.64	2	8	16526.4
334.812	334.937	660	4	10	9240
		thickness:	HBP: (Tons)	Total: (SF)	149,550.72
		0.083	**919.46**	Total: (SY)	16,616.75

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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(091)331	11	1

Reference Point	Dist. From RP (FT)	Lane	Full Depth Repair (ft) Length	X	Width	SY	Dowel Bars	Doweled Contr. Joint Assembly (LF)	Spall Repair (ft) Length	X	Width	SF	Random Cracks (LF)	Comments
331.231	1220	BOTH		X		0				X		-		SKEWED JOINTS TO 331.990
331.231	1220	PL		X		0			2	X	2	4		WHEEL PATH
331.251	1325	DL		X		0			2	X	2	4		WHEEL PATH
331.252	1331	DL		X		0			2	X	2	4		CORNER BREAK
331.252	1331	DL		X		0			2	X	2	4		WHEEL PATH
331.312	1647	DL		X		0			3	X	2	6		LONG JOINT CORNER BREAK
331.329	1737	DL		X		0			2	X	2	4		WHEEL PATH
331.331	1748	DL		X		0			2	X	2	4		WHEEL PATH
331.337	1779	PL		X		0			2	X	2	4		WHEEL PATH
331.337	1779	DL		X		0			2	X	2	4		WHEEL PATH
331.517	2730	RAMP		X		0				X		-	8	RAMP
331.587	3099	DL		X		0			2	X	2	4	4	CORNER BREAK
331.667	3522	PL		X		0			2	X	2	4		CORE HOLE
331.719	3796	DL		X		0			2	X	2	4		CORNER BREAK
331.790	4171	PL		X		0			2	X	2	4		CORNER BREAK
331.831	4388	DL		X		0			2	X	2	4		WHEEL PATH
331.831	4388	PL		X		0			2	X	2	4		WHEEL PATH
331.918	4847	PL	4	X	3.5	2	12		3.5	X	3.5	12		SPOT FULL
331.953	5032	DL		X		0			2	X	2	4		MID PANNEL
331.990	5227	BOTH		X		0				X		-		STRAIGHT JOINTS TO 333.028
Subtotals						**2**	**12**	**0**				**78**	**12**	**SUBTOTALS FOR MP 331**
332.021	111	DL	6	X	12	8	20			X		-		REPLACE TRANS JOINT
332.058	306	DL	6	X	12	8	20			X		-		REPLACE TRANS JOINT
332.058	306	PL	6	X	12	8	20			X		-		REPLACE TRANS JOINT
332.123	649	DL	6	X	12	8	20			X		-		REPLACE TRANS JOINT
332.189	998	PL		X		0			4	X	2	8		CORNER BREAK
332.379	2001	DL	6	X	12	8	20			X		-		REPLACE TRANS JOINT
332.379	2001	PL	6	X	12	8	20			X		-		SPOT FULL
332.420	2218	DL		X		0			2	X	2	4		CORNER BREAK
332.469	2476	DL	66	X	14	103	20	70		X		-		LONG JOINT REPLACEMENT
332.472	2492	PL	6	X	14	9	20			X		-		REPLACE TRANS JOINT
332.584	3084	DL	126	X	14	196	20	126		X		-		LONG JOINT REPLACEMENT
332.584	3084	PL	6	X	14	9	20			X		-		REPLACE TRANS JOINT
332.593	3131	PL		X		0			2	X	2	4		WHEEL PATH
332.612	3231	PL		X		0			2	X	2	4		WHEEL PATH
332.617	3258	PL		X		0			3	X	2	6		CORNER BREAK
332.619	3268	DL		X		0				X		-	8	ROUTE AND SEAL
332.632	3337	DL		X		0				X		-	30	ROUTE AND SEAL
332.639	3374	DL	366	X	12	488	20	300		X		-		BIG REPAIR
332.660	3485	PL		X		0				X		-	15	ROUTE AND SEAL
332.702	3707	PL		X		0			2	X	2	4		CORNER BREAK
332.715	3775	DL		X		0				X		-	10	ROUTE AND SEAL
332.727	3839	PL	6	X	12	8	20			X		-		SPOT FULL CORNER BREAK
332.753	3976	DL		X		0			3	X	2	6		CORNER BREAK
332.761	4018	PL	6	X	12	8	20			X		-		SPOT FULL CORNER BREAK
332.761	4018	PL		X		0			2	X	2	4		CORNER BREAK
332.761	4018	DL	6	X	12	8	20			X		-		SPOT FULL CORNER BREAK
332.784	4140	DL	6	X	12	8	20			X		-		SPOT FULL TRANS
332.795	4198	DL	6	X	12	8	20			X		-		SPOT FULL TRANS
332.811	4282	DL		X		0				X		-	15	ROUTE AND SEAL
332.818	4319	DL		X		0			2	X	2	4		CORNER BREAK
332.829	4377	DL	66	X	6	44	10	30		X		-		LONG JOINT REPLACEMENT
332.838	4425	DL	21	X	14	33	20	28		X		-		FULL PANEL
332.846	4467	DL		X		0				X		-	25	ROUTE AND SEAL
332.864	4562	DL		X		0			4	X	2	8		CORNER BREAK
332.915	4831	DL		X		0			2	X	2	4		WHEEL PATH
332.915	4831	DL		X		0			2	X	2	4		WHEEL PATH
Subtotals						**970**	**350**	**554**				**60**	**103**	**SUBTOTALS FOR MP 332**
333.028	148	BOTH		X		0				X		-		SKEWED JOINTS TO 333.156
333.030	158	DL	6	X	14	9	20			X		-		TRANS JOINT REPAIR
333.030	158	PL		X		0			2	X	2	4		CORNER BREAK
333.063	333	PL	3.5	X	3.5	1	12			X		-		SPOT FULL CORNER BREAK
333.111	586	PL		X		0			2	X	2	4		CORNER BREAK
333.147	776	DL		X		0			2	X	2	4		CORNER BREAK
333.147	776	PL		X		0			2	X	2	4		WHEEL PATH
333.156	824	BOTH												STRAIGHT JOINTS TO 333.508
333.158	834	PL		X		0			2	X	2	4		CORNER BREAK
333.158	834	DL		X		0			2	X	2	4		WHEEL PATH
333.187	987	DL		X		0			2	X	2	4		WHEEL PATH
333.201	1061	DL	3.5	X	3.5	1	12					-		SPOT FULL CORNER BREAK
333.201	1061	DL	3.5	X	3.5	1	12			X		-		SPOT FULL CORNER BREAK
333.201	1061	PL	3.5	X	3.5	1	12			X		-		SPOT FULL CORNER BREAK
333.329	1737	DL		X		0				X		-	15	ROUTE AND SEAL
333.331	1748	DL	3.5	X	5	2	12			X		-		SPOT FULL WHEEL PATH
333.452	2387	DL		X		0			2	X	3	6		WHEEL PATH
333.508	2682	BOTH												SKEWED JOINTS TO 334.494
333.563	2973	DL		X		0			2	X	2	4		MID PANEL
333.569	3004	PL	6	X	12	8	20			X		-		SPOT FULL WHEEL PATH
333.600	3168	DL		X		0			2	x	2	4		WHEEL PATH
333.615	3247	DL		X		0			2	X	2	4		CORNER BREAK
333.673	3553	DL		X		0			2	X	3	6		WHEEL PATH
333.687	3627	DL	6	X	12	8	20			X		-		SPOT FULL CORNER BREAK

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East Bound
Data Table
RP 331.231 to RP 333.687

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-8-094(091)331	11	2

Reference Point	Dist. From RP (FT)	Lane	Full Depth Repair (ft) Length	X	Width	SY	Dowel Bars	Doweled Contr. Joint Assembly (LF)	Spall Repair (ft) Length	X	Width	SF	Random Cracks (LF)	Comments
333.714	3770	DL	21	X	12	28	20	24		X		-		FULL PANEL
333.719	3796	PL		X		0			2	X	2	4		CORNER BREAK
333.719	3796	PL		X		0			2	X	2	4		WHEEL PATH
333.841	4440	DL		X		0			2	X	2	4		CORNER BREAK
333.841	4440	DL		X		0			2	X	2	4		CORNER BREAK
333.841	4440	PL		X		0			2	X	2	4		WHEEL PATH
333.852	4499	DL	6	X	12	8	20			X		-		SPOT FULL WHEEL PATH
333.872	4604	DL		X		0			2	X	2	4		CORNER BREAK
333.900	4752	DL		X		0			2	X	2	4		CORNER BREAK
333.928	4900	DL		X		0			2	X	2	4		WHEEL PATH
333.928	4900	PL	6	X	12	8	20			X		-		TRANS JOINT REPAIR
333.943	4979	PL	6	X	12	8	20			X		-		TRANS JOINT REPAIR
333.957	5053	DL		X		0			2	X	2	4		WHEEL PATH
333.957	5053	PL		X		0			2	X	2	4		WHEEL PATH
333.983	5190	DL		X		0			2	X	2	4		WHEEL PATH
Subtotals						**85**	**200**	**24**				**96**	**15**	**SUBTOTALS FOR MP 333**
334.072	380	DL		X		0			2	X	2	4		WHEEL PATH
334.092	486	DL		X		0			2	X	2	4		CORNER BREAK
334.092	486	PL		X		0			2	X	2	4		WHEEL PATH
334.104	549	DL		X		0			2	X	2	4		CORNER BREAK
334.115	607	PL	6	X	12	8	20			X		-		TRANS JOINT REPAIR
334.380	2006	DL		X		0			2	X	2	4		CORNER BREAK
334.494	2608	BOTH												STRAIGHT JOINTS TO 334.961
334.505	2666	PL		X		0			2	X	4	8		CORNER BREAK
334.563	2973	DL		X		0			2	X	2	4		CORNER BREAK
334.586	3094	DL	3.5	X	3.5	1	12			X		-		SPOT FULL CORNER BREAK
334.585	3089	DL		X		0				X		-	30	ROUTE AND SEAL
334.607	3205	DL		X		0			2	X	2	4		WHEEL PATH
334.607	3205	DL		X		0			2	X	2	4		WHEEL PATH
334.622	3284	DL		X		0			2	X	2	4		HUGE CORE HOLES
334.622	3284	DL		X		0			2	X	2	4		HUGE CORE HOLES
334.630	3326	DL		X		0			2	X	2	4		CORNER BREAK
334.630	3326	DL		X		0			2	X	4	8		WHEEL PATH
334.688	3633	PL		X		0			2	X	2	4		WHEEL PATH
334.713	3765	DL		X		0			2	X	2	4		WHEEL PATH
334.713	3765	PL		X		0			2	X	2	4		WHEEL PATH
334.715	3775	DL		X		0			2	X	2	4		CORNER BREAK
334.717	3786	DL		X		0			2	X	2	4		CORNER
334.724	3823	PL		X		0			2	X	2	4		WHEEL PATH
334.749	3955	PL		X		0			2	X	2	4		WHEEL PATH
334.749	3955	DL		X		0			2	X	2	4		WHEEL PATH
334.756	3992	PL		X		0			2	X	2	4		WHEEL PATH
334.775	4092	DL		X		0			2	X	2	4		WHEEL PATH
334.781	4124	DL		X		0			2	X	6	12		WHEEL PATH
334.798	4213	PL		X		0			2	X	2	4		CORNER BREAK
334.804	4245	DL		X		0			2	X	2	4		WHEEL PATH
334.841	4440	PL		X		0			2	X	2	4		WHEEL PATH
334.841	4440	DL		X		0			2	X	2	4		WHEEL PATH
334.853	4504	PL		X		0			2	X	2	4		CORNER BREAK
334.869	4588	DL	6	X	12	8	20			X		-		SPOT FULL WHEEL PATH
334.872	4604	DL		X		0			2	X	2	4		MID PANEL
334.872	4604	PL		X		0			2	X	2	4		CORNER BREAK
334.872	4604	PL		X		0			2	X	2	4		CORNER BREAK
334.924	4879	DL		X		0			2	X	2	4		WHEEL PATH
334.924	4879	PL		X		0			2	X	4	8		WHEEL PATH
334.955	5042	DL	6	X	12	8	20			X		-		MID PANEL
334.955	5042	PL		X		0				X		-	12	ROUTE AND SEAL
334.961	5074	BOTH												SKEWED JOINTS TO 338.578
334.970	5122	BOTH		X		0				X		-		EXCEPTION TO 334.994
Subtotals						**25**	**72**	**0**				**156**	**42**	**SUBTOTALS FOR MP 334**
335.018	95	DL	6	X	12	8	20			X		-		MID PANEL
335.018	95	PL	6	X	16	11	20			X		-		MID PANEL
335.018	95	SHOULDER	6	X	10	7				X		-		MID PANEL

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East Bound
Data Table
RP 333.714 to RP 335.018

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(091)331	11	3

Reference Point	Dist. From RP (FT)	Lane	Full Depth Repair (ft) Length	X	Width	SY	Dowel Bars	Doweled Contr. Joint Assembly (LF)	Spall Repair (ft) Length	X	Width	SF	Random Cracks (LF)	Comments
335.029	153	DL		X		0			2	X	2	4		MID PANEL
335.029	153	DL		X		0				X		-	15	ROUTE AND SEAL
335.059	312	DL		X		0			2	X	2	4		WHEEL PATH
335.080	422	DL		X		0			2	X	2	4		WHEEL PATH
335.090	475	DL		X		0			2	X	2	4		WHEEL PATH
335.114	602	DL		X		0			2	X	2	4		WHEEL PATH
335.116	612	DL		X		0			2	X	2	4		WHEEL PATH
335.129	681	DL		X		0				X		-	12	ROUTE AND SEAL
335.156	824	PL		X		0			2	X	2	4		WHEEL PATH
335.160	845	DL		X		0			2	X	2	4		WHEEL PATH
335.162	855	DL		X		0			2	X	2	4		CORNER BREAK
335.191	1008	DL		X		0			2	X	2	4		CORNER BREAK
335.193	1019	DL		X		0			2	X	2	4		CORNER BREAK
335.193	1019	DL		X		0			2	X	2	4		WHEEL PATH
335.211	1114	DL		X		0			2	X	2	4		CORNER BREAK
335.222	1172	DL		X		0			2	X	3	6		WHEEL PATH
335.233	1230	DL		X		0			2	X	3	6		WHEEL PATH
335.233	1230	SHOULDER		X		0			2	X	2	4		CORNER
335.302	1595	DL		X		0			2	X	2	4		WHEEL PATH
335.322	1700	DL		X		0			2	X	2	4		CORNER BREAK
335.339	1790	DL		X		0			2	X	2	4		WHEEL PATH
335.353	1864	DL		X		0			2	X	2	4		WHEEL PATH
335.383	2022	PL		X		0			2	X	3	6		WHEEL PATH
335.383	2022	PL		X		0			2	X	2	4		CORNER BREAK
335.396	2091	PL		X		0			2	X	2	4		CORNER BREAK
335.399	2107	PL		X		0			2	X	2	4		CORNER BREAK
335.399	2107	DL		X		0			2	X	4	8		CORNER BREAK
335.402	2123	DL		X		0			2	X	2	4		WHEEL PATH
335.425	2244	DL		X		0			2	X	2	4		WHEEL PATH
335.502	2651	PL		X		0			2	X	3	6		CORNER BREAK
335.502	2651	DL		X		0			2	X	2	4		CORNER BREAK
335.543	2867	DL		X		0			2	X	2	4		CORNER BREAK
335.545	2878	PL		X		0			2	X	2	4		WHEEL PATH
335.556	2936	PL		X		0			2	X	2	4		WHEEL PATH
335.556	2936	PL		X		0			2	X	2	4		WHEEL PATH
335.556	2936	DL		X		0			2	X	2	4		WHEEL PATH
335.576	3041	DL		X		0			2	X	2	4		CORNER BREAK
335.599	3163	DL		X		0			2	X	2	4		WHEEL PATH
335.628	3316	DL		X		0			2	X	2	4		WHEEL PATH
335.639	3374	DL		X		0			2	X	2	4		CORNER BREAK
335.639	3374	DL		X		0			2	X	2	4		WHEEL PATH
335.642	3390	DL		X		0			2	X	2	4		WHEEL PATH
335.653	3448	DL		X		0			2	X	4	8		WHEEL PATH
335.721	3807	DL		X		0			2	X	2	4		CORNER BREAK
335.736	3886	DL		X		0			2	X	2	4		WHEEL PATH
335.736	3886	DL		X		0			2	X	2	4		WHEEL PATH
335.856	4520	DL		X		0			2	X	2	4		WHEEL PATH
335.890	4699	DL		X		0			2	X	2	4		CORNER BREAK
335.938	4953	DL		X		0			2	X	2	4		CORNER BREAK
335.955	5042	DL		X		0			2	X	2	4		WHEEL PATH
335.975	5148	DL		X		0			2	X	2	4		WHEEL PATH
335.991	5232	PL	21	X	12	28	20	24		X		-		FULL PANEL
Subtotals						**53**	**60**	**24**				**212**	**27**	**SUBTOTALS FOR MP 335**
336.017	90	DL		X		0			2	X	2	4		WHEEL PATH
336.084	444	PL		X		0			2	X	2	4		WHEEL PATH
336.091	480	DL		X		0			2	X	2	4		WHEEL PATH
336.138	729	PL		X		0			2	X	2	4		CORNER BREAK
336.212	1119	DL		X		0			2	X	2	4		CORNER BREAK
336.212	1119	DL		X		0			2	X	2	4		CORNER BREAK
336.212	1119	DL		X		0			2	X	2	4		CORNER BREAK
336.372	1964	DL		X		0			2	X	2	4		CORNER BREAK
336.372	1964	PL		X		0			2	X	2	4		WHEEL PATH
336.390	2059	DL		X		0			2	X	2	4		CORNER BREAK
336.489	2582	DL		X		0			2	X	2	4		WHEEL PATH
336.514	2714	DL		X		0			2	X	2	4		CORNER BREAK
336.514	2714	PL		X		0			2	X	2	4		CORNER BREAK
336.549	2899	PL		X		0			2	X	2	4		WHEEL PATH
336.579	3057	DL		X		0			2	X	2	4		CORNER BREAK

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East Bound
Data Table
RP 335.029 to RP 336.579

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-8-094(091)331	11	4

Reference Point	Dist. From RP (FT)	Lane	Full Depth Repair (ft) Length	X	Width	SY	Dowel Bars	Doweled Contr. Joint Assembly (LF)	Spall Repair (ft) Length	X	Width	SF	Random Cracks (LF)	Comments
336.579	3057	DL		X		0			2	X	2	4		CORNER BREAK
336.641	3384	DL		X		0			2	X	2	4		WHEEL PATH
336.652	3443	DL		X		0			2	X	2	4		WHEEL PATH
336.672	3548	DL		X		0			2	X	2	4		WHEEL PATH
336.683	3606	DL		X		0			2	X	2	4		WHEEL PATH
336.710	3749	DL		X		0			2	X	2	4		WHEEL PATH
336.716	3780	DL		X		0			2	X	4	8		WHEEL PATH
336.769	4060	PL	6	X	12	8	20			X		-		SPOT FULL CORNER BREAK
336.835	4409	DL		X		0			2	X	2	4		WHEEL PATH
336.876	4625	DL		X		0			2	X	2	4		CORNER BREAK
336.931	4916	DL		X		0			2	X	2	4		WHEEL PATH
336.971	5127	DL		X		0			2	X	2	4		CORNER BREAK
336.971	5127	DL		X		0			2	X	2	4		CORNER BREAK
336.971	5127	DL		X		0			2	X	2	4		WHEEL PATH
336.996	5259	PL		X		0			2	X	2	4		CORNER BREAK
336.996	5259	PL		X		0			2	X	2	4		CORNER BREAK
Subtotals						**8**	**20**	**0**				**124**	**0**	**SUBTOTAL FOR MILE 336**
337.025	132	DL		X		0			2	X	2	4		CORNER BREAK
337.025	132	PL		X		0			2	X	2	4		CORNER BREAK
337.027	143	DL		X		0			2	X	2	4		WHEEL PATH
337.137	723	DL		X		0			2	X	2	4		CORNER BREAK
337.150	792	PL		X		0			2	X	2	4		WHEEL PATH
337.150	792	PL		X		0			2	X	2	4		WHEEL PATH
337.156	824	PL		X		0			2	X	2	4		WHEEL PATH
337.180	950	DL		X		0			2	X	2	4		WHEEL PATH
337.215	1135	PL		X		0			2	X	2	4		CORNER BREAK
337.219	1156	PL		X		0			2	X	2	4		WHEEL PATH
337.226	1193	DL		X		0			2	X	2	4		WHEEL PATH
337.289	1526	DL	21	X	12	28	20	24		X		-		FULL PANEL
337.311	1642	BOTH												EXCEPTION TO 337.363
337.359	1896	DL		X		0				X		-	35	APPROACH SLAB
337.363	1917	PL	6	X	12	8	20			X		-		SPOT FULL APPROACH SLAB
337.364	1922	DL	6	X	12	8	20			X		-		MID PANEL
337.366	1932	PL	6	X	12	8	20			X		-		SPOT FULL WHEEL PATH
337.375	1980	DL		X		0			2	X	2	4		CORNER BREAK
337.378	1996	DL		X		0				X		-	12	ROUTE AND SEAL
337.389	2054	PL		X		0			2	X	2	4		WHEEL PATH
337.406	2144	DL		X		0			2	X	2	4		WHEEL PATH
337.406	2144	PL		X		0			2	X	2	4		WHEEL PATH
337.520	2746	DL		X		0			2	X	2	4		WHEEL PATH
337.555	2930	PL		X		0			2	X	2	4		WHEEL PATH
337.555	2930	DL		X		0			2	X	2	4		WHEEL PATH
337.584	3084	DL		X		0			2	X	2	4		CORNER BREAK
337.636	3358	SHOULDER		X		0			4	X	2	8		4' SHOULDER
337.667	3522	DL		X		0			2	X	2	4		WHEEL PATH
337.670	3538	PL		X		0			2	X	2	4		CORNER BREAK
337.670	3538	SHOULDER		X		0			4	X	2	8		4' SHOULDER
337.706	3728	DL	6	X	12	8	20			X		-		SPOT FULL WHEEL PATH
337.733	3870	DL		X		0			2	X	2	4		MID PANEL
337.734	3876	PL		X		0			2	X	2	4		WHEEL PATH
337.963	5085	DL		X		0			2	X	2	4		WHEEL PATH
337.996	5259	DL		X		0			2	X	2	4		WHEEL PATH
SUBTOTAL						**60**	**100**	**24**				**116**	**47**	**SUBTOTAL FOR MILE 337**
338.061	322	DL		X		0			2	X	2	4		CORNER BREAK
338.075	396	DL	21	X	12	28	20	24		X		-		FULL DEPTH ONE STRAIGHT JOINT ONE SKEWED
338.212	1119	PL		X		0			2	X	2	4		WHEEL PATH
338.212	1119	PL		X		0			2	X	2	4		CORNER BREAK
338.212	1119	SHOULDER		X		0			2	X	2	4		4' SHOULDER
338.250	1320	PL		X		0			2	X	2	4		CORNER BREAK
338.383	2022	DL		X		0			2	X	2	4		CORNER BREAK
338.383	2022	SHOULDER		X		0			2	X	2	4		10' SHOULDER
338.388	2049	PL		X		0			2	X	2	4		MID PANEL
338.435	2297	DL		X		0			2	X	2	4		CORNER BREAK
338.472	2492	PL		X		0			2	X	2	4		CORNER BREAK
338.578	3052	BOTH												SLIGHT SKEWED JOINTS TO 342.839
338.579	3057	PL	6	X	12	8	20			X		-		SPOT FULL CORNER BREAK
338.610	3221	DL	6	X	12	8	20			X		-		MID PANEL
338.610	3221	PL		X		0				X		-	16	ROUTE AND SEAL

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East Bound
Data Table
RP 336.579 to RP 338.610

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-8-094(091)331	11	5

Reference Point	Dist. From RP (FT)	Lane	Full Depth Repair (ft) Length	X	Width	SY	Dowel Bars	Doweled Contr. Joint Assembly (LF)	Spall Repair (ft) Length	X	Width	SF	Random Cracks (LF)	Comments
338.612	3231	DL		X		0			2	X	2	4		CORNER BREAK
338.622	3284	DL		X		0			2	X	2	4		CORNER BREAK
338.685	3617	PL	21	X	16	37	20	24		X		-		FULL PANEL
338.685	3617	DL	21	X	12	28	20	24		X		-		FULL PANEL
338.746	3939	PL		X		0			2	X	2	4		CORNER BREAK
338.759	4008	DL		X		0			2	X	2	4		WHEEL PATH
338.764	4034	DL		X		0			2	X	2	4		CORNER BREAK
338.772	4076	DL		X		0			2	X	2	4		CORNER BREAK
338.838	4425	SHOULDER		X		0			2	X	2	4		10' SHOULDER
338.838	4425	DL	6	X	12	8	20			X		-		CORNER BREAK
338.893	4715	DL		X		0			2	X	2	4		CORNER BREAK
338.922	4868	DL		X		0			2	X	2	4		CORNER BREAK
338.984	5196	DL		X		0			2	X	2	4		CORNER BREAK
338.996	5259	DL		X		0			2	X	2	4		CORNER BREAK
338.996	5259	DL		X		0			2	X	2	4		CORNER BREAK
SUBTOTAL						**117**	**120**	**72**				**88**	**16**	**SUBTOTAL FOR MILE 338**
339.011	58	DL		X		0			2	X	2	4		CORNER BREAK
339.014	74	DL		X		0			4	X	2	8		CORNER BREAK
339.046	243	DL		X		0			2	X	2	4		CORNER BREAK
339.145	766	DL		X		0			2	X	2	4		CORNER BREAK
339.174	919	DL		X		0			2	X	2	4		CORNER BREAK
339.174	919	DL		X		0			2	X	2	4		WHEEL PATH
339.174	919	PL		X		0			2	X	8	16		WHEEL PATH
339.309	1632	DL		X		0			2	X	2	4		WHEEL PATH
339.309	1632	DL		X		0			2	X	2	4		CORNER BREAK
339.321	1695	DL		X		0			2	X	2	4		CORNER BREAK
339.338	1785	PL		X		0			2	X	2	4		WHEEL PATH
339.371	1959	PL		X		0			2	X	2	4		WHEEL PATH
339.406	2144	DL		X		0			2	X	2	4		CORNER BREAK
339.502	2651	DL		X		0			2	X	2	4		CORNER BREAK
339.523	2761	DL		X		0			2	X	2	4		CORNER BREAK
339.566	2988	DL		X		0			2	X	2	4		CORNER BREAK
339.588	3105	DL		X		0			4	X	2	8		CORNER BREAK
339.665	3511	PL		X		0			2	X	2	4		WHEEL PATH
339.665	3511	SHOULDER		X		0			2	X	2	4		4' SHOULDER
339.726	3833	DL		X		0			2	X	2	4		CORNER BREAK
339.745	3934	DL		X		0			2	X	2	4		CORNER BREAK
339.851	4493	DL		X		0			2	X	2	4		CORNER BREAK
339.884	4668	DL		X		0			2	X	2	4		CORNER BREAK
339.911	4810	DL		X		0			2	X	2	4		CORNER BREAK
339.911	4810	DL		X		0			2	X	2	4		CORNER BREAK
339.952	5027	DL		X		0			2	X	2	4		CORNER BREAK
339.952	5027	DL		X		0			2	X	2	4		CORNER BREAK
339.986	5206	DL		X		0			2	X	2	4		CORNER BREAK
SUBTOTAL						**0**	**0**	**0**				**132**	**0**	**SUBTOTAL FOR MILE 339**
340.078	412	DL		X		0			2	X	4	8		CORNER BREAK
340.104	549	DL		X		0			2	X	2	4		CORNER BREAK
340.137	723	PL	6	X	12	8	20			X		-		SPOT FULL CORNER BREAK
340.137	723	DL	6	X	12	8	20			X		-		SPOT FULL CORNER BREAK
340.189	998	DL		X		0			2	X	2	4		CORNER BREAK
340.189	998	DL		X		0			2	X	2	4		CORNER BREAK
340.220	1162	DL		X		0			2	X	2	4		CORNER BREAK
340.259	1368	DL		X		0			2	X	2	4		CORNER BREAK
340.259	1368	DL		X		0			2	X	2	4		CORNER BREAK
340.277	1463	DL		X		0			2	X	2	4		CORNER BREAK
340.301	1589	DL		X		0			2	X	2	4		CORNER BREAK
340.311	1642	DL		X		0			2	X	2	4		CORNER BREAK
340.334	1764	DL		X		0			2	X	2	4		CORNER BREAK
340.396	2091	PL		X		0			2	X	2	4		WHEEL PATH
340.422	2228	DL		X		0			2	X	2	4		CORNER BREAK

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East Bound
Data Table
RP 338.061 to RP 340.442

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(091)331	11	6

Reference Point	Dist. From RP (FT)	Lane	Full Depth Repair (ft) Length	X	Width	SY	Dowel Bars	Doweled Contr. Joint Assembly (LF)	Spall Repair (ft) Length	X	Width	SF	Random Cracks (LF)	Comments
340.425	2244	DL		X		0			2	X	2	4		CORNER BREAK
340.439	2318	DL	6	X	12	8	20			X		-		TRANS JOINT REPAIR
340.453	2392	DL		X		0			2	X	2	4		CORNER BREAK
340.565	2983	DL		X		0			2	X	2	4		CORNER BREAK
340.565	2983	DL		X		0			2	X	2	4		CORNER BREAK
340.599	3163	PL		X		0			2	X	2	4		CORNER BREAK
340.610	3221	DL		X		0			2	X	2	4		CORNER BREAK
340.610	3221	DL		X		0			2	X	2	4		CORNER BREAK
340.624	3295	PL		X		0			2	X	2	4		CORNER BREAK
340.624	3295	PL	6	X	12	8	20			X		-		CORNER BREAK
340.624	3295	DL		X		0			2	X	2	4		CORNER BREAK
340.638	3369	PL		X		0			2	X	2	4		MID PANNEL
340.638	3369	DL		X		0			2	X	2	4		MID PANNEL
340.642	3390	DL		X		0			2	X	2	4		CORNER BREAK
340.644	3400	DL	36	X	2	8	2			X		-		LONG JOINT REPLACEMENT
340.679	3585	DL		X		0			2	X	2	4		CORNER BREAK
340.688	3633	DL		X		0			2	X	2	4		CORNER BREAK
340.714	3770	DL		X		0			2	X	2	4		CORNER BREAK
340.731	3860	DL		X		0			2	X	2	4		CORNER BREAK
340.821	4335	DL		X		0			2	X	2	4		CORNER BREAK
340.833	4398	PL		X		0			2	X	2	4		CORNER BREAK
340.833	4398	DL		X		0			2	X	2	4		CORNER BREAK
340.853	4504	PL		X		0			2	X	2	4		WHEEL PATH
340.987	5211	DL	6	X	12	8	20			X		-		SPOT FULL CORNER BREAK
SUBTOTAL						**48**	**102**	**0**				**136**	**0**	**SUBTOTAL FOR MILE 340**
341.011	58	DL		X		0			2	X	2	4		CORNER BREAK
341.045	238	PL		X		0			2	X	2	4		CORNER BREAK
341.090	475	DL		X		0			2	X	2	4		CORNER BREAK
341.090	475	DL		X		0			2	X	2	4		CORNER BREAK
341.100	528	DL		X		0			2	X	2	4		CORNER BREAK
341.100	528	DL		X		0			2	X	2	4		CORNER BREAK
341.125	660	DL		X		0			2	X	2	4		CORNER BREAK
341.140	739	DL		X		0			2	X	2	4		CORNER BREAK
341.170	898	DL		X		0			2	X	2	4		CORNER BREAK
341.170	898	DL		X		0			2	X	2	4		CORNER BREAK
341.237	1251	DL		X		0			2	X	2	4		CORNER BREAK
341.237	1251	DL		X		0			2	X	2	4		CORNER BREAK
341.263	1389	DL		X		0			2	X	2	4		CORNER BREAK
341.263	1389	DL		X		0			2	X	2	4		CORNER BREAK
341.341	1800	DL		X		0			2	X	2	4		WHEEL PATH
341.381	2012	BOTH												EXCEPTION TO 341.402
341.402	2123	PL	6	X	16	11	20			X		-		MID PANEL
341.448	2365	DL		X		0			2	X	2	4		CORNER BREAK
341.448	2365	DL		X		0			2	X	2	4		CORNER BREAK
341.466	2460	DL		X		0			2	X	2	4		CORNER BREAK
341.466	2460	DL		X		0			2	X	2	4		CORNER BREAK
341.491	2592	DL		X		0			2	X	2	4		WHEEL PATH
341.493	2603	DL		X		0			2	X	2	4		WHEEL PATH
341.531	2804	DL		X		0			2	X	2	4		CORNER BREAK
341.601	3173	DL		X		0			2	X	2	4		CORNER BREAK
341.615	3247	DL		X		0			2	X	2	4		CORNER BREAK
341.646	3411	DL		X		0			2	X	2	4		CORNER BREAK
341.646	3411	DL		X		0			2	X	2	4		CORNER BREAK
341.691	3648	DL		X		0			2	X	2	4		CORNER BREAK
341.694	3664	DL	36	X	12	48	20	36		X		-		FULL PANEL
341.706	3728	DL		X		0			2	X	2	4		CORNER BREAK

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East Bound
Data Table
RP 340.425 to RP 341.706

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-8-094(091)331	11	7

Reference Point	Dist. From RP (FT)	Lane	Full Depth Repair (ft) Length	X	Width	SY	Dowel Bars	Doweled Contr. Joint Assembly (LF)	Spall Repair (ft) Length	X	Width	SF	Random Cracks (LF)	Comments
341.706	3728	DL		X		0			2	X	2	4		CORNER BREAK
341.739	3902	DL		X		0			2	X	2	4		CORNER BREAK
341.743	3923	DL		X		0			2	X	2	4		CORNER BREAK
341.755	3986	DL		X		0			2	X	2	4		CORNER BREAK
341.755	3986	DL		X		0			2	X	2	4		CORNER BREAK
341.835	4409	DL		X		0			2	X	2	4		CORNER BREAK
341.835	4409	DL		X		0			2	X	2	4		CORNER BREAK
341.866	4572	DL		X		0			5	X	2	10		WHEEL PATH
341.874	4515	DL		X		0			2	X	2	4		CORNER BREAK
341.886	4578	DL	9	X	12	12	20			X		-		HALF PANEL
341.886	4578	PL		X		0			2	X	2	4		CORNER BREAK
341.891	4704	DL		X		0			2	X	2	4		CORNER BREAK
341.891	4704	DL		X		0			2	X	2	4		CORNER BREAK
341.897	4736	DL		X		0			2	X	2	4		CORNER BREAK
341.897	4736	DL		X		0			2	X	2	4		CORNER BREAK
341.941	4968	DL	66	X	12	88	20	60		X		-		FULL PANEL
341.958	5058	DL		X		0			2	X	2	4		CORNER BREAK
341.965	5095	DL		X		0			2	X	2	4		CORNER BREAK
341.980	5174	DL		X		0			2	X	2	4		CORNER BREAK
341.980	5174	DL		X		0			2	X	2	4		CORNER BREAK
341.999	5275	DL		X		0			2	X	2	4		CORNER BREAK
341.999	5275	DL		X		0			2	X	2	4		CORNER BREAK
SUBTOTAL						**159**	**80**	**96**				**198**	**0**	**SUBTOTAL FOR MILE 341**
342.036	190	DL		X		0			2	X	2	4		CORNER BREAK
342.076	401	DL		X		0			2	X	2	4		CORNER BREAK
342.142	750	DL		X		0				X		-	15	ROUTE AND SEAL
342.153	808	PL		X		0			2	X	2	4		WHEEL PATH
342.202	1067	PL	21	X	16	37	20	24		X		-		FULL DEPTH JOINT REPLACEMENT
342.202	1067	DL	21	X	12	28	20	24		X		-		FULL DEPTH JOINT REPLACEMENT
342.256	1352	DL		X		0			5	X	2	10		WHEEL PATH
342.381	2012	DL		X		0			2	X	2	4		WHEEL PATH
342.381	2012	DL		X		0			2	X	2	4		WHEEL PATH
342.393	2075	DL		X		0			2	X	2	4		CORNER BREAK
342.429	2265	DL	21	X	12	28	20	24		X		-		FULL DEPTH
342.639	3374	DL		X		0			2	X	2	4		CORNER BREAK
342.639	3374	PL		X		0				X		-	10	ROUTE AND SEAL
342.672	3548	DL		X		0				X		-	6	ROUTE AND SEAL
342.688	3533	DL	6	X	12	8	20			X		-		TRANS JOINT REPAIR
342.688	3533	PL	6	X	16	11	20			X		-		TRANS JOINT REPAIR
342.709	3744	PL											45	ROUTE AND SEAL
342.709	3744	PL		X		0			2	X	3	6		WHEEL PATH
342.709	3744	PL		X		0			2	X	3	6		WHEEL PATH
342.711	3754	PL		X		0			2	X	8	16		WHEEL PATH
342.711	3754	PL		X		0			2	X	8	16		WHEEL PATH
342.714	3770	PL		X		0			2	X	8	16		WHEEL PATH
342.714	3770	PL		X		0			2	X	2	4		WHEEL PATH
342.717	3786	PL		X		0			2	X	2	4		WHEEL PATH
342.720	3802	PL		X		0			2	X	2	4		WHEEL PATH
342.752	3971	PL		X		0			2	X	2	4		WHEEL PATH
342.769	4060	DL		X		0			2	X	2	4		
342.837	4419	DL		X		0			2	X	2	4		CORNER BREAK
342.839	4430	PL	6	X	12	8	20			X		-		SPOT FULL WHEEL PATH
SUBTOTAL						**120**	**120**	**72**				**122**	**76**	**SUBTOTAL FOR MILE 342**

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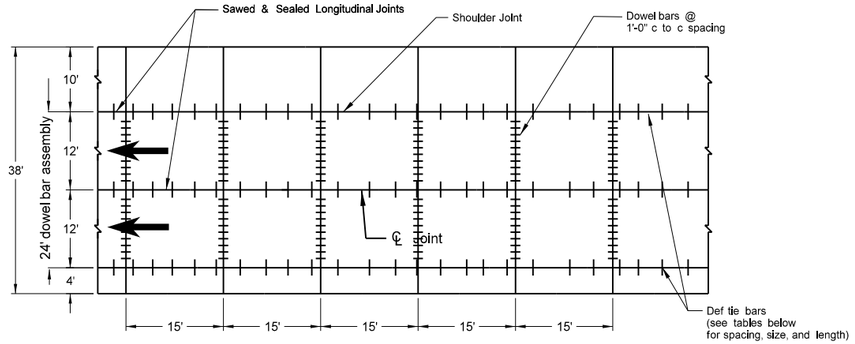
East Bound
Data Table
RP 341.706 to RP 342.839

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-8-094(091)331	20	1



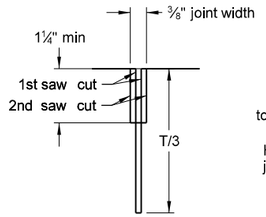
Joint Spacing
Mainline Joints Straight
Uniform Joint spacing 15'

*Same average spacing for skewed joints

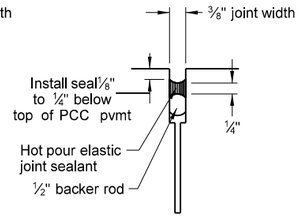
Notes:

1. T = Pavement Thickness
2. Dowel bars shall be 1¼" x 18" when T = 10" or less and shall be 1½" x 18" when T is greater than 10".
3. The ramp tapers shall also be doweled.

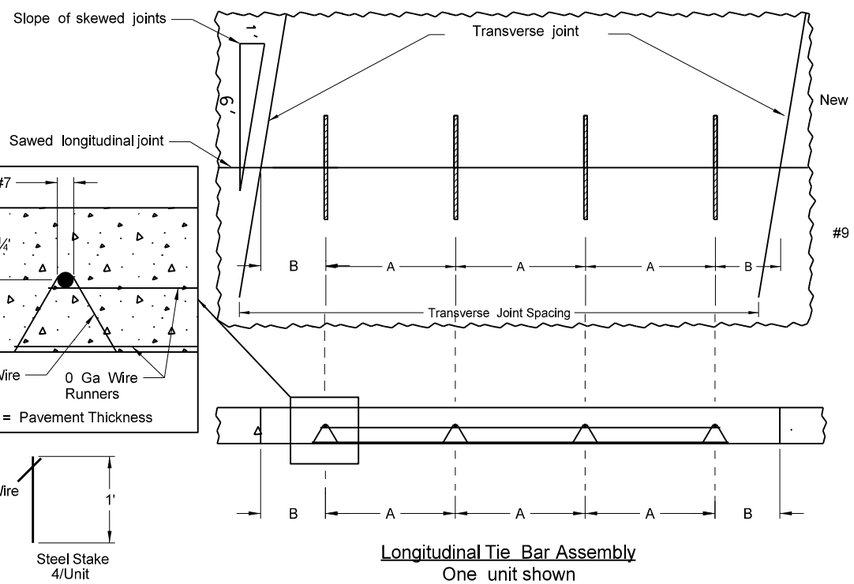
*Width requirement for top 1" only. Bottom portion of saw cut may be narrower.



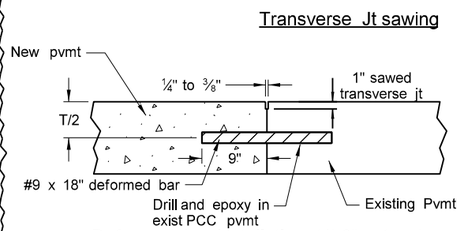
Transverse Jt sawing



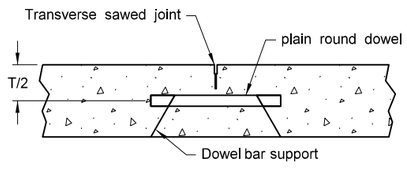
Transverse Jt sealing



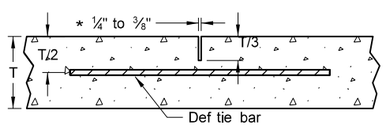
Longitudinal Tie Bar Assembly
One unit shown



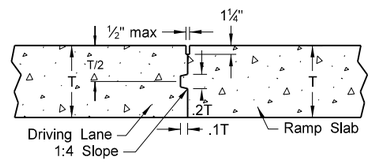
Deformed bar installation (1'-0" c to c)



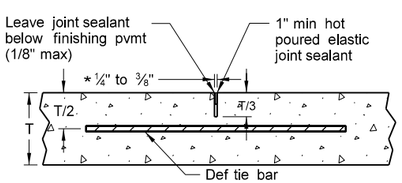
Doweled tranverse joint



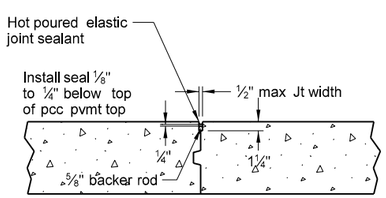
Joint sawing detail (all sawed and tied joints)



Longitudinal construction joint
(at ramps - non-tied keyed joints)



Joint sealing detail (all sawed and tied joints)

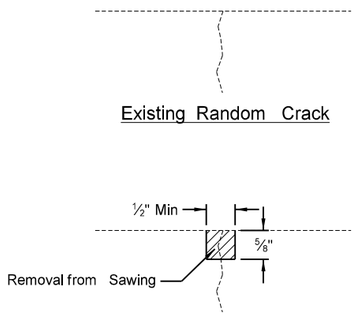


Longitudinal joint silicone seal
(non-tied keyed joints)

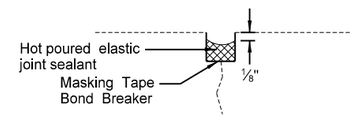
Longitudinal Joint Tie Bar Size and Length					
Pavement Depth	8"	9"	10"	11"	12"
℄ ML & Ramps	#6 x 3'-0"			#7 x 3'-0"	
10' SHLDR	#5 x 2'-6"				

Longitudinal Joint Uniform Tie Bar Spacing			
Joint Spacing	Distance A	Distance B	No. of Bars/Assembly
15'	45"	22½"	4

Random PCC Crack Cleaning & Sealing



Random Crack Sawing



Random Crack Sealing

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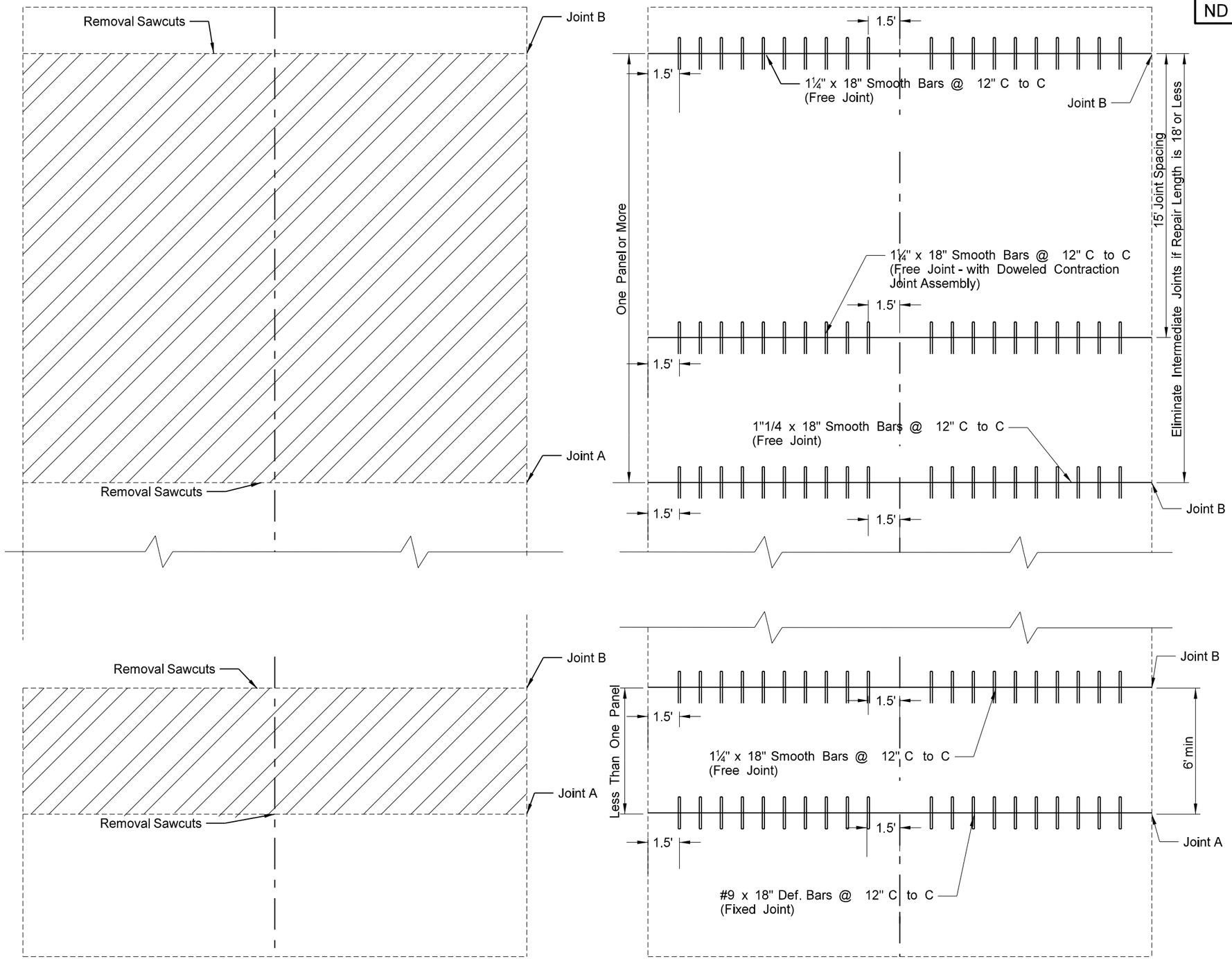
PCC Pavement Joint Details

With Uniform Spacing
I-94 Eastbound

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-8-094(031)331	20	2



Removal

Proposed

PCC Removal

Notes:

1. Joint A (Fixed Joint) shall be the new joint with the shortest distance to the next transverse joint or working random crack. The saw cut will be made at 90° to the centerline. The deformed bars shall be placed perpendicular to the face of the saw cut.
2. Joint B (Free Joint) shall be the new joint with the greatest distance to the next transverse joint or working random crack. The smooth bars shall be installed within the tolerances shown on the "Dowel Bar Placement- Full Depth Repair" detail sheet.
3. When the distance to the next transverse joint or working random crack is equal for both new joints, the free joint (joint B) shall be placed on the approach side of the repair.
4. If greater than one panel in length, a Doweled Contraction Joint Assembly shall be installed at transverse contraction joints.
5. In repair areas which are not the entire roadway width, joints shall be placed to match the existing pavement wherever possible.
6. The joints at the beginning and end of a full depth repair section can be either a Joint B or Joint A depending on the existing joint.

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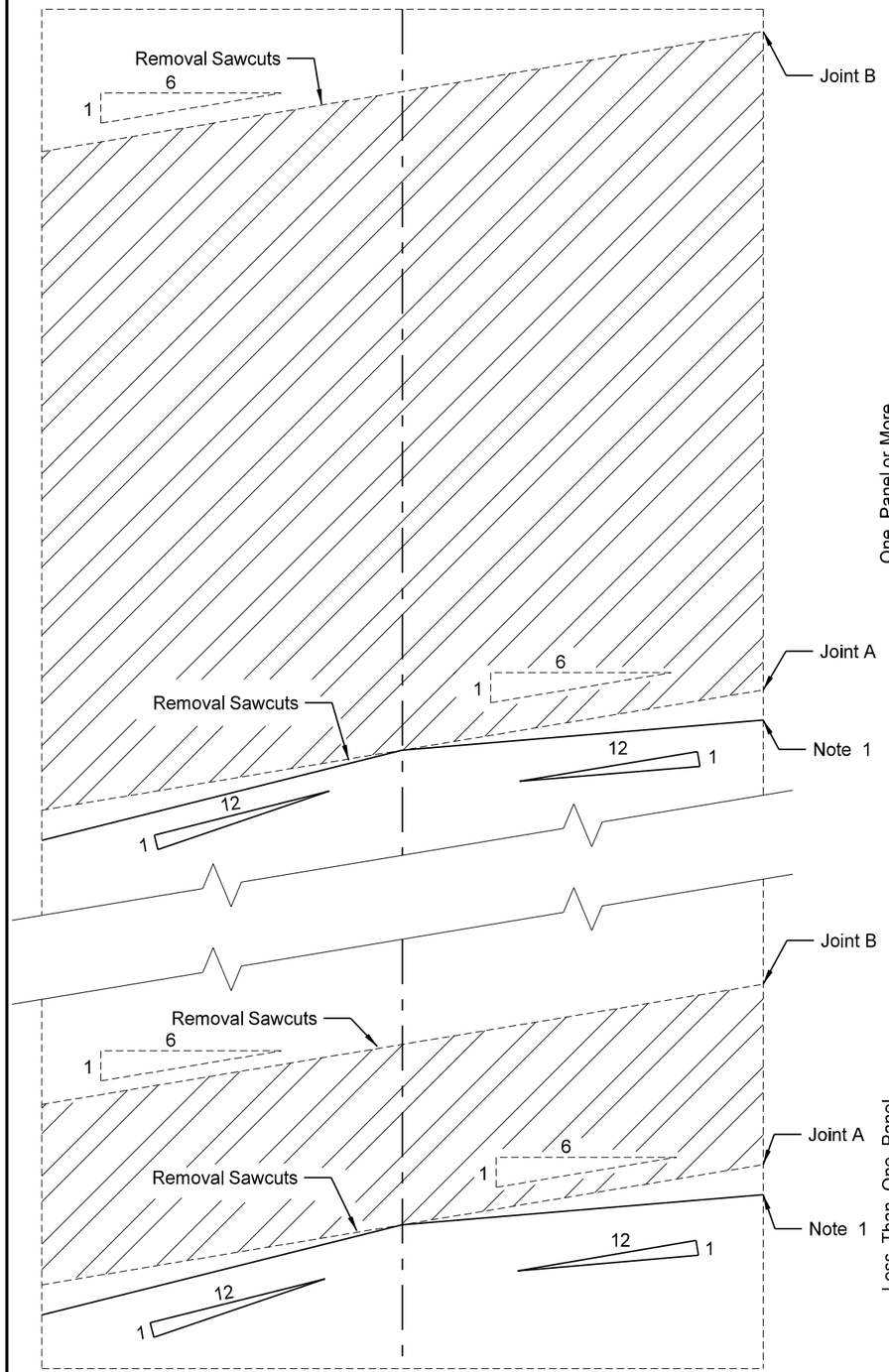
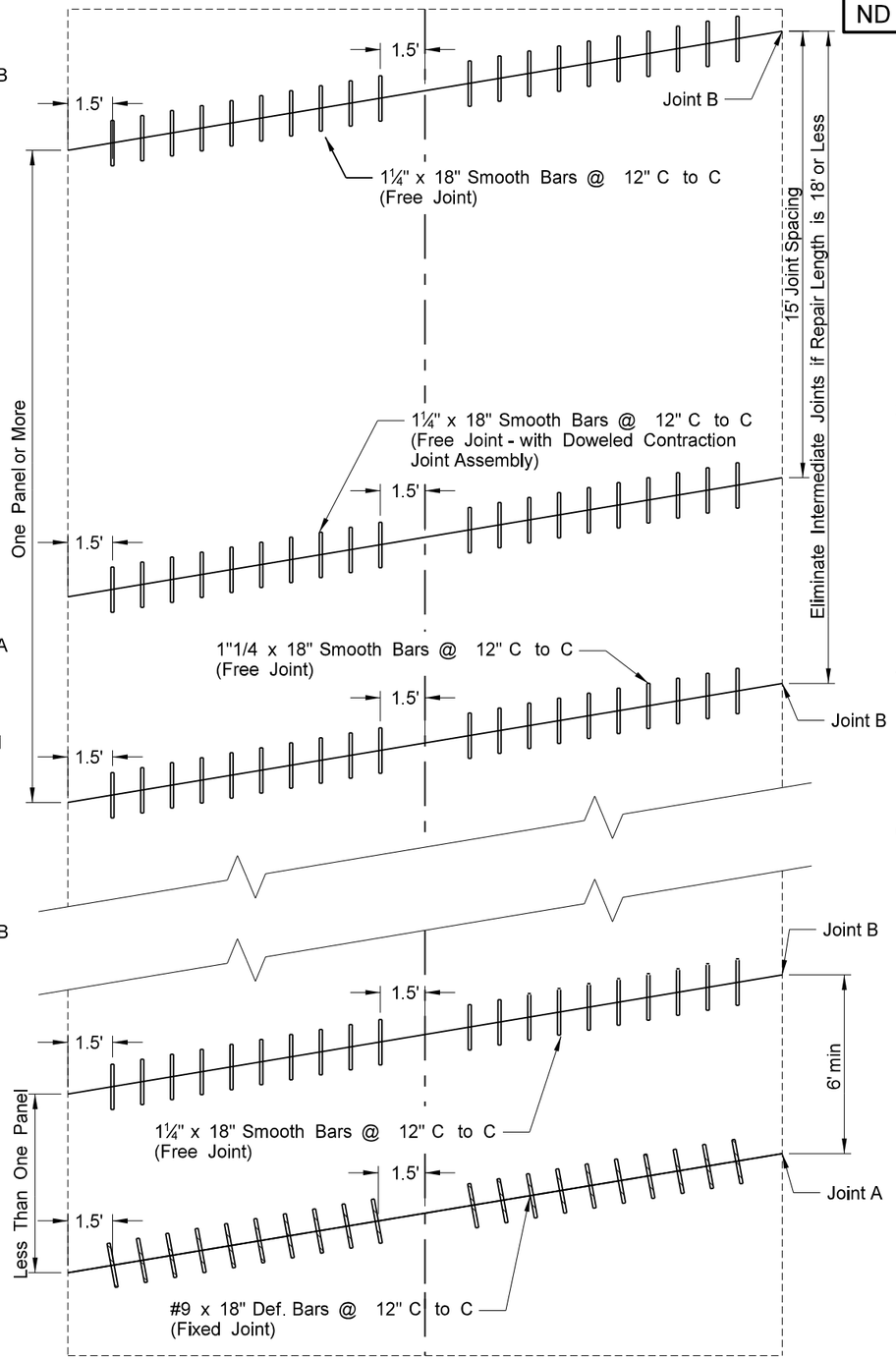
Removal of Concrete & Dowel Bar

Placement-Full Depth Repair
Straight Joint
I-94 Eastbound

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-8-094(091)331	20	3



Removal



Proposed

PCC Removal

Notes:

1. Joint A (Fixed Joint) shall be the new joint with the shortest distance to the next transverse joint or working random crack. The saw cut may be made at a 1:6 skew, or up to a maximum 1:12 skew referenced off the 1:6 skewed transverse joint. The deformed bars shall be placed perpendicular to the face of the saw cut.
2. Joint B (Free Joint) shall be the new joint with the greatest distance to the next transverse joint or working random crack. The smooth bars shall be installed within the tolerances shown on the "Dowel Bar Placement- Full Depth Repair" detail sheet.
3. When the distance to the next transverse joint or working random crack is equal for both new joints, the free joint (joint B) shall be placed on the approach side of the repair.
4. If greater than one panel in length, a Doweled Contraction Joint Assembly shall be installed at transverse contraction joints.
5. In repair areas which are not the entire roadway width, joints shall be placed to match the existing pavement wherever possible.
6. The joints at the beginning and end of a full depth repair section can be either a Joint B or Joint A depending on the existing joint.
7. Mainline joints are skewed except at bridge ends and old concrete repairs.

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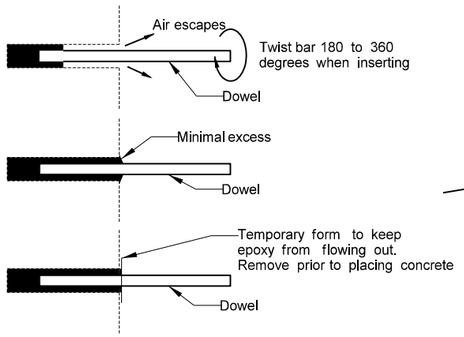
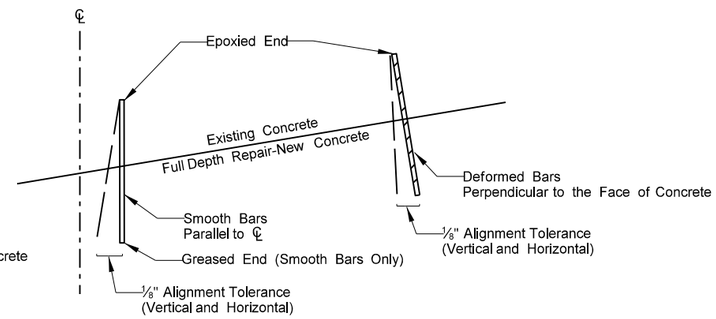
Removal of Concrete & Dowel Bar

Placement-Full Depth Repair
Skewed Joint
I-94 Eastbound

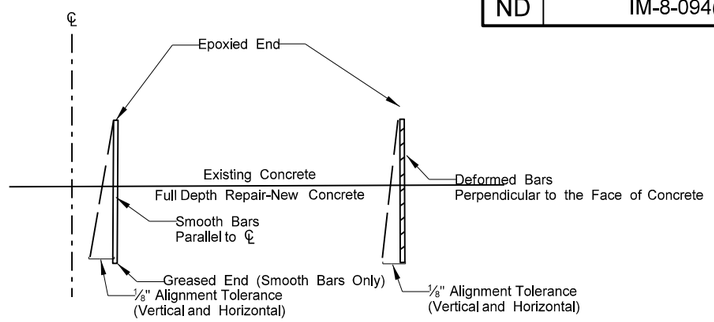
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-8-094(091)331	20	4



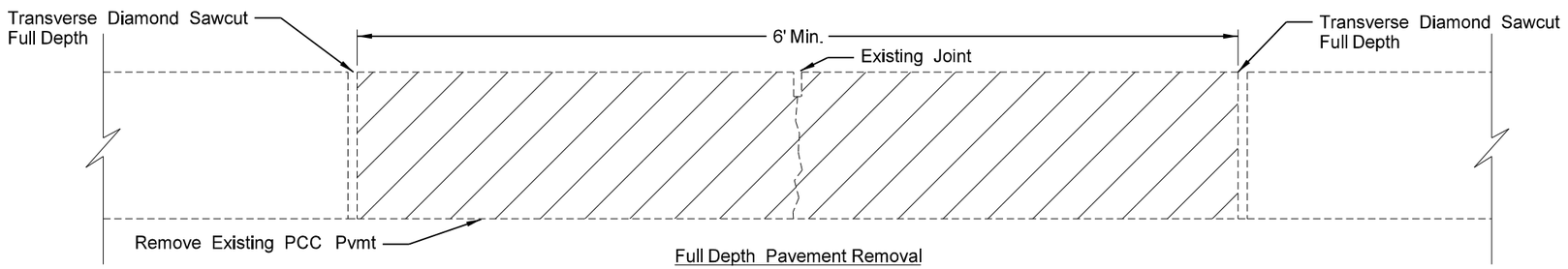
Dowel & Epoxy Installation
(Smooth or Deformed Bars)



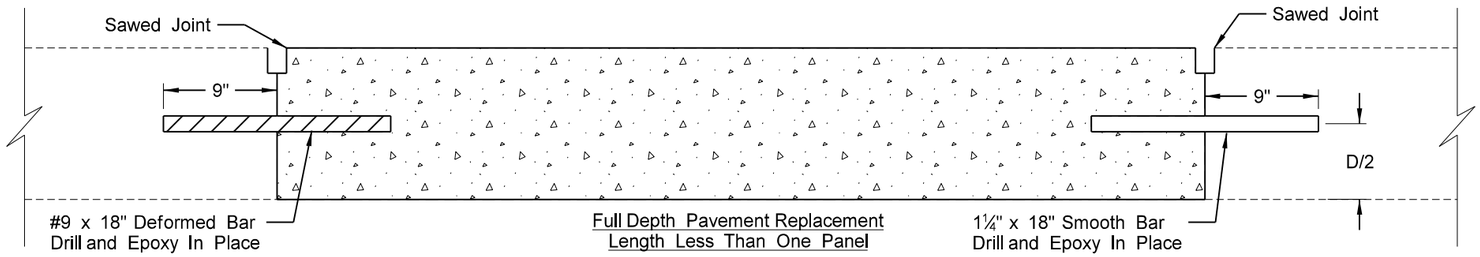
Dowel Alignment Tolerance



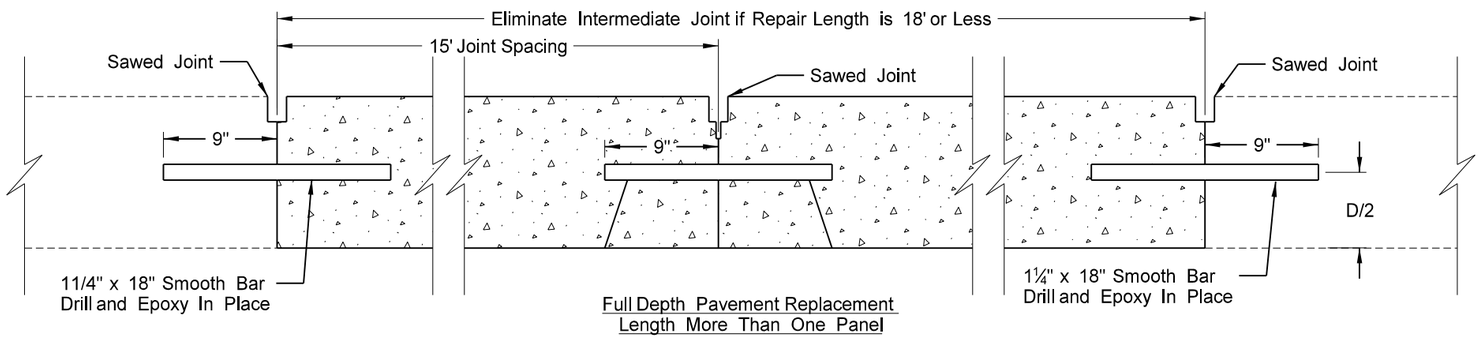
Dowel Alignment Tolerance



Full Depth Pavement Removal



Full Depth Pavement Replacement
Length Less Than One Panel



Full Depth Pavement Replacement
Length More Than One Panel

Notes:

1. Variables:
   D = Depth of Pavement
2. Removal and replacement also applies to full depth repairs at cracks.
3. Place smooth dowel bars in repair joint which is farthest away from the next transverse joint or working random crack. If distance is equal for both repair joints, place smooth dowels on approach side of patch.
4. In full depth repair areas that fall within 3' of an existing joint, the repair area shall go beyond the joint by 3' to ensure all old doweled bars are removed.

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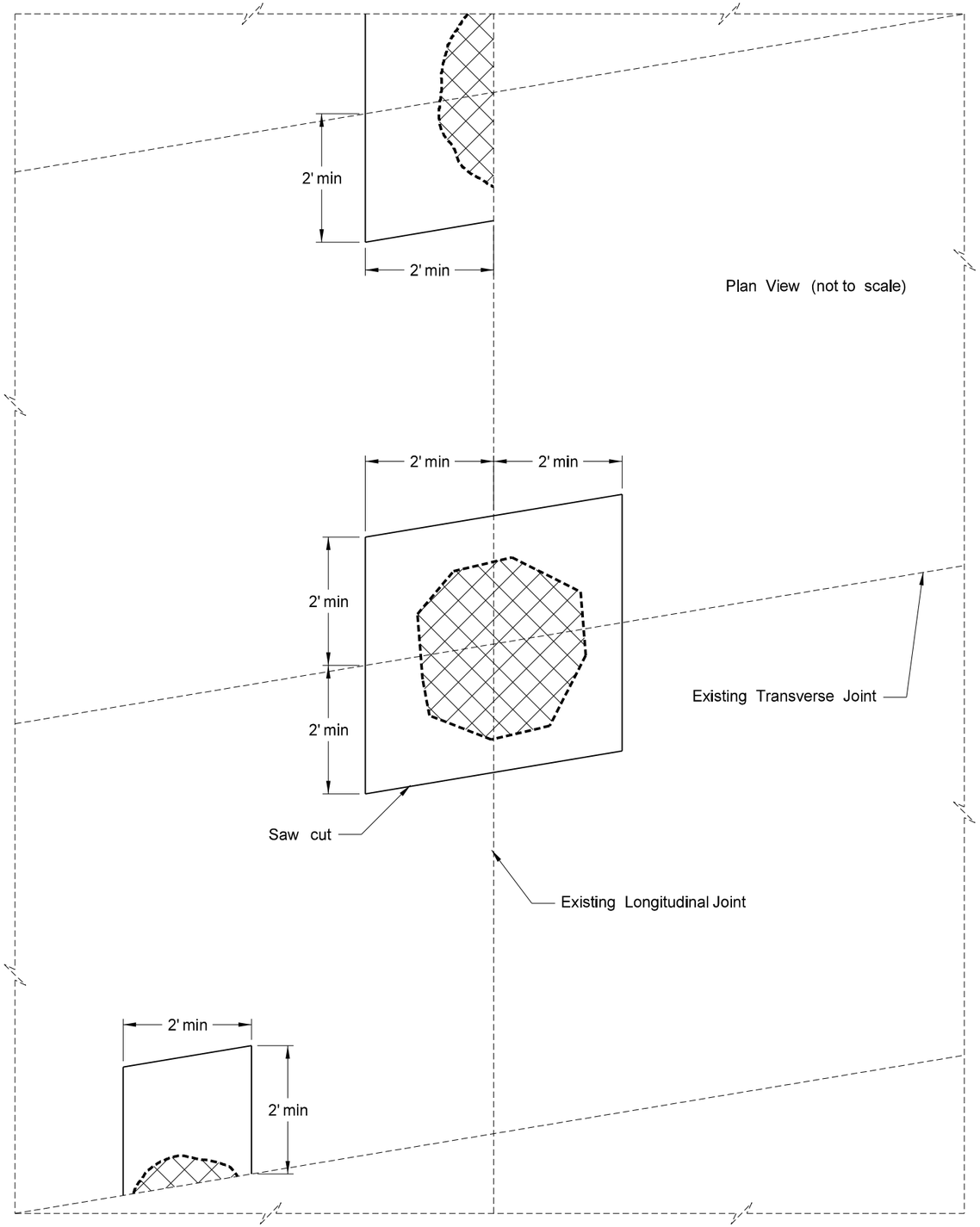
Concrete Pavement Repair-Full Depth

Non-Reinforced PCC Pavement

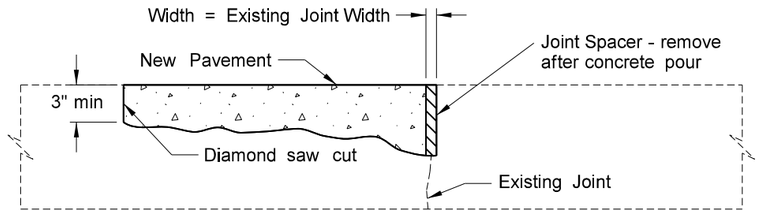
I-94 Eastbound

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(091)331	20	5



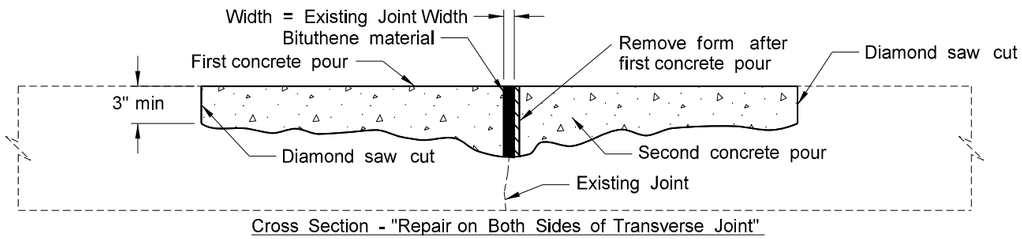
Plan View (not to scale)

Spall Repair



Cross Section - "Repair Area on One Side of Transverse Joint"

Note:
Place a spacer material on the transverse joint face to maintain the joint during repair. The spacer material shall have the capability of maintaining a width equal to that of the existing joint and being easily removed after the pour. A bituthene waterproofing material may be used for this purpose. It shall be a minimum of 260 mil (approximately ¼") thick or equal to the width of the existing joint, whichever is greater. Cut it to fit over the entire face of the existing joint to provide for expansion and prevent water from entering the existing joint throught the sides or bottom. Press it into place to conform to the face of the existing joint.



Cross Section - "Repair on Both Sides of Transverse Joint"

Spall

Concrete Removal Area

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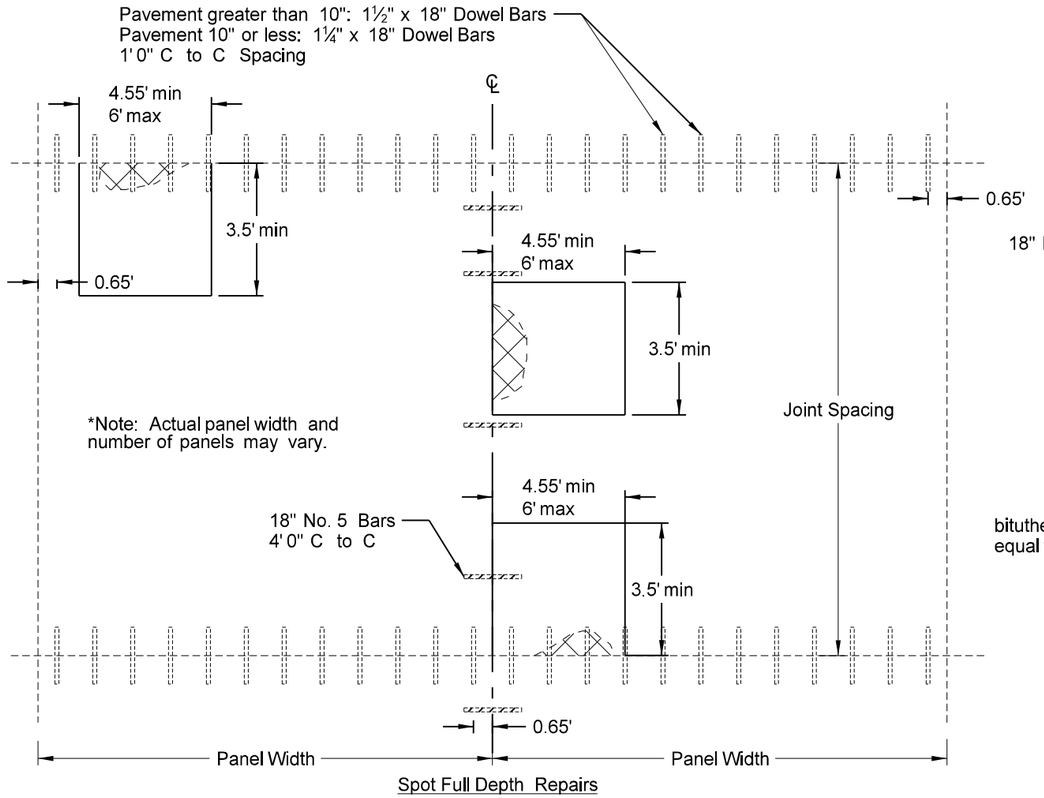
Jointed Non-Reinforced PCC Pavement
Spall Repair Detail

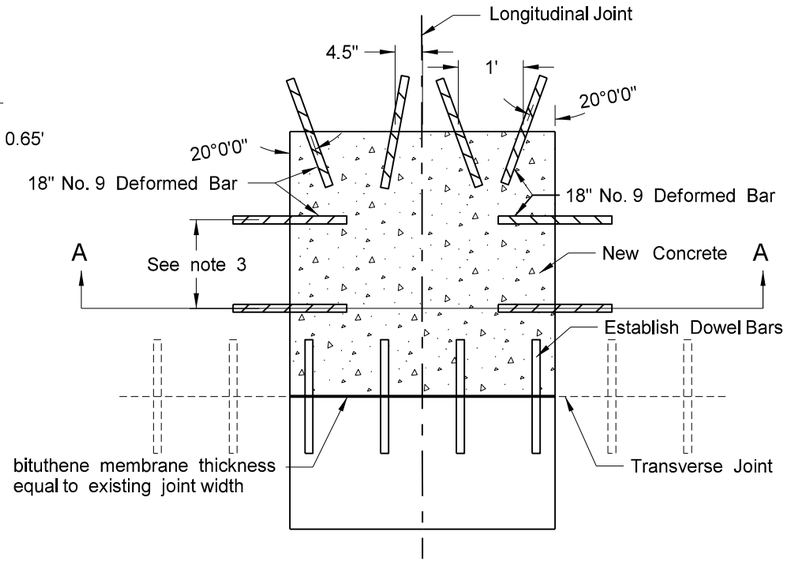
I-94 EB

2/8/2016 11:34:13 AM joss G:\PROJECT\80094331.091\Design\020GD_005_DSPALL_REPAIR.dgn

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-8-094(091)331	20	6



Spot Full Depth Repairs



Bar Placement-Repair Across Transverse Joint

Work to be Performed - Spot Repair

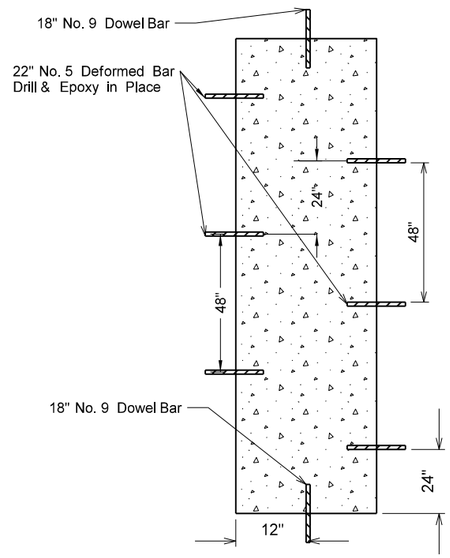
1. Order of operations follow Longitudinal Repairs.

2. Bar Placement:
-Furnish and install 18" No. 9 deformed bars.

-Transverse Edges: 12" c to c and skewed 20^0 from the face of the joint.

-Longitudinal Edges: Parallel to the joint. If the repair is 2' or less in length from a transverse joint then use one bar centered on the repair. If 2' to 4' in length from a transverse joint use two bars evenly spaced. If longer than 4' space at 24" c to c.

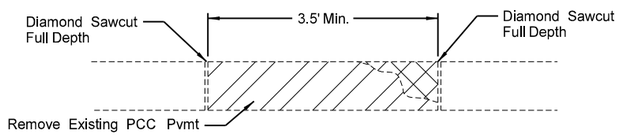
3. Substitute smooth dowel bar if on existing transverse joint.



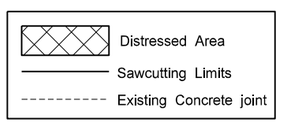
Longitudinal Spot Full Depth Repair Area
Edge of Driving Lane

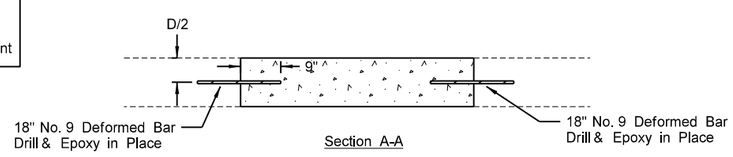
*Only transverse tie bars will be required in the shoulder spot full depth repairs

Corner Spot Full Depth Repairs



Spot Full Depth Pavement Removal





Spot Full Depth Pavement Replacement

Work to be Performed - Longitudinal Repair

1. Sawcut the marked removal area.

2. Remove concrete full depth. Restore inplace base if disturbed.

3. Furnish and install 22" long No. 5 deformed bars. The spacing and layout shall be as follows:

- Transverse Edges: 12" c to c

- Longitudinal Edges: Parallel to the longitudnal joint. If 2' to 4' in length from a transverse joint, use two bars evenly spaced. If longer than 4' space at 48" c to c., stagered on each side of the repair as shown.

4. Restore dowel bars if necessary. Use partial dowel bar assembly or drill holes as appropriate.

5. Clean and wet exposed surface of inplace concrete prior to placing new concrete.

6. Place, consolidate, finish, and cure concrete.

7. Restore transverse and longitudinal joints.

8. Clean and seal restored longitudinal and transverse joints, all work stated here in to be included in the bid price for SPOT FULL DEPTH.

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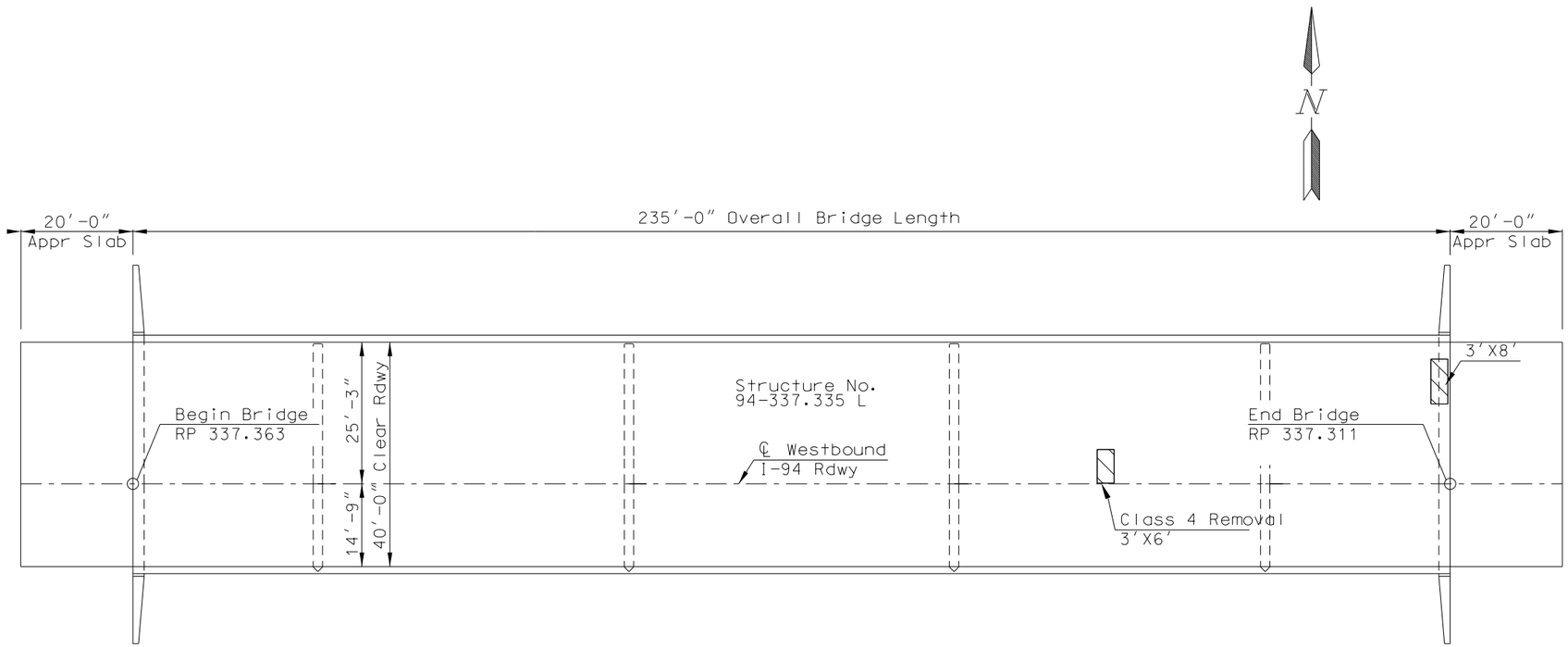
Spot Full Depth Pavement Replacement Detail

I-94 Eastbound

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(091)331	20	7



SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
650	0805	DECK SPALL REPAIR	SF	42

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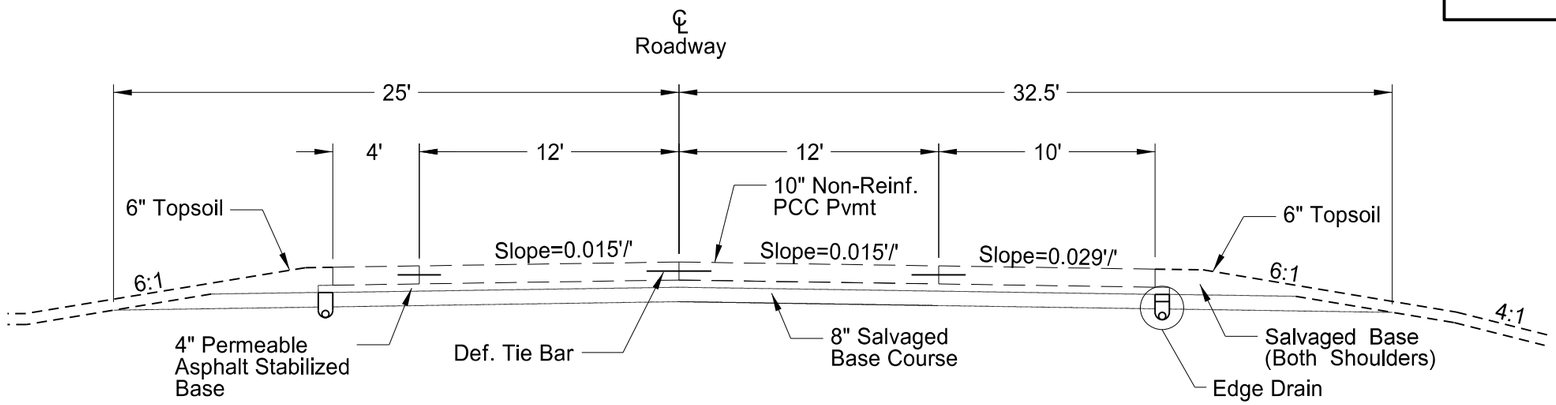
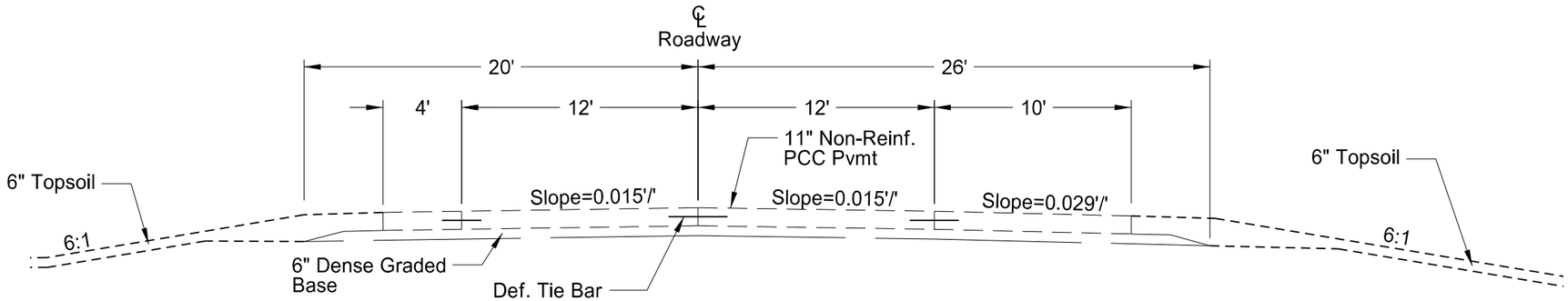
Deck Spall Layout
Maple River Structure - WB
RP 337.335

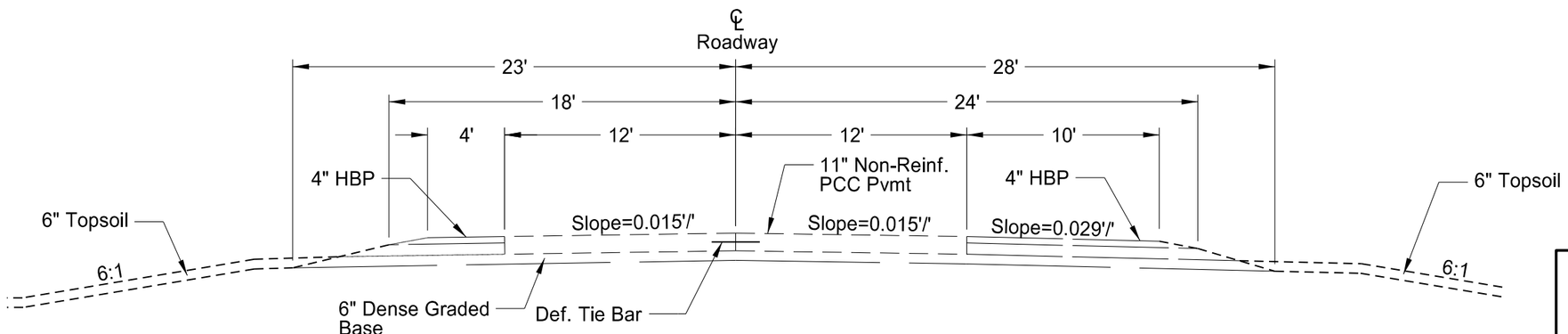
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(091)331	030	1



RP 331.231 to RP 331.583
South Roadway



RP 331.583 to RP 331.824
South Roadway Section 1



RP 331.824 to RP 331.991
South Roadway Section 2

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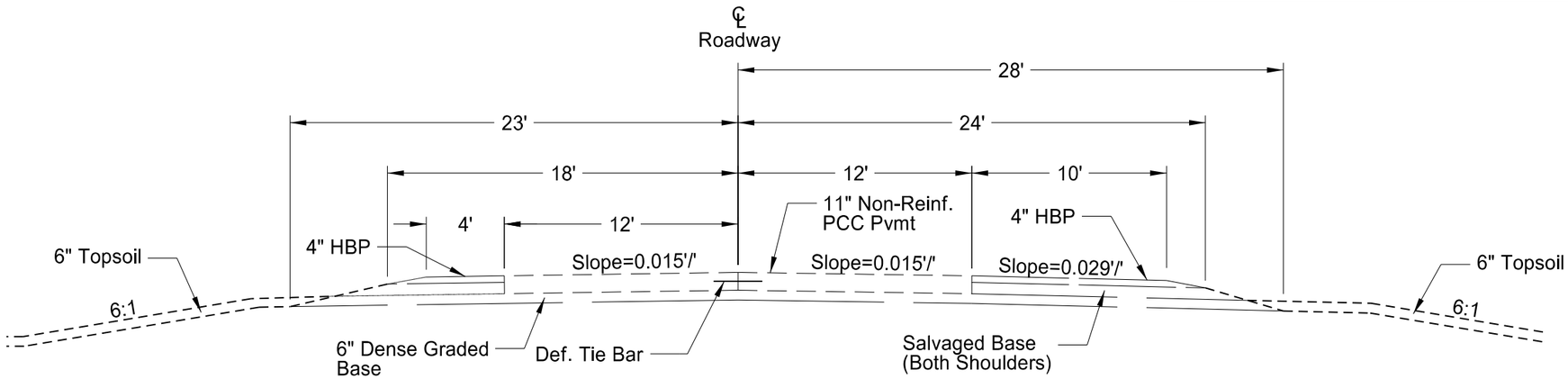
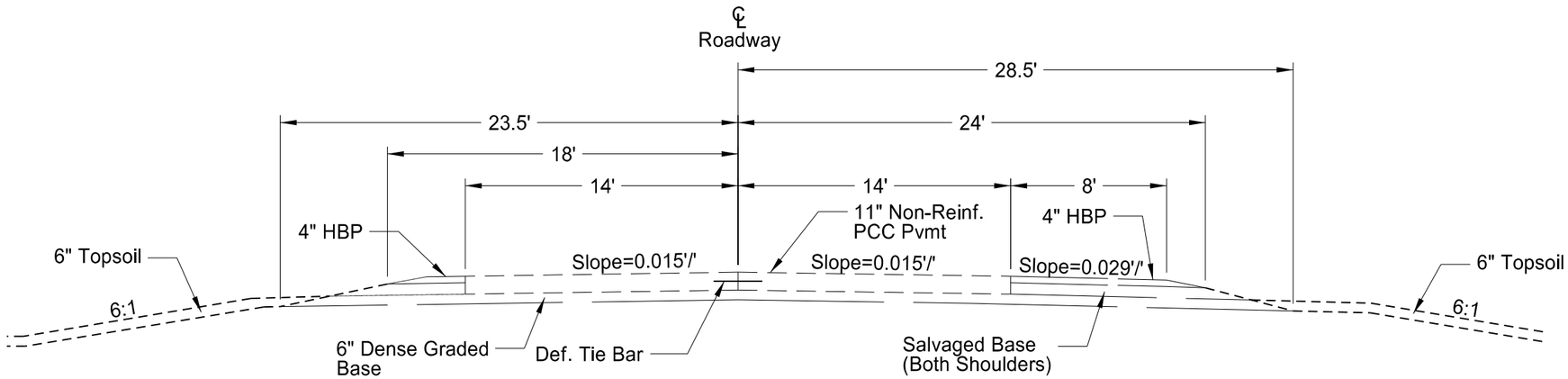
Existing Typical Section
I-94 Mainline Eastbound

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(091)331	030	2



RP 331.991 to RP 332.132
South Roadway Section 3



RP 332.132 to RP 332.351
South Roadway Section 4

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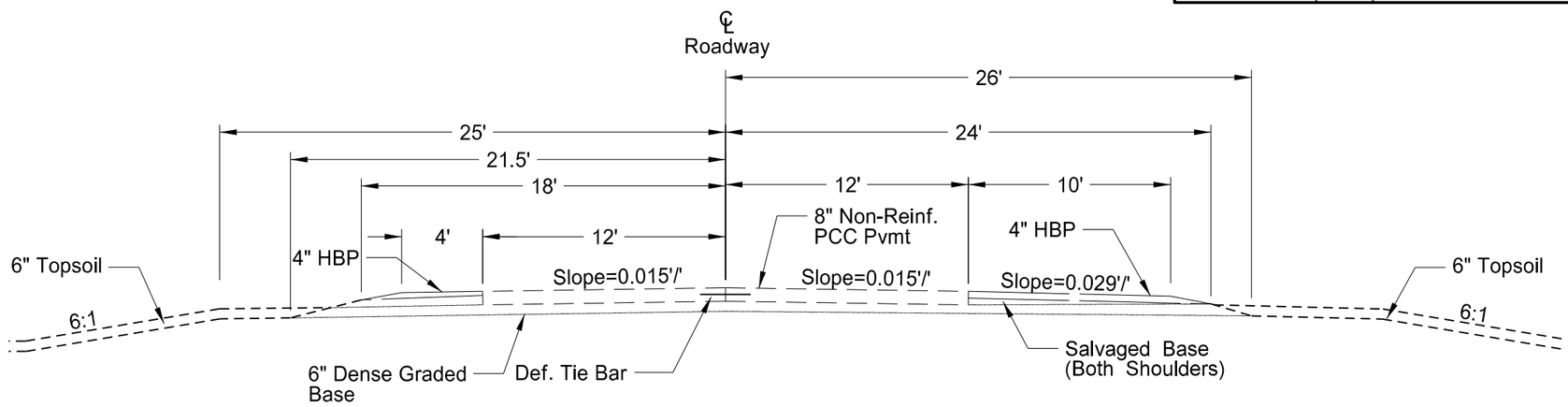
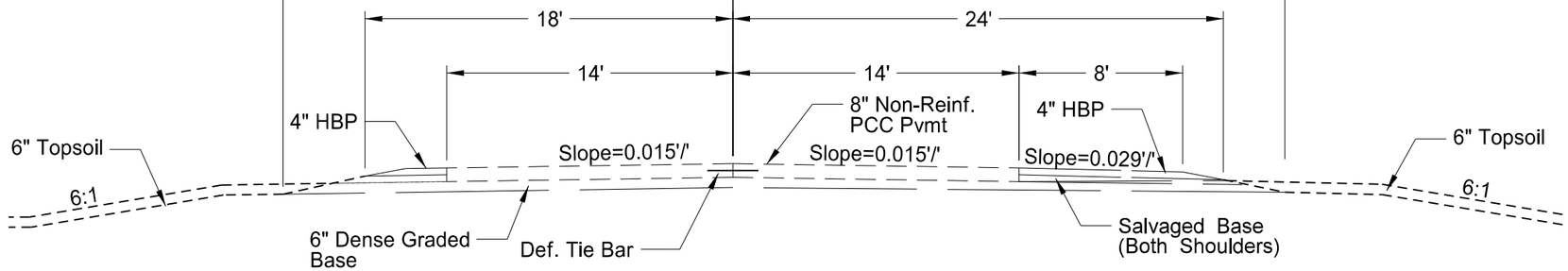
Existing Typical Section
I-94 Mainline Eastbound

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(091)331	030	3



RP 332.351 to RP 332.468
South Roadway Section 5



RP 332.468 to RP 332.590
South Roadway Section 6

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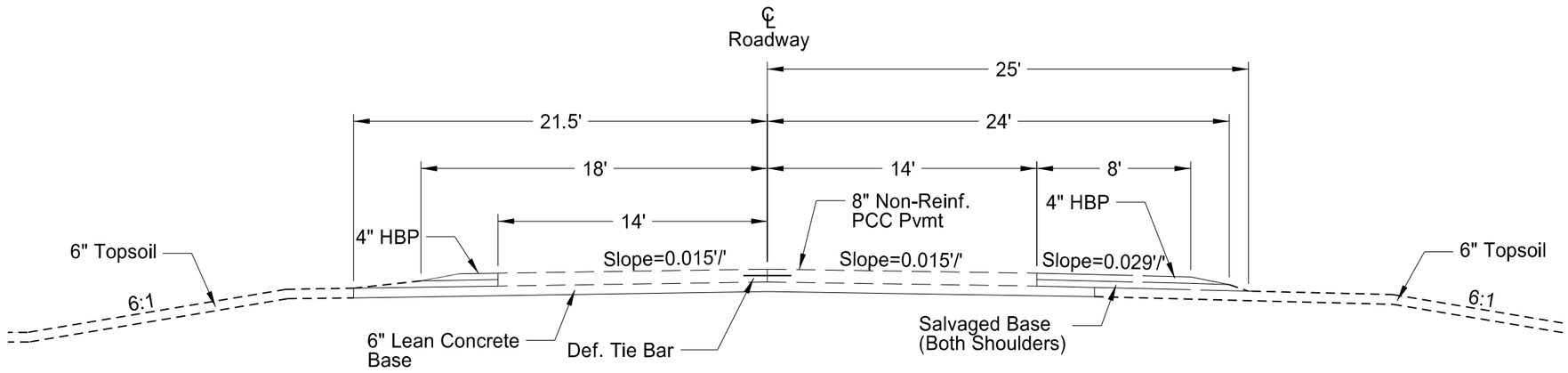
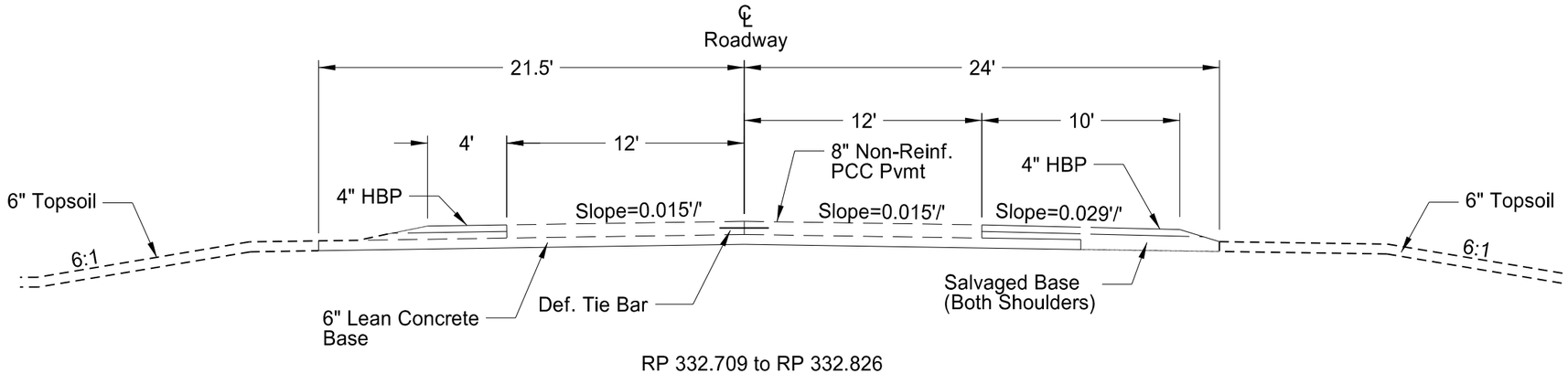
Existing Typical Section
I-94 Mainline Eastbound

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(091)331	030	4



RP 332.590 to RP 332.709
South Roadway Section 7



RP 332.709 to RP 332.826
South Roadway Section 8

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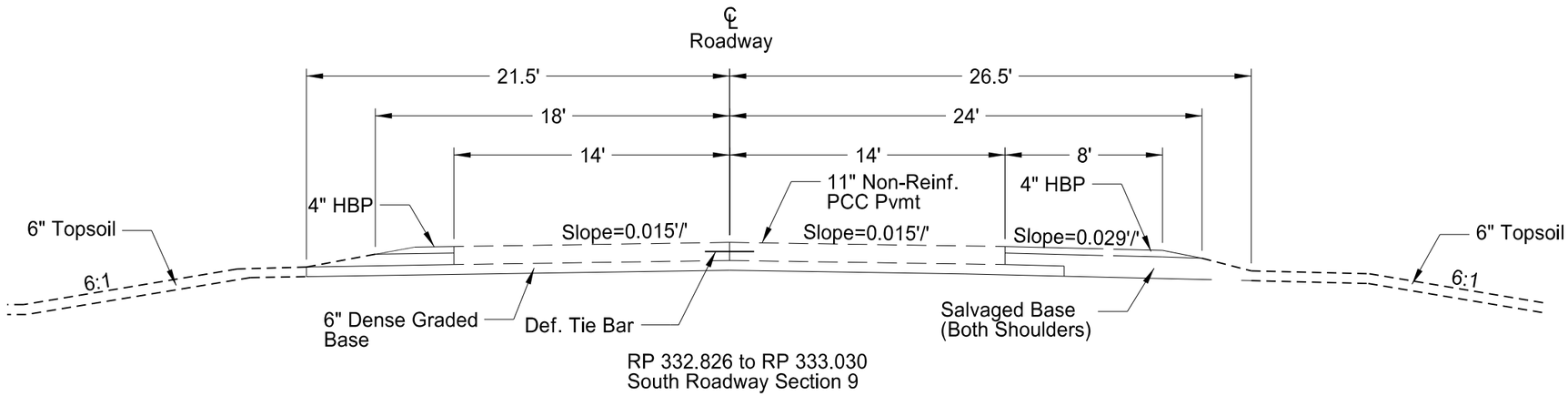
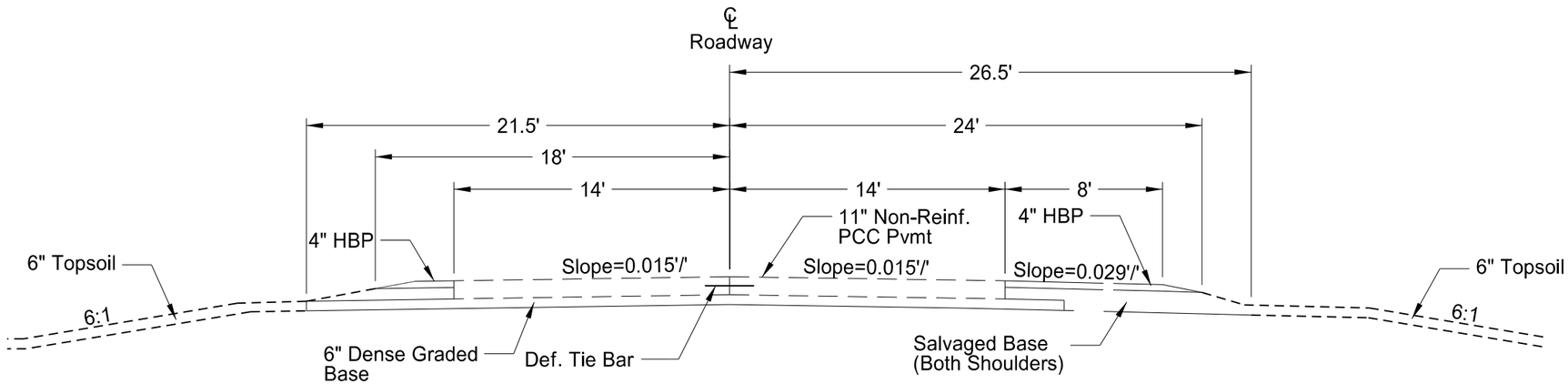
Existing Typical Section
I-94 Mainline Eastbound

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(091)331	030	5



RP 332.826 to RP 333.030
South Roadway Section 9



RP 333.030 to RP 333.155
South Roadway Section 10

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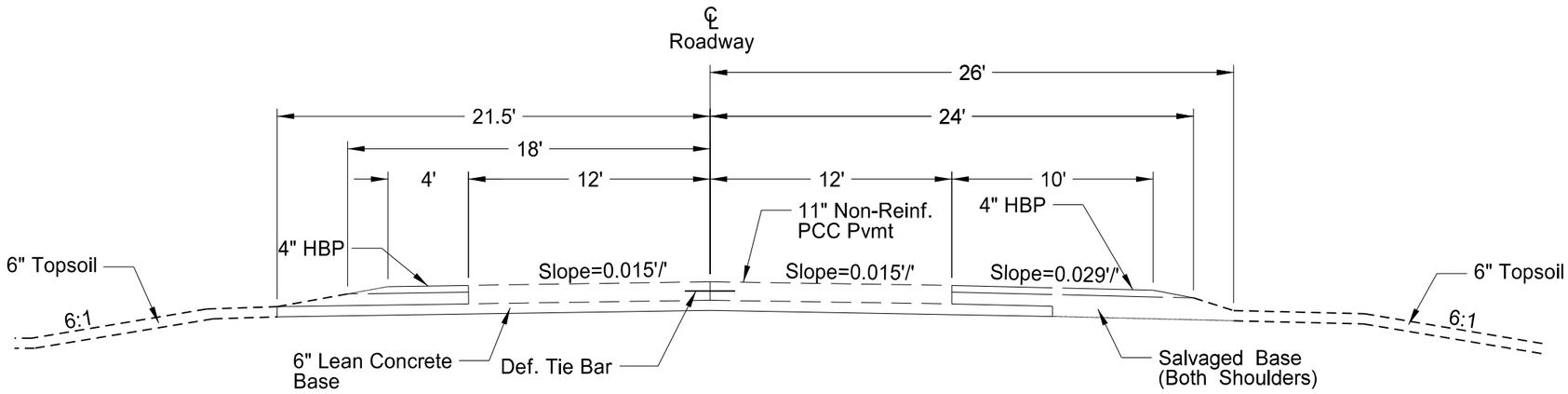
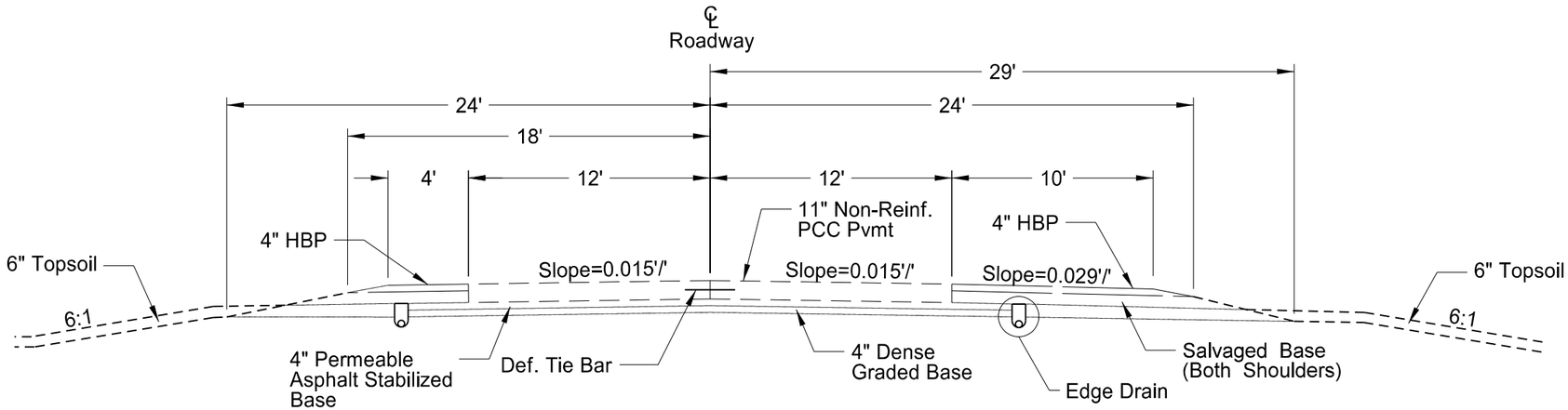
Existing Typical Section
I-94 Mainline Eastbound

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(091)331	030	6



RP 333.155 to RP 333.337
South Roadway Section 11



RP 333.337 to RP 333.519
South Roadway Section 12

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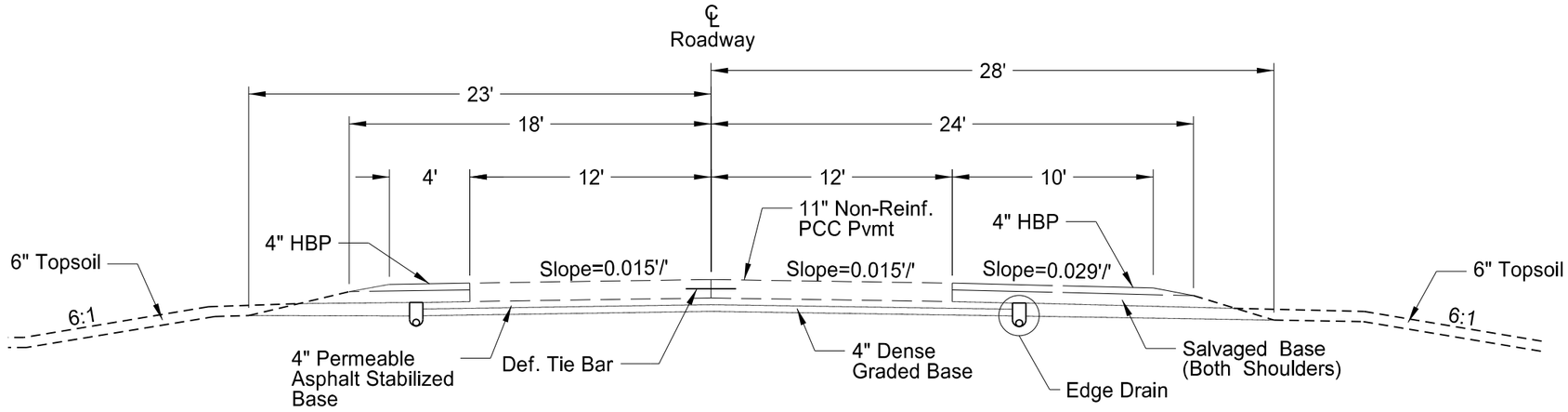
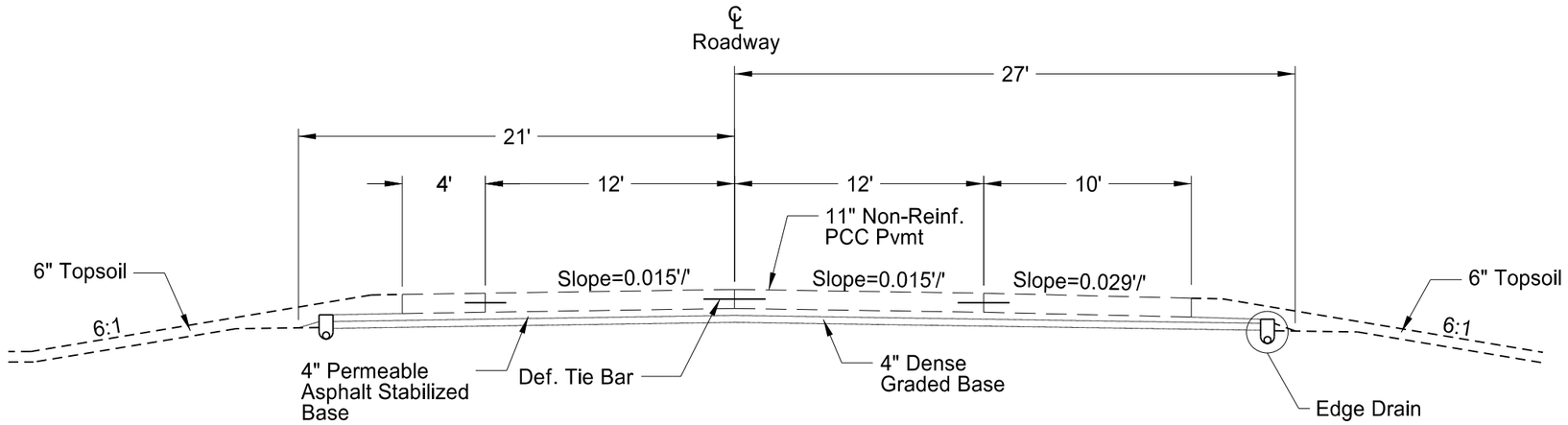
Existing Typical Section
I-94 Mainline Eastbound

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(091)331	030	7



RP 334.118 to RP 334.323
South Roadway Section 13



RP 334.323 to RP 334.499
South Roadway Section 14

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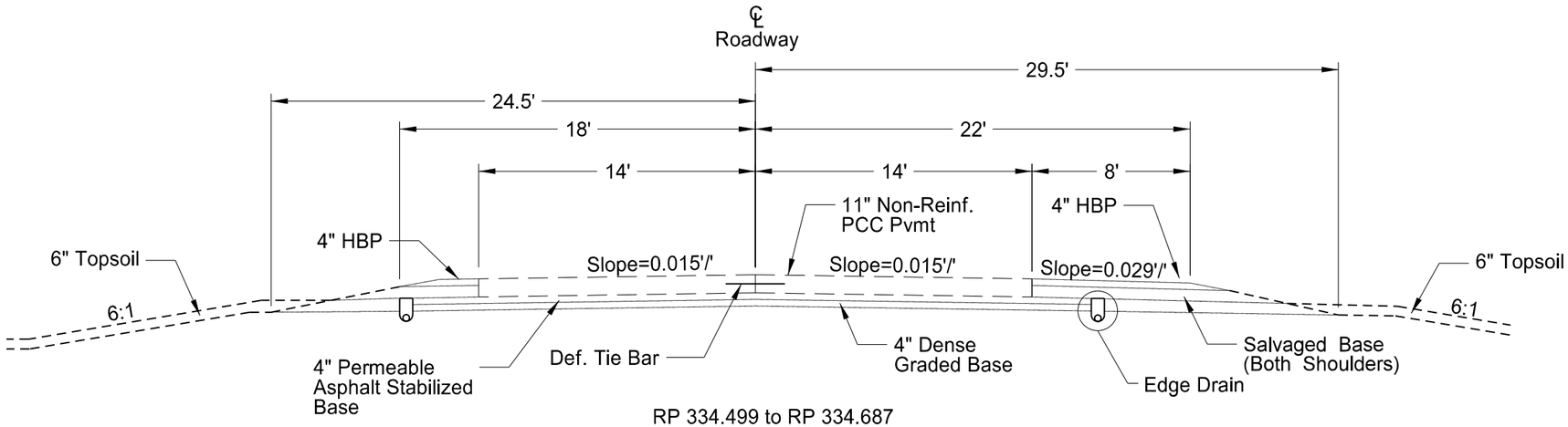
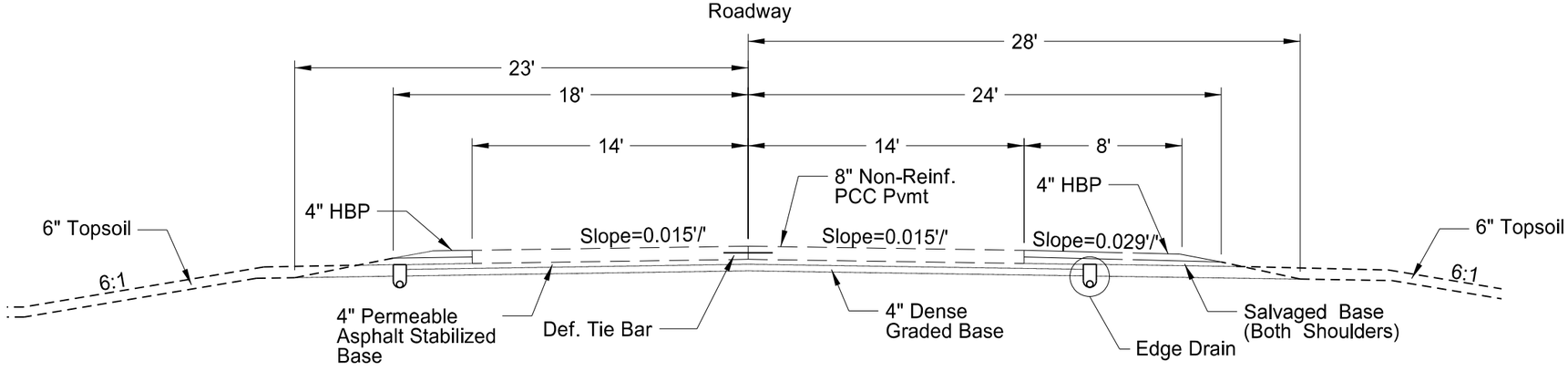
Existing Typical Section
I-94 Mainline Eastbound

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(091)331	030	8



RP 334.499 to RP 334.687
South Roadway Section 15



RP 334.687 to RP 334.812
South Roadway Section 16

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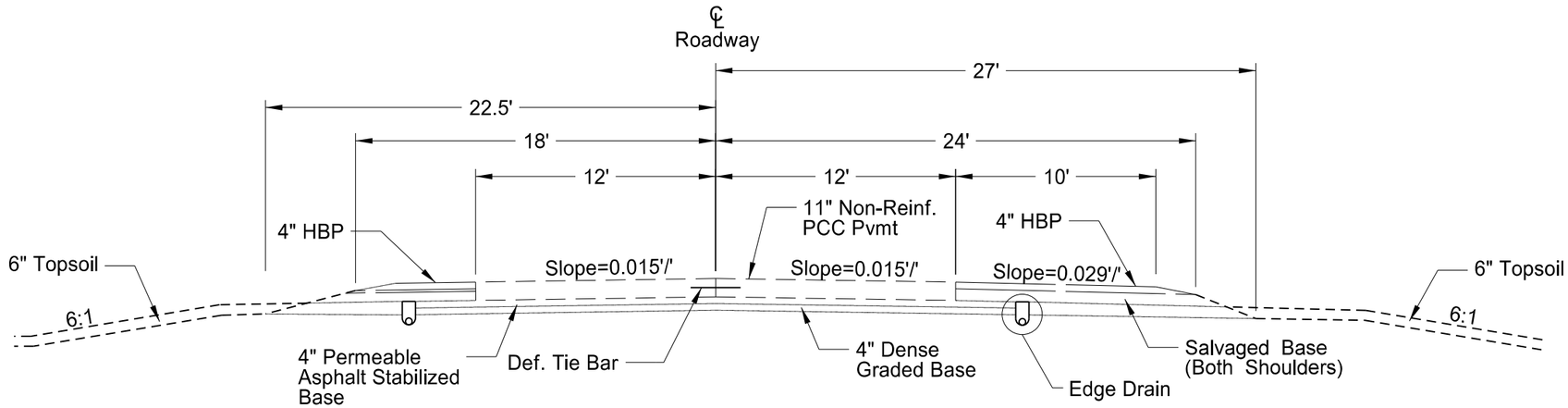
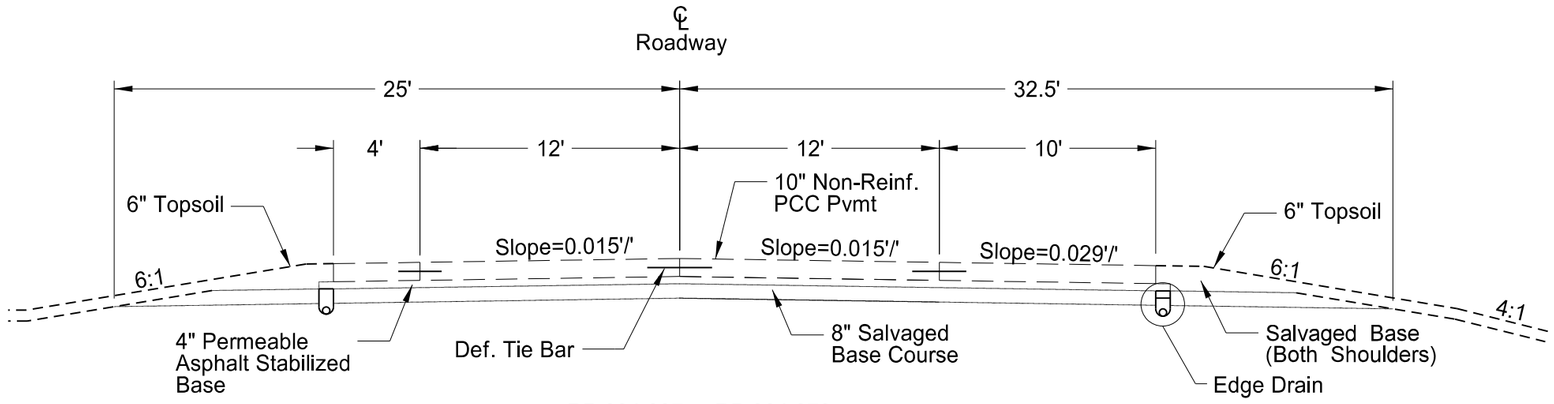
Existing Typical Section
I-94 Mainline Eastbound

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(091)331	030	9



RP 334.812 to RP 334.937
South Roadway Section 17



RP 334.937 to RP 334.970
RP 334.987 to RP 337.313
RP 337.358 to RP 338.576
South Roadway

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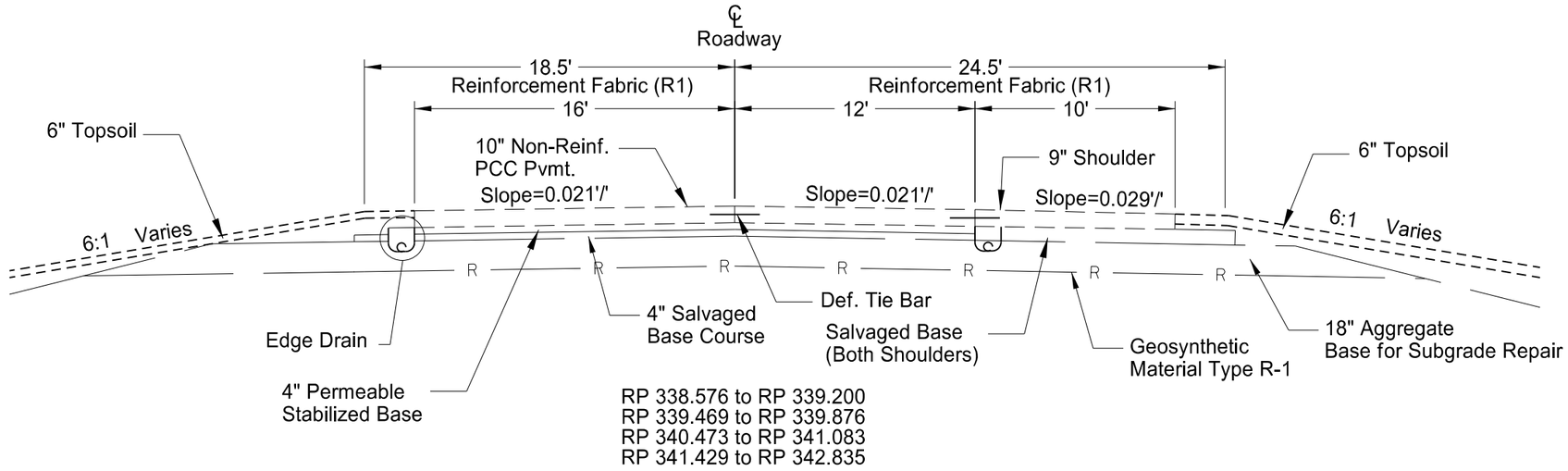
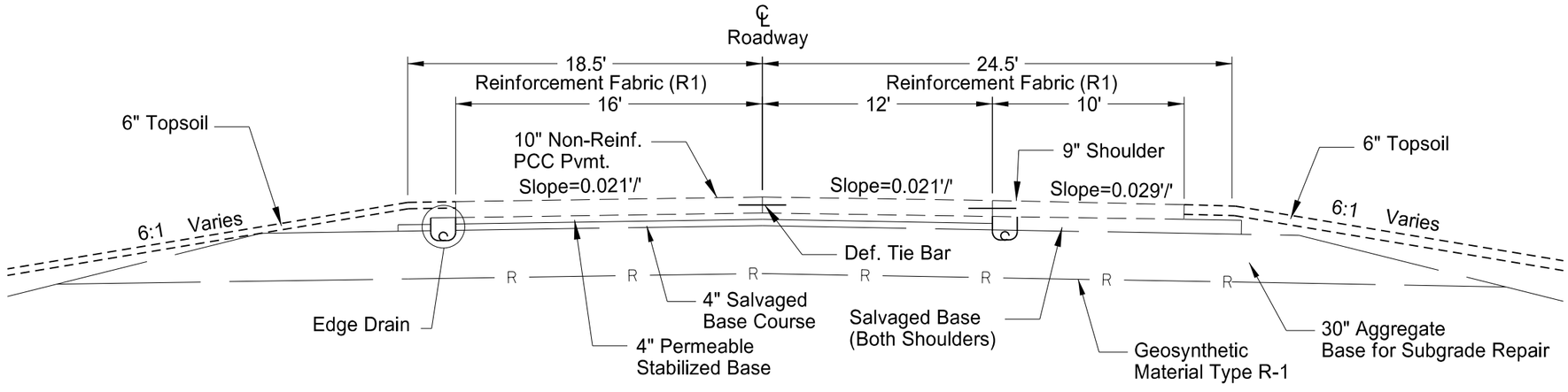
Existing Typical Section
I-94 Mainline Eastbound

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(091)331	030	10



RP 338.576 to RP 339.200
RP 339.469 to RP 339.876
RP 340.473 to RP 341.083
RP 341.429 to RP 342.835



RP 339.200 to RP 339.469
RP 339.876 to RP 340.473
RP 341.083 to RP 341.429

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Existing Typical Section
I-94 Eastbound Mainline

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-8-094(091)331	100	1

SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB TOTAL
D3-36	36"x6"	STREET NAME SIGN (Sign and installation only)		6	
G20-1-60	60"x24"	ROAD WORK NEXT __ MILES		34	
G20-1b-60	60"x24"	WORK IN PROGRESS/ NO WORK IN PROGRESS (Sign and installation only)		26	
G20-2-48	**48"x24"**	**END ROAD WORK**	**4**	**19**	**76**
G20-4-36	36"x18"	PILOT CAR FOLLOW ME (Mounted to back of pilot car)		18	
G20-10-108	**108"x48"**	**CONTRACTOR SIGN**	**1**	**64**	**64**
G20-50a-72	72"x36"	ROAD WORK NEXT __ MILES RT & LT ARROWS		37	
G20-52a-72	72"x24"	ROAD WORK NEXT __ MILES RT or LT ARROW		30	
G20-55-96	**96"x48"**	**SPEED LIMIT ENFORCED - MINIMUM FEE $80 WHEN WORKERS PRESENT**	**8**	**59**	**472**
M1-1-36	36"x36"	INTERSTATE ROUTE MARKER (Post and installation only)		10	
M1-4-24	24"x24"	U.S. ROUTE MARKER (Post and installation only)		10	
M1-5-24	24"x24"	STATE ROUTE MARKER (Post and installation only)		10	
M3-1-24	24"x12"	NORTH (Mounted on route marker post)		7	
M3-2-24	24"x12"	EAST (Mounted on route marker post)		7	
M3-3-24	24"x12"	SOUTH (Mounted on route marker post)		7	
M3-4-24	24"x12"	WEST (Mounted on route marker post)		7	
M4-8-24	24"x12"	DETOUR (Mounted on route marker post)		7	
M4-9-30	30"x24"	DETOUR ARROW RIGHT or LEFT/AHD AND RT or LT		15	
M4-10-48	48"x18"	DETOUR ARROW RIGHT or LEFT		23	
M5-1-21	21"x15"	ARROW AHD AND RT or LT(Mounted on route marker post)		7	
M5-2-21	21"x15"	ARROW AHD UP & RT or LT (Mounted on route marker post)		7	
M6-1-21	21"x15"	ARROW RT or LT (Mounted on route marker post)		7	
M6-2-21	21"x15"	ARROW UP & RT or LT (Mounted on route marker post)		7	
M6-3-21	21"x15"	ARROW AHD (Mounted on route marker post)		7	
R1-1-48	48"x48"	STOP		32	
R1-1a-18	**18"x18"**	**STOP and SLOW PADDLE Back to Back**	**2**	**5**	**10**
R1-2-60	**60"x60"**	**YIELD**	**2**	**29**	**58**
R2-1-48	**48"x60"**	**SPEED LIMIT __**	**18**	**39**	**702**
R2-1a-24	**24"x18"**	**MINIMUM FEE $80 (Mounted on Speed Limit post)**	**8**	**10**	**80**
R3-7-48	48"x48"	LEFT or RIGHT LANE MUST TURN LEFT or RIGHT		35	
R4-1-48	**48"x60"**	**DO NOT PASS**	**4**	**39**	**156**
R4-7-48	48"x60"	KEEP RIGHT SYMBOL		39	
R5-1-48	48"x48"	DO NOT ENTER		35	
R6-1-36	36"x12"	ONE WAY RIGHT or LEFT		13	
R7-1-12	12"x18"	NO PARKING		11	
R10-6-24	24"x36"	STOP HERE ON RED		16	
R11-2-48	48"x30"	ROAD CLOSED		28	
R11-2a-48	48"x30"	STREET CLOSED		28	
R11-3a-60	60"x30"	ROAD CLOSED __ MILES AHEAD LOCAL TRAFFIC ONLY		31	
R11-3c-60	60"x30"	STREET CLOSED __ MILES AHEAD LOCAL TRAFFIC ONLY		31	
R11-4a-60	60"x30"	STREET CLOSED TO THRU TRAFFIC		31	
W1-3-48	48"x48"	RIGHT or LEFT SHARP REVERSE CURVE ARROW		35	
W1-4-48	48"x48"	RIGHT or LEFT REVERSE CURVE ARROW		35	
W1-4b-48	48"x48"	DOUBLE RIGHT or LEFT REVERSE CURVE ARROW		35	
W1-6-48	48"x24"	LARGE ARROW		26	
W3-1-48	48"x48"	STOP AHEAD SYMBOL		35	
W3-3-48	48"x48"	SIGNAL AHEAD SYMBOL		35	
W3-4-48	48"x48"	BE PREPARED TO STOP		35	
W3-5-48	**48"x48"**	**SPEED REDUCTION AHEAD**	**4**	**35**	**140**
W4-2-48	**48"x48"**	**RIGHT or LEFT LANE TRANSITION SYMBOL**	**4**	**35**	**140**
W5-1-48	48"x48"	ROAD NARROWS		35	
W5-8-48	48"x48"	THRU TRAFFIC RIGHT LANE		35	
W5-9-48	48"x48"	ROAD WORK TRAFFIC ONLY DOWN & LT or RT ARROW		35	
W6-3-48	48"x48"	TWO WAY TRAFFIC SYMBOL		35	
W8-1-48	48"x48"	BUMP		35	
W8-3-48	48"x48"	PAVEMENT ENDS		35	
W8-7-48	48"x48"	LOOSE GRAVEL		35	
W8-9a-48	48"x48"	SHOULDER DROP-OFF		35	
W8-11-48	48"x48"	UNEVEN LANES		35	
W8-12-48	48"x48"	NO CENTER STRIPE		35	
W8-53-48	48"x48"	TRUCKS ENTERING HIGHWAY		35	
W8-54-48	48"x48"	TRUCKS ENTERING AHEAD or __FT.		35	
W8-55-48	48"x48"	TRUCKS CROSSING AHEAD or __ FT.		35	
W8-56-48	48"x48"	TRUCKS EXITING HIGHWAY		35	
W9-3a-48	48"x48"	CENTER LANE CLOSED SYMBOL		35	
W12-2-48	48"x48"	LOW CLEARANCE SYMBOL		35	
W13-1-24	24"x24"	__ MPH ADVISORY SPEED PLATE (Mounted on warning sign post)		11	
W13-4-48	**48"x60"**	**RAMP ARROW**	**2**	**39**	**78**
W14-3-48	48"x36"	NO PASSING ZONE		23	
W20-1-48	**48"x48"**	**ROAD WORK AHEAD or _FT or _ MILE**	**4**	**35**	**140**
W20-2-48	48"x48"	DETOUR AHEAD or __ FT		35	
W20-3-48	48"x48"	ROAD or STREET CLOSED AHEAD or __ FT.		35	
W20-4-48	48"x48"	ONE LANE ROAD AHEAD or __ FT.		35	
W20-5-48	**48"x48"**	**RIGHT or LEFT LANE CLOSED AHEAD or __ FT.**	**4**	**35**	**140**
W20-7a-48	**48"x48"**	**FLAGGING SYMBOL**	**2**	**35**	**70**
W20-7k-24	24"x18"	__ FEET (Mounted on warning sign post)		10	
W20-8-48	48"x48"	STREET CLOSED		35	
W20-51-48	48"x48"	EQUIPMENT WORKING		35	
W20-52-54	54"x12"	NEXT __ MILES (Mounted on warning sign post)		12	
W21-1a-48	48"x48"	WORKERS SYMBOL		35	
W21-2-48	48"x48"	FRESH OIL		35	
W21-3-48	48"x48"	ROAD MACHINERY AHEAD or __FT		35	

SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB TOTAL
W21-5-48	48"x48"	SHOULDER WORK		35	
W21-5a-48	48"x48"	RIGHT or LEFT SHOULDER CLOSED		35	
W21-5b-48	48"x48"	RIGHT or LEFT SHOULDER CLOSED AHEAD or __ FT.		35	
W21-6a-48	48"x48"	SURVEY CREW AHEAD		35	
W21-50-48	48"x48"	BRIDGE PAINTING AHEAD or __ FT.		35	
W21-51-48	48"x48"	MATERIAL ON ROADWAY		35	
W22-8-48	48"x48"	FRESH OIL LOOSE ROCK		35	
	24"x24"	TAKE TURNS (6" D letters) (Mounted on stop sign post)		11	

SPECIAL SIGNS

SPEC & CODE			
704-1000	**TRAFFIC CONTROL SIGNS**	**TOTAL UNITS**	**2326**

SPEC & CODE	DESCRIPTION	UNIT	QUANTITY
704-0100	**FLAGGING**	**MHR**	**500**
704-1041	ATTENUATION DEVICE-TYPE B-55	EACH	
704-1043	ATTENUATION DEVICE-TYPE B-65	EACH	
704-1044	ATTENUATION DEVICE-TYPE B-70	EACH	
704-1050	**TYPE I BARRICADES**	**EACH**	**20**
704-1051	TYPE II BARRICADES	EACH	
704-1052	**TYPE III BARRICADES**	**EACH**	**8**
704-1060	**DELINEATOR DRUMS**	**EACH**	**57**
704-1065	TRAFFIC CONES	EACH	
704-1067	**TUBULAR MARKERS**	**EACH**	**230**
704-1070	DELINEATOR	EACH	
704-1072	FLEXIBLE DELINEATORS	EACH	
704-1081	**VERTICAL PANELS - BACK TO BACK**	**EACH**	**50**
704-1085	SEQUENCING ARROW PANEL - TYPE A	EACH	
704-1086	SEQUENCING ARROW PANEL - TYPE B	EACH	
704-1087	**SEQUENCING ARROW PANEL - TYPE C**	**EACH**	**2**
704-1088	SEQUENCING ARROW PANEL - TYPE C - CROSSOVER	EACH	
704-1095	TYPE B FLASHERS	EACH	
704-1500	OBLITERATION OF PVMT MK	SF	
704-3501	PORTABLE PRECAST CONCRETE MED BARRIER	LF	
704-3510	PRECAST CONCRETE MED BARRIER - STATE FURNISHED	EACH	
762-0200	RAISED PAVEMENT MARKERS	EACH	
762-0420	SHORT TERM 4IN LINE - TYPE R	LF	
762-0430	SHORT TERM 4IN LINE - TYPE NR	LF	
772-2110	FLASHING BEACON - POST MOUNTED	EACH	

NOTE:
If additional signs are required, units will be calculated using the formula from Section III-19.06 of the Design Manual.
http://www.dot.nd.gov/

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Traffic Control Devices List

NDDOT ABBREVIATIONS

D-101-1

?	This is a special text character used in the labeling of existing features. It indicates a feature that has an unknown characteristic, potentially based on: lack of description, location accuracy or purpose.
Abn	abandoned
Abut	abutment
Ac	acres
Adj	adjusted
Aggr	aggregate
Ahd	ahead
ARV	air release valve
Align	alignment
Al	alley
Alt	alternate
Alum	aluminum
ADA	Americans with Disabilities Act
A	ampere
&	and
Appr	approach
Approx	approximate
ACP	asbestos cement pipe
Asph	asphalt
AC	asphalt cement
Assmd	assumed
@	at
Atten	attenuation
ATR	automatic traffic recorder
Ave	Avenue
Avg	average
ADT	average daily traffic
Az	azimuth
Bk	back
BF	back face
Bs	backsight
Balc	balcony
B Wire	barbed wire
Barr	barricade
Btry	battery
Brg	bearing
BI	beehive inlet
Beg	begin
BM	bench mark
Bkwy	bikeway
Bit	bituminous
Blk	block
Bd Ft	board feet
BH	bore hole
BS	both sides
Bot	bottom
Blvd	Boulevard
Bndry	boundary
BC	brass cap
Brkwy	breakaway
Br	bridge
Bldg	building
BV	butterfly valve
Byp	bypass
C Gdrl	cable guardrail
Calc	calculate
Cd	candela
CIP	cast iron pipe
CB	catch basin
CRS	cationic rapid setting
C Gd	cattle guard
C To C	center to center
Cl or ℄	centerline
Cm	centimeter
Ch	chain
Chnlk	chain-link
Ch Blk	channel block
Ch Ch	channel change
Chk	check
Chsld	chiseled
Cir	circle
Cl	class
Cl	clay
Cl F	clay fill
Cl Hvy	clay heavy
Cl Lm	clay loam
Clnt	clean-out
Clr	clear
Cl&gr	clearing & grubbing
Co S	coal slack
Comb.	combination
Coml	commercial
Compr	compression
CADD	computer aided drafting & design
Conc	concrete
Cond	conductor
Const	construction
Cont	continuous
CSB	continuous split barrel sample
Contr	contraction
Contr	contractor
CP	control point
Coord	coordinate
Cor	corner
Corr	corrected
CAES	corrugated aluminum end section
CAP	corrugated aluminum pipe
CMES	corrugated metal end section
CMP	corrugated metal pipe
CPVCP	corrugated poly-vinyl chloride pipe
CSES	corrugated steel end section
CSP	corrugated steel pipe
C	coulomb
Co	County
Crse	course
C Gr	course gravel
CS	course sand
Ct	Court
Xarm	cross arm
Xbuck	cross buck
Xsec	cross sections
Xing	crossing
Xrd	Crossroad
Crn	crown
CF	cubic feet
M3	cubic meter
M3/s	cubic meters per second
CY	cubic yard
Cy/mi	cubic yards per mile
Culv	culvert
C&G	curb & gutter
CI	curb inlet
CR	curb ramp
CS	curve to spiral
C	cut
Dd Ld	dead load
Defl	deflection
Defm	deformed
Deg or D	degree
Dlnt	delineate
Dlntr	delineator
Depr	depression
Desc	description
Det	detail
DWP	detectable warning panel
Dtr	detour
Dia	diameter
Dir	direction
Dist	distance
DM	disturbed material
DB	ditch block
DG	ditch grade
Dbl	double
Dn	down
Dwg	drawing
Dr	drive
Drwy	driveway
DI	drop inlet
D	dry density
Ea	each
Esmt	easement
E	East
EB	Eastbound
Elast	elastomeric
EL	electric locker
E Mtr	electric meter
Elec	electric/al
EDM	electronic distance meter
Elev or El	elevation
Ellipt	elliptical
Emb	embankment
Emuls	emulsion/emulsified
ES	end section
Engr	engineer
ESS	environmental sensor station
Eq	equal
Eq	equation
Evgr	evergreen
Exc	excavation
Exst	existing
Exp	expansion
Expy	Expressway
E	external of curve
Extru	extruded
FOS	factor of safety
F	Fahrenheit
FS	far side
F	farad
Fed	Federal
FP	feed point
Ft	feet/foot
Fn	fence
Fn P	fence post
FO	fiber optic
FB	field book
FD	field drive
F	fill
FAA	fine aggregate angularity
FS	fine sand
FH	fire hydrant
Fl	flange
Flrd	flared
FES	flared end section
F Bcn	flashing beacon
FA	flight auger sample
FL	flow line
Ftg	footing
FM	force main
Fs	foresight
Fnd	found
Fdn	foundation
Frac	fractional
Frwy	freeway
Frt	front
FF	front face
F Disp	fuel dispenser

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NDDOT ABBREVIATIONS

D-101-2

FFP	fuel filler pipes
FLS	fuel leak sensor
Furn	furnish/ed
Gal	gallon
Galv	galvanized
Gar	garage
Gs L	gas line
G Reg	gas line regulator
GMV	gas main valve
G Mtr	gas meter
GSV	gas service valve
GVP	gas vent pipe
GV	gate valve
Ga	gauge
Geod	geodetic
GIS	Geographical Information System
G	giga
GPS	Global Positioning System
Gov	government
Grd	graded/grade
Gr	gravel
Grnd	ground
GWM	ground water monitor
Gdrl	guardrail
Gtr	gutter
H Plg	H piling
Hdwl	headwall
Ha	hectare
Ht	height
HI	height of instrument
Hel	helical
H	henry
Hz	hertz
HDPE	high density polyethylene
HM	high mast
HP	high pressure
HPS	high pressure sodium
Hwy	highway
Hor	horizontal
HBP	hot bituminous pavement
HMA	hot mix asphalt
Hr	hour(s)
Hyd	hydrant
Ph	hydrogen ion content
Id	identification
In or "	inch
Incl	inclinometer tube
IMH	inlet manhole
ID	inside diameter
Inst	instrument
Intchg	interchange
Intmdt	intermediate
Intscn	intersection
Inv	invert
IM	iron monument
I Pn	Iron Pin
IP	iron Pipe
Jt	joint
J	joule
Jct	junction
K	kelvin
Kn	kilo newton
Kpa	kilo pascal
Kg	kilogram
Kg/m3	kilogram per cubic meter
Km	kilometer
K	Kip(s)
LS	Land Surveyor (licensed)
LSIT	Land Surveyor In Training
Ln	lane
Lg	large
Lat	latitude
Lt	left
L	length of curve
Lens	lenses
Lvl	level
LB	level book
Lvlng	leveling
Lht	light
LP	light pole
Ltg	lighting
Lig Co	lignite coal
Lig Sl	lignite slack
LF	linear foot
Liq	liquid
LL	liquid limit
L	litre
Lm	loam
Loc	location
LC	long chord
Long.	longitude
Lp	loop
LD	loop detector
Lm	lumen
Lum	luminaire
L Sum	lump sum
Lx	lux
ML	main line
M Hr	man hour
MH	manhole
Mkd	marked
Mkr	marker
Mkg	marking
MA	mast arm
Matl	material
Max	maximum
MC	meander corner
Meas	measure
Mdn	median
MD	median drain
MC	medium curing
M	mega
Mer	meridian
M	meter
M/s	meters per second
M	mid ordinate of curve
Mi	mile
MM	mile marker
MP	mile post
Ml	milliliter
Mm	millimeter
Mm/hr	millimeters per hour
Min	minimum
Misc	miscellaneous
Mon	monument
Mnd	mound
Mtbl	mountable
Mtd	mounted
Mtg	mounting
Mk	muck
Mun	municipal
N	nano
NGS	National Geodetic Survey
NS	near side
Neop	neoprene
Ntwk	network
N	newton
N	North
NE	North East
NW	North West
NB	Northbound
No. or #	number
Obsc	obscure(d)
Obsn	observation
Ocpd	occupied
Ocpy	occupy
Off Loc	office location
O/s	offset
OC	on center
C	one dimensional consolidation
OC	organic content
Orig	original
O To O	out to out
OD	outside diameter
OH	overhead
PMT	pad mounted transformer
Pg	pages
Pntd	painted
Pr	pair
Pnl	panel
Pk	park
PK	Parker-Kalon nail
Pa	pascal
PSD	passing sight distance
Pvmt	pavement
Ped	pedestal
Ped	pedestrian
PPP	pedestrian pushbutton post
Pen.	penetration
Perf	perforated
Per.	perimeter
PL	pipeline
Pl	place
P&P	plan & profile
PL	plastic limit
Pl	plate
Pt	point
PCC	point of compound curve
PC	point of curve
PI	point of intersection
PRC	point of reverse curvature
PT	point of tangent
POC	point on curve
POT	point on tangent
PE	polyethylene
PVC	polyvinyl chloride
PCC	Portland Cement concrete
Lb or #	pounds
PP	power pole
Preempt	preemption
Prefab	prefabricated
Prfmd	preformed
Prep	preperation
Press.	pressure
PRV	pressure relief valve
Prestr	prestressed
Pvt	private
PD	private drive
Prod.	production/produce
Prog	programmed
Prop.	property
Prop Ln	property line
Ppsd	proposed
PB	pull box

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NDDOT ABBREVIATIONS

Qty	quantity
Qtr	quarter
Rad or R	radius
RR	railroad
Rlwy	railway
Rsd	raised
RTP	random traverse point
Rge or R	range
RC	rapid curing
Rec	record
Rcy	recycle
RAP	recycled asphalt pavement
RPCC	recycled portland cement concrete
Ref	reference
R Mkr	reference marker
RM	reference monument
Refl	reflectorized
RCB	reinforced concrete box
RCES	reinforced concrete end section
RCP	reinforced concrete pipe
RCPS	reinforced concrete pipe sewer
Reinf	reinforcement
Res	reservation
Ret	retaining
Rev	reverse
Rt	right
R/W	right of way
Riv	river
Rd	road
Rdbd	road bed
Rdwy	roadway
RWIS	roadway weather information system
Rk	rock
Rt	route
Salv	salvage(d)
Sd	sand
Sdy Cl	sandy clay
Sdy Cl Lm	sandy clay loam
Sdy Fl	sandy fill
Sdy Lm	sandy loam
San	sanitary sewer line
Sc	scoria
Sec	seconds
Sec	section
SL	section line
Sep	separation
Seq	sequence
Serv	service
Sh	shale
Sht	sheet
Shtng	sheeting
Shldr	shoulder
Sw	sidewalk
S	siemens
SD	sight distance
SN	sign number
Sig	signal
Si Cl	silt clay
Si Cl Lm	silty clay loam
Si Lm	silty loam
Sgl	single
SC	slow curing
SS	slow setting
Sm	small
S	South
SE	South East
SW	South West
SB	Southbound
Sp	spaces
Spcl	special
SA	special assembly
SP	special provisions
G	specific gravity
Spk	spike
SC	spiral to curve
ST	spiral to tangent
SB	split barrel sample
SH	sprinkler head
SV	sprinkler valve
Sq	square
SF	square feet
Km2	square kilometer
M2	square meter
SY	square yard
Stk	stake
Std	standard
N	standard penetration test
Std Specs	standard specifications
Sta	station
Sta Yd	station yards
Stm L	steam line
SEC	steel encased concrete
SMA	stone matrix asphalt
SSD	stopping sight distance
SD	storm drain
St	street
SPP	structural plate pipe
SPPA	structural plate pipe arch
Str	structure
Subd	subdivision
Sub	subgrade
Sub Prep	subgrade preperation
Ss	subsoil
SE	superelevation
SS	supplement specification
Supp	supplemental
Surf	surfacing
Surv	survey
Sym	symmetrical
SI	systems international
Tan	tangent
T	tangent (semi)
TS	tangent to spiral
Tel	telephone
Tel B	Telephone Booth
Tel P	telephone pole
Tv	television
Temp	temperature
Temp	temporary
TBM	temporary bench mark
T	tesla
T	thinwall tube sample
T/mi	tons per mile
Ts	topsoil
Twp or T	township
Traf	traffic
TSCB	traffic signal control box
Tr	trail
Transf	transformer
TB	transit book
Trans	transition
TT	transmission tower
Trans	transverse
Trav	traverse
TP	traverse point
Trtd	treated
Trmt	treatment
Qc	triaxial compression
TERO	tribal employment rights ordinance
Tpl	triple
TP	turning point
Typ	typical
Qu	unconfined compressive strength
Ugrnd	underground
USC&G	US Coast & Geodetic Survey
USGS	US Geologic Survey
Util	utility
VG	valley gutter
Vap	vapor
Vert	vertical
VC	vertical curve
VCP	vitrified clay pipe
V	volt
Vol	volume
Wkwy	walkway
W	water content
WGV	water gate valve
WL	water line
WM	water main
WMV	water main valve
W Mtr	water meter
WSV	water service valve
WW	water well
W	watt
Wrng	wearing
Wb	weber
WIM	weigh in motion
W	west
WB	westbound
Wrng	wiring
W/	with
W/o	without
WC	witness corner
WGS	world geodetic system
Z	zenith

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NDDOT UTILITY COMPANY AND ORGANIZATION ABBREVIATIONS

D-101-10

702COM	702 Communications
ACCENT	Accent Communications
AGASSIZ WU	Agassiz Water Users Incorporated
AGC	Assiociated General Contractors of America
All PI	Alliance Pipeline
ALL SEAS WU	All Seasons Water Users Association
AMOCO PI	Amoco Pipeline Company
AMRDA HESS	Amerada Hess Corporation
AT&T	AT&T Corporation
B PAW	Bear Paw Energy Incorporated
BAKER ELEC	Baker Electric
BASIN ELEC	Basin Electric Cooperative Incorporated
BEK TEL	Bek Communications Cooperative
BELLE PL	Belle Fourche Pipeline Company
BLM	Bureau of Land Management
BNSF	Burlington Northern Santa Fe Railway
BOEING	Boeing
BRNS RWD	Barnes Rural Water District
BURK-DIV ELEC	Burke-Divide Electric Cooperative
BURL WU	Burleigh Water Users
Cable One	Cable One
CABLE SERV	Cable Services
CAP ELEC	Capital Electric Cooperative Incorporat
CASS CO ELEC	Cass County Electric Cooperative
CASS RWU	Cass Rural Water Users Incorporated
CAV ELEC	Cavalier Rural Electric Cooperative
CBLCOM	Cablecom Of Fargo
CENEX PL	Cenex Pipeline
CENT PL WATER DIST	Central Pipe Line Water District
CENT PWR ELEC	Central Power Electric Cooperative
COE	Corps of Engineers
CONS TEL	Consolidated Telephone
CONT RES	Continental Resource Inc
CPR	Canadian Pacific Railway
D O E	Department Of Energy
DAK CARR	Dakota Carrier Network
DAK CENT TEL	Dakota Central Telephone
DAK RWD	Dakota Rural Water District
DGC	Dakota Gasification Company
DICKEY R NET	Dickey Rural Networks
DICKEY RWU	Dickey Rural Water Users Association
DICKEY TEL	Dickey Telephone
DNRR	Dakota Northern Railroad
DOME PL	Dome Pipeline Company
DVELEC	Dakota Valley Electric Cooperative
DVMW	Dakota, Missouri Valley & Western
ENBRDG	Enbridge Pipelines Incorporated
ENVENTIS	Enventis Telephone
FALK MNG	Falkirk Mining Company
FHWA	Federal Highway Administration
G FKS-TRL WD	Grand Forks-traill Water District
GETTY TRD & TRAN	Getty Trading & Transportation
GLDN W ELEC	Golden West Electric Cooperative
GRGS CO TEL	Griggs County Telephone
GT PLNS NAT GAS	Great Plains Natural Gas Company
HALS TEL	Halstad Telephone Company
IDEA1	Idea1
INT-COMM TEL	Inter-Community Telephone Company
KANEB PL	Kaneb Pipeline Company
KEM ELEC	Kem Electric Cooperative Incorporated
KOCH GATH SYS	Koch Gathering Systems Incorporated
LKHD PL	Lakehead Pipeline Company
LNGDN RWU	Langdon Rural Water Users Incorporated
LWR YELL R ELEC	Lower Yellowstone Rural Electric
MCKNZ CON	McKenzie Consolidated Telcom
MCKNZ ELEC	McKenzie Electric Cooperative
MCKNZ WRD	McKenzie County Water Resource District
MCLEOD	McLeod USA
MCLN ELEC	McLean Electric Cooperative
MCLN-SHRDN R WAT	McLean-Sheridan Rural Water
MDU	Montana-dakota Utilities
MID-CONT CABLE	Mid-Continent Cable
MIDSTATE TEL	Midstate Telephone Company
MINOT CABLE	Minot Cable Television
MINOT TEL	Minot Telephone Company
MISS W W S	Missouri West Water System
MNKOTA PWR	Minnkota Power
MOR-GRAN-SOU ELEC	Mor-gran-sou Electric Cooperative
MOUNT-WILLI ELEC	Mountrail-williams Electric Cooperative
MRE LBTY TEL	Moore & Liberty Telephone
MUNICIPAL	City Water And Sewer
MUNICIPAL	City Of '.....'
N CENT ELEC	North Central Electric Cooperative
N VALL W DIST	North Valley Water District
ND PKS & REC	North Dakota Parks And Recreation
ND TEL	North Dakota Telephone Company
NDDOT	North Dakota Department of Transportation
NDSU SOIL SCI DEPT	NDSU Soil Science Department
NEMONT TEL	Nemont Telephone
NODAK R ELEC	Nodak Rural Electric Cooperative
NOON FRMS TEL	Noonan Farmers Telephone Company
NPR	Northern Plains Railroad
NSP	Northern States Power
NTH PRAIR RW	Northern Prairie Rural Water Association
NTHN BRDR PL	Northern Border Pipeline
NTHN PLNS ELEC	Northern Plains Electric Cooperative Incorporated
NTHWSTRN REF	Northwestern Refinery Company
NW COMM	Northwest Communication Cooperation
ONEOK	Oneok gas
OSHA	Occupational Safety and Health Administration
OTTR TL PWR	Otter Tail Power Company
P L E M	Prairielands Energy Marketing
POLAR COM	Polar Communications
PVT ELEC	Private Electric
QWEST	Qwest Communications
R&T W SUPPLY	R & T Water Supply Association
RAMSEY R SEW	Ramsey Rural Sewer Association
RAMSEY RW	Ramsey Rural Water Association
RAMSEY UTIL	Ramsey County Rural Utilities
RED RIV TEL	Red River Rural Telephone
RESVTN TEL	Reservation Telephone
ROBRTS TEL	Roberts Company Telephone
R-RIDER ELEC	Roughrider Electric Coop
RRVW	Red River Valley & Western Railroad
RSR ELEC	R.S.R. Electric Cooperative
S E W U	South East Water Users Incorporated
SCOTT CABLE	Scott Cable Television Dickinson
SHERDN ELEC	Sheridan Electric Cooperative
SHEYN VLY ELEC	Sheyenne Valley Electric Cooperative
SKYTECH	Skyland Technologies Incorporated
SLOPE ELEC	Slope Electric Cooperative Incorporated
SOURIS RIV TELCOM	Souris River Telecommunications
ST WAT COMM	State Water Commission
STATE LN WATER	State Line Water Cooperative
STER ENG	Sterling Energy
STUT RWU	Stutsman Rural Water Users
SW PL PRJ	Southwest Pipeline Project
T M C	Turtle Mountain Communications
TCI	TCI of North Dakota
TESORO HGH PLNS PL	Tesoro High Plains Pipeline
TRI-CNTY WU	Tri-County Water Users Incorporated
TRL CO RWU	Traill County Rural Water Users
UNTD TEL	United Telephone
UPPR SOUR WUA	Upper Souris Water Users Association
US SPRINT	U.S. Sprint
USAF MSL CABLE	U.S.A.F. Missile Cable
USFWS	US Fish and Wildlife Service
USW COMM	U.S. West Communications
VRNDRY ELEC	Verendrye Electric Cooperative
W RIV TEL	West River Telephone Incorporated
WEB	W. E. B. Water Development Association
WILLI RWA	Williams Rural Water Association
WILSTN BAS PL	Williston Basin Interstate Pipeline Company
WLSH RWD	Walsh Water Rural Water District
WOLVRTN TEL	Wolverton Telephone
XLENER	Xcel Energy
YSVR	Yellowstone Valley Railroad

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Line Styles

- Limits of Const Transition Line
- Bale Check
- Rock Check
- Sight Distance Triangle Line
- Small Hidden Object
- Dimension Leader
- Existing Ground
- Existing Topsoil (Cross Section View)
- Large Hidden Object
- Edge Drain
- Geotextile Fabric Type D
- Existing Electrical
- Existing Fiber Optic Line
- Existing TV Fiber Optic
- Existing Gas Pipe
- Geogrid
- Existing Overhead Utility Line
- Existing Power
- Existing Fuel Pipeline
- Existing Undefined Above Ground Pipe Line
- Geotextile Fabric Type R
- Geotextile Fabric Type R1
- Remove Line
- Geotextile Fabric Type RR
- Geotextile Fabric Type S
- Floating Silt Curtain
- Existing Telephone Line
- Existing TV Line
- Existing Assumed Ground (Not Surveyed)
- Tentative Ground Line
- Existing Water or Steam Line
- Existing Under Drain
- Under Drain
- Wall
- Existing Slotted Drain
- Existing Cemetary Boundary
- Centerline Pavement Marking
- Barrier with Centerline Pavement Marking
- Barrier Pavement Marking
- Stripe 4 IN Dotted Extension White
- Stripe 8 IN Dotted Extension White
- Stripe 8 IN Lane Drop
- Wetland Mitigation
- Existing Box Culvert Bridge
- Existing Concrete Surface
- Existing Drainage Structure
- Easement
- Existing Concrete
- Existing Easement
- Existing Gravel Surface
- Existing Aggregate (Cross Section View)
- Existing Curb and Gutter (Cross Section View)
- Existing Riprap
- Existing Underground Vault or Lift Station
- Tangent Line
- Hidden Object
- Existing Dirt Surface
- Existing Conduit
- Topsoil Profile
- Existing Conductor
- Conductor
- Fiber Optic
- Existing Loop Detector
- Subgrade, Subcut or Ditch Grade
- Existing Asphalt Surface
- Existing Asphalt (Cross Section View)
- Existing Reinforcement Rebar
- Existing Tie Point Line
- Existing State or International Line
- Existing Quarter Section Line
- Existing County
- Existing Section Line
- Existing Township
- Existing Railroad Centerline
- Centerline
- Existing Centerline
- Supplemental Contour
- Right of Way
- Existing Right of Way
- Existing Right of Way Railroad
- Failure Line
- Existing Conditions
- Existing Ground (Details)
- Existing Sixteenth Section Line
- Existing Right of Way Not State Owned
- Phantom Object
- Centerline Main
- Existing Guardrail Cable
- Existing Guardrail Metal
- Existing Edge of Water
- Excavation Limits
- Existing Government Lot Line
- Existing Adjacent Block Lines
- Existing Adjacent Lot Lines
- Existing Adjacent Property Line
- Existing Adjacent Subdivision Lines

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D-101-21

Line Styles

- Subgrade Reinforcement
- Existing Down Guy Wire Down Guy
- Existing Fence
- Existing Railroad
- Existing Sanitary Sewer
- Existing Sanitary Force Main
- Existing Storm Drain
- Existing Storm Drain Force Main
- Fence
- Silt Fence
- Existing Field Line
- Exst Flow
- Flow
- Existing Culvert
- Existing Curb
- Existing Valley Gutter
- Existing Driveway Gutter
- Existing Curb and Gutter
- Existing Mountable Curb and Gutter
- Existing Double Micro Loop Detector
- Micro Loop Detector Double
- Existing Overhead Sign Structure
- Existing Micro Loop Detector
- Micro Loop Detector
- Existing Overhead Sign Structure Cantilever
- Existing Railroad Switch
- Overhead Sign Structure Cantilever
- 24 Inch Pipe
- Reinforced Concrete Pipe
- Signal Head with Mast Arm
- Existing Signal Head with Mast Arm
- Tie Bar at Random Spacing
- 3-Cable w Posts
- Existing 3-Cable w Posts
- Site Boundary
- Fiber Rolls
- Doweled Joint
- Tie Bar 30 Inch 4 Foot Center to Center
- Tie Bar 18 Inch 3 Foot Center to Center
- Existing Berm, Dike, Pit, or Earth Dam
- Existing Ditch Block
- Depression Contours
- Existing City Corporate Limits or Reservation Boundary
- Gravel Pit - Borrow Area
- Existing Tree Boundary
- Tree Row
- Existing Brush or Shrub Boundary
- Existing Retaining Wall
- Existing Planter or Wall
- Retaining Wall (Plan View)
- Sheet Piling
- W-Beam w Posts
- Existing W-Beam Guardrail with Posts
- Exst Wet Area-Vegetation Break
- Existing Wetland Delineated

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07-01-14	
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DATE	CHANGE

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Symbols

D-101-30

North Arrow (Half Scale)

Truck Mounted Attenuator

Type I Barricade

Type II Barricade

Type III Barricade

Catch Basin

Cairn or Stone Circle

Video Detection Camera

Storm Drain Cap or Stub

Corrugated Metal End Section 18 Inch

Corrugated Metal End Section 24 Inch

Corrugated Metal End Section 30 Inch

Corrugated Metal End Section 36 Inch

Corrugated Metal End Section 42 Inch

Corrugated Metal End Section 48 Inch

Concrete Foundation

Ground Connection Conductor

Neutral Connection Conductor

Phase 1 Connection Conductor

Phase 2 Connection Conductor

Traffic Cone

Signal Controller

Pad Mounted Signal Controller

Alignment Data Point

Emergency Vehicle Detector

Attenuation Device

Diamond Grade Delineator Type A

Diamond Grade Delineator Type B

Diamond Grade Delineator Type C

Diamond Grade Delineator Type D

Diamond Grade Delineator Type E

Flexible Delineator

Flexible Delineator Type A

Flexible Delineator Type B

Flexible Delineator Type C

Flexible Delineator Type D

Flexible Delineator Type E

Delineator Type A

Delineator Type A Reset

Delineator Type B

Delineator Type B Reset

Delineator Type C

Delineator Type D

Delineator Type E

Delineator Drums

Spot Elevation

Existing Access Control Arrow

Existing Artifact

Existing Flashing Beacon

Existing Benchmark

Existing Railroad Battery Box

Existing Bush or Shrub

Existing Gas Cap or Stub

Existing Sanitary Cap or Stub

Existing Storm Drain Cap or Stub

Existing Water Cap or Stub

Existing Sanitary Cleanout

Existing Concrete Foundation

Existing Traffic Signal Controller

Existing Pad Mounted Signal Controller

Existing Sixteenth Section Corner

Existing Quarter Section Corner

Existing Section Corner

Existing Railroad Crossbuck

Existing Satellite Dish

Existing Fuel Dispensers

Existing Flexible Delineator Type A

Existing Flexible Delineator Type B

Existing Flexible Delineator Type C

Existing Flexible Delineator Type D

Existing Flexible Delineator Type E

Existing Delineator Type A

Existing Delineator Type B

Existing Delineator Type C

Existing Delineator Type D

Existing Delineator Type E

Existing EFB Misc

Existing Flashing Beacon

Existing Pipe Mounted Flasher

Existing Pad Mounted Feed Point

Existing Pipe Mounted Feed Point with Pad

Existing Pole Mounted Feed Point

Existing Railroad Frog

Existing Snow Gate 18

Existing Snow Gate 28

Existing Snow Gate 40

Existing Headwall

Existing Pedestrian Head with Number

Existing Signal Head

Existing Sprinkler Head

Existing Fire Hydrant

Existing Catch Basin Drop Inlet

Existing Curb Inlet

Existing Manhole Inlet

Existing Junction Box

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Symbols

D-101-31

- Existing Light Standard
- Existing High Mast Light Standard 10 Luminaire
- Existing High Mast Light Standard 3 Luminaire
- Existing High Mast Light Standard 4 Luminaire
- Existing High Mast Light Standard 5 Luminaire
- Existing High Mast Light Standard 6 Luminaire
- Existing High Mast Light Standard 7 Luminaire
- Existing High Mast Light Standard 8 Luminaire
- Existing High Mast Light Standard 9 Luminaire
- Existing Overhead Sign Structure Load Center
- Existing Luminaire
- Existing Light Standard Luminaire
- Existing Federal Mailbox
- Existing Private Mailbox
- Existing Meander Section Corner
- Existing Meter
- Existing Electrical Manhole
- Existing Gas Manhole
- Existing Sanitary Manhole
- Existing Sanitary Force Main Manhole
- Existing Sanitary Manhole with Valve
- Existing Storm Drain Manhole
- Existing Force Main Storm Drain Manhole
- Existing Force Main Storm Drain Manhole with Valve
- Existing Telephone Manhole
- Existing Manhole with Valve Water
- Existing Water Manhole
- Existing Mile Post Type A
- Existing Mile Post Type B
- Existing Mile Post Type C
- Existing Reference Marker
- Existing RW Marker
- Existing Utility Marker
- Iron Monument Found
- Iron Pin R/W Monument
- Existing Object Marker Type I
- Existing Object Marker Type II
- Existing Object Marker Type III
- Existing Electrical Pedestal
- Existing Telephone Pedestal
- Existing Fiber Optic Telephone Pedestal
- Existing TV Pedestal
- Existing Fiber Optic TV Pedestal
- Existing Fuel Filler Pipes
- Existing Traverse PI Aerial Panel
- Existing Pole
- Existing Power Pole
- Existing Power Pole with Transformer
- Existing Telephone Pole
- Existing Wood Pole
- Existing Post
- Existing Pedestrian Push Button Post
- Existing Control Point CP
- Existing Control Point GPS-RTK
- Existing Control Point TRI
- Existing Reference Marker Point NGS
- Existing Pull Box
- Existing Intelligent Transportation Pull Box
- Existing Water Pump
- Existing Slotted Reinforced Concrete Pipe
- Existing RR Profile Spot
- Existing Fuel Leak Sensors
- Existing Highway Sign
- Existing Miscellaneous Spot
- Existing Lighting Standard Pole
- Existing Traffic Signal Standard
- Existing Transformer
- Existing Large Evergreen Tree
- Existing Small Evergreen Tree
- Existing Large Tree
- Existing Small Tree
- Existing Tree Trunk
- Existing Pad Mounted Traffic Signal Control Box
- Existing Undefined Manhole
- Existing Undefined Pull Box
- Existing Undefined Pedestal
- Existing Undefined Valve
- Existing Undefined Pipe Vent
- Existing Gas Valve
- Existing Water Valve
- Existing Fuel Pipe Vent
- Existing Gas Pipe Vent
- Existing Sanitary Pipe Vent
- Existing Storm Drain Pipe Vent
- Existing Water Pipe Vent
- Existing Weather Station
- Existing Ground Water Well Bore Hole
- Existing Windmill or Tower
- Existing Witness Corner
- Flashing Beacon
- Flagger
- Pipe Mounted Flasher
- Sanitary Force Main with Valve

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Symbols

D-101-32

- Pad Mounted Feed Point
- Pipe Mounted Feed Point with Pad
- Pole Mounted Feed Point
- Headwall
- Double Headwall with Vegitation Barrier
- Single Headwall with Vegitation Barrier
- Pole Mounted Head
- Sprinkler Head
- Fire Hydrant
- Inlet Type 1
- Inlet Type 2
- Double Inlet Type 2
- Inlet Grate Type 2
- Junction Box
- High Mast Light Standard 10 Luminaire
- High Mast Light Standard 3 Luminaire
- High Mast Light Standard 4 Luminaire
- High Mast Light Standard 5 Luminaire
- High Mast Light Standard 6 Luminaire
- High Mast Light Standard 7 Luminaire
- High Mast Light Standard 8 Luminaire
- High Mast Light Standard 9 Luminaire
- Relocate Light Standard
- Overhead Sign Structure Load Center
- Light Standard 100 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 1000 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 150 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 175 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 200 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 250 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 310 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 35 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 400 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 50 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 70 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 700 Watt High Pressure Sodium Vapor Luminaire
- Manhole
- Manhole 48 Inch
- Sanitary Force Main Manhole
- Sanitary Sewer Manhole
- Storm Drain Manhole
- Storm Drain Manhole with Inlet
- Reset Mile Post
- Mile Post Type A
- Mile Post Type B
- Mile Post Type C
- Right of Way Marker
- Tubular Marker
- Alignment Monument
- Iron Pin Reference Monument
- Object Marker Type I
- Object Marker Type II
- Object Marker Type III
- Caution Mode Arrow Panel
- Back to Back Vertical Panel Sign
- Double Direction Arrow Panel
- Left Directional Arrow Panel
- Right Directional Arrow Panel
- Sequencing Arrow Panel
- Truck Mounted Arrow Panel
- Power Pole
- Wood Pole
- Pedestrian Push Button Post
- Property Corner
- Pull Box
- Intelligent Transportation Pull Box
- Sanitary Pump
- Storm Drain Pump
- Reinforced Pavement
- Reinforced Concrete End Section 15 Inch
- Reinforced Concrete End Section 18 Inch
- Reinforced Concrete End Section 24 Inch
- Reinforced Concrete End Section 30 Inch
- Reinforced Concrete End Section 36 Inch
- Reinforced Concrete End Section 42 Inch
- Reinforced Concrete End Section 48 Inch
- Reinforced Concrete End Section 54 Inch
- Reset Right of Way Marker
- Reset USGS Marker
- Right of Way Markers
- Riser 30 Inch
- Continuous Split Barrel Sample (CSB)
- Flight Auger Sample (FA)
- Split Barrel Sample (SB)
- Thinwall Tube Sample
- Highway Sign
- SNOW GATE 18 FT
- SNOW GATE 28 FT
- SNOW GATE 40 FT
- Standard Penetration Test (N)
- Transformer
- Inclinometer Tube (Incl)
- Underdrain Cleanout
- Excavation Unit
- Water Valve

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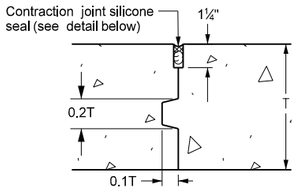
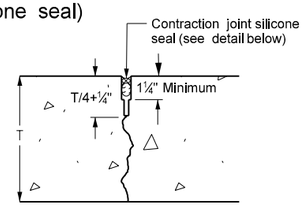
LONGITUDINAL JOINT DETAILS

D-550-2

UNTIED JOINTS (silicone seal)

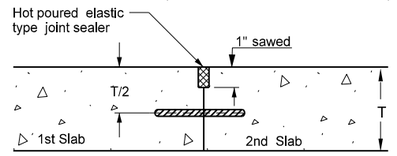


Sawed longitudinal joint with keyway



Sawed longitudinal joint without keyway

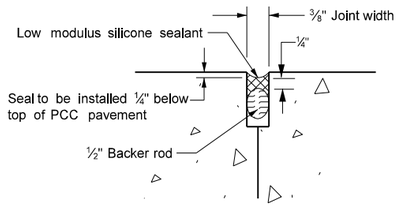
TIED JOINTS (hot poured elastic seal)



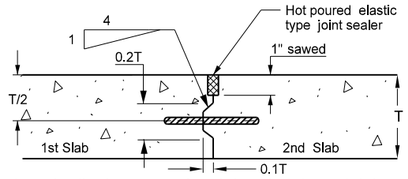
Longitudinal construction joint (tied butt joint)

Notes:

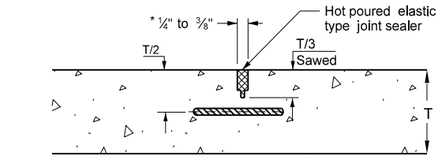
1. The hot poured elastic type joint sealer shall be in accordance with Section 826.02A.2 of the Standard Specifications.
2. The longitudinal joint and seal shall be included in the price bid for the P.C.C. pavement.
3. Tie bars shall not be placed within 18 inches of a transverse skewed joint.
4. Where tie bars are installed bent and later straightened, Grade 40 steel shall be used.
5. Tie bar spacing can be increased up to 10% to facilitate construction.
6. Tie Bars shall be at a 48 inch maximum spacing.
7. A "Warp" joint is a sawed joint or a construction joint with a keyway.
8. A "Butt joint" is a construction joint with no keyway.



Contraction joint silicone seal



Longitudinal construction joint (tied keyed joint)



* Width requirement for top 1" only, bottom portion of saw cut may be narrower

Sawed longitudinal joint

TIEBAR SPACINGS (In)

BAR SIZE / GRADE STEEL / BAR LENGTH / DIST TO FREE EDGE (FT) / JOINT TYPE / PVMT THICKNESS

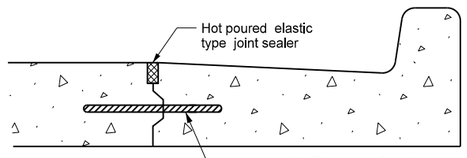
PVMT THICKNESS	JOINT TYPE	# 3 BAR GRADE 40 24"				# 3 BAR GRADE 60 30"					
		4	6	8	10	4	6	8	10	12	14
6"	WARP		48	39			48	48			
	BUTT		37	27			48	42			
8"	WARP	48	39	29	24	48	48	44	35	29	25
	BUTT	42	27			48	42	31	25		
8½"	WARP	48	37	28		48	48	42	33	28	24
	BUTT	39	26			44	39	29			
9"	WARP	48	35	26		48	48	39	31	26	
	BUTT	37	24			48	37	27			
9½"	WARP	48	33	25		48	48	37	30	25	
	BUTT	35				48	35	26			
10"	WARP	47	31			48	47	35	28		
	BUTT	33				48	33	25			
10½"	WARP	45	30			48	45	34	27		
	BUTT	32				48	32	24			
11"	WARP	43	28			48	43	32	26		
	BUTT	30				46	30				
11½"	WARP	41	27			48	41	31	24		
	BUTT	29				44	29				
12"	WARP	39	26			48	39	29			
	BUTT	27				42	27				
12½"	WARP	38	25			48	38	28			
	BUTT	27				40	27				
13"	WARP	36	24			48	36	27			
	BUTT	25				38	25				
13½"	WARP	35				48	35	26			
	BUTT	25				37	25				
14"	WARP	34				48	34	25			
	BUTT	24				35	24				
14½"	WARP	32				48	32	24			
	BUTT					34					
15"	WARP	31				47	31				
	BUTT					33					

PVMT THICKNESS	JOINT TYPE	# 4 BAR GRADE 40 24"					# 4 BAR GRADE 60 36"						
		8	10	12	14	16	8	10	12	14	16	22	24
6"	WARP	48					48						
	BUTT	48					48						
8"	WARP	48	42	35	30	26	48	48	48	45	39	28	26
	BUTT	37	29	24			48	44	37	32	27		
8½"	WARP	48	39	33	28	24	48	48	48	42	37	27	24
	BUTT	35	27				48	42	35	29	26		
9"	WARP	47	37	31	26		48	48	47	40	35	25	
	BUTT	33	26				48	40	33	28	25		
9½"	WARP	44	35	29	25		48	48	44	38	33	24	
	BUTT	31	25				47	37	31	27			
10"	WARP	42	34	28	24		48	48	42	36	31		
	BUTT	29	24				45	36	29	25			
10½"	WARP	40	32	26			48	48	40	34	30		
	BUTT	28					42	34	28	24			
11"	WARP	38	31	25			48	46	38	33	28		
	BUTT	27					40	32	27				
11½"	WARP	36	29	24			48	44	36	31	27		
	BUTT	25					39	31	25				
12"	WARP	35	28				48	42	35	30	26		
	BUTT	25					37	30	25				
12½"	WARP	33	27				48	40	33	29	25		
	BUTT						35	28					
13"	WARP	32	26				48	39	32	27	24		
	BUTT						34	27					
13½"	WARP	31	25				47	37	31	26			
	BUTT						33	26					
14"	WARP	30	24				45	36	30	25			
	BUTT						32	25					
14½"	WARP	29					43	35	29	25			
	BUTT						30	25					
15"	WARP	28					42	33	28	24			
	BUTT						29						

PVMT THICKNESS	JOINT TYPE	# 4 BAR GRADE 60 36"							# 5 BAR GRADE 40 30"						
		8	10	12	14	16	22	24	10	12	14	16	22	24	
6"	WARP														
	BUTT														
8"	WARP	48	48	48	45	39	28	26	48	48	47	41	30	27	
	BUTT	48	44	37	32	27			46	39	33	29			
8½"	WARP	48	48	48	42	37	27	24	48	48	48	44	38	28	25
	BUTT	48	42	35	29	26			44	36	31	27			
9"	WARP	48	48	47	40	35	25		48	48	42	36	26	24	
	BUTT	48	40	33	28	25			41	34	29	25			
9½"	WARP	48	48	44	38	33	24		48	46	39	34	25		
	BUTT	47	37	31	27				39	32	27	25			
10"	WARP	48	48	42	36	31			48	44	37	33	24		
	BUTT	45	36	29	25				37	31	26	24			
10½"	WARP	48	48	40	34	30			48	42	36	31			
	BUTT	42	34	28	24				35	29	25				
11"	WARP	48	46	38	33	28			48	40	34	30			
	BUTT	40	32	27					34	28	24				
11½"	WARP	48	44	36	31	27			46	38	32	28			
	BUTT	39	31	25					32	27					
12"	WARP	48	42	35	30	26			44	36	31	28			
	BUTT	37	30	25					31	25					
12½"	WARP	48	40	33	29	25			42	35	30	26			
	BUTT	35	28						29	25					
13"	WARP	48	39	32	27	24			40	33	29	25			
	BUTT	34	27						28						
13½"	WARP	47	37	31	26				39	32	28	24			
	BUTT	33	26						27						
14"	WARP	45	36	30	25				37	31	27				
	BUTT	32	25						26						
14½"	WARP	43	35	29	25				36	30	26				
	BUTT	30	25						25						
15"	WARP	42	33	28	24				35	29	25				
	BUTT	29							25						

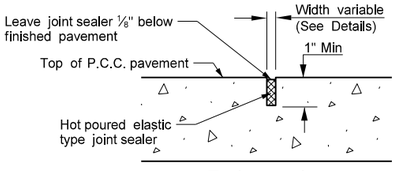
PVMT THICKNESS	JOINT TYPE	# 5 BAR GRADE 60 42"							# 6 BAR GRADE 40 36"						
		10	12	14	16	22	24		10	12	14	16	19	22	24
6"	WARP														
	BUTT														
8"	WARP	48	48	48	48	45	41		48	48	48	48	48	43	39
	BUTT	48	48	48	43	32	29		48	48	48	48	35	30	27
8½"	WARP	48	48	48	48	42	38		48	48	48	47	40	37	
	BUTT	48	48	47	41	30	27		48	48	45	39	33	28	26
9"	WARP	48	48	48	48	40	36		48	48	48	48	44	38	35
	BUTT	48	48	44	39	28	25		48	48	42	37	31	26	24
9½"	WARP	48	48	48	48	38	34		48	48	48	48	42	36	33
	BUTT	48	48	42	37	27	24		48	47	40	35	29	25	
10"	WARP	48	48	48	48	36	33		48	48	48	48	40	34	31
	BUTT	48	46	40	35	25			48	45	38	33	28	24	
10½"	WARP	48	48	48	47	34	31		48	48	48	45	38	33	30
	BUTT	48	44	38	33	24			48	42	36	32	27		
11"	WARP	48	48	48	45	32	30		48	48	48	43	36	31	28
	BUTT	48	42	36	32				48	40	35	30	25		
11½"	WARP	48	48	48	43	31	28		48	48	47	41	34	30	27
	BUTT	48	40	35	30				46	39	33	29	24		
12"	WARP	48	48	47	41	30	27		48	48	45	40	33	28	26
	BUTT	46	39	33	29				45	37	32	28			
12½"	WARP	48	48	45	39	28	26		48	48	43	38	32	27	25
	BUTT	44	37	32	27				42	35	30	27			
13"	WARP	48	48	43	38	27	25		48	48	41	36	30	26	24
	BUTT	42	35	30	27				41	34	29	25			
13½"	WARP	48	48	42	36	26	24		48	47	40	35	29	25	
	BUTT	41	34	29	25				39	33	28	25			
14"	WARP	48	48	41	36	26	24		48	45	38	34	28	24	
	BUTT	39	33	28	25				38	32	27	24			
14½"	WARP	48	48	40	35	25			48	43	37	32	27		
	BUTT	38	32	27	24				36	30	26				
15"	WARP	48	48	39	34	24			48	42	36	31	26		
	BUTT	37	31	26					35	29	25				

PVMT THICKNESS	JOINT TYPE	# 6 BAR GRADE 60 48"														
		10	12	14	16	19	22	24								
6"	WARP															
	BUTT															
8"	WARP	48	48	48	48	48	48	48								
	BUTT	48	48	48	48	48	45	41								
8½"	WARP	48	48	48	48	48	48	48								
	BUTT	48	48	48	48	48	42	39								
9"	WARP	48	48	48	48	48	48	48								
	BUTT	48	48	48	48	48	40	37								
9½"	WARP	48	48	48	48	48	48	48								
	BUTT	48	48	48	48	48	44	35								
10"	WARP	48	48	48	48	48	48	47								
	BUTT	48	48	48	48	42	36	33								
10½"	WARP	48	48	48	48	48	48	45								
	BUTT	48	48	48	48	40	34	31								
11"	WARP	48	48	48	48	48	47	43								
	BUTT	48	48	48	46	38	33	30								
11½"	WARP	48	48	48	48	48	45	41								
	BUTT	48	48	48	44	37	31	29								
12"	WARP	48	48	48	48	48	43	39								
	BUTT	48	48	48	42	35	30	27								
12½"	WARP	48	48	48	48	48	41	38								
	BUTT	48	48	45	40	34	29	26								
13"	WARP	48	48	48	48	48	46	40								
	BUTT	48	48	44	38	32	28	25								
13½"	WARP	48	48	48	48	44	38	35								
	BUTT	48	48	42	37	31	27	24								
14"	WARP	48	48	48	48	43	37	34								
	BUTT	48	47	40	35	30	26									
14½"	WARP	48	48	48	48	41	35	32								
	BUTT	48	46	39	34	29	25									
15"	WARP	48	48	48	47	40	34	31								
	BUTT	48	44	38	33	28	24									



Curb and gutter sections

JOINT SEALER DETAILS



Typical section

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

9-15-2010

REVISIONS

DATE	CHANGE
10/23/2012	Expanded Tie Bar Table

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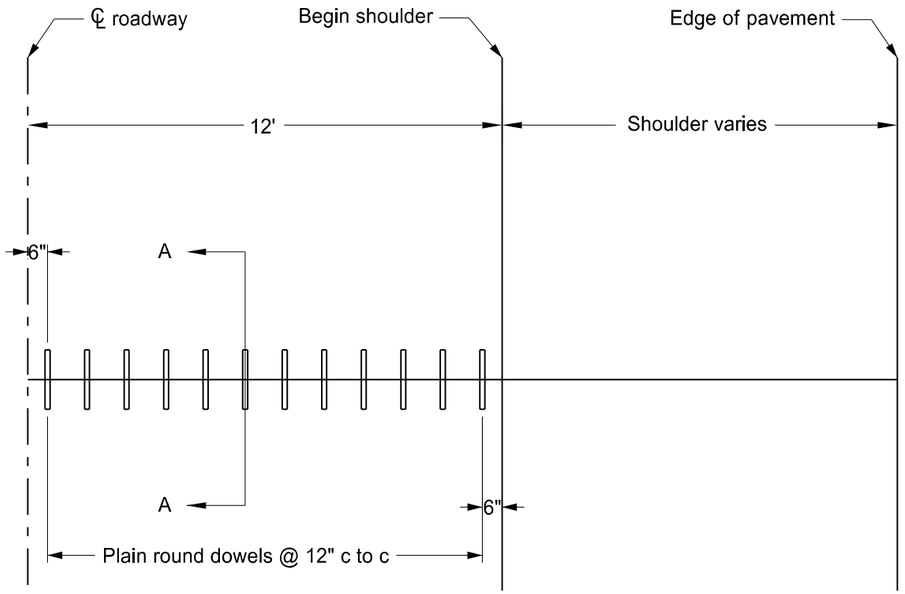
TRANSVERSE CONTRACTION JOINT DETAILS

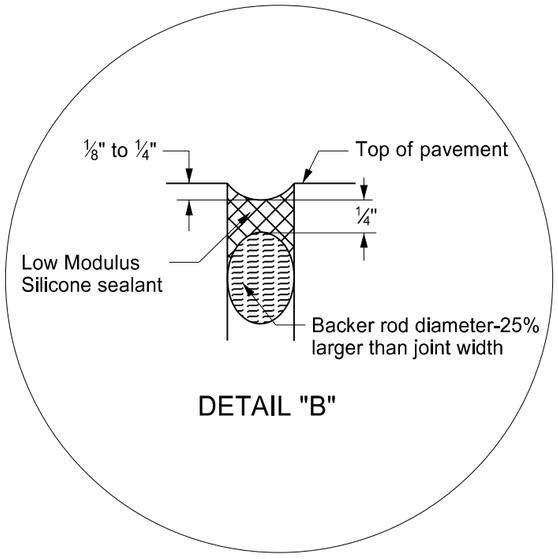
D-550-3



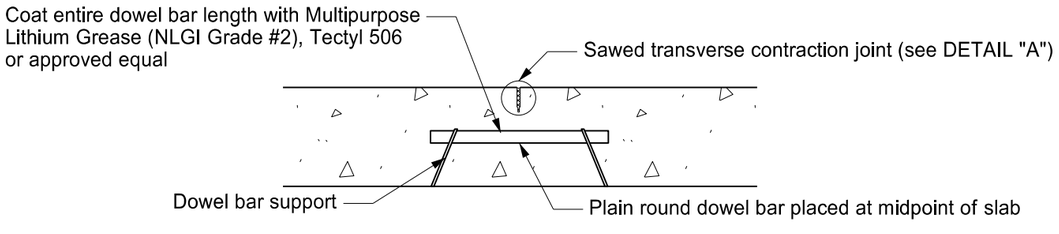
CONTRACTION JOINT DOWEL ASSEMBLY
(1/2 roadway shown)

Notes

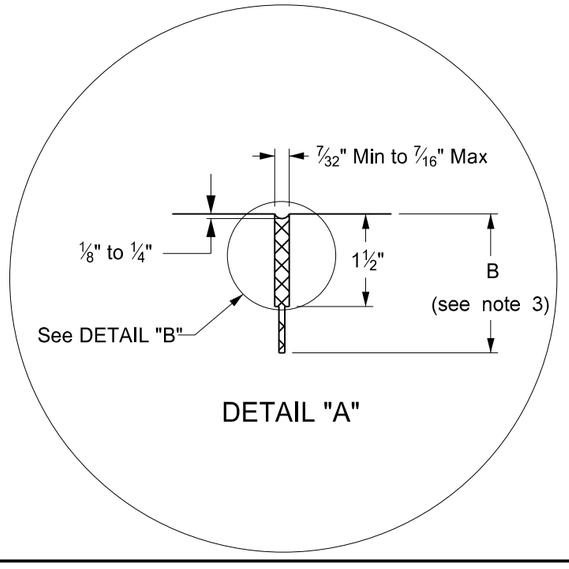
1. The joint seal details apply to both doweled and non-doweled (plain) transverse joints.
2. T = Thickness of pavement.
3. B = T/4 + ¼" for AE or YE for non-dowelled concrete pavement or
   B = T/3 for high early or dowelled concrete pavement



DETAIL "B"



SECTION A-A



DETAIL "A"

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-15-2010	
REVISIONS	
DATE	CHANGE
6/23/2014	Removed dowel size reference

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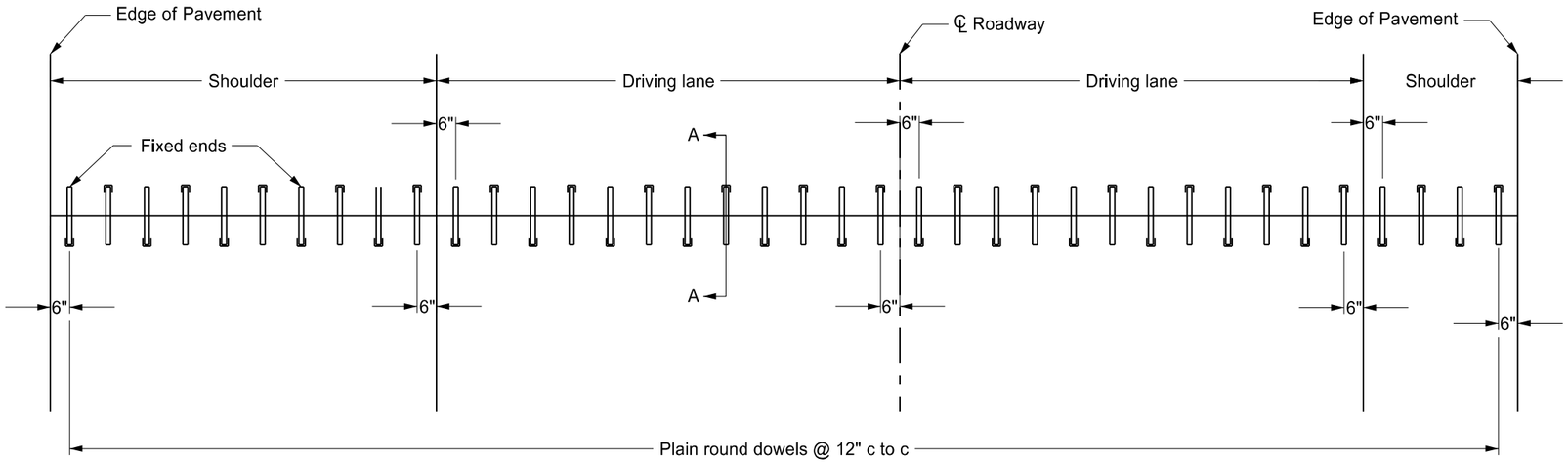
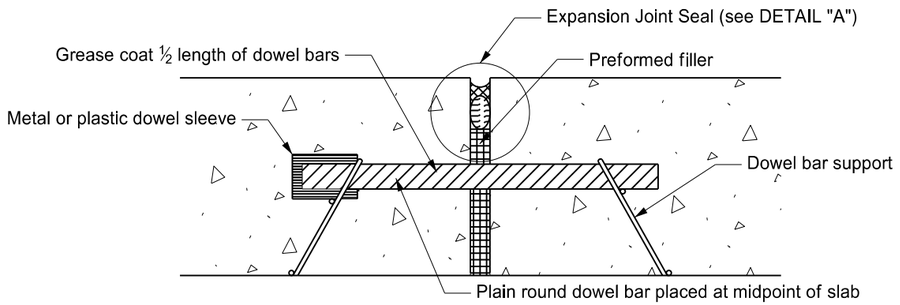
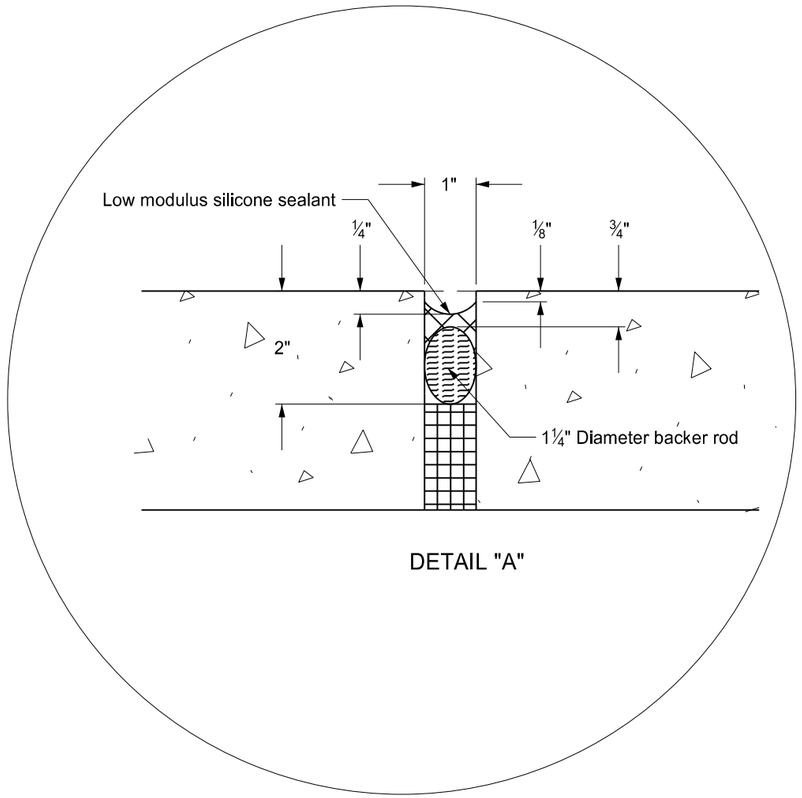
TRANSVERSE EXPANSION JOINT DETAIL



DOWELED EXPANSION JOINT ASSEMBLY



SECTION A-A



DETAIL "A"

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-15-2010	
REVISIONS	
DATE	CHANGE
6/23/2014	Removed dowel bar sizes

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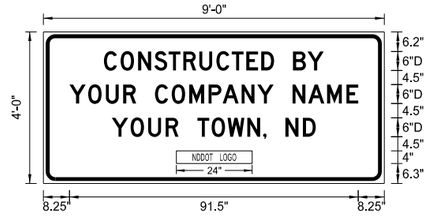
CONSTRUCTION SIGN DETAIL

D-704-5

SIGN NUMBER	G20-10-108
WIDTH x HEIGHT	9'-0" x 4'-0"
BORDER WIDTH	1.25" (inset 0.75")
CORNER RADIUS	3"
MOUNTING	Ground
BACKGROUND	TYPE: IV Reflective
	COLOR: Fluorescent Orange
LEGEND/BORDER	TYPE: Non-Refl
	COLOR: Black

SYMBOL	X	Y	WID	HT	ANGLE
	42.1	6.2	24	4	0

STATION(S): AREA: 36.0 Sq.Ft.



Dimensions are in inches.tenths

Letter locations are panel edge to lower left corner

LETTER POSITION (X)																			LENGTH	SIZE	SERIES
C	O	N	S	T	R	U	C	T	E	D		B	Y						69.7	6	D 2000
19.2	24.5	30	35.1	39.7	44.3	49.4	54.8	59.7	64.3	69	73.1	79.1	83.7								
Y	O	U	R		C	O	M	P	A	N	Y		N	A	M	E			91.5	6	D 2000
8.3	14.2	19.8	25.3	29.4	35.4	40.7	46.2	52.4	56.8	62.8	67.8	72.9	78.9	83.9	89.9	96					
Y	O	U	R		T	O	W	N	,		N	D							64.6	6	D 2000
21.7	27.6	33.2	38.7	42.8	48.8	53.3	58.4	64.6	69.6	70.7	76.7	82.2									

Notes:

1. Sign shall be placed a distance of ½A following the End Road Work (G20-2a-48) sign. There shall be a maximum of 2 signs per project.
2. Sign shall be post mounted.
3. Sign required on rural projects with a 30 day or longer duration and it is not required on seal coat projects or other short duration projects.
4. Sign shall not be placed in urban areas or within city limits.

Advance Warning Sign Spacing (A)			
Road Type	Distance between signs min. (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40 mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway and Freeway (55 mph to 60 mph)	850	1350	2200
Rural Expressway and Freeway (70 mph to 75 mph)	1000	1500	2640
Interstate/4-Lane Divided (Maintenance and Surveying)	750	1000	1500

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-22-12	
REVISIONS	
DATE	CHANGE
7-18-14	Revise sheeting to type IV

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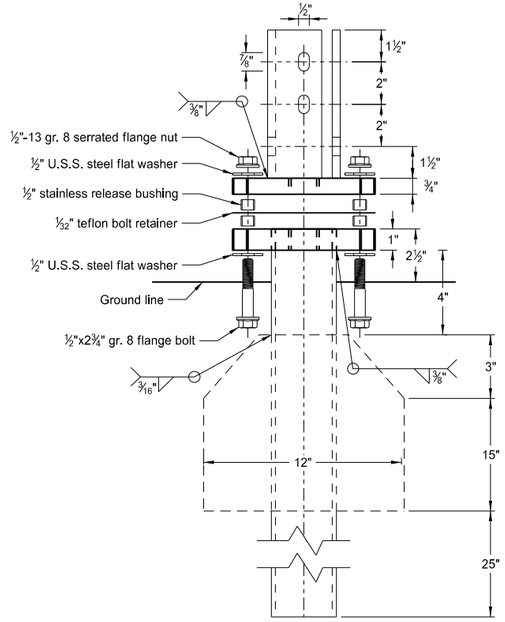
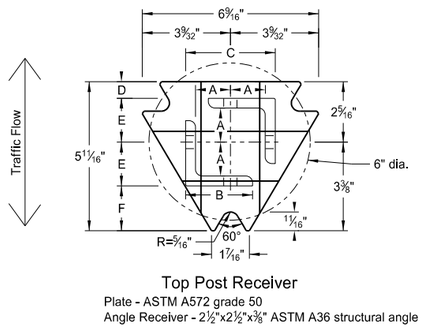
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-7

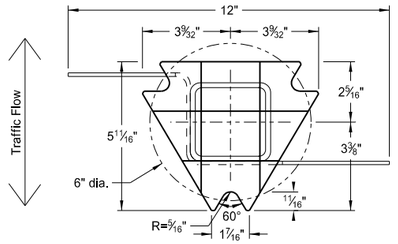


Multi-Directional
Slip Base Assembly

Perforated Tube



Top Post Receiver
Plate - ASTM A572 grade 50
Angle Receiver - 2½"x2½"x⅜" ASTM A36 structural angle



Bottom Soil Stub
Tube - 3"x3"x7 gauge ASTM A500 grade B tube
Stabilizing Wing - 7 gauge H.R.P.O. ASTM A1011
Plate - ASTM A572 grade 50

Notes:

1. Slip base bolts shall be torqued as specified by the manufacturer.
2. Anchor shall have a yield strength of 43.9 KSI and tensile strength of 59.3 KSI.
3. The 4" vertical clearance is required for the anchor or breakaway base. The 4"x60" measurement shall be made above and below post location and also back and ahead of the post.
4. When used in concrete sidewalk, anchor shall be same except without the wings.
5. Four post signs shall have over 7' between the first and the fourth posts.

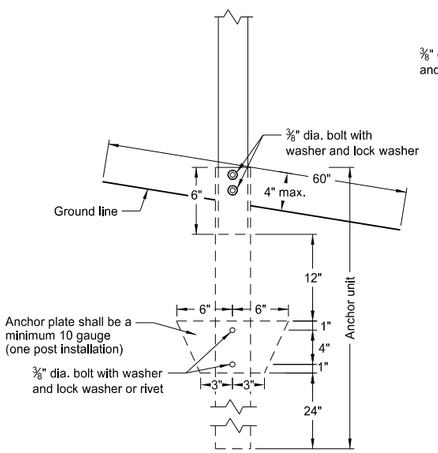
Telescoping Perforated Tube						
Number of Posts	Post Size in.	Wall Thick-ness Gauge	Sleeve Size in.	Wall Thick-ness Gauge	Slip Base	Anchor Size without Slip Base in.
1	2	12			No	2¼
1	2¼	12			No	2½
1	2½	12			(A)	3
1	2½	10			Yes	
1	2¼	12	2	12	Yes	
1	2½	12	2¼	12	Yes	
2	2	12			No	2¼
2	2¼	12			No	2½
2	2½	12			Yes	
2	2½	12			Yes	
2	2¼	10	2	12	Yes	
2	2½	12	2¼	12	Yes	
3 & 4	2½	12			Yes	
3 & 4	2½	10			Yes	
3 & 4	2½	12	2¼	12	Yes	
3 & 4	2¼	12	2	12	Yes	
3 & 4	2½	10	2³⁄₁₆	10	Yes	

Properties of Telescoping Perforated Tube						
Tube Size in.	Wall Thickness in.	U.S. Standard Gauge	Weight per Foot lbs.	Moment of Inertia in.⁴	Cross Sec. Area in.²	Section Modulus in.³
1½ x 1½	0.105	12	1.702	0.129	0.380	0.172
2 x 2	0.105	12	2.416	0.372	0.590	0.372
2¼ x 2¼	0.105	12	2.773	0.561	0.695	0.499
2³⁄₁₆ x 2³⁄₁₆	0.135	10	3.432	0.605	0.841	0.590
2½ x 2½	0.105	12	3.141	0.804	0.803	0.643
2½ x 2½	0.135	10	4.006	0.979	1.010	0.785

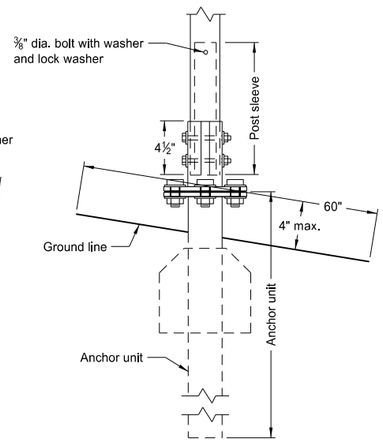
Top Post Receiver Data Table						
Square Post Sizes (B)	A	B	C	D	E	F
2³⁄₁₆"x10 ga.	1⁹⁄₆₄"	2½"	3¹⁄₃₂"	25⁄₃₂"	1³³⁄₆₄"	1⅞"
2½"x10 ga.	1⁹⁄₃₂"	2½"	3⅝"	⅝"	1²¹⁄₃₂"	1¾"

(A) The breakaway base is required when the support is placed in weak soils. The Engineer shall determine if the soils are weak.

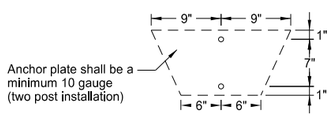
(B) The 2³⁄₁₆"x10 ga. may be inserted into 2½"x10 ga. for additional wind load.

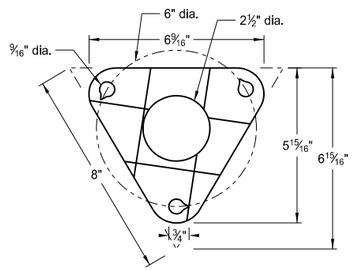


Anchor Unit and Post Assembly



Multi-Directional
Slip Base Anchor Unit
and Post Sleeve Assembly





Bolt Retainer for Base Connection
Bolt Retainer- ³⁄₃₂" Reprocessed Teflon

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-28-14	
REVISIONS	
DATE	CHANGE

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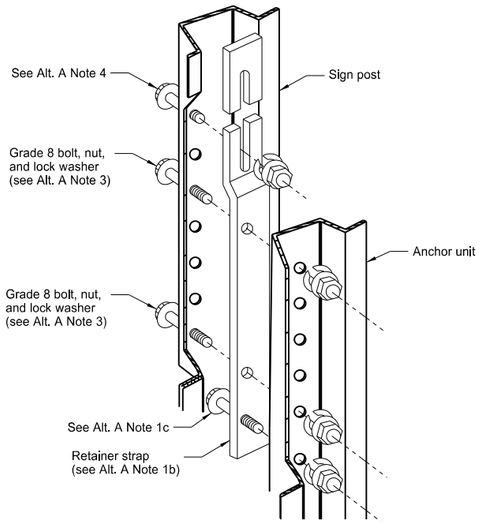
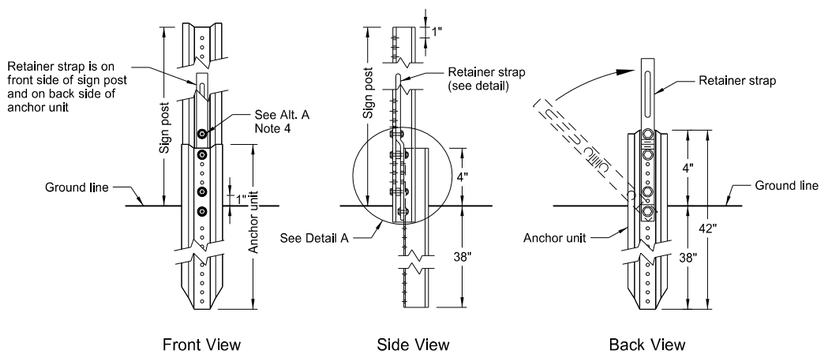
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-8

U-Channel Post



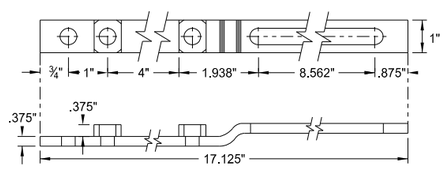
Detail A



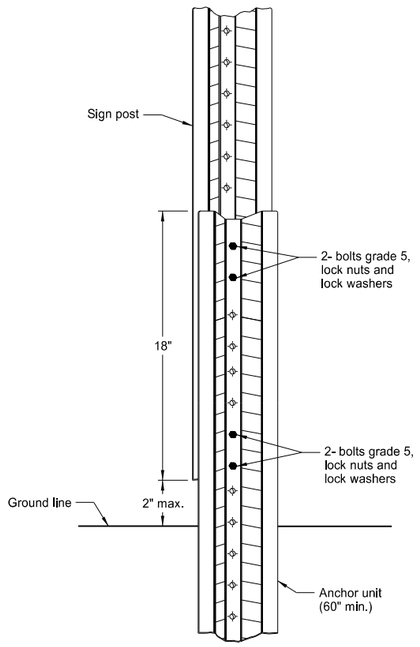
Front View Side View Back View

Breakaway U-Channel Detail
Alternate A

A maximum of 2 posts shall be installed within 7'.

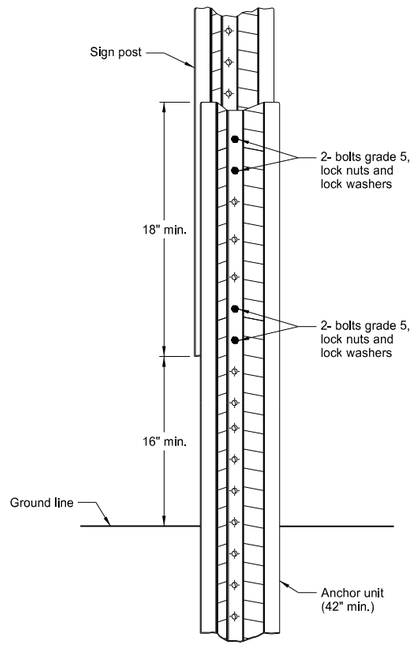


Retainer Strap Detail



Breakaway U-Channel Splice Detail
Alternate B
(2.5 and 3 lb/ft)

A maximum of 3 posts shall be installed within 7'.



Breakaway U-Channel Splice Detail
Alternate C
(2.5 and 3 lb/ft)

A maximum of 3 posts shall be installed within 7'.

Alternate A Steps of Installation:

1. a) Drive anchor unit to within 12" of ground level.
   b) Proper assembly established by lining up the bottom hole of retainer strap with the 6th hole from the top of the anchor unit.
   c) Assemble strap to back of anchor unit using 5/16"x2" bolt, lock washer and nut.
   d) Rotate strap 90° to left.
2. a) Drive anchor unit to 4" above ground.
   b) Rotate strap to vertical position.
3. a) Place 5/16"x2" bolt, lock washer and nut in bottom of sign post to facilitate alignment of sign post with proper hole in anchor unit.
   b) Alternately tighten two connector bolts.
4. Complete assembly by tightening 5/16"x2" bolt (this fastens sign post to retainer strap).
5. The base post, strap and sign post shall be properly nested. Proper nesting occurs when all flat surfaces of the base post, strap, and sign post at the bolts have full contact across the entire width.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-28-14	
REVISIONS	
DATE	CHANGE

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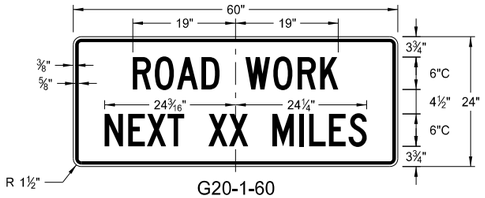
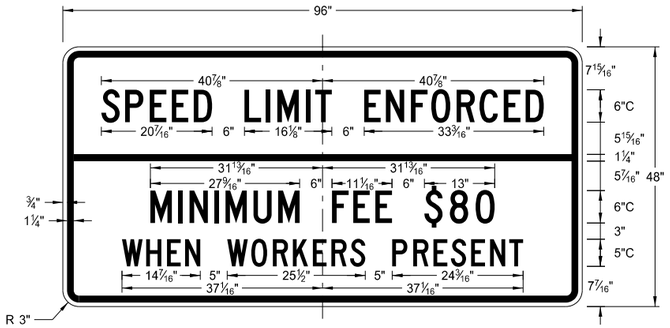
CONSTRUCTION SIGN DETAILS
TERMINAL AND GUIDE SIGNS

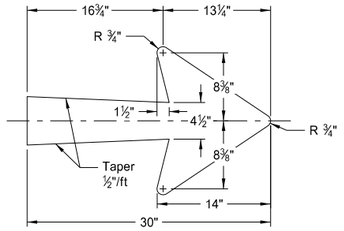


G20-1-60
Legend: black (non-refl)
Background: orange

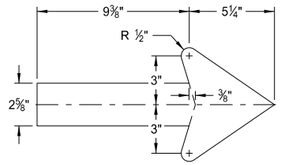
G20-4b-36
Legend: black (non-refl)
Background; orange



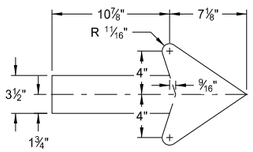
G20-55-96
Legend: black (non-refl)
Background: orange



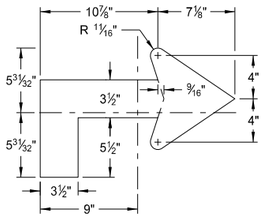
E5-1-48



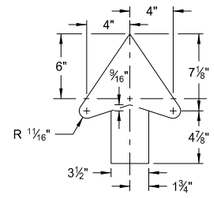
G20-50a-72
G20-52a-72



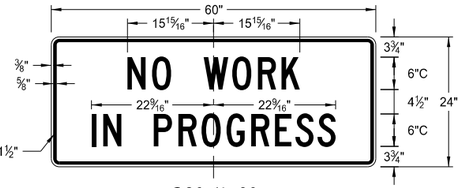
M4-9(L or R)-30
Right or Left



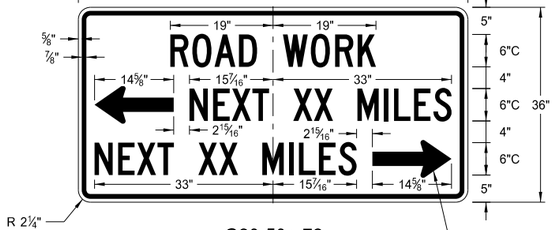
M4-9(L or R)-30
Advanced Right or Left



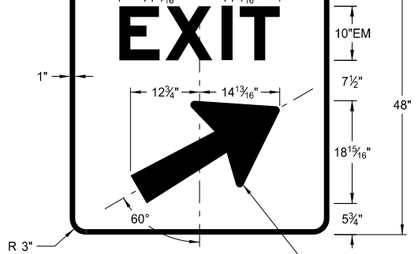
M4-9-30
Straight



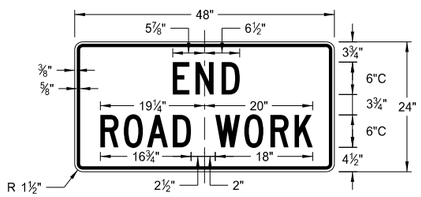
G20-1b-60
Legend: black (non-refl)
Background: orange



G20-50a-72
Legend: black (non-refl)
Background: orange



E5-1(L or R)-48
Legend: white
Background: green



G20-2-48
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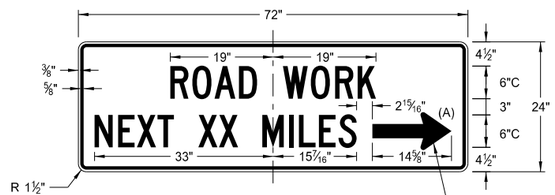
Background: orange



G20-52a-72
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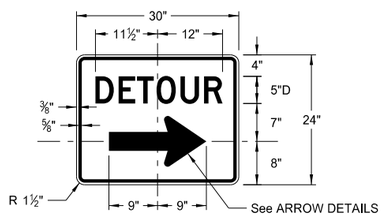
Background: orange



M4-9(L or R)-30 &
M4-9-30
Legend: black (non-refl)
Background: orange

ARROW DETAILS

NOTES:

(A) Arrow may be right or left of the legend to indicate construction to the right or left.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE

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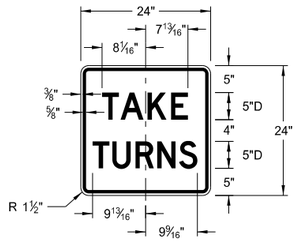
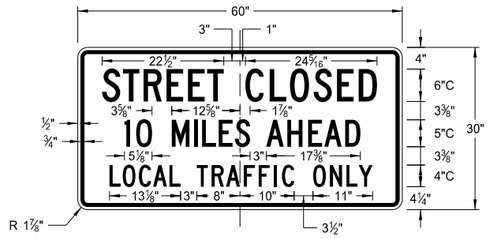
CONSTRUCTION SIGN DETAILS
REGULATORY SIGNS



R1-50-24
Legend: black (non-refl)
Background: white



R11-3c-60
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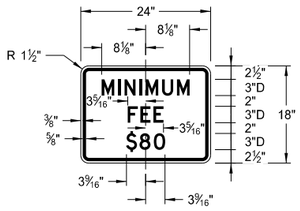
Background: white



R2-1a-24
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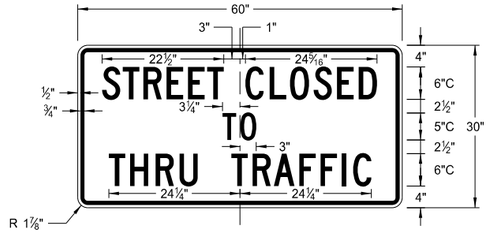

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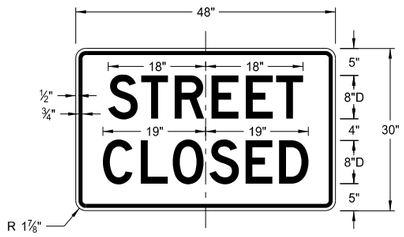

R11-2a-48
Legend: black (non-refl)
Background: white

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE

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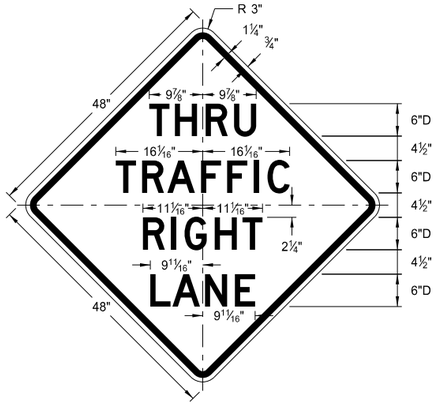
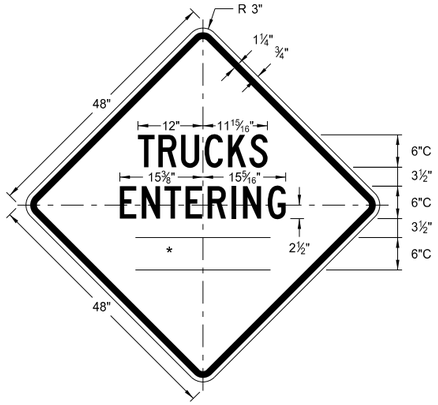
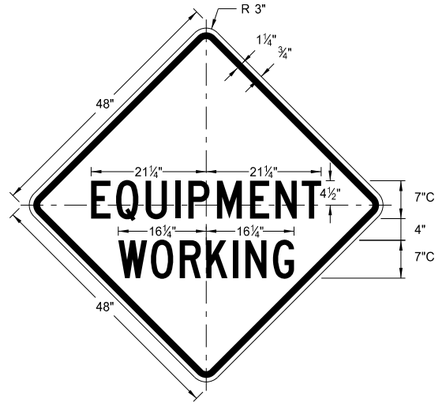
CONSTRUCTION SIGN DETAILS
WARNING SIGNS



W5-8-48
Legend: black (non-refl)
Background: orange



W8-54-48
Legend: black (non-refl)
Background: orange



W20-51-48
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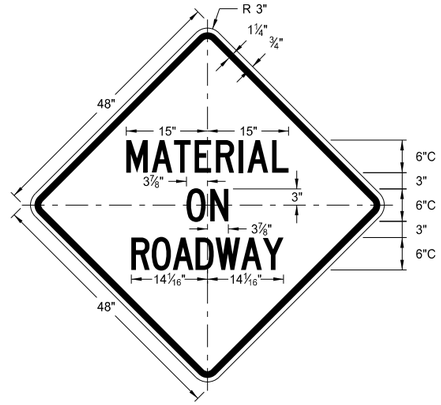
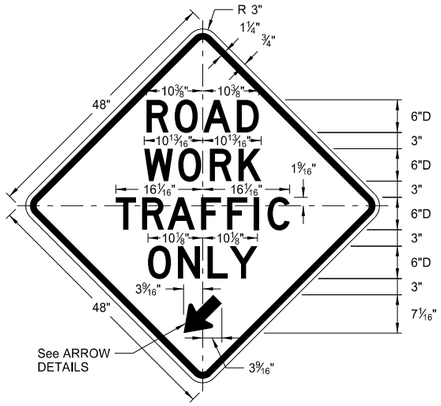
Background: orange



W21-51-48
Legend: black (non-refl)
Background: orange

WORD	LETTER SPACING
AHEAD	Standard
200 FT	Standard
350 FT	Standard
500 FT	Standard
1000 FT	Reduce 40%
1500 FT	Reduce 40%
½ MILE	Reduce 50%
1 MILE	Standard

* DISTANCE MESSAGES



W5-9-48
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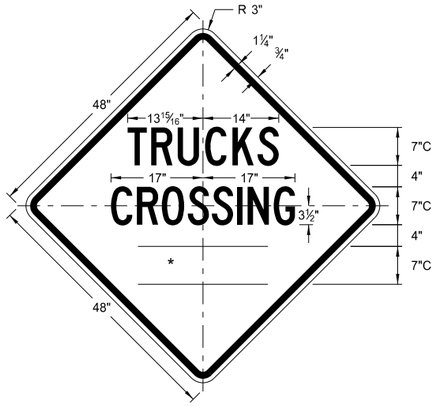
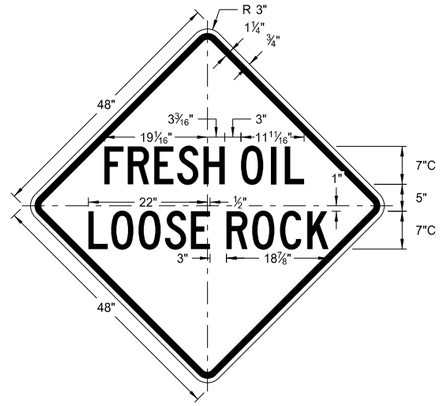


W8-55-48
Legend: black (non-refl)
Background: orange

W20-52-54
Legend: black (non-refl)
Background: orange



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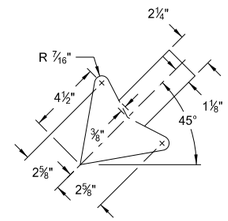
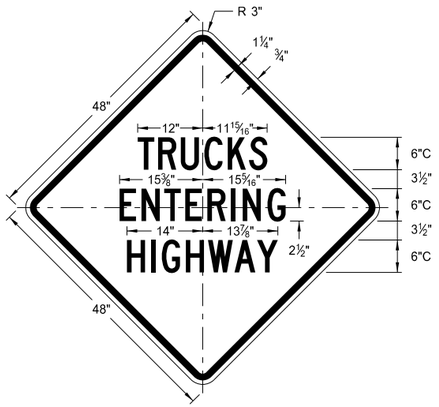


W5-9-48

ARROW DETAILS



W8-53-48
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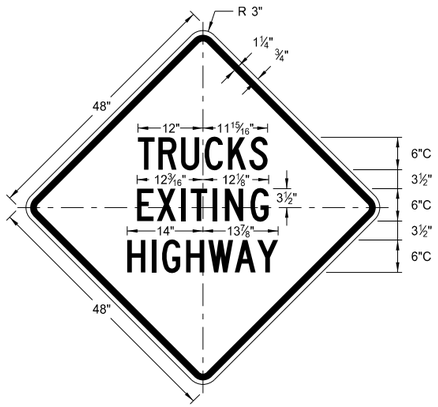
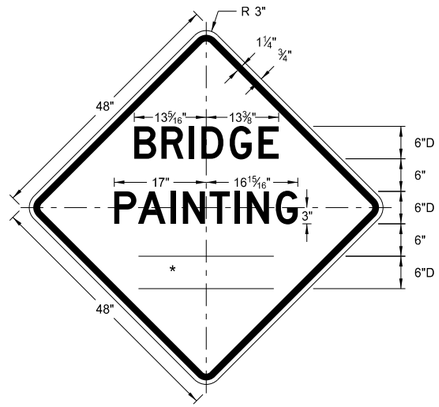


W8-56-48
Legend: black (non-refl)
Background: orange



W21-50-48
Legend: black (non-refl)
Background: orange

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
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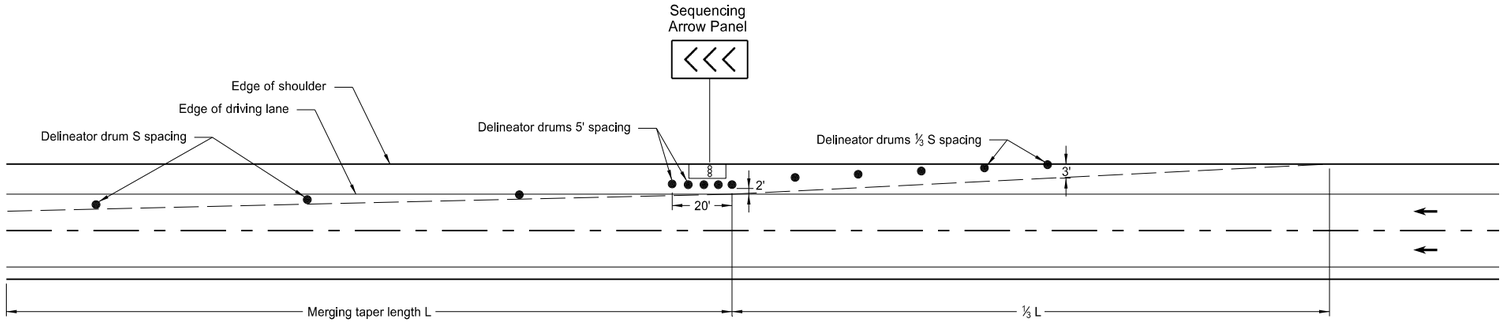
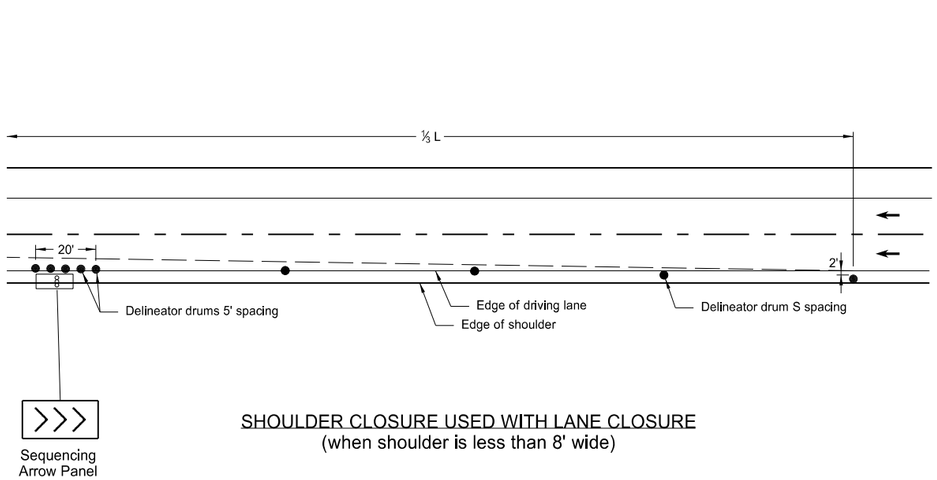
SHOULDER CLOSURE TAPERS

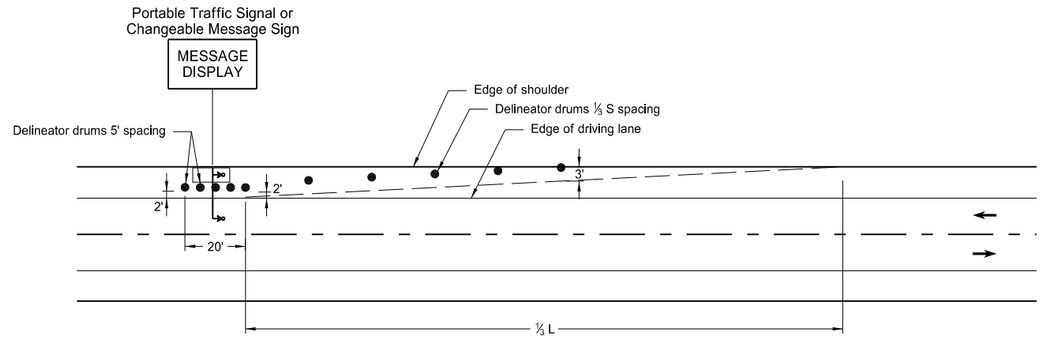
D-704-12



SHOULDER CLOSURE WITH LANE CLOSURE
(when shoulder is 8' or wider)



SHOULDER CLOSURE USED WITH LANE CLOSURE
(when shoulder is less than 8' wide)



PORTABLE TRAFFIC SIGNAL OR CHANGEABLE MESSAGE SIGN ON SHOULDER

KEY	
● Delineator Drum	∞ Sequencing Arrow Panel
∘ Message Display	Portable Traffic Signal

Notes:

1. S = Posted Speed Limit in mph
   W = Width of offset in feet
   L = Taper length in feet
   L = $WS^2/60$ (40mph or less)
   L = WS (45mph or more)
2. If a shoulder taper is used, it should have a length of approximately ⅓L. If a shoulder is used as a travel lane, a normal merging or shifting taper should be used.
3. When paved shoulders of 8 foot width or more are closed, channelizing devices shall be used to close the shoulder in advance to delineate the beginning of the work space and direct vehicular traffic to remain within the traveled way.

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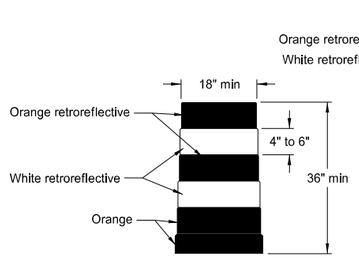
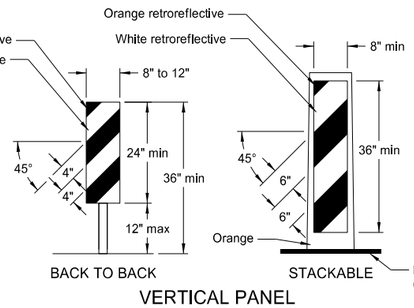
BARRICADE AND CHANNELIZING DEVICE DETAILS

D-704-13



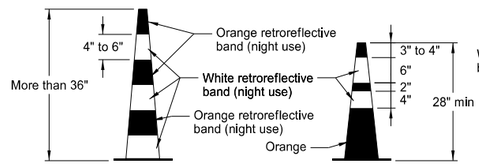
DELINEATOR DRUM

The markings on drums shall be horizontal, circumferential, alternating orange and white retroreflective stripes 4" to 6" wide. Each drum shall have a minimum of two orange and two white stripes with the top stripe being orange. Any nonretroreflectorized spaces between the horizontal orange and white stripes shall not exceed 3" wide. Stripes shall not be placed on ribs or indentations in the drum. Drums shall have closed tops that will not allow collection of construction debris or other debris. Ballast shall not be placed on the top of a drum.



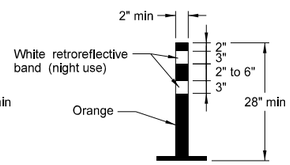
VERTICAL PANEL

Markings for vertical panels shall be alternating orange and white retroreflective stripes, sloping downward in the direction vehicular traffic is to pass. Retroreflective sheeting shall be placed on both sides of panel and shall have a minimum of 270 square inches of retroreflective area facing vehicular traffic. Where the height of the retroreflective material on the vertical panel is 36 inches or more, a stripe width of 6 inches shall be used.



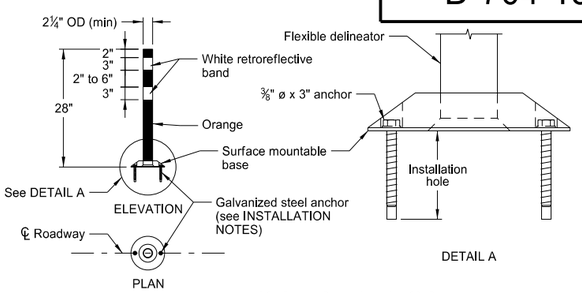
TRAFFIC CONE

Retroreflectorization of cones more than 36" in height shall be provided by alternating orange and white retroreflective stripes. Each cone shall have a minimum of two orange and two white stripes with the top stripe being orange. Any nonretroreflectorized space between the orange and white stripes shall not exceed 3" wide.



TUBULAR MARKER

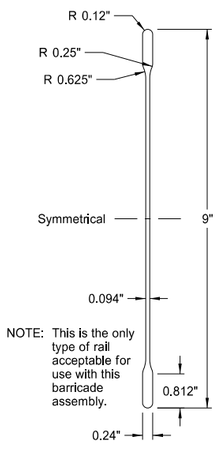
Retroreflectorization of tubular markers more than 42" in height shall be provided by alternating four 4" to 6" wide orange and white stripes with the top stripe being orange.



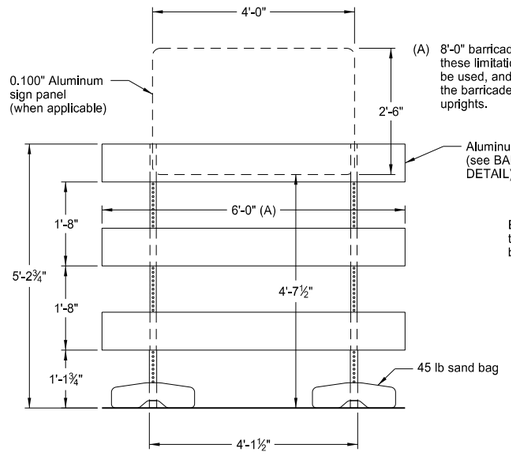
FLEXIBLE DELINEATOR

INSTALLATION NOTES:

1. Drill installation holes to diameter and depth as required by manufacturer's specifications.
2. For removal, remove anchors and fill installation hole with an epoxy designed to bond to pavement surface.
3. In lieu of bolted down base, the contractor may use an 8" x 8" butyl pad or hot melt butyl. Butyl shall be removed as close as possible to pavement surface.

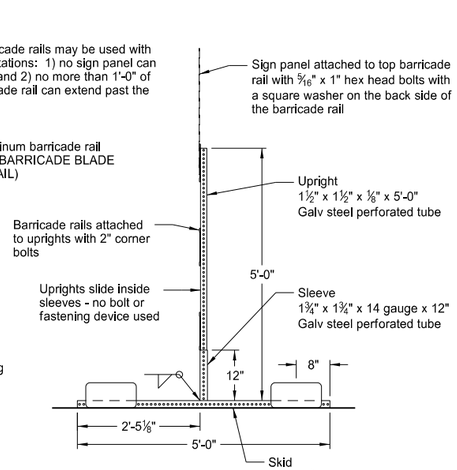


BARRICADE BLADE DETAIL



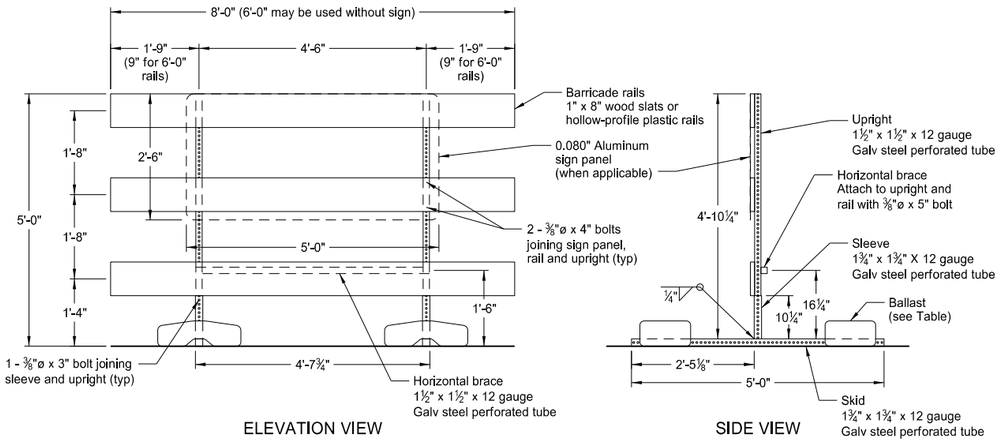
ELEVATION VIEW

(A) 8'-0" barricade rails may be used with these limitations: 1) no sign panel can be used, and 2) no more than 1'-0" of the barricade rail can extend past the uprights.



SIDE VIEW

BARRICADE ASSEMBLY DETAIL
(Aluminum Barricade Rails)

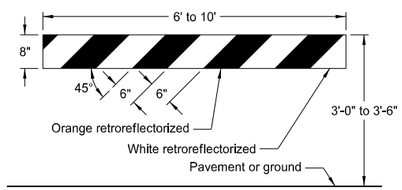


ELEVATION VIEW

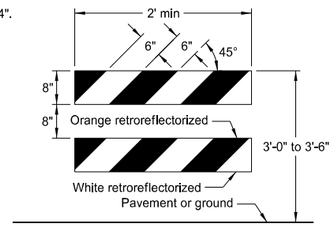
SIDE VIEW

BARRICADE ASSEMBLY DETAIL
(Wood or Plastic Rails)

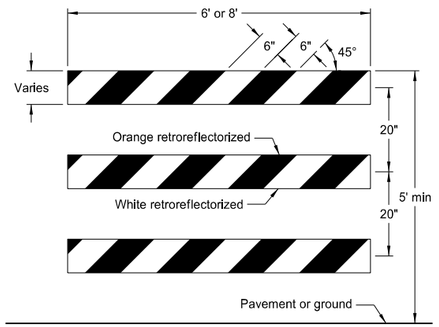
NOTE: Markings for barricades shall be alternating orange and white retroreflective stripes, sloping downward in the direction traffic is to pass. Retroreflective sheeting shall be placed on both sides of the rails and shall have a minimum of 270 square inches of visible retroreflective area facing vehicular traffic. When the barricade length is less than 36", the rail stripe width shall be 4".



TYPE I BARRICADE

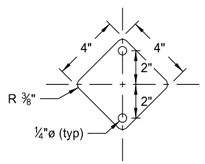


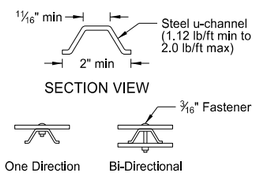
TYPE II BARRICADE

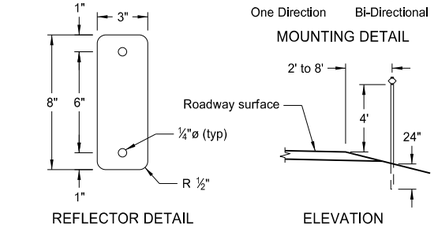


TYPE III BARRICADE

BARRICADE RAIL DETAILS







DELINEATORS

MINIMUM BALLAST
(For each side of barricade support)

Without Sign	4 - 25 lb sandbags
With Sign	6 - 25 lb sandbags

Note: The number of sandbags are based on a wind speed of 55 MPH. The sandbags are assumed to be placed at or near the ends of the skids.

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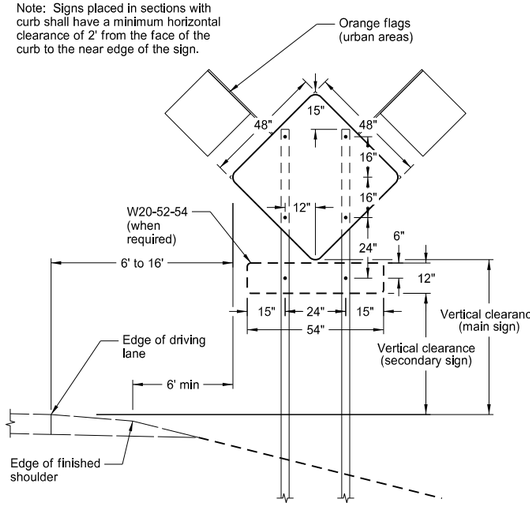
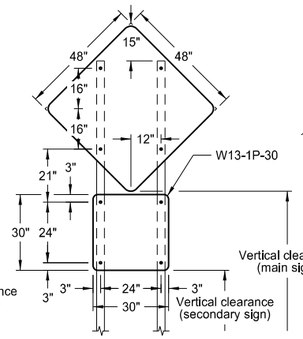
CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

D-704-14

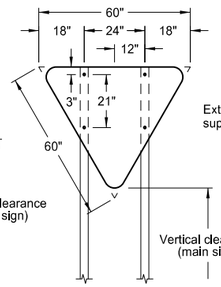
Note: Signs placed in sections with curb shall have a minimum horizontal clearance of 2' from the face of the curb to the near edge of the sign.



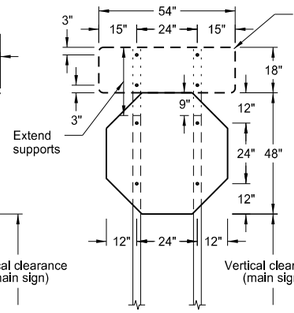
TYPICAL SECTION
(48" x 48" diamond warning sign shown)



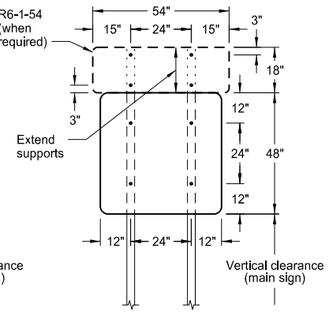
48" x 48" DIAMOND SIGN
(with 30" x 30" secondary sign)



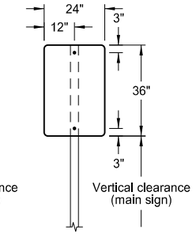
R1-2-60 - YIELD SIGN



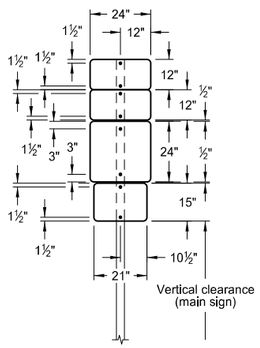
R1-1-48 - STOP SIGN
(with R6-1-54 sign as required)



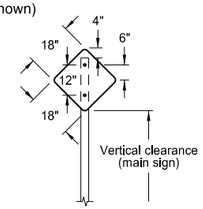
48" x 48" SIGN
(with R6-1-54 sign as required)



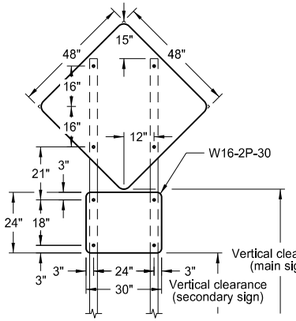
24" x 36" SIGN



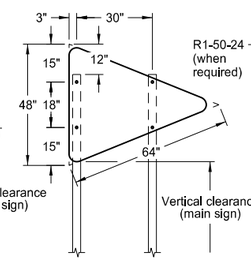
24" x 24"
ROUTE MARKER
ASSEMBLY



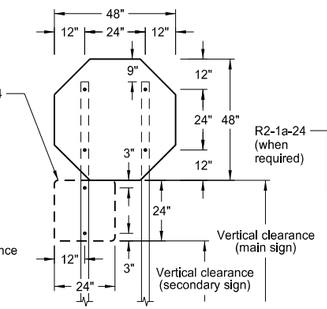
18" x 18"
DIAMOND SIGN



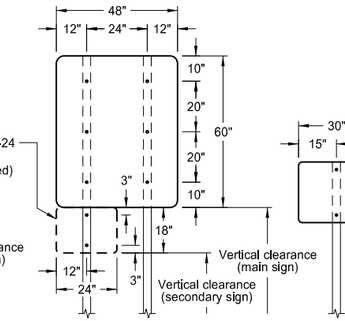
48" x 48" DIAMOND SIGN
(with 30" x 24" secondary sign)



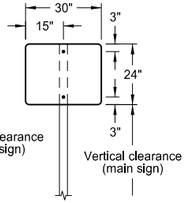
W14-3-64 - PENNANT SIGN



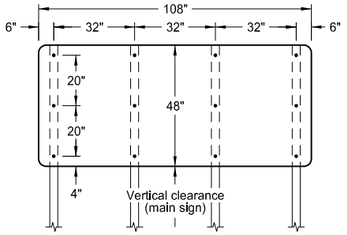
R1-1-48 - STOP SIGN
(with R1-50-24 sign as required)



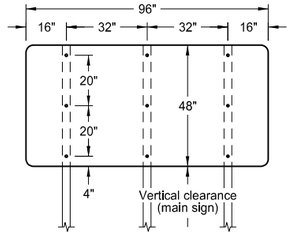
48" x 48" SIGN
(with R2-1a-24 sign as required)



30" x 24" SIGN



108" x 48" SIGN



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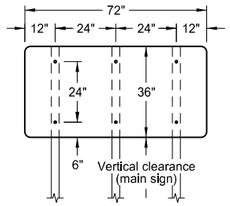
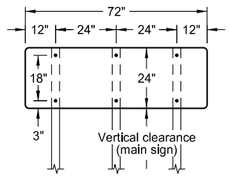
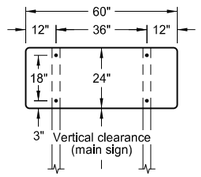


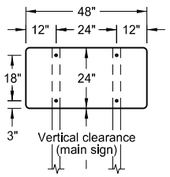
72" x 36" SIGN



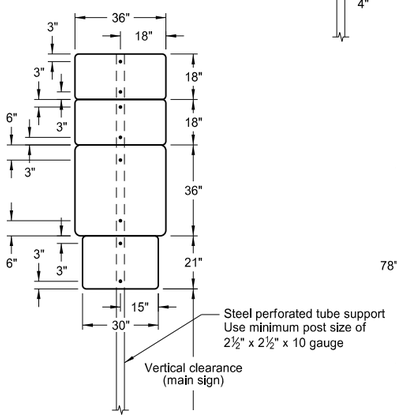
72" x 24" SIGN



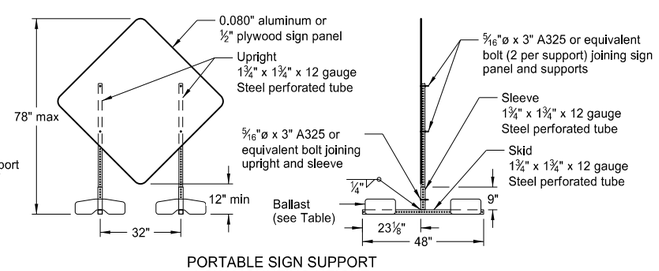
60" x 24" SIGN



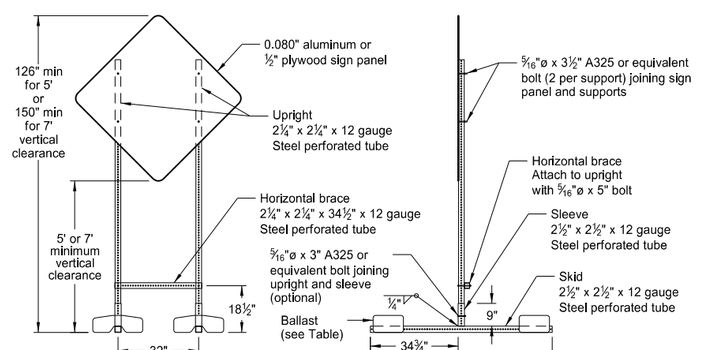
48" x 24" SIGN



36" x 36"
ROUTE MARKER
ASSEMBLY



PORTABLE SIGN SUPPORT
LOW-MOUNTING HEIGHT



PORTABLE SIGN SUPPORT
HIGH-MOUNTING HEIGHT

NOTES:

1. Sign Supports: Supports shall be galvanized or painted. Minimum post sizes are 2.5 lb/ft u-channel or 2" x 2" x 12 gauge steel perforated tube, except where noted. When installing signs on u-channel, the minimum post size for assemblies containing a secondary sign is 3.0 lb/ft. Post sizes are based on a wind speed of 55 MPH.

   Signs over 50 square feet should be installed on 2½" x 2½" perforated tube supports as a minimum.

   Guy wires shall not be attached to sign supports. Wind beams may be attached to u-posts behind the sign panels.

2. Sign Panels: Provide sign panels made of 0.100" aluminum, ½" plywood, or other approved material, except where noted. All holes to be punched round for ⅜" bolts.

3. Alternate Messages: The signs that have alternate messages may have these alternate messages placed on a reflectorized plate (without a border) and installed and removed as required. (i.e. "Left" and "Right" message on a lane closure sign)

4. Route Marker Auxiliary Signs: Provide route marker auxiliary signs, such as the cardinal direction and directional arrows, with a background and legend that match the route marker they are used with:

   Interstate - white legend on blue background
   Interstate Business Loop - white legend on green background
   US and State - black legend on white background
   County - yellow legend on blue background

5. Vertical Clearance: Install signs with a vertical clearance of 5'-0" (see TYPICAL SECTION.) In areas where parking or pedestrian movements are likely or the view of the sign may be obstructed, install signs with a vertical clearance of 7'-0" from the top of the curb or from the near edge of the driving lane in absence of a curb.

   The vertical clearance to secondary signs is 1'-0" less than the vertical clearance as stated above.

   Large signs having an area exceeding 50 square feet shall have a minimum clearance of 7'-0" from the ground at the post.

6. Portable Signs: Provide portable signs that meet the vertical clearance as stated above. Use portable signs when it is necessary to place signs within the pavement surface.

   When portable signs are used for 5 days or less, low-mounting height (minimum 12" vertical clearance) sign supports may be used as long as the view of the sign is not obstructed. Time delays caused by unforseen circumstances, such as equipment breakdown, rain, subgrade failures, etc., will not accrue towards the 5 day period. The R9-8 through R9-11a series, W1-6 through W1-8 series, M4-10, and E5-1 may be used for longer than 5 days.

   Signs mounted to the portable sign supports shown in the LOW-MOUNTING HEIGHT and HIGH-MOUNTING HEIGHT Details shall have a maximum surface area of 16 square feet.

MINIMUM BALLAST
(For each side of sign support base)

Sign Panel Mounting Height (ft)	Number of 25 lb sandbags for 4' x 4' sign panel
1'	6
5'	8
7'	10

Note: The number of sandbags are based on a wind speed of 55 MPH. The sandbags are assumed to be placed at or near the ends of the skids.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-4-13	
REVISIONS	
DATE	CHANGE
11-14-13	Revised Note 6.

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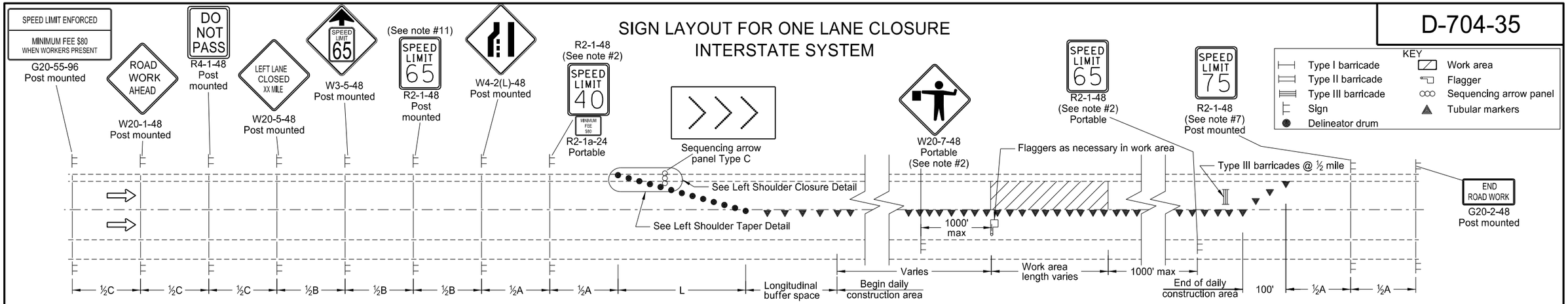
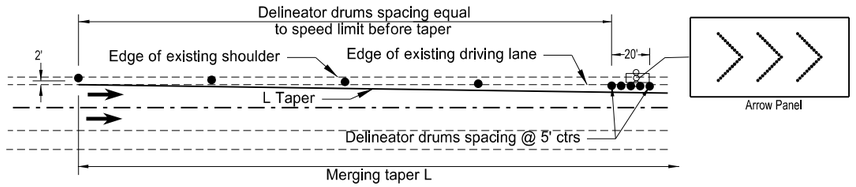
SIGN LAYOUT FOR ONE LANE CLOSURE INTERSTATE SYSTEM





LEFT SHOULDER TAPER DETAIL

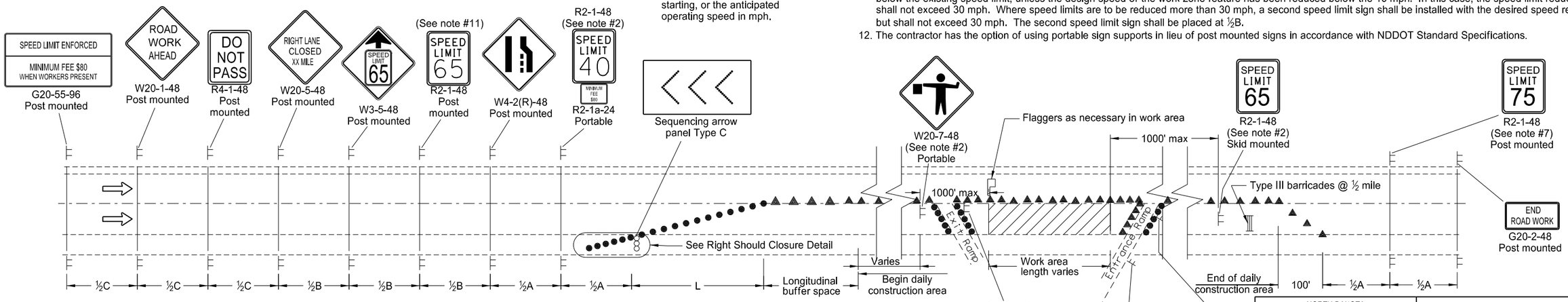
LEFT LANE CLOSED
WORKERS IN WORK AREA

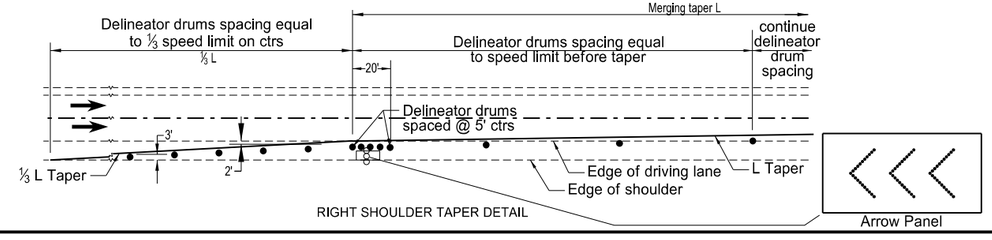
ADVANCE WARNING SIGN SPACING			
Road Type	Distance Between Signs Min (ft)		
	A	B	C
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway and Freeway (55 mph to 60 mph)	850	1350	2200
Rural Expressway and Freeway (70 mph to 75 mph)	1000	1500	2640
Interstate/4-Lane Divided (Maintenance and Surveying)	750	1000	1500

Longitudinal Buffer Space	
Speed (mph)*	Length Min (feet)
20	115
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570
65	645
70	730
75	820

*Posted speed, off-peak 85th percentile speed prior to work starting, or the anticipated operating speed in mph.

Notes:
1. Advance signs for flagging shall be installed when flaggers are flagging.
2. The advanced flagger sign and the speed limit signs shall be moved as the work area moves through the construction zone. When the work area is not visible from the flagger, the flagger station shall be placed so the work area is visible. The 65 mph speed limit and the 40 mph speed limit sign shall be spaced at ½A in advance of the flagger sign. The 65 mph speed limit sign shall also be moved. Upon completion of the work day or when workers are not present, the 65 mph speed limit, 40 mph speed limit, and the Minimum Fee $80 signs shall be covered or removed.
3. RAMPS: When the work area encompasses an entrance ramp, the ramp shall be controlled by installing a 40 mph speed limit sign and covering any existing yield sign. Install new yield sign as necessary. When the main line 40 mph speed zone is moved past the ramp, the ramp speed limit sign shall be removed.
4. Variables:
   S=Numerical value of speed limit or 85th percentile
   W=The width of taper.
   L=Minimum length of taper, or SxW for freeways, expressways, and all other roads with speeds of 45 mph or greater,
   or WxSxS/60 for urban, residential, and other streets with speeds of 40 mph or less.
5. Delineator drums, used for tapering traffic shall be spaced at the dimension "S". Tubular markers used for tangents shall be spaced at 2 times dimension "S".
6. Sequencing arrow panels should normally be placed at the beginning of the taper. Where shoulder width does not provide sufficient room, the panel should be moved closer to the work area so that it can be placed on the roadway surface.
   Type C shall be used on roadways with high traffic speeds and volumes (over 40 mph or 5000 ADT or greater).
7. The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
8. Existing speed limit signs within a reduced speed zone shall be covered.
9. Obliterated or covered pavement marking shall be paid for as Obliteration of Pavement Marking. The covering shall be approved by the engineer.
10. When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
11. The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 mph. In this case, the speed limit reduction shall not exceed 30 mph. Where speed limits are to be reduced more than 30 mph, a second speed limit sign shall be installed with the desired speed reduction, but shall not exceed 30 mph. The second speed limit sign shall be placed at ½B.
12. The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Specifications.





RIGHT SHOULDER TAPER DETAIL

RIGHT LANE CLOSED
WORKERS IN WORK AREA

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-7-2012	
REVISIONS	
DATE	CHANGE
6/23/2014	Revised Note 12

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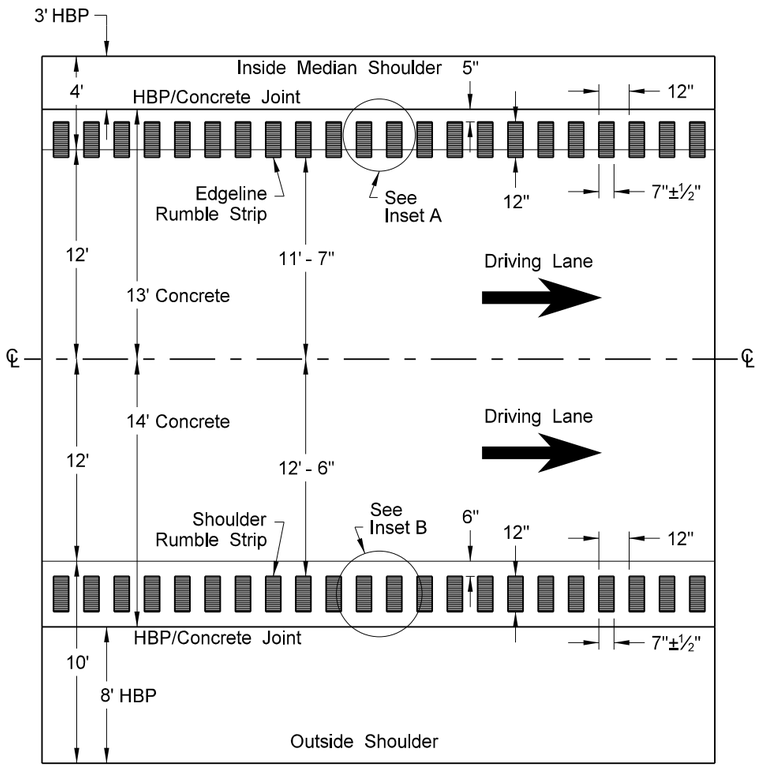
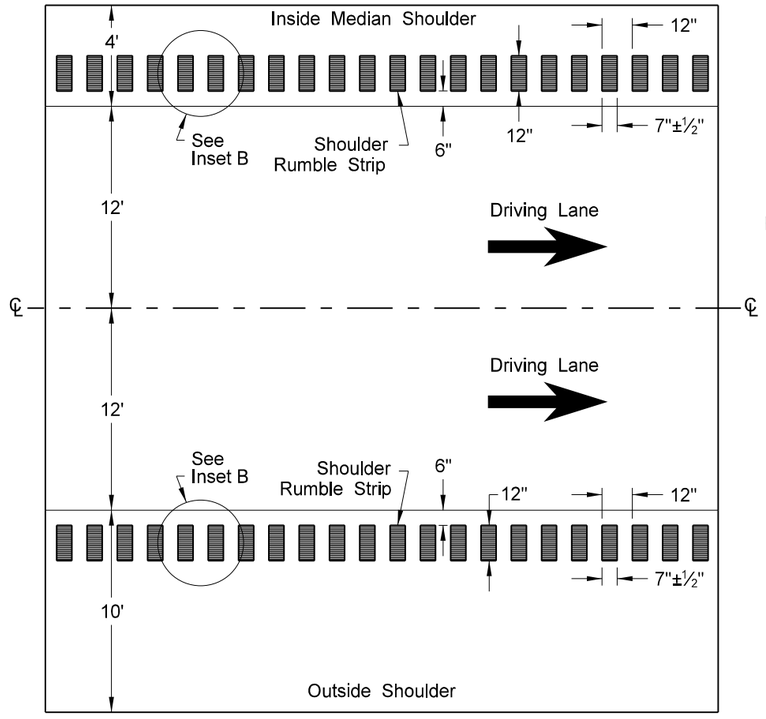
RUMBLE STRIPS
INTERSTATE HIGHWAYS



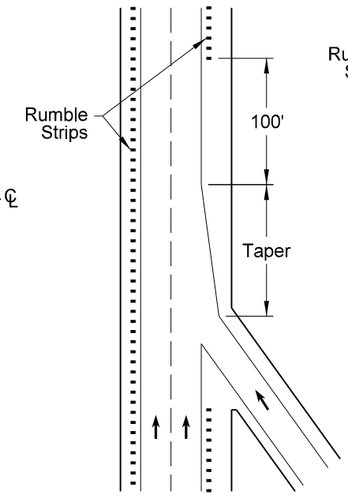
Interstate - 13' and 14' Concrete Width Mainline with Asphalt Shoulders



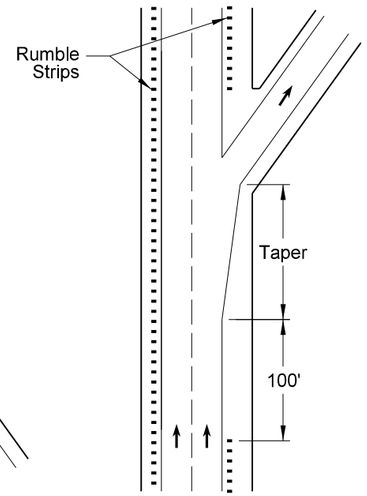
Interstate

NOTES:

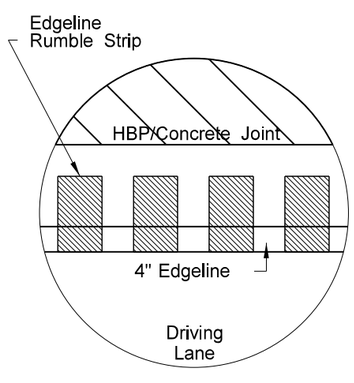
1) Discontinue rumble strips through ramps and 100' before and after ramp tapers as shown below.



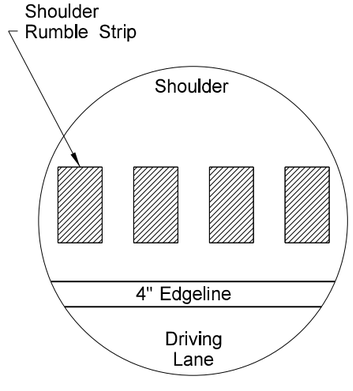
Entrance Ramp



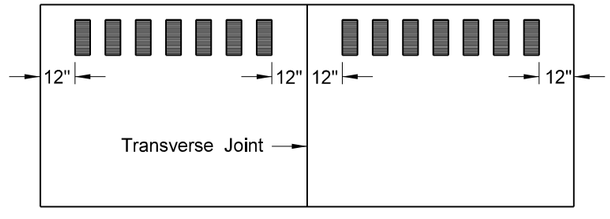
Exit Ramp



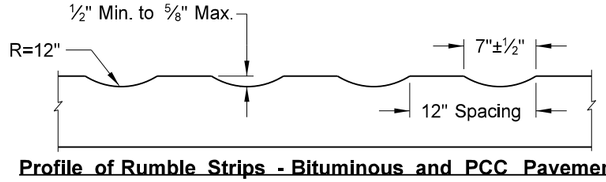
Inset A - Edgeline Rumble Strip



Inset B - Shoulder Rumble Strip



Discontinue rumble strip approx. 12" on both sides of PCC transverse joint



Profile of Rumble Strips - Bituminous and PCC Pavements

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-29-09	
REVISIONS	
DATE	CHANGE
2-25-10	Note 4 was added.
9-8-11	Revised Notes and D-760-1

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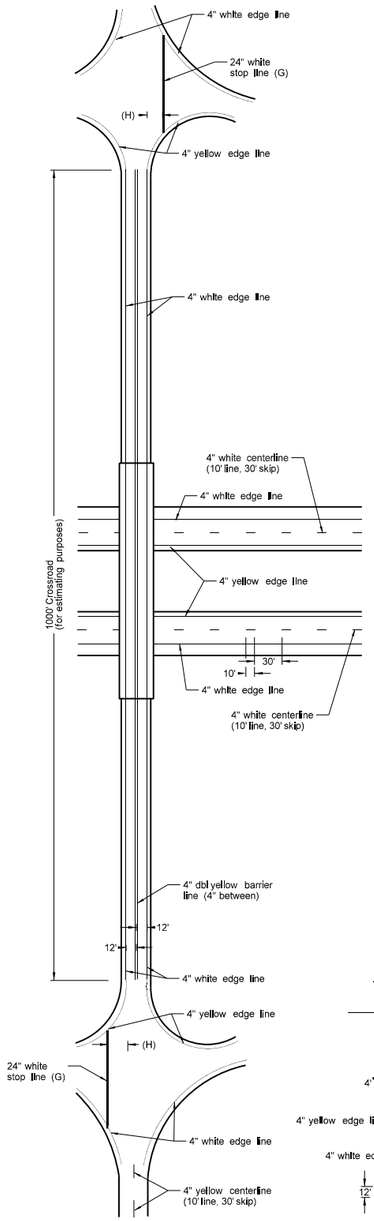
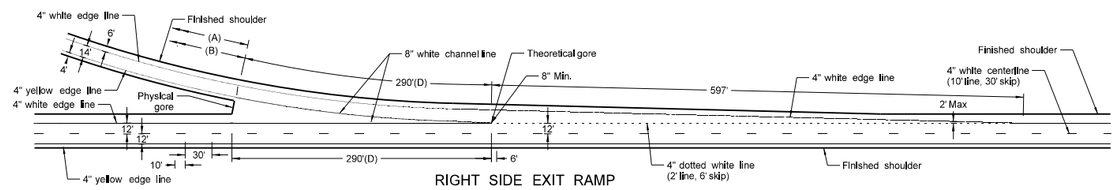
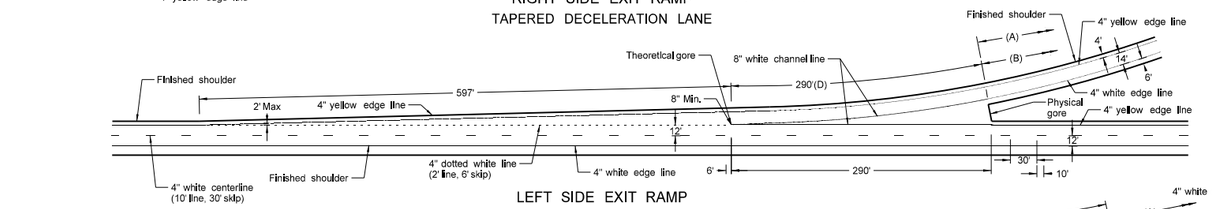
INTERSTATE PAVEMENT MARKING
4 LANE DIVIDED HIGHWAY



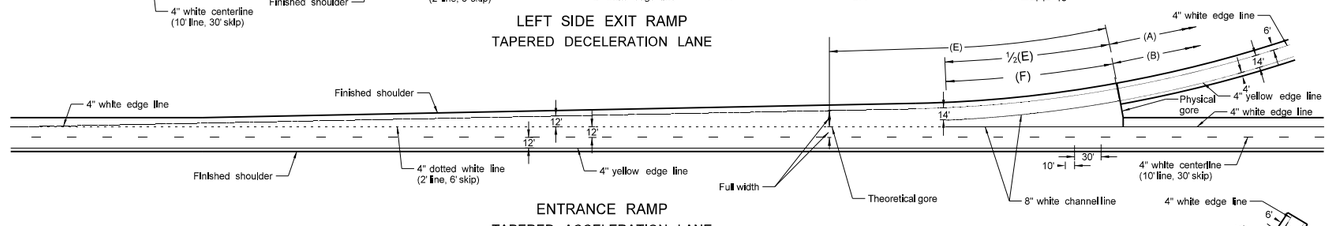
CROSS-ROAD & STRUCTURE
The engineer in the field shall determine the length to be striped.



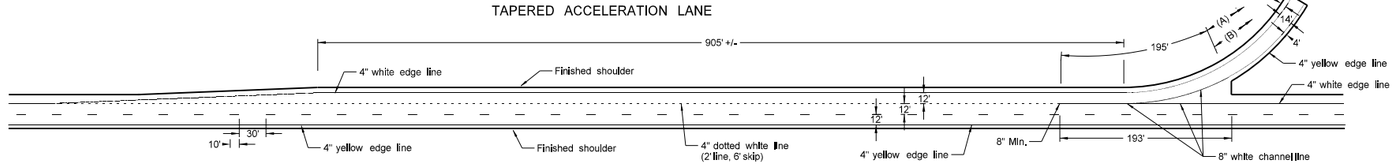
RIGHT SIDE EXIT RAMP
TAPERED DECELERATION LANE



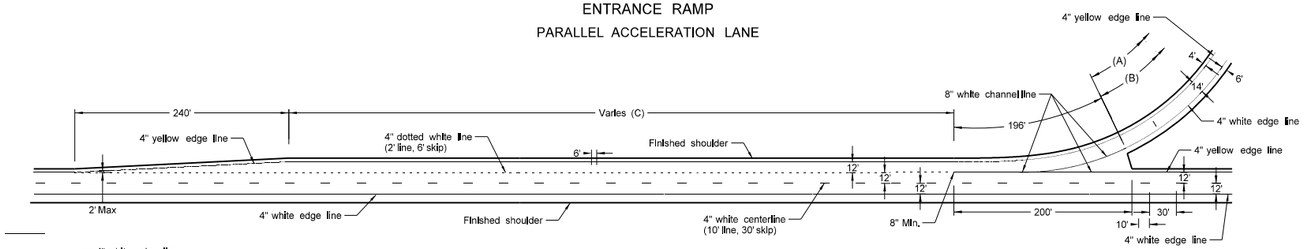
LEFT SIDE EXIT RAMP
TAPERED DECELERATION LANE



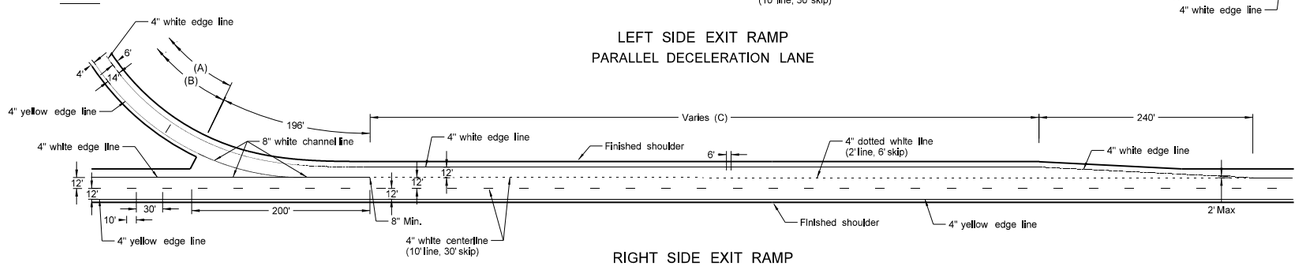
ENTRANCE RAMP
TAPERED ACCELERATION LANE



ENTRANCE RAMP
PARALLEL ACCELERATION LANE



LEFT SIDE EXIT RAMP
PARALLEL DECELERATION LANE



RIGHT SIDE EXIT RAMP
PARALLEL DECELERATION LANE

NOTE:

(A) 4" White edge line
(B) 4" Yellow edge line
(C) Assume "varies" to equal 790' for purpose of estimate. The pavement marking shall begin at the beginning of the taper and end at the 8" line.
(D) Beginning of physical gore to theoretical gore.
(E) If the dlstace Is less than 350' then extend the 8" channel line to the theoretical gore, otherwise use 195'.
(F) 195' was used for estimating purposes.
(G) Not required when crossroad approaches have gravel surface.
(H) 4' minimum, 15' maximum from the nearest edge of the Intersection traveled way.

BASIS OF ESTIMATE		
LOCATION	ITEM	
Right or Left Side Exit Ramp TAPERED	8" White channel line	580 LF
	24" White stop line	60 LF
	4" White dotted line	148 LF
	4" White edge line	1115 LF
	4" Yellow edge line	1075 LF
Entrance Ramp TAPERED	8" White channel line	390 LF
	4" White dotted line	258 LF
	4" White edge line	1270 LF
	4" Yellow edge line	1075 LF
Right or Left Side Exit Ramp PARALLEL	8" White channel line	396 LF
	24" White stop line	60 LF
	4" White dotted line (C)	258 LF
	4" White edge line	1115 LF
	4" Yellow edge line	1075 LF
Entrance Ramp PARALLEL	8" White channel line	388 LF
	4" White dotted line	283 LF
	4" White edge line	1275 LF
	4" Yellow edge line	1075 LF
Main Line (Both Roadways)	4" White lane line, 10' line, 30' skip	2640 LF/MI
	4" White edge line	10,560 LF/MI
	4" Yellow edge line	10,560 LF/MI
Cross Road	4" White edge line	2000 LF
	4" Dbl yellow barrier line (4" between)	2000 LF

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-3-11	
REVISIONS	
DATE	CHANGE

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