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Plotted From - TRPR25291

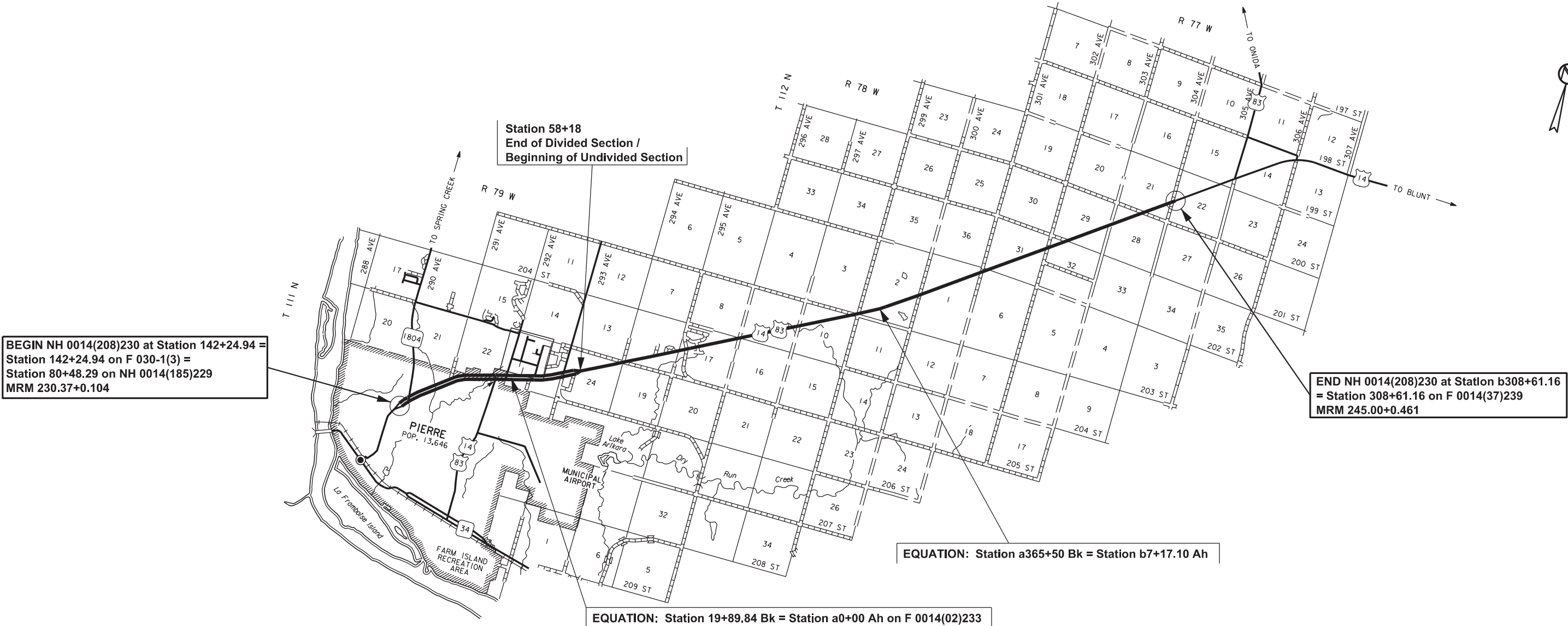
# SECTION M – PAVEMENT MARKING PLANS

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH 0014(208)230	M1	M17

Plotting Date: 12/30/2020

## INDEX OF SHEETS

- M1 General Layout with Index
- M2 - M3 Estimate of Quantities & Plan Notes
- M4 - M15 Pavement Marking Layouts
- M16 Pavement Marking Detail
- M17 Standard Plates



SECTION M ESTIMATE OF QUANTITIES

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH 0014(208)230	M2	M17

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
633E0010	Cold Applied Plastic Pavement Marking, 4"	30,923	Ft
633E0020	Cold Applied Plastic Pavement Marking, 8"	9,200	Ft
633E0030	Cold Applied Plastic Pavement Marking, 24"	2,121	Ft
633E0040	Cold Applied Plastic Pavement Marking, Arrow	40	Each
633E0050	Cold Applied Plastic Pavement Marking, Message	4	Word
633E1200	High Build Waterborne Pavement Marking Paint, White	807	Gal
633E1205	High Build Waterborne Pavement Marking Paint, Yellow	243	Gal
633E5000	Grooving for Cold Applied Plastic Pavement Marking, 4"	30,923	Ft
633E5005	Grooving for Cold Applied Plastic Pavement Marking, 8"	9,200	Ft
633E5015	Grooving for Cold Applied Plastic Pavement Marking, 24"	2,121	Ft
633E5025	Grooving for Cold Applied Plastic Pavement Marking, Arrow	40	Each
633E5035	Grooving for Cold Applied Plastic Pavement Marking, Message	4	Word
633E5100	Grooving for Durable Pavement Marking, 4"	175,920	Ft

PAVEMENT MARKING PAINT

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

The Contractor will advise the Engineer a minimum of 3 weeks prior to the application of the permanent pavement marking to allow the State to check and mark the location of no passing zones.

The application of permanent pavement marking will begin no sooner than 7 calendar days and will be completed within 14 calendar days following completion of the final surfacing.

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.

This material will consist of a durable high build, low VOC, fast drying, waterborne traffic paint with a 100% acrylic polymer (Arkema DT-400, Dow HD-21A, or equivalent). The Contractor will provide certification that the material is one of the following products or an equivalent as approved by the Operations Traffic Engineer:

- Diamond Vogel’s Waterborne High Build Polymer Marking Paint
- Ennis-Flint’s High Build Polymer Marking Paint

No further testing of this material will be required. 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.

The Department will take retroreflectivity readings on the pavement marking lines no sooner than 3 days and no later than 30 days after the completion of all line applications required for an individual highway route using a portable retroreflectometer conforming to 30-meter geometry. Retroreflectivity readings will be taken on a test location with cleaning being limited to light hand brooming.

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 15<sup>th</sup> in the following year. Upon replacement, the retroreflectivity testing process will be done again requiring new readings.

The Department 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.

Initial readings:

Pavement Marking Color	Minimum Value
White	350 mc/m²/lux
Yellow	275 mc/m²/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 Department 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 B.

RATES OF MATERIALS FOR HIGH BUILD WATERBORNE PAVEMENT MARKING PAINT

Solid 4” line = 27.8 Gals/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. All costs for removal of grinding and/or grooving residue will be included in the contract unit price per foot, each, or word for “Grooving for Cold Applied Plastic Pavement Marking” contract items.

**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 for “Grooving for Durable Pavement Marking” contract item.

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 <sup>1</sup> + 15 mils	+ 5 mils
Width of Groove	5 to 6 inches	
Length of Skip Lines <sup>2</sup>	10 foot 6 inches	± 3 inch
Tapers at ends of lines	6 to 9 inches	
Between Double Lines	4 inches	± 1/2 inch

<sup>1</sup> Marking thickness will include the thickness of marking material and reflective media.

<sup>2</sup> 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.

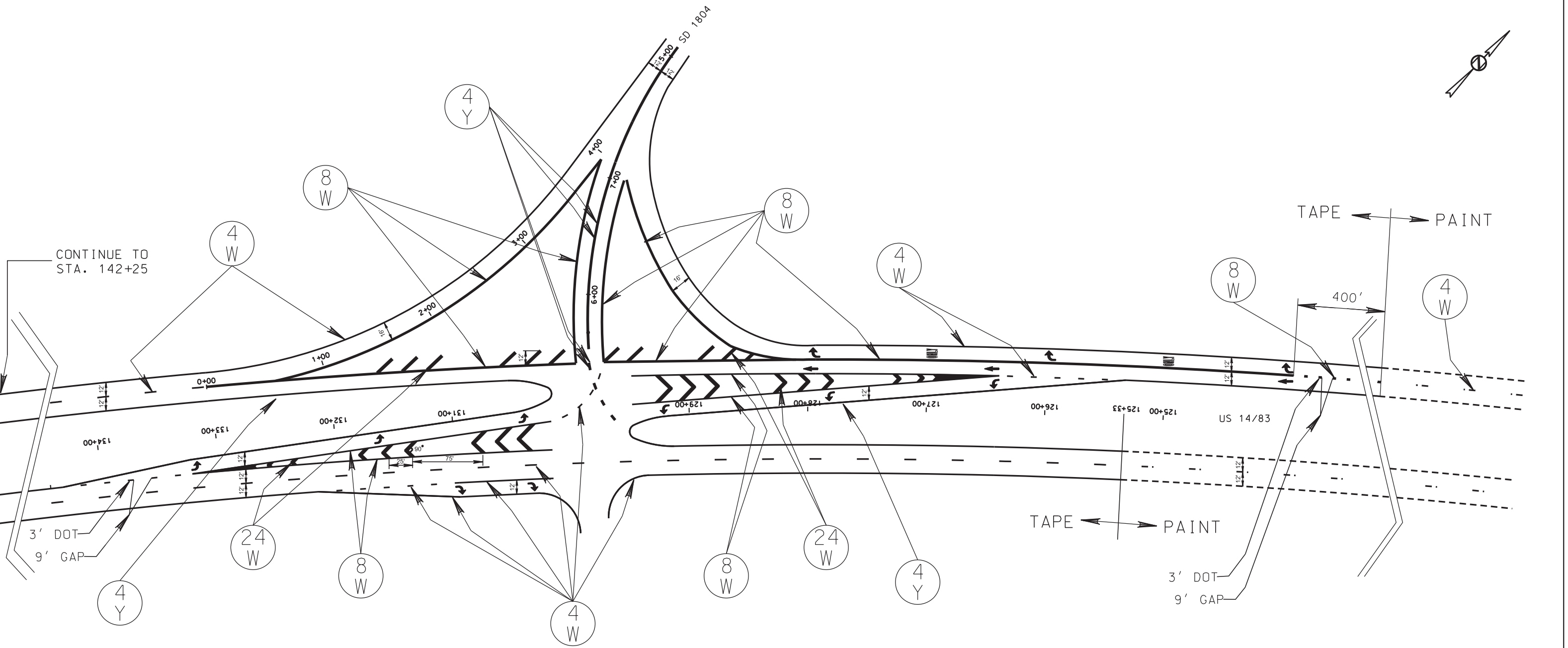
If damage occurs, including, but not limited to, joints, joint sealant material, and backer rod, the grooving operation will be stopped and modifications will be made to the grooving operation to prevent further damage. The Contractor will be required to use specially prepared circular diamond blade 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.

**TABLE OF COLD APPLIED PLASTIC PAVEMENT MARKING (TAPE)**

4” Yellow	4” White	8” Yellow	8” White	24” Yellow	24” White	Arrow Left	Arrow Right
19,045	11,878	2,550	6,650	649	1,472	26	8

Arrow Thru	Message (ONLY)						
6	4						

PAVEMENT MARKING LAYOUT  
(TAPE)  
JCT. US14/83 & SD1804



KEY	ITEM
4 Y	4" YELLOW
4 W	4" WHITE
8 W	8" WHITE
24 W	24" WHITE
↩	ARROW
ONLY	ONLY







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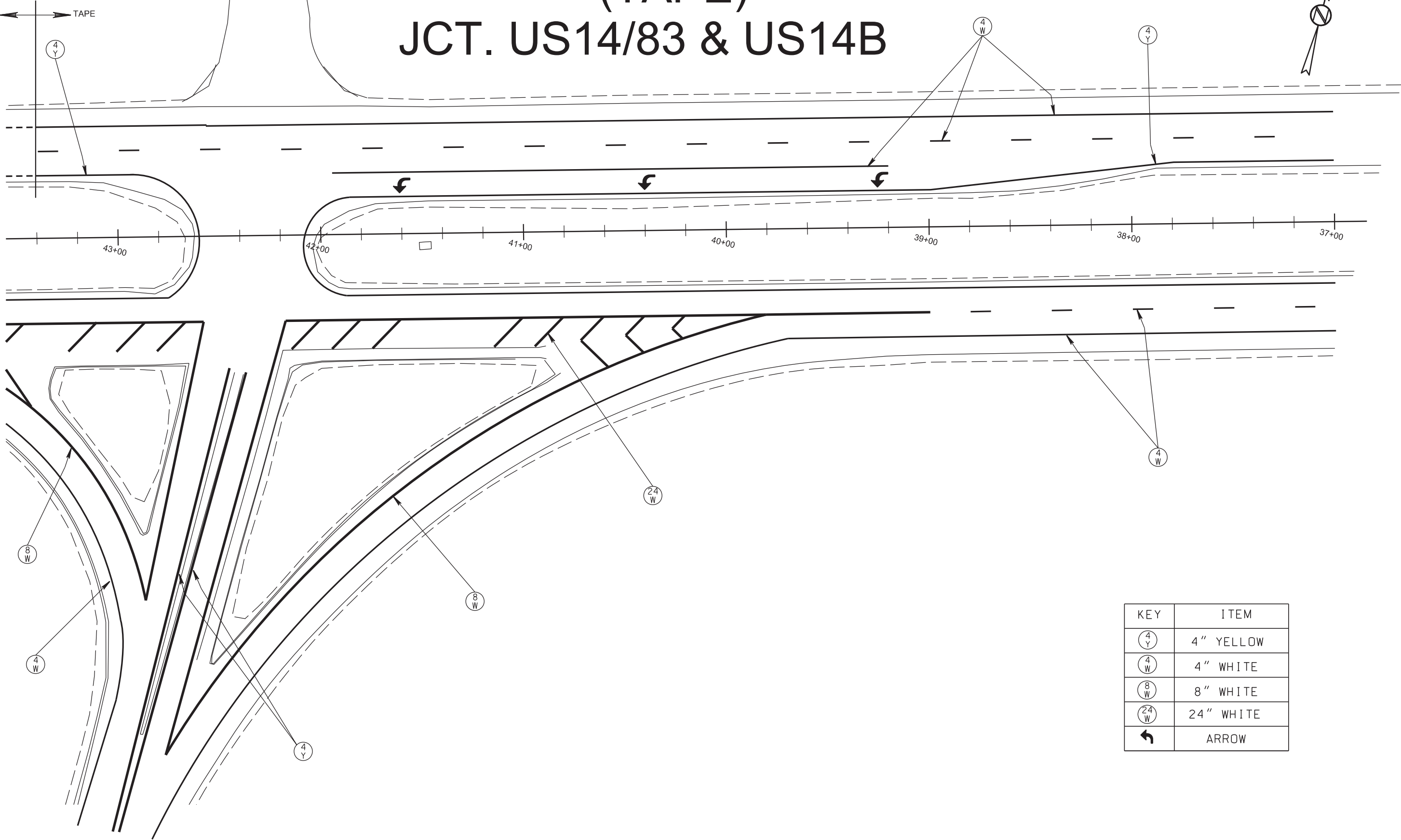
STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH 0014(208)230	M7	M17

Plotting Date: 03/01/2021

# PAVEMENT MARKING LAYOUT (TAPE)

## JCT. US14/83 & US14B

PAINT ← → TAPE



KEY	ITEM
4 Y	4 " YELLOW
4 W	4 " WHITE
8 W	8 " WHITE
24 W	24 " WHITE
↩	ARROW

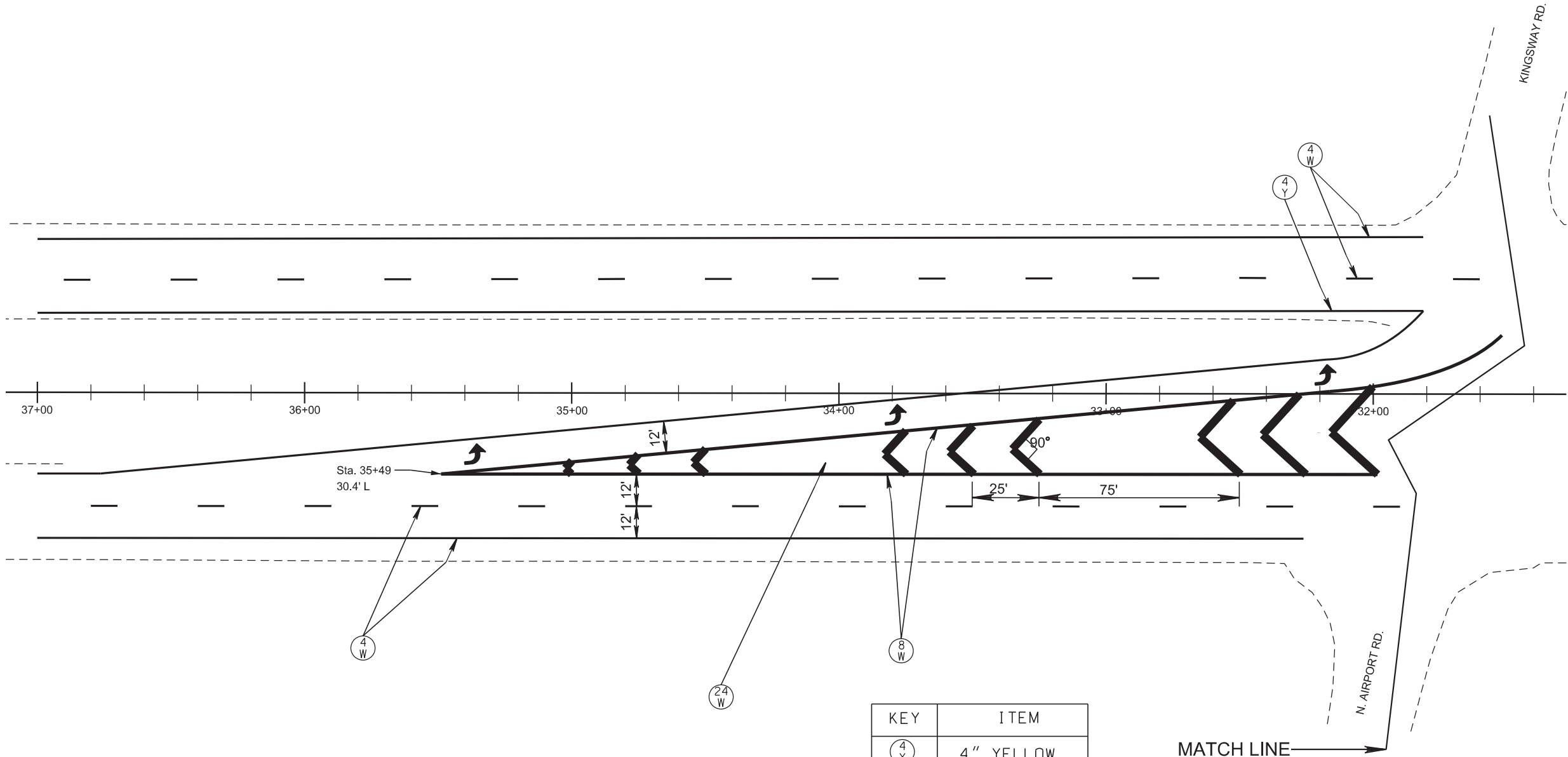
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Plotted From - TRPR25291

# PAVEMENT MARKING LAYOUT (TAPE) US14/83

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH 0014(208)230	M8	M17

Plotting Date: 12/30/2020



KEY	ITEM
4 Y	4 " YELLOW
4 W	4 " WHITE
8 W	8 " WHITE
24 W	24 " WHITE
↩	ARROW



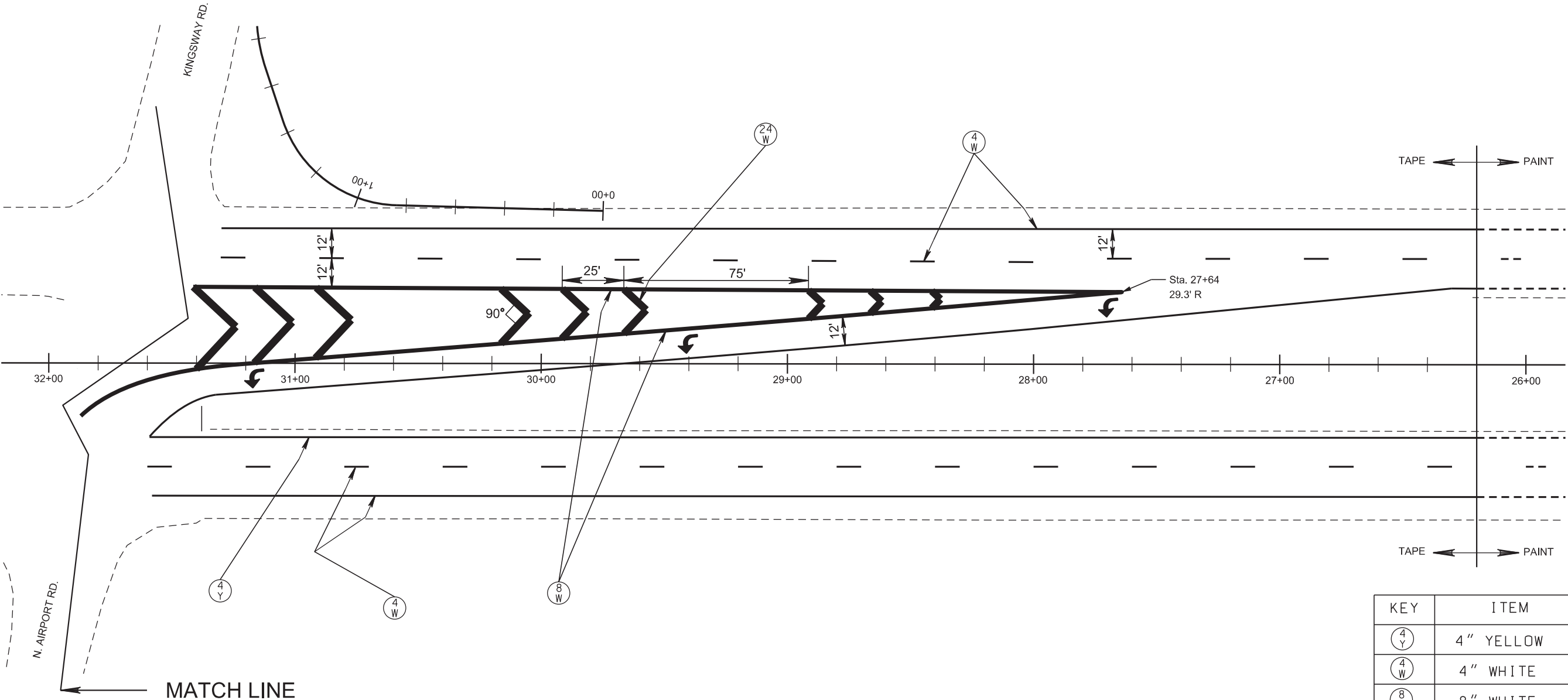
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Plotted From - TRPR25291

# PAVEMENT MARKING LAYOUT (TAPE) US14/83

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH 0014(208)230	M9	M17

Plotting Date: 12/30/2020



KEY	ITEM
4 Y	4 " YELLOW
4 W	4 " WHITE
8 W	8 " WHITE
24 W	24 " WHITE
↩	ARROW

# PAVEMENT MARKING LAYOUT (TAPE)

## US 14/83

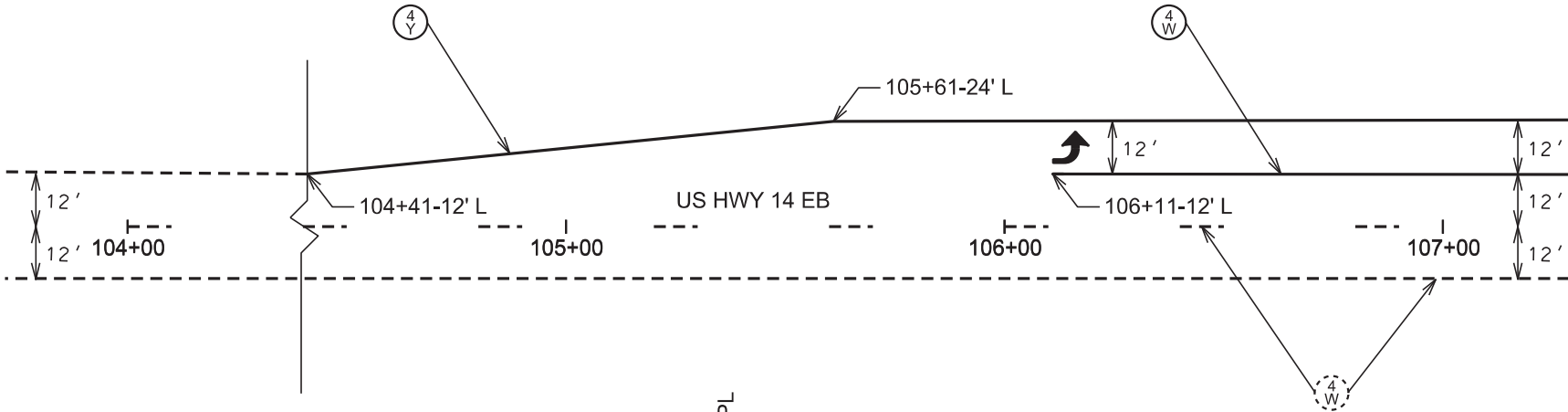
STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH 0014(208)230	M10	M17

Plotting Date: 12/30/2020



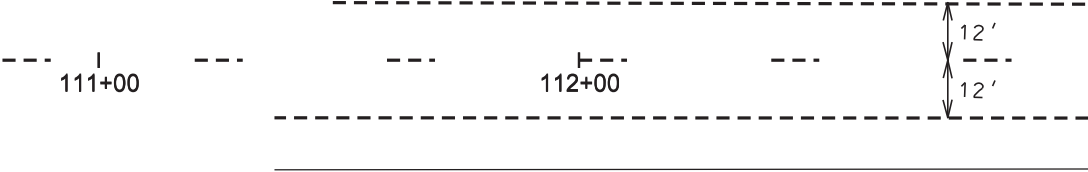
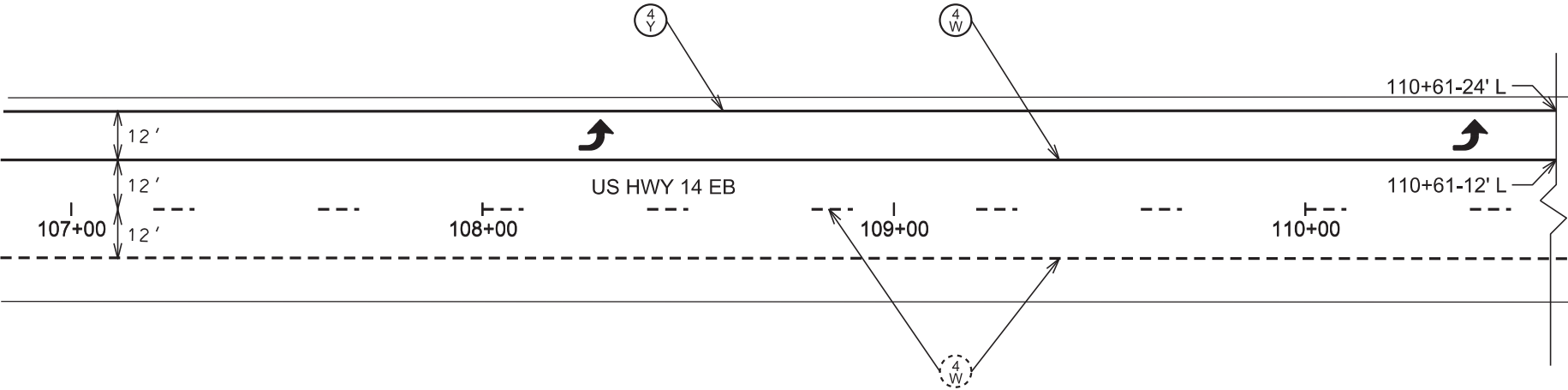
SCALE  
1" = 40'

KEY	ITEM
	4" YELLOW
	4" WHITE
	ARROW



WINDSOR PL

SD HWY 14 WB



# PAVEMENT MARKING LAYOUT (TAPE) US 14/83

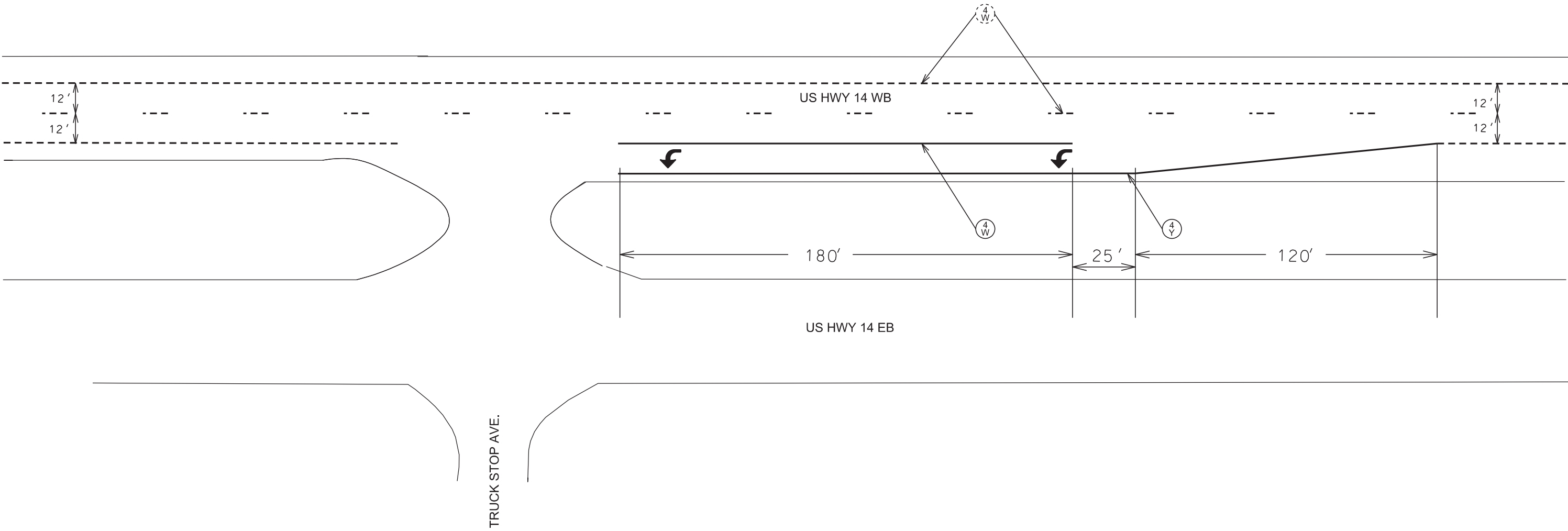
STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH 0014(208)230	M11	M17

Plotting Date: 12/30/2020



SCALE  
1" = 40'

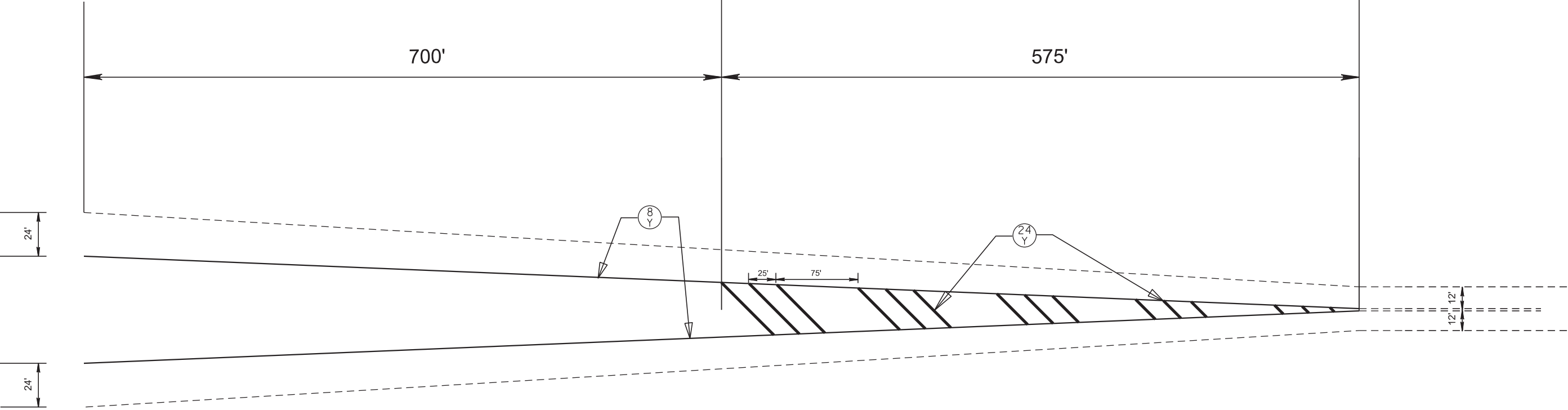
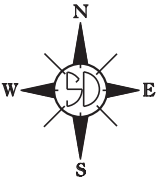
KEY	ITEM
	4" YELLOW
	4" WHITE
	ARROW



# PAVEMENT MARKING LAYOUT (TAPE)

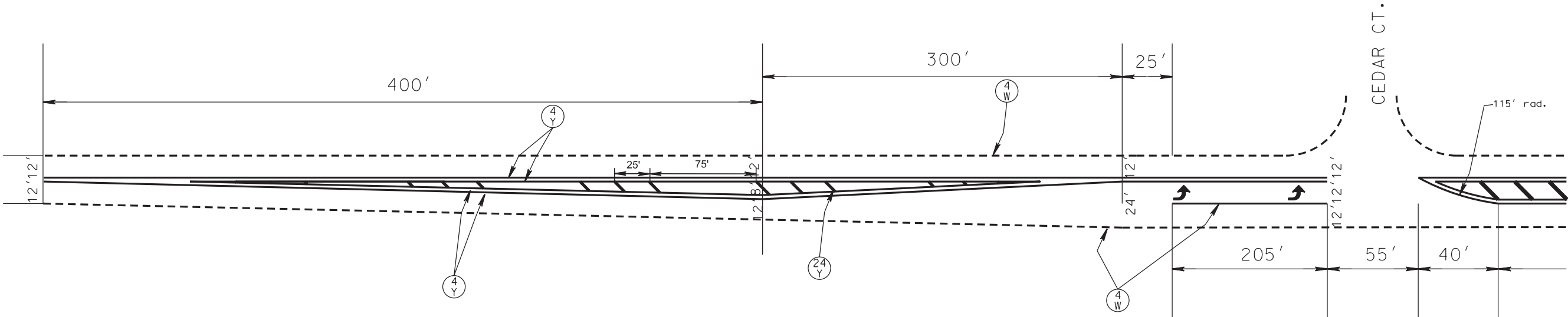
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	NH 0014(208)230	M12	M17

## GORE AREA BETWEEN DIVIDED AND UNDIVIDED



KEY	ITEM
8 Y	8 " YELLOW
24 Y	24 " YELLOW

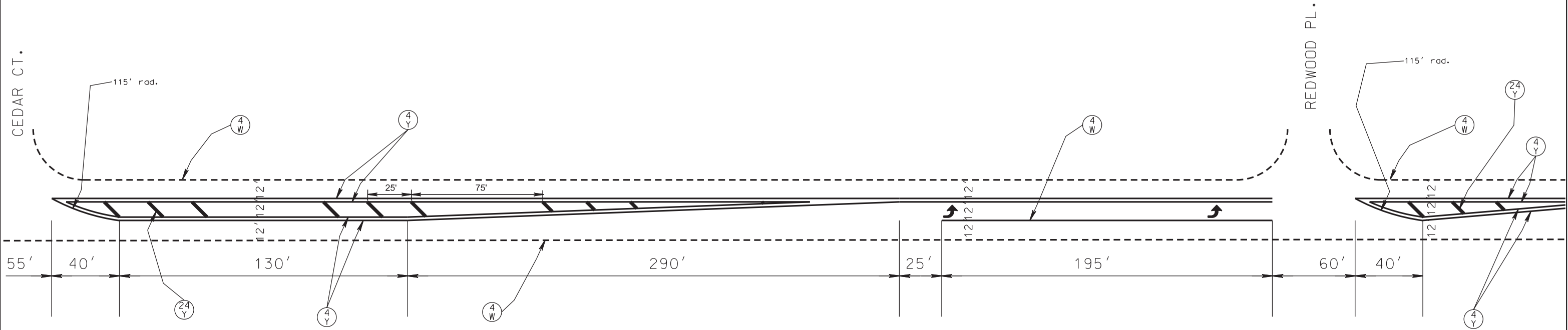
PAVEMENT MARKING LAYOUT  
(TAPE)  
US 14/83 / DELL ACRES



KEY	ITEM
4 Y	4" YELLOW
4 W	4" WHITE
24 Y	24" YELLOW
↩	ARROW

STATE OF SOUTH DAKOTA	PROJECT	SHEET NO.	TOTAL SHEETS
	NH 0014( 208 )230	M14	M17

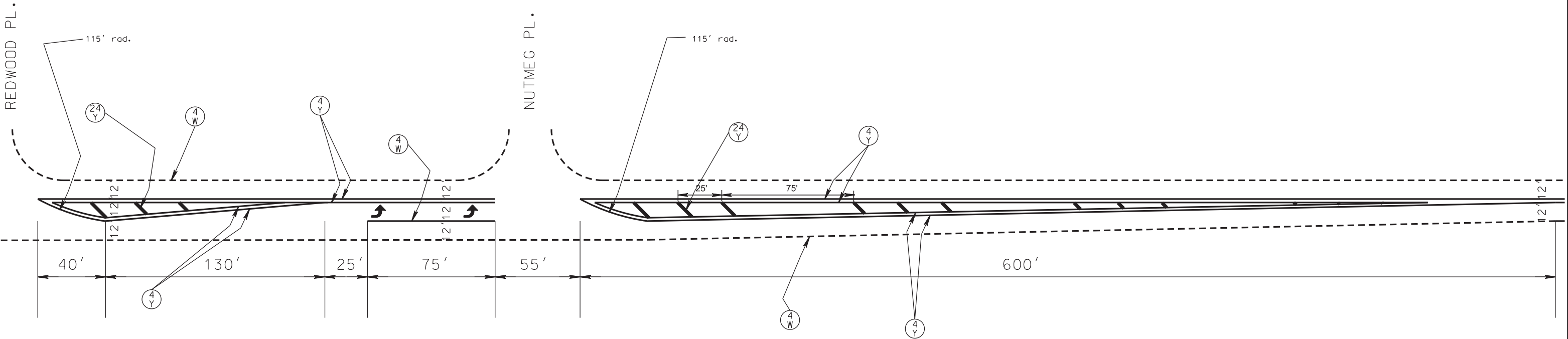
PAVEMENT MARKING LAYOUT  
(TAPE)  
US 14/83 / DELL ACRES



KEY	ITEM
(4 Y)	4" YELLOW
(4 W)	4" WHITE
(24 Y)	24" YELLOW
↩	ARROW



PAVEMENT MARKING LAYOUT  
(TAPE)  
US 14/83 / DELL ACRES



KEY	ITEM
(4 Y)	4" YELLOW
(4 W)	4" WHITE
(24 Y)	24" YELLOW
↩	ARROW

PAINT TABULATION

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	NH 0014(208)230	M16	M17

PAVEMENT MARKING

Typical pavement marking as shown on this sheet will be applied throughout the entire length of divided 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:

DIVIDED ROADWAY	
(Rates for one line)	
Solid Yellow Edgeline	Rate = 27.8 Gals./Pass-Mile
Dashed White Centerline	Rate = 6.9 Gals./Pass-Mile
Solid White Edgeline	Rate = 27.8 Gals./Pass-Mile

ESTIMATED QUANTITIES (BASED ON ONE APPLICATION)	
PAINT	QUANTITY
WHITE	174 GALLONS
YELLOW	121 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	-		
Right Arrows	-		
Straight Arrows	-		
Combo Arrows	-		
Lane Drop Arrows	-		
<u>Messages</u>			
STOP	-		
STOP AHEAD	-		
R X R with Bars	-		
SCHOOL X-ING	-		
Additional White:	-		

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

Pavement marking at On Ramps and at Off Ramps will be applied as detailed in these plans.

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 = 6.9 Gals./Pass-Mile
Solid Yellow Centerline	Rate = 27.8 Gals./Pass-Mile
Solid White Edgeline	Rate = 27.8 Gals./Pass-Mile

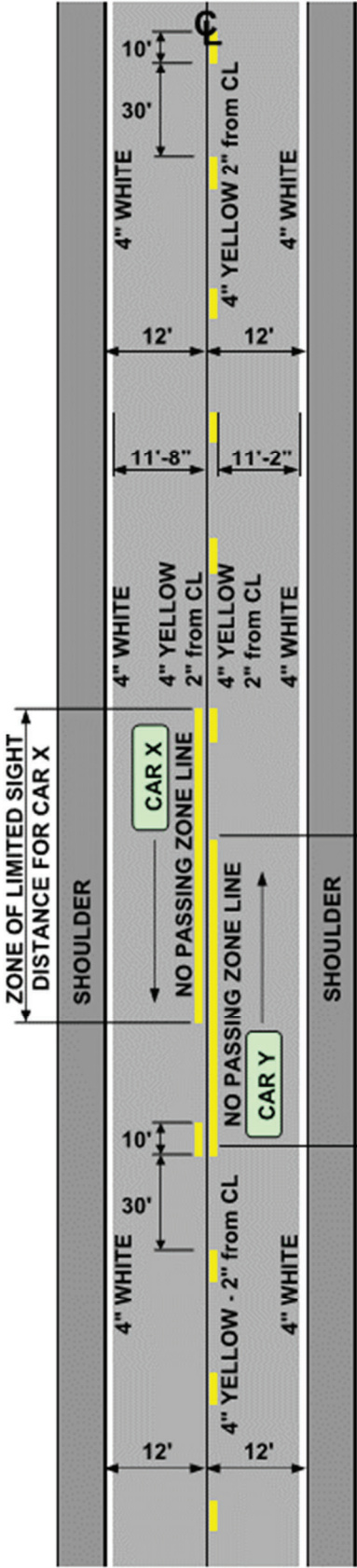
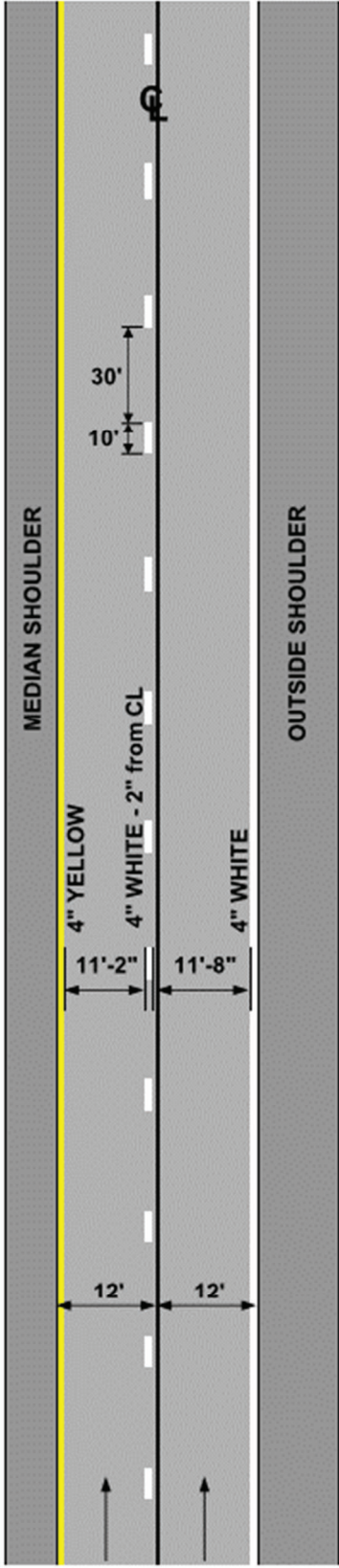
4" Yellow Skip Centerline (when not adjacent to a 4" Yellow No Passing Zone) will be placed consistently to the south or east side of centerline.

ESTIMATED QUANTITIES (BASED ON ONE APPLICATION)	
PAINT	QUANTITY
WHITE	633 GALLONS
YELLOW	122 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	-		
Right Arrows	-		
Straight Arrows	-		
Combo Arrows	-		
Lane Drop Arrows	-		
<u>Messages</u>			
STOP	-		
STOP AHEAD	-		
R X R with Bars	-		
SCHOOL X-ING	-		
Additional White:	-		

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

DIVIDED ROADWAY  
(ONE DIRECTION SHOWN)





Plotting Date: 03/02/2021

