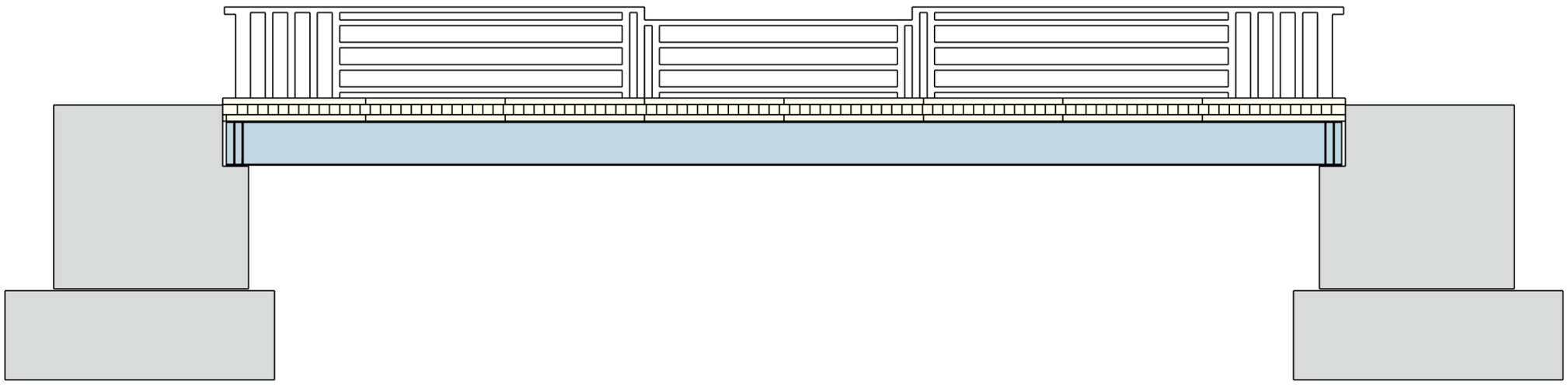
# UNION VILLAGE BRIDGE

Town of Thetford Center

U.S. Army Corps of Engineers

## Technical

43° 49’ 01.56” N
72° 15’ 12.85” W



Nick Fabrikant
Civil Engineer

Designed May 2023

STATE OF VERMONT
OFFICE OF SECRETARY OF STATE

Certificate of Trade Name Registration

I James C.Condos, Vermont Secretary of State hereby certify that

**FABRIKANT WORKS**

is registered effective 7/10/2020 as per copy attached.

Jul 10, 2020

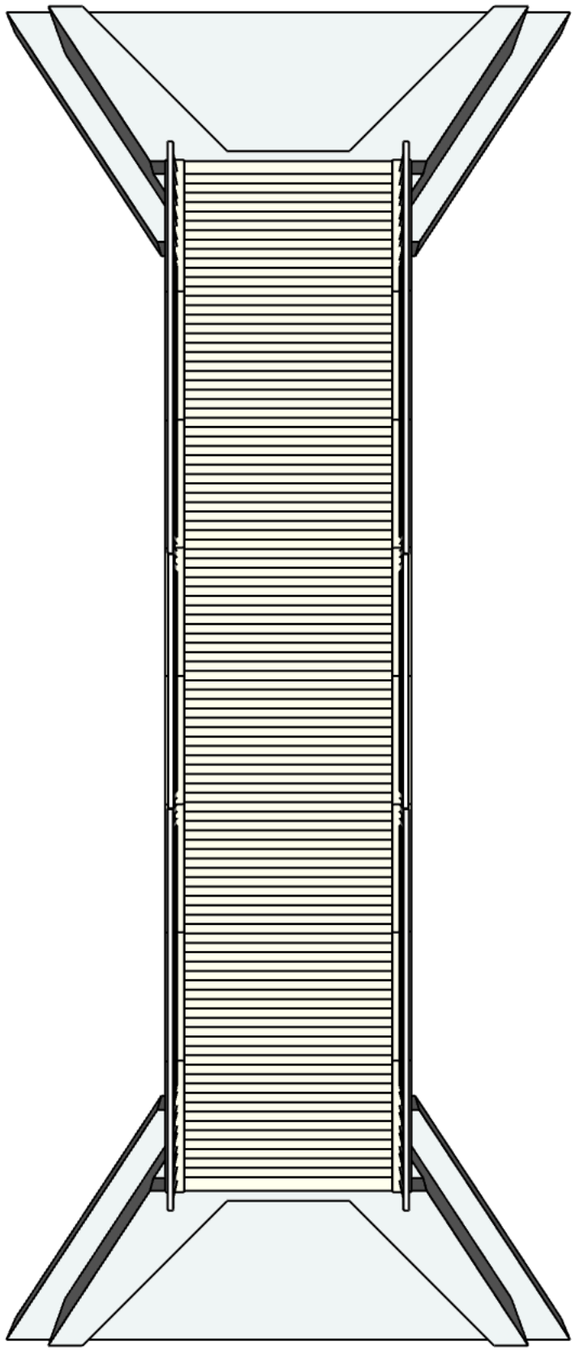
Given under my hand and the seal
of the State of Vermont,at
Montpelier,the State Capital

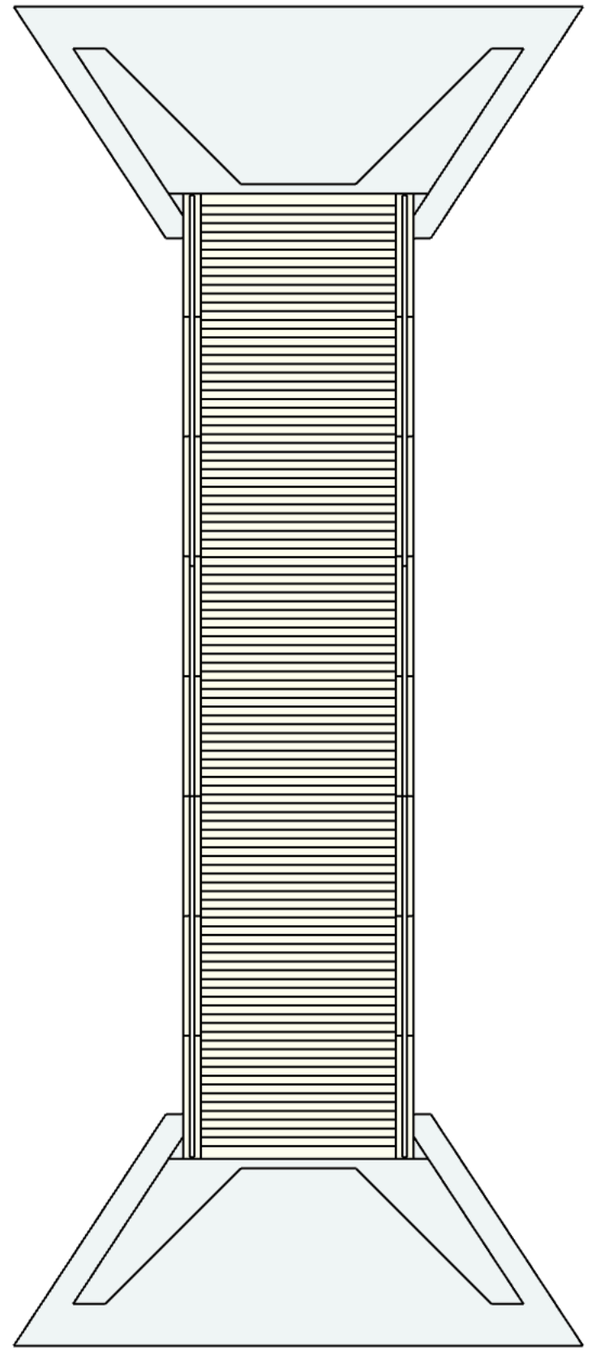
James C. Condos
Vermont Secretary of State

**Filed with the Vermont Secretary of State, Division of Corporations**

Designed May
2023

**CLEAR SPAN USABLE WIDTH OF THE BRIDGE: 10’**
**Satisfies snowmobile requirement of minimum width: 8’**





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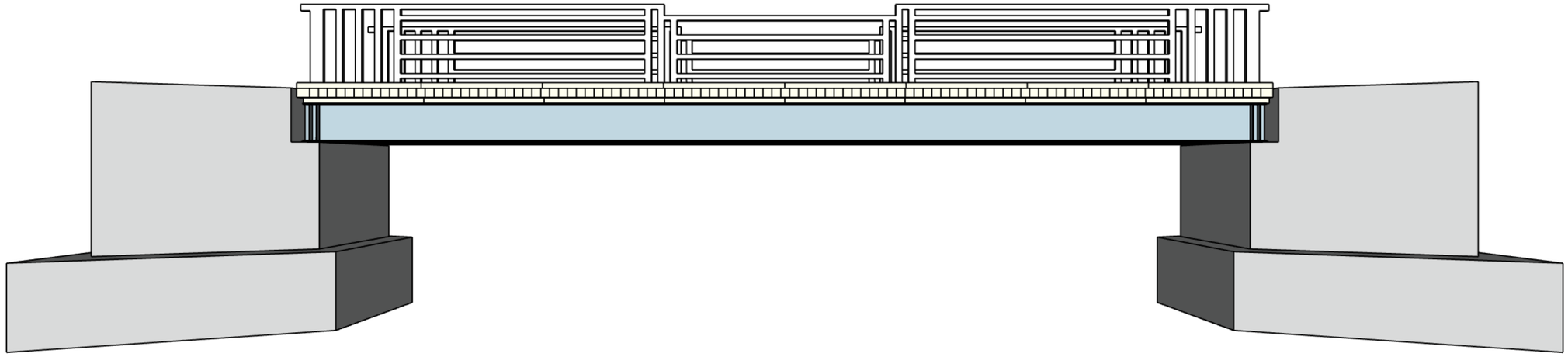
**CLEAR SPAN LENGTH OF THE BRIDGE: 48’**
**TOTAL SPAN LENGTH: 50’**

**MEASUREMENTS SATISFY STATE OF VERMONT DESIGN FLOOD CRITERION**
**-BUILT TO WITHSTAND OVER A CENTURY-**



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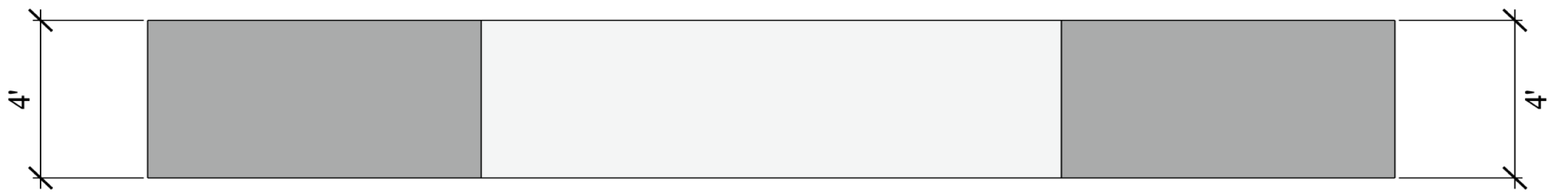
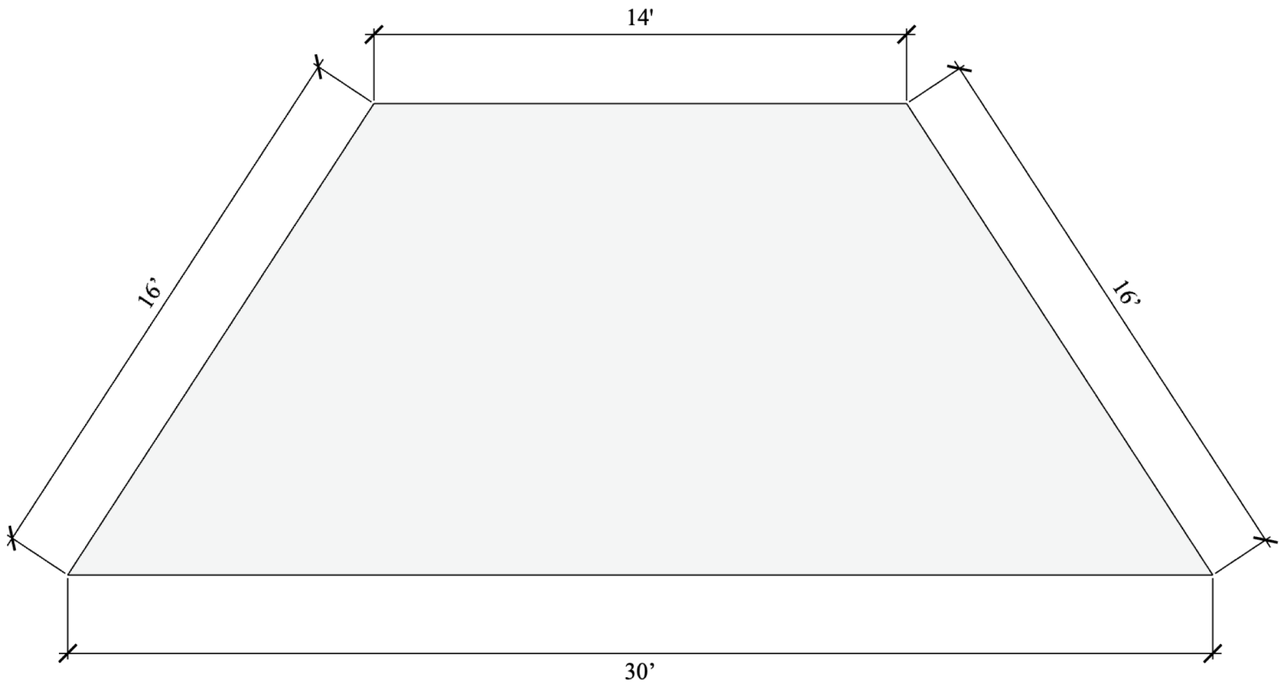
**CONCRETE:** 5000 PSI FOOTINGS and WALLS- PINNED TO EXISTING LEDGE OR ESTABLISHED ON EXISTING STABLE SOILS

FOOTINGS, 2 HORIZONTAL MATS, 16” O.C. No. 5 EPOXY REBAR GRADE 60
ALL CONCRETE WILL BE ESTABLISHED ON 6”-7” CRUSHED STONE ((FREIGHTED))
FOOTINGS:

ELEVATION:




PLAN:



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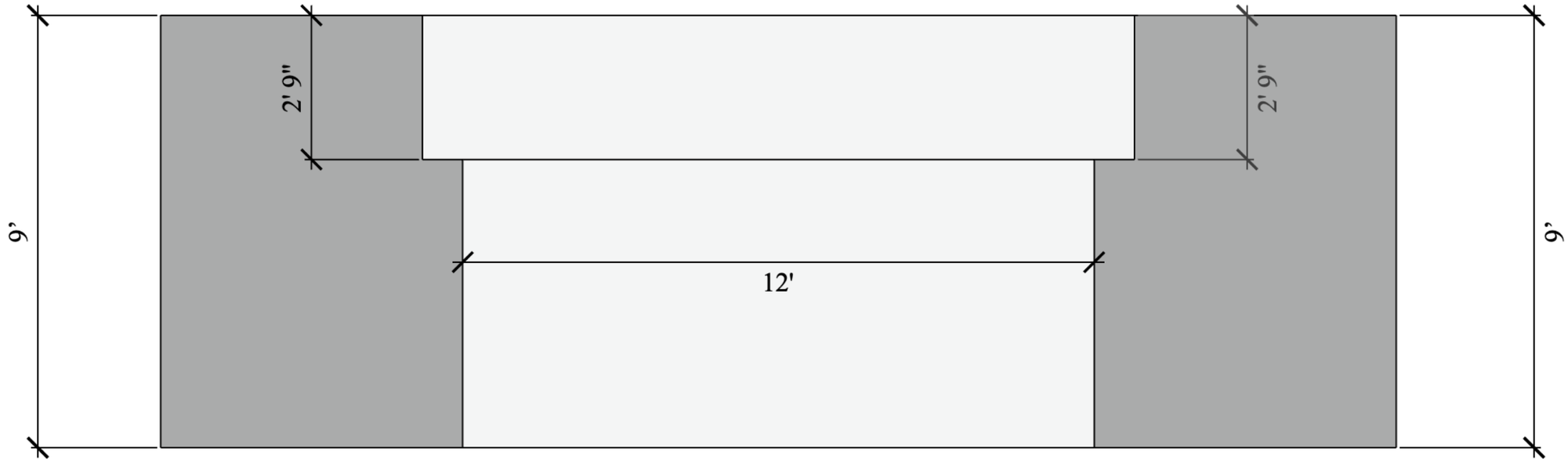
WALLS, 2 VERTICAL MATS 16” O.C. No. 5 EPOXY REBAR GRADE 60

ELEVATION:

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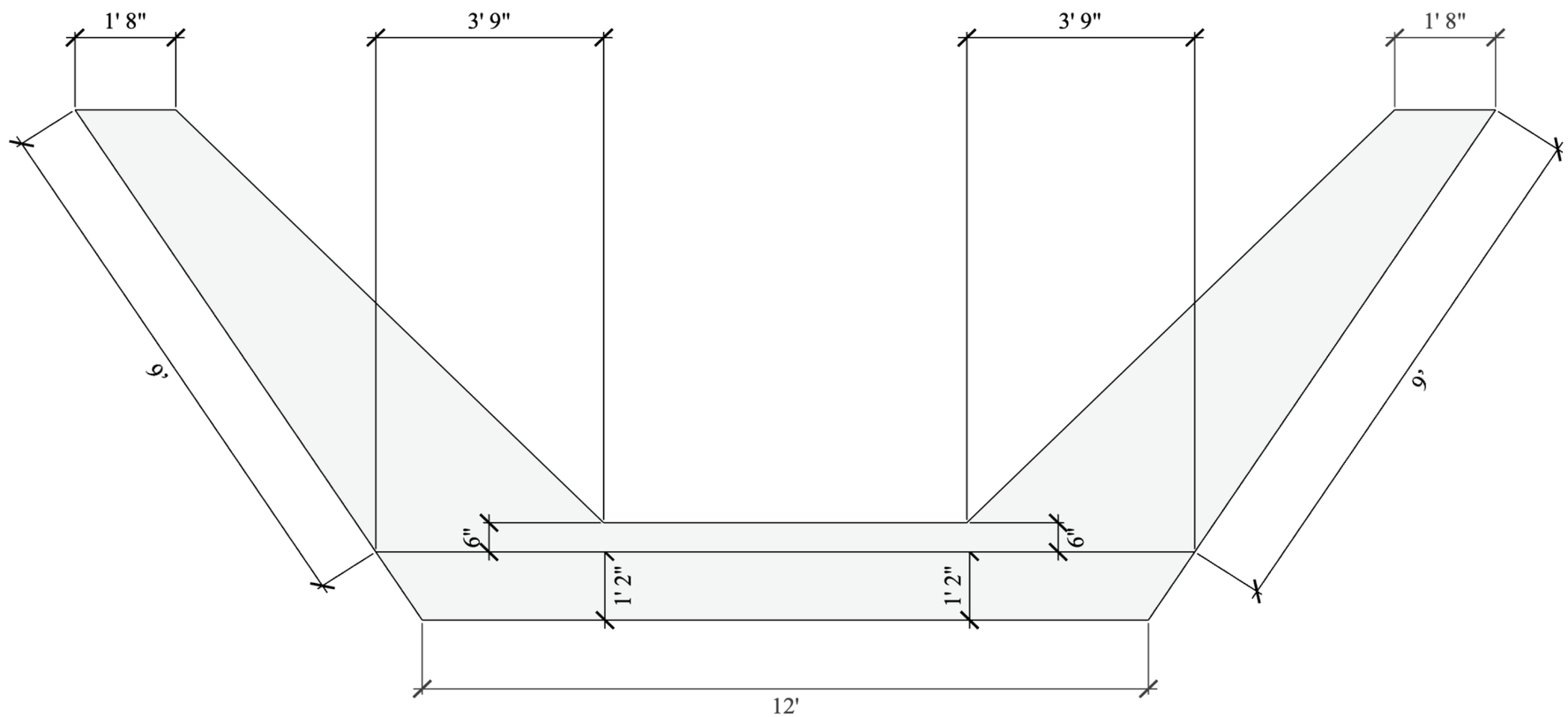

**STEEL:** STRUCTURAL ALLOY A992, 7850 kg/m$^3$, Fy 50 KSI, Fu 65 KSI

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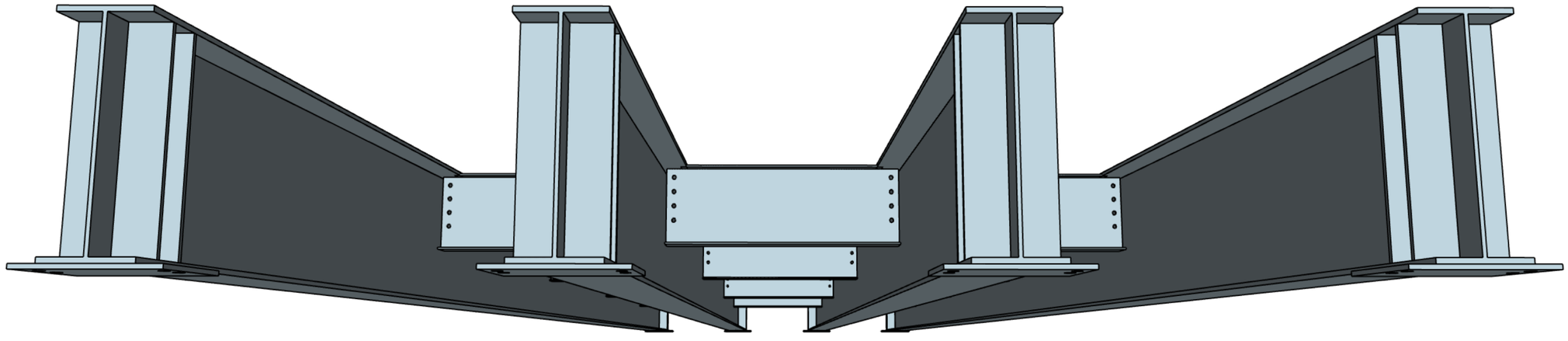
ALL COMPONENTS HOT DIPPED GALVANIZED
MAIN COMPONENTS: FOUR W 24 X 68 GIRDERS AND TWELVE W 18 X 35 DIAPHRAGM BRACES, BOTH CERTIFIED “BUY AMERICA” ARE CONNECTED TO FORM ONE STRUCTURAL SYSTEM WITH GALVANIZED A 325 BOLT CONNECTIONS VIA ANGLE IRON. A 325 GALVANIZED EPOXIED THREADED RODS AND NUTS CONNECT BOTTOM GIRDER FLAGES TO BEARING PLATES TO CONCRETE SLEEPERS, BEARING PLATES WILL BE FILLET WELDED TO BOTTOM FLANGES ((CENTERED)) IN SHOP BEFORE HOT DIP GALVANIZATION PROCESS OF COMPONENTS.



# Maximum Load Bending Check For Tandem AXLE 72 Kip Loading:

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DESIGN for ONE W 24 X 68 GIRDER (Four Total), Bending Moment checks:
Live Load: AASHTO tandem-axle weight limit 72 kips / 2 =: 34000lbs • 70% (.7) for L.D.F. • 125 % (1.25) for Dynamic Loading = 29750 lbs for Max. Load Path for One Girder
WHEN:
A992 Structural Steel
Fy = 50 ksi
Fy Adjusted (F.O.S.) = 33 ksi
Design Point Load @ center of single girder, of a simply supported beam:
29750lbs • 50 (total span)' / 4 = 414375 lbs.ft • 12" / 1000 lbs = 4462.5 kip.in
Mmax = 4463 kip.in (+) 350 kip.in Dead Load (with 1.2 F.O.S.)
Design Moment (Mmax) = 4813 kip.in
Design for Elastic Section Modulus:
Sx = Mmax / Fy Adjusted = 146 in^3 < 154in^3, Accomplished with W 24 X 68 Girders

**PRIMARY USE OF BRIDGE- SNOWMOBILE AND PEDESTRIAN:**

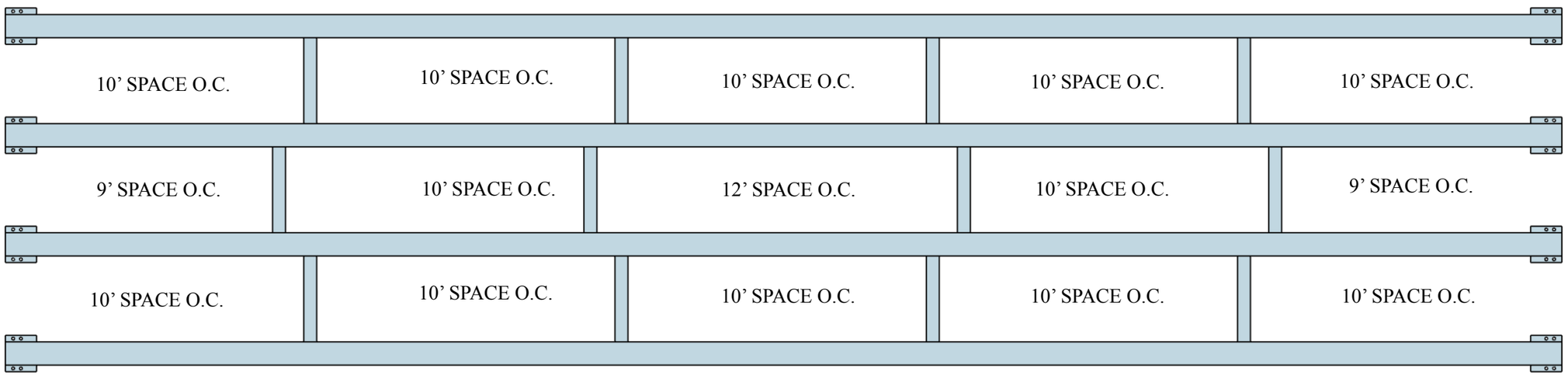
**SERVICE AND SAFETY DESIGN PEDESTRIAN:** DEFLECTION CHECKS:
DESIGN DEFLECTION CRITERIA, L / 360 ASSUMING LIVE LOAD OF 150 LBS / $FT^2$

DEFLECTION controls pedestrian bridge design, therefore, Distributed Load:
w = live load + dead load = 170 lbs / $ft^2$ • 3.5 ft Tributary Width = 595 lbs / ft = .05 kip / in
∴ ONE GIRDER: $\Delta = 5(w(L^4) / 384 • E • I$ ∴ deflection =1.59 " < 1.67" or L / 360, **Satisfied**

Shear Check Fv, Not Applicable, Therefore, DESIGN FOR FOUR: **W 24 X 68 GIRDERS**

Plan View Dimensions of the STRUCTURAL SYSTEM outlined below:

50' Long; Girder Plan View



## W 18 X 35 DIAPHRAGM BRACE DETAILS, 12 TOTAL:

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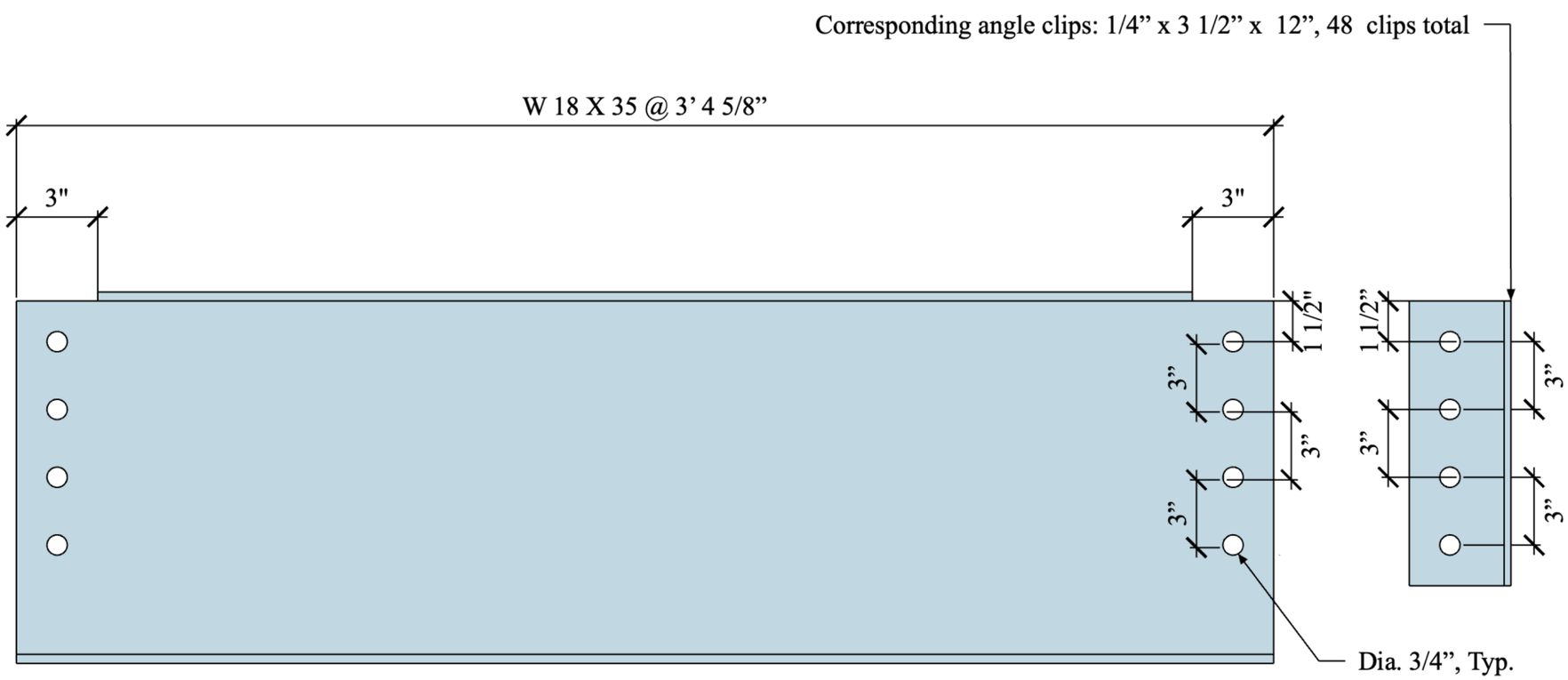
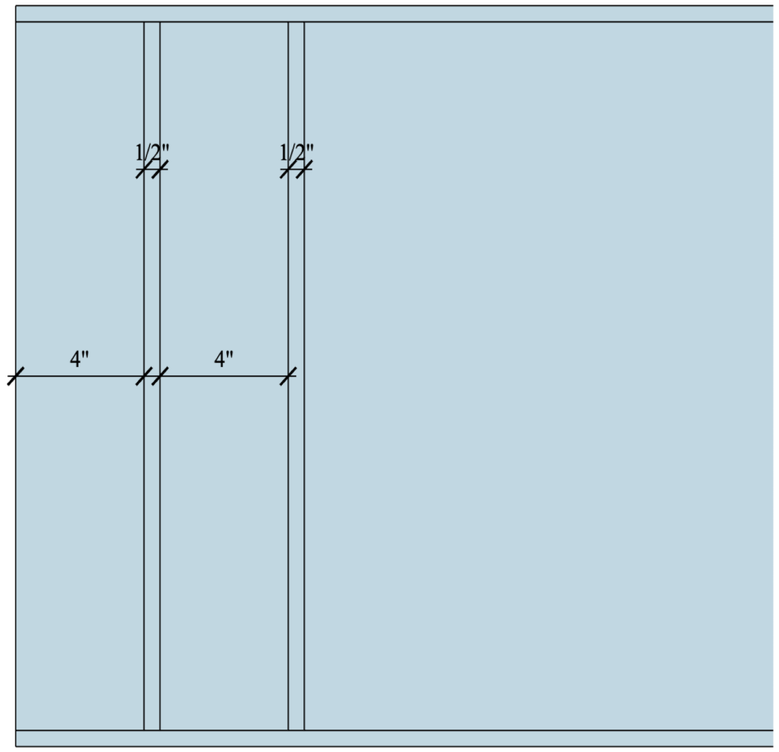
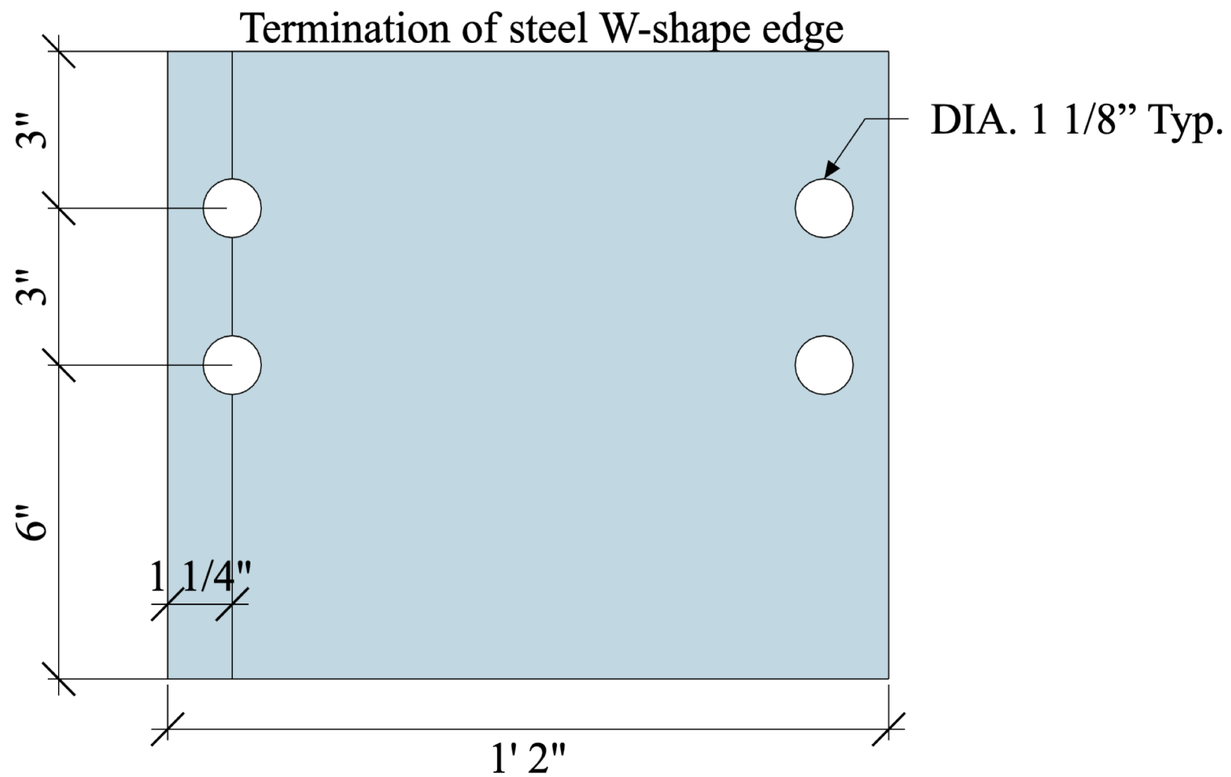


**WEB STIFFENERS:** 32 TOTAL, FLUSH WITH WEB, TOP AND BOTTOM FLANGE, FILLET WELDS




**BEARING PLATES: 8 Total,** 1/2” THICK, FILLET WELDS

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**TIMBER:** PRESSURE TREATED SOUTHERN YELLOW PINE ALL No. 1
ALL TIMBER COMPONENTS NO. 1 GRADE:
Bending: Fb 1350 PSI, **Satisfied**
Shear: Fv 175 PSI, **Satisfied**
BOLT SCHEDULE CONFIRMED IN THE FIELD

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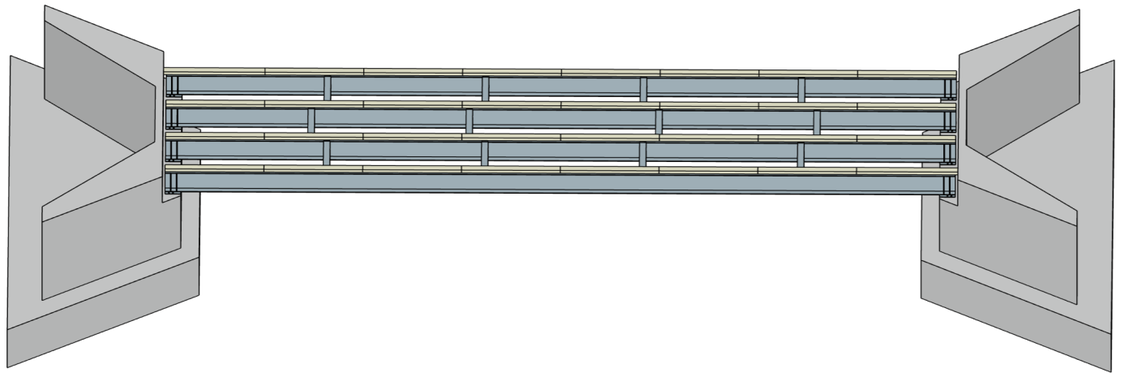
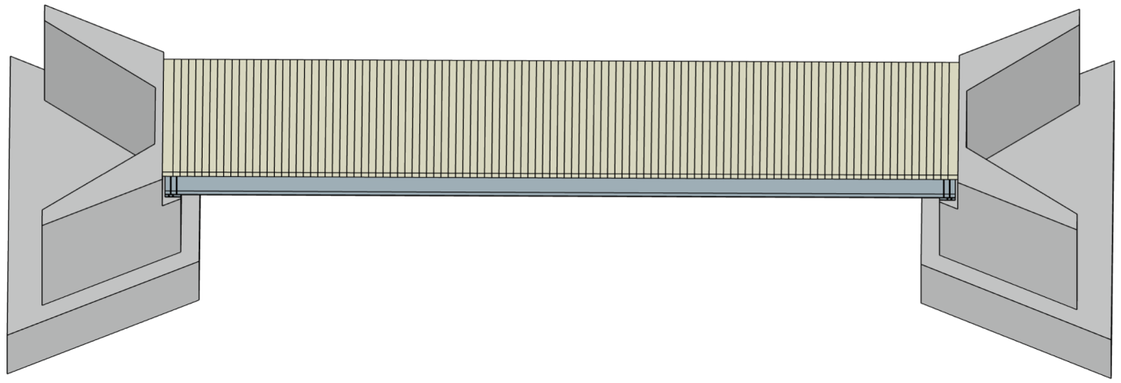
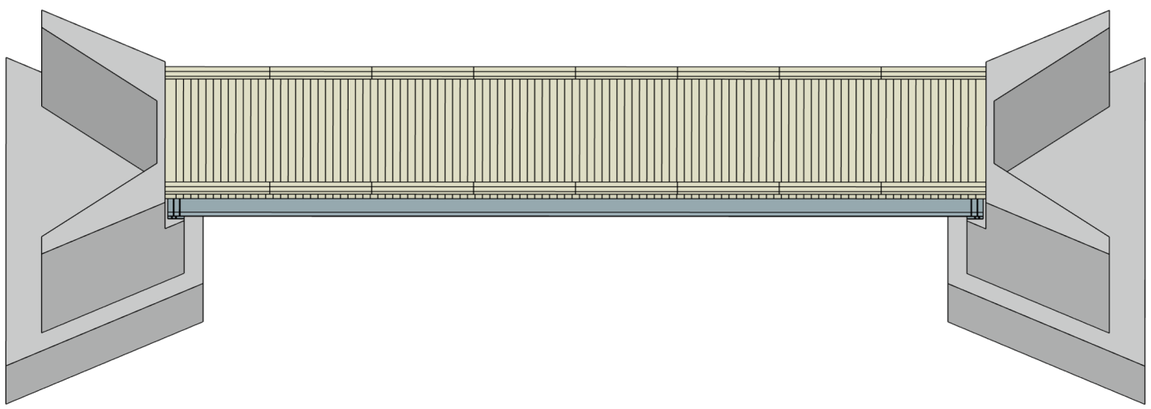


NAILERS: TOP GIRDER FLANGE CONNECTION TO 4” X 6” X 6’ 3”, 32 TOTAL BOARDS, STAINLESS STEEL (304) CARRIAGE BOLTS @ 3/8” DIA. CENTERED AND STAGGERED 2” OFF EACH GIRDER WEB @ 2’ WITH 1/2” DIAMETER PRE-DRILLS ATTACHE BOARDS TO STEEL



DECKING: GALVANIZED HEX-HEAD LAG BOLTS @ 5/8” DIA. 7” LONG- CORRESPONDING PRE-DRILL FOR WASHERS AND BOLTS, FOUR SETS PER BOARD CENTERED DIRECTLY ATOP GIRDER WEBS- CONNECT TIMBER NAILERS TO DECKING @ 6” X 6” X 12’, 112 TOTAL



CURBING: GRK STAINLESS SCREW  5/16” x 6” GRK CONNECT TIMBER DECKING TO TOP CURB, EACH 4” X 6” X 6’ 3”, 32 TOTAL- BOTTOM OF SCREW-HEAD FLUSH WITH TOP OF CURB EXACTING STRAIGHT LINES AVOIDING ALL STEEL HEX BOLT HEADS BENEATH

SECTION

**RAILINGS:** 6061-T6 ALUMINUM ALLOY, Fy 42 KSI, 3/16” WALL THICKNESS
GRK STAINLESS STEEL SCREW (304) 3/8 DIA. CONNECTIONS FASTENING
RAILING PLATES (TIG WELDED TO RAILINGS) DIRECTLY TO P.T. TIMBER DECKING
T6 PLATES @ 5” X 5” X 1/2”

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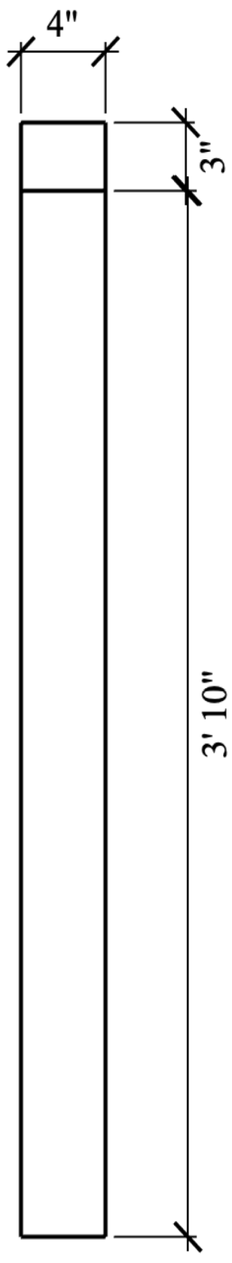
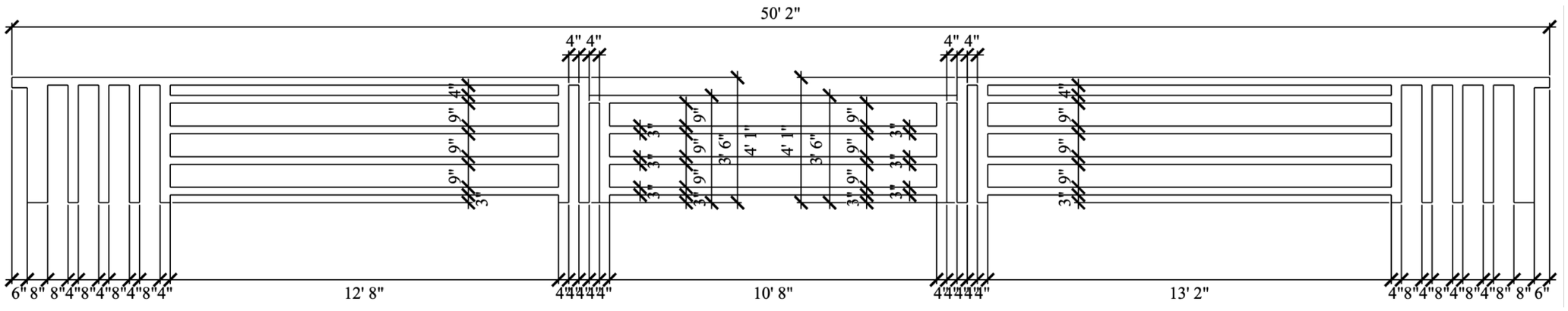
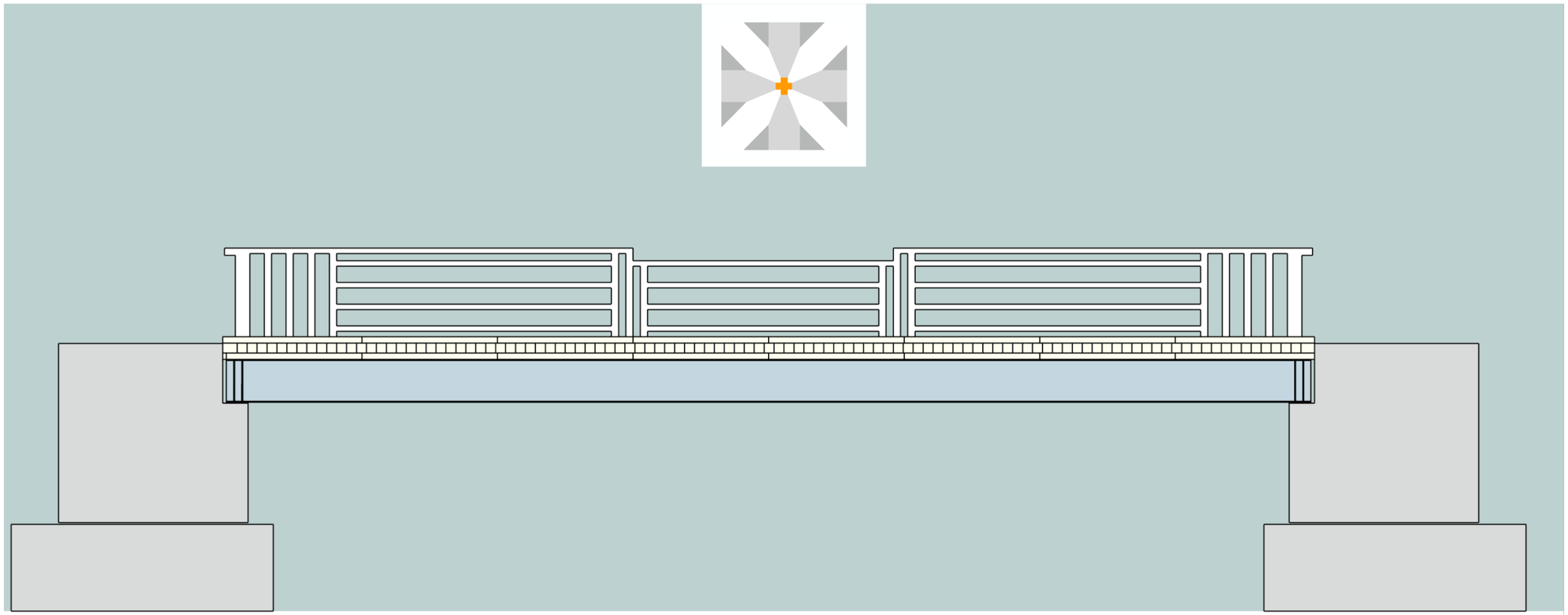
ALL HANDRAIL HEIGHT LEVELS EXCEED MINIMUM RAILING HEIGHT CODE

*Stainless connectors used in any application that warrant protection against bimetallic corrosion




ELEVATION





THANK YOU