SECTION M: PAVEMENT MARKING PLANS

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	IM 0903(102)112	M1	M6

Plotting Date: 12/29/2015

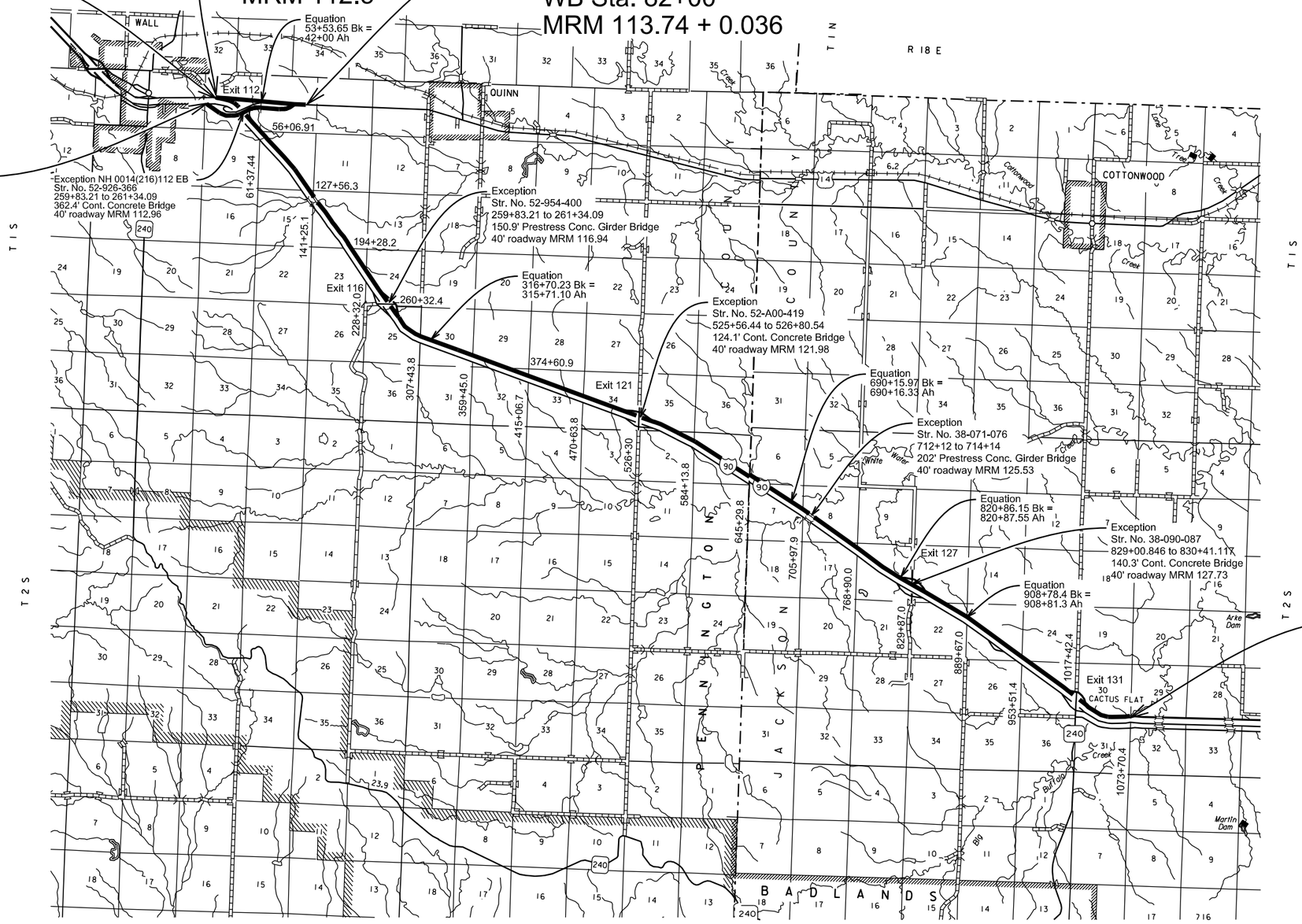
INDEX OF SHEETS

BEGIN PROJECT
IM 0903(102)112
Sta. 8+04.61
MRM 112.12 + 0.180

BEGIN PROJECT
NH 0014(216)112
EB Sta. 8+02.81
MRM 112.3

BEGIN PROJECT
NH 0014(216)112
WB Sta. 8+57
MRM 112.5

END PROJECT
NH 0014(216)112
WB Sta. 82+00
MRM 113.74 + 0.036



END PROJECT
IM 0903(102)112
Sta. 1063+89
MRM 132.0 + 0.165

Plot Scale - 1:200

Plotted From - trrc12695

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STATE OF SOUTH DAKOTA	PROJECT	SHEET NO.	TOTAL SHEETS
	IM 0903(102)112	M2	M6

ESTIMATE OF QUANTITIES

PCN 03W0

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
633E0010	Cold Applied Plastic Pavement Marking, 4"	28,203	Ft
633E0025	Cold Applied Plastic Pavement Marking, 12"	3,150	Ft
633E1200	Waterborne Pavement Marking Paint with High Grade Polymer, White	571	Gal
633E1205	Waterborne Pavement Marking Paint with High Grade Polymer,Yellow	571	Gal
633E5000	Grooving for Cold Applied Plastic Pavement Marking, 4"	28,203	Ft
633E5010	Grooving for Cold Applied Plastic Pavement Marking, 12"	3,150	Ft
633E5100	Grooving for Durable Pavement Marking, 4"	216,826	Ft

PCN 05EE

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
633E1200	Waterborne Pavement Marking Paint with High Grade Polymer, White	86	Gal
633E1205	Waterborne Pavement Marking Paint with High Grade Polymer,Yellow	86	Gal
633E5100	Grooving for Durable Pavement Marking, 4"	32,702	Ft

GENERAL NOTES

Permanent pavement markings shall be applied from MRM 112.12+0.020 to 132.00+0.165 on the westbound lanes. Pavement markings for both mainline edge lines shall be 4" and shall be "Waterborne Pavement Marking Paint with High Grade Polymer." Centerline skips shall be "Cold Applied Plastic Pavement Marking, 4"." The centerline skips and edge lines shall be grooved-in.

At the Exit 112 westbound off-ramp; Exits 116, 121, 127, and 131 westbound on-ramps and off-ramps; and at the merging of Exit 112 westbound off-ramp and eastbound US 14 and the diverging of westbound US 14 and Exit 112 eastbound on-ramp, all gore areas shall be grooved in and 12" Cold Applied Plastic Markings shall be applied, and ramp taper skip throats shall be grooved in and 4" Cold Applied Plastic Markings shall be applied.

Exit 112 westbound on-ramp and eastbound off-ramp edge lines shall be 4", grooved in and painted with "Waterborne Pavement Marking Paint with High Grade Polymer" through US 14 MRM 113.74+0.040.

Grooving, removal, and cleaning work shall be conducted in such a manner as to control and minimize airborne dust and similar debris that may become a hazard to motor vehicle operation.

PAVEMENT MARKING PAINT

All materials shall be applied as per manufacturer's recommendations.

The application of permanent pavement marking paint may not begin until 2 calendar days following completion of the flush seal and shall be completed within 14 calendar days following completion of the flush seal. If the flush seal is eliminated, the Contractor shall complete the application of permanent pavement marking paint no sooner than two calendar days, but within 14 calendar days following completion of final surfacing.

COLD APPLIED PLASTIC PAVEMENT MARKING

All materials shall be applied as per manufacturer's recommendations.

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

WATERBORNE PAVEMENT MARKING PAINT WITH HIGH GRADE POLYMER

All materials shall be applied as per manufacturer's recommendations.

This material shall consist of a durable high build, low VOC, fast drying, waterborne traffic paint with a 100% acrylic polymer (Dow DT-400 or DOW HD-21A or equivalent) and with reflective media adhered to the paint. The reflective media shall consist of glass beads as well as bonded core reflective elements.

The bonded core reflective elements shall contain either clear or yellow tinted microcrystalline ceramic beads bonded to the outer surface. All microcrystalline ceramic beads bonded to reflective elements shall have a minimum index of refraction of 1.8 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 shall be removed and replaced. If replacement of markings cannot be applied within the same year, the Contractor shall 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 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/m^2/lux
Yellow	275 mc/m^2/lux

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

RATES OF MATERIALS FOR WATERBORNE PAVEMENT MARKING PAINT WITH HIGH BUILD POLYMER

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 shall be incidental to the contract unit price per gallon for Waterborne Pavement Marking Paint with High Grade Polymer, White or Yellow.

GROOVING FOR COLD APPLIED PLASTIC PAVEMENT MARKING

The Contractor shall establish a positive means for the removal of the grinding and/or grooving residue. Residue from dry grooving shall be vacuumed. Solid residue shall be removed from the pavement surfaces before being blown by traffic action or wind. Residue from wet grooving shall 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, shall 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 shall be included in the contract unit price per foot for Grooving for Cold Applied Plastic Pavement Marking.

The bottom of the groove shall be uniform and free of loose material. The groove shall be flat and of uniform depth for the entire width of the groove.

The groove depth shall be 100 mils with a tolerance of +10 mils.

STATE OF SOUTH DAKOTA	PROJECT	SHEET NO.	TOTAL SHEETS
	IM 0903(102)112	M3	M6

GROOVING FOR WATERBORNE PAVEMENT MARKING PAINT WITH HIGH GRADE POLYMER

The Contractor shall establish a positive means for the removal of the grinding and/or grooving residue. Residue from dry grooving shall be vacuumed. Solid residue shall be removed from the pavement surfaces before being blown by traffic action or wind. Residue from wet grooving shall 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, shall 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 shall be included in the contract unit price per foot for Grooving for Durable Pavement Marking for the width, specified.

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

The grooving shall 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 shall include the thickness of marking material and reflective media.

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

The equipment shall 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 shall be stopped and modifications shall be made to the grooving operation to prevent further damage. The Contractor may be required to use specially prepared circular diamond blade cutting heads to prevent damage at the joints. Damage caused shall 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 shall start and stop a sufficient distance from the expansion joints so no damage occurs in these areas. Markings on bridge decks shall be surface applied.

TABLE OF PAVEMENT MARKING QUANTITIES

Description	Quantity	Unit
4" White Paint With High Grade Polymer	124765	Ft
4" Yellow Paint With High Grade Polymer	124765	Ft
4" White Cold Applied Plastic Pavement Marking	28028	Ft
12" White Cold Applied Plastic Pavement Marking	3150	Ft

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	IM 0903(102)112	M4	M6

Plotting Date: 12/29/2015

PAVEMENT MARKING LAYOUT

Plot Scale - 1:100

PI 43+18.16
N 608395.08
E 1476588.02
Del 5°03'28" L
Dc 0°31'48"
T 477.58'
L 954.54'
R 10813.11'

US 14 Westbound
40+00
45+00
50+00
51+54
EQNBK53+53.65
EQNAHDa 42+00.00

Ramp B

US 14 Eastbound
55+00
EQNBK58+01.71
EQNAHDa 48+86.85
a 50+00
a 51+54
EQNBKa 53+53.6
EQNAHDb 42+00.

PI 51+82.88
N 608302.37
E 1476494.50
Del 36°52'04"R
Dc 3°00'00"
T 636.58'
L 1228.93'
R 1909.86'

Ramp A

12" White Tape
4" White Tape
4" White Paint
4" Yellow Paint

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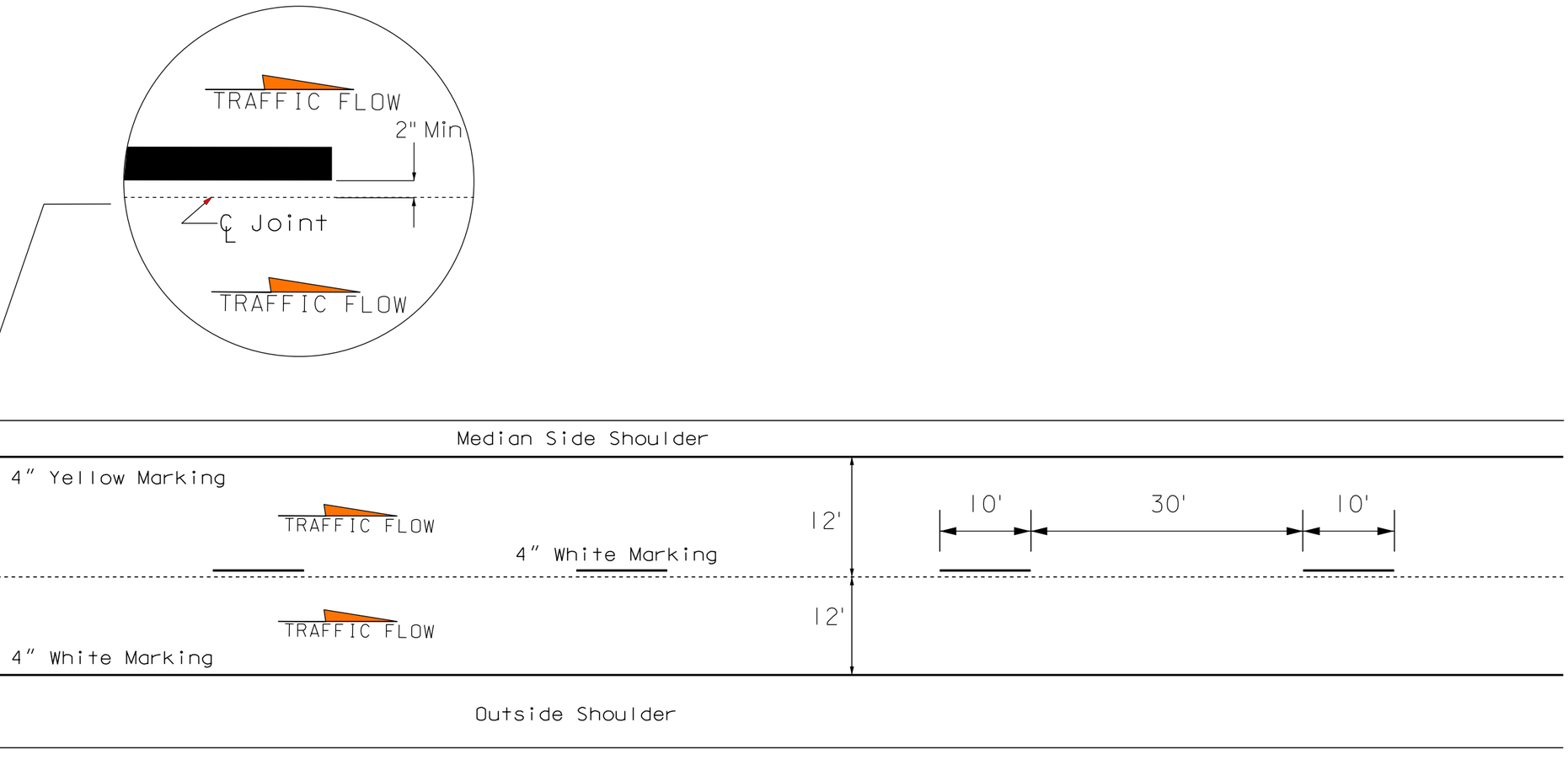
PAVEMENT MARKING LAYOUT

(TYPICAL 4-LANE DIVIDED)

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	IM 0903(102)112	M5	M6

Plotting Date: 12/29/2015



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STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	IM 0903(102)112	M6	M6

Plotting Date: 12/29/2015

PLOT SCALE - 1:200

PLOT NAME - 4

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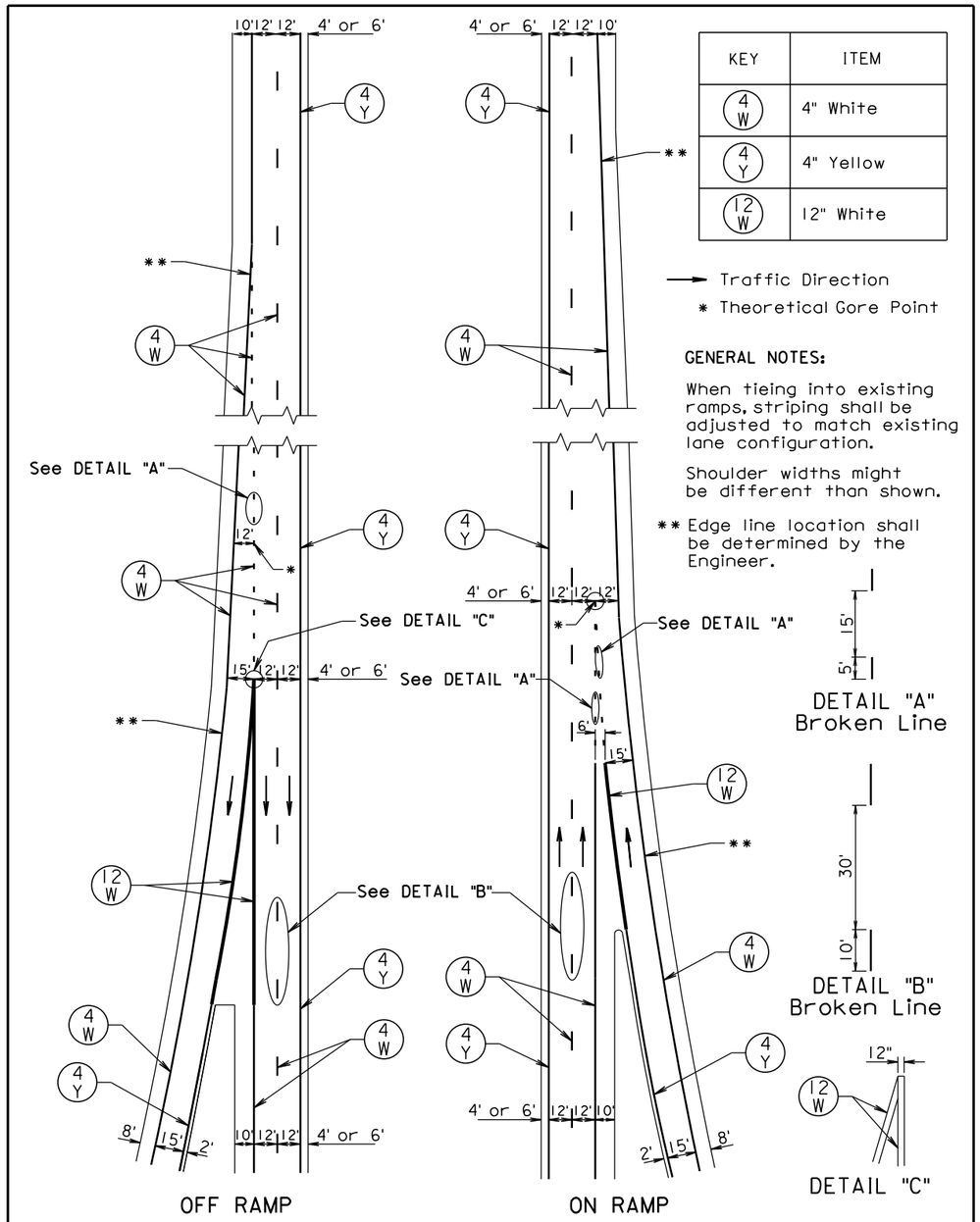
-PLOTTED FROM - TRRC12695



KEY	ITEM
4 W	4" White
4 Y	4" Yellow
12 W	12" White

GENERAL NOTES:

When tieing into existing ramps, striping shall be adjusted to match existing lane configuration.

Shoulder widths might be different than shown.

** Edge line location shall be determined by the Engineer.

DETAIL "A"
Broken Line

DETAIL "B"
Broken Line

DETAIL "C"

PAVEMENT MARKING LAYOUT FOR RAMPS