

STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION

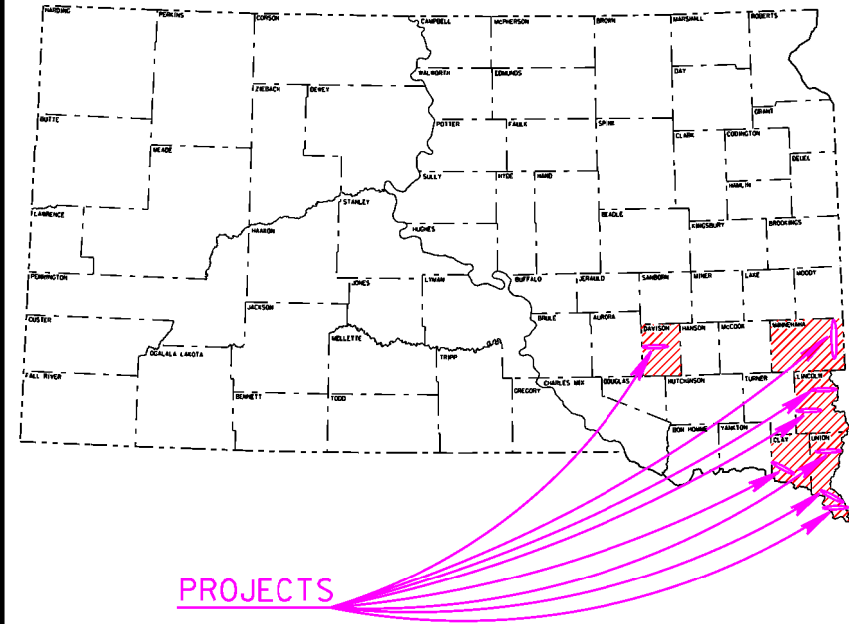
PLANS FOR PROPOSED
**PROJECTS PH 0020(184)
& PH 0020(218)**

INDEX OF SHEETS

Sheet 1	Title Sheet
Sheet 2 thru 5	Estimate of Quantities and Notes
Sheet 6 thru 21	Pavement Marking Layouts
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**SD HIGHWAY 11, SD HIGHWAY 50W,
DAVISON, CLAY, LINCOLN & UNION
STATE & COUNTY HIGHWAYS
REGION WIDE**

DURABLE PAVEMENT MARKING
PCN 05VM & 07X6



PROJECTS

ADT's

SD 11 (MRM 81.53 - 102.55)	-	2,914
SD 50W (MRM 396.02 - 407.10)	-	2,584
DAVISON CO OLD 16 (397TH AVE-408TH AVE)	-	1,035
LINCOLN COUNTY 282ND ST (466TH AVE - I-29)	-	855
LINCOLN COUNTY 276TH ST (I-29 - IOWA BRIDGE)	-	2,200
UNION COUNTY 302ND ST (SD11 - JEFFERSON BRIDGE)	-	870
UNION COUNTY ROAD 18 (ELM ST IN ELK POINT - CR #6)	-	100
UNION COUNTY 334TH ST (484TH AVE - 480TH AVE)	-	405

STORM WATER PERMIT
(None Required)

SD 11 (81.53 - 102.55)	
GROSS LENGTH	110985.6 FEET
EXCEPTION LENGTH	7575.0 FEET
NET LENGTH	103410.6 FEET

SD 50W (396.02 - 407.10)	
GROSS LENGTH	58502.4 FEET
NET LENGTH	58502.4 FEET

DAVISON COUNTY OLD 16 (397TH AVE - 408TH AVE)	
GROSS LENGTH	58080 FEET
NET LENGTH	58080 FEET

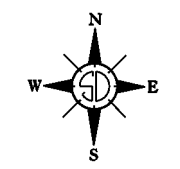
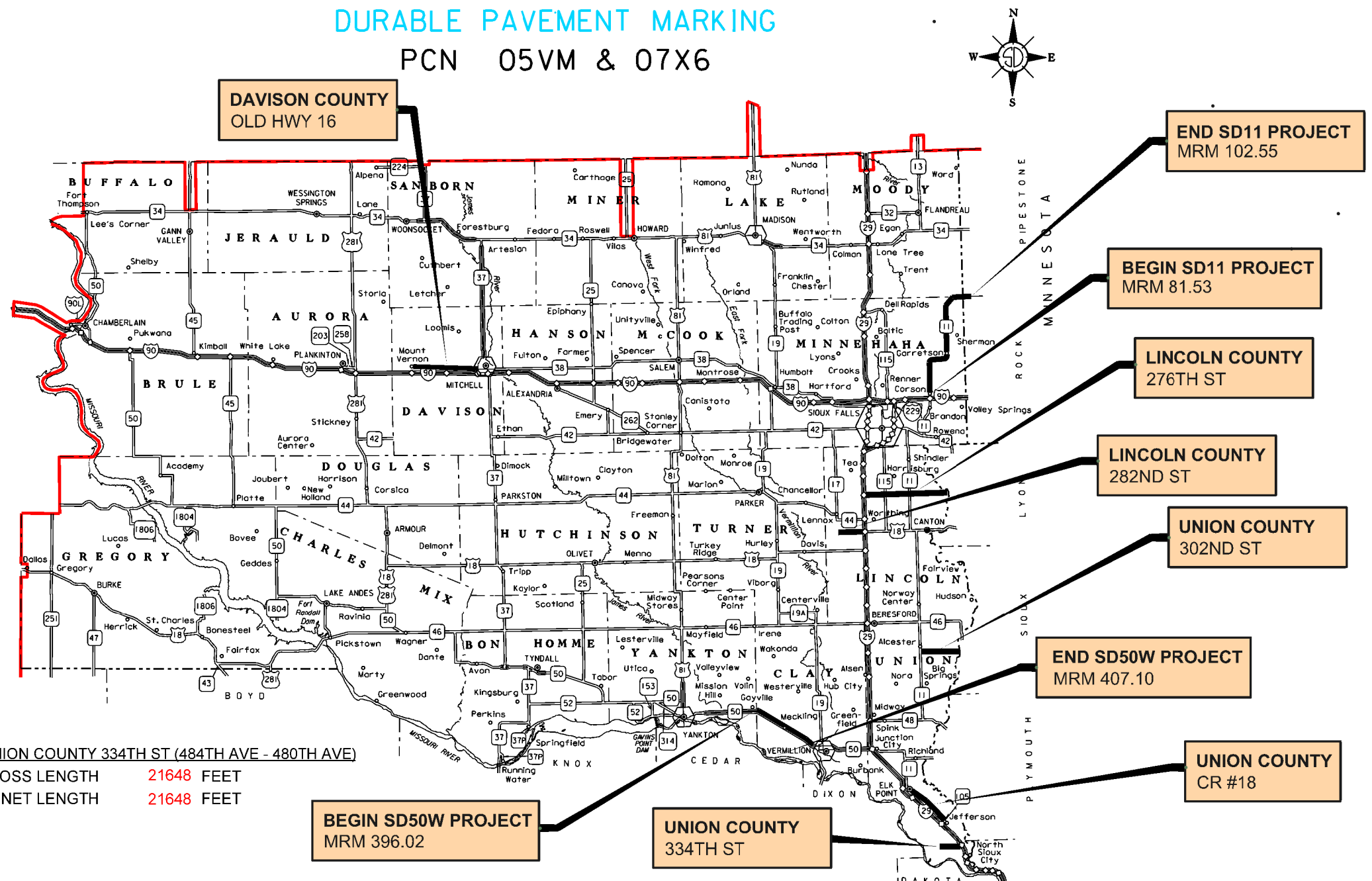
LINCOLN COUNTY 282ND ST (466TH AVE - I-29)	
GROSS LENGTH	22176 FEET
NET LENGTH	22176 FEET

LINCOLN COUNTY 276TH ST (I-29 - IOWA BRIDGE)	
GROSS LENGTH	72336 FEET
NET LENGTH	72336 FEET

UNION COUNTY 302ND ST (SD11 - JEFFERSON BRIDGE)	
GROSS LENGTH	35904 FEET
NET LENGTH	35904 FEET

UNION COUNTY ROAD 18 (ELM ST IN ELK POINT - CR #6)	
GROSS LENGTH	42768 FEET
NET LENGTH	42768 FEET

UNION COUNTY 334TH ST (484TH AVE - 480TH AVE)	
GROSS LENGTH	21648 FEET
NET LENGTH	21648 FEET



PLOT SCALE - 1:194,117

PLOTTED FROM - TRM111119

PLOT NAME - 1

FILE - ... \REGIONWIDE2024\TITLE23.DGN

ESTIMATE OF QUANTITIES – 05VM – (STATE ROUTES)

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
009E0010	Mobilization	Lump Sum	LS
633E0040	Cold Applied Plastic Pavement Marking, Arrow	54	Each
633E0055	Cold Applied Plastic Pavement Marking, Railroad Crossing	1	Each
633E1201	High Build Waterborne Pavement Marking Paint with Reflective Elements, White	1,119	Gal
633E1206	High Build Waterborne Pavement Marking Paint with Reflective Elements, Yellow	576	Gal
633E3000	Durable Pavement Marking, 4" White	73,127	Ft
633E3005	Durable Pavement Marking, 4" Yellow	58,502	Ft
633E5025	Grooving for Cold Applied Plastic Pavement Marking, Arrow	54	Each
633E5040	Grooving for Cold Applied Plastic Pavement Marking, Railroad Crossing	1	Each
633E5050	Surface Preparation for Pavement Marking	136,399	Ft
633E5100	Grooving for Durable Pavement Marking, 4"	206,754	Ft
633E5115	Grooving for Durable Pavement Marking, 24"	980	Ft
633E5120	Grooving for Durable Pavement Marking, Area	1,000	SqFt
633E9200	Mobile Retroreflectorometer Measurements	93.977	Mile
634E0010	Flagging	40.0	Hour
634E0110	Traffic Control Signs	105.0	SqFt
634E0120	Traffic Control, Miscellaneous	Lump Sum	LS

ESTIMATE OF QUANTITIES – 07X6 – (COUNTY ROUTES)

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
009E0010	Mobilization	Lump Sum	LS
633E1201	High Build Waterborne Pavement Marking Paint with Reflective Elements, White	2,704	Gal
633E1206	High Build Waterborne Pavement Marking Paint with Reflective Elements, Yellow	854	Gal
633E1290	High Build Waterborne Pavement Marking Paint, Railroad Crossing	6	Each
633E5100	Grooving for Durable Pavement Marking, 4"	569,052	Ft
633E5140	Grooving for Durable Pavement Marking, Railroad Crossing	6	Each
633E9200	Mobile Retroreflectorometer Measurements	143.700	Mile
634E0010	Flagging	80.0	Hour
634E0110	Traffic Control Signs	630.0	SqFt
634E0120	Traffic Control, Miscellaneous	Lump Sum	LS

ENVIRONMENTAL COMMITMENTS

The SDDOT is committed to protecting the environment and uses Environmental Commitments as a communication tool for the Engineer and Contractor to ensure that attention is given to avoid, minimize, and/or mitigate an environmental impact. Environmental commitments to various agencies and the public have been made to secure approval of this project. An agency with permitting authority can delay a project if identified environmental impacts have not been adequately addressed. Unless otherwise designated, the Contractor's primary contact regarding matters associated with these commitments will be the Project Engineer. During construction, the Project Engineer will verify that the Contractor has met Environmental Commitment requirements. These environmental commitments are not subject to change without prior written approval from the SDDOT Environmental Office.

Additional guidance on SDDOT's Environmental Commitments can be accessed through the Environmental Procedures Manual found at: <https://dot.sd.gov/media/documents/EnvironmentalProceduresManual.pdf>

For questions regarding change orders in the field that may have an effect on an Environmental Commitment, the Project Engineer will contact the Environmental Engineer at 605-773-3180 or 605-773-4336 to determine whether an environmental analysis and/or resource agency coordination is necessary.

Once construction is complete, the Project Engineer will review all environmental commitments for the project and document their completion.

COMMITMENT B: FEDERALLY THREATENED, ENDANGERED, AND PROTECTED SPECIES

COMMITMENT B2: WHOOPING CRANE

The Whooping Crane is a spring and fall migratory bird in South Dakota that is about 5 feet tall and typically stops on wetlands, rivers, and agricultural lands along their migration route. An adult Whooping Crane is white with a red crown and a long, dark, pointed bill. Immature Whooping Cranes are cinnamon brown. While in flight, their long necks are kept straight and their long dark legs trail behind. Adult Whooping Cranes' black wing tips are visible during flight.

Action Taken/Required:

Harassment or other measures to cause the Whooping Crane to leave the site is a violation of the Endangered Species Act. If a Whooping Crane is sighted roosting in the vicinity of the project, borrow pits, or staging areas associated with the project, cease construction activities in the affected area until the Whooping Crane departs and immediately contact the Project Engineer. The Project Engineer will contact the Environmental Office so that the sighting can be reported to USFWS.

COMMITMENT C: WATER SOURCE

The Contractor will not withdraw water with equipment previously used outside the State of South Dakota or previously used in aquatic invasive species (AIS) positive waters within South Dakota without prior approval from the SDDOT Environmental Office. To prevent and control the introduction and spread of invasive species into the project vicinity, all equipment will be power washed with hot water (≥140 °F) and completely dried for a minimum of 7 days prior to subsequent use. South Dakota administrative rule 41:10:04:02 forbids the possession and transport of AIS; therefore, all attached dirt, mud, debris and vegetation must be removed and all compartments and tanks capable of holding standing water must be drained. This includes, but is not limited to, all equipment, pumps, lines, hoses and holding tanks.

COMMITMENT C: WATER SOURCE (CONTINUED)

The Contractor will not withdraw water directly from streams of the James, Big Sioux, and Vermillion watersheds without prior approval from the SDDOT Environmental Office.

Action Taken/Required:

At a minimum and regardless of project size, appropriate erosion and sediment control measures must be installed to control the discharge of pollutants from the construction site.

COMMITMENT E: STORM WATER

Construction activities constitute less than 1 acre of disturbance.

Action Taken/Required:

At a minimum and regardless of project size, appropriate erosion and sediment control measures must be installed to control the discharge of pollutants from the construction site.

COMMITMENT H: WASTE DISPOSAL SITE

The Contractor will furnish a site(s) for the disposal of construction and/or demolition debris generated by this project.

Action Taken/Required:

Construction and/or demolition debris may not be disposed of within the Public ROW.

The waste disposal site(s) will be managed and reclaimed in accordance with the following from the General Permit for Construction/Demolition Debris Disposal Under the South Dakota Waste Management Program issued by the Department of Agriculture and Natural Resources.

The waste disposal site(s) will not be located in a wetland, within 200 feet of surface water, or in an area that adversely affects wildlife, recreation, aesthetic value of an area, or any threatened or endangered species, as approved by the Environmental Office and the Project Engineer.

If the waste disposal site(s) is located such that it is within view of any ROW, the following additional requirements will apply:

- Construction and/or demolition debris consisting of concrete, asphalt concrete, or other similar materials will be buried in a trench separate from wood debris. The final cover over the construction and/or demolition debris will consist of a minimum of 1 foot of soil capable of supporting vegetation. Waste disposal sites provided outside of the Public ROW will be seeded in accordance with Natural Resources Conservation Service recommendations. The seeding recommendations may be obtained through the appropriate County NRCS Office. The Contractor will control the access to waste disposal sites not within the Public ROW with fences, gates, and placement of a sign or signs at the entrance to the site stating, "No Dumping Allowed".
- Concrete and asphalt concrete debris may be stockpiled within view of the ROW for a period not to exceed the duration of the project. Prior to project completion, the waste will be removed from view of the ROW or buried, and the waste disposal site reclaimed as noted above.

The above requirements will not apply to waste disposal sites that are covered by an individual solid waste permit as specified in SDCL 34A-6-58, SDCL 34A-6-1.13, and ARSD 74:27:10:06. Failure to comply with the requirements stated above may result in civil penalties in accordance with South Dakota Solid Waste Law, SDCL 34A-6-1.31.

COMMITMENT H: WASTE DISPOSAL SITE (CONTINUED)

All costs associated with furnishing waste disposal site(s), disposing of waste, maintaining control of access (fence, gates, and signs), and reclamation of the waste disposal site(s) will be incidental to the various contract items.

COMMITMENT I: HISTORICAL PRESERVATION OFFICE CLEARANCES

The SDDOT has obtained concurrence with the State Historic Preservation Office (SHPO or THPO) for all work included within the project limits and all department designated sources and designated option material sources, stockpile sites, storage areas, and waste sites provided within the plans.

Action Taken/Required:

All earth disturbing activities not designated within the plans require a cultural resource review prior to scheduling the pre-construction meeting. This work includes but is not limited to: Contractor furnished material sources, material processing sites, stockpile sites, storage areas, plant sites, and waste areas.

The Contractor will arrange and pay for a record search and when necessary, a cultural resource survey. The Contractor has the option to contact the state Archaeological Research Center (ARC) at 605-394-1936 or another qualified archaeologist, to obtain either a records search or a cultural resources survey. A record search might be sufficient for review if the site was previously surveyed; however, a cultural resources survey may need to be conducted by a qualified archaeologist.

The Contractor will provide ARC with the following: a topographical map or aerial view in which the site is clearly outlined, site dimensions, project number, and PCN. If applicable, provide evidence that the site has been previously disturbed by farming, mining, or construction activities with a landowner statement that artifacts have not been found on the site.

The Contractor will submit the cultural resources survey report to SDDOT Environmental Office, 700 East Broadway Avenue, Pierre, SD 57501-2586. SDDOT will submit the information to the appropriate SHPO/THPO. Allow **30 Days** from the date this information is submitted to the Environmental Engineer for SHPO/THPO review.

In the event of an inadvertent discovery of human remains, funerary objects, or if evidence of cultural resources is identified during project construction activities, then such activities within 100 feet of the inadvertent discovery will immediately cease and the Project Engineer will be immediately notified. The Project Engineer will contact the SDDOT Environmental Office, who will contact the appropriate SHPO/THPO within 48 hours of the discovery to determine an appropriate course of action.

SHPO/THPO review does not relieve the Contractor of the responsibility for obtaining any additional permits and clearances for Contractor furnished material sources, material processing sites, stockpile sites, storage areas, plant sites, and waste areas that affect wetlands, threatened and endangered species, or waterways. The Contractor will not utilize a site known or suspected of having contaminated soil or water. The Contractor will provide the required permits and clearances to the Project Engineer at the preconstruction meeting.

WORK DESCRIPTION

SD 11 – Work will include grooving of the edgeline, cleaning of the centerline rumble strip and applying high build pavement marking with elements on edgelines, center lines, lane lines, turn lanes, cross hatches and cold applied plastic pavement making on turn arrows and RR X-ing. Grooving of the existing centerline rumble strip will not be allowed.

SD 50 W – Work will include surface prep and applying durable pavement marking on edgelines and center lines..

COUNTY MARKINGS – Work will include grooving, applying high build pavement marking on edgelines, center lines and RR X-ing

RAMP PAVEMENT ARROWS – Work will include grooving and applying cold applied plastic pavement marking arrows.

GENERAL MAINTENANCE OF TRAFFIC

The work will be done by mobile work operations for the long lines and lane closures for the hand work. Lane closures will not be allowed to be left over night. Both operations will be done during daylight hours.

All construction operations will be conducted in the general direction of traffic movement.

If there is a discrepancy between the traffic control plans, standard plates, and the MUTCD, whichever is more stringent will be used, as determined by the Engineer.

Traffic will be maintained on the driving lanes. Use of the shoulder as a driving lane will not be permitted. Any damage to the shoulder due to rerouted traffic or Contractor's equipment will be repaired at no expense to the Department.

COLD APPLIED PLASTIC PAVEMENT MARKING

All materials will be applied as per the manufacturer's recommendations.

Cold Applied Plastic Pavement Markings will be 3M Series 380 AW or an approved equal.

HIGH BUILD WATERBORNE PAVEMENT MARKING PAINT

All materials will be applied as per manufacturer's recommendations. High build waterborne pavement marking paint will conform to the supplemental specifications for Section 980.1 B.

Reflective media consisting of glass beads as well as bonded core reflective elements will be adhered to the paint.

The bonded core reflective elements will contain either clear or yellow tinted microcrystalline ceramic beads bonded to the outer surface. The bonded core reflective elements will provide a 50/50 blend of dry to wet ratio of reflective element. All microcrystalline ceramic beads bonded to reflective elements will have a minimum index of refraction of 1.8 for dry retroreflectivity and 2.4 for wet retroreflectivity when tested using the liquid oil immersion method.

Pavement markings not conforming to the retroreflectivity requirements will be removed and replaced. If replacement of markings cannot be applied within the same year, the Contractor will schedule subject work to be completed no later than June 15th in the following year. Upon replacement, the retroreflectivity testing process will be done again requiring new readings.

The Contractor will randomly select one test location per mile of each edge line including ramps and one test location per mile of centerline (solid and/or skip line will be considered as one centerline). Three retroreflectivity readings will be taken at each test location. The three readings will be averaged and become the reading for that test location.

HIGH BUILD WATERBORNE PAVEMENT MARKING PAINT (CONTINUED)

Initial readings:

Pavement Marking Color	Minimum Value
White	500 mc/m ² /lux
Yellow	325 mc/m ² /lux

All pavement markings not conforming to the requirements provided in these plans will be considered deficient and will be removed and replaced. Additional retroreflectivity readings will be taken by the Contractor to determine the limits of removal. The removal will be accomplished using suitable sand blasting or grinding equipment unless the Engineer authorizes other means. The removal process will remove at least 90% of the deficient line, with no excessive scarring of the existing pavement. The removal width will be one inch wider all around the nominal width of the pavement marking to be removed. Removal and replacement of the pavement markings will be at the Contractor's expense, with no cost incurred by the State.

High Build Waterborne Pavement Marking Paint applied after October 15 must be formulated as cold-weather waterborne paint. Cold weather waterborne paint will meet the requirements of Section 980.1 C.

RATES OF MATERIALS FOR HIGH BUILD WATERBORNE PAVEMENT MARKING PAINT

Solid 4" line = 27.8 Gals/Mile
Dashed 4" line = 7.6 Gal/Mile
Glass Beads = 5.3 Lbs/Gal.
Composite Reflective Elements = 2.1 Lbs/Gal.

All cost for materials, labor and equipment necessary to furnish and install the pavement markings will be incidental to the contract unit price for the respective High Build Waterborne Pavement Marking Paint items.

GROOVING FOR COLD APPLIED PLASTIC PAVEMENT MARKING

The Contractor will establish a positive means for the removal of the grinding and/or grooving residue. Residue from dry grooving will be vacuumed. Solid residue will be removed from the pavement surfaces before being blown by traffic action or wind. The Contractor will conduct this work to control and minimize airborne dust and similar debris that may become a hazard to motor vehicle operation or nuisance to property owners. Residue from wet grooving will not be permitted to flow across lanes being used by public traffic or into gutter or drainage facilities. Residue, whether in solid or slurry form, will be disposed of in a manner that will prevent it from reaching any waterway in a concentrated state. The cleaning of the residue for grooving will be to the satisfaction of the Engineer and may require more than one pass to adequately remove material. All costs for removal of grinding and/or grooving residue will be included in the contract unit price per each for "Grooving for Cold Applied Plastic Pavement Marking" contract item.

GROOVING FOR HIGH BUILD WATERBORNE PAVEMENT MARKING PAINT

The Contractor will establish a positive means for the removal of the grinding and/or grooving residue. Residue from dry grooving will be vacuumed. Solid residue will be removed from the pavement surfaces before being blown by traffic action or wind. The Contractor will conduct this work to control and minimize airborne dust and similar debris that may become a hazard to motor vehicle operation or nuisance to property owners. Residue from wet grooving will not be permitted to flow across lanes being used by public traffic or into gutter or drainage facilities. Residue, whether in solid or slurry form, will be disposed of in a manner that will prevent it from reaching any waterway in a concentrated state. All costs for removal of grinding and/or grooving residue will be included in the contract unit price per foot, square foot, or each, for "Grooving for Durable Pavement Marking" contract items.

Unless otherwise specified in the plans, the Contractor will groove the surface for High Build Waterborne Pavement Marking Paint as specified in these plans and as per the manufacturer's instructions.

The grooving will be completed within the following tolerances:

Description	Specification	Tolerance
Depth of Groove	Marking Thickness ¹ + 15 mils	+ 5 mils
Width of Groove	5 to 6 inches	
Length of Skip Lines ²	10 foot 6 inches	± 3 inch
Tapers at ends of lines	6 to 9 inches	
Between Double Lines	4 inches	± 1/2 inch

¹ Marking thickness will include the thickness of marking material and reflective media.

² Additional length may be required as specified in the plans.

The equipment will be capable of the following:

- Grooving the total width of the groove in one pass or uniform depths with multiple passes.
- Grooving without causing damage to the pavement joints or joint sealant material.
- Provide uniform alignment and depth.
- Moving continuously to permit a mobile traffic work operation.

If damage occurs, including, but not limited to, joints, joint sealant material, and backer rod, the grooving operation will be stopped and modifications will be made to the grooving operation to prevent further damage. The Contractor will be required to use specially prepared circular diamond blade cutting heads to prevent damage at the joints. Damage caused will be repaired or replaced by the Contractor, as directed by the Engineer. No additional payment will be made for the repair work or any reapplication of the pavement marking in the area of the repair.

Grooving on bridge decks will not be allowed. Markings on bridge decks will be surface applied.

SURFACE PREPARATION FOR PAVEMENT MARKING

The Contractor will prepare the pavement surface prior to applying the durable pavement marking in accordance with the following.

In areas where the existing groove meets the required depth and existing markings are still in place, the Contractor will clean the existing groove without adding additional depth beyond the required depth for the new pavement marking, including reflective media as noted below.

Description	Specification	Tolerance
Depth of Groove	Marking Thickness ¹ + 15 mils	+ 5 mils

¹ Marking thickness will include the thickness of marking material and reflective media.

The cleaning will result in the existing pavement marking being adequately scuffed, abraded, and removed by light grinding or abrasive blasting or both to allow proper adhesion of the new durable pavement marking as per the manufacturer's recommendations to comply with product warranties.

Existing grooves not meeting the required depth will be re-grooved to the required depth for the new pavement marking, including reflective media. Equipment for grooving will be capable of the following:

- Grooving the total width of the groove in one pass or uniform depths with multiple passes.
- Grooving without causing damage to the pavement joints or joint sealant material.
- Provide uniform alignment and depth.
- Moving continuously to permit a mobile traffic work operation.

All costs associated with cleaning of the existing groove, including re-grooving, if needed, will be included in the contract unit price per foot for "Surface Preparation for Pavement Marking". Surface preparation will be measured as 4" equivalent.

MOBILE RETRO-REFLECTIVITY MEASUREMENTS

Retro-reflectivity measurements will be taken by an Independent Consultant hired by the Contractor. Measurements will be taken in accordance with the ASTM testing methods E1710 and E2177.

A retro-reflectivity report of the measurements from the Independent Consultant will be provided to the Engineer.

The Independent Consultant will take measurements using a vehicle-mounted mobile retro-reflectometer. The mobile retro-reflectometer will utilize 30 meter CEN geometry in accordance with ASTM E 1710 (Standard Test Method for Measurement of Retroreflective Pavement Markings Materials with CEN-Prescribed Geometry Reflectometers).

The retro-reflectometer will be calibrated no less than twice a day in accordance with the operating manual and calibration guide for the particular machine and vehicle.

Measurement will consist of the average retro-reflective readings and standard deviations for pavement marking placed under this Contract. Retro-reflectivity measurements will be taken on each mainline edgeline, centerline and gore marking. Measure each line type separately. Measurement units will be mcd/m²/lux.

MOBILE RETRO-REFLECTIVITY MEASUREMENTS (CONTINUED)

Retro-reflectivity will be measured by taking a minimum 40 retro-reflectivity readings within 528' (1/10 mile) on solid lines and a minimum 20 retro-reflectivity readings within 528' (1/10 mile) on skip lines. Gore markings will have a minimum of two retro-reflectivity readings taken on each marking. The average retro-reflectivity readings for each individual 4" wide line will be obtained at 528' (1/10 mile) intervals.

Payment will be made for the actual length of retro-reflectivity measured. This is based on one laser instrument on one van that reads one line with each pass. Three passes are required for each mile of two-lane divided in one direction; LEL – Left Edgeline, REL – Right Edgeline and all gore markings along right edgeline, CL- Centerline, RCL-Right Centerline, LCL-Left Centerline. One additional pass per the length of the gore marking on the left side of the ramp will be required.

Additional passes will be required for wet recovery retro-reflectivity.

Measurements will be obtained no sooner than 7 days and no later than 30 days after the completion of all the line applications required for an individual highway route. Excess reflective media must not be visible when the retro-reflectivity testing is conducted.

Retro-reflectivity measurements will be collected when pavement and markings are dry, clean and no visible moisture is on the road surface. These criteria define initial pavement marking retro-reflectivity values. Markings will be measured in the direction of intended vehicular travel.

The Independent Consultant should expect to retest failed segments after the markings have been replaced at no additional cost to the State.

The averaged retro-reflectivity measurements must meet the requirements for retro-reflectivity as specified. Any retro-reflectivity readings not meeting the minimum average dry and wet retro-reflectivity requirements for pavement markings will be considered failed. Failed markings will be removed and remarked by the Contractor in 528' lengths.

The Contractor will mark the begin and end of the length of line to be removed and remarked that is represented by the failed averaged reading.

The measurement report will be in the form of an electronic database file, or delimited text file, and contain all raw data collected. The electronic file must also contain a summary of findings. The retroreflectivity report, including the summary and a copy of the electronic file with all data, will be provided to the Engineer. The measurement report will include:

- State Project number
- Trunk Highway number
- Date the measurements were taken
- Geographical location the measurements were taken including a distance from the nearest permanent site identification, such as a mile reference marker. The beginning and ending reference points of data collection rounded to the nearest thousandths of a mile and the beginning and ending coordinates determined by a Global Positioning System receiver with 3 meter accuracy, including the direction of travel in terms of increasing or decreasing reference points
- Identification of the pavement marking material including line type, color, age, and transverse location on the road. Identification of the marking to be included in the format; (LEL – Left Edgeline, REL – Right Edgeline, CL – Centerline, RCL – Right Centerline, LCL – Left Centerline)
- Identification of the retroreflectometer
- A summary of the dry average retroreflective measurements for each continuous length of 0.1 mile measured

MOBILE RETRO-REFLECTIVITY MEASUREMENTS (CONTINUED)

Should another mobile unit be available, the maximum acceptable deviation for measurements made by the two different instruments of the same manufacturer and for the same roadway length will be ± 10%.

Repeatability for the given mobile unit will be ± 6%.

The locations of the measurements will be randomly selected.

No final payment for pavement markings will be made until the retroreflectivity measurements are taken and the retroreflectivity report is provided to the Engineer.

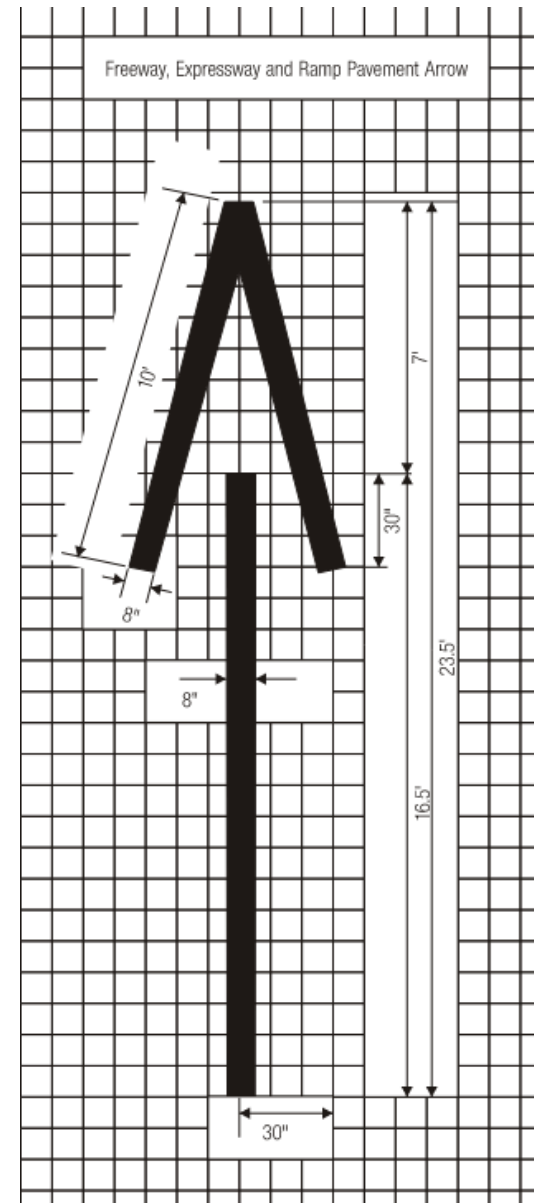
Cost for all mobile retroreflectivity measurements, reports, marking of failed lengths, equipment, materials and labor will be included in the contract unit price per mile for Mobile Retroreflectometer Measurements.

QUALITY ASSURANCE

A concrete pavement test deck site will be agreed upon. A 500' white and a 500' yellow stripe will be marked by the Contractor on the test deck site. The Department and the Independent Consultant will conduct joint evaluations of both yellow and white longitudinal markings within the test site using the Department's handheld retro-reflectometer and the Independent Consultant's mobile retro-reflectometer. Five readings will be taken on the white marking and five readings will be taken on the yellow marking. The evaluation will be deemed successful if the mean average obtained by the Independent Consultant's mobile retro-reflectometer differs by less than 10% to the mean average obtained by the Department's handheld retro-reflectometer for each color. Quality assurance will be completed before mobile reflectivity measurements begin.

Cost for Quality Assurance will be included in the contract unit price per mile for Mobile Retroreflectometer Measurements.

RAMP PAVEMENT ARROW



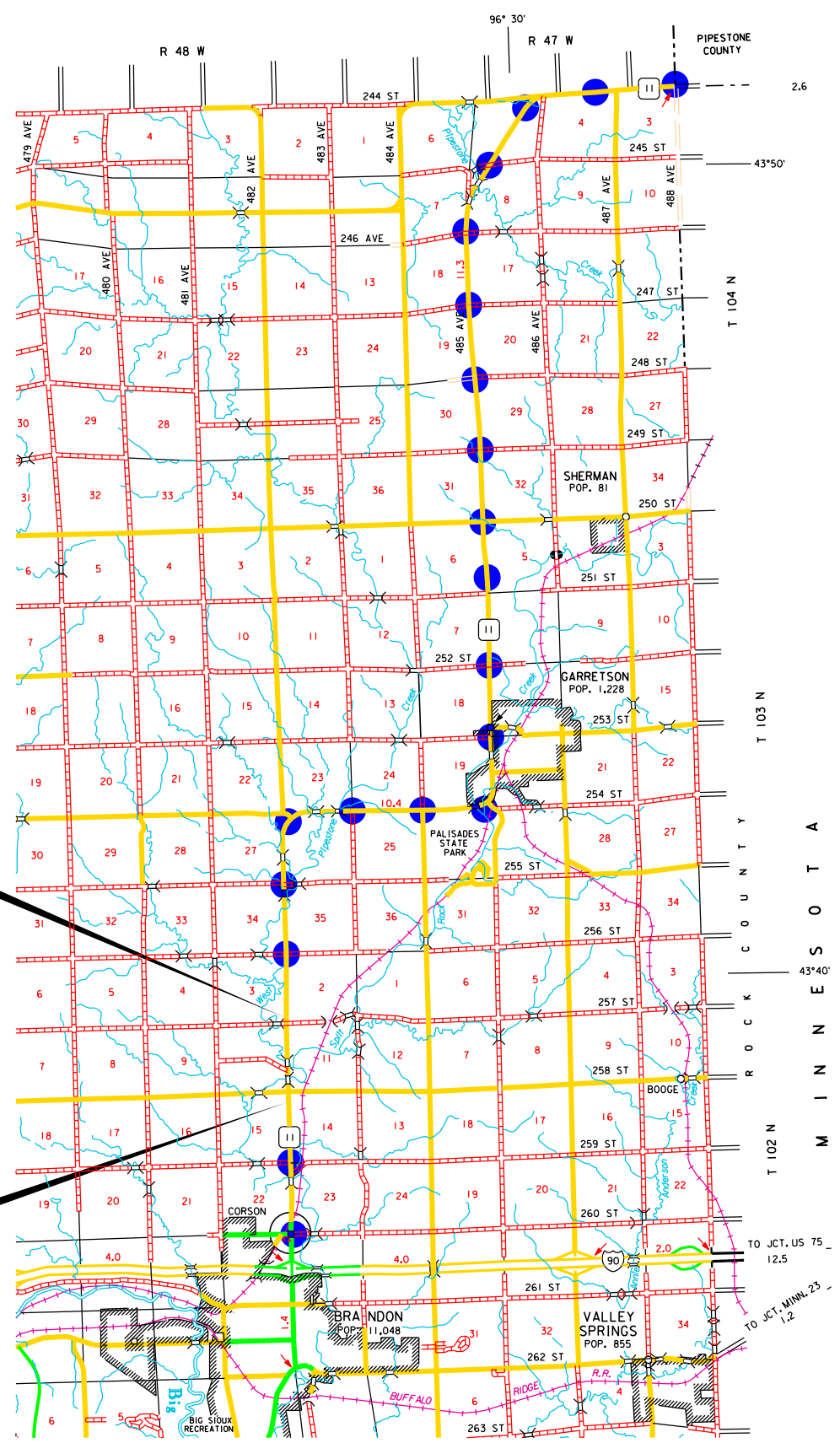
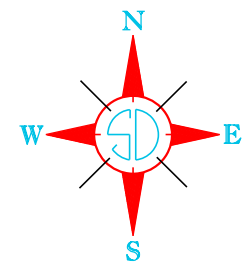
ITEMIZED LIST FOR TRAFFIC CONTROL SIGNS - 05VM

SIGN CODE	SIGN DESCRIPTION	CONVENTIONAL ROAD			
		NUMBER	SIGN SIZE	SQFT PER SIGN	SQFT
W20-1	ROAD WORK AHEAD	2	48" x 48"	16.0	32.0
W20-4	ONE LANE ROAD AHEAD	2	48" x 48"	16.0	32.0
W20-7	FLAGGER (symbol)	2	48" x 48"	16.0	32.0
G20-2	END ROAD WORK	2	36" x 18"	4.5	9.0
CONVENTIONAL ROAD TRAFFIC CONTROL SIGNS SQFT					105.0

ITEMIZED LIST FOR TRAFFIC CONTROL SIGNS - 07X6

SIGN CODE	SIGN DESCRIPTION	CONVENTIONAL ROAD			
		NUMBER	SIGN SIZE	SQFT PER SIGN	SQFT
W20-1	ROAD WORK AHEAD	12	48" x 48"	16.0	192.0
W20-4	ONE LANE ROAD AHEAD	12	48" x 48"	16.0	192.0
W20-7	FLAGGER (symbol)	12	48" x 48"	16.0	192.0
G20-2	END ROAD WORK	12	36" x 18"	4.5	54.0
CONVENTIONAL ROAD TRAFFIC CONTROL SIGNS SQFT					630.0

SD 11 PAVEMENT MARKINGS



LEGEND

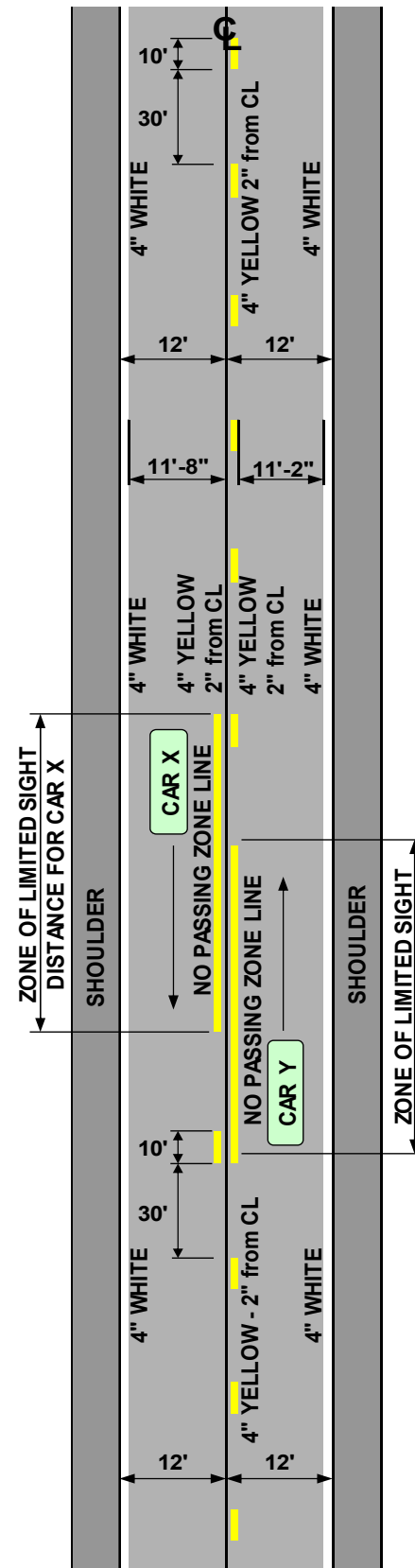
● - Centerline, Edgelines, Turn Lanes and RR -Xing with Grooving

PROJECT AND LENGTH

MRM 81.536 in Corson to MRM 102.55 (Minn State Line) - 21.014 Miles
 Exception MRM 83.00 +0.90 - MRM 84.00+0.631 - 1.435 Miles
 Total - 19.579 Miles

PAVEMENT MARKING SD 11

TWO LANE ROADWAY



Typical pavement marking as shown on this sheet will be applied throughout the entire length of two lane roadway.

Traffic Control will be incidental to the cost of application. The striper and advance or trailing warning vehicle will be equipped with flashing amber lights and advance warning arrow board.

Application rates will be as follows:

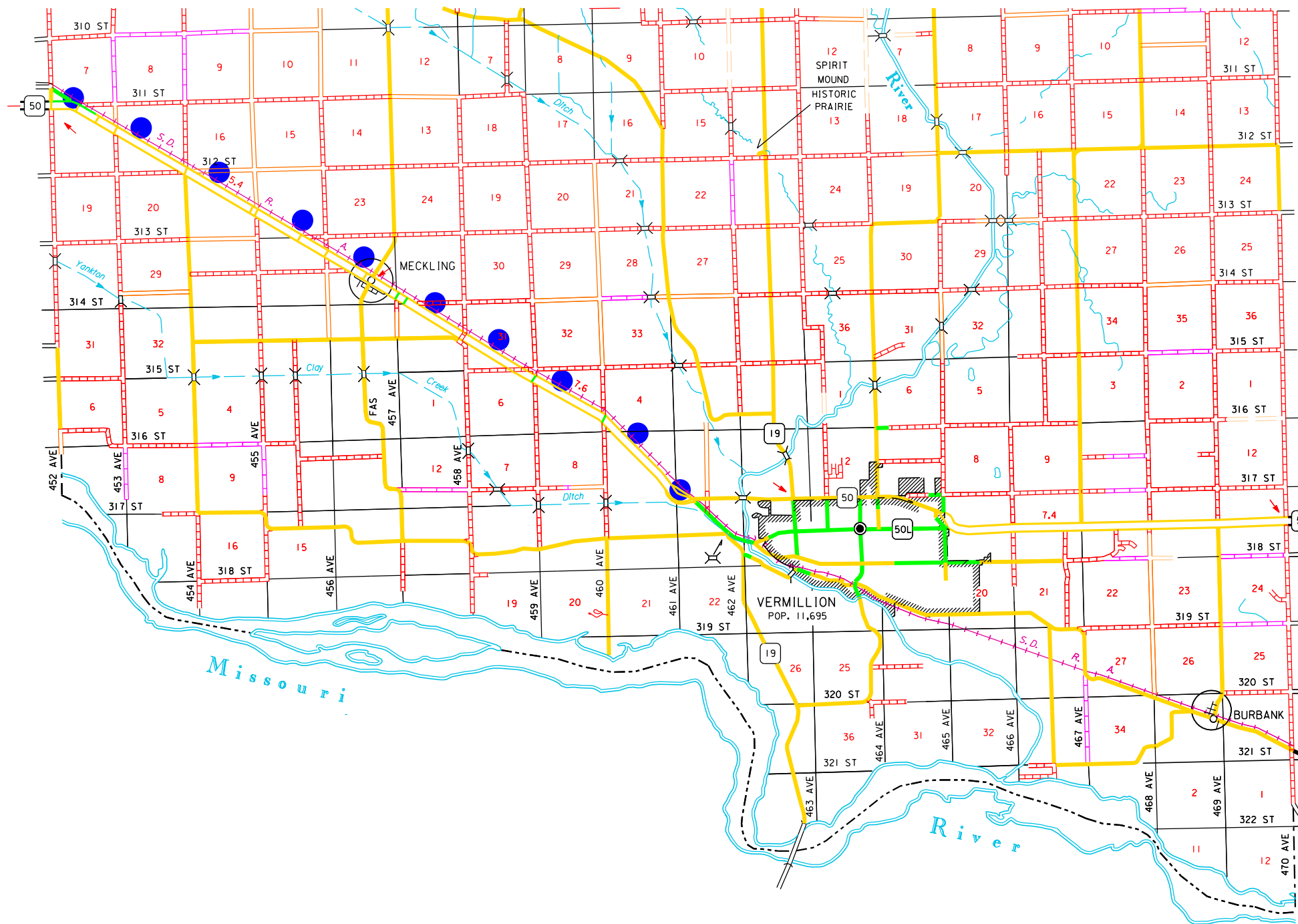
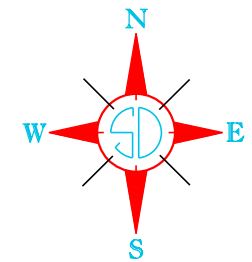
Two Lane Roadway (Rates for one line)	
Dashed Yellow Centerline	Rate = 7.6 Gals./Pass-Mile
Solid Yellow Centerline	Rate = 27.8 Gals./Pass-Mile
Solid White Edgeline	Rate = 27.8 Gals./Pass-Mile

4" Yellow Skip Centerline (when not adjacent to a 4" Yellow No Passing Zone) will be placed consistently to the south or east side of centerline.

ESTIMATED QUANTITIES (BASED ON ONE APPLICATION)	
HIGH BUILD WITH REFLECTIVE ELEMENTS	QUANTITY
WHITE	1119 GALLONS
YELLOW	576 GALLONS

Included in the above quantities are:			
Additional White (1 Application)		Additional Yellow (1 Application)	
Description	Gallons	Description	Gallons
4" Lines	4200' 28	Transitions	- - -
8" Lines	- - -	4" Skip Lines	- - -
12" Gore Lines	- - -	8" Lines	- - -
Crosswalks	- - -	12" Lines	- - -
24" Stop Lines	24' 2	24" Hatches	980' 65
24" Hatches	- - -	Solid Areas	1000sf 50
Solid Areas	- - -	Additional Yellow: 115	
<u>Arrows</u>			
Left Arrows	- - -	Additional Quantities	
Right Arrows	- - -	<u>Rates of Coverage:</u> SqFt/Gal	
Straight Arrows	- - -	4", 8" & 12" Lines - 50	
Combo Arrows	- - -	24" Lines & Hatches - 30	
Lane Drop Arrows	- - -	Arrows, Messages and Solid Areas - 20	
<u>Messages</u>			
STOP	- - -	All pavement marking dimensions are based on 12' driving lanes.	
STOP AHEAD	- - -		
R X R w/ Stop Lines	- - -		
SCHOOL X-ING	- - -		
Additional White: 30			

SD 50W PAVEMENT MARKINGS



LEGEND

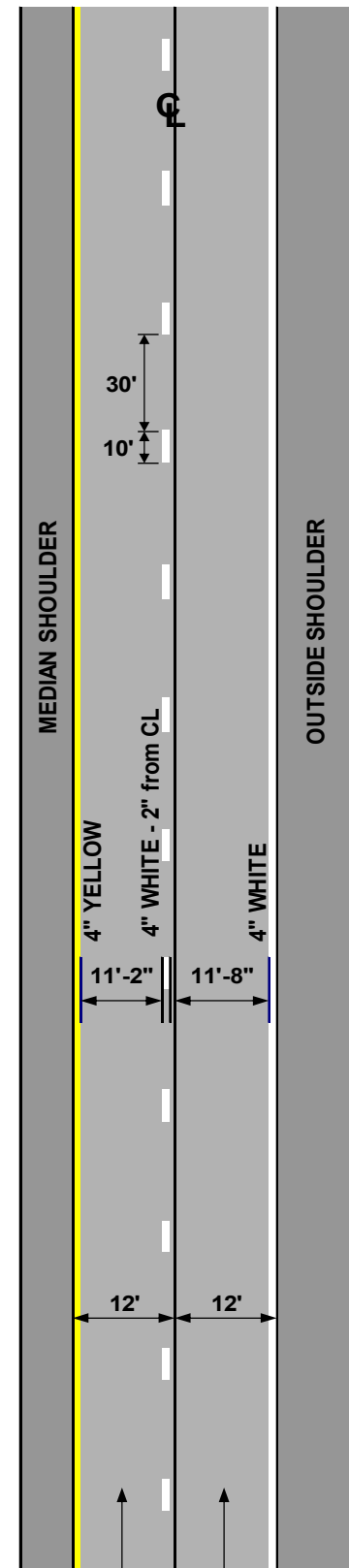
- - Centerline and Edgelines, Gore Markings with Surface Prep

PROJECT AND LENGTH

MRM 396.02 (Yankton/Clay County Line) to
MRM 407.10 (End Divided at Vermillion) - 11.08 Miles

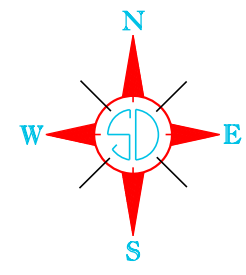
PAVEMENT MARKING - SD 50W

**DIVIDED ROADWAY
(ONE DIRECTION SHOWN)**



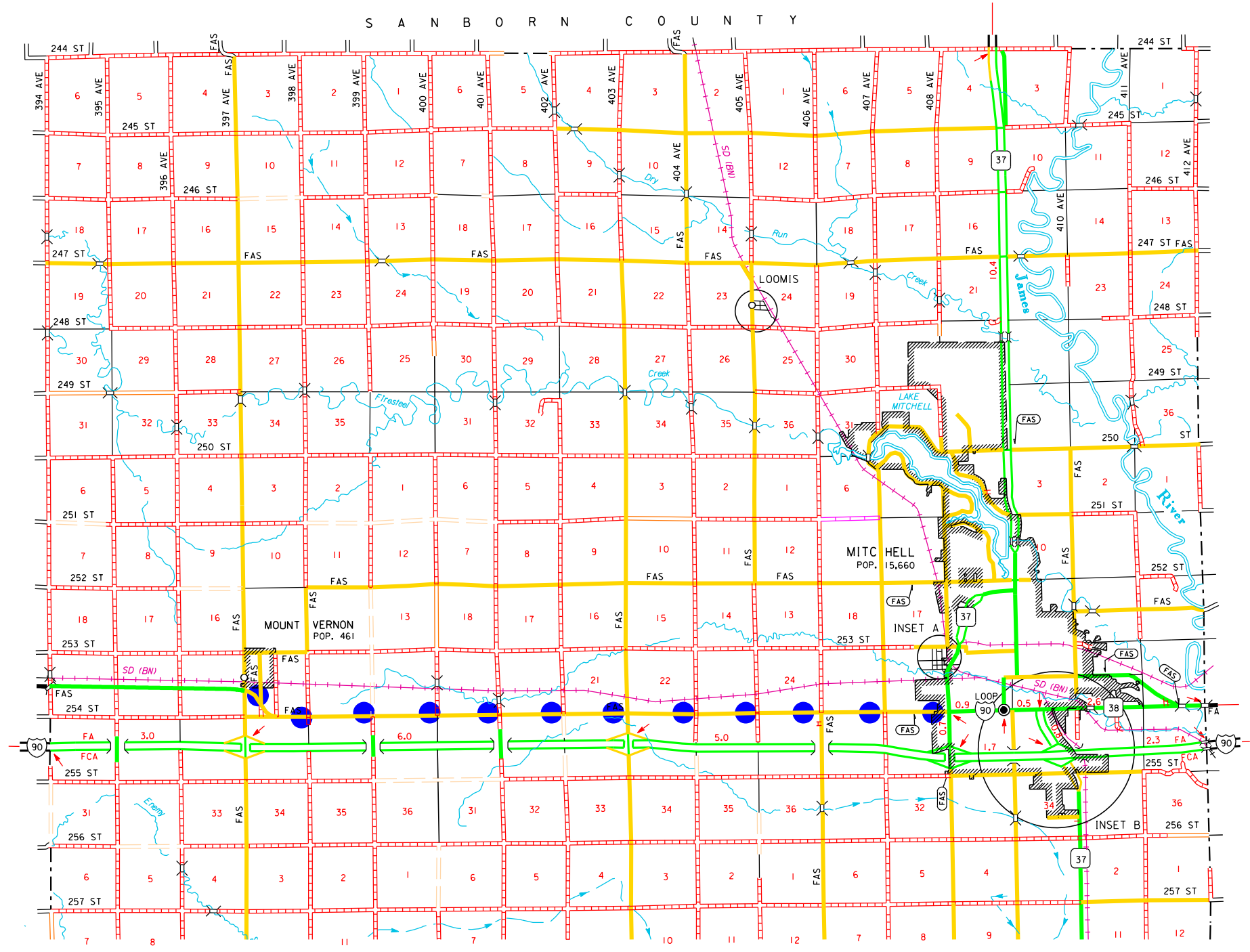
ESTIMATED QUANTITIES		
DURABLE PAVEMENT MARKING	QUANTITY	
WHITE 4"	73127	FEET
YELLOW 4"	58502	FEET

DAVISON COUNTY PAVEMENT MARKINGS



PLOT SCALE - 1:16000

PLOT NAME - 4



- - Centerline and Edgelines with Grooving

PROJECTS AND LENGTHS

Old Hwy 16 from 397th Ave to 408th Ave - 11 Miles

PLOTTED FROM - TRM111119

FILE - ... \COUNTY\DAVIS\DAVIS.DGN

PAVEMENT MARKING - DAVISON COUNTY

TWO LANE ROADWAY

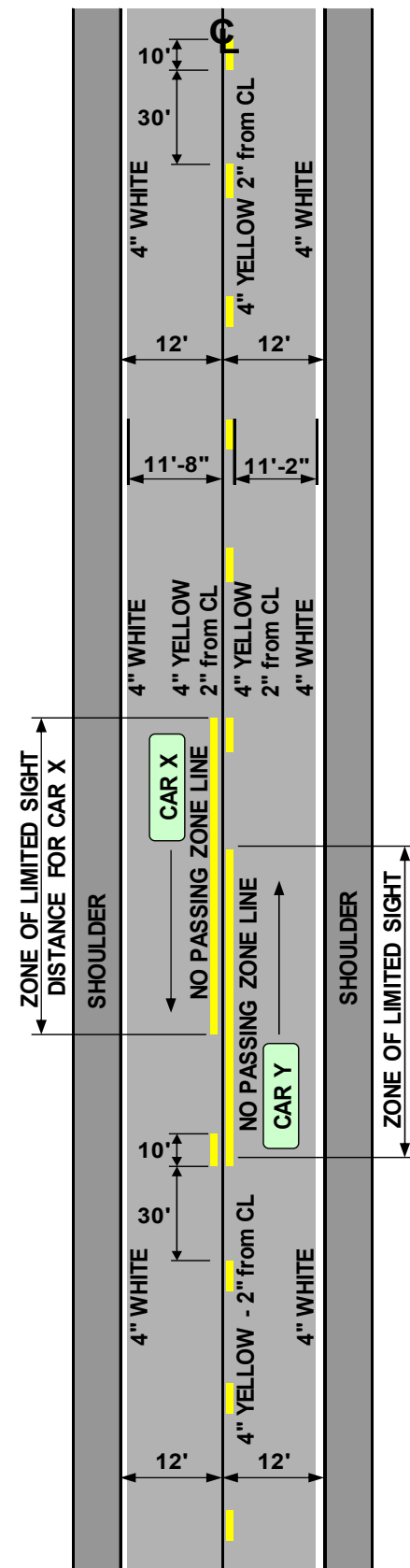
Typical pavement marking as shown on this sheet will be applied throughout the entire length of two lane roadway.

Traffic Control will be incidental to the cost of application. The striper and advance or trailing warning vehicle will be equipped with flashing amber lights and advance warning arrow board.

Application rates will be as follows:

Two Lane Roadway (Rates for one line)	
Dashed Yellow Centerline	Rate = 7.6 Gals./Pass-Mile
Solid Yellow Centerline	Rate = 27.8 Gals./Pass-Mile
Solid White Edgeline	Rate = 27.8 Gals./Pass-Mile

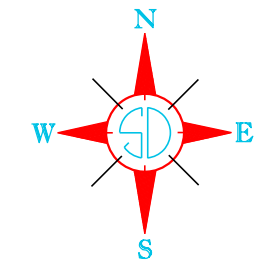
4" Yellow Skip Centerline (when not adjacent to a 4" Yellow No Passing Zone) will be placed consistently to the south or east side of centerline.



ESTIMATED QUANTITIES (BASED ON ONE APPLICATION)	
HIGH BUILD WITH REFLECTIVE ELEMENTS	QUANTITY
WHITE	612 GALLONS
YELLOW	335 GALLONS

Included in the above quantities are:			
Additional White (1 Application)		Additional Yellow (1 Application)	
Description	Gallons	Description	Gallons
4" Lines	-	Transitions	-
8" Lines	-	4" Skip Lines	-
12" Gore Lines	-	8" Lines	-
Crosswalks	-	12" Lines	-
24" Stop Lines	-	24" Hatches	-
24" Hatches	-	Solid Areas	-
Solid Areas	-	Additional Yellow:	-
<u>Arrows</u>			
Left Arrows	-	Additional Quantities	
Right Arrows	-	<u>Rates of Coverage:</u> SqFt/Gal	
Straight Arrows	-	4", 8" & 12" Lines	50
Combo Arrows	-	24" Lines & Hatches	30
Lane Drop Arrows	-	Arrows, Messages and Solid Areas	20
<u>Messages</u>			
STOP	-	All pavement marking dimensions are based on 12' driving lanes.	
STOP AHEAD	-		
R X R w/ Stop Lines	-		
SCHOOL X-ING	-		
Additional White:	-		

LINCOLN COUNTY PAVEMENT MARKINGS

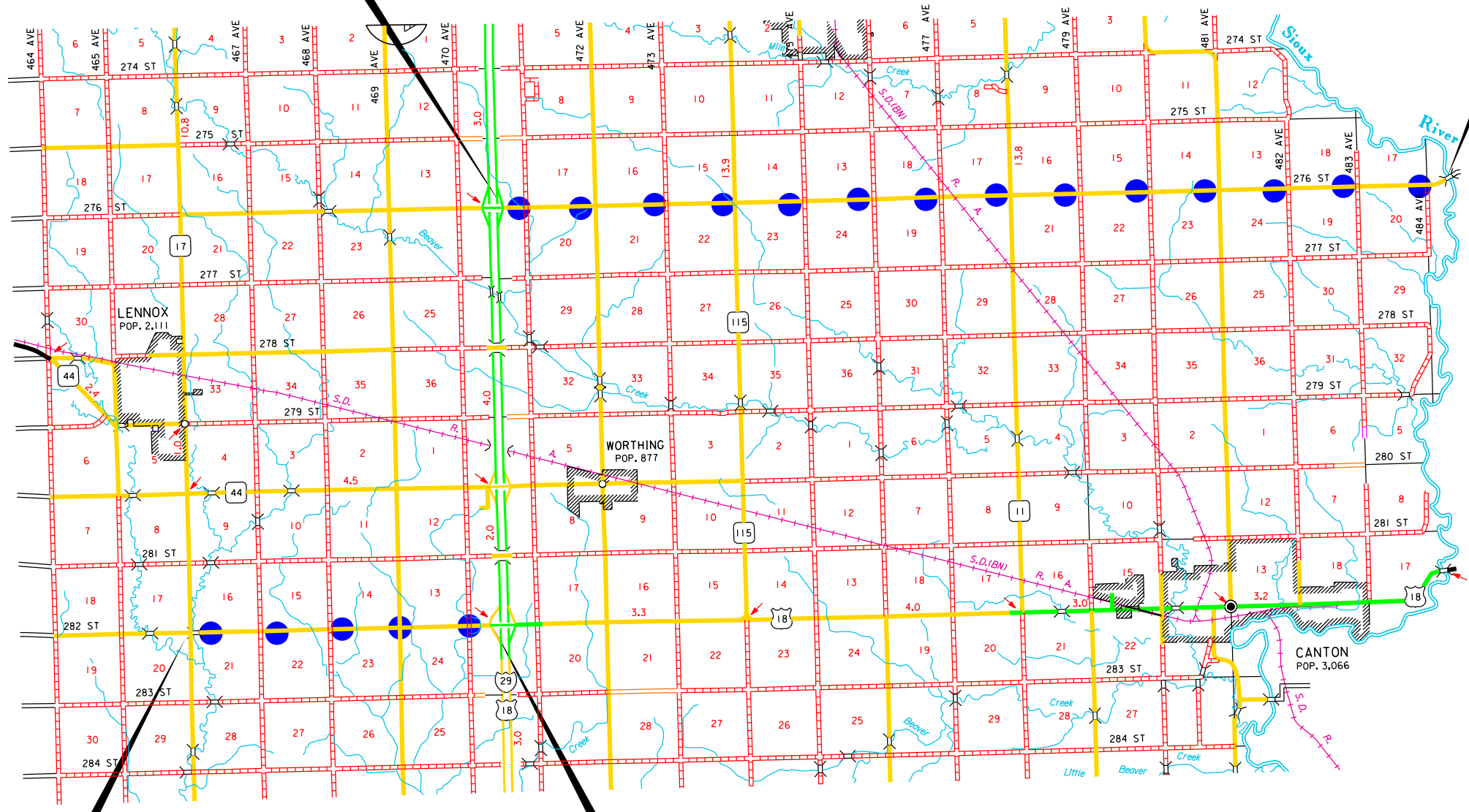


**BEGIN PROJECT 276th St
JCT I-29**

**END PROJECT 276th St
IOWA STATE LINE**

**BEGIN PROJECT 282nd St
JCT 466TH AVE**

**END PROJECT 282nd St
JCT I-29**



LEGEND

● - Centerline and Edgelines with Grooving

PROJECTS AND LENGTHS

282nd St from 466th Ave to I-29 - 4.2 MILES
 276th St from I-29 to Iowa River Bridge - 13.7 MILES
 includes 2 RR X-ing

TOTAL LENGTH - 17.9 MILES

PAVEMENT MARKING - LINCOLN COUNTY

TWO LANE ROADWAY

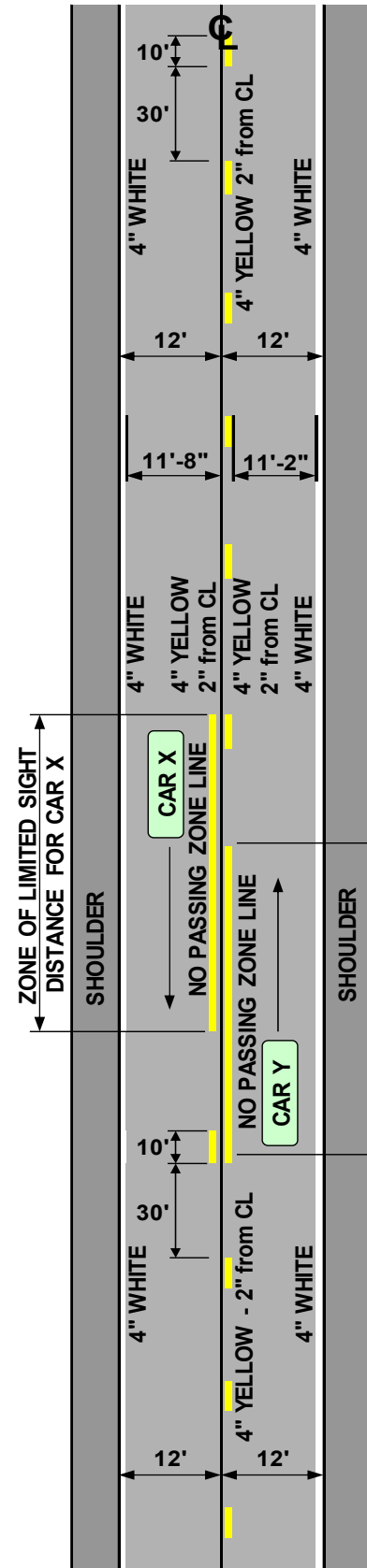
Typical pavement marking as shown on this sheet will be applied throughout the entire length of two lane roadway.

Traffic Control will be incidental to the cost of application. The striper and advance or trailing warning vehicle will be equipped with flashing amber lights and advance warning arrow board.

Application rates will be as follows:

Two Lane Roadway (Rates for one line)	
Dashed Yellow Centerline	Rate = 7.6 Gals./Pass-Mile
Solid Yellow Centerline	Rate = 27.8 Gals./Pass-Mile
Solid White Edgeline	Rate = 27.8 Gals./Pass-Mile

4" Yellow Skip Centerline (when not adjacent to a 4" Yellow No Passing Zone) will be placed consistently to the south or east side of centerline.

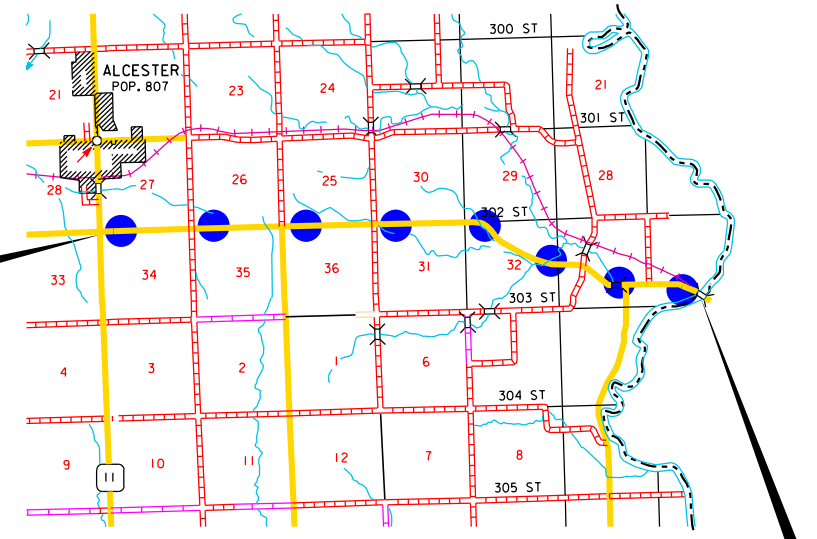
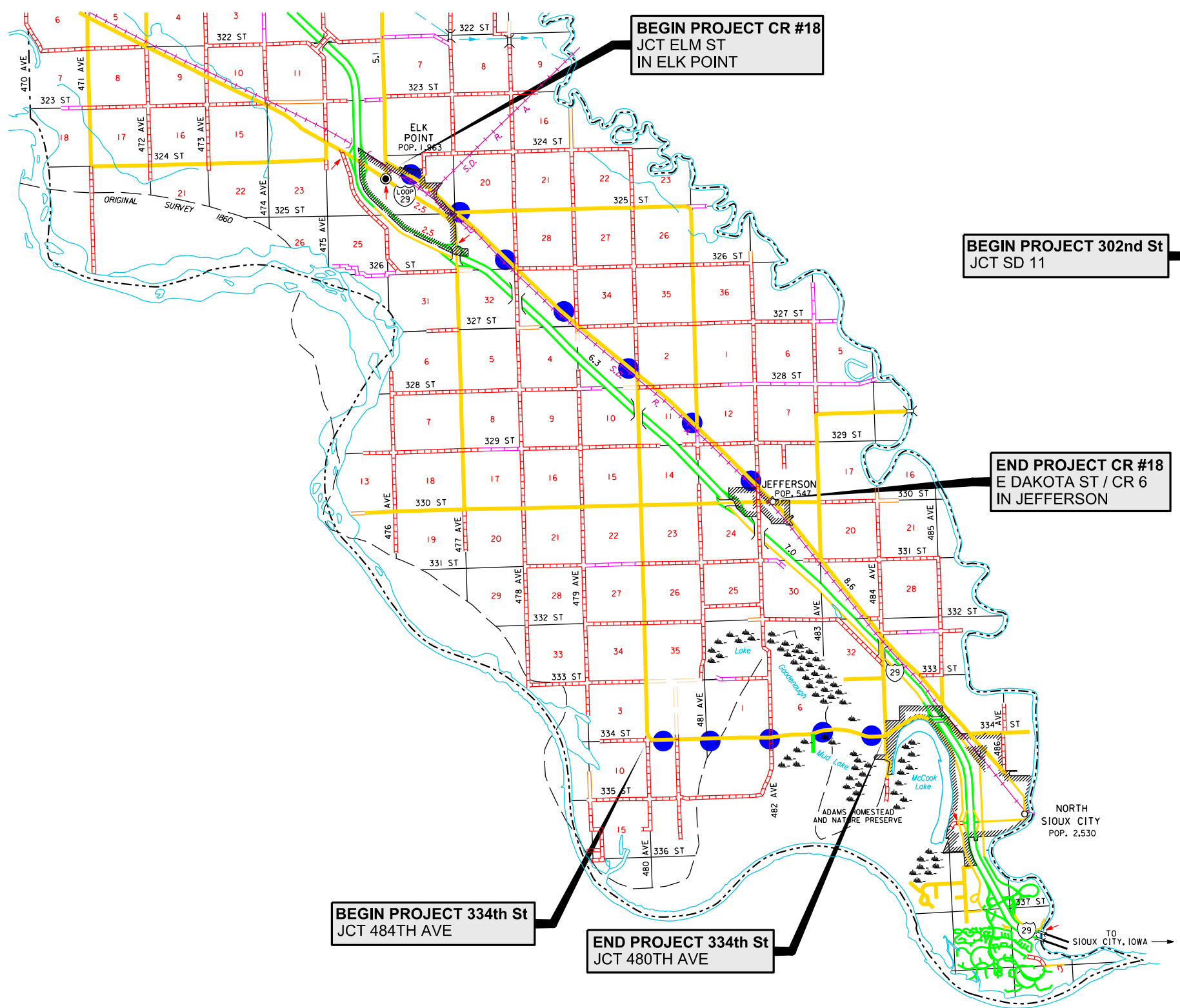
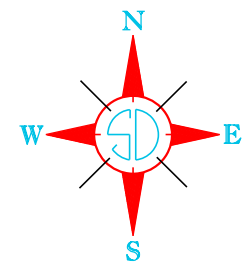


ESTIMATED QUANTITIES (BASED ON ONE APPLICATION)	
HIGH BUILD WITH REFLECTIVE ELEMENTS	QUANTITY
WHITE	1009 GALLONS
YELLOW	228 GALLONS

Included in the above quantities are:			
Additional White (1 Application)		Additional Yellow (1 Application)	
Description	Gallons	Description	Gallons
4" Lines	-	Transitions	-
8" Lines	-	4" Skip Lines	-
12" Gore Lines	-	8" Lines	-
Crosswalks	-	12" Lines	-
24" Stop Lines	-	24" Hatches	-
24" Hatches	-	Solid Areas	-
Solid Areas	-	Additional Yellow:	-
Arrows	-	Additional Quantities	-
Left Arrows	-	Rates of Coverage:	SqFt/Gal
Right Arrows	-	4", 8" & 12" Lines	50
Straight Arrows	-	24" Lines & Hatches	30
Combo Arrows	-	Arrows, Messages and Solid Areas	20
Lane Drop Arrows	-		
Messages	-		
STOP	-		
STOP AHEAD	-		
R X R w/ Stop Lines	2 Ea		
SCHOOL X-ING	-		
Additional White:	13		

All pavement marking dimensions are based on 12' driving lanes.

UNION COUNTY PAVEMENT MARKINGS



**BEGIN PROJECT CR #18
JCT ELM ST
IN ELK POINT**

**BEGIN PROJECT 302nd St
JCT SD 11**

**END PROJECT CR #18
E DAKOTA ST / CR 6
IN JEFFERSON**

**END PROJECT 302nd St
IOWA STATE LINE**

**BEGIN PROJECT 334th St
JCT 484TH AVE**

**END PROJECT 334th St
JCT 480TH AVE**

LEGEND

● - Centerline and Edgelines with Grooving

PROJECTS AND LENGTHS

- 302nd St from SD 11 to Jefferson Bridge - 6.8 MILES
- CR #18 from CR 9 to CR #6 - 8.1 MILES
includes 4 RR X-ing
- 334th St from 484th Ave/CR #1 to 480th Ave - 4.1 MILES

TOTAL LENGTH - 19.0 MILES

PAVEMENT MARKING - UNION COUNTY

TWO LANE ROADWAY

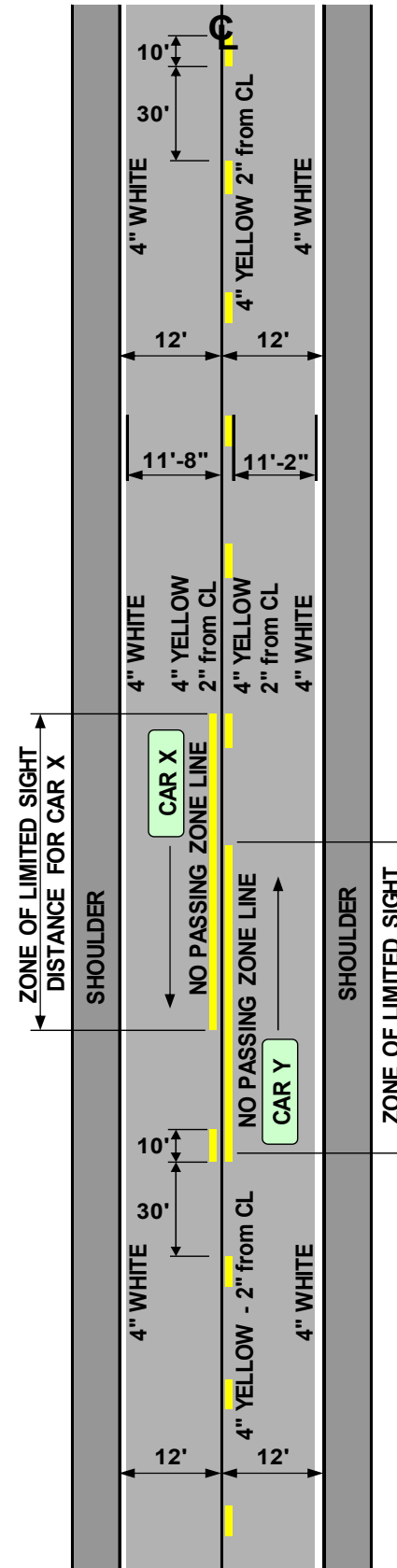
Typical pavement marking as shown on this sheet will be applied throughout the entire length of two lane roadway.

Traffic Control will be incidental to the cost of application. The striper and advance or trailing warning vehicle will be equipped with flashing amber lights and advance warning arrow board.

Application rates will be as follows:

Two Lane Roadway (Rates for one line)	
Dashed Yellow Centerline	Rate = 7.6 Gals./Pass-Mile
Solid Yellow Centerline	Rate = 27.8 Gals./Pass-Mile
Solid White Edgeline	Rate = 27.8 Gals./Pass-Mile

4" Yellow Skip Centerline (when not adjacent to a 4" Yellow No Passing Zone) will be placed consistently to the south or east side of centerline.



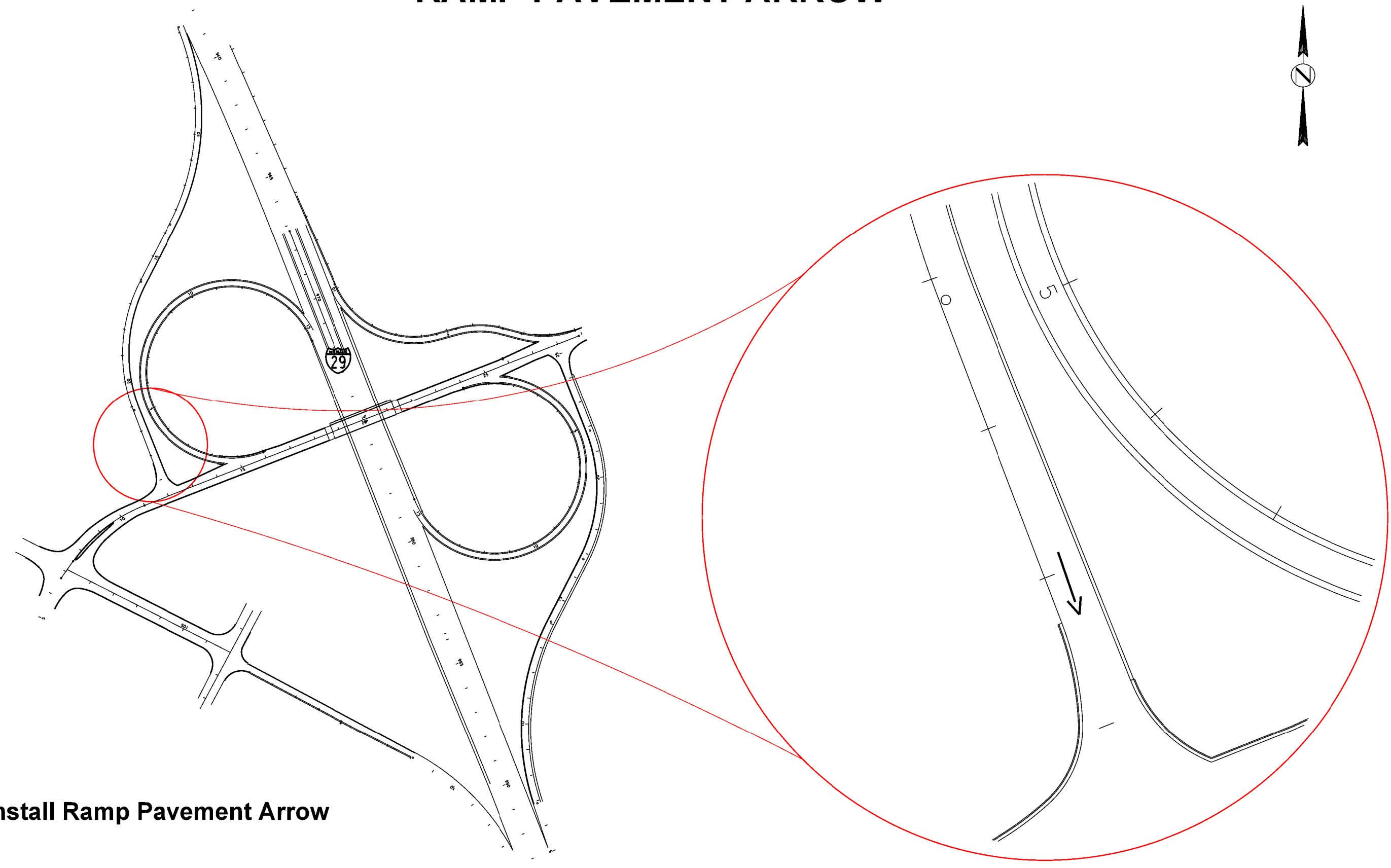
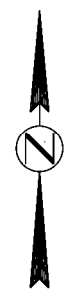
ESTIMATED QUANTITIES (BASED ON ONE APPLICATION)	
HIGH BUILD WITH REFLECTIVE ELEMENTS	QUANTITY
WHITE	1083 GALLONS
YELLOW	291 GALLONS

Included in the above quantities are:			
Additional White (1 Application)		Additional Yellow (1 Application)	
Description	Gallons	Description	Gallons
4" Lines	-	Transitions	-
8" Lines	-	4" Skip Lines	-
12" Gore Lines	-	8" Lines	-
Crosswalks	-	12" Lines	-
24" Stop Lines	-	24" Hatches	-
24" Hatches	-	Solid Areas	-
Solid Areas	-	Additional Yellow:	-
Arrows			
Left Arrows	-	Additional Quantities	
Right Arrows	-	Rates of Coverage: SqFt/Gal	
Straight Arrows	-	4", 8" & 12" Lines	50
Combo Arrows	-	24" Lines & Hatches	30
Lane Drop Arrows	-	Arrows, Messages and Solid Areas	20
Messages			
STOP	-	All pavement marking dimensions are based on 12' driving lanes.	
STOP AHEAD	-		
R X R w/ Stop Lines	4 Ea 27		
SCHOOL X-ING	-		
Additional White:	27		

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	PH 0020(184) PH 0020(218)	16	24

Plotting Date: 05/28/2024

I-29 EXIT 1 RAMP PAVEMENT ARROW



↑ - Install Ramp Pavement Arrow

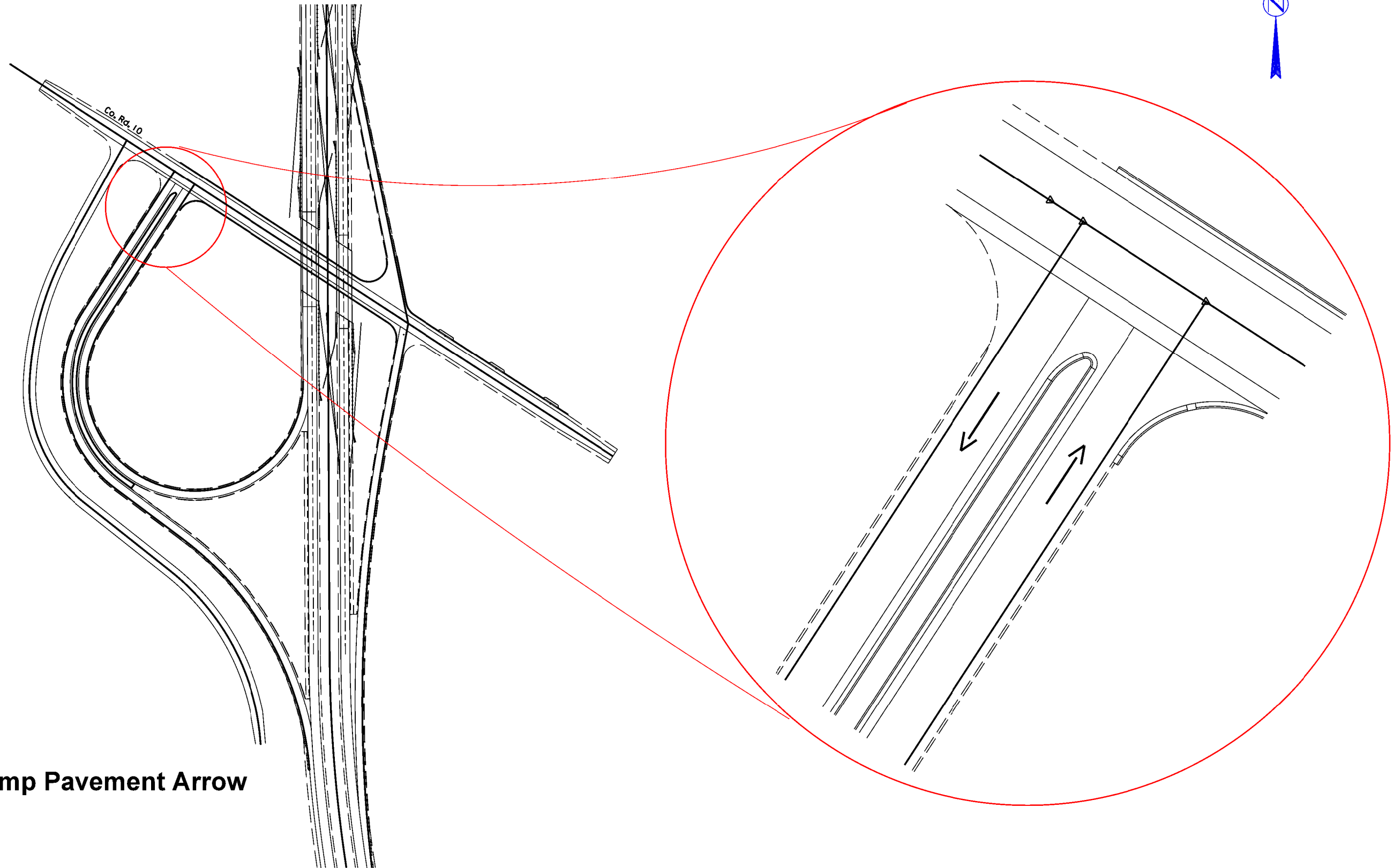
PLOTTED FROM - TRW111119 PLOT SCALE - 1:271.765

PLOT NAME - FILE - ... \NEXTS\29EXIT1.DGN

I-29 EXIT 18 RAMP PAVEMENT ARROW

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	PH 0020(184) PH 0020(218)	17	24

Plotting Date: 05/28/2024

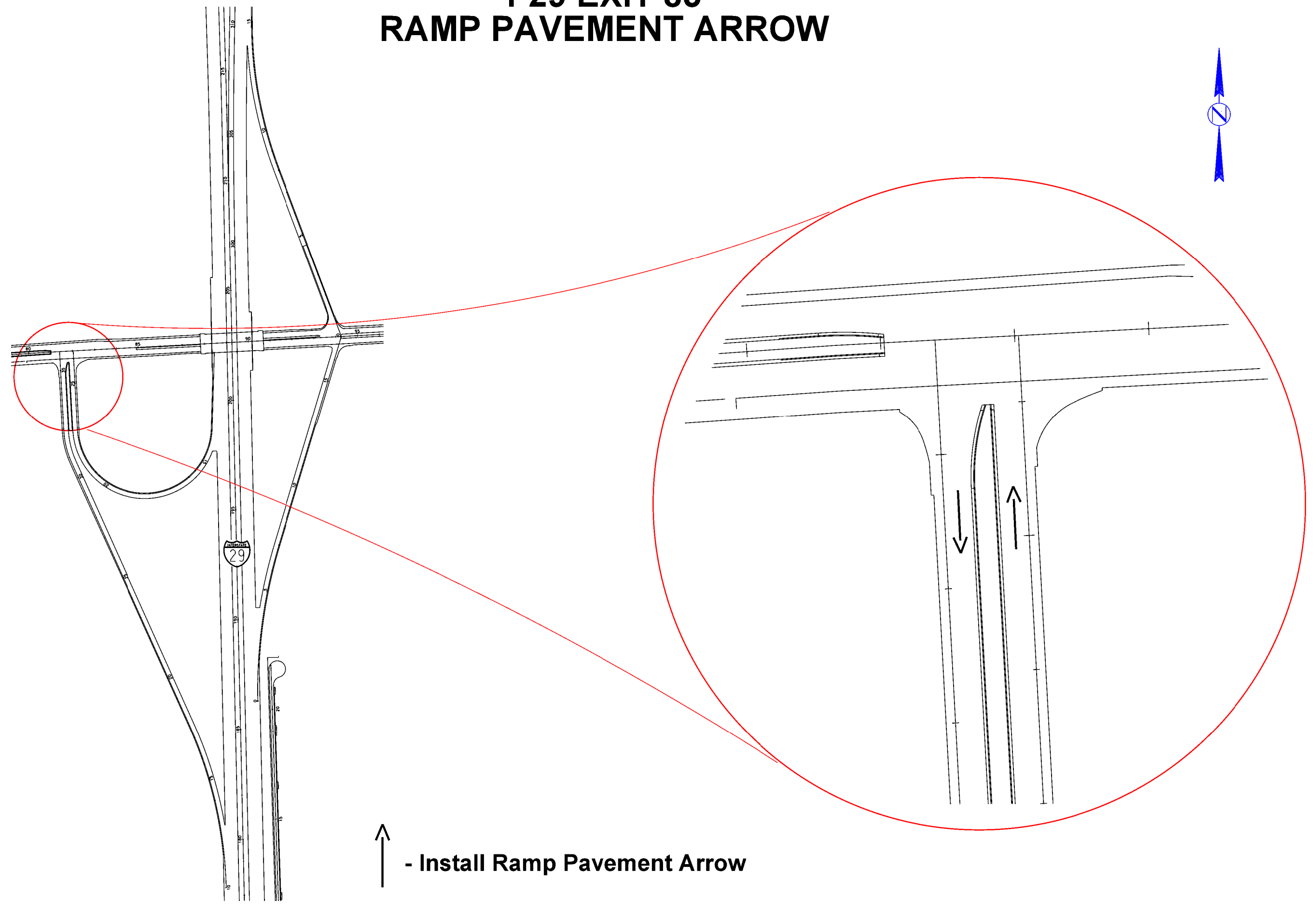


↑ - Install Ramp Pavement Arrow

PLOTTED FROM - TRW111119 PLOT SCALE - 1:271.765

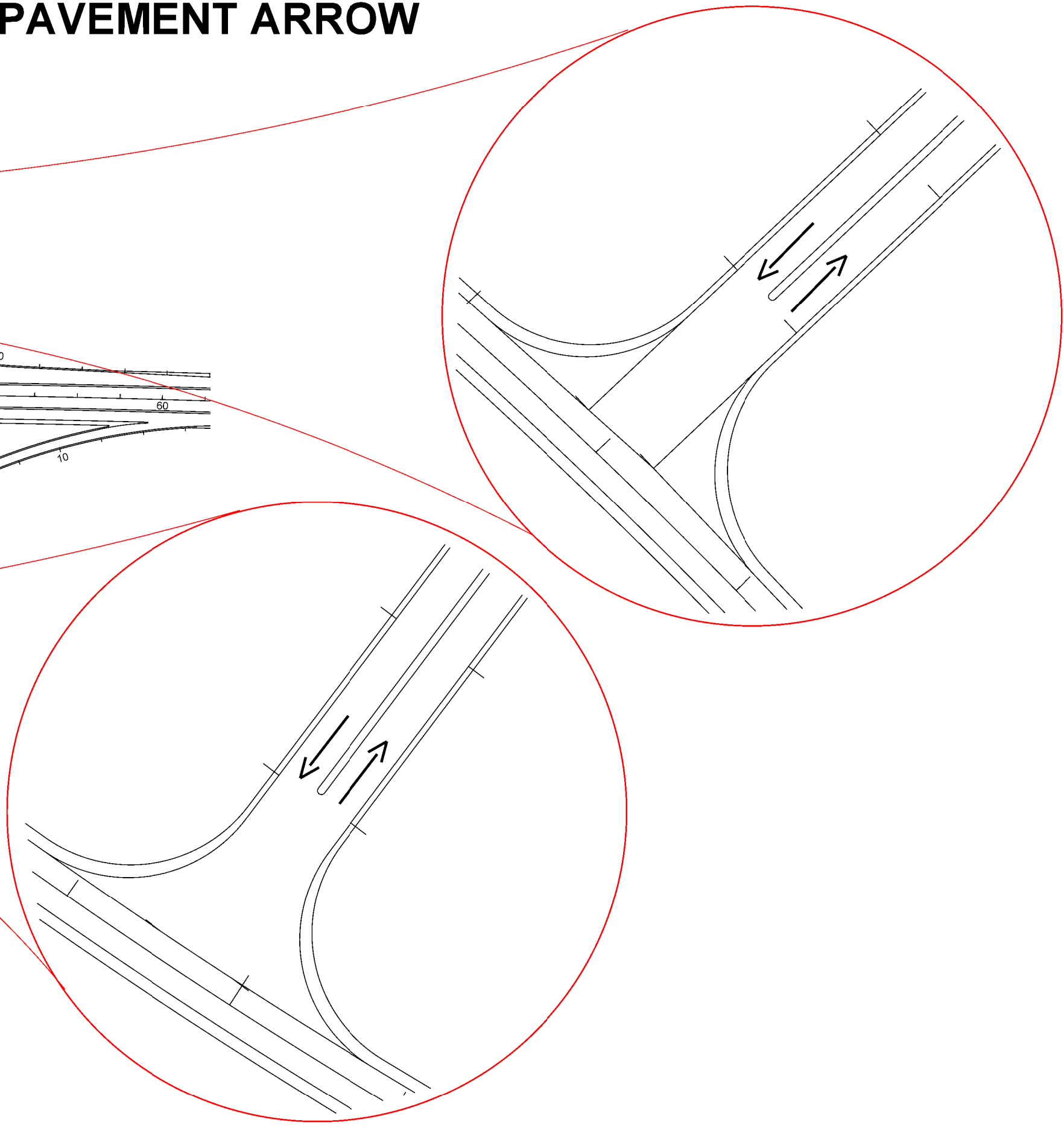
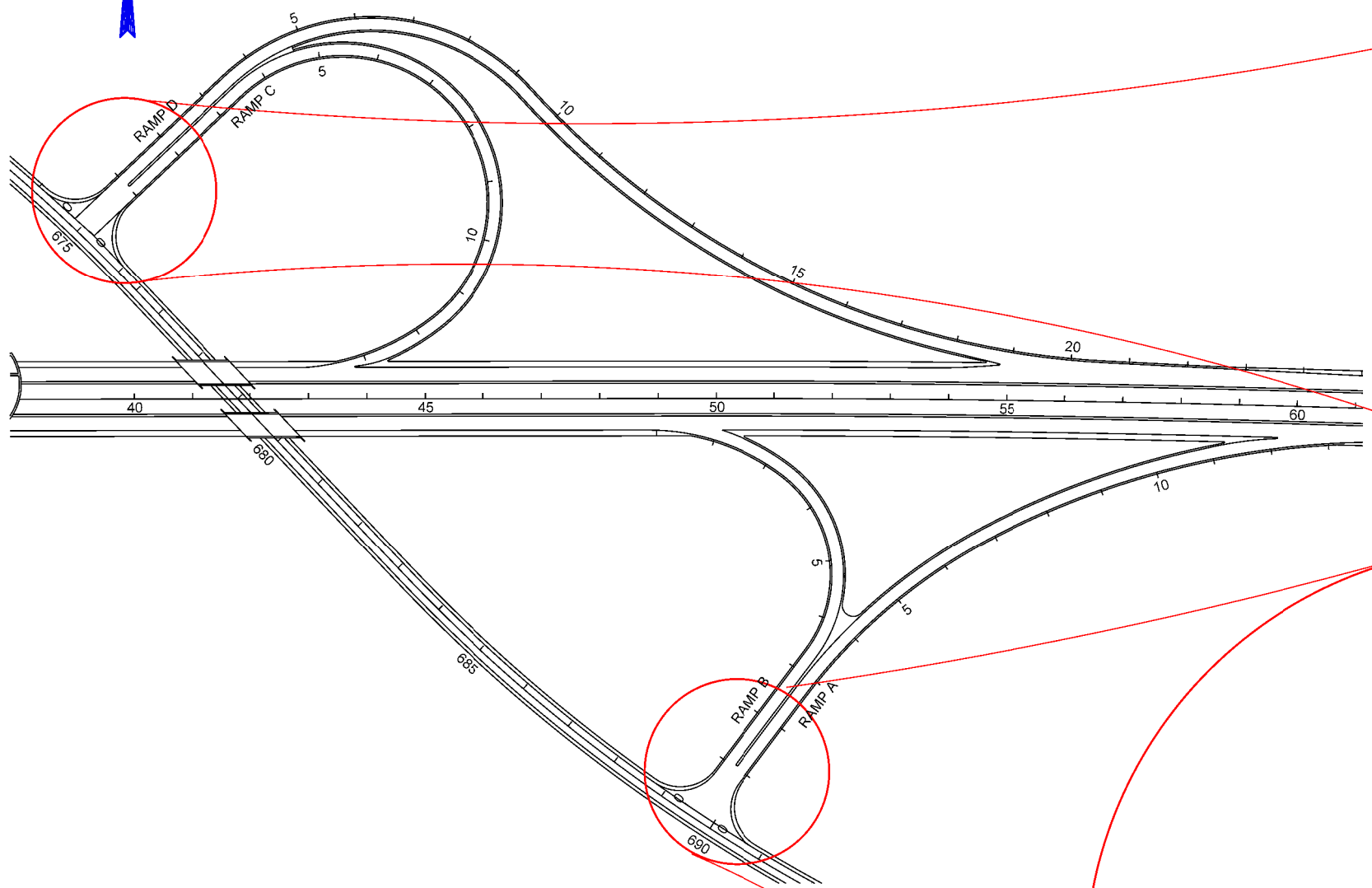
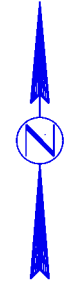
FILE - ... \NEXTS\29EXIT18.DGN PLOT NAME - 1

I-29 EXIT 83 RAMP PAVEMENT ARROW



↑ - Install Ramp Pavement Arrow

I-90 EXIT 390 RAMP PAVEMENT ARROW

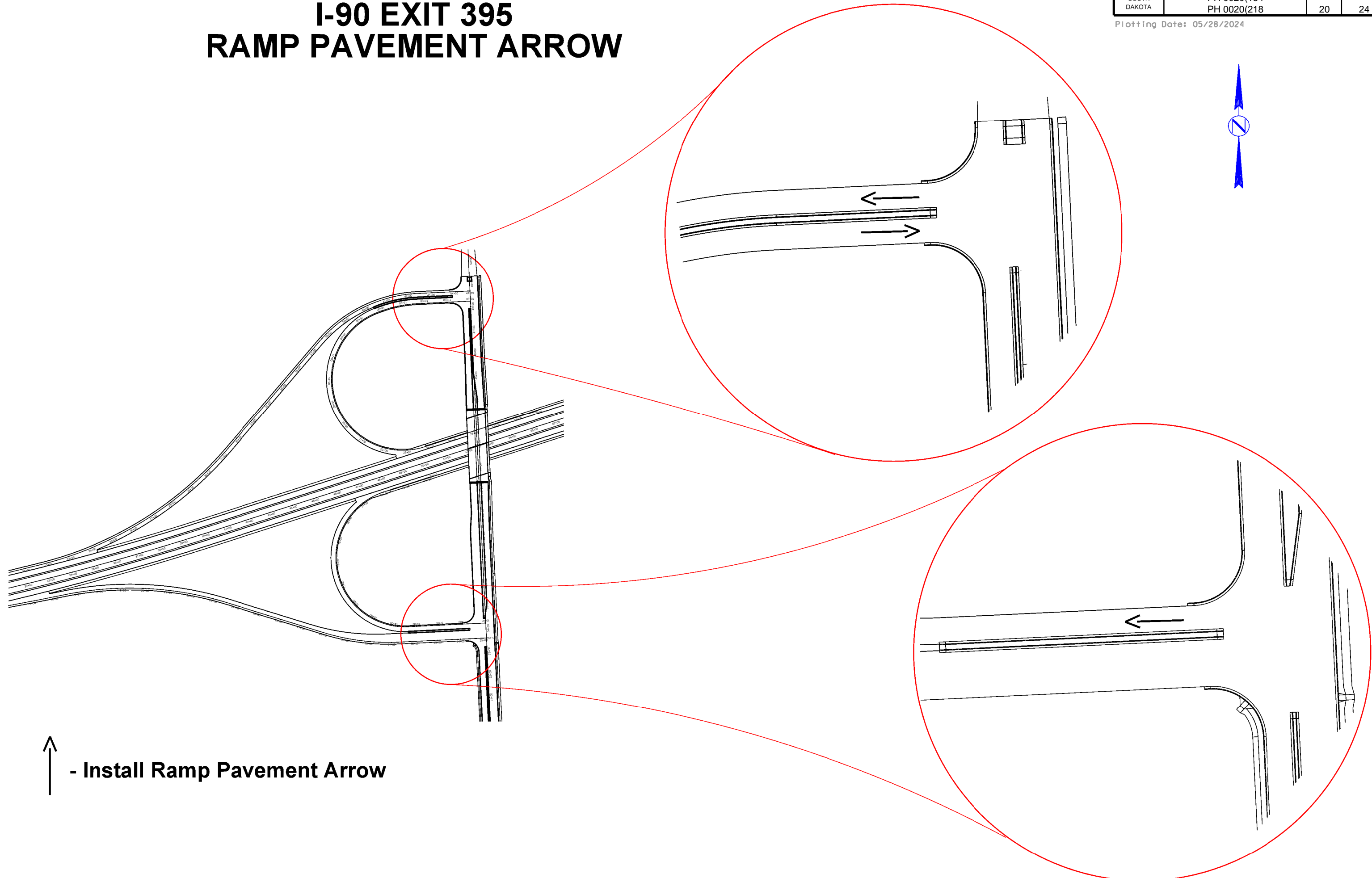


↑ - Install Ramp Pavement Arrow

I-90 EXIT 395 RAMP PAVEMENT ARROW

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	PH 0020(184) PH 0020(218)	20	24

Plotting Date: 05/28/2024



↑ - Install Ramp Pavement Arrow

PLOT SCALE - 1:271.765

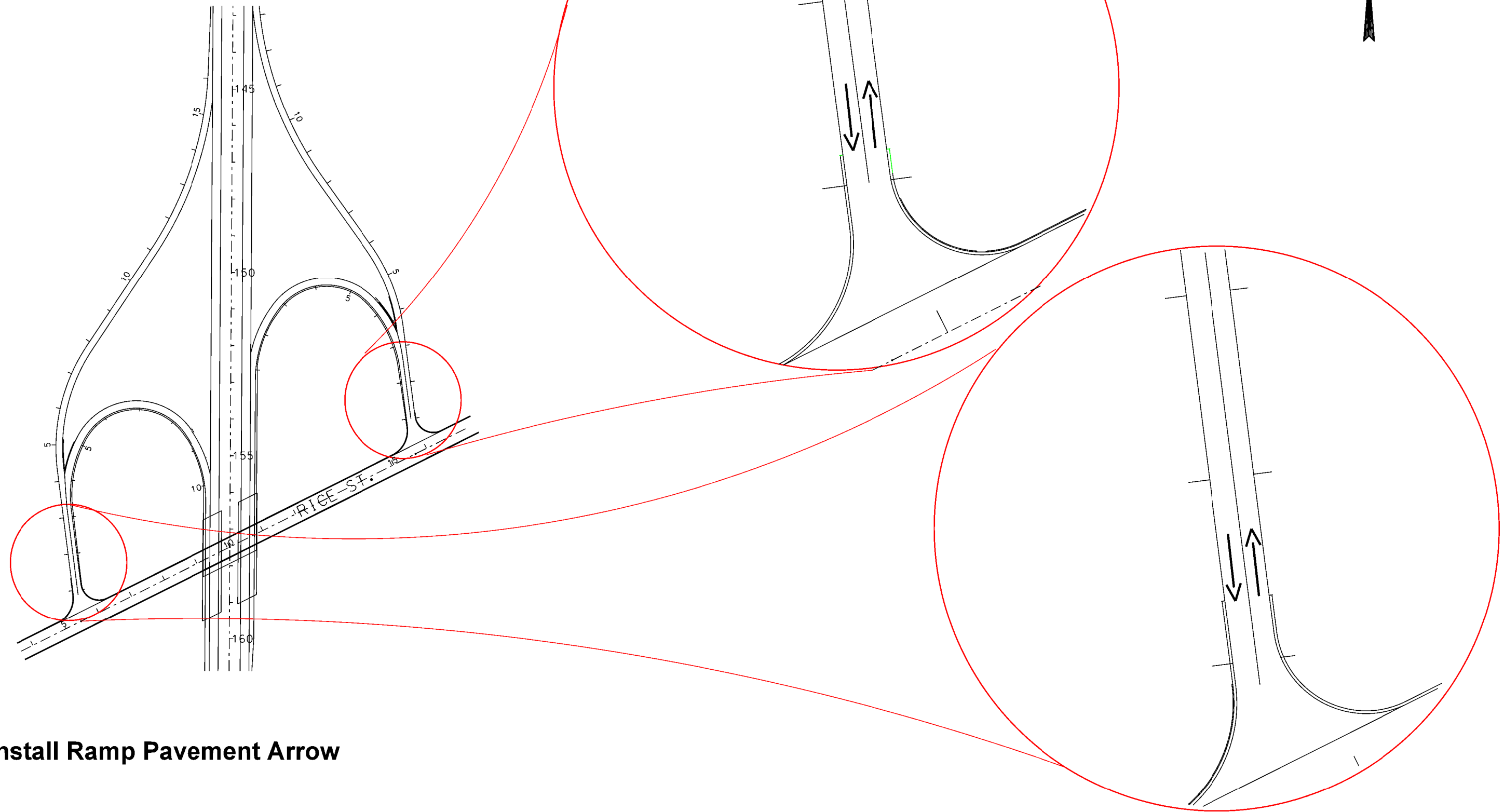
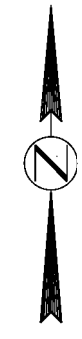
PLOTTED FROM - TRM11119

PLOT NAME - 1

FILE - ... \NEXTS\90EXIT395.DGN

Plotting Date: 05/24/2024

I-229 EXIT 7 RAMP PAVEMENT ARROW



↑ - Install Ramp Pavement Arrow

PLOT SCALE - 1:271.765

PLOTTED FROM - TRW11119

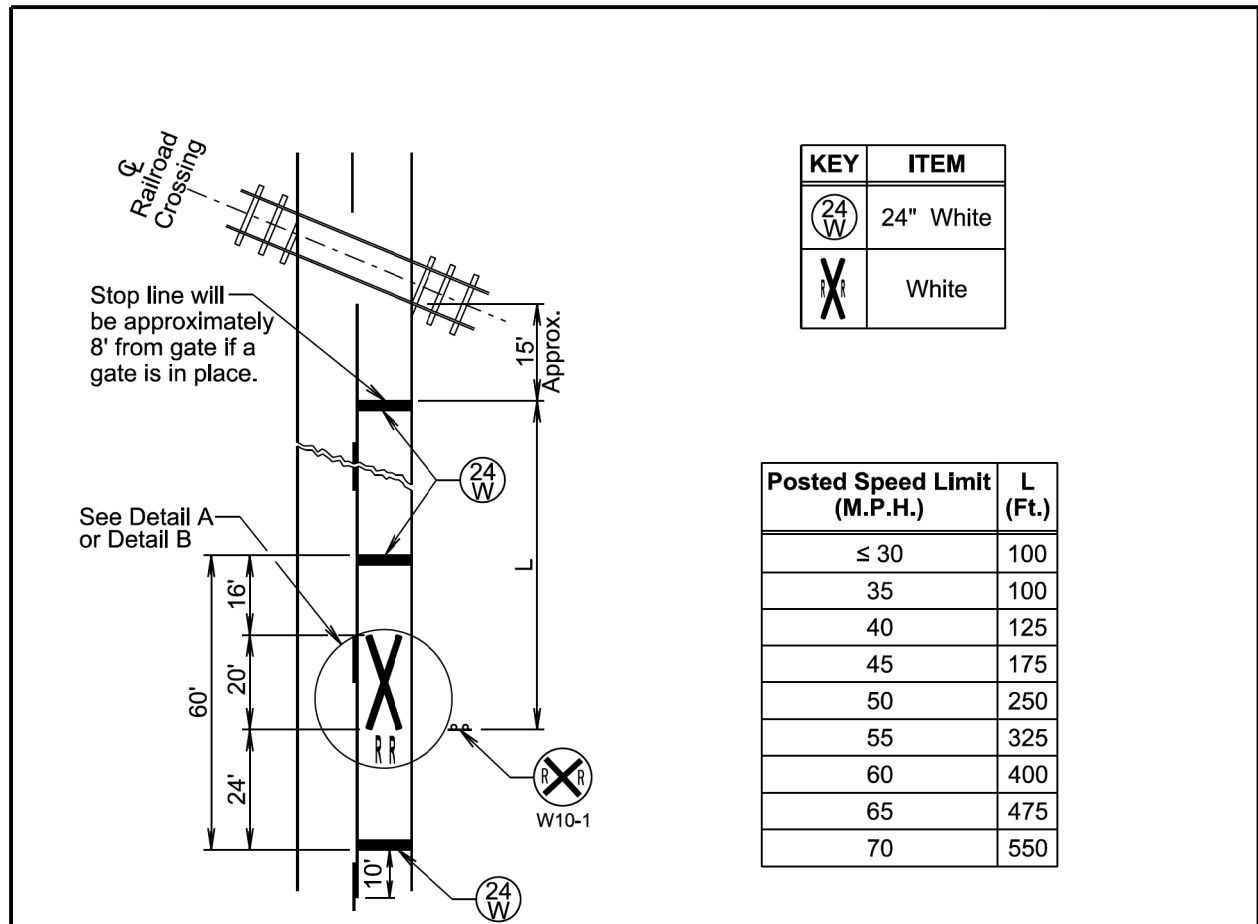
PLOT NAME - 1

FILE - ... \NEXTS\229EXIT7.DGN

PLOT SCALE - 1:199,992

PLOT NAME - 1

FILE - ... \REGION\IDE2024\STD PLATES.DGN



PLAN VIEW

GENERAL NOTES:

The railroad crossing pavement markings will be placed symmetrically about the centerline of the railroad crossing. DETAIL A should be used unless the railroad crossing pavement markings are installed in existing grooves that match DETAIL B.

When pavement markings are used, a portion of the RXR symbol will be placed directly opposite of the advance warning sign W10-1.

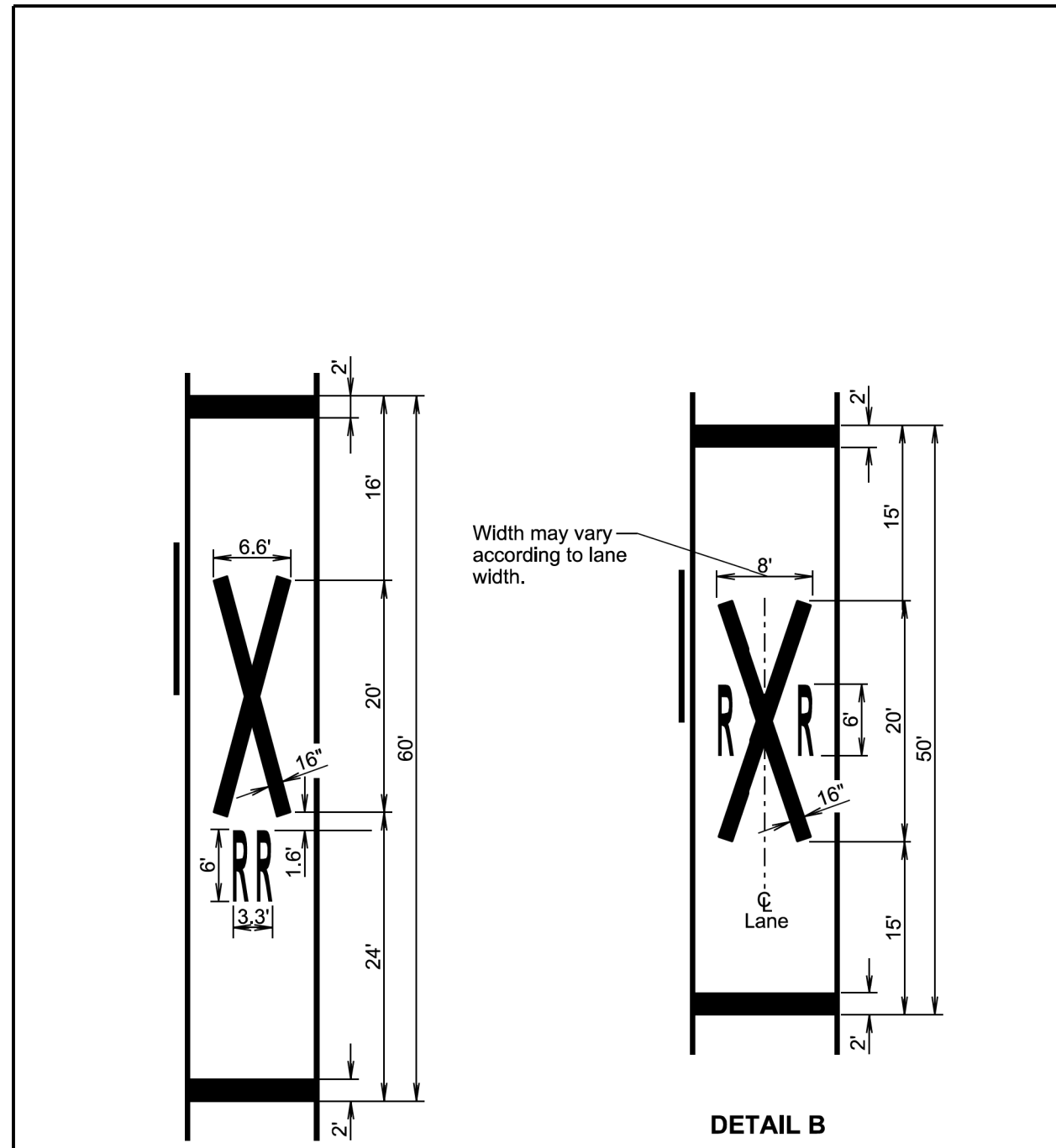
On multi-lane roads the transverse bands will extend across all approach lanes and individual RXR symbols will be placed in each approach lane.

The railroad crossing pavement markings will consist of all the transverse bands, stop lines, and RXR symbols.

All costs for furnishing and installing the markings, materials, labor, and necessary equipment for the railroad crossing markings will be paid for at the contract unit price per gallon or per each for the type of marking material specified in the plans.

November 19, 2020

Published Date: 2025	S D D O T	PAVEMENT MARKINGS AT RAILROAD CROSSING	PLATE NUMBER 633.10
			Sheet 1 of 2



DETAIL A

DETAIL B

November 19, 2020

Published Date: 2025	S D D O T	PAVEMENT MARKINGS AT RAILROAD CROSSING	PLATE NUMBER 633.10
			Sheet 2 of 2

PLOTTED FROM - TRM111119

PLOT SCALE - 1:199,992

* Messages on signs will vary depending on the operation being conducted.

Vehicle-mounted signs will be mounted in a manner such that they are not obscured by equipment or supplies. Sign legends on vehicle-mounted signs will be covered or turned from view when work is not in progress.

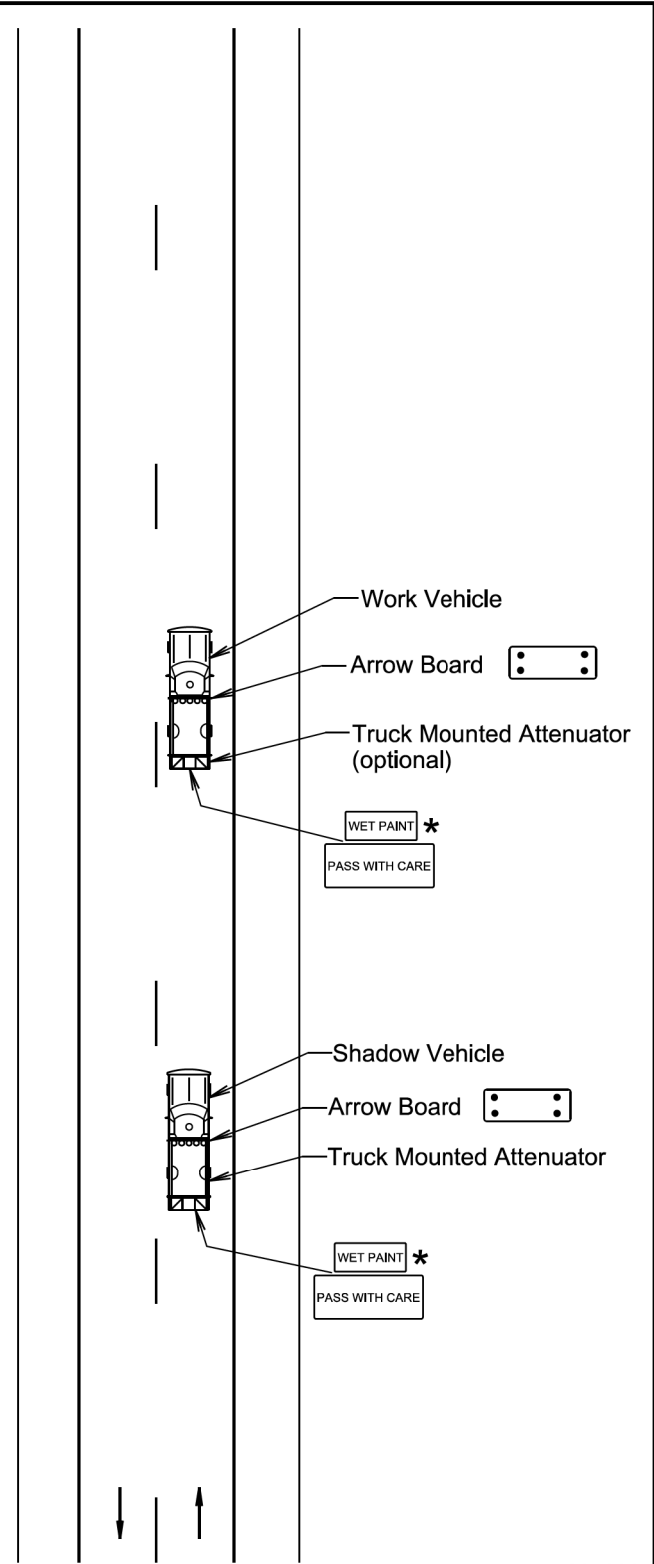
Shadow and Work vehicles will display high-intensity rotating, flashing, oscillating, or strobe lights, flags, signs, or arrow boards.

Vehicle hazard warning signals will not be used instead of the vehicle's high-intensity rotating, flashing, oscillating, or strobe lights.

When an arrow board is used, it will be used in the caution mode. Marching Diamonds are acceptable.

Arrow boards will, as a minimum, be Type B, with a size of 60" x 30".

All costs associated with the traffic control for mobile operation including signs, arrow boards and equipment will be incidental to the contract lump sum price for "Traffic Control, Miscellaneous".



January 22, 2021

Published Date: 2025	S D D O T	MOBILE OPERATIONS ON 2-LANE ROAD	PLATE NUMBER 634.06
			Sheet 1 of 1

* Messages on signs will vary depending on the operation being conducted.

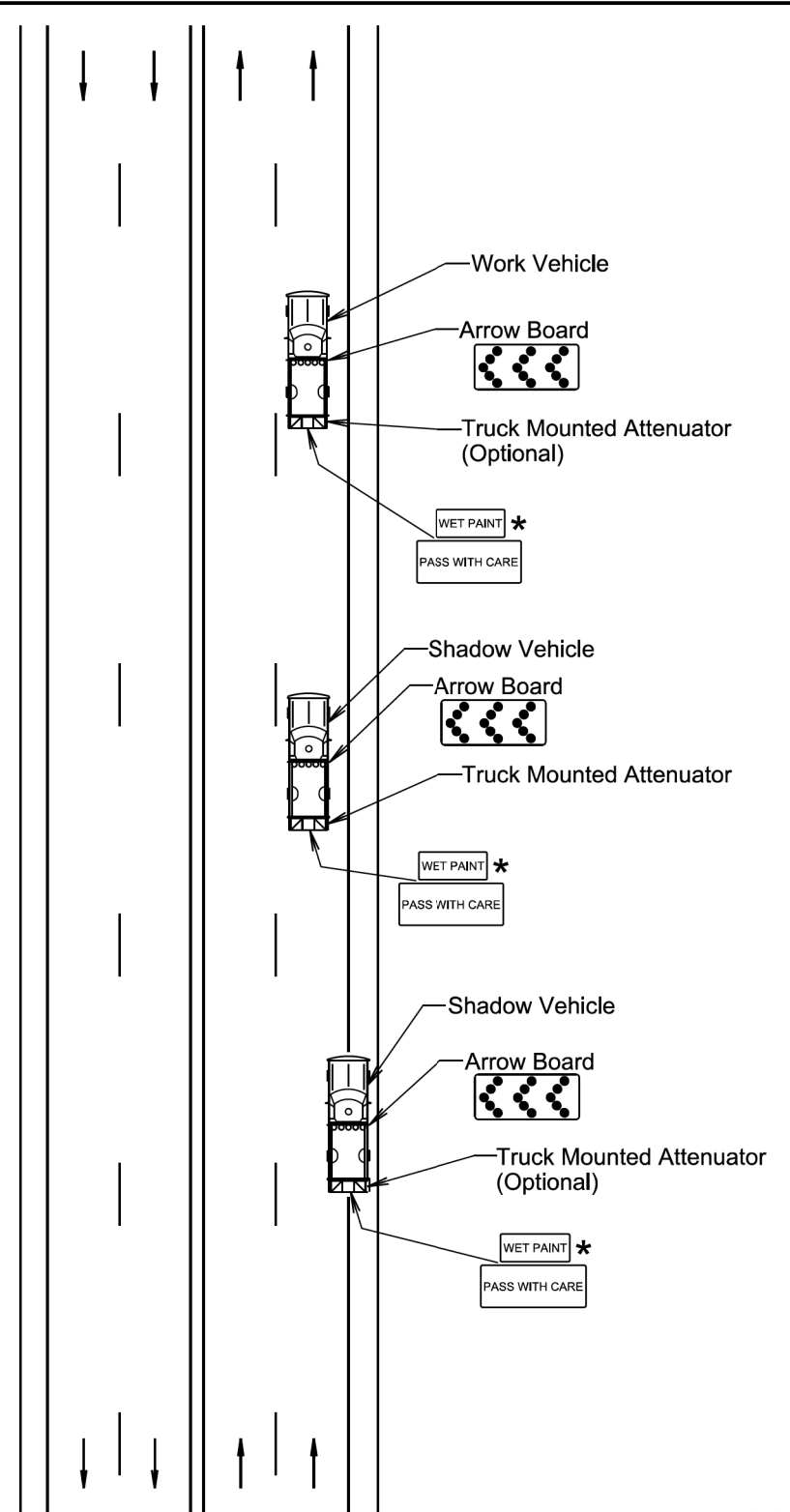
Vehicle-mounted signs will be mounted in a manner such that they are not obscured by equipment or supplies. Sign legends on vehicle-mounted signs will be covered or turned from view when work is not in progress.

Shadow and Work vehicles will display high-intensity rotating, flashing, oscillating, or strobe lights, flags, signs, or arrow boards.

Vehicle hazard warning signals will not be used instead of the vehicle's high-intensity rotating, flashing, oscillating, or strobe lights.

Arrow boards will, as a minimum, be Type B, with a size of 60" x 30".

All costs associated with the traffic control for mobile operation including signs, arrow boards and equipment will be incidental to the contract lump sum price for "Traffic Control, Miscellaneous".



January 22, 2021

Published Date: 2025	S D D O T	MOBILE OPERATIONS ON MULTI-LANE HIGHWAYS	PLATE NUMBER 634.08
			Sheet 1 of 1

PLOTTED FROM - TRM111119

PLOT NAME - 2

FILE - ... \REGION\IDE2024\STD PLATES.DGN

Posted Speed Prior to Work (M.P.H.)	Spacing of Advance Warning Signs (Feet) (A)	Spacing of Channelizing Devices (Feet) (G)
0 - 30	200	25
35 - 40	350	25
45	500	25
50	500	50
55	750	50
60 - 65	1000	50

- Flagger
- Channelizing Device

For low-volume traffic situations with short work zones on straight roadways where the flagger is visible to road users approaching from both directions, a single flagger may be used.

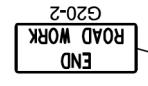
The ROAD WORK AHEAD and the END ROAD WORK signs may be omitted for short duration operations (1 hour or less).

For tack and/or flush seal operations, when flaggers are not being used, the FRESH OIL sign (W21-2) will be displayed in advance of the liquid asphalt areas.

Flashing warning lights and/or flags may be used to call attention to the advance warning signs.

The channelizing devices will be drums or 42" cones.

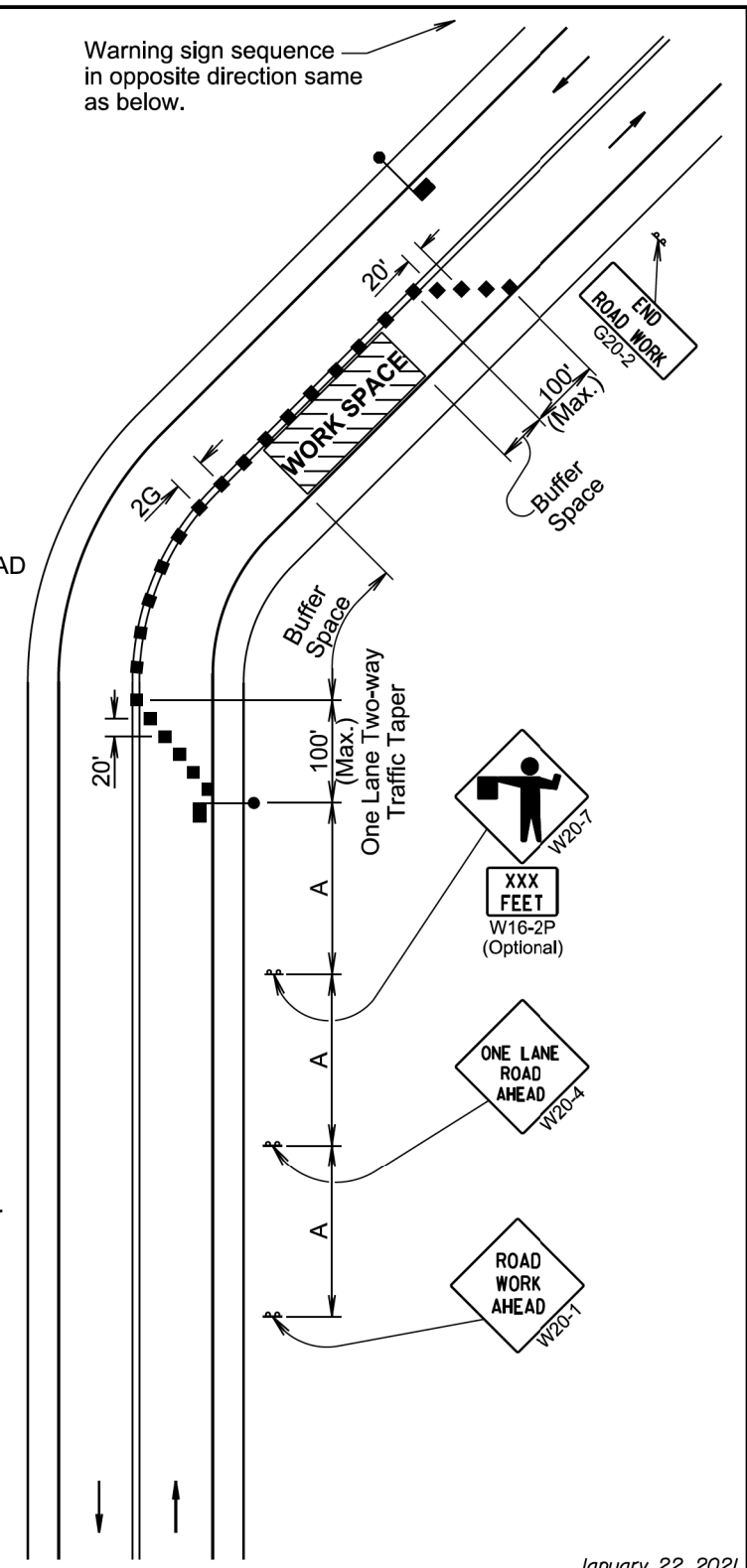
Channelizing devices are not required along the centerline adjacent to work area when pilot cars are utilized for escorting traffic through the work area.



Channelizing devices and flaggers will be used at intersecting roads to control intersecting road traffic as required.

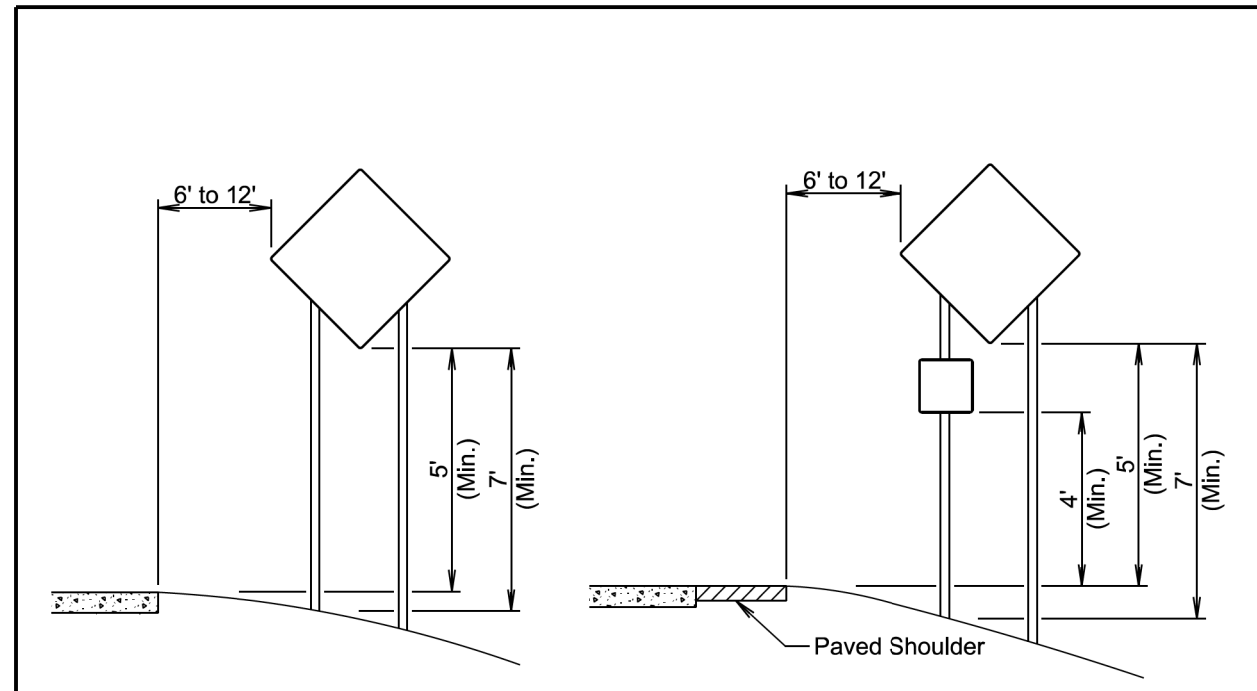
The buffer space should be extended so that the two-way traffic taper is placed before a horizontal or vertical curve to provide adequate sight distance for the flagger and queue of stopped vehicles.

The length of A may be adjusted to fit field conditions.



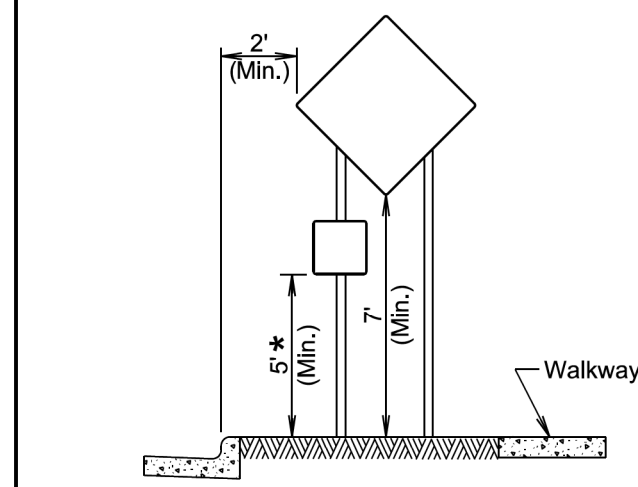
January 22, 2021

S D D O T	LANE CLOSURE WITH FLAGGER PROVIDED	PLATE NUMBER 634.23
	Published Date: 2025	Sheet 1 of 1

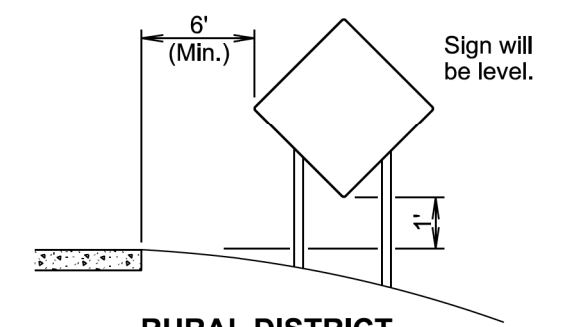


RURAL DISTRICT

RURAL DISTRICT WITH SUPPLEMENTAL PLATE



URBAN DISTRICT



RURAL DISTRICT 3 DAY MAXIMUM
(Not applicable to regulatory signs)

* If the bottom of supplemental plate is mounted lower than 7 feet above a pedestrian walkway, the supplemental plate should not project more than 4" into the pedestrian facility.

January 22, 2021

S D D O T	CRASHWORTHY SIGN SUPPORTS (Typical Construction Signing)	PLATE NUMBER 634.85
	Published Date: 2025	Sheet 1 of 1