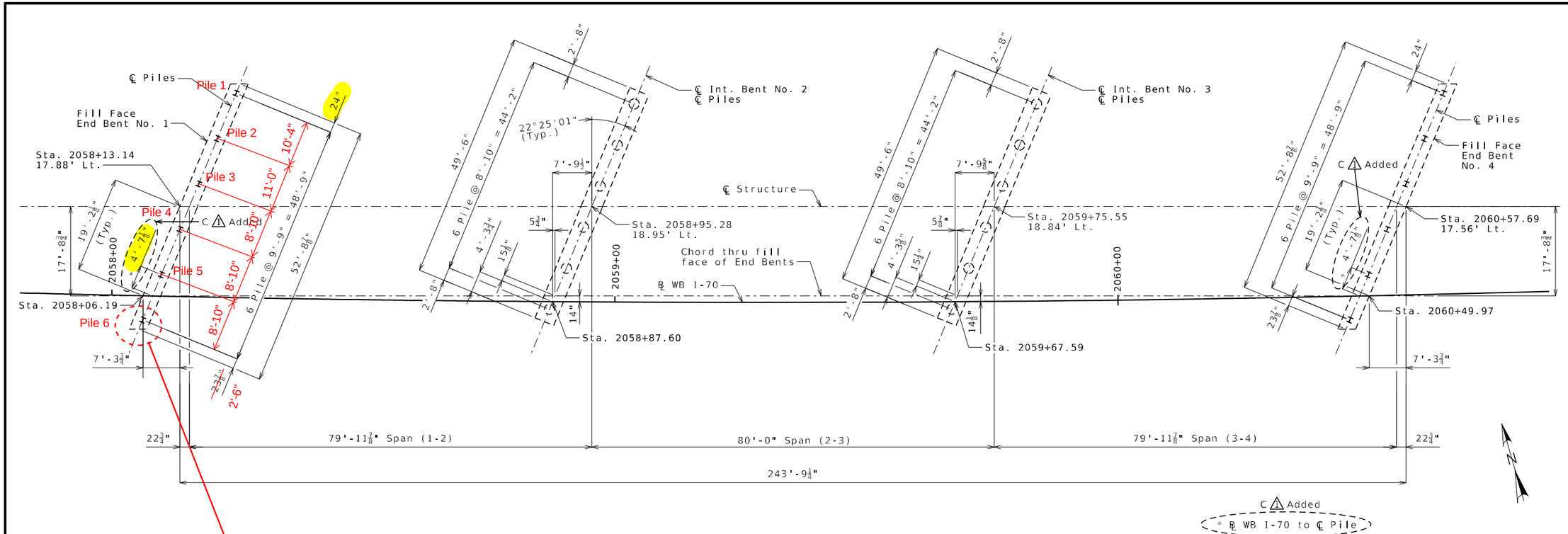
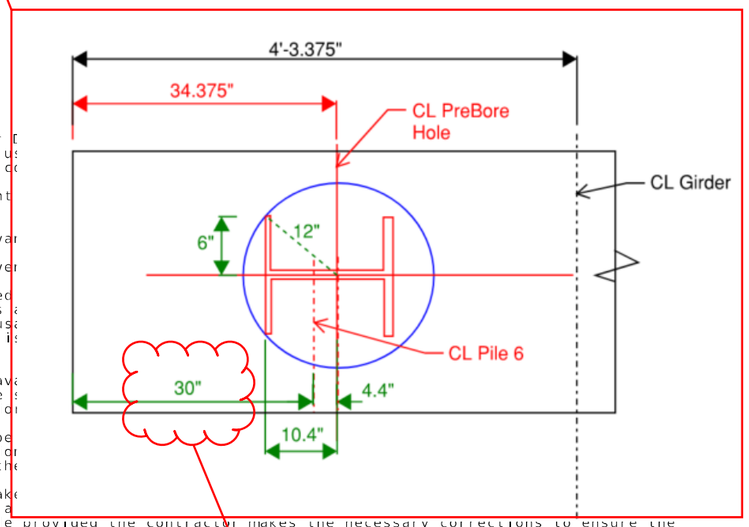


LAYOUT DATA FOR SUBSTRUCTURE



EPG sets end dimension at 18" min to 24" max. proposing to accept 30"

Notes:

Estimated Maximum Scour D
Compressive Resistance u
elevation shall not be c

Pile point reinforcement
point reinforcement.

All piles shall be galva

All piles shall be drive

HP piles are anticipated
and restrict driving as
Sec 702. When pile refus
compressive resistance i
required.

After any required excav
Bents 1 thru 3. Prebore
be filled with sand prio

Piles at Bent 4 shall be
the minimum tip elevatio
activities and notify th

The contractor shall mak
shown on the plans for a
be considered acceptable provided the contractor makes the necessary corrections to ensure the minimum penetration is achieved on subsequent piles.

Foundation Data

Type	Design Data		Bent Number 1	2	3	4
Load Bearing Pile	Pile Type and Size		HP 12x53	OECIP 24"	OECIP 24"	HP 12x53
	Number	ea	6	6	6	6
	Approximate Length Per Each	ft	17	35	38	42
	Pile Point Reinforcement	ea	All	All	All	All
	Min. Galvanized Penetration (Elev.)	ft	Full Length	Full Length	Full Length	Full Length
	Est. Max. Scour Depth 200 Yr. (Elev.)	ft	-	660	662	-
	Minimum Tip Penetration (Elev.)	ft	663	645	642	636
	Criteria for Min. Tip Penetration		Min. Embed.	Min. Embed.	Min. Embed.	Min. Embed.
	Approximate Prebore Depth per Each	ft	15	21	21	-
	Approximate Prebore Length in Rock per Each	ft	7	12	8	-
	Pile Driving Verification Method		DF	DT	DT	DF
	Resistance Factor		0.40	0.65	0.65	0.40
	Minimum Nominal Axial Compressive Resistance	kip	600	774	774	600

DF = FHWA-Modified Gates Dynamic Pile Formula

DT = Dynamic Testing

CECIP = Closed Ended Cast-in-Place concrete pile.

OECIP = Open Ended Cast-in-Place concrete pile.

Minimum Nominal Axial Compressive Resistance = $\frac{\text{Maximum Factored Loads}}{\text{Resistance Factor}}$

SUBSTRUCTURE LAYOUT PLAN

Detailed AUG. 2024
Checked JAN. 2025

Note: This drawing is not to scale. Follow dimensions.

C ⚠1 REVISED 3/11/2025

STATE OF MISSOURI
STEPHEN ALSBURY
NUMBER E-24698
REGISTERED PROFESSIONAL ENGINEER

03/11/2025 10:29:11 AM
Stephen E. Alsbury - Structural
MO PE - E-24698

DATE PREPARED 3/11/2025
ROUTE I-70 | STATE MO
DISTRICT BR | SHEET NO. 3
COUNTY BOONE
JOB NO. JST0021
CONTRACT ID.
PROJECT NO.
BRIDGE NO. A9543

DATE	DESCRIPTION
10/10/24	REV. A-PRELIMINARY REVIEW
01/29/25	REV. B-FINAL REVIEW
02/14/25	REV. 0-RELEASE FOR CONSTRUCTION
03/11/25	REV. 1-NDC-009 - ADDED DIMENSION

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

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ABNA

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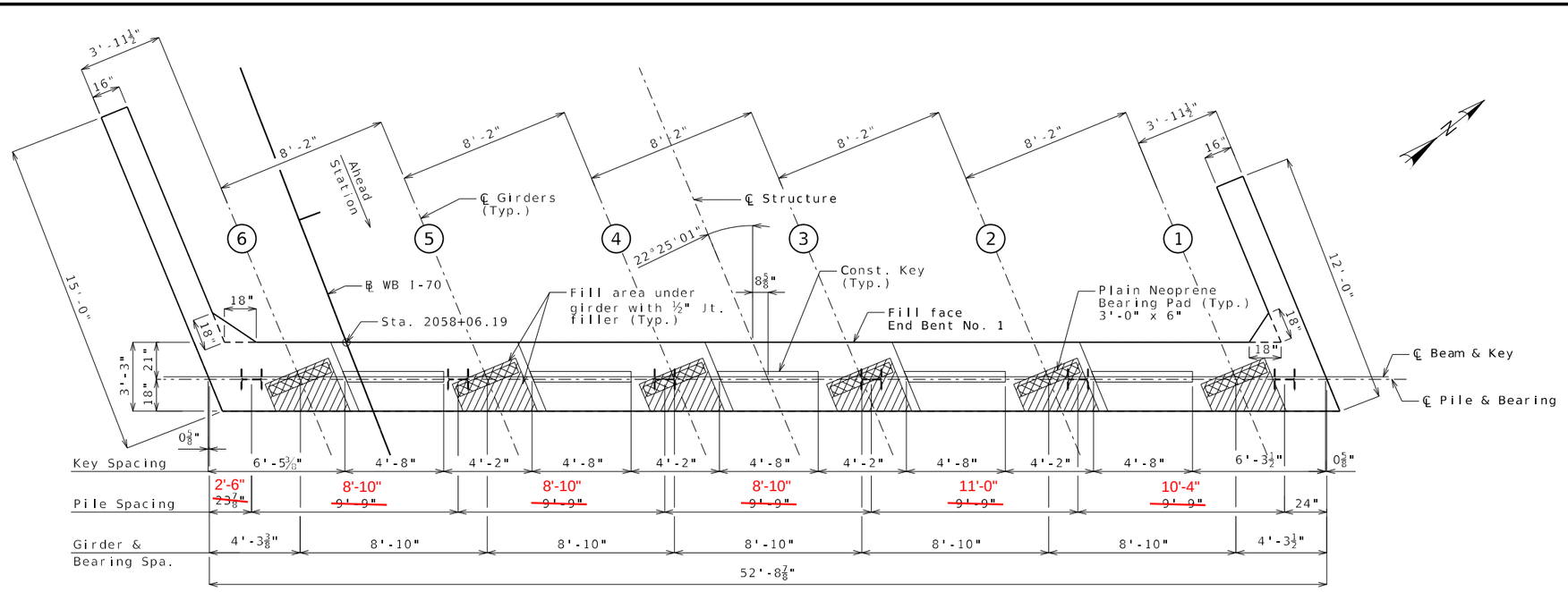
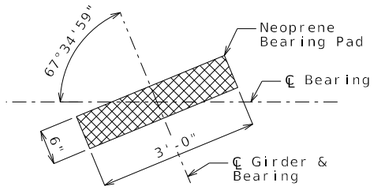
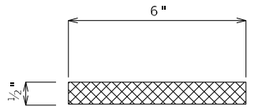
B_A9543_003_JST0021_LAYOUT_PLAN_C001.dgn 10:24:49 AM 3/11/2025



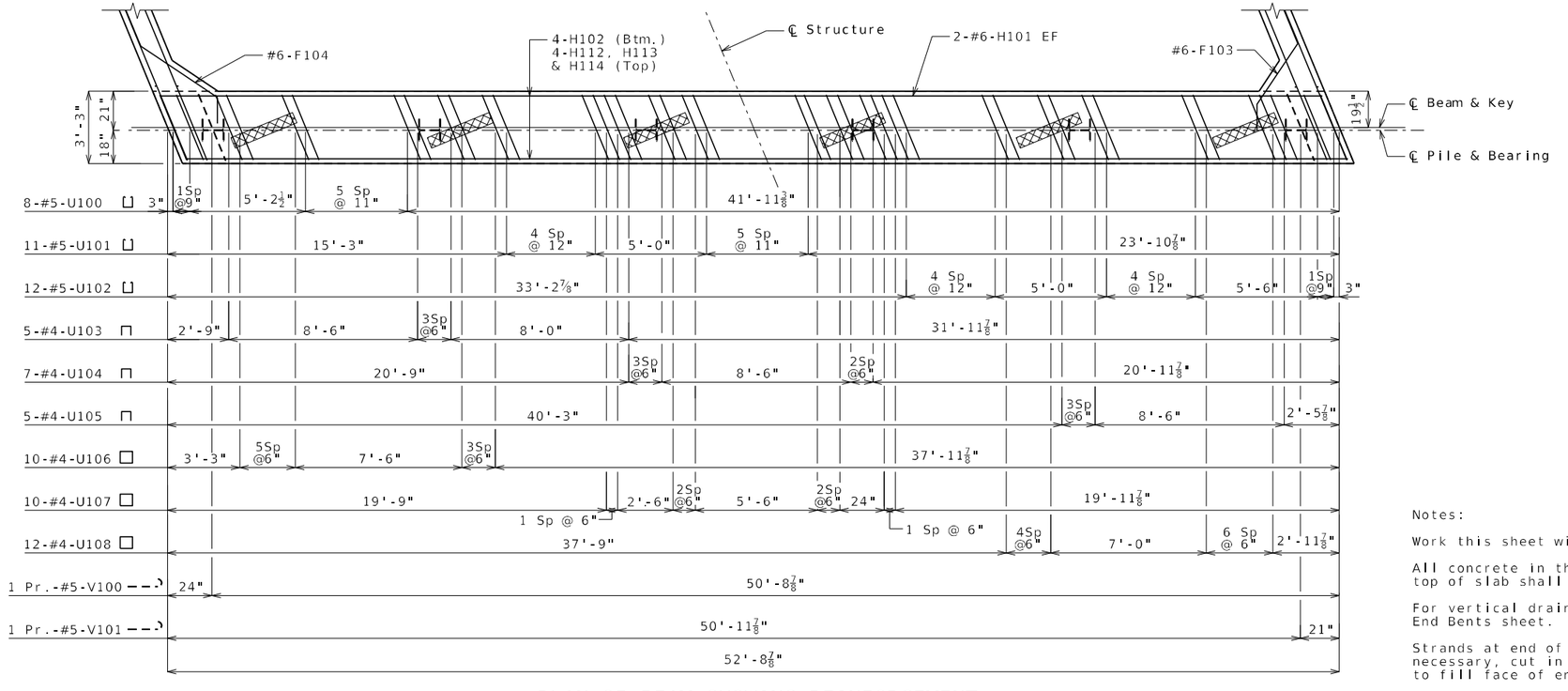
PLAN OF BEAM SHOWING DIMENSIONS



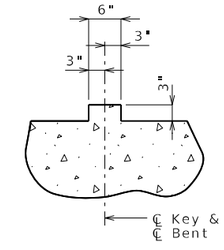
TYPICAL PLAN OF BEARINGS
6 Required



TYPICAL SECTION THRU NEOPRENE BEARING PAD



PLAN OF BEAM SHOWING REINFORCEMENT



SECTION THRU KEY

Notes:

Work this sheet with End Bent 1 Detail 02 and 03 sheets.

All concrete in the end bent above top of beam and below top of slab shall be Class B-2.

For vertical drain at end bents, see Vertical Drain at End Bents sheet.

Strands at end of the girders shall be field bent or, if necessary, cut in field to maintain 1½" minimum clearance to fill face of end bent.

Reinforcement shall be adjusted in the field to clear pile by 1½".

END BENT NO. 1 - DETAIL 01

Detailed AUG. 2024
Checked JAN. 2025

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STATE OF MISSOURI
STEPHEN ALSBURY
NUMBER E-24698
REGISTERED PROFESSIONAL ENGINEER

02/14/2025 11:37:51 AM
Stephen E. Alsbury - Structural
MO PE - E-24698

DATE PREPARED
2/14/2025

ROUTE	STATE
I-70	MO
DISTRICT	SHEET NO.
BR	4

COUNTY
BOONE

JOB NO.
JST0021

CONTRACT ID.

PROJECT NO.

BRIDGE NO.
A9543

DATE	DESCRIPTION
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02/14/25	REV. 0-RELEASE FOR CONSTRUCTION

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

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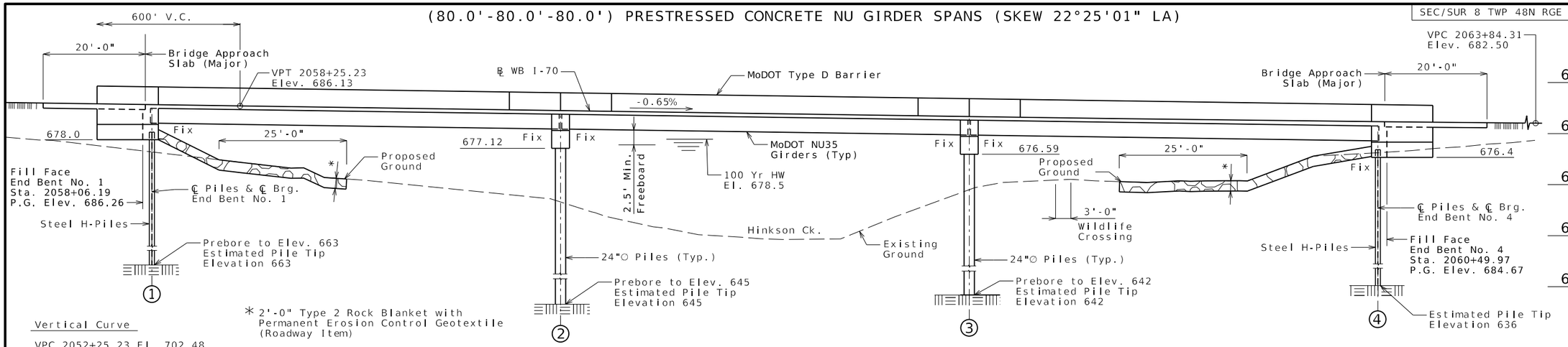
B_A9543_004_JST0021_EB1_DETL01.dgn 9:29:26 AM 2/14/2025

(80.0'-80.0'-80.0') PRESTRESSED CONCRETE NU GIRDER SPANS (SKEW 22°25'01" LA)

SEC/SUR 8 TWP 48N RGE 12W



* 2'-0" Type 2 Rock Blanket with Permanent Erosion Control Geotextile (Roadway Item)

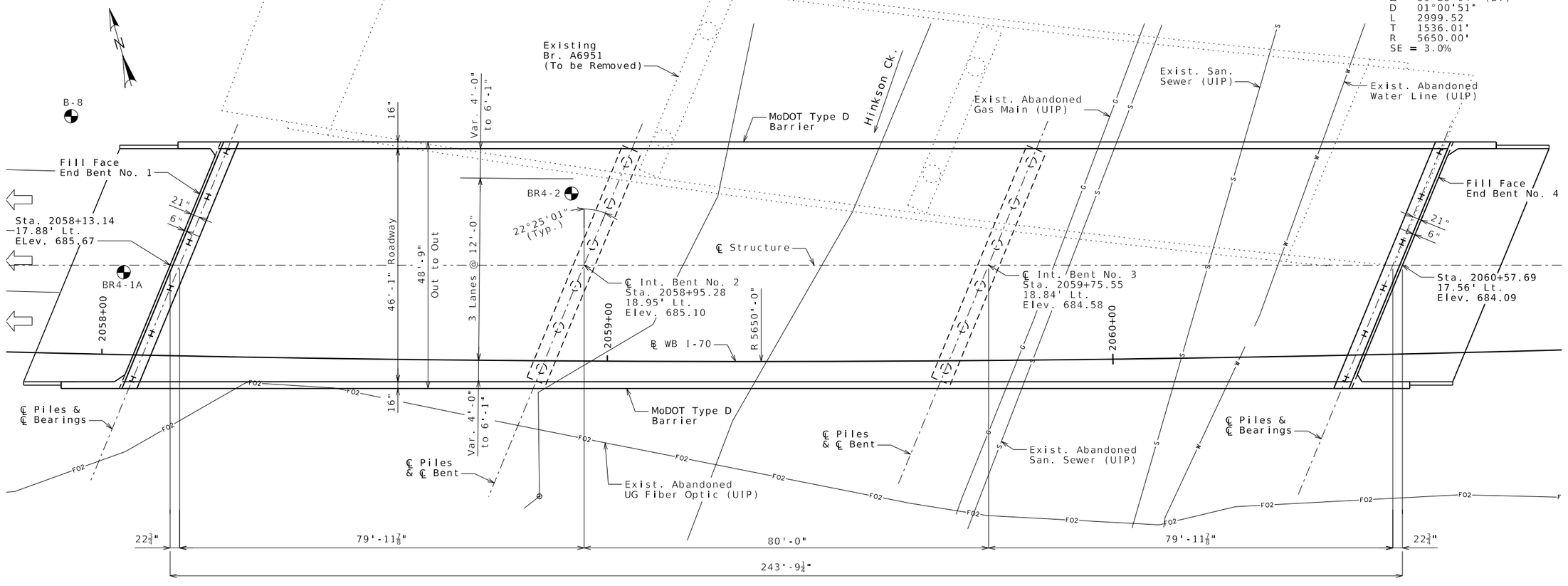
ELEVATION

Vertical Curve

VPC 2052+25.23 El. 702.48
VPI 2055+25.23 El. 688.08
VPT 2058+25.23 El. 686.13
Curve Length = 600'
Ent. Grade = -4.8%
Exit Grade = -0.65%

CURVE DATA

PI 2057+50.64
PC 2042+14.63
PT 2072+14.15
Δ 30°25'04" (LT)
D 01°00'51"
L 2999.52
T 1536.01'
R 5650.00'
SE = 3.0%



PLAN

Note: All Bents are parallel.

B.M. 70 - ELEVATION = 715.81
STATE PLANE (1983 CENTRAL ZONE)
NORTHING 1138803.0504
EASTING 1700592.2071
LATITUDE 38.96086552 DEGREES
LONGITUDE -92.28837098 DEGREES
POINT DESCRIPTION 74/IR

BRIDGE: ROUTE WB I-70 OVER HINKSON CREEK

ROUTE WB I-70
ABOUT 0.0838 MILES WEST OF EX ℄ RTE 63
BEGINNING STATION 2058+06.19 ±

Detailed AUG. 2024
Checked JAN. 2025

Note: This drawing is not to scale. Follow dimensions.

STATE OF MISSOURI
STEPHEN ALSBURY
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REGISTERED PROFESSIONAL ENGINEER

02/14/2025 11:35:21 AM
Stephen E. Alsbury - Structural
MO PE - E-24698

DATE PREPARED
2/14/2025

ROUTE	STATE
I-70	MO
DISTRICT	SHEET NO.
BR	1

COUNTY
BOONE

JOB NO.
JST0021

CONTRACT ID.

PROJECT NO.

BRIDGE NO.
A9543

DATE	DESCRIPTION
10/10/24	REV. A-PRELIMINARY REVIEW
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02/14/25	REV. 0-RELEASE FOR CONSTRUCTION

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

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MILLSTONE WEBER
ABNA

MO STATE CERTIFICATE OF AUTHORITY #001501 ENGINEERING

B_A9543_001_JST0021_GPE.dgn 9:28:23 AM 2/14/2025

General Notes:

Design Specifications:

2020 AASHTO LRFD Bridge Design Specifications (9th Ed.)
Seismic Design Category = A
Design earthquake response spectral acceleration coefficient at 1.0 second period, SD1 = 0.088
Acceleration Coefficient (effective peak ground acceleration coefficient), As = 0.060

Design Loading:

Vehicular = HL-93
Future Wearing Surface = 35 lb/sf
Earth = 120 lb/cf
Equivalent Fluid Pressure = 45 lb/cf
Superstructure: Non-Composite for dead load. Continuous Composite for live load.

Design Unit Stress:

Class B Concrete (Substructure)	f'c = 3,000 psi
Class B-1 Concrete (Barrier Curb)	f'c = 4,000 psi
Class B-2 Concrete (Superstructure, except Prestressed Beams & Barrier)	f'c = 4,000 psi
Class B-1 Concrete (Substructure)	f'c = 4,000 psi
Reinforcing Steel (ASTM A615 Grade 60)	fy = 60,000 psi
Structural Steel HP Pile (ASTM A709 Grade 50)	fy = 50,000 psi
Welded or Seamless steel shell (pipe) for CIP pile (ASTM A252 Modified Grade 3)	fy = 50,000 psi

For precast prestressed panel stresses, see Sheet No. 18.

For prestressed girder stresses, see Sheet Nos. 15 thru 16.

Neoprene Pads:

Neoprene bearing pads shall be 60 durometer and shall be in accordance with Sec 716.

Joint Filler:

All joint filler shall be in accordance with Sec 1057 for preformed sponge rubber expansion and partition joint filler, except as noted.

Reinforcing Steel:

Minimum clearance to reinforcing steel shall be 1 1/2", unless otherwise shown.

Traffic Handling:

Structure to be closed during construction. See Segment 1 Stage 3 MOT for traffic control details.

Miscellaneous:

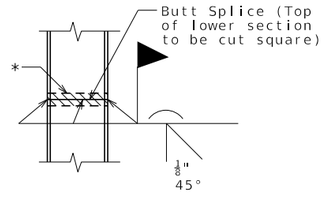
Construction personnel will indicate the type of joint filler option used under the precast panels for this structure:
☐ Constant Joint Filler
☐ Variable Joint Filler

Method of forming the slab shall be as shown on the plans and in accordance with Sec 703. All hardware for forming the slab to be left in place as a permanent part of the structure shall be coated in accordance with ASTM A123 or ASTM B633 with a thickness class SC 4 and a finish type I, II or III.

INDEX OF DRAWINGS

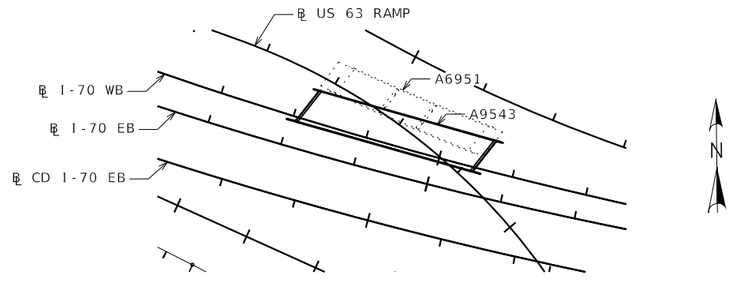
1 General Plan and Elevation
2 General Notes & Index of Drawings
3 Substructure Layout Plan
4 End Bent No. 1 - Detail 01
5 End Bent No. 1 - Detail 02
6 End Bent No. 1 - Detail 03
7 Vertical Drain at End Bents
8 Intermediate Bents No. 2 & 3 - Detail 01
9 Intermediate Bents No. 2 & 3 - Detail 02
10 Galvanized Opened Ended Cast-in-Place (OECIP) Concrete Pile
11 End Bent No. 4 - Detail 01
12 End Bent No. 4 - Detail 02
13 End Bent No. 4 - Detail 03
14 Framing Plan
15 NU Girders Spans 1-2 & 3-4
16 NU Girders Span 2-3
17 Concrete Diaphragm at Intermediate Bents
18 Prestressed Panels
19 Slab Drains
20 Slab Elevations, Haunching, and Girder Camber
21 Slab Reinforcing Plan
22 Slab Reinforcing Section & Pouring Sequence
23 Type D Barrier
24 Type D Barrier at End Bents (Right)
25 Type D Barrier at End Bents (Left)
26 Bridge Approach Slab (Major)
27 Bill of Reinforcing Steel 01
28 Bill of Reinforcing Steel 02
29 Bending Diagrams and Reinforcing Steel Totals
30 As-Built Pile Data
31 Boring Data 01
32 Boring Data 02
33 Boring Data 03

Hydrologic Data
Drainage Area = 43 mi^2
Design Flood Frequency = 100 years
Design Flood Discharge = 15,100 cfs
Design Flood (D.F.) Elevation = 678.5
Estimated Backwater = 0.2 ft
Average Velocity thru Opening = 7.2 ft/s
Freeboard (50-year)
Freeboard = 2.5 ft
Roadway Overtopping
Overtopping Flood Discharge = N/A cfs
Overtopping Flood Frequency > 500 years
500 Year Flood Elevation = 682.0



STEEL PILE SPLICE
(If required)

* Galvanizing material shall be omitted or removed one inch clear of weld locations in accordance with Sec 702.



LOCATION SKETCH

STATE OF MISSOURI
STEPHEN ALSBURY
NUMBER E-24698
REGISTERED PROFESSIONAL ENGINEER

02/14/2025 11:37:51 AM
Stephen E. Alsbury - Structural
MO PE - E-24698

DATE PREPARED
2/14/2025

ROUTE	STATE
I-70	MO
DISTRICT	SHEET NO.
BR	2

COUNTY
BOONE

JOB NO.
JST0021

CONTRACT ID.

PROJECT NO.

BRIDGE NO.
A9543

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01/29/25	REV. B-FINAL REVIEW
02/14/25	REV. 0-RELEASE FOR CONSTRUCTION

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

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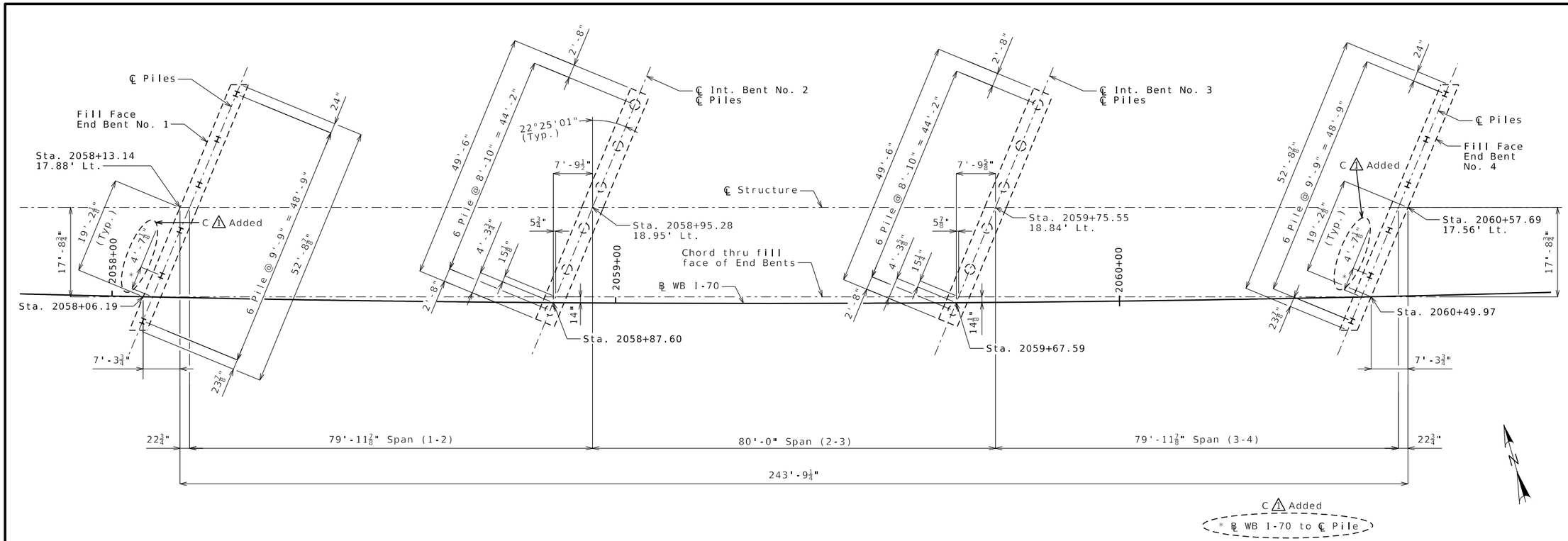
GENERAL NOTES & INDEX OF DRAWINGS

Detailed AUG. 2024
Checked JAN. 2025

Note: This drawing is not to scale. Follow dimensions.

B_A9543_002_JST0021_GEN_NOTES.dgn 9:28:52 AM 2/14/2025



LAYOUT DATA FOR SUBSTRUCTURE

Notes:

Estimated Maximum Scour Depth (Elevation) shown is for verifying Minimum Nominal Axial Compressive Resistance using dynamic testing only when pile resistance contribution above this elevation shall not be considered.

Pile point reinforcement need not be galvanized. Shop drawings will not be required for pile point reinforcement.

All piles shall be galvanized full length.

All piles shall be driven to practical refusal.

HP piles are anticipated to be driven to refusal on rock. Review all borings for depth of rock and restrict driving as appropriate to comply with hard rock driving criteria in accordance with Sec 702. When pile refusal on rock occurs, as approved by the engineer, the minimum nominal axial compressive resistance is verified and no additional pile driving verification method is required.

After any required excavation or grading, the contractor shall prebore the holes for the piles at Bents 1 thru 3. Prebore shall extend a minimum of 5-feet into limestone. The prebored holes shall be filled with sand prior to being driven to practical refusal.

Piles at Bent 4 shall be driven to practical refusal at or below the minimum tip elevation. if the minimum tip elevation listed in the Foundation Data Table is not achieved, stop pile driving activities and notify the Engineer for further direction.

The contractor shall make every effort to achieve the minimum galvanized penetration (elevation) shown on the plans for all piles. Deviations in penetration less than 5 feet of the minimum will be considered acceptable provided the contractor makes the necessary corrections to ensure the minimum penetration is achieved on subsequent piles.

Foundation Data

Type	Design Data		Bent Number 1	2	3	4
Load Bearing Pile	Pile Type and Size		HP 12x53	OECIP 24"	OECIP 24"	HP 12x53
	Number	ea	6	6	6	6
	Approximate Length Per Each	ft	17	35	38	42
	Pile Point Reinforcement	ea	All	All	All	All
	Min. Galvanized Penetration (Elev.)	ft	Full Length	Full Length	Full Length	Full Length
	Est. Max. Scour Depth 200 Yr. (Elev.)	ft	-	660	662	-
	Minimum Tip Penetration (Elev.)	ft	663	645	642	636
	Criteria for Min. Tip Penetration		Min. Embed.	Min. Embed.	Min. Embed.	Min. Embed.
	Approximate Prebore Depth per Each	ft	15	21	21	-
	Approximate Prebore Length in Rock per Each	ft	7	12	8	-
	Pile Driving Verification Method		DF	DT	DT	DF
	Resistance Factor		0.40	0.65	0.65	0.40
	Minimum Nominal Axial Compressive Resistance	kip	600	774	774	600

DF = FHWA-Modified Gates Dynamic Pile Formula

DT = Dynamic Testing

CECIP = Closed Ended Cast-in-Place concrete pile.

OECIP = Open Ended Cast-in-Place concrete pile.

Minimum Nominal Axial Compressive Resistance = $\frac{\text{Maximum Factored Loads}}{\text{Resistance Factor}}$

SUBSTRUCTURE LAYOUT PLAN

Detailed AUG. 2024
Checked JAN. 2025

Note: This drawing is not to scale. Follow dimensions.

C ⚠ REVISED 3/11/2025

STATE OF MISSOURI
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MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
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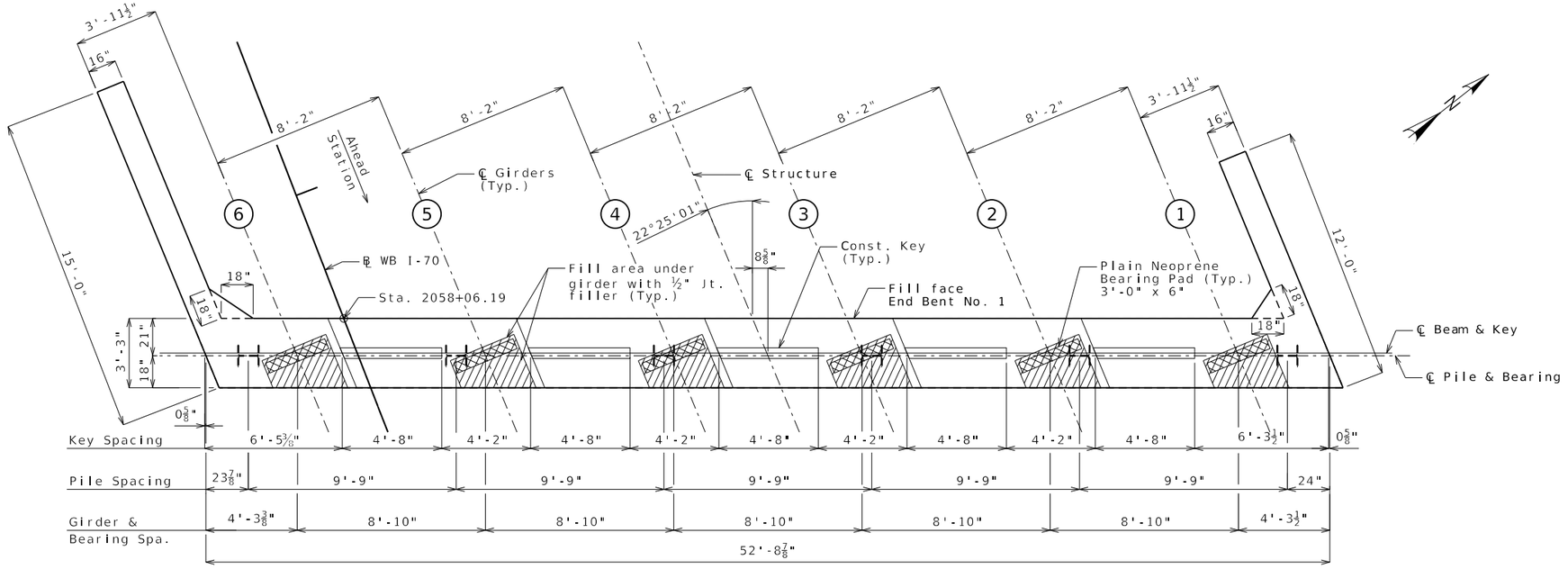
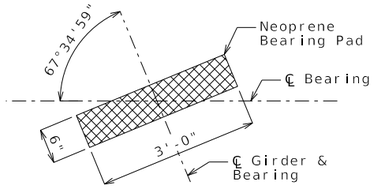
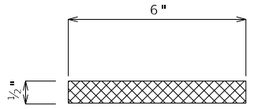
B_A9543_003_JST0021_LAYOUT_PLAN_C001.dgn 10:24:49 AM 3/11/2025



PLAN OF BEAM SHOWING DIMENSIONS



TYPICAL PLAN OF BEARINGS
6 Required



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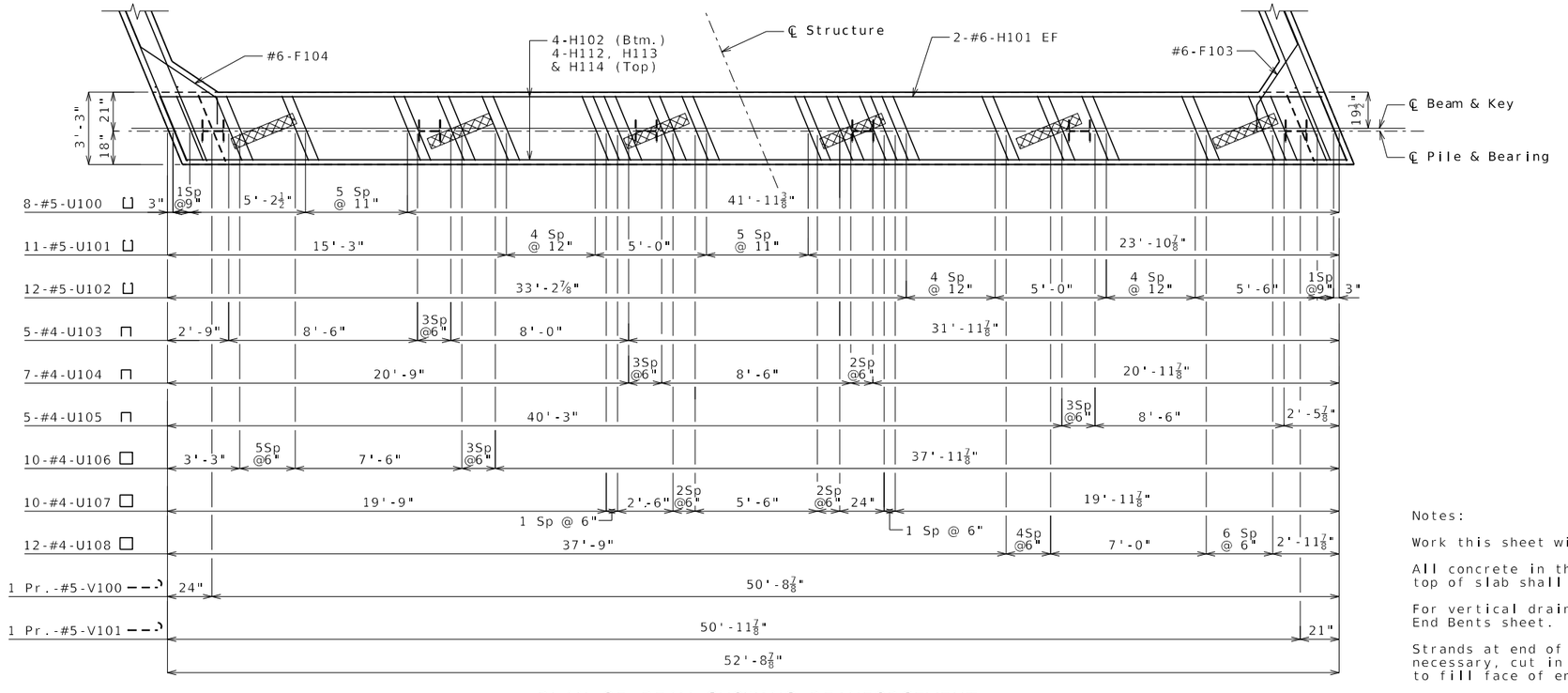
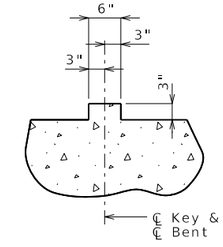


PLAN OF BEAM SHOWING REINFORCEMENT



SECTION THRU KEY

Notes:

Work this sheet with End Bent 1 Detail 02 and 03 sheets.

All concrete in the end bent above top of beam and below top of slab shall be Class B-2.

For vertical drain at end bents, see Vertical Drain at End Bents sheet.

Strands at end of the girders shall be field bent or, if necessary, cut in field to maintain 1½" minimum clearance to fill face of end bent.

Reinforcement shall be adjusted in the field to clear pile by 1½".

END BENT NO. 1 - DETAIL 01

Detailed AUG. 2024
Checked JAN. 2025

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STATE OF MISSOURI
STEPHEN ALSBURY
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DATE PREPARED
2/14/2025

ROUTE	STATE
I-70	MO
DISTRICT	SHEET NO.
BR	4

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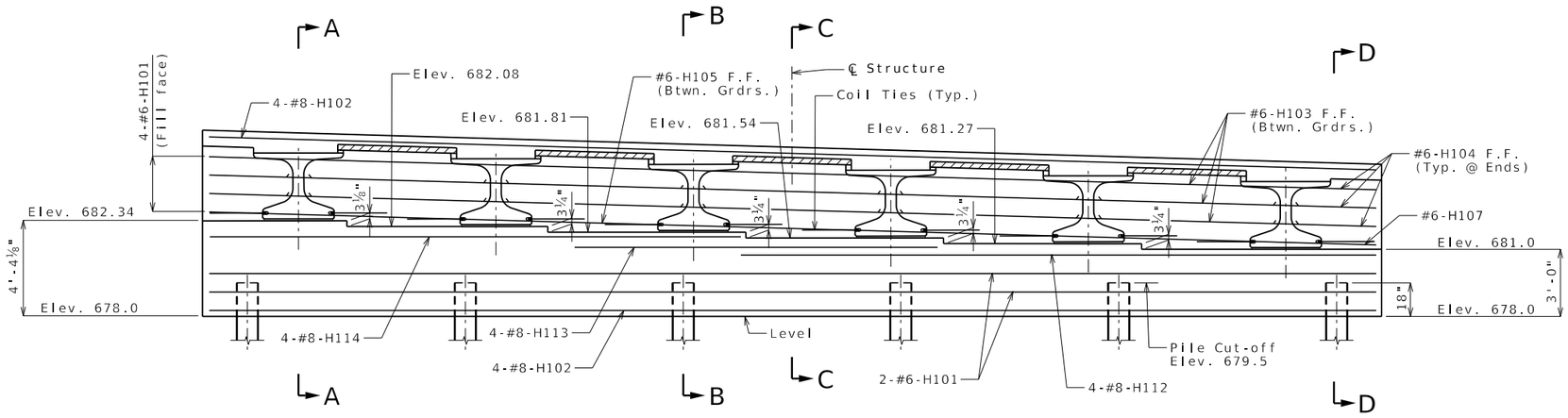
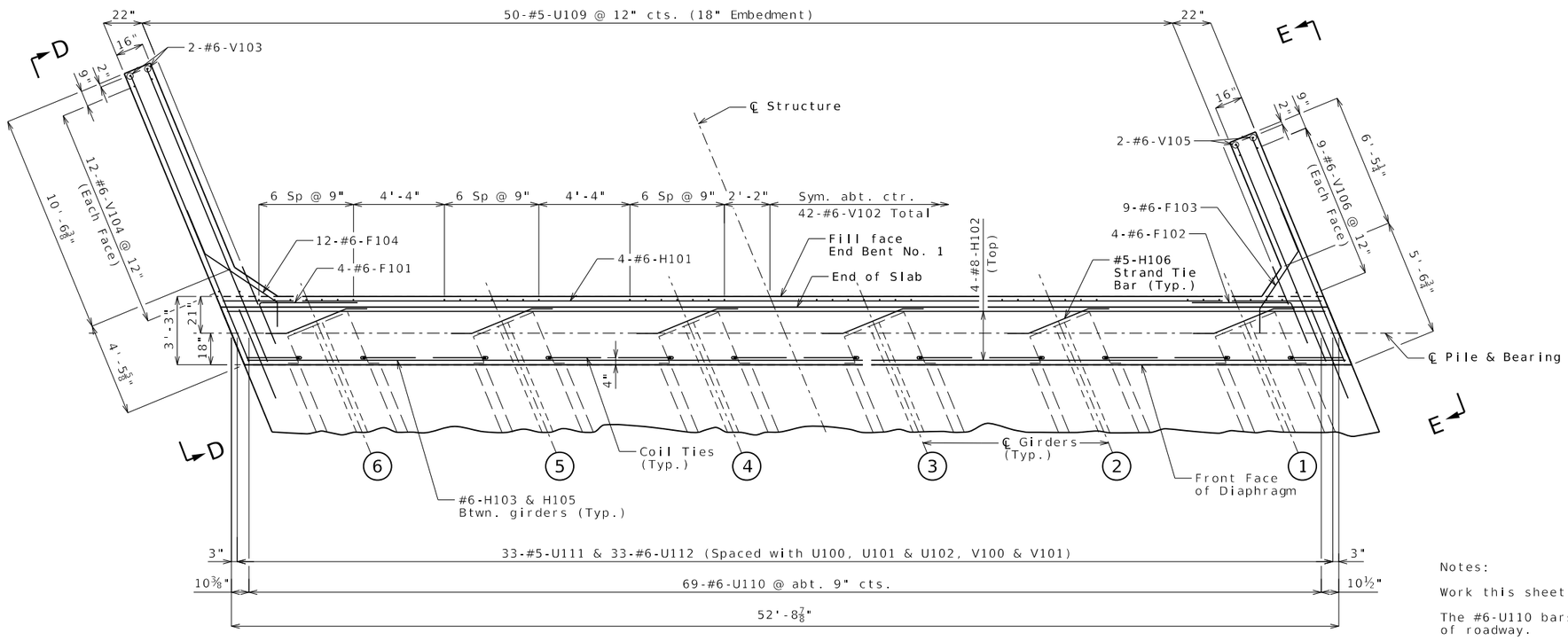
ABNA

MO STATE CERTIFICATE OF AUTHORITY #001501 ENGINEERING



SECTION NEAR END BENT

(Looking West - Back Station)
(Construction Joint Key and Vertical Reinforcement not shown for clarity)



PART OF BEAM SHOWING REINFORCEMENT

Minimum. Lap

#8 = 6'-2"

Notes:

Work this sheet with End Bent 1 Detail 01 and 03 sheets.

The #6-U110 bars shall be placed parallel to centerline of roadway.

The #6-F101 and #6-F102 bars shall be bent in the field to clear girders.

All concrete in the end bent above top of beam and below top of slab shall be Class B-2.

Strands at the end of the girders shall be field bent or, if necessary, cut in field to maintain 1½" minimum clearance to fill face of end bent.

END BENT NO. 1 - DETAIL 02

Detailed AUG. 2024
Checked JAN. 2025

Note: This drawing is not to scale. Follow dimensions.

STATE OF MISSOURI
STEPHEN ALSBURY
NUMBER E-24698
REGISTERED PROFESSIONAL ENGINEER

02/14/2025 11:37:52 AM
Stephen E. Alsbury - Structural
MO PE - E-24698

DATE PREPARED
2/14/2025

ROUTE	STATE
I-70	MO
DISTRICT	SHEET NO.
BR	5

COUNTY
BOONE

JOB NO.
JST0021

CONTRACT ID.

PROJECT NO.

BRIDGE NO.
A9543

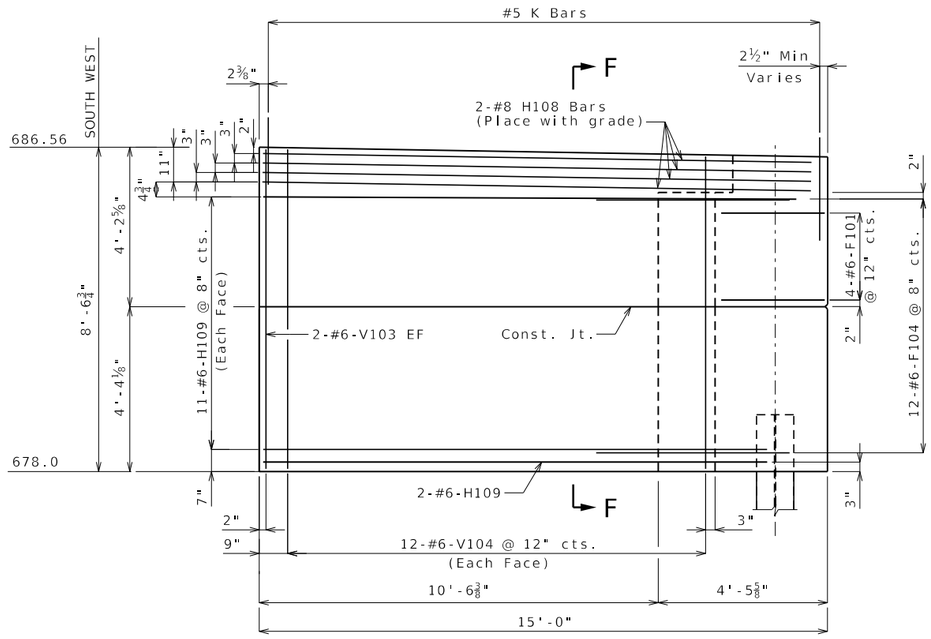
DATE	DESCRIPTION
10/10/24	REV. A-PRELIMINARY REVIEW
01/29/25	REV. B-FINAL REVIEW
02/14/25	REV. 0-RELEASE FOR CONSTRUCTION

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

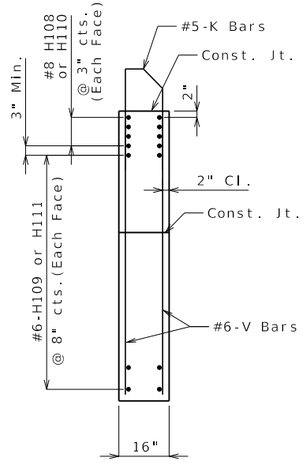
MoDOT IMPROVE I-70 DB PROJECT 1

MILLSTONE WEBER
ABNA

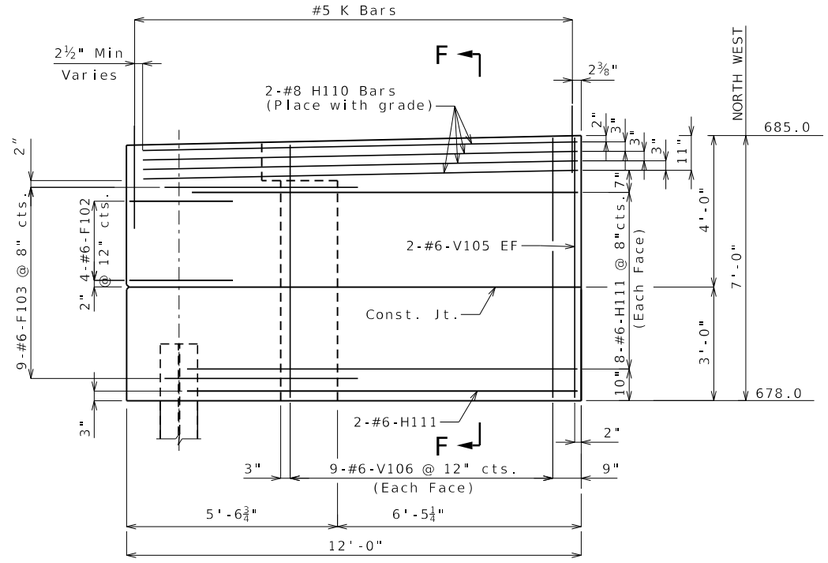
MO STATE CERTIFICATE OF AUTHORITY #001501 ENGINEERING



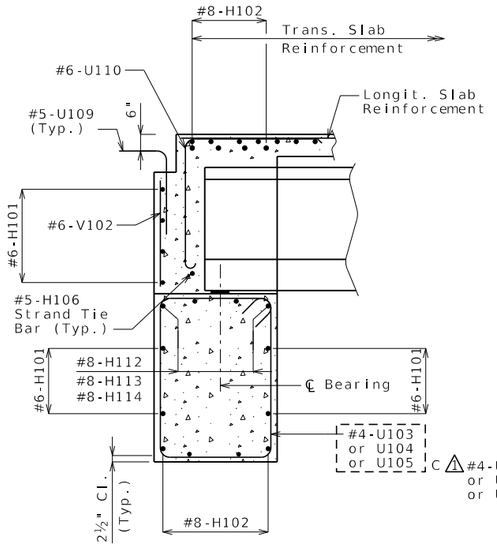
ELEVATION D-D



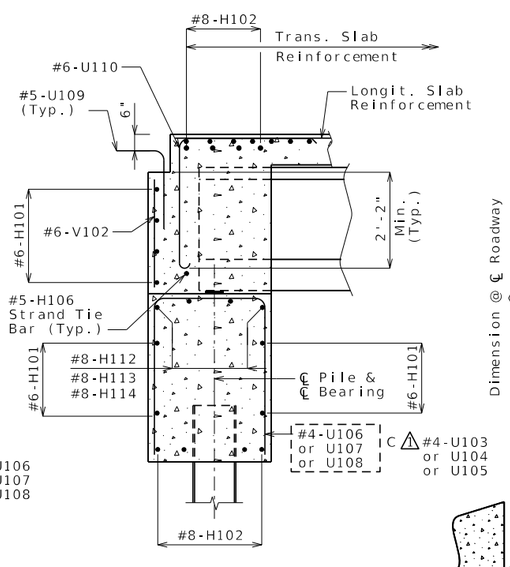
SECTION F-F



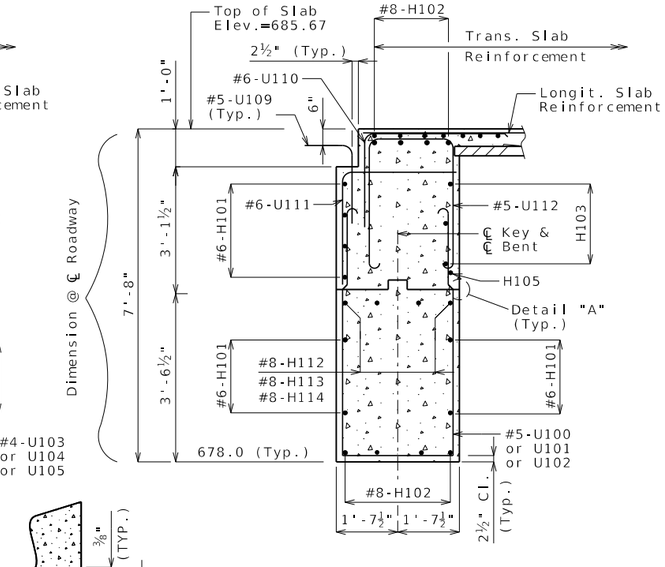
ELEVATION E-E



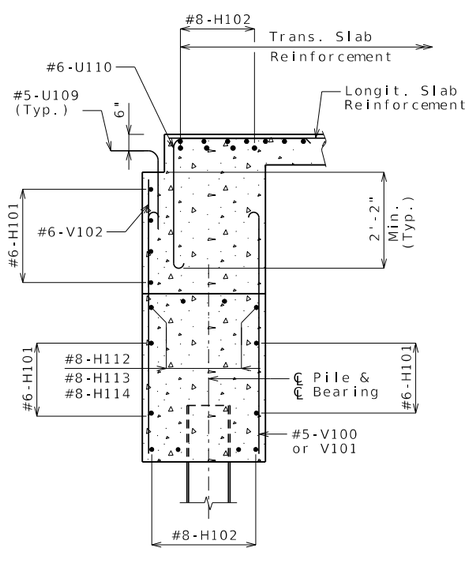
SECTION A-A



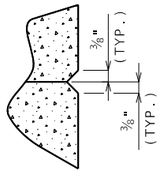
SECTION B-B



SECTION C-C



SECTION D-D



DETAIL "A"

Notes:

Work this sheet with End Bent 1 Details 01 & 02 Sheets.

For details of Vertical Drain, see Vertical Drain at End Bents sheet 7.

For details of Approach Slab, see Approach Slab sheet 26.

C⚠ REVISED 3/11/2025

END BENT NO. 1 - DETAIL 03

Detailed AUG. 2024
Checked JAN. 2025

Note: This drawing is not to scale. Follow dimensions.

STATE OF MISSOURI
STEPHEN ALSBURY
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REGISTERED PROFESSIONAL ENGINEER

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3/11/2025

ROUTE	STATE
I-70	MO
DISTRICT	SHEET NO.
BR	6

COUNTY
BOONE

JOB NO.
JST0021

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PROJECT NO.

BRIDGE NO.
A9543

DATE	DESCRIPTION
10/10/24	REV. A-PRELIMINARY REVIEW
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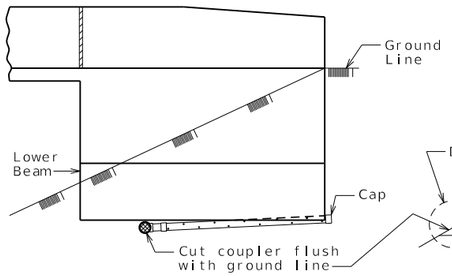
02/14/25	REV. 0-RELEASE FOR CONSTRUCTION
03/11/25	REV. 1-NDC-009-REVISED BAR LIST

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

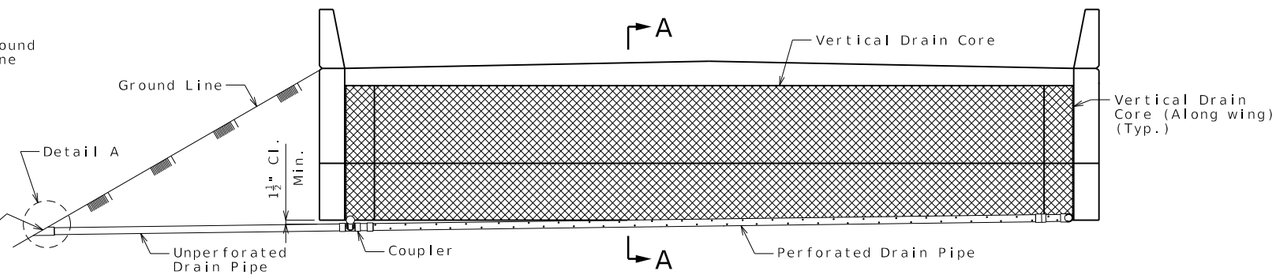
MoDOT IMPROVE I-70 DB PROJECT 1

MILLSTONE WEBER
ABNA

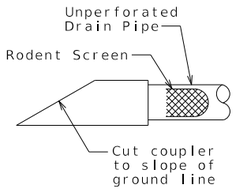
MO STATE CERTIFICATE OF AUTHORITY #001501 ENGINEERING



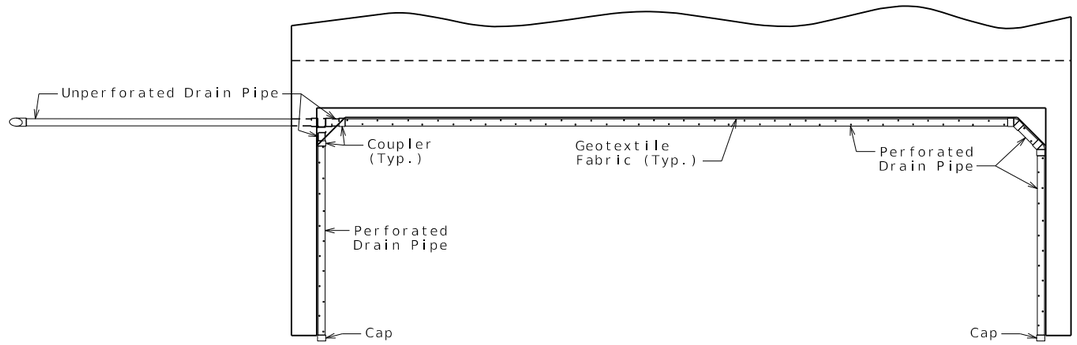
ELEVATION OF WING



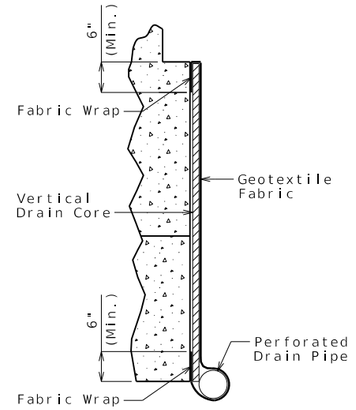
ELEVATION OF END BENT



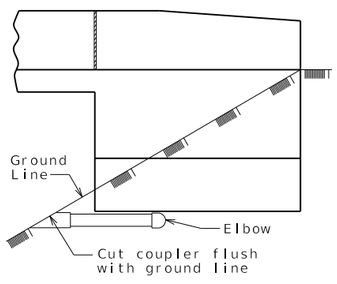
DETAIL A



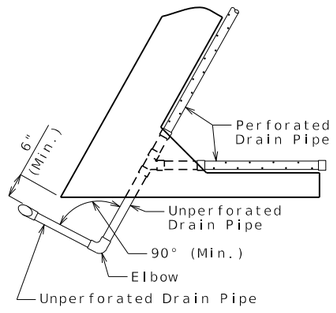
PLAN OF END BENT



PART SECTION A-A
(Section thru wing similar)



ELEVATION OF WING



PART PLAN

OPTIONAL TURNED DRAIN
(Use only when straight drain is not practical.)

General Notes:

All drain pipe shall be sloped 1 to 2 percent.

Drain pipe may be either 6-inch diameter corrugated metallic-coated steel pipe underdrain, 4-inch diameter corrugated polyvinyl chloride (PVC) drain pipe, or 4-inch diameter corrugated polyethylene (PE) drain pipe.

Drain pipe shall be placed at fill face of end bent and inside face of wings. The pipe shall slope to lowest grade of ground line, also missing the lower beam of end bent by a minimum of 1 1/2 inches.

Perforated pipe shall be placed at fill face side and inside face of wings at the bottom of end bent and plain pipe shall be used where the vertical drain ends to the exit at ground line.

VERTICAL DRAIN AT END BENTS

(Squared end bent shown, skewed end bent similar)

Detailed AUG. 2024
Checked JAN. 2025

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STATE OF MISSOURI
STEPHEN ALSBURY
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Stephen E. Alsbury - Structural
MO PE - E-24698

DATE PREPARED
2/14/2025

ROUTE	STATE
I-70	MO
DISTRICT	SHEET NO.
BR	7

COUNTY
BOONE

JOB NO.
JST0021

CONTRACT ID.

PROJECT NO.

BRIDGE NO.
A9543

DATE	DESCRIPTION
10/10/24	REV. A-PRELIMINARY REVIEW
01/29/25	REV. B-FINAL REVIEW
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MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

MoDOT IMPROVE I-70 DB PROJECT 1

MILLSTONE WEBER
ABNA

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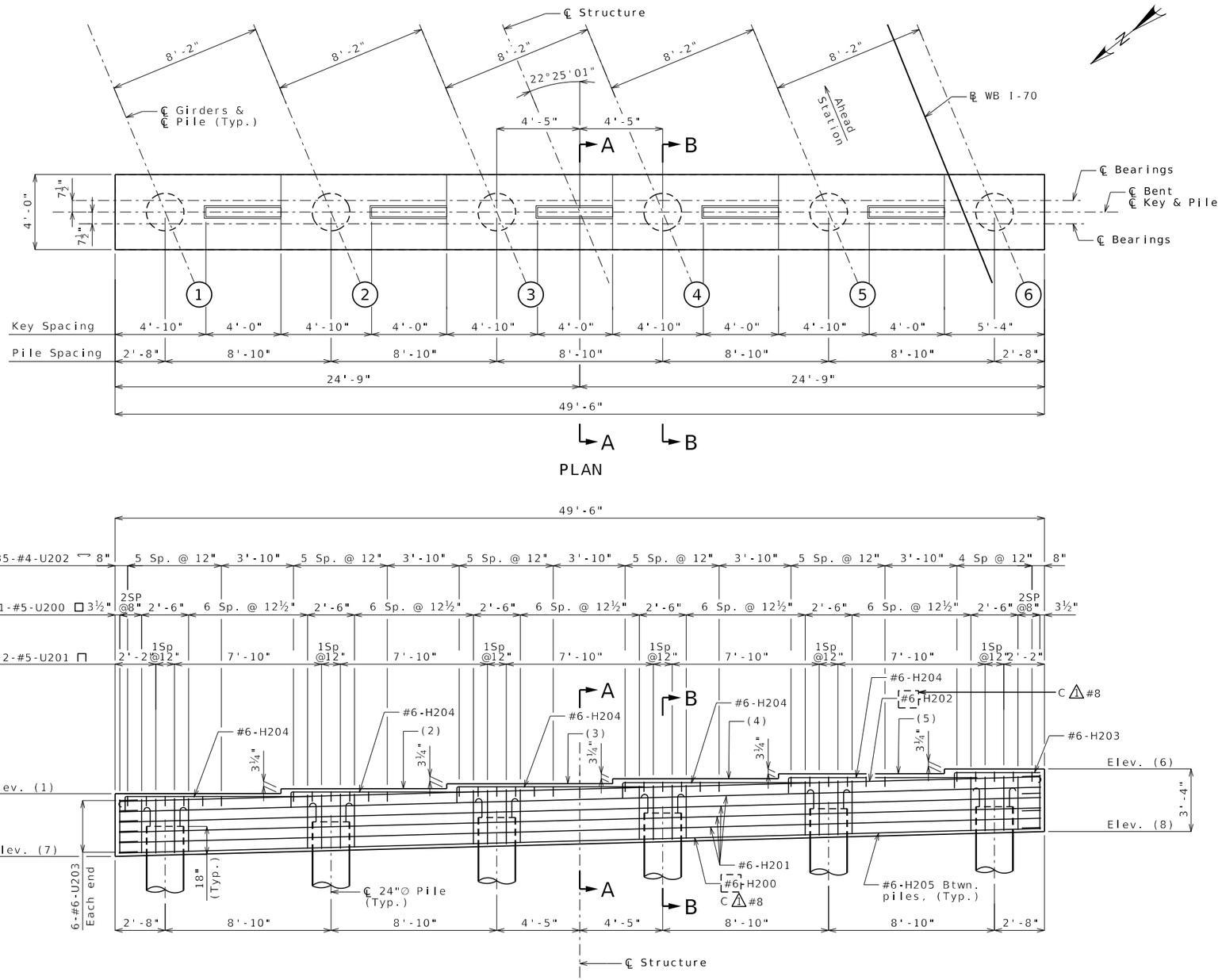
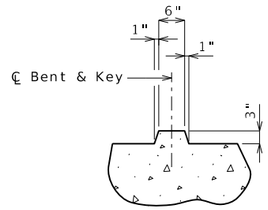


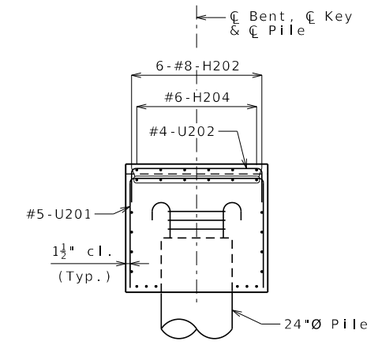
PLAN

ELEVATION

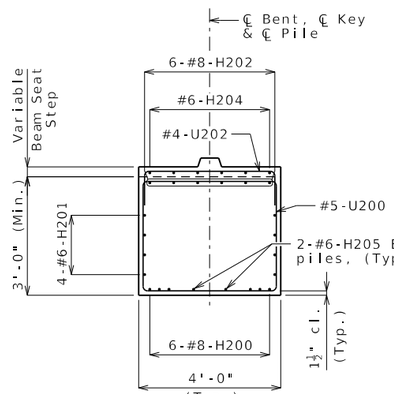
(Construction Key not shown for clarity)



SECTION THRU KEY



SECTION B-B



SECTION A-A

Elevation No.	Int. Bent No. 2		Int. Bent No. 3	
	Beam Seat Elevation	T/Pile Elevation	Beam Seat Elevation	T/Pile Elevation
(1)	680.45	678.70	679.92	678.17
(2)	680.72	678.94	680.19	678.41
(3)	680.99	679.18	680.45	678.65
(4)	681.26	679.42	680.71	678.89
(5)	681.53	679.66	680.98	679.12
(6)	681.80	679.90	681.24	679.36
(7)	677.12	-	676.59	-
(8)	678.47	-	677.91	-

Notes:

Work this sheet with Intermediate Bent No. 2 & 3 Details 02,

Protective Coating (Epoxy) on all exposed surfaces of columns, bottom and sides of cap in accordance with Sec 711

INTERMEDIATE BENTS NO. 2 & 3 - DETAIL 01

(Intermediate No. 2 shown, Int. Bent No. 3 similar - Use series 300 for Int. Bent No. 3)

Note: This drawing is not to scale. Follow dimensions.

Sheet No. 8 of 33

C ⚠1 REVISED 3/11/2025

Detailed AUG. 2024
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STATE OF MISSOURI
STEPHEN ALSBURY
NUMBER E-24698
REGISTERED PROFESSIONAL ENGINEER

03/11/2025 7:58:44 AM
Stephen E. Alsbury - Structural
MO PE - E-24698

DATE PREPARED
3/11/2025

ROUTE	STATE
I-70	MO
DISTRICT	SHEET NO.
BR	8

COUNTY
BOONE

JOB NO.
JST0021

CONTRACT ID.

PROJECT NO.

BRIDGE NO.
A9543

DATE	DESCRIPTION
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MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

MoDOT IMPROVE I-70 DB PROJECT 1

MILLSTONE WEBER
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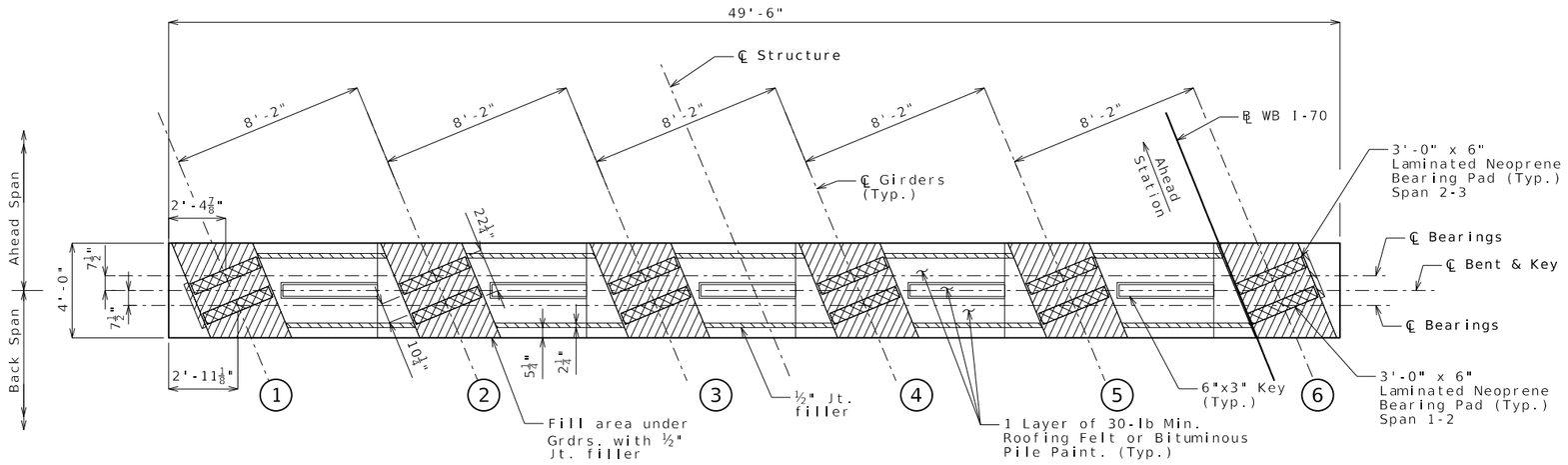
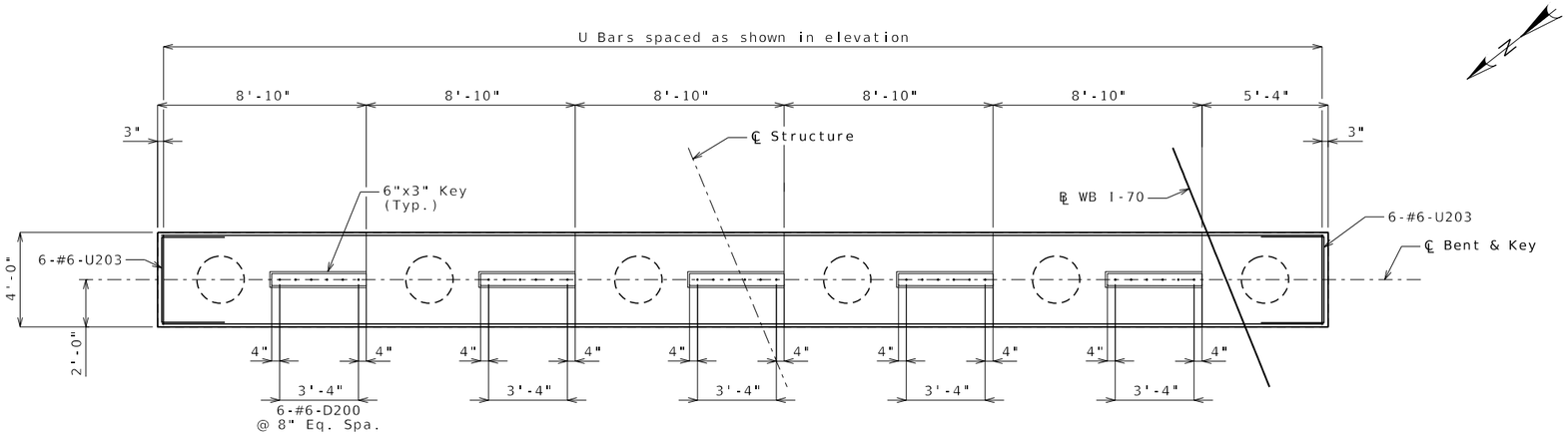
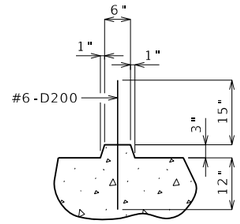


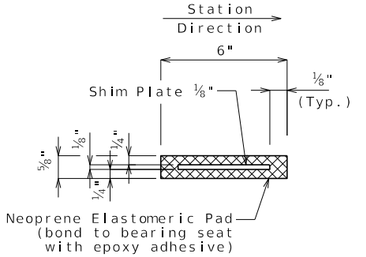
PLAN OF BEAM



PLAN OF BEAM SHOWING REINFORCEMENT



SECTION THRU KEY



SECTION THRU LAMINATED NEOPRENE BEARING PAD
Span (1-2) @ 2

(Use the same Bearing for Span 2-3)
(3-4) @ 3
(24 Required)

Notes:

Work this sheet with Intermediate Bents No. 2 & 3 Details 01 sheet.

All concrete in the intermediate bent shall be Class B-1, unless otherwise noted.

INTERMEDIATE BENTS NO. 2 & 3 - DETAIL 02

(Intermediate No. 2 shown, Int. Bent No. 3 similar - Use series 300 for Int. Bent No. 3)

Detailed AUG. 2024
Checked JAN. 2025

Note: This drawing is not to scale. Follow dimensions.

Sheet No. 9 of 33

STATE OF MISSOURI
STEPHEN ALSBURY
NUMBER E-24698
REGISTERED PROFESSIONAL ENGINEER

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Stephen E. Alsbury - Structural
MO PE - E-24698

DATE PREPARED
2/14/2025

ROUTE	STATE
I-70	MO
DISTRICT	SHEET NO.
BR	9

COUNTY
BOONE

JOB NO.
JST0021

CONTRACT ID.

PROJECT NO.

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MILLSTONE WEBER
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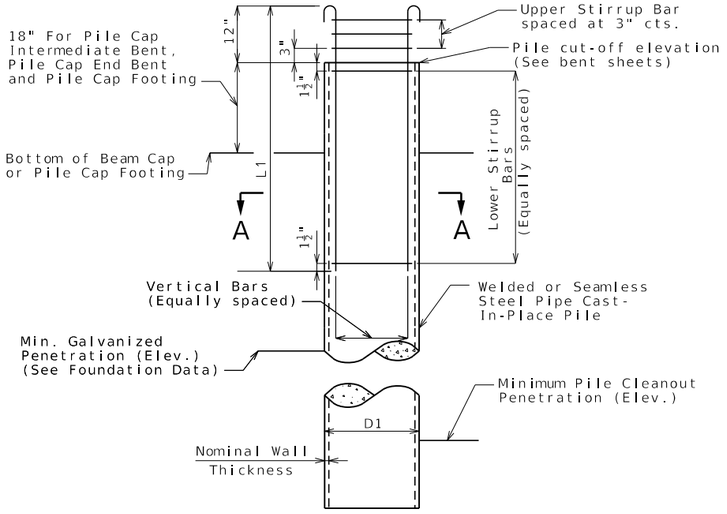
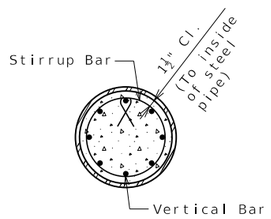
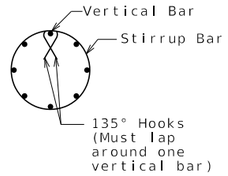
B_A9543_009_JST0021_IB2-3_DETL02.dgn 9:31:02 AM 2/14/2025



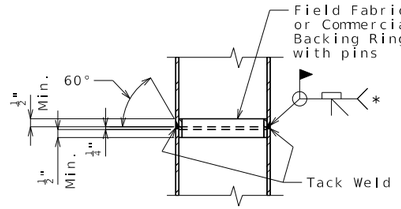
GALVANIZED OPEN ENDED CAST-IN-PLACE (OECIP) CONCRETE PILE
WITHOUT PILE POINT REINFORCEMENT



SECTION A-A



DETAIL OF SEISMIC STIRRUP BAR



STEEL PIPE PILE SPLICE

* Galvanizing material shall be omitted or removed one inch clear of weld locations in accordance with Sec 702.

GALVANIZED OPEN ENDED CAST-IN-PLACE (OECIP) CONCRETE PILE DATA				
Bent Number	1	2	3	4
D1, OECIP Pile (O.D.)	-	24	24	-
Min. Nominal Wall Thickness	-	5/8	5/8	-
Pile Point Reinforcement	-	**	**	-
Min. Pile Cleanout Penetration (Elev.)	-	670.5	670.0	-
Vertical Bars	-	12-#6-V200	12-#6-V300	-
L1, Length of Vertical Bars	-	7'-3"	7'-3"	-
Upper Stirrup Bars	-	3-#4-P200	3-#4-P300	-
Lower Stirrup Bars	-	7-#4-P200	7-#4-P300	-

** Open Ended Cutting Shoe

Notes:

Welded or seamless steel shell (pipe) shall be ASTM A252 Modified Grade 3 (fy = 50,000 psi) with physical and chemical requirements that meet ASTM A572 Grade 50. Pipe certification and source material certification shall be required.

Open ended pile shall be augered out to the minimum pile cleanout penetration elevation and filled with Class B-1 concrete.

Concrete for cast-in-place pile shall be Class B-1.

Steel casting for open ended cutting shoe pile point reinforcement shall be ASTM A27 Grade 65-35 ASTM A148 Grade 90-60.

The minimum wall thickness of any spot or local area of any type shall not be more than 12.5% under the specified nominal wall thickness.

The contractor shall determine the pile wall thickness required to avoid damage from all driving activities, but wall thickness shall not be less than the minimum specified. No additional payment will be made for furnishing a thicker pile wall then specified on the plans.

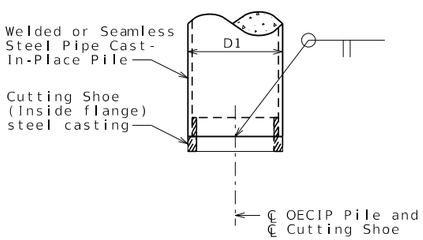
Splices of pipe for cast-in-place pipe pile shall be made watertight and to the full strength of the pipe above and below the splice to permit hard driving without damage. Pipe damaged during driving shall be replaced without cost to the state. Pipe sections used for splicing shall be at least 5 feet in length.

At the contractor's option, the hooks of vertical bars embedded in the beam cap may be oriented inward or outward.

Reinforcing steel for cast-in-place pile is included in the Bill of Reinforcing Steel.

All reinforcement for cast-in-place pile is included in the estimated quantities for bents.

For Foundation Data table, see Sheet No. 3.



MANUFACTURED OPEN ENDED
CUTTING SHOE (INSIDE FLANGE)

STATE OF MISSOURI
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02/14/2025 11:37:52 AM
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MO PE - E-24698

DATE PREPARED
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ROUTE I-70 | STATE MO
DISTRICT BR | SHEET NO. 10
COUNTY BOONE
JOB NO. JST0021
CONTRACT ID.
PROJECT NO.
BRIDGE NO. A9543

DESCRIPTION	DATE
REV. A-PRELIMINARY REVIEW	10/10/24
REV. B-FINAL REVIEW	01/29/25
REV. 0-RELEASE FOR CONSTRUCTION	02/14/25

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)
MoDOT
MILLSTONE WEBER
ABNA
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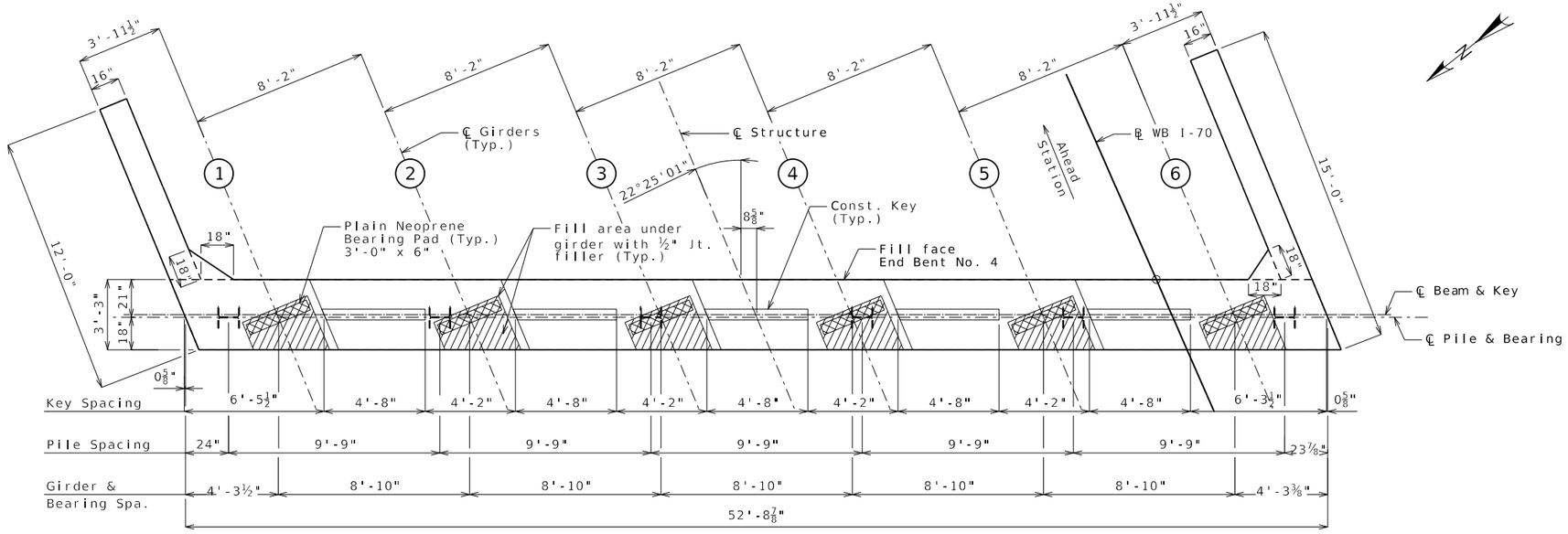
MO STATE CERTIFICATE OF AUTHORITY #001501 ENGINEERING

GALVANIZED OPEN ENDED CAST-IN-PLACE (OECIP) CONCRETE PILE

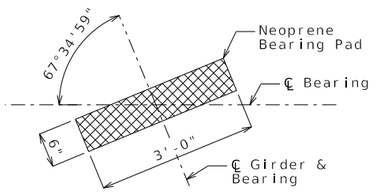
Detailed AUG. 2024
Checked JAN. 2025

Note: This drawing is not to scale. Follow dimensions.

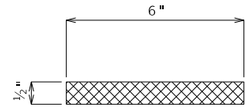
B_A9543_010_JST0021_PILE01.dgn 9:31:20 AM 2/14/2025



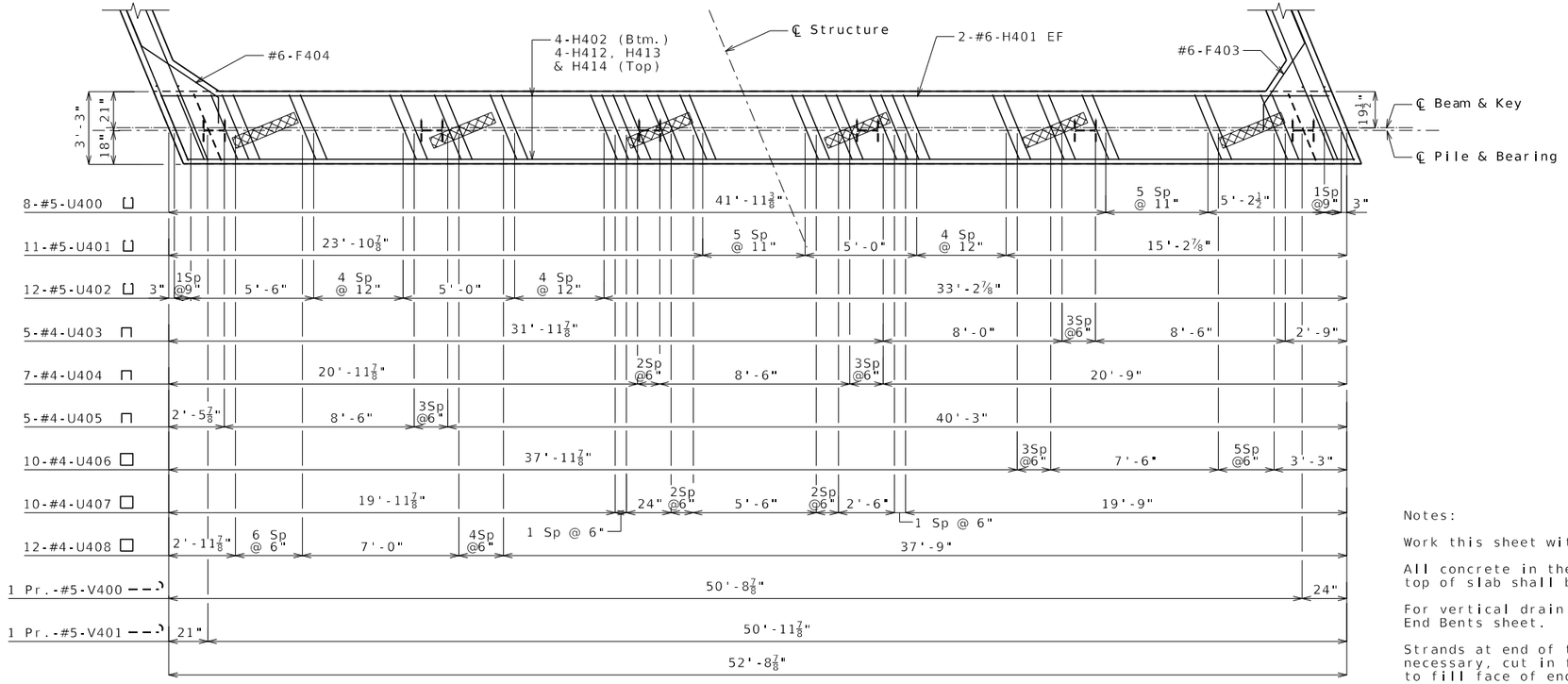
PLAN OF BEAM SHOWING DIMENSIONS



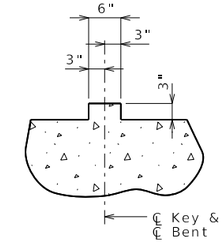
TYPICAL PLAN OF BEARINGS
6 Required



TYPICAL SECTION THRU NEOPRENE BEARING PAD



PLAN OF BEAM SHOWING REINFORCEMENT



SECTION THRU KEY

Notes:

Work this sheet with End Bent 4 Detail 02 and 03 sheets.

All concrete in the end bent above top of beam and below top of slab shall be Class B-2.

For vertical drain at end bents, see Vertical Drain at End Bents sheet.

Strands at end of the girders shall be field bent or, if necessary, cut in field to maintain 1½" minimum clearance to fill face of end bent.

Reinforcement shall be adjusted in the field to clear pile by 1½".

END BENT NO. 4 - DETAIL 01

Detailed AUG. 2024
Checked JAN. 2025

Note: This drawing is not to scale. Follow dimensions.

STATE OF MISSOURI
STEPHEN ALSBURY
NUMBER E-24698
REGISTERED PROFESSIONAL ENGINEER
02/14/2025 11:37:53 AM
Stephen E. Alsbury - Structural
MO PE - E-24698

DATE PREPARED 2/14/2025

ROUTE	STATE
I-70	MO

DISTRICT	SHEET NO.
BR	11

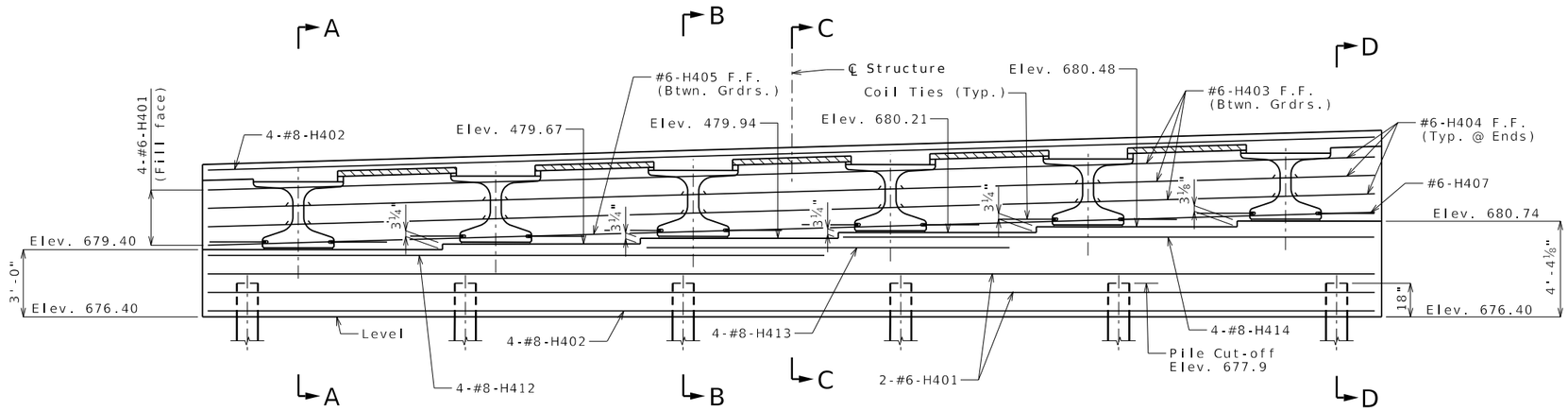
COUNTY: BOONE
JOB NO.: JST0021
CONTRACT ID.:
PROJECT NO.:
BRIDGE NO.: A9543

DATE	DESCRIPTION
10/10/24	REV. A-PRELIMINARY REVIEW
01/29/25	REV. B-FINAL REVIEW
02/14/25	REV. 0-RELEASE FOR CONSTRUCTION

MoDOT IMPROVE I-70 DB PROJECT 1

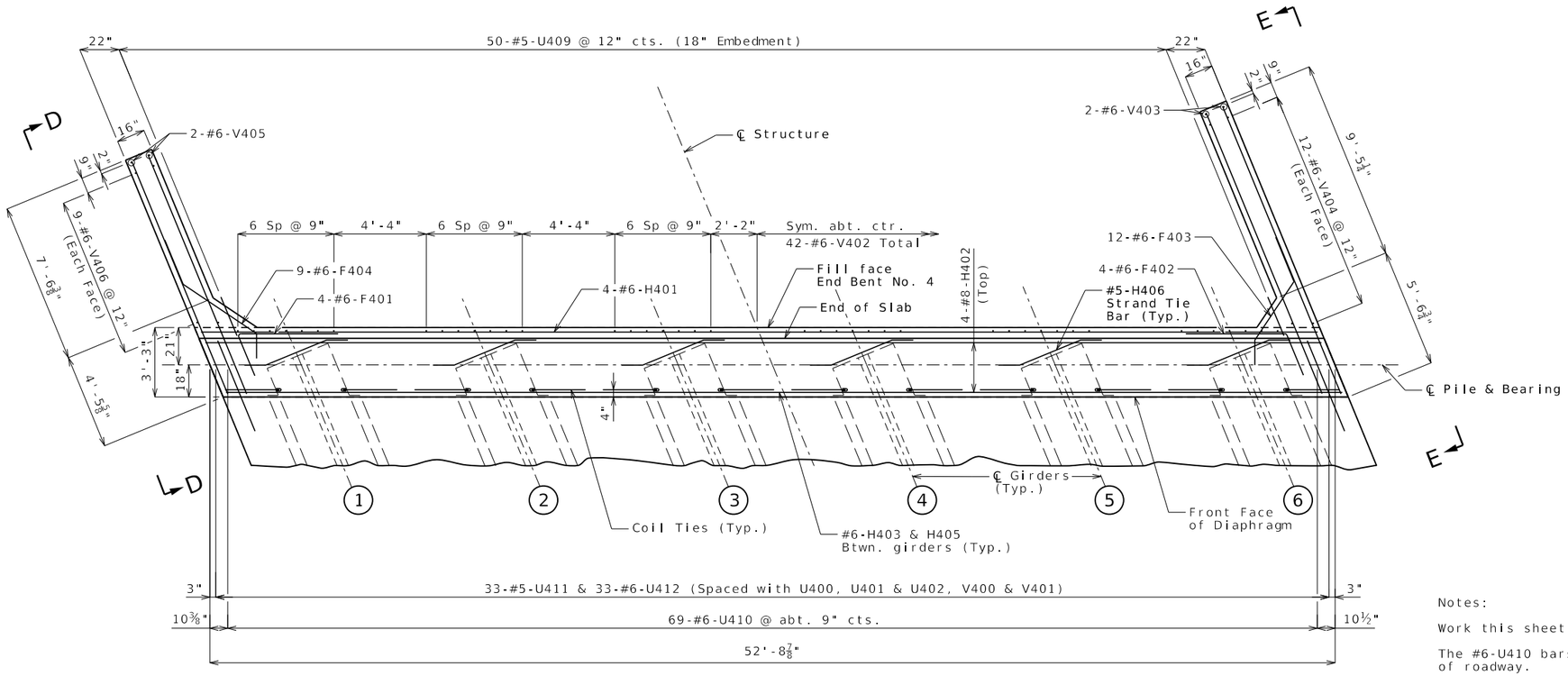
MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)
MoDOT
MILLSTONE WEBER
ABNA

MO STATE CERTIFICATE OF AUTHORITY #001501 ENGINEERING



SECTION NEAR END BENT

(Looking East - Ahead Station)
(Construction Joint Key and Vertical Reinforcement not shown for clarity)



PART OF BEAM SHOWING REINFORCEMENT

Minimum. Lap

#8 = 6'-2"

Notes:

Work this sheet with End Bent 4 Detail 01 and 03 sheets.

The #6-U410 bars shall be placed parallel to centerline of roadway.

The #6-F401 and #6-F402 bars shall be bent in the field to clear girders.

All concrete in the end bent above top of beam and below top of slab shall be Class B-2.

Strands at the end of the girders shall be field bent or, if necessary, cut in field to maintain 1½" minimum clearance to fill face of end bent.

END BENT NO. 4 - DETAIL 02

Detailed AUG. 2024
Checked JAN. 2025

Note: This drawing is not to scale. Follow dimensions.

STATE OF MISSOURI
STEPHEN ALSBURY
NUMBER E-24698
REGISTERED PROFESSIONAL ENGINEER
02/14/2025 11:37:53 AM
Stephen E. Alsbury - Structural
MO PE - E-24698

DATE PREPARED: 2/14/2025

ROUTE	STATE
I-70	MO
DISTRICT	SHEET NO.
BR	12

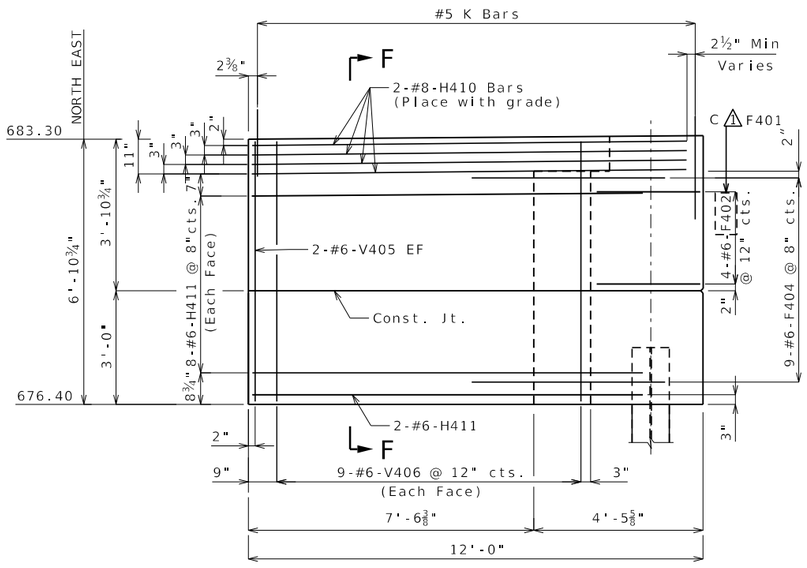
COUNTY: BOONE
JOB NO.: JST0021
CONTRACT ID.:
PROJECT NO.:
BRIDGE NO.: A9543

DATE	DESCRIPTION
10/10/24	REV. A-PRELIMINARY REVIEW
01/29/25	REV. B-FINAL REVIEW
02/14/25	REV. 0-RELEASE FOR CONSTRUCTION

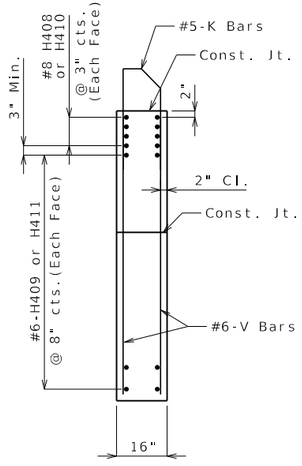
MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)
MoDOT
MILLSTONE WEBER
ABNA

MoDOT IMPROVE I-70 DB PROJECT 1

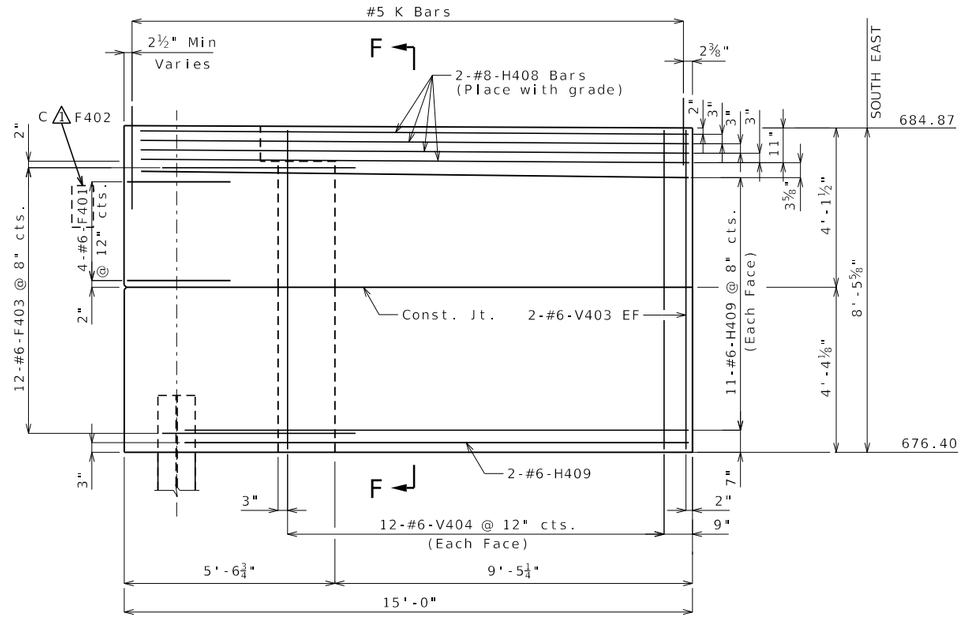
MO STATE CERTIFICATE OF AUTHORITY #001501 ENGINEERING



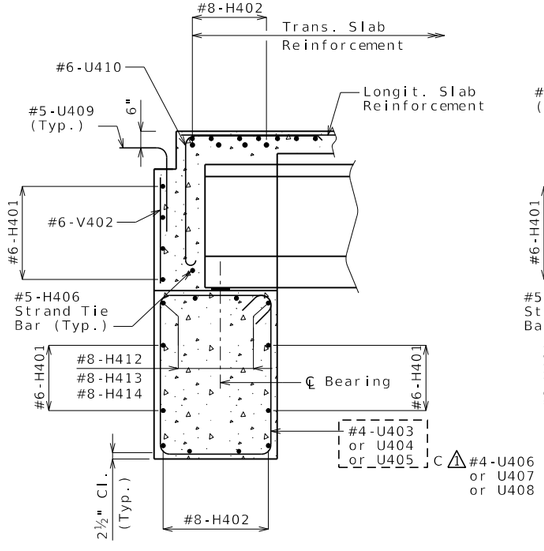
ELEVATION D-D



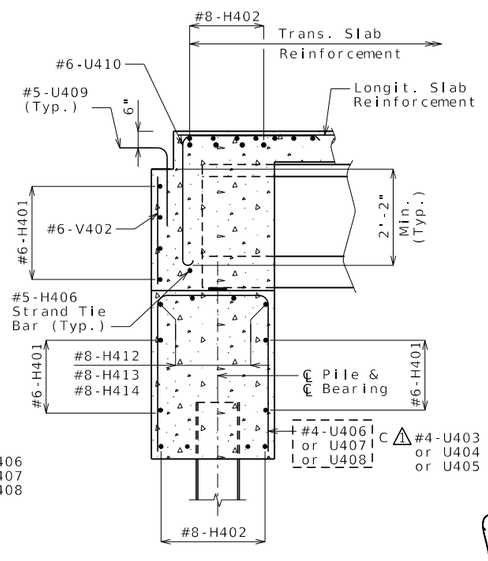
SECTION F-F



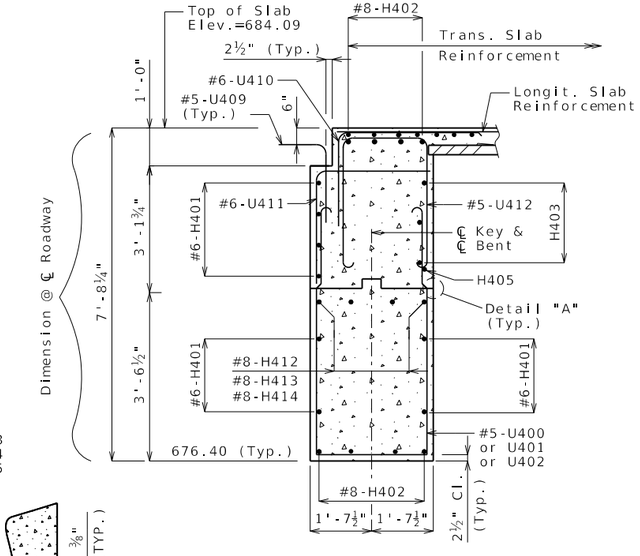
ELEVATION E-E



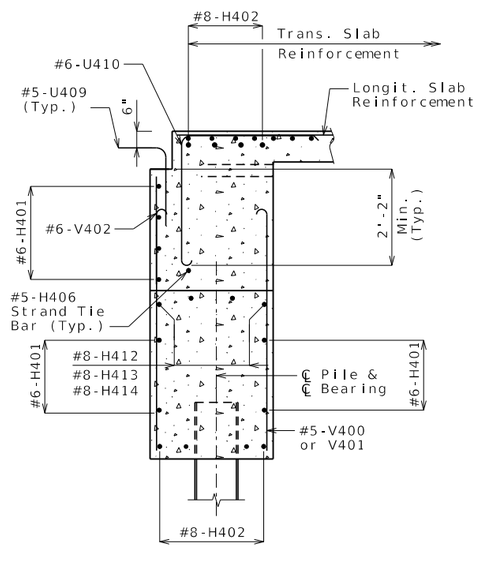
SECTION A-A



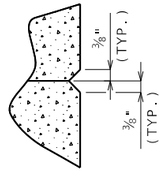
SECTION B-B



SECTION C-C



SECTION D-D



DETAIL "A"

Notes:

Work this sheet with End Bent 4 Details 01 & 02 Sheets.

For details of Vertical Drain, see Vertical Drain at End Bents sheet 7.

For details of Approach Slab, see Approach Slab sheet 26.

C 1 REVISED 3/11/2025

END BENT NO. 4 - DETAIL 03

Detailed AUG. 2024
Checked JAN. 2025

Note: This drawing is not to scale. Follow dimensions.

STATE OF MISSOURI
STEPHEN ALSBURY
NUMBER E-24698
REGISTERED PROFESSIONAL ENGINEER

03/11/2025 7:58:44 AM
Stephen E. Alsbury - Structural
MO PE - E-24698

DATE PREPARED
3/11/2025

ROUTE	STATE
I-70	MO
DISTRICT	SHEET NO.
BR	13

COUNTY
BOONE

JOB NO.
JST0021

CONTRACT ID.

PROJECT NO.

BRIDGE NO.
A9543

DATE	DESCRIPTION
10/10/24	REV. A-PRELIMINARY REVIEW
01/29/25	REV. B-FINAL REVIEW
02/14/25	REV. 0-RELEASE FOR CONSTRUCTION
03/11/25	REV. 1-NDC-009-REVISED BAR LIST

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
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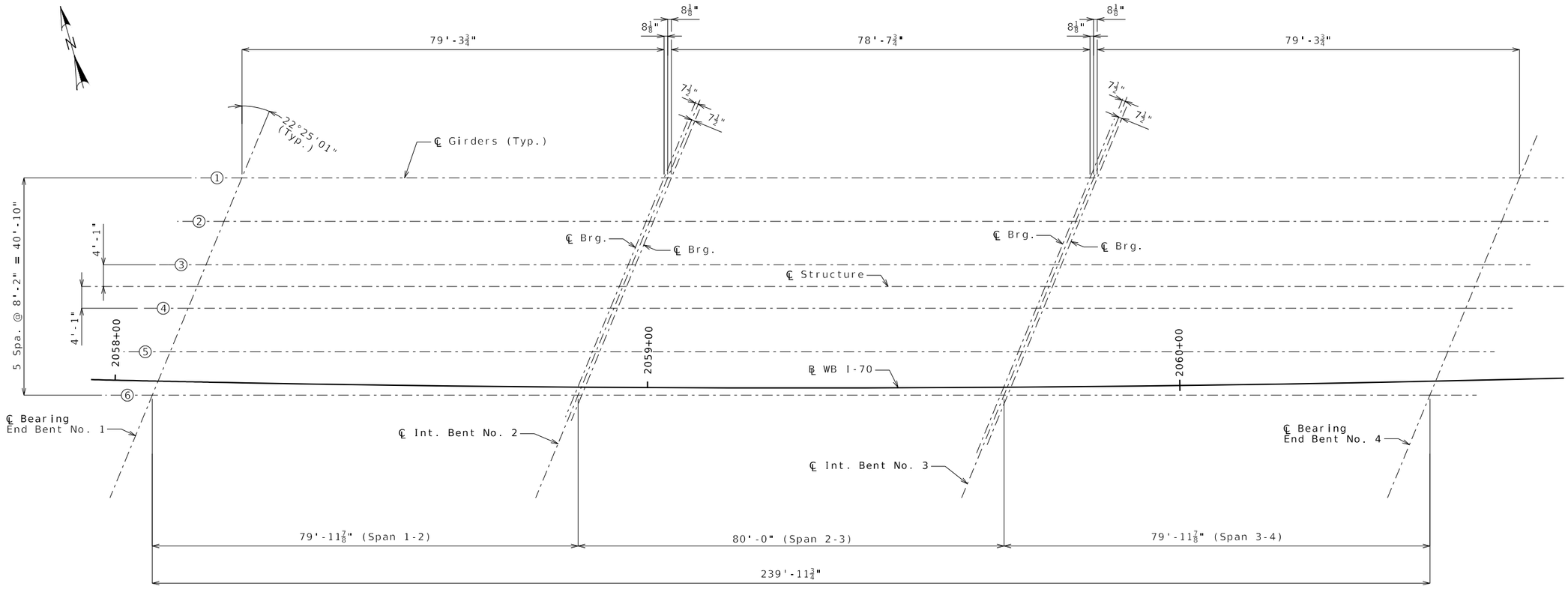
MoDOT IMPROVE I-70 DB PROJECT 1

MILLSTONE WEBER
ABNA

MO STATE CERTIFICATE OF AUTHORITY #001501 ENGINEERING



FRAMING PLAN

Detailed AUG. 2024
Checked JAN. 2025

Note: This drawing is not to scale. Follow dimensions.

STATE OF MISSOURI
STEPHEN ALSBURY
NUMBER E-24698
REGISTERED PROFESSIONAL ENGINEER
02/14/2025 11:37:53 AM
Stephen E. Alsbury - Structural
MO PE - E-24698

DATE PREPARED: 2/14/2025
ROUTE: I-70 | STATE: MO
DISTRICT: BR | SHEET NO.: 14
COUNTY: BOONE
JOB NO.: JST0021
CONTRACT ID.:
PROJECT NO.:
BRIDGE NO.: A9543

DATE	DESCRIPTION
10/10/24	REV. A-PRELIMINARY REVIEW
01/29/25	REV. B-FINAL REVIEW
02/14/25	REV. 0-RELEASE FOR CONSTRUCTION

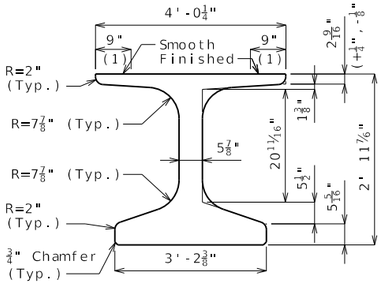
MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

MoDOT IMPROVE I-70 DB PROJECT 1

ABNA MILLSTONE WEBER

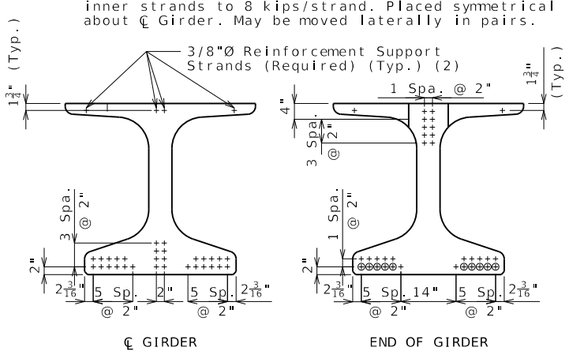
MO STATE CERTIFICATE OF AUTHORITY #001501 ENGINEERING

(1) Fabricator shall apply a bond breaker to this region excluding where joint filler will be applied.



DIMENSIONS

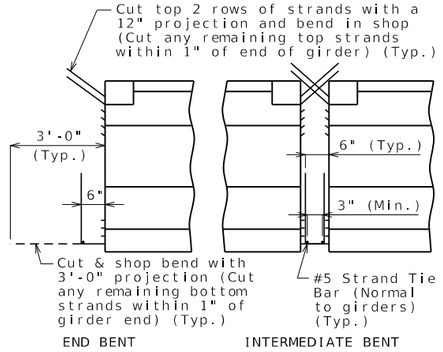
(2) Outer strands tensioned to 2.02 kips/strand and inner strands to 8 kips/strand. Placed symmetrical about ℄ Girder. May be moved laterally in pairs.



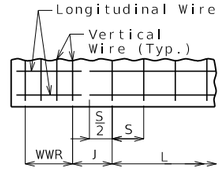
STRAND ARRANGEMENT

\+ Indicates prestressing strand.

o Indicates cut & shop bend with 3'-0" projection.



STRANDS AT GIRDER ENDS



WELDED WIRE PLACEMENT

S = Vertical wire spacing

L = Length of WWR mats

J = Distance between WWR mats

Bill of Reinforcing Steel

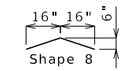
Bars Each Girder

No.	Size/Mark		Length	Shape
100	3	G1	2'-10"	8
2	4	G3	4'-2"	20
2	4	G4	2'-3"	20
2	4	G5	2'-10¾"	20
6	4	G6	Varies	20

Welded Wire Each Girder

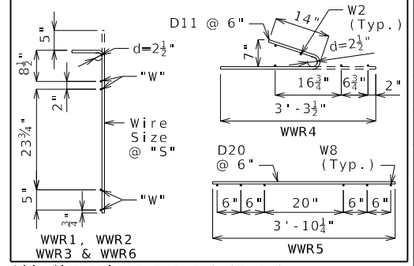
Mark	Size	S	W	L	J
WWR1	D31	4"	W12	6'-4"	11"
WWR2	D31	12"	W12	62'-0"	
WWR6	D31	2"	W12	16"	3⅛"

Bending Diagrams



Shape 8

Shape 20



All dimensions are out to out.

Hooks and bends shall be in accordance with the CRSI Manual of Standard Practice for Detailing Reinforced Concrete Structures, Stirrup and Tie Dimensions.

Actual bar lengths are measured along centerline of bar to the nearest inch.

Minimum clearance to reinforcing shall be 1", unless otherwise shown.

All bar reinforcement shall be Grade 60.

WWR shall not be epoxy coated.

G4 and G5 not required for interior girders. G3 and G6 not required for exterior girders of intermediate spans. Half no. of G3, G4, G5 and G6 not required for ext. girders of end spans.

General Notes:

Concrete for prestressed beams shall be Class A-1 with f'c = 8000 psi and f'ci = 6500 psi.

Use 30 strands, 0.6"Ø Grade 270, with an initial prestress force of 1318 kips.

Pretensioned members shall be in accordance with Sec 1029.

Fabricator shall be responsible for location and design of lifting devices.

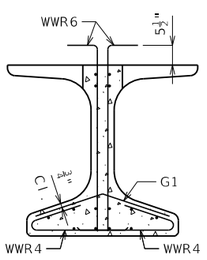
Exterior and interior girders are the same except: coil ties.

The contractor shall provide bracing necessary for lateral and torsional stability of the girders during construction of the concrete slab and remove the bracing after the slab has attained 75% design strength. Contractor shall not drill holes in the girders.

For Girder Camber Diagram, see Sheet No. 20.

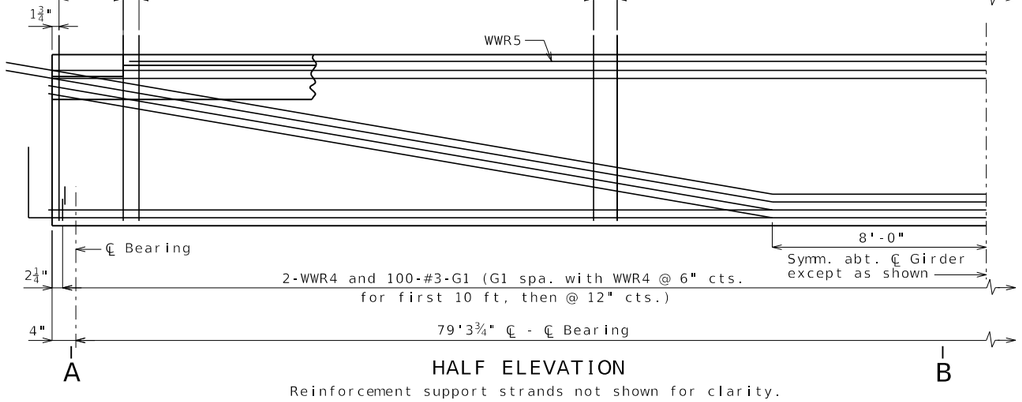
For location of coil inserts at slab drains, see Sheet No.19.

For location of coil ties at integral bents, see Sheets No. 5 and 12.



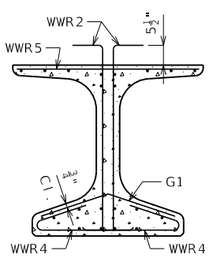
SECTION A-A

Strands not shown for clarity.



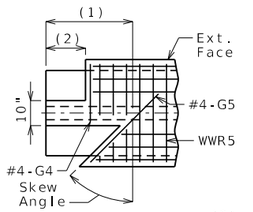
HALF ELEVATION

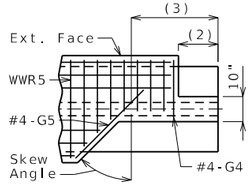
Reinforcement support strands not shown for clarity.



SECTION B-B

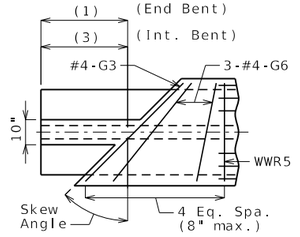
Strands not shown for clarity.





LEFT EXTERIOR GIRDER AT INTERMEDIATE BENT

Rotate 180° for right ext.



INTERIOR GIRDER AT ALL BENTS & EXTERIOR GIRDER AT END BENT

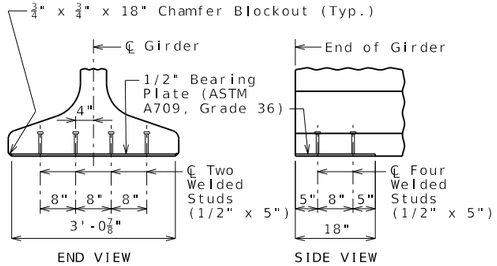
TOP FLANGE BLOCKOUT

Mirror for right advanced.

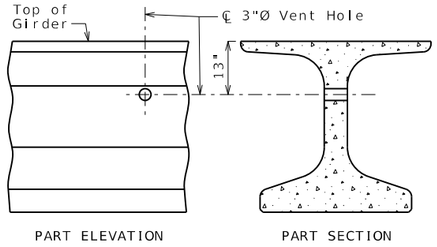
(1) 1'-9¾" @ EB 1
(1) 1'-10¼" @ EB 4

(2) 0'-9¼" @ BT 2 1-2
(2) 0'-8¾" @ BT 3 3-4

(3) 1'-3¾" @ BT 2 1-2
(3) 1'-3¼" @ BT 3 3/4

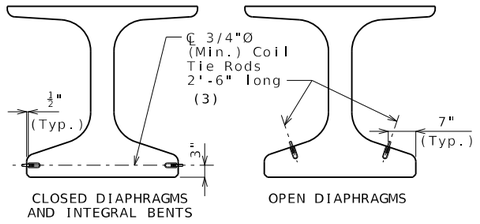


BEARING PLATE



VENT HOLE

Place vent holes at or near upgrade 1/3 point of girders and clear reinforcing steel or strands by 1 1/2" minimum.



COIL TIES

Exclude coil tie at exterior face of exterior girders except at integral end bents.

(3) 2'-2" at exterior face of exterior girders at end bents

NU-GIRDERS - SPANS (1-2) AND (3-4)

Detailed AUG. 2024
Checked JAN. 2025

Note: This drawing is not to scale. Follow dimensions.

STATE OF MISSOURI
STEPHEN ALSBURY
NUMBER E-24698
REGISTERED PROFESSIONAL ENGINEER

02/14/2025 11:37:53 AM
Stephen E. Alsbury - Structural
MO PE - E-24698

DATE PREPARED
2/14/2025

ROUTE	STATE
I-70	MO
DISTRICT	SHEET NO.
BR	15

COUNTY
BOONE

JOB NO.
JST0021

CONTRACT ID.

PROJECT NO.

BRIDGE NO.
A9543

DATE	DESCRIPTION
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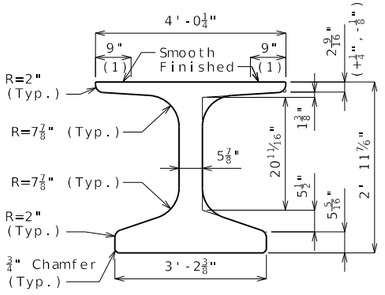
MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

MoDOT IMPROVE I-70 DB PROJECT 1

MILLSTONE WEBER
ABNA

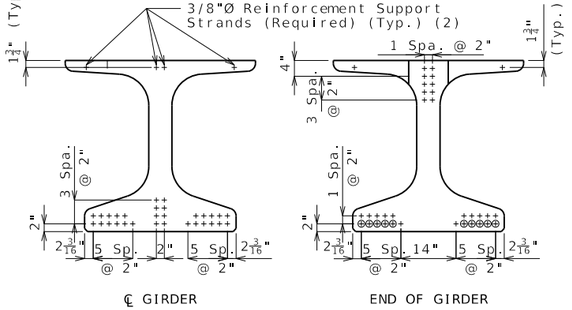
MO STATE CERTIFICATE OF AUTHORITY #001501 ENGINEERING

(1) Fabricator shall apply a bond breaker to this region excluding where joint filler will be applied.



DIMENSIONS

(2) Outer strands tensioned to 2.02 kips/strand and inner strands to 8 kips/strand. Placed symmetrical about ℄ Girder. May be moved laterally in pairs.

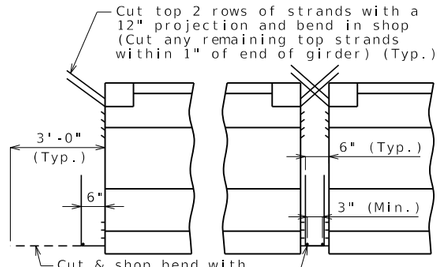


℄ GIRDER END OF GIRDER

STRAND ARRANGEMENT

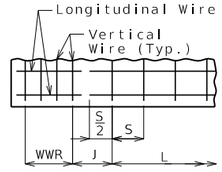
\+ Indicates prestressing strand.

○ Indicates cut & shop bend with 3'-0" projection.



END BENT INTERMEDIATE BENT

STRANDS AT GIRDER ENDS



WELDED WIRE PLACEMENT

S = Vertical wire spacing

L = Length of WWR mats

J = Distance between WWR mats

Bill of Reinforcing Steel

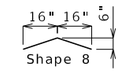
Bars Each Girder

No.	Size/Mark		Length	Shape
99	3	G1	2'-10"	8
2	4	G3	4'-2"	20
2	4	G4	2'-3"	20
2	4	G5	2'-10¾"	20
6	4	G6	Varies	20

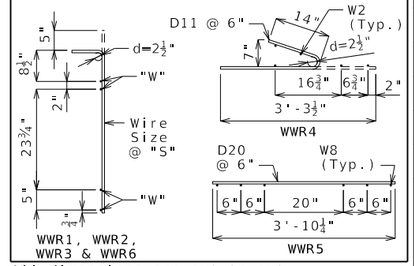
Welded Wire Each Girder

Mark	Size	S	W	L	J
WWR1	D31	4"	W12	6'-0"	11"
WWR2	D31	12"	W12	62'-0"	--
WWR6	D31	2"	W12	16"	3⅛"

Bending Diagrams



Shape 20



All dimensions are out to out.

Hooks and bends shall be in accordance with the CRSI Manual of Standard Practice for Detailing Reinforced Concrete Structures, Stirrup and Tie Dimensions.

Actual bar lengths are measured along centerline of bar to the nearest inch.

Minimum clearance to reinforcing shall be 1", unless otherwise shown.

All bar reinforcement shall be Grade 60.

WWR shall not be epoxy coated.

G4 and G5 not required for interior girders. G3 and G6 not required for exterior girders of intermediate spans. Half no. of G3, G4, G5 and G6 not required for ext. girders of end spans.

General Notes:

Concrete for prestressed beams shall be Class A-1 with f'c = 8000 psi and f'ci = 6500 psi.

Use 30 strands, 0.6"Ø Grade 270, with an initial prestress force of 1318 kips.

Pretensioned members shall be in accordance with Sec 1029.

Fabricator shall be responsible for location and design of lifting devices.

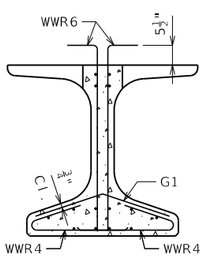
Exterior and interior girders are the same except: coil ties.

The contractor shall provide bracing necessary for lateral and torsional stability of the girders during construction of the concrete slab and remove the bracing after the slab has attained 75% design strength. Contractor shall not drill holes in the girders.

For Girder Camber Diagram, see Sheet No. 20.

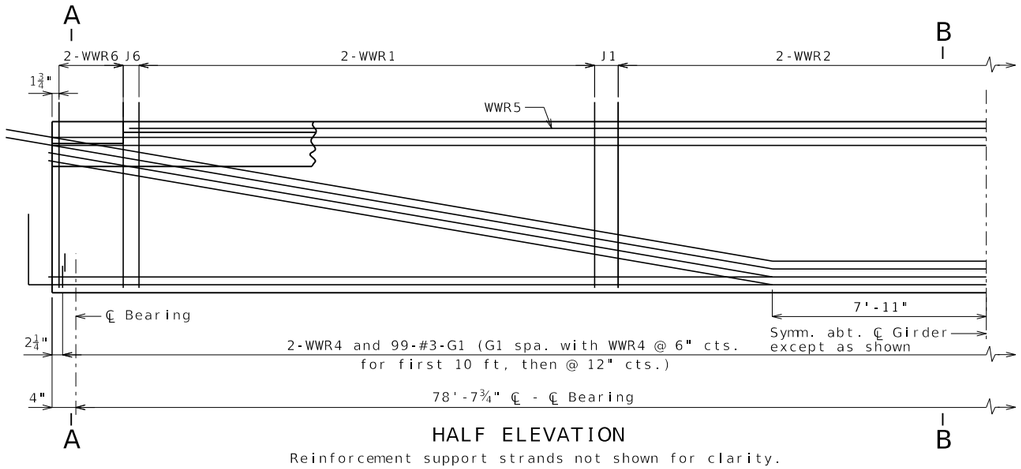
For location of coil inserts at slab drains, see Sheet No. 19.

For location of coil ties at concrete intermediate bents, see Sheets No. 17.



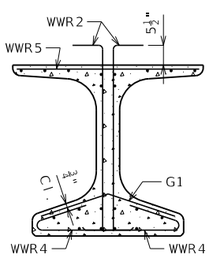
SECTION A-A

Strands not shown for clarity.



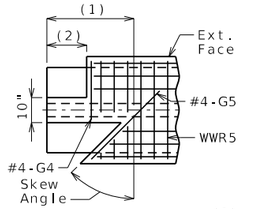
HALF ELEVATION

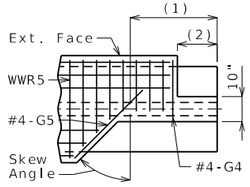
Reinforcement support strands not shown for clarity.



SECTION B-B

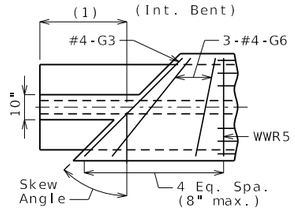
Strands not shown for clarity.





LEFT EXTERIOR GIRDER AT INTERMEDIATE BENT

Rotate 180° for right ext.



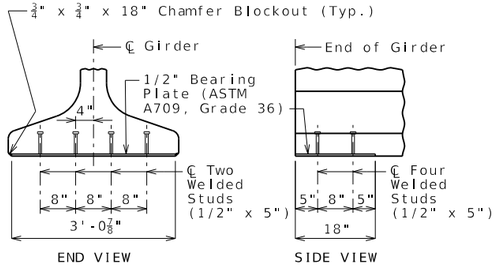
INTERIOR GIRDER AT ALL BENTS & EXTERIOR GIRDER AT END BENT

TOP FLANGE BLOCKOUT

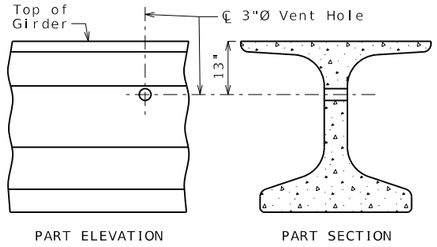
Mirror for right advanced.

(1) 1'-3¾" @ BT 2 2-3
(1) 1'-3¾" @ BT 3 2-3

(2) 0'-9¼" @ BT 2 2-3
(2) 0'-8¾" @ BT 3 2-3



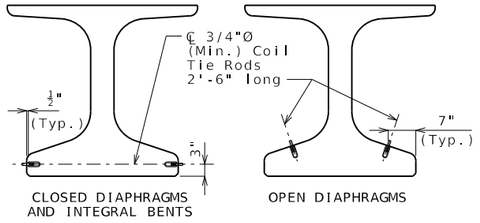
BEARING PLATE



PART ELEVATION PART SECTION

VENT HOLE

Place vent holes at or near upgrade 1/3 point of girders and clear reinforcing steel or strands by 1 1/2" minimum.



CLOSED DIAPHRAGMS AND INTEGRAL BENTS

OPEN DIAPHRAGMS

COIL TIES

Exclude coil tie at exterior face of exterior girders except at integral end bents.

NU-GIRDERS - SPAN (2-3)

Detailed AUG. 2024
Checked JAN. 2025

Note: This drawing is not to scale. Follow dimensions.

STATE OF MISSOURI
STEPHEN ALSBURY
NUMBER E-24698
REGISTERED PROFESSIONAL ENGINEER

02/14/2025 11:37:53 AM
Stephen E. Alsbury - Structural
MO PE - E-24698

DATE PREPARED
2/14/2025

ROUTE	STATE
I-70	MO
DISTRICT	SHEET NO.
BR	16

COUNTY
BOONE

JOB NO.
JST0021

CONTRACT ID.

PROJECT NO.

BRIDGE NO.
A9543

DATE	DESCRIPTION
10/10/24	REV. A-PRELIMINARY REVIEW
01/29/25	REV. B-FINAL REVIEW
02/14/25	REV. 0-RELEASE FOR CONSTRUCTION

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
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ABNA

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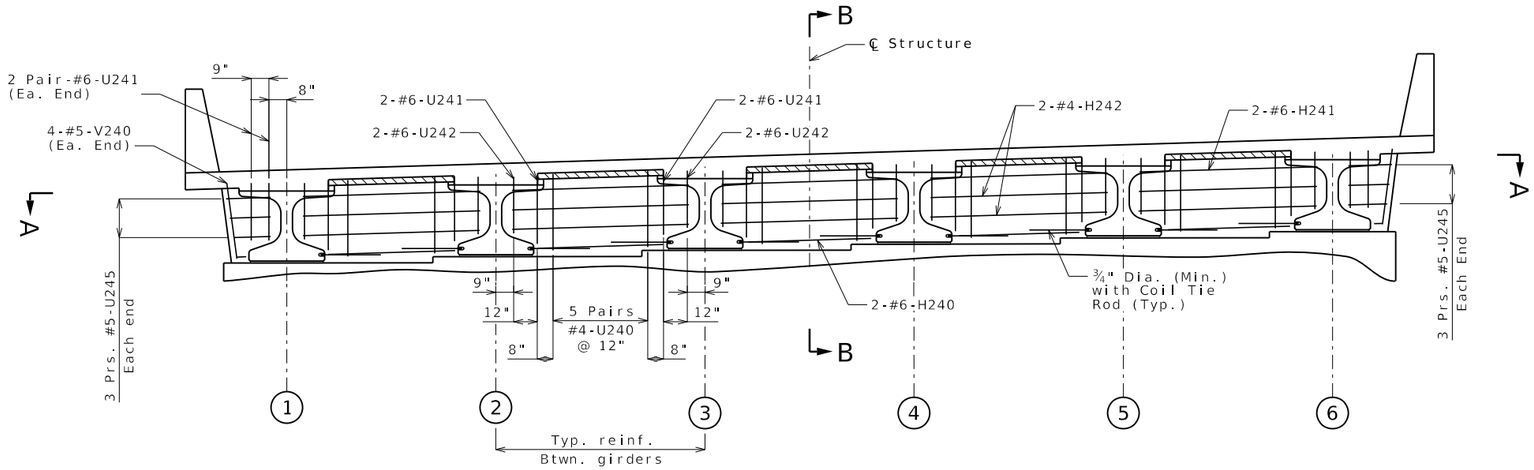
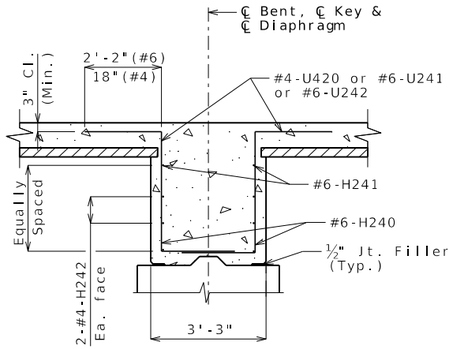
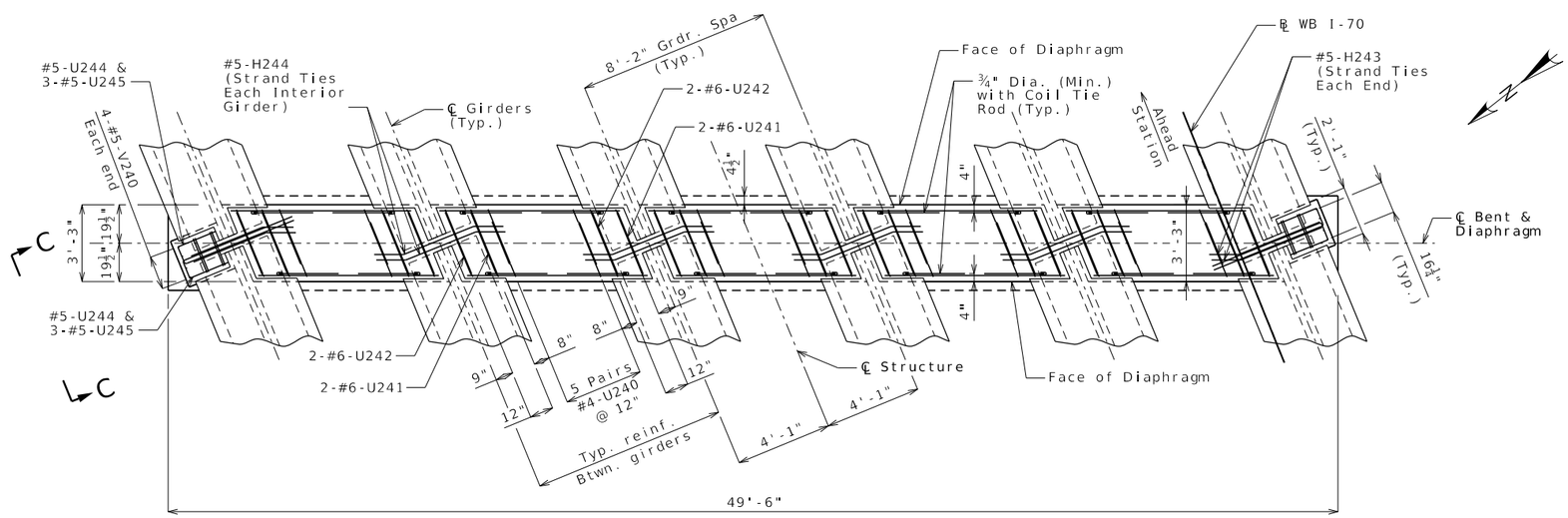


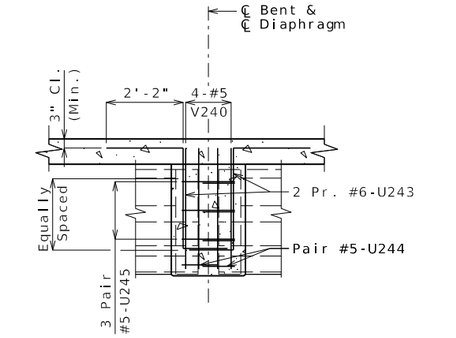
SECTION NEAR INTERMEDIATE BENT



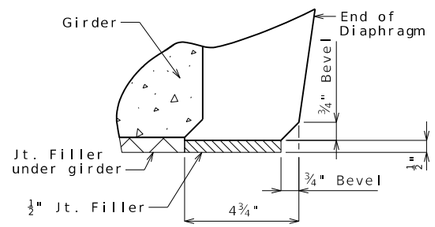
SECTION B-B



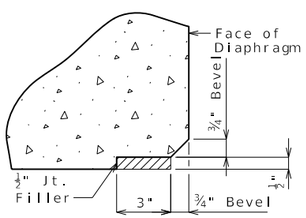
SECTION A-A



SECTION C-C



END DETAIL



EDGE DETAIL

Notes:

Diaphragms at Intermediate Bents shall be built vertical.

For location of #5-H244 and #5-H245 (Strand Tie Bars), see Sheet No. 15 and 16.

For location of Coil Ties, see Sheet No. 15 and 16.

Place U-bars parallel to ℄ Structure.

CONCRETE DIAPHRAGMS AT INTERMEDIATE BENTS

Detailed AUG. 2024
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02/14/2025 11:37:54 AM
Stephen E. Alsbury - Structural
MO PE - E-24698

DATE PREPARED: 2/14/2025

ROUTE	STATE
I-70	MO

DISTRICT	SHEET NO.
BR	17

COUNTY: BOONE
JOB NO.: JST0021
CONTRACT ID.:
PROJECT NO.:
BRIDGE NO.: A9543

DATE	DESCRIPTION
10/10/24	REV. A-PRELIMINARY REVIEW
01/29/25	REV. B-FINAL REVIEW
02/14/25	REV. 0-RELEASE FOR CONSTRUCTION

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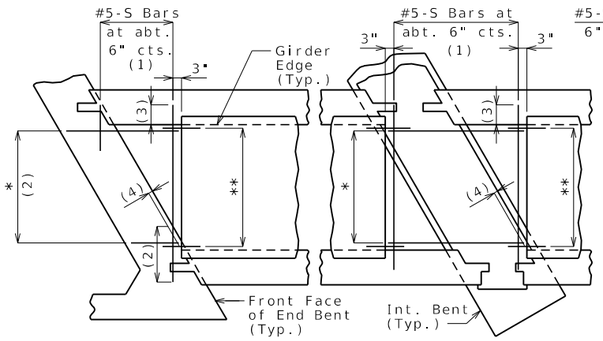
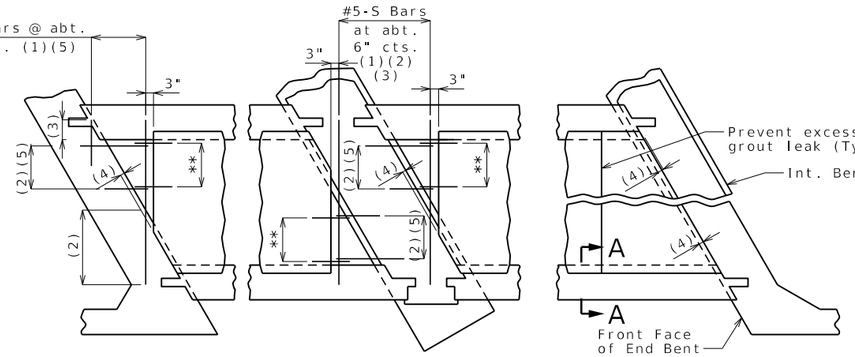
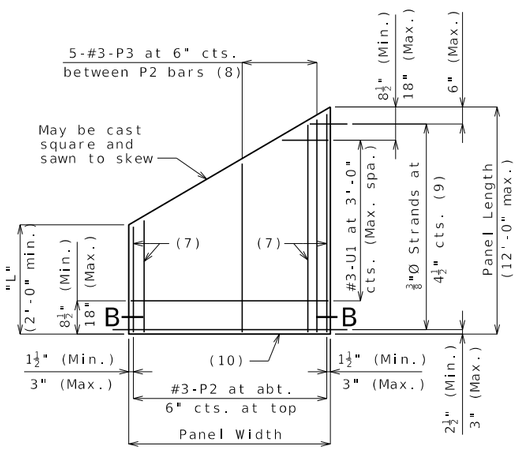




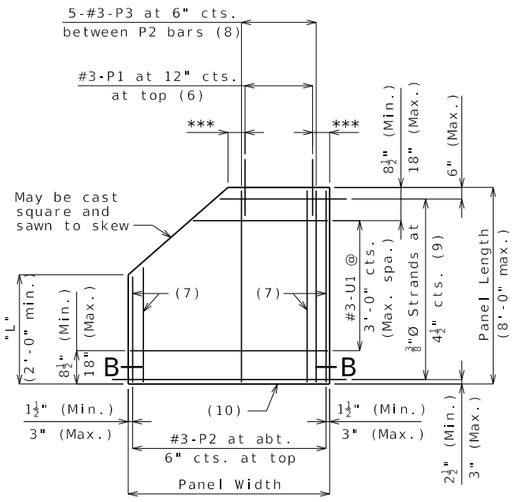
SQUARED END PANELS OR TRUNCATED END PANELS

PLAN SHOWING PANEL PLACEMENT

* #5-S Bars at abt. 9" cts. (1)
** #3-P1 at 12" cts. (End panels only)

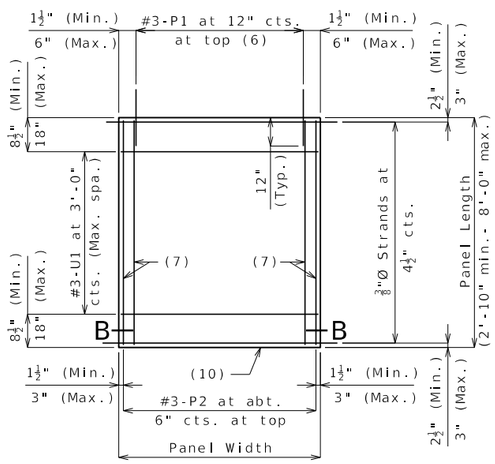


PLAN OF OPTIONAL SKEWED END PANEL



PLAN OF OPTIONAL TRUNCATED END PANEL

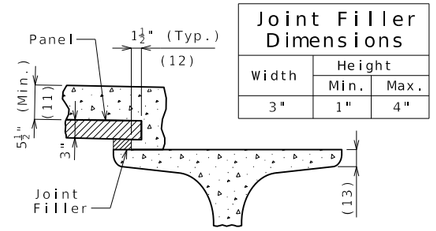
*** 3" (Min.), 6" (Max.)



PLAN OF SQUARED PANEL

SKEWED END PANELS

Joint Filler Dimensions		
Width	Height	
	Min.	Max.
3"	1"	4"



SECTION A-A

Reference Notes:

Plan of Panel Placement:
(1) S-bars shown are bottom steel in slab between panels and used with squared and truncated end panels only.

(2) Extend S-bars 18 inches beyond the front face of end bents and int. bents for squared and truncated end panels only.

(3) Extend S-bars 9 inches beyond edge of girder (Typ.).

(4) End panels shall be dimensioned 1/2" min. to 1 1/2" max. from the inside face of diaphragm.

(5) For truncated end panels, use a min. of #5-S bars at 6" crossings in openings, or min. 4x4-W7xW7.

Plans of Panels:
(6) For end panels only, P1 bars shall be 2'-0" in length and embedded 12". P1 bars will not be required for panels at squared integral end bents.

(7) #3-P2 bars near edge of panel at bottom (under strands).

(8) Use #3-P3 bars if panel is skewed 45° or greater.

(9) Any strand 2'-0" or shorter shall have a #4 reinforcing bar on each side of it, centered between strands. Strands 2'-0" or shorter may then be debonded at the fabricator's option.

(10) Optional 1/2" x 45° Chamfer one or both sides at bottom.

Section A-A:
(11) Slab thickness over prestressed panels varies due to girder camber. In order to maintain minimum slab thickness, it may be necessary to raise the grade uniformly throughout the structure. No payment will be made for additional labor or materials required for necessary grade adjustment.

(12) Contractor shall ensure proper consolidation under and between panels.

(13) At the contractor's option, the variation in slab thickness over prestressed panels may be eliminated or reduced by increasing and varying the girder top flange thickness. Dimensions shall be shown on the shop drawings.

General Notes:

Prestressed Panels:
Concrete for prestressed panels shall be Class A-1 with f'c = 6,000 psi, f'ci = 4,000 psi.

The top surface of all panels shall receive a scored finish with a depth of scoring of 1/8" perpendicular to the prestressing strands in the panels.

Prestressing tendons shall be high-tensile strength, uncoated, seven-wire, low-relaxation strands for prestressed concrete in accordance with AASHTO M 203 Grade 270, with nominal diameter of strand = 3/8" and nominal area = 0.085 sq.in. and minimum ultimate strength = 22.95 kips (270 ksi). Larger strands may be used with the same spacing and initial tension.

Initial prestressing force = 17.2 kips/strand.

The method and sequence of releasing the strands shall be shown on the shop drawings.

Suitable anchorage devices for lifting panels may be cast in panels, provided the devices are shown on the shop drawings and approved by the engineer. Panel lengths shall be determined by the contractor and shown on the shop drawings.

When squared end panels are used at skewed bents, the skewed portion shall be cast full depth. No separate payment will be made for additional concrete and reinforcing required.

Support from diaphragm forms is required under the optional skewed end until cast-in-place concrete has reached 3,000 psi compressive strength.

Prestressed panels shall be brought to saturated surface-dry (SSD) condition just prior to the deck pour. There shall be no free standing water on the panels or in the area to be cast.

The prestressed panel quantities are not included in the table of estimated quantities for the slab.

Reinforcing Steel:
All dimensions are out to out.

Hooks and bends shall be in accordance with the CRSI Manual of Standard Practice for Detailing Reinforced Concrete Structures, Stirrup and Tie Dimensions.

Minimum clearance to reinforcing steel shall be 1 1/2", unless otherwise shown.

If U1 bars interfere with placement of slab steel, U1 loops may be bent over, as necessary, to clear slab steel.

Deformed welded wire reinforcement (WWR) providing a minimum area of reinforcing perpendicular to strands of 0.22 sq in./ft, with spacing parallel to strands sufficient to ensure proper handling, may be used in lieu of the #3-P2 bars shown. Wire diameter shall not be larger than 0.375 inch. The above alternative reinforcement criteria may be used in lieu of the #3-P3 bars, when required, and placed over a width not less than 2 feet.

The following reinforcing steel shall be tied securely to the strands with the following maximum spacing in each direction:
#3-P2 bars at 16 inches.
WWR at 24 inches.

The #3-U1 bars shall be tied securely to #3-P2 bars, to WWR or to strands (when placed between P1 bars) at about 3-foot centers.

Minimum reinforcement steel length shall be 2'-0".

All reinforcement other than prestressing strands shall be epoxy coated.

Precast panels may be in contact with stirrup reinforcing in diaphragms.

S-bars are not listed in the bill of reinforcing.

Cost of S-bars will be considered completely covered by the contract unit price for the slab.

Joint Filler:
Joint filler shall be preformed fiber expansion joint material in accordance with Sec 1057 or expanded or extruded polystyrene bedding material in accordance with Sec 1073.

Use Slab Haunching Diagram on Sheet No. 20 for determining thickness of joint filler within the limits noted in the table of Joint Filler Dimensions.

Thicker material may be used on one or both sides of the girder to reduce cast-in-place concrete thickness to within tolerances.

The same thickness of preformed fiber expansion joint material shall be used under any one edge of any panel except at locations where top flange thickness may be stepped. The maximum change in thickness between adjacent panels shall be 1/2 inch. The polystyrene bedding material may be cut with a transition to match haunch height above top of flange.

Joint filler shall be glued to the girder. When thickness exceeds 1 1/2 inches, the joint filler shall be glued top and bottom. The glue used shall be the type recommended by the joint filler manufacturer.

Edges of panels shall be uniformly seated on the joint filler before slab reinforcement is placed.

PRESTRESSED PANELS

Detailed AUG. 2024
Checked JAN. 2025

Note: This drawing is not to scale. Follow dimensions.

STATE OF MISSOURI
STEPHEN ALSBURY
NUMBER E-24698
REGISTERED PROFESSIONAL ENGINEER
02/14/2025 11:37:54 AM
Stephen E. Alsbury - Structural
MO PE - E-24698

DATE PREPARED: 2/14/2025
ROUTE: I-70 | STATE: MO
DISTRICT: BR | SHEET NO.: 18
COUNTY: BOONE
JOB NO.: JST0021
CONTRACT ID.:
PROJECT NO.:
BRIDGE NO.: A9543

DESCRIPTION	DATE
REV. A-PRELIMINARY REVIEW	10/10/24
REV. B-FINAL REVIEW	01/29/25
REV. 0-RELEASE FOR CONSTRUCTION	02/14/25

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
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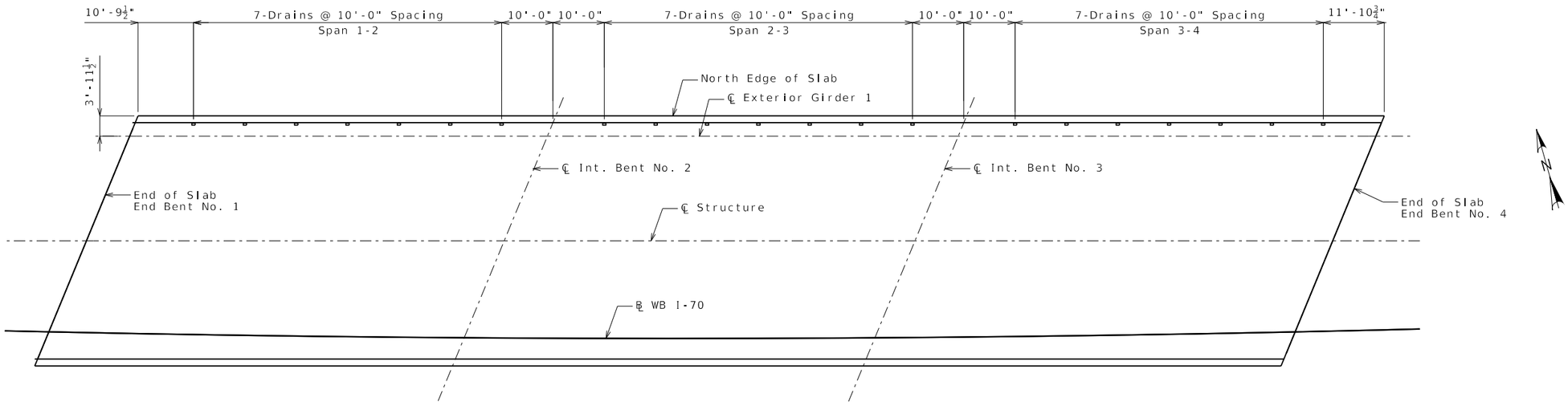
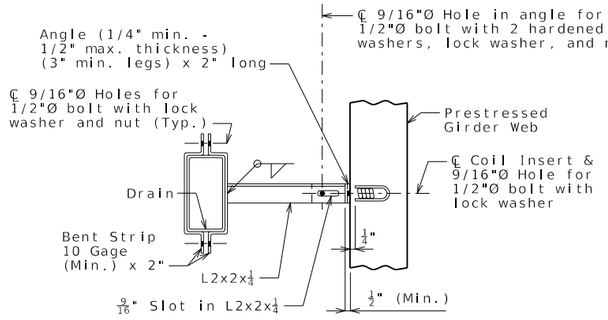
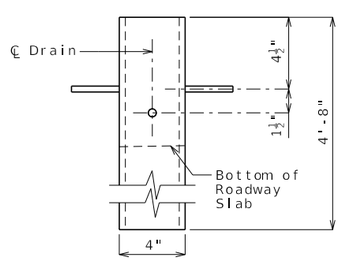


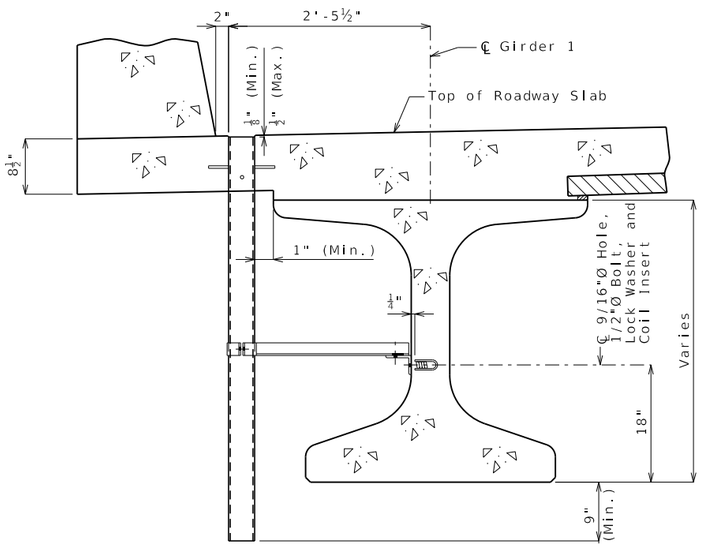
PLAN OF SLAB SHOWING SLAB DRAIN LOCATIONS



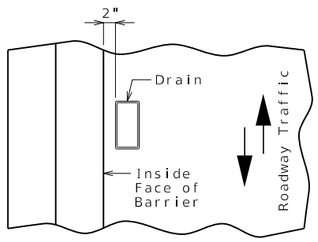
PART SECTION SHOWING BRACKET ASSEMBLY



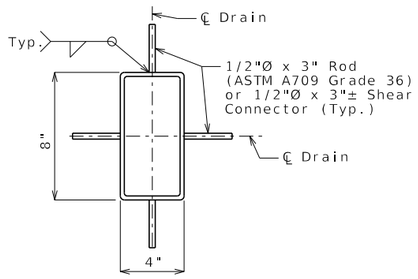
ELEVATION OF DRAIN



PART SECTION NEAR DRAIN



PART PLAN OF SLAB AT DRAIN



PLAN OF STEEL DRAIN OPTION

General Notes:

Slab drain bracket assembly shall be ASTM A709 Grade 36 steel.

Locate drains in slab by dimensions shown in Part Section Near Drain.

Reinforcing steel shall be shifted to clear drains.

The coil inserts and bracket assembly shall be galvanized in accordance with ASTM A123.

All bolts, hardened washers, lock washers and nuts shall be galvanized in accordance with AASHTO M 232 (ASTM A153), Class C.

All 1/2"Ø bolts shall be ASTM A307.

Shop drawings will not be required for the slab drains and the bracket assembly.

The coil insert required for the bracket assembly attachment shall be located on the prestressed girder shop drawings.

Coil inserts shall have a concrete pull-out strength (ultimate load) of at least 2,500 pounds in 5,000 psi concrete.

The bolt required to attach the slab drain bracket assembly to the prestressed girder web shall be supplied by the prestressed girder fabricator.

Notes for Steel Drain:

Slab drains may be fabricated of either 1/4" welded sheets of ASTM A709 Grade 36 steel or from 1/4" structural steel tubing ASTM A500 or A501.

Outside dimensions of drains are 8" x 4".

The drains shall be galvanized in accordance with ASTM A123.

SLAB DRAINS

Detailed AUG. 2024
Checked JAN. 2025

Note: This drawing is not to scale. Follow dimensions.

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Stephen E. Alsbury - Structural
MO PE - E-24698

DATE PREPARED: 2/14/2025
ROUTE: I-70 | STATE: MO
DISTRICT: BR | SHEET NO.: 19
COUNTY: BOONE
JOB NO.: JST0021
CONTRACT ID.:
PROJECT NO.:
BRIDGE NO.: A9543

DATE	DESCRIPTION
10/10/24	REV. A-PRELIMINARY REVIEW
01/29/25	REV. B-FINAL REVIEW
02/14/25	REV. 0-RELEASE FOR CONSTRUCTION

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
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ABNA

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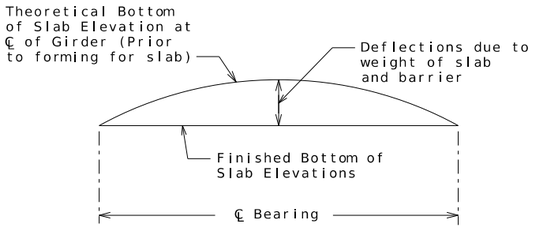
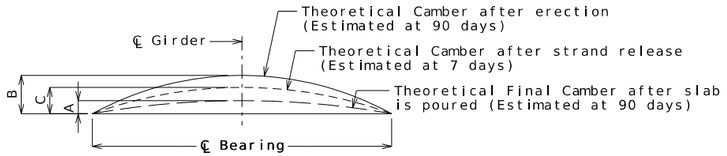
Theoretical Bottom of Slab Elevations at Centerline of Girder (Prior to forming for slab) (Estimated at 90 days)

Girder Number	Span (1-2)										
	℄ Brg.	.10	.20	.30	.40	.50	.60	.70	.80	.90	℄ Brg.
1	684.27	684.31	684.34	684.35	684.33	684.29	684.23	684.14	684.02	683.89	683.75
2	684.54	684.58	684.61	684.62	684.60	684.57	684.50	684.41	684.29	684.16	684.02
3	684.81	684.84	684.87	684.88	684.87	684.83	684.77	684.68	684.56	684.43	684.29
4	685.07	685.11	685.14	685.15	685.14	685.10	685.03	684.94	684.83	684.70	684.55
5	685.34	685.38	685.41	685.42	685.41	685.37	685.30	685.21	685.09	684.96	684.82
6	685.61	685.64	685.67	685.68	685.67	685.63	685.56	685.47	685.36	685.23	685.09
Girder Number	Span (2-3)										
	℄ Brg.	.10	.20	.30	.40	.50	.60	.70	.80	.90	℄ Brg.
1	683.72	683.76	683.78	683.79	683.78	683.74	683.67	683.58	683.47	683.34	683.21
2	683.99	684.03	684.05	684.06	684.05	684.01	683.94	683.85	683.74	683.61	683.47
3	684.26	684.29	684.32	684.33	684.31	684.28	684.21	684.12	684.01	683.88	683.74
4	684.53	684.56	684.59	684.59	684.58	684.54	684.48	684.39	684.28	684.15	684.01
5	684.79	684.83	684.85	684.86	684.85	684.81	684.74	684.65	684.54	684.41	684.28
6	685.06	685.09	685.12	685.13	685.11	685.07	685.01	684.92	684.81	684.68	684.54
Girder Number	Span (3-4)										
	℄ Brg.	.10	.20	.30	.40	.50	.60	.70	.80	.90	℄ Brg.
1	683.20	683.24	683.27	683.28	683.27	683.23	683.16	683.07	682.96	682.83	682.68
2	683.47	683.51	683.54	683.55	683.54	683.50	683.43	683.34	683.23	683.09	682.95
3	683.74	683.78	683.80	683.82	683.80	683.77	683.70	683.61	683.49	683.36	683.22
4	684.01	684.04	684.07	684.08	684.07	684.03	683.97	683.87	683.76	683.63	683.49
5	684.27	684.31	684.34	684.35	684.34	684.30	684.23	684.14	684.03	683.89	683.75
6	684.54	684.58	684.60	684.61	684.60	684.56	684.50	684.41	684.29	684.16	684.02

Elevations are based on a constant slab thickness of 8 1/2" and include allowance for theoretical dead load deflections due to weight of slab (including precast panel) and barrier.



TYPICAL SLAB ELEVATIONS DIAGRAM

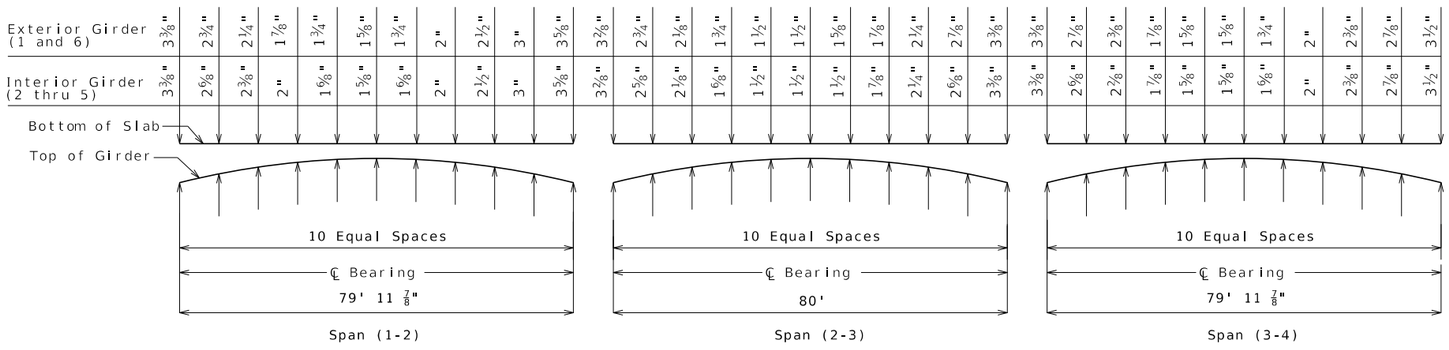


Girder	Span (1-2)			Span (2-3)			Span (3-4)		
	A	B	C	A	B	C	A	B	C
Exterior	1¾"	3¼"	1¾"	1¾"	3¼"	1¾"	1¾"	3¼"	1¾"
Interior	1¾"			1¾"			1¾"		

GIRDER CAMBER DIAGRAM

Conversion Factors for Girder Camber (Estimated at 90 days):

0.1 pt. = 0.314 x 0.5 pt.
0.2 pt. = 0.593 x 0.5 pt.
0.3 pt. = 0.813 x 0.5 pt.
0.4 pt. = 0.952 x 0.5 pt.



THEORETICAL SLAB HAUNCHING DIAGRAM (ESTIMATED AT 90 DAYS)

If girder camber is different from that shown in the camber diagram, in order to maintain minimum slab thickness, an adjustment of the slab haunches, an increase in slab thickness or a raise in grade uniformly throughout the structure shall be necessary.

SLAB ELEVATIONS, HAUNCHING AND GIRDER CAMBER

Detailed AUG. 2024
Checked JAN. 2025

Note: This drawing is not to scale. Follow dimensions.

STATE OF MISSOURI
STEPHEN ALSBURY
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REGISTERED PROFESSIONAL ENGINEER

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MO PE - E-24698

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2/14/2025

ROUTE I-70 | STATE MO
DISTRICT BR | SHEET NO. 20
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CONTRACT ID.
PROJECT NO.
BRIDGE NO. A9543

DESCRIPTION	DATE
REV. A-PRELIMINARY REVIEW	10/10/24
REV. B-FINAL REVIEW	01/29/25
REV. 0-RELEASE FOR CONSTRUCTION	02/14/25

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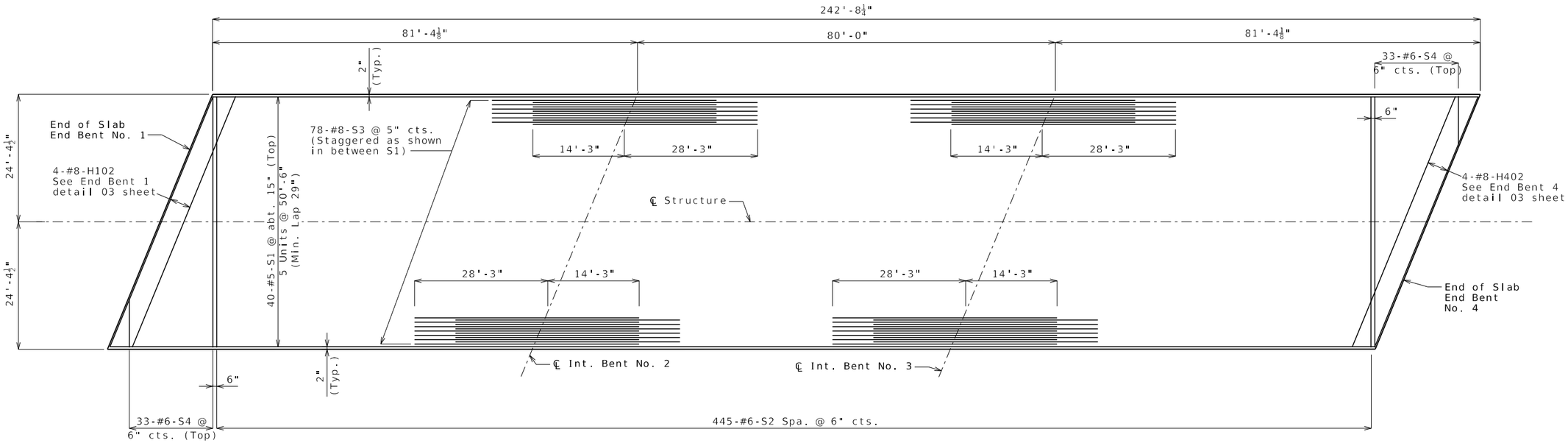
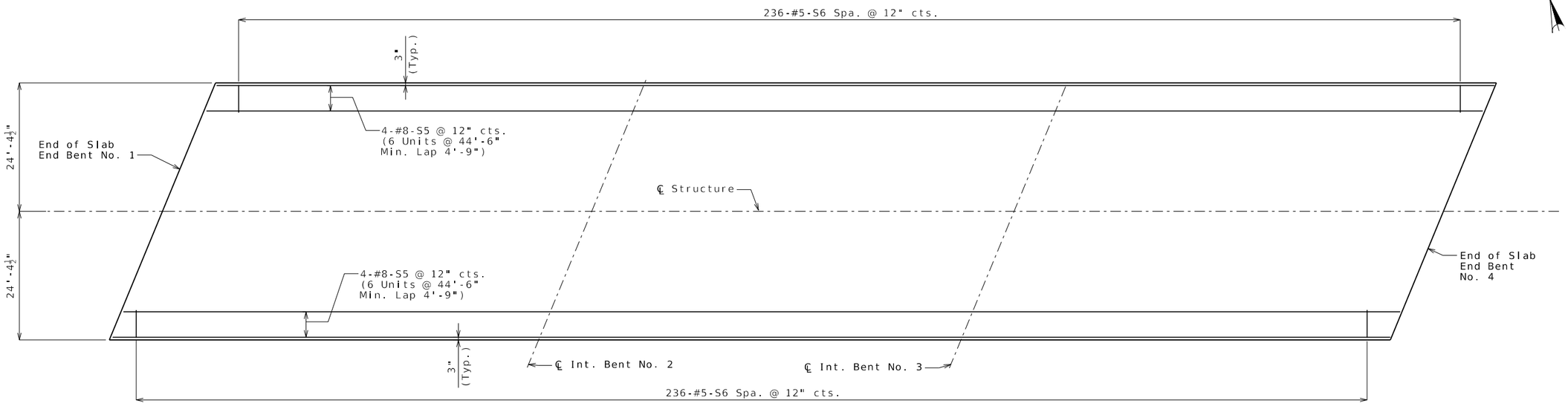


SLAB SHOWING TOP REINFORCEMENT



SLAB SHOWING BOTTOM REINFORCEMENT

Notes:

Longitudinal dimensions are measured horizontal.

For details and reinforcement in Barrier Curb see Type D Barrier sheets.

For Theoretical Bottom of Slab Elevations, Beam Camber Diagram and Dead Load Deflection Diagram, see Slab Elevations sheet 20.

Work this sheet with the Slab Reinforcement Section sheet 22.

Longitudinal reinforcement shall be placed so that ends are not more than 1½" from vertical face of ends of slab.

For pour sequence see slab reinforcing section sheet 22.

SLAB REINFORCING PLAN

Detailed AUG. 2024
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2/14/2025

ROUTE	STATE
I-70	MO
DISTRICT	SHEET NO.
BR	21

COUNTY
BOONE

JOB NO.
JST0021

CONTRACT ID.

PROJECT NO.

BRIDGE NO.
A9543

DATE	DESCRIPTION
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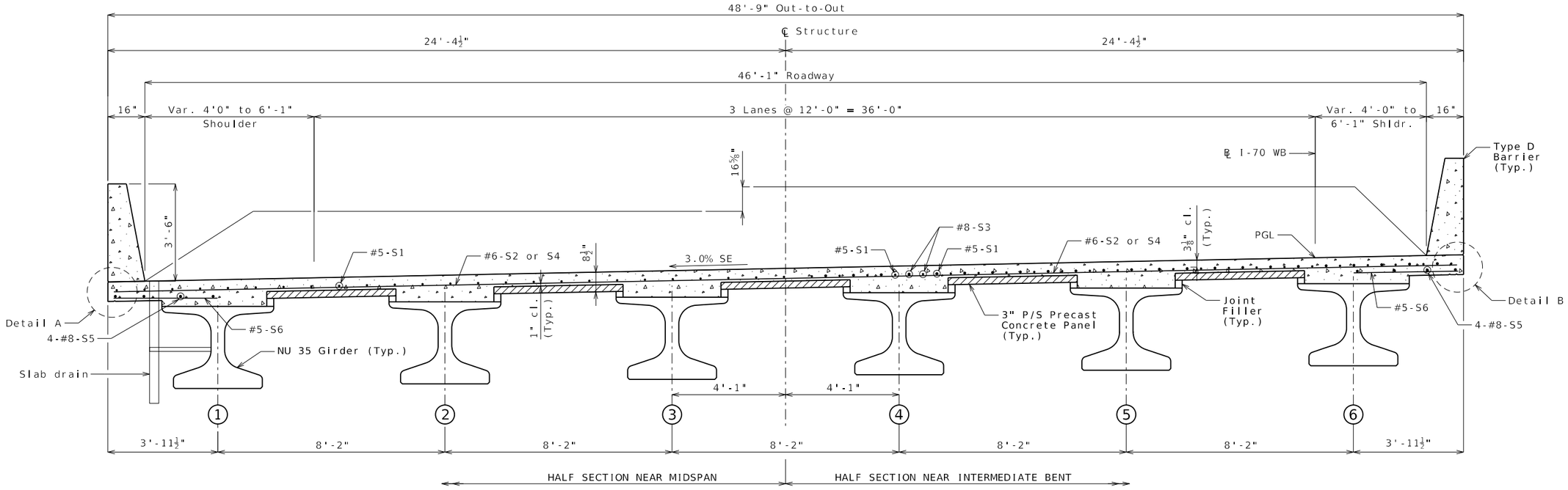
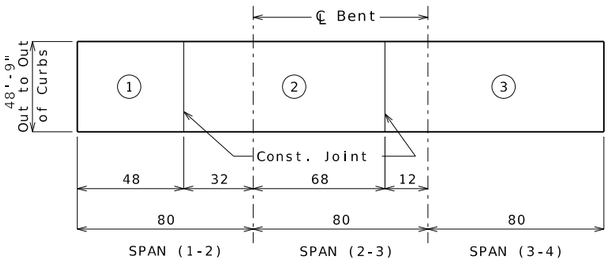


SECTION THRU SLAB

(Looking East - Ahead station)

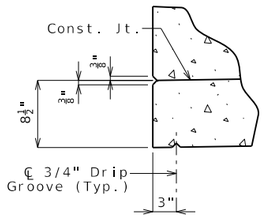


	Sequence of Pours			Min. Rate of Pour Cu. Yds./Hr.
	Direction			With Retarder
Basic Sequence	1 End to 2	2 1 to 3	3 2 to End	28
Alternate pours to the basic sequence are subject to the approval of the engineer in accordance with Sec 703.				
Alternate A Pours	1 + 2 End to 3		3 2 to End	43
Alternate B Pours	1 + 2 + 3 End to End			69

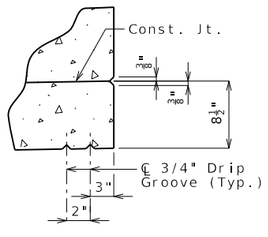
The contractor shall furnish an approved retarder to retard the set of the concrete to 2.5 hours, and shall pour and satisfactorily finish the slab pours at the rate given.

The concrete diaphragm at the intermediate bents and integral end bents shall be poured a minimum of 30 minutes and a maximum of 2 hours before the slab is poured.

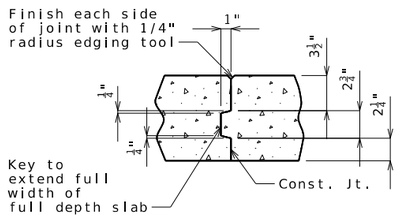
SLAB POURING SEQUENCE



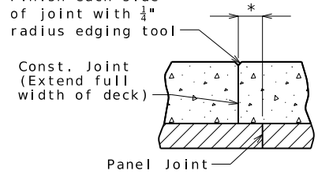
DETAIL A



DETAIL B



FULL DEPTH SLAB



* Adjust the construction joint to a clearance of 6 inches minimum from the panel joint.

SLAB ON PANELS

SLAB CONSTRUCTION JOINT

Notes:

For details of precast prestressed panels, see Sheet No. 18.

For reinforcement of barrier not shown, see Sheet No. 23.

For Theoretical Bottom of Slab Elevations, Girder Camber Diagram and Theoretical Slab Haunching Diagram, see Sheet No. 20.

For Plan of Slab Showing Reinforcement, see Sheet No. 21.

SLAB REINFORCEMENT SECTION & POURING SEQUENCE

Detailed AUG. 2024
Checked JAN. 2025

Note: This drawing is not to scale. Follow dimensions.

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MO PE - E-24698

DATE PREPARED: 2/14/2025

ROUTE	STATE
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BR	22

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JOB NO.: JST0021
CONTRACT ID.:
PROJECT NO.:
BRIDGE NO.: A9543

DATE	DESCRIPTION
10/10/24	REV. A-PRELIMINARY REVIEW
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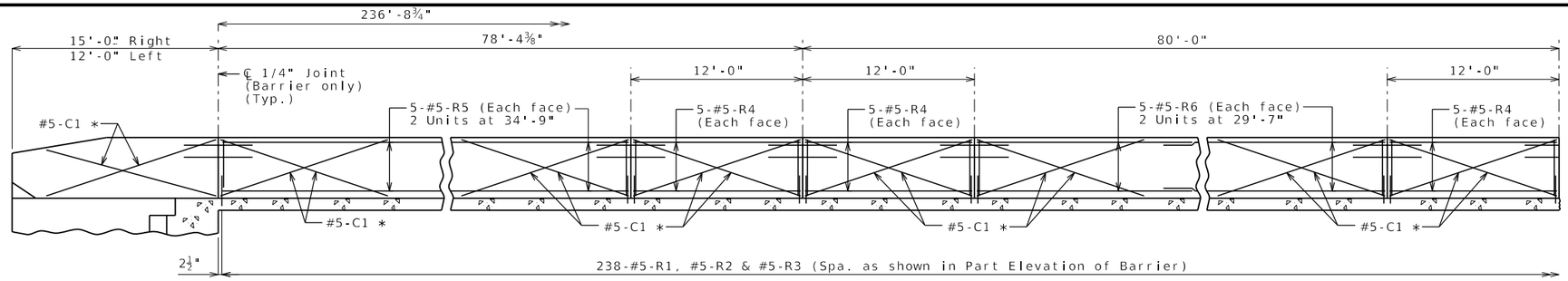
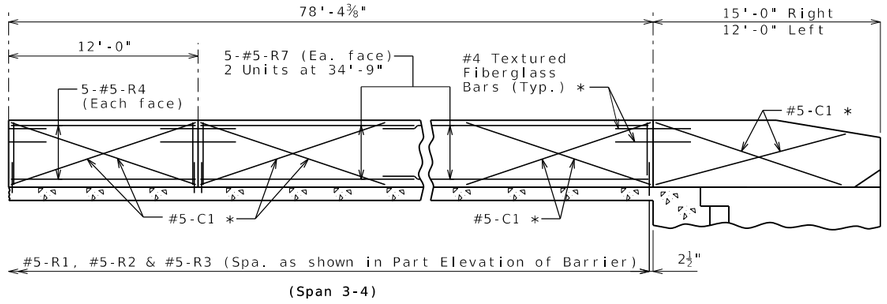


(Span 1-2)

(Span 2-3)

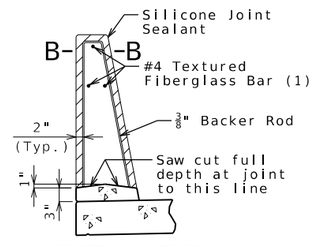


(Span 3-4)

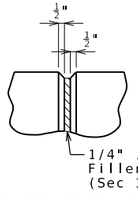
ELEVATION OF BARRIER

(Left barrier shown, right barrier similar)

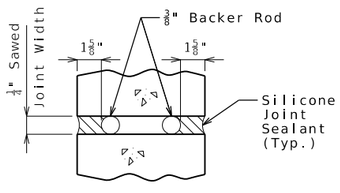
Longitudinal dimensions are horizontal.



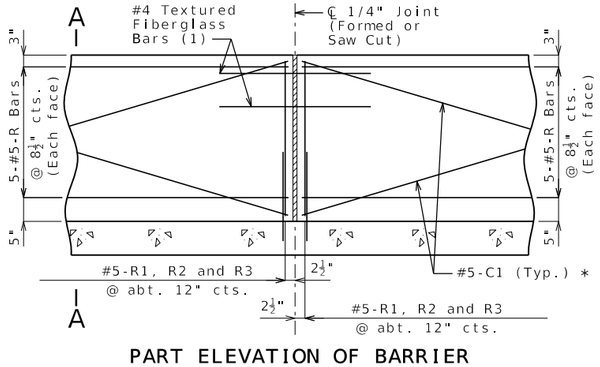
SECTION THRU
SAW CUT JOINT



PART ELEVATION
AT FORMED JOINT

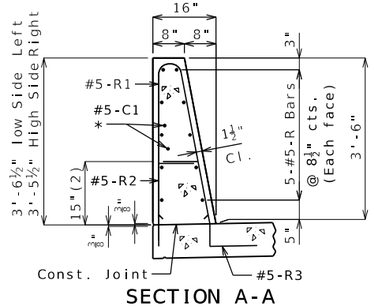


SECTION B-B



PART ELEVATION OF BARRIER

(1) Four feet long, centered on joint, slip-formed option only

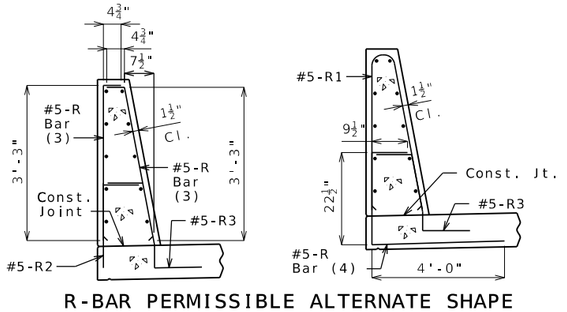


SECTION A-A

Use a minimum lap of 3'-1" for #5 horizontal barrier bars.

The cross-sectional area above the slab is 3.52 square feet.

(2) To top of bar



R-BAR PERMISSIBLE ALTERNATE SHAPE

(3) The R1 bar may be separated into two bars as shown, at the contractor's option, only when slip forming is not used. (All dimensions are out to out.)

(4) The R2 bar and #5 bottom transverse slab bar in cantilever (prestressed panels only) combination may be furnished as one bar as shown, at the contractor's option.

General Notes:

* Slip-formed option only.

Conventional forming or slip forming may be used. Saw cut joints may be used with conventional forming.

Top of barrier shall be built parallel to grade and barrier joints (except at end bents) normal to grade.

All exposed edges of barrier shall have either a 1/2-inch radius or a 3/8-inch bevel, unless otherwise noted.

Concrete in barrier shall be Class B-1.

Concrete traffic barrier delineators shall be placed on top of the barrier as shown on Missouri Standard Plan 617.10 and in accordance with Sec 617. Delineators on bridges with two-lane, two-way traffic shall have retroreflective sheeting on both sides.

Joint sealant and backer rods shall be in accordance with Sec 717 for silicone joint sealant for saw cut and formed joints.

For slip-formed option, both sides of barrier shall have a vertically broomed finish and the top shall have a transversely broomed finish.

Plastic waterstop shall not be used with saw cut joints.

TYPE D BARRIER

Detailed AUG. 2024
Checked JAN. 2025

Note: This drawing is not to scale. Follow dimensions.

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DATE PREPARED
2/14/2025

ROUTE	STATE
I-70	MO

DISTRICT	SHEET NO.
BR	23

COUNTY
BOONE

JOB NO.
JST0021

CONTRACT ID.

PROJECT NO.

BRIDGE NO.
A9543

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MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
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MILLSTONE WEBER
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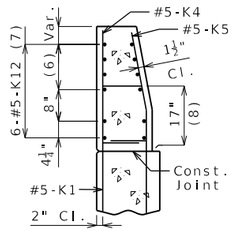
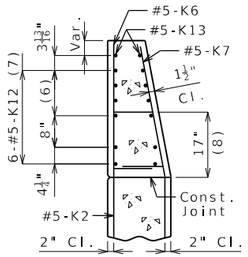
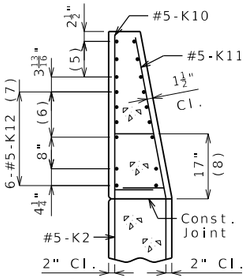


SECTION A-A



SECTION B-B



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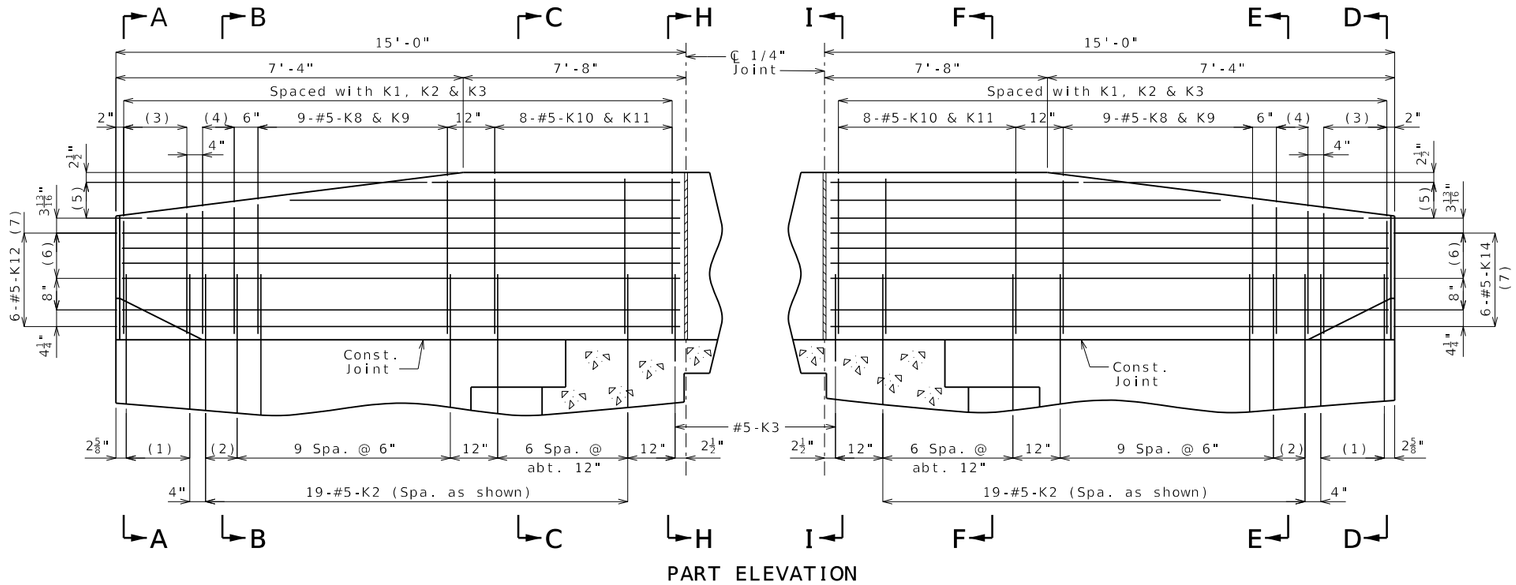
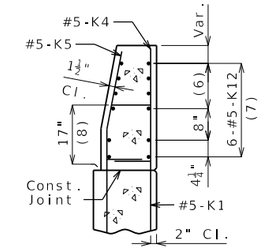


PART ELEVATION



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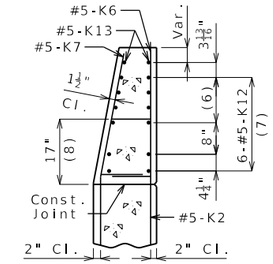
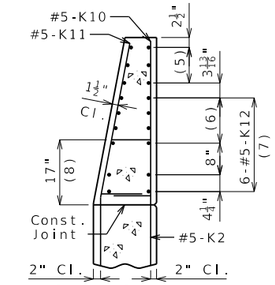
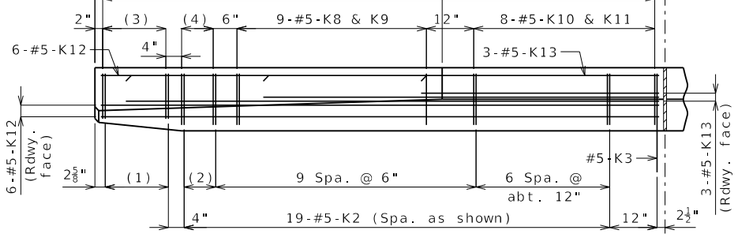


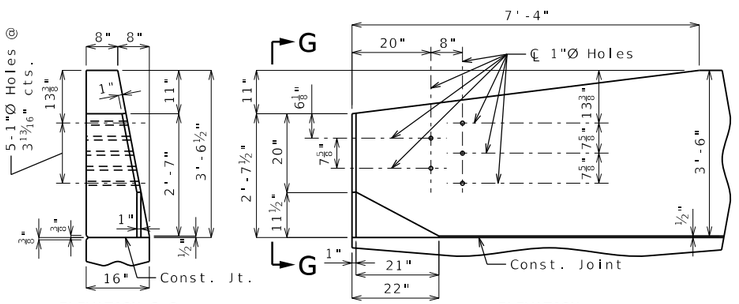
SECTION E-E



SECTION F-F

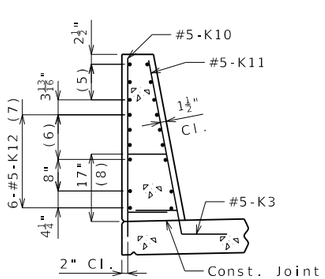


PART PLAN



ELEVATION G-G

ELEVATION



SECTION H-H

(1) 5-#5-K1 @ 4" cts.

(2) 2 spaces @ 4"

(3) 5-#5-K4 & K5

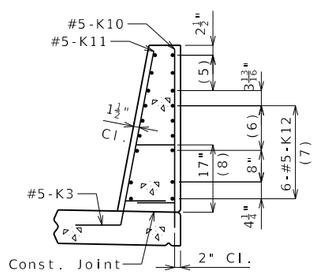
(4) 3-#5-K6 & K7

(5) 3-#5-K13 @ 4½" cts., each face

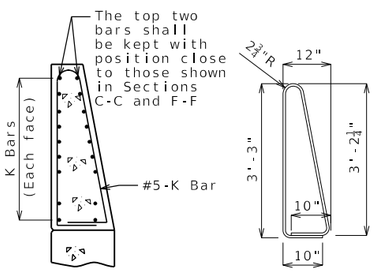
(6) 3 spaces @ 3 13/16"

(7) Spaced as shown, each face

(8) To top of bar



SECTION I-I

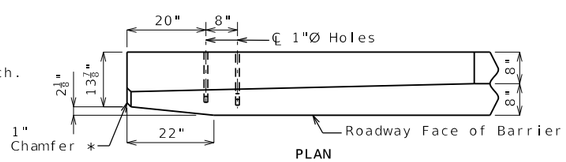


K10-K11 BAR PERMISSIBLE ALTERNATE SHAPE

(Other K bars not shown for clarity)

The K10-K11 bar combination may be furnished as one bar as shown, at the contractor's option.

All dimensions are out to out.



PLAN

DETAILS OF GUARD RAIL ATTACHMENT

* Transition to zero at Type A curb for gutter lines to match.

General Notes:

Concrete traffic barrier delineators shall be placed on top of the barrier as shown on Missouri Standard Plan 617.10 and in accordance with Sec 617. Delineators on bridges with two-lane, two-way traffic shall have retroreflective sheeting on both sides.

Reinforcing Steel:
Minimum clearance to reinforcing steel shall be 1 1/2" except as shown for bars embedded into end bent.

TYPE D BARRIER AT END BENTS (RIGHT)

Detailed AUG. 2024
Checked JAN. 2025

Note: This drawing is not to scale. Follow dimensions.

STATE OF MISSOURI
STEPHEN ALSBURY
NUMBER E-24698
REGISTERED PROFESSIONAL ENGINEER

02/14/2025 11:37:55 AM
Stephen E. Alsbury - Structural
MO PE - E-24698

DATE PREPARED
2/14/2025

ROUTE	STATE
I-70	MO
DISTRICT	SHEET NO.
BR	24

COUNTY
BOONE

JOB NO.
JST0021

CONTRACT ID.

PROJECT NO.

BRIDGE NO.
A9543

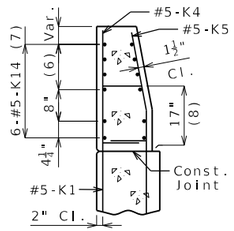
DATE	DESCRIPTION
10/10/24	REV. A-PRELIMINARY REVIEW
01/29/25	REV. B-FINAL REVIEW
02/14/25	REV. 0-RELEASE FOR CONSTRUCTION

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

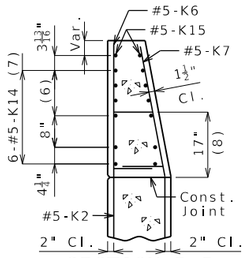
MoDOT IMPROVE I-70 DB PROJECT 1

MILLSTONE WEBER
ABNA

MO STATE CERTIFICATE OF AUTHORITY #001501 ENGINEERING



SECTION A-A



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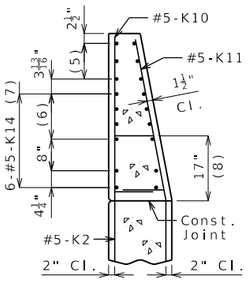
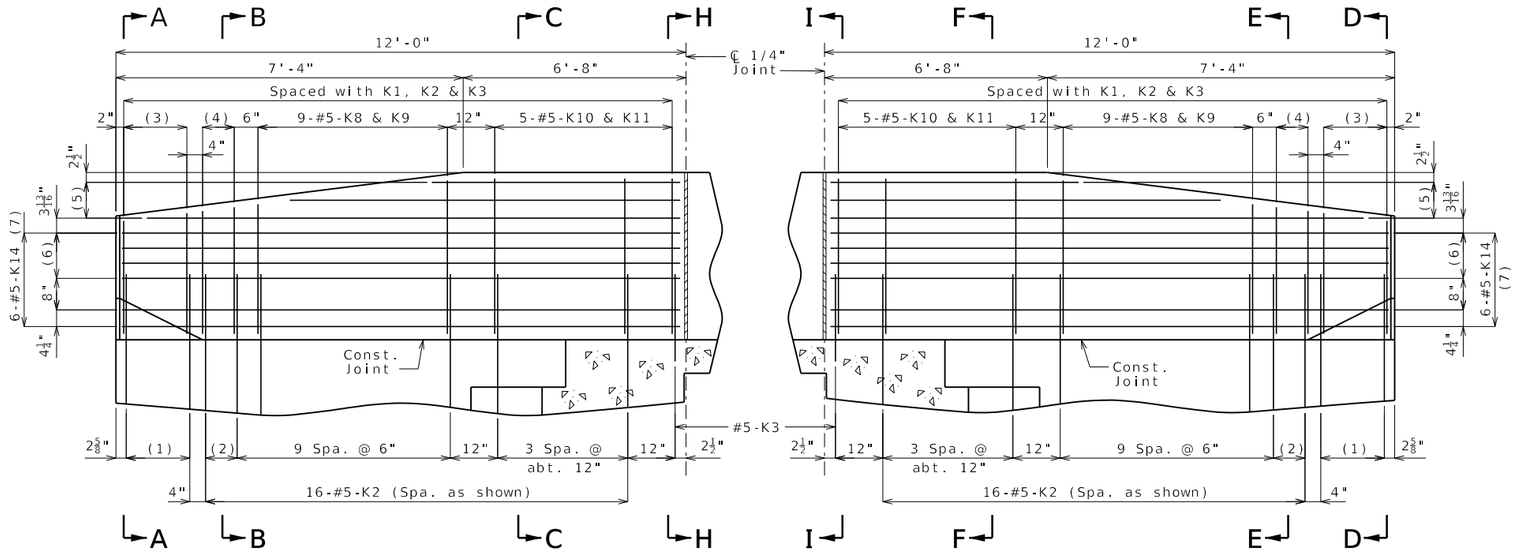
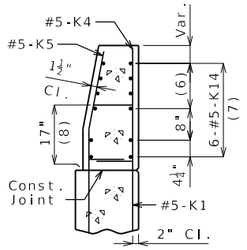


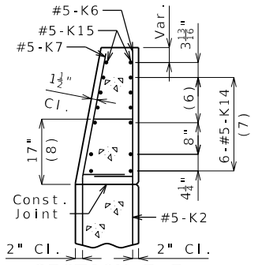
SECTION C-C



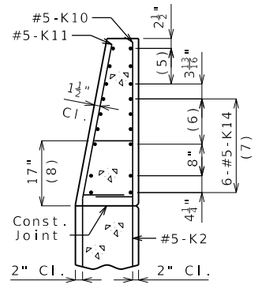
PART ELEVATION



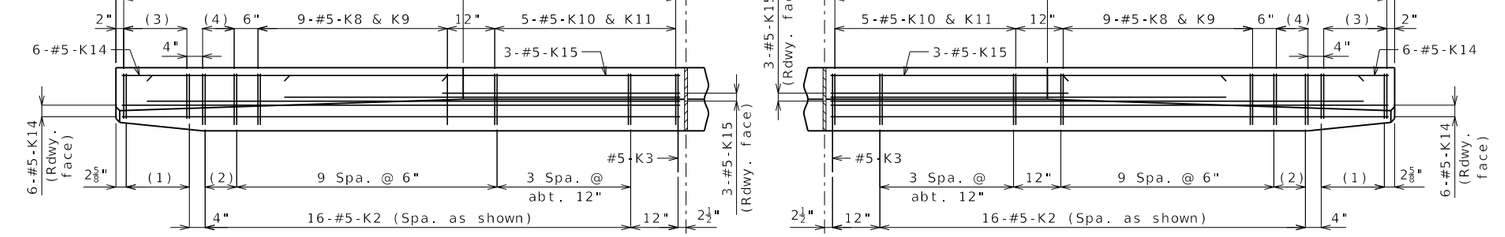
SECTION D-D



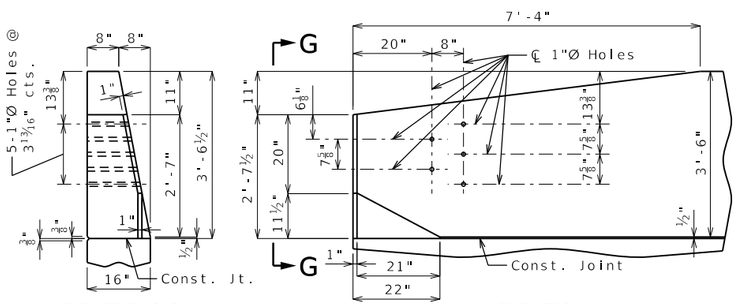
SECTION E-E

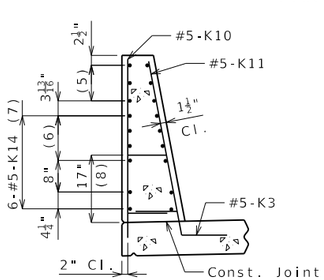


SECTION F-F



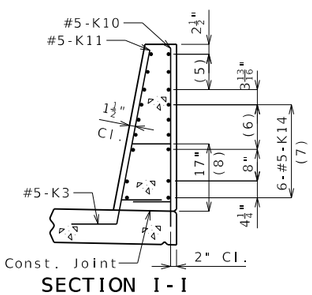
PART PLAN



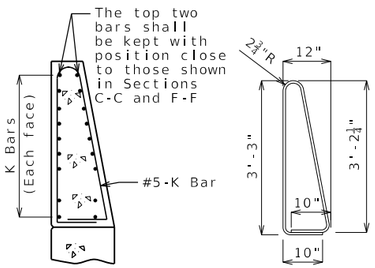


SECTION H-H

(1) 5-#5-K1 @ 4" cts.
(2) 2 spaces @ 4"
(3) 5-#5-K4 & K5
(4) 3-#5-K6 & K7
(5) 3-#5-K15 @ 4½" cts., each face
(6) 3 spaces @ 3 13/16"
(7) Spaced as shown, each face
(8) To top of bar



SECTION I-I

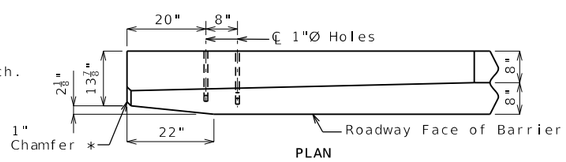


K10-K11 BAR PERMISSIBLE ALTERNATE SHAPE

(Other K bars not shown for clarity)

The K10-K11 bar combination may be furnished as one bar as shown, at the contractor's option.

All dimensions are out to out.



DETAILS OF GUARD RAIL ATTACHMENT

* Transition to zero at Type A curb for gutter lines to match.

General Notes:

Concrete traffic barrier delineators shall be placed on top of the barrier as shown on Missouri Standard Plan 617.10 and in accordance with Sec 617. Delineators on bridges with two-lane, two-way traffic shall have retroreflective sheeting on both sides.

Reinforcing Steel:
Minimum clearance to reinforcing steel shall be 1 1/2" except as shown for bars embedded into end bent.

TYPE D BARRIER AT END BENTS (LEFT)

Detailed AUG. 2024
Checked JAN. 2025

Note: This drawing is not to scale. Follow dimensions.

STATE OF MISSOURI
STEPHEN ALSBURY
NUMBER E-24698
REGISTERED PROFESSIONAL ENGINEER

02/14/2025 11:37:55 AM
Stephen E. Alsbury - Structural
MO PE - E-24698

DATE PREPARED
2/14/2025

ROUTE	STATE
I-70	MO
DISTRICT	SHEET NO.
BR	25

COUNTY
BOONE

JOB NO.
JST0021

CONTRACT ID.

PROJECT NO.

BRIDGE NO.
A9543

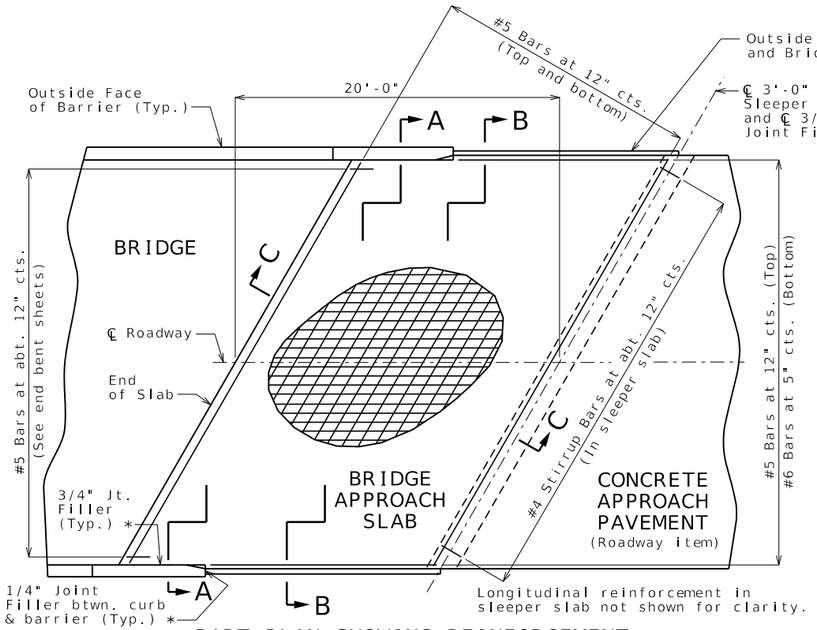
DATE	DESCRIPTION
10/10/24	REV. A-PRELIMINARY REVIEW
01/29/25	REV. B-FINAL REVIEW
02/14/25	REV. 0-RELEASE FOR CONSTRUCTION

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

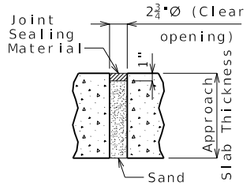
MoDOT IMPROVE I-70 DB PROJECT 1

MILLSTONE WEBER
ABNA

MO STATE CERTIFICATE OF AUTHORITY #001501 ENGINEERING

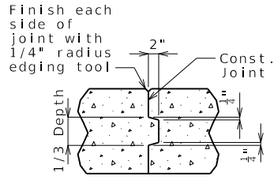


PART PLAN SHOWING REINFORCEMENT



UNDERSEAL ACCESS HOLE DETAIL

(If required)



CONSTRUCTION JOINT DETAIL

General Notes:

All concrete for the bridge approach slab and sleeper slab shall be in accordance with Sec 503 (f'c = 4,000 psi).

The reinforcing steel in the bridge approach slab and the sleeper slab shall be epoxy coated Grade 60 with fy = 60,000 psi.

Drain pipe may be either 6" diameter corrugated metallic-coated pipe underdrain, 4" diameter corrugated polyvinyl chloride (PVC) drain pipe, or 4" diameter corrugated polyethylene (PE) drain pipe.

Minimum clearance to reinforcing steel shall be 1 1/2", unless otherwise shown.

The reinforcing steel in the bridge approach slab and the sleeper slab shall be continuous. The transverse reinforcing steel may be made continuous by providing a minimum lap splice of 29 inches for #5 bars and 44 inches for #6 bars, or by mechanical bar splice.

All joint filler shall be in accordance with Sec 1057 for preformed fiber expansion joint filler except as noted.

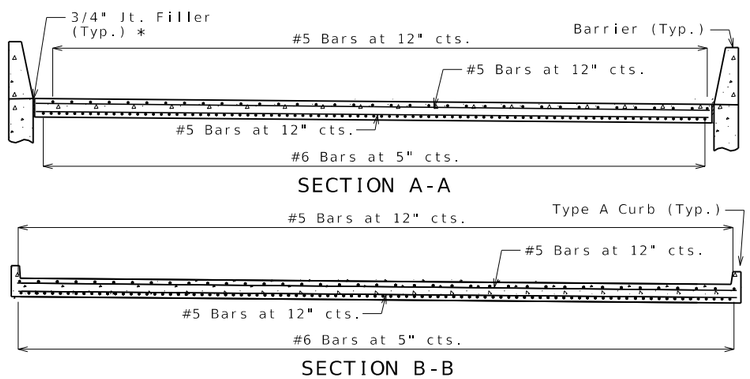
The contractor shall pour and satisfactorily finish the bridge slab before placing the bridge approach slab.

Longitudinal construction joints in approach slab and sleeper slab shall be aligned with longitudinal construction joints in bridge slab.

For concrete approach pavement details, see roadway plans.

See Missouri Standard Plan 609.00 for details of Type A curb.

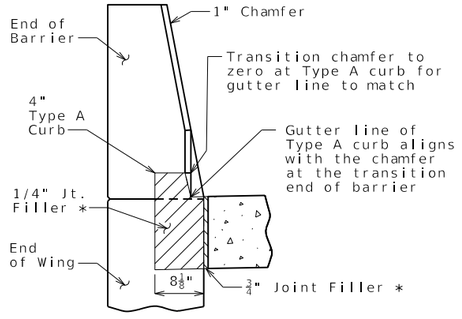
* Seal joint between vertical face of approach slab and wing with sealant in accordance with Sec 717 for silicone joint sealant for saw cut and formed joints.



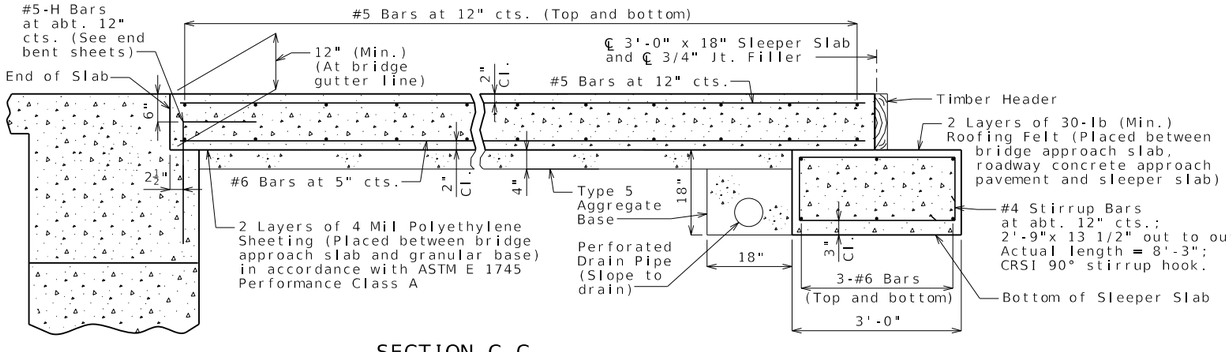
SECTION A-A

SECTION B-B

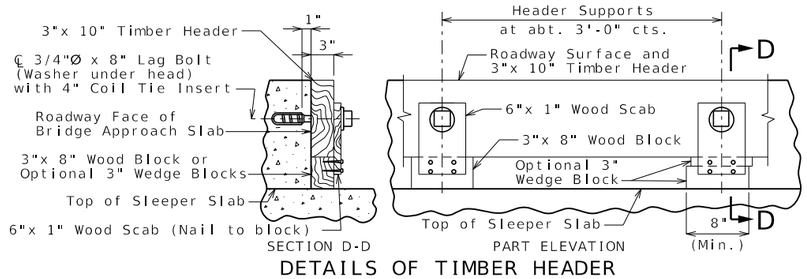
With the approval of the engineer, the contractor may crown the bottom of the approach slab to match the crown of the roadway surface.



SECTION BETWEEN CURB AND BARRIER



SECTION C-C



DETAILS OF TIMBER HEADER

Remove timber header when concrete pavement is placed.

Detailed AUG. 2024
Checked JAN. 2025

Note: This drawing is not to scale. Follow dimensions.

Sheet No. 26 of 33

BRIDGE APPROACH SLAB (MAJOR)

STATE OF MISSOURI
STEPHEN ALSBURY
NUMBER E-24698
REGISTERED PROFESSIONAL ENGINEER

02/14/2025 11:37:55 AM
Stephen E. Alsbury - Structural MO PE - E-24698

DATE PREPARED
2/14/2025

ROUTE	STATE
I-70	MO
DISTRICT	SHEET NO.
BR	26

COUNTY
BOONE

JOB NO.
JST0021

CONTRACT ID.

PROJECT NO.

BRIDGE NO.
A9543

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MoDOT IMPROVE I-70 DB PROJECT 1

MILLSTONE WEBER
ABNA

MO STATE CERTIFICATE OF AUTHORITY #001501 ENGINEERING

B_A9543_026_JST0021_APPR_SLAB.dgn 9:36:27 AM 2/14/2025

Bill of Reinforcing Steel

No. Req.	Size/ Mark	Location	Codes C	SH	V	Dimensions B ft in.	C ft in.	D ft in.	E ft in.	F ft in.	H ft in.	K ft in.	Nom. Length ft in.	Actual Length ft in.	Weight lb
		END BENT 1													
4	6 F101	BEAM	E	32			6 0.000	3 3.000			3 0.000	15.000	9 3	8 11	54
4	6 F102	BEAM	E	14			3 3.000	6 0.000			5 6.500	2 3.500	9 3	9 2	55
9	6 F103	WING BRACE	E	23		14.000	3 3.625	2 3.000	22.500	15.000	7.750	11.625	6 9	6 8	90
12	6 F104	WING BRACE	E	23		2 3.000	4 1.750	14.000	11.625	7.750	15.000	22.500	7 7	7 6	68
8	6 H101	BEAM / DIA.	E	20		52 5.000							52 5	52 5	630
8	8 H102	BEAM / SLAB	E	20		52 5.000							52 5	52 5	1260
15	6 H103	FF DIA.	E	20		8 1.000							8 1	8 1	182
6	6 H104	FF DIA.	E	20		3 9.000							3 9	3 9	34
5	6 H105	FF DIA.	E	20		5 6.000							5 6	5 6	41
6	5 H106	STRAND TIE	E	23		15.000	3 0.000	15.000	6.250	13.625	6.250	13.625	5 6	5 6	34
2	6 H107	FF DIA.	E	20		23.000							1 11	1 11	6
8	8 H108	LONG WING	E	20		14 7.000							14 7	14 7	312
24	6 H109	LONG WING	E	20		13 9.000							13 9	13 9	496
8	8 H110	SHORT WING	E	20		10 6.000							10 6	10 6	224
18	6 H111	SHORT WING	E	20		9 8.000							9 8	9 8	261
4	8 H112	BEAM	E	20		26 0.000							26 0	26 0	278
4	8 H113	BEAM	E	20		15 0.000							15 0	15 0	160
4	8 H114	BEAM	E	20		24 2.000							24 2	24 2	258
8	6 U100	BEAM	E	31		5 6.000	3 3.000	5 6.000					15 7	15 3	183
11	5 U101	BEAM	E	31		5 0.000	3 3.000	5 0.000					14 5	14 2	163
12	5 U102	BEAM	E	31		4 5.000	3 3.000	4 5.000					13 3	13 0	163
5	4 U103	BEAM	E	13		3 3.000	3 9.000	3 3.000	3 9.000				14 9	14 6	48
7	4 U104	BEAM	E	13		3 3.000	3 2.500	3 3.000	3 2.500				13 8	13 5	63
5	4 U105	BEAM	E	13		3 3.000	2 8.000	3 3.000	2 8.000				12 7	12 4	41
10	4 U106	BEAM	E	10			3 9.000	3 3.000					10 9	10 7	71
10	4 U107	BEAM	E	10			3 9.000	3 3.000					9 9	9 7	64
12	4 U108	BEAM	E	10			2 8.000	3 3.000					8 7	8 5	67
50	5 U109	APPR TIE	E	19		2 0.000	14.000						3 2	3 1	161
69	6 U110	DIA / SLAB	E	19		3 3.000	5 0.000						8 3	8 1	838
33	6 U111	DIA	E	19		2 9.000	3 9.000						6 6	6 4	295
33	5 U112	DIA	E	31		3 6.000	2 8.000	3 6.000					10 10	10 7	342
2	5 V100	BEAM	E	17		5 6.000							6 1	6 1	13
2	5 V101	BEAM	E	17		4 2.000							4 9	4 9	10
42	6 V102	DIA	E	20		2 10.000							2 10	2 10	179
2	6 V103	LONG WING	E	20		8 2.000							8 2	8 2	25
24	6 V104	LONG WING	E	20		8 2.000							8 2	8 2	294
2	6 V105	SHORT WING	E	20		6 8.000							6 8	6 8	20
18	6 V106	SHORT WING	E	20		6 8.000							6 8	6 8	180
		INT. BENT 2													
6	8 H200	BEAM	E	20		49 3.000							49 3	49 3	789
8	6 H201	BEAM	E	20		49 3.000							49 3	49 3	592
6	8 H202	BEAM	E	18		49 3.000							51 1	51 1	818
6	6 H203	BEAM	E	19		12.000	5 1.000						6 1	5 11	53
30	6 H204	BEAM	E	19		12.000	12 6.000						13 6	13 4	601
10	6 H205	BEAM	E	20		6 5.000							6 5	6 5	96
41	5 U200	BEAM	E	13		4 0.000	3 3.000	4 0.000	3 3.000				15 5	15 1	645
12	5 U201	BEAM	E	10			3 3.000	4 0.000					10 6	10 3	128
35	4 U202	BEAM	E	18		4 0.000							5 0	5 0	117
12	6 U203	BEAM	E	10			12.000	3 8.000					5 8	5 4	96
30	6 D200	BEAM	E	20		2 6.000							2 6	2 6	113
72	6 V200	PILING	E	17		7 3.000							7 11	7 11	856
60	4 P200	PILING	E	34		19.750	2.000				5 2.000		6 0	6 0	240
10	6 H240	DIA	E	20		5 0.000							5 0	5 0	75
10	6 H241	DIA	E	20		8 0.000							8 0	8 0	120
20	4 H242	DIA	E	20		8 0.000							8 0	8 0	107
4	5 H243	STRAND TIE	E	23		15.000	3 0.000				6.250	13.625	4 3	4 3	18
8	5 H244	STRAND TIE	E	23		15.000	3 0.000	15.000	6.250	13.625	6.250	13.625	5 6	5 6	46

Bill of Reinforcing Steel

C 1 20

No. Req.	Size/ Mark	Location	Codes C	SH	V	Dimensions B ft in.	C ft in.	D ft in.	E ft in.	F ft in.	H ft in.	K ft in.	Nom. Length ft in.	Actual Length ft in.	Weight lb
		INT. BENT 2 CONT.												C 1 235	
50	4 U240	DIA	E	28			18.000	3 2.000	3 2.000				7 10	7 8	256
24	6 U241	DIA	E	28			2 2.000	2 10.000	3 2.000				8 2	7 10	282
20	6 U242	DIA	E	28			2 2.000	2 4.000	3 2.000				7 8	7 4	220
8	6 U243	DIA	E	28			2 2.000	2 4.000	22.000				6 4	6 0	72
4	5 U244	DIA	E	11			19.000	14.000	4 2.000				6 11	6 8	28
12	5 U245	DIA	E	28		1.000	14.000	4 2.000					5 5	5 2	65
8	5 V240	DIA END	E	20		2 8.000							2 8	2 8	22
		INT. BENT 3													
6	8 H300	BEAM	E	20		49 3.000							49 3	49 3	789
8	6 H301	BEAM	E	20		49 3.000							49 3	49 3	592
6	8 H302	BEAM	E	18		49 3.000							51 1	51 1	818
6	6 H303	BEAM	E	19		12.000	5 1.000						6 1	5 11	53
30	6 H304	BEAM	E	19		12.000	12 6.000						13 6	13 4	601
10	6 H305	BEAM	E	20		6 5.000							6 5	6 5	96
41	5 U300	BEAM	E	13		4 0.000	3 3.000	4 0.000	3 3.000				15 5	15 1	645
12	5 U301	BEAM	E	10			3 3.000	4 0.000					10 6	10 3	128
35	4 U302	BEAM	E	18		4 0.000							5 0	5 0	117
12	6 U303	BEAM	E	10			12.000	3 8.000					5 8	5 4	96
30	6 D300	BEAM	E	20		2 6.000							2 6	2 6	113
72	6 V300	PILING	E	17		7 3.000							7 11	7 11	856
60	4 P300	PILING	E	34		19.750	2.000				5 2.000		6 0	6 0	240
10	6 H340	DIA	E	20		5 0.000							5 0	5 0	75
10	6 H341	DIA	E	20		8 0.000							8 0	8 0	120
20	4 H342	DIA	E	20		8 0.000							8 0	8 0	107
4	5 H343	STRAND TIE	E	23		15.000	3 0.000				6.250	13.625	4 3	4 3	18
8	5 H344	STRAND TIE	E	23		15.000	3 0.000	15.000	6.250	13.625	6.250	13.625	5 6	5 6	46
50	4 U240	DIA	E	28			18.000	3 2.000	3 2.000				7 10	7 8	256
24	6 U341	DIA	E	28			2 2.000	2 10.000	3 2.000				8 2	7 10	282
20	6 U342	DIA	E	28			2 2.000	2 4.000	3 2.000				7 8	7 4	220
8	6 U343	DIA	E	28			2 2.000	2 4.000	22.000				6 4	6 0	72
4	5 U344	DIA	E	11			19.000	14.000	4 2.000				6 11	6 8	28
12	5 U345	DIA	E	28		1.000	14.000	4 2.000					5 5	5 2	65
8	5 V340	DIA END	E	20		2 8.000							2 8	2 8	22
5	4 U103	BEAM	E	10			3 9.000	3 3.000					10 7	10 7	35
7	4 U104	BEAM	E	10			3 3.000	3 3.000					9 9	9 7	45
5	4 U105	BEAM	E	10			2 8.000	3 3.000					8 7	8 5	28
10	4 U106	BEAM	E	13		3 3.000	3 9.000	3 3.000	3 9.000				14 9	14 6	97
10	4 U107	BEAM	E	13		3 3.000	3 2.500	3 3.000	3 2.500				13 8	13 5	90
12	4 U108	BEAM	E	13		3 3.000	2 8.000	3 3.000	2 8.000				12 7	12 4	99

Nominal lengths are based on out to out dimensions shown in bending diagrams and are listed to the nearest inch for fabricator's use. Actual lengths are measured along centerline bar to the nearest inch. Weights are based on actual lengths.

For bending diagrams and steel reinforcing totals, see Sheet No. 29.

All bars shall be Grade 60.

Codes: C = Required coatings, where E = Epoxy Coated and G = Galvanized.

SH = Required shape, see bending diagrams. C 1 REVISED 3/11/2025

V = Sets of varied bars and number of bars of each length. Bar dimensions vary in equal increments between dimensions shown on this line and the following line and the actual length dimension shown on this line and the following line vary by the specified increment.

Detailed AUG. 2024
Checked JAN. 2025

BILL OF REINFORCING STEEL 01

Note: This drawing is not to scale. Follow dimensions.

STATE OF MISSOURI
STEPHEN ALSBURY
NUMBER E-24698
REGISTERED PROFESSIONAL ENGINEER

03/11/2025 7:58:44 AM
Stephen E. Alsbury - Structural
MO PE - E-24698

DATE PREPARED
3/11/2025

ROUTE	STATE
I-70	MO

DISTRICT	SHEET NO.
BR	27

COUNTY
BOONE

JOB NO.
JST0021

CONTRACT ID.

PROJECT NO.

BRIDGE NO.
A9543

DATE	DESCRIPTION
10/10/24	REV. A-PRELIMINARY REVIEW
01/29/25	REV. B-FINAL REVIEW
02/14/25	REV. 0-RELEASE FOR CONSTRUCTION
03/11/25	REV. 1-NDC-009-REVISED BAR LIST

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

MoDOT IMPROVE I-70 DB PROJECT 1

MILLSTONE WEBER
ABNA

MO STATE CERTIFICATE OF AUTHORITY #001501 ENGINEERING

Bill of Reinforcing Steel

No. Req.	Size/ Mark	Location	Codes C	SH	V	Dimensions B ft in.	C ft in.	D ft in.	E ft in.	F ft in.	H ft in.	K ft in.	Nom. Length ft in.	Actual Length ft in.	Weight lb
		END BENT 4													
4	6 F401	BEAM	E	32			6 0.000	3 3.000			3 0.000	15.000	9 3	8 11	54
4	6 F402	BEAM	E	14			3 3.000	6 0.000			5 6.500	2 3.500	9 3	9 2	55
12	6 F403	WING BRACE	E	23		14.000	3 3.625	2 3.000	22.500	15.000	7.750	11.625	6 9	6 8	90
9	6 F404	WING BRACE	E	23		2 3.000	4 1.750	14.000	11.625	7.750	15.000	22.500	7 7	7 6	68
		C ⚠1 8												C ⚠1 1120	
8	6 H401	BEAM / DIA.	E	20		52 5.000							52 5	52 5	630
9	6 H402	BEAM / SLAB	E	20		52 5.000							52 5	52 5	1260
15	6 H403	FF DIA.	E	20		8 1.000							8 1	8 1	182
6	6 H404	FF DIA.	E	20		3 9.000							3 9	3 9	34
5	6 H405	FF DIA.	E	20		5 6.000							5 6	5 6	41
6	5 H406	STRAND TIE	E	23		15.000	3 0.000	15.000	6.250	13.625	6.250	13.625	5 6	5 6	34
2	6 H407	FF DIA.	E	20		23.000							1 11	1 11	6
8	8 H408	LONG WING	E	20		13 6.000							13 6	13 6	288
24	6 H409	LONG WING	E	20		12 8.000							12 8	12 8	457
8	8 H410	SHORT WING	E	20		11 6.000							11 6	11 6	246
18	6 H411	SHORT WING	E	20		10 8.000							10 8	10 8	288
4	8 H412	BEAM	E	20		26 0.000							26 0	26 0	278
4	8 H413	BEAM	E	20		15 0.000							15 0	15 0	160
4	8 H414	BEAM	E	20		24 2.000							24 2	24 2	258
8	6 U400	BEAM	E	31		5 6.000	3 3.000	5 6.000					15 7	15 3	183
11	5 U401	BEAM	E	31		5 0.000	3 3.000	5 0.000					14 5	14 2	163
12	5 U402	BEAM	E	31		4 5.000	3 3.000	4 5.000					13 3	13 0	163
5	4 U403	BEAM	E	13		3 3.000	3 9.000	3 3.000	3 9.000				14 9	14 6	48
7	4 U404	BEAM	E	13		3 3.000	3 2.500	3 3.000	3 2.500				13 8	13 5	63
5	4 U405	BEAM	E	13		3 3.000	2 8.000	3 3.000	2 8.000				12 7	12 4	41
10	4 U406	BEAM	E	10			3 9.000	3 3.000					10 9	10 7	71
10	4 U407	BEAM	E	10			3 3.000	3 3.000					9 9	9 7	64
12	4 U408	BEAM	E	10			2 8.000	3 3.000					8 7	8 5	67
50	5 U409	APPR TIE	E	19		2 0.000	14.000						3 2	3 1	161
69	6 U410	DIA / SLAB	E	19		3 3.000	5 0.000						8 3	8 1	838
33	6 U411	DIA	E	19		2 9.000	3 9.000						6 6	6 4	314
33	5 U412	DIA	E	31		3 6.000	2 8.000	6.000					10 10	10 7	364
2	5 V400	BEAM	E	17		4 2.000							4 9	4 9	10
2	5 V401	BEAM	E	17		5 6.000							6 1	6 1	13
42	6 V402	DIA	E	20		2 10.000							2 10	2 10	179
2	6 V403	LONG WING	E	20		8 1.000							8 1	8 1	24
24	6 V404	LONG WING	E	20		8 1.000							8 1	8 1	291
2	6 V405	SHORT WING	E	20		6 6.000							6 6	6 6	20
18	6 V406	SHORT WING	E	20		6 6.000							6 6	6 6	176
									C ⚠1						
5	4 U403	BEAM	E	10			3 9.000	3 3.000					10 7	10 7	35
7	4 U404	BEAM	E	10			3 3.000	3 3.000					9 9	9 7	45
5	4 U405	BEAM	E	10			2 8.000	3 3.000					8 7	8 5	28
10	4 U406	BEAM	E	13		3 3.000	3 9.000	3 3.000	3 9.000				14 9	14 6	97
10	4 U407	BEAM	E	13		3 3.000	3 2.500	3 3.000	3 2.500				13 8	13 5	90
12	4 U408	BEAM	E	13		3 3.000	2 8.000	3 3.000	2 8.000				12 7	12 4	99

Bill of Reinforcing Steel

No. Req.	Size/ Mark	Location	Codes C	SH	V	Dimensions B ft in.	C ft in.	D ft in.	E ft in.	F ft in.	H ft in.	K ft in.	Nom. Length ft in.	Actual Length ft in.	Weight lb
		SLAB													
200	5 S1	LONG TOP	E	20		50 6.000							50 6	50 6	10534
445	6 S2	TRANS TOP	E	20		48 6.000							48 6	48 6	32417
156	8 S3	NEG TOP	E	20		45 6.000					C ⚠1 42'-6"		45 6	45 6	18952
66	6 S4	SKEW TOP	E	20	2	9 9.000							9 9	9 9	
		INCR=14.5IN				48 6.000							48 6	48 6	2887
48	8 S5	LONG BOT	E	20		44 6.000							44 6	44 6	5703
472	5 S6	TRANS BOT	E	20		4 0.000							4 0	4 0	1969
														C ⚠1 17702	
		TYPE D BARRIERS													
476	5 R1	BAR / TOP	E	26		3 3.000	5.500	2.750		5.500	3 0.750	6.750	7 6	6 7	3268
476	5 R2	SLAB / BAR	E	19		20.500	9.500						2 6	2 5	1200
476	5 R3	SLAB / BAR	E	27			9.500	15.250	5.000	12.000	15.000	3.000	3 6	3 3	1614
80	5 R4	BARRIER	E	20		11 8.000							11 8	11 8	973
40	5 R5	BARRIER	E	20		34 9.000							34 9	34 9	1450
40	5 R6	BARRIER	E	20		29 7.000							29 7	29 7	1234
40	5 R7	BARRIER	E	20		34 9.000							34 9	34 9	1450
48	5 C1	SLIP FORM	E	20		12 0.000							12 0	12 0	601
		BARRIER ENDS													
20	5 K1	END BARRIER	E	27		3 8.000	9.250	5.375	3 2.750		5.250	1.000	8 1	7 11	165
70	5 K2	END BARRIER	E	27		3 8.000	9.250	14.500	2 5.750		14.250	2.750	8 2	7 11	578
4	5 K3	END BARRIER	E	27		22.500	9.250	14.750	7.750	12.000	14.250	2.750	5 6	5 3	22
20	5 K4	END BARRIER	E	19	4	2 4.250	10.000						3 2	3 1	
		INCR=0.5IN				2 6.250							3 4	3 3	66
20	5 K5	END BARRIER	E	38	4			18.500	9.500	8.250	18.000	4.000	3 0	2 11	
		INCR=0.5IN						20.500			20.000	4.500	3 2	3 1	63
12	5 K6	END BARRIER	E	19		2 6.750	10.000						3 5	3 3	41
12	5 K7	END BARRIER	E	21		2 6.625	10.000				2 6.000	6.250	3 5	3 3	41
36	5 K8	END BARRIER	E	19	8	2 8.500	10 0.000						12 8	12 7	
		INCR=0.75IN				3 2.250							13 2	13 1	536
36	5 K9	END BARRIER	E	21	8	2 8.000	10.000						3 6	3 5	
		INCR=0.75IN					3 2.500				3 1.750	7.750	4 0	3 11	138
20	5 K10	END BARRIER	E	19		3 3.000	10.000				3 2.250	7.750	4 1	3 12	83
20	5 K11	END BARRIER	E	21		3 3.000	10.000						4 1	3 12	83
24	5 K12	END BARRIER	E	20		14 8.000							14 8	14 8	367
12	5 K13	END BARRIER	E	20	2	7 11.000							7 11	7 11	
		INCR=36IN				1311.000							13 11	13 11	137
24	5 K14	END BARRIER	E	20		11 8.000							11 8	11 8	292
12	5 K15	END BARRIER	E	20	2	4 11.000							4 11	4 11	
		INCR=36IN				1011.000							10 11	10 11	99
										C ⚠1					
36	5 K9	END BARRIER	E	21	8		2 8.500	10.000			2 7.750	6.750	3 6	3 5	
		INCR=0.75IN					3 2.500				3 1.750	7.750	4 0	3 11	142
26	5 K10	END BARRIER	E	19		3 3.000	10.000						4 1	4 0	108
26	5 K11	END BARRIER	E	21		3 3.000	10.000						4 1	4 0	108

Nominal lengths are based on out to out dimensions shown in bending diagrams and are listed to the nearest inch for fabricator's use. Actual lengths are measured along centerline bar to the nearest inch. Weights are based on actual lengths.

For bending diagrams and steel reinforcing totals, see Sheet No. 29.

All bars shall be Grade 60.

Codes: C = Required coatings, where E = Epoxy Coated and G = Galvanized.

SH = Required shape, see bending diagrams. C ⚠1 REVISED 3/11/2025

V = Sets of varied bars and number of bars of each length. Bar dimensions vary in equal increments between dimensions shown on this line and the following line and the actual length dimension shown on this line and the following line vary by the specified increment.

Detailed AUG. 2024
Checked JAN. 2025

BILL OF REINFORCING STEEL 02

Note: This drawing is not to scale. Follow dimensions.

STATE OF MISSOURI
STEPHEN ALSBURY
NUMBER E-24698
REGISTERED PROFESSIONAL ENGINEER

03/11/2025 7:58:44 AM
Stephen E. Alsbury - Structural
MO PE - E-24698

DATE PREPARED
3/11/2025

ROUTE: I-70 | STATE: MO
DISTRICT: BR | SHEET NO.: 28
COUNTY: BOONE
JOB NO.: JST0021
CONTRACT ID.:
PROJECT NO.:
BRIDGE NO.: A9543

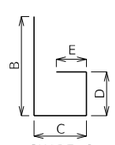
DESCRIPTION	DATE
REV. A-PRELIMINARY REVIEW	10/10/24
REV. B-FINAL REVIEW	01/29/25
REV. 0-RELEASE FOR CONSTRUCTION	02/14/25
REV. 1-NDC-009-REVISED BAR LIST	03/11/25

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

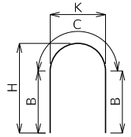
MoDOT IMPROVE I-70 DB PROJECT 1

MILLSTONE WEBER
ABNA

MO STATE CERTIFICATE OF AUTHORITY #001501 ENGINEERING



SHAPE 6
or 6S



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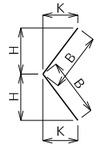

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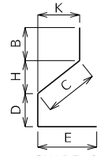

SHAPE 9
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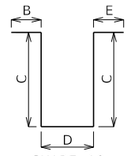

SHAPE 10
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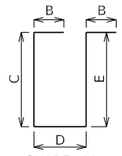

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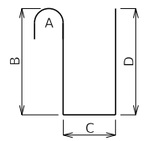
or 11S



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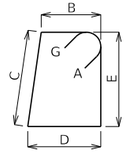

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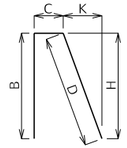
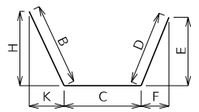


SHAPE 14
or 14S



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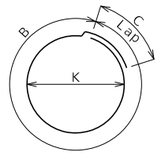
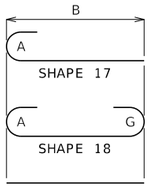
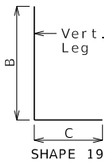
or 15S



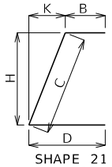
SHAPE 16



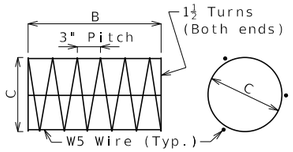
SHAPE 17
SHAPE 18
SHAPE 20



SHAPE 19
or 19S



SHAPE 21
or 21S



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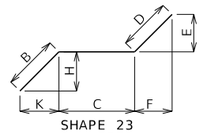
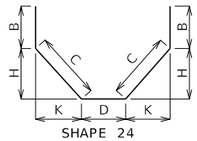
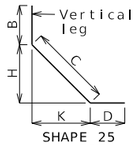


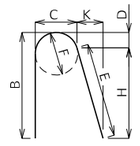
SHAPE 23
or 23S



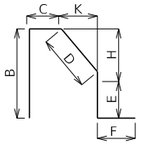
SHAPE 24
or 24S



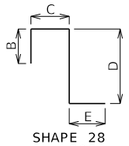
SHAPE 25
or 25S



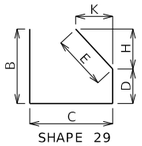
SHAPE 26



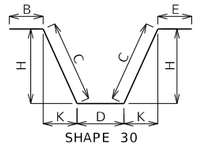
SHAPE 27S



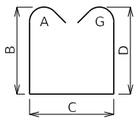
SHAPE 28
or 28S



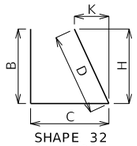
SHAPE 29
or 29S



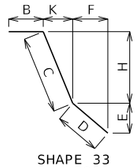
SHAPE 30
or 30S



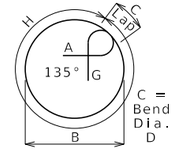
SHAPE 31S



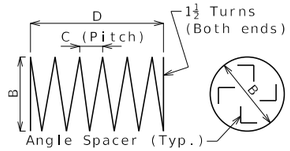
SHAPE 32
or 32S



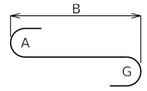
SHAPE 33
or 33S



SHAPE 34S



SHAPE 35 (1)

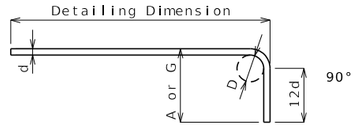


SHAPE 36

Finished Bend Diameters D and Hook Dimensions

Standard Pin Bend Shapes

Size	Case	D	A or G		J
			90°	180°	180°
#4	1	3"	8"	6"	4"
#5	1	3¾"	10"	7"	5"
#6	1	4½"	12"	8¼"	6"
#7	2	5¼"	14"	9¾"	7"
	3	7"	15"	11½"	8¾"
#8	2	6"	16"	11"	8"
	3	8"	17"	13¼"	10"
#9	1	9½"	19½"	15½"	11¾"
#10	1	10¾"	22"	17½"	13¼"
#11	1	12"	24½"	19½"	14⅞"
#14	1	18¼"	31¼"	27½"	21⅝"
#18	1	24"	41½"	36¾"	28½"

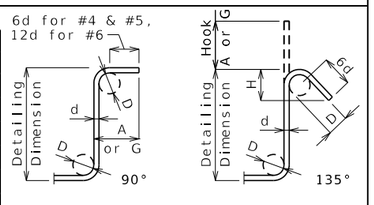


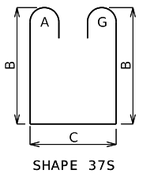
Stirrup Pin Bend Shapes (S)

Size	Case	D	A or G			H	J
			90°	135°	180°	135°	180°
#4	2	2"	4½"	4½"	5"	2⅝"	3"
	3	3"	5"	5¼"	6"	3"	4"
#5	2	2½"	5¾"	5¾"	5¾"	3⅝"	3¾"
	3	3¾"	6¼"	6½"	7"	3⅞"	5"
#6	1	4½"	12"	7¾"	8¼"	4⅝"	6"

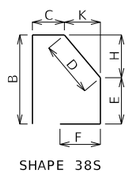
Applicable for all grades of steel.

Case 1 applies to all reinforcement. Case 2 applies to all reinforcement except for galvanized bars. Case 3 applies to galvanized bars only.





SHAPE 37S



SHAPE 38S

All dimensions are out to out.

Shapes ending with an S shall be bent in accordance with stirrup pin bend shapes.

Unless otherwise noted, finished bending diameter D is the same for all bends of a shape.

(1) Shall be a deformed or plain spiral bar or wire.

Four angle or channel spacers are required for each column spiral. Spacers are to be placed on inside of spirals. Length and weight of column spirals do not include splices or spacers.

BENDING DIAGRAMS

Reinforcing Steel Totals (Pounds)

	Size	Substructure Epoxy	Superstructure Slab Epoxy	Superstructure Barrier	Superstructure Slip Form	Entire Bridge Epoxy	
	W5	0	0	0	0	0	
C ⚠1 2228	4	2148	0	0	0	2148	C ⚠1 2228
	5	3720	12503	13965	601	30789	
C ⚠1 14268	6	14362	35304	0	0	49666	C ⚠1 49572
By	7	0	0	0	0	0	
C ⚠1 24174 Size	8	7916	24655	0	0	32571	C ⚠1 32090
	9	0	0	0	0	0	
	10	0	0	0	0	0	
	11	0	0	0	0	0	
	14	0	0	0	0	0	
	18	0	0	0	0	0	
By Type		28146	72462	13965	601	115174	C ⚠1 114679

All superstructure reinforcing steel shall be epoxy coated unless otherwise specified.

C ⚠1 28132 C ⚠1 71981

Detailed AUG. 2024
Checked JAN. 2025

BENDING DIAGRAMS AND REINFORCING STEEL TOTALS

Note: This drawing is not to scale. Follow dimensions.

C ⚠1 REVISED 3/11/2025

STATE OF MISSOURI
STEPHEN ALSBURY
NUMBER E-24698
REGISTERED PROFESSIONAL ENGINEER

03/11/2025 7:58:44 AM
Stephen E. Alsbury - Structural
MO PE - E-24698

DATE PREPARED 3/11/2025
ROUTE I-70 | STATE MO
DISTRICT BR | SHEET NO. 29
COUNTY BOONE
JOB NO. JST0021
CONTRACT ID.
PROJECT NO.
BRIDGE NO. A9543

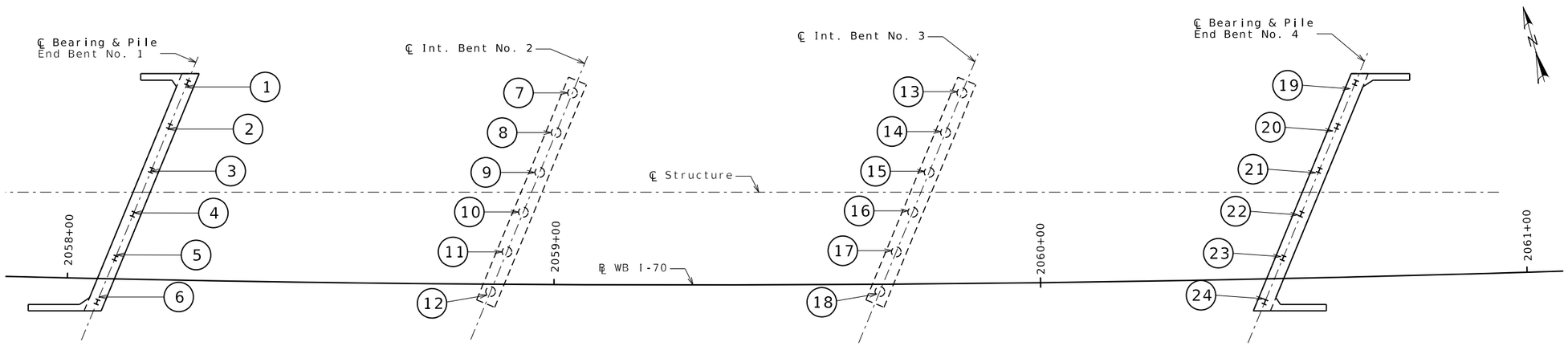
DATE	DESCRIPTION
10/10/24	REV. A-PRELIMINARY REVIEW
01/29/25	REV. B-FINAL REVIEW
02/14/25	REV. 0-RELEASE FOR CONSTRUCTION
03/11/25	REV. 1-NDC-009-REVISED BAR LIST

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

MoDOT IMPROVE I-70 DB PROJECT 1

MILLSTONE WEBER
ABNA

MO STATE CERTIFICATE OF AUTHORITY #001501 ENGINEERING



PART PLAN SHOWING PILE NUMBERING FOR RECORDING AS-BUILT PILE DATA

As-Built Pile Data					
Pile No.	Length in Place (ft)	PDA Nom. Axial Compressive Resistance (kips)	PDA End of Drive Blow Count (blows/in.)	Actual End of Drive Blow Count (blows/in.)	Remarks
END BENT NO. 1					
1					
2					
3					
4					
5					
6					
END BENT NO. 4					
19					
20					
21					
22					
23					
24					

As-Built Pile Data					
Pile No.	Length in Place (ft)	PDA Nom. Axial Compressive Resistance (kips)	PDA End of Drive Blow Count (blows/in.)	Actual End of Drive Blow Count (blows/in.)	Remarks
INTERMEDIATE BENT NO. 2					
7					
8					
9					
10					
11					
12					
INTERMEDIATE BENT NO. 3					
13					
14					
15					
16					
17					
18					

Notes:

Indicate in remarks column:
A. Pile type and grade
B. Batter
C. Driven to practical refusal
D. PDA test pile
E. Minimum tip elevation controlled
(Use when actual blow count is less than PDA blow count due to minimum tip elevation requirement. A plus sign (+) shall be placed after the PDA nominal axial compressive resistance value indicating actual value is higher than PDA value.)

This sheet to be completed by MoDOT construction personnel.

AS-BUILT PILE DATA

Detailed AUG. 2024
Checked JAN. 2025

Note: This drawing is not to scale. Follow dimensions.

STATE OF MISSOURI
STEPHEN ALSBURY
NUMBER E-24698
REGISTERED PROFESSIONAL ENGINEER
02/14/2025 11:37:56 AM
Stephen E. Alsbury - Structural
MO PE - E-24698

DATE PREPARED
2/14/2025

ROUTE	STATE
I-70	MO
DISTRICT	SHEET NO.
BR	30

COUNTY
BOONE

JOB NO.
JST0021

CONTRACT ID.

PROJECT NO.

BRIDGE NO.
A9543

DATE	DESCRIPTION
10/10/24	REV. A-PRELIMINARY REVIEW
01/29/25	REV. B-FINAL REVIEW
02/14/25	REV. 0-RELEASE FOR CONSTRUCTION

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

MoDOT IMPROVE I-70 DB PROJECT 1

MILLSTONE WEBER
ABNA

MO STATE CERTIFICATE OF AUTHORITY #001501 ENGINEERING

Surface Elevation: 688.4
Datum: NAVD88
Completion Date: 4/26/23
Northing: 1139455.89
Easting: 1698346.64

DEPTH IN FEET	ELEVATION IN FEET	DESCRIPTION OF MATERIAL	GRAPHIC LOG	DRY UNIT WEIGHT (pcf) SPT BLOW COUNTS (N60) CORE RECOVERY/RQD	SAMPLES	SHEAR STRENGTH, tsf (Δ - UU/2, ○ - QU/2, □ - PP/2) / STANDARD PENETRATION RESISTANCE ▲ N-VALUE (BLOWS PER FOOT) (ASTM D 1586) / WATER CONTENT, % (PL — LL)
		Asphalt - 1 inch Concrete - 14 inches				
		Granular Base - 6 inches				
		(1.8 to 7.0 ft) Fill: medium stiff, brown and gray, fat clay, trace gravel				
				3-10-12 (29)	SS1	
5	683.4					
		(7.0 to 12.0 ft) Stiff, brown, FAT CLAY - (CH)				
				3-5-8 (17)	SS2	68 >>
10	678.4					
		(12.0 to 18.0 ft) Dense, brown, poorly-graded SAND, some chert gravel - SP				
				9-15-16 (41)	SS3	
15	673.4					
		(18.0 to 20.5 ft) Extremely weak, gray SHALE				
				12-16 -50/4" ()	SS4	
20	668.4					
		(20.5 to 20.8 ft) Core Loss - 4 inches (clay and gravel)				
		unconfined compressive strength = 15,582 psi				

NOTE: STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL. GRAPHIC LOG FOR ILLUSTRATION PURPOSES ONLY.

N60 BORING LOG (WITH PAGE #) B-7 THROUGH B-16.GPJ 00 CLONE ME.GPJ 9/29/23

GROUNDWATER DATA

X FREE WATER NOT ENCOUNTERED DURING DRILLING

DRILLING DATA

__ AUGER 3 3/4" HOLLOW STEM
WASHBORING FROM __ FEET
RR DRILLER VTZ LOGGER
CME 55HTX DRILL RIG
HAMMER TYPE Auto
HAMMER EFFICIENCY 80 %

REMARKS:

Drawn by: ADP	Checked by: CKK	App'vd. by: CKK
Date: 5/5/23	Date: 10/2/23	Date: 10/2/23

GEOTECHNOLOGY
A Universal Engineering Sciences Company

I-70 Improvements
I-70 and US-63 Interchange
Boone County, Missouri

LOG OF BORING: B-8

Page 1 of 3

Project No. J036741.01

Surface Elevation: 688.4
Datum: NAVD88
Completion Date: 4/26/23
Northing: 1139455.89
Easting: 1698346.64

DEPTH IN FEET	ELEVATION IN FEET	DESCRIPTION OF MATERIAL	GRAPHIC LOG	DRY UNIT WEIGHT (pcf) SPT BLOW COUNTS (N60) CORE RECOVERY/RQD	SAMPLES	SHEAR STRENGTH, tsf (Δ - UU/2, ○ - QU/2, □ - PP/2) / STANDARD PENETRATION RESISTANCE ▲ N-VALUE (BLOWS PER FOOT) (ASTM D 1586) / WATER CONTENT, % (PL — LL)
		(2,244 ksf) (20.8 to 26.5 ft) Strong to very strong, gray, very finely crystalline, thin to medium bedded, unweathered LIMESTONE, some chert seams/nodules *(continued)*		93% 50%	NQ1	
25	663.4					
		(26.5 to 26.8 ft) Core Loss - 3 inches (rock core not recovered) (26.8 to 34.2 ft) limestone cont. unconfined compressive strength = 13,509 psi (1,945 ksf)		95% 87%	NQ2	
30	658.4					
		unconfined compressive strength = 17,593 psi (2,533 ksf)		83% 33%	NQ3	
35	653.4	(34.2 to 35.0 ft) Core Loss - 10 inches (rock core not recovered) (35.0 to 46.0 ft) Medium strong to strong, gray, very finely crystalline, thin to medium bedded, unweathered LIMESTONE, some chert seams and shale seams		100% 52%	NQ4	
		unconfined compressive strength = 6,654 psi (958 ksf)				
40	648.4			100% 70%	NQ5	

NOTE: STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL. GRAPHIC LOG FOR ILLUSTRATION PURPOSES ONLY.

N60 BORING LOG (WITH PAGE #) B-7 THROUGH B-16.GPJ 00 CLONE ME.GPJ 9/29/23

GROUNDWATER DATA

X FREE WATER NOT ENCOUNTERED DURING DRILLING

DRILLING DATA

__ AUGER 3 3/4" HOLLOW STEM
WASHBORING FROM __ FEET
RR DRILLER VTZ LOGGER
CME 55HTX DRILL RIG
HAMMER TYPE Auto
HAMMER EFFICIENCY 80 %

REMARKS:

Drawn by: ADP	Checked by: CKK	App'vd. by: CKK
Date: 5/5/23	Date: 10/2/23	Date: 10/2/23

GEOTECHNOLOGY
A Universal Engineering Sciences Company

I-70 Improvements
I-70 and US-63 Interchange
Boone County, Missouri

LOG OF BORING: B-8

Page 2 of 3

Project No. J036741.01

STATE OF MISSOURI
STEPHEN ALSBURY
NUMBER E-24698
REGISTERED PROFESSIONAL ENGINEER

02/14/2025 11:37:56 AM
Stephen E. Alsbury - Structural
MO PE - E-24698

DATE PREPARED
2/14/2025

ROUTE	STATE
I-70	MO
DISTRICT	SHEET NO.
BR	31

COUNTY
BOONE

JOB NO.
JST0021

CONTRACT ID.

PROJECT NO.

BRIDGE NO.
A9543

DESCRIPTION	DATE
REV. A-PRELIMINARY REVIEW	10/10/24
REV. B-FINAL REVIEW	01/29/25
REV. 0-RELEASE FOR CONSTRUCTION	02/14/25

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

MoDOT IMPROVE I-70 DB PROJECT 1

MILLSTONE WEBER
ABNA

MO STATE CERTIFICATE OF AUTHORITY #001501 ENGINEERING

BORING DATA 01

Note: For locations of borings, see Sheet No. 1.

Detailed AUG. 2024
Checked JAN. 2025

Note: This drawing is not to scale. Follow dimensions.

Sheet No. 31 of 33

B_A9543_031_JST0021_BORING01.dgn 9:37:42 AM 2/14/2025

Surface Elevation: 688.4
Datum: NAVD88
Completion Date: 4/26/23
Northing: 1139455.89
Easting: 1698346.64

DEPTH IN FEET	ELEVATION IN FEET	DESCRIPTION OF MATERIAL	GRAPHIC LOG	DRY UNIT WEIGHT (pcf) SPT BLOW COUNTS (N60) CORE RECOVERY/RQD	SAMPLES
45	643.4	(35.0 to 46.0 ft) Medium strong to strong, gray, very finely crystalline, thin to medium bedded, unweathered LIMESTONE, scme chert seams and shale seams *(continued)* unconfined compressive strength = 13,871 psi (1,997 ksf)		100% 33%	NQ6
		Boring terminated at 46 feet.			
50	638.4				
55	633.4				
60	628.4				
65	623.4				

SHEAR STRENGTH, tsf
Δ - UU/2 ○ - QU/2 □ - PP/2
0.5 1.0 1.5 2.0 2.5

STANDARD PENETRATION RESISTANCE
▲ N-VALUE (BLOWS PER FOOT)
(ASTM D 1586)

WATER CONTENT, %
PL 10 20 30 40 50 LL

GROUNDWATER DATA

X FREE WATER NOT ENCOUNTERED DURING DRILLING

DRILLING DATA

__ AUGER 3 3/4" HOLLOW STEM
WASHBORING FROM __ FEET
RR DRILLER VTZ LOGGER
CME 55HTX DRILL RIG
HAMMER TYPE Auto
HAMMER EFFICIENCY 80 %

REMARKS:

Drawn by: ADP	Checked by: CKK	App'vd. by: CKK
Date: 5/5/23	Date: 10/2/23	Date: 10/2/23

GEOTECHNOLOGY
A Universal Engineering Sciences Company

I-70 Improvements
I-70 and US-63 Interchange
Boone County, Missouri

LOG OF BORING: B-8
Page 3 of 3

Project No. J036741.01

NOTE: STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL. GRAPHIC LOG FOR ILLUSTRATION PURPOSES ONLY.

N60 BORING LOG (WITH PAGE #) B-7 THROUGH B-16.GPJ 00 CLONE ME.GPJ 9/29/23

TSI geotechnical, inc.

Missouri Department of Transportation
Construction and Materials

BORING NO. BR 4-1A
Page 1 of 1

Job No.: 20241040.00
Design:
Bent:
Station:
Offset:
Elevation: 677.4
Requested Station:
Requested Offset:
Requested Elevation:
Drill No.:

County: Boone
Skew:
Logged By: SO
Northing: 1681588.356
Easting: 756749.989
Requested Northing:
Requested Easting:
Equipment: CME 550X,Split-Spoon Sampler
Location Note: (38.9625098°, -92.2962804°)
Hammer Efficiency: 90%

Route: I-70
Location: Columbia, Missouri
Operator: LRK
Date of Work: 04/16/24-04/16/24
Depth to Water: 3.5
Depth Hole Open:
Time Change:
Drilling Method: HSA

Depth (ft)	Graphic	Description	Elevation (ft)	Sample Type	REC % (RQD %)	Blow Counts (N_{60})	Shear Data	Field Tests	Index Tests
0		0.0-3.0' (CL) Brown, lean CLAY, with gravel	675		39	3-10-9 (29)		PP = 4.25 tsf	LL = 33 PL = 15 MC = 16.6%
5		▽ 3.0-7.0' (GC) Brown, clayey GRAVEL, with sand			33	10-14-18 (48)			
					13	5-50/0.2'			
10		7.0-22.0' LIMESTONE, gray and tan, hard to very hard, highly to moderately weathered, finely to medium crystalline, thin to thick bedded, dense, with chert nodules and seams	670		92 (19)		Qu Test Results		
		10.0' -slightly weathered, thin to thick bedded below 10.0 ft.	665		100 (78)		Qu Test Results UCS = 2440 ksf		
15			660		100 (87)		Qu Test Results UCS = 1620 ksf		
20					100 (100)		Qu Test Results UCS = 1700 ksf		
		Refusal at 7.0 feet. Bottom of borehole at 22.0 feet.							

N_{60} = (Em/60)Nm N_{60} - Corrected N value for standard 60% SPT efficiency; Em - Measured hammer efficiency in percent; Nm - Observed N-value
(1) = Assumed, (2) = Actual

Coordinate System: **Coordinate Zone:** **Coordinate Proj. Factor:**
Coordinate Datum: **Coordinate Units:** U.S. Survey Feet

* Persons using this information are cautioned that the materials shown are determined by the equipment noted and accuracy of the "log of materials" is limited thereby and by judgement of the operator. THIS INFORMATION IS FOR DESIGN PURPOSES ONLY.

LETTER BOREHOLE - MODOT 20150728.GDT - 8/15/24 11:51 - \\TSI\PROJECTS\STL\GEOTECH\2024 PROJECTS\20241040.00 I-70 THIRD LANE (KINGDOM CITY TO COLUMBIA)\WORKING FILES\MODOT I-70 3RD LANE 20241040 - PRELIMINARY.GPJ

STATE OF MISSOURI
STEPHEN ALSBURY
NUMBER E-24698
REGISTERED PROFESSIONAL ENGINEER
02/14/2025 11:37:56 AM
Stephen E. Alsbury - Structural
MO PE - E-24698

DATE PREPARED
2/14/2025

ROUTE	STATE
I-70	MO
DISTRICT	SHEET NO.
BR	32

COUNTY
BOONE
JOB NO.
JST0021
CONTRACT ID.
PROJECT NO.
BRIDGE NO.
A9543

DATE	DESCRIPTION
10/10/24	REV. A-PRELIMINARY REVIEW
01/29/25	REV. B-FINAL REVIEW
02/14/25	REV. 0-RELEASE FOR CONSTRUCTION

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

MoDOT IMPROVE I-70 DB PROJECT 1

MILLSTONE WEBER
ABNA

MO STATE CERTIFICATE OF AUTHORITY #001501 ENGINEERING

BORING DATA 02

Note: For locations of borings, see Sheet No. 1.

Detailed AUG. 2024
Checked JAN. 2025

Note: This drawing is not to scale. Follow dimensions.

B_A9543_032_JST0021_BORING02.dgn 9:38:09 AM 2/14/2025

Missouri Department of Transportation
Construction and Materials

BORING NO. BR 4-2
Page 1 of 2

Job No.: 20241040.00 **County:** Boone **Route:** I-70
Design: **Skew:** **Location:** Columbia, Missouri
Bent: **Logged By:** SO **Operator:** LRK
Station: **Northing:** 1681563.583 **Date of Work:** 06/10/24-06/10/24
Offset: **Easting:** 756831.888 **Depth to Water:** 8.5
Elevation: 667.7 **Requested Northing:** **Depth Hole Open:**
Requested Station: **Requested Easting:** **Time Change:**
Requested Offset: **Equipment:** CME 550X,Split-Spoon Sampler
Requested Elevation: **Location Note:** (38.9624989, -92.2959726)
Drill No.: **Hammer Efficiency:** 90% **Drilling Method:** HSA

Depth (ft)	Graphic	Description	Elevation (ft)	Sample Type	REC % (RQD %)	Blow Counts (N_{60})	Shear Data	Field Tests	Index Tests
0		0.0-3.0' LIMESTONE rip rap	665		11	31-6-6 (18)			
5		3.0-8.0' (CL) Brown and gray, lean CLAY, with sand, silty 3.5' -with gravel from 3.5 to 5.0 ft.	660		44	5-6-7 (20)		PP = 1.50 tsf	MC = 18.4%
					56	1-2-3 (8)		PP = 1.00 tsf	LL = 35 PL = 18 MC = 20.6%
10		▽ 8.0-11.2' (ML) Gray and brown, sandy SILT			67	1-2-2 (6)		PP = 0.50 tsf	Sieve Analysis Sieve # % Passing #200 60.5
15		11.2-18.2' LIMESTONE, gray, moderately hard to very hard, slightly weathered, fine to medium crystalline, thin to medium bedded, dense, with chert 16.2' -6" calcereous shale layer at 16.2 ft. 16.7' -6" chert layer at 16.7 ft. 17.2' -3" calcereous shale layer at 17.2 ft.	655 650		93 (73) 72 (45)		Qu Test Results UCS = 2530 ksf Qu Test Results UCS = 2230 ksf		
20		18.2-19.2' Calcereous SHALE, gray 19.2-23.7' LIMESTONE, gray, moderately hard to very hard, slightly weathered, finely to medium crystalline, thin to medium bedded, dense, with chert 21.4' -4" calcereous shale with coal band at 21.4 ft. 21.7' -moderately to slightly weathered below 21.7 ft.	645		80 (22)		Qu Test Results UCS = 2570 ksf		
25		23.7-25.0' CHERT, moderately weathered							

N_{60} = (Em/60)Nm N_{60} - Corrected N value for standard 60% SPT efficiency; Em - Measured hammer efficiency in percent; Nm - Observed N-value
(1) = Assumed, (2) = Actual

Coordinate System: **Coordinate Zone:** **Coordinate Proj. Factor:**
Coordinate Datum: **Coordinate Units:** U.S. Survey Feet

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LETTER BOREHOLE - MODOT 20150728.GDT - 8/15/24 11:51 - \\TSI\PROJECTS\STL\GEOTECH\2024 PROJECTS\20241040.00 I-70 THIRD LANE (KINGDOM CITY TO COLUMBIA)\WORKING FILES\MODOT I-70 3RD LANE 20241040 - PRELIMINARY.GPJ

Missouri Department of Transportation
Construction and Materials

BORING NO. BR 4-2
Page 2 of 2

Job No.: 20241040.00 **County:** Boone **Route:** I-70
Design: **Skew:** **Location:** Columbia, Missouri
Bent: **Logged By:** SO **Operator:** LRK
Station: **Northing:** 1681563.583 **Date of Work:** 06/10/24-06/10/24
Offset: **Easting:** 756831.888 **Depth to Water:** 8.5
Elevation: 667.7 **Requested Northing:** **Depth Hole Open:**
Requested Station: **Requested Easting:** **Time Change:**
Requested Offset: **Equipment:** CME 550X,Split-Spoon Sampler
Requested Elevation: **Location Note:** (38.9624989, -92.2959726)
Drill No.: **Hammer Efficiency:** 90% **Drilling Method:** HSA

Depth (ft)	Graphic	Description	Elevation (ft)	Sample Type	REC % (RQD %)	Blow Counts (N_{60})	Shear Data	Field Tests	Index Tests
25		25.0-26.2' CHERT, moderately weathered 25.7' -6" limestone layer at 25.7 ft. Refusal at 11.2 feet. Bottom of borehole at 26.2 feet.							

N_{60} = (Em/60)Nm N_{60} - Corrected N value for standard 60% SPT efficiency; Em - Measured hammer efficiency in percent; Nm - Observed N-value
(1) = Assumed, (2) = Actual

Coordinate System: **Coordinate Zone:** **Coordinate Proj. Factor:**
Coordinate Datum: **Coordinate Units:** U.S. Survey Feet

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LETTER BOREHOLE - MODOT 20150728.GDT - 8/15/24 11:51 - \\TSI\PROJECTS\STL\GEOTECH\2024 PROJECTS\20241040.00 I-70 THIRD LANE (KINGDOM CITY TO COLUMBIA)\WORKING FILES\MODOT I-70 3RD LANE 20241040 - PRELIMINARY.GPJ

STATE OF MISSOURI
STEPHEN ALSBURY
NUMBER E-24698
REGISTERED PROFESSIONAL ENGINEER

02/14/2025 11:37:56 AM
Stephen E. Alsbury - Structural
MO PE - E-24698

DATE PREPARED
2/14/2025

ROUTE	STATE
I-70	MO
DISTRICT	SHEET NO.
BR	33

COUNTY
BOONE

JOB NO.
JST0021

CONTRACT ID.

PROJECT NO.

BRIDGE NO.
A9543

DESCRIPTION	DATE
REV. A-PRELIMINARY REVIEW	10/10/24
REV. B-FINAL REVIEW	01/29/25
REV. 0-RELEASE FOR CONSTRUCTION	02/14/25

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

MoDOT IMPROVE I-70 DB PROJECT 1

MILLSTONE WEBER
ABNA

MO STATE CERTIFICATE OF AUTHORITY #001501 ENGINEERING

BORING DATA 03

Note: For locations of borings, see Sheet No. 1.

Detailed AUG. 2024
Checked JAN. 2025

Note: This drawing is not to scale. Follow dimensions.

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