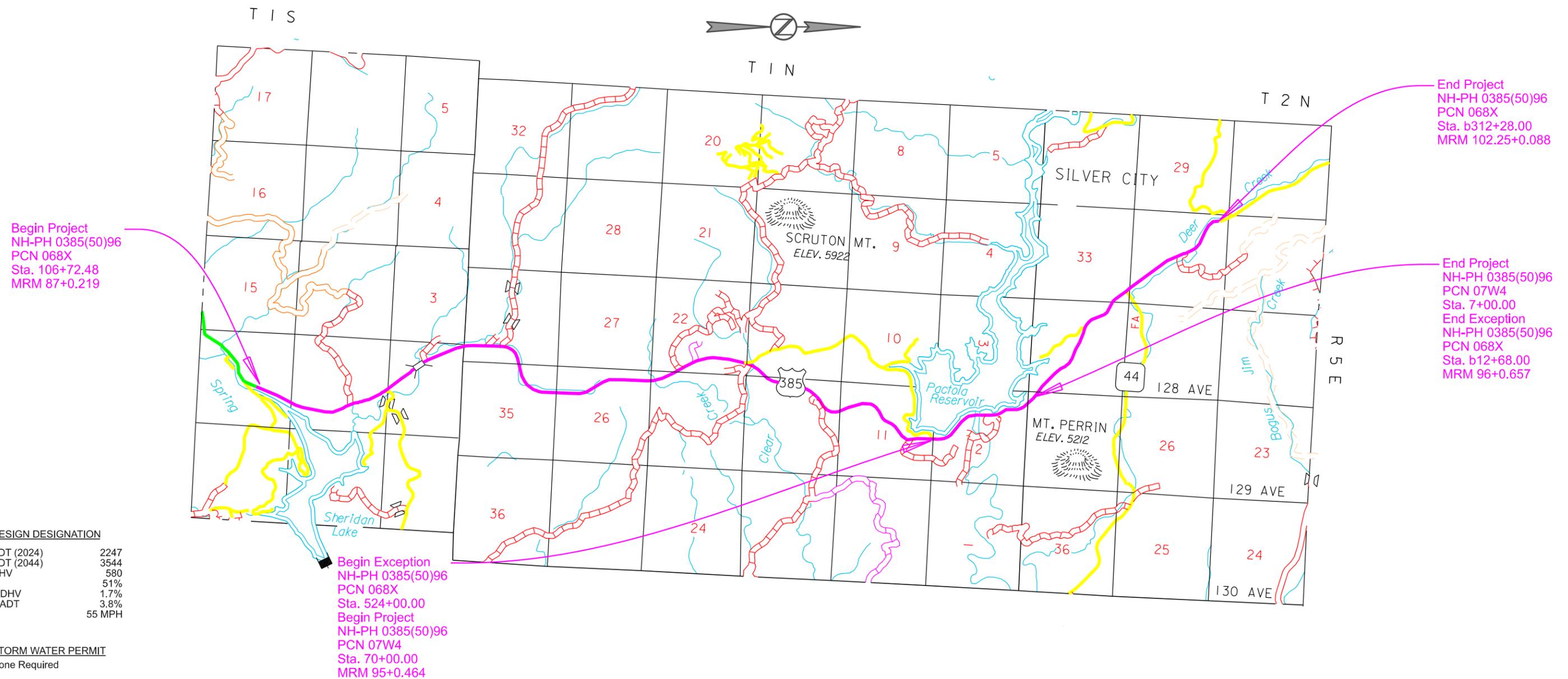


SECTION M: PAVEMENT MARKING PLANS

INDEX OF SHEETS

M1	General Layout with Index
M2-M4	Estimate, Notes, & Tables
M5	Typical Pavement Marking Layout
M6-M15	Pavement Marking Layouts
M16	Standard Plates



DESIGN DESIGNATION

ADT (2024)	2247
ADT (2044)	3544
DHV	580
D	51%
T DHV	1.7%
T ADT	3.8%
V	55 MPH

STORM WATER PERMIT

None Required

SECTION M ESTIMATE OF QUANTITIES

PCN 068X

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
633E0030	Cold Applied Plastic Pavement Marking, 24"	773	Ft
633E0040	Cold Applied Plastic Pavement Marking, Arrow	18	Each
633E1201	High Build Waterborne Pavement Marking Paint with Reflective Elements, White	379	Gal
633E1206	High Build Waterborne Pavement Marking Paint with Reflective Elements, Yellow	285	Gal
633E5015	Grooving for Cold Applied Plastic Pavement Marking, 24"	773	Ft
633E5025	Grooving for Cold Applied Plastic Pavement Marking, Arrow	18	Each
633E5100	Grooving for Durable Pavement Marking, 4"	96,781	Ft

PCN 07W4

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
633E0030	Cold Applied Plastic Pavement Marking, 24"	204	Ft
633E0040	Cold Applied Plastic Pavement Marking, Arrow	10	Each
633E1201	High Build Waterborne Pavement Marking Paint with Reflective Elements, White	56	Gal
633E1206	High Build Waterborne Pavement Marking Paint with Reflective Elements, Yellow	76	Gal
633E5015	Grooving for Cold Applied Plastic Pavement Marking, 24"	204	Ft
633E5025	Grooving for Cold Applied Plastic Pavement Marking, Arrow	10	Each
633E5100	Grooving for Durable Pavement Marking, 4"	15,336	Ft

PAVEMENT MARKING PAINT

All No Passing Zones will be reviewed prior to the application of any new centerline markings. The Contractor will advise the Engineer a minimum of 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 08-03-2026 to 08-16-2026.

The application of permanent pavement marking will begin no sooner than 7 calendar days following completion of the fog or flush seal. Application of permanent pavement marking 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 IES 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 Section 980.1 B.

Reflective media consisting of glass beads as well as wet-reflective optics will be adhered to the paint.

The wet-reflective optics will contain either clear, white, amber, or yellow tinted beads composed of glass or a composite consisting of a core made from ceramic or glass with an outer layer of microcrystalline ceramic or glass beads. The wet-reflective optics will provide a 50/50 blend of dry to wet ratio of optics. All beads bonded to wet-reflective optics 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.

Reflective media will require a Certificate of Compliance for Certification for each type, source, and lot. Acceptance sampling will not be required.

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 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 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.

RATES OF MATERIALS FOR HIGH BUILD WATERBORNE PAVEMENT MARKING PAINT

All 4" yellow and white pavement marking paint will contain both glass beads and wet-reflective optics, while all other pavement markings will only contain glass beads.

For High Build Waterborne Pavement Marking Paint, 4" Yellow and White:

- Solid 4" line = 27.8 Gals/Mile
- Dashed 4" line = 7.6 Gal/Mile
- Glass Beads = 5.3 Lbs/Gal.
- Wet-Reflective Optics = 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.

DATA LOGGING SYSTEM

The Contractor will provide striper computerized data logging system files as described below. The pavement marking device will have an onboard monitoring system for the purpose of managing the amount of pavement marking materials being applied to the pavement surface.

The following will be included in the documentation from the data logging system:

- State project number and PCN
- Highway number
- Beginning and end MRMs of the section marked rounded to the nearest hundredth of a mile, including direction of travel
- Beginning and ending coordinates determined by a Global Positioning System receiver with 3-meter accuracy, including direction of travel
- Date and beginning and ending time of application
- Product applied
- Lot number(s) of product (binder and reflective material) applied
- Striping Contractor (striper code)
- Designation of the marking being applied (LEL – Left Edgeline, REL – Right Edgeline, CL – Centerline, LL – Lane Line Broken or Dotted, 1LL – leftmost LL in multilane, 2LL – second to leftmost LL in multilane, etc.)
- Width of marking being applied
- Presence of recess or rumble strip
- Presence of contrast
- Average material application rate and film thickness calculated for the section striped

The following data will be included in the documentation from the data logging system reported as an average for each drive mile (or other segment approved by the Engineer) installed:

- Application vehicle speed rounded to the nearest tenth of a mile per hour
- Weight (Lbs) and/or volume (Gal) as measured through a positive displacement pump (mechanism or flow meter) of liquid material used by color
- Weight (Lbs) of reflective material used
- Ratio of reflective material used (weight) per liquid material used (volume) reported as Lbs/Gal
- Ambient air temperature (in degrees Fahrenheit)
- Road surface temperature (in degrees Fahrenheit)
- Humidity (percent)
- Dew point (in degrees Fahrenheit)

Provide the measurement report in the form of an electronic database file, or delimited text file, containing raw data collected. Provide the Engineer with a printed summary and submit the electronic data to the Region Traffic Engineer at the e-mail below and copy the Engineer.

Jesse.Nelson@state.sd.us

The data logging system equipment will be operational, calibrated, and in use during pavement marking operations. Pavement marking installation without the use of a data logging system may not be accepted.

Upon request, provide to the Engineer the data logging system manufacturer's recommendations for equipment calibration frequency and provide certification that the equipment meets manufacturer's recommended calibration.

Verify that the physical and electronic measurement of distance travelled is consistent by travelling a 100-foot distance prior to the start of pavement marking operations.

All cost for materials, labor, and equipment necessary to provide the pavement marking data as described will be incidental to the contract unit price for the respective pavement marking items.

MARKINGS WITHIN CENTERLINE RUMBLE STRIPES

The sinusoidal centerline rumble stripes are recessed below the pavement surface, so pavement marking grooving will not be required at these locations.

Retroreflectivity readings will not be taken for pavement markings within the sinusoidal centerline rumble stripes. Restriping of pavement markings to meet the specified application rate requirements and to provide a quality retroreflective line will be at the expense of the Contractor with no additional cost to the Department. Sections to be restriped will be determined by the Engineer.

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 foot or each for "Grooving for Cold Applied Plastic Pavement Marking" contract items.

	PROJECT	SECTION	SHEET
	NH-PH 0385(50)96	M	3/16

Plotting Date: 2/4/2026

GROOVING FOR HIGH BUILD WATERBORNE PAVEMENT MARKING PAINT

Grooving for the edge line pavement markings will not be required due to the shoulder rumble strips/stripes.

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 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.

Pavement Marking Table for PCN 068X										
STA	to STA	Length (feet)	Pavement Marking Layout	4 WP		4 YP		White Arrow (each)	24 YT	24 WT
				4" White Solid Shoulder (feet)	4" White Solid Turn Lane (feet)	4" Yellow Solid (feet)	4" Yellow Skip (feet)		24" Yellow Solid (feet)	24" White Solid (feet)
104+74	109+05	431	Sheet M7	1092	97	1457		2	26	
109+05	179+70	7065		14130		4290	3375			
179+70	199+00	1930	Sheet M8-9	4324	946	6792		7	242	32
199+00	402+85	20385		40770		12003	10798			
402+85	424+80	2195	Sheets M10-12	4675	571	7193		5	281	
424+80	525+20	10040		20080		14408	816			
525+20	536+00	1080	Sheet M13	2062	230	3751		4	192	

TOTALS (FEET OR EACH): 87134 1844 49895 14989 18 741 32
TOTALS (GAL): 371 8 263 22
4" PAINT GROOVING (FEET): 96781
24" TAPE GROOVING (FEET): 773
ARROW TAPE GROOVING (EACH): 18

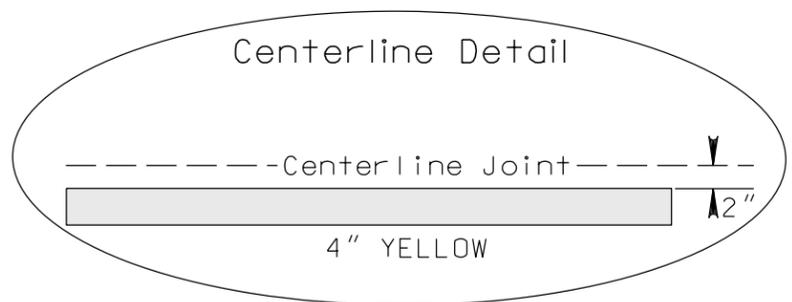
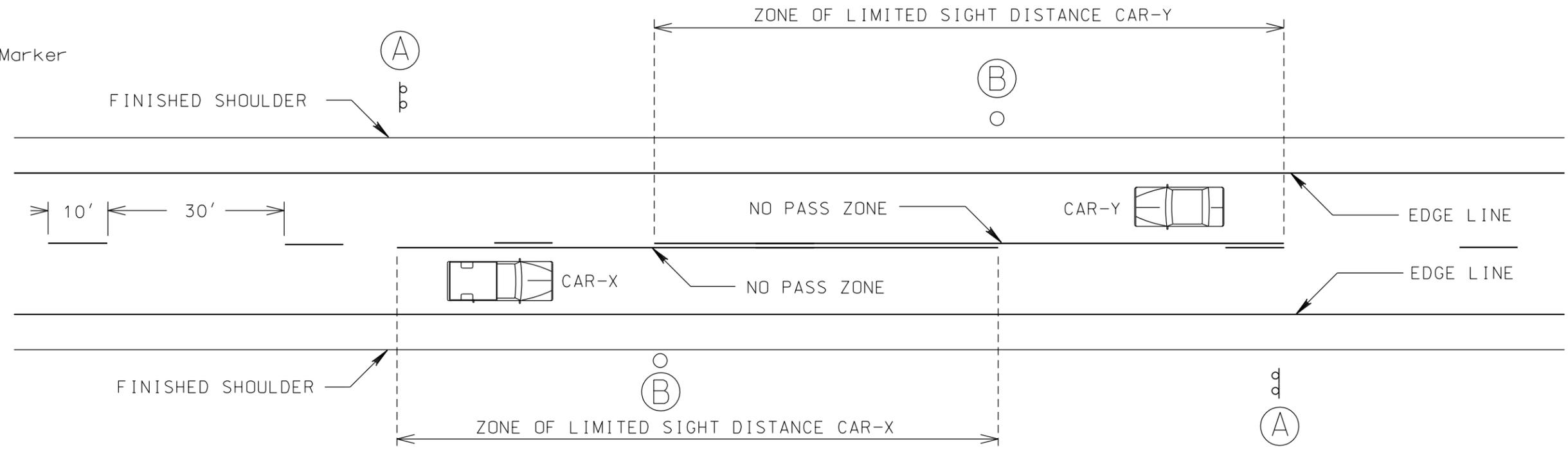
Pavement Marking Table for PCN 07W4										
STA	to STA	Length (feet)	Pavement Marking Layout	4 WP		4 YP		White Arrow (each)	24 YT	24 WT
				4" White Solid Shoulder (feet)	4" White Solid Turn Lane (feet)	4" Yellow Solid (feet)	4" Yellow Skip (feet)		24" Yellow Solid (feet)	24" White Solid (feet)
7+00	33+15	2615		5230		5230				
33+15	42+88	973	Sheets M14-15	1879	305	2807		4	82	
42+88	61+39	1851		3702		3702				
61+39	70+28	889	Sheets M15-16	1574	438	2620		6	123	

TOTALS: 12385 743 14360 10 204
TOTALS (GAL): 53 3 76
4" PAINT GROOVING (FEET): 15336
24" TAPE GROOVING (FEET): 204
ARROW TAPE GROOVING (EACH): 10

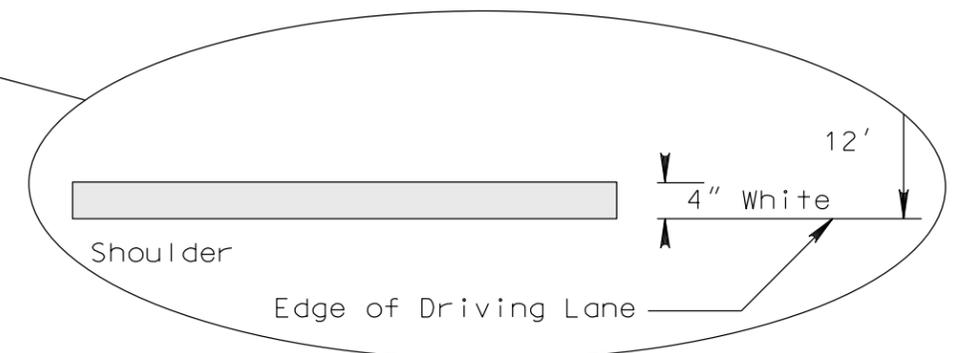
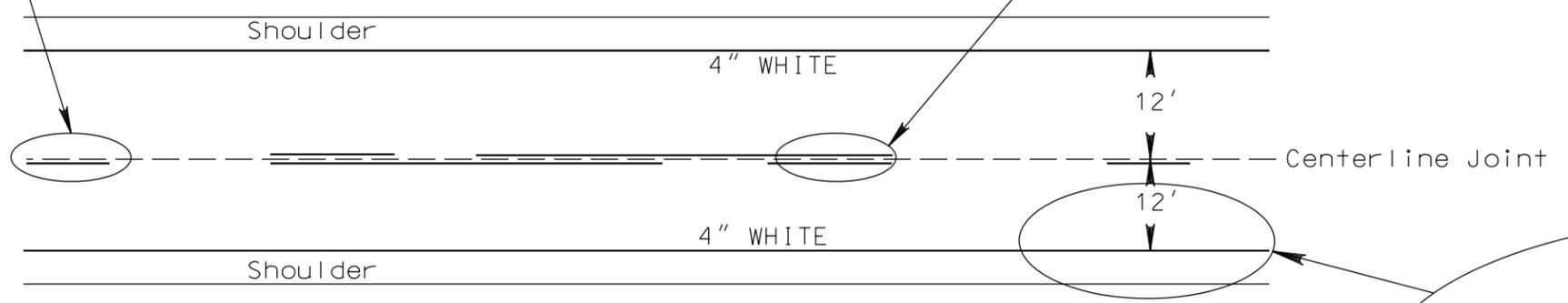
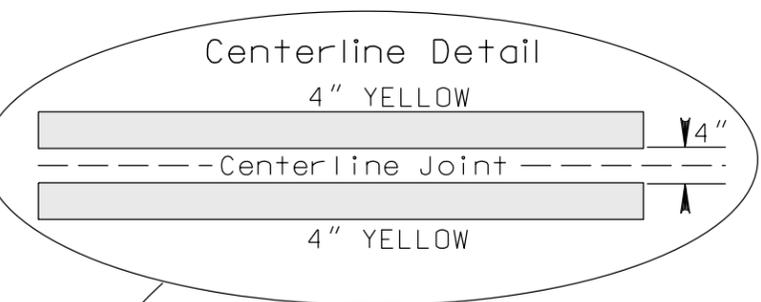
TYPICAL PAVEMENT MARKING LAYOUT



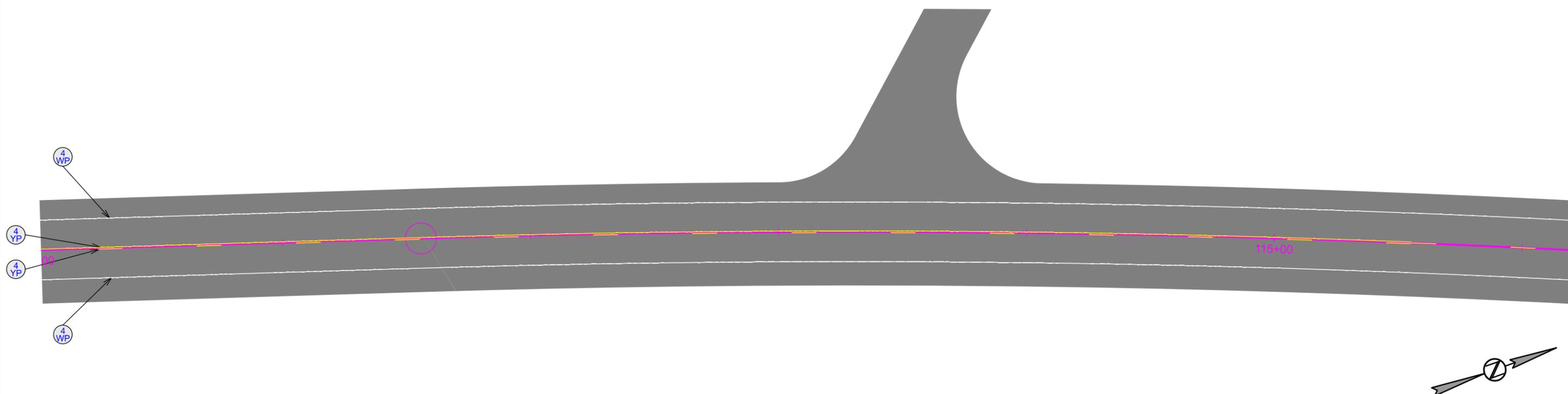
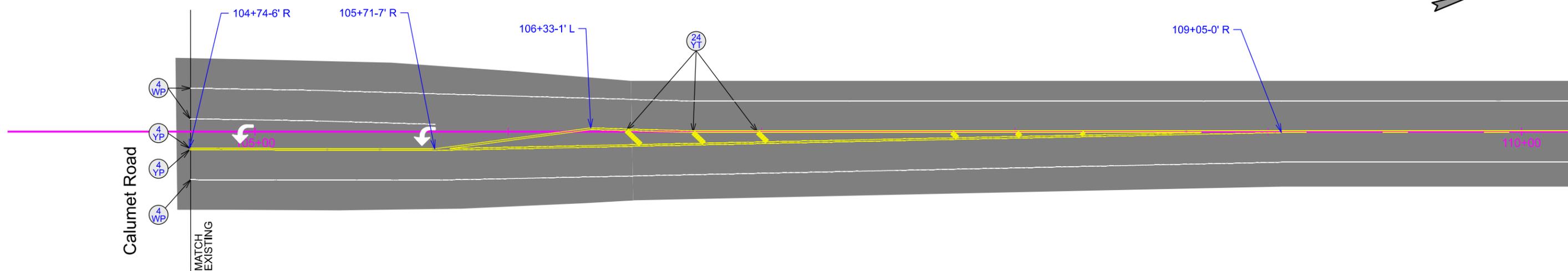
(A) NO PASSING ZONE
(B) End of Zone Marker

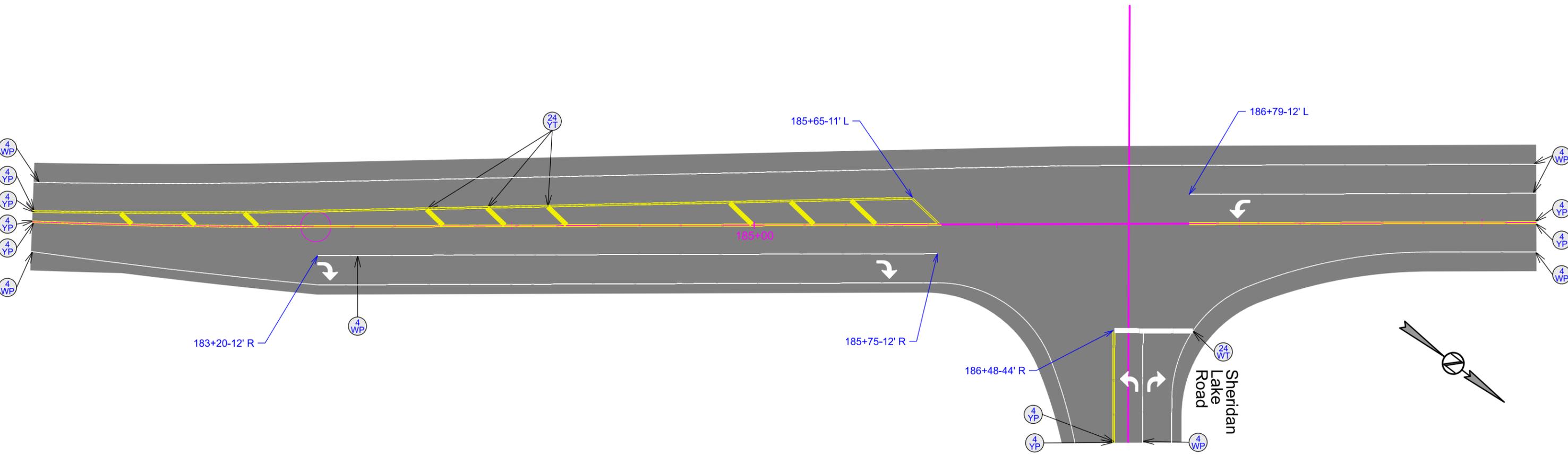
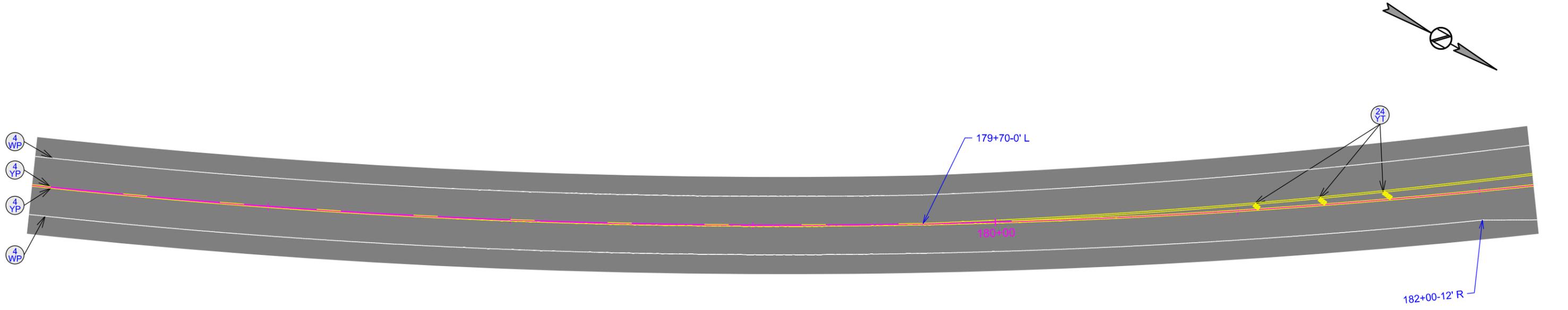


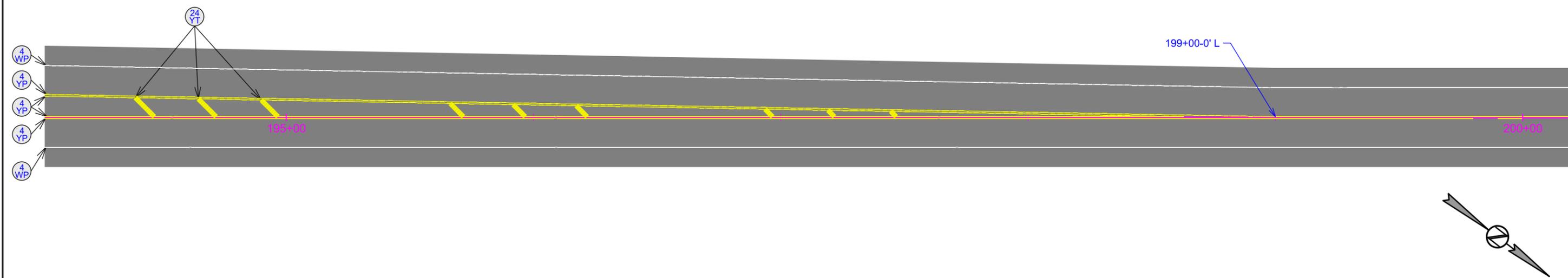
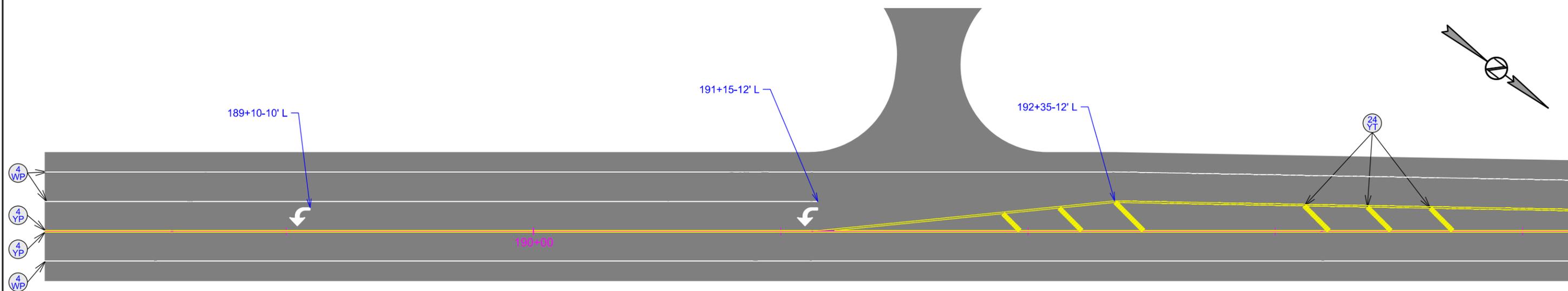
NOTE: A TWO "GUN" SYSTEM WILL BE USED TO OBTAIN THIS PATTERN.
 WHEN A SINGLE SKIP LINE EXISTS, THE SKIP WILL BE PLACED TO THE SOUTH OR EAST OF THE CENTERLINE JOINT.



PAVEMENT MARKING LAYOUTS



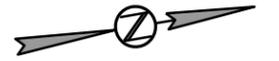
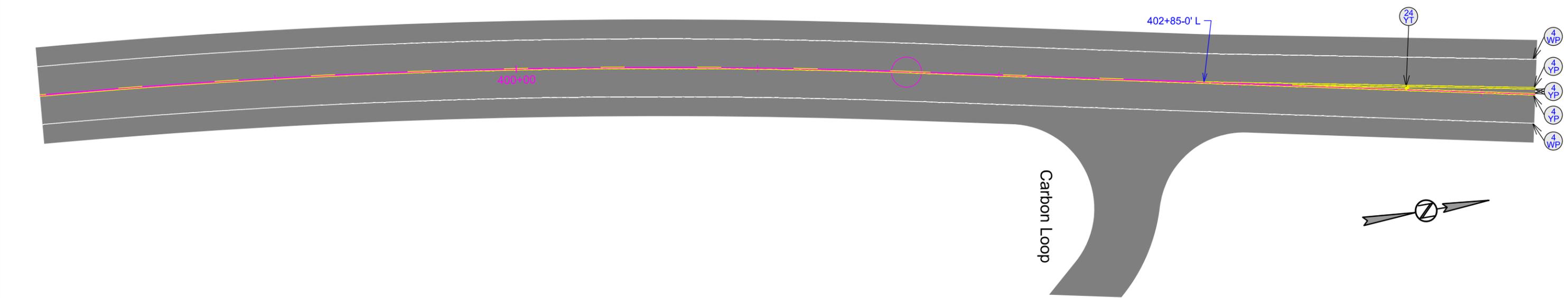
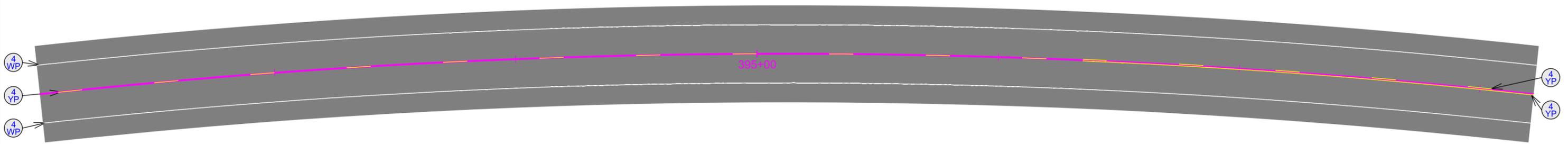


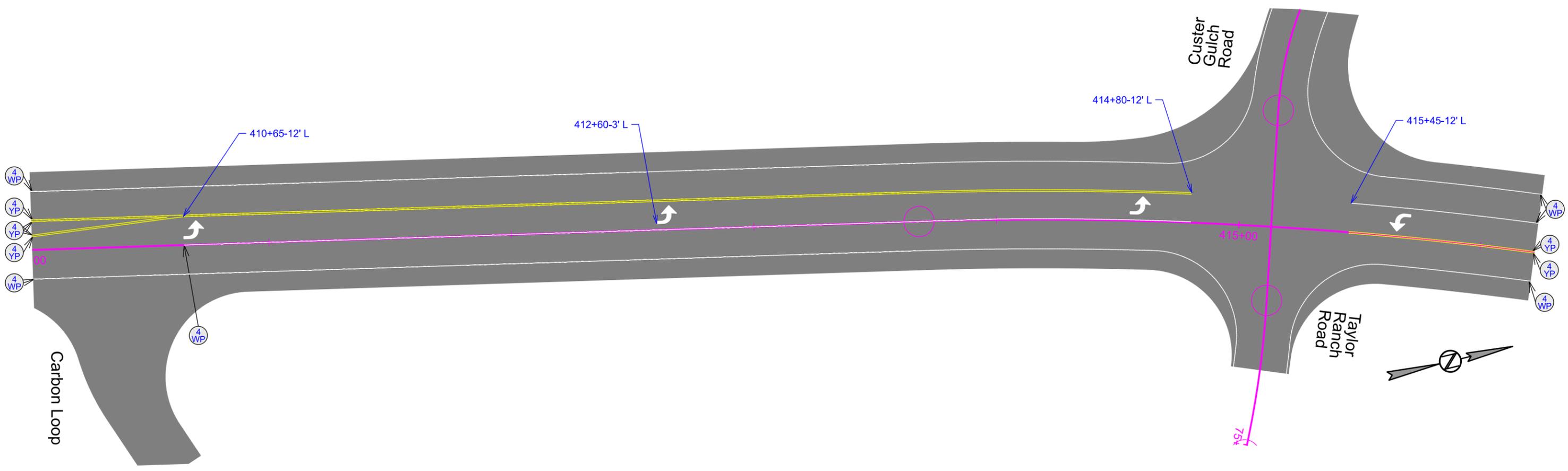
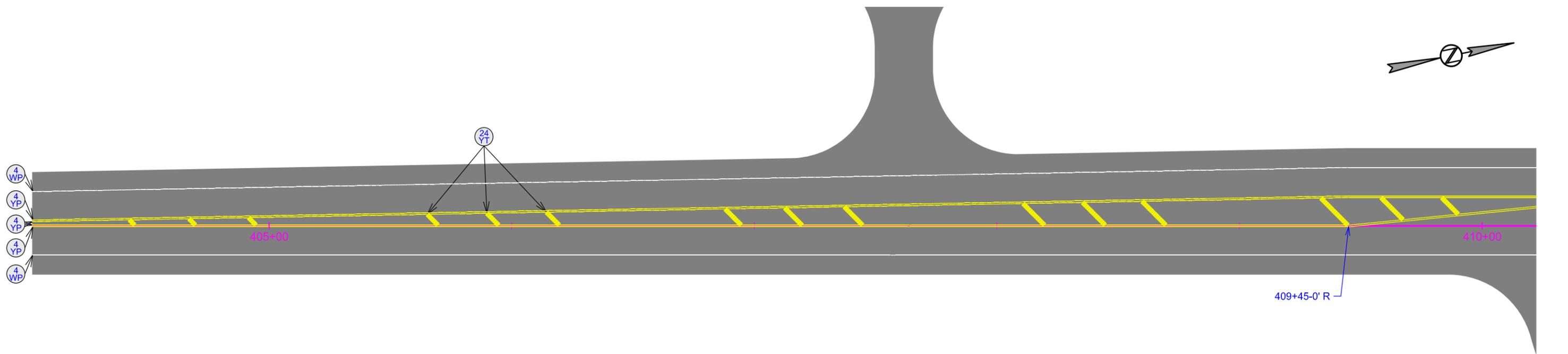


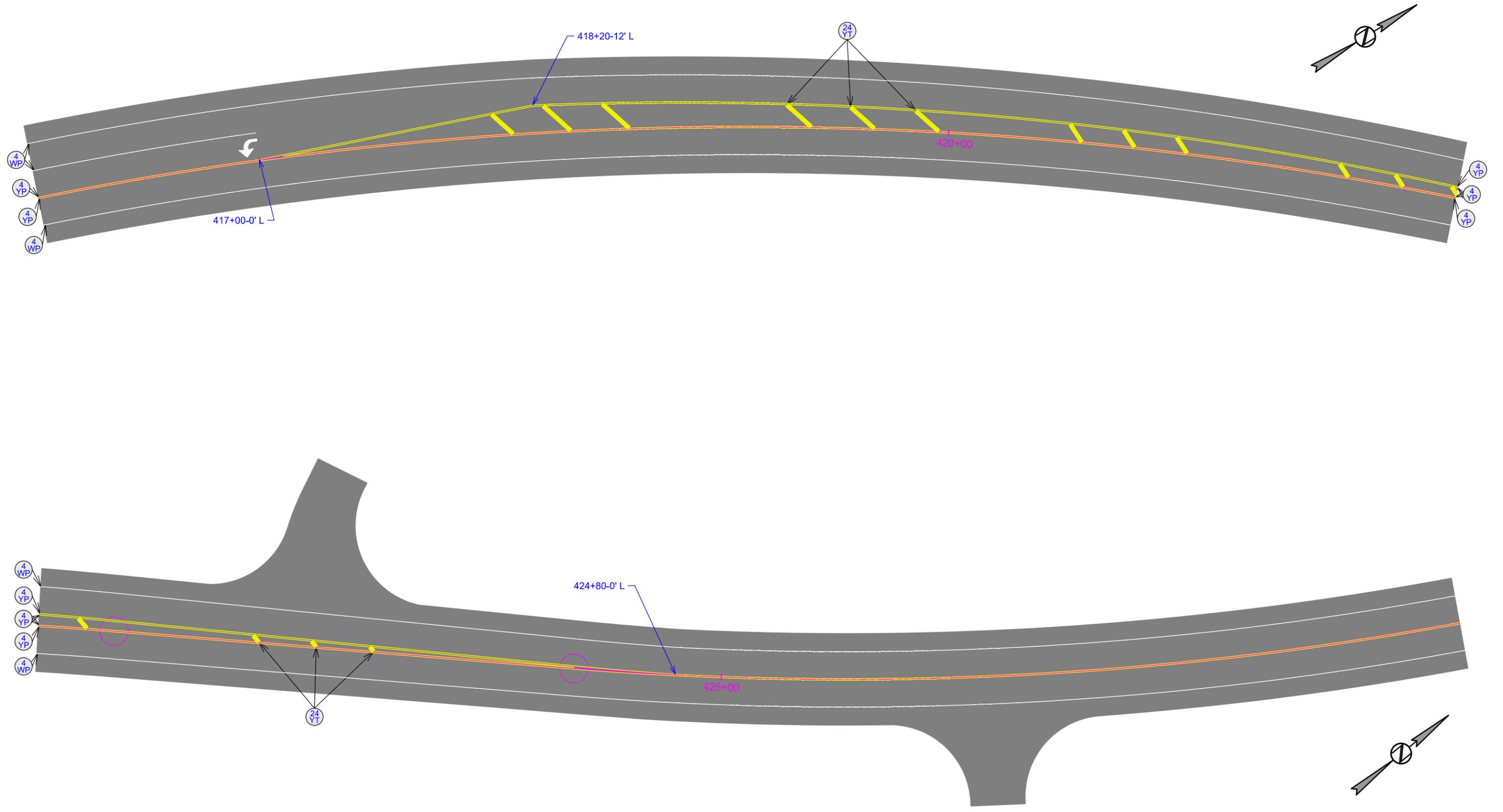


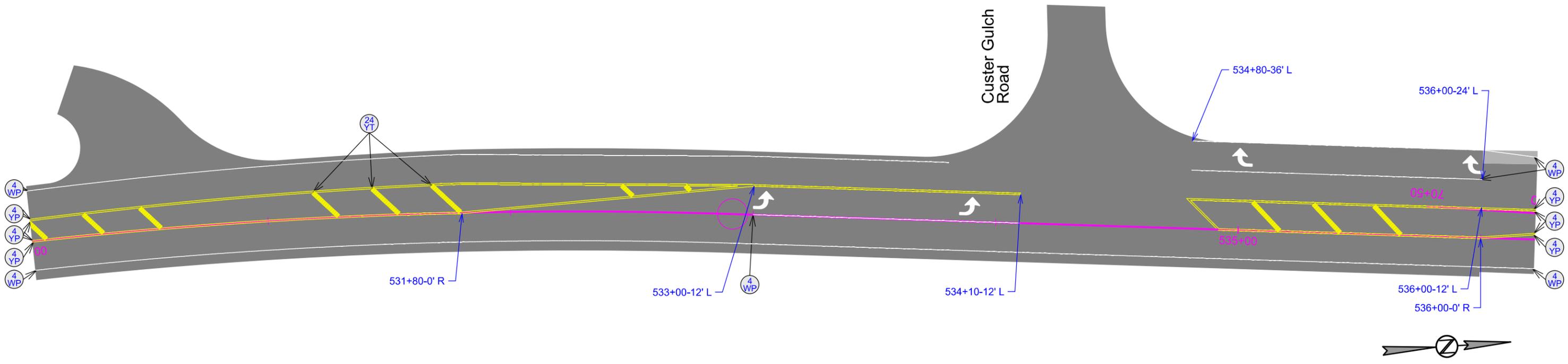
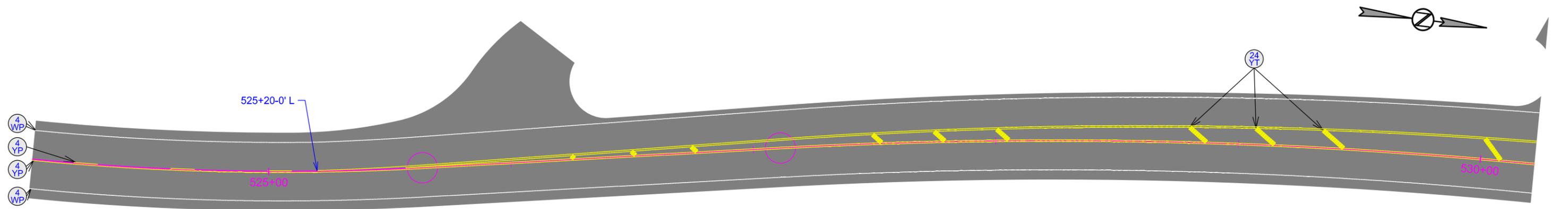
PROJECT	SECTION	SHEET
NH-PH 0385(50)96	M	9/16

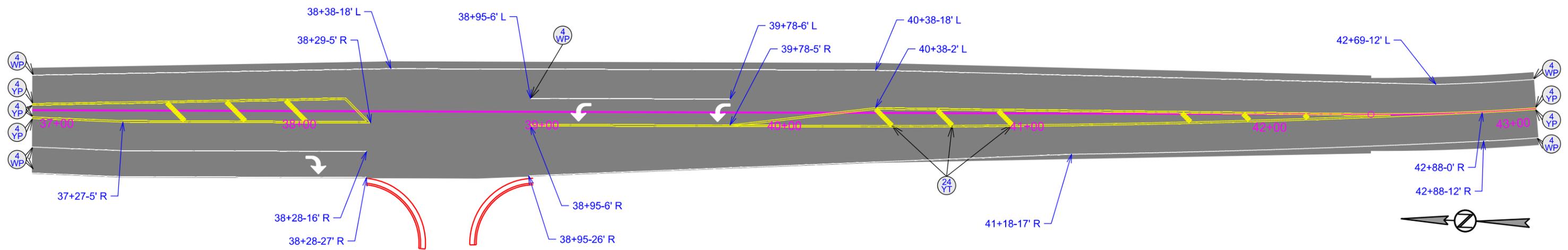
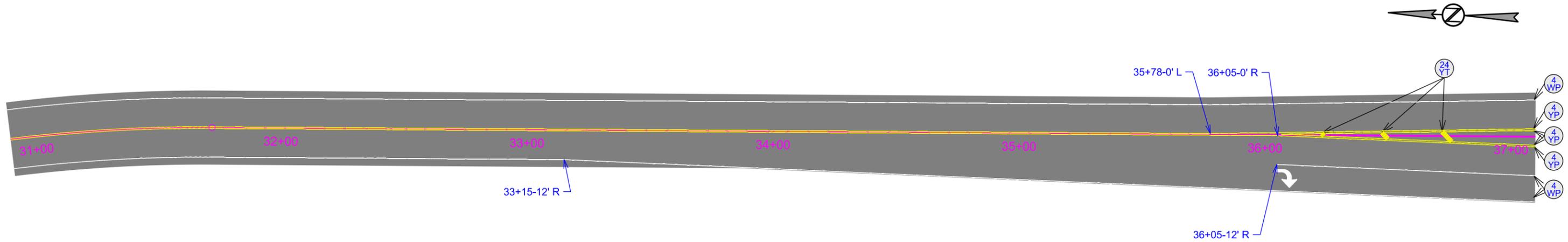
Plotting Date: 2/4/2026

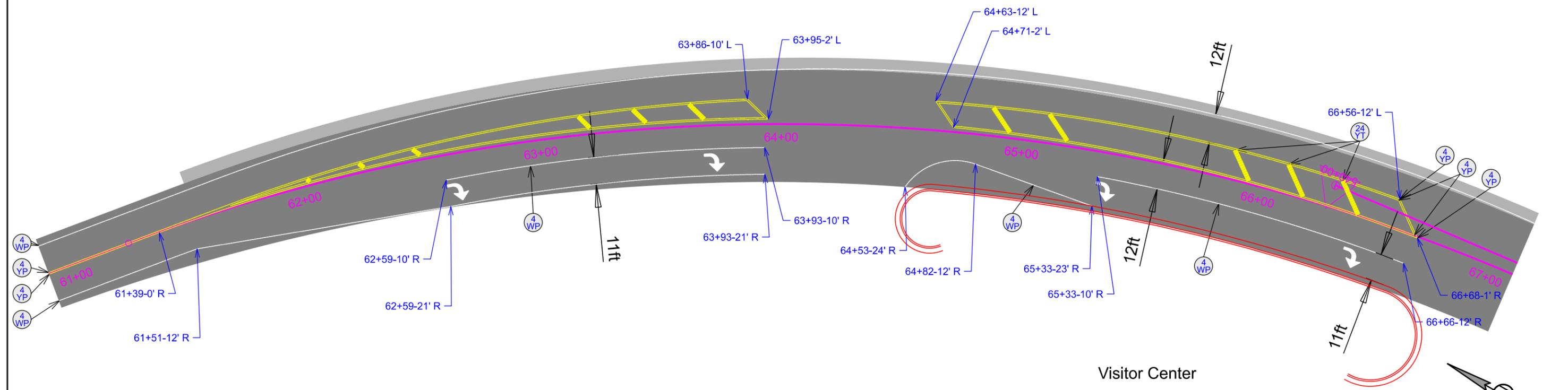
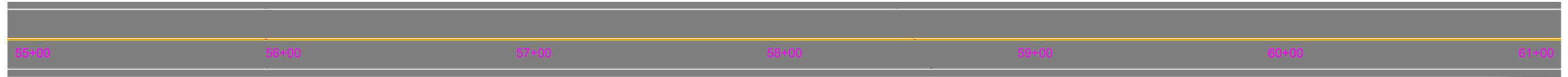
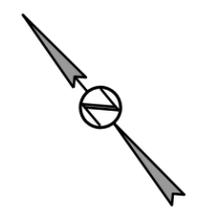


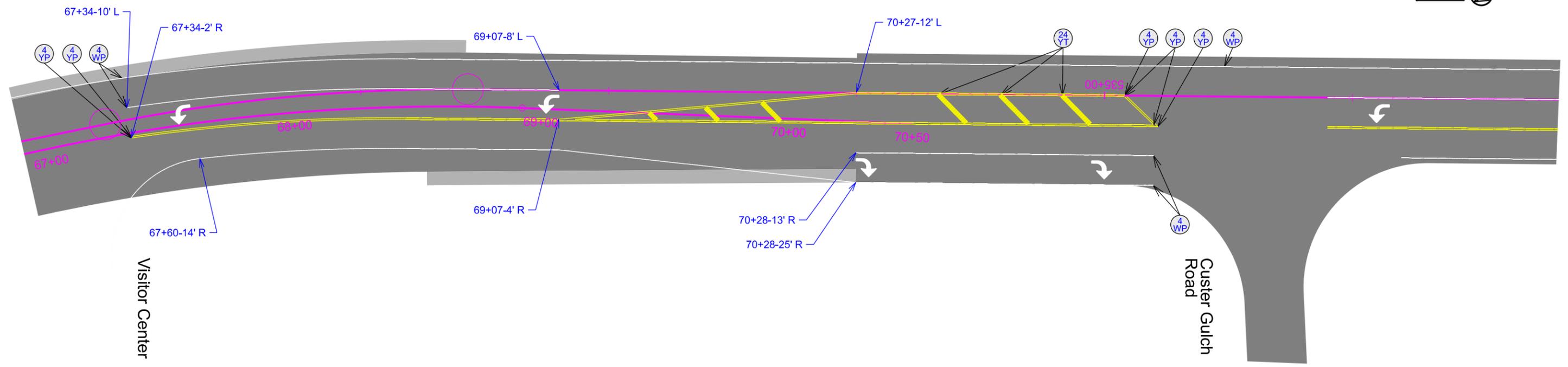
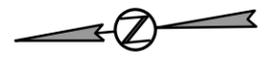


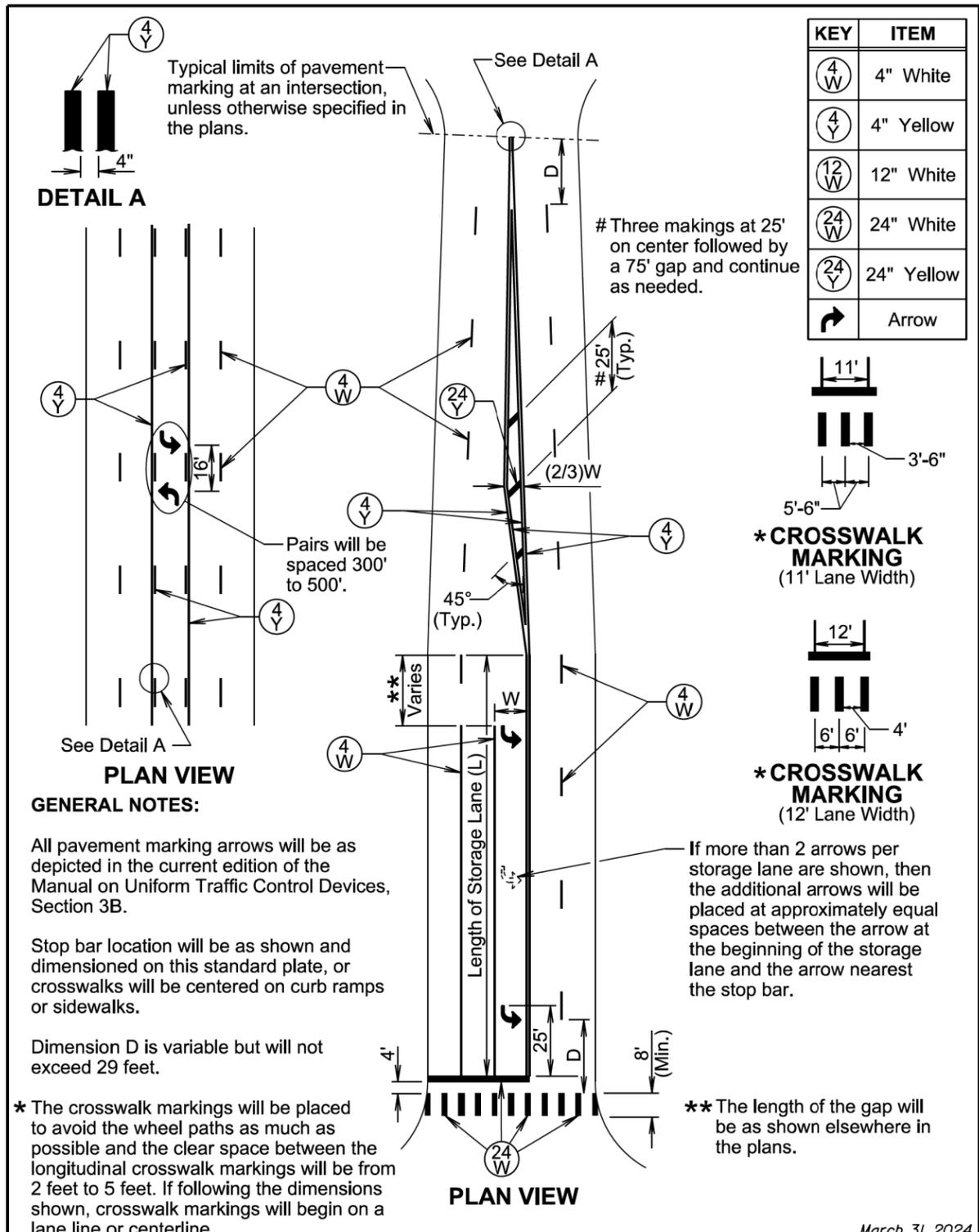












March 31, 2024

Published Date: 2026	SD DOT	PAVEMENT MARKINGS FOR ADJACENT INTERSECTIONS AND CENTER TURN LANE	PLATE NUMBER 633.01
			Sheet 1 of 1