

STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	PH 000S(255)	1	9

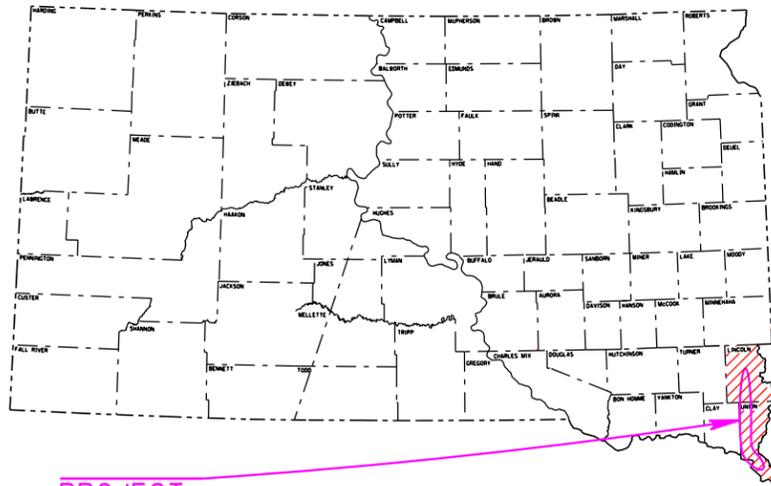
Plotting Date: 03/14/2014

PLANS FOR PROPOSED
PROJECT PH 000S(255)
INTERSTATE 29
LINCOLN and UNION COUNTIES

INDEX OF SHEETS

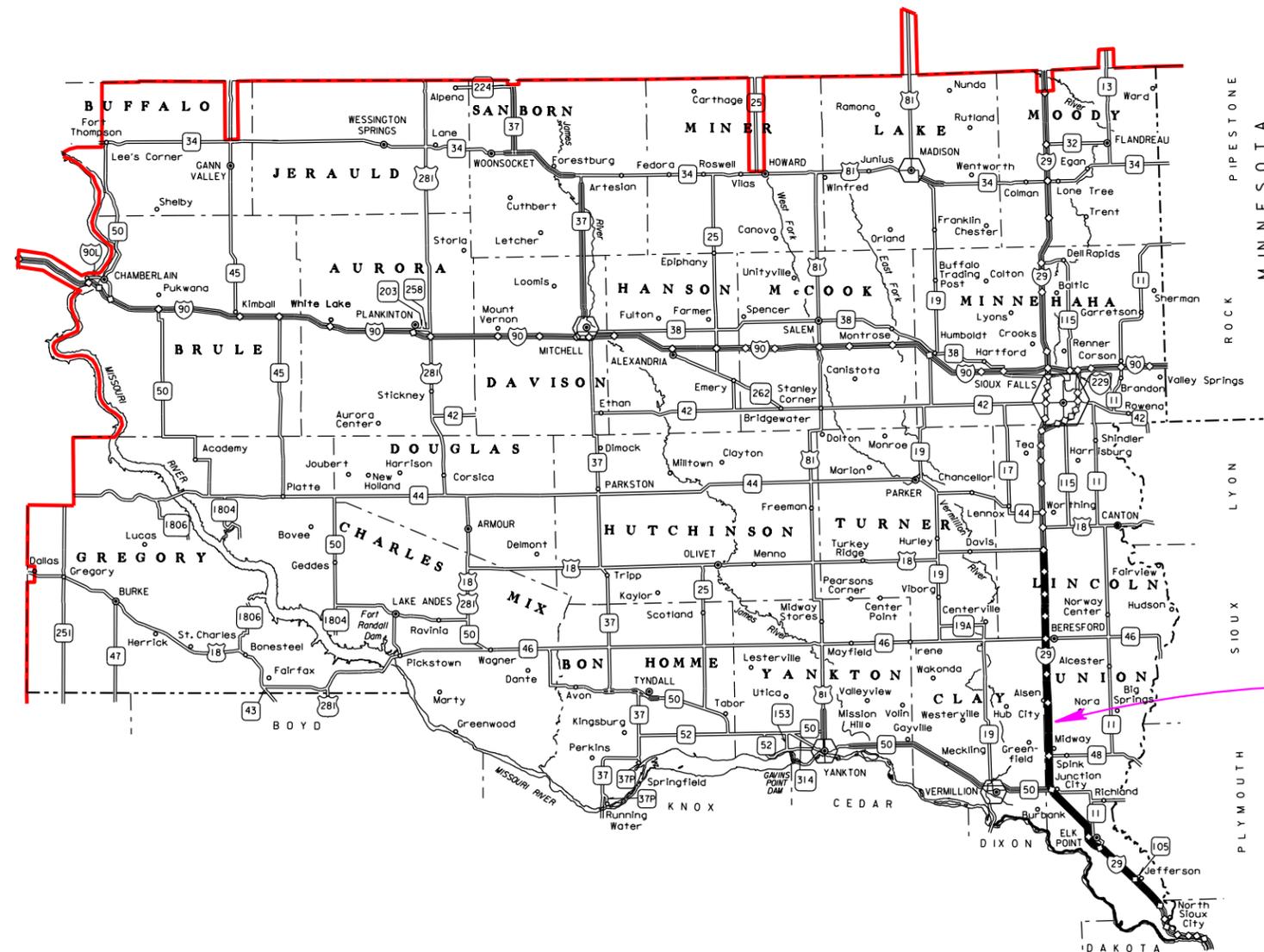
Sheet 1	Title Sheet
Sheet 2	Estimate of Quantities and typical pavement marking layout
Sheet 3 and 4	Notes
Sheet 5	Itemized List for Traffic Control
Sheet 6	Ramp Pavement Marking Layout
Sheet 7 and 8	Standard Plates
Sheet 9	Mobile Operations Layout

PLOT SCALE - 1:200



PROJECT

EPOXY PAVEMENT MARKING
PCN 02B0



ADT's

I-29N (MRM 5.0 - 59.0) - 6,354
I-29S (MRM 5.0 - 59.0) - 6,355

STORM WATER PERMIT
(None Required)

I-29 (MRM 5.0 - 59.0)

I-29 SB GROSS LENGTH 285120.0 FEET
I-29 NB GROSS LENGTH 285120.0 FEET
TOTAL NET LENGTH 570240.0 FEET

I-29
BEGIN MRM 5.0
END MRM 59.0

10

PLOTTED FROM - TRM111119

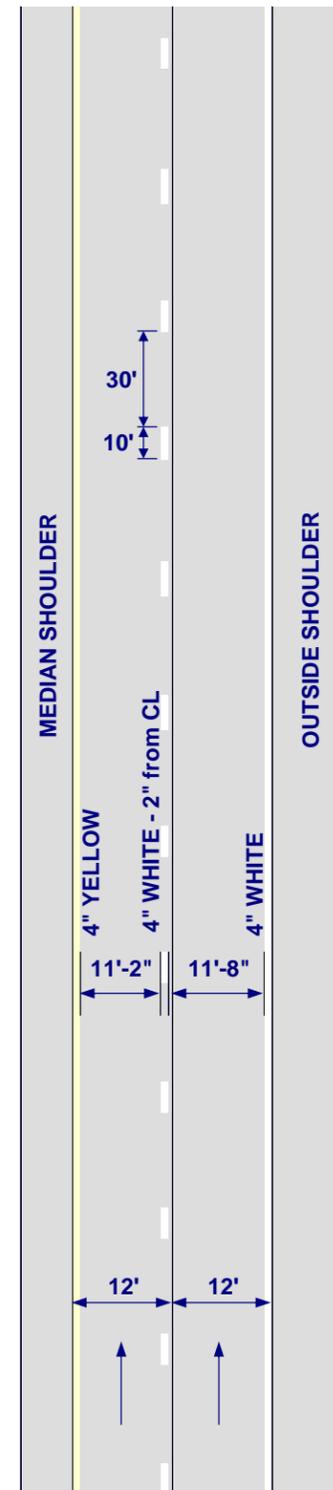
PLOT NAME - 1

FILE - ... \REGION\IDE2014\TITLE.MXD

ESTIMATE OF QUANTITIES

Bid Item Number	Item	Quantity	Unit
009E0010	Mobilization	Lump Sum	LS
633E1100	Epoxy Pavement Marking Paint, 4" White	712,800	Ft
633E1105	Epoxy Pavement Marking Paint, 4" Yellow	570,240	Ft
633E1120	Epoxy Pavement Marking Paint, 12" White	18,943	Ft
633E5050	Surface Preparation for Pavement Marking	1,339,869	Ft
633E9200	Mobile Retroreflector Measurements	64,800	Mile
634E0010	Flagging	160	Hour
634E0100	Traffic Control	1,140	Unit
634E0120	Traffic Control, Miscellaneous	Lump Sum	LS
634E0420	Type C Advance Warning Arrow Panel	2	Each

**DIVIDED ROADWAY
(ONE DIRECTION SHOWN)**



PAVEMENT MARKING

Typical pavement marking as shown on this sheet shall be applied throughout the entire length of divided roadway.

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

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

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SPECIFICATIONS

South Dakota Department of Transportation Standard Specifications for Roads and Bridges, 2004 Edition, Required Provisions, Supplemental Specifications and/or Special Provisions as included in the Proposal.

WORK DESCRIPTION

I-29 Lincoln and Union Counties (MRM 5.0 to 59.0). Work shall include pavement marking removal, surface prep and applying epoxy pavement marking on edgelines, mainline skip lines, skip lines across ramps and gore markings on both mainline and ramps.

All work shall be completed prior to taking retroreflectivity readings.

SURFACE PREPARATION

The epoxy markings to be provided and installed shall have the existing groove prepared.

The preparation shall result with the existing pavement marking being removed, adequately scuffed, or abraded to allow proper adhesion of the new epoxy pavement marking as per manufacturer's recommendations to comply with product warranties. Any remaining glass beads in the existing marking shall be adequately broken and flattened to allow proper adhesion of the new epoxy pavement marking.

The depth of preparation shall be adequate to inlay the epoxy marking below the pavement surface equivalent to the sum of the pavement marking thickness (including reflective media) +15 mils ± 5 mils clear coat.

All costs associated with preparation of the existing groove shall be incidental to the contract unit price per foot for Surface Preparation for Pavement Marking. Surface preparation shall be measured as 4" equivalent.

GENERAL MAINTENANCE OF TRAFFIC

If Contractor elects to use lane closures, the lane closures shall be installed as per standard plate 634.63. Interstate lane closures shall be manned. No un-manned lane closure shall be left in place.

A minimum of a mobile work operation may be used on interstates with an average daily traffic less than 13,000 vehicles per day. The Contractor may use lane closures to complete the work should conditions dictate.

Vehicles used for mobile work operations should be equipped with highly visible devices on the equipment such as high-intensity rotating, flashing, oscillating, or strobe lights. All other equipment shall display high-intensity rotating, flashing, oscillating, or strobe lights visible to traffic in all directions. The use of shadow vehicles, truck mounted attenuators, truck mounted signs and arrow panels is encouraged.

Where practical and when needed, the work and shadow vehicles should pull over periodically to allow vehicular traffic to pass.

During surface preparation or pavement marking operations the Contractor may close a lane of traffic on an interstate for no more than 3 miles.

Removing, relocating, covering, salvaging and resetting of existing traffic control devices, including delineation, shall be the responsibility of the Contractor. Cost for this work shall be incidental to the contract unit prices for the various items unless otherwise specified in the plans. Any delineators and signs damaged or lost shall be replaced by the Contractor at no cost to the State.

GENERAL MAINTENANCE OF TRAFFIC (CONTINUED)

Storage of vehicles and equipment shall be outside the clear zone and as near as possible to the right-of-way line. Contractor's employees should mobilize at a location off the right-of-way and arrive at the work sites in a minimum number of vehicles necessary to perform the work.

Indiscriminate driving and parking of vehicles within the right-of-way will not be permitted. Any damage to the vegetation, surfacing, embankment, delineators and existing signs resulting from such indiscriminate use shall be repaired and/or restored by the Contractor, at no expense to the State, and to the satisfaction of the Engineer.

The Contractor shall provide documentation that all breakaway sign supports comply with FHWA NCHRP 350 or MASH crash-worthy requirements. The Contractor shall provide installation details at the preconstruction meeting for all breakaway sign support assemblies.

Sufficient quantities and units for Traffic Control have been included to sign for two lane closures on a multi-lane highway. If the Contractor elects to use additional traffic control, the cost for additional traffic control devices or equipment shall be incidental to the contract unit price per Unit for Traffic Control.

Cost of equipment and traffic control devices on equipment for a mobile work operation, including arrow panels and signs, shall be incidental to the contract lump sum price for Traffic Control, Miscellaneous.

COORDINATION OF PROJECTS

Project IM-NH-P 0023(39) PCN 046F, Shoulder chip seal on I-29 MRM 4.813 to 47.748 will be completed by another Contractor in 2014. Contact Ron Peterson (605-668-2929) The Yankton Area Engineer for completion date.

The durable pavement markings shall be installed on the roadway after completion of the work on IM-NH-P 0023(39) PCN 046F.

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MOBILE RETROREFLECTIVITY MEASUREMENTS

All retroreflectivity measurements on Interstate 29 will be taken by an Independent Consultant hired by the Contractor. A retroreflectivity report of the measurements from the Independent Consultant shall be provided to the Engineer.

The Independent Consultant shall take measurements using a vehicle-mounted mobile retroreflectometer. The mobile retroreflectometer shall 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 retroreflectometer shall be calibrated no less than twice a day in accordance with the operating manual and calibration guide for the particular machine and vehicle.

Measurement shall consist of the average retroreflective readings and standard deviations for pavement marking placed under this Contract. Retroreflectivity measurements shall be taken on each edgeline, mainline and ramp gore marking, and skip centerline marking. Measure each line type separately. Measurement units shall be mcd/m²/lux. Retroreflectivity shall be measured by taking a minimum 40 retroreflectivity readings within 528' (1/10 mile) on solid lines and a minimum 20 retroreflectivity readings within 528' (1/10 mile) on skip lines. Gore markings shall have a minimum of two retroreflectivity readings taken on each marking. The average retroreflectivity readings for each individual 4" wide line shall be obtained at 528' (1/10 mile) intervals.

Payment will be made for the actual length of retroreflectivity 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 interstate in one direction; LEL – Left Edgeline, REL – Right Edgeline and all gore markings along right edgeline, CL- Centerline. One additional pass per the length of the gore marking on the left side of the ramp will be required.

Measurements shall be obtained no sooner than 3 days and no later than 30 days after the completion of all the line applications required for an individual highway route. Excess beads or reflective elements must not be visible when the retroreflectivity testing is conducted.

Measurements shall be collected when pavement and markings are dry, clean and no visible moisture is on the road surface. These criteria define initial pavement marking retroreflectivity values. Markings shall 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 528' (1/10 mile) retroreflectivity reading shall meet the requirements for retroreflectivity as specified in the Special Provision for Epoxy Markings. Any retroreflectivity readings not meeting the Special Provision shall be considered failed. Failed markings will be removed and remarked by the Contractor in 528' lengths.

The Contractor shall mark the begin and end of the length of line to be removed and remarked that is represented by the failed 528' (1/10 mile) averaged reading.

RETROREFLECTIVITY MEASUREMENTS (CONTINUED)

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, shall 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, LL – Lane Line Skip, 1LL – left most LL in multilane, 2LL – second to left most LL in multilane, etc)
- Identification of the retroreflectometer
- A summary of the average retroreflective readings for each continuous length of 0.1 mile measured
- A separate summary of the gore marking retroreflectivity readings

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 shall be ± 10%.

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

The locations of the measurements shall be randomly selected.

No final payment for pavement markings shall 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 shall be included in the price bid per Mile for Mobile Retroreflectivity Measurements.

QUALITY ASSURANCE

A concrete pavement test deck site will be agreed upon. A 500' white and a 500' yellow stripe shall 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 retroreflectometer and the Independent Consultant's mobile retroreflectometer. 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 retroreflectometer differs by less than 10% to the mean average obtained by the Department's handheld retroreflectometer for each color.

Cost for Quality Assurance shall be included in the price bid per Mile for Mobile Retroreflectivity Measurements.

ITEMIZES LIST FOR TRAFFIC CONTROL

SIGN CODE	SIGN SIZE	DESCRIPTION	NUMBER REQUIRED	UNITS PER SIGN	UNITS
E5-1	36" x 32"	EXIT GORE SIGN		24	
G20-2	36" x 18"	END ROAD WORK	2	17	34
R1-1	48" x 48"	STOP		34	
R1-2	48" x 48"	YIELD		34	
R2-1	30" x 36"	SPEED LIMIT 45	4	23	92
R2-1	30" x 36"	SPEED LIMIT 75	2	23	46
R2-6ap	30" x 24"	FINES DOUBLE	4	18	72
R3-7	30" X 30"	RIGHT/LEFT LANE MUST TURN RIGHT/LEFT		21	
R4-7	24" x 30"	KEEP RIGHT (SYMBOL)		18	
R5-1	48" x 48"	DO NOT ENTER		34	
R5-1a	48" x 36"	WRONG WAY		29	
R10-6	24" x 36"	STOP HERE ON RED		20	
R11-2	48" x 30"	ROAD CLOSED		27	
R11-3a	60" x 30"	ROAD CLOSED ___ MILES AHEAD LOCAL TRAFFIC ONLY		30	
R11-4	60" x 30"	ROAD CLOSED TO THRU TRAFFIC		30	
SW12-1b	120" x 60"	HIGHWAY WORKERS GIVE'EM A BRAKE		80	
W1-1	48" x 48"	LEFT OR RIGHT TURN ARROW		34	
W1-2	48" x 48"	LEFT OR RIGHT CURVE ARROW		34	
W1-3	48" x 48"	REVERSE TURN SIGN (LEFT OR RIGHT)		34	
W1-4a	48" x 48"	REVERSE CURVE SIGN (LEFT OR RIGHT)		34	
W3-1a	48" x 48"	STOP AHEAD (SYMBOL)		34	
W3-2a	48" x 48"	YIELD AHEAD (SYMBOL)		34	
W3-3	48" x 48"	SIGNAL AHEAD (SYMBOL)		34	
W3-5	48" x 48"	SPEED REDUCTION 45 AHEAD (SYMBOL)	4	34	136
W4-1	48" x 48"	MERGE (SYMBOL)		34	
W4-1a	48" x 48"	THRU TRAFFIC MERGE LEFT		34	
W4-2	48" x 48"	LEFT OR RIGHT LANE ENDS (SYMBOL)	4	34	136
W4-3	48" x 48"	ADDED LANE	2	34	68
W5-3	48" x 48"	ONE LANE BRIDGE		34	
W5-4	48" x 48"	RAMP NARROWS		34	
W7-3a	30" x 24"	NEXT ___ MILES		18	
W8-1	36" x 36"	BUMP		27	
W8-6	48" x 48"	TRUCK CROSSING		34	
W8-7	36" x 36"	LOOSE GRAVEL		27	
W8-9a	48" x 48"	SHOULDER DROP-OFF		34	
W8-11	48" x 48"	UNEVEN LANES		34	
W9-3	48" x 48"	CENTER LANE CLOSED AHEAD OR XX FT		34	
W13-1	24" x 24"	ADVISORY SPEED PLATE		16	
W13-4	24" x 24"	ON RAMP		16	
W20-1	48" x 48"	ROAD WORK AHEAD	6	34	204
W20-2	48" x 48"	DETOUR AHEAD		34	
W20-3	48" x 48"	ROAD CLOSED 500 FT & 1000 FT		34	
W20-4	48" x 48"	ONE LANE ROAD AHEAD		34	
W20-5	48" x 48"	LT. OR RT. OR CENTER LANE CLOSED AHEAD	4	34	136
W20-7	48" x 48"	FLAGGER	2	34	68
W20-7b	48" x 48"	BE PREPARED TO STOP		34	
W21-1a	48" x 48"	WORKERS (SYMBOL)	2	34	68
W21-2	36" x 36"	FRESH OIL		27	
W21-3	48" x 48"	ROAD MACHINERY AHEAD		34	
W21-5	48" x 48"	SHOULDER WORK		34	
W21-5a	48" x 48"	RIGHT SHOULDER CLOSED		34	
W21-5b	48" x 48"	RIGHT SHOULDER CLOSED AHEAD		34	
SPECIAL	30" x 24"	FINES DOUBLED		18	
*****	12" x 36"	TYPE III OBJECT MARKER		15	
*****	*****	TYPE III BARRICADE - 8 FT. SINGLE SIDED	2	40	80
*****	*****	TYPE III BARRICADE - 8 FT. DOUBLE SIDED		56	
TOTAL UNITS			1140		

PAVEMENT MARKING LAYOUT

TAPERED INTERSTATE RAMPS

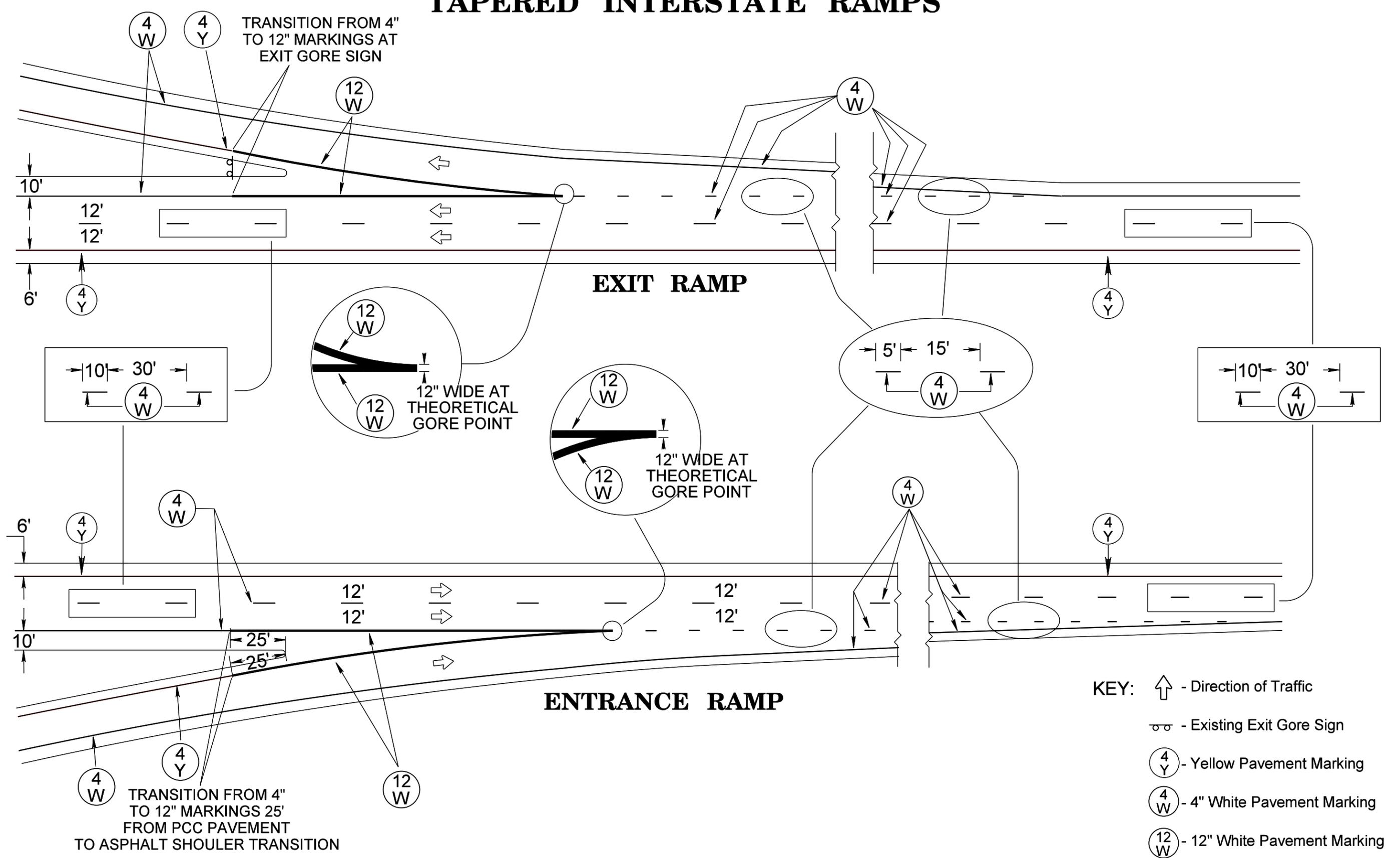
STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	PH 000S(255)	6	9

Plotting Date: 03/14/2014

PLOT SCALE - 1:50

PLOT NAME - 2

FILE - ... \RAMP PRINT NEW 111909.DGN



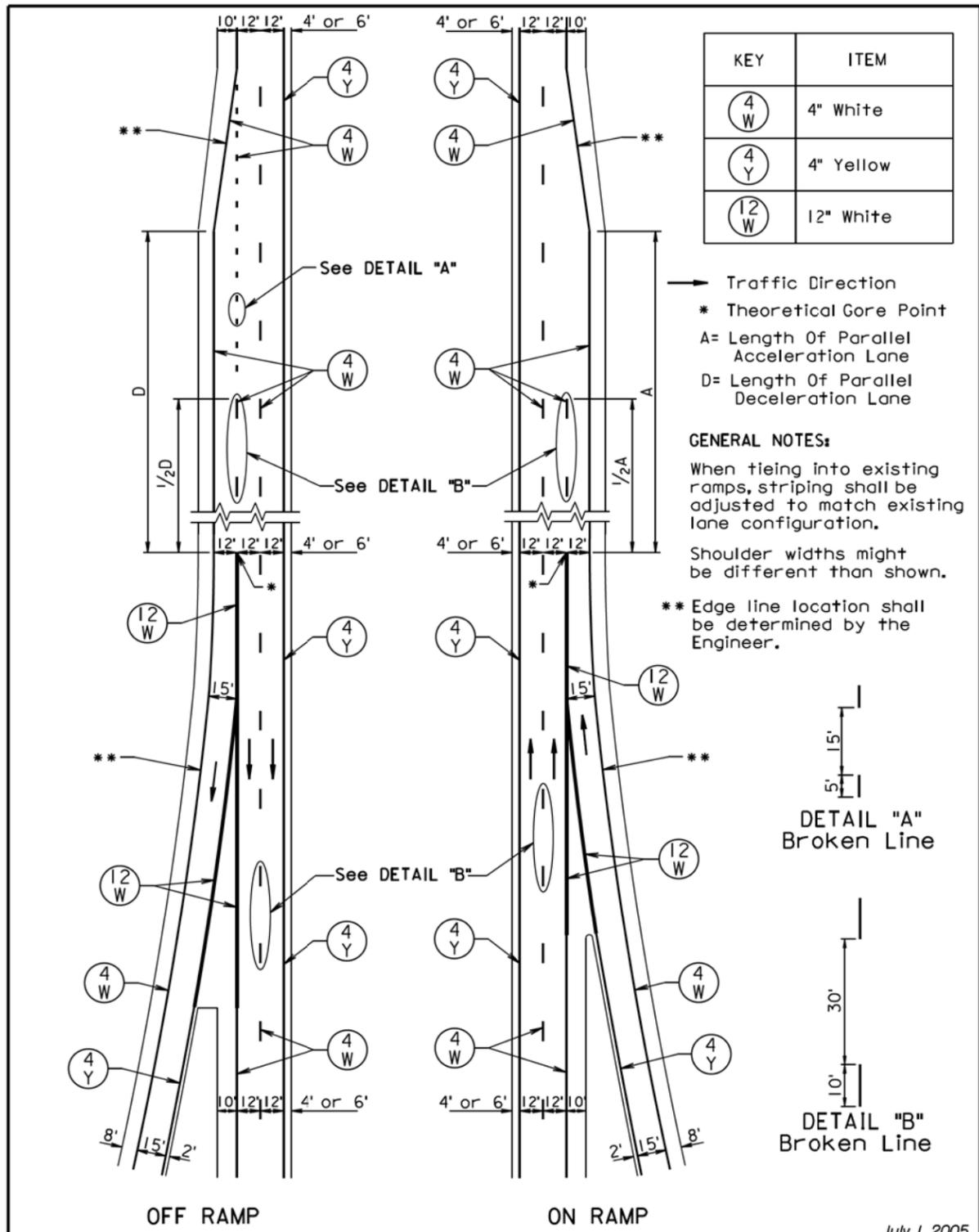
- KEY:**
- Direction of Traffic
 - Existing Exit Gore Sign
 - Yellow Pavement Marking
 - 4" White Pavement Marking
 - 12" White Pavement Marking

PLOTTED FROM - IRM11119

PLOT SCALE - 1:199,992

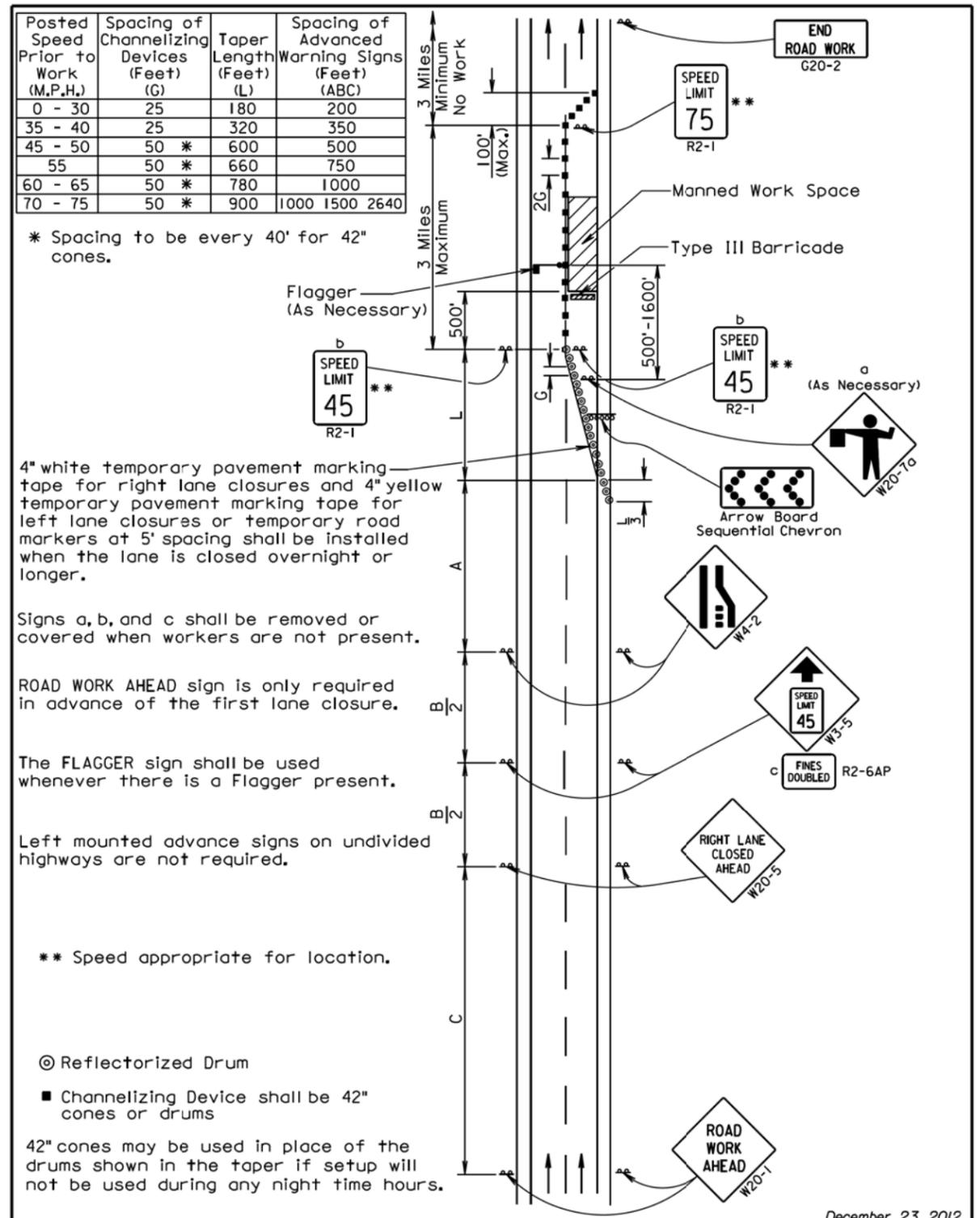
PLOT NAME - 3

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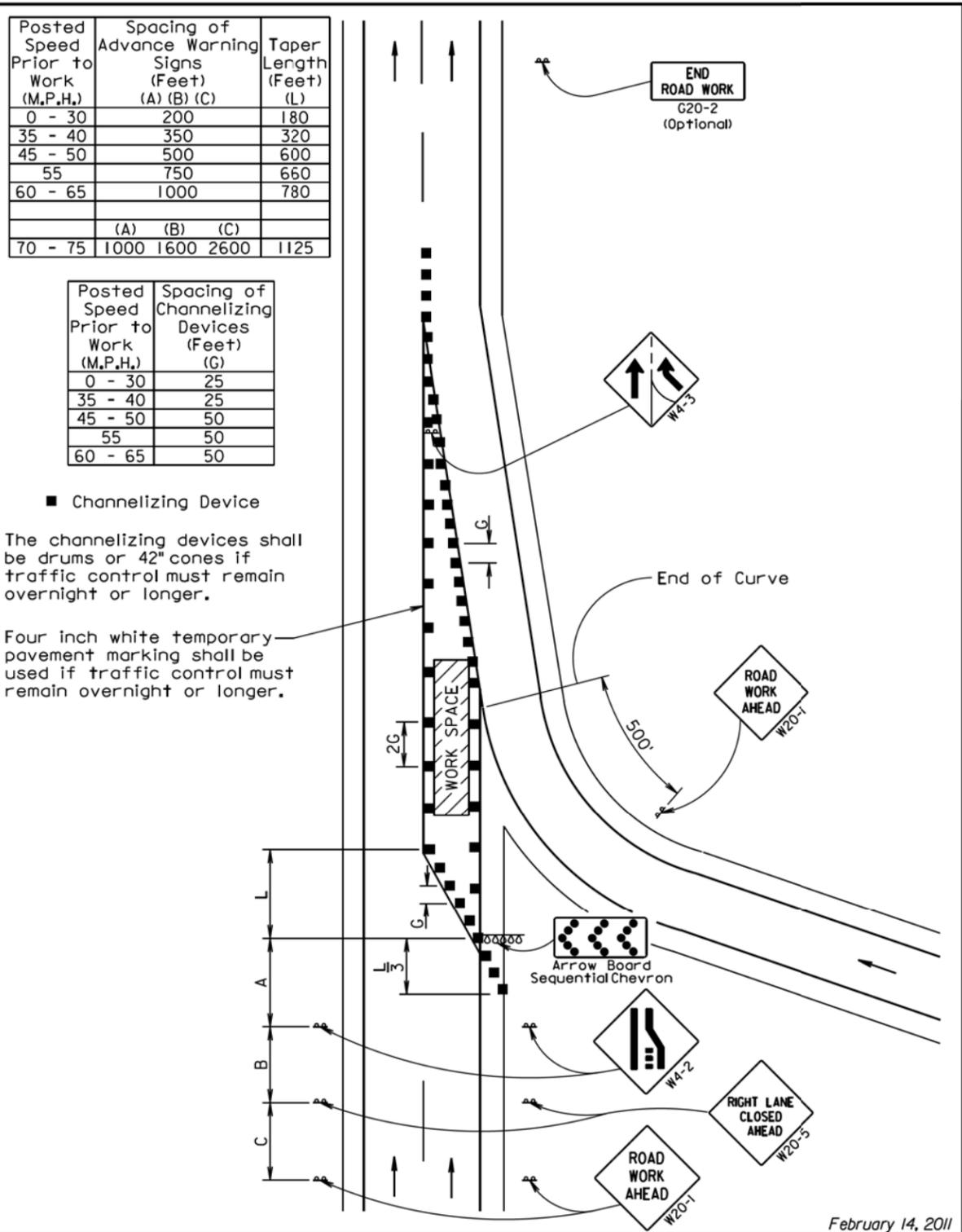
July 1, 2005

SDDOT Published Date: 1st Qtr. 2014	PAVEMENT MARKING LAYOUT FOR PARALLEL INTERSTATE RAMPS	PLATE NUMBER 633.06
		Sheet 1 of 1



December 23, 2012

SDDOT Published Date: 1st Qtr. 2014	MANNED WORK SPACE SIGNING FOR DIVIDED AND UNDIVIDED HIGHWAYS	PLATE NUMBER 634.63
		Sheet 1 of 1



February 14, 2011

S D D O T	GUIDES FOR TRAFFIC CONTROL DEVICES WORK IN VICINITY OF ENTRANCE RAMP	PLATE NUMBER 634.70
	Published Date: 1st Qtr. 2014	Sheet 1 of 1

PLOT SCALE - 1:199,992

PLOTTED FROM - TRM111119

PLOT NAME - 4

FILE - ... \REGIONWIDE2014\TITLEM.DGN

MOBILE OPERATION ON MULTI-LANE ROAD (TYPICAL)

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	PH 000S(255)	9	9

Plotting Date: 03/14/2014

Notes for Mobile Operation on Multi-lane Road (Typical)

Standard:

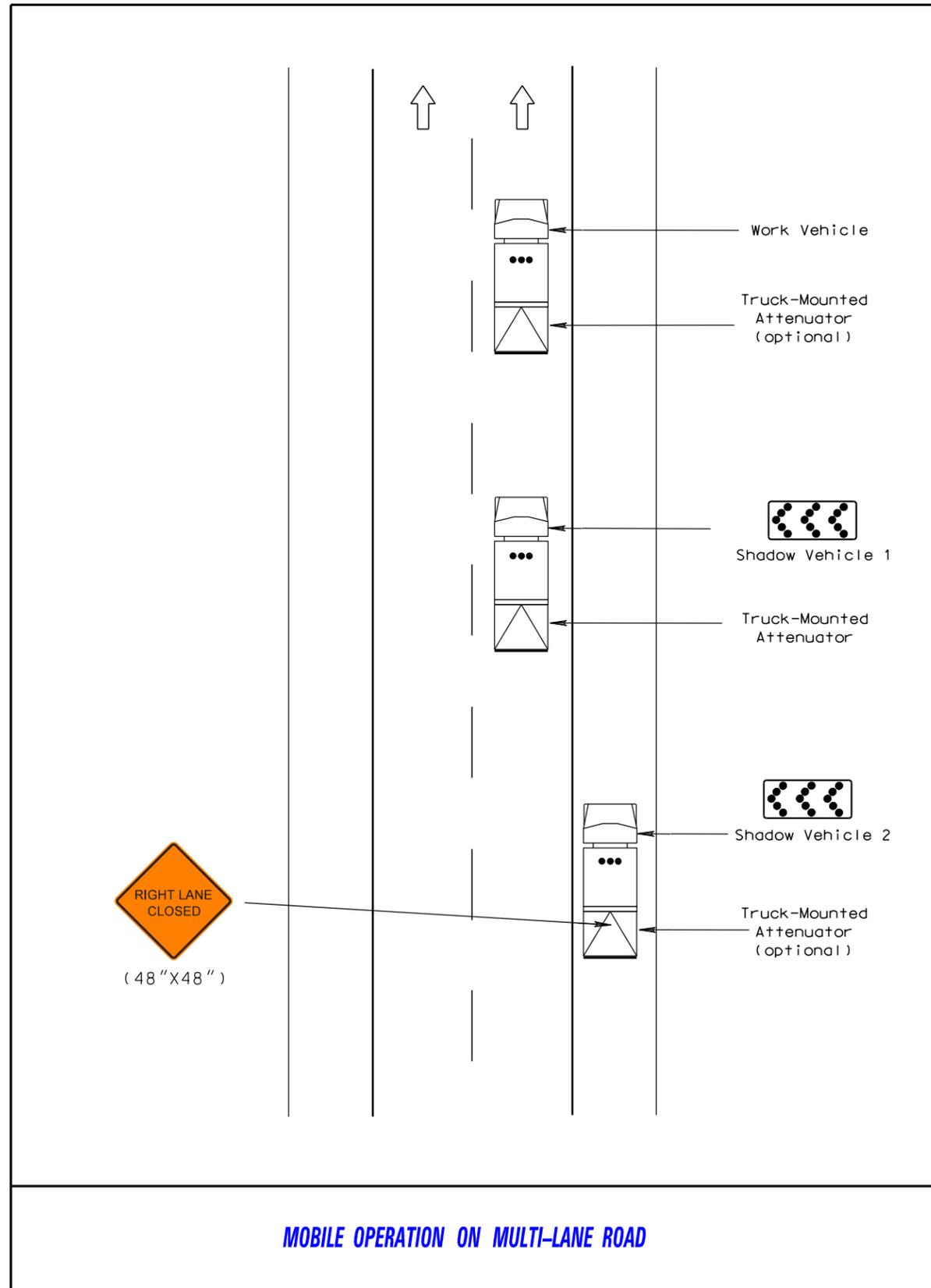
1. Arrow panels shall, as a minimum, be Type B, with a size of 1500 x 750 mm (60 x 30 in).

Guidance:

2. Vehicles used for these operations should be made highly visible with appropriate equipment, such as: high-intensity rotating, flashing, oscillating, or strobe lights, signs, and arrow panels.
3. Shadow Vehicle 1 shall be equipped with an arrow panel and truck-mounted attenuator.
4. Shadow Vehicle 2 shall be equipped with an arrow panel. An appropriate lane closure sign should be placed on Shadow Vehicle 2 so as not to obscure the arrow panel.
5. Shadow Vehicle 2 should travel at a varying distance from the work operation so as to provide adequate sight distance for vehicular traffic approaching from the rear.
6. The spacing between the work vehicles and the shadow vehicles, and between each shadow vehicle should be minimized to deter road users from driving in between.
7. Work should normally be accomplished during off-peak hours.
8. The advanced warning sign shall read LEFT LANE CLOSED and the chevron direction shall be changed when working within the left passing lane.

Option:

9. A truck-mounted attenuator may be used on Shadow Vehicle 2.
10. On high-speed roadways, a third shadow vehicle (not shown) may be used with Shadow Vehicle 1 in the closed lane, Shadow Vehicle 2 straddling the edge line, and Shadow Vehicle 3 on the shoulder.
11. Where adequate shoulder width is not available, Shadow Vehicle 3 may drive partially in the lane.



PLOT SCALE - 1:160

PLOTTED FROM - TRM11119

PLOT NAME - 5

FILE - ... \MOBILEOPERATION.DGN