



## State Route 167 Puyallup River Bridge Reuse Assessment – Phase 1

Submitted to  
**King County**  
Department of Natural Resources and Parks  
Seattle, Washington

**Final**

**State Route 167 Puyallup River Bridge Reuse Assessment – Phase 1  
Puyallup, Washington  
Project No. 1044668**

**Submitted to**

**Parks and Recreation Division  
Department of Natural Resources and Parks, King County  
Seattle, Washington**

**Final Submittal**

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# STATE ROUTE 167 PUYALLUP RIVER BRIDGE REUSE ASSESSMENT – PHASE 1

## King County Parks and Recreation Division

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# STATE ROUTE 167 PUYALLUP RIVER BRIDGE REUSE ASSESSMENT – PHASE 1 KING COUNTY, PARKS AND RECREATION DIVISION

## 1.0 EXECUTIVE SUMMARY

The State Route (SR) 167 Puyallup River Bridge has been scheduled for replacement by the Washington State Department of Transportation (WSDOT) due to age and reduced load rating. The historical significance of this bridge has developed a need to assess the feasibility of relocating and repurposing the bridge instead of demolishing to recycle. BergerABAM is tasked by King County Parks and Recreation Division to develop a removal, rehabilitation, and relocation plan and cost estimate to consider reuse of the bridge on the foothills trail. To provide an accurate cost estimate, BergerABAM consulted with general contractors, specialty moving contractors, and steel fabricators experienced with these types of projects. For the purpose of this report and cost estimate, all costs are included within the estimate. No separation for work required by WSDOT was made. Task numbers provided below follow those listed in the contract.

### 1.1 Task 2 – Removal Plan

Removing the bridge is assumed to be completed using one of two proposed options.

The first option is to lift the entire bridge in one piece onto hydraulic platform transporters located on the adjacent concrete bridge. The bridge will then be moved to a nearby field, dismantled, and prepared for transportation to a steel fabrication facility. For lifting purposes, BergerABAM assumes the use of four cranes with a minimum 100-ton capacity, and the roadway, decking, and stringers will be removed prior to lifting the bridge. The total direct project cost for this method is \$2,723,000.

The second option for removing the bridge is to disassemble in place. This method requires the use of temporary pile-supported platforms within the river to support the weight of the bridge as it is dismantled. Bridge members will be removed and directly transported to a steel fabrication facility. BergerABAM assumes the need for 16 driven piles and standard temporary structural steel framing and timber decking for the platforms. The total direct project cost for this method is \$2,315,000.

### 1.2 Task 3 – Rehabilitation Plan

Once removed, all bridge members will be sandblasted and cleared of all rust and paint. Project costs have been adjusted accordingly to account for the existing lead-based paint removal, collection, and disposal. Based on recent WSDOT bridge inspection reports, BergerABAM assumes 20 percent of all below deck beams, gusset plates, and rivets will need to be replaced with new steel elements. All rivets removed during the dismantling process and rehabilitation task will be replaced with new steel bolts. All new bridge members will be constructed to match the original shape and size of those being replaced.

The total direct project cost to rehabilitate the bridge using either Option 1 or Option 2 for removal is \$681,000.

### **1.3 Task 4 – Relocation Plan**

BergerABAM assumes relocating the bridge over the White River will require the construction of two new concrete bridge abutments. The relocated bridge is more than double the span of the original bridge for which the existing abutments were designed. For purposes of this assessment, it is assumed each new abutment will be placed outboard of the existing. The existing abutments that remain will be demolished only as required to allow for clear passage of the rehabilitated bridge above. Additionally, the three existing abutments will be utilized as support points for the pile-founded temporary work bridge. BergerABAM assumes the need for 16 piles driven in the river to complete this task. Reassembling the bridge will be completed using the work bridge to support personnel and crane operations. To limit weight, the newly constructed bridge will utilize a 16-foot-wide precast concrete path centered in the bridge deck. The precast concrete will consist of panels resting upon new bridge stringers spanning to each transverse floor beam. The total direct project cost for this task is \$2,090,000.

### **1.4 Total Cost and Comparison**

To determine the total project cost, BergerABAM assumed the lowest cost option and added estimates for a contingency account, construction support services, and coordination. The contingency account estimate is to account for unknown areas of repair that may be uncovered during the removal and repair operations. The lowest cost utilizes the Option 2 removal method (in-place disassembling) and successive rehabilitation process. This results in a total project cost of \$6,583,000. To better understand the cost for this bridge reuse project, BergerABAM compared the total project cost with the total cost associated with the construction of a new steel truss bridge, \$3,640,000. This cost was developed by King County and adjusted in bridge length to match the relocated SR 167 Puyallup River Bridge.

The total cost differential, not including taxes, is \$2,943,000 between reuse of the existing SR 167 Puyallup River Bridge and construction of a new bridge. If the cost of bridge removal is deducted from the total cost, assuming WSDOT provides the funds for this task, the cost differential is \$726,000.

## **2.0 PROJECT DESCRIPTION**

### **2.1 Introduction**

The SR 167 Puyallup River Bridge has been scheduled for replacement by WSDOT due to age and reduced load rating. The historical significance of this steel truss bridge has developed a need to assess the feasibility of relocating and repurposing the bridge instead of demolishing to recycle. This project is to assess the requirements to relocate the bridge from its current location to function as a trail bridge at a site crossing the White River near Buckley and Enumclaw, Washington. The bridge will then be repurposed for pedestrian use along the King County Parks, Foothills Trail.

### **2.2 Authorization**

BergerABAM was engaged by the King County Parks and Recreation Division to perform an assessment study for the proposed reuse of the SR 167 Puyallup River Bridge. Work for this task was authorized on 25 April 2012.

### **2.3 Purpose**

The purpose of this study is to determine the feasibility of removing and relocating the steel truss bridge. This assessment discusses the methods and techniques to perform each of the tasks and provides an overall preliminary cost estimate.

### 3.0 EXISTING BRIDGE AND SITE

#### 3.1 Introduction

The existing Puyallup River Bridge is a single-span, steel-framed truss bridge that functions as the northbound leg of SR 167 across the river. The bridge deck consists of two traffic lanes and a pedestrian footpath cantilevered off the east side truss. A four-span, cast-in-place and prestressed concrete bridge adjacent to the west side truss services southbound traffic along SR 167. Figure 1 shows the vicinity map and project location for the existing Puyallup River Bridge.

#### 3.2 Horizontal and Vertical Datum

For the purpose of this study, the horizontal and vertical datum is as listed on the existing drawings provided by King County Parks dated 6 March 1951. The vertical datum in the top of bridge deck located at the north abutment, elevation = 50.00 feet, National Geodetic Vertical Datum 1929 (NGVD 29). The horizontal datum is the centerline of the north concrete bridge pier, Station 10+0.0.

Puyallup River data is from United States Geological Survey (USGS) river gauge 12101500, Puyallup River at Puyallup, WA. This gauge is located at Latitude 47°12'52", Longitude 122°20'25", North American Datum of 1927 (NAD 27) at River Mile 6.6. Vertical datum for the gauge is NGVD 29. Table 1 provides extreme river data for the Puyallup gauge.

**Table 1 - Puyallup River Gauge Data**

River Stage	Gage [feet, NGVD 29]	Year
Maximum	31	1933
Minimum	8.23	1955
Average	19.96	N/A

#### 3.3 Existing Structure

As part of the WSDOT bridge inventory, Bridge Number 167/20E, this existing Puyallup River Bridge is subject to routine inspections for maintenance and repair. Inspections are completed on an annual basis with the most recent Structure Inventory and Appraisal Report (SI & A) conducted in 2011 resulting in a "Structurally Deficient" rating. This rating prompted a load restriction on the bridge requiring vehicles over 10,000 pounds gross vehicle weight (GVW) to use the right lane only. Additionally, WSDOT has made the bridge a priority for replacement in the 2011-2013 biennium.

The existing steel-framed truss bridge constructed in 1925 is an 87-year-old modified Warren truss design spanning 371 feet. Cast-in-place concrete abutments founded on driven timber piles provide support. Timber approach spans provide vehicular and pedestrian access. Steel construction consists of ASTM A7 rolled steel and rivets.

Members are built-up shapes utilizing angles and channel sections, flat web plates, and bar lacing. Truss members are connected using rivets and gusset plates.

### **3.4 Environmental Constraints**

The environmental constraints associated with the Puyallup River site include the river basin and the adjacent levees, roadways, and open space used for project staging. All areas will require temporary protection to prevent lead-based paint and other debris from falling into the river basin or leaching into the soil at the project staging area. Any in-water work required for the removal of the bridge will need to occur during the in-water work window, 16 July through 15 August. Other constraints regarding migratory birds may influence the staging area as potential nesting in and around the project staging area may occur.

### **3.5 Historical Constraints**

The existing steel-framed truss bridge is on the National Register of Historical Places (NRHP) with the credit for the design given to M.M. Caldwell. It is the understanding of BergerABAM that preservation of the historical look and geometry of the truss is a priority. Through conversations with WSDOT and the Department of Archaeology and Historic Preservation, it is the understanding of BergerABAM that any alterations to the existing bridge will produce an adverse effect on the historical significance.

To repurpose the bridge, various alterations will need to occur. These alterations include the following.

- New, code-compliant handrails and guardrails
- The removal and replacement of the bridge stringers
- The replacement of various floor beams, diagonal bracing, gusset plates, and bridge bearings
- New bridge decking material and configuration
- Architectural alterations of the decking to accommodate pedestrians and allow overlook/viewing points
- The use of new high-strength structural bolts in place of rivets
- Reconstruction of the bridge in a new location and over new support piers/abutments

Each of these alterations will cause an adverse effect to the historical look of the bridge. To minimize the effects, any member that is removed during the disassemble process or replaced during rehabilitation will maintain the historical aesthetics.

## 4.0 PROPOSED SITE

### 4.1 Introduction

The proposed site is located along the Foothills Trail system between Enumclaw and Buckley at the White River. King County Parks has selected a bridge alignment in-line with North River Avenue; see Figure 2. This alignment coincides with the existing abutments for a two-span vehicle bridge from an earlier SR 410 alignment. For the purposes of this study, BergerABAM assumes the existing abutments will not be utilized as support of the relocated bridge. Discussion of this assumption is included in Section 7.0.

### 4.2 Horizontal and Vertical Datum

White River data is from USGS river gauge 12099200, White River above Boise Creek at Buckley, WA. This gauge is located at Latitude 47°10'26", Longitude 122°00'29", NAD 83 at River Mile 23.9. Vertical datum for the gauge is 650 feet above NGVD 29 zero datum. Table 2 provides extreme river data for the White River gauge.

**Table 2 - White River Gauge Data**

River Stage	Gage [feet, NGVD29]	Year
Maximum	46.64	2006
Minimum	41.65	2003
Average	44.73	N/A

### 4.3 Existing Structures

The proposed location for the relocated bridge is in-line with three existing concrete bridge piers supported by concrete spread footings. The piers originally supported a two-span vehicle bridge for the old SR 410 alignment. Additionally, two of the three piers lie within the 100-year floodplain. The southern pier (SR 410 Pier 1) is the only one that is outside the floodplain and does not show signs of scour, see Figure 4.

### 4.4 Environmental Constraints

The environmental constraints associated with the White River site include the river basin and the riverbanks. All areas will require temporary protection to prevent debris from falling into the river basin during construction. Any in-water work required for the installation of temporary structures and removal will need to occur during the in-water work window, 16 July through 15 August.

### 4.5 Historical Constraints

For the purpose of this study, BergerABAM assumes there are no historical constraints with regard to existing structures at this site.

## **5.0 TASK 2 - BRIDGE REMOVAL**

### **5.1 Introduction**

BergerABAM assumes the removal of the Puyallup River Bridge will occur using one of the two proposed options described below. For each option, Mowat Construction Company provided guidance and expertise for developing the methods for removal and the associated costs. Mowat Construction Company acted as a consultant for this assessment because of their knowledge and experience with these types of projects, as well as their long history of bridge construction. Both options assume demolition of the existing bridge decking and timber approach spans occurs prior to the commencement of work. Additionally, BergerABAM assumes the existing concrete abutments will remain for demolition to occur later. The demolition cost for each of these items is not included in this assessment.

#### **5.1.1 Option 1 Removal**

Option 1 will remove the bridge in one large piece using four minimum 100-ton cranes and transport the bridge to the project staging area, north of the river. Figures 1 and 3 show the location of the bridge and the project staging area. Bigge Crane and Rigging, a heavy load transportation company, provided an estimate for cost and identified the required equipment to transport the bridge to the project staging area.

#### **5.1.2 Option 2 Removal**

Option 2 will use temporary pile-founded platforms located under the existing bridge to provide support during the bridge dismantling process. Bridge members extracted from the structure will be loaded onto tractor-trailers and shipped to a steel fabrication facility for repair and cleaning.

## **5.2 Reference Documents**

### **5.2.1 Bridge Documents**

Using the original bridge shop drawings, BergerABAM developed a material list for bridge members, rivets, and gusset plates. These drawings, provided by WSDOT and King County Parks, include Virginia Bridge and Iron Company Sheets E1 and 1 through 18. Additional information for abutments and approach spans was taken from drawings by M.M. Caldwell, Consulting Engineers, Sheets 1 through 5. Appendix A contains copies of all original documents provided by King County Parks.

### **5.2.2 Design Codes**

BergerABAM performed an analysis on both the repurposed steel truss bridge as a pedestrian bridge and the existing adjacent concrete bridge for use as support structure during bridge removal processes. The capacity of the repurposed bridge as a pedestrian bridge was determined per American Association of State Highway and Transportation Officials (AASHTO) LRFD Bridge Design Specifications, Fifth Edition, 2010. Stress checks for the adjacent concrete bridge were made in accordance with AASHTO Standard Specifications for Highway Bridges, 1996.

### **5.3 Analysis**

To perform the bridge removal using Option 1, the adjacent concrete bridge is required to support the weight of the steel truss bridge. In order to estimate the load demands of the existing truss bridge, BergerABAM performed a live-load analysis.

The analysis consisted of determining the shear and flexural demands of the design live-load truck (HS20-44) on the concrete bridge as described in the AASHTO code. A second analysis of the concrete bridge supporting the steel bridge provided demand values for comparison to the original design criteria. Because the existing bridge is much heavier than the design live-load truck, the intent of the second analysis was to determine an adequate distribution of axles under the steel truss bridge. To obtain an even load distribution, axles assemblies were situated at the end supports and near the quarter points of the steel bridge. Demands on the concrete bridge was calculated and compared to the demand of the design live-load truck. Analysis shows, eight supports under the steel truss bridge will produce demands within 10 percent of the maximum limit per the AASHTO code.

To perform the bridge removal using Option 2, the adjacent concrete bridge is required to support the weight of standard HS20-44 design live-load trucks. No further analysis is required because this live load is within the original design requirements of the bridge.

### **5.4 Sequencing**

#### **5.4.1 Option 1 Removal Sequencing**

The sequencing for Option 1 will begin with the site preparation. This preparation includes the construction of the four crane pads, clearing and grubbing of the project staging area, and the installation of the suspended quick deck system. Each of the four crane pads require a minimum 4-foot-thick by 40-foot-square pad of crushed gravel and quarry spalls. Figure 5 shows the proposed crane pad locations and their proximity to the steel truss bridge.

The proposed project staging area, as defined in Figure 3, is a wooded area just north of the bridge. This area will require clearing, grubbing, and site preparation with quarry spalls and crushed gravel. A geofabric barrier placed below the crushed gravel will act as a collection membrane for contaminated sandblasting waste and existing paint debris.

The purpose of the quick deck system is to catch and collect any debris that may fall from the bridge during the abatement process and removal of the bridge stringers. In an effort to reduce the bridge weight as much as possible, all 98 stringers will be removed, approximately 30 tons of material.

Lifting the bridge will proceed with specialized spreader crane rigging attached to the truss near each abutment. Four cranes with a minimum 100-ton capacity each will simultaneously lift the steel truss bridge off its bearings. The cranes will swing the bridge over and above the adjacent concrete bridge and down upon 24 axle lines of self-

propelled hydraulic platform transporters. These transporters are designed to hydraulically level themselves as the cranes lower the bridge; this ensures a uniform load over the length of the supporting concrete bridge. Figure 6 shows a cross-section of the concrete bridge supporting the transporters and the fully assembled steel truss bridge. Finally, the transporters will drive the steel truss bridge off the concrete bridge and north to the staging area. Following bridge removal operations, temporary construction materials will be removed from the vacant bridge crossing.

#### **5.4.2 Option 2 Removal Sequencing**

Sequencing for the removal using Option 2 will begin with the temporary pile driving for the construction of in-water bridge support platforms. Once the piles are driven and the platforms are constructed, crane pads will be added outboard of each abutment. Installation of the quick deck collection barrier will commence followed by extraction of the bridge members.

Each member extracted from the bridge will require abatement of the connection and cutting of connecting rivets. Extracted members will be loaded onto flatbed trailers and shipped to the steel fabricator facility in the largest segments capable for transportation. BergerABAM anticipates 15 trips will be required for full removal of the bridge. Finally, all temporary structures and materials will be removed.

### **5.5 Temporary Support**

#### **5.5.1 Option 1**

Temporary works for Option 1 will require the construction of four crane pads. As shown in Figure 5, two cranes will be located at each abutment. One crane is located just outboard of the abutment location and the other is located west of the adjacent concrete bridge resting on the road passing under the bridge. No other temporary support near the river is required.

#### **5.5.2 Option 2**

Temporary works for Option 2 will require the installation of driven steel pipe piles and steel support platforms below the existing bridge. Figure 7 shows (16) 80-foot-long piles used to support the bridge at eight points along its clear span. Piles will be driven to the depth required to achieve the anticipated capacity and will be extracted or cut off below mudline when the work is complete. Other temporary works include the construction of two crane pads, one on each end, outboard of the existing abutment locations.

### **5.6 Cost**

#### **5.6.1 Option 1**

The total direct project cost for removal of the bridge using Option 1 is \$2,723,000. This estimate includes all temporary structures, equipment mobilization, abutment and bridge preparation, connection abatement, and site cleanup. For a more detailed and itemized cost estimate, see Appendix B.

**Table 3 - Bridge Removal Cost Estimate Option 1**

<b>Item</b>	<b>Cost</b>
Temporary Site Preparation	\$178,000
Equipment (Mobilization & Operation)	\$368,000
Abutment & Bridge Preparation	\$502,000
Member Removal Over Land	\$1,296,000
Connection Abatement	\$33,000
Equipment Over Land (Mobilization & Operation)	\$100,000
Disposal & Removal of Temporary Construction	\$246,000
Total Cost	\$2,723,000

**5.6.2 Option 2**

The total direct project cost for removal of the bridge using Option 2 is \$2,315,000. This estimate includes all temporary structures, equipment mobilization, abutment and bridge preparation, connection abatement, and site cleanup. For a more detailed and itemized cost estimate, see Appendix B.

**Table 4 - Bridge Removal Cost Estimate Option 2**

<b>Item</b>	<b>Cost</b>
Equipment (Mobilization & Operation)	\$161,000
Abutment & Bridge Preparation	\$589,000
Disposal & Removal of Temporary Construction	\$6,000
Abatement over Water	\$31,000
Member Removal	\$1,528,000
Total Cost	\$2,315,000

## **6.0 TASK 3 - BRIDGE REHABILITATION**

### **6.1 Introduction**

The rehabilitation of the Puyallup River Bridge will require disassembling and repairing the majority of the bridge members and the complete replacement of approximately 20 percent of all below-deck structural components. The majority of the work is assumed to be completed in a steel fabrication facility with as little as possible occurring outside over land or water. Rainier Welding, a steel fabrication company specializing in bridges, acted as a consultant for this task because of their knowledge and experience with these types of projects.

### **6.2 Existing Bridge Condition**

As part of the WSDOT bridge inventory, the existing Puyallup River Bridge is subject to annual maintenance and inspections. The annual inspections provide a record of the existing condition and list suggested and recorded repairs. The most recent report provided by WSDOT was conducted during July and August of 2011. Figures 8 through 10 show plan views and elevations of the existing bridge with details referencing photos shown on Figures 11 through 17. These figures attempt to show the existing condition of the bridge, with the majority of the corrosion and material loss occurring below the deck surface. A coding system identifying the typical connections, members, and required repairs is shown on Figures 8 through 10. The coding system corresponds to the descriptions given in the WSDOT inspection reports. This acted as an aid to Rainier Welding to establish a preliminary cost estimate. This includes rivet replacement and repairs to gusset plates. Table 5 and Table 6 show the existing bridge condition descriptions and provide a count of occurrences for each type. The most common adverse condition remark in the WSDOT report is minor pack rust and bulging to the gusset plate followed by surface rust and pitting. Based on these tables, the WSDOT reports, as well as site observations, BergerABAM estimates 20 percent of all below-deck members will require replacement.

**Table 5 - Existing Bridge Superstructure Condition, Figure 8**

Mark	Condition & Remarks	Occurrences
A	No defects noted	25
B	Minor pack rust with slight bulging at gusset plate connection and pitting	31
C	1/4" pack rust at gussets and lattice	8
D	3/4" diameter drilled hole	2
E	Scattered surface and laminar rust on the inside channels (up to 2 sq. ft. total area)	10
F	Pack rust starting at lattice bar connections	1
G	Areas of rust and pitting	10
H	Pack rust 1/8" thick between lower channels and gusset plates. Slightly bent out of plane	1
I	Flange bent over 6" length	2
J	30% section loss at bottom gusset	1
K	Vertical is twisted clockwise where the SW flange is bent 1-1/4" outward over 2' of length	1
L	Lattice deformation	1
M	Bent to east 1-1/4" over 8'	1

**Table 6 - Existing Bridge Substructure Condition, Figure 9**

Mark	Condition & Remarks	Occurrences
A	Sheared rivets	8
B	10% section loss in member & seat deformation	1
C	1/16" section loss in web at west support	1
D	1-1/2" diameter hole in bottom flange at east end	1
E	50% section loss in top flange	1
F	Top flange with hole at Stringers B, C, & E	1
G	Replace bolt in railing	3

As noted on the original drawings, all bridge members are built-up sections from angle shapes and plates. Steel rivets connect all built-up members and their connection to gusset plates. BergerABAM estimates 7,000 bolts will be required to replace existing rivets.

The existing bridge coating is a lead-based paint. Removal and collection of this coating is required. BergerABAM estimates 60,000 square feet of connections and bridge member surface, which require cleaning and hazardous material collection.

### **6.3 Sequencing**

#### **6.3.1 Option 1**

The rehabilitation task for the Option 1 bridge removal will be completed in the project staging area and in a steel fabrication facility. Bridge members will be disassembled in as large of segments as possible for transport to the fabrication facility. Abatement in the field will be performed at member connections only, with the remaining cleaning and abatement occurring at the fabrication facility. Once at the fabrication facility, members will be sandblasted to a near white condition, repaired or replaced as required, and painted. One coat will be applied to all surfaces prior to shipping to the White River site. Any rivets that require replacement will be replaced with ASTM A325 dome-headed bolts that match the aesthetics of the historic bridge.

#### **6.3.2 Option 2**

All work related to the rehabilitation task for the Option 2 bridge removal will occur in the steel fabrication facility. Members will be sandblasted to a near white condition, repaired or replaced as required, and painted. One coat will be applied to all surfaces prior to shipping to the White River site. Any rivets that require replacement will be replaced with ASTM A325 dome-headed bolts that match the aesthetics of the historic bridge.

### **6.4 Cost**

For determining the required number of rivets to be replaced and the required surface area to be cleaned and repainted, BergerABAM performed a material takeoff counting rivets and calculating the surface area for all connections and bridge members.

#### **6.4.1 Option 1**

The total direct project cost for rehabilitation of the bridge using Option 1 is \$681,000. This estimate includes all equipment mobilization, connection abatement, fabrication, and coatings. A more detailed and itemized cost estimate is shown in Appendix B.

**Table 7 - Bridge Rehabilitation Cost Estimate Option 1**

<b>Item</b>	<b>Cost</b>
Member Abatement & Disassembly in Shop	\$453,000
Connection Repair	\$43,000
Member Replacement	\$49,000
Member Coating	\$128,000
Connection Coating	\$8,000
Total Cost	\$681,000

**6.4.2 Option 2**

The total direct project cost for rehabilitation of the bridge using Option 2 is \$681,000. The cost for this option is identical to Option 1 since all of the cost associated with removal and transportation to the fabrication shop is included in the removal task. This estimate includes all equipment mobilization, connection abatement, fabrication, and coatings. A more detailed and itemized cost estimate is shown in Appendix B.

**Table 8 - Bridge Rehabilitation Cost Estimate Option 2**

<b>Item</b>	<b>Cost</b>
Member Abatement & Disassembly in Shop	\$453,000
Connection Repair	\$43,000
Member Replacement	\$49,000
Member Coating	\$128,000
Connection Coating	\$8,000
Total Cost	\$681,000

## **7.0 TASK 4 - BRIDGE RELOCATION**

### **7.1 Introduction**

As part of the King County Parks, Foothills Trail system, the bridge will be relocated to span the White River and repurposed as a pedestrian bridge. As shown in Figure 4, the bridge will align with the old SR 410 alignment.

### **7.2 New Abutment Construction**

Support for the repurposed steel truss as a pedestrian bridge was originally anticipated to be provided by the existing concrete abutments. However, because one of the existing abutments is within the 100-year floodplain and each was designed to support half the load of a 170-foot bridge, new abutments are required.

### **7.3 Construction Sequencing**

Constructing the pedestrian bridge over the White River will require a temporary work bridge supported on 16 driven steel piles and use of the existing three concrete bridge abutments. The work bridge, shown in Figure 18, will allow access to cranes and personnel to reassemble the steel truss bridge. During the temporary bridge construction, approximately the top 3 feet of the existing abutments will be demolished to allow the pedestrian bridge to span between the new abutments without bearing on the existing abutments.

Assembly of the bridge will proceed in a piece-wise method using cranes and man-lifts. Once fully erected, installation of the new bridge stringers, precast concrete decking, and guardrails will finish the span. See Figure 19 for the proposed deck plan and sections. Finally, new approach spans or retained earth fill will provide access to the bridge. No cost for approach structures is included in the estimate, as this cost is a requirement by either the reuse of the existing steel truss or the construction of a new bridge.

### **7.4 Cost**

The total direct project cost for relocating the bridge is \$2,090,000. This estimate includes all equipment mobilization, member transportation, new abutment construction, and coatings. A more detailed and itemized cost estimate is shown in Appendix B.

**Table 9 - Relocation Cost Estimate**

<b>Item</b>	<b>Cost</b>
Temporary Site Preparation	\$138,000
Equipment (MOB and Operations)	\$215,000
Member Transportation & Erection	\$242,000
Temp. in-water structures	\$476,000
New Abutment Construction	\$194,000
Modifications to Existing Piers	\$6,000
Hydraulic Mitigation	\$308,000
Field Painting	\$511,000
Total Cost	\$2,090,000

## 8.0 TOTAL COST AND COMPARISON

### 8.1 Cost Estimation Sources and Assumptions

The preliminary cost estimate is based on a combination of various sources and historical data. For the majority of the bridge removal, repair, and relocation costs, BergerABAM consulted with Mowat Construction Company, Rainier Welding and Bigge Crane and Rigging. Additional cost data was taken from RSMeans Heavy Construction Cost Data, 2012. Finally, with regard to the cost comparison of a new steel pedestrian bridge to the repurposed bridge, BergerABAM selectively scaled the cost estimate provided by King County Parks and Recreation based on length, from 342 feet to 371 feet. Scaling was only performed on those components that require increased length or construction effort to reach the 371-foot length. These items include the bridge materials, fabrication, and erection and all temporary false work.

### 8.2 Total Cost

The total cost for the proposed bridge reuse project is a combination of Tasks 2 through 4 with the addition of design, permitting, construction support, and project contingency costs. For the purpose of this study, BergerABAM assumes the lowest cost will be the primary consideration for the eventual implementation of the project. Table 10 shows the total cost comparison between Options 1 and 2, including all additional nondirect costs.

**Table 10 - Total Project Cost Comparison**

Item	Option 1	Option 2
Bridge Removal	\$2,723,000	\$2,315,000
Bridge Rehabilitation	\$681,000	\$681,000
Bridge Relocation	\$2,090,000	
Design & Planning (Bridge Only)	\$250,000	
Contingency (25% of Rehabilitation & Relocation)	\$693,000	\$693,000
Construction Support (20% of Rehabilitation & Relocation)	\$554,000	\$554,000
Tax on Direct Project Cost Only (9%)	\$494,000	\$458,000
Total Project Cost	\$7,485,000	<b>\$7,041,000</b>

The lowest cost for the proposed project is Option 2, with a difference in cost from Option 1 of \$444,000.

### 8.3 Cost Comparison

To determine the feasibility of the project relative to the cost of building a new bridge at the Foothill Trail site, BergerABAM compared the total project cost of Option 2 with the total project cost for new construction. BergerABAM assumes the cost for removing the bridge from the Puyallup River site is funded by WSDOT at a cost equal to the lowest cost option, Option 2 at \$2,217,000 (\$2,315,000 adjusted for a recycling rebate of \$98,000).

This amount will be credited to the total project cost. Table 11 shows a final itemized cost comparison between the reuse of the Puyallup River Bridge and the construction of a new steel bridge. The cost estimation associated with the new bridge construction was prepared by King County Parks and Recreation Division and is included in Appendix C. The King County estimate includes the assumption that the existing abutments at the White River site will provide support for the new construction bridge. Scaling of the estimate as discussed above is reflected in Table 11.

**Table 11 - Cost Comparison between Reuse and New Construction**

<b>Item</b>	<b>Reuse Puyallup River Truss Bridge</b>	<b>New Construction</b>
Bridge Removal	\$2,315,000	-
Bridge and/or Abutment Rehabilitation	\$681,000	\$350,000
Reused Bridge or New Bridge over White River	\$2,090,000	\$2,000,000
Design & Permitting	\$250,000	\$350,000
Contingency (25% for reuse, 20% for new)	\$693,000	\$470,000
Construction Support (20%)	\$554,000	\$470,000
WSDOT Removal Credit	(\$2,217,000)	-
<b>Total Project Cost</b>	<b>\$4,366,000</b>	<b>\$3,640,000</b>

This results in a difference in cost of \$726,000 between reuse and new construction.



1  
-  
VICINITY MAP - PUYALLUP SITE  
SCALE: NTS

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**KING COUNTY**  
**SR 167 - PUYALLUP RIVER BRIDGE**  
**REUSE ASSESSMENT - PHASE 1**  
 VICINITY MAP - PUYALLUP RIVER

DRAWING NO. **FIG-1**  
 PROJECT NO. FAPWT-12-192  
 DATE: 7/13/12  
 SHEET NO. 1 OF 19



1  
-  
VICINITY MAP - FOOTHILLS TRAIL SITE  
SCALE: NTS

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**REUSE ASSESSMENT - PHASE 1**  
VICINITY MAP - WHITE RIVER

DRAWING NO. **FIG-2**  
PROJECT NO. FAPWT-12-192  
DATE: 7/13/12  
SHEET NO. 2 OF 19



1 SITE PLAN - PUYALLUP SITE  
SCALE: NTS

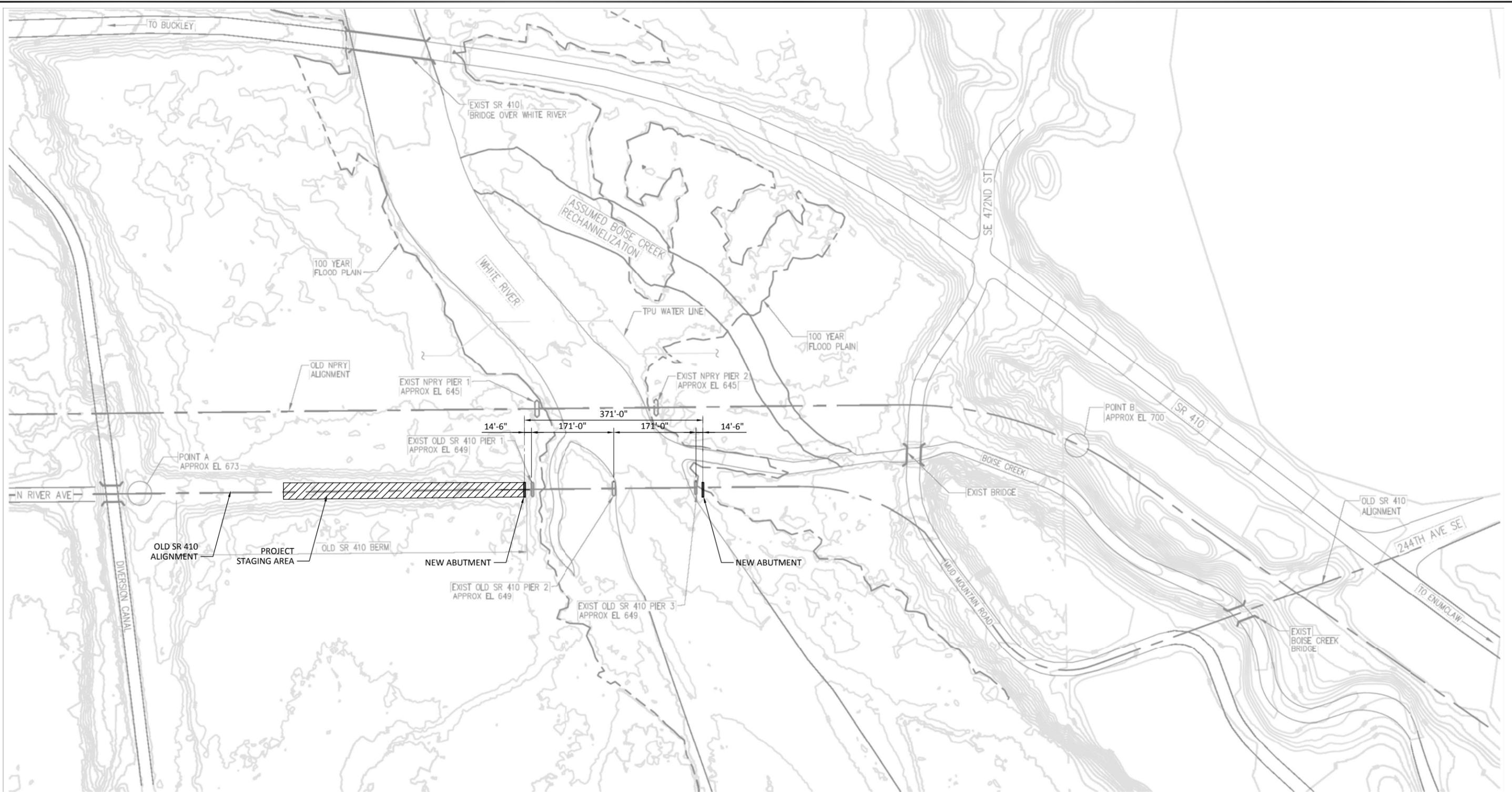
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**REUSE ASSESSMENT - PHASE 1**  
 SITE PLAN - PUYALLUP RIVER

DRAWING NO. **FIG-3**  
 PROJECT NO. FAPWT-12-192  
 DATE: 7/13/12  
 SHEET NO. 3 OF 19



1 SITE PLAN - FOOTHILLS TRAIL SITE  
SCALE: 1"=100'



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**REUSE ASSESSMENT - PHASE 1**  
SITE PLAN - WHITE RIVER

DRAWING NO. **FIG-4**  
PROJECT NO. FAPWT-12-192  
DATE: 7/13/12  
SHEET NO. 4 OF 19



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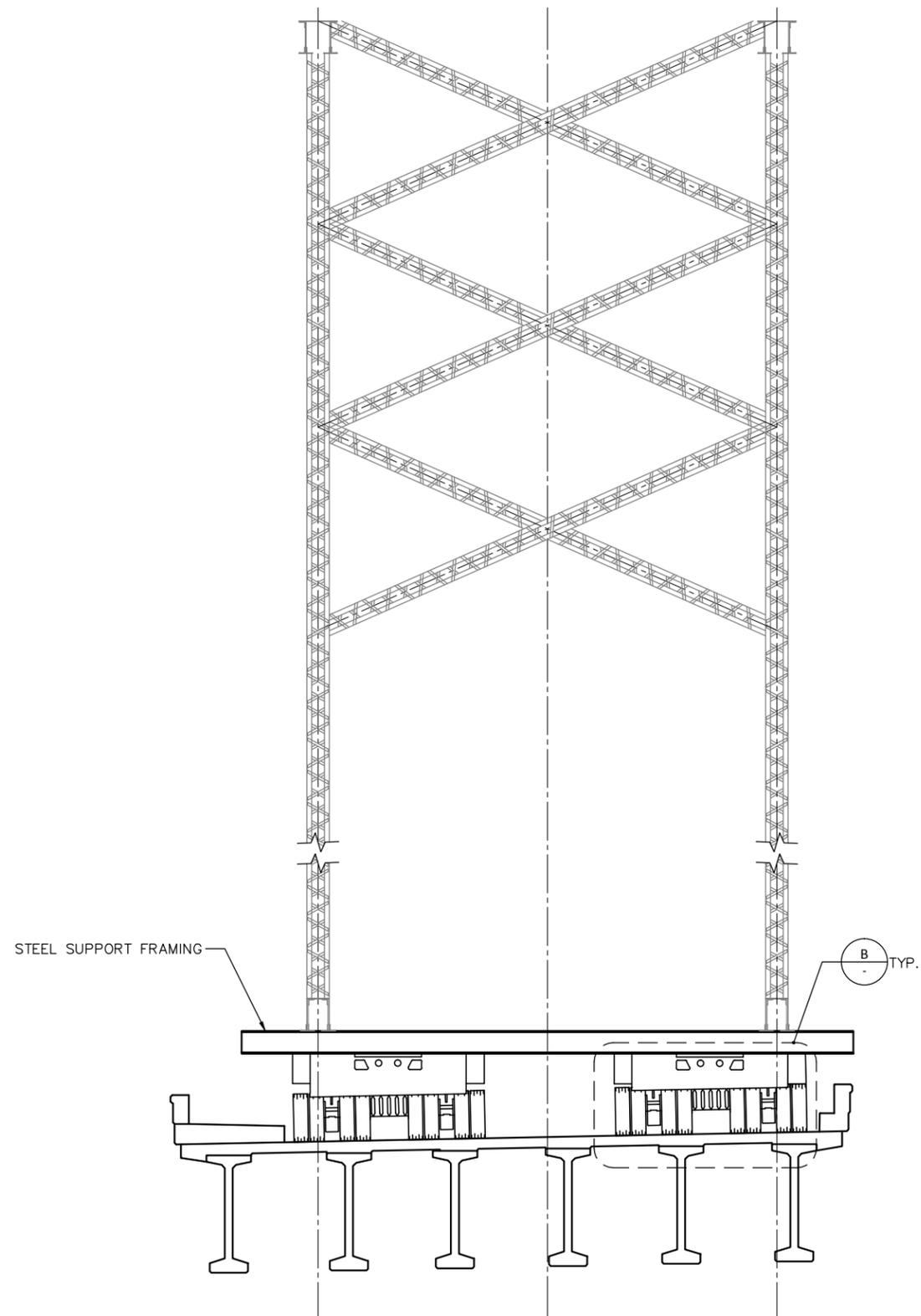


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**SR 167 - PUYALLUP RIVER BRIDGE**  
**REUSE ASSESSMENT - PHASE 1**  
 PLAN - CRANE LAYOUT AND PAD LOCATION

DRAWING NO. **FIG-5**  
 PROJECT NO. FAPWT-12-192  
 DATE: 7/13/12  
 SHEET NO. 5 OF 19



**A**  
SECTION AT CONCRETE BRIDGE GIRDER SPAN  
SCALE: 1/4"=1'-0"



**B**  
SELF PROPELLED HYDRAULIC PLATFORM TRANSPORTER  
SCALE: N.T.S.

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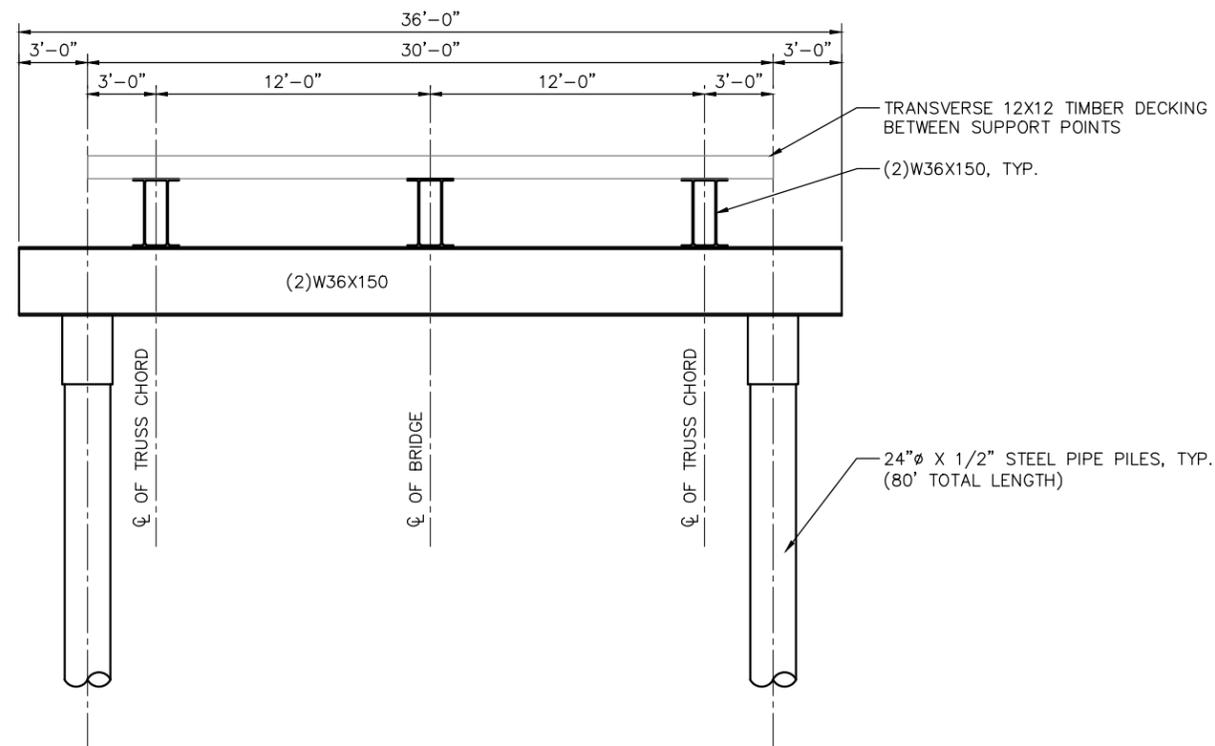
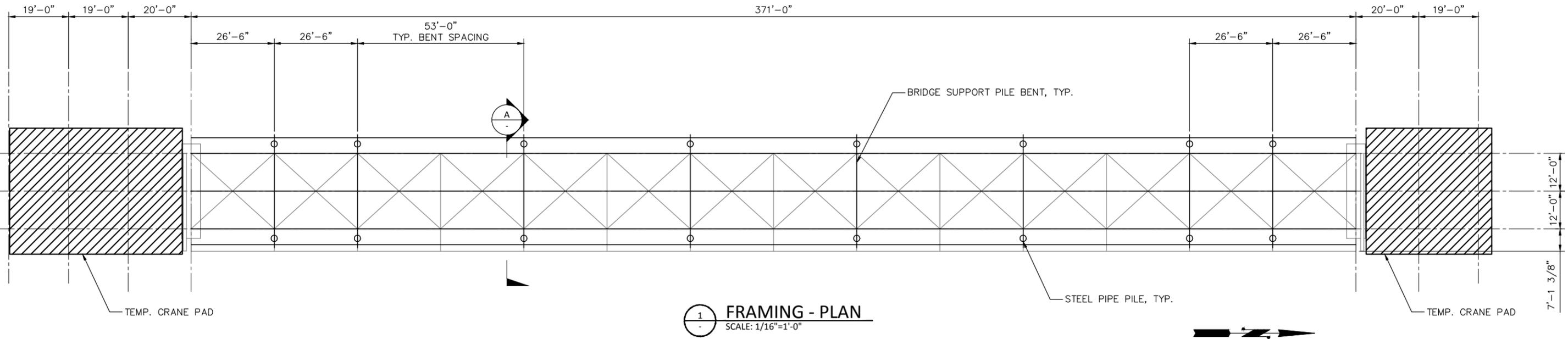


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**KING COUNTY  
SR 167 - PUYALLUP RIVER BRIDGE  
REUSE ASSESSMENT - PHASE 1**  
SECTION - CONCRETE BRIDGE SUPPORTING STEEL TRUSS BRIDGE

DRAWING NO. **FIG-6**  
PROJECT NO. FAPWT-12-192  
DATE: 7/13/12  
SHEET NO. 6 OF 19



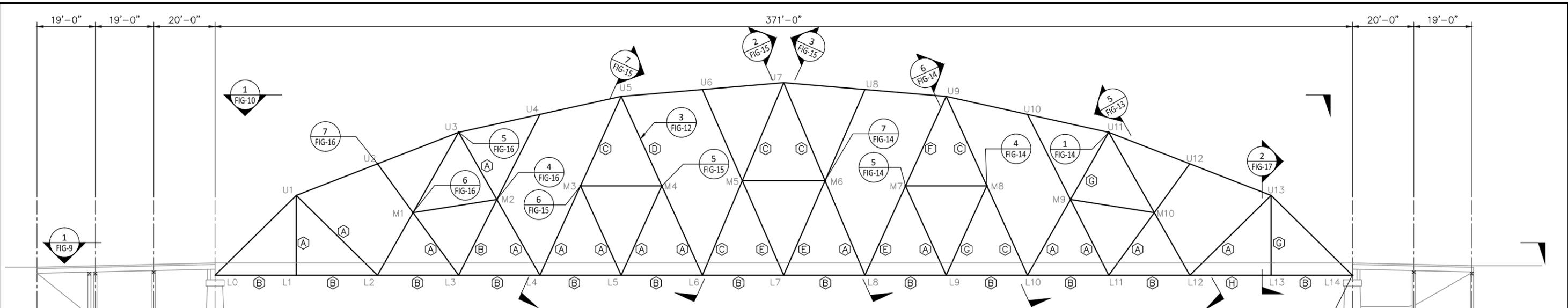
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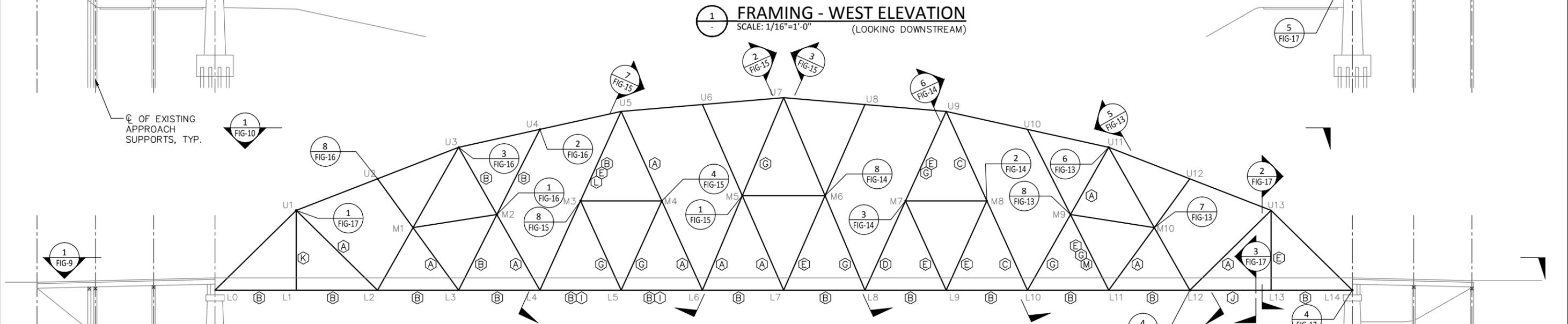
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**SR 167 - PUYALLUP RIVER BRIDGE**  
**REUSE ASSESSMENT - PHASE 1**  
**TEMPORARY BRIDGE SUPPORT PLATFORM - PUYALLUP RIVER**

DRAWING NO. **FIG-7**  
PROJECT NO. FAPWT-12-192  
DATE: 7/13/12  
SHEET NO. 7 OF 19



**1 FRAMING - WEST ELEVATION**  
SCALE: 1/16"=1'-0" (LOOKING DOWNSTREAM)



**2 FRAMING - EAST ELEVATION**  
SCALE: 1/16"=1'-0" (LOOKING DOWNSTREAM)



**C TYP. RUST @ LATTICE**  
SCALE: N.T.S.

MEMBER MARK	EXISTING CONDITION CONDITION AND REMARKS
-	NO REMARKS
(A)	NO DEFECTS NOTED
(B)	MINOR PACK RUST WITH SLIGHT BULGING AT GUSSET PLATE CONNECTION AND PITTING
(C)	1/4" PACK RUST AT GUSSETS AND LATTICE
(D)	3/4" DIAMETER DRILLED HOLE
(E)	SCATTERED SURFACE AND LAMINAR RUST ON THE INSIDE CHANNELS (UP TO 2 SQ. FT TOTAL AREA)
(F)	PACK RUST STARTING AT LATTICE BAR CONNECTIONS
(G)	AREAS OF RUST AND PITTING
(H)	PACK RUST 1/8" THICK BETWEEN LOWER CHANNELS AND GUSSET PLATES. SLIGHTLY BENT OUT OF PLANE
(I)	FLANGE BENT OVER 6" LENGTH
(J)	30% SECTION LOSS AT BOTTOM GUSSET
(K)	VERTICAL IS TWISTED CLOCKWISE WHERE THE SW FLANGE IS BENT 1-1/4" OUTWARD OVER 2' OF LENGTH
(L)	LATTICE DEFORMATION
(M)	BENT TO EAST 1-1/4" OVER 8'

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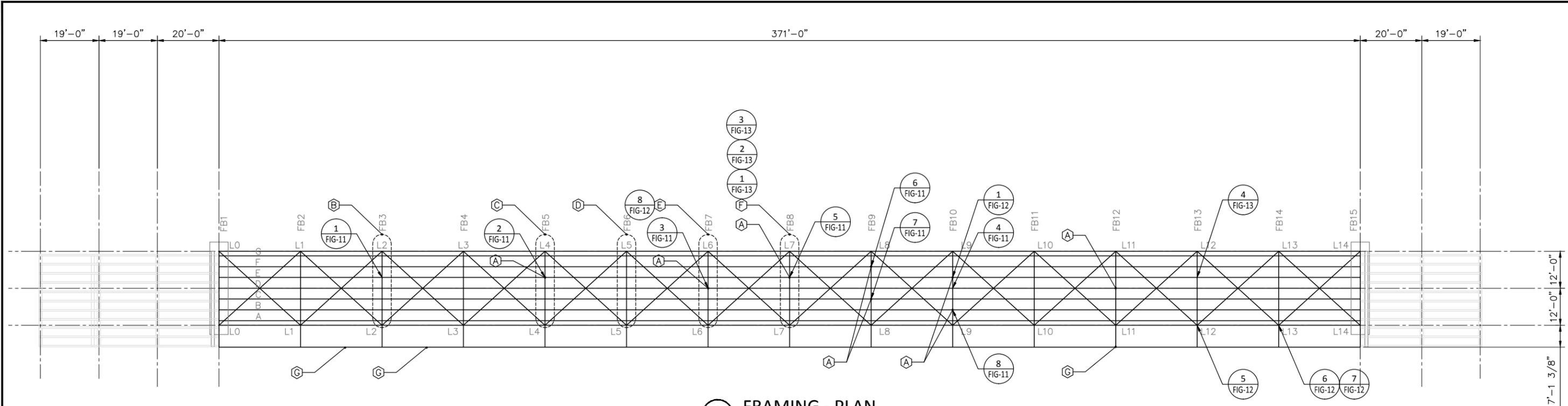
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**SR 167 - PUYALLUP RIVER BRIDGE**  
**REUSE ASSESSMENT - PHASE 1**

EXISTING BRIDGE CONDITION - ELEVATIONS

DRAWING NO. **FIG-8**  
PROJECT NO. FAPWT-12-192  
DATE: 7/13/12  
SHEET NO. 8 OF 19



**1 FRAMING - PLAN**  
SCALE: 1/16"=1'-0"

EXISTING CONDITION	
MEMBER MARK	CONDITION AND REMARKS
A	SHEARED RIVET
B	10% SECTION LOSS IN MEMBER & SEAT DEFORMATION
C	1/16" SECTION LOSS IN WEB AT WEST SUPPORT
D	1-1/2" DIAMETER HOLE IN BOTTOM FLANGE AT EAST END
E	50% SECTION LOSS IN TOP FLANGE
F	TOP FLANGE WITH HOLE AT STRINGERS B, C, & E
G	REPLACE BOLT IN RAILING



**2 TYP. CONSTRUCTION SEAT PACK RUST**  
SCALE: N.T.S.



**3 TYP. PIGEON GUANO LOWER CHORD**  
SCALE: N.T.S.

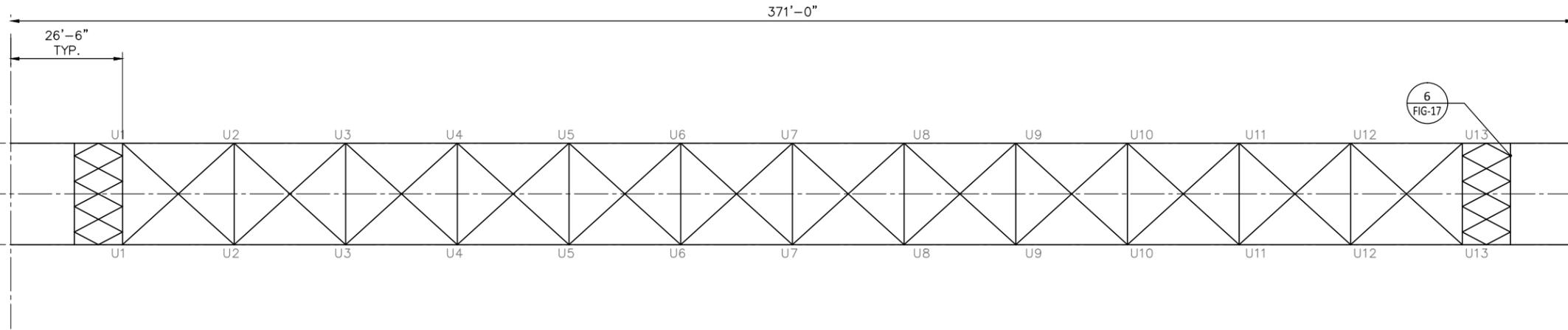
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**REUSE ASSESSMENT - PHASE 1**  
EXISTING BRIDGE CONDITION - DECK PLAN

DRAWING NO. **FIG-9**  
PROJECT NO. FAPWT-12-192  
DATE: 7/13/12  
SHEET NO. 9 OF 19



**1** **FRAMING - PLAN UPPER SWAY BRACING**  
SCALE: 1/16"=1'-0"



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**REUSE ASSESSMENT - PHASE 1**  
**EXISTING BRIDGE CONDITION - UPPER SWAY BRACING PLAN**

DRAWING NO. **FIG-10**  
PROJECT NO. FAPWT-12-192  
DATE: 7/13/12  
SHEET NO. 10 OF 19



1 REPAIRED RIVET  
FIG-9 SCALE: N.T.S.



2 REPAIRED RIVET  
FIG-9 SCALE: N.T.S.



3 REPAIRED RIVET  
FIG-9 SCALE: N.T.S.



4 REPAIRED RIVET  
FIG-9 SCALE: N.T.S.



5 SHEARED RIVET  
FIG-9 SCALE: N.T.S.



6 SHEARED RIVET  
FIG-9 SCALE: N.T.S.



7 SHEARED RIVET  
FIG-9 SCALE: N.T.S.



8 SHEARED RIVET  
FIG-9 SCALE: N.T.S.

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**REUSE ASSESSMENT - PHASE 1**  
EXISTING BRIDGE PHOTOS - SHEET 1

DRAWING NO. **FIG-11**  
PROJECT NO. FAPWT-12-192  
DATE: 7/13/12  
SHEET NO. 11 OF 19



1 SHEARED RIVET  
FIG-9 SCALE: N.T.S.



2 SHEARED RIVET  
FIG-9 SCALE: N.T.S.



3 HOLE IN CHANNEL  
FIG-8 SCALE: N.T.S.



4 RUST & SECTION LOSS  
FIG-8 SCALE: N.T.S.



5 GUSSET PLATE WITH HOLE  
FIG-9 SCALE: N.T.S.



6 TORN BRACE  
FIG-9 SCALE: N.T.S.



7 BRACE DAMAGE  
FIG-9 SCALE: N.T.S.



8 50% SECTION LOSS AT TOP FLANGE  
FIG-9 SCALE: N.T.S.

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REUSE ASSESSMENT - PHASE 1  
EXISTING BRIDGE PHOTOS - SHEET 2

DRAWING NO. **FIG-12**  
PROJECT NO. FAPWT-12-192  
DATE: 7/13/12  
SHEET NO. 12 OF 19



1 FLOOR BEAM WITH HOLE  
FIG-9 SCALE: N.T.S.



2 FLOOR BEAM SECTION LOSS  
FIG-9 SCALE: N.T.S.



3 FLOOR BEAM SECTION LOSS  
FIG-9 SCALE: N.T.S.



4 FLOOR BEAM SECTION LOSS  
FIG-9 SCALE: N.T.S.



5 NORTH SWAY BRACING  
FIG-8 SCALE: N.T.S.



6 EAST TRUSS TOP CHORD CONN.  
FIG-8 SCALE: N.T.S.



7 EAST TRUSS WEB CONN.  
FIG-8 SCALE: N.T.S.



8 EAST TRUSS WEB CONN.  
FIG-8 SCALE: N.T.S.

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**REUSE ASSESSMENT - PHASE 1**  
EXISTING BRIDGE PHOTOS - SHEET 3

DRAWING NO. **FIG-13**  
PROJECT NO. FAPWT-12-192  
DATE: 7/13/12  
SHEET NO. 13 OF 19



1 WEST TRUSS TOP CHORD  
FIG-8 SCALE: N.T.S.



2 EAST TRUSS WEB CONN.  
FIG-8 SCALE: N.T.S.



3 EAST TRUSS WEB CONN.  
FIG-8 SCALE: N.T.S.



4 WEST TRUSS WEB CONN.  
FIG-8 SCALE: N.T.S.



5 WEST TRUSS WEB CONN.  
FIG-8 SCALE: N.T.S.



6 NORTH SWAY BRACING  
FIG-8 SCALE: N.T.S.



7 WEST TRUSS WEB CONN.  
FIG-8 SCALE: N.T.S.



8 EAST TRUSS WEB CONN.  
FIG-8 SCALE: N.T.S.

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**SR 167 - PUYALLUP RIVER BRIDGE**  
**REUSE ASSESSMENT - PHASE 1**  
EXISTING BRIDGE PHOTOS - SHEET 4

DRAWING NO. **FIG-14**  
PROJECT NO. FAPWT-12-192  
DATE: 7/13/12  
SHEET NO. 14 OF 19



1 EAST TRUSS WEB CONN.  
FIG-8 SCALE: N.T.S.



2 CENTER SWAY BRACING  
FIG-8 SCALE: N.T.S.



3 CENTER SWAY BRACING  
FIG-8 SCALE: N.T.S.



4 EAST TRUSS WEB CONN.  
FIG-8 SCALE: N.T.S.



5 WEST TRUSS WEB CONN.  
FIG-8 SCALE: N.T.S.



6 WEST TRUSS WEB CONN.  
FIG-8 SCALE: N.T.S.



7 SOUTH SWAY BRACING  
FIG-8 SCALE: N.T.S.



8 EAST TRUSS WEB CONN.  
FIG-8 SCALE: N.T.S.

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**SR 167 - PUYALLUP RIVER BRIDGE**  
**REUSE ASSESSMENT - PHASE 1**  
EXISTING BRIDGE PHOTOS - SHEET 5

DRAWING NO. **FIG-15**  
PROJECT NO. FAPWT-12-192  
DATE: 7/13/12  
SHEET NO. 15 OF 19



1 EAST TRUSS WEB CONN.  
FIG-8 SCALE: N.T.S.



2 EAST TOP CHORD CONN.  
FIG-8 SCALE: N.T.S.



3 EAST TOP CHORD CONN.  
FIG-8 SCALE: N.T.S.



4 WEST TRUSS WEB CONN.  
FIG-8 SCALE: N.T.S.



5 WEST TOP CHORD CONN.  
FIG-8 SCALE: N.T.S.



6 WEST TRUSS WEB CONN.  
FIG-8 SCALE: N.T.S.



7 WEST TOP CHORD CONN.  
FIG-8 SCALE: N.T.S.



8 EAST TOP CHORD CONN.  
FIG-8 SCALE: N.T.S.

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SR 167 - PUYALLUP RIVER BRIDGE  
REUSE ASSESSMENT - PHASE 1  
EXISTING BRIDGE PHOTOS - SHEET 6

DRAWING NO. **FIG-16**  
PROJECT NO. FAPWT-12-192  
DATE: 7/13/12  
SHEET NO. 16 OF 19



1 EAST TOP CHORD CONN.  
FIG-8 SCALE: N.T.S.



2 NORTH SWAY BRACING  
FIG-8 SCALE: N.T.S.



3 EAST PEDESTRIAN PATH  
FIG-8 SCALE: N.T.S.



4 NORTHEAST BEARING  
FIG-8 SCALE: N.T.S.



5 NORTHWEST BEARING  
FIG-8 SCALE: N.T.S.



6 SHEARED RIVETS AT NORTH SWAY BRACING  
FIG-10 SCALE: N.T.S.

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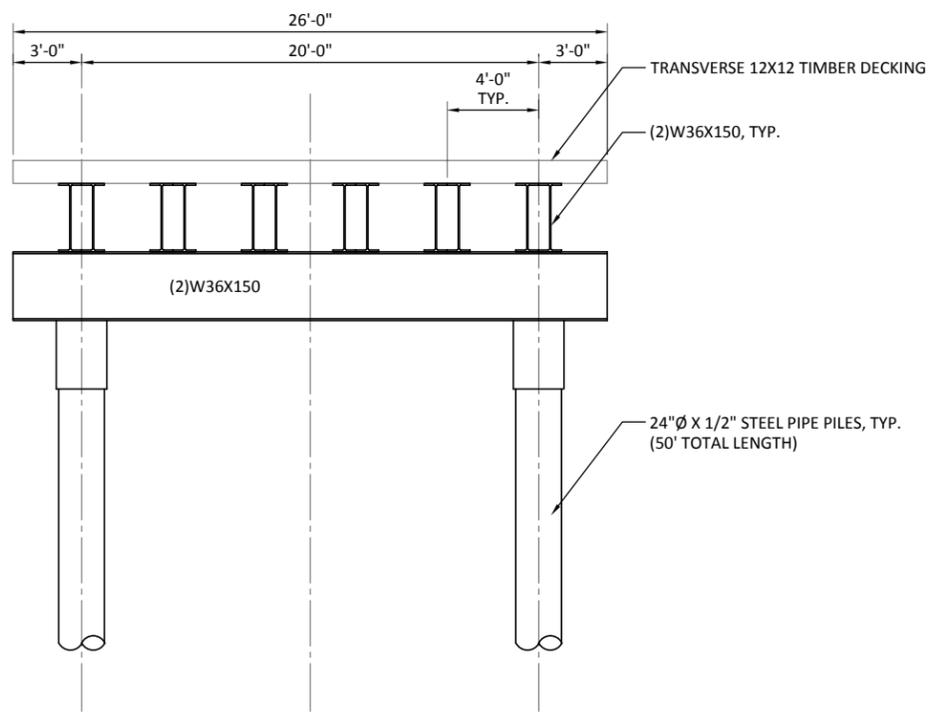
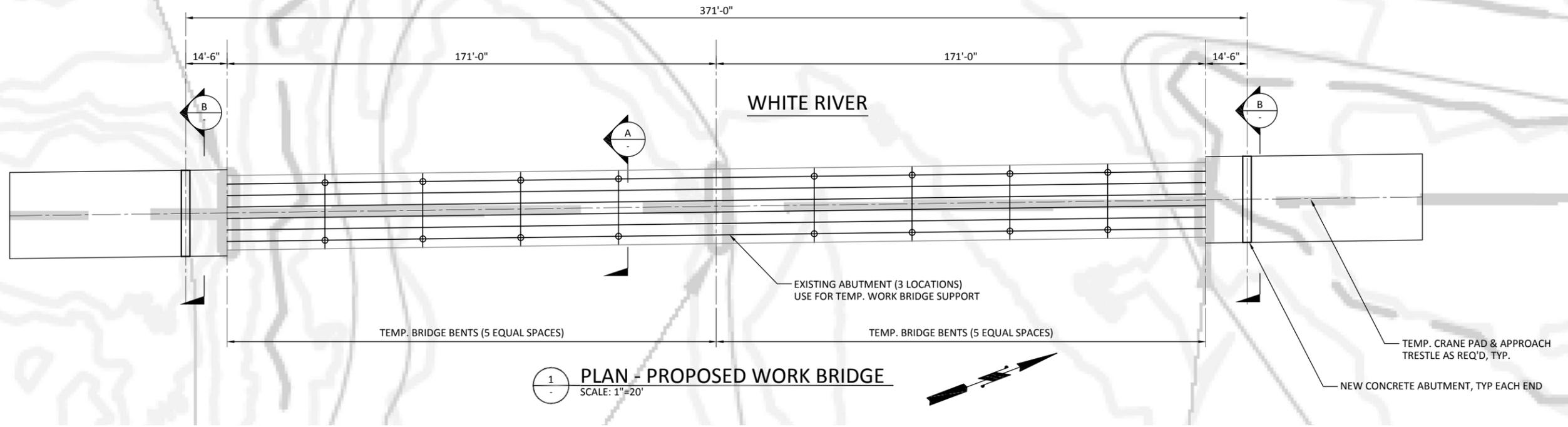


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Federal Way, Washington 98003-2600  
(206) 431-2300 Fax: (206) 431-2250

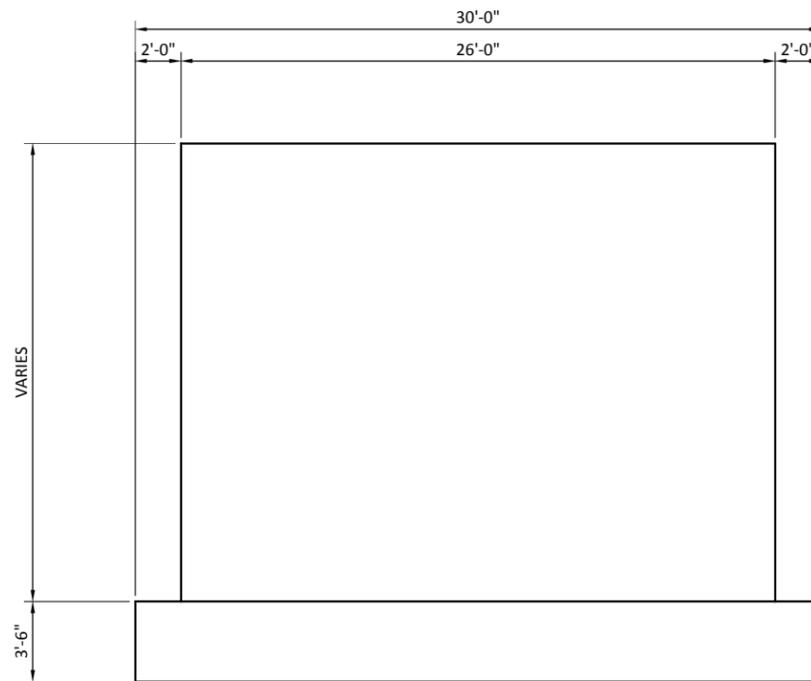
DRAWN BY TTS  
DESIGN BY TTS  
CHECK BY CSB  
PROJ MGR CSB

**KING COUNTY**  
**SR 167 - PUYALLUP RIVER BRIDGE**  
**REUSE ASSESSMENT - PHASE 1**  
EXISTING BRIDGE PHOTOS - SHEET 7

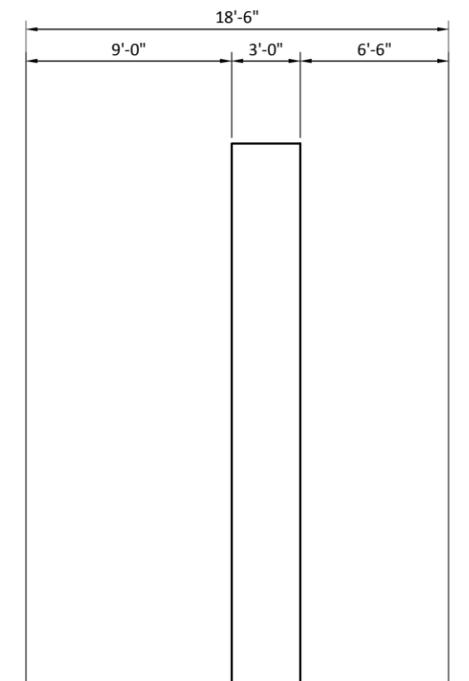
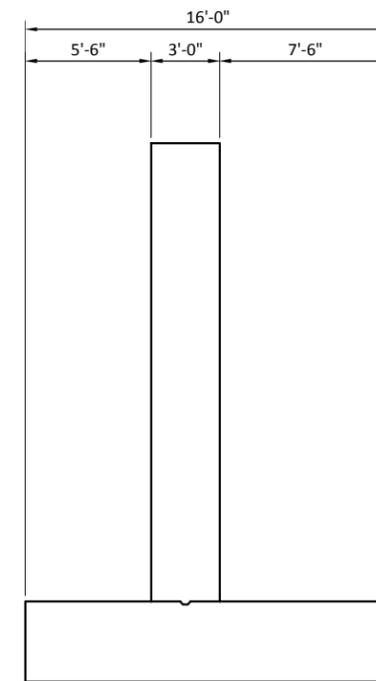
DRAWING NO. **FIG-17**  
PROJECT NO. FAPWT-12-192  
DATE: 7/13/12  
SHEET NO. 17 OF 19



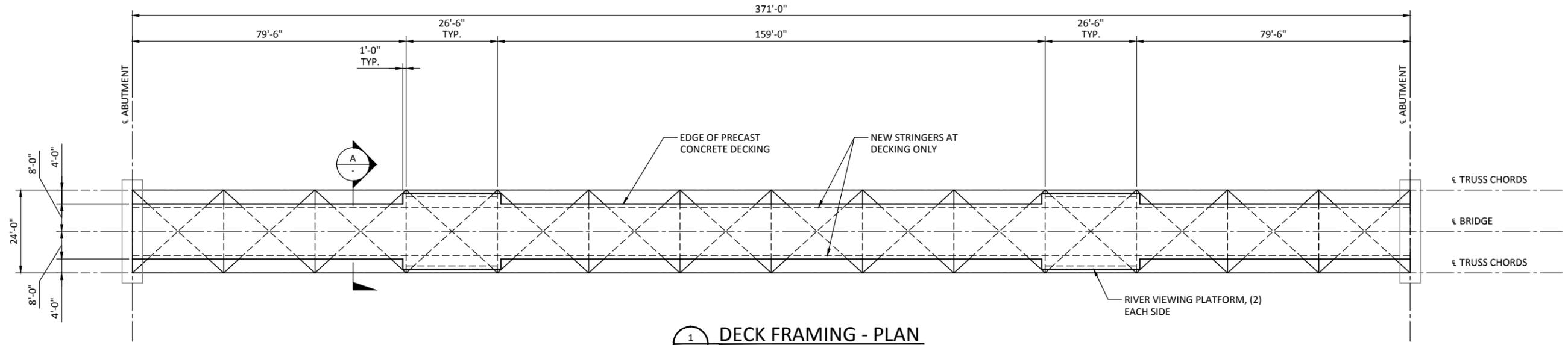
A TYP. WORK BRIDGE PILE BENT  
SCALE: 1/4"=1'-0"



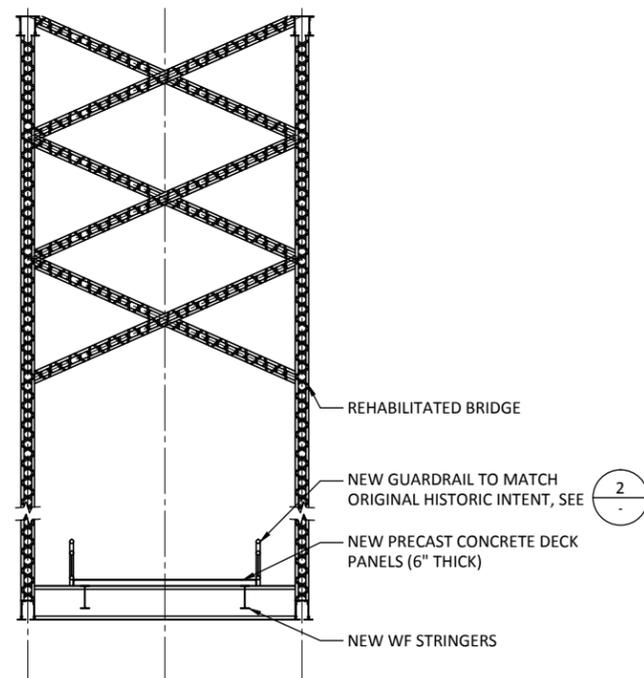
B TYP. NEW ABUTMENT  
SCALE: 1/4"=1'-0"



MARK	REVISION DESCRIPTION	BY	APP.	DATE



**1**  
DECK FRAMING - PLAN  
SCALE: 1/16"=1'-0"



**2**  
SECTION @ TYPICAL PRECAST WALKWAY  
SCALE: 1/4"=1'-0"



**2**  
TYP. GUARDRAIL TO MATCH  
SCALE: N.T.S.

MARK	REVISION DESCRIPTION	BY	APP.	DATE

33301 9th Avenue South, Suite 300  
Federal Way, Washington 98003-2600  
(206) 431-2300 Fax: (206) 431-2250

DRAWN BY TTS  
DESIGN BY TTS  
CHECK BY CSB  
PROJ MGR CSB

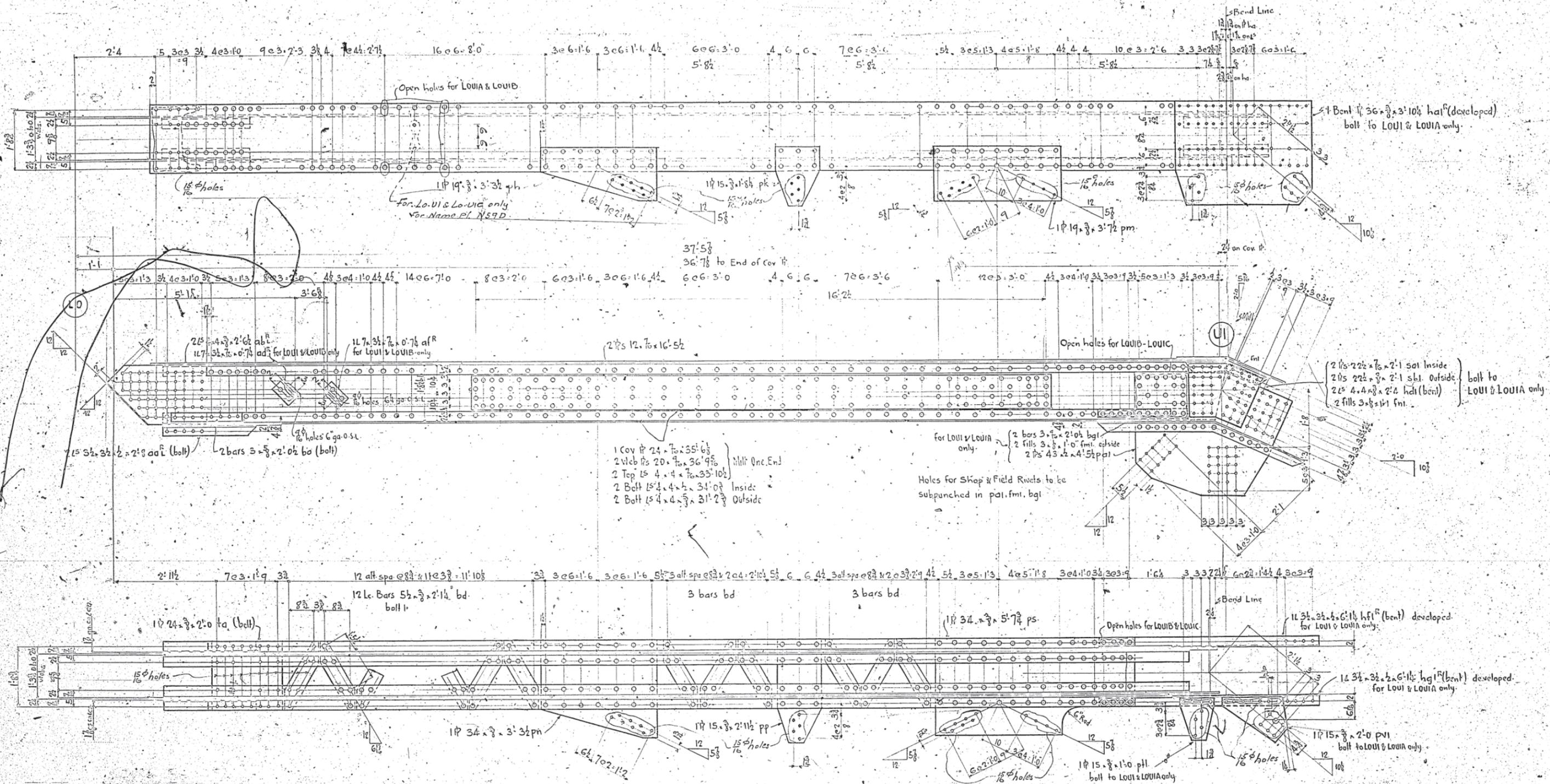
**KING COUNTY**  
**SR 167 - PUYALLUP RIVER BRIDGE**  
**REUSE ASSESSMENT - PHASE 1**  
**PROPOSED PEDESTRIAN BRIDGE DECK**

DRAWING NO. **FIG-19**  
PROJECT NO. FAPWT-12-192  
DATE: 7/13/12  
SHEET NO. 19 OF 19

**SR 167 Puyallup River Bridge Reuse Assessment – Phase 1**  
**Puyallup, WA**  
**King County Parks and Recreation**

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**Appendix A**  
**Original Puyallup River Bridge Plan Documents**

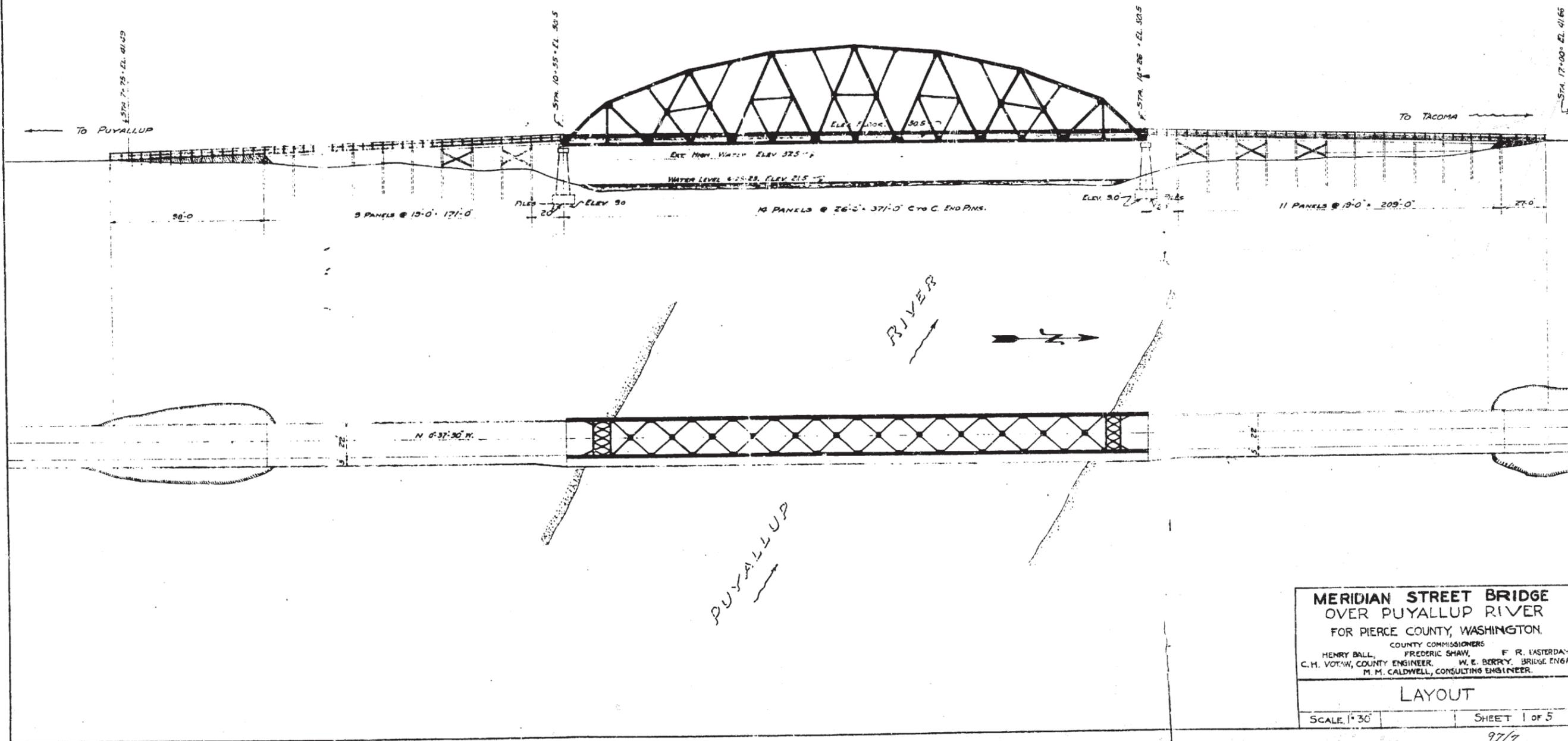


Make 1 End Post as shown LOUI.  
 " 1 " " opp. hand. LOUIA.  
 " 1 " " " LOUIB.  
 " 1 " " as shown LOUIC.  
 " 2 " " " Std. C.I. N59D  
 " 2 " " " Cast Bronze NPI. Item No. 400

**Reaming Note:**  
 All holes for field rivets in Truss members to be punched 1/16" & reamed to 1/8" while parts are assembled & matchmarked, except as noted.  
**Sheared Edges:**  
 The edges of sheared steel plates exposed to view shall be carefully faced or planed to remove defects caused by shearing.

**GENERAL NOTES:**  
 Material O. H. Struct. Steel.  
 Specifications A.S.T.M. A7-21  
 Rivets 1/2" unless noted.  
 Moles 1/2" unless noted.  
 Reaming See Note.  
 Shop Paint 1 Coat Detroit Graphite #501  
 Field Paint None  
 Erection By Others  
 Field Caps Riveted  
 Inspection Mill & Shop: Northwestern Testing Lab.

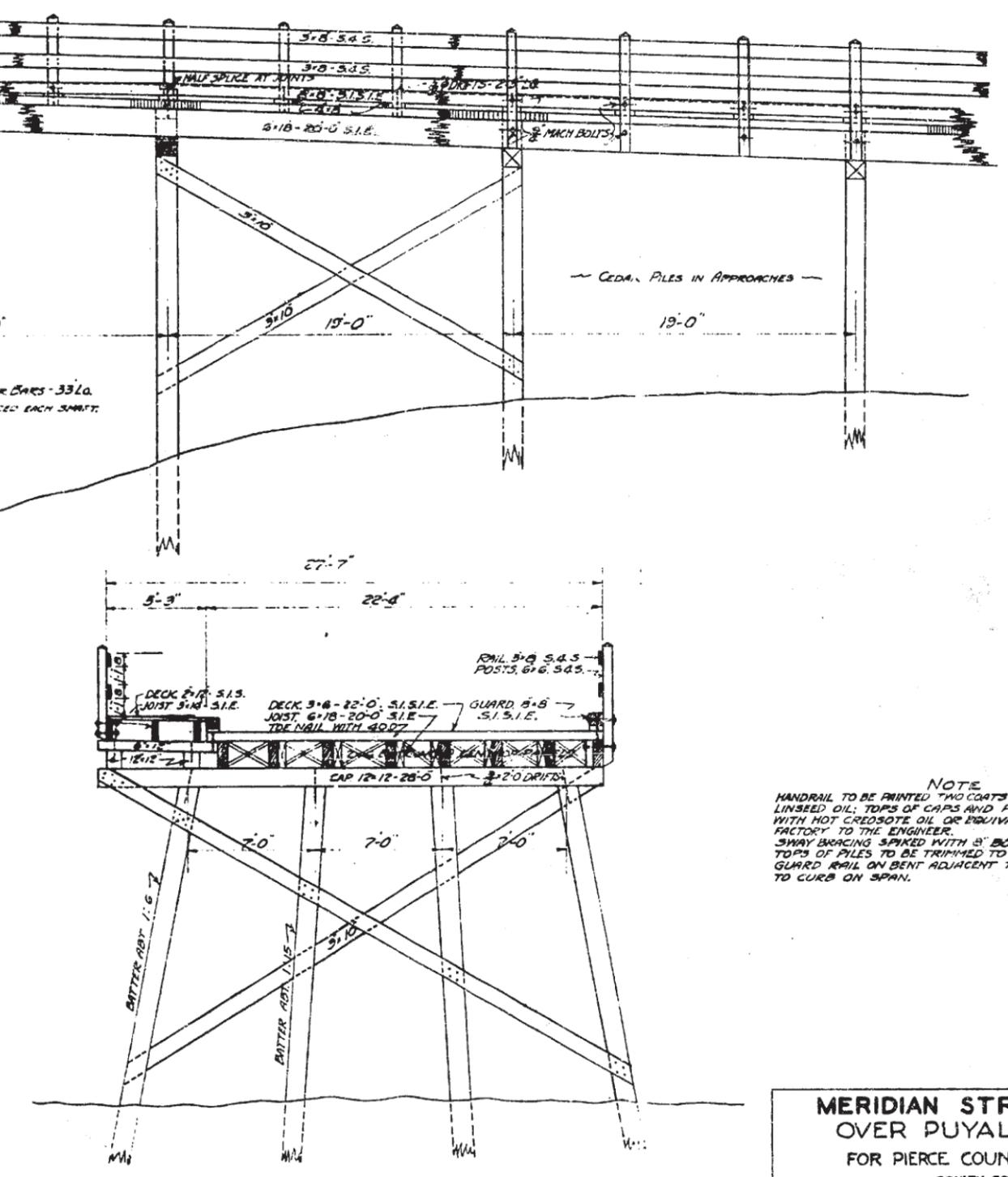
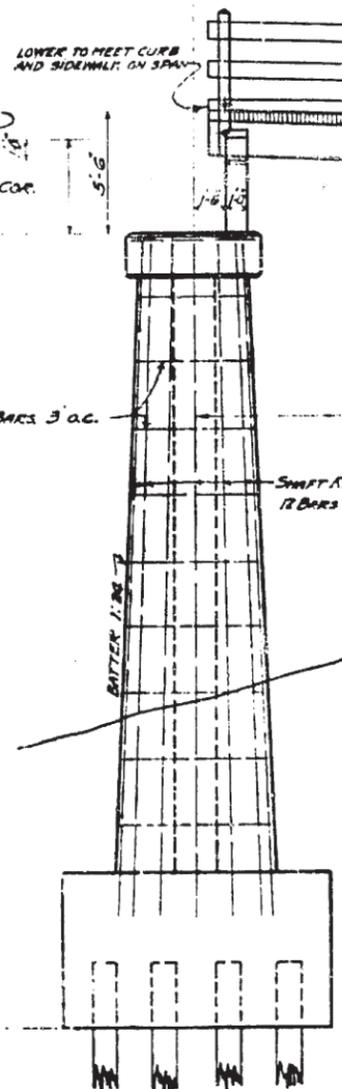
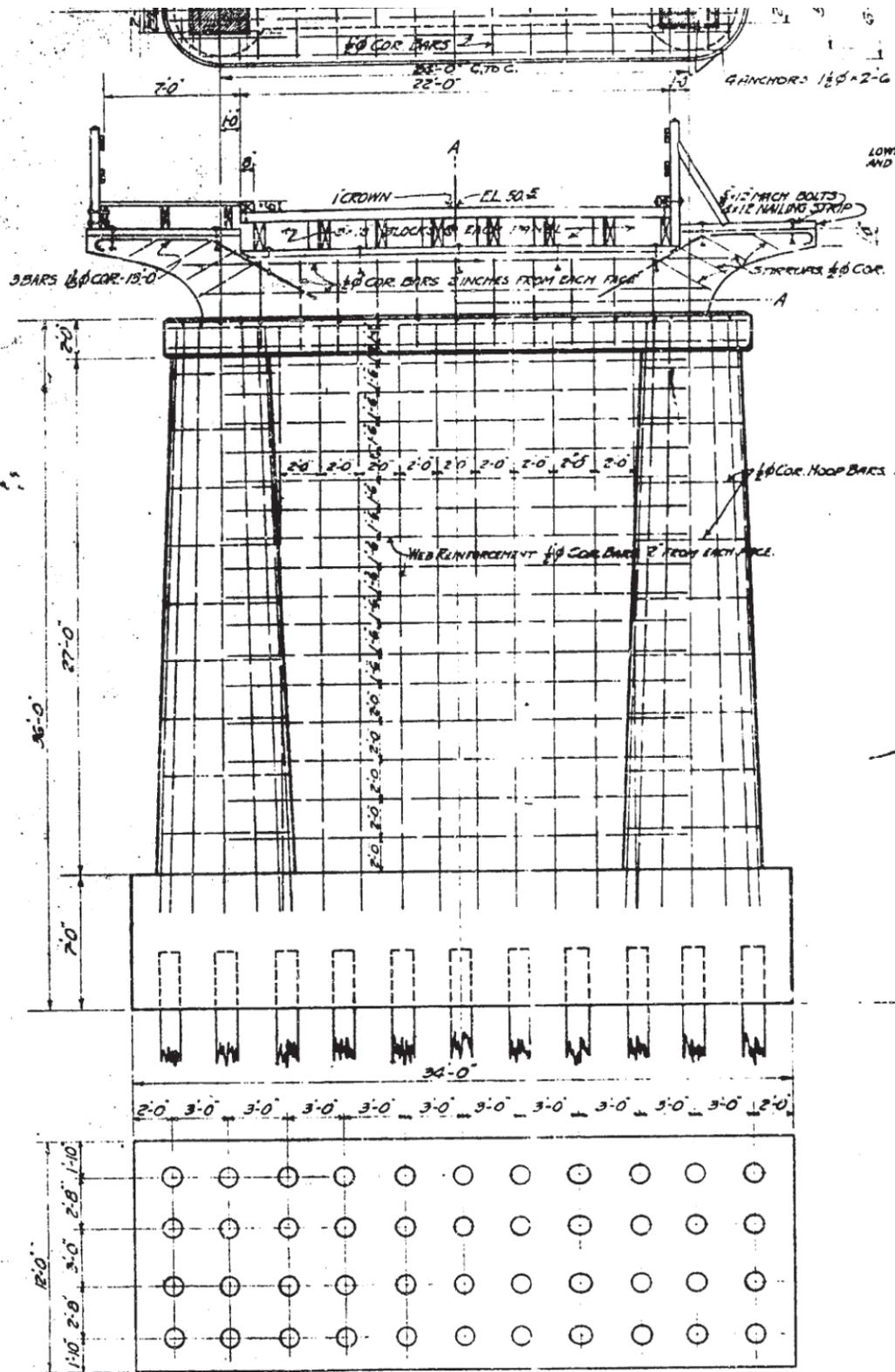
**CONTRACT V 6086.**  
 Details of End Posts  
 For: One 371'-0" thru Riveted Truss Span.  
 Location Meridian St., Payallup River, Pierce Co., Wash.  
 Owner: Puget Sound Bridge & Dredging Co.  
**VIRGINIA BRIDGE AND IRON CO.**  
 ROANOKE, VA.  
 Memphis  
 To be fabricated at  
 Made by M. G. G.  
 In charge of Pitney  
 Revised  
 Scale: In. = 1 Ft. Sheet No. 1 of 13



**MERIDIAN STREET BRIDGE**  
**OVER PUYALLUP RIVER**  
 FOR PIERCE COUNTY, WASHINGTON.  
 COUNTY COMMISSIONERS  
 HENRY BALL, FREDERIC SHAW, F. R. EASTERDAY  
 C. H. VOTAW, COUNTY ENGINEER, W. E. BERRY, BRIDGE ENGR.  
 M. M. CALDWELL, CONSULTING ENGINEER.

LAYOUT

SCALE, 1" = 30'      SHEET 1 of 5  
 97/7



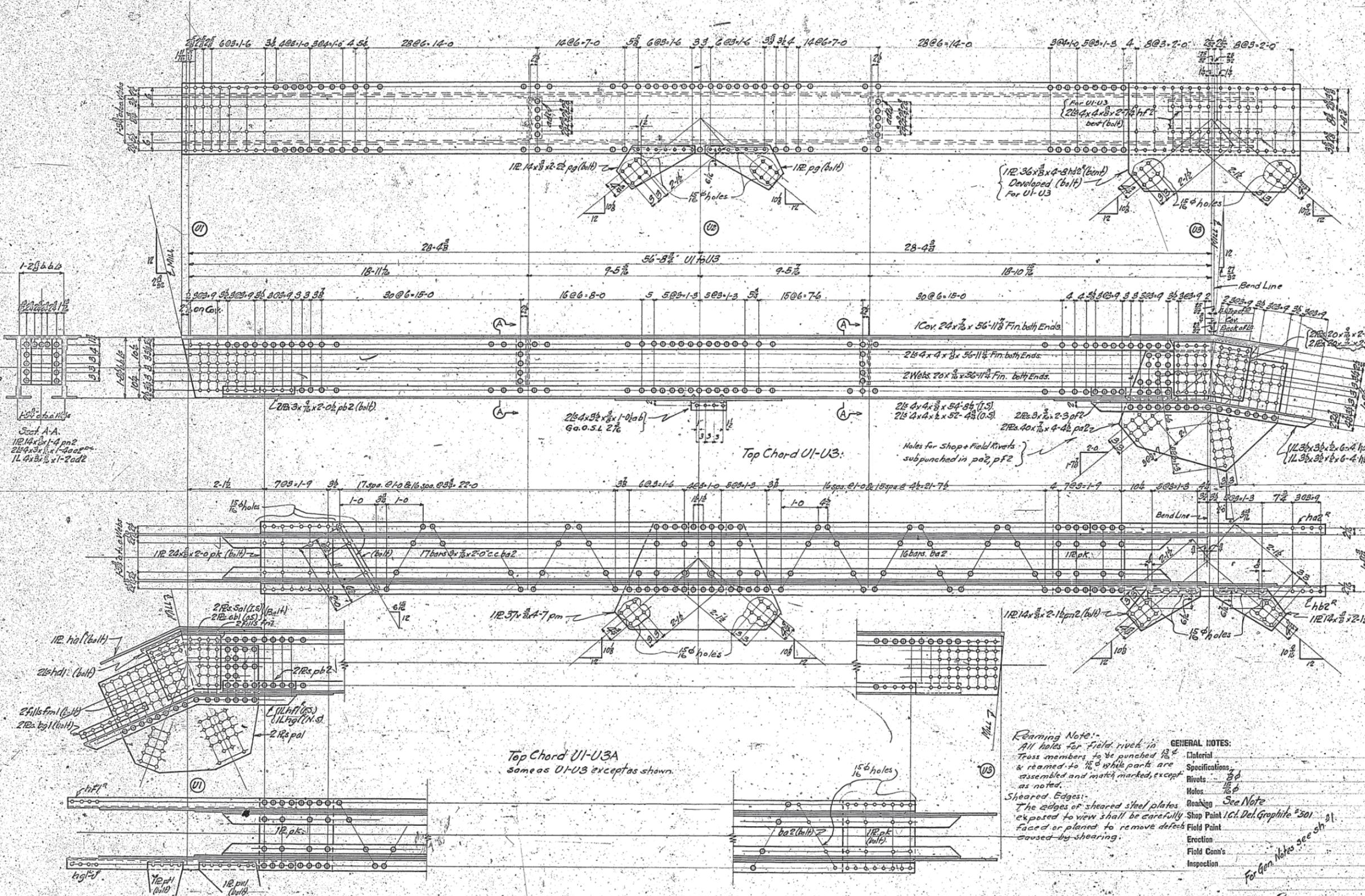
NOTE  
 HANDRAIL TO BE PAINTED TWO COATS WHITE LEAD IN BOILED LINSEED OIL; TOPS OF CAPS AND PILES TO BE WELL COATED WITH HOT CREOSOTE OIL OR EQUIVALENT MATERIAL SATISFACTORY TO THE ENGINEER.  
 SHAW BRACING SPRINKLED WITH 3\"/>

**MERIDIAN STREET BRIDGE**  
**OVER PUYALLUP RIVER**  
 FOR PIERCE COUNTY, WASHINGTON.

COUNTY COMMISSIONERS  
 HENRY BALL, FREDERIC SHAW, F. R. EASTERDAY,  
 C. H. VOTAW, COUNTY ENGINEER, W. E. BERRY, BRIDGE ENGINEER,  
 M. M. CALDWELL, CONSULTING ENGINEER.

**DETAILS FOR PIERS & APPROACHES.**

SCALE 1" = 4'-0"      SHEET 2 OF 5



1-23666  
 Section A-A  
 12.14x3.14 p2  
 25.4x4.1x1-3a2  
 12.4x3.1x1-2a2

Top Chord U1-U3:

Top Chord U1-U3A  
 same as U1-U3 except as shown.

**Reaming Note:**  
 All holes for field rivets in  
 Truss members to be punched 1/16"  
 & reamed to 1/8" while parts are  
 assembled and match marked, except  
 as noted.  
**Sheared Edges:**  
 The edges of sheared steel plates  
 exposed to view shall be carefully  
 faced or planed to remove defects  
 caused by shearing.

**GENERAL NOTES:**

- Material
- Specifications
- Rivets 3/8"
- Holes 1/8"
- Reaming See Note
- Shop Paint 1/4" Del. Graphite #301
- Field Paint
- Erection
- Field Conn's
- Inspection

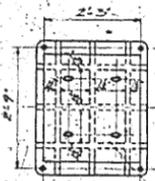
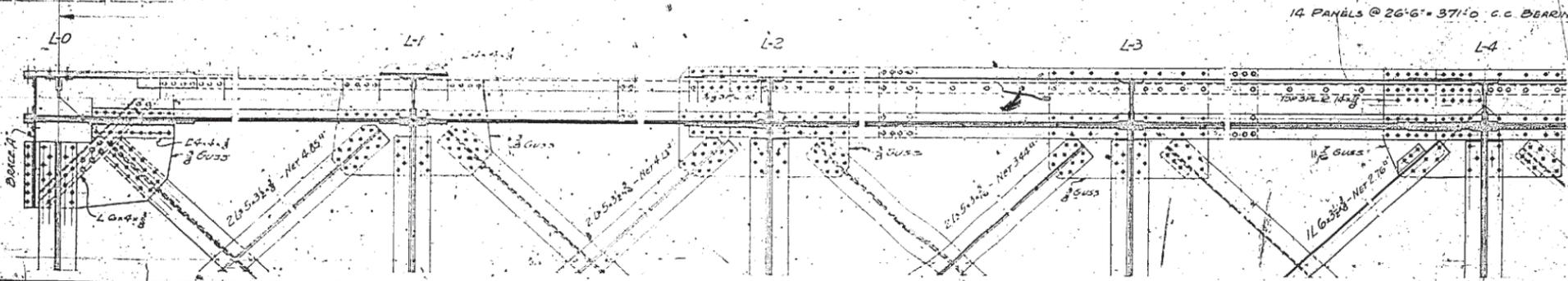
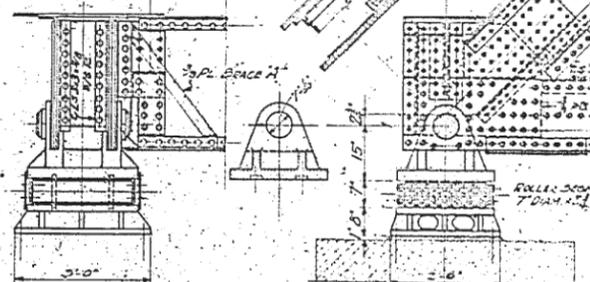
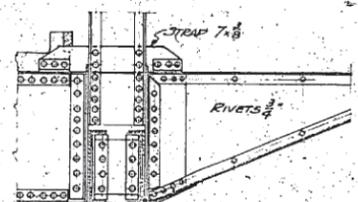
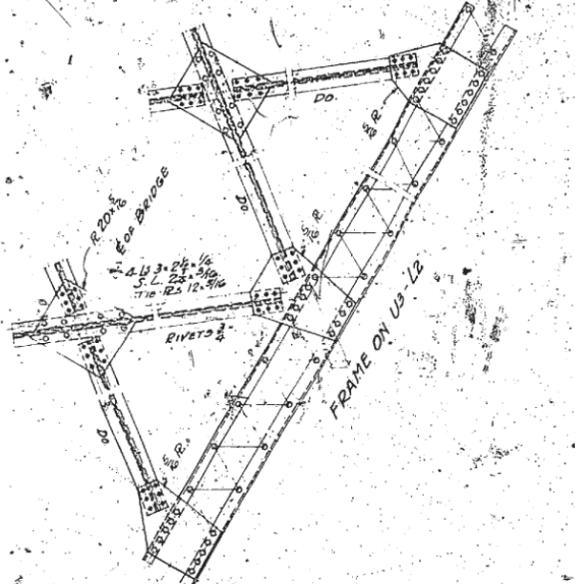
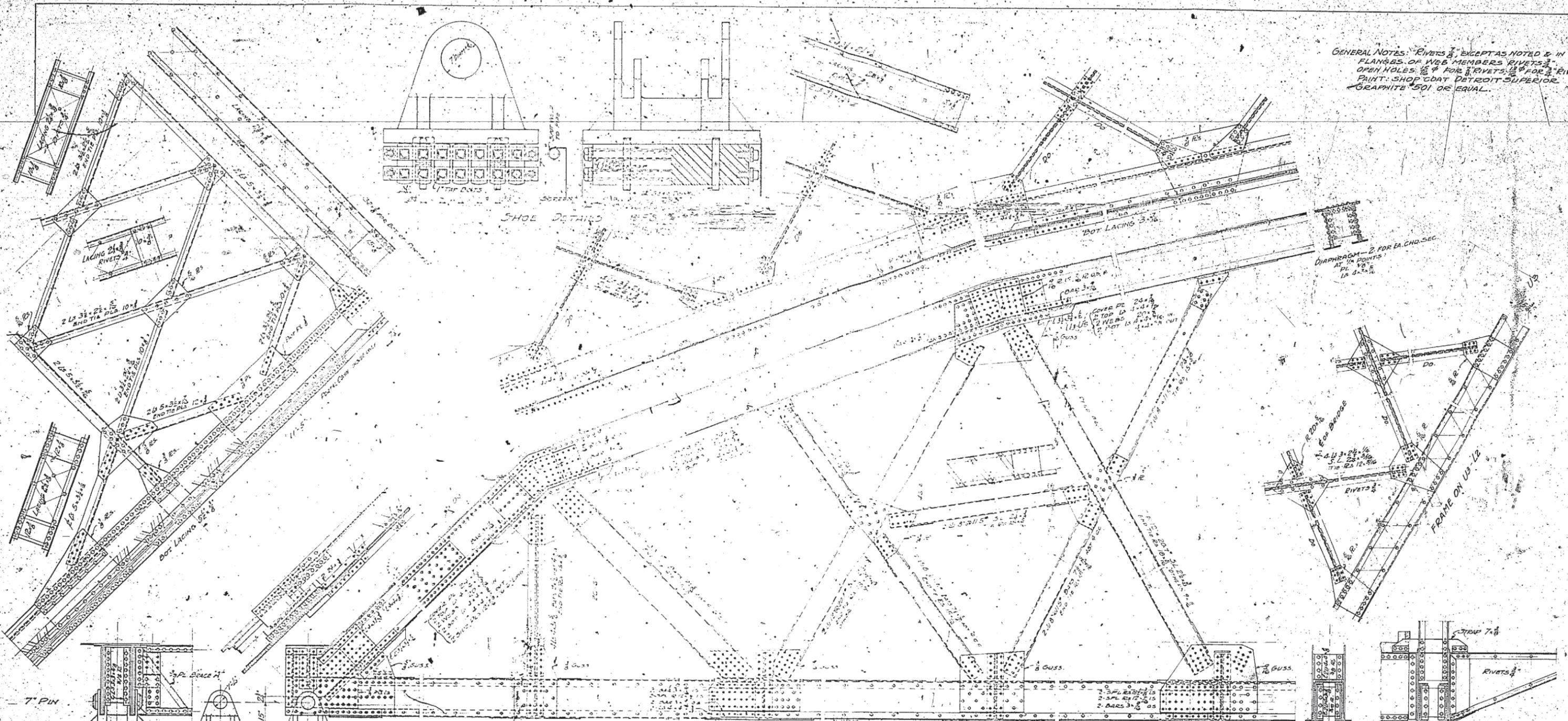
For Gen. Notes see sh

REQUIRED LIST		
MARK.	DESCRIPTION	MARK.
1	Top Chords (Trus)	U1-U3
1	" (Rev)	U1-U3
1	" (Trus)	U1-U3A
1	" (Rev)	U1-U3A

**CONTRACT V 6086**  
 Details of Top Chords  
 For 371'-0" thru Riv. Truss Span  
 Location: Meacham St. Bay Bridge, Port of Roanoke, Va.  
 Owner: Puget Sound Bridge & Dredging Co.  
**VIRGINIA BRIDGE AND IRON CO.**  
 ROANOKE, VA.  
 To be fabricated at Memphis  
 Made by C. G. S.  
 In charge of Pines  
 Revised  
 Scale: in. = 1 Ft. Sheet No. 2 of 2  
 Traced by E. A. W. 2/25/22  
 Checked by P. P. D. 2-26  
 P'ls. Cont'd by

Material on Shop Bills

GENERAL NOTES: RIVETS  $\frac{3}{4}$ " EXCEPT AS NOTED & IN THE FLANGES OF WEB MEMBERS RIVETS  $\frac{1}{2}$ " OPEN HOLES  $\frac{1}{8}$ " FOR RIVETS  $\frac{1}{2}$ " FOR RIVETS  $\frac{3}{4}$ " PAINT: SHOP COAT DETROIT SUPERIOR GRAPHITE 501 OR EQUAL.



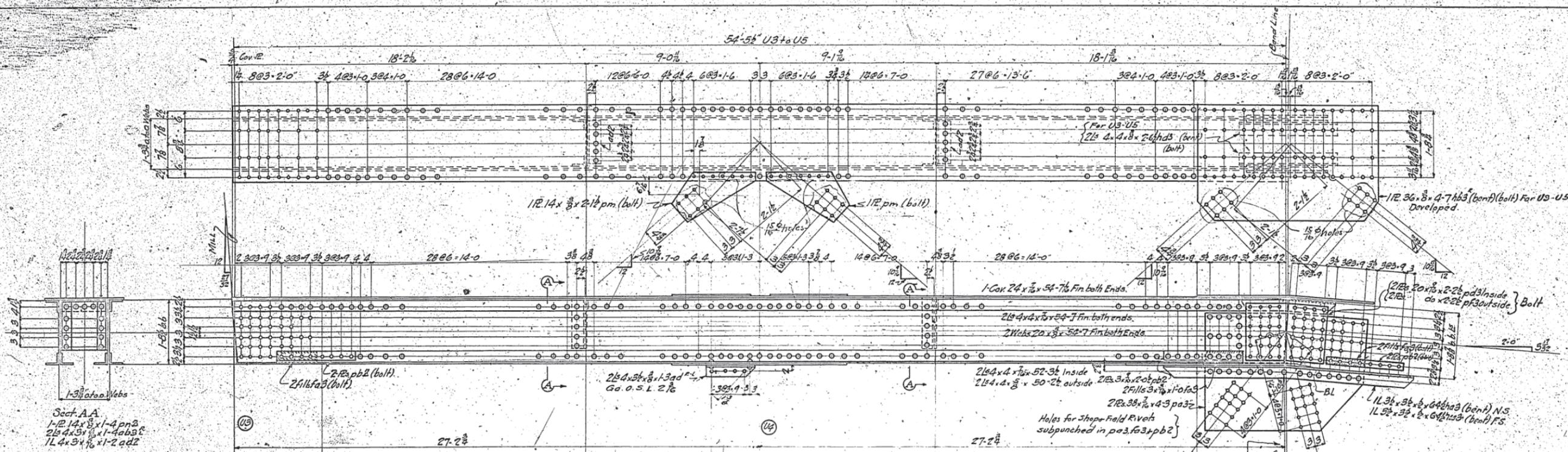
NOTE: PROVIDE FOR FASTENING FIXED END SHOES TO BOLSTER WITH 6" x 6" TAP BOLTS.

**MERIDIAN STREET BRIDGE**  
**OVER PUYALLUP RIVER**  
 FOR PIERCE COUNTY, WASHINGTON

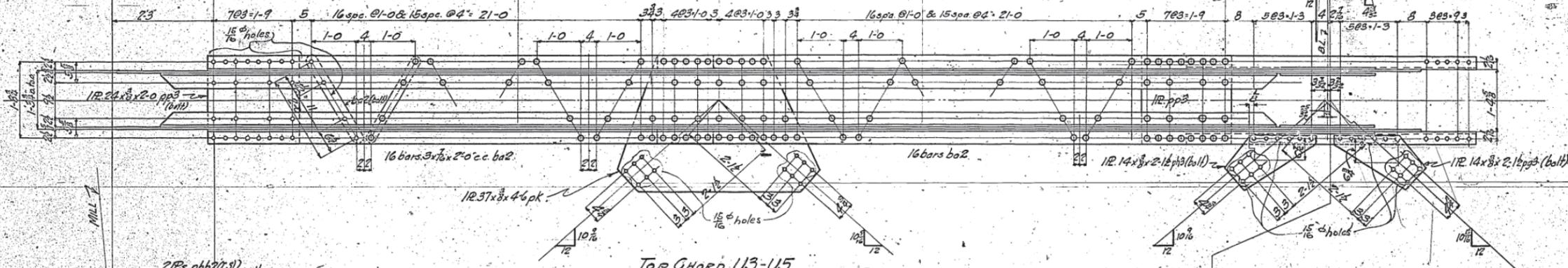
COUNTY COMMISSIONERS: HENRY BALL, FREDERIC SHAW, R. EASTERDAY  
 COUNTY ENGINEER: C. H. VOTAW, W. E. BERRY, BRIDGE ENGINEER  
 CONSULTING ENGINEER: M. M. CALDWELL

**DETAILS FOR TRUSS**

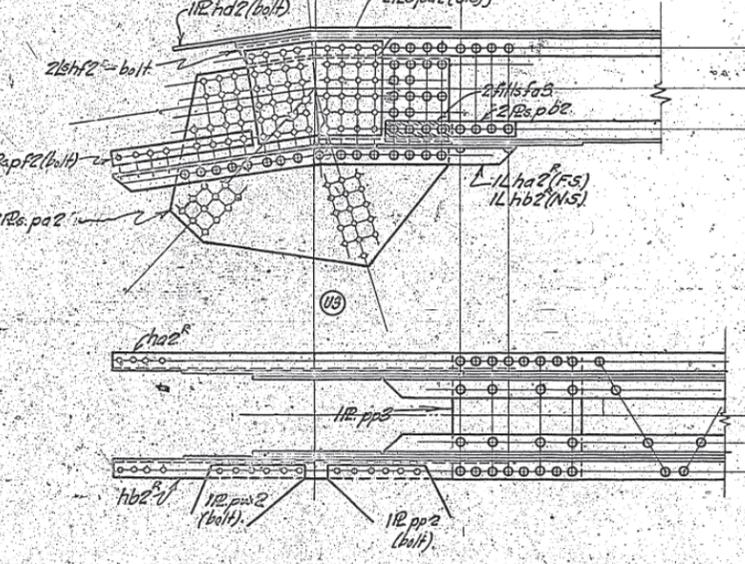
SCALE  $\frac{1}{2}$ " = 1'-0" SHEET 3 OF 5



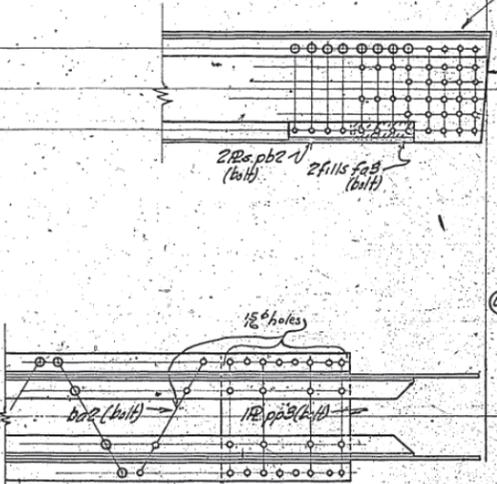
Sect. A-A  
 1-12 14x3/8x1-4 pm  
 2-2 4x3/8x1-4 ab3  
 1-1 4x3/8x1-2 ad2



TOP CHORD U3-U5



Top Chord U3-U5A  
 Same as U3-U5 except as shown.



Top View Same as U3-U5  
 except R's hb3 and hb3 omitted

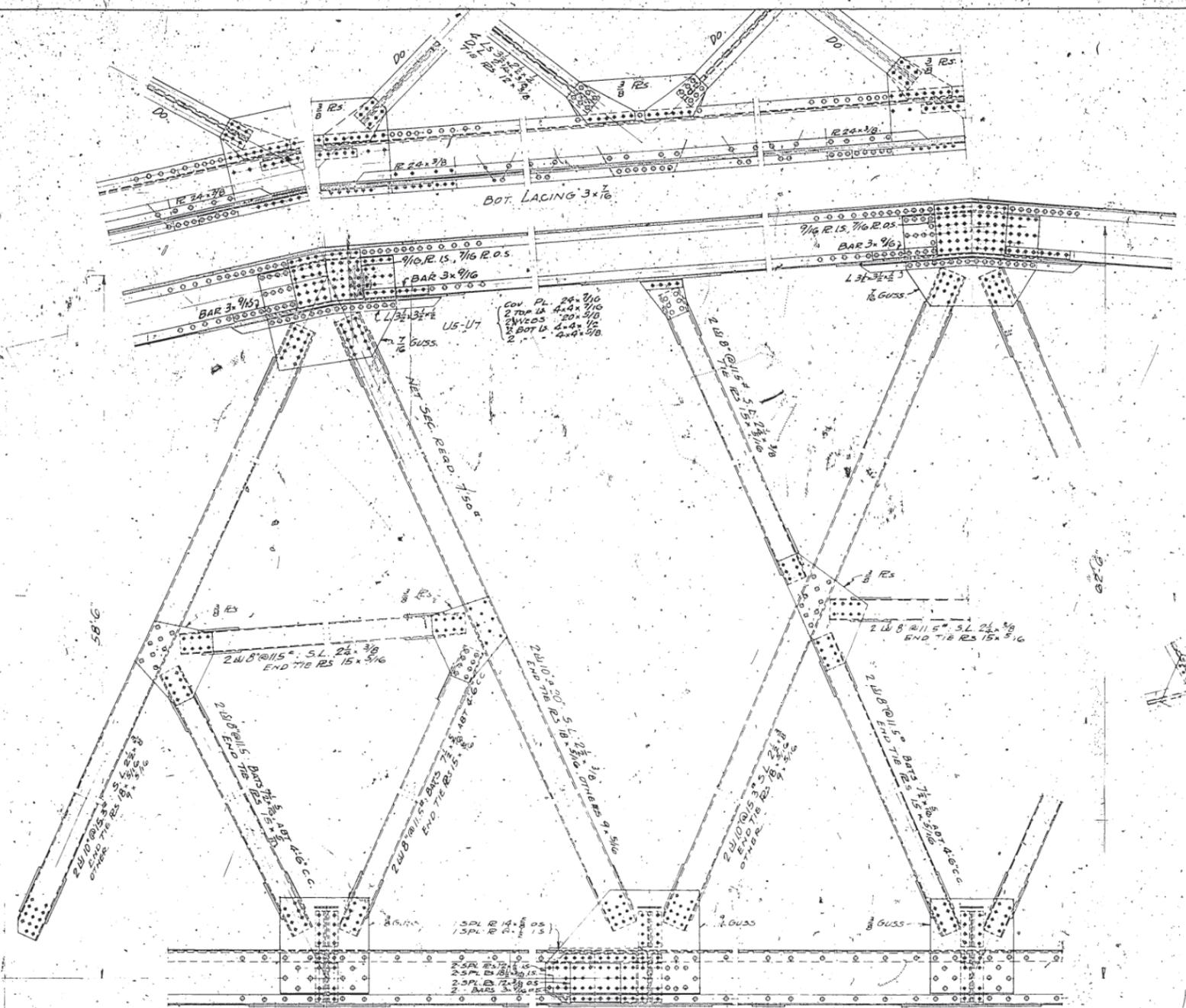
Reaming Note:-  
 All holes for field rivets in Truss members  
 to be punched 1/8" & reamed to 1/8"  
 while parts are assembled & match marked,  
 except as noted.  
 Sheared Edges:-  
 The edges of sheared plates exposed to view  
 shall be carefully faced or planed to remove  
 defects caused by shearing.

GENERAL NOTES:

- Material Specifications
- Rivets 8/8
- Plates 7/8
- Reaming See Note
- Shop Paint 1 Ct. Del. Graphite 2501
- Field Paint
- Erection
- Field Conn's
- Inspection

REQUIRED LIST		
MAKE	DESCRIPTION	MARK
1	TOP CHORD (TRUSS)	U3-U5 <sup>1/2</sup>
1	" (REV)	U3-U5 <sup>1/2</sup>
1	" (TRUSS)	U3-U5A <sup>1/2</sup>
1	" (REV)	U3-U5A <sup>1/2</sup>

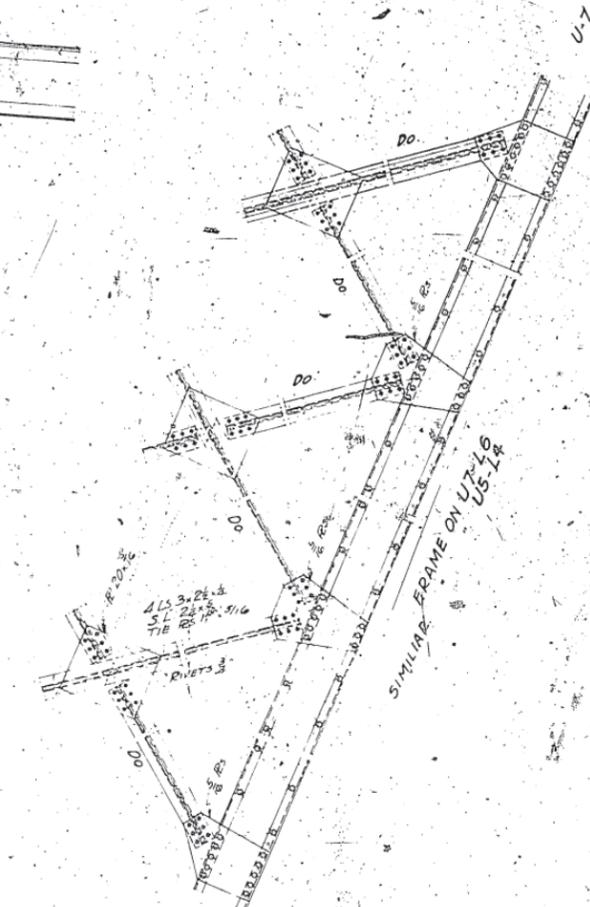
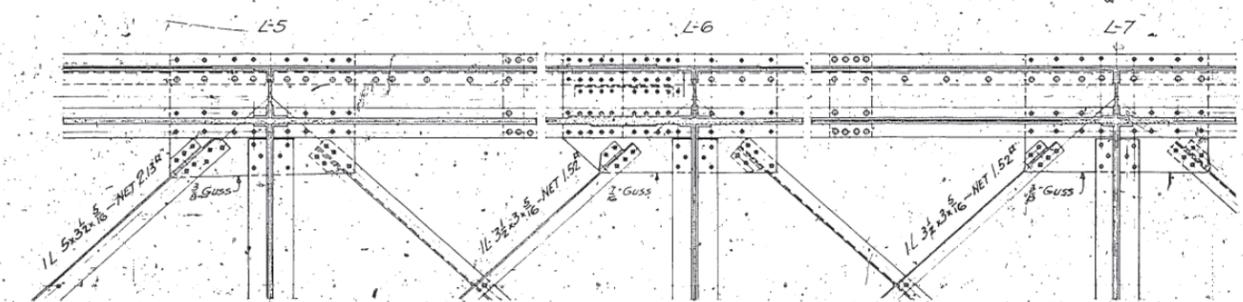
CONTRACT V 6086  
 Details of Top Chords  
 For 371-0 thru Riv. Truss Span  
 Location: Mendota St. Bayou River, Pierce Co., Wash.  
 Owner: Puget Sound Bridge & Decking Co.  
**VIRGINIA BRIDGE AND IRON CO.**  
 ROANOKE, VA.  
 To be fabricated at Memphis, Tenn. plant  
 Made by C.G.S. Traced by E.A.H. 2/20/25  
 In charge of Atney Checked by W.P.D. 2-27-25  
 Revised by F.W. C. 2/27-25  
 Scale: In. = 1 Ft. Sheet No. 3 of 4



GENERAL NOTES: RIVETS  $\frac{3}{4}$ " EXCEPT AS NOTED IN THE FLANGES OF WEB MEMBERS RIVETS  $\frac{1}{2}$ " OPEN HOLES  $\frac{1}{8}$ " FOR  $\frac{1}{2}$ " RIVETS:  $\frac{1}{16}$ " FOR  $\frac{3}{4}$ " RIVETS. PAINT SHOP COAT DETROIT SUPERIOR GRAPHITE 501 OR EQUAL. GAMBER BY LENGTHENING UPPER CHORD  $\frac{1}{8}$ " PER 10'-0"

L4-L6  
 2 WEBS 20"  
 2 TOP LS 4"x4" 7/16"  
 1 COVER 14" 7/16"  
 2 BOT LS 4"x4" 7/16" IN.  
 2 4"x4" 1/2" OUT.  
 BATTEN RES ON BOT. 12"x8" ABT 4'6" C.C.

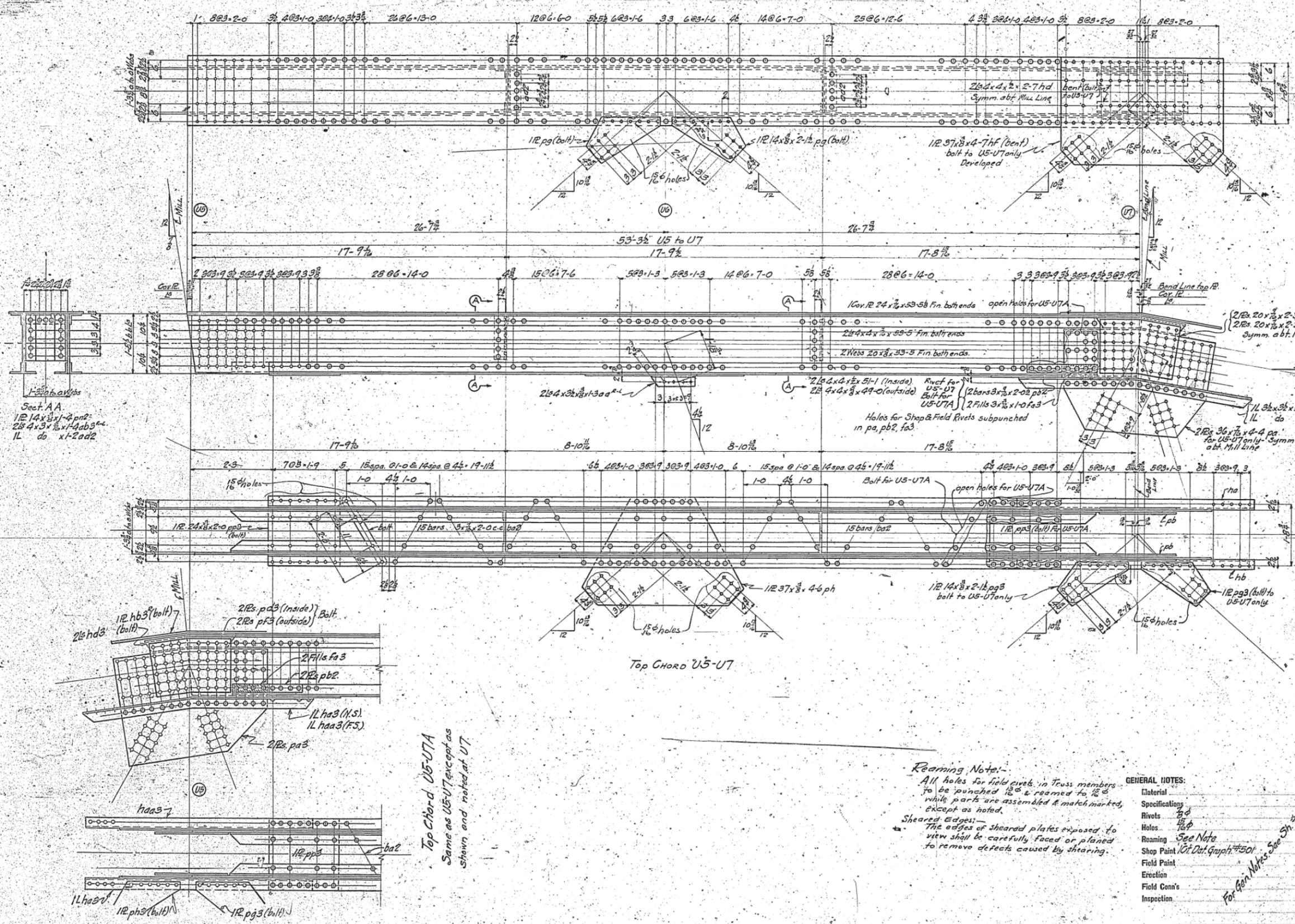
L6-L6  
 2 WEBS 20"  
 2 TOP LS 4"x4" 7/16"  
 1 COVER 14" 7/16"  
 2 BOT LS 4"x4" 7/16" IN.  
 2 4"x4" 1/2" OUT.  
 BATTEN PLS ON BOT. 12"x8" ABT 4'6" C.C.



**MERIDIAN STREET BRIDGE**  
**OVER PUYALLUP RIVER**  
 FOR PIERCE COUNTY, WASHINGTON,  
 COUNTY COMMISSIONERS  
 HENRY BALL, FREDERIC SHAW, F. R. EASTERDAY,  
 C. H. VOTAW, COUNTY ENGINEER, W. E. BERRY, BRIDGE ENGINEER,  
 M. M. CALDWELL, CONSULTING ENGINEER

**DETAILS FOR TRUSS & BRACING**

SCALE  $\frac{1}{2}$ " = 1'-0"      SHEET 4 OF 5



Sect. AA  
 1/2 14x 3/8 x 1-4 pnt.  
 2 3/4 x 3/8 x 1-4 ab 3/4  
 1L do x 1-2 ad 2

Top Chord U5-U7

Top Chord U5-UT  
 Same as U5-U7 except as  
 shown and noted at UT

REQUIRED LIST		
MARK	DESCRIPTION	MARK
1	TOP CHORD (TRUSS)	U5-U7*
1		U5-UT*
1	(Rev)	U5-U7*
1		U5-UT*

**Reaming Note:**  
 All holes for field rivets in Truss members to be punched 1/8" & reamed to 1/8" while parts are assembled & match marked, except as noted.  
**Sheared Edges:**  
 The edges of sheared plates exposed to view shall be carefully faced or planed to remove defects caused by shearing.

**GENERAL NOTES:**

- Material
- Specifications
- Rivets
- Holes
- Roaming
- Shop Paint
- Field Paint
- Erection
- Field Conn's
- Inspection

For Gen. Notes See Sp. 51

**CONTRACT V 6086**

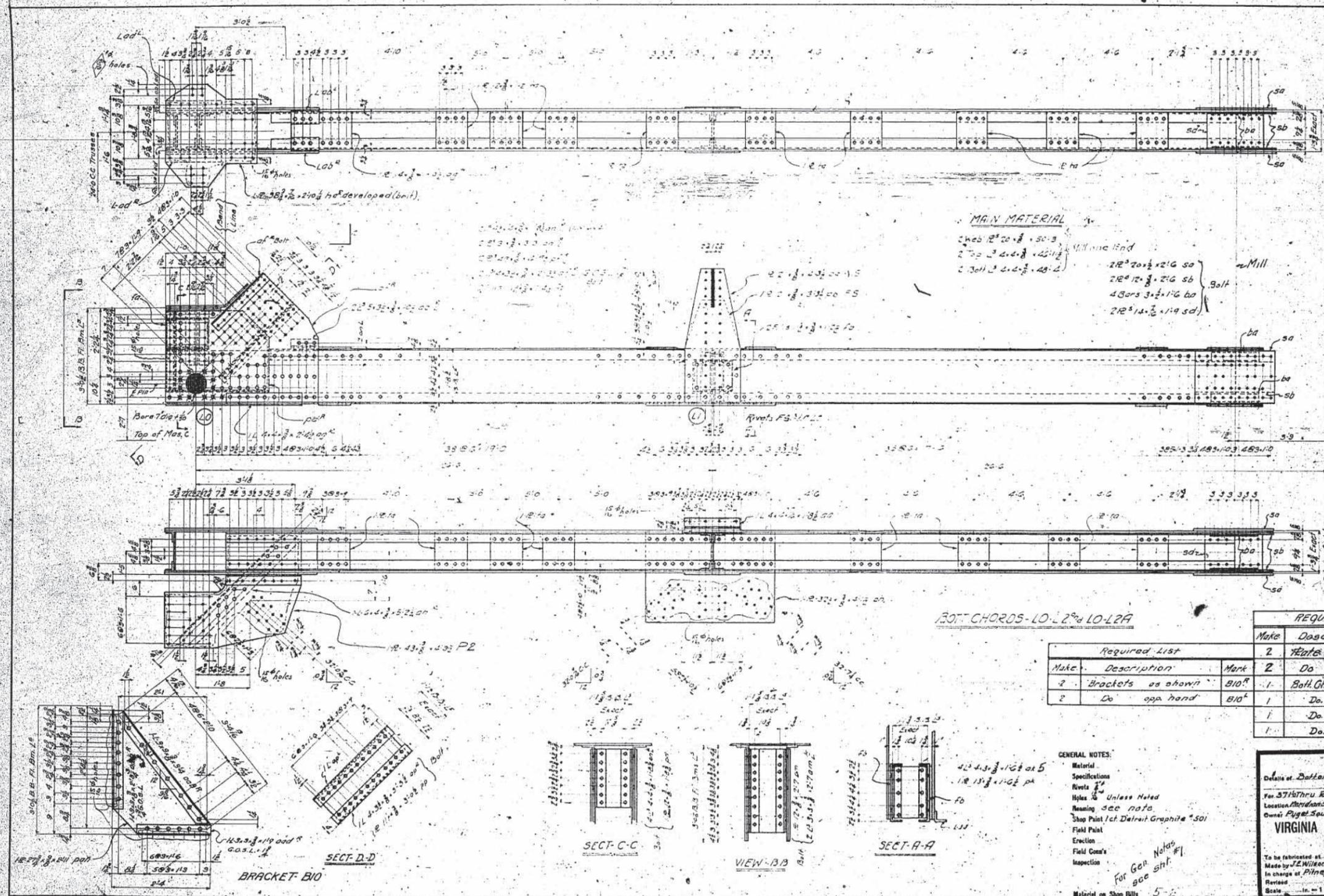
Details of **Top Chord**

For **One 371-0 Truss Riv. Truss Span**  
 Location **Puyallup River Pierce Co. Wash.**  
 Owner **Puget Sound Bridge & Drudging Co.**

**VIRGINIA BRIDGE AND IRON CO.**  
**ROANOKE, VA.**

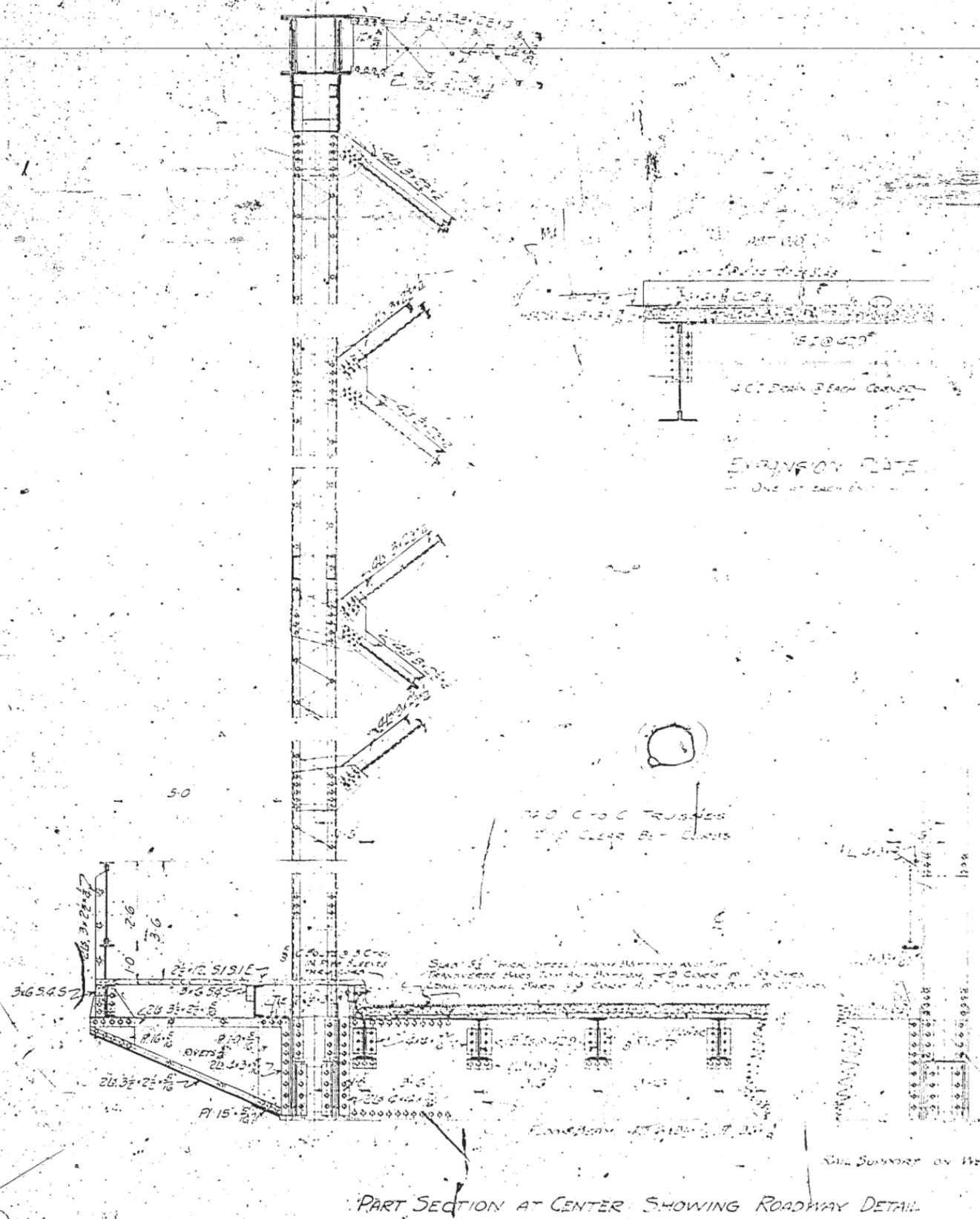
To be fabricated at **Memphis** plant  
 Made by **C.G.S.** Traced by **E.A.W. 2/21/25**  
 In charge of **H.M.V.** Checked by **N.P.D. 2-28-25**  
 Revised **Field Checked by**  
 Scale **In. = 1 Ft.** Sheet No. **4** of **4**

Material on Shop Bills

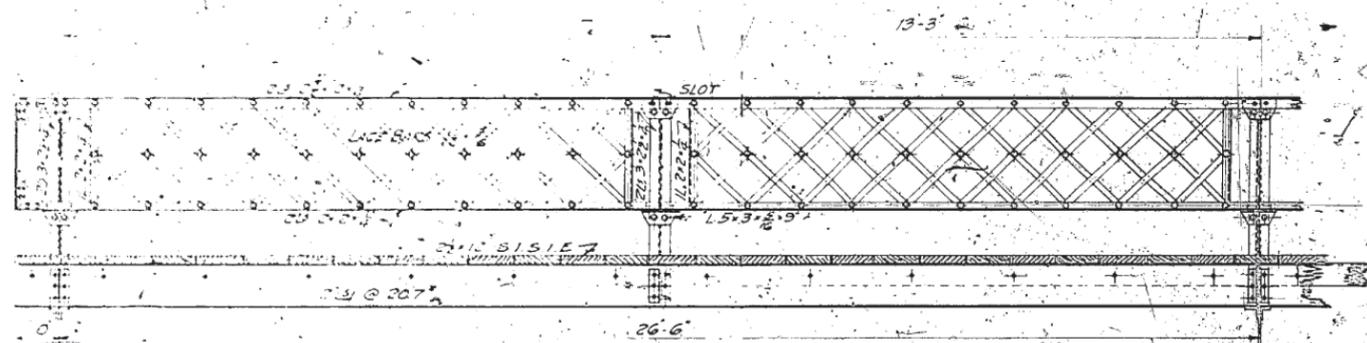
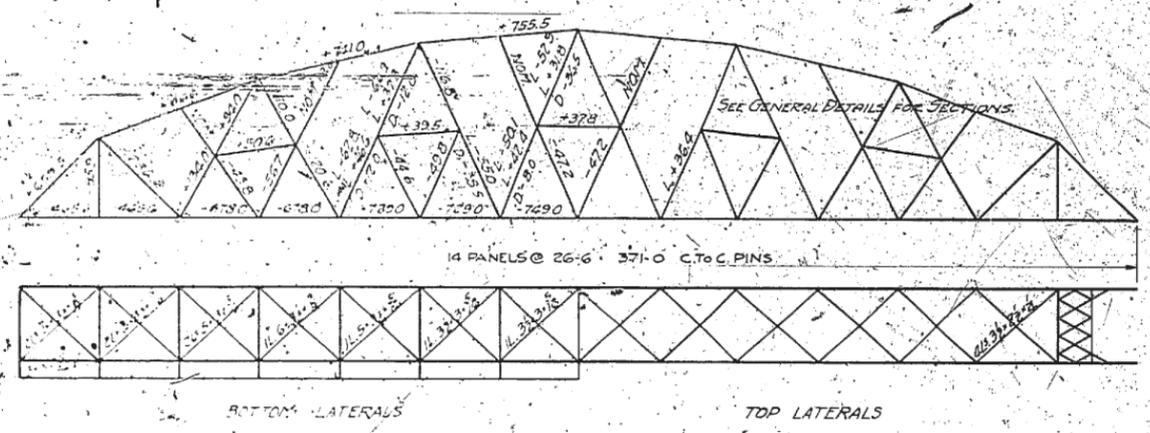


Finishing Note:  
 All holes for field rivets in Truss members to be punched in  
 & reamed to 1/8" while parts are assembled & matched, except as noted.  
 Shaped Edges - Sheared plates exposed to view shall be carefully  
 filed & pinned to remove all burrs & sharp edges.  
 Holes for floor beam connections to be reamed to 1/8" in  
 diameter & 1/16" thick.

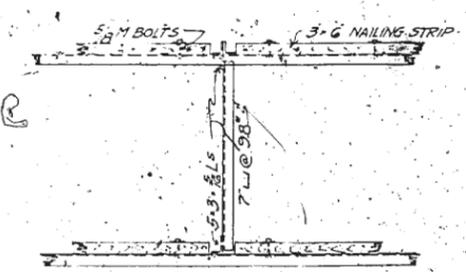
For Gen. Notes #1  
 see sheet #1



PART SECTION AT CENTER SHOWING ROADWAY DETAIL



RAILING DETAIL & SIDEWALK



PLAN

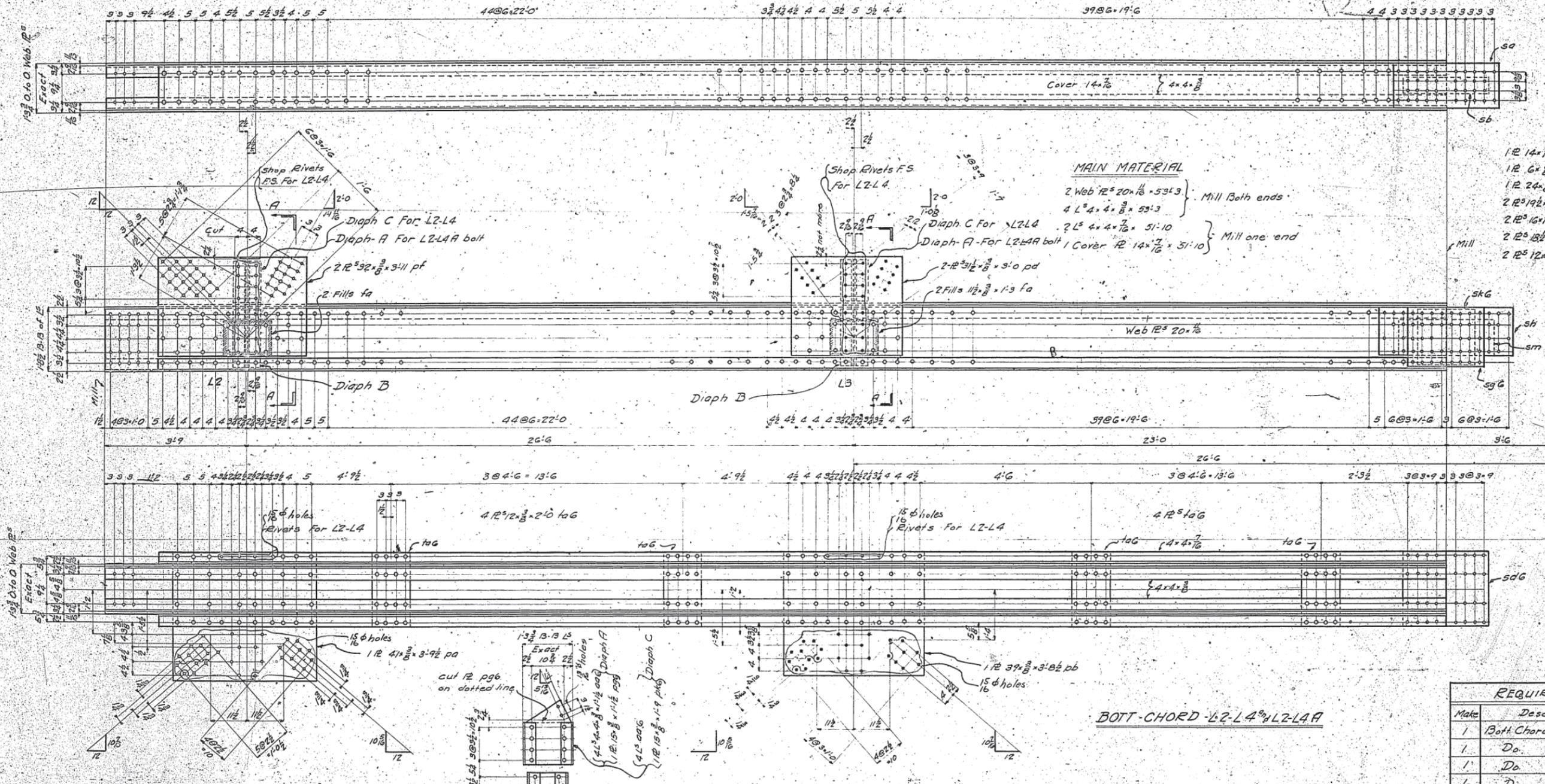
GENERAL NOTE: RIVETS EXCEPT FLANGES OF WEB MEMBERS, SIDEWALK BRACKETS ETC. OPEN HOLES 15\"/>

**MERIDIAN STREET BRIDGE  
OVER PUYALLUP RIVER**  
FOR PIERCE COUNTY, WASHINGTON.

COUNTY COMMISSIONERS  
HENRY BALL, FREDERIC SHAW, F. R. EASTERDAY,  
C. H. VOTAW, COUNTY ENGINEER, W. E. BERRY, BRIDGE ENGINEER,  
M. M. CALDWELL, CONSULTING ENGINEER.

**ROADWAY & HANDRAIL DETAILS & STRESSES**

SCALES: 1" = 2' & 30" SHEET 5 OF 5



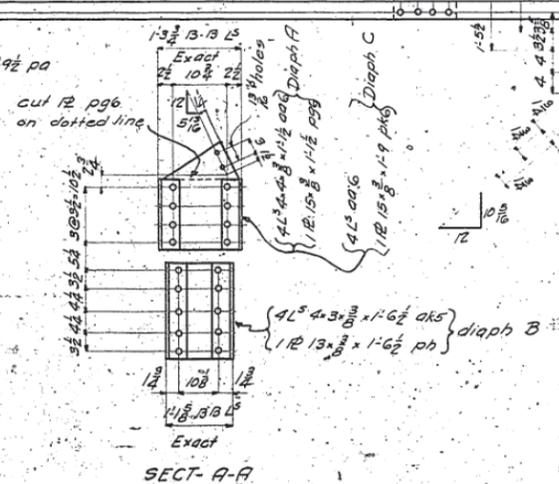
**MAIN MATERIAL**  
 2 Web  $12 \times 20 \times \frac{1}{8} = 53 \times 3$  Mill Both ends  
 4  $L^s 4 \times 4 \times \frac{3}{8} = 53 \times 3$   
 2  $L^s 4 \times 4 \times \frac{7}{16} = 51 \times 10$   
 1 Cover  $12 \times 14 \times \frac{7}{16} = 31 \times 10$  Mill one end

1 R  $14 \times \frac{3}{8} \times 29$  sg-0.5  
 1 R  $6 \times \frac{3}{8} \times 29$  sb-1.5  
 1 R  $24 \times \frac{3}{8} \times 23$  sdGos  
 2 R  $19 \times \frac{3}{8} \times 20$  sgGos  
 2 R  $16 \times \frac{3}{8} \times 31$  sh 0.5  
 2 R  $13 \times \frac{3}{8} \times 16$  skG 1.5  
 2 R  $12 \times \frac{3}{8} \times 26$  sm-1.5

**BOTT-CHORD - L2-L4 & L2-L4A**

**Reaming Note:**  
 All holes for field rivets in Truss members to be punched  $\frac{1}{16}$ " & reamed to  $\frac{1}{16}$ " while parts are assembled & match marked, except as noted.  
 Holes for Floor Beam connections to be reamed to  $\frac{1}{16}$ " to a steel template 1" thick.  
 Sheared Edges:  
 The edges of sheared plates exposed to view shall be carefully faced or planed to remove defects caused by shearing.

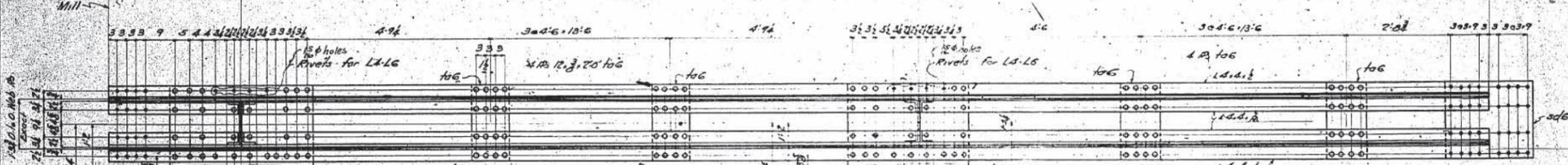
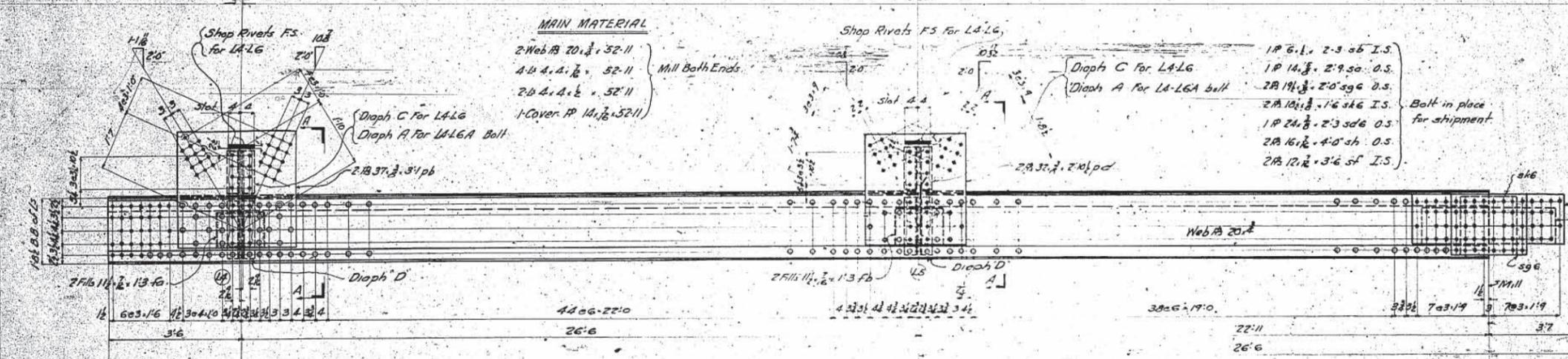
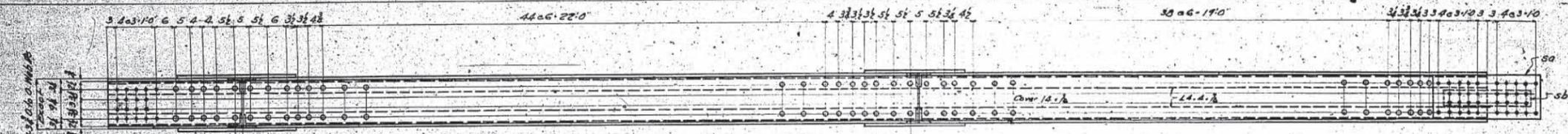
**GENERAL NOTES:**  
 Material  
 Specifications  
 Rivets  $\frac{3}{16}$ " Rivets  
 Holes  $\frac{1}{16}$ " unless noted  
 Reaming see note  
 Shop Paint 1-Ct. Detroit Graphite 501  
 Field Paint  
 Erection  
 Field Conn's  
 Inspection  
 Material on Shop Bills



REQUIRED LIST		
Make	Description	Mark
1	Bottom Chord as shown	L2L4 <sup>R</sup>
1	Do. opp hand	L2L4 <sup>L</sup>
1	Do. as shown	L2L4A <sup>R</sup>
1	Do. opp hand	L2L4A <sup>L</sup>

CONTRACT V 6086	
Details of Bottom Chords	
For	3710 Thr-U Riveted Truss Span
Location	Meridian St. Fayette River, Force Co. Wash
Owner	Pugat Sound Bridge & Dredging Co.
<b>VIRGINIA BRIDGE AND IRON CO., ROANOKE, VA.</b>	
To be fabricated at	Memphis plant
Made by	J. E. Wilson
In charge of	Phiney
Revised	Checked by 2.67 2-25
Scale	1" = 1' Ft. Sheet No. 6 of



**MAIN MATERIAL**

- 2 Web B 20.5 x 52.11
- 4 L 4.4 x 1/2 x 52.11
- 2 B 4.4 x 1/2 x 52.11
- 1 Cover P 14.1/2 x 52.11

Mill Both Ends

**Shop Rivets FS For L4-L6**

- 1 P 6.1 x 2.3 ab I.S.
- 1 P 14.3 x 2.9 sg 0.5
- 2 B 19.1/2 x 1.6 sk 6 I.S.
- 1 P 24.3 x 2.3 sd 6 0.5
- 2 B 16.1/2 x 4.0 sh 0.5
- 2 B 12.1/2 x 3.6 sf I.S.

Bolt in place for shipment

**REQUIRED LIST**

Make	Description	Mark
1	Bottom Chord as shown	L4L6
1	do. opp hand	L4L6
1	do. as shown	L4L6
1	do. opp hand	L4L6

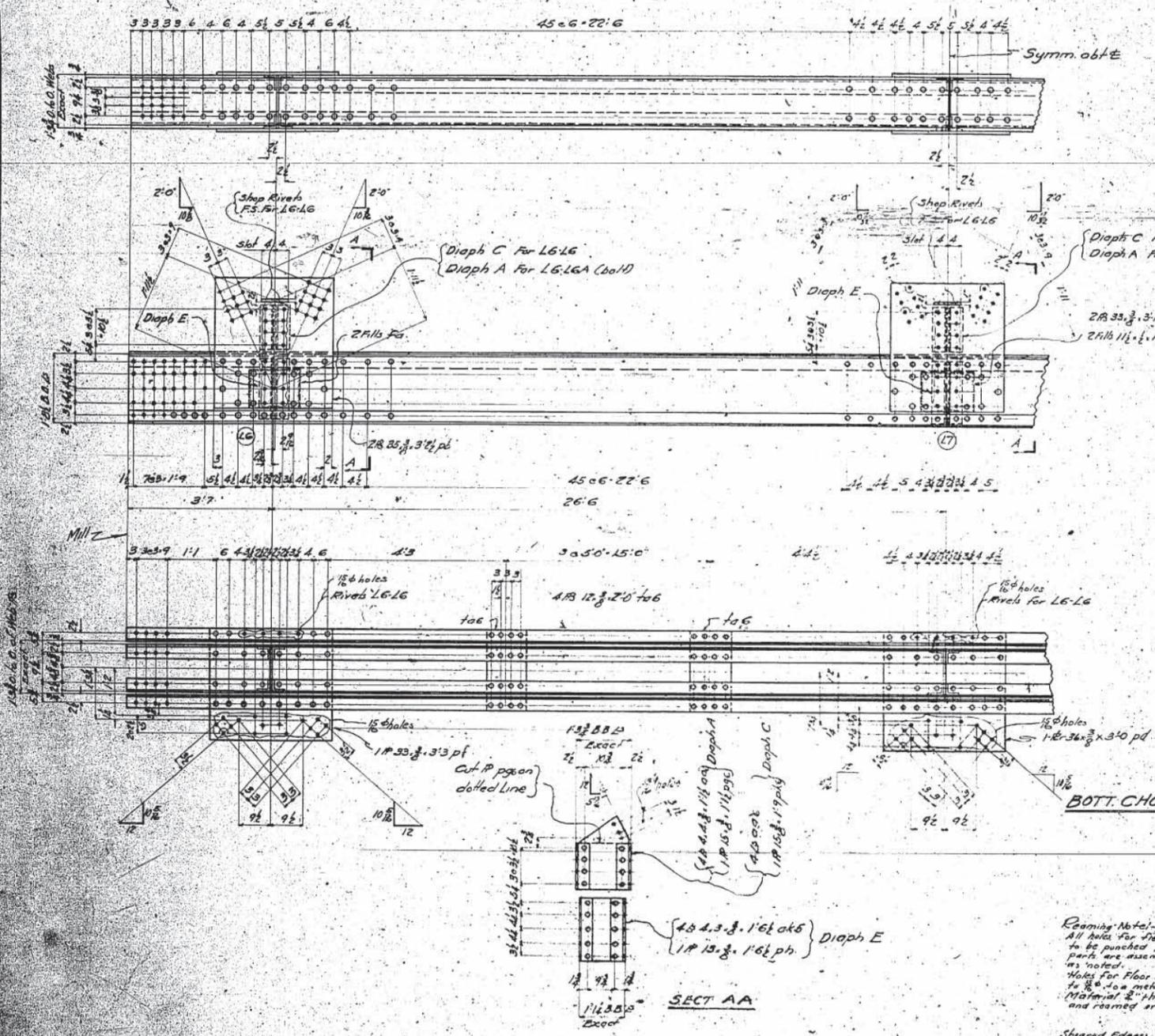
**BOTTOM CHORD L4-L6 & L4-L6A**

**Reaming Notes:**  
 All holes for field rivets in Truss members to be punched 1/8" & reamed to 1/8" while parts are assembled & marked, except as noted.  
 Holes for gusset connections to be reamed to 1/8" to metal template 1/8" thick. Material 1/8" thick or over to be sub-punched and reamed or drilled from the solid.

**Sheared Edges:**  
 The edges of sheared plates exposed to view shall be care fully faced or planed to remove defects caused by shearing.

**GENERAL NOTES:**  
 Material Specifications  
 Rivets 3/8" Unless noted  
 Reaming See Note  
 Shop Paint 1/2 Gal. Def. 30  
 Field Paint  
 Erector  
 Field Com's  
 Inspection For General Notes see DWG. 1

**CONTRACT V6086**  
 Details of **Bottom Chords**  
 For 37'-0" thru Riveted Truss Span  
 Location: **Virginia Bridge & Iron Co., Wood**  
 Owner: **Virginia Bridge & Iron Co.**  
**VIRGINIA BRIDGE AND IRON CO.**  
 ROANOKE, VA.  
 To be fabricated at **Memphis**  
 Made by **J.E.H. 2-25** Traced by **P.E. 2-25**  
 In charge of **Ch. Tracy** Checked by **E.L. 3-25**  
 Revised \_\_\_\_\_ File **CV4** by \_\_\_\_\_  
 Scale: \_\_\_\_\_ in. = 1 Ft. Sheet No. **7**



Main Material  
 2 Web Pls. 20" x 60" 2  
 6 L6-L6 x 1/2" 60" 2  
 1 Cover Pl. 14" x 60" 2  
 Mill both ends

REQUIRED LIST		
Make	Description	Mark
1	Bottom Chord	L6-L6
1	do	L6-L6A

Reaming Note:  
 All holes for rivets in Truss members to be punched 2" & reamed to 2" while parts are assembled & marked, except as noted.  
 Holes for floor Bm. connections to be reamed to 2" & a metal template 1" thick.  
 Material 2" thick or over to be sub-punched and reamed or drilled from the solid.

Sheared Edges:  
 The edges of sheared plates exposed to view shall be carefully faced or planed to remove defects caused by shearing.

GENERAL NOTES:  
 Material  
 Specifications  
 Rivets  $\frac{3}{8}$ " Unless noted  
 Holes  $\frac{1}{8}$ "  
 Reaming See Note  
 Shop Paint 100 lbs. per 100 sq. ft.  
 Field Paint  
 Erection  
 Field Conn's  
 Inspection For General Notes see DWG #1

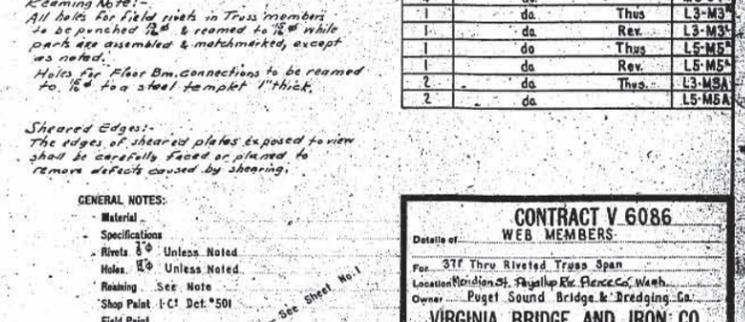
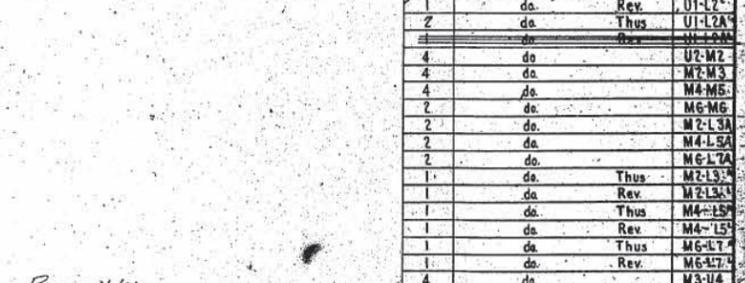
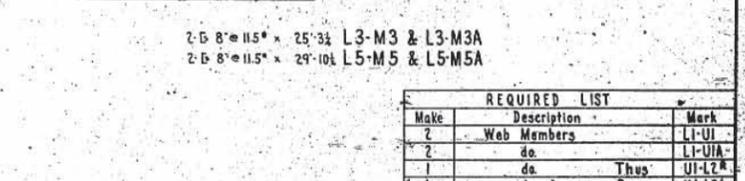
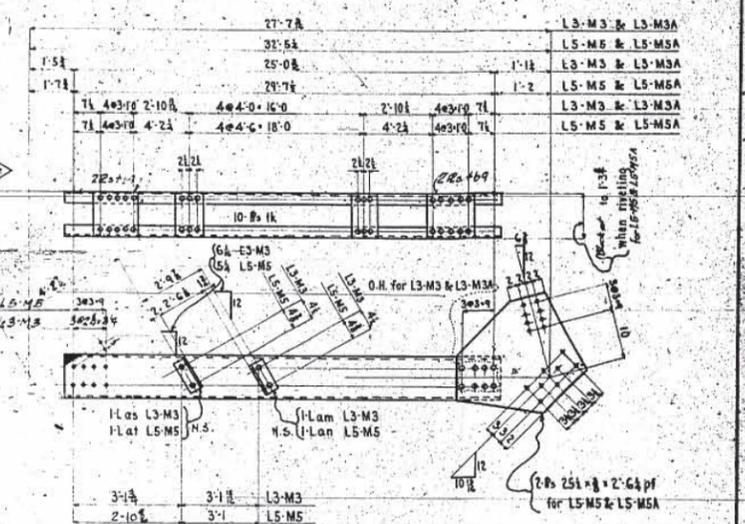
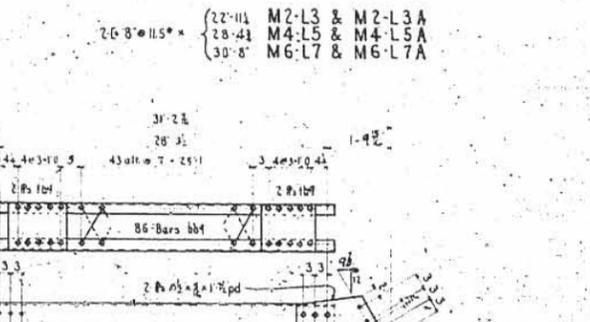
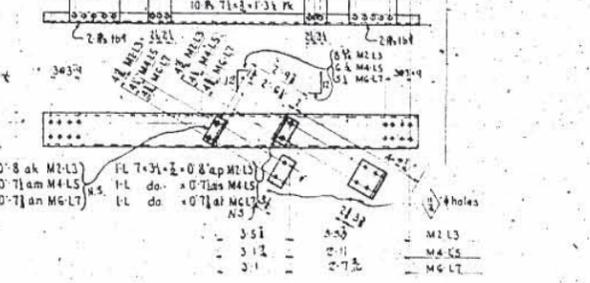
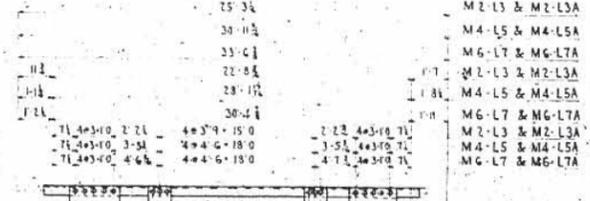
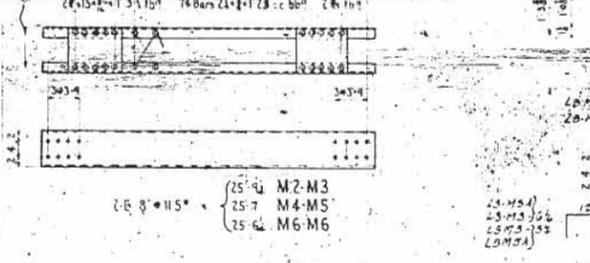
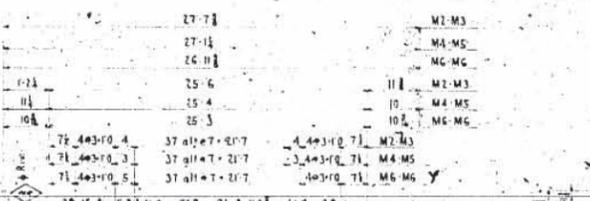
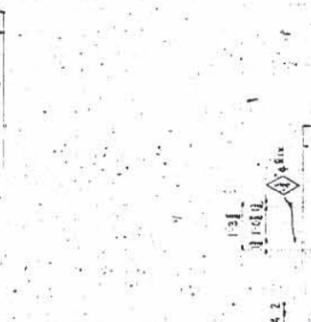
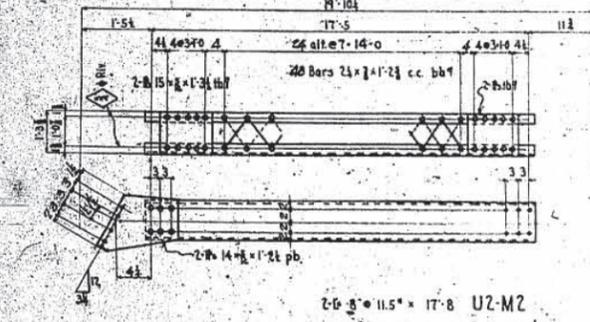
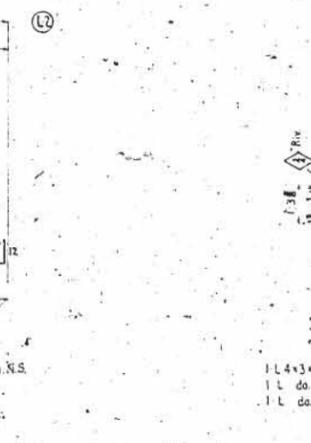
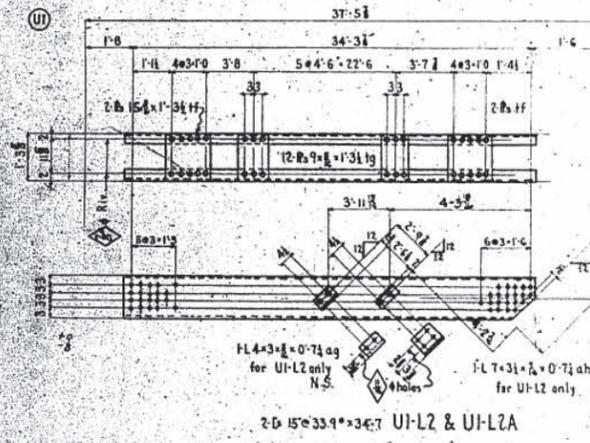
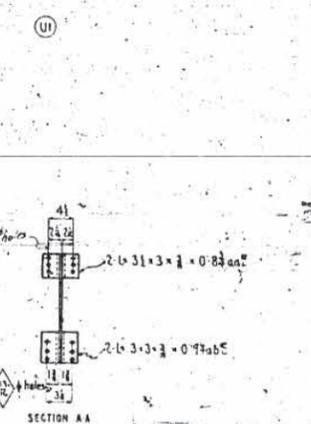
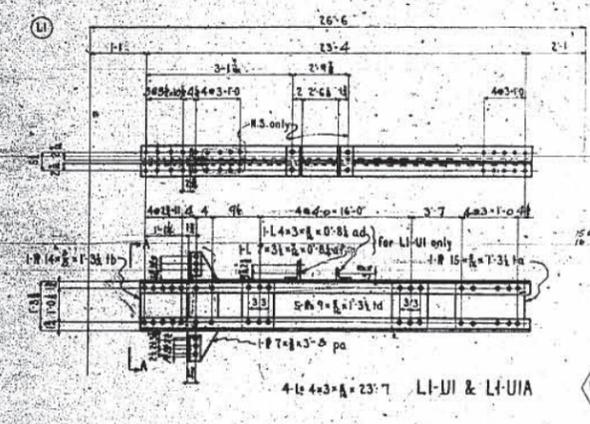
SECT AA

BOTT. CHORDS - L6-L6 & L6-L6A

**CONTRACT V 6086**  
 Details of Bottom Chords  
 For 371.0' thru Riveted Truss Span  
 Location Northwest Washington River, C. Wash.  
 Owner Puget Sound Bridge & Draying Co.  
**VIRGINIA BRIDGE AND IRON CO.**  
 ROANOKE, VA.  
 To be fabricated at Memphis  
 Made by J.N. 24-25 Traced by P.E. 22-25  
 In charge of Pitney Checked by C.C. 24-25  
 Revised \_\_\_\_\_ Filed Oct 10 by \_\_\_\_\_  
 Scale \_\_\_\_\_ in. = 1 Ft. Sheet No. 8 of \_\_\_\_\_

Material on Shop Bills 9





REQUIRED LIST		
Make	Description	Mark
2	Web Members	L1-UI
2	do	L1-UIA
1	do	Thus U1-L2A
1	do	Rev. U1-L2A
2	do	Thus U1-L2A
2	do	Rev. U1-L2A
4	do	U2-M2
4	do	M2-M3
4	do	M4-M5
2	do	M6-M6
2	do	M2-L3A
2	do	M4-L5A
2	do	M6-L7A
1	do	Thus M2-L3A
1	do	Rev. M2-L3A
1	do	Thus M4-L5A
1	do	Rev. M4-L5A
1	do	Thus M6-L7A
1	do	Rev. M6-L7A
4	do	M3-U4
1	do	Thus L3-M3
1	do	Rev. L3-M3
1	do	Thus L5-M5
1	do	Rev. L5-M5
2	do	Thus L3-M3A
2	do	Rev. L3-M3A

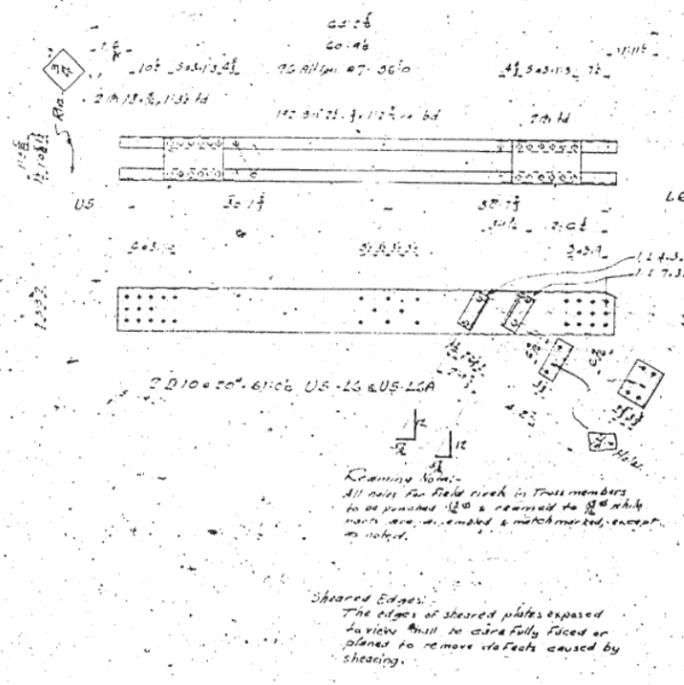
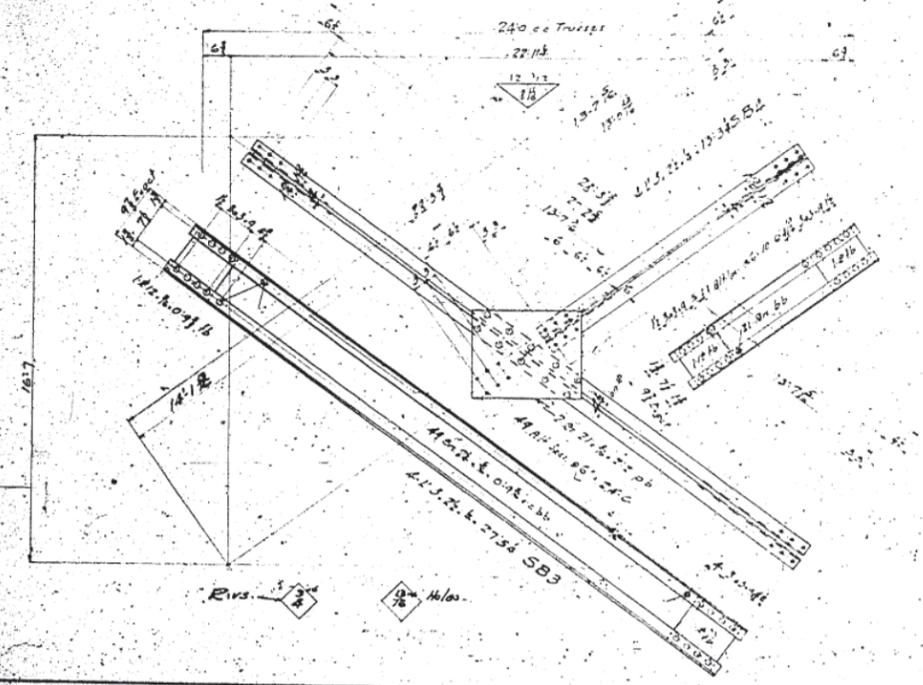
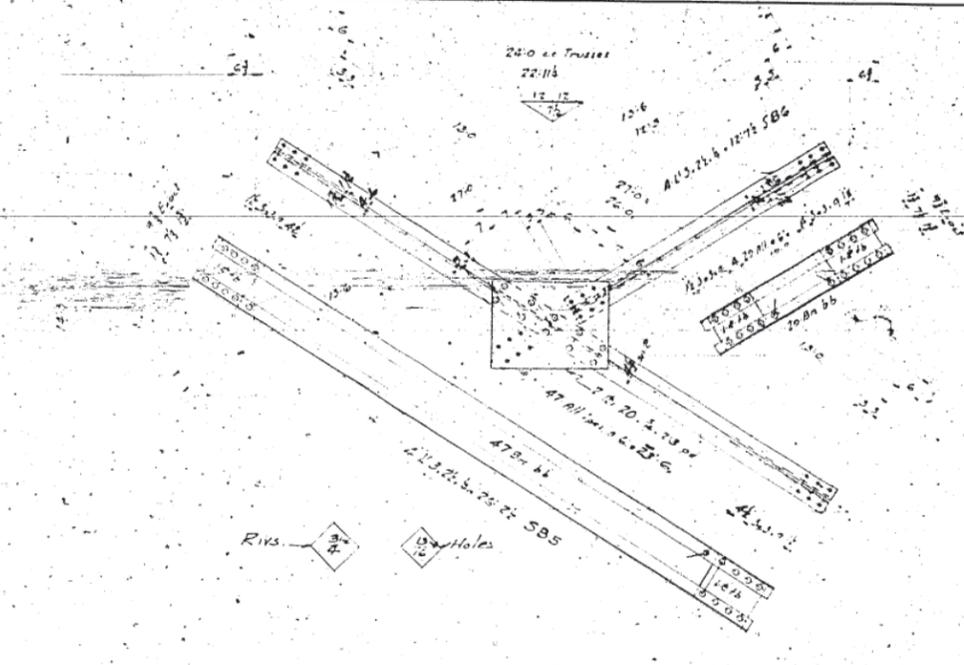
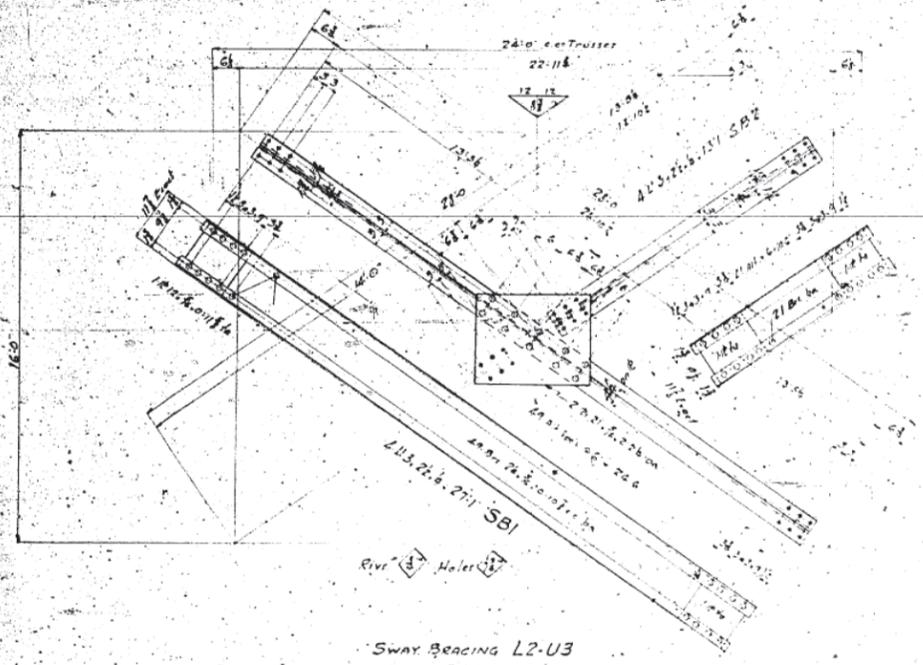
**Reaming Note:**  
All holes for field joints in Truss members to be punched  $\frac{1}{16}$ " & reamed to  $\frac{1}{16}$ " while parts are assembled & matchmarked, except as noted.  
Holes for Field Bm. Connections to be reamed to  $\frac{1}{16}$ " for a steel template 1" thick.

**Sheared Edges:**  
The edges of sheared plates exposed to view shall be carefully faced or planed to remove defects caused by shearing.

**GENERAL NOTES:**  
- Material -  
- Specifications -  
- Rivets  $\frac{3}{8}$ " Unless Noted  
- Holes  $\frac{1}{16}$ " Unless Noted  
- Reaming - See Note  
- Shop Paint - I.C. Def. #501  
- Field Paint  
- Erection  
- Field Conn's  
- Inspection  
For General Notes - See Sheet No. 1

**CONTRACT V 6086**  
**WEB MEMBERS**  
Details of:  
For: 31F Thru Riveted Truss Span  
Location: Gordon St., Fayetteville, Ark., Wash.  
Owner: Puget Sound Bridge & Drilling Co.  
**VIRGINIA BRIDGE AND IRON CO.**  
**ROANOKE, VA.**  
To be fabricated at: Memphis, Tenn.  
Made by: P.O.M. - 3-7-22  
In charge of: P. H. P. - 3-7-22  
Checked by: H. P. D. - 3-7-22  
Scale: 1" = 1' PL. Sheet No. 10 of 10

Material on Shop Bills 12-13



**REQUIRED LIST**

Make	Description	Mark
4	Sway Braces	SBI
8	do.	SB2
4	do.	SB3
8	do.	SB4
8	do.	SB5
16	do.	SB6
1	Web Member as shown	USL6
1	do. gph. end	USL6
2	do. as shown	USL6A

**GENERAL NOTES:**

Material Specifications  
 Rivets  $\frac{3}{4}$ " unless noted  
 Holes  $\frac{1}{8}$ "  
 Naming See Note  
 Shop Paint 1/4" Galv  
 Erection Field Coat  
 Inspection For General Notes see drawing

**Keaming Notes:**  
 All cuts for field rivets in truss members to be punched 1/8" & counters to 1/8" thick with arc, chamfered & matchmarked, except as noted.

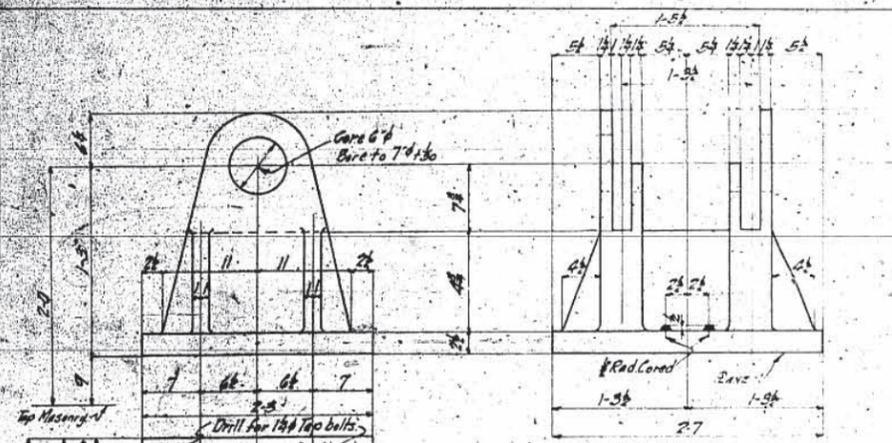
**Sheared Edges:**  
 The edges of sheared plates exposed to view shall be carefully faced or planed to remove defects caused by shearing.

**CONTRACT V.6086**

Details of **SWAY BRACING** and  
**WEB MEMBERS**  
 For **371' 0" Truss Riveted Truss Span**  
 Location **Meridian St. Ryals River, Thomas Co. Wash.**  
 Owner **Puget Sound Bridge & Dredging Co.**  
**VIRGINIA BRIDGE AND IRON CO.**  
**ROANOKE, VA.**

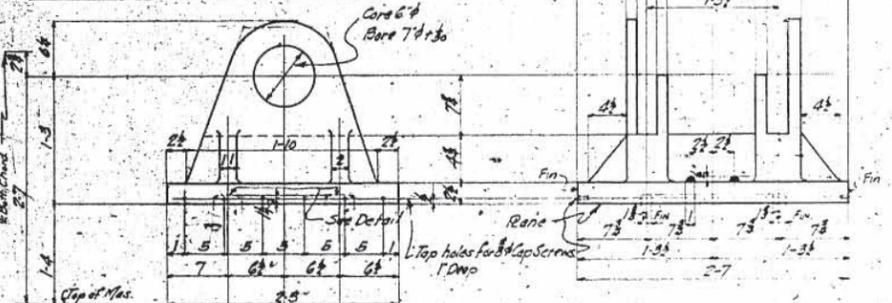
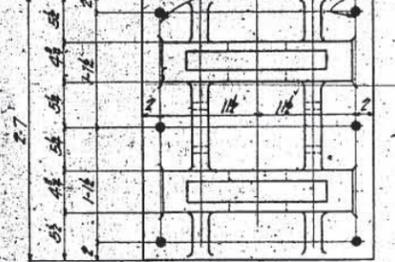
To be fabricated at **Memphis** plant  
 Made by **P.O.M. 7-18-25** Traced by **ELM. 2-19-26**  
 In charge of **Pitney** Checked by **N.R.D. 3-4-25**  
 Revised **7-18-25** Field Checked by  
 Scale **1" = 1' 0"** Sheet No. **14**



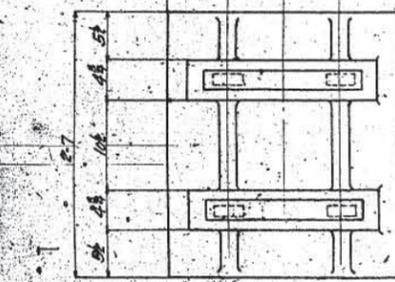


Detail of Cast Steel Fixed Shoe FSI

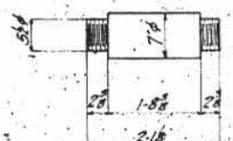
Note - Patterns for FSI & RSI are alike except for slots for teeth in RSI



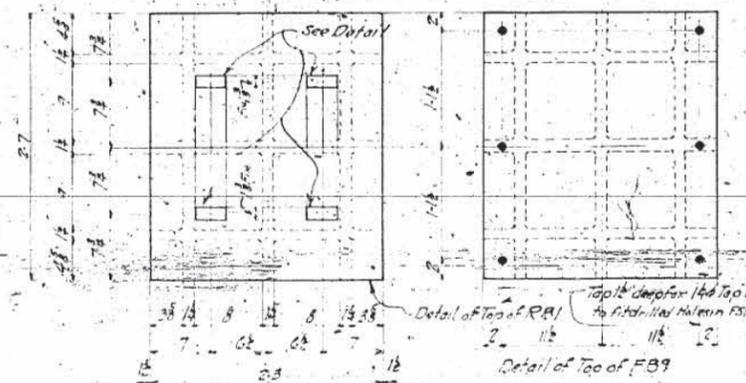
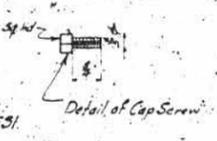
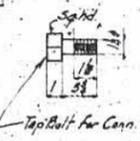
Detail of Cast Steel Roller Shoe RSI



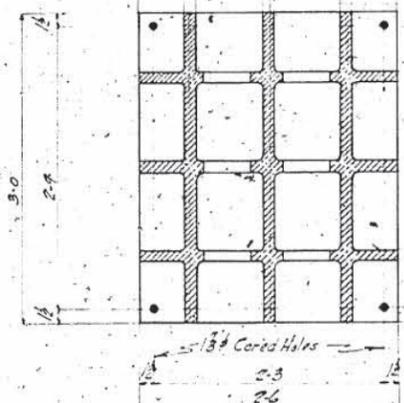
25th Lomas Nuts PN10 on each pin



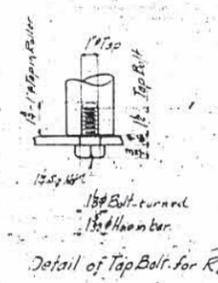
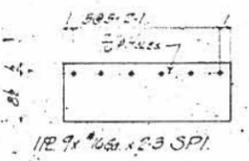
1 Bar 7/8 x 2-1/8 P1 Turn from 7/8



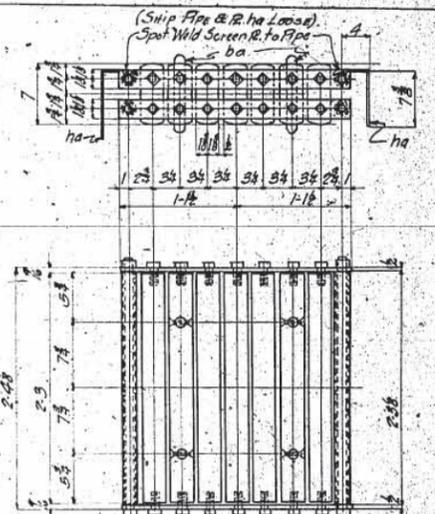
Detail of Top of RSI



Detail of Top of FB9

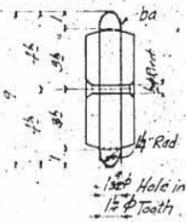


Detail of Tap Bolt for RNI



Material for One Roller Nest RNI  
 7 Seg. Rollers Tx 2 3/4 x 2-3 (Turn 7 1/2)  
 4 Bars 1 1/2 x 0-9 ba  
 28 Top bolts as detailed  
 4 Bars 2 1/2 x 2 x 2-3 bb  
 4 Bolts 1/2 x 2-5 1/2  
 2 Pins 1/2 x 16 ga x 2-3 ha (bent) Ship Loose  
 2 Pins 1/2 x 16 ga x 2-3 ha (plain) MI  
 2 Pins 1/2 x 9 ga x 2-3 bb (plain)

Detail of Slot for tooth



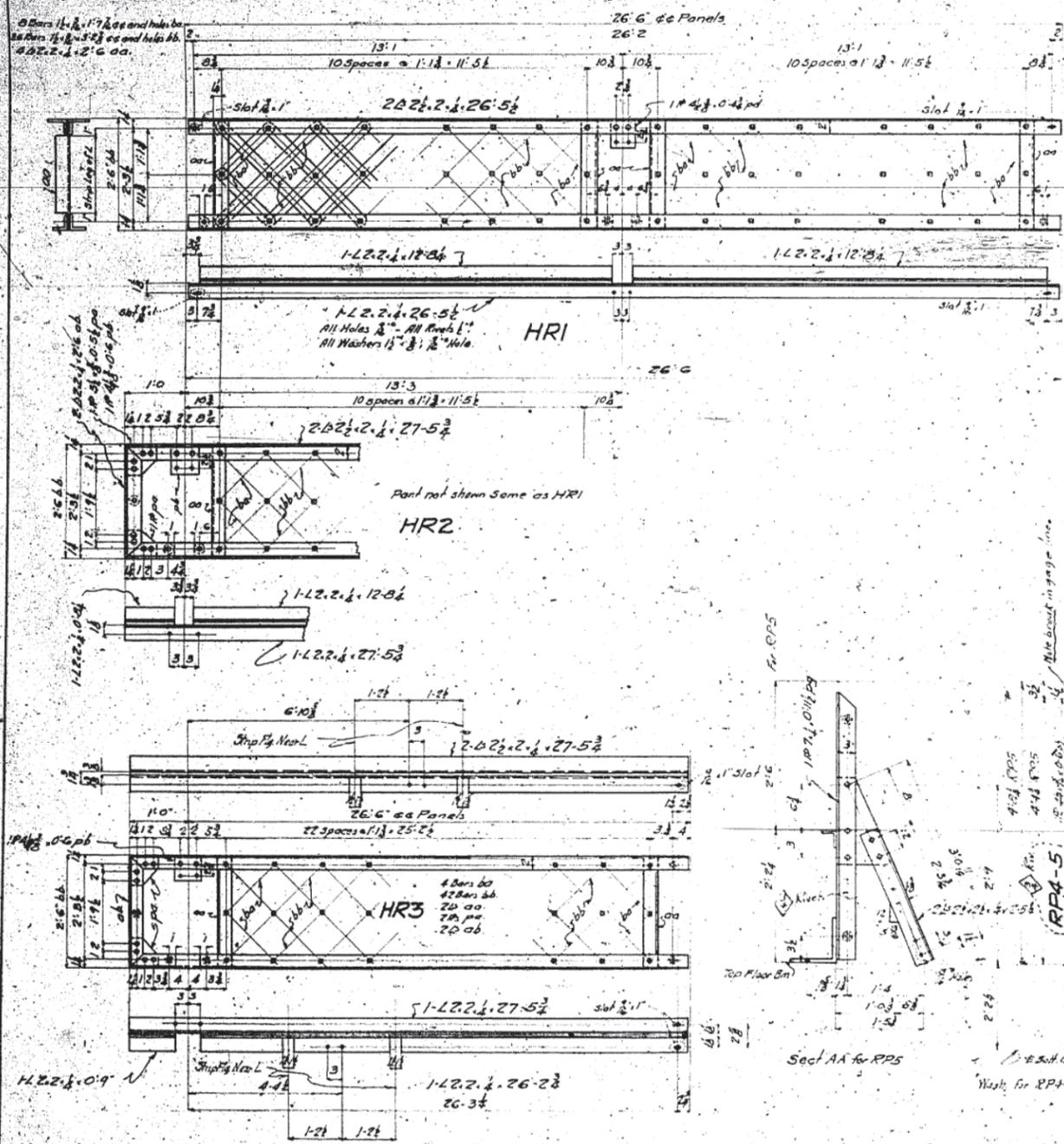
SECTION THRU ROLLER, SHOWING CONE OF TOOTH

Note - Castings must be annealed. Finish Material to allow for all fin surfaces.

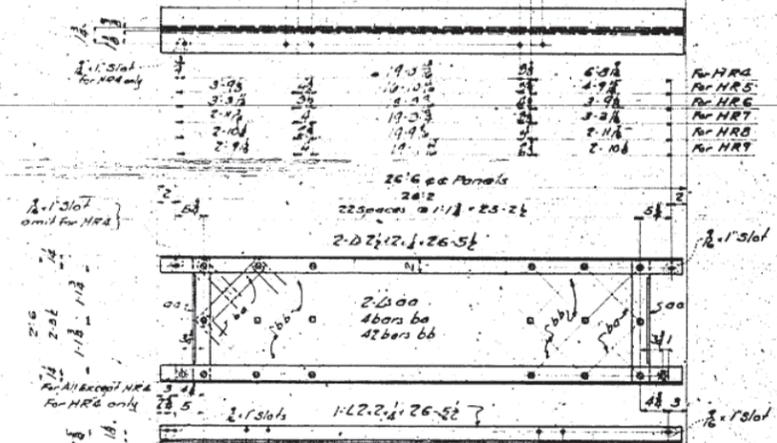
GENERAL NOTES:  
 Material: Cast Steel, CLASS 2, SOFT GRADE.  
 Specifications: See Drawing - A.S.T.M. A27-21.  
 Cast: A.S.T.M. A27-21.  
 Heat: As Noted  
 Finishing: None  
 Shop Paint: 1/2 Cr. Det. 501 except for Sun 1st coat  
 Field Paint: See Drawing  
 Erection: For Gen. Nuts See Drawing  
 Field Connections: See Drawing  
 Inspection: For Gen. Nuts See Drawing

REQUIRED LIST		
MAKE	DESCRIPTION	MARK
2	C.S. FIX SHOES	FSI
2	C.S. ROLLER SHOES	RSI
2	C.S. FIX BOLSTER	FB9
2	C.S. EXP.	RBI
2	ROLLER NESTS	RNI
4	PINS	PN10
8	STD LOMAS NUTS	PN10
4	SCREENS	SPI
12	TAP BOLTS 1/2 x 3 1/2 U.H.	
24	CAP SCREWS 3/8 x 1 1/2 U.H.	
4	SCREEN SECTIONS	MI

**CONTRACT V 6086**  
 Shoes, Roller Nests, Pins, Etc.  
 For: JOHN O. THRU RIVER TRUSS SPAN  
 Location: Memphis, Tenn.  
 Owner: FUGET SOUND BRIDGE & DECKING CO.  
**VIRGINIA BRIDGE AND IRON CO.**  
 ROANOKE, VA.  
 MEMPHIS, TENN.  
 Made by: N. G. H. Truss  
 In charge of: ATNEY  
 Checked by: G. T. B. H. Truss  
 Reviewed by: F. W. G. H. Truss  
 Date: 1-1-21  
 Sheet No. 12



61	For HR9	41
62	For HR8	64
63	For HR7	41
64	For HR6	54
65	For HR5	28
66	For HR4	41



67	For HR4	41
68	For HR5	64
69	For HR6	41
70	For HR7	54
71	For HR8	28
72	For HR9	41

REQUIRED LIST			
Make	Description	Work	
12	Hand Rail Sections	HR1	
1	do	as shown	HR2
1	do	as shown	HR3
1	do	as shown	HR4
1	do	as shown	HR5
1	do	as shown	HR6
1	do	as shown	HR7
1	do	as shown	HR8
1	do	as shown	HR9
2	Rail Posts	RPA	
11	do	RPS	

GENERAL NOTES:

Material: \_\_\_\_\_

Specifications: \_\_\_\_\_

Rivets: \_\_\_\_\_ unless noted

Notes: \_\_\_\_\_

Reaming: None

Shop Paint: 100% DEF. SN.

Field Paint: \_\_\_\_\_

Erection: \_\_\_\_\_

Field Cities: \_\_\_\_\_

Inspection: \_\_\_\_\_

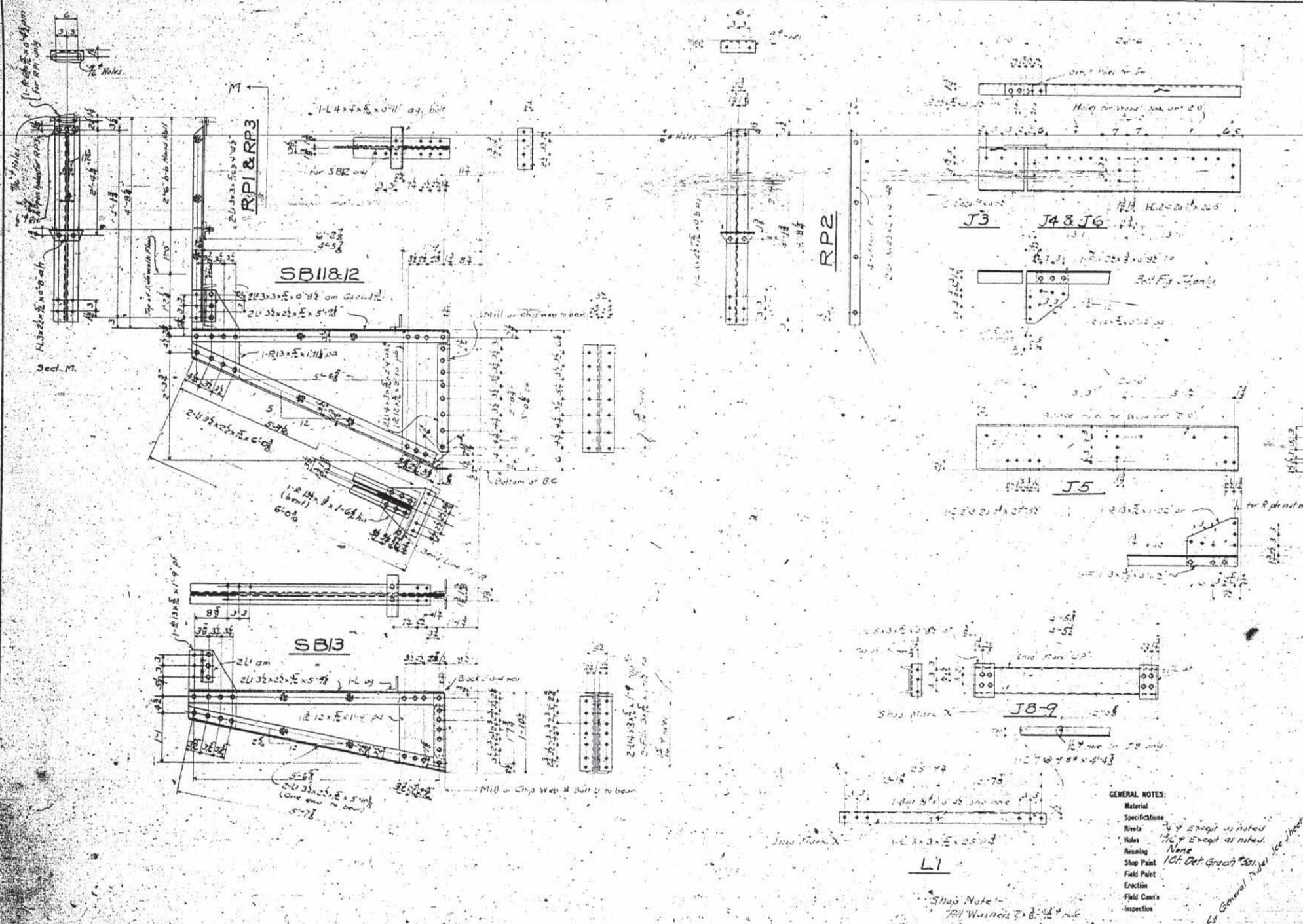
Material on Shop Bills 18-19

**CONTRACT V6086**  
**Handrail & Rail Posts**

For 37'0" thru Riveted Truss Span  
 Location: Mendocino Street, Fallallup Bl. Pierce Co. Wash.  
 Owner: Puget Sound Bridge & Dring Co.

**VIRGINIA BRIDGE AND IRON CO.**  
**ROANOKE, VA.**  
**Memphis**

To be fabricated at \_\_\_\_\_  
 Made by HBC 2-20-25  
 In charge of Fitzoy  
 Revised \_\_\_\_\_  
 Scale: 1/4" = 1' Pl. Sheet No. 14

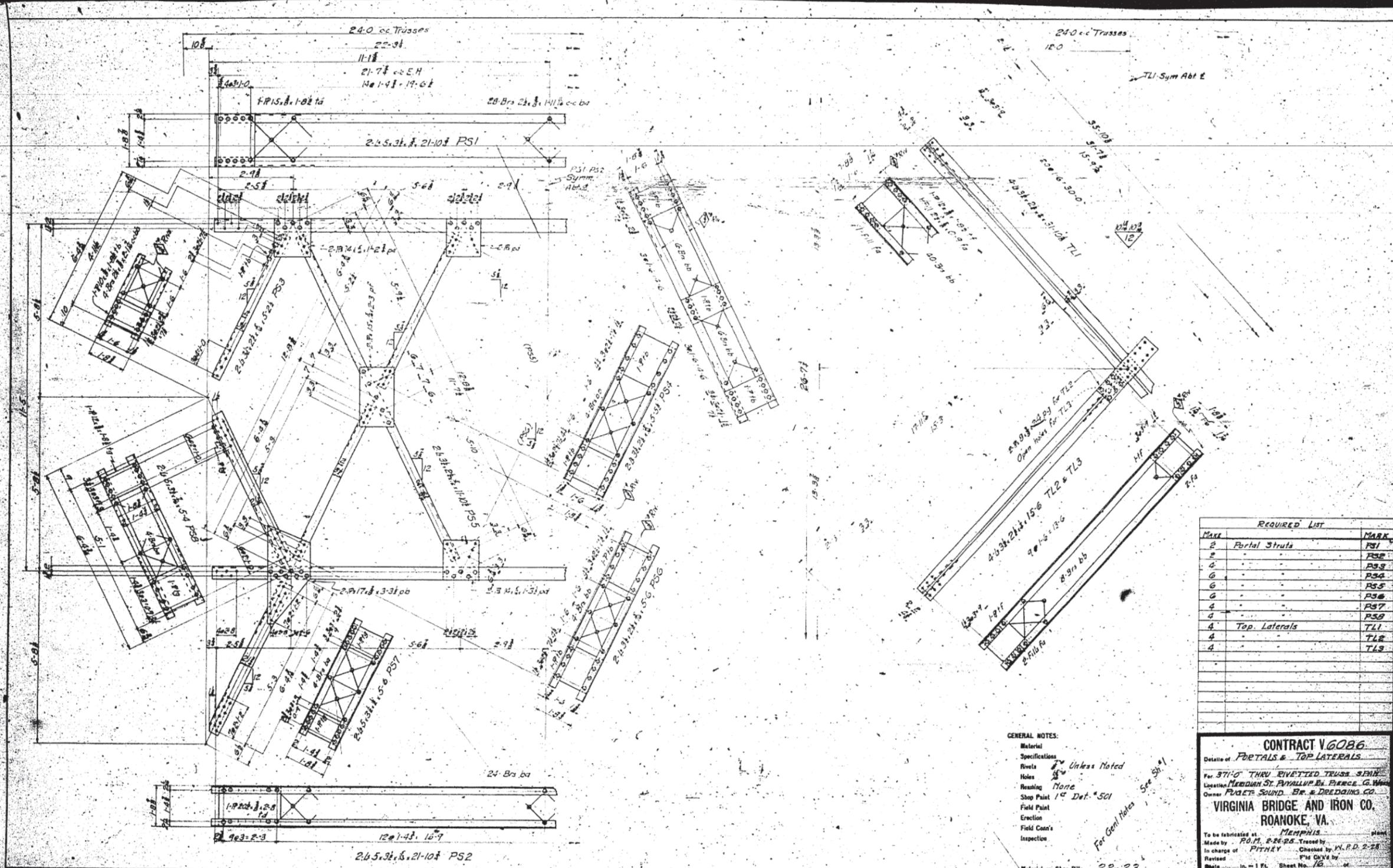


REORDER LIST

Note	Description	Mark
1	Rail Post (Rev.)	RP2 <sup>R</sup>
2	Rail Post	RP3
2	Lateral	L1
1	Stringer	Thru SB1 <sup>R</sup>
1	do	Rev SB1 <sup>L</sup>
12	do	J3
11	Sidewalk Brackets	SB11
1	do	Thru SB12 <sup>R</sup>
1	do	Rev SB12 <sup>L</sup>
1	do	Thru SB13 <sup>R</sup>
1	do	Rev SB13 <sup>L</sup>
13	Rail Post	RP1
13	do	Thru RP2 <sup>R</sup>
1	Stringer	Thru J3 <sup>R</sup>
1	do	Rev J3 <sup>L</sup>
1	do	Thru J4 <sup>R</sup>
1	do	Rev J4 <sup>L</sup>
1	do	Thru J5 <sup>R</sup>
1	do	Rev J5 <sup>L</sup>
12	do	J6
12	do	J7

**CONTRACT V 6086**  
 Details of Side Walk Brackets - Rail Posts  
 Laterals and Stringers  
 For 37th St. Thru Street, Truss Span  
 Location: Meriden, Ct. Ryallup, R.R. Bridge Co. Work  
 Owner: Puget Sound Bridge & Dredging Co.  
**VIRGINIA BRIDGE AND IRON CO.**  
**ROANOKE, VA.**  
 Made by H.O.C. Traced by P.R.L. 4-2-1915  
 In charge of Pitney Checked by C.E.T. 3-6-15  
 Scale: 1" = 1' Pl. Sheet No. 15

GENERAL NOTES:  
 Material Specifications  
 Rivets 3/4" except as noted  
 Holes 1/4" except as noted  
 Reaming None  
 Shop Paint 100% Det. Gray  
 Field Paint  
 Erection  
 Field Cont's  
 Inspection  
 Material on Shop Bills 20-21



REQUIRED LIST

Max	MARK
2	Portal Struts
2	PS1
2	PS2
4	PS3
6	PS4
6	PS5
6	PS6
4	PS7
4	PS8
4	Top Laterals
4	TL1
4	TL2
4	TL3

GENERAL NOTES:

- Material
- Specifications
- Rivets Unless Noted
- Holes
- Reaming None
- Shop Paint 1" Det. 501
- Field Paint
- Erection
- Field Conn's
- Inspection

Material on Shop Bills 22-23

For Gen Notes See Sp. #1

**CONTRACT V 6086**

Details of PORTALS & TOP LATERALS

For 37'-0" THRU RIVETTED TRUSS SPAN

Location MERIDIAN ST. BYALLUP. BR. PIERCE. G. WOOD

Owner PUGET SOUND BR. & DREDGING CO.

**VIRGINIA BRIDGE AND IRON CO.**  
ROANOKE, VA.

To be fabricated at MEMPHIS

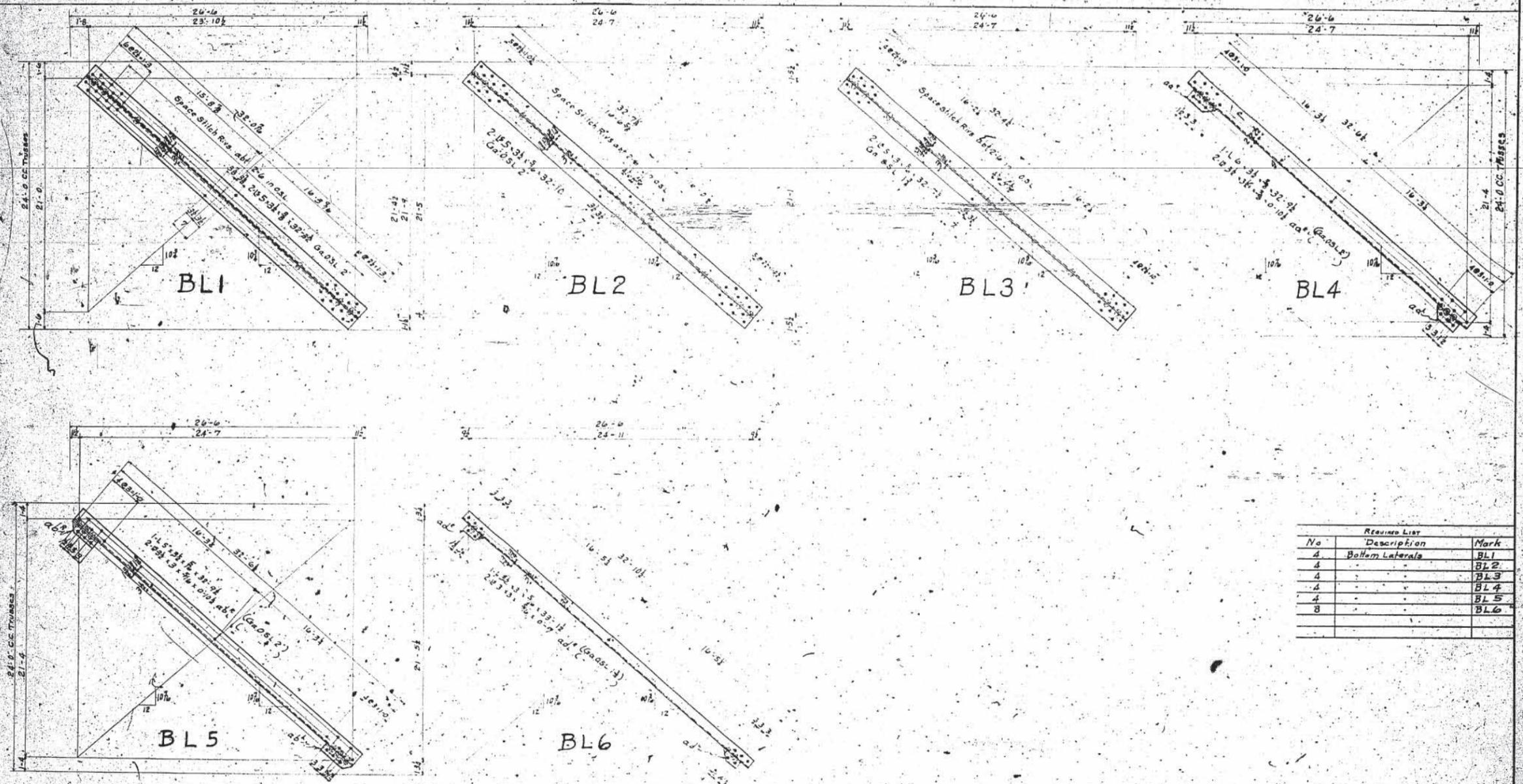
Made by R.M. 2-26-25. Traced by

In charge of PITNEY Checked by W.P.D. 2-28

Revised P.H. Cox by

Scale in. = 1 Ft. Sheet No. 12 of



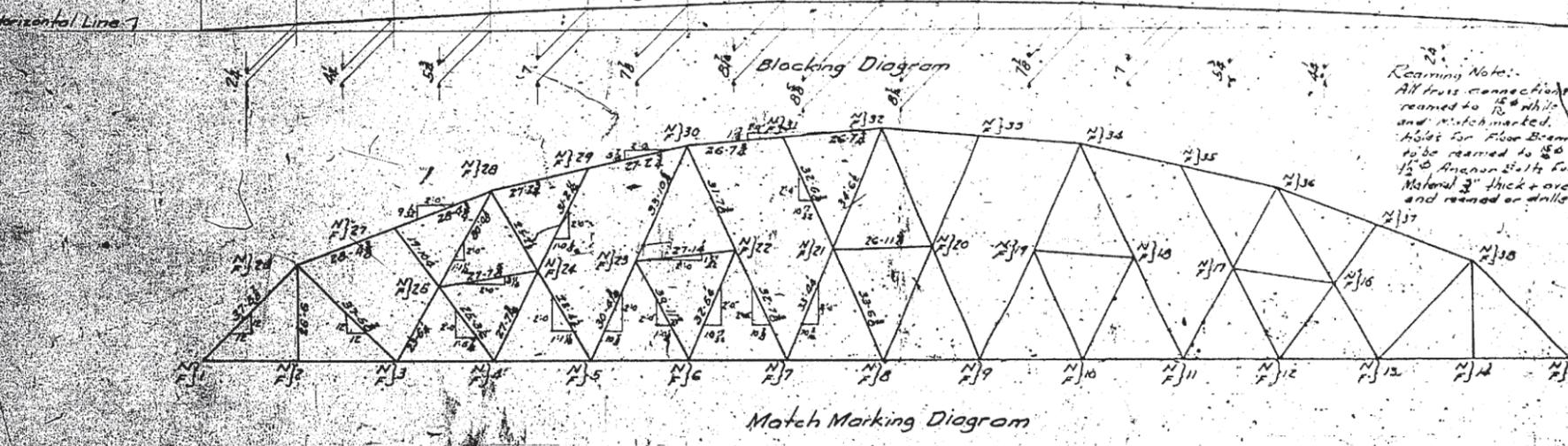
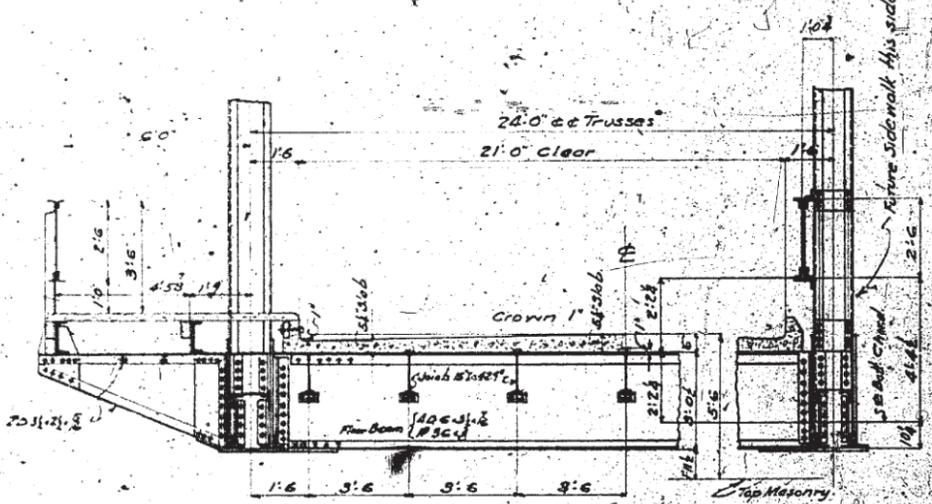
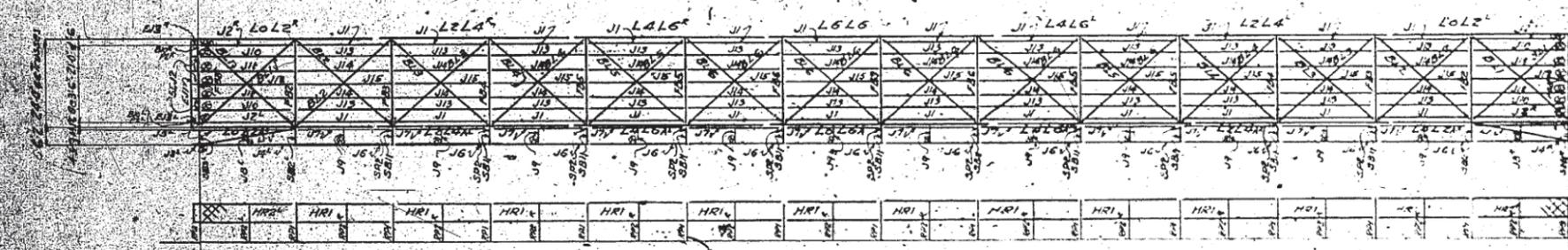
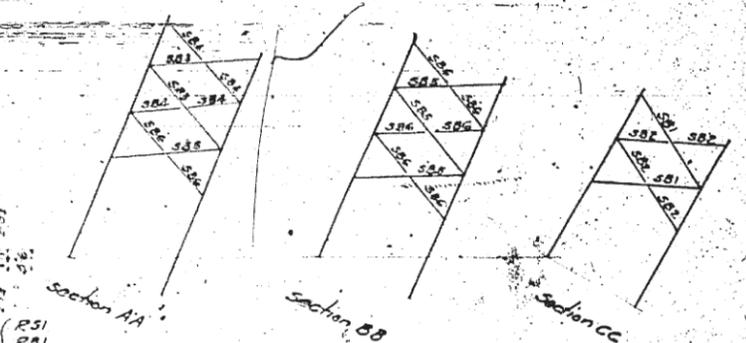
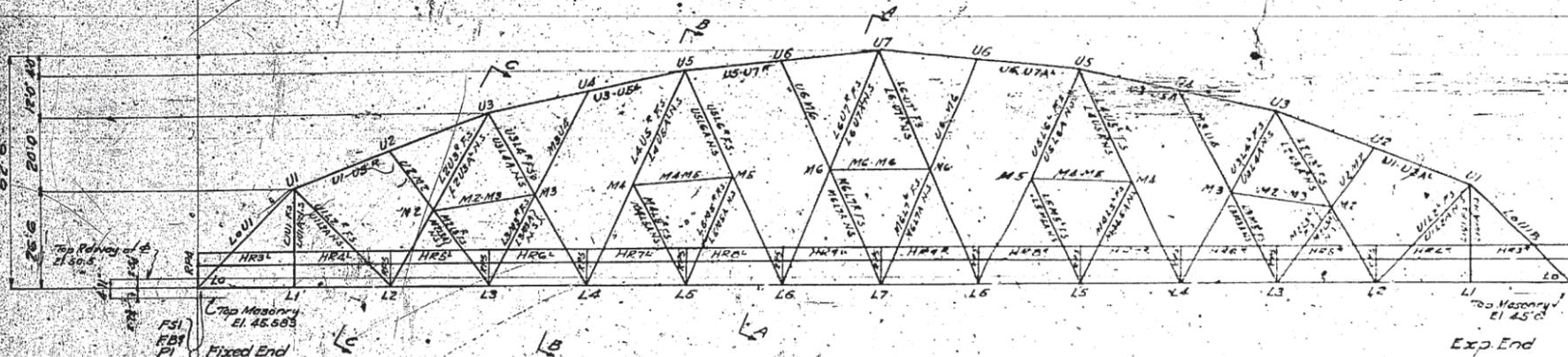
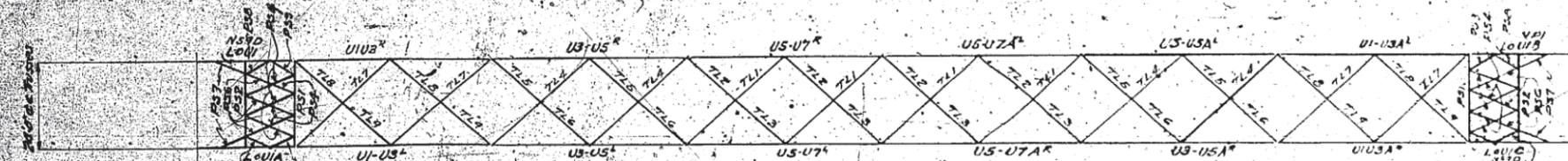


Required List		
No	Description	Mark
4	Bottom Laterals	BL1
4		BL2
4		BL3
4		BL4
4		BL5
8		BL6

GENERAL NOTES:  
 Material Specifications  
 Rivets 7/8"  
 Nuts 1 1/2"  
 Bolts 1 1/2"  
 Welding None  
 Shop Paint One ct. Det. #501  
 Field Paint  
 Erection  
 Field Conn's  
 Inspection

For Gen. Notes See Drawing # 1.

**CONTRACT V-6086**  
 Details of Bottom Laterals  
 For 371'-0" thru Riveted Truss Span  
 Located Mandan St. Pipe Mill River, Pierce Co. Wash.  
 Owner: Puget Sound Bridge and Dredging Co.  
**VIRGINIA BRIDGE AND IRON CO.**  
 ROANOKE, VA.  
 To be fabricated at Memphis, Tenn.  
 Made by H.C. Truss by 2-23-25  
 In charge of Pitney Checked by E.G. 3-4-25  
 Revised Filed by  
 Scale: 1/4" = 1' Ft. Sheet No. 18 of 18 (Final)



Reaming Note:  
 All truss connections to be punched 1/2" and reamed to 1/2" while parts are in assembly and match marked.  
 Holes for Floor Beam & Stringer connections to be reamed to 1/2" to a steel template 1" thick.  
 1/2" diameter bolts furnished & placed by others.  
 Material 3" thick & over to be subpunched and reamed or drilled from the solid.

LIST OF DRAWINGS		
E1 This Sheet	7 Bottom Chord	14 Hand Rail & Rail Posts
8 End Post	8 do.	15 Side Walk Bracket etc.
9 Top Chord	9 Web Members	16 Portable Lateral
10 do.	10 do.	17 Top Lateral
11 do.	11 Sway Bracing & Web Members	18 Bottom Lateral
12 Bottom Chord	12 Floor Beams	
13 do.	13 Shoes, Roller, Wash, Pins, etc.	

GENERAL NOTES:  
 Material A.H. Structural Steel  
 Specifications ASTM A72  
 Rivets 3" unless noted  
 Holes 3/16"  
 Reaming See Note  
 Shop Paint 1/2" Det Graphite 501  
 Field Paint None  
 Erection By others  
 Field Conn's Riveted  
 Inspection Mill & Shop Northwestern Testing Lab.

**CONTRACT V 6086**  
 Details of **ERECTION DIAGRAM**  
 For 37'0" thru Riveted Truss Span  
 Location **Roanoke River Bridge, West**  
 Owner **Pugot Sound Bridge & Iron Co.**  
**VIRGINIA BRIDGE AND IRON CO.**  
**ROANOKE, VA.**  
 To be fabricated at **Roanoke**  
 Made by **P. E. F. 25**  
 In charge of **Fitney**  
 Revised **P. E. F. 25**  
 Scale **1/4" = 1'-0"** Sheet No. **E1**

Material of Shop Bills

**SR 167 Puyallup River Bridge Reuse Assessment – Phase 1**  
**Puyallup, WA**  
**King County Parks and Recreation**

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**Appendix B**  
**Bridge Reuse Cost Estimate**

## Summary of Puyallup River Steel Truss Bridge Re-use Study

### Bridge Removal Option 1 - Lift Truss in One Piece

7/12/2012

Items	Descriptions	Re-use state Puyallup Steel Truss <i>(See Note 5)</i>	New Truss Bridge on Existing Abutments <i>(See Note 6)</i>
a	Design & Planning (Bridge Only)	\$250,000	\$350,000
b	Remove existing steel truss	\$2,723,000	-
c	Rehabilitation <i>(See Note 1)</i>	\$681,000	\$350,000
d	White River Bridge Crossing <i>(See Note 2)</i>	\$2,090,000	\$2,000,000
e	Contingency <i>(25% for reuse, 20% for new of Items c &amp; d)</i>	\$693,000	\$470,000
f	Construction Inspection <i>(20%) (See Note 3)</i>	\$554,000	\$470,000
g	Life Cycle Costs <i>(See Note 4)</i>	similar	similar
	Estimated Costs	<b>\$6,991,000</b>	<b>\$3,640,000</b>
		Cost Differential	<b>\$3,351,000</b>
		Cost Differential with credit from WSDOT for demolition	<b>\$1,134,000</b>

#### If King and Pierce County Parks decide not to re-use state owned Puyallup Steel Truss Bridge

a	Remove existing steel truss (Least Cost Option)	\$2,315,000
b	Salvage existing steels <i>(recycle rebate)</i>	(\$98,000)
	Estimated Costs to WSDOT	<b>\$2,217,000</b>

#### Notes:

- 1 **For re-use of the existing Puyallup steel truss, repairs include**  
Replace corroded and damaged steel and riveted elements, remove lead-based paint, and re-paint  
**For new bridge superstructure (steel truss) and re-use existing abutments at White River**  
Repair top of the existing pier caps and additional scour protection measures
- 2 **For the re-use of the existing Puyallup steel truss**  
Assume two new bridge piers at White River to support the reused bridge and 20% contingency  
**For new bridge superstructure (steel truss) and reused existing abutments at White River**  
Assume repairs of existing pier caps, scour protections, and 20% contingency
- 3 **Assumed construction support services = 20% of construction costs (Items c and d)**
- 4 **Expect similar life cycle costs (construction support services and maintenance) if steel truss for both cases**
- 5 **Assumed four minimum 100 ton cranes to remove the existing steel truss at Puyallup River.**
- 6 **Consider two steel truss spans with a total of 371' supported by the existing three bridge abutments**

## Summary of Puyallup River Steel Truss Bridge Re-use Study

### Bridge Removal Option 2 - Disassemble Truss in Place

7/12/2012

Items	Descriptions	Re-use state Puyallup Steel Truss <i>(See Note 5)</i>	New Truss Bridge on Existing Abutments <i>(See Note 6)</i>
a	Design & Planning (Bridge Only)	\$250,000	\$350,000
b	Remove existing steel truss	\$2,315,000	-
c	Rehabilitation <i>(See Note 1)</i>	\$681,000	\$350,000
d	White River Bridge Crossing <i>(See Note 2)</i>	\$2,090,000	\$2,000,000
e	Contingency <i>(25% for reuse, 20% for new of Items c &amp; d)</i>	\$693,000	\$470,000
f	Construction Inspection <i>(20%) (See Note 3)</i>	\$554,000	\$470,000
g	Life Cycle Costs <i>(See Note 4)</i>	similar	similar
	Estimated Costs	<b>\$6,583,000</b>	<b>\$3,640,000</b>
		Cost Differential	<b>\$2,943,000</b>
		Cost Differential with credit from WSDOT for demolition	<b>\$726,000</b>

#### If King and Pierce County Parks decide not to re-use state owned Puyallup Steel Truss Bridge

a	Remove existing steel truss (Least Cost Option)	\$2,315,000
b	Salvage existing steels <i>(recycle rebate)</i>	(\$98,000)
	Estimated Costs to WSDOT	<b>\$2,217,000</b>

#### Notes:

- 1 **For re-use of the existing Puyallup steel truss, repairs include**  
Replace corroded and damaged steel and riveted elements, remove lead-based paint, and re-paint  
**For new bridge superstructure (steel truss) and re-use existing abutments at White River**  
Repair top of the existing pier caps and additional scour protection measures
- 2 **For the re-use of the existing Puyallup steel truss**  
Assume two new bridge piers at White River to support the reused bridge and 20% contingency  
**For new bridge superstructure (steel truss) and reused existing abutments at White River**  
Assume repairs of existing pier caps, scour protections, and 20% contingency
- 3 **Assumed construction support services = 20% of construction costs (Items c and d)**
- 4 **Expect similar life cycle costs (construction support services and maintenance) if steel truss for both cases**
- 5 **Assumed temporary supports in river to aid removal of the existing steel truss at Puyallup River.**
- 6 **Consider two steel truss spans with a total of 371' supported by existing three bridge piers.**

### List of Assumptions

Item	Description	Unit Cost (Material & Labor)
Temp. Site Prep.	2' Quarry Spalls over 2' Gravel Base over Geofabric	
Total Project Staging Area	2.41AC	
Crane Mobilization	(4) minimum 100 ton Capacity	\$20,000 Each Way
Crane Pads	40'x40'x4' Quarry Spalls	
Bridge Movers	(6) Units - 24 total axle lines	
Connection/Member Abatement	Sandblast or Chemical	\$8/SF
Member Removal	Weight Based	\$2/lb. (\$4000/ton)
Rivet Replacement	Replace with ASTM A325 bolts	\$7.50/Bolt
Coating (Shop Applied)		\$2.25/SF
Coating (Field Applied)		\$8.50/SF
Recycling Rebate		\$260/ton
Temp. Work Bridge (In & Out)	Includes Pile, Beams, Stringers, & Extraction	\$50/SF

### Additional Assumptions

- 1) 20% of all under deck steel components will be replaced.
- 2) Bridge deck is removed prior to the start of removal, no cost associated with this task is included in this estimate
- 3) Timber approach spans and bents are removed prior to the start of removal, no cost is associated with this task is included in this estimate

ACTIVITY AND LOCATION CONCEPTUAL ASSESSMENT COST ESTIMATE PUYALLUP, WA	COST ESTIMATE						SHEET	
	PROJECT NUMBER: FAPWT-12-192						1 of 16	
PROJECT TITLE  SR 167 PUYALLUP RIVER BRIDGE REUSE ASSESSMENT - PHASE 1	ESTIMATED BY BERGERABAM - TTS			CHECKED BY BERGERABAM - CSB			DATE 12-Jul-12	
	STATUS OF DESIGN [X] CONCEPTUAL [ ] 60% [ ] 95% [ ] FINAL							
DESCRIPTION PROJECT SUMMARY SHEET	QUANTITY		MATERIAL COST		LABOR/EQUIP COST		ENGINEERING EST.	
	NUMBER	UNIT	UNIT COST	TOTAL	UNIT COST	TOTAL	UNIT COST	TOTAL
<b>BRIDGE REMOVAL</b>								
BRIDGE REMOVAL OPTION 1 SUMMARY								2,723,000
BRIDGE REMOVAL OPTION 2 SUMMARY								2,315,000
<b>BRIDGE REHABILITATION</b>								
BRIDGE REHABILITATION OPTION 1 SUMMARY								681,000
BRIDGE REHABILITATION OPTION 2 SUMMARY								681,000
<b>BRIDGE RELOCATION &amp; ERECTION</b>								
RELOCATE BRIDGE SUMMARY								2,090,000
<b>OPTION 1 DIRECT PROJECT COST</b>								<b>5,494,000</b>
<b>OPTION 2 DIRECT PROJECT COST</b>								<b>5,086,000</b>
DESIGN & PLANNING (BRIDGE ONLY)								250,000
PROJECT CONTINGENCY	25.0%						Option 1	693,000
							Option 2	693,000
CONSTRUCTION SUPPORT	20.0%						Option 1	554,000
							Option 2	554,000
SUBTOTAL							Option 1	6,991,000
							Option 2	6,583,000
SALES TAX ON MATERIALS (Direct Project Cost Only)	9.0%						Option 1	494,000
							Option 2	458,000
<i>Note: All values are rounded to the nearest thousand dollars.</i>								
<b>PROJECT TOTAL OPTION 1</b>								<b>\$7,485,000</b>
<b>PROJECT TOTAL OPTION 2</b>								<b>\$7,041,000</b>

ACTIVITY AND LOCATION CONCEPTUAL ASSESSMENT COST ESTIMATE PUYALLUP, WA	COST ESTIMATE						SHEET	
	PROJECT NUMBER: FAPWT-12-192						2 of 16	
PROJECT TITLE  SR 167 PUYALLUP RIVER BRIDGE REUSE ASSESSMENT - PHASE 1	ESTIMATED BY BERGERABAM - TTS			CHECKED BY BERGERABAM - CSB			DATE 12-Jul-12	
	STATUS OF DESIGN [X] CONCEPTUAL [ ] 60% [ ] 95% [ ] FINAL							
DESCRIPTION <b>BRIDGE REMOVAL OPTION 1 SUMMARY</b>	QUANTITY		MATERIAL COST		LABOR/EQUIP COST		ENGINEERING EST.	
	NUMBER	UNIT	UNIT COST	TOTAL	UNIT COST	TOTAL	UNIT COST	TOTAL
<b>TEMP. SITE PREPARATION</b>				116,000		63,000		178,000
<b>EQUIPMENT (MOBILIZATION &amp; OPERATION)</b>						368,000		368,000
<b>ABUTMENT &amp; BRIDGE PREPARATION</b>				40,000		462,000		502,000
<b>MEMBER REMOVAL OVER LAND</b>						1,296,000		1,296,000
<b>CONNECTION ABATEMENT</b>						33,000		33,000
<b>EQUIPMENT OVERLAND (MOBILIZATION &amp; OPERATION)</b>						100,000		100,000
<b>DISPOSAL &amp; REMOVAL OF TEMP. CONST.</b>						246,000		246,000
<i>Note: All values are rounded to the nearest thousand dollars.</i>								
<b>TOTAL REMOVAL OPTION 1</b>				\$156,000		\$2,568,000		<b>\$2,723,000</b>

ACTIVITY AND LOCATION CONCEPTUAL ASSESSMENT COST ESTIMATE PUYALLUP, WA	COST ESTIMATE						SHEET	
	PROJECT NUMBER: FAPWT-12-192						3 of 16	
PROJECT TITLE  SR 167 PUYALLUP RIVER BRIDGE REUSE ASSESSMENT - PHASE 1	ESTIMATED BY BERGERABAM - TTS			CHECKED BY BERGERABAM - CSB			DATE 12-Jul-12	
	STATUS OF DESIGN [X] CONCEPTUAL [ ] 60% [ ] 95% [ ] FINAL							
DESCRIPTION <b>BRIDGE REMOVAL OPTION 1</b>	QUANTITY		MATERIAL COST		LABOR/EQUIP COST		ENGINEERING EST.	
	NUMBER	UNIT	UNIT COST	TOTAL	UNIT COST	TOTAL	UNIT COST	TOTAL
<b>TEMP. SITE PREPARATION</b>								
Cut & Chip medium, trees to 12" diameter	2.50	AC			5,249.85	13,125	5,249.85	13,125
Grub stumps and remove	2.50	AC			3,454.74	8,637	3,454.74	8,637
Front end loader spreading, quarry spalls, 3 CY Bucket	4,089	CY	13.93	56,960	0.83	3,394	14.76	60,354
Front end loader spreading, gravel base, 3 CY Bucket	1,948	CY	20.66	40,246	1.24	2,416	21.90	42,661
Geofabric Barrier	26,304	SF	0.29	7,523	0.35	9,206	0.64	16,729
Temporary Fencing (Chainlink 6' high)	1,390	LF	5.41	7,520	1.83	2,544	7.24	10,064
Temporary Abutments at Staging Area Dbl. W36X150	9	TON			2,500.00	22,500	2,500.00	22,500
Crane Pads (40x40x4 Quarry Spalls)	237	CY	13.93	3,301	0.83	197	14.76	3,498
<b>Subtotal</b>				<b>115,550</b>		<b>62,018</b>		<b>177,567</b>
<b>EQUIPMENT (MOBILIZATION &amp; OPERATION)</b>								
Crane Mobilization (\$20k each way)	9.0	EA			20,000.00	180,000	20,000.00	180,000
Crane Operation	48.0	CRANE HR			750.00	36,000	750.00	36,000
Bridge Mover Mobilization & Operations	1.0	LUMP SUM			151,000.00	151,000	151,000.00	151,000
Front end loader 150hp (50mi round trip, mobilization)	1.0	EA			392.45	392	392.45	392
<b>Subtotal</b>						<b>367,392</b>		<b>367,392</b>
<b>ABUTMENT &amp; BRIDGE PREPARATION</b>								
Quarry Spalls for Crane Pad @ Bridge	2,140	CY	13.93	29,810	0.83	1,776	14.76	31,586
Quarry Spalls for Crane Pad @ Road	683	CY	13.93	9,514	0.83	567	14.76	10,081
Quick Deck Falsework	11,130	SF			20.00	222,600	20.00	222,600
Stringer Connection Abatement	413	SF			8.00	3,304	8.00	3,304
Bearing Connection Abatement	68	SF			8.00	544	8.00	544
Stringer Removal	58.00	TON			4,000.00	232,000	4,000.00	232,000
Transport Stringers to Recycler	2.00	EA			600.00	1,200	600.00	1,200
<b>Subtotal</b>				<b>39,324</b>		<b>461,991</b>		<b>501,315</b>
<b>MEMBER REMOVAL OVER LAND</b>								
Bottom Laterals	6.15	TON			4,000.00	24,600	4,000.00	24,600
Top Laterals	12.60	TON			4,000.00	50,400	4,000.00	50,400
Sway Bracing	15.00	TON			4,000.00	60,000	4,000.00	60,000
Floor Beams	34.50	TON			4,000.00	138,000	4,000.00	138,000
Top Chord	146.25	TON			4,000.00	585,000	4,000.00	585,000
Bottom Chods	109.50	TON			4,000.00	438,000	4,000.00	438,000
<b>Subtotal</b>						<b>1,296,000</b>		<b>1,296,000</b>
<b>TOTAL THIS SHEET</b>				<b>\$154,874</b>		<b>\$2,187,401</b>		<b>\$2,342,275</b>

ACTIVITY AND LOCATION CONCEPTUAL ASSESSMENT COST ESTIMATE PUYALLUP, WA	COST ESTIMATE						SHEET	
	PROJECT NUMBER: FAPWT-12-192						4 of 16	
PROJECT TITLE SR 167 PUYALLUP RIVER BRIDGE REUSE ASSESSMENT - PHASE 1	ESTIMATED BY BERGERABAM - TTS			CHECKED BY BERGERABAM - CSB			DATE 12-Jul-12	
	STATUS OF DESIGN [X] CONCEPTUAL [ ] 60% [ ] 95% [ ] FINAL							
DESCRIPTION BRIDGE REMOVAL OPTION 1	QUANTITY		MATERIAL COST		LABOR/EQUIP COST		ENGINEERING EST.	
	NUMBER	UNIT	UNIT COST	TOTAL	UNIT COST	TOTAL	UNIT COST	TOTAL
<b>CONNECTION ABATEMENT</b>								
Bottom Lateral connections	100	SF			8.00	800	8.00	800
Top Lateral connections	64	SF			8.00	512	8.00	512
Floor Beam connections	93	SF			8.00	743	8.00	743
Web Member & Top/Bottom Chord connections	3,775	SF			8.00	30,200	8.00	30,200
<b>Subtotal</b>						<b>32,255</b>		<b>32,255</b>
<b>EQUIPMENT OVERLAND (MOBILIZATION &amp; OPERATION)</b>								
Crane Mobilization (\$20k each way)	1.0	EA			20,000.00	20,000	20,000.00	20,000
Crane Operation	96.0	CRANE HR			750.00	72,000	750.00	72,000
Transport members to fabrication shop	13.0	EA			600.00	7,800	600.00	7,800
<b>Subtotal</b>						<b>99,800</b>		<b>99,800</b>
<b>DISPOSAL &amp; REMOVAL OF TEMP. CONST.</b>								
Hazardous Materials Pickup	1,780	TON			60.00	106,800	60.00	106,800
Hazardous Materials Dump	1,780	TON			40.00	71,200	40.00	71,200
Quarry Spalls Uncontaminated	6,726	CY			8.90	59,861	8.90	59,861
Base Material Uncontaminated	1,288	CY			8.90	11,467	8.90	11,467
Geofabric Barrier	26,304	SF			0.35	9,206	0.35	9,206
Fencing	1,388	LF			1.38	1,915	1.38	1,915
Stringer Disposal	58	TON			-260.00	-15,080	-260.00	-15,080
<b>Subtotal</b>						<b>245,370</b>		<b>245,370</b>
<b>Subtotal</b>								
<b>TOTAL THIS SHEET</b>						<b>\$377,425</b>		<b>\$377,425</b>

ACTIVITY AND LOCATION CONCEPTUAL ASSESSMENT COST ESTIMATE PUYALLUP, WA	COST ESTIMATE						SHEET	
	PROJECT NUMBER: FAPWT-12-192						5 of 16	
PROJECT TITLE  SR 167 PUYALLUP RIVER BRIDGE REUSE ASSESSMENT - PHASE 1	ESTIMATED BY BERGERABAM - TTS			CHECKED BY BERGERABAM - CSB			DATE 12-Jul-12	
	STATUS OF DESIGN [X] CONCEPTUAL [ ] 60% [ ] 95% [ ] FINAL							
DESCRIPTION <b>BRIDGE REMOVAL OPTION 2 SUMMARY</b>	QUANTITY		MATERIAL COST		LABOR/EQUIP COST		ENGINEERING EST.	
	NUMBER	UNIT	UNIT COST	TOTAL	UNIT COST	TOTAL	UNIT COST	TOTAL
<b>EQUIPMENT (MOBILIZATION &amp; OPERATION)</b>						161,000		161,000
<b>ABUTMENT &amp; BRIDGE PREPARATION</b>				30,000		559,000		589,000
<b>DISPOSAL &amp; REMOVAL OF TEMP. SITE</b>						6,000		6,000
<b>CONNECTON ABATEMENT</b>						31,000		31,000
<b>MEMBER REMOVAL</b>						1,528,000		1,528,000
<i>Note: All values are rounded to the nearest thousand dollars.</i>								
<b>TOTAL REMOVAL OPTION 2</b>				\$30,000		\$2,285,000		<b>\$2,315,000</b>

ACTIVITY AND LOCATION CONCEPTUAL ASSESSMENT COST ESTIMATE PUYALLUP, WA	COST ESTIMATE						SHEET	
	PROJECT NUMBER: FAPWT-12-192						6 of 16	
PROJECT TITLE  SR 167 PUYALLUP RIVER BRIDGE REUSE ASSESSMENT - PHASE 1	ESTIMATED BY BERGERABAM - TTS			CHECKED BY BERGERABAM - CSB			DATE 12-Jul-12	
	STATUS OF DESIGN [X] CONCEPTUAL [ ] 60% [ ] 95% [ ] FINAL							
DESCRIPTION <b>BRIDGE REMOVAL OPTION 2</b>	QUANTITY		MATERIAL COST		LABOR/EQUIP COST		ENGINEERING EST.	
	NUMBER	UNIT	UNIT COST	TOTAL	UNIT COST	TOTAL	UNIT COST	TOTAL
<b>EQUIPMENT (MOBILIZATION &amp; OPERATION)</b>								
Crane Mobs (\$20k each way)	4.0	EA			20,000.00	80,000	20,000.00	80,000
Crane Operation	96.0	CRANE HR			750.00	72,000	750.00	72,000
Front end loader 150hp (50mi RT mob/demob)	1.0	EA			392.45	392	392.45	392
Transport Members to Shop (50 mi)	13.0	EA			600.00	7,800	600.00	7,800
<b>Subtotal</b>						<b>160,192</b>		<b>160,192</b>
<b>ABUTMENT &amp; BRIDGE PREPARATION</b>								
Quarry Spalls for Crane Pad @ Bridge	2,140	CY	13.93	29,810	0.83	1,776	14.76	31,586
Temp Bridge Support & Work Bridge	11,130	SF			50.00	556,500	50.00	556,500
<b>Subtotal</b>				<b>29,810</b>		<b>558,276</b>		<b>588,086</b>
<b>DISPOSAL &amp; REMOVAL OF TEMP. SITE</b>								
Quarry Spalls (Non-Contaminated)	2,140	CY			8.90	19,046	8.90	19,046
Transport Stringer to Recycler	2	EA			600.00	1,200	600.00	1,200
Stringer Disposal	58	TON			-260.00	-15,080	-260.00	-15,080
<b>Subtotal</b>						<b>5,166</b>		<b>5,166</b>
<b>TOTAL THIS SHEET</b>						<b>\$29,810</b>	<b>\$723,635</b>	<b>\$753,445</b>

ACTIVITY AND LOCATION CONCEPTUAL ASSESSMENT COST ESTIMATE PUYALLUP, WA	COST ESTIMATE						SHEET	
	PROJECT NUMBER: FAPWT-12-192						7 of 16	
PROJECT TITLE  SR 167 PUYALLUP RIVER BRIDGE REUSE ASSESSMENT - PHASE 1	ESTIMATED BY BERGERABAM - TTS			CHECKED BY BERGERABAM - CSB			DATE 12-Jul-12	
	STATUS OF DESIGN [X] CONCEPTUAL [ ] 60% [ ] 95% [ ] FINAL							
DESCRIPTION <b>BRIDGE REMOVAL OPTION 2</b>	QUANTITY		MATERIAL COST		LABOR/EQUIP COST		ENGINEERING EST.	
	NUMBER	UNIT	UNIT COST	TOTAL	UNIT COST	TOTAL	UNIT COST	TOTAL
<b>CONNECTON ABATEMENT</b>								
Stringers	245	SF			8.00	1,960	8.00	1,960
Bottom Laterals	100	SF			8.00	800	8.00	800
Top Laterals	64	SF			8.00	512	8.00	512
Floor Beams	93	SF			8.00	743	8.00	743
Web Members & Top/Bottom Chords	3,273	SF			8.00	26,184	8.00	26,184
<b>Subtotal</b>						<b>30,199</b>		<b>30,199</b>
<b>MEMBER REMOVAL</b>								
Stringer Removal	58.00	TON			4,000.00	232,000	4,000.00	232,000
Bottom Laterals	6.15	TON			4,000.00	24,600	4,000.00	24,600
Top Laterals	12.60	TON			4,000.00	50,400	4,000.00	50,400
Sway Bracing	15.00	TON			4,000.00	60,000	4,000.00	60,000
Floor Beams	34.50	TON			4,000.00	138,000	4,000.00	138,000
Top Chord	146.25	TON			4,000.00	585,000	4,000.00	585,000
Bottom Chods	109.50	TON			4,000.00	438,000	4,000.00	438,000
<b>Subtotal</b>						<b>1,528,000</b>		<b>1,528,000</b>
<b>Subtotal</b>								
<b>TOTAL THIS SHEET</b>						<b>\$1,558,199</b>		<b>\$1,558,199</b>

ACTIVITY AND LOCATION CONCEPTUAL ASSESSMENT COST ESTIMATE PUYALLUP, WA	COST ESTIMATE						SHEET	
	PROJECT NUMBER: FAPWT-12-192						8 of 16	
PROJECT TITLE  SR 167 PUYALLUP RIVER BRIDGE REUSE ASSESSMENT - PHASE 1	ESTIMATED BY BERGERABAM - TTS			CHECKED BY BERGERABAM - CSB			DATE 12-Jul-12	
	STATUS OF DESIGN [X] CONCEPTUAL [ ] 60% [ ] 95% [ ] FINAL							
DESCRIPTION <b>BRIDGE REHABILITATION OPTION 1 SUMMARY</b>	QUANTITY		MATERIAL COST		LABOR/EQUIP COST		ENGINEERING EST.	
	NUMBER	UNIT	UNIT COST	TOTAL	UNIT COST	TOTAL	UNIT COST	TOTAL
<b>MEMBER ABATEMENT &amp; DISASSEMBLY IN SHOP</b>						453,000		453,000
<b>CONNECTION REPAIR</b>				20,000		23,000		43,000
<b>MEMBER REPLACEMENT</b>				4,000		45,000		49,000
<b>MEMBER COATING (1 Coat)</b>						128,000		128,000
<b>CONNECTION COATING (1 Coat)</b>						8,000		8,000
<i>Note: All values are rounded to the nearest thousand dollars.</i>								
<b>TOTAL REHAB OPTION 1</b>				\$24,000		\$657,000		<b>\$681,000</b>

ACTIVITY AND LOCATION CONCEPTUAL ASSESSMENT COST ESTIMATE PUYALLUP, WA	COST ESTIMATE						SHEET	
	PROJECT NUMBER: FAPWT-12-192						9 of 16	
PROJECT TITLE SR 167 PUYALLUP RIVER BRIDGE REUSE ASSESSMENT - PHASE 1	ESTIMATED BY BERGERABAM - TTS			CHECKED BY BERGERABAM - CSB			DATE 12-Jul-12	
	STATUS OF DESIGN [X] CONCEPTUAL [ ] 60% [ ] 95% [ ] FINAL							
DESCRIPTION <b>BRIDGE REHABILITATION</b>	QUANTITY		MATERIAL COST		LABOR/EQUIP COST		ENGINEERING EST.	
	NUMBER	UNIT	UNIT COST	TOTAL	UNIT COST	TOTAL	UNIT COST	TOTAL
<b>MEMBER ABATEMENT &amp; DISASSEMBLY IN SHOP</b>								
Bottom Laterals	12,763	SF			8.00	102,104	8.00	102,104
Sway Bracing	3,517	SF			8.00	28,136	8.00	28,136
Top Laterals	6,602	SF			8.00	52,816	8.00	52,816
Floor Beams	3,777	SF			8.00	30,216	8.00	30,216
Web Members	15,041	SF			8.00	120,328	8.00	120,328
Top Chords	10,596	SF			8.00	84,768	8.00	84,768
Bottom Chords	4,251	SF			8.00	34,008	8.00	34,008
<b>Subtotal</b>						<b>452,376</b>		<b>452,376</b>
<b>CONNECTION REPAIR</b>								
Rivet Replacement with Bolts	5,616	EA	3.50	19,656	4.00	22,464	7.50	42,120
<b>Subtotal</b>				<b>19,656</b>		<b>22,464</b>		<b>42,120</b>
<b>MEMBER REPLACEMENT</b>								
Floor Beams (20%)	1.0	LUMP SUM			28,021.00	28,021	28,021.00	28,021
Bottom Laterals (20%)	1.00	LUMP SUM			12,313.00	12,313	12,313.00	12,313
Additional Rivet Replacement (20%)	1,123	EA	3.50	3,931	4.00	4,493	7.50	8,424
<b>Subtotal</b>				<b>3,931</b>		<b>44,827</b>		<b>48,758</b>
<b>TOTAL THIS SHEET</b>					<b>\$23,587</b>		<b>\$519,667</b>	<b>\$543,254</b>

ACTIVITY AND LOCATION CONCEPTUAL ASSESSMENT COST ESTIMATE PUYALLUP, WA	COST ESTIMATE						SHEET	
	PROJECT NUMBER: FAPWT-12-192						10 of 16	
PROJECT TITLE  SR 167 PUYALLUP RIVER BRIDGE REUSE ASSESSMENT - PHASE 1	ESTIMATED BY BERGERABAM - TTS			CHECKED BY BERGERABAM - CSB			DATE 12-Jul-12	
	STATUS OF DESIGN [X] CONCEPTUAL [ ] 60% [ ] 95% [ ] FINAL							
DESCRIPTION <b>BRIDGE REHABILITATION</b>	QUANTITY		MATERIAL COST		LABOR/EQUIP COST		ENGINEERING EST.	
	NUMBER	UNIT	UNIT COST	TOTAL	UNIT COST	TOTAL	UNIT COST	TOTAL
<b>MEMBER COATING (1 Coat)</b>								
Bottom Laterals	12,763	SF			2.25	28,717	2.25	28,717
Sway Bracing	3,517	SF			2.25	7,913	2.25	7,913
Top Laterals	6,602	SF			2.25	14,855	2.25	14,855
Floor Beams	3,777	SF			2.25	8,498	2.25	8,498
Web Members	15,041	SF			2.25	33,842	2.25	33,842
Top Chords	10,596	SF			2.25	23,841	2.25	23,841
Bottom Chords	4,251	SF			2.25	9,565	2.25	9,565
<b>Subtotal</b>						<b>127,231</b>		<b>127,231</b>
<b>CONNECTION COATING (1 Coat)</b>								
Bottom Lateral connections	100	SF			2.25	225	2.25	225
Top Lateral connections	64	SF			2.25	144	2.25	144
Floor Beam connections	93	SF			2.25	209	2.25	209
Web Member & Top/Bottom Chord connections	3,273	SF			2.25	7,364	2.25	7,364
<b>Subtotal</b>						<b>7,942</b>		<b>7,942</b>
<b>TOTAL THIS SHEET</b>						<b>\$135,173</b>		<b>\$135,173</b>

ACTIVITY AND LOCATION CONCEPTUAL ASSESSMENT COST ESTIMATE PUYALLUP, WA	COST ESTIMATE						SHEET	
	PROJECT NUMBER: FAPWT-12-192						11 of 16	
PROJECT TITLE  SR 167 PUYALLUP RIVER BRIDGE REUSE ASSESSMENT - PHASE 1	ESTIMATED BY BERGERABAM - TTS			CHECKED BY BERGERABAM - CSB			DATE 12-Jul-12	
	STATUS OF DESIGN [X] CONCEPTUAL [ ] 60% [ ] 95% [ ] FINAL							
DESCRIPTION <b>BRIDGE REHABILITATION OPTION 2 SUMMARY</b>	QUANTITY		MATERIAL COST		LABOR/EQUIP COST		ENGINEERING EST.	
	NUMBER	UNIT	UNIT COST	TOTAL	UNIT COST	TOTAL	UNIT COST	TOTAL
<b>MEMBER ABATEMENT &amp; DISSEMBLY IN SHOP</b>						453,000		453,000
<b>CONNECTION REPAIR</b>				20,000		23,000		43,000
<b>MEMBER REPLACEMENT</b>				4,000		45,000		49,000
<b>MEMBER COATING</b>						128,000		128,000
<b>CONNECTION COATING (1 Coat)</b>						8,000		8,000
<i>Note: All values are rounded to the nearest thousand dollars.</i>								
<b>TOTAL REHAB OPTION 2</b>				\$24,000		\$657,000		<b>\$681,000</b>

ACTIVITY AND LOCATION CONCEPTUAL ASSESSMENT COST ESTIMATE PUYALLUP, WA	COST ESTIMATE						SHEET	
	PROJECT NUMBER: FAPWT-12-192						12 of 16	
PROJECT TITLE  SR 167 PUYALLUP RIVER BRIDGE REUSE ASSESSMENT - PHASE 1	ESTIMATED BY BERGERABAM - TTS			CHECKED BY BERGERABAM - CSB			DATE 12-Jul-12	
	STATUS OF DESIGN [X] CONCEPTUAL [ ] 60% [ ] 95% [ ] FINAL							
DESCRIPTION <b>BRIDGE REHABILITATION</b>	QUANTITY		MATERIAL COST		LABOR/EQUIP COST		ENGINEERING EST.	
	NUMBER	UNIT	UNIT COST	TOTAL	UNIT COST	TOTAL	UNIT COST	TOTAL
<b>MEMBER ABATEMENT &amp; DISSEMBLY IN SHOP</b>								
Bottom Laterals	12,763	SF			8.00	102,104	8.00	102,104
Sway Bracing	3,517	SF			8.00	28,136	8.00	28,136
Top Laterals	6,602	SF			8.00	52,816	8.00	52,816
Floor Beams	3,777	SF			8.00	30,216	8.00	30,216
Web Members	15,041	SF			8.00	120,328	8.00	120,328
Top Chords	10,596	SF			8.00	84,768	8.00	84,768
Bottom Chords	4,251	SF			8.00	34,008	8.00	34,008
<b>Subtotal</b>						<b>452,376</b>		<b>452,376</b>
<b>CONNECTION REPAIR</b>								
Rivet Replacement with Bolts	5,616	EA	3.50	19,656	4.00	22,464	7.50	42,120
<b>Subtotal</b>				<b>19,656</b>		<b>22,464</b>		<b>42,120</b>
<b>MEMBER REPLACEMENT</b>								
Floor Beams (20%)	1.0	L.S			28,021.00	28,021	28,021.00	28,021
Bottom Laterals (20%)	1.00	L.S.			12,313.00	12,313	12,313.00	12,313
Additional Rivet Replacement (20%)	1,123	EA	3.50	3,931	4.00	4,492	7.50	8,423
<b>Subtotal</b>				<b>3,931</b>		<b>44,826</b>		<b>48,757</b>
<b>TOTAL THIS SHEET</b>					<b>\$23,587</b>		<b>\$519,666</b>	<b>\$543,253</b>

ACTIVITY AND LOCATION CONCEPTUAL ASSESSMENT COST ESTIMATE PUYALLUP, WA	COST ESTIMATE						SHEET	
	PROJECT NUMBER: FAPWT-12-192						13 of 16	
PROJECT TITLE  SR 167 PUYALLUP RIVER BRIDGE REUSE ASSESSMENT - PHASE 1	ESTIMATED BY BERGERABAM - TTS			CHECKED BY BERGERABAM - CSB			DATE 12-Jul-12	
	STATUS OF DESIGN [X] CONCEPTUAL [ ] 60% [ ] 95% [ ] FINAL							
DESCRIPTION <b>BRIDGE REHABILITATION</b>	QUANTITY		MATERIAL COST		LABOR/EQUIP COST		ENGINEERING EST.	
	NUMBER	UNIT	UNIT COST	TOTAL	UNIT COST	TOTAL	UNIT COST	TOTAL
<b>MEMBER COATING</b>								
Bottom Laterals	12,763	SF			2.25	28,717	2.25	28,717
Sway Bracing	3,517	SF			2.25	7,913	2.25	7,913
Top Laterals	6,602	SF			2.25	14,855	2.25	14,855
Floor Beams	3,777	SF			2.25	8,498	2.25	8,498
Web Members	15,041	SF			2.25	33,842	2.25	33,842
Top Chords	10,596	SF			2.25	23,841	2.25	23,841
Bottom Chords	4,251	SF			2.25	9,565	2.25	9,565
<b>Subtotal</b>						<b>127,231</b>		<b>127,231</b>
<b>CONNECTION COATING (1 Coat)</b>								
Bottom Lateral connections	100	SF			2.25	225	2.25	225
Top Lateral connections	64	SF			2.25	144	2.25	144
Floor Beam connections	93	SF			2.25	209	2.25	209
Web Member & Top/Bottom Chord connections	3,273	SF			2.25	7,364	2.25	7,364
<b>Subtotal</b>						<b>7,942</b>		<b>7,942</b>
<b>Subtotal</b>								
<b>TOTAL THIS SHEET</b>						<b>\$135,173</b>		<b>\$135,173</b>

ACTIVITY AND LOCATION CONCEPTUAL ASSESSMENT COST ESTIMATE PUYALLUP, WA	COST ESTIMATE						SHEET	
	PROJECT NUMBER: FAPWT-12-192						14 of 16	
PROJECT TITLE  SR 167 PUYALLUP RIVER BRIDGE REUSE ASSESSMENT - PHASE 1	ESTIMATED BY BERGERABAM - TTS			CHECKED BY BERGERABAM - CSB			DATE 12-Jul-12	
	STATUS OF DESIGN [X] CONCEPTUAL [ ] 60% [ ] 95% [ ] FINAL							
DESCRIPTION RELOCATE BRIDGE SUMMARY	QUANTITY		MATERIAL COST		LABOR/EQUIP COST		ENGINEERING EST.	
	NUMBER	UNIT	UNIT COST	TOTAL	UNIT COST	TOTAL	UNIT COST	TOTAL
<b>TEMP. SITE PREPARATION</b>						138,000		138,000
<b>EQUIPMENT (MOB AND OPERATION)</b>						215,000		215,000
<b>MEMBER TRANSPORTATION &amp; ERECTION</b>				33,000		209,000		242,000
<b>TEMP. IN-WATER STRUCTURES</b>				30,000		446,000		476,000
<b>NEW ABUTMENT CONSTRUCTION</b>						194,000		194,000
<b>MODIFICATIONS TO EXISTING PIERS</b>						6,000		6,000
<b>HYDRAULIC MITIGATION</b>						308,000		308,000
<b>FIELD COATING, 2 COATS (\$4.25/SF/COAT)</b>						511,000		511,000
<i>Note: All values are rounded to the nearest thousand dollars.</i>								
<b>TOTAL RELOCATION SUMMARY</b>					\$63,000		\$2,027,000	<b>\$2,090,000</b>

ACTIVITY AND LOCATION CONCEPTUAL ASSESSMENT COST ESTIMATE PUYALLUP, WA	COST ESTIMATE						SHEET	
	PROJECT NUMBER: FAPWT-12-192						15 of 16	
PROJECT TITLE SR 167 PUYALLUP RIVER BRIDGE REUSE ASSESSMENT - PHASE 1	ESTIMATED BY BERGERABAM - TTS			CHECKED BY BERGERABAM - CSB			DATE 12-Jul-12	
	STATUS OF DESIGN [X] CONCEPTUAL [ ] 60% [ ] 95% [ ] FINAL							
DESCRIPTION RELOCATE BRIDGE SHEET 1	QUANTITY		MATERIAL COST		LABOR/EQUIP COST		ENGINEERING EST.	
	NUMBER	UNIT	UNIT COST	TOTAL	UNIT COST	TOTAL	UNIT COST	TOTAL
<b>TEMP. SITE PREPARATION</b>								
CLEARING AND GRUBBING	1	L.S.			21,700.00	21,700	21,700.00	21,700
CONSTRUCTION SURVEYING	1	L.S.			16,280.00	16,280	16,280.00	16,280
EROSION CONTROL SUPERVISOR AND LABOR	1	L.S.			15,000.00	15,000	15,000.00	15,000
EROSION CONTROL BLANKET	1090	S.Y.			10.00	10,900	10.00	10,900
SILT FENCE	1630	LF			6.00	9,780	6.00	9,780
TEMPORARY SEDIMENTATION CONTROL SITE	3	EACH			5,000.00	15,000	5,000.00	15,000
SEEDING, FERTILIZING, AND MULCHING	1	ACRE			8,000.00	8,000	8,000.00	8,000
SITE RESTORATION	1	LS			16,280.00	16,280	16,280.00	16,280
TEMP. STRUCT. @ BOISE CREEK FOR CONST ACCESS	1	EACH			25,000.00	25,000	25,000.00	25,000
<b>Subtotal</b>						<b>137,940</b>		<b>137,940</b>
<b>EQUIPMENT (MOB AND OPERATION)</b>								
General Mobilization	1	L.S.			180,000.00	180,000	180,000.00	180,000
Crane Mobilization	1.0	L.S.			35,000.00	35,000	35,000.00	35,000
<b>Subtotal</b>						<b>215,000</b>		<b>215,000</b>
<b>MEMBER TRANSPORTATION &amp; ERECTION</b>								
Transport Members to Site	15	EA			600.00	9,000	600.00	9,000
Steel Erection and Pylon Erection	1.0	L.S.			37,970.00	37,970	37,970.00	37,970
New Guard Rail	782	LF			174.00	136,068	174.00	136,068
Precast Decking	5,022	SF	6.55	32,894	5.01	25,160	11.56	58,054
<b>Subtotal</b>				<b>32,894</b>		<b>208,198</b>		<b>241,092</b>
<b>TEMP. IN-WATER STRUCTURES</b>								
Work Bridge (Piles, Bents, Decking) In & Out	8,892.0	SF			50.00	444,600	50.00	444,600
Quarry Spalls for Crane Pad @ Bridge	2,140	CY	13.93	29,810	0.83	1,776	14.76	31,586
<b>Subtotal</b>				<b>29,810</b>		<b>446,376</b>		<b>476,186</b>
<b>TOTAL THIS SHEET</b>					\$62,704	\$1,007,514		<b>\$1,070,219</b>

ACTIVITY AND LOCATION CONCEPTUAL ASSESSMENT COST ESTIMATE PUYALLUP, WA	COST ESTIMATE						SHEET	
	PROJECT NUMBER: FAPWT-12-192						16 of 16	
PROJECT TITLE SR 167 PUYALLUP RIVER BRIDGE REUSE ASSESSMENT - PHASE 1	ESTIMATED BY BERGERABAM - TTS			CHECKED BY BERGERABAM - CSB			DATE 12-Jul-12	
	STATUS OF DESIGN [X] CONCEPTUAL [ ] 60% [ ] 95% [ ] FINAL							
DESCRIPTION <b>RELOCATE BRIDGE SHEET 2</b>	QUANTITY		MATERIAL COST		LABOR/EQUIP COST		ENGINEERING EST.	
	NUMBER	UNIT	UNIT COST	TOTAL	UNIT COST	TOTAL	UNIT COST	TOTAL
<b>NEW ABUTMENT CONSTRUCTION</b>								
Structure Excavation Class A Incl. Haul	280	C.Y.			25.00	7,000	25.00	7,000
Concrete Class 4000 for Bridge Deck	265	C.Y.			600.00	159,000	600.00	159,000
St. Reinf. Bar for Bridge Deck	14380	LB			1.50	21,570	1.50	21,570
Shoring or Extra Excavation Class A Incl. Haul	2	L.S.			2,170.00	4,340	2,170.00	4,340
Gravel Backfill for Foundation Class A	60	TON			25.00	1,500	25.00	1,500
<b>Subtotal</b>						<b>193,410</b>		<b>193,410</b>
<b>MODIFICATIONS TO EXISTING PIERS</b>								
Removing Portion of Existing Bridge Piers	1	L.S.			5,430.00	5,430	5,430.00	5,430
<b>Subtotal</b>						<b>5,430</b>		<b>5,430</b>
<b>HYDRAULIC MITIGATION</b>								
Structure Excavation Class A Incl. Hual - Inside Cofferdam	1,180	CY			120.00	141,600	120.00	141,600
Cofferdam	2,200	SF			45.00	99,000	45.00	99,000
Heavy Loose RipRap	2,230	TON			30.00	66,900	30.00	66,900
<b>Subtotal</b>						<b>307,500</b>		<b>307,500</b>
<b>FIELD COATING, 2 COATS (\$4.25/SF/COAT)</b>								
Bottom Laterals	12,763	SF			8.50	108,486	8.50	108,486
Sway Bracing	3,517	SF			8.50	29,895	8.50	29,895
Top Laterals	6,602	SF			8.50	56,117	8.50	56,117
Floor Beams	3,777	SF			8.50	32,105	8.50	32,105
Web Members	15,041	SF			8.50	127,849	8.50	127,849
Top Chords	10,596	SF			8.50	90,066	8.50	90,066
Bottom Chords	4,251	SF			8.50	36,134	8.50	36,134
Bottom Lateral connections	100	SF			8.50	850	8.50	850
Top Lateral connections	64	SF			8.50	544	8.50	544
Floor Beam connections	93	SF			8.50	789	8.50	789
Web Member & Top/Bottom Chord connections	3,273	SF			8.50	27,821	8.50	27,821
<b>Subtotal</b>						<b>510,653</b>		<b>510,653</b>
<b>TOTAL THIS SHEET</b>						<b>\$1,016,993</b>		<b>\$1,016,993</b>

**SR 167 Puyallup River Bridge Reuse Assessment – Phase 1**  
**Puyallup, WA**  
**King County Parks and Recreation**

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**Appendix C**  
**New Construction Cost Estimate**

**FOOTHILLS TRAIL - PROPOSED WHITE RIVER CONNECTOR**  
PRELIMINARY COST ESTIMATE

5/22/2012

**TRAIL BRIDGE OVER WHITE RIVER - PREFABRICATED PARALLEL TRUSS MAIN SPAN**

ITEM NO.	STD ITEM	ITEM	UNIT	QUANTITY	UNIT COST	TOTAL COST	
<b>GENERAL</b>							
	0001	MOBILIZATION	L.S.	LUMP SUM	\$169,000.00	\$169,000.00	
		CLEARING AND GRUBBING	L.S.	LUMP SUM	\$20,000.00	\$20,000.00	
		CRUSHED SURFACING BASE COURSE FOR TRAIL	L.S.	LUMP SUM	\$0.00	\$0.00	
		CONSTRUCTION SURVEYING	L.S.	LUMP SUM	\$15,000.00	\$15,000.00	
		CRUSHED SURFACING BASE COURSE FOR STAGING ALONG PROJECT	TON	0.00		\$0.00	
		EROSION CONTROL SUPERVISOR AND LABOR	L.S.	LUMP SUM	\$15,000.00	\$15,000.00	
		EROSION CONTROL BLANKET	S.Y.	1,000.00	\$10.00	\$10,000.00	
		SILT FENCE	LF	1,500.00	\$6.00	\$9,000.00	
		TEMPORARY SEDIMENTATION CONTROL SITE	EACH	2	\$5,000.00	\$10,000.00	
		SEEDING, FERTILIZING, AND MULCHING	ACRE	0.40	\$8,000.00	\$3,200.00	
		SITE RESTORATION	LS	LUMP SUM	\$15,000.00	\$15,000.00	
		ASPHALT (HMA CL. 1/2 IN PG)	TON	0.00	\$330.00	\$0.00	
		TEMPORARY STRUCTURE CROSSING BOISE CREEK FOR CONST ACC	EACH	1	\$25,000.00	\$25,000.00	291,200
<b>BRIDGE - 2 SPANS @ 171' - PREFABRICATED PARALLEL TRUSS WITH CONCRETE DECK</b>							
		STEEL RAILINGS	LF	700	\$87.00	\$60,900.00	
		CONCRETE CLASS 4000D FOR BRIDGE	C.Y.		\$900.00	#VALUE!	
		ST. REINF. BAR FOR BRIDGE	LB		\$1.50	#VALUE!	
		STRUCTURAL CARBON STEEL	LB		\$2.90	#VALUE!	
		ELASTOMERIC BEARING PAD	EACH	8	\$500.00	\$4,000.00	
		CRANE MOBILIZATION	L.S.	LUMP SUM	\$80,000.00	\$80,000.00	
		STEEL ERECTION	L.S.	LUMP SUM	\$200,000.00	\$200,000.00	
		CABLE STAYS (270 KSI PRESTRESSING STRAND)	LB	0	\$15.00	\$0.00	
		PRECAST CONCRETE PYLON	L.S.	LUMP SUM	\$0.00	\$0.00	
		FRP DECK WITH POLYMER CONCRETE WEARING SURFACE	SF	0	\$70.00	\$0.00	1,180,730
TOTAL COST FOR BRIDGE =						\$970,730.00	
<b>TRESTLE - STEEL</b>							
		STEEL HANDRAIL	LF	0	\$90.00	\$0.00	
		CONCRETE CLASS 4000D FOR BRIDGE	CY	0	\$800.00	\$0.00	
		CONCRETE CLASS 4000 FOR BRIDGE	CY	0	\$800.00	\$0.00	
		ST. REINF BAR FOR BRIDGE	LB	0	\$1.35	\$0.00	
		STRUCTURAL CARBON STEEL	LB	0	\$2.50	\$0.00	
		STRUCTURE EXCAVATION CLASS A INCL. HAUL	CY	0	\$80.00	\$0.00	
		PIPE 6 STD. PIN PILES	EACH	0	\$1,000.00	\$0.00	0.00
<b>ABUTMENTS</b>							
		STRUCTURE EXCAVATION CLASS A INCL. HAUL	C.Y.	60	\$25.00	\$1,500.00	
		CONCRETE CLASS 4000 FOR BRIDGE	C.Y.	34.00	\$600.00	\$20,400.00	
		ST. REINF BAR FOR BRIDGE	LB	6,620	\$1.50	\$9,930.00	
		SHORING OR EXTRA EXCAVATION CLASS A INCL. HAUL	L.S.	LUMP SUM	\$2,000.00	\$2,000.00	
		GRAVEL BACKFILL FOR FOUNDATIONS CLASS A	TON	22	\$25.00	\$550.00	34,380
<b>MODIFICATIONS TO EXISTING PIERS</b>							
		REMOVING PORTION OF EXISTING BRIDGE	LS	LUMP SUM	\$5,000.00	\$5,000.00	
		MASONRY DRILLING 1-1/2" DIAMETER	LF	120	\$30.00	\$3,600.00	
		CONCRETE CLASS 4000 FOR BRIDGE	C.Y.	45	\$900.00	\$40,500.00	
		ST. REINF BAR FOR BRIDGE	LB	10,650	\$1.50	\$15,975.00	65,075
<b>TEMPORARY FALSEWORK BENT</b>							
		FURNISHING STEEL PILING	LF	400	\$40.00	\$16,000.00	
		DRIVING STEEL PILES	EACH	8	\$925.00	\$7,400.00	
		STRUCTURAL CARBON STEEL	LB	8,000	\$2.90	\$23,200.00	46,600
<b>TEMPORARY PLATFORM ON TIMBER PILES (FOR CRANE)</b>							
		FURNISHING TIMBER PILING - UNTREATED	LF	0	\$10.00	\$0.00	
		DRIVING TIMBER PILES - UNTREATED	EACH	0	\$450.00	\$0.00	
		TIMBER AND LUMBER - UNTREATED	MBM	0	\$2,000.00	\$0.00	0
<b>HYDRAULIC MITIGATION</b>							
		STRUCTURE EXCAVATION CLASS A INCL HAUL - INSIDE COFFERDAM	CY	1,080	\$120.00	\$129,600.00	
		COFFERDAM	SF	2,025	\$45.00	\$91,125.00	
		HEAVY LOOSE RIPRAP	TON	2,050	\$30.00	\$61,500.00	282,225
<b>ENVIRONMENTAL</b>							
		PERMITTING				\$0.00	
		MITIGATION				\$0.00	
							0
<b>TOTAL BID AMOUNT:</b>						<b>\$1,900,210.00</b>	<b>1,900,210</b>
<b>CONTINGENCY @ 20% OF BID AMOUNT:</b>						<b>\$380,042.00</b>	
<b>MITIGATION PLANTING (COUNTY FORCE):</b>						<b>\$10,000.00</b>	
<b>TOTAL CONSTRUCTION (OPTION 3):</b>						<b>\$2,290,252.00</b>	
<b>KC INSPECTION @ 30% OF TOTAL BID AMOUNT (OPTION 9):</b>						<b>\$570,063.00</b>	
<b>TOTAL CONSTRUCTION COST:</b>						<b>\$2,860,315.00</b>	