



# **J24S-25 Single Span Concrete Slab Bridge Standards**

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## General Notes:

The J24S-25 Bridge Standards, if properly used, provide the structural plans necessary to construct 24'-0" roadway single span concrete slab bridges with lengths of 20'-0", 30'-0", 40'-0" or 50'-0".

These bridges may be built on a 0, 15, 30 or 45 degree skew (integral abutments) and 0 or 15 degree skew (high abutments). These plans show the bridges skewed in one direction, but all dimensions and details would be the same for the opposite skew.

These standards with 24'-0" roadway are detailed with the option of concrete open rail (MASH TL-4) or side-mounted W-Beam guardrail (MASH TL-3).

These bridges are designed for HL93 loading plus 20 lb per sq ft of roadway for future wearing surface or gravel. Control of cracking by distribution of reinforcement for slab design based on Class 2 exposure (severe) for top bars and Class 1 exposure (normal) for bottom bars.

The slab as shown includes ½ inch integral wearing surface.

The abutments for these bridges are built integral with the superstructure. Therefore, it is important that a proper joint for expansion be provided between the bridge and approach paving, when approach paving is needed.

The abutment design utilized on these bridges restricts their use in the following manner:

1. These bridges are not to be used when point bearing for the abutment steel piling would be obtained on rock at a distance less than 27ft from the bottom of footing without special analysis.
2. For high abutments, the sheet pile shall be driven to full penetration (minimum embedment depth) as shown in the abutment details. Special analysis is required if lesser embedment is achieved due to stiff soils or rock.

It is recommended that the epoxy-coated reinforcing option be used if it is anticipated that the bridge deck and/or the bridge approaches will be chemically treated for the removal of ice or snow.

If epoxy-coated bars are used in the deck, then all bars used in the abutment and barrier rails shall be epoxy coated.

Keyway dimensions shown on the plans are based on nominal dimensions unless stated otherwise. In addition, the bevel used on the keyway shall be limited to a maximum of 10 degrees from vertical.

These bridge plans label all reinforcing steel with English notation (5a1 is 5/8 inch diameter bar). English reinforcing steel received in the field may display the following "bar designation". The "bar designation" is the stamped impression on the reinforcing bars, and is equivalent to the bar diameter in millimeters.

English Size	3	4	5	6	7	8	9	10	11
Bar Designation	10	13	16	19	22	25	29	32	36

All reinforcing bars and bars noted as dowels supplied for this structure shall be deformed reinforcement unless otherwise noted or shown.

## Specifications:

Design: AASHTO LRFD, 9th Ed., Series of 2020, except as noted in the current Iowa Bridge Design Manual.

Construction: Iowa Department of Transportation Standard Specifications for Highway and Bridge Construction, Series 2023, plus applicable General Supplemental Specifications, Developmental Specifications, Supplemental Specifications and Special Provision shall apply to construction work on this project.

## Design Stresses:

Design stresses for the following materials are in accordance with the AASHTO LRFD Bridge Design Specifications, 9th Ed., Series of 2020, except as noted in the current Iowa Bridge Design Manual.

Reinforcing steel in accordance with LRFD AASHTO Section 5, Grade 60 for epoxy and non-coated, and Grade 60 or 75 for stainless.

Concrete in accordance with LRFD AASHTO Section 5, f'c = 4.0 ksi.


Structural steel in accordance with LRFD AASHTO Section 6. ASTM A709 Grade 36 or Grade 50 ( AASHTO M270 Grade 36 or Grade 50).

## Shop Drawing Submittals

Shop drawings shall be submitted for the following items shown in the table below. (Note additional shop drawings may be required in accordance with Article 1105.03 of the Standard Specifications.)

Submittal requirements for shop drawings should be in accordance with 1105.03 of the Standard Specifications for Highway and Bridge Construction of the Iowa Department of Transportation.

1	Sheet piling, ties, walers, as per steel sheet piling notes (if applicable)
2	W-Beam guardrail posts (if applicable)

Latest Revision Date	Approved by Bridge Engineer		
		Standard Design - 24'-0" Roadway, Single Span Bridge	
		<b>Single Span Concrete Slab Bridges</b>	
		July, 2025	
		Index and General Notes	<b>J24S-01-25</b>

## Notes to Designer:

These standards give most of the information necessary to build these bridges. However, the following additional information is required to be part of the contract plans:

1. Title sheet with Engineer(s) seal
2. Estimated quantities totals including bid item "Class 20 Excavation" for bridge
3. Situation plan layout of bridge
4. Top of slab elevations layout
5. Bottom of abutment footing elevations
6. Elevations at top of wing (e.g. Elev. "A" and "B")
7. Piling design information
8. Slope protection layout (if needed)
9. Guardrail design
10. Approach details (if needed)

These standards have been developed utilizing epoxy-coated reinforcing. Non-coated or stainless steel bars may be substituted without modification of development or lap lengths. The Designer shall specify the appropriate bid item for the selected reinforcing.

The abutments for these standards have been designed for the use of both friction and point bearing piles. The pile length shall be determined by the Designer using Iowa DOT Bridge Design Manual (BDM) Article 6.2 based on site conditions.

Two options are provided for abutments to be used with these standards:

1. Integral abutments: HP10x42 piles at Bridge Design Manual (BDM) Article 6.2.6.1 Structural Resistance Level-1 (SRL-1). Water and ice loading not included.
2. High Abutments (0 and 15 degree skew only): HP10x42 piles at SRL-1 with PZ27 steel sheet pile backwall and wings. Maximum height from grade to top of berm/streambed of 14'-0". Water and ice loading not included.

The Bridge Designer shall obtain adequate soil borings to evaluate depth to rock and ability to achieve pile embedment as described in the General Notes, and perform the pile design.

Additionally, the Designer shall verify the soil properties obtained from the soil borings for the actual bridge site will not increase the embedment lengths required for the steel sheet piling, if applicable.

The following soil conditions were assumed in the design of the steel sheet piling:

### Backfill Material

- Shall consist of well drained granular material with less than 8% fines.
- Material shall consist of gradation as noted on Abutment Backfill Details Sheet.
- Backfill shall be placed as noted on Abutment Backfill Details Sheet.
- Unit weight of granular backfill assumed to be 130 pcf.
- $\phi'$ , internal friction angle = 34 degrees.
- Subdrain to be of type specified on Subdrain Details Sheet.

### Foundation Soils

- Consists of either alluvium, loess or glacial till, all of which will be comprised of clay soils.
- Unit weight of 125 pcf.
- Strength was conservatively modeled assuming a long term effective strength  $\phi'$ , equal to 21 degrees.
- The strength and unit weight are considered conservative and applicable if loose alluvial sand comprises the soils.
- Berm slope shall not be steeper than 2:1.

Designer will need to determine the pile construction control method, contract length, and target driving resistance and include in the plan notes and estimated quantities. Bridge Design Manual CADD notes E818, and E819 are appropriate for that purpose. The notes, as well as design examples and spreadsheets, are available on the Bridges and Structures Bureau website.

## Examples of Bridge Elevation Calculations:

The Designer shall show on the plans the three bottom of footing elevations required for each abutment. The Designer shall also show on the plans the required top of wing elevations as shown in the plans at each corner of the bridge.

The boxed details in the following examples show how the abutment elevations should be indicated on the plans.

### Example No. 1

Bridge located on a constant grade. For this example, the grade is -3.00% with the P.I. station of 199+00.00 and a P.I. elevation of 600.00. The bridge length is 50'-0"  $\bar{C}$  to  $\bar{C}$  of abutment bearings with 30° right hand ahead skew.

#### Stations

$\bar{C}$ Bridge Station	=	200+25.00
$\bar{C}$ Abut. No. 1 Brg.	=	200+00.00
$\bar{C}$ Abut. No. 2 Brg.	=	200+50.00

#### Elevations Along Profile Grade

$\bar{C}$ Abut. No. 1 Brg.	=	600.00 + (20000.00 - 19900.00)(-0.0300)
	=	597.00
$\bar{C}$ Abut. No. 2 Brg.	=	600.00 + (20050.00 - 19900.00)(-0.0300)
	=	595.50

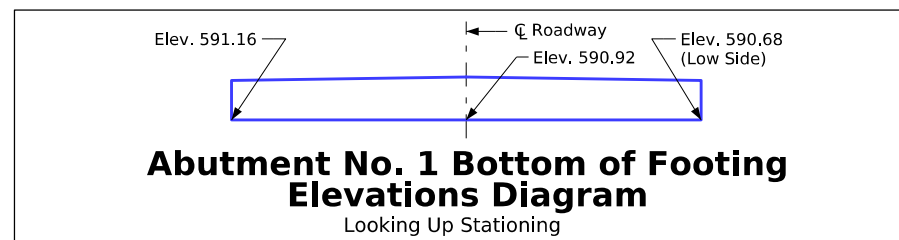
#### Skew angle correction

$$\begin{aligned} & \text{(Offset to end of abut.) (tan skew angle) (Grade)} \\ & = (13.58')(\tan 30^\circ)(0.0300) \\ & = 0.24' \end{aligned}$$

#### Abutment No. 1

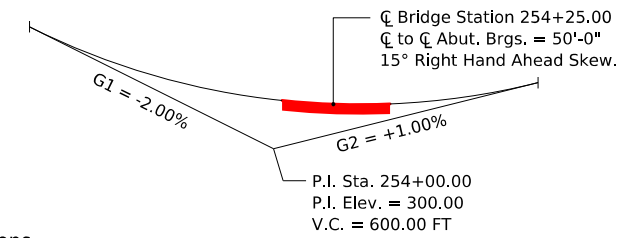
Location	Left End	$\bar{C}$ Roadway	Right End
PGL Elevation	597.00	597.00	597.00
Skew Angle Corr.	+ 0.24	0.00	- 0.24
- "X" $\blacktriangle$	- 6.08	- 6.08	- 6.08
Bottom of Abut. Elev.	<u>591.16</u>	<u>590.92</u>	<u>590.68</u>

Note: X dimension is shown for integral abutment for example purposes.



### Example No. 2

Bridge located on a parabolic vertical curve. For this example, the vertical curve is as shown below.



#### Stations

$\bar{C}$ Bridge Station	=	254+25.00
$\bar{C}$ Abut. No. 1 Brg.	=	254+00.00
$\bar{C}$ Abut. No. 2 Brg.	=	254+50.00

#### Elevations along Profile Grade

$\bar{C}$ Abut. No. 1 Brg.	=	302.25
$\bar{C}$ Abut. No. 2 Brg.	=	302.06

#### Bridge Grade

$$\text{Grade} = \frac{(302.06 - 302.25)(100)}{50.00} = -0.38\%$$

(Establish grade along  $\bar{C}$  Roadway and use this grade for bridge geometrics.)

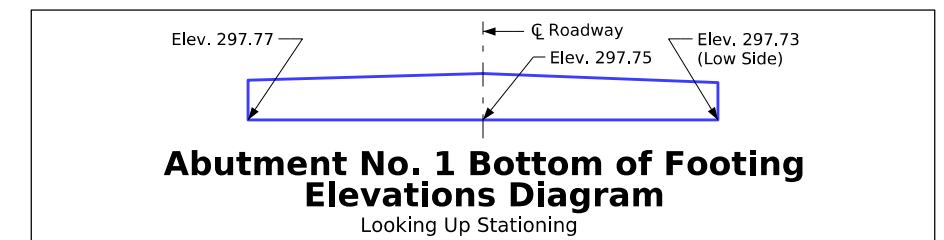
#### Skew Angle Correction

$$\begin{aligned} & \text{(Offset to end of abut.) (tan skew angle) (Grade)} \\ & = (17.5')(\tan 15^\circ)(0.0038) \\ & = 0.02' \end{aligned}$$

#### Abutment No. 1

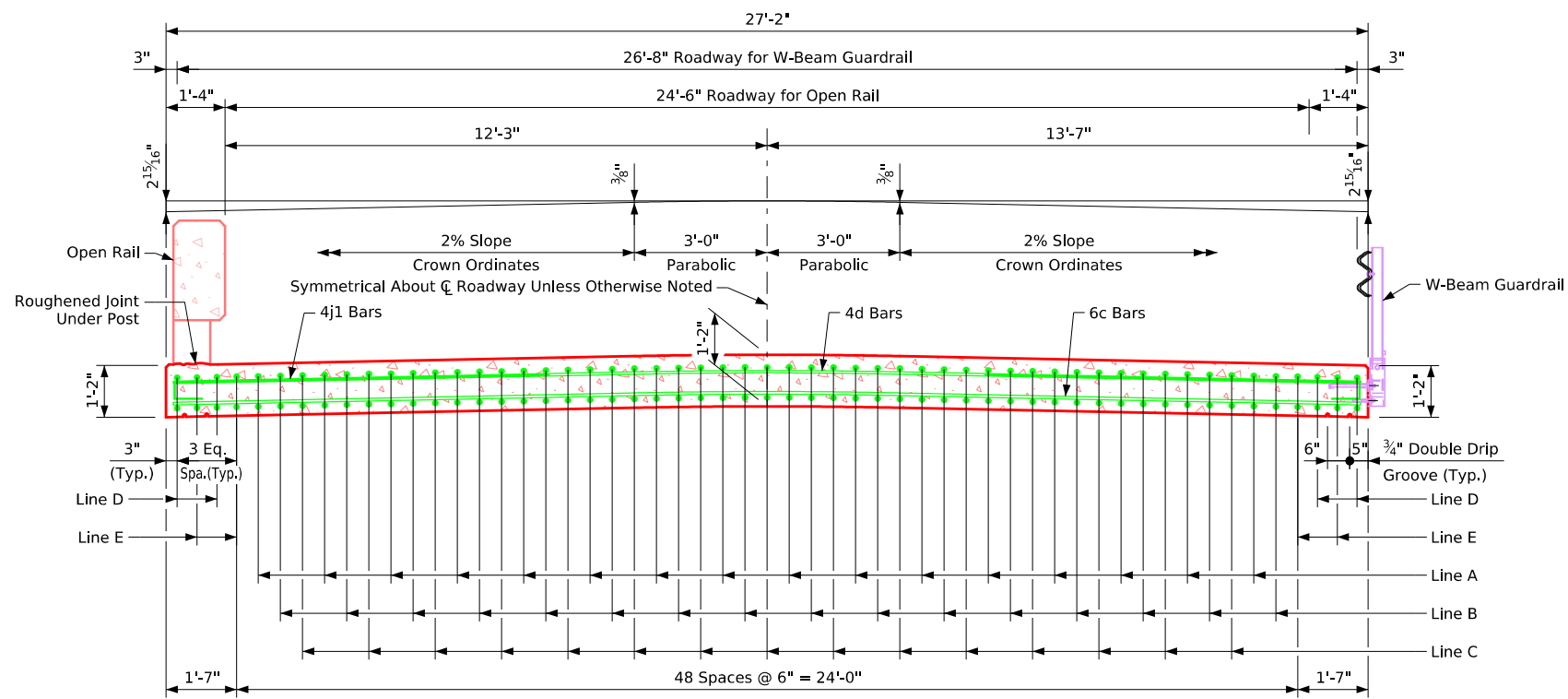
Location	Left End	$\bar{C}$ Roadway	Right End
PGL Elevation	302.25	302.25	302.25
Skew Angle Corr.	+ 0.02	0.00	- 0.02
- "X" $\blacktriangle$	- 4.50	- 4.50	- 4.50
Bottom of Abut. Elev.	<u>297.77</u>	<u>297.75</u>	<u>297.73</u>

Note: X dimension is shown for sheet pile abutment for example purposes.



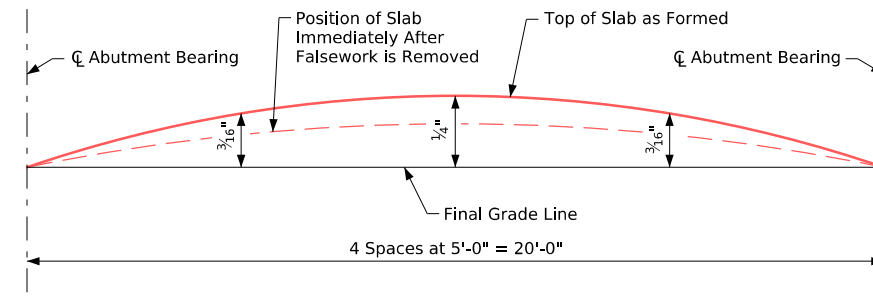
$\blacktriangle$  Slab depth plus diaphragm and cap height. See Abutment Details Sheets for "X" dimensions.

Latest Revision Date	Approved by Bridge Engineer	<b>IOWA IDOT</b>	
		Standard Design - 24'-0" Roadway, Single Span Bridge	
		<b>Single Span Concrete Slab Bridges</b>	
		July, 2025	
Designer Information		<b>J24S-02-25</b>	



**Transverse Section**

Slab Cross-Section Area = 31.69 sq ft



**Form Camber Diagram**

This diagram shows the form camber required to compensate for the anticipated ultimate dead load deflection. The above dimensions do not include any allowance for form deflection or falsework settlement.

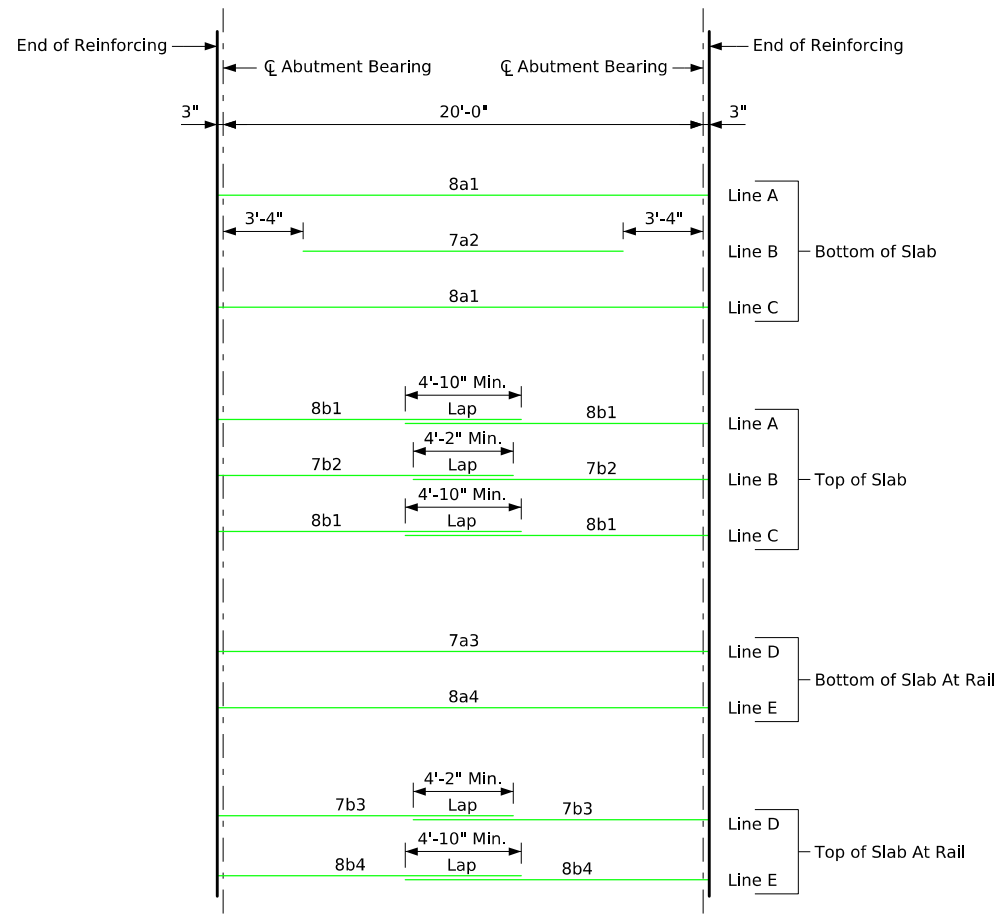
Camber values were computed for 0 degree skew. Other skews will result in slightly smaller deflection. Adjustments in camber may be considered if a wearing surface will not be placed.

**Notes:**



Top longitudinal reinforcing steel is to be parallel to and 2½ inches clear below top of slab. Bottom longitudinal reinforcing steel is to be parallel to and 1½ inch clear above bottom of slab. Reinforcing steel is to be securely wired in place and adequately supported on bar chairs before concrete is poured.

I.M. 451.01 requirements shall apply for bar chairs.

See Slab Reinforcing Plan Details for the top and bottom transverse slab reinforcing steel.



**Placement for Longitudinal Reinforcement**

Latest Revision Date  Approved by Bridge Engineer	 Standard Design - 24'-0" Roadway, Single Span Bridge	
	<b>Single Span Concrete Slab Bridges</b> July, 2025	
	Superstructure Details 20'-0" Bridge	<b>J24S-03-25</b>

## Bill of Reinforcing Steel for Superstructure - 20' Bridge

Location	Skew	0 Degree				15 Degree			30 Degree			45 Degree		
		Bar	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight
Slab Longitudinal Bottom		8a1	31	20'-6"	1697	31	20'-6"	1697	31	20'-6"	1697	31	20'-6"	1697
Slab Longitudinal Bottom, at Rail		7a3	4	20'-6"	168	4	20'-6"	168	4	20'-6"	168	4	20'-6"	168
Slab Longitudinal Top		8b1	62	15'-0"	2483	62	15'-0"	2483	62	15'-0"	2483	62	15'-0"	2483
Slab Longitudinal Top, at Rail		7b3	8	14'-8"	240	8	14'-8"	240	8	14'-8"	240	8	14'-8"	240
Slab Transverse Bottom		6c1	17	26'-10"	685	17	27'-9"	709	6	26'-10"	242	4	20'-8"	124
Slab Transverse Ends, Bottom		6c3	-	-	-	-	-	-	24	VARIABLES	578	36	VARIABLES	689
Slab Transverse, Top		4d1	17	26'-10"	305	17	27'-9"	315	6	26'-10"	108	4	20'-8"	55
Slab Transverse Ends, Top		4d3	-	-	-	-	-	-	24	VARIABLES	257	36	VARIABLES	307
Top of Slab, Transverse, at Rail		4j1	32	7'-5"	159	32	7'-5"	159	32	7'-5"	159	30	7'-5"	149
Paving Block Lifting Hoops		5z1	8	2'-10"	24	8	2'-10"	24	8	2'-10"	24	8	2'-10"	24
Epoxy-Coated Sub Total - LBS.					7,695			7,729			7,890			7,870

### Integral Abutment Bars

Slab, Transverse at Abutment		8e1	14	26'-10"	1003	-	-	-	-	-	-	-	-	-
Slab, Transverse at Abutment		8e2	-	-	-	14	27'-8"	1034	14	30'-6"	1140	14	36'-9"	1374
Slab, Hairpins, at Abutment		6e3	60	5'-0"	451	60	5'-1"	458	60	5'-5"	488	60	6'-1"	548
Slab, Diagonal, at Abutment		6e4	60	5'-11"	533	60	5'-11"	533	60	5'-11"	533	60	5'-11"	533
Wing, Vertical		5m1	40	4'-5"	184	40	4'-5"	184	40	4'-5"	184	40	4'-5"	184
Wing, Horizontal		5n1	48	6'-8"	334	48	6'-8"	334	48	6'-8"	334	48	6'-8"	334
Epoxy-Coated Sub Total - Integral Abutment - LBS.					2,505			2,543			2,679			2,973

### High Abutment Bars

Slab, Diagonal, at Abutment		6e4	60	5'-11"	533	58	5'-11"	515	-	-	-	-	-	-
Slab, Transverse at Abutment		8e5	18	34'-8"	1666	18	35'-11"	1726	-	-	-	-	-	-
Slab, Transverse at Abutment, Cap Ends		8e6	4	5'-2"	55	4	5'-4"	57	-	-	-	-	-	-
Abutment Hairpins		6s1	160	8'-0"	1923	140	8'-0"	1682	-	-	-	-	-	-
Abutment Hairpins, Cap Ends		6s2	-	-	-	16	8'-1"	194	-	-	-	-	-	-
Abutment Hairpins, Cap Ends		5s3	24	8'-4"	209	24	8'-5"	211	-	-	-	-	-	-
Spiral		#2	10	38'-6"	64	12	38'-6"	77	-	-	-	-	-	-
Spiral Spacers, L 7/8x7/8x1/8x 0,7			30	1'-10"	39	36	1'-10"	46	-	-	-	-	-	-
Epoxy-Coated Sub Total - High Abutment - LBS.					4,386			4,385						
Non-Coated Sub Total - High Abutment - LBS.					103			123						

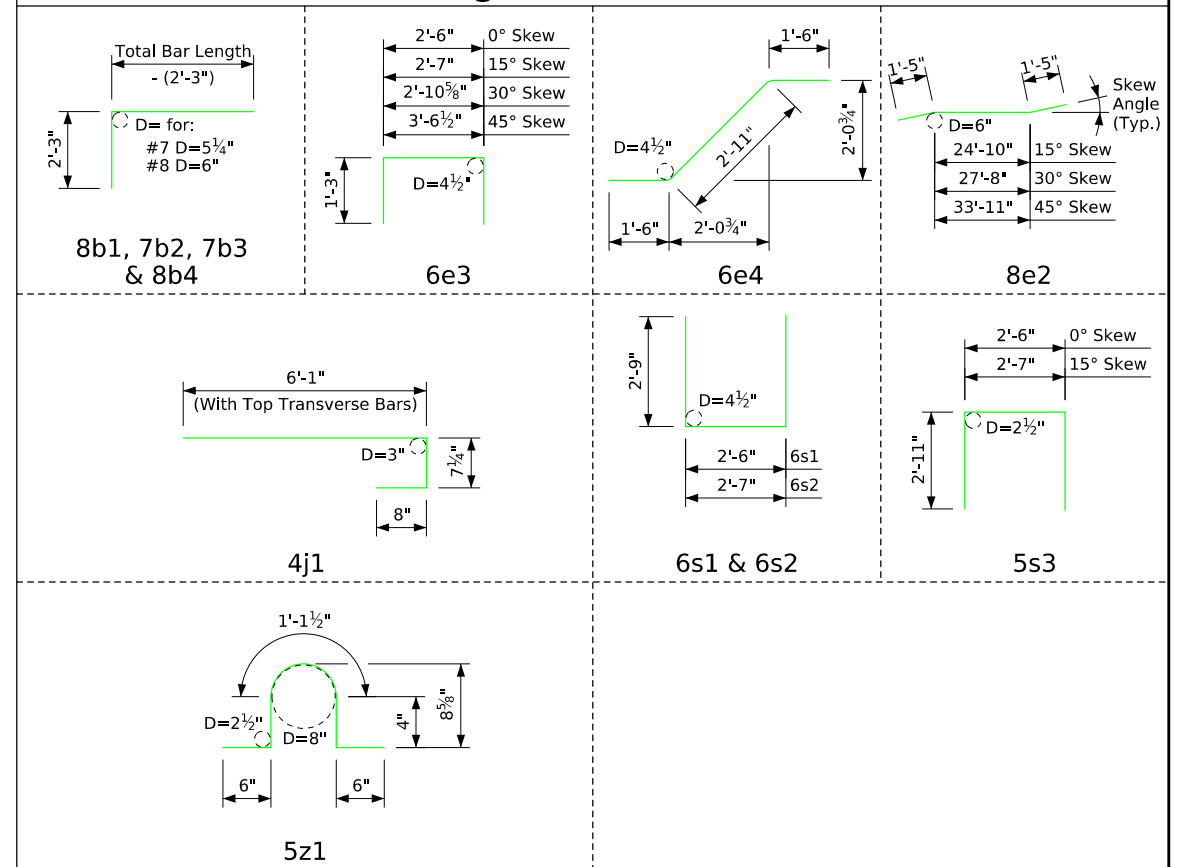
Open Rail - Integral Abutment - See Sheet J24S-27-25					2,802			2,802			2,802			2,802
Open Rail - High Abutment - See Sheet J24S-29-25					2,190			2,190			-			-
Totals with Integral Abutment - LBS		Epoxy-Coated Total	With Open Rail		13,002			13,074			13,371			13,645
			With W-Beam Guardrail		10,200			10,272			10,569			10,843
Totals with High Abutment - LBS		Epoxy-Coated Total	With Open Rail		14,271			14,304			-			-
			With W-Beam Guardrail		12,081			12,114			-			-
		Non-Coated Total			103			123						

### Estimated Quantities for Superstructure - 20' Bridge

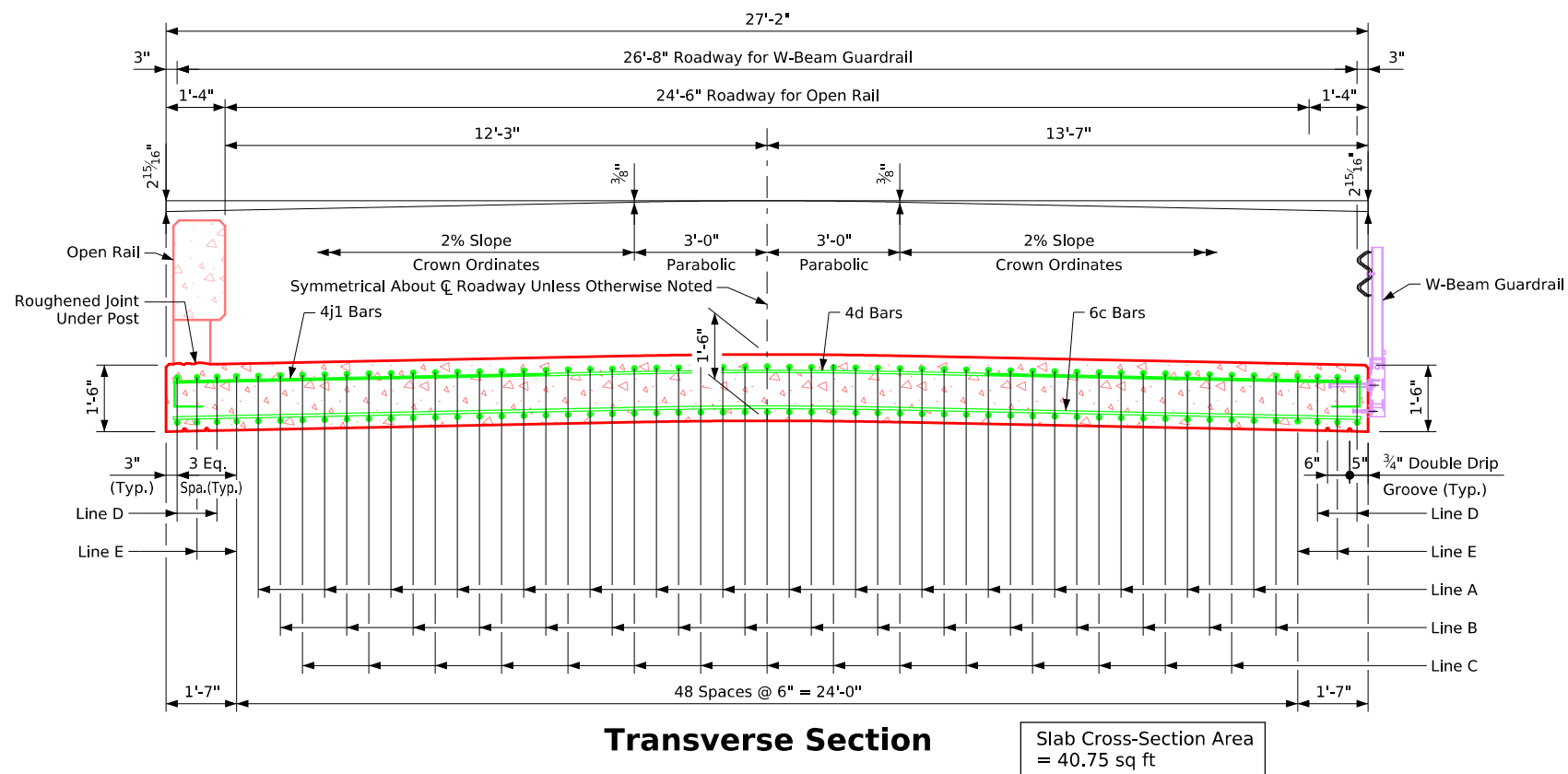
Item	Skew	Integral Abutment				High Abutment	
		0°	15°	30°	45°	0°	15°
* Structural Concrete (Bridge)	C.Y.	41.8	42.2	43.5	46.4	52.9	53.6
Reinf. Steel Epoxy Coated With Open Rail	LBS.	13,002	13,074	13,371	13,645	14,271	14,304
Reinf. Steel Epoxy Coated With W-Beam Guardrail	LBS.	10,200	10,272	10,569	10,843	12,081	12,114
Reinf. Steel Non-Coated	LBS.	-	-	-	-	103	123

\* Includes 4 wings for integral abutment at 1.18 CY each and temporary paving blocks; excludes rail concrete.

## 20' Bridge - Bent Bar Details

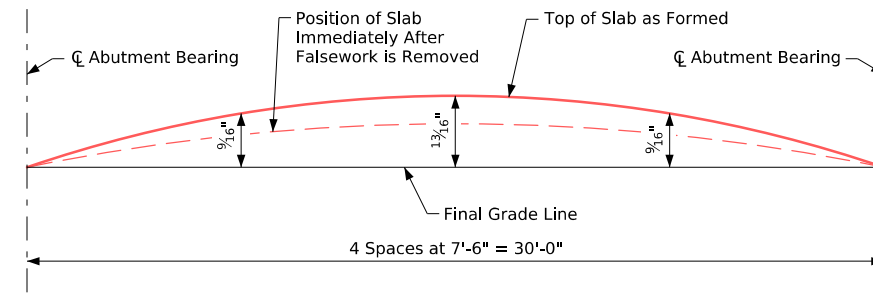


Latest Revision Date  Approved by Bridge Engineer	
	Standard Design - 24'-0" Roadway, Single Span Bridge <h3 style="margin: 0;">Single Span Concrete Slab Bridges</h3> July, 2025
	Superstructure Details 20'-0" Bridge



**Transverse Section**

Slab Cross-Section Area = 40.75 sq ft



**Form Camber Diagram**

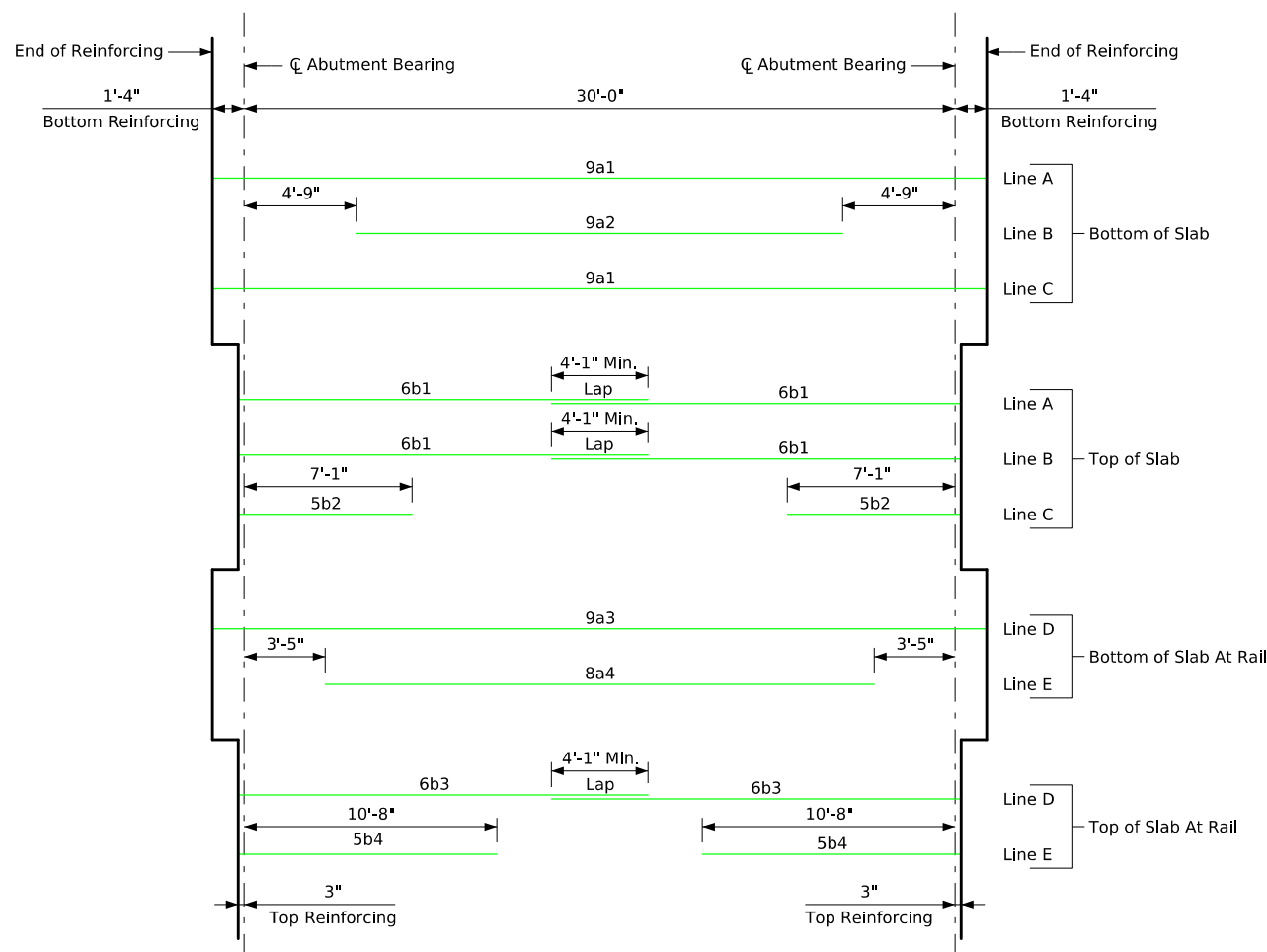
This diagram shows the form camber required to compensate for the anticipated ultimate dead load deflection. The above dimensions do not include any allowance for form deflection or falsework settlement.

Camber values were computed for 0 degree skew. Other skews will result in slightly smaller deflection. Adjustments in camber may be considered if a wearing surface will not be placed.

**Notes:**

Top longitudinal reinforcing steel is to be parallel to and 2½ inches clear below top of slab. Bottom longitudinal reinforcing steel is to be parallel to and 1½ inch clear above bottom of slab. Reinforcing steel is to be securely wired in place and adequately supported on bar chairs before concrete is poured.

I.M. 451.01 requirements shall apply for bar chairs. See Slab Reinforcing Plan Details for the top and bottom transverse slab reinforcing steel.



**Placement for Longitudinal Reinforcement**

Latest Revision Date Approved by Bridge Engineer		
	Standard Design - 24'-0" Roadway, Single Span Bridge <b>Single Span Concrete Slab Bridges</b> July, 2025	
	Superstructure Details 30'-0" Bridge	<b>J24S-05-25</b>

## Bill of Reinforcing Steel for Superstructure - 30' Bridge

Location	Skew	0 Degree				15 Degree			30 Degree			45 Degree		
		Bar	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight
Slab Longitudinal Bottom		9a1	31	32'-8"	3443	31	32'-8"	3443	31	32'-8"	3443	31	32'-8"	3443
Slab Longitudinal Bottom, at Rail		9a3	4	32'-8"	444	4	32'-8"	444	4	32'-8"	444	4	32'-8"	444
Slab Longitudinal Top		6b1	64	19'-8"	1887	64	19'-8"	1887	64	19'-8"	1887	64	19'-8"	1887
Slab Longitudinal Top, at Rail		6b3	8	19'-8"	236	8	19'-8"	236	8	19'-8"	236	8	19'-8"	236
Slab Transverse Ends, Bottom		6c1	27	26'-10"	1088	27	27'-9"	1127	16	26'-10"	645	6	26'-10"	242
Slab Transverse Bottom		6c3	-	-	-	-	-	-	24	VARIABLES	579	44	VARIABLES	976
Slab Transverse Top		4d1	27	26'-10"	484	27	27'-9"	501	16	26'-10"	287	6	26'-10"	108
Slab Transverse Ends, Top		4d3	-	-	-	-	-	-	24	VARIABLES	258	44	VARIABLES	434
Top of Slab, Transverse, at Rail		4j1	52	7'-5"	258	52	7'-5"	258	52	7'-5"	258	50	7'-5"	248
Paving Block Lifting Hoops		5z1	8	2'-10"	24	8	2'-10"	24	8	2'-10"	24	8	2'-10"	24
Epoxy-Coated Sub Total - LBS.					9,636			9,692			9,833			9,814

### Integral Abutment Bars

Slab, Transverse at Abutment		8e1	14	26'-10"	1003	-	-	-	-	-	-	-	-	-
Slab, Transverse at Abutment		8e2	-	-	-	14	27'-8"	1034	14	30'-6"	1140	14	36'-9"	1374
Slab, Hairpins, at Abutment		6e3	60	5'-0"	451	60	5'-1"	458	60	5'-5"	488	60	6'-1"	548
Slab, Diagonal, at Abutment		6e4	60	5'-11"	533	60	5'-11"	533	60	5'-11"	533	60	5'-11"	533
Wing, Vertical		5m1	40	4'-5"	184	40	4'-5"	184	40	4'-5"	184	40	4'-5"	184
Wing, Horizontal		5n1	48	6'-8"	334	48	6'-8"	334	48	6'-8"	334	48	6'-8"	334
Epoxy-Coated Sub Total - Integral Abutment - LBS.					2,505			2,543			2,679			2,973

### High Abutment Bars

Slab, Diagonal, at Abutment		6e4	58	5'-11"	515	8	5'-11"	515	-	-	-	-	-	-
Slab, Transverse at Abutment		8e5	18	34'-8"	1666	18	35'-11"	1726	-	-	-	-	-	-
Slab, Transverse at Abutment, Cap Ends		8e6	4	5'-2"	55	4	5'-4"	57	-	-	-	-	-	-
Abutment Hairpins		6s1	156	8'-0"	1874	140	8'-0"	1682	-	-	-	-	-	-
Abutment Hairpins, Cap Ends		6s2	-	-	-	16	8'-1"	194	-	-	-	-	-	-
Abutment Hairpins, Cap Ends		5s3	24	8'-4"	209	24	8'-5"	211	-	-	-	-	-	-
Spiral		#2	12	38'-6"	77	12	38'-6"	77	-	-	-	-	-	-
Spiral Spacers, L 7/8x7/8x1/8x 0,7			36	1'-10"	46	36	1'-10"	46	-	-	-	-	-	-
Epoxy-Coated Sub Total - High Abutment - LBS.					4,110			3,980						
Non-Coated Sub Total - High Abutment - LBS.					123			123						

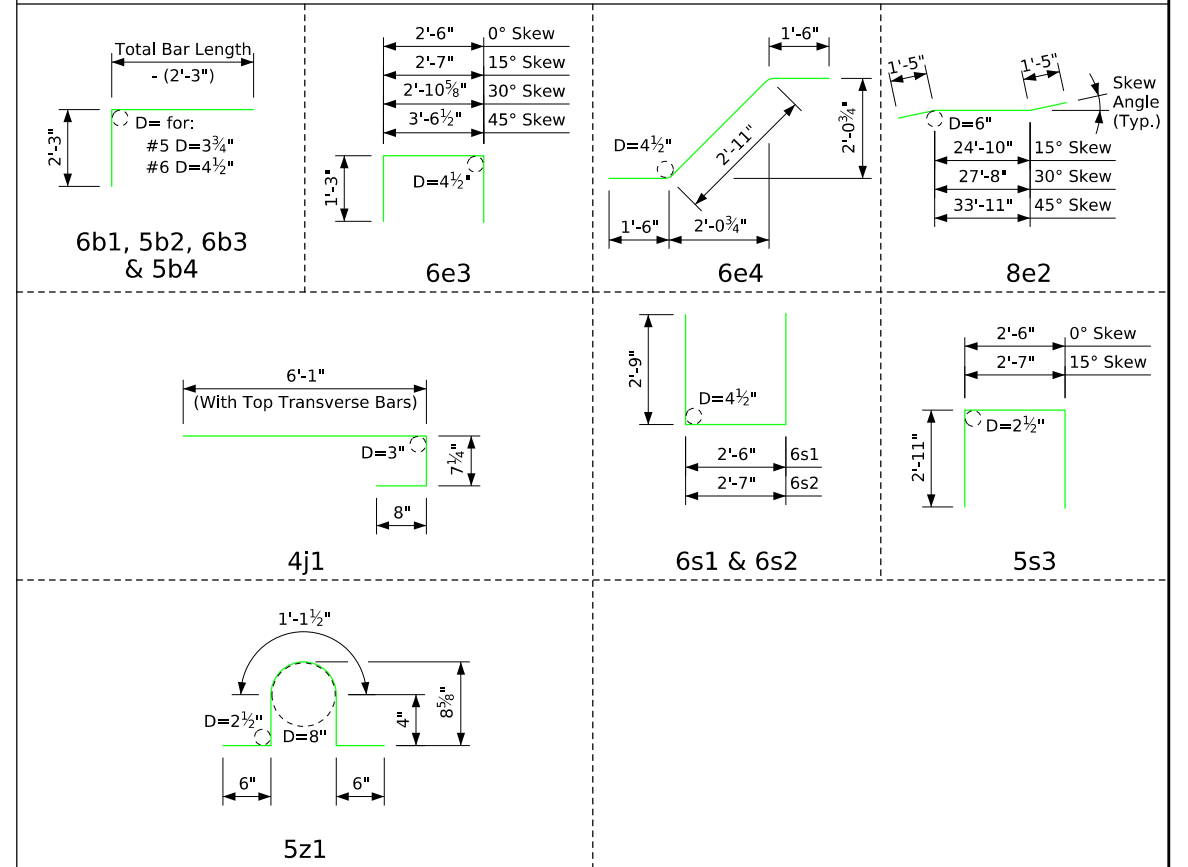
Open Rail - Integral Abutment - See Sheet J245-27-25					3,364			3,364			3,364			3,364
Open Rail - High Abutment - See Sheet J245-29-25					2,752			2,752			-			-
Totals with Integral Abutment - LBS	Epoxy-Coated Total	With Open Rail			15,505			15,599			15,876			16,151
		With W-Beam Guardrail			12,141			12,235			12,512			12,787
Totals with High Abutment - LBS	Epoxy-Coated Total	With Open Rail			16,498			16,424			-			-
		With W-Beam Guardrail			13,746			13,672			-			-
	Non-Coated Total				123			123						

## Estimated Quantities for Superstructure - 30' Bridge

Item	Skew	Integral Abutment				High Abutment	
		0°	15°	30°	45°	0°	15°
* Structural Concrete (Bridge)	C.Y.	62.6	62.9	64.1	66.7	73.7	74.3
Reinf. Steel Epoxy Coated With Open Rail	LBS.	15,505	15,599	15,876	16,151	16,498	16,424
Reinf. Steel Epoxy Coated With W-Beam Guardrail	LBS.	12,141	12,235	12,512	12,787	13,746	13,672
Reinf. Steel Non-Coated	LBS.	-	-	-	-	123	123

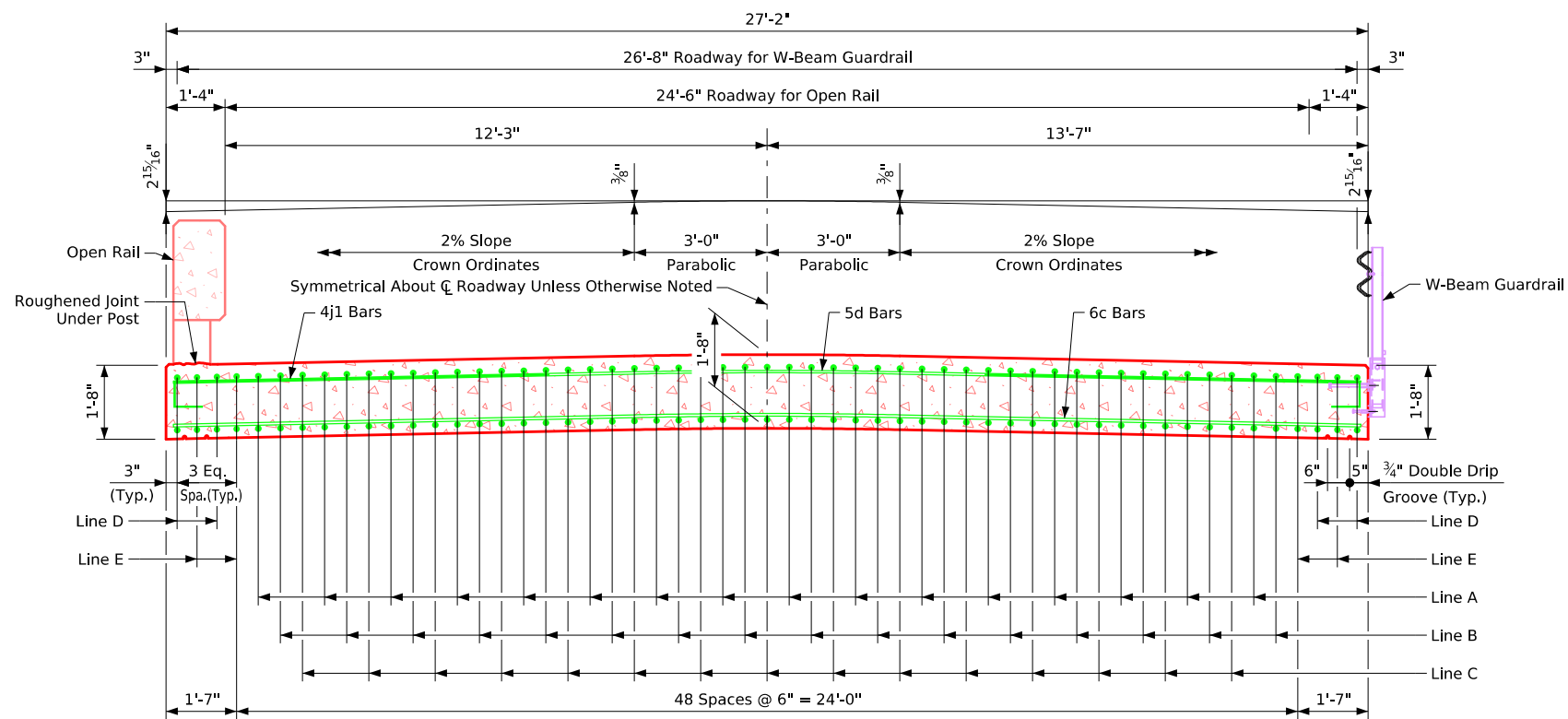
\* Includes 4 wings for integral abutment at 1.18 CY each and temporary paving blocks; excludes rail concrete.

## 30' Bridge - Bent Bar Details



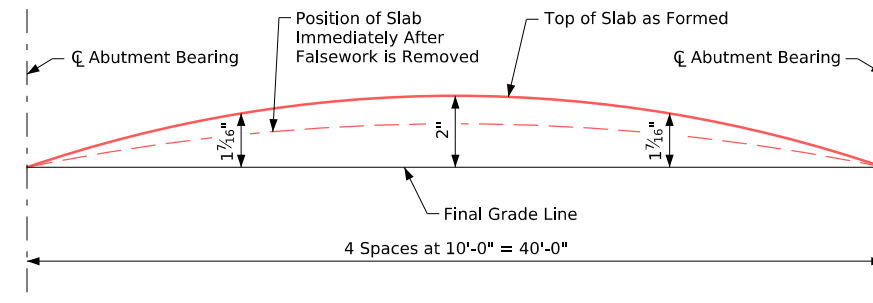
Note: All Dimensions Are Out To Out. D = Pin Diameter.

Latest Revision Date	Approved by Bridge Engineer	Standard Design - 24'-0" Roadway, Single Span Bridge <b>Single Span Concrete Slab Bridges</b> July, 2025
Superstructure Details 30'-0" Bridge		<b>J24S-06-25</b>



**Transverse Section**

Slab Cross-Section Area = 45.27 sq ft



**Form Camber Diagram**

This diagram shows the form camber required to compensate for the anticipated ultimate dead load deflection. The above dimensions do not include any allowance for form deflection or falsework settlement.

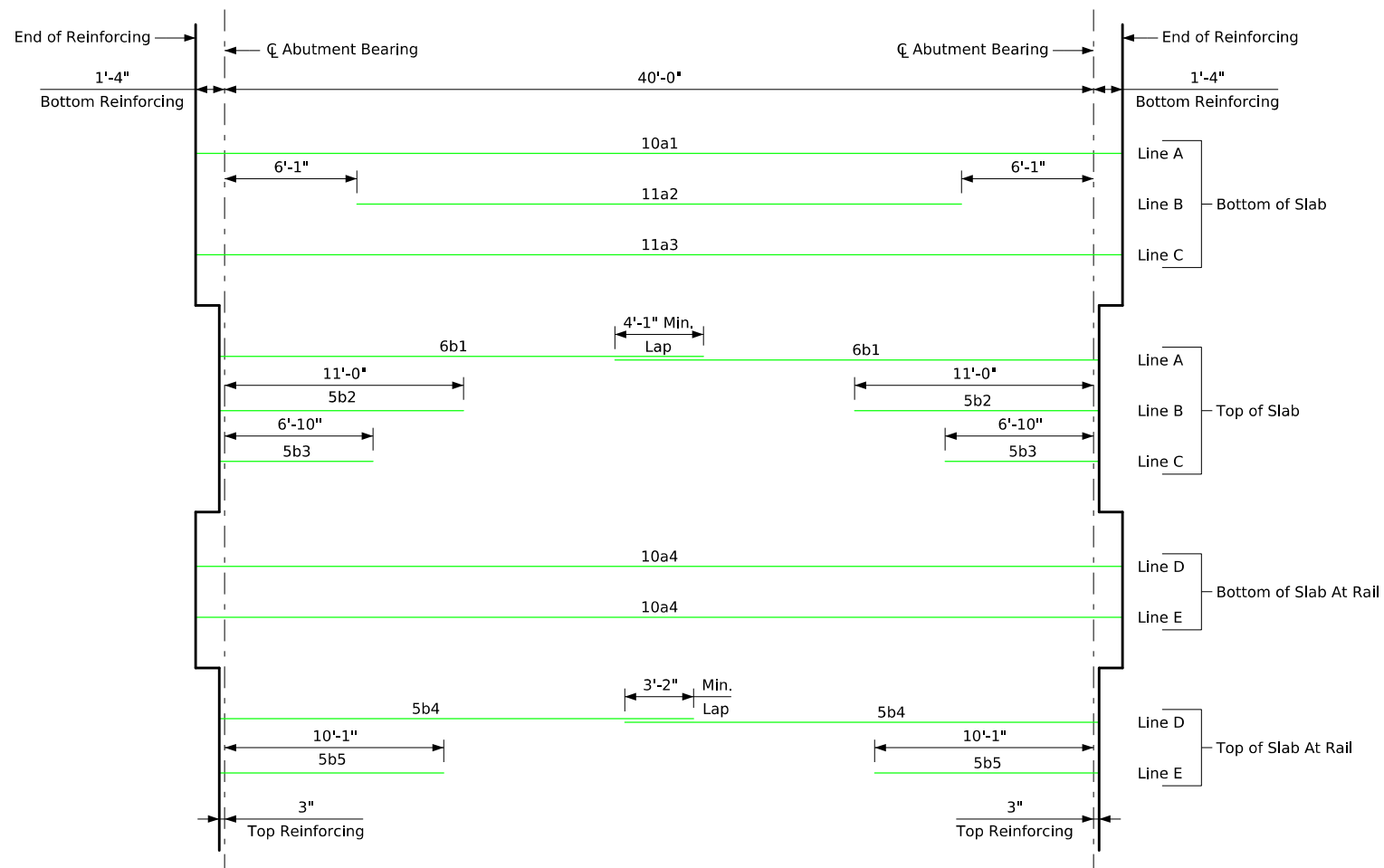
Camber values were computed for 0 degree skew. Other skews will result in slightly smaller deflection. Adjustments in camber may be considered if a wearing surface will not be placed.

**Notes:**

Top longitudinal reinforcing steel is to be parallel to and 2½ inches clear below top of slab. Bottom longitudinal reinforcing steel is to be parallel to and 1½ inch clear above bottom of slab. Reinforcing steel is to be securely wired in place and adequately supported on bar chairs before concrete is poured.

I.M. 451.01 requirements shall apply for bar chairs.

See Slab Reinforcing Plan Details for the top and bottom transverse slab reinforcing steel.



**Placement for Longitudinal Reinforcement**

Latest Revision Date	Approved by Bridge Engineer	<b>IOWA IDOT</b>	
		Standard Design - 24'-0" Roadway, Single Span Bridge	
		<b>Single Span Concrete Slab Bridges</b>	
		July, 2025	
		Superstructure Details 40'-0" Bridge	<b>J24S-07-25</b>

## Bill of Reinforcing Steel for Superstructure - 40' Bridge

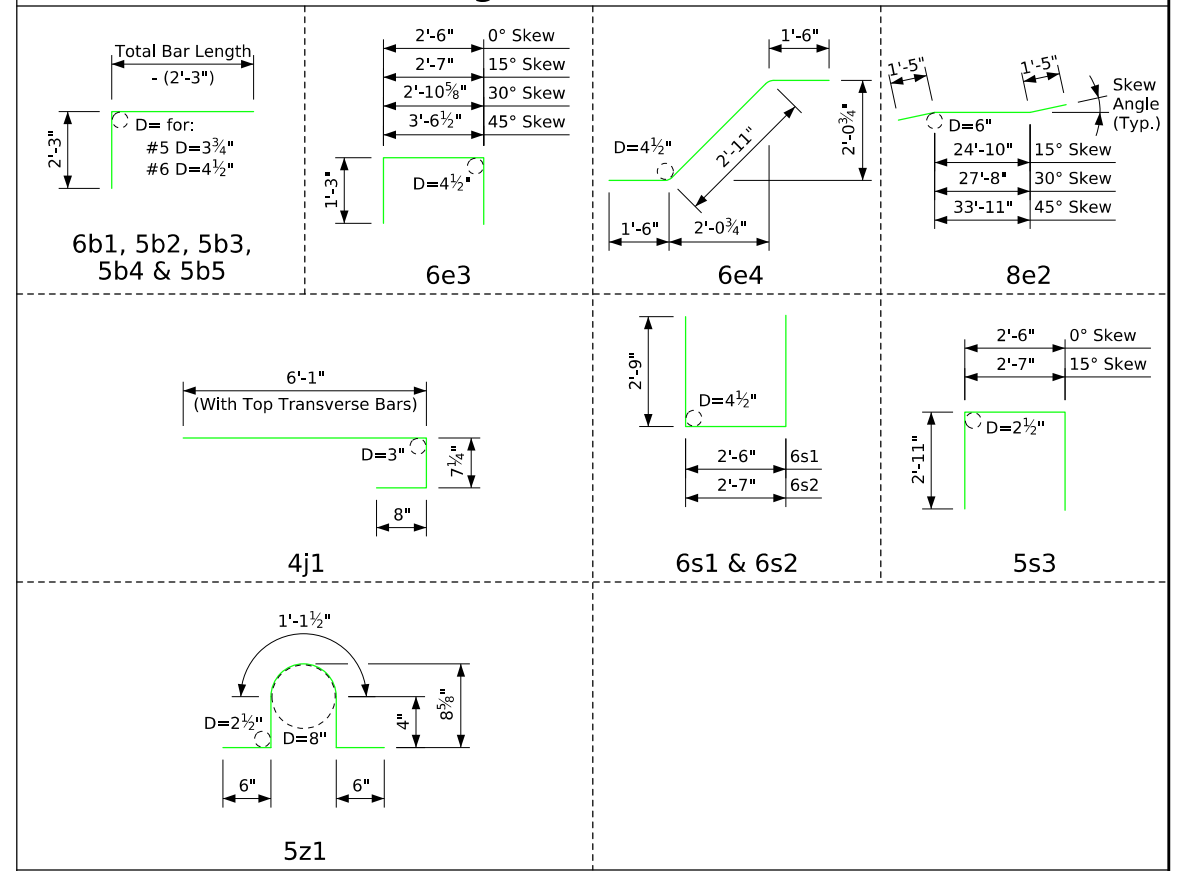
Location	Skew	Bar	0 Degree				15 Degree			30 Degree			45 Degree		
			No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	
Slab Longitudinal Bottom		10a1	16	42'-8"	2938	16	42'-8"	2938	16	42'-8"	2938	16	42'-8"	2938	
Slab Longitudinal Bottom		11a2	16	27'-10"	2366	16	27'-10"	2366	16	27'-10"	2366	16	27'-10"	2366	
Slab Longitudinal Bottom		11a3	15	42'-8"	3400	15	42'-8"	3400	15	42'-8"	3400	15	42'-8"	3400	
Slab Longitudinal Bottom, at Rail		10a4	8	42'-8"	1469	8	42'-8"	1469	8	42'-8"	1469	8	42'-8"	1469	
Slab Longitudinal Top		6b1	32	24'-8"	1184	32	24'-8"	1184	32	24'-8"	1184	32	24'-8"	1184	
Slab Longitudinal Top		5b2	32	13'-6"	451	32	13'-6"	451	32	13'-6"	451	32	13'-6"	451	
Slab Longitudinal Top		5b3	30	9'-4"	292	30	9'-4"	292	30	9'-4"	292	30	9'-4"	292	
Slab Longitudinal Top, at Rail		5b4	8	24'-2"	202	8	24'-2"	202	8	24'-2"	202	8	24'-2"	202	
Slab Longitudinal Top, at Rail		5b5	8	12'-7"	105	8	12'-7"	105	8	12'-7"	105	8	12'-7"	105	
Slab Transverse Bottom		6c1	37	26'-10"	1491	37	27'-9"	1544	26	26'-10"	1048	16	26'-10"	645	
Slab Transverse Ends, Bottom		6c3	-	-	-	-	-	-	24	VARIABLES	579	44	VARIABLES	976	
Slab Transverse Top		5d2	37	26'-10"	1036	37	27'-9"	1072	26	26'-10"	728	16	26'-10"	448	
Slab Transverse Ends, Top		5d4	-	-	-	-	-	-	24	VARIABLES	402	44	VARIABLES	678	
Top of Slab, Transverse, at Rail		4j1	72	7'-5"	357	72	7'-5"	357	72	7'-5"	357	70	7'-5"	347	
Paving Block Lifting Hoops		5z1	8	2'-10"	24	8	2'-10"	24	8	2'-10"	24	8	2'-10"	24	
Epoxy-Coated Sub Total - LBS.					15,315			15,404			15,545			15,525	
<b>Integral Abutment Bars</b>															
Slab, Transverse at Abutment		8e1	14	26'-10"	1003	-	-	-	-	-	-	-	-	-	
Slab, Transverse at Abutment		8e2	-	-	-	14	27'-8"	1034	14	30'-6"	1140	14	36'-9"	1374	
Slab, Hairpins, at Abutment		6e3	60	5'-0"	451	60	5'-1"	458	60	5'-5"	488	60	6'-1"	548	
Slab, Diagonal, at Abutment		6e4	60	5'-11"	533	60	5'-11"	533	60	5'-11"	533	60	5'-11"	533	
Wing, Vertical		5m1	40	4'-5"	184	40	4'-5"	184	40	4'-5"	184	40	4'-5"	184	
Wing, Horizontal		5n1	48	6'-8"	334	48	6'-8"	334	48	6'-8"	334	48	6'-8"	334	
Epoxy-Coated Sub Total - Integral Abutment - LBS.					2,505			2,543			2,679			2,973	
<b>High Abutment Bars</b>															
Slab, Diagonal, at Abutment		6e4	60	5'-11"	533	60	5'-11"	533	-	-	-	-	-	-	
Slab, Transverse at Abutment		8e5	18	34'-8"	1666	18	35'-11"	1726	-	-	-	-	-	-	
Slab, Transverse at Abutment, Cap Ends		8e6	4	5'-2"	55	4	5'-4"	57	-	-	-	-	-	-	
Abutment Hairpins		6s1	160	8'-0"	1923	140	8'-0"	1730	-	-	-	-	-	-	
Abutment Hairpins, Cap Ends		6s2	-	-	-	16	8'-1"	194	-	-	-	-	-	-	
Abutment Hairpins, Cap Ends		5s3	24	8'-4"	209	24	8'-5"	211	-	-	-	-	-	-	
Spiral		#2	14	38'-6"	89	14	38'-6"	89	-	-	-	-	-	-	
Spiral Spacers, L 7/8x7/8x1/8x 0.7			42	1'-10"	54	42	1'-10"	54	-	-	-	-	-	-	
Epoxy-Coated Sub Total - High Abutment - LBS.					4,386			4,594							
Non-Coated Sub Total - High Abutment - LBS.					143			143							
<b>Open Rail - Integral Abutment - See Sheet J24S-27-25</b>															
<b>Open Rail - High Abutment - See Sheet J24S-29-25</b>															
Totals with Integral Abutment - LBS	Epoxy-Coated Total	With Open Rail			21,738			21,865			22,142			22,416	
		With W-Beam Guardrail			17,820			17,947			18,224			18,498	
Totals with High Abutment - LBS	Epoxy-Coated Total	With Open Rail			23,024			23,321			-			-	
		With W-Beam Guardrail			19,701			19,998			-			-	
	Non-Coated Total				143			143							

## Estimated Quantities for Superstructure - 40' Bridge

Item	Integral Abutment					High Abutment	
	Skew	0°	15°	30°	45°	0°	15°
* Structural Concrete (Bridge)	C.Y.	83.9	84.2	85.3	87.7	95.0	95.6
Reinf. Steel Epoxy Coated With Open Rail	LBS.	21,738	21,865	22,142	22,416	23,024	23,321
Reinf. Steel Epoxy Coated With W-Beam Guardrail	LBS.	17,820	17,947	18,224	18,498	19,701	19,998
Reinf. Steel Non-Coated	LBS.	-	-	-	-	143	143

\* Includes 4 wings for integral abutment at 1.18 CY each and temporary paving blocks; excludes rail concrete.

## 40' Bridge - Bent Bar Details

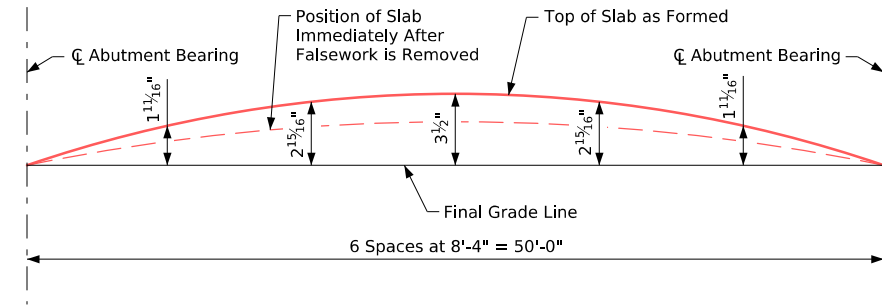
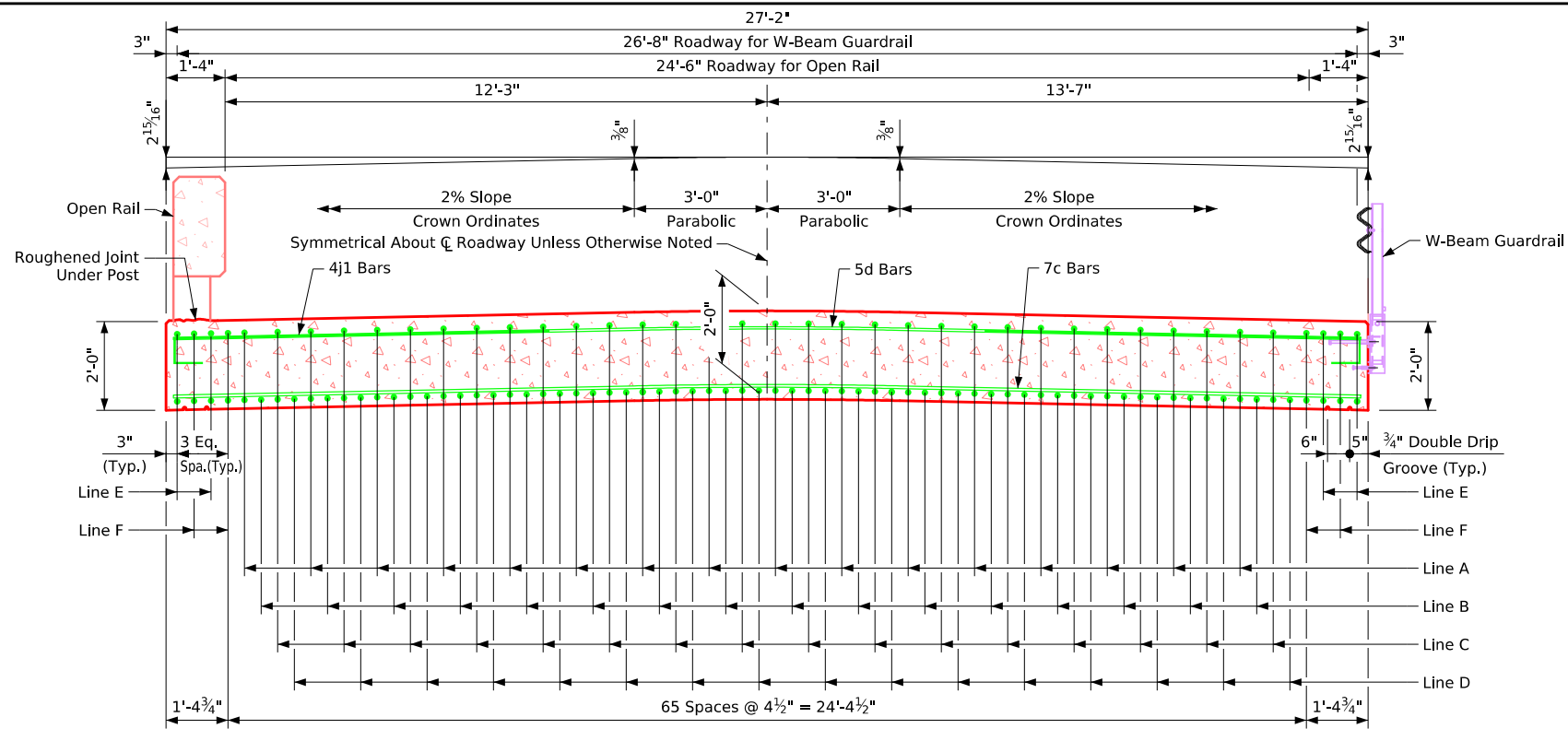


Note: All Dimensions Are Out To Out. D = Pin Diameter.

Latest Revision Date  Approved by Bridge Engineer	
	Standard Design - 24'-0" Roadway, Single Span Bridge <b>Single Span Concrete Slab Bridges</b> July, 2025
	Superstructure Details 40'-0" Bridge

**J24S-08-25**

Revised 11-2025: Removed incorrectly detailed 6b1 top of slab longitudinal bars that were previously shown in Top of Slab "Line B" in the "Transverse Section" detail.



### Form Camber Diagram

This diagram shows the form camber required to compensate for the anticipated ultimate dead load deflection. The above dimensions do not include any allowance for form deflection or falsework settlement.

Camber values were computed for 0 degree skew. Other skews will result in slightly smaller deflection. Adjustments in camber may be considered if a wearing surface will not be placed.

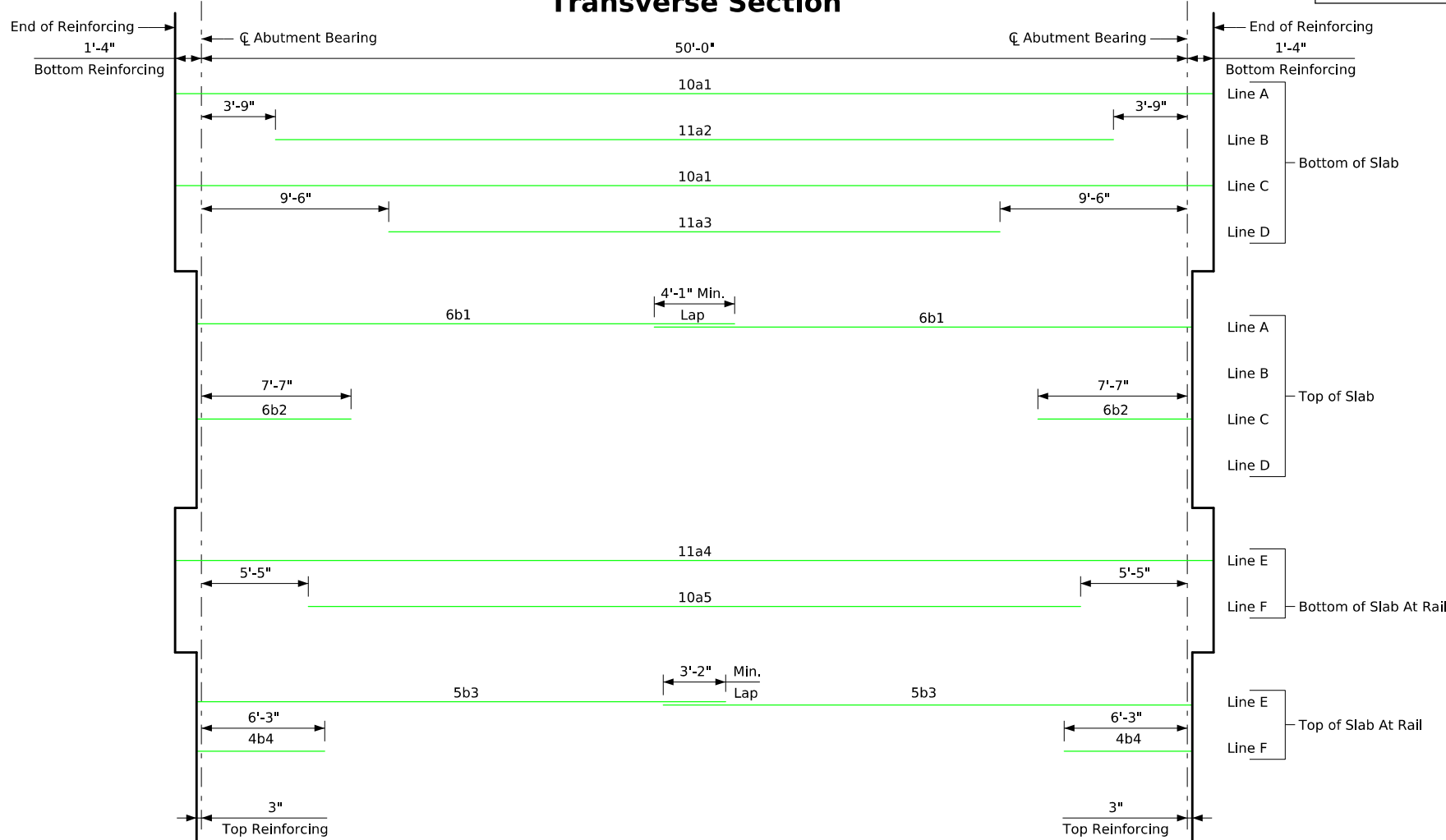
#### Notes:

Top longitudinal reinforcing steel is to be parallel to and 2 1/2 inches clear below top of slab. Bottom longitudinal reinforcing steel is to be parallel to and 1 1/2 inch clear above bottom of slab. Reinforcing steel is to be securely wired in place and adequately supported on bar chairs before concrete is poured.

I.M. 451.01 requirements shall apply for bar chairs. See Slab Reinforcing Plan Details for the top and bottom transverse slab reinforcing steel.

Slab Cross-Section Area = 54.33 sq ft

### Transverse Section



### Placement for Longitudinal Reinforcement

11-2025 Latest Revision Date Approved by Bridge Engineer		
	Standard Design - 24'-0" Roadway, Single Span Bridge <b>Single Span Concrete Slab Bridges</b> July, 2025	
	Superstructure Details 50'-0" Bridge	<b>J24S-09-25</b>

## Bill of Reinforcing Steel for Superstructure - 50' Bridge

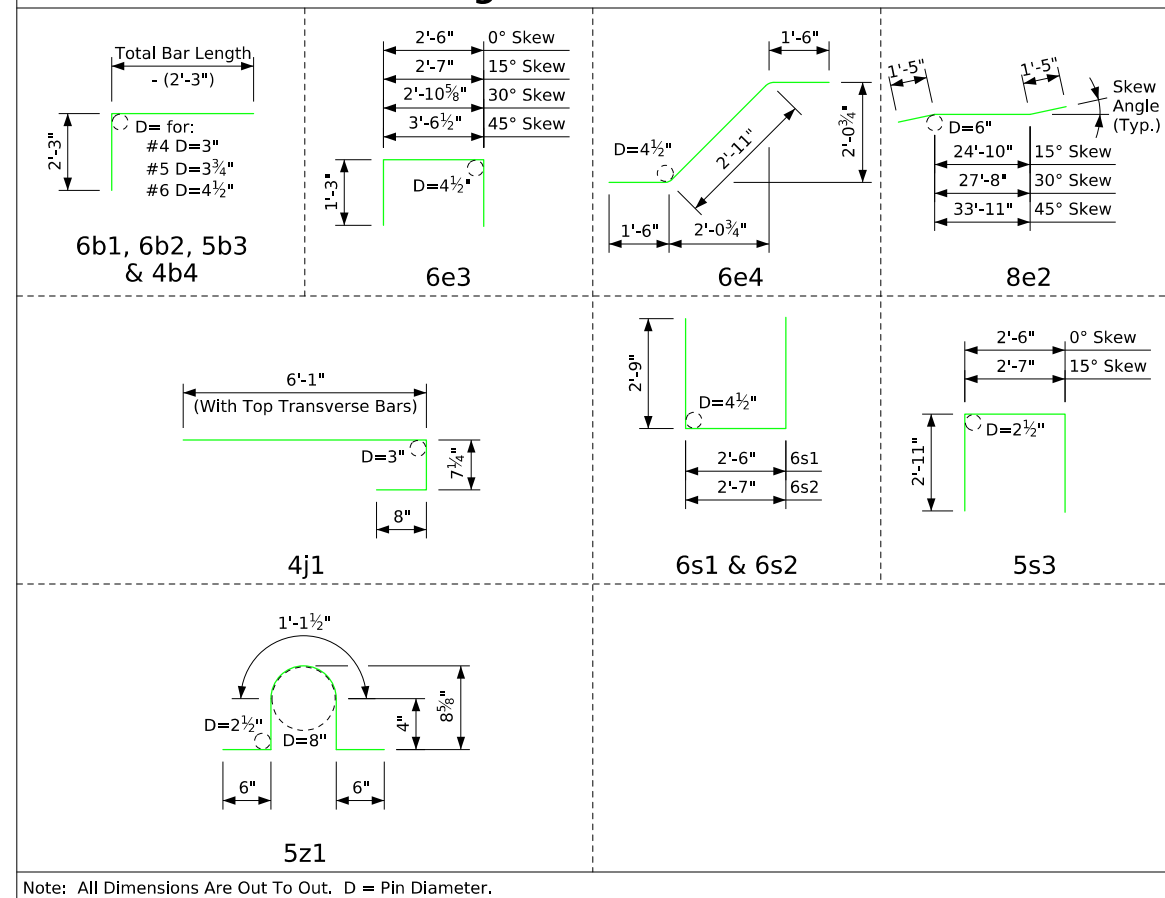
Location	Skew	0 Degree				15 Degree			30 Degree			45 Degree		
		Shape	Bar	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length
Slab Longitudinal Bottom		10a1	32	52'-8"	7252	32	52'-8"	7252	32	52'-8"	7252	32	52'-8"	7252
Slab Longitudinal Bottom		11a2	16	42'-6"	3613	16	42'-6"	3613	16	42'-6"	3613	16	42'-6"	3613
Slab Longitudinal Bottom		11a3	16	31'-0"	2635	16	31'-0"	2635	16	31'-0"	2635	16	31'-0"	2635
Slab Longitudinal Bottom, at Rail		11a4	4	52'-8"	1119	4	52'-8"	1119	4	52'-8"	1119	4	52'-8"	1119
Slab Longitudinal Bottom, at Rail		10a5	4	39'-2"	674	4	39'-2"	674	4	39'-2"	674	4	39'-2"	674
Slab Longitudinal Top		6b1	32	29'-8"	1424	32	29'-8"	1424	32	29'-8"	1424	32	29'-8"	1424
Slab Longitudinal Top		6b2	32	10'-1"	485	32	10'-1"	485	32	10'-1"	485	32	10'-1"	485
Slab Longitudinal Top, at Rail		5b3	8	29'-2"	243	8	29'-2"	243	8	29'-2"	243	8	29'-2"	243
Slab Longitudinal Top, at Rail		4b4	8	8'-9"	47	8	8'-9"	47	8	8'-9"	47	8	8'-9"	47
Slab Transverse Bottom		7c2	47	26'-10"	2578	47	27'-9"	2669	36	26'-10"	1975	26	26'-10"	1426
Slab Transverse Ends, Bottom		7c4	-	-	-	-	-	-	24	VARIABLES	789	44	VARIABLES	1328
Slab Transverse Top		5d2	47	26'-10"	1315	47	27'-9"	1362	36	26'-10"	1008	26	26'-10"	728
Slab Transverse Ends, Top		5d4	-	-	-	-	-	-	24	VARIABLES	402	44	VARIABLES	678
Top of Slab, Transverse, at Rail		4j1	92	7'-5"	456	92	7'-5"	456	92	7'-5"	456	90	7'-5"	446
Paving Block Lifting Hoops		5z1	8	2'-10"	24	8	2'-10"	24	8	2'-10"	24	8	2'-10"	24
Epoxy-Coated Sub Total - LBS.					21,865			22,003			22,146			22,122
<b>Integral Abutment Bars</b>														
Slab, Transverse at Abutment		8e1	14	26'-10"	1003	-	-	-	-	-	-	-	-	-
Slab, Transverse at Abutment		8e2	-	-	-	14	27'-8"	1034	14	30'-6"	1140	14	36'-9"	1374
Slab, Hairpins, at Abutment		6e3	60	5'-0"	451	60	5'-1"	458	60	5'-5"	488	60	6'-1"	548
Slab, Diagonal, at Abutment		6e4	60	5'-11"	533	60	5'-11"	533	60	5'-11"	533	60	5'-11"	533
Wing, Vertical		5m1	40	4'-5"	184	40	4'-5"	184	40	4'-5"	184	40	4'-5"	184
Wing, Horizontal		5n1	48	6'-8"	334	48	6'-8"	334	48	6'-8"	334	48	6'-8"	334
Epoxy-Coated Sub Total - Integral Abutment - LBS.					2,505			2,543			2,679			2,973
<b>High Abutment Bars</b>														
Slab, Diagonal, at Abutment		6e4	58	5'-11"	515	58	5'-11"	515	-	-	-	-	-	-
Slab, Transverse at Abutment		8e5	22	34'-8"	2036	22	35'-11"	2110	-	-	-	-	-	-
Slab, Transverse at Abutment, Cap Ends		8e6	4	5'-2"	55	4	5'-4"	57	-	-	-	-	-	-
Abutment Hairpins		6s1	156	8'-0"	1874	140	8'-0"	1682	-	-	-	-	-	-
Abutment Hairpins, Cap Ends		6s2	-	-	-	16	8'-1"	194	-	-	-	-	-	-
Abutment Hairpins, Cap Ends		5s3	24	8'-4"	209	24	8'-5"	211	-	-	-	-	-	-
Spiral		#2	16	38'-6"	102	16	38'-6"	102	-	-	-	-	-	-
Spiral Spacers, L 7/8x7/8x1/8x 0.7			48	1'-10"	62	48	1'-10"	62	-	-	-	-	-	-
Epoxy-Coated Sub Total - High Abutment - LBS.					4,689			4,933						
Non-Coated Sub Total - High Abutment - LBS.					164			164						
Open Rail - Integral Abutment - See Sheet J24S-27-25					4,462			4,462			4,462			4,462
Open Rail - High Abutment - See Sheet J24S-29-25					3,920			3,920			-			-
Totals with Integral Abutment - LBS		Epoxy-Coated Total		With Open Rail	28,832			29,008			29,287			29,557
				With W-Beam Guardrail	24,370			24,546			24,825			25,095
Totals with High Abutment - LBS		Epoxy-Coated Total		With Open Rail	30,474			30,856			-			-
				With W-Beam Guardrail	26,554			26,936			-			-
		Non-Coated Total			164			164						

## Estimated Quantities for Superstructure - 50' Bridge

Item	Skew	Integral Abutment				High Abutment	
		0°	15°	30°	45°	0°	15°
* Structural Concrete (Bridge)	C.Y.	116.4	116.7	117.7	119.8	127.6	128.1
Reinf. Steel Epoxy Coated With Open Rail	LBS.	28,832	29,008	29,287	29,557	30,474	30,856
Reinf. Steel Epoxy Coated With W-Beam Guardrail	LBS.	24,370	24,546	24,825	25,095	26,554	26,936
Reinf. Steel Non-Coated	LBS.	-	-	-	-	164	164

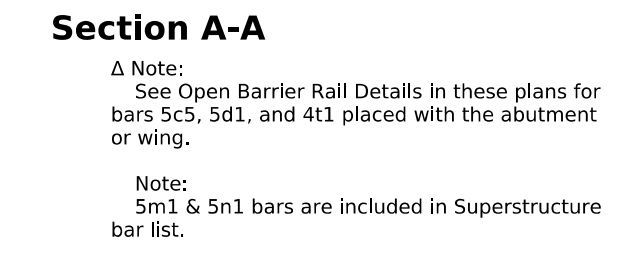
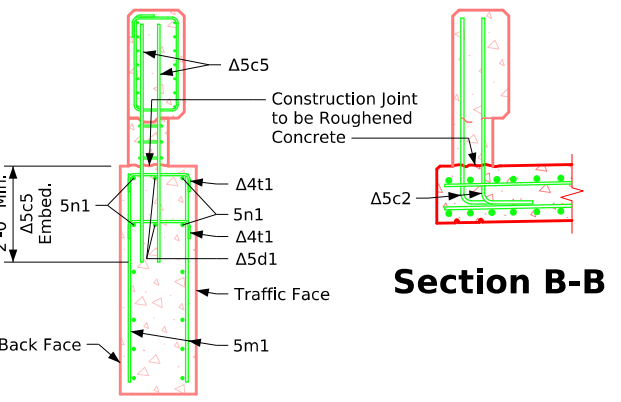
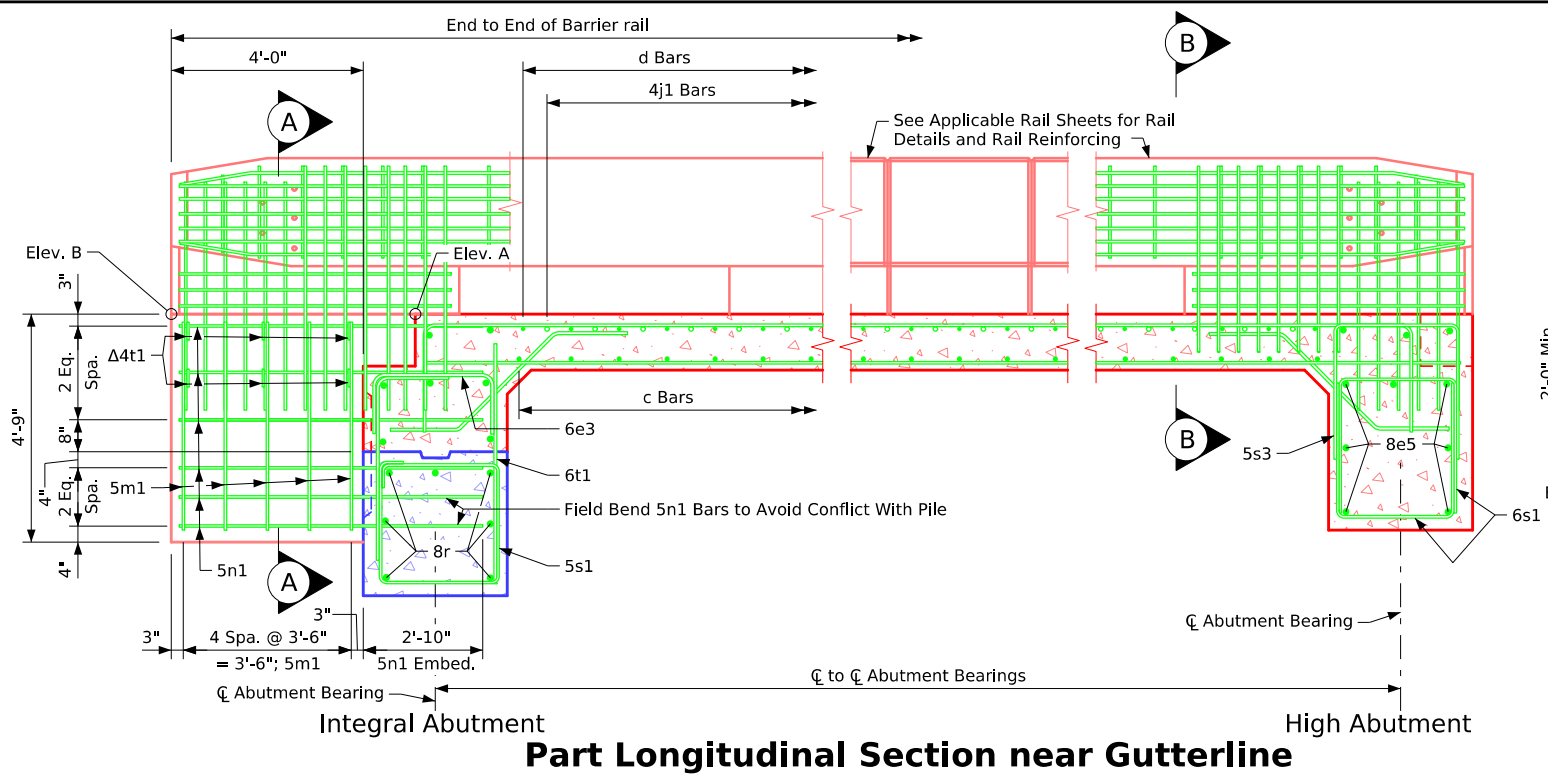
\* Includes 4 wings for integral abutment at 1.18 CY each and temporary paving blocks; excludes rail concrete.

## 50' Bridge - Bent Bar Details



Latest Revision Date  Approved by Bridge Engineer	
	Standard Design - 24'-0" Roadway, Single Span Bridge <b>Single Span Concrete Slab Bridges</b> July, 2025
	Superstructure Details 50'-0" Bridge

**J24S-10-25**

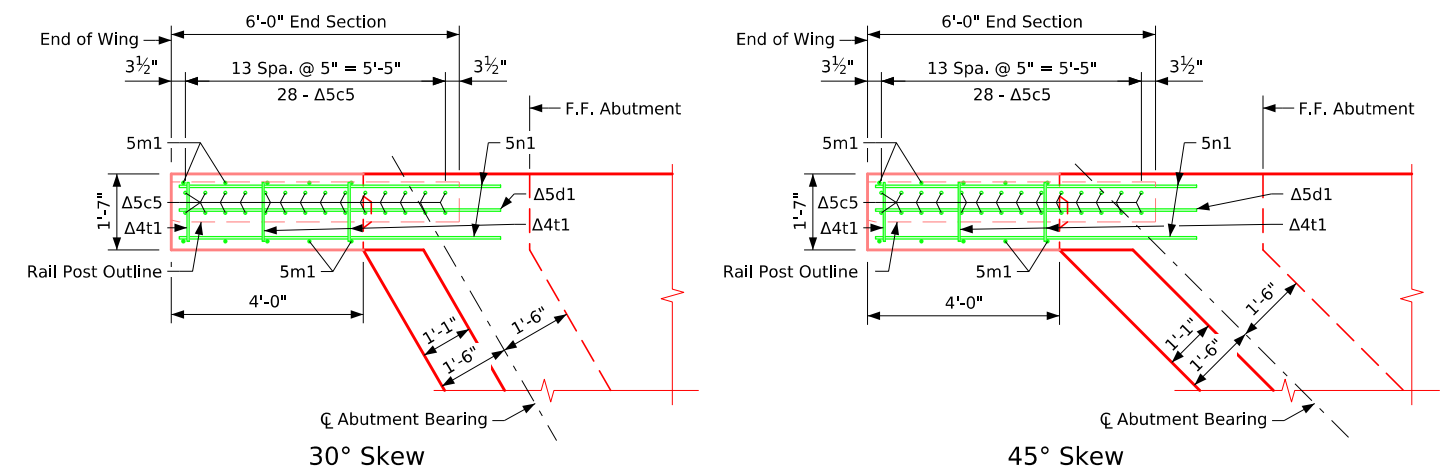
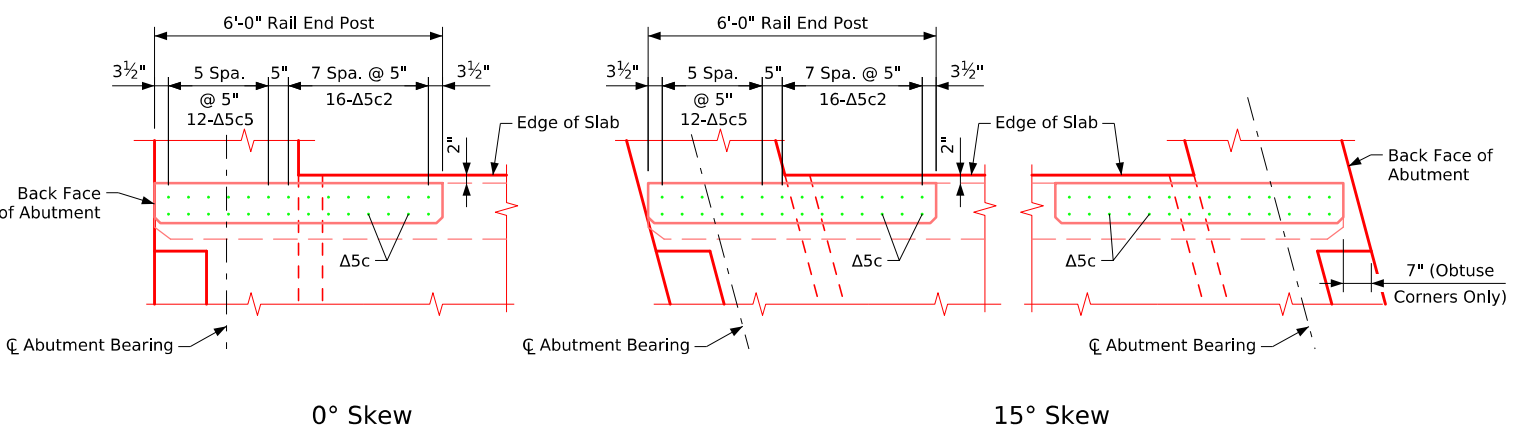
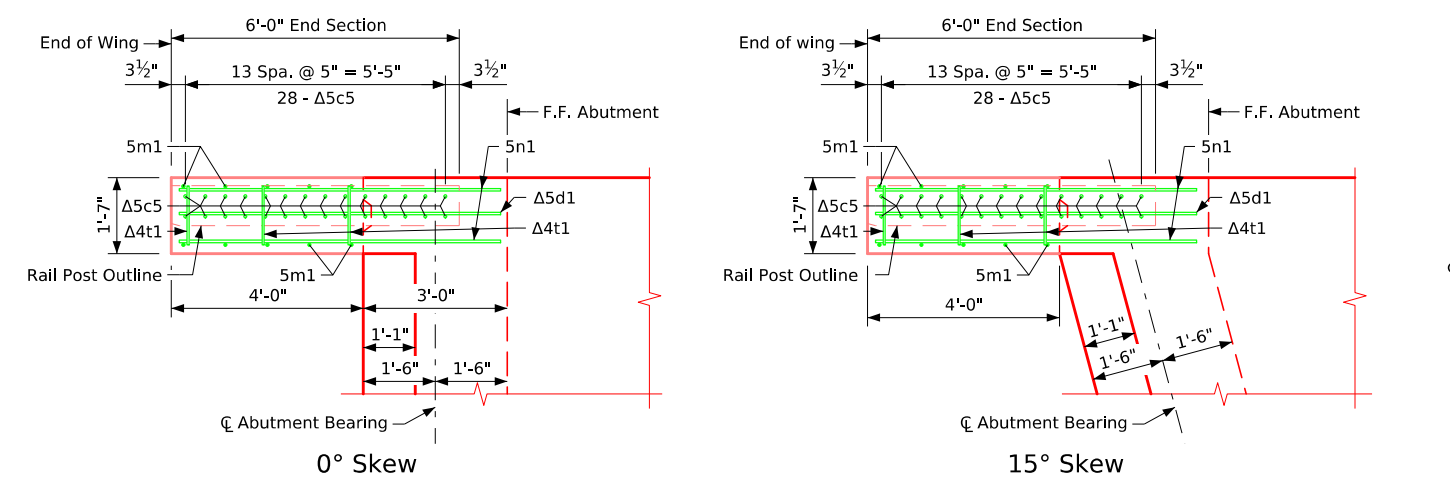


**Superstructure Notes:**

This bridge is designed for HL-93 loading plus an allowance of 20 pounds per square foot of roadway for future wearing surface. The slab as shown includes a 1/2 inch integral wearing surface. The minimum clear distance from face of concrete to near reinforcing bar shall be 2 inches unless otherwise noted or shown. All reinforcing steel is to be securely wired in place. See "Bar Chair Note". All reinforcing shall be Grade 60. The concrete slab is to be placed with a minimum of construction joints. Procedures for placing slab concrete shall be submitted for approval together with a statement of the proposed method and evidence that the Contractor possesses the necessary equipment and facilities to accomplish the required result. Slab falsework shall be removed prior to construction of the barrier rails, unless slab construction is staged. Note that when portland cement approach pavement is placed, compressible joint material must be used between pavement and end of bridge. W-Beam guardrail is an alternate railing type not shown on this sheet. For W-Beam guardrail details, see Sheets J24S-30-25 and J24S-31-25.

**Bar Chair Note:**

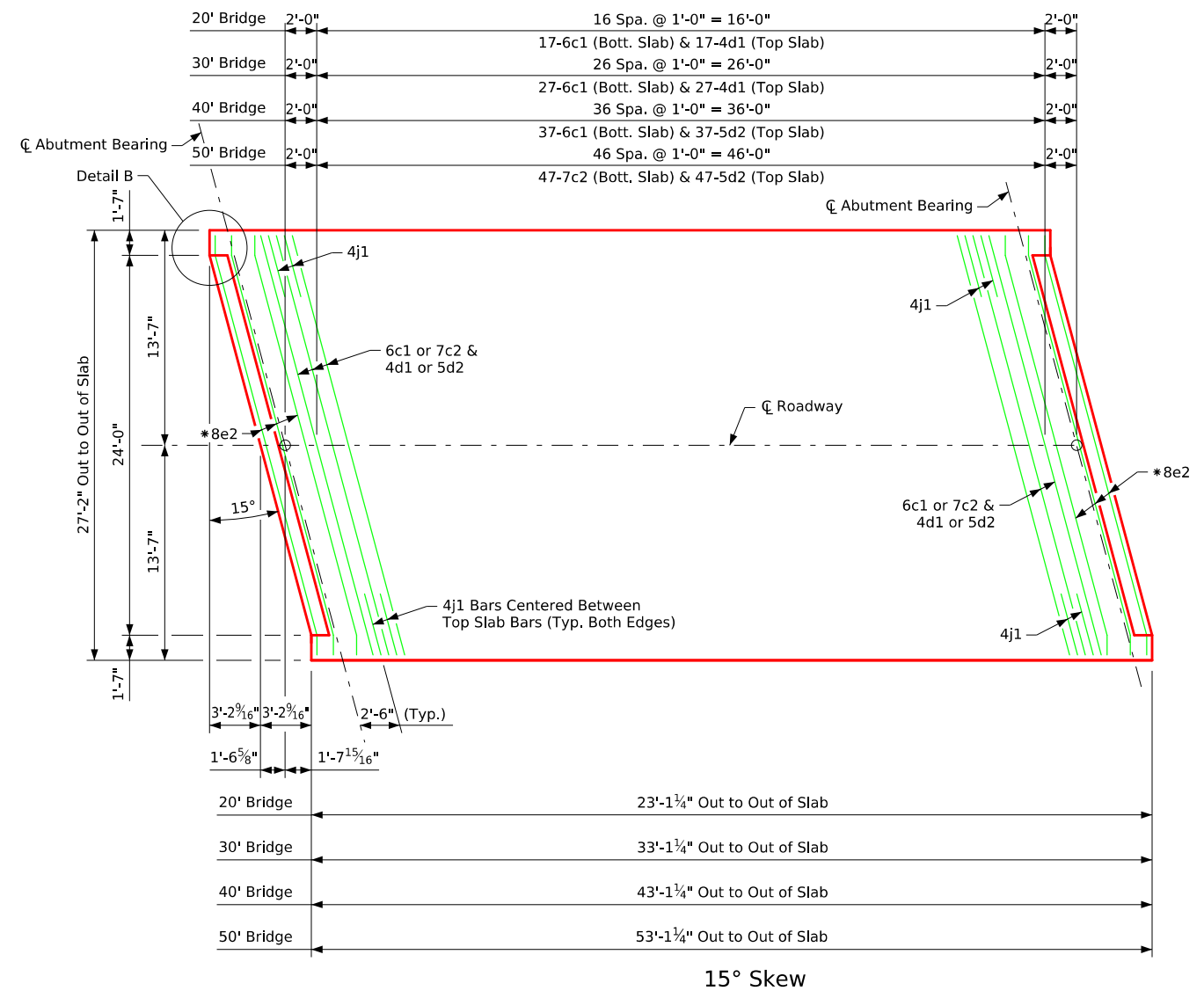
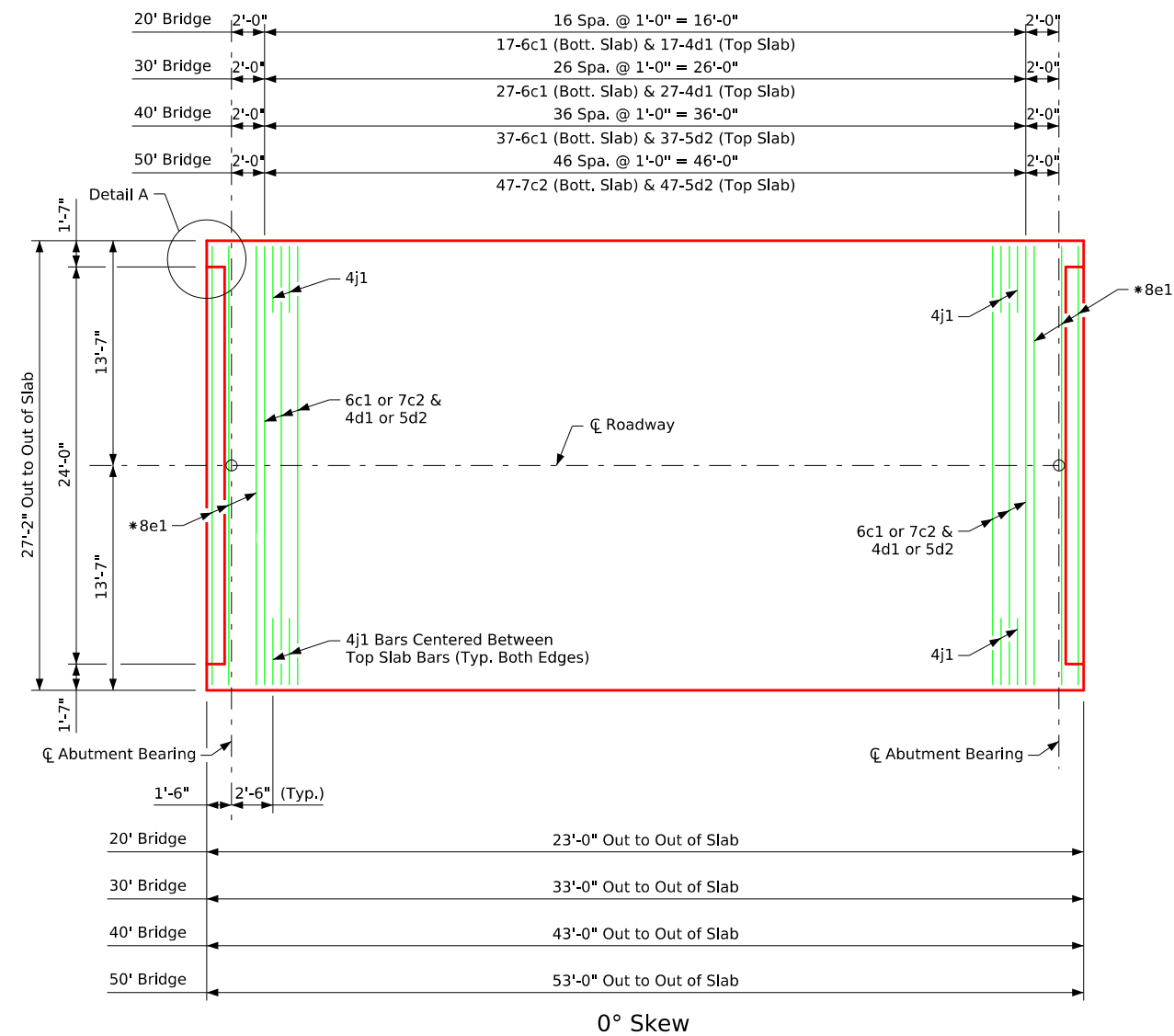
Top mat of reinforcing steel is to be supported by individual bar chairs spaced at not more than 3'-0" centers longitudinally and transversely. The bottom mat of reinforcing steel is to be supported by individual bar chairs spaced at not more than 3'-0" centers longitudinally and transversely, or by continuous rows of bar high chairs or slab bolsters spaced 4'-0" apart. I.M. 451.01 requirements shall apply for bar chairs, bar high chairs, and slab bolsters.



**Part Plan View at Top of Wing - High Abutment with Open Rail**  
(Slab And Abutment Reinforcing Not Shown)

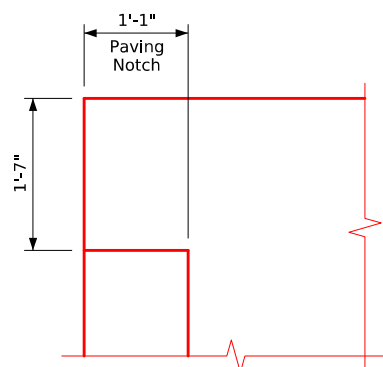
**Part Plan View at Top of Wing - Integral Abutment with Open Rail**

Latest Revision Date  Approved by Bridge Engineer		
	Standard Design - 24'-0" Roadway, Single Span Bridge <b>Single Span Concrete Slab Bridges</b> July, 2025	
	Superstructure Details-All Bridges	<b>J24S-11-25</b>

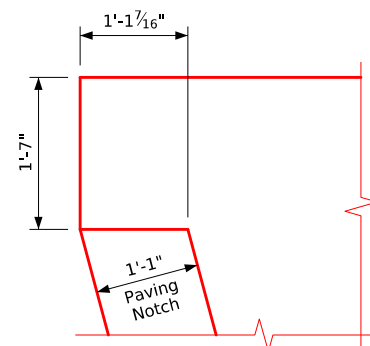


### Transverse Reinforcing Steel Layout

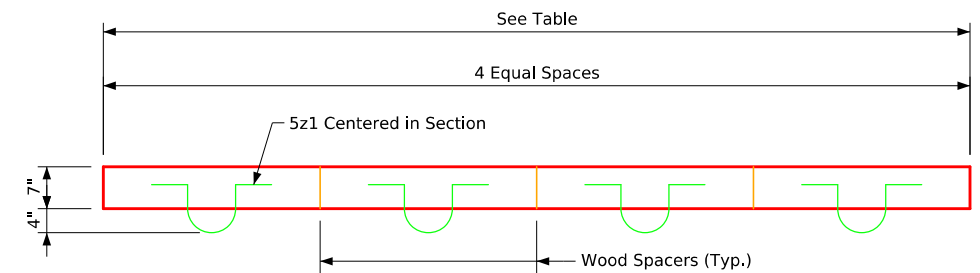
Note:  
 \* Plan views are shown for spans that utilize an integral abutment. For details in the pile cap for the high abutments, see Sheet J24S-20-25 or J24S-21-25.



Detail A





Detail B

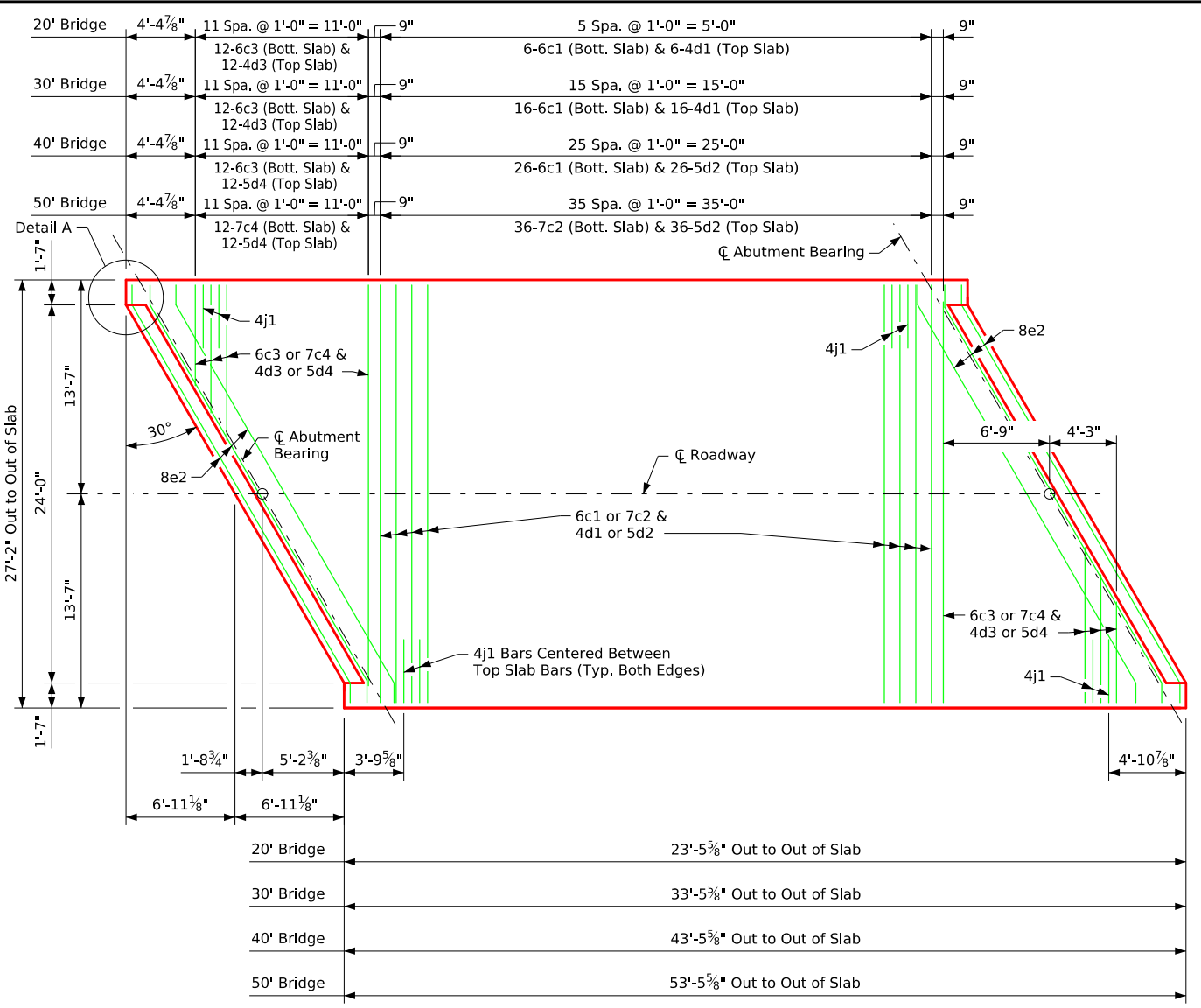


### Temporary Paving Block Detail

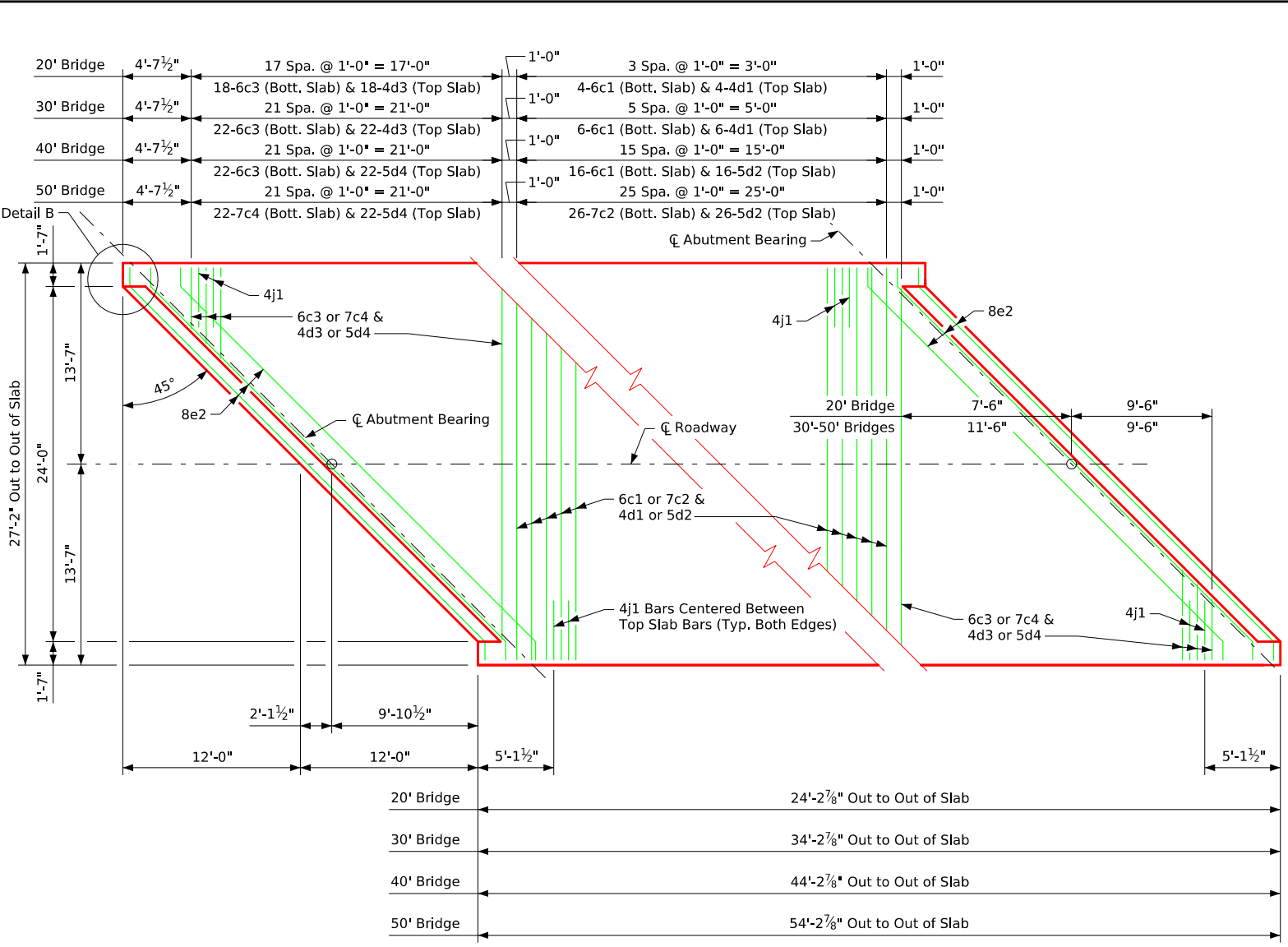
Note:  
 Temporary Paving Block to be used with paved approaches only.  
 Line Paving Notch with tar paper before placing Temporary Paving Block.

Temporary Paving Block		
Skew	Length	Concrete
0°	22'-0"	0.5 C.Y.
15°	22'-10"	0.5 C.Y.

Latest Revision Date	 Approved by Bridge Engineer	 Standard Design - 24'-0" Roadway, Single Span Bridge	
		<b>Single Span Concrete Slab Bridges</b> July, 2025	
		Slab Reinforcing Plan Details-0° & 15° Skew	<b>J24S-12-25</b>



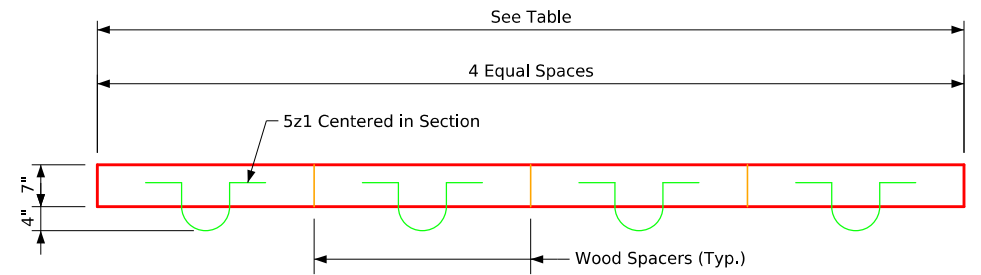
30° Skew



45° Skew

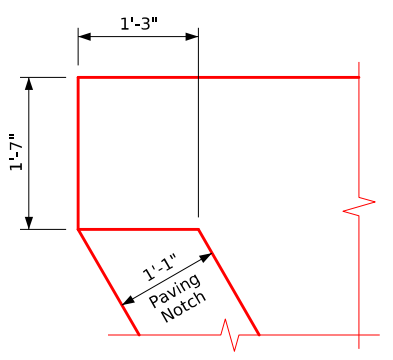
**Transverse Reinforcing Steel Layout**

Notes:  
 4d or 5d bars are to pass under 8e2 bars in conflict areas on 30° & 45° skew bridges.  
 Bar size and spacing for variable top (6c3 and 7c4) and bottom (4d3 and 5d4) bars are similar on both ends of the span.  
 Rotate or field bend 4j1 bars to fit in acute corners. The 4j1 bars shall not be trimmed.

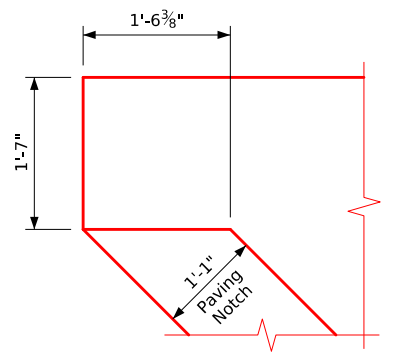


**Temporary Paving Block Detail**

Note:  
 Temporary Paving Block to be used with paved approaches only.  
 Line Paving Notch with tar paper before placing Temporary Paving Block.



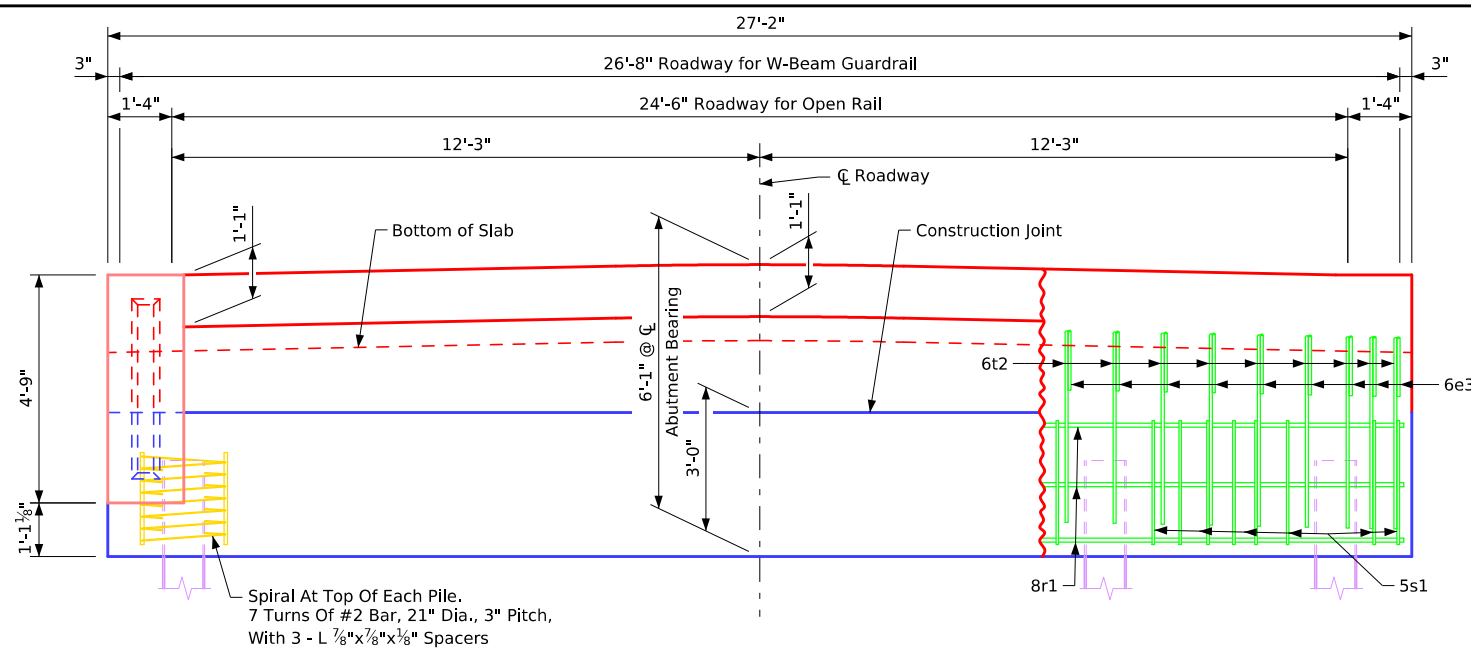
**Detail A**



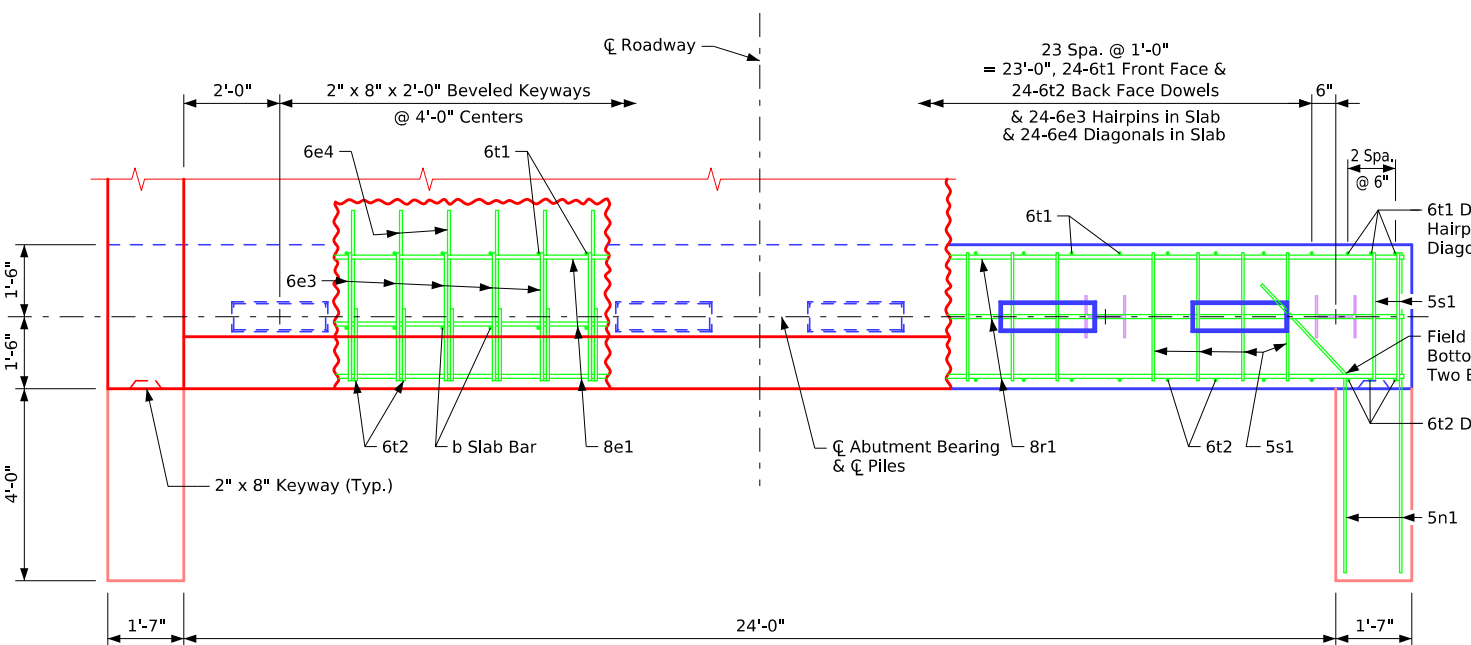
**Detail B**

Temporary Paving Block		
Skew	Length	Concrete
30°	25'-9"	0.6 C.Y.
45°	31'-11"	0.7 C.Y.

Latest Revision Date	Approved by Bridge Engineer	<b>IOWA IDOT</b>	
		Standard Design - 24'-0" Roadway, Single Span Bridge	
		<b>Single Span Concrete Slab Bridges</b>	
		July, 2025	
		Slab Reinforcing Plan Details-30° & 45° Skew	<b>J24S-13-25</b>

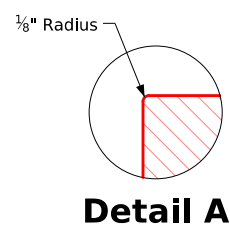


**Rear Elevation**

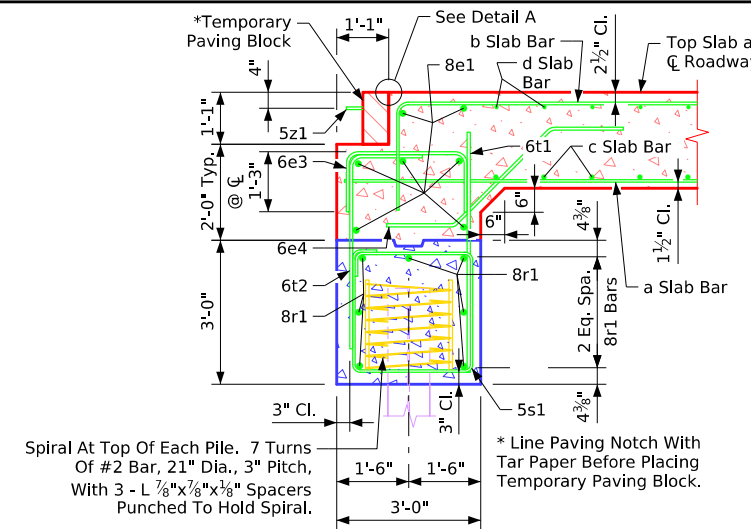


**Plan View**

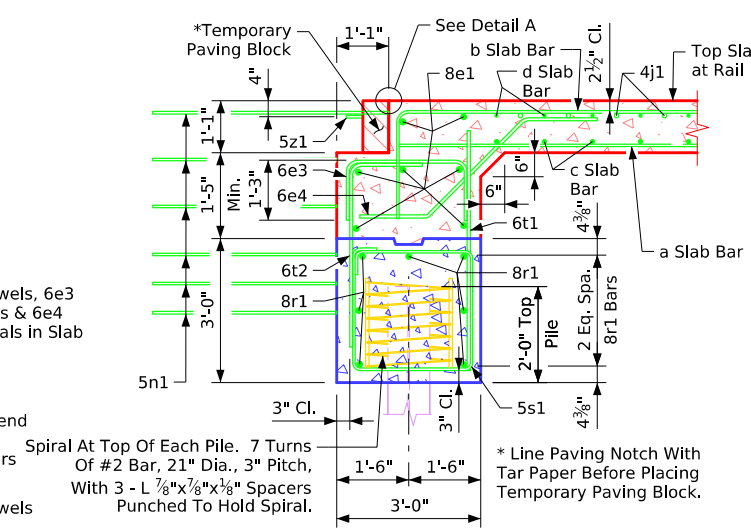
Note:  
 Rails not shown.  
 5n1 wing reinforcement shall be placed in the abutment footing before the footing is poured. Refer to Sheet J24S-11-25 for additional details.  
 6e3, 6e4 and 8e1 are included with superstructure quantities.



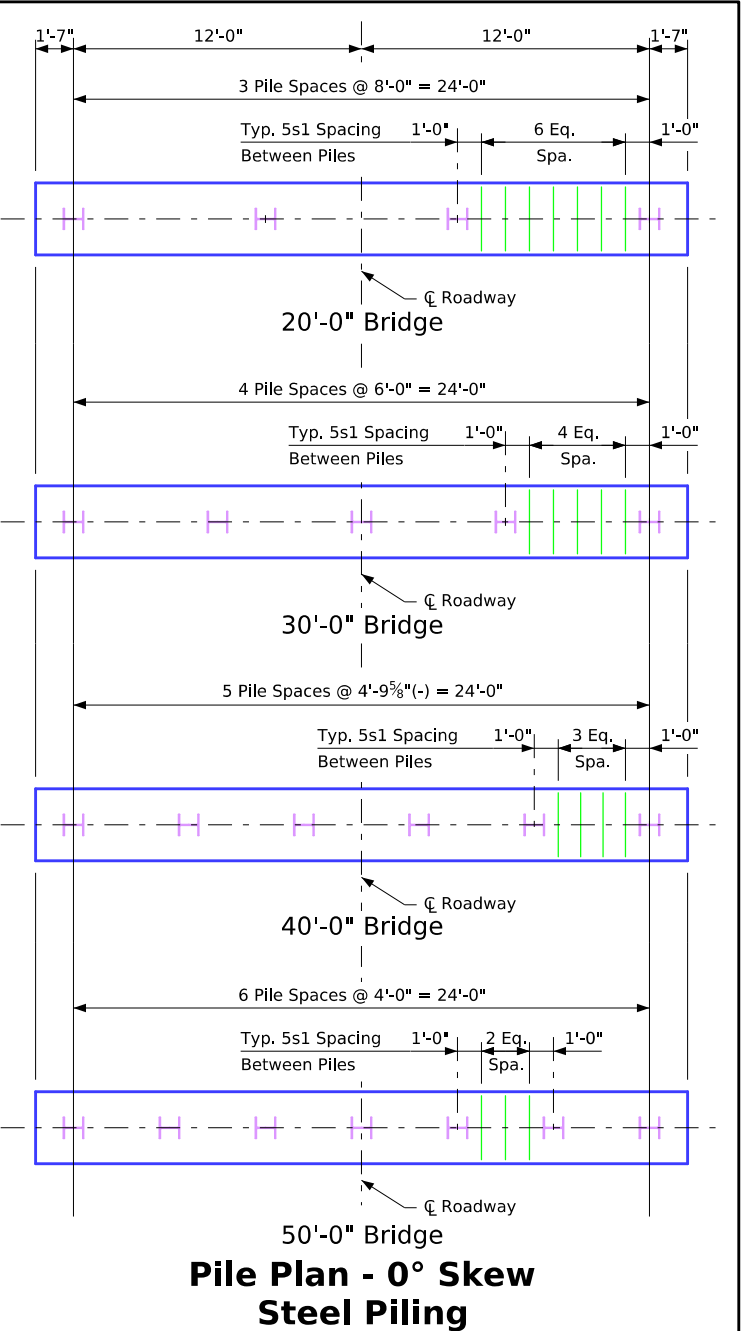
**Detail A**



**Section Normal to Abutment at CL**



**Section Normal to Abutment at Gutterline**





**Pile Plan - 0° Skew Steel Piling**

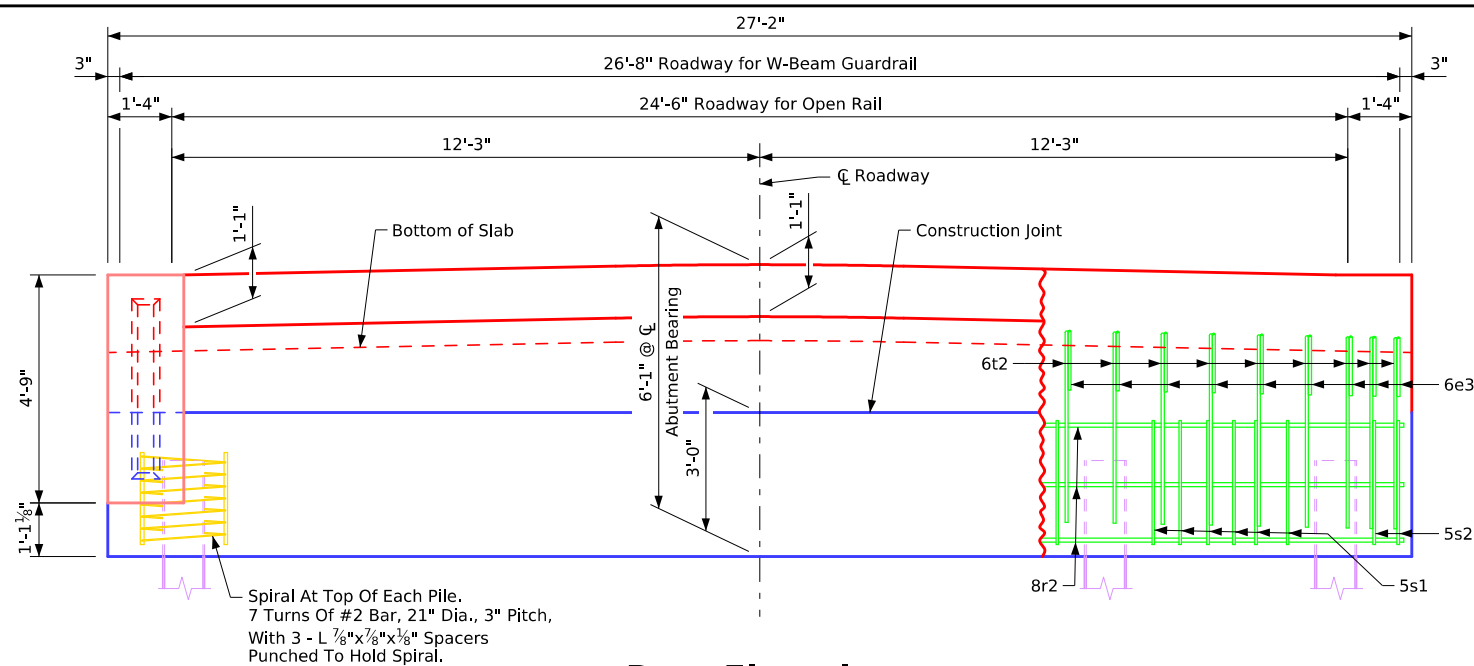
Bridge Length	20'-0"	30'-0"	40'-0"	50'-0"
Number of Piles	4	5	6	7
Pu, strength I design load for each abutment (kips)	430	513	603	716

Note: Pu, strength I design load for each abutment (kips) is not the value used in the field for driving piles.

**Abutment Notes:**

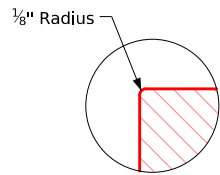
All piling HP 10x42.  
 The concrete and reinforcing steel for the wings is included with the superstructure.  
 The minimum clear distance from the face of the concrete to near reinforcing bar is to be 2 inches unless otherwise noted or shown.  
 Steel abutment piles shall be driven to full penetration if practicable but in no case to a bearing value less than specified in the design plans.  
 All reinforcing steel is to be Grade 60.  
 Abutment piling was designed for HL-93 loading with an allowance for 20 lbs. per sq. ft. future wearing surface.

Latest Revision Date	 Approved by Bridge Engineer	 Standard Design - 24'-0" Roadway, Single Span Bridge	
		<b>Single Span Concrete Slab Bridges</b> July, 2025	
Integral Abutment Details 0° Skew		<b>J24S-14-25</b>	

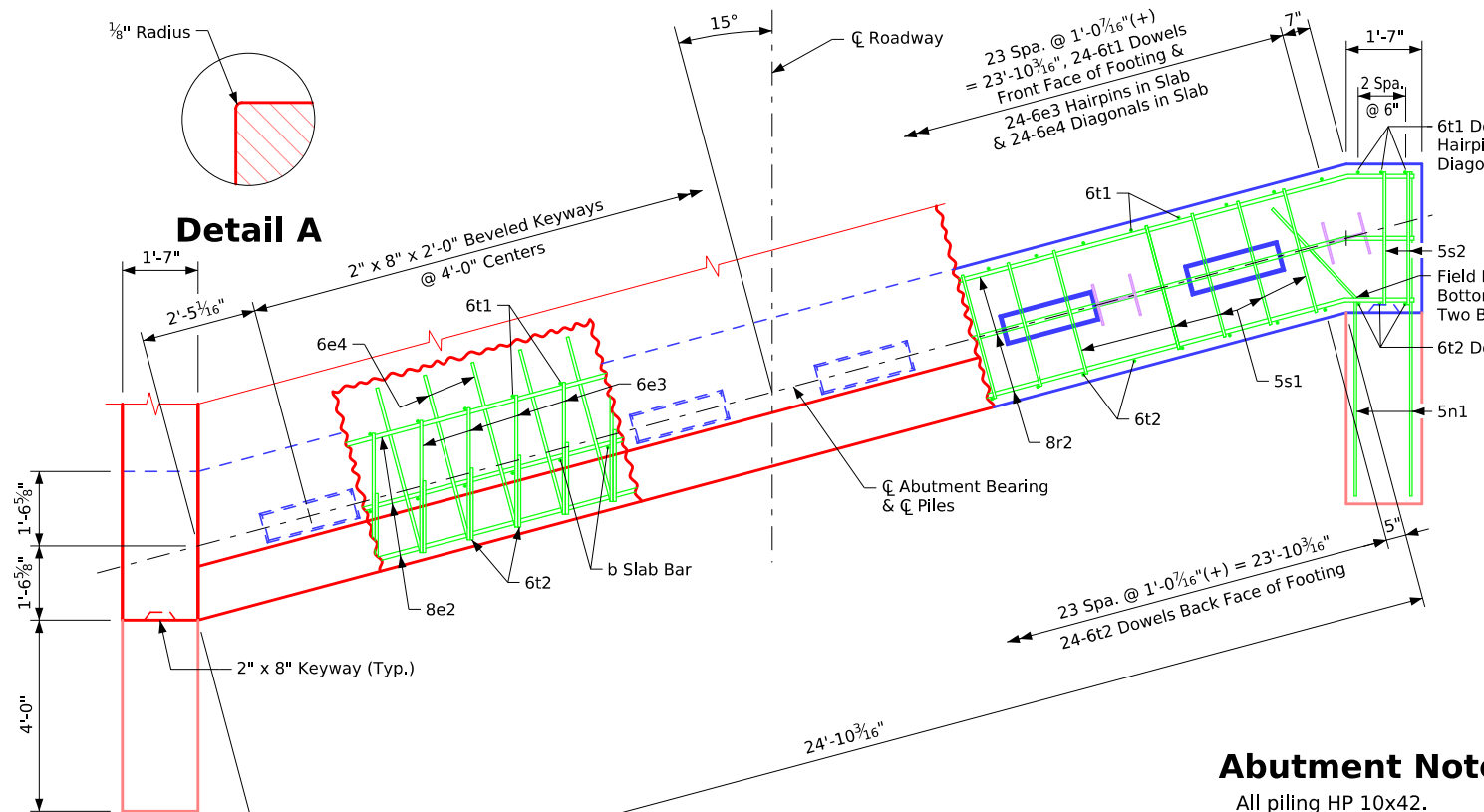


**Rear Elevation**

Note:  
The bottom of footing is to be sloped to compensate for grade on this skewed abutment. Therefore, bottom of footing elevations will be required at each exterior pile.



**Detail A**

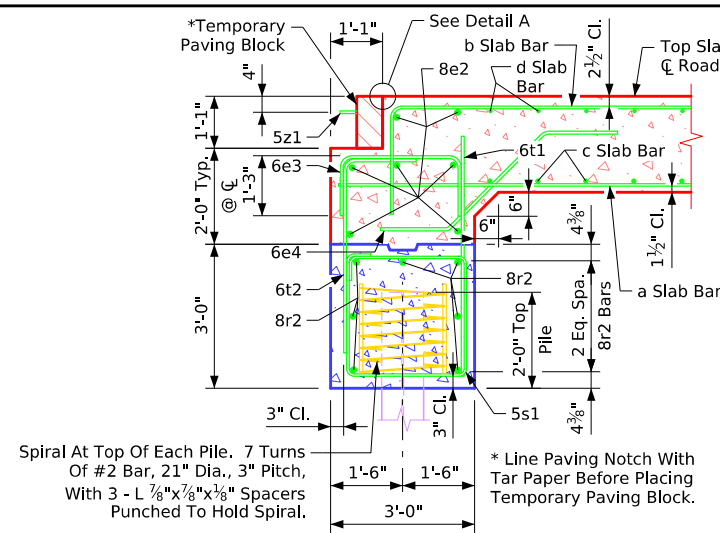


**Plan View**

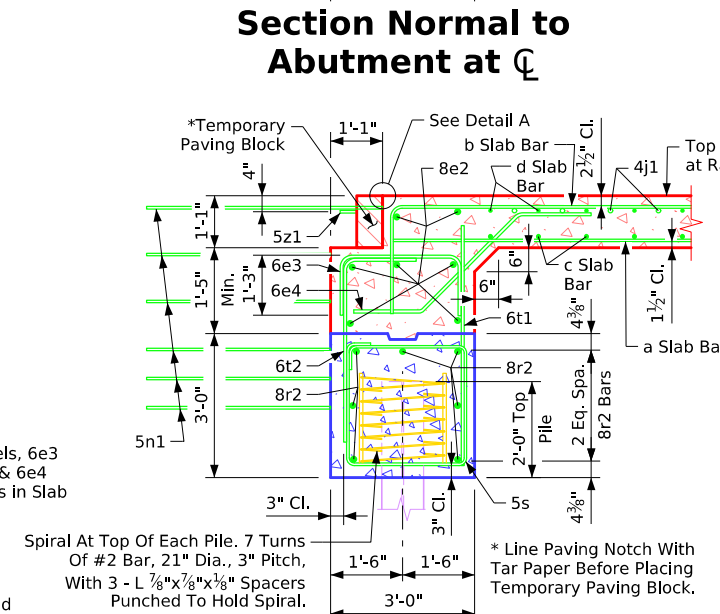
Notes:  
Rails not shown.  
5n1 wing reinforcement shall be placed in the abutment footing before the footing is poured. Refer to Sheet J245-11-25 for additional details.  
6e3, 6e4 and 8e2 are included with superstructure quantities.

**Abutment Notes:**

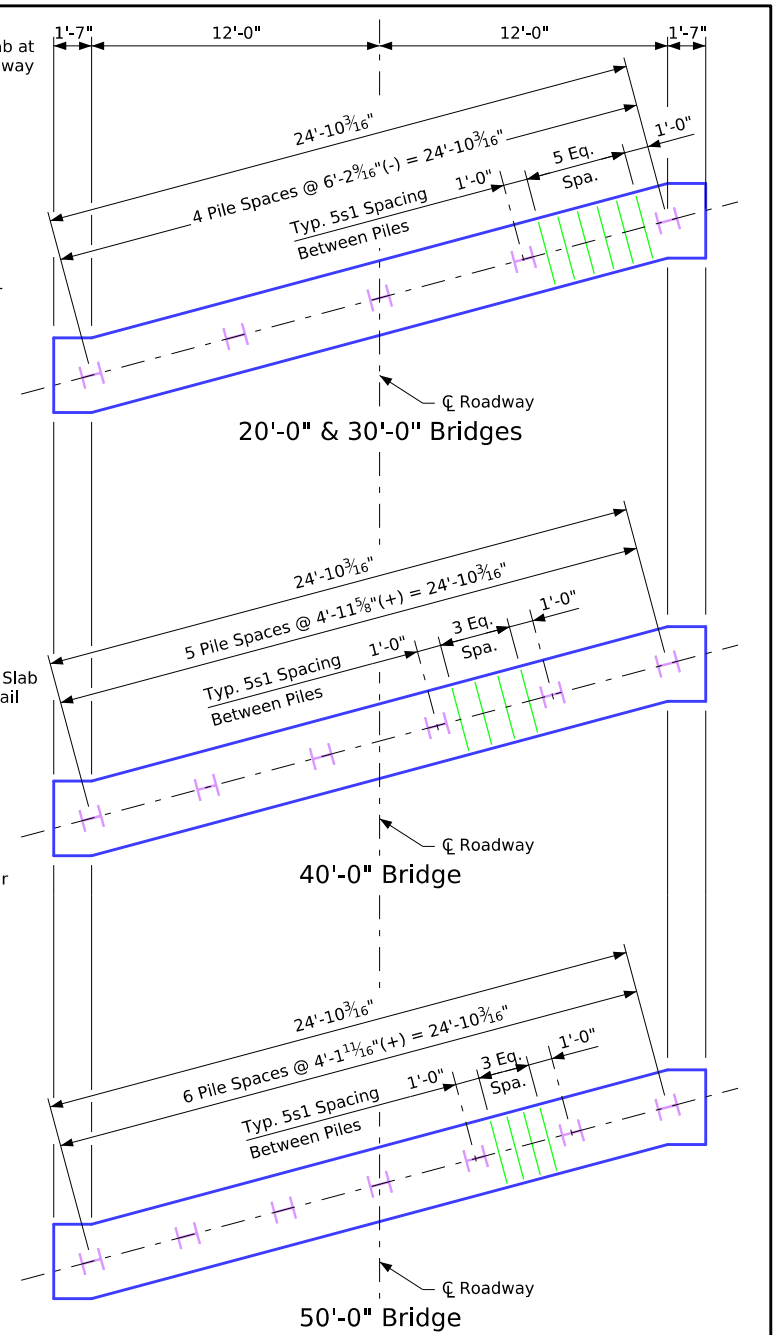
All piling HP 10x42.  
The concrete and reinforcing steel for the wings is included with the superstructure.  
The minimum clear distance from the face of the concrete to near reinforcing bar is to be 2 inches unless otherwise noted or shown.  
Steel abutment piles shall be driven to full penetration if practicable but in no case to a bearing value less than specified in the design plans.  
All reinforcing steel is to be Grade 60.  
Abutment piling was designed for HL-93 loading with an allowance for 20 lbs. per sq. ft. future wearing surface.



**Section Normal to Abutment at CL**



**Section Normal to Abutment at Gutterline**

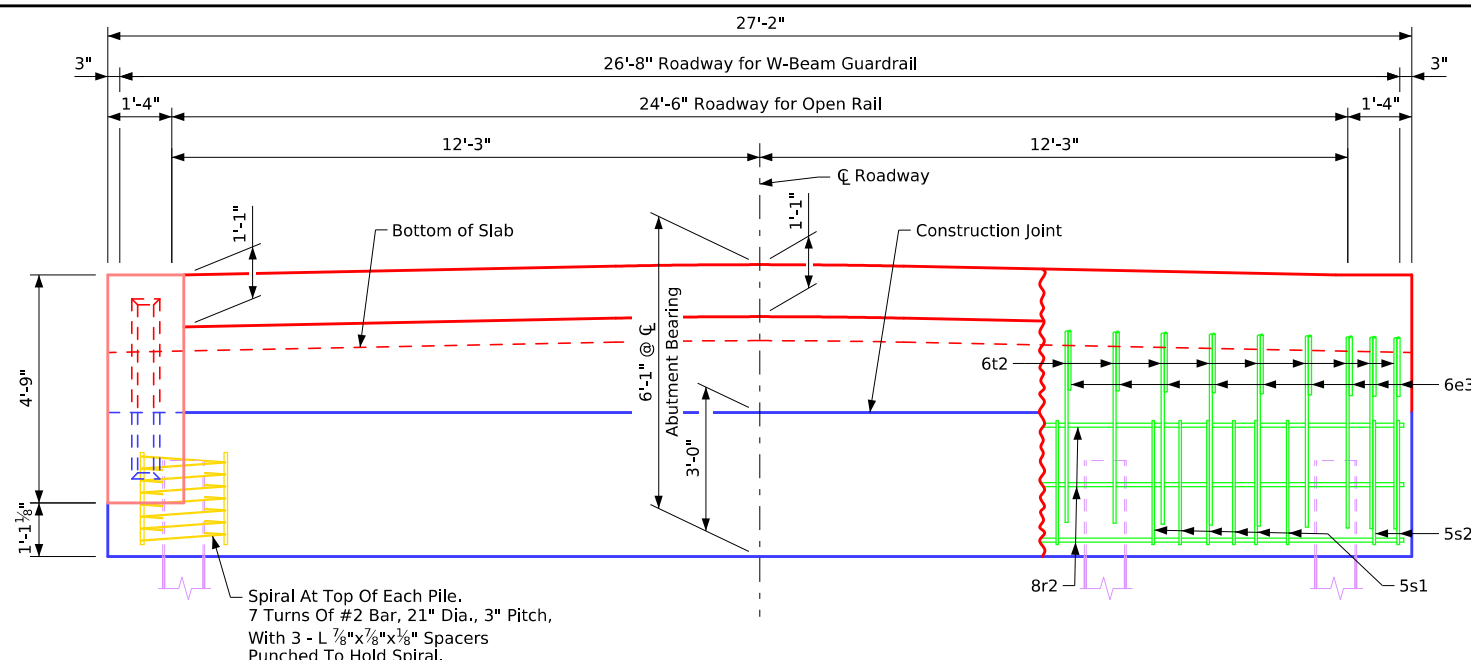


**Pile Plan - 15° Skew Steel Piling**

Number of Piles and Abutment Design Loads				
Bridge Length	20'-0"	30'-0"	40'-0"	50'-0"
Number of Piles	5	5	6	7
Pu, strength I design load for each abutment (klps)	433	516	606	719

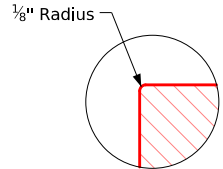
Note: Pu, strength I design load for each abutment (klps) is not the value used in the field for driving piles.

Latest Revision Date  Approved by Bridge Engineer	 Standard Design - 24'-0" Roadway, Single Span Bridge	
	<b>Single Span Concrete Slab Bridges</b> July, 2025	
	Integral Abutment Details 15° Skew	<b>J24S-15-25</b>

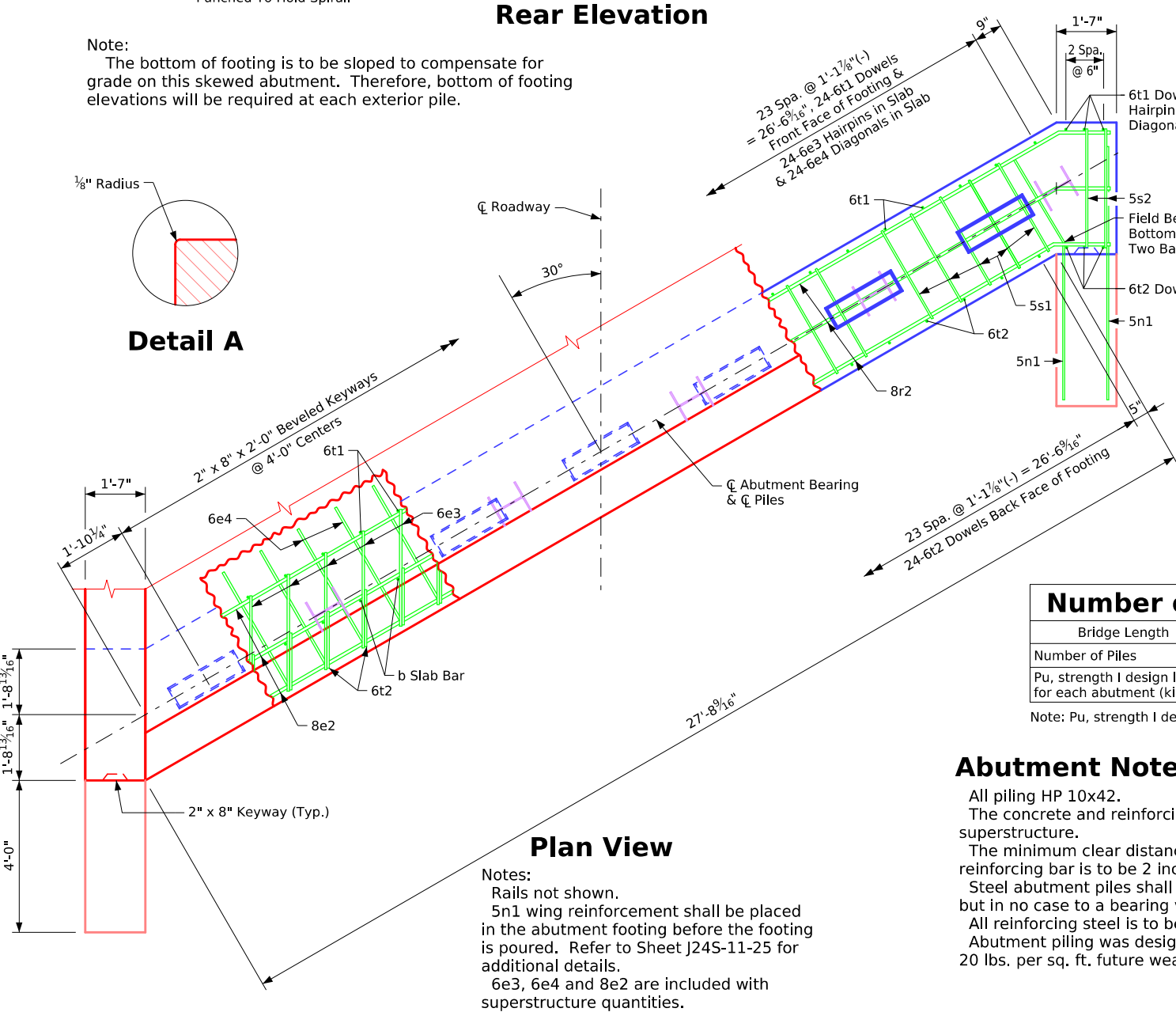


**Rear Elevation**

Note:  
The bottom of footing is to be sloped to compensate for grade on this skewed abutment. Therefore, bottom of footing elevations will be required at each exterior pile.

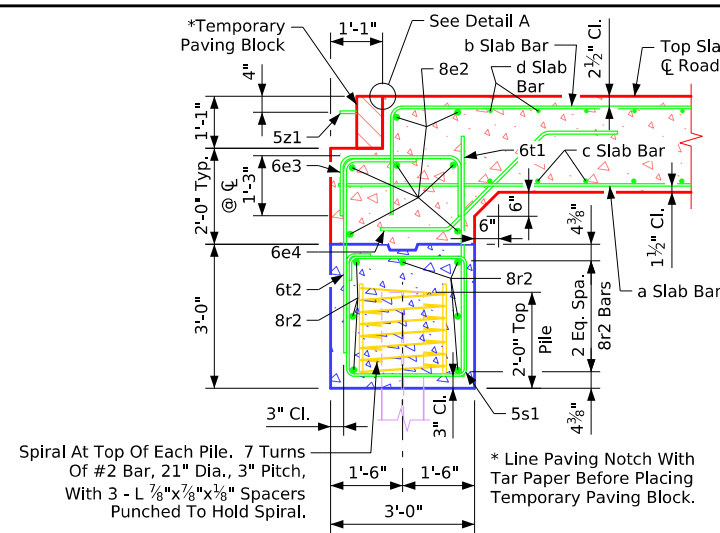


**Detail A**

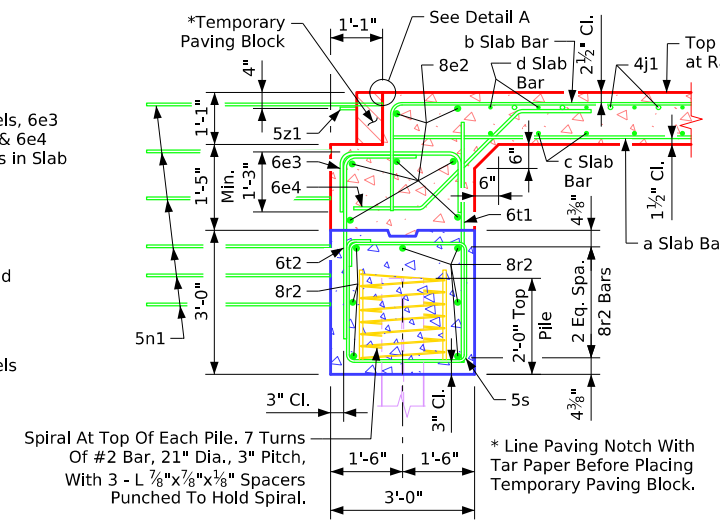


**Plan View**

Notes:  
Rails not shown.  
5n1 wing reinforcement shall be placed in the abutment footing before the footing is poured. Refer to Sheet J24S-11-25 for additional details.  
6e3, 6e4 and 8e2 are included with superstructure quantities.



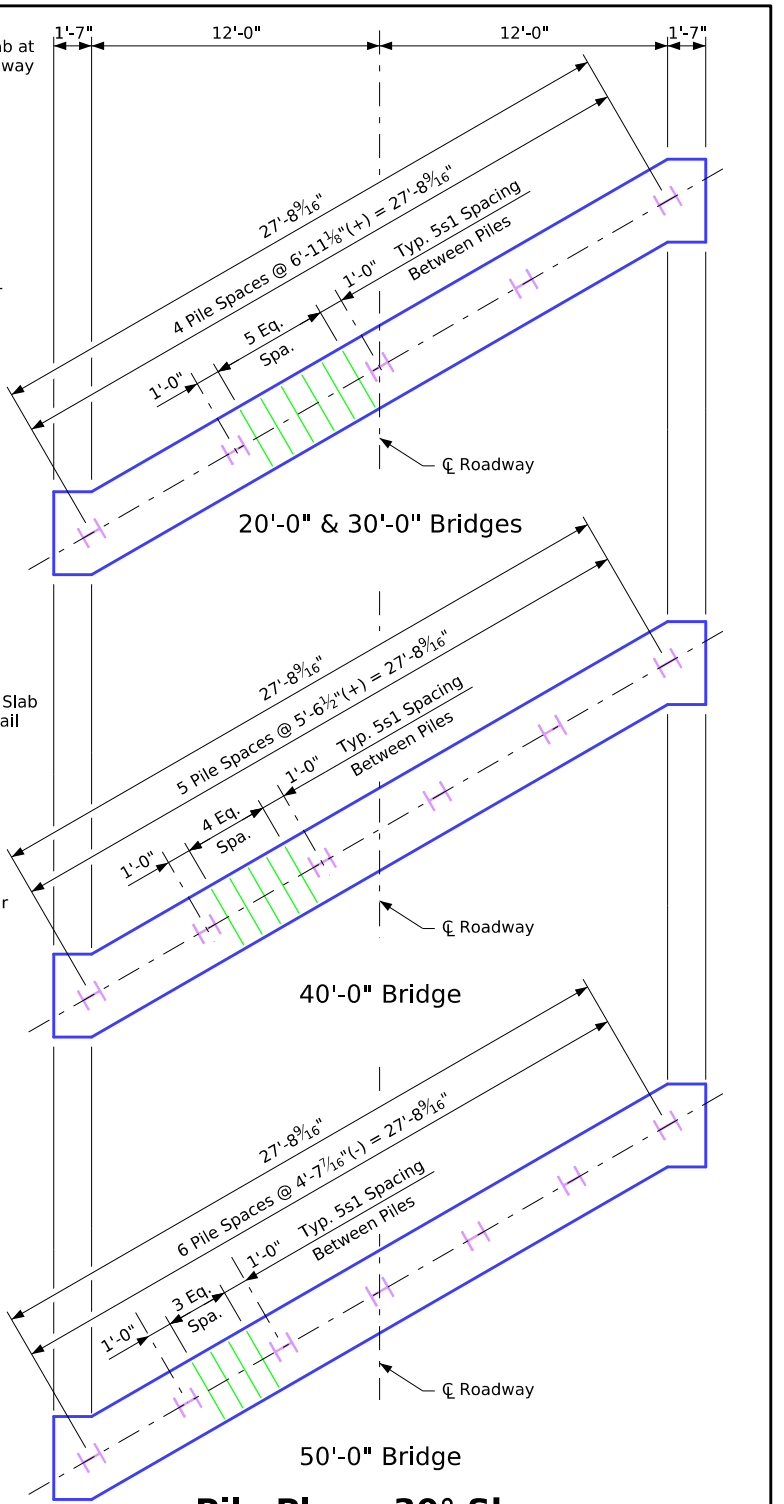
**Section Normal to Abutment at CL**



**Section Normal to Abutment at Gutterline**

Number of Piles and Abutment Design Loads				
Bridge Length	20'-0"	30'-0"	40'-0"	50'-0"
Number of Piles	5	5	6	7
Pu, strength I design load for each abutment (kips)	443	526	616	728

Note: Pu, strength I design load for each abutment (kips) is not the value used in the field for driving piles.

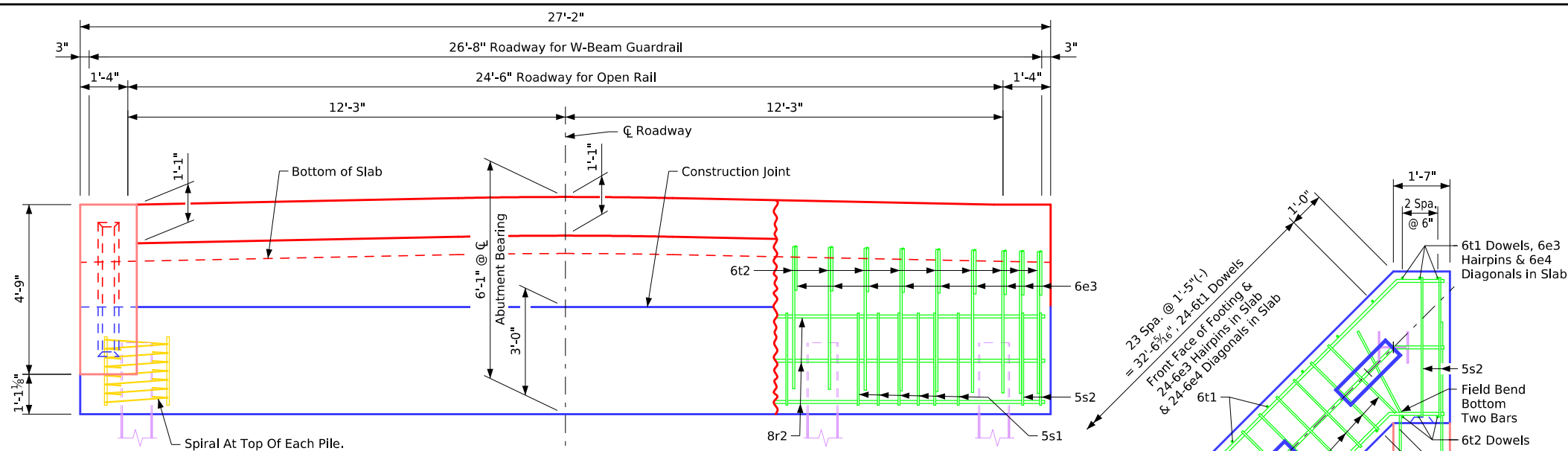


**Pile Plan - 30° Skew Steel Piling**

**Abutment Notes:**

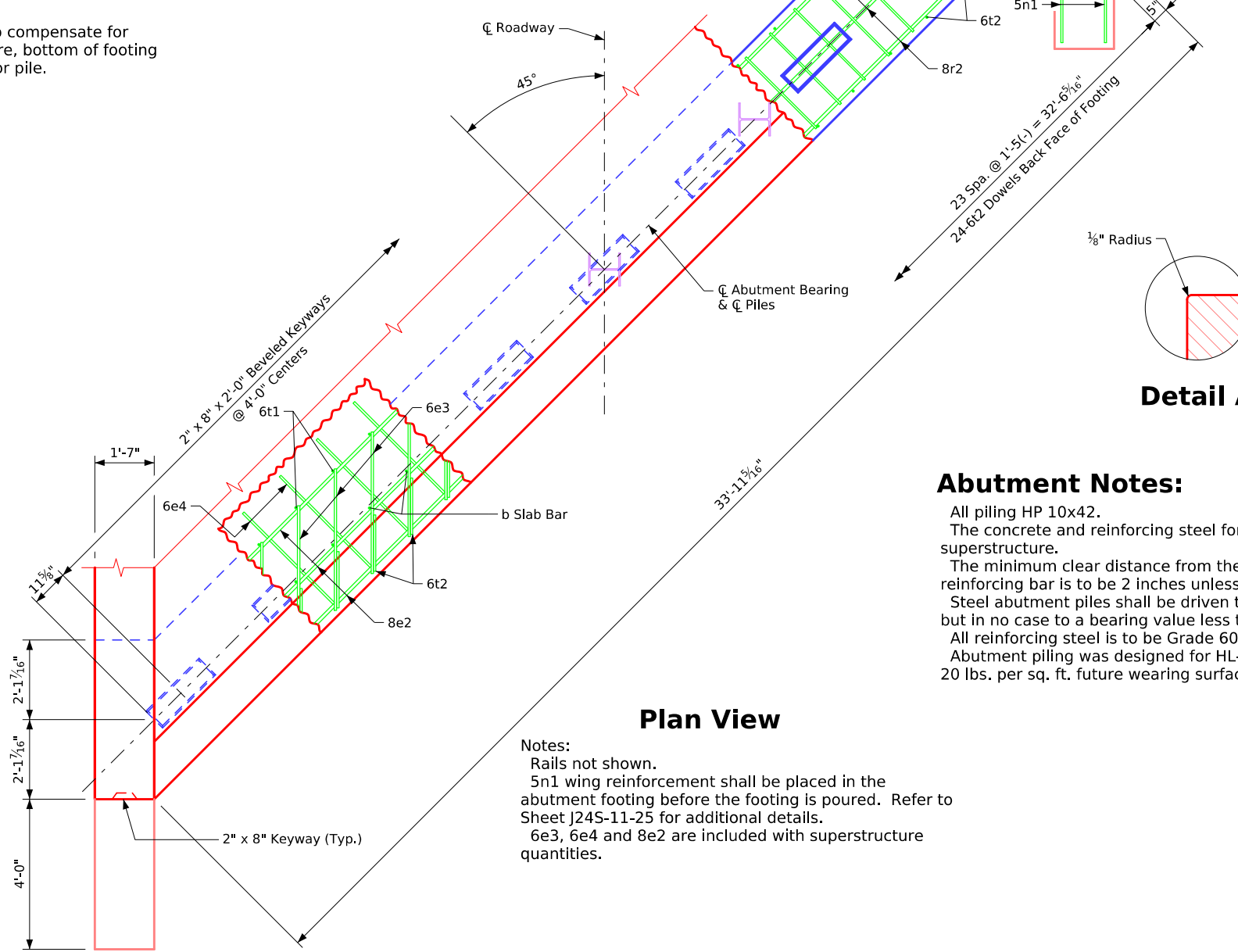
All piling HP 10x42.  
The concrete and reinforcing steel for the wings is included with the superstructure.  
The minimum clear distance from the face of the concrete to near reinforcing bar is to be 2 inches unless otherwise noted or shown.  
Steel abutment piles shall be driven to full penetration if practicable but in no case to a bearing value less than specified in the design plans.  
All reinforcing steel is to be Grade 60.  
Abutment piling was designed for HL-93 loading with an allowance for 20 lbs. per sq. ft. future wearing surface.

Latest Revision Date	Approved by Bridge Engineer	<b>IOWA IDOT</b>	
		Standard Design - 24'-0" Roadway, Single Span Bridge	
		<b>Single Span Concrete Slab Bridges</b>	
		July, 2025	
		Integral Abutment Details 30° Skew	<b>J24S-16-25</b>



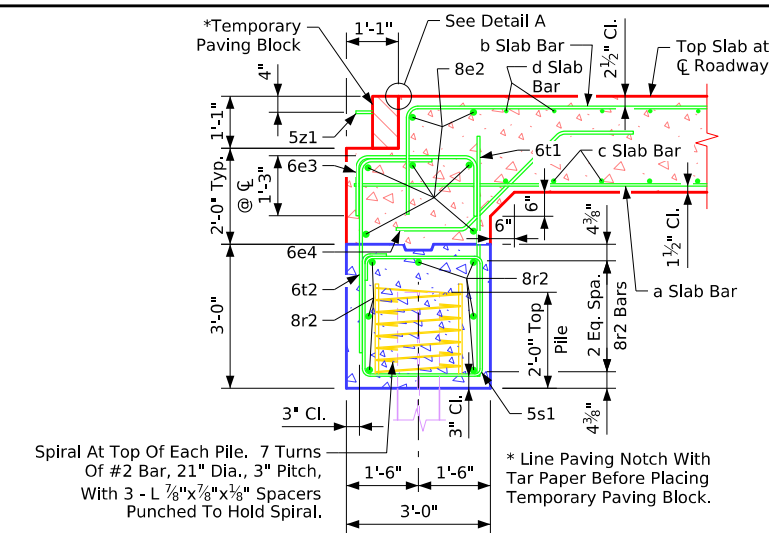
**Rear Elevation**

Note:  
The bottom of footing is to be sloped to compensate for grade on this skewed abutment. Therefore, bottom of footing elevations will be required at each exterior pile.



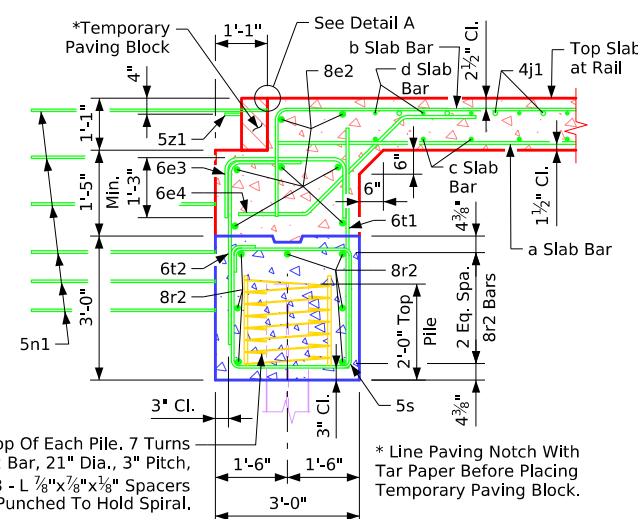
**Plan View**

Notes:  
Rails not shown.  
5n1 wing reinforcement shall be placed in the abutment footing before the footing is poured. Refer to Sheet J24S-11-25 for additional details.  
6e3, 6e4 and 8e2 are included with superstructure quantities.



**Section Normal to Abutment at CL**

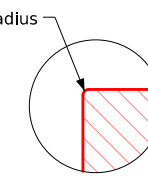
Spiral At Top Of Each Pile. 7 Turns Of #2 Bar, 21" Dia., 3" Pitch, With 3 - L 1/8"x1/8"x1/8" Spacers Punched To Hold Spiral.  
\* Line Paving Notch With Tar Paper Before Placing Temporary Paving Block.



**Section Normal to Abutment at Gutterline**



Spiral At Top Of Each Pile. 7 Turns Of #2 Bar, 21" Dia., 3" Pitch, With 3 - L 1/8"x1/8"x1/8" Spacers Punched To Hold Spiral.  
\* Line Paving Notch With Tar Paper Before Placing Temporary Paving Block.

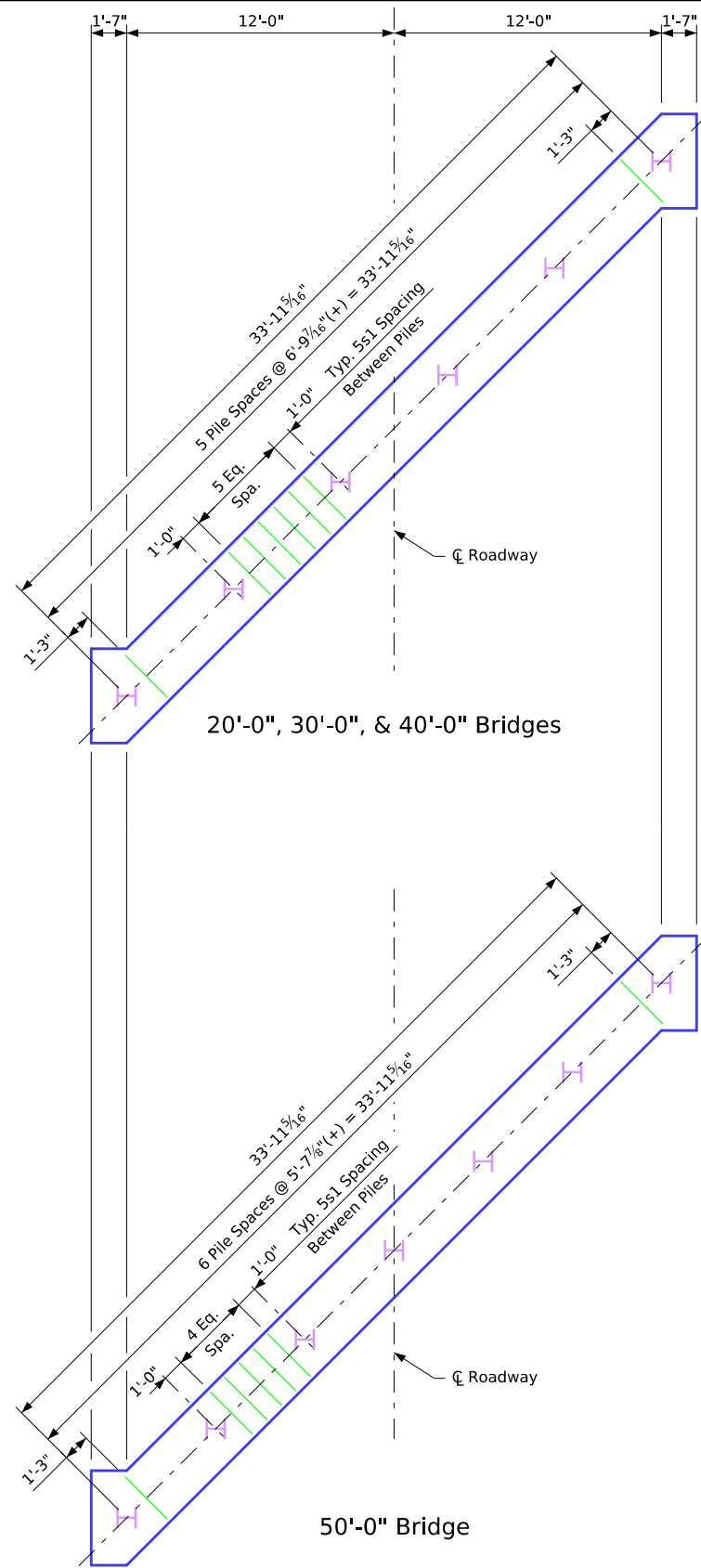
**Detail A**



**Abutment Notes:**

- All piling HP 10x42.
- The concrete and reinforcing steel for the wings is included with the superstructure.
- The minimum clear distance from the face of the concrete to near reinforcing bar is to be 2 inches unless otherwise noted or shown.
- Steel abutment piles shall be driven to full penetration if practicable but in no case to a bearing value less than specified in the design plans.
- All reinforcing steel is to be Grade 60.
- Abutment piling was designed for HL-93 loading with an allowance for 20 lbs. per sq. ft. future wearing surface.

Latest Revision Date  Approved by Bridge Engineer	 Standard Design - 24'-0" Roadway, Single Span Bridge	
	<b>Single Span Concrete Slab Bridges</b> July, 2025	
	Integral Abutment Details 45° Skew	<b>J24S-17-25</b>



20'-0", 30'-0", & 40'-0" Bridges

50'-0" Bridge

Note:  
All piles are to be oriented with webs perpendicular to the  $\text{C}$  of the roadway as shown.

Number of Piles and Abutment Design Loads				
Bridge Length	20'-0"	30'-0"	40'-0"	50'-0"
Number of Piles	6	6	6	7
Pu, strength I design load for each abutment (kips)	466	547	637	749

Note: Pu, strength I design load for each abutment (kips) is not the value used in the field for driving piles.

**Pile Plan - 45° Skew  
Steel Piling**

Latest Revision Date	 Approved by Bridge Engineer	<b>IOWA IDOT</b>
		Standard Design - 24'-0" Roadway, Single Span Bridge
		<b>Single Span Concrete Slab Bridges</b>
		July, 2025
		Integral Abutment Details 45° Skew
		<b>J24S-18-25</b>

### Bill of Reinforcing Steel - One Abutment - 0° Skew

Bridge Length				20'-0"		30'-0"		40'-0"		50'-0"	
Bar	Location	Shape	Length	No.	Weight	No.	Weight	No.	Weight	No.	Weight
8r1	Abutment Footing Longitudinal		26'-10"	7	502	7	502	7	502	7	502
5s1	Abutment Footing Hoops		11'-0"	25	287	24	275	24	275	22	252
6t1	Footing to Slab Dowels		5'-0"	30	225	30	225	30	225	30	225
6t2	Footing to Slab Dowels		5'-7"	30	252	30	252	30	252	30	252
#2	Pile Spiral		38'-6"	4	26	5	32	6	39	7	45
	Spiral Spacers, L 7/8x7/8x1/8x 0.70		1'-10"	12	15	15	19	18	23	21	27
Epoxy Coated Reinforcing Steel - Total (lbs.)					1,266		1,254		1,254		1,231
Non-Coated Reinforcing Steel - Total (lbs.)					41		51		62		72

### Bill of Reinforcing Steel - One Abutment - 15° Skew

Bridge Length				20'-0"		30'-0"		40'-0"		50'-0"	
Bar	Location	Shape	Length	No.	Weight	No.	Weight	No.	Weight	No.	Weight
8r2	Abutment Footing Longitudinal		27'-8"	7	517	7	517	7	517	7	517
5s1	Abutment Footing Hoops		11'-0"	24	275	24	275	20	229	24	275
5s2	Abutment Footing Hoops		11'-3"	4	47	4	47	4	47	4	47
6t1	Footing to Slab Dowels		5'-0"	30	225	30	225	30	225	30	225
6t2	Footing to Slab Dowels		5'-7"	30	252	30	252	30	252	30	252
#2	Pile Spiral		38'-6"	5	32	5	32	6	39	7	45
	Spiral Spacers, L 7/8x7/8x1/8x 0.70		1'-10"	15	19	15	19	18	23	21	27
Epoxy Coated Reinforcing Steel - Total (lbs.)					1,316		1,316		1,270		1,316
Non-Coated Reinforcing Steel - Total (lbs.)					51		51		62		72

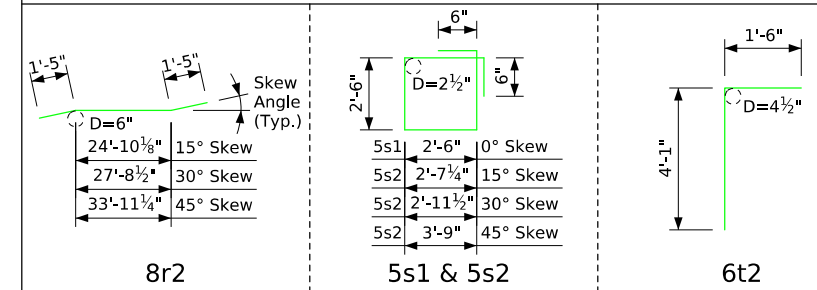
### Bill of Reinforcing Steel - One Abutment - 30° Skew

Bridge Length				20'-0"		30'-0"		40'-0"		50'-0"	
Bar	Location	Shape	Length	No.	Weight	No.	Weight	No.	Weight	No.	Weight
8r2	Abutment Footing Longitudinal		30'-7"	7	572	7	572	7	572	7	572
5s1	Abutment Footing Hoops		11'-0"	24	275	24	275	25	287	24	275
5s2	Abutment Footing Hoops		11'-11"	4	50	4	50	4	50	4	50
6t1	Footing to Slab Dowels		5'-0"	30	225	30	225	30	225	30	225
6t2	Footing to Slab Dowels		5'-7"	30	252	30	252	30	252	30	252
#2	Pile Spiral		38'-6"	5	32	5	32	6	39	7	45
	Spiral Spacers, L 7/8x7/8x1/8x 0.70		1'-10"	15	19	15	19	18	23	21	27
Epoxy Coated Reinforcing Steel - Total (lbs.)					1,374		1,374		1,386		1,374
Non-Coated Reinforcing Steel - Total (lbs.)					51		51		62		72

### Bill of Reinforcing Steel - One Abutment - 45° Skew

Bridge Length				20'-0"		30'-0"		40'-0"		50'-0"	
Bar	Location	Shape	Length	No.	Weight	No.	Weight	No.	Weight	No.	Weight
8r2	Abutment Footing Longitudinal		36'-9"	7	687	7	687	7	687	7	687
5s1	Abutment Footing Hoops		11'-0"	30	344	30	344	30	344	30	344
5s2	Abutment Footing Hoops		13'-6"	4	56	4	56	4	56	4	56
6t1	Footing to Slab Dowels		5'-0"	30	225	30	225	30	225	30	225
6t2	Footing to Slab Dowels		5'-7"	30	252	30	252	30	252	30	252
#2	Pile Spiral		38'-6"	6	39	6	39	6	39	7	45
	Spiral Spacers, L 7/8x7/8x1/8x 0.70		1'-10"	18	23	18	23	18	23	21	27
Epoxy Coated Reinforcing Steel - Total (lbs.)					1,564		1,564		1,564		1,564
Non-Coated Reinforcing Steel - Total (lbs.)					62		62		62		72

### Abutment - Bent Bar Details



Note: All Dimensions Are Out To Out. D = Pin Diameter.

### Estimated Quantities - One Abutment - 0° Skew

Location	Unit	20'-0"	30'-0"	40'-0"	50'-0"
Bridge Length					
Structural Concrete (Bridge)	c.y.	9.1	9.1	9.1	9.1
Reinforcing Steel (Epoxy Coated)	lbs.	1,266	1,254	1,254	1,231
Reinforcing Steel (Non-Coated)	lbs.	41	51	62	72
Steel Piling HP 10x42	no.	4	5	6	7

### Estimated Quantities - One Abutment - 15° Skew

Location	Unit	20'-0"	30'-0"	40'-0"	50'-0"
Bridge Length					
Structural Concrete (Bridge)	c.y.	9.4	9.4	9.4	9.4
Reinforcing Steel (Epoxy Coated)	lbs.	1,316	1,316	1,270	1,316
Reinforcing Steel (Non-Coated)	lbs.	51	51	62	72
Steel Piling HP 10x42	no.	5	5	6	7

### Estimated Quantities - One Abutment - 30° Skew

Location	Unit	20'-0"	30'-0"	40'-0"	50'-0"
Bridge Length					
Structural Concrete (Bridge)	c.y.	10.5	10.5	10.5	10.5
Reinforcing Steel (Epoxy Coated)	lbs.	1,374	1,374	1,386	1,374
Reinforcing Steel (Non-Coated)	lbs.	51	51	62	72
Steel Piling HP 10x42	no.	5	5	6	7

### Estimated Quantities - One Abutment - 45° Skew

Location	Unit	20'-0"	30'-0"	40'-0"	50'-0"
Bridge Length					
Structural Concrete (Bridge)	c.y.	12.8	12.8	12.8	12.8
Reinforcing Steel (Epoxy Coated)	lbs.	1,564	1,564	1,564	1,564
Reinforcing Steel (Non-Coated)	lbs.	62	62	62	72
Steel Piling HP 10x42	no.	6	6	6	7

Latest Revision Date

Approved by Bridge Engineer

IOWA IDOT

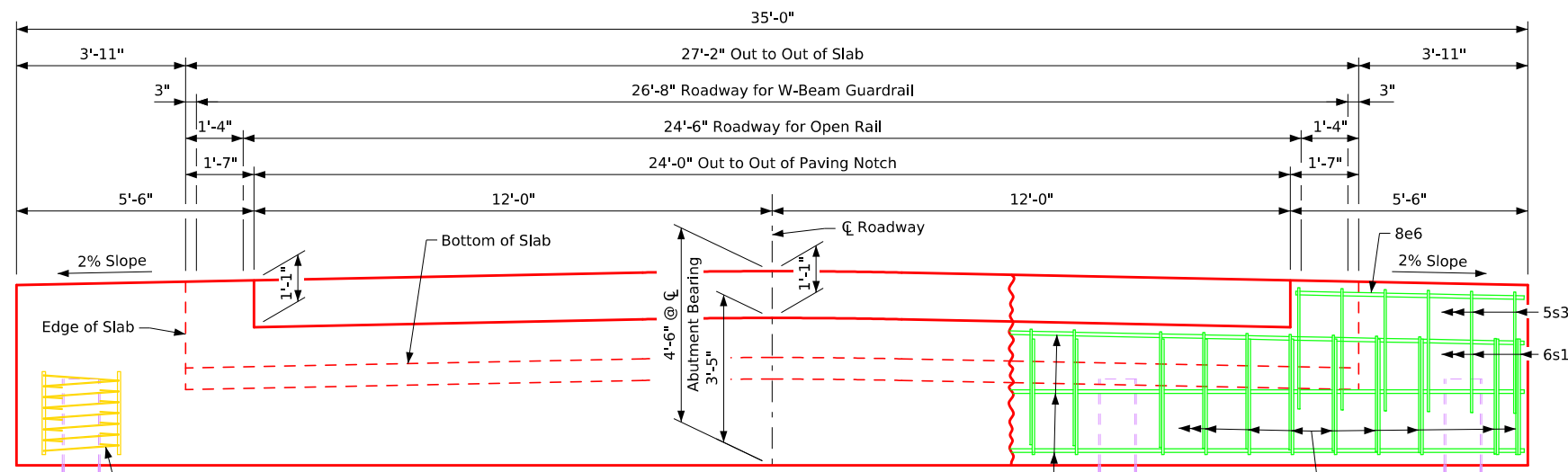
Standard Design - 24'-0" Roadway, Single Span Bridge

Single Span Concrete Slab Bridges

July, 2025

Integral Abutment Details

J24S-19-25

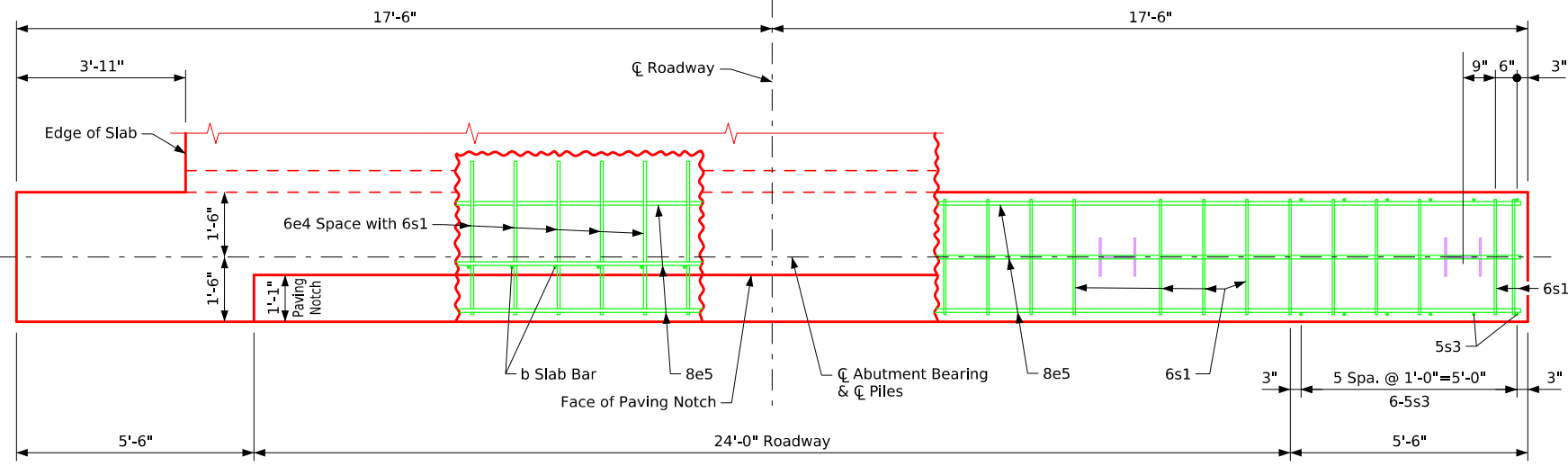


Spiral At Top Of Each Pile. 7 Turns Of #2 Bar, 21" Dia., 3" Pitch, With 3 - L  $\frac{7}{8}$ "x $\frac{7}{8}$ "x $\frac{3}{8}$ " Spacers Punched To Hold Spiral.

**Rear Elevation**

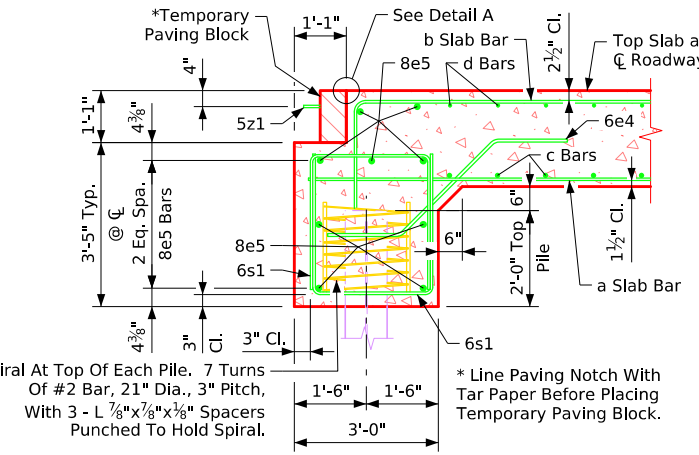
Number of Piles and Abutment Design Loads				
Bridge Length	20'-0"	30'-0"	40'-0"	50'-0"
Number of Piles	5	6	7	8
Pu, strength I design load for each abutment (kips)	458	548	646	763

Note: Pu, strength I design load for each abutment (kips) is not the value used in the field for driving piles.

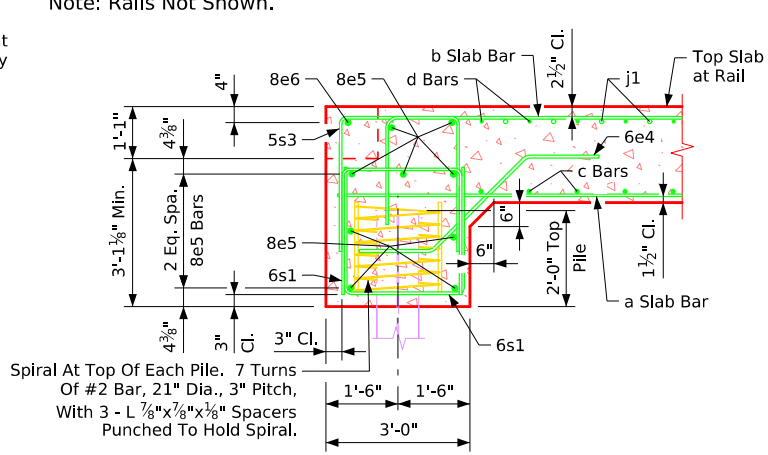


**Plan View**

Note: Rails Not Shown.



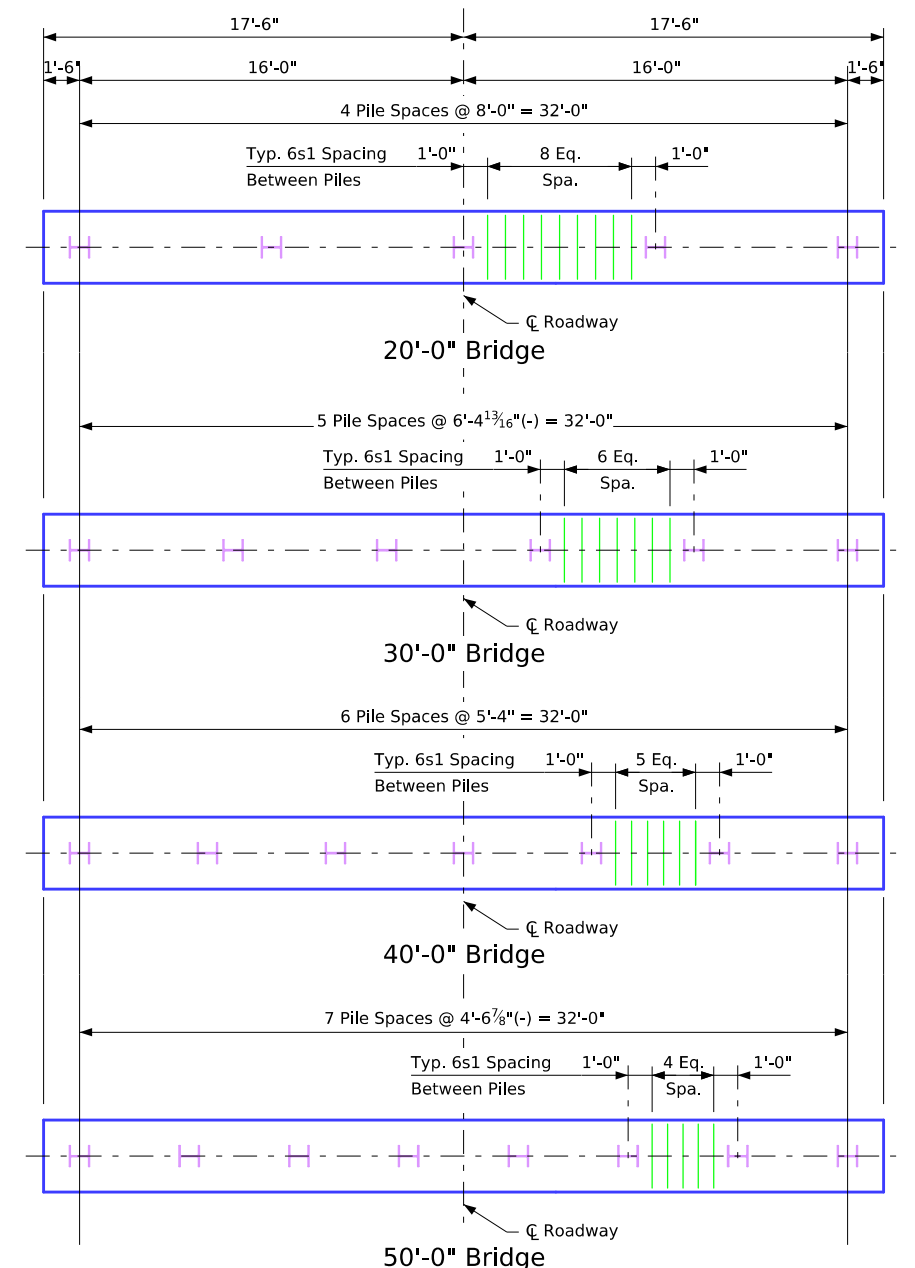
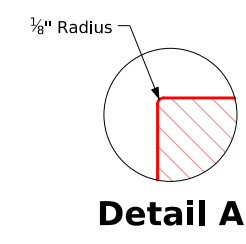
**Section Normal to Abutment at  $\bar{C}$**



**Section Normal to Abutment at Gutterline**

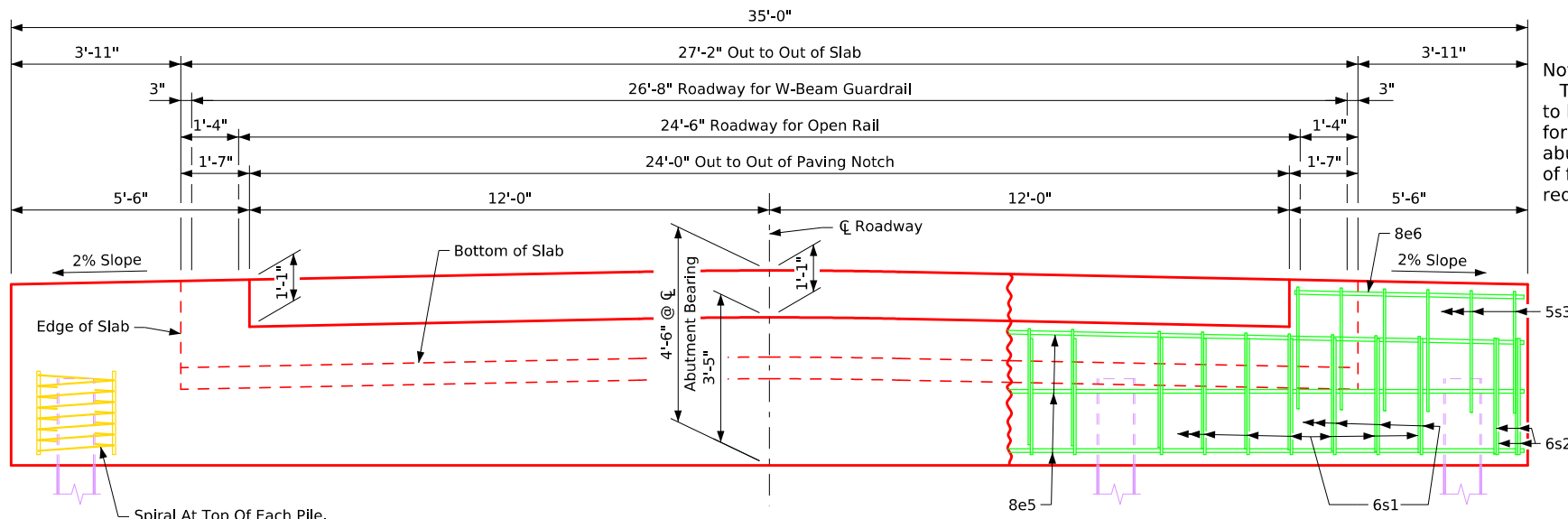
**Abutment Notes:**

All piling HP 10x42.  
 The minimum clear distance from the face of the concrete to near reinforcing bar is to be 2 inches unless otherwise noted or shown.  
 Steel abutment piles shall be driven to full penetration if practicable but in no case to a bearing value less than specified in the design plans.  
 Abutment piling was designed for HL-93 loading with an allowance for 20 lbs. per sq. ft. future wearing surface.  
 All reinforcing bars are included with the superstructure quantities.

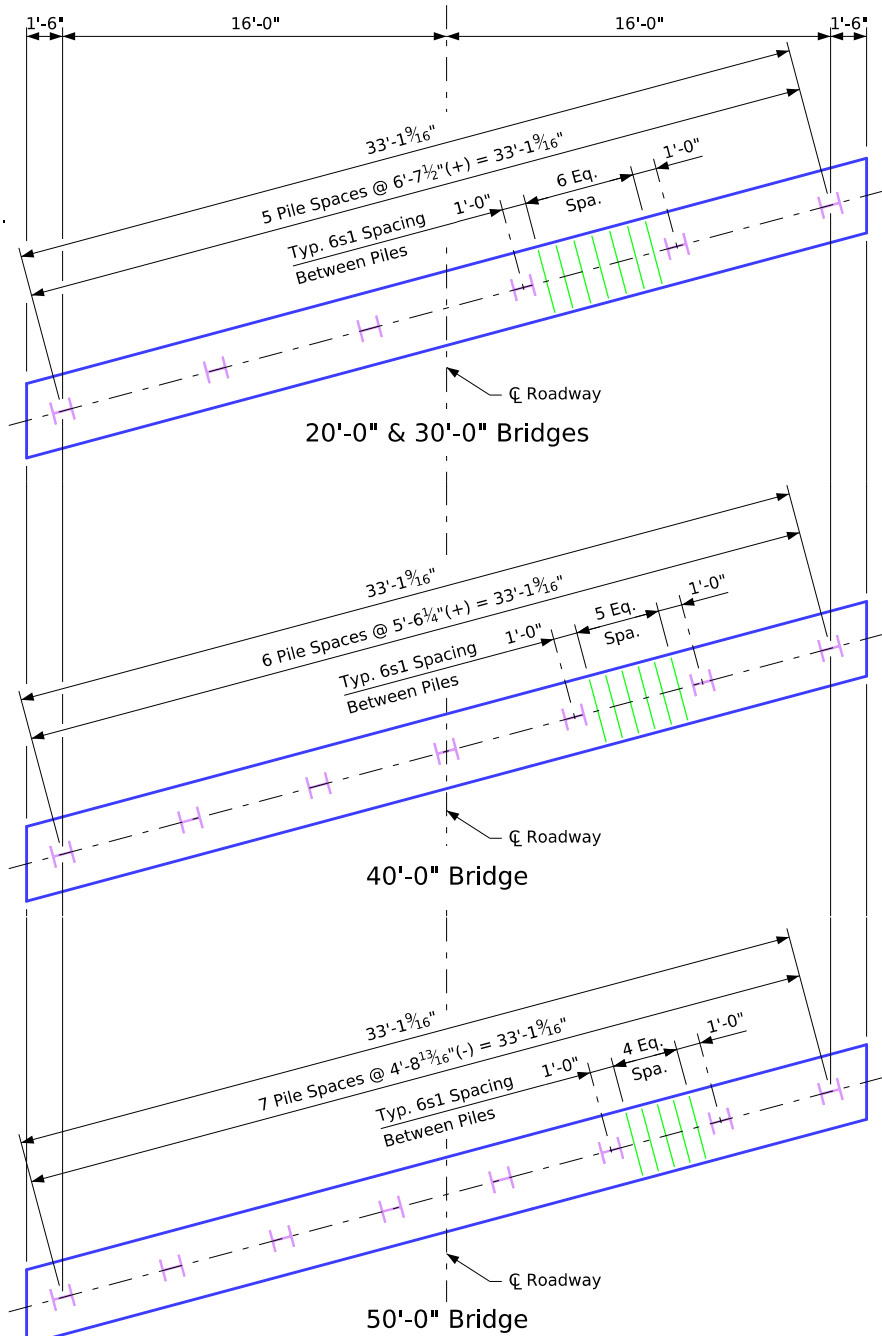


**Pile Plan - 0° Skew Steel Piling**

Latest Revision Date	Approved by Bridge Engineer	<b>IOWA IDOT</b>	
		Standard Design - 24'-0" Roadway, Single Span Bridge	
		<b>Single Span Concrete Slab Bridges</b>	
		July, 2025	
		High Abutment Details 0° Skew	<b>J24S-20-25</b>



Note:  
 The bottom of footing is to be sloped to compensate for grade on this skewed abutment. Therefore bottom of footing elevations will be required at each exterior pile.

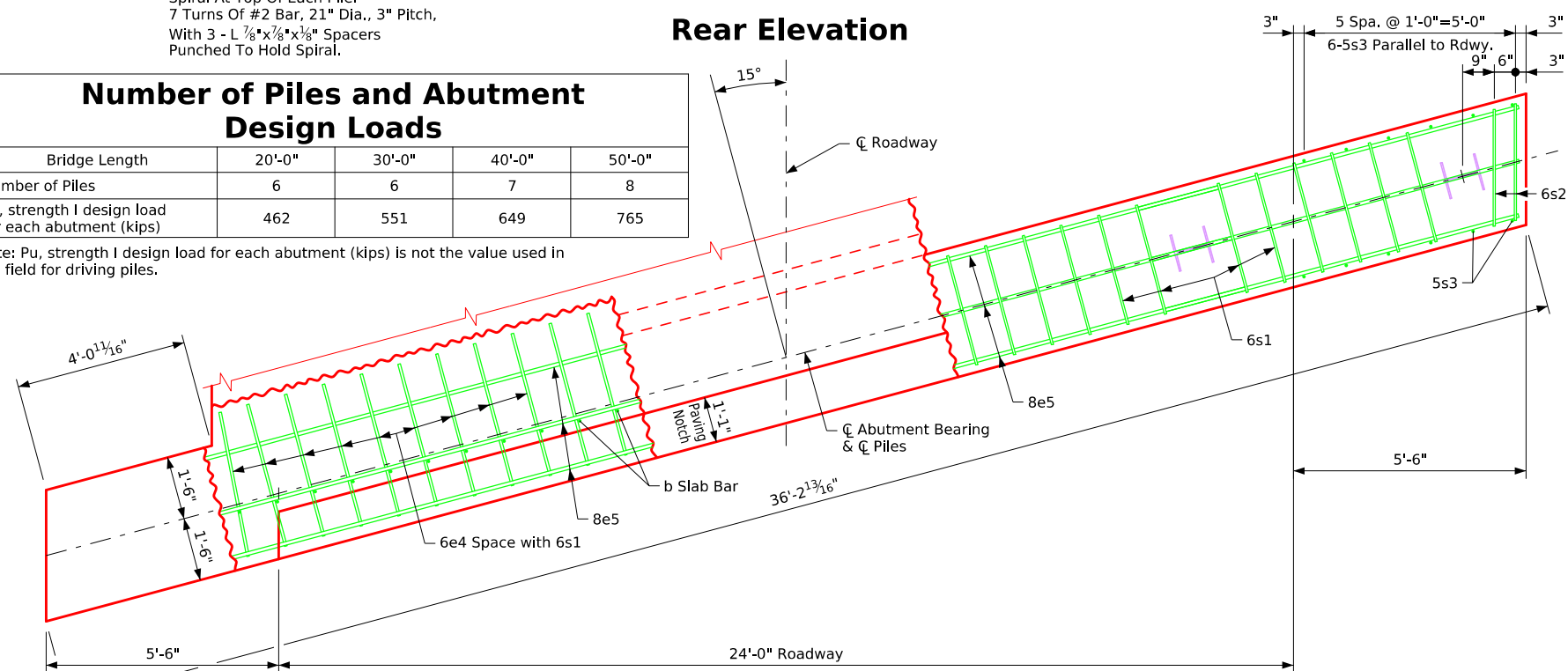


**Pile Plan - 15° Skew Steel Piling**

**Number of Piles and Abutment Design Loads**

Bridge Length	20'-0"	30'-0"	40'-0"	50'-0"
Number of Piles	6	6	7	8
Pu, strength I design load for each abutment (kips)	462	551	649	765

Note: Pu, strength I design load for each abutment (kips) is not the value used in the field for driving piles.

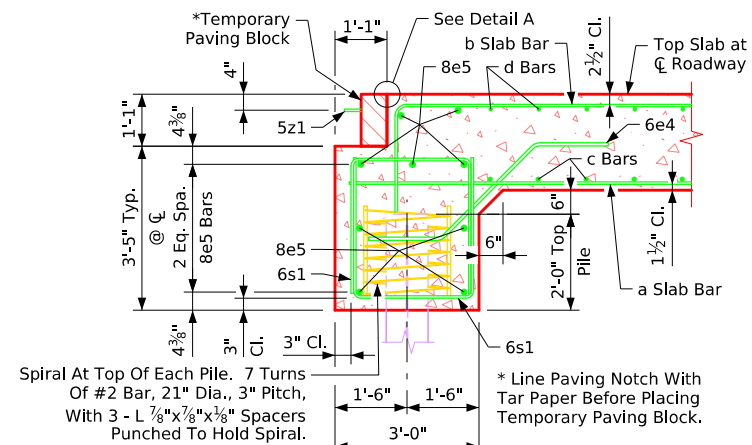


**Plan View**

Note: Rails Not Shown.

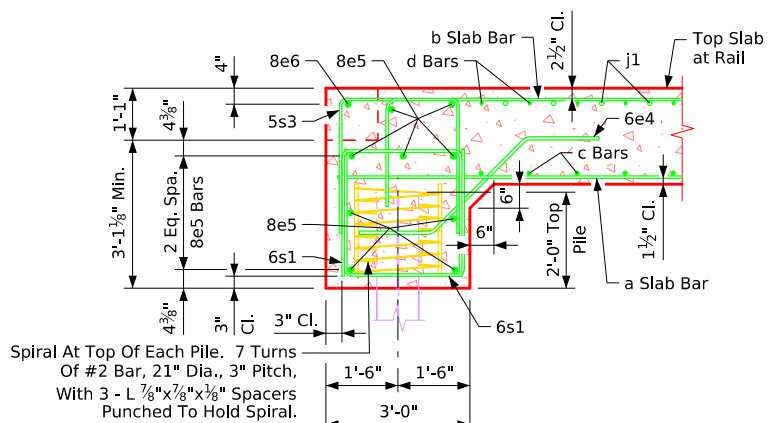
**Abutment Notes:**

All piling HP 10x42.  
 The minimum clear distance from the face of the concrete to near reinforcing bar is to be 2 inches unless otherwise noted or shown.  
 Steel abutment piles shall be driven to full penetration if practicable but in no case to a bearing value less than specified in the design plans.  
 Abutment piling was designed for HL-93 loading with an allowance for 20 lbs. per sq. ft. future wearing surface.  
 All reinforcing bars are included with the superstructure quantities.



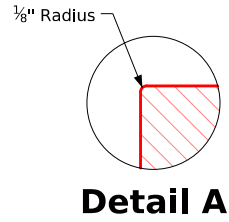
**Section Normal to Abutment at  $\bar{C}$**

Spiral At Top Of Each Pile. 7 Turns Of #2 Bar, 21" Dia., 3" Pitch, With 3 - L 7/8"x7/8"x1/2" Spacers Punched To Hold Spiral.  
 \* Line Paving Notch With Tar Paper Before Placing Temporary Paving Block.

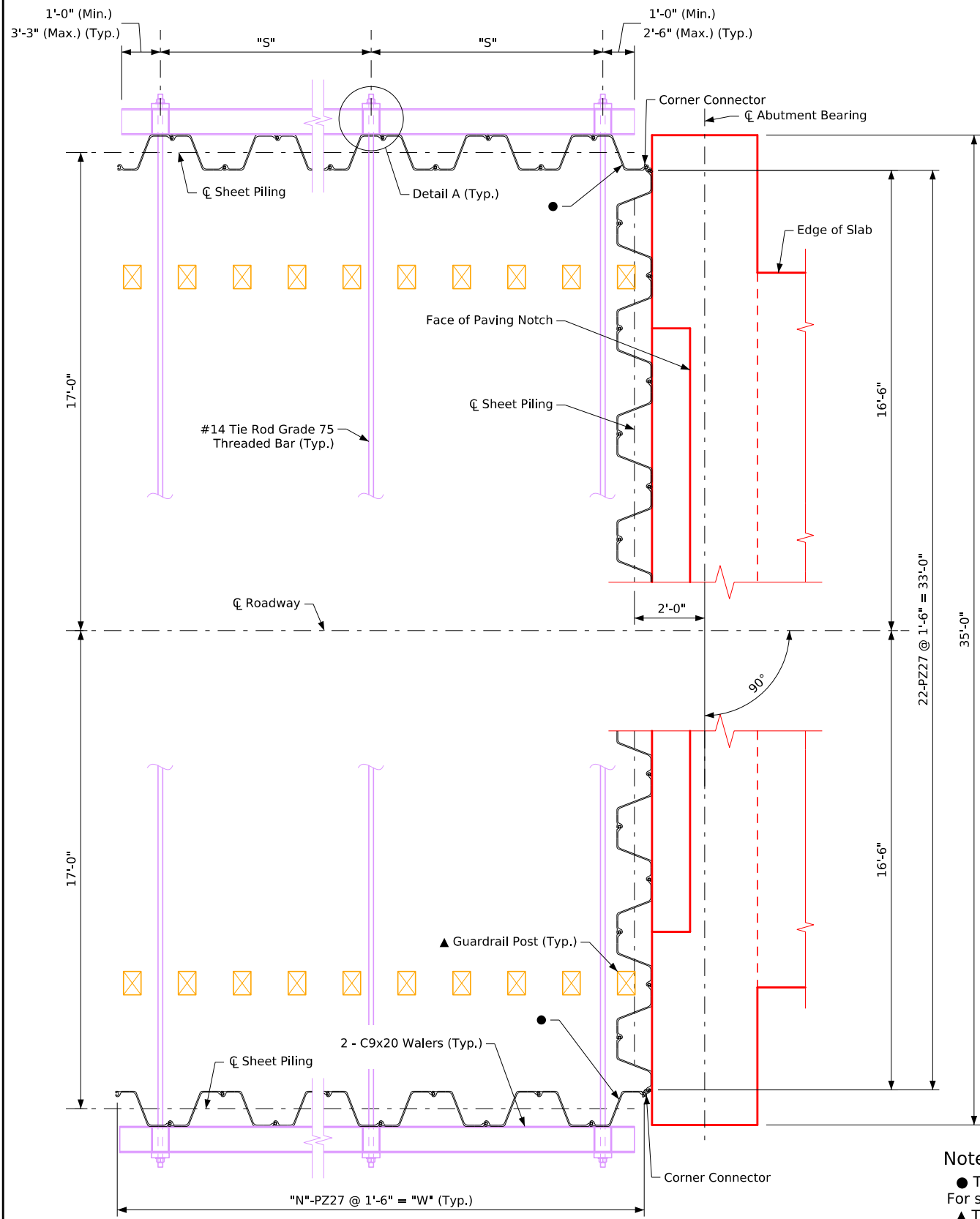


**Section Normal to Abutment at Gutterline**

Spiral At Top Of Each Pile. 7 Turns Of #2 Bar, 21" Dia., 3" Pitch, With 3 - L 7/8"x7/8"x1/2" Spacers Punched To Hold Spiral.



Latest Revision Date	 Approved by Bridge Engineer	<b>IOWA IDOT</b>	
		Standard Design - 24'-0" Roadway, Single Span Bridge	
		<b>Single Span Concrete Slab Bridges</b>	
		July, 2025	
		High Abutment Details 15° Skew	<b>J24S-21-25</b>



**Steel Sheet Piling Plan View**  
(Cover Plates Not Shown For Clarity)

**Notes:**

- Top of sheet piling at wings to match top of abutment elevation. For sheet pile cover plate details, see Sheets J245-24-25 and J245-25-25.
- ▲ The guardrail post #15 (open concrete rails only) may require adjustment to ensure adequate clearance from the backwall sheeting and backwall cover plate. See Sheet J245-25-25 and roadway sheets for post locations. The Bridge Contractor shall verify clearances for guardrail post installation, and make any necessary adjustments. Post #15 blockout lengths may be field adjusted to facilitate guardrail installation.

Sheet Pile Backwall and Wing Wall Quantities			
Number of Sheet Piles	Per Wing	*N = W / 1.5'	Total = 2 x N + 26
	Backwall	26	
Sheet Pile Area		(D1 + D2 + L) x W + 26 x 1.5' x (L - 2')	
Number of Tie Rods		*T = W / S + 1	

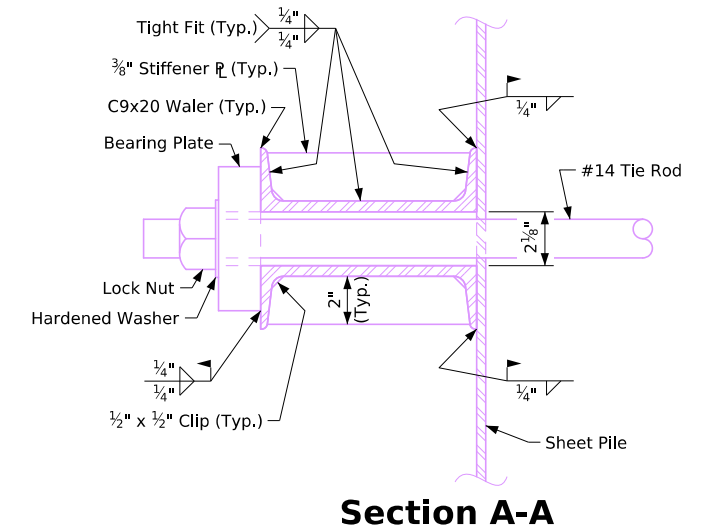
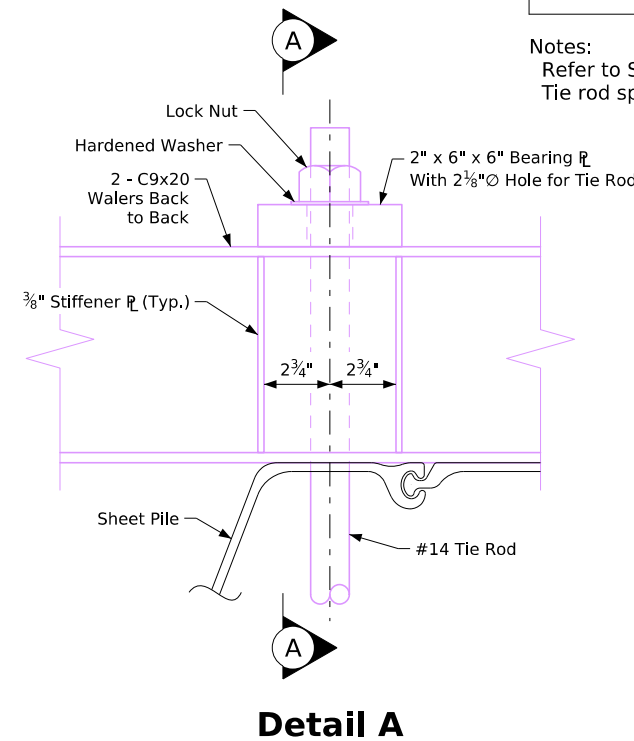
**Notes:**

All units are in feet.  
Wing length "W" is to be calculated by the Engineer based on height from grade to top of berm "H" and wing slope.  
\* Number of wing wall sheet piles and tie rods shall be calculated as shown and rounded up to a whole number.  
See Sheet J245-24-25 for "D1" + "D2" values required (minimum embedment depths).

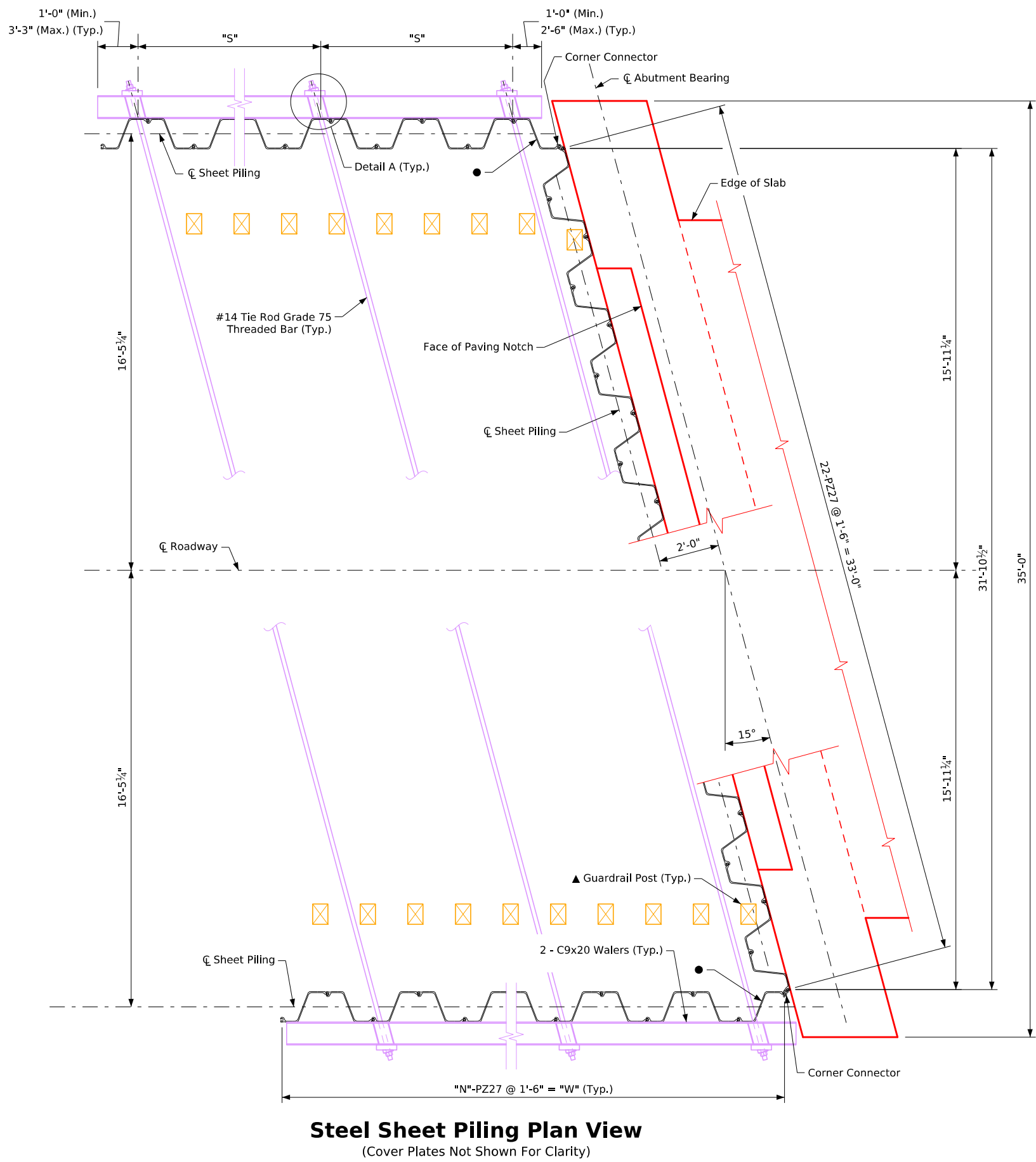
Table of Required Tie Rod Spacing					
Abutment Height "H"	6'-0"	8'-0"	10'-0"	12'-0"	14'-0"
Maximum Tie Rod Spacing "S"	9'-2"	8'-4"	7'-3"	5'-11"	4'-11"

**Notes:**

Refer to Sheet J245-24-25 for sheet pile height ("H") details.  
Tie rod spacing ("S") shall be selected to avoid conflicts with the guardrail posts.



Latest Revision Date  Approved by Bridge Engineer		
	Standard Design - 24'-0" Roadway, Single Span Bridge	
	<b>Single Span Concrete Slab Bridges</b>	
	July, 2025	
Steel Sheet Piling Details 0° Skew		<b>J24S-22-25</b>



### Sheet Pile Backwall and Wing Wall Quantities

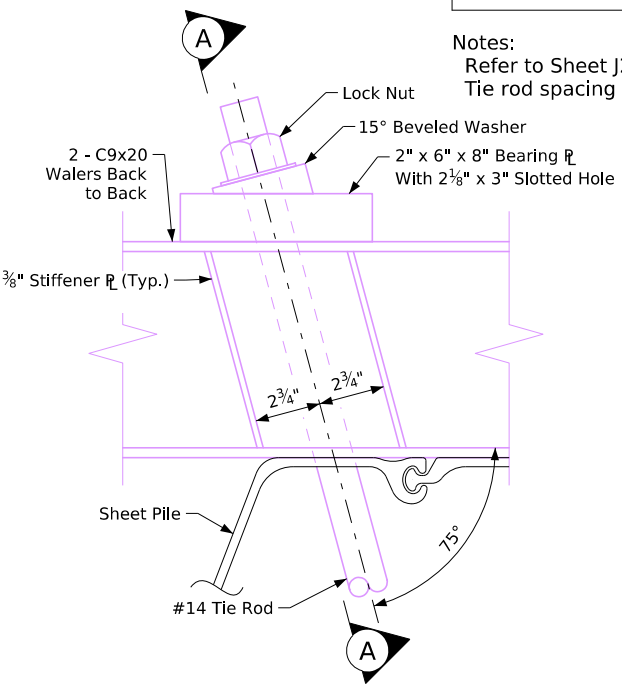
Number of Sheet Piles	Per Wing	*N = W / 1.5'	Total = 2 x N + 26
	Backwall	26	
Sheet Pile Area		(D1 + D2 + L) x W + 26 x 1.5' x (L - 2')	
Number of Tie Rods		*T = W / S + 1	

Notes:  
 All units are in feet.  
 Wing length "W" is to be calculated by the Engineer based on height from grade to top of berm "H" and wing slope.  
 \* Number of wing wall sheet piles and tie rods shall be calculated as shown and rounded up to a whole number.  
 See Sheet J24S-24-25 for "D1" + "D2" values required (minimum embedment depths).

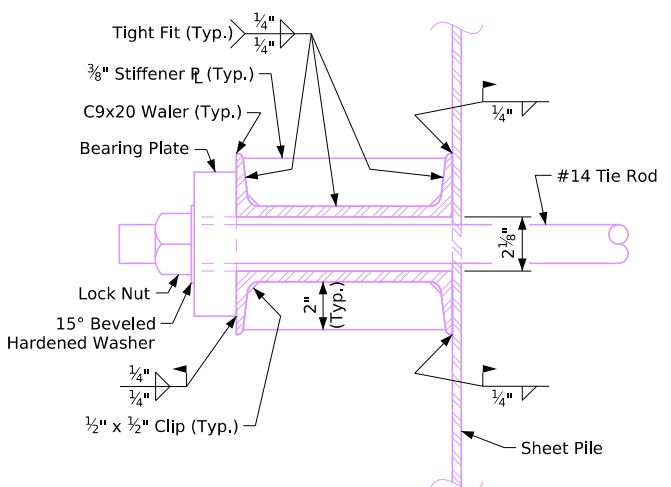
### Table of Required Tie Rod Spacing

Abutment Height "H"	6'-0"	8'-0"	10'-0"	12'-0"	14'-0"
Maximum Tie Rod Spacing "S"	9'-2"	8'-4"	7'-0"	5'-9"	4'-9"

Notes:  
 Refer to Sheet J24S-24-25 for sheet pile height ("H") details.  
 Tie rod spacing ("S") shall be selected to avoid conflicts with the guardrail posts.



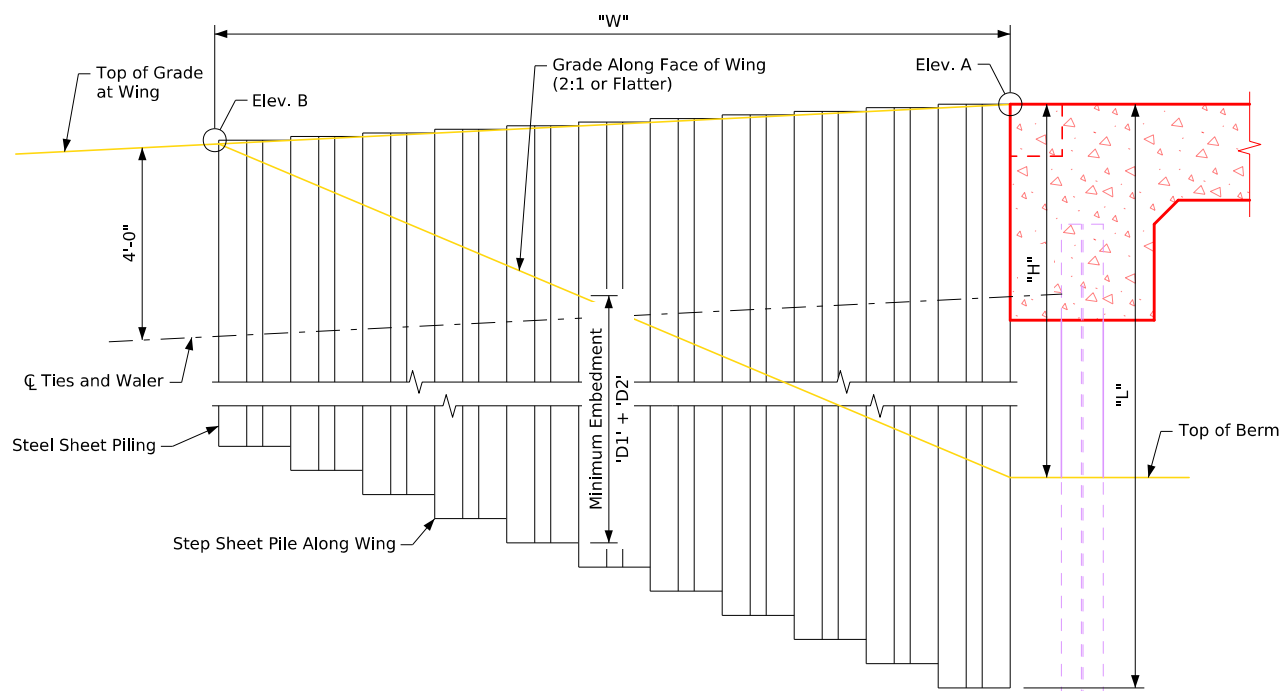
**Detail A**



**Section A-A**

Notes:  
 ● Top of sheet piling at wings to match top of abutment elevation. For sheet pile cover plate details, see Sheets J24S-24-25 and J24S-25-25.  
 ▲ The guardrail post #15 (open concrete rails only) may require adjustment to ensure adequate clearance from the backwall sheeting and backwall cover plate. See Sheet J24S-25-25 and roadway sheets for post locations. The Bridge Contractor shall verify clearances for guardrail post installation, and make any necessary adjustments. Post #15 blackout lengths may be field adjusted to facilitate guardrail installation.

Latest Revision Date  Approved by Bridge Engineer		
	Standard Design - 24'-0" Roadway, Single Span Bridge <b>Single Span Concrete Slab Bridges</b> July, 2025	
	Steel Sheet Piling Details 15° Skew	<b>J24S-23-25</b>



**Wing Elevation**

If very stiff or dense materials are present, installation of the sheet piles may be difficult with a vibratory hammer and consideration should be given to using an impact hammer. If lesser embedment of the sheet pile occurs due to the presence of stiffer or denser foundation soils, the Engineer shall be notified immediately.

**Steel Sheet Piling Notes:**

As a minimum, all steel sheet piling shall be PZ27 and shall conform to ASTM A328 steel and shall meet the following requirements:

Section Length:	See this sheet to calculate "L"
Maximum Section Depth:	12 in.
Minimum Section Thickness:	0.375 in.
Elastic Section Modulus:	30.2 in <sup>3</sup> /ft



The Contractor shall submit for review a shop plan of the sheet pile layout, including the ties and walers, showing all pertinent dimensions, details, and section properties. The Contractor shall not proceed with installation of steel sheet piling and steel bearing piling prior to approval of the submittal by the Engineer.

Tie rods shall be ASTM A615 Grade 75 and galvanized in accordance with ASTM A123. Lock nuts and washers shall be galvanized and provided by the tie rod manufacturer. Steel channels, bearing plates and other miscellaneous plates shall conform to ASTM A709, Grade 50.

Field welding shall meet the requirements of Materials I.M. 558.

The steel walers shall bear uniformly against the sheet piles at each contact point as shown prior to tightening the tie rod nuts. 6" x 6" shim plates shall be used to provide uniform bearing.

Nuts shall be tightened snug tight prior to placing backfill above the elevation of the tie rod.

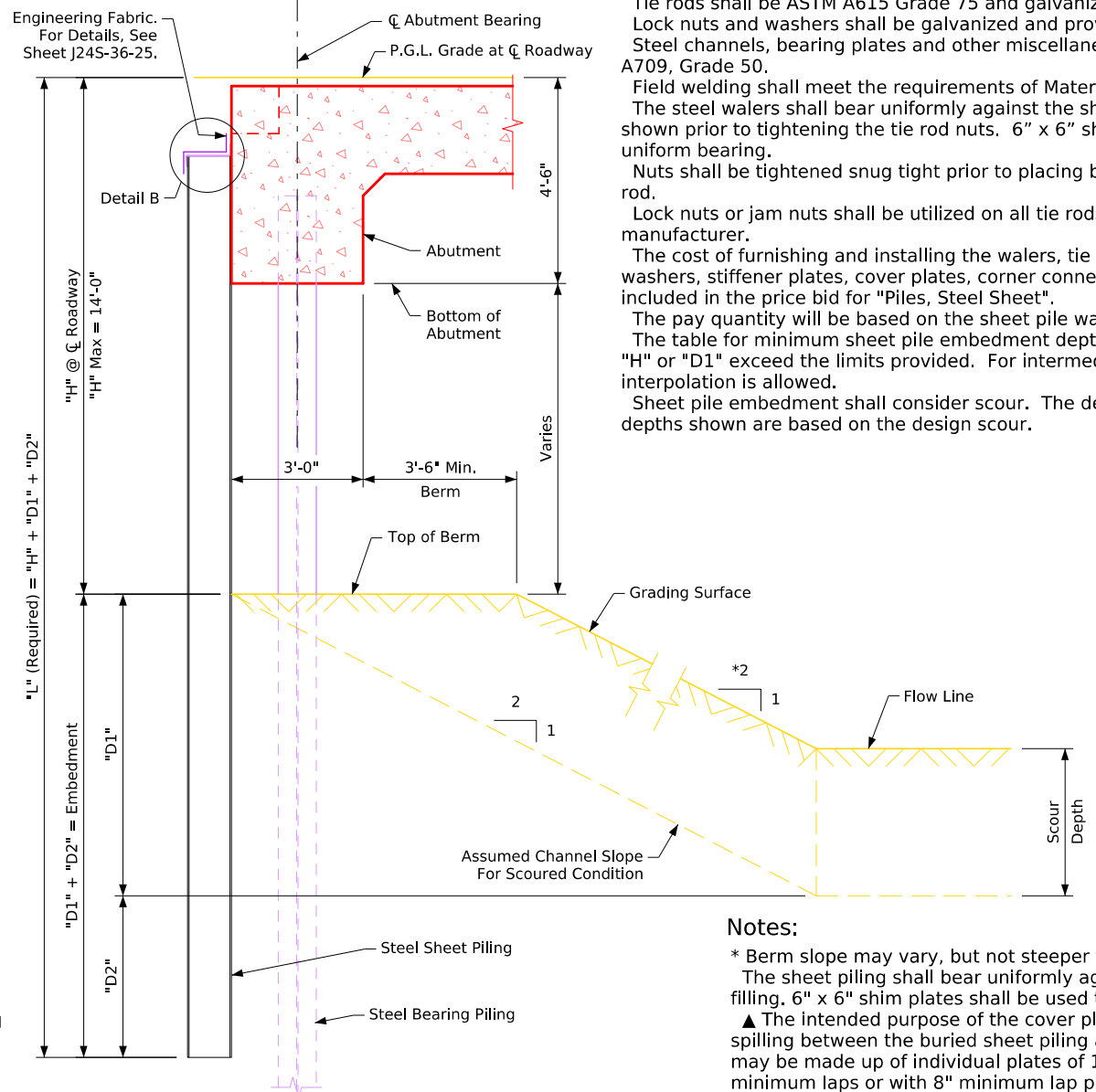
Lock nuts or jam nuts shall be utilized on all tie rods, or as specified by the tie rod manufacturer.

The cost of furnishing and installing the walers, tie rods, bearing plates, lock nuts, washers, stiffener plates, cover plates, corner connectors, and shim plates shall be included in the price bid for "Piles, Steel Sheet".

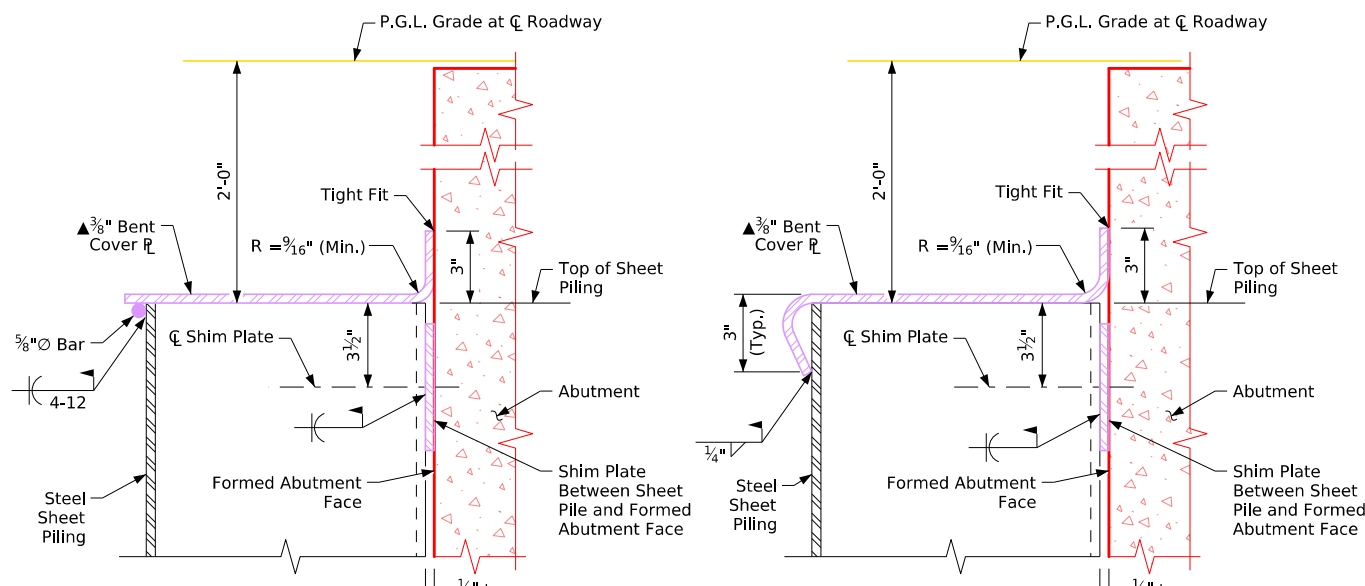
The pay quantity will be based on the sheet pile wall dimensions shown.

The table for minimum sheet pile embedment depths shall not be used if the values of "H" or "D1" exceed the limits provided. For intermediate values of "H" and "D1", interpolation is allowed.

Sheet pile embedment shall consider scour. The design and sheet pile embedment depths shown are based on the design scour.



**Typical Section thru Abutment**



**Alternate Detail B**

(Engineering Fabric Not Shown)

**Detail B**

(Engineering Fabric Not Shown)

**Notes:**

\* Berm slope may vary, but not steeper than 2:1.

The sheet piling shall bear uniformly against the abutment prior to back filling, 6" x 6" shim plates shall be used to provide uniform bearing.

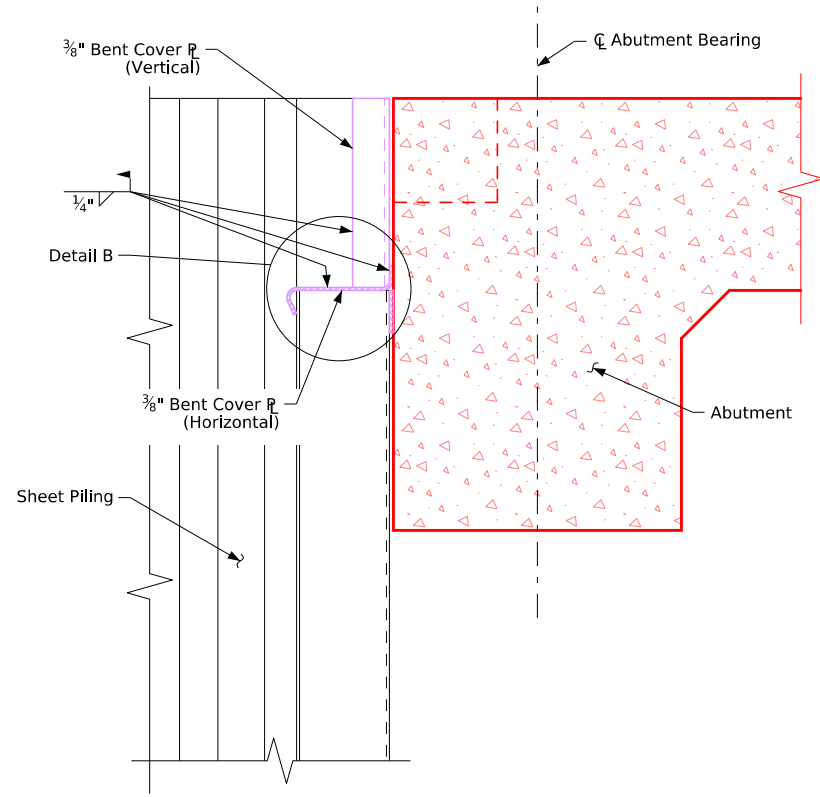
▲ The intended purpose of the cover plates is to prevent the backfill from spilling between the buried sheet piling and the abutment. The cover plate may be made up of individual plates of 10'-0" minimum length with 4" minimum laps or with 8" minimum lap plates (4" min. each side). Laps or lap plate are to be seal welded.

For additional cover plate details, see Sheet J24S-25-25.

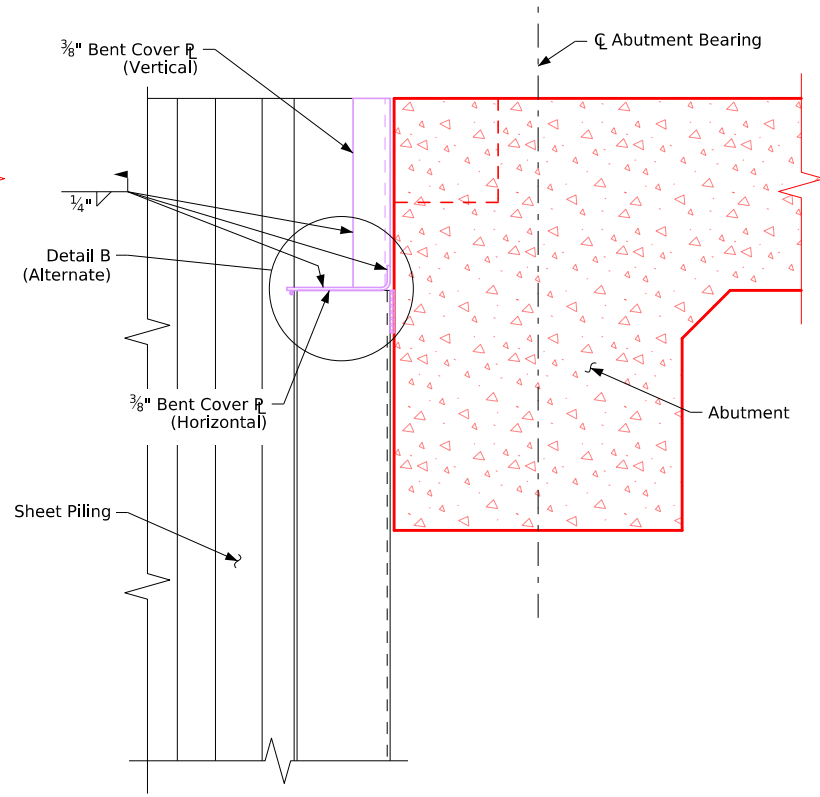
**Minimum Sheet Pile Embedment Depth (D1+D2)**

Height from Berm to Grade (H)	14'-0"	12'-0"	10'-0"	8'-0"	6'-0"
10'-0"	37'-0"	34'-0"	31'-6"	28'-6"	25'-6"
8'-0"	34'-0"	31'-6"	28'-6"	26'-0"	23'-0"
6'-0"	31'-0"	28'-6"	25'-6"	23'-0"	20'-0"
4'-0"	27'-6"	25'-0"	22'-6"	20'-0"	17'-0"
2'-0"	24'-0"	21'-6"	19'-0"	16'-6"	14'-0"
0'-0"	20'-0"	17'-6"	15'-0"	13'-0"	11'-0"

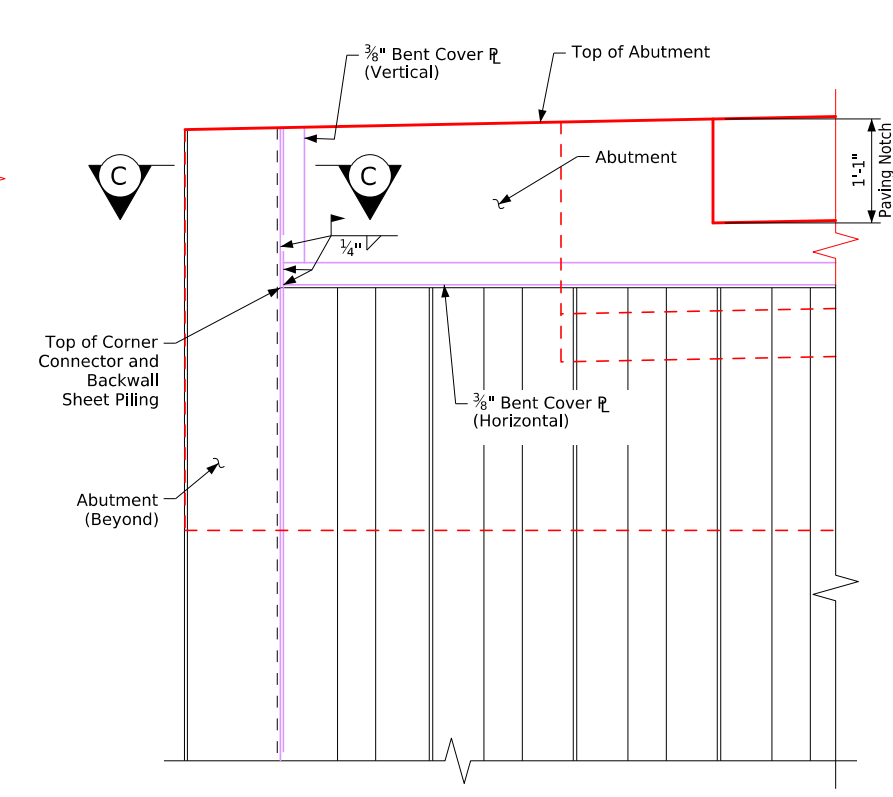
Latest Revision Date  Approved by Bridge Engineer	 Standard Design - 24'-0" Roadway, Single Span Bridge	
	<b>Single Span Concrete Slab Bridges</b> July, 2025	
	Steel Sheet Piling Details	<b>J24S-24-25</b>



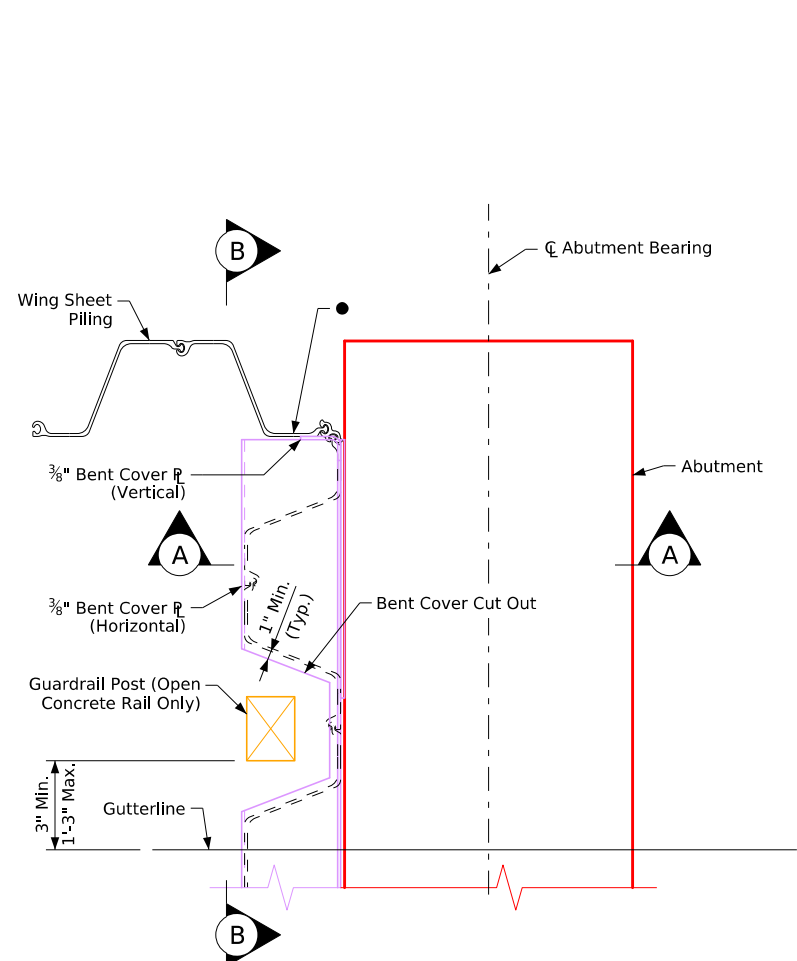
**Section A-A**



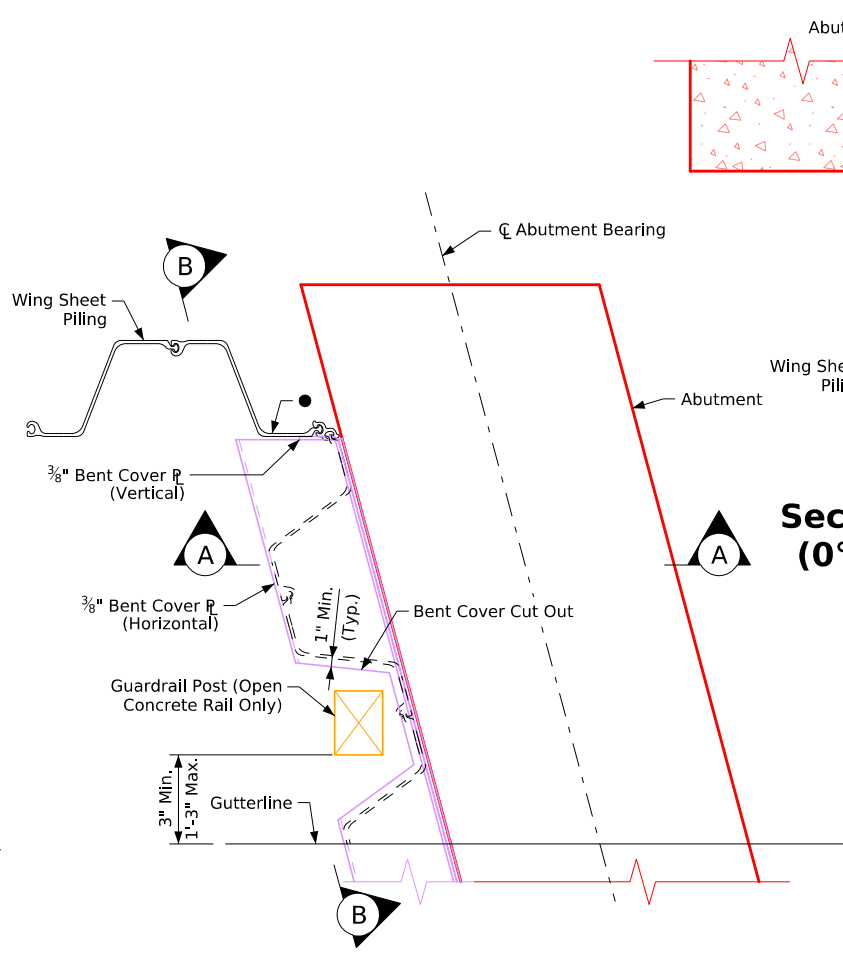
**Section A-A (Alternate)**



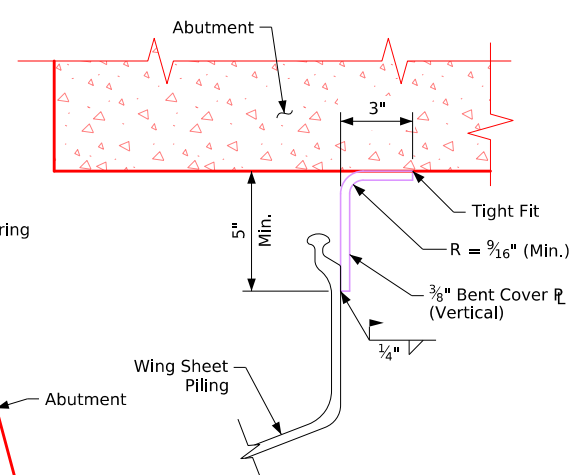
**View B-B**



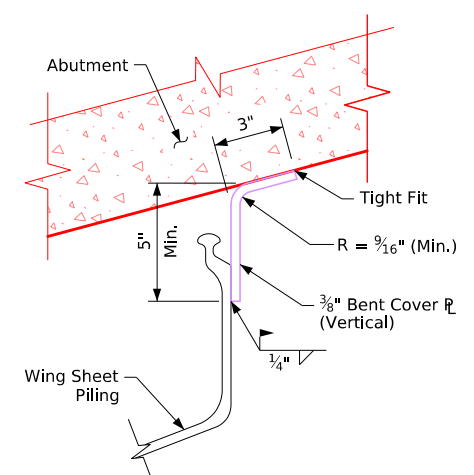
**Partial Plan View at End of Abutment (0° Skew)**



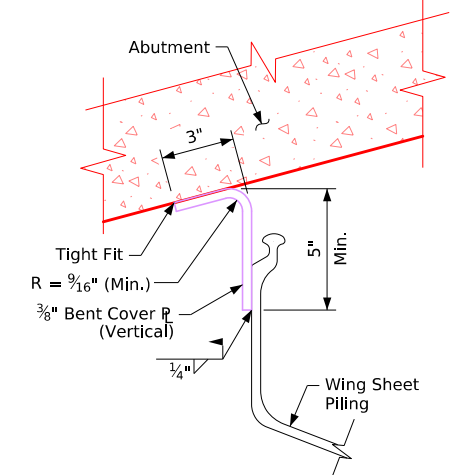
**Partial Plan View at End of Abutment (15° Skew)**



**Section C-C (0° Skew)**



**Section C-C (15° Skew-Obtuse Side)**



**Section C-C (15° Skew-Acute Side)**

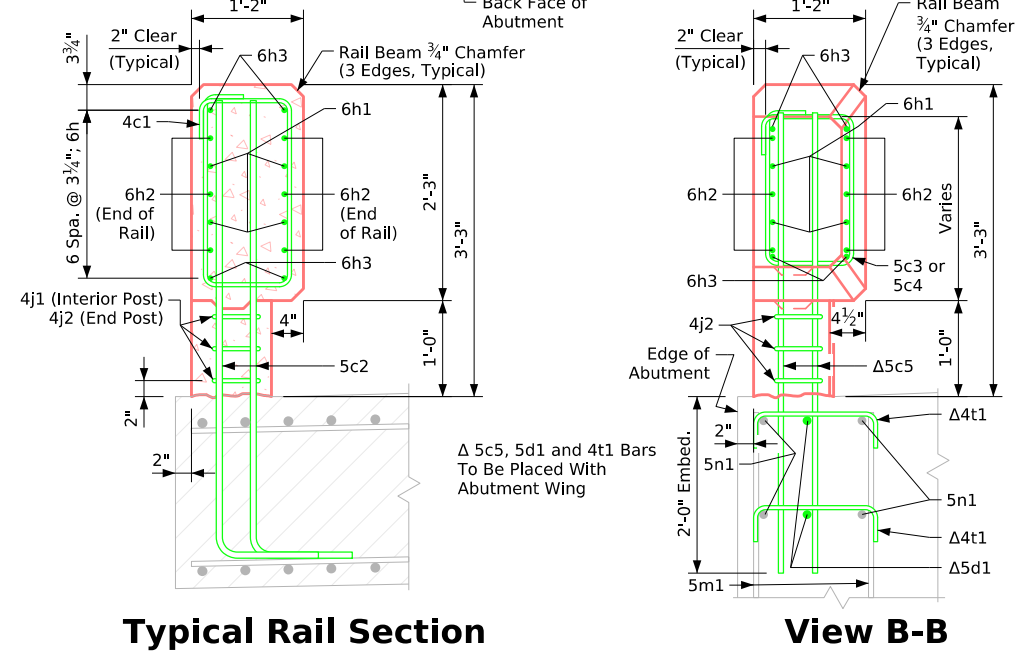
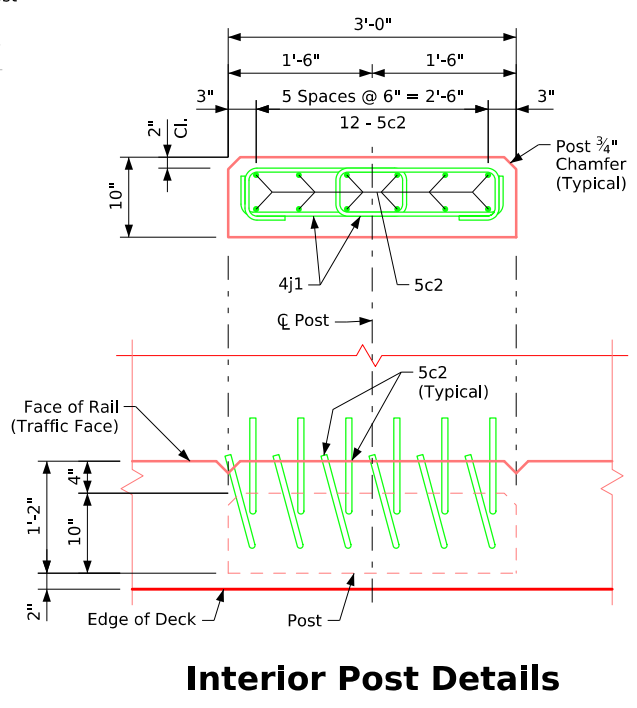
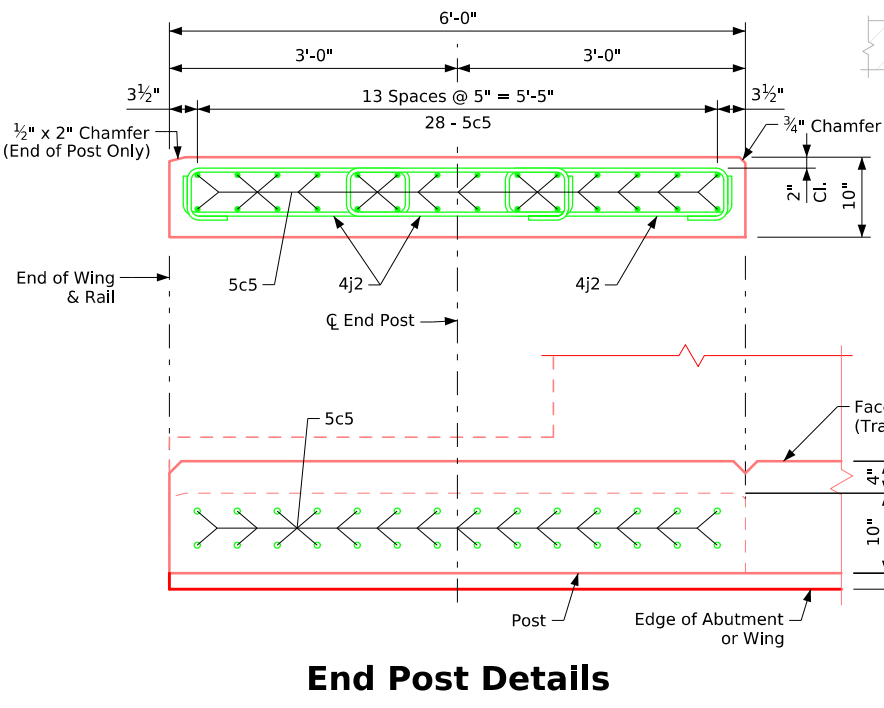
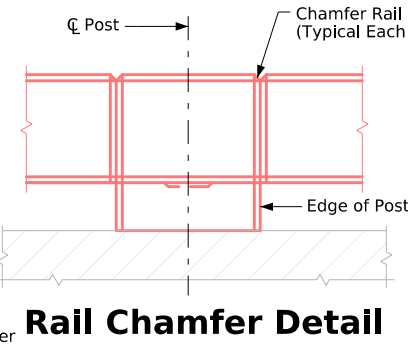
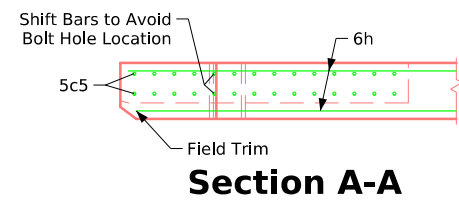
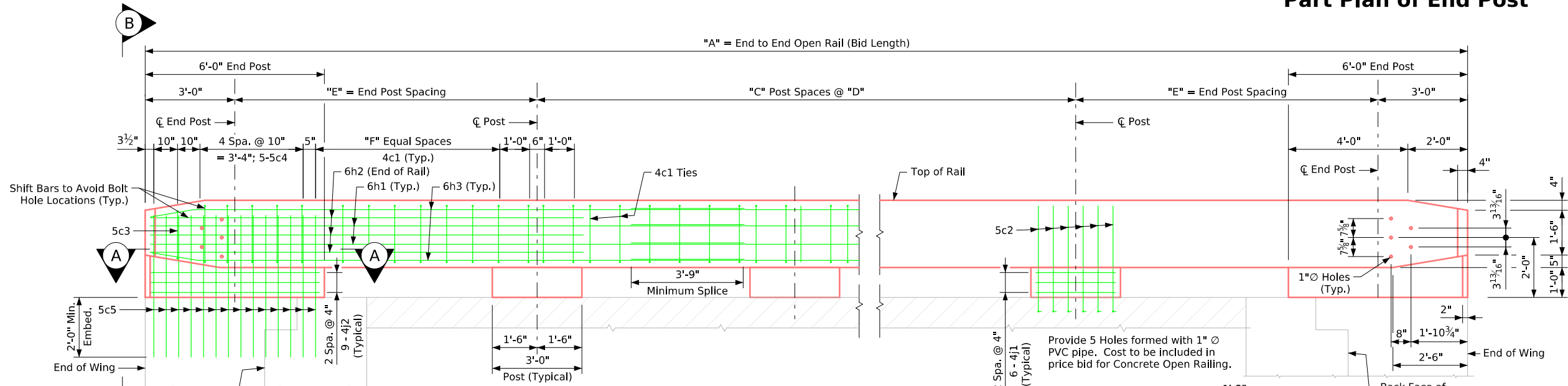
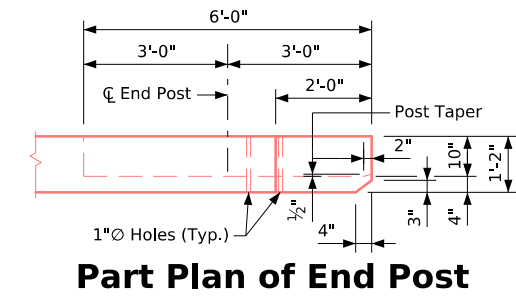
Notes:  
 For Detail B, see Sheet J24S-24-25.  
 ● Top of sheet piling at wings to match top of backwall elevation.

Latest Revision Date	Approved by Bridge Engineer	<b>IOWA IDOT</b>	
		Standard Design - 24'-0" Roadway, Single Span Bridge	
		<b>Single Span Concrete Slab Bridges</b>	
		July, 2025	
		Steel Sheet Piling Details	<b>J24S-25-25</b>

Revised 11-2025: In Elevation of Open Rail Layout details, corrected leader notes and added callouts to "End of Wing" and "Back Face of Abutment". (Was incorrectly showing back face of abutment location at end of wing.)

**Table of Open Rail Dimensions and Numbers**

Span		20'-0"				30'-0"				40'-0"				50'-0"			
Skew		0°	15°	30°	45°	0°	15°	30°	45°	0°	15°	30°	45°	0°	15°	30°	45°
Dimensions or Number	A	31'-0"	31'-1 1/4"	31'-5 9/16"	32'-2 15/16"	41'-0"	41'-1 1/4"	41'-5 9/16"	42'-2 15/16"	51'-0"	51'-1 1/4"	51'-5 9/16"	52'-2 15/16"	61'-0"	61'-1 1/4"	61'-5 9/16"	62'-2 15/16"
	C	1	1	1	1	2	2	2	2	3	3	3	3	4	4	4	4
	D	7'-4"	7'-4 7/16"	7'-5 7/8"	7'-9"	8'-0"	8'-0 5/16"	8'-1 3/8"	8'-3 3/4"	8'-4 13/16"	8'-5 1/16"	8'-5 15/16"	8'-7 13/16"	8'-8"	8'-8 3/16"	8'-8 15/16"	8'-10 1/2"
	E	8'-10"	8'-10 7/16"	8'-11 7/8"	9'-3"	9'-6"	9'-6 5/16"	9'-7 3/8"	9'-9 3/4"	9'-10 13/16"	9'-11 1/16"	9'-11 15/16"	10'-1 13/16"	10'-2"	10'-2 3/16"	10'-2 15/16"	10'-4 1/2"
	F	6	6	6	6	6	6	6	6	7	7	7	7	7	7	7	7



11-2025 Latest Revision Date	<i>[Signature]</i> Approved by Bridge Engineer	<b>IOWA IDOT</b>	
		Standard Design - 24'-0" Roadway, Single Span Bridge	
		<b>Single Span Concrete Slab Bridges</b>	
		July, 2025	
		Open Barrier Rail Details for Integral Abutments	<b>J24S-26-25</b>

## Epoxy Coated Reinforcing Steel - Two Open Rails

Bridge Length		20'-0"			30'-0"			40'-0"			50'-0"			
Bar	Location	Shape	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight
4c1	Rail, Ties		46	6'-3"	192	64	6'-3"	267	92	6'-3"	384	112	6'-3"	468
5c2	Posts, Vertical		48	4'-10"	242	72	5'-1"	382	96	5'-3"	526	120	5'-7"	699
5c3	End Post, Tie		4	6'-2"	26	4	6'-2"	26	4	6'-2"	26	4	6'-2"	26
5c4	End Post, Tie		20	6'-6"	136	20	6'-6"	136	20	6'-6"	136	20	6'-6"	136
5c5	Vertical, End Section		112	5'-1"	594	112	5'-1"	594	112	5'-1"	594	112	5'-1"	594
5d1	Wing, Longitudinal, Tie Bar		8	5'-8"	47	8	5'-8"	47	8	5'-8"	47	8	5'-8"	47
6h1	Rail, Horizontal		8	31'-11"	384	16	22'-10"	549	16	27'-10"	669	16	32'-10"	789
6h2	Rail, Horizontal, Ends		24	13'-7"	490	24	14'-2"	511	24	14'-6"	523	24	14'-8"	529
6h3	Rail, Horizontal, Ends		16	17'-10"	429	16	22'-10"	549	16	27'-10"	669	16	32'-10"	789
4j1	Interior Post, Tie		24	5'-1"	81	36	5'-1"	122	48	5'-1"	163	60	5'-1"	204
4j2	End Post, Tie		36	6'-3"	150	36	6'-3"	150	36	6'-3"	150	36	6'-3"	150
4t1	Wing Tie Bars		24	2'-0"	32	24	2'-0"	32	24	2'-0"	32	24	2'-0"	32
(Include with Superstructure Reinforcing)			Total (Lbs.)	2802		3364		3918		4462				

Reinforcing quantities shown are based on 45° skew bid lengths.

### Concrete Placement Quantities

Bridge Length	20'-0"	30'-0"	40'-0"	50'-0"
**Standard Section (Cu. Yds.)	7.3	9.4	11.5	13.6

\*\*Concrete quantities shown are based on 45° skew bid lengths. These values shall be used for all skews.

### Concrete Open Rail Quantities

Bridge Length		Unit	20'-0"	30'-0"	40'-0"	50'-0"
Concrete Open Railing, TL-4	0° Skew	L.F.	62.0	82.0	102.0	122.0
Concrete Open Railing, TL-4	15° Skew	L.F.	62.2	82.2	102.2	122.2
Concrete Open Railing, TL-4	30° Skew	L.F.	63.0	83.0	103.0	123.0
Concrete Open Railing, TL-4	45° Skew	L.F.	64.4	84.4	104.4	124.4

## Open Barrier Rail - Bent Bar Details

**4c1**

**5c2**

**5c3 & 5c4**

**6h3**

**4j1 & 4j2**

**4t1**

Span	Dimension "A"
20'-0"	4'-0"
30'-0"	4'-3"
40'-0"	4'-5"
50'-0"	4'-9"

Span	Dimension "B"
20'-0"	15'-6"
30'-0"	20'-6"
40'-0"	25'-6"
50'-0"	30'-6"

Note: All Dimensions Are Out To Out. D = Pin Diameter.

### Open Rail Notes:

- Open rail system meets Test Level 4 (TL-4) according to the Manual for Assessing Safety Hardware (MASH) and includes provision for a 3" future wearing surface height.
- All reinforcing shall be Grade 60, Epoxy Coated.
- Stainless steel reinforcing may be substituted for 5c2 and 6c3 bars at the Designer's discretion. Lap and development lengths shown are based on epoxy coated reinforcing and need not be modified.
- Minimum clear distance from face of concrete to near reinforcing bar is to be 2" unless otherwise noted or shown.
- The concrete open rail is to be bid on a lineal foot basis measured from end to end of rail. The number of lineal feet of open rail installed will be paid for at the contract price per lineal foot. Price bid for "Concrete Open Railing, TL-4" shall be full compensation for furnishing all material, excluding reinforcing steel, and all of the equipment and labor required to construct the rail in accordance with these plans and current specifications.
- All open rail concrete is to be Class C.
- Top of the open rail is to be parallel to theoretical  $\bar{C}$  grade.

11-2025 Latest Revision Date	 Approved by Bridge Engineer	
	Standard Design - 24'-0" Roadway, Single Span Bridge	
	<h2 style="margin: 0;">Single Span Concrete Slab Bridges</h2> <p style="margin: 0;">July, 2025</p>	
Open Barrier Rail Details for Integral Abutments		<b>J24S-27-25</b>

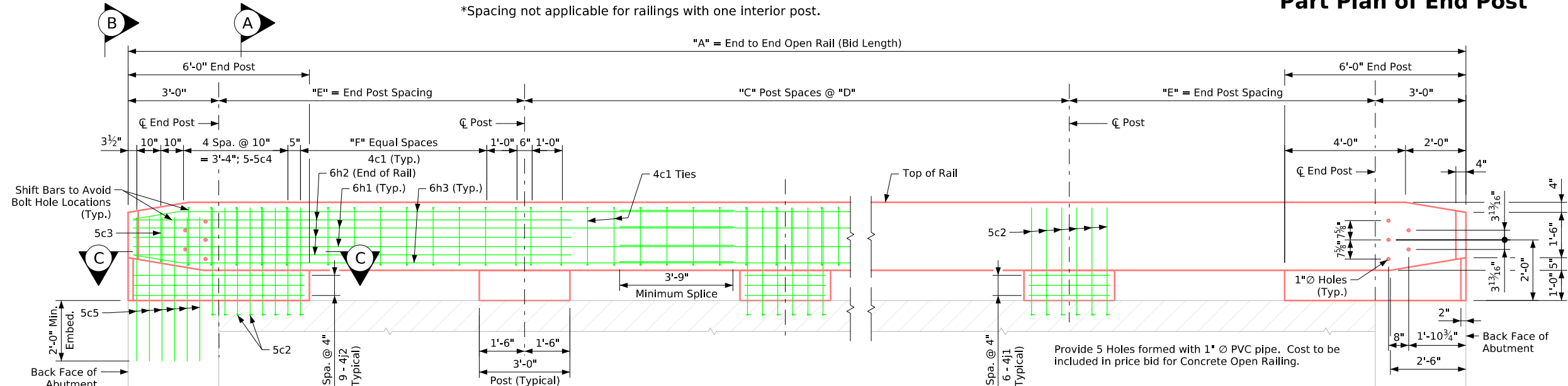
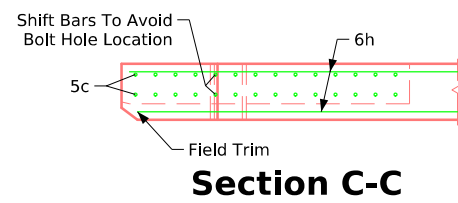
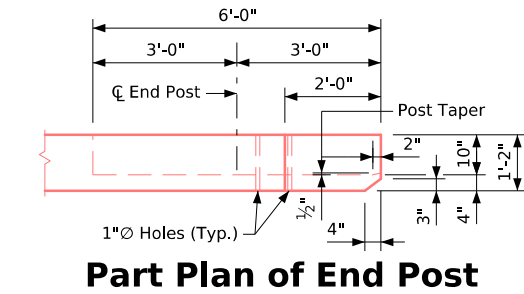
Revised 11-2025: In 6h3 Bent Bar Details Table, changed Dimension "B" lengths (previously Dim. "B" values were for 20'-0" B was 10'-9", 30'-0" B was 15'-9", 40'-0" B was 20'-9", 50'-0" B was 25'-9").

### Table of Open Rail Dimensions and Numbers

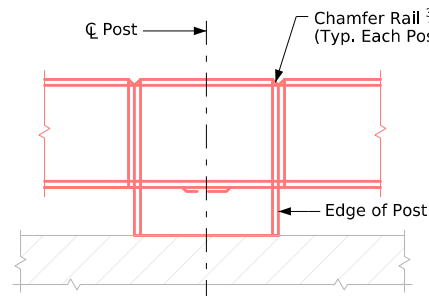
Span	20'-0"		30'-0"		40'-0"		50'-0"	
Skew	0°	15°	0°	15°	0°	15°	0°	15°
A	23'-0"	22'-8 1/4"	33'-0"	32'-8 1/4"	43'-0"	42'-8 1/4"	53'-0"	52'-8 1/4"
C	*	*	1	1	2	2	3	3
D	*	*	8'-0"	7'-10 3/4"	8'-6"	8'-5 1/16"	8'-9 5/8"	8'-8 7/8"
E	8'-6"	8'-4 1/8"	9'-6"	9'-4 3/4"	10'-0"	9'-11 1/16"	10'-3 5/8"	10'-2 7/8"
F	5	5	6	6	6	6	7	7

\*Spacing not applicable for railings with one interior post.

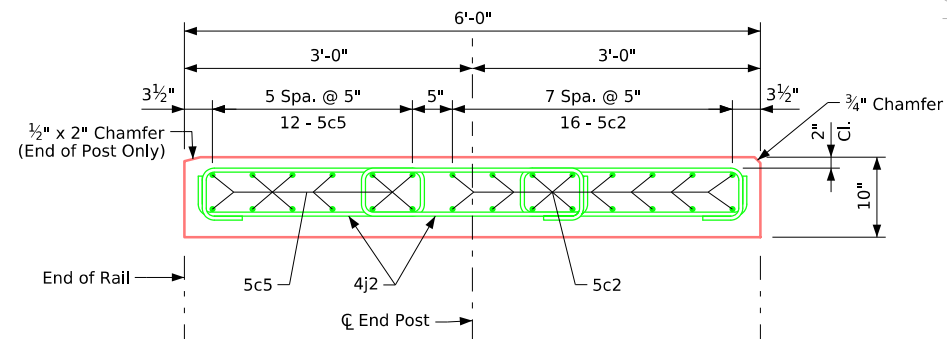
"A" = End to End Open Rail (Bid Length)



### Elevation Open Rail Layout

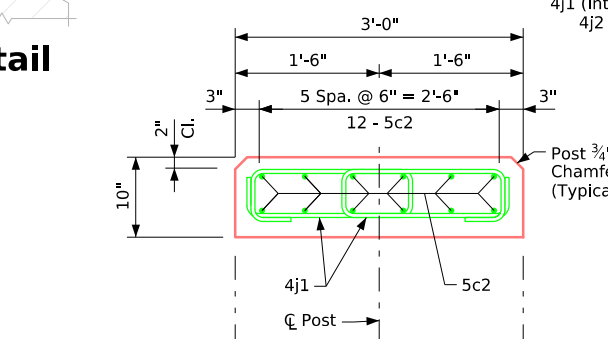


### Rail Chamfer Detail

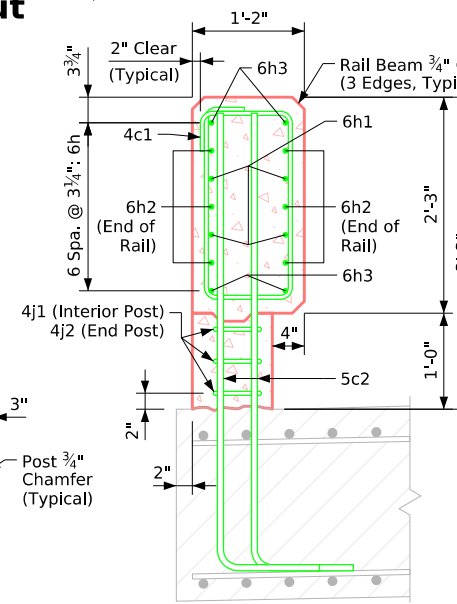


### End Post Details

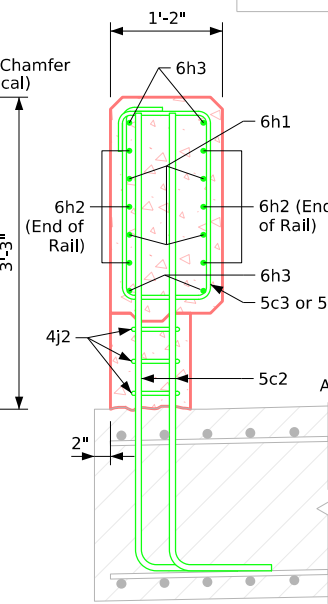
(0° Skew Shown - See J24S-11-25 for Detail Showing 15° Skew)



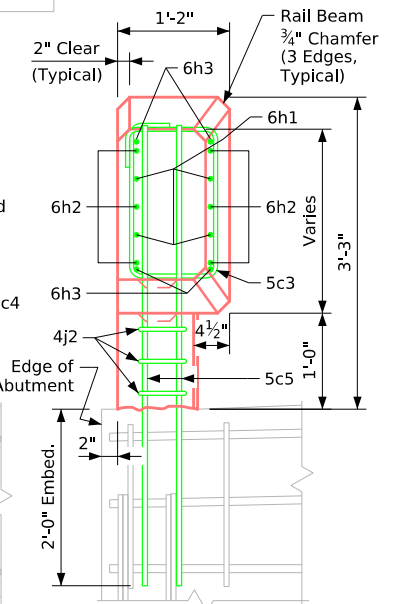
### Interior Post Details



### Typical Rail Section



### Section A-A (At End Post)



### View B-B

Latest Revision Date  Approved by Bridge Engineer	 Standard Design - 24'-0" Roadway, Single Span Bridge
	<b>Single Span Concrete Slab Bridges</b> July, 2025
	Open Barrier Rail Details for High Abutments

**J24S-28-25**

Epoxy Coated Reinforcing Steel - Two Open Rails														
Bridge Length			20'-0"			30'-0"			40'-0"			50'-0"		
Bar	Location	Shape	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight
4c1	Rail, Ties		24	6'-3"	100	46	6'-3"	192	64	6'-3"	267	92	6'-3"	384
5c2	Posts, Vertical		88	4'-10"	444	112	5'-1"	594	136	5'-3"	745	160	5'-7"	932
5c3	End Post, Tie		4	6'-2"	26	4	6'-2"	26	4	6'-2"	26	4	6'-2"	26
5c4	End Post, Tie		20	6'-6"	136	20	6'-6"	136	20	6'-6"	136	20	6'-6"	136
5c5	Vertical, End Section		48	5'-1"	254	48	5'-1"	254	48	5'-1"	254	48	5'-1"	254
6h1	Rail, Horizontal		8	22'-4"	268	8	32'-4"	389	16	23'-1"	555	16	28'-1"	675
6h2	Rail, Horizontal, Ends		24	12'-8"	457	24	13'-9"	496	24	14'-3"	514	24	14'-7"	526
6h3	Rail, Horizontal, Ends		16	13'-1"	314	16	18'-1"	435	16	23'-1"	555	16	28'-1"	675
4j1	Interior Post, Tie		12	5'-1"	41	24	5'-1"	81	36	5'-1"	122	48	5'-1"	163
4j2	End Post, Tie		36	6'-3"	150	36	6'-3"	150	36	6'-3"	150	36	6'-3"	150
(Include with Superstructure Reinforcing)			Total (Lbs.)	2190				2752			3323			3920

Reinforcing quantities shown are based on 15° skew bid lengths.

### Concrete Placement Quantities

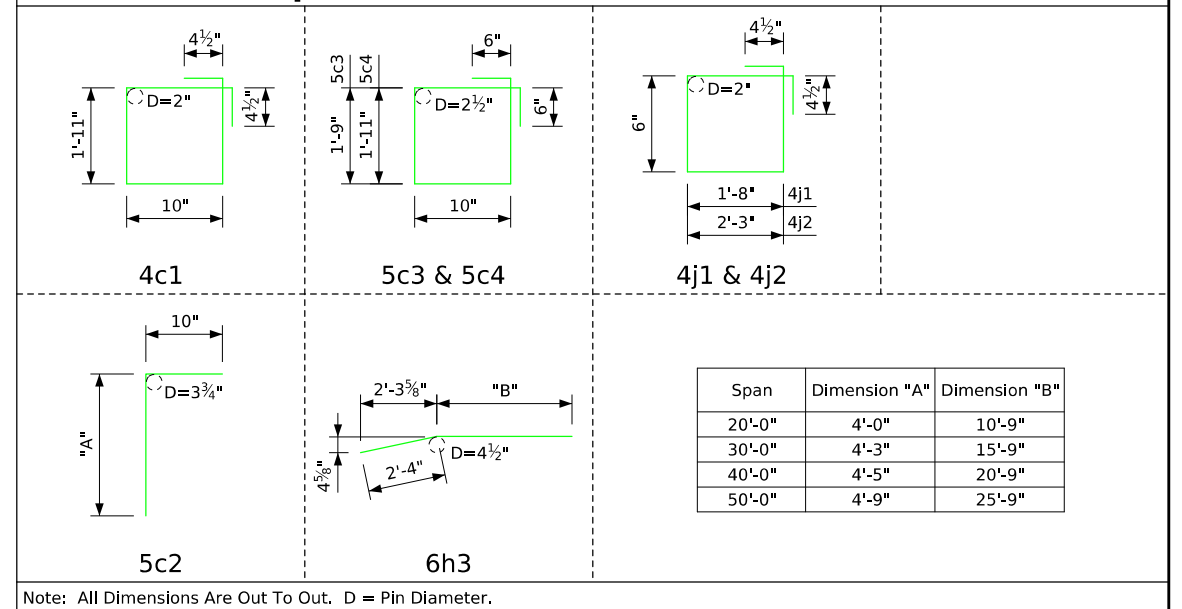
Bridge Length	20'-0"	30'-0"	40'-0"	50'-0"
**Standard Section (Cu. Yds.)	5.2	7.4	9.5	11.6

\*\*Concrete quantities shown are based on 15° skew bid lengths. These values shall be used for all skews.

### Concrete Open Rail Quantities

Bridge Length		Unit	20'-0"	30'-0"	40'-0"	50'-0"
Concrete Open Railing, TL-4	0° Skew	L.F.	46	66	86	106
Concrete Open Railing, TL-4	15° Skew	L.F.	45.4	65.4	85.4	105.4

### Open Barrier Rail - Bent Bar Details



### Open Rail Notes:

Open rail system meets Test Level 4 (TL-4) according to the Manual for Assessing Safety Hardware (MASH) and includes provision for a 3" future wearing surface height.

All reinforcing shall be Grade 60, Epoxy Coated.

Stainless steel reinforcing may be substituted for 5c2 and 5c5 bars at the Designer's discretion. Lap and development lengths shown are based on epoxy coated reinforcing and need not be modified.

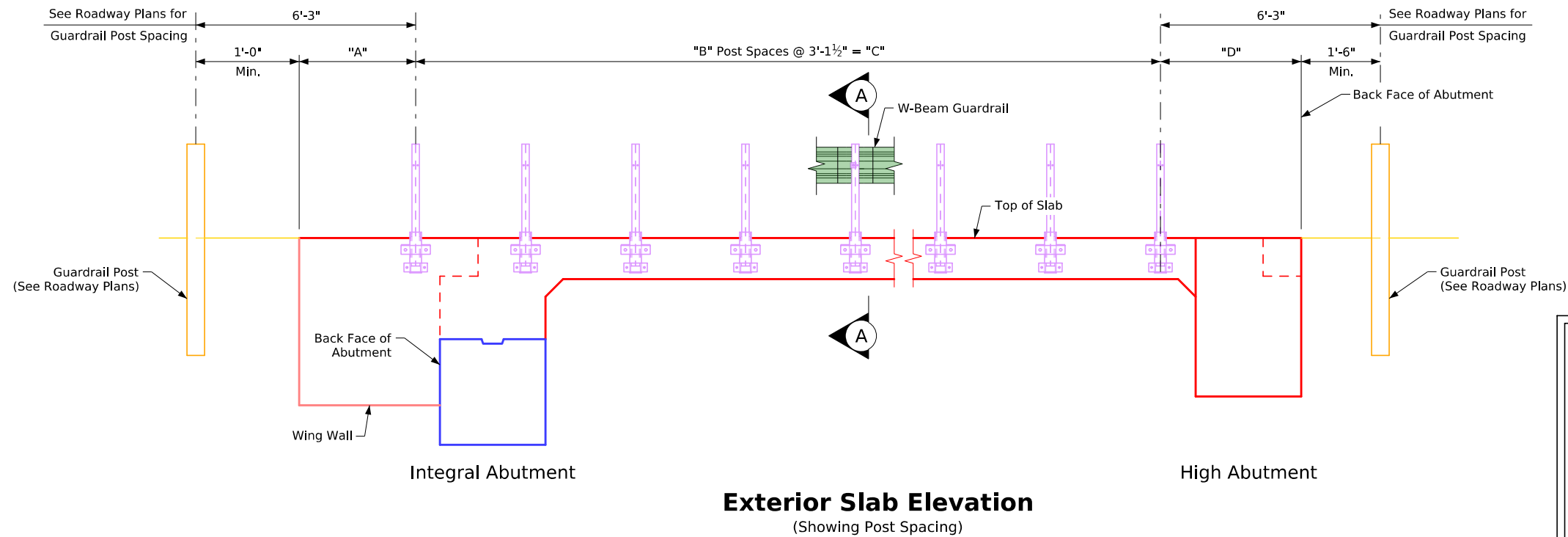
Minimum clear distance from face of concrete to near reinforcing bar is to be 2" unless otherwise noted or shown.

The concrete open rail is to be bid on a lineal foot basis measured from end to end of rail. The number of lineal feet of open rail installed will be paid for at the contract price per lineal foot. Price bid for "Concrete Open Railing, TL-4" shall be full compensation for furnishing all material, excluding reinforcing steel, and all of the equipment and labor required to construct the rail in accordance with these plans and current specifications.

All open rail concrete is to be Class C.

Top of the open rail is to be parallel to theoretical  $\bar{C}$  grade.

Latest Revision Date  Approved by Bridge Engineer		
	Standard Design - 24'-0" Roadway, Single Span Bridge <b>Single Span Concrete Slab Bridges</b> July, 2025	
	Open Barrier Rail Details for High Abutments	<b>J24S-29-25</b>



**Anchor Rod Notes:**  
 Post socket anchor details shown in these plans assume use of cast-in-place anchors. Contractor is permitted to substitute drilled anchors at no additional cost to the Contracting Authority. The embedded nuts are to be omitted. Minimum hole depth shall be equal to "T" shown in these plans.  
 Use a polymer grout system in accordance with Materials I.M. 491.11. Anchors shall be installed in accordance with the manufacturer's recommendations. Any additional cost of drilling holes and adhesive will be considered incidental and no additional payment will be made.

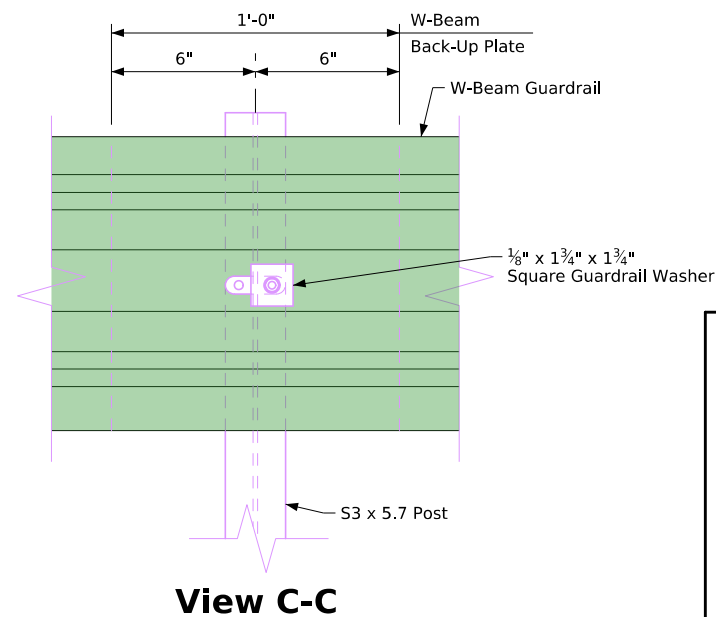
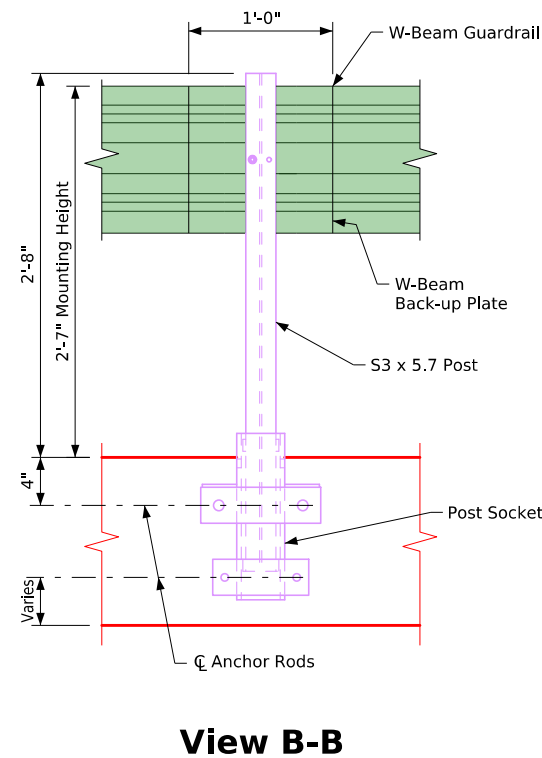
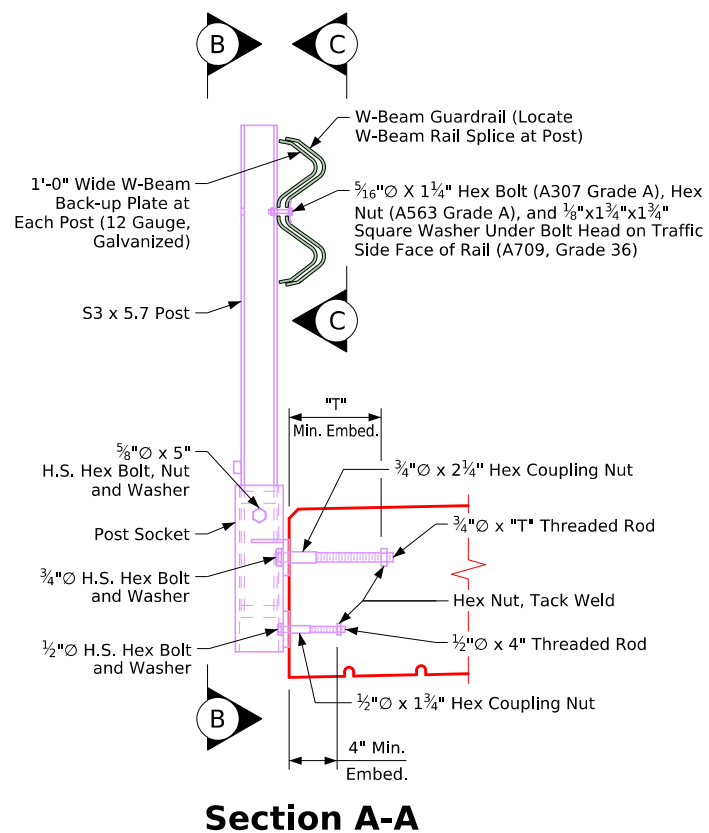
**Guardrail Designer Note:**  
 Designer shall evaluate need for a crashworthy TL-3 guardrail end terminal at each end of the bridge. If provided, the following recommended guidelines should be considered in addition to guardrail length-of-need requirements:  
 1) Minimum 12'-6" length standard guardrail between the first bridge post and the interior end of guardrail end terminal.  
 2) Minimum barrier length of 50 ft. before the first bridge post (including standard guardrail section and end terminal).  
 3) For flared guardrail applications, a minimum length of 25 ft. between the first bridge post and the start of the flared section.

**Post Spacing Data Table (Integral Abutments)**

Span	"A" Dimension				"B" Post Spaces at 3'-1 1/2"	"C"	Total Number of Posts on Bridge
	0° Skew	15° Skew	30° Skew	45° Skew			
20'-0"	3'-0"	3'-0 5/8"	3'-2 13/16"	3'-7 7/16"	8	25'-0"	18
30'-0"	3'-3 3/4"	3'-4 3/8"	3'-6 9/16"	3'-11 3/16"	11	34'-4 1/2"	24
40'-0"	3'-7 1/2"	3'-8 1/8"	3'-10 5/16"	4'-2 15/16"	14	43'-9"	30
50'-0"	3'-11 1/4"	3'-11 7/8"	4'-2 1/16"	4'-6 11/16"	17	53'-1 1/2"	36

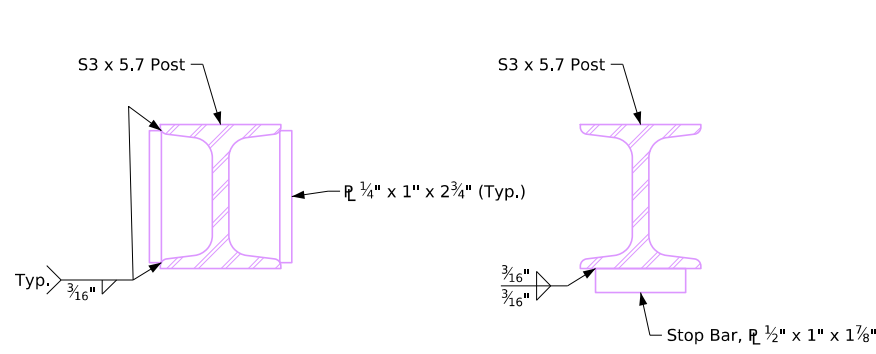
**Post Spacing Data Table (High Abut.)**

Span	"D" Dimension		"B" Post Spaces at 3'-1 1/2"	"C"	Total Number of Posts on Bridge
	0° Skew	15° Skew			
20'-0"	3'-8 1/4"	3'-8 7/8"	5	15'-7 1/2"	12
30'-0"	4'-0"	4'-0 5/8"	8	25'-0"	18
40'-0"	4'-3 3/4"	4'-4 3/8"	11	34'-4 1/2"	24
50'-0"	4'-7 1/2"	4'-8 1/8"	14	43'-9"	30



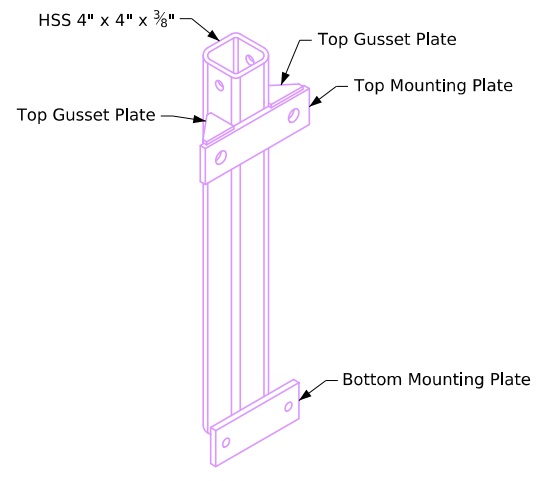
**Bridge Rail Notes:**  
 All material including bolts, rods, nuts and washers shall be galvanized per Article 4100.07 and/or 4153.06 of the Standard Specifications.  
 Structural steel shall conform to ASTM A709 Grade 50, unless otherwise noted or shown.  
 Post sockets shall conform to ASTM A500 Grade B.  
 All bolts and threaded rod shall be ASTM A449 unless otherwise noted or shown.  
 Nuts shall be ASTM A563, Grade DH, unless otherwise noted or shown.  
 Washers shall be ASTM F436 unless otherwise noted or shown.  
 Shop drawings of the steel posts showing layout and details shall be submitted for review.  
 Cost of furnishing and installing the steel posts and 1'-0" W-Beam back-up plates, excluding the cost of W-Beam guardrail, shall be included in the price bid for Structural Steel. Cost of W-Beam guardrail should be included in the bid item "Steel Beam Guardrail".  
 Refer to Sheet J24S-31-25 for dimension "T".

Latest Revision Date	 Approved by Bridge Engineer	 Standard Design - 24'-0" Roadway, Single Span Bridge	
		<b>Single Span Concrete Slab Bridges</b> July, 2025	
Bridge W-Beam Guardrail Details		<b>J24S-30-25</b>	



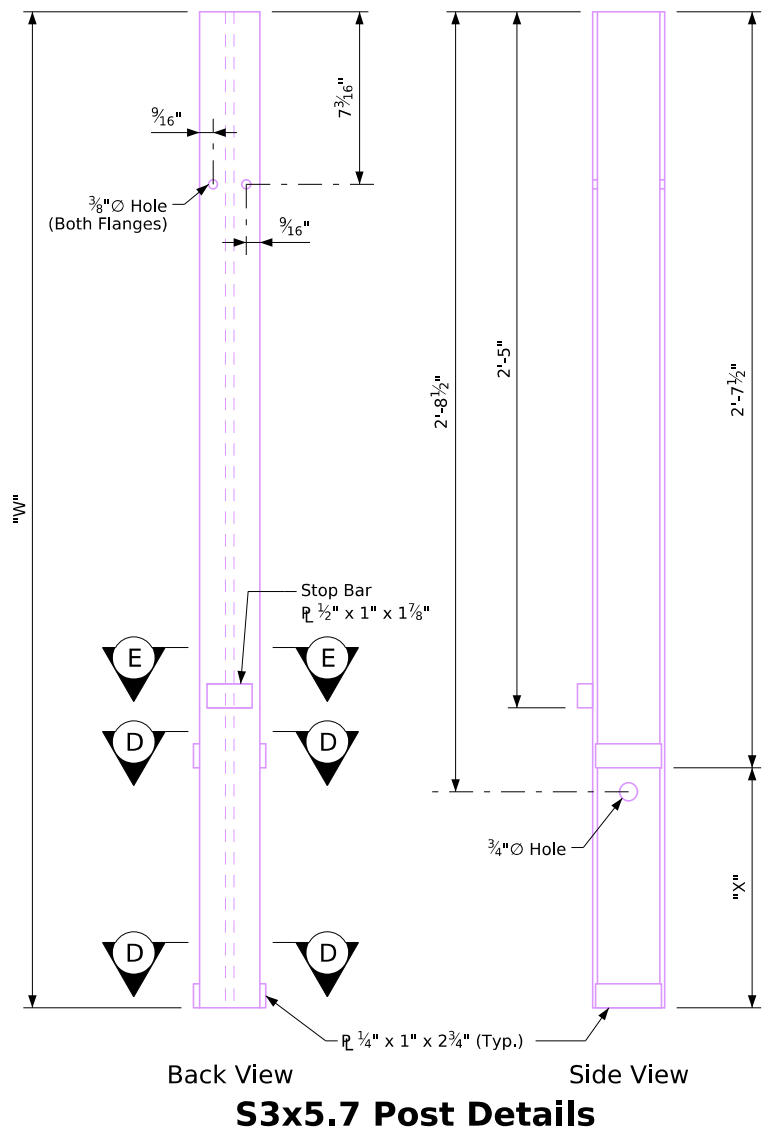
**Section D-D**

**Section E-E**

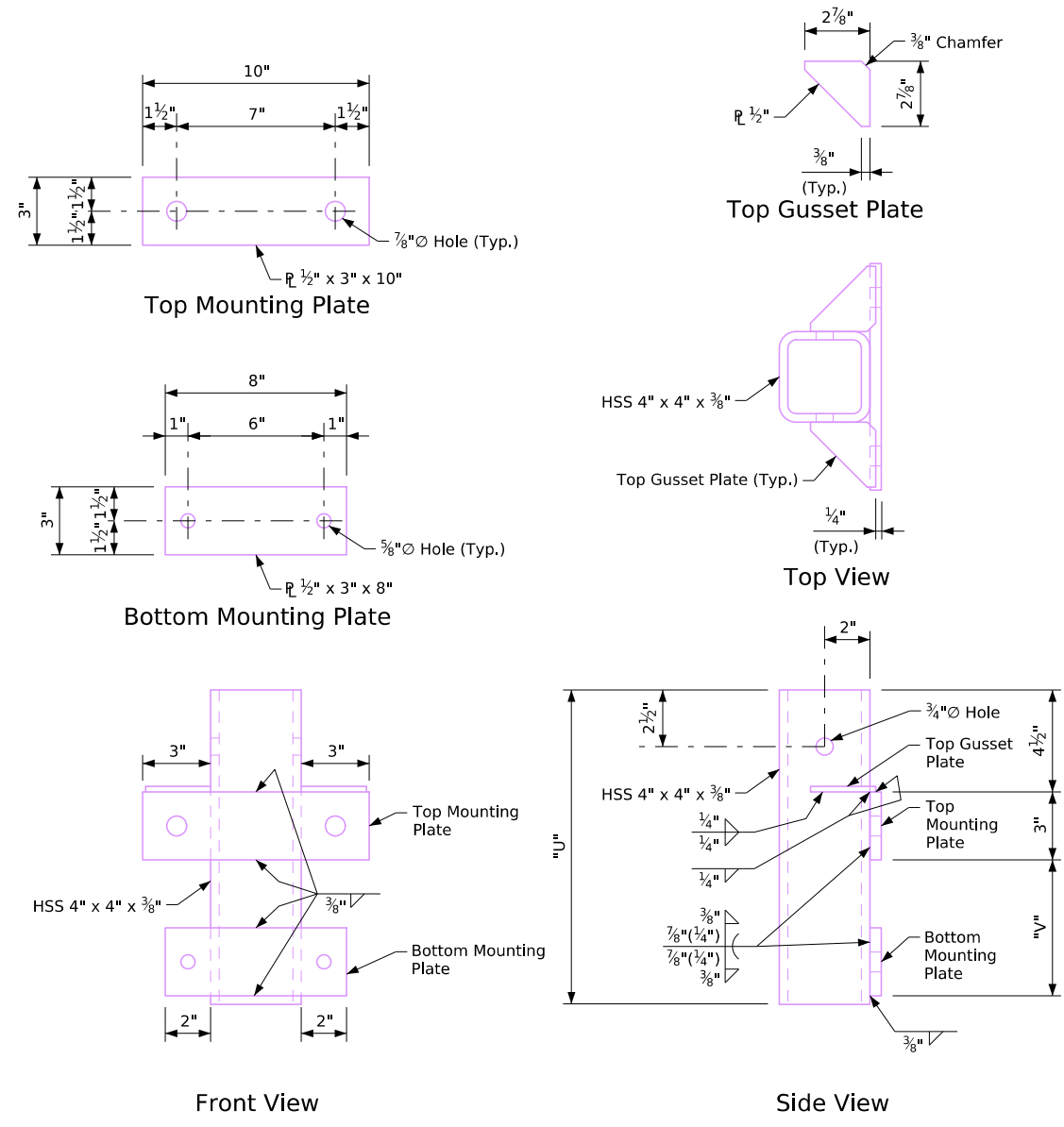


**Post Socket Isometric View**

		Span			
		20'-0"	30'-0"	40'-0"	50'-0"
<b>One Post Assembly</b>	Post S3x5.7 (Lbs.)	21.1	22.5	22.5	22.5
	Post Socket Assembly (Lbs.)	29.6	34.6	34.6	34.6
	Bolts, All-Thread Rod, Nuts, Washers (Lbs.):				
	(1) 5/16"Ø x 1 1/4" Bolt w/ Nut and Washer				
	(1) 5/8"Ø x 5" Bolt w/ Nut & Washer	5.9	4.9	4.9	4.9
(2) 3/4"Ø x ("T" + 2") All-Thread Rod w/ Nuts and Washers					
(2) 1/2"Ø x 6" All-Thread Rod w/ Nuts and Washers					
	Weight per Assembly (Lbs.)	56.6	62.0	62.0	62.0
Integral Abut.	Number of Posts	18	24	30	36
	Total Weight (Lbs.)	1018	1488	1860	2232
High Abut.	Number of Posts	12	18	24	30
	Total Weight (Lbs.)	679	1116	1488	1860



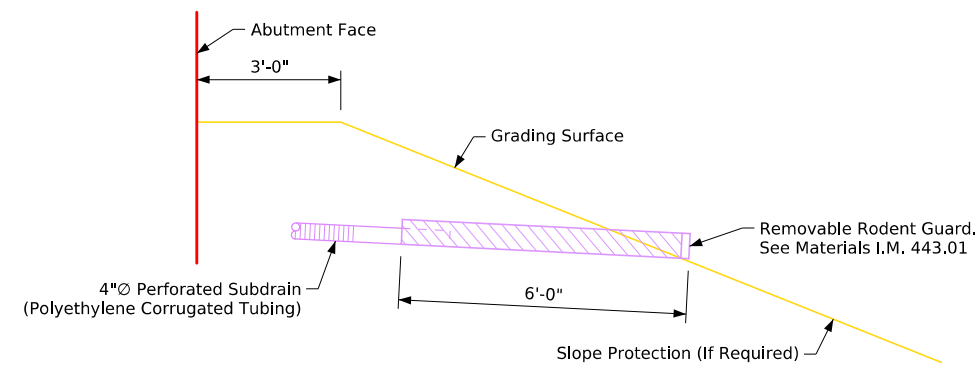
**S3x5.7 Post Details**



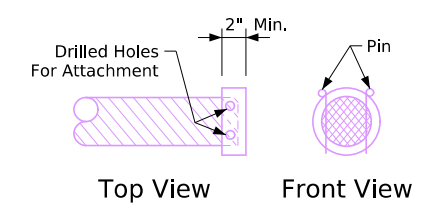
**Post Socket Details**

Span	Post & Socket Dimension Table				
	Anchor Bolt	Post Socket		Post	
	"T"	"U"	"V"	"W"	"X"
20'-0"	1'-0"	1'-2 3/8"	6 1/2"	3'-6"	10 1/2"
30'-0"	8"	1'-5 7/8"	10"	3'-9"	1'-1 1/2"
40'-0"	8"	1'-5 7/8"	10"	3'-9"	1'-1 1/2"
50'-0"	8"	1'-5 7/8"	10"	3'-9"	1'-1 1/2"

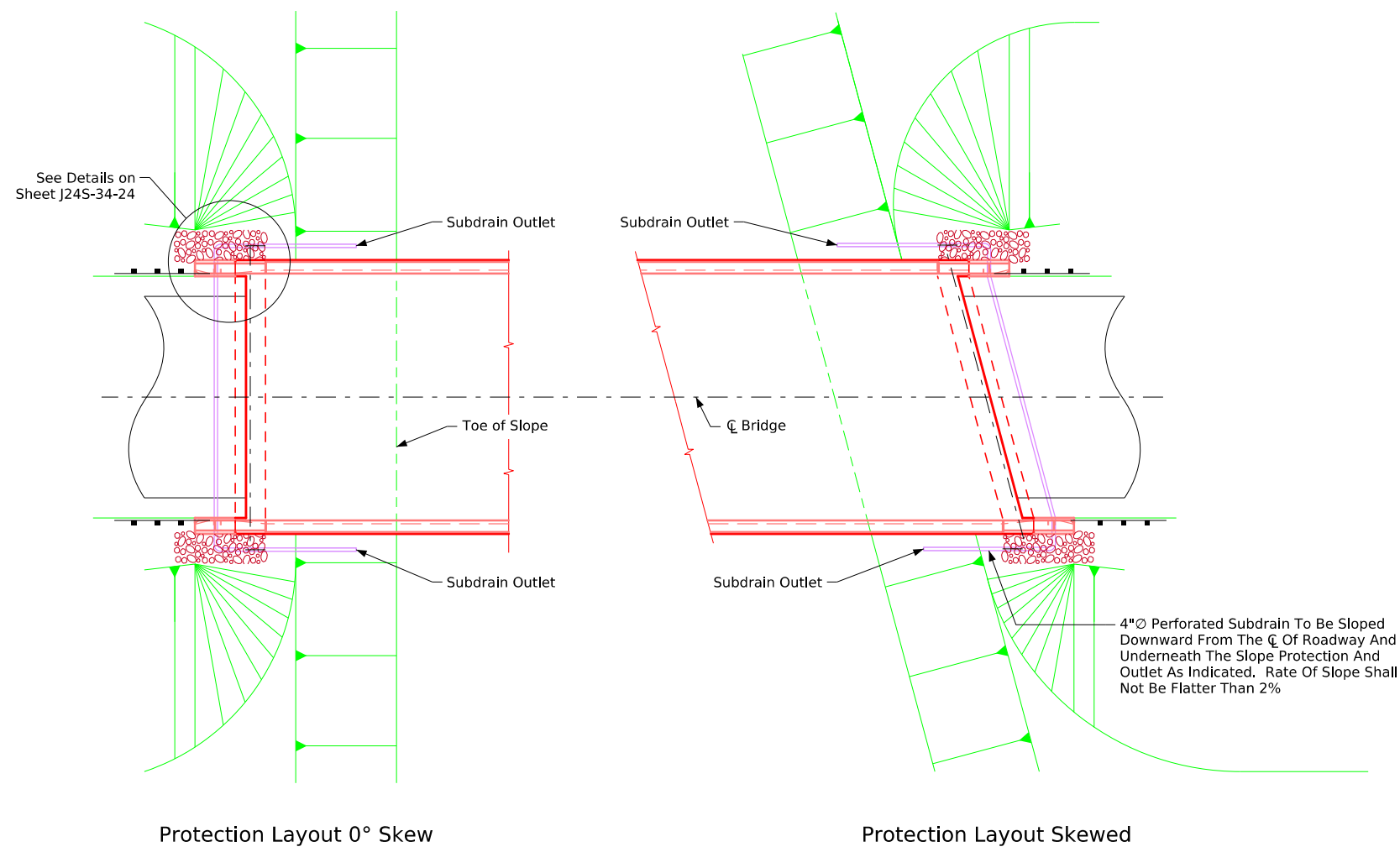
Latest Revision Date  Approved by Bridge Engineer	
	Standard Design - 24'-0" Roadway, Single Span Bridge <b>Single Span Concrete Slab Bridges</b> July, 2025
	Bridge W-Beam Guardrail Details <b>J24S-31-25</b>



Typical Section of Subdrain Outlet



Removable Rodent Guard Details  
Outlet Details

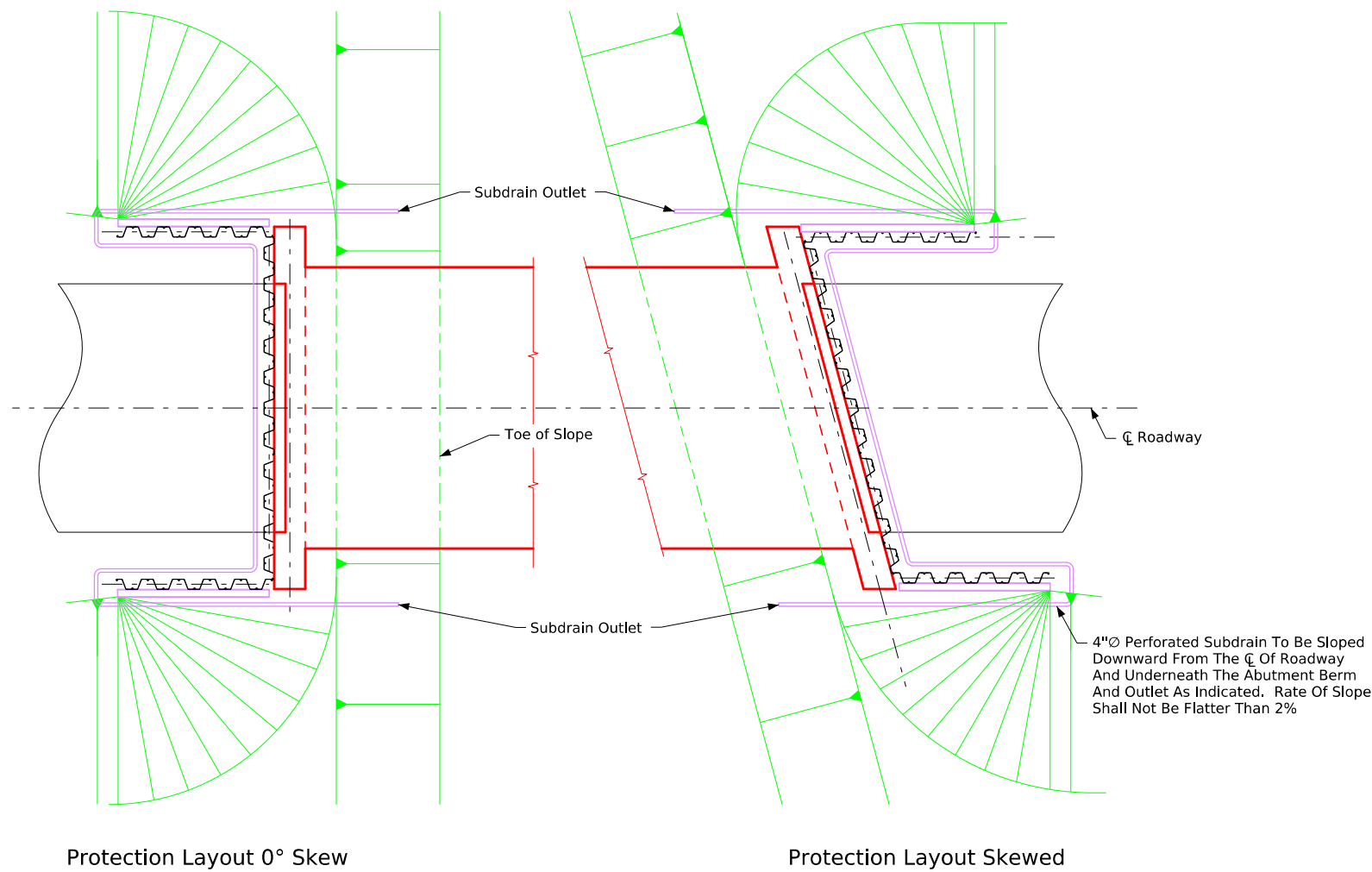


Situation Plan  
Refer to Situation Plan for North Arrow

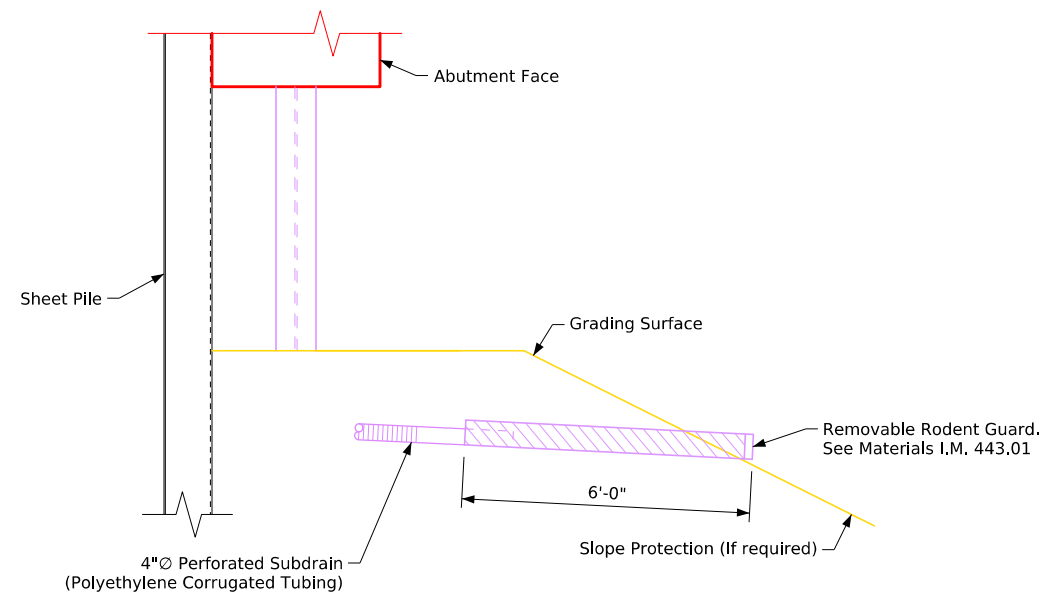
**Subdrain Notes:**

See Situation Plan and Abutment Backfill Details for additional details of placement not shown on this sheet.  
 The subdrains shall be 4"Ø and shall be in accordance with Article 4143.01, B, of the Standard Specifications.  
 The subdrain outlet shall consist of a length of pipe with a removable rodent guard as detailed on this sheet. The length of the outlet pipe shall be determined by the revetment and it's placement location. The Contractor is to insure the outlet pipe is adequately strong enough and will not be damaged when revetment is placed. A check will be made at the subdrain outlet to insure that the subdrain is not damaged and is draining properly during the backfill flooding process. If a metal outlet pipe is used, it shall be 6"Ø and coupled to the 4"Ø subdrain in one of the two following ways.  
 -Use an inside fit reducer coupler (coupler must be inserted a minimum of 1'-0" into the metal outlet pipe).  
 -Insert 1'-0" of the 4"Ø subdrain into the 6"Ø metal outlet pipe, then fully seal the entire opening with grout.  
 The cost of furnishing and placing subdrain (including excavation), granular backfill, porous backfill, and subdrain outlet is to be included in the price bid for "Structural Concrete (Bridge)". No extra payment will be made.  
 The dimensions shown for the proposed subdrains are based on the proposed grading layout of bridge berms. The dimensions shown are for estimating only. Required lengths and general locations of subdrains are subject to change due to field adjustments of the grading layout.

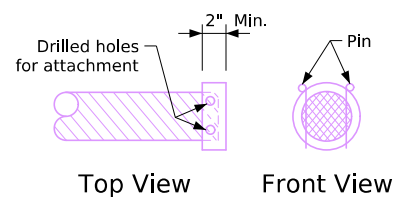
Latest Revision Date  Approved by Bridge Engineer		
	Standard Design - 24'-0" Roadway, Single Span Bridge <b>Single Span Concrete Slab Bridges</b> July, 2025	
	Subdrain Details Integral Abutments	<b>J24S-32-25</b>



**Situation Plan**  
Refer to Situation Plan for North Arrow



Typical Section of Subdrain Outlet

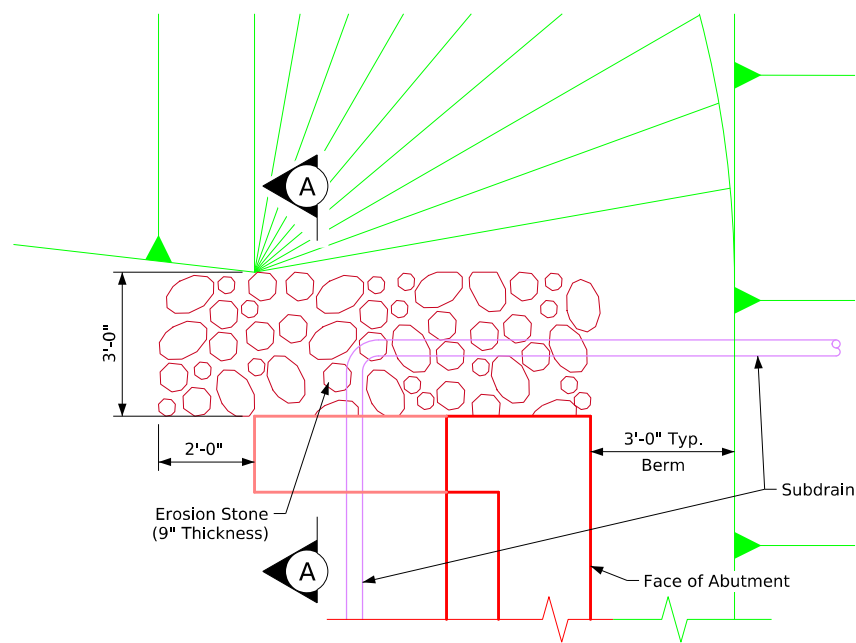


Removable Rodent Guard Details  
**Outlet Details**

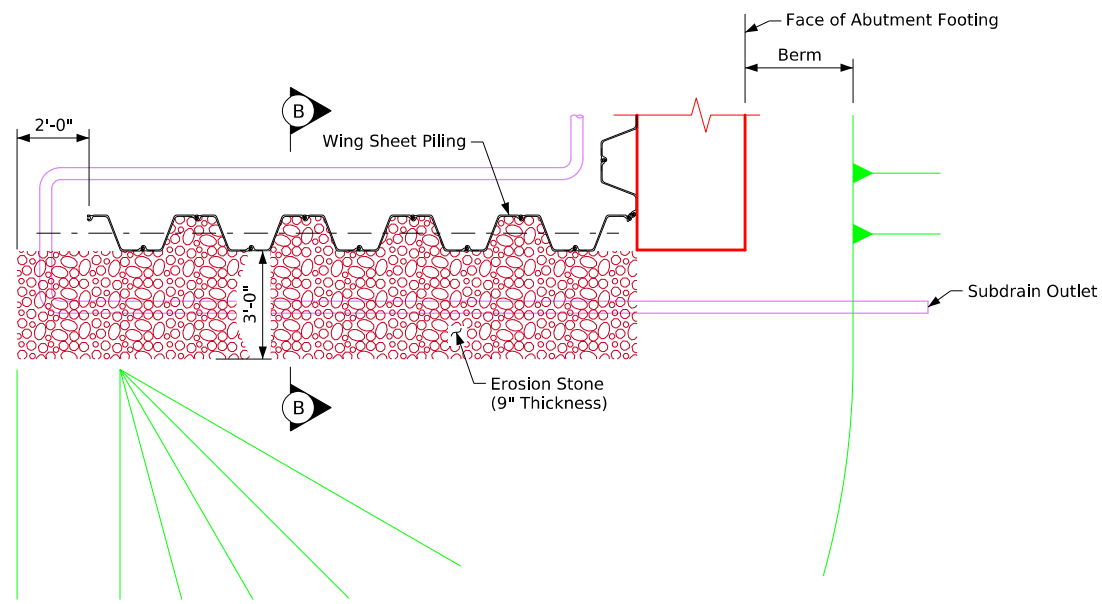
**Subdrain Notes:**

- See Situation Plan and Abutment Backfill Details for additional details of placement not shown on this sheet.
- The subdrains shall be 4"Ø and shall be in accordance with Article 4143.01, B, of the Standard Specifications.
- The subdrain outlet shall consist of a length of pipe with a removable rodent guard as detailed on this sheet. The length of the outlet pipe shall be determined by the revetment and its placement location. The Contractor is to insure the outlet pipe is adequately strong enough and will not be damaged when revetment is placed. A check will be made at the subdrain outlet to insure that the subdrain is not damaged and is draining properly during the backfill flooding process. If a metal outlet pipe is used, it shall be 6"Ø and coupled to the 4"Ø subdrain in one of the two following ways.
  - Use an inside fit reducer coupler (coupler must be inserted a minimum of 1'-0" into the metal outlet pipe).
  - Insert 1'-0" of the 4"Ø subdrain into the 6"Ø metal outlet pipe, then fully seal the entire opening with grout.
- The cost of furnishing and placing subdrain (including excavation), and subdrain outlet is to be included in the price bid for "Granular Backfill". No extra payment will be made.
- The dimensions shown for the proposed subdrains are based on the proposed grading layout of bridge berms. The dimensions shown are for estimating only. Required lengths and general locations of subdrains are subject to change due to field adjustments of the grading layout.

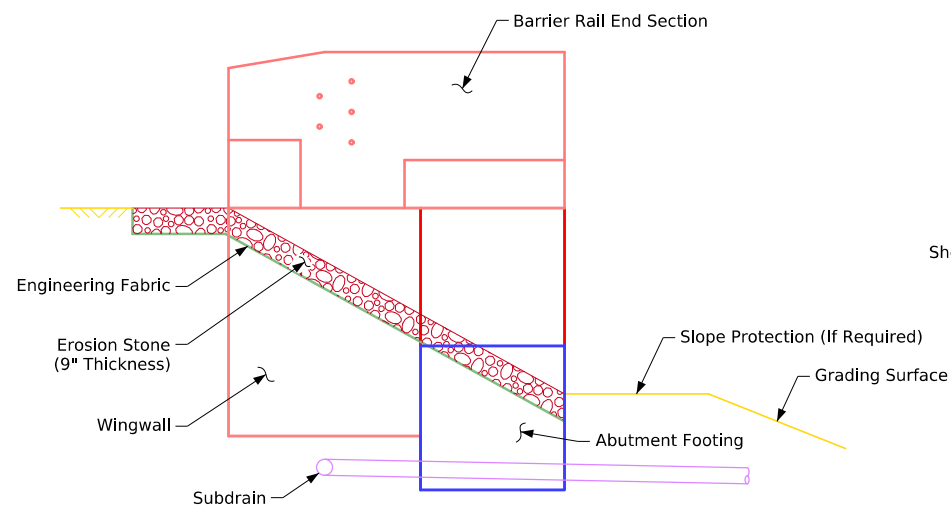
Latest Revision Date  Approved by Bridge Engineer		
	Standard Design - 24'-0" Roadway, Single Span Bridge <b>Single Span Concrete Slab Bridges</b> July, 2025	
	Subdrain Details High Abutments	<b>J24S-33-25</b>



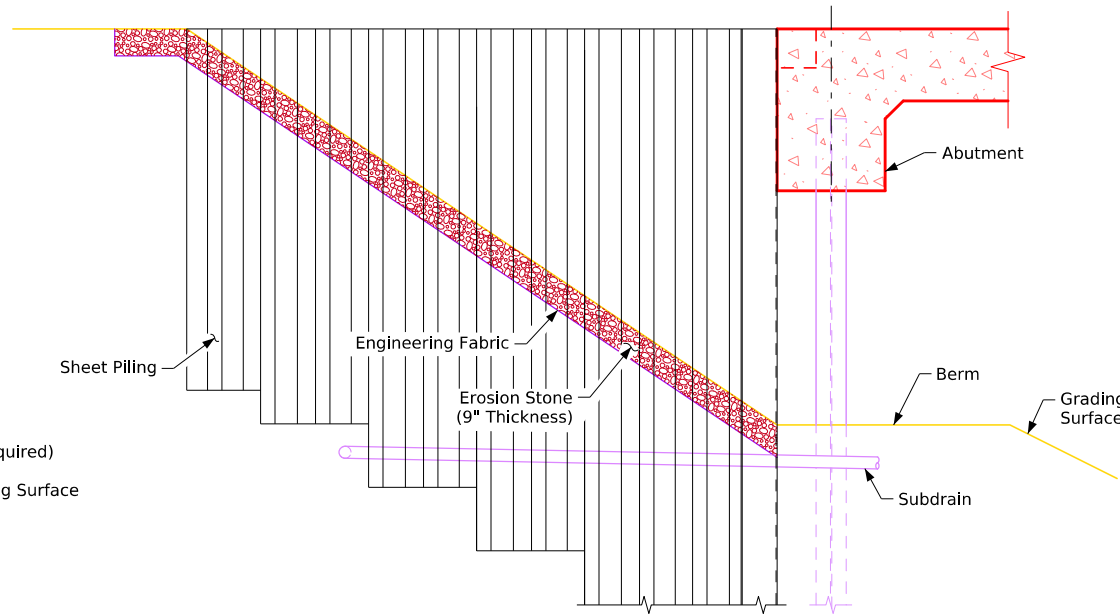
Top View of Wing Armoring



Top View of Wing Armoring



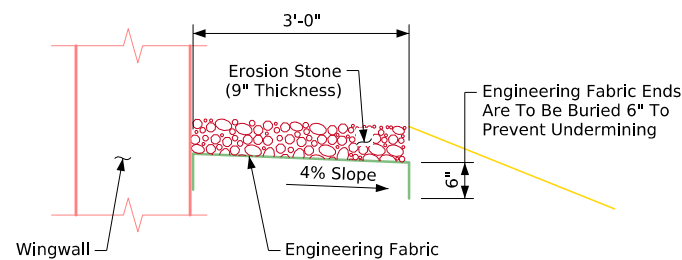
Profile View of Wing Armoring



Profile View of Wing Armoring

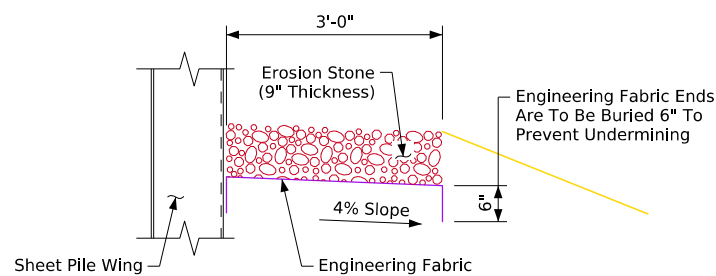
**Erosion Stone Wing Armoring Note:**

Erosion stone shall be placed along the sides of the wings as shown. This is typical at each corner of the bridge unless otherwise noted in the plans. The erosion stone at these locations shall be underlaid with engineering fabric in accordance with Article 4196.01, B, 3, of the Standard Specifications. The erosion stone shall be in accordance with Section 4130 of the Standard Specifications. Material passing the 3 inch screen but 100% retained on a 1 inch screen may be used as choke stone. The erosion stone shall be deposited, spread, consolidated and shaped by mechanical or hand methods that will provide uniform 9" depth and density and provide uniform surface appearance. Payment for the Bridge Wing Armoring will be bid per square yard. Cost will include engineering fabric, erosion stone, excavation, shaping, and compaction to dimensions shown in these plans. Bid item shall be "Bridge Wing Armoring - Erosion Stone".





Section A-A

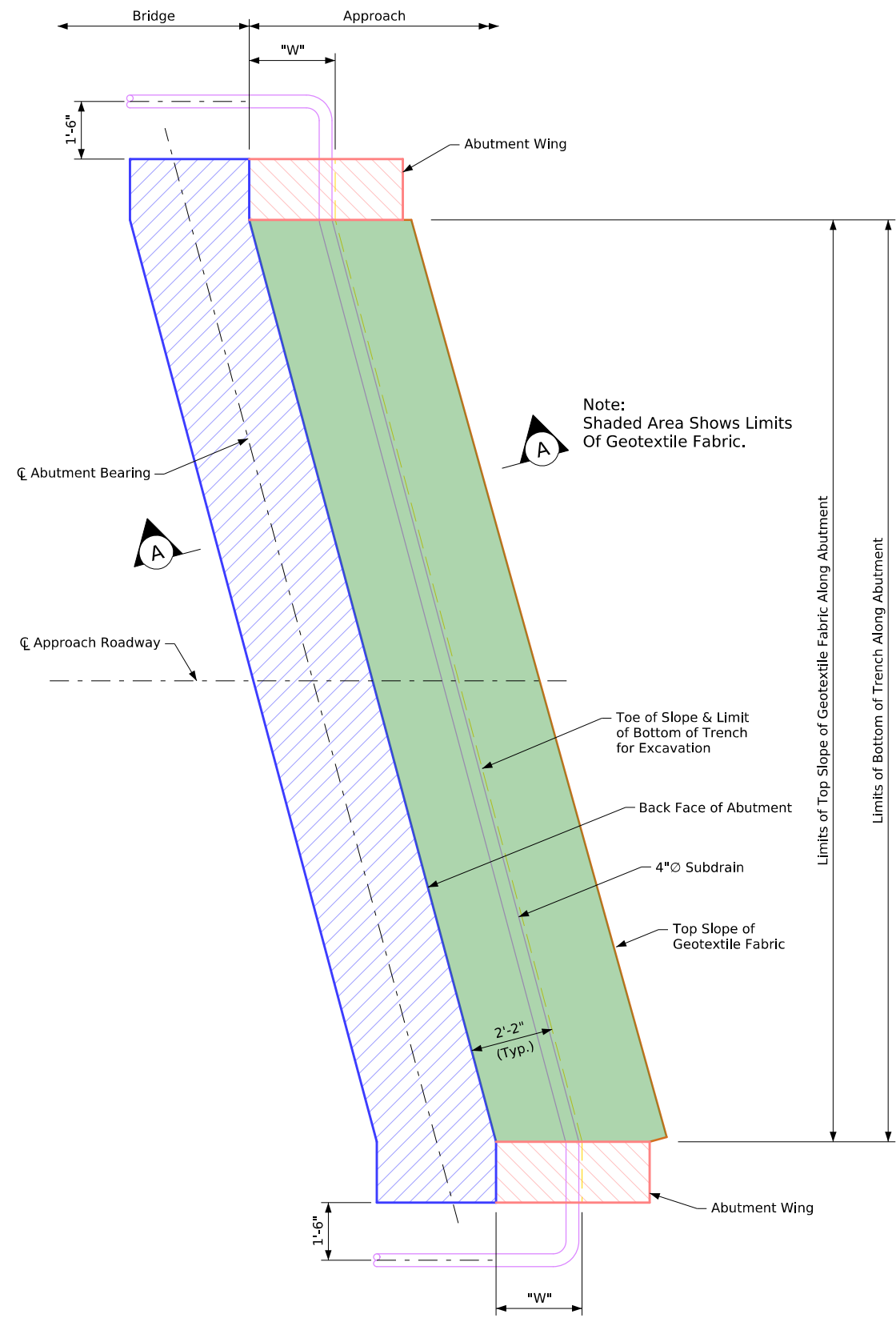
**Integral Abutment**



Section B-B

**High Abutment**

Latest Revision Date  Approved by Bridge Engineer	 Standard Design - 24'-0" Roadway, Single Span Bridge
	<b>Single Span Concrete Slab Bridges</b> July, 2025
	Bridge Wing Armoring <b>J24S-34-25</b>



**Abutment Plan**  
(Right Ahead Skew Shown; Left Ahead And 0° Degree Skew Similar)

**Abutment Backfill Process:**

The base of the excavation subgrade behind the abutment is to be graded with a 4% slope away from the abutment footing and a 2% cross slope in the direction of the subdrain outlet. This excavation shaping is to be done prior to beginning installation of the geotextile and backfill material.

After the subgrade has been shaped, the geotextile fabric shall be installed in accordance with the details shown. The fabric is intended to be installed in the base of the excavation and extended vertically up the abutment backwall, abutment wing walls, and excavation face to a height that will be approximately 1 to 2 foot higher than the height of the porous backfill placement as shown in the "Backfill Details" on this sheet. The strips of the fabric placed shall overlap approximately 1 foot and shall be pinned in place. The fabric shall be attached to the abutment by using lath folded in the fabric and secured to the concrete with shallow concrete nails. The fabric placed against the excavation face shall be pinned.

When the fabric is in place, the subdrain shall be installed directly on the fabric at the toe of the rear excavation slope. A slot will need to be cut in the fabric at the point where the subdrain exits the fabric near the end of the abutment wing wall.

Porous backfill is then placed and leveled, no compaction is required.

The remaining work involves backfilling with floodable backfill, surface flooding, and vibratory compaction. The floodable backfill material shall be in accordance with the Standard Specifications. The floodable backfill shall be placed in individual lifts, surface flooded, and compacted with vibratory compaction to ensure full consolidation. Limit the loose lifts to no more than 2 feet of thickness.

Start surface flooding for each floodable backfill lift at the high point of the subdrain and progress to the low point where the subdrain exits the fabric. To ensure uniform surface flooding, water running full in a 2-inch diameter hose should be sprayed in successive 6-foot to 8-foot increments for 5 minutes within each increment.

Floodable backfill lift placement, flooding, and compaction shall progress until the required full thickness of the abutment backfill has been completed.

Water required for flooding, subdrains, porous backfill, floodable backfill, and geotextile fabric furnished at the bridge abutments will not be measured separately for payment.

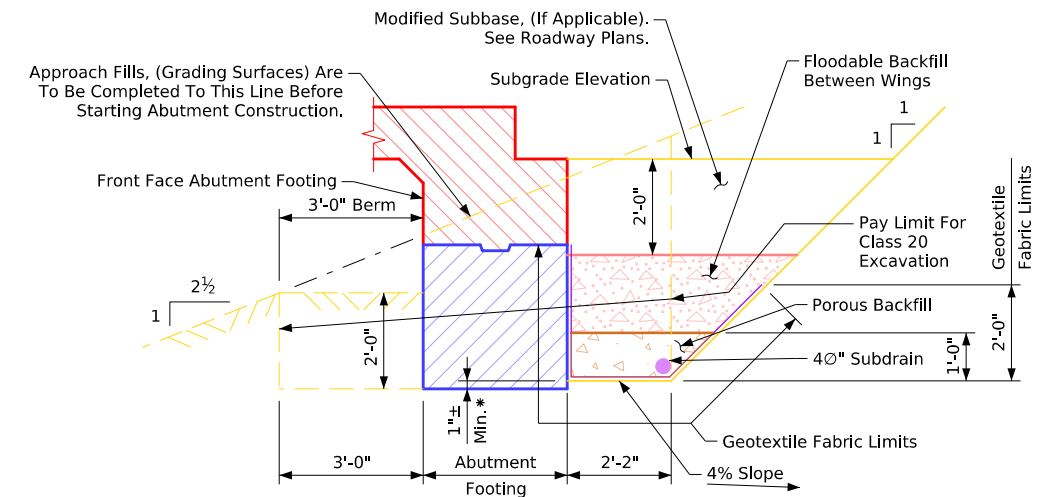
The cost of water required for flooding, subdrains, porous backfill, floodable backfill, and geotextile fabric furnished at the bridge abutments shall be included in the contract unit price bid for "Structural Concrete".

**Note:**

Subdrain shall slope downward 2% from  $\bar{C}$  approach roadway when outletting both sides of the abutment.

Subdrain shall slope downward 2% from high end when outletting at one end of the abutment.

The geotextile fabric shall be in accordance with Article 4196.01, B, 6 of the Standard Specifications. If the engineering fabric is lapped the laps shall be a minimum of one foot in length, shingle fashion with up slope lap piece on top and stapled for continuity.



**Section A-A**  
**Backfill Details**

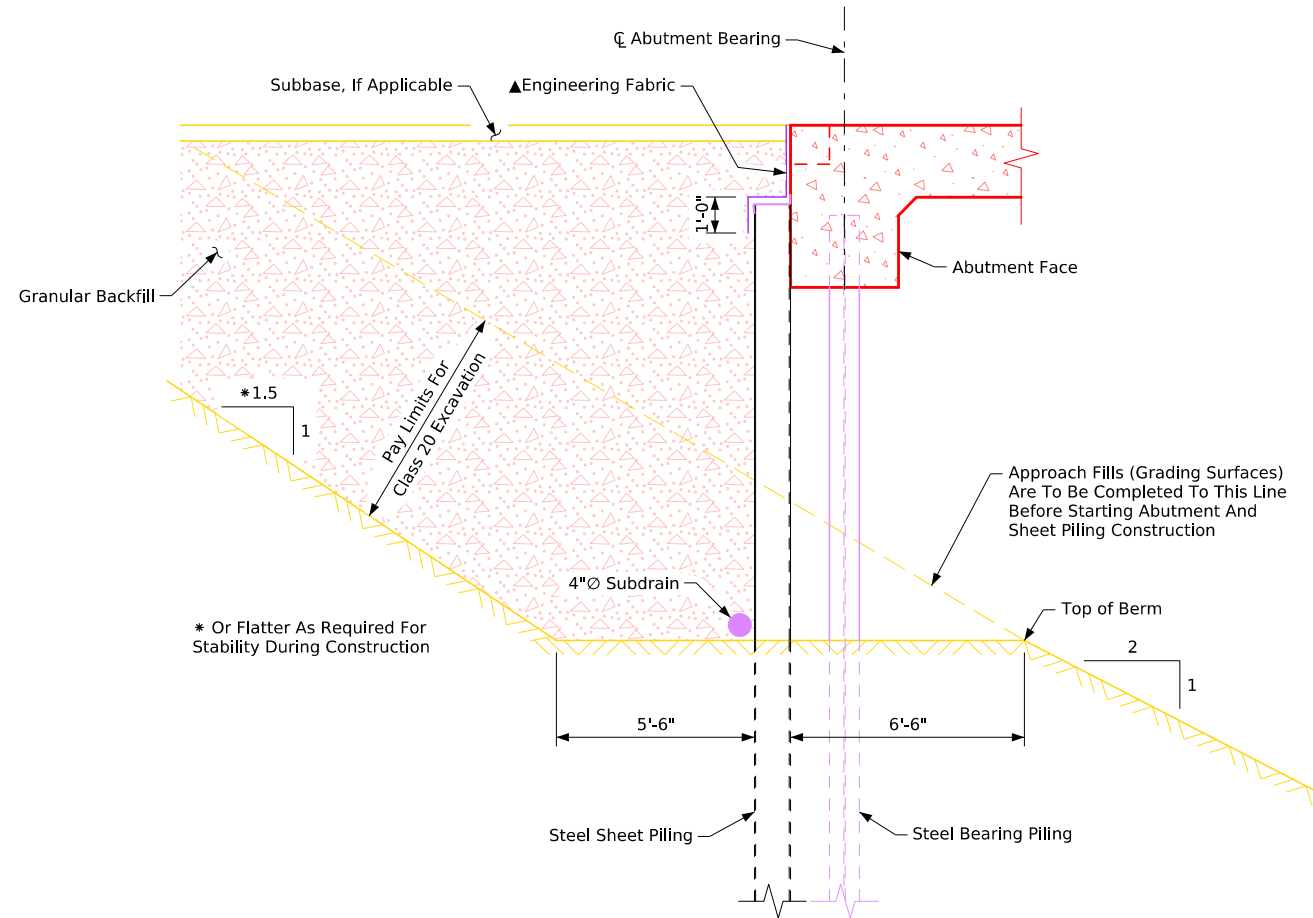
Note:  
Geotextile Fabric will be attached to face of abutment footing and wings.  
\* Dimension varies due to 2% subdrain slope.

**"W" Dimension**

Skew	Dimension
0°	2'-2"
15°	2'-3"
30°	2'-6"
45°	3'-1"

Note:  
See Subdrain Details sheet for details not shown on this sheet which are pertinent to this structure.

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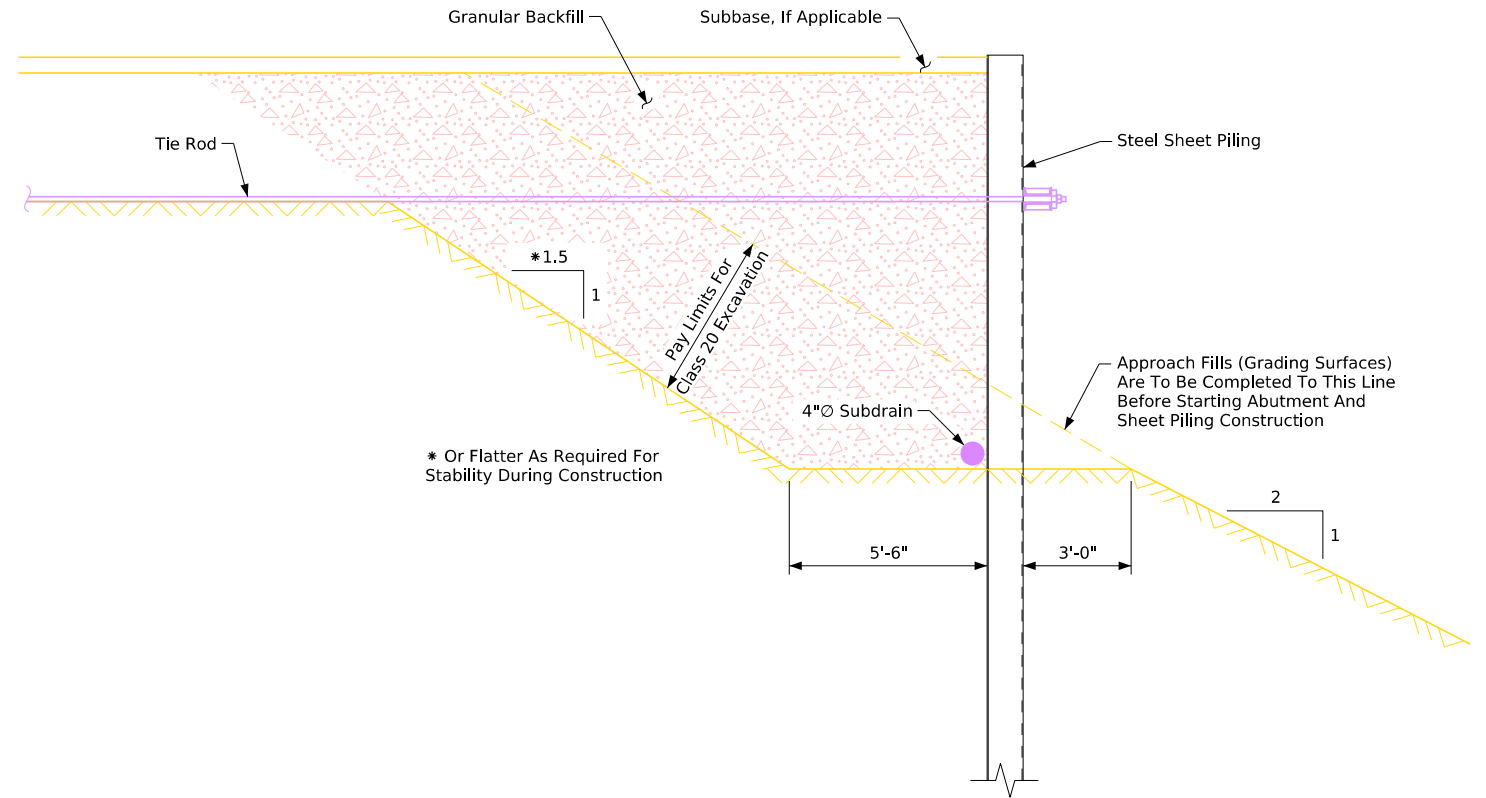
**Backfill Details**  
(Section Thru Abutment)

Notes:  
Subdrain Shall Slope Downward 2% From  $\text{CL}$  Approach Roadway.

Notes:  
▲ Engineering fabric is to be placed full width of sheet piling and extend 2'-0" minimum past vertical cover plates.  
The engineering fabric shall be in accordance with Article 4196.01,B,6 of the Standard Specifications. If the engineering fabric is lapped, the laps shall be a minimum of one foot in length, shingle fashion and stapled for continuity.  
The intended purpose of the engineering fabric is to prevent the backfill from spilling between sheet piling and abutment. The Contractor shall ensure all gaps are sealed to retain the backfill to the satisfaction of the Engineer.

Note:  
Construction and installation of slab and abutment cap shall be completed prior to beginning installation of backfill.

Note:  
See Subdrain Details sheet for details not shown on this sheet which are pertinent to this structure.



**Backfill Details**  
(Section Thru Wing)

Notes:  
Subdrain Shall Slope Downward 2% From  $\text{CL}$  Approach Roadway.

**Abutment Backfill Notes:**

Abutment backfill operations shall proceed following the complete construction of the bridge abutments and slab.  
Provide granular backfill meeting the requirements of Section 4133, except that the percent passing the No. 200 sieve shall not exceed 5.0%. Place and compact backfill according to the requirements of Article 2432.03, G, 3 of the Standard Specifications.  
Place backfill behind both abutments simultaneously so that the two fills are kept at approximately the same depth at all times.  
The cost of furnishing and placing subdrains (including excavation), subdrain outlets, and engineering fabric shall be included in the contract unit price bid for "Granular Backfill". No extra payment will be made.

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	<b>Single Span Concrete Slab Bridges</b> July, 2025	
	Abutment Backfill Details - High Abutments	<b>J24S-36-25</b>