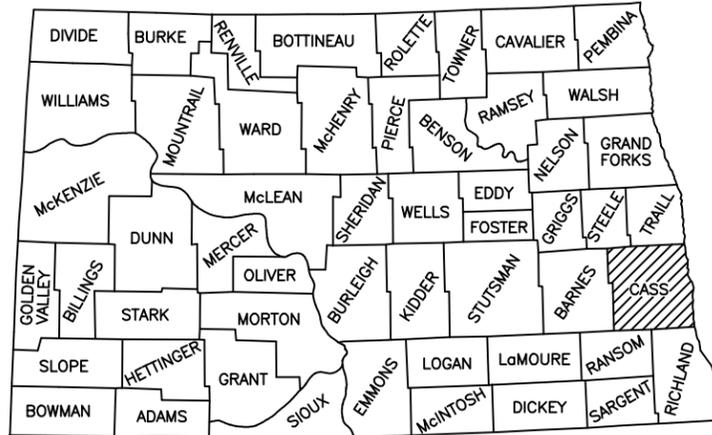


STATE	FEDERAL AID PROJECT NUMBER	SHEET	TOTAL SHEETS
PCN 21535	N.D.	SC-0900(016)	1
			21

CASS COUNTY HIGHWAY DEPARTMENT PLANS

FOR THE PROPOSED IMPROVEMENT OF A COUNTY HIGHWAY FEDERAL AID PROJECT NO. SC-0900(016) MILL & HMA OVERLAY

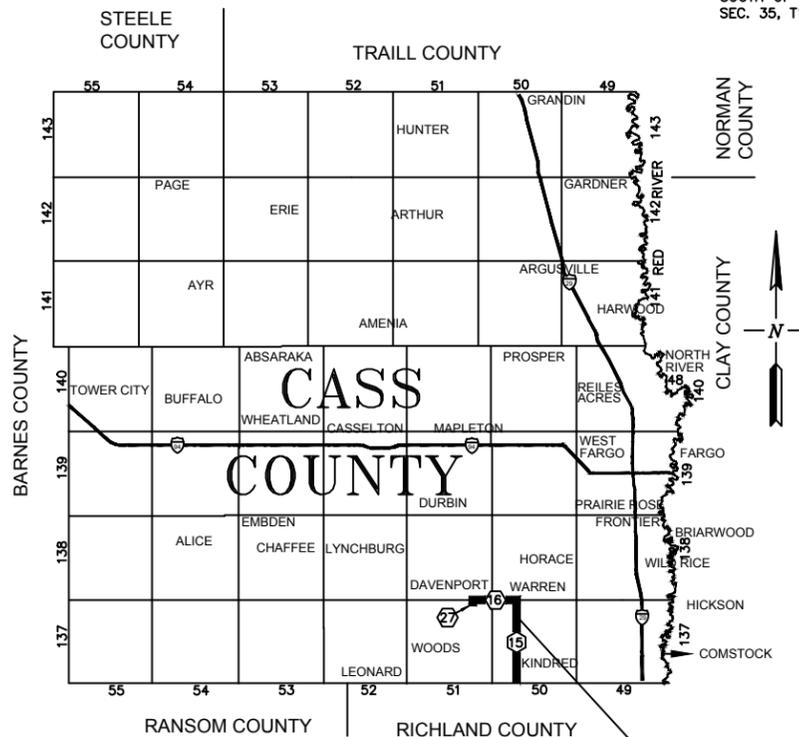
CASS CO. HWY 15; FROM CASS CO. HWY 16 TO DAKOTA STREET
CASS CO. HWY 15; SHEYENNE STREET TO STATE HIGHWAY 46
CASS CO. HWY 16; FROM CASS CO. HWY 15 TO CASS CO. HWY. 27
CASS CO. HWY 27; FROM CASS CO. HWY 16 TO 1ST AVE (NON-PARTICIPATING)



SKETCH MAP OF NORTH DAKOTA SHOWING COUNTIES

TRAFFIC	CURRENT (2016)	FORECAST (2036)
C-15 FROM C-16 TO STATE 46	PASS 1765 TRUCKS 150 TOTAL 1,915	PASS 4,675 TRUCKS 395 TOTAL 5,070
C-16 FROM C-27 TO C-15	PASS 675 TRUCKS 10 TOTAL 685	PASS 1,785 TRUCKS 20 TOTAL 1,805
C-27 FROM C-16 TO 1ST AVE (NON-PARTICIPATING)	PASS 220 TRUCKS 20 TOTAL 240	PASS 580 TRUCKS 50 TOTAL 630

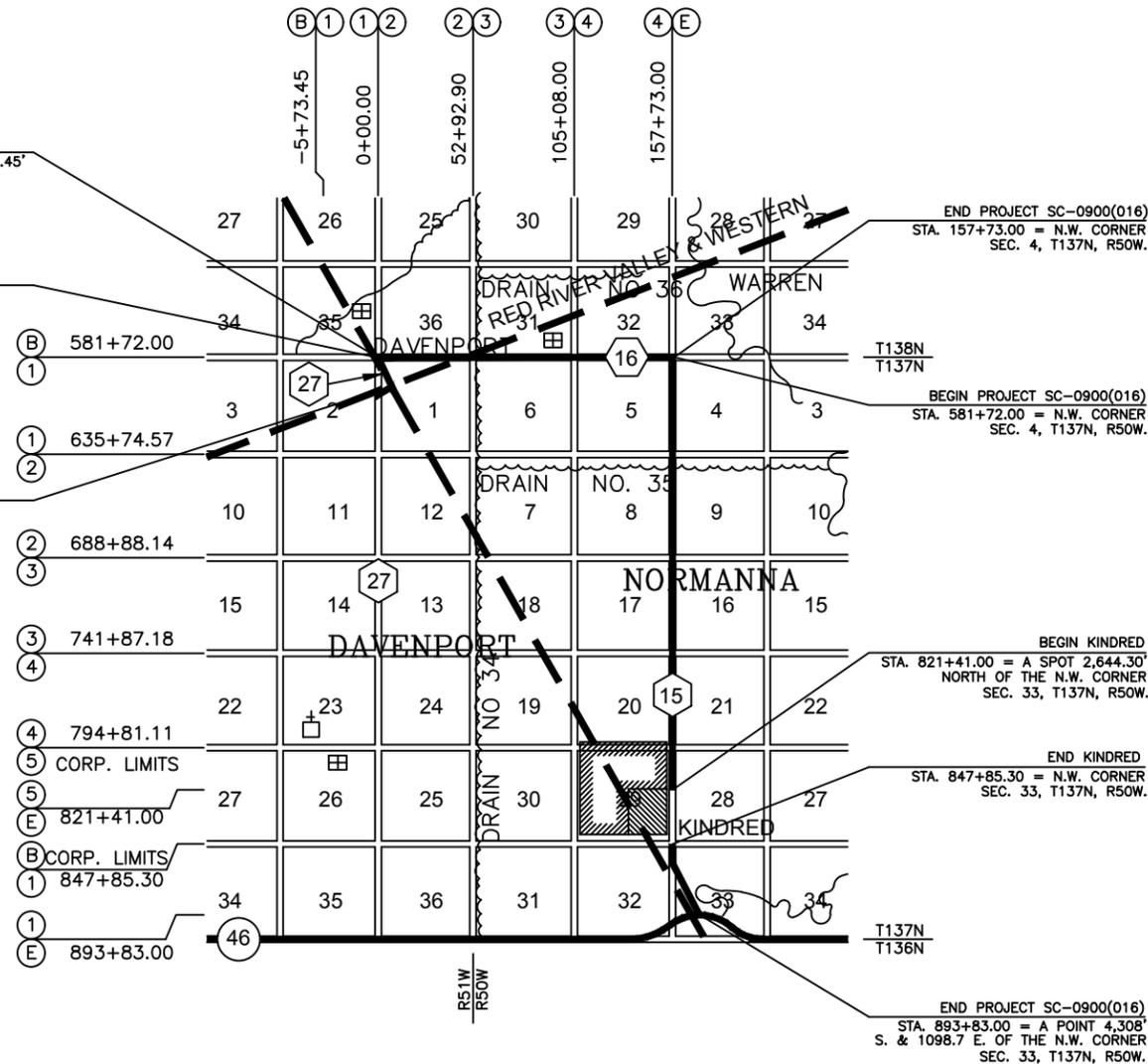
DESIGN SPEED 55 MPH
MINIMUM SIGHT DISTANCE (STOPPING) 495 FEET
SUPERELEVATION .05 FT/FT
HIGHWAY CROSS SLOPE 2.1%



BEGIN PROJECT SC-0900(016)
STA. -5+73.45 = A POINT 573.45' WEST OF THE S.E. CORNER SEC. 35, T138N, R51W.

END PROJECT SC-0900(016) - NON PARTICIPATING
STA. 22+00.00 = S.E. CORNER SEC. 35, T138N, R51W.

BEGIN PROJECT SC-0900(016) - NON PARTICIPATING
STA. -1+00 = A POINT 2,300' SOUTH OF THE S.E. CORNER SEC. 35, T138N, R51W.



END PROJECT SC-0900(016)
STA. 157+73.00 = N.W. CORNER SEC. 4, T137N, R50W.

BEGIN PROJECT SC-0900(016)
STA. 581+72.00 = N.W. CORNER SEC. 4, T137N, R50W.

BEGIN KINDRED
STA. 821+41.00 = A SPOT 2,644.30' NORTH OF THE N.W. CORNER SEC. 33, T137N, R50W.

END KINDRED
STA. 847+85.30 = N.W. CORNER SEC. 33, T137N, R50W.

END PROJECT SC-0900(016)
STA. 893+83.00 = A POINT 4,308' S. & 1098.7' E. OF THE N.W. CORNER SEC. 33, T137N, R50W.

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.

INDEX OF DRAWINGS

SHEET NO.	TITLE
1	COVER SHEET
2	SCOPE OF WORK
3-4	CONSTRUCTION NOTES
5-7	BASIS OF ESTIMATE
8	ESTIMATED QUANTITIES
9-14	TYPICAL SECTIONS
15	INTERSECTION DETAILS
16-18	APPROACH DETAILS
19	RUMBLE STRIP DETAILS
20-21	CONSTRUCTION SIGNING

LIST OF SPECIAL PROVISIONS

SP 298(14)	FLEXIBLE PAVEMENT SURFACE TOLERANCE
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STANDARD DRAWINGS

NUMBER	TITLE
D-704-7,8,9,10, 11,12,13,14,15, 20,22,26,56	CONSTRUCTION SIGNING & BARRICADE DETAILS
D-762-1,4	PAVEMENT MARKING
D-762-6	SHORT TERM PVMT. MARKING

LENGTH OF PROJECT

PROJECT	MILES GROSS	TOWN EXCEPTION	MILES NET
SC-0900(016)	5.911	0.500	5.411
SC-0900(016)	3.096	0.000	3.096
NON-PARTICIPATING	0.436	0.000	0.436
TOTAL	9.443	0.000	8.943

DESIGN PS&E FEBRUARY 2016
FEBRUARY 2016

THIS DOCUMENT WAS ORIGINALLY ISSUED AND SEALED BY
JASON P. BENSON
N.D. REG. NO. 7490
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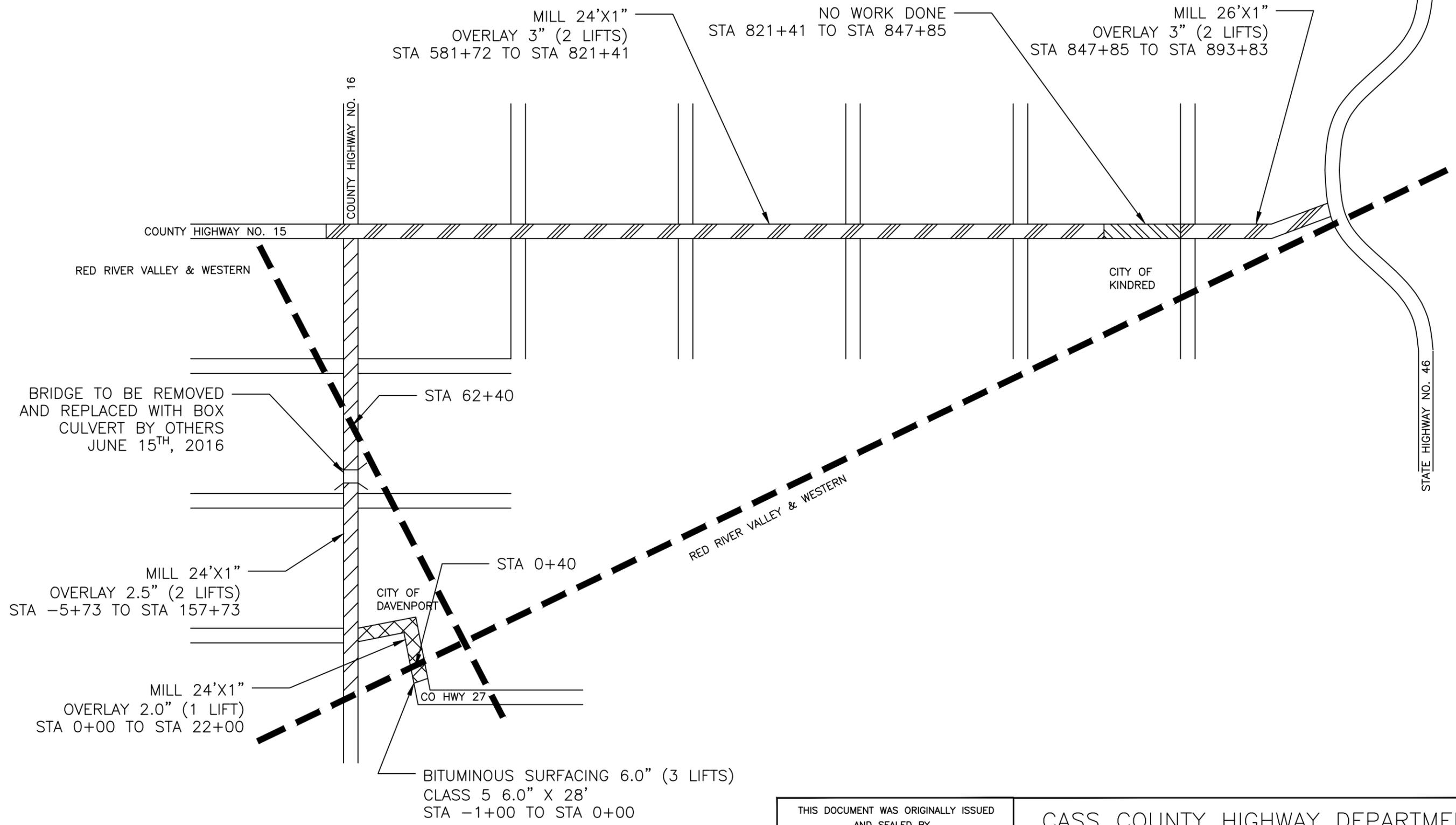
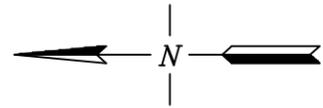
CASS COUNTY HIGHWAY DEPARTMENT
PROJECT NO. SC-0900(016)

I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION.

JASON P. BENSON N.D. REG. NO. 7490

DATE: _____

STATE	FEDERAL AID PROJECT NUMBER	SHEET	TOTAL SHEETS
PCN 21535	N.D.	SC-0900(016)	2
			21



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CASS COUNTY HIGHWAY DEPARTMENT
PROJECT NO. SC-0900(016)
SCOPE OF WORK

	STATE	FEDERAL AID PROJECT NUMBER	SHEET	TOTAL SHEETS
PCN 21535	N.D.	SC-0900(016)	3	21

GENERAL PROVISIONS:

Thicknesses shown on the typical sections for surfacing are approximate. It is intended that the plan tonnages provided for by the basis of estimate will be used uniformly throughout the project unless otherwise authorized by the Engineer.

The attention of the bidders is directed to M.S. 298.75 (Aggregate Material Tax), pursuant to the removal of aggregates from any deposit in Minnesota.

RAILROAD PROTECTIVE LIABILITY INSURANCE:

This project crosses the Red River Valley and Western Railway at crossing numbers 06-2719U and 07-0920T. This type of work that will be performed within the railroad right of way is Hot Bituminous Paving. Inquiries for protective liability insurance should be directed to:

Mr. Dan Zink
 Red River Valley and Western RR
 116 4th Street South
 Wahpeton, ND 58074
 (701)-642-8257

RAILWAY NOTIFICATION:

The contractor shall notify Red River Valley and Western Railway a minimum of 5 days prior to performing work on or adjacent to the railroad right-of-way for possible flagging.

HAUL ROADS:

The Contractor's attention is directed to Section 107.08 of the Standard Specifications regarding the use of public roads for hauling materials to the project. Haul roads that will not be allowed for this project are as follows: Barnes County Highway 6 from State Highway 32, East to the Cass County line. Cass County Highway 26, from the Barnes County line East to State Highway 38, and Cass County Highway 10 from Tower City East to State Highway 38. No Township roads anywhere in Cass County will be allowed for haul road usage. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO INVESTIGATE THE SUITABILITY OF ROUTES WITH THE AGENCY HAVING CONTROL OF THE ROAD PRIOR TO SUBMITTING A BID.

CULTURAL RESOURCE PRESERVATION AND CLEARANCES OF GRAVEL PITS:

In accordance with section 107.05 of the standard specifications, the contractor is required to ensure that applicable cultural resource laws and regulations have been followed for all material sources. Below is the NDDOT website of pits that been certified.

<http://www.dot.nd.gov/dotnet2/materialsource/certificatesofapproval.aspx>

All material source locations, even those opened prior to the current project, must have been subjected to class III cultural resources inventory prior to use. Inventory results will determine recommendations regarding use of a particular source. The contractor's attention is directed to section 107.06 of the standard specifications for the treatment of any cultural resources that may be uncovered within the right of way.

PLACEMENT OF CLASS 5 AGGREGATE:

The Contractor shall be responsible for the direction, placement (Dumpman) and coordination of aggregate trucks.

RUMBLE STRIP FOG COAT:

The fog coat shall be placed after the rumble strips are cut. Rumble strips fogged 2' wide in both directions. Apply a bitumen that is diluted with water at a (50/50) ratio at a rate of 0.10 gallons per square yard. All costs associated with this item shall be included in the unit cost for "RUMBLE STRIPS-ASPAHLT SHOULDER."

TOP LIFT FOG COAT:

Apply the fog coat after the final rolling while the pavement is still warm. Apply a bitumen that is diluted with water at a (50/50) ratio at a rate of 0.10 GAL/SY. All costs associated with this item shall be included in the unit cost for "RAP - SUPERPAVE FAA 42."

SS-1H, CSS-1H, OR MS-1 EMULSIFIED ASPHALT:

Apply the tack coat at a (50/50) ratio at a rate of 0.10 GAL/SY. All costs associated with this item shall be included in the unit cost for "RAP - SUPERPAVE FAA 42."

MILLED MATERIAL:

Contractor shall use the milled bituminous material for recycle for "RAP - SUPERPAVE FAA 42." Excess milled material, meeting a maximum size of 1 1/2", with 90% passing the 1" sieve, shall be disposed of by stockpiling at the County stockpile in Gardner, ND. Upon stockpiling at the yard, material becomes property of the county. All costs of delivering and pushing the excess millings onto the existing stockpile with a dozer shall be included in the unit cost for "MILLING PAVEMENT SURFACE."

HOT MIX ASPHALT:

The hot mix asphalt shall be placed and accepted according to NDDOT Standard Specifications Section 430. **OUTSIDE EDGE OF SLOUGH MUST REMAIN 1.5" OR THINNER OR BE RAKED OUT OR REPAIRED BY CONTRACTOR AT THEIR EXPENSE.**

Cass Highway 27 hot mix asphalt from STA -1+00 to STA 0+00 shall be paver laid 24' wide on top of 6" Class 5 with a 2' slough in 3 lifts from the railroad tracks to 100' west. Excess existing material to be hauled off site to a location approved by the Engineer. All costs associated with excavation and transportation of material to be included in the bid item "RAP - SUPERPAVE FAA."

All hot mix asphalt and asphalt cement required shall be measured and paid for by the ton of "RAP - SUPERPAVE FAA 42" and "PG 58-28 ASPHALT CEMENT". This shall be considered full payment for performing this work.

WARM MIX ASPHALT (WMA):

Warm Mix Asphalt (WMA) may be substituted for Hot Mix Asphalt (HMA) at the Contractor's choosing. The WMA additive or technology is at the Contractor's choosing, and to be approved by the Engineer. All costs and savings associated with WMA shall be included in the unit cost for "RAP - SUPERPAVE FAA 42."

CONTRACTOR MIX DESIGN:

The mix design will be a laboratory mix design determined by the Contractor and approved by the Engineer. The mix design will be developed according to NDDOT mix design procedures and will meet the requirements of Section 430 of the NDDOT Standard Specifications. The mix design will be developed using the aggregate source, RAP source, and asphalt cement that is to be used on the project.

RECYCLED ASPHALT PAVEMENT (RAP):

Contractor may add up to 15% recycled asphalt pavement (RAP), with a tolerance of ±5% in the Superpave FAA 42 mixture. The contractor shall use 100% virgin material until enough RAP material is available to achieve the 10%.

RAP must be utilized in accordance with Section 430.03 E of the Standard Specification.

CONTRACTOR CORING:

Before placing bituminous material into core holes, apply a tack coat on all sides of the core holes as Specified in Section 401.

PAVING SEAMS:

All seams must be at least 11.5' from the centerline of the roadway unless a hot seam is used. Hot seams can be located at any offset distance. A hot seam will be defined as a seam created when two pavers are paving at the same time, with no more than 300' between the pavers. The seam must be rolled in a way to join and hide the seam so it is not visible to the traveling public.

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CASS COUNTY HIGHWAY DEPARTMENT
 PROJECT NO. SC-0900(016)
 CONSTRUCTION NOTES

HOT MIX ASPHALT:

The "RAP – SUPERPAVE FAA 42" shall have the following aggregate and mix design properties:

Test	Criteria	Reference
Course Aggregate Angularity	75% min	NDDOT Field Sampling/Testing Manual
Fine Aggregate Angularity	42% min	AASHTO T 304
Gyratory Effort, # Gyration	Nini=7, Ndes=75, Nmax=115	AASHTO R 35
Voids Filled with Asphalt	65–78%	AASHTO M 323, T 166
%Gmm @ Nini	90.5% max	AASHTO M 323, T 166

PAVEMENT TOLERANCES:

Contractor is directed to Section 430.04K of the 2014 NDDOT Standard Specification regarding pavement tolerances. All pavement sections and transverse joints that are not within tolerance will be required to be corrected at the Contractor's expense.

BITUMINOUS LABORATORY:

Replace 706.02C, Number 8, with the following: A forced draft oven with an interior capacity of 6 cubic feet and that is capable of maintaining a temperature range from 250°F to 350°F ± 5°F.

TRAFFIC CONTROL:

Lump sum "TRAFFIC CONTROL" bid item shall include all signage required for construction (See sheet 21 for device listing), flagging and pilot car. Flagging hours are estimated at 347 hours for the project, Pilot Car hours are estimated at 174 hours for the project.

"TRAFFIC CONTROL" bid item shall also include all costs for a Traffic Control Supervisor and Traffic Watchperson per NDDOT Specification 704.04.

TRAFFIC CONTROL FOR RUMBLE STRIPS:

The contractor shall use Standard Drawing D-704-15 layout A or Standard Drawing D-704-56 for shoulder rumble strips.

Any other method of traffic control must be requested by the Contractor and approved by the Engineer prior to use in the field. All costs for this work shall be included in the price bid for "RUMBLE STRIPS – ASPHALT SHOULDER".

STRIPING:

All striping must be 4" wide (both temporary or permanent). If the temporary striping is measured at a thinner width, the prorated amount of width will be paid for the quantity placed. If permanent striping is measured less than 4" width, section must be re-striped at contractor's cost.

PREFORMED PATTERNED PVT MK-MESSAGE (GROOVED):

Railroad crossing messages as detailed on Standard Drawing D-762-1 shall be installed each way from the railroad crossings on C-16 at STA. 62+34, on west side of the railroad crossing on C-16 at STA. -5+73, and on the west side of the railroad crossing on C-27 at STA. 0+00.

WEED CONTROL:

Successful bidders as part of their supply contract will be required as part of the bid acceptance to comply with the following:

1. All noxious weeds must be controlled within the pit and extraction area each year in compliance with North Dakota State Agriculture Department recommendations for noxious weed control.
2. The county weed officer shall inspect the pit and extraction area before any materials shall be removed and shall by written letter certify operator's compliance with the North Dakota Department of Agriculture's recommendations for noxious weed control.
3. Any questions concerning the certifications of compliance for noxious weed control and the requirements thereunder is available from the County Weed Officer at (701) 298-2388.

This request is made pursuant to section 4.1-47 of the North Dakota Century Code.

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CASS COUNTY HIGHWAY DEPARTMENT
PROJECT NO. SC-0900(016)
CONSTRUCTION NOTES

BASIS OF ESTIMATE	
MATERIAL	BASIS OF ESTIMATE
AGGREGATE BASE COURSE - CLASS 5	1.875 TON/CY
SHRINKAGE FOR CLASS 5	COMPACTED VOLUME IN PLACE PLUS 25%
CLASS 5 FOR APPROACHES	23 TONS/APPROACH
HOT BITUMINOUS PAVEMENT	2 TON/CY
ADDED ASPHALT CEMENT	5.0% OF HBP BY WEIGHT
EMULSIFIED ASPHALT FOR TACK COAT - MILLED SURFACE	0.10 GAL/SY
EMULSIFIED ASPHALT FOR TACK COAT - NON MILLED SURFACE	0.05 GAL/SY
EMULSIFIED ASPHALT FOR RUMBLE STRIPS	0.10 GAL/SY
EMULSIFIED ASPHALT FOR FOG COAT	0.05 GAL/SY
WATER	
AGGREGATE BASE CLASS 5 COMPACTION	30 GAL/TON
AS A DUST PALLATIVE ON HAUL ROADS	30 M GAL PER DAY OF HAULING (ESTIMATED TO BE 15 DAYS)
TRAFFIC CONTROL	
FLAGGING	12 HOURS FLAGGING/FLAGGER/2,000 TONS FAA 42
PILOT CAR	12 HOURS PILOT CAR/2000 TONS FAA 42

BASIS OF ESTIMATE (SURFACING INTERSECTIONS/APPROACHES)						
DESCRIPTION	C16 & C27		C27 & 1ST AVE		C15 & C16.	
RECYCLED ASPHALT PAVEMENT - FAA 42	400	TON	200	TON	400	TON
ASPHALT CEMENT	20	TON	10	TON	20	TON
EMULS. ASPH. FOR TACK COAT	108	GAL.	54	GAL.	108	GAL.
EMULS. ASPH. FOR FOGGING	54	GAL.	0	GAL.	54	GAL.
INTERSECTION/APPROACH RECYCLED ASPHALT PAVEMENT - FAA 42 TOTALS = 1,000 TONS						

MAXIMUM SIZE OF AGGREGATES		
DESCRIPTION	TYPE OF AGGR.	MAXIMUM SIZE
RECYCLED ASPHALT PAVEMENT - FAA 42	CRUSHED	5/8"
AGGREGATE BASE & SHOULDERS - CLASS 5	CRUSHED	1"

OVERLAYING APPROACHES				
PROJECT CH1702 - HWY 27				
DESCRIPTION	PRIVATE DRIVE	SECTION LINE	FIELD APPROACH	TOTAL
AMOUNT	13	2	0	
RECYCLED ASPHALT PAVEMENT - FAA 42	20 TON	20 TON	8 TON	300 TON
ASPHALT CEMENT	1 TON	1 TON	0.4 TON	15 TON
AGGREGATE BASE - CLASS 5	23 TON	23 TON	23 TON	345 TON
EMULS. ASPH. FOR TACK COAT	15 GAL.	15 GAL.	10 GAL.	225 GAL.

OVERLAYING APPROACHES				
PROJECT CH1702 - HWY 15				
DESCRIPTION	PRIVATE DRIVE	SECTION LINE	FIELD APPROACH	TOTAL
AMOUNT	14	11	12	
RECYCLED ASPHALT PAVEMENT - FAA 42	20 TON	20 TON	8 TON	596 TON
ASPHALT CEMENT	1 TON	1 TON	0.4 TON	29.8 TON
AGGREGATE BASE - CLASS 5	23 TON	23 TON	23 TON	851 TON
EMULS. ASPH. FOR TACK COAT	15 GAL.	15 GAL.	10 GAL.	495 GAL.

OVERLAYING APPROACHES				
PROJECT CH1702 - HWY 16				
DESCRIPTION	PRIVATE DRIVE	SECTION LINE	FIELD APPROACH	TOTAL
AMOUNT	4	7	10	
RECYCLED ASPHALT PAVEMENT - FAA 42	20 TON	20 TON	8 TON	300 TON
ASPHALT CEMENT	1 TON	1 TON	0.4 TON	15 TON
AGGREGATE BASE - CLASS 5	23 TON	23 TON	23 TON	483 TON
EMULS. ASPH. FOR TACK COAT	15 GAL.	15 GAL.	10 GAL.	265 GAL.

CLASS 5 TONNAGE ESTIMATE								
HIGHWAY	LOCATION	STA START	STA END	DEPTH (IN)	WIDTH (FT)	AREA (SF)	LENGTH (FT)	TONS
C-27	MAINLINE	-1+00	0+00	6.0	30	15.0000	100	104
							TOTAL	104
							10% OVERAGE	10
							APPROACHES/INT	1,679
							GRAND TOTAL	1,793

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CASS COUNTY HIGHWAY DEPARTMENT
 PROJECT NO. SC-0900(016)
 BASIS OF ESTIMATE

EMULSIFIED ASPHALT FOR TACK COAT

SC-0900(016) - HWY 15

LOCATION	LENGTH (FT)	WIDTH (FT)	AREA (SY)	GAL
MAINLINE - 1ST LIFT - 0.1 GAL/SY	23,969	24	63,917	6,392
MAINLINE - TOP LIFT - 0.05 GAL/SY	23,969	32	85,223	4,261
MAINLINE - 1ST LIFT - 0.1 GAL/SY	4,598	26	13,283	1,328
MAINLINE - TOP LIFT - 0.05 GAL/SY	4,598	38	19,414	971
APPROACHES/INTERSECTIONS				603
TOTAL =			181,837	13,555

EMULSIFIED ASPHALT FOR FOGGING

SC-0900(016) - HWY 15

LOCATION	LENGTH (FT)	WIDTH (FT)	AREA (SY)	GAL
RUMBLE STRIPS - 0.05 GAL/SY	23,969	4	10,653	533
MAINLINE - 0.05 GAL/SY	23,969	24	63,917	3,196
SHOULDERS - 0.05 GAL/SY	23,969	8	21,306	1,065
RUMBLE STRIPS - 0.05 GAL/SY	4,598	4	2,044	102
MAINLINE - 0.05 GAL/SY	4,598	26	13,283	664
SHOULDERS - 0.05 GAL/SY	4,598	12	6,131	307
TOTAL =			117,333	5,867

EMULSIFIED ASPHALT FOR TACK COAT

SC-0900(016) - HWY 16

LOCATION	LENGTH (FT)	WIDTH (FT)	AREA (SY)	GAL
MAINLINE - 1ST LIFT - 0.1 GAL/SY	16,346	24	43,589	4,359
MAINLINE - TOP LIFT - 0.05 GAL/SY	16,346	32	58,119	2,906
APPROACHES/INTERSECTIONS				373
TOTAL =			101,708	7,638

EMULSIFIED ASPHALT FOR FOGGING

SC-0900(016) - HWY 16

LOCATION	LENGTH (FT)	WIDTH (FT)	AREA (SY)	GAL
RUMBLE STRIPS - 0.05 GAL/SY	16,346	4	7,265	363
MAINLINE - 0.05 GAL/SY	16,346	24	43,589	2,179
SHOULDERS - 0.05 GAL/SY	16,346	8	14,530	726
TOTAL =			65,384	3,268

EMULSIFIED ASPHALT FOR TACK COAT

SC-0900(016) NON PARTICIPATING - HWY 27

LOCATION	LENGTH (FT)	WIDTH (FT)	AREA (SY)	GAL
MAINLINE - 1ST LIFT - 0.1 GAL/SY	2,200	24	5,867	587
MAINLINE - 2ND LIFT - 0.05 GAL/SY	100	24	267	13
MAINLINE - TOP LIFT - 0.05 GAL/SY	100	24	267	13
APPROACHES/INTERSECTIONS				279
TOTAL =			6,401	892

EMULSIFIED ASPHALT FOR FOGGING

SC-0900(016) NON PARTICIPATING - HWY 27

LOCATION	LENGTH (FT)	WIDTH (FT)	AREA (SY)	GAL
MAINLINE - 0.05 GAL/SY	2,300	24	6,133	307
TOTAL =			6,133	307

PAVING TONNAGE ESTIMATE CH1702 - HWY 16

TYPE	STA START	STA END	LENGTH (FT)	WIDTH (FT)	AREA (SF)	THICKNESS (IN)	TONS
MAINLINE	-5+73	157+73	16,346	24	392,304	2.5	6,054
SHOULDERS	-5+73	157+73	16,346	8	130,768	1.5	1,211
SLOUGH	-5+73	157+73	16,346	3	49,038	1.5	454
TOTAL							7,719
5% OVERAGE							386
APPROACHES/INT							700
GRAND TOTAL							8,805

PAVING TONNAGE ESTIMATE CH1702 - HWY 15

TYPE	STA START	STA END	LENGTH (FT)	WIDTH (FT)	AREA (SF)	THICKNESS (IN)	TONS
MAINLINE	581+72	821+41	23,969	24	575,256	3.0	10,653
SHOULDERS	581+72	821+41	23,969	8	191,752	2.0	2,367
SLOUGH	581+72	821+41	23,969	3	71,907	2.0	888
MAINLINE	847+85	893+83	4,598	26	119,548	3.0	2,214
SHOULDERS	847+85	893+83	4,598	12	55,176	2.0	681
SLOUGH	847+85	893+83	4,598	2	9,196	2.0	114
TOTAL							16,917
5% OVERAGE							846
APPROACHES/INT							996
GRAND TOTAL							18,759

PAVING TONNAGE ESTIMATE CH1702 - HWY 27

TYPE	STA START	STA END	LENGTH (FT)	WIDTH (FT)	AREA (SF)	THICKNESS (IN)	TONS
MAINLINE	0+00	22+00	2,200	24	52,800	2	652
MAINLINE	-1+00	0+00	100	24	2,400	6	89
SLOUGH	0+00	22+00	2,200	2	4,400	2	54
SLOUGH	-1+00	0+00	100	2	200	6	7
TOTAL							802
5% OVERAGE							40
APPROACHES/INT							500
GRAND TOTAL							1,342

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CASS COUNTY HIGHWAY DEPARTMENT
 PROJECT NO. SC-0900(016)
 BASIS OF ESTIMATE

PAVEMENT MARKING QUANTITIES - CH1702 - HWY 15								
START STA	END STA	LANE	4" YELLOW TEMPORARY (3 LIFTS)		4" PERMANENT MARKING			
			SKIP (L.F.)	NPZ (L.F.)	4" SKIP (L.F.)	4" NPZ (L.F.)	4" WHITE (L.F.)	TOTAL 4" (L.F.)
581+72	818+84		5,928		5,928		47,424	53,352
581+72	590+67	LT		895		895		895
733+87	741+87	RT		800		800		800
741+87	749+87	LT		800		800		800
818+84	821+41	LT/RT		514		514	514	1,028
847+85	849+77	LT/RT		384		384	384	768
849+77	893+83		1,102		1,102		8,816	9,918
882+72	893+84	RT		1,112		1,112		1,112
PER LIFT TOTAL =			7,030	4,505	N/A	N/A	N/A	N/A
3 LIFT TOTALS =			21,090	13,515	7,030	4,505	57,138	68,673

PAVEMENT MARKING QUANTITIES - CH1702 - HWY 16								
START STA	END STA	LANE	4" YELLOW TEMPORARY (3 LIFTS)		4" PERMANENT MARKING			
			SKIP (L.F.)	NPZ (L.F.)	4" SKIP (L.F.)	4" NPZ (L.F.)	4" WHITE (L.F.)	TOTAL 4" (L.F.)
-5+73	52+67		1,460		1,460		11,680	13,140
-5+73	2+97	LT		870		870		870
49+47	52+67	RT		320		320		320
52+67	62+12	LT/RT		1,890		1,890	1,890	3,780
62+12	157+73		2,390		2,390		19,120	21,510
62+32	72+27	LT		995		995		995
147+93	157+73	RT		980		980		980
PER LIFT TOTAL =			3,850	5,055	N/A	N/A	N/A	N/A
3 LIFT TOTALS =			11,550	15,165	3,850	5,055	32,690	41,595

PAVEMENT MARKING QUANTITIES - CH1702 - HWY 27								
START STA	END STA	LANE	4" YELLOW TEMPORARY (2 LIFTS)		4" PERMANENT MARKING			
			SKIP (L.F.)	NPZ (L.F.)	4" SKIP (L.F.)	4" NPZ (L.F.)	4" WHITE (L.F.)	TOTAL 4" (L.F.)
0+50	22+00		538		538		4,304	4,842
-1+00	0+50	LT/RT		300		300	300	600
19+25	22+00	LT		275		275		275
PER LIFT TOTAL =			538	575	N/A	N/A	N/A	N/A
2 LIFT TOTALS =			1,076	1,150	538	575	4,604	5,717

MILLING BITUMINOUS PAVEMENT - 1"				
PROJECT CH1702 - HWY 15				
STATION	WIDTH (FT)	LENGTH (FT)	AREA (SY)	TONS
581+72 TO 821+41	24	23,969	63,917	3,551
847+85 TO 893+83	26	4,598	13,283	738
TOTAL			77,200	4,289
PROJECT CH1702 - HWY 16				
STATION	WIDTH (FT)	LENGTH (FT)	AREA (SY)	TONS
-5+73 TO 157+73	24	16,346	43,589	2,422
TOTAL			43,589	2,422
PROJECT CH1702 - HWY 27				
STATION	WIDTH (FT)	LENGTH (FT)	AREA (SY)	TONS
0+00 TO 22+00	24	2,200	5,867	326
TOTAL			5,867	326
GRAND TOTAL			126,656	7,037

PREFORMED PATTERNED PVMT MK-MESSAGE (GROOVED)		
PROJECT CH1702 - HWY 16		
STATION	ARROW TYPE	SF
-2+73 LT	RR CROSSING	132.5
57+06 RT	RR CROSSING	132.5
69+63 LT	RR CROSSING	132.5
	TOTAL	397.5
PROJECT CH1702 - HWY 27		
STATION	ARROW TYPE	SF
1+00 LT	RR CROSSING	158.5
	TOTAL	158.5
	GRAND TOTAL	556.0

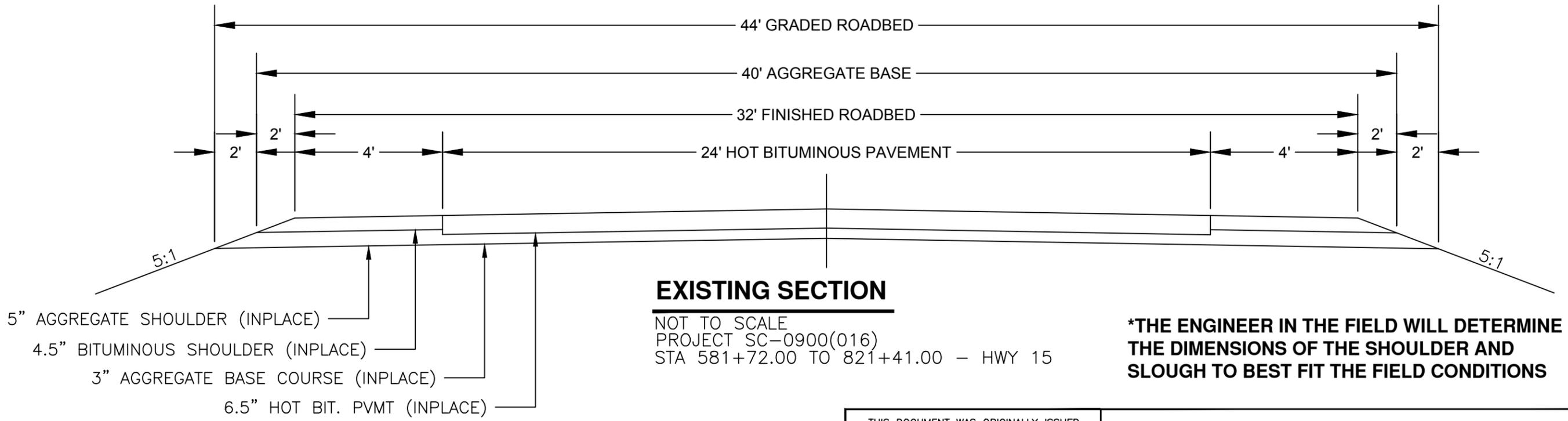
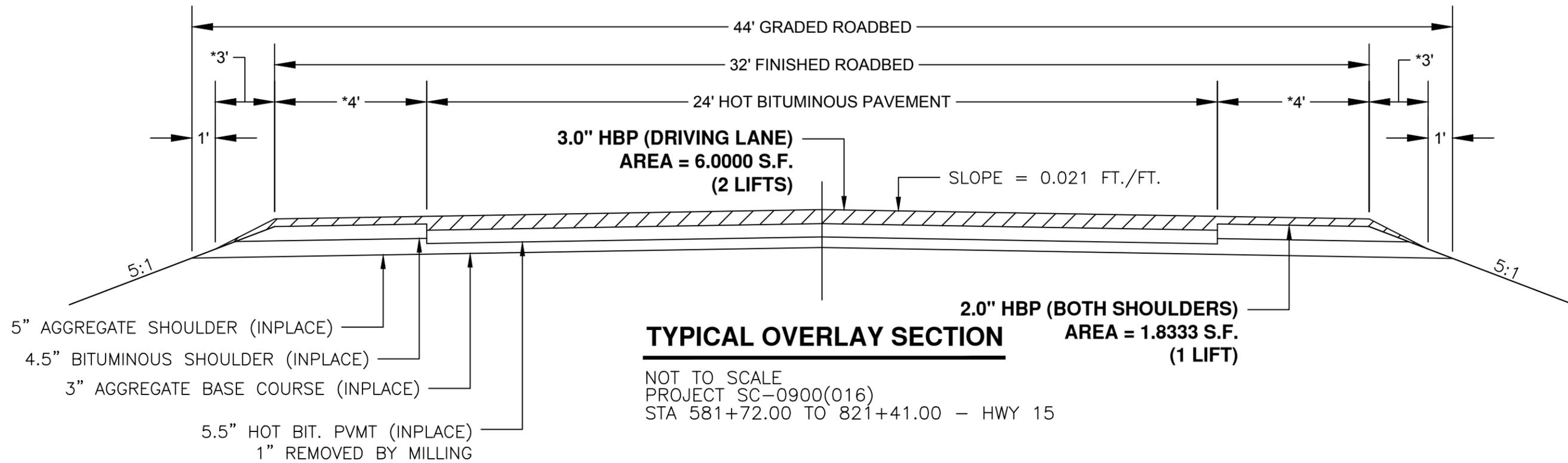
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CASS COUNTY HIGHWAY DEPARTMENT
 PROJECT NO. SC-0900(016)
 BASIS OF ESTIMATE

					ESTIMATED QUANTITIES SC-0900(016) HIGHWAY 15 & 16	ESTIMATED QUANTITIES SC-0900(016) HIGHWAY 27 NON-PARTICIPATING	TOTAL
ITEM	SPEC NO.	CODE	DESCRIPTION	UNIT	APPROX. QUANTITY	APPROX. QUANTITY	APPROX. QUANTITY
1	103	0100	CONTRACT BOND	L SUM	0.95	0.05	1
2	107	0101	RAILWAY PROTECTION INSURANCE-2 LOCATIONS	L SUM	0.50	0.50	1
3	302	0120	AGGREGATE BASE COURSE CL 5	TON	1,334	459	1,793
4	411	0105	MILLING PAVEMENT SURFACE	SY	120,789	5,867	126,656
5	430	0142	RAP - SUPERPAVE FAA 42	TON	27,564	1,342	28,906
6	430	1000	CORED SAMPLE	EA	99	5	104
7	430	5828	PG 58-28 ASPHALT CEMENT	TON	1378	67	1,445
8	702	0100	MOBILIZATION	L SUM	0.95	0.05	1
9	704	1100	TRAFFIC CONTROL	L SUM	0.95	0.05	1
10	706	0550	BITUMINOUS LABORATORY	EA	1	0	1
11	706	0600	CONTRACTORS LABORATORY	EA	1	0	1
12	760	0005	RUMBLE STRIPS-ASPHALT SHOULDER	MILE	17.014	0	17.014
13	762	0122	PREFORMED PATTERNED PVMT MK-MESSAGE(GROOVED)	SF	397.5	158.5	556
14	762	0405	SHORT TERM 4 IN BROKEN LINE-PNT TAPE OR RSD MRK	LF	32,640	1,076	33,716
15	762	0410	SHORT TERM 4 IN LINE NPZ - PN TP OR RS MRK	LF	28,680	1,150	29,830
16	762	1104	PVMT MK PAINTED 4IN LINE	LF	110,268	5,717	115,985

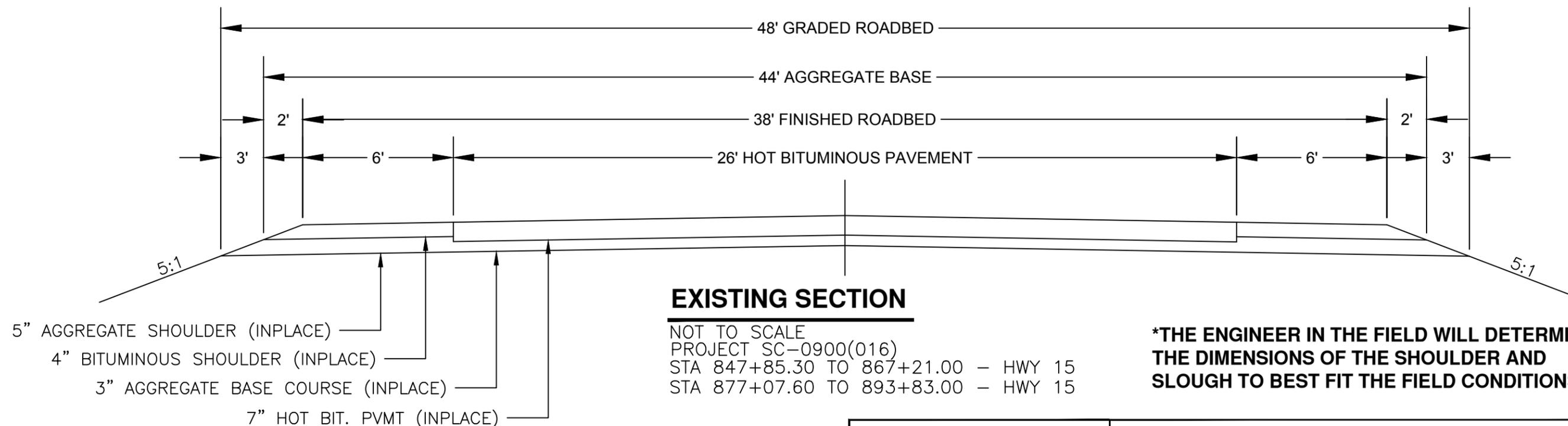
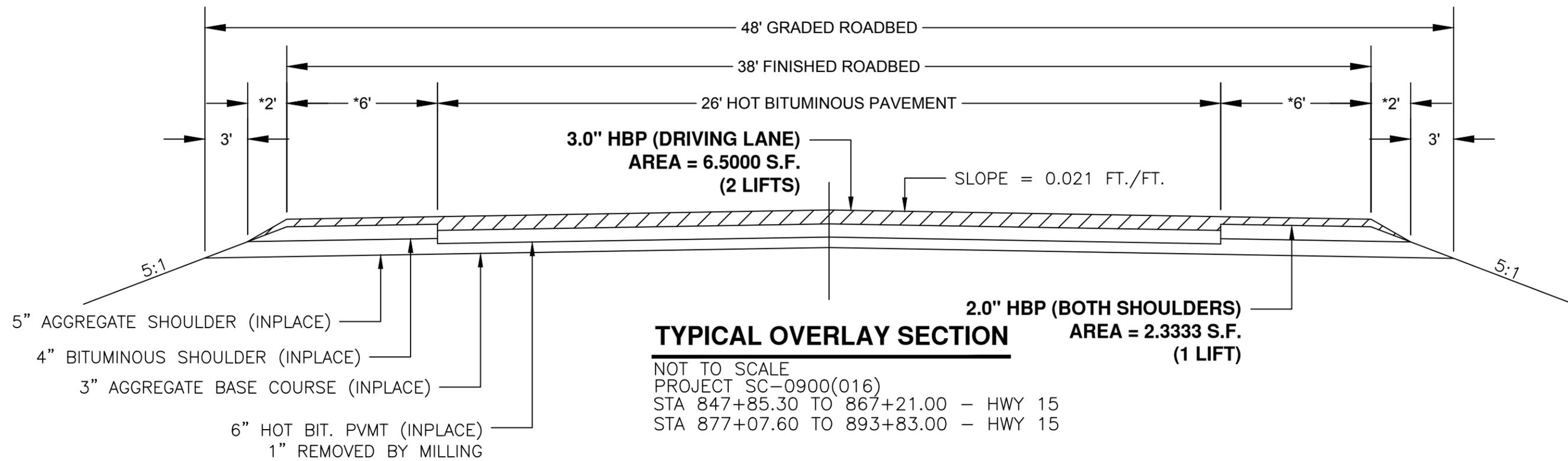
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CASS COUNTY HIGHWAY DEPARTMENT
PROJECT NO. SC-0900(016)
ESTIMATE OF QUANTITIES



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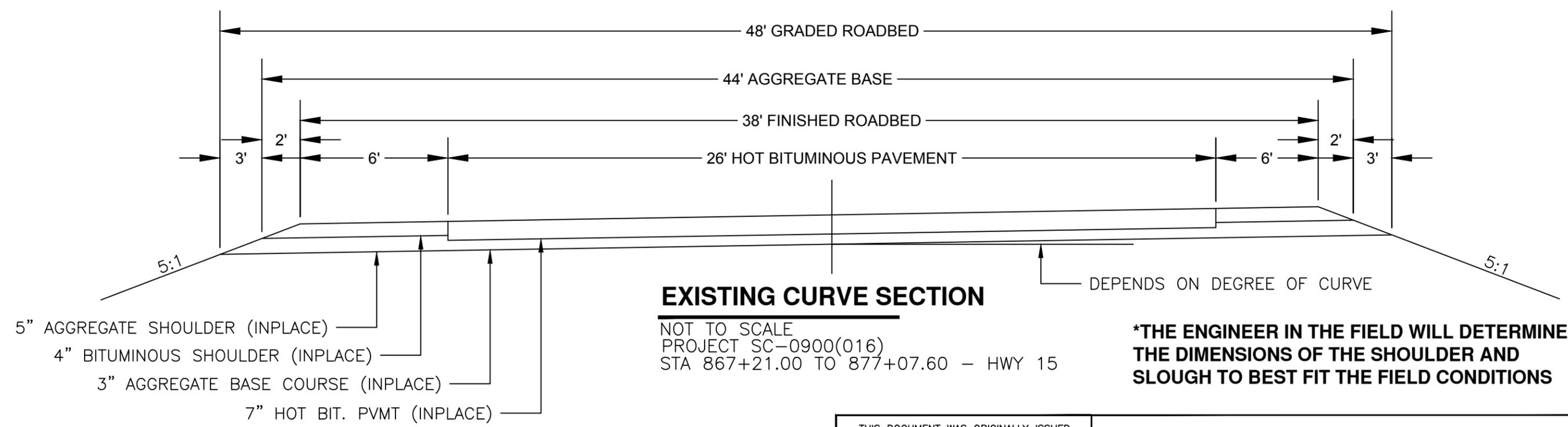
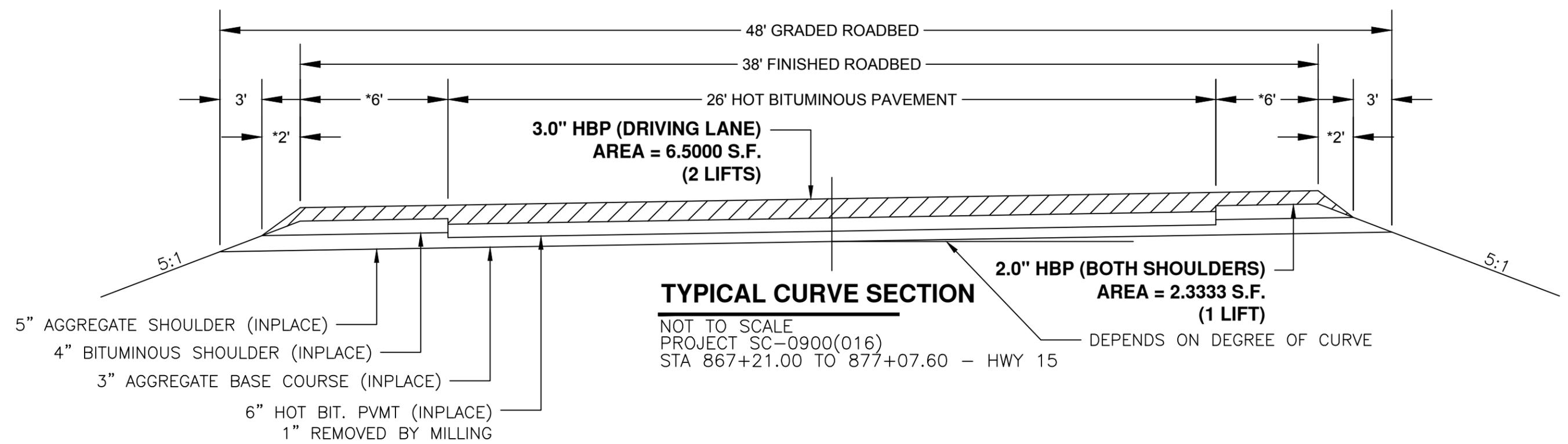
CASS COUNTY HIGHWAY DEPARTMENT
 PROJECT NO. SC-0900(016)
 TYPICAL SECTIONS



***THE ENGINEER IN THE FIELD WILL DETERMINE THE DIMENSIONS OF THE SHOULDER AND SLOUGH TO BEST FIT THE FIELD CONDITIONS**

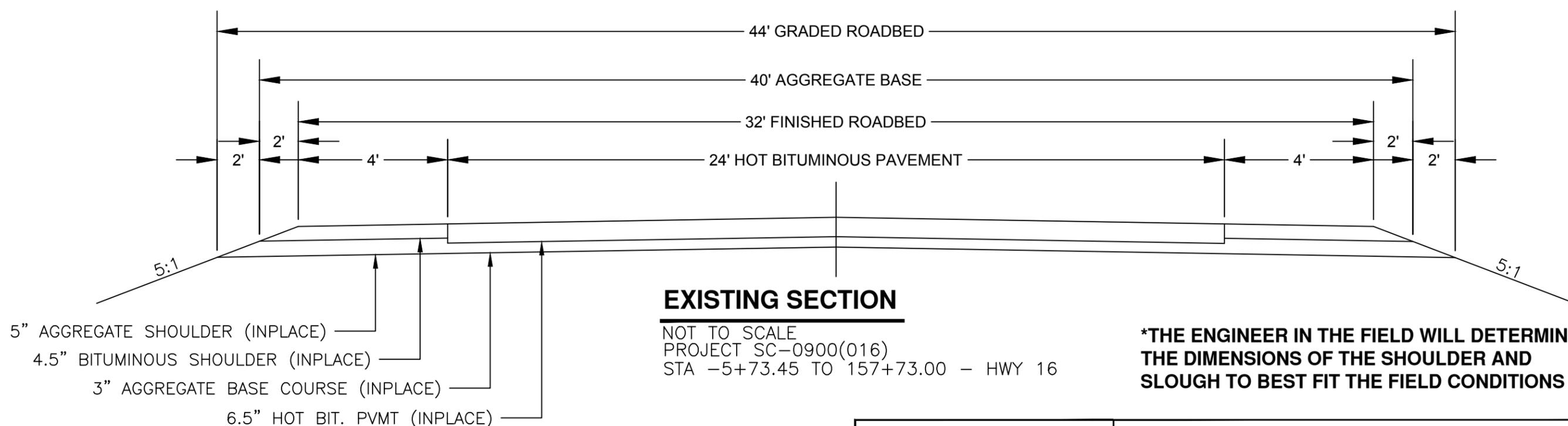
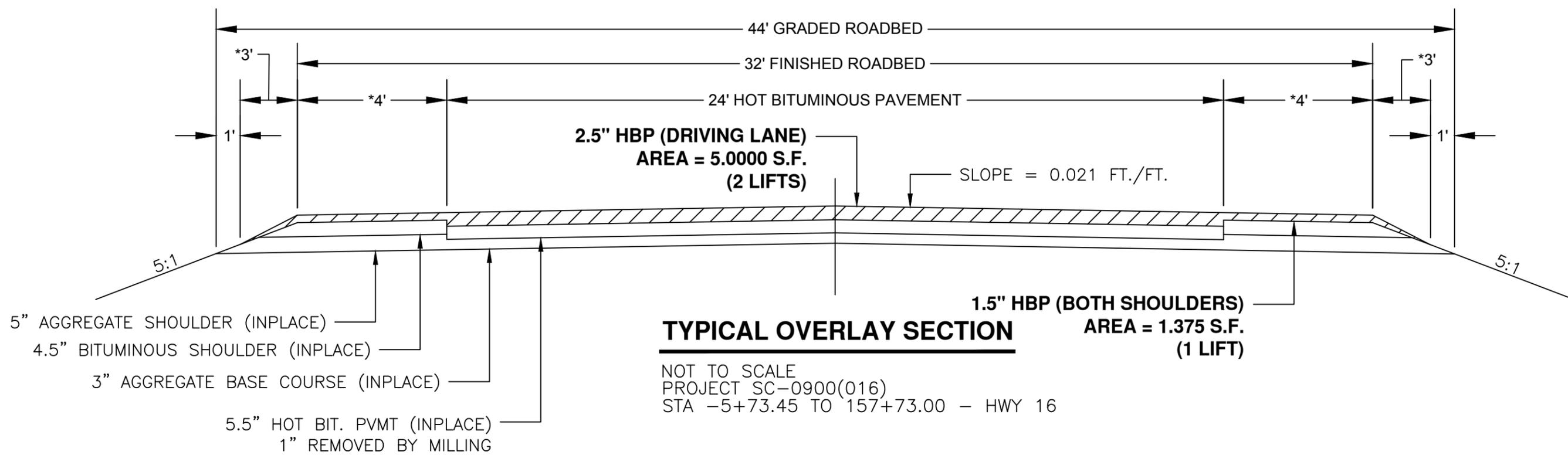
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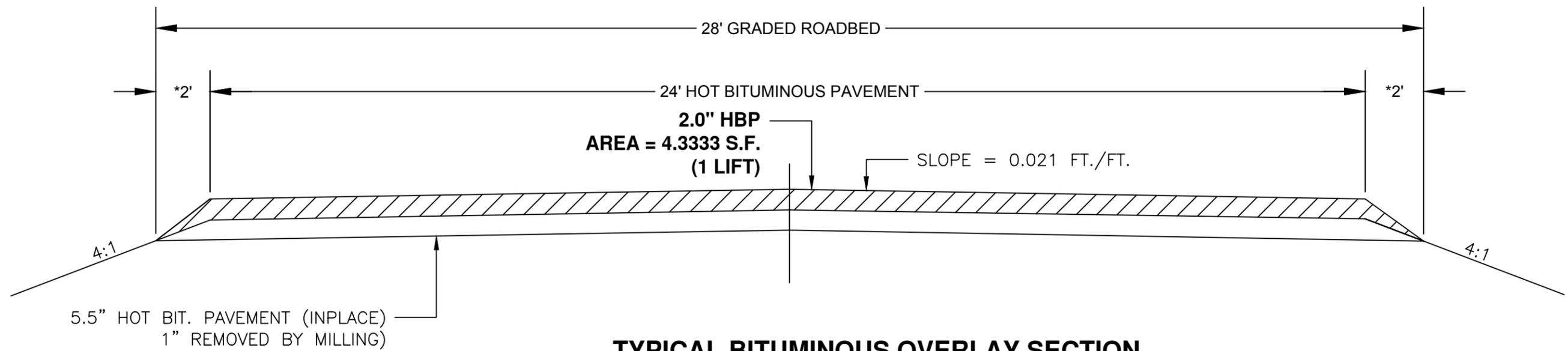
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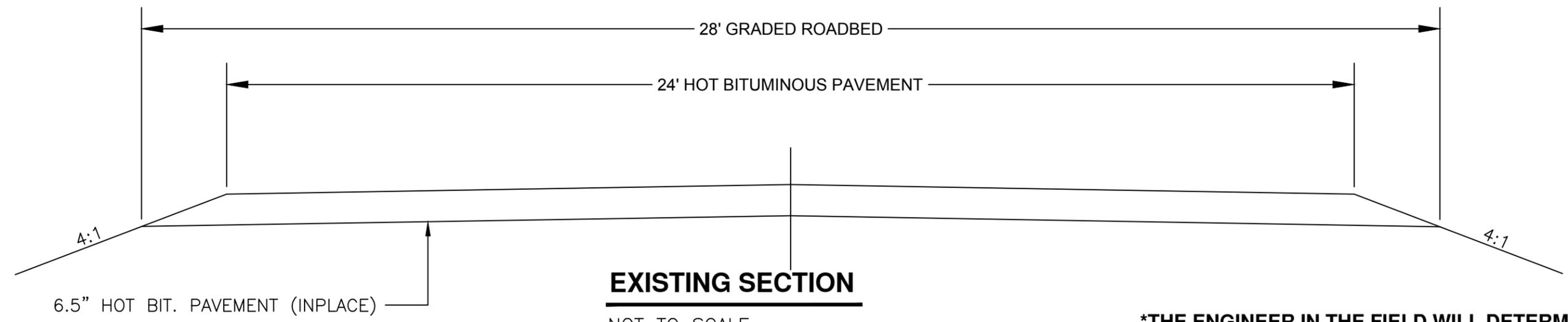
CASS COUNTY HIGHWAY DEPARTMENT
 PROJECT NO. SC-0900(016)
 TYPICAL SECTIONS

PCN 21535	STATE N.D.	FEDERAL AID PROJECT NUMBER SC-0900(016)	SHEET 13	TOTAL SHEETS 21
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TYPICAL BITUMINOUS OVERLAY SECTION

NOT TO SCALE
 PROJECT SC-0900(016) NON-PARTICIPATING
 STA 0+00.00 TO 22+00.00 - HWY 27



EXISTING SECTION

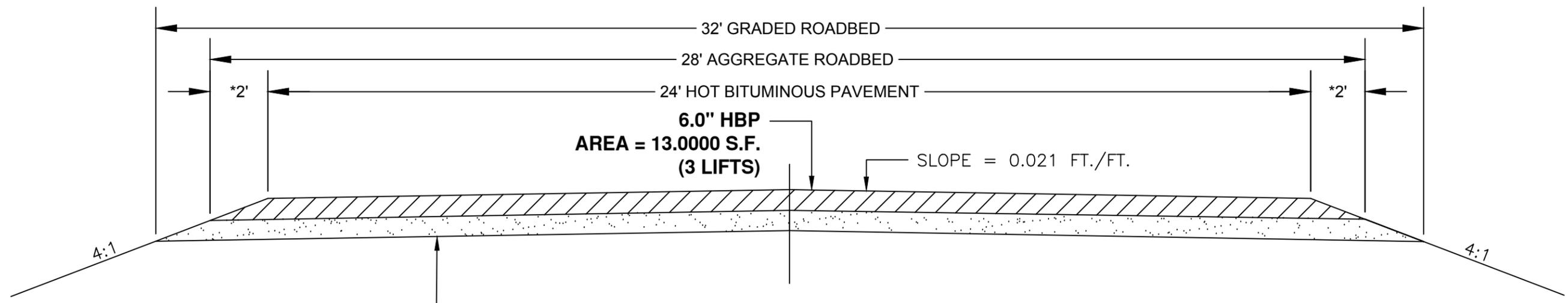
NOT TO SCALE
 PROJECT SC-0900(016) NON-PARTICIPATING
 STA 0+00.00 TO 22+00.00 - HWY 27

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CASS COUNTY HIGHWAY DEPARTMENT
 PROJECT NO. SC-0900(016)
 TYPICAL SECTIONS

PCN 21535	STATE	FEDERAL AID PROJECT NUMBER	SHEET	TOTAL SHEETS
	N.D.	SC-0900(016)	14	21



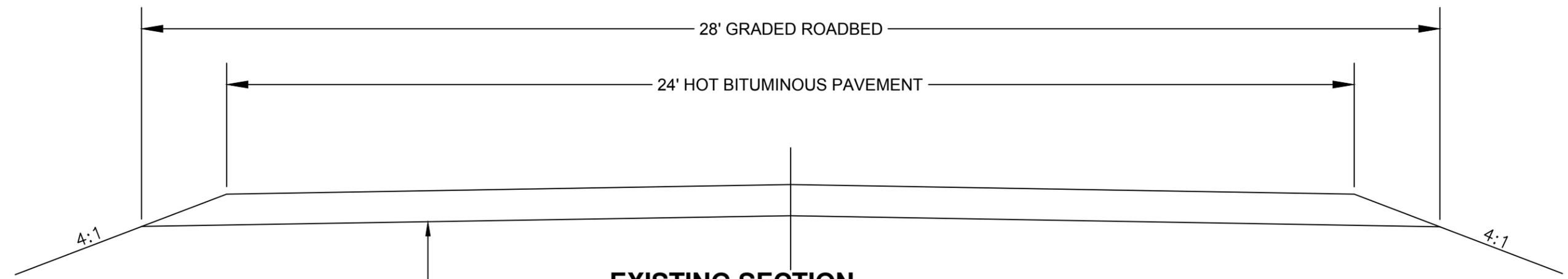
6" CLASS 5 BASE
AREA = 15.0000 S.F.

6.0" HBP
AREA = 13.0000 S.F.
(3 LIFTS)

SLOPE = 0.021 FT./FT.

TYPICAL BITUMINOUS OVERLAY SECTION

NOT TO SCALE
PROJECT SC-0900(016) NON-PARTICIPATING
STA -1+00.00 TO 0+00.00 - HWY 27



4" GRAVEL (INPLACE)

EXISTING SECTION

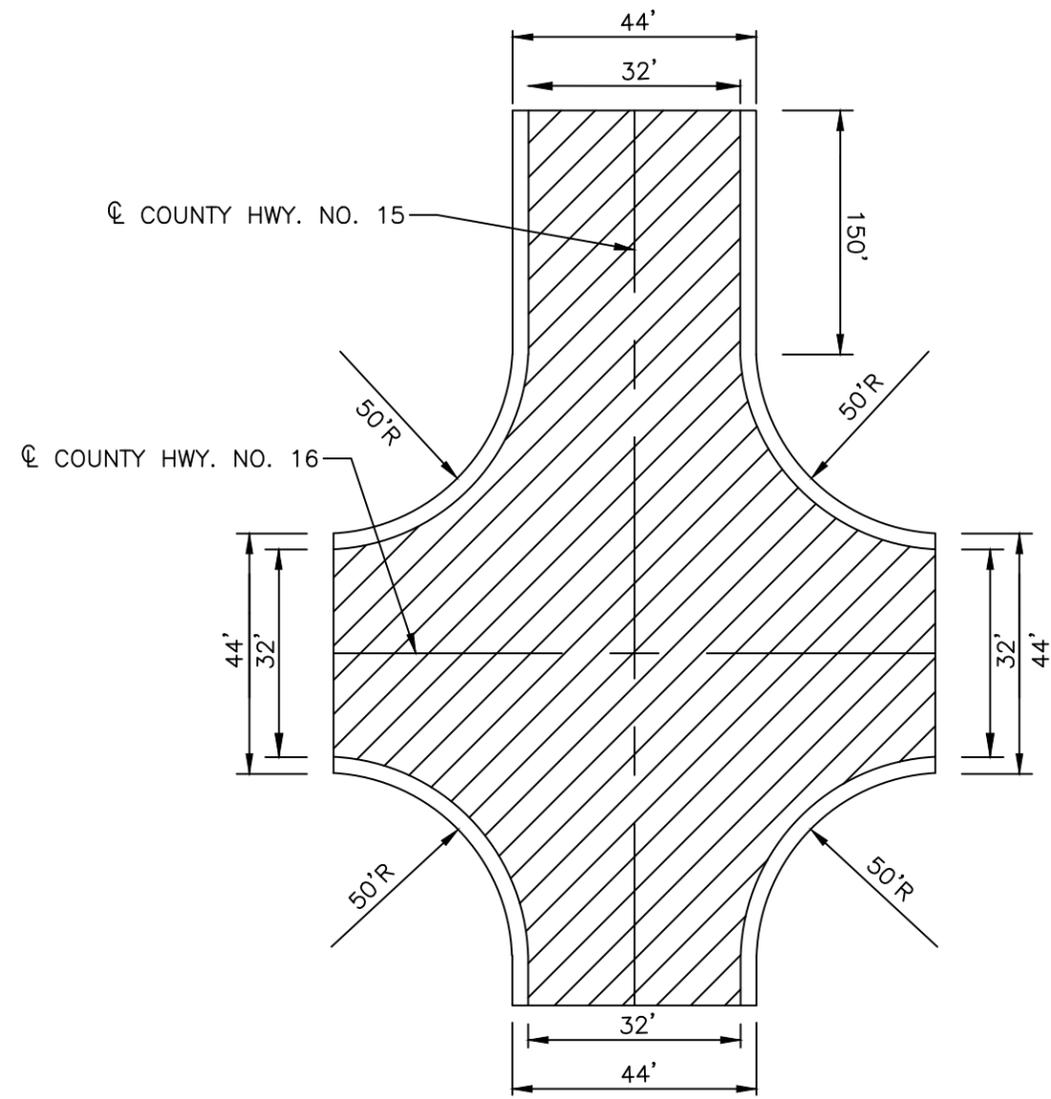
NOT TO SCALE
PROJECT SC-0900(016) NON-PARTICIPATING
STA -1+00.00 TO 0+00.00 - HWY 27

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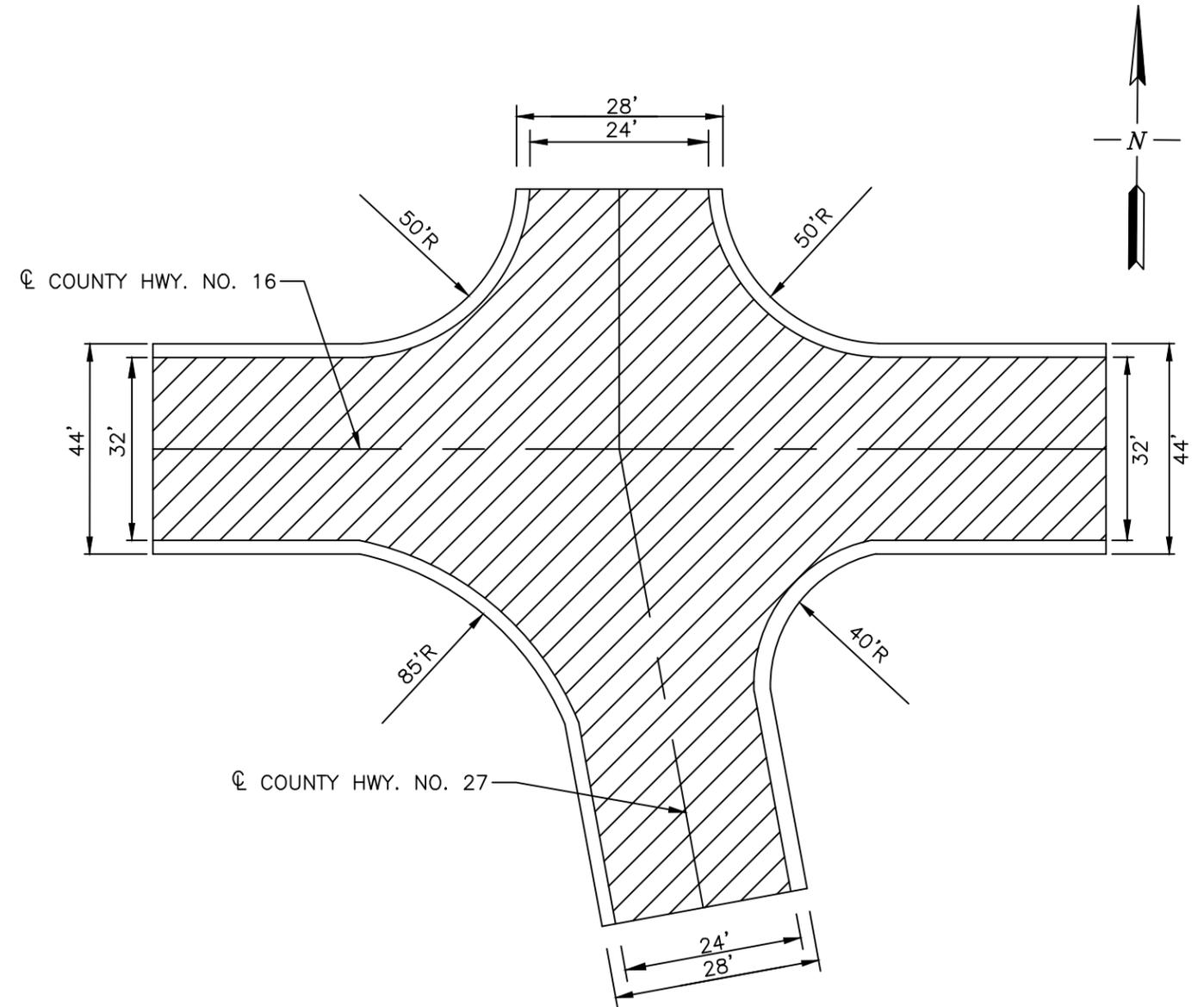
CASS COUNTY HIGHWAY DEPARTMENT
PROJECT NO. SC-0900(016)
TYPICAL SECTIONS

PCN 21535	STATE N.D.	FEDERAL AID PROJECT NUMBER SC-0900(016)	SHEET 15	TOTAL SHEETS 21
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INTERSECTION DETAIL

CASS COUNTY HIGHWAY 16 & 15
 STA. 157+73 & STA. 581+72
 NOT TO SCALE



INTERSECTION DETAIL

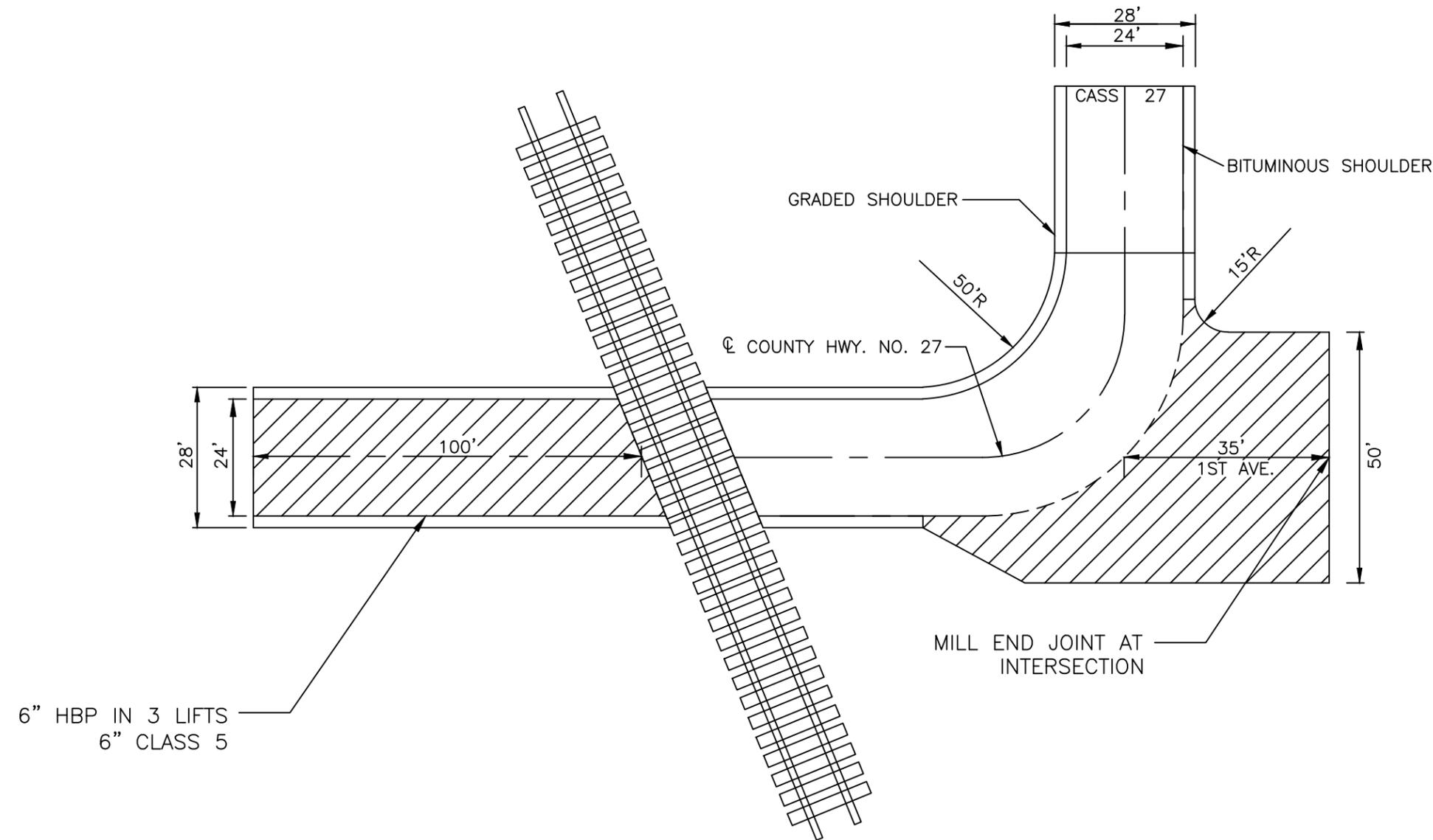
CASS COUNTY HIGHWAY 16 & 27
 STA. 0+00 & STA. 22+00
 NOT TO SCALE

*** DIMENSIONS MAY VARY.
 ENGINEER IN FIELD SHALL DETERMINE
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CASS COUNTY HIGHWAY DEPARTMENT
 PROJECT NO. SC-0900(016)
 INTERSECTION DETAILS

PCN 21535	STATE N.D.	FEDERAL AID PROJECT NUMBER SC-0900(016)	SHEET 16	TOTAL SHEETS 21
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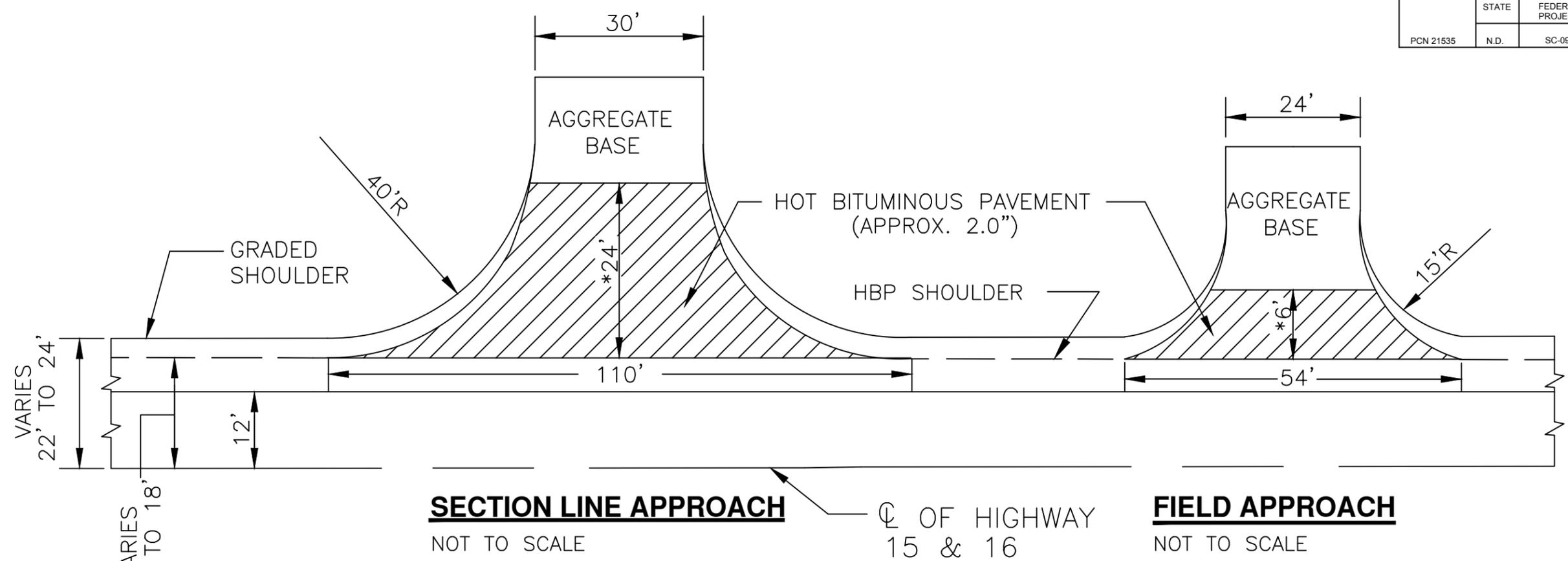
APPROACH DETAILS

CASS COUNTY HIGHWAY 27 & 1ST AVE. DAVENPORT, ND
NOT TO SCALE

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CASS COUNTY HIGHWAY DEPARTMENT
PROJECT NO. SC-0900(016)
APPROACH DETAILS



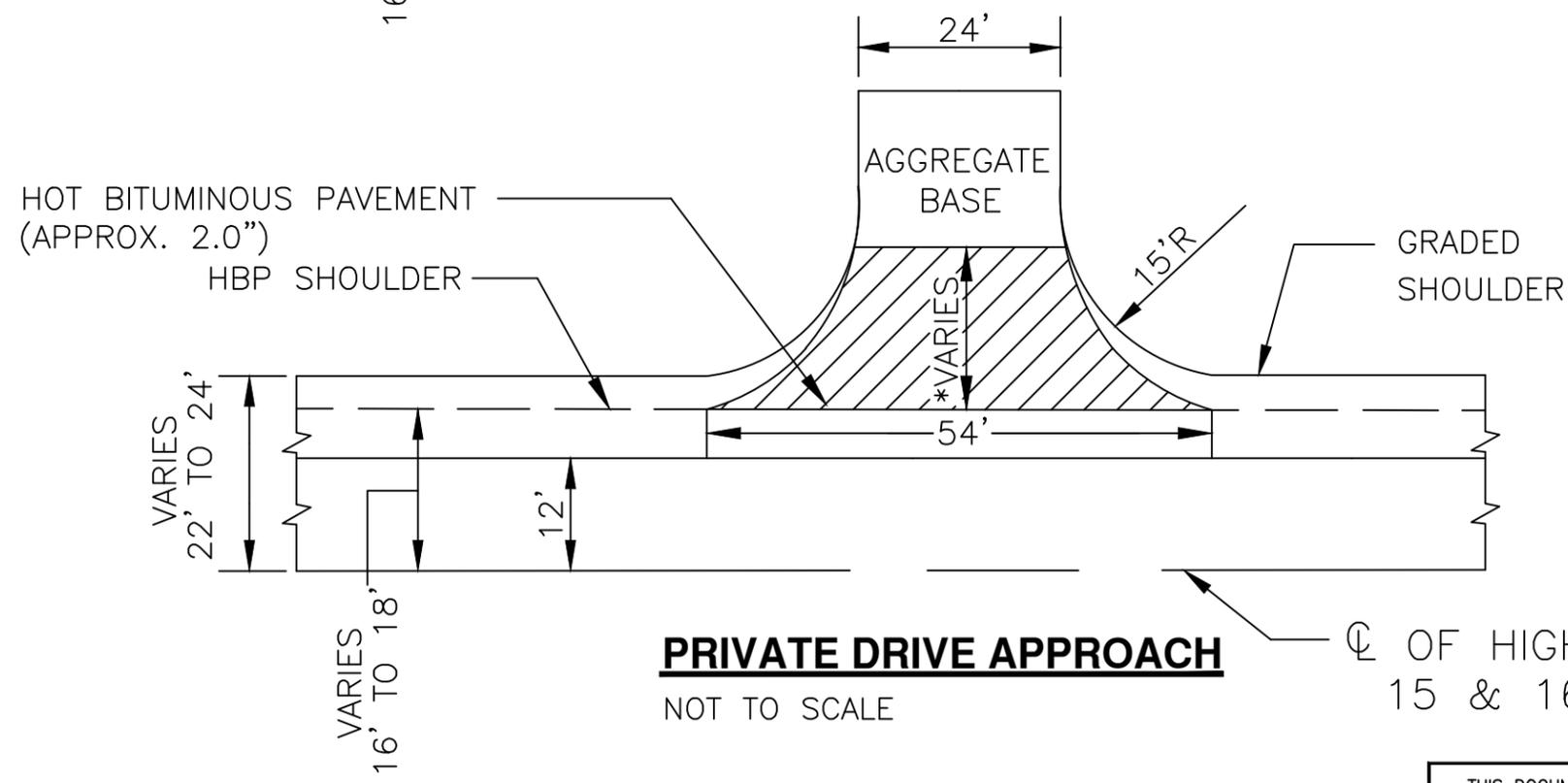
SECTION LINE APPROACH

NOT TO SCALE

☉ OF HIGHWAY
15 & 16

FIELD APPROACH

NOT TO SCALE



PRIVATE DRIVE APPROACH

NOT TO SCALE

☉ OF HIGHWAY
15 & 16

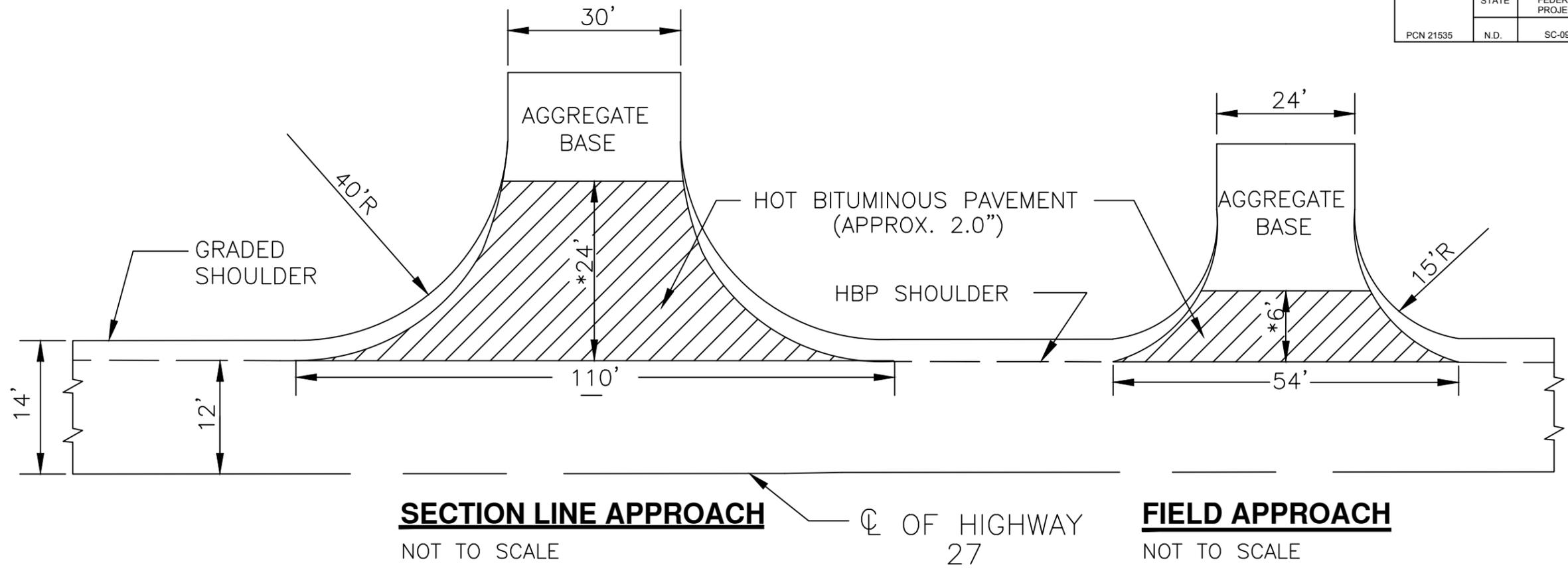
*** DIMENSIONS MAY VARY. ENGINEER IN FIELD SHALL DETERMINE EXACT LIMITS OF SURFACING AT ALL DRIVES AND APPROACHES.**

**** EXCAVATION COSTS REQUIRED TO EXTEND THE EXISTING APPROACHES SHALL BE INCLUDED IN THE SUBGRADE PREPARATION -TYPE A-SHOULDERS BID ITEM.**

PLACEMENT OF APPROACH PVMT:
PAVEMENT FOR APPROACHES SHALL BE PLACED AHEAD OF THE MAINLINE TOP LIFT PAVING OPERATION.
NO COLD JOINT WILL BE ALLOWED BETWEEN THE MAINLINE AND APPROACHES.

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CASS COUNTY HIGHWAY DEPARTMENT
 PROJECT NO. SC-0900(016)
 APPROACH DETAILS



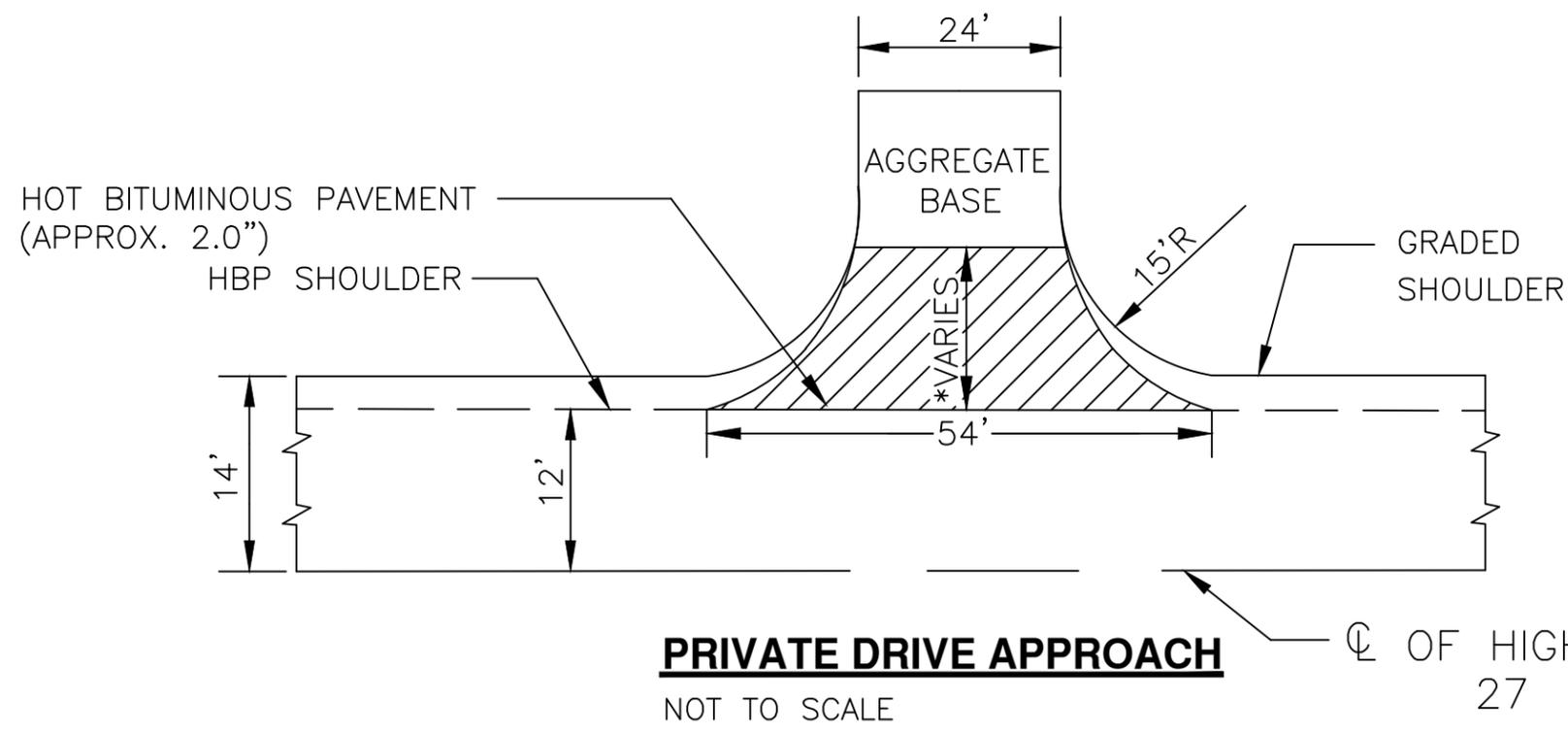
SECTION LINE APPROACH

NOT TO SCALE

FIELD APPROACH

NOT TO SCALE

☉ OF HIGHWAY 27



PRIVATE DRIVE APPROACH

NOT TO SCALE

☉ OF HIGHWAY 27

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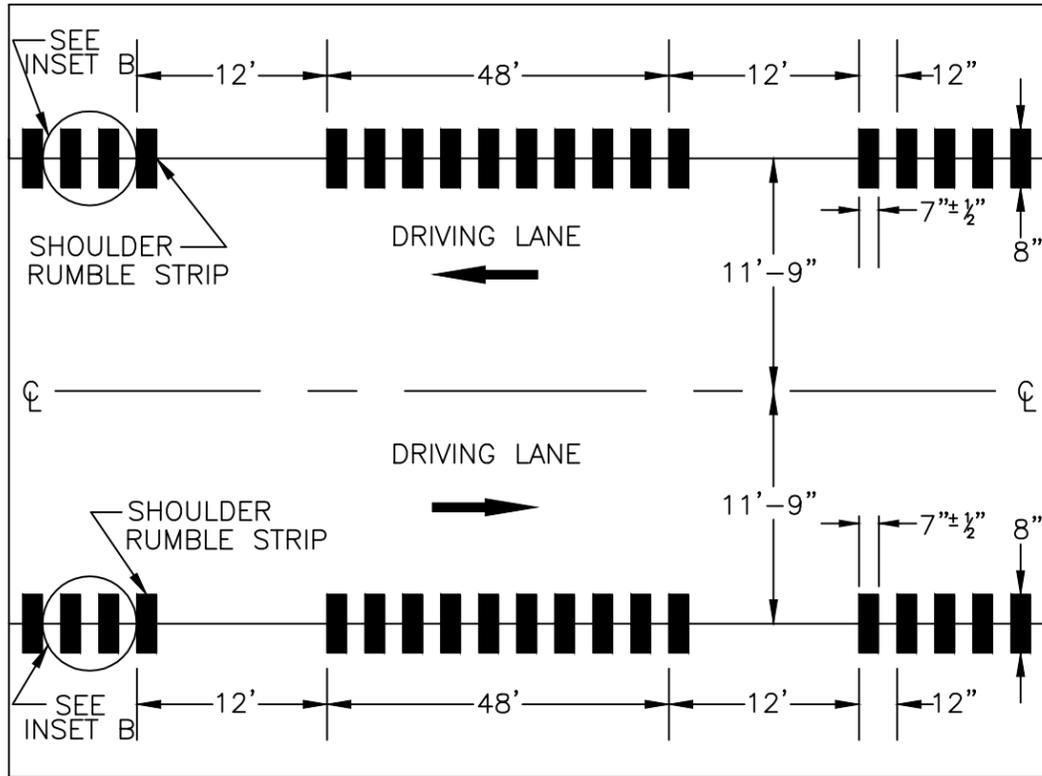
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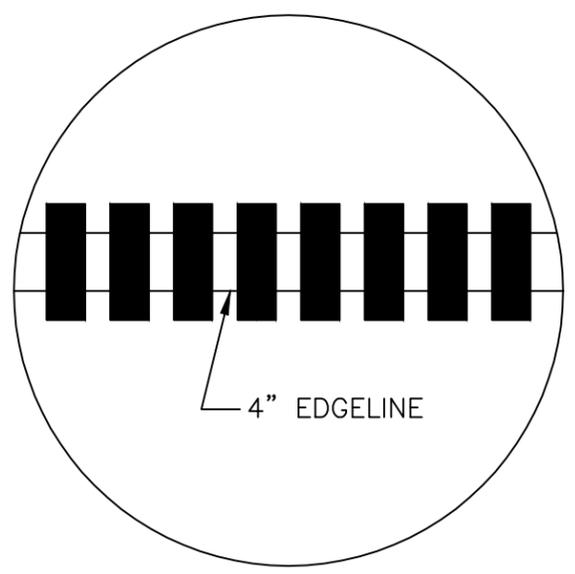
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 PROJECT NO. SC-0900(016)
 APPROACH DETAILS

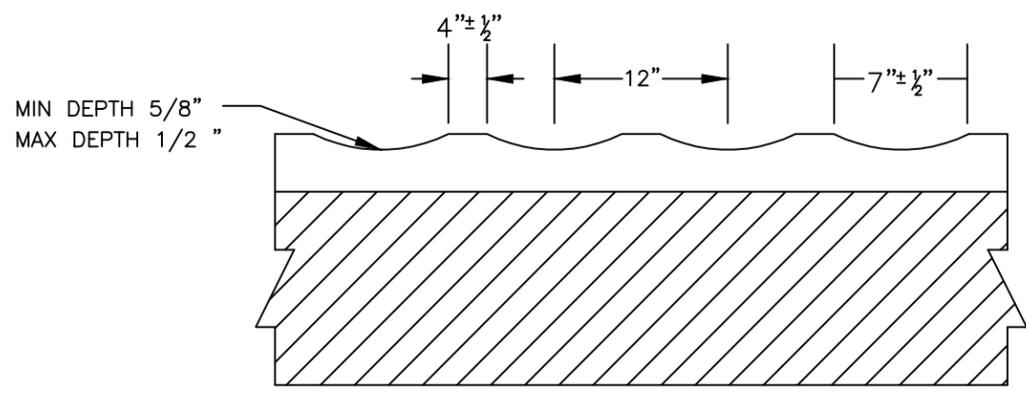
STATE	FEDERAL AID PROJECT NUMBER	SHEET	TOTAL SHEETS
PCN 21535	SC-0900(016)	19	21



PLAN VIEW OF RUMBLE STRIPS



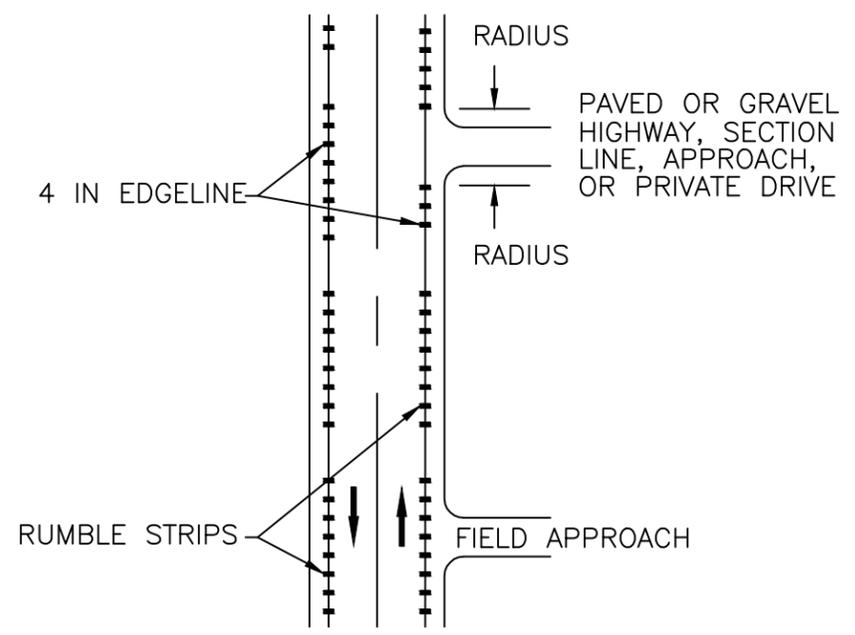
INSET B - SHOULDER RUMBLE STRIP



PROFILE VIEW OF RUMBLE STRIPS

RUMBLE STRIP DETAILS

NOT TO SCALE



ENTRANCE ROADWAYS

NOTES:

- 1) Rumble strips shall be milled into the bituminous paved shoulders. All milled materials shall be swept off of the driving lanes and paved shoulders using a mechanical sweeper. All costs for sweeping shall be included in the price bid for "RUMBLE STRIPS - ASPHALT SHOULDER."
- 2) Rumble strips milled into new or existing bituminous pavements shall be fog sealed across the full width of the milling with an application of SS-1h or CSS-1h emulsified asphalt at a rate of about 0.10 Gal/SY diluted 50/50 sprayed in both directions. All costs for fog sealing shall be included in the price bid for "RUMBLE STRIPS - ASPHALT SHOULDER."
- 3) Discontinue rumble strips across bridge decks and approach slabs, adjacent to guardrail, and 1/2 mile on either side of:
 - highways with posted speeds 45 mph or less
 - all urban areas
 - areas with curb and gutter
- 4) Discontinue shoulder rumble strips through the entire length of right turn lanes, 100' before right turn lane tapers, and at the radius of a paved or gravel highway, section line, approach, or private drive.
- 5) All costs associated with the use of a paint dribble line for rumble strip alignment shall be included in the "RUMBLE STRIPS - ASPHALT SHOULDER" bid item.

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CASS COUNTY HIGHWAY DEPARTMENT
 PROJECT NO. SC-0900(016)
 RUMBLE STRIPS DETAIL

TRAFFIC CONTROL LEGEND

STATE	FEDERAL AID PROJECT NUMBER	SHEET	TOTAL SHEETS	
PCN 21535	N.D.	SC-0900(016)	20	21

⇨ POST-MOUNTED SIGN

|| TYPE III BARR.



W20-1-48



W20-1-48



G20-1a-60



G20-2a-48



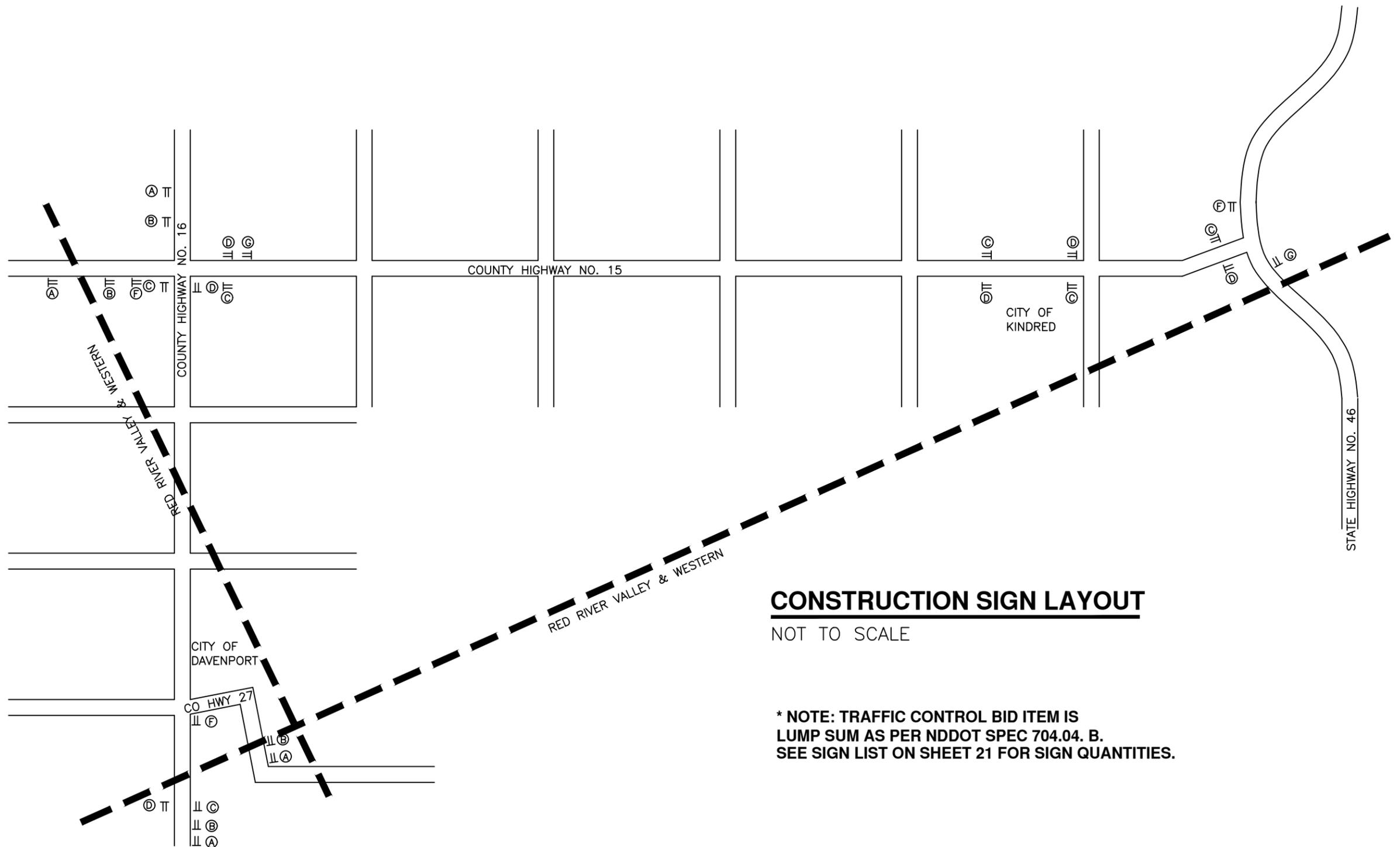
G20-50a-72



G20-52a-72



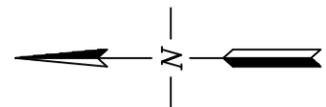
G20-52a-72



CONSTRUCTION SIGN LAYOUT

NOT TO SCALE

* NOTE: TRAFFIC CONTROL BID ITEM IS LUMP SUM AS PER NDDOT SPEC 704.04. B. SEE SIGN LIST ON SHEET 21 FOR SIGN QUANTITIES.



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CASS COUNTY HIGHWAY DEPARTMENT
 PROJECT NO. SC-0900(016)
 CONSTRUCTION SIGN LAYOUT

PROJECT NO. SC-0900(016)

SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQ'D	UNITS PER AMOUNT	UNITS SUB-TOTAL
G20-1a-60	60" X 24"	ROAD WORK NEXT ___ MILES	6	34	204
G20-2a-48	48" X 24"	END ROAD WORK	6	19	114
G20-4-36	36" X 18"	PILOT CAR FOLLOW ME	1	18	18
G20-50a-72	72" X 36"	ROAD WORK NEXT ___ MILES RT & LT ARROWS		37	
G20-52a-72	72" X 24"	ROAD WORK NEXT ___ MILES RT OR LT ARROWS	5	30	150
G20-54-48	48" X 36"	OVERHEAD BRIDGE PAINTING		30	
G20-8-48	48" X 36"	TEMPORARY SURFACE NEXT ___ MILES		30	
M1-4-24	24" X 24"	ROUTE MARKER (POST AND INSTALLATION ONLY)		10	
M3-2-24	24" X 12"	EAST (MOUNTED ON ROUTE MARKER POST)		7	
M3-3-24	24" X 12"	SOUTH (MOUNTED ON ROUTE MARKER POST)		7	
M3-4-24	24" X 12"	WEST (MOUNTED ON ROUTE MARKER POST)		7	
M4-10-48	48" X 18"	DETOUR ARROW RIGHT or LEFT		23	
M4-8-24	24" X 12"	DETOUR (MOUNTED ON THE ROUTE MARKER POST)		7	
M5-1-21	21" X 15"	ARROW AHD AND RT or LT (MTD ON ROUTE MKR POST)		7	
M6-1-21	21" X 15"	ARROW RT or LT (MOUNTED ON ROUTE MARKER POST)		7	
R1-1-48	48" X 48"	STOP		32	
R1-1-30	30" X 30"	STOP		32	
R1-1a-18	18" X 18"	STOP and SLOW PADDLE Back to Back	4	5	20
R1-2-48	48" X 48"	YIELD TO ONCOMING TRAFFIC		29	
R2-1-48	48" X 60"	SPEED LIMIT		39	
R2-1a-24	24" X 24"	MINIMUM FEE \$80		10	
R2-5a-48	48" X 60"	SPEED ZONE AHEAD		39	
R4-1-48	48" X 60"	DO NOT PASS		39	
R4-7-48	48" X 60"	KEEP RIGHT SYMBOL		39	
R4-8-48	48" X 60"	KEEP LEFT SYMBOL		39	
R10-6-48	48" X 72"	STOP HERE ON RED		16	
R11-2-48	48" X 30"	ROAD CLOSED		28	
R11-2a-48	48" X 30"	STREET CLOSED		28	
R11-3a-60	60" X 30"	ROAD CLOSED ___ MILES AHEAD LOCAL TRAFFIC ONLY		31	
R11-3b-60	60" X 30"	BRIDGE OUT ___ MILES AHEAD LOCAL TRAFFIC ONLY		31	
R11-3c-48	60" X 30"	STREET CLOSED		31	
R11-4a-60	60" X 30"	STREET CLOSED TO THRU TRAFFIC		31	
W1-1-48	48" X 48"	RIGHT or LEFT SHARP CURVE ARROW		35	
W1-2-48	48" X 48"	RIGHT or LEFT CURVE ARROW		35	
W1-3-48	48" X 48"	RIGHT or LEFT SHARP REVERSE CURVE ARROW		35	
W1-4-48	48" X 48"	RIGHT or LEFT REVERSE CURVE ARROW		35	
W1-6-48	48" X 24"	LARGE ARROW		26	
W3-1a-48	48" X 48"	STOP AHEAD SYMBOL		35	
W3-2a-48	48" X 48"	YIELD AHEAD SYMBOL		35	
W5-1-48	48" X 48"	ROAD NARROWS		35	

SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQ'D	UNITS PER AMOUNT	UNITS SUB-TOTAL
W6-3-48	48" X 48"	TWO WAY TRAFFIC SYMBOL		35	
W8-11-48	48" X 48"	UNEVEN LANES	6	35	210
W8-1-48	48" X 48"	BUMP	10	35	350
W8-3a-48	48" X 48"	PAVEMENT ENDS SYMBOL		35	
W8-53-48	48" X 48"	TRUCKS ENTERING HIGHWAY	6	35	210
W8-54-48	48" X 48"	TRUCKS ENTERING AHEAD OR ___ FT.		35	
W8-55-48	48" X 48"	TRUCKS CROSSING AHEAD OR ___ FT.		35	
W8-9-48	48" X 48"	LOW SHOULDER		35	
W8-9a-48	48" X 48"	SHOULDER DROP OFF		35	
W13-1-24	24" X 24"	___ MPH ADVISORY SPEED PLATE		11	
W13-4-48	48" X 60"	RAMP ARROW		39	
W20-1-48	48" X 48"	ROADWORK AHEAD or ___ FT.	8	35	280
W20-2-48	48" X 48"	DETOUR ___ FT.		35	
W20-3-48	48" X 48"	ROAD OR STREET CLOSED AHEAD or ___ FT.		35	
W20-4-48	48" X 48"	ONE LANE ROAD AHEAD or ___ FT.		35	
W20-51-48	48" X 48"	EQUIPMENT WORKING	6	35	210
W20-52-54	54" X 12"	NEXT ___ MILES	6	12	72
W20-5-48	48" X 48"	RIGHT or LEFT LANE CLOSED AHEAD or ___ FT.		35	
W20-7a-48	48" X 48"	FLAGGING SYMBOL	6	35	210
W20-7b-48	48" X 48"	BE PREPARED TO STOP	6	35	210
W20-7k-24	24" X 18"	___ FEET	6	10	60
W20-8-48	48" X 48"	STREET CLOSED		35	
W21-2-48	48" X 48"	FRESH OIL		35	
W21-4-48	48" X 48"	ROAD WORK ___ FT.		35	
W21-50-48	48" X 48"	BRIDGE PAINTING AHEAD OR ___ FT.		35	
W21-51-48	48" X 48"	MATERIAL ON ROADWAY		35	
W21-5-48	48" X 48"	SHOULDER WORK		35	
W22-7-48	48" X 48"	SINGLE LANE AHEAD or ___ FT.		35	
W22-8-48	48" X 48"	FRESH OIL LOOSE ROCK		35	
TOTAL UNITS					2,318

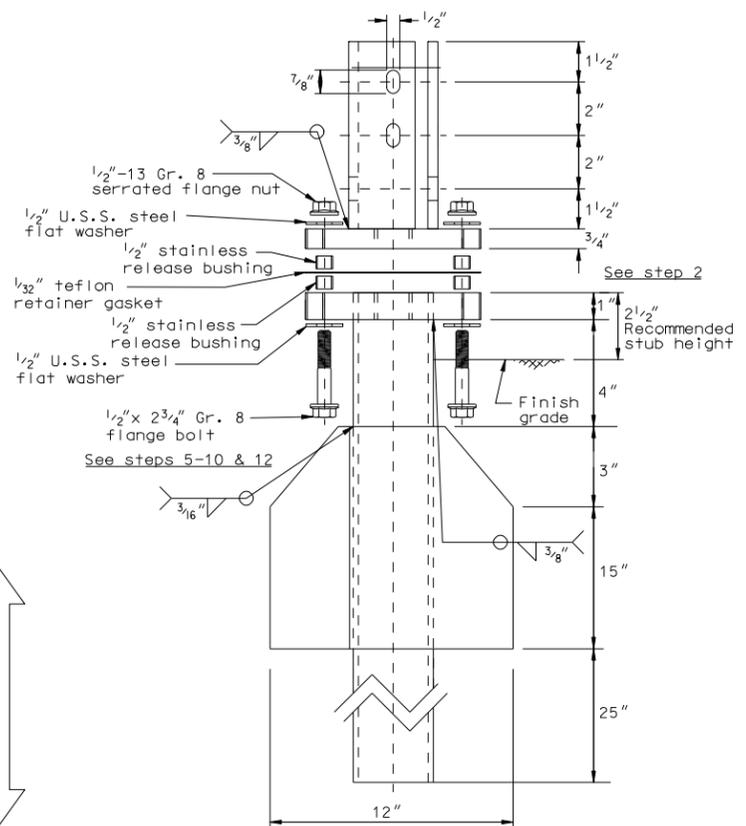
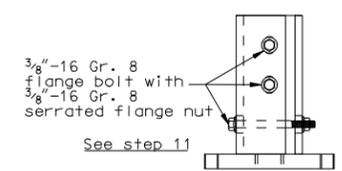
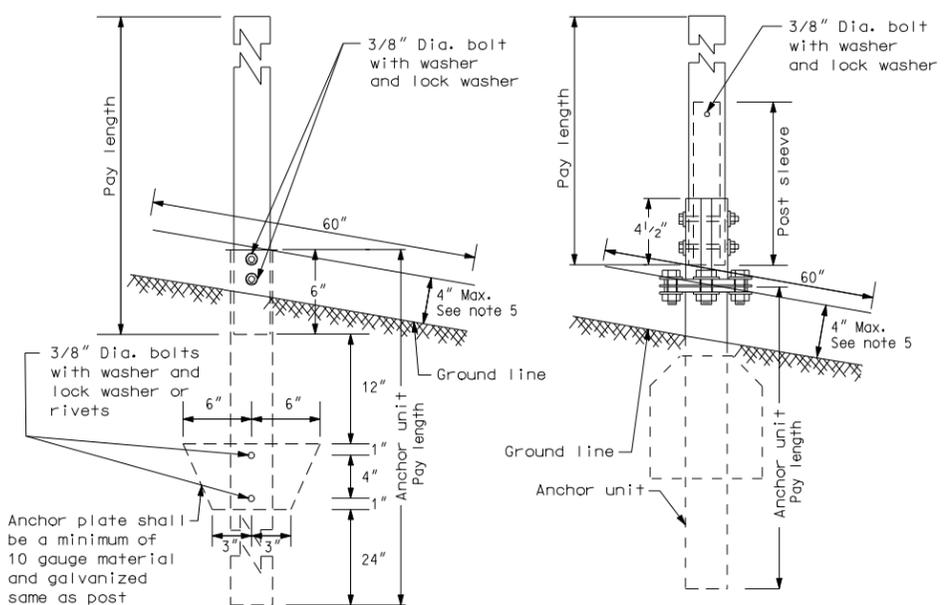
			SPEC&CODE	
			704-1000	
TYPE III	8' LONG	BARRICADES	EACH	704-1052
TYPE II	2' MIN.	BARRICADES	EACH	704-1051
TYPE I	6' TO 10'	BARRICADES	EACH	704-1050
			EACH	704-1060
			18" X 36" MIN. DELINEATOR DRUMS	

THIS DOCUMENT WAS ORIGINALLY ISSUED
AND SEALED BY
JASON P. BENSON
N.D. REG. NO. 7490
ON 2/5/2016 AND THE ORIGINAL
DOCUMENT IS STORED AT THE CASS COUNTY
HIGHWAY DEPARTMENT, WEST FARGO, ND

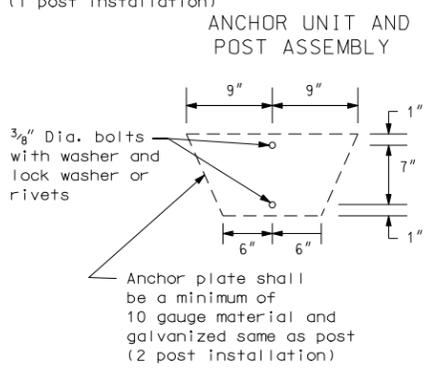
CASS COUNTY HIGHWAY DEPARTMENT
PROJECT NO. SC-0900(016)
CONSTRUCTION SIGN LIST

BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

PERFORATED TUBE

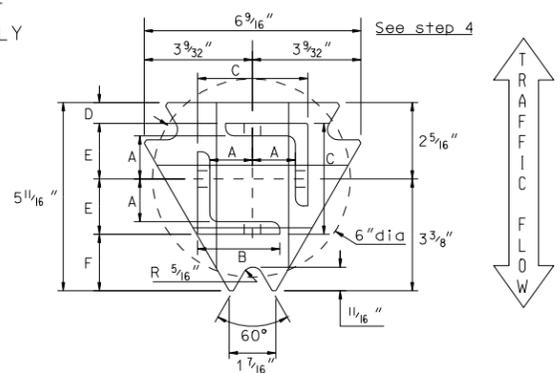


- Notes
1. Slip base bolts shall be torqued as specified by the manufacturer.
 2. The 2 3/16 inch size 10 gauge is shown as 2.19 inch size on the plans. The 2 1/2 inch size 10 gauge is shown as 2.51 inch size on the plans.
 3. Anchor for 2 inch, 2 1/4 inch, and 2 1/2 inch posts.
 4. Anchor material shall be 7 gauge H.R.P.O. Commercial quality ASTM A569 and 3 inch x 3 inch x 7 gauge ASTM A500 Grade B. Anchor shall have a yield strength of 43.9 KSI and tensile strength of 59.3 KSI. Anchor shall be hot dipped galvanized per ASTM A123/A153. All tolerances on anchor unit and slip base bottom assembly are ± 0.005 unless otherwise noted.
 5. 4 inch vertical clearance of anchor or breakaway base. The 4 inch x 60 inch measurement shall be made above and below post location and also back and ahead of post.
 6. When used in concrete sidewalk, anchor shall be the same except without the wings.
 7. Four post signs shall have over 8 feet between the first and fourth posts.



ANCHOR UNIT AND POST ASSEMBLY

SLIP BASE ANCHOR UNIT AND POST SLEEVE ASSEMBLY

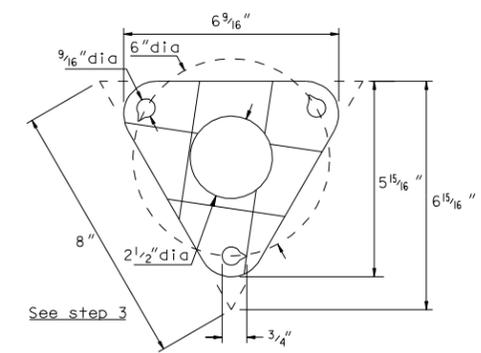


TOP POST RECEIVER

Materials: Plate - ASTM A572 grade 50
Angle receiver - 2 1/2 inch x 2 1/2 inch x 3/8 inch ASTM A36 structural angle

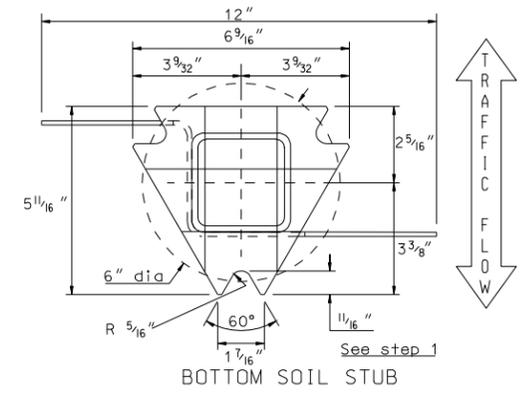
TOP POST RECEIVER DATA TABLE						
Square Post Sizes	A	B	C	D	E	F
2 3/16 inch x 10 Ga. Square Post	1 3/64 inch	2 1/2 inch	3 1/32 inch	2 5/32 inch	1 3/64 inch	1 7/8 inch
2 1/2 inch x 10 Ga. Square Post	1 3/32 inch	2 1/2 inch	3 5/16 inch	5/8 inch	1 2/32 inch	1 3/4 inch

2 3/16 inch x 10 gauge may be inserted into 2 1/2 inch x 10 gauge for additional wind load.



BOLT RETAINER FOR BASE CONNECTION
Materials: 1/32 inch reprocessed Teflon

MULTI-DIRECTIONAL SLIP BASE ASSEMBLY	
STEP	INSTALLATION PROCEDURE
1.	Install bottom soil anchor stub plumb and squared up with road, with point of plate facing oncoming traffic.
2.	Depth of imbedment to leave 2 1/2 inch from grade to top of anchor plate.
3.	Place teflon bolt retainer gasket on top of bottom plate (make sure that notches in holes are pointing counter clockwise).
4.	Place top post receiver on to retainer gasket, properly indexed so that angle receivers are squared up with road.
5.	Slide 1 each 1/2 inch flat washer on to 1 each inverted 1/2 inch - 13 gr. 8 flange bolt, followed by 1 each stainless steel release bushing.
6.	Insert above bolt with washer and bushing up through notched points of top and bottom plates, passing through hole in gasket.
7.	Slide second bushing down on to above bolt until it rests on top of gasket followed by second washer.
8.	Complete by threading 1/2 inch - 13 gr. 8 serrated flange nut snugly down against top of washer.
9.	Repeat steps 5,6,7 & 8 at the two remaining notched triangle points.
10.	Insert sign post into angle receivers on top half until post(s) bottom out. *NOTE: Where higher wind load is desired, insert the next size smaller square post inside bottom of main upright post (Minimum of 48 inch, not to exceed beyond bottom edge of sign).
11.	Secure posts into receivers using 3 each 3/8 inch - 16 gr. 8 flange bolts and 3 each 3/8 inch - 16 serrated flange nuts in receiver slots (top 2 bolts should be parallel to highway) do not tighten nuts until all bolts are in place.
12.	After all sub-assembly hardware is tightened, then torque the three 1/2 inch - 13 nuts to 42 ft-lbs, in a circular pattern until all bolt assemblies reach the required torque. *NOTE: On multi-leg installations, be sure that all anchors are squared and lined up with each other.



BOTTOM SOIL STUB
Materials: Tube - 3 inch x 3 inch x 7 gauge ASTM A500 Gr B tube
Stabilizing Wing - 7 gauge H.R.P.O. ASTM A 569
Plate - ASTM A572 grade 50

Number of Posts	Telescoping Perforated Tube					
	Post Size In.	Wall Thickness Gauge	Sleeve Size In.	Wall Thickness Gauge	Slip Base	Anchor Size Without Slip Base In.
1	2	12			No	2 1/4
1	2 1/4	12			No	2 1/2
1	2 1/2	12			B	3
1	2 1/2	10			Yes	
1	2 1/4	12	2	12	Yes	
1	2 1/2	12	2 1/4	12	Yes	
2	2	12			No	2 1/4
2	2 1/4	12			No	2 1/2
2	2 1/2	12			Yes	
2	2 1/2	10			Yes	
2	2 1/4	12	2	12	Yes	
2	2 1/2	12	2 1/4	12	Yes	
3 & 4	2 1/2	12			Yes	
3 & 4	2 1/2	10			Yes	
3 & 4	2 1/2	12	2 1/4	12	Yes	
3 & 4	2 1/4	12	2	12	Yes	
3 & 4	2 1/2	10	2 3/16	10	Yes	

B - The 2 1/2 inch, 12 gauge posts do not need breakaway bases when placed in standard soils, but require a shim as specified by the manufacturer. The breakaway base is required when the support is placed in weak soils. The Engineer shall determine if the soils are weak. Weak soils are classified as boggy, wet, or loose soil areas.

Telescoping Perforated Tubes						
Tube Size In.	Wall Thickness In.	U.S. Standard Gauge	Weight Per Foot Lbs.	Moment of Inertia In. 4	Cross Sect. Area In. 2	Section Modulus In. 3
1 1/2 x 1 1/2	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
2 1/4 x 2 1/4	0.105	12	2.773	0.561	0.695	0.499
2 3/16 x 2 3/16	0.135	10	3.432	0.605	0.841	0.590
2 1/2 x 2 1/2	0.105	12	3.141	0.804	0.803	0.643
2 1/2 x 2 1/2	0.135	10	4.006	0.979	1.010	0.785
4 x 4	0.250	1/4	6.600	3.040	1.940	1.050

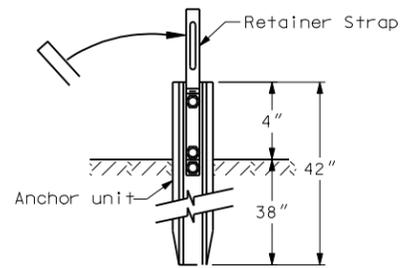
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-21-02	
REVISIONS	
DATE	CHANGE
12-01-04	PE stamp added

This document was originally issued and sealed by MARK S GAYDOS, Registration Number PE-4518, on 12/01/04 and the original document is stored at the North Dakota Department of Transportation

BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-8

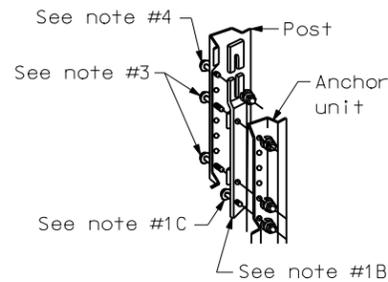
FLANGED CHANNEL



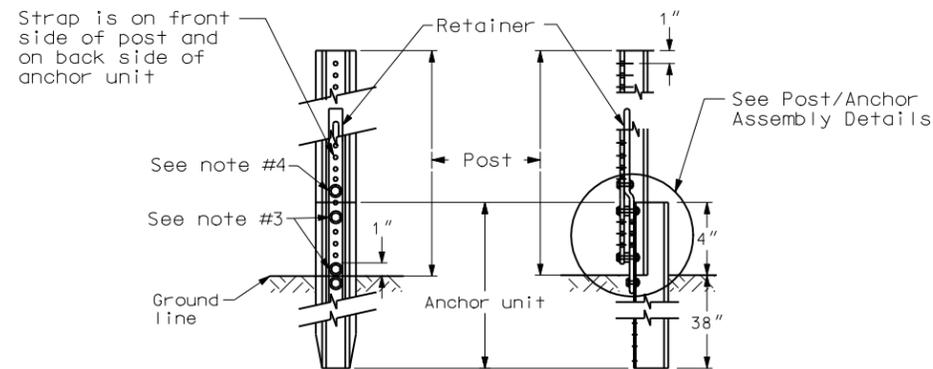
Anchor Unit & Strap Assembly Detail

STEPS OF INSTALLATION

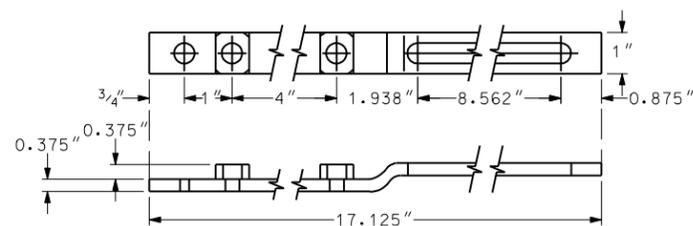
1. A) Drive anchor unit to within 12" of ground level.
B) Proper assembly established by lining up the top 3/4" slot of retainer spacer strap with top hole of anchor unit.
C) Assemble strap to back of anchor unit using 3/8"-16 UNC x 2.0" long bolt, lock washer and nut.
D) Rotate strap 90° to left.
2. A) Drive anchor unit to 4" dimension.
B) Rotate strap to vertical position.
3. A) Place 3/8"-16 UNC x 2" bolt, lock washer & nut in bottom of sign post to facilitate alignment of sign post with proper hole in anchor unit (this coincides with the bottom 3/4" slot in the strap).
B) Alternately tighten two connector bolts.
4. A) Complete assembly by tightening 3/8"-16 UNC x 2" long retainer bolt (this fastens sign post to retainer spacer strap).
5. The base post, strap & 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.



Post/Anchor Assembly Details



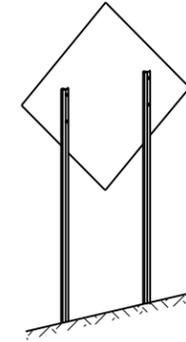
Front View Side View Sign Post Assembly Detail



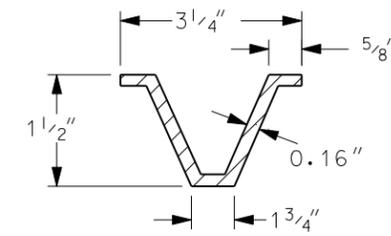
Retainer/Spacer Strap Detail

CHANNEL SIZE IN.	WALL THICKNESS IN.	WEIGHT PER FOOT LBS.	MOMENT OF INERTIA IN. 4	CROSS SECT. AREA IN. SQ.	SECTION MODULUS IN. 3
1.516 x 3.125"	.116	2.00	.179	.590	.225
1.532 x 3.125"	.124	2.25	.201	.648	.254
1.562 x 3.125"	.132	2.50	.233	.748	.289
1.578 x 3.125"	.140	2.75	.271	.819	.329
1.750 x 3.500"	.150	3.00	.372	.918	.403
1.750 x 3.500"	.175	4.00	.500	1.190	.560

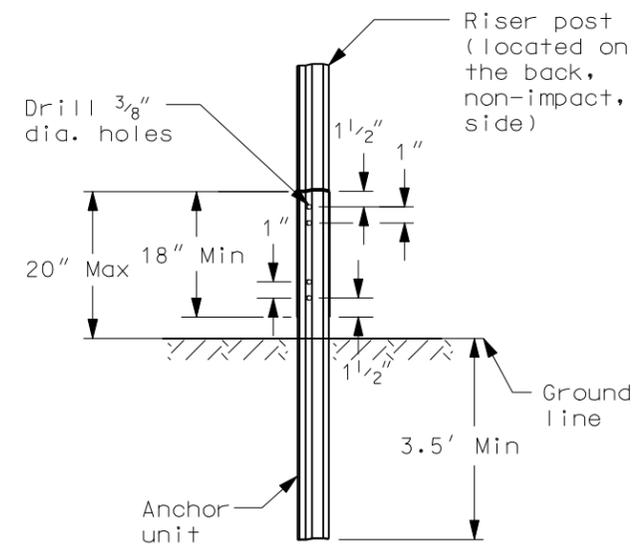
3 LB/FT U POSTS



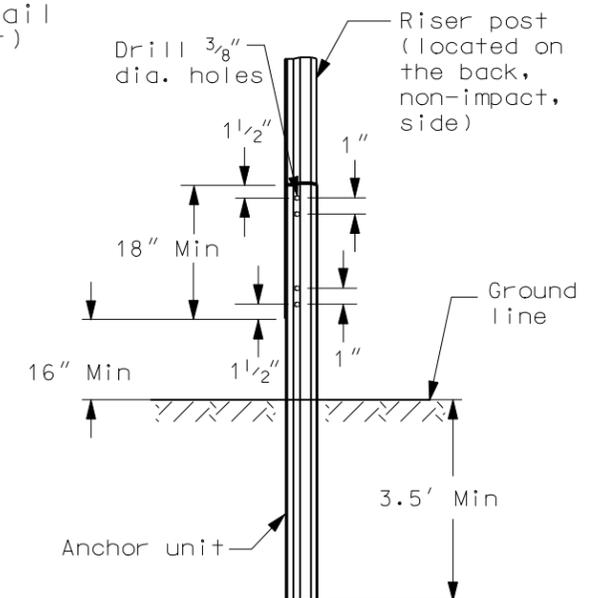
Typical Installation



U-Post Detail (3 lb/ft)



U-Channel Splice Option 1



U-Channel Splice Option 2

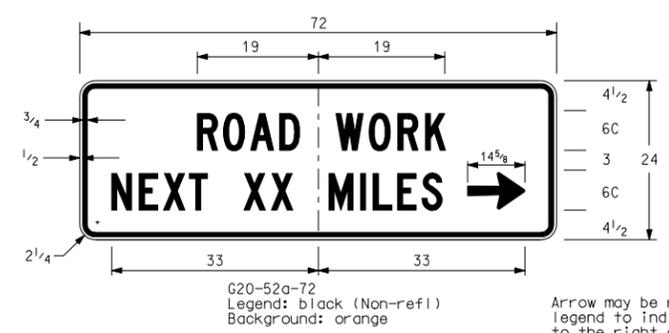
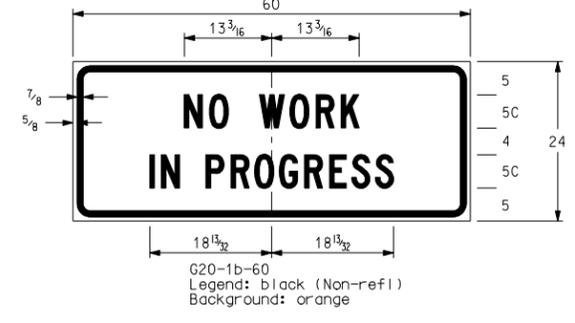
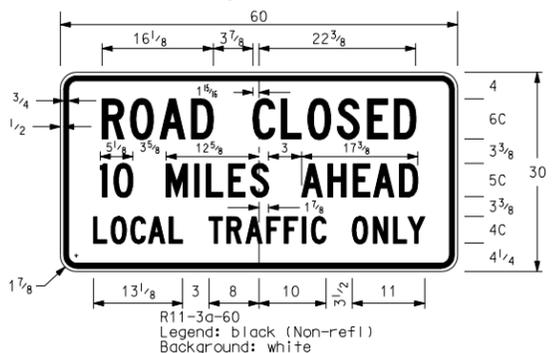
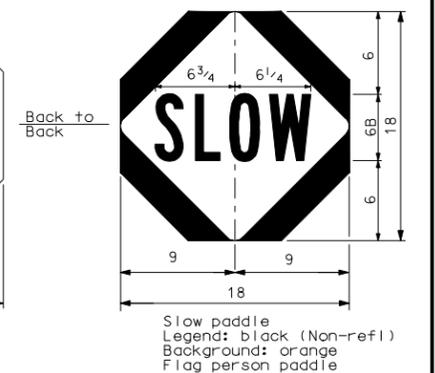
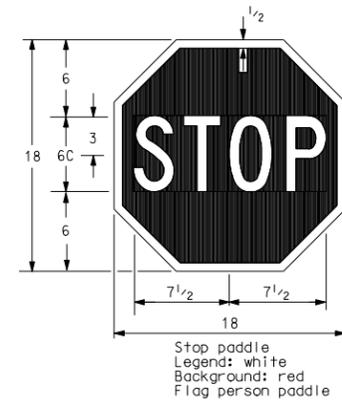
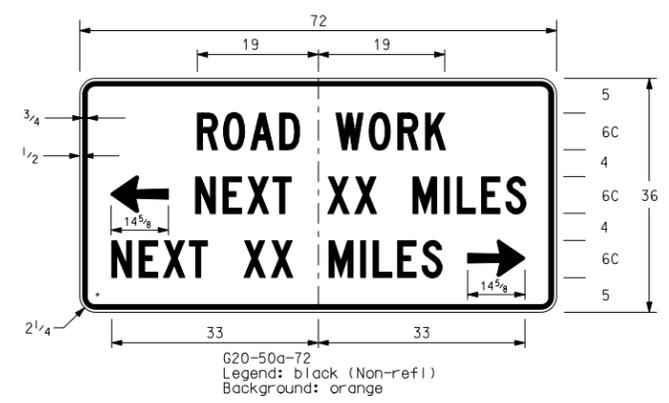
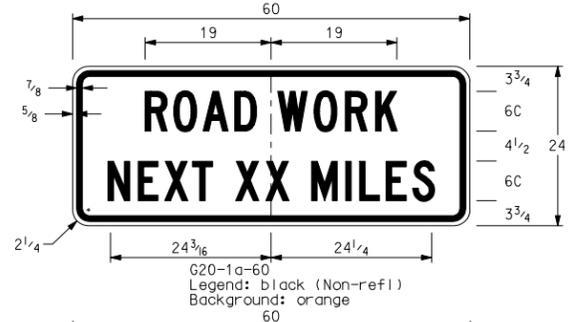
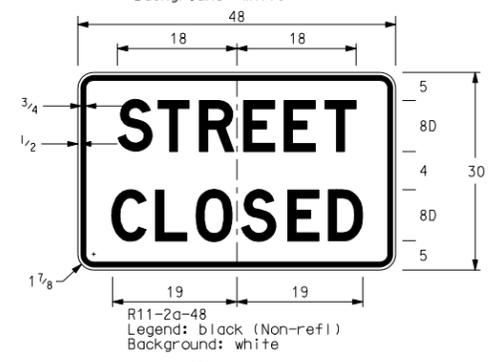
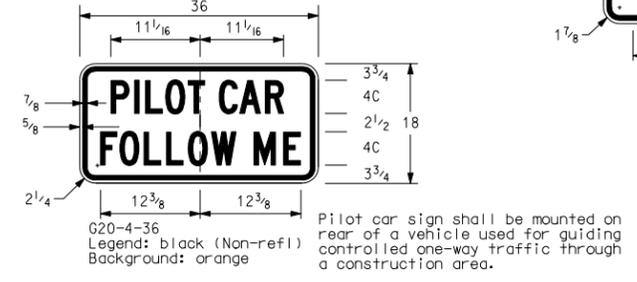
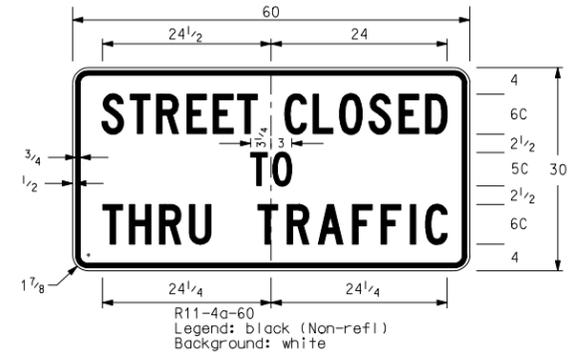
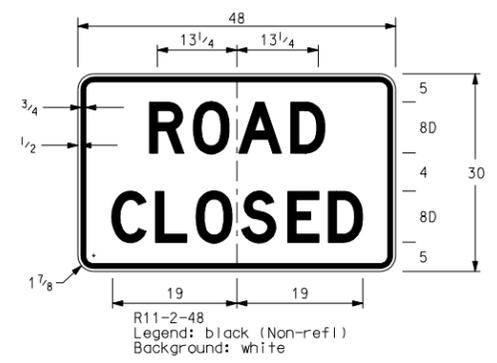
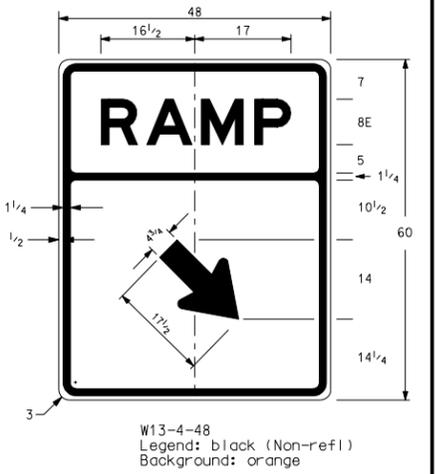
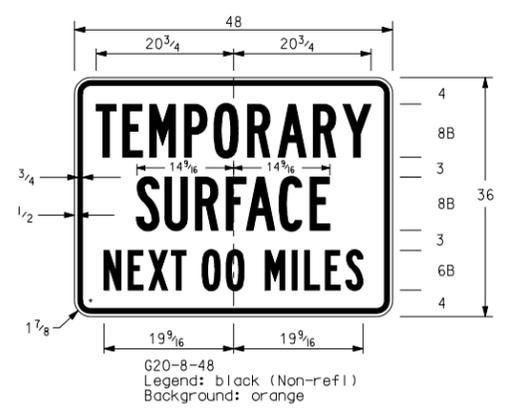
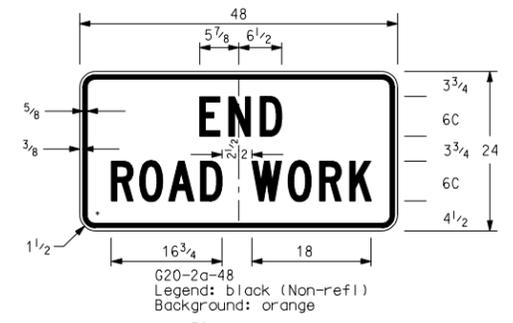
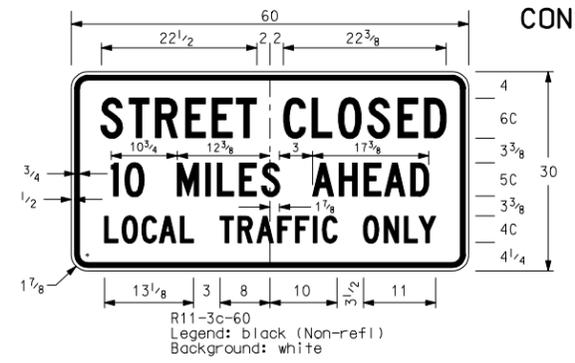
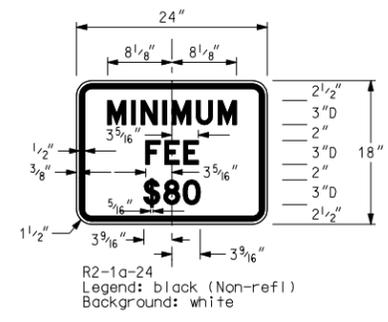
Notes

1. Use 3 lb/ft riser anchor units and risers
2. Driven riser posts shall be at least 7' long and embedded at least 3.5'.
3. A splice shall overlap a minimum of 18".
4. Use 4 bolts 5/16" diameter with washers and nuts. Two at top and two at bottom of splice.
5. Anchor unit for guy wires shall be no more than 4" above ground and embedded at least 3.5'.

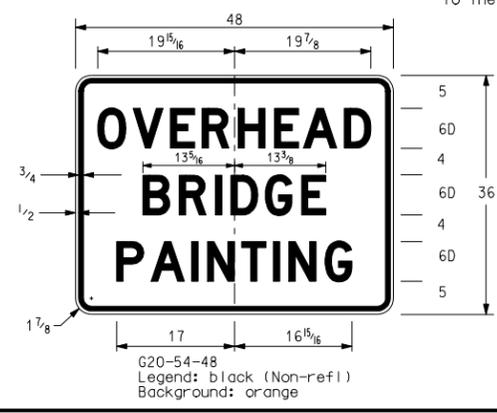
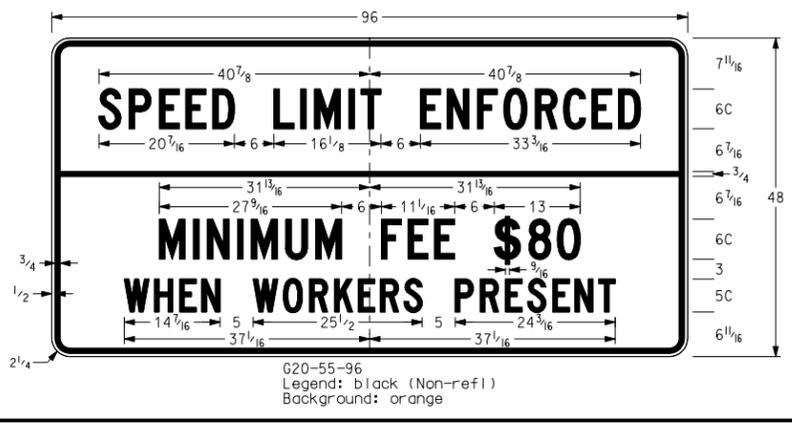
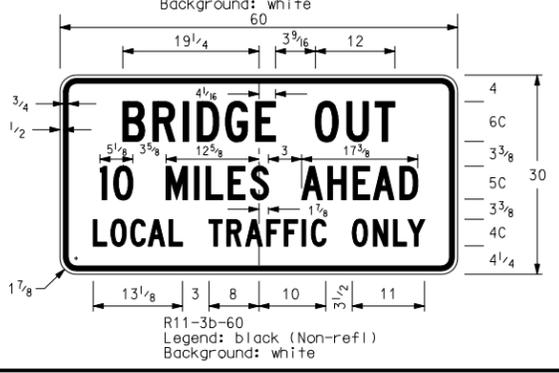
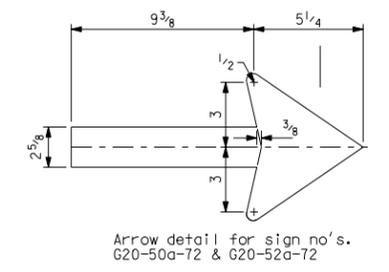
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-28-93	
REVISIONS	
DATE	CHANGE
03-07-01	Revised U-post details
11-21-02	Deleted perforated tube
05-08-03	Revised U-Channel splice
12-01-04	PE stamp added
06-29-05	Revised flanged channel note

This document was originally issued and sealed by MARK S GAYDOS Registration Number PE-4518, on 06/29/05 and the original document is stored at the North Dakota Department of Transportation

CONSTRUCTION SIGN DETAILS



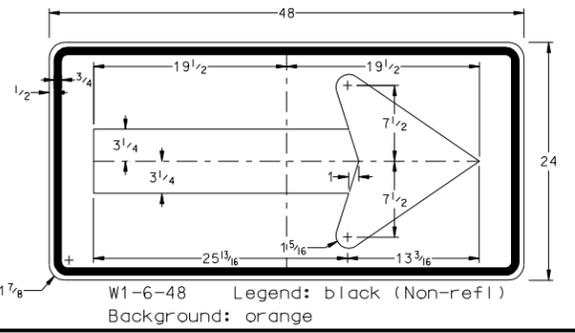
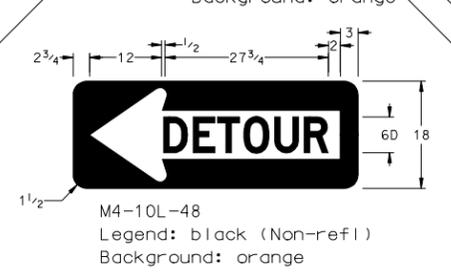
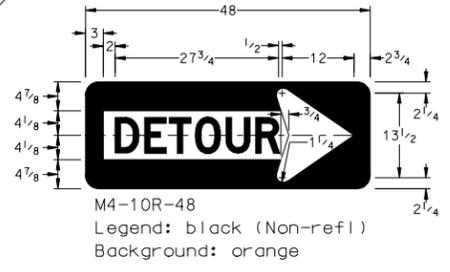
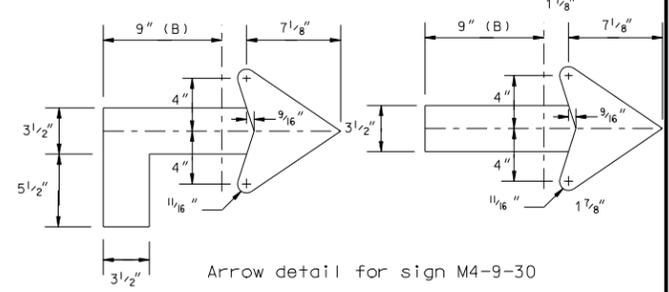
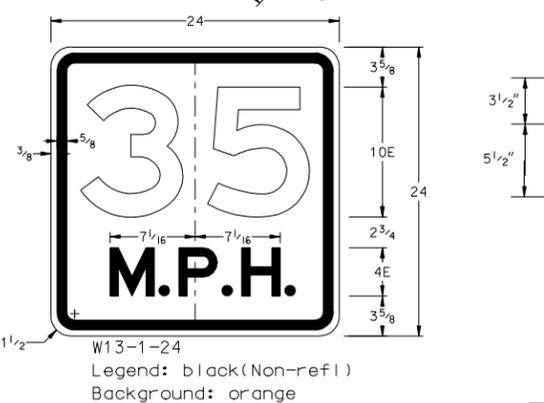
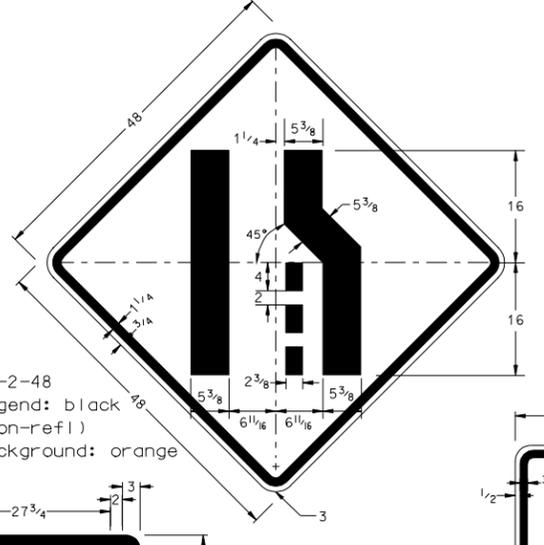
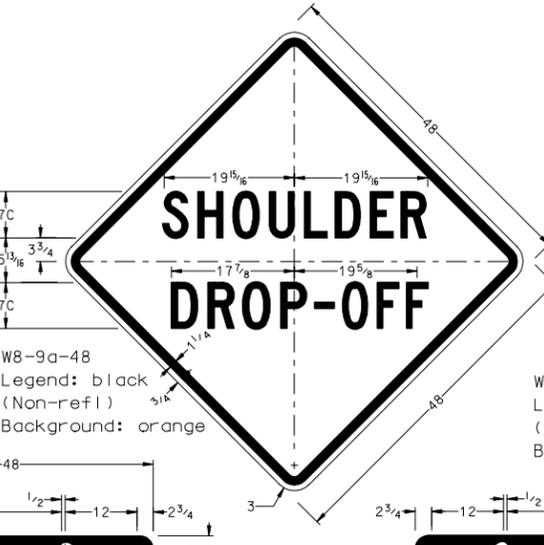
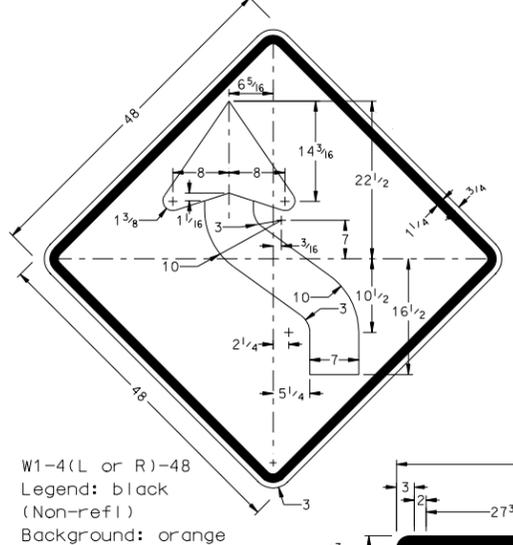
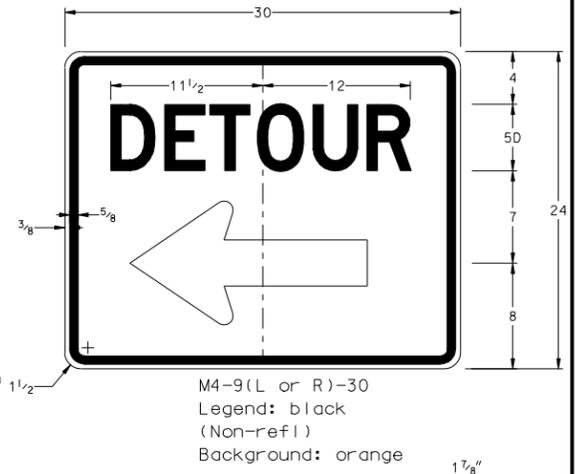
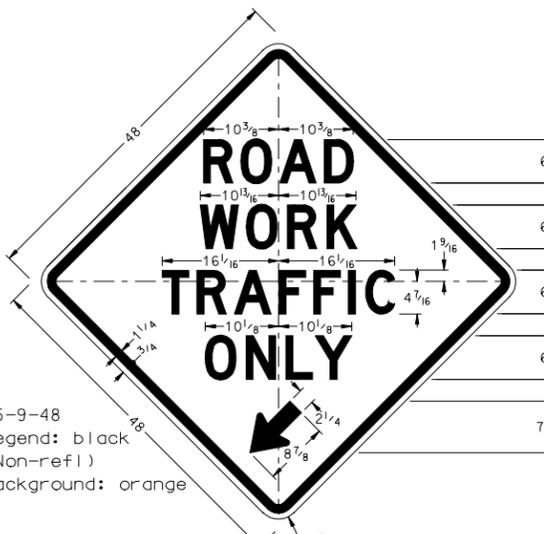
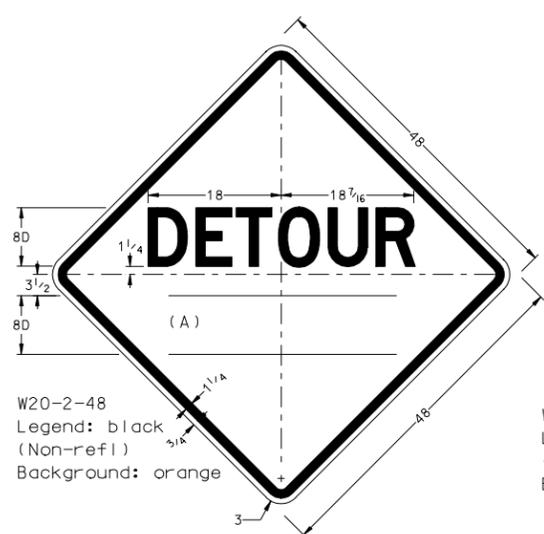
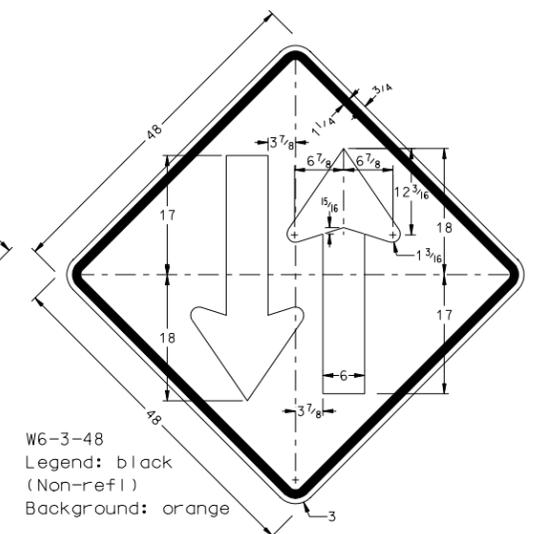
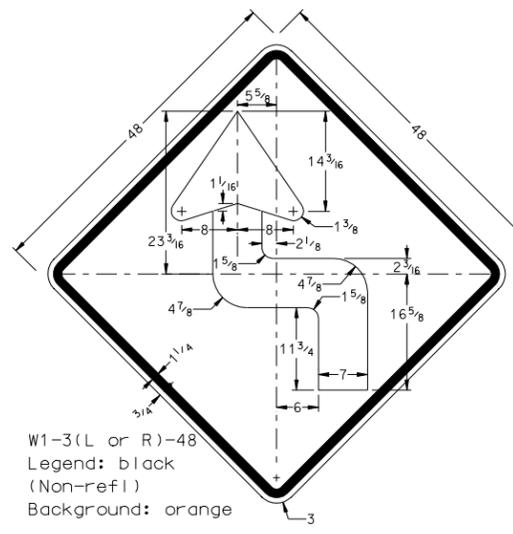
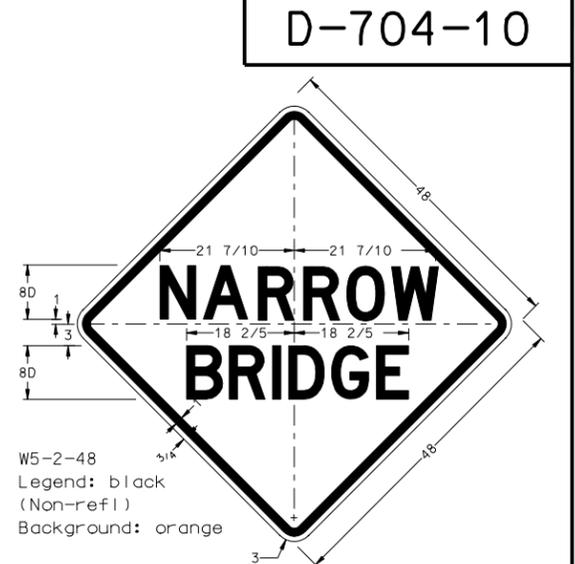
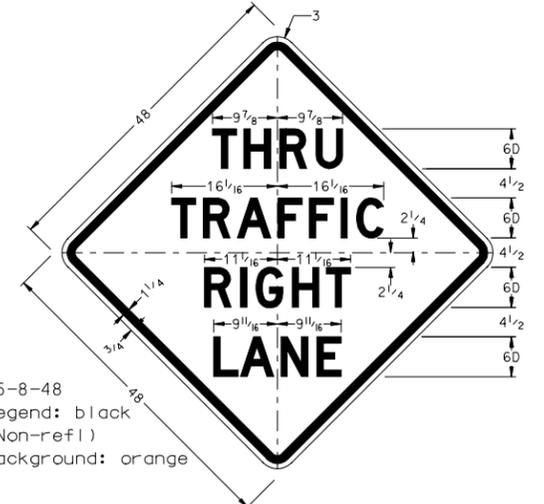
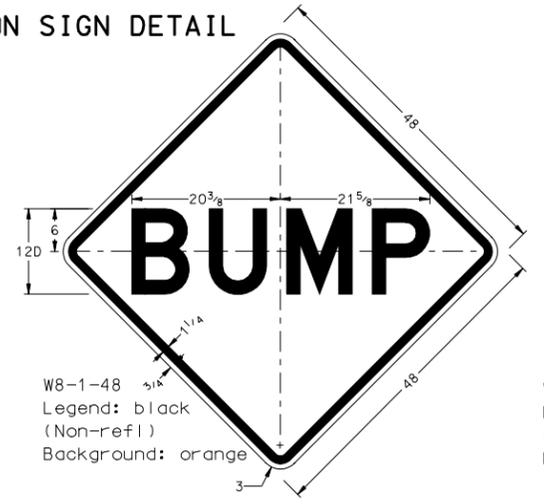
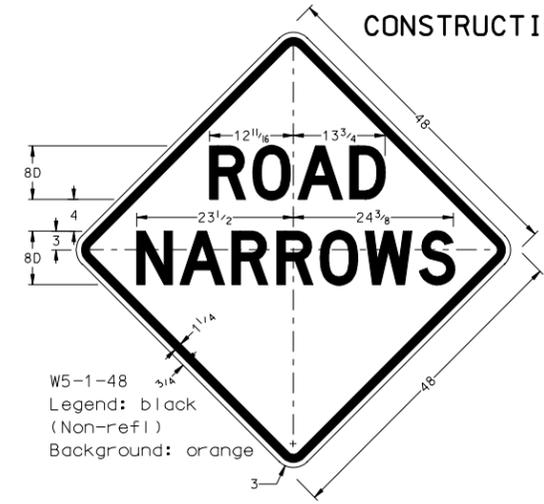
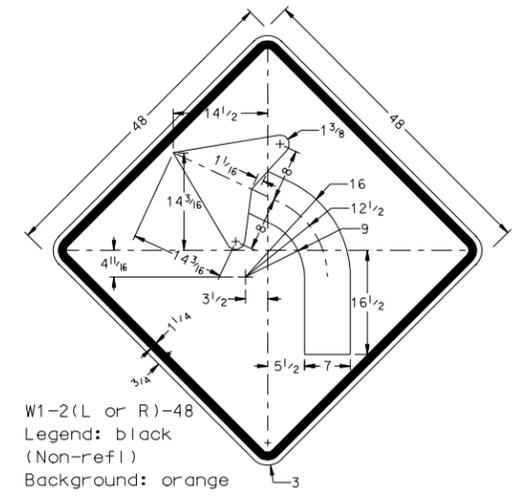
Arrow may be right or left of legend to indicate construction to the right or left.



NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-1-86	
REVISIONS	
DATE	CHANGE
05-01-92	General revision
07-26-95	Added signs G20-1a, G20-50a, R2-1a
03-04-96	Remove G20-2-60
10-18-01	G20-1b-60
01-30-03	Pavement end sign
07-25-04	Revised Fee Sign
04-01-04	Revised G20-55-96 sign
08-04-04	Deleted W8-3-48, Added Slow paddle
12-01-04	PE stamp added
07-11-05	Revised G20-4

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CONSTRUCTION SIGN DETAIL

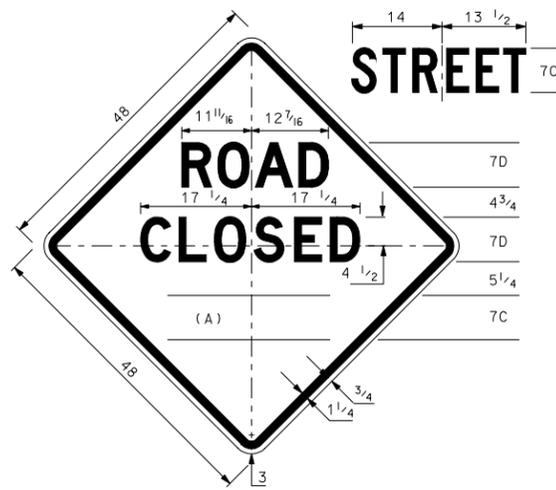


NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-1-86	
REVISIONS	
DATE	CHANGE
08-03-87	Detour no.
12-01-88	Shoulder drop off
05-01-88	General revisions
02-03-95	W8-9a-48
03-04-96	Remove W20-1-48
05-01-00	W5-8-48, W5-9-48
11-07-00	Add W5-2-48
01-06-04	W4-9-30 to M4-9-30
08-04-04	add arrow detail
12-01-04	General revisions
07-11-05	PE stamp added Revised W8-9a and W4-2

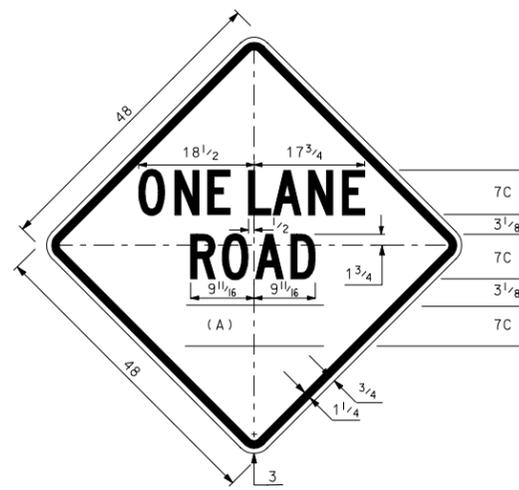
This document was originally issued and sealed by Mark S Gaydos, Registration Number PE-4518, on 07/11/05 and the original document is stored at the North Dakota Department of Transportation

CONSTRUCTION SIGN DETAIL

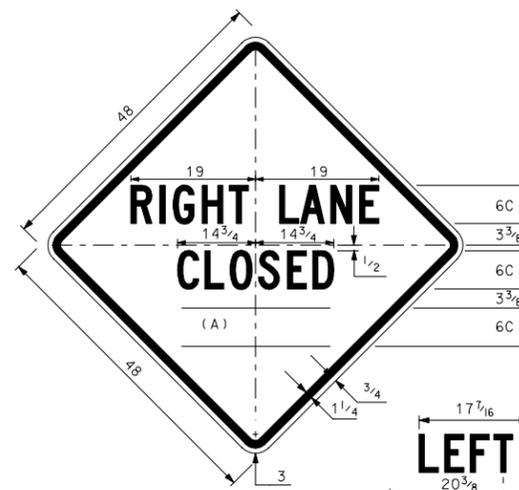
D-704-11



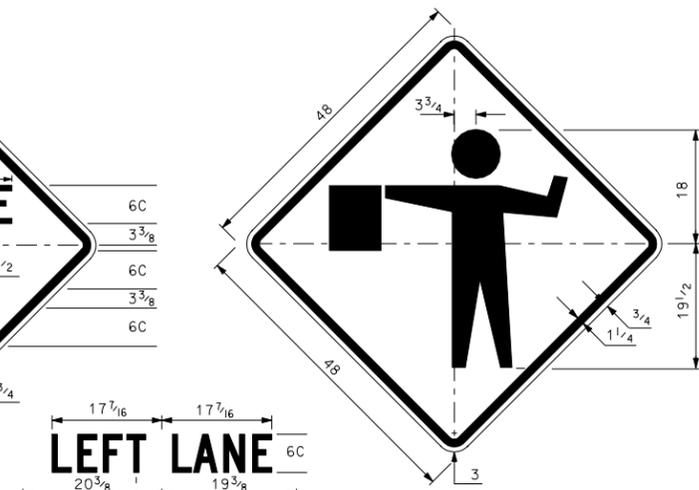
W20-3-48
Legend: black
(Non-refl)
Background: orange



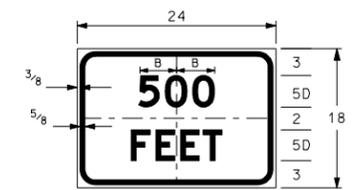
W20-4-48
Legend: black
(Non-refl)
Background: orange



W20-5-48
Legend: black
(Non-refl)
Background: orange



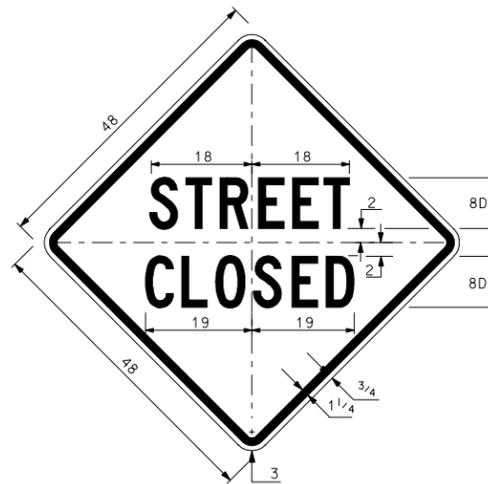
W20-7a-48
Legend: black
(Non-refl)
Background: orange



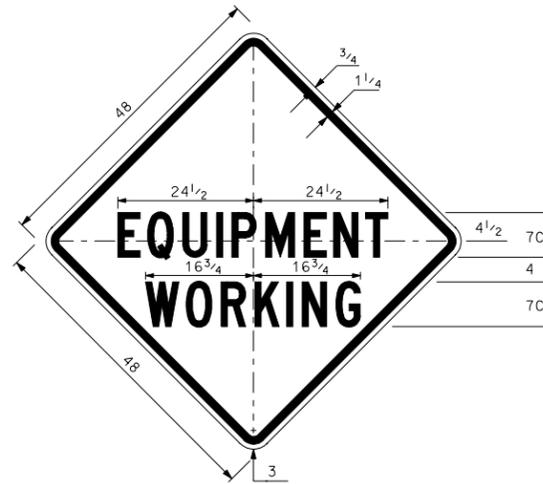
W20-7k-24
Legend: black
(Non-refl)
Background: orange

SIGN	DIMENSION B (INCHES)
500'	6
1000'	7 3/8
1500'	7 3/8

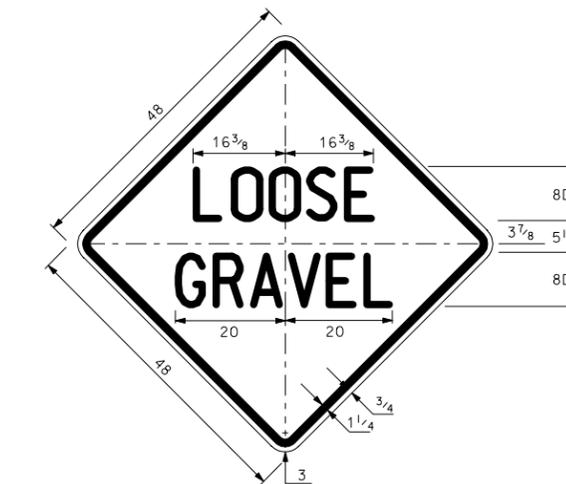
For use with
W20-7a-48 &
W21-1a-48



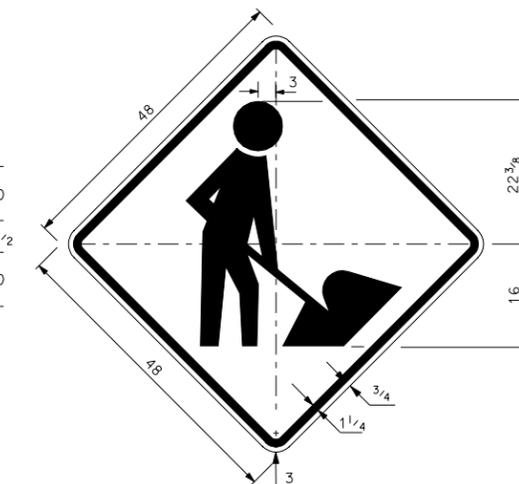
W20-8-48
Legend: black
(Non-refl)
Background: orange



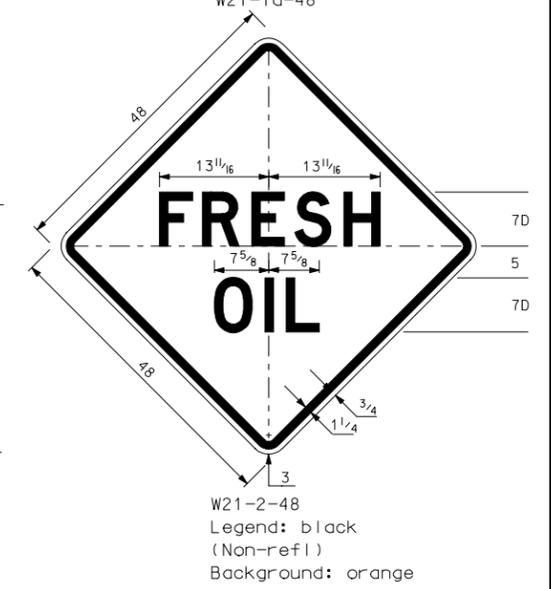
W20-51-48
Legend: black
(Non-refl)
Background: orange



W8-7-48
Legend: black
(Non-refl)
Background: orange



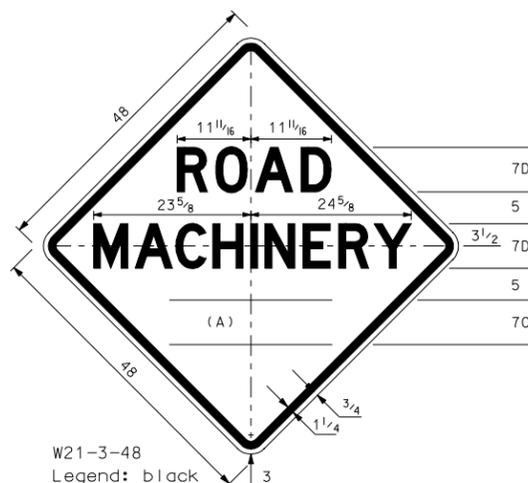
W21-1a-48
Legend: black
(Non-refl)
Background: orange



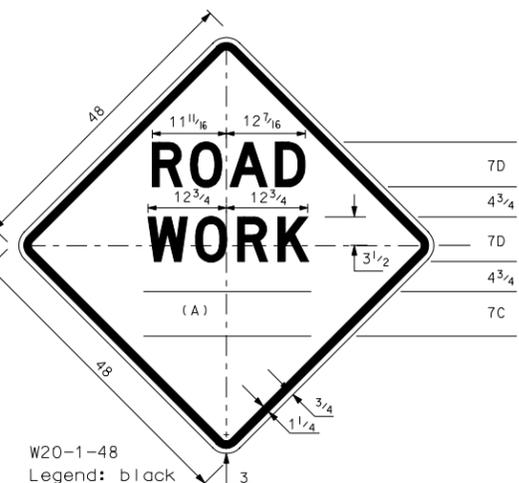
W21-2-48
Legend: black
(Non-refl)
Background: orange



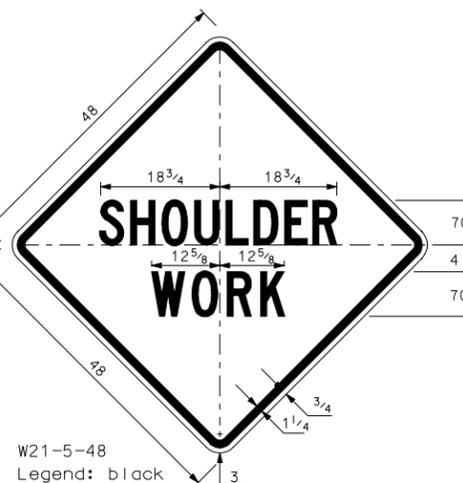
W20-52-54
Legend: black
(Non-refl)
Background: orange



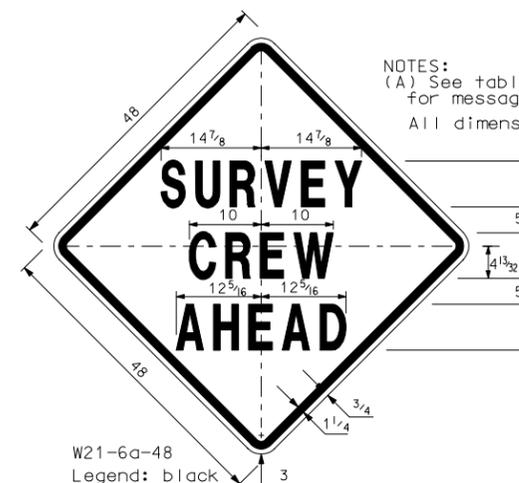
W21-3-48
Legend: black
(Non-refl)
Background: orange



W20-1-48
Legend: black
(Non-refl)
Background: orange



W21-5-48
Legend: black
(Non-refl)
Background: orange



W21-6a-48
Legend: black
(Non-refl)
Background: orange

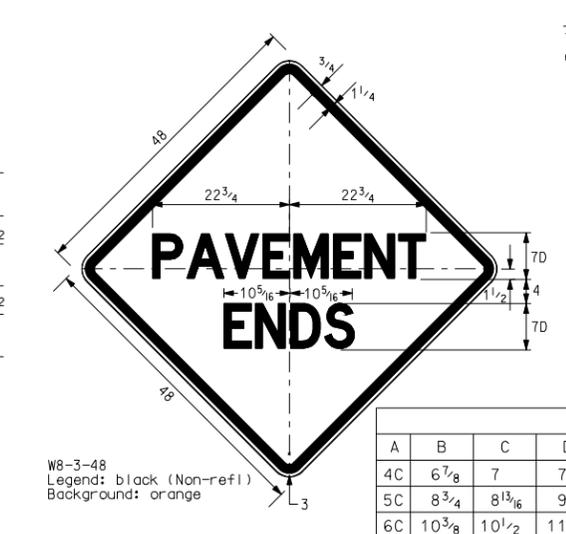
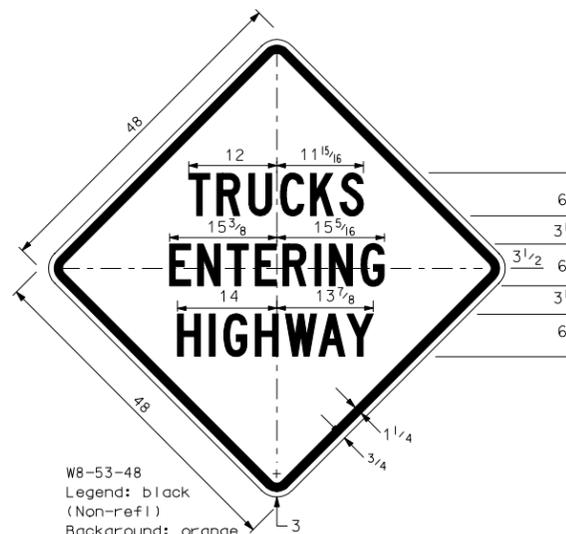
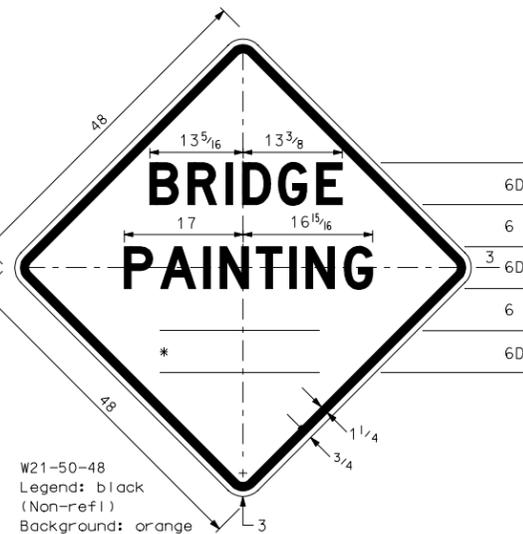
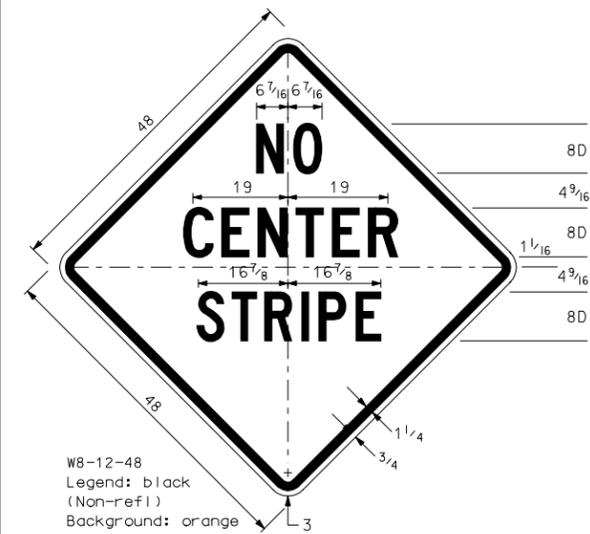
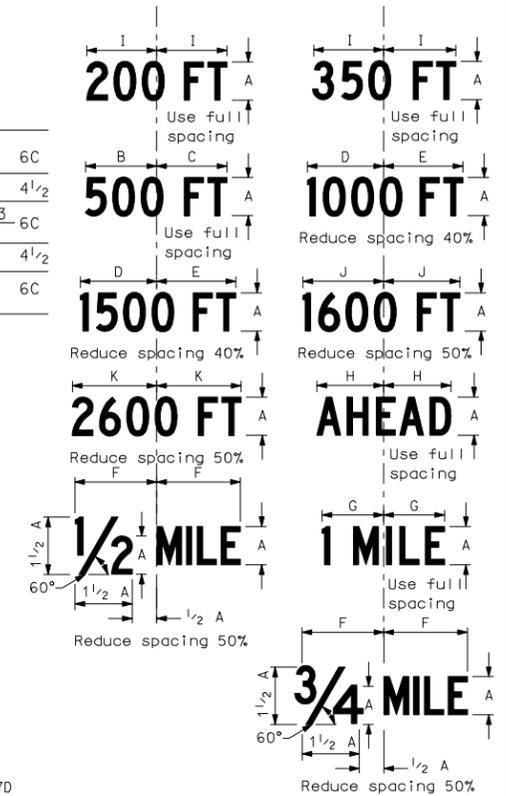
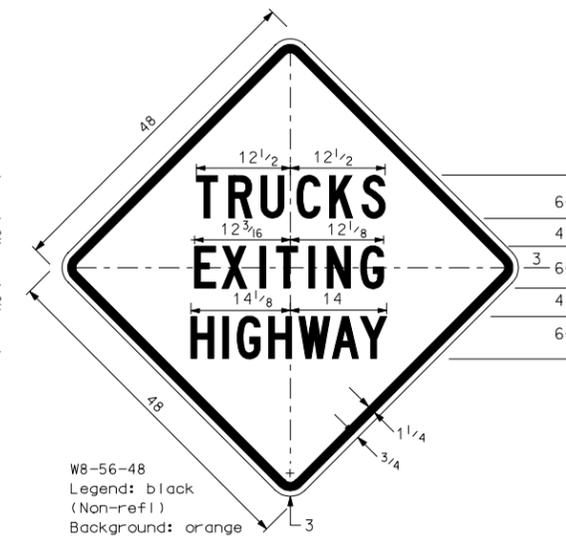
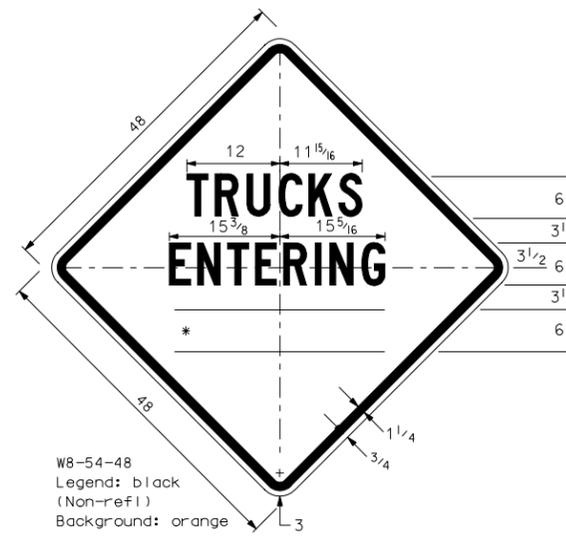
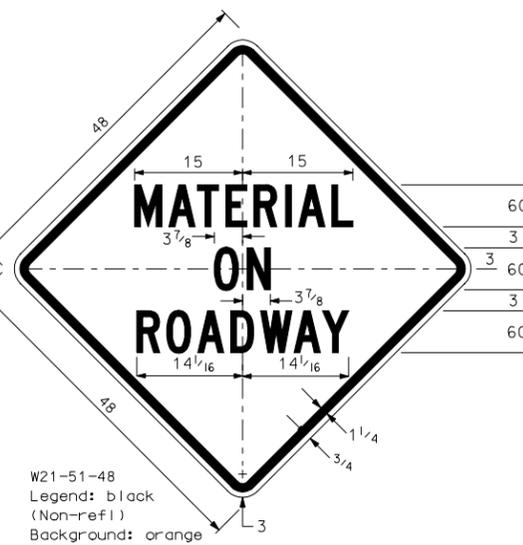
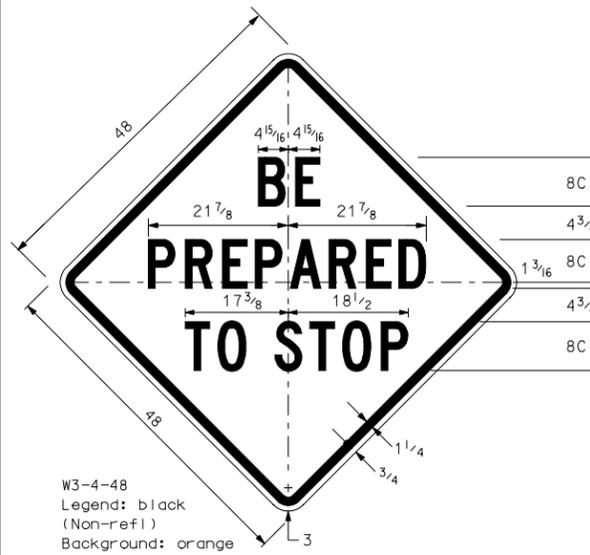
NOTES:
(A) See table on standard D-704-12
for messages and dimensions.
All dimensions are in inches

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION 10-1-86	
REVISIONS	
DATE	CHANGE
05-01-92	General revisions
06-09-95	Chg 7D to 7C(Dwg)
	W20-3, W21-3 & W21-4
05-26-98	Add W7-7-48
11-06-00	Rev W20-52-54
01-25-01	W21-6a-48
07-25-03	Rev W21-4 to W20-1
08-05-04	General revisions
12-01-04	PE stamp added
07-11-05	Revised W21-3, W20-1, W20-7a, W21-1a and W20-7k

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CONSTRUCTION SIGN DETAIL

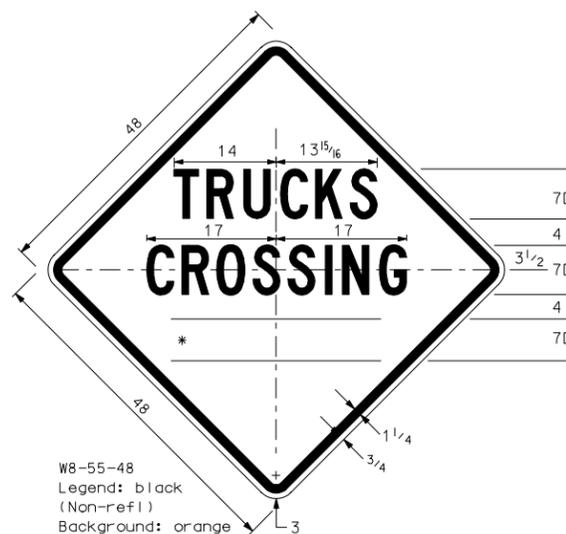
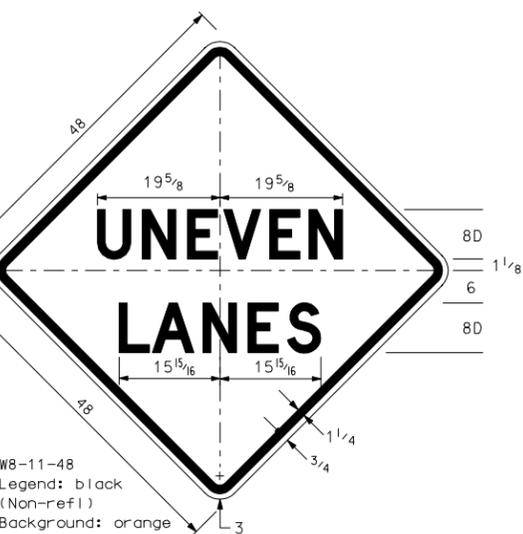
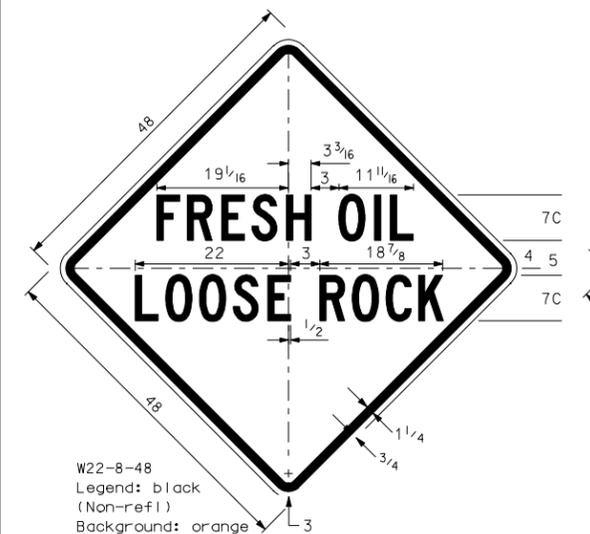
D-704-12



* DIMENSIONS (INCHES)

	A	B	C	D	E	F	G	H	I	J	K
4C	6 7/8	7	7 1/2	8	8 5/16	6 1/16	7	8 5/16	9 1/8	9 3/4	
5C	8 3/4	8 13/16	9 3/8	10	10 7/16	7 5/8	8 3/4	10 1/16	11 1/16	12 3/16	
6C	10 3/8	10 1/2	11 1/4	12	12 1/2	9 1/8	10 1/2	12 1/2	13 3/4	14 5/8	
7C	12	12 3/16	13 1/8	14	14 9/16	10 5/8	12 1/4	14 9/16	15	15 5/8	
8C	13 3/4	14	15	16	16 5/8	12 1/8	14	16 3/4	18 1/4	19 1/2	
4D	8 1/8	8 5/8	8 1/2	9	9	7 3/16	8 1/16	9 3/4	10 3/4	11 3/8	
5D	10 3/16	10 13/16	11 5/8	11 1/4	11 1/4	9 1/2	10 7/8	12 1/8	13 1/4	14 1/4	
6D	12 3/16	12 15/16	13 3/4	13 1/2	13 1/2	11 13/16	13 1/8	14 9/16	14 7/8	15 1/2	
7D	14 1/4	15 1/8	14 7/8	15 3/4	15 3/4	13 1/16	15 1/2	15 1/8	15 1/2	16 7/8	
8D	16 1/4	17 1/4	17	18	18	14 3/8	17 7/16	19 1/4	17 3/4	19 5/16	

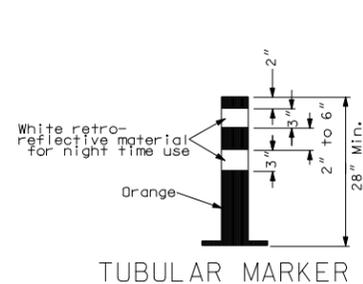
Standard signs that are shown in the construction sign and barricade location details shall be fabricated in the shape, color, and dimensions as shown in the standard signs layout booklet.



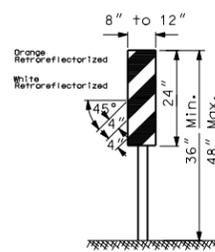
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-1-86	
REVISIONS	
DATE	CHANGE
12-01-88	Uneven pavement
05-01-92	General revisions
01-24-95	W8-12-48
02-03-95	W8-11-48
06-15-95	General revisions
05-19-98	Added 3/4 mile
05-26-99	Added W8-56-48
08-05-04	Deleted slow paddle added W8-3-48
12-01-04	PE stamp added
07-11-05	Changed W20-7b to W3-4, Revised W8-11 and W8-12

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BARRICADE DETAILS AND CHANNELIZING DEVICES



TUBULAR MARKER



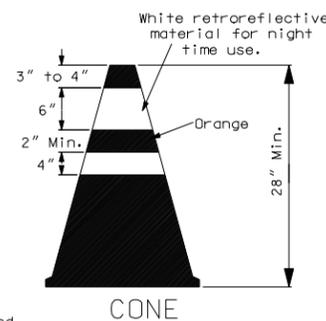
VERTICAL PANEL

(Retro-reflective sheeting shall be placed on both sides)
 NOTE: Vertical panels used on the expressways or other high speed roadways shall be 12" by 24"

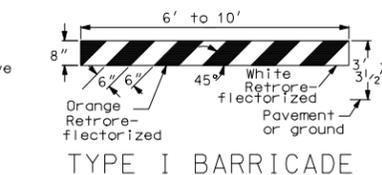


DELINEATOR DRUM
 36" Min. height

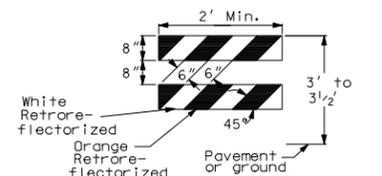
The markings on drums shall be orange and white stripes 4 to 6 inches wide. There shall be at least two orange and two white stripes. Where drums have ribs or indentations, there shall be no retro-reflective sheeting in this area. This space shall be no more than 2 inches wide. The drum surface shall be prepared as recommended by the sheeting manufacturer before retro reflective sheeting is applied.



CONE

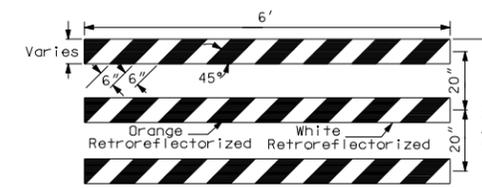


TYPE I BARRICADE



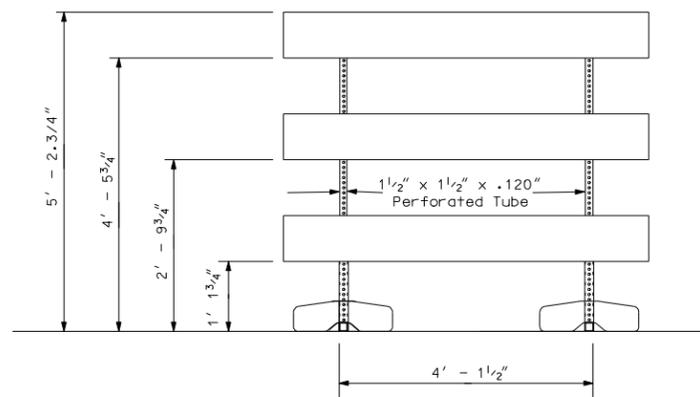
TYPE II BARRICADE

Rail stripe width shall be 4" if barricade length is less than 36".

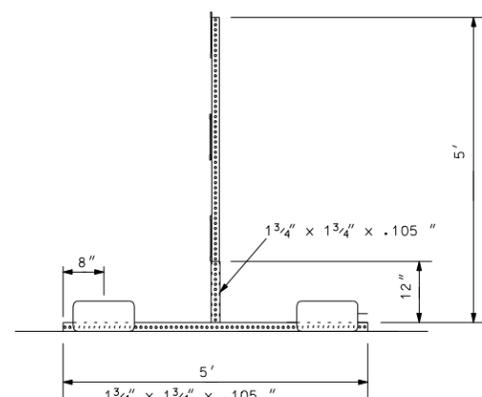


TYPE III BARRICADE

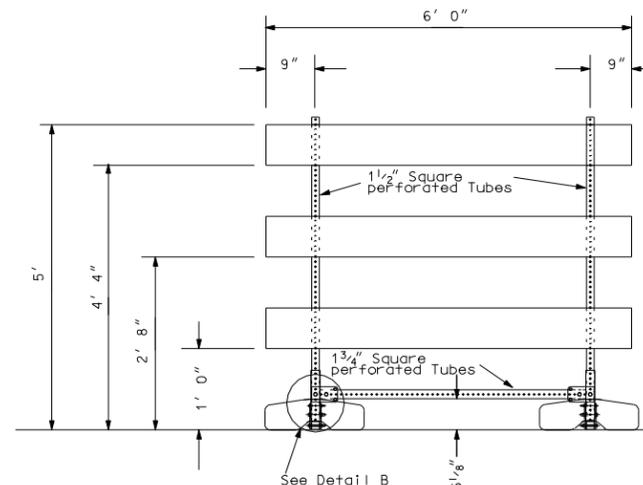
BARRICADES:
 Number of retro-reflective rail faces:
 Type I - 2 (One each direction)
 Type II - 4 (Two each direction)
 Type III - 6 (Three in each direction)



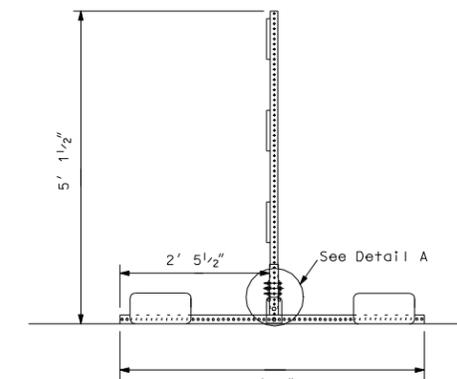
FRONT VIEW



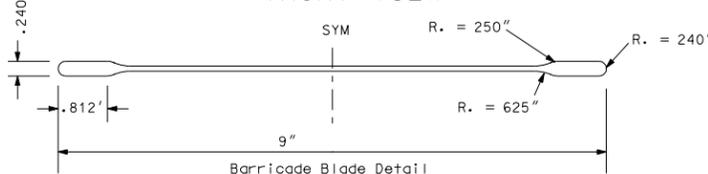
END VIEW



See Detail B

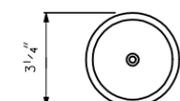


See Detail A



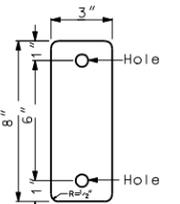
Ballast = 45lb sandbag at the end of each leg.
 Barricade blade fastened to vertical supports with 2" corner bolts.
 Vertical portion of leg is welded to horizontal portion on all four sides.
 Masts slide inside vertical portion of legs. No bolts or fastenings devices used.

BARRICADE ASSEMBLY DETAIL
 (Use when aluminum blade as detailed above)



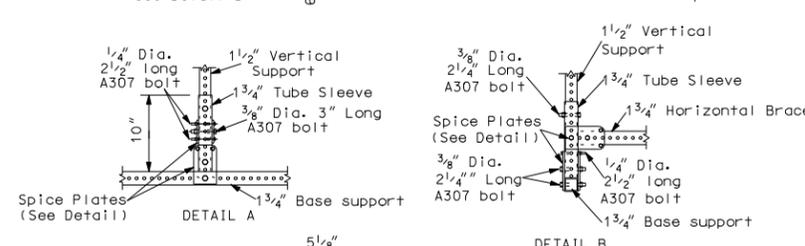
ACRYLIC PLASTIC REFLECTOR

Delineator reflector shall meet the requirements of section 894



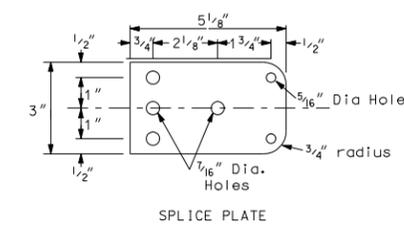
DELINEATOR REFLECTOR

3"x8"- 18 Gauge galvanized steel sheet or 0.080" aluminum plate with white retro-reflective sheeting (Type 3A or 3B) as specified in section 894 of the Standard Specifications.



DETAIL A

DETAIL B



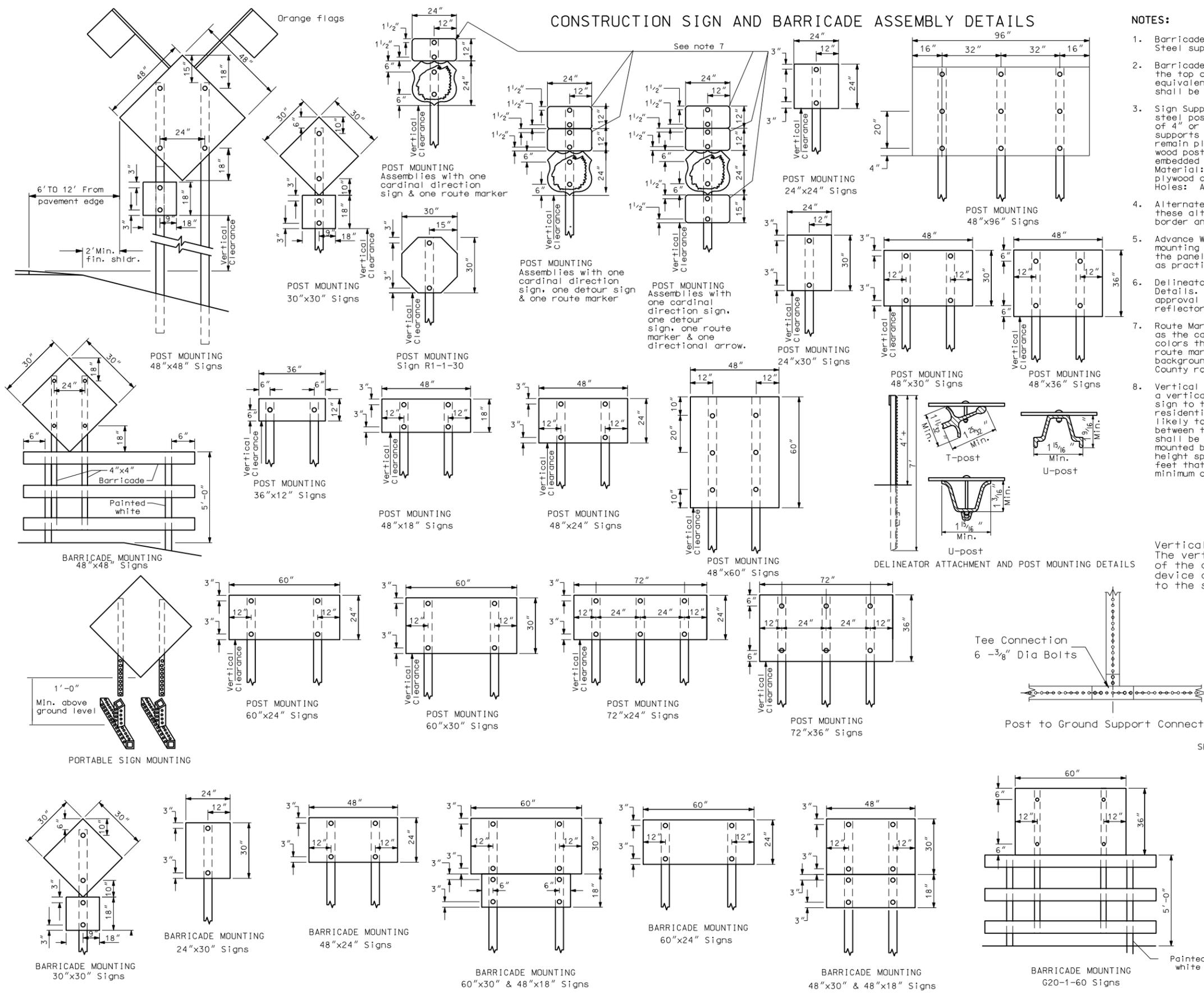
SPLICE PLATE

BARRICADE ASSEMBLY DETAIL
 (Use when Plastic I-Beam w/ 1 1/2" Hollow Core Flanges or 1" x 8" x72" wood boards.)

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-1-86	
REVISIONS	
DATE	CHANGE
08-03-87	Type sheeting
10-01-87	Delineator drum note
06-08-88	Barricade type III
06-01-92	General revision
06-10-93	General revision
09-23-93	Vertical panel
06-09-95	Reflective sheeting
03-01-02	Barricade type III assembly details
04-01-02	Type III barricade
12-01-04	PE stamp added
06-29-05	Revised Type II barricade stripe

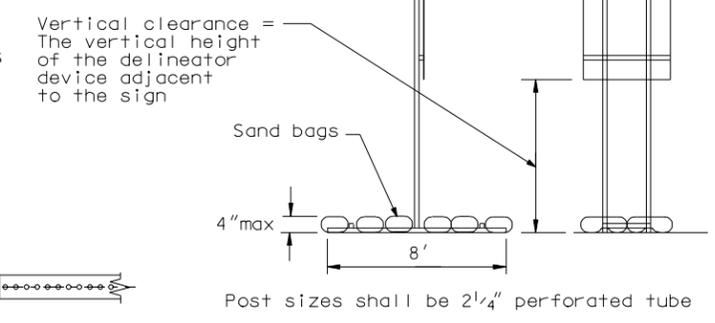
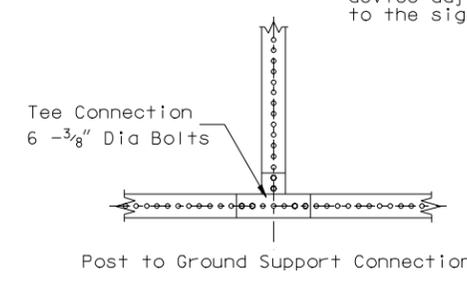
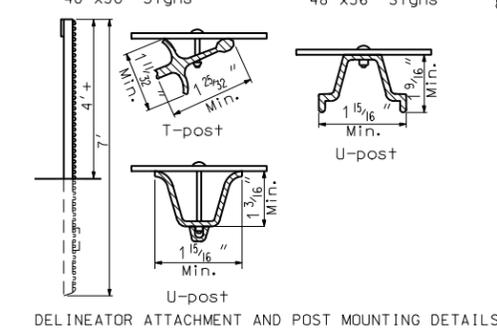
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CONSTRUCTION SIGN AND BARRICADE ASSEMBLY DETAILS

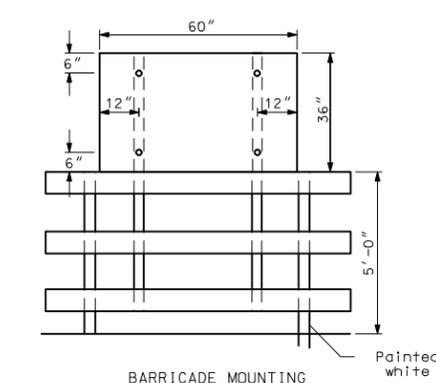


NOTES:

1. Barricade and Sign Supports: Wooden supports shall be painted white. Steel supports shall be galvanized or painted.
2. Barricade Mounting Signs: The bottom of the sign shall be flush with the top of the top rail. Wood sign posts shall be 4"x4" min. SFS or equivalent steel posts. All barricade and barricade mounted signs shall be assembled with 3/8" bolts.
3. Sign Supports: Sign supports shall be 4"x4" min. SFS or equivalent steel post. The anchor for steel supports shall have a stub height of 4" or less. Wood posts more than 4"x4" shall be breakaway. Sign supports shall be imbedded to a sufficient depth so that signs will remain plumb throughout duration of project. It is suggested that wood posts have a min. depth of embedment of 5' and steel posts be imbedded a min. 3'-6". Material: All signs shall be 0.100" aluminum, 12 gauge steel, 1/2" plywood or other approved material. Holes: All holes to be punched round for 3/8" bolts.
4. Alternate Messages: The signs that have alternate messages may have these alternate messages placed on a reflectorized plate without a border and this plate installed and removed as required.
5. Advance Warning Flashing or Sequencing Arrow Panels: The minimum mounting height shall be 7 feet above the roadway to the bottom of the panel, except on vehicle mounted panels which shall be as high as practicable.
6. Delineator Posts: Typical fence post sections are shown in Attachment Details. Other types of metal fence posts may be substituted upon approval of the engineer. These substituted posts shall have reflectors attached similar to the ones shown.
7. Route Marker Auxiliary Signs: The route marker auxiliary signs such as the cardinal direction and directional arrows shall have background colors the same as the route marker they are used with (Interstate route markers, blue background, US and State route markers, white background, Interstate Business loop and spur, green background, and County route markers, blue background).
8. Vertical Clearance: Post mounted signs placed in rural areas shall have a vertical clearance of at least 5 feet measured from the bottom of the sign to the near edge of the driving lane. In business, commercial and residential districts where parking and/or pedestrian movement is likely to occur or where other obstructions to view, the distance between the bottom of the sign to the near edge of the driving lane shall be at least 7 feet. The height to the bottom of secondary signs mounted below another sign may be 1 foot less than the appropriate height specified. Large signs having an area exceeding 50 square feet that are installed on multiple breakaway posts shall be mounted a minimum of 7 feet above the ground.



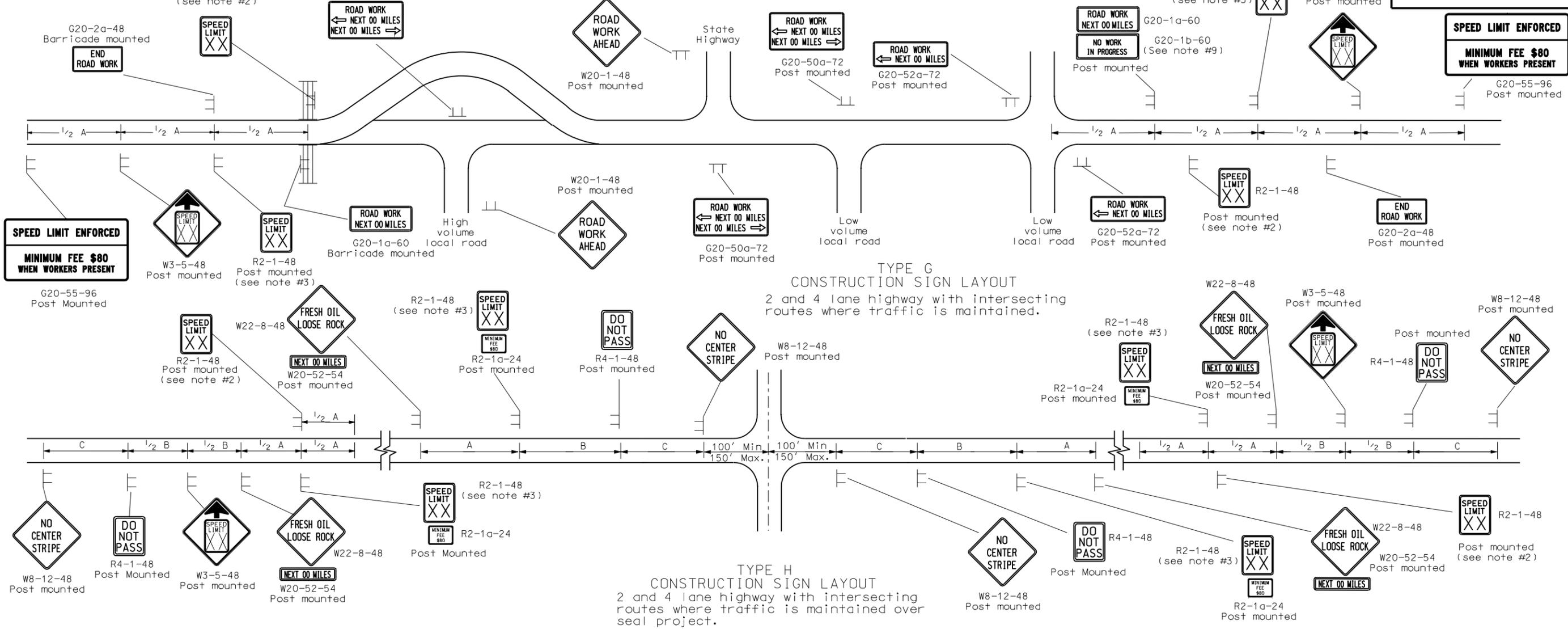
SKID MOUNTED SIGNS



NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-1-86	
REVISIONS	
DATE	CHANGE
08-01-88	Sign assembly
05-01-92	Sign assembly
03-30-93	Sign supports note
07-04-96	Sign height
08-15-96	Note 8
07-10-97	Note revision
01-31-98	Note & portable sign
10-01-99	Skid mounted sign
02-07-03	Vertical clearance note
11-30-04	Third post added to some signs
12-01-04	PE stamp added

This document was originally issued and sealed by MARK S GAYDOS, Registration Number PE-4518, on 12/01/04 and the original document is stored at the North Dakota Department of Transportation

CONSTRUCTION SIGN AND BARRICADE LOCATION DETAILS



- Barricade shown to be placed on roadway shall be on a moveable assembly. Sign to be mounted on barricades shall be mounted with the sign bottom on the top of the top barricade bar. Sign shown to be placed on the roadway shall be placed on skid mounted assemblies.
- The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
- 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 1/2 B.
- 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.
- Existing speed limit signs within a reduced speed zone shall be covered.
- Sign no. R2-1-48, R2-1a-24, R4-1-48, W22-8-48, W20-52-54, and W8-12-48 shall be placed just after all important intersections and every five miles in either direction. Sign no W8-12-48 shall be placed when traffic volumes are 750 ADT or less. No short term markings are placed when this condition exists.

- The contractor has the option of using portable sign supports in lieu of post mounted sign as shown on the standard drawings as specified in section 704.03 C.
- Type H construction sign traffic control shall have the speed limit signs covered or removed once the loose aggregate has been removed.
- The contractor shall install the G20-1b-60 sign when work is suspended for winter.
- The layouts show the signs needed before work begins. The requirements at the actual work areas will require the use of other standards. If the speed limit is reduced in the work areas, the speed limit signs shall have the R2-1a-24 sign placed below.

KEY

	Type I barricade		Work area
	Type II barricade		Flagger
	Type III barricade		Sequencing arrow panel
	Sign		Type A delineator or vertical panels back to back
	Delineator drum		
	Cones		

ADVANCE WARNING SIGN SPACING

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 10-1-86

REVISIONS

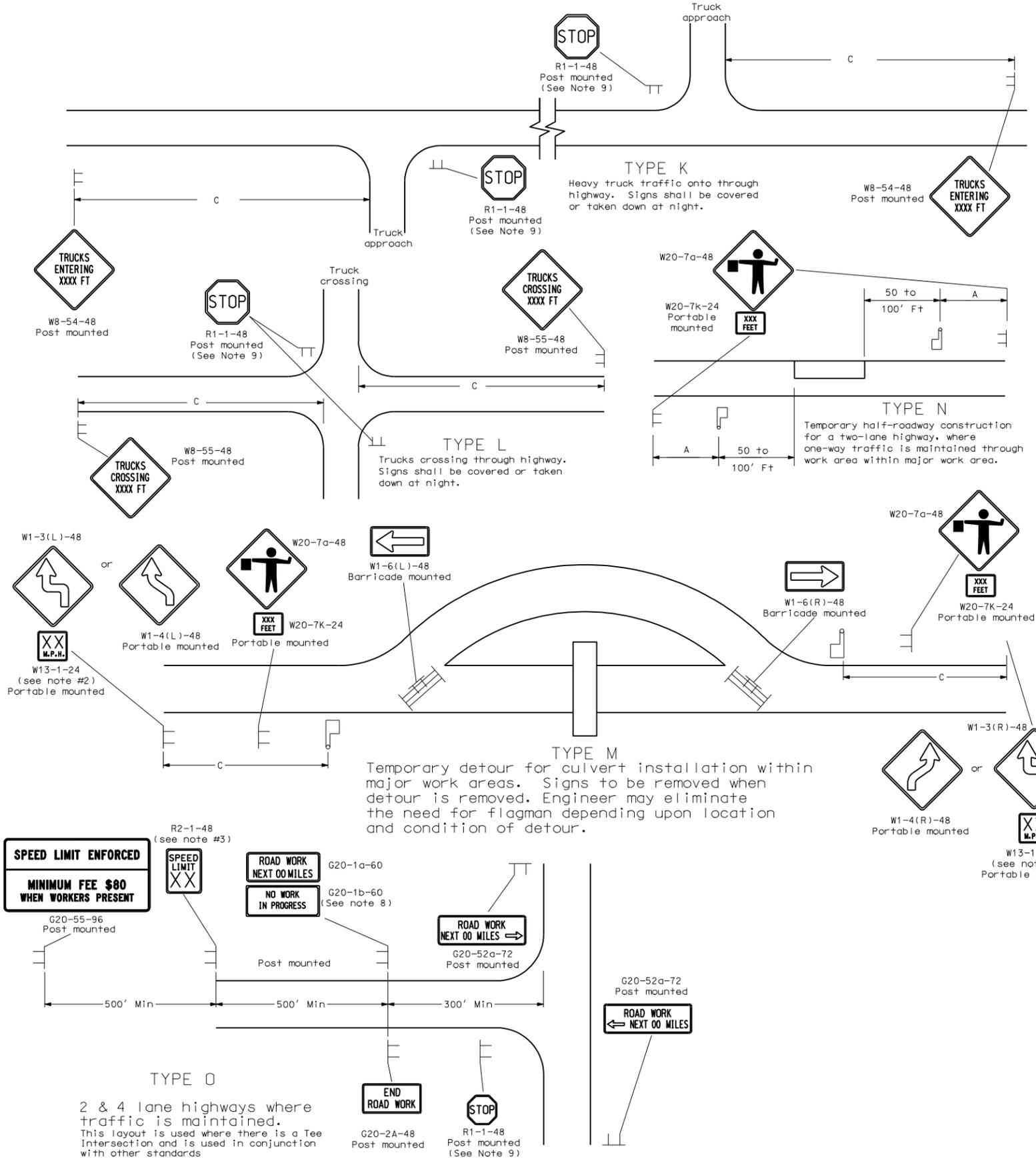
DATE	CHANGE
08-15-96	Revise flag note
10-01-99	General revisions
10-18-01	Added note 8 & 9
07-19-02	Rev. end road work & speed limit sign
07-25-03	Rev. R2-1a & W20-1
04-01-04	Rev. fee sign & warning sign spacing Rev note 3, add note 10
12-01-04	PE Stamp added
06-29-05	Added W3-5 to Type H and Type G, Rev. Adv. Warning Table, Rev. Note 3
04-05-06	Corrected sign W3-5

This document was originally issued and sealed by MARK S. GAYDOS, Registration Number PE-4518, on 04/05/06 and the original document is stored at the North Dakota Department of Transportation

CONSTRUCTION SIGN AND BARRICADE LOCATION DETAILS

Notes

1. Barricade shown to be placed on roadway shall be on a moveable assembly. Sign to be placed on top of the top barricade bar. Sign shown to be placed on the roadway shall be placed on skid mounted assemblies.
2. Where necessary, safe speed to be determined by the Engineer.
3. 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 1/2 B.
4. 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.
5. Existing speed limit signs within a reduced speed zone shall be covered.
6. Obliterated or covered pavement marking shall be paid for as Obliteration of Pavement Marking. The covering shall be approved by the engineer.
7. The contractor has the option of using portable sign supports in lieu of post mounted sign as shown on the standard drawings as specified in section 704.03 C.
8. The contractor shall install the G20-1b-60 sign when work is suspended for winter.
9. If existing stop sign is in place, a 48" stop sign is not required.



KEY

	Type I barricade		Work area
	Type II barricade		Flagger
	Type III barricade		Sequencing arrow panel
	Sign		Type A delineator or vertical panels back to back
	Delineator drum		
	Cones		

ADVANCE WARNING SIGN SPACING

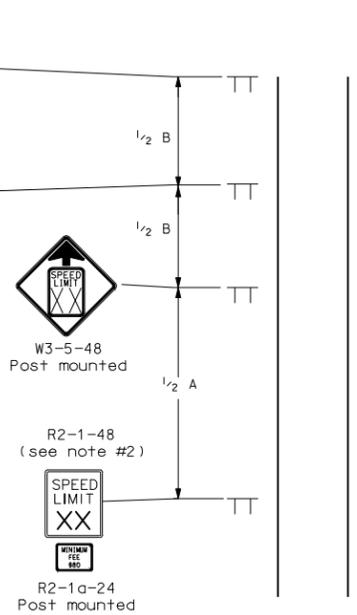
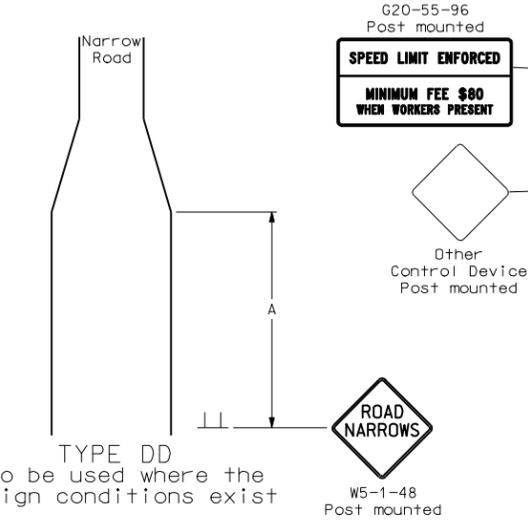
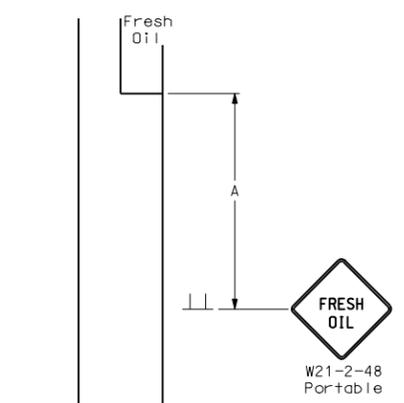
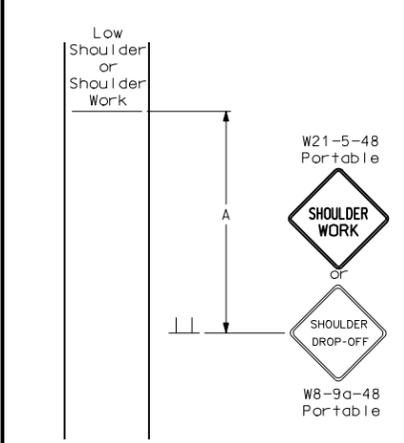
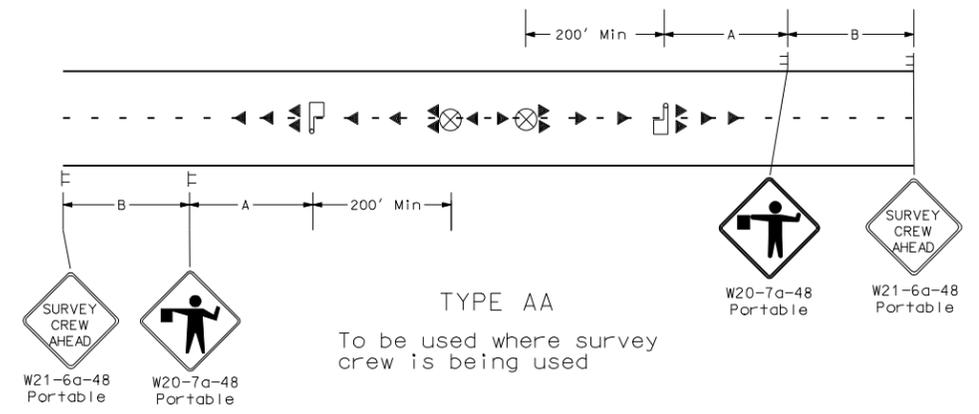
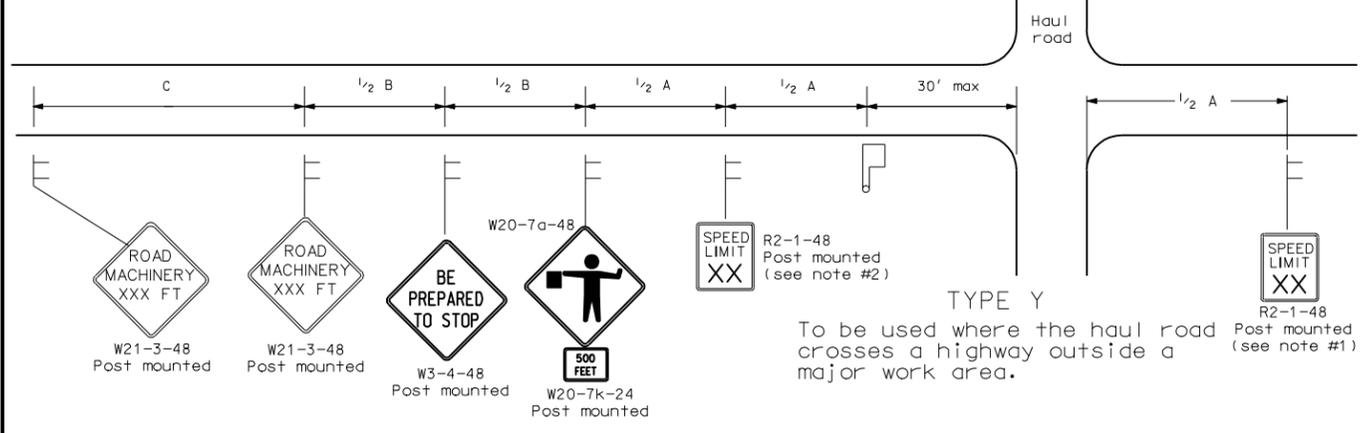
Road Type	Distance Between Signs Min. (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40 mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway and Freeway (55 mph to 60 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
10-1-86

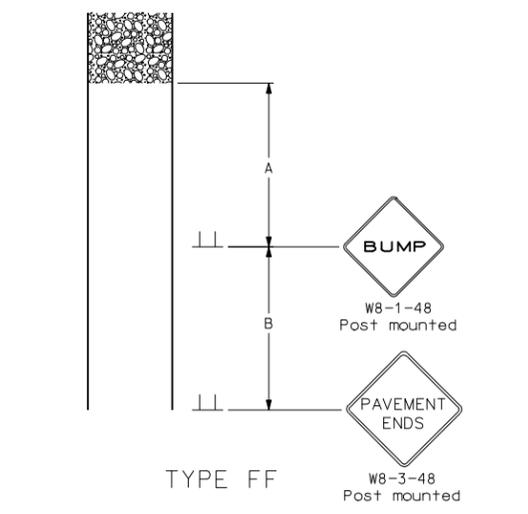
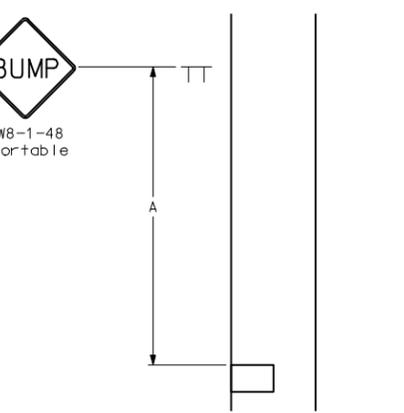
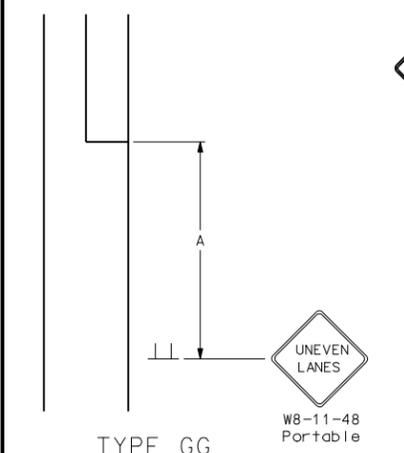
REVISIONS	
DATE	CHANGE
09-30-93	General revisions
06-21-95	General revisions
08-15-96	Revise flag note
10-01-99	General revisions
02-02-00	W8-55-48 Deleted Work In Progress Sign
10-17-02	Revised R2-1a
07-25-03	Revised fee sign & Warning sign spacing.
04-01-04	Revised note 3
12-01-04	PE stamp added.
02-14-05	Added note 9 and revised stop sign size
06-29-05	Rev. Adv. Warning Table, Rev. Note 3

This document was originally issued and sealed by Mark S Gaydos Registration Number PE-4518, on 06/29/05 and the original document is stored at the North Dakota Department of Transportation

CONSTRUCTION SIGN AND BARRICADE LOCATION DETAILS



- Notes
- The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
 - 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 1/2 B.
 - 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.
 - Existing speed limit signs within a reduced speed zone shall be covered.
 - The contractor has the option of using portable sign supports in lieu of post mounted sign as shown on the standard drawings as specified in section 704.03 C.
 - G20-55-96 or R2-1a-24 signs are not required if this standard is part of other traffic control layouts, or the work is less than 5 days.



KEY

— —	Type I barricade	▨	Work area
— — —	Type II barricade	⬇	Flagger
— — — —	Type III barricade	∞	Sequencing arrow panel
⊙	Sign	⊥	Type A delineator or vertical panels back to back
●	Delineator drum		
▲	Cones		

ADVANCE WARNING SIGN SPACING

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

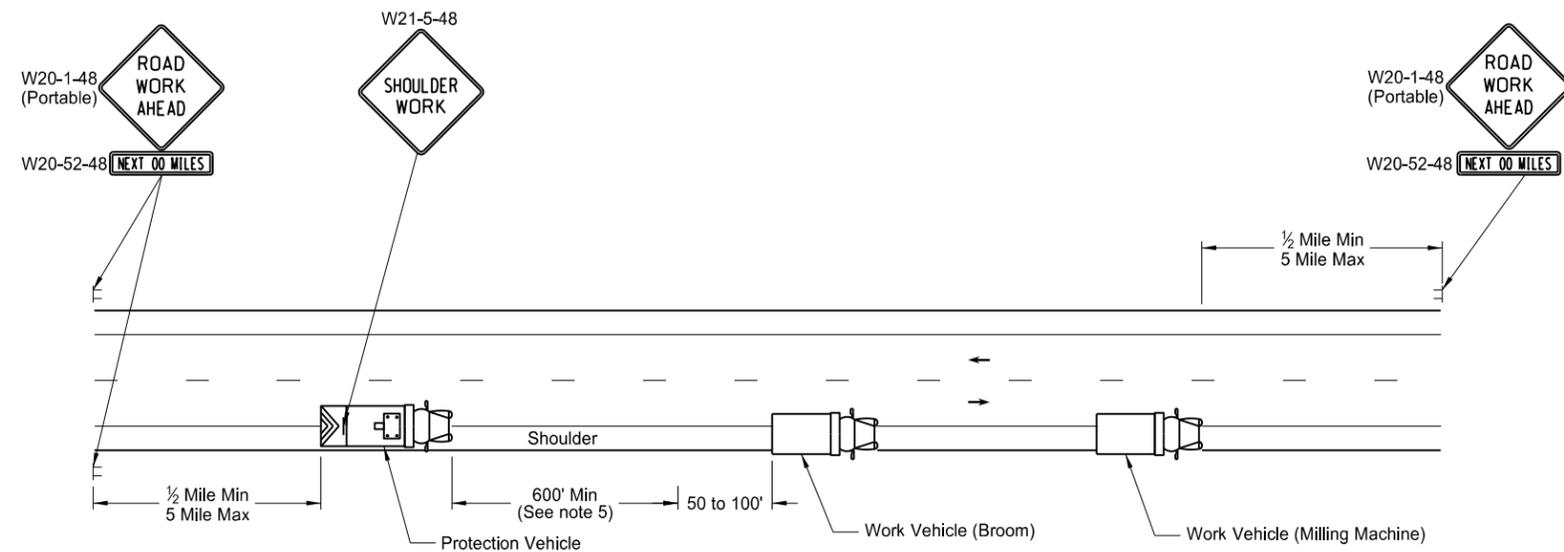
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION 10-1-86

REVISIONS

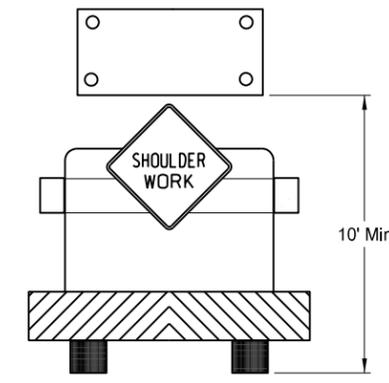
DATE	CHANGE
09-03-96	70 mph
01-31-97	Sign spacing
10-01-99	General Revision
07-19-02	Revised spacing of Speed Limit Signs
01-30-03	Pavement end sign
07-25-03	Revised R2-1a
04-01-04	Rev. fee sign & warning sign spacing. Add note 6 PE Stamp added
12-01-04	Replaced R2-5a with W3-5
06-29-05	Rev. Adv. Warning Table, Rev. Note 2
07-05-05	Changed W20-7b to W3-4

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MOBILE OPERATION
Grinding Shoulder Rumble Strips



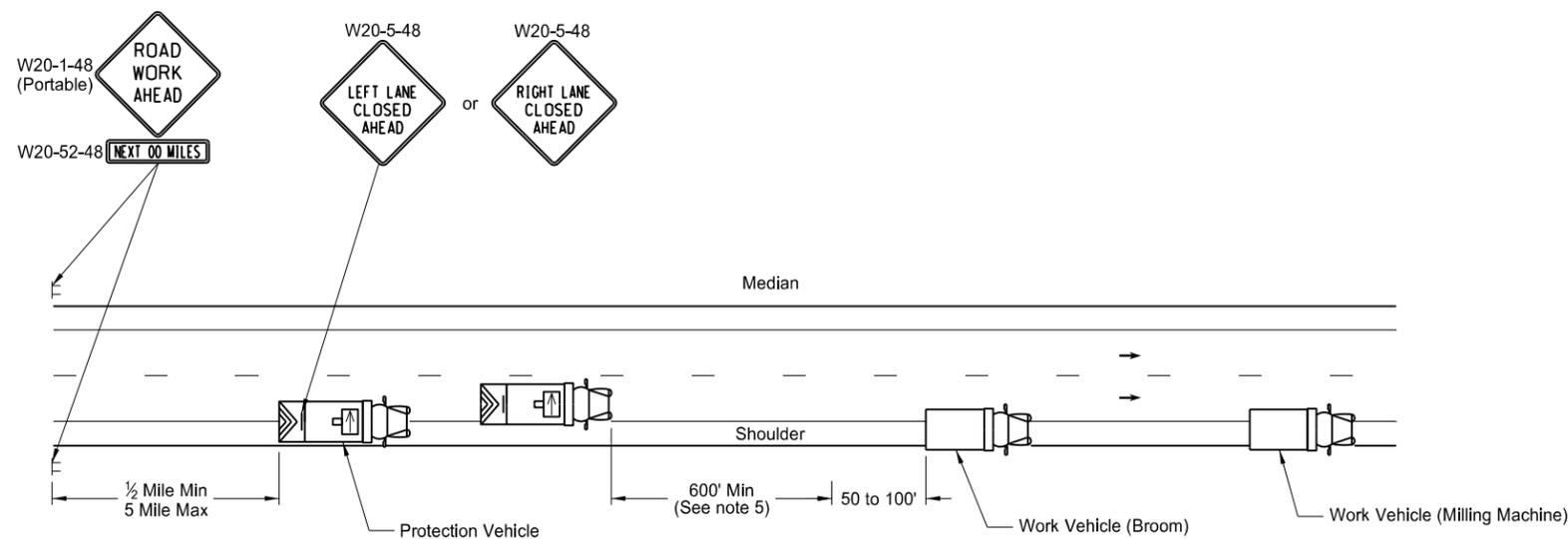
TWO LANE - TWO WAY ROADWAY



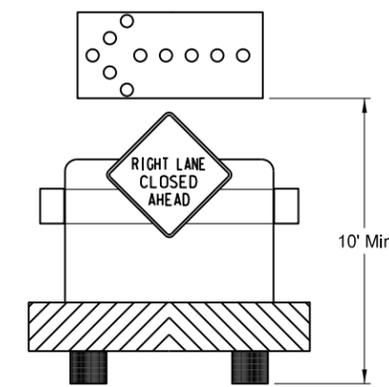
TWO LANE - TWO WAY ROADWAY
Typical Protection Vehicle with
Flashing Arrow Panel In Caution Mode

Notes:

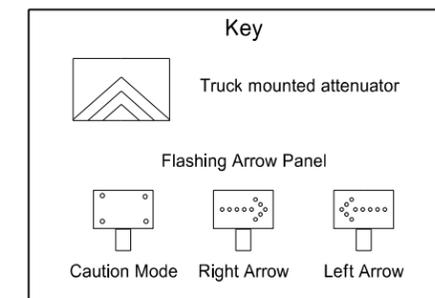
1. If the contractor chooses to place more vehicles in the convoy than are shown, these vehicles shall have the truck mounted attenuator and shall be at the contractors expense.
2. Vehicles shall have a rotating, flashing, oscillating or strobe lights.
3. Flashing arrow panels shall be Type B or Type C. The panel operation shall be controlled from inside the vehicle.
4. Each vehicle shall have two - way electronic communication capability.
5. Vehicle spacing between the protection vehicle and work vehicle will vary depending on sight distance restrictions. Motorists approaching the work convoy should be able to see the protection vehicle in time to slow down and safely pass the work vehicles.
6. ROAD WORK AHEAD SIGN: Advance Road Work Ahead signs shall be moved as the work area moves through the construction zone.
7. Next XX Miles sign required when the distance from Road Work Ahead sign to the work location is two miles or greater.



INTERSTATE & 4 LANE DIVIDED HIGHWAY



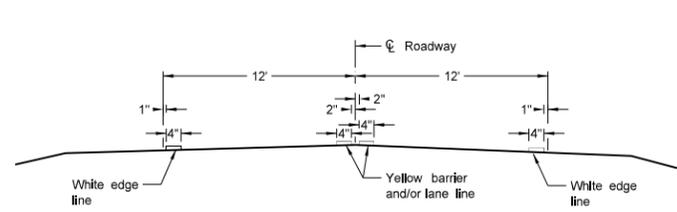
INTERSTATE & 4 LANE DIVIDED HIGHWAY
Typical Protection Vehicle with Flashing Arrow
Panel In Flashing Arrow Mode



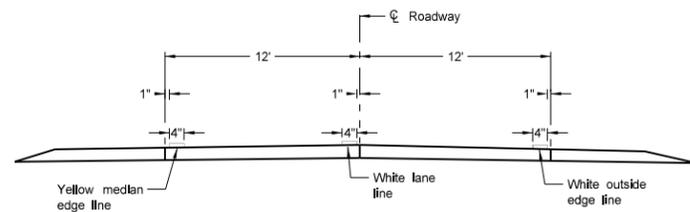
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-15-12	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Roger Weigel Registration Number PE-2930, on 11/15/12 and the original document is stored at the North Dakota Department of Transportation

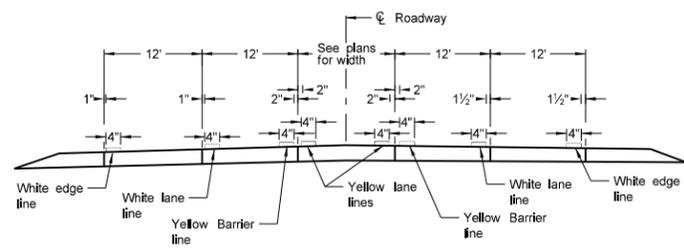
PAVEMENT MARKING



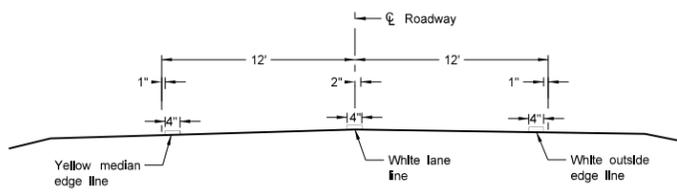
Two Lane Two Way
RURAL ROADWAY



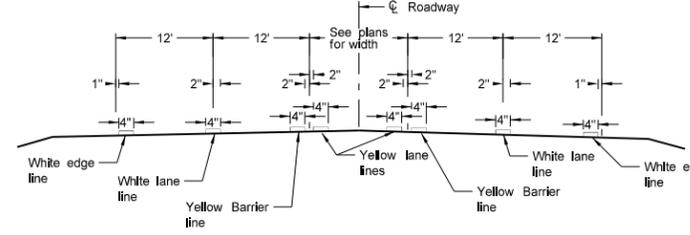
Two Lane Roadway
INTERSTATE HIGHWAY
Concrete Section



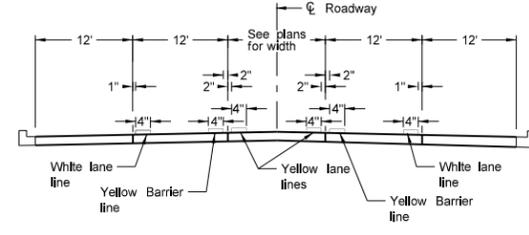
RURAL FIVE LANE ROADWAY
Concrete Section



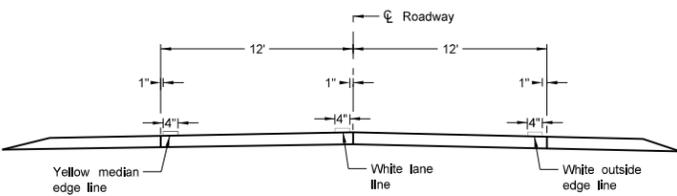
Two Lane Divided
Rural Roadway
PRIMARY HIGHWAY
Asphalt Section



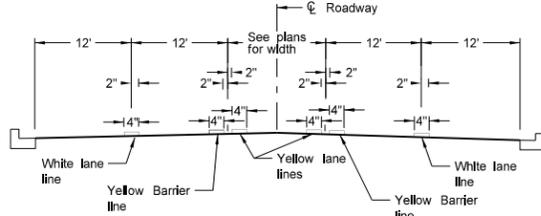
RURAL FIVE LANE ROADWAY
Asphalt Section



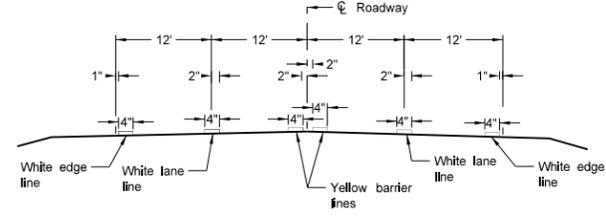
URBAN FIVE LANE SECTION
Concrete Section



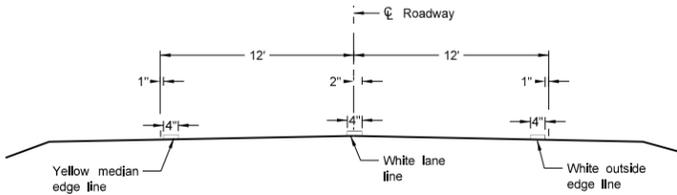
Two Lane Roadway
PRIMARY HIGHWAY
Concrete Section



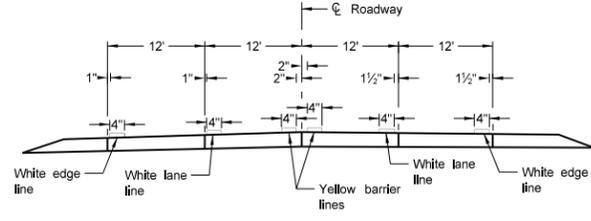
URBAN FIVE LANE SECTION
Asphalt Section



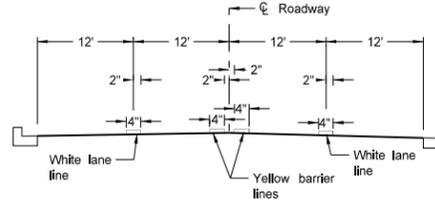
RURAL FOUR LANE ROADWAY
Asphalt Section



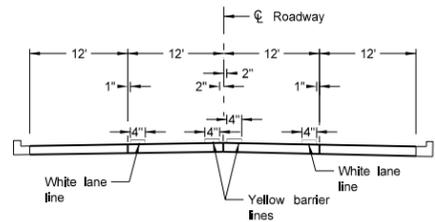
Two Lane Roadway
INTERSTATE HIGHWAY
Asphalt Section



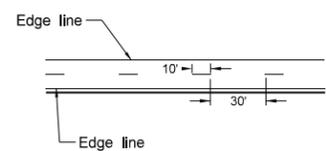
RURAL FOUR LANE ROADWAY
Concrete Section



URBAN FOUR LANE SECTION
Asphalt Section



URBAN FOUR LANE SECTION
Concrete Section



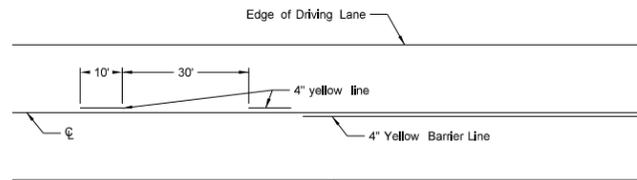
CENTERLINE PAVEMENT MARKING SKIP SPACING DETAIL

NOTES:
1. Edge lines shall be continued through private drives and field drives and broken for intersections.

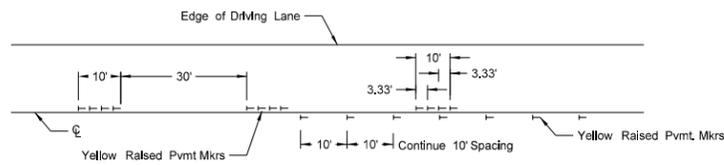
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE

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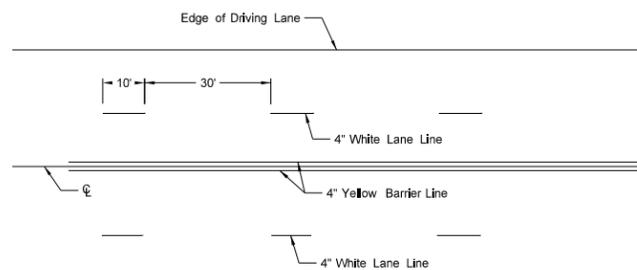
SHORT-TERM PAVEMENT MARKING



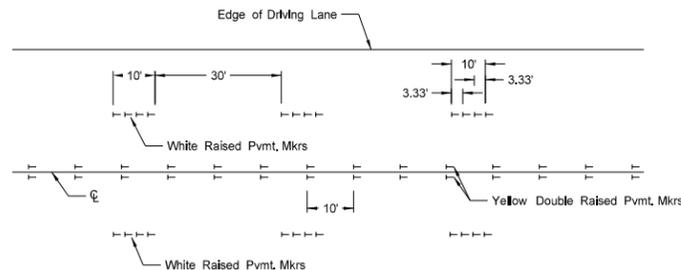
Painted or Tape Lines



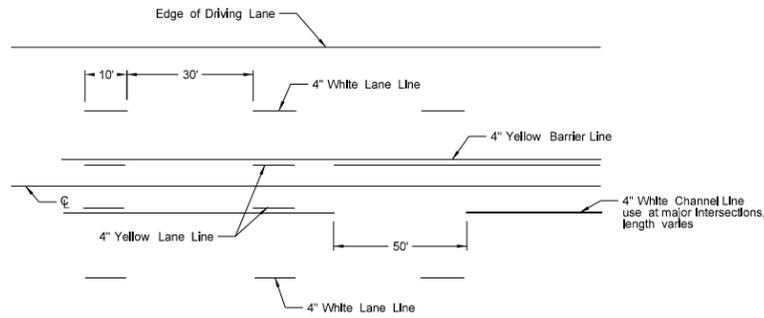
Raised Pavement Markers
TWO-LANE TWO-WAY ROADWAY



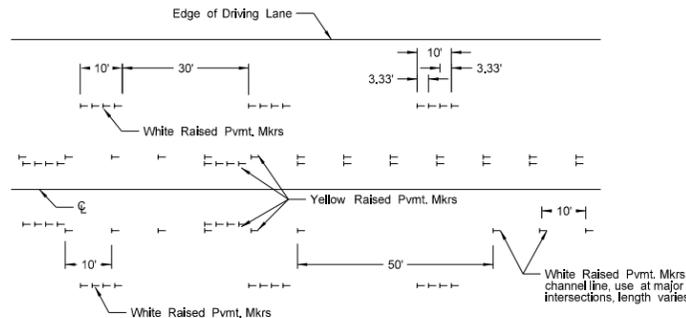
Painted or Tape Lines



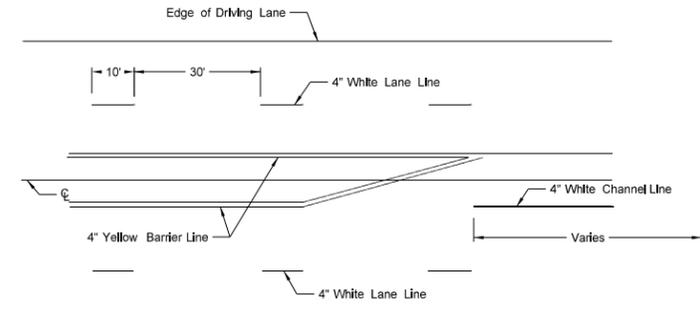
Raised Pavement Markers
FOUR LANE ROADWAY



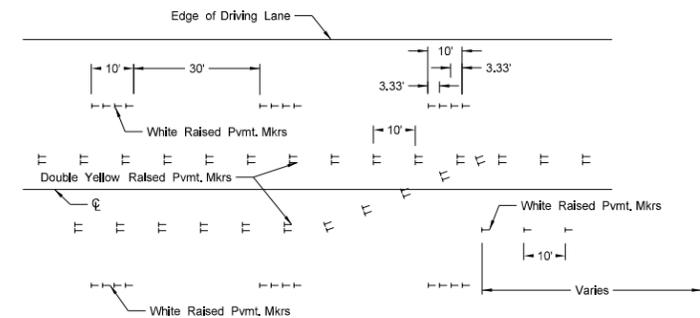
Painted or Tape Lines



Raised Pavement Markers
FIVE LANE ROADWAY TWO WAY LEFT TURN



Painted or Tape Lines



Raised Pavement Markers
FIVE LANE ROADWAY WITH MARKED ISLANDS

NOTES:

1. Two-lane two-way roadways shall have no passing zones placed as shown. No passing zone signs may be placed in lieu of short term no passing zone pavement markings. These signs will be allowed to remain in place for three days, at which time the short term no passing zone pavement marking shall be placed.
2. Short term center line stripe (paint) on top lift shall be carefully placed with exact spacing so that the permanent stripe will match when applied.
3. Raised markers and tape markings shall be removed after permanent pavement marking has been installed. Removed markings shall become the property of the contractor.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE

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