VALMONT® U-BEAM™ BRIDGE SYSTEM - AASHTO LRFD DESIGN

AN AASHTO PRESS BRAKE FORMED STEEL TUB GIRDER

DESIGN SPECIFICATIONS:

1. AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION, 2020.
2. BRIDGE DESIGN MANUALS BY STATE DEPARTMENT OF TRANSPORTATIONS.
3. AASHTO / AWS D1.5M/D1.5:2020 "BRIDGE WELDING CODE.

FABRICATION & CONSTRUCTION SPECIFICATIONS:

1. U-BEAMS ARE FABRICATED PER PRESS BRAKE FORMED TUB GIRDER (PBFTG) METHOD.
2. FABRICATION AND TOLERANCES SHALL CONFORM TO: AASHTO LRFD STEEL BRIDGE FARICATION SPECIFICATIONS, 1ST EDITION, 2023.
3. CONSTRUCTION AND WORKMANSHIP SHALL CONFORM TO: AASHTO LRFD GUIDE SPECIFICATIONS FOR HIGHWAY CONSTRUCTION, 10TH EDITION, 2020.

MATERIAL SPECIFICATIONS:

1. STRUCTURAL STEEL COMPONENTS LISTED BELOW SHALL CONFORM TO AASHTO M270 GRADE 50 (ASTM A709 GRADE 50) FOR GALVANIZED FINISH OR AASHTO M270 GRADE 50W (ASTM A588 GRADE 50) FOR WEATHERING STEEL.
   a. U-BEAM PLATES
   b. END INTERNAL DIAPHRAGM PLATES
   c. SPLICE PLATES
   d. COVER PLATES
2. STRUCTURAL STEEL COMPONENTS LISTED BELOW SHALL CONFORM TO AASHTO M183 (ASTM A36).
   a. INTERMEDIATE INTERNAL DIAPHRAGM
   b. TOP FLANGE LATERAL BRACING MEMBERS
   c. SOLE PLATES
   d. EXTERNAL INTERMEDIATE DIAPHRAGM C-CHANNELS
   e. EXTERNAL INTERMEDIATE DIAPHRAGM CONNECTION PLATES
   e. ACCESS HATCH COVER PLATE
   f. POSITION DOWELS
   G. PLATE WASHERS
3. SHEAR STUDS SHALL CONFORM TO AASHTO M169 (ASTM A108, GRADES 1015 THROUGH 1020).
4. ANCHOR BOLTS SHALL CONFORM TO AASHTO M314 90 GRADE 105 (ASTM F1554 GRADE 105).
5. ALL HIGH STRENGTH BOLTS TO BE HEAVY HEX AND SHALL CONFORM AASHTO M164 (ASTM F3125 / F3125M, GRADE A325). ALL HIGH STRENGTH BOLTS SHALL BE ROTATIONAL CAPACITY TESTED PRIOR TO USE. DO NOT MIX NUTS AND BOLTS FROM DIFFERENT LOTS.
6. ALL NUTS TO BE HEAVY HEX AND SHALL CONFORM AASHTO M291 (ASTM A563).
7. ALL STANDARD WASHERS (EXCLUDING PLATE WASHERS) SHALL CONFORM AASHTO M293 (ASTM F436).
8. ACCESS HATCH CONNECTION HARDWARE TO BE STAINLESS STEEL.
9. METAL DECKING SHALL CONFORM ASTM A653/A653M GRADE 80.
10. STRUCTURAL STEEL COMPONENTS LISTED BELOW (NOTED "CVN") SUBJECT TO CHARPY V-NOTCH, TESTING ZONE IS PER PROJECT REQUIREMENTS. CVN SAMPLING AND TESTING MUST BE PERFORMED PER STATE DEPARTMENT OF TRANSPORTATION SPECIFICATIONS.
    a. U-BEAM PLATES
    b. END INTERNAL DIAPHRAGM PLATES
    c. SPLICE PLATES
    d. COVER PLATES
    e. SOLE PLATES
11. DECK CONCRETE 28 DAY MINIMUM STRENGTH (f'_c) IS TAKEN AS 4000 PSI, GRADE PER STATE DEPARTMENT OF TRANSPORTATION SPECIFICATIONS.

WELDING:

1. ASTM A709 GR50 GROOVE WELDS PER WPS# W-FC(SP)-BRIDGE-GROOVE-01
2. ASTM A 709 GR50 FILLET WELDS < 5/16IN – WPS # W-FC(SP)-BRIDGE-SP FILLETS-01
3. ASTM A709 GR50 FILLET WELDS > 5/16IN – WPS # W-FC(SP)-BRIDGE-MP FILLETS-01
4. STUD WELDS WPS# W-SM-BRIDGE-STUD-01 FOR ALL ASTM A709 GR50 MATERIAL.
5. COVER PLATE WELDS TO BE PERFORMED WITH SUBMERGED ARC WELDING PROCESS.

INSPECTION:

1. NON-DESTRUCTIVE WELD INSPECTION SHALL BE IN ACCORDANCE WITH CHAPTER 6 OF THE AASHTO / AWS D1.5M/D1.5:2020 "BRIDGE WELDING CODE.
2. "VT" INDICATES VISUAL INSPECTION. VT ON 100% OF WELDS.
3. "MT" INDICATES MAG-PARTICLE INSPECTION. MT PRIMARY MEMBER FILLET WELDS: 100% FOR ≤ 10", 10" + 10% OF LENGTH OVER 10" FOR > 10".
4. "RT" INDICATES RADIOGRAPHIC INSPECTION. RT PRIMARY MEMBER WEB & FLANGE SPLICES. WELDS ON FASCIA BEAMS SHALL ONLY BE GROUND ON THE INSIDE (NON FASCIA SIDE) FOR TESTING.
5. "PT" INDICATES DYE-PENETRANT INSPECTION. PT PRIMARY MEMBER WEB AND FLANGE SPLICE TERMINATIONS.

CAMBER:

1. THE NEW BEAM SHALL HAVE A CAMBER WITH ORDINATES AS SHOWN ON THE CAMBER DIAGRAM.
2. THE CAMBER SHOWN IS TO BE MEASURED WITH THE BEAM LYING ON ITS SIDE.
3. CAMBER SHALL BE PROVIDED BY MECHANICAL COLD ROLLING PROCESS AND HEAT CAMBER MAY BE APPLIED FOR FINAL CAMBER.

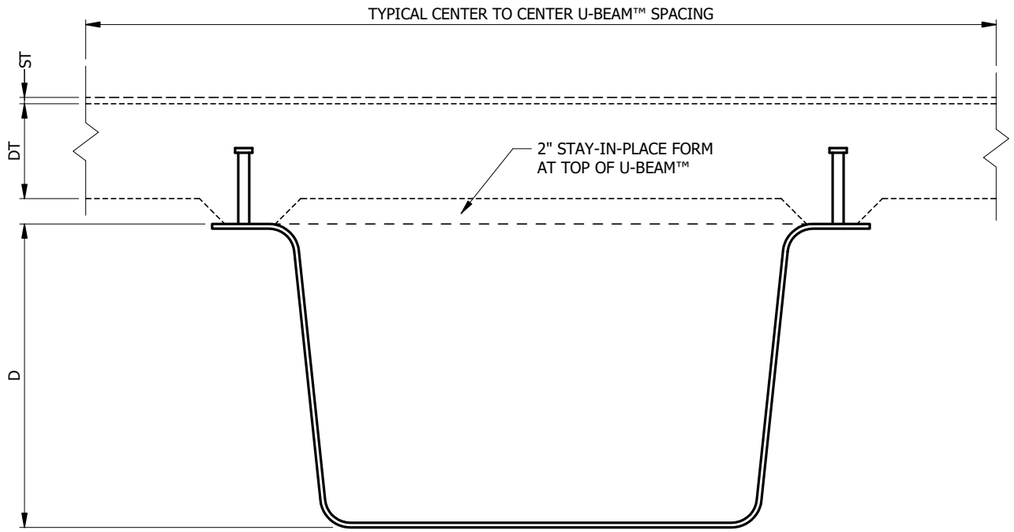
CLEANING AND COATING (FOR GALVANIZED STEEL ONLY):

1. STRUCTURAL STEEL COMPONENTS LISTED BELOW SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH AASHTO M111M / M111 (ASTM A123).
   a. U-BEAM PLATES
   b. END INTERNAL DIAPHRAGM PLATES
   c. INTERMEDIATE INTERNAL DIAPHRAGM
   e. TOP FLANGE LATERAL BRACING MEMBERS
   e. SOLE PLATES
   f. EXTERNAL INTERMEDIATE DIAPHRAGM C-CHANNELS
   g. EXTERNAL INTERMEDIATE DIAPHRAGM CONNECTION PLATES
   h. SPLICE PLATES
   i. COVER PLATES
   j. SHEAR STUDS
2. STRUCTURAL STEEL COMPONENTS LISTED BELOW SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH AASHTO M232 (ASTM A153).
   a. ACCESS HATCH COVER PLATE
   b. ANCHOR BOLTS
   c. POSITION DOWELS
   d. HIGH STRENGTH BOLTS
   e. NUTS
   f. STANDARD AND PLATE WASHERS
   g. PLATE WASHERS
3. REMOVE WELD SPATTER BY GRINDING BEFORE GALVANIZING.
4. PREPARE STEEL COMPONENTS FOR GALVANIZING IN ACCORDANCE WITH SSPC-SP 8.
5. HOT-DIP GALVANIZED COATING MUST MEET THE MINIMUM AVERAGE COATING THICKNESS IN ACCORDANCE WITH AASHTO M111 (ASTM A123).
6. ALL WELDED HARDWARE SHALL BE WELDED PRIOR TO GALVANIZING.
7. GALVANIZED NUTS SHALL BE TAPPED OVERSIZE PER THE REQUIREMENTS OF ASTM A563 AND LUBRICATED PER S1 AND S2, LUBRICANT DYE.

BEARING PADS:

1. BEARING PAD ELASTOMER HARDNESS TO BE 50 WITH A SHEAR MODULUS OF 100 PSI AND STEEL REINFORCING TO BE GRADE 36 IN ACCORDANCE WITH AASHTO M251.
2. TESTING OF ELASTOMER PER SECTION 8 AND 9 OF AASHTO M251.

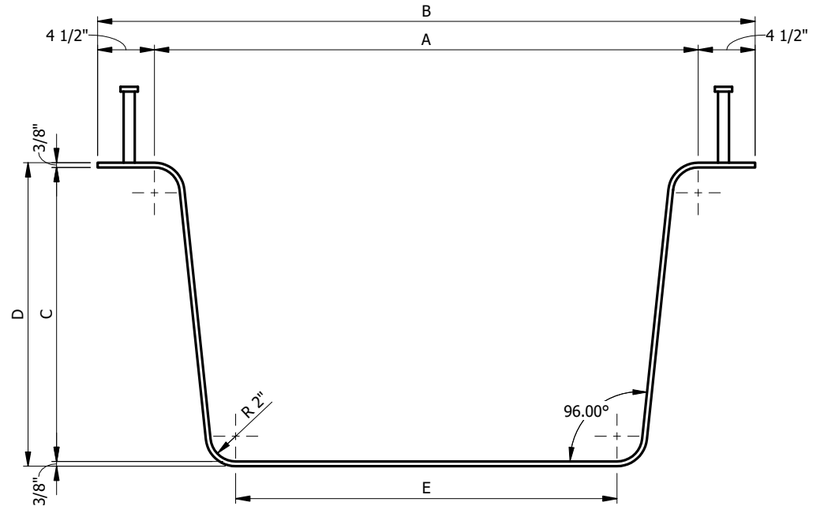
JOB: VALMONT® U-BEAM™	THE DESIGN AND DETAILS CONTAINED IN THESE DRAWINGS ARE BASED ON VALMONT® INDUSTRIES, INC. STANDARD SPECIFICATIONS AND MANUFACTURING PROCESS. THESE DRAWINGS ARE FURNISHED FOR INFORMATION ONLY AND ARE NOT PROJECT SPECIFIC DESIGNS.	valmont VALLEY, NE 68064 (402) 359-2201	PAGE NUMBER: 1 OF 22
TITLE: DESIGN GUIDELINES			SHEET NUMBER: S1.01



VALMONT® U-BEAM™ STANDARD COMPOSITE CROSS SECTION

COMPOSITE CROSS SECTION NOTES:

- DT DESIGNATES STRUCTURAL DECK THICKNESS.
- ST DESIGNATES SACRIFICIAL DECK THICKNESS (INTERGRAL WEARING SURFACE).
- ST AND DT DETERMINED AS STATE DOT REQUIREMENTS.



VALMONT® U-BEAM™ STANDARD CROSS SECTION

DESIGNATION	A	B	C	D	E
U12	43"	52"	11 1/4"	12"	32 5/8"
U18	43"	52"	17 1/4"	18"	31 3/8"
U24	43"	52"	23 1/4"	24"	30 1/8"
U30	43"	52"	29 1/4"	30"	28 7/8"
U33	45"	54"	32 1/4"	33"	30 1/4"

JOB VALMONT® U-BEAM™

TITLE U-BEAM™ STANDARD SECTIONS

valmont
VALLEY, NE 68064
(402) 359-2201

VERSION 5.3 ISSUED ON 4/11/23

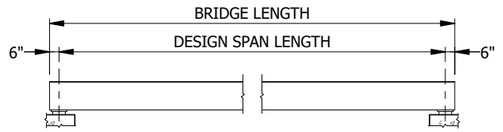
STATE	LOADING CLASSIFICATION
ALABAMA	GROUP A
ALASKA	GROUP B
ARIZONA	GROUP D
ARKANSAS	GROUP A
CALIFORNIA	GROUP D
COLORADO	GROUP D
CONNECTICUT	GROUP B
DELAWARE	GROUP B
FLORIDA	GROUP B
GEORGIA	GROUP A
HAWAII	GROUP A
IDAHO	GROUP A
ILLINOIS	GROUP B
INDIANA	GROUP D
IOWA	GROUP A
KANSAS	GROUP C
KENTUCKY	GROUP C
LOUISIANA	GROUP D
MAINE	GROUP C
MARYLAND	GROUP B
MASSACHUSETTS	GROUP A
MICHIGAN	GROUP C
MINNESOTA	GROUP C
MISSISSIPPI	GROUP A
MISSOURI	GROUP B
MONTANA	GROUP A
NEBRASKA	GROUP A
NEVADA	GROUP D
NEW HAMPSHIRE	GROUP B
NEW JERSEY	GROUP D
NEW MEXICO	GROUP D
NEW YORK	GROUP D
NORTH CAROLINA	GROUP A
NORTH DAKOTA	GROUP A
OHIO	GROUP B
OKLAHOMA	GROUP A
OREGON	GROUP D
PENNSYLVANIA	GROUP D
RHODE ISLAND	GROUP A
SOUTH CAROLINA	GROUP A
SOUTH DAKOTA	GROUP A
TENNESSEE	GROUP B
TEXAS	GROUP B
UTAH	GROUP A
VERMONT	GROUP C
VIRGINIA	GROUP B
WASHINGTON	GROUP A
WEST VIRGINIA	GROUP A
WISCONSIN	GROUP A
WYOMING	GROUP A

DEFINITIONS & ASSUMPTIONS

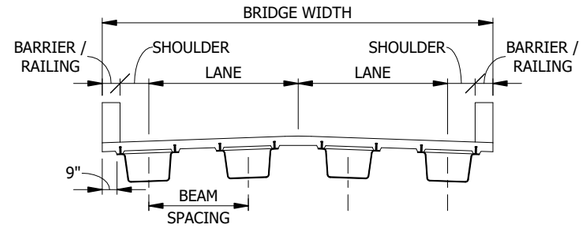
- THIS DESIGN ASSUMES THE SUPERSTRUCTURE IS A SIMPLY SUPPORTED SPAN, WHERE SPAN LENGTH IS DEFINED AS CENTER TO CENTER OF BEARING LOCATIONS.
- THE DESIGN SPAN LENGTH IS ASSUMED TO BE 12" LESS THAN BRIDGE LENGTH.
- DC, DW AND LL REQUIREMENTS OF EVERY STATE HAVE BEEN INVESTIGATED, AND ALL STATES HAVE BEEN CLASSIFIED INTO FOUR (4) LOADING GROUPS.
- DC, DW AND LL REQUIRENTS OF EACH GROUP HAVE BEEN SELECTED TO ENSURE THAT THE DESIGN LOADS ARE CALCULATED CONSERVATIVELY FOR EACH STATE CLASSIFIED UNDER THAT LOADING GROUP.
    - ○ GROUP A CONSIST OF STATES THAT REQUIRE:
        - DECK THICKNESS LESS THAN OR EQUAL TO 8",
        - FUTURE WEARING SURFACE LESS THAN OR EQUAL TO 40 PSF,
        - LIVE LOAD IS TAKEN AS AASHTO LRFD HL-93.
    - ○ GROUP B CONSIST OF STATES THAT REQUIRE:
        - DECK THICKNESS LESS THAN OR EQUAL TO 8 1/2",
        - FUTURE WEARING SURFACE LESS THAN OR EQUAL TO 60 PSF,
        - LIVE LOAD IS TAKEN AS AASHTO LRFD HL-93.
    - ○ GROUP C CONSIST OF STATES THAT REQUIRE:
        - DECK THICKNESS LESS THAN OR EQUAL TO 9",
        - FUTURE WEARING SURFACE LESS THAN OR EQUAL TO 40 PSF,
        - LIVE LOAD IS TAKEN AS HL-93 (MODIFIED).
    - ○ GROUP D CONSIST OF STATES THAT REQUIRE:
        - PERMIT LOAD ANALYSIS OR HIGHER LOADING REQUIREMENTS FOR DC, DW AND/OR LL THAN OTHER STATES.
        - ♦ EACH BRIDGE IN GROUP D NEEDS TO UNDERGO SEPERATE EVALUATION FOR EACH INDIVIDUAL CASE. CONTACT VALMONT FOR MORE INFORMATION.
- STAY IN PLACE FRAMEWORK LOADING IS TAKEN AS 10 PSF.
- BARRIER LOADING IS TAKEN AS 400 PLF AND IS DISTRIBUTED TO EXTERIOR AND INTERIOR BEAMS WITH 60% / 40% RATIO RESPECTFULLY.
- BRIDGE DECK OVERHANG FROM THE EDGE OF THE TOP FLANGE IS TAKEN AS 9".
- MULTIPLE PRESENCE FACTOR IS CALCULATED PER AASHTO LRFD 3.6.1.1.2 AND ALLOWED REDUCTION FOR MULTIPLE PRESENCE FACTOR FOR LOW ADTT PER AASHTO LRFD C3.6.1.1.2 IS NOT UTILIZED.
- FOR EACH GROUP, SELECTION DIAGRAMS ARE CREATED. SELECTION DIAGRAMS INCLUDE DESIGNS FOR COMPACT AND NON-COMPACT OPTIONS.
- IF UTILIZED, COVER PLATE WELDED TO THE BOTTOM FLANGE MIGHT INCREASE THE MAXIMUM SPAN LENGTH FOR SOME BEAM SPACING & BEAM SIZE CONFIGURATION GIVEN IN SELECTION CHARTS. CONTACT VALMONT FOR MORE INFORMATION.

STRENGTH AND OTHER DESIGN SPECIFICATIONS

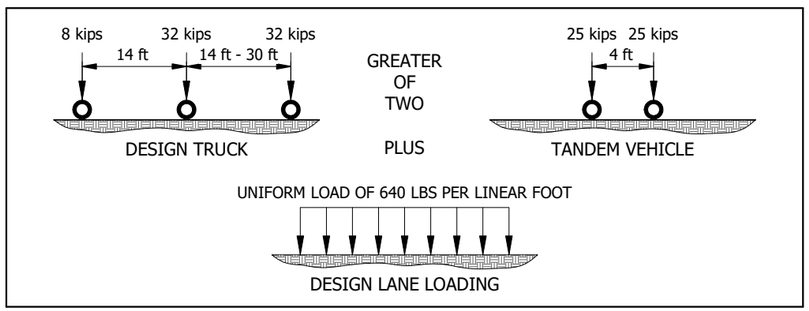
- U-BEAM™ MATERIAL IS AASHTO M270, AND THE DESIGN YIELD STRENGTH IS 50 KSI.
- ALL U-BEAM™ CROSS SECTIONS GIVEN IN COMPACT DESIGN TABLE SATISFIES ALL REQUIREMENTS PER AASHTO LRFD ARTICLE 6.11.6.2.2.
- ALL U-BEAM™ CROSS SECTIONS GIVEN IN NON-COMPACT DESIGN TABLE ARE CLASSIFIED AS "NON-COMPACT" EITHER DUE TO HIGH BEAM SPACING OR BEARING LINES BEING CONSIDERABLY SKEWED PER AASHTO LRFD ARTICLE 6.11.2.3.
- THE LIVE LOAD DISTRIBUTION FACTOR FOR INTERIOR BEAMS IS CALCULATED WITH EQUATIONS DEVELOPED BY WEST VIRGINIA UNIVERSITY, EXTENSIVE PARAMETRIC FINITE ELEMENT ANALYSIS STUDY ON OVER 15,000 BRIDGE.
- THE LIVE LOAD DISTRIBUTION FACTOR FOR EXTERIOR BEAMS IS CALCULATED BY LEVER RULE PER AASHTO LRFD NCHRP REPORT 529H SECTION 4 B4 LEVER RULE FORMULA.
- THE LIVE LOAD DEFLECTION IS CALCULATED WITH TWO LANES OF TRAFFIC AND A MINIMUM 28 FOOT BRIDGE WIDTH WITH ALL LANES LOADED AND THE DYNAMIC ALLOWANCE FACTOR APPLIED.
- THE LIVE LOAD DEFLECTION MEETS AASHTO RECOMMENDATIONS OF LESS THAN SPAN/800.
- FATIGUE DESIGN IS BASED ON ONE DIRECTIONAL SINGLE LANE ANNUAL DAILY TRUCK TRAFFIC ($ADTT_{SL}$).



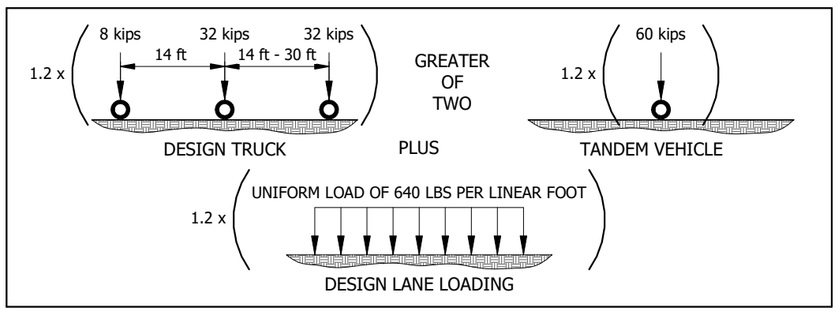
ELEVATION



CROSS SECTION



HL-93



HL-93 (MODIFIED)

JOB	VALMONT® U-BEAM™
TITLE	STATE DESIGN GROUPS

valmont
VALLEY, NE 68064
(402) 359-2201

LOADING GROUP A

U-BEAM™ DEPTH SELECTION CHART - COMPACT DESIGN

U-BEAM™ SPACING		SPAN LENGTH (ft) 25	30	35	40	45	50	55	60	65	70	75	80	85
4' - 6"	U12					42 (47)								
	U18							56 (64)						
	U24										70 (79)			
	U30												79 (92)	
	U33													85 (99)
5' - 0"	U12					41 (45)								
	U18							55 (62)						
	U24										68 (77)			
	U30												78 (90)	
	U33													84 (97)
5' - 6"	U12					40 (44)								
	U18							54 (59)						
	U24										67 (74)			
	U30												77 (87)	
	U33													83 (94)
6' - 0"	U12					40 (43)								
	U18							54 (58)						
	U24										66 (71)			
	U30												75 (84)	
	U33													82 (89)
6' - 6"	U12					39 (42)								
	U18							53 (57)						
	U24										65 (68)			
	U30												75 (80)	
	U33													81 (85)
7' - 0"	U12					39 (42)								
	U18							52 (55)						
	U24										64 (67)			
	U30												73 (76)	
	U33													79 (82)
7' - 6"	U12					38 (41)								
	U18							51 (54)						
	U24										63 (66)			
	U30												71 (74)	
	U33													77 (80)
8' - 0"	U12					38 (40)								
	U18							51 (53)						
	U24										61 (64)			
	U30												70 (73)	
	U33													75 (78)

U-BEAM™ DEPTH SELECTION CHART - NON-COMPACT DESIGN

U-BEAM™ SPACING		SPAN LENGTH (ft) 25	30	35	40	45	50	55	60	65	70	75
4' - 6"	U12					42						
	U18							53				
	U24									61		
	U30										70	
	U33											75
5' - 0"	U12					41						
	U18							52				
	U24									61		
	U30										69	
	U33											74
5' - 6"	U12					40						
	U18							51				
	U24									60		
	U30										68	
	U33											73
6' - 0"	U12					40						
	U18							51				
	U24									59		
	U30										67	
	U33											72
6' - 6"	U12					39						
	U18							50				
	U24									58		
	U30										66	
	U33											71
7' - 0"	U12					39						
	U18							49				
	U24									57		
	U30										64	
	U33											69
7' - 6"	U12					38						
	U18							47				
	U24									55		
	U30										62	
	U33											67
8' - 0"	U12					38						
	U18							46				
	U24									54		
	U30										61	
	U33											66
8' - 6"	U12					37						
	U18							45				
	U24									52		
	U30										60	
	U33											64
9' - 0"	U12					36						
	U18							44				
	U24									51		
	U30										59	
	U33											63
9' - 6"	U12					35						
	U18							43				
	U24									51		
	U30										57	
	U33											62
10' - 0"	U12					35						
	U18							43				
	U24									50		
	U30										56	
	U33											61

NOTES:

- BEAMS SHALL BE DESIGNED AS COMPACT IF BEAM SPACING IS LESS THEN OR EQUAL TO 8' - 0" AND BEARING LINES ARE ARRANGED NOT THE BE SKEWED.
- NON-COMPACT DESIGN SELECTION DIAGRAM ASSUMES 30° SKEW. MINOR REDUCTION IN MAXIMUM SPAN LENGTH MIGHT BE NEEDED FOR GREATER SKEW ANGLES. CONTACT VALMONT FOR MORE INFORMATION.
- SPAN LENGTHS VALUES GIVEN IN THE PARANTHESIS ARE CALCULATED WITH REDUCED DESIGN LOADING ASSUMPTIONS. SEE BELOW FOR THE REDUCED ASSUMPTIONS.
  - FUTURE WEARING SURFACE IS TAKEN AS 25 PSF,
  - BRIDGE DECK OVERHANG FROM THE EDGE OF THE TOP FLANGE IS TAKEN AS 0".
  - MULTIPLE PRESENCE FACTORS ARE REDUCED BY %10 FOR LOW ADTT PER AASHTO LRFD C3.6.1.1.2.
  - BARRIER LOADING IS TAKEN AS 100 PLF AND IS DISTRIBUTED TO EXTERIOR AND INTERIOR BEAMS WITH 60%/40% RATIO RESPECTFULLY.
  - CONSTRUCTION LOADS ARE MINIMIZED AND INSTEAD FLEXURAL LOADS DUE TO OVERHANG FORM IS DISTRIBUTED TO ALL BEAM.

JOB VALMONT® U-BEAM™

TITLE U-BEAM™ SELECTION GUIDELINES

valmont
VALLEY, NE 68064
(402) 359-2201

VERSION 5.3 ISSUED ON 4/11/23

LOADING GROUP B

U-BEAM™ DEPTH SELECTION CHART - COMPACT DESIGN

U-BEAM™ SPACING		SPAN LENGTH (ft) 25	30	35	40	45	50	55	60	65	70	75	80	85
4' - 6"	U12					41 (46)								
	U18							55 (62)						
	U24									68 (77)				
	U30												78 (91)	
	U33													83 (97)
5' - 0"	U12				40 (45)									
	U18							54 (61)						
	U24									67 (75)				
	U30												77 (89)	
	U33													82 (94)
5' - 6"	U12				40 (44)									
	U18							54 (60)						
	U24									66 (73)				
	U30												76 (85)	
	U33													81 (90)
6' - 0"	U12				39 (43)									
	U18							53 (58)						
	U24									65 (71)				
	U30												75 (81)	
	U33													80 (87)
6' - 6"	U12				39 (41)									
	U18							52 (57)						
	U24									64 (68)				
	U30												74 (77)	
	U33													79 (84)
7' - 0"	U12				38 (40)									
	U18							51 (55)						
	U24									63 (66)				
	U30												72 (74)	
	U33													77 (81)
7' - 6"	U12				37 (39)									
	U18							50 (53)						
	U24									62 (64)				
	U30												70 (72)	
	U33													75 (78)
8' - 0"	U12				37 (38)									
	U18							50 (52)						
	U24									60 (63)				
	U30												68 (71)	
	U33													73 (76)

U-BEAM™ DEPTH SELECTION CHART - NON-COMPACT DESIGN

U-BEAM™ SPACING		SPAN LENGTH (ft) 25	30	35	40	45	50	55	60	65	70	75
4' - 6"	U12					41						
	U18							52				
	U24									60		
	U30											68
	U33											73
5' - 0"	U12				40							
	U18							51				
	U24									59		
	U30											67
	U33											72
5' - 6"	U12				40							
	U18							51				
	U24									59		
	U30											67
	U33											71
6' - 0"	U12				39							
	U18							50				
	U24									58		
	U30											66
	U33											70
6' - 6"	U12				39							
	U18							49				
	U24									57		
	U30											65
	U33											70
7' - 0"	U12				38							
	U18							48				
	U24									56		
	U30											65
	U33											67
7' - 6"	U12				37							
	U18							46				
	U24									54		
	U30											61
	U33											66
8' - 0"	U12				37							
	U18							45				
	U24									53		
	U30											60
	U33											64
8' - 6"	U12				36							
	U18							44				
	U24									51		
	U30											58
	U33											63
9' - 0"	U12				36							
	U18							43				
	U24									50		
	U30											57
	U33											62
9' - 6"	U12				35							
	U18							43				
	U24									50		
	U30											56
	U33											61
10' - 0"	U12				34							
	U18							42				
	U24									49		
	U30											55
	U33											60

NOTES:

- BEAMS SHALL BE DESIGNED AS COMPACT IF BEAM SPACING IS LESS THEN OR EQUAL TO 8' - 0" AND BEARING LINES ARE ARRANGED NOT THE BE SKEWED.
- NON-COMPACT DESIGN SELECTION DIAGRAM ASSUMES 30° SKEW. MINOR REDUCTION IN MAXIMUM SPAN LENGTH MIGHT BE NEEDED FOR GREATER SKEW ANGLES. CONTACT VALMONT FOR MORE INFORMATION.
- SPAN LENGTHS VALUES GIVEN IN THE PARANTHESIS ARE CALCULATED WITH REDUCED DESIGN LOADING ASSUMPTIONS. SEE BELOW FOR THE REDUCED ASSUMPTIONS.
  - FUTURE WEARING SURFACE IS TAKEN AS 25 PSF,
  - BRIDGE DECK OVERHANG FROM THE EDGE OF THE TOP FLANGE IS TAKEN AS 0".
  - MULTIPLE PRESENCE FACTORS ARE REDUCED BY %10 FOR LOW ADTT PER AASHTO LRFD C3.6.1.1.2.
  - BARRIER LOADING IS TAKEN AS 100 PLF AND IS DISTRIBUTED TO EXTERIOR AND INTERIOR BEAMS WITH 60%/40% RATIO RESPECTFULLY.
  - CONSTRUCTION LOADS ARE MINIMIZED AND INSTEAD FLEXURAL LOADS DUE TO OVERHANG FORM IS DISTRIBUTED TO ALL BEAM.

JOB VALMONT® U-BEAM™

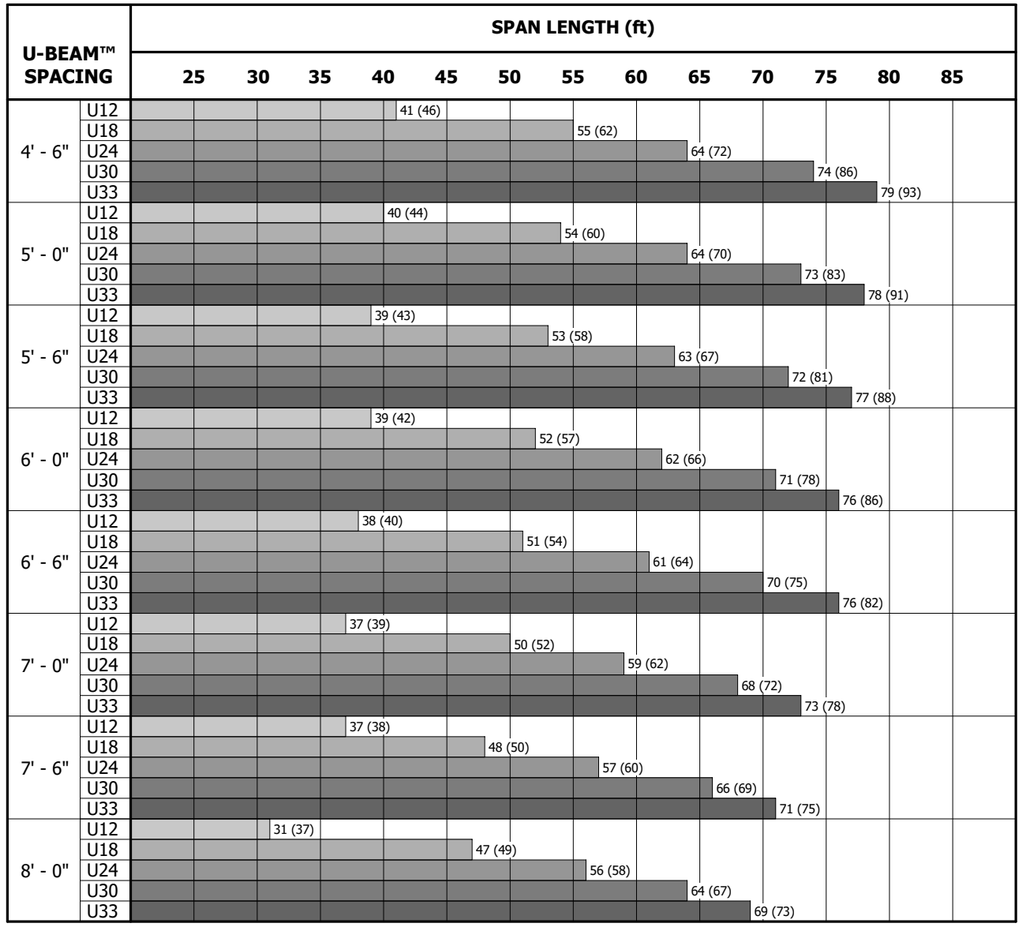
TITLE U-BEAM™ SELECTION GUIDELINES

valmont
VALLEY, NE 68064
(402) 359-2201

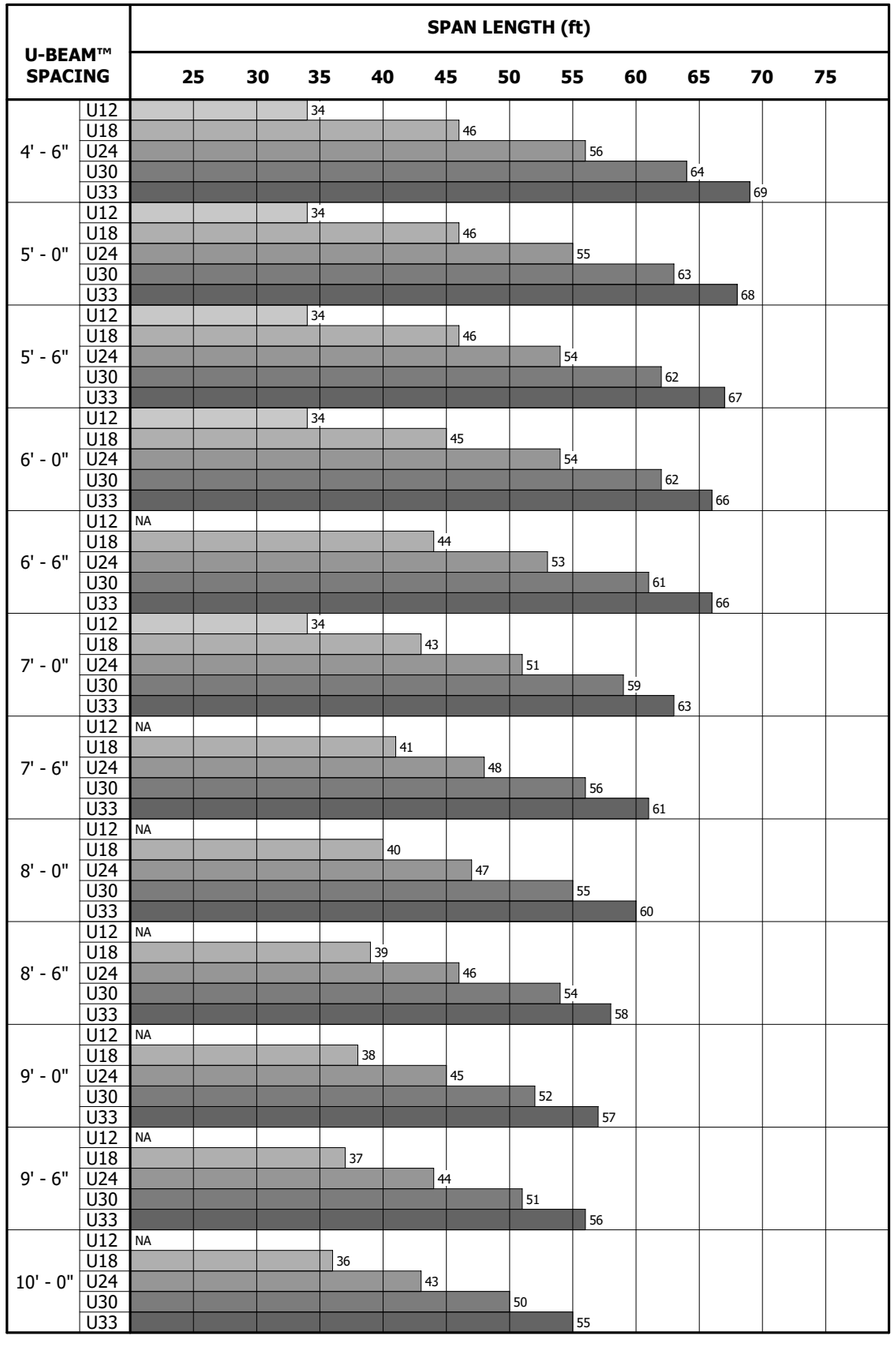
VERSION 5.3 ISSUED ON 4/11/23

LOADING GROUP C

U-BEAM™ DEPTH SELECTION CHART - COMPACT DESIGN



U-BEAM™ DEPTH SELECTION CHART - NON-COMPACT DESIGN



NOTES:

- BEAMS SHALL BE DESIGNED AS COMPACT IF BEAM SPACING IS LESS THEN OR EQUAL TO 8' - 0" AND BEARING LINES ARE ARRANGED NOT THE BE SKEWED.
- NON-COMPACT DESIGN SELECTION DIAGRAM ASSUMES 30° SKEW. MINOR REDUCTION IN MAXIMUM SPAN LENGTH MIGHT BE NEEDED FOR GREATER SKEW ANGLES. CONTACT VALMONT FOR MORE INFORMATION.
- SPAN LENGTHS VALUES GIVEN IN THE PARANTHESIS ARE CALCULATED WITH REDUCED DESIGN LOADING ASSUMPTIONS. SEE BELOW FOR THE REDUCED ASSUMPTIONS.
  - FUTURE WEARING SURFACE IS TAKEN AS 25 PSF,
  - BRIDGE DECK OVERHANG FROM THE EDGE OF THE TOP FLANGE IS TAKEN AS 0".
  - MULTIPLE PRESENCE FACTORS ARE REDUCED BY %10 FOR LOW ADTT PER AASHTO LRFD C3.6.1.1.2.
  - BARRIER LOADING IS TAKEN AS 100 PLF AND IS DISTRIBUTED TO EXTERIOR AND INTERIOR BEAMS WITH 60%/40% RATIO RESPECTFULLY.
  - CONSTRUCTION LOADS ARE MINIMIZED AND INSTEAD FLEXURAL LOADS DUE TO OVERHANG FORM IS DISTRIBUTED TO ALL BEAM.

JOB VALMONT® U-BEAM™

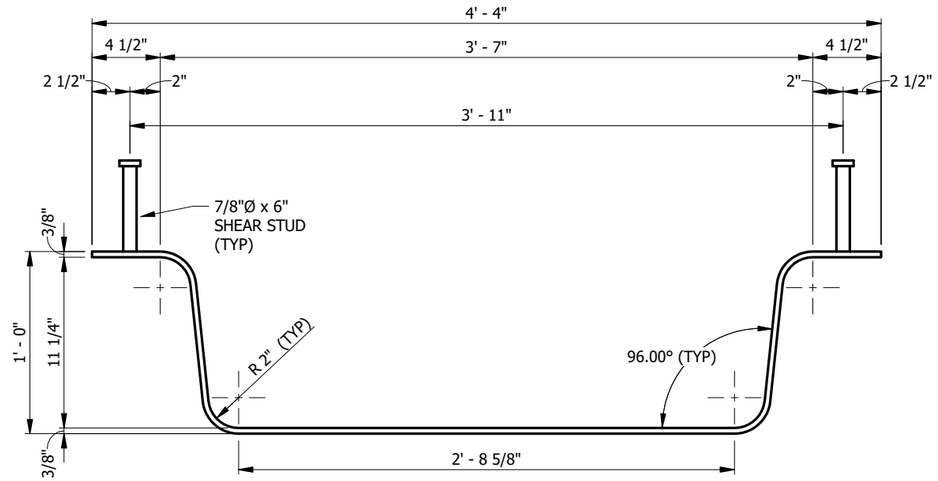
TITLE U-BEAM™ SELECTION GUIDELINES

valmont
VALLEY, NE 68064
(402) 359-2201

VERSION 5.3 ISSUED ON 4/11/23

U12			
NON-COMPOSITE SECTION PROPERTIES			
I_{steel}	**S_{steel_top}**	**S_{steel_bottom}**	**J**
in^4	**in^3**	**in^2**	**in^4**
582.74	-73.18	144.35	1.34

PLATE INFORMATION			
t_{steel}	**L_{steel}**	**A_{steel}**	**ω_{steel}**
in	**in**	**in^2**	**plf**
3/8	70	26.23	90

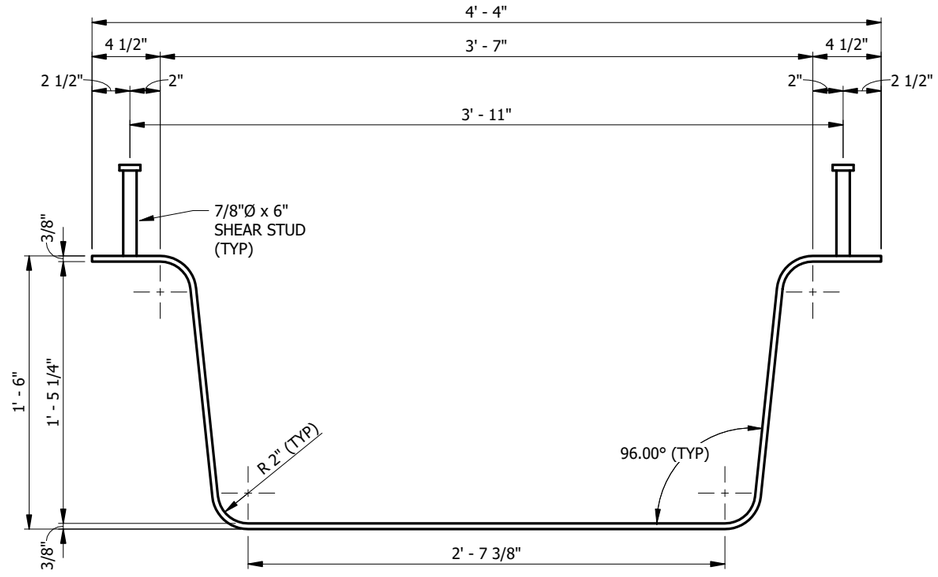


U12 STEEL U-BEAM™

(AASHTO M270, ASTM A709 GR50 T3)

U18			
NON-COMPOSITE SECTION PROPERTIES			
I_{steel}	**S_{steel_top}**	**S_{steel_bottom}**	**J**
in^4	**in^3**	**in^2**	**in^4**
1475.69	-128.98	224.99	1.70

PLATE INFORMATION			
t_{steel}	**L_{steel}**	**A_{steel}**	**ω_{steel}**
in	**in**	**in^2**	**plf**
3/8	80 3/4	30.29	104



U18 STEEL U-BEAM™

(AASHTO M270, ASTM A709 GR50 T3)

NOTE:

COMPOSITE SECTION PROPERTIES AVAILABLE UPON REQUEST.
INCREASE GIVEN WEIGHT BY 10% MINIMUM FOR THE COMPLETE ASSEMBLED U-BEAM™.

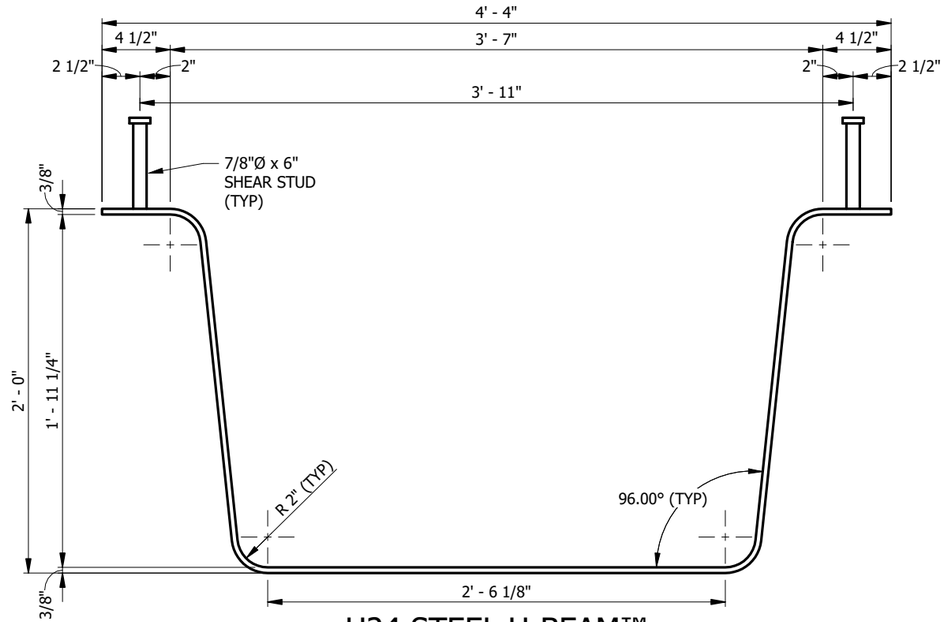
JOB VALMONT® U-BEAM™

TITLE U-BEAM™ SECTIONS

valmont
VALLEY, NE 68064
(402) 359-2201

U24			
NON-COMPOSITE SECTION PROPERTIES			
I_{steel}	**S_{steel_top}**	**S_{steel_bottom}**	**J**
in^4	**in^3**	**in^2**	**in^4**
2869.23	-194.86	309.34	1.88

PLATE INFORMATION			
t_{steel}	**L_{steel}**	**A_{steel}**	**ω_{steel}**
in	**in**	**in^2**	**plf**
3/8	91 5/8	34.34	117

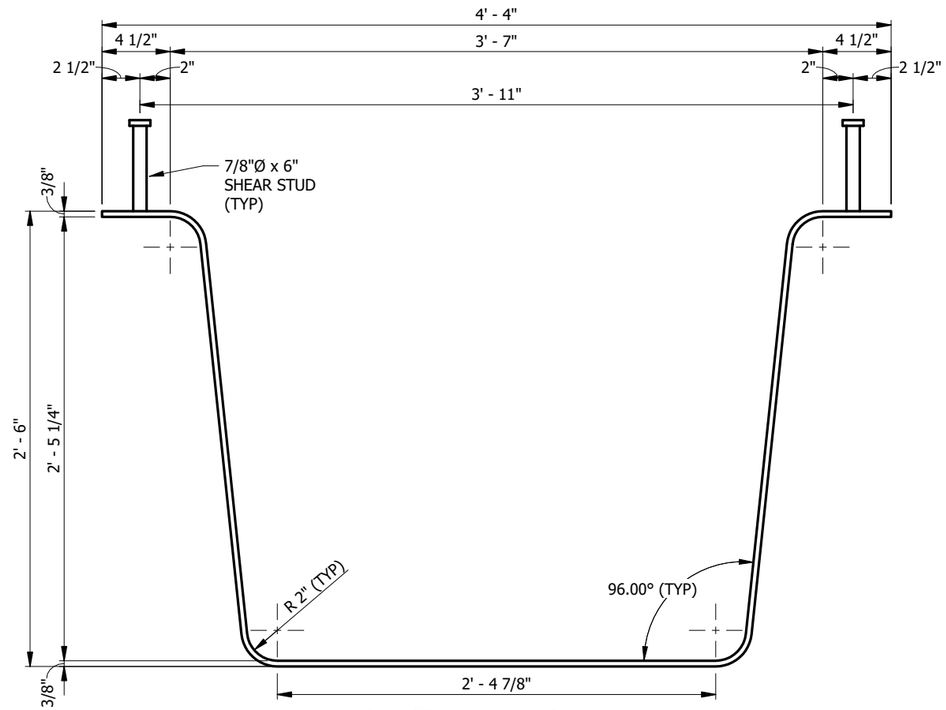


U24 STEEL U-BEAM™

(AASHTO M270, ASTM A709 GR50 T3)

U30			
NON-COMPOSITE SECTION PROPERTIES			
I_{steel}	**S_{steel_top}**	**S_{steel_bottom}**	**J**
in^4	**in^3**	**in^2**	**in^4**
4826.52	-270.02	396.06	2.14

PLATE INFORMATION			
t_{steel}	**L_{steel}**	**A_{steel}**	**ω_{steel}**
in	**in**	**in^2**	**plf**
3/8	102 3/8	38.40	131



U30 STEEL U-BEAM™

(AASHTO M270, ASTM A709 GR50 T3)

NOTE:

COMPOSITE SECTION PROPERTIES AVAILABLE UPON REQUEST.
INCREASE GIVEN WEIGHT BY 10% MINIMUM FOR THE COMPLETE ASSEMBLED U-BEAM™.

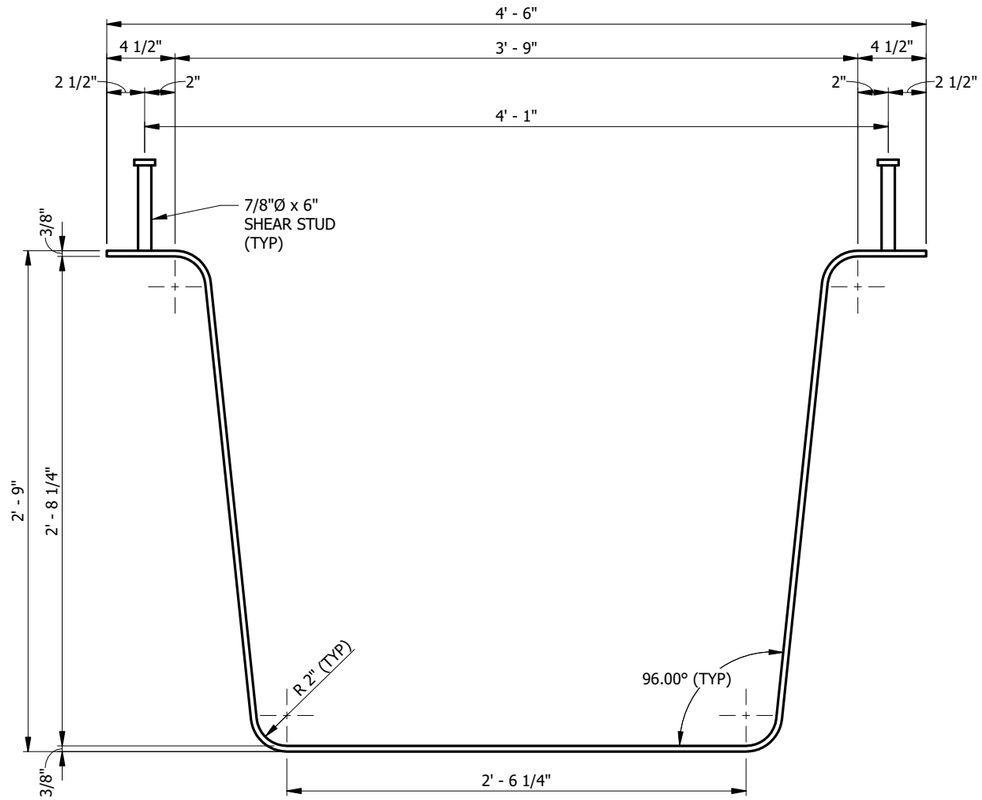
JOB VALMONT® U-BEAM™

TITLE U-BEAM™ SECTIONS

valmont
VALLEY, NE 68064
(402) 359-2201

U33			
NON-COMPOSITE SECTION PROPERTIES			
I_{steel}	**S_{steel_top}**	**S_{steel_bottom}**	**J**
in^4	**in^3**	**in^2**	**in^4**
6159.71	-313.61	455.90	2.35

PLATE INFORMATION			
t_{steel}	**L_{steel}**	**A_{steel}**	**ω_{steel}**
in	**in**	**in^2**	**plf**
3/8	109 3/4	41.18	141



U33 STEEL U-BEAM™

(AASHTO M270, ASTM A572 GR50 T3)

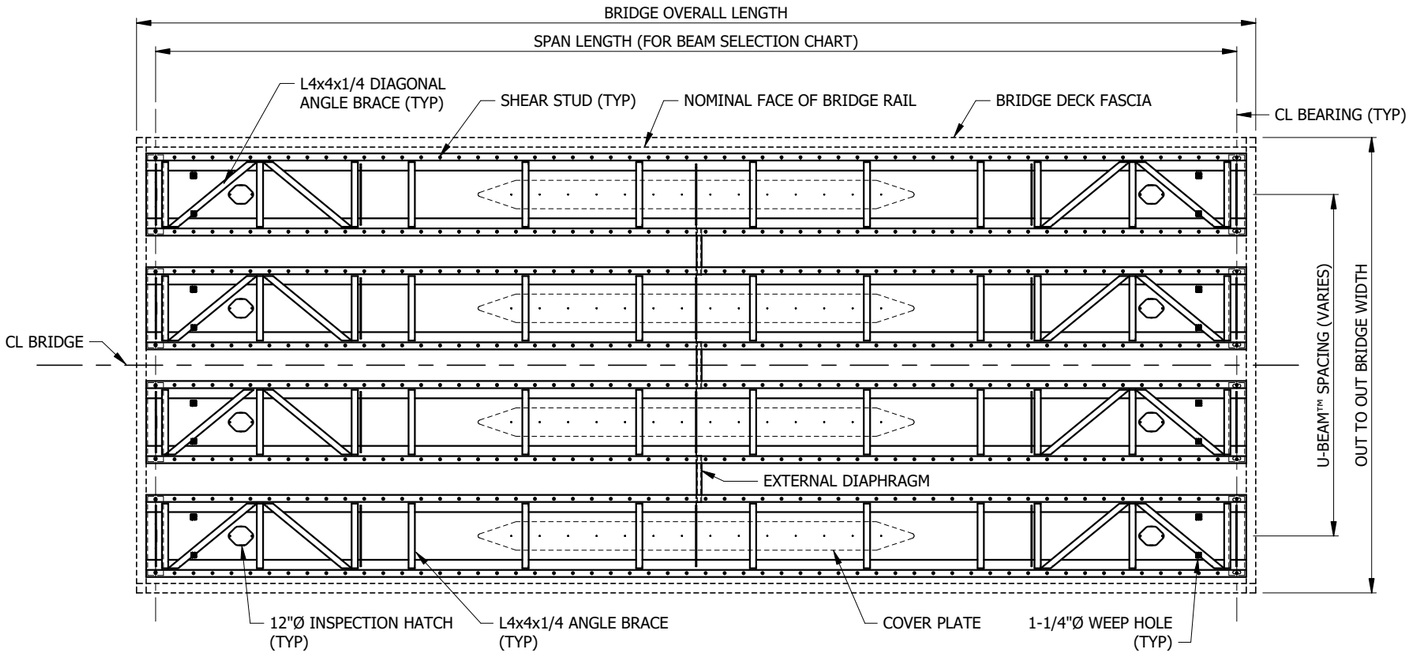
NOTE:

COMPOSITE SECTION PROPERTIES AVAILABLE UPON REQUEST.
INCREASE GIVEN WEIGHT BY 10% MINIMUM FOR THE COMPLETE ASSEMBLED U-BEAM™.

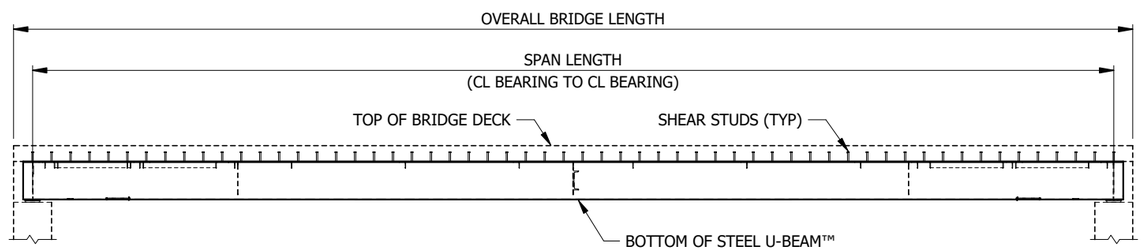
JOB VALMONT® U-BEAM™

TITLE U-BEAM™ SECTION

valmont
VALLEY, NE 68064
(402) 359-2201



TYPICAL PLAN VIEW OF U-BEAM™ LAYOUT



ELEVATION VIEW OF U-BEAM™

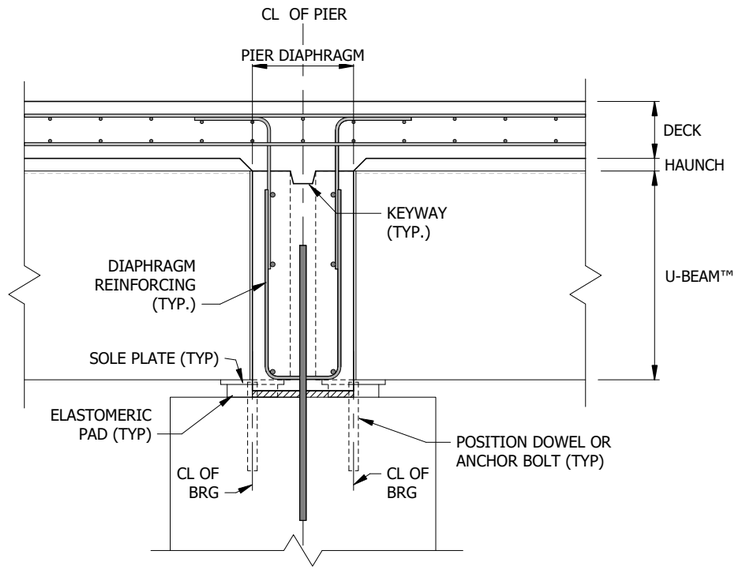
GENERAL NOTES:

- U-BEAM™ CAN BE DESIGNED WITH A CONCRETE DIAPHRAGM OVER PIERS FOR A CONTINUOUS DECK. SEE TYPICAL PIER DIAPHRAGM SECTION ON SHEET S1.11.
- IN THE PRESENCE OF SKEWED ABUTMENTS, IT IS RECOMMENDED TO KEEP THE BEARING LINES OF EACH BEAM PERPENDICULAR TO THE CL OF THE BEAMS TO UTILIZE A COMPACT DESIGN PROCESS. SEE TYPICAL BEARING DETAIL AT SKEWED ABUTMENT ON SHEET S1.11.
- COVER PLATES ARE OPTIONAL OR AS NEEDED.
- EXTERNAL DIAPHRAGMS ARE AS NEEDED.

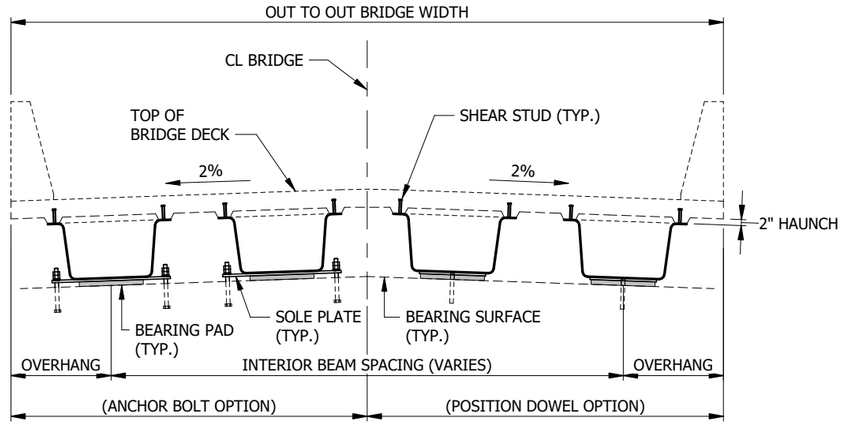
FRAMING NOTES:

- FOR U-BEAM™ SPAN LENGTHS UP TO 55'-0", USE (1) ONE BAY OF DIAGONAL BRACING, NO SPLICE NO EXTERNAL DIAPHRAGM NEEDED.
- FOR U-BEAM™ SPAN LENGTHS BETWEEN 55'-0" AND 75' - 0", USE (2) TWO BAYS OF DIAGONAL BRACING, SINGLE SPLICE AND OPTIONAL EXTERNAL INTERMEDIATE DIAPHRAGM.
- FOR U-BEAM™ SPAN LENGTHS ABOVE 75' - 0", USE (3) BAYS OF DIAGONAL BRACING, DOUBLE SPLICE AND MINIMUM (1) EXTERNAL INTERMEDIATE DIAPHRAGM.
- FOR U-BEAM™ SPAN LENGTHS GREATER THAN 60'-0" WITH A MINIMUM OF 30 DEGREE SKEW, USE MINIMUM (1) EXTERNAL INTERMEDIATE DIAPHRAGM.
- FOR ALL U-BEAM™ SPAN LENGTHS, USE INTERNAL INTERMEDIATE DIAPHRAGMS MINIMUM IN ALL LOCATIONS WHERE EXTERNAL INTERMEDIATE DIAPHRAGM EXISTS.

JOB VALMONT® U-BEAM™	THE DESIGN AND DETAILS CONTAINED IN THESE DRAWINGS ARE BASED ON VALMONT® INDUSTRIES, INC. STANDARD SPECIFICATIONS AND MANUFACTURING PROCESS. THESE DRAWINGS ARE FURNISHED FOR INFORMATION ONLY AND ARE NOT PROJECT SPECIFIC DESIGNS.	valmont VALLEY, NE 68064 (402) 359-2201	PAGE NUMBER: 10 OF 22
TITLE GENERAL BRIGE LAYOUT			SHEET NUMBER S1.10

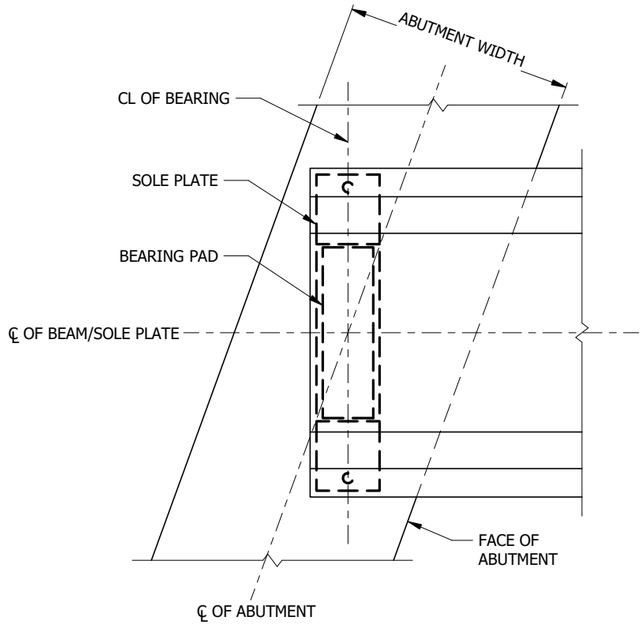


TYPICAL PIER DIAPHRAGM SECTION

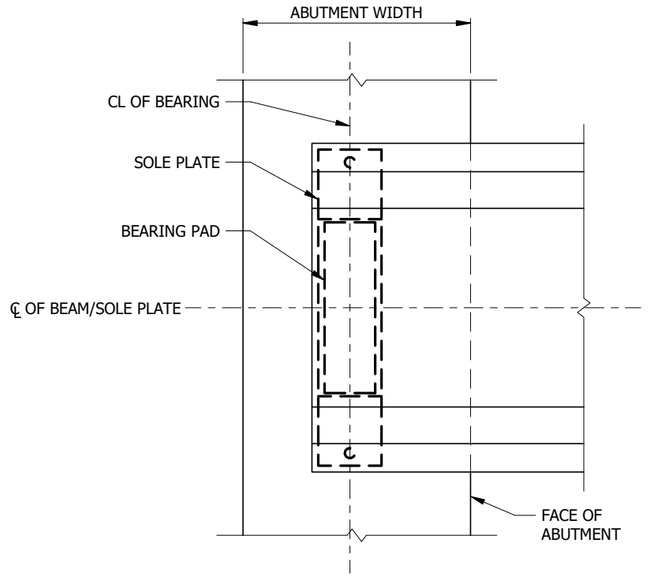


TYPICAL CROSS SECTION

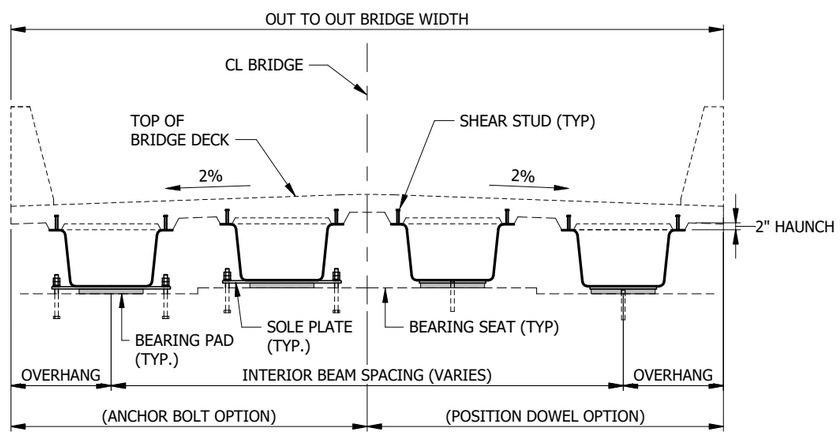
(SLOPED BEARING SURFACE)



TYPICAL BEARING DETAIL AT SKEWED ABUTMENT



TYPICAL BEARING DETAIL AT SQUARE ABUTMENT



TYPICAL CROSS SECTION (ALTERNATE)

(STEPPED BEARING SURFACE)

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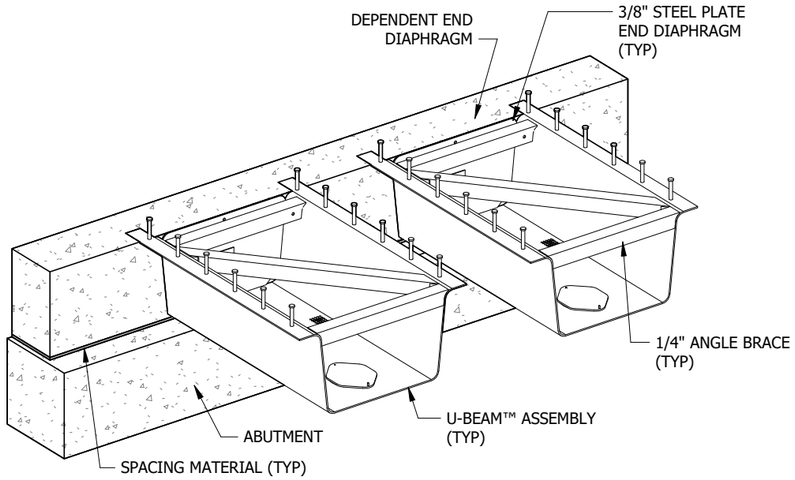
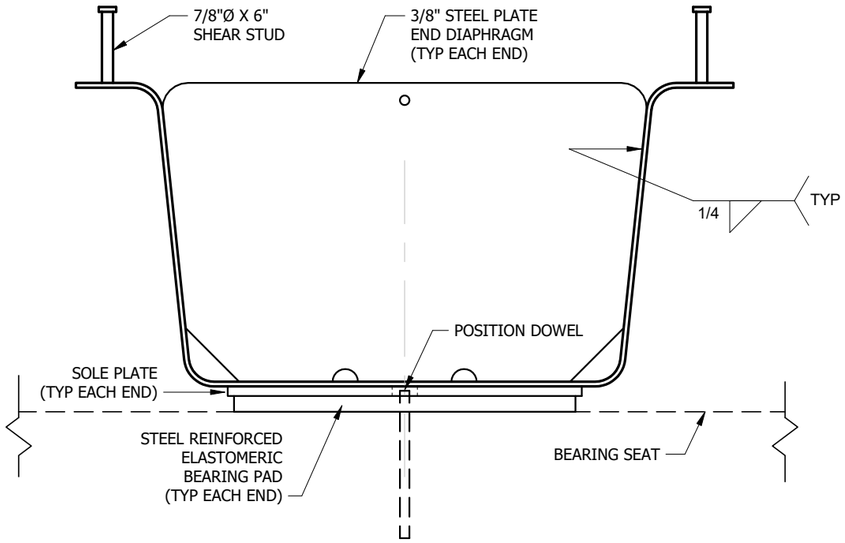
TITLE GENERAL BRIDGE LAYOUT			SHEET NUMBER S1.11



ISOMETRIC VIEW

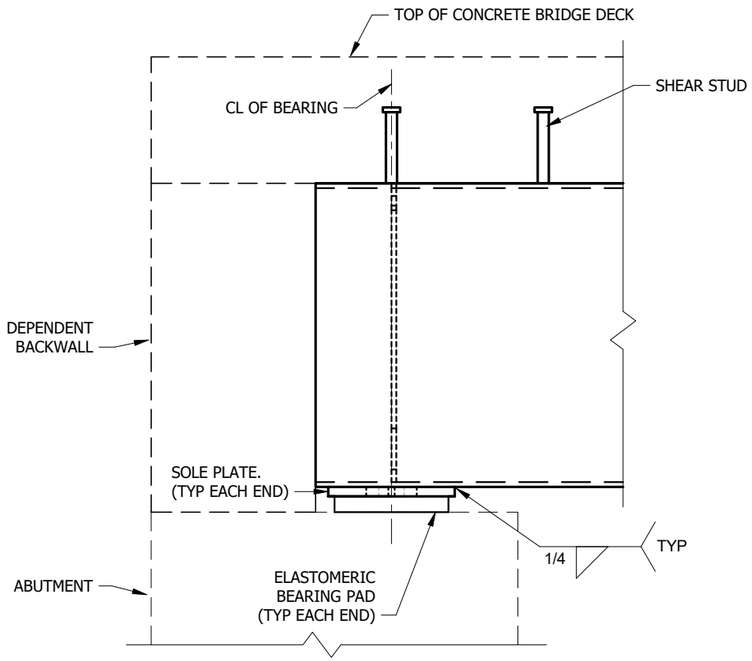
DEPENDENT END DIAPHRAGM

NOTE: END DIAPHRAGM SHALL BE CAST PRIOR TO ANY CONSTRUCTION DECK FORMING, REBAR PLACEMENT OR DECK CONCRETE PLACEMENT OPERATIONS.

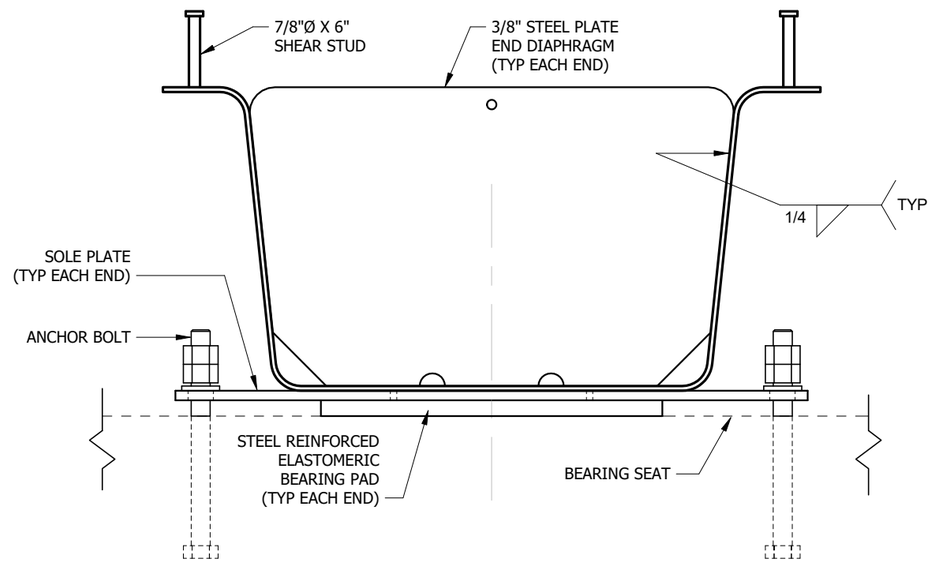


U-BEAM™ END ELEVATION (POSITION DOWEL OPTION)

NOTE: U-BEAMS™ SHALL BE SECURED FROM OVERTURNING PRIOR TO ANY CONSTRUCTION, DECK FORMING, OR CONCRETE PLACEMENT OPERATIONS.



U-BEAM™ SIDE ELEVATION AT BEARING



U-BEAM™ END ELEVATION (ANCHOR BOLT OPTION)

NOTE: ANCHOR BOLTS SHALL BE INSTALLED PRIOR TO ANY CONSTRUCTION DECK FORMING, REBAR PLACEMENT OR CONCRETE PLACEMENT OPERATIONS.

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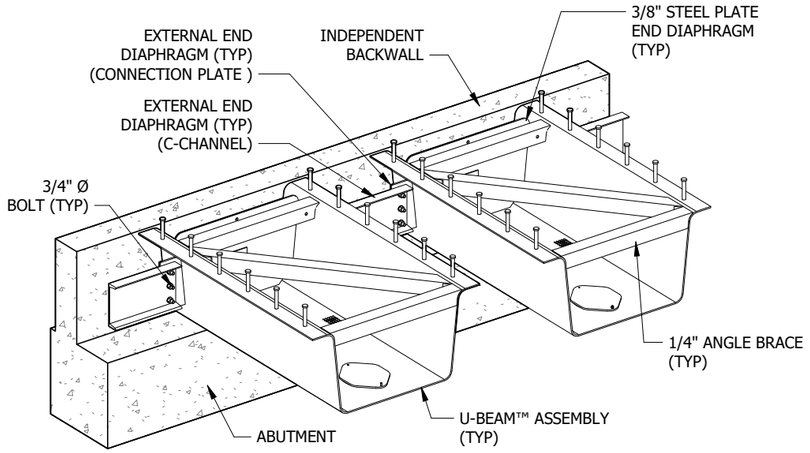
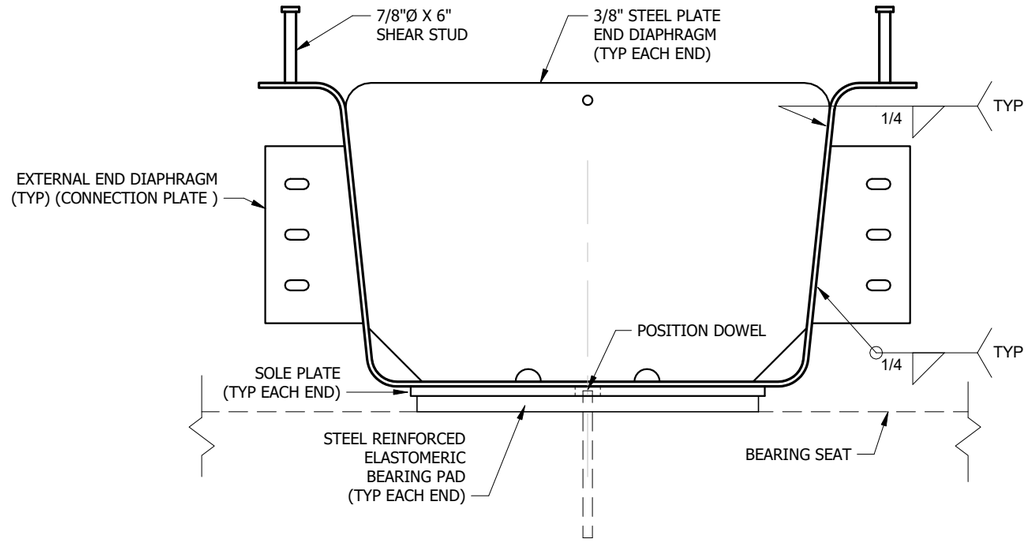
TITLE GENERAL BRIDGE DETAILS			SHEET NUMBER S1.12



ISOMETRIC VIEW

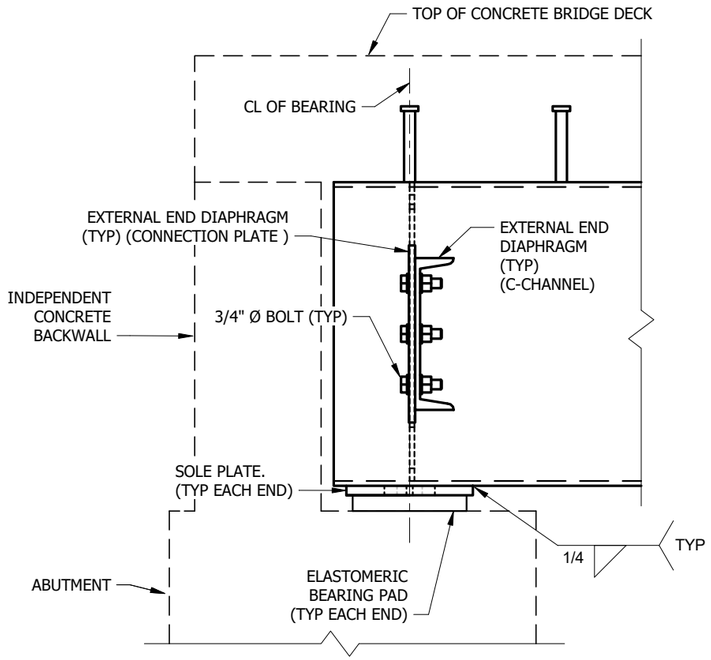
STEEL END DIAPHRAGM WITH INDEPENDENT CONCRETE BACKWALL

NOTE: STEEL END DIAPHRAGM SHALL BE INSTALLED PRIOR TO ANY CONSTRUCTION DECK FORMING, REBAR PLACEMENT OR CONCRETE PLACEMENT OPERATIONS.

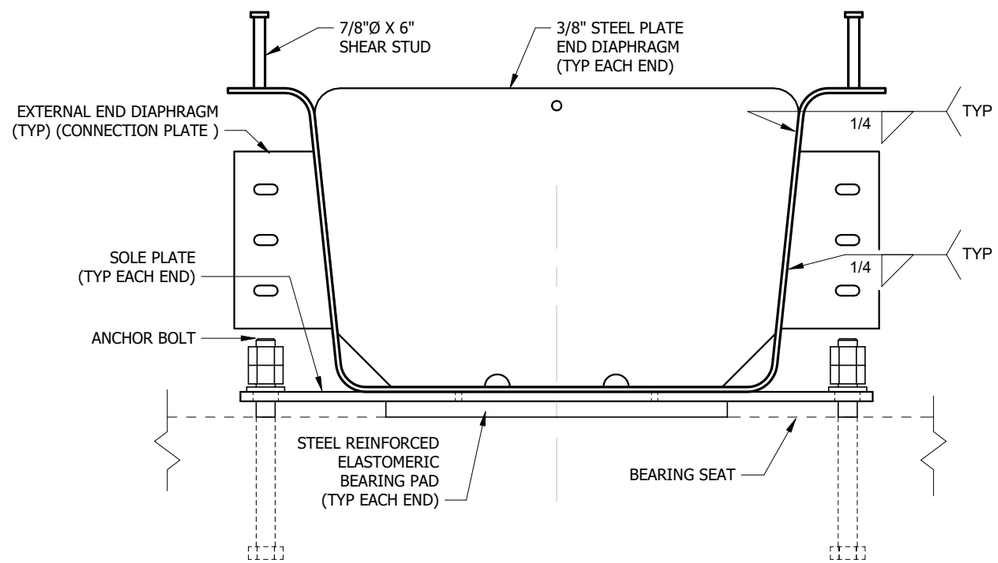


U-BEAM™ END ELEVATION (POSITION DOWEL OPTION)

NOTE: U-BEAMS™ SHALL BE SECURED FROM OVERTURNING PRIOR TO ANY CONSTRUCTION, DECK FORMING, OR CONCRETE PLACEMENT OPERATIONS.



U-BEAM™ SIDE ELEVATION AT BEARING



U-BEAM™ END ELEVATION (ANCHOR BOLT OPTION)

NOTE: ANCHOR BOLTS SHALL BE INSTALLED PRIOR TO ANY CONSTRUCTION DECK FORMING, REBAR PLACEMENT OR CONCRETE PLACEMENT OPERATIONS.

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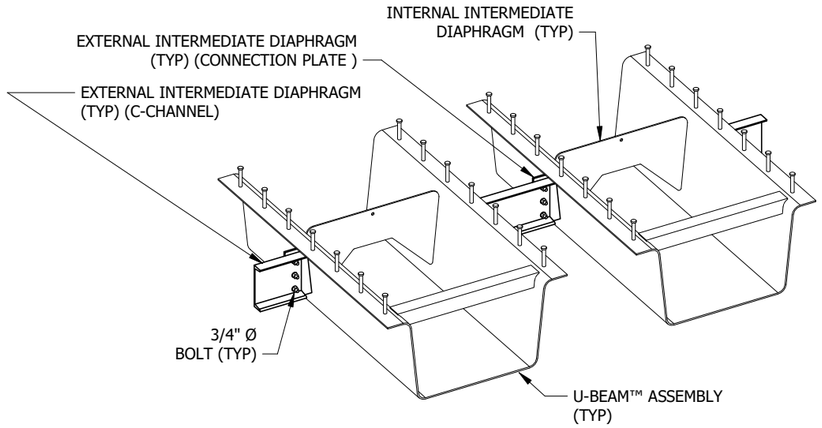
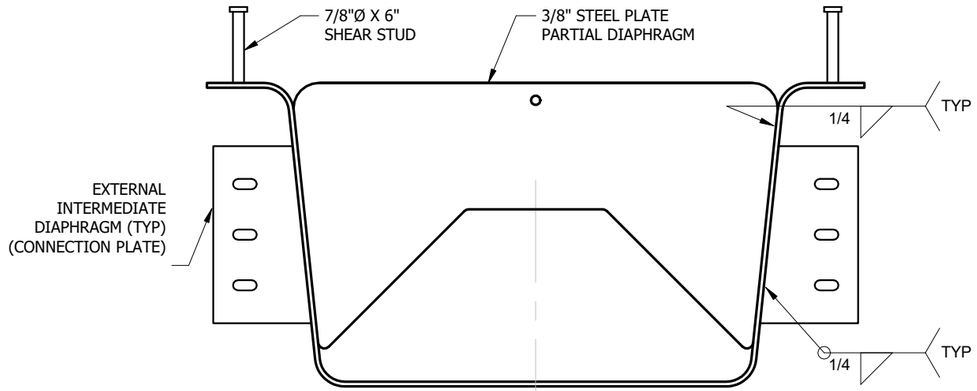
TITLE GENERAL BRIDGE DETAILS			SHEET NUMBER S1.13



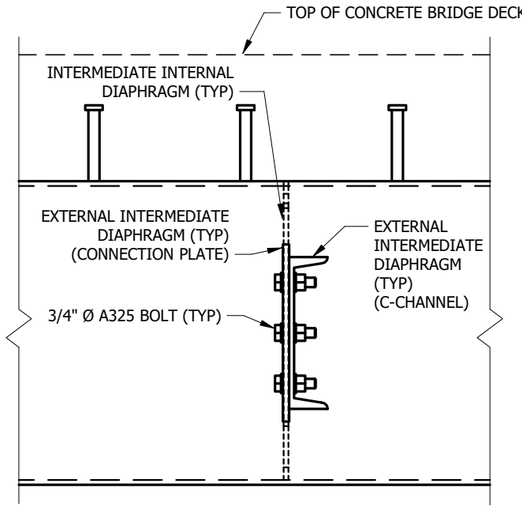
ISOMETRIC VIEW

INTERMEDIATE DIAPHRAGM

NOTE: INTERMEDIATE DIAPHRAGM SHALL BE INSTALLED PRIOR TO ANY CONSTRUCTION DECK FORMING, REBAR PLACEMENT OR CONCRETE PLACEMENT OPERATIONS.

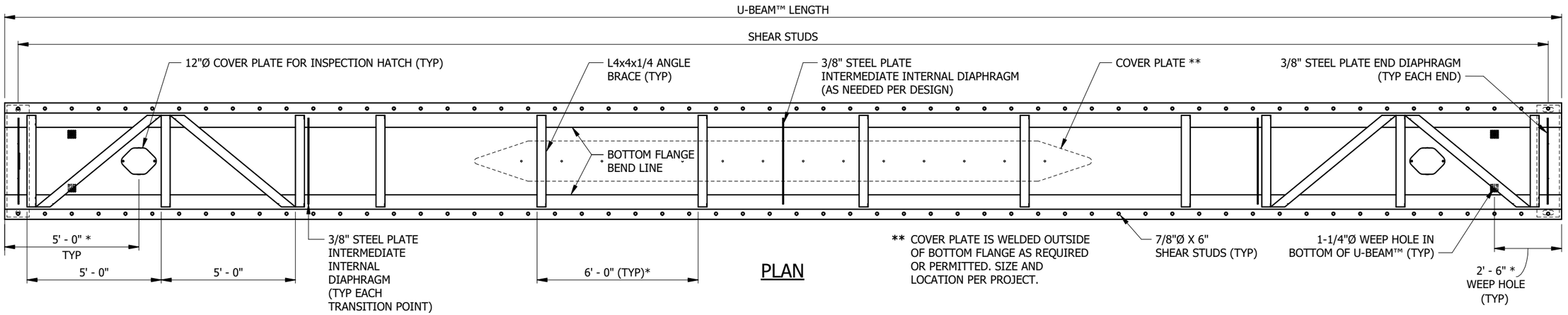


U-BEAM™ ELEVATION (INTERMEDIATE INTERNAL DIAPHRAGM)

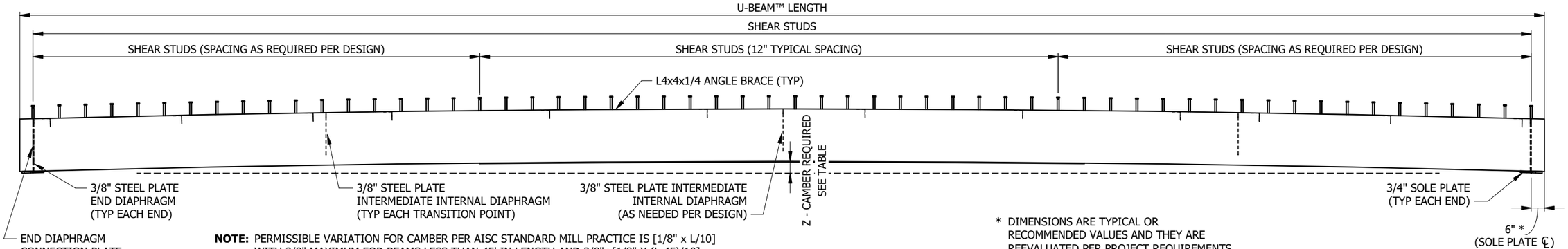


U-BEAM™ SIDE ELEVATION AT INTERMEDIATE DIAPHRAGM

JOB VALMONT® U-BEAM™	THE DESIGN AND DETAILS CONTAINED IN THESE DRAWINGS ARE BASED ON VALMONT® INDUSTRIES, INC. STANDARD SPECIFICATIONS AND MANUFACTURING PROCESS. THESE DRAWINGS ARE FURNISHED FOR INFORMATION ONLY AND ARE NOT PROJECT SPECIFIC DESIGNS.	valmont VALLEY, NE 68064 (402) 359-2201	PAGE NUMBER: 14 OF 22
TITLE GENERAL BRIDGE DETAILS			SHEET NUMBER S1.14



PLAN



NOTE: PERMISSIBLE VARIATION FOR CAMBER PER AISC STANDARD MILL PRACTICE IS [1/8" x L/10] WITH 3/8" MAXIMUM FOR BEAMS LESS THAN 45' IN LENGTH AND 3/8"+[1/8" X (L-45)/10] FOR BEAMS OVER 45' IN LENGTH.

* DIMENSIONS ARE TYPICAL OR RECOMMENDED VALUES AND THEY ARE REEVALUATED PER PROJECT REQUIREMENTS.

ELEVATION

STEEL U-BEAM™

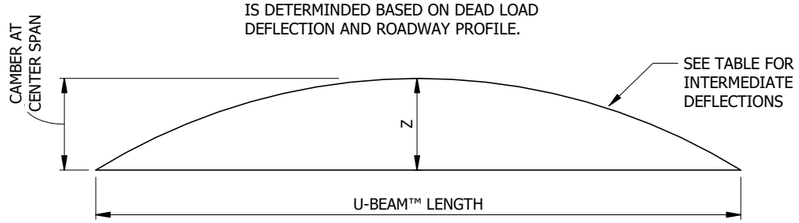
(AASHTO M270, ASTM A709 GR50 T3)

TABLE OF DEFLECTIONS	
LOCATION	**DEFLECTION (in)**
CL BRG	0.0
0.1 SPAN	0.36 x Z
0.2 SPAN	0.64 x Z
0.3 SPAN	0.84 x Z
0.4 SPAN	0.96 x Z
CL SPAN	Z

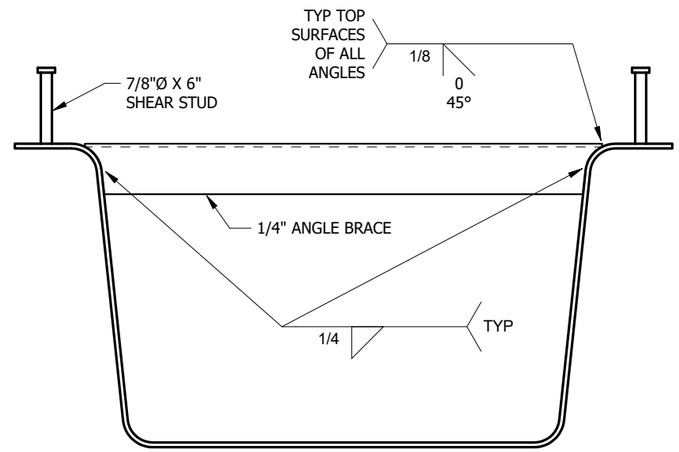
NOTE:

THE MAXIMUM PERMISSIBLE CAMBER ACCOUNTING FOR DEAD LOAD AND ROADWAY PROFILE IS 7 INCHES FOR NON SPLICED BEAMS.

CAMBER "Z" VALUE IS PROJECT SPECIFIC AND IS DETERMINDED BASED ON DEAD LOAD DEFLECTION AND ROADWAY PROFILE.

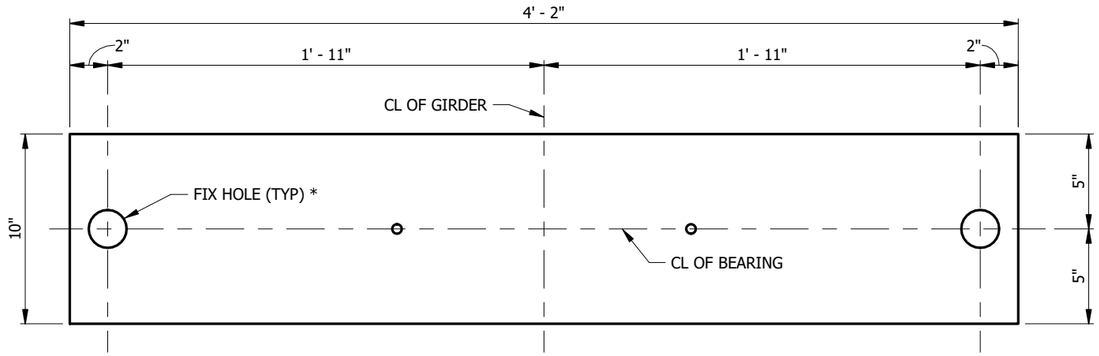


CAMBER DEFLECTION DIAGRAM

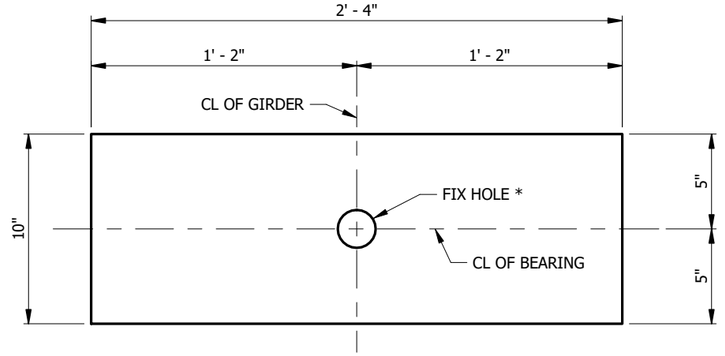


U-BEAM™ CROSS SECTION (ANGLE BRACE)

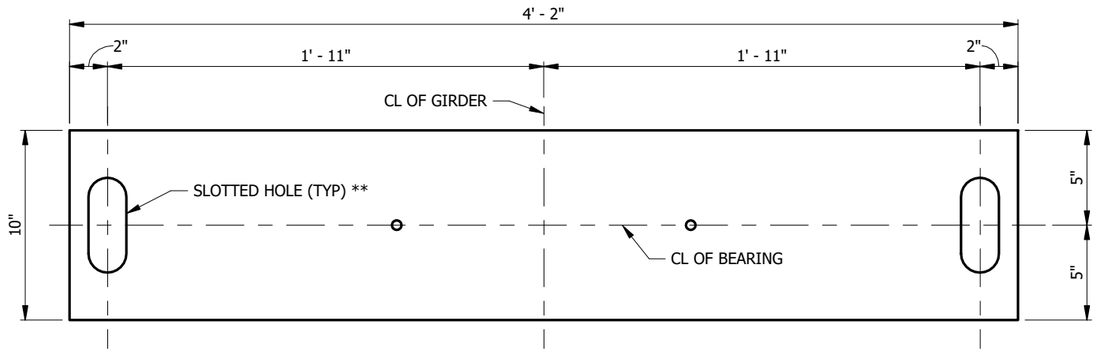
JOB VALMONT® U-BEAM™	THE DESIGN AND DETAILS CONTAINED IN THESE DRAWINGS ARE BASED ON VALMONT® INDUSTRIES, INC. STANDARD SPECIFICATIONS AND MANUFACTURING PROCESS. THESE DRAWINGS ARE FURNISHED FOR INFORMATION ONLY AND ARE NOT PROJECT SPECIFIC DESIGNS.	valmont VALLEY, NE 68064 (402) 359-2201	PAGE NUMBER: 15 OF 22
TITLE U-BEAM™ DETAILS			SHEET NUMBER S1.15



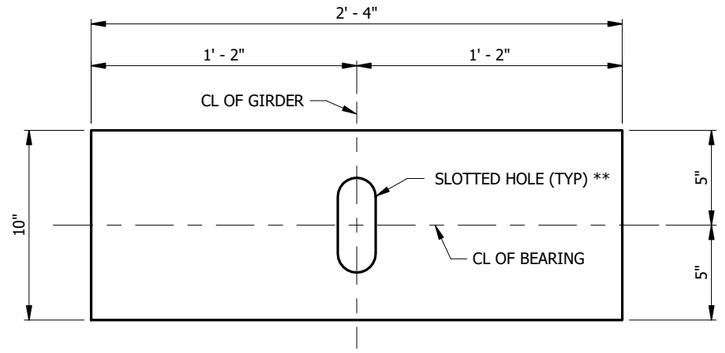
FIXED SOLE PLATE DETAIL (ANCHOR BOLT OPTION)



FIXED SOLE PLATE DETAIL (POSTION DOWEL OPTION)

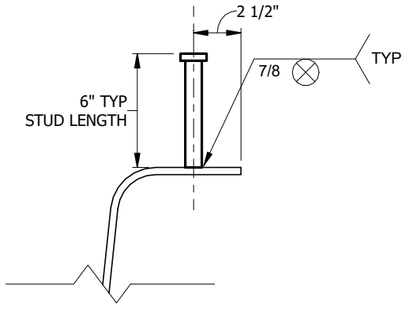


EXPANSION SOLE PLATE DETAIL (ANCHOR BOLT OPTION)

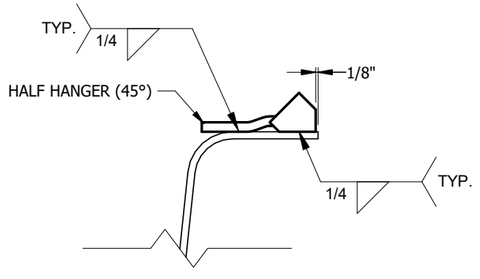


EXPANSION SOLE PLATE DETAIL (POSTION DOWEL OPTION)

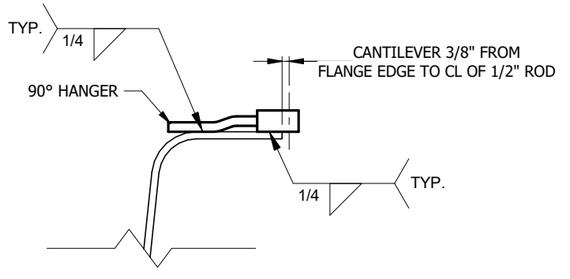
* FIX HOLE DIAMETER TO BE ANCHOR BOLT OR POSITION DOWEL DIAMETER + 1/2".
** SLOTTED HOLE DIAMETER TO BE ANCHOR BOLT OR POSITION DOWEL DIAMETER + 1/2" X 5".



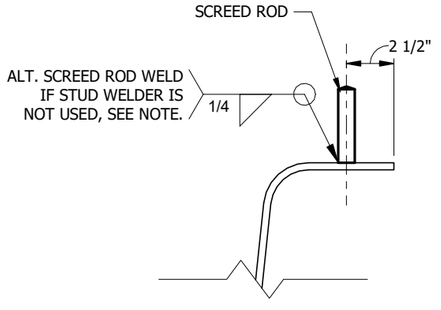
SHEAR STUD DETAIL



HALF HANGER DETAIL



90° HANGER DETAIL



SCREED ROD DETAIL

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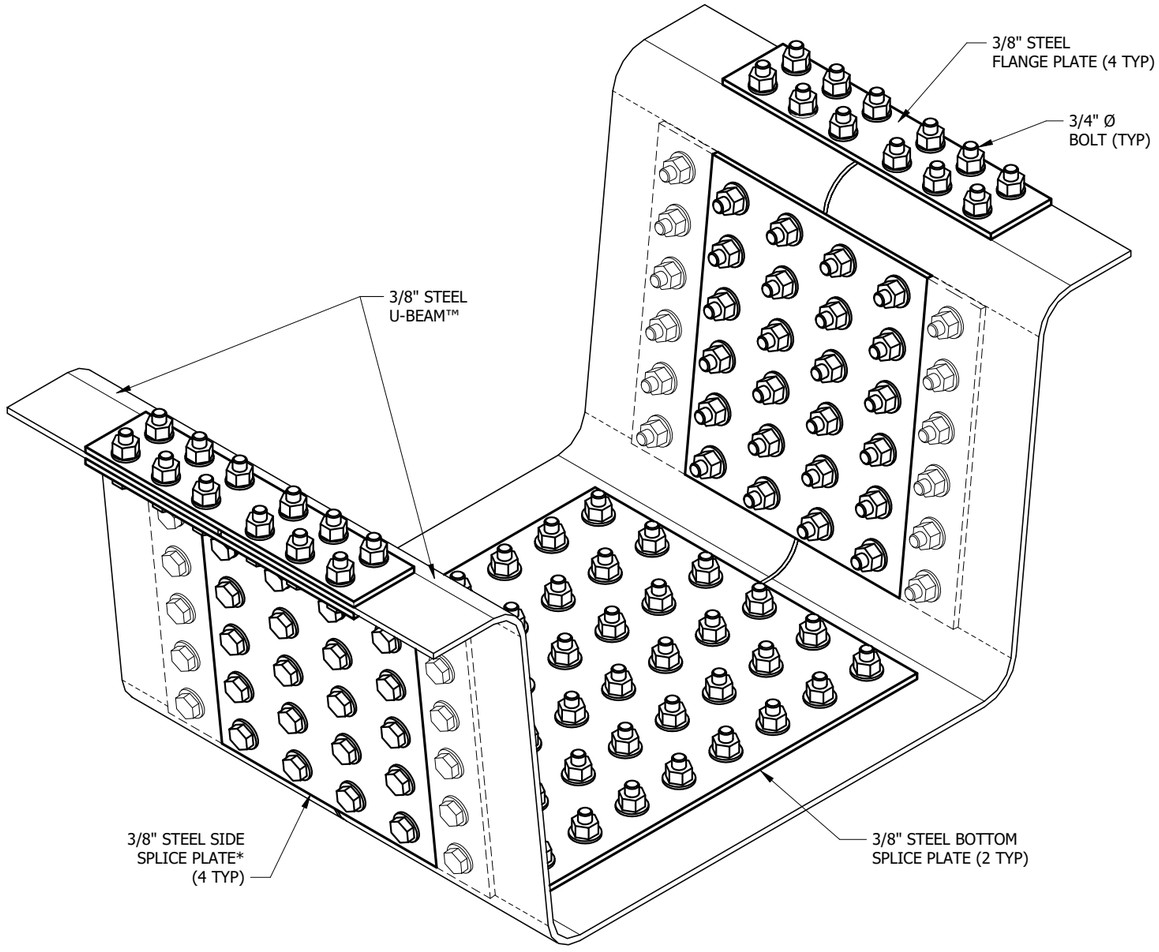
TITLE U-BEAM™ DETAILS			SHEET NUMBER S1.16



* SIDE SPLICE PLATES MAY HAVE (4) OR (6) ROW OF BOLTS DEPENDING ON THE DESIGN REQUIREMENTS.

NOTE: U-BEAM™ SPLICES ARE REQUIRED FOR NON-SKEWED BEAM LENGTHS GREATER THAN 57' - 0".

BOLTED SPLICE PLATE ASSEMBLY

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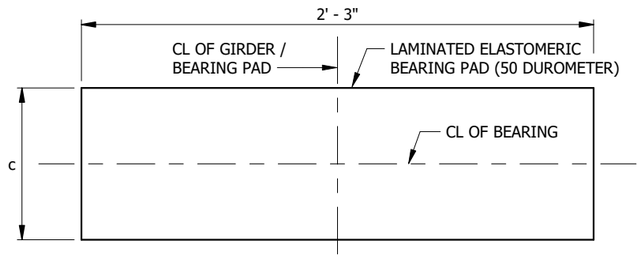
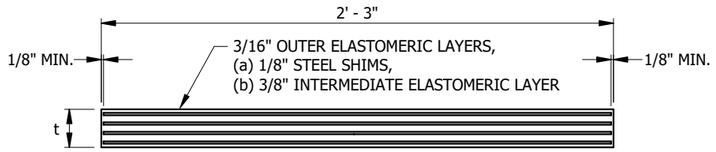
TITLE SPLICE DETAILS			SHEET NUMBER S1.17

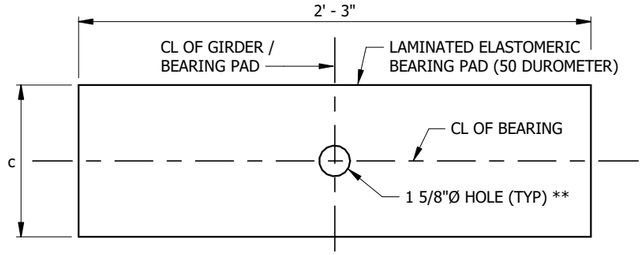


PLAN OF ELASTOMERIC PAD

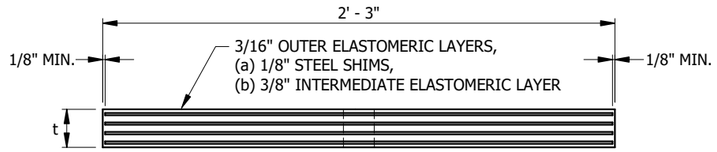


ELEVATION

BEARING PAD DETAIL (ANCHOR BOLT OPTION)



PLAN OF ELASTOMERIC PAD - FIXED BRG



ELEVATION

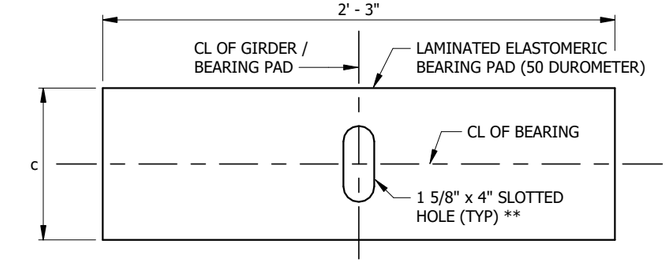
FIXED BEARING PAD DETAIL (POSITION DOWEL OPTION)

** HOLE SIZES IN BEARING PADS CAN BE REVISED PER PROJECT REQUIREMENTS.

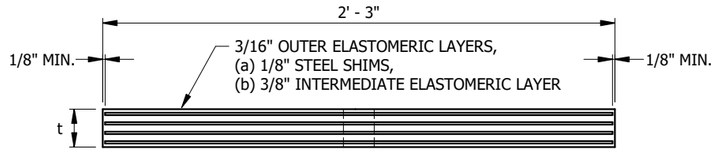
SPAN	BEARING PAD TABLE			
	t	a	b	c
40	2"	(4)	(3)	8"
50	2"	(5)	(4)	8"
60	2 1/2"	(6)	(5)	8"
70	3"	(7)	(6)	8"
80	3 1/2"	(8)	(7)	8"
90	4"	(9)	(8)	9"
100	4 1/2"	(10)	(9)	9"

NOTES:

- VALUES IN THE ABOVE TABLE ARE CALCULATED FOR THE LARGEST POSSIBLE REACTION FORCES.
- SMALLER VALUES MIGHT BE POSSIBLE FOR PROJECT SPECIFIC DESIGN INFORMATION.
- CONTACT WITH VALMONT FO RMORE INFORMATION.



PLAN OF ELASTOMERIC PAD - EXPANSION BRG



ELEVATION

EXPANSION BEARING PAD DETAIL (POSITION DOWEL OPTION)

JOB VALMONT® U-BEAM™

TITLE BEARING PAD DETAILS

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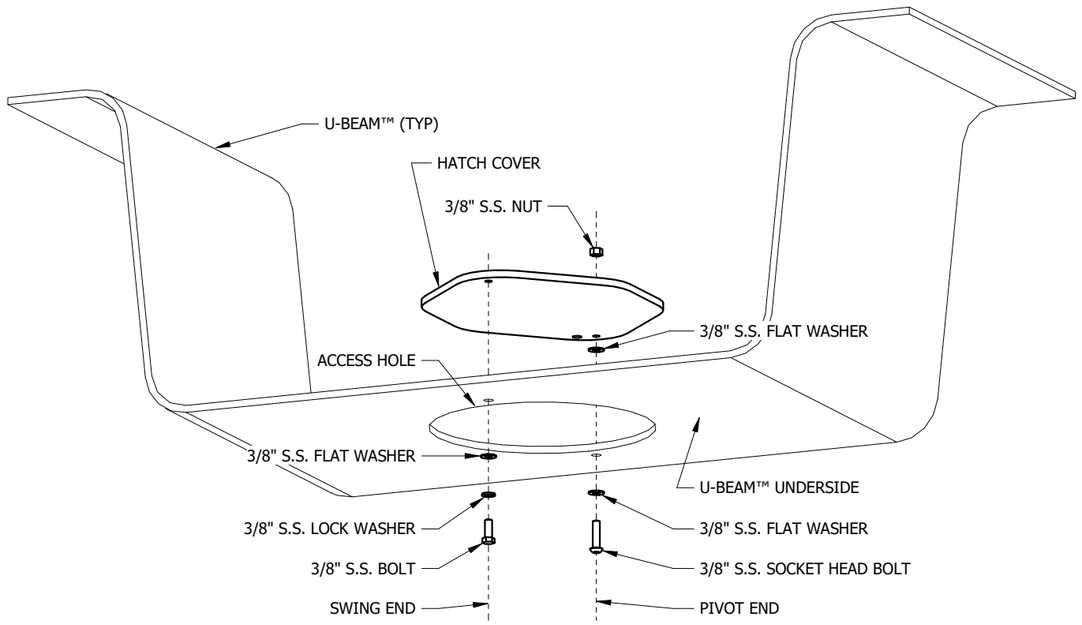

FIELD INSTALLATION INSTRUCTIONS:

- WORKING FROM THE UNDERSIDE OF THE U-BEAM™, ORIENTATE HATCH COVER SUCH THAT THE COVER FITS THROUGH THE OPENING ON LOWER FLANGE OF U-BEAM™. INSERT COVER THROUGH HOLE & SET OUT OF THE WAY OF SMALL MOUNTING HOLES.
- PLACE (1) WASHER ON THE INSIDE OF THE U-BEAM™ FLANGE ALIGNING WITH HOLE AS SHOWN ON PIVOT END.
- ALIGN PIVOT END HOLE OF HATCH COVER WITH WASHER & LOWER FLANGE HOLE (WASHER SANDWICHED BETWEEN HATCH COVER & BOTTOM FLANGE OF U-BEAM™).
- WITH HOLES ALIGNED, & THE COVER RESTING ON THE WASHER, FROM THE UNDERSIDE, INSERT A 3/8" x 1-1/2" BUTTON HEAD BOLT & FLAT WASHER, THROUGH U-BEAM™ & THE INSIDE WASHER, & THREAD INTO HATCH COVER HOLE.
- TIGHTEN BOLT SUCH THAT THE HATCH COVER CAN FREELY ROTATE ABOUT BOLT.
- PLACE NUT ON PROTRUDING END OF BOLT & TIGHTEN WHILE PREVENTING BOLT FROM TURNING, TO SECURE BOLT TO HATCH COVER, CREATING A PIVOT POINT FOR THE HATCH COVER. THERE SHOULD BE A SLIGHT GAP BETWEEN HATCH COVER, WASHER, & U-BEAM™. THE HATCH COVER SHOULD ROTATE & PIVOT FREELY.
- ROTATE HATCH COVER TO ALIGN WITH OTHER HOLE IN U-BEAM™ WITH OTHER SIDE OF COVER PLATE.
- FROM THE UNDERSIDE, INSERT 3/8" HEX HEAD BOLT WITH FLAT WASHER AND LOCK WASHER & THREAD INTO HOLE ON COVER PLATE.
- TIGHTEN BOLT TO SECURE HATCH COVER TO U-BEAM™.

ACCESS HATCH COVER ASSEMBLY DETAIL

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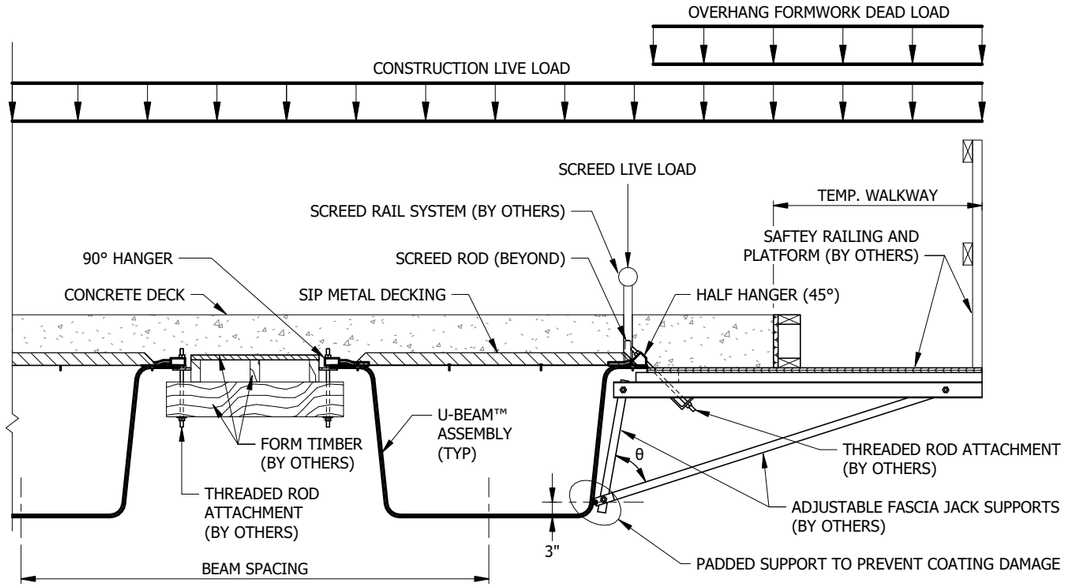
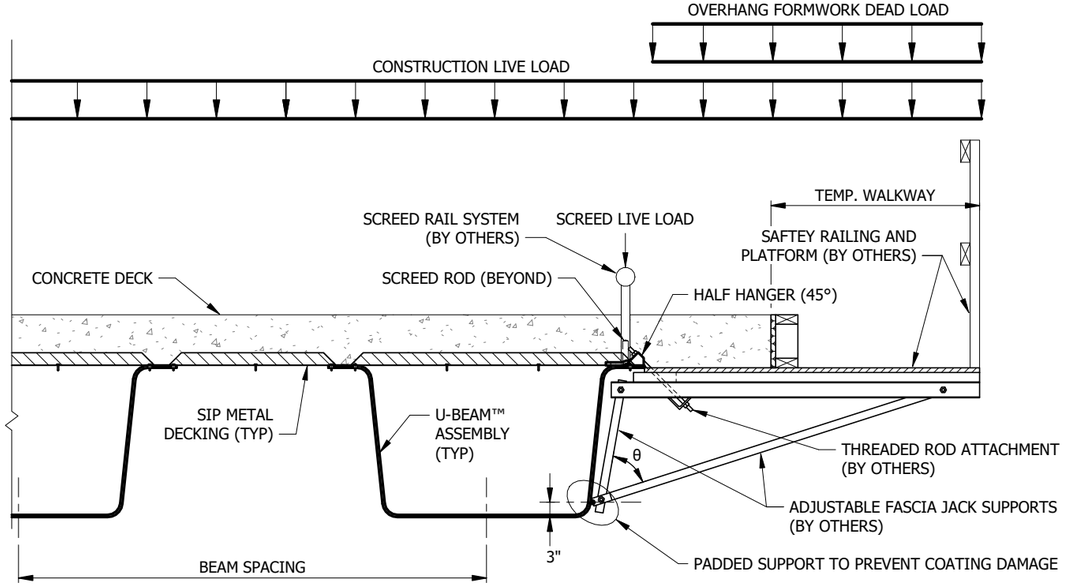
TITLE: ACCESS HATCH COVER ASSEMBLY			SHEET NUMBER: S1.19



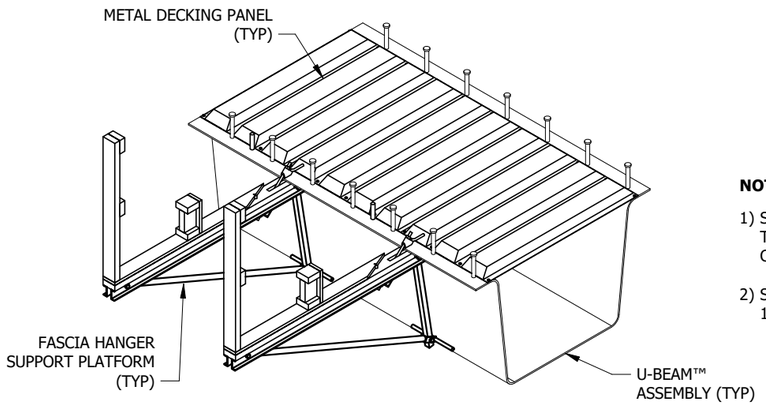
CONSTRUCTION FRAMING & LOADS DIAGRAM (WOOD FORMS BETWEEN BEAMS)



CONSTRUCTION FRAMING & LOADS DIAGRAM (SIP FORMS BETWEEN BEAMS)

NOTES:

- ALTERNATE SCREED RAIL SYSTEMS WHERE SCREED IS SUPPORTED BY THE FASCIA SUPPORT INSTEAD OF U-BEAM™ TOP FLANGE CAN BE USED.
- OVERHANG FORMWORK DEAD LOAD IS TAKEN AS 25 PSF AND APPLIED TO FULL SPAN LENGTH.
- SCREED LIVE LOAD IS TAKEN AS 300 PLF AND APPLIED AS 10 FT LONG DISTRIBUTED MOVING LOAD ALONG THE SPAN.
- CONSTRUCTION LIVE LOAD IS TAKEN AS 20 PSF AND APPLIED AS A 20 FT LONG DISTRIBUTED MOVING LOAD CENTERED ON SCREED LIVE LOAD.
- TEMPORARY WALKWAY IS TAKEN AS 2' - 6" WIDE.

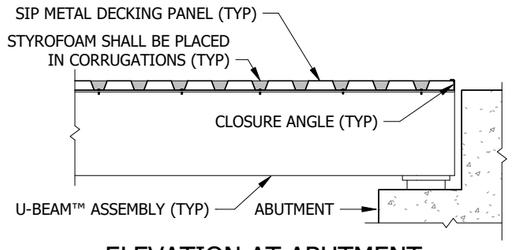


ISOMETRIC VIEW
(TYP)

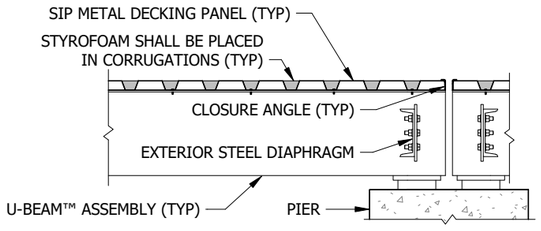
NOTES:

1) SIP METAL DECKING PANELS SHALL BE FASTENED TO TOP FLANGES PRIOR TO APPLYING ANY KIND OF CONSTRUCTION LOADS.
2) SIP METAL DECKING PANELS SHALL BEAR A MINIMUM 1" ON ALL SUPPORTS.

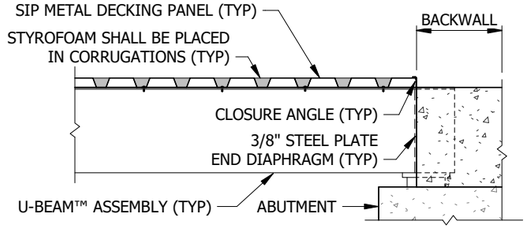
SIP METAL DECKING



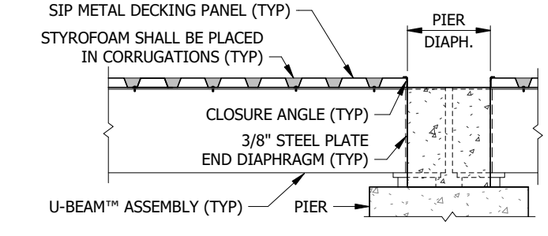
ELEVATION AT ABUTMENT
WITH INDEPENDENT BACKWALL



ELEVATION AT PIERS
WITH STEEL DIAPHRAGM



ELEVATION AT ABUTMENT
WITH DEPENDENT BACKWALL



ELEVATION AT PIERS
WITH CONCRETE DIAPHRAGM

JOB	VALMONT® U-BEAM™
TITLE	GENERAL BRIDGE CONSTR. DETAILS

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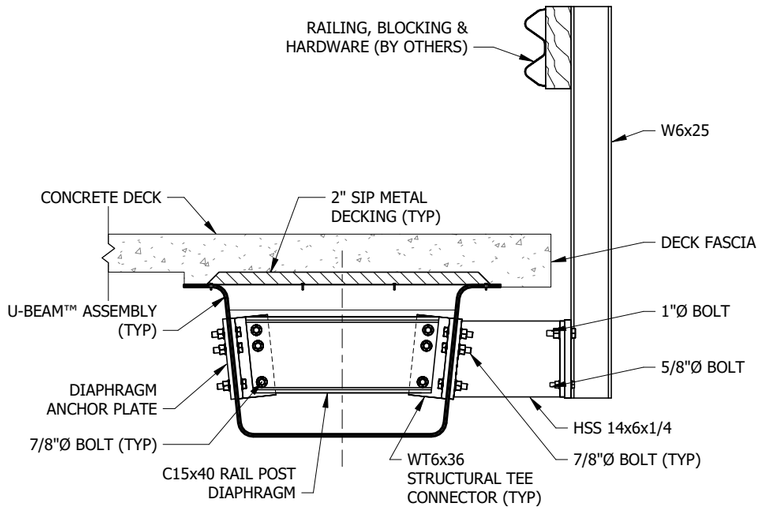

TYPICAL BRIDGE DECK SECTION AT TL-2 BRIDGE RAIL POST ASSEMBLY

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TITLE TL-2 GUARDRAIL POST ASSEMBLY			SHEET NUMBER S1.21

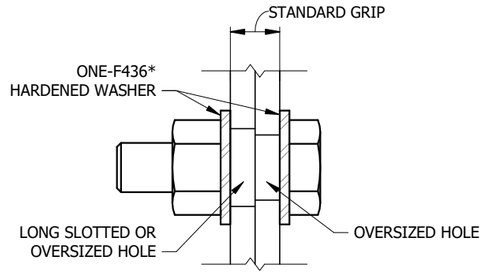
BOLTING TIGHTENING PROCEDURES:

1. THE STORAGE AND LUBRICATION OF BOLTING ASSEMBLIES AND BOLTING COMPONENTS SHALL COMPLY WITH THE REQUIREMENTS OF AISC / RCSC SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS ARTICLE 2.10"
2. EVERY FASTENER SHALL BE IN SNUG-TIGHT CONDITION PRIOR TO APPLYING PRE-TENSIONING METHOD. SNUG-TIGHT CONDITION IS DEFINED AS '*THE JOINT CONDITION IN WHICH THE PLIES HAVE BEEN BROUGHT INTO FIRM CONTACT AND EACH BOLTING ASSEMBLY HAS AT LEAST THE TIGHTNESS ATTAINED WITH EITHER A FEW IMPACTS OF AN IMPACT WRENCH, RESISTANCE TO A SUITABLE NON-IMPACT WRENCH, OR THE FULL EFFORT OF AN IRONWORKER USING AN ORDINARY SPUD WRENCH.*'
3. INSPECTION PRIOR AND DURING BOLTION SHALL COMPLY WITH THE REQUIREMENTS OF AISC / RCSC SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS ARTICLE 9.2.
4. PRETENSION ALL BOLTS ACCORDING TO AISC / RCSC SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS ARTICLE 8.2. PRETENSIONING METHODS ARE LISTED AS BELOW WITHOUT PREFERENCE.
   A. TURN OF THE NUT METHOD PRETENSIONING
   B. CALIBRATED WRENCH METHOD PRETENSIONG
   C. TWIST-OFF TENSION CONTROL BOLT METHOD PRETENSIONING
   D. DIRECT RENSION INDICATOR METHOD PRETENSIONING
   E. COMBINED METHOD PRETENSIONING
5. TENSIONING OF ALL BOLTS IN THE JOINT SHALL BE PROGRESSING FROM THE MOST RIGID PART OF THE JOINT IN A MANNER THAT WILL MINIMIZE RELAXATION OF PREVIOUSLY PRETENSIONED BOLTS.

TABLE 5.2 (PARTIAL). MINIMUM BOLT PRETENSION, PRETENSIONED AND SLIP-CRITICAL JOINTS

NOMINAL BOLT DIAMETER, d^b, in.	SPECIFIED MINIMUM BOLT PRETENSION, Tm, kips[a]	
	GROUP 120	GROUP 144 AND GROUP 150
1/2	12	15
5/8	19	24
3/4	28	35
7/8	39	49
1	51	64

[a] EQUAL TO 70 PRECENT OF THE SPECIFIED MINIMUM TENSILE STRENGTH OF BOLTS AS SPECIFIED IN ASTM SPECIFICATIONS FOR TESTS OF FULL-SIZE ASTM A325 BOLTS WITH UNC THREADS LOADED IN AXIAL TENSION, ROUNDED TO THE NEAREST kip.



NUT/BOLT SECTION

*REPLACE F-436 HARDENED WASHERS WITH 5/16" x 2" x 2" PLATE WASHERS WHERE LONG SLOTTED HOLES EXIST.

NUT AND BOLT PRETENSION

JOB VALMONT® U-BEAM™

TITLE NUT-BOLT PRETENSION

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