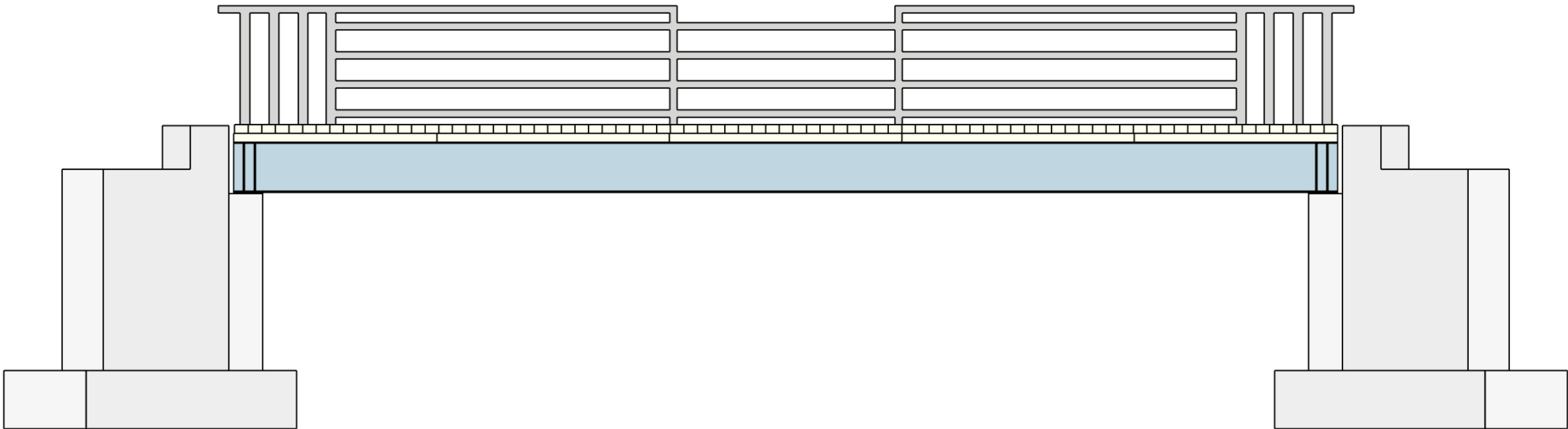


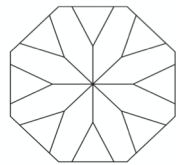
Brown Schoolhouse Road Bridge Replacement, Norwich, VT

43° 44' 25.49" N
72° 20' 42.13" W

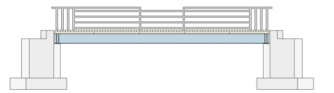
•Technical Bid•



Nick Fabrikant
Civil Engineer



Designed May
2020



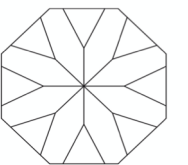
FABRIKANT WORKS

3681 Thetford Center Vermont
Thetford, VT
05075

1 802 272 0524
nickcodyfab@protonmail.com

At its best the building profession provides safe, durable, functional, economic, and beautiful structures for civilization. As a bridge builder I feel humbled to be a small part of this tradition. Certain bridges are more than physical links, they are metaphorical ones, reminding a community of its own inspired potential.

When I saw this opportunity in Norwich, my enthusiasm perked. I have over a decade of experience working as a general contractor with a master's of science degree in civil / structural engineering. While working as an engineer on bridges, I have also worked as a design architect. Born and raised here in the Upper Valley has fostered my deep of love of Nature and wilderness. I take pride in delivering understated yet timeless artistic results which are respectful to the site of which I am working, while doing so in the most efficient and economic manner possible. I take personal responsibility on each construction project I lead to ensure the very highest of standards. I am also honored to be a part of the building team I work with (more on them below) as well as the state permitting engineer, Scott Jensen, of whom I have teamed up with before and who has pre-approved my technical plans herein. Most of my built works, bio, and visual philosophy can be found here:
www.nickfabrikant.com



Designed May
2020



BIO's:

Bryan “bridge” Tillotson, now an independent contractor, was lead carpenter of Wright Construction Company at the time he performed timber and concrete form restoration work on this list of famous local bridges: Brookfield Floating Bridge, Bath Covered Bridge, Quechee Covered Bridge, Taftsville Covered Bridge, Wright’s Newport Bridge, Gifford Covered Bridge, The Kingsbury Covered Bridge, Weathersfield Covered Bridge, and the Haverhill Bath Covered Bridge in Woodsville.

Phone: 802 222 1232

Email: bptillotson@hotmail.com

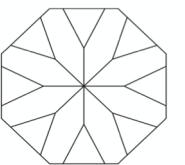
Gary Thrasher, excavator operator, dirt work, grade leveling, and site service contractor worked on extensive bridge repair after the flooding of Irene. He and his team helped fix, and or build anew over a dozen new bridges within Upper Valley flood affected areas and beyond. I have worked with Gary on numerous projects including Mitchell Bridge, right here in Norwich, VT.

Phone: 802 685 2273

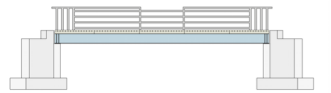
Bob Rowden is boss at Robco Metal Fabricators in Wells River, Vermont. I always work with “lucky” Bob directly. His company, Robco was established in 1986 and has fabricated steel items for Mount Washington Observatory and Cog Railway. Robco has worked on numerous businesses, homes, bridges- all varying in the private, commercial, and municipal sectors. Robco sources W-Shapes that are certified, “Buy America” and you can always count on Bob to deliver, no matter the weather!

Phone: 802 274 9052

Email: robcosteel@gmail.com



Designed May
2020



Rich Franklin, master metal smith, and owner of Vermont Country Iron has been in business for 20 years. Rich has an exceptional engineering mind, and has taught me a great deal about metal fabrication. His scope of railing fabrications includes residential stairway railings, balcony, deck railings, bridge, and commercial railings. Vermont Country Iron fabricates in iron, carbon steel, aluminum, and stainless-steel materials and frequently works with engineers, architects, and contractors and is focused to maintain the highest standard of quality. Rich's works can be found here:

<https://vermontcountryiron.com>

Phone: 802 222 4117

Email: info@vermontcountryiron.com

Chad Franklin (yes Rich's son) works at Robco Steel fabricators and has extensive experience working with all types of steel alloys. While still in Highschool, Chad won top prize as best welder in Vermont, and came in the top 99th percentile of the whole country for his welding skills! Chad would be fabricating the structural steel system and applying the No. 1 grade timber decking.

Phone: 603 359 5541

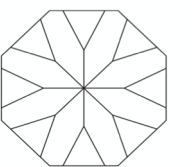
Budget Lumber is owned by Winston Oakes, who's been in the lumber business since 1973. He remains true to purchasing the best material possible at the lowest price: Their motto is, "Quality products at Discount; big enough to supply your needs, small enough to care." Southern yellow pine high structural grade pressure treated lumber is sourced directly from farms in Maine.

Phone: 603 787 2517

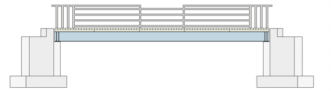
Email: jrdilly@earthlink.net

I am truly honored to be included in this bridge building team, all together with over 150 years of construction experience!

Respectfully,
Nick Fabrikant



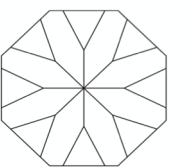
Designed May
2020



DBE:

In regards, to Disadvantaged Business Enterprise (DBE), a search was made to all local Vermont and New Hampshire contractors, and beyond. Good faith had been made to reach out to contractors and subcontractors who are DBE certified of whom could assist in the bridge construction project. The official search was made under the subtext, Construction. Some DBE contractors are too far from the project's proximity to consider, or I have not heard back from them. An example, I contacted Susan Burm outside of Boston in regard to a quote for structural steel, fabrication, hot dipped galvanization, freight, and setting. I didn't get a reply. I also have reached out to many others, without reply. A good faith effort will also be made on my part to ensure sub-contractors on the project do their part to include those who are DBE certified. In addition, some of the services listed on the DBE directory are simply not needed, like asphalt paving, electrical works, curbing, etc. In addition, many services that are listed, such as engineering, design, and contracting are being handled directly by myself in full to see this project is safe, durable, and at budget.

Respectfully,
Nick Fabrikant



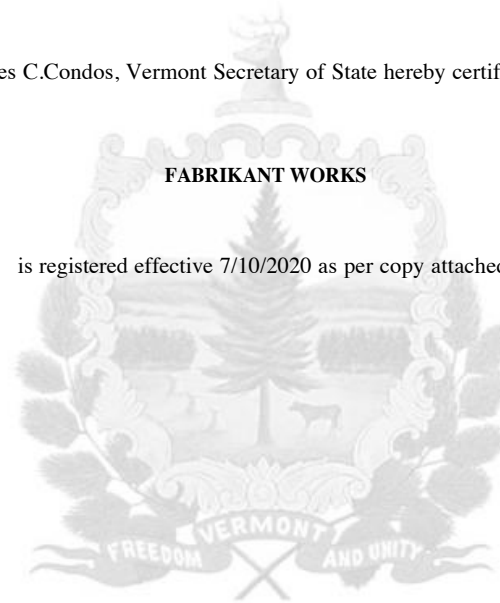
STATE OF VERMONT
OFFICE OF SECRETARY OF STATE

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

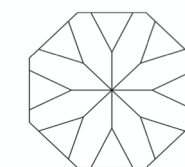
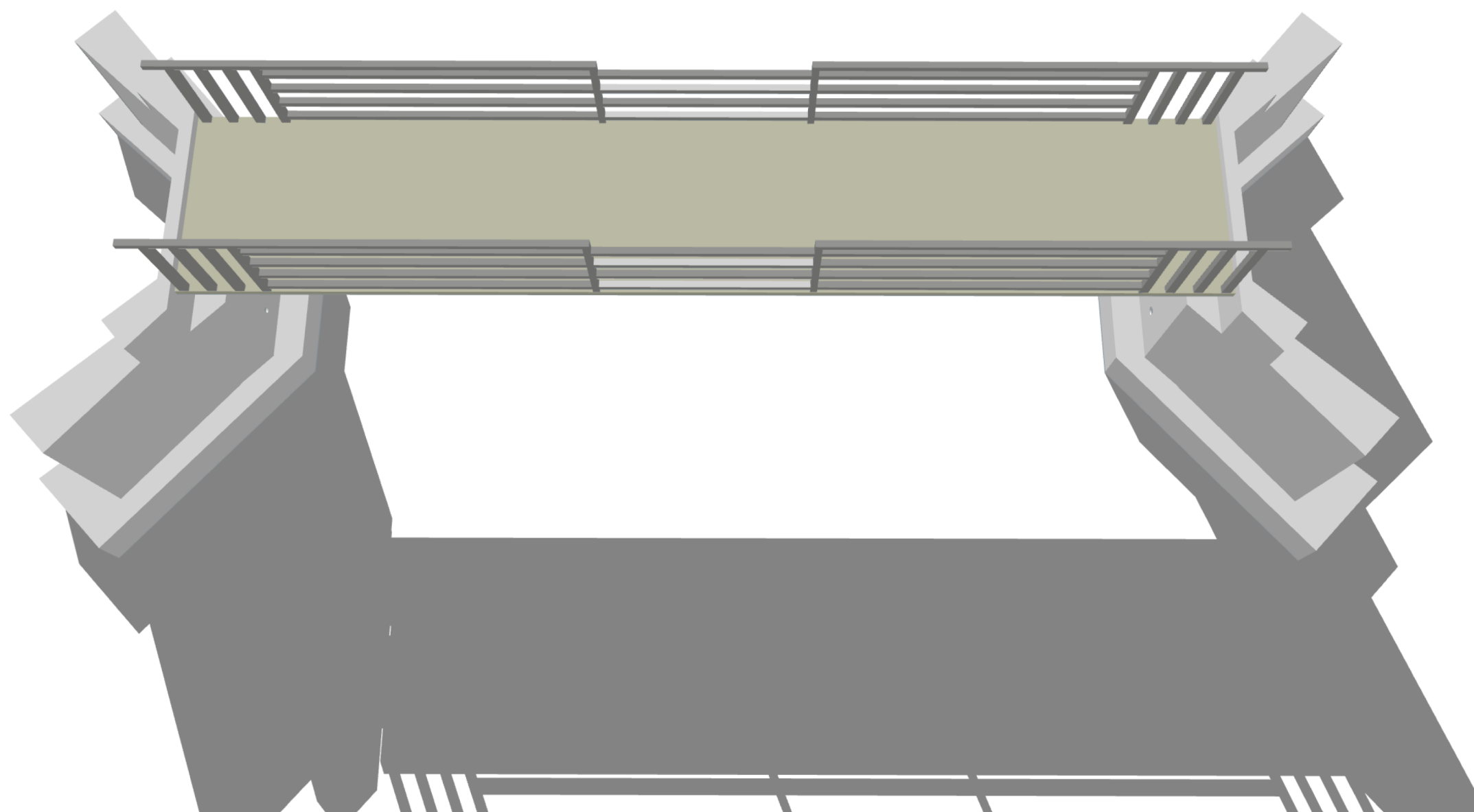
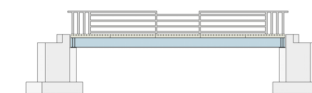
James C. Condos
Vermont Secretary of State

Filed with the Vermont Secretary of State, Division of Corporations

Designed May
2020

PER REQUEST OF THE DESIGN-BUILD SERVICE PROPOSAL, TOWN
OF NORWICH, VERMONT:

CLEAR SPAN USABLE WIDTH OF THE BRIDGE: 6'

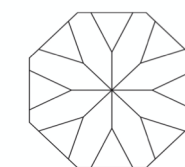
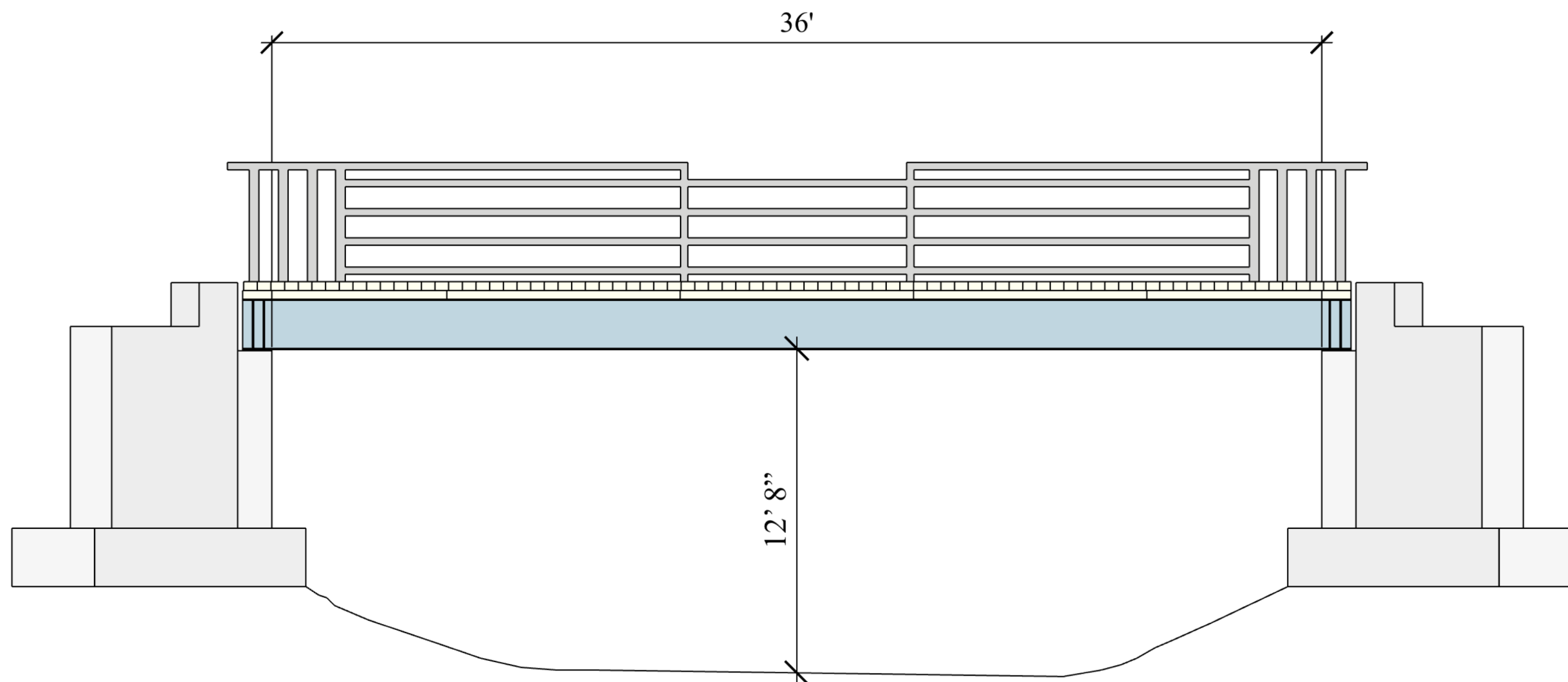
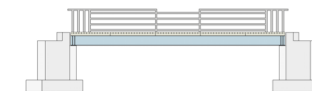


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Designed May
2020

DISTANCE FROM STREAM BED TO BOTTM GIRDER FLANGE: 12' 8"
CLEAR SPAN LENGTH OF THE BRIDGE: 36'

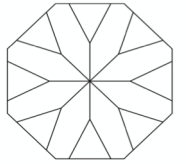
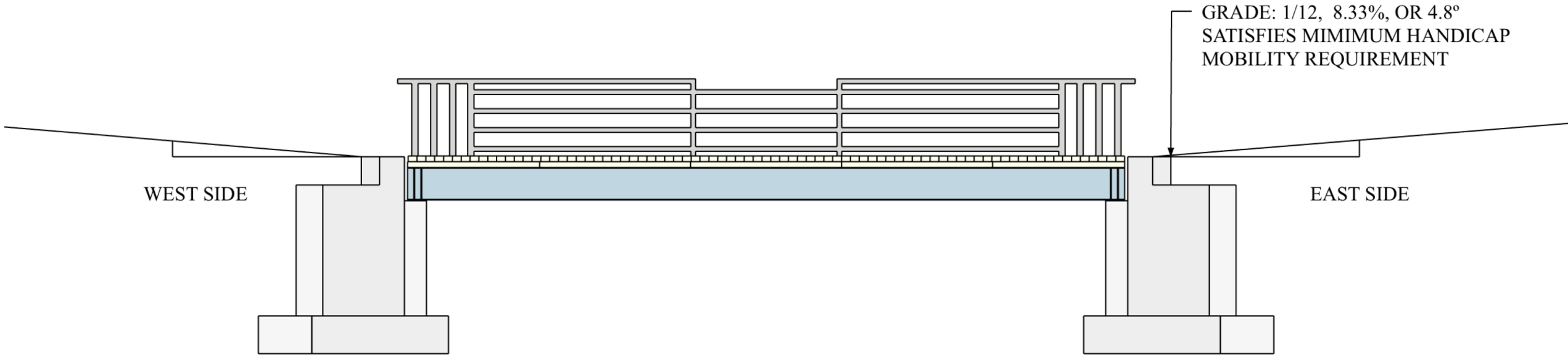
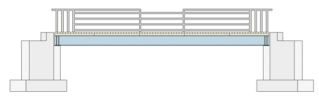
BOTH MEASUREMENTS SATISFY STATE OF VERMONT DESIGN FLOOD CRITERION



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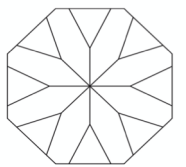
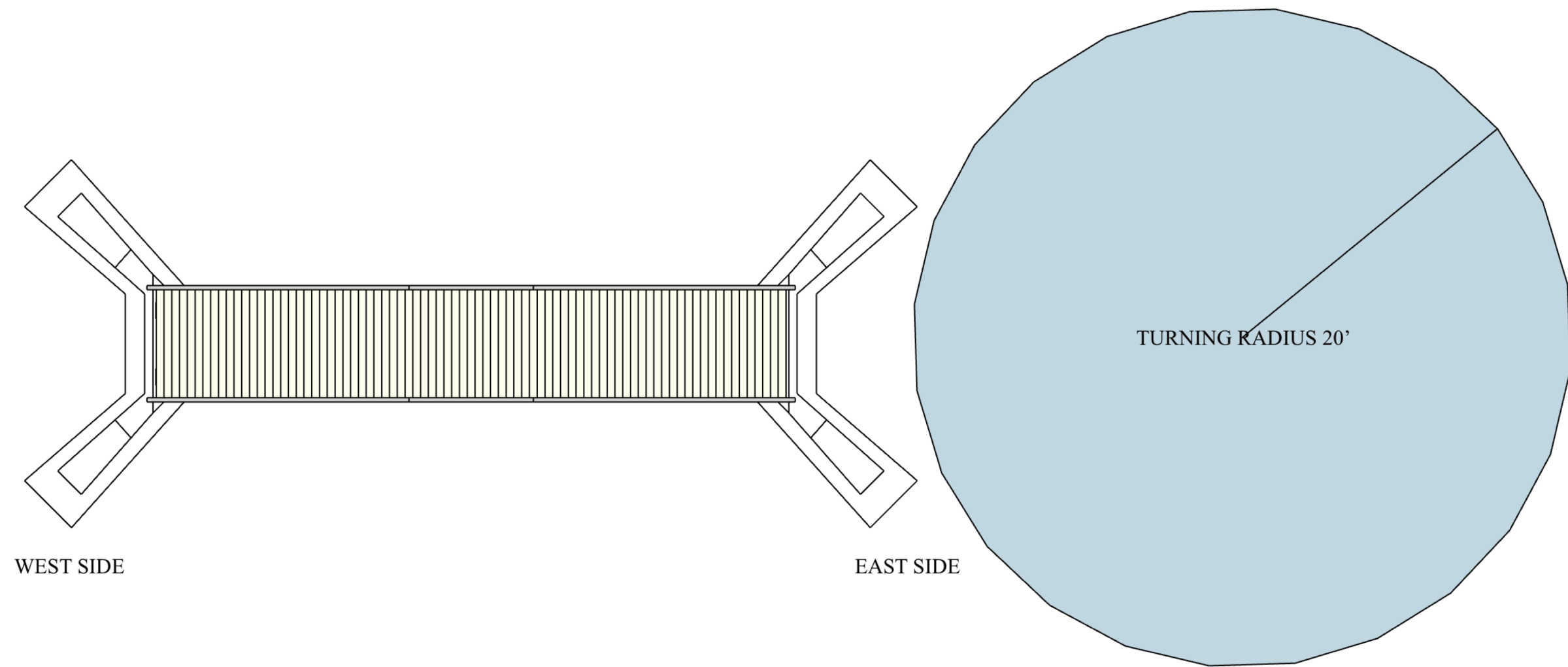
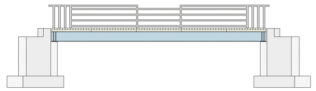
Designed May
2020

ACCESSABILITY REQUIREMENTS A:
ELEVATION OF MINIMUM GRADE LEVEL ON BOTH APPROACHES

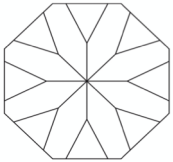
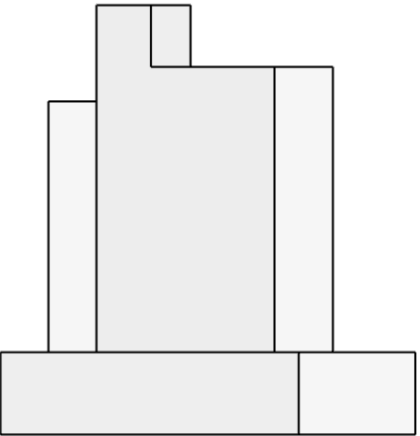
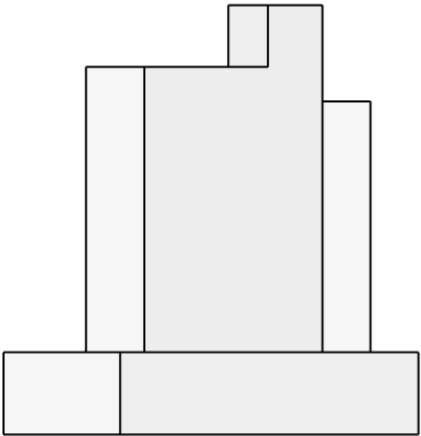
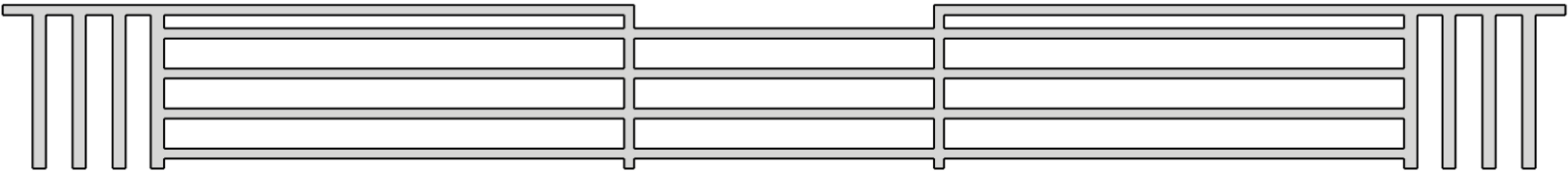


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ACCESSABILITY REQUIREMENTS B:
PLAN VIEW OF BRIDGE WITH SURFACE AREA FOR VEHICLE TURNAROUND



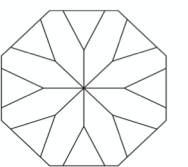
MAIN COMPONENTS:



Designed May
2020



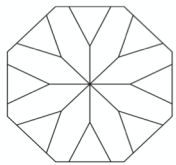
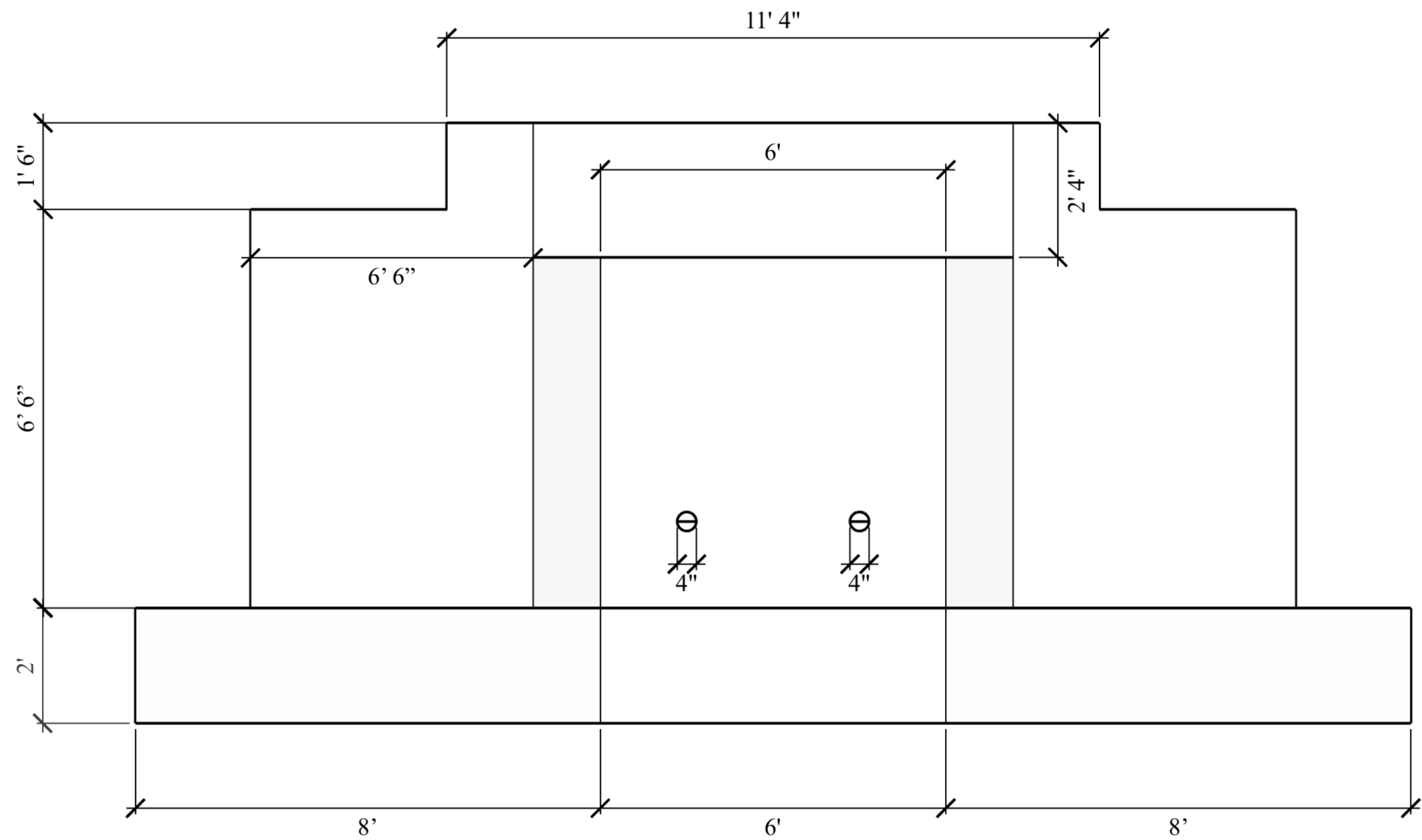
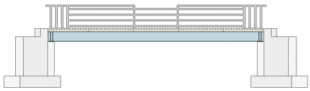
The diagram shows the front and top views of a mechanical part. The front view (top) has a total width of 4' and a total height of 5' 8". It features a base of 2' and a top section with a 45° chamfer. The top section has a width of 1' 8" and a height of 1' 6". The top view (bottom) shows a rectangular shape with a width of 4' and a depth of 2'.



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ELEVATION OF CONCRETE FOOTINGS AND WALLS

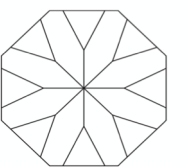
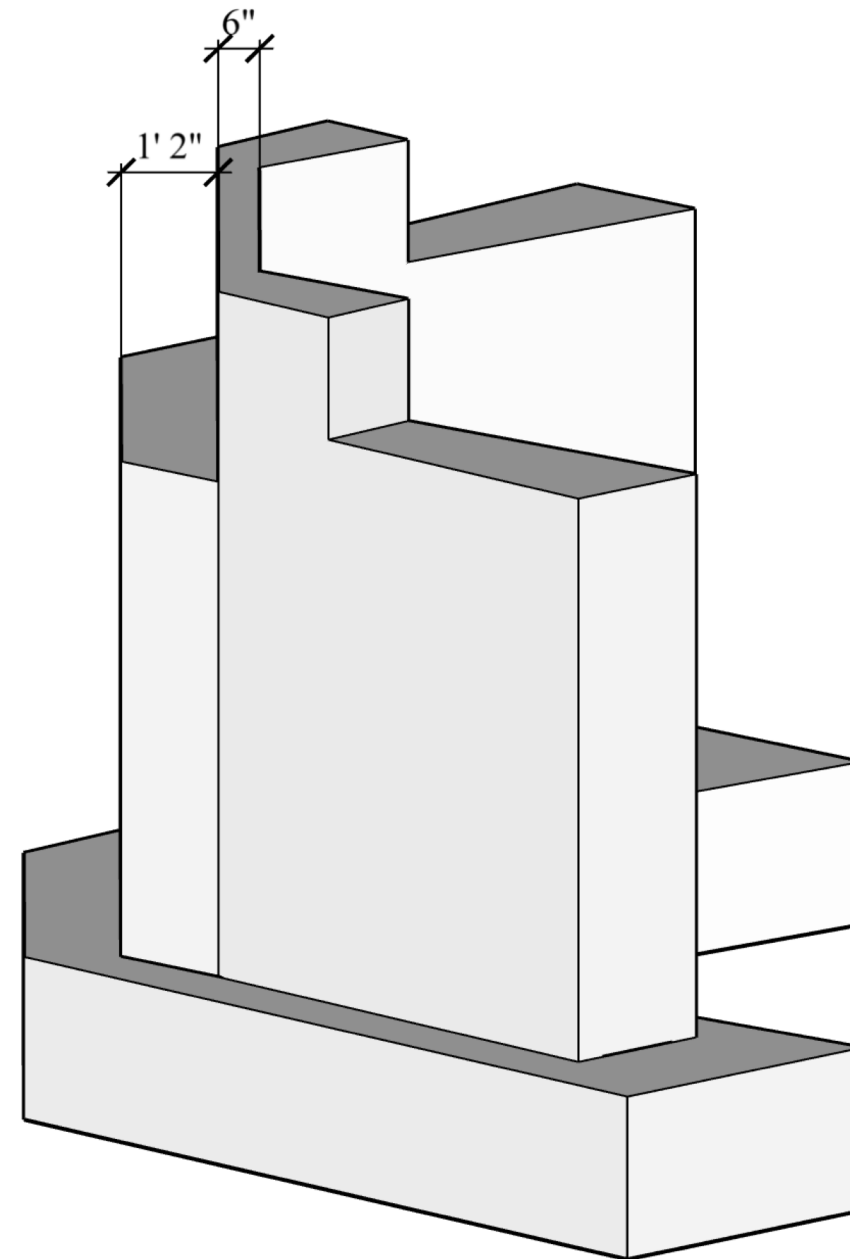
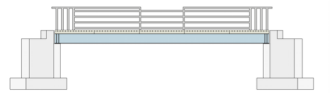
Designed May
2020



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FINAL GRADE TO BE FLUSH WITH 6" THICK ABUTMENT APPROACH WALLS

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2020



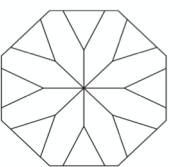
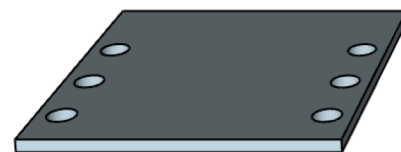
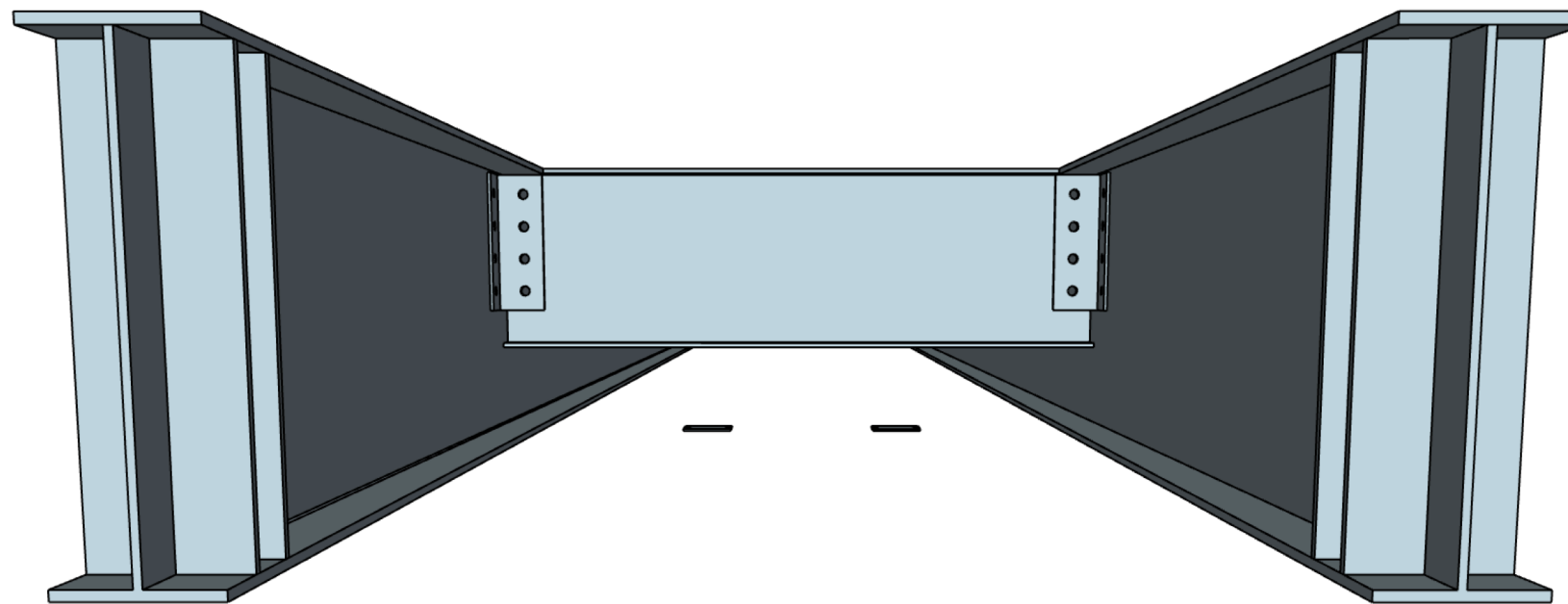
A₈

STEEL: STRUCTURAL ALLOY A992, 7850 kg/m^3 , F_y 50 KSI, F_u 65 KSI

ALL COMPONENTS HOT DIPPED GALVANIZED

MAIN COMPONENTS: TWO W 21 X 44 GIRDERS AND FOUR W 14 X 22 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 FLANGES TO BEARING PLATES TO CONCRETE SLEEPERS, BEARING PLATES WILL BE FILLET WELDED TO BOTTOM FLANGES, 2 3/4" FROM LONGITUDINAL EDGES (CENTERED) IN SHOP BEFORE HOT DIP GALVANIZATION PROCESS OF COMPONENTS.

Designed May
2020



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SERVICE AND SAFETY DESIGN: DEFLECTION CHECKS:

DESIGN DEFLECTION CRITERIA, $L / 360$ ASSUMING LIVE LOAD OF $90 \text{ LBS} / \text{FT}^2$

DEFLECTION controls pedestrian bridge design, therefore, Distributed Load:

$$w = \text{live load} + \text{dead load} = 155 \text{ lbs} / \text{ft}^2 \cdot 3.5 \text{ ft Tributary Width} = 543 \text{ lbs} / \text{ft} = .045 \text{ kip} / \text{in}$$

$$\therefore \text{ ONE GIRDER: } \Delta = 5(w(L^4) / 384 \cdot E \cdot I \therefore \text{ deflection} = 0.93'' < 1.2'' \text{ or } L / 360, \text{ Satisfied}$$

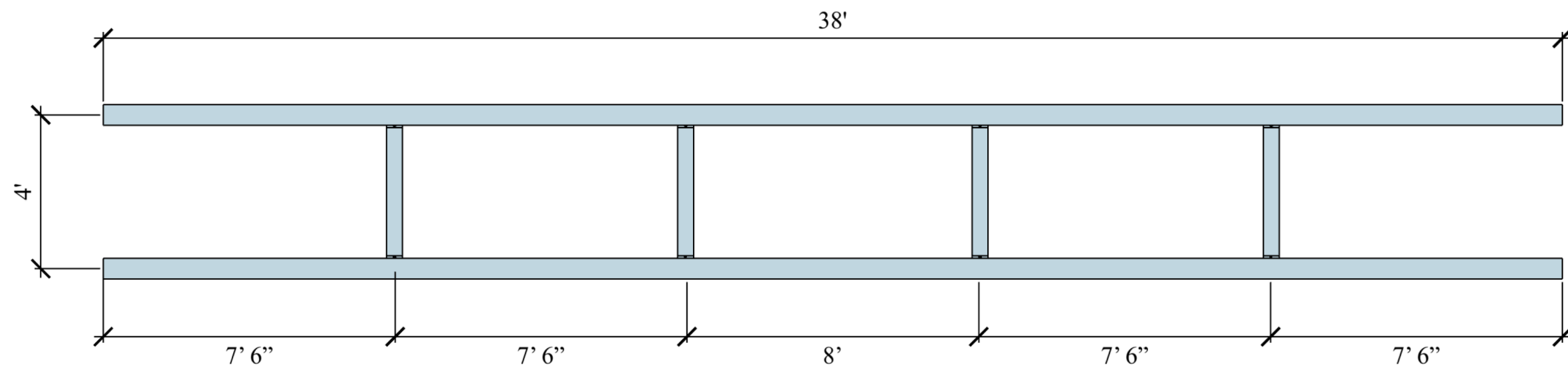
Bending Check F_b , A 992 Steel F_y 50 ksi, Adjusted for safety factor, $F_y = 33 \text{ ksi}$,

40 kip Point Load, center loading conditions: $P l / 4 \therefore$ Max Moment for ONE GIRDER

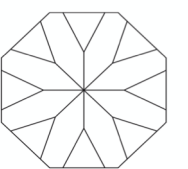
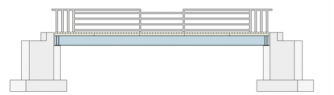
$$\therefore 24 \text{ kips} = 2664 \text{ Kip.in} / 33 \text{ ksi} = 80.7 \text{ in}^3 < 81.6 \text{ in}^3 (S_x), \text{ Elastic Section Modulus, Satisfied}$$

Shear Check F_v , Not Applicable, Therefore, DESIGN FOR TWO: **W 21 X 44 GIRDERS**

Plan View Dimensions of the STRUCTURAL SYSTEM outlined below



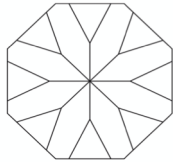
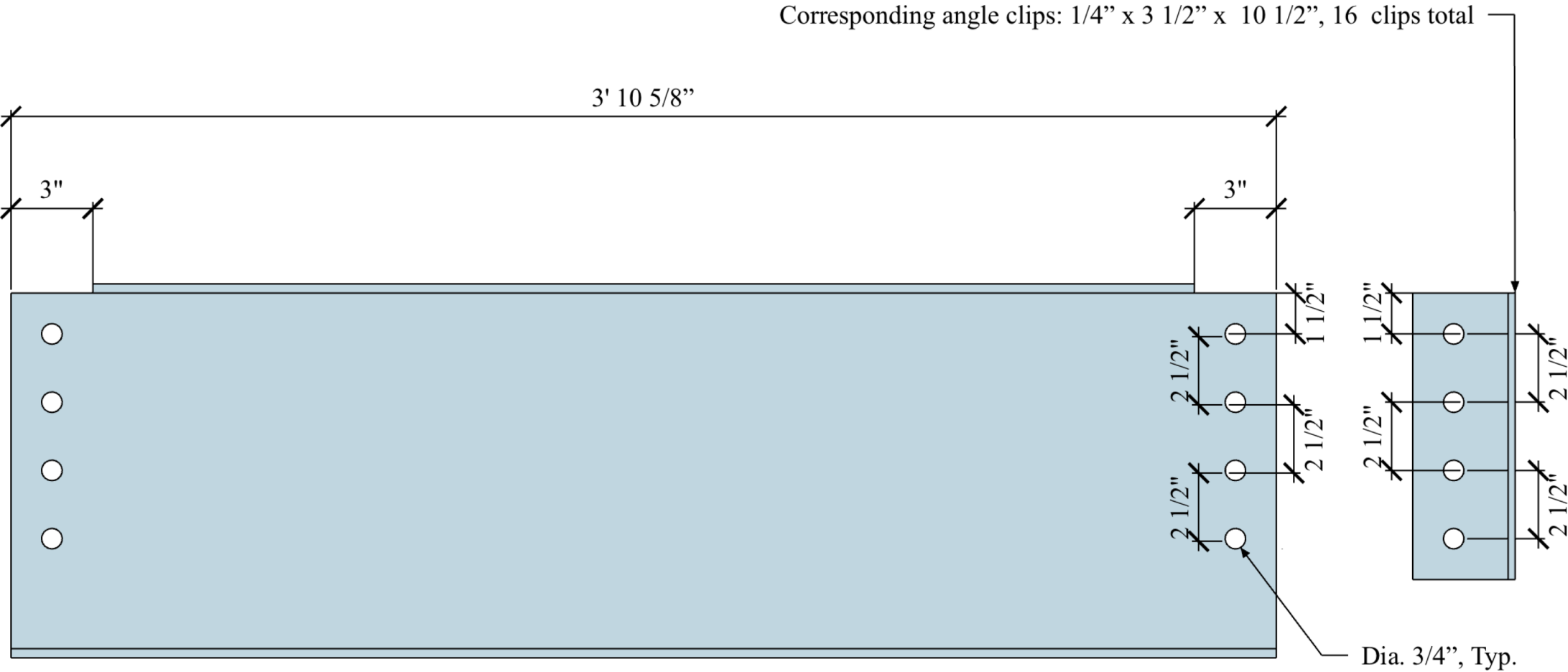
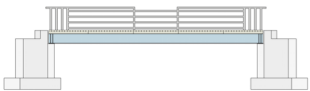
Designed May
2020



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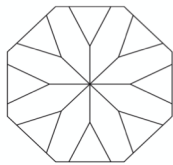
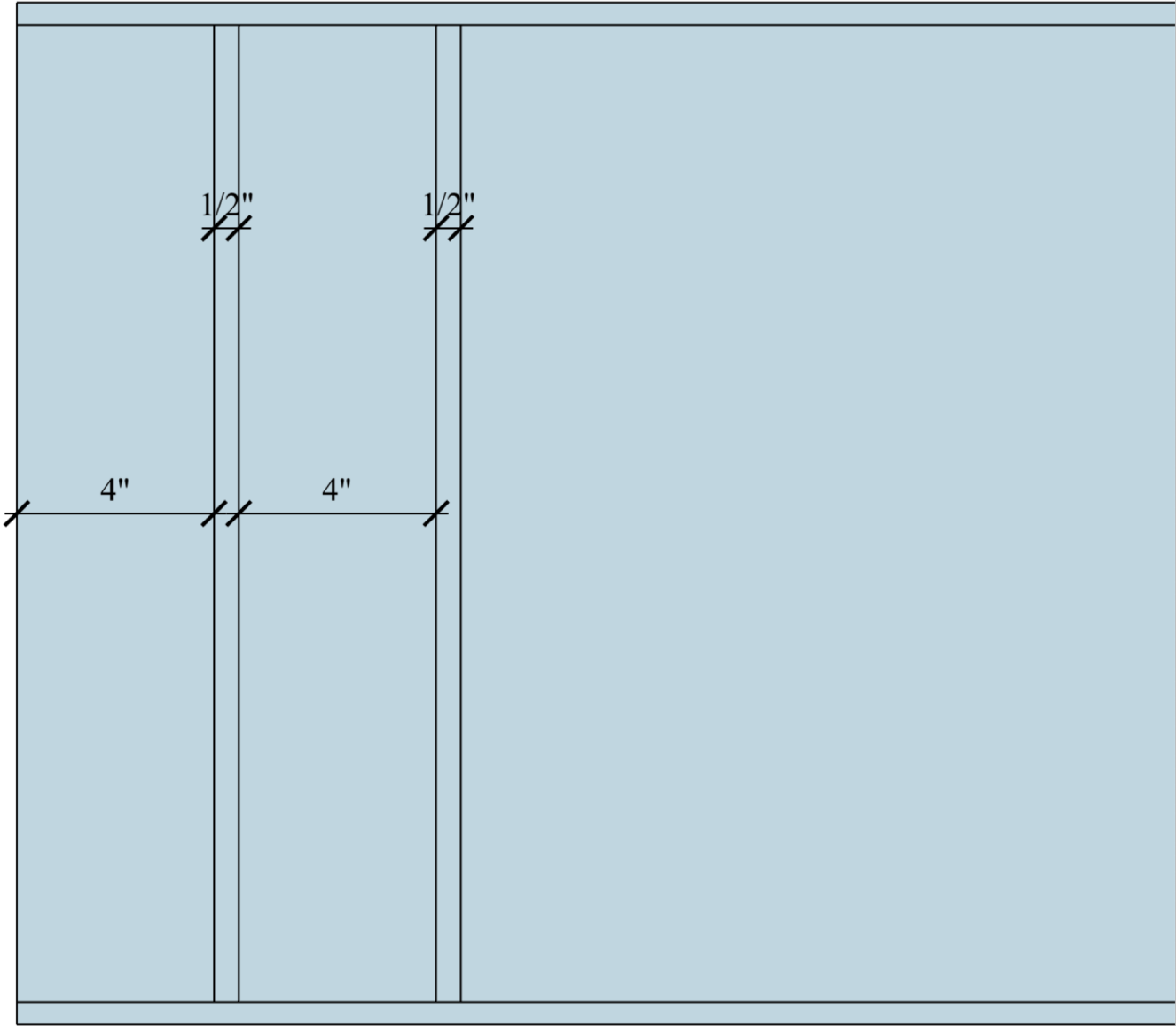
DIAPHRAGM BRACE DETAILS:

Designed May
2020



WEB STIFFENERS: 16 TOTAL, FLUSH WITH WEB, TOP AND BOTTOM FLANGE, FILLET WELDS

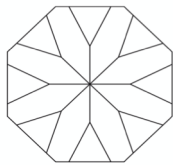
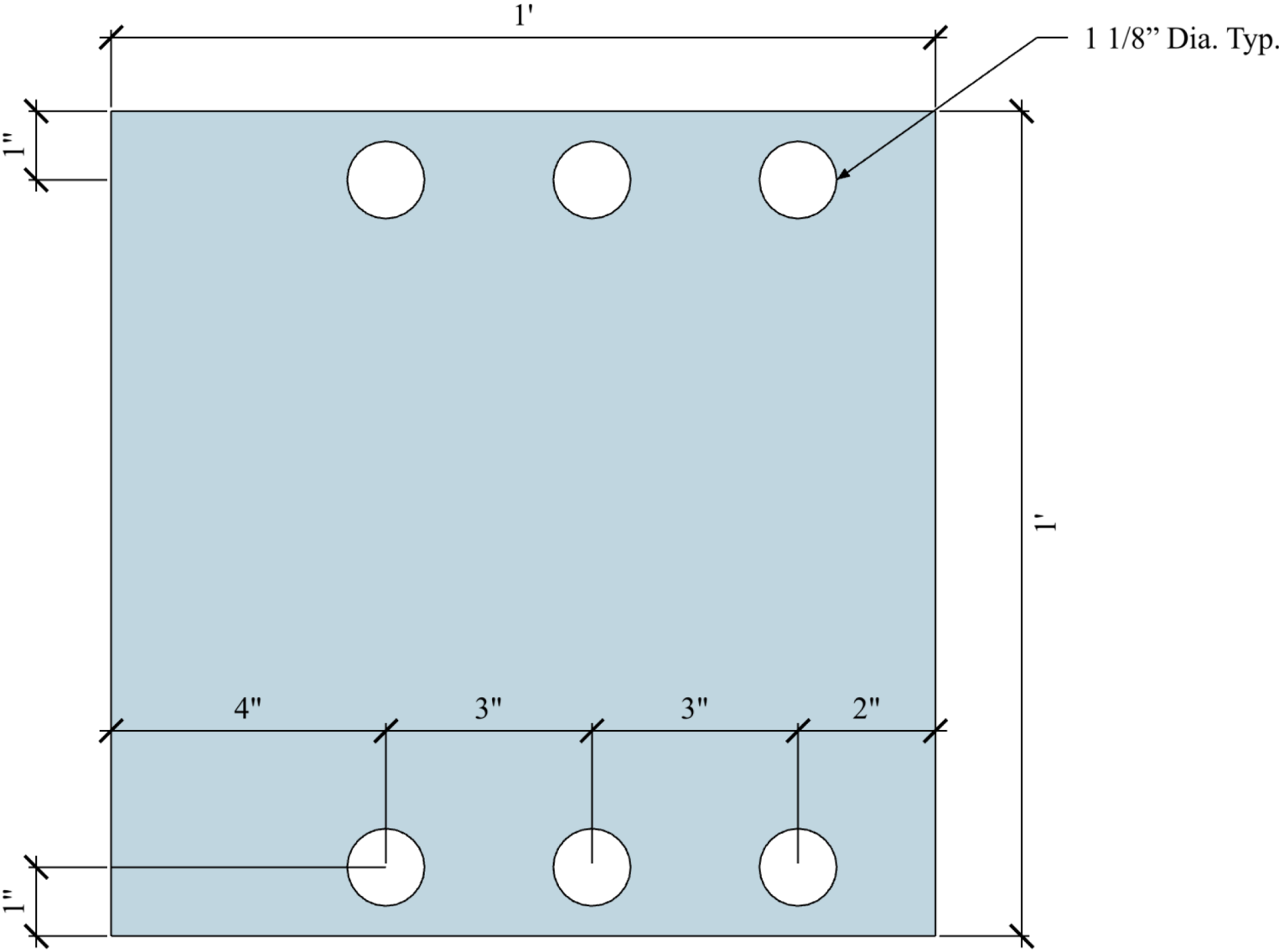
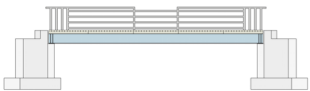
Designed May
2020



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BEARING PLATES: 1/2" THICK

Designed May
2020

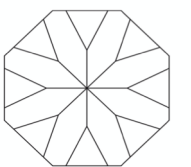
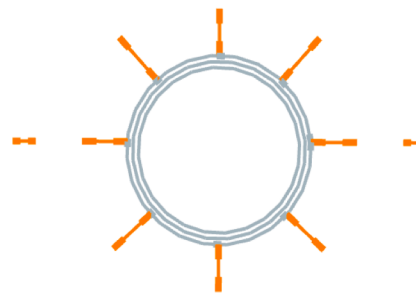


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SUSTAINABILITY AND SERVICEABILITY

All A992 steel structural members, plates, bolts, connection components will be ordered as uniformly as possible for the entirety of the project, simplifying assembly, and streamlining delivery of the necessary elements to the site, saving time, emissions, and reducing waste. Silt and erosion filters will be applied downstream and parallel to both abutment site locations until the concrete footings and walls have cured and the form work is removed. Structural steel is arguably the most sustainable material used in construction; it's recyclable, it's durable, and it has fast erection times. Sustainable means Durable. By using high concrete compressive strength mixtures, high grade lumber which is sourced locally, and corrosion resistant structural grade aluminum for the railings, energy savings are inherently built into the design. The galvanization of the steel components is the No. 1 environmental priority for this project. Galvanization is proven. No other treatment for structural steel has such a proven track record for making this inherently corrosive material endure—depending on the external conditions, sometimes three to four times longer than if the member hadn't been treated. Furthermore, when the zinc coating starts to fade in seventy to eighty years, a cold galvanization process may be applied to the bridge to ensure its further longevity. If the cold galvanization process is not applied, the untreated structural steel will be safe for another thirty years. The structural aluminum railings are the definition of sustainable, and not only more durable than timber railings, but will also save a significant amount of time and energy. High grade aluminum is inherently corrosion resistant, while the railings will oxidize (the oxidation process actually keeps it from corroding), minimal maintenance every few years will keep the railing functioning properly and looking good as new, indefinitely. The pressure treated timber decking will be the first main component of the bridge system to be replaced, but that's nearly a half century away, and when it does, the railings, railing plates, and lumber to Girder carriage bolt fasteners are all designed to un-bolt and then re-bolt effectively onto new standard dimensional lumber. The concrete abutments are designed for well over a century of use, and with decennial engineering checks for damp, even longer. With reliable, and relatively minimal maintenance, this bridge will last over a century, perhaps even Two. Also considered, is highly organized and coordinated construction schedules; ones that are reliable, will reduce vehicle emissions, expedite site cleanup, and provide mitigated disruption **to local communities**.

Designed May
2020



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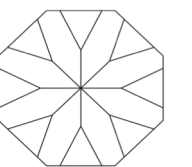
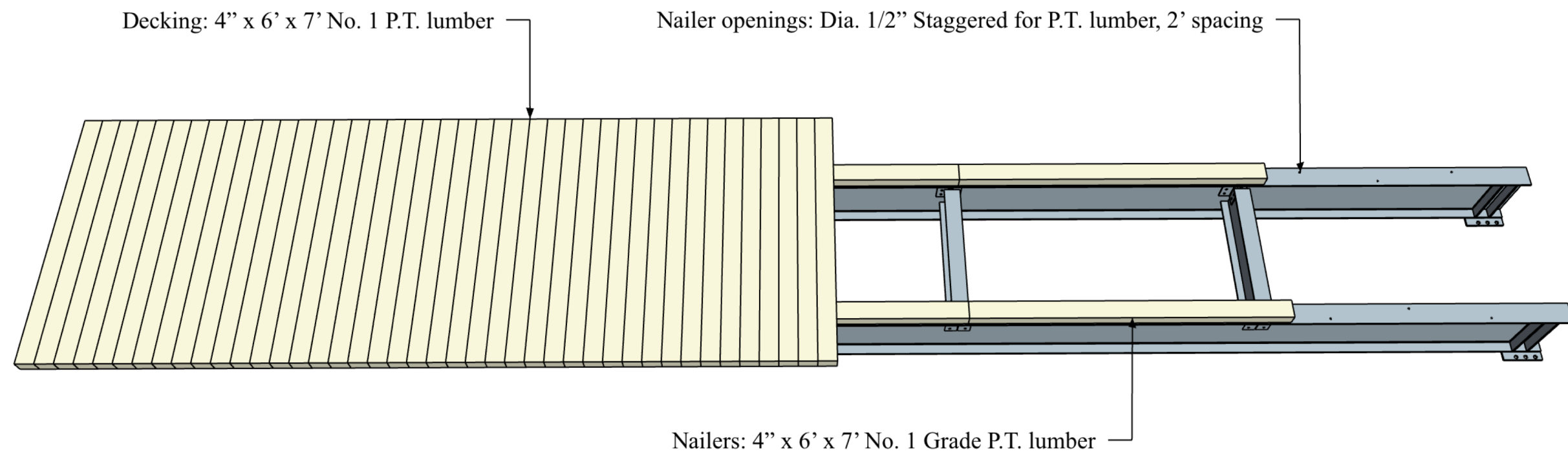
TIMBER: PRESSURE TREATED SOUTHERN YELLOW PINE ALL 4" X 6" X 7'

ALL TIMBER NO. 1 GRADE:
Bending: Fb 1350 PSI, **Satisfied**
Shear: Fv 175 PSI, **Satisfied**

STAGGERED NAILER TO TOP GIRDER FLANGE CONNECTION, STAINLESS STEEL (304)
CARRIAGE BOLTS @ 3/8 Dia. ON TOP GIRDER FLANGE

GALVANIZED LAG BOLTS @ 5/8" Dia. WITH CORRESPONDING WASHERS, TWO SETS
PER BOARD, CENTERED OFF THE TOP GIRDER FLANGE WEBS WITH 1/2" PRE-DRILLS
CONNECT TIMBER DECKING TO TIMBER NAILERS

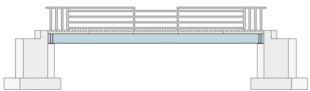
Designed May
2020



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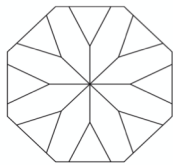
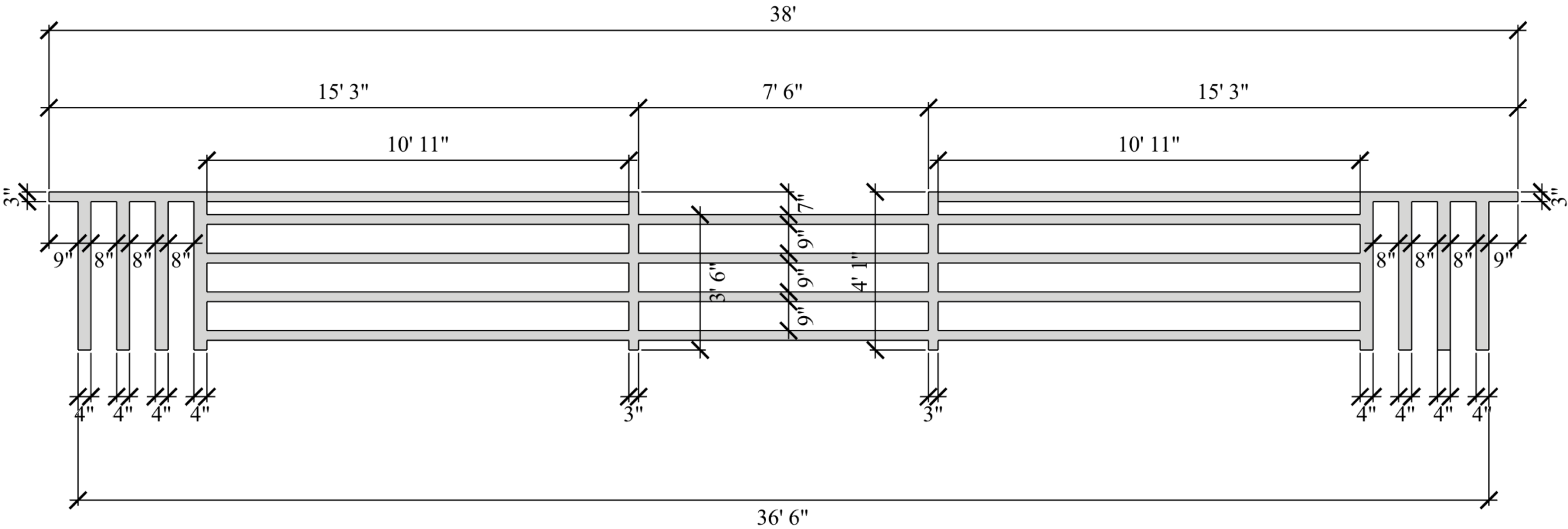
RAILINGS: 6061-T6 ALUMINUM ALLOY, Fy 42 KSI, 3/16" WALL THICKNESS
STAINLESS STEEL (304) 3/8 Dia. NUT AND BOLT CONNECTIONS FASTENING
RAILING PLATES (TIG WELDED TO RAILINGS) TO TIMBER DECKING

Designed May
2020



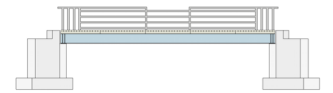
ALL HANDRAIL HEIGHT LEVELS EXCEED MINIMUM RAILING HEIGHT CODE

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



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Designed May
2020



•Cost Bid•

STATEMENT OF COST: PER REQUEST OF THE TOWN OF NORWICH VERMONT, MAY 2020

Designed for a Service Life of over 100 Years:

Permitting: Scott Jensen, Vermont Waterway Engineer Fee: **\$200**

Excavation: Gary Thrasher, Heavy Equipment Operator Services,
Excavation: **\$16,000**

Concrete Contracting: Bryan Tillotson, Concrete Form Work:
\$17,000

Structural Steel: Robco Steel Fabricators, Fabrication, Galvanization,
Delivery: **\$14,000**

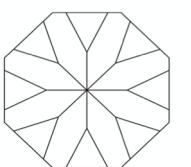
Timber Decking: Chad Franklin and Budget Lumber, No. 1 Grade
Pressure Treated, Delivery: **\$6,000**

Aluminum Railings: Rich Franklin, Fabrication, Welding, Delivery:
\$11,500

Structural Fasteners: Ordered for Timber Decking and Aluminum
Railings: **\$2,000**

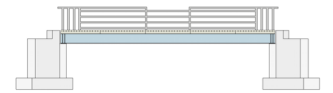
Design, Engineering, Lead Contracting: Nick Fabrikant: **\$9,000**

TOTAL BRIDGE BUDGET ESTIMATE: \$75,700



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Designed May
2020



Schedule of Construction, Milestones, and Cost:

July 17th, 2020: Down payments of **10%** of all estimates shall be administered to the lead contractor, myself, and distributed to the main sub-contractors to ensure their services on the project. The main 90% difference in cost will be paid upon completion of the bridge. The residual amounts (time and material breakdowns) are itemized below:

August 17th, 2020: Site leveling checks, silt and erosion filters installed, digging on the East side Abutment commences. Time (\$3,000), Materials (\$400): Gary Thrasher, **\$3,400**

August 19th, 2020: Digging on the West side Abutment commences. Time (\$4,000), Materials (\$1,000): Gary Thrasher, **\$5,000**

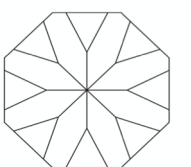
August 24th, 2020: Concrete Footing Form commences on the East side Abutment. Time (\$2,000) and Materials (\$3,300): Bryan Tillotoson, **\$5,300**

August 27th, 2020: Concrete Footing Form work commences on the West side Abutment. Time (\$2,000) and Materials (\$3,000): Bryan Tillotoson **\$5,000**

August 31st, 2020: Concrete Wall Form work begins on the East side Abutment. Time (\$2,000) and Materials (\$500): Bryan Tillotoson, **\$2,500**

September 3rd, 2020: Concrete Wall Form work begins on the West side Abutment. Silt and erosion filters removed from the stream hereafter. Time (\$2,000) and Materials (\$500): Bryan Tillotson, **\$2,500**

September 14th, 2020: (delay is due to a minimum concrete curing time) Galvanized Structural Steel System will be craned into place and fastened to abutments. Time (\$4,000) and Materials (\$8,600): To Robco Metal Fabricators, **\$12,600**



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Designed May
2020



Schedule of Construction, Milestones, and Cost:

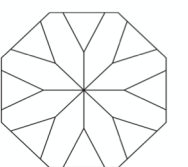
September 17th, 2020: Excavation Backfill of East Abutment. Time (\$1,500) and Materials (\$1,500): To Gary Thrasher, **\$3,000**

September 21st and September 22nd 2020: No. 1 Grade Pressure Treated Timber Decking attached to Structural Steel System. Time (\$3,000) and Materials (\$2,400): To Chad Franklin and Budget Lumber, **\$5,400**

October 5th, 2020: 6061 Aluminum railings to be fastened to the timber decking. Time (\$6,000) and Materials (\$4,350): To Rich Franklin, **\$10,350**

October 8th, 2020: Excavation Backfill of West Abutment. Time (\$1,500) and Materials (\$1,500): To Gary Thrasher, **\$3,000**

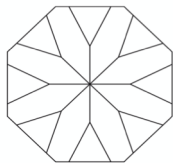
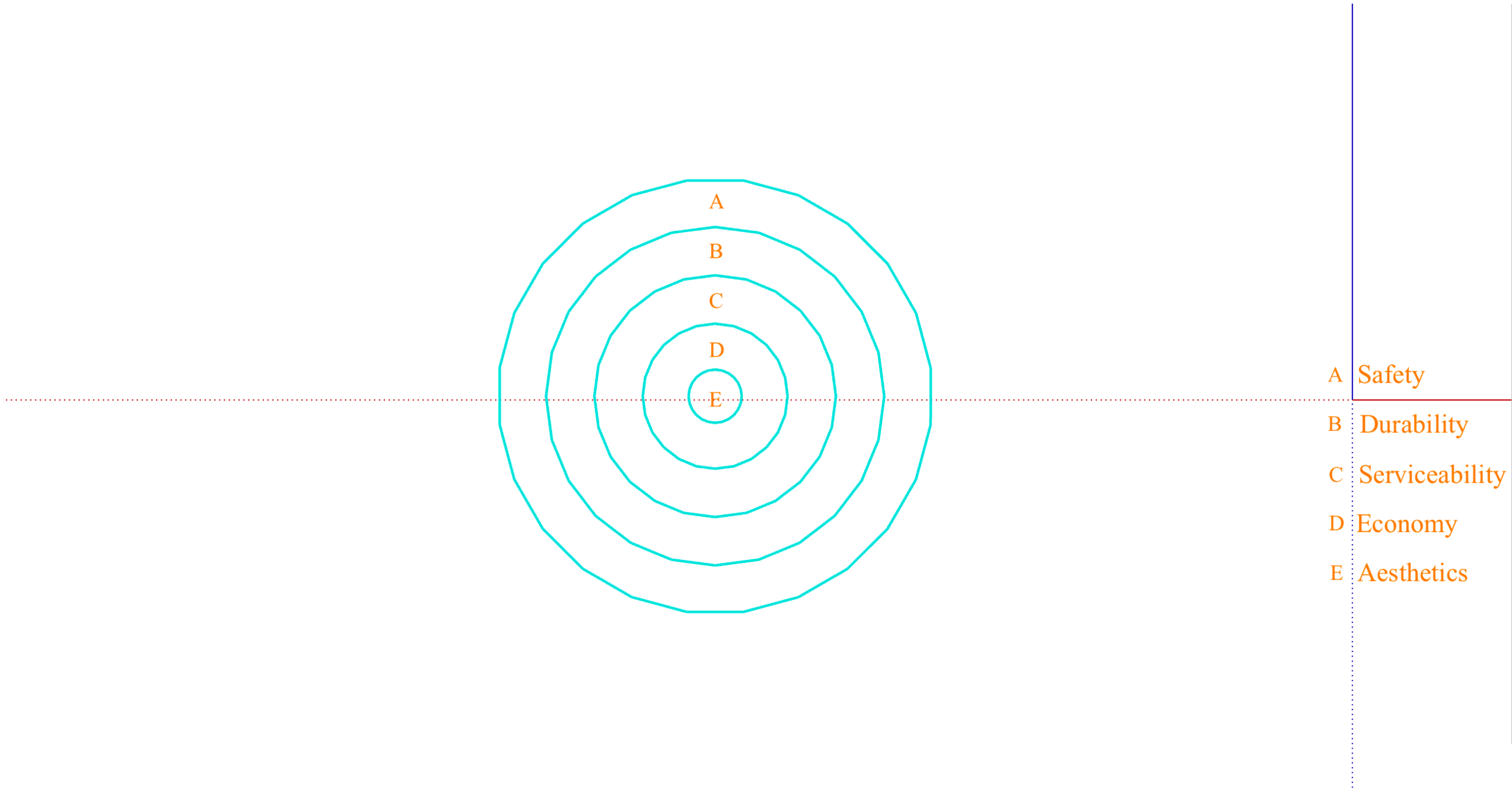
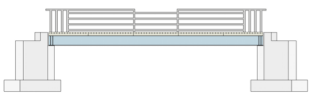
October 12th, 2020: Engineering Checks, Grade re-measurements, Environmental Checks, Site Clean-Up, and the commencing of Winter Rye to be planted onsite. Time (\$8,100): To Nick Fabrikant, **\$8,100**



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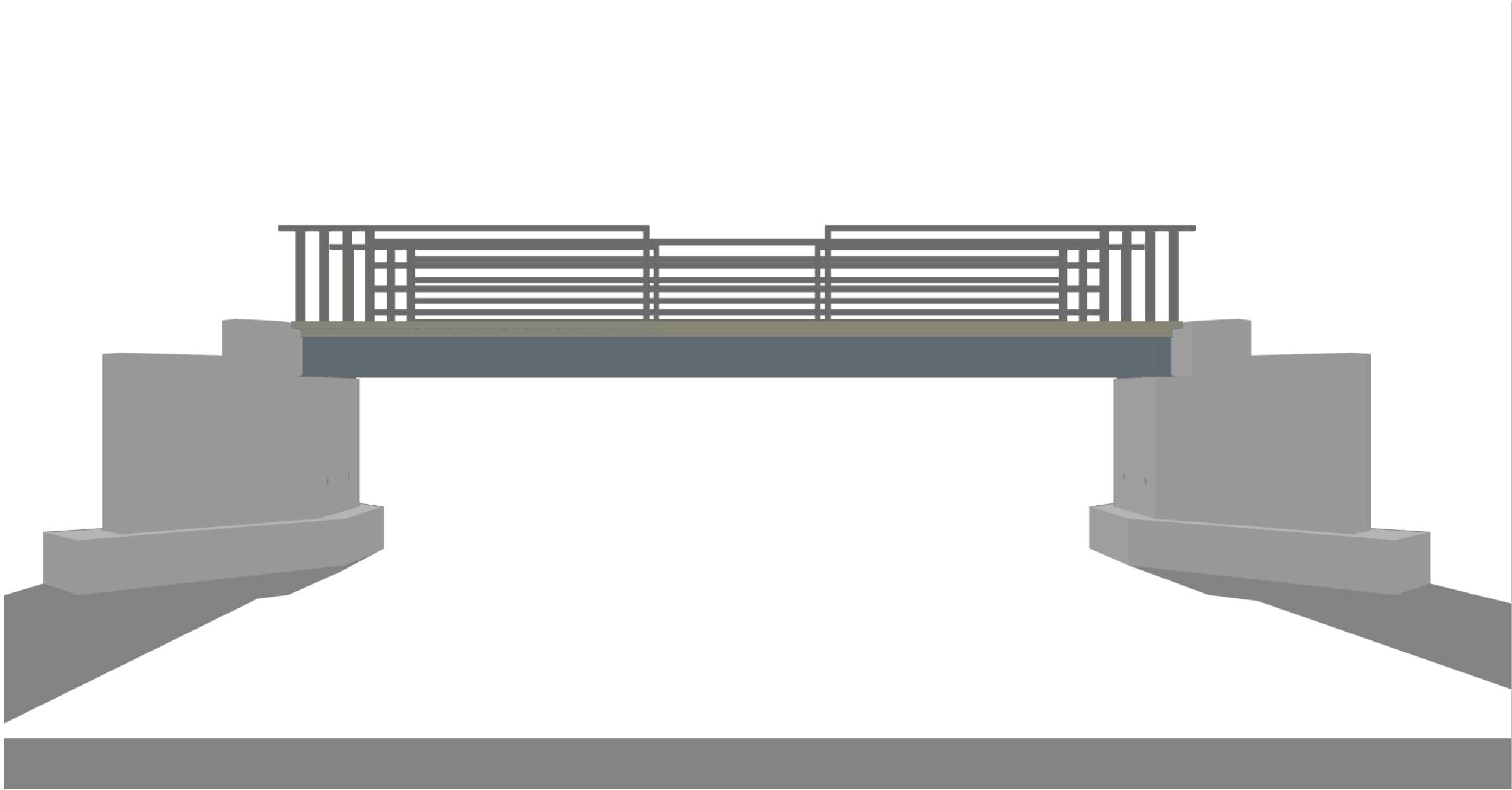
Bridge Design Philosophy:
Hit the Bullseye

Designed May
2020



Thank You

43° 44' 25.49" N
72° 20' 42.13" W



Nick Fabrikant
Civil Engineer

