

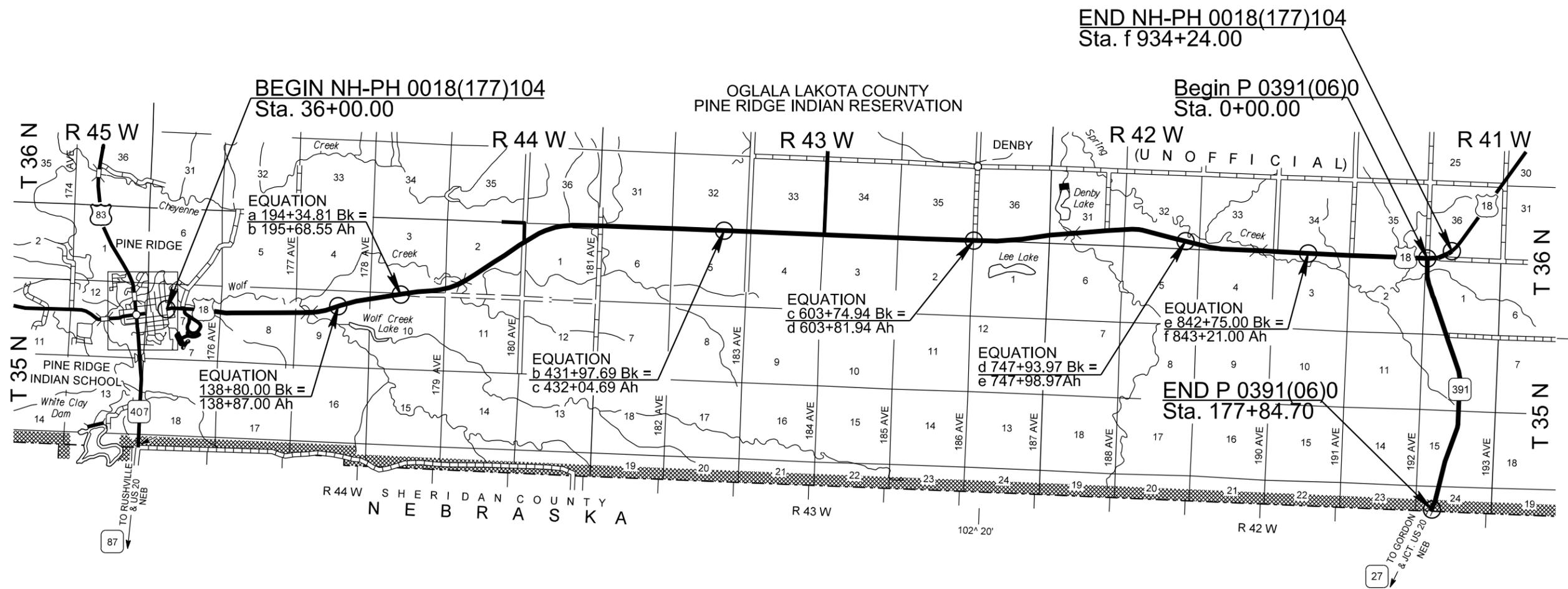
STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH-PH 0018(177)104	M1	M8

Plotting Date: 01/21/2016

# Section M: Pavement Markings

## INDEX OF SHEETS

- M1: General Layout W/ Index
- M2-M3: Estimate W/ General Notes & Tables
- M4-M7: Typical Details
- M8: Standard Plates



Plot Scale - 1:200

Plotted From - trcs12695

Plot Name -

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**ESTIMATE OF QUANTITIES**

US HWY 18:

Bid Item Number	Item	Quantity	Unit
633E0040	Cold Applied Plastic Pavement Marking, Arrow	65	Each
633E1200	Waterborne Pavement Marking Paint with High Grade Polymer, White	963.4	Gal
633E1205	Waterborne Pavement Marking Paint with High Grade Polymer, Yellow	630.7	Gal
633E5025	Grooving for Cold Applied Plastic Pavement Marking, Arrow	65	Each

SD HWY 391:

Bid Item Number	Item	Quantity	Unit
633E0030	Cold Applied Plastic Pavement Marking, 24"	12	Ft
633E1200	Waterborne Pavement Marking Paint with High Grade Polymer, White	188.0	Gal
633E1205	Waterborne Pavement Marking Paint with High Grade Polymer, Yellow	60.0	Gal
633E5015	Grooving for Cold Applied Plastic Pavement Marking, 24"	12	Ft

**PERMANENT PAVEMENT MARKINGS**

Work on this project consists of Grooving and applying Cold Applied Plastic Pavement Markings and applying Waterborne Pavement Marking Paint with High Grade Polymer.

US18: – Asphalt Concrete Surfacing  
MRM 104.00+0.176 to MRM 121.00+0.212  
Centerlines & Edgelines

- Waterborne Paint with High Grade Polymer
- Arrows
  - Grooved-In Cold Applied Plastic Pavement Markings

SD391: – Asphalt Concrete Surfacing  
MRM 0.00+0.000 to MRM 3.37+0.000  
Centerlines & Edgelines

- Waterborne Paint with High Grade Polymer
- Stop Bars
  - Grooved-In Cold Applied Plastic Pavement Markings

All surfaces have existing markings and the Contractor is encouraged to review all routes prior to bidding.

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

**COLD APPLIED PLASTIC PAVEMENT MARKING**

The Contractor shall apply the Cold Applied Plastic Pavement Marking material as per manufacturer's instructions.

Cold applied plastic pavement markings shall be placed into a recessed groove on the surface.

Final locations of markings will be determined by Engineer.

**GROOVE PAVEMENT FOR COLD APPLIED PLASTIC MARKINGS**

The grooving shall be completed within the following tolerance:

Depth of Groove: 110 mils, ± 10 mils.

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.

Markings that fall outside of the groove shall be removed (at least 90%) using additional methods approved by the Engineer. All costs for materials, labor, and equipment necessary to remove the existing markings shall be incidental to the contract unit price per foot for Grooving for Cold Applied Plastic Marking, 24" or Grooving for Cold Applied Plastic Marking, Arrow.

The Contractor shall establish a positive means for the removal of the grinding and/or grooving residue. Solid residue shall be removed from the pavement surfaces before being blown by traffic action or wind. Residue 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.

**PAVEMENT MARKING PAINT WITH HIGH GRADE POLYMER**

This material shall consist of a durable high build, low VOC, fast drying, waterborne traffic paint with an acrylic polymer emulsion 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 retro-reflectivity 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 retro-reflectometer conforming to 30-meter geometry. Retro-reflectivity readings will be taken on a test location with cleaning being limited to light hand brooming.

Pavement markings not conforming to the Retro-reflectivity 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 15<sup>th</sup> in the following year. Upon replacement, the retro-reflectivity testing process will be done again requiring new readings.

**PAVEMENT MARKING PAINT WITH HIGH GRADE POLYMER (CONT.)**

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

Initial Readings (within 3 - 30 days of the line application):

<u>Pavement Marking Color</u>	<u>Minimum Value</u>
White	350 mcd/m2/lux
Yellow	275 mcd/m2/lux

All pavement markings not conforming to the requirements provided in these plans will be considered deficient and shall be removed and replaced. Additional retro-reflectivity 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 Contractor's expense, with no cost incurred by the State.

**RATES OF MATERIALS FOR HIGH GRADE POLYMER 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 shall be incidental to the contract unit price per gallon for Waterborne Pavement Marking Paint with High Grade Polymer, White or Yellow.

**NO PASS ZONES**

All No Pass Zones shall be reviewed prior to the application of any new centerline markings. The Contractor shall advise the Engineer a minimum of three (3) weeks prior to the application of permanent pavement markings to allow the State to mark the locations of No Pass Zones. State forces will not be available to mark the No Pass Zones from 07-19-16 to 08-13-16.

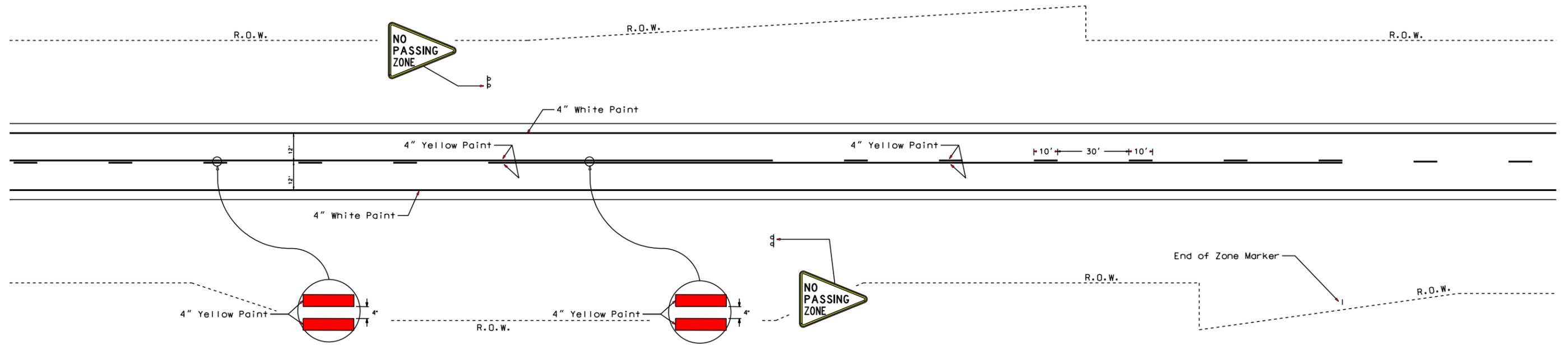
**TABLE OF COLD APPLIED PLASTIC PAVEMENT MARKING, ARROW**

<b>Approx Sta</b>	<b>Description</b>	<b>Number of Arrows</b>
32+60	Eastbound Left Turn Lane	3
33+00	Eastbound Right Turn Lane	2
34+00	Westbound Left Turn Lane	3
38+00	Two-Way Left Turn Lane	2
42+00	Two-Way Left Turn Lane	2
46+00	Two-Way Left Turn Lane	2
50+00	Two-Way Left Turn Lane	2
54+00	Two-Way Left Turn Lane	2
58+00	Two-Way Left Turn Lane	2
62+00	Two-Way Left Turn Lane	2
64+00	Two-Way Left Turn Lane	2
67+00	Two-Way Left Turn Lane	2
70+00	Two-Way Left Turn Lane	2
72+00	Two-Way Left Turn Lane	2
76+00	Two-Way Left Turn Lane	2
80+00	Two-Way Left Turn Lane	2
83+00	Two-Way Left Turn Lane	2
85+00	Two-Way Left Turn Lane	2
89+00	Two-Way Left Turn Lane	2
93+00	Two-Way Left Turn Lane	2
97+00	Two-Way Left Turn Lane	2
100+00	Two-Way Left Turn Lane	2
103+00	Two-Way Left Turn Lane	2
106+00	Two-Way Left Turn Lane	2
279+70b	Eastbound Left Turn Lane	3
293+38b	Westbound Left Turn Lane	3
491+48c	Eastbound Left Turn Lane	3
920+50f	Eastbound Left Turn Lane	3
929+24f	Westbound Left Turn Lane	3
	<b>Total:</b>	<b>65</b>

# TYPICAL LAYOUT

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH-PH 0018(177)104	M4	M8
Plotting Date: 01/21/2016			

## 2-LANE MARKING & SIGNING



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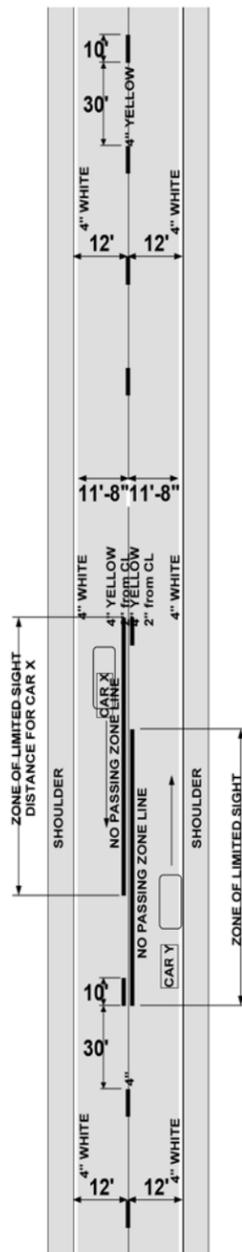
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**TWO LANE ROADWAY**

**FURNISHING AND APPLYING PAVEMENT MARKING PAINT**



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

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

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

Vehicle-mounted signs shall be mounted in a manner such that they are not obscured by equipment or supplies.

Sign legends on vehicle-mounted signs shall be covered or turned from view when work is not in progress.

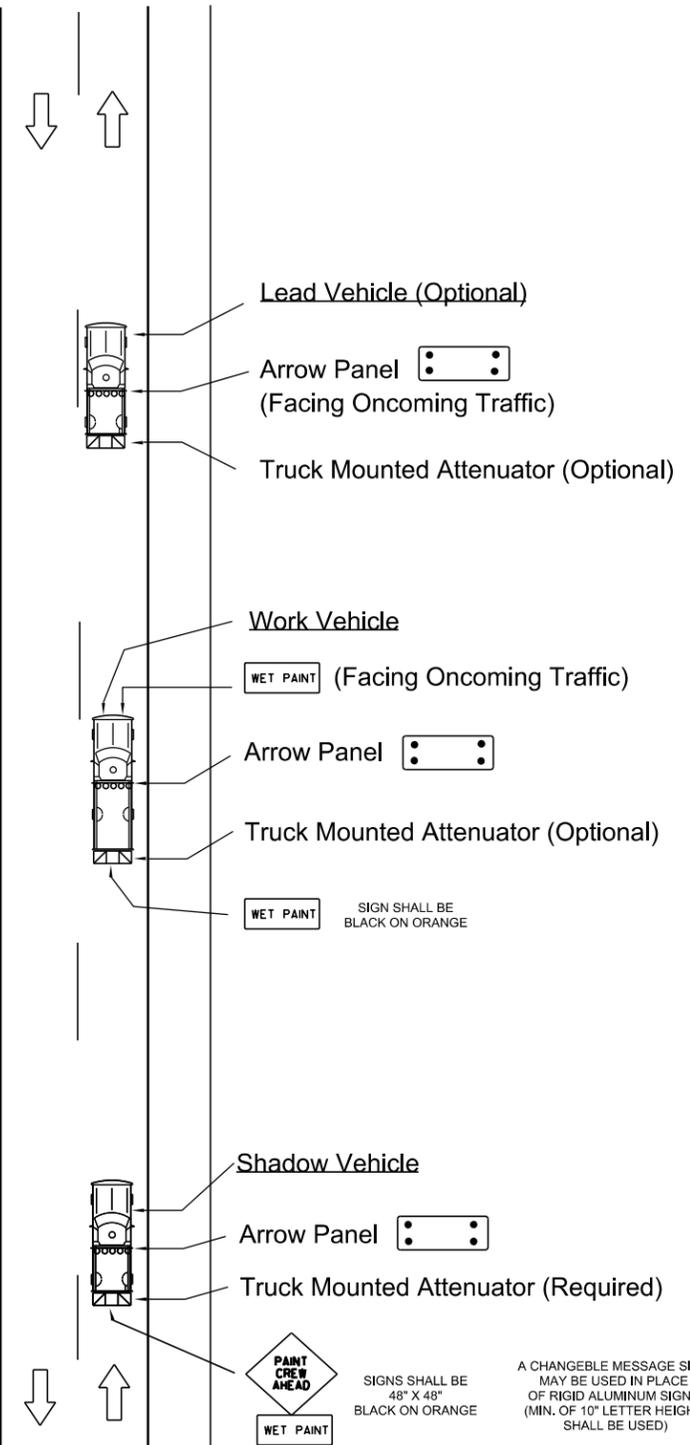
Shadow and Work vehicles shall display high-intensity rotating, flashing, oscillating, or strobe lights, flags, signs, or arrow panels.

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

When an arrow panel is used, it shall be used in the caution mode.

Marching Diamonds are acceptable.

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



Lead Vehicle (Optional)

Arrow Panel (Facing Oncoming Traffic)

Truck Mounted Attenuator (Optional)

Work Vehicle

WET PAINT (Facing Oncoming Traffic)

Arrow Panel

Truck Mounted Attenuator (Optional)

WET PAINT SIGN SHALL BE BLACK ON ORANGE

Shadow Vehicle

Arrow Panel

Truck Mounted Attenuator (Required)

PAINT CREW AHEAD WET PAINT  
SIGNS SHALL BE 48" X 48" BLACK ON ORANGE

A CHANGEABLE MESSAGE SIGN MAY BE USED IN PLACE OF RIGID ALUMINUM SIGNS (MIN. OF 10' LETTER HEIGHT SHALL BE USED)

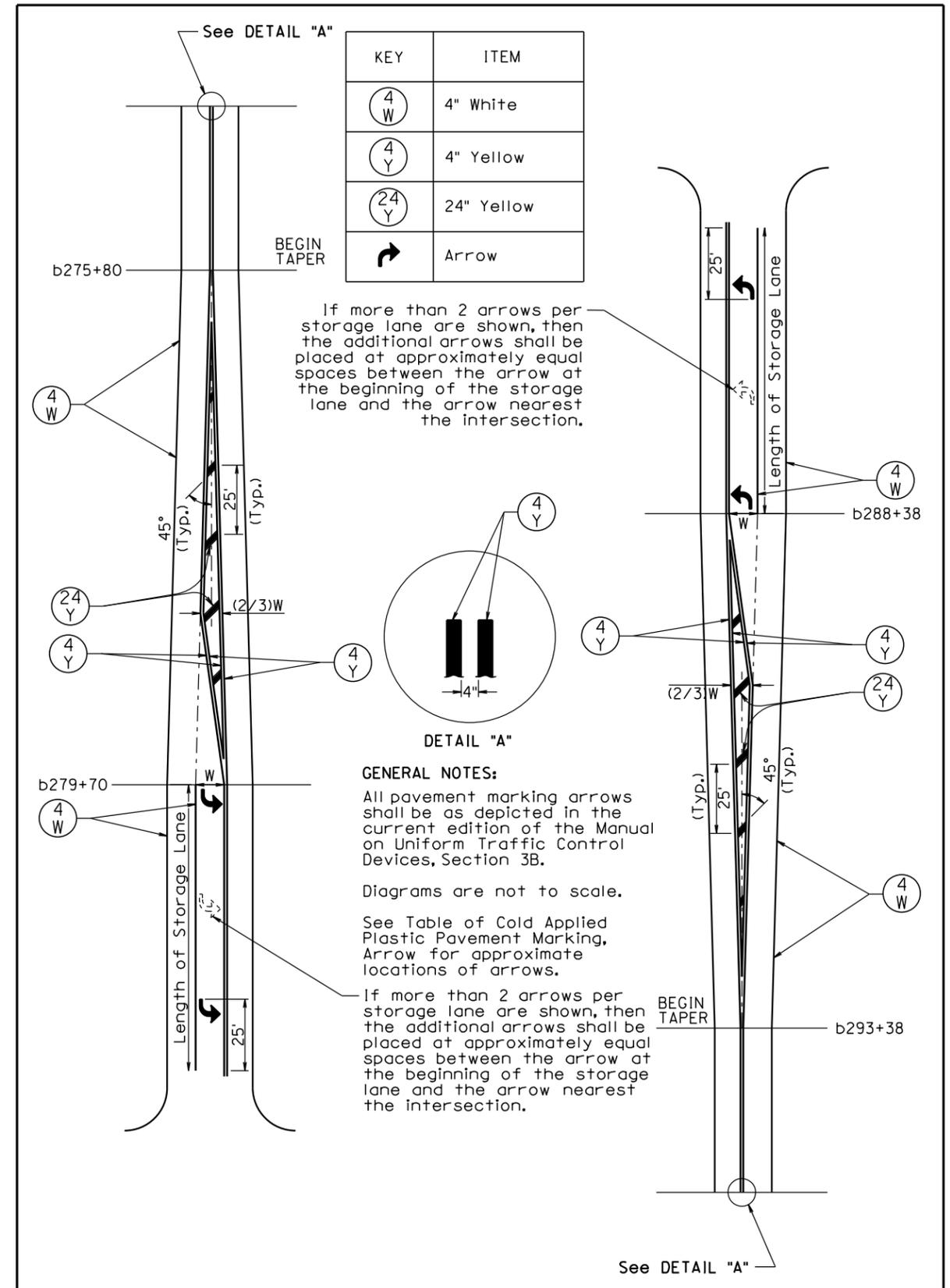
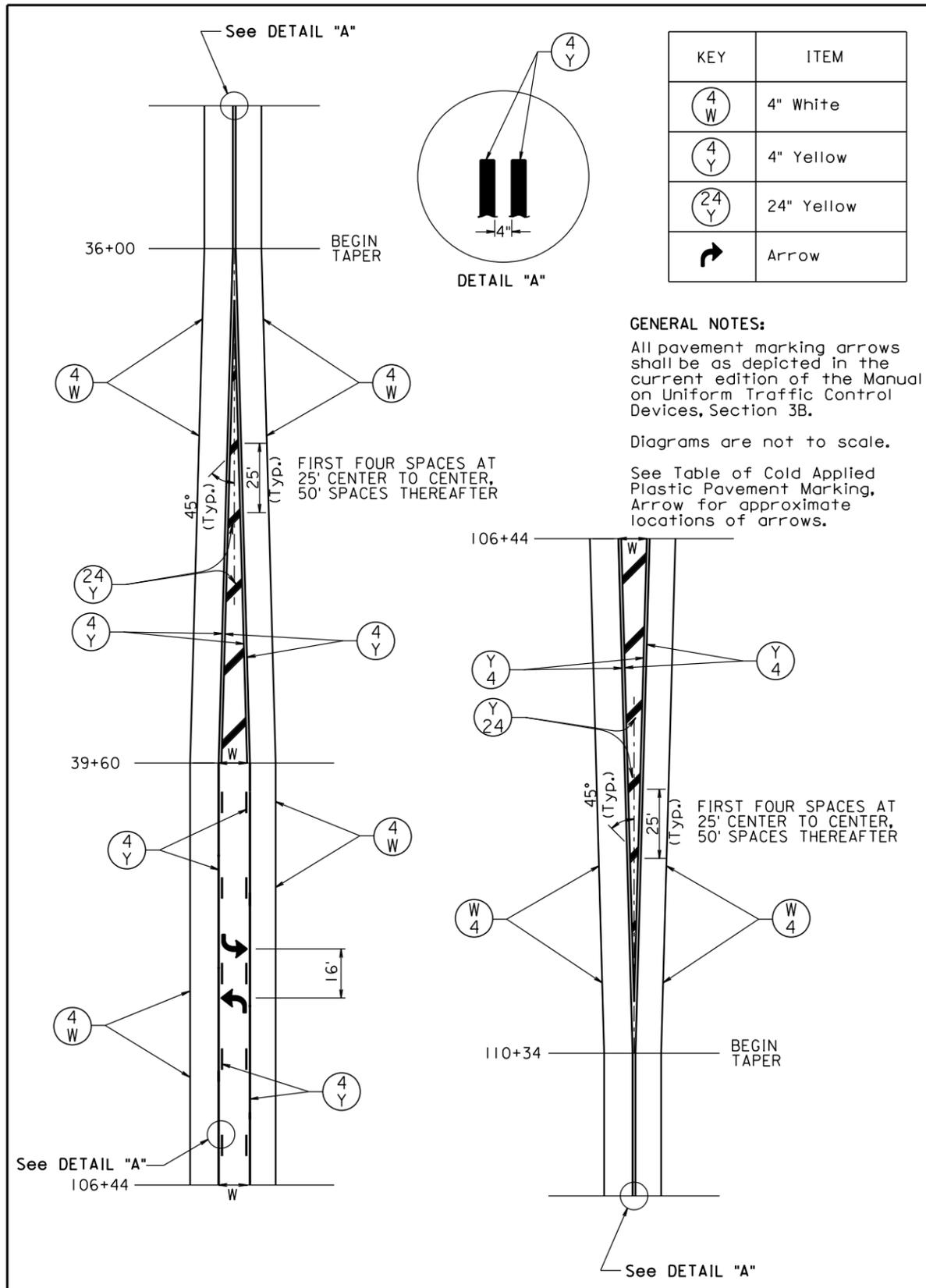
**GUIDES FOR TRAFFIC CONTROL DEVICES  
MOBILE OPERATIONS ON 2-LANE ROAD**

MOBILE: Intermittent & Continuous Moving

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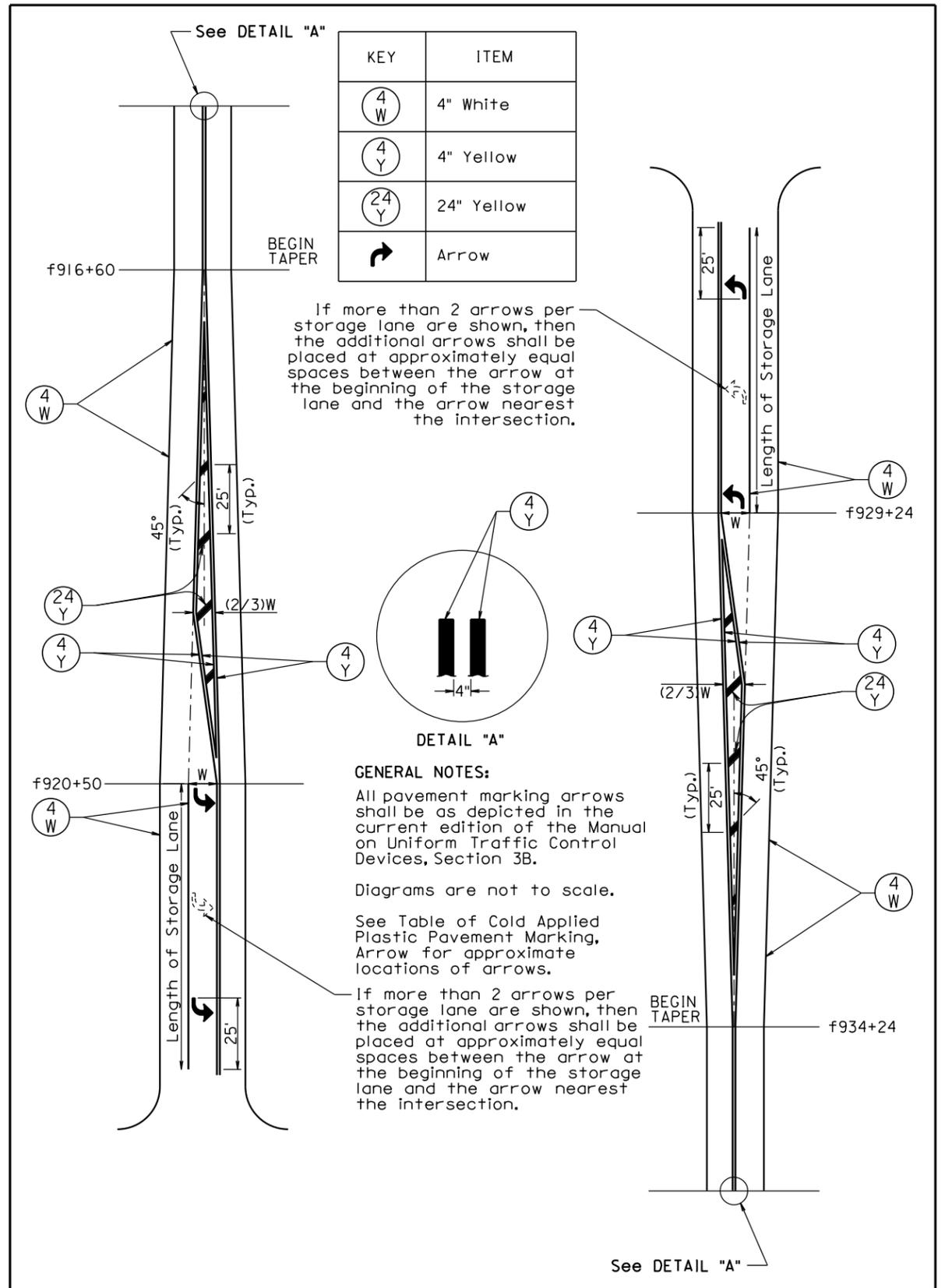
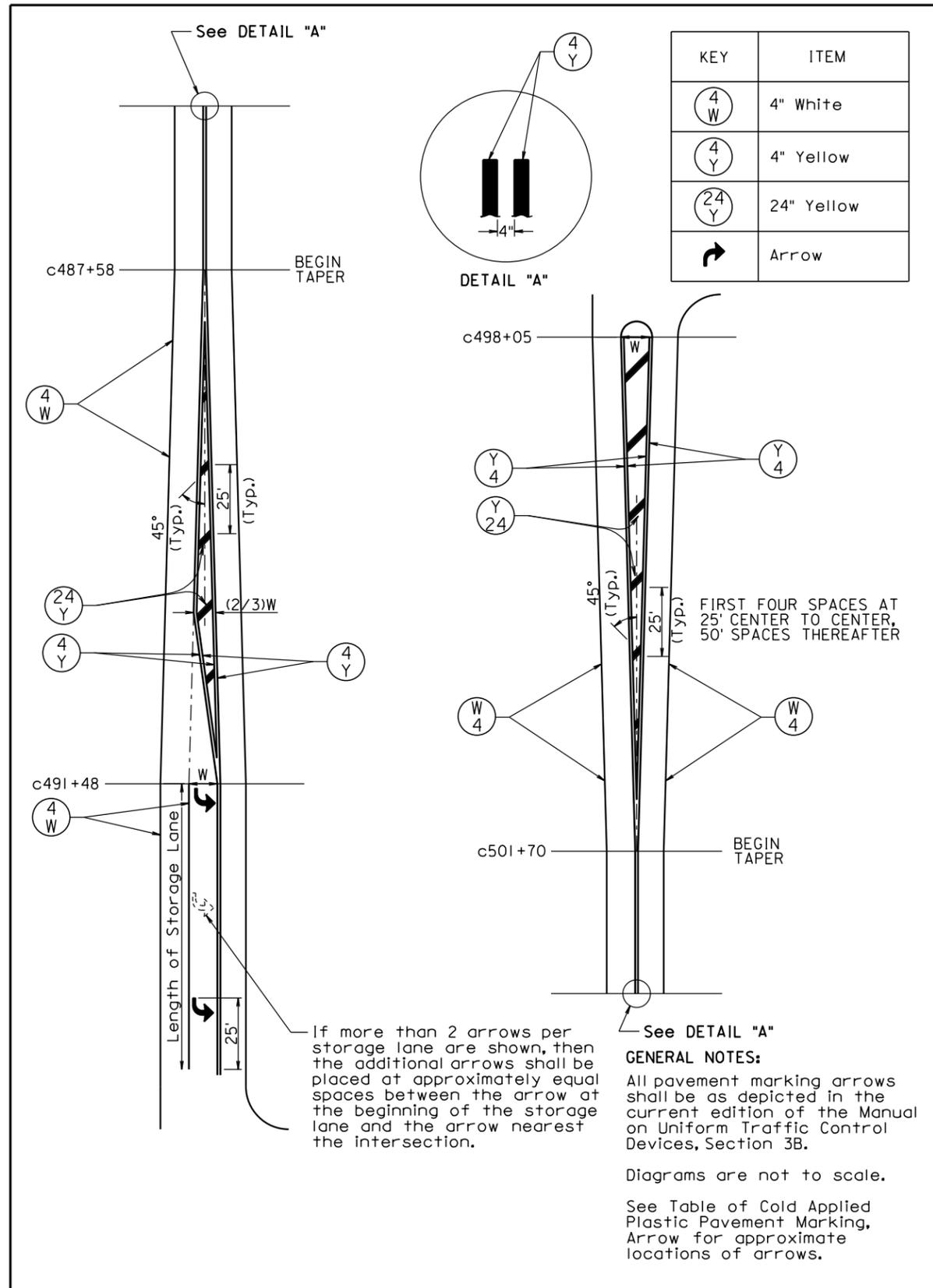
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