

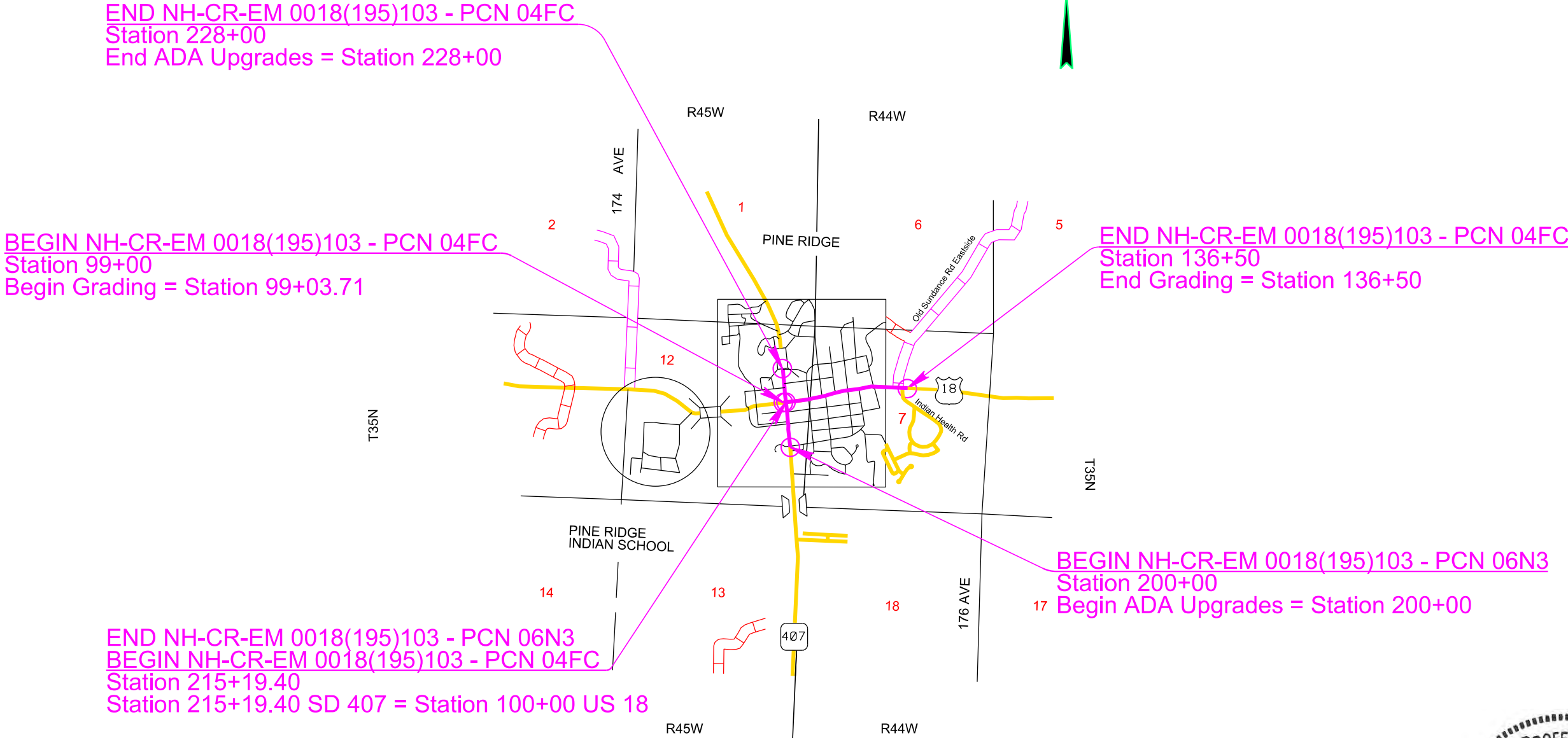
SECTION M: PAVEMENT MARKING PLANS

FOR BIDDING PURPOSES ONLY

KJJ STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH-CR-EM 0018(195)103	M1	M15
Plotting Date: 10/17/2024		Rev. 10/17/2024 BAF	

INDEX OF SHEETS

M1	General Layout with Index
M2-M3	Estimate with General Notes & Tables
M4-M14	Pavement Marking Layouts
M15	Standard Plates



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SECTION M ESTIMATE OF QUANTITIES – PCN 04FC

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
633E0010	Cold Applied Plastic Pavement Marking, 4"	10,834	Ft
633E0020	Cold Applied Plastic Pavement Marking, 8"	190	Ft
633E0220	Preformed Thermoplastic Pavement Marking, 12"	164	Ft
633E0225	Preformed Thermoplastic Pavement Marking, 24"	1,120	Ft
633E0235	Preformed Thermoplastic Pavement Marking, Arrow	47	Each
633E1220	High Build Waterborne Pavement Marking Paint, 4" White	370	Ft
633E1222	High Build Waterborne Pavement Marking Paint, 4" Yellow	3,712	Ft
633E1252	High Build Waterborne Pavement Marking Paint, 12" Yellow	31	Ft
633E1262	High Build Waterborne Pavement Marking Paint, 24" Yellow	18	Ft
633E5000	Grooving for Cold Applied Plastic Pavement Marking, 4"	10,834	Ft
633E5005	Grooving for Cold Applied Plastic Pavement Marking, 8"	190	Ft
633E5010	Grooving for Cold Applied Plastic Pavement Marking, 12"	164	Ft
633E5015	Grooving for Cold Applied Plastic Pavement Marking, 24"	1,120	Ft
633E5025	Grooving for Cold Applied Plastic Pavement Marking, Arrow	47	Each

SECTION M ESTIMATE OF QUANTITIES – PCN 06N3

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
633E0010	Cold Applied Plastic Pavement Marking, 4"	410	Ft
633E0225	Preformed Thermoplastic Pavement Marking, 24"	96	Ft
633E0235	Preformed Thermoplastic Pavement Marking, Arrow	2	Each
633E1222	High Build Waterborne Pavement Marking Paint, 4" Yellow	797	Ft
633E5000	Grooving for Cold Applied Plastic Pavement Marking, 4"	410	Ft
633E5015	Grooving for Cold Applied Plastic Pavement Marking, 24"	96	Ft
633E5025	Grooving for Cold Applied Plastic Pavement Marking, Arrow	2	Each

PREFORMED THERMOPLASTIC PAVEMENT MARKING

General

- Made of prefabricated retroreflective, resilient thermoplastic material;
- Contains glass beads uniformly distributed through the entire cross-sectional area;
- Capable of being affixed to bituminous or concrete pavement by heating;
- Resistant to deterioration due to exposure to sunlight, water, salt, and adverse weather conditions;
- Under traffic wear, shows no appreciable fading in accordance with the color requirements, lifting, or shrinkage throughout the life of the marking;
- Capable of conforming to pavement contours, breaks, and faults through the action of traffic at normal pavement temperatures;
- Possesses resealing characteristics, such that it is capable of fusing with itself and previous thermoplastic markings when heated; and
- Protected during shipment and in storage.

Apply the preformed thermoplastic pavement marking as recommended by the manufacturer to provide a neat, durable marking that will not flow, distort, or crack due to temperature if the pavement surface remains stable. Use equipment and application methods specified by the manufacturer. Primer as required by the manufacturer will be provided with the material.

Application of the markings will include the use of any manufacturer recommended sealers. Sealers may be required on concrete pavements, inside grooves, or on older asphalt pavements. Prior to placing any markings on new concrete, the Contractor will remove any curing compounds. Removal will be by sandblasting or other standard industry methods.

Any required primers or sealers will be included in the contract unit price for the various preformed thermoplastic pavement marking items.

Provide precut messages and symbols meeting the requirements of the MUTCD and the Standard Signs Manual in custom kits. Use separate pieces or segments to form individual letters or symbols only to the extent supplied by the manufacturer. Provide shapes, sizes, and colors as required by the contract.

Color

- Will meet the color specification limits and luminance factors for Cold Applied Plastic Pavement Marking and Legends (Section 983.2 D, Tables 1 and 2).

Glass Beads

- Ensure the preformed thermoplastic pavement marking contains a minimum 30% intermixed glass beads by weight and a minimum 80% true spheres.
- Ensure preformed thermoplastic pavement markings contain only clear beads.

Skid Resistance

- Ensure the surface of the preformed thermoplastic pavement marking provides a skid resistance value of at least 45 British Pendulum Number (BPN) when tested in accordance with ASTM E303.

Retroreflectivity

- Provide preformed thermoplastic pavement marking meeting the minimum initial pavement marking retroreflectivity values using 30 m geometry and meeting the testing procedures of ASTM E1710:

Minimum Initial Pavement Marking Retroreflectivity		
	White	Yellow
Thermoplastic	400 mcd/sq. ft./ft.	250 mcd/sq. ft./ft.
Thermoplastic, enhanced skid resistance (ESR)	250 d/sq. ft./ft.	150 d/sq. ft./ft.

FOR BIDDING PURPOSES ONLY

Thickness

- A longitudinal marking is a minimum 90 mils thick at the edges, and a maximum 125 mils thick at the center of the stripe.
- Transverse markings and symbols are a minimum 125 mils thick at the edges, and a maximum 160 mils thick at the center.

Sample

- Prior to application, the Contractor will provide a sample of the preformed thermoplastic pavement marking to be used on the project to the Region Traffic Engineer for inspection and approval.
- Do not begin application of the preformed thermoplastic pavement marking prior to obtaining the Region Traffic Engineer's approval of the preformed thermoplastic pavement marking material. The Region Traffic Engineer's approval of the preformed thermoplastic pavement marking does not void other preformed thermoplastic pavement marking requirements specified.

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.

GROOVING FOR COLD APPLIED PLASTIC AND PREFORMED THERMOPLASTIC 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, square foot or each for "Grooving for Cold Applied Plastic Pavement Marking" contract items.



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 the supplemental specifications for Section 980.1 B.

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

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

Solid 4" line = 22.5 Gals/Mile
Dashed 4" line = 6.2 Gal/Mile
Glass Beads = 8 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.

RETROREFLECTIVITY FOR PAVEMENT MARKING PAINT

The Department may take retroreflectivity readings on the pavement marking lines after 2 days and within 30 days of the line application using either a portable or mobile retroreflectometer that conforms to 30-meter geometry. If the Department chooses to take retroreflectivity readings, three retroreflectivity readings will be taken on each line at each test location. The three readings will be averaged and become the reading for that test location.

If the Department chooses to take retroreflectivity readings, three readings will be taken on the edge lines and lane lines in the direction of application. For combination solid yellow and skip yellow lines for turn lanes and for centerline markings on two-way roadways, three readings will be taken in one direction, the reflectometer will be turned 180 degrees and three more readings will be taken. The six readings for the centerline markings will be averaged and become the test reading for that test location.

If the Department chooses to take readings, the minimum retroreflectivity values will be 275 mc/m²/lux for white and 170 mc/m²/lux for yellow.

SURFACE PREPARATION FOR PAVEMENT MARKING

The Contractor will prepare the pavement surface prior to applying the durable pavement marking in accordance with the following.

In areas where the existing groove meets the required depth and existing markings are still in place, the Contractor will clean the existing groove without adding additional depth beyond the required depth for the new pavement marking, including reflective media as noted below.

Description	Specification	Tolerance
Depth of Groove	Marking Thickness¹ + 15 mils	+ 5 mils

¹ Marking thickness will include the thickness of marking material and reflective media.

The cleaning will result in the existing pavement marking being adequately scuffed, abraded, and removed by light grinding or abrasive blasting or both to allow proper adhesion of the new durable pavement marking as per the manufacturer’s recommendations to comply with product warranties.

Existing grooves not meeting the required depth will be re-grooved to the required depth for the new pavement marking, including reflective media. Equipment for grooving 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.

All costs associated with cleaning of the existing groove, including re-grooving, if needed, will be included in the contract unit price per foot for “Surface Preparation for Pavement Marking”. Surface preparation will be measured as 4” equivalent.

REMOVE PAVEMENT MARKING, 4” OR EQUIVALENT

Markings that fall outside of the new groove will be obliterated using additional methods approved by the Engineer. Removal of the existing markings will be accomplished without causing damage to the pavement, pavement joints, or joint sealant. The Contractor will repair any damage to the pavement, pavement joints, or joint sealant for no additional payment and at no cost to the State. All costs for materials, labor, and equipment necessary to remove the existing markings will be incidental to the contract unit price per foot for “Remove Pavement Marking, 4” or Equivalent”.



FOR BIDDING PURPOSES ONLY

KLJ STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH-CR-EM 0018(195)103 P 0407(05)01	M3	M15

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REPLACEMENT OF PAVEMENT MARKINGS

An estimated amount of various pavement markings has been added to the Estimate of Quantities to accommodate the replacement of pavement markings removed for Traffic Control. Please see the tables below for location and type of pavement markings to be replaced.

The Contractor shall make every effort to match the existing layout of any pavement markings removed on pavement that was not disturbed during construction. The proposed layout for replaced pavement markings will be approved by the Engineer prior to application of any pavement markings.

All costs for materials, labor, and equipment necessary to replace the existing markings will be incidental to the contract unit price per foot, square foot or each for the various pavement marking bid items.

PCN 04FC – TABLE OF REPLACED PAVEMENT MARKINGS

West Main Street

Type of Pavement Marking	Quantity	Unit
Preformed Thermoplastic Pavement Marking, Arrow	1	Each
High Build Waterborne Pavement Marking Paint, 4" White	50	Ft
High Build Waterborne Pavement Marking Paint, 4" Yellow	609	Ft
High Build Waterborne Pavement Marking Paint, 12" Yellow	31	Ft

US 18 East/West

Type of Pavement Marking	Quantity	Unit
Preformed Thermoplastic Pavement Marking, Arrow	2	Each
High Build Waterborne Pavement Marking Paint, 4" Yellow	741	Ft

US 18 North/South

Type of Pavement Marking	Quantity	Unit
Cold Applied Plastic Pavement Marking, 4" White	146	Ft
Cold Applied Plastic Pavement Marking, 4" Yellow	3037	Ft
Preformed Thermoplastic Pavement Marking, Arrow	11	Each
High Build Waterborne Pavement Marking Paint, 4" Yellow	588	Ft

PCN 06N3 – TABLE OF REPLACED PAVEMENT MARKINGS

SD 407 South

Type of Pavement Marking	Quantity	Unit
Cold Applied Plastic Pavement Marking, 4" White	80	Ft
Cold Applied Plastic Pavement Marking, 4" Yellow	153	Ft
Preformed Thermoplastic Pavement Marking, Arrow	2	Each
High Build Waterborne Pavement Marking Paint, 4" Yellow	797	Ft

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Plotted From - brandonified

PAVEMENT MARKING LAYOUT

US HIGHWAY 18

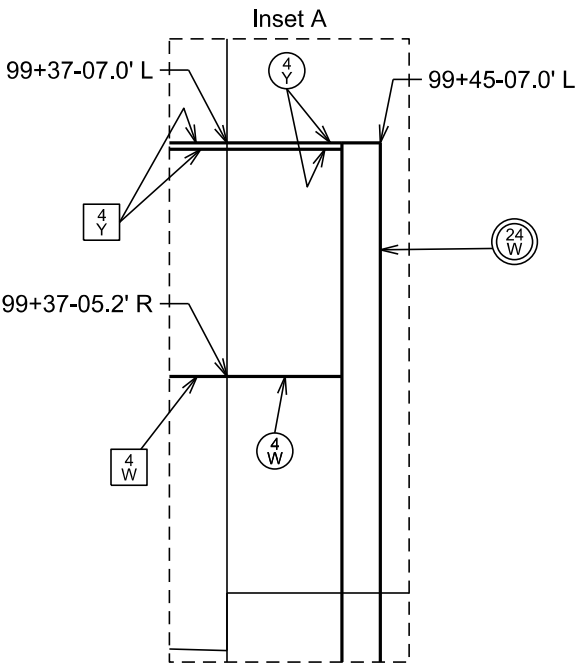
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KLI STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH-CR-EM 0018(195)103 P 0407(05)01	M4	M15
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04FC - US18

ESTIMATE OF QUANTITIES

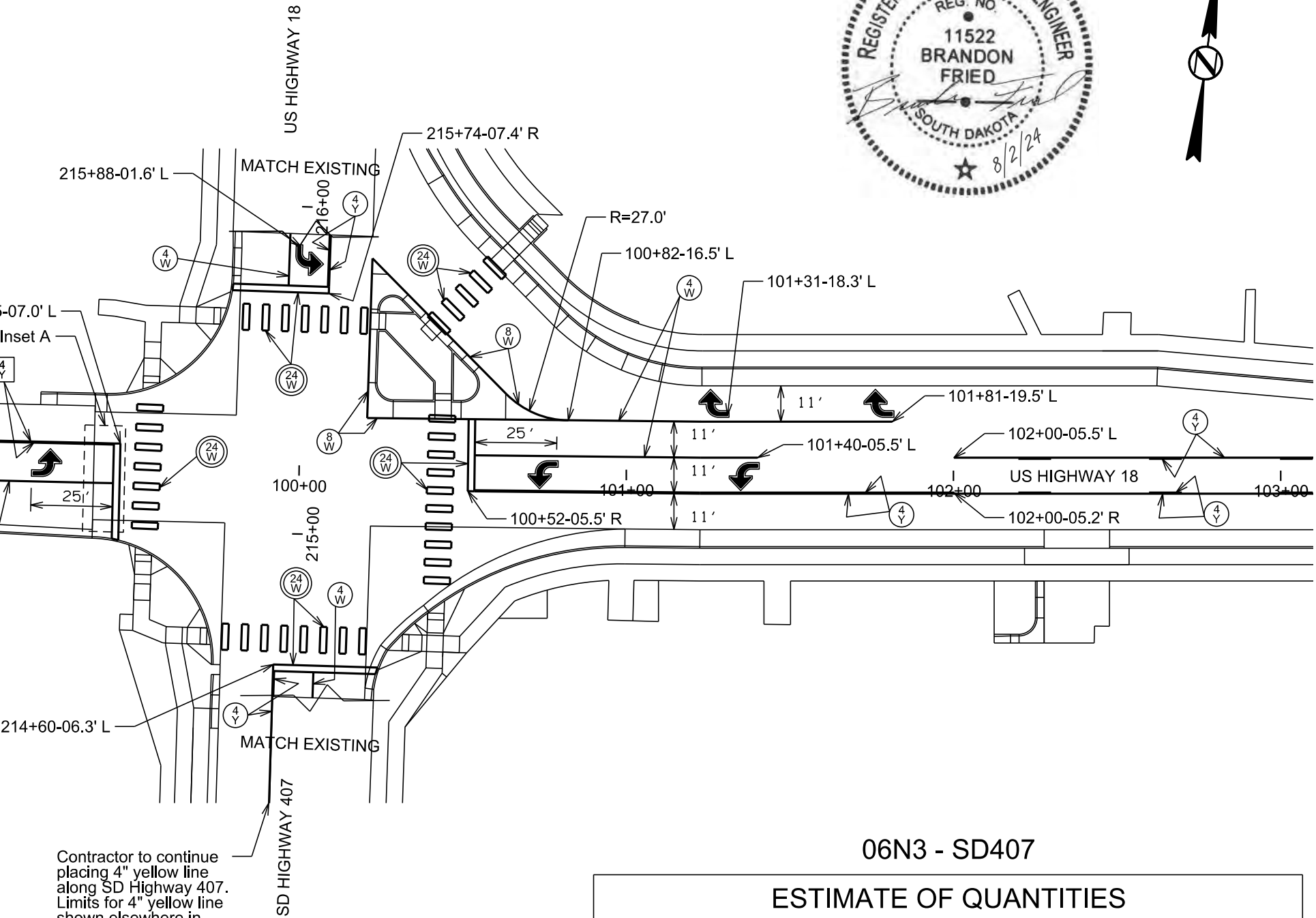
KEY		EST QUANT	UNIT
4 W	High Build Waterborne Pavement Marking Paint, 4" White	320	FT
4 Y	High Build Waterborne Pavement Marking Paint, 4" Yellow	1774	FT
24 Y	High Build Waterborne Pavement Marking Paint, 24" Yellow	18	FT



04FC - US18

ESTIMATE OF QUANTITIES

KEY	ITEM	EST QUANT	UNIT
4 W	Cold Applied Plastic Pavement Marking, 4" White	580	FT
4 Y	Cold Applied Plastic Pavement Marking, 4" Yellow	7071	FT
8 W	Cold Applied Plastic Pavement Marking, 8" White	190	FT
12 W	Preformed Thermoplastic Pavement Marking, 12" White	164	FT
24 W	Preformed Thermoplastic Pavement Marking, 24" White	1120	FT
↩	Preformed Thermoplastic Pavement Marking, Arrow (Left - 29, Right - 6)	33	EACH
	Grooving For Cold Applied Plastic Pavement Marking, 4"	7651	FT
	Grooving For Cold Applied Plastic Pavement Marking, 8"	190	FT
	Grooving For Cold Applied Plastic Pavement Marking, 12"	164	FT
	Grooving For Cold Applied Plastic Pavement Marking, 24"	1120	FT
	Grooving For Cold Applied Plastic Pavement Marking, Arrow (Left - 27, Right - 6)	33	EACH



06N3 - SD407

ESTIMATE OF QUANTITIES

KEY	ITEM	EST QUANT	UNIT
4 W	Cold Applied Plastic Pavement Marking, 4" White	8	FT
4 Y	Cold Applied Plastic Pavement Marking, 4" Yellow	169	FT
24 W	Preformed Thermoplastic Pavement Marking, 24" White	96	FT
	Grooving For Cold Applied Plastic Pavement Marking, 4"	177	FT
	Grooving For Cold Applied Plastic Pavement Marking, 24"	96	FT

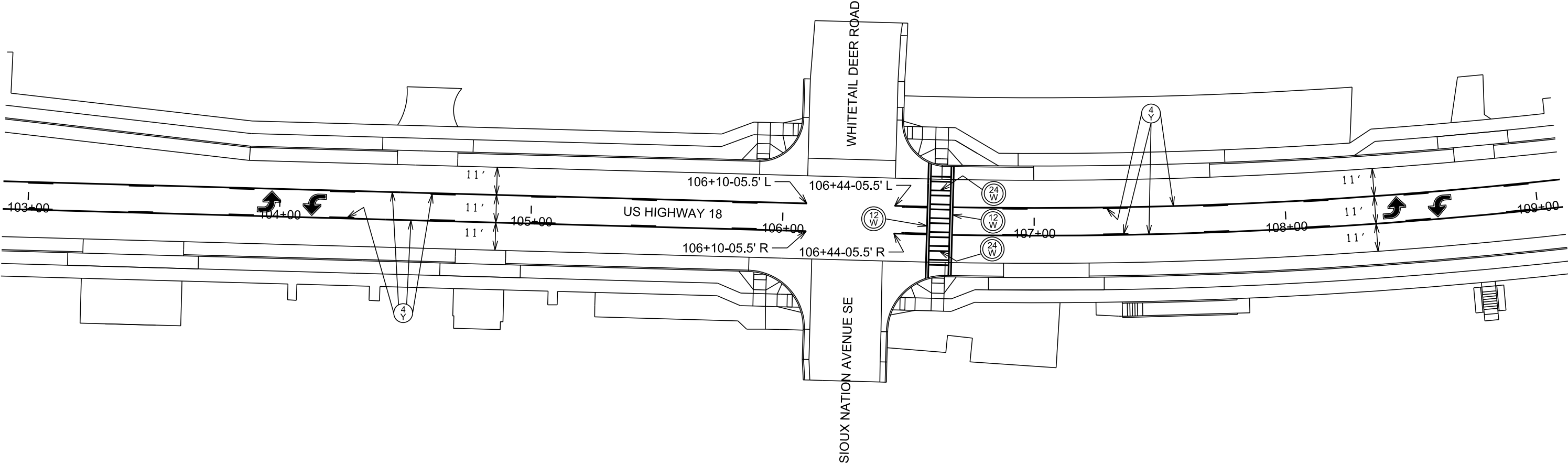


PAVEMENT MARKING LAYOUT

US HIGHWAY 18

FOR BIDDING PURPOSES ONLY

KJJ STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
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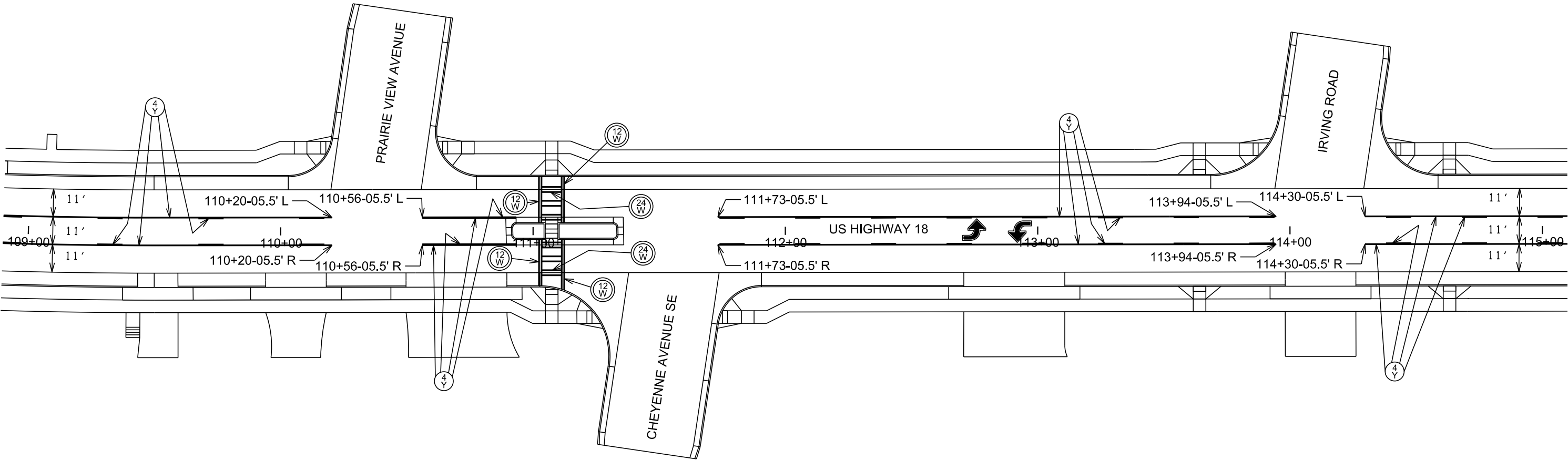
PAVEMENT MARKING LAYOUT

US HIGHWAY 18

FOR BIDDING PURPOSES ONLY

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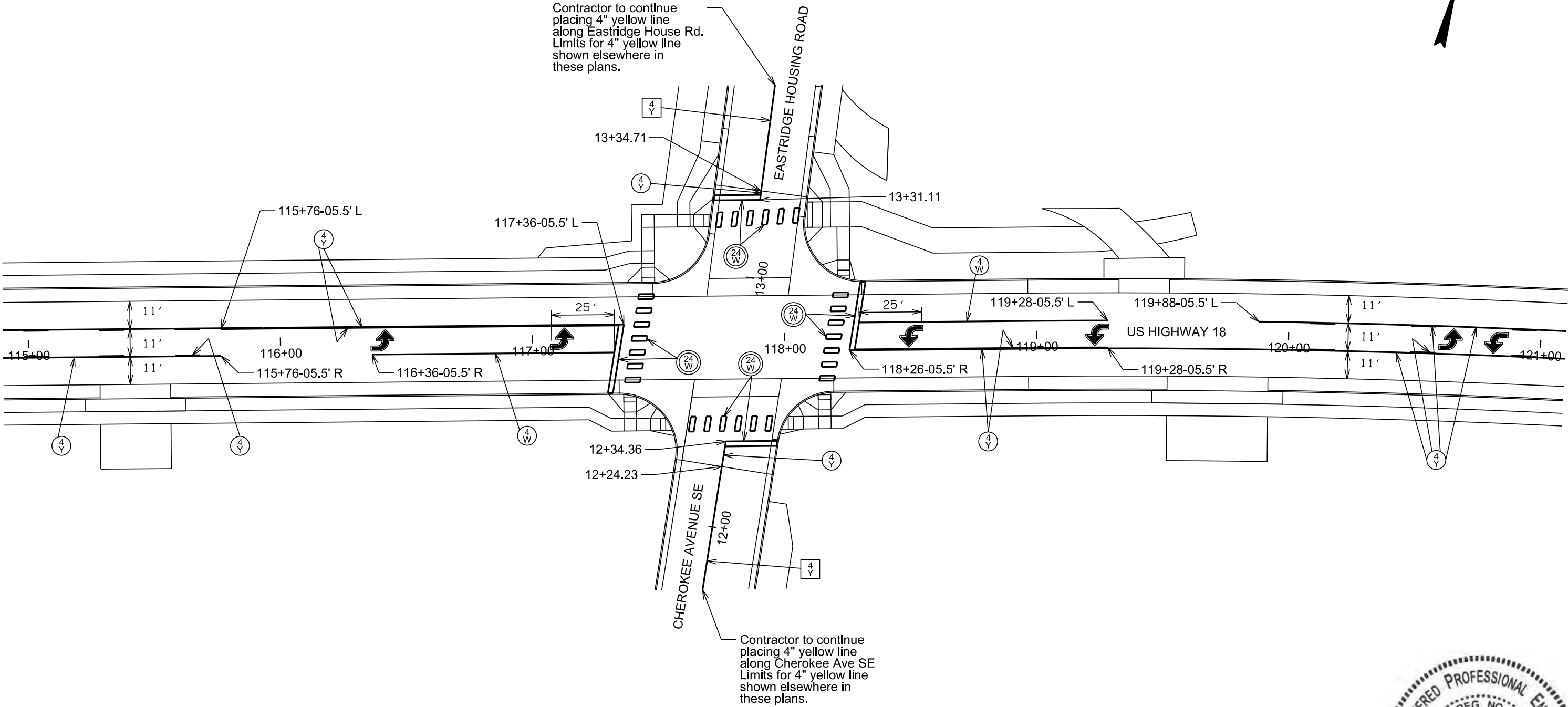
PAVEMENT MARKING LAYOUT

US HIGHWAY 18

FOR BIDDING PURPOSES ONLY

KJ	STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
		NH-CR-EM 0018(195)103 P 0407(05)01	M7	M15

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Plotting Date: 7/31/2024 Rev. 8/2/2024 BAF



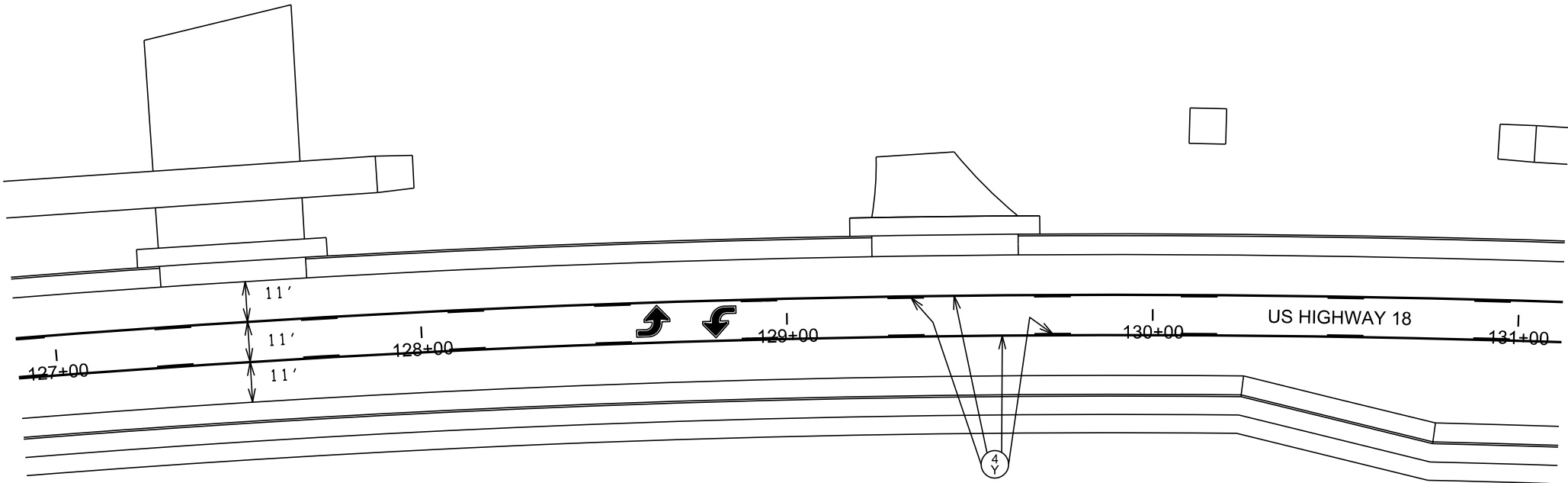
PAVEMENT MARKING LAYOUT

US HIGHWAY 18

FOR BIDDING PURPOSES ONLY

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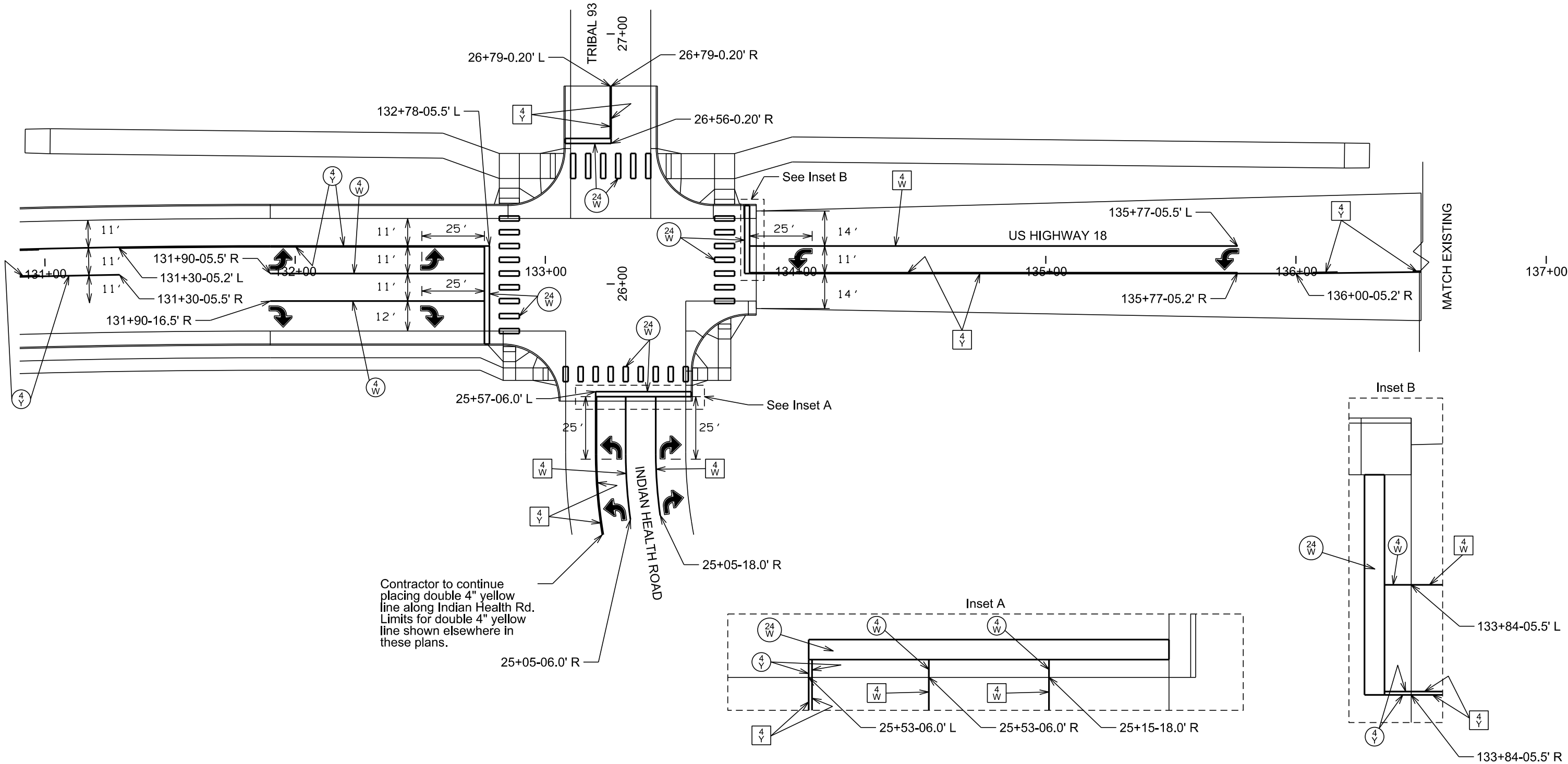


PAVEMENT MARKING LAYOUT

US HIGHWAY 18

FOR BIDDING PURPOSES ONLY

KLI ONLY	STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
		NH-CR-EM 0018(195)103 P 0407(05)01	M10	M15
Plotting Date:		7/31/2024	Rev. 8/2/2024	BAF



PAVEMENT MARKING LAYOUT

CHEROKEE AVE SE / EASTRIDGE HOUSING ROAD

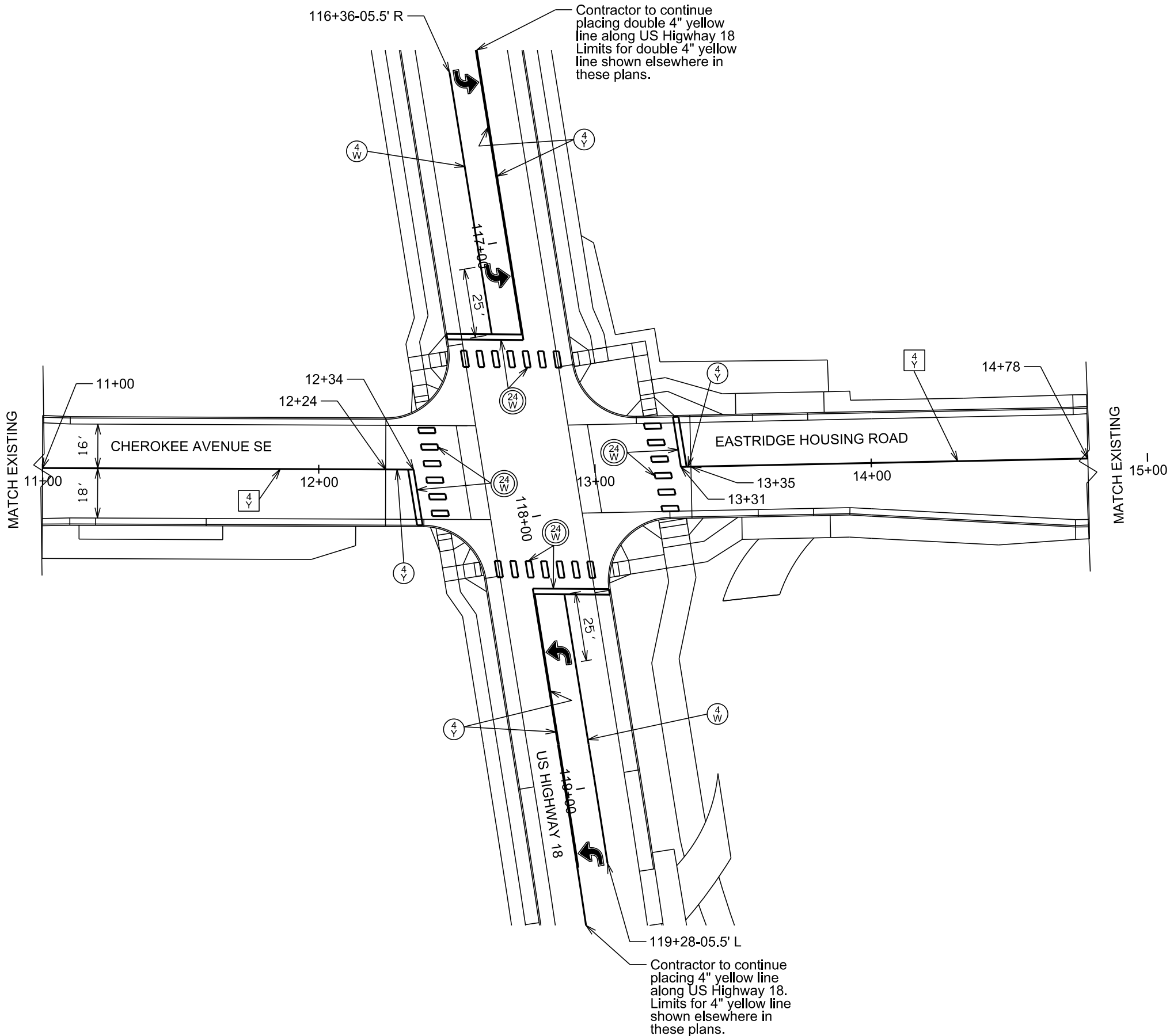
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KLI STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH-CR-EM 0018(195)103 P 0407(05)01	M11	M15

Plotting Date:

7/31/2024

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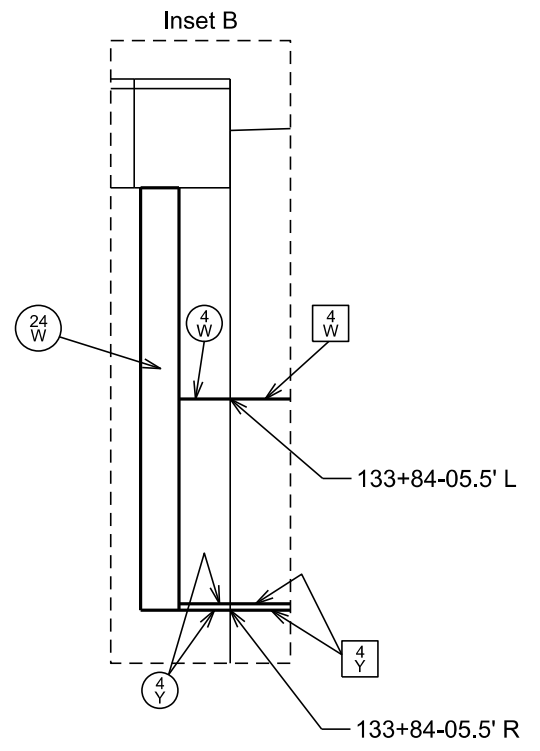
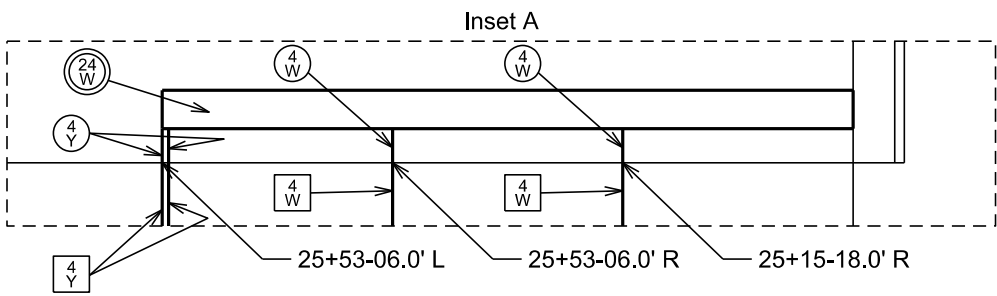
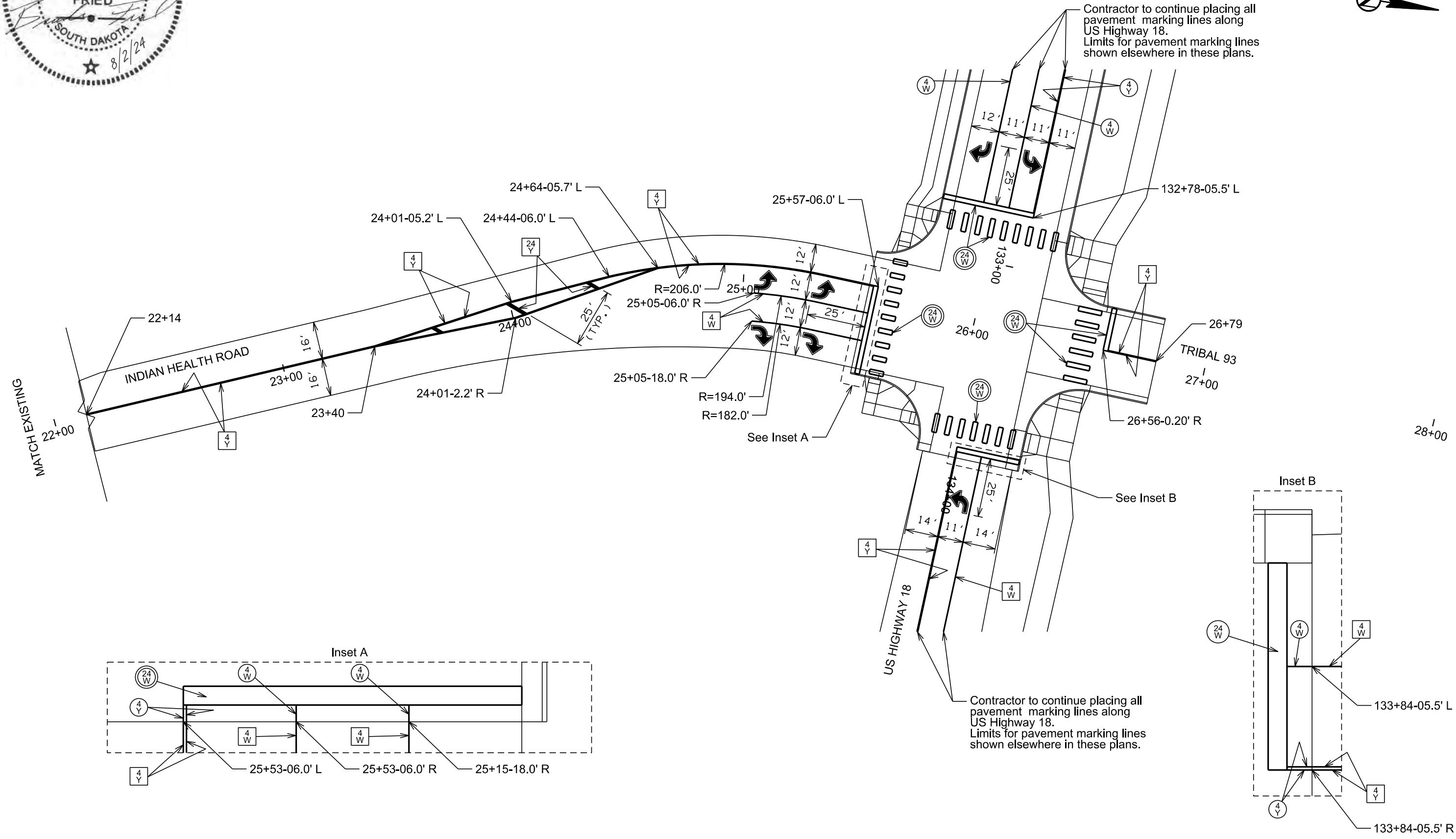
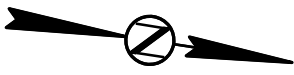


PAVEMENT MARKING LAYOUT

INDIAN HEALTH ROAD

FOR BIDDING PURPOSES ONLY

PROJECT	SHEET	TOTAL SHEETS
NH-CR-EM 0018(195)103 P 0407(05)01	M12	M15
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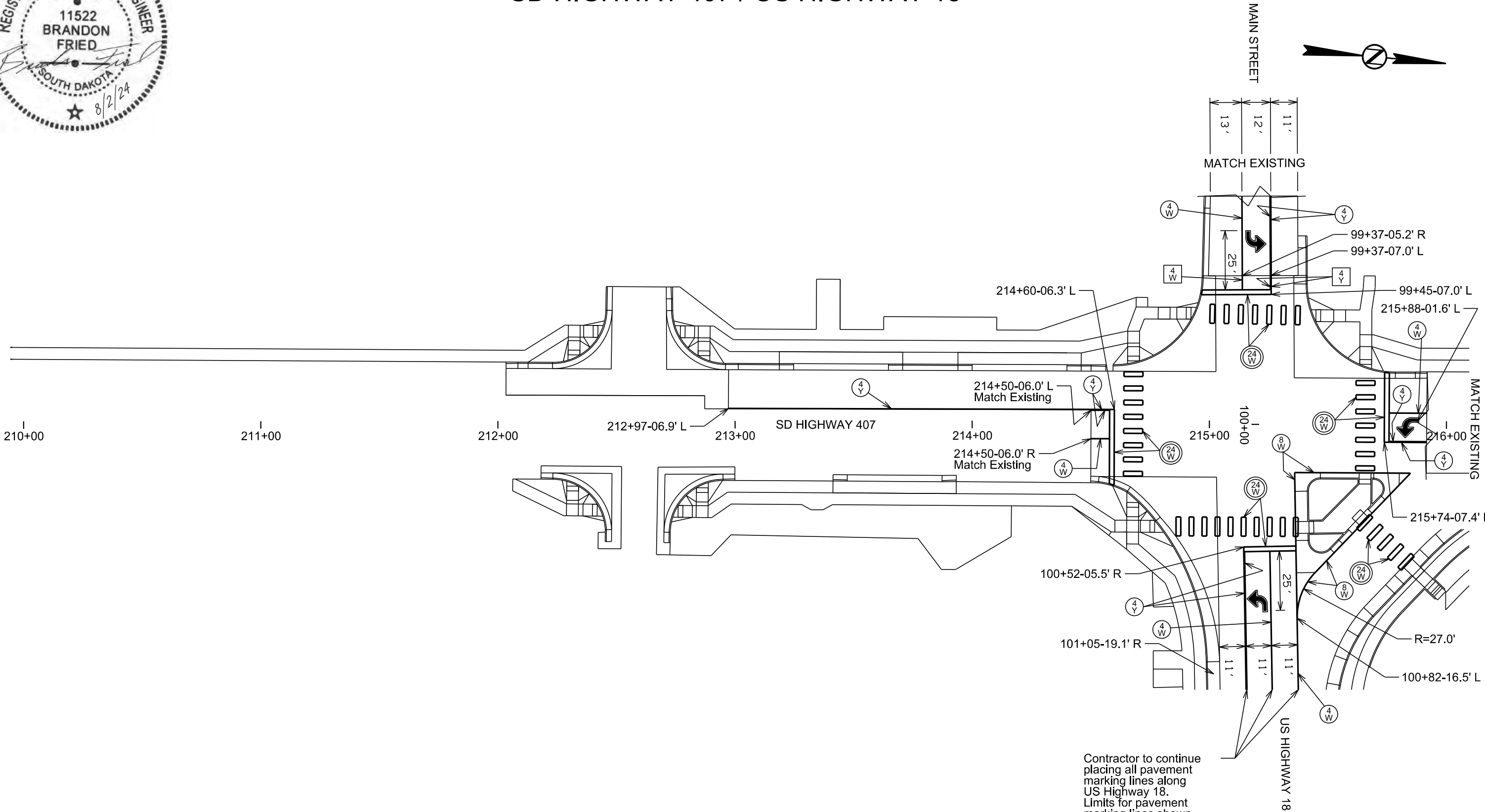
PAVEMENT MARKING LAYOUT

SD HIGHWAY 407 / US HIGHWAY 18

FOR BIDDING PURPOSES ONLY

PROJECT	SHEET	TOTAL SHEETS
NH-CR-EM 0018(195)103 P 0407(05)01	M13	M15

Plotting Date: 7/31/2024 Rev. 8/2/2024 BAF



Contractor to continue placing all pavement marking lines along US Highway 18. Limits for pavement marking lines shown elsewhere in these plans.

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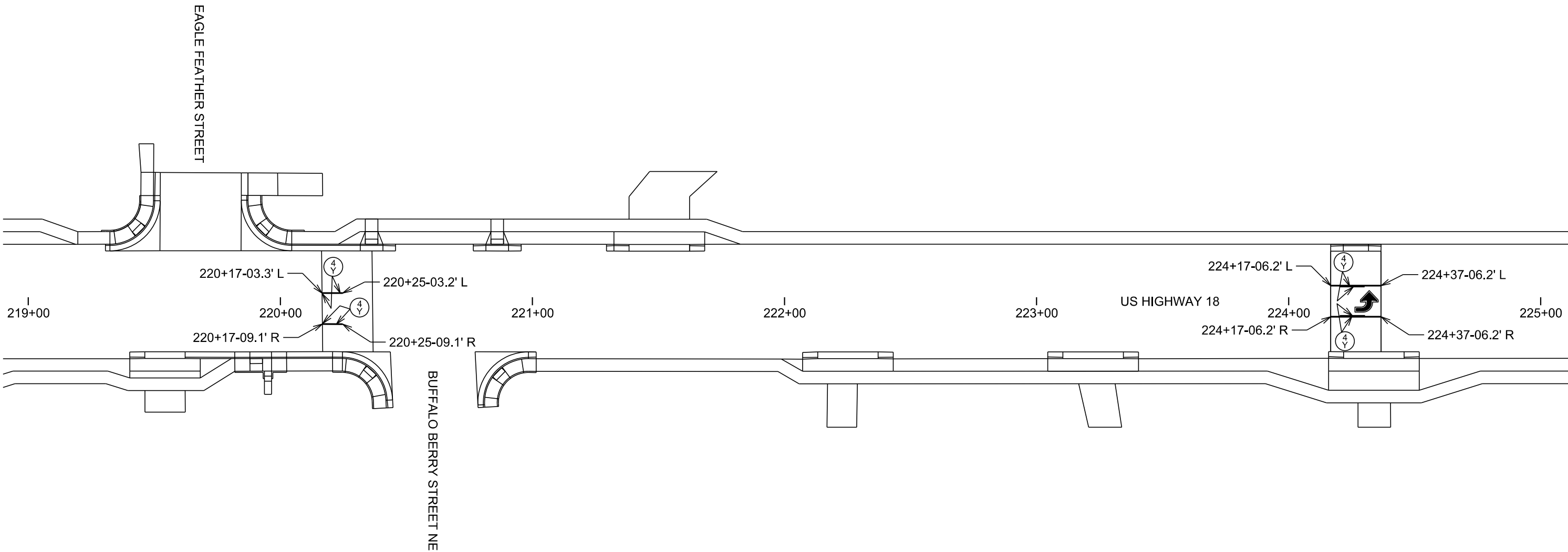
PAVEMENT MARKING LAYOUT

US HIGHWAY 18

FOR BIDDING PURPOSES ONLY

 STATE OF SOUTH DAKOTA	PROJECT NH-CR-EM 0018(195)103 P 0407(05)01		SHEET M14	TOTAL SHEETS M15

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