Community Development Department
Director: Lauren Prentice
310 W. Poplar, Suite 200 | Walla Walla, WA 99362
commdev@co.walla-walla.wa.us | 509-524-2610
https://www.co.walla-walla.wa.us/residents/community_development/index.php

STAFF REPORT

To:	Walla Walla County Hearing Examiner
From:	Jennifer Ballard, Senior Planner
Date Prepared:	February 6, 2023
Hearing Date:	February 13, 2023
RE:	**Agenda Item #1–** File Number SHR22-001, Dell Sharpe Bridge Replacement on Pettyjohn Road Shoreline Substantial Development Permit for Walla Walla County Public Works.

Summary of Proposal

Walla Walla County Public Works proposes to remove and replace Dell Sharpe Bridge on Pettyjohn Road, which spans the Touchet River. The Dell Sharpe Bridge was constructed in 1914 and is considered to be at the end of its useful life; stability issues anticipated due to scour of the bridge foundation by the Touchet River, and the constrained meander caused by the bridge's design, as well safety concerns due to vehicular line of sight limitations. The new bridge location will be approximately 400 feet upstream of the existing bridge location. The existing bridge is 19 feet wide and 155 feet in length, while the replacement bridge will be 32 feet wide and 320 feet in length. Construction is anticipated to run from July 2023 to September 2024. This project is generally located at the Dell Sharpe Bridge on Pettyjohn Road, north of the intersection with Pettyjohn Road and Sharp Road, in the vicinity of parcels 350903110001, 350902210003, 350902240002 and 350902220006. Both the existing and replacement bridges are located within the Primary Agriculture (PA-40) zoning district and Rural Conservancy Shoreline Environment designation of the Touchet River.

Recommendation

Staff recommends that the Hearing Examiner approve the shoreline substantial development permit (SHR22-001), subject to the recommended conditions of approval in the staff report.

General Information

Property Owner(s):

Walla Walla County c/o Public Works Department
PO Box 813
Walla Walla, WA 99362

Additional right-of-way (ROW) in shoreline jurisdiction yet to be acquired (see Exhibit 17) from:
Melvin L Talbott (APN 350902210003)
PO Box 203
Prescott, WA 99348

Applicant:	Walla Walla County Public Works Department c/o Seth Walker 990 Navion Ln Walla Walla, WA 99362
Assessor's Parcel No.:	Existing public right-of-way and APN 350902210003
Location:	Dell Sharpe Bridge on Pettyjohn Rd over the Touchet River north of the intersection of Pettyjohn Road and Sharp Road, Prescott, WA,
Zoning District:	PA-40
Comprehensive Plan Land Use Designation:	Primary Agriculture
Shoreline:	Touchet River
Shoreline Designation:	Rural Conservancy

Public Notice

On March 7, 2022, a Notice of Application with Optional Determination of Non-Significance (NOA/ODNS) was issued for SHR22-001/SEPA22-006. The NOA/ODNS was published in the Walla Walla Union Bulletin and Waitsburg Times, published on the Community Development Department (CDD) website, and posted at the southern end of the Dell Sharpe Bridge on Pettyjohn Rd on March 7, 2022 (Exhibit 2).

A Notice of Public Hearing (NOPH) was issued and published on the CDD website and mailed to property owners within 500-feet of the boundary of the subject property on January 30, 2023. The NOPH was published in the Walla Walla Union Bulletin and Waitsburg Times newspapers on February 2, 2023 (Exhibit 3).

These notification procedures are consistent with the Notice of Application requirements in Walla Walla County Code (WWCC) 14.07.080 and the Notice of Public Hearing requirements in WWCC 14.09.065, and the noticing requirements of Walla Walla County's Shoreline Master Program (SMP).

Agencies Contacted

Application materials were distributed with the NOA/ODNS to the following agencies for review and comment on March 7, 2022:

- Walla Walla County Building Official/Fire Marshal
- Walla Walla County Department of Community Health, Environmental Health Division
- Walla Walla County Public Works Department
- Walla Walla County GIS Department
- Walla Walla County Fire District No. 7
- Prescott School District
- City of Prescott
- City of Waitsburg
- Walla Walla County Sherriff

- Washington State Department of Ecology (Ecology)
- Washington State Department of Transportation (WSDOT)
- Washington State Department of Fish and Wildlife
- Washington State Department of Natural Resources
- Washington State Department of Archaeology and Historic Preservation (DAHP)
- Walla Walla Valley Metropolitan Planning Organization
- Walla Walla County Conservation District
- Confederated Tribes of the Umatilla Indian Reservation
- US Army Corps of Engineers

Comments were received from the Walla Walla County Fire Marshal/Building Official and the Washington State Department of Ecology (Exhibit 4).

The Department of Ecology noted that some construction and demolition wastes may qualify as dangerous wastes in Washington state, directing the applicant to the related Ecology webpage, and stated the project should obtain a Construction Stormwater General Permit, as soil disturbances were stated to be approximately 3.35 acres.

The Walla Walla County Building Official/Fire Marshal reviewed the application and supporting documents, noting *"the bridge design is HL-93 for loading, meets Fire requirements per County Road Standards."*

Public Comments

No public comments have been received, only requests for project information from Melvin Talbott, Monesa Grant, and Mary Grant Tompkins.

SEPA Review

The State Environmental Policy Act (SEPA) Lead Agency for this project was Walla Walla County Community Development. A SEPA Checklist, SEPA22-006, was submitted by the Applicant on February 11, 2022 (Exhibit 6). As noted above, the Optional DNS process was used and a NOA/ODNS was issued on March 7, 2022, with a 14-day comment period.

A Final Determination of Non-Significance (DNS) was made on January 27, 2023 (Exhibit 8). A SEPA Staff Evaluation Report summarizing this review is included in Exhibit 8.

Walla Walla County Shoreline Master Program

In the SMP, the effected portion of the Touchet River is assigned the Rural Conservancy Environment designation.

According to the 'Transportation and Parking' section of the Shoreline Use or Modification Table (SMP Page 50) new bridges require a shoreline substantial development permit (SDP) or exemption. Walla Walla County uses the State Joint Aquatic Resources Project Approval (JARPA) form as the shoreline permit application, per SMP 7.5.B, for all shoreline reviews. (Exhibit 10)

Shoreline Substantial Development Permits

Section 7.6.A-B, page 80, of the SMP provides the criteria for shoreline substantial development permitting:

A. *A shoreline Substantial Development Permit shall be required for all development of shorelines, unless the proposals is specifically exempt per Section 7.4 (Exemption from Permit Requirements) or is not subject to the SMP per Section 1.3.3 (Applicability).*

   Staff Assessment: The proposed bridge replacement is not exempt from a shoreline substantial development permit under the transportation facility replacement definition in RCW 90.58.356(1)(c) as the proposed replacement structure does not "substantially conform" to the design and location of the original structure.

B. *A substantial development permit shall be granted only when the development proposed is consistent with:*
   1. *The policies and procedures of the SMA;*
   2. *The provisions of WAC 173-27; and*
   3. *This SMP.*

   Staff Assessment: The proposal is consistent with 76.6.B with conditions of approval per below analysis.

Shoreline Environment Designation

Management Policies for the Rural Conservancy Environment designation are included in Section 4.3 (Page 30) of the SMP.

C. *Management Polices:*
   1. *Allow agricultural activities and expansions of current agricultural activities on previously un-farmed lands consistent with this SMP.*
   2. *Development standards should seek to conserve soils and water resources suitable for agricultural purposes.*
   3. *Low-intensity, water-oriented commercial and industrial uses may be permitted in limited instances where those uses have been located in the past or at unique sites in rural communities that possess shoreline conditions and services to support the use.*
   4. *New structural shoreline stabilization and flood control works should only be allowed where there is a documented need to protect an existing structure or ecological function.*
   5. *Activities and uses should be compatible with the rural character, including the overall density pattern.*

Shoreline Policies and Regulations for Transportation and Circulation

Section 6.21 (Page 76), of the SMP provides the policies and regulations that apply to transportation projects. Below are the applicable policies and regulations.

Policies

Policy-1. *Design, implement, and locate new roads, railroads, and parking facilities in such a manner as to result in no net loss of shoreline ecological function.*

Policy-2. *Encourage a circulation system which will efficiently and safely move people, goods and services to minimize disruption or adverse effect on the shoreline areas.*

Policy-3. *Encourage circulation planning systems for pedestrian and bicycle transportation where appropriate.*

Policy-4. *Require that circulation planning and projects support existing and proposed shoreline uses that are consistent with this SMP.*
Policy-5. *New roads and railroads in shoreline jurisdiction should be located as far landward from the shoreline as possible.*
Policy-6. *Consider viewpoints, parking, trails and similar improvements for transportation system projects in shoreline areas*.

Regulations

Note, regulations SMP 6.21 F-H pertain to parking areas and stand-alone parking lots and parking garages. As parking is not part of this proposal, these regulations are not applicable and thus not included herein.

A. When it is necessary to locate transportation infrastructure within shoreline jurisdiction, such facilities should be designed to minimize the amount of land area consumed and located as far landward from the shoreline as possible.

Staff Assessment: The replacement bridge is located as far from the shoreline as practicable given that it must tie into the existing road network and meet grade and line of sight requirements for new road construction.

B. Proper design, location, and construction of road and railroad facilities should be exercised to:

1. *Minimize erosion and maintain slope stability using methods consistent with the most current WSDOT design manual.*
2. *Permit the natural movement of water.*
3. *Prevent the entry of pollutants or waste materials into the water body.*
4. *Use existing topography and preserve natural conditions to the greatest practical extent.*
5. *Provide to the degree practical, scenic corridors, rest areas, viewpoints and other public amenities in public shoreline areas.*

Staff Assessment:

1. Per the Applicant, the site will be stabilized by plantings and restoration per sheets SP01-03 and LP01-03 (Exhibit 9).
2. The proposed bridge is 320-feet in length, as opposed to the existing bridge's 155-feet in length, in order to span as much of the channel and bank of the Touchet River as practicable and minimize impact on the floodplain. The proposed bridge also has one (1) central pier that is located outside of the current channel during low flows, unlike the current bridge. The proposed bridge has an average of more than three (3) feet of clearance between the lowest horizontal member of the bridge deck and one percent (1%) annual chance flood base flood elevation to reduce impediments to the natural movement of water and woody debris in the Touchet River during high flow events.
   Construction of the center pier and removal of the existing bridge piers and abutments will occur during the low flow months to minimize disruption to water flows and the aquatic habitat.

3. The runoff from the existing bridge runs either directly into the Touchet River or into roadside ditches that drain into the Touchet River. The proposed bridge design ensures runoff will be captured in infiltration areas (Exhibits 9 and 15).
4. Per the Applicant, construction will tie into existing topography to the maximum extent possible.
5. Per the Applicant, providing scenic corridors, rest areas, viewpoints and other public amenities is not practical as the overall construction area is fairly small and limited to bridge replacement.

C. *Encourage the retention of extensive loops or spurs of old highways in SMP jurisdiction with high aesthetic quality or trail route potential to be used as pleasure bypass routes.*

Staff Assessment: Not applicable in this project as the old bridge must be removed, not retained and the County does not own land in the area, rather the roads will be within easements (rights-of-way).

D. *Transportation facilities shall be constructed of materials which will not adversely affect water quality or aquatic plants and animals over the long-term. Elements within or over water shall be constructed of materials approved by applicable state agencies for use in water for both submerged portions and other components to avoid discharge of pollutants from splash, rain or runoff. Wood or pilings treated with creosote, pentachlorophenol or other similarly toxic materials is prohibited. Preferred materials are concrete and steel.*

Staff Assessment: The bridge will be constructed of reinforced concrete.

E. *Transportation and parking development shall be carried out in a manner that maintains or improves state water quality standards for affected waters and results in no net loss of shoreline ecological function.*

Staff Assessment: Construction of the center pier and removal of the existing bridge piers and abutments will occur during the low flow months to minimize disruption to water flows and the aquatic habitat. Native plantings will stabilize the shoreline and mitigate for habitat loss.

Archaeological and Historic Resources

The cultural impacts of the replacement of the Dell Sharpe Bridge, which was constructed in 1914, were identified in the Cultural Resources Report prepared by Plateau Archaeological Investigations LLC (Exhibit 7) and confirmed by DAHP. A memorandum of understanding was entered into between DAHP, WSDOT and Walla Walla County in 2021, prior to submittal of the shoreline permit application and SEPA Checklist SEPA22-006, to mitigate the impact of demolishing the Dell Sharpe Bridge (Exhibit 5).

Critical Areas

Critical areas within SMP jurisdiction are subject to the critical area regulations in Appendix A of the SMP. The following critical areas are mapped as within or adjacent to the subject property per Ordinance 476.

- Critical Aquifer Recharge Areas (High Recharge Vulnerability)
- Frequently Flooded Areas (Floodplain)
- Wetlands
- Geologically Hazardous Areas (Moderate to High Potential Liquefaction Susceptibility, Steep Slopes)
- Fish & Wildlife Habitat Conservation Areas (Habitats of Local Importance: Ferruginous Hawk, Riparian Buffer)

Staff Assessment:

1. Critical Aquifer Recharge Areas

New transportation infrastructure and associated stormwater management is not a listed use in the Critical Aquifer Recharge areas per SMP Appendix A Sections 2.4, 2.7, 2.8, 2.9, 2.10 or 1.14. Per Appendix A Section 2.6.D the SMP administrator determined sufficient information is available to evaluate the potential risk of contamination to the Walla Walla River shallow gravel aquifer from the use and will not contaminate the aquifer.

2. Frequently Flooded Areas

Per Flood Insurance Rate Map Panel number 5301940225C, the project site is in an un-numbered A zone with no base flood elevations established and no floodway delineated. Per modeling performed (Exhibit 14) there will be no upstream increase in one percent annual change flood water surface elevations due to this project.

3. Wetlands

On site investigation shows no wetlands in the project area (Exhibit 12, page 5).

4. Geologically Hazardous Areas

Liquefaction Susceptibility was assessed in the Geotechnical Report (Exhibit 16) and determined to be low at the project site. The short vertical slopes identified in the Critical Areas Report are most likely fluvial terraces created by the flow of the Touchet River. Impacted slopes will be graded and vegetated to correct any construction caused destabilization. Geotextile and riprap will be used to stabilize the newly created steep slopes resulting from the bridge abutments/retaining wall construction.

5. Fish & Wildlife Habitat Conservation Areas - Riparian Buffer

A bridge to cross a water body is considered a water dependent use and therefore does not have a required buffer per SMP Appendix A 6.5.B.2. Instead, mitigation is required to compensate for the impacts to fish and wildlife habitat and vegetation conservation areas by replacing, enhancing, or providing substitute resources, and then monitoring the impacted area and required mitigation for a reasonable period of time and taking remedial action when necessary. See SMP Section 5.1 Mitigation Plan, SMP Section 5.3 Vegetation Conservation.

Per the mitigation plan (Exhibit 13) a mixture of native grasses, shrubs and trees will be planted to mitigate the impacts of the proposed bridge. The planting locations attempt to create a vegetated riparian corridor that involves filling in areas that are grasses with shrubs and trees where they are lacking (Exhibit 13, Figure 6). The plantings will be installed no later than the spring following completion of the project (installation of new bridge and removal of existing bridge), will be monitored, and watered if needed, for five (5) years with a yearly report submitted to Community Development, and an 80 percent survival rate will be required.

Approximately 5,500 square feet of high-quality habitat and 3,100 square feet of marginal quality habitat will be lost to install the bridge's central pier (Exhibit 17) that were not taken into account in the critical areas mitigation plan prepared by PBS (Exhibit 13). Staff recommends additional mitigation to offset the impacts of the central pier's construction as a condition of approval.

6. Fish and Wildlife Habitat Conservation Areas - Habitats of Local Importance

Construction will occur during Touchet River's low-flow months, which are typically lowest in August and September, to minimize impact on aquatic species.

The biological assessment (Exhibit 11) and Critical Areas Report did not address habitats and species of local importance (SMP Appendix A Section 6.1.A.3, 6.1.C). The project area is mapped as Ferruginous Hawk Habitat (Exhibit 19). Per SMP 6.4.J, in areas designated as Raptor Ferruginous Hawk Habitat, tree removal connected with a development permit will be restricted to the non-nesting season August through January and limited to hazard tree removal unless otherwise approved by the department after review of a critical area report. Per SMP 6.4.K, between March 1st and May 31st, clearing and grading activities connected with a development permit are not allowed within 820 feet of an active Ferruginous Hawk nest.

Staff recommends restrictions on clearing and grading and a nest survey per the SMP as a condition of approval.

Recommended Conditions of Approval

Staff recommends that the Hearing Examiner approve the shoreline substantial development permit (SHR22-001) subject to the following conditions of approval.

1. As set forth in WAC 173-27-190 and the Walla Walla County SMP Section 7.5(F), construction pursuant to the permit may not begin and is not authorized until twenty-one days from the date of filing as defined in RCW 90.58.140(6) and WAC 173-27-130, or until all review proceedings initiated within twenty-one days from the date of such filing have terminated; except as provided in RCW 90.58.140(5)(a) and (b).
2. Prior to construction the following revised plans must be submitted to Community Development for review and approval per SMP 5.1, Appendix A Section 1.18 and 1.19:
    a. Revised Mitigation Plan to include additional mitigation for central pier installation.
    b. Revised timeline for construction activities, including clearing and grading, as submitted timeline of March 2023-September 2023 is no longer accurate.
3. Per SMP Section 6.4.J, tree removal connected with this development will be restricted to the non-nesting season of August through January.
4. During nesting season of 2023, a biologist must conduct a survey for ferruginous hawk nesting activity and submit findings to Community Development. If a nest is found, the construction timeline must take into account that during nesting season (March 1st to May 31st) each year no clearing or grading for this project is allowed within 820 feet of an active Ferruginous Hawk nest.

5. Limits of disturbance will be clearly flagged/marked on site prior to construction to ensure that no unauthorized intrusion occurs. This shall be verified by the Community Development Director prior to the commencement of permitted activities. The temporary markings shall be maintained throughout construction and shall not be removed until construction activities are completed.
6. Before construction, the applicant must first obtain any other associated permit(s) or approvals required by the County or any other governmental agency or regulatory authority with jurisdiction over a particular aspect of the project. Any conditions of approval or requirements imposed as part of such permits or approvals shall be hereby incorporated as Conditions of Approval for the Permit.
7. Pursuant to WWCC Section 14.13.110, at any time during the life of the permit, the Community Development Director may ask the Hearing Examiner to revoke the permit if the project is not in compliance with any of the conditions of approval and/or required permits.
8. Future changes in operations, plans, or additions will require an amendment, approved by the County's Hearing Examiner, to the shoreline substantial development permit pursuant to WWCC Section 14.03.050.

Recommended Exhibits

1. Staff Report dated 2/1/2023
2. Notice of Application with Optional Determination of Non-Significance, dated 3/7/2022, and Certificate of Notification
3. Notice of Public Hearing, published 2/2/2023, and Certificate of Notification
4. Washington State Department of Ecology Comments, dated 3/17/2022
5. Washington State Department of Archeology & Historic Preservation Letter, dated 6/3/2021 and Memorandum of Agreement executed 10/2021
6. SEPA Environmental Checklist (SEPA22-006) with attachments: vicinity map, shoreline map, iPaC resource list dated 2/7/2022
7. Cultural Resources Survey prepared by Plateau Archaeological Investigations LLC, dated 5/25/2021
8. Final SEPA Determination of Non-Significance, dated 1/27/2023, and SEPA Staff Evaluation Report
9. Site and Construction Plans submitted 2/11/2022
10. Joint Aquatic Resources Project Approval (JARPA) Form (Shoreline SDP Application) dated 1/25/2022
11. Biological Assessment prepared by PBS Engineering & Environmental Inc, dated 1/2022
12. Critical Areas Assessment Report prepared by PBS Engineering & Environmental Inc, dated 2/2021
13. Critical Areas Mitigation Plan prepared by PBS Engineering & Environmental Inc, dated 1/2022
14. Bridge Replacement Hydraulic Report prepared by MP Stormwater, dated 12/2021
15. Storm Drainage Report prepared by PBS Engineering & Environmental Inc, dated 1/2022
16. Geotechnical Report prepared by PBS Engineering & Environmental Inc, dated 12/16/2022
17. Proposed project Easement locations, dated 1/12/2023
18. Project Limits of Disturbance, submitted 2/2/2023
19. Map CA -5B Priority Habitats and Species

Exhibit 2

Walla Walla County Community Development Department

310 W. Poplar Street, Suite 200, Walla Walla, WA 99362 / 509-524-2610 Main

File No. SHR22-001/SEPA22-006

NOTICE OF APPLICATION / ODNS

Notice is hereby given on this date, 3/07/2022, that the application/proposal described in this notice has been filed with the Walla Walla County Community Development Department (CDD). The application/proposal may be reviewed at the CDD office at 310 W Poplar St., Suite 200, Walla Walla, WA 99362. All interested persons and parties may comment on the application, appeal rights are outlined in Walla Walla County Code Chapter 14.11

The CDD is using the optional threshold determination process under the State Environmental Policy Act (SEPA) authorized by WAC 197-11-355. The application comment period may be the only opportunity to comment on the environmental impacts of the proposal. A copy of the SEPA determination on the proposal may be obtained upon request. The proposal may include mitigation measures under applicable codes, and the project review process may incorporate or require mitigation measures regardless of whether an environmental impact statement is prepared. The SEPA Responsible Official has preliminarily determined that the proposal is:

[ ] categorically exempt under SEPA

[X] subject to SEPA threshold determination requirements and the responsible official expects to issue the following determination: Determination of Non Significance (DNS).

The following identified existing environmental documents are hereby incorporated by reference, and all or part of the documents may be used to evaluate the application/proposal:

- SEPA Checklist
- Biological Assessment by PBS Engineering, dated January 2022
- Final Hydraulic Report by MP Stormwater, dated December 2021
- Storm Drainage Report by PBS Engineering, dated January 2022
- Final Critical Areas Mitigation Plan by PBS Engineering, dated January 2022
- Joint Aquatic Resources Permit Application Form, dated January 2022
- Critical Areas Assessment Report by PBS Engineering, dated February 2021
- Cultural Resource Survey by Plateau Archeological Investigations LLC, dated March 2021
- Letter to Trent de Boer, WSDOT from Washington State Department of Archeology and Historic Preservation re: Project 2021.02.00901, dated June 3, 2021
- Vicinity Map
- Shoreline Map
- Potential Impacts on Resources of US Fish and Wildlife (IPaC) Printout

These documents are located at the office of the CDD at 310 W Poplar St., Suite 200, Walla Walla, WA, and shall be made available for public review during all applicable comment periods on the application/proposal. Preliminary determinations and information contained herein shall not bind the County and are subject to continuing review and modification.

1. Applicant: Walla Walla COUNTY PUBLIC WORKS c/o Seth Walker; 990 NAVION LN; WALLA WALLA WA, 99362
2. Property Owners: Walla Walla County Road Right-of-Way
3. Application filing date: 2/11/2022
4. Date that application was determined to be substantially complete: 2/22/2022
5. Location and description of proposed action: Applicant proposed to remove and replace Dell Sharpe Bridge which spans the Touchet River connecting on Pettyjohn Road due to scour of the bridge foundation by the Touchet River. The new location will be approximately 400 feet upstream of the existing bridge location. The existing bridge is 19 feet wide and 155 feet in length, while the replacement bridge will be 32 feet wide and 320 feet in length. This project is located in the general areas of APNs 350903110001, 350902210003, 350902240002 and 350902220006.
6. Comprehensive plan map designation for the location: Primary Agriculture
7. Zoning map designation for the location: Primary Agriculture 40
8. Shoreline Environment: Rural Conservancy
9. Development Regulations: Walla Walla County Code Chapter 18.08; Walla Walla County Shoreline Master Program (SMP); Walla Walla County Road Design Standards
10. Comments on this application must be submitted in writing to the CDD at 310 W Poplar St., Suite 200, Walla Walla, WA 99362. Any person desiring to submit written comments concerning an application, or desiring to receive notification of the final decision concerning the proposal as expeditiously as possible after the issuance of decision, may submit the comments or requests for decisions to the Department within fourteen days following the date of final publication of the notice of application. **Comments must be received by the Department before 5:00 PM on the following date: 3/21/2022.**
11. A public hearing will be held on this proposal; but it has not been scheduled yet.
12. The decision on this application will be made by the Walla Walla County Hearing Examiner.

For additional information please contact the CDD at 310 W Poplar St., Suite 200, Walla Walla, WA 99362; 509-524-2610; commdev@co.walla-walla.wa.us. **Staff Contact: Jennifer Ballard, Senior Planner, 509-524-2626.**

This Notice of Application is required by RCW 36.70B.110 and Walla Walla County Code 14.07.080.

Community Development Department
Director: Lauren Prentice
310 W. Poplar, Suite 200 | Walla Walla, WA 99362
Main: commdev@co.walla-walla.wa.us | 509-524-2610
https://www.co.walla-walla.wa.us/residents/community_development/index.php

Certificate of Notification

File Number & Name: SHR22-001, Dell Sharpe Bridge On Pettyjohn Road/SEPA22-006
Site Address/Location: Dell Sharpe Bridge on Pettyjohn Rd over the Touchet River north of the intersection of Pettyjohn Road and Sharp Road, Prescott, WA,
Type of Notice: Notice of Application/ODNS
Review Level/Type: Level 3

Proof of Posting

I certify under penalty of perjury under the laws of the State of Washington that the content of the above form of notice was

☒ Posted in the following-described manner in the following location(s) on the following-stated date: 3/7/2022 by Inspector Jeff Briggs
Address and location on property: north side of intersection between Pettyjohn Rd & Sharp Rd

Jennifer B. Ballard
Digitally signed by Jennifer B. Ballard
DN: cn=Jennifer B. Ballard, o=Walla Walla County Community Development Dept, ou, email=jballard@co.walla-walla.wa.us, c=US
Date: 2023.02.01 16:44:57 -08'00'

Jennifer Ballard		2/1/2023
Printed Name	Signature	Date

Proof of Mailing

I certify under penalty of perjury under the laws of the State of Washington that the content of the above form of notice was

☒ E-mailed to applicant or applicant's representative on: 2/27/2022

Jennifer B. Ballard
Digitally signed by Jennifer B. Ballard
DN: cn=Jennifer B. Ballard, o=Walla Walla County Community Development Dept, ou, email=jballard@co.walla-walla.wa.us, c=US
Date: 2023.02.01 16:44:33 -08'00'

Jennifer Ballard		2/1/2023
Printed Name	Signature	Date

Proof of Publishing

I certify under penalty of perjury under the laws of the State of Washington that the content of the above form of notice was

☒ Published in the official gazette (Walla Walla Union Bulletin) on: 3/7/2022
☒ Published in a paper of general circulation (Waitsburg Times) on 3/7/2022
☒ Published on the CDD website on the following date: 3/7/2022

Jennifer B. Ballard
Digitally signed by Jennifer B. Ballard
DN: cn=Jennifer B. Ballard, o=Walla Walla County Community Development Dept, ou, email=jballard@co.walla-walla.wa.us, c=US
Date: 2023.02.01 16:44:44 -08'00'

«Planner»		2/1/2023
Printed Name	Signature	Date

Exhibit 3

Community Development Department
Director: Lauren Prentice
310 W. Poplar, Suite 200 | Walla Walla, WA 99362
Main: commdev@co.walla-walla.wa.us | 509-524-2610
Submit to: planning@co.walla-walla.wa.wa.us
https://www.co.walla-walla.wa.us/residents/community_development/index.php

NOTICE OF PUBLIC HEARING

File name/number: Dell Sharpe Bridge On Pettyjohn Road/SHR22-001

Application type: Shoreline, Substantial Development Permit

Applicant:
Ww County Public Works c/o Seth Walker
990 Navion Ln
Walla Walla, WA 99362

Project description: Applicant proposes to remove and replace Dell Sharpe Bridge on Pettyjohn Road, which spans the Touchet River, due to scour of the bridge foundation by the Touchet River. The new bridge location will be approximately 400 feet upstream of the existing bridge location. The existing bridge is 19 feet wide and 155 feet in length, while the replacement bridge will be 32 feet wide and 320 feet in length. This project is generally located at the Dell Sharpe Bridge on Pettyjohn Road in the vicinity of APNs 350903110001, 350902210003, 350902240002 and 350902220006, in the PA-40 zoning district.

Review process and public comment: The Hearing Examiner will make a decision within ten working days of the public hearing. Written testimony may be submitted prior to or at the public hearing on **2/13/2023**. Please indicate your name and address and refer to the file indicated above.

Send written comments via email to planning@co.walla-walla.wa.us or to
Walla Walla County Community Development Department c/o Jennifer Ballard, Senior Planner
310 W Poplar St., Suite 200
Walla Walla, WA 99362

PUBLIC HEARING INFORMATION

Monday, 2/13/2023, at 1:30 PM (or as close thereto as possible)

Location (in person): Community Development Office
2nd Floor Conference Room
310 W. Poplar Street, Walla Walla WA 99362

Virtually participate via Cisco Webex Meeting Link: https://wwco.webex.com/meet/CDD
Call in: 1-408-418-9388; Meeting Number/Access Code: 969 633 053; *6 to unmute your phone

THE PUBLIC COMMENT PERIOD ON THIS APPLICATION ENDS AT THE CONCLUSION OF THE 2/13/2023 PUBLIC HEARING UNLESS NOTED BY HEARING EXAMINER

Any interested person may comment on this application, receive notice, and participate in any hearings. Persons submitting testimony may participate in the public hearing, request a copy of the final decision, and have rights to appeal the final decision. An agenda, instructions on participating by phone or online, and a staff report, will be available one week prior to the hearing; you can obtain a copy of these documents from the CDD by contacting the person listed below or online.

Contact staff directly for more information about how to participate virtually; if you provide your email address, we will add you to the email distribution list.

FOR MORE INFORMATION: For more information regarding this application, please contact Jennifer Ballard, Senior Planner, at 509-524-2626 or planning@co.walla-walla.wa.us.

Walla Walla County complies with ADA; reasonable accommodation provided with 3 days notice.

Community Development Department
Director: Lauren Prentice
310 W. Poplar, Suite 200 | Walla Walla, WA 99362
Main: commdev@co.walla-walla.wa.us | 509-524-2610
https://www.co.walla-walla.wa.us/residents/community_development/index.php

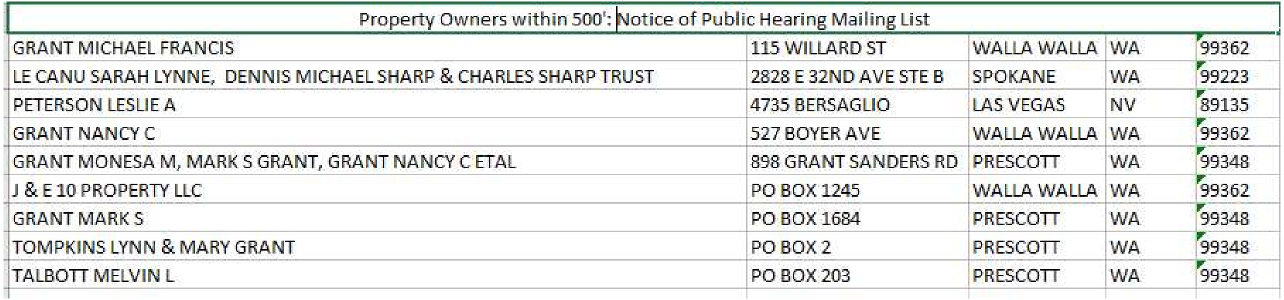
Certificate of Notification

File Number/Name: SHR22-001, Dell Sharpe Bridge On Pettyjohn Rd
Site Address/Location: Dell Sharpe Bridge on Pettyjohn Rd over the Touchet River north of the intersection of Pettyjohn Road and Sharp Road, Prescott, WA
Type of Notice: Notice of Public Hearing
Review Level/Type: Level 3

Proof of Mailing

I certify under penalty of perjury under the laws of the State of Washington that the content of the above form of notice was

☒ Mailed to the property owners of record within 500' adjacent to the subject property on the following date: 1/30/2023



Property Owners within 500': Notice of Public Hearing Mailing List

GRANT MICHAEL FRANCIS	115 WILLARD ST	WALLA WALLA	WA	99362
LE CANU SARAH LYNNE, DENNIS MICHAEL SHARP & CHARLES SHARP TRUST	2828 E 32ND AVE STE B	SPOKANE	WA	99223
PETERSON LESLIE A	4735 BERSAGLIO	LAS VEGAS	NV	89135
GRANT NANCY C	527 BOYER AVE	WALLA WALLA	WA	99362
GRANT MONESA M, MARK S GRANT, GRANT NANCY C ETAL	898 GRANT SANDERS RD	PRESCOTT	WA	99348
J & E 10 PROPERTY LLC	PO BOX 1245	WALLA WALLA	WA	99362
GRANT MARK S	PO BOX 1684	PRESCOTT	WA	99348
TOMPKINS LYNN & MARY GRANT	PO BOX 2	PRESCOTT	WA	99348
TALBOTT MELVIN L	PO BOX 203	PRESCOTT	WA	99348

☒ E-mailed to applicant or applicant's representative on: 1/31/2023
☒ Mailed to all parties of record on: 1/30/2023

Jennifer B. Ballard
Digitally signed by Jennifer B. Ballard
DN: cn=Jennifer B. Ballard, o=Walla Walla County Community Development Dept, ou, email=jballard@co.walla-walla.wa.us, c=US
Date: 2023.02.02 15:52:14 -08'00'

Jennifer Ballard
Printed Name

Signature

2/2/2023
Date

Proof of Publishing

I certify under penalty of perjury under the laws of the State of Washington that the content of the above form of notice was

☒ Published in the official gazette (Walla Walla Union Bulletin) on: 2/2/2023
☒ Published in a paper of general circulation (Waitsburg Times) on: 2/2/2023
☒ Published on the CDD website on the following date: 1/31/2023

Jennifer B. Ballard
Digitally signed by Jennifer B. Ballard
DN: cn=Jennifer B. Ballard, o=Walla Walla County Community Development Dept, ou, email=jballard@co.walla-walla.wa.us, c=US
Date: 2023.02.02 15:52:04 -08'00'

Jennifer Ballard
Printed Name

Signature

2/2/2023
Date

Exhibit 4

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
4601 N. Monroe Street • Spokane, Washington 99205-1295 • (509) 329-3400
711 for Washington Relay Service • Persons with a speech disability can call 877-833-6341

March 17, 2022

Jennifer Ballard
Senior Planner
Walla Walla County
310 West Poplar Street, Suite 200
Walla Walla, WA 99362

Re: Dell Sharpe Bridge on Pettyjohn Road
File: SEPA22-006/SHR22-001

Dear Jennifer Ballard:

Thank you for the opportunity to comment on the Notice of Application and anticipated Determination of Nonsignificance regarding Dell Sharpe Bridge on Pettyjohn Road project (Proponent: Walla Walla County Department of Public Works). After reviewing the documents, the Department of Ecology (Ecology) submits the following comments:

Hazardous Waste and Toxics Reduction Program-Huckleberry Palmer (509) 952-5442

Please keep in mind that during the construction activities associated with the Dell Sharpe Bridge on Pettyjohn Road project, some construction-related wastes produced may qualify as dangerous wastes in Washington State. Some of these wastes include:

- Absorbent material
- Aerosol cans
- Asbestos-containing materials
- Lead-containing materials
- PCB-containing light ballasts
- Waste paint
- Waste paint thinner
- Sanding dust
- Treated wood

The Construction and demolition website has a more comprehensive list, as well as a link to identify and designate your wastes on the Common Construction and Demolition Wastes website at https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Dangerous-waste-guidance/Common-dangerous-waste/Construction-and-demolition.

The applicant, as the facility generating the waste, bears the responsibility for all construction waste. The waste generator is the person who owns the site. Even if you hire a contractor to conduct the demolition or a waste service provider to designate your waste, the site owner is ultimately liable. This is why it is important to research reputable and reliable contractors.

In order to adequately identify some of your construction and remodel debris, you may need to sample and test the wastes generated to determine whether they are dangerous waste. Information about how to sample and what to test for can be found at the above linked website.

For more information and technical assistance, contact Huckleberry Palmer at (509) 952-5442 or via email at Huckleberry.Palmer@ecy.wa.gov.

Water Quality Program-Shannon Adams (509) 329-3610

This project should obtain a Construction Stormwater General Permit. Soil disturbances was stated to be approximately 3.35 acres. This does not include staging area or temporary roads.

Assure that time frames for exposed and unworked soil are for Eastern Washington, not Western Washington as stated in the SEPA. Exposed and unworked soils can remain exposed for 5 days during the wet season and 10 days during the dry season.

For more information or technical assistance regarding the requirements of a Construction Stormwater General Permit, please contact Shannon Adams at (509) 329-3610 or via email at Shannon.Adams@ecy.wa.gov.

State Environmental Policy Act (SEPA)-Cindy Anderson (509) 655-1541

Ecology bases comments upon information submitted for review. As such, comments made do not constitute an exhaustive list of the various authorizations you may need to obtain, nor legal requirements you may need to fulfill in order to carry out the proposed action. Applicants should remain in touch with their Local Responsible Officials or Planners for additional guidance.

For information on the SEPA Process, please contact Cindy Anderson at (509) 655-1541 or via email at Cindy.Anderson@ecy.wa.gov.

To receive more guidance on or to respond to the comments made by Ecology, please contact the appropriate staff listed above at the phone number or email provided.

Department of Ecology
Eastern Regional Office
(Ecology File: 202200965)

Exhibit 5

dahp
protect the past, shape the future

Allyson Brooks Ph.D., Director
State Historic Preservation Officer

June 3, 2021

Mr. Trent de Boer
Archaeologist
WA State Dept. of Transportation
PO Box 47390
Olympia, WA 98504-7390

In future correspondence please refer to:
Project Tracking Code: 2021-02-00919
Property: Dell Sharpe Bridge
Re: ADVERSE Effect

Dear Mr. de Boer:

Thank you for contacting the State Historic Preservation Officer (SHPO) and Department of Archaeology and Historic Preservation (DAHP) regarding the above referenced proposal. We have reviewed the materials you provided for this project.

As a result of our review, we concur with following:

- Property ID: 12798, Dell Sharpe Bridge is **eligible** for listing in the National Register of Historic Places (NRHP) under Criterion C; and
- Property ID: 724180, the Pettyjohn Schoolhouse is **not eligible** for listing in the NRHP; and
- Site 45WW458 is **not eligible** for the (NRHP) under criteria A through D.

We also concur your determination that the project as proposed will have an Adverse Effect on Property ID: 12798, Dell Sharpe Bridge. In view of our concurrence on the adverse effect determination, we look forward to further consultation and the development of a Memorandum of Agreement (MOA). The MOA shall identify specific measures that when implemented will serve to mitigate the adverse effect on the property.

Also, we appreciate receiving any correspondence or comments from concerned tribes or other parties that you receive as you consult under the requirements of 36 CFR 800.4(a)(4). These comments are based on the information available at the time of this review and on behalf of the State Historic Preservation Officer (SHPO) pursuant to Section 106 of the National Historic Preservation Act and its implementing regulations 36 CFR 800.

Thank you for the opportunity to review and comment. Please ensure that the DAHP Project Number (a.k.a. Project Tracking Code) is shared with any hired cultural resource consultants and is attached to any communications or submitted reports. Should you have any questions, please feel free to contact me.

Sincerely,

Holly Borth

State of Washington • **Department of Archaeology & Historic Preservation**
P.O. Box 48343 • Olympia, Washington 98504-8343 • (360) 586-3065
www.dahp.wa.gov

1889

Holly Borth
Project Compliance Reviewer
(360) 890-0174
holly.borth@dahp.wa.gov

MEMORANDUM OF AGREEMENT AMONG THE FEDERAL HIGHWAY ADMINISTRATION, THE DEPARTMENT OF ARCHAEOLOGY AND HISTORIC PRESERVATION, THE WASHINGTON STATE DEPARTMENTOF TRANSPORTATION, AND WALLA WALLA COUNTY EXECUTED PURSUANT TO 36 CFR 800.6(b)(iv) REGARDING THE DELL SHARPE BRIDGE PROJECT, WALLA WALLA COUNTY, WASHINGTON

WHEREAS, the U.S. Department of Transportation, Federal Highway Administration (FHWA) has determined that Walla Walla County's Dell Sharpe Bridge Project (Project) will have an adverse effect on the Dell Sharpe Bridge, and has consulted with the Washington State Historic Preservation Officer (SHPO), in accordance with Section 106 of the National Historic Preservation Act (16 U.S.C. § 470), and its implementing regulations 36 CFR Part 800; and

WHEREAS a cultural resources assessment conducted for the Project did not identify any significant archaeological deposits in the area of potential effects; and

WHEREAS the Washington State Department of Transportation (WSDOT), on behalf of the FHWA, determined that the Dell Sharpe Bridge (a concrete double arch built in 1914) is eligible for listing in the National Register of Historic Places under Criterion C; and

WHEREAS the adverse effect is the removal of the Dell Sharpe Bridge and replacement with a new structure; and

WHEREAS pursuant to 36 CFR 800.6(c)(2) FHWA has invited the WSDOT and Walla Walla County (COUNTY) to sign this Memorandum of Agreement (MOA); and

WHEREAS in accordance with 36 CFR Section 800.6(a)(1), WSDOT, on behalf of the FHWA has notified the Advisory Council on Historic Preservation (COUNCIL) of its adverse effect determination, and the COUNCIL has chosen not to participate in the consultation pursuant to 36 CFR Section 800.6(a)(1)(iii);

NOW, THEREFORE, FHWA, SHPO, WSDOT, and the COUNTY agree that upon FHWA's decision to proceed with the Project, FHWA shall ensure that the following stipulations are implemented in order to take into account the adverse effect of the Project on historic properties, and that these stipulations shall govern the Project and all of its parts until this MOA expires or is terminated.

I. STIPULATIONS

FHWA shall ensure that the following measures are carried out:

1. The COUNTY will complete DAHP Level II Mitigation documentation of the Dell Sharpe Bridge. The standards are similar to those set forth in the Historic American Engineering Record (HAER):
   - Archival reproduction of existing historical photographs of the Dell Sharpe Bridge; and
   - Production of three sets of archival-quality, black-and-white digital photographs of elevation views of the Dell Sharpe Bridge; and
   - Preparation of a narrative history and description of the Dell Sharpe Bridge, including information relevant to its historic use and significance. Documentation must be reviewed and approved by DAHP prior to replacement of the bridge. A copy of the documentation shall be provided to each of the following:
     - One set shall be provided to DAHP, Olympia.
     - One set shall be provided to Walla Walla County Heritage, a project of the Walla Walla County Rural Library District; and

2. The COUNTY will coordinate with HistoryLink.org to prepare an essay discussing the Dell Sharpe Bridge, the nearby Pettyjohn Schoolhouse, and the surrounding community.

3. The COUNTY will bear the costs of stipulations 1-2.

II. DISPUTE RESOLUTION

Should any party to this agreement object at any time to any actions proposed or the manner in which the terms of the MOA are implemented, FHWA shall consult with the objecting party(ies) to resolve the objection. If FHWA determines, within 30 days, that such objections cannot be resolved, FHWA shall:

1. Forward all documentation relevant to the dispute to the COUNCIL in accordance with 36 CFR Section 800.2(b)(2). Upon receipt of adequate documentation, the COUNCIL shall review and advise FHWA on the resolution of the objection within 30 days. Any comment provided by the COUNCIL, and all comments from parties to the MOA, will be taken into account by FHWA in reaching a final decision regarding the dispute.
2. If the COUNCIL does not provide comments regarding the dispute within 30 days after receipt of adequate documentation, FHWA will give consideration to comments from the parties to the MOA and make a final decision.
3. FHWA's responsibilities to carry out all other actions subject to the terms of this MOA that are not subject of the dispute will remain unchanged. FHWA will notify all parties of its decision in writing before implementing that disputed portion of the Project. FHWA's decision will be final.

III. AMENDMENTS, TERMINATION AND NONCOMPLIANCE

If any signatory to this MOA determines that its terms will not or cannot be carried out or that an amendment to its terms must be made, that party shall immediately consult with the other parties to develop an amendment to this MOA pursuant to 36 CFR 800.6(c)(7) and 800.6(c)(8). The amendment will be effective on the date a copy is signed by all of the original signatories and is filed with the COUNCIL. If a MOA is not amended following the consultation set out in accordance with Dispute Resolution, it may be terminated by any signatory. Within 30 days following termination, FHWA shall notify the signatories if it will initiate consultation to execute an MOA with the signatories under 36 CFR 800.6(a)(1) or request the comments of the COUNCIL under 36 CFR 800.7(a) and proceed accordingly.

IV. DURATION

The MOA will take effect immediately upon execution by the Signatory Parties. The terms of this MOA shall be satisfactorily fulfilled within five years following the date of execution. Prior to such time, FHWA may consult with SHPO to reconsider the terms of the agreement and propose its amendment in accordance with Section III above. Unless terminated pursuant to Section III, this MOA will be in effect until FHWA, in consultation with SHPO, determines that all of its terms have been satisfactorily fulfilled.

V. EXECUTION OF AGREEMENT

Execution and implementation of the terms of this Memorandum of Agreement by FHWA, SHPO, WSDOT, and COUNTY serves as evidence that FHWA has afforded the COUNCIL and all concerned parties the opportunity to comment on the project and the effects on historic properties, and that FHWA has taken into account the effects of the Project on the Dell Sharpe Bridge and has satisfied the requirements of Section 106 of the National Historic Preservation Act (16 U.S.C. 470 (f)).

FEDERAL HIGHWAY ADMINISTRATION

By:____ Date:_____________________
Mindy Roberson, Acting FHWA Division Administrator

WASHINGTON STATE HISTORIC PRESERVATION OFFICER

DocuSigned by:
By: Allyson Brooks Date 10/15/2021
FF699DFCFDE1425...
Allyson Brooks, PhD, Director, Department of Archaeology & Historic Preservation

CONCUR:

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

By: Jay Drye Digitally signed by Jay Drye
Date: 2021.10.26 15:18:55 -07'00' Date_____________________
Jay Drye, Director, Local Programs

WALLA WALLA COUNTY

By: ____ Date_____________________
Chair of the Board, Walla Walla County Commissioners

filed with the COUNCIL. If a MOA is not amended following the consultation set out in accordance with Dispute Resolution, it may be terminated by any signatory. Within 30 days following termination, FHWA shall notify the signatories if it will initiate consultation to execute an MOA with the signatories under 36 CFR 800.6(a)(1) or request the comments of the COUNCIL under 36 CFR 800.7(a) and proceed accordingly.

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V. EXECUTION OF AGREEMENT

Execution and implementation of the terms of this Memorandum of Agreement by FHWA, SHPO, WSDOT, and COUNTY serves as evidence that FHWA has afforded the COUNCIL and all concerned parties the opportunity to comment on the project and the effects on historic properties, and that FHWA has taken into account the effects of the Project on the Dell Sharpe Bridge and has satisfied the requirements of Section 106 of the National Historic Preservation Act (16 U.S.C. 470 (f)).

FEDERAL HIGHWAY ADMINISTRATION

By:______________________________ Date:______________
Mindy Roberson, Acting FHWA Division Administrator

WASHINGTON STATE HISTORIC PRESERVATION OFFICER

By:______________________________ Date______________
Allyson Brooks, PhD, Director, Department of Archaeology & Historic Preservation

CONCUR:

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

By:______________________________ Date______________
Jay Drye, Director, Local Programs

WALLA WALLA COUNTY

By: Gregory A. Tompkins Date 10/18/2021
Chair of the Board, Walla Walla County Commissioners

Exhibit 6

SEPA ENVIRONMENTAL CHECKLIST

Purpose of checklist:

Governmental agencies use this checklist to help determine whether the environmental impacts of your proposal are significant. This information is also helpful to determine if available avoidance, minimization or compensatory mitigation measures will address the probable significant impacts or if an environmental impact statement will be prepared to further analyze the proposal.

Instructions for applicants:

This environmental checklist asks you to describe some basic information about your proposal. Please answer each question accurately and carefully, to the best of your knowledge. You may need to consult with an agency specialist or private consultant for some questions. You may use "not applicable" or "does not apply" only when you can explain why it does not apply and not when the answer is unknown. You may also attach or incorporate by reference additional studies reports. Complete and accurate answers to these questions often avoid delays with the SEPA process as well as later in the decision-making process.

The checklist questions apply to all parts of your proposal, even if you plan to do them over a period of time or on different parcels of land. Attach any additional information that will help describe your proposal or its environmental effects. The agency to which you submit this checklist may ask you to explain your answers or provide additional information reasonably related to determining if there may be significant adverse impact.

Instructions for Lead Agencies:

Please adjust the format of this template as needed. Additional information may be necessary to evaluate the existing environment, all interrelated aspects of the proposal and an analysis of adverse impacts. The checklist is considered the first but not necessarily the only source of information needed to make an adequate threshold determination. Once a threshold determination is made, the lead agency is responsible for the completeness and accuracy of the checklist and other supporting documents.

Use of checklist for nonproject proposals:

For nonproject proposals (such as ordinances, regulations, plans and programs), complete the applicable parts of sections A and B plus the SUPPLEMENTAL SHEET FOR NONPROJECT ACTIONS (part D). Please completely answer all questions that apply and note that the words "project," "applicant," and "property or site" should be read as "proposal," "proponent," and "affected geographic area," respectively. The lead agency may exclude (for non-projects) questions in Part B - Environmental Elements –that do not contribute meaningfully to the analysis of the proposal.

A. Background [HELP]

1. Name of proposed project, if applicable:
   Dell Sharpe Bidge on Pettyjohn Road, MP 5.20 to MP 5.80

2. Name of applicant:
   Walla Walla County Public Works Department

3. Address and phone number of applicant and contact person:

   990 Navion Lane, Walla Walla, WA

   Seth Walker, Chief, Engineering & Construction Division

4. Date checklist prepared:

   February 7, 2022

5. Agency requesting checklist:

   Walla Walla County Community Development

6. Proposed timing or schedule (including phasing, if applicable):

   November 2022

7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.

   No

8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.

   Critical Areas Assessment Report, Critical Areas Mitigation Plan, Storm Drainage Report, Biological Assessment, Final Hydraulic Report

9. Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain.

   None

10. List any government approvals or permits that will be needed for your proposal, if known.

    Shoreline Pemit – Condition Use, Corp 404 permit, and HPA.

11. Give brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page. (Lead agencies may modify this form to include additional specific information on project description.)

    Constructing a 320-foot-long bridge with a single central pier, creation of stormwater features, and demolition of the existing Dell Sharpe Bridge. The overall purpose of the project is to replace the existing bridge that is nearing the end of its serviceable lifespan, improve safety with revised approaches to the bridge, and provide stormwater treatment and infiltration.

12. Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist.

Dell Sharpe Bridge – Structure No. 07990700,
Pettyjohn Road - Road Log No. 39590,
Section 2 & 3, Township 09 North, Range 35 E.W.M.
Vicinity Map attached.

B. Environmental Elements [HELP]

1. *Earth* [help]

a. General description of the site:

(circle one): Flat, rolling, hilly, steep slopes, mountainous, other ____________

b. What is the steepest slope on the site (approximate percent slope)?

c. What general types of soils are found on the site (for example, clay, sand, gravel, peat, muck)? If you know the classification of agricultural soils, specify them and note any agricultural land of long-term commercial significance and whether the proposal results in removing any of these soils.

Silt with sand to sandy silt

d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe.

No

e. Describe the purpose, type, total area, and approximate quantities and total affected area of any filling, excavation, and grading proposed. Indicate source of fill.

Fill: Purpose: Roadway embankment; Type: common borrow & crushed surfacing base course, 3.35 acres of grading disturbance area; ~23,000 CY fill Cut: Purpose: excavation for stormwater facilities, bridge foundations, and removal and replacement of unsuitable material; grading disturbance area= 3.35 acres; quantity: 6,000 CY cut

f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe.

Temporarily exposed soils that will not be disturbed for two days during the wet season or seven days during the dry season shall be immediately stabilized with the approved erosion/sediment control methods (e.g., seeding, mulching, plastic covering, etc.)

g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?

Approximately 51%

h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any:

All seeding areas will include the use of hydraulically applied erosion control product (HECP) using a natural fiber based long-term mulch and native seed mix. All seeding areas will be prepared with longitudinal depressions formed perpendicular to the natural flow of water on the slope to reduce velocity runoff.

2. Air [help]

a. What types of emissions to the air would result from the proposal during construction, operation, and maintenance when the project is completed? If any, generally describe and give approximate quantities if known.

There may be an increase if dust and exhaust emissions during construction. There will be no increase in emissions to the air once the project is completed.

b. Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe.

No

c. Proposed measures to reduce or control emissions or other impacts to air, if any:

None

3. Water [help]

a. Surface Water: [help]

1) Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into.

Touchet Rver

2) Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans.

Yes, Grading of new bridge approaches on both sides (north and south) of the bridge. Construction of geosynthetic retaining walls at the terminus of the approaches. Construction of bridge abutments landward of the ordinary high water mark (OHWM) of the Touchet River. Construction of a central cast-in-place pier located within the 100-year floodplain but outside of the current OHWM. Placing of precast bridge girders, pouring of bridge deck and traffic barriers, and paving of asphalt approaches. Construction of stormwater conveyance system and infiltration swales. Demolition and removal of existing Dell Sharpe Bridge deck and piers.

3) Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material.

The center pier is located outside of the OHWM of the Touchet River but is within the channel mender zone of the river. The construction of this pier will be completed in the dry season during low flows within the Touchet River. There will be 20 cy of concrete removed.

4) Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities if known.

A temporary sandbag or bulk bag cofferdam will be installed to isolate the work area. This coffer dam can likely isolate the north abutment and central pier at the same time and push in-stream flows to the south in order to reduce the need for separate fish removal and work area isolation sessions.

5) Does the proposal lie within a 100-year floodplain? If so, note location on the site plan.

Yes, see attache BA.

6) Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge.

No

b. Ground Water: [help]

1) Will groundwater be withdrawn from a well for drinking water or other purposes? If so, give a general description of the well, proposed uses and approximate quantities withdrawn from the well. Will water be discharged to groundwater? Give general description, purpose, and approximate quantities if known.

No

2) Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: Domestic sewage; industrial, containing the following chemicals. . . ; agricultural; etc.). Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve.

None

c. Water runoff (including stormwater):

1) Describe the source of runoff (including storm water) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? If so, describe.

Stormwater from the proposed bridge approaches and bridge structure will be routed to four separate stormwater infiltration swales located within upland areas adjacent to the bridge. Stormwater treatment and detention was designed in accordance with Ecology's 2019 Stormwater Management Manual for Eastern Washington

2) Could waste materials enter ground or surface waters? If so, generally describe.

No, SPPC plan will be in place during construction. All stormwater will be infiltrated with no planned discharges to surface waters.

3) Does the proposal alter or otherwise affect drainage patterns in the vicinity of the site? If so, describe.

Stormwater from the proposed bridge approaches and bridge structure will be routed to four separate stormwater infiltration swales located within upland areas adjacent to the bridge. Stormwater treatment and

detention was designed in accordance with Ecology's 2019 Stormwater Management Manual for Eastern Washington

d. Proposed measures to reduce or control surface, ground, and runoff water, and drainage pattern impacts, if any:

See Storm Drainage Report.

4. Plants [help]

a. Check the types of vegetation found on the site:

__✓__deciduous tree: alder, maple, aspen, other
____evergreen tree: fir, cedar, pine, other
__✓__shrubs
__✓__grass
____pasture
____crop or grain
____ Orchards, vineyards or other permanent crops.
____ wet soil plants: cattail, buttercup, bullrush, skunk cabbage, other
____water plants: water lily, eelgrass, milfoil, other
____other types of vegetation

b. What kind and amount of vegetation will be removed or altered?

A total of 0.61 acre of vegetation will be cleared for construction of the new bridge and approaches. Most of this vegetation consists of non-native shrubs and forbs located outside the riparian zone. Impacts to native vegetation within the riparian zone will be limited to clearing that is determined to be necessary for bridge girder placement.

c. List threatened and endangered species known to be on or near the site.

Unkown

d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any:

See attached Critical Area Mitigation Plan

e. List all noxious weeds and invasive species known to be on or near the site.

Unkown

5. Animals [help]

a. List any birds and other animals which have been observed on or near the site or are known to be on or near the site.

Examples include:

birds: hawk, heron, eagle, songbirds, other:
mammals: [✓ deer], bear, elk, beaver, other:
fish: bass, salmon, [✓ trout], herring, shellfish, other ________

b. List any threatened and endangered species known to be on or near the site.

See attached IPaC resource list

c. Is the site part of a migration route? If so, explain.

No

d. Proposed measures to preserve or enhance wildlife, if any:

Vegitation planting

e. List any invasive animal species known to be on or near the site.

Unkown

6. Energy and Natural Resources [help]

a. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.

N/A

b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.

N/A

c. What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any:

N/A

7. Environmental Health [help]

a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur as a result of this proposal? If so, describe.

1) Describe any known or possible contamination at the site from present or past uses.

Checked Department of Ecology site and none found

2) Describe existing hazardous chemicals/conditions that might affect project development and design. This includes underground hazardous liquid and gas transmission pipelines located within the project area and in the vicinity.

None known.

3) Describe any toxic or hazardous chemicals that might be stored, used, or produced during the project's development or construction, or at any time during the operating life of the project.

4) Describe special emergency services that might be required.

SPCC plan will be in place during construction.

5) Proposed measures to reduce or control environmental health hazards, if any:

SPCC plan will be in place during construction.

b. Noise

1) What types of noise exist in the area which may affect your project (for example: traffic, equipment, operation, other)?

The project location is in a remote area. Very little traffic. During wheat harvest you would have farming traffic.

2) What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example: traffic, construction, operation, other)? Indicate what hours noise would come from the site.

The contractor will be allowed to work from 7 AM to 6 PM. Because of the remote location the bridge does not experience a high level of tracfic.

3) Proposed measures to reduce or control noise impacts, if any:

The project location is in a remote area.

8. Land and Shoreline Use [help]

a. What is the current use of the site and adjacent properties? Will the proposal affect current land uses on nearby or adjacent properties? If so, describe.

None

b. Has the project site been used as working farmlands or working forest lands? If so, describe. How much agricultural or forest land of long-term commercial significance will be converted to other uses as a result of the proposal, if any? If resource lands have not been designated, how many acres in farmland or forest land tax status will be converted to nonfarm or nonforest use?

None

1) Will the proposal affect or be affected by surrounding working farm or forest land normal business operations, such as oversize equipment access, the application of pesticides, tilling, and harvesting? If so, how:

No

c. Describe any structures on the site.

Dell Sharpe Bridge - Dell Sharpe Bridge is a county bridge on Pettyjohn Road. Dell Sharpe Bridge was constructed in 1914 over the Touchet River. The structure in 155-ft in length and 19-ft wide curb to curb.

d. Will any structures be demolished? If so, what?

Dell Sharpe Bridge

e. What is the current zoning classification of the site?

Primary Agriculure 40

f. What is the current comprehensive plan designation of the site?

Unkown

g. If applicable, what is the current shoreline master program designation of the site?

Rural Conservancy – See attached map

h. Has any part of the site been classified as a critical area by the city or county? If so, specify.

The only critical area that has a formal buffer established in the County Code is the Touchet River which is a Type S River regulated as a fish and wildlife habitat conservation area. Type S rivers are regulated as shorelines of the state and the buffer extends landward for a distance of 200-feet or to the edge of the 100-year floodplain, whichever is great

i. Approximately how many people would reside or work in the completed project?

No one will reside at the project site. At this time we do not know how many people will work on the project, it will depend on what contractor is awarded the contract.

i. Approximately how many people would the completed project displace?

None

k. Proposed measures to avoid or reduce displacement impacts, if any:

N/A

L. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any:

N/A

m. Proposed measures to reduce or control impacts to agricultural and forest lands of long-term commercial significance, if any:

N/A

9. Housing [help]

a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing.

N/A

b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing.

N/A

c. Proposed measures to reduce or control housing impacts, if any:

N/A

10. Aesthetics [help]

a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed?

N/A

b. What views in the immediate vicinity would be altered or obstructed?

N/A

d. Proposed measures to reduce or control aesthetic impacts, if any:

N/A

11. Light and Glare [help]

a. What type of light or glare will the proposal produce? What time of day would it mainly occur?

None

b. Could light or glare from the finished project be a safety hazard or interfere with views?

No

c. What existing off-site sources of light or glare may affect your proposal?

None

d. Proposed measures to reduce or control light and glare impacts, if any:

None

12. Recreation [help]

a. What designated and informal recreational opportunities are in the immediate vicinity?

None

b. Would the proposed project displace any existing recreational uses? If so, describe.

None

e. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any:

None

13. Historic and cultural preservation [help]

a. Are there any buildings, structures, or sites, located on or near the site that are over 45 years old listed in or eligible for listing in national, state, or local preservation registers ? If so, specifically describe.

See attached Cultural Resources Survey. I have attached the letter from DAPH. We are in the pocess of a Level II Mitigation with DAPH.

f. Are there any landmarks, features, or other evidence of Indian or historic use or occupation? This may include human burials or old cemeteries. Are there any material evidence, artifacts, or areas of cultural importance on or near the site? Please list any professional studies conducted at the site to identify such resources.

No

g. Describe the methods used to assess the potential impacts to cultural and historic resources on or near the project site. Examples include consultation with tribes and the department of archeology and historic preservation, archaeological surveys, historic maps, GIS data, etc.

Cultural Resource Survey has been completed. Please see attached report.

d. Proposed measures to avoid, minimize, or compensate for loss, changes to, and disturbance to resources. Please include plans for the above and any permits that may be required.

We have entered an agreement with We are in the pocess of a Level II Mitigation with DAPH.

14. Transportation [help]

a. Identify public streets and highways serving the site or affected geographic area and describe proposed access to the existing street system. Show on site plans, if any.

See attached vicinity map

b. Is the site or affected geographic area currently served by public transit? If so, generally describe. If not, what is the approximate distance to the nearest transit stop?

N/A

c. How many additional parking spaces would the completed project or non-project proposal have? How many would the project or proposal eliminate?

N/A

d. Will the proposal require any new or improvements to existing roads, streets, pedestrian, bicycle or state transportation facilities, not including driveways? If so, generally describe (indicate whether public or private).

No

e. Will the project or proposal use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe.

No

f. How many vehicular trips per day would be generated by the completed project or proposal? If known, indicate when peak volumes would occur and what percentage of the volume would be trucks (such as commercial and nonpassenger vehicles). What data or transportation models were used to make these estimates?

None

g. Will the proposal interfere with, affect or be affected by the movement of agricultural and forest products on roads or streets in the area? If so, generally describe.

None

j. Proposed measures to reduce or control transportation impacts, if any:

The existing Dell Sharpe will stay in place till the new bridge is completed.

15. Public Services [help]

a. Would the project result in an increased need for public services (for example: fire protection, police protection, public transit, health care, schools, other)? If so, generally describe.

No

b. Proposed measures to reduce or control direct impacts on public services, if any.

There will be no direct impacts on public serevies. The existing bridge will stay in place till the new one is completed.

16. Utilities [help]

a. Circle utilities currently available at the site:
[✓ electricity], natural gas, water, refuse service, [✓ telephone], sanitary sewer, septic system, other ___________

b. Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity which might be needed.

The existing utilities will be relocated.

C. Signature [HELP]

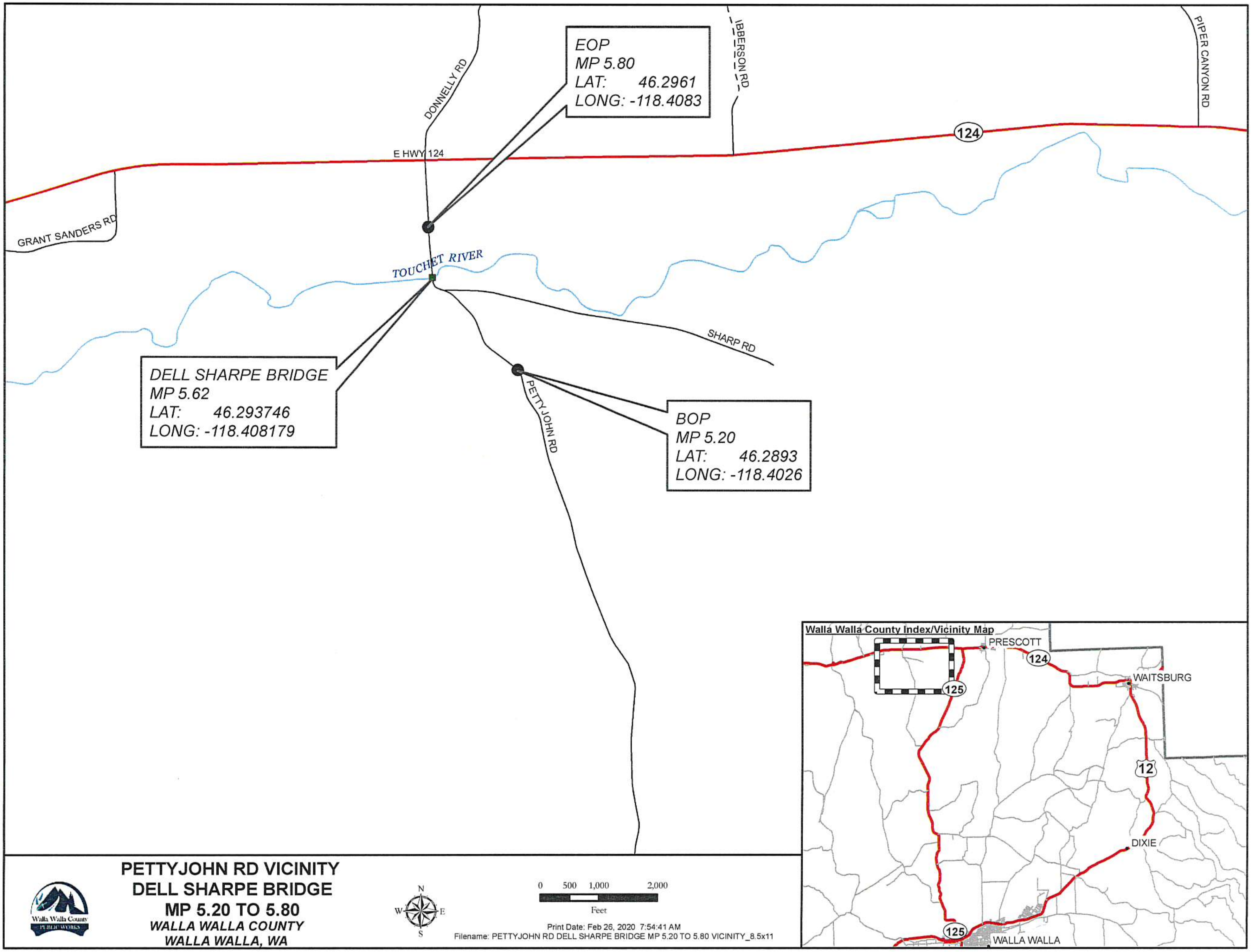
The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

Signature: ______________________________

Name of signee: **Seth Walker**

Position and Agency/Organization: **Chief, Engineering & Construction Division, Walla Walla County Department of Public Works**

Date Submitted: 2/11/2022



EOP
MP 5.80
LAT: 46.2961
LONG: -118.4083

DELL SHARPE BRIDGE
MP 5.62
LAT: 46.293746
LONG: -118.408179

BOP
MP 5.20
LAT: 46.2893
LONG: -118.4026

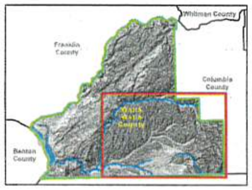
PETTYJOHN RD VICINITY
DELL SHARPE BRIDGE
MP 5.20 TO 5.80

WALLA WALLA COUNTY
WALLA WALLA, WA

Print Date: Feb 26, 2020 7:54:41 AM
Filename: PETTYJOHN RD DELL SHARPE BRIDGE MP 5.20 TO 5.80 VICINITY_8.5x11

REGIONAL SHORELINE MASTER PROGRAM UPDATE - WALLA WALLA COUNTY

Official Shoreline Map - Sheet 3 of 3



MAP LEGEND

Proposed Environment Designation

- 🟥 High Intensity (HI)
- 🟦 Mill Creek Flume (MCF)
- 🟩 Natural (N)
- 🟨 Rural Conservancy (RC)
- 🟨 Rural Residential (RR)
- 🟧 Urban Conservancy (UC)
- 🟪 Urban Downtown (UD)
- 🟥 Urban Residential (UR)
- ~ SMP stream
- Other stream
- Waterbody
- Parcel
- ⬚ Urban Growth Area (UGA)
- ▨ LAMIRD
- ▨ Rural Activity Center (RAC)
- ▨ Rural Farm Worker Community (RFC)
- ☐ City Boundary
- ⬚ County Boundary
- ~ Railroad

Notes:
We hereby certify that this map constitutes the Official Shoreline Map as approved by Ordinance 444 of Walla Walla County and signed by its chairman dated this 14th day of June, 2016.

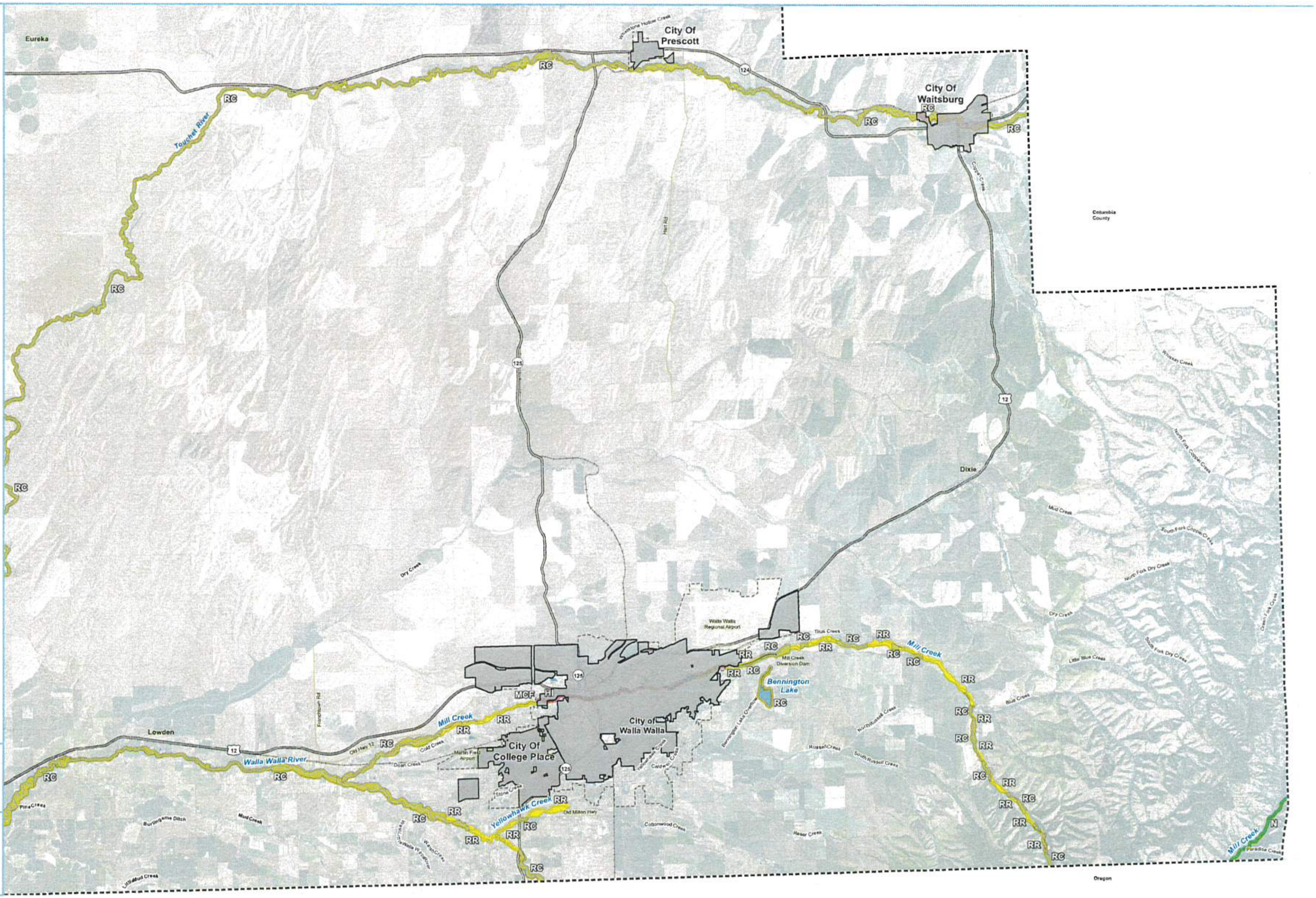
Data Source:
Walla Walla County, City of Walla Walla, WA Department of Ecology, NAIP 2011 Aerial, The Watershed Company.

Date: June 14, 2016

0 1 2 Miles

Original scale = 1:72,000 @ 22" x 34" layout.
Adjust scale accordingly.

All features depicted on this map are approximate. They have not been formally delineated or surveyed and are intended for planning purposes only. Additional site-specific evaluation may be needed to confirm/verify information shown on this map.



THE WATERSHED COMPANY

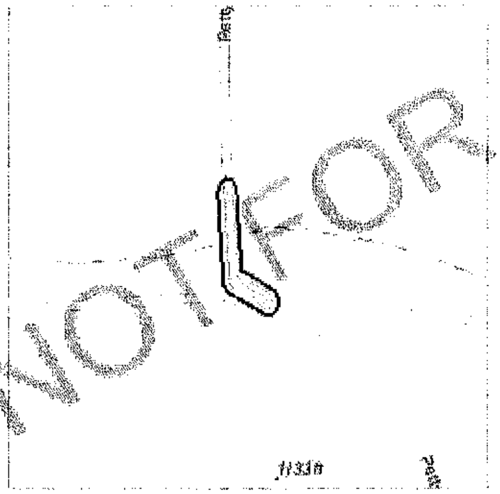
IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Walla Walla County, Washington



Local office

Washington Fish And Wildlife Office

☎ (360) 753-9440
📠 (360) 753-9405

510 Desmond Drive Se, Suite 102
Lacey, WA 98503-1263

http://www.fws.gov/wafwo/

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Birds

NAME	STATUS
Yellow-billed Cuckoo Coccyzus americanus There is **final** critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/3911	Threatened

Fishes

NAME	STATUS
Bull Trout Salvelinus confluentus There is **final** critical habitat for this species. Your location overlaps the critical habitat. https://ecos.fws.gov/ecp/species/8212	Threatened

Insects

NAME	STATUS
Monarch Butterfly Danaus plexippus Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9743	Candidate

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

This location overlaps the critical habitat for the following species:

NAME	TYPE
Bull Trout Salvelinus confluentus https://ecos.fws.gov/ecp/species/8212#crithab	Final

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

---

1. The Migratory Birds Treaty Act of 1918.

2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE" INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)
Cassin's Finch Carpodacus cassinii This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9462	Breeds May 15 to Jul 15

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (▨)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (▯)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

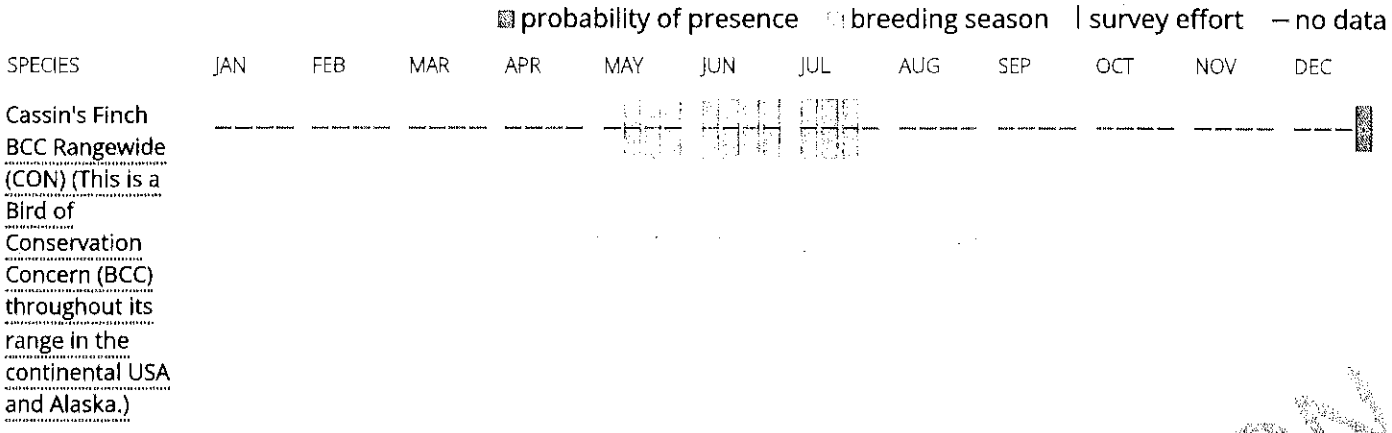
Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

WETLAND INFORMATION IS NOT AVAILABLE AT THIS TIME
This can happen when the National Wetlands Inventory (NWI) map service is unavailable, or for very large projects that intersect many wetland areas. Try again, or visit the NWI map to view wetlands at this location.

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

Exhibit 7

CULTURAL RESOURCES REPORT COVER SHEET

DAHP Project Number: 2021-02-00919

Author: Justin Fitzpatrick and David A. Harder

Title of Report: Cultural Resource Survey for the Dell Sharpe Bridge Replacement Project, Walla Walla County, Washington

Date of Report: May 25, 2021

County(ies): Walla Walla Section: 02 and 03 Township: 09 N Range: 35 E; and

Section: 34 and 35 Township: 10 N Range: 35 E

Quad: Harsha, 1967 (1976) Acres: 12.5

PDF of report submitted (REQUIRED) ☒ Yes

Historic Property Inventory Forms to be Approved Online? ☒ Yes ☐ No

Archaeological Site(s)/Isolate(s) Found or Amended? ☒ Yes ☐ No

TCP(s) found? ☐ Yes ☒ No

Replace a draft? ☐ Yes ☒ No

Satisfy a DAHP Archaeological Excavation Permit requirement? ☐ Yes ☒ No

Were Human Remains Found? ☐ Yes DAHP Case # ☒ No

DAHP Archaeological Site #:
45WW458

Cultural Resource Survey for the Dell Sharpe Bridge Replacement, Walla Walla County, Washington

By:
Justin Fitzpatrick and
David A. Harder

PLATEAU
Archaeological Investigations, LLC
P.O. Box 714, Pullman, Washington 99163
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March 2021

ABSTRACT

Cultural Resource Survey for the Dell Sharpe Bridge Replacement, Walla Walla County, Washington

Walla Walla County is preparing to replace the Dell Sharpe Bridge on Pettyjohn Road at MP 5.20 to MP 5.80. The undertaking will include the realignment of a portion of Pettyjohn Road and replacing the existing bridge that crosses the Touchet River with a two-span, pretested girder bridge. The project area covers approximately 12.5 acres and lies in Sections 02 and 03 of Township 09 North, Range 35 East; and Sections 34 and 35 of Township 10 North, Range 35 East, Willamette Meridian. This project will be federally funded and administered by the Federal Highway Administration (FHWA). As such, potential impacts to cultural resources must be considered as per Section 106 of the National Historic Preservation Act.

Pre-field research included the review of known archaeological resources within a 1.0-mile radius of the area of potential effect (APE) as inventoried at the Washington State Department of Archaeology and Historic Preservation (DAHP). This review was completed using DAHP's secure electronic database known as the Washington Information System for Architectural and Archaeological Data (WISAARD). This database includes recorded archaeological resources, historic property inventories (HPIs), National Register of Historic Properties (NRHP) and Washington Heritage Register (WHR) properties, identified cemeteries, and previously conducted cultural resource surveys found throughout the state. The DAHP's predictive model places the APE in areas of "High to Very High Risk" for encountering cultural resources, stating that "survey is highly advised" for this location.

The fieldwork was completed in a manner consistent with RCW 27.53.030, and included inspection techniques to identify both surface and subsurface archaeological resources. Plateau archaeologists conducted a pedestrian survey and excavated 27 subsurface probes. The pedestrian survey covered the entire APE and subsurface probes were placed in the orientation of the new road and in the two staging areas. A historic debris scatter/concentration consisting of a concrete cistern, a 1946 Oldsmobile, and a Holt combine were recorded and inventoried. An archaeological site form was prepared for this historic site (Appendix A).

Plateau also recorded and inventoried two structures for this project—the Dell Sharpe Bridge and the Pettyjohn School House. A historic property inventory form was prepared for each of the structures (Appendix B). Only one structure, Dell Sharpe Bridge, is eligible for NRHP inclusion under Criterion C; Pettyjohn School House is ineligible.

The project will result in **No Effect to the Pettyjohn Schoolhouse**. No further archaeological investigations are recommended prior to, or during, execution of this project.

KEY INFORMATION

PROJECT

Cultural Resource Survey for the Dell Sharpe Bridge Replacement

REPORT AUTHORS

Justin Fitzpatrick and David A. Harder

COUNTY

Walla Walla County

LEGAL LOCATION OF PROJECT

Sections 02 and 03 of Township 09 North, Range 35 East
Sections 34 and 35 of Township 10 North, Range 35 East, Willamette Meridian

USGS QUADS

Harsha, Washington 7.5 minute, 1967 (1976)

ACREAGE

12.5 acres

PROJECT DATA

2 previously recorded historic properties
1 new cultural resources located and/or recorded

DAHP PROJECT NUMBER

2021-02-00919

MANAGING AGENCY

Federal Highway Administration (FHWA)

REPORT PREPARED FOR

Walla Walla County Public Works

FIELD NOTE DISPOSITION

Archived at the office of Plateau Archaeological Investigations LLC, Pullman.

PRINCIPAL INVESTIGATOR

David A. Harder, M.A.

CERTIFICATION OF RESULTS

I certify that this investigation was conducted and documented according to Secretary of Interior's Standards and Guidelines and that the report is complete and accurate to the best of my knowledge.

Signature of Reporter

May 25, 2021
Date

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PROJECT DESCRIPTION

Walla Walla County Public Works is preparing to replace a bridge along Pettyjohn Road, located in the northern part of Walla Walla County, Washington (Figure 1). The project will include replacing the Dell Sharpe Bridge crossing the Touchet River with a new two span, pretested girder bridge. This replacement will require a realignment of the length of road from milepost (MP) 5.20 to MP 5.80. Replacement of the bridge is necessary due to stream stability issues caused by the Dell Sharpe Bridge, including stability issues caused by a static entity that does not span the 100-year flood zone, whereas the stream is dynamic and changing. In addition, the center pier of the existing bridge collects large wooden debris, causing higher flows that would normally flow to be redirected, scouring the banks and abutment footings. Anticipated impacts include excavations, compaction of sediments, and other ground-disturbing construction activities. The area of potential effect (APE) covers approximately 12.5 acres, and lies within Section 02 and 03 of Township 09 North, Range 35 East; and Sections 34 and 35 of Township 10 North, Range 35 East, Willamette Meridian (Figure 2). The APE hereafter will be referred to as the "Project Area."

This project will be federally funded and administered by the Federal Highway Administration (FHWA). As such, potential impacts to cultural resources must be considered as per Section 106 of the National Historic Preservation Act (NHPA).

STATEMENT OF OBJECTIVES FOR SURVEY

The cultural resource survey of the Dell Sharpe Bridge Replacement Project is intended to identify potential historic properties, including archaeological and built environment cultural resources, within the Project Area prior to execution of the proposed project. The pre-field research is designed to identify any known historic properties, including archaeological sites and isolates; historic property inventories of buildings, structures, and historic districts; and cemeteries located in or near the Project Area. Fieldwork procedures are intended to identify areas of moderate to high probability for such cultural resources, previously recorded or otherwise. This report describes the pre-field research, methodology, results, and recommendations for the cultural resources aspect of the proposed project.

PRE-FIELD RESEARCH

Pre-field research included the review of known archaeological resources within a 1.0-mile (mi) (1.6-kilometer [km]) radius of the Project Area as inventoried at the Washington State Department of Archaeology and Historic Preservation (DAHP) in Olympia, Washington. This review was completed using DAHP's secure electronic database known as the Washington Information System for Architectural and Archaeological Data (WISAARD). This database includes recorded archaeological resources, historic property inventories (HPIs), properties and districts on the National Register of Historic Places (NRHP) and the Washington Heritage Register (WHR), identified cemeteries, and previously conducted cultural resource surveys found throughout the state.

Figure 1. The location of the Project Area within Walla Walla County.

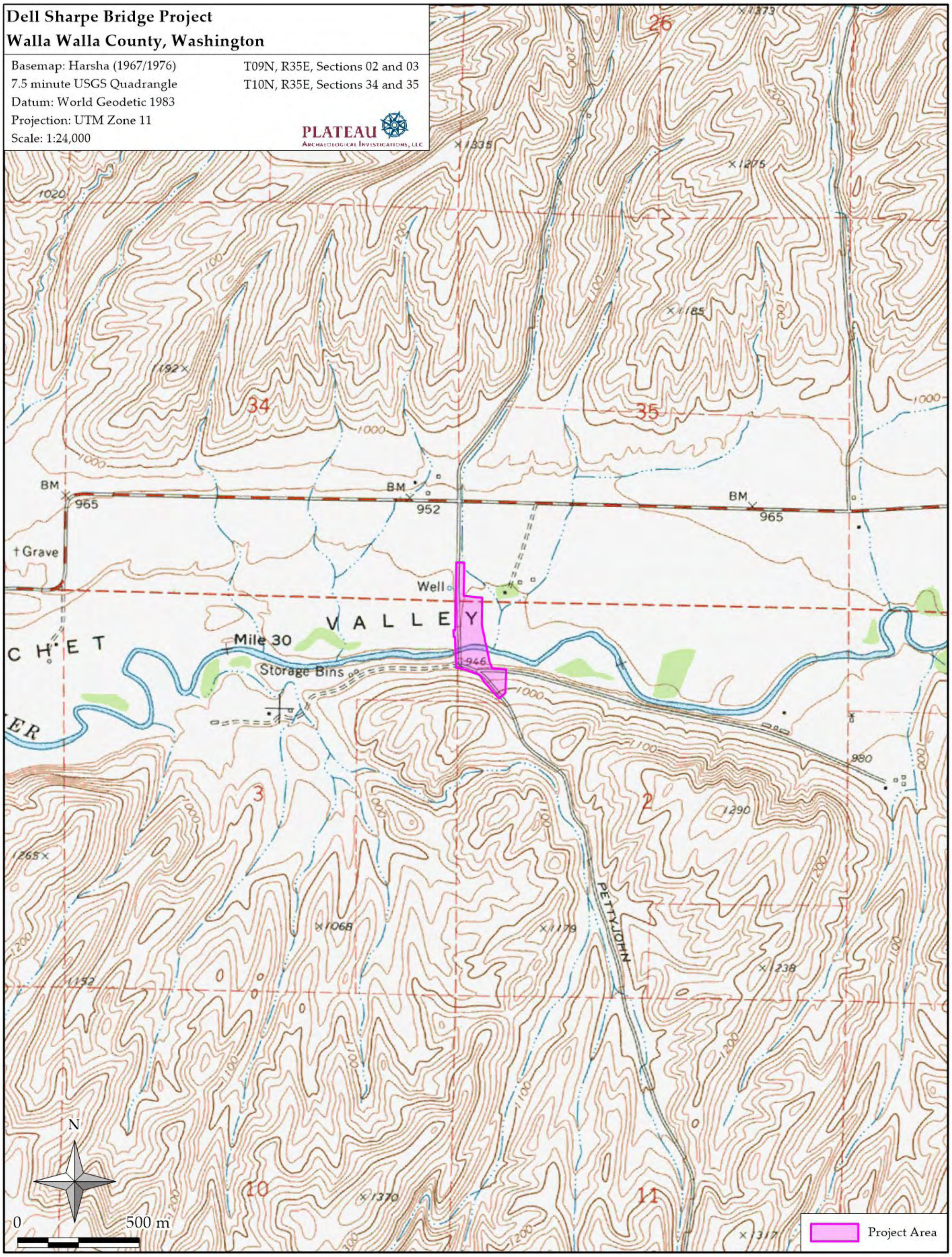

Figure 2. The Project Area shown on a portion of the Harsha USGS map.

Plateau also conducted cartographic analysis of landform, topography, proximity to water using topographic maps, and the United States Department of Agriculture (USDA) online soil survey. Secondary historic resources, on file at the DAHP and the Plateau office in Pullman, were consulted to identify other potential historic resources. In addition, available survey and overview reports and ethnographic accounts of the region were consulted. This background review allows for the identification of previously recorded historic and archaeological resources within or near the Project Area.

ENVIRONMENTAL SETTING

The Project Area is within the Columbia Basin, situated between the Rocky Mountain and Cascade Mountain ranges. The region consists of gently rolling hills amidst the Channeled Scablands, which are features that resulted from Pleistocene-era mega-floods ranging in size from small stream-like trenches to large coulees measuring miles wide and hundreds of feet deep. Elevations in this region range between 200 feet (ft) (61 meters [m]) above mean sea level (AMSL) near the Columbia River to over 4,500 ft (1,372 m) AMSL in outlying ridges and low mountains (Fenneman 1946; Hunt 1967).

According to the Natural Resources Conservation Service (2021), the Project Area contains three soil types: Onyx silt loam at 0 to 3 percent slopes makes up 52 percent of the Project Area, Riverwash makes up 42 percent of the Project Area, and Walla Walla silt loam at 8 to 30 percent slopes makes up 6 percent of the Project Area.

The predominant draw for Native American and Euroamerican populations in this region was, and still is, the extensive river systems. The most significant environmental feature is the Columbia River, which flows for more than 1,200 mi (2,000 km) from the base of the Canadian Rockies in southeastern British Columbia to the Pacific Ocean at Astoria, Oregon. Ten major tributaries—the Cowlitz, Deschutes, Kootenay, Lewis, Okanogan, Spokane, Snake, Wenatchee, Willamette, and Yakima—complete the drainage system. The Touchet River intersects the middle of the Project Area.

The vegetation around the Project Area falls within the *Artemisia tridentata—Agropyron spicatum* habitat type, characterized by arid sagebrush steppe (Daubenmire 1970; Taylor 1992). Big sagebrush *(Artemisia tridentata)* and bluebunch wheatgrass *(Agropyron spicatum)* are dominant in this environment. The plant community includes threetip sagebrush (*Artemisia tripartita*), gray horsebrush (*Tetradymia canescens*), spiny hopsage (*Grayia spinosa*), green rabbitbrush (*Chrysothamnus viscidiflorus*), and gray rabbitbrush (*Chrysothamnus nauseosus*). Grasses and forbs include needle and thread (*Stipa comata*), *Stipa thurberana* (no common name known), bottlebrush squirreltail (*Sitanion hystrix*), Cusick's bluegrass (*Poa cusikii*), Indian paintbrush (*Castilleja* spp.), lupine (*Lupinus* spp.), plantain (*Plantago patagonica*), longleaf phlox (*Phlox longifolia*) and balsamroot (*Balsamorhiza sagittata*). Additional species of flora thrive along the shores of the Columbia River, including bitterbrush (*Purshia tridentata*), quaking aspen (*Populus tremuloides*), willow *(Salix* spp.) and currant (*Ribes* spp.) (Daubenmire 1970). Many of these plants have been incorporated in Native American use as medicinal plants, food sources, and other employment.

The Project Area lies within a region that historically contained an abundance of life. It is likely, though, that Native Americans had access to an even larger variety of resources during the past that played a role in aboriginal use, settlement, and travel patterns in relation to the Project Area. Mammals include sagebrush voles (*Lemmiscus curtatus*), Great Basin pocket mice (*Perognathus parvus*), deer mice (*Peromyscus maniculatus*), bushy-tailed wood rat (*Neotoma cinerea*), Washington ground squirrel (*Spermophilus washingtoni*), northern pocket gopher (*Thomomys talpoides*), yellow bellied marmot (*Marmota flaviventris*), white-tailed hare (*Lepus townsendii*), Nuttal cottontail (*Sylvilagus nuttallii*), porcupine (*Erethizon dorsatum*), beaver (*Castor canadensis*), muskrat (*Ondatra zibethica*), Bighorn sheep (*Ovis canadensis*), coyote (*Canis latrans*), bobcat (*Lynx rufus*), badger (*Taxidea taxus*), and long-tailed weasel (*Mustela frenata*). The occasional bison (*bison bison*) is also thought to be available prehistorically (Burt and Grossenheider 1961; Ingles 1965; Schroedl 1973).

Many types of fowl were also available in the past including Swarth blue grouse (*Dendragapus obscurus pallidus*), Columbian ruffed grouse (*Bonasa umbellus affinis*), Columbian sharp-tailed grouse (*Pedioecetes phasianellus*), western sage grouse *(Centrocercus urophasianus phaios*), mallard duck (*Anas platyrhynchos platyrhynchos*), western harlequin duck (*Histrionicus histrionicus pacificus*), American common merganser *(Mergus merganser americanus*), the lesser snow goose (*Chen hyperborea hyperborea*), and the Great Basin Canada goose (*Branta canadensis moffitti*). Seasonally available birds such as Gadwall (*Anas strepera*), wood duck (*Aix sponsa*), redhead (*Aythya americana*), and the northern ruddy duck (*Oxjura jamaicensis rubida*) resided in the region in the summer. Winter game birds of the region included canvasback (*Aythya valisineria*) and American greater scaup *(Aythya marila nearctica*) (Lothson 1977).

The climate in the Columbia Basin was cool and moist at the end of the last glacial period. Gradually, climatic conditions became markedly warmer and dryer by approximately 9,000 years before present (B.P.). The warm dry climatic trend reached its maximum around 6,500 B.P. and then conditions reverted to a cooler and moister regime (Fryxell and Daugherty 1962). Comparatively, the present climate is arid with mild moist winters and hot dry summers (Meinig 1968). The mean seasonal temperatures recorded at the Pleasant View, Washington station (#456553) between 1936 and 1979 are 33.4° Fahrenheit (F) in winter and 70.6° F in the summer. Extreme temperatures of -24° F and 109° F have been recorded at the same station. Yearly precipitation averages 12.3 inches (Western Regional Climate Center 2021).

REGIONAL PRECONTACT BACKGROUND

The Project Area is included in the Plateau culture area, which corresponds roughly to the geographic region drained by the Fraser, Columbia, and Snake rivers. The Plateau culture area is bordered on the west by the Cascade Mountains and on the east by the Rocky Mountains. The northern border of the culture area is in Canada where it gives way to Arctic culture patterns. The southern border of the Plateau culture area mixes gradually with the Great Basin culture area (Walker 1998:1-3).

A cultural chronology provides a time line describing the adaptations, material culture, subsistence, and sometimes settlement patterns of the people who inhabited a specific area. A cultural chronology for the Lower Snake River was compiled and developed by Frank Leonhardy and David Rice (1970). Leonhardy and Rice described five distinct phases within the region: the Paleoindian (11,500 to 10,000 B.P.) (Meltzer 1993), the Windust Phase (10,000 to 8,000 B.P.) (Leonhardy and Rice 1970), the Cascade Phase (8,000 to 5,000 B.P.), Tucanon Phase (5,000 to 2,500 B.P.) (Lucas 1994), and the Harder Phase (2,500 to 150 BP) (Harder 1998). The cultural chronology of the Lower Snake River has been discussed at length in Leonhardy and Rice (1970), Meltzer (1993), Lucas (1994), and Harder (1998), and, if pertinent, will be discussed further within the results of this report.

Ethnography

The Project Area lies within the traditional homelands of the Walla Walla people which range from the Columbia River, east of Highway 82, and encompasses all of the land between the Snake and Walla Walla Rivers including the Walla Walla River Drainage (Garth 1964). However, the Walla Walla engaged in a seasonal round that expanded their territory from these main rivers to the Blue Mountains. The Walla Walla are part of the Sahaptian speaking people of the Columbia River which includes a diversity of cultures including the Cayuse and the Umatilla. Today the Walla Walla reside on, and are part of, the Confederated Tribes of the Umatilla Indian Reservation.

Similar to their neighbors, the Umatilla and the Cayuse, the Walla Walla engaged in a seasonal round that included sedentary villages along the Columbia and Walla Walla Rivers. These large, aggregated winter villages were comprised of many large mat lodges holding several kin related families. These houses may have had some kin connections with other houses within the winter village; however, it was most often the case the these houses were autonomous. In addition to mat lodges, winter villages often contained extra structures other than the mat lodge depressions, including storage pits for dried fish and roots, pit houses for seclusion, and mud baths and sweat lodges (Stern 1998). Fish, including steelhead, whitefish, suckers, and sturgeon were often caught in riverine villages, dried or smoked, and stored for winter subsistence (Stern 1998). In addition to aquatic resources, dried roots collected in summer months could be stored through the winter and made up a significant portion of the winter diet.

The summer seasonal round saw the movement of Walla Walla from their riverine villages into the hills and mountains south and east of the rivers. Particularly, hunting and gathering in the Blue Mountains was important for the Walla Walla as these resources provided sustenance throughout the summer and into the winter (Stern 1998). Women, children, and elderly would travel to the streams of the Blue Mountains to dig and collect roots including *Lomatium canbyi* and *Lomatium cous* (Stern 1998). While women dug roots in the hills, men often engaged in hunting deer and elk, or fixed weirs and kept an eye out for raiders (usually Shoshonis or Paiutes) (Stern 1998). Hunting parties in the Blue Mountains utilized fire to drive deer and antelope towards waiting hunters at stands (Stern 1998). Garth (1964) states that the Walla Walla had two distinct class of people, either fishermen or buffalo hunters, but this is probably a reflection of post-horse introduction by the Plains Indians. After the introduction of the horse, hunting parties ventured further and changed their hunting strategies, such as "riding down" or persistence hunting where game is chased on horseback until it is too tired to run anymore (Stern 1998). However, not all Walla Walla and other groups left the Columbia River during the summer months. Many households stayed along the Columbia River and aggregated at productive fishing locations, many of which were documented by Lewis and Clark on their journey through the area in 1805 (Stern 1998). Fishing was done on platforms or by canoe. The Walla Walla were known to purchase their canoes from the Spokane Indians; however, the longevity of purchasing canoes from the Spokane is not well known (Stern 1998).

Like neighboring groups in the area, the Walla Walla were engaged in a system of bilateral kindship which allowed for household autonomy and flexibility in determining summer and winter village placement. In bilateral kinship systems, men and women have access to resource locations on both sides of their families and can claim those rights when they want. Because intermarriage between the Umatilla, Cayuse, Yakima, and Walla Walla was so common, it was not uncommon for Walla Walla people to claim rights to resource locations and to live within the territories of the Umatilla, Cayuse, or Yakima. Although this practice is noted for the ethnographic record, Ray (1938) states that the divide between the Umatilla and Walla Walla territory was definite and that the two groups did not freely intermingle.

Places of Cultural Significance

The Project Area is within the traditional territory of the Walla Walla. A review of ethnographies was undertaken to help identify any known HPRCSIT (Historic Properties of Religious and Cultural Significance) or TCPs (Traditional Cultural Properties). This is a preliminary review performed using publicly available resources, and should not be construed as an exhaustive identification of potential resources. The works of Angelo Anastasio (1972), Verne Ray (1936, 1939, 1942), Alan Smith (1988) Leslie Spier (1936), and Robert Suphan (1974) are particularly relevant to the region, and were reviewed in addition to works by Jennifer Karson (2006), Robert H. Ruby and John A. Brown (1972), and Robert J. Shuphan (1936).

Walla Walla and its surrounding region lies within land traditionally occupied by three Native American groups within the Plateau culture area – the Cayuse (*Weyiiletpuu*), Walla Walla (*Waluulapam*), and the Umatilla (*Imatalamlama*). The Umatilla and Walla Walla both spoke a dialect of the Sahaptin language. The Cayuse, on the other hand, spoke a unique dialect, which may have been derived from the Penutian superfamily (Stern 1998:395). Intermarriage between these groups and the Nez Perce brought about bilingualism, most choosing to speak the Lower Nez Perce language. The Cayuse continued to speak their traditional language amongst themselves; however, as generations passed the language became moribund and lost by the late 19th century (Stern 1998:395).

As generations became linguistically and culturally entwined, so did their territories. The Walla Walla primarily used lands closer to the confluence of the Columbia and Walla Walla rivers while the Cayuse occupied lands southeast of the Touchet River (Ray 1936). Historic maps (Carlton 1857; Meany 1857) from the mid nineteenth century distinguish the Cayuse from the Walla Walla and Umatilla, noting that the Cayuse inhabited land between the Snake and Walla Walla rivers. Both map makers refer to land between the Columbia and Snake rivers as being that of both the Cayuse and Walla Walla. "Their land" is of course a relative term, as several scholars have noted that the Cayuse, Umatilla, and Walla Walla shared the same territory, often at the same time, for the purpose of hunting, fishing, and gathering (Dickson 2001:3).

Principal villages of the Cayuse, Walla Walla, and Umatilla were located along major rivers such as the Walla Walla and Umatilla, while many seem to have concentrated along creeks. Stern (1998) notes nine Cayuse winter villages in the Walla Walla Valley (Table 1).

Table 1. Ethnographic Winter Villages (Stern 1998)

Traditional Name	Translation	Winer Village Location
kimilehispu	Tamarack People	Butter Creek
witu npu	Birch Creek People	Birch Creek (Pilot Rock)
hawtmipu	McKay Creek People	McKay Creek
nixya wipu	Aspen Springs People	Umatilla River between Mission and Cayuse
imeqicimenikenpu	Large Confluence People	Umatilla River between Thornhollow and Gibbon
qapqapi cpu	Cottonwood Grove People	Cottonwood Creek, a tributary of the Walla Walla
imce me pu	Mortar Stone Creek People	Upper Walla Walla River, near Milton Freewater
pasxapu	Sunflower People	Middle of Walla Walla River and Mill Creek
e?hetimepu	No Translation	Willow Creek, near Heppner

Mill Creek was originally referred to by local Native Americans as *Pasha*, *Pashki*, *Pashau*, or *Pashkee* (Lyman 1918:114 *in* Sprague and Combes 1965:2). The band known as *pasxapu* ("sunflower people") was affiliated with a winter village located on Mill Creek (Stern 1998). Mill Creek, named after the presence of Marcus Whitman's saw mill, became the focus of Walla Walla settler growth, with Main Street in Walla Walla following the path of the creek, and the "Old Nez Perce Trail" (Bennett 1980). Importantly, Mill Creek was the site of the Treaty of 1855, in the vicinity of the present day downtown Walla Walla.

Kopperl and Heideman (2007:8) includes ethnographic information on subsistence areas, villages, and winter camp sites for the Umatilla, Cayuse, Walla Walla, Nez Perce, and Columbia River Indians (including Warm Springs). Winter camps for the Umatilla, Cayuse, and Walla Walla are located in present day Walla Walla, Milton Freewater, and Pendleton area; villages are located along the Columbia River; and subsistence areas are located in northeastern Oregon. Sprague and Comes (1965) were told by a local informant of a large camp along Mill Creek at the present-day site of the Wickersham Bridge. One informant reported, "the flat had so many tepees that there was not room for another one" (Sprague and Combes 1965:4). The site was destroyed in 1931 when Mill Creek swelled, changed course, and flowed directly over the site.

Numerous collections of published legends were consulted to identify points of legendary significance within the Project Area. These include publications by Franz Boas (1917), Ella Clark (1969), Richard Erdoes and Alfonso Ortiz (1984), and Verne Ray (1933). This effort provided no additional information.

It should be noted that TCPs, place names, and landscape narratives are highly sensitive and often sacred. Native American traditional knowledge and landscape narratives are extensive within traditional territories, which extend well-beyond current Reservation boundaries and include the Project Area. Due to the significance of TCPs, as well as their esoteric and sacred importance, and out of genuine and reasonable concern for their safety, tribes often do not share information regarding TCPs, and published materials often do not reveal locations of sensitive properties or narratives. Given their access to qualitative data, narratives, and traditional knowledge, the Confederated Tribes of the Umatilla Indian Reservation, which represent the Walla Walla, are uniquely qualified to do additional review. If further review of TCPs is required, it is recommended that one make arrangements with the Tribes directly.

REGIONAL HISTORIC BACKGROUND

On August 12, 1805, the Corps of Discovery (Corps) expedition led by Meriwether Lewis and William Clark traversed Lemhi Pass, crossing the Continental Divide into north Idaho and becoming the first European Americans to explore the region. The Corps met Chief Yelleppit of the Wallulapum tribe while traveling along the Walla Walla River towards the Pacific Ocean, but the encounter was brief. However, on their return in April of 1806, the Corps spent several days at Chief Yelleppit's village, trading and learning of an overland route towards their next destination before departing (National Parks Service 2020). Speaking specifically of the Walla Walla region, Lewis wrote:

> ...the country along the rocky mountains for several hundred miles in length and about 50 in width is level extreemly [sic] fertile and in many parts covered with a tall and open growth of the longleafed pine, near the watercourses the hills are steep and lofty tho' [they] are covered with a good soil not remarkably stony and possess more timber than the level country. the bottom lands on the watercou[r]ses are reather [sic] narrow and confined tho' fertile & seldom inundated. this country would form an extensive settlement; the climate appears quite as mild as that of similar latitude on the Atlantic coast if not more so and it cannot be otherwise than healthy; it possesses a fine dry pure air. the grass and many plants are now upwards to knee high. I have no doubt but this tract of country if cultivated would produce in great abundance every article essentially necessary to the comfort and subsistence of civillized man (quoted in Meinig 1968:31).

And with this seal of approval, the region was soon traversed and explored by trappers, fur traders, and missionaries.

Fort Walla Walla (Nez Perce) was constructed in 1818 by the Hudson's Bay Company. The fort was strategically built at the confluence of the Columbia and Walla Walla rivers, virtually guaranteeing the business of trading parties departing for and arriving from peripheral districts who used the Columbia as a trunk line to the sea. This was also an important area to the Native Americans, which served as a major meeting and trading ground for themselves. With the establishment of the fort came increasing hostilities, leading this informal rendevous into a permanent post.

To that end, a formidable fort was built. Dwellings and storehouses were enclosed inside a twelve-foot wall. Surrounding the inner cluster was a palisade reaching twenty feet tall topped by a range of balustrades four feet high, which served as an encircling gallery (Meinig 1968:62-63). At each corner stood wooden fortified water towers and 200-gallon water reservoirs to combat fire. Cannons, muskets, and pikes added additional protection. Indians were not allowed inside the inner circle; rather, trade was conducted through a small opening in the inner wall. This double-wall design was unique among the company's posts at that time. Fort Walla Walla was the strongest and most complete fort west of the Rocky Mountains and earned the title the "Gibralter of the Columbia" (Meinig 1968:63). It not only was an important fur trading depot, but it also provided grain to the other forts in the northwest (Bennett 1980; Brosch 1951).

Following in the footsteps of the fur trapping era, and before the massive influx of immigrants, came the missionaries. First to the region were Dr. Marcus Whitman and his wife, Narcissa, together serving the American Board of Commissioners for Foreign Missions (ABCFM), a group that governed the activities of Presbyterian and Congregational missions to various Native American tribes. In the spring of 1836, Marcus (then age 34) and Narcissa (then age 32), along with another missionary couple, Henry and Eliza Spalding, traveled west reaching the Walla Walla Valley in September of that same year. The Spaldings continued westward while the Whitmans remained in the valley to establish their mission at Waiilatpu on the Walla Walla River (Bennett 1980).

For all their good intentions, it appears that the Whitmans struggled at their missionary duties – mainly attracting converts. The Cayuse seemed impervious to the Euroamericans religion, perhaps having heard tales of it in their ever-expanding travels. The ABCFM threatened to close the mission in 1842. A trip east to plea his case led the council to reconsider their decision and the Whitmans were able to keep the Walla Walla mission open. Marcus traveled back west in 1843 in the company of approximately 1,000 settlers, a movement known as The Great Migration along the Oregon Trail. Throughout the next four years, the Walla Walla mission became a way-station for exhausted settlers arriving from the east.

Although interaction between the Whitmans and the Cayuse had been cordial from initial contact, Native American alarm rose at the massive influx of Europeans into their homeland. Not only were these new people claiming prime land but they were introducing new diseases to which the Native

Americans had no immunity. Tensions reached a violent climax when an epidemic of the measles hit the valley in 1847. The Whitmans administered medical attention (inoculations) to all; however, without immunity, the Native Americans did not recover as well as the settlers. Suspecting they were receiving inadequate treatment, a small group attacked the mission on November 29, 1847, killing the Whitmans and twelve others. Dubbed the Whitman Massacre, five members of the Cayuse tribe, including their chief, *Tiloukaik*t, were later tried for the murders and subsequently hung in Oregon City (Bennett 1980; Gray 1953).

The Oregon Territory (later Washington and Idaho) was established in 1848 following the Whitman Massacre. Efforts were made to limit the incursion of emigrants and others into Indian territories but by 1850, nearly 12,000 immigrants had passed through the Plateau region along the Oregon Trail (Beckham 1998; Walker and Sprague 1998). Prohibition of settlement was strictly maintained, and as General Wool pointed out, "the army cannot furnish guards to farm houses dotted among hostile tribes" (Meinig 1968:165). The settlement prohibition was only a temporary solution to an inevitability. People settled and volunteer militias attacked indiscriminately, fueling the fire under uncertain relations.

In an attempt to quell this unrest, treaties between Native tribes and the new state and federal governments were soon underway. Washington Governor Isaac Stevens, also appointed as Superintendent of Indian Affairs by President Pierce, worked jointly with Joel Palmer, Superintendent of Indian Affairs in Oregon, to negotiate a series of treaties between 1854 and 1855. The Walla Walla Treaty Council of 1855 was created to establish land cessions and reservations among Native American tribes of the Southern Plateau in Washington and Oregon Territories. The first of these treaties focused on the Walla Walla, Cayuse, and Umatilla tribes. A total of 6.4 million acres of land was ceded with 512,000 acres originally designated for the Umatilla Indian Reservation near modern day Pendleton, Oregon. A series of surveys and executive acts reduced this land to its current size of 172,000 acres, with tribes reserving their right to fish, hunt, and gather traditional foods and medicines throughout the ceded lands (Lahren 1998:484-487). These treaties were difficult to maintain in light of the Chinook jargon used in negotiations, rapid influx of miners following the several "rushes," and settlers who were eager for property. Almost immediately after signing the Walla Walla Council Treaty of 1855, gold was discovered on several promised reservations in the Plateau, and miners began to mine the mineral-rich lands. The introduction of disease, treaty violations, and other stresses introduced by the new settlers caused mistrust and eventually, warfare.

The unrest culminated with George Wright's ruthless campaign in 1858 that resulted in the executions and murders of 16 Indians including a Yakama chief named Owhi and his son, Qualchan (Beckham 1998). While Lieutenant Colonel Steptoe's campaign was underway north, near present-day Spokane, Major R.S. Garnett led approximately 300 soldiers on a sweep from Fort Simcoe up through the Yakama country, through Wenatchee, and as far as the Similkameen River. Garnett's sweep resulted in the summary executions of 10 Indians suspected of attacking miners, and the loss of one private who was lagging behind the company and presumed shot by Natives

(Wilson 1990:62). Meanwhile, the settlers had sought retribution on the Cayuse for the Whitman Massacre. Rather than bring to trial those that committed the murders, the settlers attacked the entire Cayuse.

These conflicts were settled in 1860 with the creation of the Confederated Tribes of the Umatilla, which resulted in the removal of Walla Walla, Cayuse, and Umatilla peoples to the Umatilla Indian Reservation. However, this did not solve unrest between Native Americans and Euroamericans settlers, eventually culminating in clashes with bordering towns over land (Stern 1998: 415).

Walla Walla County

Walla Walla County was formed on April 25, 1854. The county was created from Clark and Skamania counties and originally encompassed all of eastern Washington, Idaho, and approximately one fourth of Montana (Bennett 1980). The county seat was placed at Waiilatpu, the former location of the Whitman Mission, on the claim of a settler named Lloyd Brook. The Treaty Council at Walla Walla in May 1855 and the Indian Wars that followed prevented the county infrastructure from being fully organized. On January 19, 1859, the Territorial Legislature passed an act creating a true infrastructure for Walla Walla County, and the City of Walla Walla was chosen as the county seat. Over the next 16 years, Walla Walla County would be subject to several downsizing events. Present day Walla Walla County is bounded to the east by Columbia County, to the north by the Snake River and Franklin County, to the west by Benton and Franklin counties and the Columbia River, and to the south by the state of Oregon.

The land that would become Walla Walla County was one of the earliest areas between the Rocky Mountains and the Cascade Mountains to be permanently settled by non Indians, and for that reason it is sometimes referred to as the cradle of Pacific Northwest history. Agriculture is the most significant industry in the county, especially the cultivation of wheat, onions, and wine grapes.

Cartographic Analysis of the Project Area

The Project Area is located in the NW¼ NW¼ of Section 02 of Township 09 North, Range 35 East. The 1861 cadastral map (Tilton 1861) shows one structure in the NE¼ NW¼ of Section 03 of Township 09 North, Range 35 East outside of the Project Area. There are no other built environment features within or around the Project Area.

The 1909 atlas shows Sharp Road and Pettyjohn Road in the same orientation as modern times. There is a structure within 0.25 mi of the Project Area to the northwest labeled as “School” (Ogle 1909). The land encompassing the Project Area is labeled as owned by F.D. and C.E. Sharp (Ogle 1909). The 1967 USGS map provides no additional information.

PREVIOUS ARCHAEOLOGY

A review of previously recorded cultural resources and archaeological surveys was completed through the WISAARD on February 18, 2021. The review covered areas within Sections 01, 02, 03, 10, and 11 of Township 09 North, Range 35 East; and Sections 34, 35, and 36 of Township 10 North, Range 35 East. This review revealed no known cultural resources within 1.0 mi (1.6 km) of the Project Area.

The Dell Sharpe Bridge had been inventoried and recorded to the DAHP records. The inventory was completed by Lisa Soderberg on a form type that was in use before the DAHP established the WISAARD portal, but the date of recording was not reported on the form, nor was NRHP eligibility identified. Hauser (2021) prepared an HPI form for Dell Sharpe Bridge. No additional HPI's have been inventoried, or derived from the Walla Walla County Assessor's records within 1.0 mi (1.6 km) of the Project Area.

There have been no previously conducted cultural resource surveys within 1.0 mi (1.6 km) of the Project Area.

FIELD METHODS AND SURVEY RESULTS

Survey work was completed in accordance with the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation (48 FR 44716, September 29, 1983) and under the supervision of Principal Investigator, David Harder. Fieldwork included both archaeological survey and a built environment survey.

The Project Area is along Pettyjohn Road, north of Walla Walla, and south of Highway 124. The environment of the Project Area is an open field, gravel shoulder, and riverine setting adjacent to the Touchet River. Vegetation does not match native vegetation as described in Environmental Setting section of the report. Prior to the field visit, a utility locate was requested under ticket #21077600. This locate identified one subsurface utility line spanning the length of the Project Area.

Archaeological Survey

Plateau archaeologists Idah Whisenant and Justin Fitzpatrick completed the archaeological survey on March 10-12, 2021. The limits of the Project Area were identified using maps provided by the client. Survey conditions included temperatures in the mid 40s, with clear skies, light wind, and no precipitation.

Mr. Fitzpatrick and Ms. Whisenant, conducted pedestrian survey consisting of 14 east/west transects, spaced at intervals no more than 20 m (65.6 ft) (Figure 3). Ground surface visibility varied between 10% in the portion adjacent to the Touchet River of the Project Area to 50% in the field portion of the Project Area (Figure 4 and Figure 5). Plant debris, vegetation, and road gravel impeded ground visibility. Road cuts and rodent spoils augmented ground visibility throughout.

Site 45WW458 was identified and recorded during the archaeological survey, and consists of a historic debris scatter/concentration (Figure 6). The site includes three artifacts including a Holt combine body, a concrete irrigation cistern, and a crushed 1946 Oldsmobile. All of these artifacts were likely placed to stabilize the southeastern bank. A site form was prepared for this historic debris scatter/concentration (Appendix A).

A total of 27 subsurface probes (SSPs) were excavated throughout the Project Area as 40 cm holes (Table 2). Probes were placed in the orientation of the proposed road and within the two staging areas. The archaeologists removed sediment in arbitrary 10 cm levels, screened spoils through ¼-inch wire mesh, and recorded sediment characteristics on standardized forms with the color, composition, and degree of compaction noted. The archaeologists took representative photographs of the Project Area, and all subsurface probes and other relevant geospatial data were recorded using a handheld GPS unit. Onyx silt loam and Walla Walla silt loam were observed within the SSPs as predicted by the NRCS. All SSPs were excavated to a depth of 100 cm except for two probes, which were terminated due to cobbles and compaction. SSPs ranged in depth from 80-120 cm (31.5-47.2 in), averaging 100.7 cm (39.6 in).

Table 2. Subsurface Probe Results.

SSP#	Depth (cm)	Soil Profile (cm)	Cultural Material
01	105	0-105 10YR4/4 Silty loam with <5% rounded to subrounded gravel to cobbles	Negative
02	100	0-100 10YR4/4 Silty loam with <5% rounded to subrounded gravel to cobbles	Negative
03	120	0-100 10YR4/4 Silty loam with <5% rounded to subrounded gravel to cobbles 100-120 10YR4/2 clay loam mottling	90-100; large mammal bone; no modification
04	100	0-100 10YR4/4 Silty loam with <5% rounded to subrounded gravel to cobbles	Negative
05	100	0-100 10YR4/4 Silty loam with <5% rounded to subrounded gravel to cobbles	Negative
06	100	0-100 10YR4/4 Silty loam with <5% rounded to subrounded gravel to cobbles	30-40 One large mammal bone; no modification
07	100	0-100 10YR4/4 Silty loam with <5% rounded to subrounded gravel to cobbles	Negative
08	100	0-100 10YR4/4 Silty loam with <5% rounded to subrounded gravel to cobbles	Negative
09	100	0-100 10YR4/4 Silty loam with <5% rounded to subrounded gravel to cobbles	Negative
10	100	0-100 10YR4/4 Silty loam with <5% rounded to subrounded gravel to cobbles 73-80 10YR4/2 clay loam mottling 80-100 10YR2/1 Soot/burned mottling	Negative
11	100	0-100 10YR4/4 Silty loam with <5% rounded to subrounded gravel to cobbles	Negative

Table 2. Subsurface Probe Results (continued).

SSP#	Depth (cm)	Soil Profile (cm)	Cultural Material
12	100	0-100 10YR4/4 Silty loam with <5% rounded to subrounded gravel to cobbles	Negative
13	100	0-100 10YR4/4 Silty loam with <5% rounded to subrounded gravel to cobbles	Negative
14	120	0-120 10YR4/4 Silty loam with <5% rounded to subrounded gravel to cobbles	Negative
15	95	0-95 10YR4/4 Silty loam with <5% rounded to subrounded gravel to cobbles 95 cmbs; Terminated due to cobble	Negative
16	100	0-100 10YR4/4 Silty loam with <5% rounded to subrounded gravel to cobbles	Negative
17	80	0-80 10YR4/4 Silty loam with <5% rounded to subrounded gravel to cobbles Terminated due to compaction	Negative
18	100	0-100 10YR4/4 Silty loam with <5% rounded to subrounded gravel to cobbles	Negative
19	100	0-100 10YR4/4 Silty loam with <5% rounded to subrounded gravel to cobbles	Negative
20	100	0-100 10YR4/4 Silty loam with <5% rounded to subrounded gravel to cobbles	Negative
21	100	0-100 10YR4/4 Silty loam with <5% rounded to subrounded gravel to cobbles	Negative
22	100	0-100 10YR4/4 Silty loam with <5% rounded to subrounded gravel to cobbles	Negative
23	100	0-100 10YR4/4 Silty loam with <5% rounded to subrounded gravel to cobbles	Negative
24	100	0-100 10YR4/4 Silty loam with <5% rounded to subrounded gravel to cobbles	Negative
25	100	0-100 10YR4/4 Silty loam with <5% rounded to subrounded gravel to cobbles	Negative
26	100	0-100 10YR4/4 Silty loam with <5% rounded to subrounded gravel to cobbles	Negative
27	100	0-100 10YR4/4 Silty loam with <5% rounded to subrounded gravel to cobbles	Negative

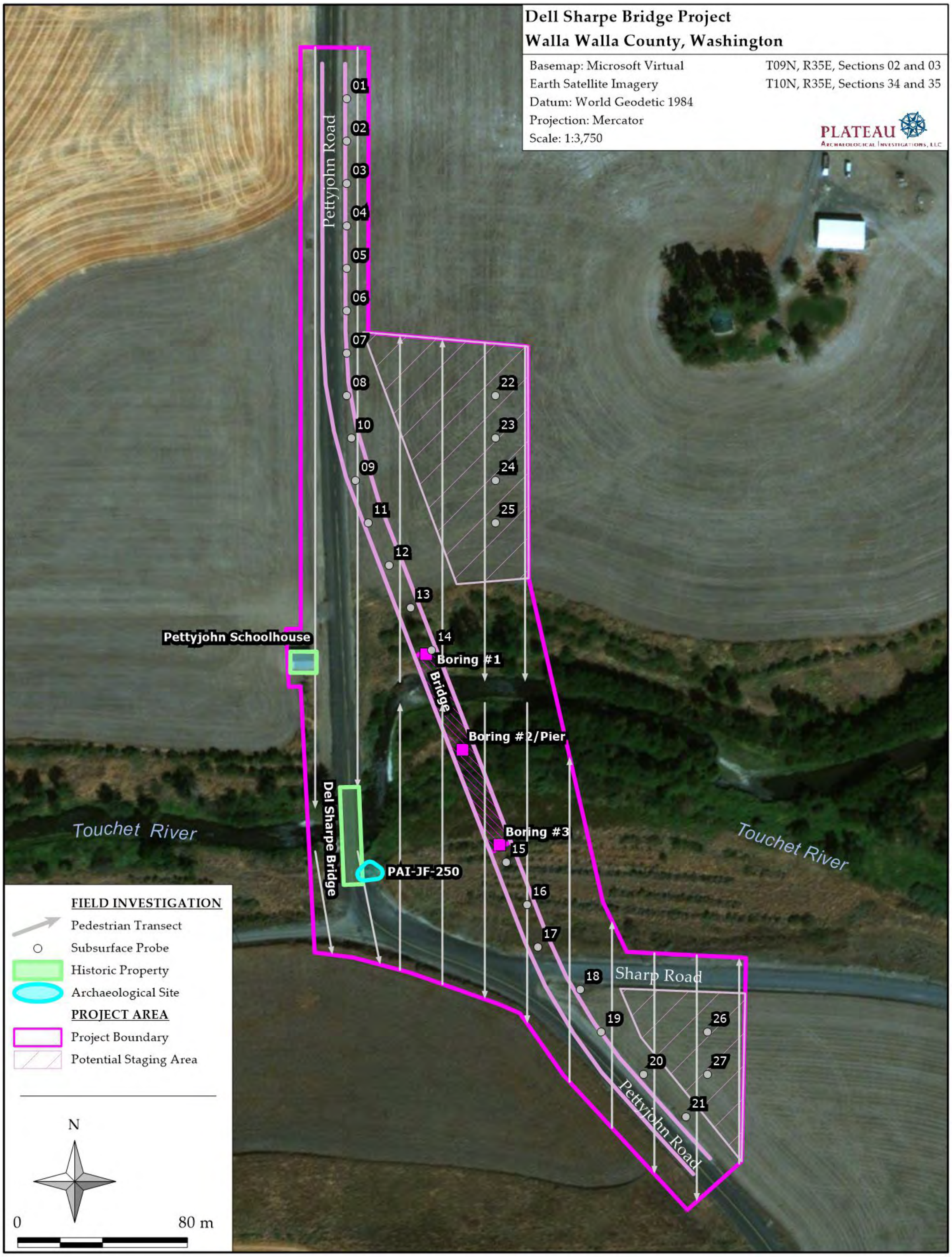

Figure 3. The Project Area and field investigation inventoried on an aerial photograph.

Figure 4. Overview of the field portion of the Project Area. View to the east.

Figure 5. Overview of the riparian portion of the Project Area. View to the west.

Figure 6. Overview of Site 45WW458 showing the concrete cistern in the foreground, the 1946 Oldsmobile to the right and the Holt Combine in the background. View to the southwest.

Historic Property Inventories

Dell Sharpe Bridge Dell Sharpe Bridge was constructed in 1914 by the Walla Walla County Road Department. The bridge spans the Touchet River, which is north of the Pettyjohn Road and Sharp Road intersection and south of Highway 124. The bridge structure is 155 ft in length (excluding approaches), 19 in curb to curb (width), and guard rails (walls) are 36 in high and rest upon curbing of varied height. Concrete coping is situated at the approach walls and over the center piers. The bridge was constructed as a dual concrete/steel rib arch with closed spandrels. There is one large concrete wing wall located on the upstream face (east) at the north approach. Rip rap material consisting of an automobile and combined harvester carcass is located at the south approach and concrete slab pieces have been utilized for stabilization at the south approach, which are downstream facing. The road deck is concrete and oil. The bridge is unadorned, in keeping with so-called "cookie cutter" type bridges that have been prolific over the past one hundred years. The integrity of the bridge is fair to poor.

Constructed as utilitarian, the Dell Sharpe Bridge mirrors many county bridges built in the early 20th century across the nation. The Dell Sharpe bridge file held by Walla Walla County suggests that this bridge's design may have been influenced by engineer Daniel B. Luten (1869-1946) who specialized in earth-filled, concrete arch bridges. Luten designed upwards of 20,000 bridges that show up in 47 American states (Purdue University 2021). Luten was known to initiate law suits against those companies who constructed similar concrete arch designs, claiming patent violations and royalty payments of 10%. It is unknown whether or not the Dell Sharpe Bridge is actually a Luten-designed bridge. A search of Commissioner proceedings in Walla Walla County shows bids being called for in July of 1914, eventually awarded to construction engineer Charles G. Huber of Seattle, but there is no indication in the award documents that Luten was paid a commission.

Local lore traces the Dell Sharpe Bridge name to Friedel DeForest Sharp, a local farmer who lived just east of the bridge. During construction, "Del" hosted the crew until completion of the bridge, so the crew decided to name it Dell Sharpe. By 1920, Sharp had removed to Seaside, Oregon. Certain criteria must be met for the bridge to be included on the NRHP. The Dell Sharpe Bridge does not meet Criterion A, which is a resource that is associated with events that have made a significant contribution to the broad patterns of our history, nor is it a resource that is associated with the lives of persons significant in our past (Criterion B). However, the resource does embody the distinctive characteristics of a type, period, and method of construction. The fact that it does not represent the work of a master does not exclude this resource from inclusion to the NRHP under Criterion C. Lastly, it does not meet Criterion D, a resource that has yielded or may be likely to yield information important in prehistory or history. This resource is eligible for inclusion on the NRHP under Criterion C.

Figure 7. The west face of the Dell Sharpe Bridge. View to the northeast.

Pettyjohn Schoolhouse The Pettyjohn Schoolhouse is located approximately 225 ft north of the north approach of the Dell Sharpe Bridge on Pettyjohn Road that spans the Touchet River. The building is 30 x 21 ft in a rectangular plan, which was "L" shaped at one time. The roof mass is front gabled, and clad with corrugated metal panels which are typically correlated with the 1980s. The exterior wall cladding is 1 x 6 wood drop siding applied vertically. The façade (east elevation) is symmetrical with a centered entry door flanked by vertically placed narrow lights. An original photo dated 1906 shows 4 over 4, double hung sash windows on the east and south elevations, with a rear door at the west elevation. The windows are currently covered with hinged plywood.

The Pettyjohn one-room schoolhouse shares a long history of educational facilities in the rural far west and hundreds of these schoolhouses dotted rural America from the 1860s through the 1930s when district consolidations were widespread. According to the 1909 Ogle Atlas, the Pettyjohn schoolhouse represented one of three such schools in the township and today, it is the only extant historic one-room schoolhouse. Initial research finds that the schoolhouse is a resource that is not associated with events that have made a significant contribution to the broad patterns of our history (Criteria A). The resource is not associated with the lives of persons significant in our past (Criterion B). The integrity of the building at present appears to be good; however, the build date is unknown and the structure has been relocated on four separate known occasions. Many alterations to the building have occurred over the past fifty years; the bell tower and two chimneys have been removed; an "L" addition added then taken down and sold in the 1940s; a rear entry door and affixed porch was deleted; a front entry stairway and landing was eliminated; and the original windows were replaced in the 1980s. For these reasons, the resource does not meet the

Figure 8. Pettyjohn Schoolhouse. View to the west.

requirements of Criterion C, a resource that embodies the distinctive characteristics of a type, period, or method of construction, or that represents the work of a master, or that possesses high artistic values, or that represents a significant and distinguishable entity whose components may lack individual distinction. The resource has not yielded, and is unlikely to yield information important in prehistory or history (Criterion D). This resource is not eligible for inclusion on the NRHP.

CONCLUSIONS AND RECOMMENDATIONS

Plateau archaeologists conducted a pedestrian survey over the entire Project Area, and excavated 27 subsurface probes. Subsurface probes ranged in depth from 80-120 cm (31.5-47.2 in); zero contained cultural materials.

The survey and subsurface investigations of the Dell Sharpe Bridge Replacement Project identified one new cultural resource. During pedestrian survey, the archaeologists located 45WW458, a historic debris scatter/concentration. The site consists of three artifacts including a Holt combine, a concrete irrigation cistern, and a crushed 1946 Oldsmobile. All of these artifacts were most likely placed to stabilize the southeastern bank. A site form was prepared for the historic archaeological site (Appendix A). Site 45WW458 is not eligible for inclusion on the NRHP due to a lack of known association with specific events that made a significant contribution to the broad patterns of U.S., Washington, or Walla Walla County history (Criterion A). The site is not eligible due to the lack of associative value to any individual person significant in history and lack of associative value to any significant aspect of an important person's life (Criterion B). This site does not embody distinctive characteristics of a type, period, or method of construction; and it does not possess high artistic value and does not represent the work of a master (Criterion C) and it has not yielded, and is not likely to yield, information important in history (Criterion D).

Plateau documented two historical structures; the Dell Sharpe Bridge and the Pettyjohn School House (Appendix B). Following the field investigation, conversations with local informants, and background review of documents related to the structures, Plateau determined that the Dell Sharpe Bridge is eligible for inclusion on the NRHP under Criterion C, a resource that embodies the distinctive characteristics of a type, period, or method of construction. The Pettyjohn Schoolhouse is not eligible for inclusion on the NRHP as its numerous relocations and remodels/alterations have had negative impacts on its integrity.

Since one of the two structures within the APE is considered eligible for inclusion in the NRHP, consideration of impacts is warranted. The Dell Sharp Bridge will be removed. This is a profound impact to the structure, however, potential association with Daniel Luten and the history of the construction and maintenance will not be completely lost. The structure has been inventoried. The dearth of direct reference to Luten suggests that this bridge was most likely built from stock plans, without any additional involvement from Mr. Luten who lived in Indianapolis, Indiana. Greater than 150 examples of "Luten Bridge" can be found on the NRHP database (Archives.gov 2021). **Removal of the Dell Sharpe Bridge will result in an Adverse Effect to this property**, however, examples with a more direct association and with better physical integrity still exist.

The Pettyjohn Schoolhouse will not be moved or physically impacted by this project, but may be subject to aesthetic changes by the bridge replacement. The project, however, will not change the association with rural education and the patterns of our history, and will result in **No Effect to the Pettyjohn Schoolhouse**.

Should ground-disturbing activities reveal any cultural materials (e.g., structural remains, European American artifacts, or Native American artifacts), activity will cease and the Washington State Historic Preservation Officer should be notified immediately. The results and recommendations in this document concern the specified APE. The proponent is advised that the results and recommendations reported herein do not apply to areas of potential effect altered or expanded after the cultural resource survey. A supplementary cultural resource review will be necessary should the APE be altered or changed, as per 36 CFR 800.4.

If ground-disturbing activities encounter human skeletal remains during the course of construction, then all activity ***will*** cease that may cause further disturbance to those remains. The area of the find will be secured and protected from further disturbance to those remains. The area of the find will be secured and protected from further disturbance until the State provides notice to proceed. The finding of human skeletal remains ***will*** be reported to the county medical examiner/coroner ***and*** local law enforcement in the most expeditious manner possible. The remains will not be touched, moved, or further disturbed. The county medical examiner/coroner will assume jurisdiction over the human skeletal remains and make a determination of whether those remains are forensic or non-forensic. If the county medical examiner/coroner determines the remains are non-forensic, then they will report that finding to the DAHP who will then take jurisdiction over the remains. The DAHP will notify any appropriate cemeteries and all affected tribes of the find. The State Physical Anthropologist will make a determination of whether the remains are Indian or Non-Indian and report that finding to any appropriate cemeteries and affected tribes. The DAHP will then handle all consultation with the affected parties as to the future preservation, excavation, and disposition of the remains.

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Washington State Department of Natural Resources

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Western Regional Climate Center

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Wilson, Bruce A.

1990 *Late Frontier: A History of Okanogan County, Washington*. Okanogan County Historical Society, Okanogan.

APPENDIX A:

Site Form

STATE OF WASHINGTON
ARCHAEOLOGICAL SITE INVENTORY FORM

Smithsonian Number: 45WW00458

County: Walla Walla

Date: 3/15/2021 **Human Remains?** ☐ **DAHP Case No.:**

Compiled By: Justin Fitzpatrick Plateau Archaeological Investigations, LLC

Archaeological Sites are exempt from public disclosure per RCW 42.56.300

SITE DESIGNATION

Site Name:

Field/Temporary ID:

Site Type: Historic Debris Scatter/Concentration

As the designated authority under the National Historic Preservation Act, as amended, I hereby certify that this request for determination of eligibility meet the documentation standards for registering properties in the National Register of Historic Places and meets the procedural and professional requirements set forth in 36 CFR Part 60. In my opinion, the site
☐ meets ☑ does not meet the National Register Criteria.

I recommend that this property be considered significant at the following level(s) of significance:

Criteria

Statement of Significance

This site is not eligible for inclusion on the NRHP due to a lack of known association with specific events that made a significant contribution to the broad patterns of U.S., Washington, or Walla Walla County history (Criterion A). The site is not eligible due to the lack of associative value to any individual person significant in history and lack of associative value to any significant aspect of an important person's life (Criterion B). This site does not embody distinctive characteristics of a type, period, or method of construction; and it does not possess high artistic value and does not represent the work of a master (Criterion C) and it has not yielded, and is not likely to yield, information important in history (Criterion D).

Integrity

The retaining wall on the southwestern portion of the bridge is constructed of three historical artifacts, which includes a concrete cistern, a 1946 Oldsmobile, and a Holt Combine. The cistern, 1946 Oldsmobile, and Holt Combine are not in their original context and may have been used to help with the stabilization of the fill around the bridge.

SHPO Determination

Eligibility Potentially Eligible **Determined On** 3/31/2021

Determined By

SHPO Comments

SITE LOCATION

USGS Quad Map Name(s): HARSHA

T: 09 **R:** 35 **E/W:** E **Section:** 02

UTM: Zone: 11 **Easting:** 391545 **Northing:** 5127625

Latitude: 46.173648 **Longitude:** 118.242811 **Elevation (ft/m):** 938 ft

Drainage, Major: Columbia River **Drainage, Minor:** South Fork Touchet River **River Mile**

Aspect **Slope**

Thursday, April 1, 2021

Location Description (General to Specific):

The site is located north of Walla Walla, Washington. It is located approximately 100 feet north of the intersection of Pettyjohn Road and Sharp Road. The site is located in a retaining wall southeast of the current bridge.

Directions (For Relocation Purposes):

Start on I-90 W. Take exit 221 for WA-261 S toward Washtucna/Ritzville. Follow WA-261 S for 48.4 mi. Then follow Lyons Ferry Rd to WA-124 in Walla Walla County for 25.9 mi. Then turn left on WA-124 for 3.9 mi. Turn right onto Pettyjohn Roac and follow it for 0.4 mi. The site will be to the east just southeast of the bridge.

SITE DESCRIPTION

Narrative Description (Overall Site Observations):

The site consists of three artifacts that were not originally used in this location; but rather were placed to stabilize the fill placed for the bridge. The three artifacts include a concrete cistern, a 1946 Oldsmobile, and a Holt Combine.

Site Dimensions (Overall Site Dimensions):

Length: **Direction:** Hand-Tape **Width:** **Direction:**

Method of Horizontal Measurement: Hand-Tape

Depth: N/A **Method of Vertical Measurement:** N/A

Vegetation (On Site):

Local: Forbes and grasses.

Regional: The vegetation around the Project Area falls within the Artemisia tridentata—Agropyron spicatum habitat type, characterized by arid sagebrush steppe (Daubenmire 1970; Taylor 1992). Big sagebrush (Artemisia tridentata) and bluebunch wheatgrass (Agropyron spicatum) are dominant in this environment. The plant community includes threetip sagebrush (Artemisia tripartita), gray horsebrush (Tetradymia canescens), spiny hopsage (Grayia spinosa), green rabbitbrush (Chrysothamnus viscidiflorus), and gray rabbitbrush (Chrysothamnus nauseosus). Grasses and forbs include needle and thread (Stipa comata), Stipa thurberana (no common name known), bottlebrush squirreltail (Sitanion hystrix), Cusick's bluegrass (Poa cusikii), Indian paintbrush (Castilleja spp.), lupine (Lupinus spp.), plantain (Plantago patagonica), longleaf phlox (Phlox longifolia) and balsamroot (Balsamorhiza sagittata). Additional species of flora thrive along the shores of the Columbia River, including bitterbrush (Purshia tridentata), quaking aspen (Populus tremuloides), willow (Salix spp.) and currant (Ribes spp.) (Daubenmire 1970). Many of these plants have been incorporated in Native American use as medicinal plants, food sources, and other employment.

Landforms (On Site):

Local: Rolling Hills

Regional: Rolling Hills

Water Resources (Type): Touchet River **Distance:** Adjacent **Permanence:** Year-round

CULTURAL MATERIALS AND FEATURES

Narrative Description (Specific Inventory Details):

The combine within the site is most likely a Holt combine, manufactured in California. Holt and Best formed what would become Caterpillar in the 1920s. The concrete structure is an irrigation cistern. The car is a 1946 Oldsmobile that has been crushed. The car was identified using the tag that was still legible. The 1946 Oldsmobile measures 80.7 inches in height by 118.1 inches wide by 165 inches in length. The Holt combine 42.1 inches wide by 153.5 inches in length by 50.8 inches in height. The concrete cistern measures 42.1 inches in height by 84.6 inches in width by 84.6 in length, and 15.0 inches in thickness.

Method of Collection:

Artifacts were left in situ.

Location of Artifacts (Temporary/Permanent):

No artifacts were collected.

SITE AGE

Component Type	Historic
Dates	past 1946
Dating Method	Tag on Oldsmobile
Phase	Historic
Basis for Phase Designation	Date on tag on Oldsmobile

SITE RECORDERS

Observed By	**Address**
Idah Whisenant	115 NW State Street, Pullman, WA 99163

Date Recorded: 3/15/2021

Recorded by (Professional Archaeologist): Idah Whisenant

Organization:	Plateau Archaeological Investigations, LLC	**Phone Number:**	(803) 389-0850
Address:	115 NW State Street, Pullman, WA 99163	**Email:**	imwhisenant@gmail.com

SITE HISTORY

Previous Archaeological Work:

No previous archaeological work done at this location.

LAND OWNERSHIP

Owner	**Address**	**Parcel**
Melvin L Talbott	PO BOX 203 , Prescott, Wa, 99348	350902210003

RESEARCH REFERENCES

Items/Documents Used in Research:

N/A

ARCHAEOLOGICAL SITE INVENTORY FORM

Smithsonian Number: 45WW00458

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USGS MAP

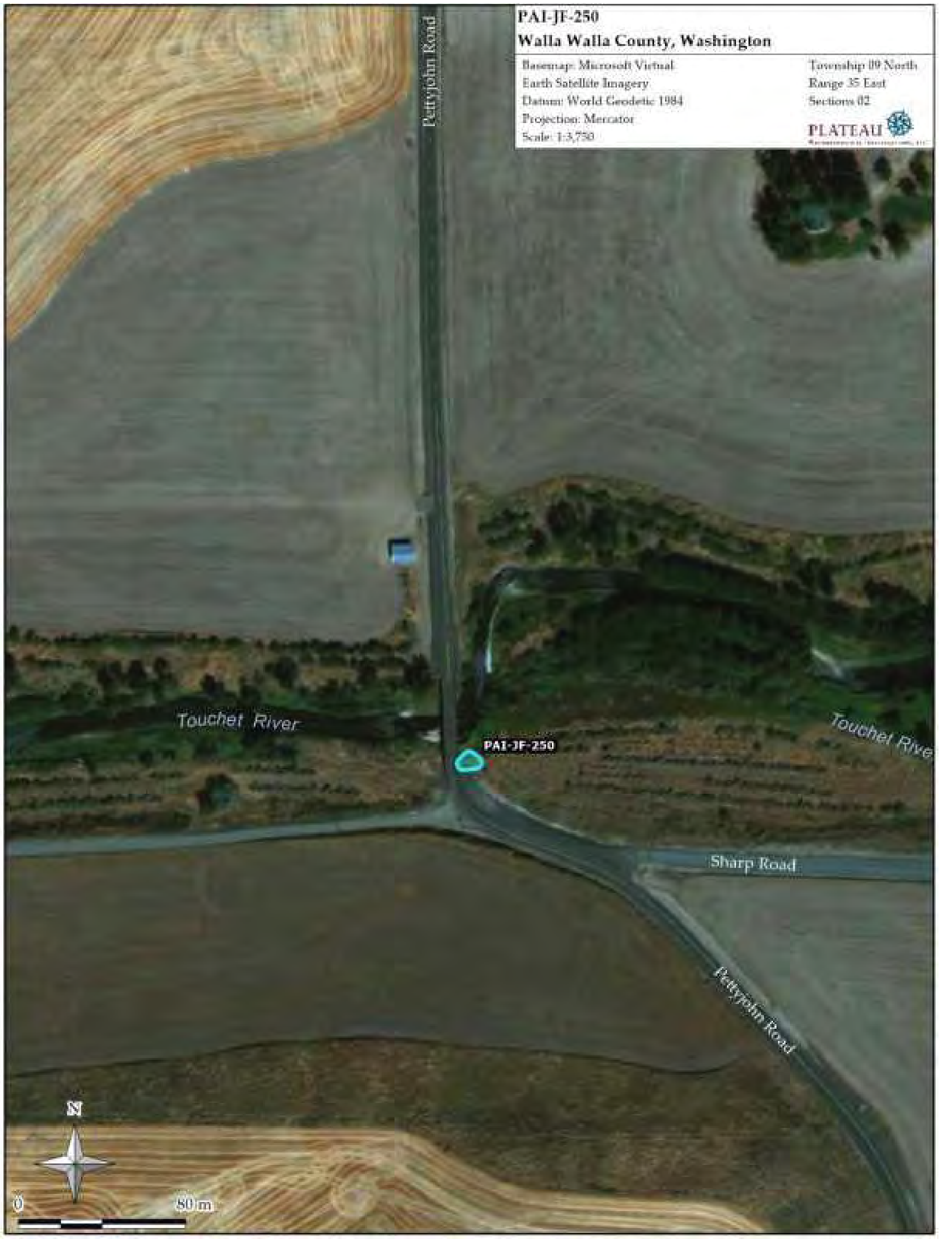
ARCHAEOLOGICAL SITE INVENTORY FORM

Smithsonian Number: 45WW00458

Page 5 of 10

SKETCH MAPS

Source Information 03/16/2021 Inventory - Plateau Archaeological Investigations, LLC



Photographs, Tables and Additional Information

Photo ID	514844
Title	DSCN8902.JPG
Year Taken	2021
Is Circa?	☐
Notes	Overview of the 1946 Oldsmobile
Type	image/jpeg
Photo View	
Source	03/16/2021 Inventory - Plateau Archaeological Investigations, LLC
Copyright	☐

ARCHAEOLOGICAL SITE INVENTORY FORM

Smithsonian Number: 45WW00458

Page 7 of 10

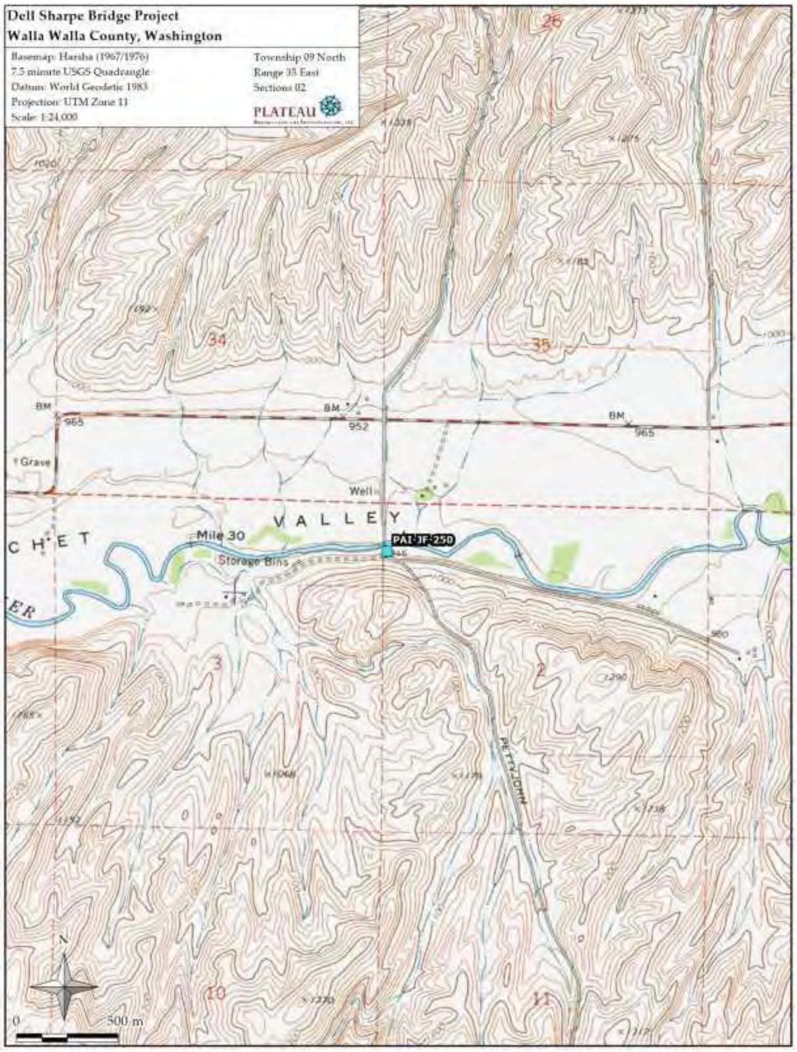


Photo ID	518452
Title	WWCTY2101_Site_QuadMap.jpg
Year Taken	2021
Is Circa?	☐
Notes	Quad map of the archaeological site
Type	image/jpeg
Photo View	Aerial
Source	03/16/2021 Inventory - Plateau Archaeological Investigations, LLC
Copyright	☐

Photo ID	514847
Title	DSCN8907.JPG
Year Taken	2021
Is Circa?	☐
Notes	Overview of the Holt Combine, showing that the combine is within the retaining wall
Type	image/jpeg
Photo View	
Source	03/16/2021 Inventory - Plateau Archaeological Investigations, LLC
Copyright	☐

ARCHAEOLOGICAL SITE INVENTORY FORM

Smithsonian Number: 45WW00458

Photo ID	514846
Title	DSCN8909.JPG
Year Taken	
Is Circa?	☐
Notes	Overview of the Holt Combine, showing that the combine is within the retaining wall
Type	image/jpeg
Photo View	
Source	03/16/2021 Inventory - Plateau Archaeological Investigations, LLC
Copyright	☐

Thursday, April 1, 2021

ARCHAEOLOGICAL SITE INVENTORY FORM

Smithsonian Number:
45WW00458

Photo ID	514845
Title	DSCN8905.JPG
Year Taken	2021
Is Circa?	☐
Notes	Showing the information tag on the 1946 Oldsmobile
Type	image/jpeg
Photo View	PLAN
Source	03/16/2021 Inventory - Plateau Archaeological Investigations, LLC
Copyright	☐

APPENDIX B:

Historic Property Inventories

Historic Property Report

Resource Name: Dell Sharpe Bridge

Property ID: 12798

Location

Address: Pettyjohn Rd, Prescott, Washington, 99348

Tax No/Parcel No: n/a

Information

Number of stories: N/A

Construction Dates:

Construction Type	Year	Circa
Built Date	1914	☐

Historic Use:

Category	Subcategory
Transportation	Transportation - Road-Related (vehicular)
Transportation	Transportation - Road-Related (vehicular)

Historic Context:

Category

Architect/Engineer:

Category	Name or Company
Builder	Huber, Charles
Engineer	E. B. Shiffley, Walla Walla County Engineer
Builder	Luten Borth

Thematics:

Local Registers and Districts

Name	Date Listed	Notes

Project History

Project Number, Organization, Project Name	Resource Inventory	SHPO Determination	SHPO Determined By, Determined Date
2016-01-00010, DAHP, Architect File	2/4/2021	Survey/Inventory	
2021-02-00919, WSDOT, Dell Sharpe Bridge	2/22/2021	Survey/Inventory	

Photos

Dell Sharpe Bridge_Tochet2.jpg

Dell Sharpe Bridge West Face Looking NE.jpg

Dell Sharpe Bridge Looking NW.jpg

Dell Sharpe Bridge East Face Looking North.jpg

Decking and Guard Wall Section Looking North.jpg

Center Pier Looking Downstream (West).jpg

Rip Rap Material South Approach.jpg

Infill Material at South Approach Looking NE.jpg

Guard Wall with Coping Looking NW.jpg

Dell Sharpe Bridge and Pettyjohn SH Looking NW.jpg

Curbing and Guard Wall Section Looking NE.jpg

Approach Wall Section Looking NW.jpg

Historic Property Report

Resource Name: Dell Sharpe Bridge

Property ID: 12798

DelSharpBridge_Tochet4.JPG

The Pettyjohn - Del Sharp Bridge.

The wooden Pettyjohn Bridge was replaced by a concrete bridge in 1914. The workers stayed at the Del Sharp home in the background and named it the Del Sharp Bridge. A horse rider and two pedestrians are crossing the bridge.

Courtesy William Eugene Sharp.

DelSharpBridge_Tochet5.jpg

DelSharpBridge_Tochet1.jpg

DelSharpBridge_Tochet3.jpg

Original HPI form(s)

Historic Property Report

Resource Name: Dell Sharpe Bridge

Property ID: 12798

Inventory Details - 1/1/1900

Common name:	Walla Walla County Bridge #3959
Date recorded:	1/1/1900
Field Recorder:	
Field Site number:	
SHPO Determination	

Historic Property Report

Resource Name: Dell Sharpe Bridge

Property ID: 12798

Inventory Details - 2/4/2021

Common name:	
Date recorded:	2/4/2021
Field Recorder:	Michael Houser
Field Site number:	
SHPO Determination	

Historic Property Report

Resource Name: Dell Sharpe Bridge

Property ID: 12798

Inventory Details - 2/22/2021

Common name:	Dell Sharp Bridge
Date recorded:	2/22/2021
Field Recorder:	(John) Jeff Creighton
Field Site number:	
SHPO Determination	

Detail Information

Characteristics:

Category	**Item**
Structural System	Masonry - Poured Concrete
Structural System	Metal - Steel

Styles:

Period	**Style Details**
No Style	No Style

Surveyor Opinion

Significance narrative: The Dell Sharpe bridge came on the heals of rampant bridge-building in eastern Washington, primarily in the city of Spokane. The first multi span concrete arch bridge constructed in the state of Washington was the Washington Street Bridge in 1907-08. From that point on, the concrete arch bridge became the norm. Other bridges include Monroe Street, Post Street, and Latah Creek, all within the City of Spokane. Walla Walla County would not be immune from the move from wood/steel to concrete. Similar to Dell Sharpe, the Flathers Bridge, located 4.2 miles east of Dell Sharpe on highway 125, was also constructed in 1914. In 1920, the single arch Evans Bridge, spanned Dry Creek on Sapolil Road. As late as 1930, another concrete arch bridge was constructed over the Touchet River, known as the Main Street Bridge in Walla Walla. The Dell Sharpe Bridge is 106 years old and integrity is poor. Constructed as utilitarian, Dell Sharpe mirrors many such county bridges built in the early 20th century, not just in Washington state, but across the nation. Local lore traces the Dell Sharpe name to Friedel DeForest Sharp, a local farmer who lived just east of the bridge. During construction, “Del” hosted the crew until completion of the bridge, so the crew decided to name it Dell Sharpe. By 1920, Sharp had removed to Seaside, Oregon. According to the Dell Sharpe bridge file, the bridge may have been a design influenced by engineer Daniel B. Luten (1869-1946) who specialized in earth-filled, concrete arch bridges; it has been said that he had designed upwards of 20,000 bridges; 2000 are located in Indiana alone. Luten was responsible for a unique concrete arch design that focused on major stress points that would actually make the bridge lighter as well as stronger. The Luten Arch-designed bridges show up in 47 American states (Purdue University 2021). Luten as well, was notable for initiating law suits against those companies who constructed similar concrete arch designs, claiming patent violations and royalty payments of ten percent.

Between 1900 and 1920, the concrete arch was the bridge of choice nationwide, and Luten apparently wanted to cash in. In the state of Kansas, Luten managed to sue just about every engineering/building firm who constructed similar arch bridges. From the years 1913-1920, newspapers across the country covered the on going litigation brought by the engineer, not only in Kansas, but in Nebraska, Indiana, Iowa, California and Oklahoma, among others (see Des Moines Evening Tribune 1913; Times-Republican, Marshalltown, Iowa 1914; Nebraska Signal 1916, just to name a few). In fact, Attorney General Dexter T. Baxter of Nebraska could boast in 1916 that he prevented “Luten from collecting 10 per cent royalty upon all re-inforced [sic] concrete bridges built in Nebraska, thus saving thousands of dollars for the taxpayer…” (The Alliance Herald 1918).

As Jochims Describes in 1985:

“Because it was virtually impossible to build a reinforced concrete arch bridge without using one of his patents, the royalty costs for bridge companies, states, counties and municipalities became burdensome. The company was continuously involved in litigation throughout the Midwest. A number of lawsuits charging patent infringement were filed in Kansas by Luten’s attorneys against local units of government. The issue was not settled until 1918 when the state attorney general successfully argued that Luten’s patents were invalid, and the cases were dismissed” (Jochims 1985; Kansas City Times 1919).

It is unknown whether or not Dell Sharpe is actually a Luten-designed bridge. A search of Commissioner proceedings in Walla Walla County shows bids being called for in July of 1914, eventually awarded to construction engineer Charles G Huber of Seattle. The other three bids were from Omaha Structural Steel Works, Portland Bridge and Iron Works, and Illinois Steel Bridge Co. Huber was awarded the contract in August of 1914 (Walla Walla County Commissioners 1914). There was an apparent uproar between Commissioners and then county engineer Lew Loehr, having to do with whether or not the bridge should constructed of steel rather than concrete. This was common during that era, and became quite contentious between the Steel Camp versus the Concrete supporters. Huber also won the bid in 1917, to construct the emergency concrete wing wall at the northeast abutment of the bridge, which is still standing (Walla Walla County Commissioners 1914; Spokesman-Review 1914).

Nowhere in the records do we find definitive evidence that the Dell Sharpe bridge is indeed a Luten Arch bridge. Huber did use the Luten Arch design when, “erecting the new bridge across the Des Chutes river at Tumwater paying $13,789. The new bridge will be of the Luten design” (Washington Standard 1915). No evidence exists concerning royalties paid, and no lawsuits concerning patent infringements. And finally, turning to bridge inspection reports, there are two reports that have the name “Luten Arch” on said report, but that’s where it ends. Regardless, the Dell Sharpe bridge would be eligible for inclusion on the NRHP.

Certain criteria must be met for inclusion on the NRHP. The Dell Sharpe bridge does not meet Criteria A, which is a resource that is associated with events that have made a significant contribution to the broad patterns of our history, nor is it eligible in all probability as a resource under Criteria B, one is associated with the lives of persons significant in our past. However, the resource does embody the distinctive characteristics of a type, period, or method of construction, and though it does not represent the work of a master, it still meets the essential requirements of Criteria C. Lastly, it does not meet Criteria D, a resource that has yielded, or may be likely to yield, information important in prehistory or history. Eligible, Criteria C.

Physical description:

Constructed in 1914 by Walla Walla County Road Department, the Dell Sharpe Bridge spans the Touchet River, just north of the Pettyjohn/Sharp road junction, and south of Hwy 124. The structure is 155-feet in length (excluding approaches), and 19 feet curb to curb (width). Guard rails (walls) are 36-inches in height and rests upon curbing of varied height. Concrete coping is situated at the approach walls and over the center piers. The bridge was constructed as an earth-filled, dual concrete/steel rib arch with closed spandrels. There is one large concrete wing wall located on the upstream face (east) at the north approach. Rip rap material consisting of an automobile and combined harvester carcass is located at the opposite end at the south approach. Concrete slab pieces have been utilized for stabilization at the south approach, west, downstream facing. The road deck is concrete and oil. The bridge is unadorned, in keeping with so-called "cookie cutter" type bridges, that have been so prolific over the past one hundred years. Integrity is fair to poor.

Bibliography:

Alliance Herald (Nebraska)
1918. "Dexter T. Barrett," August 15, pg. 3

Jochims, Larry
1985. "Masonry Arch Bridges of Kansas." National Register of Historic Places (NRHP) form, Inventory of Historic Bridges, Kansas Department of Transportation, Topeka, KS. Kansas State Historical Society repository.

Kansas City Times
1919. "No Concrete Bridge Royalty," 1 January, pg. 4.

Nebraska Signal
1916. "Cement Arch Patent," Geneva, Fillmore County, pg. 2

Purdue University
2021. Archives and Special Collections.
https://archives.lib.purdue.edu/agents/people/982, Lafayette, IN.

Spokesman-Review
1914. "Tangle Over New Bridge." August 11, pg. 8.

"Let Contract for Concrete Bridge," August 13, pg. 8

Walla Walla County Public Works
2020 Del Sharp Bridge File, October 19.

Walla Walla County Commissioner's Proceedings
1914, 1917

Washington Standard
1915. "Notes of the City," June 11, pg. 8

Historic Property Report

Resource Name: Pettyjohn Schoolhouse

Property ID: 724180

Location

Address: Pettyjohn Rd, Prescott, Washington, 99348

Geographic Areas: HADLEY Quadrangle, Walla Walla County, T09R35E35

Information

Number of stories: 1.00

Construction Dates:

Construction Type	Year	Circa
Moved	1890	☑

Historic Use:

Category	Subcategory
Education	Education - School
Education	Education - School

Historic Context:

Category
Architecture
Education

Architect/Engineer:

Category	Name or Company

Thematics:

Local Registers and Districts

Name	Date Listed	Notes

Project History

Project Number, Organization, Project Name	Resource Inventory	SHPO Determination	SHPO Determined By, Determined Date
2021-02-00919, WSDOT, Dell Sharpe Bridge	2/24/2021	Survey/Inventory	

Photos

North Elevation Looking South.jpg

Dell Sharpe Bridge.JPG

South Elevation Looking NW.jpg

South and West Elevation Looking NE.jpg

Pettyjohn Schoolhouse Looking West.jpg

Pettyjohn Schoolhouse Looking West 1906.jpg

Historic Property Report

Resource Name: Pettyjohn Schoolhouse

Property ID: 724180

Pettyjohn Schoolhouse Full Frontal Looking West.jpg

Pettyjohn Schoolhouse 1890s Looking NE.jpg

North Elevation Looking SW.jpg

Inventory Details - 2/24/2021

Common name:

Date recorded: 2/24/2021

Field Recorder: (John) Jeff Creighton

Field Site number:

SHPO Determination

Detail Information

Characteristics:

Category	Item
Foundation	Concrete - Poured
Roof Type	Gable - Front
Roof Material	Metal - Corrugated
Cladding	Wood - Drop Siding
Structural System	Wood - Braced Frame
Plan	Rectangle

Styles:

Period	Style Details
No Style	No Style

Surveyor Opinion

Historic Property Report

Resource Name: Pettyjohn Schoolhouse

Property ID: 724180

Significance narrative:

In context, the Pettyjohn one-room schoolhouse shares a long history of educational facilities in the rural far West. Literally hundreds of these schoolhouses dotted rural America from the1860s through the1930s when district consolidations were widespread. According to the 1909 Ogle Atlas, the Pettyjohn schoolhouse represented one of three such schools in the township, and today Pettyjohn is the only extant historic one-room schoolhouse. Initial research finds that the schoolhouse is not eligible under Criteria A , as a resource that is associated with events that have made a significant contribution to the broad patterns of our history. In addition, the resource is not associated with the lives of persons significant in our past (Criteria B). Though the integrity at present appears to be good, the built date is unknown, and the structure has been relocated on four separate occasions. Many alterations occurred over the past fifty years; bell tower removed as well as two chimneys; "L" addition added (1905), then taken down and sold in the 1940s; rear entry door and affixed porch deleted; a front entry stairway and landing eliminated, and original widows replaced in the 1980s. For these reasons, the resource does not meet the requirements of Criteria C, a resource that embodies the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction. Further, the resource has not yielded, or may be likely to yield, information important in prehistory or history (Criteria D). Not eligible under any NRHP criteria.

Physical description:

The little Pettyjohn schoolhouse is located approximately 225 feet north of the north approach of the Del Sharp bridge (Pettyjohn Road) that spans the Touchet River. The building is 30 x 21 feet, and rectangular in plan (at one time "L" shaped). The roof mass is front gabled and clad with corrugated metal panels. Exterior wall cladding is 1 x 6 wood drop siding applied in a vertical fashion. The façade (east elevation) is symmetrical with a centered entry door, and flanked by vertically placed, narrow lights. An original photo dated 1906, show 4 over 4, double hung sash windows on the east and south elevations, with a rear door at the west elevation. Today, the windows are covered with hinged plywood. The west elevation is now simply a blank wall, the rear door and small porch having since been eliminated. The north elevation features one narrow window and an oversized sliding wood door, near the northwest corner. In addition, the building was raised and placed on a poured concrete foundation in 1981. The schoolhouse is now used for storage. Photos from the mid-1890s show the schoolhouse with a rear door and small porch, which as stated above, have been removed. In another photo dated 1906, an addition to the north elevation, which was used to house teachers, created an "L" shaped plan; this addition was later detached and sold in the 1940s. Interestingly, this particular building had been moved from three previous locations, until resting here in 1891.

Bibliography:

Mary Grant Tomkins in-person interview, 24 February 2021, Tomkins residence, Prescott, WA.

APPENDIX C:

Area of Potential Effect (APE) Letters

Walla Walla County
PUBLIC WORKS

February 5, 2021

Attn: **Phil Nugent**
WSDOT
Local Programs Office
2809 Rudkin Road
Union Gap, WA 98903-1648

Re: **Dell Sharpe Bridge on Pettyjohn Road, MP 5.20 to MP 5.80, BROS-2036(035), LA 9891**

Walla Walla County is in the preliminary engineering phase of **Dell Sharpe Bridge on Pettyjohn Road, MP 5.20 to MP 5.80.** We are requesting your assistance in obtaining concurrence from the Office of Archaeology and Historic Preservation for this project and request clarification on whether a site survey will or will not be required for the project.

We also request your assistance, through FHWA, in obtaining comments or information in identifying historic properties within the work area from **The Confederated Tribes of the Umatilla Reservation**.

General description and limits of project: Replace existing bridge with a two span, prestessed girder bridge.

Legal description of project: Dell Sharpe Bridge is on Pettyjohn Road, Road Log No 39590 from MP 5.20 to MP 5.80 and located in Section 2 & 3, Township 09N, Range 35E.

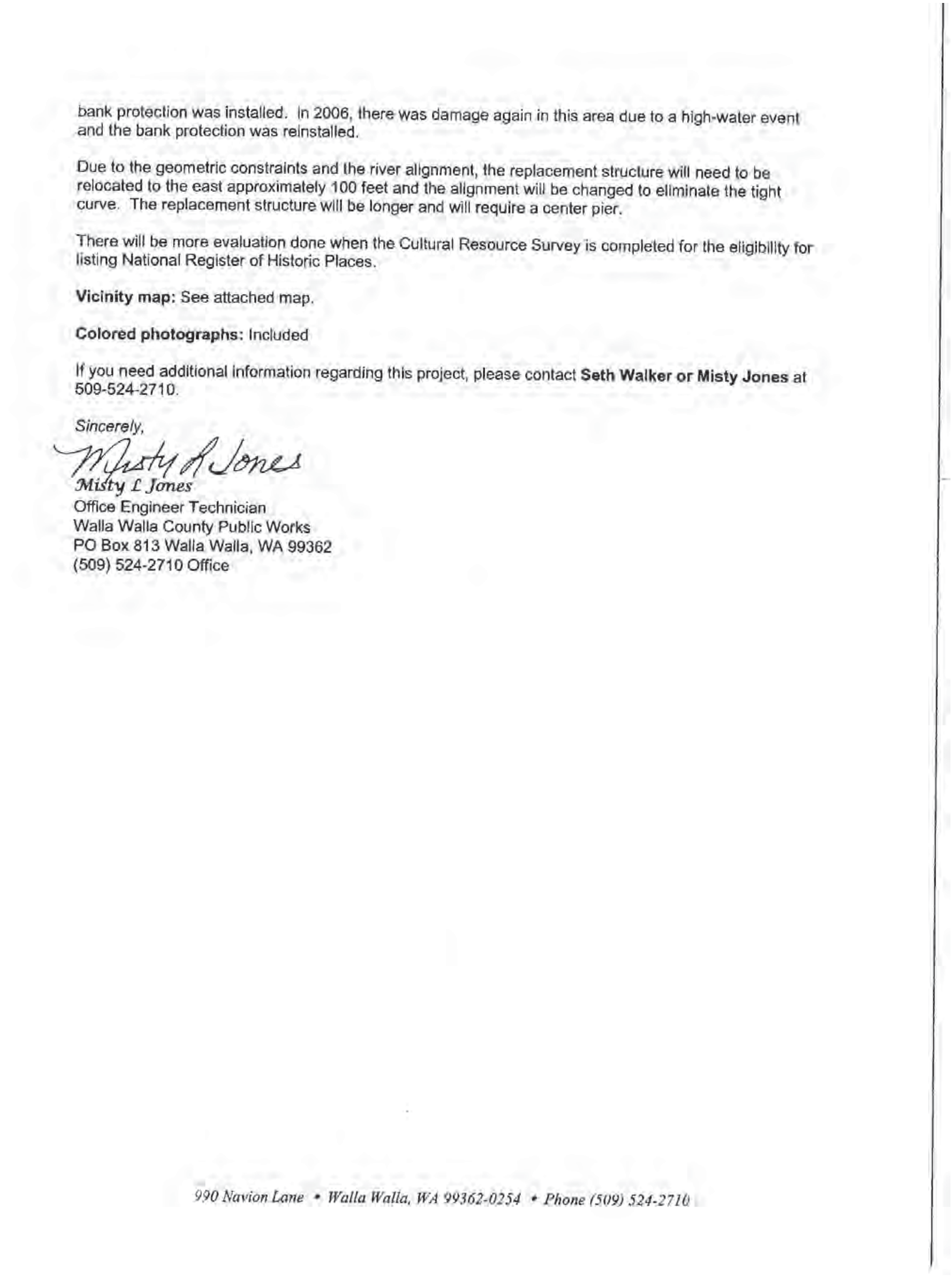
Disturbance of previously undisturbed areas: The existing bridge will be removed and replace with new bridge upstream from existing bridge. Disturbance area shall be where we are removing the existing bridge, bridge abutments & center pier construction, wall foundations near bridge abutments, upstream improvements. Potential staging area are marked on the attached map. Areas that are mark have been previous as for they are agricultural ground.

Age of any structures that will be impacted by the project: Dell Sharpe Bridge, ID Number 07990700, The existing structure is a two-span concrete arch that was constructed in 1914. The design load is unknown and insufficient information exists to properly load rate the structure. In accordance with the Bridge Inspection Manual Section 5.02.C, a design loading of H-15 is assumed. This results in an inventory rating of 15.00 tons and an operating rating of 25.01 tons.

The bridge is founded on highly fractured rock that appears to be susceptible to erosion during high water events. Of special concern is the loss of rock supporting the center pier. Probing measurements show that there has been a reduction of approximately 9.5% in bearing area supporting the center pier footing.

The curb-to-curb width is 19.3 feet. This makes it difficult for two vehicles to pass on the bridge safely, especially considering the larger vehicles associated with farming practices in the area. There is a tight curve on the south side of the structure with a radius of 143.2 feet and the curve begins on the structure. This curve is due to a geometric constraint by the existing topography.

The river runs perpendicular into the road approximately 150 feet north of the structure and then runs parallel to the road until it passes through the bridge. In 1920, a 65-foot wing wall was added to the structure likely because of this issue. In 1996, during a flooding event the wing wall was exposed, and



bank protection was installed. In 2006, there was damage again in this area due to a high-water event and the bank protection was reinstalled.

Due to the geometric constraints and the river alignment, the replacement structure will need to be relocated to the east approximately 100 feet and the alignment will be changed to eliminate the tight curve. The replacement structure will be longer and will require a center pier.

There will be more evaluation done when the Cultural Resource Survey is completed for the eligibility for listing National Register of Historic Places.

Vicinity map: See attached map.

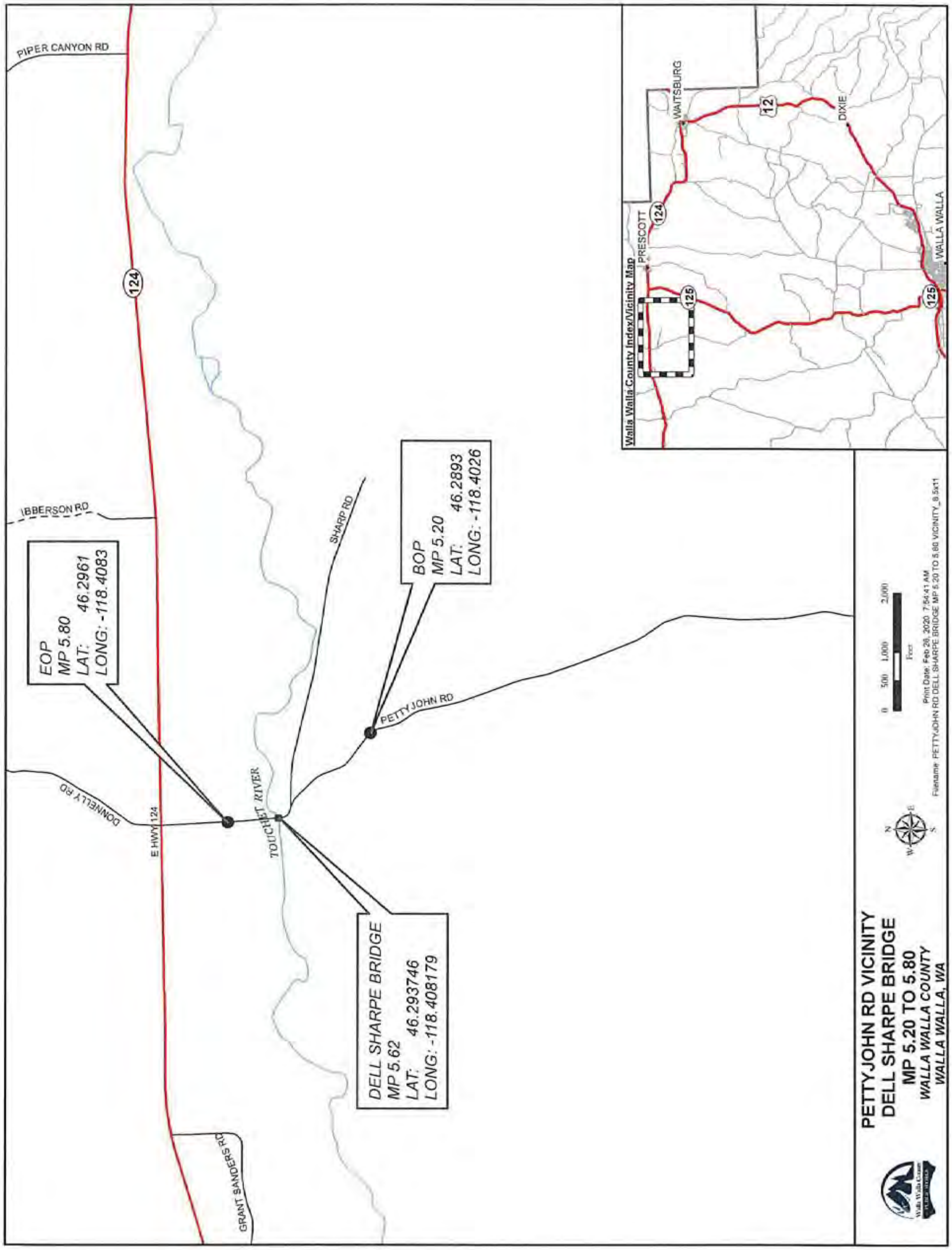
Colored photographs: Included

If you need additional information regarding this project, please contact **Seth Walker or Misty Jones** at 509-524-2710.

Sincerely,

Misty L Jones

Misty L Jones
Office Engineer Technician
Walla Walla County Public Works
PO Box 813 Walla Walla, WA 99362
(509) 524-2710 Office


PETTYJOHN RD VICINITY
DELL SHARPE BRIDGE
MP 5.20 TO 5.80
WALLA WALLA COUNTY
WALLA WALLA, WA
PIPER CANYON RD
124
IBBERSON RD
EOP
MP 5.80
LAT: 46.2961
LONG: -118.4083
SHARP RD
BOP
MP 5.20
LAT: 46.2893
LONG: -118.4026
PETTYJOHN RD
DONNELLY RD
E HWY 124
TOUCHET RIVER
DELL SHARPE BRIDGE
MP 5.62
LAT: 46.293746
LONG: -118.408179
GRANT SANDERS RD
Walla Walla County Index/Vicinity Map
WAITSBURG
12
DIXIE
PRESCOTT
124
125
WALLA WALLA
125
N
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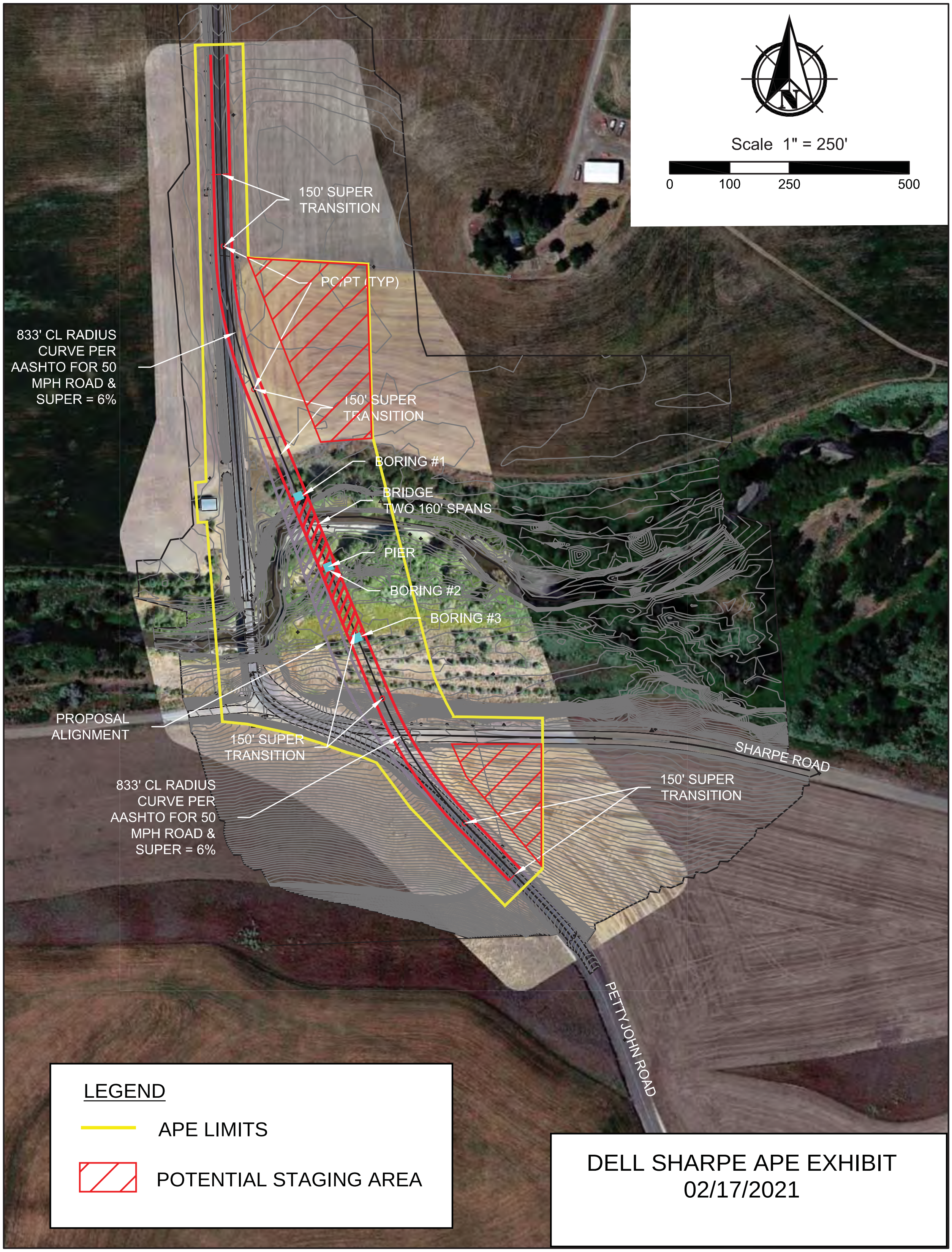
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150' SUPER TRANSITION
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BRIDGE TWO 160' SPANS
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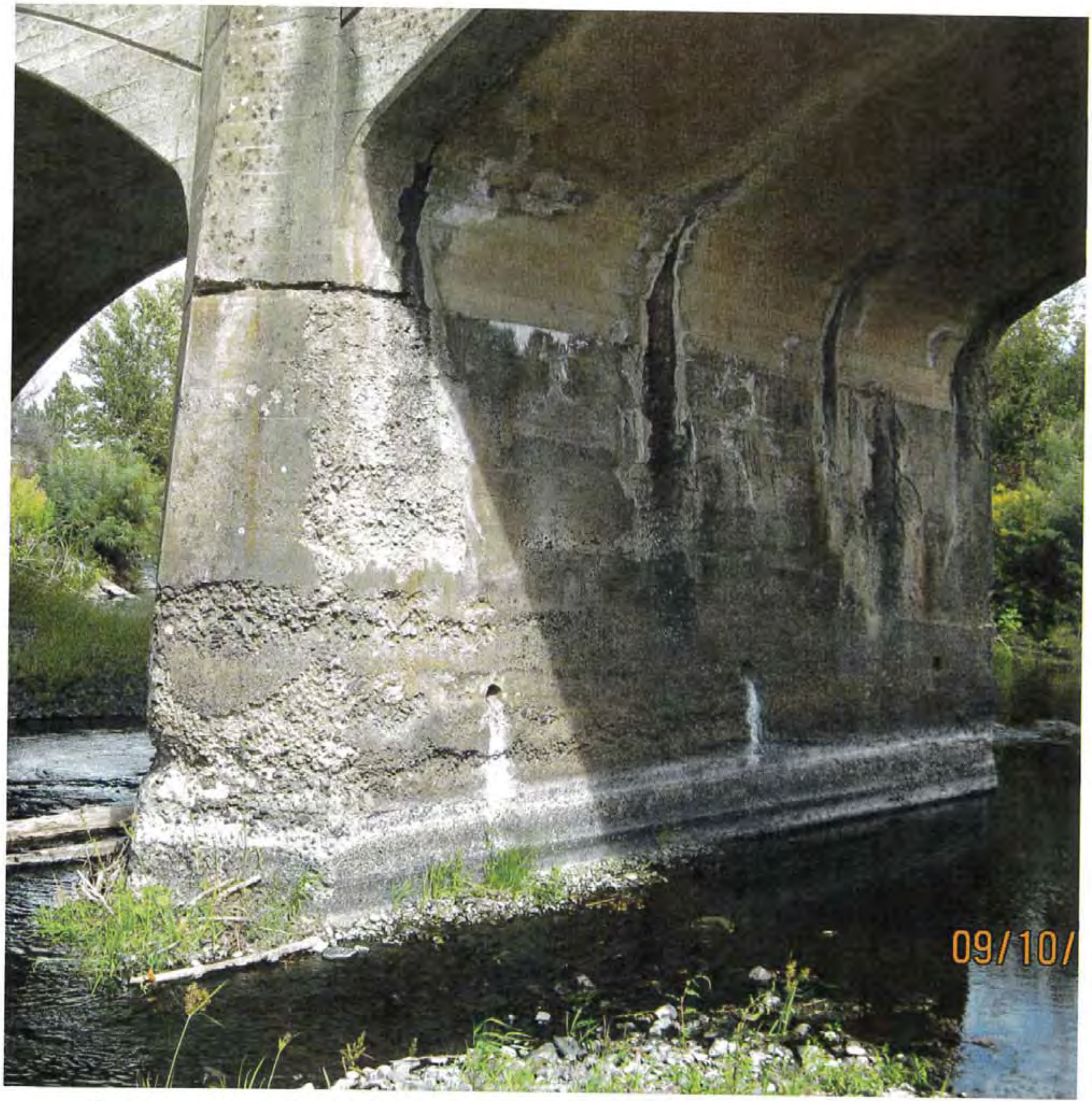
BORING #2
BORING #3
PROPOSAL ALIGNMENT
150' SUPER TRANSITION
833' CL RADIUS CURVE PER AASHTO FOR 50 MPH ROAD & SUPER = 6%
SHARPE ROAD
150' SUPER TRANSITION
PETTYJOHN ROAD
LEGEND
APE LIMITS
POTENTIAL STAGING AREA
DELL SHARPE APE EXHIBIT
02/17/2021

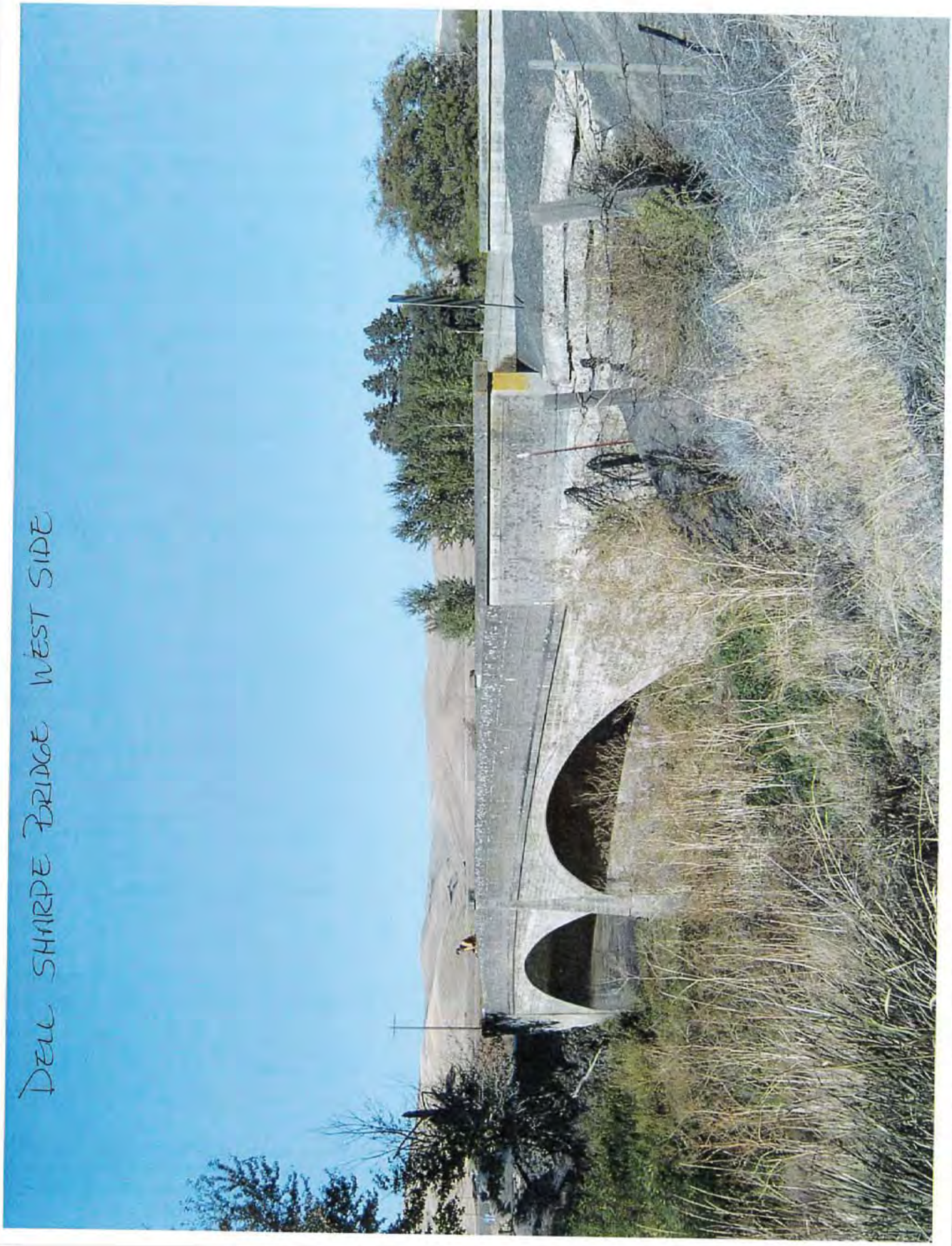
08/15/2018

08/15/2018


08/15/2018



DELL SHARPE BRIDGE CENTER PIER



DELL SHARPE BRIDGE WEST SIDE

Washington State
Department of Transportation

Transportation Building
310 Maple Park Avenue S.E.
P.O. Box 47300
Olympia, WA 98504-7300
360-705-7000
TTY: 1-800-833-6388
www.wsdot.wa.gov

February 18, 2021

Dr. Allyson Brooks
Washington State Historic Preservation Officer
Department of Archaeology and Historic Preservation
P. O. Box 48343
Olympia, WA 98504-8343

Walla Walla County
Dell Sharpe Bridge Project
Initiation of Consultation // APE
Federal Aid Number: BROS-2036(035)
DAHP Log # 2021-02-00919

Dear Dr. Brooks:

Walla Walla County is proposing to replace the Dell Sharpe Bridge with funding from the Federal Highway Administration (FHWA). The Washington State Department of Transportation (WSDOT) Local Programs Division is assisting the County and acting on behalf of the FHWA in processing federal environmental compliance documentation. As noted above this correspondence is intended to initiate consultation and provide you our definition of the Area of Potential Effects (APE), pursuant to 36 CFR 800.3 and 800.4 respectively.

The proposed project is located on Pettyjohn Road where it crosses the Touchet River, just south of State Route 124 (Township 9 North, Range 35 East, Sections 2 and 3). The project includes removal of the existing bridge, installation of a new two-span prestressed girder bridge upstream of the existing bridge, bridge approach work, and road realignment.

The direct effects APE is defined as the footprint of the construction items listed above. Indirect effects will be assessed on any historic resources (50 years or older) located immediately adjacent the construction footprint. Staging will occur on the agricultural fields within these limits.

I look forward to your comments or input on any aspect of the APE or project undertaking by 18 March 2021. Electronic versions of this letter were sent to the Historic Bridge Foundation and the technical staff at the Confederated Tribes of the Umatilla and the Yakama Nation. A cultural resources survey will be completed for this project that will comply with the Washington State Standards for Cultural Resources Reporting. Please contact me at (360) 705-7879 or deboert@wsdot.wa.gov if you have any questions.

Sincerely,

Trent de Boer
WSDOT Archaeologist
Local Programs

(Electronic)
cc: Gary Martindale, FHWA, MS 40943 (electronic, w/attachments)
Randy Giles, SC Region Local Programs Engineer (electronic, w/attachments)

Washington State
Department of Transportation

Transportation Building
310 Maple Park Avenue S.E.
P.O. Box 47300
Olympia, WA 98504-7300
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www.wsdot.wa.gov

February 18, 2021

The Honorable Gary Burke
Confederated Tribes of the Umatilla
46411 Timíne Way
Pendleton, OR 97801

Walla Walla County
Dell Sharpe Bridge Project
Initiation of Consultation // APE
Federal Aid Number: BROS-2036(035)
DAHP Log # 2021-02-00919

Dear Chairperson Burke:

Walla Walla County is proposing to replace the Dell Sharpe Bridge with funding from the Federal Highway Administration (FHWA). The Washington State Department of Transportation (WSDOT) Local Programs Division is assisting the County and acting on behalf of the FHWA in processing federal environmental compliance documentation.

FHWA and WSDOT would like to initiate government-to-government consultation for this project. Among other things, we would like this consultation to address the cultural and historic resource issues, pursuant to the regulations implementing Section 106 of the National Historic Preservation Act (36 CFR Part 800). WSDOT has entered into the environmental review phase of this project and will prepare documentation to support the determination of this project as a Documented Categorical Exclusion under the National Environmental Policy Act (NEPA). We are inviting your comments on the Area of Potential Effects (APE) for this project pursuant to 36 CFR 800.4.

Recognizing the government-to-government relationship that the Federal Highway Administration has with the tribe, FHWA will continue to play a key role in this project as the responsible federal agency. If this project requires a permit from the US Army Corps of Engineers (USACE), this consultation will also serve to meet their Section 106 responsibilities. However, since WSDOT has been delegated the authority from FHWA to initiate consultation and to directly manage the cultural resources studies as part of carrying out this undertaking you may contact FHWA at any time for assistance with the process and/or the undertaking.

The proposed project is located on Pettyjohn Road where it crosses the Touchet River, just south of State Route 124 (Township 9 North, Range 35 East, Sections 2 and 3). The project includes removal of the existing bridge, installation of a new two-span prestressed girder bridge upstream of the existing bridge, bridge approach work, and road realignment.

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Honorable Gary Burke
Confederated Tribes of the Umatilla
Walla Walla County
Dell Sharpe Bridge Project

Your response to this letter, acknowledging your interest in participating in this undertaking as a consulting party, in identifying any historic properties, including Traditional Cultural Properties (TCPs) that may exist within the project's APE, and providing any key tribal contacts, is greatly appreciated. We are also inviting comments regarding any other tribal concerns the proposed project may raise. Electronic versions of this letter were sent to the State Historic Preservation Officer, the Historic Bridge Foundation and the technical staff at the Confederated Tribes of the Umatilla and the Yakama Nation. Should you have any questions about this project, please contact me at (360) 705-7879 or deboert@wsdot.wa.gov.

Sincerely,

Trent de Boer
WSDOT Archaeologist
Local Programs

cc: Teara Farrow Ferman, Umatilla Cultural Resources (electronic, w/attachments)
Eric Quaempts, Umatilla Natural Resources (electronic, w/attachments)
Gary Martindale, FHWA, MS 40943 (electronic, w/attachments)
Randy Giles, SC Region Local Programs Engineer (electronic, w/attachments)

Washington State
Department of Transportation

Transportation Building
310 Maple Park Avenue S.E.
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Olympia, WA 98504-7300
360-705-7000
TTY: 1-800-833-6388
www.wsdot.wa.gov

February 18, 2021

The Honorable Delano Saluskin
Yakama Nation
PO Box 151
Toppenish, WA 98948

Walla Walla County
Dell Sharpe Bridge Project
Initiation of Consultation // APE
Federal Aid Number: BROS-2036(035)
DAHP Log # 2021-02-00919

Dear Chairperson Saluskin:

Walla Walla County is proposing to replace the Dell Sharpe Bridge with funding from the Federal Highway Administration (FHWA). The Washington State Department of Transportation (WSDOT) Local Programs Division is assisting the County and acting on behalf of the FHWA in processing federal environmental compliance documentation.

FHWA and WSDOT would like to initiate government-to-government consultation for this project. Among other things, we would like this consultation to address the cultural and historic resource issues, pursuant to the regulations implementing Section 106 of the National Historic Preservation Act (36 CFR Part 800). WSDOT has entered into the environmental review phase of this project and will prepare documentation to support the determination of this project as a Documented Categorical Exclusion under the National Environmental Policy Act (NEPA). We are inviting your comments on the Area of Potential Effects (APE) for this project pursuant to 36 CFR 800.4.

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Honorable Delano Saluskin
Yakama Nation
Walla Walla County
Dell Sharpe Bridge Project

Your response to this letter, acknowledging your interest in participating in this undertaking as a consulting party, in identifying any historic properties, including Traditional Cultural Properties (TCPs) that may exist within the project's APE, and providing any key tribal contacts, is greatly appreciated. We are also inviting comments regarding any other tribal concerns the proposed project may raise. Electronic versions of this letter were sent to the State Historic Preservation Officer, the Historic Bridge Foundation and the technical staff at the Confederated Tribes of the Umatilla and the Yakama Nation. Should you have any questions about this project, please contact me at (360) 705-7879 or deboert@wsdot.wa.gov.

Sincerely,

Trent de Boer
WSDOT Archaeologist
Local Programs

cc: Casey Barney, Yakama Cultural Resources (electronic, w/attachments)
Phillip Rigdon, Yakama Natural Resources (electronic, w/attachments)
Gary Martindale, FHWA, MS 40943 (electronic, w/attachments)
Randy Giles, SC Region Local Programs Engineer (electronic, w/attachments)

Washington State Department of Transportation

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P.O. Box 47300
Olympia, WA 98504-7300
360-705-7000
TTY: 1-800-833-6388
www.wsdot.wa.gov

February 18, 2021

Ms. Kitty Henderson
Executive Director
1500 Payne Avenue
Austin, TX 78757

Walla Walla County
Dell Sharpe Bridge Project
Initiation of Consultation // APE
Federal Aid Number: BROS-2036(035)
DAHP Log # 2021-02-00919

Dear Ms. Henderson:

Walla Walla County is proposing to replace the Dell Sharpe Bridge with funding from the Federal Highway Administration (FHWA). The Washington State Department of Transportation (WSDOT) Local Programs Division is assisting the County and acting on behalf of the FHWA in processing federal environmental compliance documentation. As noted above this correspondence is intended to initiate consultation and provide you our definition of the Area of Potential Effects (APE), pursuant to 36 CFR 800.3 and 800.4 respectively.

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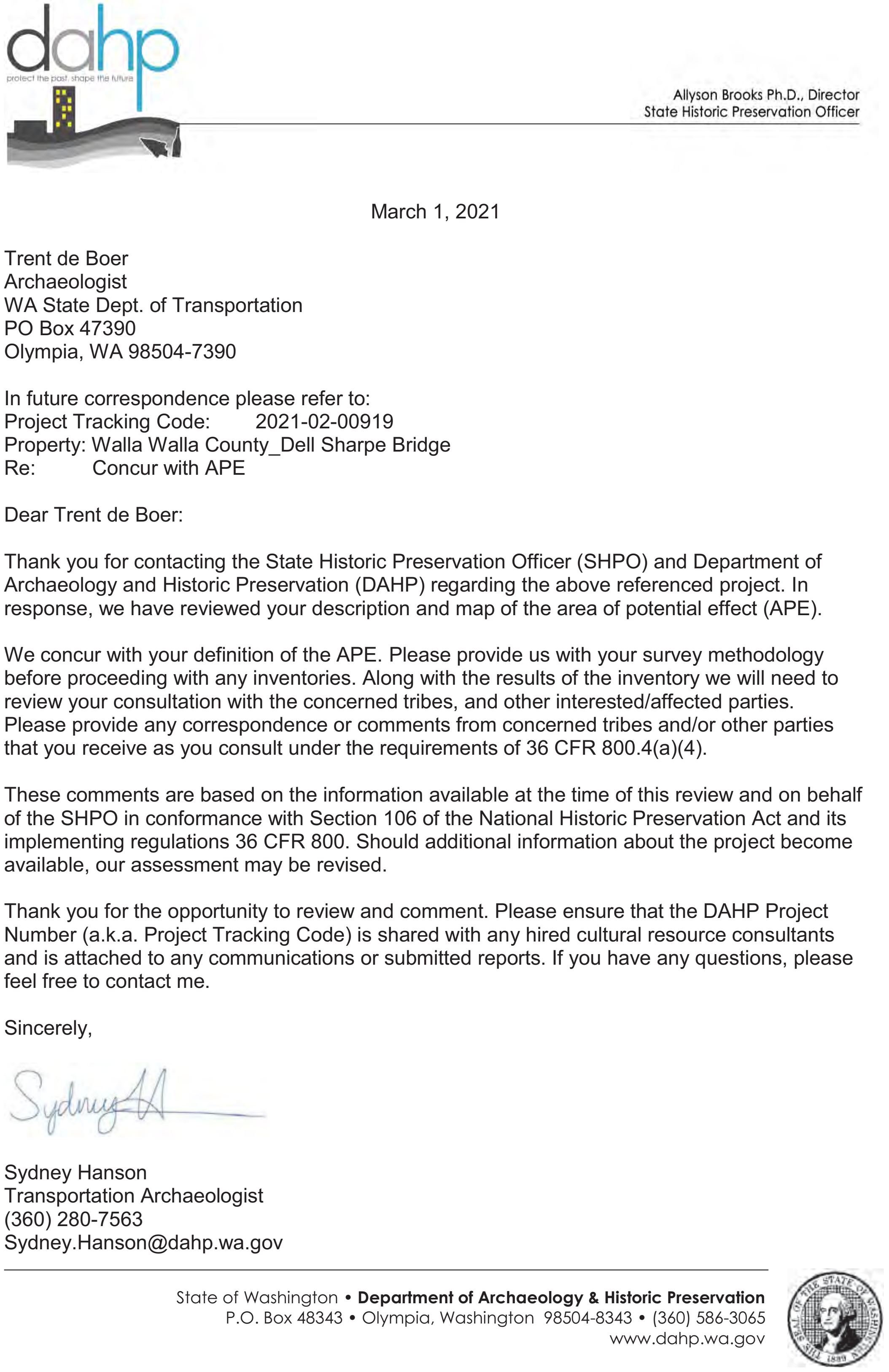
Sincerely,

Trent de Boer
WSDOT Archaeologist
Local Programs

(Electronic)
cc: Gary Martindale, FHWA, MS 40943 (electronic, w/attachments)
Randy Giles, SC Region Local Programs Engineer (electronic, w/attachments)



dahp
protect the past, shape the future

Allyson Brooks Ph.D., Director
State Historic Preservation Officer

March 1, 2021

Trent de Boer
Archaeologist
WA State Dept. of Transportation
PO Box 47390
Olympia, WA 98504-7390

In future correspondence please refer to:
Project Tracking Code: 2021-02-00919
Property: Walla Walla County_Dell Sharpe Bridge
Re: Concur with APE

Dear Trent de Boer:

Thank you for contacting the State Historic Preservation Officer (SHPO) and Department of Archaeology and Historic Preservation (DAHP) regarding the above referenced project. In response, we have reviewed your description and map of the area of potential effect (APE).

We concur with your definition of the APE. Please provide us with your survey methodology before proceeding with any inventories. Along with the results of the inventory we will need to review your consultation with the concerned tribes, and other interested/affected parties. Please provide any correspondence or comments from concerned tribes and/or other parties that you receive as you consult under the requirements of 36 CFR 800.4(a)(4).

These comments are based on the information available at the time of this review and on behalf of the SHPO in conformance with Section 106 of the National Historic Preservation Act and its implementing regulations 36 CFR 800. Should additional information about the project become available, our assessment may be revised.

Thank you for the opportunity to review and comment. Please ensure that the DAHP Project Number (a.k.a. Project Tracking Code) is shared with any hired cultural resource consultants and is attached to any communications or submitted reports. If you have any questions, please feel free to contact me.

Sincerely,

Sydney

Sydney Hanson
Transportation Archaeologist
(360) 280-7563
Sydney.Hanson@dahp.wa.gov

State of Washington • **Department of Archaeology & Historic Preservation**
P.O. Box 48343 • Olympia, Washington 98504-8343 • (360) 586-3065
www.dahp.wa.gov

1889

Exhibit 8

Community Development Department
Director: Lauren Prentice
310 W. Poplar, Suite 200 | Walla Walla, WA 99362
commdev@co.walla-walla.wa.us | 509-524-2610
Submit to: planning@co.walla-walla.wa.us
https://www.co.walla-walla.wa.us/residents/community_development/index.php

FINAL DETERMINATION OF NON-SIGNIFICANCE (DNS)

File(s):	SEPA22-006
Description of Proposal:	**Dell Sharpe Bridge Replacement.** Remove and replace Dell Sharpe Bridge which spans the Touchet River connecting on Pettyjohn Road due to scour of the bridge foundation by the Touchet River. The new location will be approximately 400 feet upstream of the existing bridge location. The existing brige is 19 feet wide and 155 feet in length, while the replacement bridge will be 32 feet wide and 320 feet in length.
Proponent:	Walla Walla County Public Works Department c/o Seth Walker 990 Navion Ln Walla Walla, WA 99362
Owner:	Talbott Melvin L Po Box 203 Prescott, WA 99348
Location of Proposal:	The subject property is generally located at 4082 E Highway 124, Assessor's Parcel Number (APN) 350902210003.

The lead agency for this proposal has determined that it does not have a probable significant adverse impact on the environment. An environmental impact statement (EIS) is not required under RCW 43.21C.030 (2) (c). This decision was made after review of a completed environmental checklist and other information on file with the lead agency. This information is available to the public on request.

The Determination of Non-Significance (DNS) is based on the project as proposed and reflected in the following:

- SEPA Staff Evaluation Report, 1/24/2023
- SEPA Environmental Checklist, SEPA22-006, dated 2/7/2022 and attachments:
  - Shoreline Environment Designation Map
  - Potential Impacts on Resources of US Fish and Wildlife (IPaC) Printout
- Biological Assessment by PBS Engineering, dated January 2022
- Final Hydraulic Report by MP Stormwater, dated December 2021
- Storm Drainage Report by PBS Engineering, dated January 2022
- Final Critical Areas Mitigation Plan by PBS Engineering, dated January 2022
- Joint Aquatic Resources Permit Application Form, dated January 2022
- Critical Areas Assessment Report by PBS Engineering, dated February 2021
- Cultural Resource Survey by Plateau Archeological Investigations LLC, dated March 2021
- Letter to Trent de Boer, WSDOT from Washington State Department of Archeology and Historic

  Preservation re: Project 2021.02.00901, dated June 3, 2021
- Vicinity Map dated 2/26/2020
- Site and Construction Plans CRP 20-02 2/11/2022
- Department of Ecology comment letter dated 3/17/2022

This DNS is issued after using the optional DNS process in WAC 197-11-355. **There is no further comment period on this DNS.**

The lead agency has determined that the requirements for environmental analysis, protection, and mitigation measures have been adequately addressed in the development regulations and comprehensive plan adopted under chapter 36.70A RCW, and in other applicable local, state or federal laws or rules, as provided by RCW 43.21C.240 and WAC 197-11-158. Our agency will not require any additional mitigation measures under SEPA.

This DNS may be withdrawn at any time if the proposal is modified so that it is likely to have significant adverse environmental impacts (unless a non-exempt license has been issued if the proposal is a private project); if there is significant new information indicating, or on, a proposal's probable significant adverse environmental impacts; or if the DNS was procured by misrepresentation or lack of material disclosure.

Lead Agency: Walla Walla County Community Development Department

Responsible Official: Lauren Prentice, Community Development Director

Address:
310 W Poplar Street, Suite 200
Walla Walla, WA 99362
Phone: 509-524-2610
Email: planning@co.walla-walla.wa.us

Issue Date: 1/27/2023

Signature: ______________________________ **Date:** **1/27/2023**

Staff Contact: **Jennifer Ballard, Senior Planner, 509-524-2626**

Per WWCC 18.04.170 this determination may be appealed to the CDD no later than fourteen days from the date of issue. Chapter 14.11 outlines the County's appeal procedure. Submit an Appeal Application by the end of business (5 PM) on February 10. 2023 by email to planning@co.walla-walla.wa.us, or by postal mail or in-person delivery to 310 W. Poplar St, Suite 200, Walla Walla, WA 99362, and $1,715.98 ($1,666 Application Fee and 3% Technology Fee) payable by cash, check made out to Walla Walla County, or credit/debit card. The appeal, should an appeal be filed, will be consolidated with the hearing for the underlying permit application.

Community Development Department
Director: Lauren Prentice
310 W. Poplar, Suite 200 | Walla Walla, WA 99362
Main: commdev@co.walla-walla.wa.us | 509-524-2610
https://www.co.walla-walla.wa.us/residents/community_development/index.php

STATE ENVIRONMENTAL POLICY ACT (SEPA)
Final Staff Evaluation for Environmental Checklist

This document is intended to supplement information in the applicant's submitted environmental checklist and also document some staff evaluation of the proposal. It is meant to serve as a supplement to the primary documents required by SEPA.

Date: 1/24/2023

Project Name/Number: Dell Sharpe Bridge Replacement on Pettyjohn Road/SEPA22-006

Proponent:
Walla Walla County Public Works Department
c/o Seth Walker
990 Navion Ln
Walla Walla, WA 99362

Description of Proposal: Remove and replace Dell Sharpe Bridge which spans the Touchet River connecting on Pettyjohn Road due to scour of the bridge foundation by the Touchet River. The new location will be approximately 400 feet upstream of the existing bridge location. The existing brige is 19 feet wide and 155 feet in length, while the replacement bridge will be 32 feet wide and 320 feet in length.

Location of Proposal: The site is generally located at 4082 E Highway 124, Assessor's Parcel Number (APN) 350902210003. This project is located in the general area of APNs 350902210003, 350902240002 and 350902220006.

Zoning: Primary Agriculture 40 (PA-40)

Comprehensive Plan Map Designation: Primary Agriculture

Shoreline Environment Designation: Rural Conservancy

Conclusion: Based on the analysis herein, the proposal can be found to not have a probable significant adverse impact on the environment. Application materials, including the SEPA checklist, were distributed to state and local agencies for review and comment during the 14-day comment period using the Notice of Application Optional Determination of Non-significant process.

The County reserves the right to review any future revisions or alterations to the site or to the proposal in order to determine the environmental significance or non-significance of the project at that point in time.

Prepared by: Jennifer Ballard, Senior Planner, 509-524-2626

Reviewed project and environmental documents:

- SEPA Environmental Checklist, SEPA22-006, dated 2/7/2022 and attachments:
  - Shoreline Environment Designation Map
  - Potential Impacts on Resources of US Fish and Wildlife (IPaC) Printout
- Biological Assessment by PBS Engineering, dated January 2022
- Final Hydraulic Report by MP Stormwater, dated December 2021
- Storm Drainage Report by PBS Engineering, dated January 2022
- Final Critical Areas Mitigation Plan by PBS Engineering, dated January 2022
- Joint Aquatic Resources Permit Application Form, dated January 2022
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- Cultural Resource Survey by Plateau Archeological Investigations LLC, dated March 2021

- Letter to Trent de Boer, WSDOT from Washington State Department of Archeology and Historic Preservation re: Project 2021.02.00901, dated June 3, 2021
- Vicinity Map dated 2/26/2020
- Site and Construction Plans CRP 20-02 2/11/2022
- Department of Ecology comment letter dated 3/17/2022

Agencies and organizations Notice of Application ODNS sent to

- Federal/Tribal
  - Confederated Tribes of Umatilla Indian Reservation
  - US Army Corps of Engineers
- Walla Walla Valley Metropolitan Planning Organization
- Walla Walla County Conservation District
- Prescott School District
- Fire District 7
- Municipalities located within Walla Walla County
  - City of Prescott
  - City of Waitsburg
- Walla Walla County Government
  - Public Works Department
  - Building Official/Fire Marshal
  - GIS Department (911 Addressing)
  - Sheriff
- Washington State
  - Department of Archeology & Historic Preservation
  - Department of Natural Resources
  - Department of Ecology, SEPA, Water Master, Wetlands/Shorelands
  - Department of Ecology, Water Master
  - Department of Fish & Wildlife
  - Department of Transportation

A. Background

The SEPA checklist for project SEPA22-006 was prepared by the Walla Walla County Public Works Department, dated February 7, 2022.

A preapplication meeting was not held for this project. No building permits are issued for public roads/bridges by the Community Development Department.

B. Environmental Elements

1. **Earth**

   Generally concur with checklist
   1. Applicant did not answer item a. The site is flat/gently sloping where there are actively cultivated farm fields. The banks of the Touchet River are steep.
   2. Applicant did not answer item b. Slopes in some portions of the project site appear to be near vertical.
2. **Air**

   Generally concur with checklist.

3. **Water**

   Generally concur with checklist.

4. **Plants**

   Generally concur with checklist.

5. **Animals**

   Generally concur with checklist.

6. **Energy and natural resources**

   Generally concur with checklist.

7. **Environmental Health**

   Generally concur with checklist.

   a3. Applicant did not answer item a(3).

   a4 -5. An SPCC plan is a 'Spill Prevention, Control, and Countermeasure Plan'.
   Staff did not receive a copy of the SPCC plan.

8. **Land and Shoreline Use**

Generally concur with checklist.

a. The current use of the site and adjacent properties is agriculture (wheat fields, scattered barns/equipment sheds) and rural residential (few scattered farmhouses).
b. The Applicant states that no working farmland will be lost as part of this project, but approximately .44 acres of farmland will be permanently removed from production on APN 350902210003 due to the bridge replacement upstream of the current bridge and the resulting realignment of Pettyjohn Road. The site is located within the PA-40 district; these lands are classified as agricultural lands of long-term commercial significance.
f. Primary Agriculture
h. Critical Areas: The Applicant states that the only critical areas present is the 100-foot riparian buffer from Touchet River. That is not accurate. The project site is within a flood hazard area (frequently flooded area), Fish & Wildlife Habitat Conservation Areas (100-foot minimum riparian buffer, Ferruginous Hawk Habitat), Geologically Hazardous Areas (steep slopes/erosion hazard), Critical Aquifer Recharge Areas (High Vulnerability), Wetlands.

   Per CA report completed by PBS Engineering & Environmental Inc, no wetlands were present at the subject site, therefore no buffering or mitigation associated with wetlands will be required.

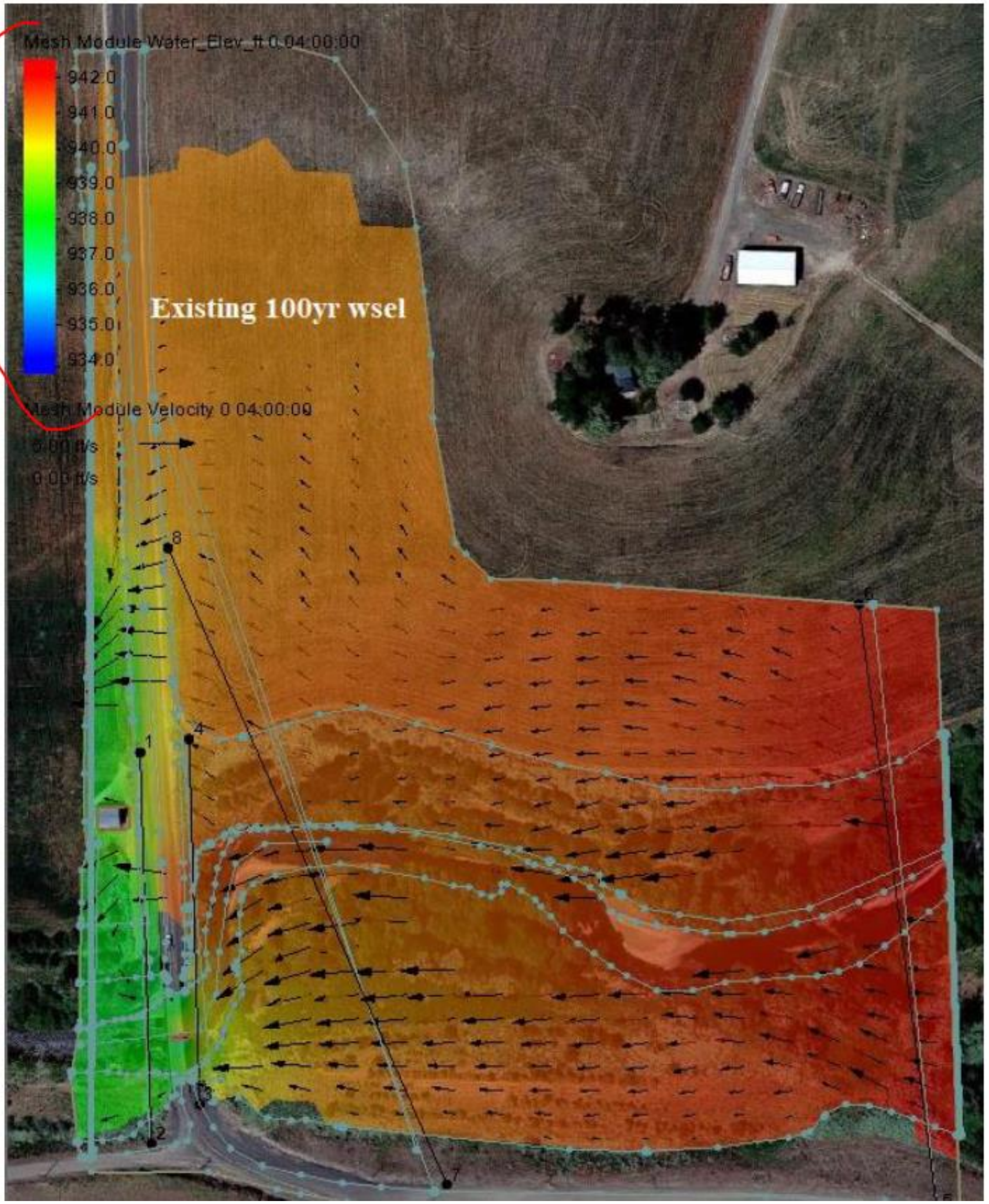
   Per SMP 6.4.J, in areas designated as Raptor Ferruginous Hawk Habitat, tree removal connected with a development permit will be restricted to the non-nesting season August through January, and limited to hazard tree removal unless otherwise approved by the department after review of a critical area report.

   Per SMP 6.4.K, between March 1st and May 31st, clearing and grading activities connected with a development permit are not allowed within 820 feet of an active Ferruginous Hawk nest. The applicant may use a species-specific survey to demonstrate that a potential nest tree does not contain an active nest.

   Frequently Flooded Areas: The Touchet River in the area of the project site is considered an unnumbered A zone, in which though 1% annual chance floodplain has been mapped, no base flood elevations have been established and no floodway boundaries have been established. Because of the lack of floodway established there is no requirement for a 'no rise' certificate. The images below show the water surface elevation modeled in the Bridge Replacement Hydraulic Report completed by MP Stormwater in December 2021. Though, at first glace you would assume that the WSEL decreased due to the proposed bridge, the surface elevation appears to be changed only minorly as it is a change in the scale of the models that cause the appearance of a great elevation difference. This modeling shows that there should essentially be no flood elevation increase directly upstream or directly downstream of the existing and proposed Dell Sharpe bridge during the 1% annual chance flood.

   Habitat Buffer: The critical areas mitigation plan submitted by the applicant seems to only take into account the area of permanent disturbance in the buffer, and did not address the trees and shrubs, especially those that are mature and located in the area designated on the CA plan as high-quality habitat, that would be cleared to construct the center span of the bridge. Additional information may be required in order to comply with the requirements of the SMP. SMP Table 6.5-1.

   Because the site is located within jurisdiction of the Walla Walla County Shoreline Master Program (SMP), the project is subject to the critical areas regulations in Appendix A of the SMP, rather than WWCC Chapter 18.08. A separate critical areas permit application is not required.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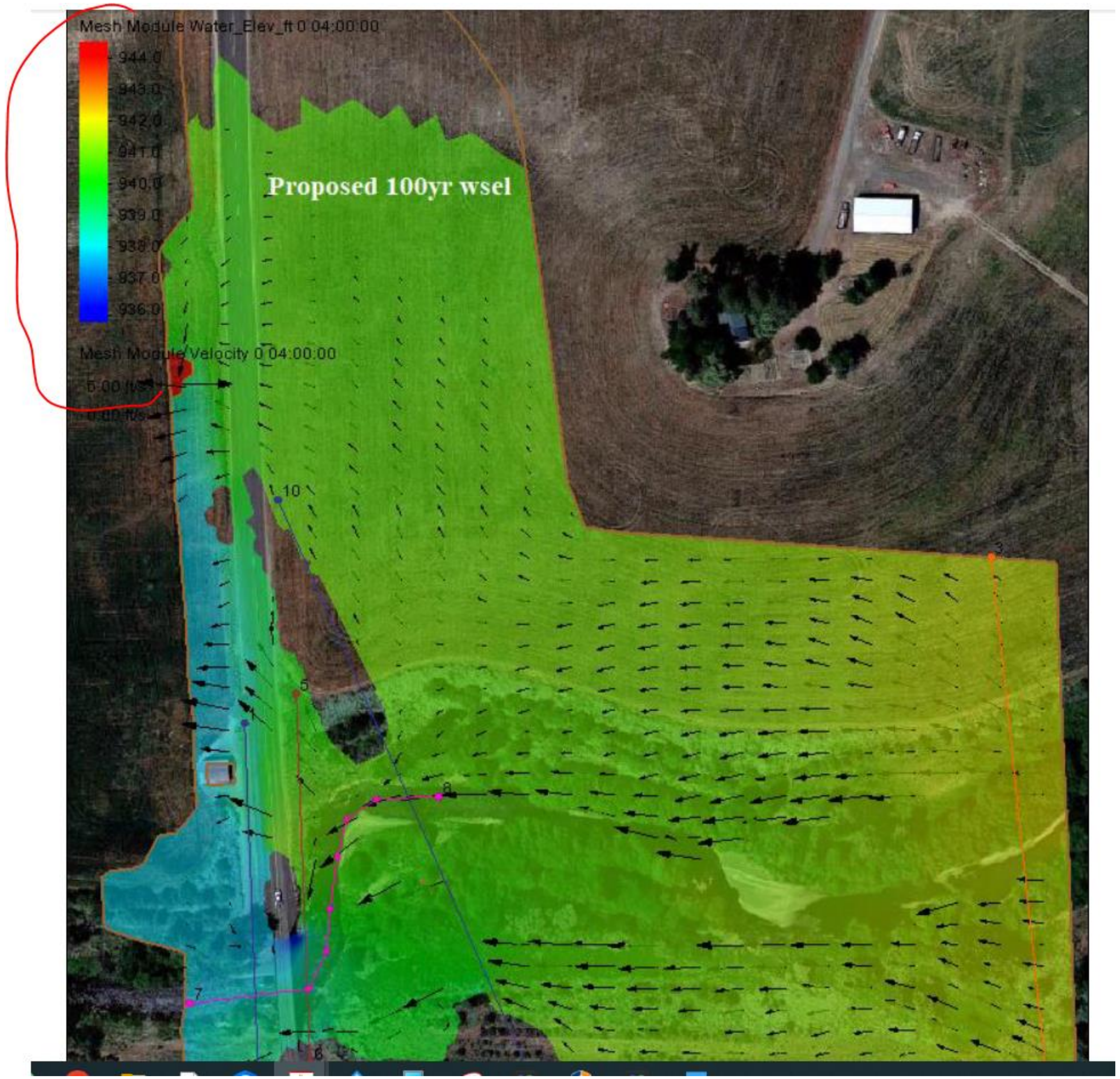
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9. Housing
Generally concur with checklist.

10. Aesthetics
Generally concur with checklist.
  a. The replacement Dell Sharpe Bridge will be elevated higher than the existing bridge, particularly south of the Touchet River.

11. Light and Glare
Generally concur with checklist.

12. Recreation
Generally concur with checklist.
  a. People may fish in the river or swim in the Touchet River. There are no designated recreational uses in the project area.
  b. No recreational uses will be displaced.

13. Historic and Cultural Preservation
Generally concur with checklist.
  a. The Dell Sharpe Bridge and the Pettyjohn Schoolhouse is located on west side of Pettyjohn Road as it approaches Dell Sharpe Bridge, are considered historic structures due to their ages though the schoolhouse is not eligible for inclusion in the National Register of Historic Places.
  d. Staff has not been given information on what the Level II mitigation required by the WA Department of Archeology & Historic Preservation will consist of.

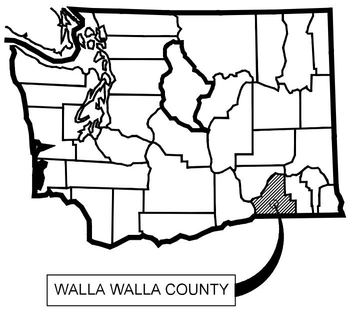
14. Transportation
Generally concur with checklist.
  a. Sharp Rd and Pettyjohn Road

15. Public Services
Generally concur with checklist.

16. Utilities
Generally concur with checklist.

Exhibit 9

STATE OF WASHINGTON



DELL SHARPE BRIDGE REPLACEMENT PROJECT

CRP 20-02

WALLA WALLA COUNTY, WA

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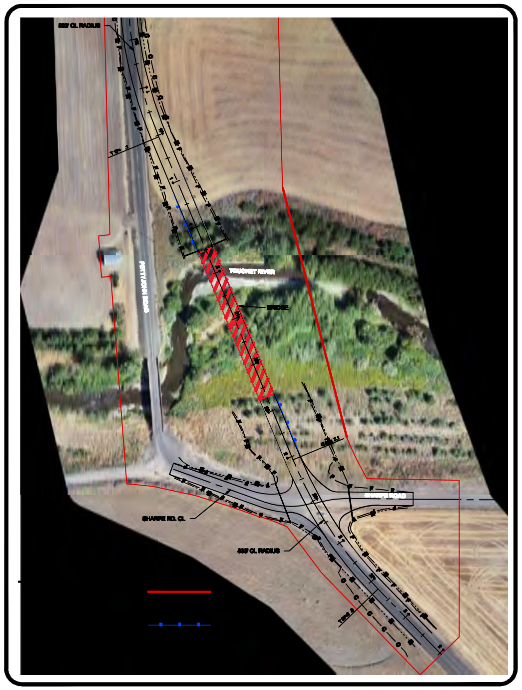

VICINITY MAP

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

COVER SHEET

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P:\2020\2020025 – Walla Walla Dell Sharpe Bridge Replacement\000 CAD\010 Drawing\C–Structural Sheet\G1–COVER.Dwg\TAB:G01 modified by djensen on Jan 14, 2022 – 16:51

Existing Linetype Legend

Existing Sanitary Sewer Pipe	—— SS ——
Existing 4" Sanitary Sewer Pipe	—— 4'' SS ——
Existing 6" Sanitary Sewer Pipe	—— 6'' SS ——
Existing 8" Sanitary Sewer Pipe	—— 8'' SS ——
Existing 10" Sanitary Sewer Pipe	—— 10'' SS ——
Existing 12" Sanitary Sewer Pipe	—— 12'' SS ——
Existing 15" Sanitary Sewer Pipe	—— 15'' SS ——
Existing 18" Sanitary Sewer Pipe	—— 18'' SS ——
Existing 24" Sanitary Sewer Pipe	—— 24'' SS ——
Existing 30" Sanitary Sewer Pipe	—— 30'' SS ——
Existing Sanitary Force Main	—— FM ——
Existing Storm Sewer Pipe	—— SD ——
Existing 4" Storm Sewer Pipe	—— 4'' SD ——
Existing 6" Storm Sewer Pipe	—— 6'' SD ——
Existing 8" Storm Sewer Pipe	—— 8'' SD ——
Existing 10" Storm Sewer Pipe	—— 10'' SD ——
Existing 12" Storm Sewer Pipe	—— 12'' SD ——
Existing 15" Storm Sewer Pipe	—— 15'' SD ——
Existing 18" Storm Sewer Pipe	—— 18'' SD ——
Existing 24" Storm Sewer Pipe	—— 24'' SD ——
Existing Water Pipe	—— WL ——
Existing 4" Water Pipe	—— 4'' WL ——
Existing 6" Water Pipe	—— 6'' WL ——
Existing 8" Water Pipe	—— 8'' WL ——
Existing 10" Water Pipe	—— 10'' WL ——
Existing 12" Water Pipe	—— 12'' WL ——
Existing 15" Water Pipe	—— 15'' WL ——
Existing 18" Water Pipe	—— 18'' WL ——
Existing 24" Water Pipe	—— 24'' WL ——
Existing Water Lateral	— — — — — —
Existing Irrigation Pipe	—— IRR ——
Existing 4" Irrigation Pipe	—— 4'' IRR ——
Existing 6" Irrigation Pipe	—— 6'' IRR ——
Existing 8" Irrigation Pipe	—— 8'' IRR ——
Existing 10" Irrigation Pipe	—— 10'' IRR ——
Existing 12" Irrigation Pipe	—— 12'' IRR ——
Existing Irrigation Lateral	— — — — — —
Existing Cable Tv Line	—— TV ——
Existing Electric Line	—— E —— E ——
Existing Gas Line	—— G —— G ——
Existing Over Head Power Line	—— OHP ——
Existing Telephone Line	—— T —— T ——
Existing Fiber Optic Line	—— FO ——
Existing Underground Utility Line	- - - - - - - - -
Existing Centerline	————
Existing Curb	═ ═ ═ ═ ═ ═
Existing Curb & Gutter	≡ ≡ ≡ ≡ ≡ ≡
Existing Lot Line	— — — — — —
Existing Gravel road	- - - - - - - - -
Existing Flow Line	——➤ - - - ——
Existing Paint Stripe	- - - - - - - - -
Existing Right-of-way	————
Existing Fence	——X——X——
Existing Building	— — — — — —
Existing Wetland Perimeter	—— · — · ——
Existing Wetland Buffer	— · · — · · — · · —
Existing Property Line	— — — — — —
Existing Utility Easement	—— —— ——
Existing Quarter Section	— · —— · —
Existing Railroad	————
Existing Fence	——X——X——
Existing Wall	— — — — — —
Existing Lot Line	— — — — — —
Existing Contour	—— 253 ——

Proposed/Future Linetype Legend

Proposed Sanitary Sewer Pipe	═══
Proposed Sanitary Lateral	━━━
Proposed Sanitary Force Main	━━━
Proposed Storm Under Drain	━━━
Proposed Storm Rain Drain	━━━
Proposed Storm Pipe	═══
Proposed Water Lateral	━━━
Proposed Water Pipe	━━━
Proposed Irrigation Pipe	━━━
Proposed Irrigation Lateral	━━━
Proposed Lot Line	————
Proposed Flow Line	——➤ - - - ——
Proposed Centerline	—— — ——
Proposed Right-of-way	━━ ━ ━ ━━
Proposed Sawcut Line	- - - - - - - - -
Proposed Easement	— — — — — —
Proposed Curb & Gutter	≡≡≡
Proposed End Of Pav't	————
Proposed Sidewalk	————
Proposed Wall	————
Proposed Building	————
Proposed Setback	————
Proposed Property Line	————
Proposed Cut Line	- - - - - - - - -
Proposed Score Line	————
Proposed Paint Stripe	————
Proposed Fence	——X——X——
Proposed Wetland Buffer	— · · — · · — · · —
Proposed Wetland Perimeter	—— · — · ——
Proposed Contour	—— 253 ——
Erosion Control Filter Fabric Fence	—— —— ——
Fill Catch Slope	—— F —— F ——
Cut Catch Slope	—— C —— C ——
Ordinary High Water Line	▬ OHW ▬ OHW ▬

Symbol Legend

Existing Water Valve	WV ⋈
Existing Gas Valve	GV ⋈
Existing Fire Hydrant	-ф-
Existing Power Pole	-o-
Existing Water Meter	⊞
Existing Electrical Pedestal	E
Existing Power Riser	⧄
Existing Power Meter	PM
Existing Sanitary Manhole	○
Existing Storm Manhole	◎
Existing Catch Basin	▥
Existing Area Drain	⊜
Existing Combo Inlet	⊡
Existing Telephone Pad	T
Existing Telephone Riser	⊠
Existing Roof Drain	●
Existing Cleanout	∘CO
Existing Guy Anchor	←
Existing Project Bench Mark	⊕
Existing Iron Rod	●
Existing Sign	⊣
Existing Shrub	⊖⊖
Existing Deciduous Tree	✿
Existing Coniferous Tree	✶
See Extg. Sanitary Sewer Data	ⓧ
See Extg. Storm Drainage Data	☒
Existing Flow Arrow	⇦
Proposed Bollard	∘
Proposed Street Light	●—✱
Proposed Road Barrier	⊔
Proposed Road Sign	-
Proposed Flow Arrow	←
Proposed Fire Protection Vault	■
Proposed Water Meter	▬
Proposed Water Backflow Device	■
Proposed Water Valve	⋈
Proposed Water Bend Tee W/valve	⋈◁
Proposed Water Bend Tee W/tb	◁
Proposed Water 22½° Bend W/tb	◁
Proposed Water 11¼° Bend W/tb	◁
Proposed Water 45° Bend W/tb	◁
Proposed Water 90° Bend W/tb	◁
Proposed Water Stand Pipe	⋈
Proposed Water Bend X	✚
Proposed Water Temporary Blowoff	⋈
Proposed Water Standard Blowoff	▷
Proposed Water Reducer	▶
Proposed Water Thrust Block	▷
Proposed Fire Hydrant	⋈

Symbol Legend

Proposed Catch Basins	▥ ▥
Proposed Area Drain	⊘
Proposed Combination Curb Inlet	⊡
Proposed Storm Reducer	▶
Proposed Rain Drain	•
Proposed Storm Cleanout	●
Proposed Storm Manhole	●
Proposed Sedimentation Manhole	◐
Proposed Drywell	◉
Proposed Sanitary Cap	[
Proposed Sanitary Reducer	▶
Proposed Sanitary Cleanout	∘
Proposed Sanitary Manhole	○
Proposed Irrigation Meter	▫
Proposed Irrigation Backflow Device	■
Proposed Irrigation Valve	⋈
Proposed Irrigation Bend Tee W/valve	⋈◁
Proposed Irrigation Bend Tee W/tb	◁
Proposed Water 22½° Bend W/tb	◁
Proposed Water 11¼° Bend W/tb	◁
Proposed Irrigation 45° Bend W/tb	◁
Proposed Irrigation 90° Bend W/tb	◁
Proposed Irrigation Stand Pipe	⋈
Proposed Irrigation Bend X	✚
Proposed Irrigation Temporary Blowoff	⋈
Proposed Irrigation Standard Blowoff	▷
Proposed Irrigation Reducer	▶
Proposed Irrigation Thrust Block	▷
Proposed Inlet Protection Pillow	■
Proposed Gravel Construction Entrance	⬡
Proposed Sedimentation Trap	◎
Erosion Control feature code & ID number	E 3.30
BMP Type	IP-1

Abbreviation Legend

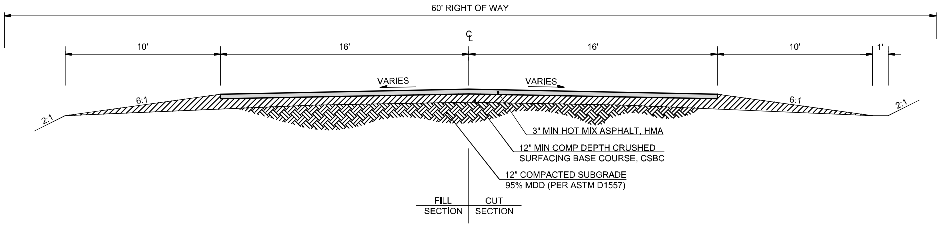
Acres	AC
Assembly	ASS'Y
Avenue	AVE
Approved	APP'D
Butterfly	BF
Boulevard	BLVD
Benchmark	BM
Blow Off	BO
Back Of Curb	BOC
Begin Vertical Curve	BVC
Care Of	C/O
Catch Basin	CB
Cubic Feet	CF
Cast Iron	CI
Cement	CEM
Circle	CIR
Centerline	℄
Corrugated Metal Pipe	CMP
Cleanout	CO
Combination	COMB
Compaction	COMP
Concrete	CONC
Construction	CONST
Corrugated Polyethylene	CPE
Concrete Sewer Pipe	CSP
Court	CT
Cubic Yard	CY
Cement	CEM
Depth	D
Ductile Iron	DI
Diameter	DIA
Ductile Iron Pipe	DIP
Down Spout	DS
Edge Of Pavement	EOP
End Curb Return	ER
Easement	ESMT
Existing	EXTG
Elevation	EL
Electric	ELEC
End Vertical Curb	EVC
Finished Floor	FF
Finished Grade	FG
Fire Hydrant	FH
Flange	FLG
Force Main	FM
Foot / Feet	FT
Gas	G
Galvanized Iron	GI
Ground	GRD
Gate Valve	GV
High Density Polyethylene	HDPE
Horizontal	HORIZ

Abbreviation Legend

High Water Elevation	HW
Hydrant	HYD
Invert Elevation	IE
Intersection	INTX
Invert	INV
Length	L
Lateral	LAT
Left	LT
Maximum	MAX
Manhole	MH
Minimum	MIN
Mechanical Joint	MJ
Number	No. or #
Overhead Electric	OHE
Pavement	PAV'T
Point Of Curve	PC
Power Pole	PP
Point Of Reverse Curve	PRC
Point Of Reverse Vertical Curve	PRVC
Point Of Tangent	PT
Point Of Vertical Intersection	PVI
Polyvinyl Chloride	PVC
Place	PL
Radius	R
Right Of Way	R/W
Return	RET
Right	RT
Sheet	SHT
Stainless Steel	SS
Steel	STL
Sidewalk	S/W
Street	ST
Station Centerline	STA
Standard	STD
Sanitary	SAN
Storm	STM
Tangent	T
Thrust Block	TB
Temporary Benchmark	TBM
Top Of Concrete	TC
Telephone	TEL
Temporary	TEMP
Top Of Manhole	TOP
Typical	TYP
Underground Electric	UGE
Vertical Curve	VC
Vertical	VERT
Water	WTR
With	W/
Without	W/O
With Yellow Plastic Cap	W/YPC
Water Meter	WM
Yard	YD

Hatching Legend

░	Proposed Asphalt Concrete
⁚	Proposed Cement Concrete
▨	Proposed Gravel Road
▧	Existing Asphalt To Be Removed



TYPICAL ROAD SECTION DETAIL

NTS

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

CIVIL NOTES, LEGENDS, AND TYPICAL SECTIONS

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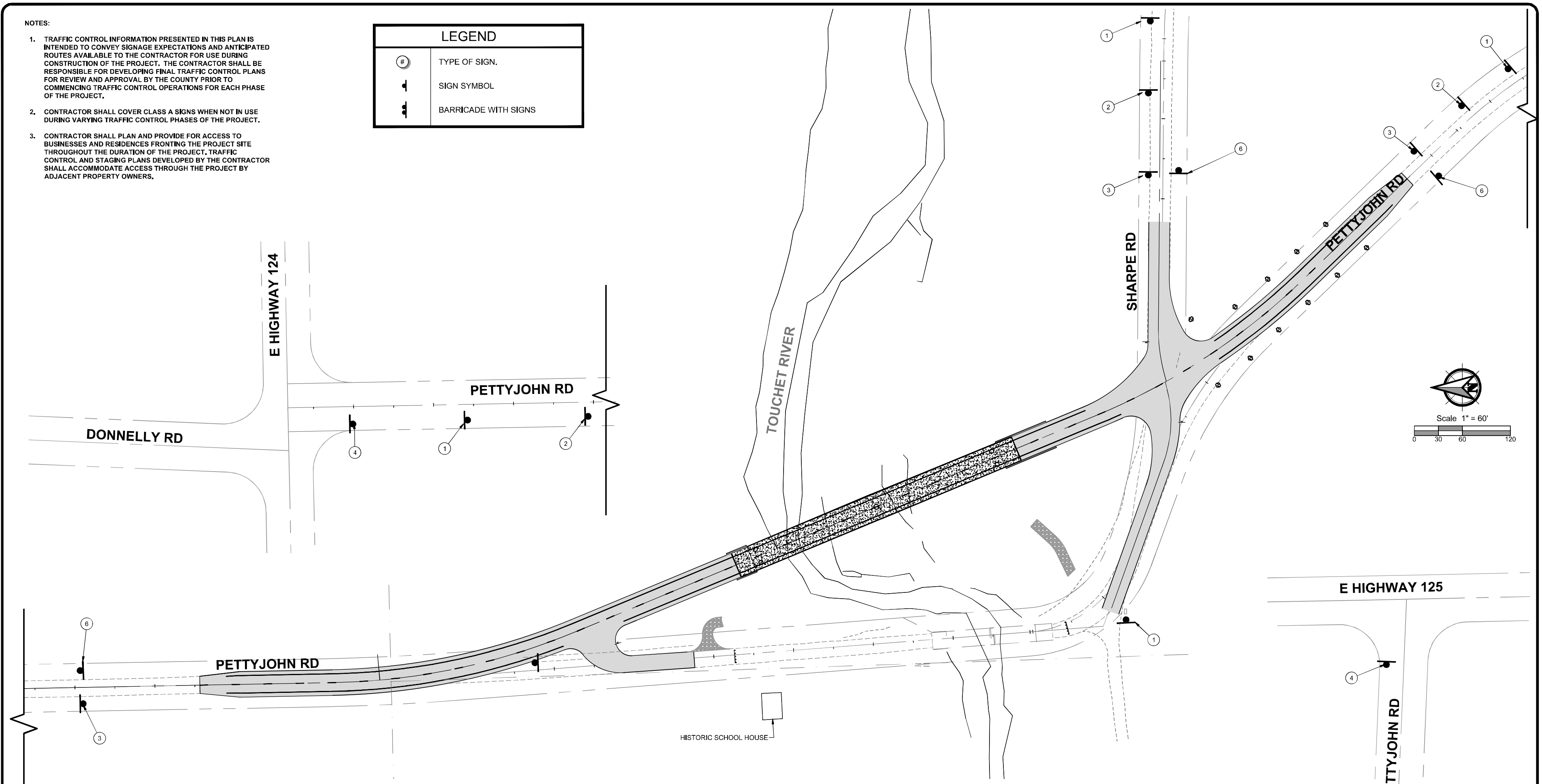
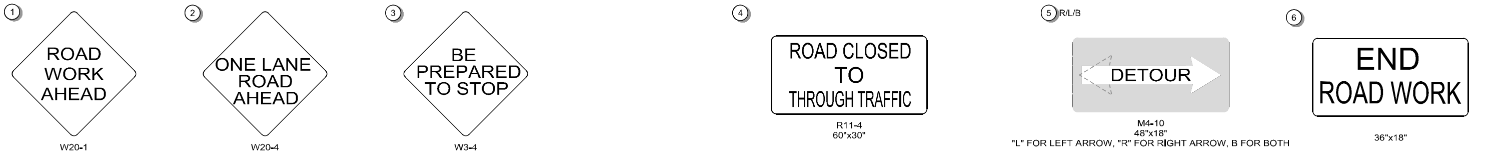
NOTES:

1. TRAFFIC CONTROL INFORMATION PRESENTED IN THIS PLAN IS INTENDED TO CONVEY SIGNAGE EXPECTATIONS AND ANTICIPATED ROUTES AVAILABLE TO THE CONTRACTOR FOR USE DURING CONSTRUCTION OF THE PROJECT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DEVELOPING FINAL TRAFFIC CONTROL PLANS FOR REVIEW AND APPROVAL BY THE COUNTY PRIOR TO COMMENCING TRAFFIC CONTROL OPERATIONS FOR EACH PHASE OF THE PROJECT.
2. CONTRACTOR SHALL COVER CLASS A SIGNS WHEN NOT IN USE DURING VARYING TRAFFIC CONTROL PHASES OF THE PROJECT.
3. CONTRACTOR SHALL PLAN AND PROVIDE FOR ACCESS TO BUSINESSES AND RESIDENCES FRONTING THE PROJECT SITE THROUGHOUT THE DURATION OF THE PROJECT. TRAFFIC CONTROL AND STAGING PLANS DEVELOPED BY THE CONTRACTOR SHALL ACCOMMODATE ACCESS THROUGH THE PROJECT BY ADJACENT PROPERTY OWNERS.

LEGEND	
(#)	TYPE OF SIGN.
●	SIGN SYMBOL
●●	BARRICADE WITH SIGNS





W20-1
36"x36"

W20-4
36"x36"

W3-4
36"x36"

R11-4
60"x30"

M4-10
48"x18"
"L" FOR LEFT ARROW, "R" FOR RIGHT ARROW, B FOR BOTH

36"x18"

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

CONSTRUCTION SIGNING

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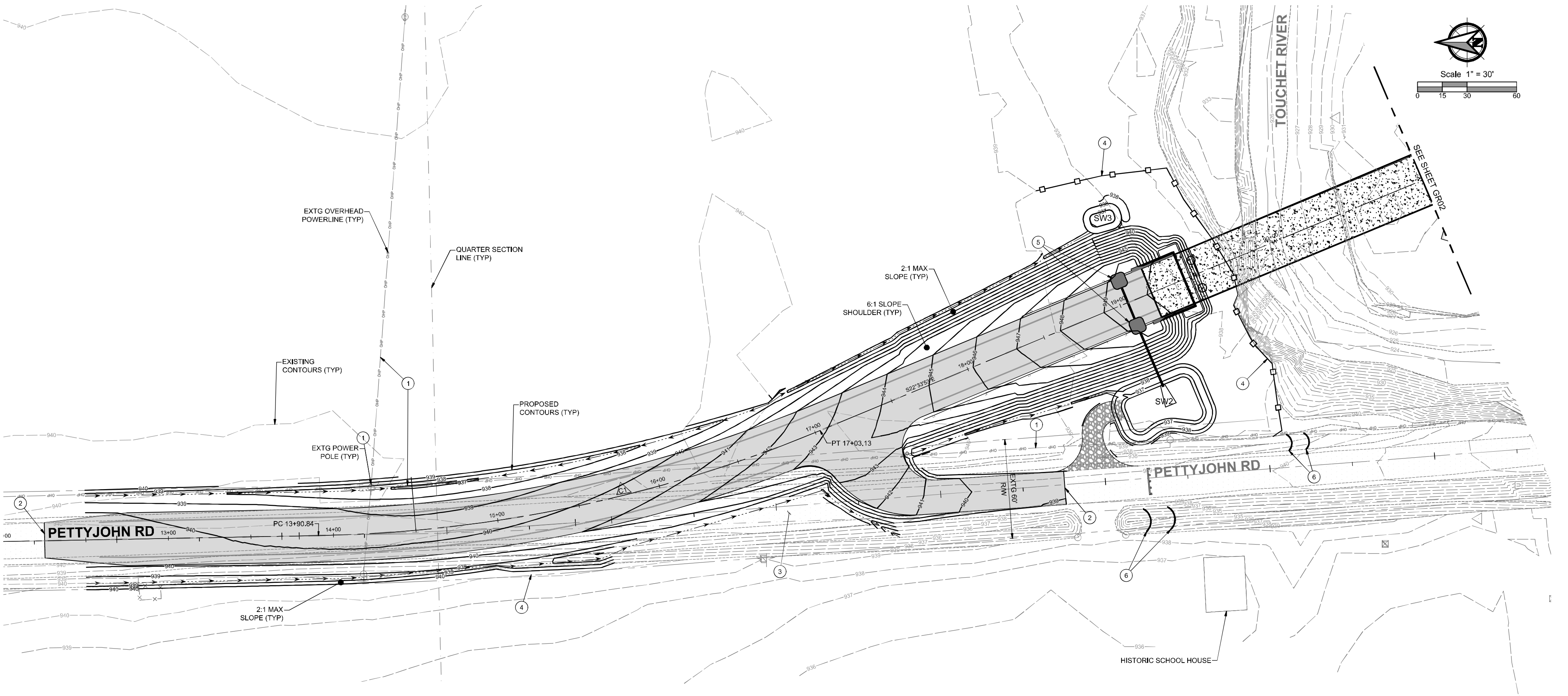

EROSION CONTROL NOTES:

SEE SHEET GN01 FOR TYPICAL ROAD SECTION GEOMETRY.

EROSION CONTROL MEASURES SHALL BE ADJUSTED AS NECESSARY BASED ON THE STAGE OF THE PROJECT. COORDINATE WITH LOCAL JURISDICTION OR THE "STORMWATER MANAGEMENT MANUAL FOR EASTERN WASHINGTON" FOR APPROVED METHODS.

KEYED GRADING NOTES

① ALL EXISTING UTILITIES SHALL BE PROTECTED DURING GRADING ACTIVITIES UNLESS OTHERWISE NOTED.

② SAWCUT ASPHALT CONCRETE. REMOVE EXISTING ASPHALT AND BASE COURSE MATERIAL FROM WORK AREAS.

③ REMOVE EXISTING PAVEMENT.

④ TEMPORARY FILTER FABRIC FENCE PER WSDOT STANDARD PLAN 1-30.15

⑤ INLET PROTECTION PER WSDOT STANDARD PLAN I-40.20

⑥ BIODEGRADABLE CHECK DAM PER WSDOT STANDARD PLAN I-50.20

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

GRADING AND EROSION CONTROL PLAN - NORTH

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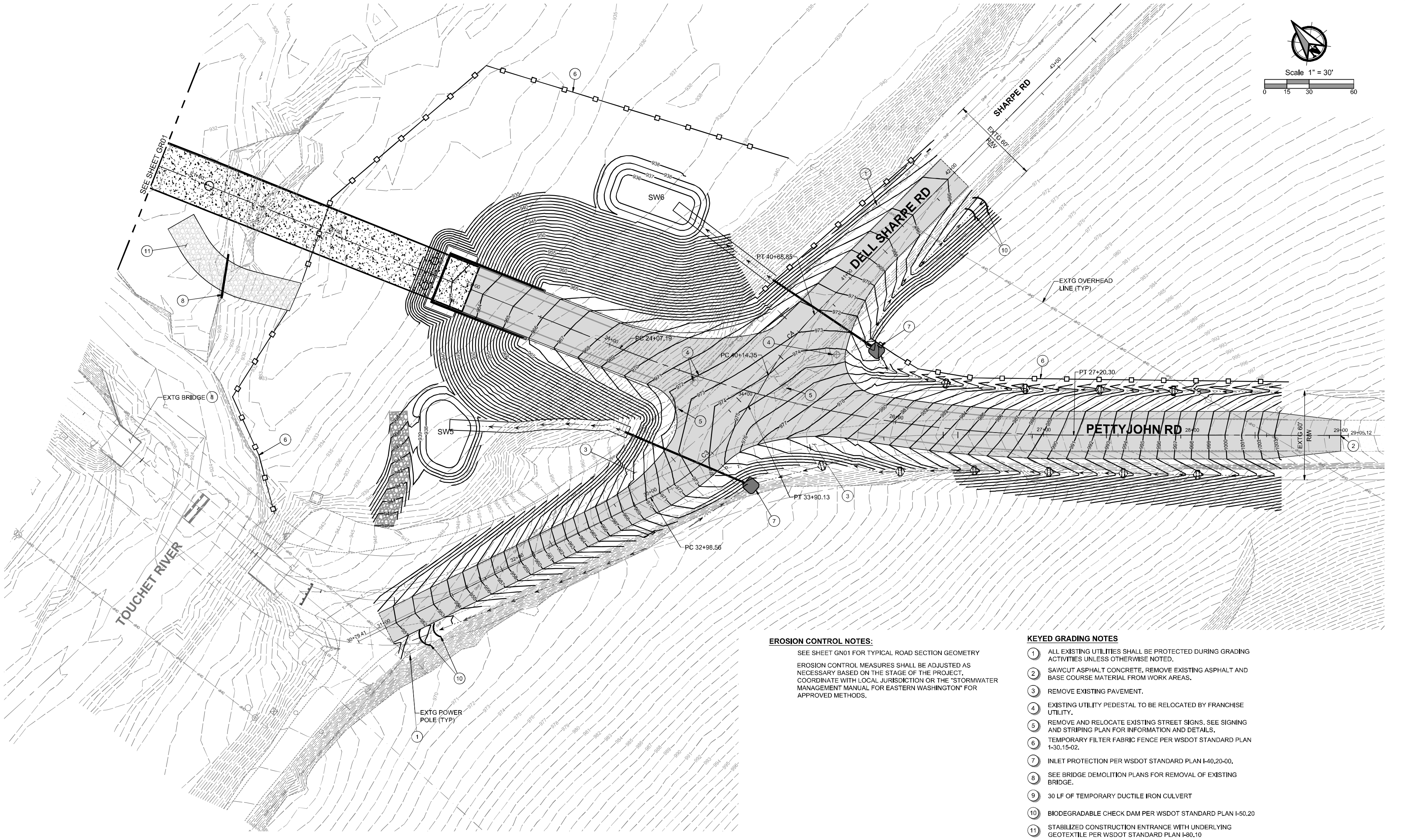

EROSION CONTROL NOTES:

SEE SHEET GN01 FOR TYPICAL ROAD SECTION GEOMETRY

EROSION CONTROL MEASURES SHALL BE ADJUSTED AS NECESSARY BASED ON THE STAGE OF THE PROJECT. COORDINATE WITH LOCAL JURISDICTION OR THE "STORMWATER MANAGEMENT MANUAL FOR EASTERN WASHINGTON" FOR APPROVED METHODS.

KEYED GRADING NOTES

① ALL EXISTING UTILITIES SHALL BE PROTECTED DURING GRADING ACTIVITIES UNLESS OTHERWISE NOTED.

② SAWCUT ASPHALT CONCRETE. REMOVE EXISTING ASPHALT AND BASE COURSE MATERIAL FROM WORK AREAS.

③ REMOVE EXISTING PAVEMENT.

④ EXISTING UTILITY PEDESTAL TO BE RELOCATED BY FRANCHISE UTILITY.

⑤ REMOVE AND RELOCATE EXISTING STREET SIGNS. SEE SIGNING AND STRIPING PLAN FOR INFORMATION AND DETAILS.

⑥ TEMPORARY FILTER FABRIC FENCE PER WSDOT STANDARD PLAN 1-30.15-02.

⑦ INLET PROTECTION PER WSDOT STANDARD PLAN I-40.20-00.

⑧ SEE BRIDGE DEMOLITION PLANS FOR REMOVAL OF EXISTING BRIDGE.

⑨ 30 LF OF TEMPORARY DUCTILE IRON CULVERT

⑩ BIODEGRADABLE CHECK DAM PER WSDOT STANDARD PLAN I-50.20

⑪ STABILIZED CONSTRUCTION ENTRANCE WITH UNDERLYING GEOTEXTILE PER WSDOT STANDARD PLAN I-80.10

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

GRADING AND EROSION CONTROL PLAN - SOUTH

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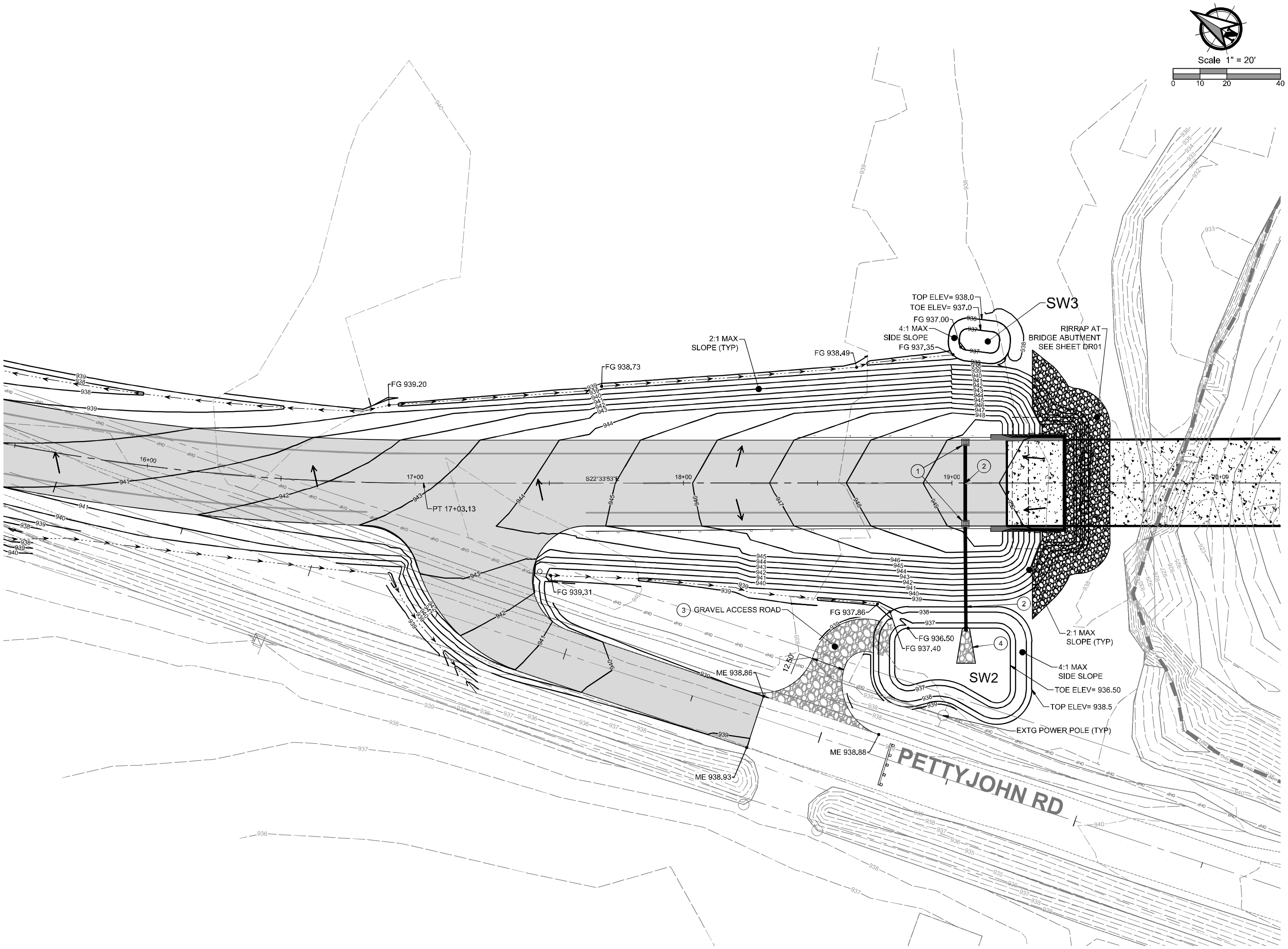

EROSION CONTROL NOTES:

SEE SHEET GN01 FOR TYPICAL ROAD SECTION GEOMETRY

EROSION CONTROL MEASURES SHALL BE ADJUSTED AS NECESSARY BASED ON THE STAGE OF THE PROJECT. COORDINATE WITH LOCAL JURISDICTION OR THE "STORMWATER MANAGEMENT MANUAL FOR EASTERN WASHINGTON" FOR APPROVED METHODS.

KEYED GRADING NOTES

① CATCH BASIN TYPE 1, SEE PLAN PROFILE SHEETS FOR ADDITIONAL INFORMATION.

② 12" STORM PIPE, SEE PLAN AND PROFILE SHEETS FOR ADDITIONAL INFORMATION.

③ SEE GRAVEL ACCESS ROAD SECTION DETAIL ON SHEET D01.

④ RIP RAP PAD AT PIPE OUTFALL PER DETAIL ON SHEET D01.

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

NORTH ABUTMENT GRADING AND STORM FACILITIES PLAN

PROJECT NUMBER
CRP20-02
SHEET
GR03
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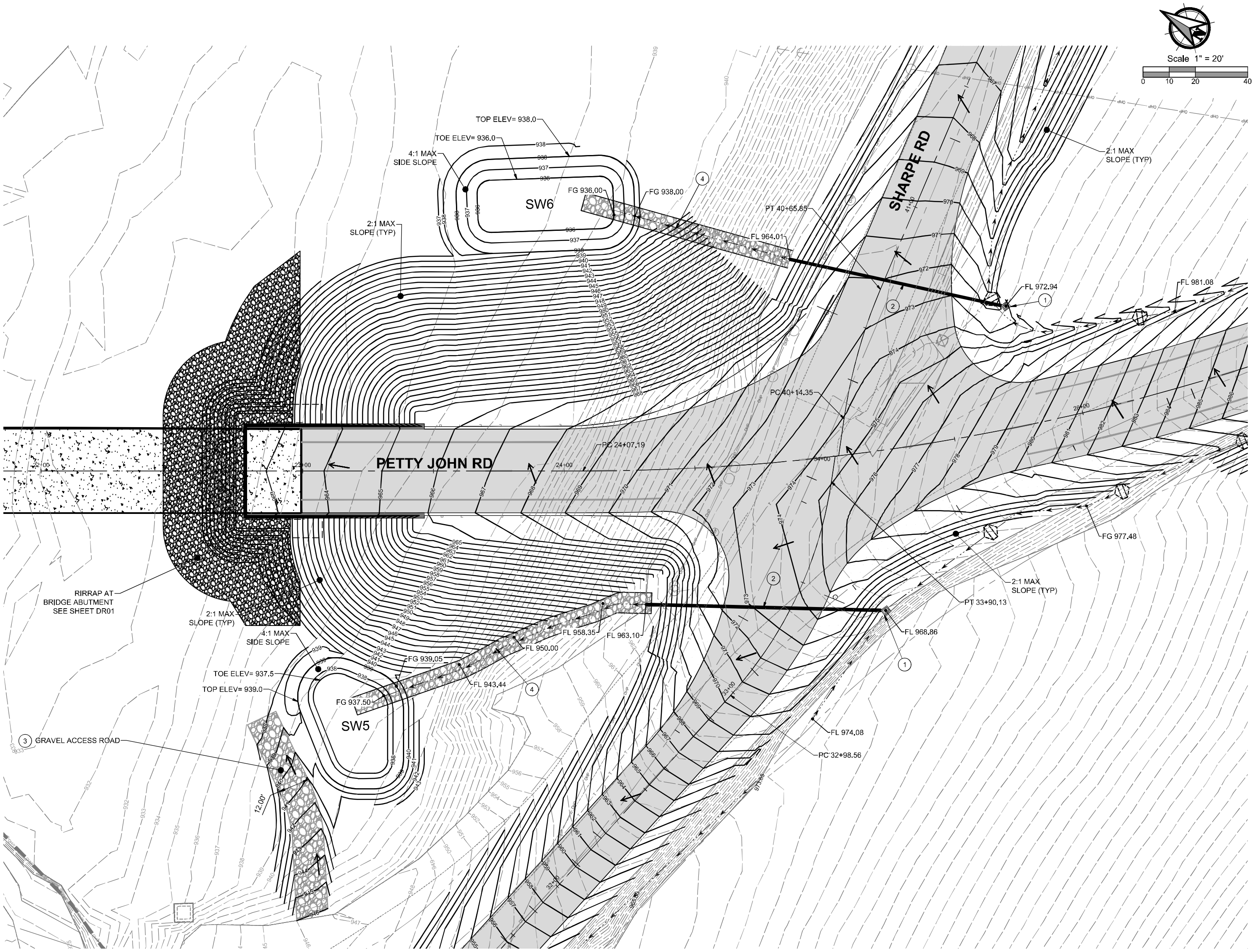

EROSION CONTROL NOTES:

SEE SHEET GN01 FOR TYPICAL ROAD SECTION GEOMETRY

EROSION CONTROL MEASURES SHALL BE ADJUSTED AS NECESSARY BASED ON THE STAGE OF THE PROJECT. COORDINATE WITH LOCAL JURISDICTION OR THE "STORMWATER MANAGEMENT MANUAL FOR EASTERN WASHINGTON" FOR APPROVED METHODS.

KEYED GRADING NOTES

① DITCH INLET, SEE PLAN AND PROFILE SHEETS FOR ADDITIONAL INFORMATION.

② 12" STORM PIPE - SEE PLAN AND PROFILE SHEETS FOR ADDITIONAL INFORMATION.

③ SEE GRAVEL ACCESS ROAD SECTION DETAIL ON SHEET D01.

④ ROCK-LINED CHANNEL PER DETAIL ON SHEET D01.

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

SOUTH ABUTMENT GRADING AND STORM FACILITIES PLAN

PROJECT NUMBER
CRP20-02

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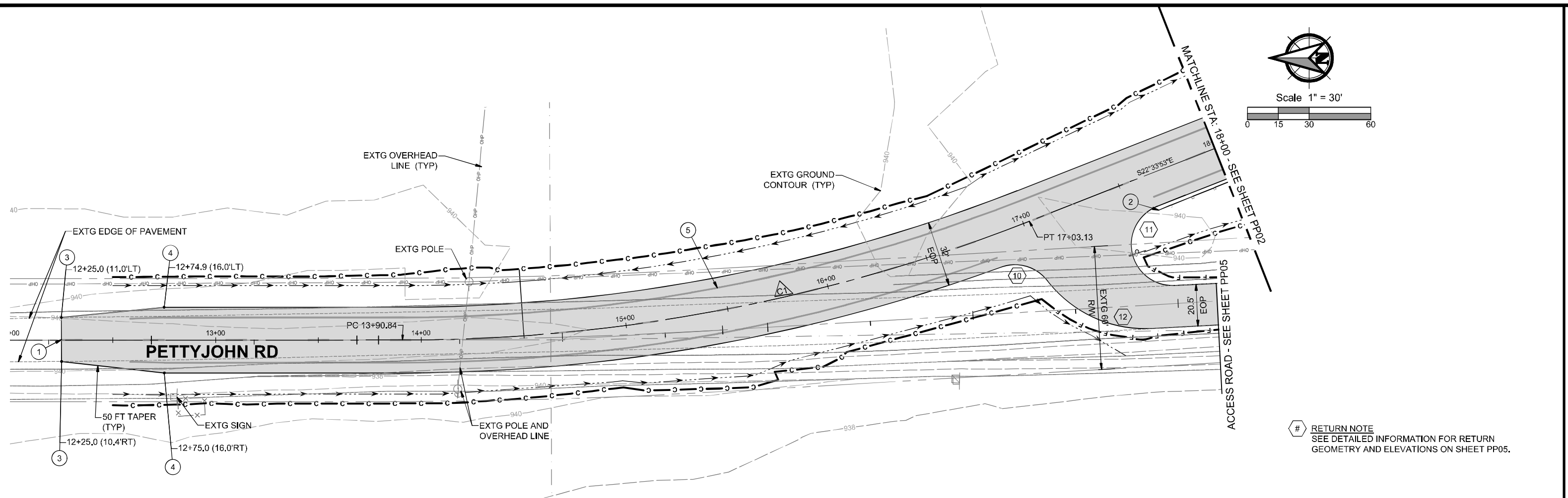

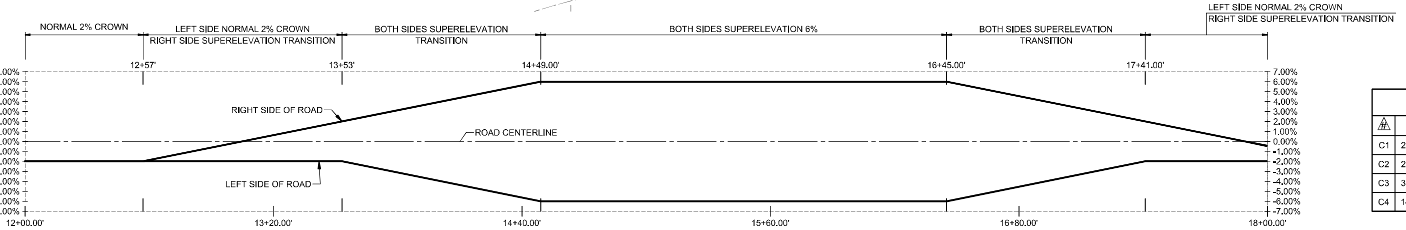

CURVE DATA				
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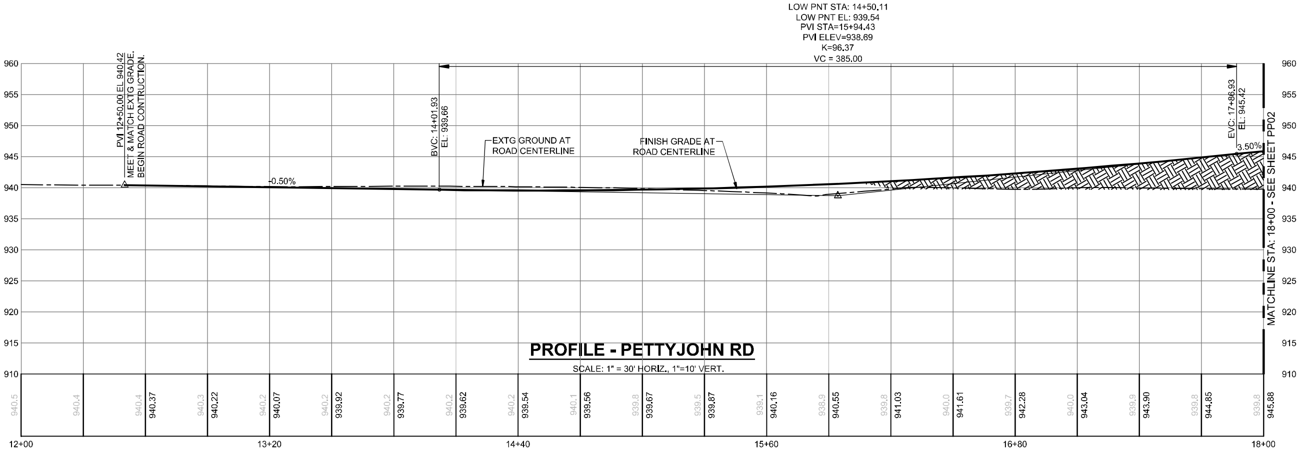
C1	21°28'48"	833.00	312.29	158.00
C2	21°32'12"	833.00	313.11	158.43
C3	33°50'56"	155.00	91.57	47.16
C4	14°45'17"	200.00	51.50	25.90



PROFILE - PETTYJOHN RD

SCALE: 1" = 30' HORIZ., 1"=10' VERT.

GENERAL CONSTRUCTION NOTES:

1. SEE SHEET GN01 FOR TYPICAL ROAD SECTIONS.
2. INSTALL SURVEY MONUMENTS AT ALL CENTERLINE STREET INTERSECTIONS, CENTER POINTS, AND PT / PC GEOMETRY POINTS PER WALLA WALLA COUNTY STANDARD PLAN R-12.

KEYED GRADING NOTES

① STA: 12+25.00 (0.0' LT/RT) - BEGIN ROADWAY IMPROVEMENTS. SAW-CUT A MINIMUM OF 2' FROM EXISTING EDGE OF ASPHALT PROVIDING A NEAT VERTICAL EDGE AND REMOVE CUT-OFF PORTION OF EXISTING PAVEMENT FOR NEW CONSTRUCTION AND UTILITIES. MATCH EDGE OF NEW ASPHALT TO EXISTING PROVIDING A SMOOTH TRANSITION.

② STA: 17+63.40 (18' RT) - BEAM GUARDRAIL TYPE 31 NON-FLARED TERMINAL TYPE MSKT-SP-MGS PER WSDOT STD PLAN C22.40

③ BEGIN TAPER FROM EXISTING ROAD TO STANDARD ROADWAY SECTION.

④ END TAPER. BEGIN TYPICAL 32' ROAD SECTION. SEE SHEET GN01.

⑤ SEE SIGNING AND STRIPING FOR INFORMATION AND DETAILS.

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

PETTY JOHN ROAD PLAN/PROFILE SHEET

PROJECT NUMBER
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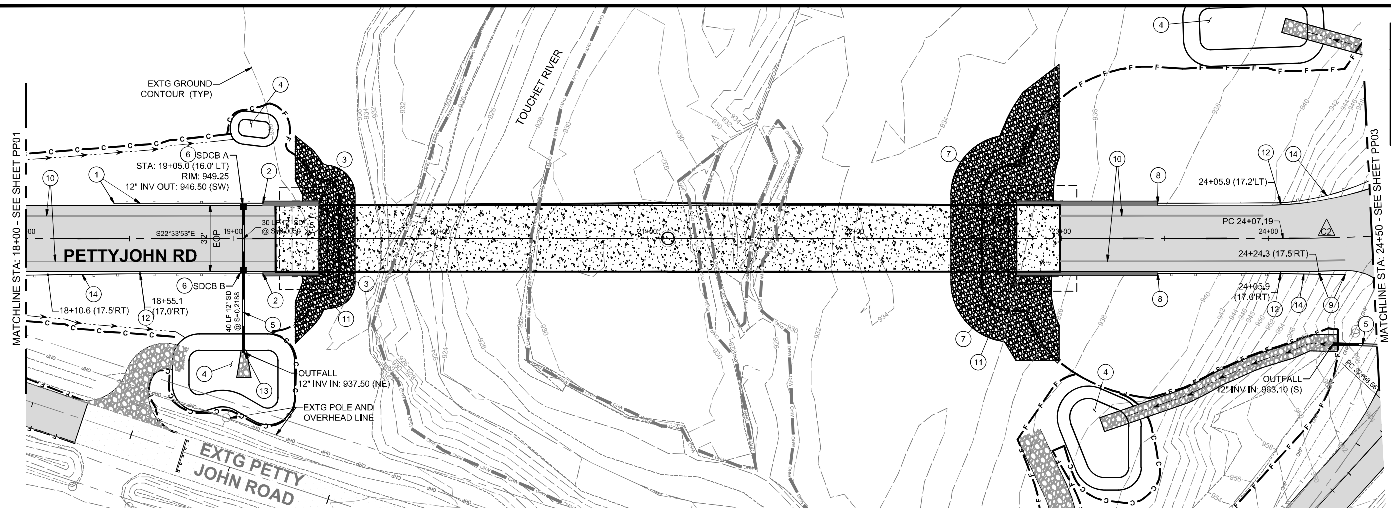

CURVE DATA				
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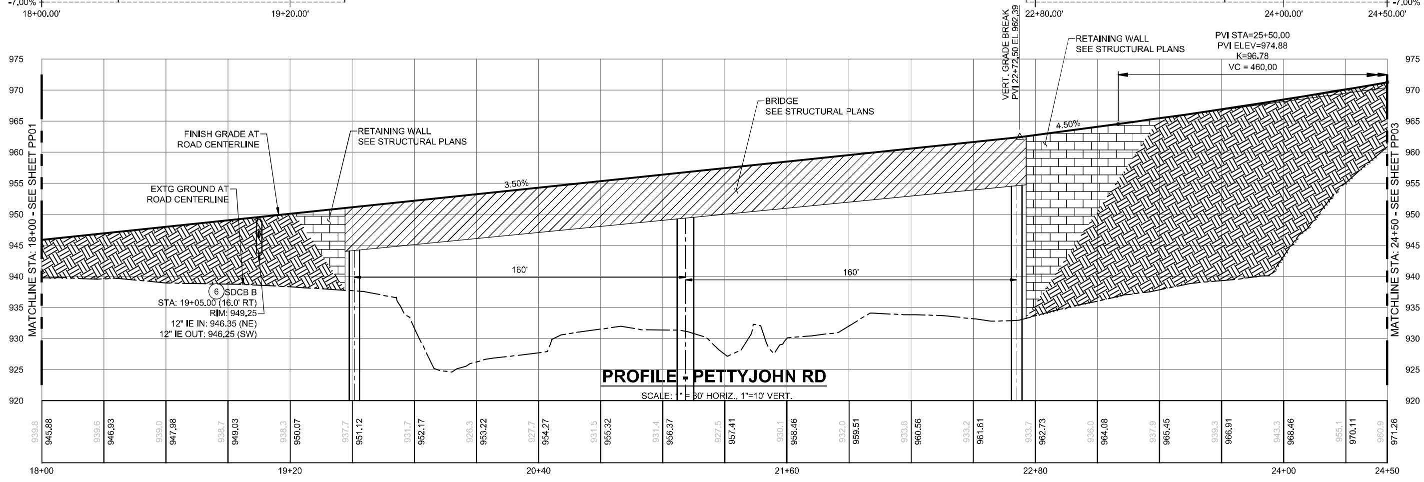
C1	21°28'48"	833.00	312.29	158.00
C2	21°32'12"	833.00	313.11	158.43
C3	33°50'56"	155.00	91.57	47.16
C4	14°45'17"	200.00	51.50	25.90

Scale 1" = 30'

0 15 30 60



PROFILE - PETTYJOHN RD

SCALE: 1" = 30' HORIZ., 1"=10' VERT.

GENERAL CONSTRUCTION NOTES:

1. SEE SHEET GN01 FOR TYPICAL ROAD SECTIONS.

2. INSTALL SURVEY MONUMENTS AT ALL CENTERLINE STREET INTERSECTIONS, CENTER POINTS, AND PT / PC GEOMETRY POINTS PER WALLA WALLA COUNTY STANDARD PLAN R-12.

KEYED GRADING NOTES

① STA: 18+42.6 (17.0' LT) - BEAM GUARDRAIL ANCHOR TYPE 10 PER WSDOT STD PLAN C23.60. CONNECT TO TRANSITION SECTION.

② STA: 19+14.50 (17.0' LT/RT) - END BEAM GUARDRAIL WITH TRANSITION TYPE 21 PER WSDOT STD PLAN C25.20. CONNECT TO SINGLE SLOPE BARRIER PER WSDOT STD PLAN C24.10 TYPE D CONNECTION.

③ STA: 19+41.50 (17.0' LT/RT) - END SINGLE SLOPE CONCRETE BARRIER, TRANSITION TO BRIDGE SECTION.

④ APPROXIMATE LOCATION OF STORMWATER FACILITIES/SWALE. SEE SHEET GR03 AND GR04 FOR DETAILS.

⑤ 12" CMP STORM PIPE.

⑥ TYPE 1 CATCH BASIN PER WSDOT STD PLAN B-5.20-03.

⑦ STA: 22+78.50 (17.0' LT/RT) - START SINGLE SLOPE CONCRETE BARRIER, TRANSITION FROM BRIDGE SECTION.

⑧ STA: 23+46.50 (17.0 LT/RT) - END SINGLE SLOPE CONCRETE BARRIER, BEGIN BEAM GUARDRAIL TRANSITION TYPE 21 PER WSDOT STD PLAN C25.20. TRANSITION TO GUARDRAIL PER WSDOT STD PLAN C24.10, TYPE D CONNECTION.

⑨ STA: 24+36.50 (18.0' RT) - END BEAM GUARDRAIL WITH ANCHOR TYPE 10, PER WSDOT STD PLAN C23.60.

⑩ SEE SIGNING AND STRIPING FOR INFORMATION AND DETAILS.

⑪ SEE SHEET DR01 FOR RIPRAP AROUND BRIDGE ABUTMENT.

⑫ END TRANSITION TYPE 21, BEGIN BEAM GUARDRAIL TYPE 31 PER WSDOT STD PLAN C-20.10.

⑬ STORM OUTFALL TO INFILTRATION SWALE. SEE SHEET GR03 AND GR04.

⑭ INSTALL BEAM GUARDRAIL TYPE 31 PER WSDOT STD PLAN C20.10 BETWEEN STATIONS INDICATED. CONNECT TO SPECIFIED ANCHOR OR TRANSITION SECTION AT EACH END.

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

PETTY JOHN ROAD PLAN/PROFILE SHEET

PROJECT NUMBER
CRP20-02

SHEET
PP02

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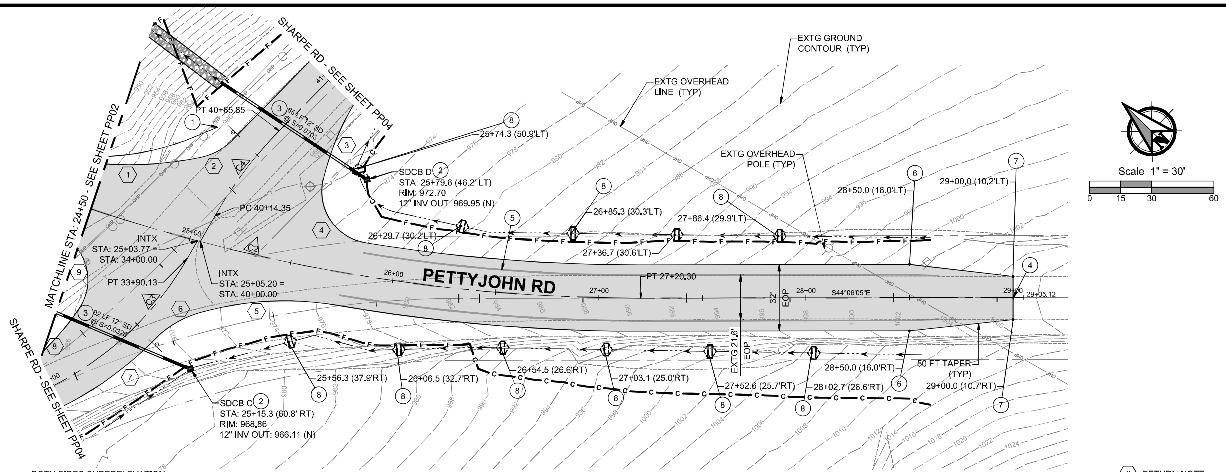

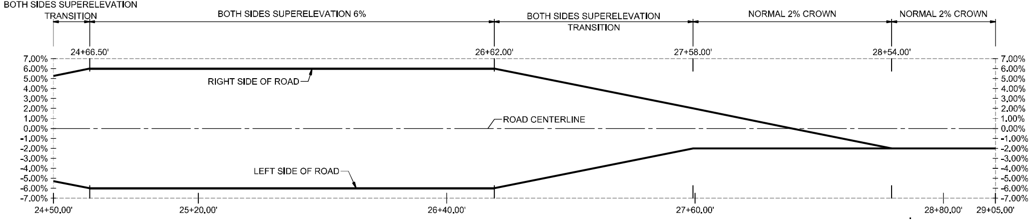

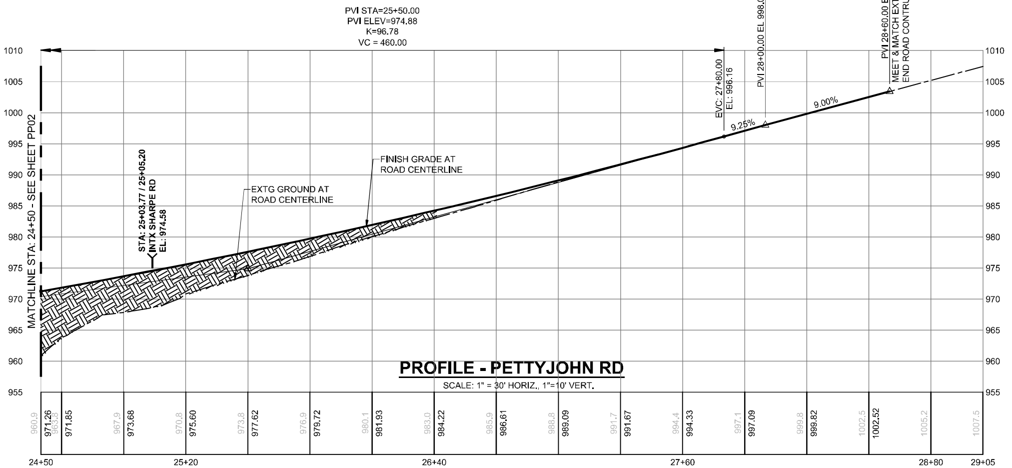

PROFILE - PETTYJOHN RD

SCALE: 1" = 30' HORIZ., 1"=10' VERT.

GENERAL CONSTRUCTION NOTES:

1. SEE SHEET GN01 FOR TYPICAL ROAD SECTIONS.
2. INSTALL SURVEY MONUMENTS AT ALL CENTERLINE STREET INTERSECTIONS, CENTER POINTS, AND PT / PC GEOMETRY POINTS PER WALLA WALLA COUNTY STANDARD PLAN R-12.

KEYED GRADING NOTES

① STA: 24+98.78 (55.42' LT) - END BEAM GUARDRAIL WITH ANCHOR TYPE 10, PER WSDOT STD PLAN C23.60.

② DROP INLET TYPE 1 PER WSDOT STANDARD PAN B-45.20.

③ 12" CMP STORM PIPE.

④ STA: 29+00.00 (0.0' LT/RT) - END ROADWAY IMPROVEMENTS. SAW-CUT A MINIMUM OF 2' FROM EXISTING EDGE OF ASPHALT PROVIDING A NEAT VERTICAL EDGE AND REMOVE CUT-OFF PORTION OF EXISTING PAVEMENT FOR NEW CONSTRUCTION AND UTILITIES. MATCH EDGE OF NEW ASPHALT TO EXISTING PROVIDING A SMOOTH TRANSITION.

⑤ SEE SIGNING AND STRIPING FOR INFORMATION AND DETAILS.

⑥ BEGIN TAPER. END OF TYPICAL 32' ROAD SECTION.

⑦ END TAPER. MEET AND MATCH EXISTING END OF PAVEMENT.

⑧ INSTALL CHECK DAM PER WALLA WALLA COUNTY STANDARD PLAN R-11.

⬡# RETURN NOTE
SEE DETAILED INFORMATION FOR RETURN GEOMETRY AND ELEVATIONS ON SHEET PP05.

CURVE DATA

#	Δ	R	L	T
C3	33°50'56"	155.00	91.57	47.16
C4	14°45'17"	200.00	51.50	25.90
C1	21°28'48"	833.00	312.29	158.00
C2	21°32'12"	833.00	313.11	158.43

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

PETTY JOHN ROAD PLAN/PROFILE SHEET

PROJECT NUMBER
CRP20-02

SHEET
PP03

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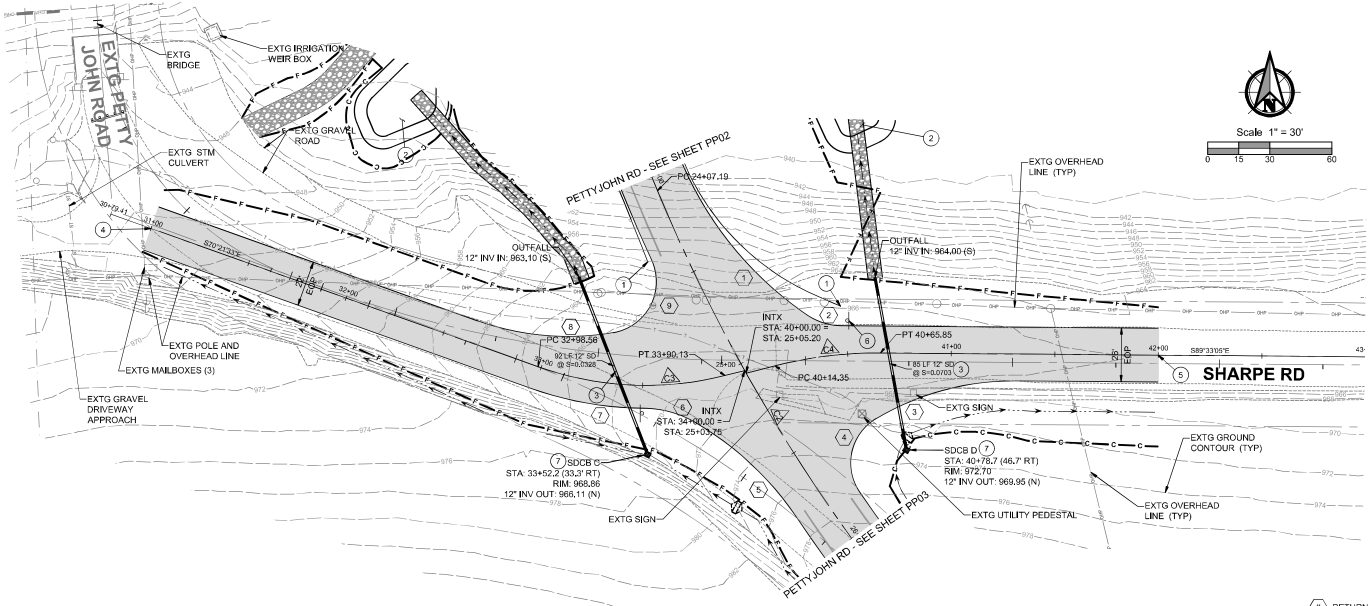

CURVE DATA				
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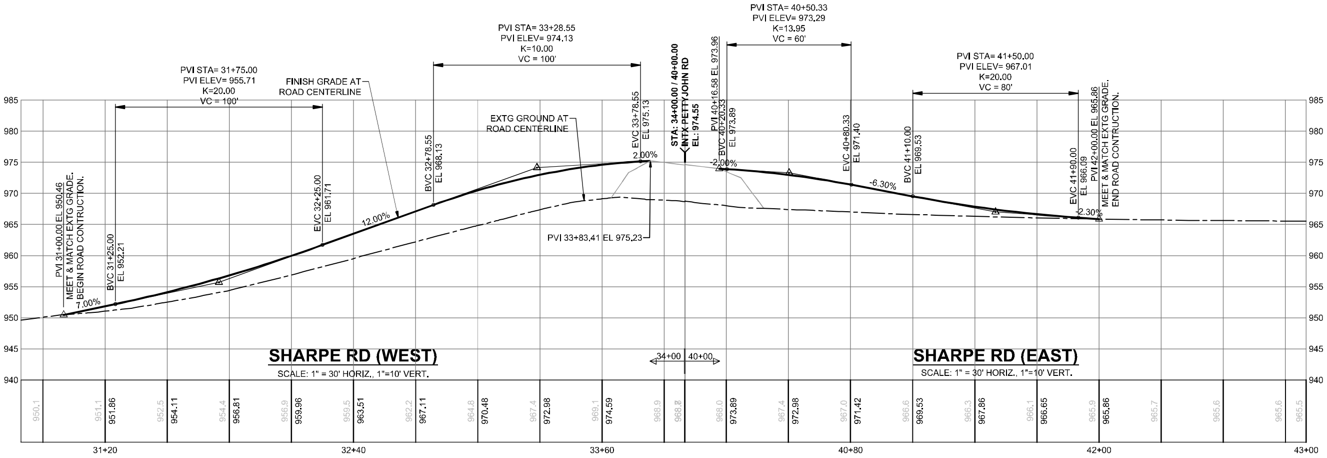
C3	33°50'56"	155.00	91.57	47.16
C1	21°28'48"	833.00	312.29	158.00
C2	21°32'12"	833.00	313.11	158.43

\# RETURN NOTE
SEE DETAILED INFORMATION FOR RETURN GEOMETRY AND ELEVATIONS ON SHEET PP05.



GENERAL CONSTRUCTION NOTES:

1. SEE SHEET GN01 FOR TYPICAL ROAD SECTIONS.
2. INSTALL SURVEY MONUMENTS AT ALL CENTERLINE STREET INTERSECTIONS, CENTER POINTS, AND PT / PC GEOMETRY POINTS PER WALLA WALLA COUNTY STANDARD PLAN R-12.

KEYED GRADING NOTES

① GUARDRAIL - SEE PETTY JOHN ROAD PLAN AND PROFILE SHEETS FOR DETAILS.

② APPROXIMATE LOCATION OF STORMWATER FACILITIES/SWALE. SEE SHEET GR03 AND GR04 FOR DETAILS.

③ 12" CMP STORM PIPE

④ STA: 31+00.00 (0.0' LT/RT) - BEGIN ROADWAY IMPROVEMENTS, TRANSITION TO EXISTING ASPHALT ROAD.

⑤ STA: 42+00.00 (0.0' LT/RT) - END ROADWAY IMPROVEMENTS, TRANSITION TO EXISTING GRAVEL ROAD.

⑥ SEE SIGNING AND STRIPING FOR INFORMATION AND DETAILS.

⑦ DROP INLET TYPE 1 PER WSDOT STANDARD PLAN B-45.20-01.

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

SHARPE ROAD PLAN/PROFILE SHEET AND INTERSECTION GEOMETRY SHEET

PROJECT NUMBER
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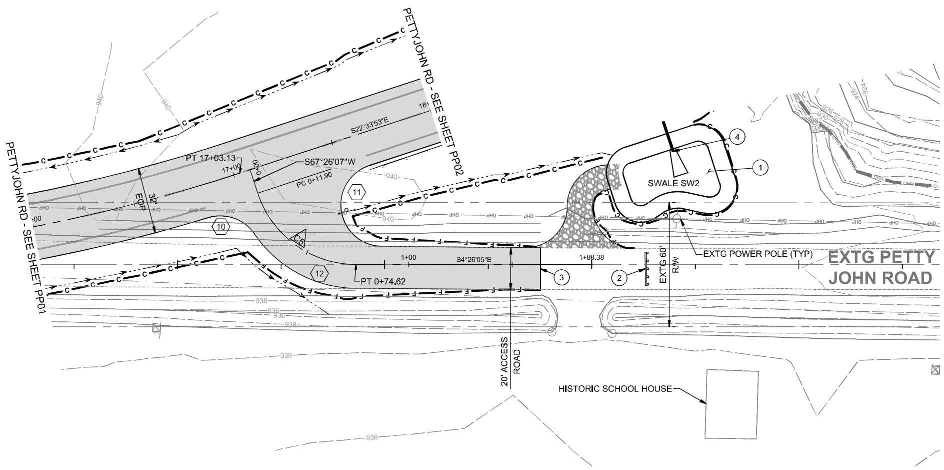


Scale 1" = 30'

0 15 30 60

CURVE DATA

#	Δ	R	L	T
C5	71°52'12"	50.00	62.72	36.24

GENERAL CONSTRUCTION NOTES:

1. SEE SHEET GN01 FOR TYPICAL ROAD SECTIONS.
2. INSTALL SURVEY MONUMENTS AT ALL CENTERLINE STREET INTERSECTIONS, CENTER POINTS, AND PT / PC GEOMETRY POINTS PER WALLA WALLA COUNTY STANDARD PLAN R-12.

KEYED GRADING NOTES

① STORM SWALE - SEE SHEETS GR03 AND D01 FOR ADDITIONAL INFORMATION

② SEE SIGNING AND STRIPING FOR INFORMATION AND DETAILS.

③ STA: 1+63.64 (0.0' LT/RT) - END ROADWAY IMPROVEMENTS. SAW-CUT A MINIMUM OF 2' FROM EXISTING EDGE OF ASPHALT PROVIDING A NEAT VERTICAL EDGE AND REMOVE CUT-OFF PORTION OF EXISTING PAVEMENT FOR NEW CONSTRUCTION AND UTILITIES. MATCH EDGE OF NEW ASPHALT TO EXISTING PROVIDING A SMOOTH TRANSITION.

④ STORM OUTFALL TO INFILTRATION SWALE. SEE SHEET GR03 AND PP02.

PETTYJOHN & SHARPE ROAD (EAST) RETURN DATA

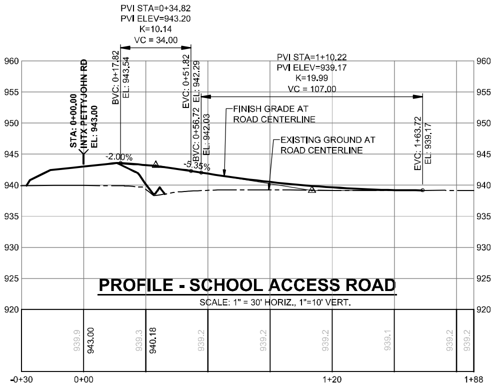
RETURN I.D.	DELTA	RADIUS	LENGTH	EDGE OF PAVEMENT (EOP) DATA (CLOCKWISE)		
				SCR STA AND ELEV	MID PNT EOP EL	ECR STA AND ELEV
1	90°00'00"	28.00'	43.98'	1+48.38, 21.50'R 1316.32	1315.56	21+11.15, 21.50'L 1314.81
2	90°00'00"	28.00'	43.98'	21+11.15, 21.50'R 1314.81	1315.04	2+47.38, 21.50'R 1315.28
3	90°00'00"	28.00'	43.98'	21+11.15, 21.50'R 1314.81	1315.04	2+47.38, 21.50'R 1315.28
4	90°00'00"	28.00'	43.98'	21+11.15, 21.50'R 1314.81	1315.04	2+47.38, 21.50'R 1315.28

PETTYJOHN & SHARPE ROAD (WEST) RETURN DATA

RETURN I.D.	DELTA	RADIUS	LENGTH	EDGE OF PAVEMENT (EOP) DATA (CLOCKWISE)		
				SCR STA AND ELEV	MID PNT EOP EL	ECR STA AND ELEV
5	90°00'00"	28.00'	43.98'	1+48.38, 21.50'R 1316.32	1315.56	21+11.15, 21.50'L 1314.81
6	90°00'00"	28.00'	43.98'	21+11.15, 21.50'R 1314.81	1315.04	2+47.38, 21.50'R 1315.28
7	90°00'00"	28.00'	43.98'	21+11.15, 21.50'R 1314.81	1315.04	2+47.38, 21.50'R 1315.28
8	90°00'00"	28.00'	43.98'	21+11.15, 21.50'R 1314.81	1315.04	2+47.38, 21.50'R 1315.28
9	90°00'00"	28.00'	43.98'	21+11.15, 21.50'R 1314.81	1315.04	2+47.38, 21.50'R 1315.28

PETTYJOHN &ACCESS ROAD RETURN DATA

RETURN I.D.	DELTA	RADIUS	LENGTH	EDGE OF PAVEMENT (EOP) DATA (CLOCKWISE)		
				SCR STA AND ELEV	MID PNT EOP EL	ECR STA AND ELEV
10	90°00'00"	28.00'	43.98'	1+48.38, 21.50'R 1316.32	1315.56	21+11.15, 21.50'L 1314.81
11	90°00'00"	28.00'	43.98'	21+11.15, 21.50'R 1314.81	1315.04	2+47.38, 21.50'R 1315.28
12	90°00'00"	28.00'	43.98'	21+11.15, 21.50'R 1314.81	1315.04	2+47.38, 21.50'R 1315.28



PROFILE - SCHOOL ACCESS ROAD

SCALE: 1" = 30' HORIZ., 1"=10' VERT.

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

SCHOOL ACCESS ROAD PLAN/PROFILE SHEET

PROJECT NUMBER
CRP20-02

SHEET
PP05

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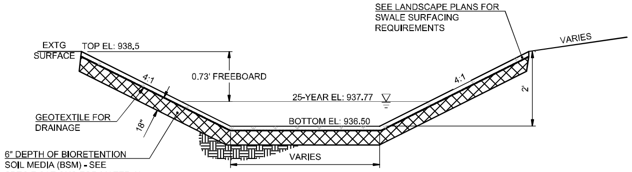
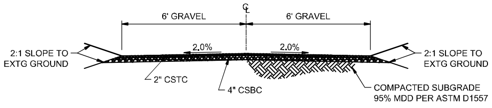


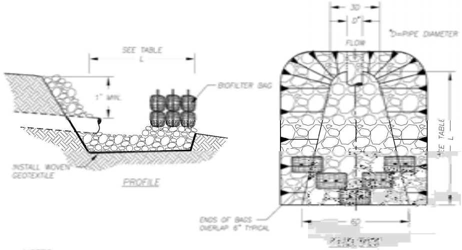
BIORETENTION SWALE SW2

NTS



GRAVEL ROAD SECTION DETAIL

NTS



NOTES:

1. BIO-BAGS ONLY REQUIRED WHEN DISCHARGING SEDIMENT LADEN WATER. [illegible] EITHER METHOD USING (2) 1"x2" WOOD STAKES OR APPROVED EQUAL PER BAG.
2. RIP-RAP SIZING GOVERNED BY THE SIDE SLOPES ON THE OUTLET CHANNEL, ASSUMED TO BE 3:1.
3. PLACE WOVEN GEOTEXTILE ALONG BOTTOM AND SIDE SLOPES TO CROWN OF PIPE, AND INSTALL ROCK TO 1" ABOVE PIPE CROWN ALONG BOTH SIDES OF CHANNEL.
4. RIP-RAP SHALL BE IN ACCORDANCE WITH SECTION 9-13.1 OF THE WSDOT STANDARD SPECIFICATIONS. RIP-RAP ROCK SIZE SHALL BE AS SHOWN IN THE TABLE BELOW.
5. RIP-RAP SHALL BE HAND LAID AND REASONABLY GRADED.
6. INSPECT ONCE PER WEEK ON ACTIVE SITES, ONCE EVERY TWO WEEKS ON INACTIVE SITES, AND WITHIN 24 HOURS FOLLOWING A 0.5 INCH RAIN EVENT.
7. IF THERE IS SCOURING AT THE OUTLET, PROTECT THE ERODED AREA BY INCREASING THE SIZE OF THE ENERGY DISSIPATOR FACILITY.
8. REMOVE ACCUMULATED SEDIMENT FREQUENTLY.
9. USE THIS DETAIL FOR OUTLET PROTECTION AS A MINIMUM. CONSIDER SITE CONDITIONS TO DETERMINE IF A MORE COMPLEX ENERGY DISSIPATOR MAY BE REQUIRED.

DISCHARGE VELOCITY AT DESIGN FLOW (FPS)	REQUIRED PROTECTION MINIMUM DIMENSIONS	
	TYPE	LENGTH (L)
0 TO <5	RIP-RAP*	8' OR 3D (WHICHEVER IS GREATER)
5 TO <10	RIP-RAP**	12' OR 4D (WHICHEVER IS GREATER)
[illegible]	[illegible]	[illegible]
>20	ENGINEERED ENERGY DISSIPATOR REQUIRED	

* 8" MAXIMUM, 6" MEDIAN, 2" MINIMUM
** 24" MAXIMUM, 15" MEDIAN, 4" MINIMUM

RIPRAP/ PIPEOUT FALL DETAIL

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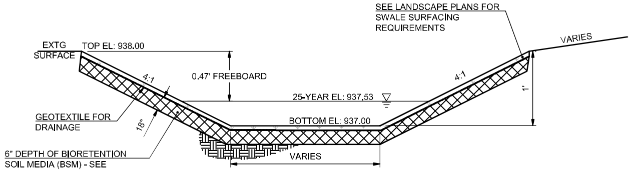

BIORETENTION SWALE SW3

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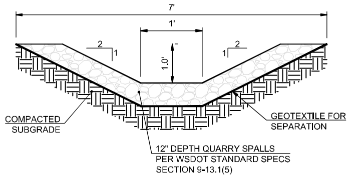
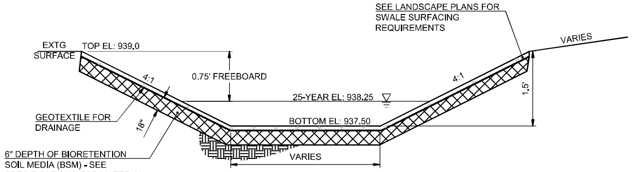


ROCK-LINED CHANNEL SECTION DETAIL

NTS



BIORETENTION SWALE SW5

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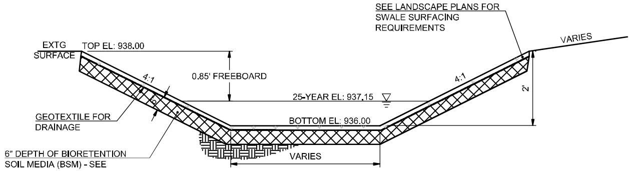

BIORETENTION SWALE SW6

NTS

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

CIVIL DETAILS

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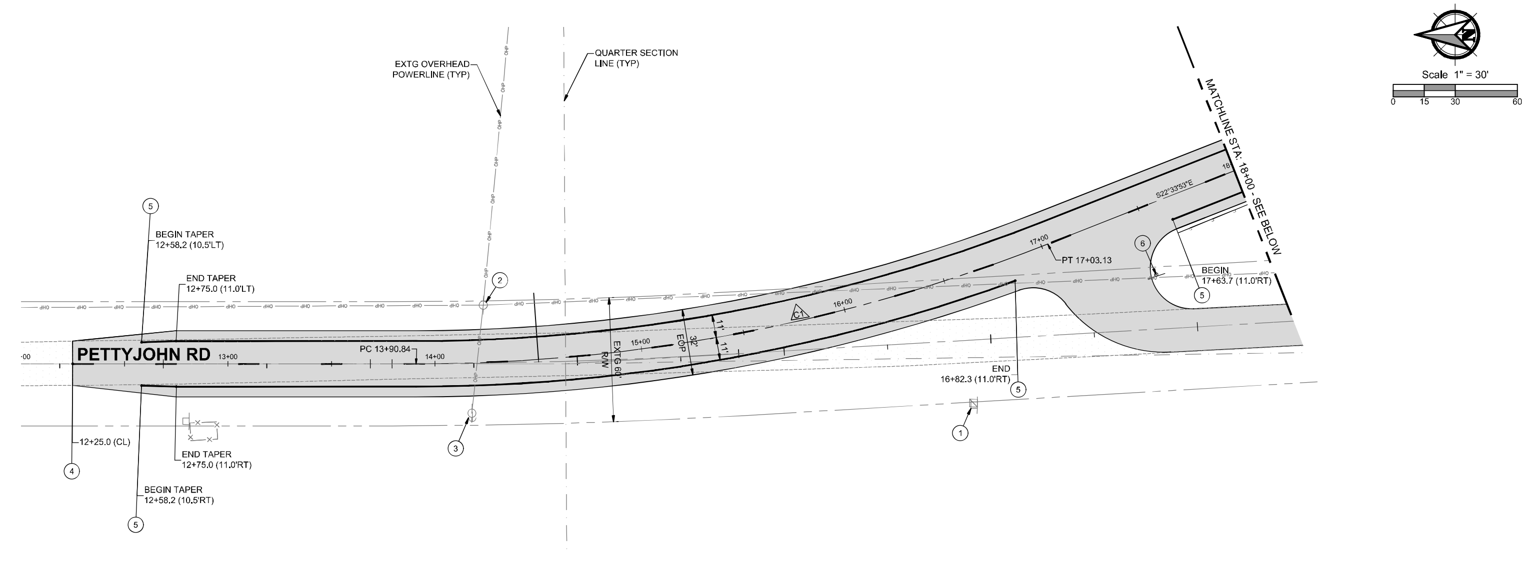

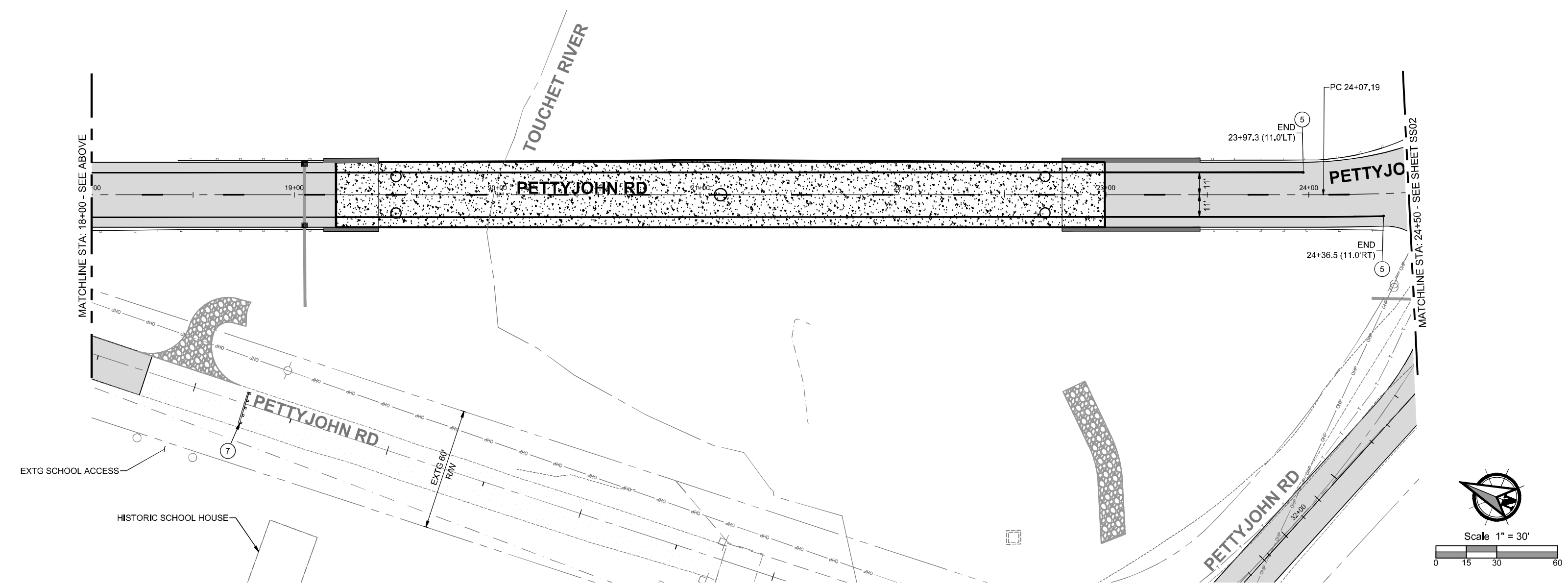

CONSTRUCTION NOTES:

SEE SHEET GN01 TYPICAL ROAD SECTIONS

SIGNING & STRIPING NOTES:

① RELOCATE AND REPLACE EXISTING SIGN.

② PROTECT EXISTING UTILITY POLE.

③ RELOCATE AND REPLACE EXISTING UTILITY POLE, BY OTHERS. LOCATIONS ARE APPROXIMATE AND WILL BE RESOLVED IN THE FIELD BY UTILITY DURING CONSTRUCTION.

④ 4" YELLOW CENTERLINE PER WSDOT STANDARD PLAN M-20.10

⑤ 4" WHITE EDGE LINE PER WSDOT STANDARD PLAN M-20.10

⑥ INSTALL STOP SIGN AND STREET NAME SIGN PER WALLA WALLA COUNTY STANDARD PLAN R-13.

⑦ MUTCD TYPE 3 BARRICADE.

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

SIGNING AND STRIPING PLAN

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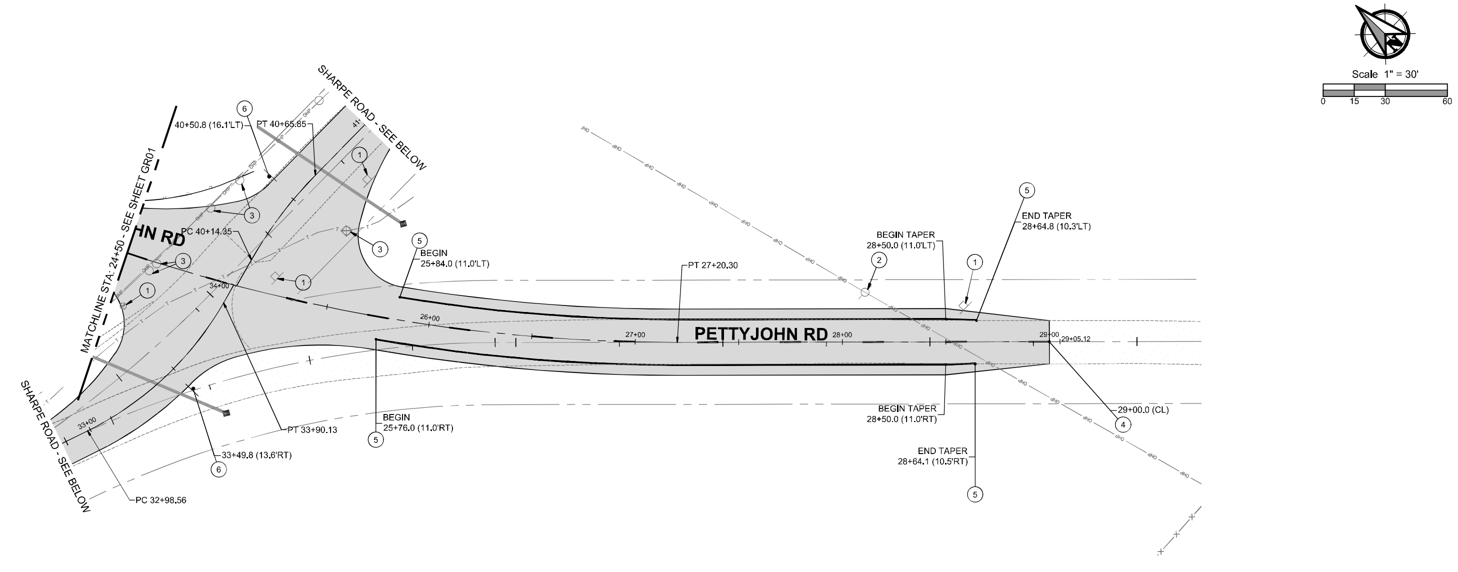

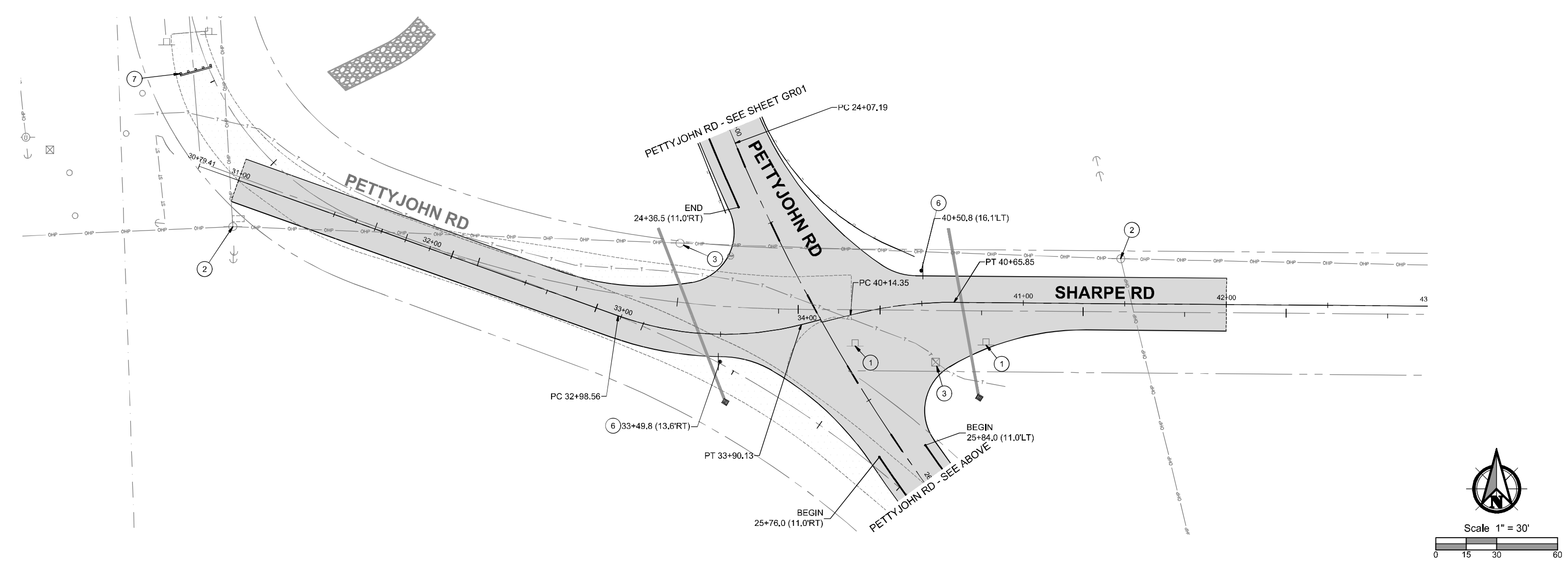

CONSTRUCTION NOTES:

SEE SHEET GN01 FOR TYPICAL ROAD SECTIONS.

SIGNING & STRIPING NOTES:

① REMOVE AND RELOCATE EXISTING SIGN.

② PROTECT EXISTING UTILITY POLE.

③ RELOCATE AND REPLACE EXISTING UTILITY BOX/POLE, BY OTHERS. LOCATIONS ARE APPROXIMATE AND WILL BE RESOLVED BY FRANCHISE UTILITY DURING CONSTRUCTION.

④ 4" YELLOW CENTERLINE PER WSDOT STANDARD PLAN M-20.10.

⑤ 4" WHITE EDGE LINE PER WSDOT STANDARD PLAN M-20.10.

⑥ INSTALL STOP SIGN AND STREET NAME SIGN PER WALLA WALLA COUNTY STANDARD PLAN R-13.

⑦ MUTCD TYPE 3 BARRICADE.

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SIGNING AND STRIPING PLAN

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GENERAL SHEET NOTES

1. SEE SHEET SP03 FOR GENERAL NOTES AND DETAILS.

SOIL PREPARATION & SEEDING NOTES

① MITIGATION AREA - SEE PREPARATION WORK DETAIL

② SEEDING AREA PREPARATION PER STANDARD SPECIFICATION 8-02.3(5)A.

③ 6" DEPTH OF TOPSOIL TYPE 'B' PER STANDARD SPECIFICATIONS 8-02.3(4)A AND SPECIAL PROVISIONS.

④ 3" DEPTH OF FINE COMPOST PER STANDARD SPECIFICATIONS 8-02.3(6).

⑤ SEEDING, FERTILIZING AND MULCHING - SITE UPLAND PER STANDARD SPECIFICATION 8-02.3(9) AND SPECIAL PROVISIONS.

⑥ SEEDING, FERTILIZING AND MULCHING - SITE MITIGATION PER STANDARD SPECIFICATION 8-02.3(9) AND SPECIAL PROVISIONS.

⑦ BARK OR WOOD MULCH RINGS PER STANDARD SPECIFICATIONS 8-02.3(11)C. ONE RING PER TREE OR SHRUB. SEE RESTORATION PLANS.

SEEDING LEGEND

⁘	SEEDING, FERTILIZING AND MULCHING - SITE UPLAND
▨	SEEDING, FERTILIZING AND MULCHING - SITE MITIGATION

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

NORTH SOIL PREPARATION & SEEDING PLAN

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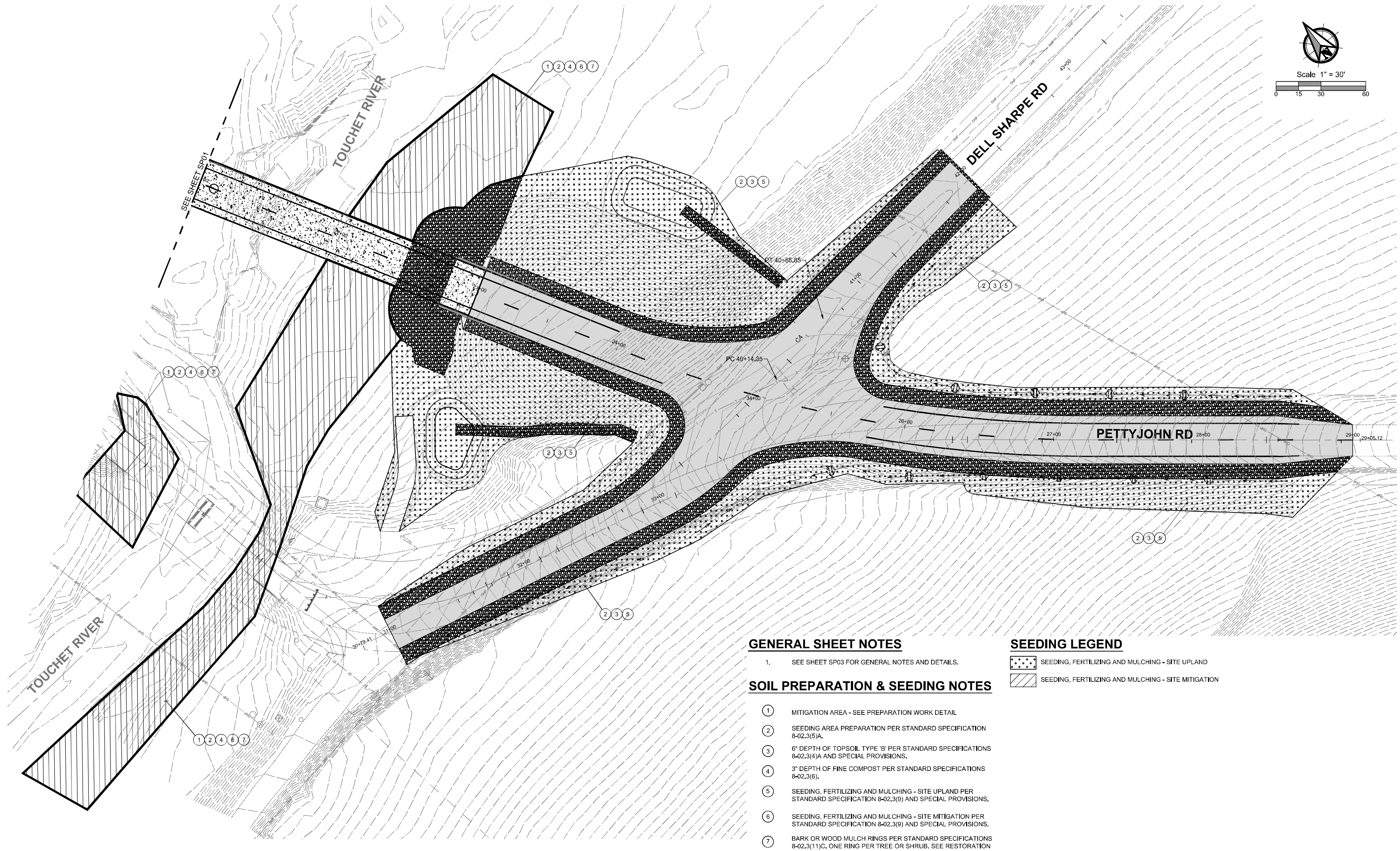

GENERAL SHEET NOTES

1. SEE SHEET SP03 FOR GENERAL NOTES AND DETAILS.

SOIL PREPARATION & SEEDING NOTES

① MITIGATION AREA - SEE PREPARATION WORK DETAIL

② SEEDING AREA PREPARATION PER STANDARD SPECIFICATION 8-02.3(5)A.

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⑥ SEEDING, FERTILIZING AND MULCHING - SITE MITIGATION PER STANDARD SPECIFICATION 8-02.3(9) AND SPECIAL PROVISIONS.

⑦ BARK OR WOOD MULCH RINGS PER STANDARD SPECIFICATIONS 8-02.3(11)C. ONE RING PER TREE OR SHRUB. SEE RESTORATION PLANS.

SEEDING LEGEND

⁘	SEEDING, FERTILIZING AND MULCHING - SITE UPLAND
▨	SEEDING, FERTILIZING AND MULCHING - SITE MITIGATION

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SOUTH SOIL PREPARATION & SEEDING PLAN

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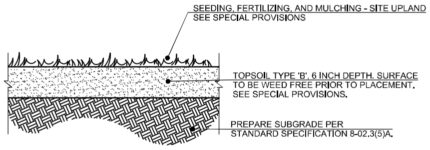
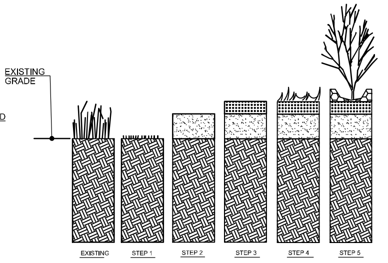


Topsoil and Seeding Cross Section - Upland

NOT TO SCALE



SEEDING AREA PREPARATION PER
SPECIFICATION 8-02.3(5)A

STEP 1
REMOVE ALL VEGETATION UNLESS
OTHERWISE FLAGGED BY THE ENGINEER
TO PRODUCE A BARE SOIL CONDITION.

STEP 2
APPLY UP TO 6 INCHES PF TOPSOIL TYPE 'B'
FOR MINOR GRADING FROM ANY DEMO WORK.

STEP 3
APPLY 3 INCH DEPTH OF FINE COMPOST.

STEP 4
APPLY SEEDING, FERTILLZING AND MULCHING -
SITE MITIGATION WITH LONG TERM MULCH.
SEE SPECIAL PROVISIONS FOR SEED MIX.

STEP 5
APPLY BARK OR WOOD MULCH RINGS PER
STANDARD SPECIFICATION 8-02.3(12) AT
EACH SHRUB OR TREE LOCATION.

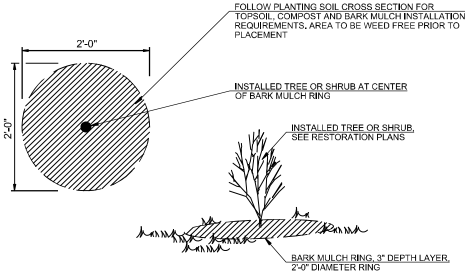
THIS DETAIL FOR ORDER OF WORK ONLY. ALL NECESSARY WORK SHALL BE APPLIED BY
THE APPROPRIATE PAY ITEM. LIMITS OF WORK SHALL BE STAKED IN FIELD.

Mitigation Area - Sequence of Work

NOT TO SCALE

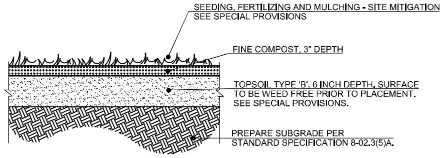
SEEDING LIST

BID ITEM	SYM	SPECIES MIX	PLS (by acre)	DESIRED % by WEIGHT	TOTAL QTY (acres)
SEEDING, FERTILIZING & MULCHING - SITE UPLAND	▒	*Elymus lanceolatus* Thickspike Wheatgrass	10.99	25%	2.16
		Festuca ovina var. covar Covar Sheep Fescue	2.74	25%	
		Poa ampla Sherman's Big Bluegrass	1.12	16%	
		Pseudoroengeria spicata Bluebunch Wheatgrass	8.26	16%	
		Poa canbyi Canby's Bluegrass	0.61	9%	
		Lupinus albicalus Sicklekeel Lupine	21.28	9%	
SEEDING, FERTILIZING & MULCHING - SITE MITIGATION	▨	*Elymus cinereus* Basin Wildrye	18.72	40%	0.74
		Elymus trachycaulus Slender Wheatgrass	7.65	20%	
		Elymus lanceolatus Thickspike Wheatgrass	8.57	20%	
		Pseudoroegneria spicata Bluebunch Wheatgrass	10.06	20%	



Bark or Wood Chip Mulch Ring Detail

NOT TO SCALE



Topsoil and Seeding Cross Section - Mitigation

NOT TO SCALE

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

SOIL PREPARATION & SEEDING DETAILS SHEET

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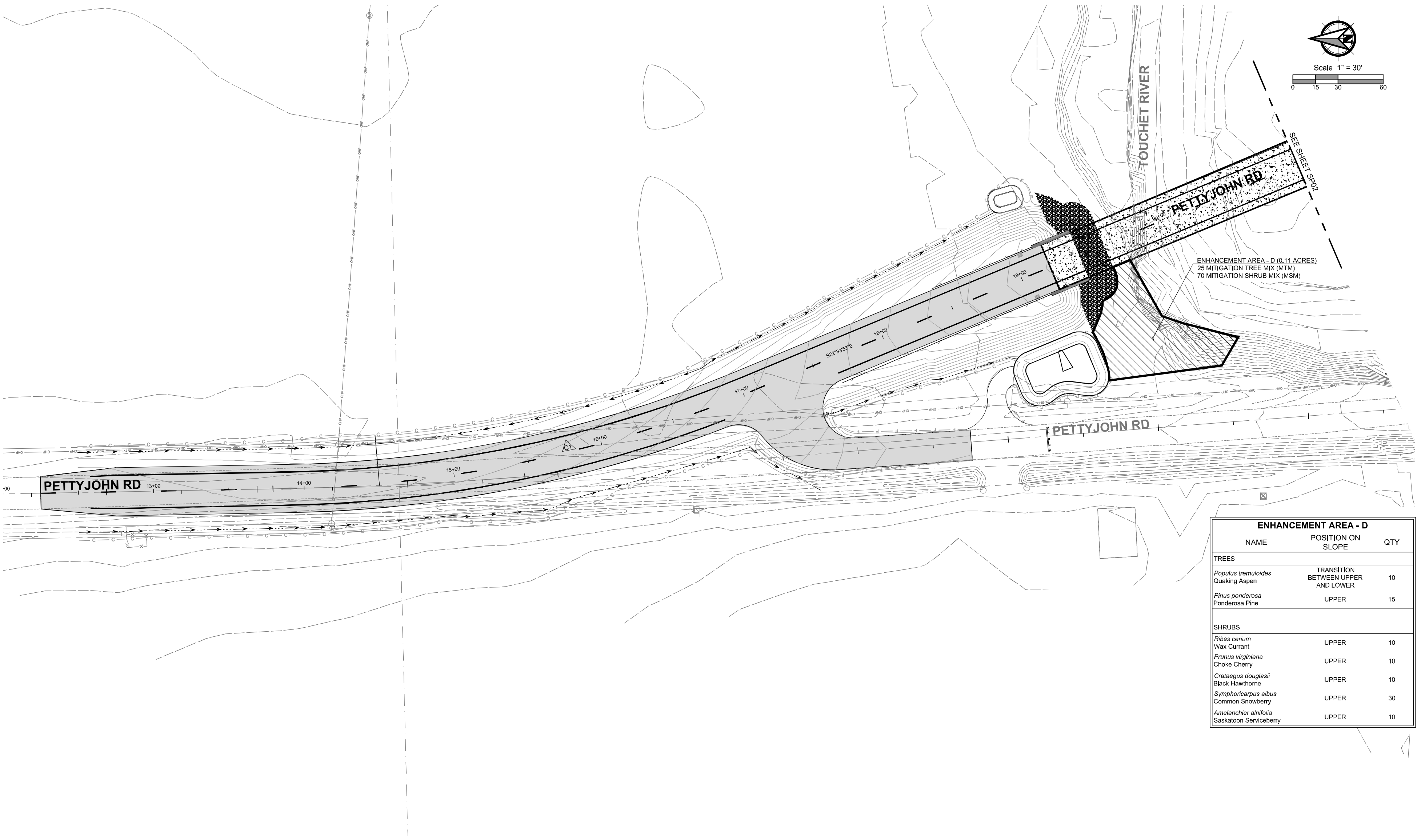

ENHANCEMENT AREA - D (0.11 ACRES)
25 MITIGATION TREE MIX (MTM)
70 MITIGATION SHRUB MIX (MSM)

ENHANCEMENT AREA - D

NAME	POSITION ON SLOPE	QTY
TREES		
Populus tremuloides Quaking Aspen	TRANSITION BETWEEN UPPER AND LOWER	10
Pinus ponderosa Ponderosa Pine	UPPER	15
SHRUBS		
Ribes cerium Wax Currant	UPPER	10
Prunus virginiana Choke Cherry	UPPER	10
Crataegus douglasii Black Hawthorne	UPPER	10
Symphoricarpus albus Common Snowberry	UPPER	30
Amelanchier alnifolia Saskatoon Serviceberry	UPPER	10

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

NORTH RESTORATION PLAN

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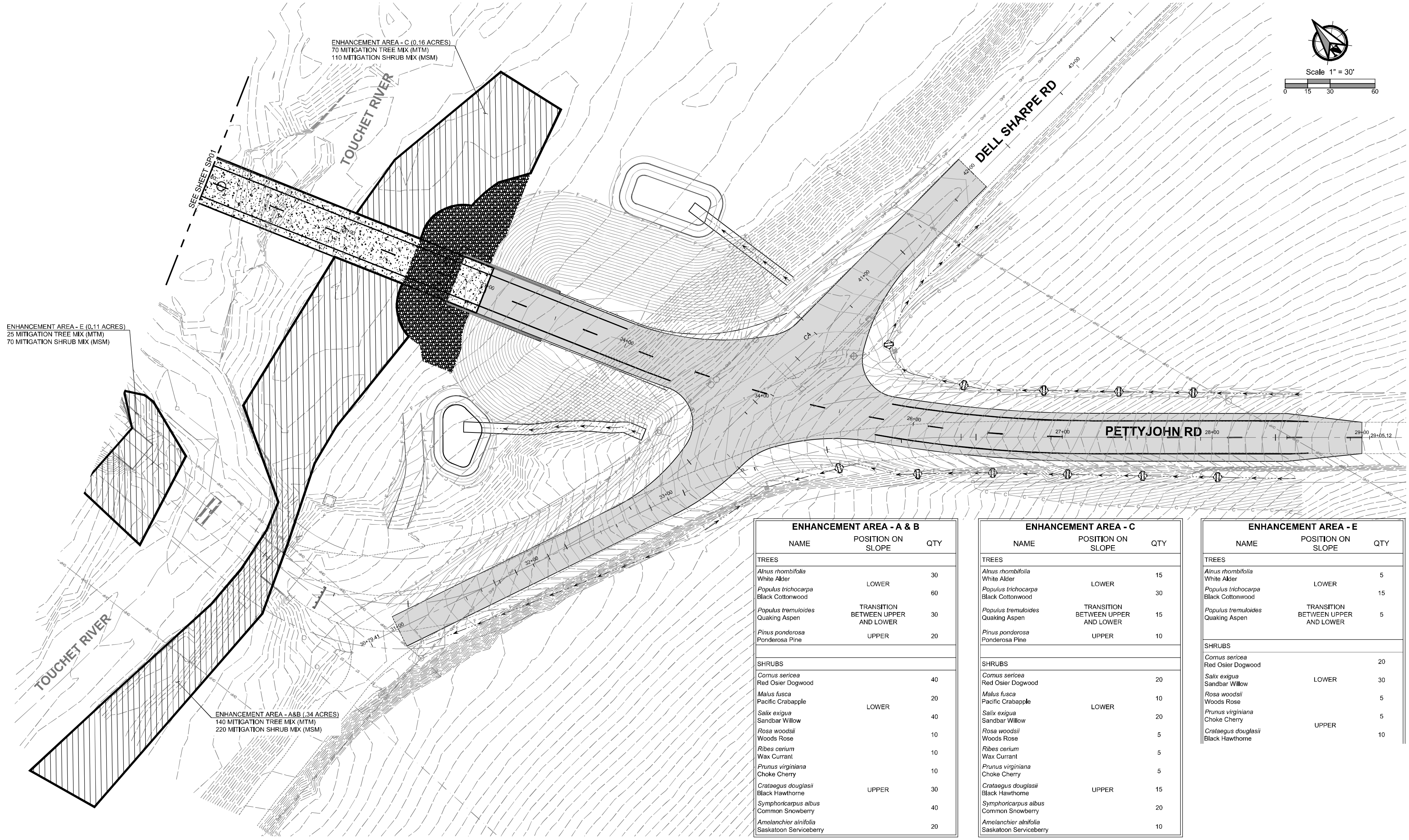

ENHANCEMENT AREA - A & B

NAME	POSITION ON SLOPE	QTY
TREES		
Alnus rhombifolia White Alder	LOWER	30
Populus trichocarpa Black Cottonwood		60
Populus tremuloides Quaking Aspen	TRANSITION BETWEEN UPPER AND LOWER	30
Pinus ponderosa Ponderosa Pine	UPPER	20
SHRUBS		
Cornus sericea Red Osier Dogwood	LOWER	40
Malus fusca Pacific Crabapple		20
Salix exigua Sandbar Willow		40
Rosa woodsii Woods Rose		10
Ribes cerium Wax Currant	UPPER	10
Prunus virginiana Choke Cherry		10
Crataegus douglasii Black Hawthorne		30
Symphoricarpus albus Common Snowberry		40
Amelanchier alnifolia Saskatoon Serviceberry		20

ENHANCEMENT AREA - C

NAME	POSITION ON SLOPE	QTY
TREES		
Alnus rhombifolia White Alder	LOWER	15
Populus trichocarpa Black Cottonwood		30
Populus tremuloides Quaking Aspen	TRANSITION BETWEEN UPPER AND LOWER	15
Pinus ponderosa Ponderosa Pine	UPPER	10
SHRUBS		
Cornus sericea Red Osier Dogwood	LOWER	20
Malus fusca Pacific Crabapple		10
Salix exigua Sandbar Willow		20
Rosa woodsii Woods Rose		5
Ribes cerium Wax Currant	UPPER	5
Prunus virginiana Choke Cherry		5
Crataegus douglasii Black Hawthorne		15
Symphoricarpus albus Common Snowberry		20
Amelanchier alnifolia Saskatoon Serviceberry		10

ENHANCEMENT AREA - E

NAME	POSITION ON SLOPE	QTY
TREES		
Alnus rhombifolia White Alder	LOWER	5
Populus trichocarpa Black Cottonwood		15
Populus tremuloides Quaking Aspen	TRANSITION BETWEEN UPPER AND LOWER	5
SHRUBS		
Cornus sericea Red Osier Dogwood	LOWER	20
Salix exigua Sandbar Willow		30
Rosa woodsii Woods Rose		5
Prunus virginiana Choke Cherry	UPPER	5
Crataegus douglasii Black Hawthorne		10

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

SOUTH RESTORATION PLAN

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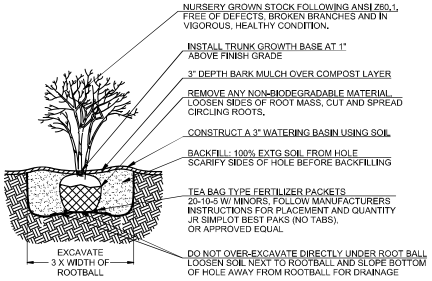
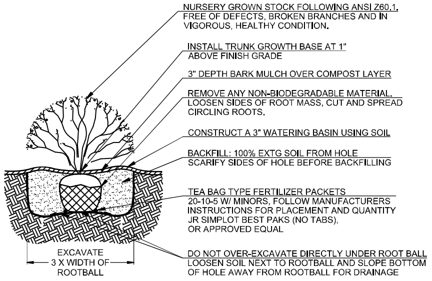


NOTE: THOROUGHLY WATER ENTIRE ROOTBALL REGARDLESS OF SEASON.

Tree Container Planting Detail

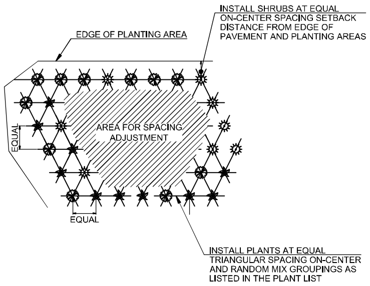
NOT TO SCALE



NOTE: THOROUGHLY WATER ENTIRE ROOTBALL REGARDLESS OF SEASON.

Shrub Container Planting Detail

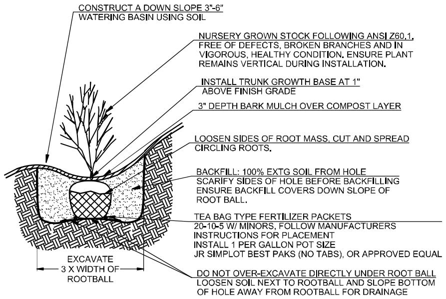
NOT TO SCALE



NOTE:
MAINTAIN THE OUTSIDE SETBACK DISTANCE THROUGHOUT ENTIRE PLANTING AREA, USING THE CENTER AREA FOR QUANTITY ADJUSTMENT.

Native Restoration Spacing Detail

NOT TO SCALE



NOTE: THOROUGHLY WATER ENTIRE ROOTBALL REGARDLESS OF SEASON.

Planting on Slope Detail

NOT TO SCALE

GENERAL NOTES:

1. REFER TO CIVIL ENGINEER'S DRAWINGS FOR PROPOSED UTILITY INFORMATION; INCLUDING STORM DRAIN, SEWER, WATER, ELECTRICAL, GAS, TELEPHONE AND CABLE.
2. REFER TO AGENCY STANDARD PLANS AND SPECIFICATIONS WHERE APPLICABLE.
3. CONTRACTOR SHALL BE RESPONSIBLE FOR THE LOCATING OF EXISTING UNDERGROUND UTILITIES, PIPES AND STRUCTURES. CONTRACTOR SHALL TAKE SOLE RESPONSIBILITY FOR ALL DAMAGES CAUSED AS A RESULT OF THEIR WORK.
4. CONTRACTOR SHALL NOT WILLFULLY PROCEED WITH CONSTRUCTION AS DESIGNED WHEN IT IS OBVIOUS THAT OBSTRUCTIONS, AREA DISCREPANCIES AND/OR GRADE DIFFERENCE EXIST THAT MAY NOT HAVE BEEN KNOWN DURING DESIGN. SUCH CONDITIONS SHALL BE IMMEDIATELY BROUGHT TO THE ATTENTION OF THE OWNER'S AUTHORIZED REPRESENTATIVE. THE CONTRACTOR SHALL ASSUME FULL RESPONSIBILITY FOR ALL NECESSARY REVISIONS DUE TO FAILURE TO GIVE SUCH NOTIFICATIONS.

PLANTING NOTES:

1. VERIFY LOCATIONS OF ALL PERTINENT SITE IMPROVEMENTS UNDER OTHER SECTIONS. IF ANY PART OF THIS PLAN CANNOT BE FOLLOWED DUE TO SITE CONDITIONS, CONTACT THE LANDSCAPE ARCHITECT FOR INSTRUCTION PRIOR TO COMMENCING WORK.
2. PRIOR TO INSTALLATION, CONTRACTOR SHALL PREPARE ALL SEEDING AND PLANTING AREAS ACCORDING TO THESE PLANS, DETAILS, SPECIFICATIONS AND THE SPECIAL PROVISIONS.
3. ALL PLANT MATERIAL SHALL BE NURSERY GROWN STOCK AND BE ADEQUATELY CLIMATIZED TO THE REGION AND FOLLOW STANDARDS OF ANSI Z60, AMERICAN STANDARD NURSERY STOCK (ASNS), AS UPDATED AND FOLLOW STANDARD SPECIFICATIONS 9-14.7 AND THE SPECIAL PROVISIONS.
4. NO PLANT MATERIAL SHALL BE PLANTED UNTIL IT HAS BEEN INSPECTED AND APPROVED FOR PLANTING BY THE LANDSCAPE ARCHITECT.
5. PLANT MATERIAL SHALL BE STORED AND HANDLED PER SECTION 9-14.7(3).
6. PLANT MATERIAL SHALL BE INSTALLED PER SECTION 8-02.3(8)B.
7. DO NOT MAKE SUBSTITUTIONS. IF SPECIFIED PLANTING MATERIAL IS NOT OBTAINABLE, SUBMIT PROOF OF NON-AVAILABILITY FROM AT LEAST THREE (3) SOURCES TO THE OWNER'S AUTHORIZED REPRESENTATIVE OR LANDSCAPE ARCHITECT WITH AT LEAST FIVE (5) PROPOSED SUBSTITUTION FOR EQUIVALENT MATERIAL FOR FINAL APPROVAL.
8. CONTRACTOR SHALL CONTACT THE LANDSCAPE ARCHITECT FOR PLANT MATERIAL INSPECTION 3 DAYS PRIOR TO INSTALLATION.
9. CONTRACTOR SHALL REPAIR OR REPLACE ANY EXISTING LANDSCAPE AFFECTED BY CONSTRUCTION TO IT'S ORIGINAL CONDITION. CONTACT LANDSCAPE ARCHITECT IF ANY AREAS NOT ORIGINALLY LANDSCAPED, BECOME LANDSCAPE.
10. SEE PLANTING DETAILS AND SPECIAL PROVISIONS FOR ADDITIONAL REQUIREMENTS.
11. REFERENCE APPROVED MITIGATION PLAN FOR ADDITIONAL REQUIREMENTS INCLUDING USE OF ANY HERBIVORY PROTECTION MEASURES.

PLANT LIST

ITEM	NAME	SIZE	CONDITION	SPACING	POSITION ON SLOPE	QTY
TREES						
PSIPE, MITIGATION TREE MIX (MTM)	*Alnus rhombifolia* White Alder	5 gallon	Container	12' o.c. spacing	LOWER	50
	Populus trichocarpa Black Cottonwood	5 gallon	Container	12' o.c. spacing		105
	Populus tremuloides Quaking Aspen	5 gallon	Container	12' o.c. spacing	TRANSITION BETWEEN UPPER AND LOWER	55
	Pinus ponderosa Ponderosa Pine	5 gallon	Container	12' o.c. spacing	UPPER	50
SHRUBS						
PSIPE, MITIGATION SHRUB MIX (MSM)	*Cornus sericea* Red Osier Dogwood	1 gallon	Container	7' o.c. spacing	LOWER	80
	Malus fusca Pacific Crabapple	1 gallon	Container	7' o.c. spacing	LOWER	30
	Salix exigua Sandbar Willow	1 gallon	Container	7' o.c. spacing	LOWER	90
	Rosa woodsii Woods Rose	1 gallon	Container	7' o.c. spacing	LOWER	20
	Ribes cerium Wax Currant	1 gallon	Container	7' o.c. spacing	UPPER	25
	Prunus virginiana Choke Cherry	1 gallon	Container	7' o.c. spacing	UPPER	30
	Crataegus douglasii Black Hawthorne	1 gallon	Container	7' o.c. spacing	UPPER	65
	Symphoricarpus albus Common Snowberry	1 gallon	Container	7' o.c. spacing	UPPER	90
	Amelanchier alnifolia Saskatoon Serviceberry	1 gallon	Container	7' o.c. spacing	UPPER	40

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ROBERT W. PHIPPS
EXP 02/07/2023 NO. 1161
PRELIMINARY

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

RESTORATION DETAILS & NOTES SHEET

PROJECT NUMBER
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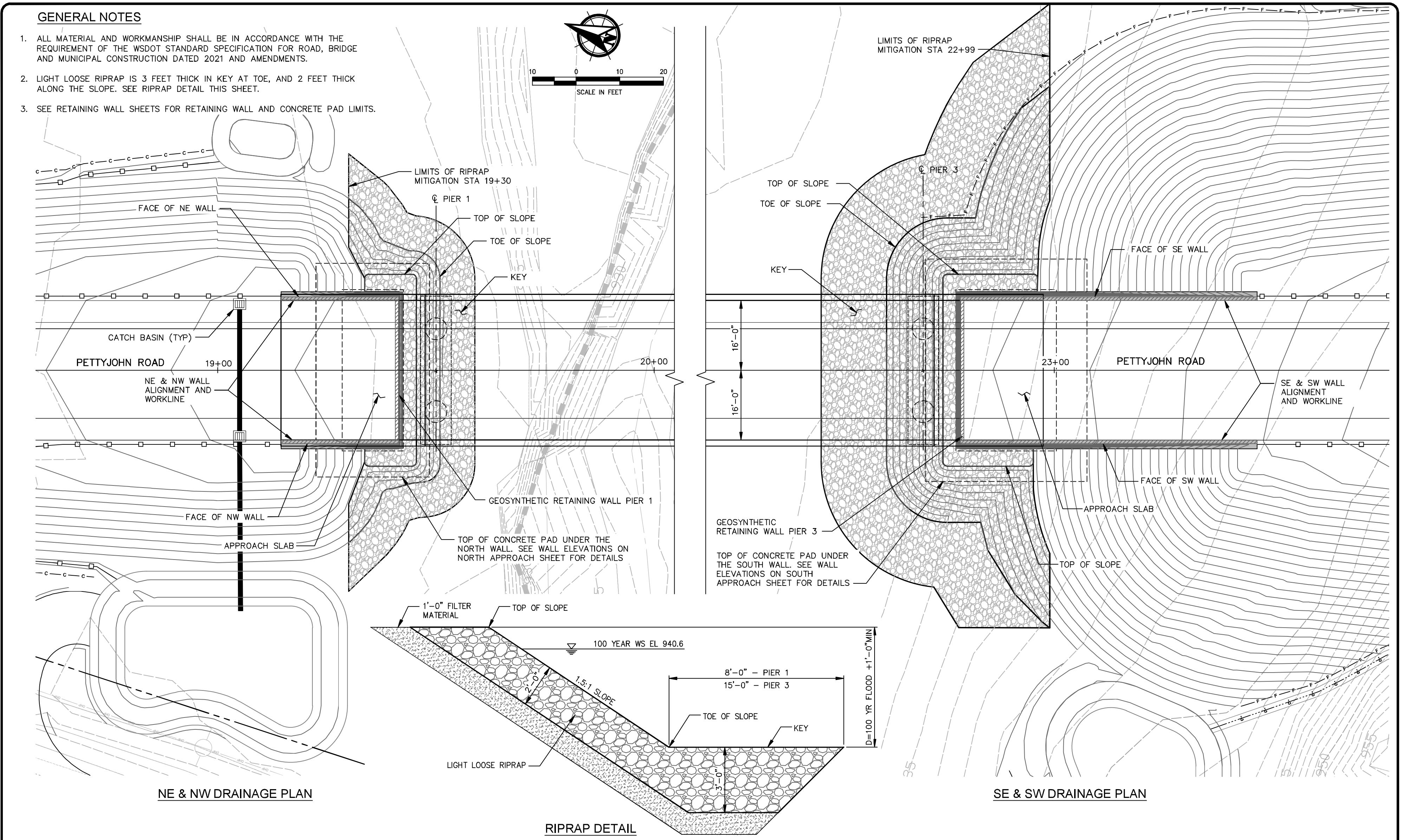
GENERAL NOTES

1. ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE REQUIREMENT OF THE WSDOT STANDARD SPECIFICATION FOR ROAD, BRIDGE AND MUNICIPAL CONSTRUCTION DATED 2021 AND AMENDMENTS.
2. LIGHT LOOSE RIPRAP IS 3 FEET THICK IN KEY AT TOE, AND 2 FEET THICK ALONG THE SLOPE. SEE RIPRAP DETAIL THIS SHEET.
3. SEE RETAINING WALL SHEETS FOR RETAINING WALL AND CONCRETE PAD LIMITS.



NE & NW DRAINAGE PLAN

RIPRAP DETAIL

SE & SW DRAINAGE PLAN

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

RIPRAP DETAILS

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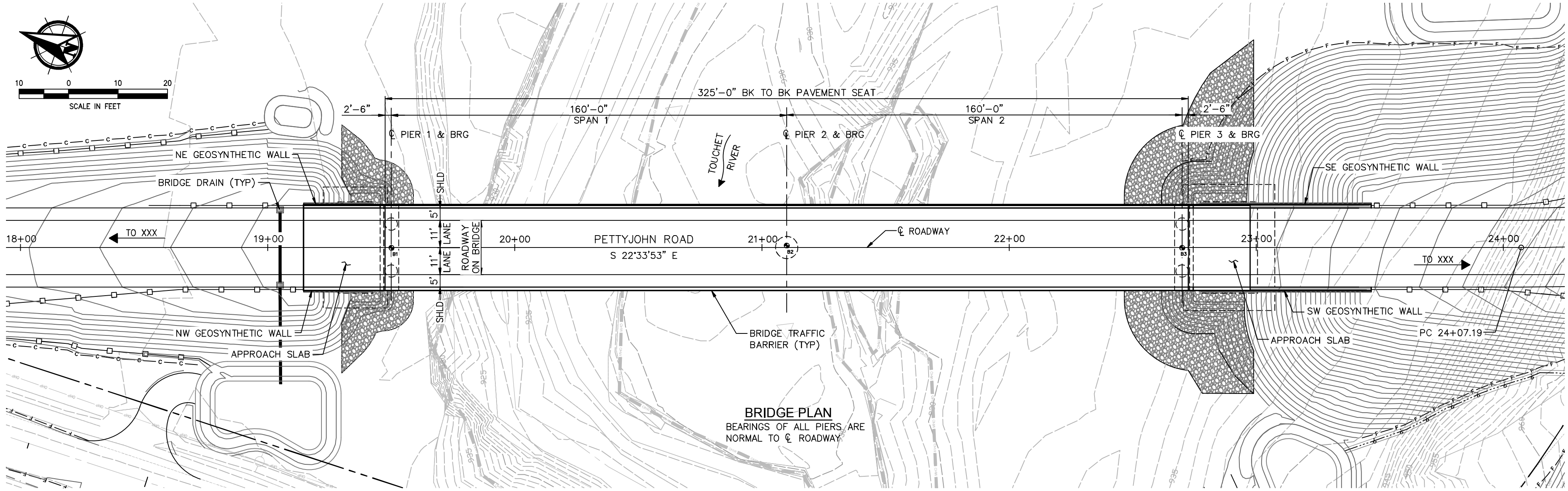
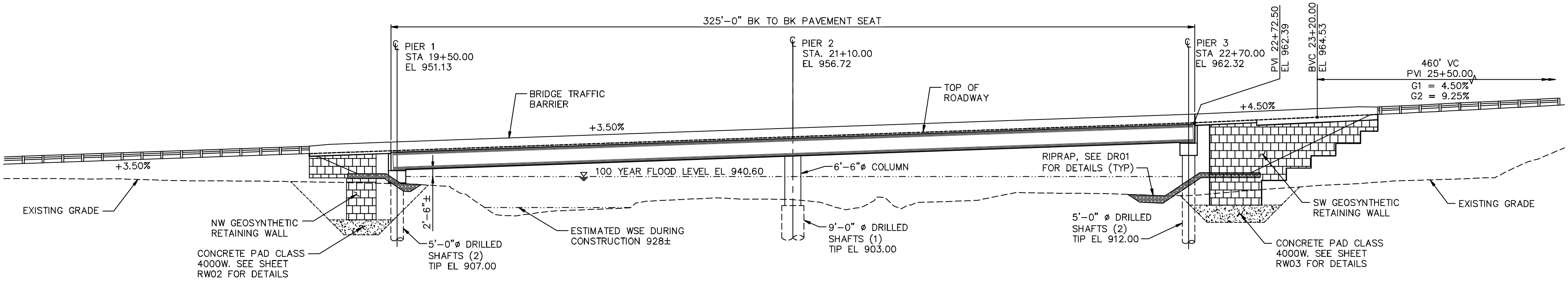


BRIDGE PLAN

BEARINGS OF ALL PIERS ARE NORMAL TO ℄ ROADWAY



DATUM
NGVD 29

BRIDGE ELEVATION

LOOKING UPSTREAM – GRADE ELEVATIONS SHOWN ARE FINISH GRADES AT TOP OF DECK AND ARE EQUAL TO PROFILE GRADE AT ℄ OF ROADWAY.

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

BRIDGE PLAN AND ELEVATION

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GENERAL NOTES

1. ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THESE PLANS, THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR ROAD, BRIDGE AND MUNICIPAL CONSTRUCTION DATED 2021, AMENDMENTS AND PROJECT SPECIAL PROVISIONS.

2. THIS STRUCTURE HAS BEEN DESIGNED IN ACCORDANCE WITH THE REQUIREMENTS OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION, DATED 2020 AND STATE OF WASHINGTON DEPARTMENT OF TRANSPORTATION BRIDGE DESIGN MANUAL LRFD, DATED 2020.

3. DESIGN LOADS:
   DEAD LOAD:
      NORMAL REINFORCED CONCRETE – 155 PCF
      STRUCTURAL STEEL – 490 PCF
      PRESTRESSED CONCRETE – 165 PCF
   LIVE LOAD:
      VEHICLE – HL93 AASHTO TRUCK (W/IMPACT)
   WIND LOAD:
      BASIC WIND SPEED – 85 MPH (3 SECOND GUST)
   THERMAL FORCES:
      NORMAL TEMPERATURE – 64° F
      TEMPERATURE RANGE – 36° F RISE, 64° F FALL
      COEFFICIENT OF THERMAL EXPANSION – 0.000006.
   FUTURE WEARING SURFACE: – 25 PSI

4. SEISMIC DESIGN OF THIS STRUCTURE CONFORMS TO THE REQUIREMENTS OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS USING THE FOLLOWING SITE DATA:
   SITE CLASS – B
   PEAK GROUND ACCELERATION COEFFICIENT – 0.105g
   DESIGN SPECTRAL ACCELERATION COEFFICIENT AT 0.2 SEC – 0.23g
   DESIGN SPECTRAL ACCELERATION COEFFICIENT AT 1.0 SEC – 0.07g
   SEISMIC DESIGN CATEGORY – A

5. THE CONCRETE IN THE SHAFT SHALL BE CLASS 5000P. THE CONCRETE IN THE ROADWAY DECK SHALL BE CLASS 4000D, THE CONCRETE IN THE APPROACH SLABS SHALL BE CLASS 4000A AND CLASS 4000W FOR THE CONCRETE SEALS. ALL OTHER CONCRETE SHALL BE CLASS 4000, UNLESS NOTED ON THE PLANS. REINFORCEMENT BAR SHALL CONFORM TO ASTM A706 GR 60 UNLESS NOTED OTHERWISE.

6. UNLESS OTHERWISE SHOWN ON THE PLANS, CLEAR CONCRETE COVER FROM THE TOP OF BRIDGE DECK TO ANY REINFORCEMENT BAR SHALL BE 2½ INCHES, 1 INCH FROM THE BOTTOM OF THE BRIDGE DECK, 6 INCHES FROM DIAMETER SHAFT WALL AND 1½ INCHES FROM ALL OTHER CONCRETE SURFACES.

7. ALL PLAN DIMENSIONS SHOWN ARE MEASURED HORIZONTALLY UNLESS OTHERWISE NOTED, AND REFLECT THE ULTIMATE GEOMETRIC SHAPE AND LOCATION OF ALL ELEMENTS AT A MEAN TEMPERATURE OF 64° F.

8. ALL EXPOSED EDGES OF CONCRETE SHALL BE CHAMFERED ¾" UNLESS OTHERWISE SHOWN OR NOTED.

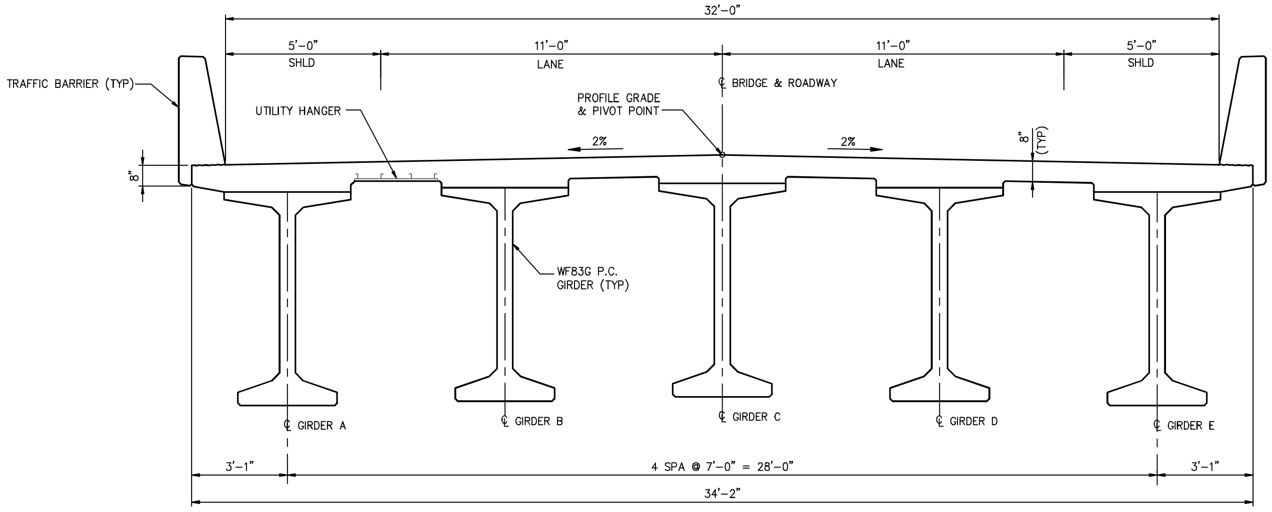
9. CONSTRUCTION JOINTS SHOWN ARE OPTIONAL UNLESS NOTED OTHERWISE.

10. FOR GEOTECHNICAL INFORMATION, SEE GEOTECHNICAL ENGINEERING REPORT PREPARED BY PBS INCLUDED IN THE BID DOCUMENTS.

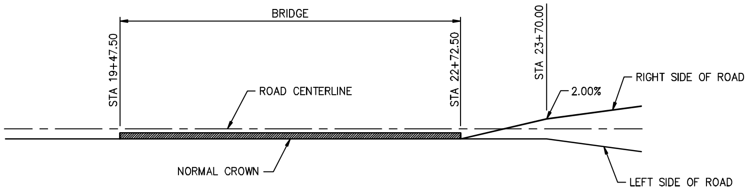
11. FOUNDATION:

THE NOMINAL SHAFT RESISTANCE SHALL BE TAKEN AS, IN KIPS:

SERVICE–I LIMIT STATE		
PIER NO.	SKIN FRICTION RESISTANCE	END BEARING RESISTANCE
1	XX	XX
2	XX	XX
3	XX	XX
STRENGTH LIMIT STATE		
PIER NO.	SKIN FRICTION RESISTANCE	END BEARING RESISTANCE
1	XX	XX
2	XX	XX
3	XX	XX
EXTREME EVENT–I LIMIT STATE		
PIER NO.	SKIN FRICTION RESISTANCE	END BEARING RESISTANCE
1	XX	XX
2	XX	XX
3	XX	XX



TYPICAL BRIDGE SECTION



SUPERELEVATION DIAGRAM

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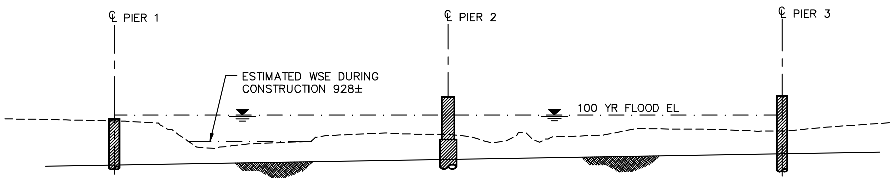
DELL SHARPE BRIDGE REPLACEMENT PROJECT

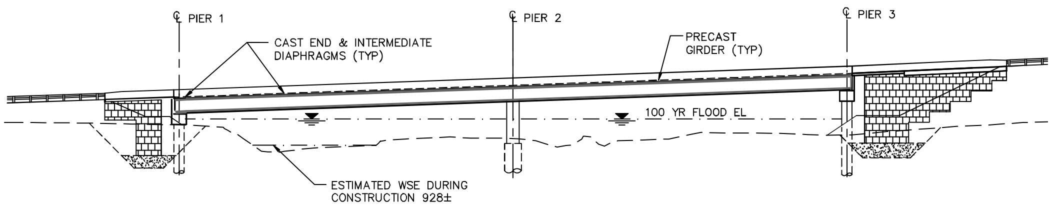
GEN NOTES, TYP SECTION & SUPERELEVATION

PROJECT NUMBER
CRP20-02

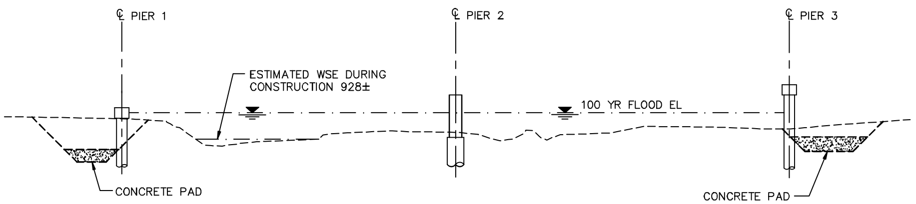
SHEET
S02



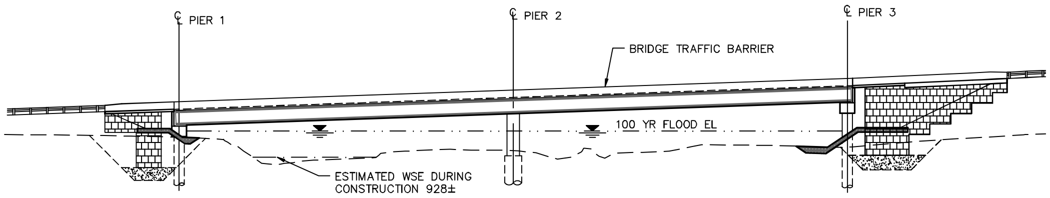
STAGE 1:
CONSTRUCT PIER SUBSTRUCTURE



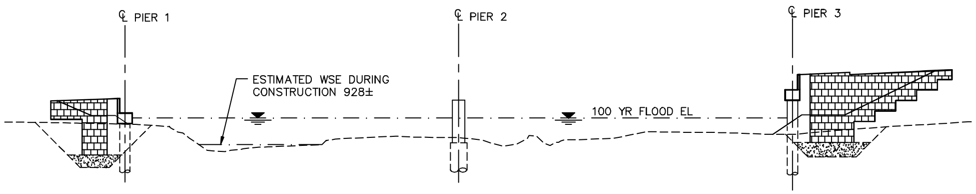
STAGE 4:
CONSTRUCT SUPERSTRUCTURE,
SEE SHEET S04 FOR CONSTRUCTION SEQUENCE



STAGE 2:
CONSTRUCT CONCRETE PADS FOR WALL BASES



STAGE 5:
CONSTRUCT RIPRAP EROSION CONTROL MEASURE



STAGE 3:
CONSTRUCT PIER CAPS AND
GEOSYNTHETIC RETAINING WALLS

STAGE 6:
REMOVE EXISTING BRIDGE

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

SUGGESTED CONSTRUCTION SEQUENCE

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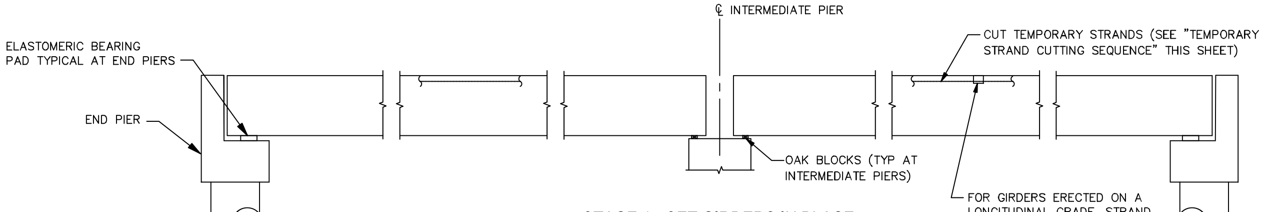
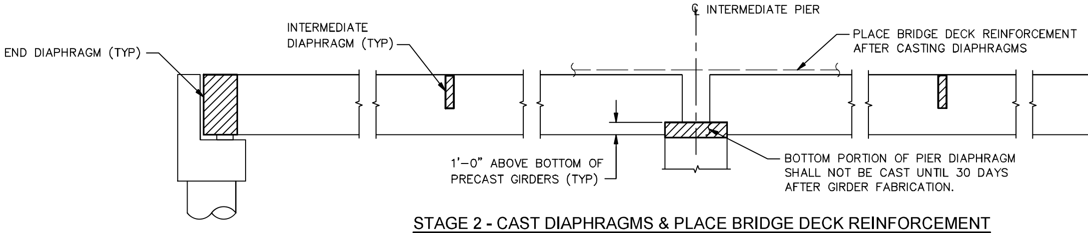


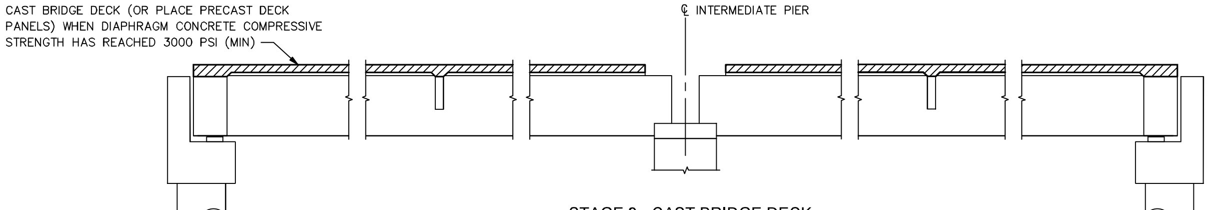
STAGE 1 - SET GIRDERS IN PLACE

INSTALL TEMPORARY BRACING FOR ERECTION IN ACCORDANCE WITH STD SPEC SECTON 6-02.3(17)F4

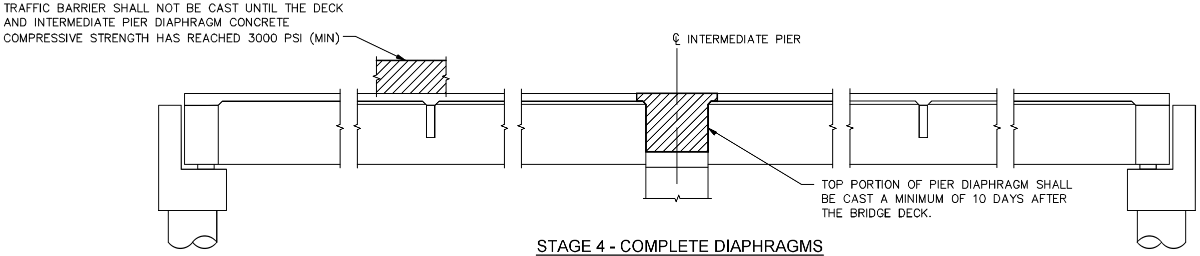


STAGE 2 - CAST DIAPHRAGMS & PLACE BRIDGE DECK REINFORCEMENT

INSTALL TEMPORARY BRACING FOR DIAPHRAGM AND DECK PLACEMENT IN ACCORDANCE WITH STD SPEC SECTON 6-02.3(17)F5



STAGE 3 - CAST BRIDGE DECK



STAGE 4 - COMPLETE DIAPHRAGMS

TEMPORARY STRAND CUTTING SEQUENCE

1. ERECT AND BRACE GIRDERS.
2. JUST PRIOR TO CUTTING THE TEMPORARY STRANDS, REMOVE EXPANDED POLYSTYRENE IN BLOCKOUTS IN TOP FLANGE OF GIRDERS. ONCE THE EXPANDED POLYSTYRENE HAS BEEN REMOVED FROM THE STRAND DETENSIONING BLOCKOUT, PREVENT MOISTURE FROM ENTERING THE BLOCKOUT UNTIL THE TEMPORARY TOP STRAND IS CUT AND THE BLOCKOUT FILLED WITH GROUT.
3. CUT STRANDS IN BLOCKOUTS. STRANDS MAY BE CUT BY USING A CUTTING TORCH AND MOVING THE FLAME BACK AND FORTH OVER THE LENGTH OF EXPOSED STRAND TO LET INDIVIDUAL WIRES BREAK ONE AT A TIME TO LESSEN THE SHOCK TO THE GIRDER. STRANDS SHALL BE RELEASED IN A SYMMETRICAL MANNER ABOUT THE GIRDER CENTERLINE STARTING WITH THOSE FURTHEST FROM THE CENTERLINE AND WORKING INWARDS.
4. WITHIN 24 HOURS OF CUTTING THE TEMPORARY STRANDS, FILL THE BLOCKOUTS WITH A GROUT CONFORMING TO STD. SPEC. 9-20.3(2). REMOVE ALL MOISTURE IN BLOCKOUTS PRIOR TO FILLING THEM WITH GROUT.

NOTE:
NO LIVE LOAD SHALL BE ALLOWED ON THE SPANS UNTIL THE COMPRESSIVE STRENGTH OF THE TOP PORTION OF THE PIER DIAPHRAGM HAS REACHED 3000 PSI (MIN.).

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

SUPERSTRUCTURE CONSTR. SEQUENCE

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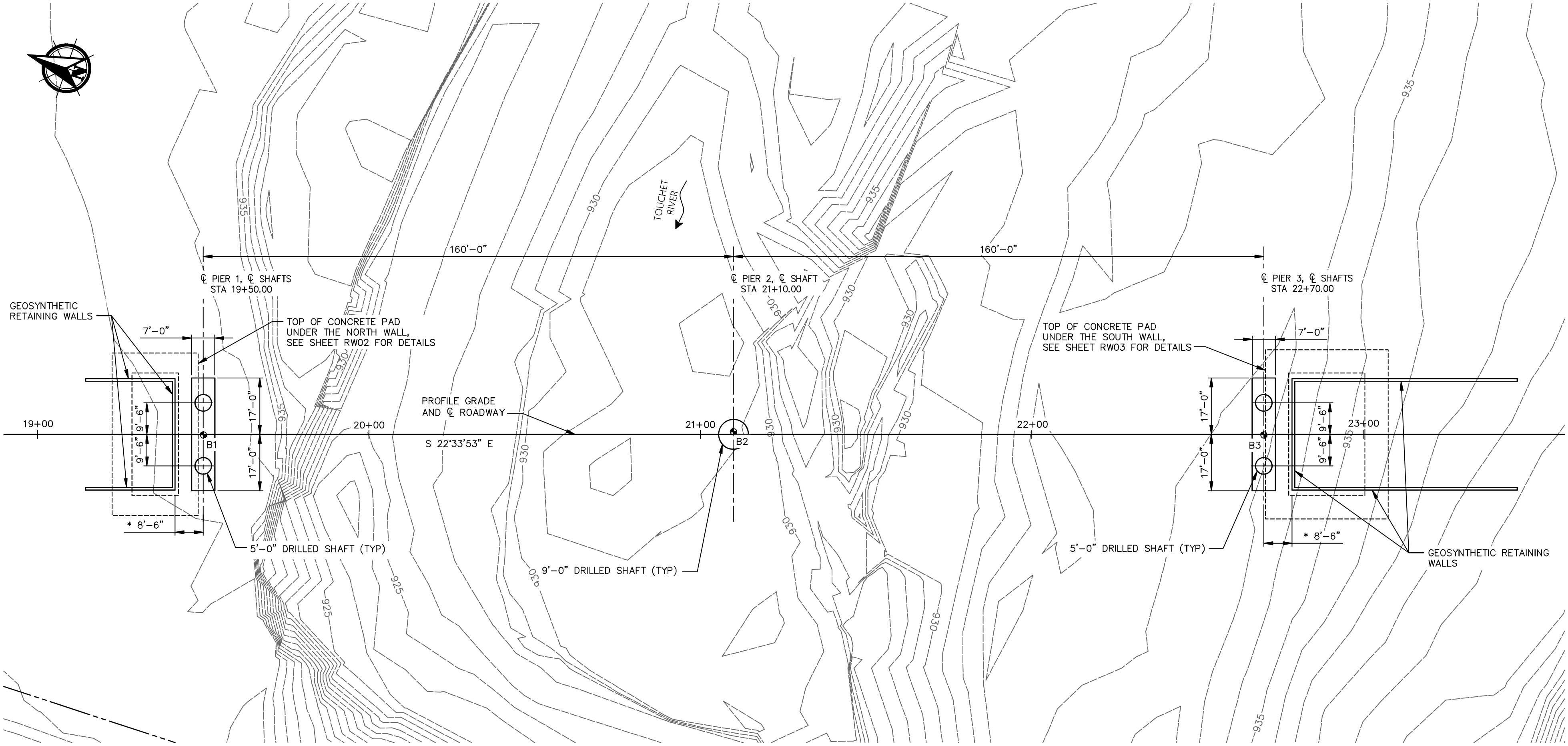

FOUNDATION PLAN

BEARING OF ALL PIERS IS N 67°26'07" E

NOTES

1. ● INDICATES THE LOCATION AND DESIGNATION OF BOREHOLES. SEE GEOTECHINCAL REPORT FOR BOREHOLE EXPLORATION LOGS AND OTHER INFORMATION.
2. SEE SHAFT DETAILS SHEET S06 FOR LENGTHS AND TIP ELEVATIONS.
3. SEE SHEET S02 FOR THE NOMINAL SHAFT RESISTANCE.
4. * DIMENSION MEASURED AT TOP OF THE WALL.

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

FOUNDATION PLAN

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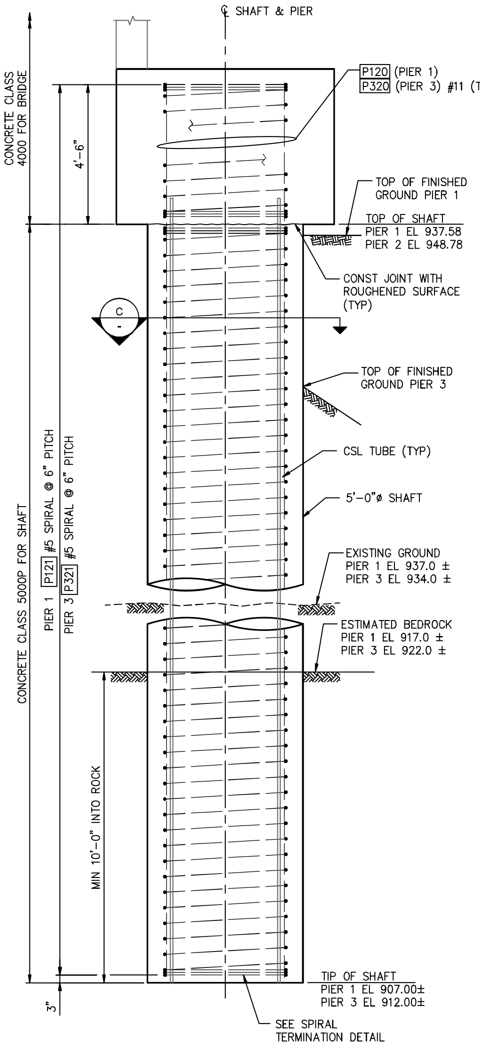
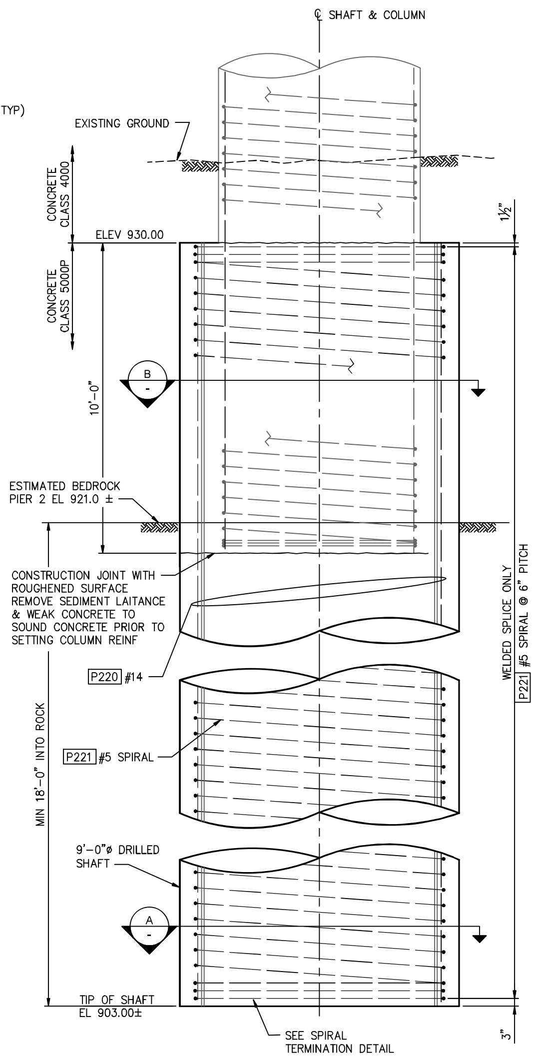


ELEVATION - PIER 1 AND 3

NOTE: PIER CAP REINF NOT SHOWN FOR CLARITY

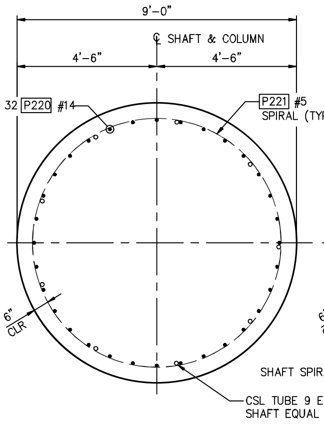


ELEVATION - PIER 2

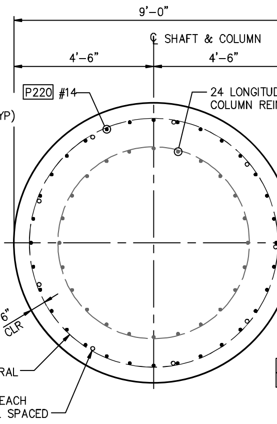
NOTE: PIER CAP REINF NOT SHOWN FOR CLARITY

NOTES:

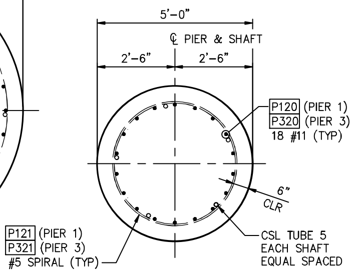
1. ONLY WELDED SPLICES SHALL BE USED FOR SPIRAL REINFORCEMENT.
2. DO NOT WELD WITH SPIRAL IN CONTACT WITH VERTICAL REINFORCING. ISOLATE VERTICAL REINFORCING FROM HE HEAT AND SPLATTER.
3. DRILLED SHAFTS WILL REQUIRE DRILLING THROUGH SOIL AND HIGHLY FRACTURED AND MASSIVE ROCK. DRILLING EQUIPMENT AND TECHNIQUES NEED TO BE CAPABLE OF EXCAVATING AND REMOVING VARIABLY FRACTURED ROCK BOTH ABOVE AND BELOW THE GROUNDWATER. TEMPORARY CASING IS NOT ANTICIPATED IN THE ROCK. HOWEVER, LOCAL CAVING MAY OCCUR, ESPECIALLY IF PENETRATING BELOW THE GROUNDWATER TABLE. THIS MAY REQUIRE TEMPORARY CASING ABOVE THE ROCK OR DRILLING SLURRY AT THE CONTRACTOR'S OPTION.



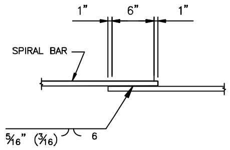
SECTION A



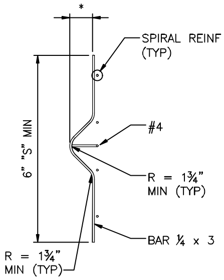
SECTION B



SECTION C



WELDED LAP SPLICE DETAIL 1



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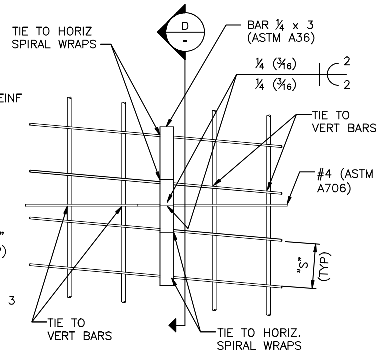
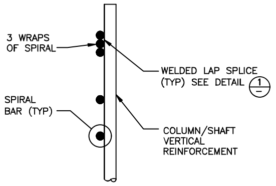


CENTRALIZER DETAIL



SPIRAL TERMINATION DETAIL

* MINIMUM CONCRETE COVER MINUS ½"

CENTRALIZER NOTES

1. CENTRALIZERS SHALL BE EPOXY COATED R PAINTED WITH INORGANIC ZINC AFTER FABRICATION.
2. EACH LEG SHALL BE TIED TO TWO VERTICAL BARS AND TWO SPIRAL WRAPS OR TWO HOOPS.
3. SEE STD. SPEC. 6–19.3(5)B FOR SPACING REQUIREMENTS.

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

SHAFT DETAILS

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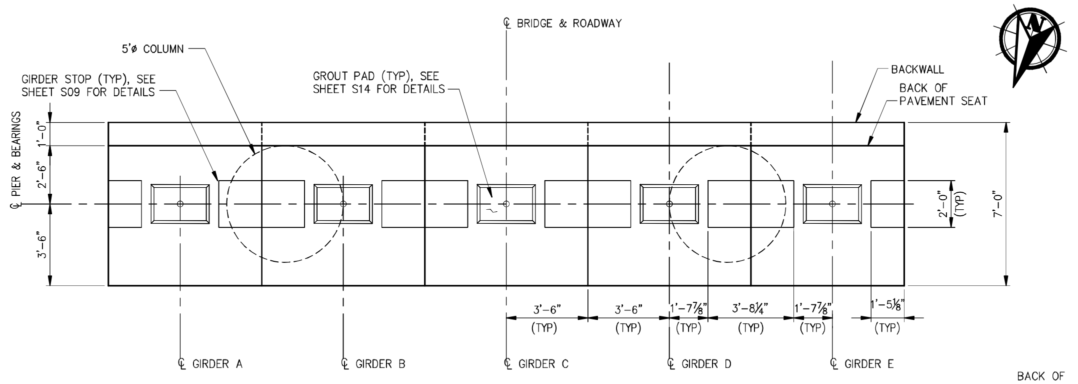


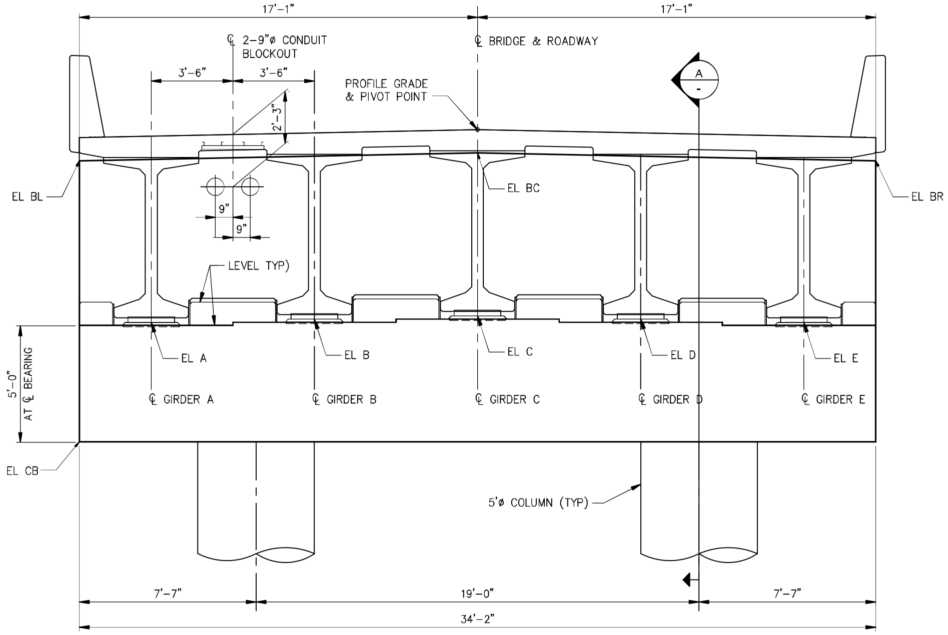
PLAN

PIER 3 SHOWN, PIER 1 SIMILAR

CONTROL ELEVATIONS TABLE

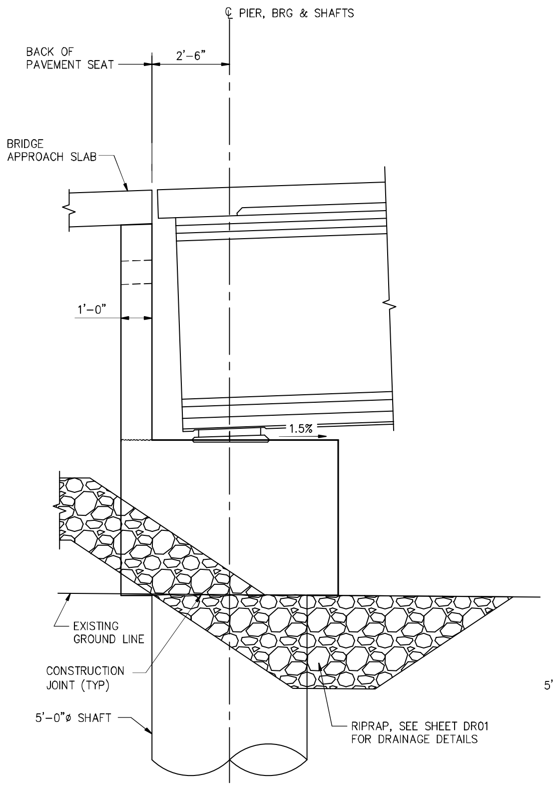
LOCATION	DESCRIPTION	PIER 1	PIER 3
BC	TOP OF BACKWALL, CL BRIDGE & ROADWAY AT BACK OF PAVEMENT SEAT	950.03	961.22
BL	TOP OF BACKWALL, LEFT* END AT BACK OF PAVEMENT SEAT	949.61	960.97
BR	TOP OF BACKWALL, RIGHT* END AT BACK OF PAVEMENT SEAT	949.61	960.97
A	CL GIRDER A AT TOP OF GROUT PAD	942.75	953.94
B	CL GIRDER B AT TOP OF GROUT PAD	942.89	954.08
C	CL GIRDER C AT TOP OF GROUT PAD	943.03	954.22
D	CL GIRDER D AT TOP OF GROUT PAD	942.89	954.08
E	CL GIRDER E AT TOP OF GROUT PAD	942.75	953.94
CB	BOTTOM OF CAP	937.63	948.81

* – LOOKING AHEAD ON STATIONING



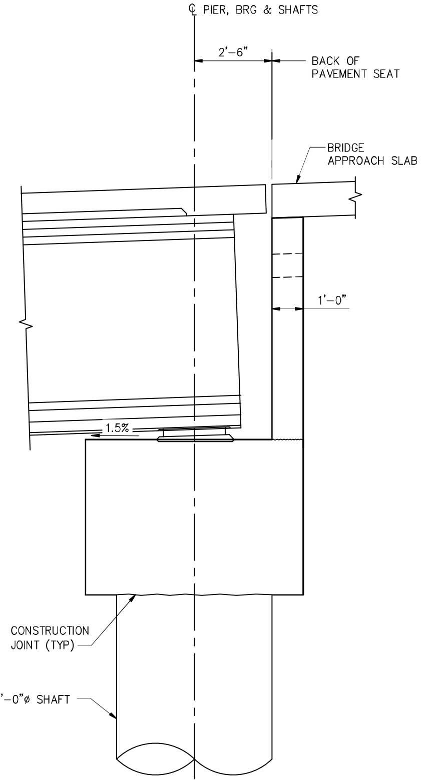
ELEVATION

PIER 3 SHOWN, PIER 1 SIMILAR
LOOKING AHEAD ON STATIONING



SECTION A –

PIER 1



SECTION A –

PIER 3

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

PIER 1 & PIER 3 PLAN & ELEVATION

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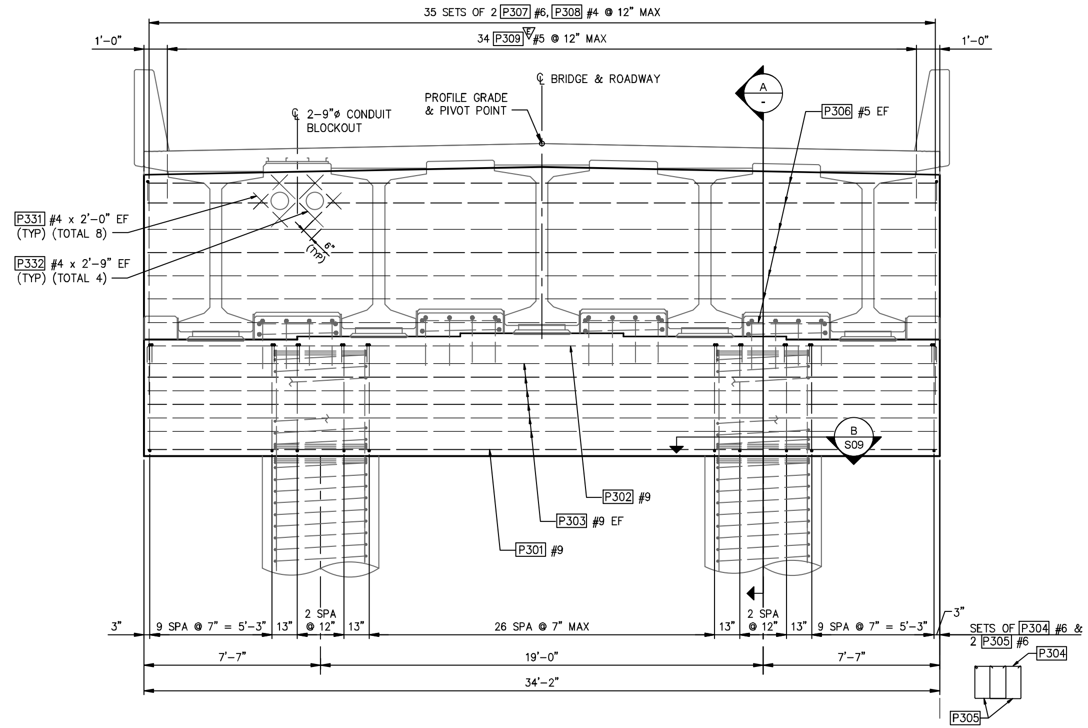
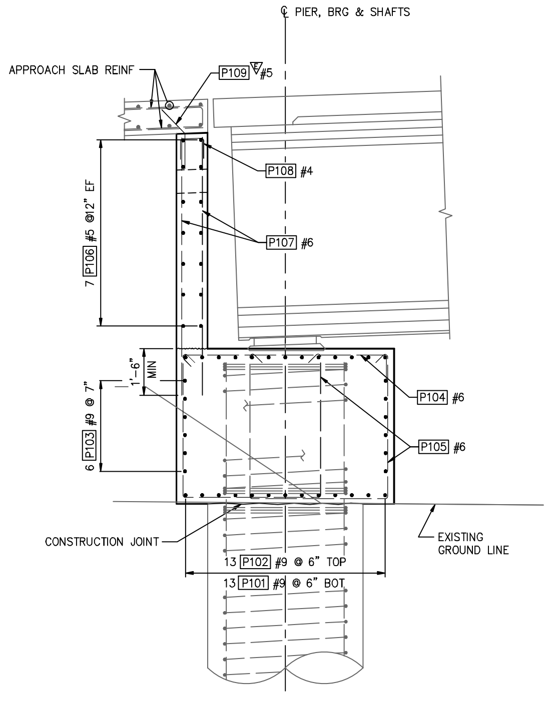


ELEVATION

PIER 3 SHOWN, PIER 1 SIMILAR
LOOKING AHEAD ON STATIONING
REINFORCING FOR PIER 1 IS LABELED P1XX
IN BARLIST



SECTION A
–
PIER 1

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

PIER 1 & PIER 3 DETAILS 1

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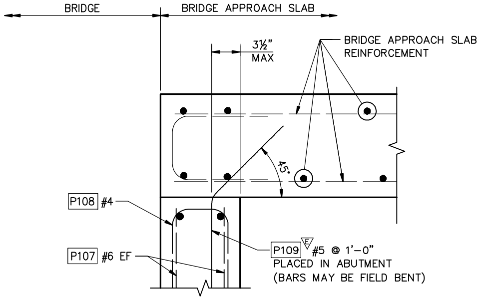
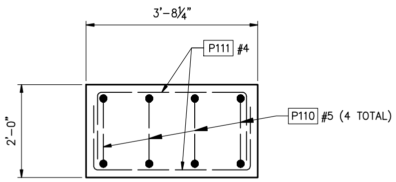
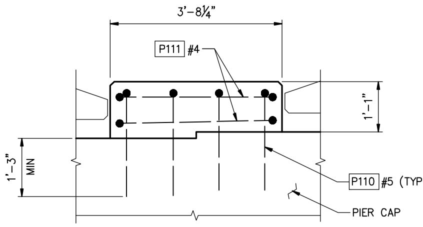


ANCHOR DETAIL

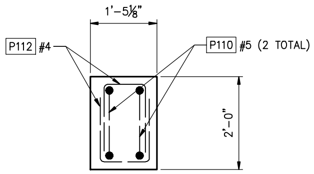


GIRDER STOP PLAN

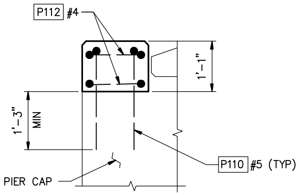


GIRDER STOP ELEVATION

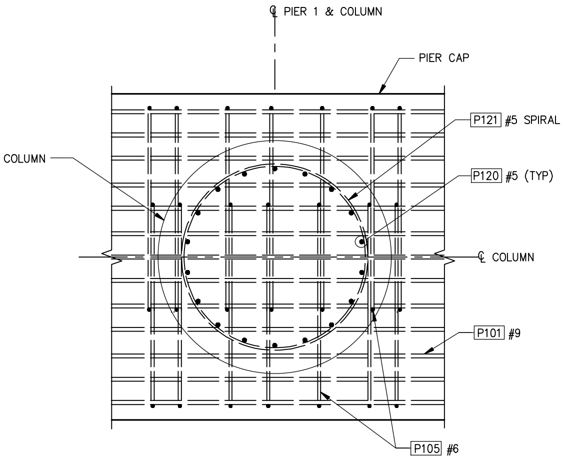
PIER CAP REINF NOT
SHOWN FOR CLARITY



END GIRDER STOP PLAN



END GIRDER STOP ELEVATION



SECTION B/S08
INTERFERENCE DETAIL

NOTES:

1. THE INTERFERENCE DETAIL IS ONLY A SUGGESTED METHOD. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PLACING THE REINFORCEMENT BY ITS OWN METHODS TO COMPLY WITH THE CONTRACT PLANS.
2. PIER 1 REINF SHOWN, PIER 3 SIMILAR REINF FOR PIER 3 IS LABELED P3XX

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

PIER1 & PIER 3 DETAILS 2

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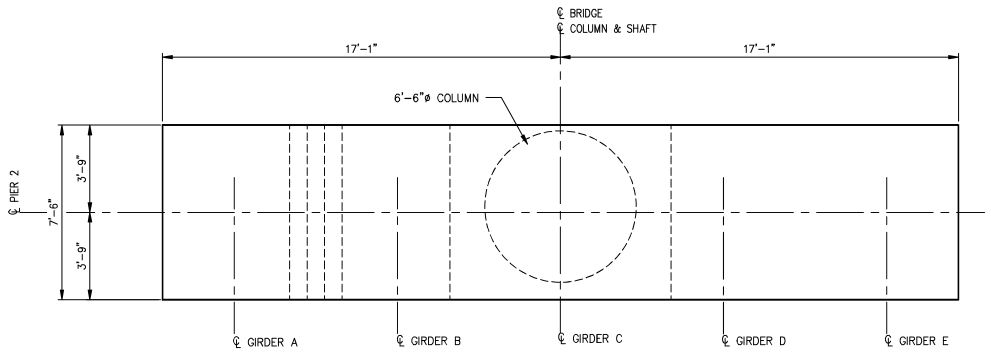
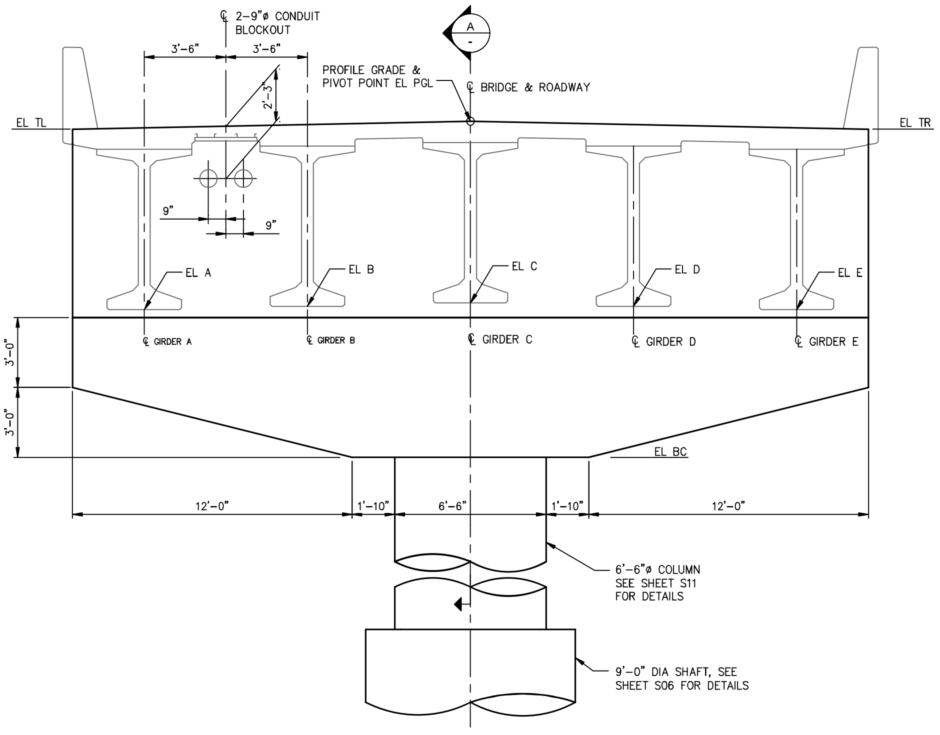


PLAN

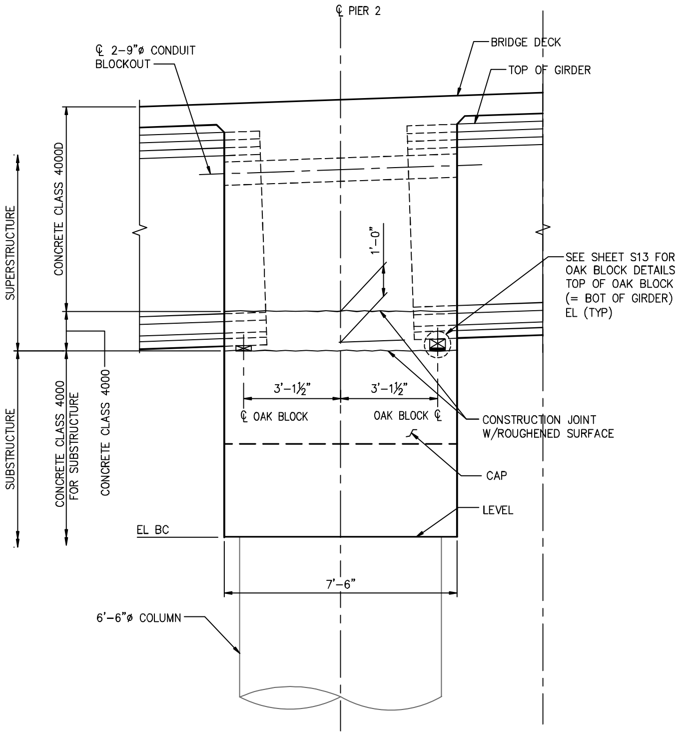
CONTROL ELEVATIONS TABLE - PIER 2			
LOCATION	DESCRIPTION	BACK STATION	AHEAD STATION
PGL	AT CL PIER	956.71	
TL	TOP OF ROADWAY LEFT* AT CL PIER	956.37	
TR	TOP OF ROADWAY RIGHT* AT CL PIER	956.37	
A	CL GIRDER A AT TOP OF OAK BLOCK	948.44	948.65
B	CL GIRDER B AT TOP OF OAK BLOCK	948.58	948.79
C	CL GIRDER C AT TOP OF OAK BLOCK	948.72	948.93
D	CL GIRDER D AT TOP OF OAK BLOCK	948.58	948.79
E	CL GIRDER E AT TOP OF OAK BLOCK	948.44	948.65
TC	TOP OF CAP	948.19	
BC	BOTTOM OF CAP	942.19	

* LOOKING UP ON STATIONING



ELEVATION

LOOKING AHEAD ON STATIONING



SECTION A
-

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

PIER 2 PLAN & ELEVATION

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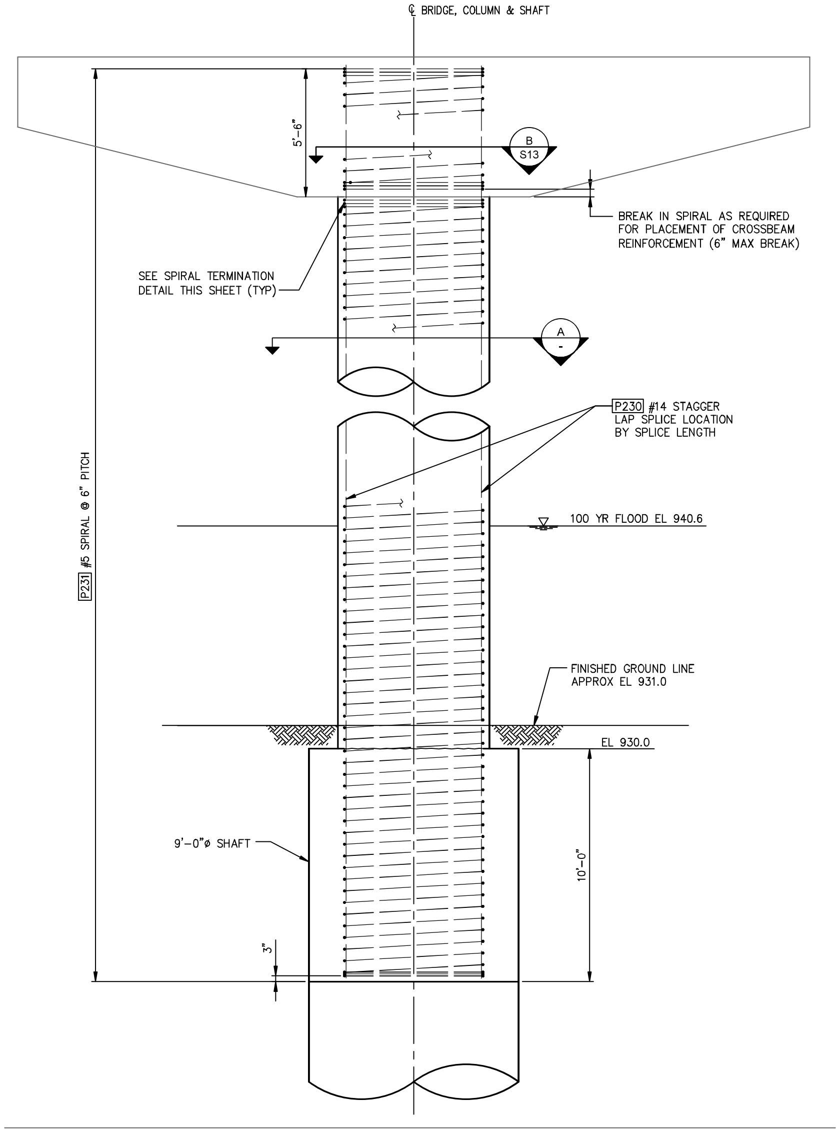
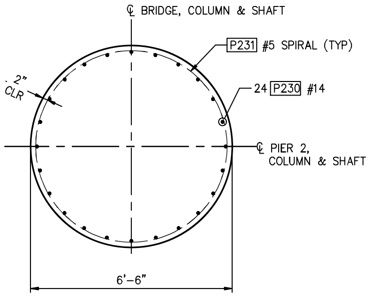
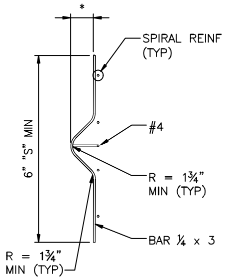


COLUMN ELEVATION



SECTION A –



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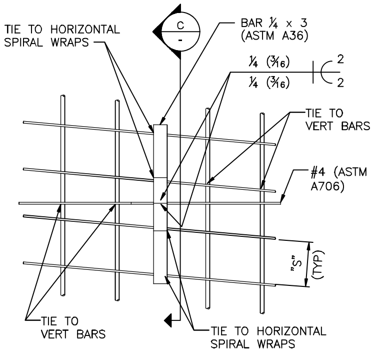
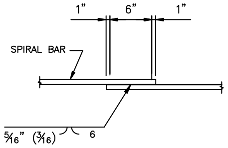


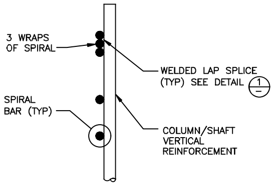
CENTRALIZER DETAIL

CENTRALIZER NOTES

1. CENTRALIZERS SHALL BE EPOXY COATED R PAINTED WITH INORGANIC ZINC AFTER FABRICATION.
2. EACH LEG SHALL BE TIED TO TWO VERTICAL BARS AND TWO SPIRAL WRAPS OR TWO HOOPS.
3. SEE STD. SPEC. 6–19.3(5)B FOR SPACING REQUIREMENTS.



WELDED LAP SPLICE DETAIL 1 –



SPIRAL TERMINATION DETAIL

* MINIMUM CONCRETE COVER MINUS ½"

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

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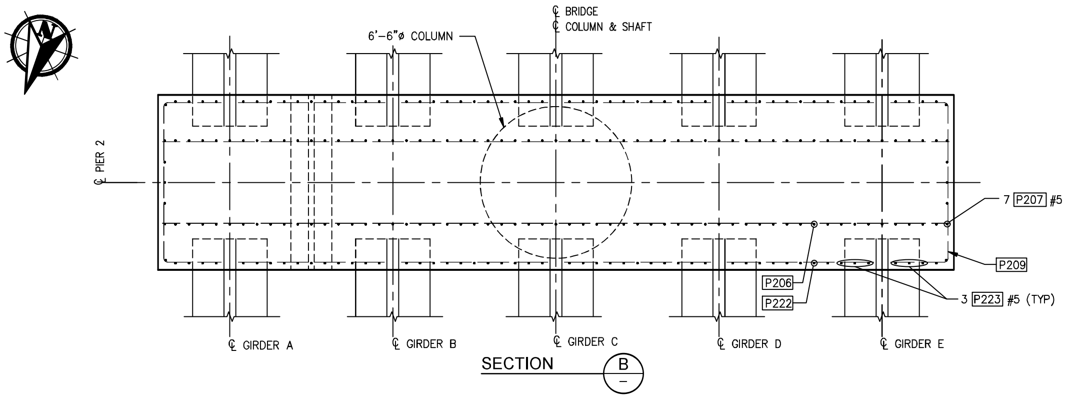

SECTION B
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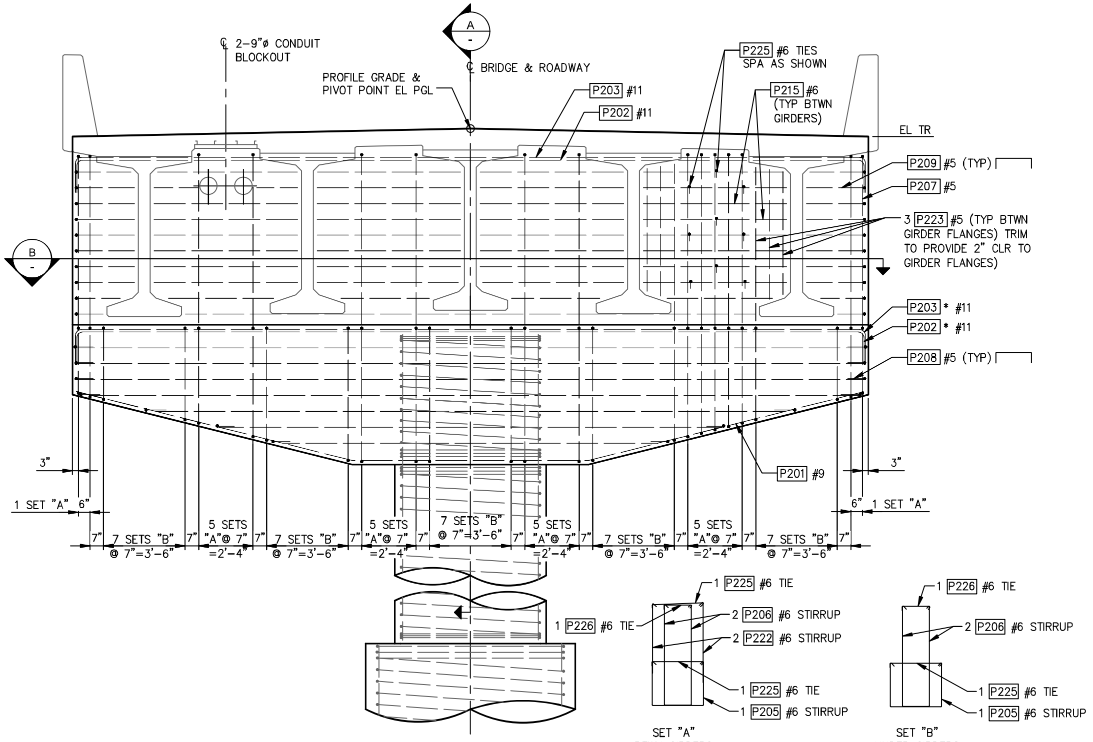
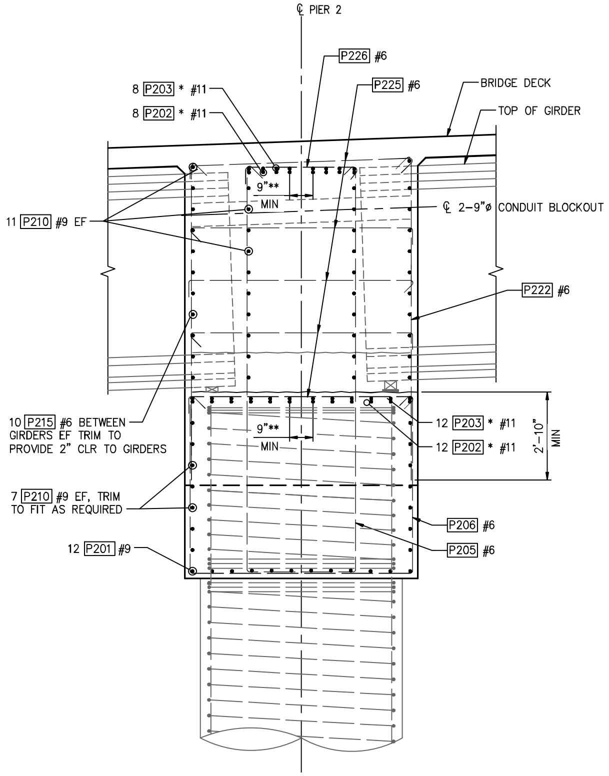


SET "A"
BTWN GIRDERS

SET "B"
UNDER GIRDERS

ELEVATION
LOOKING AHEAD ON STATIONING



SECTION A
-

* BUNDLE BARS
** GAP FOR CONCRETE PLACEMENT
CAP REINFORCING SPACING MAY BE
ADJUSTED TO CLEAR COLUMN REINFORCING

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

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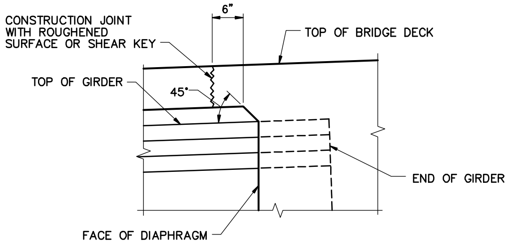
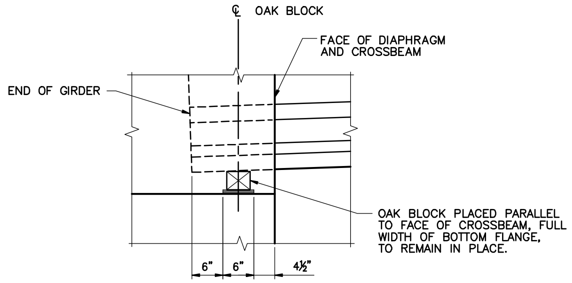
NOTES:

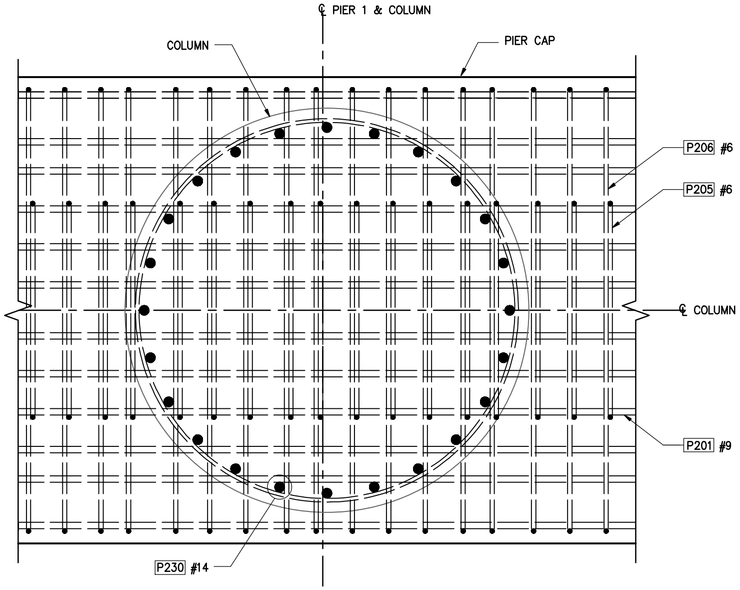
1. GIRDERS SHALL BE HELD RIGIDLY IN PLACE WHEN DIAPHRAGMS ARE PLACED.
2. EXTENDED STRANDS AND GIRDER REINFORCING NOT SHOWN FOR CLARITY.
3. LONGITUDINAL DIMENSIONS ARE NORMAL TO ℄ DIAPHRAGM.



DETAIL 1/–
DIAPHRAGM REINF NOT SHOWN FOR CLARITY



OAK BLOCK DETAIL



SECTION B/S11
INTERFERENCE DETAIL

NOTE:
THE INTERFERENCE DETAIL IS ONLY A SUGGESTED METHOD. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PLACING THE REINFORCEMENT BY ITS OWN METHODS TO COMPLY WITH THE CONTRACT PLANS.

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

PIER 2 DETAILS 3

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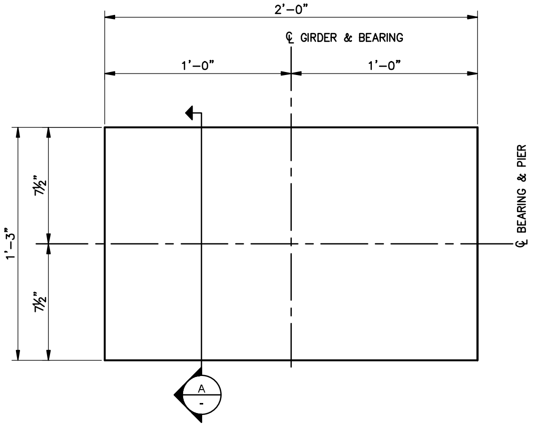
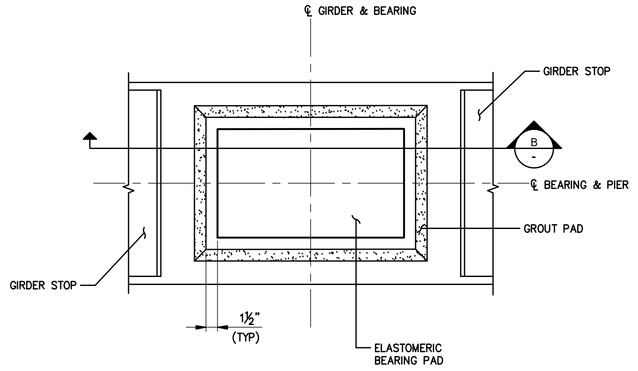


ELASTOMERIC BEARING PAD PLAN

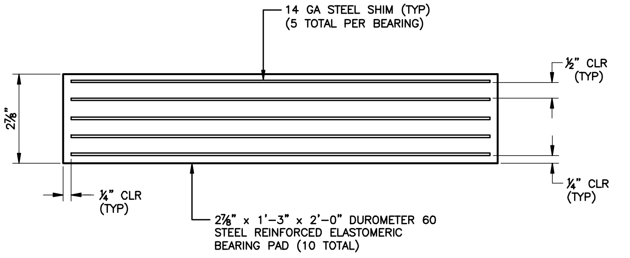


GROUT PAD PLAN

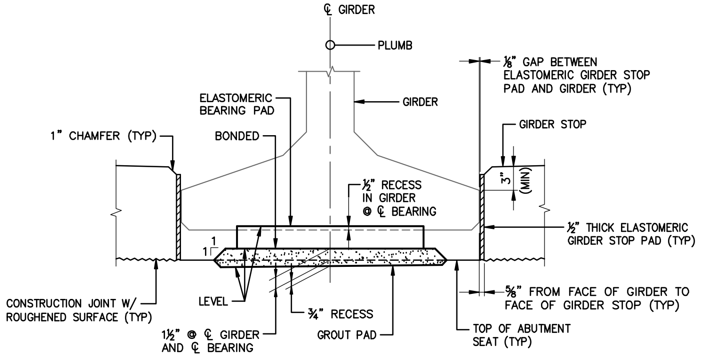
NOTES:

1. FABRICATE AND TEST ALL BEARINGS IN ACCORDANCE WITH AASHTO LRFD BRIDGE DESIGN SPECIFICATONS METHOD B, AND AASHTO SPECIFICATION M251, TEST REQUIREMENTS.
2. STEEL SHIMS FOR ELASTOMERIC BEARING PADS SHALL BE FABRICATED FROM MATERIAL MEETING ASTM A 1011, STRUCTURAL STEEL GRADE 36, TYPE 1.
3. ELASTOMERIC BEARINGS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO SPECIFICATION M 251.
4. GIRDER STOPS SHALL BE CONSTRUCTED AFTER PLACEMENT OF GIRDERS. ELASTOMERIC PADS BETWEEN GIRDER AND GIRDER STOPS SHALL BE PLACED AFTER CONSTRUCTION OF THE GIRDER STOPS. THE PADS SHALL BE BONDED TO GIRDER STOPS WITH PRE-APPROVED ADHESIVE.
5. THE ELASTOMERIC BEARING PAD SHALL BE BONDED TO THE BEARING SEAT WITH AN APPROVED EPOXY ADHESIVE.

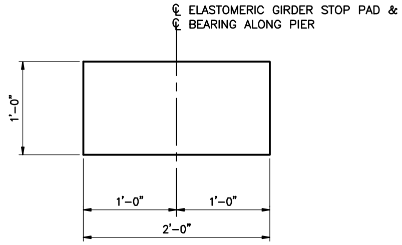
BEARING DESIGN TABLE SERVICE 1 LIMIT STATE	
DEAD LOAD REACTION	215.1 KIPS
LIVE LOAD REACTION (W/O IMPACT)	47.2 KIPS
UNLOADED HEIGHT	2.87 INCHES
LOADED HEIGHT (DL)	2.85 INCHES
SHEAR MODULUS AT 73°	165 PSI



SECTION A –



SECTION B –



ELASTOMERIC GIRDER STOP PAD

SHEAR MODULUS – 165 PSI

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

ELASTOMERIC BEARINGS & GROUT PAD DETAILS

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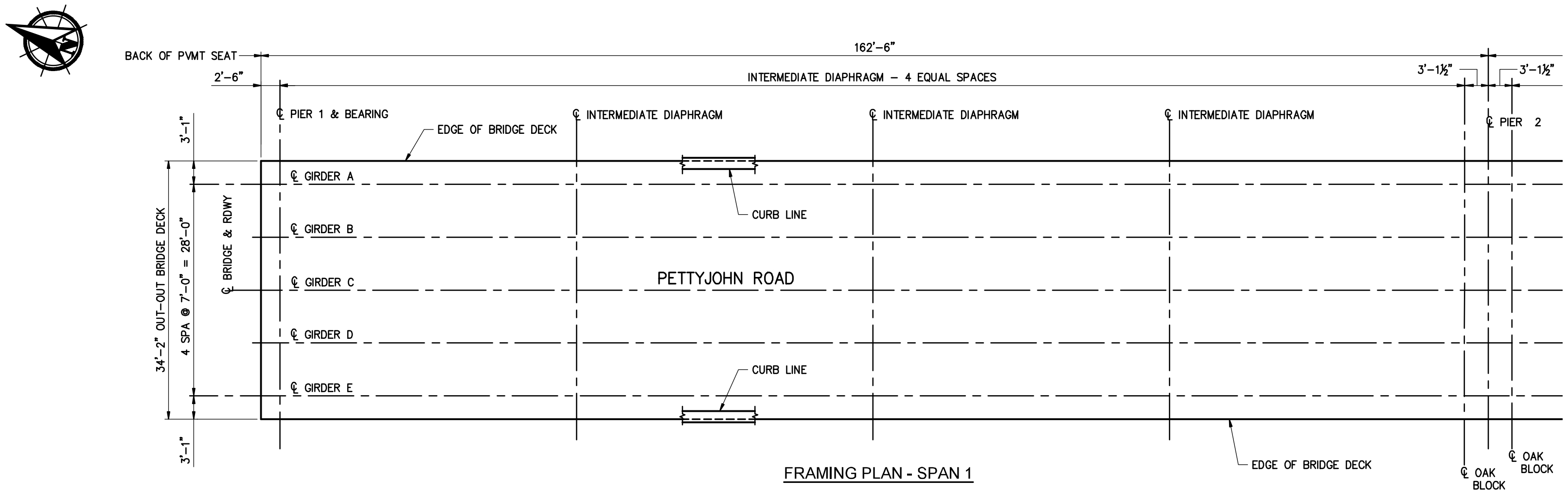
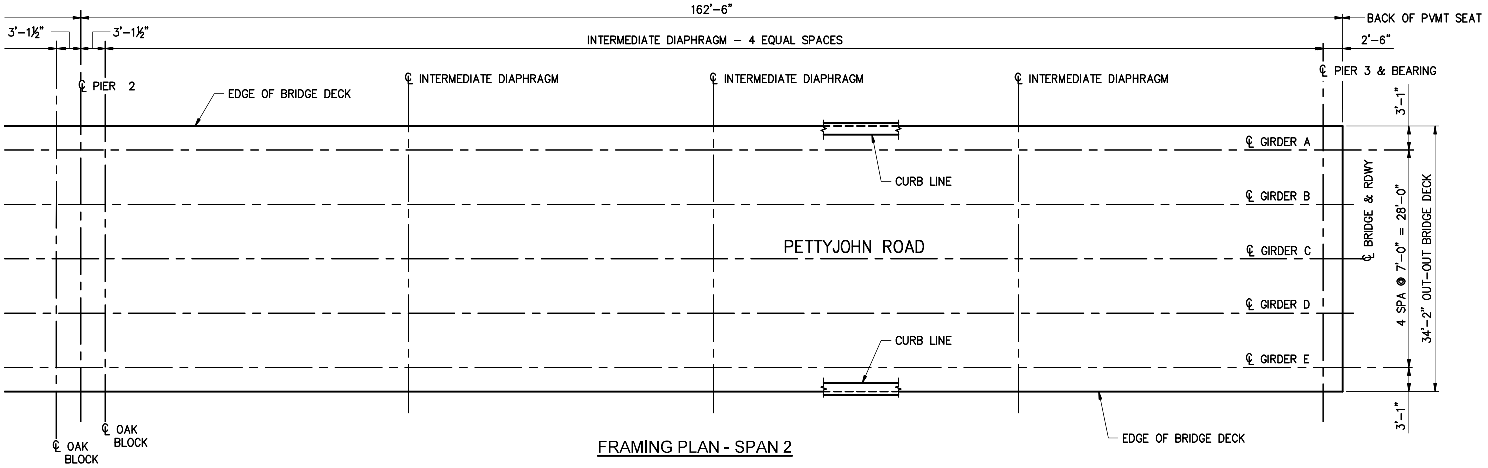


FRAMING PLAN - SPAN 1



FRAMING PLAN - SPAN 2

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

FRAMING PLAN

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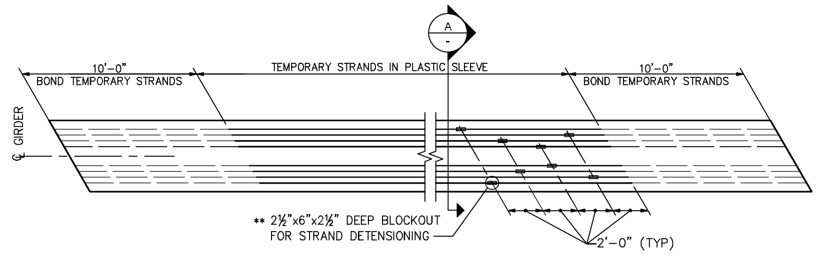
GIRDER SCHEDULE

SPAN	GIRDER	GIRDER SERIES	PLAN LENGTH (ALONG GIRDER GRADE) (SEE GIRDER NOTE 1)	INT. DIAPHRAGM TYPE (FULL OR PARTIAL)	GIRDER END DETAILS							MIN. CONC. COMP. STRENGTH		NUMBER OF STRANDS (SEE GIRDER NOTE 2)			LOCATION OF C.G. STRANDS			STRAIGHT STRANDS TO EXTEND				"A" DIMENSION AT ℄ BEARINGS	DECK SCREED CAMBER C	MIDSPAN VERTICAL DEFLECTION D		REINFORCEMENT DETAILS							SHIPPING AND HANDLING DETAILS					
					END 1 TYPE	END 2 TYPE	L_d	Q_1	Q_2	P_1	P_2	@ 28-DAYS F'C (KSI)	@ RELEASE F'CI (KSI)	STRAIGHT	HARPED	TEMPORARY	E	F℄	Fo	END 1		END 2				LOWER BOUND @ 40 DAYS	UPPER BOUND @ 120 DAYS	ZONE 1		ZONE 2		ZONE 3		H1	MAX MIDSPAN VERTICAL DEFLECTION AT SHIPPING	L	L_1	L_2	K_θ MINIMUM SHIPPING SUPPORT ROTATIONAL SPRING CONSTANT	W_{CC} MINIMUM SHIPPING SUPPORT CTR-TO-CTR WHEEL SPACING
																				STRANDS	EXTENSION LENGTH	STRANDS	EXTENSION LENGTH					SPACING	LENGTH	SPACING	LENGTH	SPACING	LENGTH							
1	ALL	WF83G	159'-2⅝"	PARTIAL	B	D	–	90°	90°	1'-6"	–	8	6	38	14	2	3½"	4⅜"	10"	–	–	●	4'-0"	12"	2⅝"	2¼"	5⅜"	3"	1'-9"	6"	12'-0"	9"	4'-6"	8'-1⅝"	6¾"	9'-0"	15'-0"	15'-3"	60,000 $\frac{KIP \cdot IN}{RAD}$	6'-0"
2	ALL	WF83G	159'-2⅝"	PARTIAL	D	B	–	90°	90°	–	1'-6"	8	6	38	14	2	3½"	4⅜"	10"	●	4'-0"	–	–	12"	2⅝"	2¼"	5⅜"	3"	1'-9"	6"	12'-0"	9"	4'-6"	8'-1⅝"	6⅝"	9'-0"	15'-0"	15'-3"	60,000 $\frac{KIP \cdot IN}{RAD}$	6'-0"

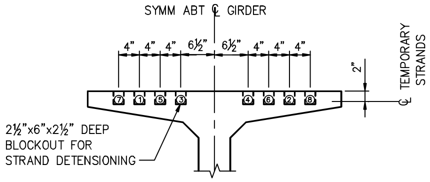
SEE GIRDER NOTE 3

SEE GIRDER NOTE 3



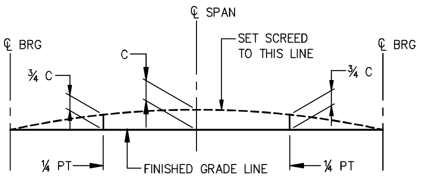
PLAN - PRETENSIONED TEMPORARY TOP STRANDS

SEE GIRDER SCHEDULE FOR NUMBER OF TEMPORARY STRANDS REQUIRED.



SECTION (A/–)

TEMPORARY STRAND LOCATION SEQUENCE SHALL BE AS SHOWN ①, ② ETC.



SCREED SETTING DIMENSIONS

FOR DIMENSION "C" SEE GIRDER SCHEDULE

TEMPORARY STRAND NOTES:

1. FOR GIRDERS ERECTED ON A LONGITUDINAL GRADE, STRAND DETENSIONING BLOCKOUTS SHALL BE PLAM CED AT THE LOW END OF THE GIRDER.
2. SEE SHEET S04 FOR TEMPORARY STRAND DETENSIONING PROCEDURE.

GIRDER NOTES:

1. PLAN LENGTH SHALL BE INCREASED AS NECESSARY TO COMPENSATE FOR SHORTENING DUE TO PRESTRESS AND SHRINKAGE.
2. ALL PRETENSIONED AND TEMPORARY STRANDS SHALL BE 0.6"ø AASHTO M203 GRADE 270 LOW RELAXATION STRANDS, JACKED TO 202.5 KSI (42.9 KIPS PER STRAND).
3. EXTEND STRAIGHT STRANDS ③, ④ AND ⑮ THROUGH ⑳ AT END AHEAD ON STATION.

   EXTEND STRAIGHT STRANDS ⑤, ⑥, AND ⑨ THROUGH ⑭ AT END BACK ON STATION.

* GIRDER STIRRUPS SHALL BE SIZED ACCORDING TO THE EXPECTED VARIATION OF THE "A" DIMENSION TO MEET THE BENDING REQUIREMENTS SHOWN ON SHEET S21.

** FORM WITH EXPANDED POLYSTYRENE (TYP).

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

PRESTRESSED GIRDER DETAILS 1

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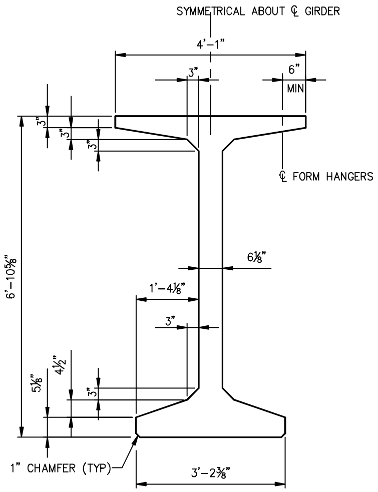
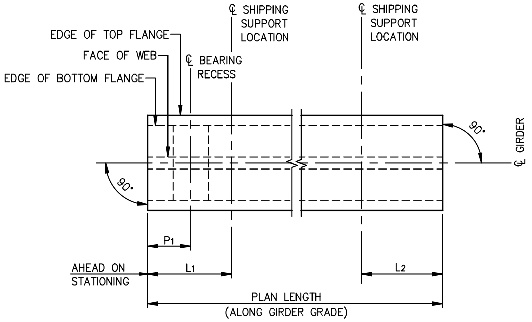
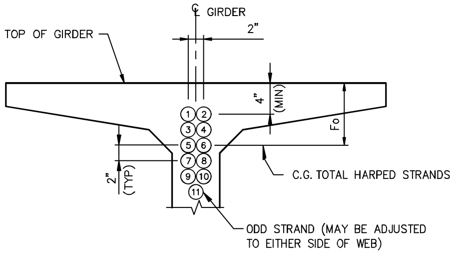


SECTION A –

REINF AND STRANDS NOT SHOWN

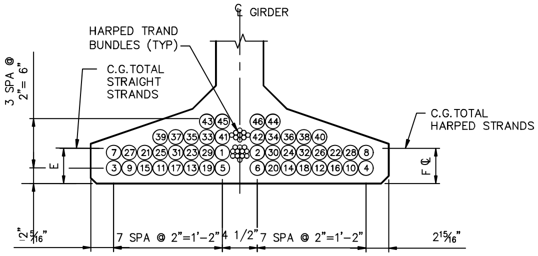


GIRDER PLAN



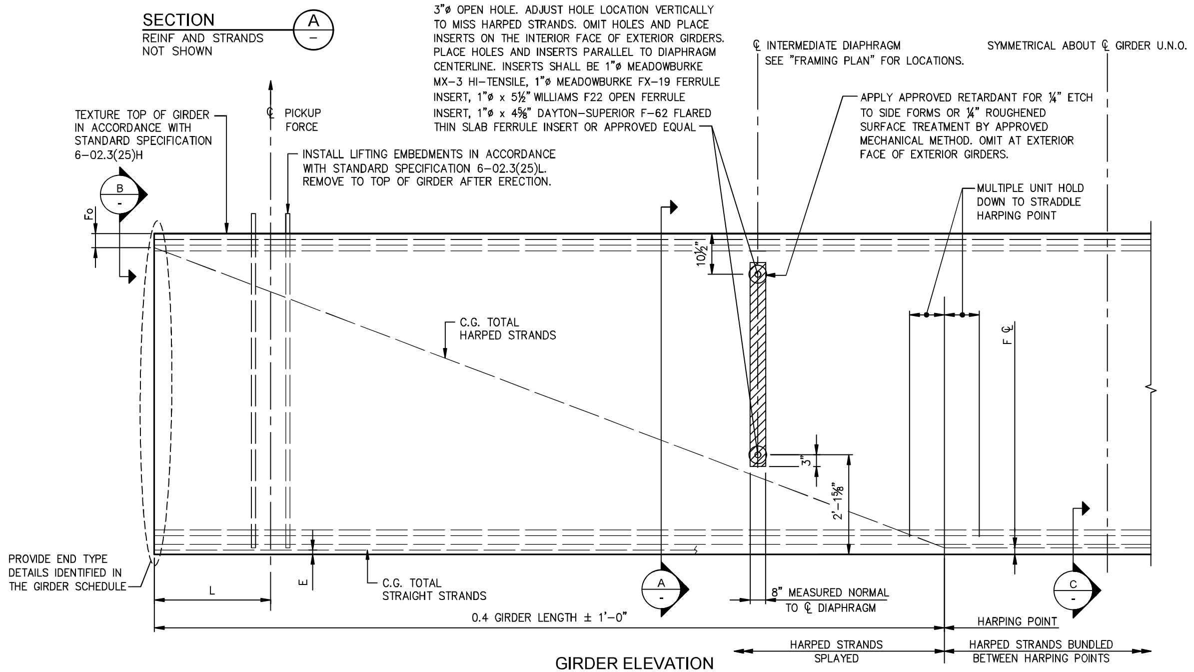
VIEW B –

HARPED STRAND LOCATION SEQUENCE SHALL BE AS SHOWN ①, ②, ETC



SECTION C –

SHAPED STRAND LOCATION SEQUENCE SHALL BE AS SHOWN ①, ②, ETC



GIRDER ELEVATION

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

PRESTRESSED GIRDER DETAILS 2

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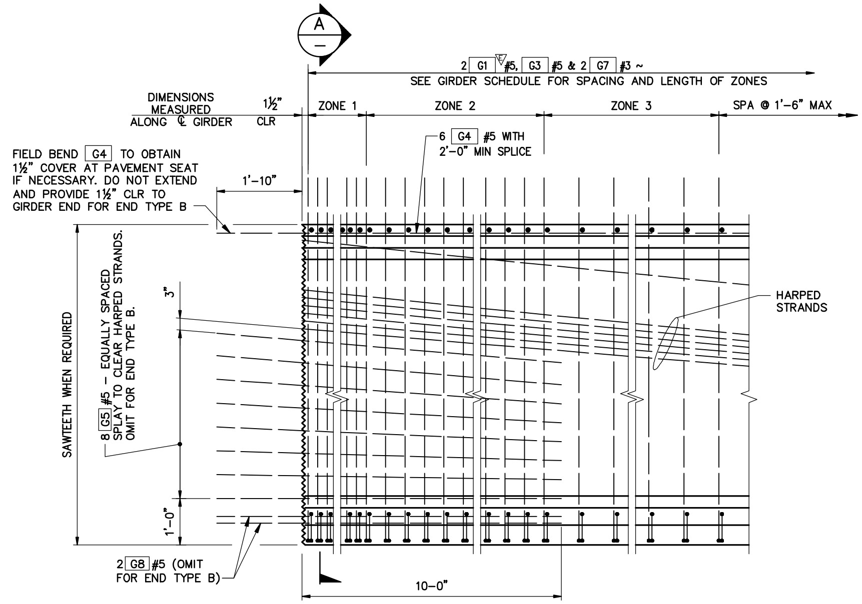
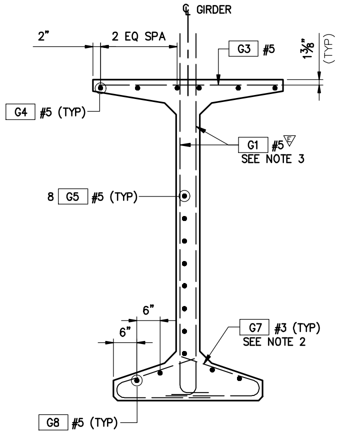
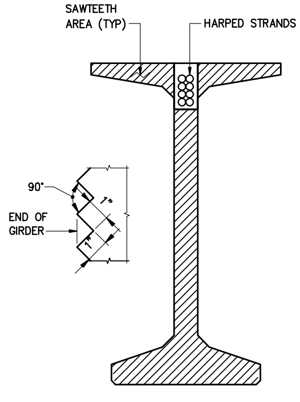


REINFORCEMENT END ELEVATION
STRAIGHT STRANDS NOT SHOWN FOR CLARITY



SECTION A –
STRANDS NOT SHOWN



SAWTEETH DETAILS
SAWTEETH SHALL BE FULL WIDTH OVER AREA SHOWN

GIRDER REINFORCMENT NOTES

1. DEFORMED WELDED WIRE REINFORCEMENT MAY BE SUBSTITUTED FOR MILD REINFORCEMENT IN ACCORDANCE WITH STANDARD SPECIFICATION 6-02.3(25)A.
2. PAIRS OF G7 BARS OR G9 AND G10 BARS MAY BE USED INTERCHANGEABLY AS BOTTOM FLANGE TIES.
3. 1 G2 MAY BE SUBSTITUTED FOR 2 G1 WITHIN ZONE 1.

NOTES

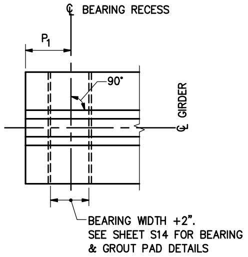
⟨1⟩ 1$1\frac{1}{16}$"ø MIN STRAND CHUCK TACK WELDED TO ASTM A36 ℄ ½" x 4" x 0'-4" WITH ¾"ø HOLE PRIOR TO INSTALLING ON STRAND, ASTM A108 2¾"ø x 1⅛" STRAND ANCHOR, OR APPROVED EQUAL (TYP). VERIFY STRAND GRIPS ARE SEATED TIGHTLY IMMEDIATELY BEFORE PLACING DIAPHRAGM CONCRETE. SECURELY TIE ANCHOR TO THE REBAR CAGE TO PREVENT DISPLACEMENT DURING CONCRETE PLACEMENT.

⟨2⟩ CUT ALL STRANDS FLUSH WITH THE GIRDER ENDS AND PAINT WITH AN APPROVED EPOXY RESIN, EXCEPT FOR EXTENDED STRANDS AS SHOWN.

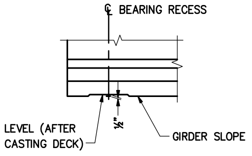
⟨3⟩ MEASURED NORMAL TO ℄ DIAPHRAGM

⟨4⟩ APPLY APPROVED RETARDANT FOR ¼" ETCH TO SIDE FORMS OR ¼" ROUGHENED SURFACE TREATMENT BY APPROVED MECHANICAL METHOD. OMIT AT EXTERIOR FACE OF EXTERIOR GIRDERS.

⟨5⟩ ADJUST HOLE LOCATION VERTICALLY TO MISS HARPED STRANDS. OMIT HOLES AND PLACE INSERTS ON THE INTERIOR FACE OF EXTERIOR GIRDERS. PLACE HOLES AND INSERTS PARALLEL TO DIAPHRAGM CENTERLINE. INSERTS SHALL BE 1"ø MEADOWBURKE MX-3 HI-TENSILE, 1"ø MEADOWBURKE FX-19 FERRULE INSERT, 1"ø x 5½" WILLIAMS F22 OPEN FERRULE INSERT, 1"ø x 4⅝" DAYTON-SUPERIOR F-62 FLARED THIN SLAB FERRULE INSERT OR APPROVED EQUAL.



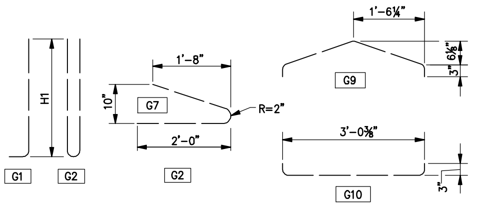
PLAN



ELEVATION

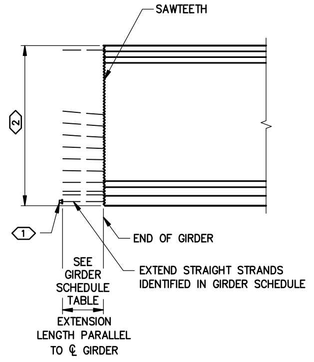
BEARING RECESS AND BOTTOM FLANGE SPALL PROTECTION DETAIL
BEARING RECESS FORMS SHALL BE CONSTRUCTED AND FASTENED TO AVOID GIRDER DAMAGE DURING STRAND RELEASE.

BENDING DIAGRAM
(ALL DIMENSIONS ARE OUT TO OUT)

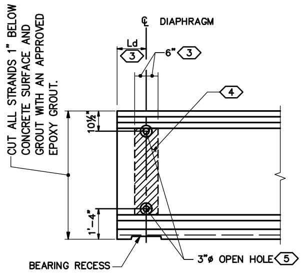


PAIRS OF G7 BARS, OR G9 AND G10 BARS, MAY BE USED INTERCHANGEABLY AS BOTTOM FLANGE TIES.

1 G2 MAY BE SUBSTITUTED FOR 2 G1 WITHIN ZONE 1.



STRAND EXTENSION DETAIL - END TYPE D



END TYPE B
MEASURED NORMAL TO ℄ DIAPHRAGM

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

PRESTRESSED GIRDER DETAILS 3

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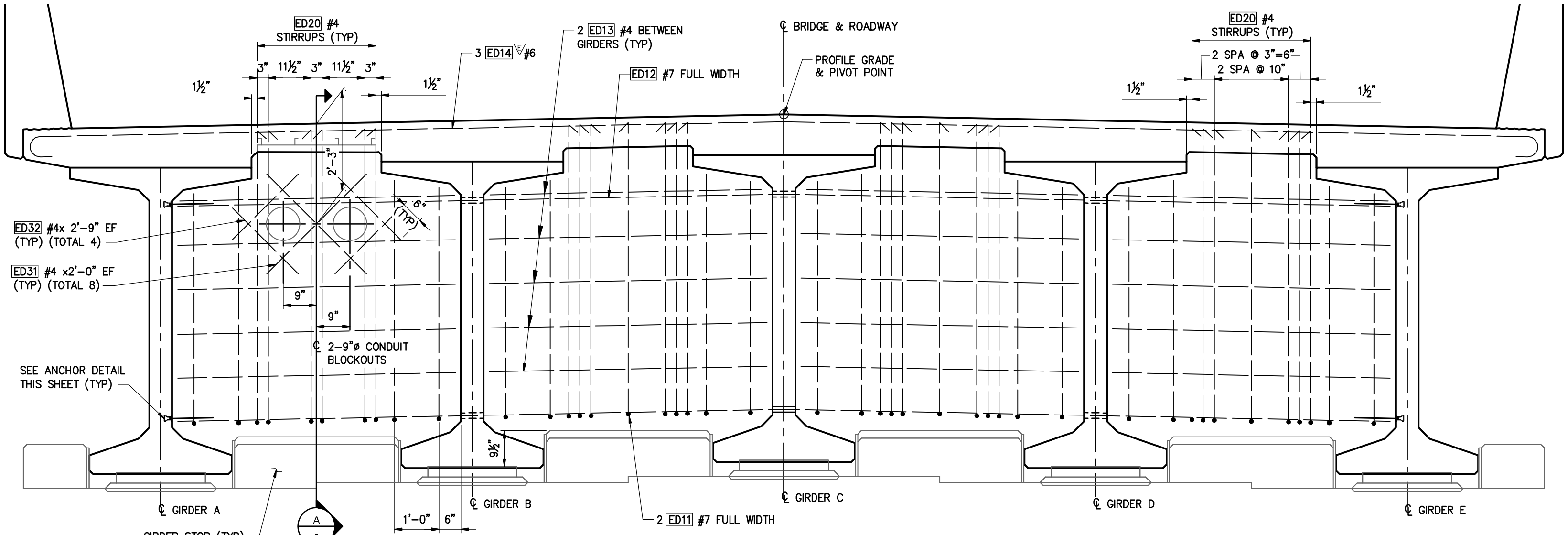
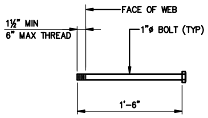


END DIAPHRAGM ELEVATION

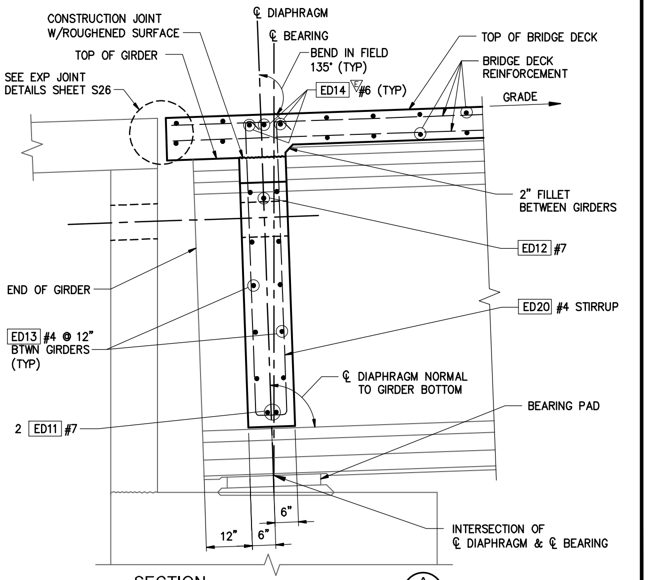
LOOKING AHEAD ON STATIONING
PIER 3 SHOWN, PIER 1 SIMILAR
DIMENSIONS ARE ALONG CL DIAPHRAGM

DIAPHRAGM NOTES:

1. GIRDERS SHALL BE HELD RIGIDLY IN PLACE WHEN DIAPHRAGMS ARE PLACED.
2. IT MAY BE NECESSARY TO THREAD #7 REINFORCING BARS THROUGH HOLES IN GIRDERS PRIOR TO PLACING EXTERIOR GIRDERS.
3. CUT/RELEASE GIRDER TEMPORARY STRANDS BEFORE CASTING DIAPHRAGM. SEE TEMPORARY STRAND CUTTING SEQUENCE.
4. FOR CONCRETE PLACEMENT PROCEDURE SEE SHEET S04.



ANCHOR DETAIL



SECTION A –

DIAPHRAGM AT PIER 1 SHOWN, PIER 3 SIMILAR
GIRDER STOP NOT SHOWN FOR CLARITY
LONGITUDINAL DIMENSIONS ARE NORMAL TO DIAPHRAGM

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

END DIAPHRAGM DETAILS

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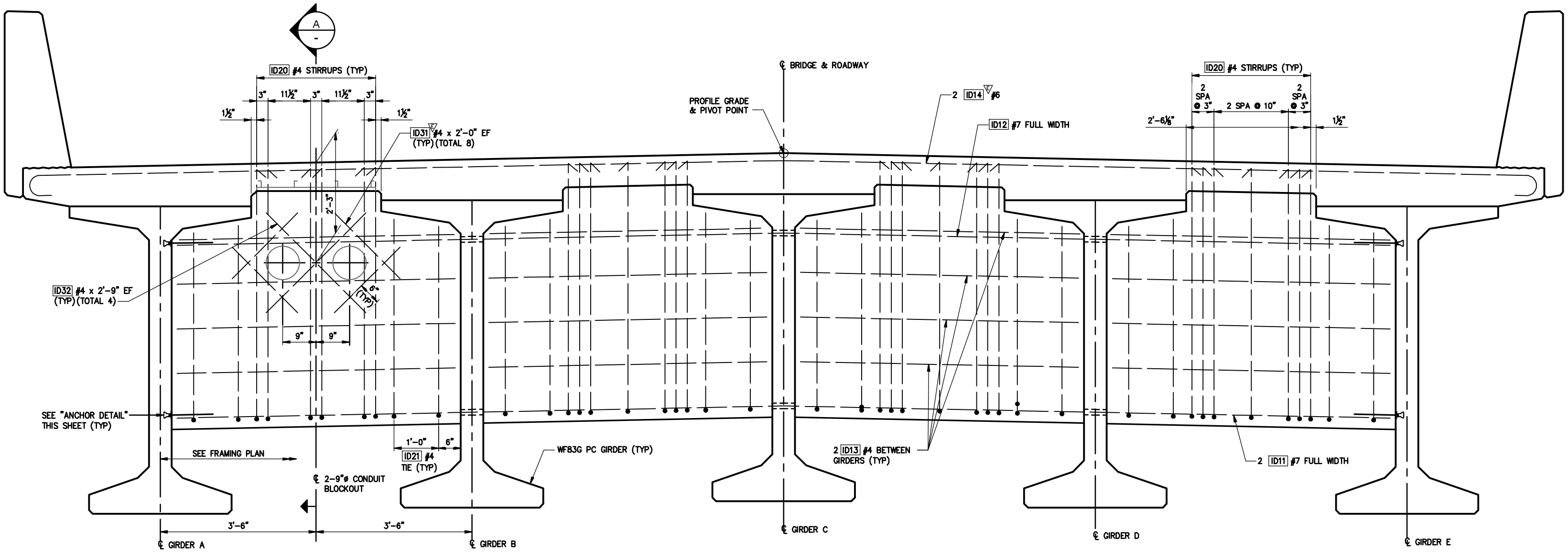
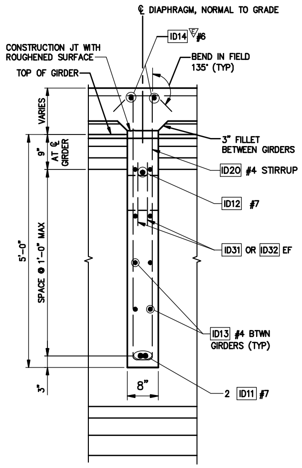


INTERMEDIATE DIAPHRAGM ELEVATION

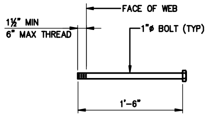
LOOKING AHEAD ON STATIONING

DIAPHRAGM NOTES:

1. GIRDERS SHALL BE HELD RIGIDLY IN PLACE WHEN DIAPHRAGMS ARE PLACED.
2. IT MAY BE NECESSARY TO THREAD REINFORCING BARS THROUGH HOLES IN GIRDERS PRIOR TO PLACING EXTERIOR GIRDERS.
3. CUT/RELEASE GIRDER TEMPORARY STRANDS BEFORE CASTING DIAPHRAGM. SEE TEMPORARY STRAND CUTTING SEQUENCE.
4. LONGITUDINAL DIMENSIONS ARE NORMAL TO SKEW.
5. FOR CONCRETE PLACEMENT PROCEDURE SEE SHEET S04.
6. CLEAR COVER AROUND BLOCKOUTS SHALL BE 1".



SECTION A –



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INTERMEDIATE DIAPHRAGM DETAILS

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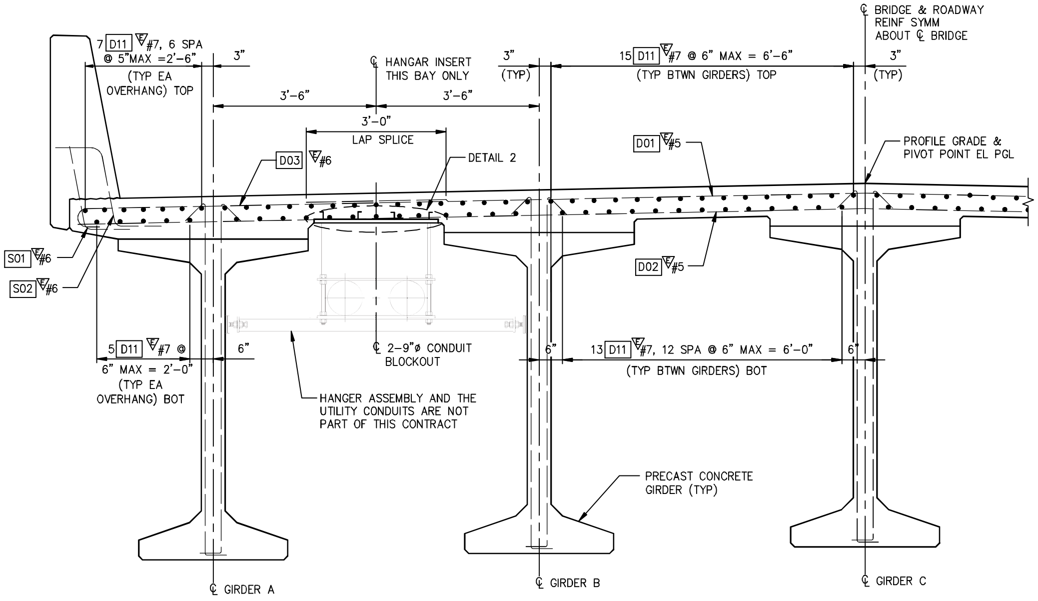
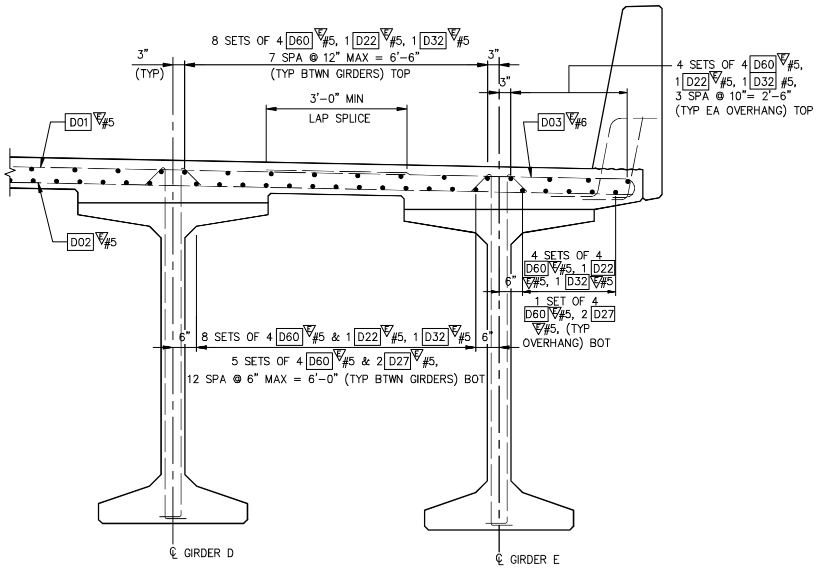


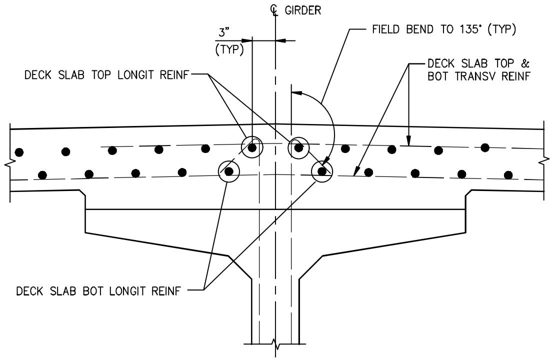
TYPICAL REINFORCING SECTION NEAR PIER 2

LOOKING AHEAD ON STATIONING

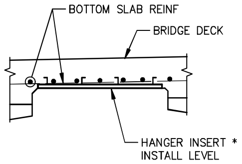


TYPICAL REINFORCING SECTION AT MIDSPAN

LOOKING AHEAD ON STATIONING



GIRDER HOOK DETAIL



DETAIL 2
—

* COOPER B-LINE B22-I-32, POWERSTRUT PS 349 2'8" CS/EC, OR UNISTRUT P3257, WITH SPRING NUT (TYP.). CHASE THREADS ON HANGER ROD FOR THREAD COMPATIBILITY WITH SPRING NUT. INSERT TO BE INSTALLED LEVEL LONGITUDINALLY AND TRANSVERSELY. PLACE INSERT TO PROVIDE FOR TRANSVERSE ADJUSTMENT OF HANGER RODS. HANGER RODS SHALL NOT BE WITHIN 2" OF THE END OF THE INSERT. TWO INSERTS MAY BE USED TO ACCOMMODATE SUPERELEVATION.

NOTES:

1. BAR D11 #7 IS 50'-0" LONG, PLACE AS SHOWN IN PLAN VIEWS.
2. SEE SHEET S27 FOR TRAFFIC BARRIER REINFORCEMENT EMBEDDED IN THE BRIDGE DECK.

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

DECK REINFORCING - TYPICAL SECTION

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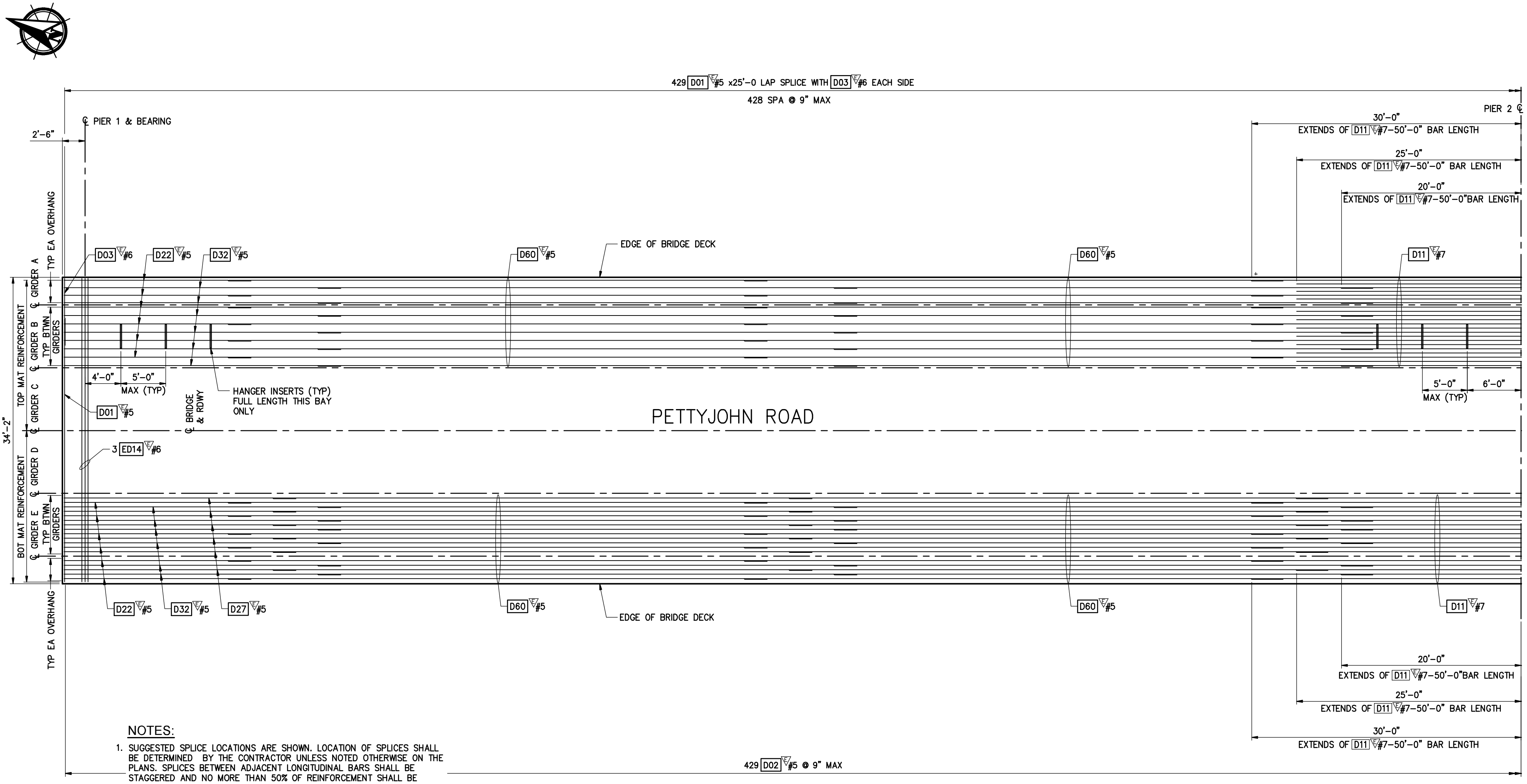

NOTES:

1. SUGGESTED SPLICE LOCATIONS ARE SHOWN. LOCATION OF SPLICES SHALL BE DETERMINED BY THE CONTRACTOR UNLESS NOTED OTHERWISE ON THE PLANS. SPLICES BETWEEN ADJACENT LONGITUDINAL BARS SHALL BE STAGGERED AND NO MORE THAN 50% OF REINFORCEMENT SHALL BE SPLICED AT ANY ONE LOCATION.

   THE MIN LAP SPLICE OF ▽#5 IS 2'-6"
   THE MIN LAP SPICE OF ▽#6 IS 3'-0"
   THE MIN LAP SPLICE OF ▽#7 IS 3'-6"

2. REINFORCEMENT IS SYMMETRICAL ABOUT THE CENTERLINE OF THE BRIDGE.

3. SEE SHEETS S27 & S28 FOR BARRIER REINFORCEMENT EMBEDDED IN THE BRIDGE DECK.

BRIDGE DECK REINFORCEMENT PLAN - SPAN 1

ALL TRANSVERSE REINFORCING ARE PLACED NORMAL TO ℄ BRIDGE

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

DECK REINFORCING SPAN 1

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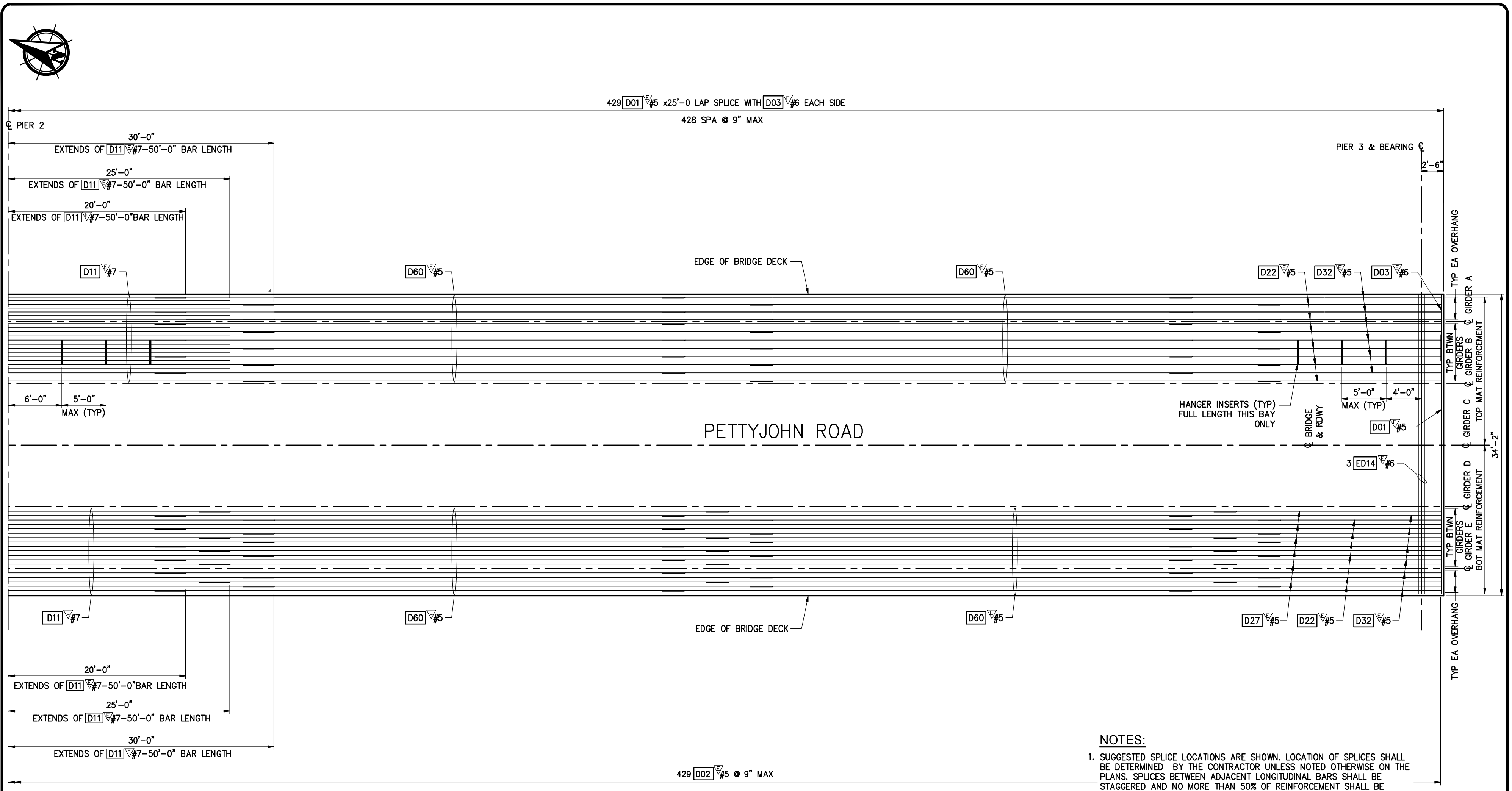

BRIDGE DECK REINFORCEMENT PLAN - SPAN 2

ALL TRANSVERSE REINFORCING ARE PLACED NORMAL TO ℄ BRIDGE

NOTES:

1. SUGGESTED SPLICE LOCATIONS ARE SHOWN. LOCATION OF SPLICES SHALL BE DETERMINED BY THE CONTRACTOR UNLESS NOTED OTHERWISE ON THE PLANS. SPLICES BETWEEN ADJACENT LONGITUDINAL BARS SHALL BE STAGGERED AND NO MORE THAN 50% OF REINFORCEMENT SHALL BE SPLICED AT ANY ONE LOCATION.

   THE MIN LAP SPLICE OF #5 IS 2'-6"
   THE MIN LAP SPICE OF #6 IS 3'-0"
   THE MIN LAP SPLICE OF #7 IS 3'-6"

2. REINFORCEMENT IS SYMMETRICAL ABOUT THE CENTERLINE OF THE BRIDGE.

3. SEE SHEETS S27 & S28 FOR BARRIER REINFORCEMENT EMBEDDED IN THE BRIDGE DECK.

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DATE:	ISSUED / REVISED	BY:
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21020015

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

DECK REINFORCING SPAN 2

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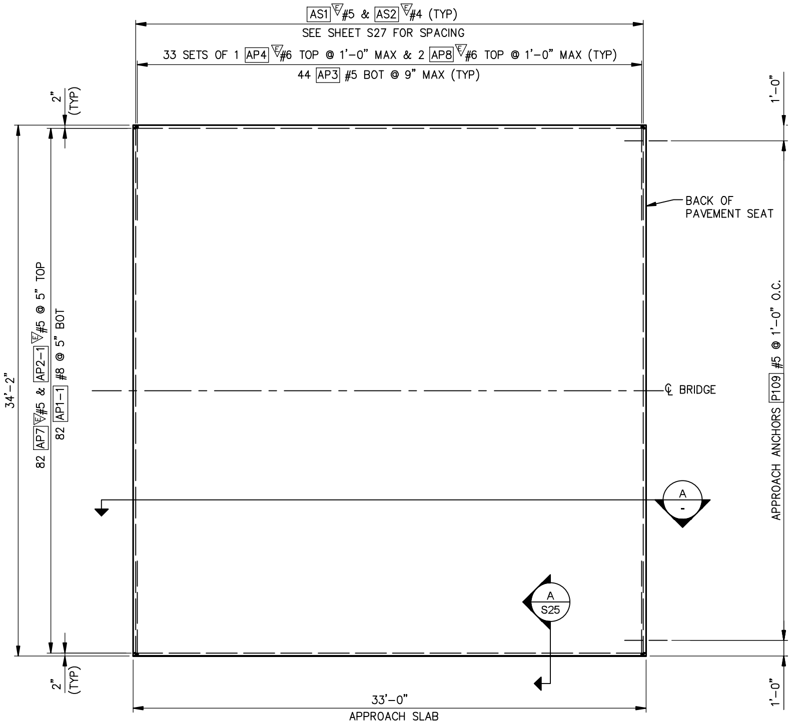
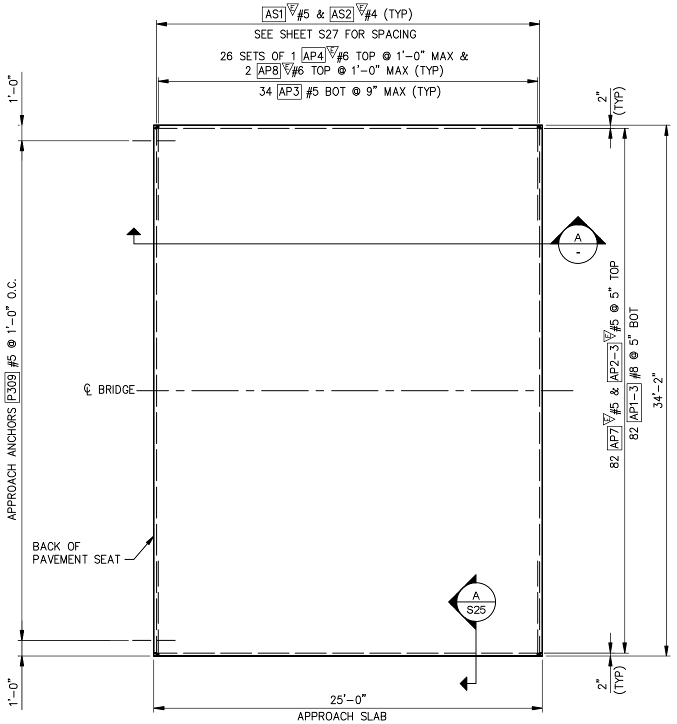


NORTH APPROACH SLAB PLAN

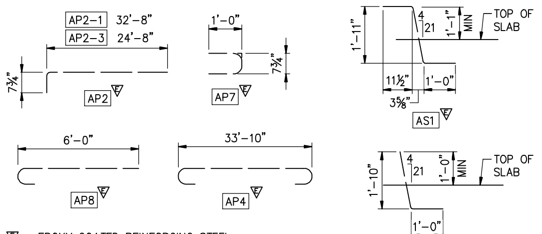


SOUTH APPROACH SLAB PLAN

APPROACH SLAB NOTES:

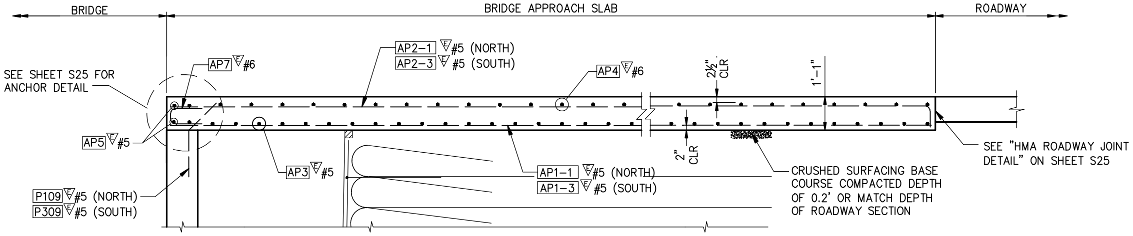
1. ALL EDGES OF BRIDGE APPROACH SLAB SHALL HAVE 1/2" RADIUS EXCEPT ADJACENT TO L-TYPE ABUTMENTS.
2. THE MINIMUM LAP SPLICE OF #5 IS 2'-0", ▽#5 IS 2'-6", ▽#6 IS 3'-0", AND #8 IS 3'-3". ALL LAP SPLICES SHALL BE STAGGERED SO THAT NO MORE THAN 50% OF REBAR IS SPLICED AT THE SAME LOCATION. LAP SPLICES SHALL BE LOCATED WITHIN THE MIDDLE HALF OF THE BRIDGE APPROACH SLAB. OPTIONAL SPLICES ARE ALLOWED FOR AP4 ▽#6.
3. FOR TRAFFIC BARRIER DETAILS, SEE TRAFFIC BARRIER SHEETS.

BENDING DIAGRAM



▽ = EPOXY COATED REINFORCING STEEL

NOTE: ALL DIMENSIONS ARE OUT TO OUT



SECTION A
–

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

APPROACH SLAB LAYOUT

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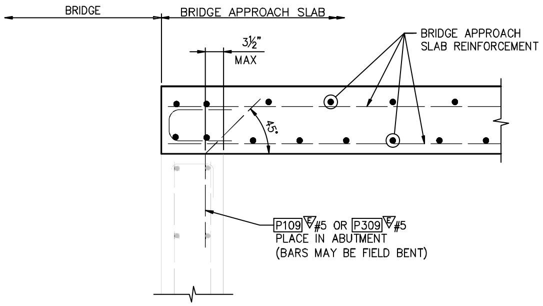
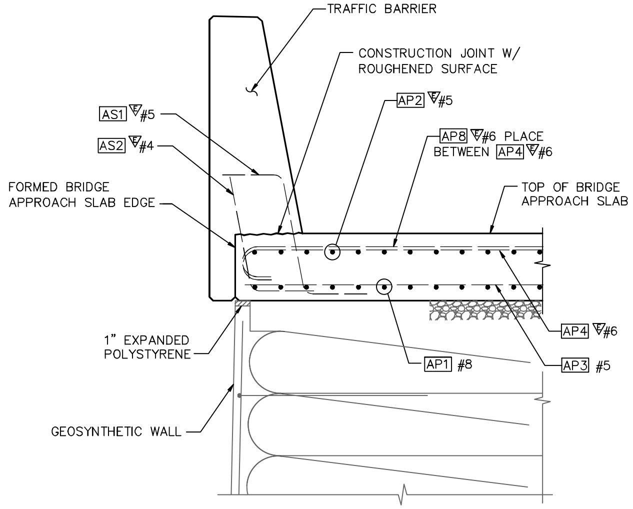
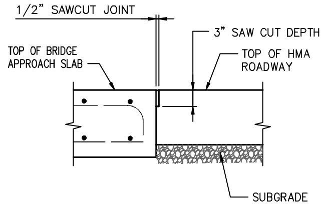


ANCHOR DETAILS



SECTION A S24



HMA ROADWAY JOINT DETAIL

SAWCUT SHALL BE FILLED WITH HOT-POURED COMPONENT AND SEALED IN ACCORDANCE WITH WSDOT STANDARD SPECIFICATION, AND WSDOT STD PLAN A-40.20 DETAIL 3.

P:\2020\2020025 – Walla Walla Dell Sharpe Bridge Replacement\000 CAD\010 Drawing\C-Structural Sheet\S21-28.dwg\TAB:S25 modified by djensen on Jan 14, 2022 – 16:52

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INTERMEDIATE DIAPHRAGM ELEVATION

DATE:	ISSUED / REVISED	BY:
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DELL SHARPE BRIDGE REPLACEMENT PROJECT

APPROACH SLAB DETAILS

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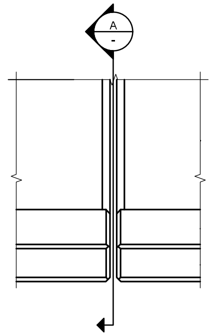
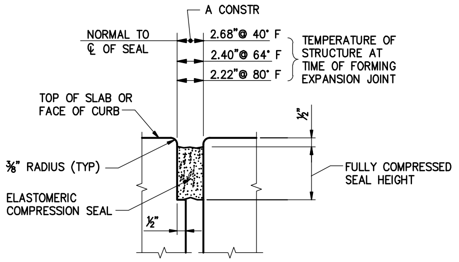


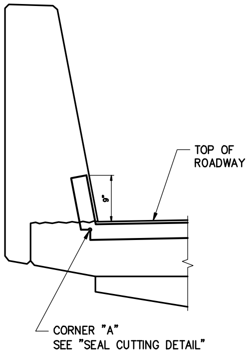
EXPANSION JOINT PLAN



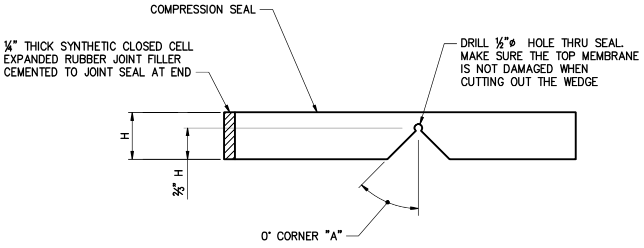
COMPRESSION SEAL DETAIL

COMPRESSION SEAL TABLE			
D. S. BROWN		WATSON BOWMAN ACME	
SEAL	WIDTH	SEAL	WIDTH
CV–4000	4"	WA–4000	4"

TESTING SHALL BE PER ASTM D2628 PRIOR TO USE



SECTION A/–



SEAL CUTTING DETAIL

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

EXPANSION JOINT DETAILS

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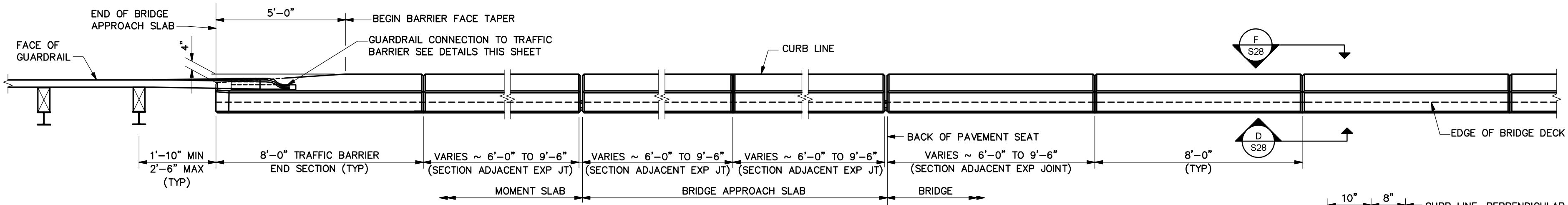
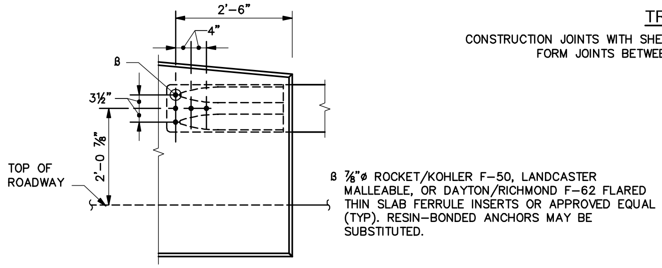


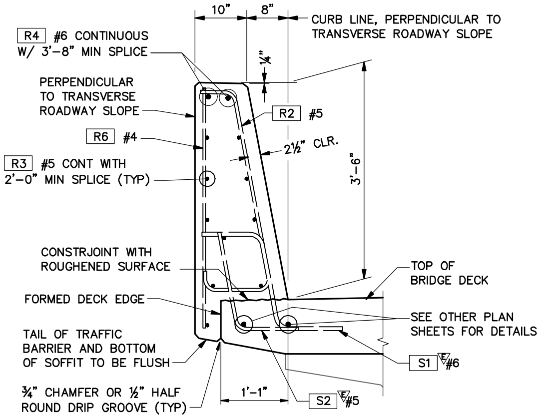
TRAFFIC BARRIER PLAN

CONSTRUCTION JOINTS WITH SHEAR KEYS ARE PERMISSIBLE AT DUMMY JOINT LOCATIONS.
FORM JOINTS BETWEEN DUMMY JOINTS SHALL NOT BE PERMITTED.

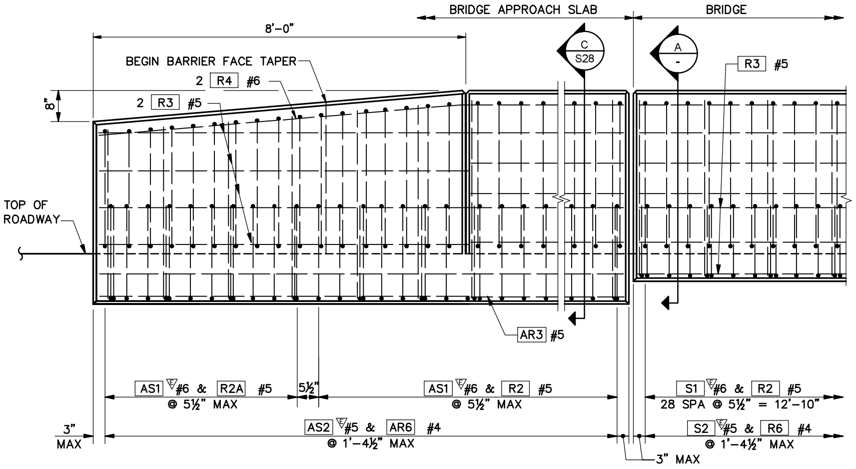


GUARDRAIL CONNECTION ELEVATION

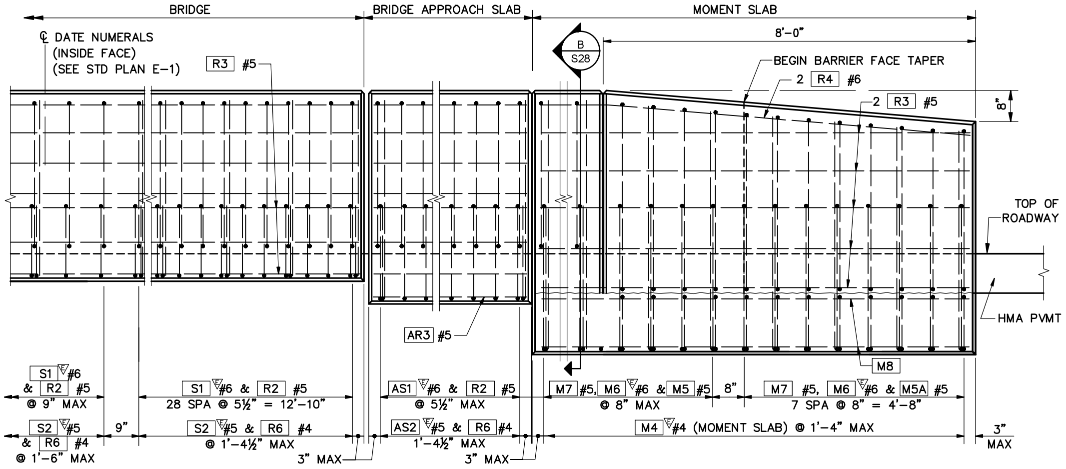
W-BEAM END SECTION DESIGN "F" (SEE STD. PLAN C-7)



SECTION A



TRAFFIC BARRIER OUTSIDE ELEVATION



TRAFFIC BARRIER OUTSIDE ELEVATION

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

TRAFFIC BARRIER DETAILS 1

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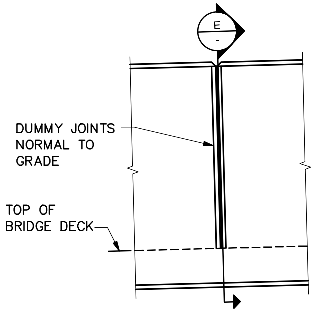
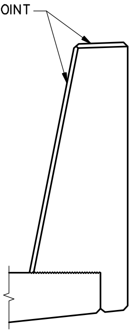
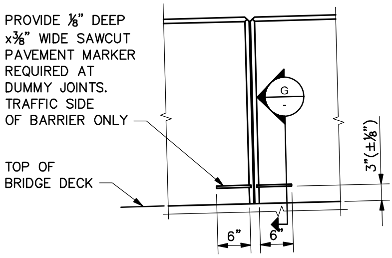


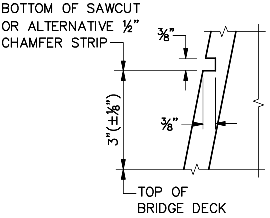
VIEW D S27



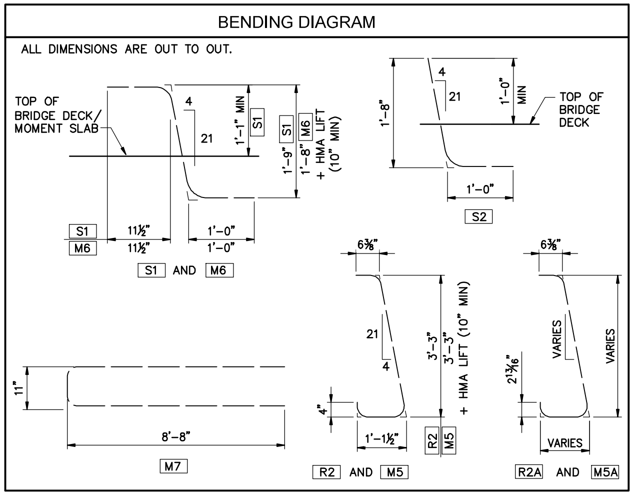
SECTION E -

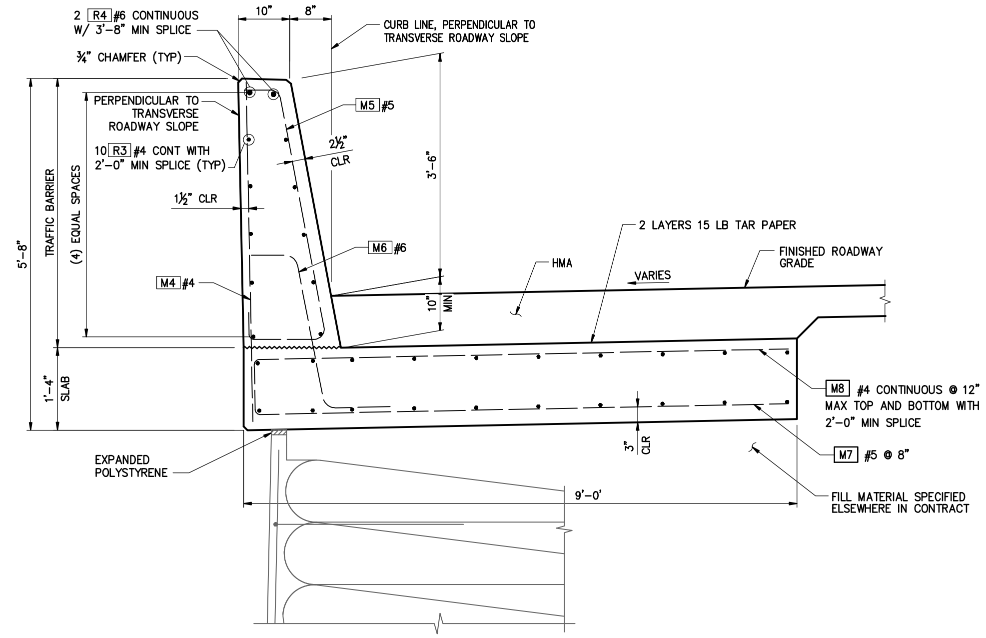


VIEW F S27

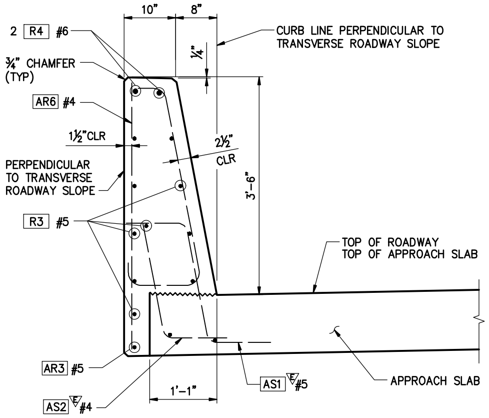


SECTION G -
PAVEMENT MARKER





MOMENT SLAB ON GEOSYNTHETIC WALL TRAFFIC BARRIER SECTION B S27



SECTION C S27
ON APPROACH SLAB

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

TRAFFIC BARRIER DETAILS 2

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C:\Users\cheering\AppData\Local\Temp\AcPublish_212\BAR LIST.dwg\TAB:S29 modified by cheering on Jan 17, 2022 – 11:22

S=BAR IS INCLUDED IN SUBSTRUCTURE QUANTITIES

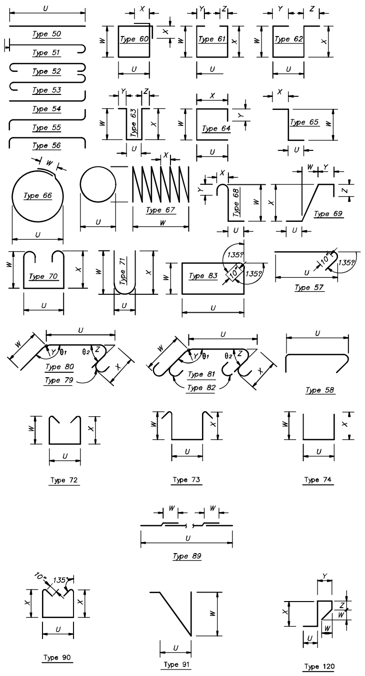
T=TIE OR STIRRUP

E=BAR IS TO BE EPOXY COATED

DIMENSIONS (OUT TO OUT)

MARK	DESCRIPTION	SIZE	NUM	BEND	TIE	SUBS	EPOXY	VARIES	# EA	U		W		X		Y		Z		Θ1	Θ2	W/L	LENGTH		LENGTH		LENGTH		WEIGHT
#			REQD							FT		FT	IN	FT	IN	FT	IN	FT	IN	DEG	DEG		FT	IN	FT	IN	FT	IN	LBS
SHAFT																													
P230	LONG COL PIER 2	14	24	50		S				60.00	0.00											7.7	60.00	0.000			1440.00000		11016
P231	SPIRAL COL PIER 2	5	1	67		S				6.00	2.00	60.00	0.00	0.00	6.00	3.00	0.00	60.00	0.00			1.0	2421.00	2.600			2421.21667		2525
P120	LONG SHAFT PIER 1	11	18	50		S				35.00	1.00											5.3	35	1			631.50000		3355
P121	SPIRAL SHAFT PIER 1	5	1	67		S				4.00	0.00	35.00	1.00	0.00	6.00	3.00	0.00	60.00	0.00			1.0	914	6.2			914.51667		954
P320	LONG SHAFT PIER 3	11	18	50		S				41.00	3.40											5.3	41	3.4			743.10000		3948
P321	SPIRAL SHAFT PIER 3	5	1	67		S				4.00	0.00	41.00	3.40	0.00	6.00	3.00	0.00	60.00	0.00			1.0	1076	1.6			1076.13333		1122
P220	LONG SHAFT PIER 2	14	32	50		S				32.00	0.00											7.7	32	0			1024.00000		7834
P221	SPIRAL SHAFT PIER 2	5	1	67		S				8.00	0.00	32.00	0.00	0.00	6.00	3.00	0.00	60.00	0.00			1.0	1678	3.1			1678.25833		1750
PIER 1&3 CAP																													
P101	LONG BOT	9	13	50						33.000	11.000											3.4	33	11			440.91667		1499
P102	LONG TOP	9	13	50						33.000	11.000											3.4	33	11			440.91667		1499
P103	LONG FACE	9	12	50						33.000	8.000											3.4	33	8			404.00000		1374
P104	TRANS STIRRUP	6	53	83	T					6.000	9.000	4.000	9.000									1.5	23.000	9.7			1261.84167		1896
P105	TRANS STIRRUP	6	106	72	T					4.000	0.000	4	9	4	9							1.5	14	5.6			1533.46667		2303
P106	LONG FACE BW	5	14	50						33.000	8.000											1.0	33	8			471.33333		492
P107	BW DOWEL	6	72	50	T					9.000	6.000											1.5	9	6			684.00000		1027
P108	BW TOP STIRRUP	4	36	56	T					0.000	9.000											0.7	1	3.9			47.70000		32
P109	APR SLAB CONNECTOR	5	35	69	T					0.000	9.000	1.000	6.000	1.000	6.000	0.00	0.00	0	0			1.0	2	10.1			99.45833		104
P131	UTL BLOCKOUT	5	4	50	T					2.000	9.000											1.0	2	9			11.00000		11
P132	UTL BLOCKOUT	5	8	50	T					2.000	0.000											1.1	2	0			16.00000		17
P301	LONG BOT	9	13	50						33.000	11.000											3.4	33	11			440.91667		1499
P302	LONG TOP	9	13	50						33.000	11.000											3.4	33	11			440.91667		1499
P303	LONG FACE	9	12	50						33.000	8.000											3.4	33	8			404.00000		1374
P304	TRANS STIRRUP	6	53	83	T					6.000	9.000	4.000	9.000									1.5	23	9.7			1261.84167		1896
P305	TRANS STIRRUP	6	106	72	T					4.000	0.000	4.000	9.000	4.000	9.000							1.5	14	5.6			1533.46667		2303
P306	LONG FACE BW	5	14	50						33.000	8.000											1.0	33	8			471.33333		492
P307	BW DOWEL	6	72	50	T					9.000	6.000											1.5	9	6			684.00000		1027
P308	BW TOP STIRRUP	4	36	56	T					0.000	9.000											0.7	1	3.9			47.70000		32
P309	APR SLAB CONNECTOR	5	35	69	T					0.000	9.000	1.000	6.000	1.000	6.000	0.000	0.000	0.000	0.000			1.0	2	10.1			99.45833		104
P331	UTL BLOCKOUT	5	4	50	T					2.000	9.000											1.0	2	9			11.00000		11
P332	UTL BLOCKOUT	5	8	50	T					2.000	0.000											1.1	2	0			16.00000		17
P110	GIRDER STOP	5	20	74						1.000	9.000	2.000	1.000	2.000	1.000							1.0	5	7.9			113.16667		118
P111	GIRDER STOP	4	16	74						3.000	2.200	1.000	6.000	1.000	6.000							0.7	5	11.7			95.60000		64
P112	GIRDER STOP	4	8	74						1.000	2.100	1.000	6.000	1.000	6.000							0.7	3	11.6			31.73333		21
P310	GIRDER STOP	5	20	74						1.000	9.000	2.000	1.000	2.000	1.000							1.0	5	7.9			113.16667		118
P311	GIRDER STOP	4	16	74						3.000	2.200	1.000	6.000	1.000	6.000							0.7	5	11.7			95.60000		64
P312	GIRDER STOP	4	8	74						1.000	2.100	1.000	6.000	1.000	6.000							0.7	3	11.6			31.73333		21
																											0.00000		
PIER 2 CAP																											0.00000		
P201	LONG BOT	9	12	80						6.000	0.000	12.000	4.800	12.000	4.800	3.000	0.000	3.000	0.000	166	166	3.4	30	9.2			369.20000		1255
P202	LONG TOP CAP	11	20	50						27.000	11.000											5.3	27	11			558.33333		2966
P203	LONG TOP CAP	11	20	50						27.000	11.000											5.3	27	11			558.33333		2966
P205	STIRRUP	6	57	72	T			√	1	6.000	9.000	6.000	0.000	6.000	0.000							1.3	19	8.6			1123.85000		1431
										6.000	9.000	3.000	0.000	3.000	0.000								13	8.6			0.00000		
P206	STIRRUP	6	57	72	T			√	1	3.000	6.000	6.000	0.000	6.000	0.000							1.2	16	5.6			938.60000		1153
										3.000	6.000	3.000	0.000	3.000	0.000								10	5.6			0.00000		
P210	LONG FACE	9	12	50						33.000	11.000											3.4	33	11			407.00000		1384
P215	LONG FACE	6	80	50						7.000	0.000											1.5	7	0			560.00000		841
P222	STIRRUP	6	26	72	T			√	1	6.000	9.000	6.000	0.000	6.000	0.000							2.0	19	8.6			512.63333		1024
										6.000	9.000	13.000	0.000	12.000	0.000								32	8.6			0.00000		
P223	TIE	5	52	50	T					6.000	9.000											1.0	6	9			351.00000		366
P225	TIE	5	260	58	T					6.000	9.000											1.0	7	6.9			1969.50000		2054
P226	TIE	5	50	58	T					4.000	0.000											1.0	4	9.9			241.25000		252
P208	END REIF	5	10	74	T					6.000	9.000	1.000	0.000	1.000	0.000							1.0	8	6.4			85.33333		89
P209	END REIF	5	22	74	T					6.000	9.000	2.000	0.000	2.000	0.000							1.0	10	6.4			231.73333		242
P207	END REIF	5	14	50	T					8.000	0.000											1.0	8	0			112.00000		117
END DIAPHRAGM																													
ED11	LONG BOT	7	4	80						14.000	0.000	14	0	0	0	3.00	0.00	0	0	178	0	2.0	27	12			112.00000		229
ED12	LONG MID	7	2	80						14.000	0.000	14	0	0	0	3.00	0.00	0	0	178	0	2.0	27	12			56.00000		114
ED13	LONG FACE	4	80	50						7.000	0.000											0.7	7	0			560.00000		374
ED14	LONG FACE	6	6	52						28.000	0.000											1.5	29	4.5			176.25000		265
ED20	STIRRUP	4	56	72	T					5.000	10.000	0	3	0	3							0.7	6	10.8			386.40000		258
ED31	UTIL BLOCKOUT	4	16	50						2.000	0.000											0.7	2	0			32.00000		21
ED32	UTIL BLOCKOUT	4	8	50						2.000	9.000											0.7	2	9			22.00000		15
																											0.00000		
INTERMEDIATE DIAPHRAGM																											0.00000		
ID11	LONG BOT	7	4	80						14.000	0.000	14	0	0	0	3.00	0.00	0	0	178	0	2.0	27	12.0			112.00000		229
ID12	LONG MID	7	2	80						14.000	0.000	14	0	0	0	3.00	0.00	0	0	178	0	2.0	27	12			56.00000		114
ID13	LONG FACE	4	80	50						7.000	0.000											0.7	7	0			560.00000		374
ID14	LONG FACE	6	6	52						28.000	0.000											1.5	29	4.5			176.25000		265
ID20	STIRRUP	4	56	72	T					5.000	10.000	0.000	3.000	0.000	3.000							0.7	6	10.8			386.40000		258
ID31	UTIL BLOCKOUT	4	16	50						2.000	0.000											0.7	2	0			32.00000		21
ID32	UTIL BLOCKOUT	4	8	50						2.000	9.000											0.7	2	9			22.00000		15
																											0.00000		
DECK																											0.00000		
D01	TRANS TOP	5	429	80	T		E			11.000	0.000	11	0	0	0	0.00	3.00	0	0	178	0	1.0	21	12			9438.00000		9843
D02	TRANS BOT	5	429	80	T		E			13.000	0.000	13	0	0	0	0.00	3.00	0	0	178	0	1.0	25	12			11154.00000		11633
D03	TRANS TOP	5	858	54	T		E			6.000	0.000											1.0	6	4.3			5455.45000		5692
D11	LONG PIER	7	136	50			E			50.000	0.000											2.0	50	0			6800.00000		13899

REINFORCEMENT BENDING DIAGRAMS



REINFORCING NOTES:

1. ALL REINFORCING BARS ON THIS SHEET SHALL BE A.S.T.M. A-615. GRADE 60 UNLESS SHOWN OTHERWISE.
2. REINFORCING FOR TRAFFIC BARRIERS NOT SHOWN IN THIS BAR LIST. SEE TRAFFIC BARRIER SHEET.
3. BEND FOR TRANSVERSE BARS DUE TO ROADWAY CROWN CONDITIONS HAVE NOT SHOWN. THESE BARS SHALL BE BENT AS REQUIRED TO CONFIRM TO THE CONFIGURATION OF THE STRUCTURE.
4. REINFORCING OF PRESTRESSED DECK UNITS AND CONCRETE PILING NOT SHOWN IN THIS BAR LIST.

TRANTECH
Engineering LLC

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BELLEVUE, WA 98005
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FAX: 425-453-6779

DATE:	ISSUED / REVISED	BY:
.	.	.

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21020015

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

BAR LIST 1

PROJECT NUMBER
CRP20-02

SHEET
S29

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---- OF XX

S=BAR IS INCLUDED IN SUBSTRUCTURE QUANTITIES

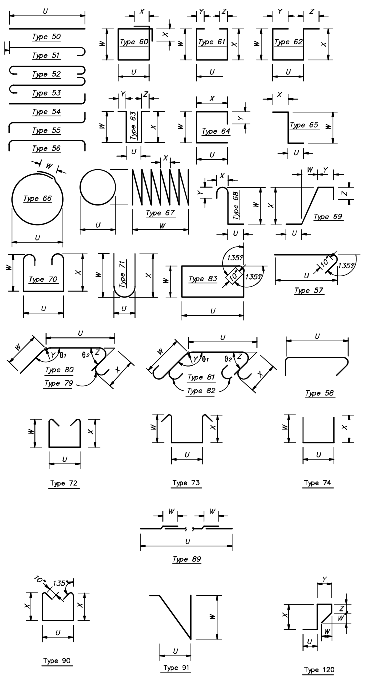
T=TIE OR STIRRUP

E=BAR IS TO BE EPOXY COATED

DIMENSIONS (OUT TO OUT)

MARK	DESCRIPTION	SIZE	NUM	BEND	TIE	SUBS	EPOXY	VARIES	# EA	U		W		X		Y		Z		Θ1	Θ2	W/L	LENGTH		LENGTH		LENGTH		WEIGHT
#			REQD							FT		FT	IN	FT	IN	FT	IN	FT	IN	DEG	DEG		FT	IN	FT	IN	FT	IN	LBS
D22	LONG PIER	5	82	50			E			15.000	0.000											1.0	15	0			1230.00000		1283
D27	LONG PIER BOT	5	172	50			E			15.000	0.000											1.0	15	0			2580.00000		2691
D32	LONG PIER BOT	5	82	50			E			30.000	0.000											1.0	30	0			2460.00000		2566
D60	LONG PIER BOT	5	340	50			E			60.000	0.000											1.0	60	0			20400.00000		21277

REINFORCEMENT BENDING DIAGRAMS



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4. REINFORCING OF PRESTRESSED DECK UNITS AND CONCRETE PILING NOT SHOWN IN THIS BAR LIST.

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

BAR LIST 2

PROJECT NUMBER
CRP20-02

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S30

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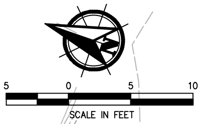
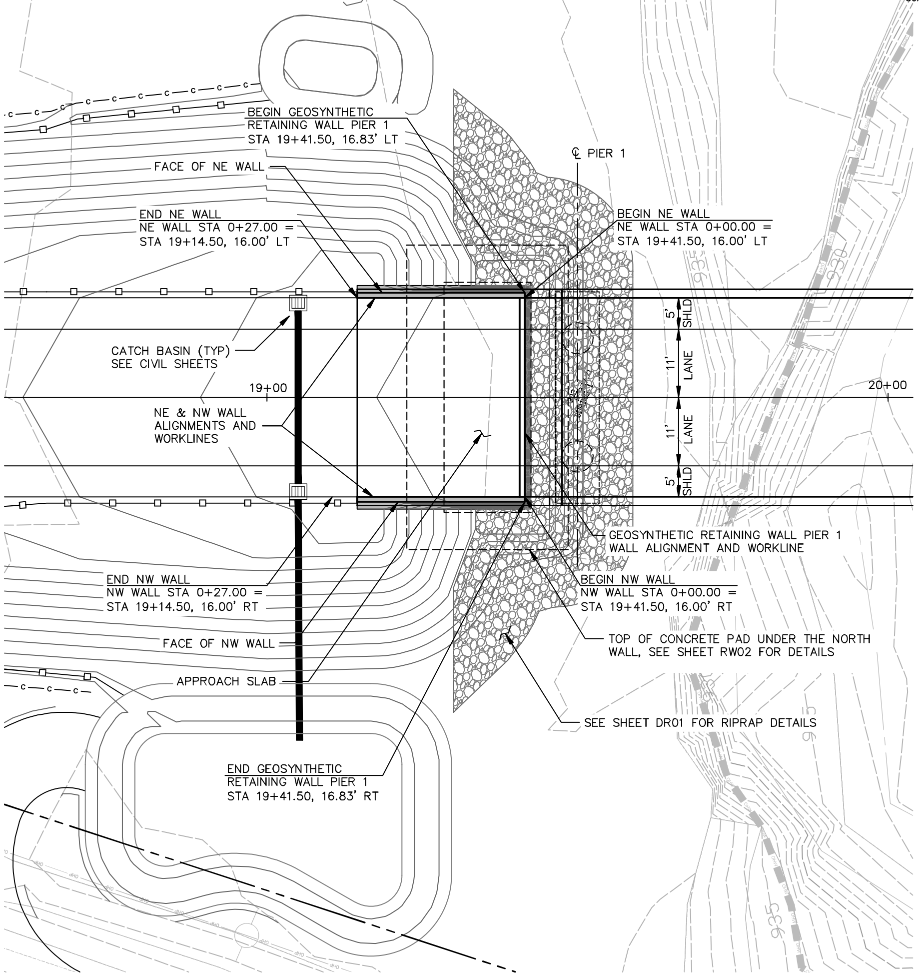
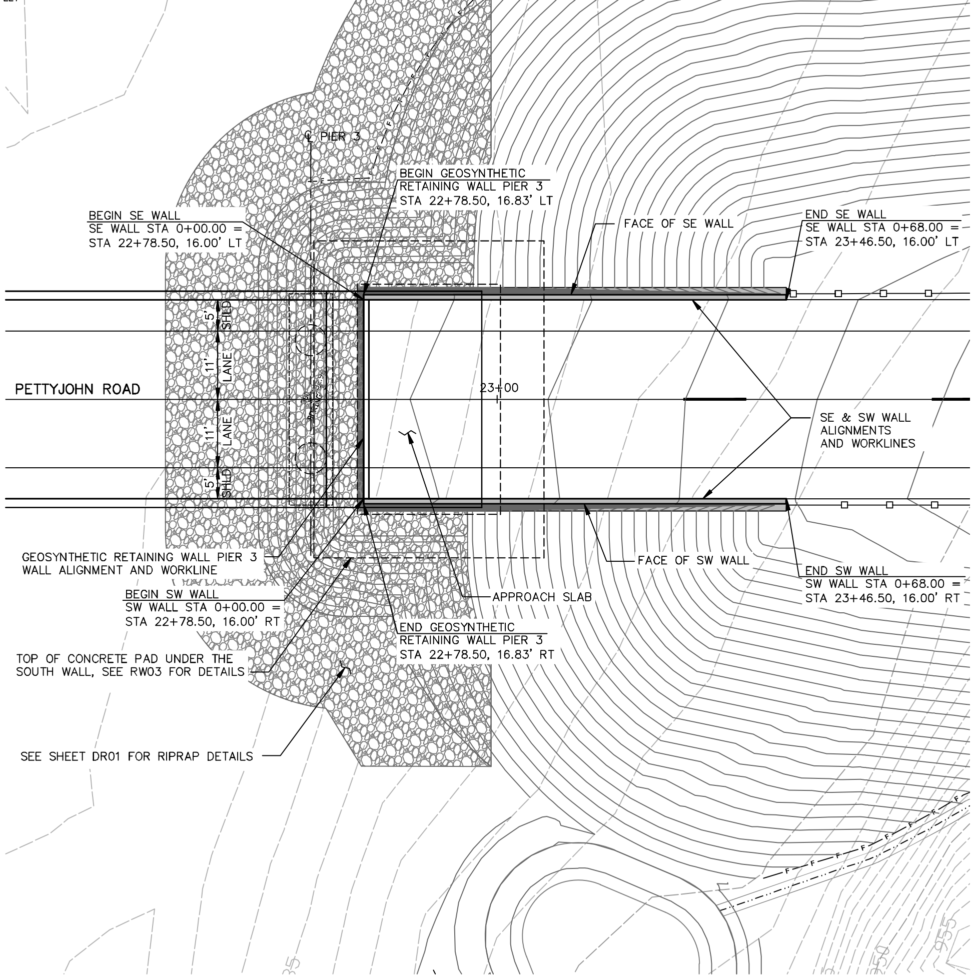
---- OF XX





NORTH APPROACH RETAINING WALL PLAN



SOUTH APPROACH RETAINING WALL PLAN

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

RETAINING WALL LAYOUTS

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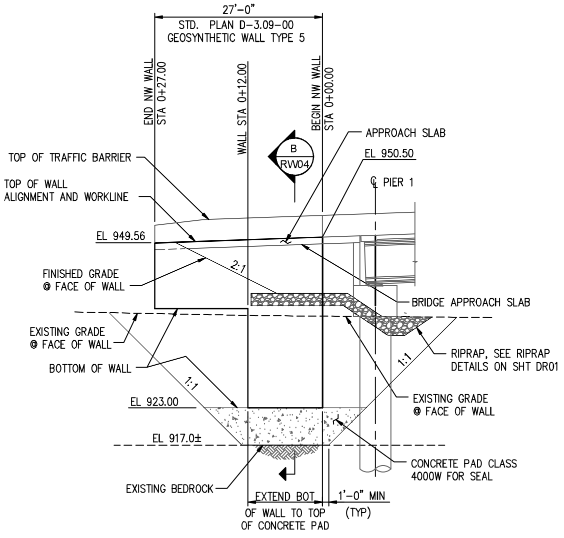
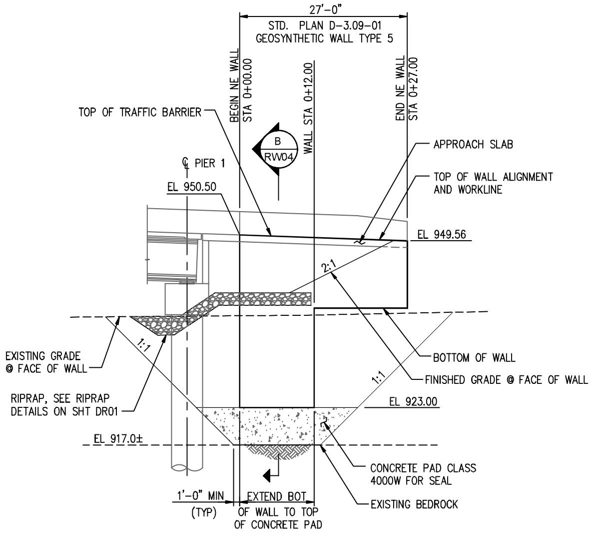
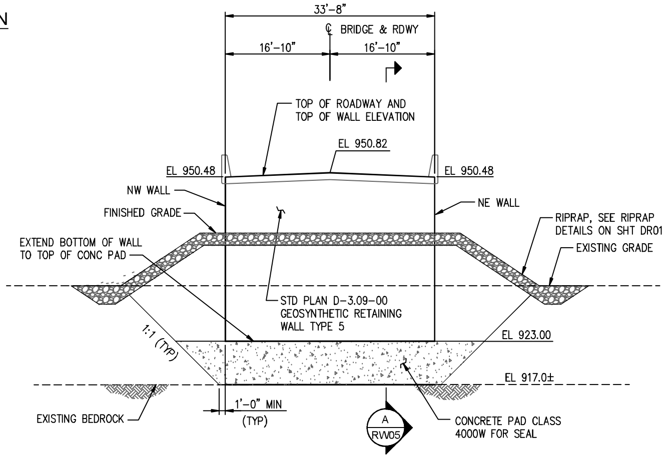


NW WALL ELEVATION



NE WALL ELEVATION



GEOSYNTHETIC RETAINING WALL - PIER 1 ELEVATION

LOOKING BACK ON STATIONING

P:\2020\2020025 - Walla Walla Dell Sharpe Bridge Replacement\000 CAD\010 Drawing\C-Structural Sheet\RW02.dwg\TAB:RW02 modified by djensen on Jan 14, 2022 - 16:53

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

WALL ELEVATIONS - NORTH APPROACH

PROJECT NUMBER
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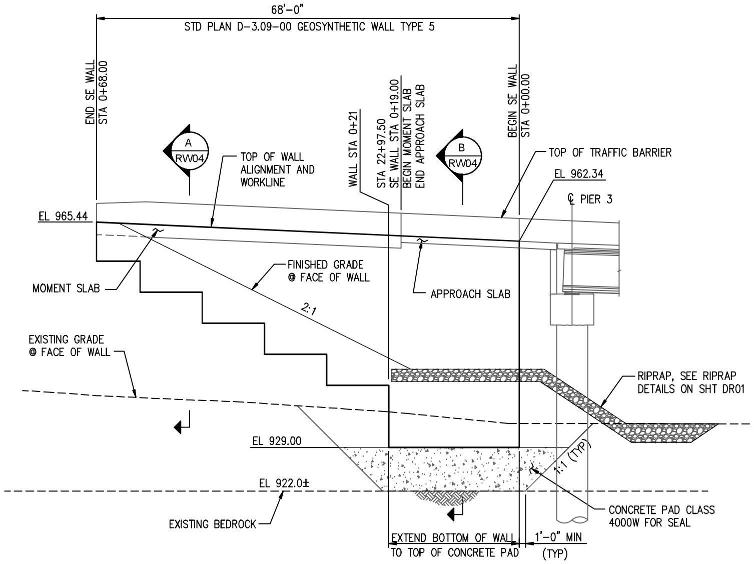
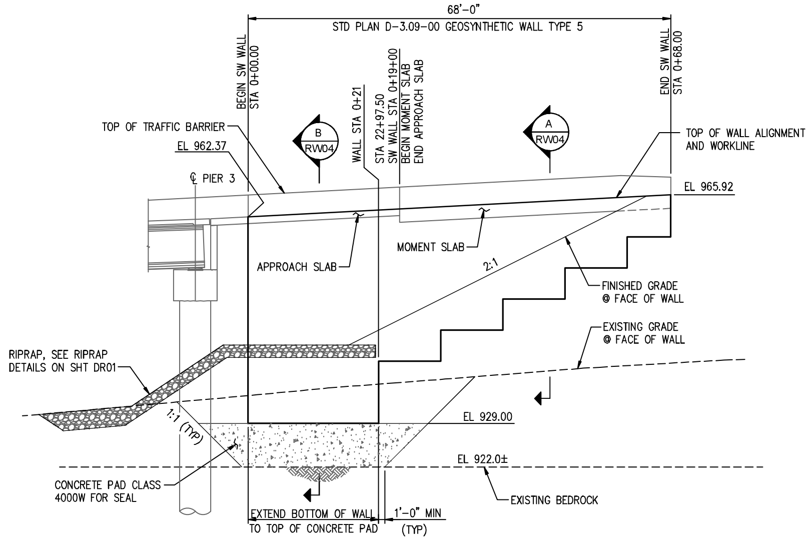
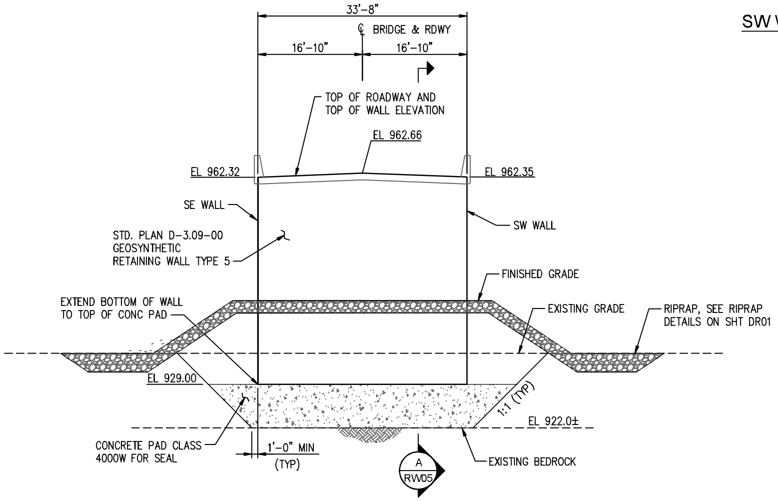
---- OF XX



SE WALL ELEVATION



SW WALL ELEVATION



GEOSYNTHETIC RETAINING WALL - PIER 3 ELEVATION

LOOKING AHEAD ON STATIONING

P:\2020\2020025 - Walla Walla Dell Sharpe Bridge Replacement\00 CAD\010 Drawing\C-Structural Sheet\RW02.dwg\TAB:RW03 modified by djensen on Jan 14, 2022 - 16:53

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

WALL ELEVATIONS - SOUTH APPROACH

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RW03
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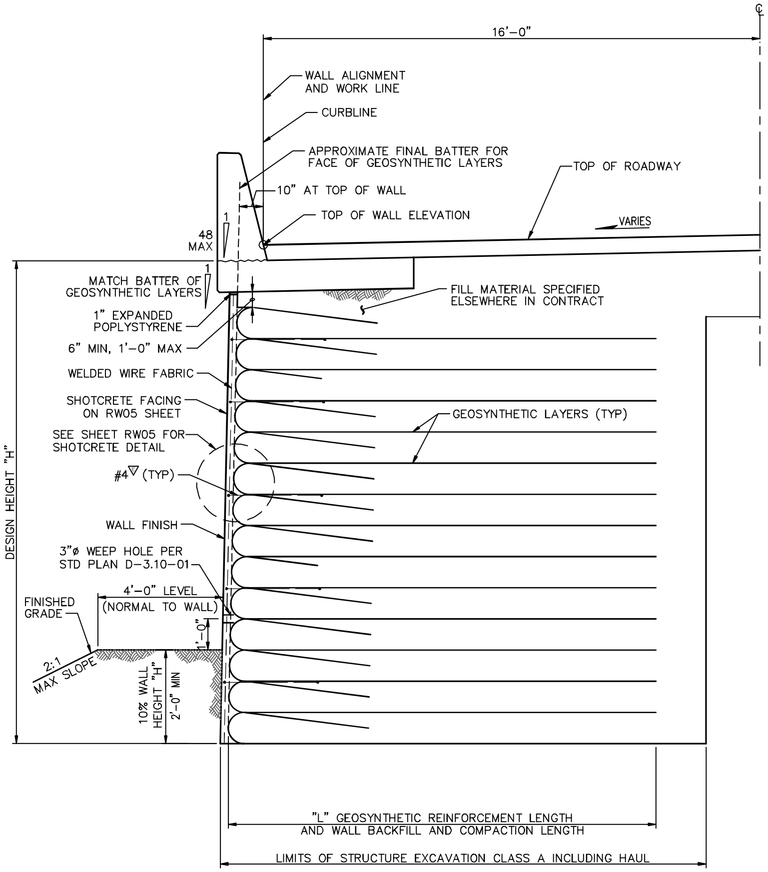
---- OF XX

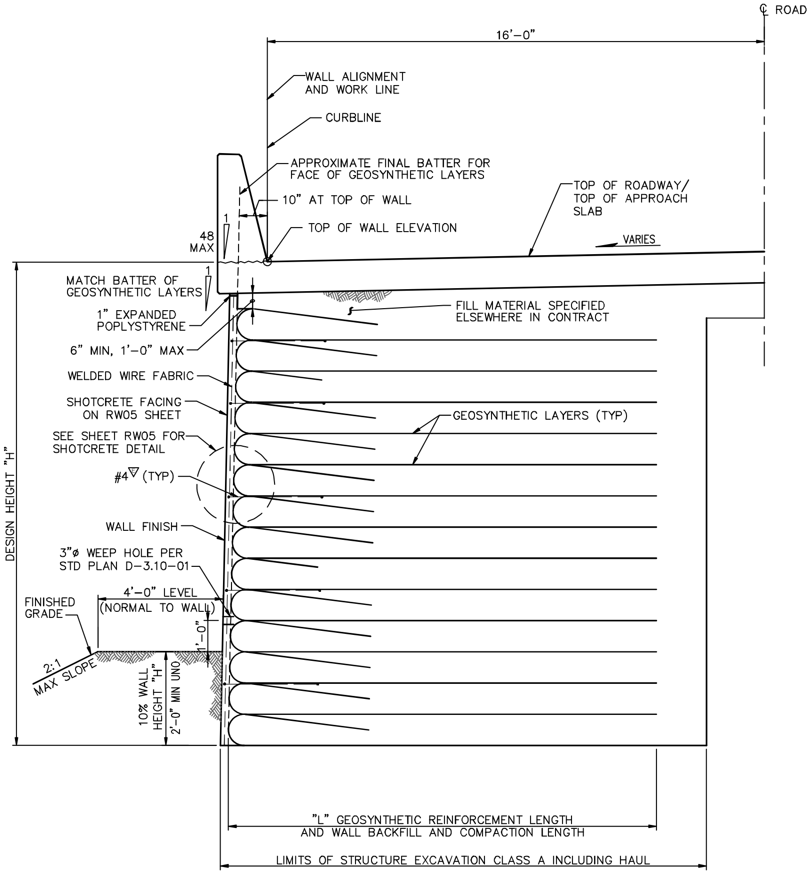
P:\2020\2020025 – Walla Walla Dell Sharpe Bridge Replacement\00 CAD\010 Drawing\C-Structural Sheet\RW04.dwg\TAB:RW04 modified by djensen on Jan 14, 2022 – 16:53

NOTES:

1. ALL BARS SHOWN ON THIS PLAN SHALL BE ASTM A706 UNLESS OTHERWISE SPECIFIED IN THE CONTRACT.



WALL & BARRIER TYPICAL SECTION
BEYOND APPROACH SLAB LIMITS
A
RW03



WALL & BARRIER TYPICAL SECTION
WITHIN APPROACH SLAB LIMITS
B
RW02, RW03

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DATE:	ISSUED / REVISED	BY:
.	.	.

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

RETAINING WALL DETAILS 1

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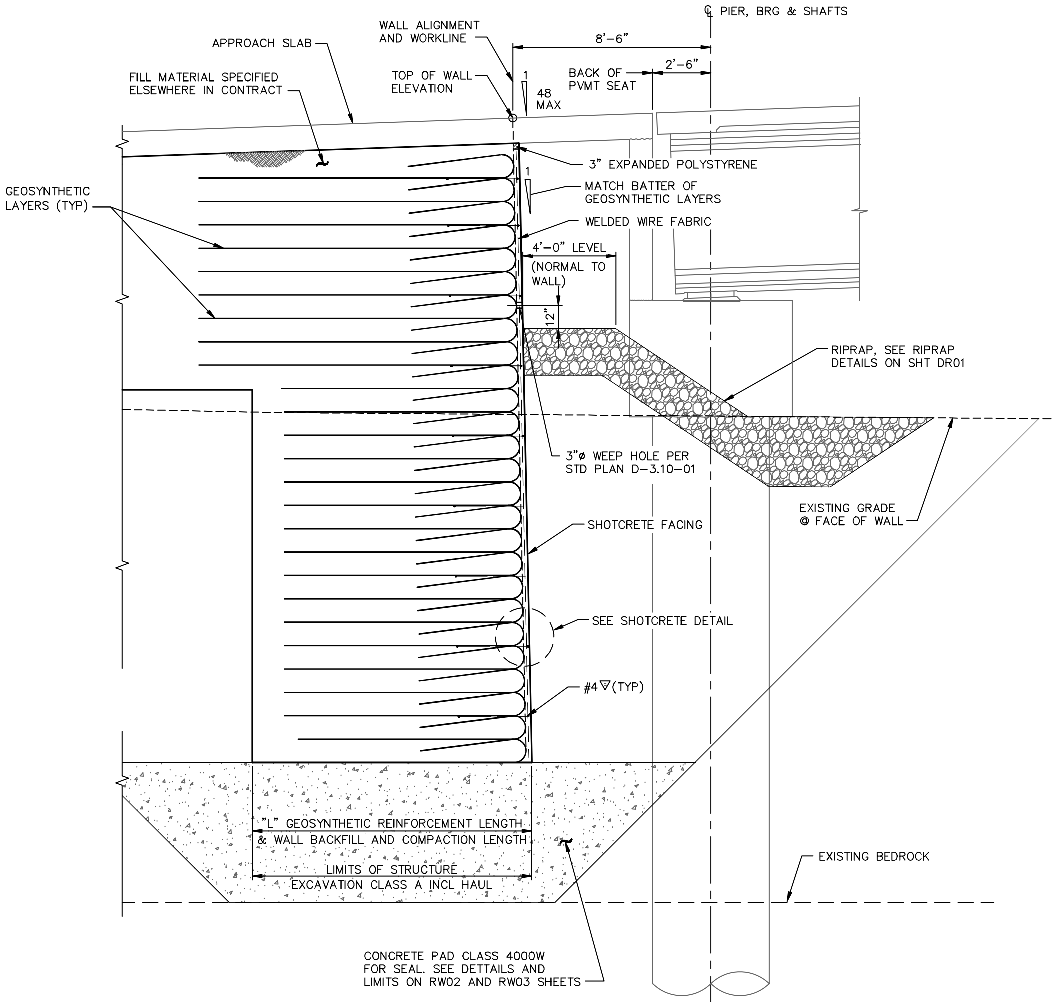
---- OF XX

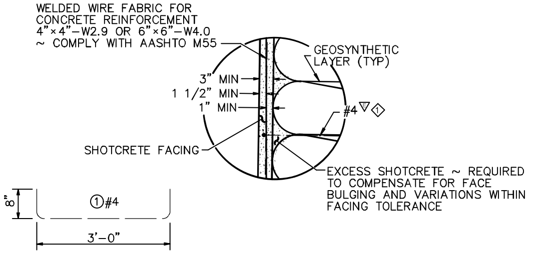


GEOSYNTHETIC RETAINING WALL - PIER 1 TYPICAL SECTION (A) RW02, RW03

PIER 1 SHOWN, PIER 3 SIMILAR

KEY NOTES

◇1 "N" ROWS OF ① #4▽ DOWEL REINFORCEMENT PLACE BETWEEN GEOSYNTHETIC LAYERS AT 5'-0" O.C. HORIZONTAL SPACING, SEE TABLE ON STD PLAN D3.10-01. VERTICAL SPACING BETWEEN ROWS TO BE EQUAL, AS MULTIPLES OF "Sv" ALLOW. ROWS MAY BE STAGGERED. SEE STD PLAN D-3.09 FOR "Sv".



SHOTCRETE DETAIL

TRANTECH Engineering LLC

BELLEVUE OFFICE:
365 - 118th AVE. SE, STE 100
BELLEVUE, WA 98005
WWW.TRANTECHENG.COM
PH: 425-453-5545
FAX: 425-453-6779

DATE:	ISSUED / REVISED	BY:
.	.	.

NICK N NIKPOUR 21020015

WALLA WALLA COUNTY
Public Works Department
999 Navion Lane
Walla Walla, Washington, 99362
Phone: 509. 524-2710
Web Address: www.wwcountyroads.com

DELL SHARPE BRIDGE REPLACEMENT PROJECT

RETAINING WALL DETAILS 2

PROJECT NUMBER
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RW05
PAGE
---- OF XX

Exhibit 10

US Army Corps
of Engineers®
Seattle District

WASHINGTON STATE
Joint Aquatic Resources Permit Application (JARPA) Form[1,2] [help]

USE BLACK OR BLUE INK TO ENTER ANSWERS IN THE WHITE SPACES BELOW.

AGENCY USE ONLY

Date received:

Agency reference #: ____________________

Tax Parcel #(s): ____________________

____

Part 1–Project Identification

1. Project Name (A name for your project that you create. Examples: Smith's Dock or Seabrook Lane Development) [help]
Dell Sharpe Bridge on Pettyjohn Road MP 5.20 to MP 5.80

Part 2–Applicant

The person and/or organization responsible for the project. [help]

2a. Name (Last, First, Middle)			
Walla Walla County			
2b. Organization (If applicable)			
Department of Public Works			
2c. Mailing Address (Street or PO Box)			
990 Navion Lane			
2d. City, State, Zip			
Walla Walla, WA 99362			
2e. Phone (1)	**2f.** Phone (2)	**2g.** Fax	**2h.** E-mail
509-524-2710	509-524-2715		swalker@co.walla-walla.wa.us

---

[1] Additional forms may be required for the following permits:
- If your project may qualify for Department of the Army authorization through a Regional General Permit (RGP), contact the U.S. Army Corps of Engineers for application information (206) 764-3495.
- Not all cities and counties accept the JARPA for their local Shoreline permits. If you need a Shoreline permit, contact the appropriate city or county government to make sure they accept the JARPA.

[2] To access an online JARPA form with [help] screens, go to http://www.epermitting.wa.gov/site/alias__resourcecenter/jarpa_jarpa_form/9984/jarpa_form.aspx.

For other help, contact the Governor's Office for Regulatory Innovation and Assistance at (800) 917-0043 or help@oria.wa.gov.

Part 3–Authorized Agent or Contact

Person authorized to represent the applicant about the project. (Note: Authorized agent(s) must sign 11b of this application.) [help]

3a. Name (Last, First, Middle)			
Walker, Seth, Adam			
3b. Organization (If applicable)			
Walla Walla County Public Works			
3c. Mailing Address (Street or PO Box)			
990 Navion Lane			
3d. City, State, Zip			
Walla Walla, WA 99362			
3e. Phone (1)	**3f.** Phone (2)	**3g.** Fax	**3h.** E-mail
509-524-2710	509-524-2715		swalker@co.walla-walla.wa.us

Part 4–Property Owner(s)

Contact information for people or organizations owning the property(ies) where the project will occur. Consider both **upland and aquatic** ownership because the upland owners may not own the adjacent aquatic land. [help]

☒ Same as applicant. (Skip to Part 5.)

☐ Repair or maintenance activities on existing rights-of-way or easements. (Skip to Part 5.)

☐ There are multiple upland property owners. Complete the section below and fill out JARPA Attachment A for each additional property owner.

☐ Your project is on Department of Natural Resources (DNR)-managed aquatic lands. If you don't know, contact the DNR at (360) 902-1100 to determine aquatic land ownership. If yes, complete JARPA Attachment E to apply for the Aquatic Use Authorization.

4a. Name (Last, First, Middle)			
4b. Organization (If applicable)			
4c. Mailing Address (Street or PO Box)			
4d. City, State, Zip			
4e. Phone (1)	**4f.** Phone (2)	**4g.** Fax	**4h.** E-mail

Part 5–Project Location(s)

Identifying information about the property or properties where the project will occur. [help]

☐ There are multiple project locations (e.g. linear projects). Complete the section below and use JARPA Attachment B for each additional project location.

5a. Indicate the type of ownership of the property. (Check all that apply.) [help]

☐ Private
☐ Federal
☒ Publicly owned (state, county, city, special districts like schools, ports, etc.)
☐ Tribal
☐ Department of Natural Resources (DNR) – managed aquatic lands (Complete JARPA Attachment E)

5b. Street Address (Cannot be a PO Box. If there is no address, provide other location information in 5p.) [help]

Pettyjohn Road

5c. City, State, Zip (If the project is not in a city or town, provide the name of the nearest city or town.) [help]

Prescott, WA 99348

5d. County [help]

Walla Walla

5e. Provide the section, township, and range for the project location. [help]

¼ Section	Section	Township	Range
	2&3	9N	35E

5f. Provide the latitude and longitude of the project location. [help]

- Example: 47.03922 N lat. / -122.89142 W long. (Use decimal degrees - NAD 83)

46.2963746 N lat / -118.408179

5g. List the tax parcel number(s) for the project location. [help]

- The local county assessor's office can provide this information.

5h. Contact information for all adjoining property owners. (If you need more space, use JARPA Attachment C.) [help]

Name	Mailing Address	Tax Parcel # (if known)
Marks S Grant	PO Box 25 Prescott, WA 99348	35-09-02-24-0002
Melvin L Talbott	PO Box 203 Prescott, WA 99348	35-10-35-31-0004 35-09-02-21-0003
Nancy Grant	527 Boyer Ave Walla Walla, WA 99362	35-10-34-11-002 35-09-0311-0001 35-09-02-22-0006
Monesa M Grant	898 Grant Sanders Road Prescott, WA 99348	35-10-34-11-002 35-09-0311-0001 35-09-02-22-0006

5i. List all wetlands on or adjacent to the project location. [help]

None were Identified.

5j. List all waterbodies (other than wetlands) on or adjacent to the project location. [help]

Touchet River

5k. Is any part of the project area within a 100-year floodplain? [help]

☒ Yes ☐ No ☐ Don't know

5l. Briefly describe the vegetation and habitat conditions on the property. [help]

Vegetation in most of the area is dominated by non-native grasses, forbs, and shrubs. There will be a small Number of native trees.

5m. Describe how the property is currently used. [help]

County Bridge

5n. Describe how the adjacent properties are currently used. [help]

Wheat Farmland.

5o. Describe the structures (above and below ground) on the property, including their purpose(s) and current condition. [help]

Dell Sharpe Bridge is a county bridge on Pettyjohn Road. Dell Sharpe Bridge was constructed in 1914 over the Touchet River. The structure in 155-ft in length and 19-ft wide curb to curb.

5p. Provide driving directions from the closest highway to the project location, and attach a map. [help]

Go west of Prescott, WA approx. on HWY 124 for approx. 5 miles till you come to Pettyjohn Road take a left. On Pettyjohn Road go south on Pettyjohn Road approx. half mile to Dell Sharpe Bridge.

Part 6–Project Description

6a. Briefly summarize the overall project. You can provide more detail in 6b. [help]

This work includes grading and construction of new bridge approaches, constructing a 320-foot-long bridge with a single central pier, creation of stormwater features, and demolition of the existing Dell Sharpe Bridge. The overall purpose of the project is to replace the existing bridge that is nearing the end of its serviceable lifespan, improve safety with revised approaches to the bridge, and provide stormwater treatment and infiltration.

6b. Describe the purpose of the project and why you want or need to perform it. [help]

Walla Walla County proposes to replace the existing Dell Sharpe Bridge. The bridge is past its serviceable lifetime and the County has struggled with scour and river hydraulics which have caused stability concerns for the bridge foundations. The piers for the bridge are not anchored to the bedrock and simply sit on the streambed. Additionally, the current bridge alignment has operational issues, in the form of safety and maintenance concerns, because of its alignment in relation to the approaches to the bridge.

6c. Indicate the project category. (Check all that apply) [help]

☐ Commercial ☐ Residential ☐ Institutional ☒ Transportation ☐ Recreational
☐ Maintenance ☐ Environmental Enhancement

6d. Indicate the major elements of your project. (Check all that apply) [help]

☐ Aquaculture
☐ Bank Stabilization
☐ Boat House
☐ Boat Launch
☐ Boat Lift
☒ Bridge
☐ Bulkhead
☐ Buoy
☐ Channel Modification
☐ Culvert
☐ Dam / Weir
☐ Dike / Levee / Jetty
☐ Ditch
☐ Dock / Pier
☐ Dredging
☐ Fence
☐ Ferry Terminal
☐ Fishway
☐ Float
☐ Floating Home
☐ Geotechnical Survey
☐ Land Clearing
☐ Marina / Moorage
☐ Mining
☐ Outfall Structure
☐ Piling/Dolphin
☐ Raft
☐ Retaining Wall (upland)
☐ Road
☐ Scientific Measurement Device
☐ Stairs
☐ Stormwater facility
☐ Swimming Pool
☐ Utility Line

☐ Other:

6e. Describe how you plan to construct each project element checked in 6d. Include specific construction methods and equipment to be used. [help]

- Identify where each element will occur in relation to the nearest waterbody.
- Indicate which activities are within the 100-year floodplain.

The project will entail realigning and constructing new bridge approaches that are located approximately 400-ft directly east of the existing road alignment as it passes over the Touchet River. Grading of new bridge approaches on both sides (north and south) of the bridge. Construction of geosynthetic retaining walls at the terminus of the approaches. Construction of bridge abutments landward of the ordinary high water mark (OHWM) of the Touchet River. Construction of a central cast-in-place pier located within the 100-year floodplain but outside of the current OHWM. Placing of precast bridge girders, pouring of bridge deck and traffic barriers, and paving of asphalt approaches. Construction of stormwater conveyance system and infiltration swales. Typical heavy equipment, such as backhoes, dozers excavators, graders, roller, and dump trucks.

6f. What are the anticipated start and end dates for project construction? (Month/Year) [help]

- If the project will be constructed in phases or stages, use JARPA Attachment D to list the start and end dates of each phase or stage.

Start Date: March 2023 End Date: November 2023 ☐ See JARPA Attachment D

6g. Fair market value of the project, including materials, labor, machine rentals, etc. [help]

$7,200,000

6h. Will any portion of the project receive federal funding? [help]

- **If yes**, list each agency providing funds.

☒ Yes ☐ No ☐ Don't know

Part 7–Wetlands: Impacts and Mitigation

☐ Check here if there are wetlands or wetland buffers on or adjacent to the project area.
(If there are none, skip to Part 8.) [help]

7a. Describe how the project has been designed to avoid and minimize adverse impacts to wetlands. [help]

☒ Not applicable

There are not wetlands within the project limits.

7b. Will the project impact wetlands? [help]

☐ Yes ☐ No ☐ Don't know

7c. Will the project impact wetland buffers? [help]

☐ Yes ☐ No ☐ Don't know

7d. Has a wetland delineation report been prepared? [help]

- **If Yes,** submit the report, including data sheets, with the JARPA package.

☐ Yes ☐ No

7e. Have the wetlands been rated using the Western Washington or Eastern Washington Wetland Rating System? [help]

- **If Yes,** submit the wetland rating forms and figures with the JARPA package.

☐ Yes ☐ No ☐ Don't know

7f. Have you prepared a mitigation plan to compensate for any adverse impacts to wetlands? [help]

- **If Yes,** submit the plan with the JARPA package and answer 7g.
- **If No, or Not applicable,** explain below why a mitigation plan should not be required.

☐ Yes ☒ No ☐ Don't know

There are no wetlands in the project.

7g. Summarize what the mitigation plan is meant to accomplish, and describe how a watershed approach was used to design the plan. [help]

7h. Use the table below to list the type and rating of each wetland impacted, the extent and duration of the impact, and the type and amount of mitigation proposed. Or if you are submitting a mitigation plan with a similar table, you can state (below) where we can find this information in the plan. [help]

Activity (fill, drain, excavate, flood, etc.)	Wetland Name[1]	Wetland type and rating category[2]	Impact area (sq. ft. or Acres)	Duration of impact[3]	Proposed mitigation type[4]	Wetland mitigation area (sq. ft. or acres)

[1] If no official name for the wetland exists, create a unique name (such as "Wetland 1"). The name should be consistent with other project documents, such as a wetland delineation report.

[2] Ecology wetland category based on current Western Washington or Eastern Washington Wetland Rating System. Provide the wetland rating forms with the JARPA package.

[3] Indicate the days, months or years the wetland will be measurably impacted by the activity. Enter "permanent" if applicable.

[4] Creation (C), Re-establishment/Rehabilitation (R), Enhancement (E), Preservation (P), Mitigation Bank/In-lieu fee (B)

Page number(s) for similar information in the mitigation plan, if available: ____________

7i. For all filling activities identified in 7h, describe the source and nature of the fill material, the amount in cubic yards that will be used, and how and where it will be placed into the wetland. [help]

7j. For all excavating activities identified in 7h, describe the excavation method, type and amount of material in cubic yards you will remove, and where the material will be disposed. [help]

Part 8–Waterbodies (other than wetlands): Impacts and Mitigation

In Part 8, "waterbodies" refers to non-wetland waterbodies. (See Part 7 for information related to wetlands.) [help]

☒ Check here if there are waterbodies on or adjacent to the project area. (If there are none, skip to Part 9.)

8a. Describe how the project is designed to avoid and minimize adverse impacts to the aquatic environment. [help]
☐ Not applicable
The very basis of the proposed bridge design was to reduce impacts to the Touchet River. The new bridge alignment will be constructed in a manner that it will span the entire floodplain of the river and will only have a single pier that is located outside the OHWM. The abutments for the river are located well above the river valley and outside the channel meander zone of the river. In addition to realigning the approaches and crossing, a key impact avoidance measure is the utilization of geosynthetic walls that will reduce the amount of grading and fill required to construct the bridge approaches and abutments. These walls will substantially decrease the impact area.

8b. Will your project impact a waterbody or the area around a waterbody? [help]
☒ Yes ☐ No

8c. Have you prepared a mitigation plan to compensate for the project's adverse impacts to non-wetland waterbodies? [help]

- **If Yes,** submit the plan with the JARPA package and answer 8d.
- **If No, or Not applicable,** explain below why a mitigation plan should not be required.

☒ Yes ☐ No ☐ Don't know

See Attached Critical Areas Mitigation Plan.

8d. Summarize what the mitigation plan is meant to accomplish. Describe how a watershed approach was used to design the plan.

- If you already completed 7g you do not need to restate your answer here. [help]

The new bridge alignment will be constructed in a manner that it will span the entire floodplain of the river and will only have a single pier that is located outside the OHWM. The abutments for the river are located well above the river valley and outside the channel meander zone of the river. In addition to realigning the approaches and crossing, a key impact avoidance measure is the utilization of geosynthetic walls that will reduce the amount of grading and fill required to construct the bridge approaches and abutments. These walls will substantially decrease the impact area.

8e. Summarize impact(s) to each waterbody in the table below. [help]

Activity (clear, dredge, fill, pile drive, etc.)	Waterbody name[1]	Impact location[2]	Duration of impact[3]	Amount of material (cubic yards) to be placed in or removed from waterbody	Area (sq. ft. or linear ft.) of waterbody directly affected
Center Pier	Touchet River	In water	5 days	20 CY Removed	184 SF
North Pier	Touchet River	Adjacent	5 days		

[1] If no official name for the waterbody exists, create a unique name (such as "Stream 1") The name should be consistent with other documents provided.

[2] Indicate whether the impact will occur in or adjacent to the waterbody. If adjacent, provide the distance between the impact and the waterbody and indicate whether the impact will occur within the 100-year flood plain.

[3] Indicate the days, months or years the waterbody will be measurably impacted by the work. Enter "permanent" if applicable.

8f. For all activities identified in 8e, describe the source and nature of the fill material, amount (in cubic yards) you will use, and how and where it will be placed into the waterbody. [help]

The central bridge pier is the only portion of the project that will be subject to inundation during flood events. The pier is located outside of the OHWM of the Touchet River but is within the channel mender zone of the river. The construction of this pier will be completed in the dry season during low flows within the Touchet River. The central pier consists of a single drilled shaft with a formed and poured pier cap.

8g. For all excavating or dredging activities identified in 8e, describe the method for excavating or dredging, type and amount of material you will remove, and where the material will be disposed. [help]

A full containment system will be approved by Walla Walla County Public Works and installed prior to the commencement of demolition activities to ensure that debris does not enter the river. Containment will likely employ the use of debris curtains hung from the bridge to catch any debris. All concrete cutting will use water injection mechanisms to limit the amount of concrete dust generated. Any debris that falls into the river channel will be removed by hand if possible. The roadbed and bridge superstructure will be cut into manageable sections and removed via a land-based crane. Demolition of the abutments and central pier will commence following removal of the bridge deck. The southern bridge abutment sits entirely above the OHWM while the northern abutment forms the OHWM. Abutment removal will require the use of jack hammers, concrete saws, and excavators. Excavators will operate from the shore and not within the river channel. The north abutment and central pier demolition will require flows to be diverted around the in-water work area. The construction of a simple sandbag or bulk bag coffer dam will push flows to the southern portion of the river channel and isolate the work area. The dam will be approximately 3 feet high and approximately 100 feet long.

Part 9–Additional Information

Any additional information you can provide helps the reviewer(s) understand your project. Complete as much of this section as you can. It is ok if you cannot answer a question.

9a. If you have already worked with any government agencies on this project, list them below. [help]

Agency Name	Contact Name	Phone	Most Recent Date of Contact

9b. Are any of the wetlands or waterbodies identified in Part 7 or Part 8 of this JARPA on the Washington Department of Ecology's 303(d) List? [help]

- **If Yes,** list the parameter(s) below.
- If you don't know, use Washington Department of Ecology's Water Quality Assessment tools at: https://ecology.wa.gov/Water-Shorelines/Water-quality/Water-improvement/Assessment-of-state-waters-303d.

☒ Yes ☐ No

Chlorinated pesticides, Fecal coliform, Temperature, and pH & dissolved oxygen.

9c. What U.S. Geological Survey Hydrological Unit Code (HUC) is the project in? [help]

- Go to http://cfpub.epa.gov/surf/locate/index.cfm to help identify the HUC.

17070102

9d. What Water Resource Inventory Area Number (WRIA #) is the project in? [help]

- Go to https://ecology.wa.gov/Water-Shorelines/Water-supply/Water-availability/Watershed-look-up to find the WRIA #.

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9e. Will the in-water construction work comply with the State of Washington water quality standards for turbidity? [help]

- Go to https://ecology.wa.gov/Water-Shorelines/Water-quality/Freshwater/Surface-water-quality-standards/Criteria for the standards.

☒ Yes ☐ No ☐ Not applicable

9f. If the project is within the jurisdiction of the Shoreline Management Act, what is the local shoreline environment designation? [help]

- If you don't know, contact the local planning department.
- For more information, go to: https://ecology.wa.gov/Water-Shorelines/Shoreline-coastal-management/Shoreline-coastal-planning/Shoreline-laws-rules-and-cases.

☐ Urban ☐ Natural ☐ Aquatic ☒ Conservancy ☐ Other: ____________

9g. What is the Washington Department of Natural Resources Water Type? [help]

- Go to http://www.dnr.wa.gov/forest-practices-water-typing for the Forest Practices Water Typing System.

☒ Shoreline ☐ Fish ☐ Non-Fish Perennial ☐ Non-Fish Seasonal

9h. Will this project be designed to meet the Washington Department of Ecology's most current stormwater manual? [help]

- **If No**, provide the name of the manual your project is designed to meet.

☒ Yes ☐ No

Name of manual: Stormwater Management Manual for Eastern Washington 2019

9i. Does the project site have known contaminated sediment? [help]

- **If Yes**, please describe below.

☐ Yes ☒ No

Checked Department of Ecology web site.

9j. If you know what the property was used for in the past, describe below. [help]

County Bridge and road.

9k. Has a cultural resource (archaeological) survey been performed on the project area? [help]

- **If Yes**, attach it to your JARPA package.

☒ Yes ☐ No

9l. Name each species listed under the federal Endangered Species Act that occurs in the vicinity of the project area or might be affected by the proposed work. [help]

Birds- Yellow-billed Cuckoo
Fish - Bull Trout
Insects – Monarch Butterfly

9m. Name each species or habitat on the Washington Department of Fish and Wildlife's Priority Habitats and Species List that might be affected by the proposed work. [help]

Birds- Yellow-billed Cuckoo
Fish - Bull Trout
Insects – Monarch Butterfly

Part 10–SEPA Compliance and Permits

Use the resources and checklist below to identify the permits you are applying for.

- Online Project Questionnaire at http://apps.oria.wa.gov/opas/.
- Governor's Office for Regulatory Innovation and Assistance at (800) 917-0043 or help@oria.wa.gov.
- For a list of addresses to send your JARPA to, click on agency addresses for completed JARPA.

10a. Compliance with the State Environmental Policy Act (SEPA). (Check all that apply.) [help]

- For more information about SEPA, go to https://ecology.wa.gov/regulations-permits/SEPA-environmental-review.

☐ A copy of the SEPA determination or letter of exemption is included with this application.

☒ A SEPA determination is pending with Walla Walla County Community Development (lead agency). The expected decision date is min. of 60 days.

☐ I am applying for a Fish Habitat Enhancement Exemption. (Check the box below in 10b.) [help]

☐ This project is exempt (choose type of exemption below).

  ☐ Categorical Exemption. Under what section of the SEPA administrative code (WAC) is it exempt?

  ____

  ☐ Other: ______________________________

☐ SEPA is pre-empted by federal law.

10b. Indicate the permits you are applying for. (Check all that apply.) [help]

LOCAL GOVERNMENT

Local Government Shoreline permits:

☒ Substantial Development ☒ Conditional Use ☐ Variance

☐ Shoreline Exemption Type (explain): ______________________________

Other City/County permits:

☐ Floodplain Development Permit ☒ Critical Areas Ordinance

STATE GOVERNMENT

Washington Department of Fish and Wildlife:

☒ Hydraulic Project Approval (HPA) ☐ Fish Habitat Enhancement Exemption – Attach Exemption Form

Washington Department of Natural Resources:

☐ Aquatic Use Authorization

Complete JARPA Attachment E and submit a check for $25 payable to the Washington Department of Natural Resources. **Do not send cash.**

Washington Department of Ecology:

☐ Section 401 Water Quality Certification ☐ Non-Federally Regulated Waters

FEDERAL AND TRIBAL GOVERNMENT

United States Department of the Army (U.S. Army Corps of Engineers):

☒ Section 404 (discharges into waters of the U.S.) ☐ Section 10 (work in navigable waters)

United States Coast Guard:

For projects or bridges over waters of the United States, contact the U.S. Coast Guard at: d13-pf-d13bridges@uscg.mil

☐ Bridge Permit ☐ Private Aids to Navigation (or other non-bridge permits)

United States Environmental Protection Agency:

☐ Section 401 Water Quality Certification (discharges into waters of the U.S.) on tribal lands where tribes do not have treatment as a state (TAS)

Tribal Permits: (Check with the tribe to see if there are other tribal permits, e.g., Tribal Environmental Protection Act, Shoreline Permits, Hydraulic Project Permits, or other in addition to CWA Section 401 WQC)

☐ Section 401 Water Quality Certification (discharges into waters of the U.S.) where the tribe has treatment as a state (TAS).

Part 11–Authorizing Signatures

Signatures are required before submitting the JARPA package. The JARPA package includes the JARPA form, project plans, photos, etc. [help]

11a. Applicant Signature (required) [help]

I certify that to the best of my knowledge and belief, the information provided in this application is true, complete, and accurate. I also certify that I have the authority to carry out the proposed activities, and I agree to start work only after I have received all necessary permits.

I hereby authorize the agent named in Part 3 of this application to act on my behalf in matters related to this application. _________ (initial)

By initialing here, I state that I have the authority to grant access to the property. I also give my consent to the permitting agencies entering the property where the project is located to inspect the project site or any work related to the project. _________ (initial)

SETH WALKER		1/26/2022
Applicant Printed Name	Applicant Signature	Date

11b. Authorized Agent Signature [help]

I certify that to the best of my knowledge and belief, the information provided in this application is true, complete, and accurate. I also certify that I have the authority to carry out the proposed activities and I agree to start work only after all necessary permits have been issued.

Authorized Agent Printed Name	Authorized Agent Signature	Date

11c. Property Owner Signature (if not applicant) [help]

Not required if project is on existing rights-of-way or easements (provide copy of easement with JARPA).

I consent to the permitting agencies entering the property where the project is located to inspect the project site or any work. These inspections shall occur at reasonable times and, if practical, with prior notice to the landowner.

Property Owner Printed Name	Property Owner Signature	Date

18 U.S.C §1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly falsifies, conceals, or covers up by any trick, scheme, or device a material fact or makes any false, fictitious, or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious, or fraudulent statement or entry, shall be fined not more than $10,000 or imprisoned not more than 5 years or both.

If you require this document in another format, contact the Governor's Office for Regulatory Innovation and Assistance (ORIA) at (800) 917-0043. People with hearing loss can call 711 for Washington Relay Service. People with a speech disability can call (877) 833-6341. ORIA publication number: ORIA-16-011 rev. 09/2018

US Army Corps
of Engineers
Seattle District

WASHINGTON STATE
Joint Aquatic Resources Permit Application (JARPA) [help]

AGENCY USE ONLY

Date received: ____________________

Agency reference #: ____________________

Tax Parcel #(s): ____________________

____

____

Attachment C:
Contact information for adjoining property owners. [help]

TO BE COMPLETED BY APPLICANT [help]

Project Name: ____________________

Location Name (if applicable): ____________________

____

Use this attachment only if you have more than four adjoining property owners.

Use black or blue ink to enter answers in white spaces below.

1. Contact information for all adjoining property owners. [help]

Name	Mailing Address	Tax Parcel # (if known)
J & E 10 Property LLC	PO Box 1245 Walla Walla, WA 99362	35-10-34-11-002 35-09-0311-0001 35-09-02-22-0006
Mary Grant Tompkins	PO Box 2 Prescott, WA 99348	35-10-34-11-002 35-09-0311-0001 35-09-02-22-0006

If you require this document in another format, contact the Governor's Office for Regulatory Innovation and Assistance (ORIA) at (800) 917-0043. People with hearing loss can call 711 for Washington Relay Service. People with a speech disability can call (877) 833-6341. ORIA publication number: ORIA-16-014 rev. 10/2016

Exhibit 11

Biological Assessment

Dell Sharpe Bridge Replacement Project
Walla Walla County, Washington

Prepared for:

Walla Walla County Public Works Department
990 Navion Lane
Walla Walla, Washington 99362

January 2022.
PBS Project 66257.000

PBS
5 NORTH COLVILLE ST, STE 200
WALLA WALLA, WA 99362
509.956.3026 MAIN
866.727.0140 FAX
PBSUSA.COM

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APPENDICES

Executive Summary

The Dell Sharpe Bridge Replacement Project (project) is located in unincorporated Walla Walla County, Washington, within Section 2, Township 9 North, Range 35 East. The project consists of a new bridge over the Touchet River and removing the existing concrete arched Dell Sharpe Bridge which has a mid-channel pier within the river channel.

This work includes grading and construction of new bridge approaches, constructing a 320-foot-long bridge with a single central pier, creation of stormwater features, and demolition of the existing Dell Sharpe Bridge. The overall purpose of the project is to replace the existing bridge that is nearing the end of its serviceable lifespan, improve safety with revised approaches to the bridge, and provide stormwater treatment and infiltration.

The action area for the project is within Water Resource Inventory Area (WRIA) 9 (Walla Walla), 6th field Hydrologic Unit Code (HUC) 171100130302. Identified habitat areas for listed species within the action area include the aquatic habitats of the Touchet River which are accessible to anadromous fishes. Endangered Species Act (ESA) listed fish species potentially affected include bull trout and Middle Columbia River distinct population segment (DPS) steelhead. The action area includes critical habitat for bull trout and Middle Columbia River DPS steelhead. Terrestrial species that may be present in the action area include yellow-billed cuckoo, which use large blocks of riparian habitat. However, this species is rarely found in Washington state.

Potential direct effects of the project on protected species include harm caused by temporary turbidity and sedimentation from road grading and filling activities, and removal of the existing Dell Sharpe Bridge. All construction activities in or adjacent to the stream will use appropriate project best management practices (BMPs), including sediment and erosion control measures to reduce potential impacts to these waters. Potential effects on yellow-billed cuckoo include construction-generated noise.

Table ES-1 provides a summary of ESA species potentially present in the action area, their ESA status, and effects determination for the species. The project area does not contain essential fish habitat as regulated under the Magnuson-Stevens Fishery Conservation and Management Act.

Table ES-1

Species	Status	Critical Habitat	Species Effect	Critical Habitat Affect
Mid-Columbia River DPS Steelhead	T	Yes	May Affect, Likely to Adversely Affect	May Affect, Likely to Adversely Affect
Bull Trout	T	Yes	May Affect, Likely to Adversely Affect	May Affect, Likely to Adversely Affect
Yellow-Billed Cuckoo	T	No	May Affect, Not Likely to Adversely Affect	N/A

T = Threatened, E = Endangered, P = Proposed

1 INTRODUCTION

Walla Walla County (County) proposes to replace the existing Dell Sharpe Bridge. The bridge is past its serviceable lifetime and the County has struggled with scour and river hydraulics which have caused stability concerns for the bridge foundations. The piers for the bridge are not anchored to the bedrock and simply sit on the streambed. Additionally, the current bridge alignment has operational issues, in the form of safety and maintenance concerns, because of its alignment in relation to the approaches to the bridge. The project includes the following activities.

- Grading of new bridge approaches on both sides (north and south) of the bridge.
- Construction of geosynthetic retaining walls at the terminus of the approaches.
- Construction of bridge abutments landward of the ordinary high water mark (OHWM) of the Touchet River.
- Construction of a central cast-in-place pier located within the 100-year floodplain but outside of the current OHWM.
- Placing of precast bridge girders, pouring of bridge deck and traffic barriers, and paving of asphalt approaches.
- Construction of stormwater conveyance system and infiltration swales.
- Demolition and removal of existing Dell Sharpe Bridge deck and piers.

The proposed project will include in-water work in regulated waters and will require a Clean Water Act Section 404 permit from the US Army Corps of Engineers (USACE), a water quality certification from the Washington State Department of Ecology (Ecology), and a Hydraulic Project Approval (HPA) from the Washington Department of Fish and Wildlife (WDFW).

The project has received federal funding from the Federal Highway Administration (FHWA) and administered through the Washington State Department of Transportation (WSDOT) Local Programs. The use of federal funds represents a federal nexus that requires the FHWA to consult with the National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NOAA Fisheries) and the U.S. Fish and Wildlife Service (USFWS) to assess the potential for effects to species or critical habitats listed under Section 7 of the Endangered Species Act (ESA) and to essential fish habitat (EFH) under the provisions of the Magnuson-Stevens Fishery Conservation and Management Act (see Appendix B for a discussion of EFH). The FHWA is the lead federal agency in this consultation. The action area does not contain essential fish habitat (EFH) and therefore no analysis under the Magnuson-Stevens Fisheries Conservation and Management Act (MSA) is required.

1.1 Consultation History

No prior consultation has occurred with USFWS or the National Oceanic and Atmospheric Administration National Marine Fisheries Service (NOAA Fisheries) regarding this project.

2 PROJECT LOCATION

The proposed project area extends along Pettyjohn Road from approximately 500 feet south of the Sharp Road intersection to approximately 1,000 feet north of this intersection (Figure 1). The project lies in Sections 2 and 3, Township 9 North, Range 35 East, and is entirely within Walla Walla County, Washington. The project is within Water Resource Inventory Area (WRIA) 33, Walla Walla River watershed, and the 6th field Hydrologic Unit Code (HUC) 170701020702.

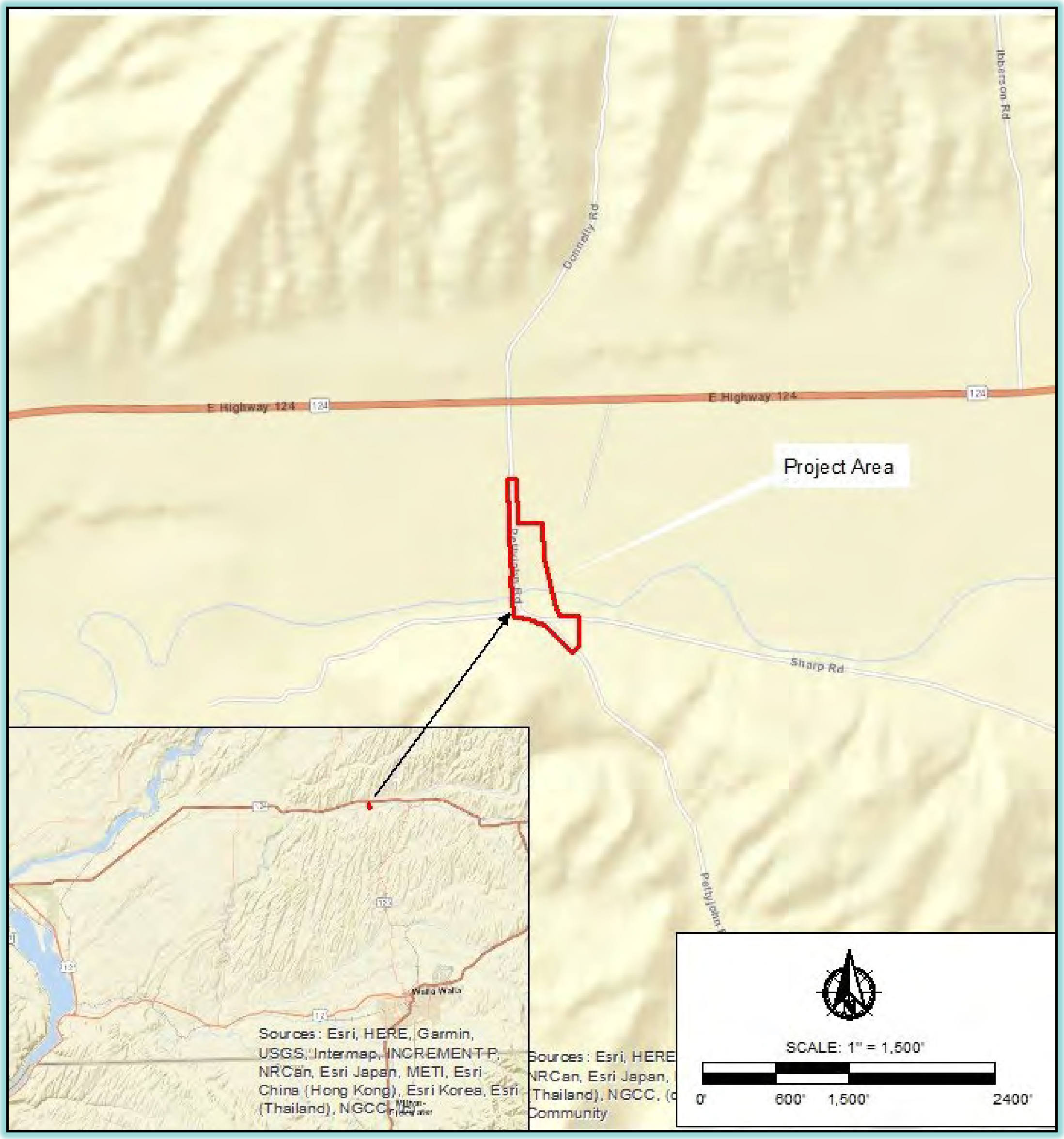


Figure 1. Vicinity Map and Project Area

3 PROJECT DESCRIPTION

Walla Walla County is proposing to replace the existing Dell Sharpe Bridge which is currently beyond its service life and is being undermined by scour and river hydraulics (Photograph 1). This is concerning as the bridge abutments are not anchored to bedrock, they simply rest on the bottom of the channel. The proposed improvements will include clearing, grading, filling, and paving activities throughout the project limits and construction of a new bridge over the Touchet River. Upon completion and following the rerouting of traffic onto the new bridge, the existing Dell Sharpe Bridge will be removed along with the existing roadbed approaches.

Photograph 1- Existing Dell Sharpe Bridge (facing north)

Earthwork will consist primarily of fills to achieve proper grades. Proposed fill has been estimated at 20,000 cubic yards. Fill material will consist of clean fill material obtained from an approved source.

Construction and subsequent demolition will use typical heavy construction equipment, such as backhoes, bulldozers, dump trucks, and excavators. Graders, rollers, and similar heavy construction equipment will also be used in the affected areas. Heavy construction equipment is expected to generate a maximum combined noise level of 97 A-weighted decibels (dBA). Noise from these activities will be confined to allowable work hours under local, state, and federal permit restrictions.

In-water work will be conducted during the WDFW-approved fish window (June 16–September 30). All work areas below the OHWM will be isolated with sandbag cofferdams; water within the isolated area will be pumped out and discharged to a vegetated upland location. Approved fish screens will be installed and maintained on all pumps removing surface waters. Block netting will be installed upstream and downstream of the work area during in-water work periods. Following dewatering, all fish will be relocated downstream of the work area using methods consistent with Washington State Department of Transportation (WSDOT) fish exclusion protocols and standards (WSDOT, 2016) and the NOAA *Guidelines for Electrofishing Waters Containing Salmonids Listed Under the Endangered Species Act* (NOAA Fisheries, 2000).

3.1 Detailed Project Description

3.1.1 Primary Project Elements

Primary elements of the project include grading and constructing new bridge approaches, new bridge and deck, and the removing the existing Dell Sharpe Bridge. The 50% design set for the project is included in Appendix A. To aid the reader, the construction sequence for the bridge construction portion of the project is presented in Sheet S04. The primary project elements are detailed below.

3.1.2 Bridge Approaches and Geosynthetic Walls

The project will entail realigning and constructing new bridge approaches that are located approximately 400 feet directly east of the existing road alignment as it passes over the Touchet River. This alignment was chosen during the initial project design phases as it represents a safer approach in terms of vehicular traffic sight lines in addition to utilizing exiting topography to construct a bridge design with minimal features within the 100-year floodplain. The approaches will require both cut and fill activity to achieve designed grades although filling is the predominant activity.

Geosynthetic retaining walls will be constructed to limit the amount of earthwork required to obtain the appropriate grades and transitions between the bridge and its north and south approaches. Retaining wall locations can be reviewed on page S06 with details in RW04 of Appendix A. These geosynthetic walls will be constructed using standard construction techniques that involve constructing sequential fabric wrapped soil lifts. A notable departure from typical geosynthetic retaining walls is the addition of a layer of shotcrete that will be installed along the exterior of the bridge. This feature will increase bridge aesthetics in addition to helping protect the structure from weathering and erosion.

3.1.3 Bridge Abutments

Bridge abutments will be located on both ends of the bridge, immediately adjacent to the terminus of the geosynthetic walls. Each bridge abutment will be supported by two concrete columns formed as extensions of drilled shafts. Shafts will be drilled, and the material removed from the center of the shaft with an auger to allow for rebar cages to be lowered into place and concrete to be pumped into the shaft. Once the poured shafts and their adjoining columns have cured, pier caps will be formed and poured on top of the piles to support the bridge superstructure. This work is performed within the uplands located to the north and south of the OHWM of the Touchet River. Locations and details are provided in Sheets S06 and S10.

3.1.4 Central Bridge Pier

The central bridge pier is the only portion of the project that will be subject to inundation during flood events. The pier is located outside of the OHWM of the Touchet River but is within the channel mender zone of the river (Sheet C03). The construction of this pier will be completed in the dry season during low flows within the Touchet River. The central pier consists of a single drilled shaft with a formed and poured pier cap (Sheet S12). Shaft drilling will be completed with the drill rig situated on the gravel/sand bar, landward of the OHWM. Erosion control best management practices (BMPs) will consist of containment of debris and material used during the construction of the pier. These will include sediment fences, straw wattles, and containment of excavated materials. Full BMP measures are listed within the impact and avoidance section. The process of constructing the central pier is identical to the process described in the bridge abutment section above.

3.1.5 Remaining Bridge Construction Activities

The prefabricated concrete girders will be delivered via truck and placed into position with a crane. Following placement of the girders over the central pier, bridge decking will be installed. At this time the bridge decking will be cast in-place concrete.

3.1.6 Bridge Demolition Activities

The bridge demolition will be scheduled so that the removal of the central bridge pier will occur within the approved in-water work window of June 16 to September 30. A full containment system will be approved by Walla Walla County Public Works and installed prior to the commencement of demolition activities to ensure that debris does not enter the river. Containment will likely employ the use of debris curtains hung from the bridge to catch any debris. All concrete cutting will use water injection mechanisms to limit the amount of concrete dust generated. Any debris that falls into the river channel will be removed by hand if possible. The roadbed and bridge superstructure will be cut into manageable sections and removed via a land-based crane. Demolition of the abutments and central pier will commence following removal of the bridge deck. The southern bridge abutment sits entirely above the OHWM while the northern abutment forms the OHWM. Abutment removal will require the use of jack hammers, concrete saws, and excavators. Excavators will operate from the shore and not within the river channel.

The north abutment and central pier demolition will require flows to be diverted around the in-water work area. The construction of a simple sandbag or bulk bag coffer dam will push flows to the southern portion of the river channel and isolate the work area. The dam will be approximately 3 feet high and approximately 100 feet long. The work area will be isolated and de-fished by a team of biologists in accordance with WSDOT in-water work isolation guidelines, the USACE nationwide permit, and the WDFW HPA.

3.1.7 Stormwater Facilities

Stormwater from the proposed bridge approaches and bridge structure will be routed to four separate stormwater infiltration swales located within upland areas adjacent to the bridge. Stormwater treatment and detention was designed in accordance with Ecology's 2019 Stormwater Management Manual for Eastern Washington.

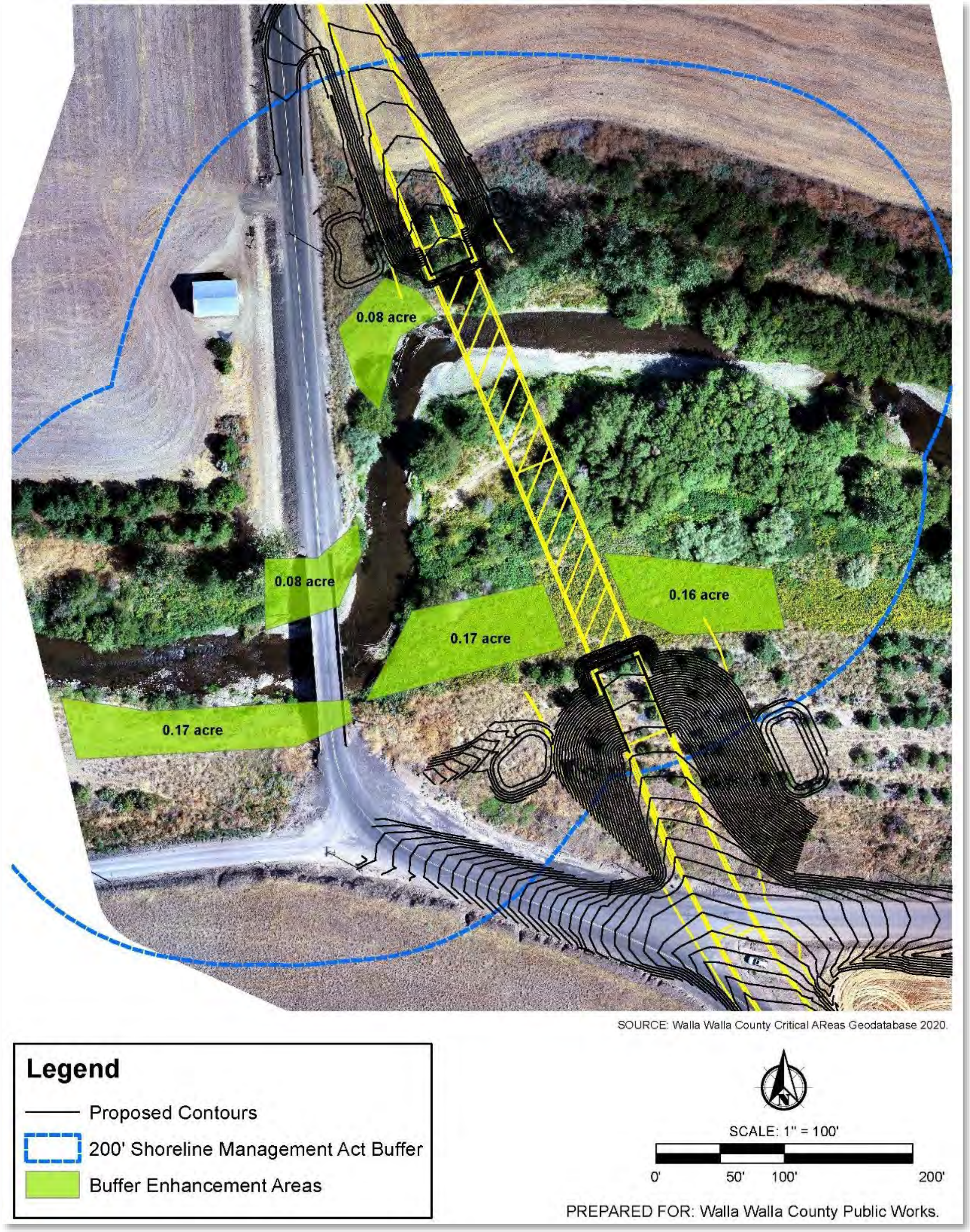
The proposed improvements will result in an increase of 0.70 acre of impervious surface. However, the project will only result in an increase of 0.52 acre of new pollution generating impervious surface (PGIS) as upon completion of the project, vehicle traffic will be eliminated from the existing bridge approaches. Stormwater plans for the project show that treatment and detention for a total of 1.5 acres of new and impervious surfaces will be provided. All stormwater will be infiltrated with no planned discharges to surface waters.

3.2 Secondary Project Elements

3.2.1 Riparian Area Revegetation

The riparian area for this project has been defined as all areas within the 200-foot shoreline buffer that is administered by Walla Walla County. The total amount of impacts to this area equals 0.82 acre and will result from the creation of the fill slopes to support the bridge approaches and abutments. Approximately 70% of this impact area is vegetated with invasive non-native grasses and forbs.

To mitigate for the loss of riparian vegetation, a native tree and shrub plant community will be installed along the Touchet River in four separate locations that total 0.66 acre in size. Planting densities equal roughly 10 trees and 20 shrubs per 1,000 sq. ft. of enhancement area. Planting locations have been selected to provide for wildlife habitat, increase shading of surface waters, promote channel stability through establishment of dense vegetation, and provide a source of future woody debris recruitment for instream habitat creation. These plantings will also increase native plant diversity, forage opportunities for resident and migratory wildlife, and cover. Figure 2 below identifies the locations of the planned enhancement plantings.



SOURCE: Walla Walla County Critical AReas Geodatabase 2020.

PREPARED FOR: Walla Walla County Public Works.

Figure 2 - Riparian Habitat Enhancement Plan

3.2.2 Construction Access, Staging Areas, and Detours

Project staging will be located within previously disturbed areas within the project area and generally within the existing and proposed road easements. These consist of gravel maintenance roads and cleared areas directly adjacent to the existing Pettyjohn Road alignment. No vegetation within the riparian zone will be removed for staging or access. Staging areas will be delineated with orange construction fencing or flagging and suitable erosion control measures employed if erosion is identified. Any areas within the riparian zone that are cleared will be restored through the establishment of native grasses and herbs.

Traffic will be maintained along the existing bridge during construction of the new bridge and approaches. Upon completion of the new bridge alignment, traffic will be routed to the new bridge to allow demolition to commence. No formal detour will be required for the project.

3.2.3 Construction Equipment

Construction of the roadway improvements is expected to use the equipment and methods shown below as organized from loudest to quietest. Noise levels expressed in A-weighted decibels (dBA) are based on WSDOT guidance (WSDOT, 2020) and are provided in parenthesis:

- Jackhammer for breaking up asphalt/concrete (95 dBA)
- Dump trucks to haul debris, soil, and aggregates to and from the site (91 dBA)
- Concrete saws (90 dBA)
- Concrete pump trucks (89 dBA)
- Excavators to remove concrete and asphalt and excavate for walls, new pavement subgrades, storm pipes and culverts, and utilities (87 dBA)
- Dozers to place embankment and aggregate material for roadbed construction (86 dBA)
- Paving machines for placing hot mix asphalt (82 dBA)
- Mixer trucks to deliver and off-load concrete (81 dBA)
- Rollers for subgrade, embankment, and hot mix asphalt compaction (81 dBA)
- Backhoes for smaller excavation and loading activities (80 dBA)
- Drill rig truck (79 dBA)
- Loaders to move debris, soil, and aggregates around the site (71 dBA)
- Cranes and boom trucks to set heavy structures and bridge girders (71 dBA)

4 PROJECT TIMELINE

Demolition and construction work for the project is expected to begin on March 1, 2023, with completion anticipated by November 30, 2023. The initial work will include clearing, excavation, filling, and grading activities for the roadway and associated wall structures conducted within the existing road rights-of-way and uplands. This work will be ongoing throughout the project. In-water work in (including demolishing and removing the existing bridge) will be conducted during the WDFW approved fish window (June 16 to September 30). Work activities will be conducted during daylight hours throughout this period. Table 1 shows the currently estimated work elements start and end dates.

Table 1. Anticipated Project Schedule

Project Element	Start	End
Entire project	March 1, 2023	November 30, 2023
Install erosion and sediment control BMPs	March 1, 2023	March 15, 2023
Site preparation	March 1, 2023	March 15, 2023
Grading approaches/constructing retaining walls	March 15, 2023	May 15, 2023
Constructing abutments and central pier	May 15, 2023	September 30, 2023
Girder placement/bridge decking	August 1, 2023	September 30, 2023
Stormwater infrastructure	March 15, 2023	June 15, 2023
Roadway paving and stripping	August 1, 2023	September 30, 2023
Restoration and enhancement plantings	October 1, 2023	November 30, 2023
Constructing debris containment system(s) (demolition)	May 1, 202	May 5, 2023
Demolishing bridge structure	May 5, 2023	June 1, 2023
Begin in-water work window (June 16)		
Coffer dam, fish removal, and dewatering	June 16, 2023	June 17, 2023
Demolishing bridge abutments and central pier	June 17, 2023	September 30, 2023
End in-water work window (September 30)		
Final cleanup and demobilization	September 30, 2023	October 15, 2023

5 IMPACT AVOIDANCE AND MINIMIZATION MEASURES

The project improvements have been designed to avoid or minimize impacts to streams, riparian areas, and buffers. Impacts to these features have been reduced or avoided using the following design/construction methods:

- Multiple design and location approaches were assessed to minimize potential impacts while meeting the overall purpose and need of the project.
- The proposed project will cross the Touchet River at a more appropriate location and result in the removal of in-stream bridge infrastructure.

Project design impact minimization measures include:

- Seasonal restrictions applied to work conducted within or below the OHWM will follow requirements identified in the HPA issued by WDFW and Water Quality Standards for Surface Waters of the State of Washington (Washington Administrative Code [WAC] Chapter 173-201A).
- Construction impacts will be confined to the minimum area necessary to complete the project.
- Construction/demolition activities will follow local, state, and federal permit restrictions for allowable work hours.

Grading, Cutting, or Filling:

- Fill material will only be placed in specified and permitted locations.
- Temporary fill will be placed outside all sensitive areas.
- Temporary fill will be entirely removed, and the site restored to preexisting conditions.

Vegetation Removal and Clearing:

- Boundaries of clearing limits associated with site access and construction limits will be clearly flagged to prevent ground disturbance outside the limits.
- Removal of riparian vegetation will be minimized to the greatest extent possible.
- Temporarily disturbed areas will be restored to prework conditions to the extent possible, including protecting existing root systems and allowing resprouting of herbaceous and woody plants. Where replanting is required, native trees and shrubs will be used, and monitoring of plantings will occur for a minimum of five years.
- Mitigation for the loss of riparian vegetation will be completed through the installation and maintenance of a native tree and shrub plant community.
- Revegetation shall occur no later than spring of the year following construction.

In-Water Work:

- All work below OHWM will be isolated from flowing water and will occur during the approved in-water work window.
- A temporary sandbag or bulk bag cofferdam will be installed to isolate the work area. This coffer dam can likely isolate the north abutment and central pier at the same time and push in-stream flows to the south in order to reduce the need for separate fish removal and work area isolation sessions.
- All fish and other aquatic life will be removed from the work area prior to any in-water work activities. Fish salvage will be conducted, consistent with *WSDOT Fish Exclusion Protocols and Standards* (WSDOT, 2021), and the *Guidelines for Electrofishing Waters Containing Salmonids Listed Under the Endangered Species Act* (NOAA Fisheries, 2000).
- Sediment-laden water in the work area will be pumped to settling tanks or ponds and allowed to settle before discharging to the creek. Sediment will be disposed of in accordance with Ecology requirements. Water will be discharged over a well-vegetated area, water energy dissipation pad, or bedrock.
- Prior to entering the work area, equipment will be checked daily for leaks and will be well-maintained to prevent lubricants and any other deleterious materials from entering waters of the state. All

equipment will be free of any external petroleum products, hydraulic fluid, and coolants. Wash water will not be discharged to any water body without pretreatment.

- Project operations will cease under high-flow conditions that may result in inundation of the project area, except for efforts to avoid or minimize resource damage.

Sensitive Aquatic Habitat/Overwater Work:

- No contractor will stage heavy equipment within 100 feet of streams, unless site-specific review completed by the project biologist indicates that no impacts to the sensitive resource areas will occur due to topography or other factors. All equipment will be fueled and maintained more than 100 feet from the nearest ditches or flowing or standing water, unless site-specific review completed by the project biologist indicates that no impacts to the resource areas will result. Stationary equipment will include full-time containment systems. Containment measures will be implemented when fueling and maintaining equipment.
- The contractor will be responsible for developing a temporary erosion and sediment control (TESC) plan to address erosion control during and after construction (including directing runoff away from unstabilized soils, slowing runoff with structures, and installing silt fence to catch particulates). The TESC plan will be a component of plans and specifications.
- A Spill Prevention, Control, and Countermeasure (SPCC) plan will be developed and implemented for the project. The SPCC plan will identify construction planning elements, including containment measures, and potential spill sources at the site. The plan will also outline responsive actions in the event of a spill or release, identify notification and reporting procedures, and include contractor management elements such as personnel responsibilities, project site security, site inspections, and training.
- Absorbent materials and watertight pans, or similar BMPs, will be placed under all stationary equipment and staged vehicles on barges or other over-water structures. Absorbent materials will be applied immediately on small spills, and promptly removed and disposed of properly. An adequate supply of spill cleanup materials, such as absorbent materials, will be maintained and available in multiple locations on site.
- All construction platforms where such surfaces are used for containment of uncured concrete, slurry, or residue to prevent discharges to waters of the state, will include watertight surfaces/watertight plastic on curbing, bull rails, toe boards, or other devices.
- Nets, tarps, platforms, scaffolds, blankets, barges, floats, or combination thereof, will be used to contain and control debris beneath structures being constructed or demolished.
- The curbing, bull rails, toe boards, or other devices will be installed with a height to be sufficient to contain runoff water, high pH water, and process water.
- Concrete pumps and pipelines will be equipped with emergency shutoff valves so that no uncured concrete comes into contact with waters of the state.
- Concrete and grout delivery systems situated over water will be inspected daily to prevent any discharges of concrete, grout, and/or slurry water into waters of the state.
- Concrete truck cleanout areas will be established to properly contain wet concrete and wash water and prevent it from entering nearby waterbodies.

- The contractor will protect all inlets and catchments from stormwater runoff from sediment, fresh concrete, tackifier, paving, or paint striping in case inclement weather unexpectedly occurs.
- All unstable slopes resulting from construction activities with a high likelihood of delivery of material to listed species-bearing waters will be stabilized within two days from October through June, and within seven days from July through September.
- Temporary material storage piles consisting of erosive materials shall by placed entirely outside the 100-year floodplain.
- No paving, chip sealing, or stripe painting will be initiated in rainy weather.
- There will be no visible sheen from petroleum products in the receiving water as a result of project activities.

6 ACTION AREA

The action area (AA) for a proposed project is defined as all areas to be affected directly and indirectly by the federal action, and not merely the immediate area involved in the action (ESA 50 CFR 17.11). Direct effects include all immediate impacts (adverse and beneficial) from project-related actions, impacts that are directly related to project elements that occur close to the time of the action itself (such as sedimentation), and those impacts from are interrelated or interdependent actions. Indirect effects are those that are caused by or result from the proposed action and are still reasonably certain to occur but occur later in time. The primary direct and indirect activities that define the action area with regard to transportation projects are physical disturbance, project-generated noise, and related aquatic impacts.

6.1 Potential Direct Impacts

6.1.1 Physical Disturbance

The construction-related physical disturbance zone includes all staging, clearing, excavating, grading, construction, paving, and demolition activities. Detours required for construction of the project will use existing paved roadway surfaces. These detours will not result in any additional construction-related extensions to the action area. The limits of these activities are shown as the work area on Figure 3.

6.1.2 Noise

6.1.2.1 Terrestrial

Potential noise disturbance resulting from project construction was calculated using WSDOT methodology for determining the extent of noise impacts for construction projects. Construction noise levels and attenuation distances were calculated using the rules for decibel addition for construction equipment noise and ambient noise level data based on the noise assessment guidance from WSDOT (2020).

The three loudest pieces of construction equipment to be used for the project are:

- Jackhammer for breaking up asphalt/concrete (95 dBA)
- Dump trucks to haul debris, soil, and aggregates to and from the site (91 dBA)
- Concrete saws (90 dBA)

The resulting maximum combined noise level using the WSDOT guidelines for decibel addition is 97 dBA. There are no formal noise analysis reports for the project area to measure background noise levels. Because of its remote location the bridge does not experience a high level of traffic. Daily trips were estimated at 100 trips per day with 20% of those trips consisting of heavy trucks. Noise levels for the project area were estimated using a JavaScript calculator with inputs for average daily car and truck trips and speed (Rigolet, 2021). Six cars and one truck per hour at a speed of 40 miles per hour would generate a noise level of 47 dbL at 50 feet.

Noise attenuation distance was calculated using WSDOT's spherical spreading loss model, expressed as:

$$D = Do * 10((\text{Construction Noise} - \text{Ambient Sound Level in dBA})/\alpha)$$

Where D = the distance from the noise source, Do = the reference measurement distance (50 feet), and α = 25 for soft ground. For point source noise, a spherical spreading loss model is used. The alpha (α) value assumes a 7.5 dBA reduction per doubling distance over soft ground.

Based on these data and calculations, terrestrial construction noise from the project would attenuate to background levels within 5,000 feet of the construction activities. This 5,000-foot limit was used as the limit of construction-related noise effects on terrestrial species and habitats (Figure 3). The Action Area includes the Touchet River between river mile (RM) 30-32.

6.1.3 Water Quality

In-stream work will be limited to the demolition of existing bridge piers. Even though this work will be done during the summer low flow season and the work areas will be isolated from flowing waters, some degree of sedimentation of downstream waters is anticipated. Water quality impacts may include potential sedimentation and turbidity resulting from the temporary in-stream work when the existing bridge pier is removed, potential debris entering the steam during demolition, and erosion of exposed areas prior to stabilization.

The downstream extent of the aquatic zone of effect for the demolition was determined based on the criteria in the Water Quality Standards for Surface Waters of the State of Washington (WAC Chapter 173-201A) and flow estimates developed for the bridge design. The US Geological Survey stream gauge #14017000 indicates that normal low flow conditions for the Touchet River during the in-water work period is 20 cubic feet per second. The code states "for waters with flows from 10 to 100 cubic feet per second at the time of construction, the point of compliance shall be 200 feet downstream of the activity causing the turbidity exceedance" (Ecology, 2006). This 200-foot limit serves as the outer extent of the potential water quality effects of the project and defines the aquatic action area shown in Figure 4.

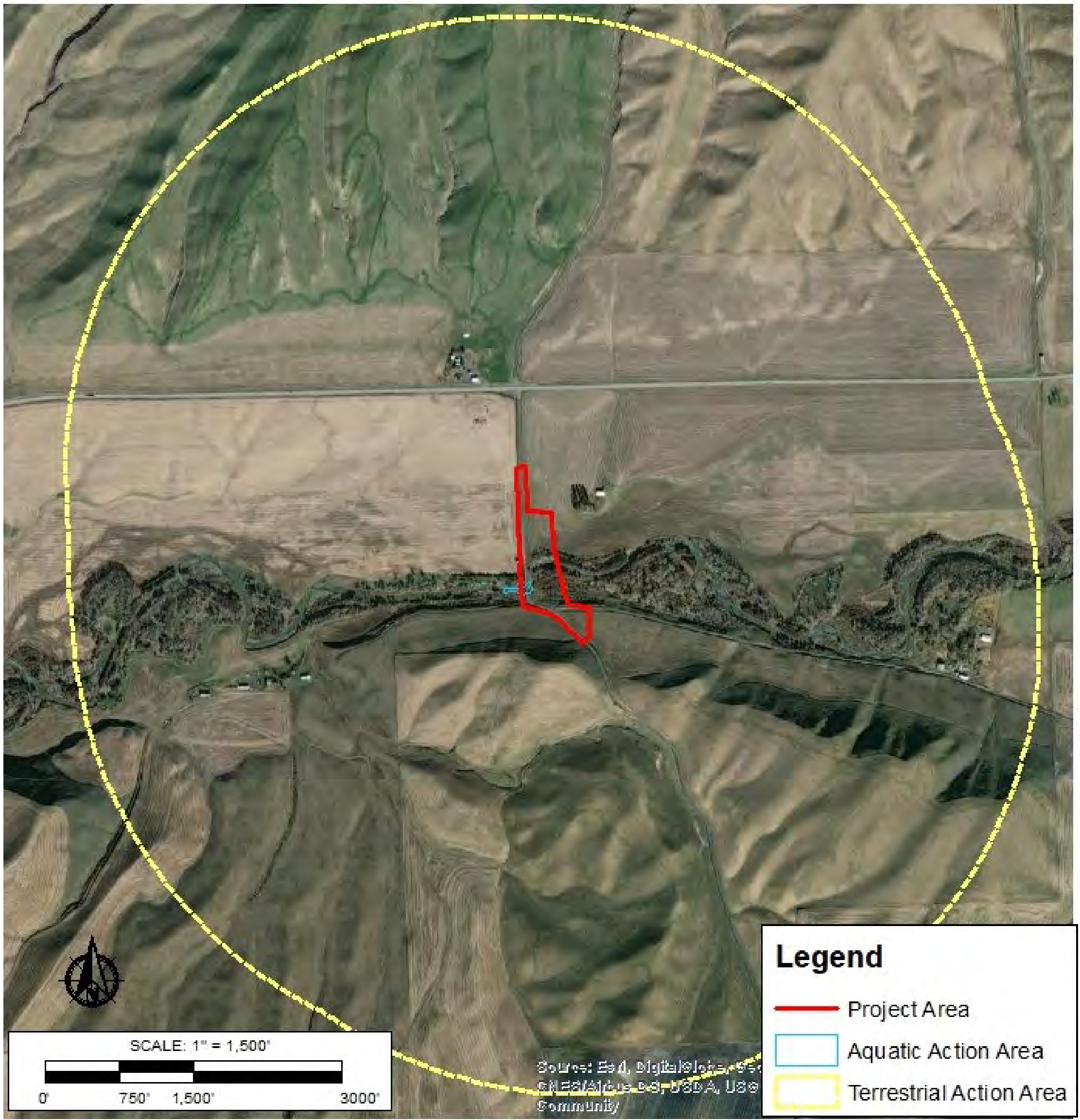


Figure 3. Project Terrestrial Action Area

Figure 4. Aquatic Action Area

Species and Habitat Information

7 SPECIES AND CRITICAL HABITAT ADDRESSED IN BIOLOGICAL ASSESSMENT

Table 2. Federally Protected Species & Critical Habitats in the Action Area

Species	Ecological Significant Unit/ Distinct Population Segment	Federal Status	Critical Habitat
Aquatic Species			
Steelhead trout (Oncorhynchus mykiss)	Middle Columbia River DPS	Threatened	Final designated
Bull trout (Salvelinus confluentus)	US, conterminous lower 48 states	Threatened	Final designated
Terrestrial Species			
Yellow-billed cuckoo (Coccyzus americanus)	Western US DPS	Threatened	

8 SPECIES AND CRITICAL HABITAT OCCURRENCE

8.1 Steelhead Trout Middle Columbia River DPS

8.1.1 Status of Species

The steelhead (*Oncorhynchus mykiss*) Middle Columbia River Distinct Population Segment (DPS) was first listed as threatened by NOAA Fisheries on March 25, 1999. The designation was updated on February 6, 2006, and on April 14, 2014. This DPS includes naturally spawned anadromous populations originating below natural and humanmade impassible barriers from the Columbia River upstream of the wind and Hood River and includes fish from the Yakima River. The Middle Columbia DPS does not include stocks originating from the Snake River basin. The species is supported through four separate artificial propagation programs. A recovery plan for this population was established in 2009 (NOAA Fisheries, 2009). The species recovery within the Touchet River basin has been challenging and the population viability was evaluated as being at a high risk of extirpation (WDFW, 2016).

8.1.2 Status of Critical Habitat

Critical habitat for Middle Columbia River DPS steelhead was designated on September 2, 2005. The spawning range of the Middle Columbia River DPS steelhead extends over an area of approximately 35,000 square miles in the Columbia plateau of eastern Washington and eastern Oregon. The DPS includes all naturally spawned populations of steelhead in drainages upstream of the Wind River, Washington, and the Hood River, Oregon (exclusive), up to, and including, the Yakima River, Washington, excluding steelhead from the Snake River Basin Major drainages in this DPS are the Deschutes, John Day, Umatilla, Walla Walla, Yakima, and Klickitat river systems. The Cascade Mountains form the western border of the plateau in both Oregon and Washington, while the Blue Mountains form the eastern edge. The southern border is marked by the divides that separate the upper Deschutes and John Day basins from the Oregon High Desert and drainages to the south. The Wenatchee Mountains and Palouse areas of eastern Washington border the Middle Columbia on the north (NOAA Fisheries, 2009).

8.1.3 Occurrence in the Action Area

Summer run steelhead are presumed to migrate through the portions of the Touchet River within the action area. Winter run steelhead within the Columbia River are not found upstream of the Klickitat River (Smith, 2004). Fish enter the Touchet River as early as May in the year prior to spawning, and as late as the following April (WDFW, 2015). Steelhead spawn upstream of the project location. Abundance figures for steelhead within the Touchet River are limited. Because of high summer water temperatures and low amounts of suitable cover, this section of the Touchet River is used by steelhead for migration (Trump, 2021). The lowest recorded redds were observed at RM45, approximately 10 miles upstream from the action area (WDFW, 2015). Steelhead are most likely to be within the action area during migration that correspond with heavy precipitation events (Trump, 2021).

Juvenile summer steelhead rear successfully in the Touchet River above RM 40, and are widely spread throughout the upper mainstem, each of the major forks, and smaller tributaries. Rearing success appears to be dependent upon habitat and water quality, which is poor below RM 40, and only moderate between RM 40-53 (Mendel et al 1999). Above RM 53, rearing conditions are good for steelhead. Juveniles will typically spend from one to three (primarily two) years in the Touchet River before emigrating as smolts, though a few age four individuals have been identified from adult scale samples (Bumgarner and Dedloff, 2015).

8.1.4 Critical Habitat

The Touchet River is designated critical habitat for middle Columbia River DPS steelhead. Critical habitat was designated on February 16, 2000. NOAA Fisheries physical and biological features (PBF, formerly primary constituent elements [PCEs]) for Middle Columbia River DPS steelhead critical habitat that are applicable to streams in the action area include:

1. Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation, and larval development.
2. Freshwater rearing sites with water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; water quality and forage supporting juvenile development; and natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.

3. Freshwater migration corridors free of obstruction with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival.

8.1.5 Critical Habitat PCEs within action area

Of the PCEs listed above, the action area provides migration opportunities. Water quality impairments, principally temperature, prevent usage of the action area reaches for spawning and rearing. While micro-habitats such as pools, undercut banks, and low flow side channels due exist within the action area, water surface temperatures in the summer months exceed 70 degrees Fahrenheit prevent utilization of these areas.

8.2 Bull Trout

8.2.1 Status of Species

The bull trout (*Salvelinus confluentus*) population segment was listed as threatened by USFWS on November 1, 1999. The Mid-Columbia Recovery Unit (Mid-C RU) comprises 24 bull trout core areas. The recovery unit is located within eastern Washington, eastern Oregon, and portions of central Idaho and major drainages include the Methow River, Wenatchee River, Yakima River, John Day River, Umatilla River, Walla Walla River, Grande Ronde River, Imnaha River, Clearwater River, and smaller drainages along the Snake River and Columbia River and a recovery plan was established in 2015 (USFWS, 2015).

8.2.2 Status of Critical Habitat

Critical habitat for the bull trout was designated on September 26, 2005, and revised on October 18, 2010. This final designation includes approximately 3,828 miles of streams; 143,218 acres of lakes in Idaho, Montana, Oregon, and Washington; and 985 miles of shoreline paralleling marine habitat in Washington. Designated critical habitat includes the Columbia River and its tributaries, including the Walla Walla and Touchet Rivers.

8.2.3 Occurrence in the Action Area

Bull trout within the Touchet River system are mostly located in the upper reaches within the North Fork Touchet River and Wolf Fork Touchet River that supply the cooler surface water temperatures that bull trout require (Trump, 2021; (Mendel et al., 2003). Eight years of surveys for the presence of bull trout from 1998 to 2006 within the lower reaches of the Touchet River (Confluence to Coppei Creek) yielded one observation of a bull trout (WDFW, 2007). There have been no spawning or redd surveys done for bull trout within the action area reach. Bull trout use this reach of the Touchet only for migration (Trump, 2021). Water temperatures within the action area during the in-water Work window which runs from June through September well exceed those that can be tolerated by bull trout. Seven day averages for June, July, and September recorded between 2003-2006 indicate water surface temperatures exceed 70 degrees by the 2nd week of June and don’t fall below 70 until the 2nd or 3rd week of September (WDFW, 2007).

8.2.4 Critical Habitat

Designated critical habitat for bull trout includes the Columbia River and its tributaries, which includes the Touchet River. The following nine points summarize the USFWS PBFs appropriate to freshwater aquatic systems in the action area:

1. Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flows) to contribute to water quality and quantity and provide thermal refugia.
2. Migration habitats with minimal physical, biological, or water quality impediments.
3. An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.

4. Complex river, stream, lake, reservoir, and marine shoreline aquatic environments, and processes that establish and maintain these aquatic environments.
5. Water temperatures ranging from 2 to 15 degrees Celsius (°C or 36 to 59 degrees Fahrenheit [°F]), with adequate thermal refugia available.
6. Spawning and rearing areas with suitable substrate.
7. A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges.
8. Sufficient water quality and quantity.
9. Low levels of occurrence of non-native predatory species.

8.2.5 Critical Habitat PCEs within action area

Of the PCSs listed above, only spawning sites with suitable substrate are present within the action area. However, water quality parameters far exceed those required for bull trout presence and utilization.

8.3 Yellow-Billed Cuckoo

8.3.1 Status of Species

The yellow-billed cuckoo (*Coccyzus americanus*) is a relatively large bird with a long tail and slender body. The Western US Distinct Population Segment (DPS) of the yellow-billed cuckoo was listed as threatened by USFWS on November 3, 2014. This DPS occurs in the western US from Texas to British Columbia and California to Colorado. Yellow-billed cuckoo populations have declined extensively in the west, particularly in Washington and Oregon where breeding populations are considered to be extirpated (WDFW, 2013).

8.3.2 Status of Critical Habitat

Critical habitat for the yellow-billed cuckoo was proposed on August 15, 2014, and revised on April 21, 2021. Critical habitat units were proposed in California, Nevada, Idaho, and other southwestern states, but not Washington.

8.3.3 Occurrence in the Action Area

The project action area contains riparian corridors with cottonwood (*Populus balsamifera*) and willow (*Salix* sp.) cover that could provide suitable nesting habitat for western yellow-billed cuckoo. There is a strong correlation between habitat size and presence of yellow-billed cuckoo where contiguous cottonwood-willow habitats larger than 40 hectares were preferred by the birds in California (Laymon, 1989). The riparian corridor along the Touchet River is relatively narrow and is flanked to the north and south by agricultural land. As a result, these areas are likely too fragmented and lack canopy coverage and density to provide habitat for yellow-billed cuckoo. General information on the life history of this species in provided in Appendix C.

Environmental Setting/Baseline

9 GENERAL SETTING

The Dell Sharpe Bridge Replacement project is within unincorporated Walla Walla County and is situated in the northern extent of the Columbia Plateau. This region of Washington is characterized by rolling volcanic plains typically vegetated with sagebrush. Precipitation ranges from 7 to 18 inches per year from east to west across the ecoregion. This area experiences long, hot summers and short, cold winters.

The general vicinity of the AA is characterized by rolling hills dedicated to non-irrigated agricultural activities. The topography of the site is highly variable and essentially spans from rolling hills and slopes in the south to a flat valley to the north. The Touchet River flows west through the southern edge of this valley. Pettyjohn Road descends into the project area and becomes flat where it crosses Sharp Road. South of Sharp Road, there are short, steep slopes that lead down to the Touchet River floodplain.

Current land uses in the vicinity of the project is dominated by wheat and hay production. There is a single residence and outbuildings located approximately one mile west of the project site (Figure 3). Additionally, there is an old school building located directly north of the existing bridge, on the west side of the road. There are no other developments within the action area.

Vegetation within the AA includes active wheat and hay fields in the northern and southern extents and unmanaged vegetation in the central portions of the area, directly adjacent to the Touchet River. The slopes leading down to the Touchet River floodplain are dominated by large amounts of invasive, non-native plant species. These include Canada thistle (*Cirsium arvense*), perennial ryegrass (*Lollium perrene*), cheatgrass (*Bromus tectorum*), cereal rye (*Secale cereale*), curly dock (*Rumex crispus*), Canada goldenrod (*Solidago canadensis*), and poison hemlock (*Conium maculatum*). The upper portions of this slope are sparsely vegetated within grasses and forbs and scattered Russian olive (*Elaeagnus augustifolia*) and big sagebrush (*Artemisia tridentata*). The lower bench that sits slightly above the floodplain areas consists of a thick stand of poison hemlock. Below the poison hemlock, a less disturbed vegetation community comprises a native understory and an understory of both native and non-native grasses and forbs. The overstory consists of dense stands of black cottonwood (*Populous trichocarpa*), water birch (*Betula occidentalis*), white alder (*Alnus rhombifolia*), and coyote willow (*Salix exigua*). Understory vegetation along the river consists of young coyote willow, red-osier dogwood (*Cornus alba*), nootka rose (*Rosa nootkana*), Russian olive, and scattered false-indigo bush (*Amorpha fruticose*).

9.1 Waters

The only water within the AA is the Touchet River, which flows west under the existing Dell Sharpe Bridge. The Touchet River Watershed originates from streams on the northwestern slopes of the Blue Mountains, and from seasonal streams draining Palouse hillsides to the north. The Touchet River drains into the Walla Walla River just west of the town of Touchet, Washington. There are currently no mapped non-fish passable culverts between the confluence with the Walla Walla River and the project area (WDFW, 2021b). Within the AA, the river exists as a moderate gradient stream with riffle and glide habitats with a few small shallow pools. The banks of the river are a mixture of steep, eroded banks on the outside meander bend of the river near the existing bridge and relatively flat vegetated floodplain areas. There is a small amount of large woody debris (LWD) in the channel and several areas with undercut banks and some areas of overhanging vegetation that likely provide cover habitat. Photographs of the stream are provided in Appendix E.

10 ENVIRONMENTAL BASELINE

The following sections describe the environmental baseline for ESA listed species and their habitats present in the action area.

10.1 Terrestrial Species and Habitat

Terrestrial environments in the project action area were evaluated for the presence of suitable habitat for listed species. Baseline conditions assessed included the following elements:

- Foraging habitat
- Nesting or dispersal habitat
- Habitat for prey
- Suitable or occupied habitat

The terrestrial portion of the AA is dominated by agricultural fields used to grow pasture grasses and grains. E Highway 124 runs east-west through the northern portion of the AA. The only habitats within the AA that are not currently farmed is the narrow strip of vegetation adjacent to the Touchet River. Vegetation in this area is a mixture of non-native grasses, forbs, and shrubs that transitions to a predominately native vegetation within the floodplain of the river.

The slopes leading down to the Touchet River floodplain are dominated by large amounts of invasive, non-native plant species. These include Canada thistle, perennial ryegrass, cheatgrass, cereal rye, curly dock, Canada goldenrod, and poison hemlock. The upper portions of this slope are sparsely vegetated with grasses and forbs and scattered Russian olive and big sagebrush. The lower bench that sits slightly above the floodplain areas consists of a thick stand of poison hemlock.

The floodplain areas directly adjacent to the Touchet River are vegetated by a mixture of native trees and shrubs with an understory comprising a mixture of non-native herbs and grasses. There is a dense overstory of black cottonwood, water birch, white alder, and coyote willow. Emergent vegetation is very sparse, likely due to seasonal flooding and scouring of the floodplain and is dominated by scattered reed canarygrass (*Phalaris Aurundinacea*), bentgrass (*Agrostis sp.*), and scattered soft rush (*Juncus effusus*).

10.2 Aquatic Species and Habitat

NOAA Fisheries has prepared guidance on the evaluation of properly functioning conditions (PFC) for ESA-listed salmonids. Existing environmental conditions within action area for the project were evaluated using the Pathways and Indicators matrices for properly functioning conditions developed by NOAA Fisheries.

The environmental baseline conditions for the Touchet River were rated as functioning at risk based on these matrices (see Appendix D).

10.3 Water Quality

Detailed current temperature data is not available for the Touchet River as it flows through the AA. However, past water quality monitoring indicates that summertime water temperatures well exceed levels tolerable to salmonids. Between 2001-2006, the WDFW measured surface water temperatures from May 1st- July 16 and September 1st- November 2nd at a location that is 1.5 miles above the AA (WDFW, 2007). The results of these measurements showing the seven day maximum temperatures are presented in Figure 4 below. The shaded cells indicate temperatures that would be thermal barriers to fish passage to passage temperatures (>68°F).

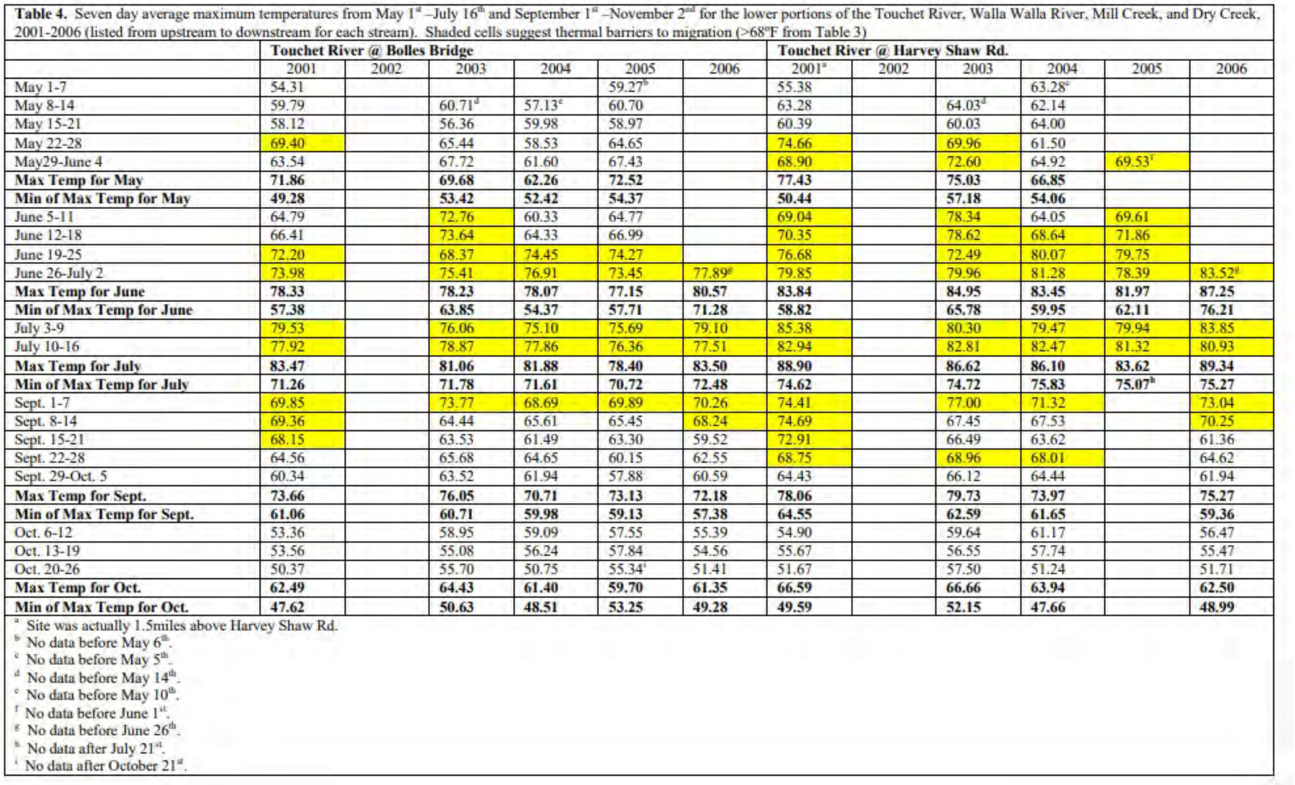


Table 4. Seven day average maximum temperatures from May 1st –July 16th and September 1st –November 2nd for the lower portions of the Touchet River, Walla Walla River, Mill Creek, and Dry Creek, 2001-2006 (listed from upstream to downstream for each stream). Shaded cells suggest thermal barriers to migration (>68°F from Table 3)

	Touchet River @ Bolles Bridge						**Touchet River @ Harvey Shaw Rd.**					
	2001	2002	2003	2004	2005	2006	2001[a]	2002	2003	2004	2005	2006
May 1-7	54.31				59.27[b]		55.38			63.28[c]		
May 8-14	59.79		60.71[d]	57.13[e]	60.70		63.28		64.03[d]	62.14		
May 15-21	58.12		56.36	59.98	58.97		60.39		60.03	64.00		
May 22-28	69.40		65.44	58.53	64.65		74.66		69.96	61.50		
May29-June 4	63.54		67.72	61.60	67.43		68.90		72.60	64.92	69.53[f]	
Max Temp for May	**71.86**		**69.68**	**62.26**	**72.52**		**77.43**		**75.03**	**66.85**		
Min of Max Temp for May	**49.28**		**53.42**	**52.42**	**54.37**		**50.44**		**57.18**	**54.06**		
June 5-11	64.79		72.76	60.33	64.77		69.04		78.34	64.05	69.61	
June 12-18	66.41		73.64	64.33	66.99		70.35		78.62	68.64	71.86	
June 19-25	72.20		68.37	74.45	74.27		76.68		72.49	80.07	79.75	
June 26-July 2	73.98		75.41	76.91	73.45	77.89[g]	79.85		79.96	81.28	78.39	83.52[g]
Max Temp for June	**78.33**		**78.23**	**78.07**	**77.15**	**80.57**	**83.84**		**84.95**	**83.45**	**81.97**	**87.25**
Min of Max Temp for June	**57.38**		**63.85**	**54.37**	**57.71**	**71.28**	**58.82**		**65.78**	**59.95**	**62.11**	**76.21**
July 3-9	79.53		76.06	75.10	75.69	79.10	85.38		80.30	79.47	79.94	83.85
July 10-16	77.92		78.87	77.86	76.36	77.51	82.94		82.81	82.47	81.32	80.93
Max Temp for July	**83.47**		**81.06**	**81.88**	**78.40**	**83.50**	**88.90**		**86.62**	**86.10**	**83.62**	**89.34**
Min of Max Temp for July	**71.26**		**71.78**	**71.61**	**70.72**	**72.48**	**74.62**		**74.72**	**75.83**	**75.07[h]**	**75.27**
Sept. 1-7	69.85		73.77	68.69	69.89	70.26	74.41		77.00	71.32		73.04
Sept. 8-14	69.36		64.44	65.61	65.45	68.24	74.69		67.45	67.53		70.25
Sept. 15-21	68.15		63.53	61.49	63.30	59.52	72.91		66.49	63.62		61.36
Sept. 22-28	64.56		65.68	64.65	60.15	62.55	68.75		68.96	68.01		64.62
Sept. 29-Oct. 5	60.34		63.52	61.94	57.88	60.59	64.43		66.12	64.44		61.94
Max Temp for Sept.	**73.66**		**76.05**	**70.71**	**73.13**	**72.18**	**78.06**		**79.73**	**73.97**		**75.27**
Min of Max Temp for Sept.	**61.06**		**60.71**	**59.98**	**59.13**	**57.38**	**64.55**		**62.59**	**61.65**		**59.36**
Oct. 6-12	53.36		58.95	59.09	57.55	55.39	54.90		59.64	61.17		56.47
Oct. 13-19	53.56		55.08	56.24	57.84	54.56	55.67		56.55	57.74		55.47
Oct. 20-26	50.37		55.70	50.75	55.34[i]	51.41	51.67		57.50	51.24		51.71
Max Temp for Oct.	**62.49**		**64.43**	**61.40**	**59.70**	**61.35**	**66.59**		**66.66**	**63.94**		**62.50**
Min of Max Temp for Oct.	**47.62**		**50.63**	**48.51**	**53.25**	**49.28**	**49.59**		**52.15**	**47.66**		**48.99**

[a] Site was actually 1.5miles above Harvey Shaw Rd.
[b] No data before May 6th.
[c] No data before May 5th.
[d] No data before May 14th.
[e] No data before May 10th.
[f] No data before June 1st.
[g] No data before June 26th.
[h] No data after July 21st.
[i] No data after October 21st.

Figure 4 - 7-day Average Water Temperatures (from WDFW, 2007).

The one-day maximum temperatures were between 30.01 and 33°C (Ecology, 2007). This temperature is significantly higher than the less than 20°C target set by the Environmental Protection Agency (EPA) for migrating salmonids. It has been shown that salmonids will completely avoid waters with temperatures exceeding 22 to 24°C (EPA, 1999). The entire Walla Walla Watershed is currently covered under TMDLs for temperature, bacteria, DO, and pH (Ecology, 2021).

10.4 Habitat Access

The Touchet River generally has good aquatic habitat access owing to low development rates in the watershed and a lack of non-fish passable culverts and structures. The WDFW state fish passage map does not show any non-fish passable culverts between the project site and the downstream confluence with the Walla Walla River (WDFW, 2021). Despite the lack of recorded migratory blockages, low flows in the Touchet River may prevent adult fish from entering the system until heavy precipitation events. Low flows in the lower Walla Walla and Touchet rivers may prevent or inhibit adult steelhead from migrating above the mouth of the Touchet River until December in many years (Mahoney et al., 2001). WDFW staff think this is likely a function of water surface elevations and temperature (Trump, 2021).

10.5 Habitat Elements

Sands, gravels, and cobbles predominate in the substrate of the project site reach of the Touchet River. Embedment of channel substrate is very low, likely due to the absence of silts. Large woody debris is uncommon or absent in the affected portions of both streams with less than 10 pieces per 100 meters and the existing riparian zones are narrow and lack potential for woody debris recruitment. Instream habitat in the affected stream reaches is run and riffle type; there is only a single pool located adjacent to the bridge pier and appeared shallow (less than 3 feet deep). Riparian cover is fair while there is a good amount of woody vegetation adjacent to the stream and undercut banks are present. There is no off-channel habitat within the affected stream reach.

10.6 Channel Condition

Stream width to depth ratios vary within the Touchet River reach within the AA. The creek generally has a width to depth ratio of around 30. In general, the river displays appropriate channel geometry with steeper banks on the outside of channel meanders and shallow, gently sloped areas on the inside of channel meanders. While most of the channel banks are stable, there are a few isolated areas that show active erosion.

10.7 Flow, Hydrology, and Watershed Conditions

The majority of the watershed that feeds the Touchet River comprises lands converted to agriculture. The hydrology of the river does not suffer from flashy hydrology or prolonged peak flows typical of more urbanized streams, but summer stream flows are reduced due to agriculture diversions. Reductions in flows have been identified as one of the major reasons for the high temperatures recorded within the river. There has been a significant effort in recent years by various organizations to purchase water rights to increase stream flows.

11 ANALYSIS OF EFFECTS

Under the ESA, federal agencies must evaluate the effects of the proposed action on endangered species and critical habitats. The analysis must include direct effects and delayed consequences (i.e., future effects that are reasonably likely to occur). The following sections describe direct effects and delayed consequences, as well as effects resulting from interrelated/interdependent actions and cumulative project impacts.

11.1 Direct Effects

Direct effects of the Dell Sharpe Bridge Replacement Project include potential discharge of hazardous materials to surface waters, construction-related noise, disturbance of instream habitat, and vegetation clearing. These effects are described in detail below.

11.1.1 Hazardous Materials and Chemical Spills

The use and storage of hazardous materials and chemicals (e.g., diesel fuel, lubricants, drilling fluids, uncured concrete) near waterways could potentially impair water quality if they are spilled or released. In general, construction-related chemical spills could affect fish by increasing physiological stress, altering primary and secondary production, affecting juvenile salmonid prey species, and possibly causing direct mortality. Hazardous materials can have lethal and sub-lethal effects on aquatic organisms. Sub-lethal effects may influence populations by affecting reproduction. Likewise, sub-lethal effects may cause physiological stress that leads to increased susceptibility to other sources of mortality, such as predation. Adverse effects related to contaminant spills and leaks could result, but will be adequately mitigated by implementing a SPCC plan as part of the environmental commitments for the project. With BMPs in place, any impacts from hazardous materials are anticipated to be insignificant.

11.1.2 Noise

11.1.2.1 Terrestrial

Yellow-billed cuckoo are sensitive to noise when nesting; however, this species is not known to breed in Washington state, and the AA does not provide suitable nesting habitat. The AA does provide potential foraging habitat, but the habitat is not of high quality and its use by this species is unlikely. In the unlikely event that yellow-billed cuckoo are present within the AA, they could be temporarily displaced during noise-generating construction activities.

11.1.2.2 Aquatic

No impacts to aquatic species are expected from noise created by project construction. There will be no in-water pile driving that could produce noise. Portions of the project will be completed below the OHWM of the Touchet River but the work will be completed within isolated areas that are pumped dry. The proposed work is not anticipated to generate any measurable noise in sections of the stream where fish may be present.

11.1.3 Fish Salvage

Potential direct effects to ESA-listed fish could result from fish capture and relocation during construction. The proposed bridge abutment and pier removals will coincide with the WDFW in-water work window to reduce the chance that ESA-listed fish species are present in the work area. In addition to adherence to the in-water work window, surface water temperatures within this time period would likely cause salmonids and other temperature sensitive fish to avoid the AA. Despite these conditions, fish salvage and exclusion will be necessary in order to isolate the in-water work areas.

11.1.4 Disturbance of In-Stream Habitat

Potential direct effects to critical habitats in the Touchet River will result from removal of the existing bridge abutments and central pier. This will cause temporary disruption in gravel and sediment distributions in the immediate area. This disruption would be limited to the areas surrounding the removal activities and would be short term.

Beneficial effects of the project include removing the large central pier of the existing Dell Sharpe Bridge. The new bridge, with its smaller, single pier design located outside the OHWM will improve in-stream habitat functions by spanning the entire channel migration zone of the river; allowing for easier passage of LWD; maintaining current flood elevations; and allowing the formation of natural channel meanders which are currently prevented by the existing bridge abutments.

These factors are expected to increase habitat complexity and encourage pool formation, create natural cover, and generally improve migration potential, which address current deficiencies in the PBFs. Overall, the proposed project will result in an improvement to natural stream processes and in-stream habitat in the AA.

11.1.5 Vegetation Clearing

A total of 0.61 acre of vegetation will be cleared for construction of the new bridge and approaches. Most of this vegetation consists of non-native shrubs and forbs located outside the riparian zone. Impacts to native vegetation within the riparian zone will be limited to clearing that is determined to be necessary for bridge girder placement. As a result, short-term loss of buffer vegetation in the affected areas would result in negligible change in riparian function.

Temporarily exposed soils that will not be disturbed for two days during the wet season or seven days during the dry season shall be immediately stabilized with the approved erosion/sediment control methods (e.g., seeding, mulching, plastic covering, etc.). All seeding areas will include the use of hydraulically applied erosion control product (HECP) using a natural fiber based long-term mulch and native seed mix. All seeding areas will be prepared with longitudinal depressions formed perpendicular to the natural flow of water on the slope to reduce velocity runoff.

The project will include the enhancement of 0.61 acre of riparian area through the planting of native trees and shrubs that will be maintained for a period of five years. The soil preparation will utilize native soils that satisfy specific requirements conducive to plant establishment including organic matter, soil texture classification, and pH. Riparian vegetation serves important functions in stream ecosystems by providing shade, sediment storage, nutrient inputs, channel and streambank stability, habitat diversity, LWD input, and cover and shelter for fish (Murphy and Meehan, 1991). As such, the proposed project will result in a small increase in riparian habitat quality and associated in-stream benefits.

11.1.6 Sedimentation and Turbidity

Project construction (clearing, grubbing, and grading) will remove vegetation and disturb soil to construct the bridge approaches and bridge abutments. These activities can result in large areas of exposed soils that are susceptible to erosion, subsequently increasing turbidity and sedimentation in project receiving waters. Following the onset of the rainy season or rewatering the new channel, these suspended sediments could move downstream into the Touchet River.

Increased turbidity and suspended sediments can have physical and behavioral effects on salmonids. Physical effects would result when fish are exposed to suspended sediments and may include alterations to blood sugar levels and osmoregulatory function and damage to gills. Behavioral effects include avoidance of turbid water, changes in foraging ability, reduced avoidance of predators, and reduced territoriality (Bash et al., 2001).

Increased sedimentation downstream of the construction areas may negatively affect benthic invertebrates through alteration of water quality and substrate conditions. Benthic macroinvertebrates affected by sedimentation within the action area are expected to recover rapidly following construction (Reid et al., 2002). Few, if any, measurable effects on listed fish species are anticipated because of the degraded water quality conditions within the action area and lack of suitable holding habitats that would represent thermal refuge.

To minimize construction-related erosion and sedimentation to project water bodies, the contractor will implement erosion and sediment control measures described in a site-specific TESC plan. Implementation of BMPs in the TESC plan and other measures, as necessary, will be performed to allow the project to comply with Washington state water quality standards and anticipated permit conditions. With appropriate measures in place, the project is expected to result in only minor, short-term increases of turbidity and suspended sediment. Water quality impacts are not expected to extend beyond 200 feet downstream of the project. Sedimentation may occur downstream of the work areas but is not expected to cause significant impacts.

12 DELAYED CONSEQUENCES

Delayed consequences of the proposed project include potential impacts to aquatic habitats from sedimentation and turbidity that may result after construction and impacts to fish access and stream and floodplain processes in the project area. Specific effects are discussed below.

12.1 Noise

The proposed project will not create additional lanes of traffic or result in an increase of bridge utilization that would cause noise levels to increase within the AA.

12.2 Water Quality

The pollution generating roads and bridge within the project area currently have no stormwater management. In addition, there are several small erosion rills directly adjacent to Pettyjohn Road that are delivering sediment and pollutants directly to surface waters in the Touchet River.
Stormwater impacts will result from changes of impervious surfaces in the work area. Stormwater treatment and detention for the proposed project was designed in accordance with Ecology's 2019 Stormwater Management Manual for Eastern Washington. The project will result in an increase of 0.70 acre of impervious surface and a net increase in pollution generating impervious surface (PGIS) of 0.52 acre. However, the

proposed stormwater facilities will collect, treat, and infiltrate a total of 1.5 acres of PGIS which represents an increase in water quality over existing conditions. As stormwater will be fully infiltrated, there will be no stormwater outfalls that could disrupt the hydrology of the Touchet River.

12.3 Stream and Floodplain Processes

Removal of the existing Dell Sharpe bridge will involve the demolition of the bridge abutments and central pier. These features currently serve to restrict the ability to form natural channel meanders as well as disrupt woody debris distribution. Eliminating these features will result in an increase in the ability of the Touchet River to hydrologically sort sediments for channel evolution and fish habitat creation, transport woody debris that form scour pools and in-stream cover and reduce bank erosion by allowing flood flows to pass through the new crossing.

The project will include the planting of native trees and shrubs within 0.61 acre of Touchet River riparian area. Upon maturity, these plantings will increase water quality parameters such as temperature and increase wildlife habitat.

13 INTERRELATED AND INTERDEPENDENT ACTIONS

An interrelated action is one that is part of the larger action and depends on that larger action for its justification. An interdependent action is one that has no independent utility apart from the action under consultation. Interrelated and interdependent actions that could result in direct or indirect effects are those that would not occur “but for” the proposed action.

The proposed project is being constructed to facilitate the repair of aging infrastructure and has independent utility. The project will not serve to spur further development actions or improvement projects within the County.

14 CUMULATIVE EFFECTS

Cumulative effects are defined in 50 CFR § 402.02 as those effects of future state or private activities, not involving federal activities, that are reasonably certain to occur within the action area of the federal action subject to consultation. The project team is not aware of any specific future non-federal activities within the action area that could adversely affect the species and critical habitat evaluated in this BA.

15 CONCLUSIONS AND EFFECTS DETERMINATIONS

15.1 Middle Columbia Steelhead

15.1.1 Species

The project **may affect** Middle Columbia River DPS steelhead. The project may affect steelhead because:

- Middle Columbia steelhead may be present in the action area.
- The project includes in-water work within streams in the action area.
- Construction may temporarily degrade water quality during construction.

The project is **likely to adversely affect** Middle Columbia River DPS steelhead because:

- Middle Columbia River DPS steelhead may be present during the in-water work window and require relocation outside the exclusion areas.
- Fish handling would result in mortality or stress to fish.
- Temporary sedimentation could result in Steelhead avoiding the Action Area.

- In-water work would exclude fish from portions of the river.

15.1.2 Critical Habitat

The proposed project **may affect** Middle Columbia River DPS steelhead critical habitat for the following reasons:

- The project will require in-water work in the Touchet River.
- The project will disrupt riverbed material and generate turbidity during in-water work associated with bridge removal.
- The proposed work will entail vegetation clearing that could result in sedimentation of the Touchet River that may result in decreased water quality.

The proposed project is **likely to adversely affect** critical habitat for Middle Columbia River DPS steelhead for the following reason:

- There will be a temporary loss of in-stream habitat as work areas are isolated to complete in-water work.
- Removal of the existing bridge superstructure will disrupt the riverbed and disrupt channel bed materials.
- Turbidity generated during construction could negatively affect benthic organisms.

15.2 Bull Trout

15.2.1 Species

The project **may affect** bull trout. The project may affect bull trout because:

- Bull trout are potentially present in the action area.
- The project will require in-water work that may temporarily degrade water quality during and following construction.
- Construction may temporarily degrade water quality during construction.

The project is **likely to adversely affect** bull trout because:

- Bull trout may be present during the in-water work window and may have to be relocated outside the exclusion areas.
- Fish handling would result in mortality or stress to fish.
- Temporary sedimentation could result in bull trout avoiding the Action Area.
- In-water work would exclude fish from portions of the river.

15.2.2 Critical Habitat

The proposed project **may affect** critical habitat for bull trout for the following reasons:

- The Touchet River is designated critical habitat for bull trout.
- The project will require in-water work in the Touchet River.
- The project could result in disruption of riverbed material and short-term turbidity during bridge removal.

The proposed project is **likely to adversely affect** critical habitat for bull trout for the following reasons:

- There will be a temporary loss of in-stream habitat as work areas are isolated to complete in-water work.
- Removal of the existing bridge superstructure will disrupt the riverbed and disrupt channel bed materials.
- The proposed work will entail vegetation clearing that could result in sedimentation of the Touchet River.

15.3 Yellow-Billed Cuckoo

15.3.1 Species

The proposed project **may affect** yellow-billed cuckoo for the following reasons:

- Marginal potential habitat for the yellow-billed cuckoo is present within the action area.
- Construction-generated noise may cause yellow-billed cuckoo to avoid the area.

However, the proposed project is **not likely to adversely affect** yellow-billed cuckoo for the following reasons:

- Yellow-billed cuckoos are extremely rare in Washington state with only 17 observations made over the last 50 years.
- The most northern breeding range along the West Coast is believed to be southern California, although some breeding may be taking place in coastal northern California along the Eel River. No documented breeding pairs are present in Washington state.
- The habitat in the proposed construction area is limited to the narrow riparian corridor along the Touchet River which is not likely suitable for yellow-billed cuckoo utilization.
- No stands of cottonwood or willow trees are present in the riparian areas where clearing or grading will occur.

Table 3 below summarizes the effects determinations for species and critical habitats addressed in this BA.

Table 3. Summary of Effects Determinations

Listed Species	Species Affects	Critical habitat Affects
Middle Columbia DPS Steelhead	May Affect, Likely to Adversely Affect	May Affect, Likely to Adversely Affect
Bull Trout	May Affect, Likely to Adversely Affect	May Affect, Likely to Adversely Affect
Yellow-Billed Cuckoo	May Affect, Not Likely to Adversely Affect	N/A

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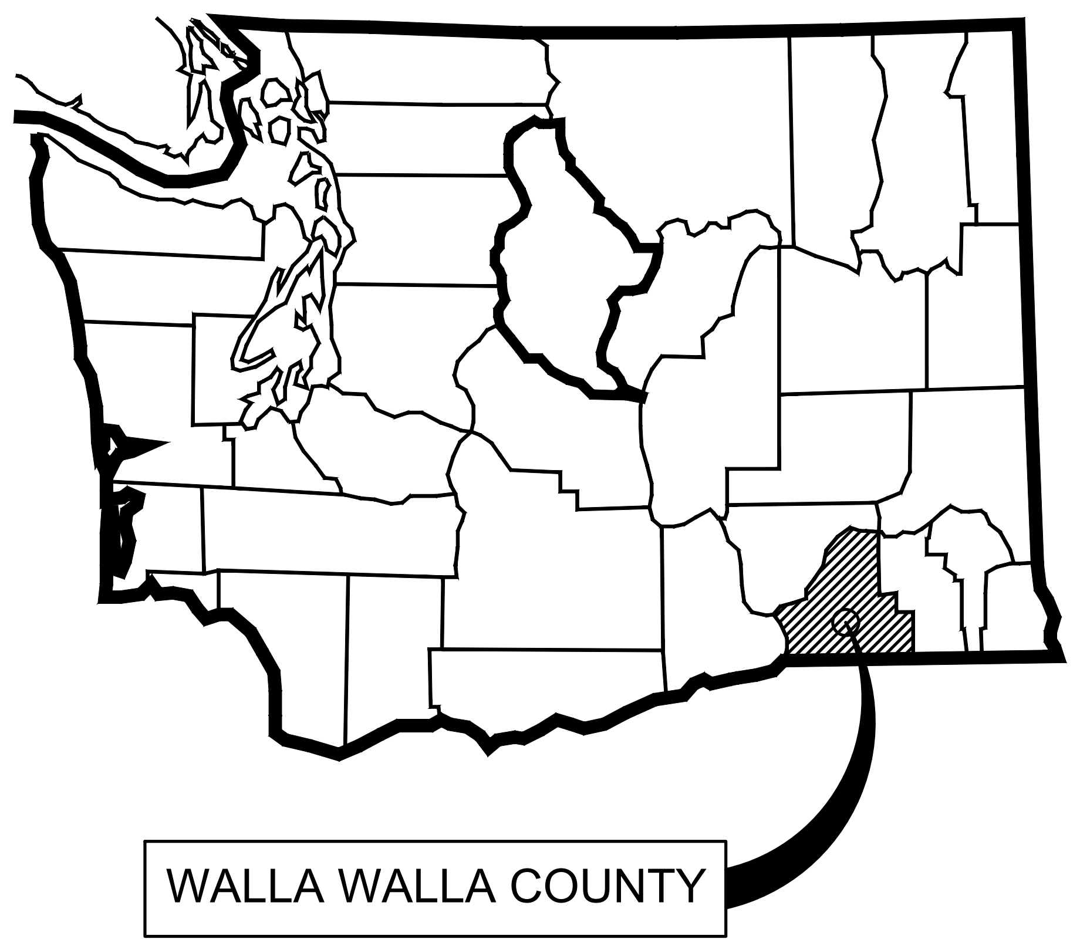
Appendix A

Plan Sheets

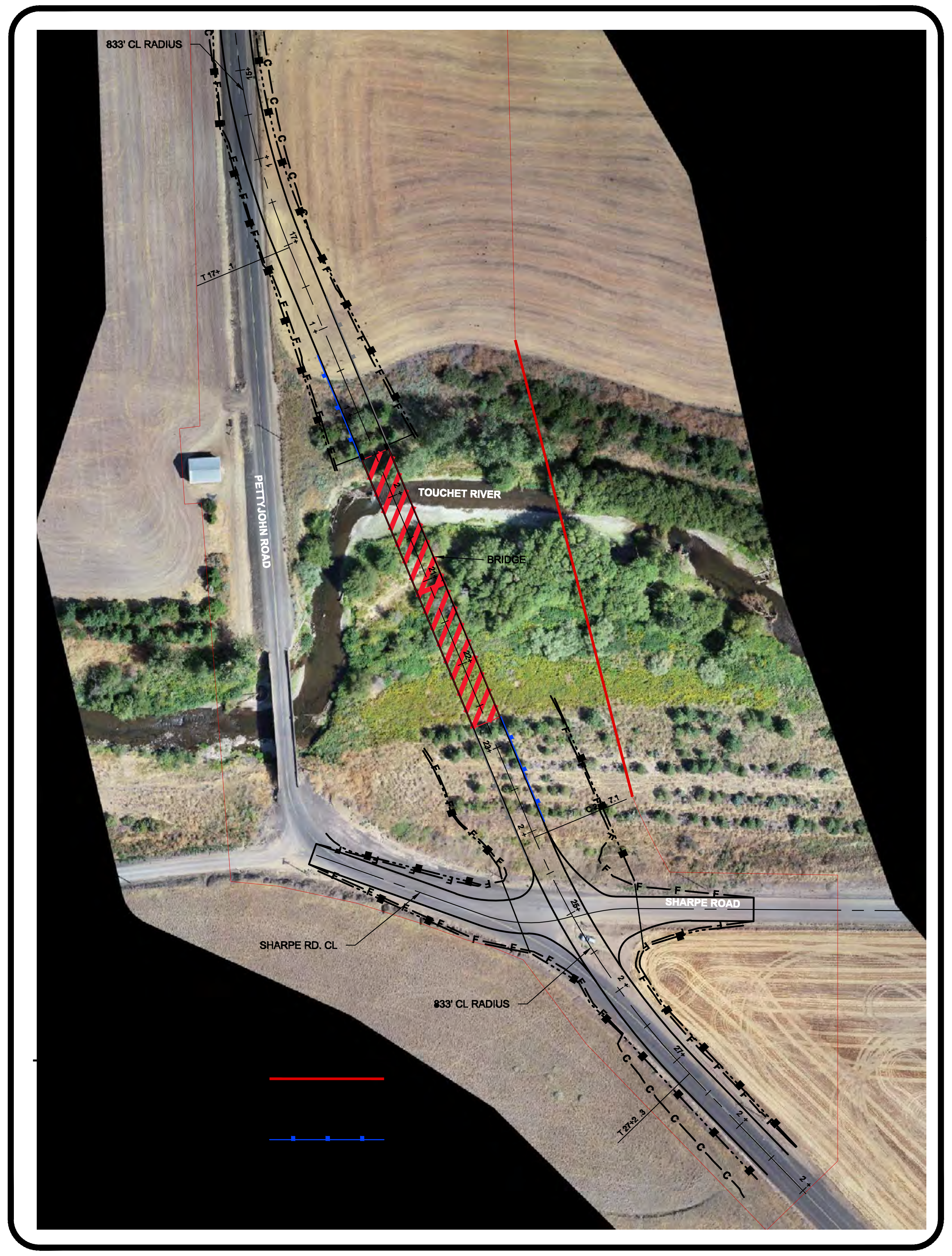
STATE OF WASHINGTON



DELL SHARPE BRIDGE REPLACEMENT PROJECT

CRP 20-02

WALLA WALLA COUNTY, WA



VICINITY MAP

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

COVER SHEET

PROJECT NUMBER
CRP20-02

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G01

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Existing Linetype Legend

Existing Sanitary Sewer Pipe	—— SS ——
Existing 4" Sanitary Sewer Pipe	—— 4'' SS ——
Existing 6" Sanitary Sewer Pipe	—— 6'' SS ——
Existing 8" Sanitary Sewer Pipe	—— 8'' SS ——
Existing 10" Sanitary Sewer Pipe	—— 10'' SS ——
Existing 12" Sanitary Sewer Pipe	—— 12'' SS ——
Existing 15" Sanitary Sewer Pipe	—— 15'' SS ——
Existing 18" Sanitary Sewer Pipe	—— 18'' SS ——
Existing 24" Sanitary Sewer Pipe	—— 24'' SS ——
Existing 30" Sanitary Sewer Pipe	—— 30'' SS ——
Existing Sanitary Force Main	—— FM ——
Existing Storm Sewer Pipe	—— SD ——
Existing 4" Storm Sewer Pipe	—— 4'' SD ——
Existing 6" Storm Sewer Pipe	—— 6'' SD ——
Existing 8" Storm Sewer Pipe	—— 8'' SD ——
Existing 10" Storm Sewer Pipe	—— 10'' SD ——
Existing 12" Storm Sewer Pipe	—— 12'' SD ——
Existing 15" Storm Sewer Pipe	—— 15'' SD ——
Existing 18" Storm Sewer Pipe	—— 18'' SD ——
Existing 24" Storm Sewer Pipe	—— 24'' SD ——
Existing Water Pipe	—— WL ——
Existing 4" Water Pipe	—— 4'' WL ——
Existing 6" Water Pipe	—— 6'' WL ——
Existing 8" Water Pipe	—— 8'' WL ——
Existing 10" Water Pipe	—— 10'' WL ——
Existing 12" Water Pipe	—— 12'' WL ——
Existing 15" Water Pipe	—— 15'' WL ——
Existing 18" Water Pipe	—— 18'' WL ——
Existing 24" Water Pipe	—— 24'' WL ——
Existing Water Lateral	— — — — — —
Existing Irrigation Pipe	—— IRR ——
Existing 4" Irrigation Pipe	—— 4'' IRR ——
Existing 6" Irrigation Pipe	—— 6'' IRR ——
Existing 8" Irrigation Pipe	—— 8'' IRR ——
Existing 10" Irrigation Pipe	—— 10'' IRR ——
Existing 12" Irrigation Pipe	—— 12'' IRR ——
Existing Irrigation Lateral	— — — — — —
Existing Cable Tv Line	—— TV ——
Existing Electric Line	—— E —— E ——
Existing Gas Line	—— G —— G ——
Existing Over Head Power Line	—— OHP ——
Existing Telephone Line	—— T —— T ——
Existing Fiber Optic Line	—— FO ——
Existing Underground Utility Line	- - - - - - - - - -
Existing Centerline	————
Existing Curb	═ ═ ═ ═ ═ ═
Existing Curb & Gutter	≡ ≡ ≡ ≡ ≡ ≡
Existing Lot Line	— — — — — —
Existing Gravel road	- - - - - - - - - -
Existing Flow Line	——➤ - - - ——
Existing Paint Stripe	- - - - - - - - - -
Existing Right-of-way	————
Existing Fence	——X——X——
Existing Building	— — — — — —
Existing Wetland Perimeter	—— · — · ——
Existing Wetland Buffer	— · · — · · — · · —
Existing Property Line	— — — — — —
Existing Utility Easement	—— —— ——
Existing Quarter Section	— · —— · —
Existing Railroad	————
Existing Fence	——X——X——
Existing Wall	— — — — — —
Existing Lot Line	— — — — — —
Existing Contour	—— 253 ——

Proposed/Future Linetype Legend

Proposed Sanitary Sewer Pipe	════
Proposed Sanitary Lateral	━━━━
Proposed Sanitary Force Main	━━━━
Proposed Storm Under Drain	━━━━
Proposed Storm Rain Drain	————
Proposed Storm Pipe	═ —— ═ —— ═
Proposed Water Lateral	————
Proposed Water Pipe	━━━━
Proposed Irrigation Pipe	━━━━
Proposed Irrigation Lateral	————
Proposed Lot Line	————
Proposed Flow Line	——➤ - - - ——
Proposed Centerline	—— — ——
Proposed Right-of-way	━━ ━ ━ ━━
Proposed Sawcut Line	- - - - - - - - - -
Proposed Easement	— — — — — —
Proposed Curb & Gutter	≡≡≡≡
Proposed End Of Pav't	————
Proposed Sidewalk	————
Proposed Wall	————
Proposed Building	━━━━
Proposed Setback	————
Proposed Property Line	━━━━
Proposed Cut Line	- - - - - - - - - -
Proposed Score Line	————
Proposed Paint Stripe	————
Proposed Fence	——X——X——
Proposed Wetland Buffer	— · · — · · — · · —
Proposed Wetland Perimeter	—— · — · ——
Proposed Contour	—— 253 ——
Erosion Control Filter Fabric Fence	—— —— ——
Fill Catch Slope	—— **F** —— **F** ——
Cut Catch Slope	—— **C** —— **C** ——
Ordinary High Water Line	▬ OHW ▬ OHW ▬

Symbol Legend

Existing Water Valve	WV ⋈
Existing Gas Valve	GV ⋈
Existing Fire Hydrant	-⌀-
Existing Power Pole	-○-
Existing Water Meter	⊞
Existing Electrical Pedestal	E
Existing Power Riser	◪
Existing Power Meter	PM
Existing Sanitary Manhole	○
Existing Storm Manhole	◎
Existing Catch Basin	▥
Existing Area Drain	⊜
Existing Combo Inlet	CI
Existing Telephone Pad	TP
Existing Telephone Riser	⊠
Existing Roof Drain	•
Existing Cleanout	∘CO
Existing Guy Anchor	←
Existing Project Bench Mark	⊕
Existing Iron Rod	●
Existing Sign	┤
Existing Shrub	✿✿
Existing Deciduous Tree	✿
Existing Coniferous Tree	✶
See Extg. Sanitary Sewer Data	ⓧ
See Extg. Storm Drainage Data	☒
Existing Flow Arrow	⇦
Proposed Bollard	∘
Proposed Street Light	•—✕
Proposed Road Barrier	⊓—⊓—⊓
Proposed Road Sign	-
Proposed Flow Arrow	←
Proposed Fire Protection Vault	▣
Proposed Water Meter	▣
Proposed Water Backflow Device	▣
Proposed Water Valve	⊗
Proposed Water Bend Tee W/valve	⊗◁
Proposed Water Bend Tee W/tb	◁
Proposed Water 22½° Bend W/tb	◁
Proposed Water 11¼° Bend W/tb	◁
Proposed Water 45° Bend W/tb	◁
Proposed Water 90° Bend W/tb	◁
Proposed Water Stand Pipe	✕◁
Proposed Water Bend X	⊗┼⊗
Proposed Water Temporary Blowoff	▷⊗⊗
Proposed Water Standard Blowoff	▷⊗
Proposed Water Reducer	▶
Proposed Water Thrust Block	▷
Proposed Fire Hydrant	⋈

Symbol Legend

Proposed Catch Basins	▥ ▥
Proposed Area Drain	⊘
Proposed Combination Curb Inlet	▣
Proposed Storm Reducer	▶
Proposed Rain Drain	•
Proposed Storm Cleanout	•
Proposed Storm Manhole	●
Proposed Sedimentation Manhole	◐
Proposed Drywell	⊙
Proposed Sanitary Cap	[
Proposed Sanitary Reducer	▶
Proposed Sanitary Cleanout	∘
Proposed Sanitary Manhole	○
Proposed Irrigation Meter	▫
Proposed Irrigation Backflow Device	■
Proposed Irrigation Valve	⊗
Proposed Irrigation Bend Tee W/valve	⊗◁
Proposed Irrigation Bend Tee W/tb	◁
Proposed Water 22½° Bend W/tb	◁
Proposed Water 11¼° Bend W/tb	◁
Proposed Irrigation 45° Bend W/tb	◁
Proposed Irrigation 90° Bend W/tb	◁
Proposed Irrigation Stand Pipe	✕◁
Proposed Irrigation Bend X	⊗┼⊗
Proposed Irrigation Temporary Blowoff	▷⊗⊗
Proposed Irrigation Standard Blowoff	▷⊗
Proposed Irrigation Reducer	▶
Proposed Irrigation Thrust Block	▷
Proposed Inlet Protection Pillow	■
Proposed Gravel Construction Entrance	⬠⬠
Proposed Sedimentation Trap	◎
Erosion Control feature code & ID number	E 3.30
BMP Type	IP-1

Abbreviation Legend

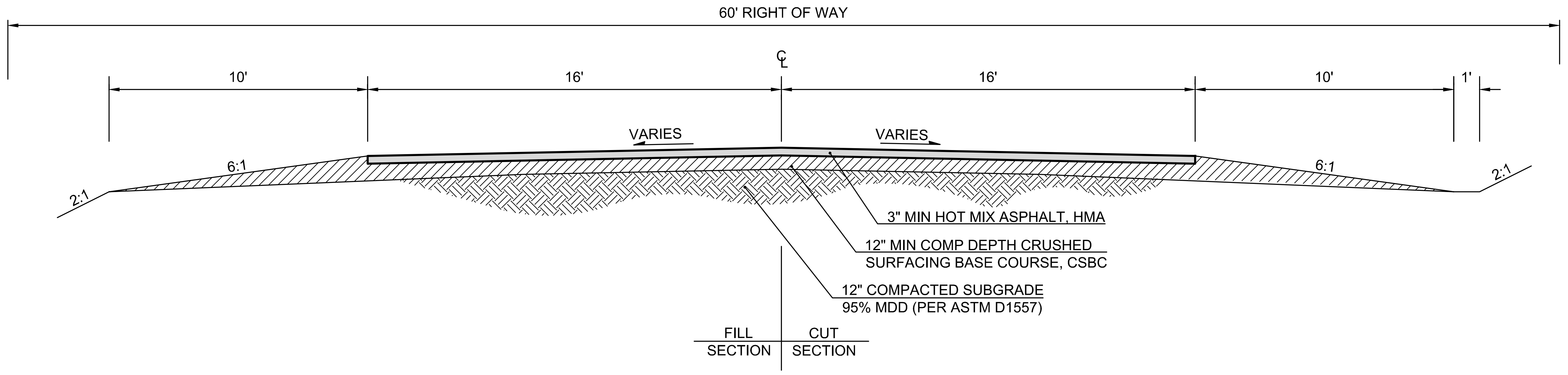
Acres	AC
Assembly	ASS'Y
Avenue	AVE
Approved	APP'D
Butterfly	BF
Boulevard	BLVD
Benchmark	BM
Blow Off	BO
Back Of Curb	BOC
Begin Vertical Curve	BVC
Care Of	C/O
Catch Basin	CB
Cubic Feet	CF
Cast Iron	CI
Cement	CEM
Circle	CIR
Centerline	℄
Corrugated Metal Pipe	CMP
Cleanout	CO
Combination	COMB
Compaction	COMP
Concrete	CONC
Construction	CONST
Corrugated Polyethylene	CPE
Concrete Sewer Pipe	CSP
Court	CT
Cubic Yard	CY
Cement	CEM
Depth	D
Ductile Iron	DI
Diameter	DIA
Ductile Iron Pipe	DIP
Down Spout	DS
Edge Of Pavement	EOP
End Curb Return	ER
Easement	ESMT
Existing	EXTG
Elevation	EL
Electric	ELEC
End Vertical Curb	EVC
Finished Floor	FF
Finished Grade	FG
Fire Hydrant	FH
Flange	FLG
Force Main	FM
Foot / Feet	FT
Gas	G
Galvanized Iron	GI
Ground	GRD
Gate Valve	GV
High Density Polyethylene	HDPE
Horizontal	HORIZ

Abbreviation Legend

High Water Elevation	HW
Hydrant	HYD
Invert Elevation	IE
Intersection	INTX
Invert	INV
Length	L
Lateral	LAT
Left	LT
Maximum	MAX
Manhole	MH
Minimum	MIN
Mechanical Joint	MJ
Number	No. or #
Overhead Electric	OHE
Pavement	PAV'T
Point Of Curve	PC
Power Pole	PP
Point Of Reverse Curve	PRC
Point Of Reverse Vertical Curve	PRVC
Point Of Tangent	PT
Point Of Vertical Intersection	PVI
Polyvinyl Chloride	PVC
Place	PL
Radius	R
Right Of Way	R/W
Return	RET
Right	RT
Sheet	SHT
Stainless Steel	SS
Steel	STL
Sidewalk	S/W
Street	ST
Station Centerline	STA
Standard	STD
Sanitary	SAN
Storm	STM
Tangent	T
Thrust Block	TB
Temporary Benchmark	TBM
Top Of Concrete	TC
Telephone	TEL
Temporary	TEMP
Top Of Manhole	TOP
Typical	TYP
Underground Electric	UGE
Vertical Curve	VC
Vertical	VERT
Water	WTR
With	W/
Without	W/O
With Yellow Plastic Cap	W/YPC
Water Meter	WM
Yard	YD

Hatching Legend

▒	Proposed Asphalt Concrete
⬚	Proposed Cement Concrete
▦	Proposed Gravel Road
▨	Existing Asphalt To Be Removed



TYPICAL ROAD SECTION DETAIL

NTS

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

CIVIL NOTES, LEGENDS, AND TYPICAL SECTIONS

PROJECT NUMBER
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NOTES:

1. TRAFFIC CONTROL INFORMATION PRESENTED IN THIS PLAN IS INTENDED TO CONVEY SIGNAGE EXPECTATIONS AND ANTICIPATED ROUTES AVAILABLE TO THE CONTRACTOR FOR USE DURING CONSTRUCTION OF THE PROJECT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DEVELOPING FINAL TRAFFIC CONTROL PLANS FOR REVIEW AND APPROVAL BY THE COUNTY PRIOR TO COMMENCING TRAFFIC CONTROL OPERATIONS FOR EACH PHASE OF THE PROJECT.
2. CONTRACTOR SHALL COVER CLASS A SIGNS WHEN NOT IN USE DURING VARYING TRAFFIC CONTROL PHASES OF THE PROJECT.
3. CONTRACTOR SHALL PLAN AND PROVIDE FOR ACCESS TO BUSINESSES AND RESIDENCES FRONTING THE PROJECT SITE THROUGHOUT THE DURATION OF THE PROJECT. TRAFFIC CONTROL AND STAGING PLANS DEVELOPED BY THE CONTRACTOR SHALL ACCOMMODATE ACCESS THROUGH THE PROJECT BY ADJACENT PROPERTY OWNERS.

LEGEND	
#	TYPE OF SIGN.
╡	SIGN SYMBOL
╡	BARRICADE WITH SIGNS

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

CONSTRUCTION SIGNING

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CS01
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EROSION CONTROL NOTES:

SEE SHEET GN01 FOR TYPICAL ROAD SECTION GEOMETRY.

EROSION CONTROL MEASURES SHALL BE ADJUSTED AS NECESSARY BASED ON THE STAGE OF THE PROJECT. COORDINATE WITH LOCAL JURISDICTION OR THE "STORMWATER MANAGEMENT MANUAL FOR EASTERN WASHINGTON" FOR APPROVED METHODS.

KEYED GRADING NOTES

① ALL EXISTING UTILITIES SHALL BE PROTECTED DURING GRADING ACTIVITIES UNLESS OTHERWISE NOTED.

② SAWCUT ASPHALT CONCRETE. REMOVE EXISTING ASPHALT AND BASE COURSE MATERIAL FROM WORK AREAS.

③ REMOVE EXISTING PAVEMENT.

④ TEMPORARY FILTER FABRIC FENCE PER WSDOT STANDARD PLAN I-30.15

⑤ INLET PROTECTION PER WSDOT STANDARD PLAN I-40.20

⑥ BIODEGRADABLE CHECK DAM PER WSDOT STANDARD PLAN I-50.20

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

GRADING AND EROSION CONTROL PLAN - NORTH

PROJECT NUMBER
CRP20-02

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GR01

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EROSION CONTROL NOTES:

SEE SHEET GN01 FOR TYPICAL ROAD SECTION GEOMETRY

EROSION CONTROL MEASURES SHALL BE ADJUSTED AS NECESSARY BASED ON THE STAGE OF THE PROJECT. COORDINATE WITH LOCAL JURISDICTION OR THE "STORMWATER MANAGEMENT MANUAL FOR EASTERN WASHINGTON" FOR APPROVED METHODS.

KEYED GRADING NOTES

① ALL EXISTING UTILITIES SHALL BE PROTECTED DURING GRADING ACTIVITIES UNLESS OTHERWISE NOTED.

② SAWCUT ASPHALT CONCRETE. REMOVE EXISTING ASPHALT AND BASE COURSE MATERIAL FROM WORK AREAS.

③ REMOVE EXISTING PAVEMENT.

④ EXISTING UTILITY PEDESTAL TO BE RELOCATED BY FRANCHISE UTILITY.

⑤ REMOVE AND RELOCATE EXISTING STREET SIGNS. SEE SIGNING AND STRIPING PLAN FOR INFORMATION AND DETAILS.

⑥ TEMPORARY FILTER FABRIC FENCE PER WSDOT STANDARD PLAN 1-30.15-02.

⑦ INLET PROTECTION PER WSDOT STANDARD PLAN I-40.20-00.

⑧ SEE BRIDGE DEMOLITION PLANS FOR REMOVAL OF EXISTING BRIDGE.

⑨ 30 LF OF TEMPORARY DUCTILE IRON CULVERT

⑩ BIODEGRADABLE CHECK DAM PER WSDOT STANDARD PLAN I-50.20

⑪ STABILIZED CONSTRUCTION ENTRANCE WITH UNDERLYING GEOTEXTILE PER WSDOT STANDARD PLAN I-80.10

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

GRADING AND EROSION CONTROL PLAN - SOUTH

PROJECT NUMBER
CRP20-02
SHEET
GR02
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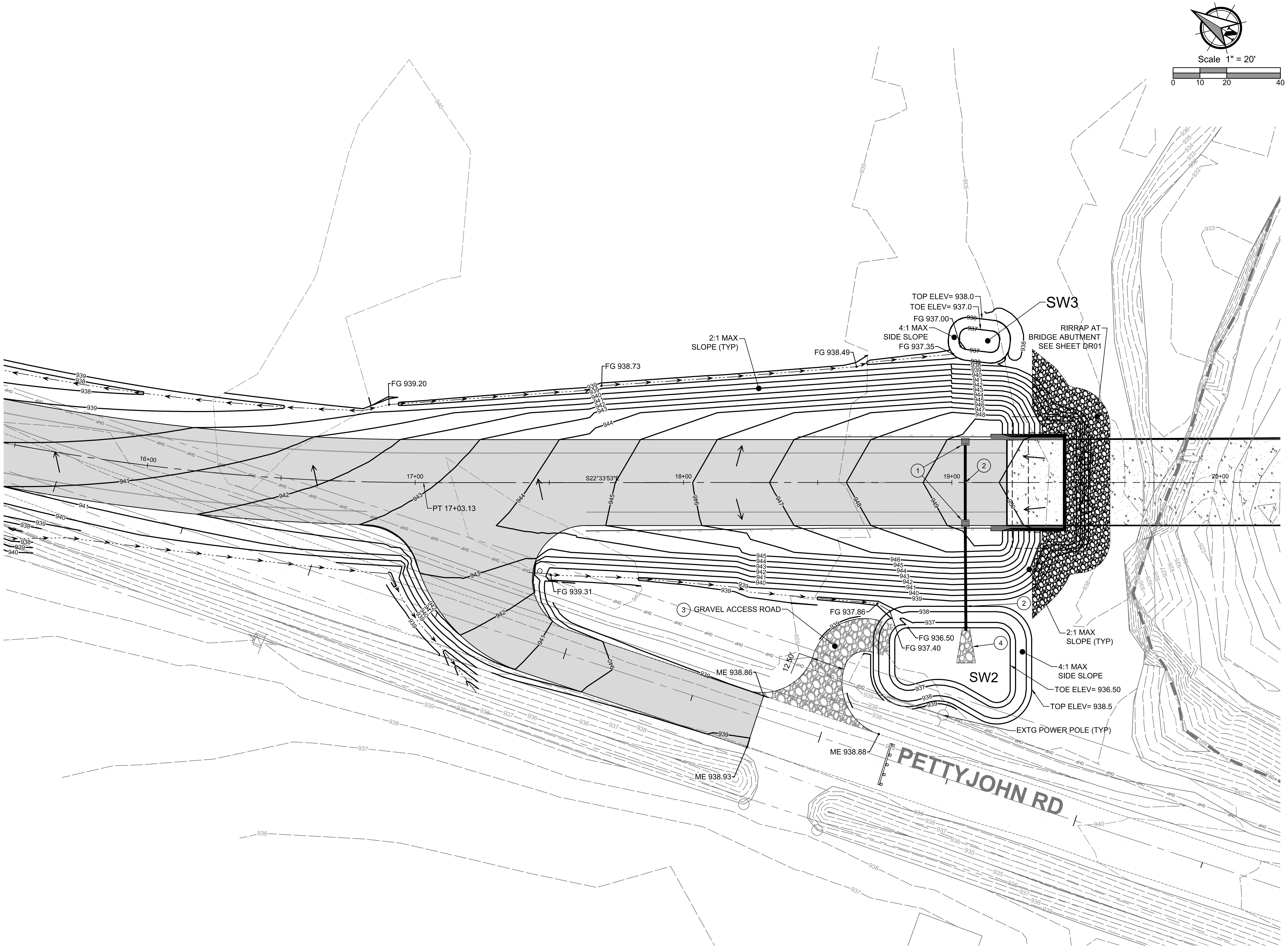

EROSION CONTROL NOTES:

SEE SHEET GN01 FOR TYPICAL ROAD SECTION GEOMETRY

EROSION CONTROL MEASURES SHALL BE ADJUSTED AS NECESSARY BASED ON THE STAGE OF THE PROJECT. COORDINATE WITH LOCAL JURISDICTION OR THE "STORMWATER MANAGEMENT MANUAL FOR EASTERN WASHINGTON" FOR APPROVED METHODS.

KEYED GRADING NOTES

① CATCH BASIN TYPE 1, SEE PLAN PROFILE SHEETS FOR ADDITIONAL INFORMATION.

② 12" STORM PIPE, SEE PLAN AND PROFILE SHEETS FOR ADDITIONAL INFORMATION.

③ SEE GRAVEL ACCESS ROAD SECTION DETAIL ON SHEET D01.

④ RIP RAP PAD AT PIPE OUTFALL PER DETAIL ON SHEET D01.

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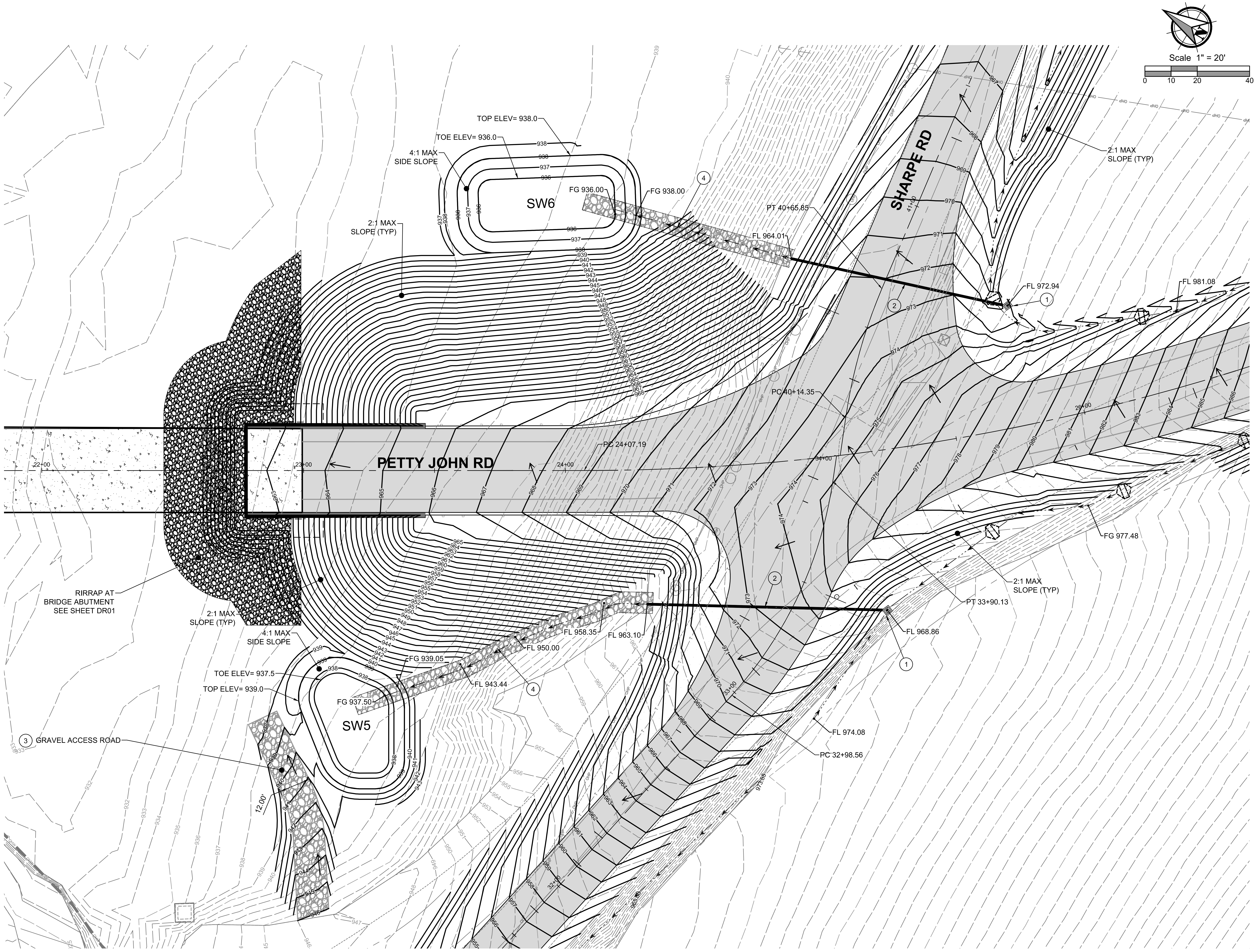
DELL SHARPE BRIDGE REPLACEMENT PROJECT

NORTH ABUTMENT GRADING AND
STORM FACILITIES PLAN

PROJECT NUMBER
CRP20-02
SHEET
GR03
PAGE
5 OF XX



EROSION CONTROL NOTES:

SEE SHEET GN01 FOR TYPICAL ROAD SECTION GEOMETRY

EROSION CONTROL MEASURES SHALL BE ADJUSTED AS NECESSARY BASED ON THE STAGE OF THE PROJECT. COORDINATE WITH LOCAL JURISDICTION OR THE "STORMWATER MANAGEMENT MANUAL FOR EASTERN WASHINGTON" FOR APPROVED METHODS.

KEYED GRADING NOTES

① DITCH INLET, SEE PLAN AND PROFILE SHEETS FOR ADDITIONAL INFORMATION.

② 12" STORM PIPE - SEE PLAN AND PROFILE SHEETS FOR ADDITIONAL INFORMATION.

③ SEE GRAVEL ACCESS ROAD SECTION DETAIL ON SHEET D01.

④ ROCK-LINED CHANNEL PER DETAIL ON SHEET D01.

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

SOUTH ABUTMENT GRADING AND STORM FACILITIES PLAN

PROJECT NUMBER
CRP20-02

SHEET
GR04

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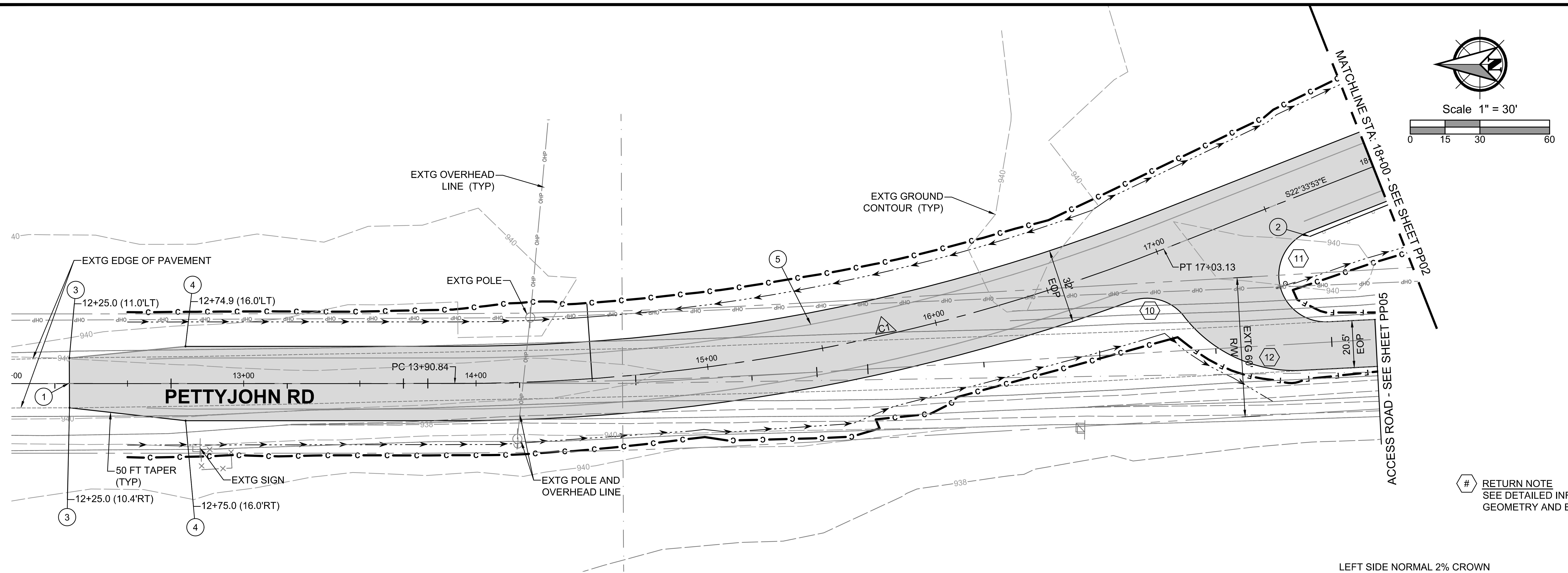
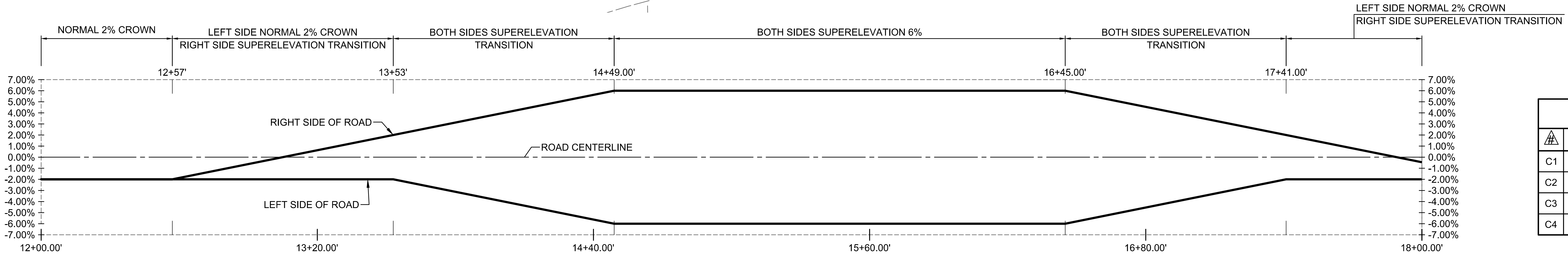
6 OF XX



\# RETURN NOTE
SEE DETAILED INFORMATION FOR RETURN GEOMETRY AND ELEVATIONS ON SHEET PP05.



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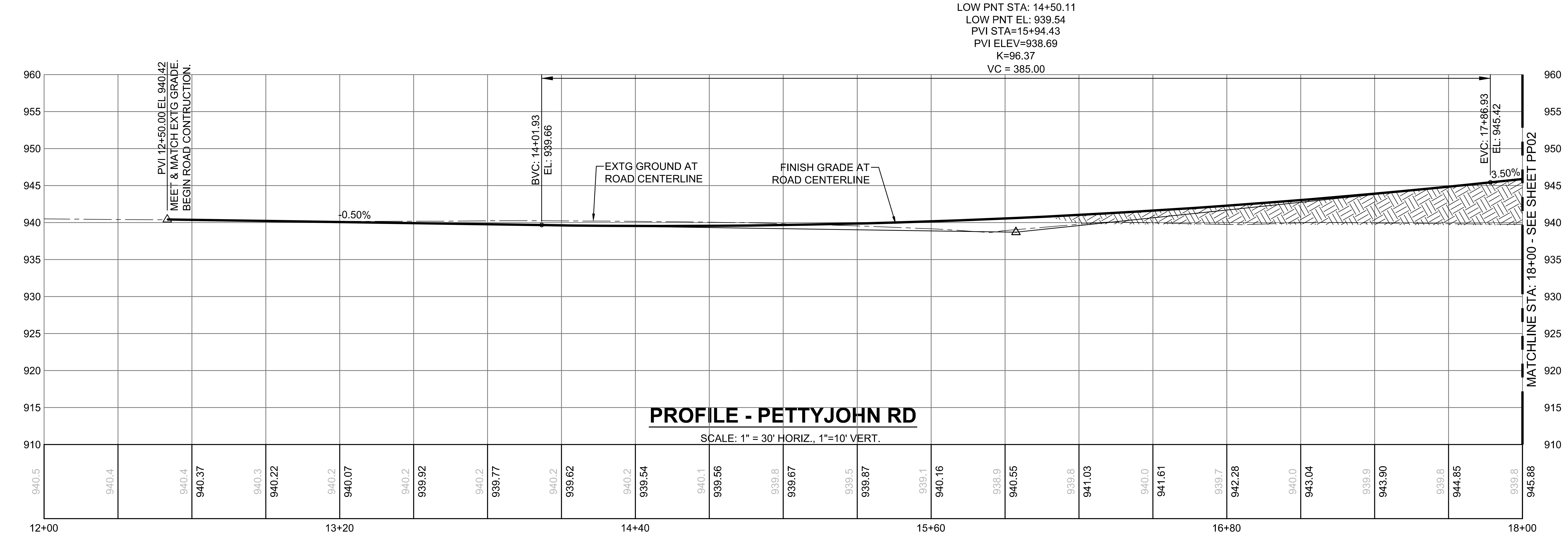
C2	21°32'12"	833.00	313.11	158.43
C3	33°50'56"	155.00	91.57	47.16
C4	14°45'17"	200.00	51.50	25.90



PROFILE - PETTYJOHN RD

SCALE: 1" = 30' HORIZ., 1"=10' VERT.

GENERAL CONSTRUCTION NOTES:

1. SEE SHEET GN01 FOR TYPICAL ROAD SECTIONS.
2. INSTALL SURVEY MONUMENTS AT ALL CENTERLINE STREET INTERSECTIONS, CENTER POINTS, AND PT / PC GEOMETRY POINTS PER WALLA WALLA COUNTY STANDARD PLAN R-12.

KEYED GRADING NOTES

① STA: 12+25.00 (0.0' LT/RT) - BEGIN ROADWAY IMPROVEMENTS. SAW-CUT A MINIMUM OF 2' FROM EXISTING EDGE OF ASPHALT PROVIDING A NEAT VERTICAL EDGE AND REMOVE CUT-OFF PORTION OF EXISTING PAVEMENT FOR NEW CONSTRUCTION AND UTILITIES. MATCH EDGE OF NEW ASPHALT TO EXISTING PROVIDING A SMOOTH TRANSITION.

② STA: 17+63.40 (18' RT) - BEAM GUARDRAIL TYPE 31 NON-FLARED TERMINAL TYPE MSKT-SP-MGS PER WSDOT STD PLAN C22.40

③ BEGIN TAPER FROM EXISTING ROAD TO STANDARD ROADWAY SECTION.

④ END TAPER. BEGIN TYPICAL 32' ROAD SECTION. SEE SHEET GN01.

⑤ SEE SIGNING AND STRIPING FOR INFORMATION AND DETAILS.

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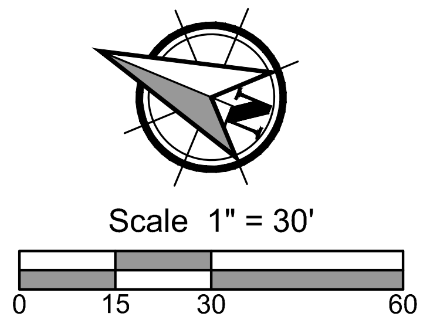
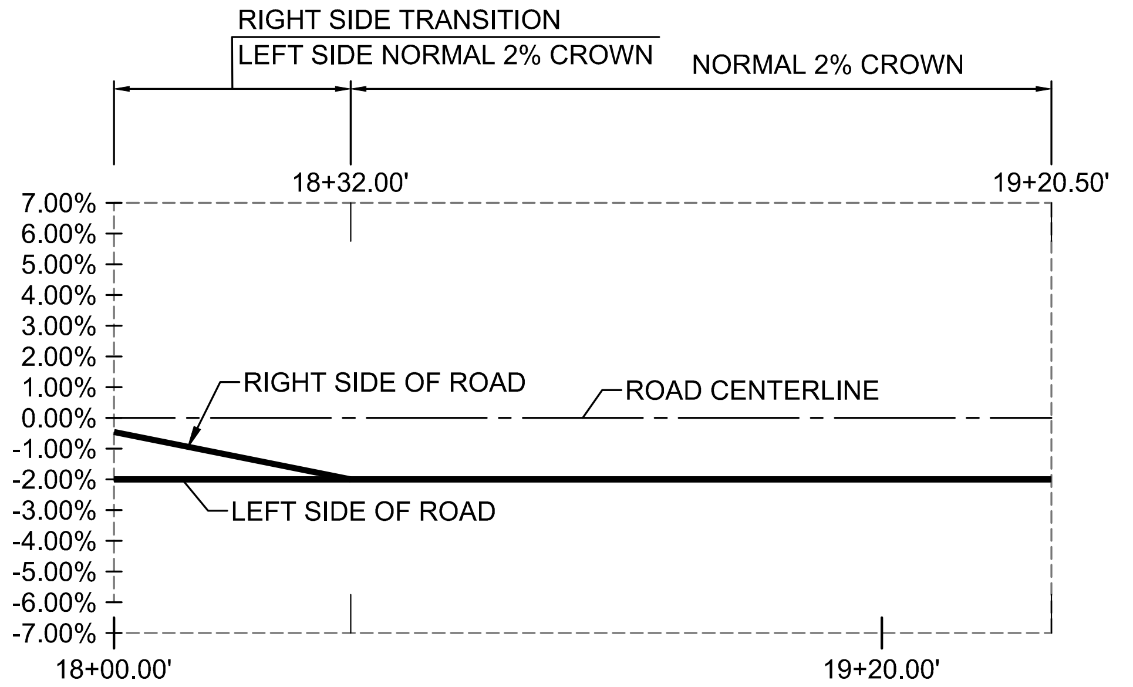
DELL SHARPE BRIDGE REPLACEMENT PROJECT
PETTY JOHN ROAD PLAN/PROFILE SHEET

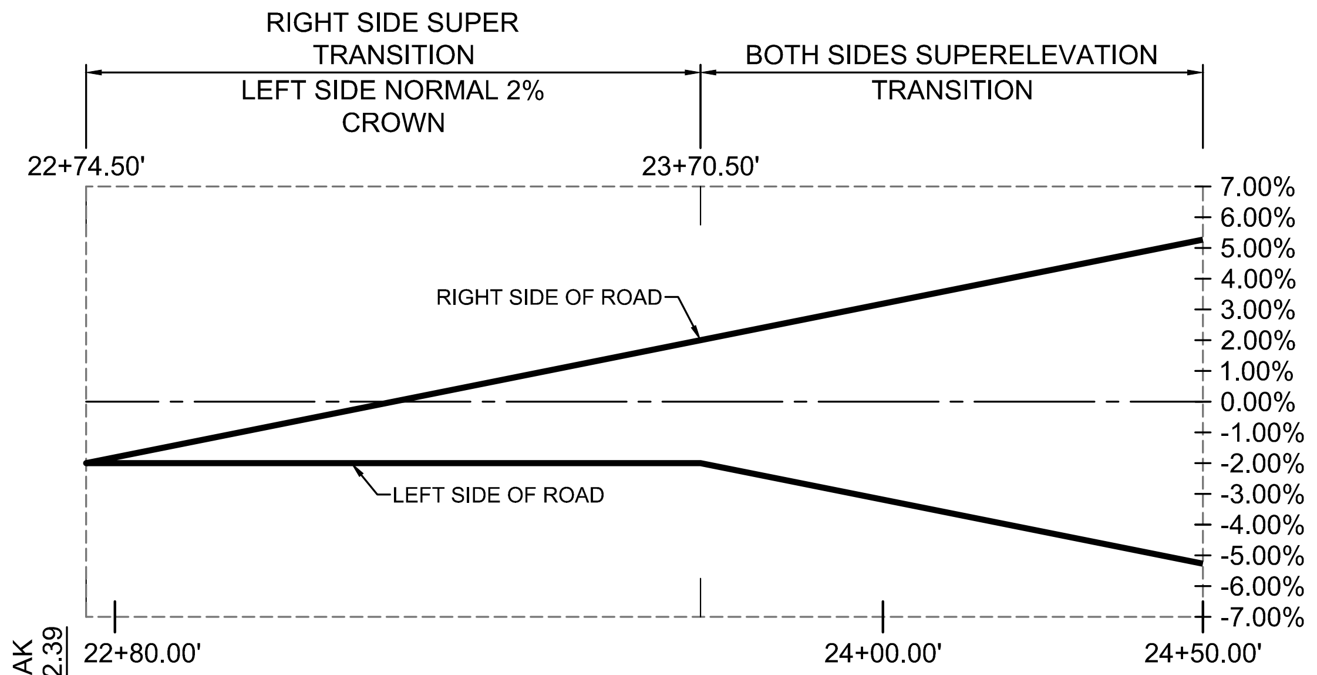
PROJECT NUMBER
CRP20-02
SHEET
PP01
PAGE
7 OF XX

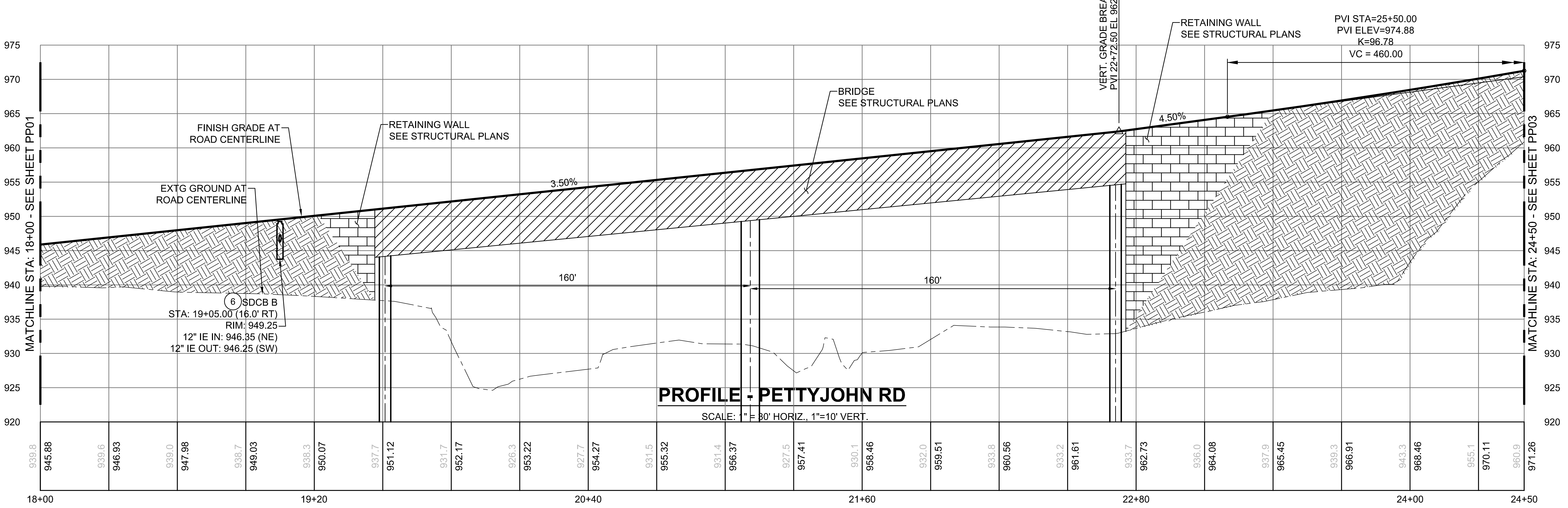
CURVE DATA

#	Δ	R	L	T
C1	21°28'48"	833.00	312.29	158.00
C2	21°32'12"	833.00	313.11	158.43
C3	33°50'56"	155.00	91.57	47.16
C4	14°45'17"	200.00	51.50	25.90









PROFILE - PETTYJOHN RD

SCALE: 1" = 30' HORIZ., 1"=10' VERT.

GENERAL CONSTRUCTION NOTES:

1. SEE SHEET GN01 FOR TYPICAL ROAD SECTIONS.

2. INSTALL SURVEY MONUMENTS AT ALL CENTERLINE STREET INTERSECTIONS, CENTER POINTS, AND PT / PC GEOMETRY POINTS PER WALLA WALLA COUNTY STANDARD PLAN R-12.

KEYED GRADING NOTES

① STA: 18+42.6 (17.0' LT) - BEAM GUARDRAIL ANCHOR TYPE 10 PER WSDOT STD PLAN C23.60. CONNECT TO TRANSITION SECTION.

② STA: 19+14.50 (17.0' LT/RT) - END BEAM GUARDRAIL WITH TRANSITION TYPE 21 PER WSDOT STD PLAN C25.20. CONNECT TO SINGLE SLOPE BARRIER PER WSDOT STD PLAN C24.10 TYPE D CONNECTION.

③ STA: 19+41.50 (17.0' LT/RT) - END SINGLE SLOPE CONCRETE BARRIER, TRANSITION TO BRIDGE SECTION.

④ APPROXIMATE LOCATION OF STORMWATER FACILITIES/SWALE. SEE SHEET GR03 AND GR04 FOR DETAILS.

⑤ 12" CMP STORM PIPE.

⑥ TYPE 1 CATCH BASIN PER WSDOT STD PLAN B-5.20-03.

⑦ STA: 22+78.50 (17.0' LT/RT) - START SINGLE SLOPE CONCRETE BARRIER, TRANSITION FROM BRIDGE SECTION.

⑧ STA: 23+46.50 (17.0 LT/RT) - END SINGLE SLOPE CONCRETE BARRIER, BEGIN BEAM GUARDRAIL TRANSITION TYPE 21 PER WSDOT STD PLAN C25.20. TRANSITION TO GUARDRAIL PER WSDOT STD PLAN C24.10, TYPE D CONNECTION.

⑨ STA: 24+36.50 (18.0' RT) - END BEAM GUARDRAIL WITH ANCHOR TYPE 10, PER WSDOT STD PLAN C23.60.

⑩ SEE SIGNING AND STRIPING FOR INFORMATION AND DETAILS.

⑪ SEE SHEET DR01 FOR RIPRAP AROUND BRIDGE ABUTMENT.

⑫ END TRANSITION TYPE 21, BEGIN BEAM GUARDRAIL TYPE 31 PER WSDOT STD PLAN C-20.10.

⑬ STORM OUTFALL TO INFILTRATION SWALE. SEE SHEET GR03 AND GR04.

⑭ INSTALL BEAM GUARDRAIL TYPE 31 PER WSDOT STD PLAN C20.10 BETWEEN STATIONS INDICATED. CONNECT TO SPECIFIED ANCHOR OR TRANSITION SECTION AT EACH END.

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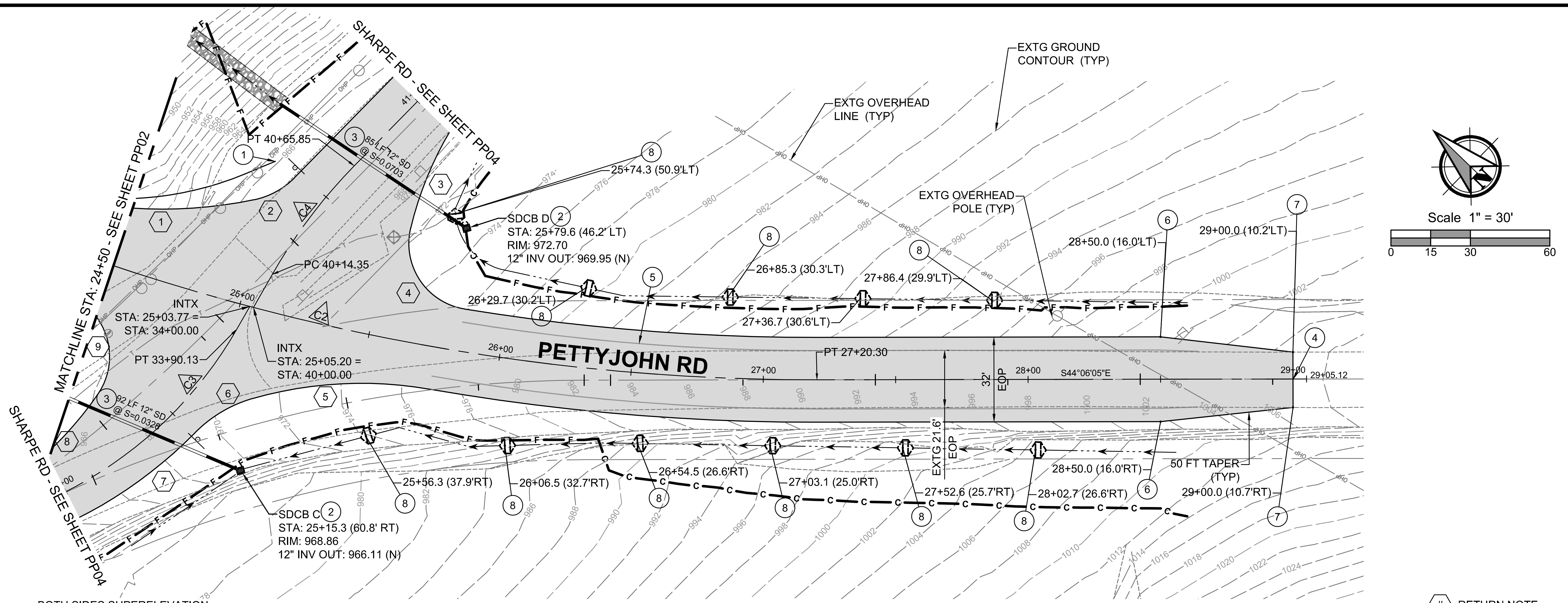
DELL SHARPE BRIDGE REPLACEMENT PROJECT

PETTY JOHN ROAD PLAN/PROFILE SHEET

PROJECT NUMBER
CRP20-02

SHEET
PP02



GENERAL CONSTRUCTION NOTES:

1. SEE SHEET GN01 FOR TYPICAL ROAD SECTIONS.
2. INSTALL SURVEY MONUMENTS AT ALL CENTERLINE STREET INTERSECTIONS, CENTER POINTS, AND PT / PC GEOMETRY POINTS PER WALLA WALLA COUNTY STANDARD PLAN R-12.

KEYED GRADING NOTES

① STA: 24+98.78 (55.42' LT) - END BEAM GUARDRAIL WITH ANCHOR TYPE 10, PER WSDOT STD PLAN C23.60.

② DROP INLET TYPE 1 PER WSDOT STANDARD PAN B-45.20.

③ 12" CMP STORM PIPE.

④ STA: 29+00.00 (0.0' LT/RT) - END ROADWAY IMPROVEMENTS. SAW-CUT A MINIMUM OF 2' FROM EXISTING EDGE OF ASPHALT PROVIDING A NEAT VERTICAL EDGE AND REMOVE CUT-OFF PORTION OF EXISTING PAVEMENT FOR NEW CONSTRUCTION AND UTILITIES. MATCH EDGE OF NEW ASPHALT TO EXISTING PROVIDING A SMOOTH TRANSITION.

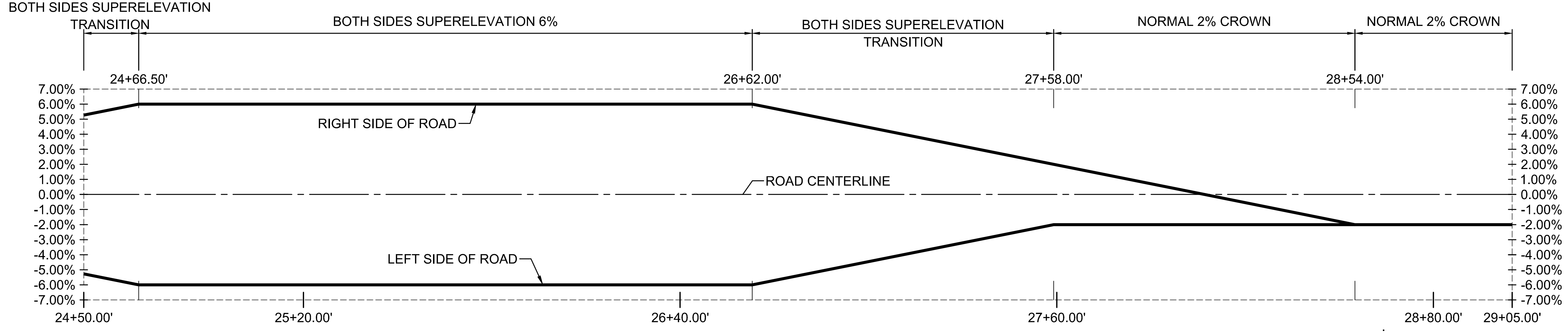
⑤ SEE SIGNING AND STRIPING FOR INFORMATION AND DETAILS.

⑥ BEGIN TAPER. END OF TYPICAL 32' ROAD SECTION.

⑦ END TAPER. MEET AND MATCH EXISTING END OF PAVEMENT.

⑧ INSTALL CHECK DAM PER WALLA WALLA COUNTY STANDARD PLAN R-11.

⬡# RETURN NOTE
SEE DETAILED INFORMATION FOR RETURN GEOMETRY AND ELEVATIONS ON SHEET PP05.



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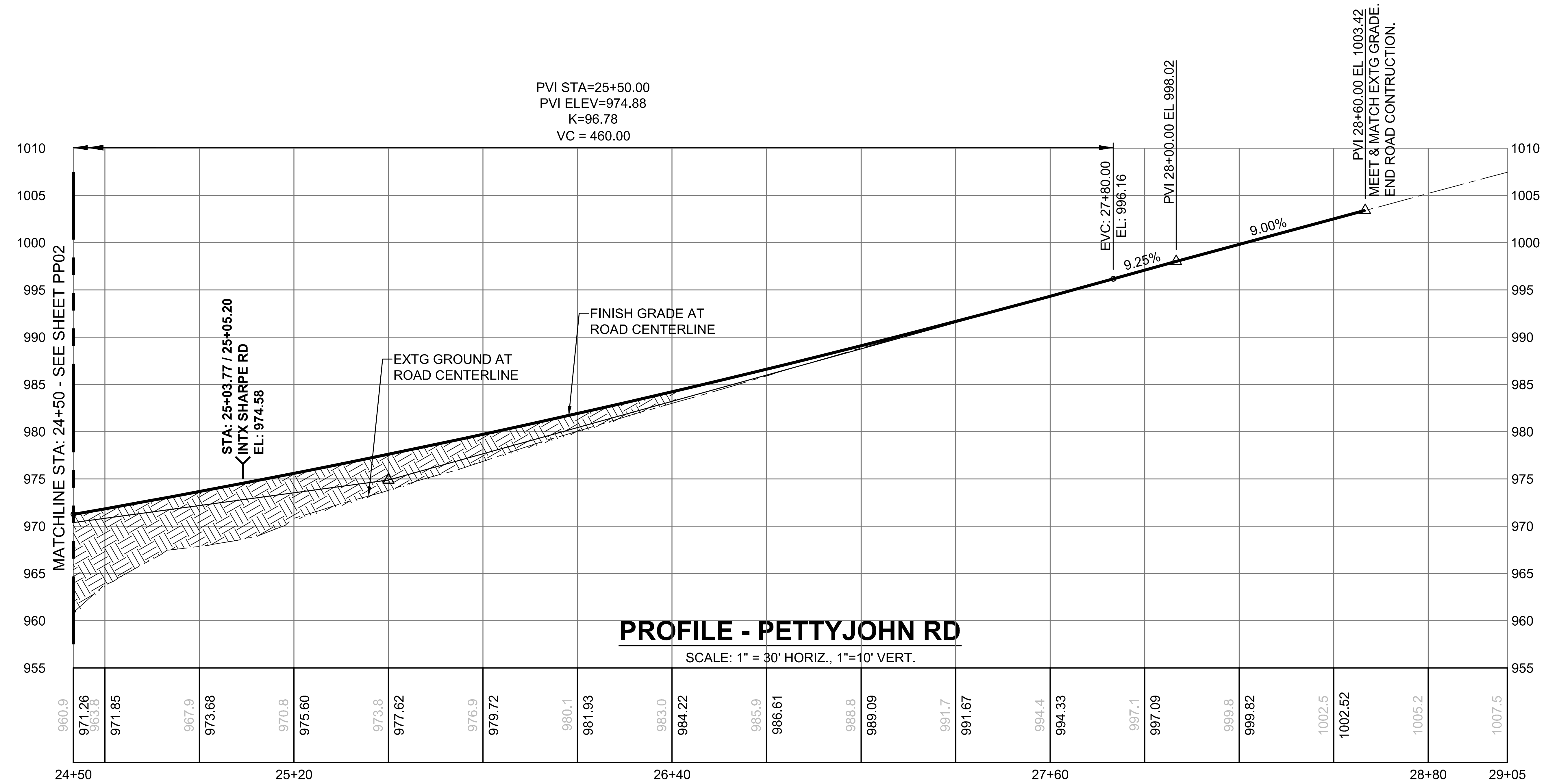
C4	14°45'17"	200.00	51.50	25.90
C1	21°28'48"	833.00	312.29	158.00
C2	21°32'12"	833.00	313.11	158.43



PROFILE - PETTYJOHN RD

SCALE: 1" = 30' HORIZ., 1"=10' VERT.

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

PETTY JOHN ROAD PLAN/PROFILE SHEET

PROJECT NUMBER
CRP20-02

SHEET
PP03

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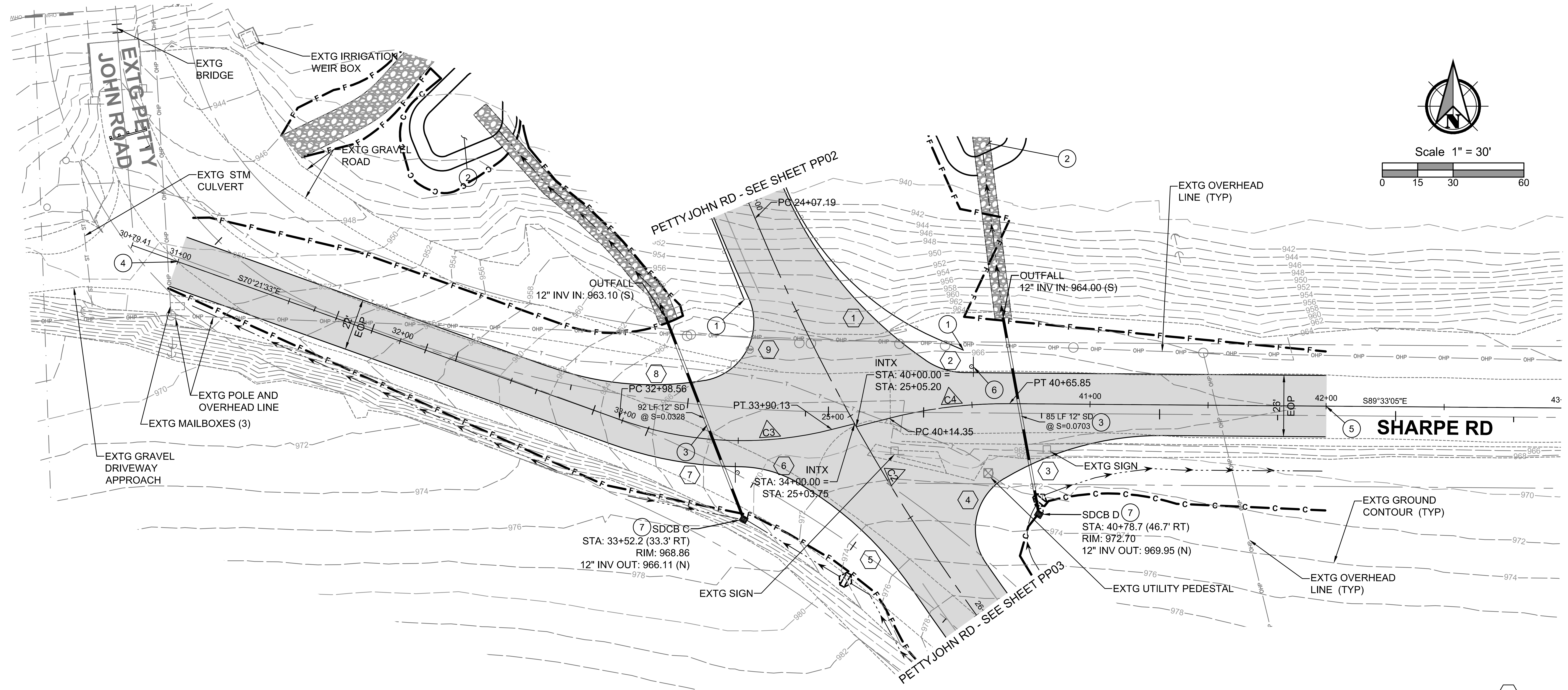

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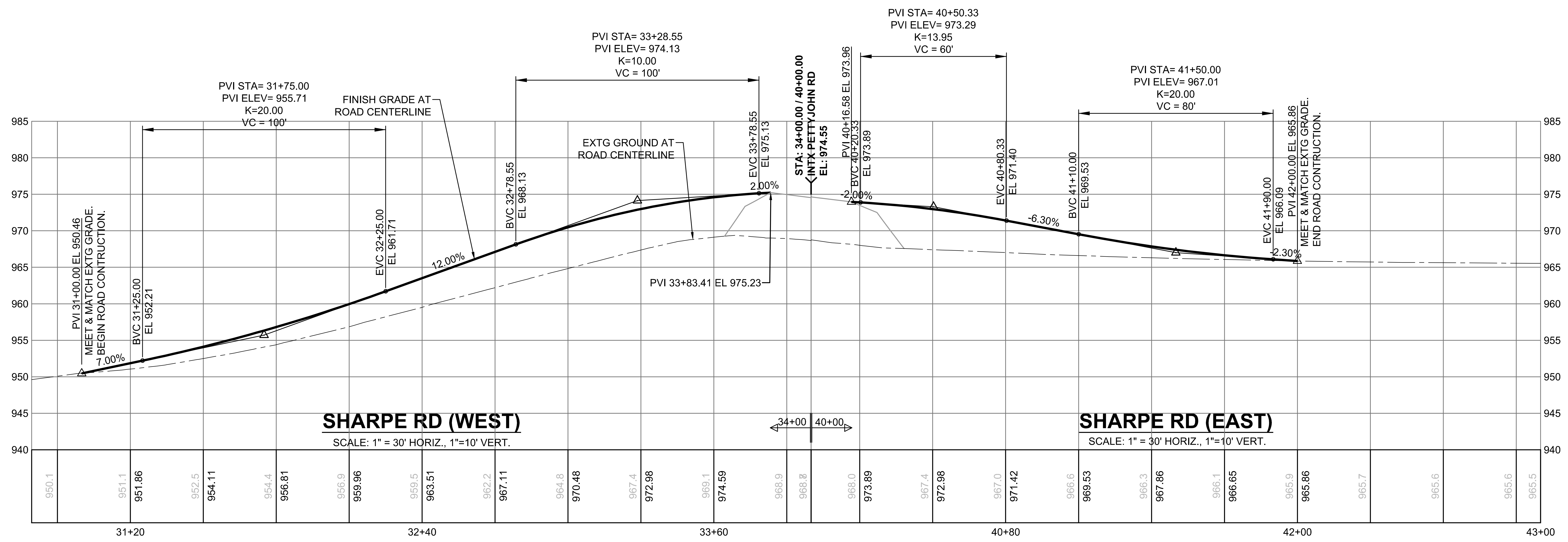
C3	33°50'56"	155.00	91.57	47.16
C1	21°28'48"	833.00	312.29	158.00
C2	21°32'12"	833.00	313.11	158.43

RETURN NOTE
SEE DETAILED INFORMATION FOR RETURN GEOMETRY AND ELEVATIONS ON SHEET PP05.



GENERAL CONSTRUCTION NOTES:

1. SEE SHEET GN01 FOR TYPICAL ROAD SECTIONS.
2. INSTALL SURVEY MONUMENTS AT ALL CENTERLINE STREET INTERSECTIONS, CENTER POINTS, AND PT / PC GEOMETRY POINTS PER WALLA WALLA COUNTY STANDARD PLAN R-12.

KEYED GRADING NOTES

① GUARDRAIL - SEE PETTY JOHN ROAD PLAN AND PROFILE SHEETS FOR DETAILS.

② APPROXIMATE LOCATION OF STORMWATER FACILITIES/SWALE. SEE SHEET GR03 AND GR04 FOR DETAILS.

③ 12" CMP STORM PIPE

④ STA: 31+00.00 (0.0' LT/RT) - BEGIN ROADWAY IMPROVEMENTS, TRANSITION TO EXISTING ASPHALT ROAD.

⑤ STA: 42+00.00 (0.0' LT/RT) - END ROADWAY IMPROVEMENTS, TRANSITION TO EXISTING GRAVEL ROAD.

⑥ SEE SIGNING AND STRIPING FOR INFORMATION AND DETAILS.

⑦ DROP INLET TYPE 1 PER WSDOT STANDARD PLAN B-45.20-01.

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

SHARPE ROAD PLAN/PROFILE SHEET AND INTERSECTION GEOMETRY SHEET

PROJECT NUMBER
CRP20-02

SHEET
PP04

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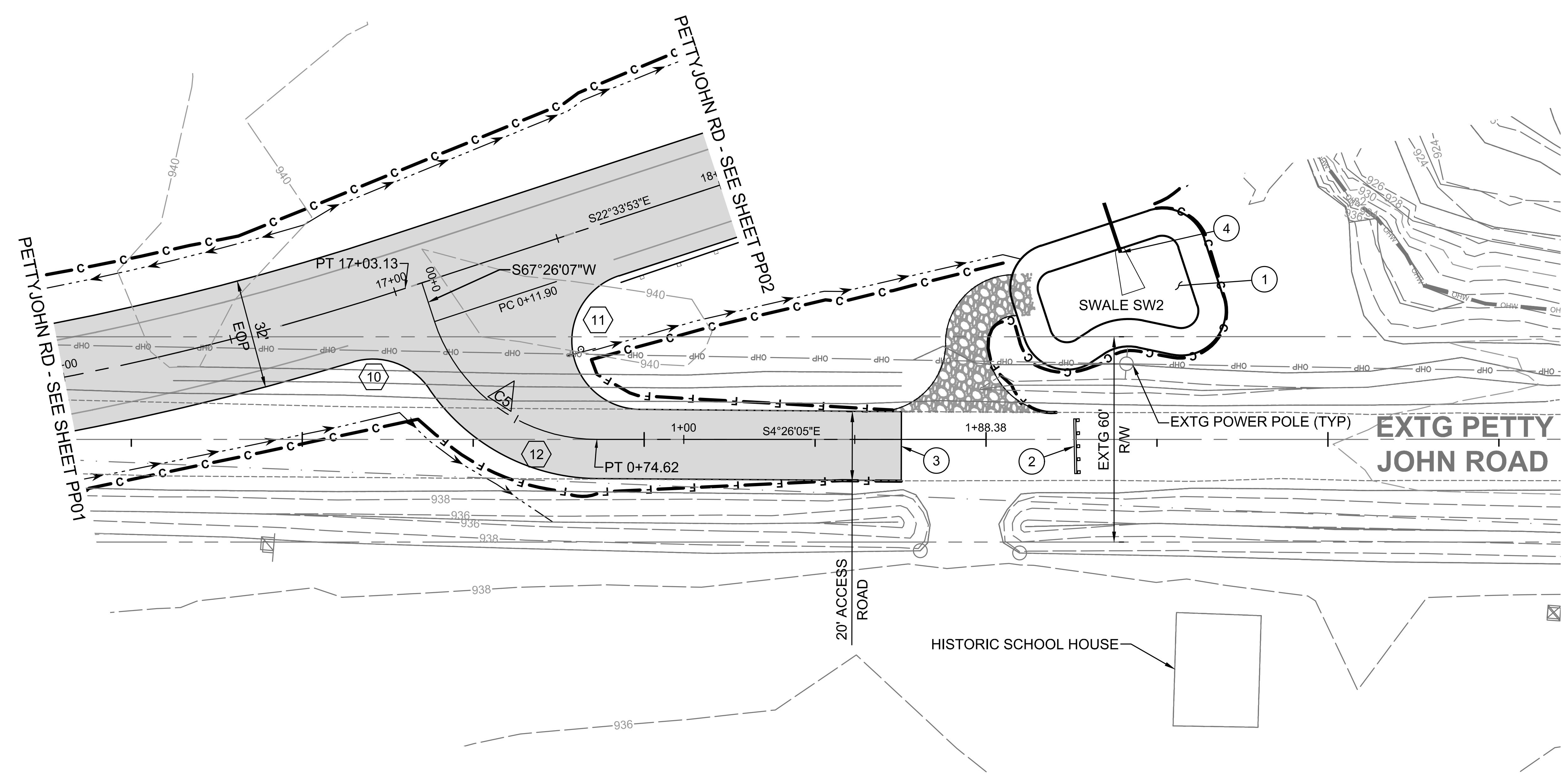
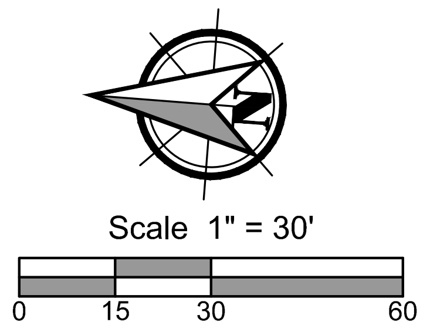
10 OF XX





CURVE DATA				
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GENERAL CONSTRUCTION NOTES:

1. SEE SHEET GN01 FOR TYPICAL ROAD SECTIONS.
2. INSTALL SURVEY MONUMENTS AT ALL CENTERLINE STREET INTERSECTIONS, CENTER POINTS, AND PT / PC GEOMETRY POINTS PER WALLA WALLA COUNTY STANDARD PLAN R-12.

KEYED GRADING NOTES

① STORM SWALE - SEE SHEETS GR03 AND D01 FOR ADDITIONAL INFORMATION

② SEE SIGNING AND STRIPING FOR INFORMATION AND DETAILS.

③ STA: 1+63.64 (0.0' LT/RT) - END ROADWAY IMPROVEMENTS. SAW-CUT A MINIMUM OF 2' FROM EXISTING EDGE OF ASPHALT PROVIDING A NEAT VERTICAL EDGE AND REMOVE CUT-OFF PORTION OF EXISTING PAVEMENT FOR NEW CONSTRUCTION AND UTILITIES. MATCH EDGE OF NEW ASPHALT TO EXISTING PROVIDING A SMOOTH TRANSITION.

④ STORM OUTFALL TO INFILTRATION SWALE. SEE SHEET GR03 AND PP02.

PETTYJOHN & SHARPE ROAD (EAST) RETURN DATA

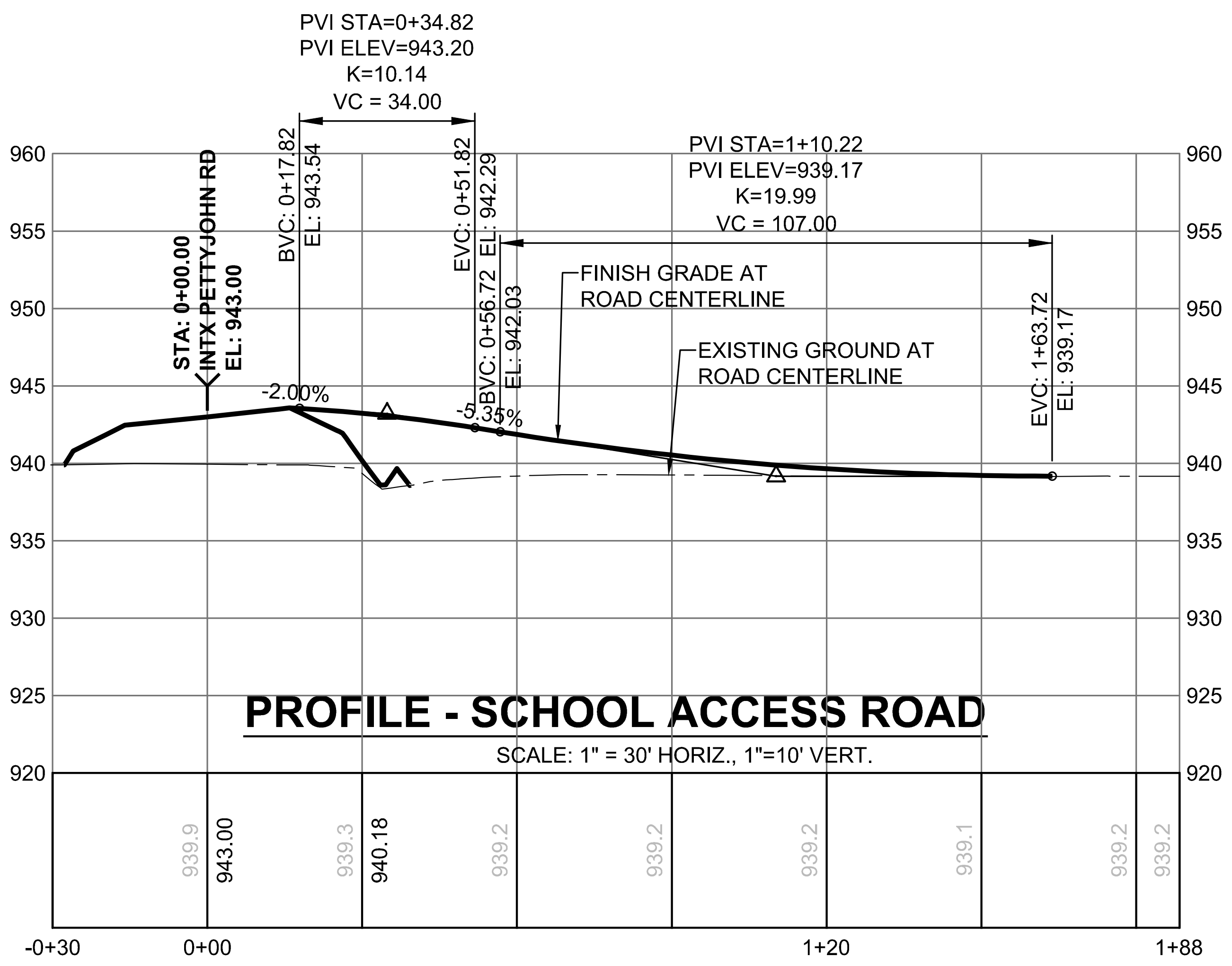
RETURN I.D.	DELTA	RADIUS	LENGTH	EDGE OF PAVEMENT (EOP) DATA (CLOCKWISE)		
				SCR STA AND ELEV	MID PNT EOP EL	ECR STA AND ELEV
1	90°00'00"	28.00'	43.98'	1+48.38, 21.50'R 1316.32	1315.56	21+11.15, 21.50'L 1314.81
2	90°00'00"	28.00'	43.98'	21+11.15, 21.50'R 1314.81	1315.04	2+47.38, 21.50'R 1315.28
3	90°00'00"	28.00'	43.98'	21+11.15, 21.50'R 1314.81	1315.04	2+47.38, 21.50'R 1315.28
4	90°00'00"	28.00'	43.98'	21+11.15, 21.50'R 1314.81	1315.04	2+47.38, 21.50'R 1315.28

PETTYJOHN & SHARPE ROAD (WEST) RETURN DATA

RETURN I.D.	DELTA	RADIUS	LENGTH	EDGE OF PAVEMENT (EOP) DATA (CLOCKWISE)		
				SCR STA AND ELEV	MID PNT EOP EL	ECR STA AND ELEV
5	90°00'00"	28.00'	43.98'	1+48.38, 21.50'R 1316.32	1315.56	21+11.15, 21.50'L 1314.81
6	90°00'00"	28.00'	43.98'	21+11.15, 21.50'R 1314.81	1315.04	2+47.38, 21.50'R 1315.28
7	90°00'00"	28.00'	43.98'	21+11.15, 21.50'R 1314.81	1315.04	2+47.38, 21.50'R 1315.28
8	90°00'00"	28.00'	43.98'	21+11.15, 21.50'R 1314.81	1315.04	2+47.38, 21.50'R 1315.28
9	90°00'00"	28.00'	43.98'	21+11.15, 21.50'R 1314.81	1315.04	2+47.38, 21.50'R 1315.28

PETTYJOHN &ACCESS ROAD RETURN DATA

RETURN I.D.	DELTA	RADIUS	LENGTH	EDGE OF PAVEMENT (EOP) DATA (CLOCKWISE)		
				SCR STA AND ELEV	MID PNT EOP EL	ECR STA AND ELEV
10	90°00'00"	28.00'	43.98'	1+48.38, 21.50'R 1316.32	1315.56	21+11.15, 21.50'L 1314.81
11	90°00'00"	28.00'	43.98'	21+11.15, 21.50'R 1314.81	1315.04	2+47.38, 21.50'R 1315.28
12	90°00'00"	28.00'	43.98'	21+11.15, 21.50'R 1314.81	1315.04	2+47.38, 21.50'R 1315.28



PROFILE - SCHOOL ACCESS ROAD

SCALE: 1" = 30' HORIZ., 1"=10' VERT.

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WALLA WALLA COUNTY
Public Works Department
999 Navion Lane
Walla Walla, Washington, 99362
Phone: 509. 524-2710
Web Address: www.wwcountyroads.com

DELL SHARPE BRIDGE REPLACEMENT PROJECT

SCHOOL ACCESS ROAD PLAN/PROFILE SHEET

PROJECT NUMBER
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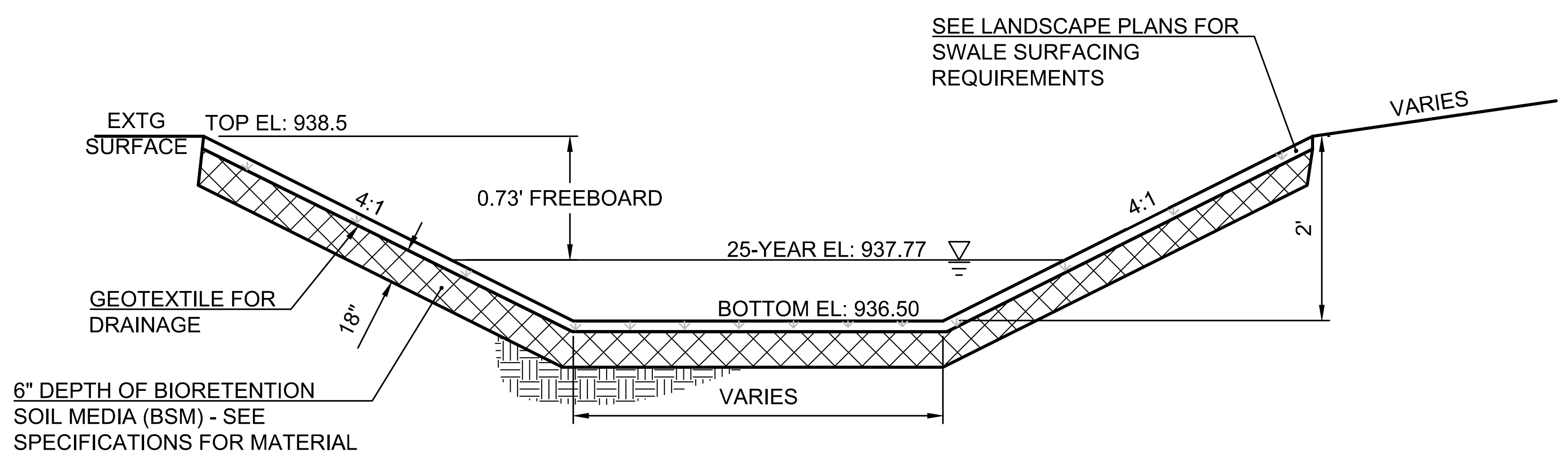
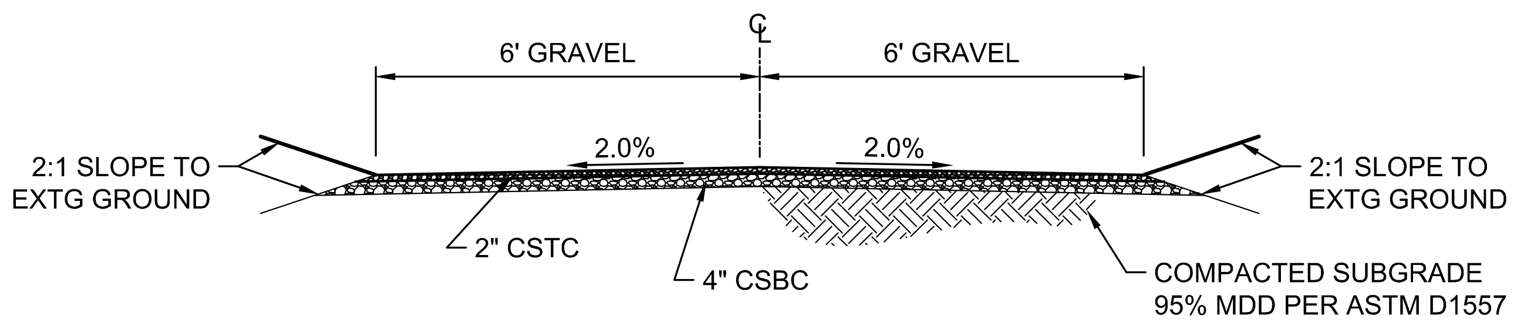


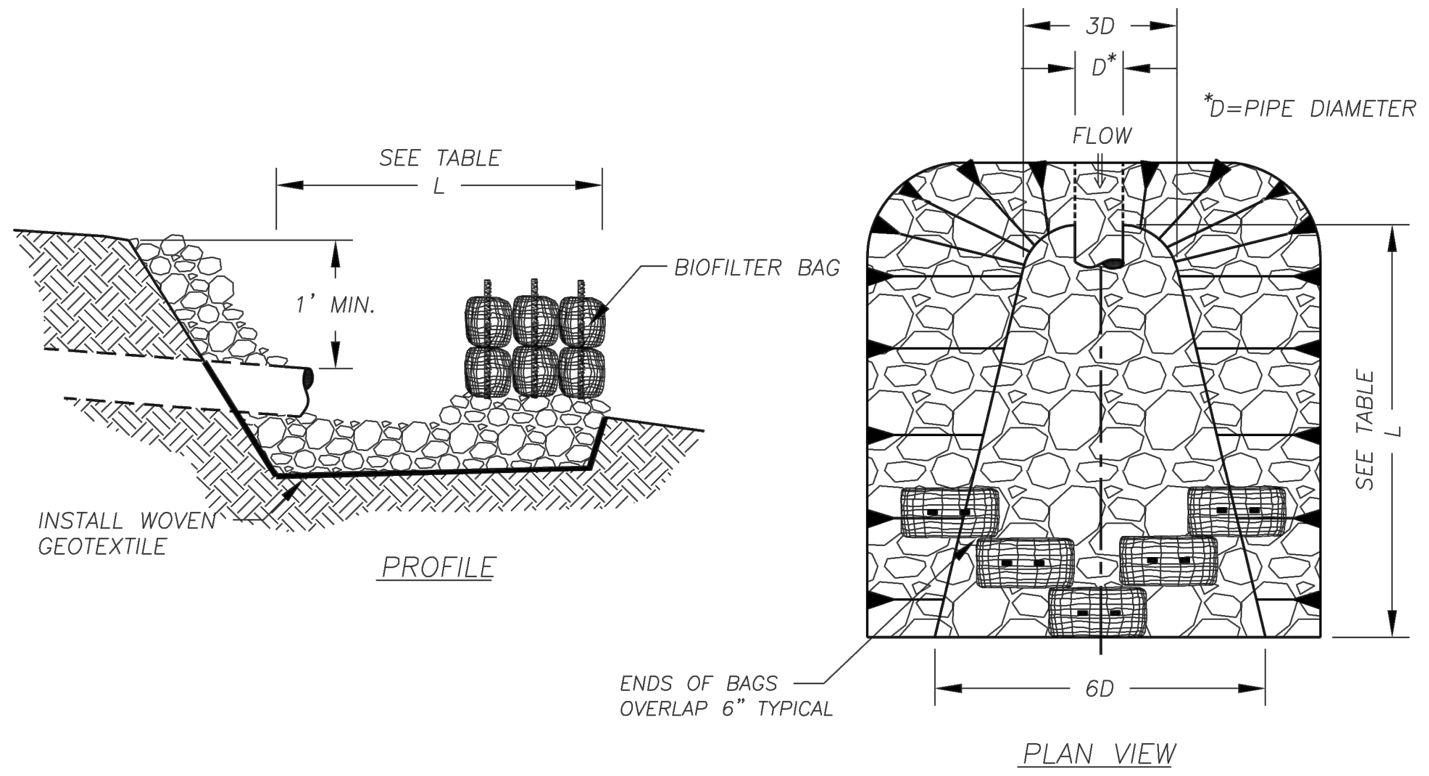
BIORETENTION SWALE SW2

NTS



GRAVEL ROAD SECTION DETAIL

NTS



NOTES:

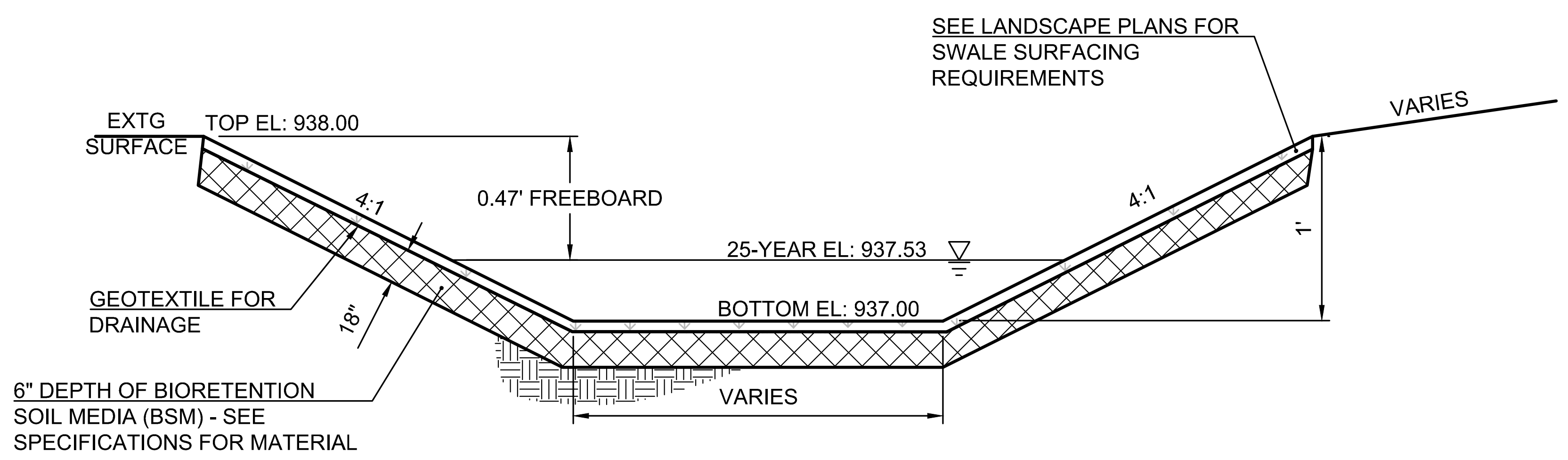
1. BIO-BAGS ONLY REQUIRED WHEN DISCHARGING SEDIMENT LADEN WATER. STAKING OF BAGS REQUIRED WITH EITHER METHOD USING (2) 1"x2" WOOD STAKES OR APPROVED EQUAL PER BAG.
2. RIP-RAP SIZING GOVERNED BY THE SIDE SLOPES ON THE OUTLET CHANNEL, ASSUMED TO BE 3:1.
3. PLACE WOVEN GEOTEXTILE ALONG BOTTOM AND SIDE SLOPES TO CROWN OF PIPE, AND INSTALL ROCK TO 1' ABOVE PIPE CROWN ALONG BOTH SIDES OF CHANNEL.
4. RIP-RAP SHALL BE IN ACCORDANCE WITH SECTION 9-13.1 OF THE WSDOT STANDARD SPECIFICATIONS. RIP-RAP ROCK SIZE SHALL BE AS SHOWN IN THE TABLE BELOW.
5. RIP-RAP SHALL BE HAND LAID AND REASONABLY GRADED.
6. INSPECT ONCE PER WEEK ON ACTIVE SITES, ONCE EVERY TWO WEEKS ON INACTIVE SITES, AND WITHIN 24 HOURS FOLLOWING A 0.5 INCH RAIN EVENT.
7. IF THERE IS SCOURING AT THE OUTLET, PROTECT THE ERODED AREA BY INCREASING THE SIZE OF THE ENERGY DISSIPATOR FACILITY.
8. REMOVE ACCUMULATED SEDIMENT FREQUENTLY.
9. USE THIS DETAIL FOR OUTLET PROTECTION AS A MINIMUM. CONSIDER SITE CONDITIONS TO DETERMINE IF A MORE COMPLEX ENERGY DISSIPATOR MAY BE REQUIRED.

DISCHARGE VELOCITY AT DESIGN FLOW (FPS)	REQUIRED PROTECTION MINIMUM DIMENSIONS	
	TYPE	LENGTH (L)
0 TO <5	RIP-RAP*	8' OR 3D (WHICHEVER IS GREATER)
6 TO <10	RIP-RAP**	12' OR 4D (WHICHEVER IS GREATER)
11 TO <20	GABION	AS REQUIRED
>20	ENGINEERED ENERGY DISSIPATER REQUIRED	

* 8" MAXIMUM, 6" MEDIAN, 2" MINIMUM
** 24" MAXIMUM, 16" MEDIAN, 4" MINIMUM

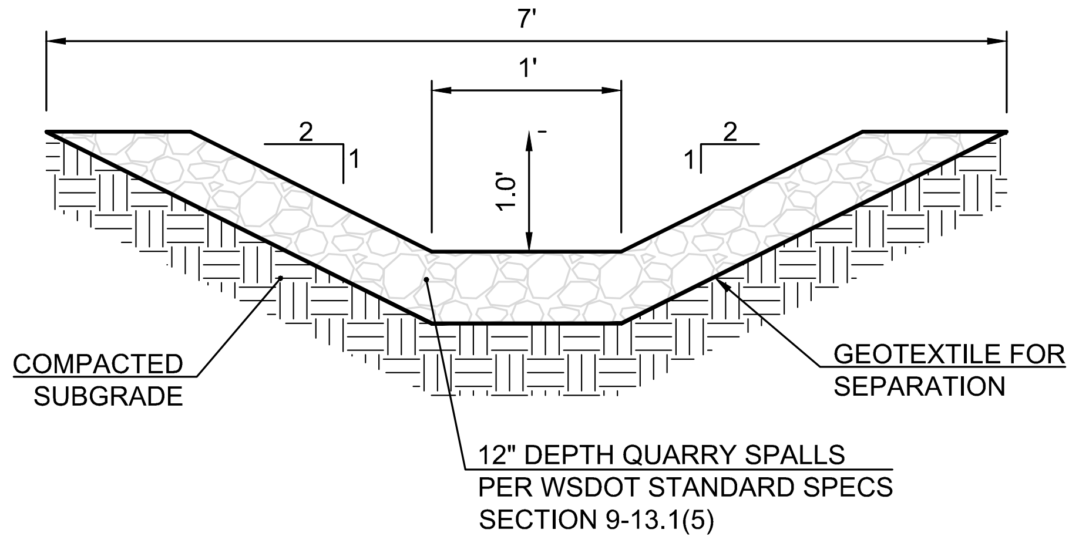
RIPRAP/ PIPEOUT FALL DETAIL

NTS



BIORETENTION SWALE SW3

NTS



ROCK-LINED CHANNEL SECTION DETAIL

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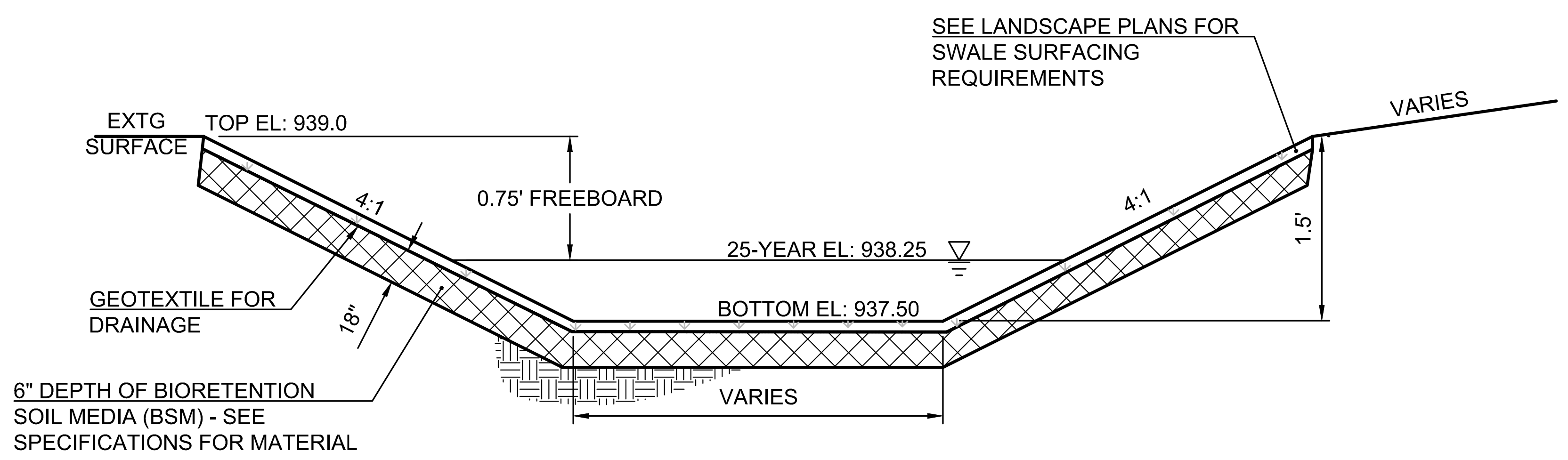

BIORETENTION SWALE SW5

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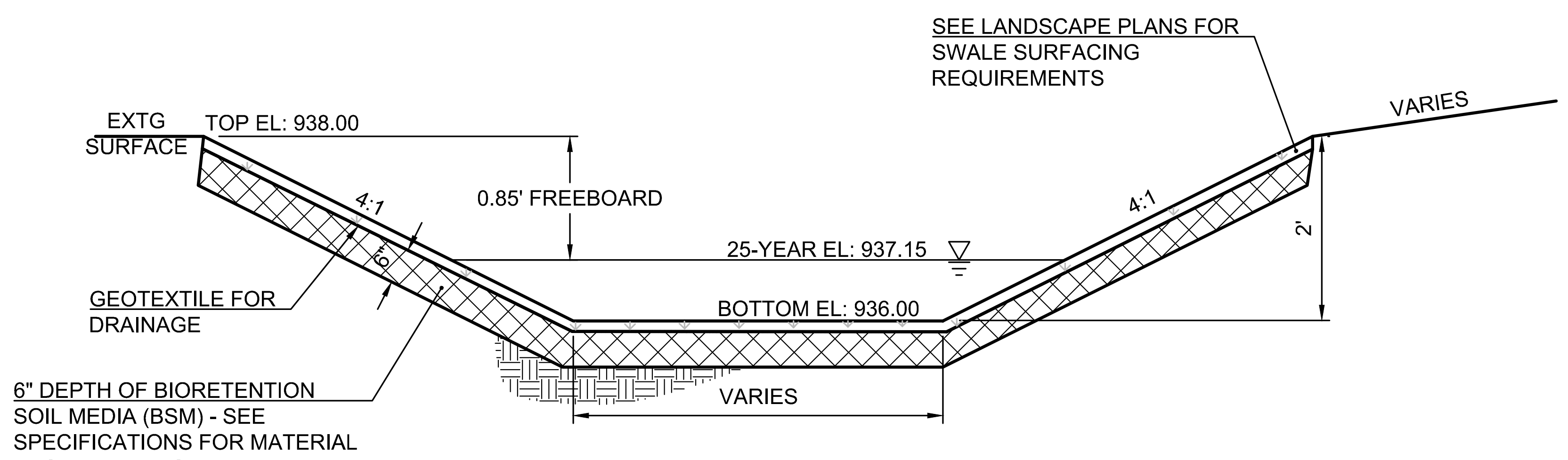

BIORETENTION SWALE SW6

NTS

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

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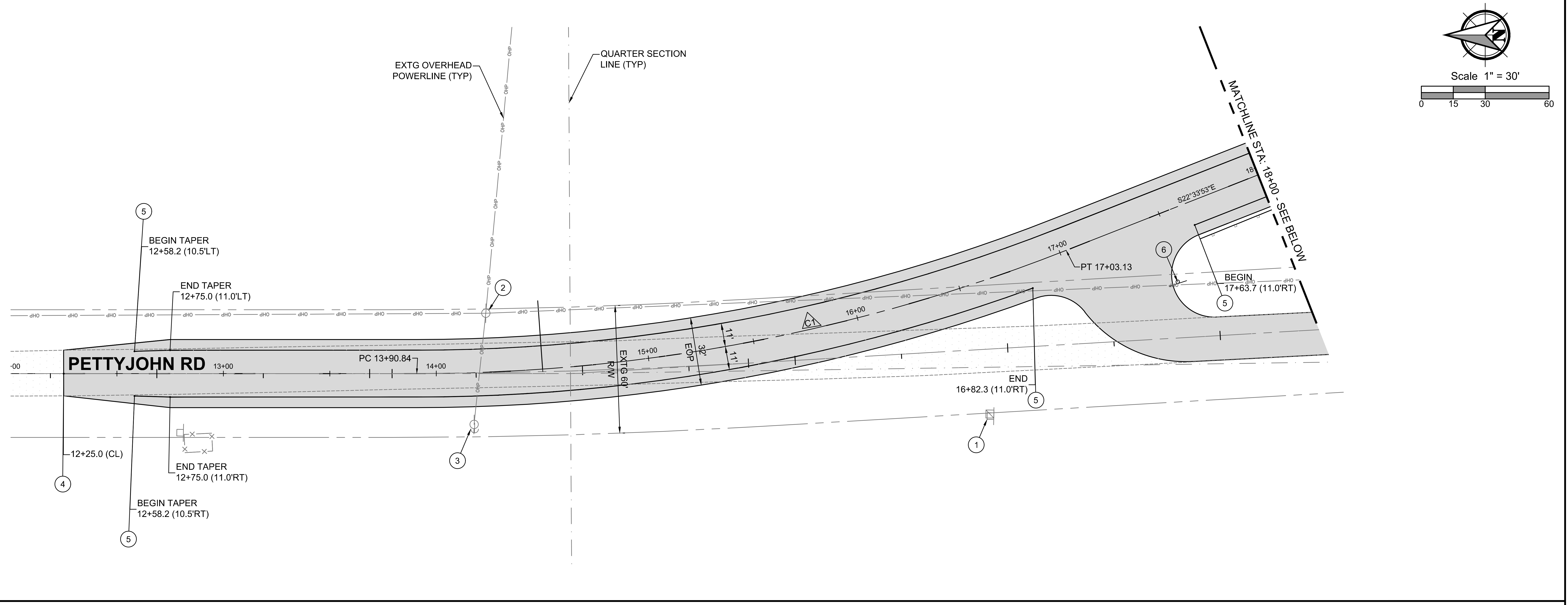

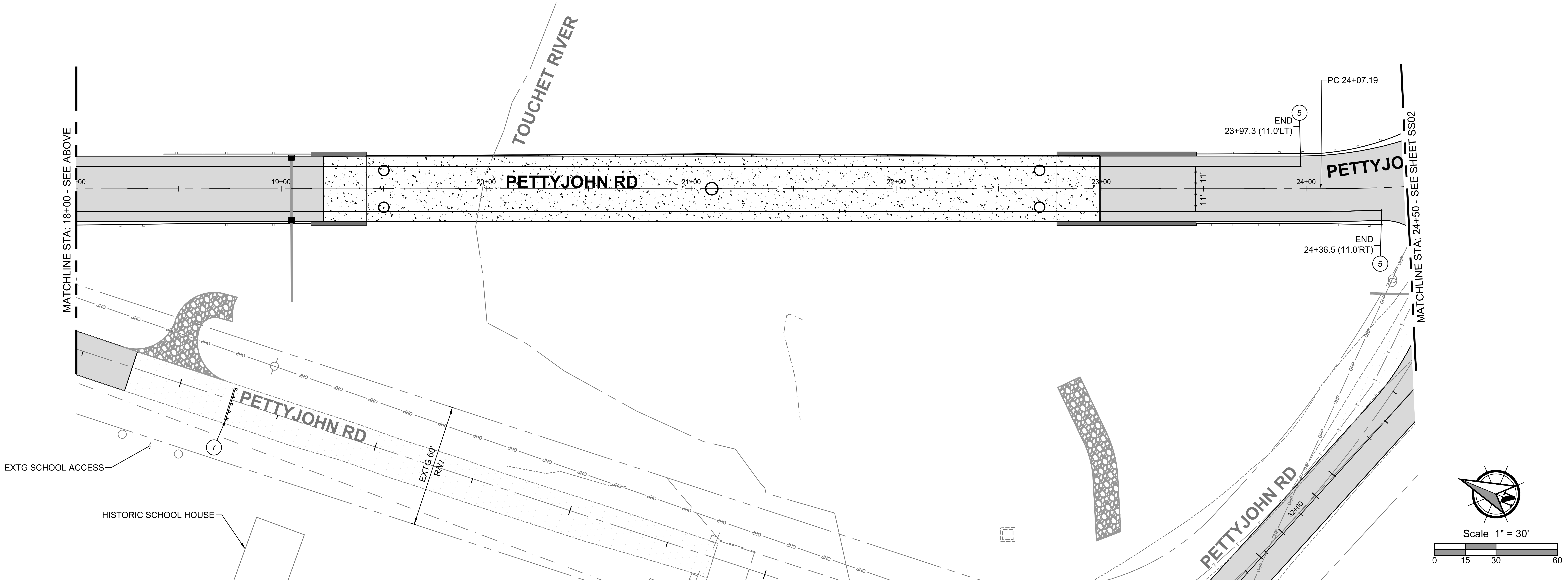

CONSTRUCTION NOTES:

SEE SHEET GN01 TYPICAL ROAD SECTIONS

SIGNING & STRIPING NOTES:

① RELOCATE AND REPLACE EXISTING SIGN.

② PROTECT EXISTING UTILITY POLE.

③ RELOCATE AND REPLACE EXISTING UTILITY POLE, BY OTHERS. LOCATIONS ARE APPROXIMATE AND WILL BE RESOLVED IN THE FIELD BY UTILITY DURING CONSTRUCTION.

④ 4" YELLOW CENTERLINE PER WSDOT STANDARD PLAN M-20.10

⑤ 4" WHITE EDGE LINE PER WSDOT STANDARD PLAN M-20.10

⑥ INSTALL STOP SIGN AND STREET NAME SIGN PER WALLA WALLA COUNTY STANDARD PLAN R-13.

⑦ MUTCD TYPE 3 BARRICADE.

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

SIGNING AND STRIPING PLAN

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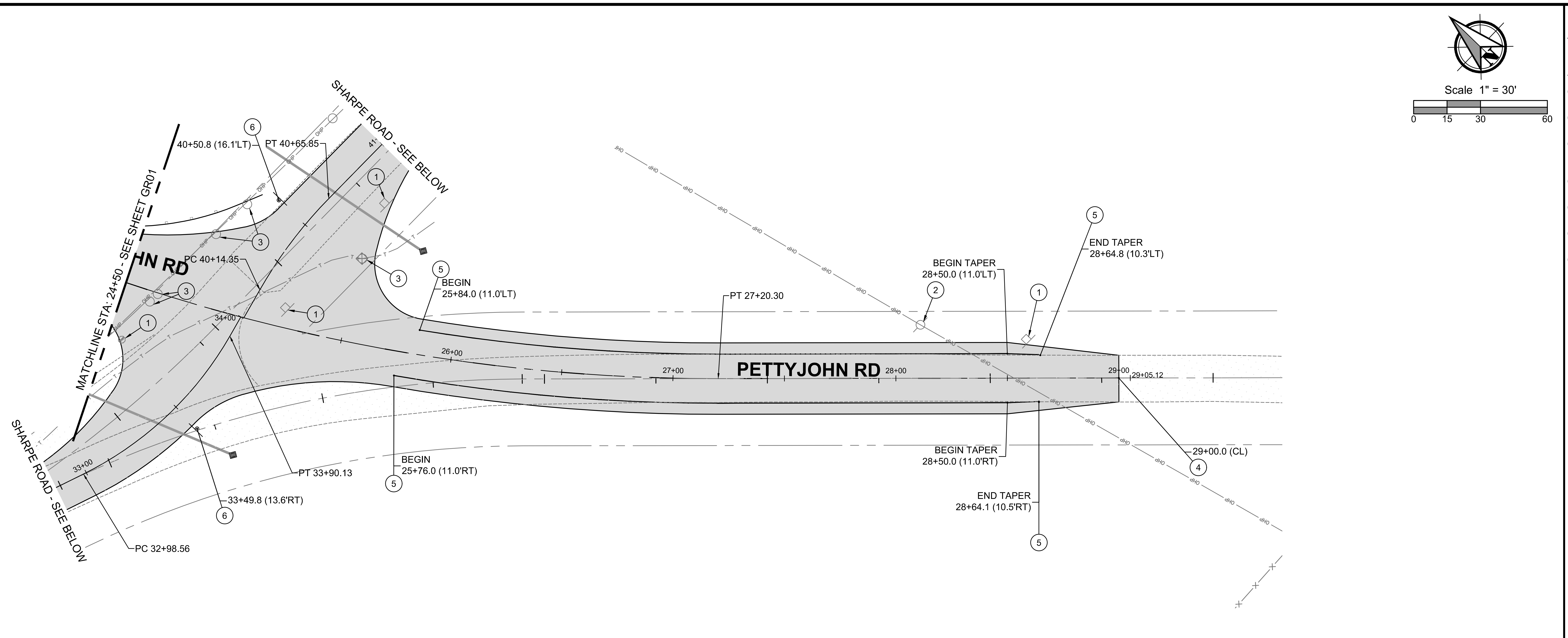

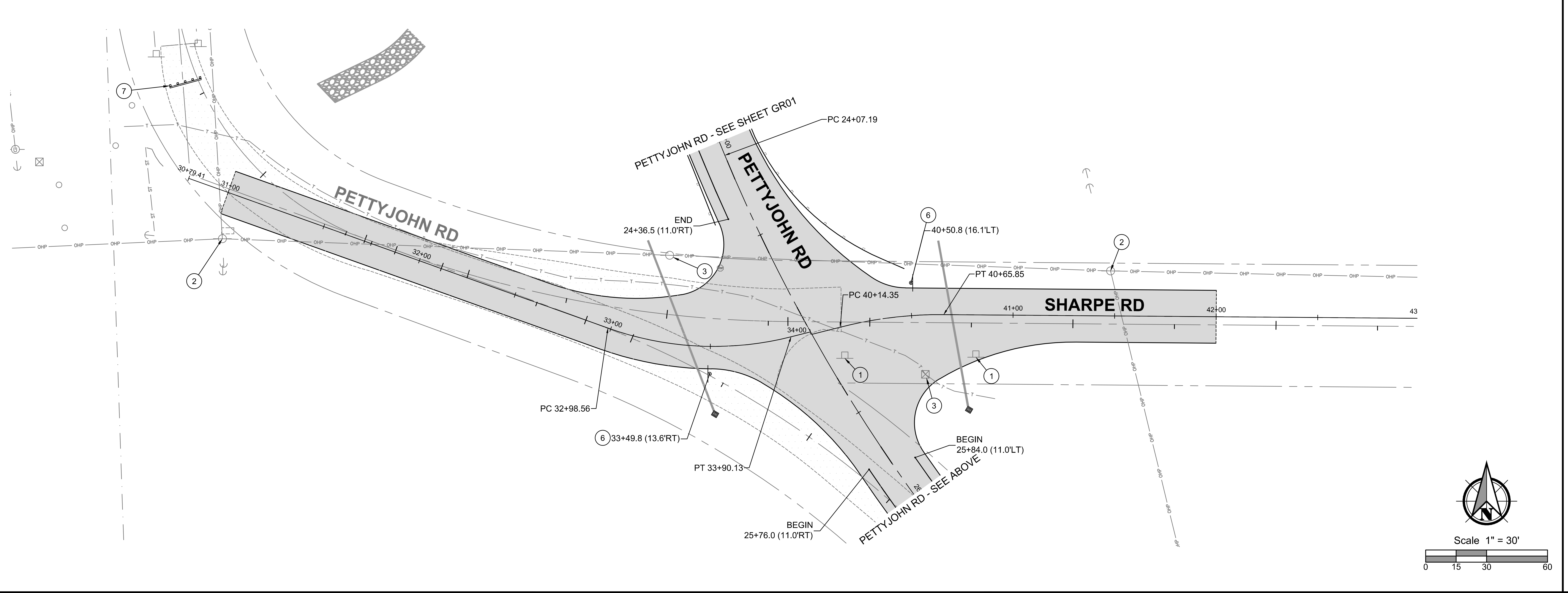

CONSTRUCTION NOTES:

SEE SHEET GN01 FOR TYPICAL ROAD SECTIONS.

SIGNING & STRIPING NOTES:

① REMOVE AND RELOCATE EXISTING SIGN.

② PROTECT EXISTING UTILITY POLE.

③ RELOCATE AND REPLACE EXISTING UTILITY BOX/POLE, BY OTHERS. LOCATIONS ARE APPROXIMATE AND WILL BE RESOLVED BY FRANCHISE UTILITY DURING CONSTRUCTION.

④ 4" YELLOW CENTERLINE PER WSDOT STANDARD PLAN M-20.10.

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

SIGNING AND STRIPING PLAN

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GENERAL SHEET NOTES

1. SEE SHEET SP03 FOR GENERAL NOTES AND DETAILS.

SOIL PREPARATION & SEEDING NOTES

① MITIGATION AREA - SEE PREPARATION WORK DETAIL

② SEEDING AREA PREPARATION PER STANDARD SPECIFICATION 8-02.3(5)A.

③ 6" DEPTH OF TOPSOIL TYPE 'B' PER STANDARD SPECIFICATIONS 8-02.3(4)A AND SPECIAL PROVISIONS.

④ 3" DEPTH OF FINE COMPOST PER STANDARD SPECIFICATIONS 8-02.3(6).

⑤ SEEDING, FERTILIZING AND MULCHING - SITE UPLAND PER STANDARD SPECIFICATION 8-02.3(9) AND SPECIAL PROVISIONS.

⑥ SEEDING, FERTILIZING AND MULCHING - SITE MITIGATION PER STANDARD SPECIFICATION 8-02.3(9) AND SPECIAL PROVISIONS.

⑦ BARK OR WOOD MULCH RINGS PER STANDARD SPECIFICATIONS 8-02.3(11)C. ONE RING PER TREE OR SHRUB. SEE RESTORATION PLANS.

SEEDING LEGEND

⁘	SEEDING, FERTILIZING AND MULCHING - SITE UPLAND
▨	SEEDING, FERTILIZING AND MULCHING - SITE MITIGATION

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

NORTH SOIL PREPARATION & SEEDING PLAN

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GENERAL SHEET NOTES

1. SEE SHEET SP03 FOR GENERAL NOTES AND DETAILS.

SOIL PREPARATION & SEEDING NOTES

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⑥ SEEDING, FERTILIZING AND MULCHING - SITE MITIGATION PER STANDARD SPECIFICATION 8-02.3(9) AND SPECIAL PROVISIONS.

⑦ BARK OR WOOD MULCH RINGS PER STANDARD SPECIFICATIONS 8-02.3(11)C. ONE RING PER TREE OR SHRUB. SEE RESTORATION PLANS.

SEEDING LEGEND

⁺⁺	SEEDING, FERTILIZING AND MULCHING - SITE UPLAND
▨	SEEDING, FERTILIZING AND MULCHING - SITE MITIGATION

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STATE OF WASHINGTON
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LANDSCAPE ARCHITECT

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

SOUTH SOIL PREPARATION & SEEDING PLAN

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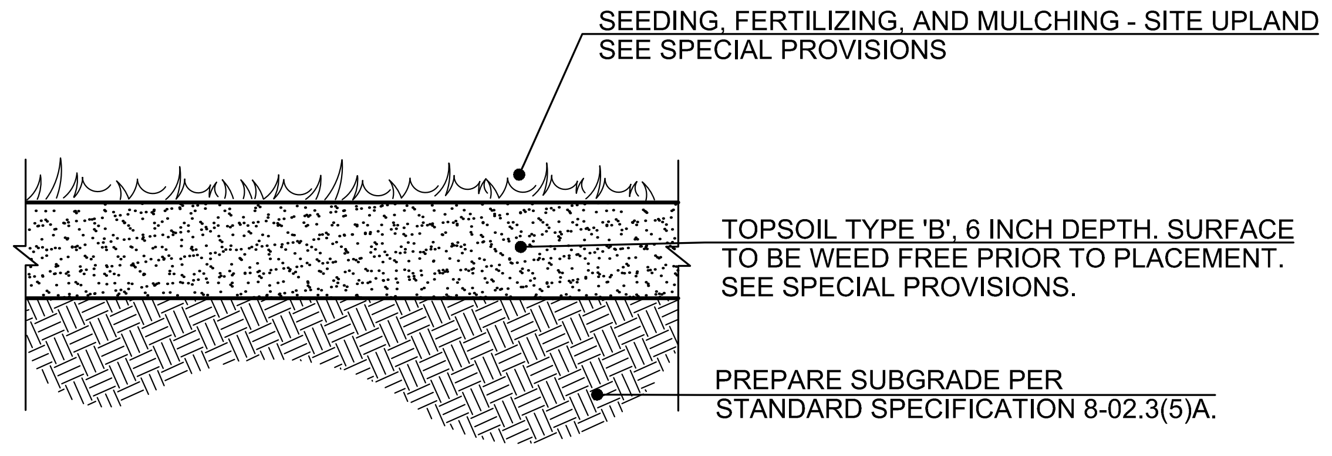
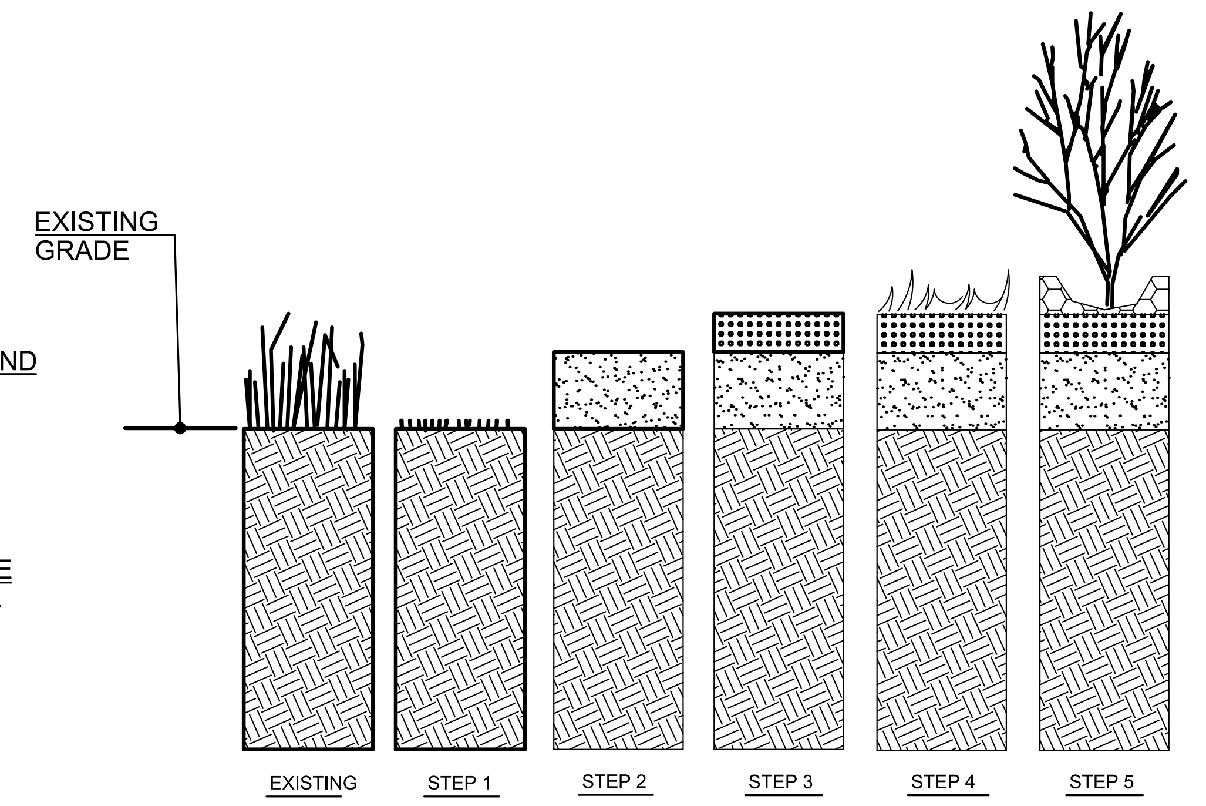


Topsoil and Seeding Cross Section - Upland

NOT TO SCALE



SEEDING AREA PREPARATION PER
SPECIFICATION 8-02.3(5)A

STEP 1
REMOVE ALL VEGETATION UNLESS OTHERWISE FLAGGED BY THE ENGINEER TO PRODUCE A BARE SOIL CONDITION.

STEP 2
APPLY UP TO 6 INCHES PF TOPSOIL TYPE 'B' FOR MINOR GRADING FROM ANY DEMO WORK.

STEP 3
APPLY 3 INCH DEPTH OF FINE COMPOST.

STEP 4
APPLY SEEDING, FERTILLZING AND MULCHING - SITE MITIGATION WITH LONG TERM MULCH. SEE SPECIAL PROVISIONS FOR SEED MIX.

STEP 5
APPLY BARK OR WOOD MULCH RINGS PER STANDARD SPECIFICATION 8-02.3(12) AT EACH SHRUB OR TREE LOCATION.

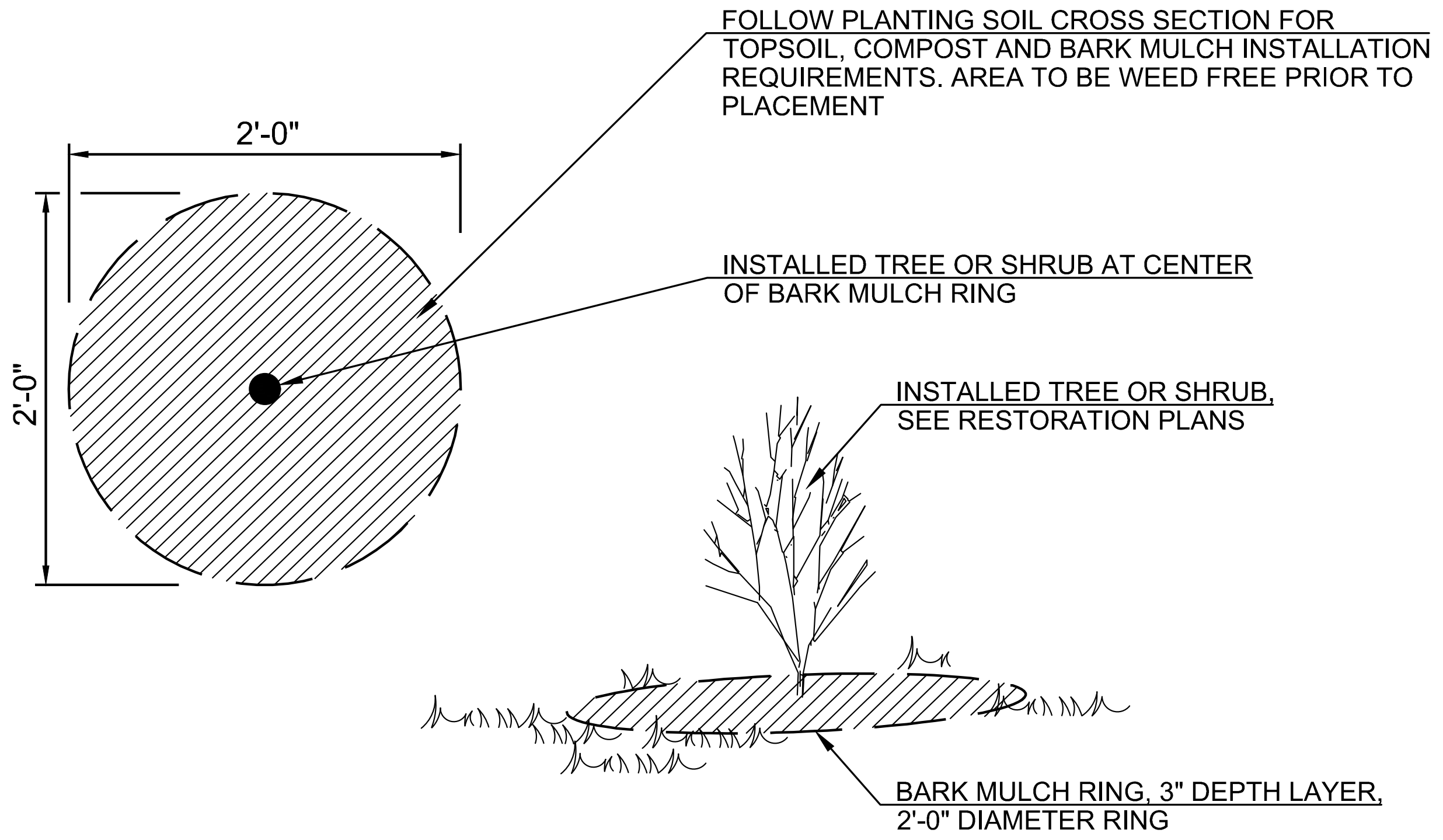
THIS DETAIL FOR ORDER OF WORK ONLY. ALL NECESSARY WORK SHALL BE APPLIED BY THE APPROPRIATE PAY ITEM. LIMITS OF WORK SHALL BE STAKED IN FIELD.

Mitigation Area - Sequence of Work

NOT TO SCALE

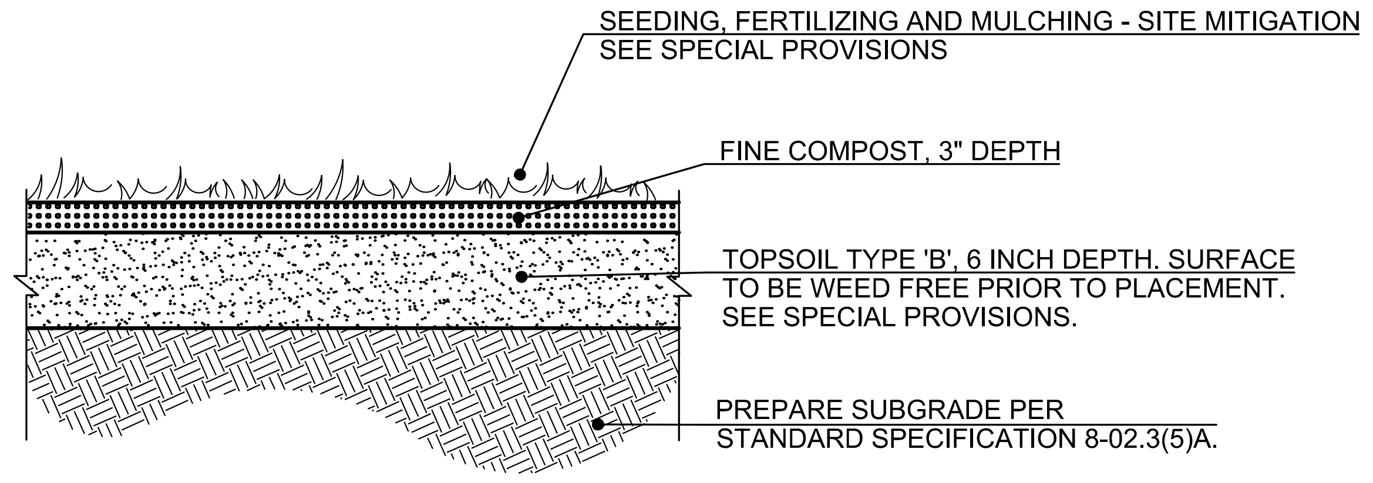
SEEDING LIST

BID ITEM	SYM	SPECIES MIX	PLS (by acre)	DESIRED % by WEIGHT	TOTAL QTY (acres)
SEEDING, FERTILIZING & MULCHING - SITE UPLAND	⁺⁺	*Elymus lanceolatus* Thickspike Wheatgrass	10.99	25%	2.16
		Festuca ovina var. covar Covar Sheep Fescue	2.74	25%	
		Poa ampla Sherman's Big Bluegrass	1.12	16%	
		Pseudoroengeria spicata Bluebunch Wheatgrass	8.26	16%	
		Poa canbyi Canby's Bluegrass	0.61	9%	
		Lupinus albicalus Sicklekeel Lupine	21.28	9%	
SEEDING, FERTILIZING & MULCHING - SITE MITIGATION	▨	*Elymus cinereus* Basin Wildrye	18.72	40%	0.74
		Elymus trachycaulus Slender Wheatgrass	7.65	20%	
		Elymus lanceolatus Thickspike Wheatgrass	8.57	20%	
		Pseudoroegneria spicata Bluebunch Wheatgrass	10.06	20%	



Bark or Wood Chip Mulch Ring Detail

NOT TO SCALE



Topsoil and Seeding Cross Section - Mitigation

NOT TO SCALE

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

SOIL PREPARATION & SEEDING DETAILS SHEET

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ENHANCEMENT AREA - D

NAME	POSITION ON SLOPE	QTY
TREES		
Populus tremuloides Quaking Aspen	TRANSITION BETWEEN UPPER AND LOWER	10
Pinus ponderosa Ponderosa Pine	UPPER	15
SHRUBS		
Ribes cerium Wax Currant	UPPER	10
Prunus virginiana Choke Cherry	UPPER	10
Crataegus douglasii Black Hawthorne	UPPER	10
Symphoricarpus albus Common Snowberry	UPPER	30
Amelanchier alnifolia Saskatoon Serviceberry	UPPER	10

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

NORTH RESTORATION PLAN

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ENHANCEMENT AREA - C (0.16 ACRES)
70 MITIGATION TREE MIX (MTM)
110 MITIGATION SHRUB MIX (MSM)

ENHANCEMENT AREA - E (0.11 ACRES)
25 MITIGATION TREE MIX (MTM)
70 MITIGATION SHRUB MIX (MSM)

ENHANCEMENT AREA - A&B (.34 ACRES)
140 MITIGATION TREE MIX (MTM)
220 MITIGATION SHRUB MIX (MSM)

ENHANCEMENT AREA - A & B

NAME	POSITION ON SLOPE	QTY
TREES		
Alnus rhombifolia White Alder	LOWER	30
Populus trichocarpa Black Cottonwood		60
Populus tremuloides Quaking Aspen	TRANSITION BETWEEN UPPER AND LOWER	30
Pinus ponderosa Ponderosa Pine	UPPER	20
SHRUBS		
Cornus sericea Red Osier Dogwood	LOWER	40
Malus fusca Pacific Crabapple		20
Salix exigua Sandbar Willow		40
Rosa woodsii Woods Rose		10
Ribes cerium Wax Currant		10
Prunus virginiana Choke Cherry	UPPER	10
Crataegus douglasii Black Hawthorne		30
Symphoricarpus albus Common Snowberry		40
Amelanchier alnifolia Saskatoon Serviceberry		20

ENHANCEMENT AREA - C

NAME	POSITION ON SLOPE	QTY
TREES		
Alnus rhombifolia White Alder	LOWER	15
Populus trichocarpa Black Cottonwood		30
Populus tremuloides Quaking Aspen	TRANSITION BETWEEN UPPER AND LOWER	15
Pinus ponderosa Ponderosa Pine	UPPER	10
SHRUBS		
Cornus sericea Red Osier Dogwood	LOWER	20
Malus fusca Pacific Crabapple		10
Salix exigua Sandbar Willow		20
Rosa woodsii Woods Rose		5
Ribes cerium Wax Currant		5
Prunus virginiana Choke Cherry	UPPER	5
Crataegus douglasii Black Hawthorne		15
Symphoricarpus albus Common Snowberry		20
Amelanchier alnifolia Saskatoon Serviceberry		10

ENHANCEMENT AREA - E

NAME	POSITION ON SLOPE	QTY
TREES		
Alnus rhombifolia White Alder	LOWER	5
Populus trichocarpa Black Cottonwood		15
Populus tremuloides Quaking Aspen	TRANSITION BETWEEN UPPER AND LOWER	5
SHRUBS		
Cornus sericea Red Osier Dogwood	LOWER	20
Salix exigua Sandbar Willow		30
Rosa woodsii Woods Rose		5
Prunus virginiana Choke Cherry	UPPER	5
Crataegus douglasii Black Hawthorne		10

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

SOUTH RESTORATION PLAN

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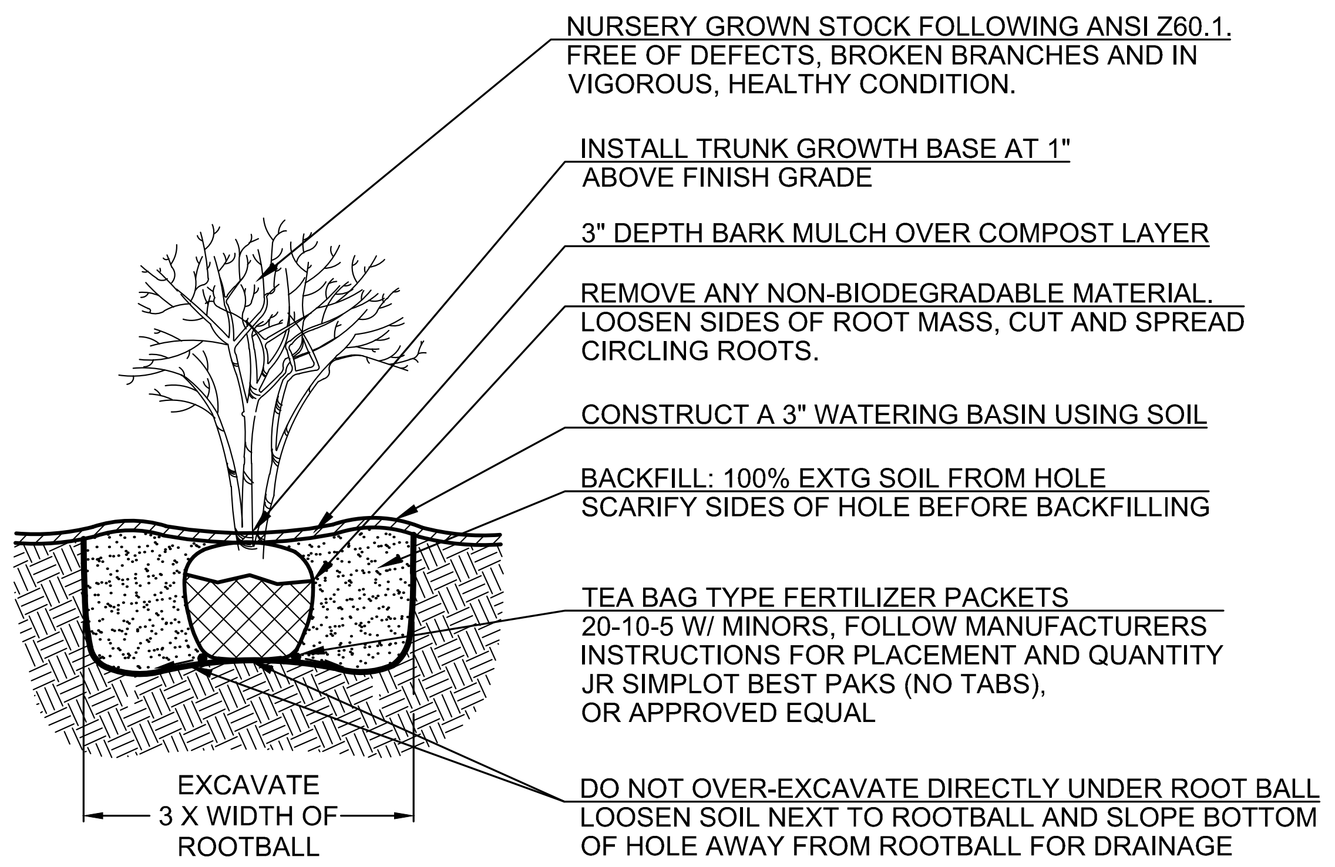
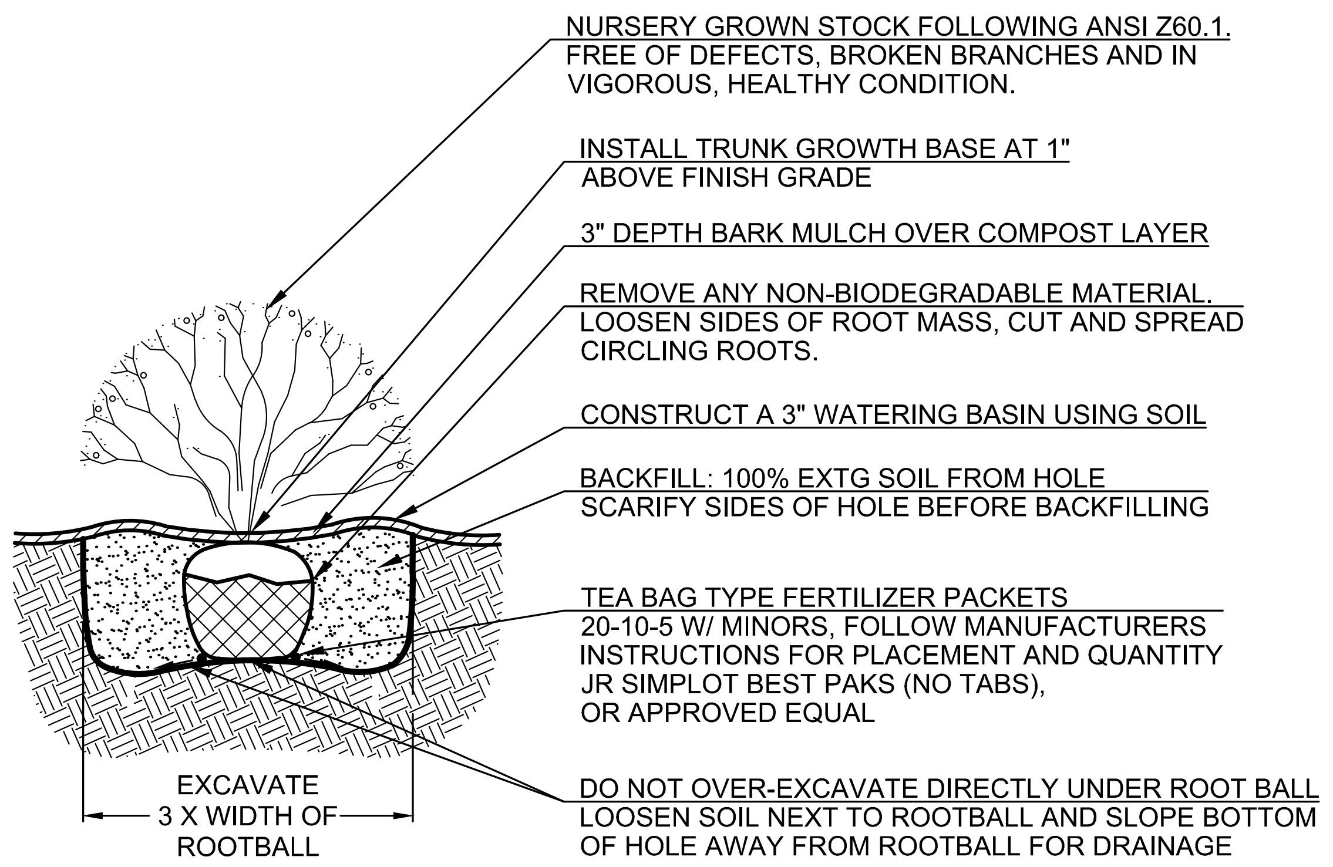


NOTE: THOROUGHLY WATER ENTIRE ROOTBALL REGARDLESS OF SEASON.

Tree Container Planting Detail

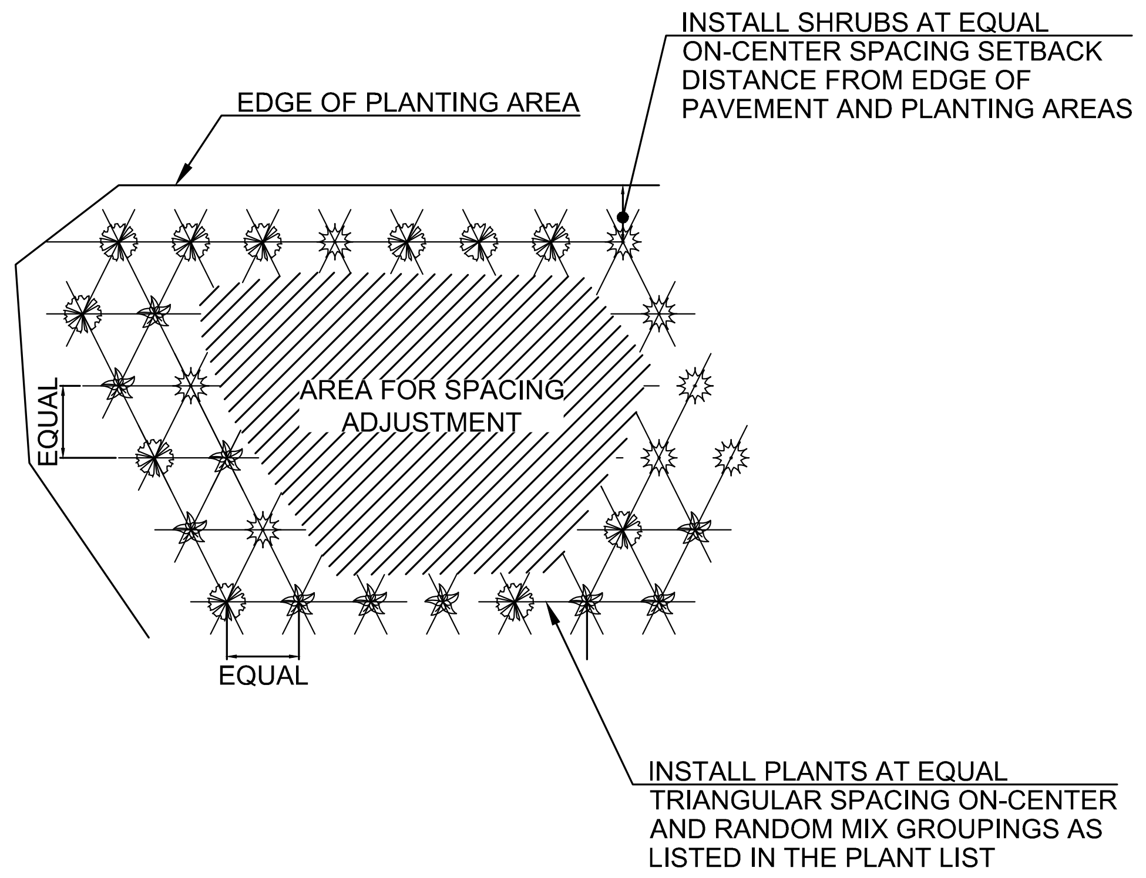
NOT TO SCALE



NOTE: THOROUGHLY WATER ENTIRE ROOTBALL REGARDLESS OF SEASON.

Shrub Container Planting Detail

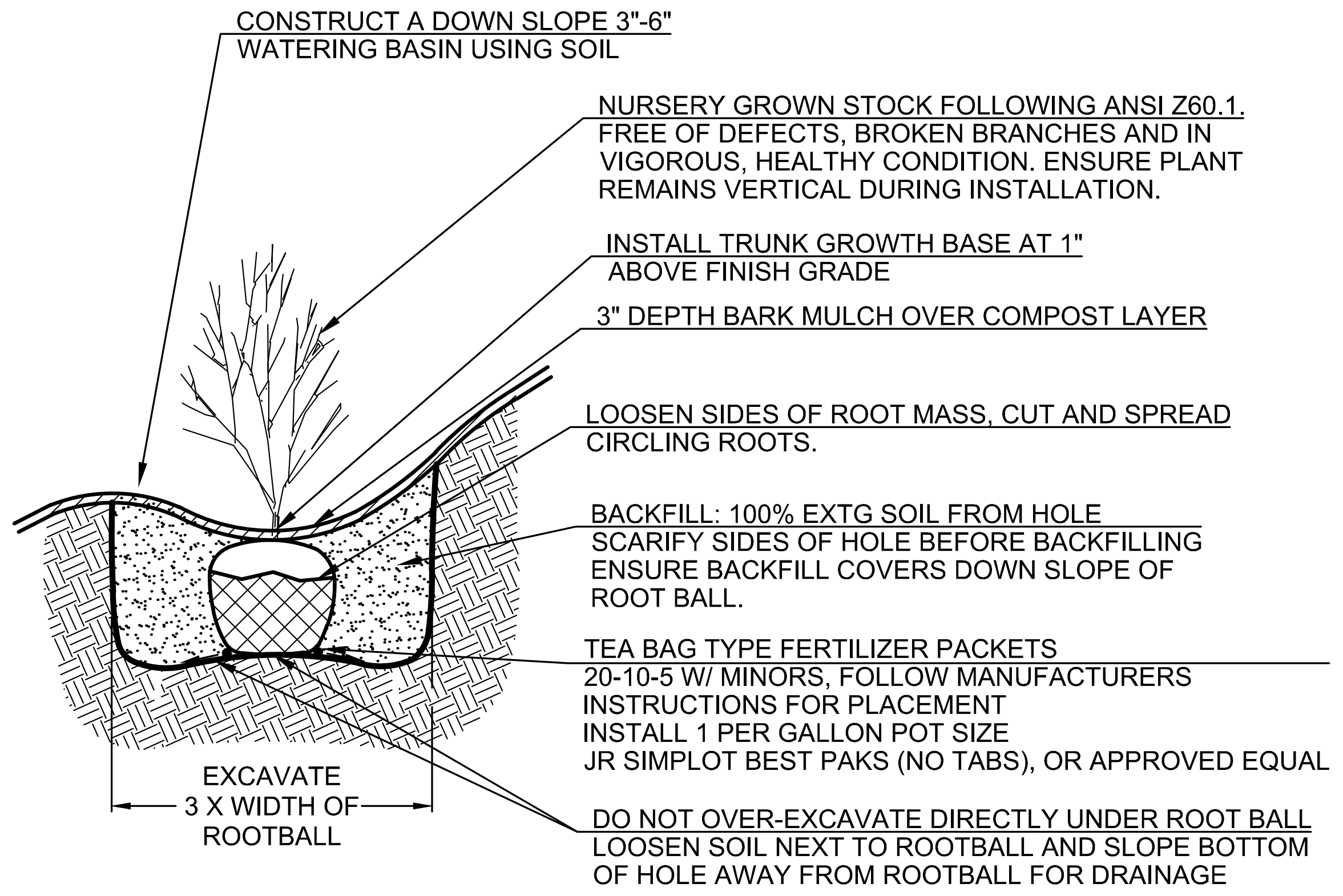
NOT TO SCALE



NOTE:
MAINTAIN THE OUTSIDE SETBACK DISTANCE THROUGHOUT ENTIRE
PLANTING AREA, USING THE CENTER AREA FOR QUANTITY ADJUSTMENT.

Native Restoration Spacing Detail

NOT TO SCALE



NOTE: THOROUGHLY WATER ENTIRE ROOTBALL REGARDLESS OF SEASON.

Planting on Slope Detail

NOT TO SCALE

GENERAL NOTES:

1. REFER TO CIVIL ENGINEER'S DRAWINGS FOR PROPOSED UTILITY INFORMATION; INCLUDING STORM DRAIN, SEWER, WATER, ELECTRICAL, GAS, TELEPHONE AND CABLE.
2. REFER TO AGENCY STANDARD PLANS AND SPECIFICATIONS WHERE APPLICABLE.
3. CONTRACTOR SHALL BE RESPONSIBLE FOR THE LOCATING OF EXISTING UNDERGROUND UTILITIES, PIPES AND STRUCTURES. CONTRACTOR SHALL TAKE SOLE RESPONSIBILITY FOR ALL DAMAGES CAUSED AS A RESULT OF THEIR WORK.
4. CONTRACTOR SHALL NOT WILLFULLY PROCEED WITH CONSTRUCTION AS DESIGNED WHEN IT IS OBVIOUS THAT OBSTRUCTIONS, AREA DISCREPANCIES AND/OR GRADE DIFFERENCE EXIST THAT MAY NOT HAVE BEEN KNOWN DURING DESIGN. SUCH CONDITIONS SHALL BE IMMEDIATELY BROUGHT TO THE ATTENTION OF THE OWNER'S AUTHORIZED REPRESENTATIVE. THE CONTRACTOR SHALL ASSUME FULL RESPONSIBILITY FOR ALL NECESSARY REVISIONS DUE TO FAILURE TO GIVE SUCH NOTIFICATIONS.

PLANTING NOTES:

1. VERIFY LOCATIONS OF ALL PERTINENT SITE IMPROVEMENTS UNDER OTHER SECTIONS. IF ANY PART OF THIS PLAN CANNOT BE FOLLOWED DUE TO SITE CONDITIONS, CONTACT THE LANDSCAPE ARCHITECT FOR INSTRUCTION PRIOR TO COMMENCING WORK.
2. PRIOR TO INSTALLATION, CONTRACTOR SHALL PREPARE ALL SEEDING AND PLANTING AREAS ACCORDING TO THESE PLANS, DETAILS, SPECIFICATIONS AND THE SPECIAL PROVISIONS.
3. ALL PLANT MATERIAL SHALL BE NURSERY GROWN STOCK AND BE ADEQUATELY CLIMATIZED TO THE REGION AND FOLLOW STANDARDS OF ANSI Z60, AMERICAN STANDARD NURSERY STOCK (ASNS), AS UPDATED AND FOLLOW STANDARD SPECIFICATIONS 9-14.7 AND THE SPECIAL PROVISIONS.
4. NO PLANT MATERIAL SHALL BE PLANTED UNTIL IT HAS BEEN INSPECTED AND APPROVED FOR PLANTING BY THE LANDSCAPE ARCHITECT.
5. PLANT MATERIAL SHALL BE STORED AND HANDLED PER SECTION 9-14.7(3).
6. PLANT MATERIAL SHALL BE INSTALLED PER SECTION 8-02.3(8)B.
7. DO NOT MAKE SUBSTITUTIONS. IF SPECIFIED PLANTING MATERIAL IS NOT OBTAINABLE, SUBMIT PROOF OF NON-AVAILABILITY FROM AT LEAST THREE (3) SOURCES TO THE OWNER'S AUTHORIZED REPRESENTATIVE OR LANDSCAPE ARCHITECT WITH AT LEAST FIVE (5) PROPOSED SUBSTITUTION FOR EQUIVALENT MATERIAL FOR FINAL APPROVAL.
8. CONTRACTOR SHALL CONTACT THE LANDSCAPE ARCHITECT FOR PLANT MATERIAL INSPECTION 3 DAYS PRIOR TO INSTALLATION.
9. CONTRACTOR SHALL REPAIR OR REPLACE ANY EXISTING LANDSCAPE AFFECTED BY CONSTRUCTION TO IT'S ORIGINAL CONDITION. CONTACT LANDSCAPE ARCHITECT IF ANY AREAS NOT ORIGINALLY LANDSCAPED, BECOME LANDSCAPE.
10. SEE PLANTING DETAILS AND SPECIAL PROVISIONS FOR ADDITIONAL REQUIREMENTS.
11. REFERENCE APPROVED MITIGATION PLAN FOR ADDITIONAL REQUIREMENTS INCLUDING USE OF ANY HERBIVORY PROTECTION MEASURES.

PLANT LIST

ITEM	NAME	SIZE	CONDITION	SPACING	POSITION ON SLOPE	QTY
TREES						
PSIPE, MITIGATION TREE MIX (MTM)	*Alnus rhombifolia* White Alder	5 gallon	Container	12' o.c. spacing	LOWER	50
	Populus trichocarpa Black Cottonwood	5 gallon	Container	12' o.c. spacing		105
	Populus tremuloides Quaking Aspen	5 gallon	Container	12' o.c. spacing	TRANSITION BETWEEN UPPER AND LOWER	55
	Pinus ponderosa Ponderosa Pine	5 gallon	Container	12' o.c. spacing	UPPER	50
SHRUBS						
PSIPE, MITIGATION SHRUB MIX (MSM)	*Cornus sericea* Red Osier Dogwood	1 gallon	Container	7' o.c. spacing	LOWER	80
	Malus fusca Pacific Crabapple	1 gallon	Container	7' o.c. spacing	LOWER	30
	Salix exigua Sandbar Willow	1 gallon	Container	7' o.c. spacing	LOWER	90
	Rosa woodsii Woods Rose	1 gallon	Container	7' o.c. spacing	LOWER	20
	Ribes cerium Wax Currant	1 gallon	Container	7' o.c. spacing	UPPER	25
	Prunus virginiana Choke Cherry	1 gallon	Container	7' o.c. spacing	UPPER	30
	Crataegus douglasii Black Hawthorne	1 gallon	Container	7' o.c. spacing	UPPER	65
	Symphoricarpus albus Common Snowberry	1 gallon	Container	7' o.c. spacing	UPPER	90
	Amelanchier alnifolia Saskatoon Serviceberry	1 gallon	Container	7' o.c. spacing	UPPER	40

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PRELIMINARY
ROBERT W. PHIPPS
NO. 1161
EXP. 02/07/2023

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

RESTORATION DETAILS & NOTES SHEET

PROJECT NUMBER
CRP20-02

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LP03

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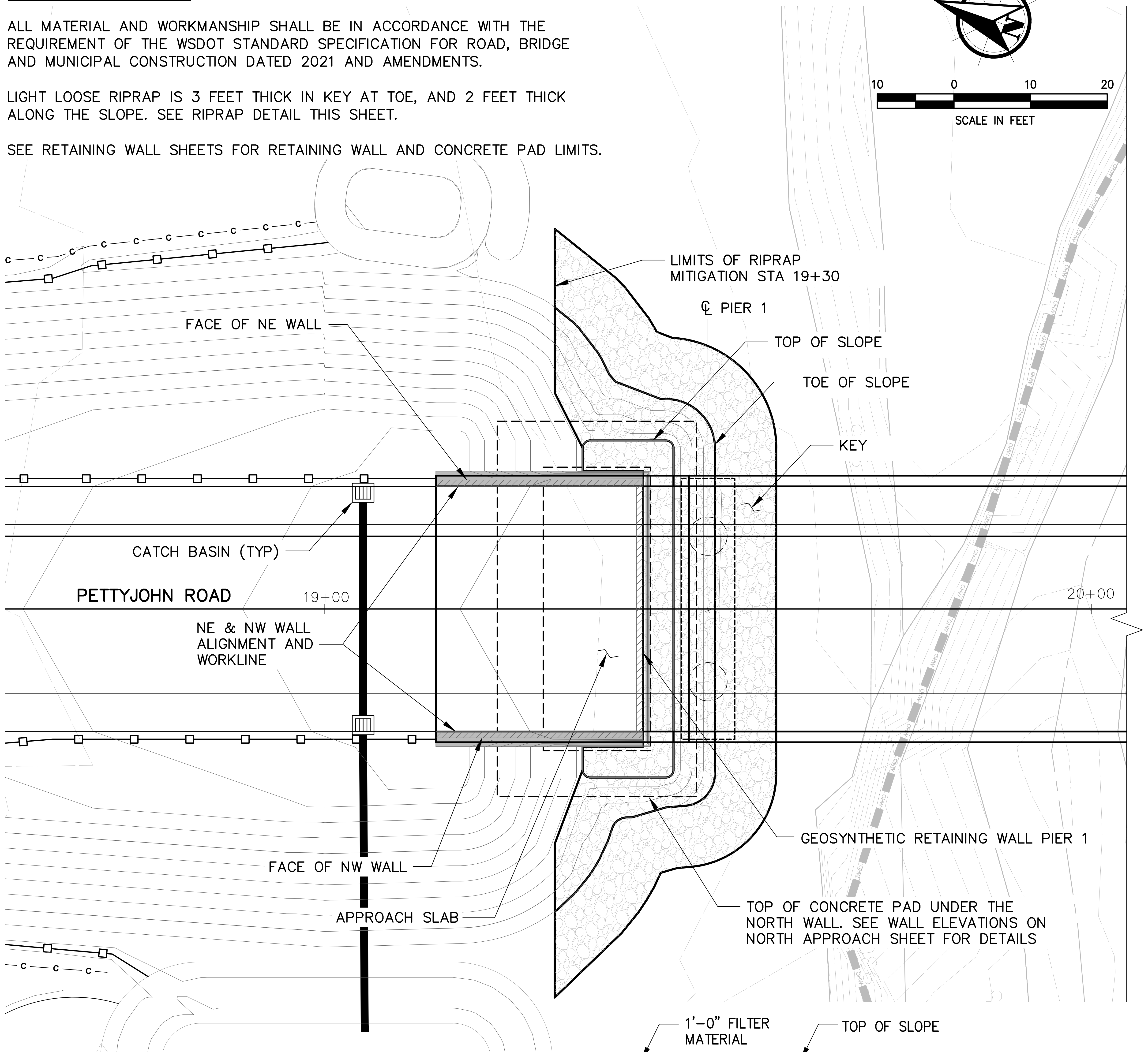
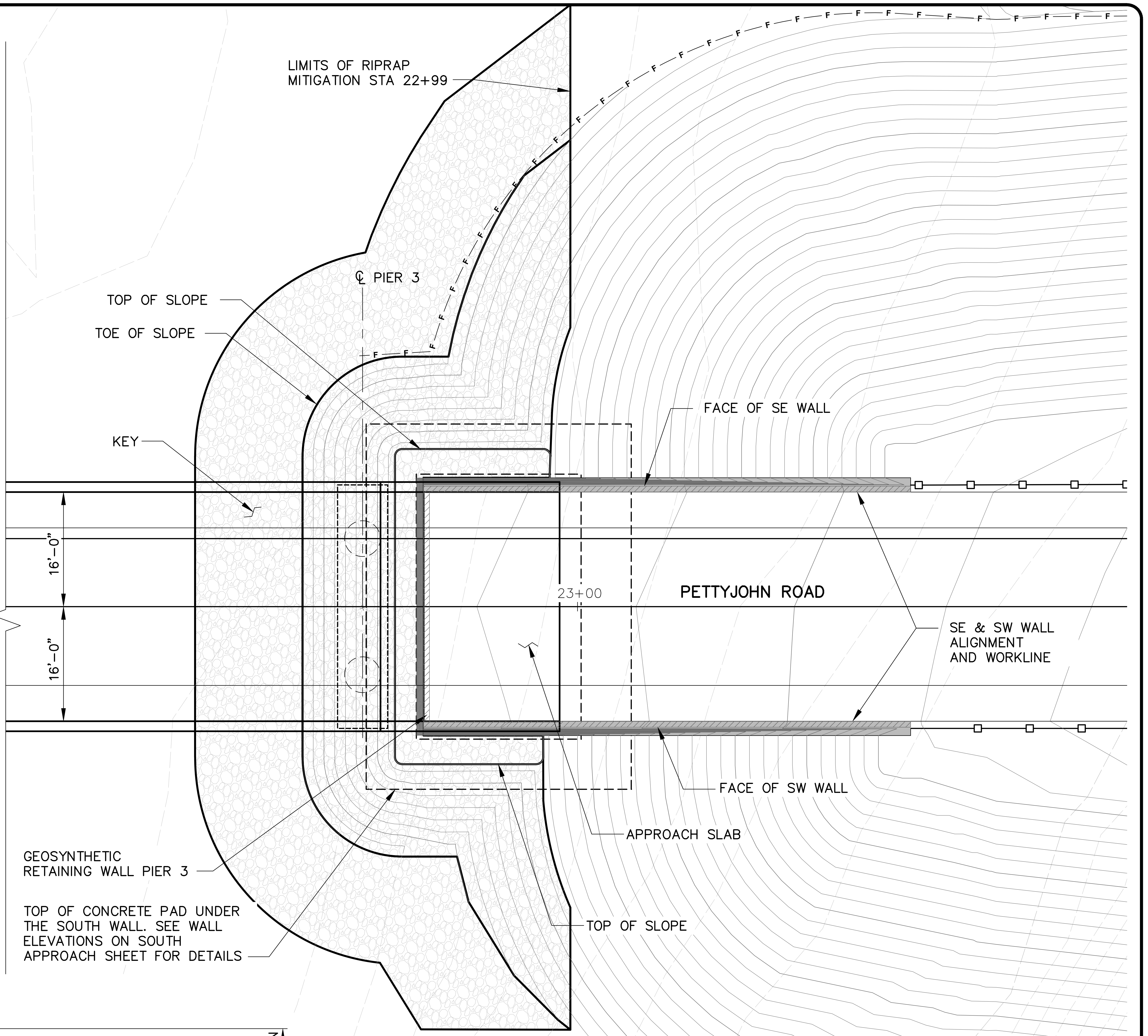
GENERAL NOTES

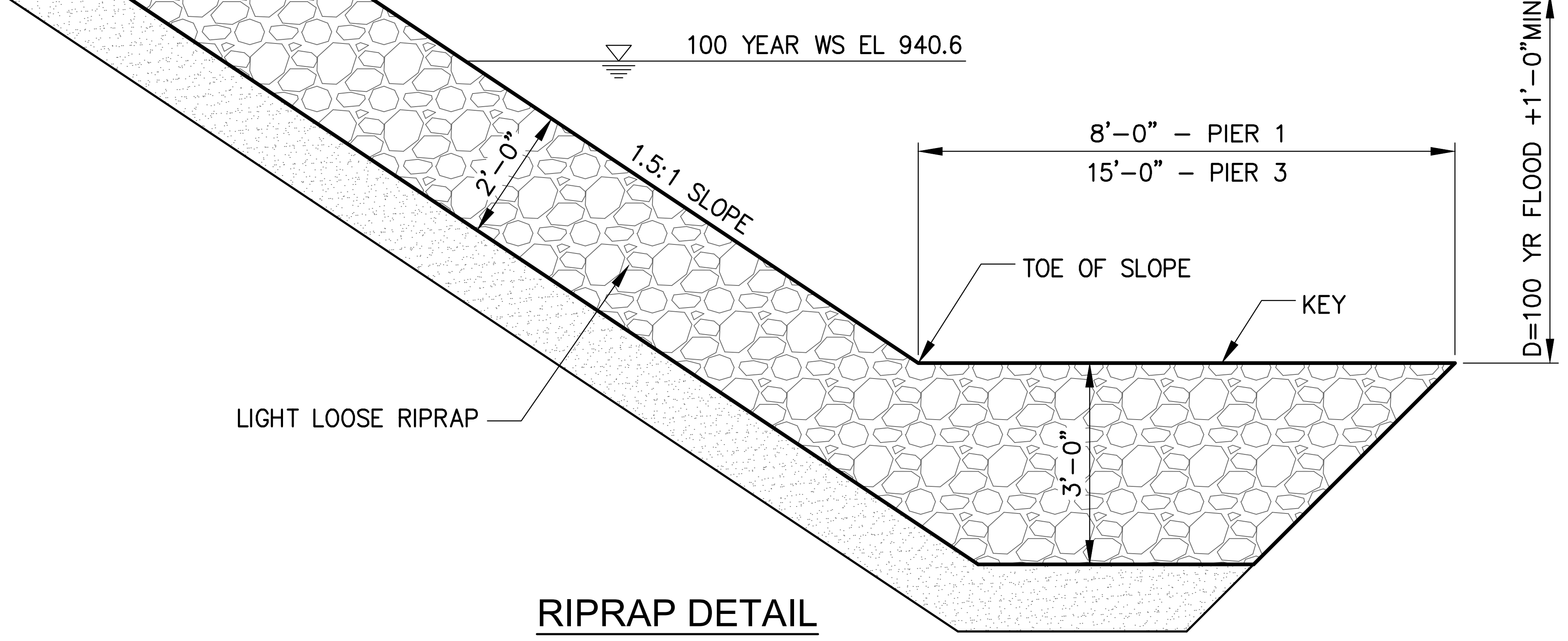
1. ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE REQUIREMENT OF THE WSDOT STANDARD SPECIFICATION FOR ROAD, BRIDGE AND MUNICIPAL CONSTRUCTION DATED 2021 AND AMENDMENTS.
2. LIGHT LOOSE RIPRAP IS 3 FEET THICK IN KEY AT TOE, AND 2 FEET THICK ALONG THE SLOPE. SEE RIPRAP DETAIL THIS SHEET.
3. SEE RETAINING WALL SHEETS FOR RETAINING WALL AND CONCRETE PAD LIMITS.



NE & NW DRAINAGE PLAN



SE & SW DRAINAGE PLAN



RIPRAP DETAIL

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

RIPRAP DETAILS

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BRIDGE PLAN

BEARINGS OF ALL PIERS ARE
NORMAL TO ℄ ROADWAY

BRIDGE ELEVATION

LOOKING UPSTREAM – GRADE ELEVATIONS SHOWN
ARE FINISH GRADES AT TOP OF DECK AND ARE
EQUAL TO PROFILE GRADE AT ℄ OF ROADWAY.

DATUM
NGVD 29

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

BRIDGE PLAN AND ELEVATION

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GENERAL NOTES

1. ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THESE PLANS, THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR ROAD, BRIDGE AND MUNICIPAL CONSTRUCTION DATED 2021, AMENDMENTS AND PROJECT SPECIAL PROVISIONS.

2. THIS STRUCTURE HAS BEEN DESIGNED IN ACCORDANCE WITH THE REQUIREMENTS OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION, DATED 2020 AND STATE OF WASHINGTON DEPARTMENT OF TRANSPORTATION BRIDGE DESIGN MANUAL LRFD, DATED 2020.

3. DESIGN LOADS:
   DEAD LOAD:
   NORMAL REINFORCED CONCRETE – 155 PCF
   STRUCTURAL STEEL – 490 PCF
   PRESTRESSED CONCRETE – 165 PCF
   LIVE LOAD:
   VEHICLE – HL93 AASHTO TRUCK (W/IMPACT)
   WIND LOAD:
   BASIC WIND SPEED – 85 MPH (3 SECOND GUST)
   THERMAL FORCES:
   NORMAL TEMPERATURE – 64° F
   TEMPERATURE RANGE – 36° F RISE, 64° F FALL
   COEFFICIENT OF THERMAL EXPANSION – 0.000006.
   FUTURE WEARING SURFACE: – 25 PSI

4. SEISMIC DESIGN OF THIS STRUCTURE CONFORMS TO THE REQUIREMENTS OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS USING THE FOLLOWING SITE DATA:
   SITE CLASS – B
   PEAK GROUND ACCELERATION COEFFICIENT – 0.105g
   DESIGN SPECTRAL ACCELERATION COEFFICIENT AT 0.2 SEC – 0.23g
   DESIGN SPECTRAL ACCELERATION COEFFICIENT AT 1.0 SEC – 0.07g
   SEISMIC DESIGN CATEGORY – A

5. THE CONCRETE IN THE SHAFT SHALL BE CLASS 5000P. THE CONCRETE IN THE ROADWAY DECK SHALL BE CLASS 4000D, THE CONCRETE IN THE APPROACH SLABS SHALL BE CLASS 4000A AND CLASS 4000W FOR THE CONCRETE SEALS. ALL OTHER CONCRETE SHALL BE CLASS 4000, UNLESS NOTED ON THE PLANS. REINFORCEMENT BAR SHALL CONFORM TO ASTM A706 GR 60 UNLESS NOTED OTHERWISE.

6. UNLESS OTHERWISE SHOWN ON THE PLANS, CLEAR CONCRETE COVER FROM THE TOP OF BRIDGE DECK TO ANY REINFORCEMENT BAR SHALL BE 2½ INCHES, 1 INCH FROM THE BOTTOM OF THE BRIDGE DECK, 6 INCHES FROM DIAMETER SHAFT WALL AND 1½ INCHES FROM ALL OTHER CONCRETE SURFACES.

7. ALL PLAN DIMENSIONS SHOWN ARE MEASURED HORIZONTALLY UNLESS OTHERWISE NOTED, AND REFLECT THE ULTIMATE GEOMETRIC SHAPE AND LOCATION OF ALL ELEMENTS AT A MEAN TEMPERATURE OF 64° F.

8. ALL EXPOSED EDGES OF CONCRETE SHALL BE CHAMFERED ¾" UNLESS OTHERWISE SHOWN OR NOTED.

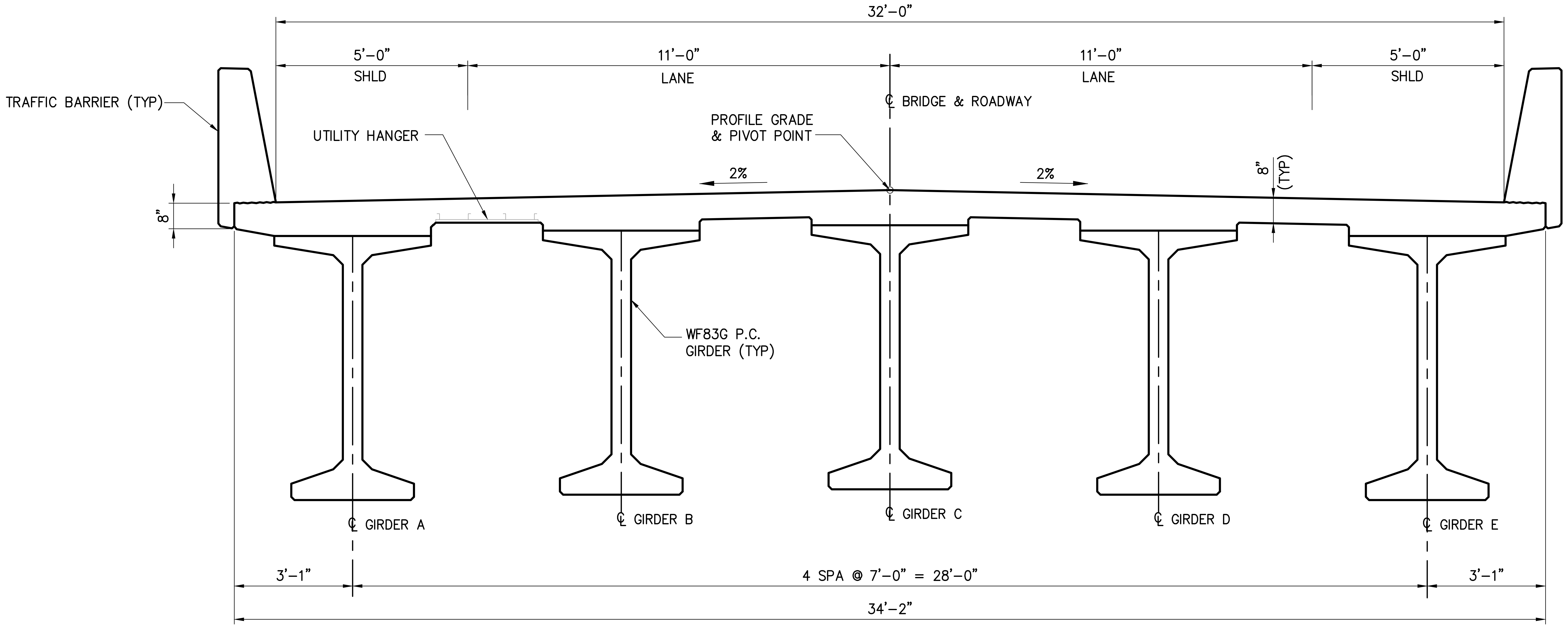
9. CONSTRUCTION JOINTS SHOWN ARE OPTIONAL UNLESS NOTED OTHERWISE.

10. FOR GEOTECHNICAL INFORMATION, SEE GEOTECHNICAL ENGINEERING REPORT PREPARED BY PBS INCLUDED IN THE BID DOCUMENTS.

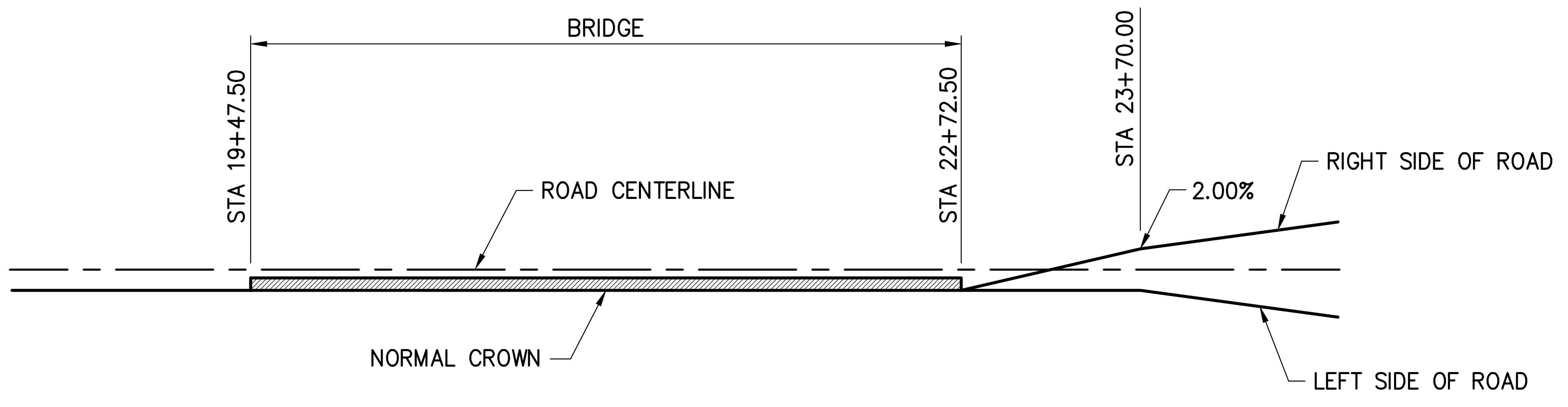
11. FOUNDATION:

THE NOMINAL SHAFT RESISTANCE SHALL BE TAKEN AS, IN KIPS:

SERVICE–I LIMIT STATE		
PIER NO.	SKIN FRICTION RESISTANCE	END BEARING RESISTANCE
1	XX	XX
2	XX	XX
3	XX	XX
STRENGTH LIMIT STATE		
PIER NO.	SKIN FRICTION RESISTANCE	END BEARING RESISTANCE
1	XX	XX
2	XX	XX
3	XX	XX
EXTREME EVENT–I LIMIT STATE		
PIER NO.	SKIN FRICTION RESISTANCE	END BEARING RESISTANCE
1	XX	XX
2	XX	XX
3	XX	XX



TYPICAL BRIDGE SECTION



SUPERELEVATION DIAGRAM

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DELL SHARPE BRIDGE REPLACEMENT PROJECT
GEN NOTES, TYP SECTION & SUPERELEVATION

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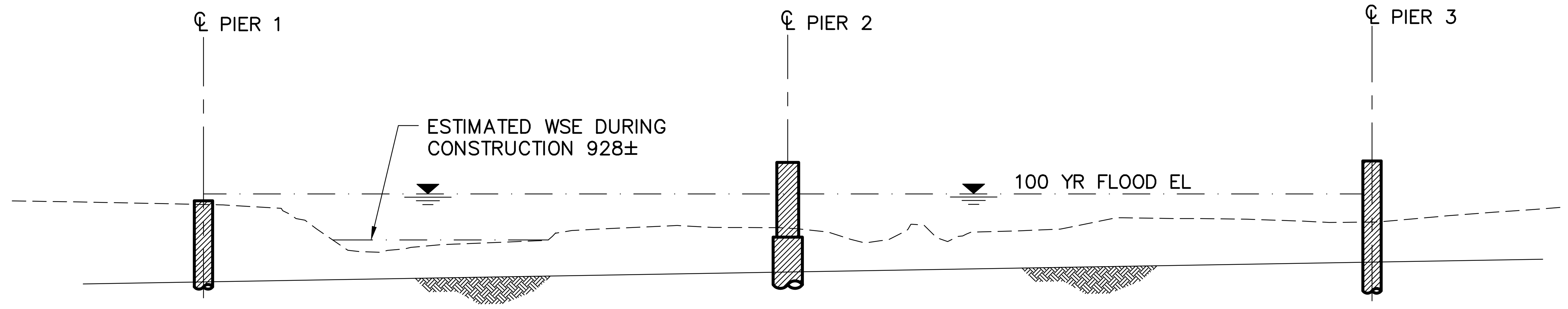
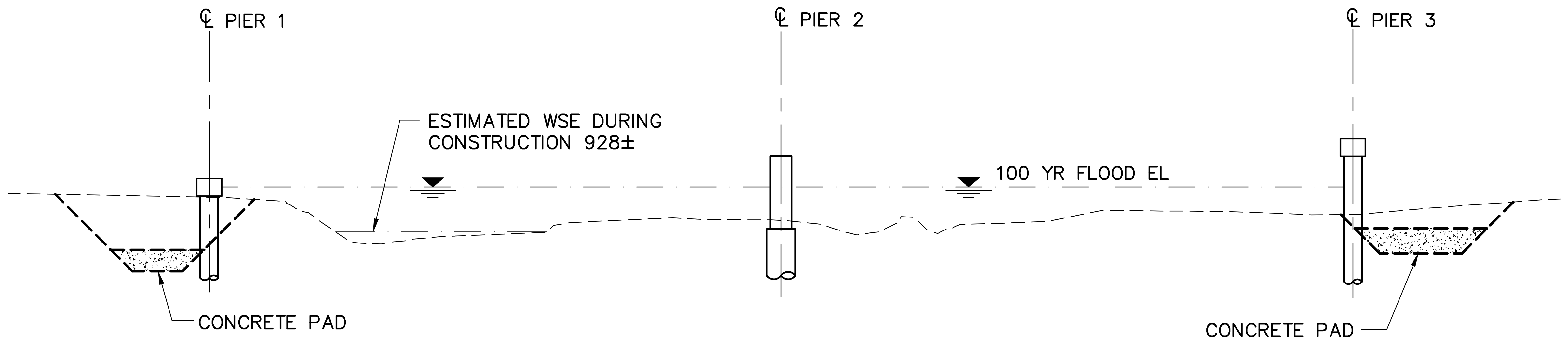
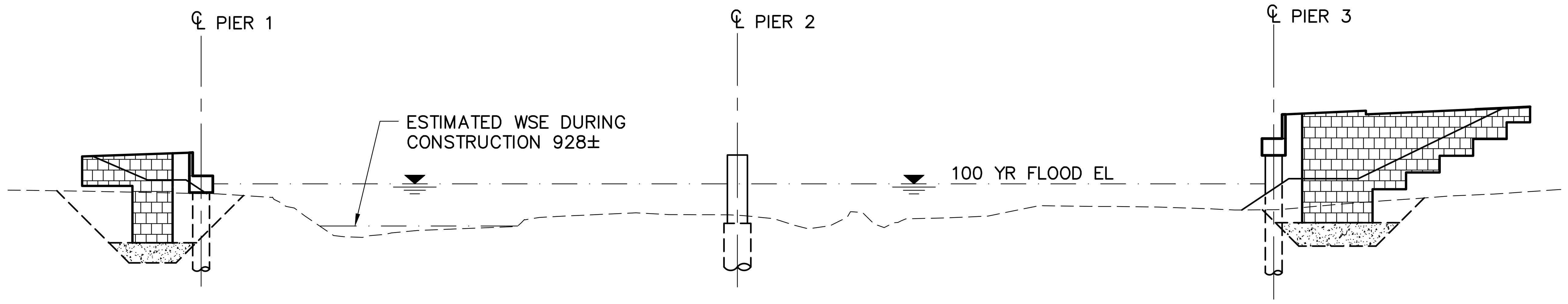


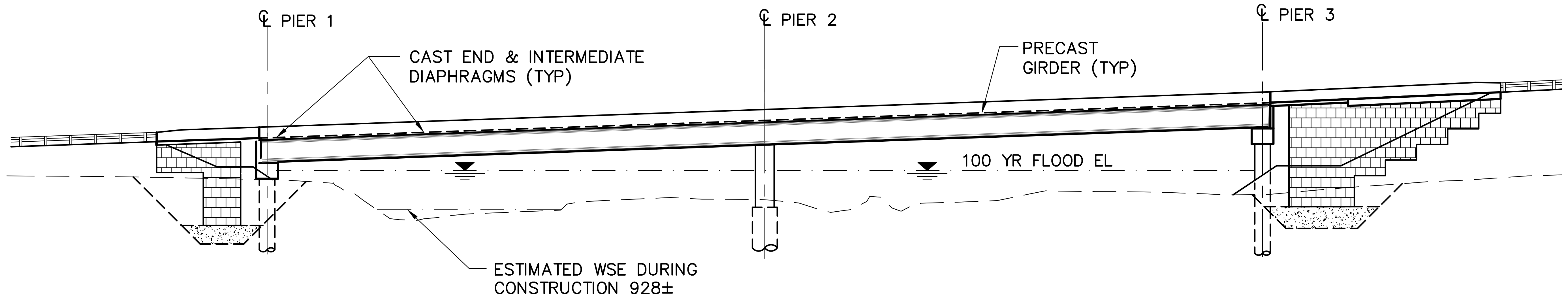
STAGE 1:
CONSTRUCT PIER SUBSTRUCTURE



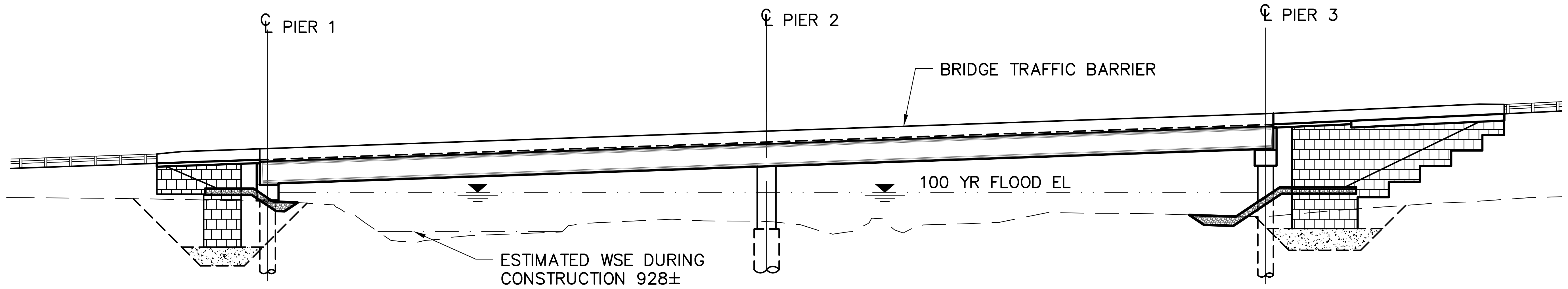
STAGE 2:
CONSTRUCT CONCRETE PADS FOR WALL BASES



STAGE 3:
CONSTRUCT PIER CAPS AND
GEOSYNTHETIC RETAINING WALLS



STAGE 4:
CONSTRUCT SUPERSTRUCTURE,
SEE SHEET S04 FOR CONSTRUCTION SEQUENCE



STAGE 5:
CONSTRUCT RIPRAP EROSION CONTROL MEASURE

STAGE 6:
REMOVE EXISTING BRIDGE

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

SUGGESTED CONSTRUCTION SEQUENCE

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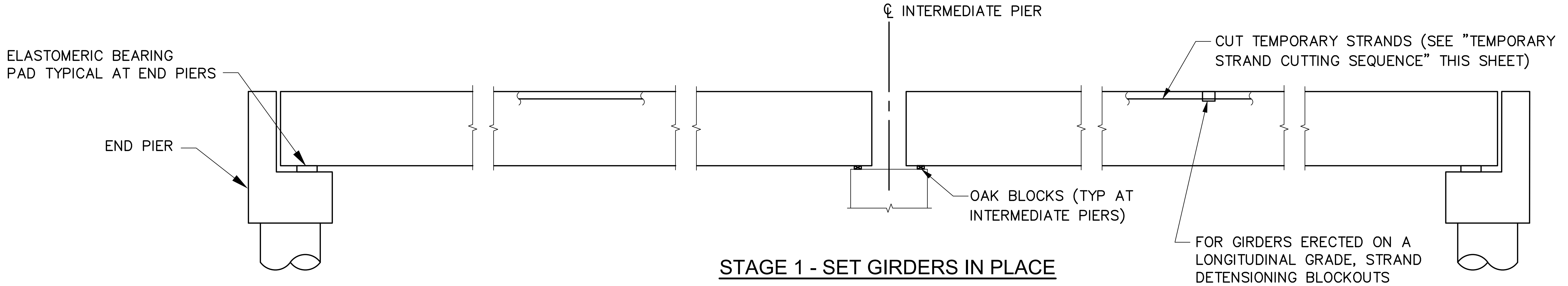
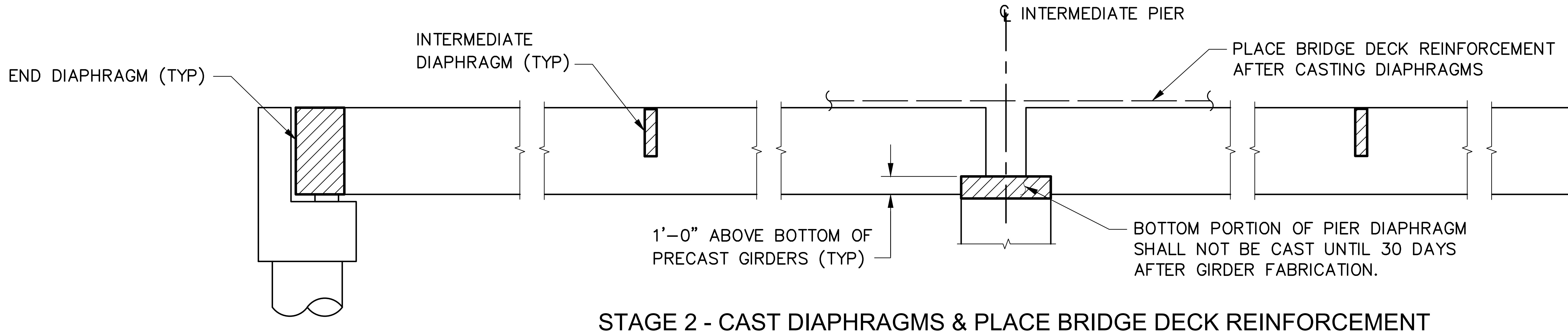


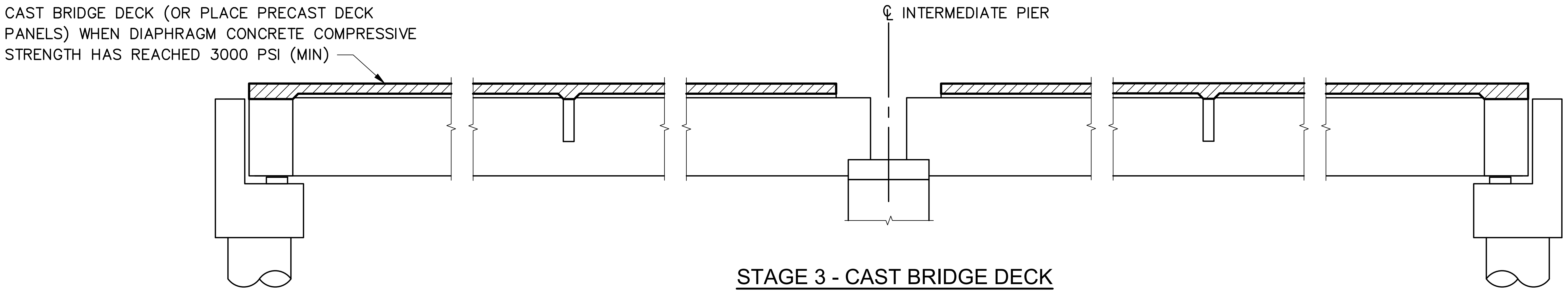
STAGE 1 - SET GIRDERS IN PLACE

INSTALL TEMPORARY BRACING FOR ERECTION IN ACCORDANCE WITH STD SPEC SECTON 6-02.3(17)F4

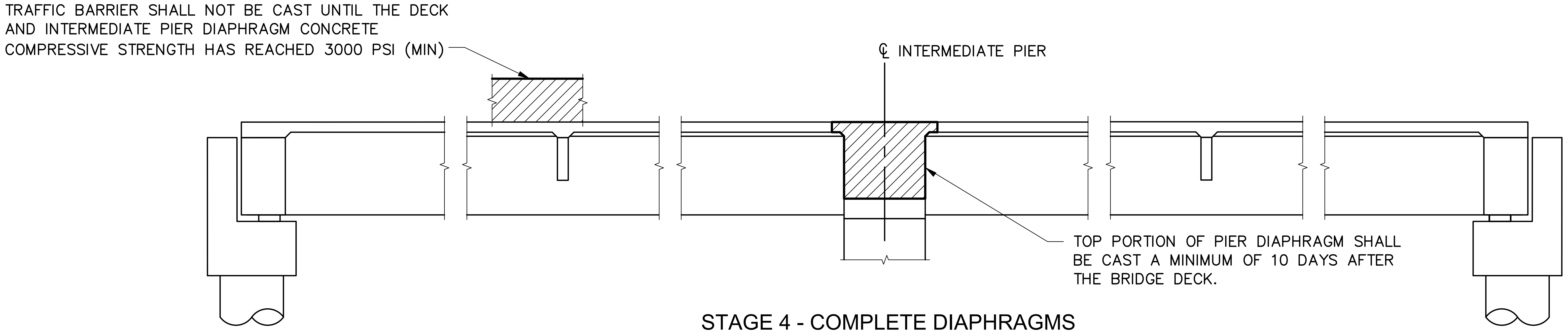


STAGE 2 - CAST DIAPHRAGMS & PLACE BRIDGE DECK REINFORCEMENT

INSTALL TEMPORARY BRACING FOR DIAPHRAGM AND DECK PLACEMENT IN ACCORDANCE WITH STD SPEC SECTON 6-02.3(17)F5



STAGE 3 - CAST BRIDGE DECK



STAGE 4 - COMPLETE DIAPHRAGMS

TEMPORARY STRAND CUTTING SEQUENCE

1. ERECT AND BRACE GIRDERS.
2. JUST PRIOR TO CUTTING THE TEMPORARY STRANDS, REMOVE EXPANDED POLYSTYRENE IN BLOCKOUTS IN TOP FLANGE OF GIRDERS. ONCE THE EXPANDED POLYSTYRENE HAS BEEN REMOVED FROM THE STRAND DETENSIONING BLOCKOUT, PREVENT MOISTURE FROM ENTERING THE BLOCKOUT UNTIL THE TEMPORARY TOP STRAND IS CUT AND THE BLOCKOUT FILLED WITH GROUT.
3. CUT STRANDS IN BLOCKOUTS. STRANDS MAY BE CUT BY USING A CUTTING TORCH AND MOVING THE FLAME BACK AND FORTH OVER THE LENGTH OF EXPOSED STRAND TO LET INDIVIDUAL WIRES BREAK ONE AT A TIME TO LESSEN THE SHOCK TO THE GIRDER. STRANDS SHALL BE RELEASED IN A SYMMETRICAL MANNER ABOUT THE GIRDER CENTERLINE STARTING WITH THOSE FURTHEST FROM THE CENTERLINE AND WORKING INWARDS.
4. WITHIN 24 HOURS OF CUTTING THE TEMPORARY STRANDS, FILL THE BLOCKOUTS WITH A GROUT CONFORMING TO STD. SPEC. 9-20.3(2). REMOVE ALL MOISTURE IN BLOCKOUTS PRIOR TO FILLING THEM WITH GROUT.

NOTE:
NO LIVE LOAD SHALL BE ALLOWED ON THE SPANS UNTIL THE COMPRESSIVE STRENGTH OF THE TOP PORTION OF THE PIER DIAPHRAGM HAS REACHED 3000 PSI (MIN.).

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

SUPERSTRUCTURE CONSTR. SEQUENCE

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FOUNDATION PLAN

BEARING OF ALL PIERS IS N 67°26'07" E

NOTES

1. ◈ INDICATES THE LOCATION AND DESIGNATION OF BOREHOLES. SEE GEOTECHINCAL REPORT FOR BOREHOLE EXPLORATION LOGS AND OTHER INFORMATION.
2. SEE SHAFT DETAILS SHEET S06 FOR LENGTHS AND TIP ELEVATIONS.
3. SEE SHEET S02 FOR THE NOMINAL SHAFT RESISTANCE.
4. * DIMENSION MEASURED AT TOP OF THE WALL.

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

FOUNDATION PLAN

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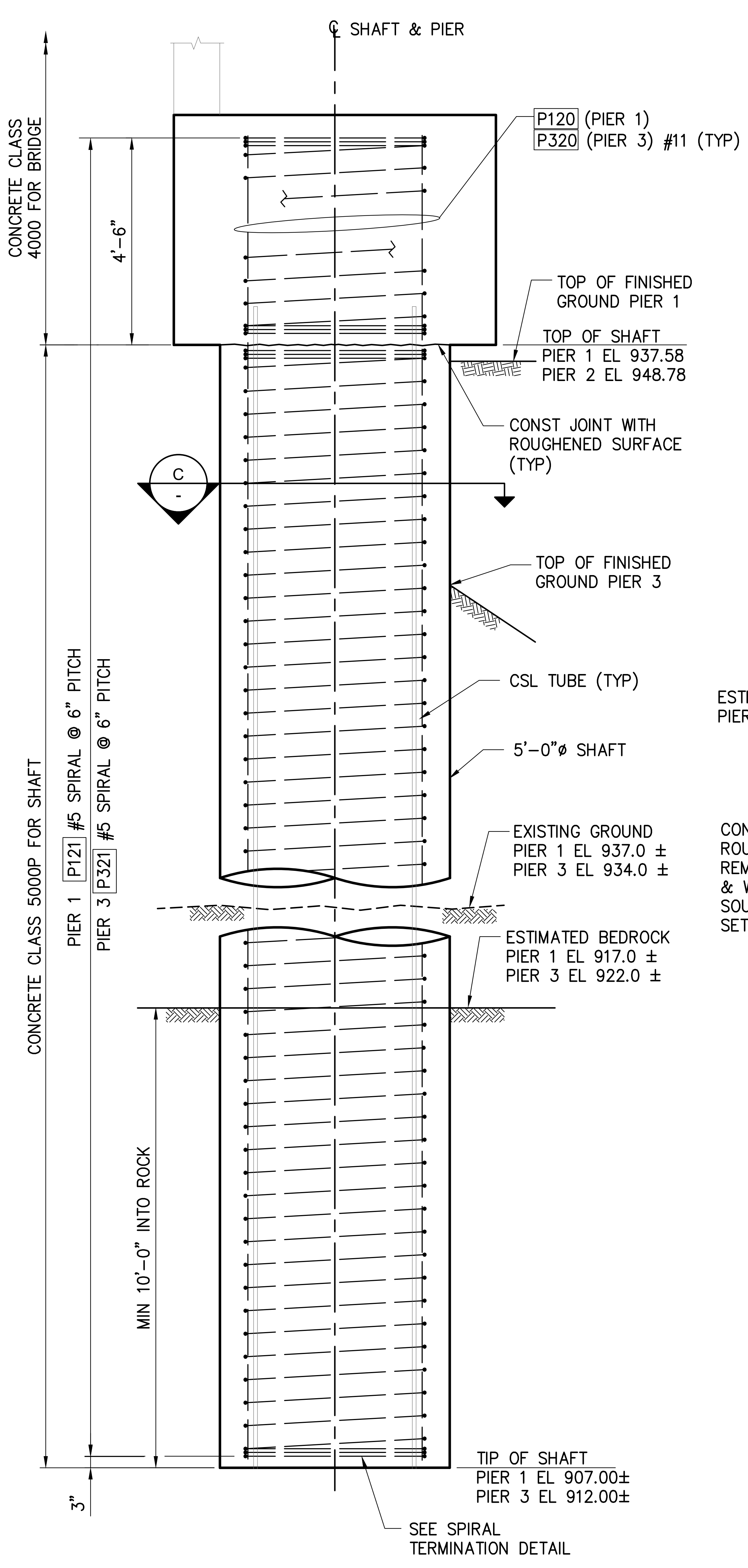
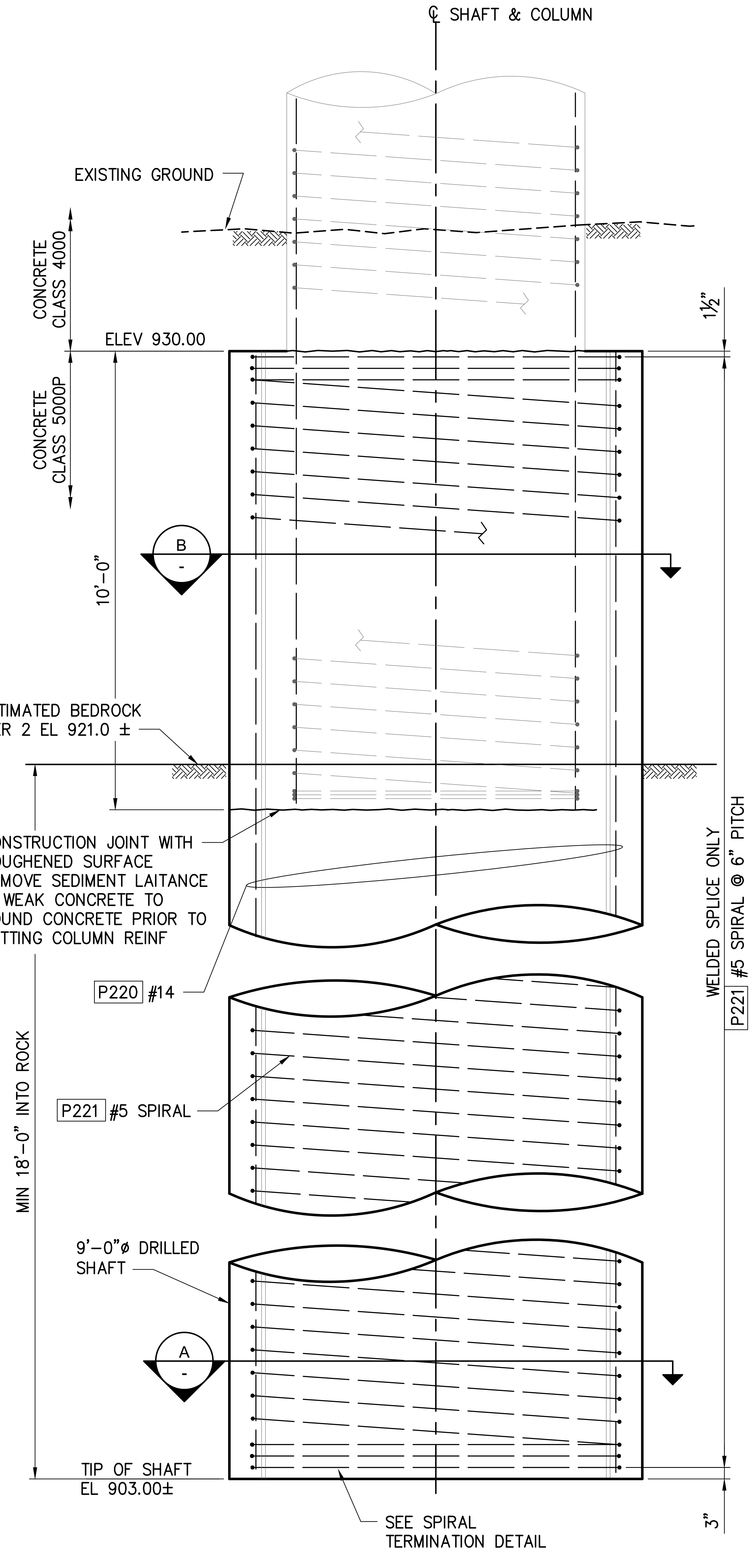


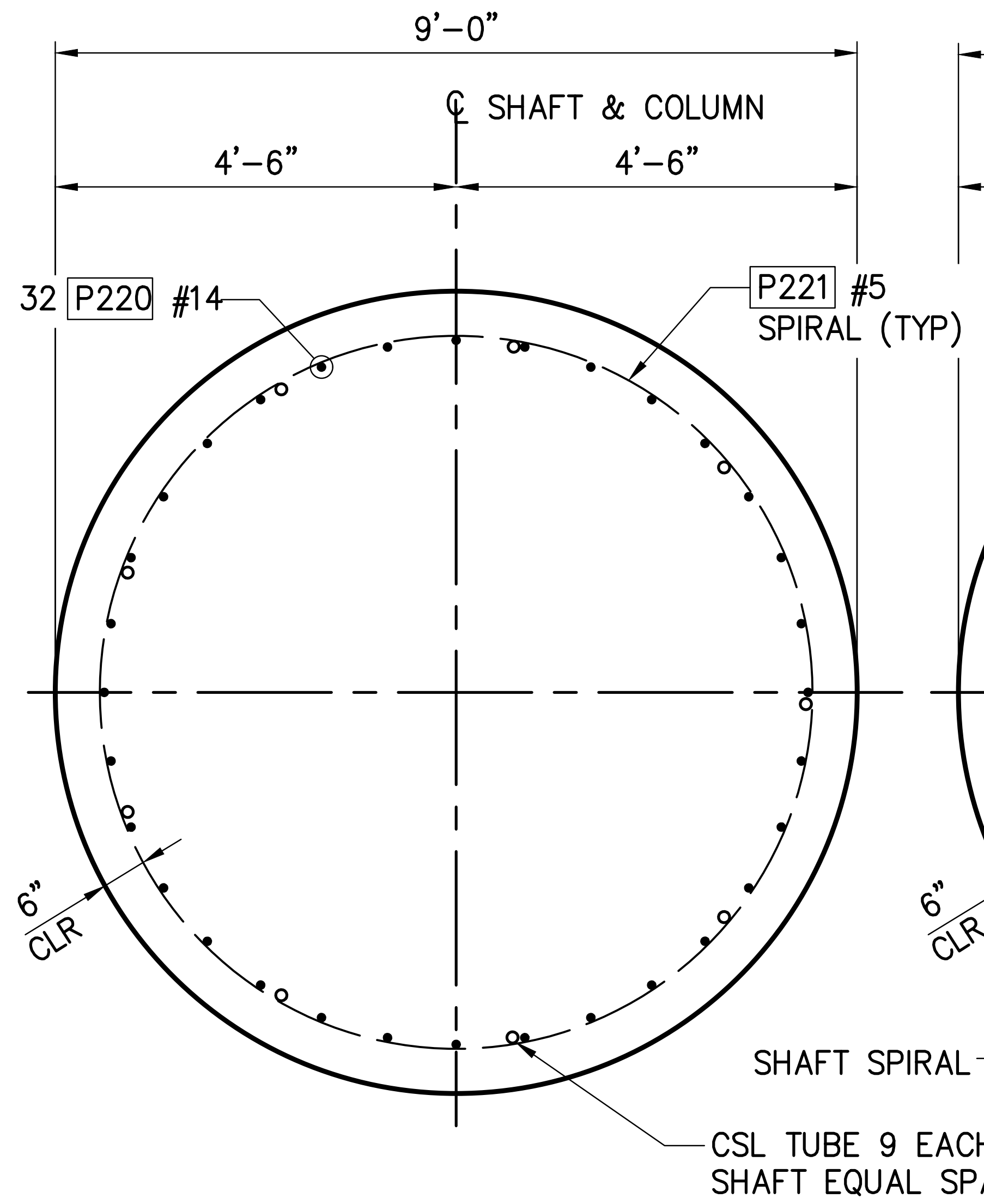
ELEVATION - PIER 1 AND 3

NOTE: PIER CAP REINF NOT SHOWN FOR CLARITY

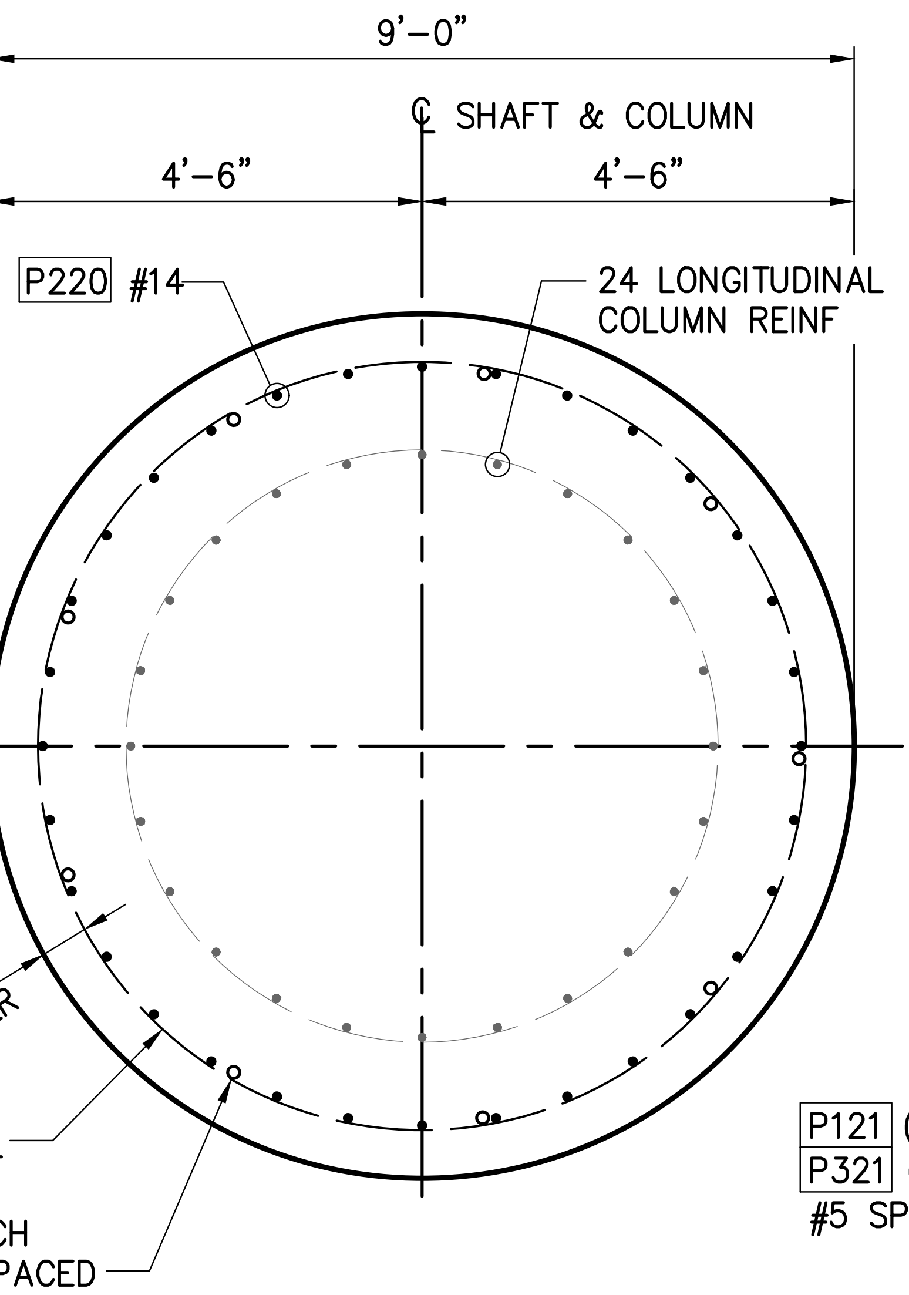


ELEVATION - PIER 2

NOTE: PIER CAP REINF NOT SHOWN FOR CLARITY



SECTION A



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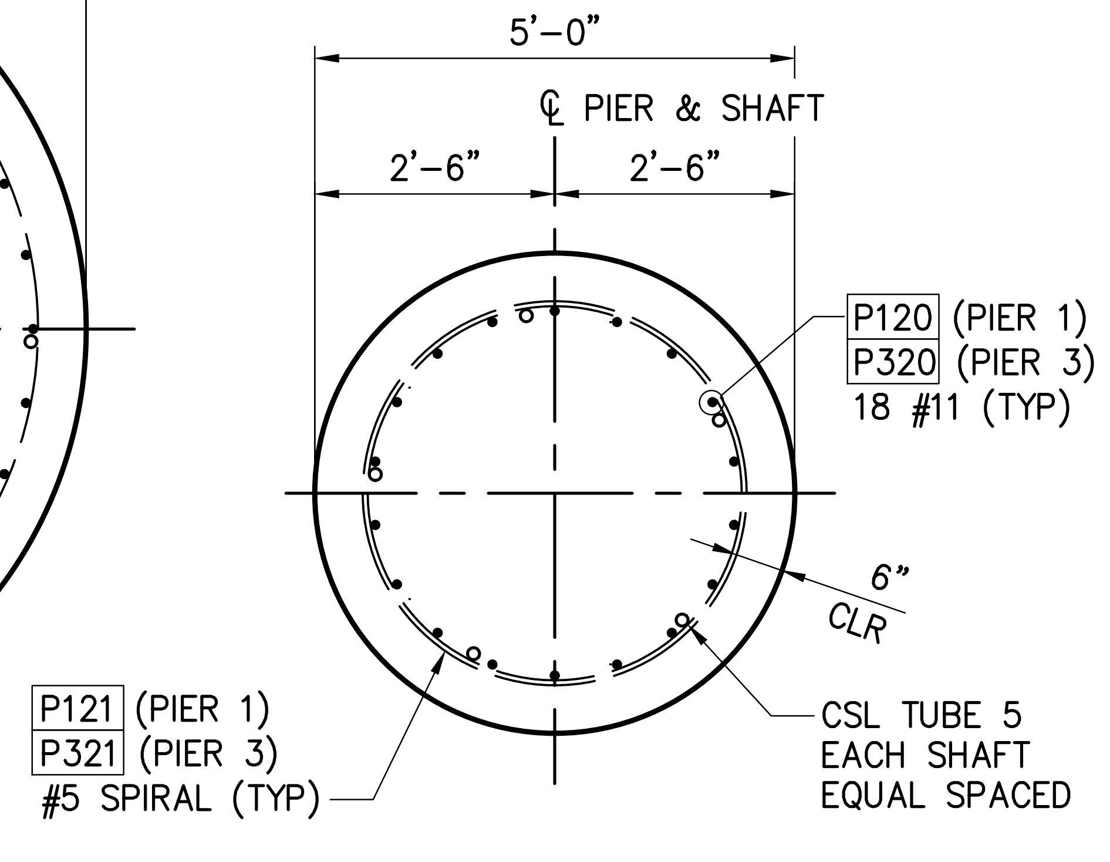

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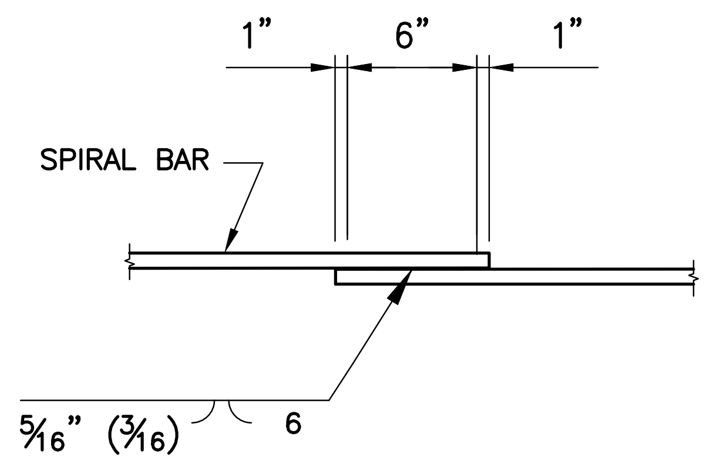
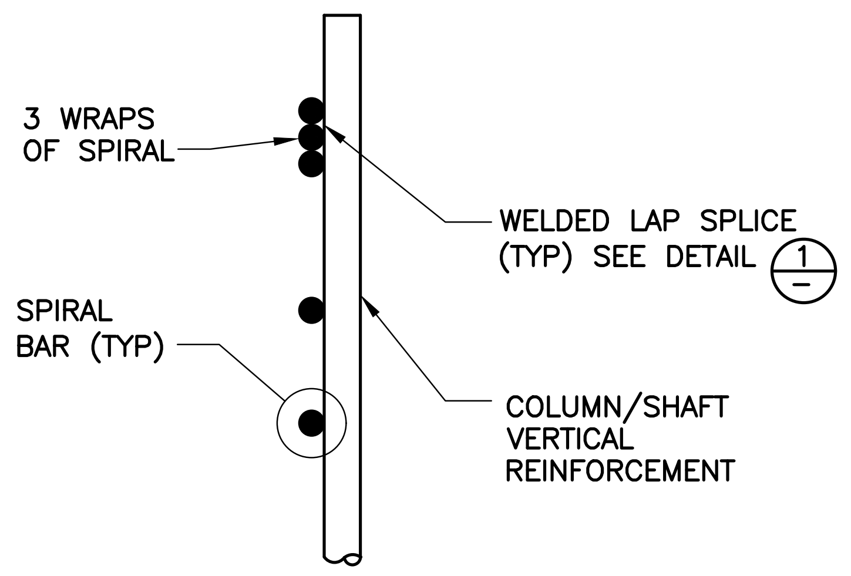
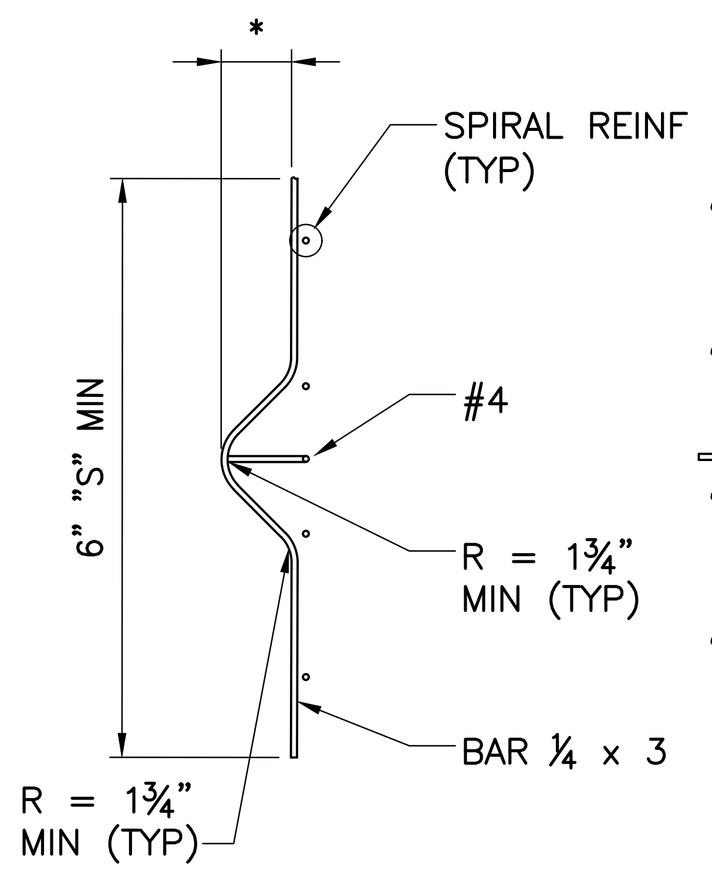


WELDED LAP SPLICE DETAIL 1

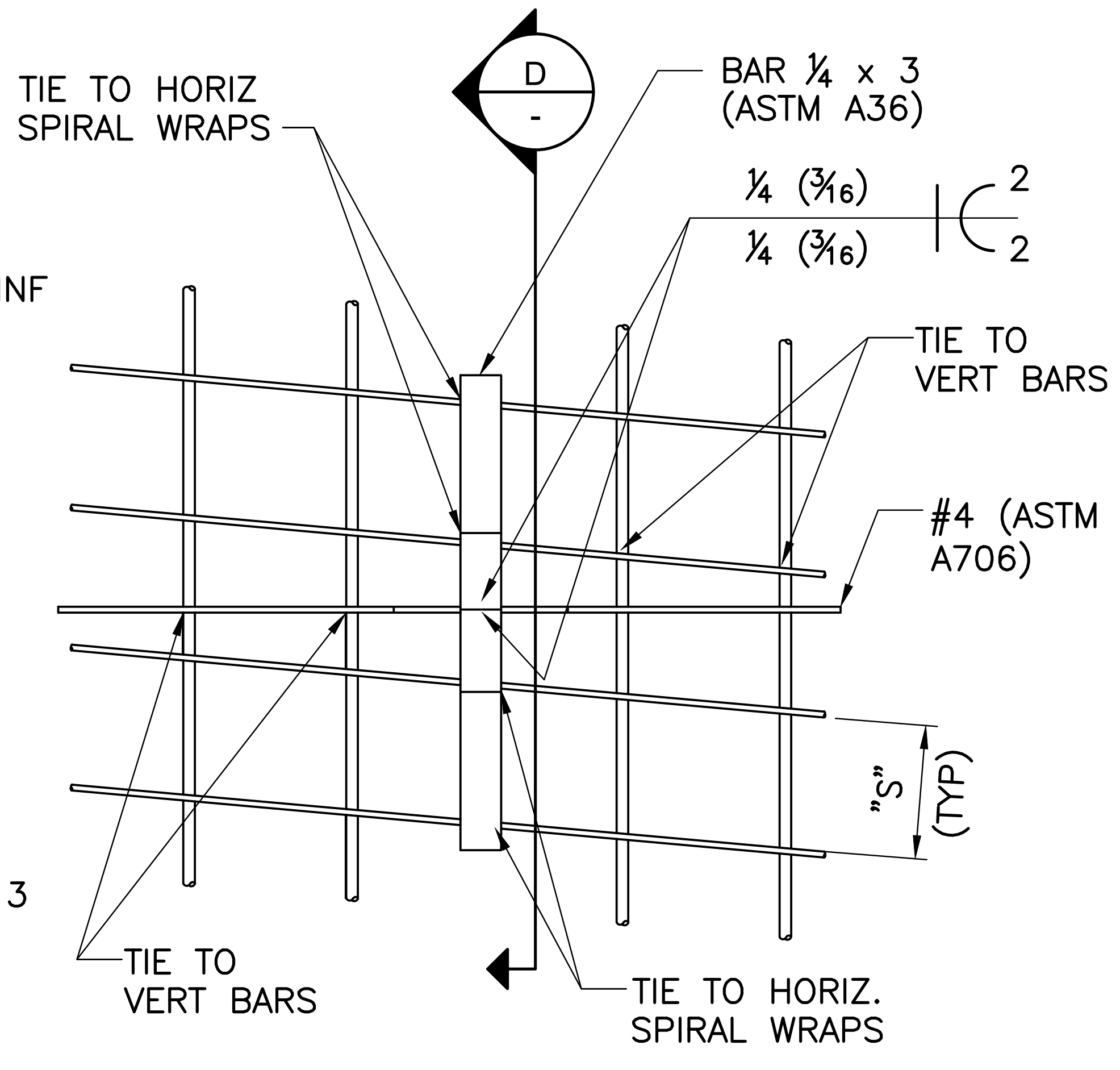


SPIRAL TERMINATION DETAIL

* MINIMUM CONCRETE COVER MINUS ½"



SECTION D



CENTRALIZER DETAIL

NOTES:

1. ONLY WELDED SPLICES SHALL BE USED FOR SPIRAL REINFORCEMENT.
2. DO NOT WELD WITH SPIRAL IN CONTACT WITH VERTICAL REINFORCING. ISOLATE VERTICAL REINFORCING FROM HE HEAT AND SPLATTER.
3. DRILLED SHAFTS WILL REQUIRE DRILLING THROUGH SOIL AND HIGHLY FRACTURED AND MASSIVE ROCK. DRILLING EQUIPMENT AND TECHNIQUES NEED TO BE CAPABLE OF EXCAVATING AND REMOVING VARIABLY FRACTURED ROCK BOTH ABOVE AND BELOW THE GROUNDWATER. TEMPORARY CASING IN NOT ANTICIPATED IN THE ROCK. HOWEVER, LOCAL CAVING MAY OCCUR, ESPECIALLY IF PENETRATING BELOW THE GROUNDWATER TABLE. THIS MAY REQUIRE TEMPORARY CASING ABOVE THE ROCK OR DRILLING SLURRY AT THE CONTRACTOR'S OPTION.

CENTRALIZER NOTES

1. CENTRALIZERS SHALL BE EPOXY COATED R PAINTED WITH INORGANIC ZINC AFTER FABRICATION.
2. EACH LEG SHALL BE TIED TO TWO VERTICAL BARS AND TWO SPIRAL WRAPS OR TWO HOOPS.
3. SEE STD. SPEC. 6-19.3(5)B FOR SPACING REQUIREMENTS.

P:\2020\2020025 – Walla Walla Dell Sharpe Bridge Replacement\000 CAD\010 Drawing\C-Structural Sheet\S06-28.dwg\TAB:S06 modified by djensen on Jan 14, 2022 – 16:52

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

SHAFT DETAILS

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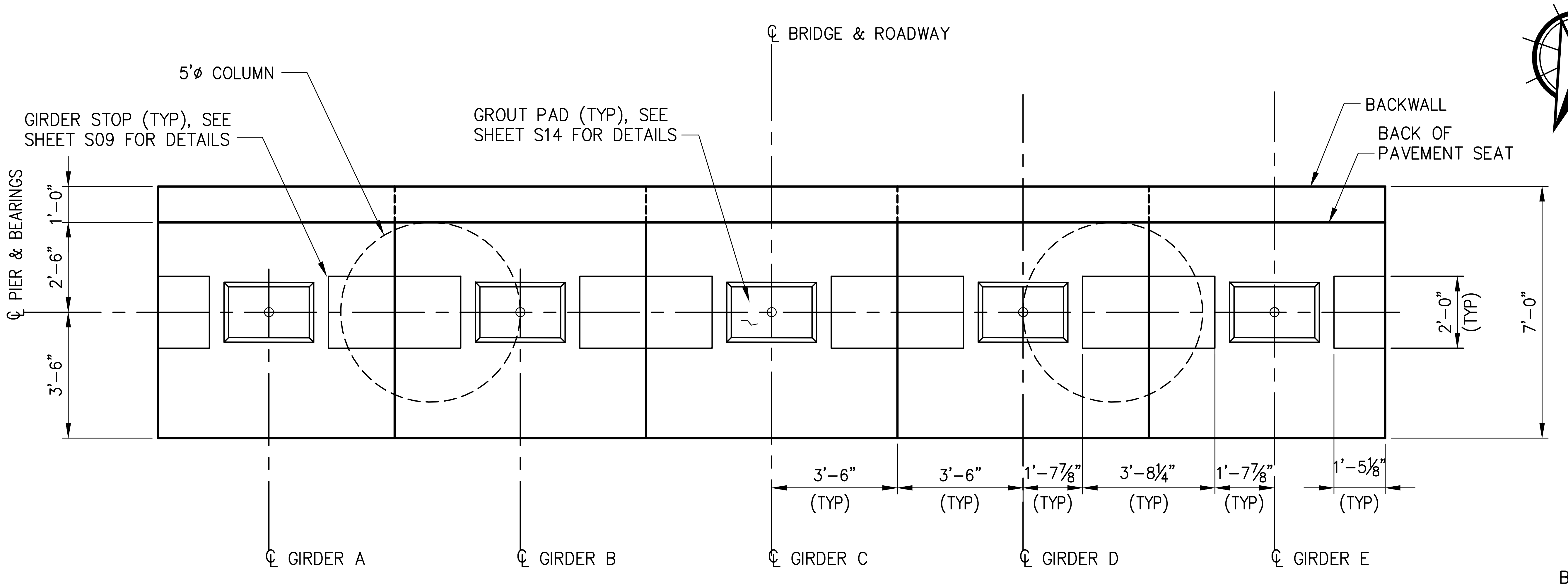


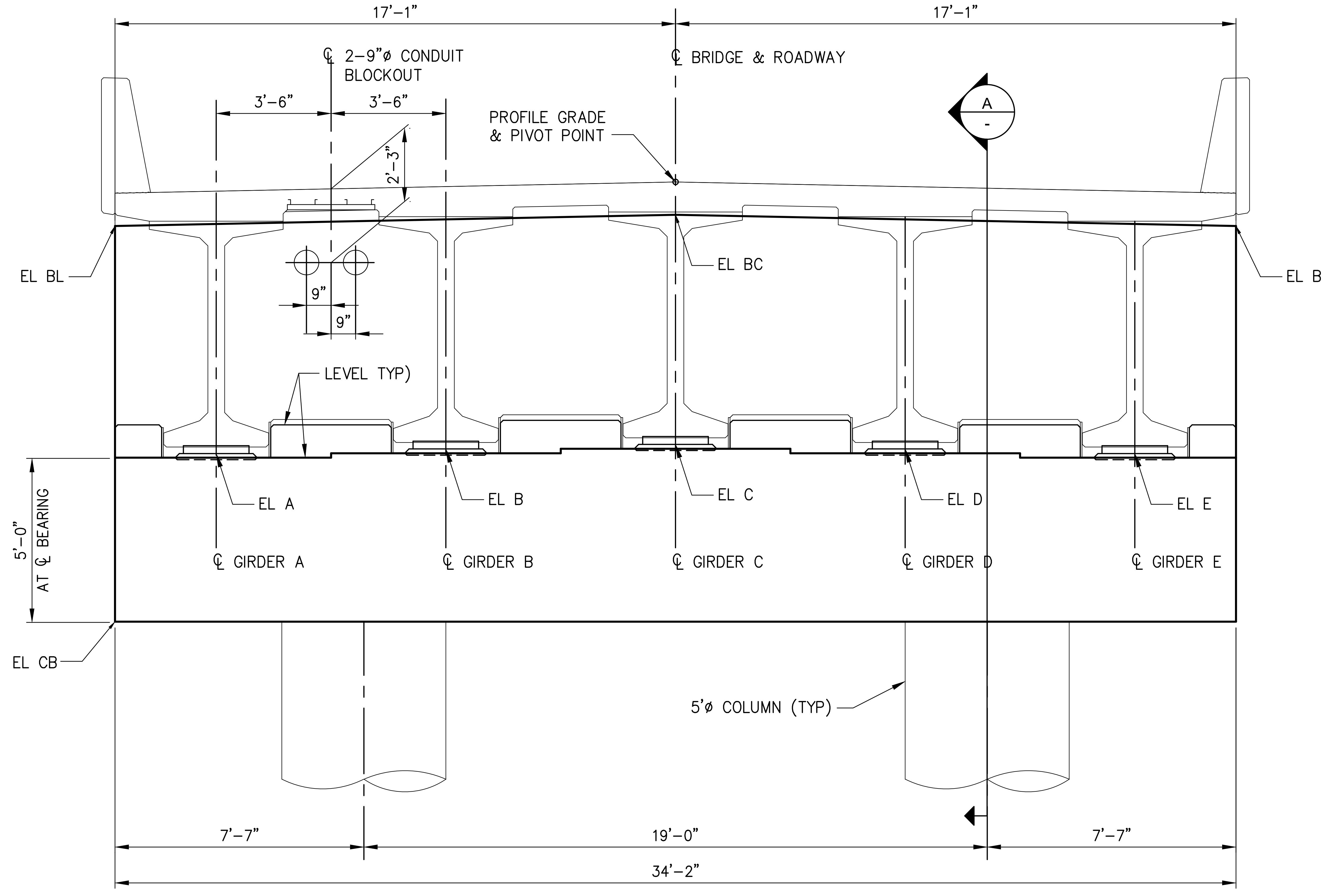
PLAN

PIER 3 SHOWN, PIER 1 SIMILAR

CONTROL ELEVATIONS TABLE

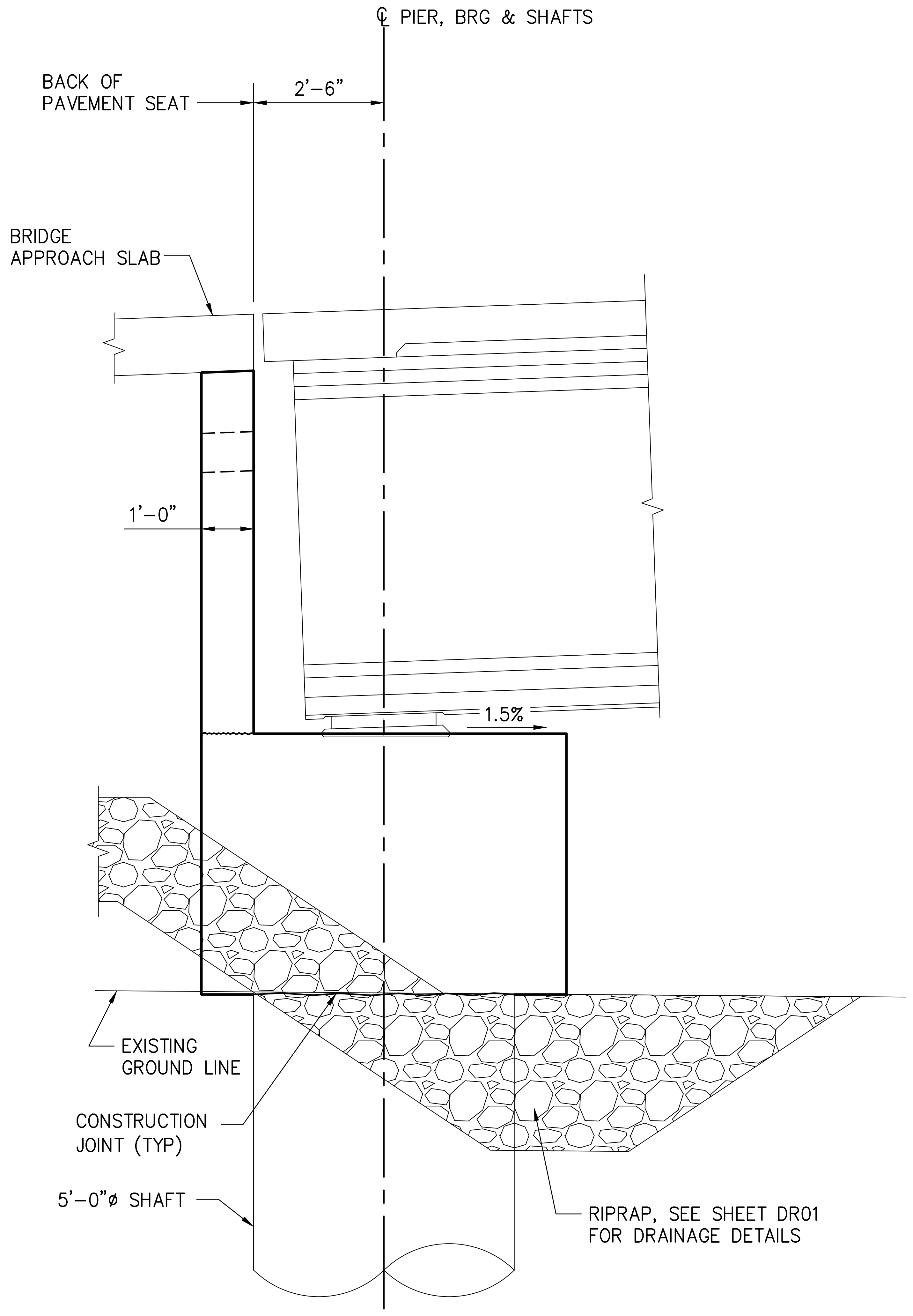
LOCATION	DESCRIPTION	PIER 1	PIER 3
BC	TOP OF BACKWALL, CL BRIDGE & ROADWAY AT BACK OF PAVEMENT SEAT	950.03	961.22
BL	TOP OF BACKWALL, LEFT* END AT BACK OF PAVEMENT SEAT	949.61	960.97
BR	TOP OF BACKWALL, RIGHT* END AT BACK OF PAVEMENT SEAT	949.61	960.97
A	CL GIRDER A AT TOP OF GROUT PAD	942.75	953.94
B	CL GIRDER B AT TOP OF GROUT PAD	942.89	954.08
C	CL GIRDER C AT TOP OF GROUT PAD	943.03	954.22
D	CL GIRDER D AT TOP OF GROUT PAD	942.89	954.08
E	CL GIRDER E AT TOP OF GROUT PAD	942.75	953.94
CB	BOTTOM OF CAP	937.63	948.81

* – LOOKING AHEAD ON STATIONING



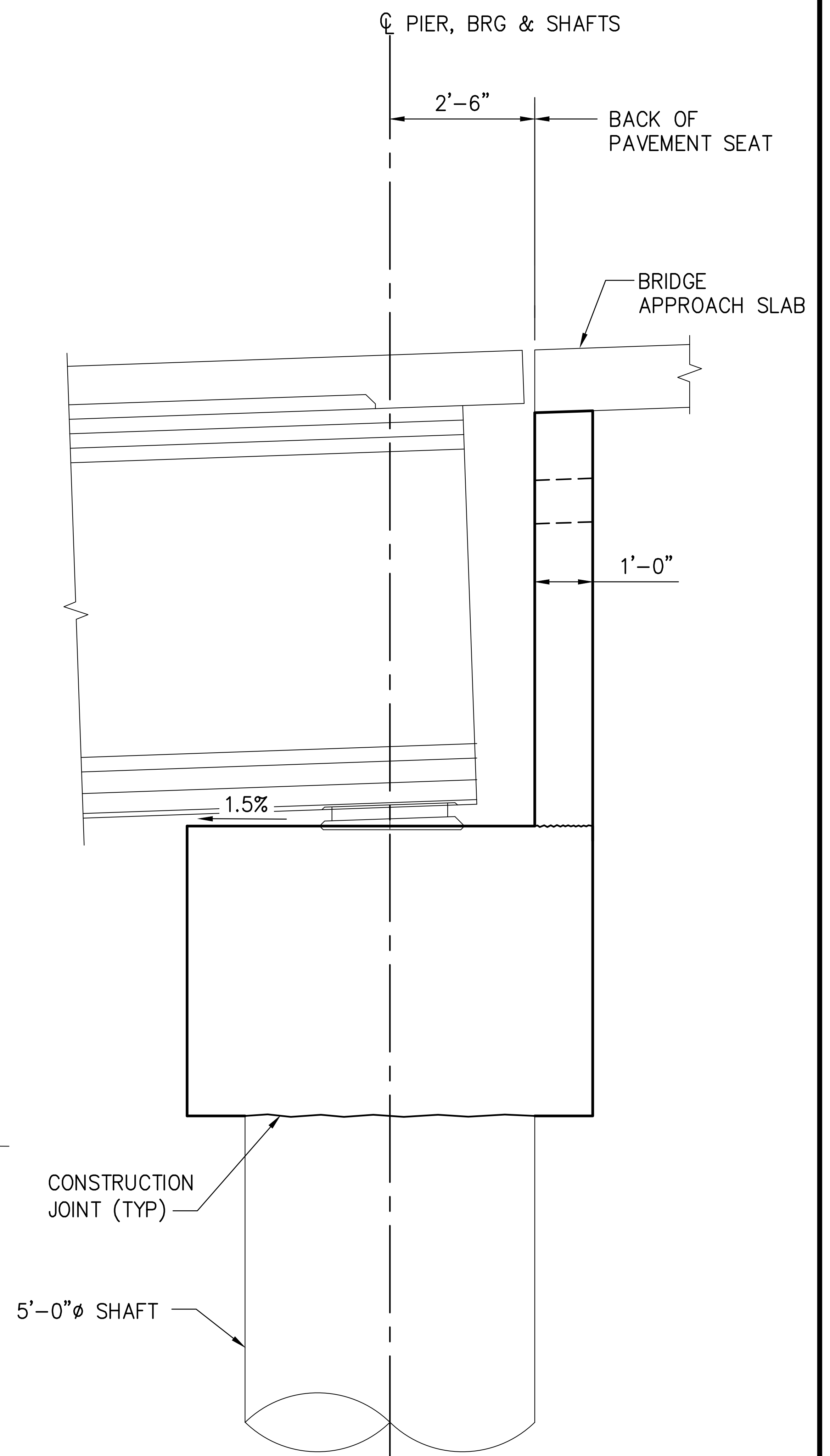
ELEVATION

PIER 3 SHOWN, PIER 1 SIMILAR
LOOKING AHEAD ON STATIONING



SECTION A –

PIER 1



SECTION A –

PIER 3

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

PIER 1 & PIER 3 PLAN & ELEVATION

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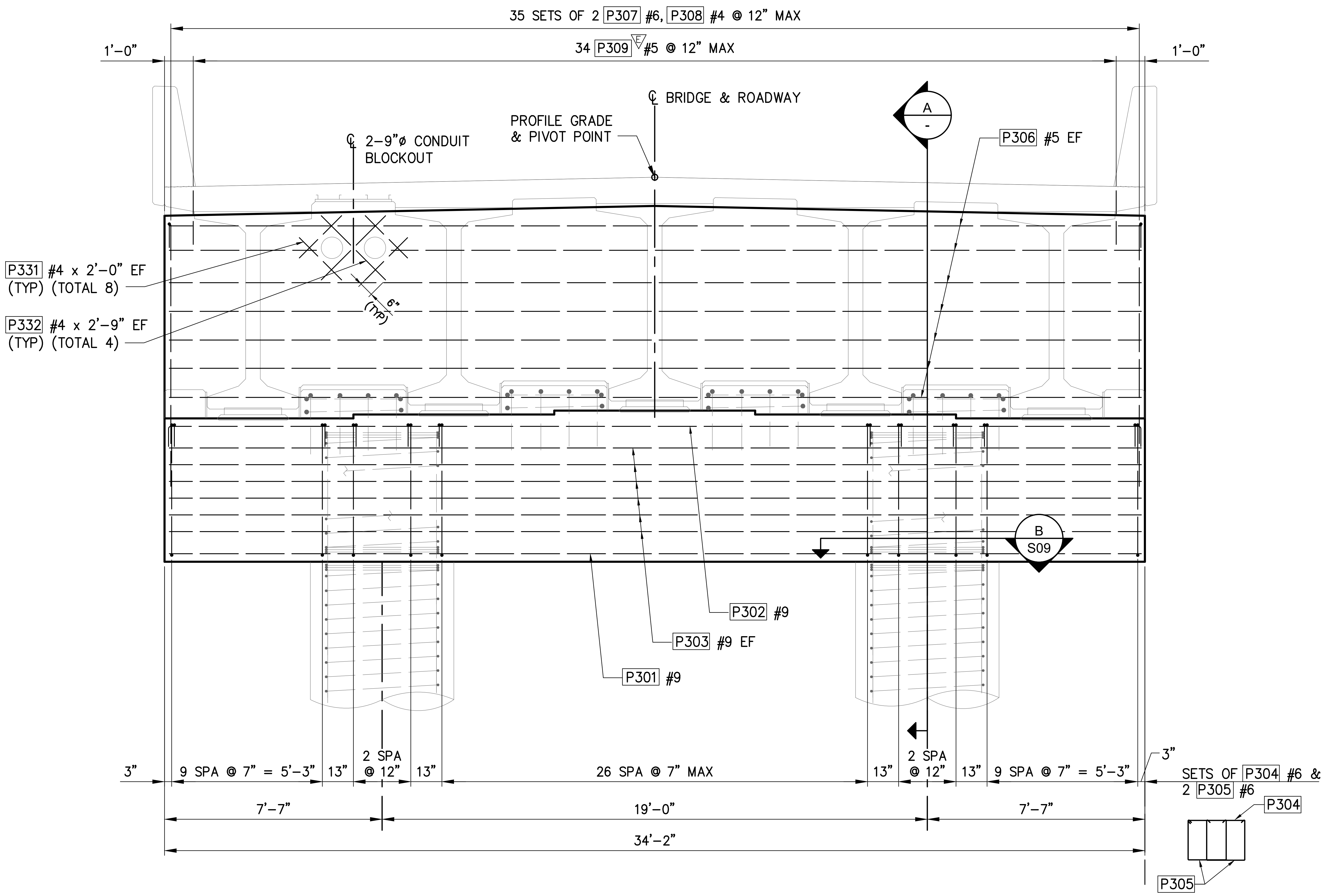
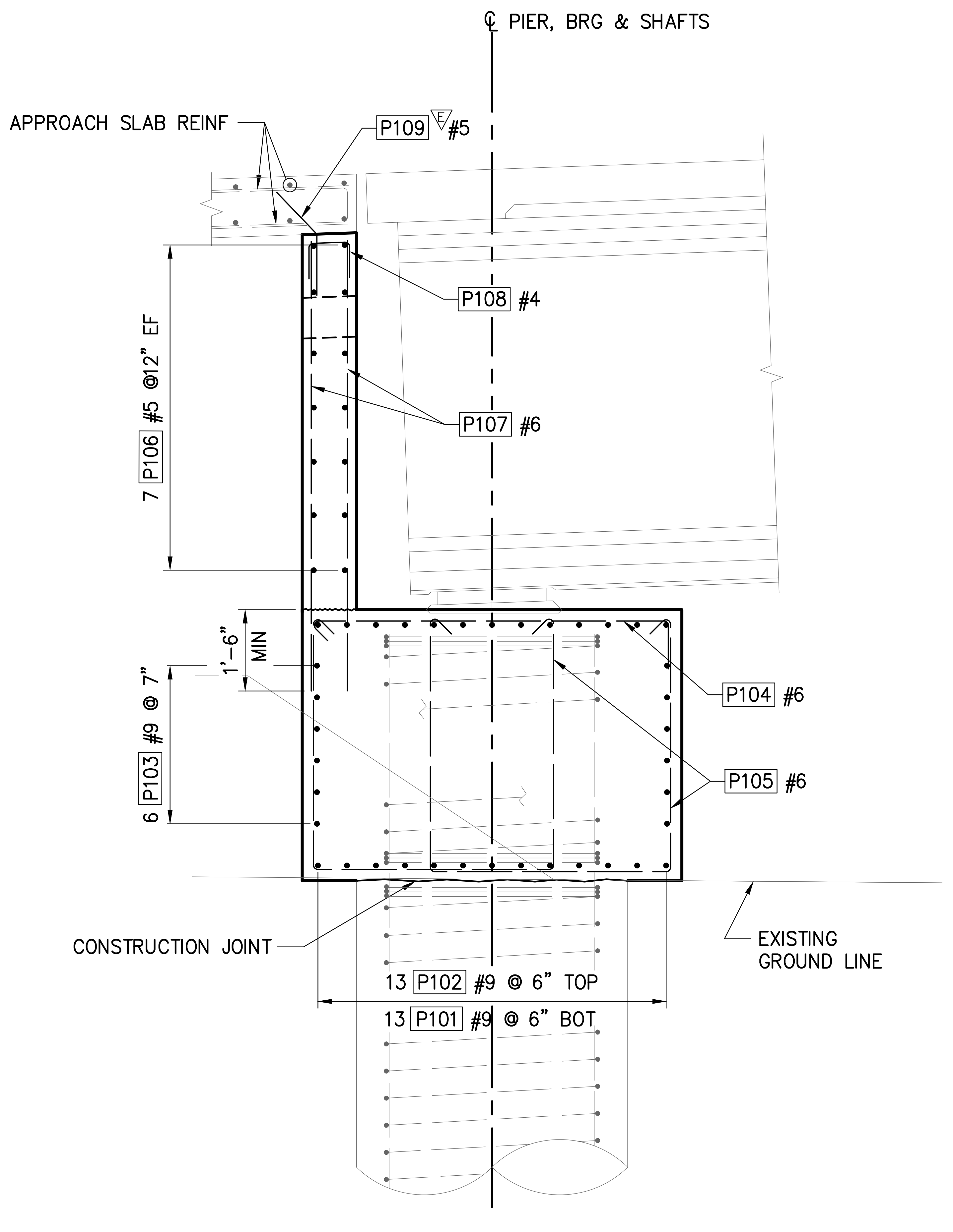


ELEVATION

PIER 3 SHOWN, PIER 1 SIMILAR
LOOKING AHEAD ON STATIONING
REINFORCING FOR PIER 1 IS LABELED P1XX
IN BARLIST



SECTION A –

PIER 1

P:\2020\2020025 – Walla Walla Dell Sharpe Bridge Replacement\000 CAD\010 Drawing\C–Structural Sheet\S06–28.dwg\TAB:S08 modified by djensen on Jan 14, 2022 – 16:52

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

PIER 1 & PIER 3 DETAILS 1

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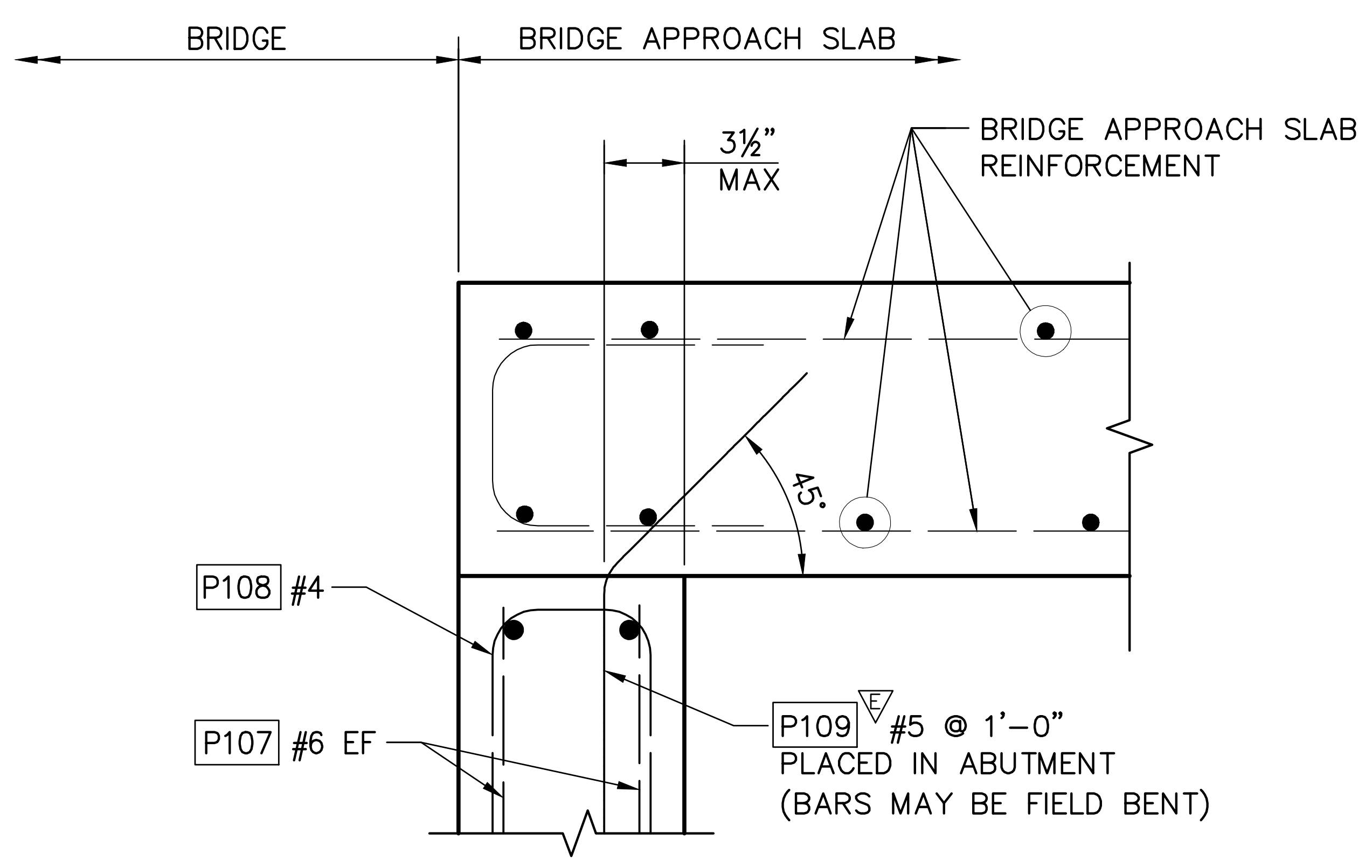
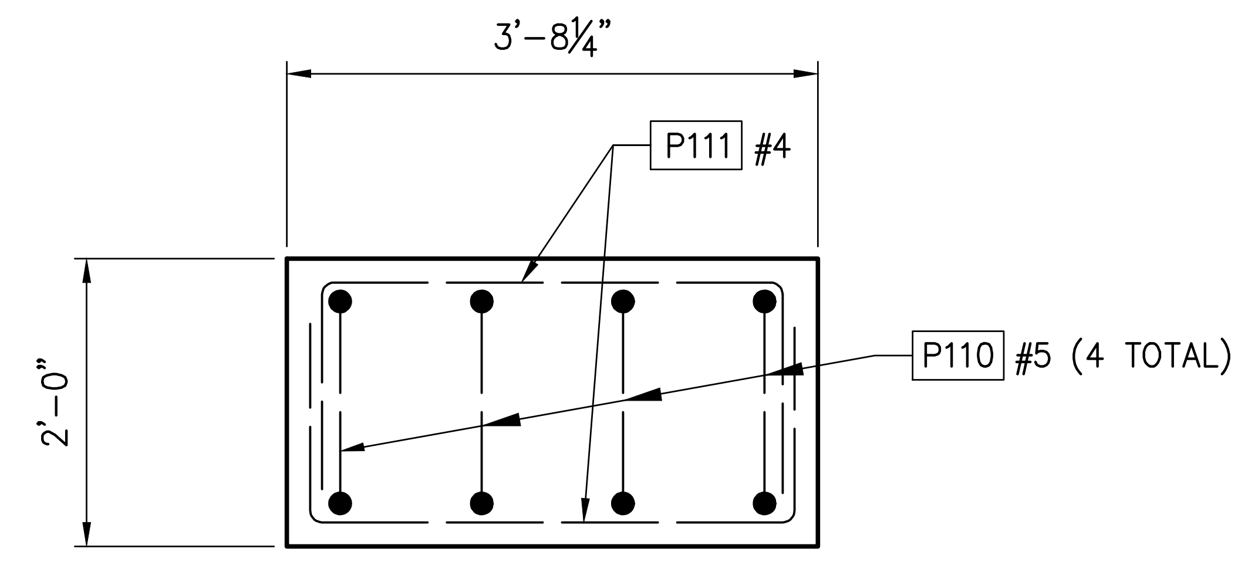
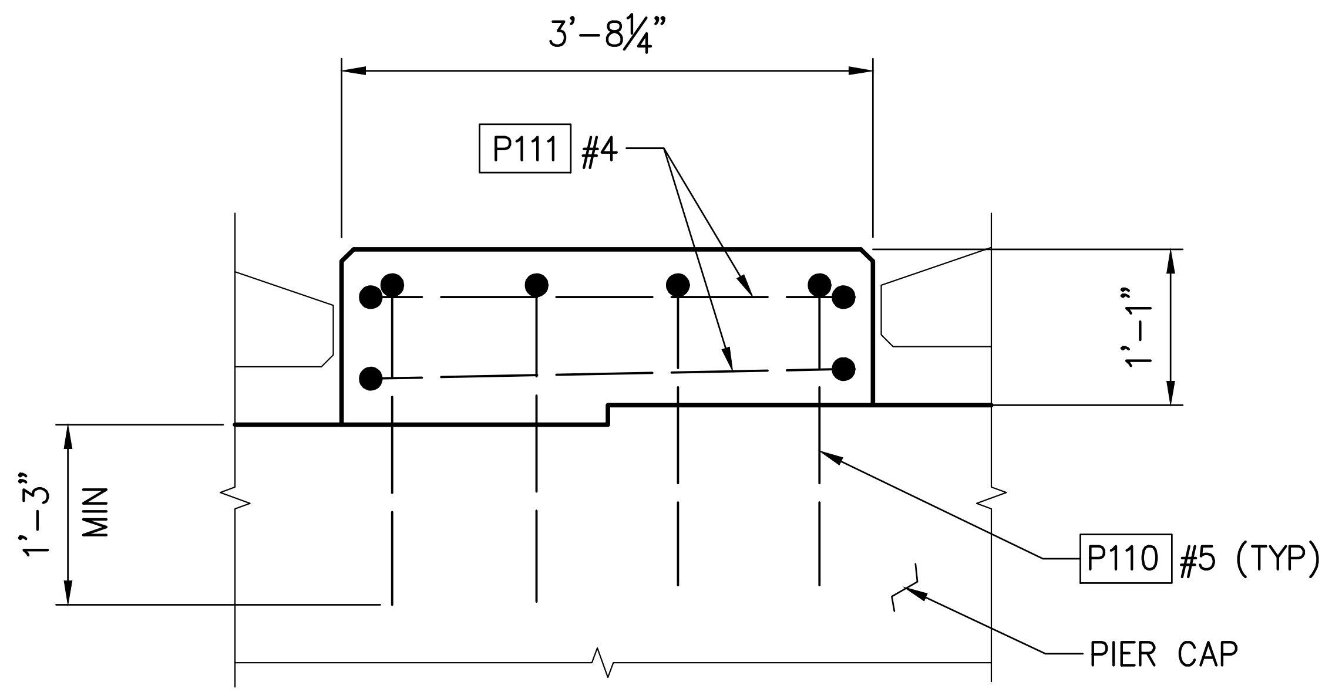


ANCHOR DETAIL

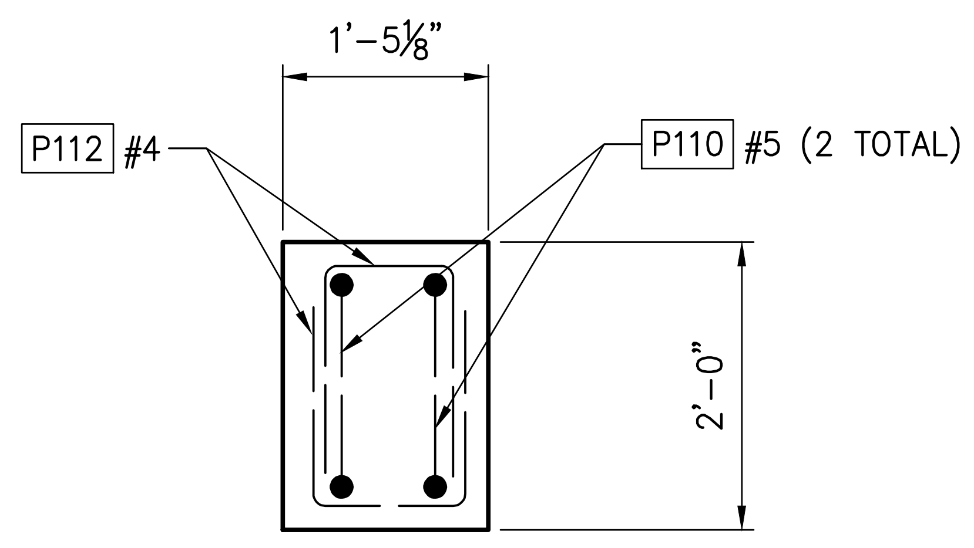


GIRDER STOP PLAN

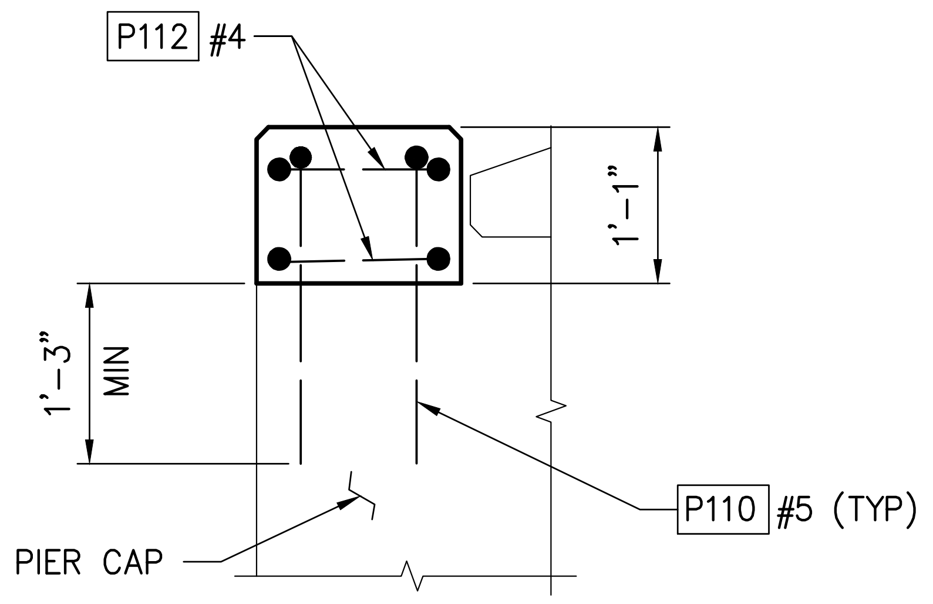


GIRDER STOP ELEVATION

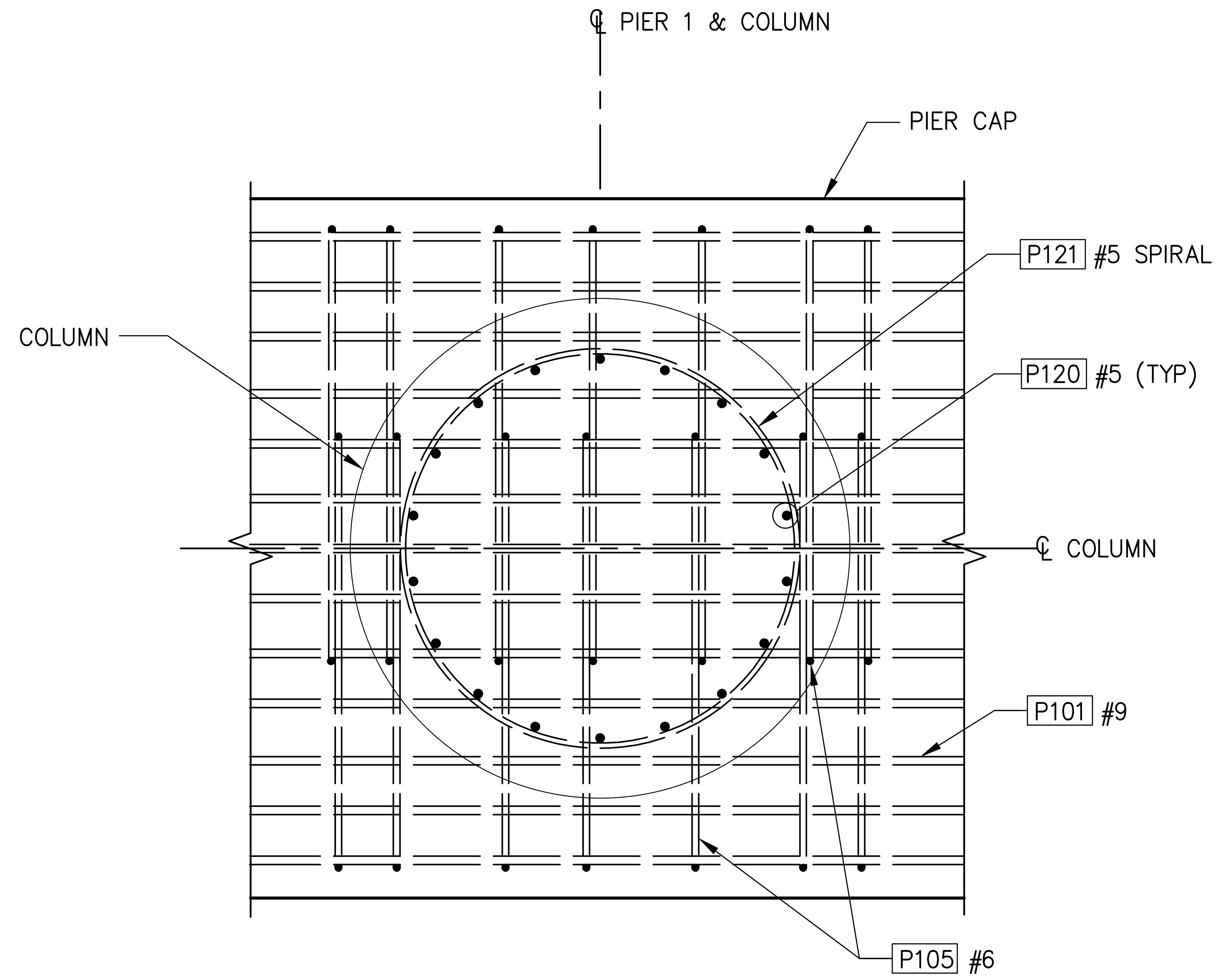
PIER CAP REINF NOT
SHOWN FOR CLARITY



END GIRDER STOP PLAN



END GIRDER STOP ELEVATION



SECTION B
INTERFERENCE DETAIL S08

NOTES:

1. THE INTERFERENCE DETAIL IS ONLY A SUGGESTED METHOD. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PLACING THE REINFORCEMENT BY ITS OWN METHODS TO COMPLY WITH THE CONTRACT PLANS.
2. PIER 1 REINF SHOWN, PIER 3 SIMILAR REINF FOR PIER 3 IS LABELED P3XX

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

PIER1 & PIER 3 DETAILS 2

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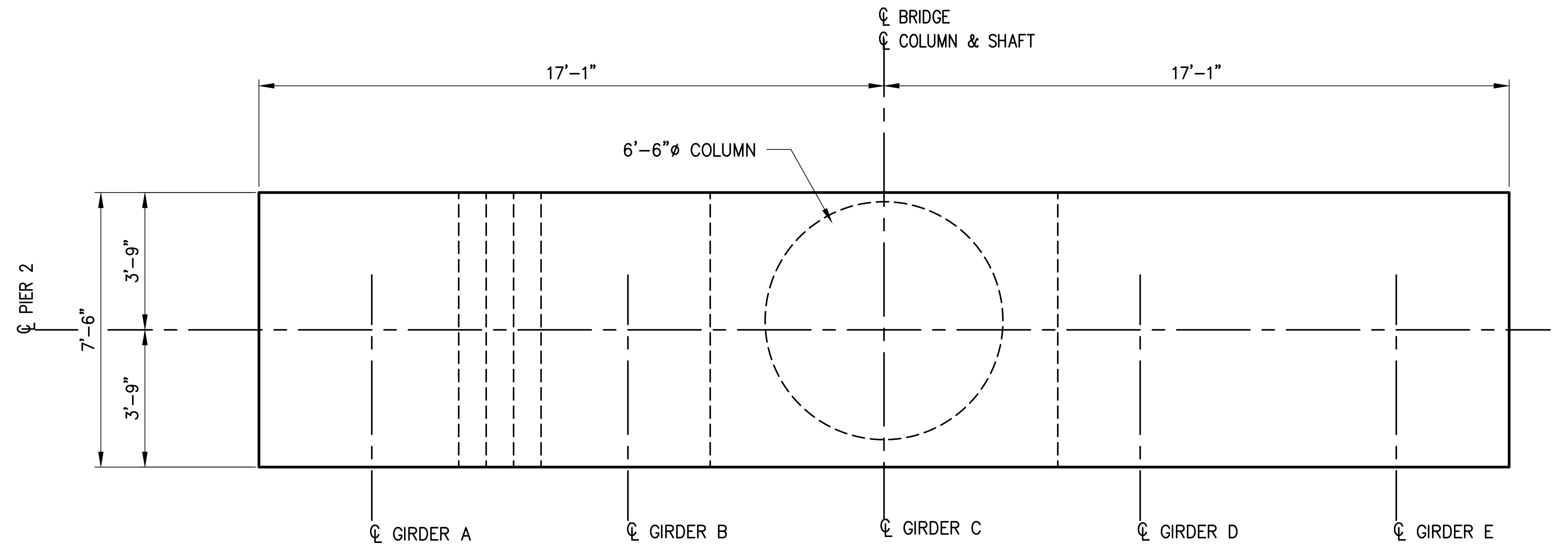
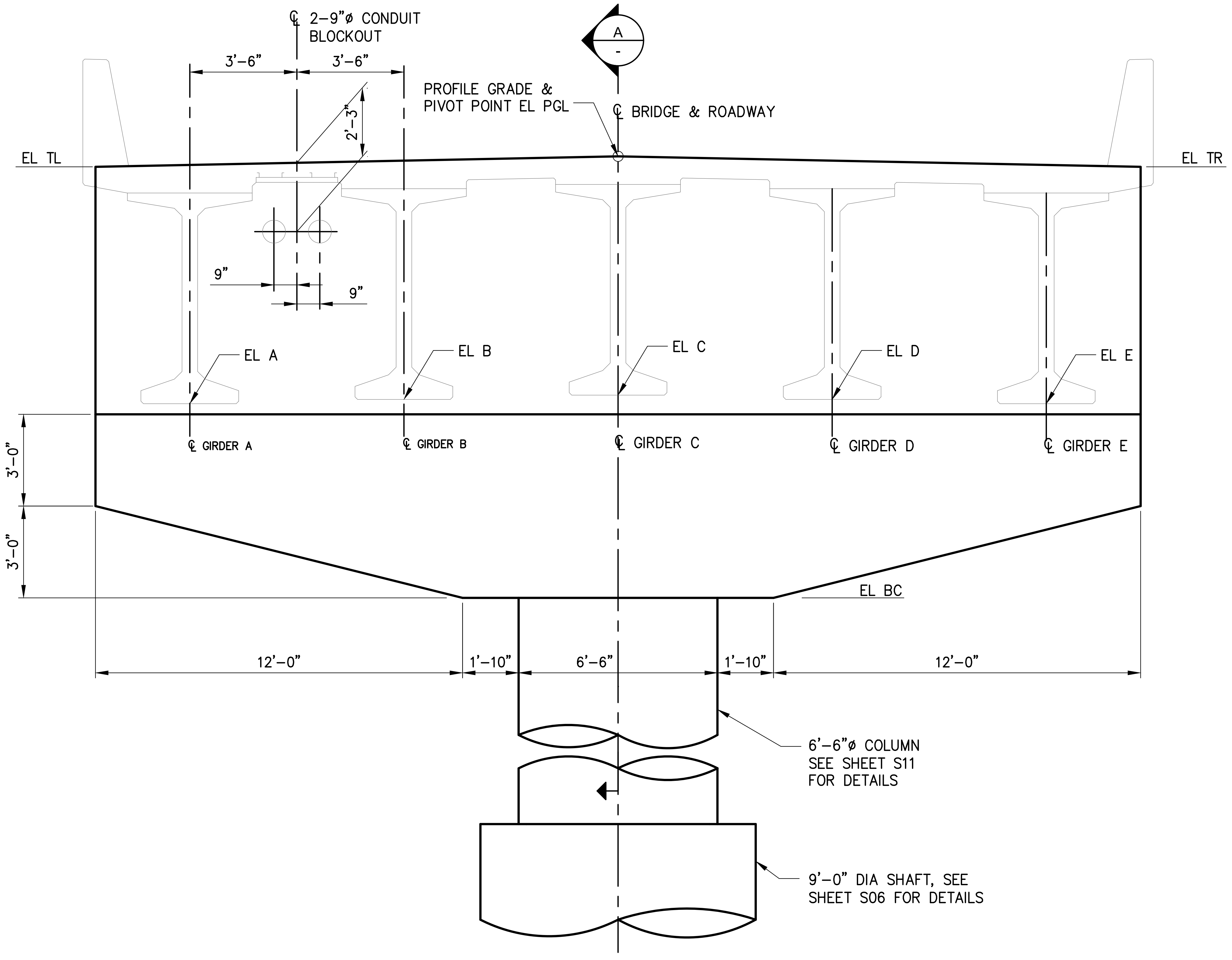


PLAN

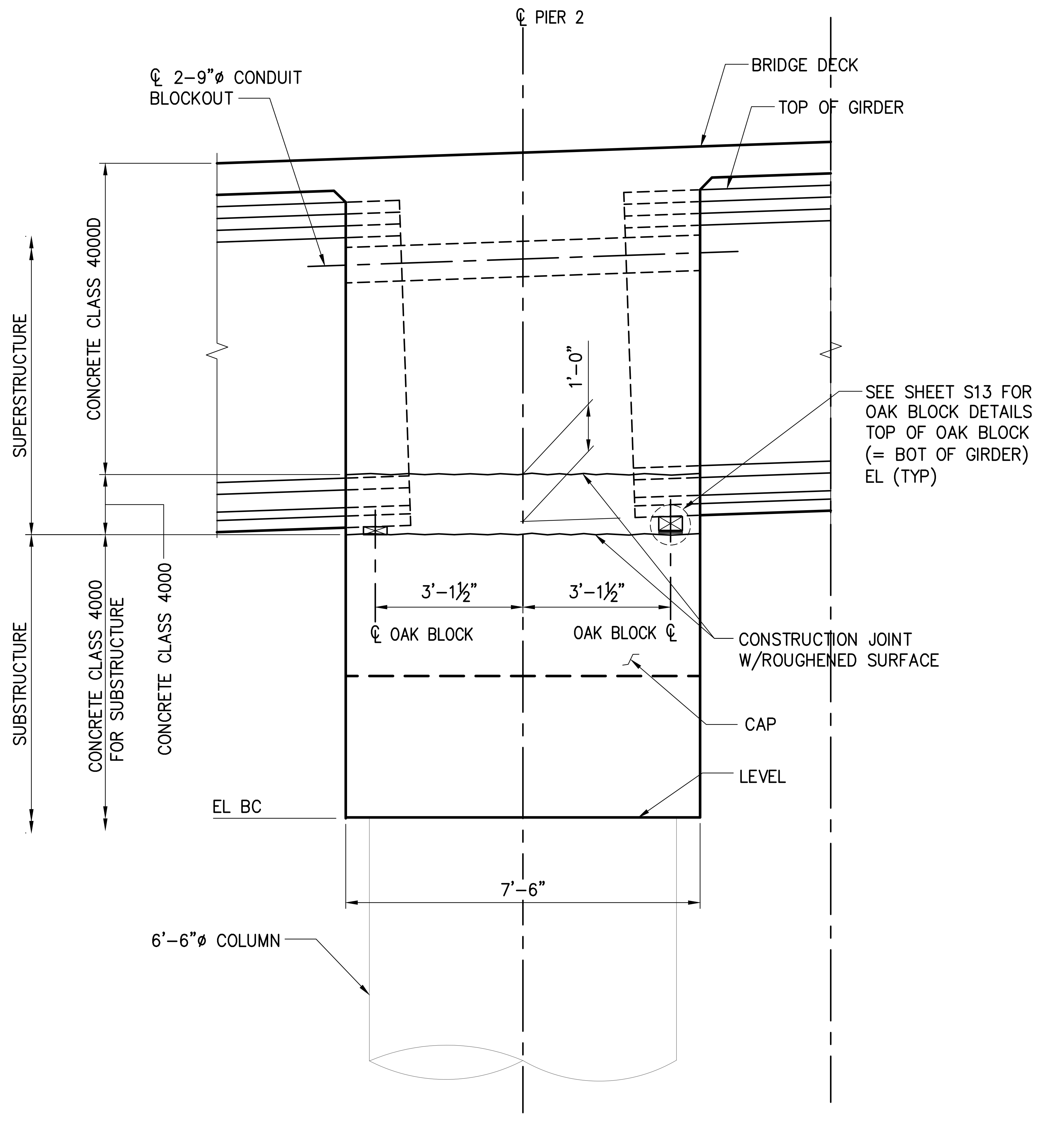
CONTROL ELEVATIONS TABLE - PIER 2			
LOCATION	DESCRIPTION	BACK STATION	AHEAD STATION
PGL	AT CL PIER	956.71	
TL	TOP OF ROADWAY LEFT* AT CL PIER	956.37	
TR	TOP OF ROADWAY RIGHT* AT CL PIER	956.37	
A	CL GIRDER A AT TOP OF OAK BLOCK	948.44	948.65
B	CL GIRDER B AT TOP OF OAK BLOCK	948.58	948.79
C	CL GIRDER C AT TOP OF OAK BLOCK	948.72	948.93
D	CL GIRDER D AT TOP OF OAK BLOCK	948.58	948.79
E	CL GIRDER E AT TOP OF OAK BLOCK	948.44	948.65
TC	TOP OF CAP	948.19	
BC	BOTTOM OF CAP	942.19	

* LOOKING UP ON STATIONING



ELEVATION

LOOKING AHEAD ON STATIONING



SECTION A/-

P:\2020\2020025 - Walla Walla Dell Sharpe Bridge Replacement\000 CAD\010 Drawing\C-Structural Sheet\S06-28.dwg\TAB:S10 modified by djensen on Jan 14, 2022 - 16:52

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

PIER 2 PLAN & ELEVATION

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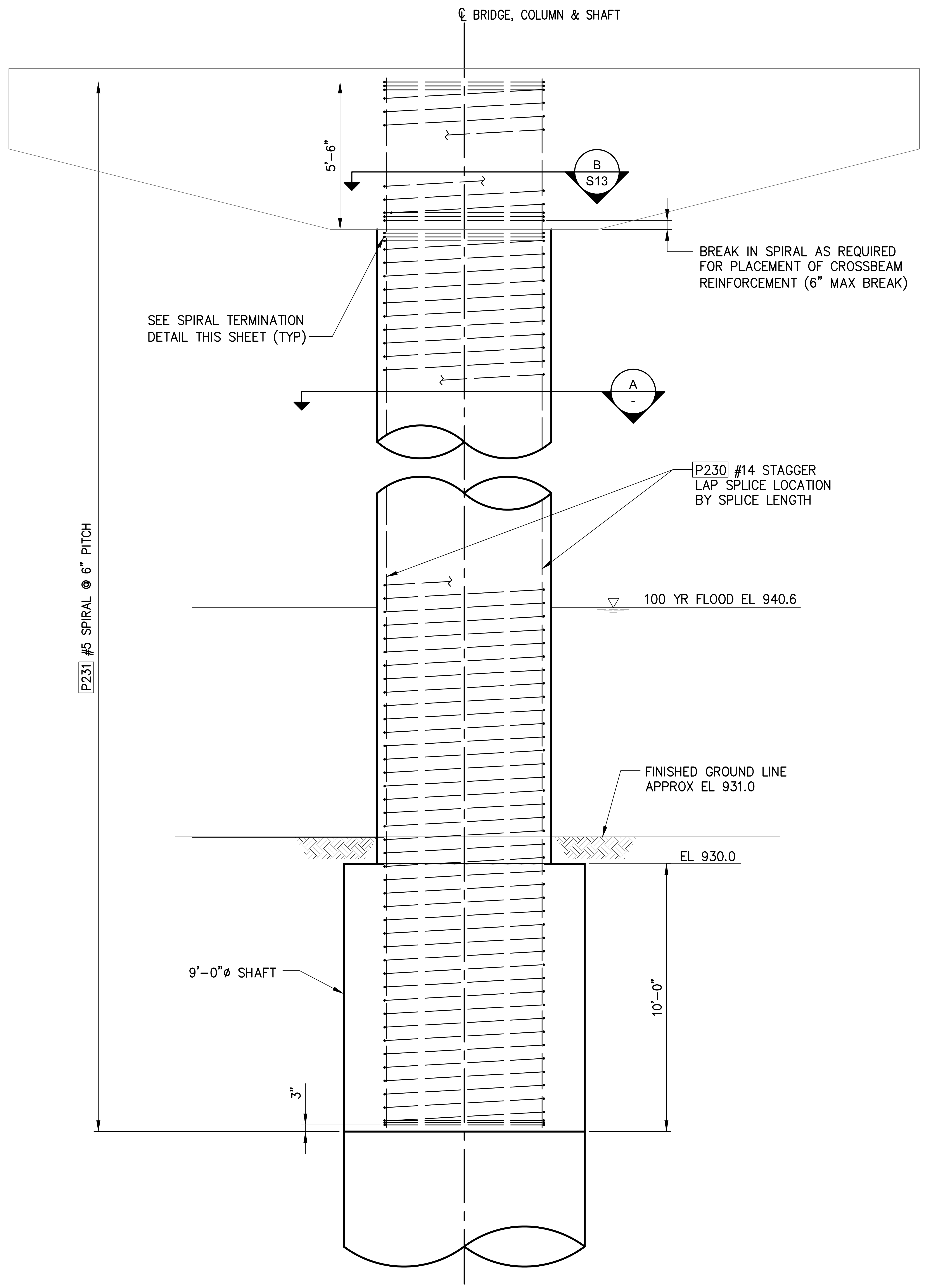
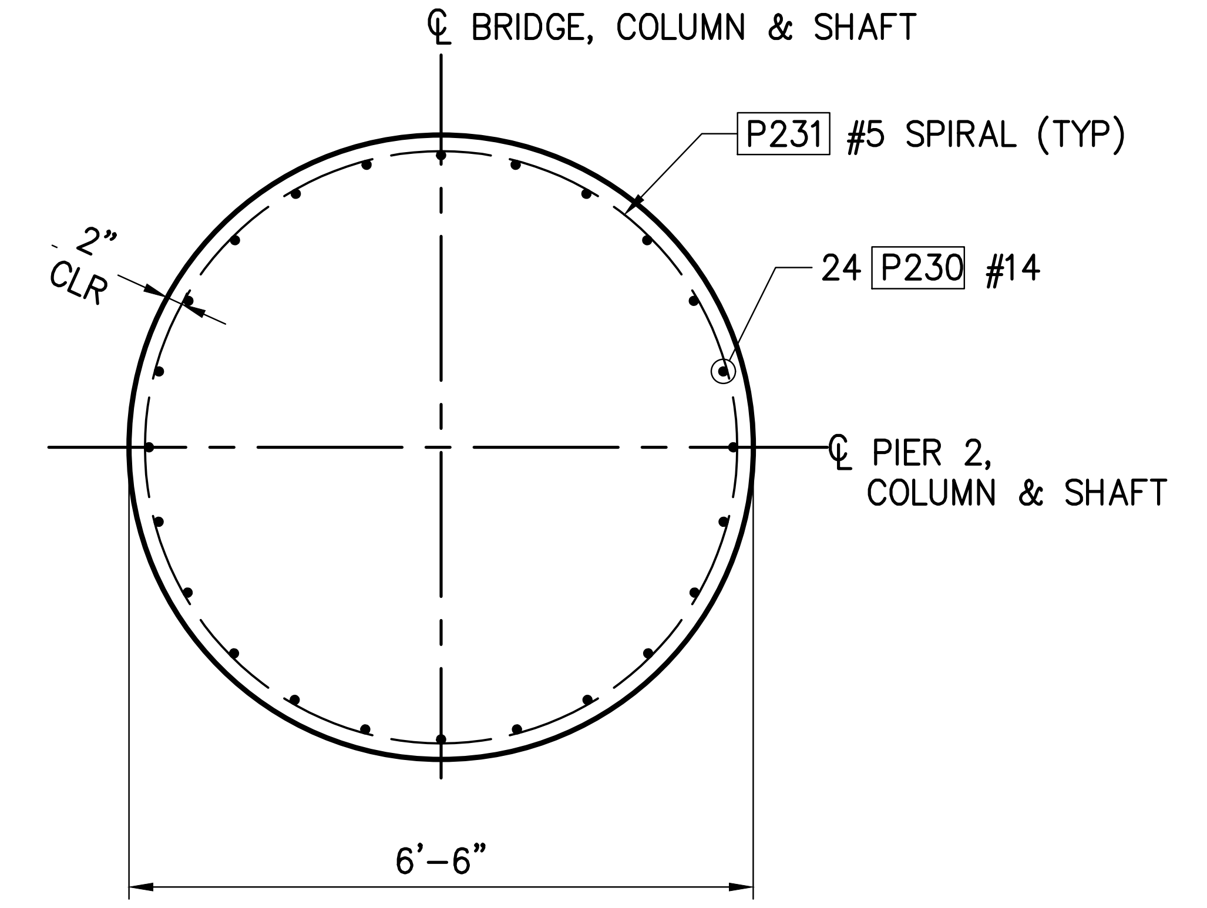
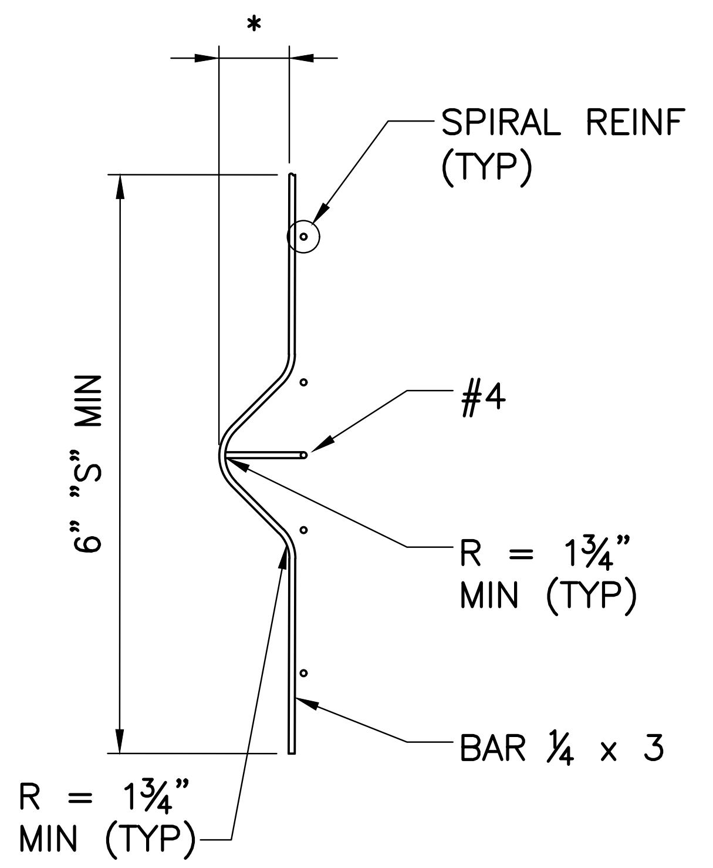


COLUMN ELEVATION



SECTION A
–



SECTION C
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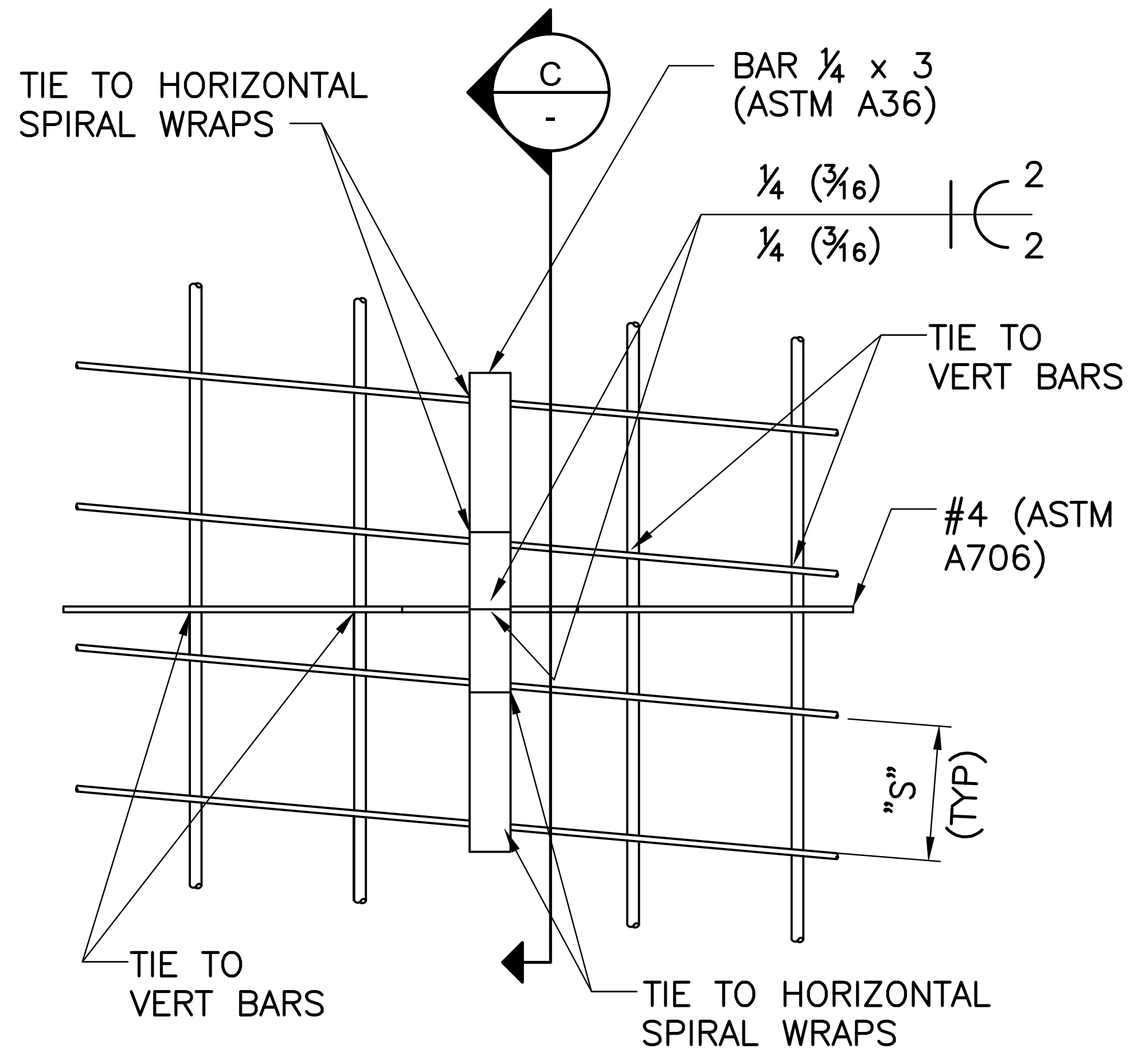
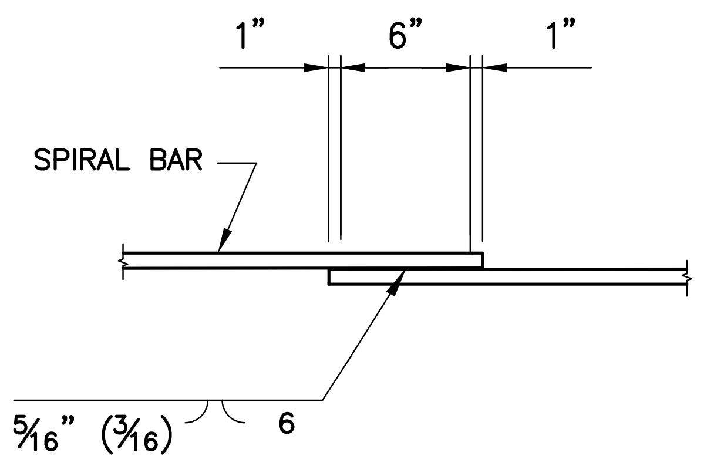


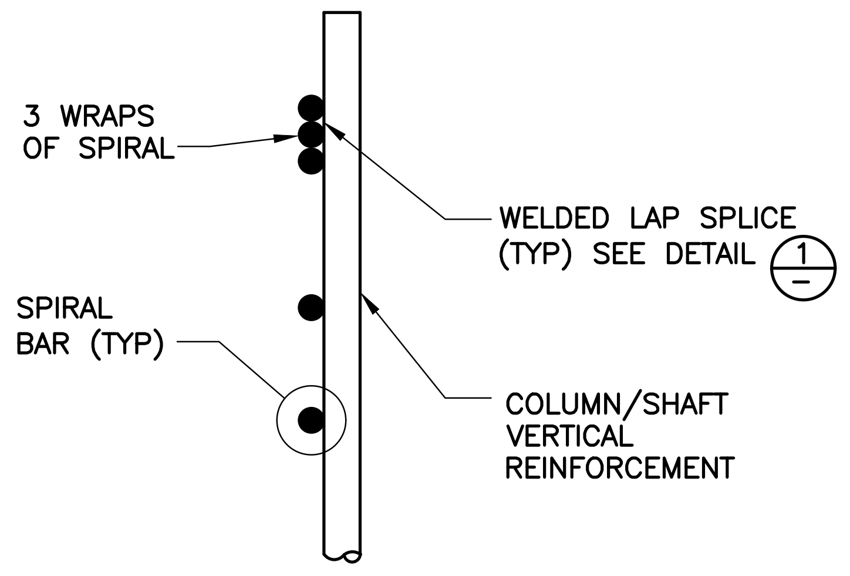
CENTRALIZER DETAIL

CENTRALIZER NOTES

1. CENTRALIZERS SHALL BE EPOXY COATED R PAINTED WITH INORGANIC ZINC AFTER FABRICATION.
2. EACH LEG SHALL BE TIED TO TWO VERTICAL BARS AND TWO SPIRAL WRAPS OR TWO HOOPS.
3. SEE STD. SPEC. 6–19.3(5)B FOR SPACING REQUIREMENTS.



WELDED LAP SPLICE DETAIL
1
–



SPIRAL TERMINATION DETAIL
* MINIMUM CONCRETE COVER MINUS ½"

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

PIER 2 DETAILS 1

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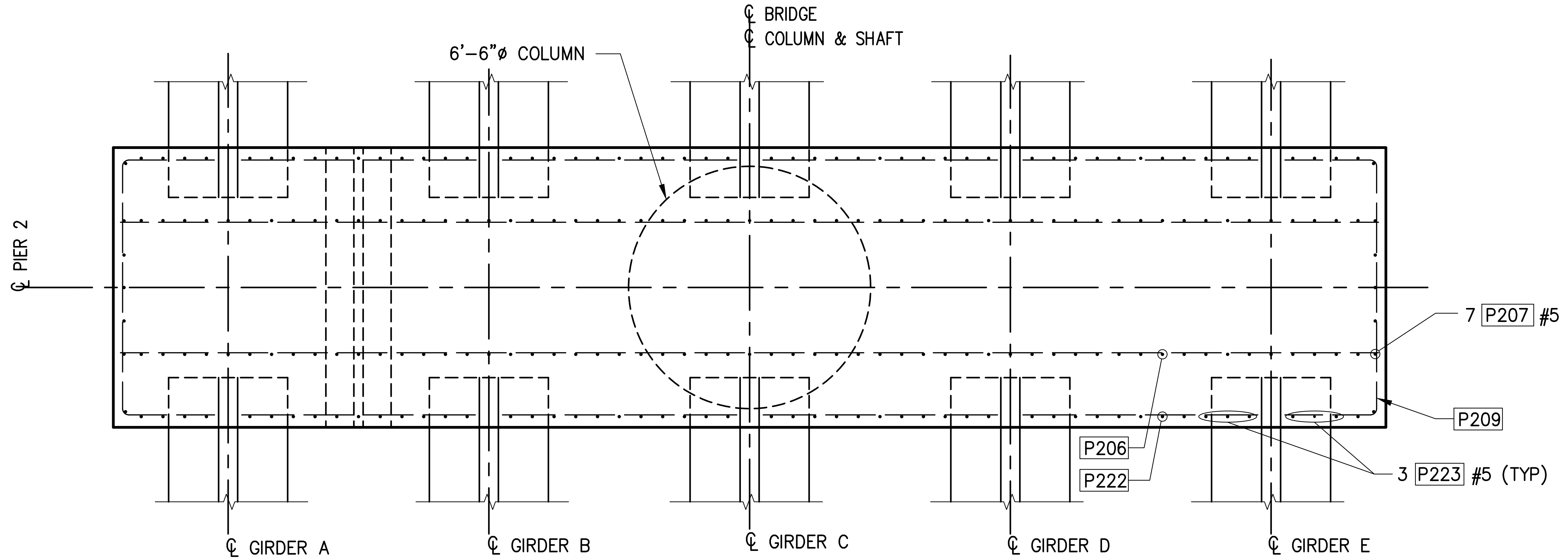

SECTION B
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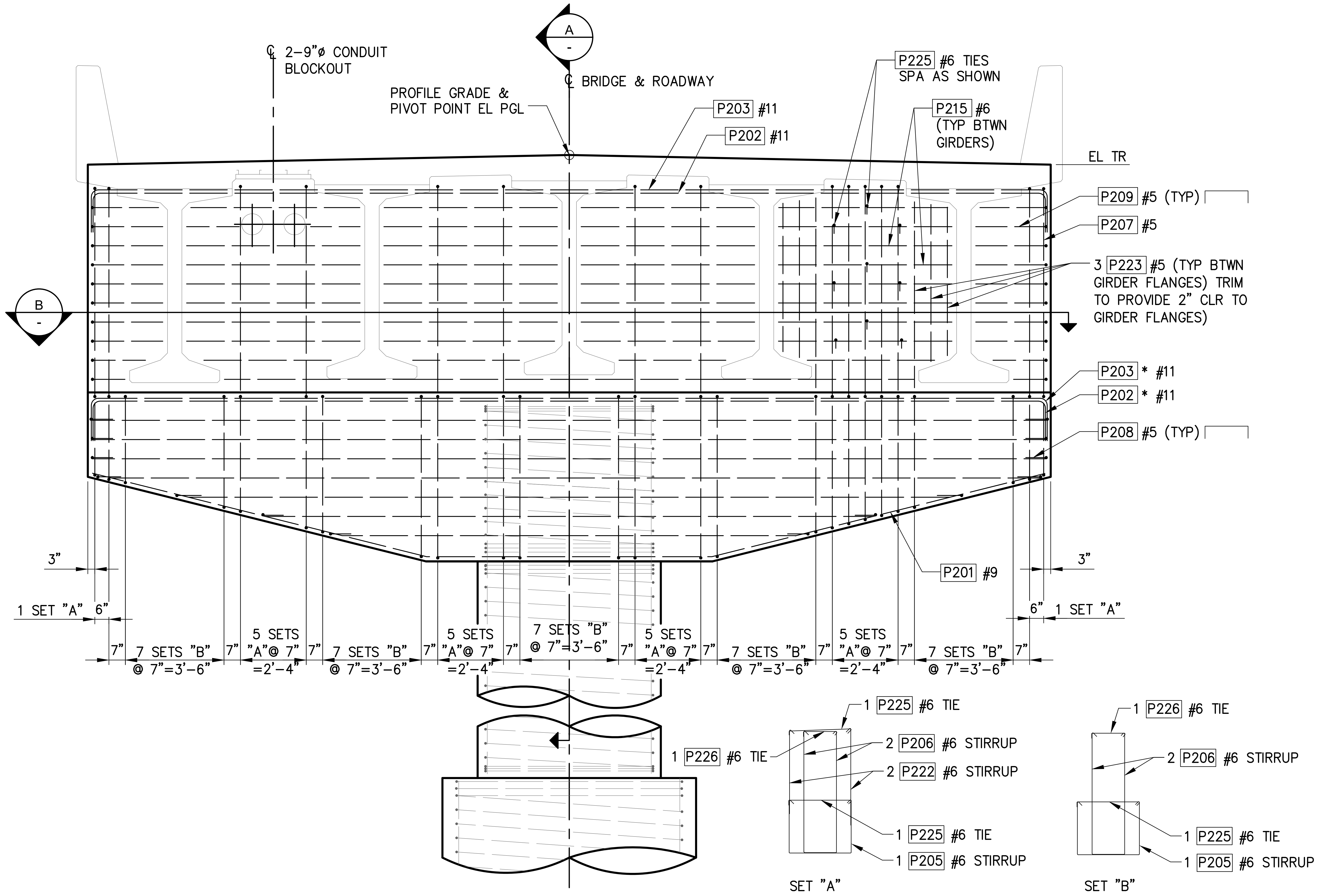
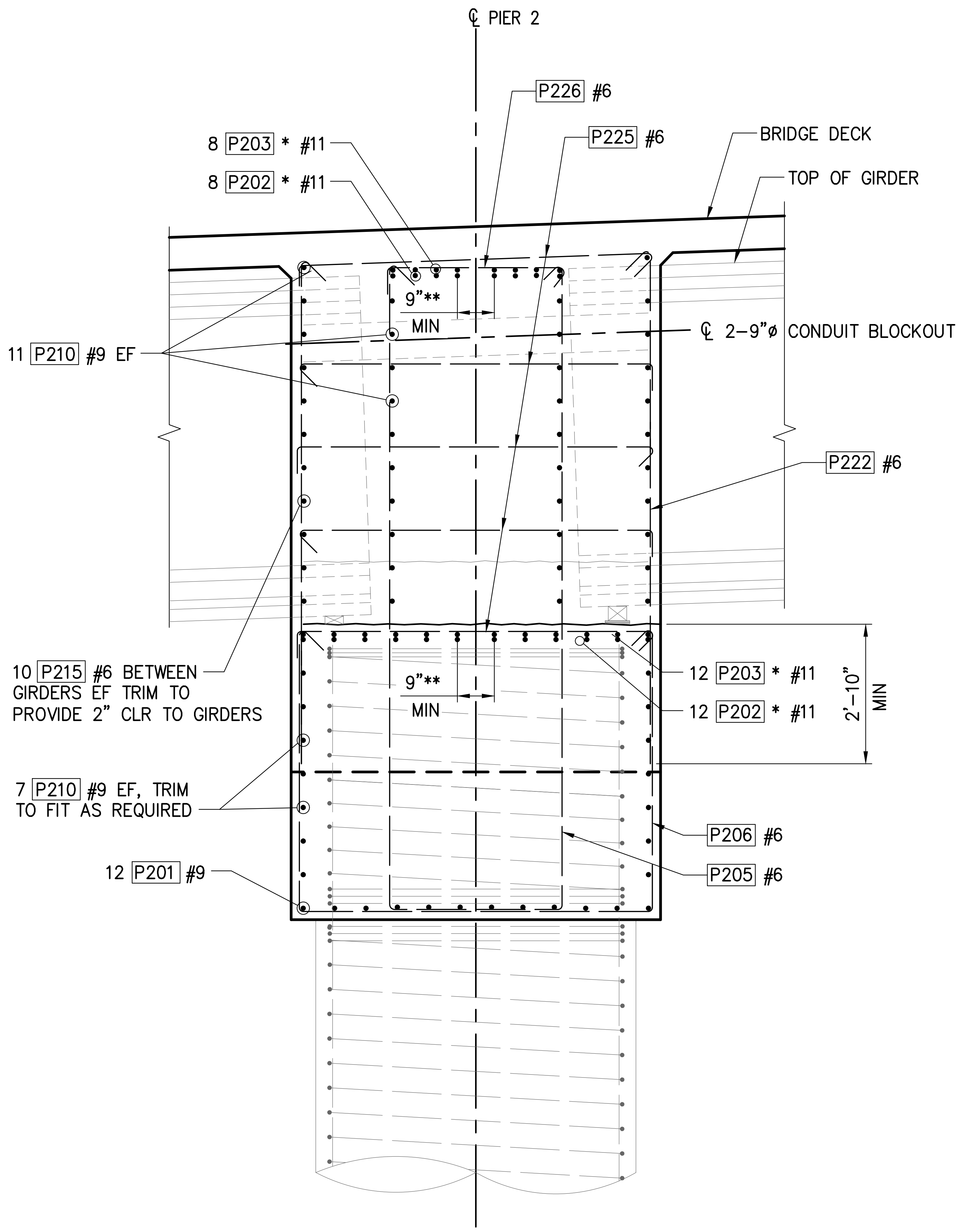


SET "A"
BTWN GIRDERS

SET "B"
UNDER GIRDERS

ELEVATION
LOOKING AHEAD ON STATIONING



SECTION A
–

* BUNDLE BARS
** GAP FOR CONCRETE PLACEMENT
CAP REINFORCING SPACING MAY BE ADJUSTED TO CLEAR COLUMN REINFORCING

P:\2020\2020025 - Walla Walla Dell Sharpe Bridge Replacement\000 CAD\010 Drawing\C-Structural Sheet\S06-28.dwg\TAB:S12 modified by djensen on Jan 14, 2022 - 16:52

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

PIER 2 DETAILS 2

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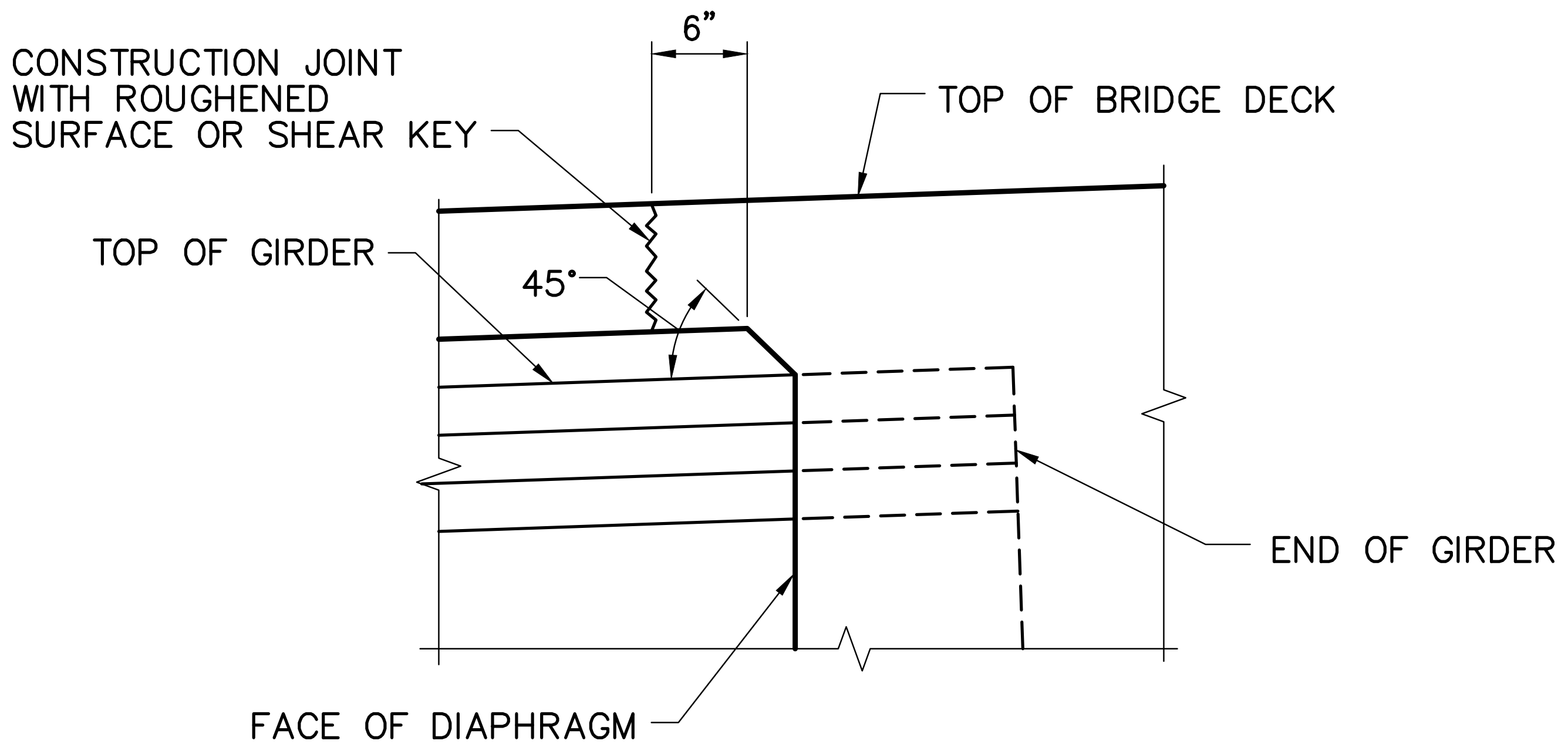
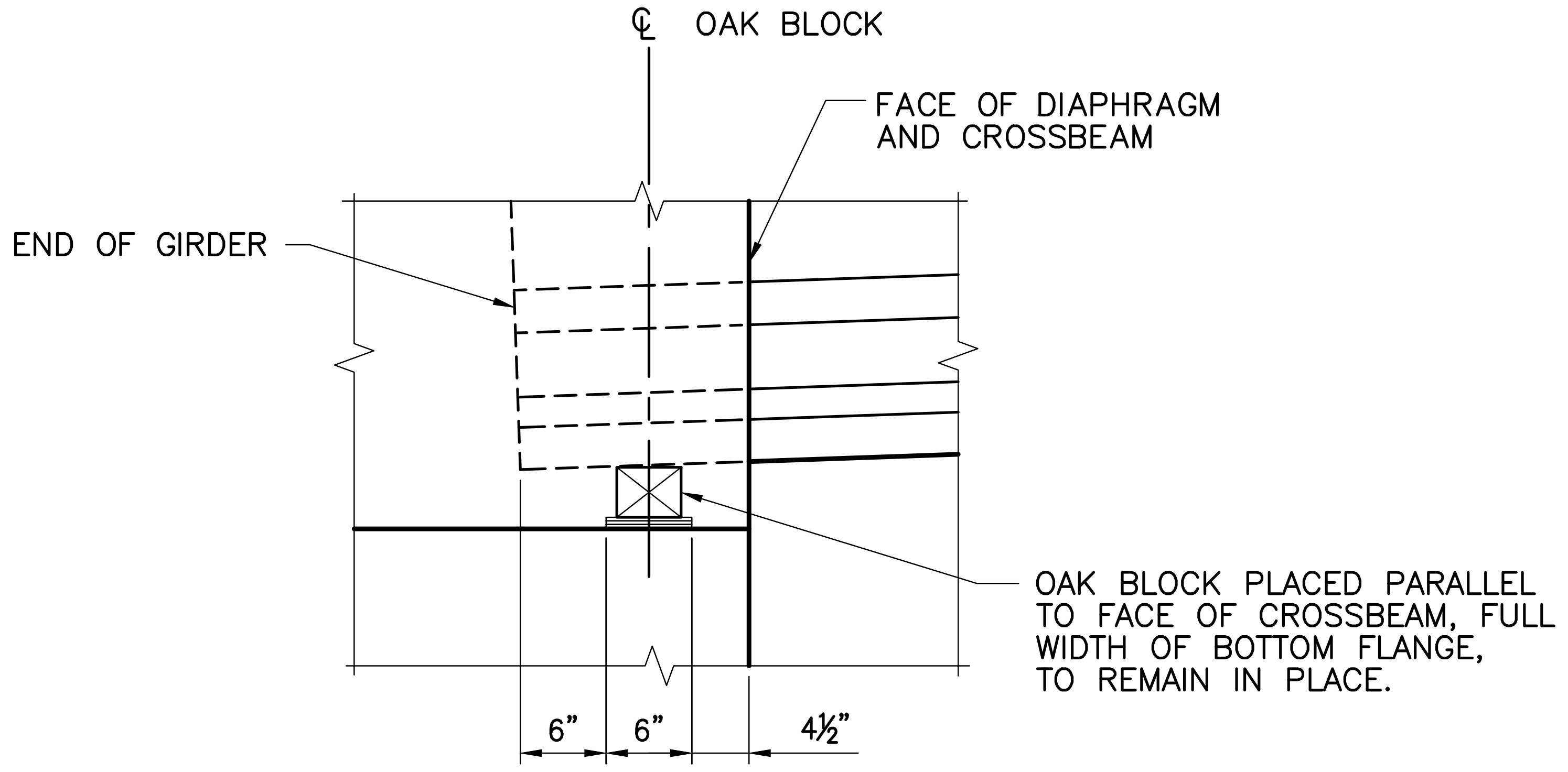
NOTES:

1. GIRDERS SHALL BE HELD RIGIDLY IN PLACE WHEN DIAPHRAGMS ARE PLACED.
2. EXTENDED STRANDS AND GIRDER REINFORCING NOT SHOWN FOR CLARITY.
3. LONGITUDINAL DIMENSIONS ARE NORMAL TO ℄ DIAPHRAGM.

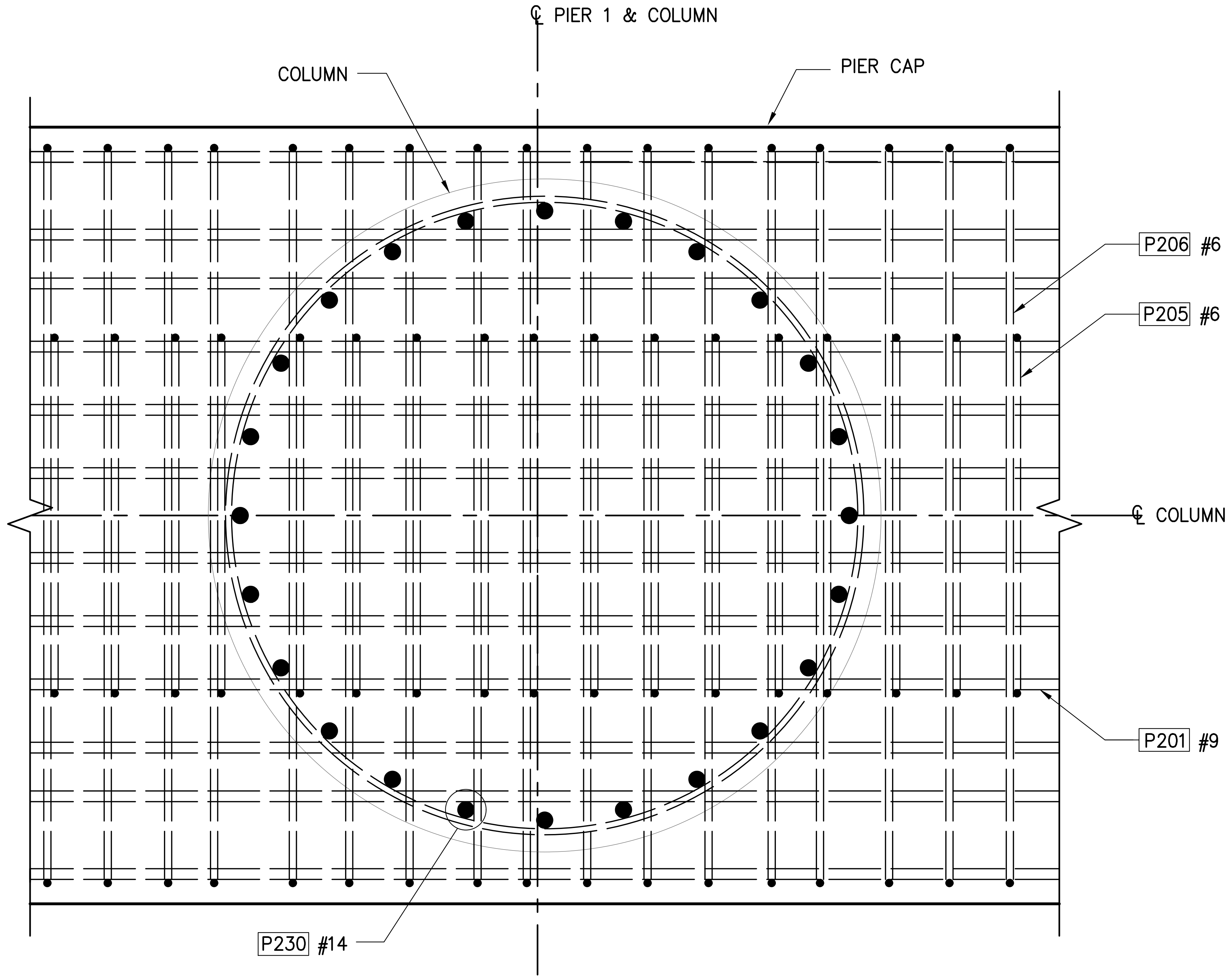


DETAIL 1 / –

DIAPHRAGM REINF NOT SHOWN FOR CLARITY



OAK BLOCK DETAIL



SECTION B / S11

INTERFERENCE DETAIL

NOTE:
THE INTERFERENCE DETAIL IS ONLY A SUGGESTED METHOD. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PLACING THE REINFORCEMENT BY ITS OWN METHODS TO COMPLY WITH THE CONTRACT PLANS.

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

PIER 2 DETAILS 3

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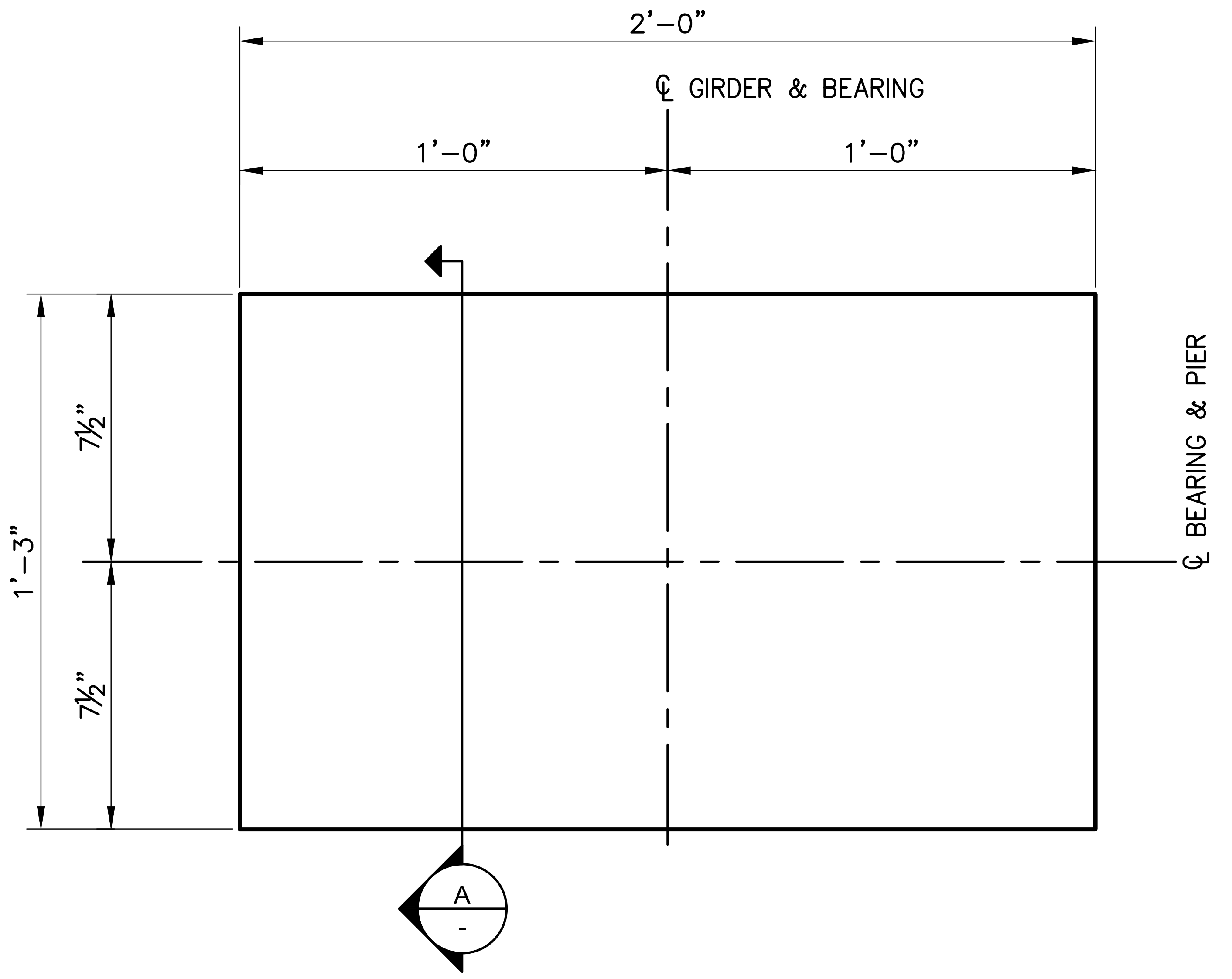
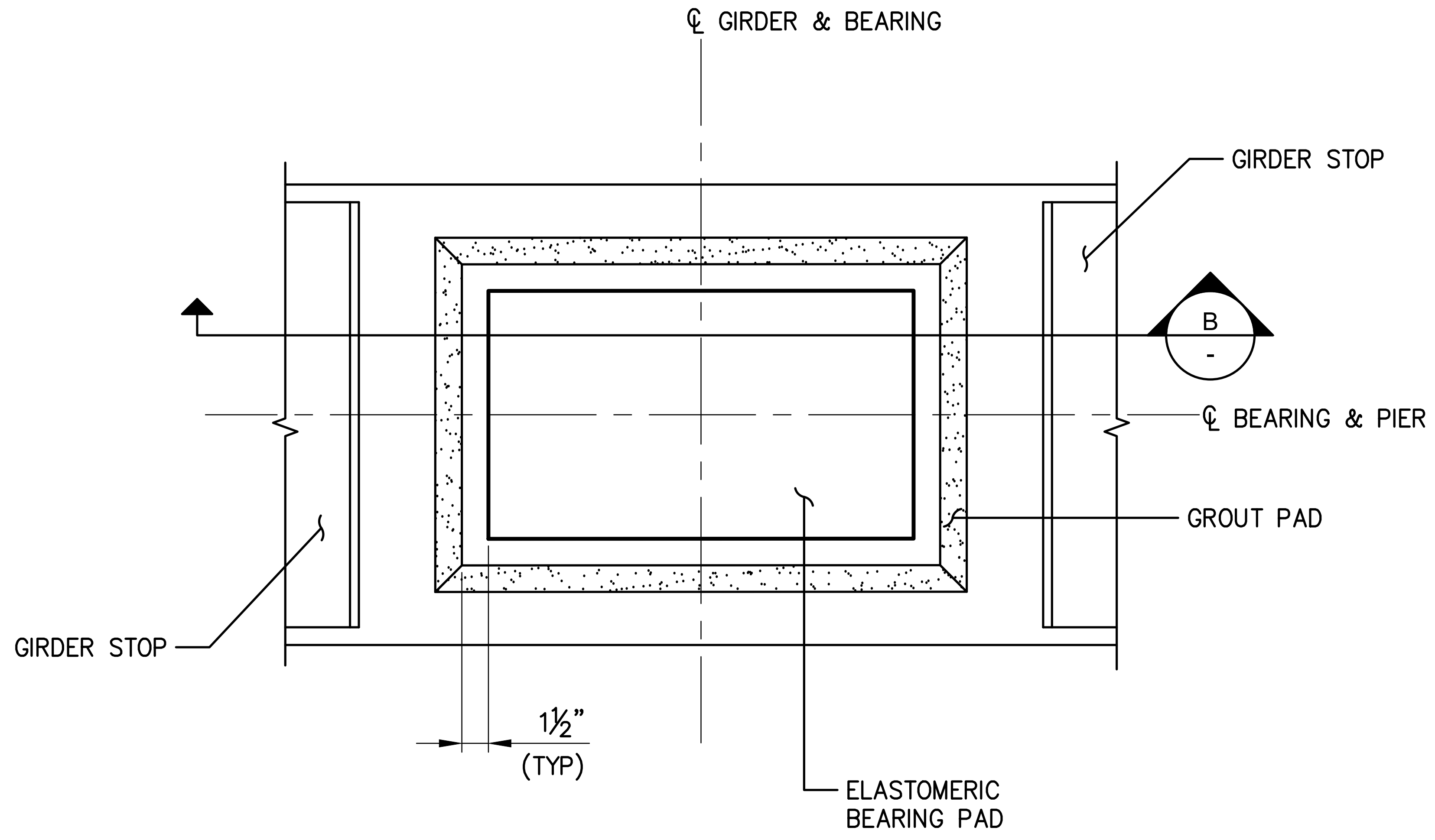
---- OF XX



ELASTOMERIC BEARING PAD PLAN

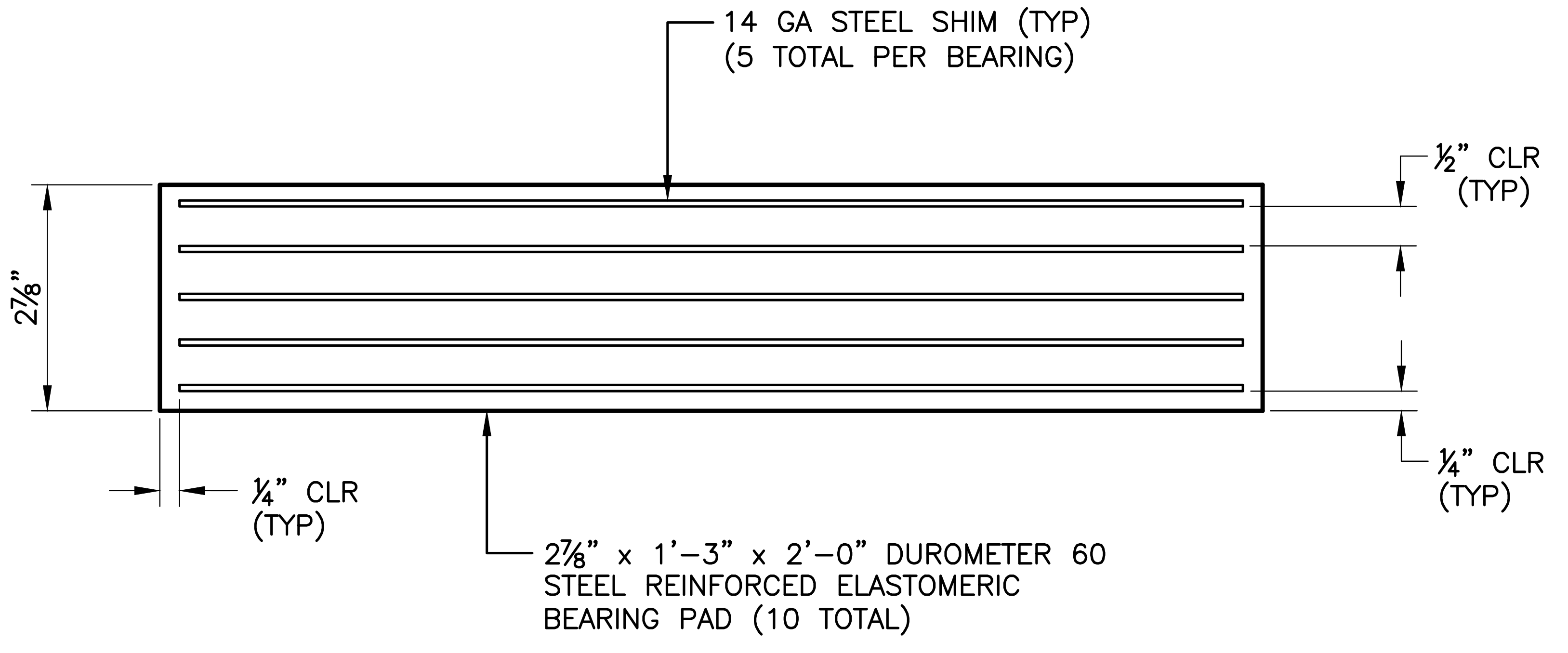


GROUT PAD PLAN

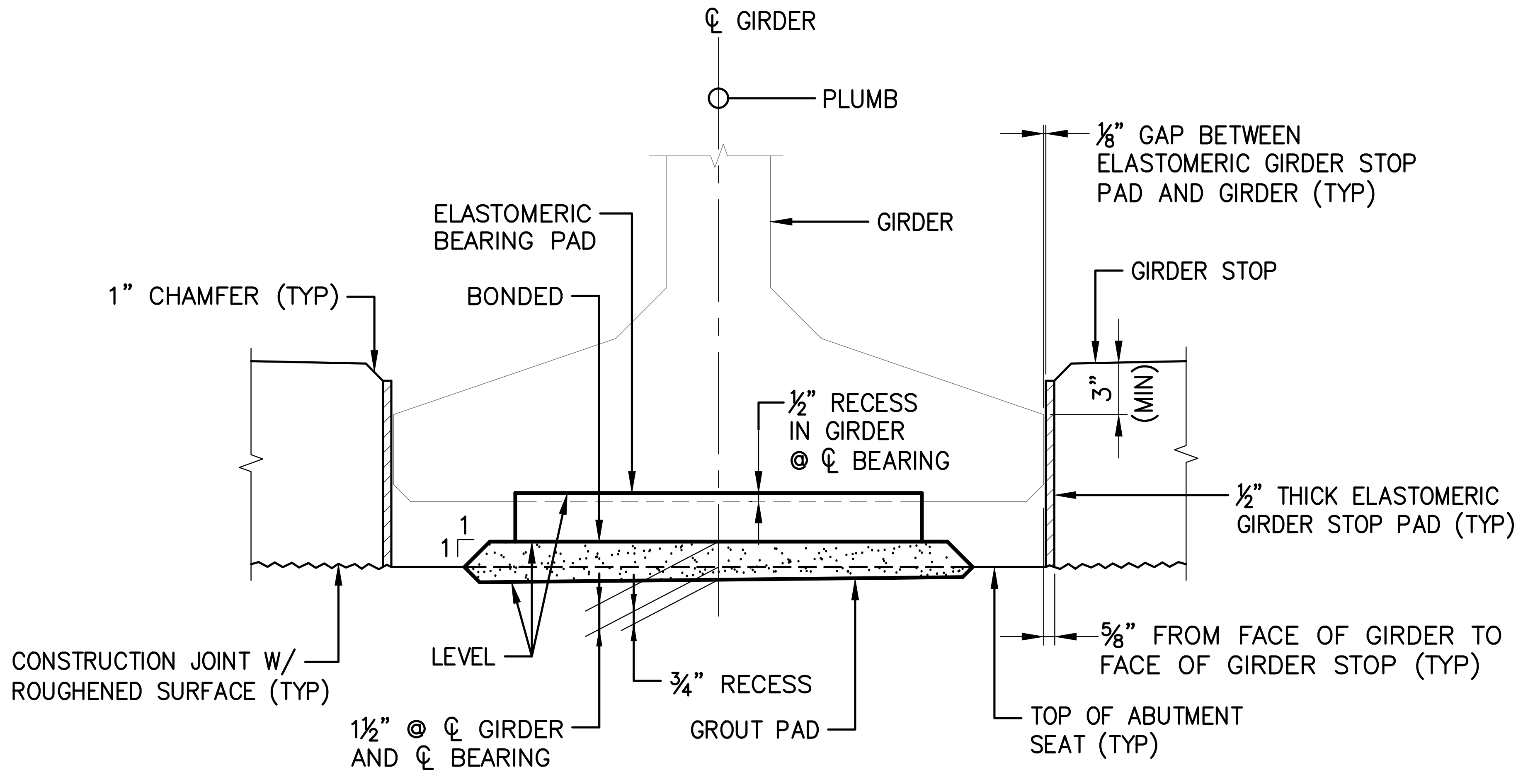
NOTES:

1. FABRICATE AND TEST ALL BEARINGS IN ACCORDANCE WITH AASHTO LRFD BRIDGE DESIGN SPECIFICATONS METHOD B, AND AASHTO SPECIFICATION M251, TEST REQUIREMENTS.
2. STEEL SHIMS FOR ELASTOMERIC BEARING PADS SHALL BE FABRICATED FROM MATERIAL MEETING ASTM A 1011, STRUCTURAL STEEL GRADE 36, TYPE 1.
3. ELASTOMERIC BEARINGS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO SPECIFICATION M 251.
4. GIRDER STOPS SHALL BE CONSTRUCTED AFTER PLACEMENT OF GIRDERS. ELASTOMERIC PADS BETWEEN GIRDER AND GIRDER STOPS SHALL BE PLACED AFTER CONSTRUCTION OF THE GIRDER STOPS. THE PADS SHALL BE BONDED TO GIRDER STOPS WITH PRE–APPROVED ADHESIVE.
5. THE ELASTOMERIC BEARING PAD SHALL BE BONDED TO THE BEARING SEAT WITH AN APPROVED EPOXY ADHESIVE.

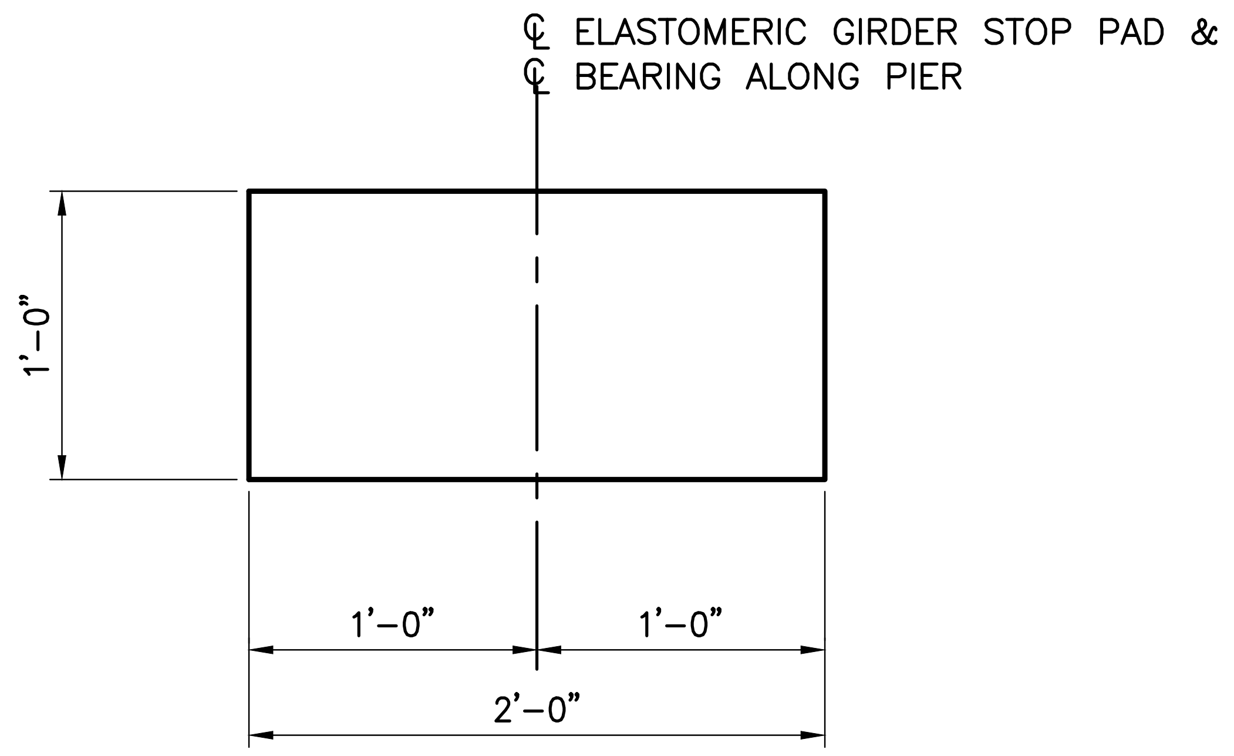
BEARING DESIGN TABLE SERVICE 1 LIMIT STATE	
DEAD LOAD REACTION	215.1 KIPS
LIVE LOAD REACTION (W/O IMPACT)	47.2 KIPS
UNLOADED HEIGHT	2.87 INCHES
LOADED HEIGHT (DL)	2.85 INCHES
SHEAR MODULUS AT 73°	165 PSI



SECTION A –



SECTION B –



ELASTOMERIC GIRDER STOP PAD

SHEAR MODULUS – 165 PSI

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

ELASTOMERIC BEARINGS & GROUT PAD DETAILS

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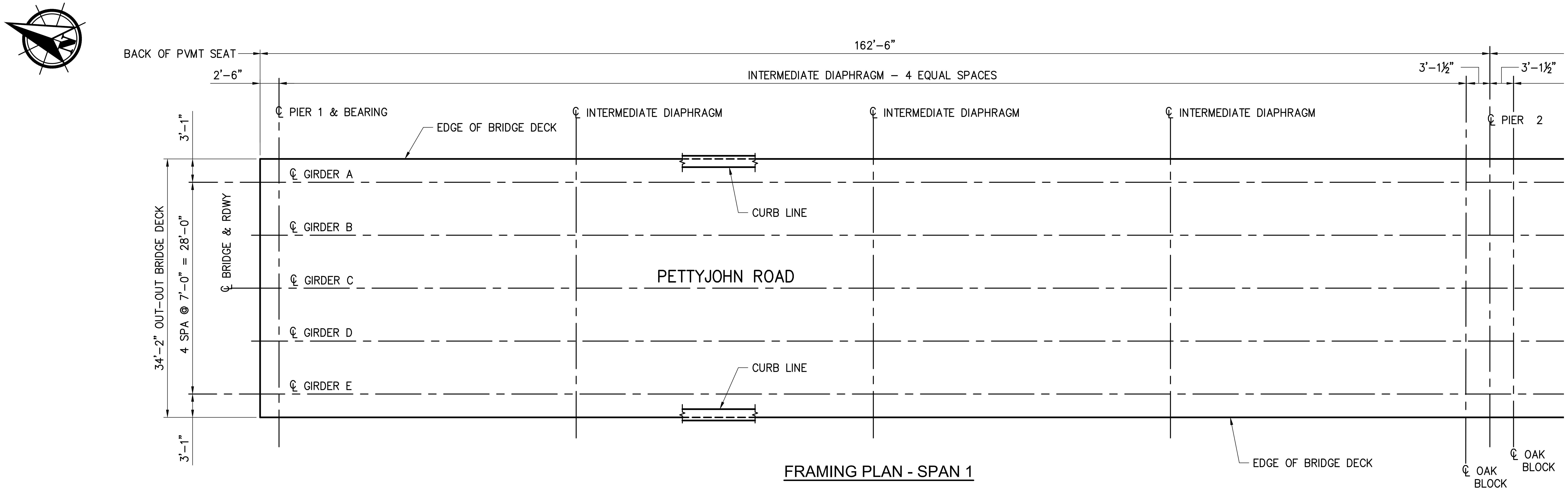
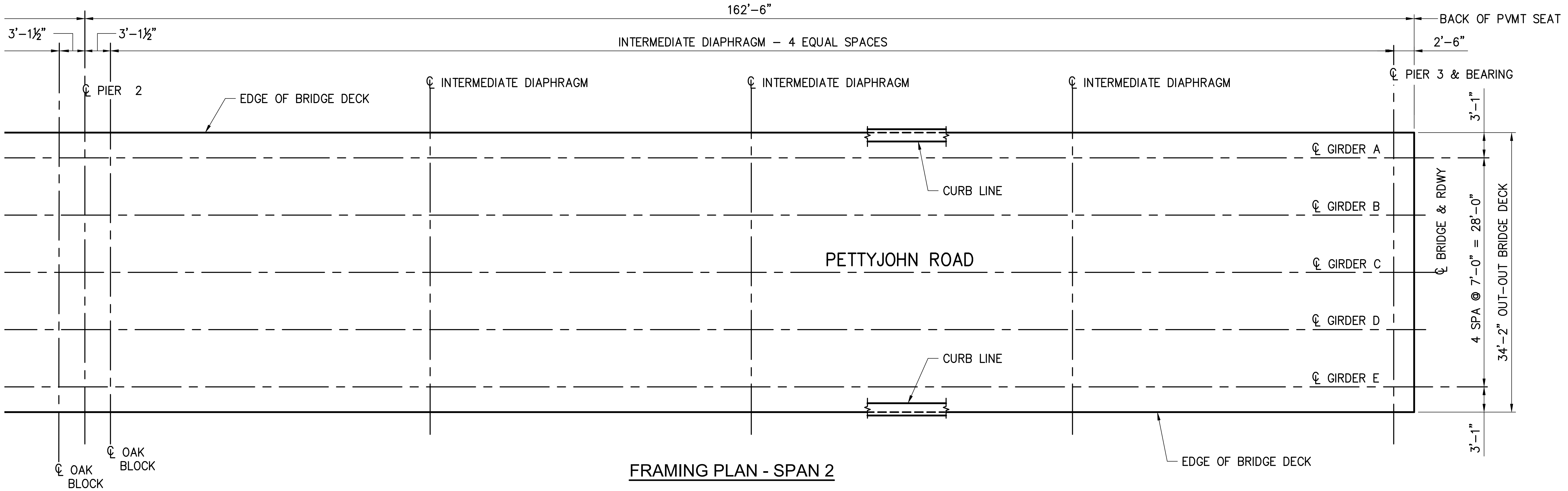


FRAMING PLAN - SPAN 1



FRAMING PLAN - SPAN 2

P:\2020\2020025 – Walla Walla Dell Sharpe Bridge Replacement\000 CAD\010 Drawing\C–Structural Sheet\S06–28.dwg\TAB:S15 modified by djensen on Jan 14, 2022 – 16:52

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

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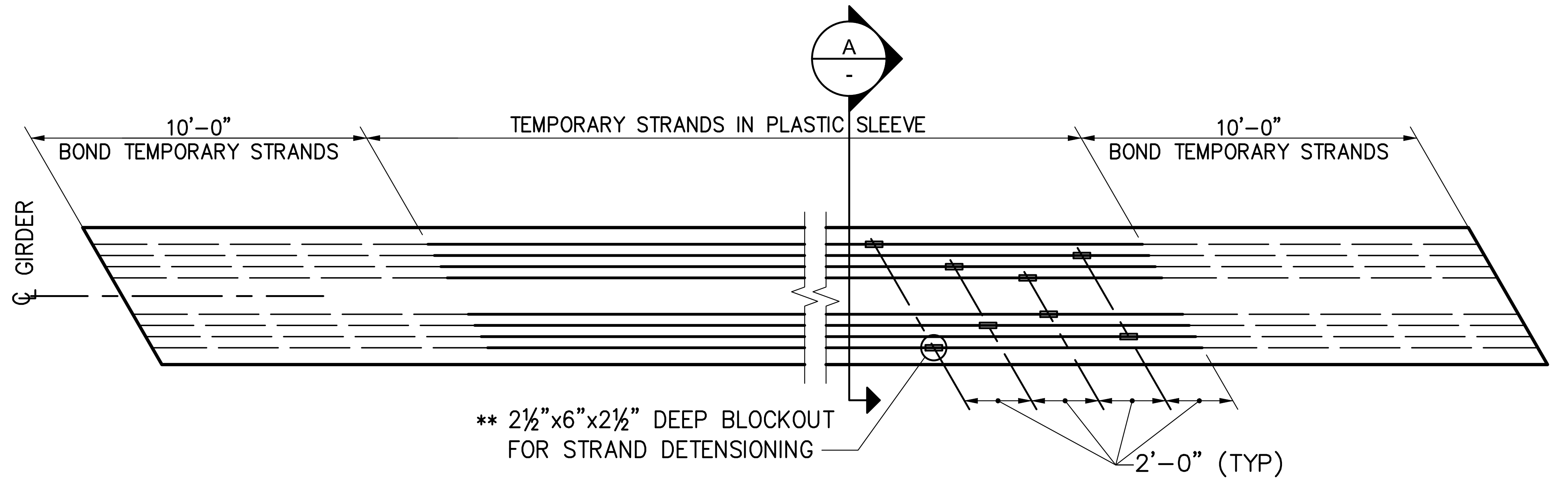
GIRDER SCHEDULE

SPAN	GIRDER	GIRDER SERIES	PLAN LENGTH (ALONG GIRDER GRADE) (SEE GIRDER NOTE 1)	INT. DIAPHRAGM TYPE (FULL OR PARTIAL)	GIRDER END DETAILS							MIN. CONC. COMP. STRENGTH		NUMBER OF STRANDS (SEE GIRDER NOTE 2)			LOCATION OF C.G. STRANDS			STRAIGHT STRANDS TO EXTEND				"A" DIMENSION AT ℄ BEARINGS	DECK SCREED CAMBER C	MIDSPAN VERTICAL DEFLECTION D		REINFORCEMENT DETAILS							SHIPPING AND HANDLING DETAILS					
																				END 1		END 2						ZONE 1		ZONE 2		ZONE 3								
					END 1 TYPE	END 2 TYPE	Ld	Θ1	Θ2	P1	P2	@ 28-DAYS F'C (KSI)	@ RELEASE F'CI (KSI)	STRAIGHT	HARPED	TEMPORARY	E	F℄	Fo	STRANDS	EXTENSION LENGTH	STRANDS	EXTENSION LENGTH			LOWER BOUND @ 40 DAYS	UPPER BOUND @ 120 DAYS	SPACING	LENGTH	SPACING	LENGTH	SPACING	LENGTH	H1	MAX MIDSPAN VERTICAL DEFLECTION AT SHIPPING	L	L1	L2	Kθ MINIMUM SHIPPING SUPPORT ROTATIONAL SPRING CONSTANT	W_{CC} MINIMUM SHIPPING SUPPORT CTR-TO-CTR WHEEL SPACING
1	ALL	WF83G	159'-2⅝"	PARTIAL	B	D	–	90°	90°	1'-6"	–	8	6	38	14	2	3½"	4⅜"	10"	–	–	●	4'-0"	12"	2⅝"	2¼"	5⅜"	3"	1'-9"	6"	12'-0"	9"	4'-6"	8'-1⅝"	6¾"	9'-0"	15'-0"	15'-3"	60,000 $\frac{KIP\cdot IN}{RAD}$	6'-0"
2	ALL	WF83G	159'-2⅝"	PARTIAL	D	B	–	90°	90°	–	1'-6"	8	6	38	14	2	3½"	4⅜"	10"	●	4'-0"	–	–	12"	2⅝"	2¼"	5⅜"	3"	1'-9"	6"	12'-0"	9"	4'-6"	8'-1⅝"	6⅝"	9'-0"	15'-0"	15'-3"	60,000 $\frac{KIP\cdot IN}{RAD}$	6'-0"

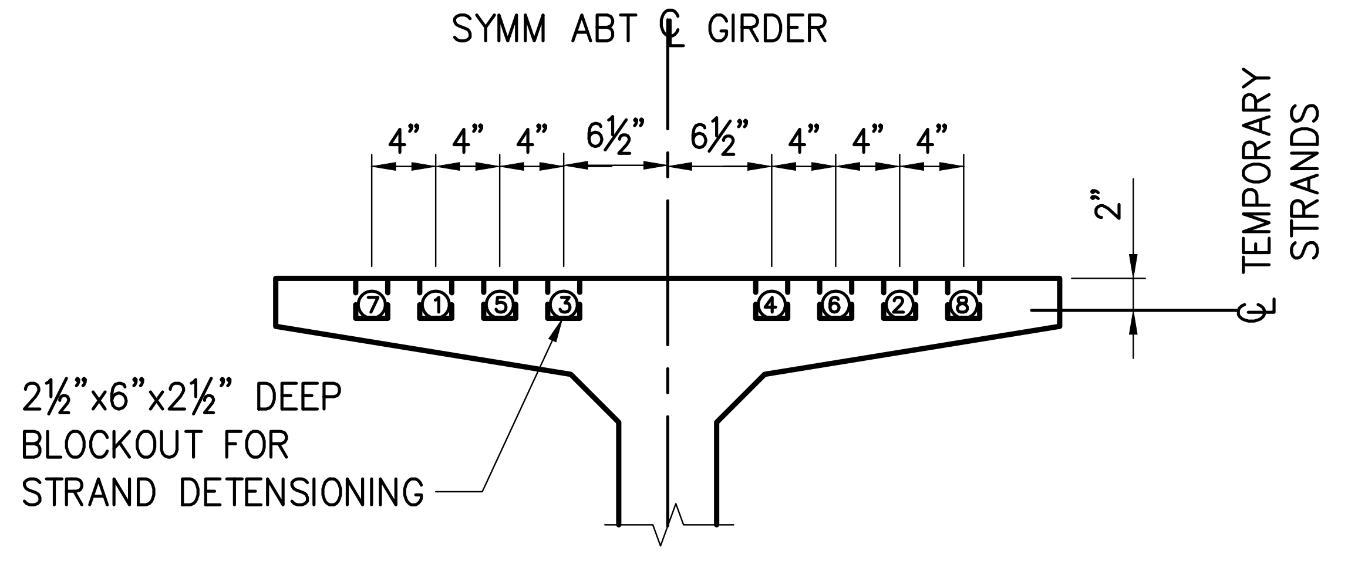
SEE GIRDER NOTE 3

SEE GIRDER NOTE 3



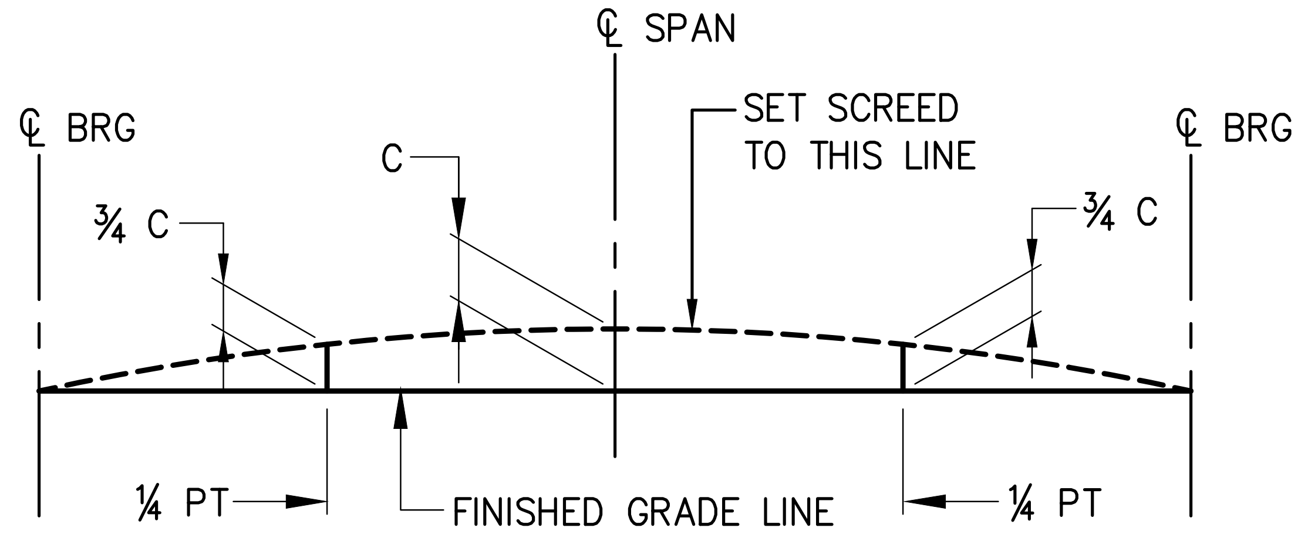
PLAN - PRETENSIONED TEMPORARY TOP STRANDS

SEE GIRDER SCHEDULE FOR NUMBER OF TEMPORARY STRANDS REQUIRED.



SECTION A/–

TEMPORARY STRAND
LOCATION SEQUENCE SHALL
BE AS SHOWN ①, ② ETC.



SCREED SETTING DIMENSIONS

FOR DIMENSION "C" SEE GIRDER SCHEDULE

TEMPORARY STRAND NOTES:

1. FOR GIRDERS ERECTED ON A LONGITUDINAL GRADE, STRAND DETENSIONING BLOCKOUTS SHALL BE PLAM CED AT THE LOW END OF THE GIRDER.
2. SEE SHEET S04 FOR TEMPORARY STRAND DETENSIONING PROCEDURE.

GIRDER NOTES:

1. PLAN LENGTH SHALL BE INCREASED AS NECESSARY TO COMPENSATE FOR SHORTENING DUE TO PRESTRESS AND SHRINKAGE.
2. ALL PRETENSIONED AND TEMPORARY STRANDS SHALL BE 0.6"ø AASHTO M203 GRADE 270 LOW RELAXATION STRANDS, JACKED TO 202.5 KSI (42.9 KIPS PER STRAND).
3. EXTEND STRAIGHT STRANDS ③,④ AND ⑮ THROUGH ⑳ AT END AHEAD ON STATION.

   EXTEND STRAIGHT STRANDS ⑤,⑥, AND ⑨ THROUGH ⑭ AT END BACK ON STATION.

* GIRDER STIRRUPS SHALL BE SIZED ACCORDING TO THE EXPECTED VARIATION OF THE "A" DIMENSION TO MEET THE BENDING REQUIREMENTS SHOWN ON SHEET S21.

** FORM WITH EXPANDED POLYSTYRENE (TYP).

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

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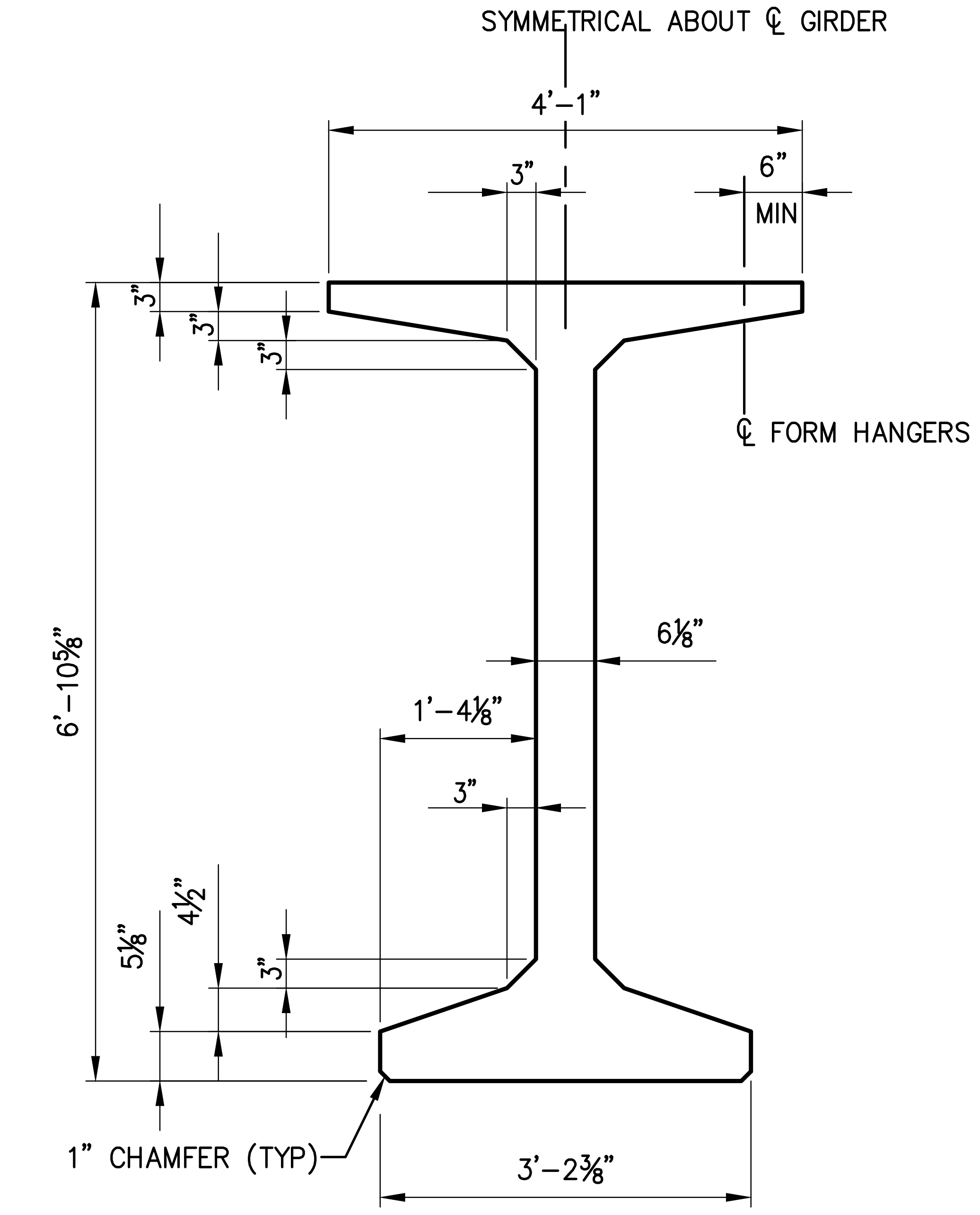
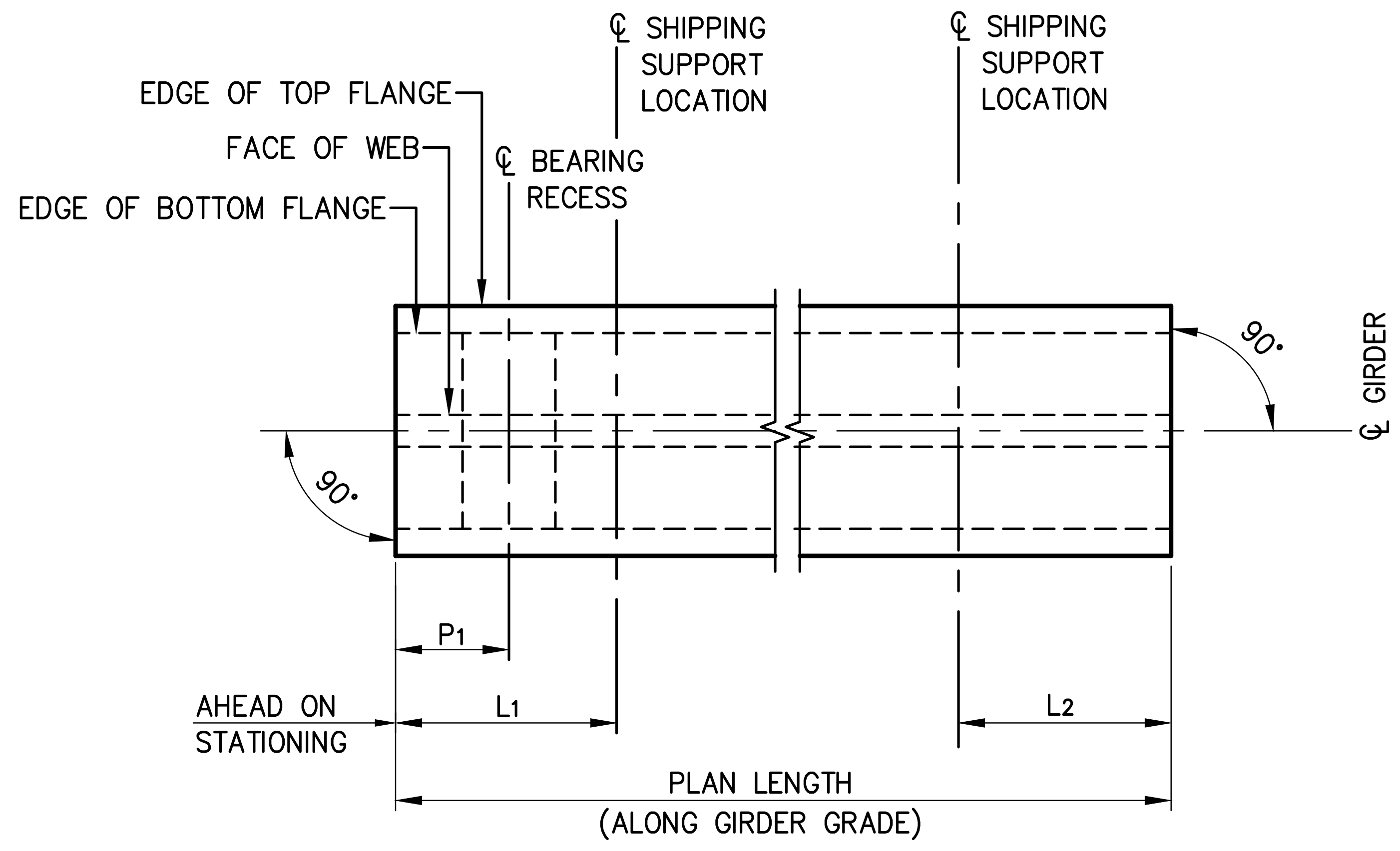
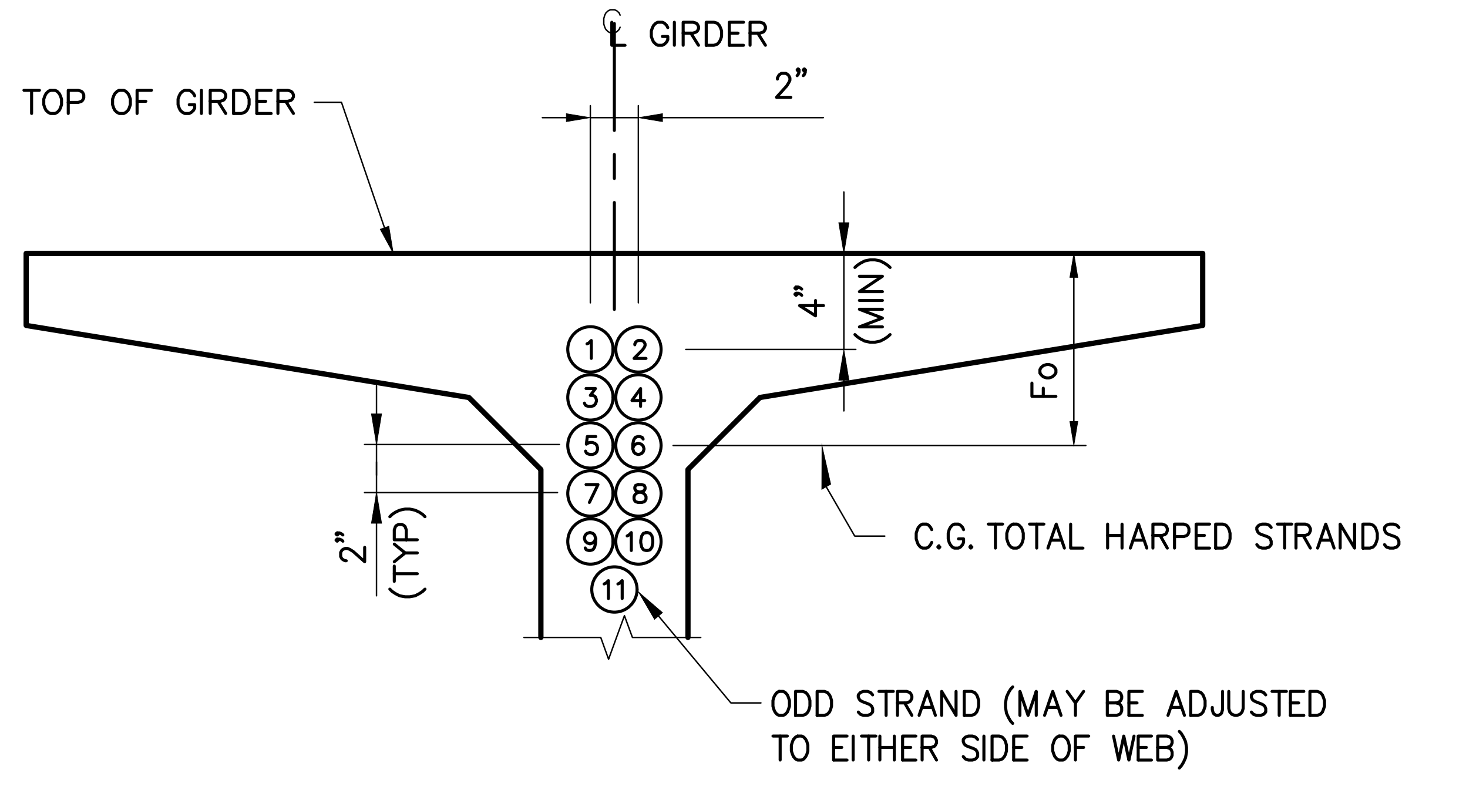


SECTION (A/–)

REINF AND STRANDS NOT SHOWN

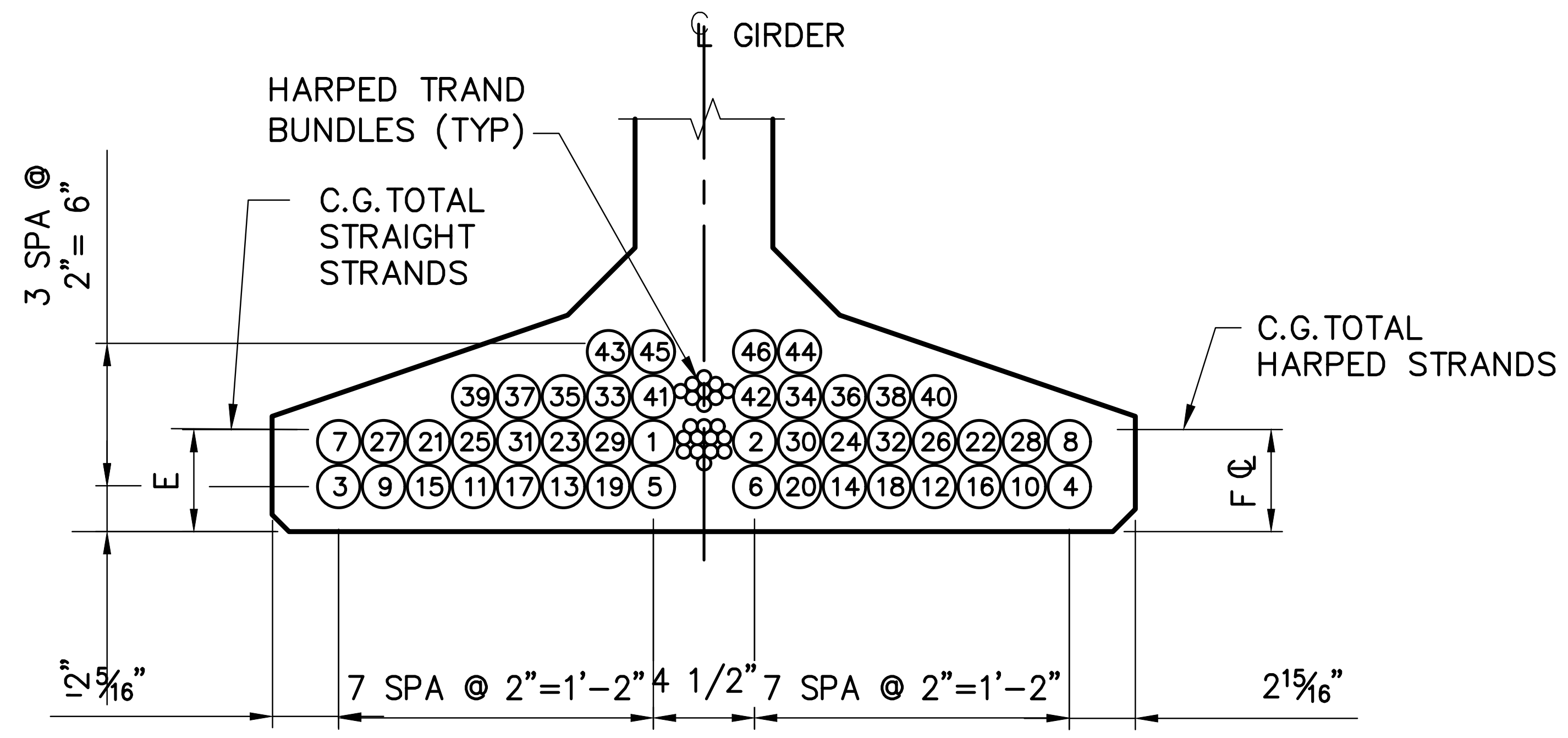


GIRDER PLAN



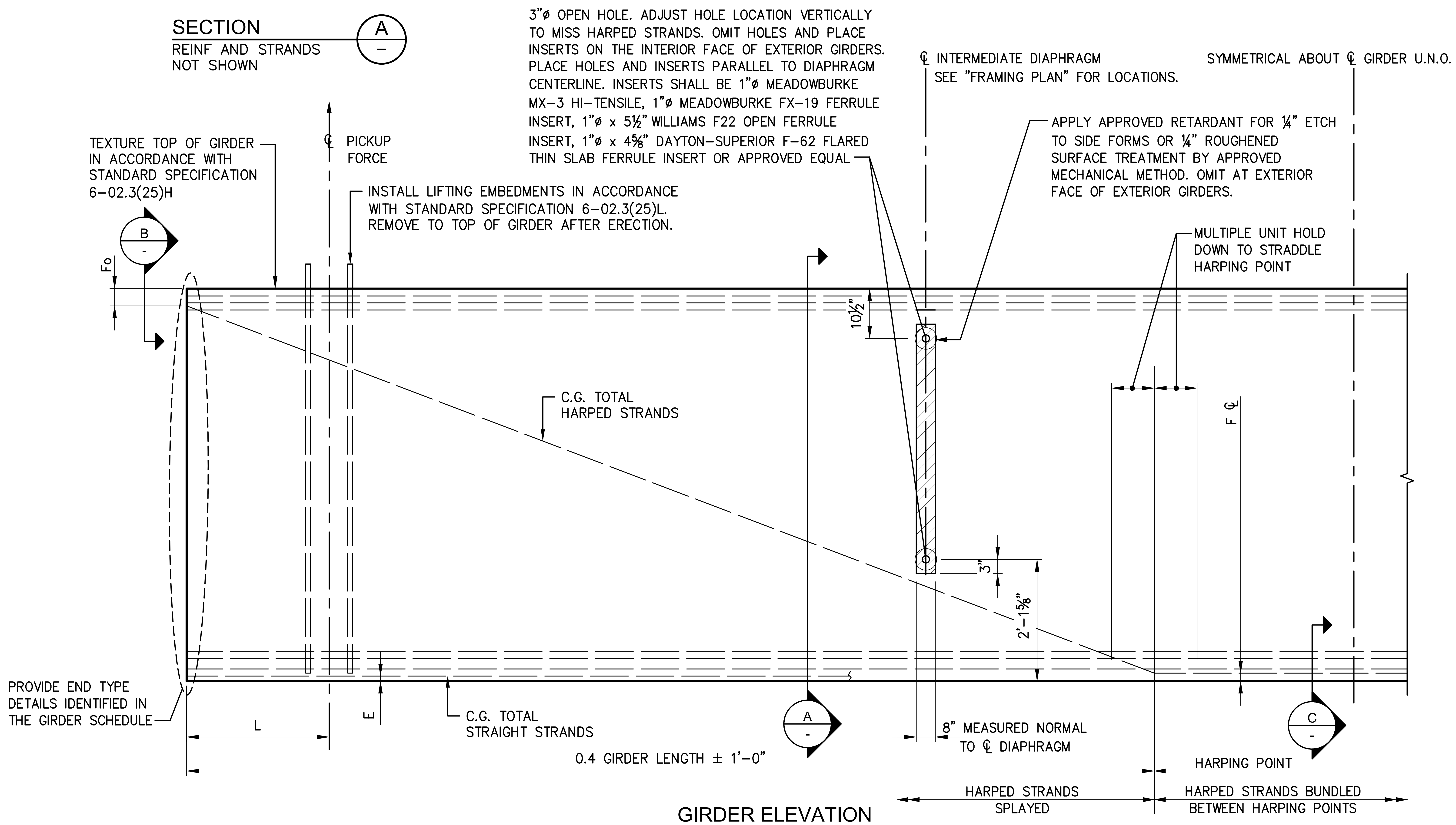
VIEW (B/–)

HARPED STRAND LOCATION SEQUENCE SHALL BE AS SHOWN ①, ②, ETC



SECTION (C/–)

SHAPED STRAND LOCATION SEQUENCE SHALL BE AS SHOWN ①, ②, ETC



GIRDER ELEVATION

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

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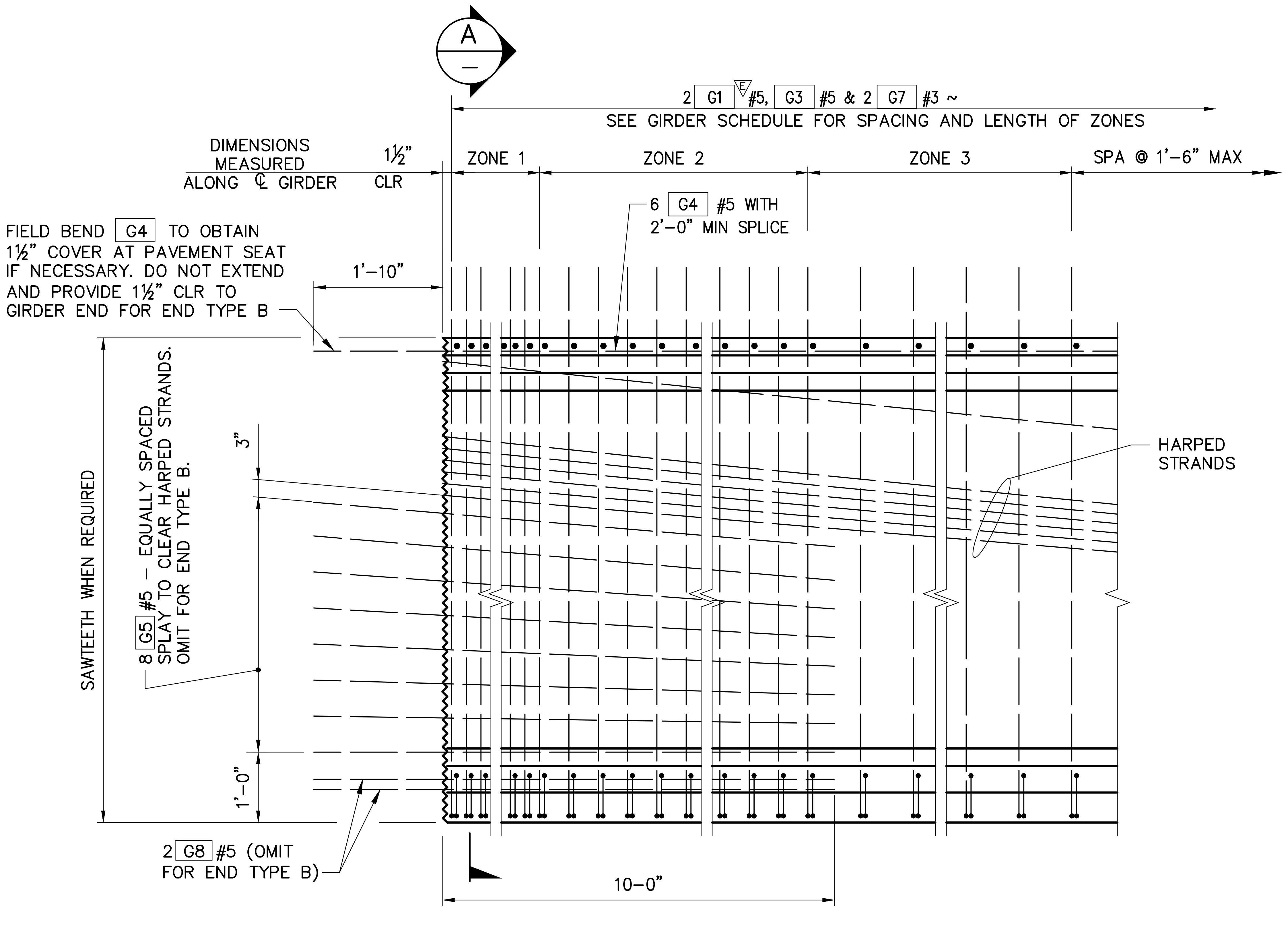
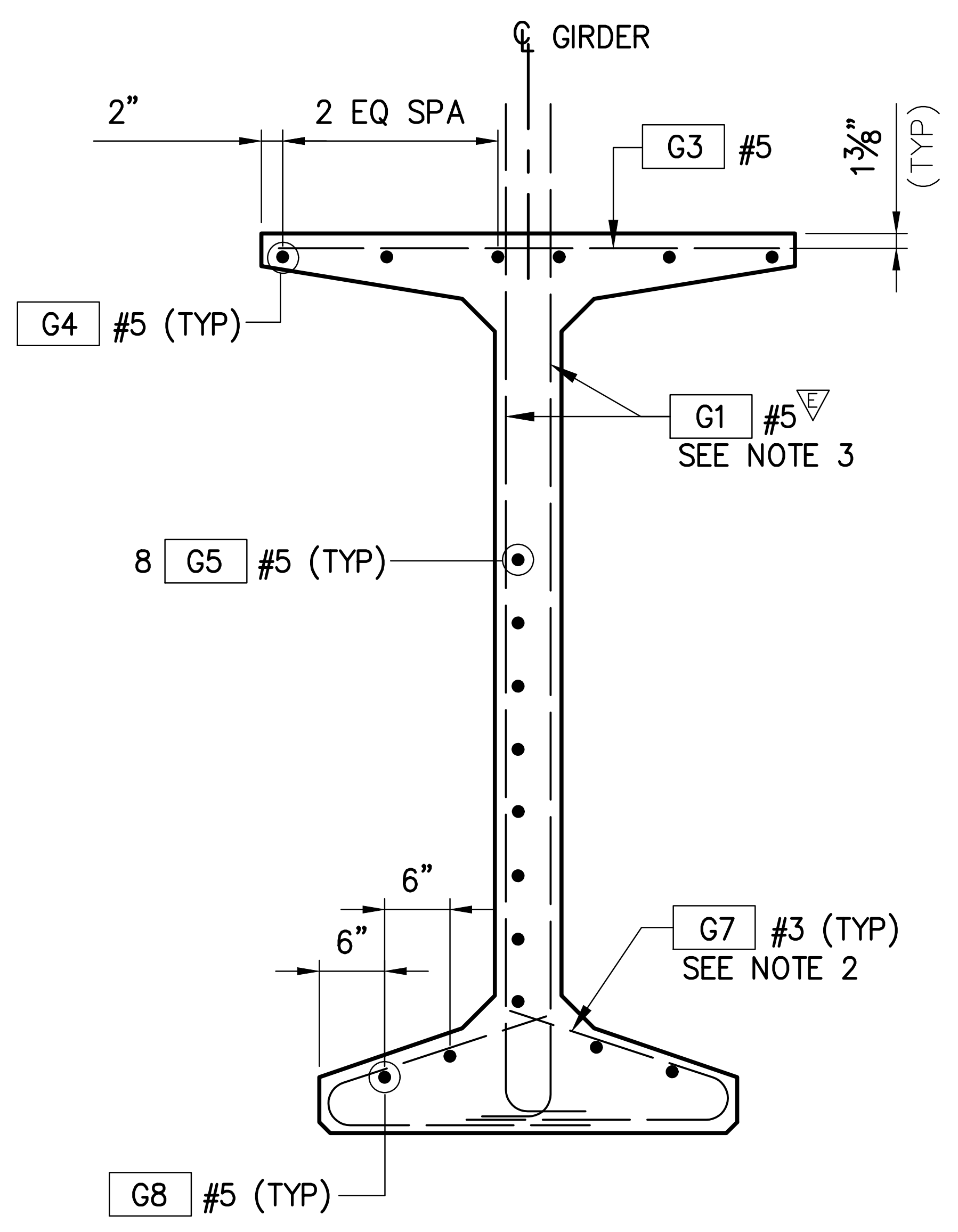


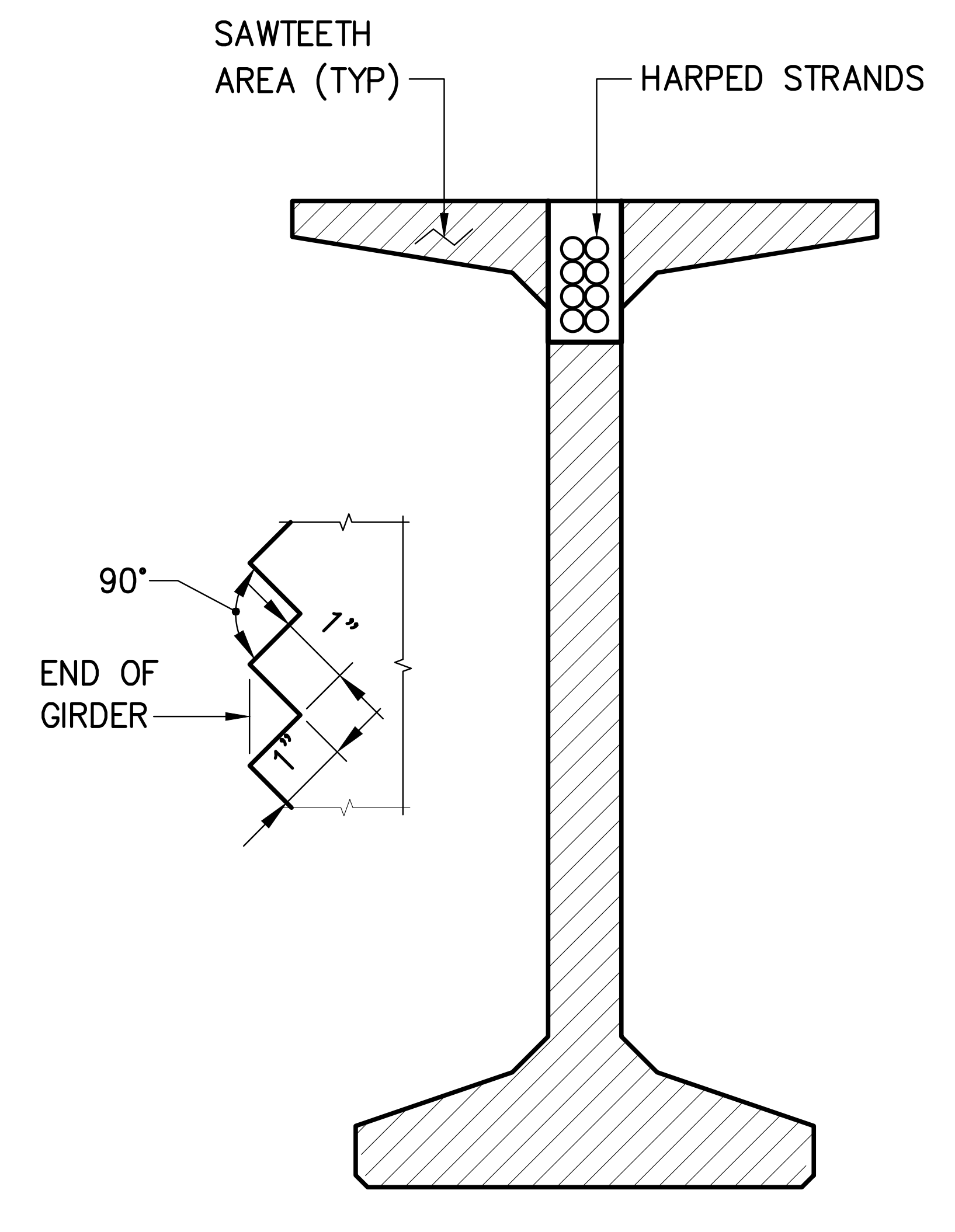
REINFORCEMENT END ELEVATION

STRAIGHT STRANDS NOT SHOWN FOR CLARITY



SECTION A –

STRANDS NOT SHOWN



SAWTEETH DETAILS

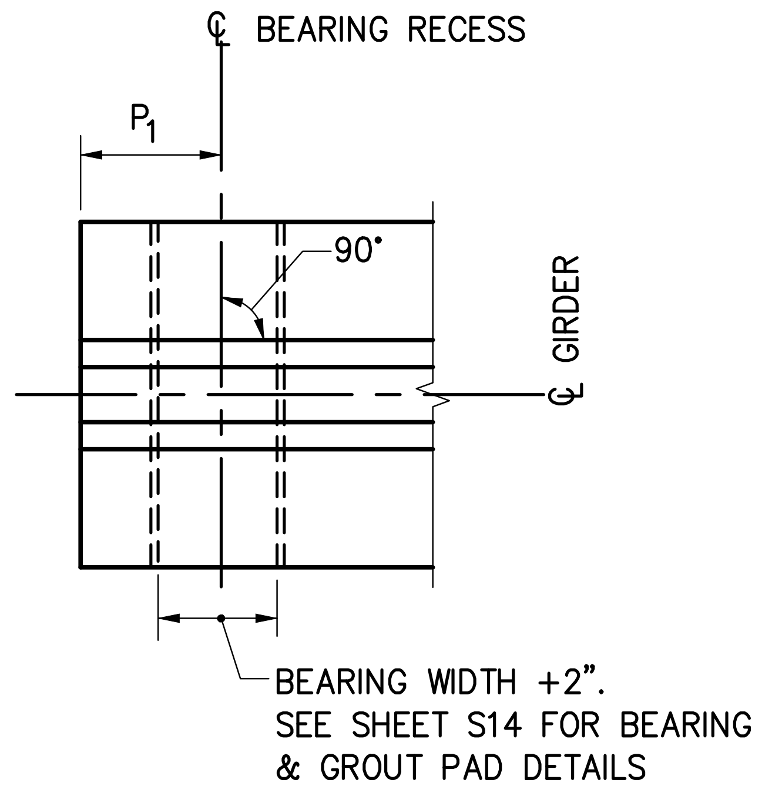
SAWTEETH SHALL BE FULL WIDTH OVER AREA SHOWN

GIRDER REINFORCMENT NOTES

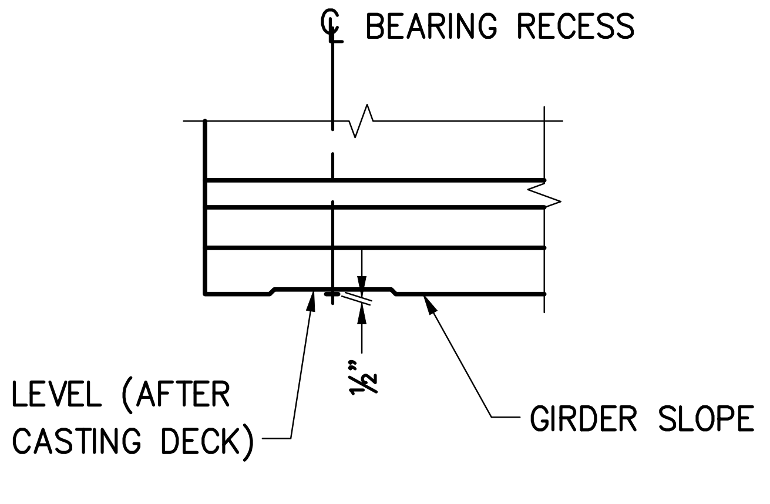
1. DEFORMED WELDED WIRE REINFORCEMENT MAY BE SUBSTITUTED FOR MILD REINFORCEMENT IN ACCORDANCE WITH STANDARD SPECIFICATION 6–02.3(25)A.
2. PAIRS OF G7 BARS OR G9 AND G10 BARS MAY BE USED INTERCHANGEABLY AS BOTTOM FLANGE TIES.
3. 1 G2 MAY BE SUBSTITUTED FOR 2 G1 WITHIN ZONE 1.

NOTES

1. 1$1\frac{1}{16}$"ø MIN STRAND CHUCK TACK WELDED TO ASTM A36 ℄ ½" x 4" x 0'–4" WITH ¾"ø HOLE PRIOR TO INSTALLING ON STRAND, ASTM A108 2¾"ø x 1⅛" STRAND ANCHOR, OR APPROVED EQUAL (TYP). VERIFY STRAND GRIPS ARE SEATED TIGHTLY IMMEDIATELY BEFORE PLACING DIAPHRAGM CONCRETE. SECURELY TIE ANCHOR TO THE REBAR CAGE TO PREVENT DISPLACEMENT DURING CONCRETE PLACEMENT.
2. CUT ALL STRANDS FLUSH WITH THE GIRDER ENDS AND PAINT WITH AN APPROVED EPOXY RESIN, EXCEPT FOR EXTENDED STRANDS AS SHOWN.
3. MEASURED NORMAL TO ℄ DIAPHRAGM
4. APPLY APPROVED RETARDANT FOR ¼" ETCH TO SIDE FORMS OR ¼" ROUGHENED SURFACE TREATMENT BY APPROVED MECHANICAL METHOD. OMIT AT EXTERIOR FACE OF EXTERIOR GIRDERS.
5. ADJUST HOLE LOCATION VERTICALLY TO MISS HARPED STRANDS. OMIT HOLES AND PLACE INSERTS ON THE INTERIOR FACE OF EXTERIOR GIRDERS. PLACE HOLES AND INSERTS PARALLEL TO DIAPHRAGM CENTERLINE. INSERTS SHALL BE 1"ø MEADOWBURKE MX–3 HI–TENSILE, 1"ø MEADOWBURKE FX–19 FERRULE INSERT, 1"ø x 5½" WILLIAMS F22 OPEN FERRULE INSERT, 1"ø x 4⅝" DAYTON–SUPERIOR F–62 FLARED THIN SLAB FERRULE INSERT OR APPROVED EQUAL.



PLAN



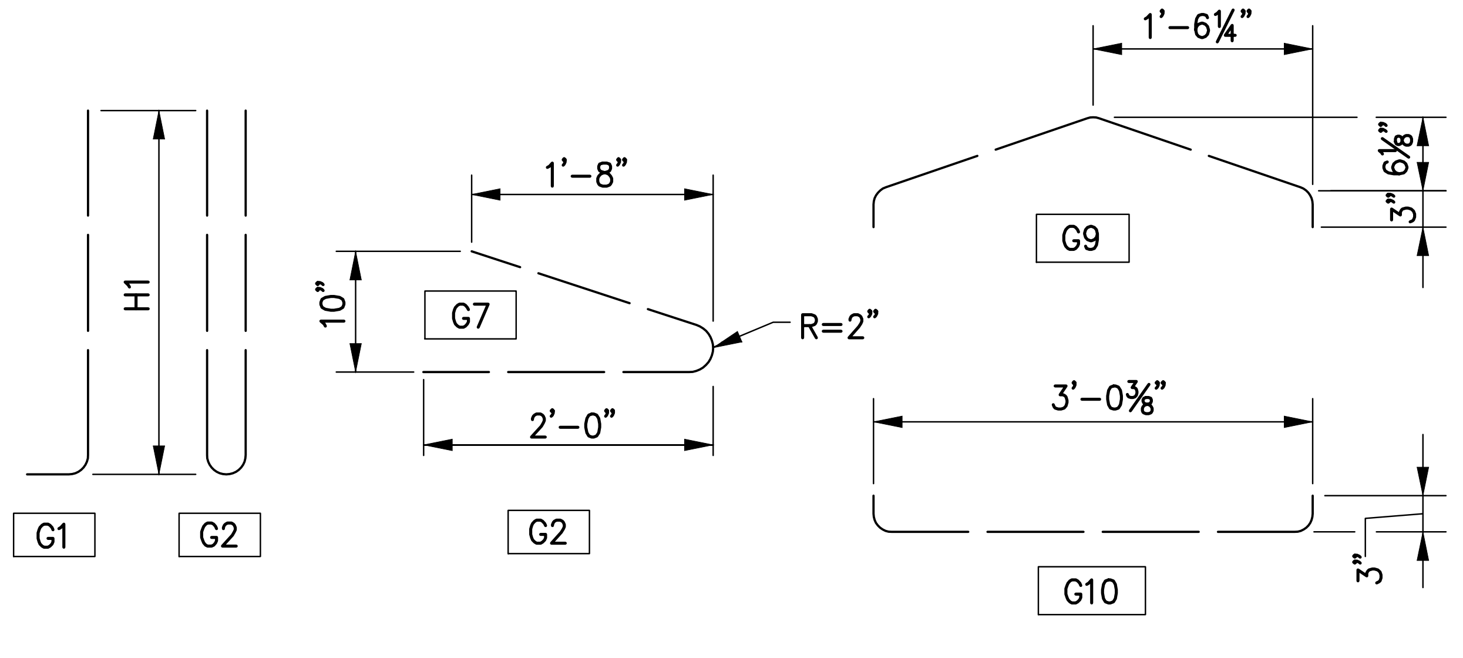
ELEVATION

BEARING RECESS AND BOTTOM FLANGE SPALL PROTECTION DETAIL

BEARING RECESS FORMS SHALL BE CONSTRUCTED AND FASTENED TO AVOID GIRDER DAMAGE DURING STRAND RELEASE.

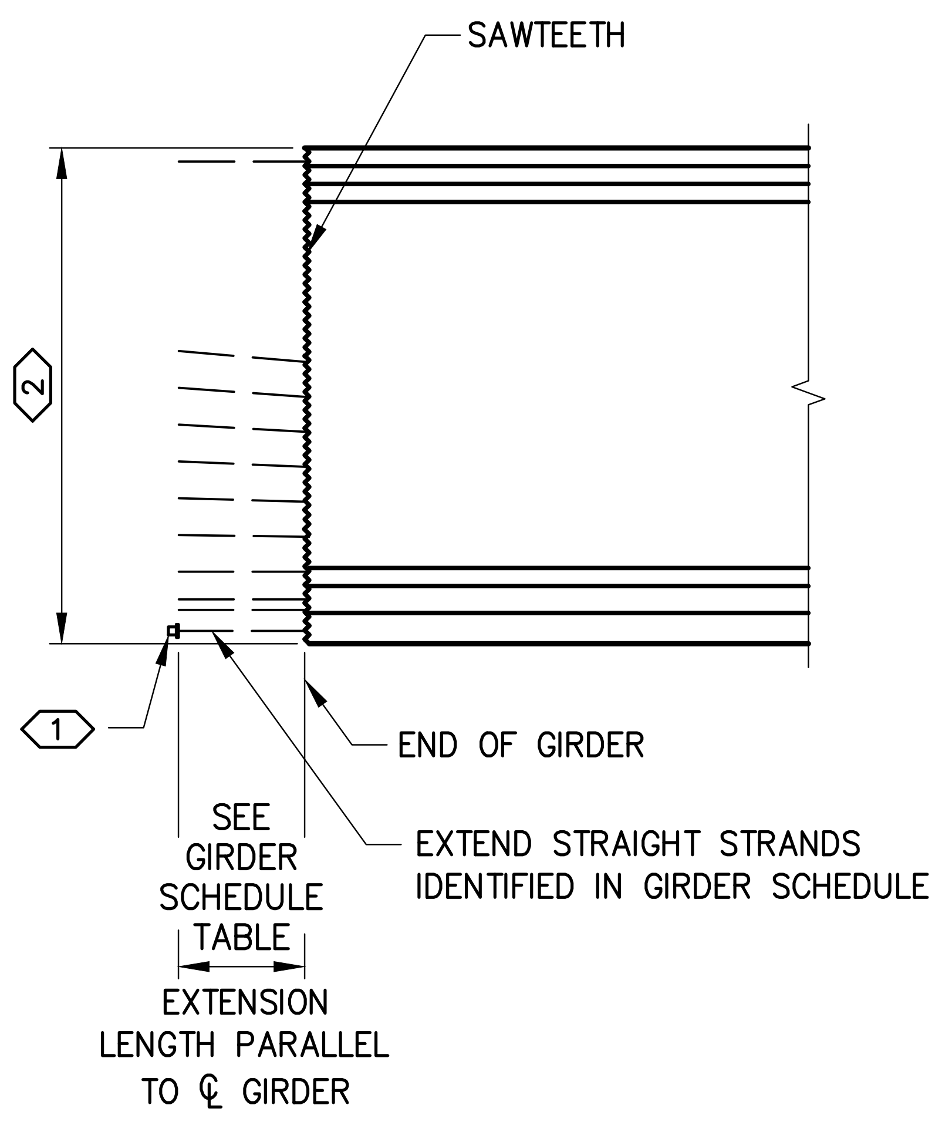
BENDING DIAGRAM

(ALL DIMENSIONS ARE OUT TO OUT)

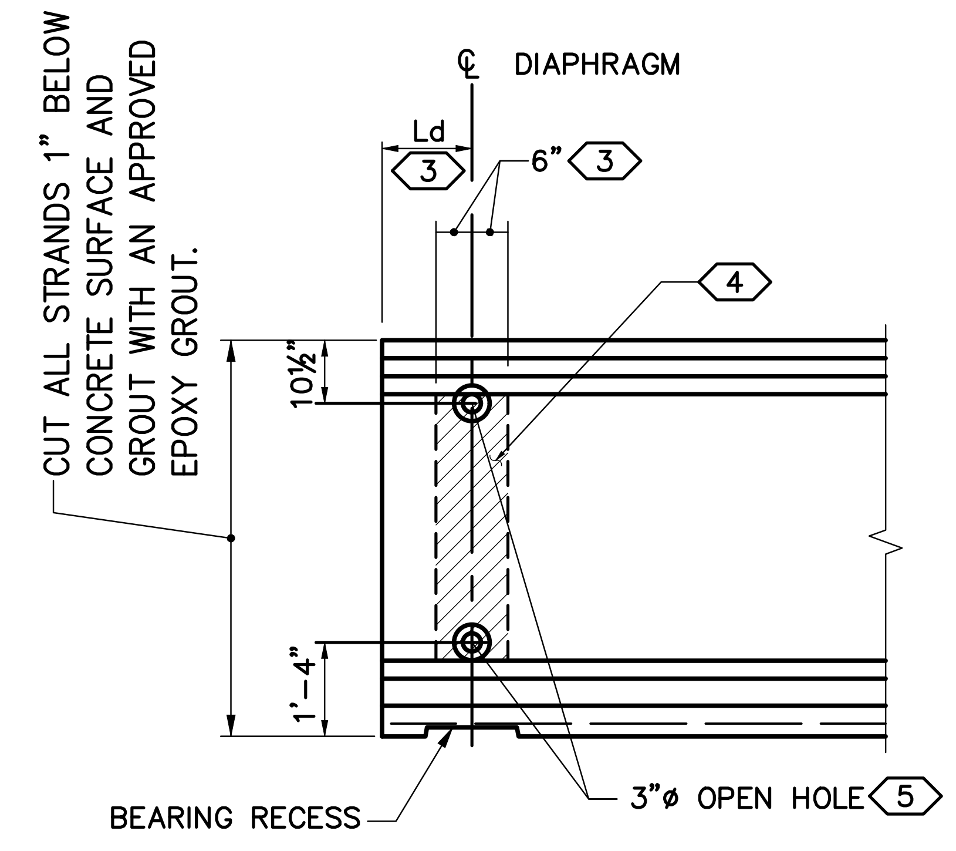


PAIRS OF G7 BARS, OR G9 AND G10 BARS, MAY BE USED INTERCHANGEABLY AS BOTTOM FLANGE TIES.

1 G2 MAY BE SUBSTITUTED FOR 2 G1 WITHIN ZONE 1.



STRAND EXTENSION DETAIL - END TYPE D



END TYPE B

MEASURED NORMAL TO ℄ DIAPHRAGM

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

PRESTRESSED GIRDER DETAILS 3

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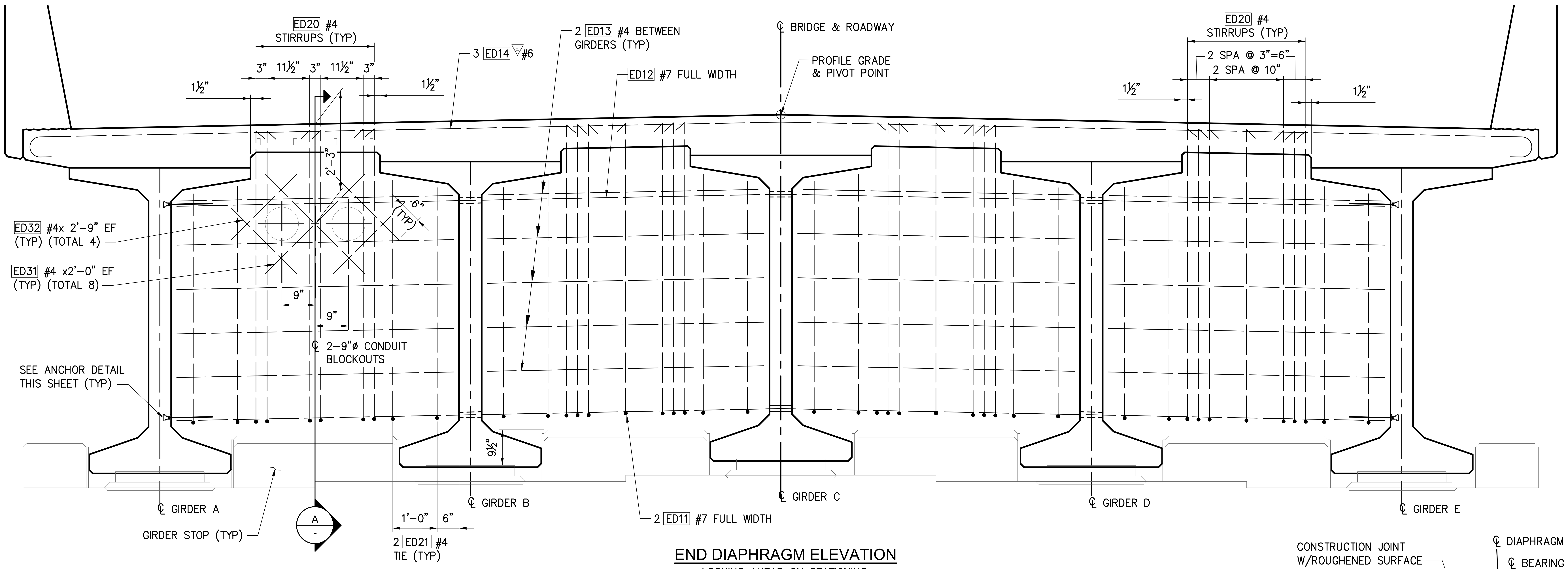
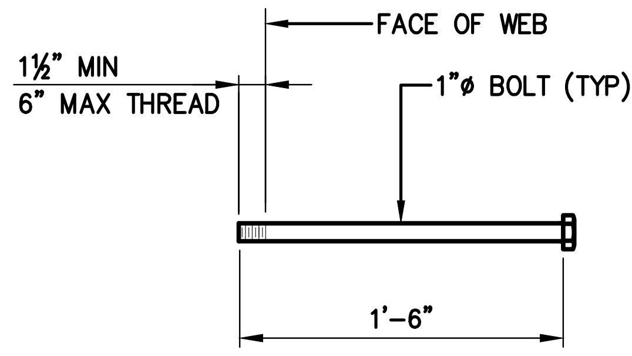


END DIAPHRAGM ELEVATION

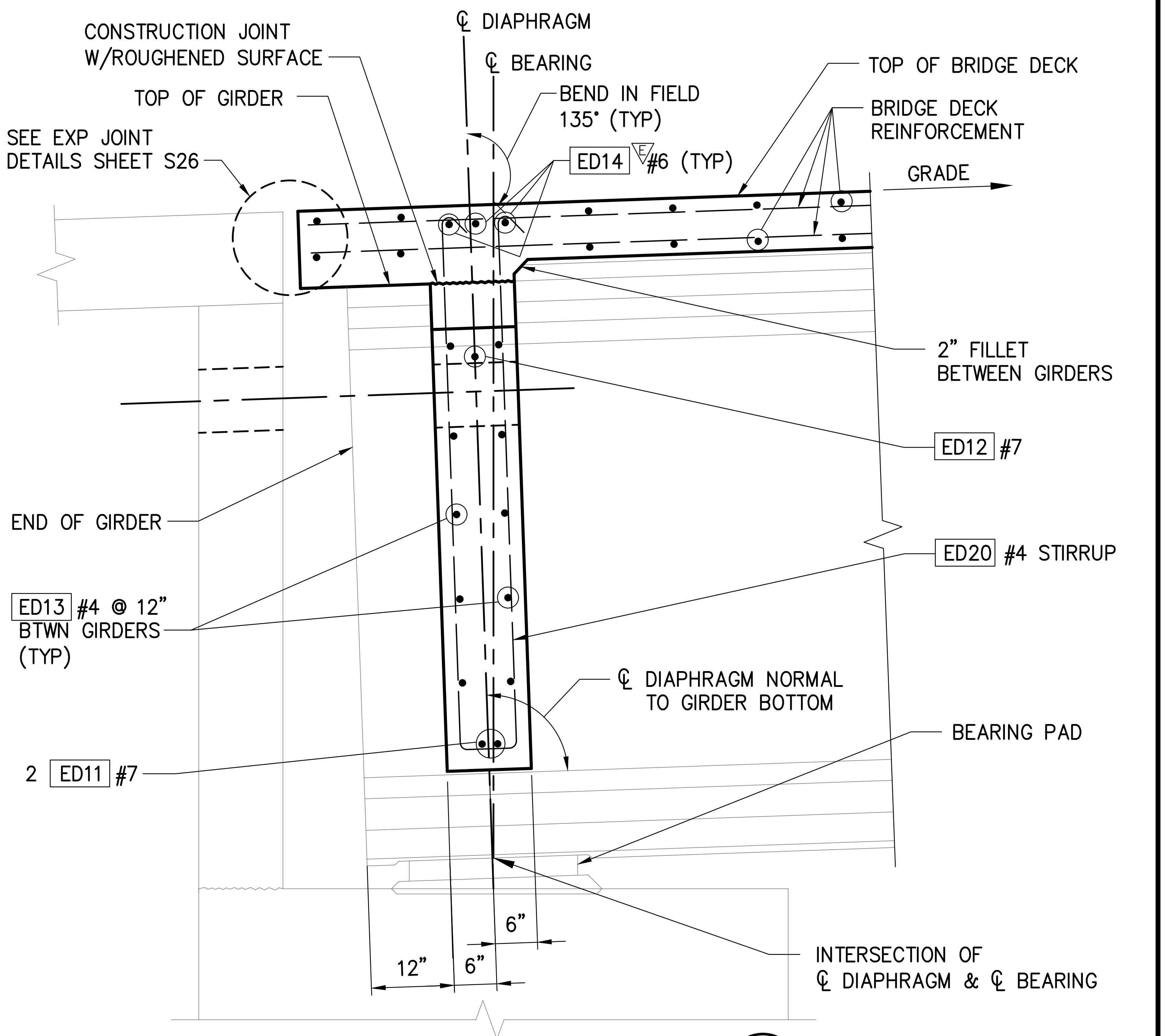
LOOKING AHEAD ON STATIONING
PIER 3 SHOWN, PIER 1 SIMILAR
DIMENSIONS ARE ALONG CL DIAPHRAGM

DIAPHRAGM NOTES:

1. GIRDERS SHALL BE HELD RIGIDLY IN PLACE WHEN DIAPHRAGMS ARE PLACED.
2. IT MAY BE NECESSARY TO THREAD #7 REINFORCING BARS THROUGH HOLES IN GIRDERS PRIOR TO PLACING EXTERIOR GIRDERS.
3. CUT/RELEASE GIRDER TEMPORARY STRANDS BEFORE CASTING DIAPHRAGM. SEE TEMPORARY STRAND CUTTING SEQUENCE.
4. FOR CONCRETE PLACEMENT PROCEDURE SEE SHEET S04.



ANCHOR DETAIL



SECTION A -

DIAPHRAGM AT PIER 1 SHOWN, PIER 3 SIMILAR
GIRDER STOP NOT SHOWN FOR CLARITY
LONGITUDINAL DIMENSIONS ARE NORMAL TO DIAPHRAGM

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

END DIAPHRAGM DETAILS

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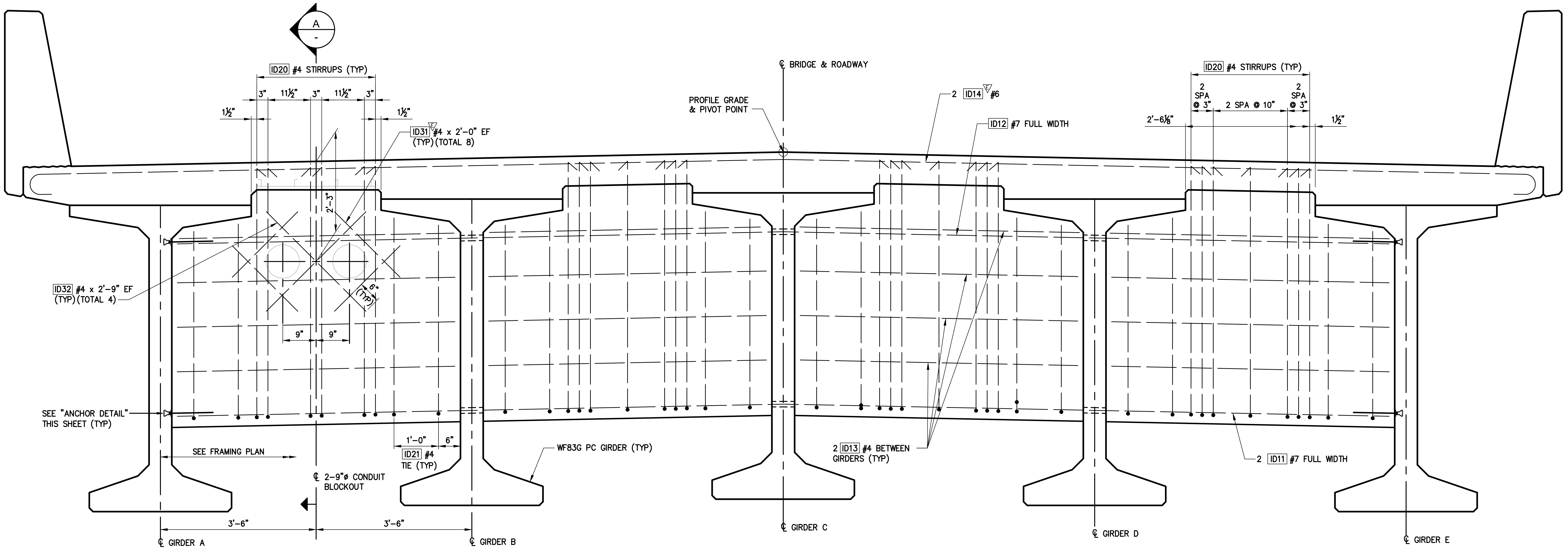
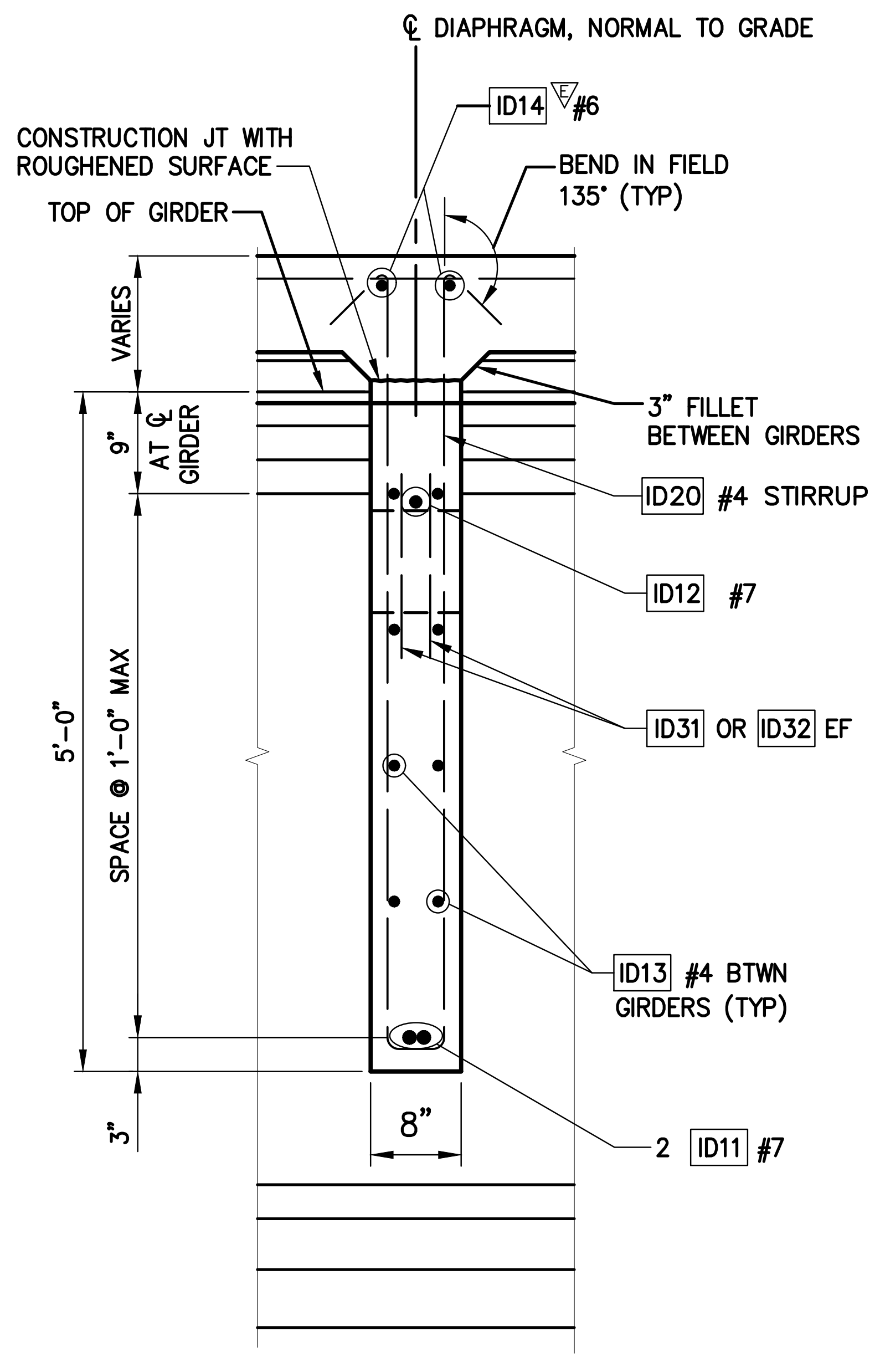


INTERMEDIATE DIAPHRAGM ELEVATION

LOOKING AHEAD ON STATIONING

DIAPHRAGM NOTES:

1. GIRDERS SHALL BE HELD RIGIDLY IN PLACE WHEN DIAPHRAGMS ARE PLACED.
2. IT MAY BE NECESSARY TO THREAD REINFORCING BARS THROUGH HOLES IN GIRDERS PRIOR TO PLACING EXTERIOR GIRDERS.
3. CUT/RELEASE GIRDER TEMPORARY STRANDS BEFORE CASTING DIAPHRAGM. SEE TEMPORARY STRAND CUTTING SEQUENCE.
4. LONGITUDINAL DIMENSIONS ARE NORMAL TO SKEW.
5. FOR CONCRETE PLACEMENT PROCEDURE SEE SHEET S04.
6. CLEAR COVER AROUND BLOCKOUTS SHALL BE 1".



SECTION A
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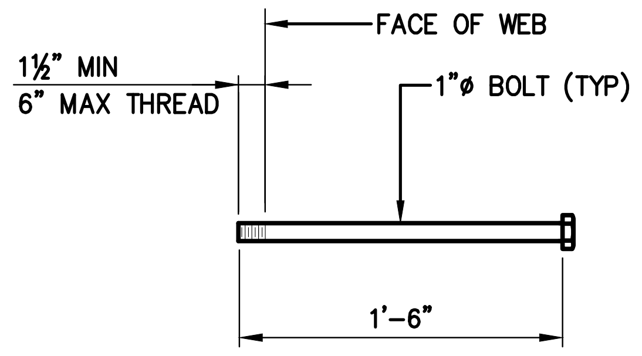

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INTERMEDIATE DIAPHRAGM DETAILS

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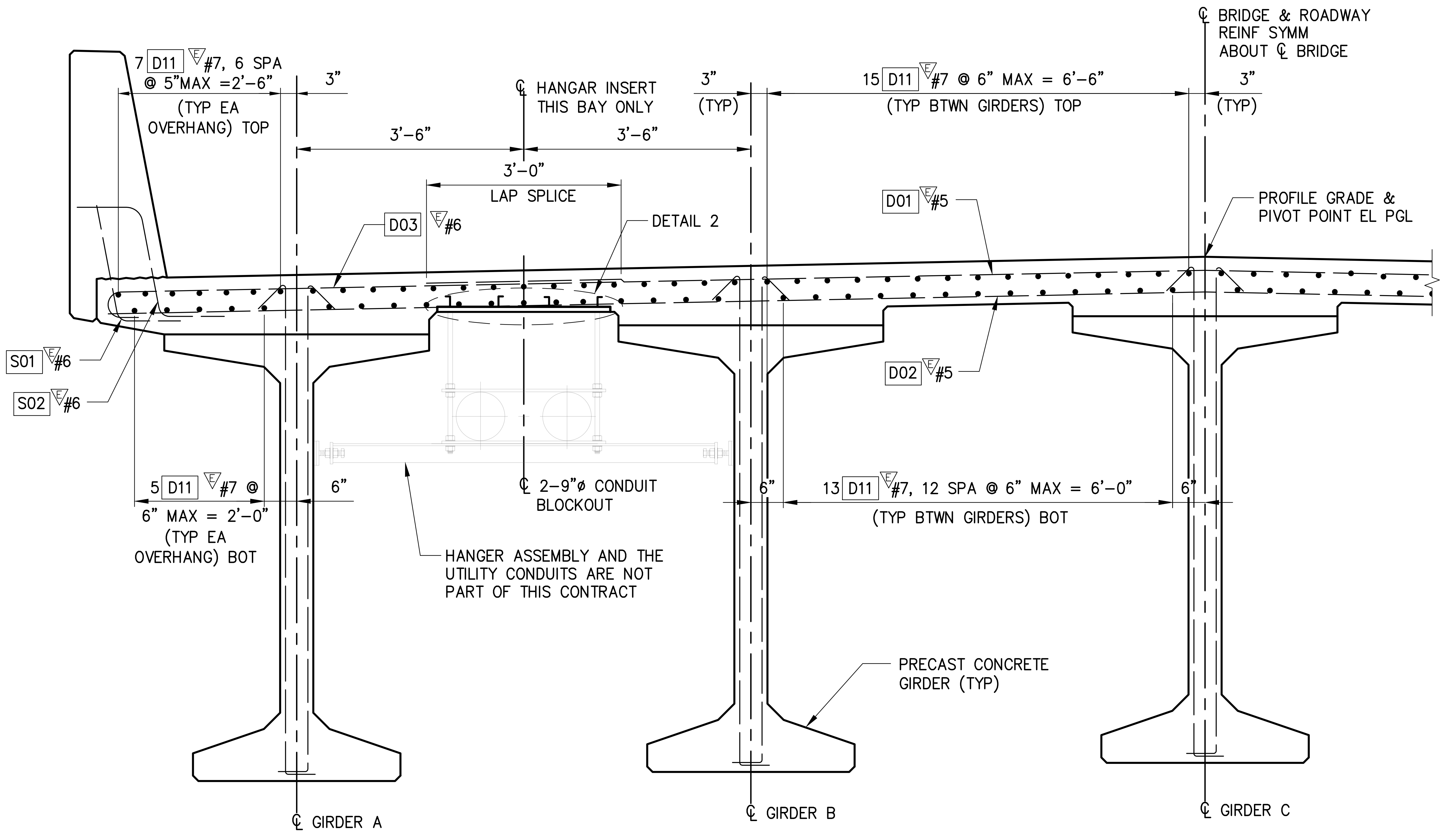
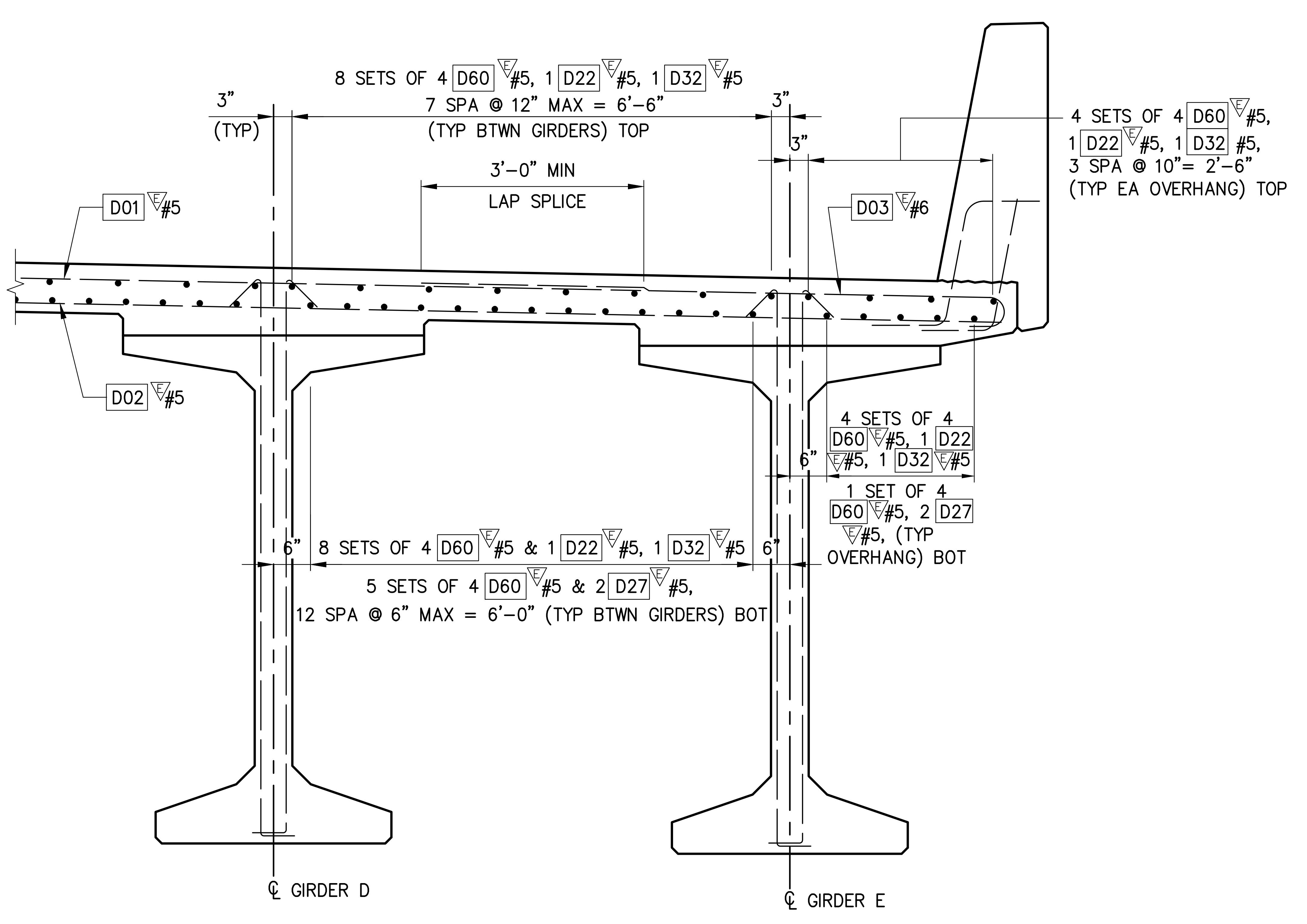


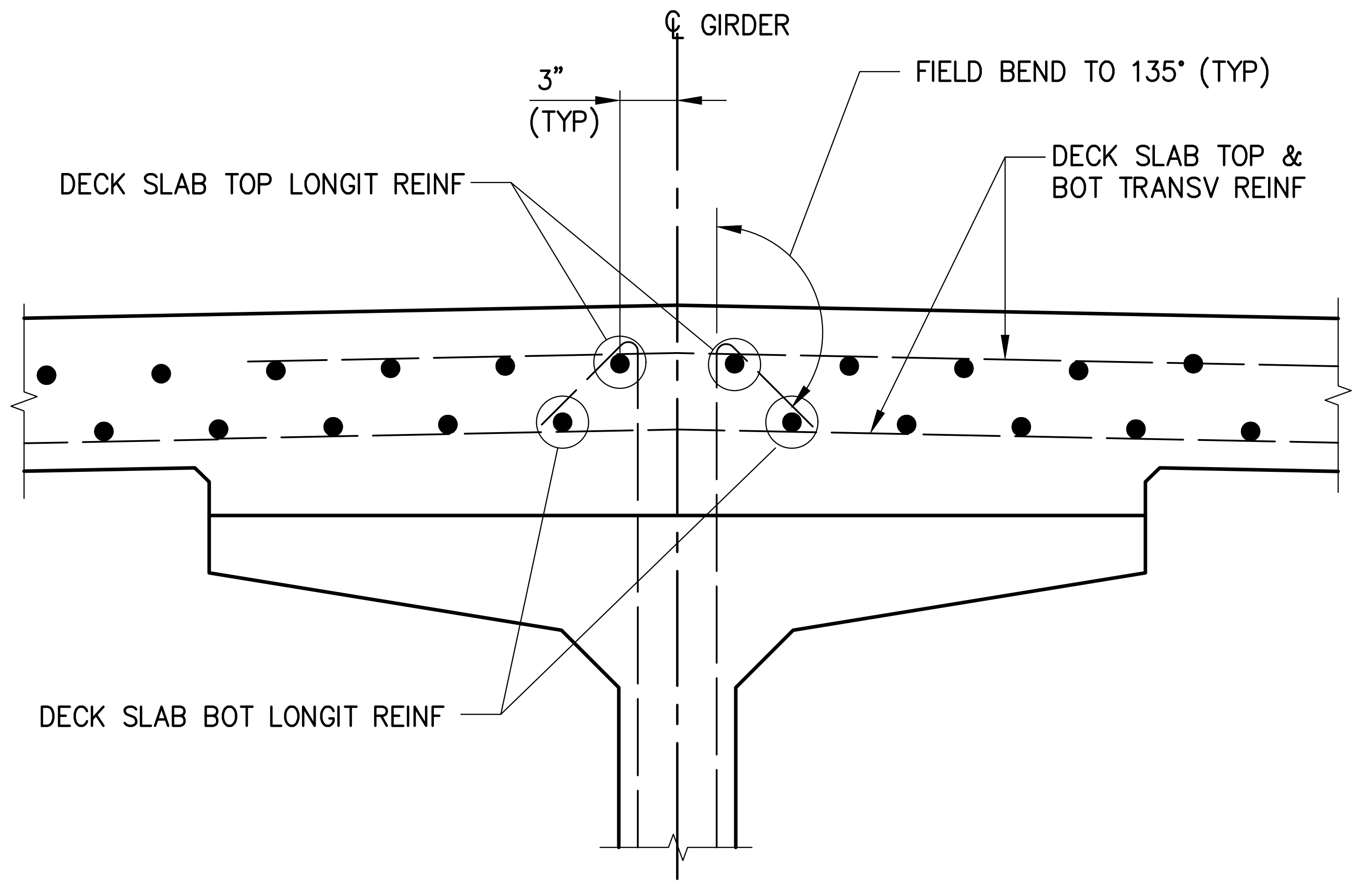
TYPICAL REINFORCING SECTION NEAR PIER 2

LOOKING AHEAD ON STATIONING

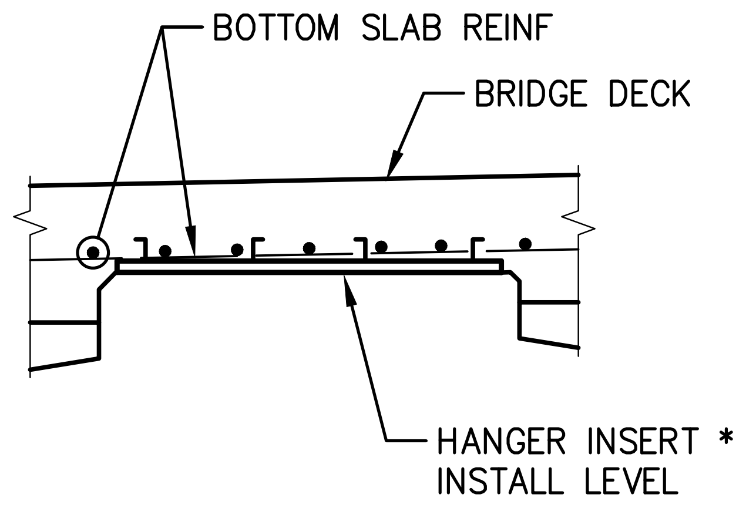


TYPICAL REINFORCING SECTION AT MIDSPAN

LOOKING AHEAD ON STATIONING



GIRDER HOOK DETAIL



DETAIL 2
—

* COOPER B-LINE B22-I-32, POWERSTRUT PS 349 2'8" CS/EC, OR UNISTRUT P3257, WITH SPRING NUT (TYP.). CHASE THREADS ON HANGER ROD FOR THREAD COMPATIBILITY WITH SPRING NUT. INSERT TO BE INSTALLED LEVEL LONGITUDINALLY AND TRANSVERSELY. PLACE INSERT TO PROVIDE FOR TRANSVERSE ADJUSTMENT OF HANGER RODS. HANGER RODS SHALL NOT BE WITHIN 2" OF THE END OF THE INSERT. TWO INSERTS MAY BE USED TO ACCOMMODATE SUPERELEVATION.

NOTES:

1. BAR D11 #7 IS 50'-0" LONG, PLACE AS SHOWN IN PLAN VIEWS.
2. SEE SHEET S27 FOR TRAFFIC BARRIER REINFORCEMENT EMBEDDED IN THE BRIDGE DECK.

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

DECK REINFORCING - TYPICAL SECTION

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NOTES:

1. SUGGESTED SPLICE LOCATIONS ARE SHOWN. LOCATION OF SPLICES SHALL BE DETERMINED BY THE CONTRACTOR UNLESS NOTED OTHERWISE ON THE PLANS. SPLICES BETWEEN ADJACENT LONGITUDINAL BARS SHALL BE STAGGERED AND NO MORE THAN 50% OF REINFORCEMENT SHALL BE SPLICED AT ANY ONE LOCATION.

   THE MIN LAP SPLICE OF ▽E#5 IS 2'–6"
   THE MIN LAP SPICE OF ▽E#6 IS 3'–0"
   THE MIN LAP SPLICE OF ▽E#7 IS 3'–6"

2. REINFORCEMENT IS SYMMETRICAL ABOUT THE CENTERLINE OF THE BRIDGE.

3. SEE SHEETS S27 & S28 FOR BARRIER REINFORCEMENT EMBEDDED IN THE BRIDGE DECK.

BRIDGE DECK REINFORCEMENT PLAN - SPAN 1

ALL TRANSVERSE REINFORCING ARE PLACED NORMAL TO ℄ BRIDGE

P:\2020\2020025 – Walla Walla Dell Sharpe Bridge Replacement\000 CAD\010 Drawing\C–Structural Sheet\S21–28.dwg\TAB:S22 modified by djensen on Jan 14, 2022 – 16:52

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

DECK REINFORCING SPAN 1

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BRIDGE DECK REINFORCEMENT PLAN - SPAN 2

ALL TRANSVERSE REINFORCING ARE PLACED NORMAL TO ℄ BRIDGE

NOTES:

1. SUGGESTED SPLICE LOCATIONS ARE SHOWN. LOCATION OF SPLICES SHALL BE DETERMINED BY THE CONTRACTOR UNLESS NOTED OTHERWISE ON THE PLANS. SPLICES BETWEEN ADJACENT LONGITUDINAL BARS SHALL BE STAGGERED AND NO MORE THAN 50% OF REINFORCEMENT SHALL BE SPLICED AT ANY ONE LOCATION.

   THE MIN LAP SPLICE OF ▽E #5 IS 2'–6"
   THE MIN LAP SPICE OF #6 IS 3'–0"
   THE MIN LAP SPLICE OF ▽E #7 IS 3'–6"

2. REINFORCEMENT IS SYMMETRICAL ABOUT THE CENTERLINE OF THE BRIDGE.

3. SEE SHEETS S27 & S28 FOR BARRIER REINFORCEMENT EMBEDDED IN THE BRIDGE DECK.

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

DECK REINFORCING SPAN 2

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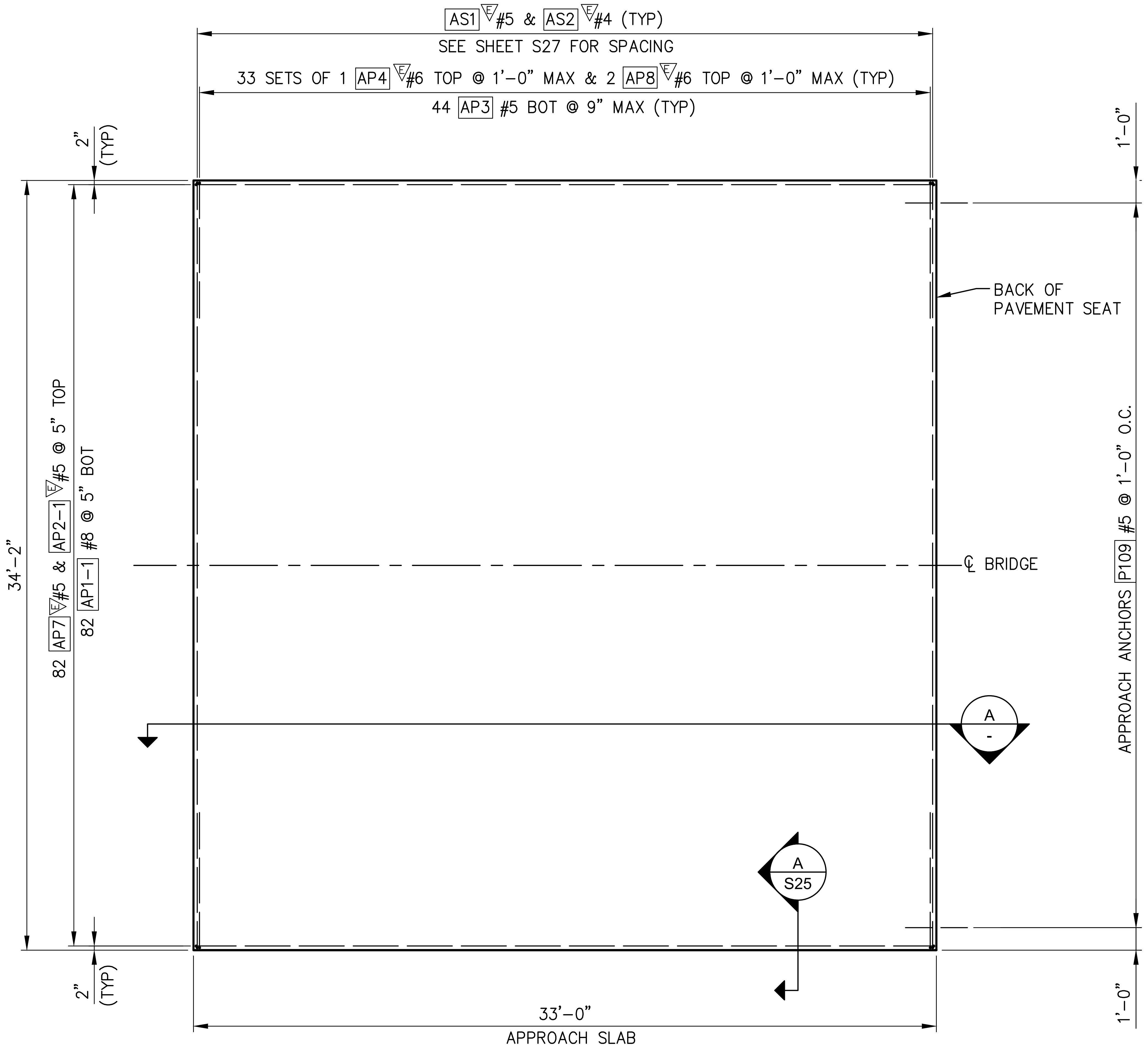
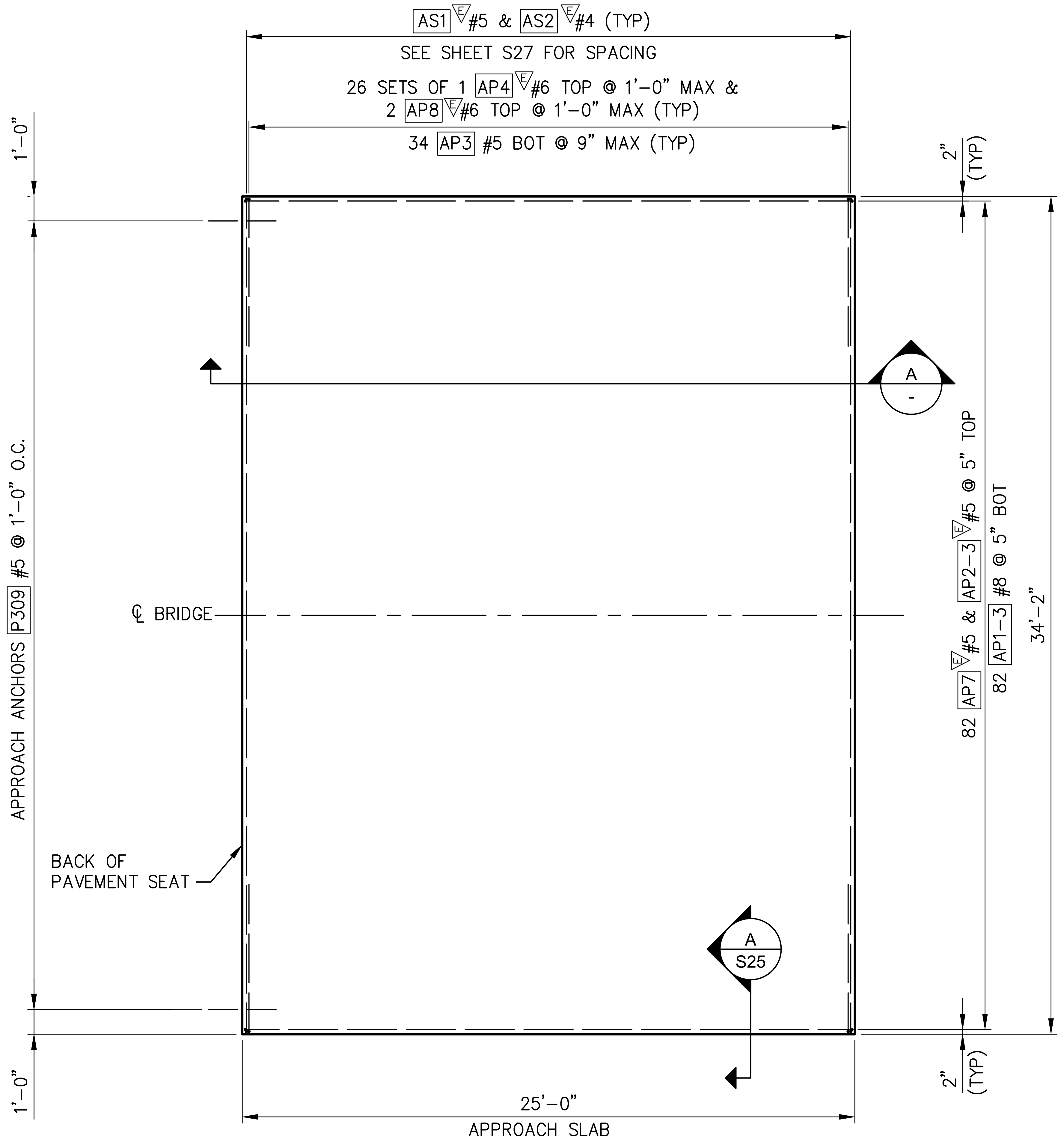


NORTH APPROACH SLAB PLAN

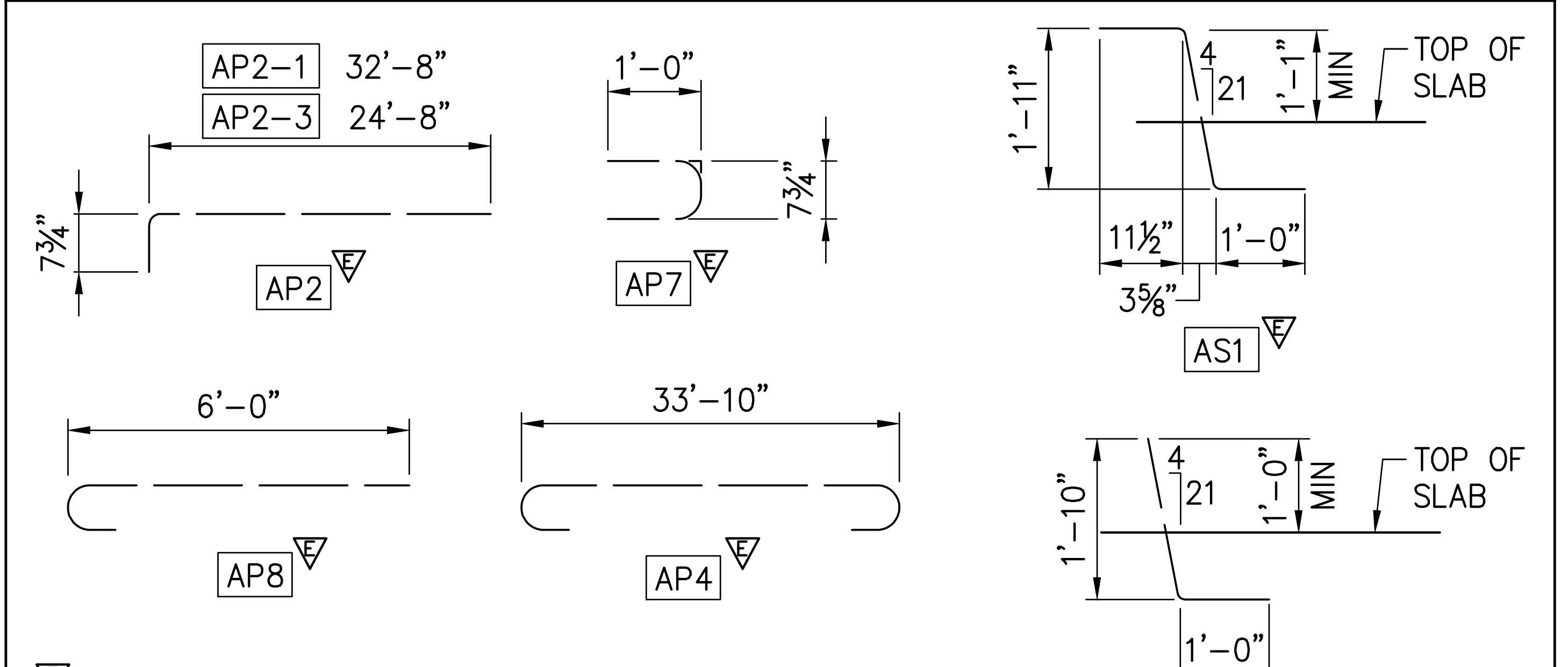


SOUTH APPROACH SLAB PLAN

APPROACH SLAB NOTES:

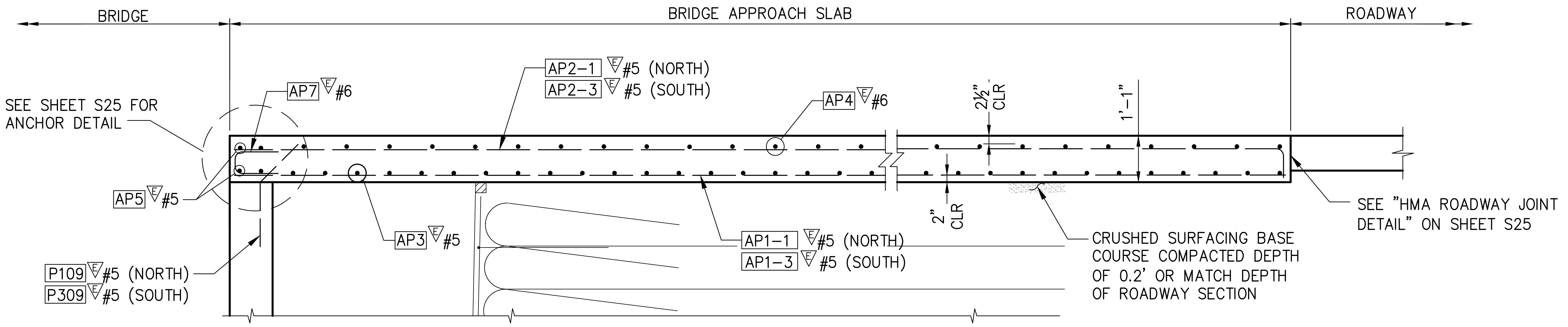
1. ALL EDGES OF BRIDGE APPROACH SLAB SHALL HAVE 1/2" RADIUS EXCEPT ADJACENT TO L-TYPE ABUTMENTS.
2. THE MINIMUM LAP SPLICE OF #5 IS 2'-0", ▽#5 IS 2'-6", ▽#6 IS 3'-0", AND #8 IS 3'-3". ALL LAP SPLICES SHALL BE STAGGERED SO THAT NO MORE THAN 50% OF REBAR IS SPLICED AT THE SAME LOCATION. LAP SPLICES SHALL BE LOCATED WITHIN THE MIDDLE HALF OF THE BRIDGE APPROACH SLAB. OPTIONAL SPLICES ARE ALLOWED FOR AP4 ▽#6.
3. FOR TRAFFIC BARRIER DETAILS, SEE TRAFFIC BARRIER SHEETS.

BENDING DIAGRAM



▽ = EPOXY COATED REINFORCING STEEL

NOTE: ALL DIMENSIONS ARE OUT TO OUT



SECTION A
–

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

APPROACH SLAB LAYOUT

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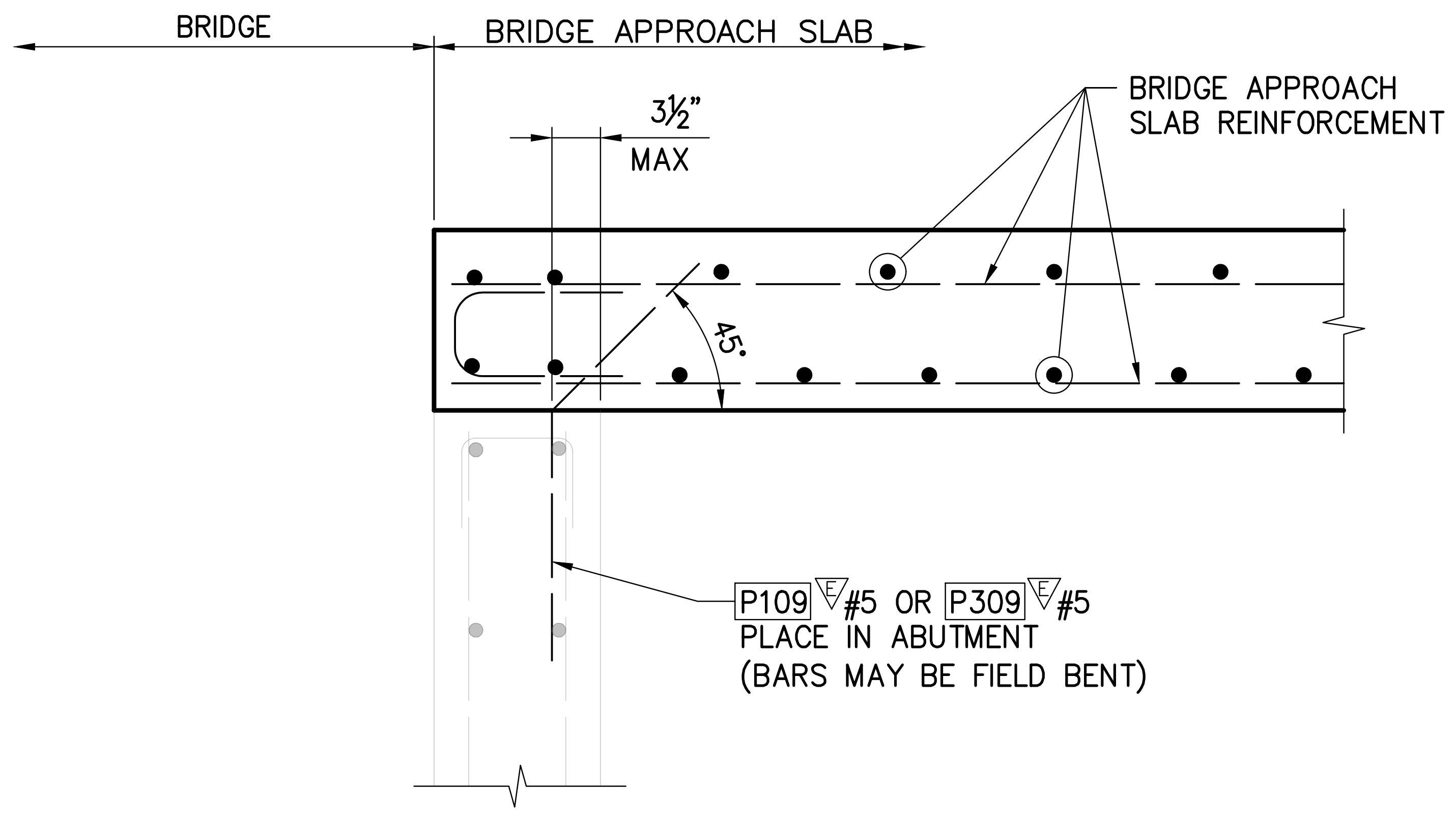
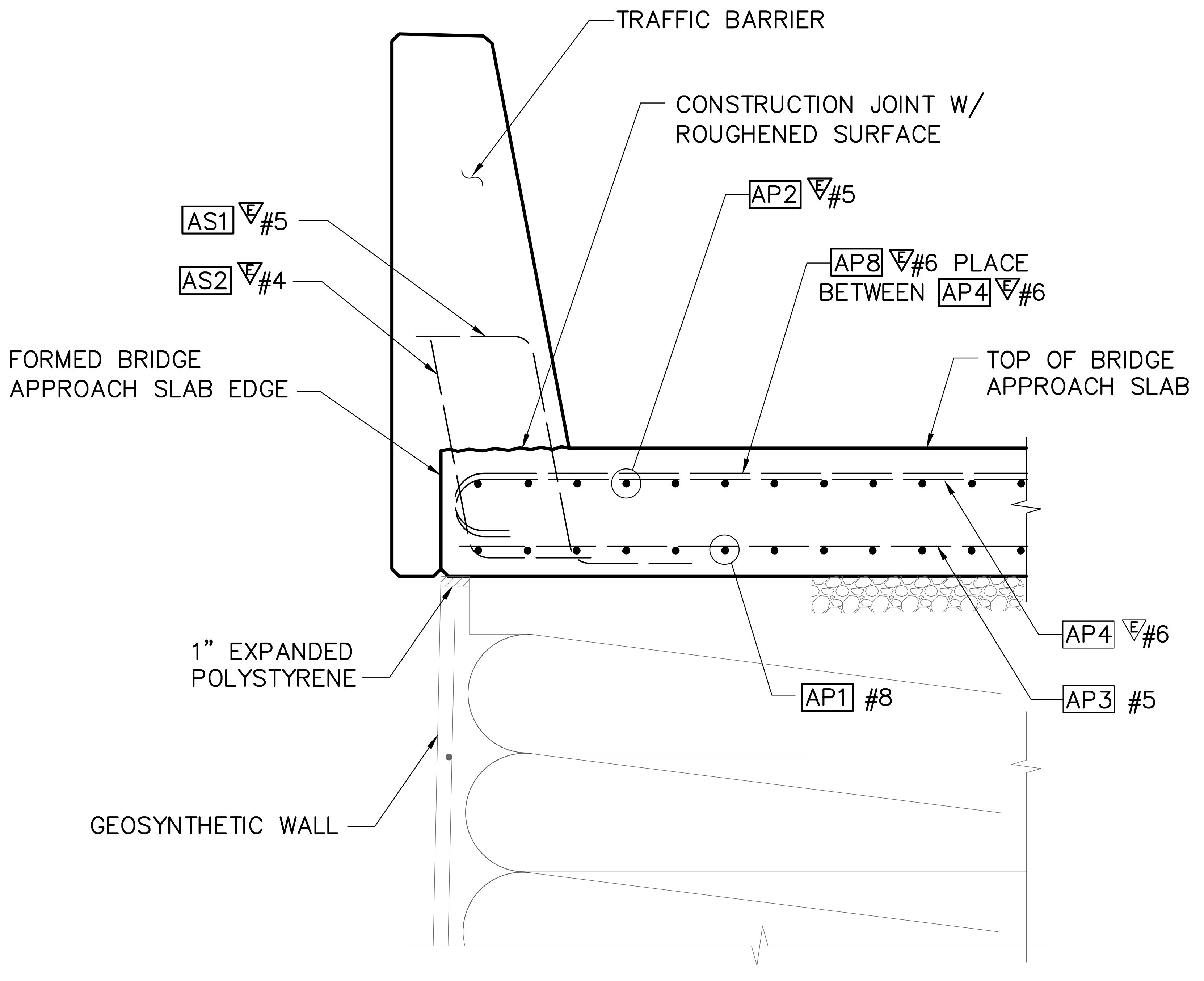
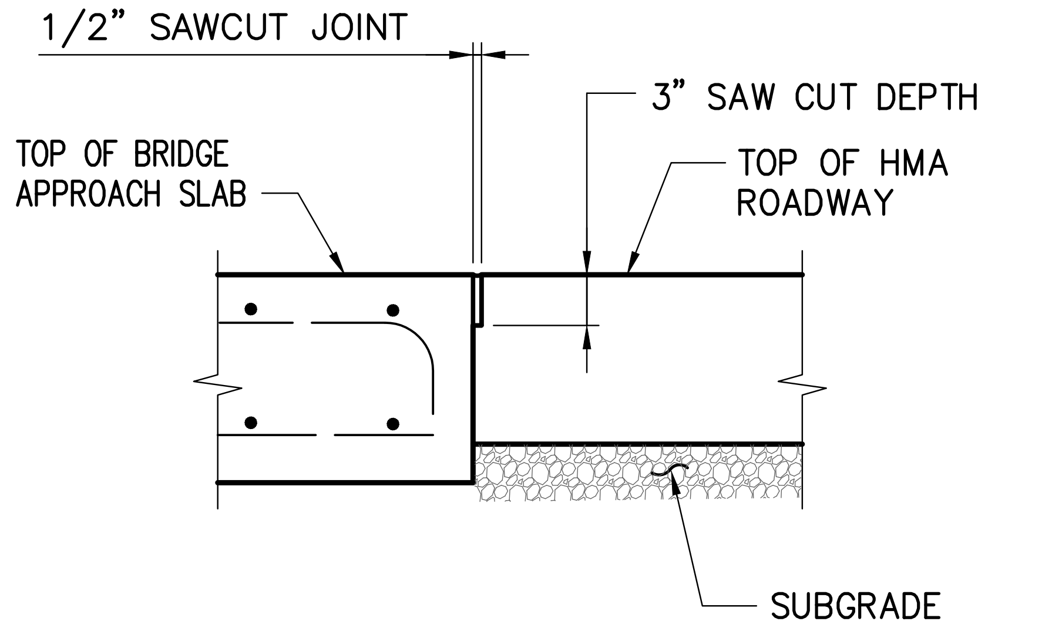


ANCHOR DETAILS



SECTION A/S24



HMA ROADWAY JOINT DETAIL

SAWCUT SHALL BE FILLED WITH HOT-POURED COMPONENT AND SEALED IN ACCORDANCE WITH WSDOT STANDARD SPECIFICATION, AND WSDOT STD PLAN A-40.20 DETAIL 3.

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INTERMEDIATE DIAPHRAGM ELEVATION

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

APPROACH SLAB DETAILS

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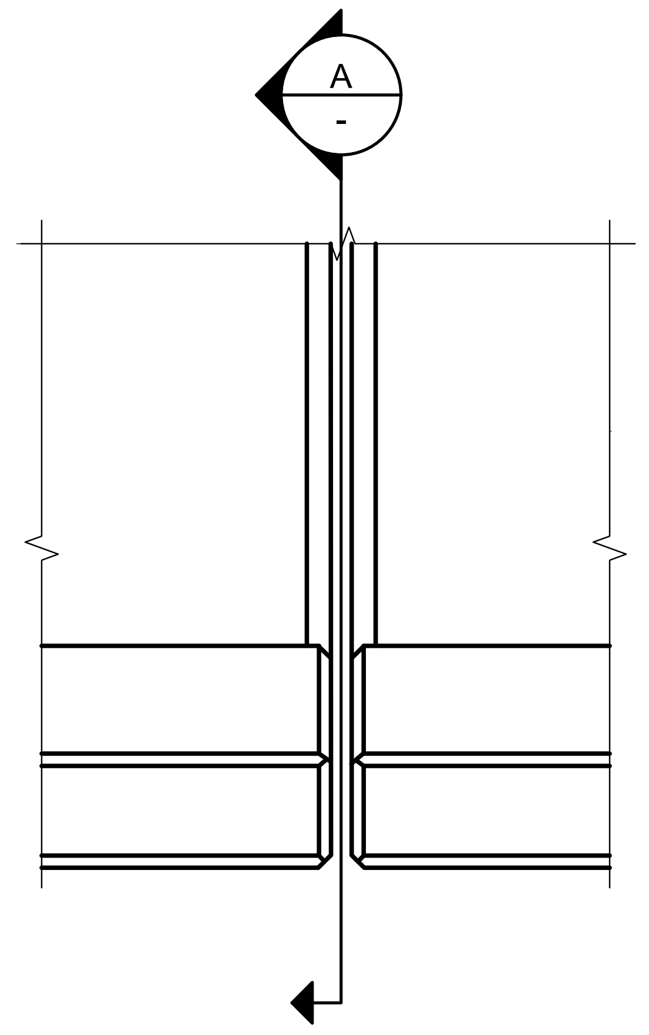
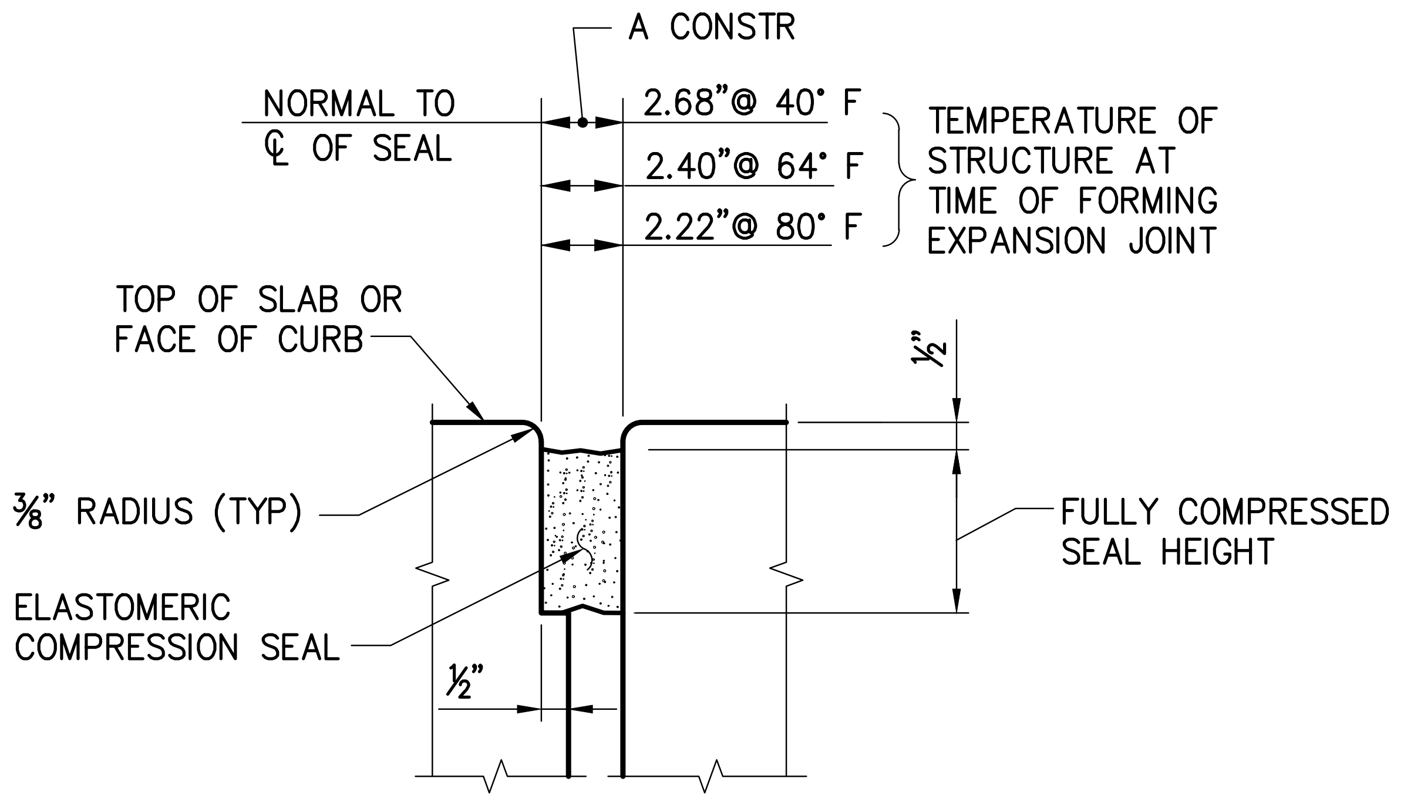


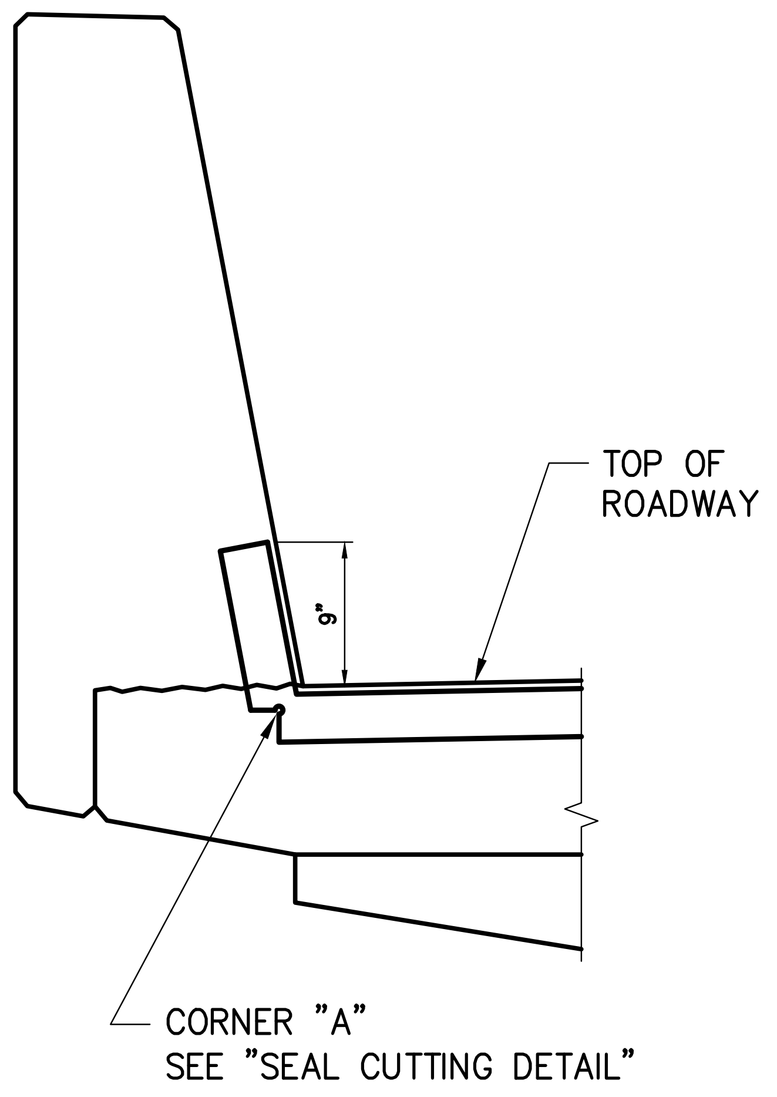
EXPANSION JOINT PLAN



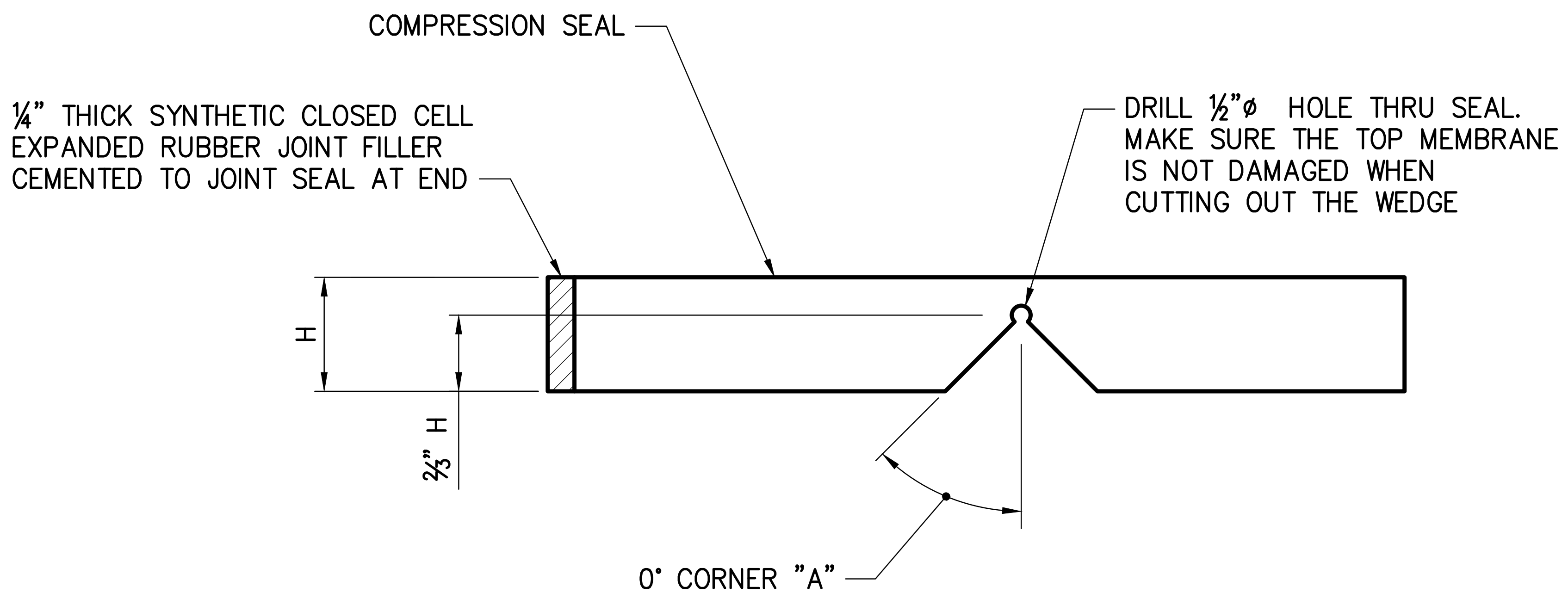
COMPRESSION SEAL DETAIL

COMPRESSION SEAL TABLE			
D. S. BROWN		WATSON BOWMAN ACME	
SEAL	WIDTH	SEAL	WIDTH
CV–4000	4"	WA–4000	4"

TESTING SHALL BE PER ASTM D2628 PRIOR TO USE



SECTION A
–



SEAL CUTTING DETAIL

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

EXPANSION JOINT DETAILS

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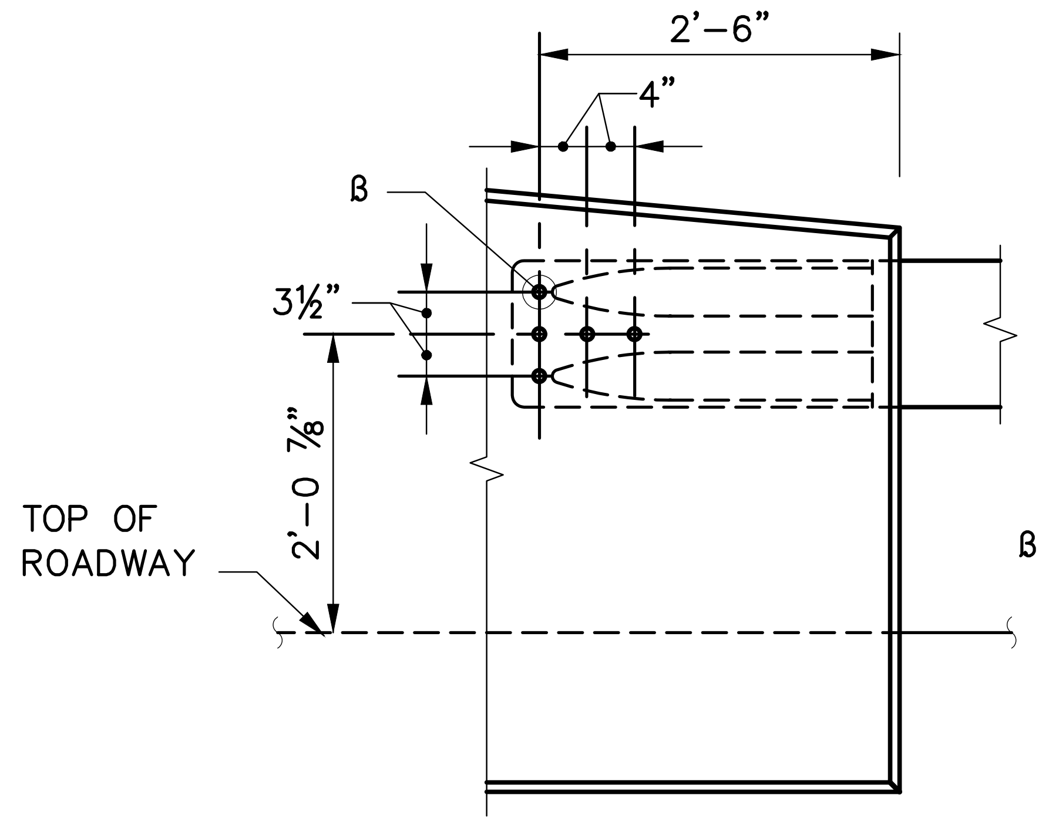
TRAFFIC BARRIER PLAN

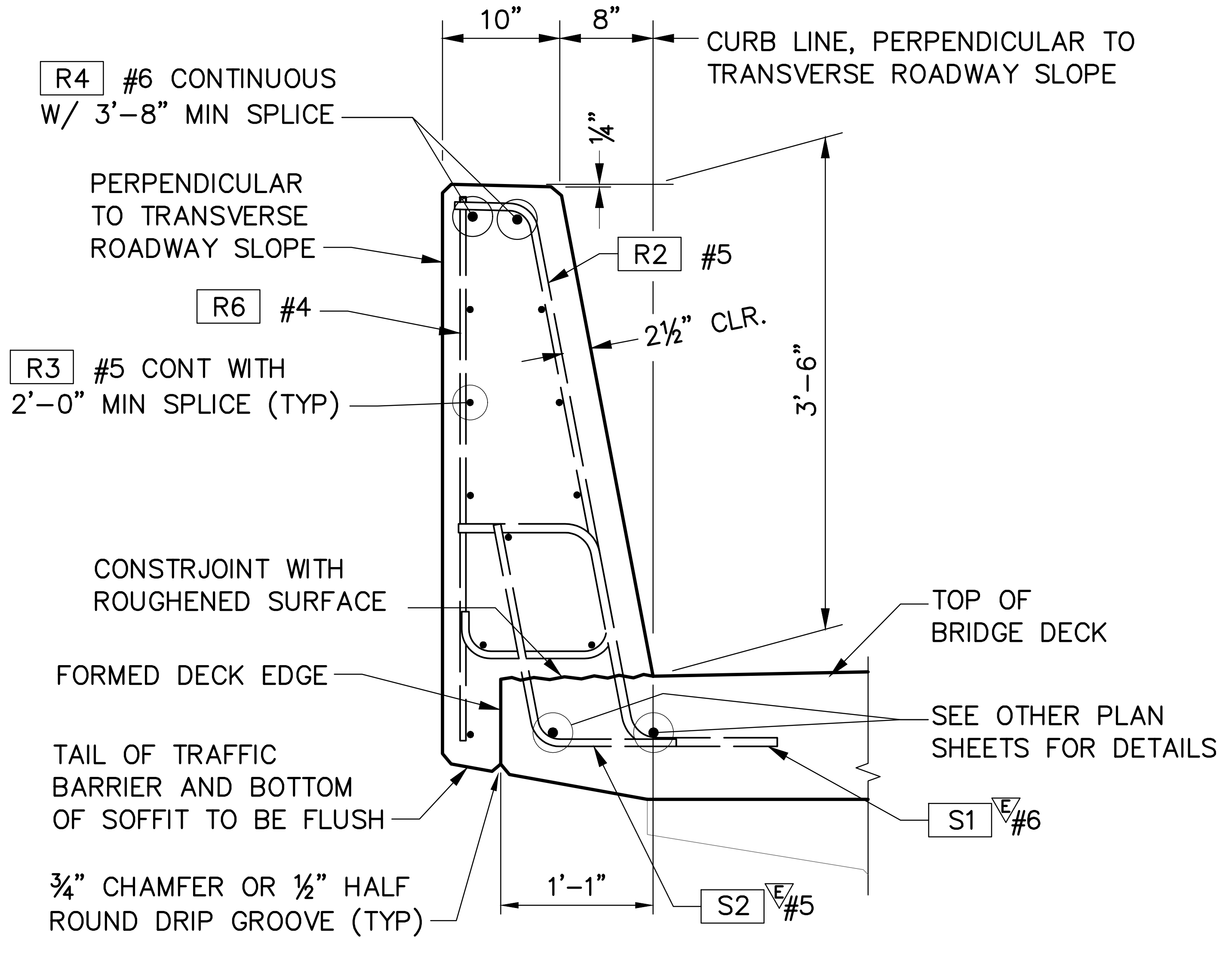
CONSTRUCTION JOINTS WITH SHEAR KEYS ARE PERMISSIBLE AT DUMMY JOINT LOCATIONS.
FORM JOINTS BETWEEN DUMMY JOINTS SHALL NOT BE PERMITTED.



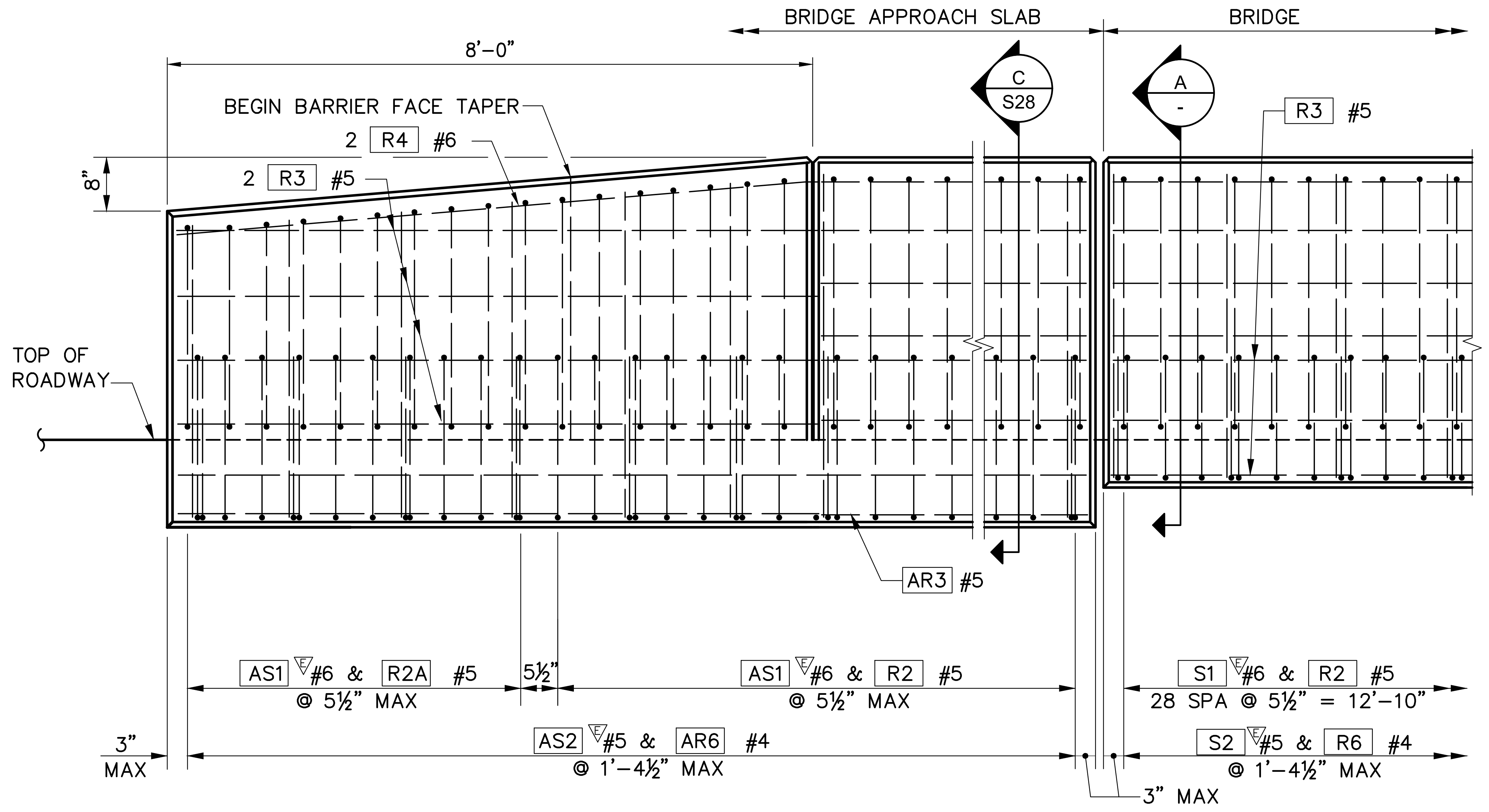
ß ⅞"ø ROCKET/KOHLER F–50, LANDCASTER MALLEABLE, OR DAYTON/RICHMOND F–62 FLARED THIN SLAB FERRULE INSERTS OR APPROVED EQUAL (TYP). RESIN–BONDED ANCHORS MAY BE SUBSTITUTED.

GUARDRAIL CONNECTION ELEVATION

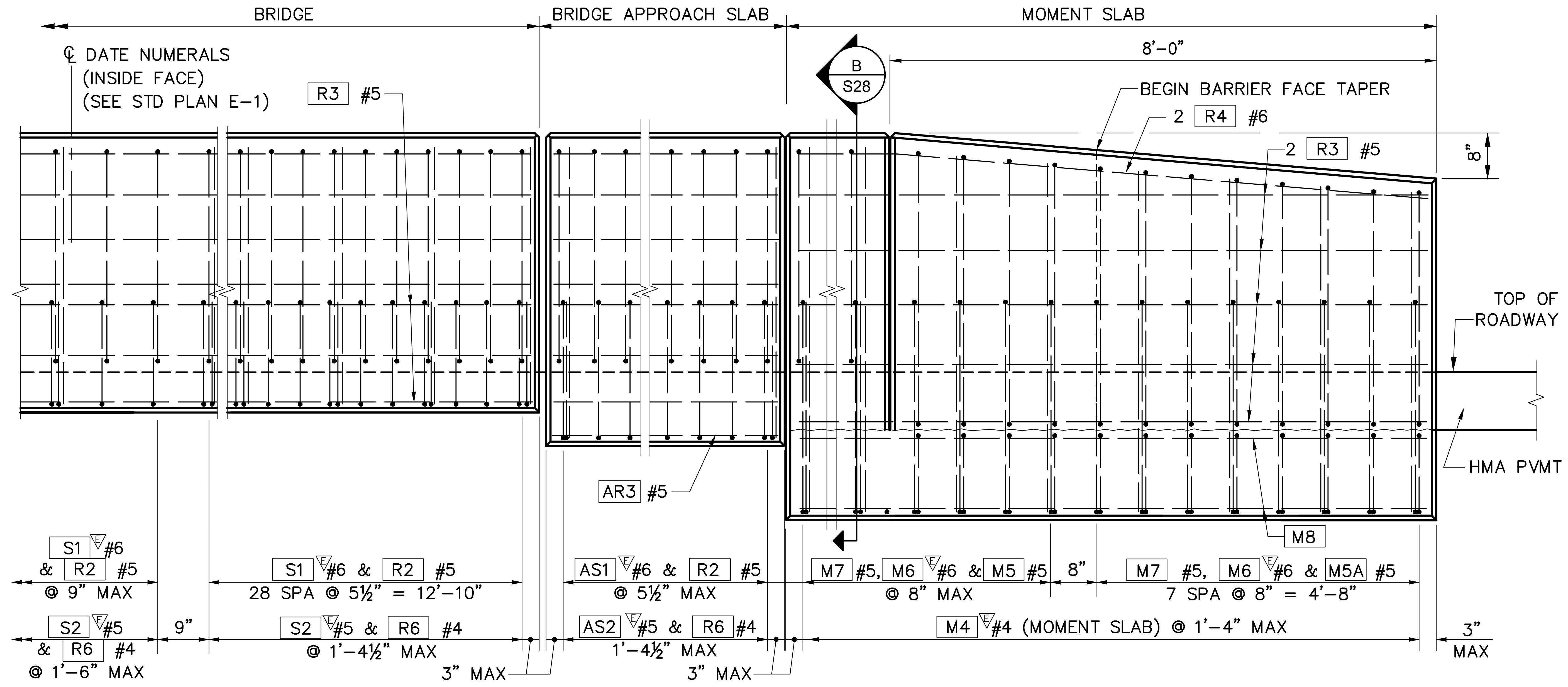
W–BEAM END SECTION DESIGN "F" (SEE
STD. PLAN C–7)



SECTION A –



TRAFFIC BARRIER OUTSIDE ELEVATION



TRAFFIC BARRIER OUTSIDE ELEVATION

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

TRAFFIC BARRIER DETAILS 1

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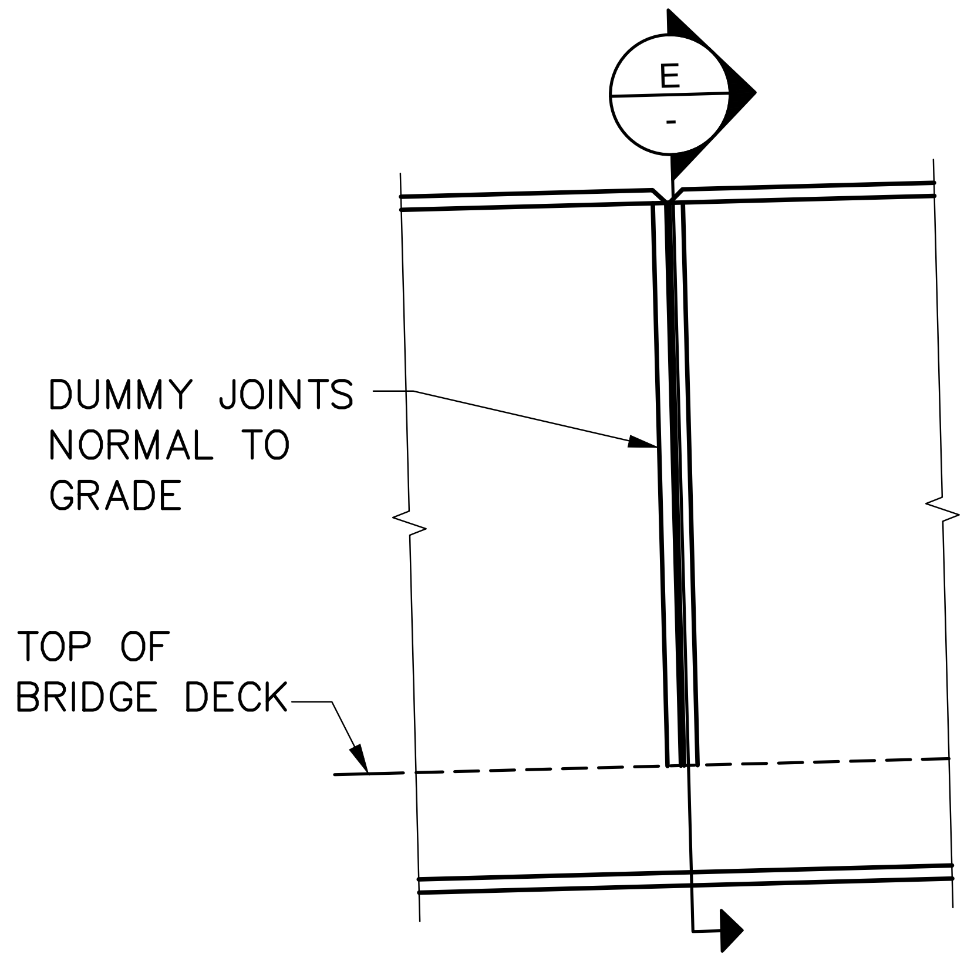
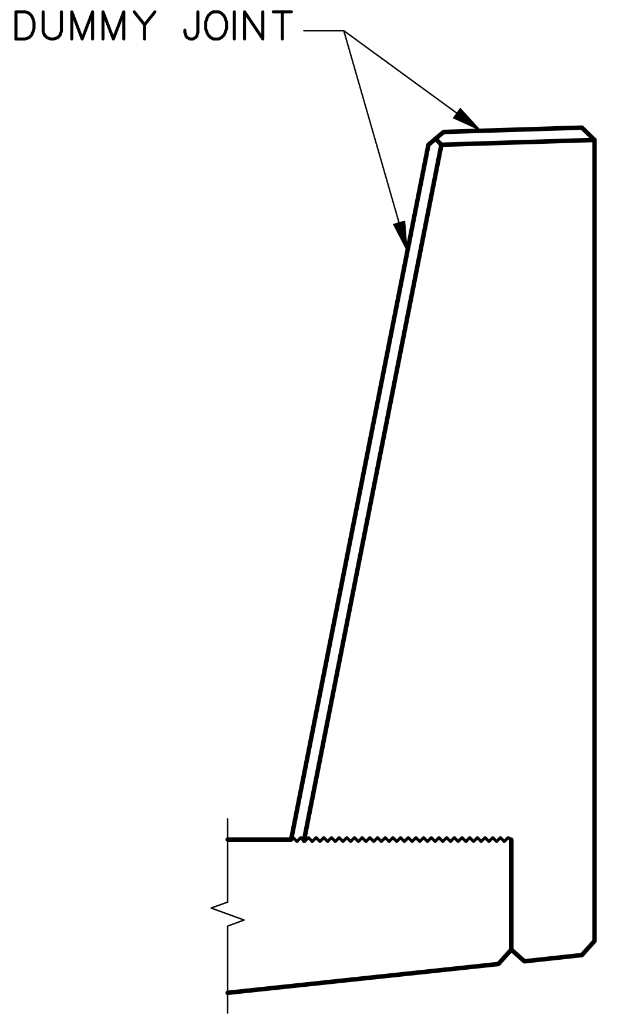
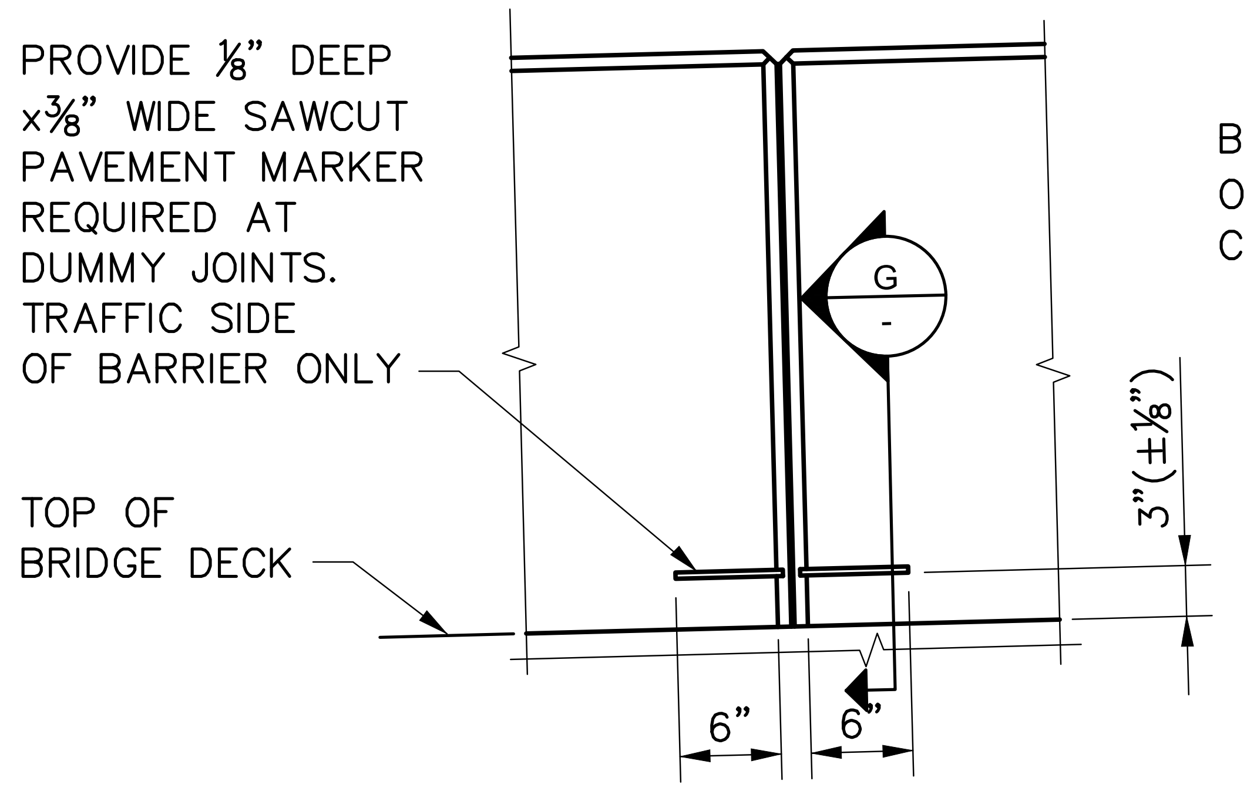


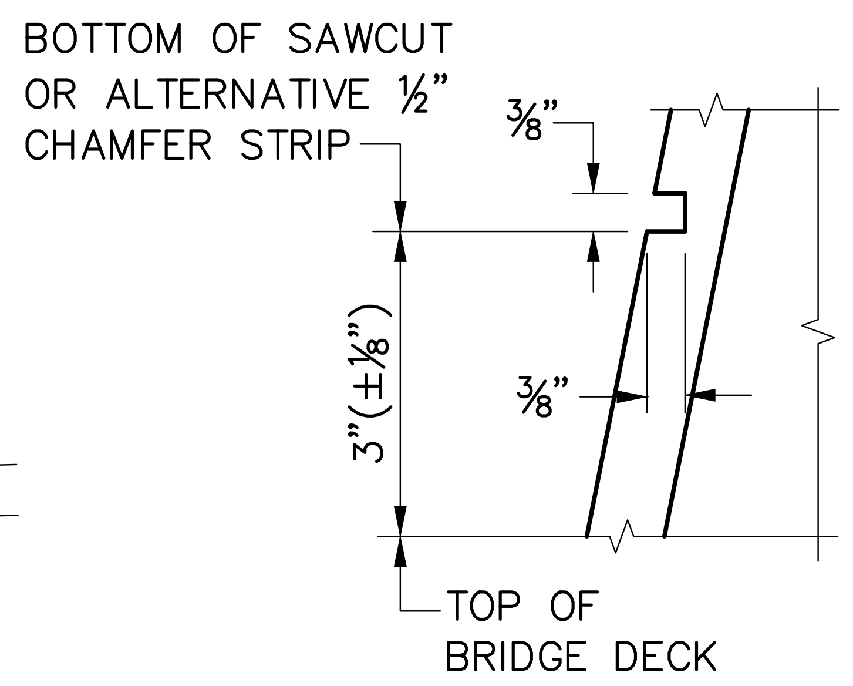
VIEW D S27



SECTION E –



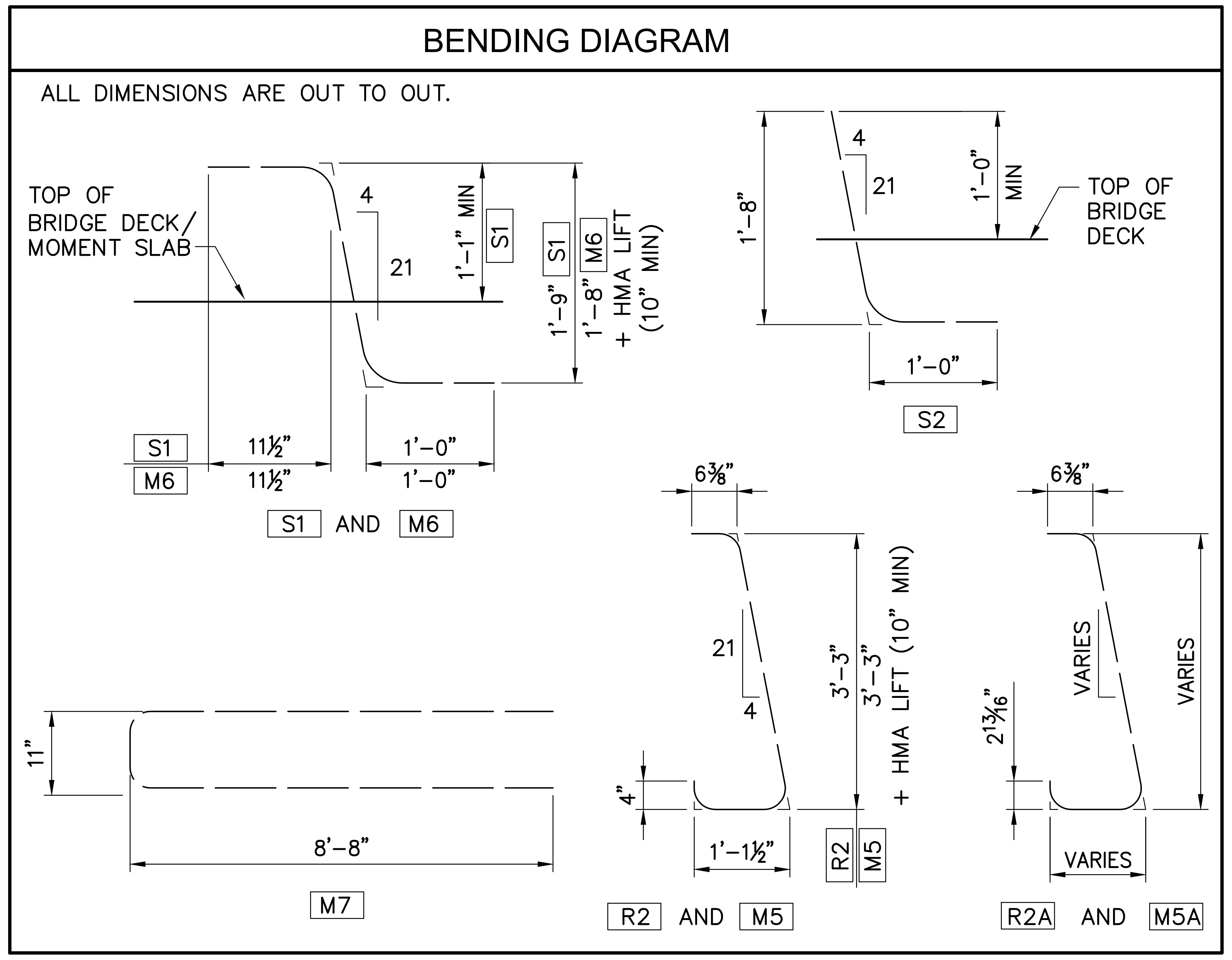
VIEW F S27

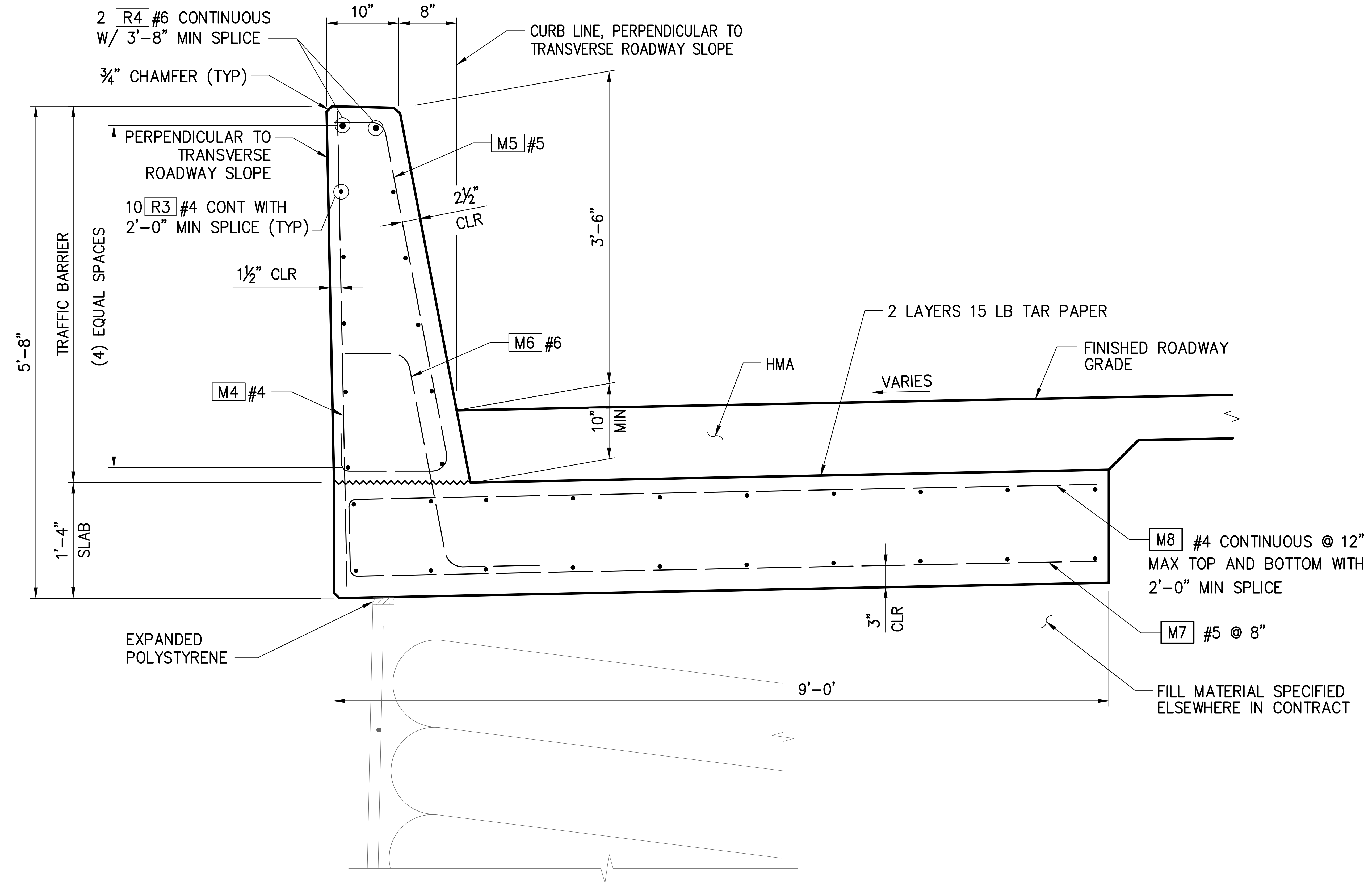


SECTION G –
PAVEMENT MARKER

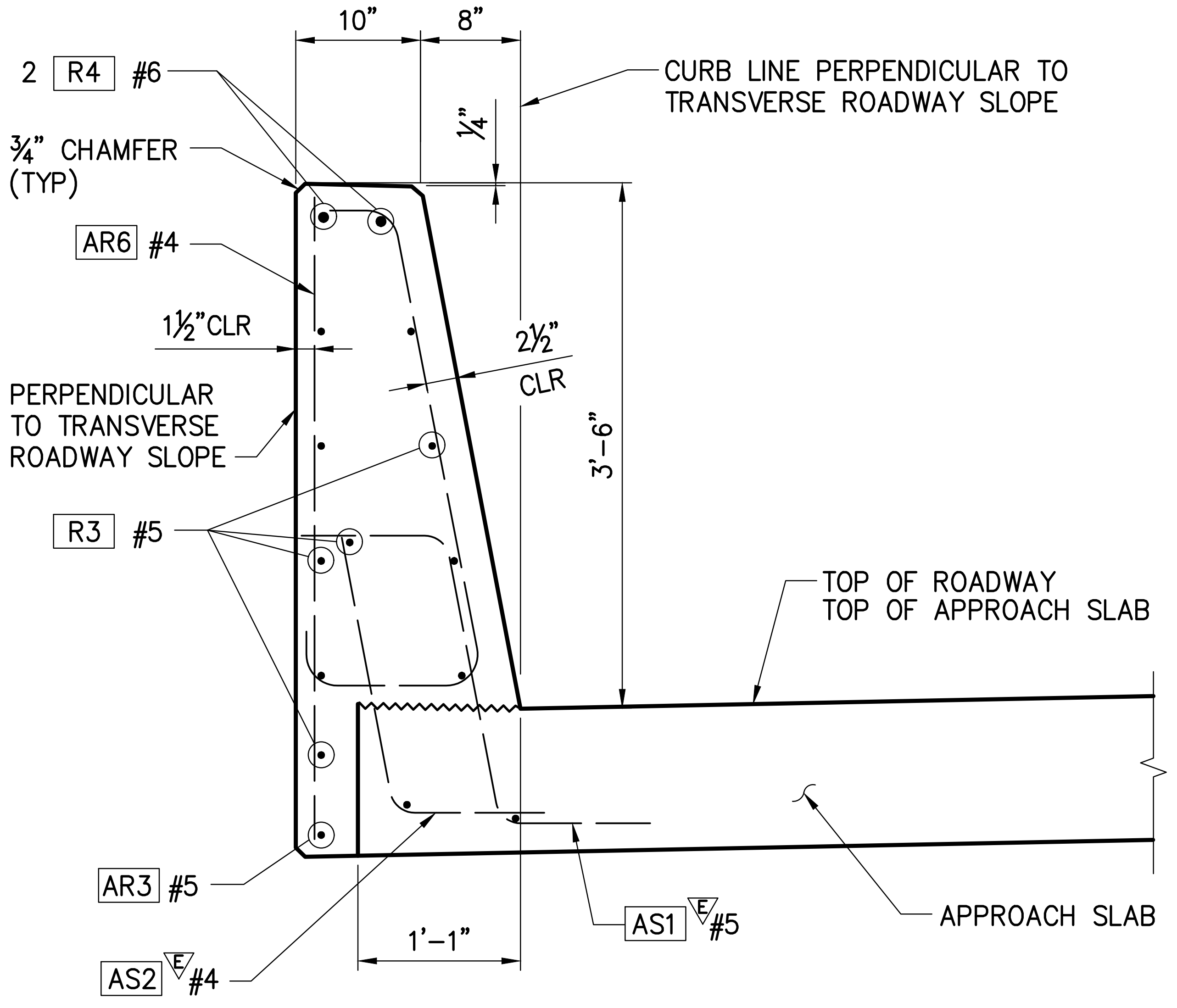
BENDING DIAGRAM

ALL DIMENSIONS ARE OUT TO OUT.





MOMENT SLAB ON GEOSYNTHETIC WALL TRAFFIC BARRIER SECTION B S27



SECTION C S27
ON APPROACH SLAB

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

TRAFFIC BARRIER DETAILS 2

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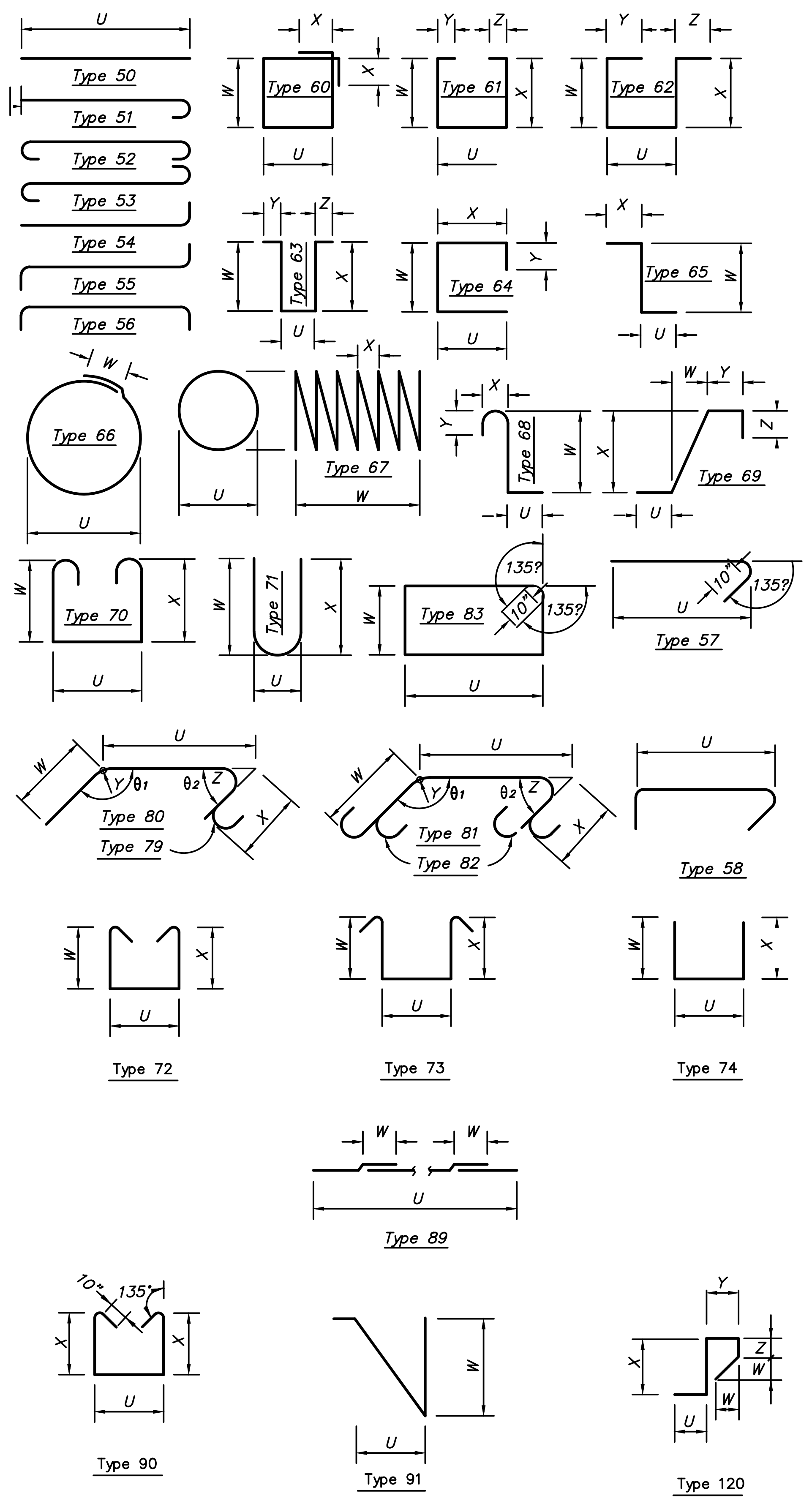
S=BAR IS INCLUDED IN SUBSTRUCTURE QUANTITIES
T=TIE OR STIRRUP
E=BAR IS TO BE EPOXY COATED

DIMENSIONS (OUT TO OUT)

MARK	DESCRIPTION	SIZE	NUM	BEND	TIE	SUBS	EPOXY	VARIES	# EA	U		W		X		Y		Z		Θ1	Θ2	W/L	LENGTH		LENGTH		LENGTH		WEIGHT
#			REQD							FT		FT	IN	FT	IN	FT	IN	FT	IN	DEG	DEG		FT	IN	FT	IN	FT	IN	LBS
SHAFT																													
P230	LONG COL PIER 2	14	24	50		S				60.00	0.00											7.7	60.00	0.000			1440.00000		11016
P231	SPIRAL COL PIER 2	5	1	67		S				6.00	2.00	60.00	0.00	0.00	6.00	3.00	0.00	60.00	0.00			1.0	2421.00	2.600			2421.21667		2525
P120	LONG SHAFT PIER 1	11	18	50		S				35.00	1.00											5.3	35	1			631.50000		3355
P121	SPIRAL SHAFT PIER 1	5	1	67		S				4.00	0.00	35.00	1.00	0.00	6.00	3.00	0.00	60.00	0.00			1.0	914	6.2			914.51667		954
P320	LONG SHAFT PIER 3	11	18	50		S				41.00	3.40											5.3	41	3.4			743.10000		3948
P321	SPIRAL SHAFT PIER 3	5	1	67		S				4.00	0.00	41.00	3.40	0.00	6.00	3.00	0.00	60.00	0.00			1.0	1076	1.6			1076.13333		1122
P220	LONG SHAFT PIER 2	14	32	50		S				32.00	0.00											7.7	32	0			1024.00000		7834
P221	SPIRAL SHAFT PIER 2	5	1	67		S				8.00	0.00	32.00	0.00	0.00	6.00	3.00	0.00	60.00	0.00			1.0	1678	3.1			1678.25833		1750
PIER 1&3 CAP																													
P101	LONG BOT	9	13	50						33.000	11.000											3.4	33	11			440.91667		1499
P102	LONG TOP	9	13	50						33.000	11.000											3.4	33	11			440.91667		1499
P103	LONG FACE	9	12	50						33.000	8.000											3.4	33	8			404.00000		1374
P104	TRANS STIRRUP	6	53	83	T					6.000	9.000	4.000	9.000									1.5	23.000	9.7			1261.84167		1896
P105	TRANS STIRRUP	6	106	72	T					4.000	0.000	4	9	4	9							1.5	14	5.6			1533.46667		2303
P106	LONG FACE BW	5	14	50						33.000	8.000											1.0	33	8			471.33333		492
P107	BW DOWEL	6	72	50	T					9.000	6.000											1.5	9	6			684.00000		1027
P108	BW TOP STIRRUP	4	36	56	T					0.000	9.000											0.7	1	3.9			47.70000		32
P109	APR SLAB CONNECTOR	5	35	69	T					0.000	9.000	1.000	6.000	1.000	6.000	0.00	0.00	0	0			1.0	2	10.1			99.45833		104
P131	UTL BLOCKOUT	5	4	50	T					2.000	9.000											1.0	2	9			11.00000		11
P132	UTL BLOCKOUT	5	8	50	T					2.000	0.000											1.1	2	0			16.00000		17
P301	LONG BOT	9	13	50						33.000	11.000											3.4	33	11			440.91667		1499
P302	LONG TOP	9	13	50						33.000	11.000											3.4	33	11			440.91667		1499
P303	LONG FACE	9	12	50						33.000	8.000											3.4	33	8			404.00000		1374
P304	TRANS STIRRUP	6	53	83	T					6.000	9.000	4.000	9.000									1.5	23	9.7			1261.84167		1896
P305	TRANS STIRRUP	6	106	72	T					4.000	0.000	4.000	9.000	4.000	9.000							1.5	14	5.6			1533.46667		2303
P306	LONG FACE BW	5	14	50						33.000	8.000											1.0	33	8			471.33333		492
P307	BW DOWEL	6	72	50	T					9.000	6.000											1.5	9	6			684.00000		1027
P308	BW TOP STIRRUP	4	36	56	T					0.000	9.000											0.7	1	3.9			47.70000		32
P309	APR SLAB CONNECTOR	5	35	69	T					0.000	9.000	1.000	6.000	1.000	6.000	0.000	0.000	0.000	0.000			1.0	2	10.1			99.45833		104
P331	UTL BLOCKOUT	5	4	50	T					2.000	9.000											1.0	2	9			11.00000		11
P332	UTL BLOCKOUT	5	8	50	T					2.000	0.000											1.1	2	0			16.00000		17
P110	GIRDER STOP	5	20	74						1.000	9.000	2.000	1.000	2.000	1.000							1.0	5	7.9			113.16667		118
P111	GIRDER STOP	4	16	74						3.000	2.200	1.000	6.000	1.000	6.000							0.7	5	11.7			95.60000		64
P112	GIRDER STOP	4	8	74						1.000	2.100	1.000	6.000	1.000	6.000							0.7	3	11.6			31.73333		21
P310	GIRDER STOP	5	20	74						1.000	9.000	2.000	1.000	2.000	1.000							1.0	5	7.9			113.16667		118
P311	GIRDER STOP	4	16	74						3.000	2.200	1.000	6.000	1.000	6.000							0.7	5	11.7			95.60000		64
P312	GIRDER STOP	4	8	74						1.000	2.100	1.000	6.000	1.000	6.000							0.7	3	11.6			31.73333		21
																											0.00000		
PIER 2 CAP																											0.00000		
P201	LONG BOT	9	12	80						6.000	0.000	12.000	4.800	12.000	4.800	3.000	0.000	3.000	0.000	166	166	3.4	30	9.2			369.20000		1255
P202	LONG TOP CAP	11	20	50						27.000	11.000											5.3	27	11			558.33333		2966
P203	LONG TOP CAP	11	20	50						27.000	11.000											5.3	27	11			558.33333		2966
P205	STIRRUP	6	57	72	T			V	1	6.000	9.000	6.000	0.000	6.000	0.000							1.3	19	8.6			1123.85000		1431
										6.000	9.000	3.000	0.000	3.000	0.000								13	8.6			0.00000		
P206	STIRRUP	6	57	72	T			V	1	3.000	6.000	6.000	0.000	6.000	0.000							1.2	16	5.6			938.60000		1153
										3.000	6.000	3.000	0.000	3.000	0.000								10	5.6			0.00000		
P210	LONG FACE	9	12	50						33.000	11.000											3.4	33	11			407.00000		1384
P215	LONG FACE	6	80	50						7.000	0.000											1.5	7	0			560.00000		841
P222	STIRRUP	6	26	72	T			V	1	6.000	9.000	6.000	0.000	6.000	0.000							2.0	19	8.6			512.63333		1024
										6.000	9.000	13.000	0.000	12.000	0.000								32	8.6			0.00000		
P223	TIE	5	52	50	T					6.000	9.000											1.0	6	9			351.00000		366
P225	TIE	5	260	58	T					6.000	9.000											1.0	7	6.9			1969.50000		2054
P226	TIE	5	50	58	T					4.000	0.000											1.0	4	9.9			241.25000		252
P208	END REIF	5	10	74	T					6.000	9.000	1.000	0.000	1.000	0.000							1.0	8	6.4			85.33333		89
P209	END REIF	5	22	74	T					6.000	9.000	2.000	0.000	2.000	0.000							1.0	10	6.4			231.73333		242
P207	END REIF	5	14	50	T					8.000	0.000											1.0	8	0			112.00000		117
END DIAPHRAGM																													
ED11	LONG BOT	7	4	80						14.000	0.000	14	0	0	0	3.00	0.00	0	0	178	0	2.0	27	12			112.00000		229
ED12	LONG MID	7	2	80						14.000	0.000	14	0	0	0	3.00	0.00	0	0	178	0	2.0	27	12			56.00000		114
ED13	LONG FACE	4	80	50						7.000	0.000											0.7	7	0			560.00000		374
ED14	LONG FACE	6	6	52						28.000	0.000											1.5	29	4.5			176.25000		265
ED20	STIRRUP	4	56	72	T					5.000	10.000	0	3	0	3							0.7	6	10.8			386.40000		258
ED31	UTIL BLOCKOUT	4	16	50						2.000	0.000											0.7	2	0			32.00000		21
ED32	UTIL BLOCKOUT	4	8	50						2.000	9.000											0.7	2	9			22.00000		15
																											0.00000		
INTERMEDIATE DIAPHRAGM																											0.00000		
ID11	LONG BOT	7	4	80						14.000	0.000	14	0	0	0	3.00	0.00	0	0	178	0	2.0	27	12.0			112.00000		229
ID12	LONG MID	7	2	80						14.000	0.000	14	0	0	0	3.00	0.00	0	0	178	0	2.0	27	12			56.00000		114
ID13	LONG FACE	4	80	50						7.000	0.000											0.7	7	0			560.00000		374
ID14	LONG FACE	6	6	52						28.000	0.000											1.5	29	4.5			176.25000		265
ID20	STIRRUP	4	56	72	T					5.000	10.000	0.000	3.000	0.000	3.000							0.7	6	10.8			386.40000		258
ID31	UTIL BLOCKOUT	4	16	50						2.000	0.000											0.7	2	0			32.00000		21
ID32	UTIL BLOCKOUT	4	8	50						2.000	9.000											0.7	2	9			22.00000		15
																											0.00000		
DECK																											0.00000		
D01	TRANS TOP	5	429	80	T		E			11.000	0.000	11	0	0	0	0.00	3.00	0	0	178	0	1.0	21	12			9438.00000		9843
D02	TRANS BOT	5	429	80	T		E			13.000	0.000	13	0	0	0	0.00	3.00	0	0	178	0	1.0	25	12			11154.00000		11633
D03	TRANS TOP	5	858	54	T		E			6.000	0.000											1.0	6	4.3			5455.45000		5692
D11	LONG PIER	7	136	50			E			50.000	0.000											2.0	50	0			6800.00000		13899

REINFORCEMENT BENDING DIAGRAMS



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1. ALL REINFORCING BARS ON THIS SHEET SHALL BE A.S.T.M. A-615. GRADE 60 UNLESS SHOWN OTHERWISE.
2. REINFORCING FOR TRAFFIC BARRIERS NOT SHOWN IN THIS BAR LIST. SEE TRAFFIC BARRIER SHEET.
3. BEND FOR TRANSVERSE BARS DUE TO ROADWAY CROWN CONDITIONS HAVE NOT SHOWN. THESE BARS SHALL BE BENT AS REQUIRED TO CONFIRM TO THE CONFIGURATION OF THE STRUCTURE.
4. REINFORCING OF PRESTRESSED DECK UNITS AND CONCRETE PILING NOT SHOWN IN THIS BAR LIST.

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Engineering LLC

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BELLEVUE, WA 98005
WWW.TRANTECHENG.COM
PH: 425-453-5545
FAX: 425-453-6779

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21020015

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Public Works Department
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Phone: 509. 524-2710
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DELL SHARPE BRIDGE REPLACEMENT PROJECT

BAR LIST 1

PROJECT NUMBER
CRP20-02
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DIMENSIONS (OUT TO OUT)

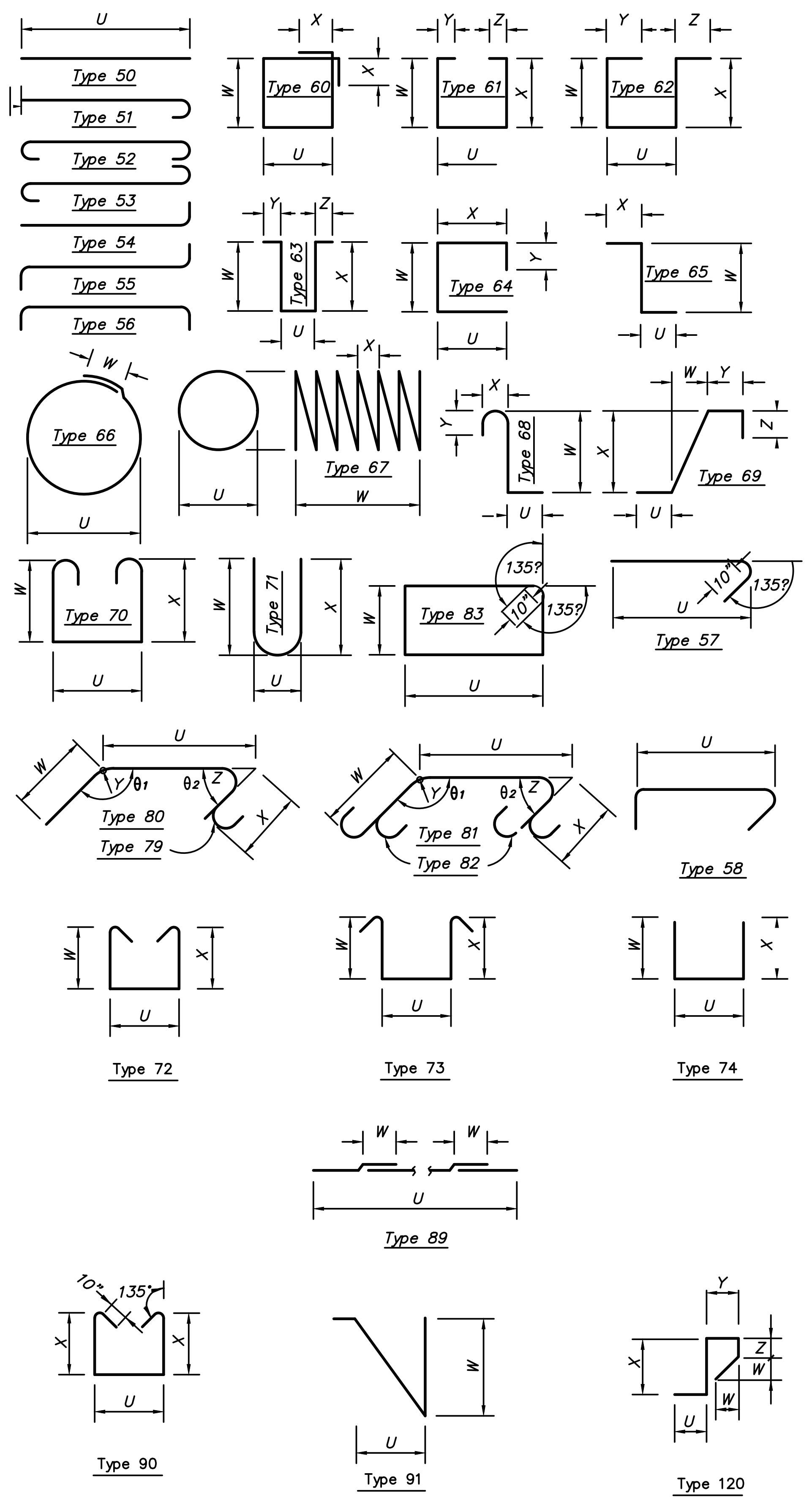
T=TIE OR STIRRUP

S=BAR IS INCLUDED IN SUBSTRUCTURE QUANTITIES

E=BAR IS TO BE EPOXY COATED

MARK	DESCRIPTION	SIZE	NUM	BEND	TIE	SUBS	EPOXY	VARIES	# EA	U		W		X		Y		Z		Θ1	Θ2	W/L	LENGTH		LENGTH		LENGTH		WEIGHT
#			REQD							FT		FT	IN	FT	IN	FT	IN	FT	IN	DEG	DEG		FT	IN	FT	IN	FT	IN	LBS
D22	LONG PIER	5	82	50			E			15.000	0.000											1.0	15	0			1230.00000		1283
D27	LONG PIER BOT	5	172	50			E			15.000	0.000											1.0	15	0			2580.00000		2691
D32	LONG PIER BOT	5	82	50			E			30.000	0.000											1.0	30	0			2460.00000		2566
D60	LONG PIER BOT	5	340	50			E			60.000	0.000											1.0	60	0			20400.00000		21277

REINFORCEMENT BENDING DIAGRAMS



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4. REINFORCING OF PRESTRESSED DECK UNITS AND CONCRETE PILING NOT SHOWN IN THIS BAR LIST.

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

BAR LIST 2

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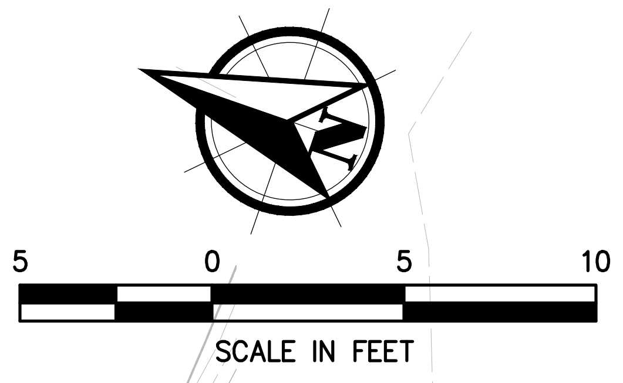
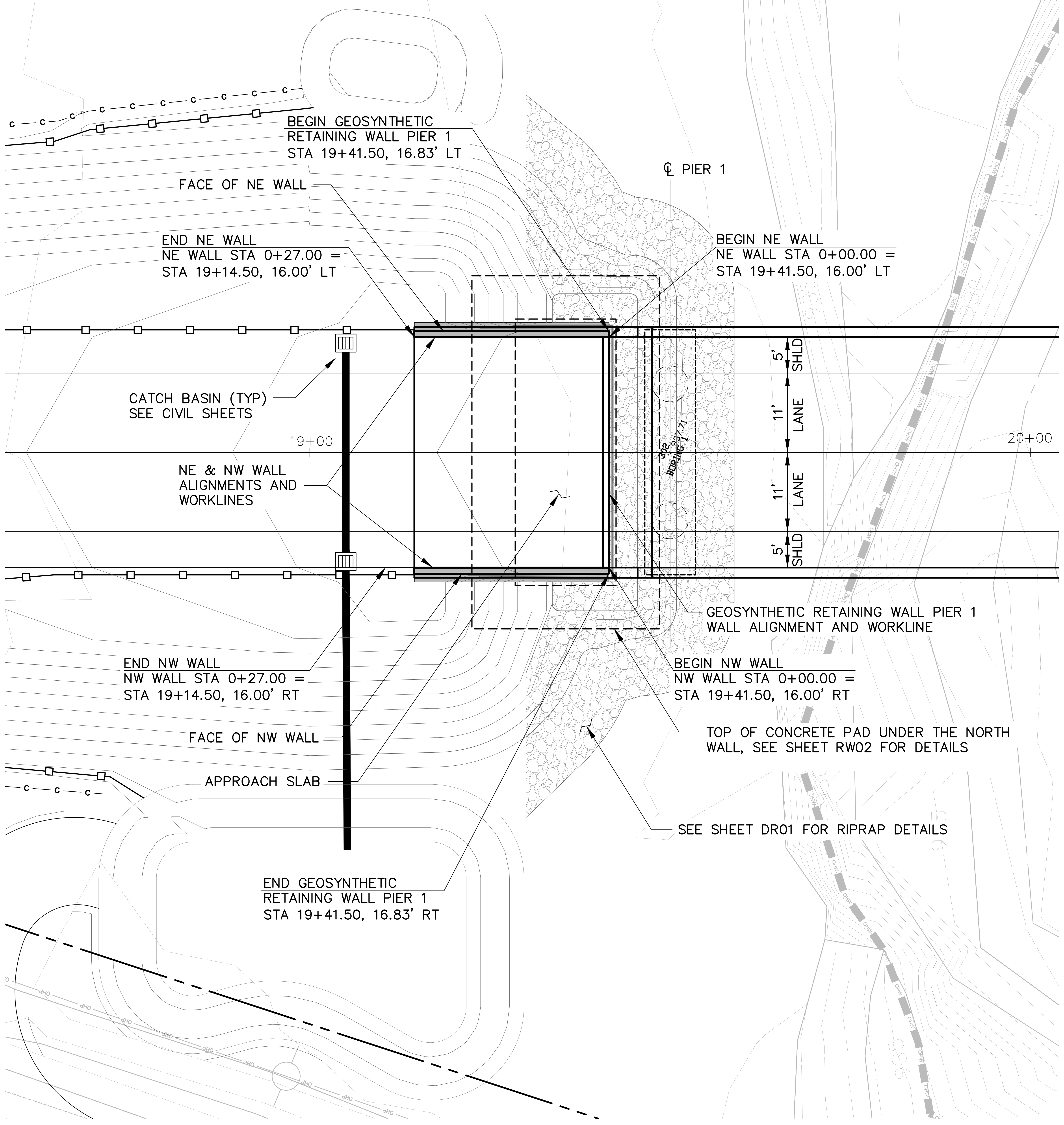
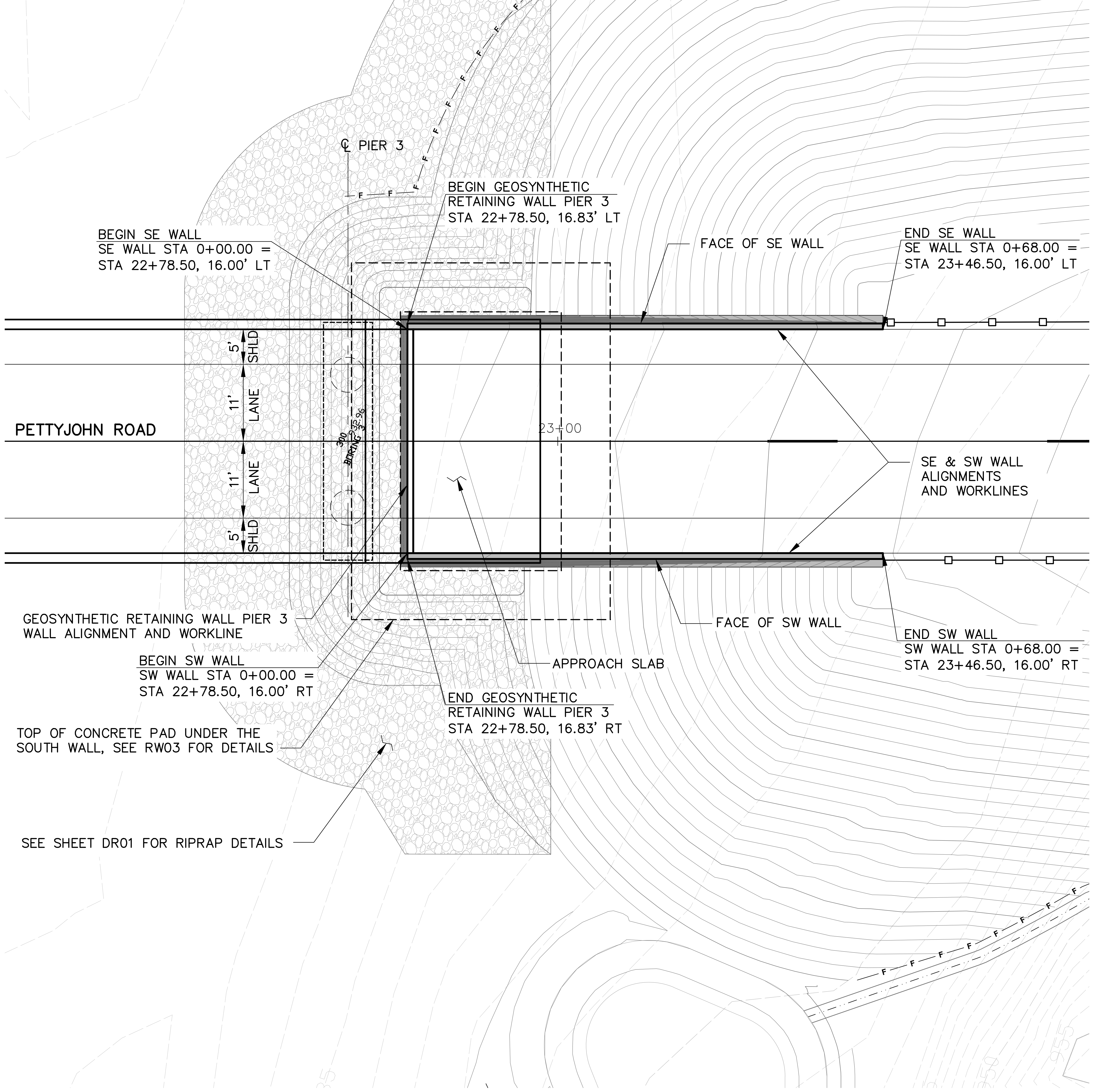




NORTH APPROACH RETAINING WALL PLAN



SOUTH APPROACH RETAINING WALL PLAN

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

RETAINING WALL LAYOUTS

PROJECT NUMBER
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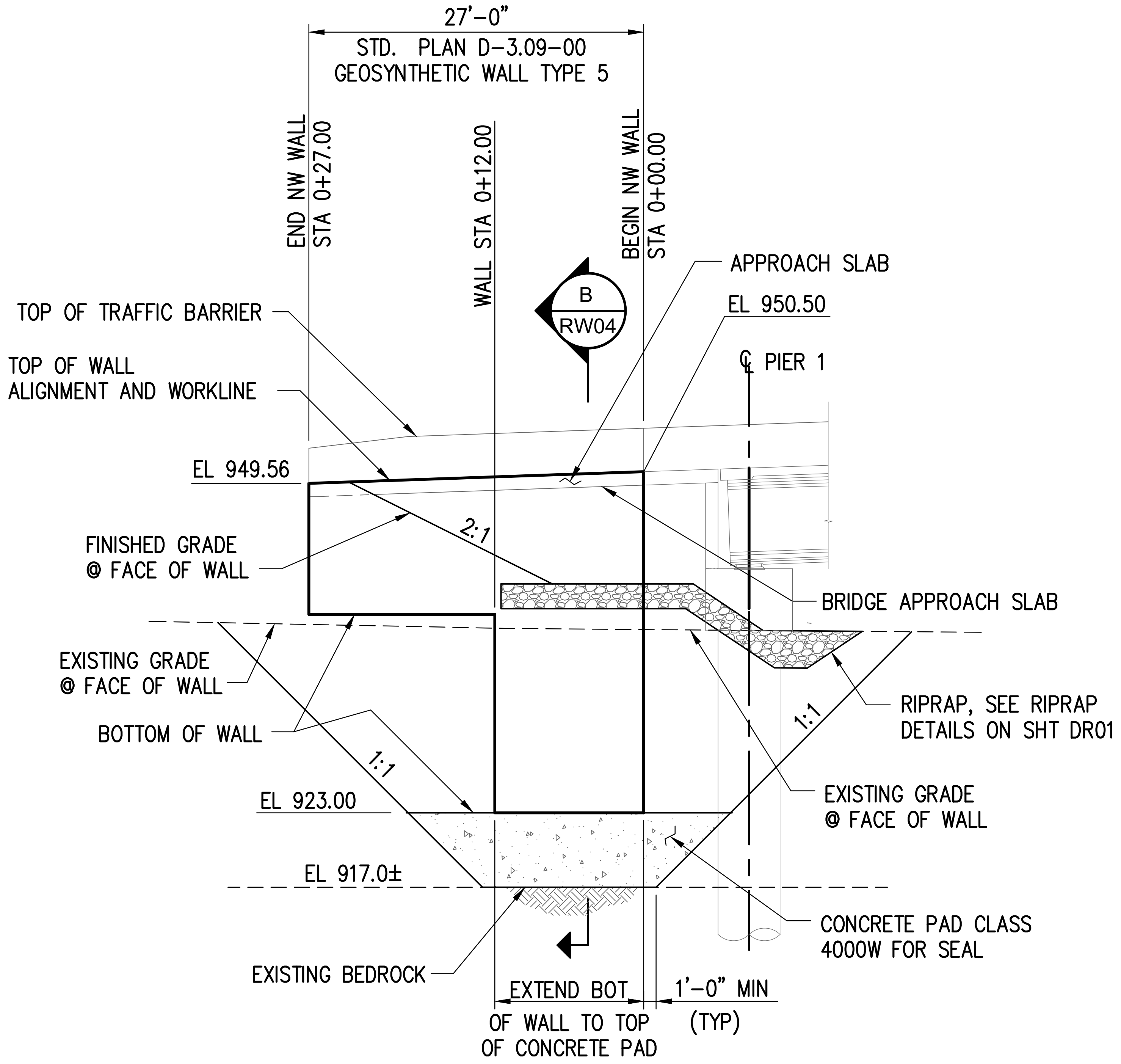
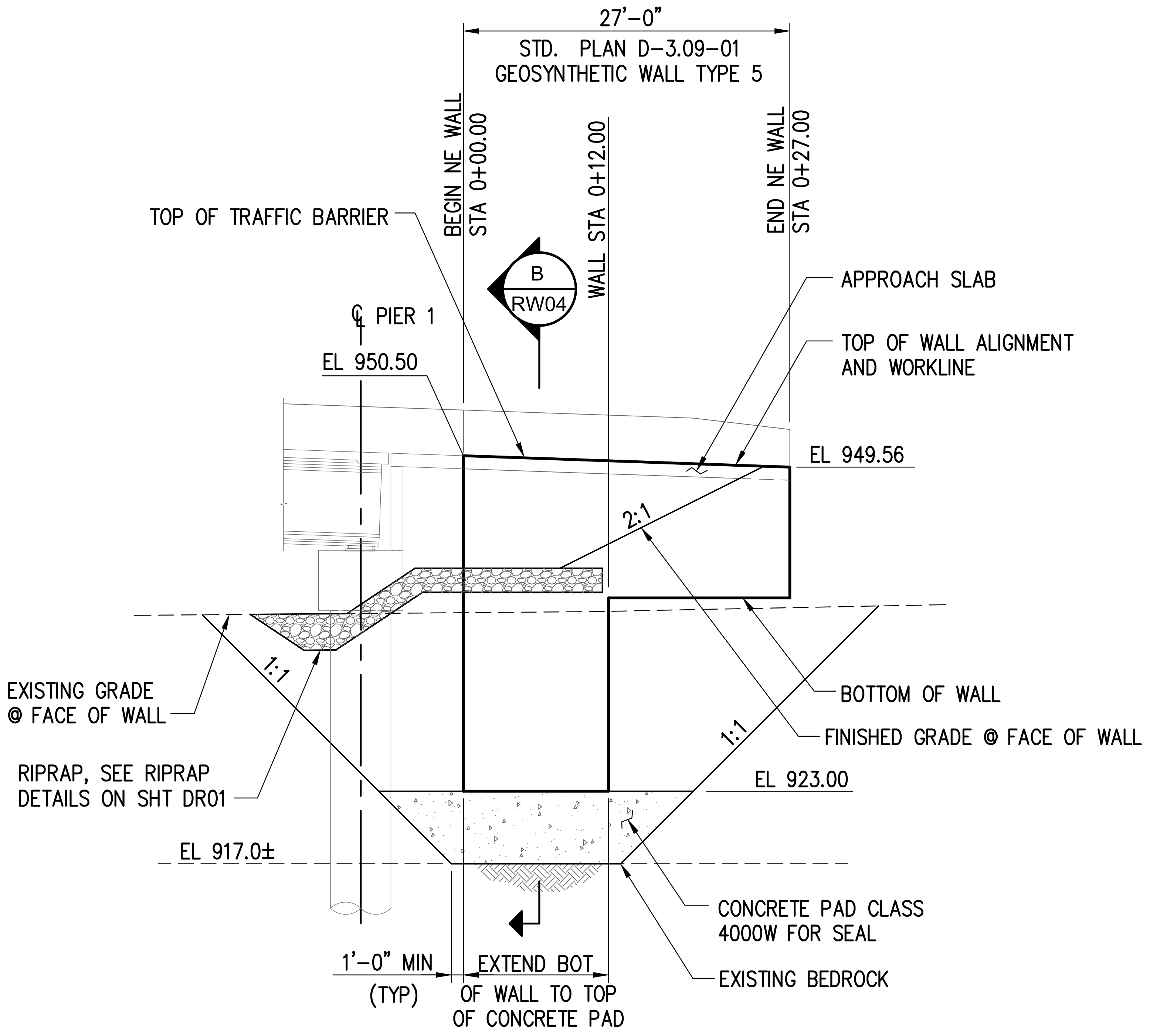
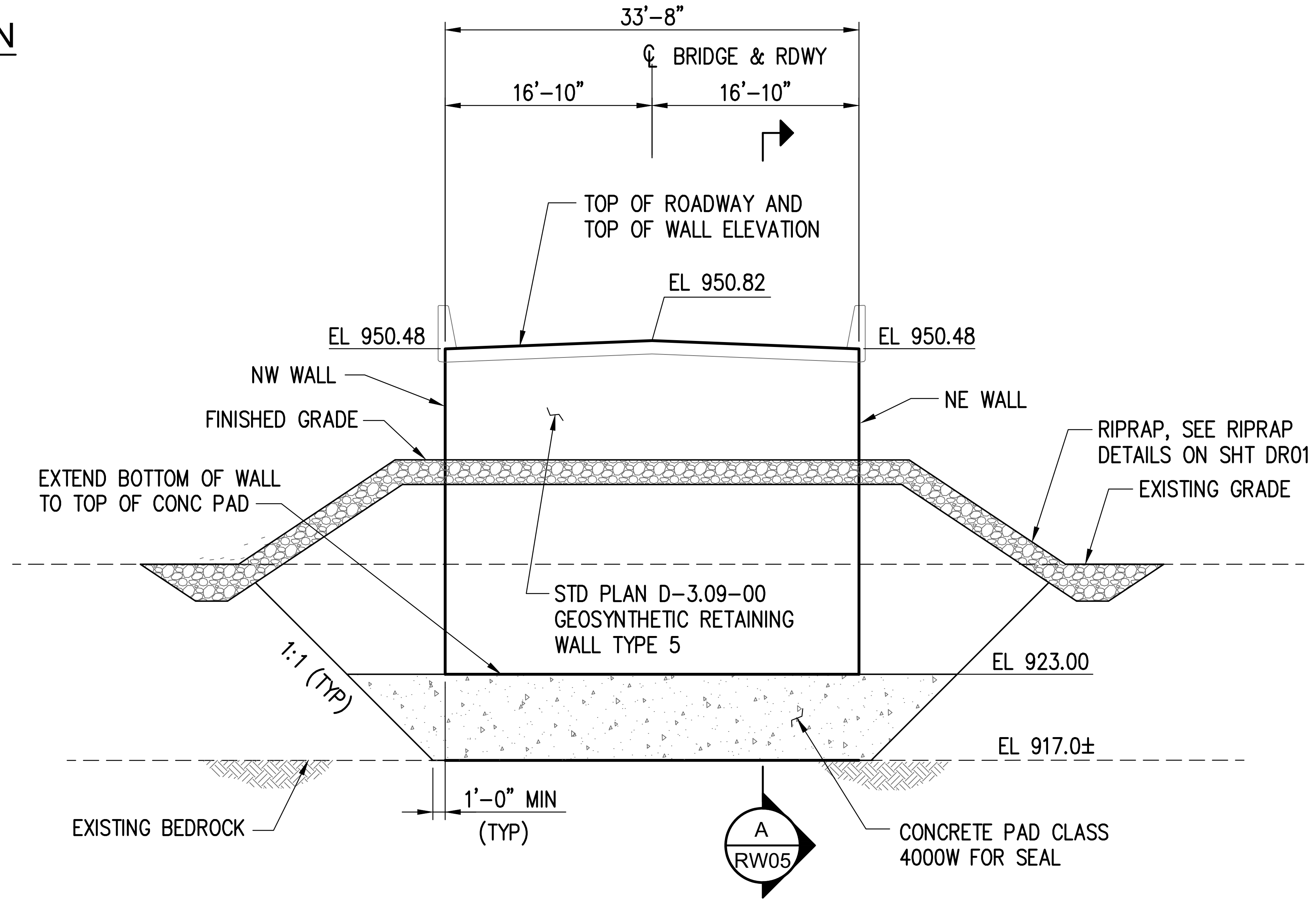


NW WALL ELEVATION



NE WALL ELEVATION



GEOSYNTHETIC RETAINING WALL - PIER 1 ELEVATION

LOOKING BACK ON STATIONING

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

WALL ELEVATIONS - NORTH APPROACH

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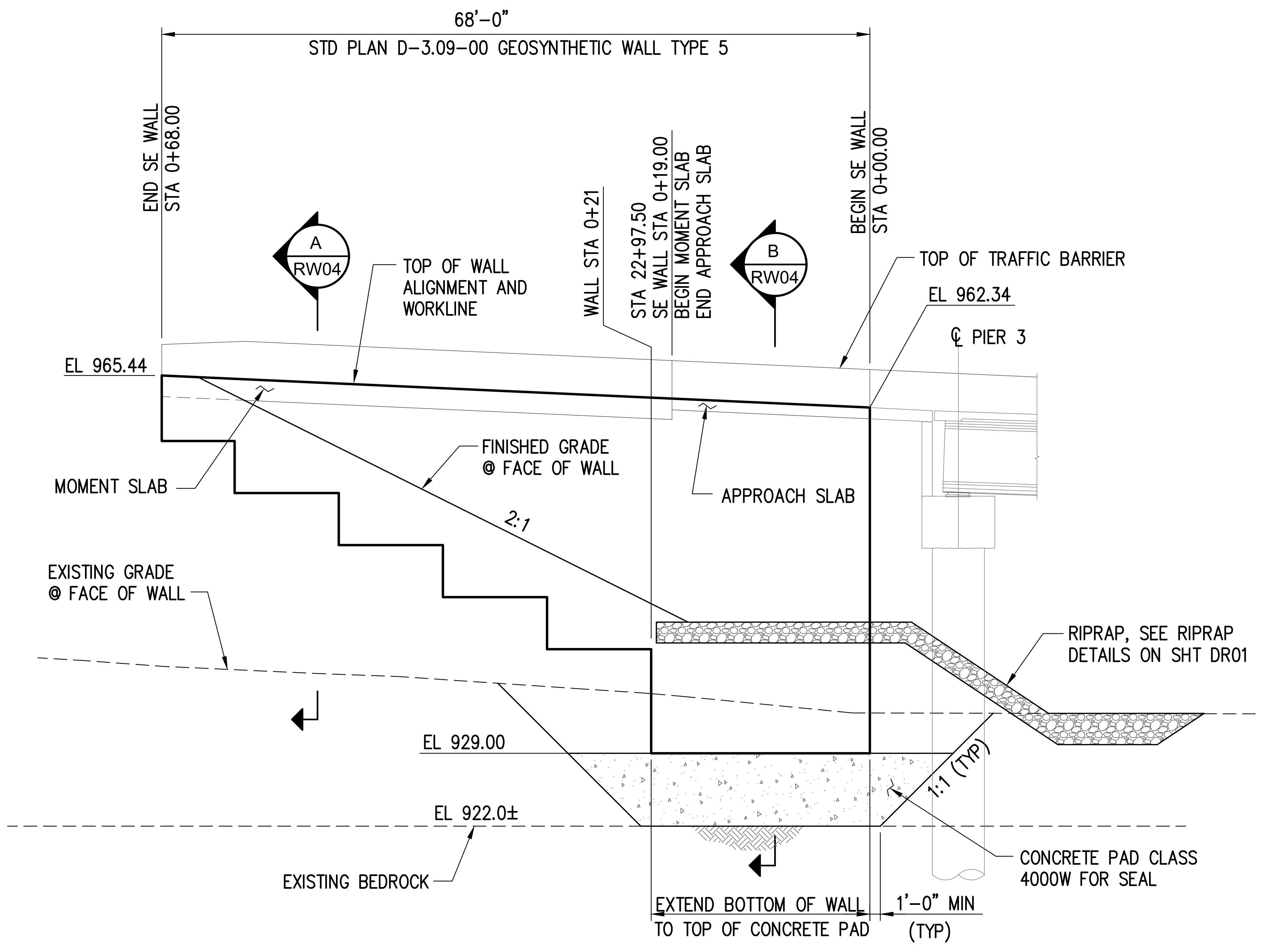
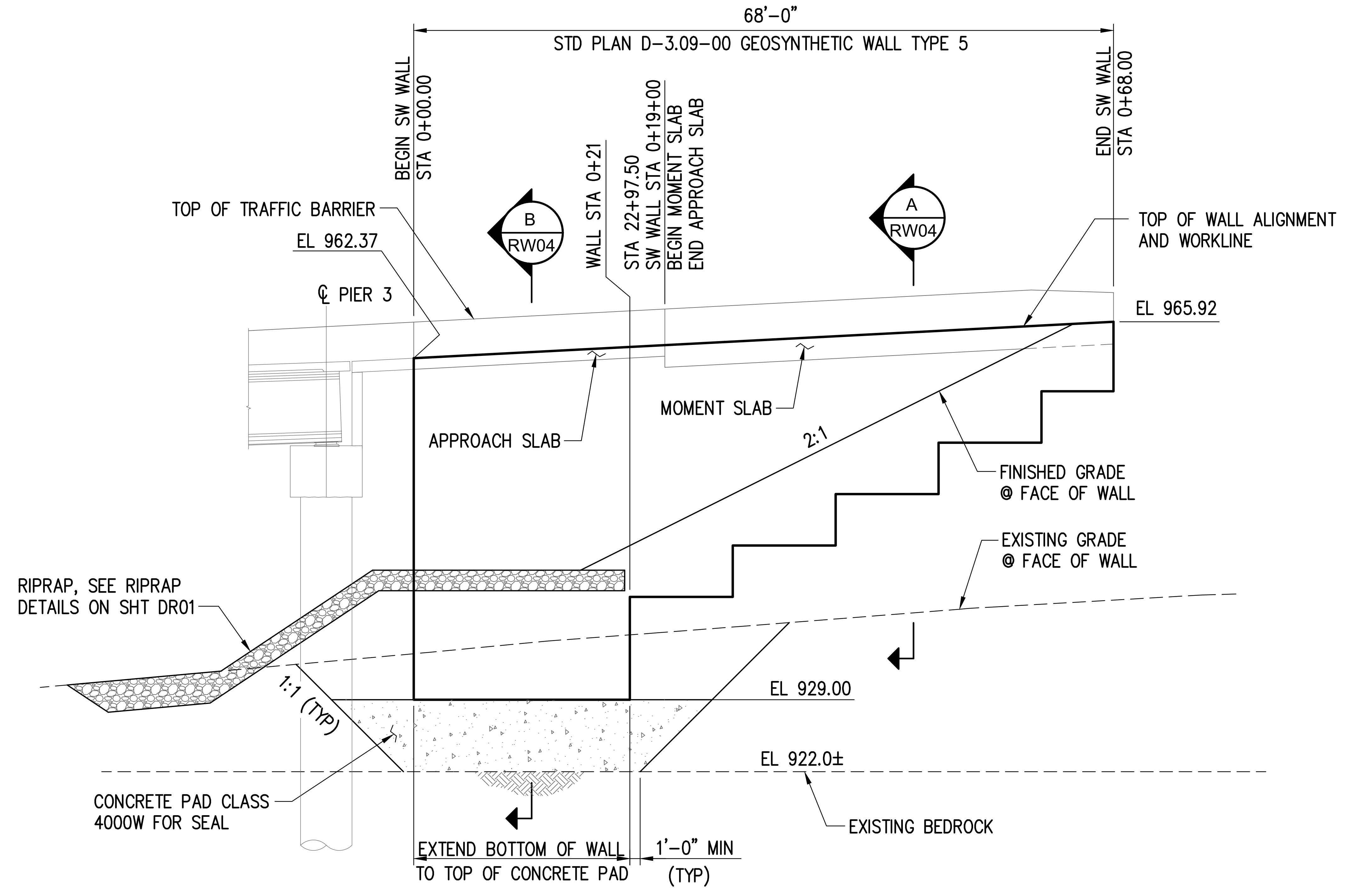
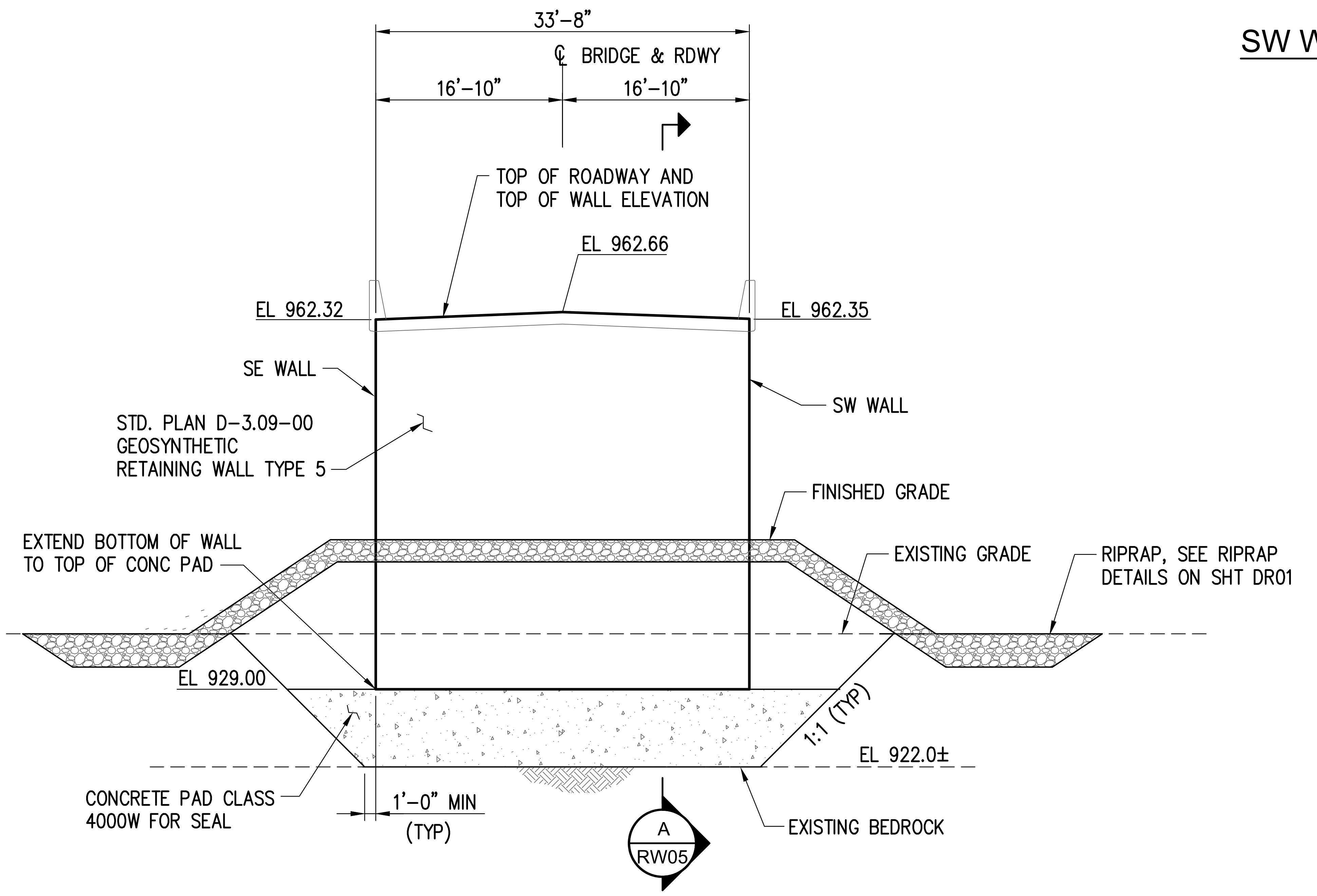


SE WALL ELEVATION



SW WALL ELEVATION



GEOSYNTHETIC RETAINING WALL - PIER 3 ELEVATION

LOOKING AHEAD ON STATIONING

P:\2020\2020025 - Walla Walla Dell Sharpe Bridge Replacement\000 CAD\010 Drawing\C-Structural Sheet\RW02.dwg\TAB:RW03 modified by djensen on Jan 14, 2022 - 16:53

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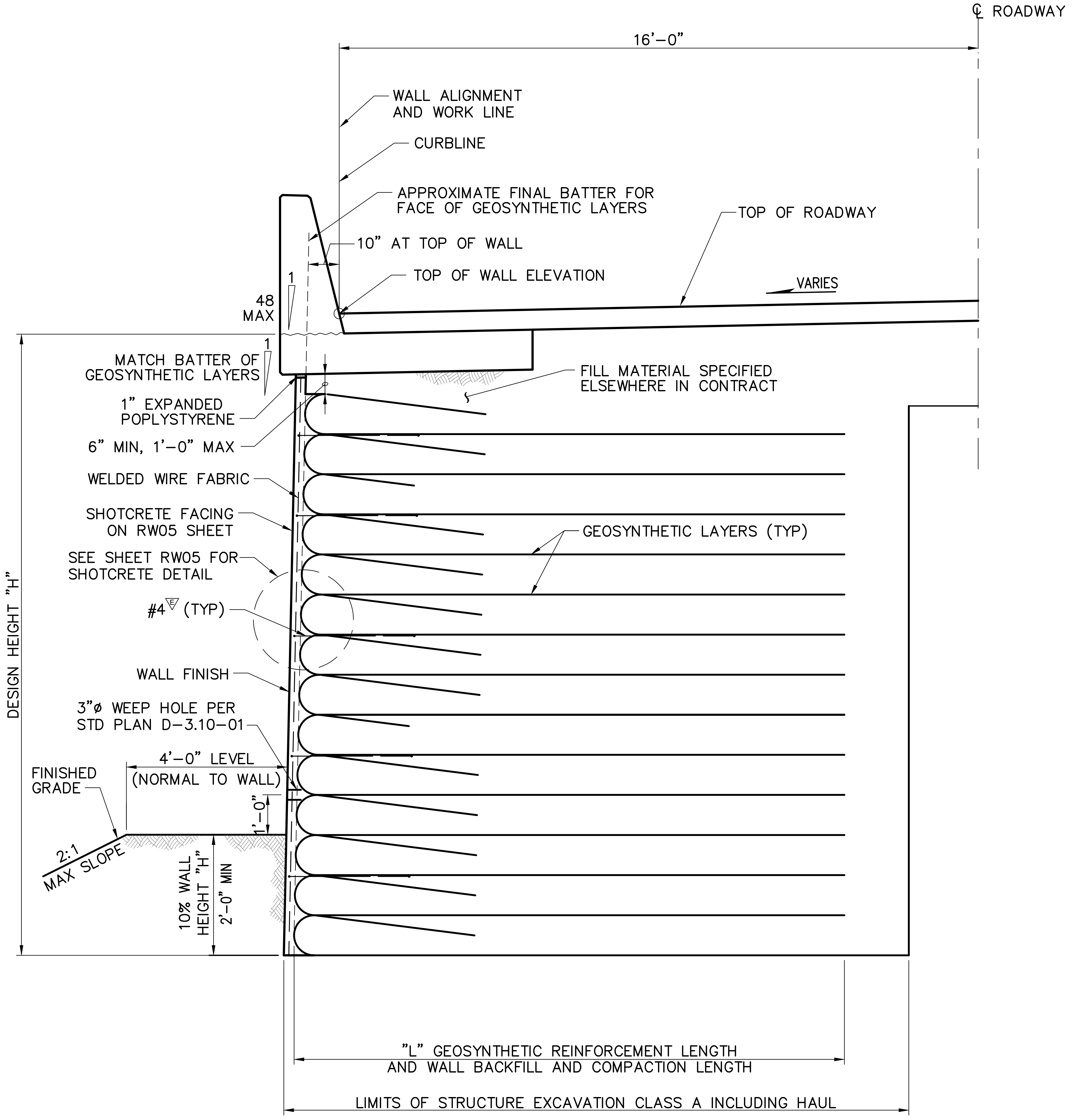
DELL SHARPE BRIDGE REPLACEMENT PROJECT

WALL ELEVATIONS - SOUTH APPROACH

PROJECT NUMBER
CRP20-02
SHEET
RW03
PAGE
---- OF XX

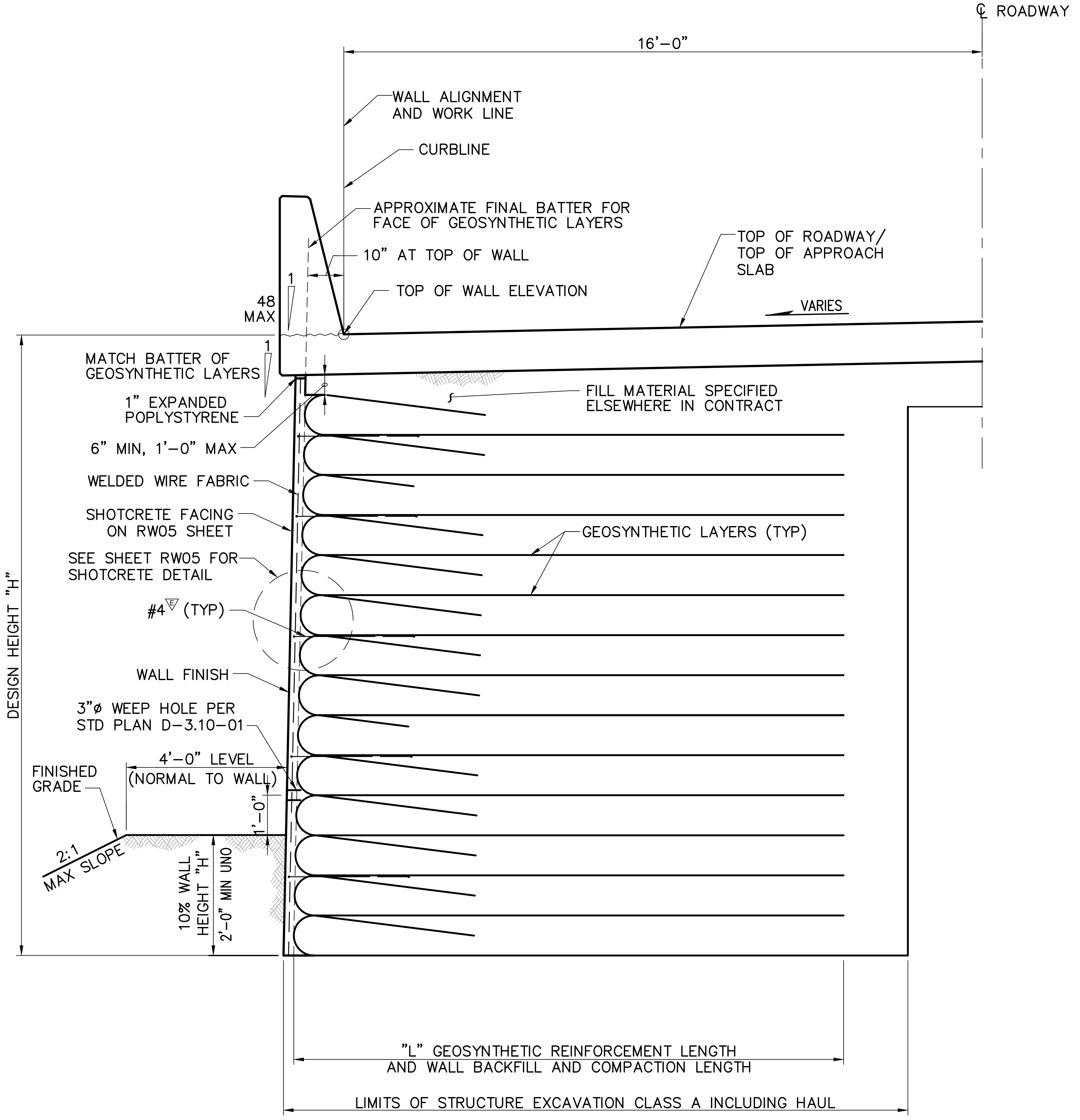
NOTES:

1. ALL BARS SHOWN ON THIS PLAN SHALL BE ASTM A706 UNLESS OTHERWISE SPECIFIED IN THE CONTRACT.



WALL & BARRIER TYPICAL SECTION
BEYOND APPROACH SLAB LIMITS

A
RW03



WALL & BARRIER TYPICAL SECTION
WITHIN APPROACH SLAB LIMITS

B
RW02, RW03

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Walla Walla County
PUBLIC WORKS

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Public Works Department
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DELL SHARPE BRIDGE REPLACEMENT PROJECT

RETAINING WALL DETAILS 1

PROJECT NUMBER
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RW04
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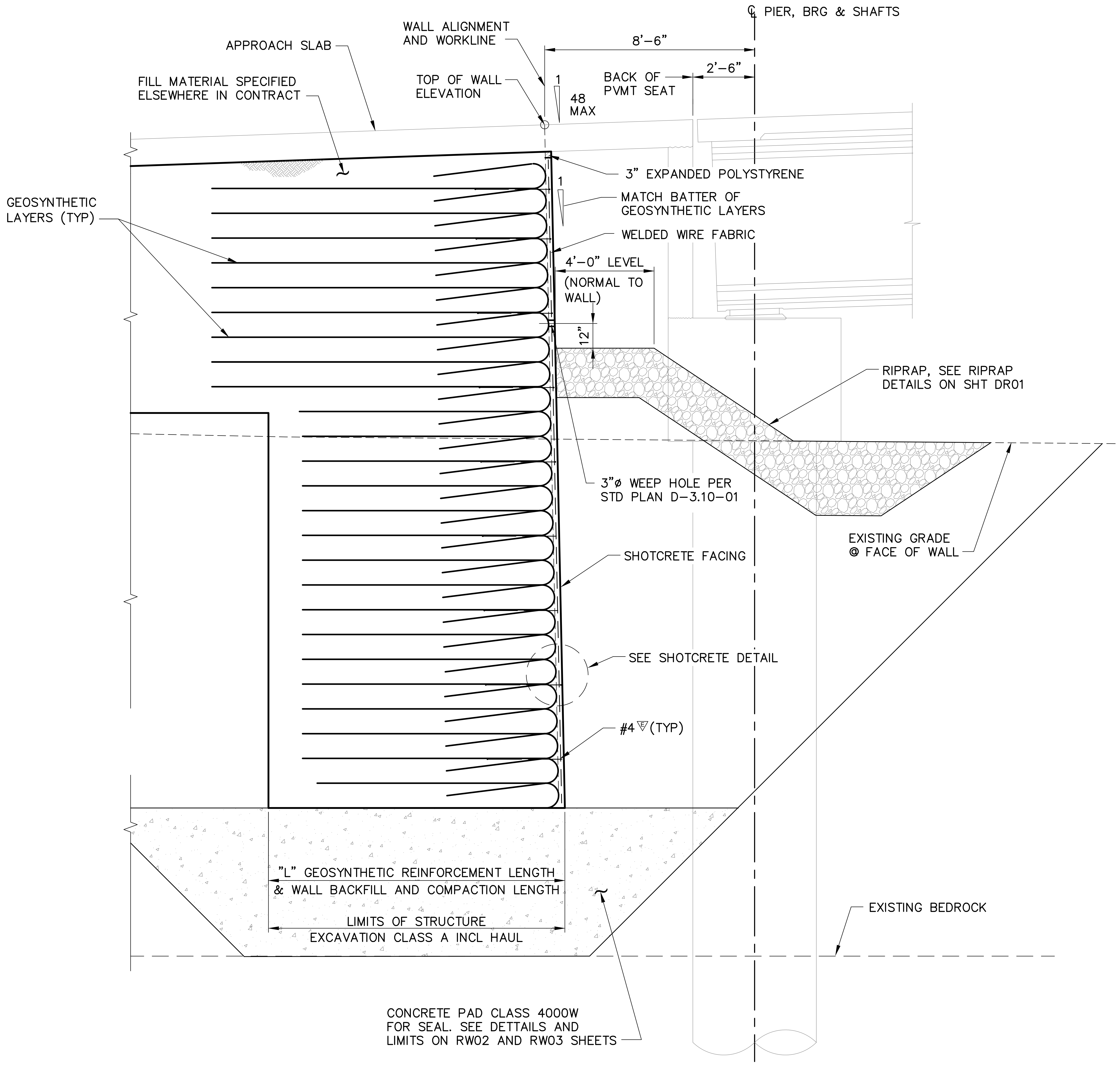
---- OF XX

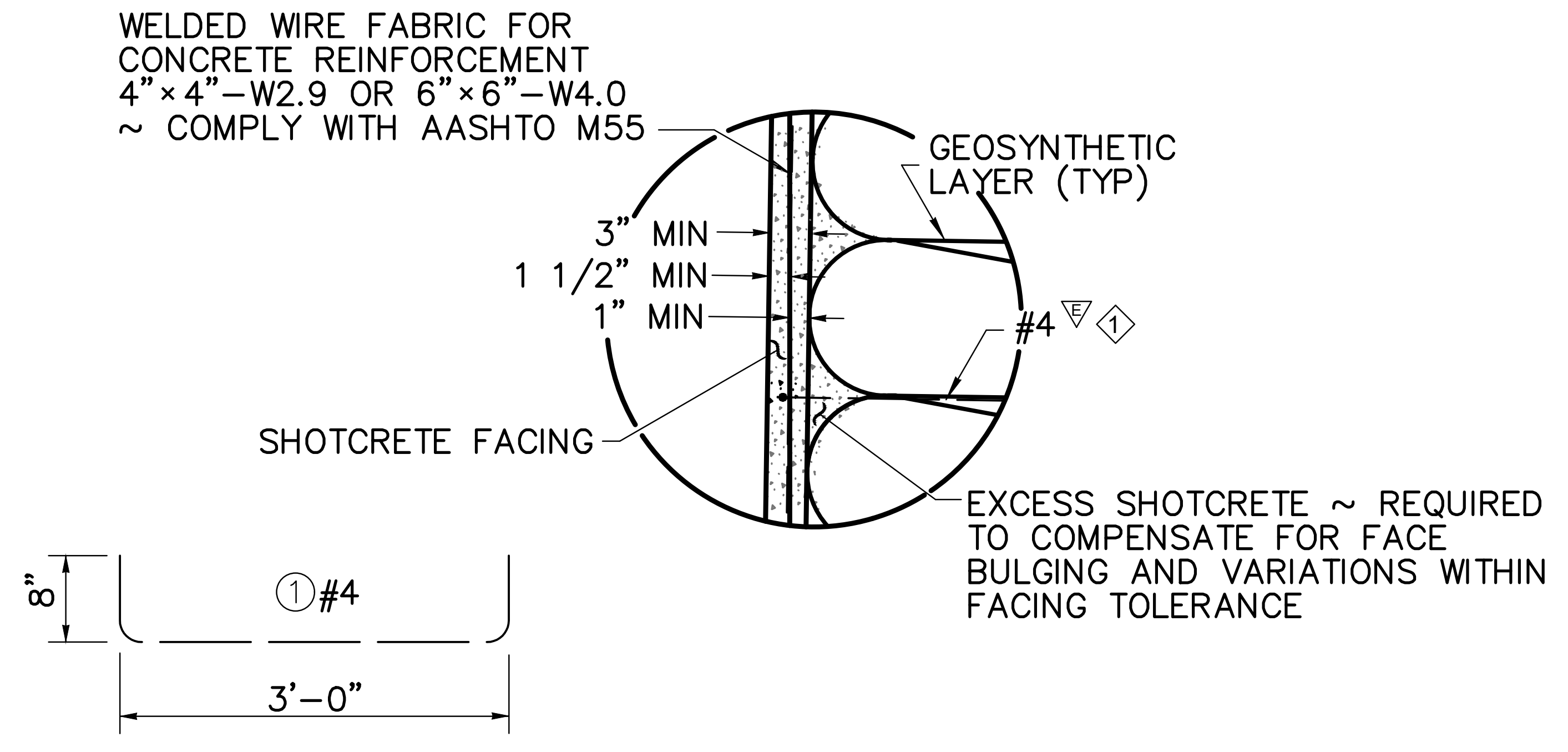
KEY NOTES

◇1 "N" ROWS OF ①#4▽ DOWEL REINFORCEMENT PLACE BETWEEN GEOSYNTHETIC LAYERS AT 5'–0" O.C. HORIZONTAL SPACING, SEE TABLE ON STD PLAN D3.10–01. VERTICAL SPACING BETWEEN ROWS TO BE EQUAL, AS MULTIPLES OF "Sv" ALLOW. ROWS MAY BE STAGGERED. SEE STD PLAN D–3.09 FOR "Sv".



GEOSYNTHETIC RETAINING WALL - PIER 1 TYPICAL SECTION (A) RW02, RW03

PIER 1 SHOWN, PIER 3 SIMILAR



SHOTCRETE DETAIL

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

RETAINING WALL DETAILS 2

PROJECT NUMBER
CRP20-02

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RW05

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---- OF XX

Appendix B

Official Species List

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Washington Fish And Wildlife Office
510 Desmond Drive Se, Suite 102
Lacey, WA 98503-1263
Phone: (360) 753-9440 Fax: (360) 753-9405
http://www.fws.gov/wafwo/

In Reply Refer To: August 24, 2021
Consultation Code: 01EWFW00-2021-SLI-0699
Event Code: 01EWFW00-2021-E-03420
Project Name: Dell Sharpe Bridge Replacement Project

Subject: Updated list of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, and proposed species, designated and proposed critical habitat, and candidate species that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. The species list is currently compiled at the county level. Additional information is available from the Washington Department of Fish and Wildlife, Priority Habitats and Species website: http://wdfw.wa.gov/mapping/phs/ or at our office website: http://www.fws.gov/wafwo/species_new.html. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 et seq.), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether or not the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species, and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:
http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 et seq.). You may visit our website at http://www.fws.gov/pacific/eagle/for information on disturbance or take of the species and information on how to get a permit and what current guidelines and regulations are. Some projects affecting these species may require development of an eagle conservation plan: (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Also be aware that all marine mammals are protected under the Marine Mammal Protection Act (MMPA). The MMPA prohibits, with certain exceptions, the "take" of marine mammals in U.S. waters and by U.S. citizens on the high seas. The importation of marine mammals and marine mammal products into the U.S. is also prohibited. More information can be found on the MMPA website: http://www.nmfs.noaa.gov/pr/laws/mmpa/.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Related website:
National Marine Fisheries Service: http://www.nwr.noaa.gov/protected_species/species_list/species_lists.html

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Washington Fish And Wildlife Office
510 Desmond Drive Se, Suite 102
Lacey, WA 98503-1263
(360) 753-9440

Project Summary

Consultation Code: 01EWFW00-2021-SLI-0699
Event Code: 01EWFW00-2021-E-03420
Project Name: Dell Sharpe Bridge Replacement Project
Project Type: BRIDGE CONSTRUCTION / MAINTENANCE
Project Description: replacement of existing bridge over the Touchet River
Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@46.29345235,-118.40532377480136,14z

Counties: Walla Walla County, Washington

Endangered Species Act Species

There is a total of 2 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

---

1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Birds

NAME	STATUS
Yellow-billed Cuckoo *Coccyzus americanus* Population: Western U.S. DPS There is **final** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/3911	Threatened

Fishes

NAME	STATUS
Bull Trout *Salvelinus confluentus* Population: U.S.A., conterminous, lower 48 states There is **final** critical habitat for this species. Your location overlaps the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/8212	Threatened

Critical habitats

There is 1 critical habitat wholly or partially within your project area under this office's jurisdiction.

NAME	STATUS
Bull Trout *Salvelinus confluentus* https://ecos.fws.gov/ecp/species/8212#crithab	Final

Appendix C

Biology of Listed Species

Steelhead Middle Columbia River Distinct Population Segment

Steelhead follow a generalized life history, which includes the hatching of embryos; emergence and initial rearing of juveniles in fresh water; migration to oceanic habitats for extended periods of feeding and growth; return to natal waters for completion of maturation and spawning; and return to oceanic habitats. The species *Oncorhynchus mykiss* exhibits perhaps the most complex suite of life history traits of any species of Pacific salmonid. These fish can be anadromous (migratory) or freshwater residents (and under some circumstances, apparently yield offspring of the opposite form). Steelhead can spawn more than once (iteroparous), whereas all other *Oncorhynchus* except cutthroat trout (*O. clarki*) spawn once and then die (semelparous) (NOAA Fisheries, 2009).

Within this general life history strategy, steelhead have highly diverse variations in life histories, even within the Middle Columbia River DPS. Steelhead can be divided into summer-run and winter-run types, based on the timing and level of maturity at fresh-water entry and length of spawning migration. Summer-run, or stream-maturing fish, enter rivers between May and October, migrate to headwater areas, and remain for several months before spawning the following spring. Summer run steelhead are the only type upstream of the Klickitat River.

Adult steelhead inhabit marine waters, returning to freshwater streams to spawn. Adults hold in pools or side channels during high winter flows before spawning. Suitable spawning habitat occurs in high-gradient streams with relatively swift water, typically inside channels, riffles, and pool tailouts with gravel and cobble substrates. Juvenile steelhead generally rear in freshwater for two years and spend one to three years in the ocean environment before returning to spawn (NOAA Fisheries, 2009).

Primary threats to the species include freshwater habitat degradation and fragmentation and the effects of these on habitat connectivity (NOAA Fisheries, 2009).

Bull Trout

Bull trout are a native char to the northwest that can reach up to 32 pounds. Bull trout occur in widespread, but fragmented habitats. Bull trout exhibit multiple life history patterns, including resident and freshwater migratory, and a rarer anadromous form, occurring only in western Washington (USFWS, no date). Resident bull trout complete their life cycles in the tributary (or nearby) streams in which they spawn and rear. Migratory bull trout spawn in tributary streams where juvenile fish rear from one to four years before migrating to either a lake (adfluvial), river (fluvial), or in certain coastal areas, to saltwater (anadromous or amphidromous) to mature (Fraley and Shepard, 1989; Goetz, 1989).

Bull trout have more specific habitat requirements than other salmonids. Bull trout are a cold-water species, found in moderate to fast flowing streams and rivers and cold-water lakes and reservoirs; bull trout are believed to be limited by waters that exceed 15°C (59°F) (Fraley and Shepard, 1989). Additional components (limiting factors) that appear to influence bull trout distribution and abundance include cover, channel form and stability, valley form, spawning and rearing substrates, and migratory corridors (Oliver, 1979; Pratt, 1984 and 1992; Fraley and Shepard, 1989; Goetz, 1989). Adult bull trout use the bottoms of deep pools for cover. Complex habitats, including riffles, deep pools, undercut banks, side channels, and LWD, provide shelter and foraging cover for juvenile bull trout (USFWS, no date). Juvenile bull trout feed on insects and macrozooplankton; adult bull trout prey on fish and other small vertebrates.

Bull trout are multi-year spawners and typically spawn from August to September during periods of decreasing water temperatures. Migratory bull trout frequently begin spawning migrations as early as April and have been known to move upstream as far as 250 kilometers (155 miles) to spawning grounds. Spawning occurs in water temperatures below 48°F (9°C) (McPhail and Baxter, 1996); successful incubation of the eggs requires temperatures below 40°F. Spawning substrates include loose gravels and cobbles with low levels of fine sediments in 12 to 24 inches of deep water (Fraley and Shepard, 1989; Goetz, 1989; Boag 1991; Baxter and McPhail, 1996). Bull trout fry emerge in April–May and rear near their spawning areas. The growing juveniles can adopt one of the three life strategies discussed above. Some fry may drop downstream looking for foraging opportunities and, depending on the rearing habitats that they select, may enter the estuary. The foraging juvenile and sub-adult char may migrate throughout the basin looking for feeding opportunities. Juvenile migratory bull trout remain in their natal stream for one to four years before out-migrating (USFWS, no date).

Primary threats to the species include fish passage, habitat fragmentation and degradation, and non-native species (USFWS, no date).

Yellow-Billed Cuckoo

The western yellow-billed cuckoo is a neotropical migrant that occurs in large tracts of riparian habitat in North America during the breeding season, particularly cottonwood and willow riparian woodlands associated with low gradient rivers and streams in open valleys and broad floodplains (USFWS, 2014a and 2014b). Western yellow-billed cuckoos forage and nest in willow and cottonwood riparian forests that are usually 50 acres or larger; optimal sites are larger than 200 acres and have dense canopy closure (USFWS, 2014a). Dense, closed-canopy riparian forests prevent cuckoo predation by birds of prey, and provide moist conditions necessary for egg and nestling survival and prey abundance (USFWS, 2014a). Cuckoos arrive at breeding grounds in June and nesting is timed to coincide with prey abundance (USFWS, 2013). Cuckoos primarily feed on insects (caterpillars, grasshoppers, katydids, beetles, and crickets) and occasionally prey upon tree frogs and lizards (USFWS, 2014a). Brood size and number is related to prey abundance; cuckoos typically have two broods and can raise up to three in one season if prey is abundant (USFWS, 2013). Eggs hatch in 11 to 12 days and nestlings fledge in 5 to 7 days. Yellow-billed cuckoos leave breeding grounds in August to winter in South America.

Primary threats to the species include loss and degradation of riparian habitat.

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Appendix D

Environmental Baseline for Aquatic Habitats

Table 1. Matrix of Diagnostics/Pathways and Indicators

Diagnostics/Pathways Indicators	**Population and Environmental Baseline**		**Effects of the Action**		
	Properly Functioning Criteria	**Functionality (PF/AR/NPF)***	**Restore**	**Maintain**	**Degrade**
Water Quality:					
Temperature Avg Max Summer	40 to 57°F for spawning and incubation	NPF		X	
Sediment/Turbidity	Less than 12% fines (fines = <6.4 millimeter)	AR		X	
Chemical Contamination/ Nutrients	Low levels of contamination, no 303(d) streams	NPF		X	
Habitat Access:					
Physical Barriers	Less than one fish passage barrier	PF		X	
Habitat Elements:					
Substrate Embeddedness Percent Clean Substrate	Gravel, cobble dominant; embeddedness greater than 20%	PF		X	
Large Woody Debris (LWD)	10 to 20 pieces/100 linear feet	NPF		X	
Pool Frequency	Channel width #pools/mile 5 feet = 184 10 feet = 96 15 feet = 70 20 feet = 56 25 feet = 47 50 feet = 26 75 feet = 23	NPF		X	
Pool Quality	3.28 feet or 1 meter deep with good cover	NPF		X	
Large Pools	Each reach has many large pools (3.28 feet or 1 meter deep)	NPF		X	
Off-Channel Habitat:	Many backwaters with cover	NPF		X	
Refugia:	Sufficient with adequate buffer and riparian	AR		X	
Channel Conditions and Dynamics:					
Avg. Wetted Width/Max. Depth Ratio	Ratio is 10	NPF		X	
Stream Bank Condition	≥90% stable	AR		X	
Floodplain Connectivity	Frequent hydrologic connection to main channel	AR		X	
Flow/Hydrology:					
Change in Peak/Base Flows	Disturbance relative to undisturbed watershed	AR		X	
Increase in Drainage Network	Zero or minimum increase in drainage network	NPF		X	

Diagnostics/Pathways Indicators	Population and Environmental Baseline		Effects of the Action		
	Properly Functioning Criteria	Functionality (PF/AR/NPF)*	Restore	Maintain	Degrade
Road Density and Location	<2 miles/mile; no valley bottom roads	AR		X	
Disturbance History	Less than 15% Equivalent Clear-Cut Area (ECA); base flow, peak, and flow timing comparable to undisturbed	NPF		X	
Riparian Reserves	Riparian corridor at least 80% intact; composed of 50% endemic vegetation	AR		X	

PF = properly functioning, AR = at risk, NPF = not properly functioning

Table 2. Environmental Baseline Conditions for Bull Trout

Diagnostics/ Pathways Indicators	Population and Environmental Baseline			Effects of the Action		
	Criteria	Present condition	Functionality (FP/AR/FUR)*	Restore	Maintain	Degrade
Subpopulation Size	Mean population size greater than several thousand individuals. All life stages equally represented.	No resident populations within the action area. Individuals present during migration only.	FUR		X	
Growth and Survival	Population resilience to short-term disturbances.	Limited information is available about population resilience in the action area. However, population levels appear to be consistently low in the action area, and habitat use is limited to migration.	FUR		X	
Life History Diversity and Isolation	Migratory form is present; subpopulations exist close to other spawning and rearing groups.	Spawning occurs only in the upper reaches of the watershed. No spawning has been documented in the action area and habitat is not suitable for spawning.	FUR		X	

Diagnostics/ Pathways Indicators	**Population and Environmental Baseline**			**Effects of the Action**		
	Criteria	**Present condition**	**Functionality (FP/AR/FUR)***	**Restore**	**Maintain**	**Degrade**
Persistence and Genetic Integrity	Connectivity among populations.	Little or no connectivity present.	FUR		X	
Integration of Species and Habitat Conditions	Habitat quality; connectivity between subpopulations.	Spawning habitat not present in action area; no subpopulation connectivity.	FUR		X	

FP = Functioning appropriately
AR = Functioning at risk
FUR = Functioning at unacceptable risk

Appendix E

Site Photographs

Photo 1. Upstream of Bridge facing north

Photo 2. Gravel banks immediately upstream of project site.

Photo 3. Vegetated floodplain upstream of bridge

Photo 4. Meander at bridge (facing north)

Photo 5. Bank armoring river right upstream of bridge.

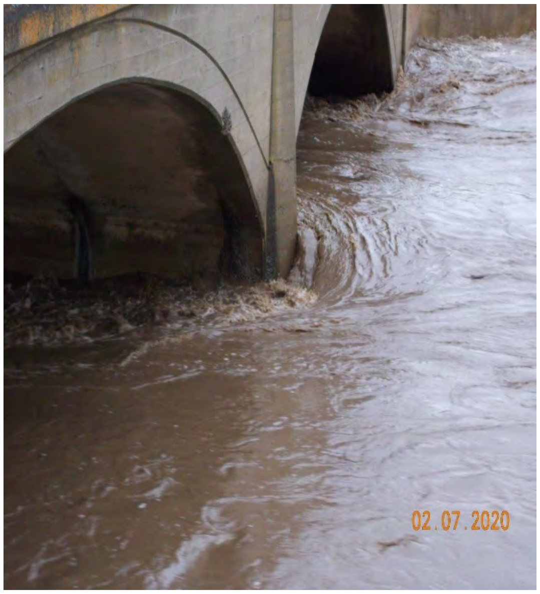

Photo 6. +100 year flood at bridge

Photo 7. +100 year flood level at bridge

Photo 8. Drone photo of floodplain at approximate proposed bridge location.

Exhibit 12

Critical Areas Assessment Report

Dell Sharpe Bridge Replacement Project
Walla Walla County, Washington

Prepared for:

Walla Walla County Public Works
990 Navion Lane
Walla Walla, Washington 99362

February 2021
PBS Project 66257.000

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Project Overview

Location

Project Address:	No formal site address, directly north of the Sharp Road and Pettyjohn Road intersection (Figure 1)
APE Size:	11.8 acres
Walla Walla County tax IDs:	350902210003, 35103510004, 351034110002, 350903110001, 35090220006, 3502240002
Proposed Project:	Bridge Replacement / Realignment
Central Coordinates:	46.2937210, -118.408232
Township and Range:	NW ¼ Section 2, T9N, R35E
Critical Areas Present:	Fish and wildlife habitat conservation areas, frequently flooded areas, critical aquifer recharge areas, geologic hazard areas

1 INTRODUCTION

PBS Engineering and Environmental Inc. (PBS) was contracted to conduct a critical areas assessment for the planned replacement of the Dell Sharpe Bridge in Walla Walla County, Washington. The purpose of the assessment was to identify and delineate critical areas on the site and determine the extent of baseline buffers or regulated zones.

Through the course of the assessment several different types of critical areas that are subject to regulation were identified. These include the following: fish and wildlife habitat conservation areas, frequently flooded areas, geologic hazard areas, and critical aquifer recharge areas (CARAs). In addition to being regulated as a fish and wildlife habitat conservation area, the Touchet River is regulated as a shoreline of the state.

Following a review of existing information, a site visit was completed on November 13, 2020, to record the existing conditions of the site, determine the presence or absence of jurisdictional wetlands, and assess existing habitat conditions for priority wildlife species. The results of the investigation are presented below.

2 PREPARER

The on-site assessment and critical area report were completed by Senior Wetland Scientist/Project Manager Brian Bieger. Mr. Bieger has a Bachelor of Science degree in Wildlife Science and 18 years professional experience in wetland and wildlife habitat assessment and related project permitting.

3 BACKGROUND INFORMATION

The project area consists of an Area of Potential Effect (APE) that was determined during the preliminary design phase of the bridge replacement project. The APE encompasses the entirety of areas that could be impacted during the project ranging from clearing and staging, demolition of the existing bridge, and construction of the new span. The APE exists as a roughly rectangular area 11.8 acres in size that follows the existing alignment of Pettyjohn Road as it crosses the Touchet River (Figure 1).

A review of available existing information was completed prior to completing a site visit. This included a review of maps and database information from the following sources:

- Washington Department of Fish and Wildlife (WDFW) Online Priority Habitat and Species (PHS) maps
- US Fish and Wildlife Service national wetland inventory (NWI) maps
- Natural Resource Conservation Service (NRCS) soil maps
- Walla Walla County critical area maps
- Washington Natural Heritage Program rare plant maps
- Recent and historic aerial photographs

3.1 Ecological Setting

The APE is located in the northern extent of the Columbia Plateau ecoregion within the Loess Islands Level IV region (10B). This region of Washington is characterized by rolling volcanic plains typically vegetated with sagebrush. Precipitation ranges from 7 to 18 inches per year from east to west across the ecoregion. The big sage / bluebunch wheatgrass association grades into bluebunch wheatgrass-Idaho fescue as precipitation increases. Present-day land use has transformed the loess islands into wheat fields and similar agriculture uses. Because of the limitations in moisture, crop rotations generally include a fallow period.

3.2 Topography

The topography of the site is highly variable and essentially spans from rolling hills and slopes in the south to a flat valley to the north (Figure 2). Pettyjohn Road descends into the project area and becomes flat where it crosses Sharp Road. South of Sharp Road, there are short steep slopes that lead down to the Touchet River floodplain. There are some areas on the east side of Pettyjohn Road, immediately before the bridge, where erosion rills have formed from roadside drainage. Photographs of these features are included in the site photographs presented in Appendix B. There is a moderate amount of near-vertical banks along the Touchet River that are mostly concentrated on the outside of the channel meander leading to the bridge.

3.3 Soils

The NRCS Soil maps for the APE indicate the presence of three individual soil units (Figure 3). None of the mapped soil units are listed as hydric in the Walla Walla County soils survey (NRCS, 1964). Descriptions of the mapped soils are summarized below.

WaD—Walla Walla silt loam, 8 to 30% slopes. The Walla Walla component makes up 100% of the map unit. Slopes are 8 to 30%. This component is on hills. The parent material consists of loess. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3%. This soil does not meet hydric criteria.

OnA—Onyx silt loam, 0 to 3% slopes. The Onyx component makes up 100% of the map unit. Slopes are 0 to 3%. This component is on flood plains. The parent material consists of loess alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. This soil is occasionally flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3%. This soil does not meet hydric criteria.

HnA—Hermiston very fine sandy loam, 0 to 3% slopes. The Hermiston component makes up 100% of the map unit. Slopes are 0 to 3%. This component is on flood plains. The parent material consists of loess alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2%. This soil does not meet hydric criteria.

3.4 NWI Mapped Wetlands

The NWI maps indicate the existence of a perennial stream (R3UBH) flowing through the central portion of the APE (Touchet River) in addition to floodplain palustrine wetland (PEM1C) along the south side of the Touchet River (Figure 4). It should be noted that NWI maps are created from interpretation of aerial photography and are not meant to represent the extent of jurisdictional wetlands. The presence of the palustrine wetland was not identified in the field.

3.5 WDFW Mapped Priority Habitats and Species

The WDFW PHS database returned several different potential species and two habitats. The PHS report is provided in Appendix A of this report. The priority habitats identified in the report are riparian habitat in the form of the Touchet River corridor and emergent wetlands.

3.5.1 Aquatic Species

Listed priority fish that are verified to inhabit the Touchet River include the following:

- Summer steelhead trout (*Oncorhynchus mykiss*)
- Rainbow trout (*Oncorhynchus mykiss*)

- Spring Chinook salmon (*Oncorhynchus tshawytscha*)

Summer Steelhead Trout

Summer steelhead within the Touchet River belong to the Middle Columbia River Distinct Population Segment (DPS). The mid-Columbia portion of the Columbia River stretches upstream from the Hood River up to and including the Yakima River (NOAA, 2021). This population is listed as threatened under the Endangered Species Act (ESA).

Steelhead are anadromous native rainbow trout that migrate to marine waters as juveniles and return to freshwater to spawn. The summer or winter demarcation between steelhead populations is based on what time of the year they return to freshwater to spawn. Summer steelhead return to freshwater between April and October while winter steelhead do the same between November to May.

Steelhead are known to not follow a rigid outmigration and return to freshwater cycle. Juvenile steelhead typically stay in freshwater for a period of three years but may remain in freshwater for up to seven years prior to migrating to brackish and salt waters where they mature (USFWS, 2021). Mature male steelhead typically return to freshwater after two years at sea while females typically return after three years. Steelhead are the only salmonid that is known to migrate from the ocean to spawn in freshwater, and then out-migrate again to marine waters to again return to freshwater to spawn in the future.

Prime steelhead habitat includes cold, clean water and suitable habitat. Suitable habitat includes undercut banks, large woody debris, and boulders which form pool habitats for cover and hunting. Spawning habitat for steelhead typically takes the form of sediment free gravels in rapidly flowing waters.

Rainbow Trout

Rainbow trout and steelhead are genetically the same species. The difference between the two is that rainbow trout do not out-migrate to marine environments and live their whole life in freshwater. The natural habitat of rainbow trout is the cool waters of the northern hemisphere, but they have been introduced as game fish throughout the world. Rainbow trout are carnivorous and primarily feed on smaller aquatic insects (SFSU, 2005).

Rainbow trout typically spawn during their second year of life depending on growth rates which are a function of food availability. Rainbow trout are susceptible to the same environmental threats as steelhead. These include water pollutants, elevated temperatures, loss of diverse in-stream habitat, and fluctuating hydrology resulting from impervious surface drainage.

Spring Chinook Salmon

Chinook salmon are also an anadromous salmonid that is born in freshwater, migrates to saltwater, and then returns to freshwater to spawn. The species of Chinook salmon found within the Touchet River is the mid-Columbia DPS Chinook salmon that is currently not listed under the ESA (NOAA, 2021). Unlike the steelhead trout, Chinook salmon do not exhibit a large variability in life cycle timing. Chinook salmon out-migrate to brackish and saltwater during the first year of their life. Chinook salmon migrate back to freshwater to spawn between three and five years of age, with the majority being four years old (NOAA, 2021b).

Chinook salmon prefer to spawn in larger river systems but are known to utilize smaller streams if seasonal flows are conducive. Chinook salmon, owing to their large size, can spawn in much coarser gravel than any of the other salmon species in the northwest (WDFW, 2021b). Chinook salmon, like steelhead, require cold clear water and diverse habitats for spawning and early rearing. Chinook salmon are very susceptible to thermal stress from warm waters. High temperatures negatively affect both out-migrating juveniles and returning adults. Higher in-stream temperatures increase stress, make individuals more susceptible to disease, and expend energy stores at a faster rate (WDFW, 2021b).

3.5.2 Terrestrial Species

Terrestrial wildlife species that are known to occur in the ¼ section that the APE is located include:

- Ring-necked pheasant (*Phasianus colchicus*)
- Northwest white-tailed deer (*Odocoileus virginianus ochrourus*)

Ring-Necked Pheasant

Ring-necked pheasants are a game bird that is not currently or proposed to be listed as a state endangered, threatened, sensitive, or candidate species. Ring-neck pheasants are typically associated with croplands that are near areas of tall grasses, shrubs, and trees that provide cover. They are strongly associated with the edge habitat that occurs at the intersection of these two land types. In the eastern portion of Washington ring-necked pheasants are associated with water features and can be found in wetlands, adjacent to lakes, and in riparian areas.

Juvenile birds are typically insectivorous and feed on worms, beetles, crickets, ants, and the like. As they grow, their diet expands to include grains. This is the primary factor in the bird preferring habitats in close proximity to agriculture operations. The steady decline in ring-neck numbers beginning in the late 1990s has often been associated with changing agricultural practices that have eliminated edge habitat and increased urbanization (Cornell, 2021).

White-Tailed Deer

White-tailed deer are native to Washington and were found in abundance in the foothills and valleys of the northwest Unites States in the early 1800s. In the present, the white-tailed deer is primarily found in the eastern counties of Washington with the highest populations located in the northern portions of the state (WDFW, 1991). White-tailed deer are most often found at the intersections of food, cover, and water. Habitat types in the Walla Walla County area where these habitats are found include palustrine forested and shrub / scrub wetlands, riparian areas, and riparian areas adjacent to or in close proximity to agriculture lands. While deer will utilize wide open fields, they generally require thick shrub or tree cover nearby.

White-tailed deer typically have home ranges that are between 40 to 300 acres (Banfield, 1974). Overwintering habitat in the form of high canopy coverage riparian areas are critical for white-tails where thermoregulation and forage are available. This species is an herbivore that is known to feed on grasses in spring; forbs in summer; leafy green browse, acorns, and other fruits in late summer; and evergreen woody browse in the winter. White-tailed deer generally lose weight all winter as nutritional content in available browse is low (McCullough, 1985).

Management considerations for deer habitat include reduced amounts of public travelled roads, habitat loss, conversion of natural lands to agriculture, and loss of edge habitat. Corridors with sufficient cover to allow deer to travel between different habitat areas are also critical for deer populations as they move between seasonal habitats.

4 SITE VISIT RESULTS

A site visit was completed on November 13, 2020. Vegetation within the APE includes active agriculture land in the northern and southern extents and unmanaged vegetation in the central portions of the area. The slopes leading down to the Touchet River floodplain are dominated by large amounts of invasive, non-native plant species. These include Canada thistle (*Cirsium arvense*), Perennial ryegrass (*Lollium perrene*), cheatgrass (*Bromus tectorum*), cereal rye (*Secale cereale*), curly dock (*Rumex crispus*), Canada goldenrod (*Solidago canadensis*), and poison hemlock (*Conium maculatum*). The upper portions of this slope are sparsely vegetated within grasses and forbs and scattered Russian olive (*Elaeagnus augustifolia*) and big sagebrush (*Artemisia tridentata*). The lower bench that sits slightly above the floodplain areas consists of a thick stand of poison hemlock (Figure 5).

The floodplain areas directly adjacent to the Touchet River are vegetated by a mixture of native trees and shrubs with an understory comprising a mixture of non-native herbs and grasses. There is a dense overstory of black cottonwood (*Populous trichocarpa*), water birch (*Betula occidentalis*), white alder (*Alnus rhombifolia*), and coyote willow (*Salix exigua*). Understory vegetation comprises young coyote willow, red-osier dogwood (*Cornus sericea*), nootka rose (*Rosa nootkana*), Russian olive, and scattered false-indigo bush (*Amorpha fruticose*). Photographs of this area are presented in Appendix B. Emergent vegetation is very sparse, likely due to seasonal flooding and scouring of the floodplain and is dominated by reed canarygrass (*Phalaris Aurundinacea*), bentgrass (*Agrostis sp.*), and scattered soft rush (*Juncus effusus*). It should be noted that the reed canarygrass and soft rush are predominately located directly adjacent to the mainstem and backwater channels and not dispersed over the entire gravel bar.

5 CRITICAL AREAS

5.1 Wetlands

Despite the fact that NWI maps indicate palustrine wetlands located adjacent to the Touchet River, no wetlands were identified within the APE during the delineation. The floodplain areas of the Touchet River channel are vegetated with riparian plant species that meet the wetland hydrophytic vegetation criteria, but primary indicators of wetland hydrology and wetland soils were absent. Soil test pits revealed bright silty soils with a high number of gravels and cobbles. Soil matrix colors range from 10YR 3/3 to 10YR 4/3. There were no redoximorphic features within the upper 15 inches of the soil profile. Sample plot locations are found in Figure 4. It was determined that the floodplain areas are likely too well drained to allow for the formation of hydric soils and jurisdictional wetlands.

5.2 Fish and Wildlife Habitat Conservation Areas

5.2.1 Waters of the State

The Touchet River flows west through the approximate center of the APE. The ordinary high water marks (OHWM) of the river were flagged and recorded in the field using a Trimble GeoXT handheld GPS unit capable that yielded an accuracy of ±2 feet after post processing of collected data. The OHWM flags were also subsequently surveyed in the field (Figure 5).

At the time of the site visit the river consisted of a series of pools and riffle habitat. Substrate varies upon channel location based on hydrologic sorting of bedload material and ranged from sandy areas along the inside of channel meanders to large cobble-small boulders along the outside of the meanders. The central portion of the channel has substrate that is characterized by two size classes of cobble, 1.5-inch and 3.5-inch diameters. Substrate did not appear overly embedded which is a positive aspect in terms of the potential for salmonid spawning.

Several smaller pieces of large woody debris (LWD) were identified within or directly adjacent to the channel but there were no large "key" pieces that would support the formation of complex log jams or larger pool habitat. In general, it appears that the river is deficient in LWD based on familiarity with streams of similar size and slope. In general, fish habitat is good within the reach that flows through the APE. Undercut banks were identified in several locations and within the immediate area the floodplains of the river are well vegetated which generally promotes channel stability.

Known water quality issues for the Touchet River within the APE are limited to temperature. Downstream of the APE, closer to Highway 12, the Touchet River suffers from temperature, PH, dissolved oxygen, and bacteria counts that exceed state water quality standards. Water surface temperatures in the Touchet River at Harvey Shaw Road routinely exceeded 80 degrees Fahrenheit (°F) between 2001 and 2006 (WDFW, 2007). Temperatures exceeding 75–84°F are known to be lethal for salmonids (Bjorn and Reiser, 1991).

Aerial drone photographs, surface level photographs, and field notes on vegetation were reviewed to qualitatively rate the available existing habitat withing the riparian corridor. This analysis resulted in three different qualities of habitat being assigned (high, marginal, degraded). The higher quality habitat areas are represented by areas where native vegetation is dominant, and the riparian area has a multi-tiered vegetation layer with canopy, shrub, and emergent vegetation layers. The marginal vegetation layers exist as areas with high vegetation coverage, but it is dominated by non-native species. Lastly, the degraded areas exhibit low overall coverage of vegetation and the predominance of non-native or invasive species. Establishing the overall conditions of the existing riparian corridor will help determine potential mitigation measures. The three different vegetation zones are presented in Figure 6. As per this figure, as you get closer to the Touchet River the condition of the habitat improves. The outermost portions of the assessed area are likely outside the zone of influence of the Touchet River, which is one factor contributing to the lack of vegetation. Any restoration and enhancement efforts should focus on invasive species removal and establishment of native vegetation closer to the channel.

5.2.2 WDFW Priority Species

There are three priority fish species and two terrestrial species that are mapped as having the potential to be located within the APE. The life histories of the identified species are covered above. The potential that the species occur within the project area is discussed below.

Rainbow trout. There is a high likelihood that rainbow trout are present within the sections of the Touchet River within the APE for most of the year. The river contains suitable fish and surface water temperatures, while exceeding state water quality standards during the summer months, likely do not limit fish usage.

Sumer steelhead trout. Summer steelhead are known to utilize the Touchet River for spawning, migration, and rearing. Summer steelhead return to spawn between April and October.

Spring Chinook salmon. Chinook salmon are known to utilize the Touchet River for spawning, migration, and rearing although their numbers are limited (WDFW, 2007).

Ring-necked pheasant. The habitat within the APE represents prime ring-necked pheasant habitat as it provides food, cover, and a water source. The close proximity of agricultural fields provide forage opportunities for adult pheasants and the forested and shrub / scrub habitat within the riparian corridor provide cover from thermal stress. It is highly likely that ring-necked pheasants are utilizing the APE.

White-tailed deer. The habitat within the APE represents good habitat for white-tail deer with a fair amount of vegetation that would provide suitable cover, some degree of forage opportunity, and fresh water. Similar habitats are found east and west of the APE that form a potential travel corridor for deer. The corridor, however, is narrow and there are places within the corridor that deer would have some amount of difficulty traversing. In addition, the areas surrounding this vegetated corridor are open and expansive agriculture fields which white-tailed deer would generally avoid traveling through due to lack of cover. No deer prints were identified during the site visit. The potential for deer presence within the APE is likely moderate.

5.3 Critical Aquifer Recharge Areas

CARA are defined in the Washington Administrative Code (WAC) chapter 365-190 as: "Areas with a critical recharging effect on aquifers used for potable water are areas where an aquifer that is a source of drinking water is vulnerable to contamination that would affect the potability of the water." Walla Walla County critical area maps were reviewed to determine if the APE is within a vulnerable CARA. The APE is located within both a Zone 1 (high vulnerability) and Zone 2 (low vulnerability) (Figure 7). Zone 1 represents areas that have a high potential for groundwater contamination from certain land uses that utilize hazardous materials. This potential occurs from a high water-table elevation, porous sediments, or a combination of the two.

5.4 Frequently Flooded Areas

Portions of the project area are within areas subject to frequent flooding. The Federal Emergency Management Agency (FEMA) flood insurance maps for the project area were consulted and georeferenced to the project location using ArcMap (Figure 8). The FEMA maps indicate that the central portion of the project area is within Zone A, also commonly referred to as the 100-year floodplain. Detailed hydraulic analysis that would calculate actual water surface elevations during the 100-year flood have not been completed for this reach of the Touchet River.

As there has not been a formal floodway or flood fringe that has been mapped, the potential project will have to be reviewed to determine potential impacts to flows and flood elevations within the Touchet River. The applicant will be completing a hydraulic analysis to determine these effects.

5.5 Geologic Hazard Areas

The APE contains steep slopes and erodible areas within the floodplain of the Touchet River. In addition, the area is mapped as having a moderate to high liquefaction risk (Figure 9). The presence of these geologic hazards will be addressed during the engineering process. The applicant is in the process of completing geotechnical borings and analysis to determine appropriate measures. These hazards will be covered in a separate report prepared by a geotechnical engineer licensed in the state of Washington.

6 REGULATORY OVERVIEW

The project area contains several critical areas that are subject to federal, state, and local regulation. The regulations surrounding the critical areas within the APE are addressed individually below.

6.1 Waters of the State

The Touchet River is regulated on multiple levels. Walla Walla County regulations concerning the Touchet River are codified in Chapter 18.08.600 of the Walla Walla County Code of Ordinances (Code). As per the Code, the Touchet River has a 100-foot base riparian buffer that extends from the identified OHWM. In addition to the protection under the Code, the Touchet River is listed as a shoreline of the state and is subject to regulation under the Walla Walla County Shoreline Master Plan (SMP). The shoreline zone extends 200 feet from the OHWM or the edge of the 100-year floodplain, whichever is greater. The proposed development will be required to obtain a shoreline substantial development permit prior to construction. Impacts to native vegetation within the shoreline zone may require mitigation to ensure no net loss of function.

In addition to Walla Walla County, any work below the OHWM of the Touchet River will require formal authorization from the US Army Corps of Engineers (USACE) and WDFW. In-water work will be subject to timing restrictions to prevent potential effects to ESA-listed fish species.

6.2 Critical Aquifer Recharge Areas

The proposed project (transportation infrastructure) is not listed as an exempt activity within Section 18.08.085 or 18.08.0220. That said, it is not one of the listed activities that would require a level one or level two hydrogeologic assessment. As the proposed project will not involve the use of hazardous materials and will meet all applicable stormwater requirements, it is unlikely that further review under the CARA section of the Code will be required.

6.3 Frequently Flooded Areas

Frequently flooded areas are regulated by Walla Walla County under Section 18.08.400 of the Code. As detailed above, water surface elevations for the 100-year flood have not been calculated by FEMA. Additionally, the floodway and flood fringe have not been mapped. As such, the results of the hydrologic model will have to be reviewed by the county flood engineer to ensure compliance with the Code in addition to state and federal regulations concerning changes to the conveyance of flood waters.

6.4 Geologic Hazard Areas

Geologic hazard areas are regulated by Walla Walla County under Section 18.08.500 of the code. A complete geotechnical analysis for the project is being completed. The proposed project will include a detailed analysis of geologic hazards and engineered solutions to those hazards.

7 SUMMARY

Walla Walla County is proposing to construct a new bridge and approaches over the Touchet River. An APE was established for the project and a review of potential critical areas within the APE was completed. Based on the results of the critical areas review, the APE was found to contain geologic hazard areas, critical aquifer recharge areas, frequently flood areas, and fish and wildlife habitat conservation areas.

The only critical area that has a formal buffer established in the County Code is the Touchet River which is a Type S River regulated as a fish and wildlife habitat conservation area. Type S rivers are regulated as shorelines of the state and the buffer extends landward for a distance of 200-feet or to the edge of the 100-year floodplain, whichever is greater.

Impacts to the regulated areas of the Touchet River corridor may require formal restoration and enhancement measures to offset impacts to vegetation communities. These would be addressed in a critical areas mitigation plan.

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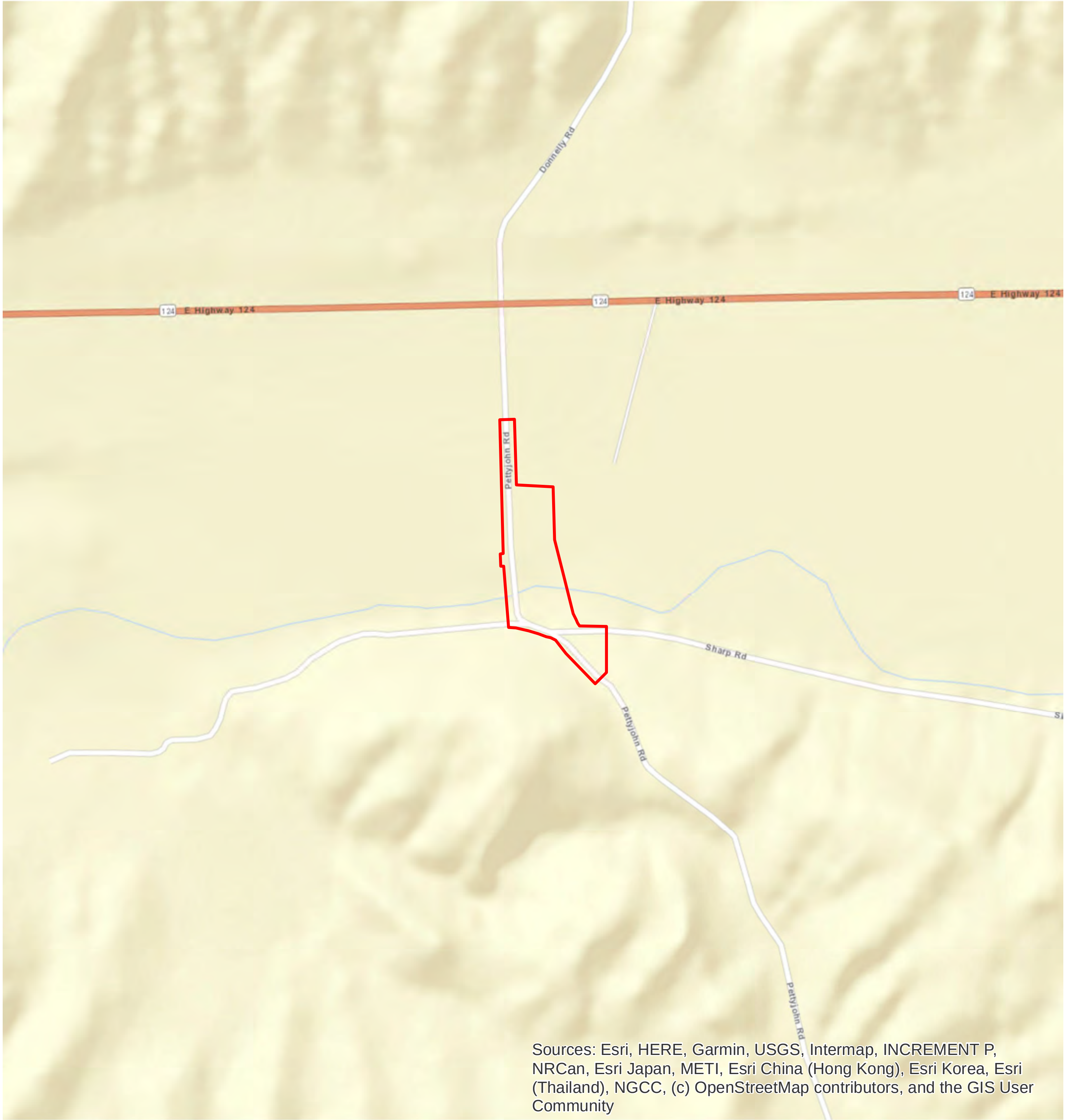
Figures



Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

SOURCE: ESRI Open source street maps.

N

SCALE: 1" = 1,000'

0' 600' 1,000' 2400'

Legend

🟥 Area of Potential Effect

PREPARED FOR: Walla Walla County Public Works.

PBS

LOCATION MAP

CRITICAL AREAS REPORT
DELL SHARPE BRIDGE REPLACEMENT PROJECT

FEB 2021
66257.000

FIGURE
1

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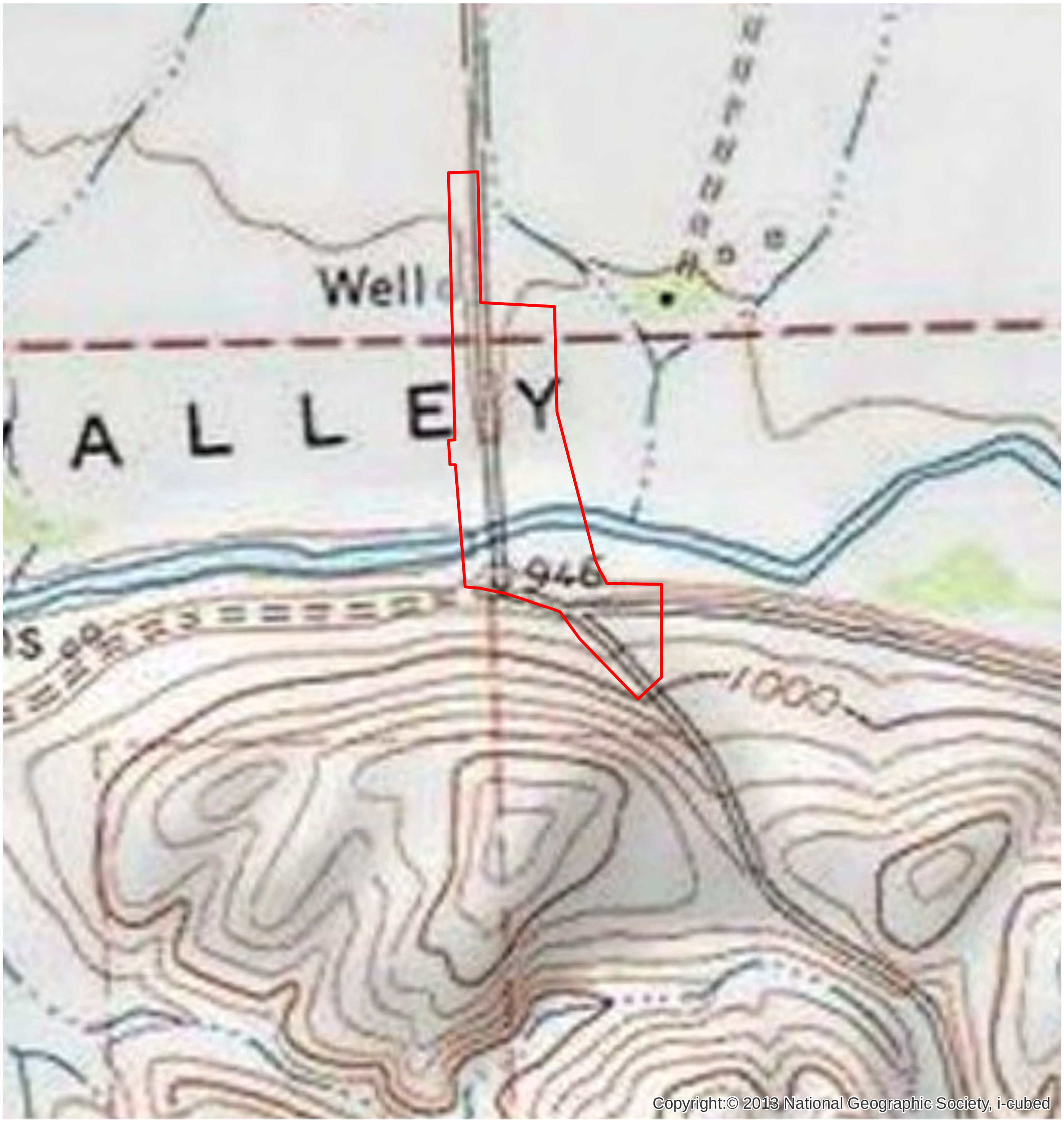

SOURCE: USGS topographic map data.

SCALE: 1" = 500'

0' 250' 500' 1000'

Legend

Area of Potential Effect

PREPARED FOR: Walla Walla County Public Works.

TOPOGRAPHIC MAP

CRITICAL AREAS REPORT
DELL SHARPE BRIDGE REPLACEMENT PROJECT

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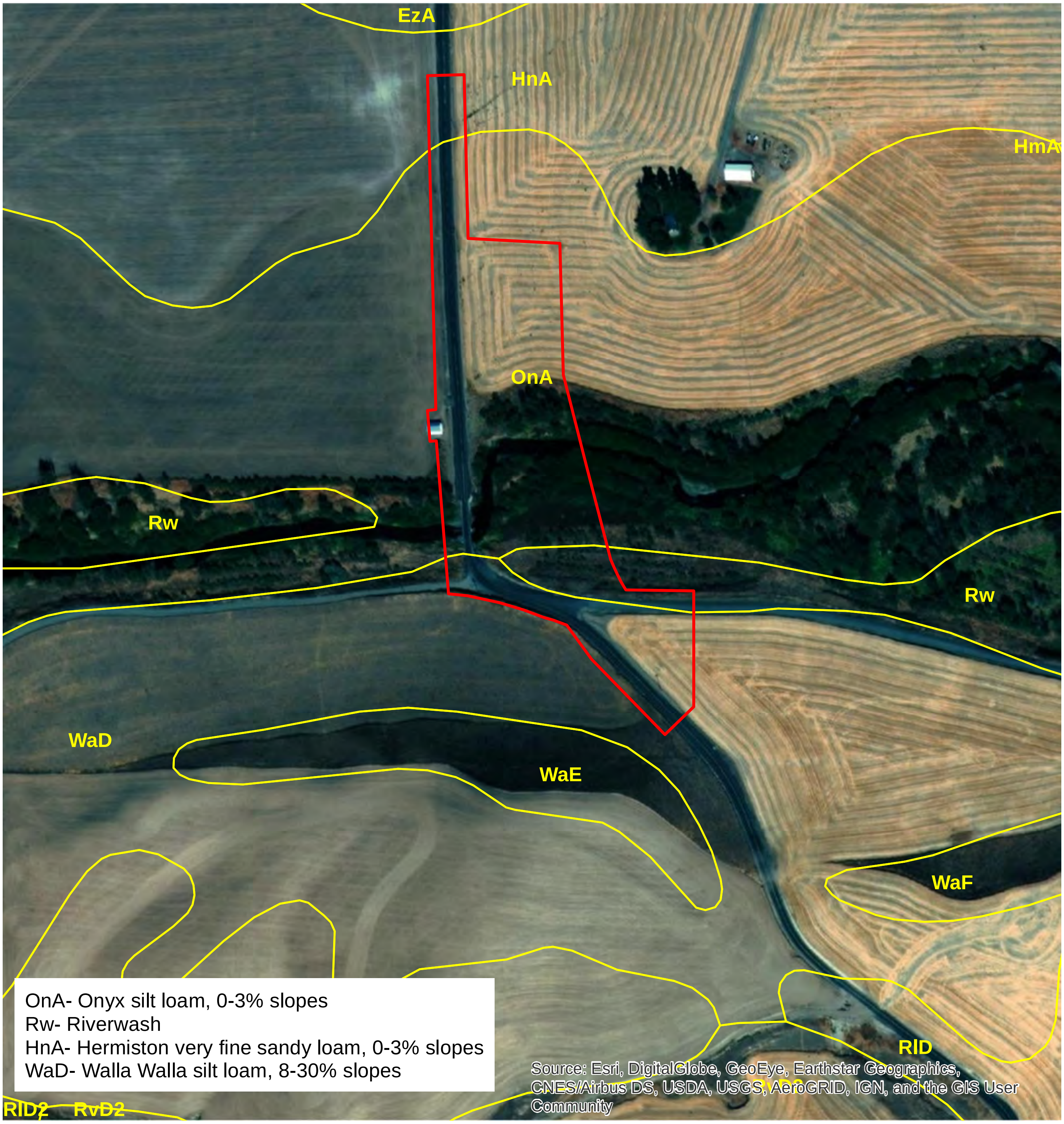
FIGURE
2

Filename: L:\Projects\66000\66257\66257-000\NR\GIS\dellsharpeCA2.mxd Plot Date/Time: 2/23/2021 4:00:09 PM



OnA- Onyx silt loam, 0-3% slopes
Rw- Riverwash
HnA- Hermiston very fine sandy loam, 0-3% slopes
WaD- Walla Walla silt loam, 8-30% slopes

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

SOURCE: NRCS Soil Data shape files.

Legend

— Area of Potential Effect
☐ Soil Mapping Units

N

SCALE: 1" = 400'

0' 200' 400' 800'

PREPARED FOR: Walla Walla County Public Works.

NRCS SOILS MAP

CRITICAL AREAS REPORT
DELL SHARPE BRIDGE REPLACEMENT PROJECT

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66257.000

FIGURE
3

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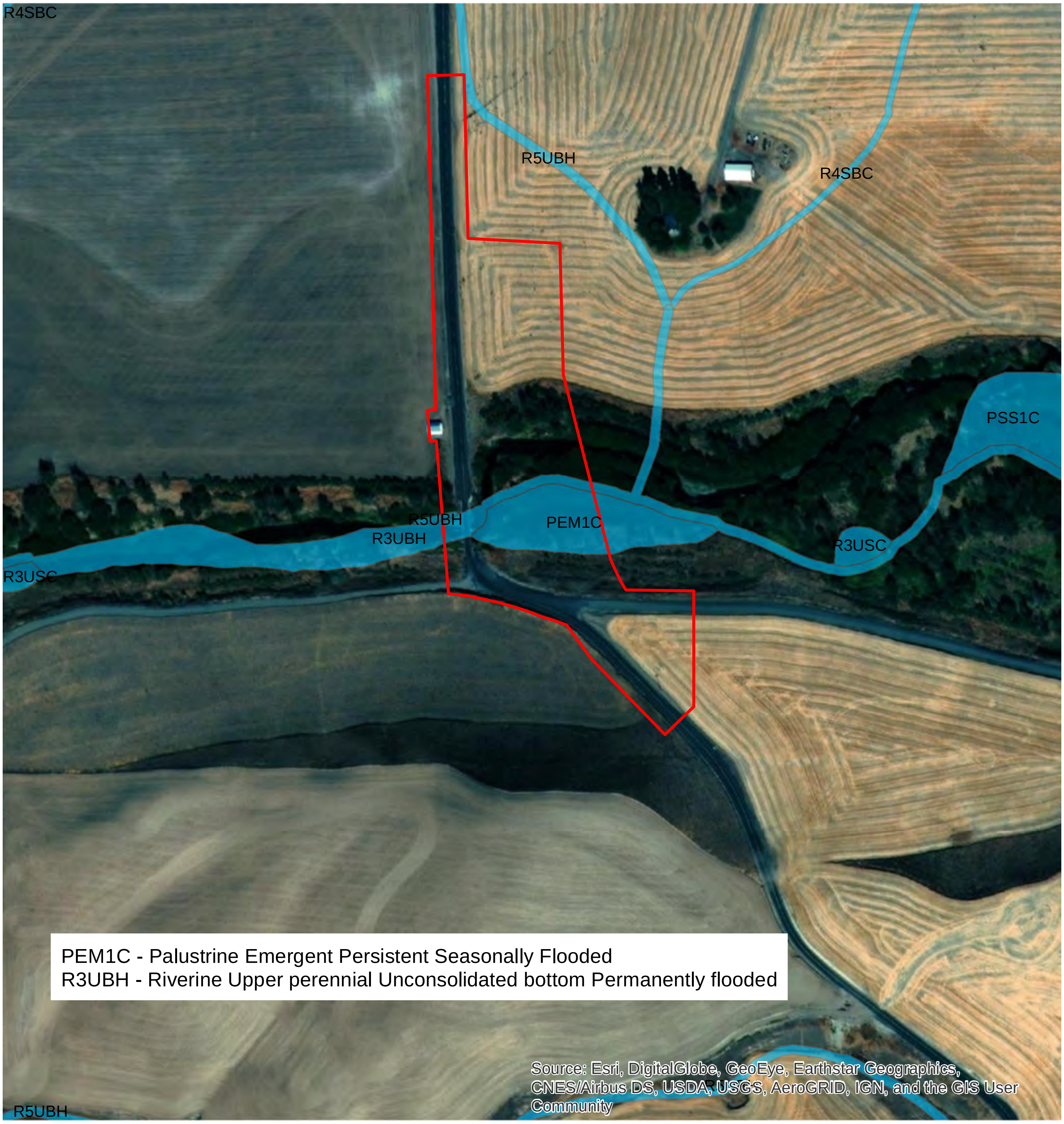

PEM1C - Palustrine Emergent Persistent Seasonally Flooded
R3UBH - Riverine Upper perennial Unconsolidated bottom Permanently flooded

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

SOURCE: USFWS NWI shape files.

Legend

— Area of Potential Effect

🟦 NWI Wetland

N

SCALE: 1" = 400'

0' 200' 400' 800'

PREPARED FOR: Walla Walla County Public Works.

PBS

NATIONAL WETLAND INVENTORY MAP

CRITICAL AREAS REPORT
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FIGURE
4

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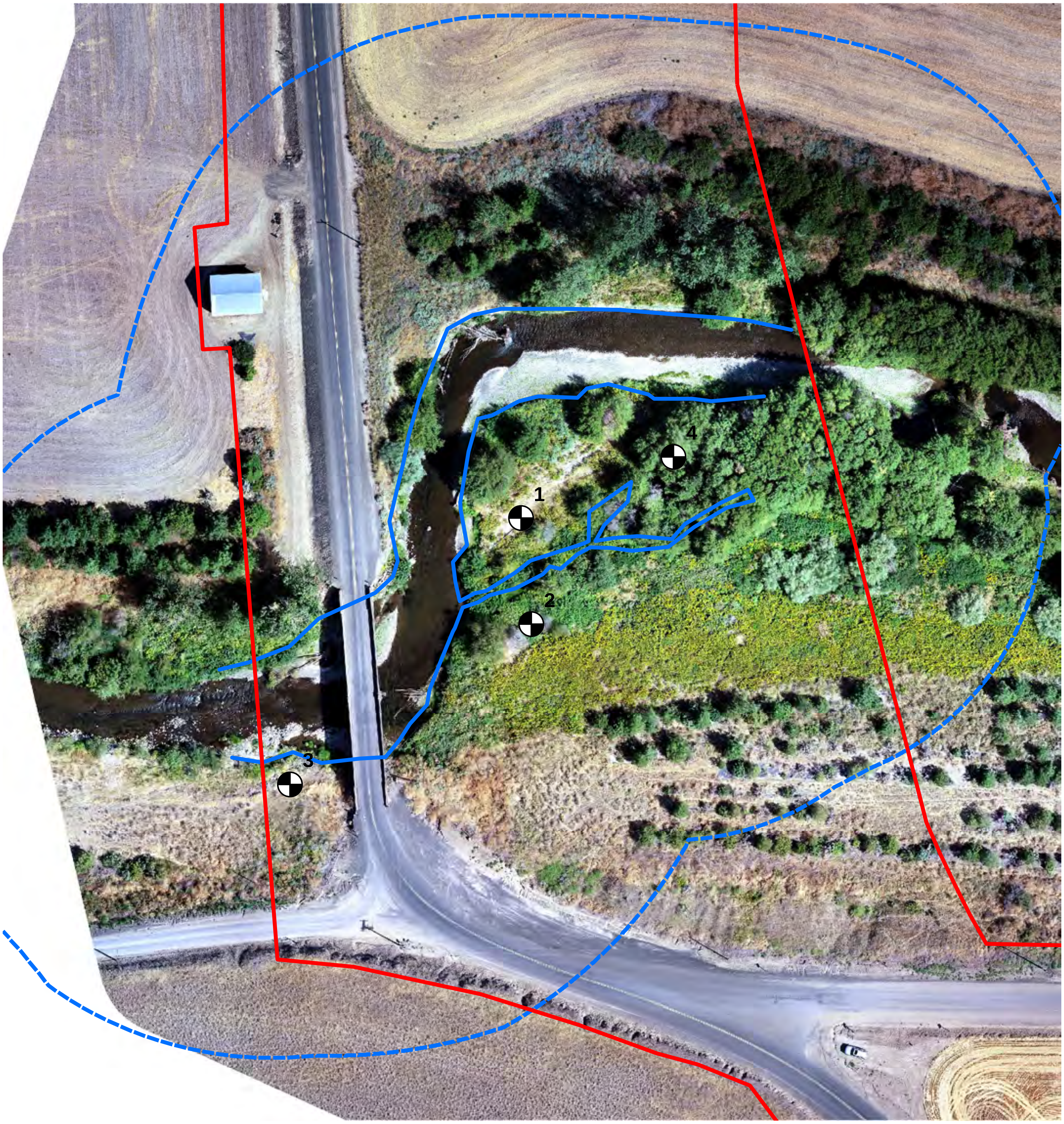

SOURCE: PBS Aerial Drone Photo 2020.

Legend

━ Area of Potential Effect
━ OHWM Touchet River Type S Water
┅ 200' Shoreline Management Act Buffer
◐ Wetland Sample Plots

N

SCALE: 1" = 100'

0' 100' 100' 400'

PREPARED FOR: Walla Walla County Public Works.

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PBS

SHORELINE MAP

CRITICAL AREAS REPORT
DELL SHARPE BRIDGE REPLACEMENT PROJECT

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66257.000

FIGURE
5

SOURCE: PBS Aerial Drone Photo 2020.

Legend

- ━ Area of Potential Effect
- ▨ High Quality Condition
- ▤ Marginal Quality Condition
- ▧ Degraded Quality Condition
- ━ OHWM Touchet River Type S Water

N

SCALE: 1" = 100'

0' 50' 100' 200'

PREPARED FOR: Walla Walla County Public Works.

PBS

HABITAT CONDITIONS MAP

CRITICAL AREAS REPORT
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FIGURE
6

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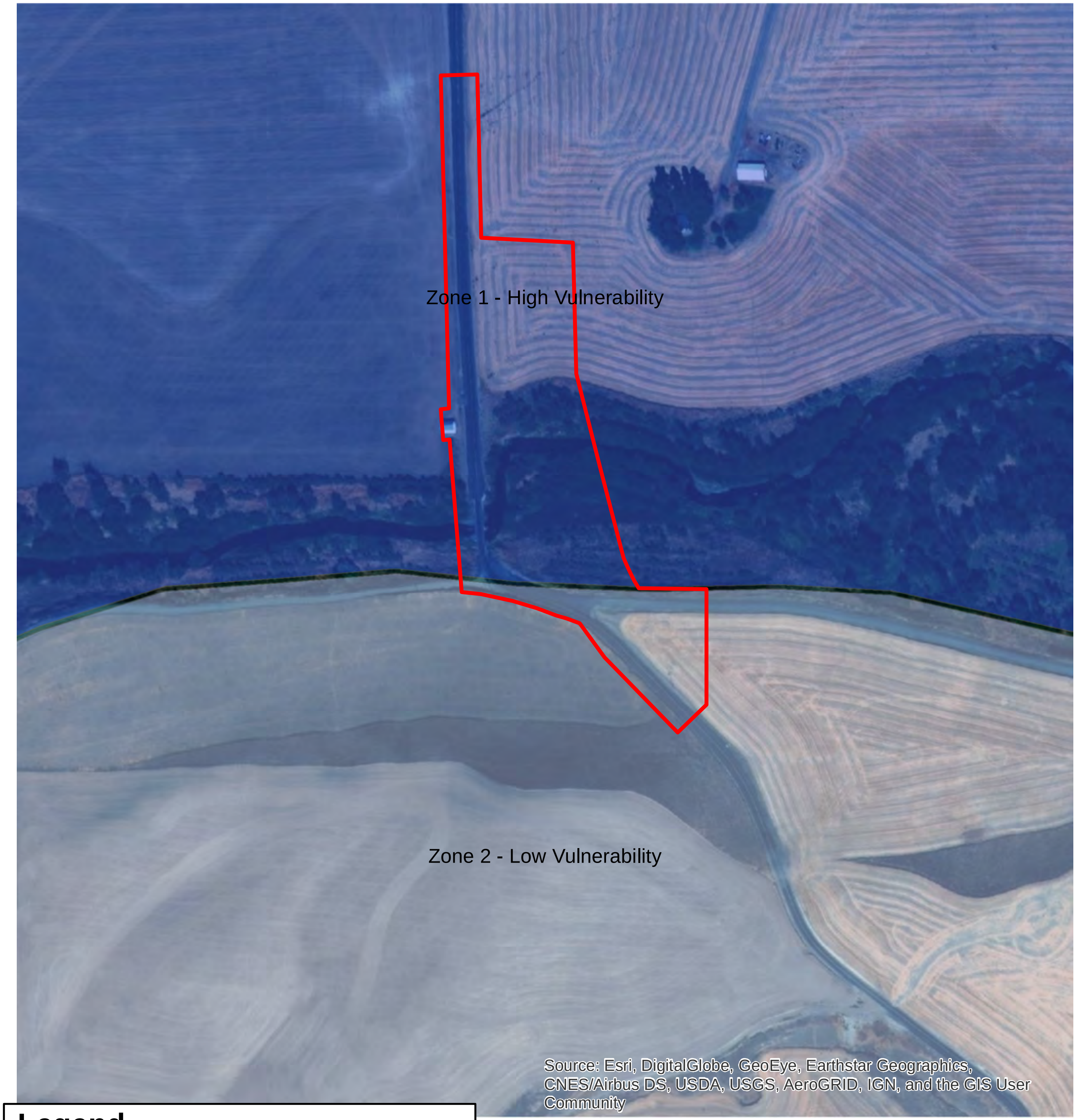

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

— Area of Potential Effect

Critical Aquifer Recharge Areas

🟦 Zone 1 - High Vulnerability

⬜ Zone 2 - Low Vulnerability

SOURCE: WDFW and Walla Walla County GIS shape files.

SCALE: 1" = 400'

0' 200' 400' 800'

PREPARED FOR: Walla Walla County Public Works.

PBS

CRITICAL AQUIFER RECHARGE AREAS

CRITICAL AREAS REPORT
DELL SHARPE BRIDGE REPLACEMENT PROJECT

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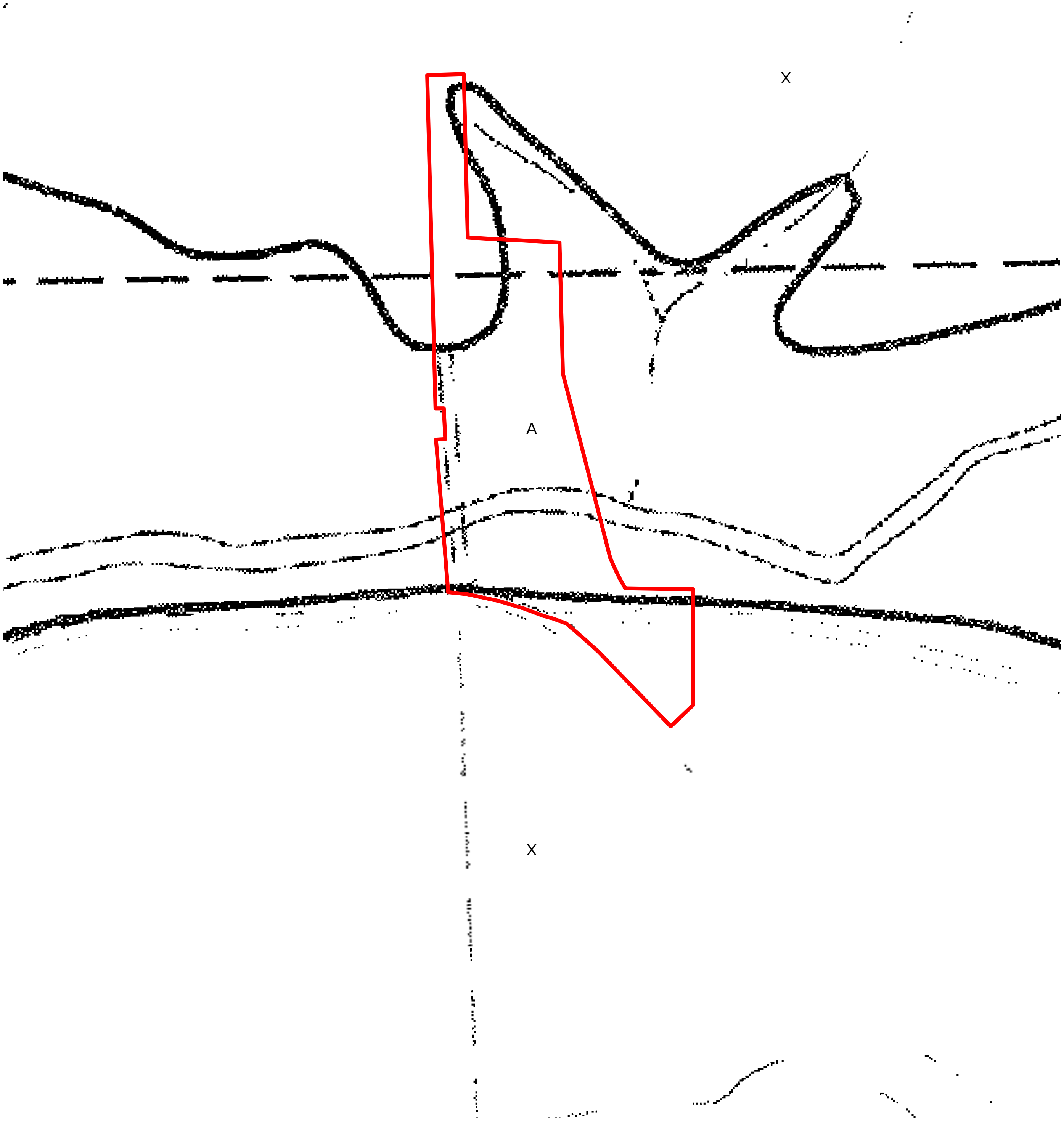
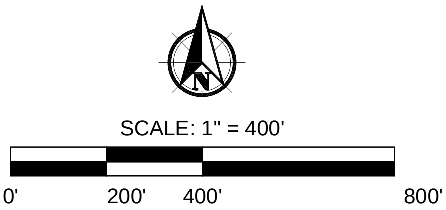
FIGURE
7

Filename: L:\Projects\66000\66257\66257-000\NR\GIS\dellsharpeCA2.mxd Plot Date/Time: 2/23/2021 6:05:30 PM



SOURCE: Digitized Flood Insurance Map



Legend

— Area of Potential Effect

PREPARED FOR: Walla Walla County Public Works.

PBS

FEMA FLOOD ZONE MAP

CRITICAL AREAS REPORT
DELL SHARPE BRIDGE REPLACEMENT PROJECT

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FIGURE
8

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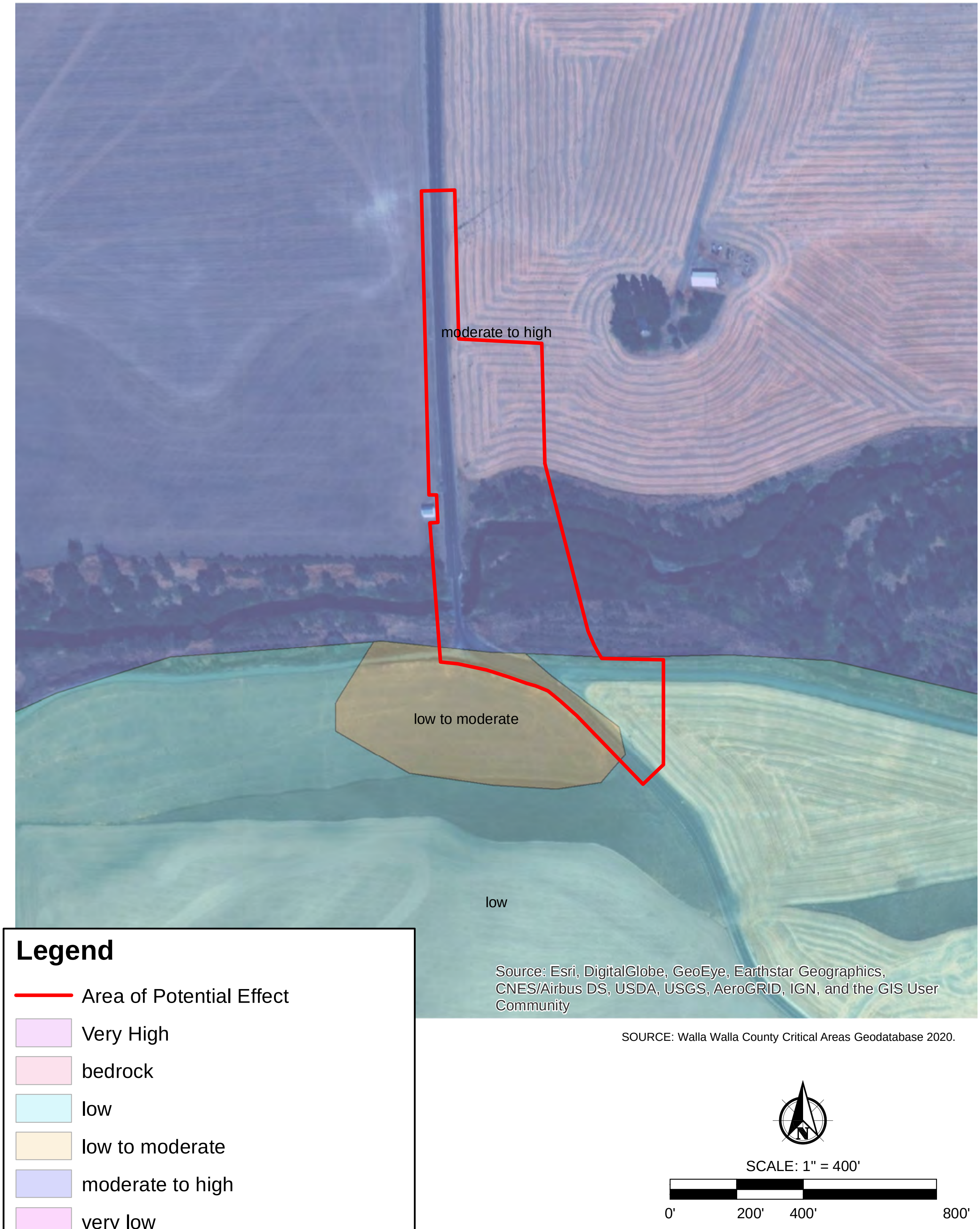

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

SOURCE: Walla Walla County Critical Areas Geodatabase 2020.

PREPARED FOR: Walla Walla County Public Works.

GEOLOGIC HAZARDS MAP

CRITICAL AREAS REPORT
DELL SHARPE BRIDGE REPLACEMENT PROJECT

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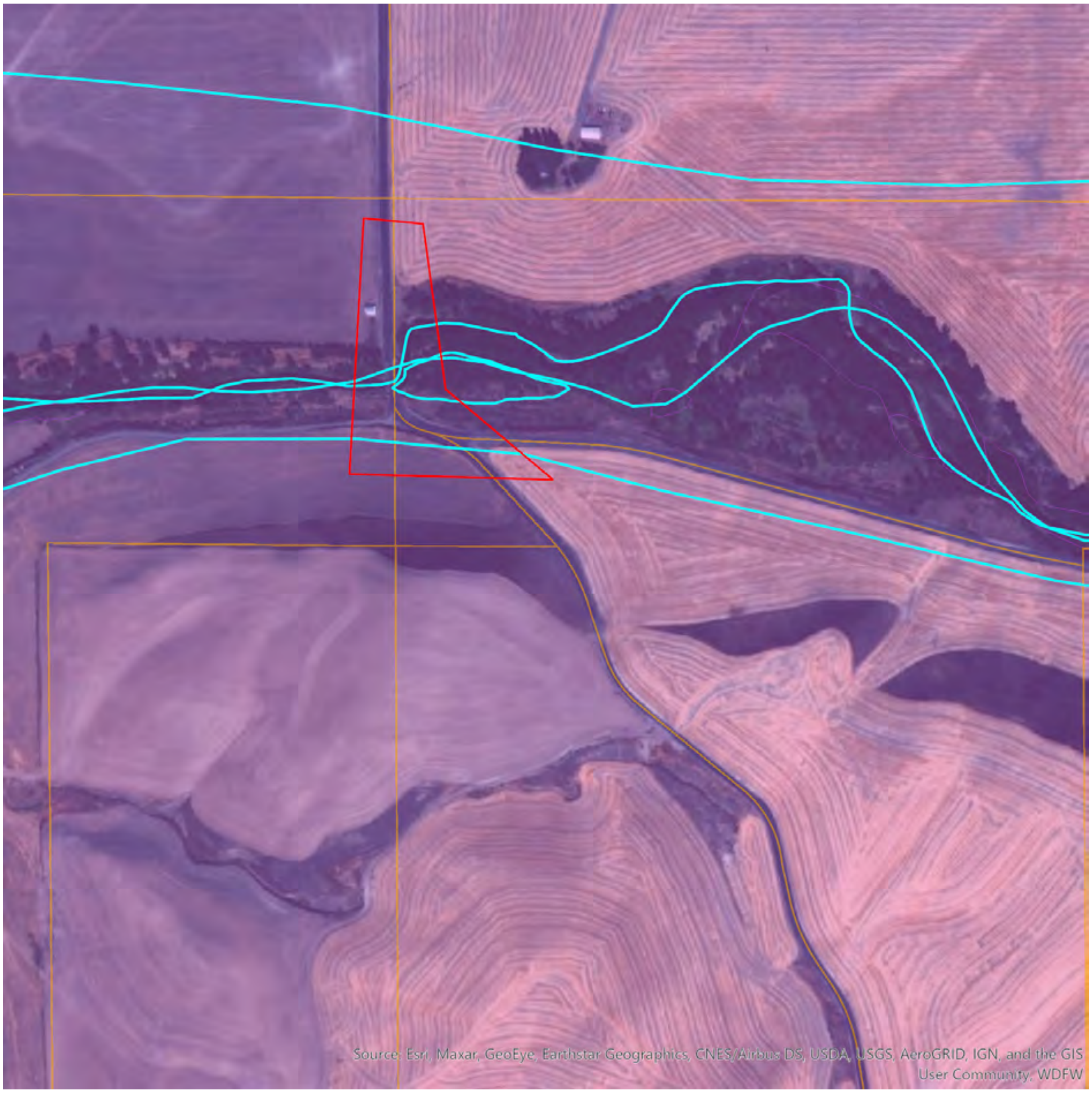
FIGURE
9

Filename: L:\Projects\66000\66257\66257-000\NR\GIS\dellsharpeCA2.mxd Plot Date/Time: 2/23/2021 7:07:09 PM

Appendix A

WDFW Priority Habitat and Species Report

Priority Habitats and Species on the Web


Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community, WDFW

Report Date: 02/03/2021

PHS Species/Habitats Overview:

Occurence Name	Federal Status	State Status	Generalized Location
Spring Chinook	N/A	N/A	No
Summer Steelhead	N/A	N/A	No
Steelhead	Threatened	N/A	No
Rainbow Trout	N/A	N/A	No
Northwest white-tailed deer	N/A	N/A	No
Ring-necked pheasant	N/A	N/A	No
Freshwater Emergent Wetland	N/A	N/A	No

PHS Species/Habitats Details:

Spring Chinook	
Scientific Name	*Oncorhynchus tshawytscha*
Priority Area	Occurrence/Migration
Site Name	Touchet River
Accuracy	NA
Notes	LLID: 1186823460337, Fish Name: Chinook Salmon, Run Time: Spring, Life History: Anadromous
Source Record	2147
Source Dataset	SWIFD
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversty/soc/soc.htm
Geometry Type	Lines

Summer Steelhead	
Scientific Name	*Oncorhynchus mykiss*
Priority Area	Occurrence/Migration
Site Name	Touchet River
Accuracy	NA
Notes	LLID: 1186823460337, Fish Name: Steelhead Trout, Run Time: Summer, Life History: Anadromous
Source Record	2157
Source Dataset	SWIFD
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversty/soc/soc.htm
Geometry Type	Lines

Steelhead	
Scientific Name	*Oncorhynchus mykiss*
Priority Area	Occurrence
Site Name	Touchet River
Accuracy	NA
Notes	LLID: 1186823460337, Stock Name: Touchet Summer Steelhead, Run: Summer, Status: Depressed
Source Record	6861
Source Dataset	SASI
Source Name	Not Given
Source Entity	WDFW Fish Program
Federal Status	Threatened
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversty/soc/soc.htm
Geometry Type	Lines

Rainbow Trout	
Scientific Name	*Oncorhynchus mykiss*
Priority Area	Occurrence/Migration
Site Name	Touchet River
Accuracy	NA
Notes	LLID: 1186823460337, Fish Name: Rainbow Trout, Run Time: Unknown or not Applicable, Life History: Resident
Source Record	2155
Source Dataset	SWIFD
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversty/soc/soc.htm
Geometry Type	Lines

Northwest white-tailed deer	
Scientific Name	*Odocoileus virginianus ochrourus*
Priority Area	Regular Concentration
Site Name	BLUE MOUNTAIN FOOTHILLS
Accuracy	1/4 mile (Quarter Section)
Notes	WHITE-TAILED DEER WINTER RANGE AND YEAR-ROUND CONCENTRATIONS.
Source Record	914407
Source Dataset	PHSREGION
Source Name	WIK, PAUL
Source Entity	WA Dept. of Fish and Wildlife
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://wdfw.wa.gov/publications/pub.php?id=00612
Geometry Type	Polygons

Ring-necked pheasant	
Scientific Name	*Phasianus colchicus*
Priority Area	Regular Concentration
Site Name	TOUCHET RIVER-PHEASANT CONCENTRATION AREAS
Accuracy	1/4 mile (Quarter Section)
Notes	BRUSHY DRAWS, ASSOCIATED WET AREAS, RIPARIAN AREAS, WINTERING AREAS. ASSOCIATED STEPPE TYPE HABITAT. PHEASANT, QUAIL, MULE DEER, WHITE TAIL DEER, TURKEY
Source Record	908423
Source Dataset	PHSREGION
Source Name	JOHNSON, TED
Source Entity	WA Dept. of Fish and Wildlife
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://wdfw.wa.gov/publications/pub.php?id=00026
Geometry Type	Polygons

Freshwater Emergent Wetland	
Priority Area	Aquatic Habitat
Site Name	N/A
Accuracy	NA
Notes	Wetland System: Freshwater Emergent Wetland - NWI Code: PEM1C
Source Dataset	NWIWetlands
Source Name	Not Given
Source Entity	US Fish and Wildlife Service
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://www.ecy.wa.gov/programs/sea/wetlands/bas/index.html
Geometry Type	Polygons

DISCLAIMER. This report includes information that the Washington Department of Fish and Wildlife (WDFW) maintains in a central computer database. It is not an attempt to provide you with an official agency response as to the impacts of your project on fish and wildlife. This information only documents the location of fish and wildlife resources to the best of our knowledge. It is not a complete inventory and it is important to note that fish and wildlife resources may occur in areas not currently known to WDFW biologists, or in areas for which comprehensive surveys have not been conducted. Site specific surveys are frequently necesssary to rule out the presence of priority resources. Locations of fish and wildlife resources are subject to variation caused by disturbance, changes in season and weather, and other factors. WDFW does not recommend using reports more than six months old.

Appendix B

Site Photographs

Photo 1. Upstream of Bridge facing north

Photo 2. Upstream of bridge facing northeast

Photo 3. Channel downstream of bridge facing west

Photo 4. Downstream of bridge facing northwest

Photo 5. Entrance to side channel

Photo 6. Ponding in side channel

Photo 7. Emergent vegetation in western portion of side channel

Photo 8. Drone photo of side channel facing east

Photo 9. Native vegetation; river left upstream of bridge

Photo 10. Abandoned mammal den

Photo 11. Drainage swale north of bridge on west side of road

Photo 12. Active erosion rill - south of road on east side of road

Appendix C

Wetland Data Forms

WETLAND DETERMINATION DATA FORM – Arid West

Project/Site: Dell Sharpe Bridge Replacement Project City/County: Walla Walla Sampling Date: 11/13/2020
Applicant/Owner: Walla Walla County Public Works State: Washington Sampling Point: 1
Investigator(s): Bieger Section/Township/Range: section 2, T 9S, R 35E
Landform (hillslope, terrace etc.): Terrace Local relief: Slope Slope (%): 0.02
Subregion (LRR): Cascade Wheat Lat: 46.293721 Long: -118.408232 Datum: WGS84
Soil Map Unit Name: OnA Onyx Silt loam, 0-3% slopes NWI Classification: PEMC
Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ___ (If no, explain in Remarks)
Are Vegetation ___ ,Soil ___ , or Hydrology ___ significantly disturbed?
Are Vegetation ___ ,Soil ___ , or Hydrology ___ naturally problematic?
Are “Normal Circumstances” present? (If needed, explain any answers in remarks) Yes X No ___

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes	X	No		Is the Sampled Area within a wetland? Yes ___ No X
Hydric Soil Present?	Yes		No	X	
Wetland Hydrology Present?	Yes		No	X	

Remarks:

VEGETATION

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30' r)			
1.			
2.			
3.			
4.			
Total Cover:	0		
Sapling/Shrub Stratum (Plot size: 30' r)			
1. *Salix exigua*	20	Yes	FACW
2.			
3.			
4.			
5.			
Total Cover:	20		
Herb Stratum (Plot size: 5' r)			
1. *Rumex crispus*	20	Yes	FAC
2. *Phalaris arundinacea*	20	Yes	FACW
3. *Cirsium arvense*	20	Yes	FACU
4.			
5.			
6.			
7.			
8.			
Total Cover:	60		
Woody Vine Stratum (Plot Size: 30' r)			
1.			
2.			
Total Cover:	0		

% Bare Ground in Herb Stratum 40 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 75% (A/B)

Prevalence Index worksheet:

Total % Cover of:			Multiply by:
OBL species	0	x 1 =	
FACW species	40	x 2 =	80
FAC species	20	x 3 =	60
FACU species	20	x 4 =	80
UPL species	0	x 5 =	
Column Totals:	80 (A)		220 (B)

Prevalence Index = B/A = 2.75

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%
___ Prevalence Index is ≤3.0[1]
___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes X No ___

Remarks:

Little to no emergent vegeattion.

SOIL

Sampling Point: 1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (in.)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-14	10YR 4/3	100					Cobbly silt loam	lots of gravel/cobble

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS = Covered or Coated Sand Grains

[2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

Histosol (A1)
Histic Epipedon (A2)
Black Histic (A3)
Hydrogen Sulfide (A4)
Stratified Layers (A5) (**LRRC**)
1 cm Muck (A9) (**LRRD**)
Depleted Below Dark Surface (A11)
Thick Dark Surface (A12)

Sandy Mucky Mineral (S1)
Sandy Gleyed Matrix (S4)
Sandy Redox (S5)
Stripped Matrix (S6)
Loamy Mucky Mineral (F1)
Loamy Gleyed Matrix (F2)
Depleted Matrix (F3)
Redox Dark Surface (F6)

Indicators for Problematic Hydric Soils[3]:

Depleted Dark Surface (F7)
Redox Depressions (F8)
Vernal Pools (F9)
1 cm Muck (A19) (**LRR C**)
2 cm Muck (A10) (**LRR B**)
Reduced Vertic (F18)
Red Parent Material (TF2)
Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? **Yes** **No** x

Remarks: well draining non hydric soil. Mostly comprised of riverwash silts.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

Surface Water (A1)
High Water Table (A2)
Saturation (A3)
Water Marks (B1) (**Nonriverine**)
Sediment Deposits (B2) (**Nonriverine**)
Drift Deposits (B3) (**Nonriverine**)
Surface Soil Cracks (B6)
Inundation Visible on Aerial Imagery (B7)
Water-Stained Leaves (B9)
Salt Crust (B11)

Biotic Crust
Aquatic Invertebrates (B13)
Hydrogen Sulfide Odor (C1)
Oxidized Rhizospheres along Living Roots (C3)
Presence of Reduced Iron (C4)
Recent Iron Reduction in Tilled Soils (C6)
Thin Muck Surface (C7)
Other (Explain in Remarks)
Water Marks (B1) (**Riverine**)
Sediment Deposits (B2) (**Riverine**)

Secondary Indicators (2 or more required)

Drift Deposits (B2) (**Riverine**)
Drainage Patterns (B10)
Dry-Season Water Table (C2)
Crayfish Burrows (C8)
Saturation Visible on Aerial Imagery (C9)
Shallow Aquitard (D3)
x FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes No x Depth (in):
Water Table Present? Yes No x Depth (in):
Saturation Present? Yes No x Depth (in):
(includes capillary fringe)

Wetland Hydrology Present? **Yes** **No** x

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: drift lines and areas of obvious water movement only present in side channels

WETLAND DETERMINATION DATA FORM – Arid West

Project/Site: Dell Sharpe Bridge Replacement Project City/County: Walla Walla Sampling Date: 11/13/2020
Applicant/Owner: Walla Walla County Public Works State: Washington Sampling Point: 2
Investigator(s): Bieger Section/Township/Range: section 2, T 9S, R 35E
Landform (hillslope, terrace etc.): Terrace Local relief: Slope Slope (%): 0.02
Subregion (LRR): Cascade Wheat Lat: 46.293721 Long: -118.408232 Datum: WGS84
Soil Map Unit Name: OnA Onyx Silt loam, 0-3% slopes NWI Classification: PEMC
Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ___ (If no, explain in Remarks)
Are Vegetation ___ ,Soil ___ , or Hydrology ___ significantly disturbed?
Are Vegetation ___ ,Soil ___ , or Hydrology ___ naturally problematic?
Are "Normal Circumstances" present? (If needed, explain any answers in remarks) Yes X No ___

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes	X	No	
Hydric Soil Present?	Yes		No	X
Wetland Hydrology Present?	Yes		No	

Is the Sampled Area within a wetland? **Yes** ___ **No** X

Remarks:

VEGETATION

Tree Stratum (Plot size: 30' r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	0		
Sapling/Shrub Stratum (Plot size: 30' r)			
1. *Rubus armeniacus*		No	FAC
2.			
3.			
4.			
5.			
Total Cover:	0		
Herb Stratum (Plot size: 5' r)			
1. *Cirsium arvense*	20	Yes	FACU
2. *Conium maculatum*	60	Yes	FACW
3. *Lolium perenne*	20	Yes	FAC
4.			
5.			
6.			
7.			
8.			
Total Cover:	100		
Woody Vine Stratum (Plot Size: 30' r)			
1.			
2.			
Total Cover:	0		

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 67% (A/B)

Prevalence Index worksheet:

Total % Cover of:			Multiply by:
OBL species	0	x 1 =	
FACW species	60	x 2 =	120
FAC species	20	x 3 =	60
FACU species	20	x 4 =	80
UPL species	0	x 5 =	
Column Totals:	100 (A)		260 (B)

Prevalence Index = B/A = 2.60

Hydrophytic Vegetation Indicators:

X	Dominance Test is >50%
	Prevalence Index is ≤3.0[1]
	Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
	Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks:

heavily domainted by invasives

SOIL

Sampling Point: 2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (in.)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 3/3	100					SL	bright silt loam

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS = Covered or Coated Sand Grains

[2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5) (**LRRC**)
- 1 cm Muck (A9) (**LRRD**)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Loamy Mucky Mineral (F1)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)

Indicators for Problematic Hydric Soils[3]:

- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Vernal Pools (F9)
- 1 cm Muck (A19) (**LRR C**)
- 2 cm Muck (A10) (**LRR B**)
- Reduced Vertic (F18)
- Red Parent Material (TF2)
- Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present?

Yes ______ **No** x

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- Surface Water (A1)
- High Water Table (A2)
- Saturation (A3)
- Water Marks (B1) (**Nonriverine**)
- Sediment Deposits (B2) (**Nonriverine**)
- Drift Deposits (B3) (**Nonriverine**)
- Surface Soil Cracks (B6)
- Inundation Visible on Aerial Imagery (B7)
- Water-Stained Leaves (B9)
- Salt Crust (B11)
- Biotic Crust
- Aquatic Invertebrates (B13)
- Hydrogen Sulfide Odor (C1)
- Oxidized Rhizospheres along Living Roots (C3)
- Presence of Reduced Iron (C4)
- Recent Iron Reduction in Tilled Soils (C6)
- Thin Muck Surface (C7)
- Other (Explain in Remarks)
- Water Marks (B1) (**Riverine**)
- Sediment Deposits (B2) (**Riverine**)

Secondary Indicators (2 or more required)

- Drift Deposits (B2) (**Riverine**)
- Drainage Patterns (B10)
- Dry-Season Water Table (C2)
- Crayfish Burrows (C8)
- Saturation Visible on Aerial Imagery (C9)
- Shallow Aquitard (D3)
- FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ______ No x Depth (in): ______

Water Table Present? Yes ______ No x Depth (in): ______

Saturation Present? (includes capillary fringe) Yes ______ No x Depth (in): ______

Wetland Hydrology Present?

Yes ______ **No** ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: no primary or secondary indicators of wetland hydrology

WETLAND DETERMINATION DATA FORM – Arid West

Project/Site: Dell Sharpe Bridge Replacement Project
City/County: Walla Walla
Sampling Date: 11/13/2020
Applicant/Owner: Walla Walla County Public Works
State: Washington
Sampling Point: 3
Investigator(s): Bieger
Section/Township/Range: section 2, T 9S, R 35E
Landform (hillslope, terrace etc.): Terrace
Local relief: Slope
Slope (%): 0.02
Subregion (LRR): Cascade Wheat
Lat: 46.293721
Long: -118.408232
Datum: WGS84
Soil Map Unit Name: OnA Onyx Silt loam, 0-3% slopes
NWI Classification: PEMC
Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ___ (If no, explain in Remarks)
Are Vegetation ___ ,Soil ___ , or Hydrology ___ significantly disturbed?
Are Vegetation ___ ,Soil ___ , or Hydrology ___ naturally problematic?
Are “Normal Circumstances” present? (If needed, explain any answers in remarks) Yes X No ___

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes	X	No	
Hydric Soil Present?	Yes		No	X
Wetland Hydrology Present?	Yes		No	X

Is the Sampled Area within a wetland? **Yes** ___ **No** X

Remarks:

VEGETATION

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30' r)			
1.			
2.			
3.			
4.			
Total Cover:	0		
Sapling/Shrub Stratum (Plot size: 30' r)			
1. *Artemisia tridentata*	15	Yes	UPL
2.			
3.			
4.			
5.			
Total Cover:	15		
Herb Stratum (Plot size: 5' r)			
1. *Lolium perenne*	15	Yes	FAC
2. *Rumex crispus*	15	Yes	FAC
4.			
5.			
6.			
7.			
8.			
Total Cover:	30		
Woody Vine Stratum (Plot Size: 30' r)			
1.			
2.			
Total Cover:	0		

% Bare Ground in Herb Stratum 70
% Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 67% (A/B)

Prevalence Index worksheet:

Total % Cover of:			Multiply by:	
OBL species	0	x 1 =		
FACW species	0	x 2 =		
FAC species	30	x 3 =	90	
FACU species	0	x 4 =		
UPL species	15	x 5 =	75	
Column Totals:	45	(A)	165	(B)

Prevalence Index = B/A = 3.67

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%
___ Prevalence Index is ≤3.0[1]
___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks:

mostly bare ground

SOIL

Sampling Point: 3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(in.)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-14	10YR 3/4	100						

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS = Covered or Coated Sand Grains

[2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5) (**LRRC**)
- 1 cm Muck (A9) (**LRRD**)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Loamy Mucky Mineral (F1)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)

Indicators for Problematic Hydric Soils[3]:

- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Vernal Pools (F9)
- 1 cm Muck (A19) (**LRR C**)
- 2 cm Muck (A10) (**LRR B**)
- Reduced Vertic (F18)
- Red Parent Material (TF2)
- Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present?

Yes ____ **No** x

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- Surface Water (A1)
- High Water Table (A2)
- Saturation (A3)
- Water Marks (B1) (**Nonriverine**)
- Sediment Deposits (B2) (**Nonriverine**)
- Drift Deposits (B3) (**Nonriverine**)
- Surface Soil Cracks (B6)
- Inundation Visible on Aerial Imagery (B7)
- Water-Stained Leaves (B9)
- Salt Crust (B11)
- Biotic Crust
- Aquatic Invertebrates (B13)
- Hydrogen Sulfide Odor (C1)
- Oxidized Rhizospheres along Living Roots (C3)
- Presence of Reduced Iron (C4)
- Recent Iron Reduction in Tilled Soils (C6)
- Thin Muck Surface (C7)
- Other (Explain in Remarks)
- Water Marks (B1) (**Riverine**)
- Sediment Deposits (B2) (**Riverine**)

Secondary Indicators (2 or more required)

- Drift Deposits (B2) (**Riverine**)
- Drainage Patterns (B10)
- Dry-Season Water Table (C2)
- Crayfish Burrows (C8)
- Saturation Visible on Aerial Imagery (C9)
- Shallow Aquitard (D3)
- FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No x Depth (in): ____

Water Table Present? Yes ____ No x Depth (in): ____

Saturation Present? Yes ____ No x Depth (in): ____
(includes capillary fringe)

Wetland Hydrology Present?

Yes ____ **No** x

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West

Project/Site: Dell Sharpe Bridge Replacement Project City/County: Walla Walla Sampling Date: 11/13/2020
Applicant/Owner: Walla Walla County Public Works State: Washington Sampling Point: 4
Investigator(s): Bieger Section/Township/Range: section 2, T 9S, R 35E
Landform (hillslope, terrace etc.): Terrace Local relief: Slope Slope (%): 0.02
Subregion (LRR): Cascade Wheat Lat: 46.293721 Long: -118.408232 Datum: WGS84
Soil Map Unit Name: OnA Onyx Silt loam, 0-3% slopes NWI Classification: PEMC
Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No __ (If no, explain in Remarks)
Are Vegetation __ ,Soil __ , or Hydrology __ significantly disturbed? Are "Normal Circumstances" present? (If needed, explain any answers in remarks) Yes X No __
Are Vegetation __ ,Soil __ , or Hydrology __ naturally problematic?

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes	X	No		**Is the Sampled Area within a wetland?** **Yes** __ **No** X
Hydric Soil Present?	Yes		No	X	
Wetland Hydrology Present?	Yes		No	X	

Remarks:

VEGETATION

Tree Stratum (Plot size: 30' r)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Populus balsamifera*	40	Yes	FAC
2. *Alnus rhombifolia*	20	Yes	FACW
3.			
4.			
Total Cover:	60		
Sapling/Shrub Stratum (Plot size: 30' r)			
1. *Salix exigua*		No	FACW
2.			
3.			
4.			
5.			
Total Cover:	0		
Herb Stratum (Plot size: 5' r)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
Total Cover:	0		
Woody Vine Stratum (Plot Size: 30' r)			
1.			
2.			
Total Cover:	0		

% Bare Ground in Herb Stratum 100 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:			Multiply by:	
OBL species	0	x 1 =		
FACW species	20	x 2 =	40	
FAC species	40	x 3 =	120	
FACU species	0	x 4 =		
UPL species	0	x 5 =		
Column Totals:	60	(A)	160	(B)

Prevalence Index = B/A = 2.67

Hydrophytic Vegetation Indicators:

X	Dominance Test is >50%
	Prevalence Index is ≤3.0[1]
	Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
	Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** X **No** __

Remarks:

native floodplain vegetation

SOIL

Sampling Point: 4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(in.)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 4/3	100					sand and silt	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS = Covered or Coated Sand Grains

[2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

Histosol (A1)
Histic Epipedon (A2)
Black Histic (A3)
Hydrogen Sulfide (A4)
Stratified Layers (A5) (**LRRC**)
1 cm Muck (A9) (**LRRD**)
Depleted Below Dark Surface (A11)
Thick Dark Surface (A12)

Sandy Mucky Mineral (S1)
Sandy Gleyed Matrix (S4)
Sandy Redox (S5)
Stripped Matrix (S6)
Loamy Mucky Mineral (F1)
Loamy Gleyed Matrix (F2)
Depleted Matrix (F3)
Redox Dark Surface (F6)

Indicators for Problematic Hydric Soils[3]:

Depleted Dark Surface (F7)
Redox Depressions (F8)
Vernal Pools (F9)
1 cm Muck (A19) (**LRR C**)
2 cm Muck (A10) (**LRR B**)
Reduced Vertic (F18)
Red Parent Material (TF2)
Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? **Yes** **No** x

Remarks: well drained riverine alluvium

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

Surface Water (A1)
High Water Table (A2)
Saturation (A3)
Water Marks (B1) (**Nonriverine**)
Sediment Deposits (B2) (**Nonriverine**)
Drift Deposits (B3) (**Nonriverine)**
Surface Soil Cracks (B6)
Inundation Visible on Aerial Imagery (B7)
Water-Stained Leaves (B9)
Salt Crust (B11)

Biotic Crust
Aquatic Invertebrates (B13)
Hydrogen Sulfide Odor (C1)
Oxidized Rhizospheres along Living Roots (C3)
Presence of Reduced Iron (C4)
Recent Iron Reduction in Tilled Soils (C6)
Thin Muck Surface (C7)
Other (Explain in Remarks)
Water Marks (B1) (**Riverine**)
Sediment Deposits (B2) (**Riverine**)

Secondary Indicators (2 or more required)

Drift Deposits (B2) (**Riverine**)
Drainage Patterns (B10)
Dry-Season Water Table (C2)
Crayfish Burrows (C8)
Saturation Visible on Aerial Imagery (C9)
Shallow Aquitard (D3)
x FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes No x Depth (in):
Water Table Present? Yes No x Depth (in):
Saturation Present? (includes capillary fringe) Yes No x Depth (in):

Wetland Hydrology Present? **Yes** **No** x

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Exhibit 13

Final Critical Areas Mitigation Plan

Dell Sharpe Bridge Replacement Project
Walla Walla County, Washington

Prepared for:

Walla Walla County Public Works
990 Navion Lane
Walla Walla, Washington 99362

Revised January 2022.
PBS Project 66257.000

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Supporting Data

TABLES

FIGURES

1 INTRODUCTION

Walla Walla County Public Works Department is proposing to replace the existing Dell Sharpe Bridge that conveys traffic over the Touchet River. PBS Engineering and Environmental Inc. (PBS) was contracted to design a series of mitigation measures that would restore and enhance remaining portions of the riparian area to ensure that the project will not result in a net loss of riparian habitat functions and values.

The Touchet River is regulated under Section 18 of the Walla Walla County Code of Ordinances (Code) as a Fish and Wildlife Habitat Conservation Area and under the Walla Walla County Shoreline Management Act (SMA) as shoreline of the state by Walla Walla County (County). Section 18.08.075(c) of the Code states:

> *Compliance with the provisions of this chapter does not constitute compliance with other federal, state, and local regulations and permit requirements that may be required (for example, Shoreline Substantial Development Permits, Hydraulic Project Approvals permits, Army Corps of Engineers Section 404 permits, National Pollutant Discharge Elimination System permits). The applicant is responsible for complying with these requirements, apart from the process established in this chapter. Where applicable, the community development director will encourage use of information such as permit applications to other agencies or special studies prepared in response to other regulatory requirements to support required documentation submitted for critical areas review.*

This implies that the County would be responsible for obtaining both a critical areas permit and a shoreline substantial development review. Additionally, within section 1.4 (C-D) of the SMA (Relationships to other codes ordinances, and plans) states:

> *C. All local development regulations including, but not limited to, zoning and subdivision rules shall apply in addition to this SMP. This SMP includes critical areas regulations applicable only in shoreline jurisdiction, and shall control within shoreline jurisdiction over other Walla Walla County critical area regulations adopted pursuant to the Growth Management Act.*
>
> *D. In the event provisions of this SMP conflict with provisions of federal, state, or County regulations, the provision that is most protective of shoreline resources shall prevail, when consistent with policies set out in the SMA*

As the buffer on the Touchet River set forth in the Code is 100 feet and the SMA a 200-foot shoreline area, the more stringent buffers set forth in the SMA will override those set forth in the Code.

The impacts and mitigation measures within this plan will address the SMA 200-foot buffer. The details of the existing conditions, proposed project, impacts, and mitigation efforts are presented below.

2 PREPARER

This mitigation plan was prepared by PBS Senior Scientist Brian Bieger. Mr. Bieger has over 20 years of consulting experience in critical area assessment, mitigation design, and permitting.

3 BASELINE INFORMATION/CRITICAL AREAS

3.1 Location

The Dell Sharpe Bridge Replacement Project (project) is located in unincorporated Walla Walla County, Washington, within Section 2, Township 9 North, Range 35 East. The existing bridge conveys Pettyjohn Road traffic over the Touchet River (Figure 1). A critical areas assessment was conducted by PBS biologists in February 2021 to identify and map regulated critical areas within the project area.

3.2 Ecological Setting

The project is located in the northern extent of the Columbia Plateau ecoregion within the Environmental Protection Agency (EPA) Level IV Ecoregion 10B (Loess Islands). This arid region of eastern Washington is characterized by rolling hills dominated by sagebrush communities. Precipitation ranges from 7 to 18 inches per year from east to west across the ecoregion. Most of the sagebrush lands within the project area have been converted to agricultural uses.

3.3 Wetlands

PBS biologists assessed the project area for the presence of wetlands as defined and regulated by the US Army Corps of Engineers (USACE). The only identified wetlands were the active channel of the Touchet River and side channels that are regulated as riparian habitat, waters of the state, and waters of the United States (US). No palustrine wetlands were identified within the project area. While wetland vegetation was identified on gravels bars located adjacent to the river, these areas consist of well-draining silts, sands, and gravels and therefore did not meet the hydric soil indicators required to be determined a wetland.

3.4 Waters

The Touchet River flows west through the project area. The Touchet River Watershed originates from streams on the northwestern slopes of the Blue Mountains, and from seasonal streams draining Palouse hillsides to the north. The Touchet River is tributary to the Walla Walla River with its confluence just west of the town of Touchet, Washington. The river exists as a moderate gradient stream with riffle and glide habitats within the project area. The river is located within a relatively narrow valley at the bottom of a series of tall steep slopes to the south. North of the river valley, the topography is nearly level to gently sloping (Figure 2).

The Touchet River supports a wide variety of freshwater fish species and is verified habitat for Endangered Species Act (ESA) listed middle Columbia River distinct population segment (DPS) steelhead and bull trout. The project reach of the Touchet River is used as migration only for these species. While there is suitable spawning habitat within the project reach, fish generally avoid the reach due to high water temperatures.

3.5 Riparian Habitat

The Touchet River is regulated by Walla Walla County as a shoreline of the state. The shoreline buffer extends landward from the ordinary high water mark (OHWM) for 200 feet. For the purpose of permitting and mitigation requirements, this distance designates the extent of regulated fish and wildlife habitat conservation areas (FWHCAs). This 200-foot buffer is shown on an aerial photograph of the project area in Figure 3.

The overall quality of vegetation within the 200-foot buffer varies greatly depending on location. The lower portions of the buffer that are located within the vegetated floodplain of the river would be considered high-quality habitat due to a high percentage of native species and a high level of both structural and species diversity (Figure 4). Vegetation within this section has an overstory of black cottonwood (*Populous trichocarpa*), water birch (*Betula occidentalis*), white alder (*Alnus rhombifolia*), and coyote willow (*Salix exigua*). Understory vegetation comprises young coyote willow, red-osier dogwood (*Cornus sericea*), nootka rose (*Rosa nootkana*), Russian olive (*Elaeagnus angustifolia*), and scattered false-indigo bush (*Amorpha fruticose*). Emergent vegetation is sparse and comprises native and non-native grasses and some native wetland vegetation that includes slough sedge (*Carex obnupta*) and soft rush (*Juncus effuses*).

This high-quality habitat quickly transitions to moderate-quality habitat as you ascend the side slopes that lead down to the river (Figure 4). This area consists of primarily non-native vegetation that includes Canada thistle (*Cirsium arvense*), perennial ryegrass (*Lollium perrene*), cheatgrass (*Bromus tectorum*), cereal rye (*Secale cereale*), curly dock (*Rumex crispus*), and Canada goldenrod (*Solidago canadensis*). This area is dominated by dense poison hemlock (*Conium maculatum*). The extent of the poison hemlock can be seen in the aerial photo within Figure 4. While this area is dominated by non-native vegetation, it is thick enough that it would serve to filter runoff and provide some uptake of pollutant functions.

The outer portion of the buffer was classified as heavily degraded (Figure 4). Because of the topography of the site, this area would not be anticipated to have a riparian vegetation community. This area has been subject to past disturbance and exists as degraded shrub lands. The sparse vegetation is a mixture of big sagebrush (*Artemisia tridentata*), Canada thistle, sparse Russian olive, cheatgrass, and cereal rye.

4 AVOIDANCE AND MINIMIZATION OF IMPACTS

The very basis of the proposed bridge design was to reduce impacts to the Touchet River. The existing bridge has central piers that are located within the flowing channel. Additionally, the bridge abutments are located at the very edge of the OHWM of the Touchet River. These abutments constrict the stream during high flow events in addition to preventing or diminishing natural river processes such as large woody debris transport, sediment sorting, and meander formation.

The new bridge alignment will be constructed in a manner that it will span the entire floodplain of the river and will only have a single pier that is located outside the OHWM. The abutments for the river are located well above the river valley and outside the channel meander zone of the river. In addition to realigning the approaches and crossing, a key impact avoidance measure is the utilization of geosynthetic walls that will reduce the amount of grading and fill required to construct the bridge approaches and abutments. These walls will substantially decrease the impact area.

The following construction best management practices (BMPs) will be used to prevent unintended impacts during construction:

Project design impact minimization measures include:

- Seasonal restrictions applied to work conducted within or below the OHWM will follow requirements identified in the Hydraulic Project Approval (HPA) issued by WDFW and Water Quality Standards for Surface Waters of the State of Washington (Washington Administrative Code [WAC] Chapter 173-201A).
- Construction impacts will be confined to the minimum area necessary to complete the project.
- Construction/demolition activities will follow local, state, and federal permit restrictions for allowable work hours.

Grading, cutting, or filling:

- Fill material will only be placed in specified and permitted locations.
- Temporary fill will be placed outside all sensitive areas.
- Temporary fill will be entirely removed, and the site restored to preexisting conditions.

Vegetation removal and clearing:

- Boundaries of clearing limits associated with site access and construction limits will be clearly flagged to prevent ground disturbance outside the limits.
- Removal of riparian vegetation will be minimized to the greatest extent possible.
- Temporarily disturbed areas will be restored to prework conditions to the extent possible, including protecting existing root systems and allowing resprouting of herbaceous and woody plants. Where replanting is required, native trees and shrubs will be used, and monitoring of plantings will occur for a minimum of five years.
- Mitigation for the loss of riparian vegetation will be completed through the installation and maintenance of a native tree and shrub plant community.
- Revegetation shall occur no later than spring of the year following construction.

In-water work:

- All work below OHWM will be isolated from flowing water and will occur during the approved in-water work window.
- A temporary sandbag or bulk bag cofferdam will be installed to isolate the work area. This cofferdam can likely isolate the north abutment and central pier at the same time and push in-stream flows to the south in order to reduce the need for separate fish removal and work area isolation sessions.
- All fish and other aquatic life will be removed from the work area prior to any in-water work activities. Fish salvage will be conducted consistent with Washington State Department of Transportation fish exclusion protocols and standards, and the Guidelines for Electrofishing Waters Containing Salmonids listed under the ESA.
- Sediment-laden water in the work area will be pumped to settling tanks or ponds and allowed to settle before discharging to the creek. Sediment will be disposed of in accordance with Washington State Department of Ecology requirements. Water will be discharged over a well-vegetated area, water energy dissipation pad, or bedrock.
- Prior to entering the work area, equipment will be checked daily for leaks and will be well-maintained to prevent lubricants and any other deleterious materials from entering waters of the state. All equipment will be free of any external petroleum products, hydraulic fluid, and coolants. Wash water will not be discharged to any water body without pretreatment.
- Project operations will cease under high-flow conditions that may result in inundation of the project area, except for efforts to avoid or minimize resource damage.

Sensitive aquatic habitat/overwater work:

- No contractor will stage heavy equipment within 100 feet of streams, unless site-specific review completed by the project biologist indicates that no impacts to the sensitive resource areas will occur due to topography or other factors. All equipment will be fueled and maintained more than 100 feet from the nearest ditches or flowing or standing water, unless site-specific review completed by the project biologist indicates that no impacts to the resource areas will result. Stationary equipment will include full-time containment systems. Containment measures will be implemented when fueling and maintaining equipment.
- The contractor will be responsible for developing a temporary erosion and sediment control (TESC) plan to address erosion control during and after construction (including directing runoff away from

un-stabilized soils, slowing runoff with structures, and installing silt fence to catch particulates). The TESC plan will be a component of plans and specifications.

- A Spill Prevention, Control, and Countermeasure (SPCC) plan will be developed and implemented for the project. The SPCC plan will identify construction planning elements, including containment measures, and potential spill sources at the site. The plan will also outline responsive actions in the event of a spill or release, identify notification and reporting procedures, and include contractor management elements such as personnel responsibilities, project site security, site inspections, and training.
- Absorbent materials and watertight pans, or similar BMPs, will be placed under all stationary equipment and staged vehicles on barges or other overwater structures. Absorbent materials will be applied immediately on small spills, and promptly removed and disposed of properly. An adequate supply of spill cleanup materials, such as absorbent materials, will be maintained and available in multiple locations on site.
- All construction platforms where such surfaces are used for containment of uncured concrete, slurry, or residue to prevent discharges to waters of the state, will include watertight surfaces/watertight plastic on curbing, bull rails, toe boards, or other devices.
- Nets, tarps, platforms, scaffolds, blankets, barges, floats, or combination thereof, will be used to contain and control debris beneath structures being constructed or demolished.
- The curbing, bull rails, toe boards, or other devices will be installed with a height to be sufficient to contain runoff water, high pH water, and process water.
- Concrete pumps and pipelines will be equipped with emergency shutoff valves so that no uncured concrete comes into contact with waters of the state.
- Concrete and grout delivery systems situated over water will be inspected daily to prevent any discharges of concrete, grout, and/or slurry water into waters of the state.
- Concrete truck cleanout areas will be established to properly contain wet concrete and wash water and prevent it from entering nearby waterbodies.
- The contractor will protect all inlets and catchments from stormwater runoff from sediment, fresh concrete, tackifier, paving, or paint striping in case inclement weather unexpectedly occurs.
- All unstable slopes resulting from construction activities with a high likelihood of delivery of material to listed species-bearing waters will be stabilized within two days from October through June, and within seven days from July through September.
- Temporary material storage piles consisting of erosive materials shall by placed entirely outside the 100-year floodplain.
- No paving, chip sealing, or stripe painting will be initiated in rainy weather.
- There will be no visible sheen from petroleum products in the receiving water because of project activities.

5 CRITICAL AREA IMPACTS

5.1 Impact location

The proposed projects will result in unavoidable impacts to FWHCAs extending from the Touchet River. These impacts will result from the grading, clearing, and construction of the bridge approaches and bridge abutments. These impacts will take place within the heavily degraded buffer on the south side of the river and within marginal and degraded buffer on the north side of the river. The total amount of impacts was calculated at 0.82 acre (Figure 5).

Vegetation in most of these areas is dominated by non-native grasses, forbs, and shrubs. There will be a small amount of native tree impacts that will occur through construction of the northern bridge abutment. The location of the proposed grading contours and resulting impacts are shown in figure 5.

5.2 Riparian Function Impacts

The removal of vegetation within the regulated buffer will result in a small amount of impacts to riparian habitat functions on the site. The overall level of impacts is slight given the existing vegetation within the corridor, the positive aspects of removing the existing bridge abutments, and spanning the entire channel meander zone with a new zone. Outside of measuring the areas that will be affected, there is no quantitative method to assess impacts at this scale. In general, the impacts to riparian functions are summarized in Table 1 below.

Table 1. Impacts to Riparian Functions

Action	Resulting Impact	Duration
Construction noise	Avoidance of the area by terrestrial and avian wildlife, fish avoidance during in-water work	Temporary
Vegetation removal	Slight decrease in shading of surface waters, small amount of habitat diversity loss, loss of source of nutrient and LWD inputs	Permanent
Structure over river	The presence of a new structure over the river should not increase traffic or result in a decrease in habitat functions over the existing condition	Permanent
In-water work	Sediment generation, disturbance of streambed	Temporary

LWD: large woody debris

6 MITIGATION ACTIVITIES

6.1 Riparian Habitat Enhancements

To compensate for the proposed riparian habitat impacts and ensure that the project will not result in a net reduction in habitat function and value, the applicant is proposing to enhance existing areas of the riparian habitat that are in a degraded or poorly functioning condition.

A total of 0.66 acre of enhancements will be performed in five individual locations (Figure 6). These locations were chosen based on existing vegetation patterns, topography, need for riparian vegetation, and ability to access the locations for maintenance. The proposed enhancement areas are slightly smaller than the total area that will be impacted as the majority of the impacts will occur within those areas identified as heavily degraded (Figure 5).

Enhancements will take place following the completion of project construction activities. Enhancements will involve seeding native emergent vegetation followed up by the installation of native wood vegetation.

6.2 Native seeding

All disturbed areas will be seeded with the seed mix detailed in Table 2 below. This seed mix comprises native upland species that are drought tolerant and will provide erosion protection and forage for native wildlife. Seeding will take place between October 1 and November 15. Seed can be manually broadcast but experience dictates that hydroseeding with the addition of a hydro mulch and tackifier will result in a greater degree of success.

Table 2. Enhancement Area Seeding (0.66 acre)

Common Name	Scientific Name	Mix Percentage
Basin wildrye	*Elymus cinereus*	40%
Slender wheatgrass	*Elymus trachycaulus*	20%
Thick spike wheatgrass	*Elymus lanceolatus*	20%
Bluebunch wheatgrass	*Pseudoroegneria spicata*	20%

Seeding rate 1 pound per 1,000 square feet

6.3 Enhancement Plantings

The purpose of the proposed habitat plantings is to create a diverse, self-sustaining forested plant community that will serve to increase buffer functions and increase habitat values for the site. The native plants listed in Tables 3 through 7 will be installed within the enhancement areas detailed in Figure 6. Native trees and shrubs will be planted at a density of 10 trees and 20 shrubs per 1,000 sq. ft. The spacing guidelines found within the tables area recommendations for minimum spacing based on this spacing.

Table 3. Enhancement Area A Plantings (0.17 acre)

Species	Form	Minimum Size (gallons)	Spacing (on-center)	Position on slope	Number
Trees					
White Alder *(Alnus rhombifolia)*	Container	5	12 feet	Lower	15
Black cottonwood *(Populus trichocarpa)*	Container	5	12 feet	Lower	30
Quaking aspen (*Populous tremuloides)*	Container	5	12 feet	Middle-Upper	10
Ponderosa pine *(Pinus ponderosa*)	Container	5	12 feet	Upper	15
Total Trees					**70**
Shrubs					
Red-osier dogwood (*Cornus sericea*)	Container	1	7 feet	Lower	20
Western crabapple *(Pyrus fusca)*	Container	1	7 feet	Lower	10
Sandbar willow *(Salix exigua)*	Container	1	7 feet	Lower	20
Woods rose (*Rosa woodsi*)	Container	1	7 feet	Lower	5
Wax currant *(Ribes cerium*)	Container	1	7 feet	Upper	5
Choke cherry (*Prunus virginiana*)	Container	1	7 feet	Upper	5

Species	Form	Minimum Size (gallons)	Spacing (on-center)	Position on slope	Number
Black Hawthorne *(Crataegus douglasii)*	Container	1	7 feet	Upper	15
Snowberry *(Symphoricarpos alba)*	Container	1	7 feet	Upper	20
Serviceberry (*Amelanchier alnifolia*)	Container	1	7 feet	Upper	10
Total Shrubs					**110**

Table 4. Enhancement Area B Plantings (0.17 acre)

Species	Form	Minimum Size (gallons)	Spacing (on-center)	Position on slope	Number
Trees					
White alder *(Alnus rhombifolia)*	Container	5	12 feet	Lower	15
Black cottonwood *(Populus trichocarpa)*	Container	5	12 feet	Lower	30
Quaking aspen *(Populous tremuloides)*	Container	5	12 feet	Middle-Upper	15
Ponderosa pine *(Pinus ponderosa)*	Container	5	12 feet	Upper	10
Total Trees					**70**
Shrubs					
Red-osier dogwood *(Cornus sericea)*	Container	1	7 feet	Lower	20
Western crabapple *(Pyrus fusca)*	Container	1	7 feet	Lower	10
Sandbar willow *(Salix exigua)*	Container	1	7 feet	Lower	20
Woods rose *(Rosa woodsi)*	Container	1	7 feet	Lower	5
Wax currant *(Ribes cerium)*	Container	1	7 feet	Upper	5
Choke cherry *(Prunus virginiana)*	Container	1	7 feet	Upper	5
Black Hawthorne *(Crataegus douglasii)*	Container	1	7 feet	Upper	15
Snowberry *(Symphoricarpos alba)*	Container	1	7 feet	Upper	20
Total Shrubs					**110**

Table 5. Enhancement Area C Plantings (0.16 acre)

Species	Form	Minimum Size (gallons)	Spacing (on-center)	Position on slope	Number
Trees					
White alder *(Alnus rhombifolia)*	Container	5	12 feet	Lower	15
Black cottonwood *(Populus trichocarpa)*	Container	5	12 feet	Lower	30
Quaking aspen *(Populous tremuloides)*	Container	5	12 feet	Middle-Upper	15
Ponderosa pine *(Pinus ponderosa)*	Container	5	12 feet	Upper	10
Total Trees					**70**
Shrubs					
Red-osier dogwood *(Cornus sericea)*	Container	1	7 feet	Lower	20
Western crabapple *(Pyrus fusca)*	Container	1	7 feet	Lower	10
Sandbar willow *(Salix exigua)*	Container	1	7 feet	Lower	20
Woods rose *(Rosa woodsi)*	Container	1	7 feet	Lower	5
Wax currant *(Ribes cerium)*	Container	1	7 feet	Upper	5
Choke cherry *(Prunus virginiana)*	Container	1	7 feet	Upper	5
Black hawthorne *(Crataegus douglasii)*	Container	1	7 feet	Upper	15
Snowberry *(Symphoricarpos alba)*	Container	1	7 feet	Upper	20
Serviceberry *(Amelanchier alnifolia)*	Container	1	7 feet	Upper	10
Total Shrubs					**110**

Table 6. Enhancement Area D Plantings (0.08 acre)

Species	Form	Minimum Size (gallons)	Spacing (on-center)	Position on slope	Number
Trees					

Species	Form	Minimum Size (gallons)	Spacing (on-center)	Position on slope	Number
Quaking aspen *(Populous tremuloides)*	Container	5	20 feet	Middle-Upper	10
Ponderosa pine *(Pinus ponderosa)*	Container	5	20 feet	Upper	15
Total Trees					**25**
Shrubs					
Wax currant *(Ribes cerium)*	Container	1	7 feet	Upper	10
Choke cherry *(Prunus virginiana)*	Container	1	7 feet	Upper	10
Black Hawthorne *(Crataegus douglasii)*	Container	1	7 feet	Upper	10
Snowberry *(Symphoricarpos alba)*	Container	1	7 feet	Upper	30
Serviceberry *(Amelanchier alnifolia)*	Container	1	7 feet	Upper	10
Total Shrubs					**70**

Table 7. Enhancement Area E Plantings (0.08 acre)

Species	Form	Minimum Size (gallons)	Spacing (on-center)	Position on slope	Number
Trees					
White alder *(Alnus rhombifolia)*	Container	5	12 feet	Lower	5
Black cottonwood *(Populus trichocarpa)*	Container	5	12 feet	Lower	15
Quaking aspen *(Populous tremuloides)*	Container	5	12 feet	Lower-Middle	5
Total Trees					**25**
Shrubs					
Red-osier dogwood *(Cornus sericea)*	Container	1	7 feet	Lower	20
Sandbar willow *(Salix exigua)*	Container	1	7 feet	Lower	30
Woods rose *(Rosa woodsi)*	Container	1	7 feet	Lower	5
Choke cherry *(Prunus virginiana)*	Container	1	7 feet	Upper	5

Species	Form	Minimum Size (gallons)	Spacing (on-center)	Position on slope	Number
Black Hawthorne *(Crataegus douglasii)*	Container	1	7 feet	Upper	10
Total Shrubs					**70**

6.4 Planting Guidelines

1. **Source of Plant Materials.** All plants will be obtained from nurseries specializing in native Pacific Northwest plant materials.
2. **Location of Plants.** Buffer enhancement plantings will take place within the area shown in Figure 6. Plantings will be performed by a qualified landscape professional familiar with critical area enhancement plantings.
3. **Planting Time.** Any bareroot shrubs and trees should be planted between October 1 and November 15, when plants are dormant.
4. **Planting Method.** Planting holes shall be excavated to be large enough to accommodate the plant roots without restriction and no less than 1 foot in diameter and 1 foot deep. Plants will be held in place with the top of the root mass at ground level. Topsoil will be backfilled around the roots and lightly tamped to remove any air pockets in the soil.
5. **Mulching.** Mulch (2 to 3 inches deep) in a 1-foot-diameter shall be applied around the base of each plant.
6. **Soil Moisture.** If the soils are not saturated at the time of planting, each plant shall be watered with enough quantity to saturate the root zone of planted stock.
7. **Plant Protection.** Based on recommendations from the WDFW, each enhancement area will be protected from herbivory from resident wildlife. This can be achieved through the installation of temporary deer fencing that can be removed following the 2nd year of monitoring.

7 MITIGATION GOAL

The goal of this mitigation plan is to implement a series of mitigation measures to prevent the loss of critical area functions and values.

8 OBJECTIVES AND PERFORMANCE STANDARDS

The following objective and performance standards are established to evaluate the monitoring and maintenance period if the proposed buffer enhancements are successful:

Objective #1. Create a self-sustaining native forested plant community within the 0.61-acre riparian habitat enhancement area through the installation of native trees and shrubs.

Performance Standard #1. Achieve at least 80% survivorship of all planted native woody vegetation in Tables 3 through 6 and less than 10% aerial cover of invasive weed species at the end of the five-year monitoring period. If planted stock does not survive but are replaced by native naturally colonizing riparian plant species, the project will be judged to meet the threshold for successful enhancement with respect to the vegetative component.

9 MONITORING AND MAINTENANCE PLAN

Section 18.08.115 of the Code dictates that monitoring and maintenance of mitigation areas must be completed in order to ensure that the planned mitigation is successful, and that functions and values have been replaced. The following actions will be implemented as part of the monitoring and maintenance plan on this site:

1. The initial and all successive plantings will be supervised by a qualified professional to ensure that correct planting procedures are followed and that plantings are done according to the planting plan.
2. Monitoring of all planted areas shall begin once the mitigation site is established and shall continue at least once per year for five successive growing seasons during the late spring or summer. A report documenting the monitoring results will be submitted to Walla Walla County Community Development each year of the five-year monitoring period. At a minimum this report will contain the following:
    a. Results of a complete plant count.
    b. Photographs taken from established photo stations.
    c. Discussion of any deficiencies in the enhancement progress and any contingency measures that will be taken to correct those deficiencies.
    d. Detailed replanting requirements if necessary.
3. To ensure planting success, the applicant will be responsible for performing minor maintenance over the monitoring period. Actions will include the selective removal of non-native plant species such as blackberry that may be hindering the growth and establishment of planted native stock. An area, 1 foot in diameter surrounding each planted woody species, will be kept free of competing vegetation. This can be accomplished either by scarifying the area by hand or through the application of mulch.
4. Maintenance of the enhancement area may include irrigation to increase survival and meet the performance standard. A watering schedule may be established during the dry months (June through September) so that the plants are watered on a weekly basis during this time. If necessary, a temporary aboveground irrigation system capable of watering the entire enhanced buffer area may be installed.

10 CONTINGENCY PLANS

Contingency plans are designed to identify potential courses of action, and any corrective measures to be taken when monitoring indicates project objectives may not be achieved. In general, the contingency measures for this site are as follows:

1. **Replacement Plantings.** Replacement plantings will be made throughout the monitoring period if monitoring reveals that greater than 10% plant mortality of original planting number per species has occurred. If this occurs, species will be replanted to the original number of plants proposed in the accepted mitigation plan annually throughout the duration of the monitoring and maintenance period.
2. **Planting Plan Modifications.** Modifications to the planting plan (i.e., plant species and densities) will be made if monitoring identifies problems with the original planting scheme. For example, if annual monitoring identifies that plant mortality is attributed to an inappropriate hydrologic regime, or soil

conditions, then replacement plantings will be made using a more suitable plant species. Any recommended changes to the planting scheme will be documented in the annual monitoring report. The addition of any new plant species, not already included in this enhancement plan, must be approved by Walla Walla County.

3. **Soil Erosion.** Any areas demonstrating soil erosion problems will be restored as soon as possible. If there does not appear to be a problem with the original design, the eroded areas will be restored by replacing any lost topsoil and replanted according to the original planting scheme.

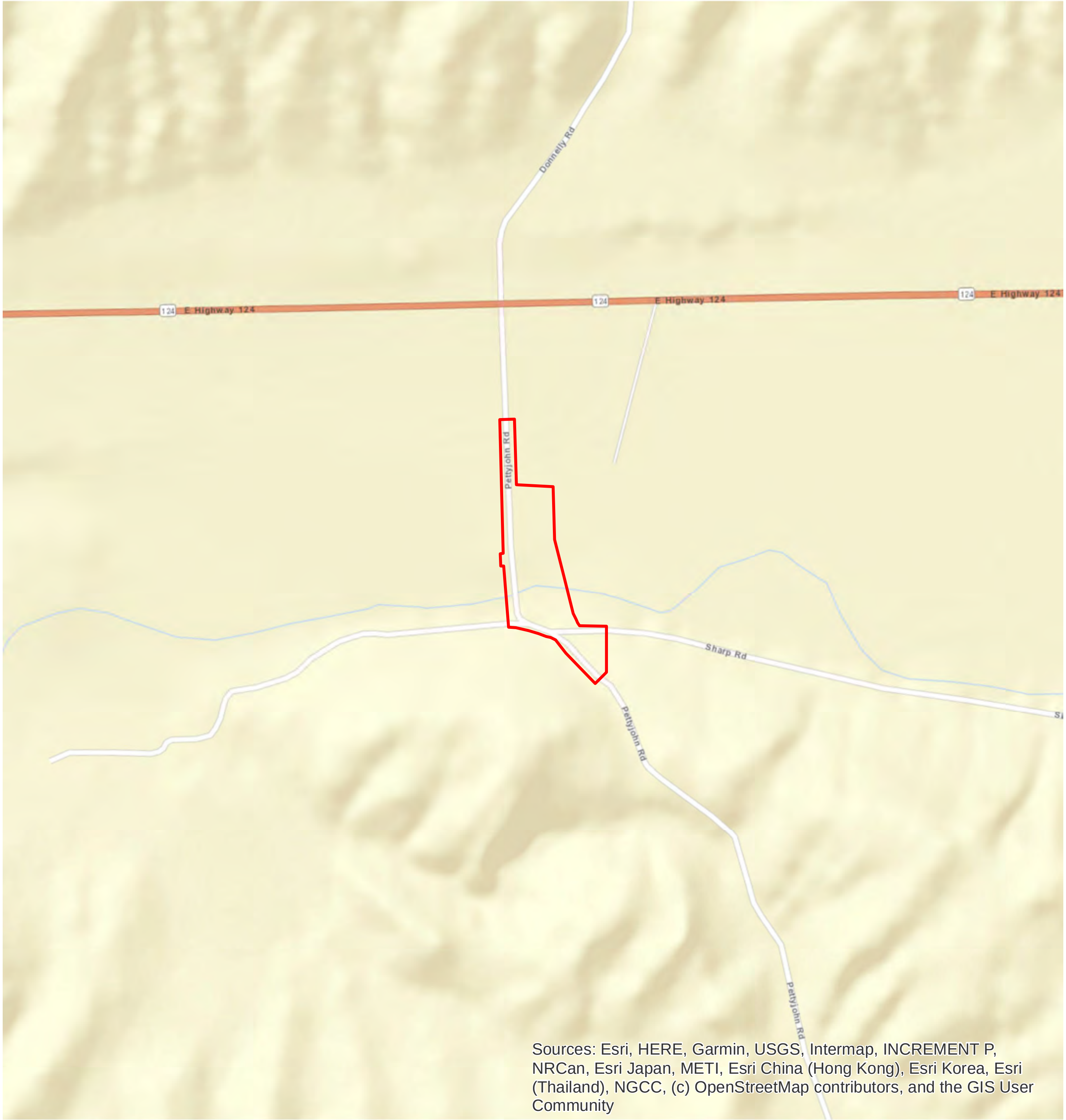
11 DEMARCATION

Consistent with Section 18.08.640 (H) of the Code, the outer edge of the habitat buffer on the project property shall be demarcated with a metal sign attached to a metal post at least every 50 feet that reads:

Habitat Conservation Area
Do Not Disturb
Contact Walla Walla County
Regarding Uses and Restrictions

Figures

Wetland Mitigation Figures 1–6



Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

SOURCE: ESRI Open source street maps.

N

SCALE: 1" = 1,000'

0' 500' 1,000' 2000'

PREPARED FOR: Walla Walla County Public Works.

Legend

— Area of Potential Effect

Filename: L:\Projects\66000\66257\66257-000\NR\GIS\dellsharpeCA2.mxd Plot Date/Time: 2/23/2021 3:59:43 PM

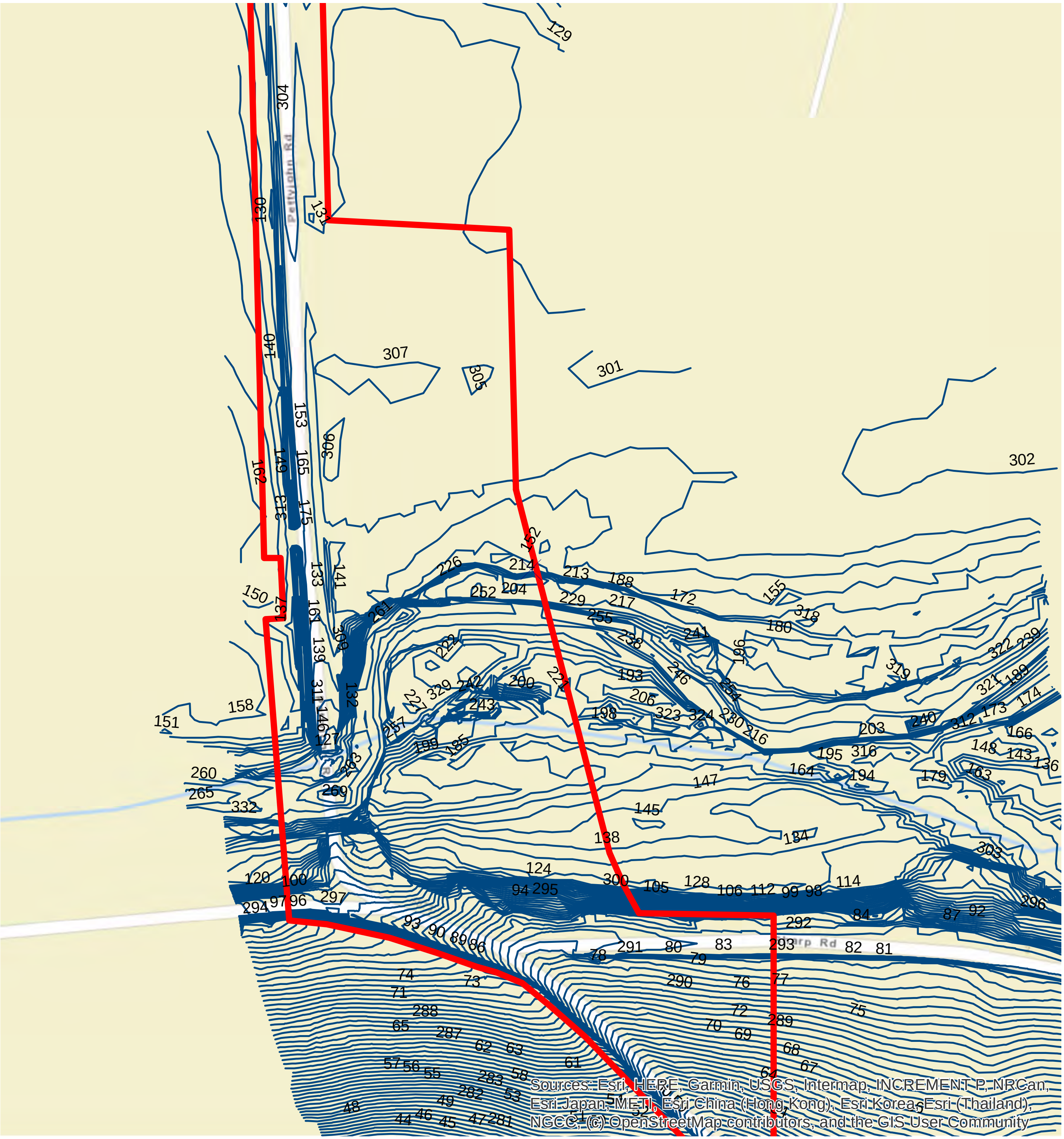
PBS

LOCATION MAP

CRITICAL AREAS MITIGATION PLAN
DELL SHARPE BRIDGE REPLACEMENT PROJECT

JAN 2022
66257.000

FIGURE
1



Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

SOURCE: PBS Topographic Survey.

Legend

▬ Area of Potential Effect

▬ Existing Topography

SCALE: 1" = 200'

0' 100' 200' 400'

PREPARED FOR: Walla Walla County Public Works.

PBS

TOPOGRAPHIC MAP

CRITICAL AREA MITIGATION PLAN
DELL SHARPE BRIDGE REPLACEMENT PROJECT

JAN 2022
66257.000

FIGURE
2

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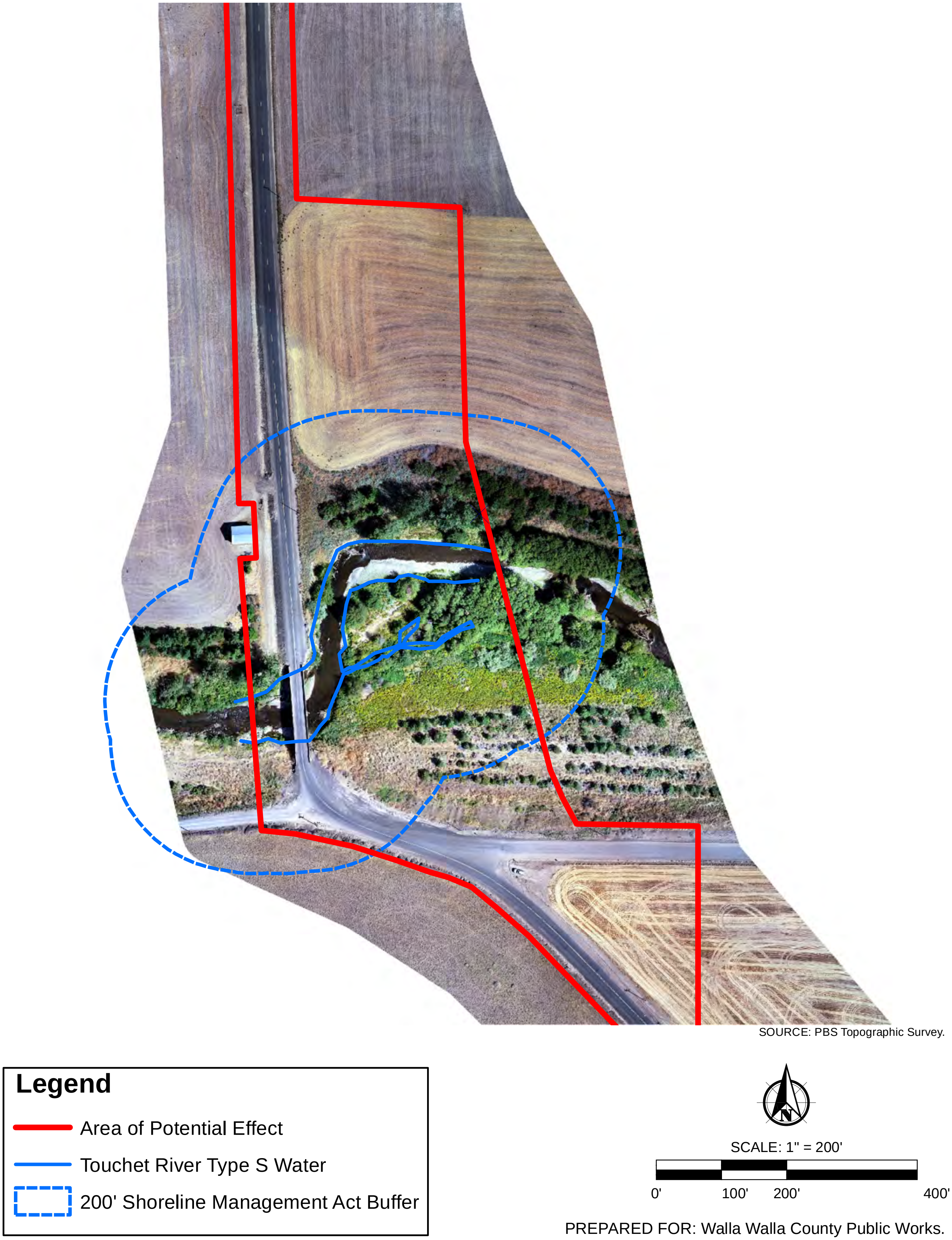

SOURCE: PBS Topographic Survey.

PREPARED FOR: Walla Walla County Public Works.

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PBS

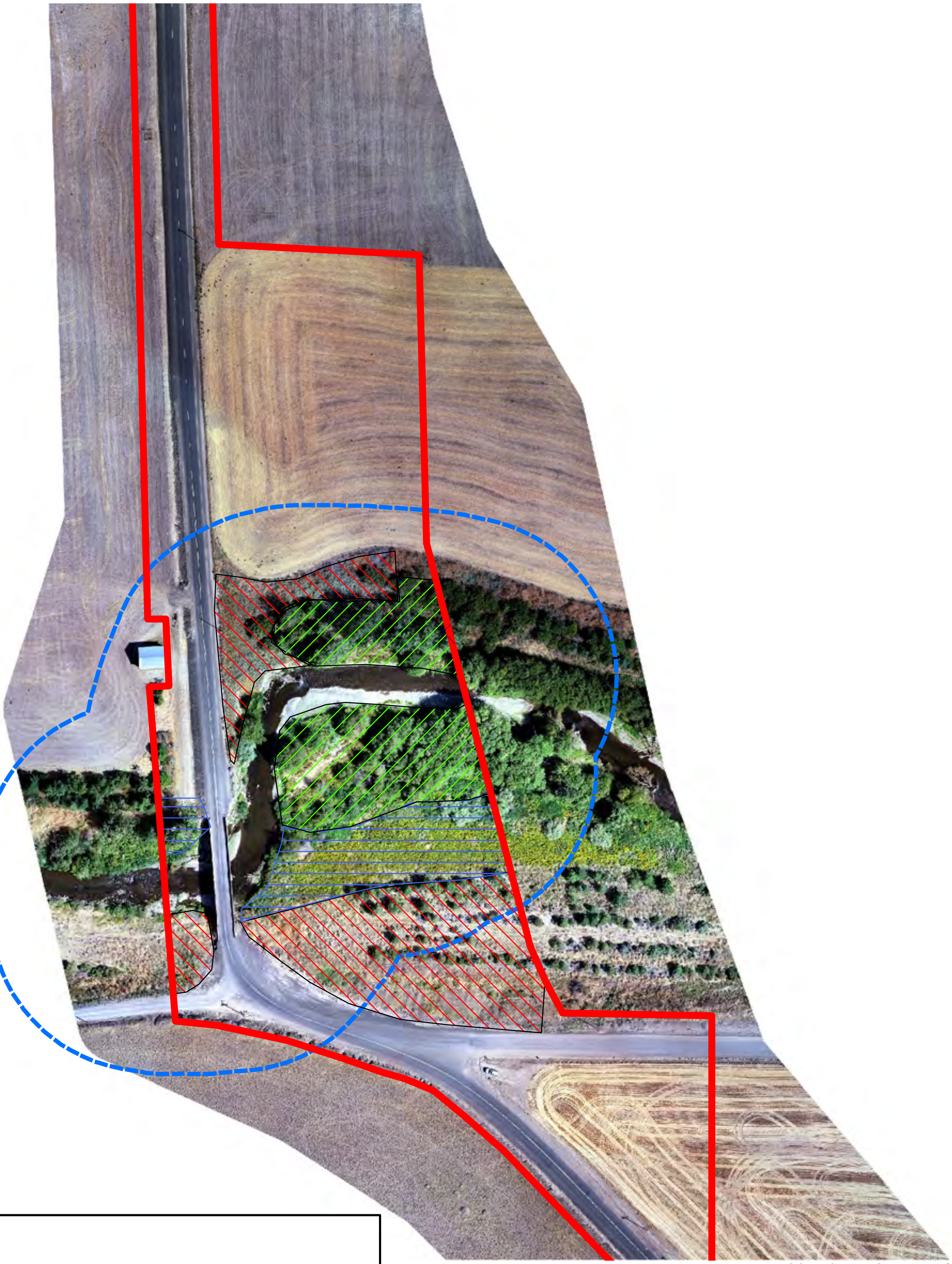
SHORELINE BUFFER

CRITICAL AREA MITIGATION PLAN
DELL SHARPE BRIDGE REPLACEMENT PROJECT

JAN 2022
66257.000

FIGURE

3



SOURCE: PBS Topographic Survey.

Legend

- ▬ Area of Potential Effect
- ▨ High Quality Condition
- ▤ Marginal Quality Condition
- ▧ Degraded Quality Condition
- ⬚ 200' Shoreline Management Act Buffer

SCALE: 1" = 200'

0' 100' 200' 400'

PREPARED FOR: Walla Walla County Public Works.

BUFFER CONDITION MAP

CRITICAL AREA MITIGATION PLAN
DELL SHARPE BRIDGE REPLACEMENT PROJECT

JAN 2022
66257.000

FIGURE
4

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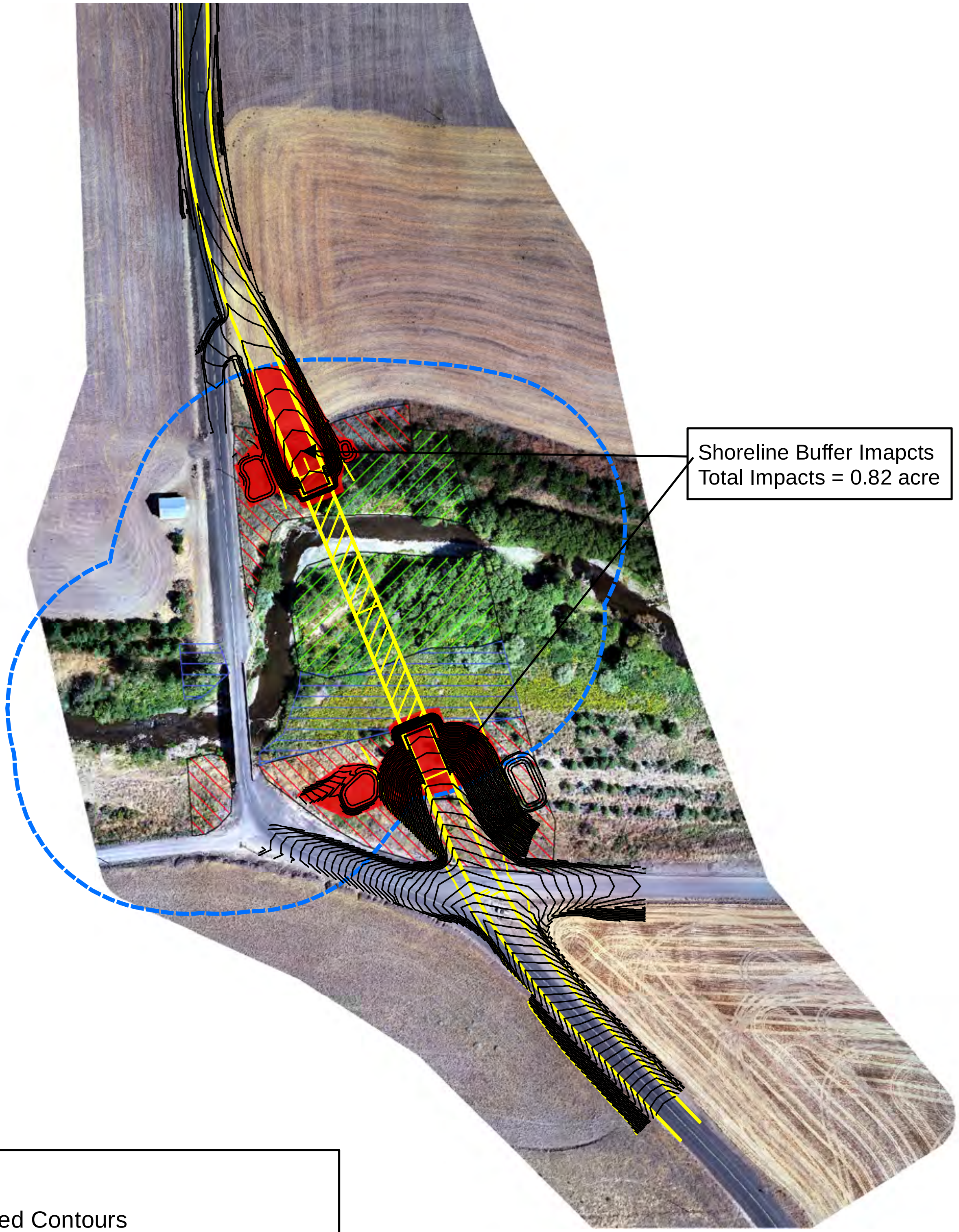


Legend

- —— Proposed Contours
- ⬚ 200' Shoreline Management Act Buffer
- 🟥 Shoreline Buffer Impacts
- ▨ High Quality Condition
- ▤ Marginal Quality Condition
- ▧ Degraded Quality Condition

SOURCE: PBS Aerial Drone Photo 2020.

N

SCALE: 1" = 200'

0' 100' 200' 400'

PREPARED FOR: Walla Walla County Public Works.

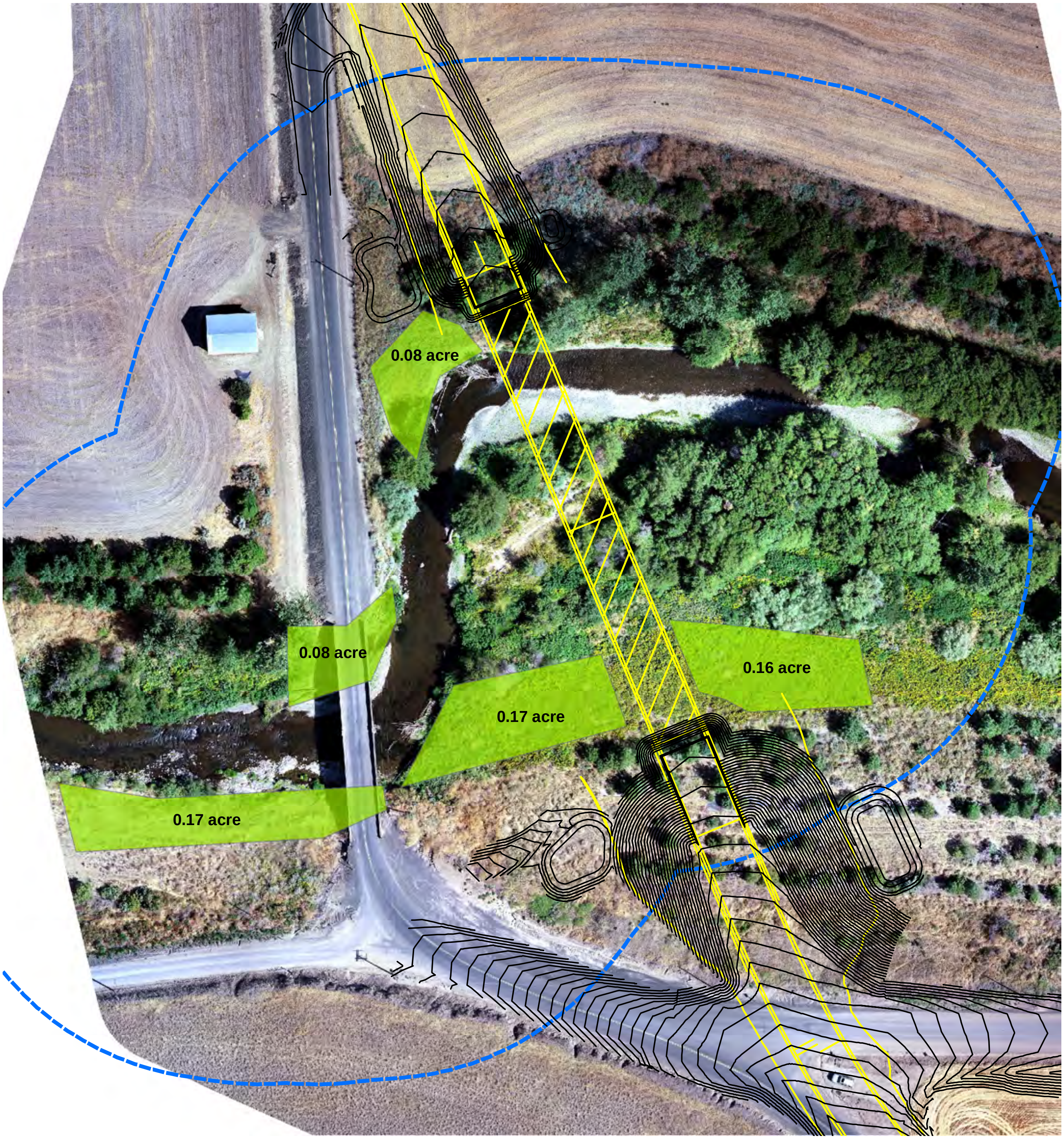
HABITAT IMPACTS MAP

CRITICAL AREA MITIGATION PLAN
DELL SHARPE BRIDGE REPLACEMENT PROJECT

JAN 2022
66257.000

FIGURE
5

Filename: L:\Projects\66000\66257\66257-000\NR\GIS\dellsharpeCA2.mxd Plot Date/Time: 12/22/2021 6:07:44 PM



SOURCE: Walla Walla County Critical AReas Geodatabase 2020.

Legend

- —— Proposed Contours
- ⬚ 200' Shoreline Management Act Buffer
- 🟩 Buffer Enhancement Areas

SCALE: 1" = 100'

0' 50' 100' 200'

PREPARED FOR: Walla Walla County Public Works.

PBS

HABITAT ENHANCEMENTS

CRITICAL AREA MITIGATION PLAN
DELL SHARPE BRIDGE REPLACEMENT PROJECT

JAN 2022
66257.000

FIGURE
6

Filename: L:\Projects\66000\66257\66257-000NR\GIS\dellsharpeCA2.mxd Plot Date/Time: 1/4/2022 3:21:54 PM

Exhibit 14

Final Hydraulic Report

Dell Sharpe Bridge Replacement
Walla Walla County, Washington

MP Stormwater

Hydraulic Engineering Services

December 2021

Final Hydraulic Report
Dell Sharpe Bridge Replacement
Walla Walla County, Washington

Hydraulic Engineering Services
December 2021

Prepared for:

Walla Walla County
c/o TRANTECH Engineering, LLC
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Attention: Kash Nikzad and Walt Olsen

Prepared by:

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Tables

Figures

APPENDICES

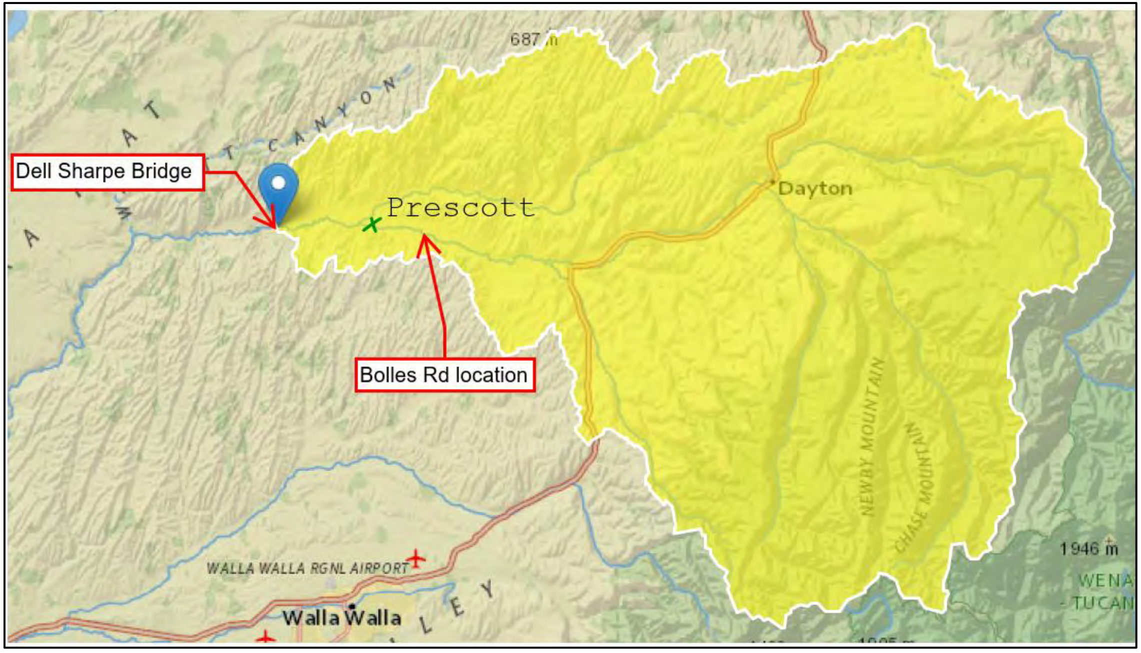
Executive Summary

This executive summary for the Dell Sharpe Bridge Replacement addresses hydraulic engineering services which include water surface elevations, scour depths, bridge deck runoff and riprap recommendations. The proposed bridge length used in this analysis is 320ft, along the new proposed profile and alignment location. The stream and floodplain DTM (Digital Terrain Model) surface was surveyed by PBS Engineering and Environmental Inc for the stream cross sections.

Drainage Basin

The Touchet River has a drainage basin of 497 square miles and is just downstream from the town of Prescott, see Figure 1. The Walla Walla County 2002 FEMA Flood Insurance Study (FIS) reported flows for the Touchet River at Bolles Rd approximately 5 miles upstream from the town of Prescott. This location also had a USGS gage 140170000 with data from 1925 to 1989 to establish Mean Recurrence Interval (MRI) Flood Events which were cross referenced with StreamStats flows. It was also discovered that Washington State Department of Ecology has a flow monitoring station at Bolles Rd. The monitoring station has data from 2007 to present.

Figure 1- Touchet River Drainage Basin



Design Discharge Flow Rates

The 2002 Walla Walla County FEMA FIS listed the Touchet River peak discharge MRI at Bolles, which were cross referenced to the peak flow rates from the USGS Gage records from 1925 to 1989. It was also noted that the FEMA flows were closer to the upper limit values of the USGS Gage peak flow analysis than the estimated values. The FEMA flows are more conservative considering it has 13 years of additional flow data and captures the 1990's major floods in the area. Table 1 below shows the StreamStats flows at Bolles compared to USGS Gage, DOE Flow Monitoring Station and FEMA FIS flows. This establishes the delta value that will be used at the project site to derive the design flows for Dell Sharpe Bridge crossing.

Table 1- Delta flows

	Flow Adjustments to StreamStat Flows at Bolles				
Storm Event	Streamstats Flows (cfs)	USGS Gage Data (cfs)	DOE Flow Monitoring Station (cfs)	FEMA Flows (cfs)	Delta (cfs)
2yr (NHW)	2,270	3,055			785
2/7/2020	7,040		7,650		610
100yr	10,600			12,000	1,400
200yr	12,300			15,000	2,700
500yr	15,100			18,000	2,900

*NHW-Normal High Water (2yr MRI)

Table 2 shows all the storm events and design discharge flow rates that will be used on this project. The delta is the flow adjustment from Table 1 to the StreamStats flows at the project site to establish the design flows for the Q2, Q100, Q200, Q500 and the Feb 7th event for validation.

Table 2- Design Flows at Dell Sharpe Bridge

Flow Adjustments to Streamstats at Dell Sharpe Road			
Storm Event	Streamstats Flows (cfs)	Delta (cfs)	Design Flows (cfs)
2yr (NHW)	2,430	785	3,215
2/7/2020	8,360	610	8,970
100yr	12,900	1,400	14,300
200yr	15,300	2,700	18,000
500yr	19,100	2,900	22,000

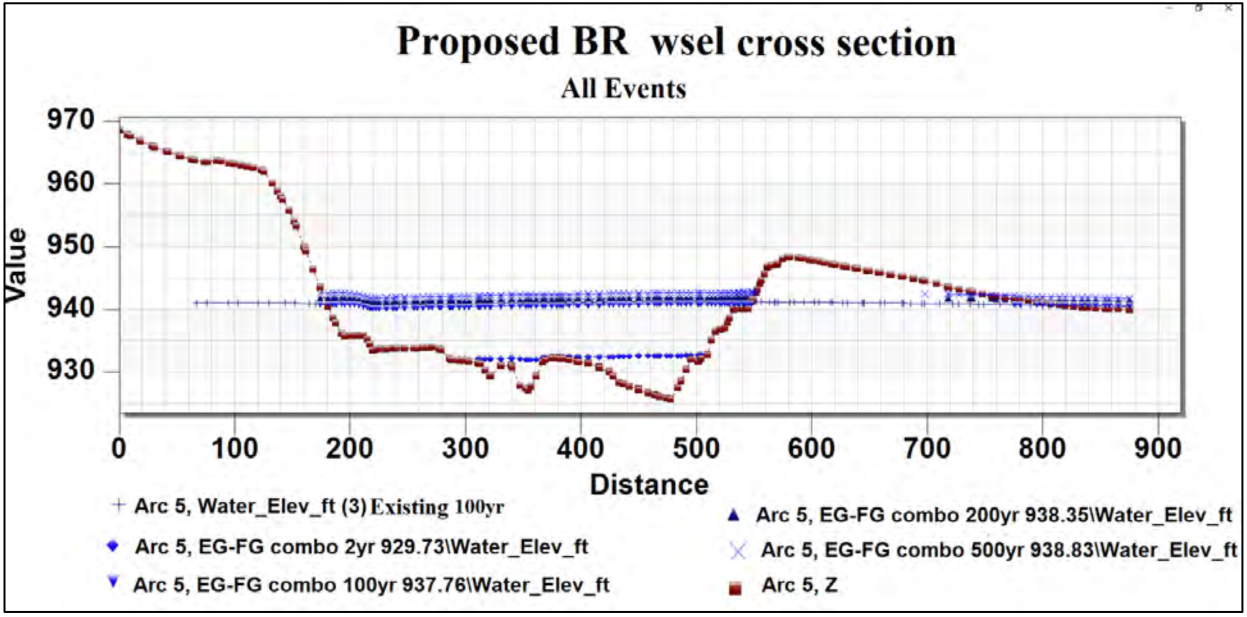
Water Surface Elevations, Velocity and Vertical Clearance

SRH-2D downstream boundary conditions were used to determine the 2yr, 100yr, 200yr, and 500yr water surface elevations for the existing and proposed bridge. The water surface elevations (WSEL) are as follows for the proposed condition based on the NAVD (1988) Datum at the upstream side of the proposed bridge. The design flow rates from Table 2 were used to derive proposed WSEL, velocity and vertical clearance as seen in Table 3 and Figure 2 below.

Table 3- Design Flows, WSEL, Velocity, Vertical Clearance

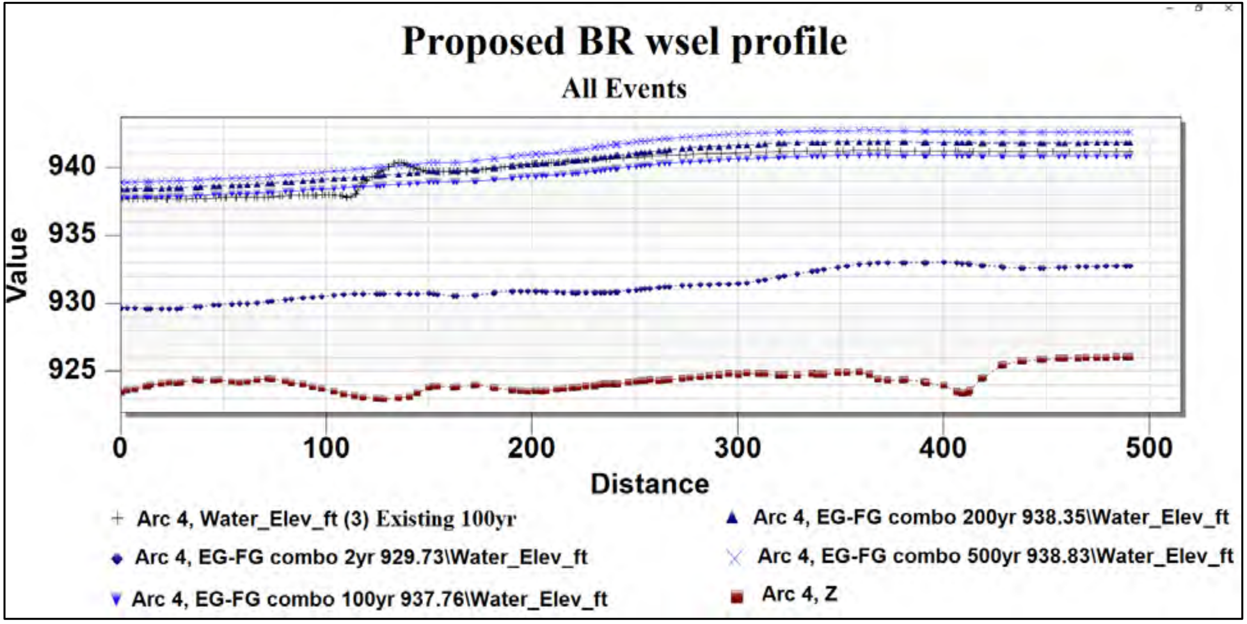
Design Storm Event	Design flows (cfs)	Proposed wsel (ft)	Proposed avg velocity (fps)	Proposed vertical clearance (ft)
2yr (NHW)	3,215	932.39	4.04	10.67
100yr	14,300	940.60	3.67	2.46
200yr	18,000	941.54	3.98	1.52
500yr	22,000	942.27	4.31	0.79

Figure 2- All Events Proposed WSEL Cross Section



The new bridge opening has decreased the velocity through the channel and removed the 2.5ft of backwater, thus improving the overall river hydraulic capacity as seen in Figure 3. The new vertical clearance is 2.46ft for the 100yrWSEL on the north. This clearance is less than the 3-ft recommendation per WSDOT Hydraulic Manual based on the federal mandate to maintain a 3ft vertical clearance between the bottom of the bridge and the 100-year water surface elevation. However, on the south the vertical clearance is 13.65ft. The average vertical clearance for the proposed bridge is 8.05ft which is more than enough clearance for debris.

Figure 3- All Events Proposed WSEL profile



Scour Depth and Riprap Recommendation

The scour depths were determined by using the FHWA Hydraulic Toolbox version 5.0. The types of scours that were derived are: General Scour, Contraction Scour, Local Pier Scour and Abutment Scour for the 200yr and 500yr Design. The existing channel bottom (thalweg) elevation is approximately at elevation 924.82 ft. at proposed bridge crossing.

It was also noted that bedrock is near the surface per the geotechnical drill bore logs. The north abutment bedrock is approximately at elevation 917 ft, at mid length around elevation 921 ft and at south abutment elevation 922 ft. These elevations will determine the final scour depth in those locations. If the calculated scour depth at each location falls below the bedrock elevation, it will default to the bedrock elevation.

General Scour, an assumed D50 of 0.078 ft and an assumed D84 of 0.134 ft were used to determine the natural degradation of the river. The average predicted degradation (general scour) is approximately ***0.13 ft*** for the 200yr and ***0.16 ft*** for 500yr Design.

Contraction Scour, for this river falls under live-bed conditions which means, the material being transported in the upstream reach is transported through to the downstream reach mostly in suspension and at less than capacity of the flow. Live-bed scour is cyclic in nature. The scour hole that develops during the rising stage of the flood refills during the falling stage. The total contraction scour for the proposed crossing is ***0.0ft*** for the 200year and 500yr Design. This confirms the new bridge length is removing the existing constriction.

Local Scour (Pier Scour) per HEC 18, the CSU equation is recommended for live-bed pier scour. The equation predicts maximum pier scour depths. The local 200yr approach velocity of 5.09 fps was used to derive a local pier scour depth of ***10.5 ft*** for the center pier and ***11 ft*** for the 500yr. However, there are two pier columns at the abutments that also need to be reviewed for pier scour. The northeast pier has a scour depth of ***4.6 ft*** and northwest pier ***5.3 ft.*** The southeast pier has a scour depth of ***7.4 ft*** and southwest pier ***6.6 ft*** for the 200yr event. See Table 4 for 500yr local pier scour depths. The local pier scour does not consider debris piled up against the pier just the width of the design pier diameter.

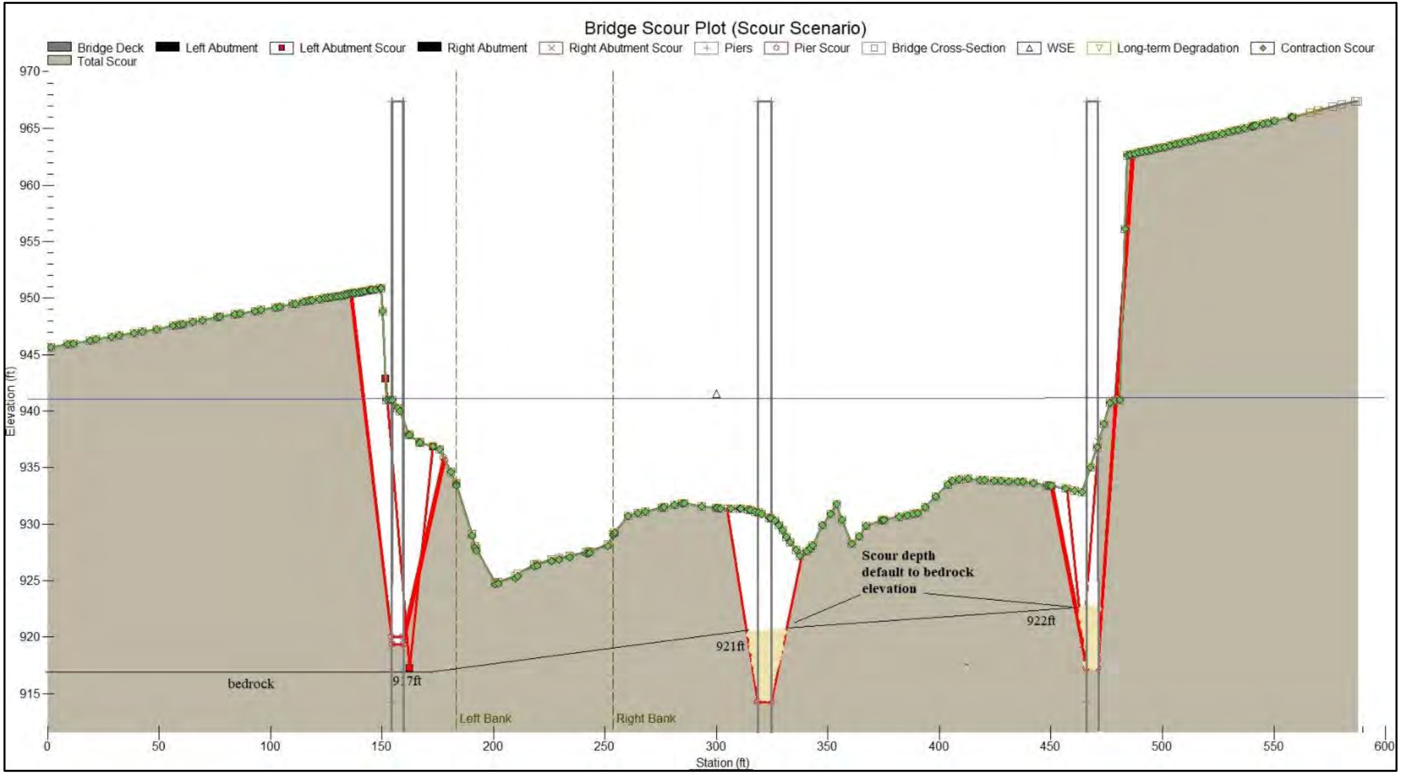
Abutment Scour was derived using the NCHRP Method in the FHWA Hydraulic Toolbox version 5.0. The 200yr scour depth is ***7.4 ft*** on the north and ***13.7 ft*** on the south and the 500yr scour depth is ***8.4 ft*** on the north and ***16.8 ft*** on the south. The south side abutment is slightly deeper than the north side; please refer to the results below for the difference. At this time, riprap protection is required to protect the retaining wall foundation, since the bridge pier and columns will be drilled shafts for deep foundation.

Total Scour Depth is the combination of General Scour plus Contraction Scour and center Local Pier in the channel. Local Pier and Abutment Scour is along the abutment and the sides of the channel. Table 4 below shows the Scour Depths at the proposed bridge and Figure 4 shows the schematic with the bedrock and scour depth reference:

Table 4- Total Scour Depths

Design Events	**200yr**	**500yr**	**Scour elevation**	**Bedrock elevation**
General Scour	0.13ft	0.16ft	***924.68ft***	917ft
Contraction Scour	0.00ft	0.00ft	***924.68ft***	917ft
Local Pier Scour				
center pier	10.5ft	11.0ft	914.24ft	***921ft***
northeast pier	4.6ft	5.5ft	***920.05ft***	917ft
northwest pier	5.3ft	5.9ft	***919.38ft***	917ft
southeast pier	7.4ft	9.2ft	917.26ft	***922ft***
southwest pier	6.6ft	8.2ft	918.07ft	***922ft***
Abutment Scour				
north	7.4ft	8.4ft	***917.28ft***	917ft
south	13.7ft	16.8ft	919.6ft	***922ft***

Figure 4- Total Scour Depth and Bedrock elevation



Riprap Recommendation is to place light loose riprap on a 1.5:1 around the abutment embankment slope, please refer to Figure 5 and Figure 6 below for placement.

Figure 5- Riprap Detail

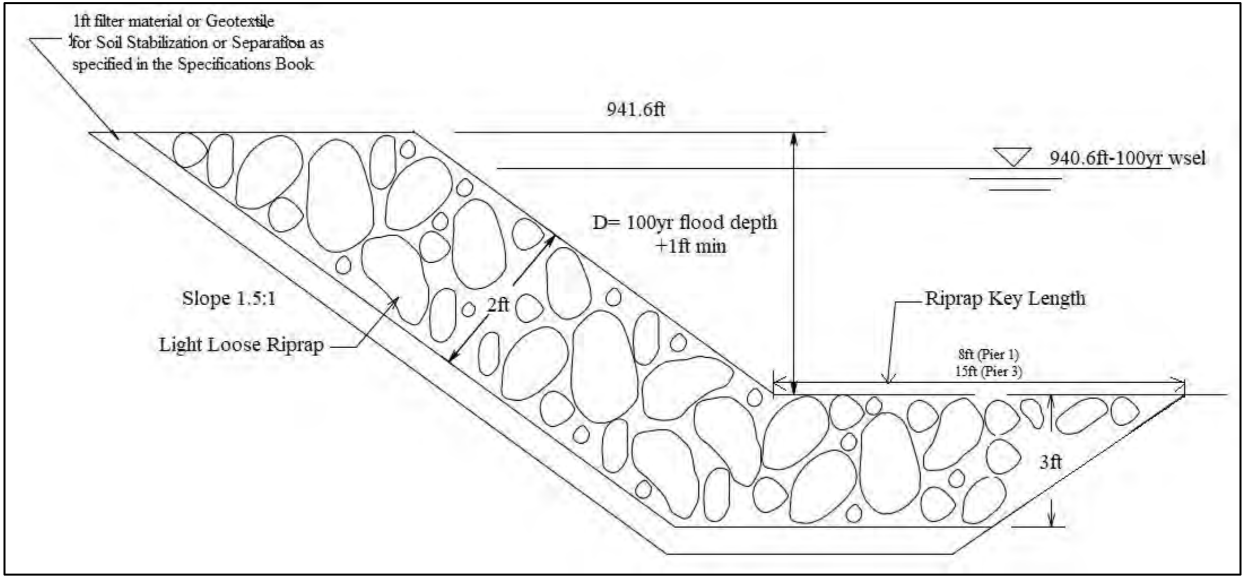
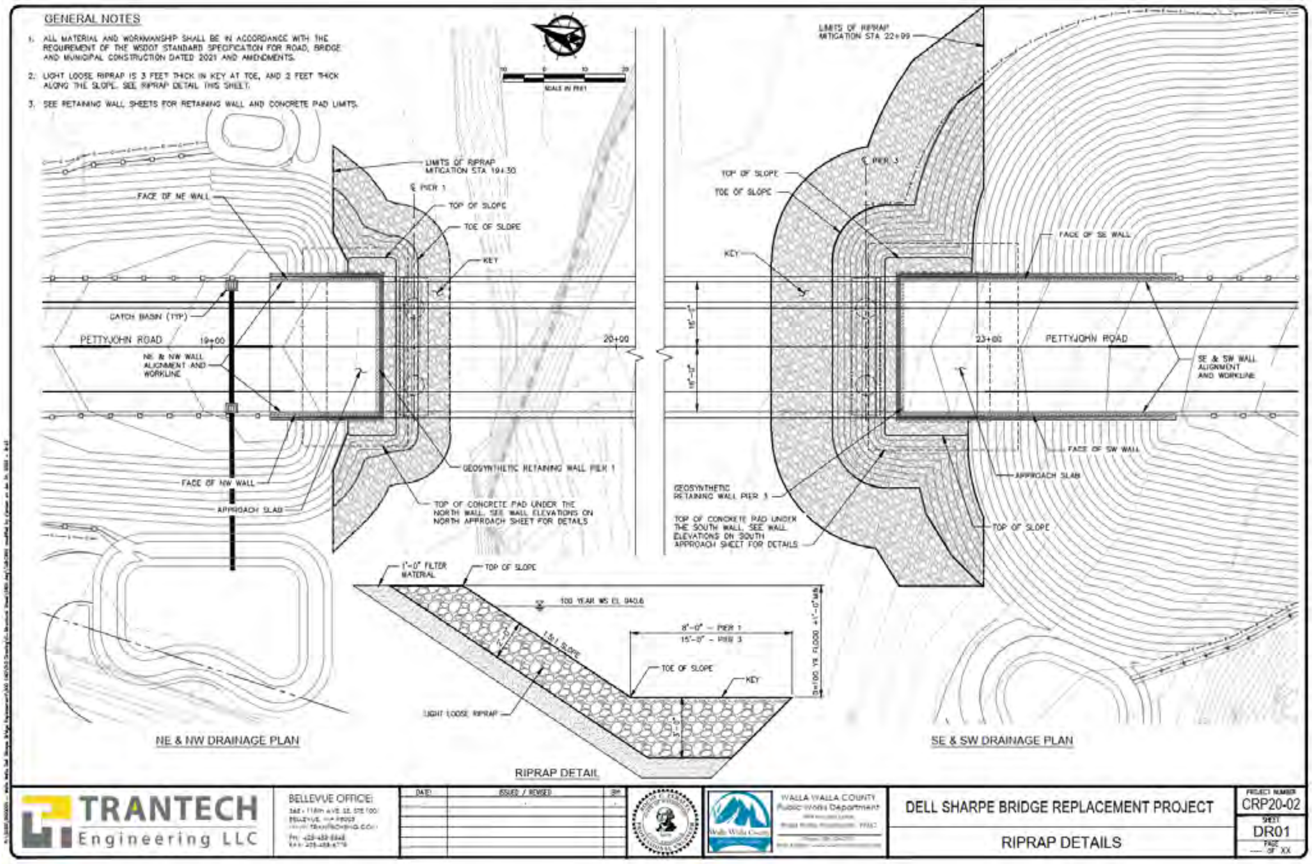


Figure 6- Bridge plan riprap placement


GENERAL NOTES

1. ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE REQUIREMENT OF THE WSDOT STANDARD SPECIFICATION FOR ROAD, BRIDGE AND MUNICIPAL CONSTRUCTION DATED 2021 AND AMENDMENTS.
2. LIGHT LOOSE RIPRAP IS 3 FEET THICK IN KEY AT TOE, AND 2 FEET THICK ALONG THE SLOPE. SEE RIPRAP DETAIL THIS SHEET.
3. SEE RETAINING WALL SHEETS FOR RETAINING WALL AND CONCRETE PAD LIMITS.

Recommendations for bridge design, are to set the bottom of the walls within the riprap protection limits shown to scour depth or bedrock to protect the abutment approach fills from being undermined if the river meanders in the future (life of the bridge). Pier column shafts shall extend below the design scour depth, or the bedrock as recommended in the geotechnical report.

Bridge Deck Runoff Water Quality

At this time, it has been determined that Core Element 1-8 are required for stormwater compliance on this project based on the 2019 DOE Stormwater Management Manual for Eastern Washington. These core elements consist of the following requirements to develop the project erosion control plan and documentation.

- Core Element 1: Preparation of a Stormwater Site Plan
- Core Element 2: Construction Stormwater Pollution Prevention (SWPP)
- Core Element 3: Source Control of Pollutants
- Core Element 4: Preservation of Natural Drainage Systems
- Core Element 5: Runoff Treatment
- Core Element 6: Flow Control
- Core Element 7: Operation and Maintenance
- Core Element 8: Local Requirements

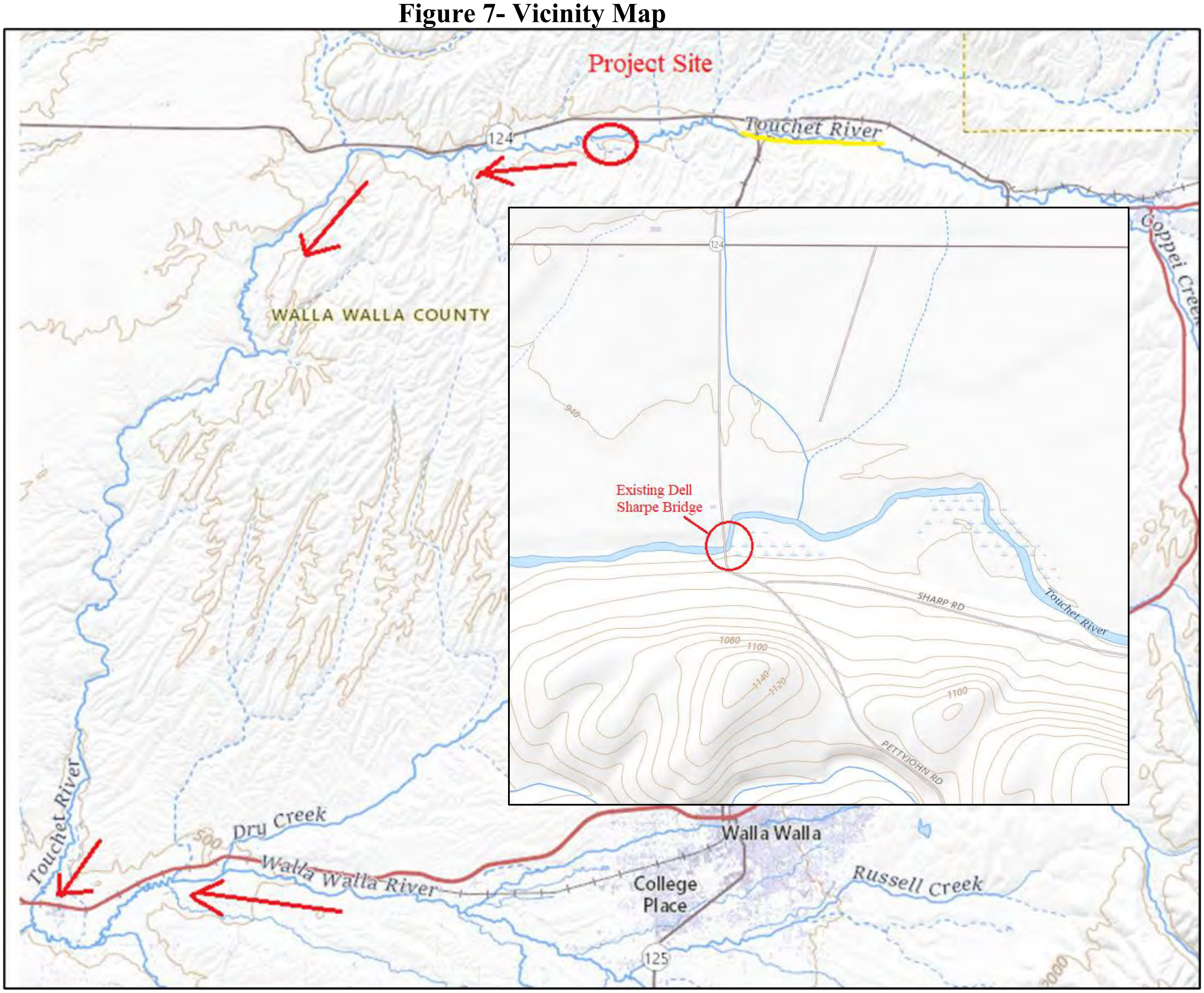
Water quantity and water quality treatment is required because the project exceeds the threshold criteria of 5,000 sf of new hard surfaces. Currently, the total new hard surface for the new proposed bridge alone is approximately 10,240 sf not counting the new roadway and bridge approach slabs.

The proposed bridge design will convey the runoff off the bridge to infiltration swales on the north side of the bridge east and west banks before it reaches the river. This would preserve the natural hydrology by infiltrating the flows instead of concentrating the flows and creating erosion along the embankment. PBS Engineering and Environmental Inc is responsible for the stormwater design of the project and can be referenced for more information in their final stormwater report.

Project Overview

The existing Dell Sharpe Bridge was built in 1914 and is 115 ft in length, see Appendix B for existing bridge plans. It has been identified as structurally deficient and the latest bridge inspection report determined this bridge to be scour critical code 3, see Appendix B for bridge inspection report. The bridge crosses the Touchet River off SR124 on Pettyjohn road in Walla Walla County and flows south to the Walla Wall River as seen on **Figure 7**.

Figure 7- Vicinity Map



The object of this report is to understand the hydraulic conditions at the existing bridge and use that understanding to establish hydraulic design parameters for the design of the proposed bridge replacement. Three major hydraulic task items were established that consist of a site inspection and field survey, hydraulic modeling, and scour analysis. These three hydraulic engineering services will establish the proposed water surface elevation, scour depths, bridge deck runoff and riprap recommendations for this project.

Site Conditions

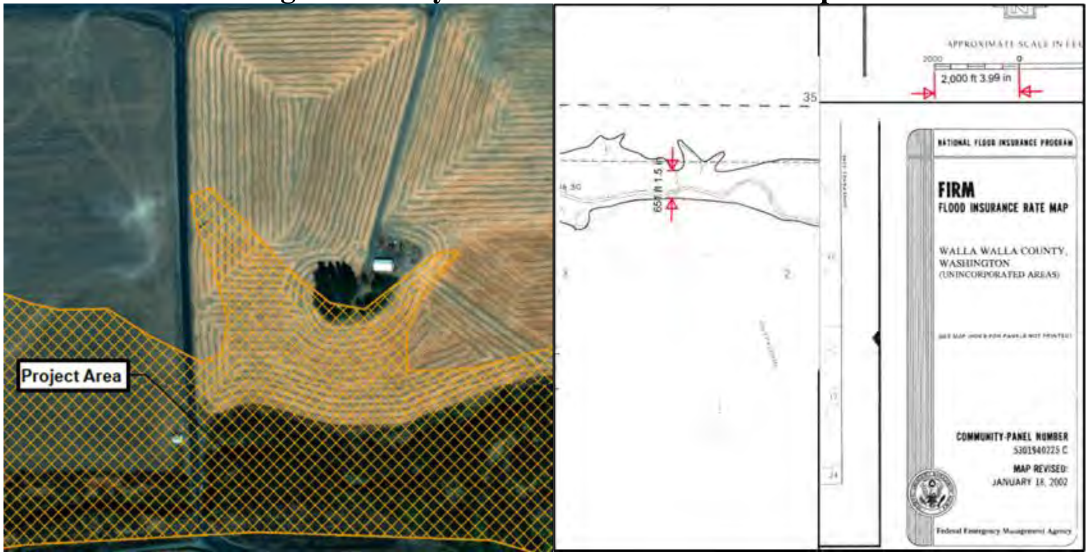
The Dell Sharpe Bridge is located just west of Prescott, WA in Walla Walla County. Touchet River at the Dell Sharpe Bridge crossing has a drainage basin of approximately 497 square miles, approximately 4.5 miles downstream from the town of Prescott, see Figure 8. The Walla Walla County 2002 FEMA Flood Insurance Study (FIS) reported flows for the Touchet River at Bolles Rd approximately 5 miles upstream from the town of Prescott. This location also had a USGS gage 140170000 with data from 1925 to 1989 to establish Mean Recurrence Interval (MRI) Flood Events that was cross referenced with StreamStats flows. It was also discovered that Washington State Department of Ecology has a flow monitoring station at Bolles Rd. The monitoring station has data from 2007 to present. This station was able to capture the latest flood event on February 7, 2020, that will be used to validate the model.

The basin areas can receive up to an average of 29.5 inches for its mean annual precipitation and still has a low amount of tree cover canopy approximately 19.5%. It's a steep basin at the headwaters, however down at the bridge, it is only 0.3% basin slope very flat with lower velocities but flashy at times with the higher events.

Figure 8– Touchet River

The Flood Insurance Rate Map (FIRM) as seen in Figure 9 below, indicates the project site having a wide floodplain. The 100yr floodplain is approximately 650ft wide at the current bridge crossing per the latest map revision on January 18, 2002. Figure 9 shows the FIRM and an aerial view from google earth with the 100yr floodplain limits as reference. Hydraulic modeling will confirm the floodplain widths, see Hydraulic Modeling at Bridge Site for findings.

Figure 9- 100yr Flood Insurance Rate Map



Hydrology

The 2002 Walla Walla County FEMA FIS listed the Touchet River peak discharge MRI at Bolles, which were cross referenced to the peak flow rates from the USGS Gage records from 1925 to 1989 at Bolles. It was also noted that the FEMA flows were closer to the upper limit values of the USGS Gage peak flow analysis than the estimated values. The FEMA flow is more conservative considering it has 13 years of additional flow data and captures the 1990's major floods in the area.

Comparing the flows from FEMA to StreamStats at Bolles location, the difference is approximately 1,400 cfs for the 100-yr event, with FEMA at 12,000 cfs and StreamStats at 10,600 cfs being slightly lower. Table 5 shows the StreamStats flows at Bolles compared to USGS Gage, DOE Flow Monitoring Station and FEMA FIS flows to derive the delta value at Bolles. This establishes the delta value that will be used at the project site to determine the design flows for Dell Sharpe Bridge crossing.

Table 5- Basin Flow Design Delta

Flow Adjustments to StreamStat Flows at Bolles

Storm Event	Streamstats Flows (cfs)	USGS Gage Data (cfs)	DOE Flow Monitoring Station (cfs)	FEMA Flows (cfs)	Delta (cfs)
2yr (NHW)	2,270	3,055			785
2/7/2020	7,040		7,650		610
100yr	10,600			12,000	1,400
200yr	12,300			15,000	2,700
500yr	15,100			18,000	2,900

*NHW-Normal High Water (2yr MRI)

The delta value at Bolles Station can be added to the flows at Dell Sharpe using StreamStats. The StreamStats results for Dell Sharpe are approximately 2,300 cfs higher than the StreamStats flows at Bolles for the 100-yr event. The basin area at Dell Sharpe is 497 square miles compared to 372 square miles at Bolles, so it makes sense the flows are larger: but the flows should be closer to the FEMA FIS study. Taking delta value from Table 5, by increasing the flows at Bolles Station to 12,000 cfs from 10,600 cfs to match FEMA, the 100-yr flow at Dell Sharpe would be approximately 12,900 cfs plus 1,400 cfs for 14,300 cfs. Thus, this project will use 14,300 cfs for the 100-yr design MRI. Table 6 shows all the storm events and design discharge flow rates that will be used on this project. The delta value is the flow adjustment to StreamStats flows to match FEMA flows for the Q2, Q100, Q500 and the Feb 7th event.

Table 6- Design Flows at Dell Sharpe Bridge

Flow Adjustments to Streamstats at Dell Sharpe Road

Storm Event	Streamstats Flows (cfs)	Delta (cfs)	Design Flows (cfs)
2yr (NHW)	2,430	785	3,215
2/7/2020	8,360	610	8,970
100yr	12,900	1,400	14,300
200yr	15,300	2,700	18,000
500yr	19,100	2,900	22,000

The same approach was applied to the other events, except for the February 7,2020 event. That event flow was captured by the DOE flow monitoring station at Bolles Station with the highest reading at 7,650cfs on February 7th, 2020. This value is close to the 25-yr event for the Bolles StreamStats at 7,040cfs with a difference of only 610cfs. This difference will be the delta added to the 25-yr event at Dell Sharpe StreamStats at 8,360cfs plus 610cfs for a total of 8,970cfs. This is the flow that will be used to validate the model with photos capturing high water line.

See Appendix A for the Hydrology information on all the stations and the Wall Walla County FEMA FIS report.

Hydraulics

Hydraulic analysis for bridge scour and stream stability analysis process are found in the Hydraulic Engineering Circular (HEC) manuals: HEC-18, Evaluating Scour at Bridges, HEC-20 Stream Stability at Highway Structures. These two manuals are to be used as a set and provide complete stream stability and scour evaluation recommendations.

Stream Stability at Highway Structures

HEC 20 is set up to identify stream instability problems in a three-level process. The first level is to do a simple geomorphic assessment, the second level is to assess basic hydrologic and hydraulic concepts and the third level, if necessary, would be to do a physical model which for this project is not necessary.

A geomorphic concept looks at five items during the site visit to establish the stability of the system. The site visit for Dell Sharpe Bridge was on December 7, 2020, from 8:00am to 10:00am. There was no rain but very cold around 30 degrees with a dense fog. The river flow was low in the channel that day, which made it easy to walk down the channel, see the exposed footing, take photos of the gravel bar sediments and to collect information for the site assessment. See Appendix F for field notes.

The first item is to examine the stream characteristics. The Touchet River is an eastern basin in the Palouse region which is mid-size in basin area. The river's active channel migration zone near the proposed bridge crossing is approximately 345 ft wide, see Appendix B for details. The river is a precipitation fed system that can be flashy at times on a silt fine bed material with gravel. The banks upstream are more vertical due to bank erosion from lateral migration, but downstream banks are moderate sloping. The flood plain is approximately 10 times the channel width. It's a moderate meandrous channel upstream and less meandrous downstream from the existing bridge location. Figure 10 are photos showing the upstream and downstream conditions during the site inspection. Refer to Appendix F for photo log.

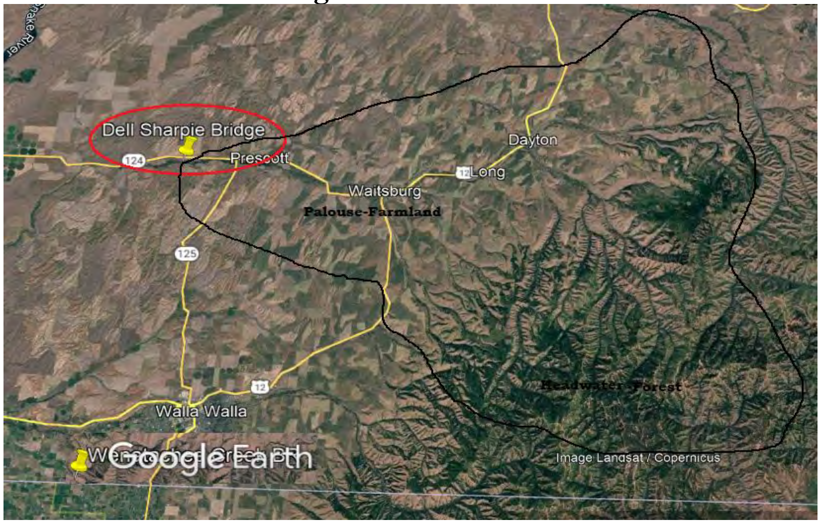
Figure 10– Touchet River at Dell Sharpe Bridge site visit

Looking upstream

Looking downstream

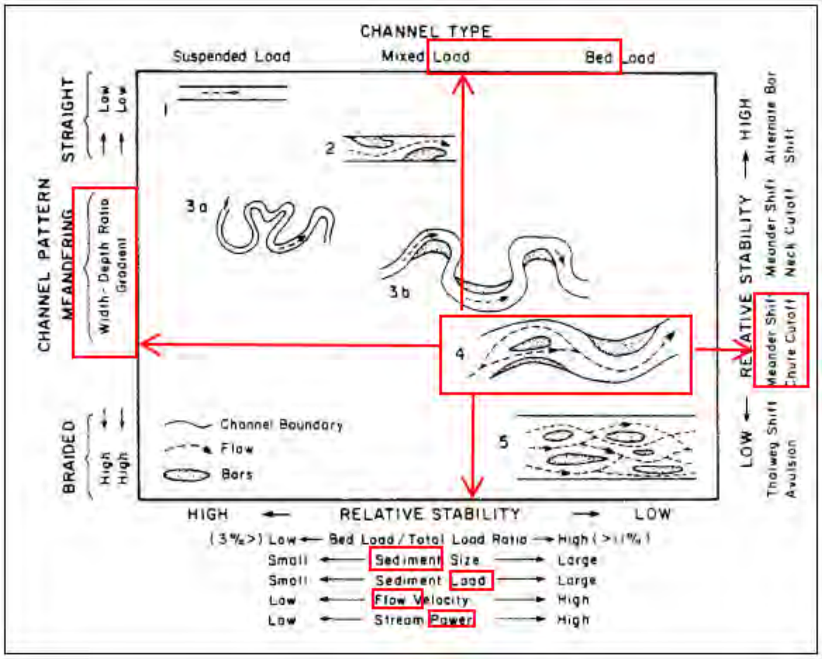
The second item is evaluating the land use changes in the basin that have affected the stream responses. The upper drainage basin is steep and forested compared to the lower drainage basin in the Palouse farmland. This basin has been experiencing low flows due to hot weather and lack of early spring snowpack reported by the DOE July 31, 2020. It also experienced flooding on February 7th of 2020 with the melting of the snowpack. Thus, the flooding did not allow for recharging the ground water and created more bank erosion. It was also noted that any wood recruitment in the river was along the bank line when the lateral migration of the river causes sloughing of the trees. Refer to Appendix F in the photo log for debris and bank line photos. Figure 11 below is from the Google Earth drainage basin aerial view.

Figure 11– Touchet River Drainage Basin Aerial View Farmland & Forest Cover



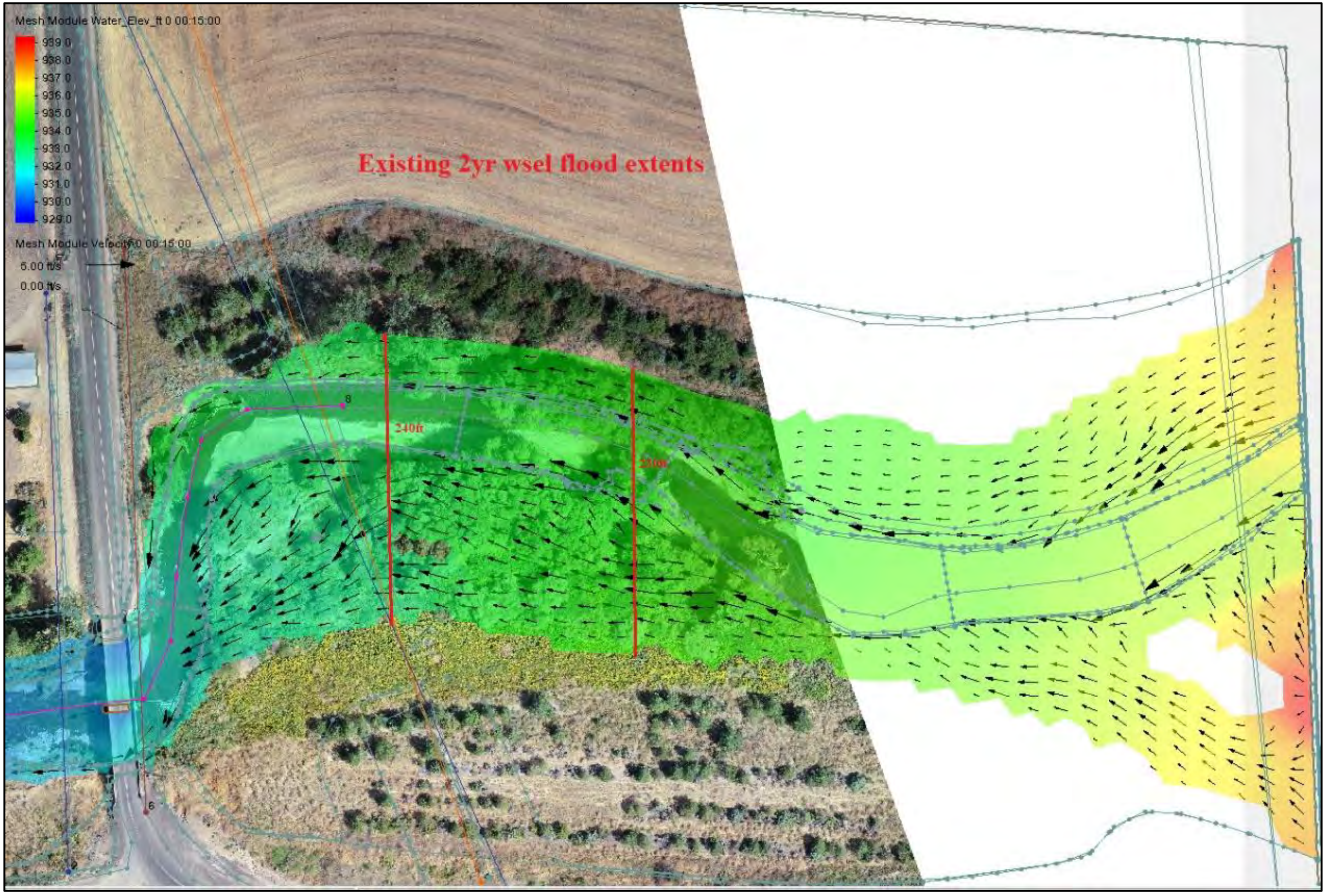
The third item is to assess the overall stream stability of the system. Figure 12 from HEC-20 is useful in making qualitative assessment of stream stability based on stream characteristics. It shows that a meandrous channel pattern with mix load of sediment on a flat grade tend to be relatively stable.

Figure 12– Channel Stability Classification



The fourth item is to evaluate the lateral stability of a stream which is dependent on the extent of the bank erosion. Bank erosion can undermine piers and abutments, and migration of a bend through a bridge opening can change the stream stability and the development of point bars and gravel bars upstream that can accentuate local and contraction scour. These are all channel responses to lateral stability. At this site, the river is relative stable however the meander on the upstream side will need to be monitored for the life of the project. The river does show existing signs of contraction scour at the existing bridge crossing. The existing bridge opening is currently 150ft in width and the average bank width upstream is approximately 240ft. This is constricting the channel width by 100ft and increasing velocities through the bridge which is creating a backwater and scour around the north pier. Recommendation would be to meet the minimum hydraulic opening seen below in **Figure 13**. Refer to Appendix B for DFW bridge criteria and memo on Dell Sharpe Bridge Replacement Stream Stability Issues March 5, 2021, for recommendation on removal of existing bridge.

Figure 13- Minimum Hydraulic Opening



Minimum Hydraulic Opening

$W_{HYO} = 1.2*W_{bf} + 2$ feet

Where

W_{HYO}= Width of hydraulic opening

W_{bf}= BFW

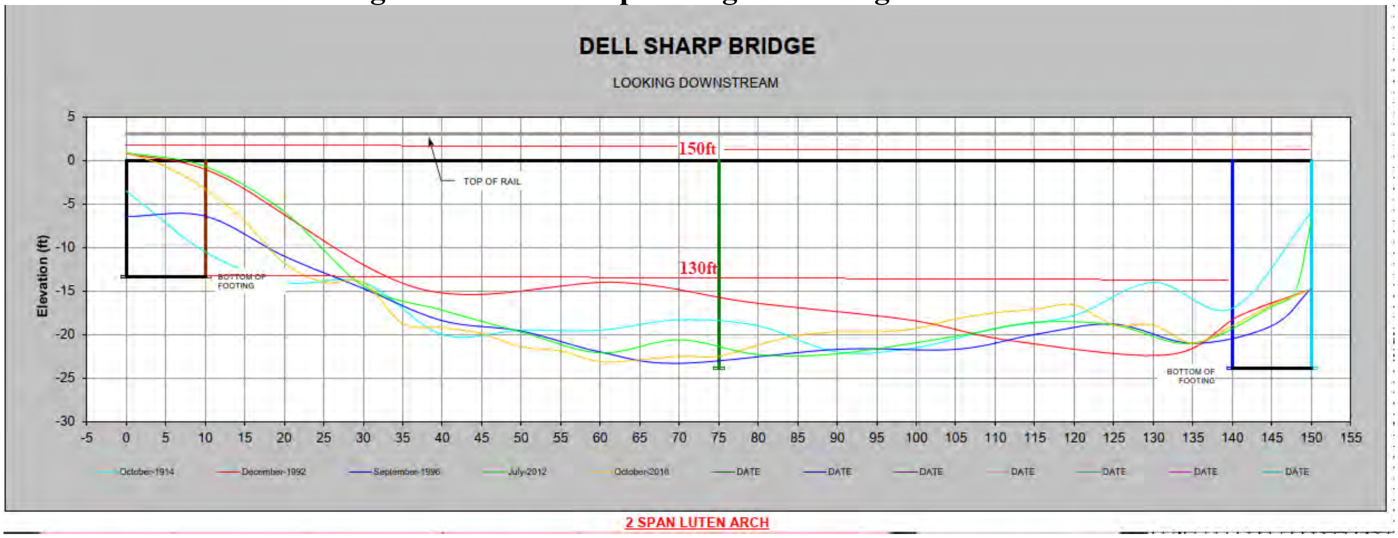
W_{hyo}=1.2(240) + 2=290ft

Floodplain Utilization Ratio
FPW/BFW > 3
Unconfined System

1-Check Vn v Vb ratio less 1.1: project at 1.33 check backwater
2-Check backwater less than 0.2ft: project no backwater for propose decreased by 0.4ft
3- Check Lateral Migration: project incorporates CMZ and deep foundation design

Item five is to assess the vertical stability of the channel. No signs of down cutting were seen during the site visit of the river channel profile, or from the survey done by PBS. The only sign of vertical issue was seen along north abutment pier wall and center pier exposure. Figure 14 shows the historical bridge soundings. With the teal line being the as built ground line from 1914 and the orange line most recent 2016. Due to the bridge being a constriction as discussed above in the lateral stability section and the thalweg shifting up against the center pier creating the scour. This should be a non-issue with the new proposed bridge.

Figure 14- Dell Sharpe Bridge Soundings



In summary, the stream stability was evaluated based on channel response to change as stated in the five items. In each item, it was found that the channel is relatively stable but that the existing bridge is a major constriction. The above lateral and vertical stability at the existing bridge will improve once the new bridge width is placed to help with better lateral and vertical stability at the new proposed bridge crossing. The next section will assess the hydraulic modeling conditions at the bridge site.

Hydraulic Modeling at Bridges

A Level 2 Analysis involves the basic engineering assessments of scour problems at the proposed crossing. HEC 18, Evaluating Scour at Bridges looks at the hydrologic, hydraulic and scour analyses.

Evaluation of hydrologic conditions has included review of the gage record as stated before in the Hydrology section. Direct measurements of flood events that capture the variables for depth and flows for design storms are the best information to use. The design flows listed in Table 2 and Table 6 will be used to derive the hydraulic conditions.

Hydraulic parameters such as velocity, flow depths, and top widths for given flood events are essential for the Level 2 Analysis. For this project, the computer model SRH-2D version 13.01.14 will be used for analysis to derive the water surface profiles and hydraulic conditions.

SRH-2D Input Parameters

Hydraulic information for both the main channel and the overbank areas are required input to model river conditions using SRH-2D. Survey information was done by PBS, taking cross sections approximately 1200 ft upstream and 200 ft downstream of the existing bridge. The cross sections are necessary to establish the hydraulic conveyance at each cross section since Lidar cannot capture elevations below water. Lidar was used on the dry surface areas and cross referenced with survey points to validate elevations. With both Lidar and river cross sections to define the river bottom, a digital terrain model (DTM) was established to import into the SRH-2D model. Refer to Appendix B for survey/mesh model and proposed bridge plans.

The Manning's coefficient parameter was divided by main channel, left and right overbanks, top bank, agricultural areas, ditches, and roadway. The land cover varied from tree and brush along the bank line and agriculture in the floodplain to silt and gravel in the channel, thus Manning's 'n' value ranged from 0.03 to 0.013 depending on the location. See Appendix C for material properties manning roughness.

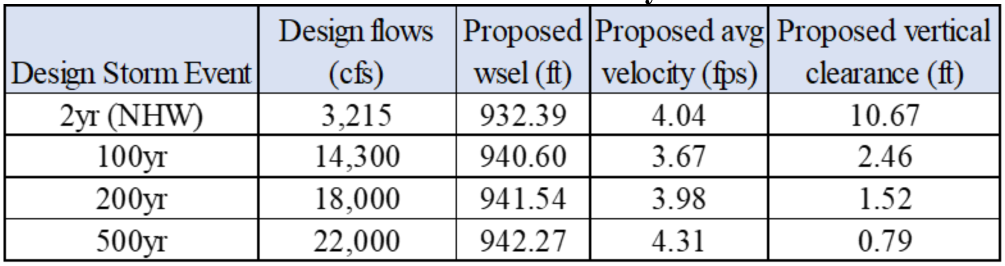
Validation is a very important step when doing any modeling. For this project a recent event happened on February 7th, 2020. This event was captured at the Bolles monitoring station just upstream from Dell Sharpe Bridge. The County Engineers had photos taken that day at the existing bridge where it showed the high-water line see Appendix A for photos. Knowing the flow and approximate water surface elevation, it was easy to validate the model for that event. The model resulted in a water surface elevation within tolerance of 0.2ft. Please see Appendix C for model validation results and plots. This was a good indication that the model is stable and within tolerance.

SRH-2D allows the modeler to run several flow regimes: subcritical, supercritical, and mixed flows in the Boundary setting. The subcritical flow regime was chosen since all systems in a natural setting are in subcritical flow. Since subcritical flow was used, only a downstream boundary condition is necessary for each discharge of interest. The SRH-2D model simulation links together 4 components. These components are Mesh (digital terrain model), Boundary Conditions (defining flow regimes, flow, normal depth), Materials (manning roughness of DTM) and Monitor (points to check). These 4 components define the SRH-2D model of interest and creates data sets for water surface elevation, depth, velocity, etc. for each node and time step in the mesh.

Water Surface, Velocity and Vertical Clearance Results

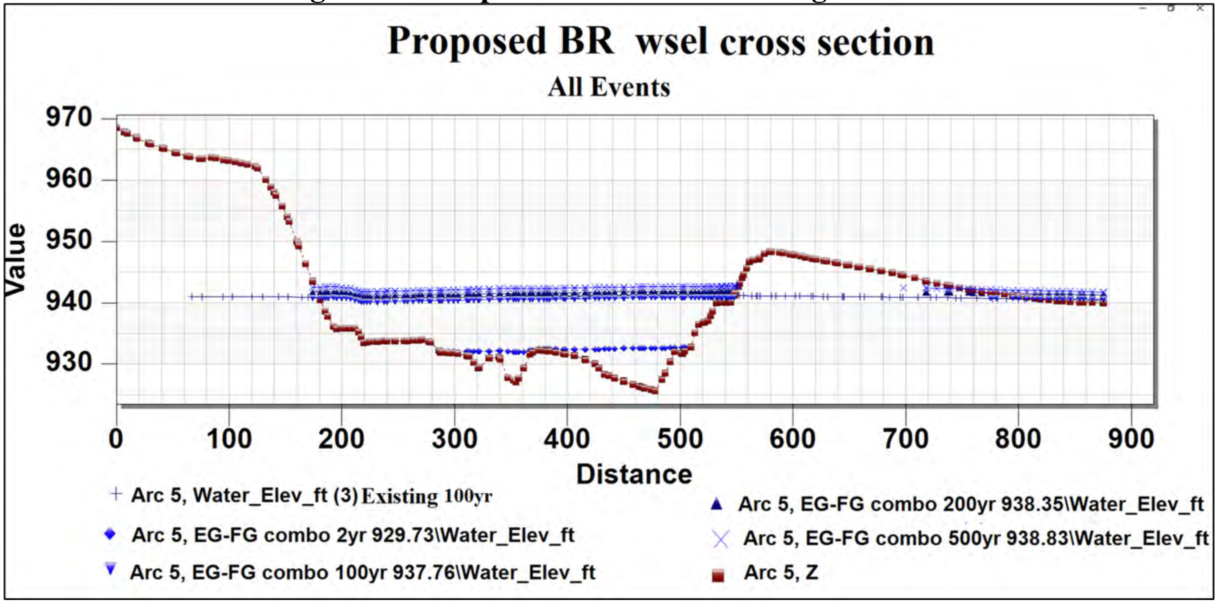
SRH-2D downstream boundary conditions were used to determine the 100yr, 200yr, 500yr and 2yr (NHW) normal high-water surface elevations for the proposed bridge. The water surface elevations (WSEL) are for the proposed condition based on the NAVD (1988) Datum at the upstream side of the proposed bridge. The design flow rates used are shown in Table 2. The WSEL, velocities and vertical clearance are listed below in Table 7 and Figure 15.

Table 7- Water Surface Elevation-Velocity-Vertical Clearance



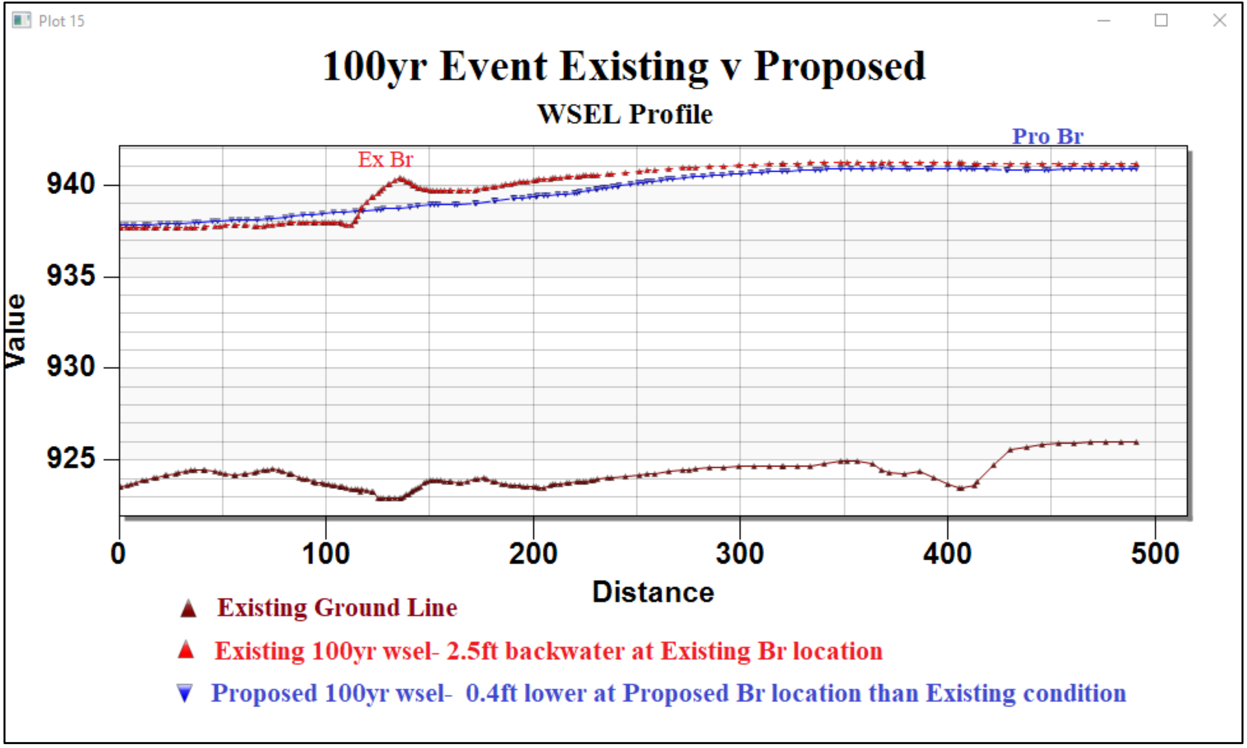
Design Storm Event	Design flows (cfs)	Proposed wsel (ft)	Proposed avg velocity (fps)	Proposed vertical clearance (ft)
2yr (NHW)	3,215	932.39	4.04	10.67
100yr	14,300	940.60	3.67	2.46
200yr	18,000	941.54	3.98	1.52
500yr	22,000	942.27	4.31	0.79

Figure 15- Proposed WSEL for all design events



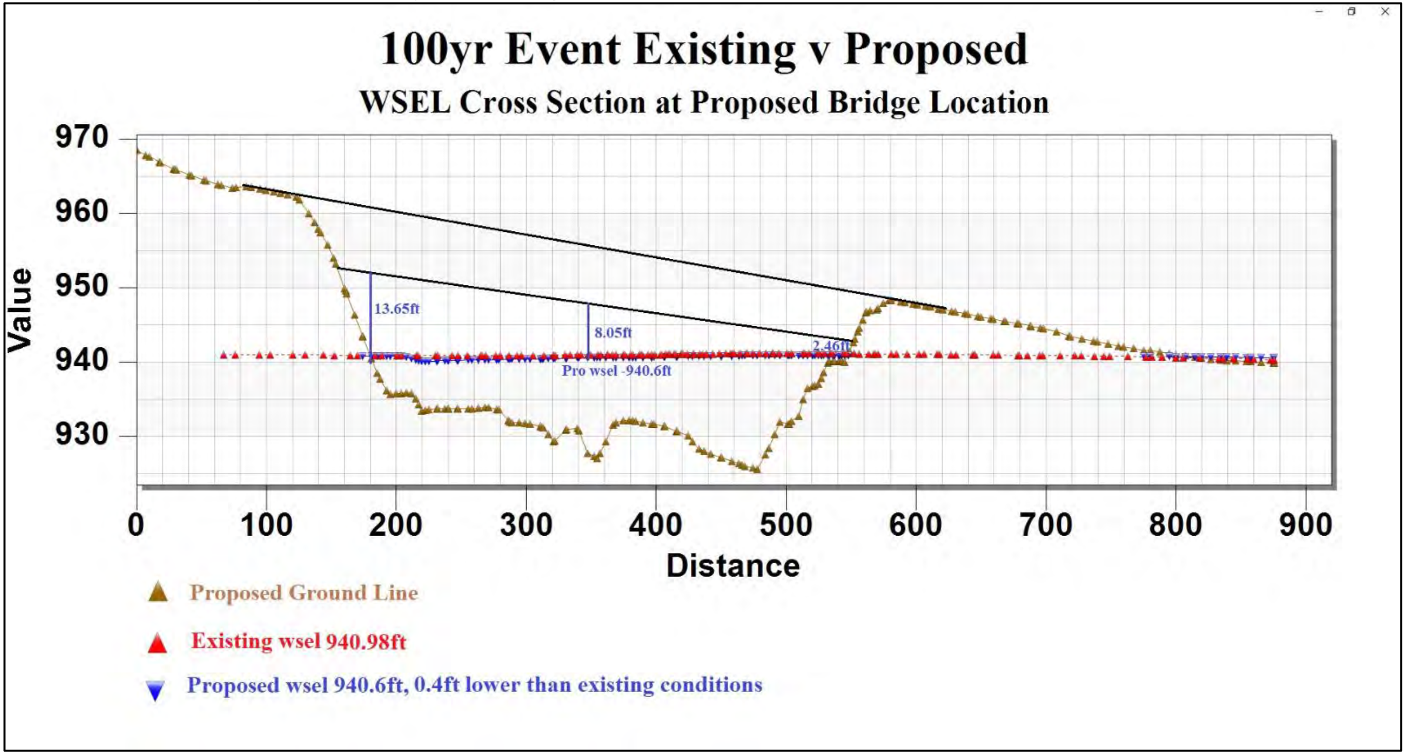
The new bridge opening, and removal of the existing bridge has increased the hydraulic opening through the channel thus removing the 2.5 ft of backwater. This improves the overall river hydraulic capacity as seen in Figure 16. The existing bridge length is approximately 150 ft and creates a constriction for the Touchet River. The backwater is approximately 2.5 ft which is greater than the allowed 0.2 ft and the velocity under the existing bridge is higher than the existing channel.

Figure 16- Existing and Proposed WSEL Profile Results



The hydraulic objective of the project is to provide a minimum bridge hydraulic opening which is approximately 290 ft from Figure 13. The proposed bridge hydraulic opening is 320 ft which is greater than the required minimum and takes into account the channel migration zone. This new bridge length decreases the velocity downstream and the backwater effect under existing conditions while minimizing overall environmental impacts. By keeping the new proposed bridge length of 320 ft, this decreased the backwater dropping the water surface profile 0.4ft from the existing WSEL at the proposed new bridge crossing seen in Figure 16 and Figure 17. More detailed results are shown in Appendix C modeling results.

Figure 17-100yr Existing v Proposed WSEL Cross Section



The new vertical clearance is 2.46 ft for the 100yr event on the north which less than the 3 ft recommendation but on the south the vertical clearance is 13.65 ft. The average vertical clearance for the proposed bridge is 8.05 ft more than enough clearance for debris as seen in Figure 17. See Appendix C for memo on Dell Sharpe Bridge Vertical Clearance Modeling Memo May 17, 2021, on vertical clearance recommendations

Figure 18- 100yr Velocity rates for Proposed Bridge Mesh Model

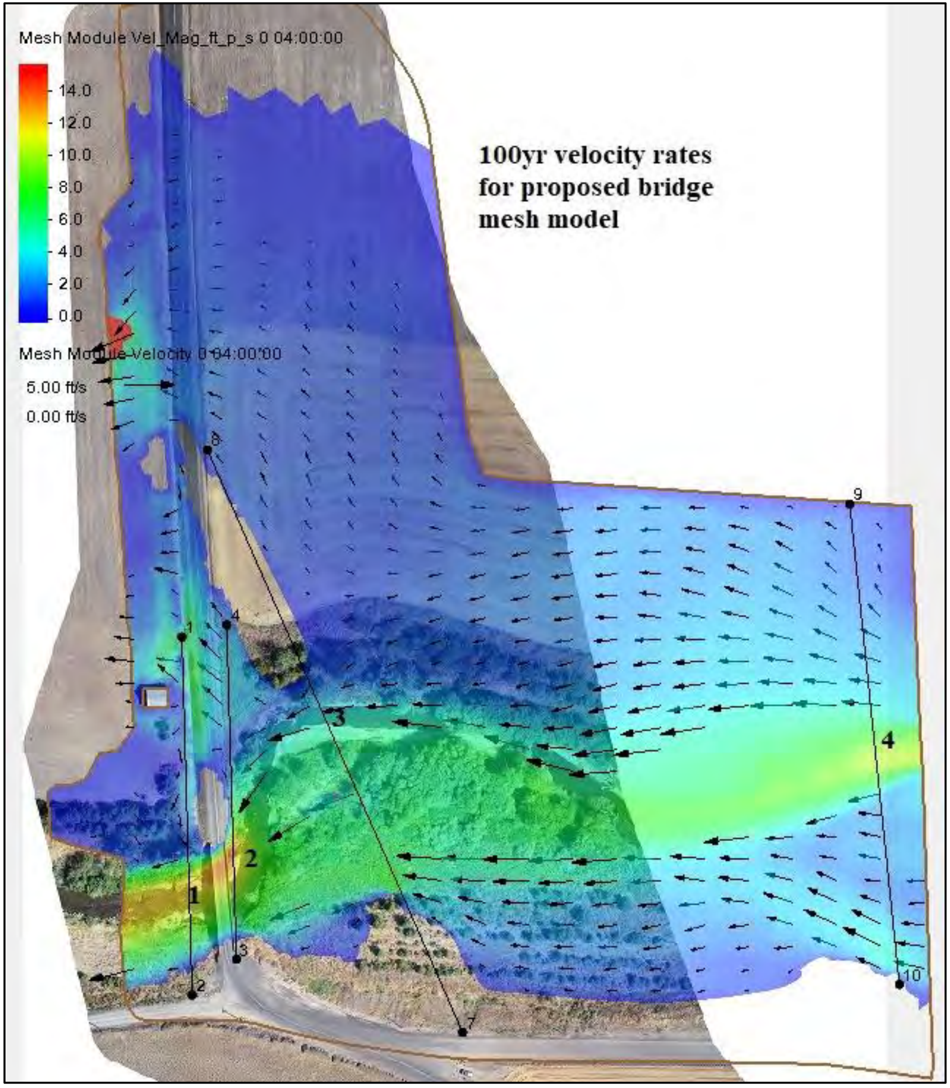


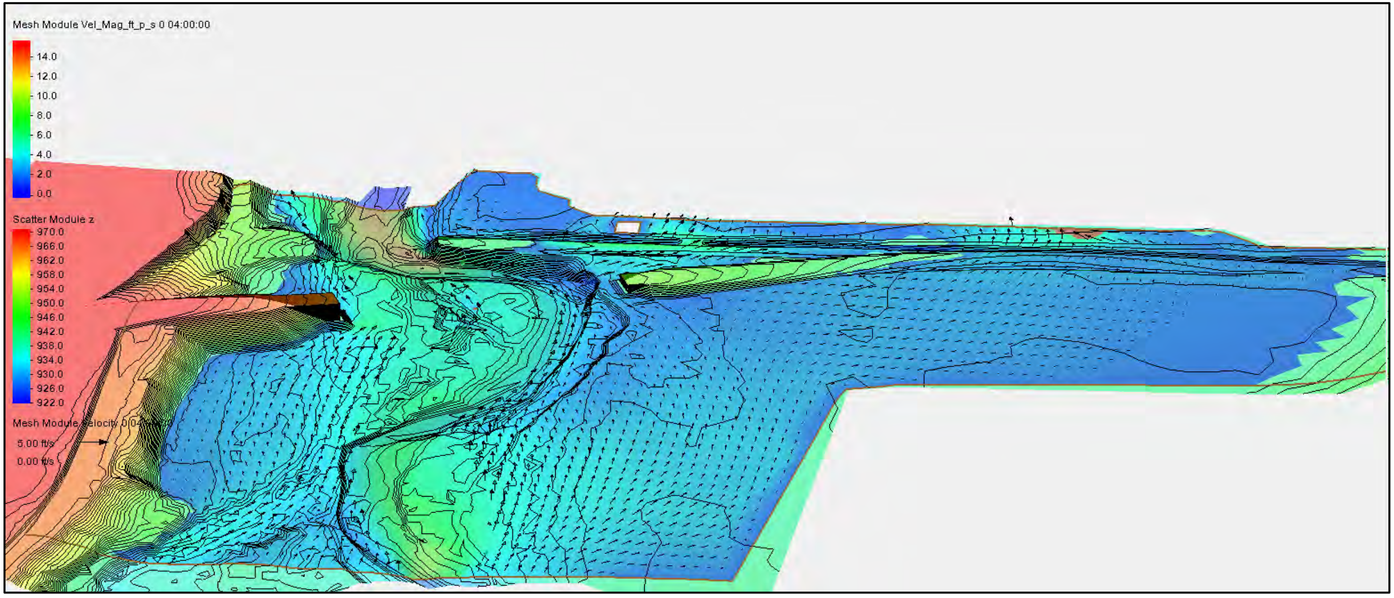
Figure 18 illustrates the difference of velocity between the channel and around the abutment fill slopes. The SRH-2D model also shows the direction of the flow path as it flows into the channel and around the embankments. This information is used to derive the local pier scour, abutment scour and general scour using the 200yr and 500yr Event. The velocity rates for each cross section in Figure 18 can be found in Table 8 for the 100yr event and in Appendix C for all other events.

Table 8- 100yr Velocities for proposed bridge mesh model

	Proposed 100yr	Proposed 100yr
	Vel_Mag_ft_p_s	Water_Elev_ft
Reach-Fig 17	Ave	Ave
1-Ex br ds	4.09	938.36
2-Ex br us	5.22	939.94
3-Pr br us	3.67	940.63
4-Us xs	3.27	941.77

Figure 19 shows the 100yr Event with the entire floodway inundated and flow paths. This information may be of value for any project flood permits, and results can be found in Appendix C. The model shows similar areas being inundated with slight differences around the new proposed alignment than the current January 18, 2002, Flood Insurance Map. The project currently meets all criteria by not raising the 100yr wsel and does not change the floodplain significantly. The SOW did not require floodway encroachment analysis comparison that is additional work if it is required.

Figure 19- 3D-Velocity Flow Path View– 100yr Event



Scour Analysis

Scour evaluation can now be looked at with all the information that has been developed. The survey information can be evaluated to assess the long-term aggradation or degradation of the channel. The geotechnical finding of the soil gradation can establish the sediment movement supplied by the headwaters or basin changes. Also, the evaluation of contraction scour if it's live or clear migration can limit the scour due to storms during flood events. All these things must be considered and evaluated with the result of each scour.

In long-term degradation the Laursen equation is used to determine whether to use the clear-water or live-bed contraction scour equation. Refer to Appendix D for the calculation of the Laursen equation results.

In this case live-bed is the result. Soil gradation, channel flow and crossing width must be known to solve the equations. The soil gradation was derived from a pebble count done during the site visit on December 7th 2020, and verified by photos. The pebble count derived the D50 to be a value of 0.078 ft and D84 value to be approximately 0.134 ft. Calculations using the D50 value of 0.078 ft and the D84 value of 0.134 ft derived a live-bed result. Refer to Appendix D for the report finding.

The scour depths were determined by using the FHWA Hydraulic Toolbox version 5.0. The types of scour derived are: General Scour, Contraction Scour, Local Pier Scour and Abutment Scour for the 200yr and 500yr Design. The existing channel bottom (thalweg) elevation is approximately at elevation 924.82 ft. at the proposed bridge crossing. The proposed bridge velocity through the channel has decreased and matches the channel thus the thalweg should fill in downstream and level out the stream profile.

It was also noted that bedrock is near the surface per the geotechnical drill bore logs. The north abutment bedrock is approximately at elevation 917 ft, at mid length around elevation 921 ft and at south abutment elevation 922 ft. These elevations will determine the final scour depth in those locations. If the calculated scour depth at each location falls below the bedrock, it will default to the bedrock elevation. See Appendix D for Geotech bore logs reference.

General Scour an assumed D50 of 0.078 ft and an assumed D84 of 0.134 ft were used to determine the natural degradation of the river. The average predicted degradation (general scour) is approximately ***0.13 ft*** for the 200yr and ***0.16 ft*** for 500yr Design for the proposed design since the velocity has decreased compared to the existing conditions as stated above.

This is assuming 100% of the material is coarser than the critical particle size and there is no degradation, but at the critical point of aggradation which is noted upstream with the gravel depositions. Calculations can be found in Appendix D and Table 9 below.

Contraction Scour. for this river falls under live-bed conditions which means, the material being transported in the upstream reach is transported through to the downstream reach mostly in suspension and at less than capacity of the flow. Live-bed scour is cyclic in nature. The scour hole that develops during the rising stage of the flood refills during the falling stage. The total contraction scour for the proposed crossing is ***0.0 ft*** for the 200year and 500yr Design. This confirms the new bridge length is removing the existing constriction. The existing contraction has been removed. Calculations can be found in Appendix D and Table 9 below.

Local Scour (Pier Scour) per HEC 18, the CSU equation is recommended for live-bed pier scour. The equation predicts maximum pier scour depths. The local 200yr approach velocity of 5.09 fps was used to derive a local pier scour depth of ***10.5 ft*** for the center pier and ***11 ft*** for the 500yr. However, there are two piers at the abutments that also need to be reviewed for pier scour. The northeast pier has a scour depth of ***4.6 ft*** and northwest pier ***5.3 ft.*** The southeast pier has a scour depth of ***7.4 ft*** and southwest pier ***6.6 ft*** for the 200yr event. See Table 9 for 500yr local pier scour depths. The local pier scour does not consider debris piled up against the pier, just the width of the design pier diameter. Calculation can be found in Appendix D and Table 9 below.

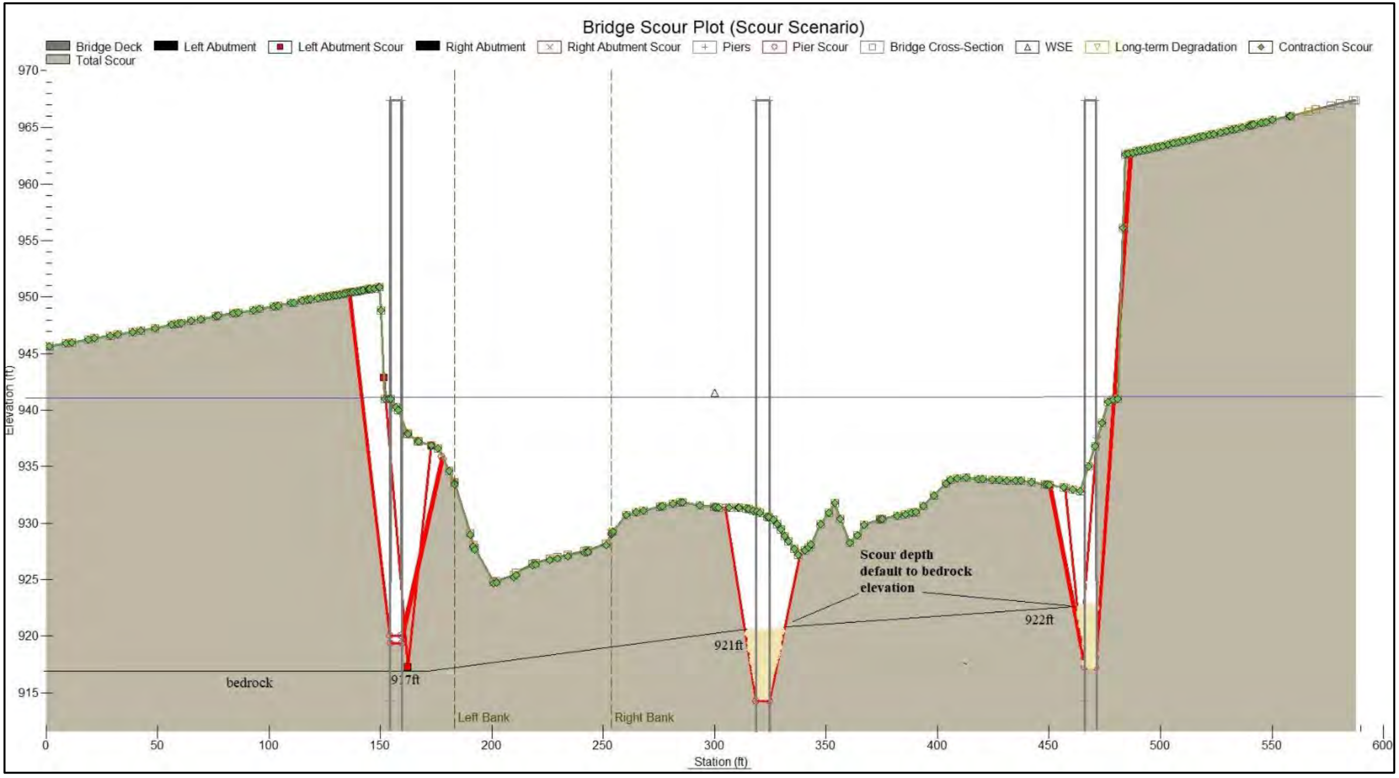
Abutment Scour was derived using the NCHRP Method in the FHWA Hydraulic Toolbox version 5.0. The 200yr scour depth is ***7.4 ft*** on the north and ***13.7 ft*** on the south and the 500yr scour depth is ***8.4 ft*** on the north and ***16.8 ft*** on the south. The south side abutment is slightly deeper than the north side; please refer to the results below for the difference. At this time, riprap bank protection is required to protect the retaining wall foundation, since the bridge pier and columns will be drilled shafts for deep foundation. Calculation can be found in Appendix D and Table 9 below.

Total Scour Depth is the combination of General Scour plus Contraction Scour and center Local Pier in the channel. Local Pier and Abutment Scour is along the abutment and the sides of the channel. Table 9 below shows the Scour Depths at the proposed bridge for the 200yr and 500yr Events and Figure 20 shows the schematic with the bedrock and scour depth reference Table 9 General Scour, Contraction Scour and Abutment Scour.

Table 9- Total Scour Depths and Elevations

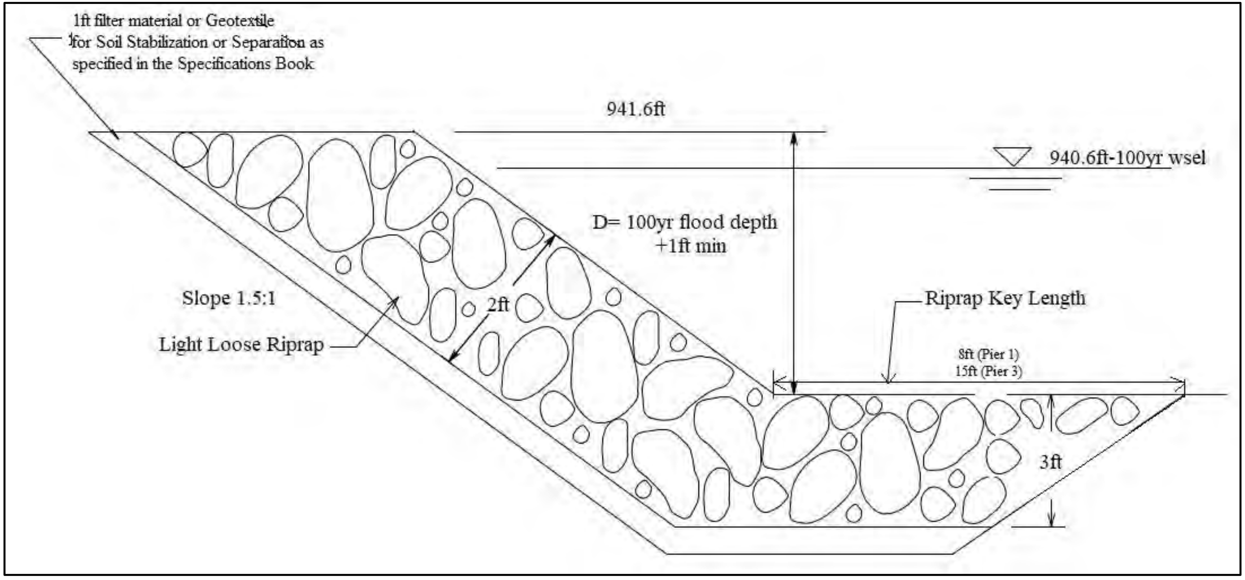
Design Events	**200yr**	**500yr**	**Scour elevation**	**Bedrock elevation**
General Scour	0.13ft	0.16ft	***924.68ft***	917ft
Contraction Scour	0.00ft	0.00ft	***924.68ft***	917ft
Local Pier Scour				
center pier	10.5ft	11.0ft	914.24ft	***921ft***
northeast pier	4.6ft	5.5ft	***920.05ft***	917ft
northwest pier	5.3ft	5.9ft	***919.38ft***	917ft
southeast pier	7.4ft	9.2ft	917.26ft	***922ft***
southwest pier	6.6ft	8.2ft	918.07ft	***922ft***
Abutment Scour				
north	7.4ft	8.4ft	***917.28ft***	917ft
south	13.7ft	16.8ft	919.6ft	***922ft***

Figure 20- Scour Depth Plot for 200yr Event



Riprap Recommendation is to place light loose riprap on a 1.5:1 around the abutment embankment slope, please refer to Figure 21. Riprap limit should extend to the end of the wall design to protect the fill toe from eroding, refer to Figure 24 below for placement.

Figure 21- Riprap Recommendation



The thickness along the slope is 2 ft but will increase along the toe to 3ft. The length of the key/toe at Pier 1 is approximately 8ft and at Pier 3 approximately 15ft per the HEC23 criteria for riprap at bridge abutments as seen in Figure 22. The criteria states the key length should be twice the depth of flow.

Figure 22- Bridge abutment riprap placement

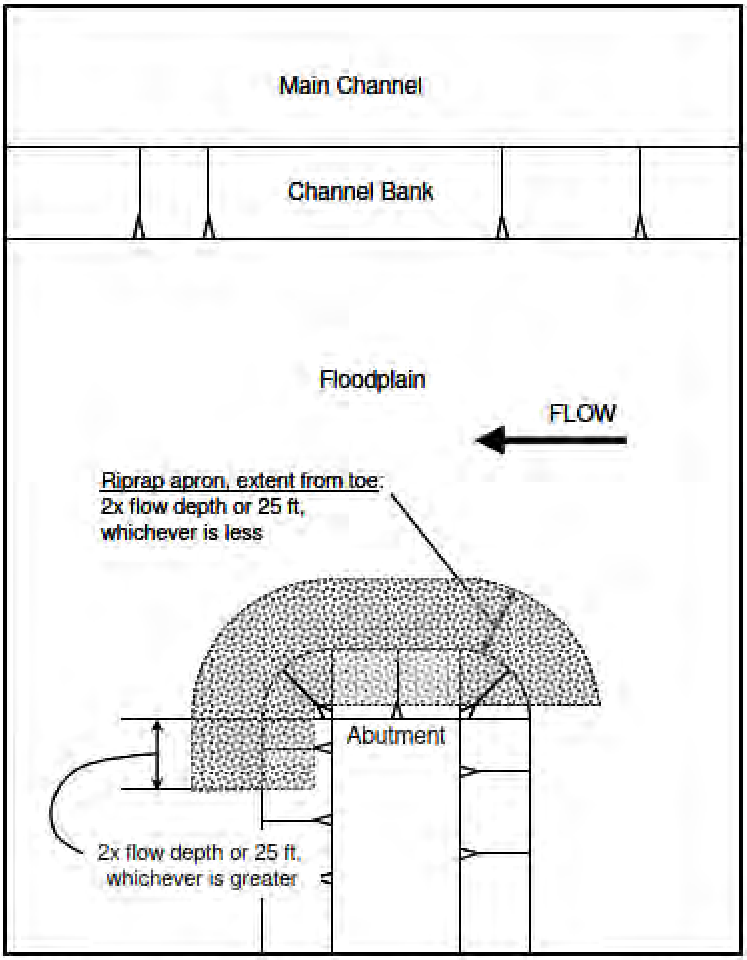


Figure 14.7. Plan view of the extent of rock riprap apron (Lagasse et al. 2006).

The flow depth around Pier 1 is approximately 4ft, and the flow depth around Pier 3 is approximately 7.5 ft, and both depths decreases as you move downstream. The limits of the riprap will extend to match the retaining wall length approximately 15 ft on the north and 24 ft on the south, see Figure 23. The retaining wall limits match the limits of the channel migration zone, see Appendix B for channel migration zone limits. This is to provide the scour protection required for lateral migration of the river and build a concrete pad to the limits of the scour depth or bedrock, default to the lower of the two elevations. Details can be seen in Figure 24 the Bridge Plan and Elevations for riprap placement and location.

Figure 23- Retaining wall limits Pier 1 and Pier 3

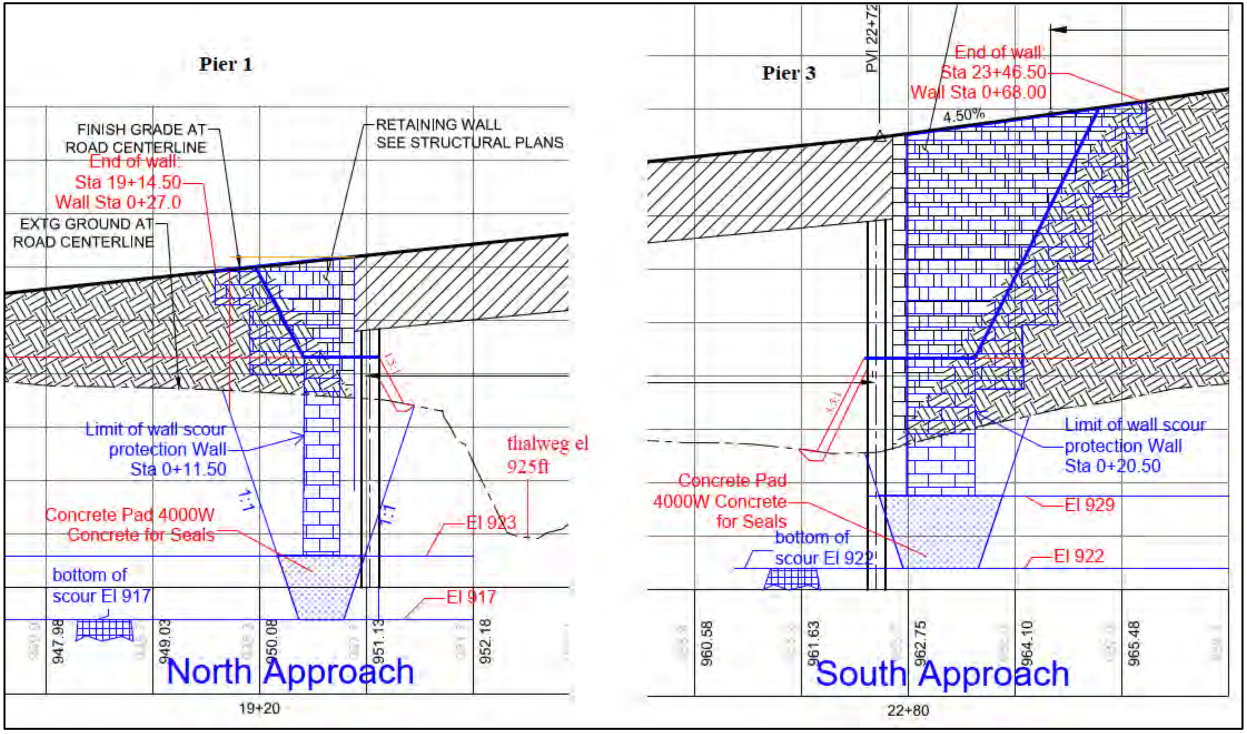
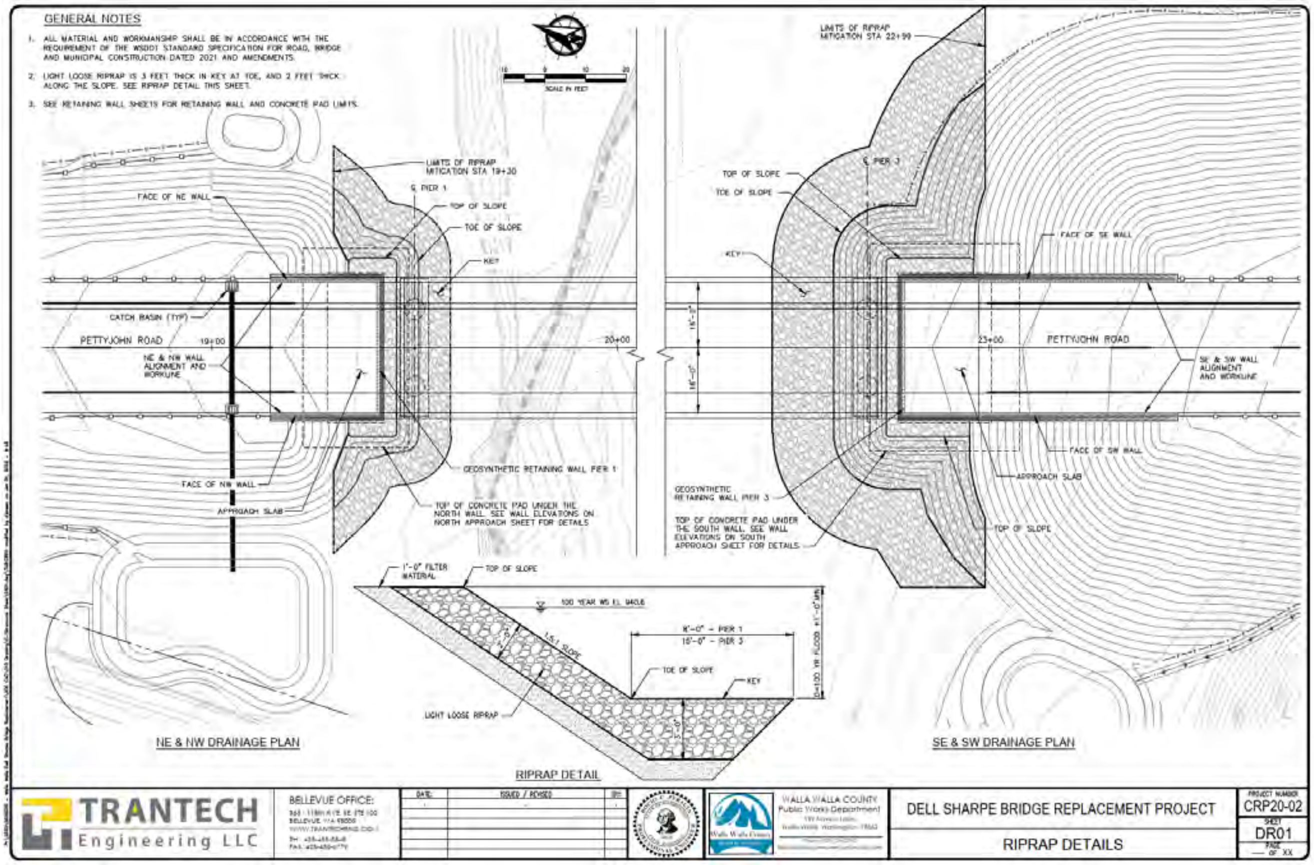


Figure 24 Riprap Details


GENERAL NOTES

1. ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE REQUIREMENT OF THE WSDOT STANDARD SPECIFICATION FOR ROAD, BRIDGE AND MUNICIPAL CONSTRUCTION DATED 2021 AND AMENDMENTS.
2. LIGHT LOOSE RIPRAP IS 3 FEET THICK IN KEY AT TOE, AND 2 FEET THICK ALONG THE SLOPE. SEE RIPRAP DETAIL THIS SHEET.
3. SEE RETAINING WALL SHEETS FOR RETAINING WALL AND CONCRETE PAD LIMITS.

Recommendations for bridge design, are to set the bottom of the walls within the riprap protection limits shown to scour depth or bedrock to protect the abutment approach fills from being undermined if the river meanders in the future (life of the bridge). Pier column shafts shall extend below the design scour depth, or the bedrock as recommended in the geotechnical report.

The depth of flow during the summer months is approximately 3ft, see Appendix A (A12) for river depths. Thus, the water surface elevation in the river would be approximately at elevation 928ft. Refer to Figure 23 for thalweg elevation of 925ft near Pier 1. This will be important for dewatering for the construction of the concrete pad that provides scour protection.

Bridge Deck Runoff

The existing bridge is an asphalt deck with 10 ft lanes and a concrete rail with no openings along the full length of the structure, seen in Figure 25. The profile of the bridge slopes to the north. This allows the water to collect along concrete rail and discharge to the east and west sides on the north side of the bridge discharging directly into the Touchet River.

Figure 25- Existing Bridge Deck Drainage

The existing roadway is crowned, and sheet flows off the roadway embankment into the floodplain. The floodplain inundates with the 100-year event at elevation 940.6ft.

The proposed bridge will have a new slightly raised profile along a new alignment upstream from the existing bridge crossing. It will have a normal 2% crown to the west and east and a continuous curb allowing the bridge deck to collect into catch basin on to the north end of the bridge into a water quality treatment facility swale for treatment.

Calculations for bridge deck drainage can be seen in Appendix E.

Bridge Deck Hydraulic Calculations

Hydrology and Hydraulic Design Standards

The design frequencies for hydraulic structure will follow the WSDOT 2019 Hydraulic Manual. Below is Table 10 that outlines the structure type and design mean recurrence interval (MRI) for this project.

Table 10- MRI for Structure design

Type of Structure	MRI (years)
Curb and Gutter	10
Storm Drain Inlets on Longitudinal slope	10

The hydrology method used on this project is the rational method. This method was to establish the curb and gutter design for the inlet analysis. The m & n values in the WSDOT Hydraulic manual were double checked for the project site. The nearest m & n values are the Walla Walla values which are 23 miles north of the bridge site. See Table 11 for values. Based on the 10yr 24hr Isopluvial Map at the project site and then comparing it to the Walla Walla values, both are in the same region of 1.8inches confirming the m & n values for Walla Walla apply at the bridge site, see Appendix E.

Table 11- 10yr rainfall coefficient m & n values

m value	n value
7.30	0.627

Curb and Gutter Design bypass analysis

One type of frame will be used on the project. A rectangular vane grate WSDOT standard plan B30.30-03 with a standard type 1 catch basin unit. The inlets should be placed approximately 10 ft before the bridge approach slab per WSDOT standard plan B95.40-01. The placement for this project would be approximately at station 19+05 on the west and east sides of the curb and gutter. Calculation sheets can be found in the Appendix E.

Concrete curb and gutter will be used on this project to capture the runoff from the bridge deck and bridge approach paved areas. This runoff will be treated by the required best management practices. These curbs must be maintained so they don’t short circuit the proposed stormwater treatment system.

This report includes the proper design analysis for the inlet spacing to satisfy capacity. Bypass at last inlet < 0.1 cfs has been achieved at all locations.

Stormwater Management Design

This project will construct a new bridge alignment, thus the area of impact for stormwater is the new impervious surface. This project proposes to remove the existing bridge and construct a new bridge alignment upstream from the existing river crossing. The original 20 ft roadway width will increase to 32 ft width for the proposed roadway. The new impervious surface on the bridge alone is 10,2440 sf. This triggers water quantity and water quality treatment requirements because the project exceeds the threshold criteria of 5,000 sf of new hard surfaces.

The proposed bridge design will convey the runoff off the bridge and be treated with infiltration swales before it reaches the river. This would preserve the natural hydrology by infiltrating the runoff instead of concentrating the flow and creating erosion along the embankment.

At this time, it has been determined that Core Elements 1-8 are required for stormwater compliance on this project based on the 2019 DOE Stormwater Management Manual for Eastern Washington. These minimum requirements consist of the following requirements to develop the project erosion control plan and documentation.

- Core Element 1: Preparation of a Stormwater Site Plan
- Core Element 2: Construction Stormwater Pollution Prevention (SWPP)
- Core Element 3: Source Control of Pollutants
- Core Element 4: Preservation of Natural Drainage Systems
- Core Element 5: Runoff Treatment
- Core Element 6: Flow Control
- Core Element 7: Operation and Maintenance
- Core Element 8: Local Requirements

These Core Elements will be further investigated and develop by PBS Engineering and Environmental Inc. They are responsible for the roadway stormwater design of the project.

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Appendix

Appendix A-Hydrology

Dell Sharpe Bridge Hydrology

Walla Walla Flood Insurance Study-2002

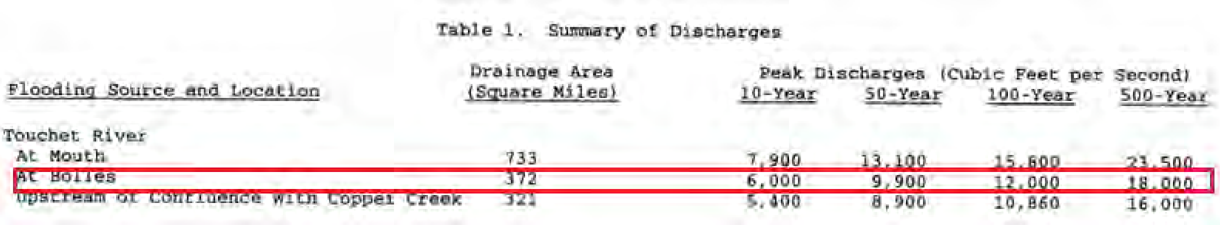
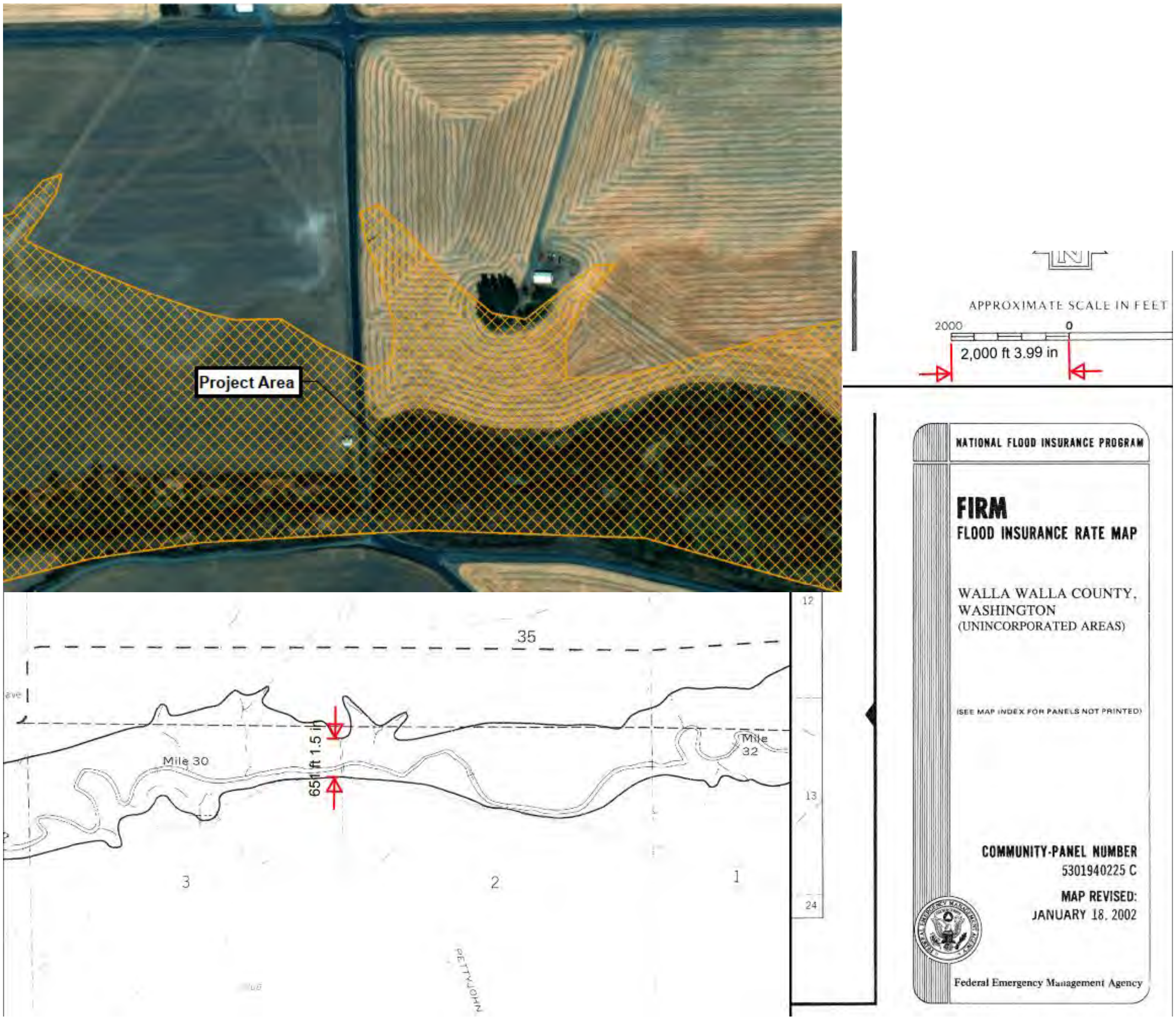


Table 1. Summary of Discharges

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharges (Cubic Feet per Second) 10-Year	50-Year	100-Year	500-Year
Touchet River					
At Mouth	733	7,900	13,100	15,600	21,500
At Bolles	372	6,000	9,900	12,000	18,000
Upstream of Confluence with Coppei Creek	321	5,400	8,900	10,860	16,000

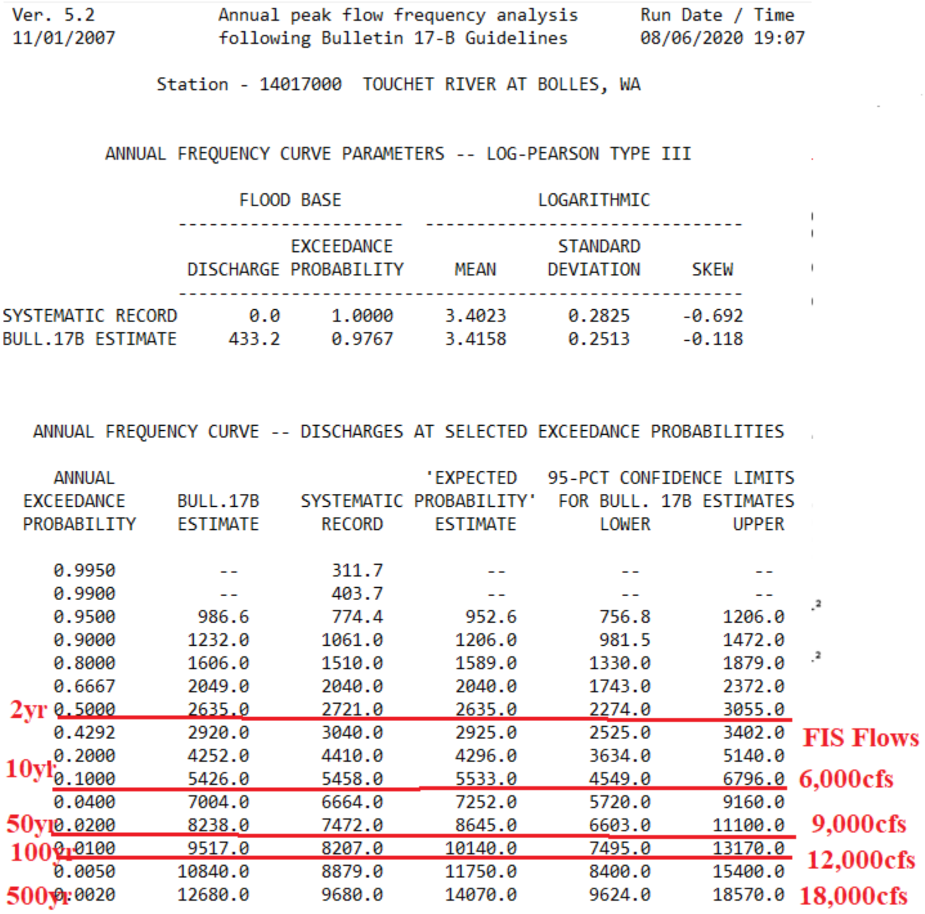
The FEMA FIRM Map for the project location



Flood Insurance Study does not have flows at the project site, but they do have flows just upstream near Bolles, Wa for a cross reference with the USGS gage 14017000 from 1925 to 1989 and Stream Stats.

USGS gage at Bolles 1925-1989 peak flows

USGS gage 14017000 from 1925 to 1989 peak flows, basin area 372 sq miles
flows are lower than FIS study, matches the upper limits of the Log Pearson Type III



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 Ver. 5.2          Annual peak flow frequency analysis      Run Date / Time
 11/01/2007        following Bulletin 17-B Guidelines       08/06/2020 19:07

              Station - 14017000  TOUCHET RIVER AT BOLLES, WA


         ANNUAL FREQUENCY CURVE PARAMETERS -- LOG-PEARSON TYPE III

                      FLOOD BASE                 LOGARITHMIC
                 ----------------------  ------------------------------
                            EXCEEDANCE            STANDARD
                  DISCHARGE PROBABILITY     MEAN    DEVIATION     SKEW
                 ------------------------------------------------------
SYSTEMATIC RECORD       0.0      1.0000     3.4023     0.2825     -0.692
BULL.17B ESTIMATE     433.2      0.9767     3.4158     0.2513     -0.118

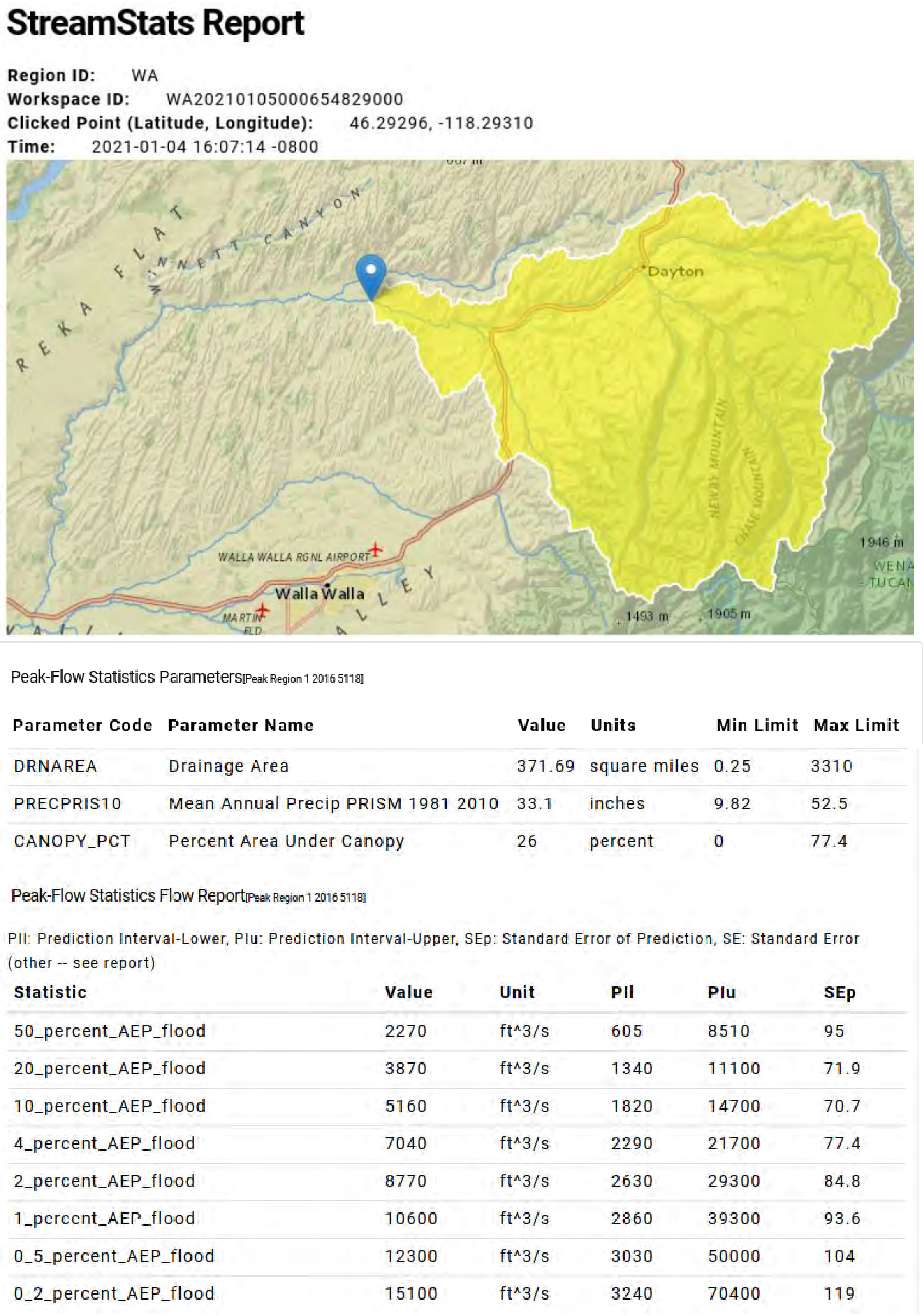


   ANNUAL FREQUENCY CURVE -- DISCHARGES AT SELECTED EXCEEDANCE PROBABILITIES

     ANNUAL                             'EXPECTED   95-PCT CONFIDENCE LIMITS
   EXCEEDANCE    BULL.17B   SYSTEMATIC PROBABILITY'  FOR BULL. 17B ESTIMATES
   PROBABILITY   ESTIMATE     RECORD     ESTIMATE        LOWER        UPPER

      0.9950         --        311.7         --           --           --
      0.9900         --        403.7         --           --           --
      0.9500       986.6       774.4       952.6        756.8       1206.0
      0.9000      1232.0      1061.0      1206.0        981.5       1472.0
      0.8000      1606.0      1510.0      1589.0       1330.0       1879.0
      0.6667      2049.0      2040.0      2040.0       1743.0       2372.0
      0.5000      2635.0      2721.0      2635.0       2274.0       3055.0
      0.4292      2920.0      3040.0      2925.0       2525.0       3402.0
      0.2000      4252.0      4410.0      4296.0       3634.0       5140.0
      0.1000      5426.0      5458.0      5533.0       4549.0       6796.0
      0.0400      7004.0      6664.0      7252.0       5720.0       9160.0
      0.0200      8238.0      7472.0      8645.0       6603.0      11100.0
      0.0100      9517.0      8207.0     10140.0       7495.0      13170.0
      0.0050     10840.0      8879.0     11750.0       8400.0      15400.0
      0.0020     12680.0      9680.0     14070.0       9624.0      18570.0
```

Stream Stats flows at Bolles



StreamStats Report

Region ID: WA
Workspace ID: WA20210105000654829000
Clicked Point (Latitude, Longitude): 46.29296, -118.29310
Time: 2021-01-04 16:07:14 -0800

Peak-Flow Statistics Parameters[Peak Region 1 2016 5118]

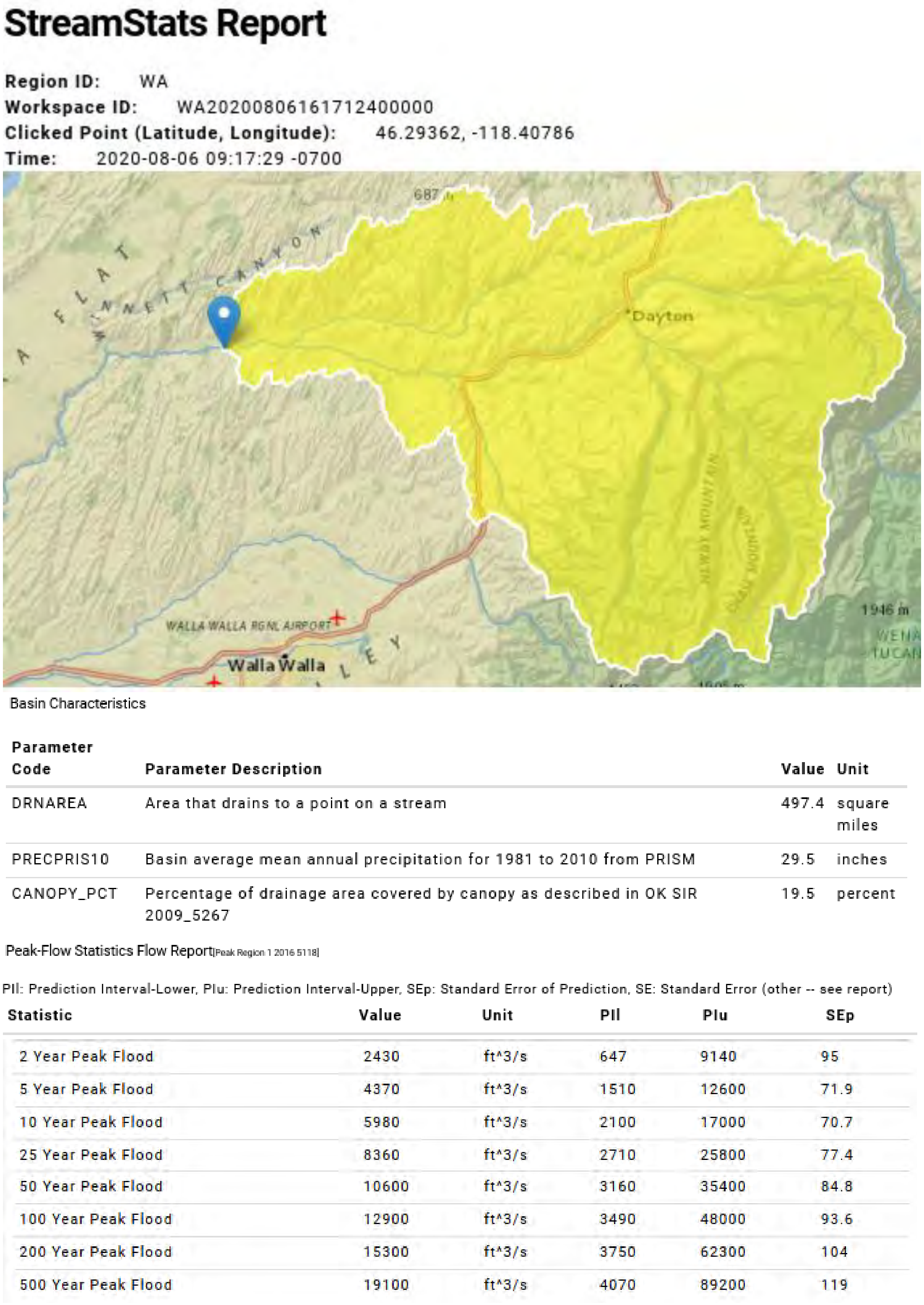
Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	371.69	square miles	0.25	3310
PRECPRIS10	Mean Annual Precip PRISM 1981 2010	33.1	inches	9.82	52.5
CANOPY_PCT	Percent Area Under Canopy	26	percent	0	77.4

Peak-Flow Statistics Flow Report[Peak Region 1 2016 5118]

PII: Prediction Interval-Lower, Plu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	PII	Plu	SEp
50_percent_AEP_flood	2270	ft^3/s	605	8510	95
20_percent_AEP_flood	3870	ft^3/s	1340	11100	71.9
10_percent_AEP_flood	5160	ft^3/s	1820	14700	70.7
4_percent_AEP_flood	7040	ft^3/s	2290	21700	77.4
2_percent_AEP_flood	8770	ft^3/s	2630	29300	84.8
1_percent_AEP_flood	10600	ft^3/s	2860	39300	93.6
0_5_percent_AEP_flood	12300	ft^3/s	3030	50000	104
0_2_percent_AEP_flood	15100	ft^3/s	3240	70400	119

Stream Stats flows at Dell Sharpe Bridge



StreamStats Report

Region ID: WA
Workspace ID: WA20200806161712400000
Clicked Point (Latitude, Longitude): 46.29362, -118.40786
Time: 2020-08-06 09:17:29 -0700

Basin Characteristics

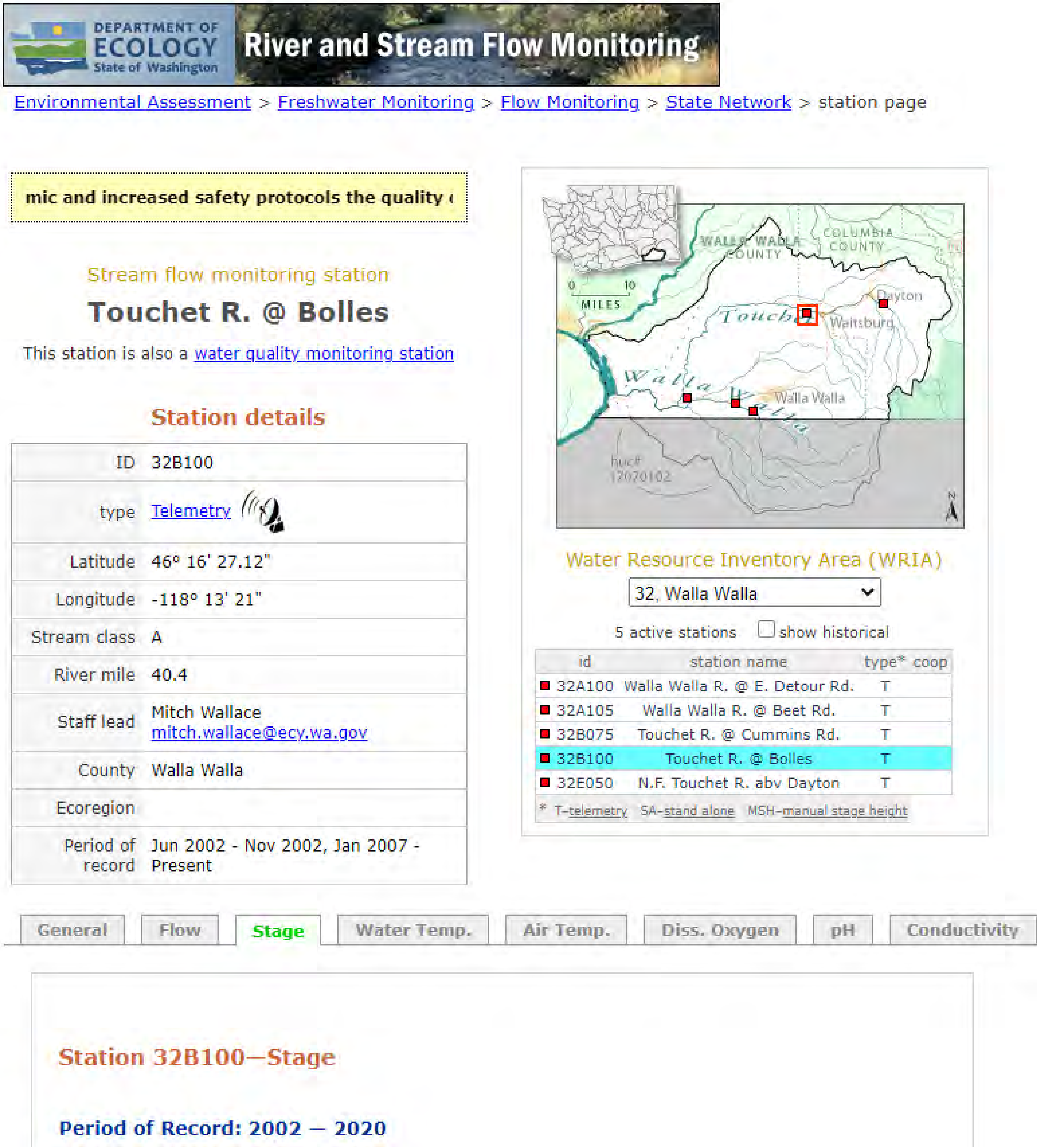
Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	497.4	square miles
PRECPRIS10	Basin average mean annual precipitation for 1981 to 2010 from PRISM	29.5	inches
CANOPY_PCT	Percentage of drainage area covered by canopy as described in OK SIR 2009_5267	19.5	percent

Peak-Flow Statistics Flow Report[Peak Region 1 2016 5118]

PII: Prediction Interval-Lower, PIu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	PII	PIu	SEp
2 Year Peak Flood	2430	ft^3/s	647	9140	95
5 Year Peak Flood	4370	ft^3/s	1510	12600	71.9
10 Year Peak Flood	5980	ft^3/s	2100	17000	70.7
25 Year Peak Flood	8360	ft^3/s	2710	25800	77.4
50 Year Peak Flood	10600	ft^3/s	3160	35400	84.8
100 Year Peak Flood	12900	ft^3/s	3490	48000	93.6
200 Year Peak Flood	15300	ft^3/s	3750	62300	104
500 Year Peak Flood	19100	ft^3/s	4070	89200	119

DOE Monitoring Station at Bolles 2012-2020 captured February 7th, 2020 Event



Environmental Assessment > Freshwater Monitoring > Flow Monitoring > State Network > station page

mic and increased safety protocols the quality

Stream flow monitoring station

Touchet R. @ Bolles

This station is also a water quality monitoring station

Station details

ID	32B100
type	Telemetry
Latitude	46° 16' 27.12"
Longitude	-118° 13' 21"
Stream class	A
River mile	40.4
Staff lead	Mitch Wallace mitch.wallace@ecy.wa.gov
County	Walla Walla
Ecoregion	
Period of record	Jun 2002 - Nov 2002, Jan 2007 - Present

Water Resource Inventory Area (WRIA)

32, Walla Walla

5 active stations ☐ show historical

id	station name	type*	coop
🟥 32A100	Walla Walla R. @ E. Detour Rd.	T	
🟥 32A105	Walla Walla R. @ Beet Rd.	T	
🟥 32B075	Touchet R. @ Cummins Rd.	T	
🟥 32B100	Touchet R. @ Bolles	T	
🟥 32E050	N.F. Touchet R. abv Dayton	T	

* T–telemetry SA–stand alone MSH–manual stage height

General | Flow | **Stage** | Water Temp. | Air Temp. | Diss. Oxygen | pH | Conductivity

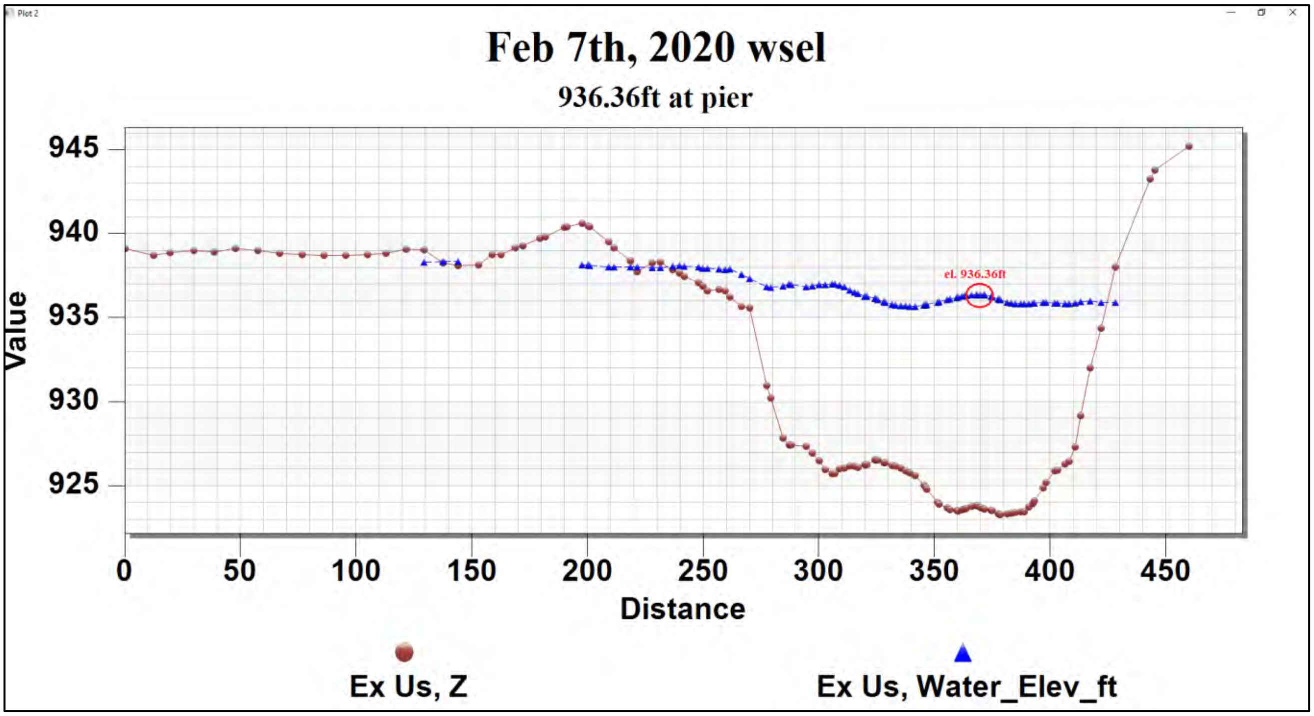
Station 32B100—Stage

Period of Record: 2002 — 2020

Was able to capture an Inst Max flow of 7650cfs and a max gage height of 11.71ft as seen below

Photos taken by Walla Walla County on Feb 7th, 2020, during the event. Can see the high-water line at 936.1ft and where it's flowing at 934.6ft at the time of the photo upstream looking north.

SRH-2D model result 936.36ft compared to approximately 936.1ft model estimates 0.26ft higher which is within the 0.30ft tolerance.



Downstream looking north

Downstream looking south

Upstream looking south

```
         Washington State Dept. of Ecology                                                           HYDAY V139  Output 02/24/2021

         Site     32B100          Touchet River at Bolles                                                       Year       2019/20
         VarFrom  232.00          Raw Stage in Feet                                                             Table Type    Rate
         VarTo    262.00          Discharge in Cubic feet/second, Measured flow
                                  Figures are for period starting 00:00

         Day       Oct      Nov      Dec      Jan      Feb      Mar      Apr      May      Jun      Jul      Aug      Sep     Day

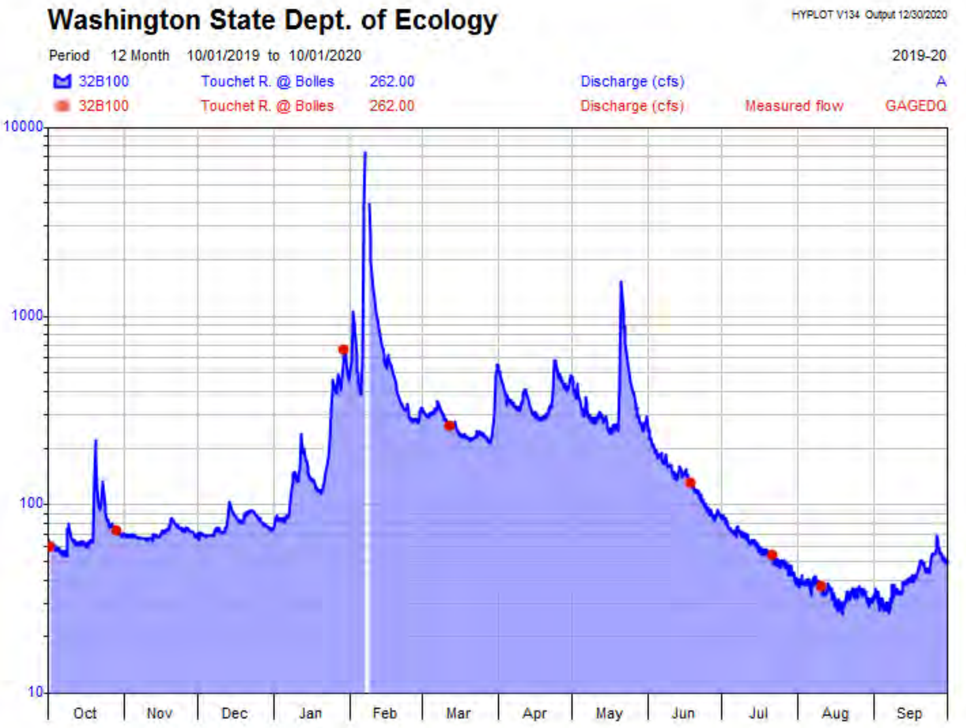
           1       62.8~    78.6~    78.9~    99.6~     628~     366~     577~     501~     268~    86.6~    35.7~    30.7B     1
           2       61.4~    76.8~    82.3~     101~     947~     348~     522~     437~     237~    84.7~    36.9~    28.9B     2
           3       60.2~    76.8~    80.7~    99.9~     639~     335~     471~     459~     216~    79.6~    35.7~    27.5B     3
           4       59.5~    76.8~    80.7~    99.4~     461~     344~     422~     395~     202~    75.4~    36.7~    26.5B     4
           5       58.4~    76.8~    80.8~     101~     455~     350~     405~     353~     193~    74.0~    36.2~    25.5B     5
           6       57.3~    75.8~    80.9~     104~    3990M     361~     397~     380~     195~    72.1~    33.5B    25.1B     6
           7       56.3~    74.9~    82.5~     124~  [    ]^     388~     381~     354~     181~    74.7~    37.4~    25.5B     7
           8       59.2~    75.0~    86.5~     151~  [    ]^     370~     369~     324~     186~    73.6~    37.6~    31.5B     8
           9       78.9~    75.0~    87.6~     162~    2070M     344~     366~     310~     173~    70.9~    35.1~    32.3B     9
          10       69.6~    75.1~    84.4~     154~    1430M     319~     387~     310~     168~    70.6~    35.0B    32.3B    10
          11       66.0~    75.1~    85.5~     193~    1140~     302~     436~     328~     155~    68.0~    33.0B    31.3B    11
          12       65.5~    76.5~    92.6~     221~     963~     291~     448~     336~     150~    63.8~    31.4B    33.0B    12
          13       65.4~    78.9~     113~     199~     816~     286~     403~     324~     156~    65.2~    34.3~    36.3~    13
          14       66.1~    77.5~     111~     177~     721~     294~     359~     317~     162~    63.7~    32.4B    37.0~    14
          15       65.7~    78.4~     106~     158~     647~     272~     342~     296~     154~    61.2~    29.9B    37.5~    15
          16       64.5~    82.4~     102~     153~     688~     258~     336~     272~     161~    58.5~    25.8B    37.8~    16
          17       65.9~    82.2~    97.5~     147~     632~     252~     323~     272~     149~    56.6~    25.5B    38.2~    17
          18       68.0~    84.8~    95.8~     137~     572~     252~     320~     288~     138~    56.0~    25.4B    39.8~    18
          19       81.9~    90.8~    99.0~     135~     512~     245~     323~     282~     130~    55.3~    24.9B    45.3~    19
          20        176~    96.3~     106~     139~     458~     240~     330~     600M     125~    53.1~    27.8B    47.7~    20
          21        111~    92.7~     107~     153~     415~     240~     350~    1280M     122~    51.0~    29.7B    45.2~    21
          22        117~    89.5~     109~     182~     386~     244~     369~     931~     113~    48.6~    30.4B    42.4~    22
          23        122~    87.0~     109~     251~     376~     255~     503~     702~     108~    46.9~    32.1B    42.6~    23
          24        100~    86.3~     105~     416~     365~     261~     621~     566~     101~    47.1~    30.9B    51.1~    24
          25       90.2~    85.3~     102~     449~     333~     258~     555~     475~    95.7~    47.7~    31.4B    54.1~    25
          26       86.3~    87.6~    98.4~     439~     324~     253~     535~     415~    92.6~    48.1~    32.8B    60.9~    26
          27       85.1~    84.6~    95.1~     476~     324~     241~     499~     361~    88.5~    44.8~    30.8B    58.7~    27
          28       82.6~    84.2~    93.9~     499~     327~     233~     480~     318~    87.5~    43.2~    30.7B    53.1~    28
          29       81.0~    81.4~    91.8~     624~     360~     253~     474~     292~    93.6~    42.7~    27.9B    49.8~    29
          30       78.0~    79.7~    89.9~     598~              376~     535~     285~    90.2~    40.3~    27.4B    48.6~    30
          31       78.6~             89.9~     505~              587~              310~             36.4~    27.8B             31

          Mean     78.8~    81.4~    94.3~     240~     777M     304~     428~     422M     150~    60.0~    31.7B    39.2B
        Median     68.0~    79.3~    93.9~     158~     572M     286~     404~     336M     152~    58.5~    31.4B    37.7B
Max.Daily Mean      176~    96.3~     113~     624~    3990M     587~     621~    1280M     268~    86.6~    37.6B    60.9B
Min.Daily Mean     56.3~    74.9~    78.9~    99.4~     324M     233~     320~     272M    87.5~    36.4~    24.9B    25.1B
      Inst.Max      224~    98.4~     120~     656~    7650M     620~     645~    1540M     280~    89.8~    39.8B    69.3B
      Inst.Min     54.2~    73.1~    76.4~    91.0~     312M     228~     311~     258M    83.5~    35.3~    21.7B    22.1B
  Missing Days         0        0        0        0        2        0        0        0        0        0        0        0

                Summaries
                ---------

 Annual Mean        220M
 Ann. Median        102M
 Missing Days          2

                Maximum     Minimum
 Daily Mean       3990M       24.9M
    Instant       7650M       21.7M
```



```
         Washington State Dept. of Ecology                                                    HYDAY V139  Output 02/24/2021

         Site     32B100          Touchet River at Bolles                                                Year       2019/20
         VarFrom  232.00          Raw Stage in Feet                                                      Table Type   Level
         VarTo    233.00          Corrected Stage in Feet, Measured
                                  Figures are for period starting 00:00

         Day       Oct      Nov      Dec      Jan      Feb      Mar      Apr      May      Jun      Jul      Aug      Sep      Day

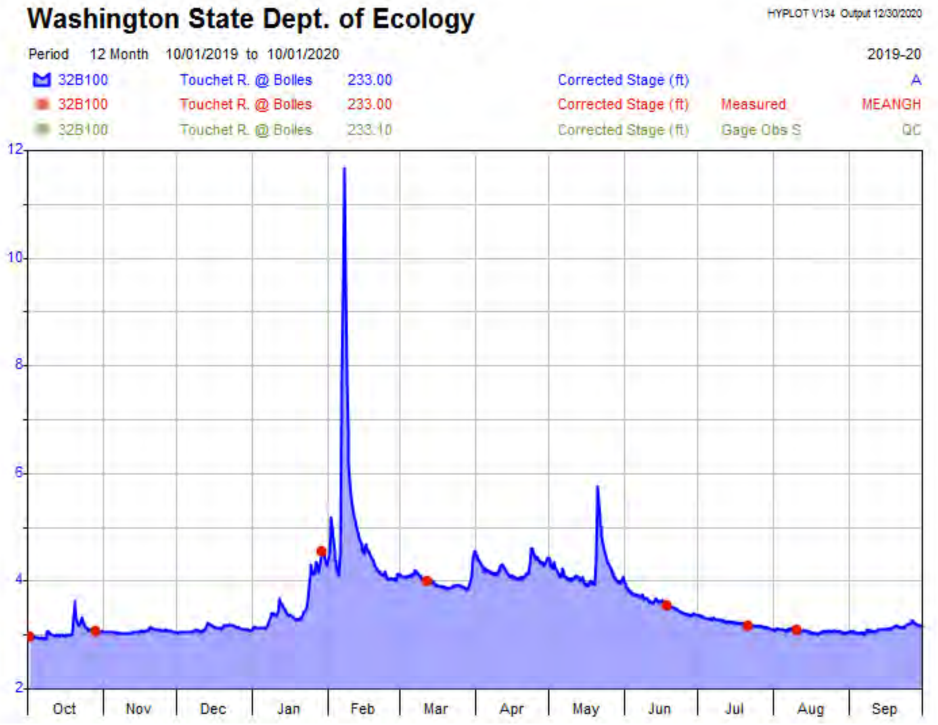
           1       2.98~    3.06~    3.06~    3.16~    4.57~    4.14~    4.49~    4.37~    3.94~    3.36~    3.10~    3.07~    1
           2       2.97~    3.05~    3.08~    3.17~    5.03~    4.11~    4.40~    4.27~    3.87~    3.35~    3.11~    3.06~    2
           3       2.96~    3.05~    3.07~    3.16~    4.59~    4.08~    4.32~    4.30~    3.81~    3.33~    3.10~    3.05~    3
           4       2.96~    3.05~    3.07~    3.16~    4.28~    4.10~    4.24~    4.20~    3.77~    3.31~    3.10~    3.04~    4
           5       2.95~    3.05~    3.07~    3.17~    4.26~    4.11~    4.21~    4.12~    3.74~    3.30~    3.10~    3.03~    5
           6       2.95~    3.05~    3.07~    3.19~    7.31~    4.13~    4.20~    4.17~    3.75~    3.29~    3.08~    3.03~    6
           7       2.94~    3.04~    3.08~    3.27~   10.60~    4.18~    4.17~    4.12~    3.71~    3.30~    3.11~    3.03~    7
           8       2.96~    3.04~    3.10~    3.38~    7.92~    4.15~    4.15~    4.06~    3.72~    3.30~    3.11~    3.07~    8
           9       3.06~    3.04~    3.11~    3.43~    6.27~    4.10~    4.14~    4.03~    3.68~    3.28~    3.09~    3.08~    9
          10       3.02~    3.04~    3.09~    3.40~    5.63~    4.05~    4.18~    4.03~    3.67~    3.28~    3.09~    3.08~   10
          11       3.00~    3.04~    3.10~    3.53~    5.27~    4.02~    4.27~    4.07~    3.63~    3.27~    3.08~    3.07~   11
          12       2.99~    3.05~    3.13~    3.62~    5.05~    3.99~    4.29~    4.09~    3.61~    3.25~    3.07~    3.08~   12
          13       2.99~    3.06~    3.22~    3.55~    4.86~    3.98~    4.21~    4.06~    3.63~    3.26~    3.09~    3.10~   13
          14       3.00~    3.06~    3.22~    3.48~    4.72~    4.00~    4.13~    4.05~    3.65~    3.25~    3.08~    3.11~   14
          15       3.00~    3.06~    3.19~    3.41~    4.61~    3.95~    4.10~    4.00~    3.62~    3.23~    3.06~    3.11~   15
          16       2.99~    3.08~    3.17~    3.39~    4.67~    3.92~    4.09~    3.95~    3.65~    3.22~    3.04~    3.11~   16
          17       3.00~    3.08~    3.15~    3.37~    4.58~    3.90~    4.06~    3.95~    3.61~    3.21~    3.03~    3.11~   17
          18       3.01~    3.09~    3.14~    3.33~    4.48~    3.90~    4.05~    3.99~    3.57~    3.21~    3.03~    3.12~   18
          19       3.08~    3.12~    3.16~    3.32~    4.39~    3.89~    4.06~    3.97~    3.54~    3.21~    3.03~    3.15~   19
          20       3.47~    3.15~    3.19~    3.34~    4.30~    3.87~    4.07~    4.49~    3.52~    3.20~    3.05~    3.17~   20
          21       3.22~    3.13~    3.20~    3.39~    4.23~    3.87~    4.11~    5.45~    3.50~    3.18~    3.06~    3.15~   21
          22       3.24~    3.11~    3.21~    3.50~    4.18~    3.88~    4.15~    5.01~    3.47~    3.17~    3.06~    3.14~   22
          23       3.26~    3.10~    3.21~    3.71~    4.16~    3.91~    4.37~    4.69~    3.45~    3.16~    3.07~    3.14~   23
          24       3.17~    3.10~    3.19~    4.18~    4.14~    3.92~    4.56~    4.47~    3.43~    3.16~    3.07~    3.18~   24
          25       3.12~    3.09~    3.17~    4.26~    4.08~    3.92~    4.45~    4.33~    3.40~    3.17~    3.07~    3.20~   25
          26       3.10~    3.10~    3.16~    4.23~    4.06~    3.91~    4.42~    4.23~    3.39~    3.17~    3.08~    3.23~   26
          27       3.09~    3.09~    3.14~    4.32~    4.06~    3.88~    4.37~    4.13~    3.37~    3.15~    3.07~    3.22~   27
          28       3.08~    3.09~    3.13~    4.35~    4.07~    3.86~    4.34~    4.05~    3.37~    3.14~    3.07~    3.20~   28
          29       3.07~    3.08~    3.12~    4.57~    4.13~    3.91~    4.33~    4.00~    3.39~    3.14~    3.05~    3.18~   29
          30       3.06~    3.07~    3.12~    4.53~             4.15~    4.42~    3.98~    3.38~    3.13~    3.05~    3.17~   30
          31       3.06~             3.12~    4.37~             4.51~             4.03~             3.10~    3.05~            31

          Mean     3.06~    3.07~    3.14~    3.62~    4.98~    4.01~    4.25~    4.21~    3.59~    3.23~    3.07~    3.12~
        Median     3.01~    3.06~    3.13~    3.41~    4.57~    3.98~    4.21~    4.09~    3.62~    3.22~    3.07~    3.11~
Max.Daily Mean     3.47~    3.15~    3.22~    4.57~   10.60~    4.51~    4.56~    5.45~    3.94~    3.36~    3.11~    3.23~
Min.Daily Mean     2.94~    3.04~    3.06~    3.16~    4.06~    3.86~    4.05~    3.95~    3.37~    3.10~    3.03~    3.03~
      Inst.Max     3.63~    3.16~    3.25~    4.62~   11.71~    4.56~    4.60~    5.76~    3.97~    3.38~    3.12~    3.28~
      Inst.Min     2.93~    3.03~    3.05~    3.12~    4.04~    3.84~    4.03~    3.92~    3.35~    3.09~    3.01~    3.01~

                Summaries
                ---------

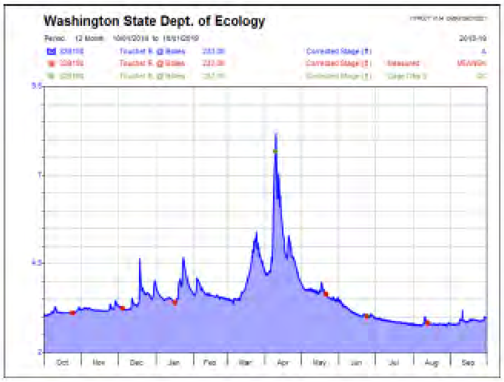
 Annual Mean      3.61~
 Ann. Median      3.29~

                Maximum     Minimum
 Daily Mean       10.60~       2.94~
    Instant       11.71~       2.93~
```



Average yearly depths for the years captured is approximately 3ft in the summer months from June-Aug.

DOE Bolles Summer flow depths July-Sept	
Year	Ave Depth
2020	3.1
2019	2.9
2018	3
2017	2.8
2016	2.2
2014	2.3
2013	2.5
2012	2.5
	21.3
	2.6625



Deriving the Delta values for StreamStat Flows at Bolles location using FEMA and the Gaging Stations flows. The February 7, 2020, event was captured with the DOE monitoring station. It was close to the 25yr event, thus that is the event flow used for the Bolles StreamStats column flow in the table below.

Flow Adjustments to StreamStat Flows at Bolles

Storm Event	Streamstats Flows (cfs)	USGS Gage Data (cfs)	DOE Flow Monitoring Station (cfs)	FEMA Flows (cfs)	Delta (cfs)
2yr (NHW)	2,270	3,055			785
2/7/2020	7,040		7,650		610
100yr	10,600			12,000	1,400
200yr	12,300			15,000	2,700
500yr	15,100			18,000	2,900

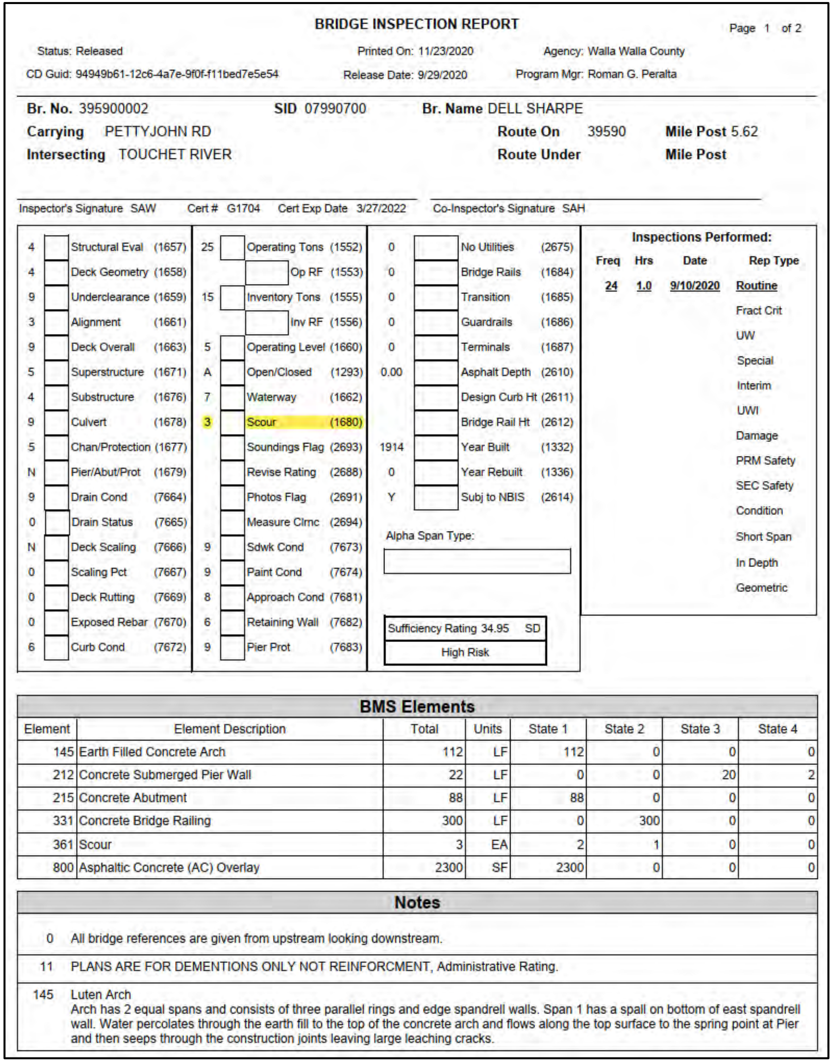
Taking the Delta values for each event and adding it to the StreamStats flow at the Dell Sharpe to determine the design flows. These will be the flows that will be used in the hydraulic modeling and scour analysis.

Flow Adjustments to Streamstats at Dell Sharpe Road

Storm Event	Streamstats Flows (cfs)	Delta (cfs)	Design Flows (cfs)
2yr (NHW)	2,430	785	3,215
2/7/2020	8,360	610	8,970
100yr	12,900	1,400	14,300
200yr	15,300	2,700	18,000
500yr	19,100	2,900	22,000

Appendix B-Hydraulics

Bridge Inspection Report



BRIDGE INSPECTION REPORT

Page 1 of 2

Status: Released | Printed On: 11/23/2020 | Agency: Walla Walla County

CD Guid: 94949b61-12c6-4a7e-9f0f-f11bed7e5e54 | Release Date: 9/29/2020 | Program Mgr: Roman G. Peralta

Br. No. 395900002 **SID** 07990700 **Br. Name** DELL SHARPE

Carrying PETTYJOHN RD **Route On** 39590 **Mile Post** 5.62

Intersecting TOUCHET RIVER **Route Under** **Mile Post**

Inspector's Signature SAW Cert # G1704 Cert Exp Date 3/27/2022 Co-Inspector's Signature SAH

4	Structural Eval	(1657)	25	Operating Tons	(1552)	0	No Utilities	(2675)
4	Deck Geometry	(1658)		Op RF	(1553)	0	Bridge Rails	(1684)
9	Underclearance	(1659)	15	Inventory Tons	(1555)	0	Transition	(1685)
3	Alignment	(1661)		Inv RF	(1556)	0	Guardrails	(1686)
9	Deck Overall	(1663)	5	Operating Level	(1660)	0	Terminals	(1687)
5	Superstructure	(1671)	A	Open/Closed	(1293)	0.00	Asphalt Depth	(2610)
4	Substructure	(1676)	7	Waterway	(1662)		Design Curb Ht	(2611)
9	Culvert	(1678)	3	Scour	(1680)		Bridge Rail Ht	(2612)
5	Chan/Protection	(1677)		Soundings Flag	(2693)	1914	Year Built	(1332)
N	Pier/Abut/Prot	(1679)		Revise Rating	(2688)	0	Year Rebuilt	(1336)
9	Drain Cond	(7664)		Photos Flag	(2691)	Y	Subj to NBIS	(2614)
0	Drain Status	(7665)		Measure Clrnc	(2694)			
N	Deck Scaling	(7666)	9	Sdwk Cond	(7673)			
0	Scaling Pct	(7667)	9	Paint Cond	(7674)			
0	Deck Rutting	(7669)	8	Approach Cond	(7681)			
0	Exposed Rebar	(7670)	6	Retaining Wall	(7682)			
6	Curb Cond	(7672)	9	Pier Prot	(7683)			

Alpha Span Type:

Sufficiency Rating 34.95 SD

High Risk

Inspections Performed:

Freq	Hrs	Date	Rep Type
24	1.0	9/10/2020	Routine
			Fract Crit
			UW
			Special
			Interim
			UWI
			Damage
			PRM Safety
			SEC Safety
			Condition
			Short Span
			In Depth
			Geometric

BMS Elements

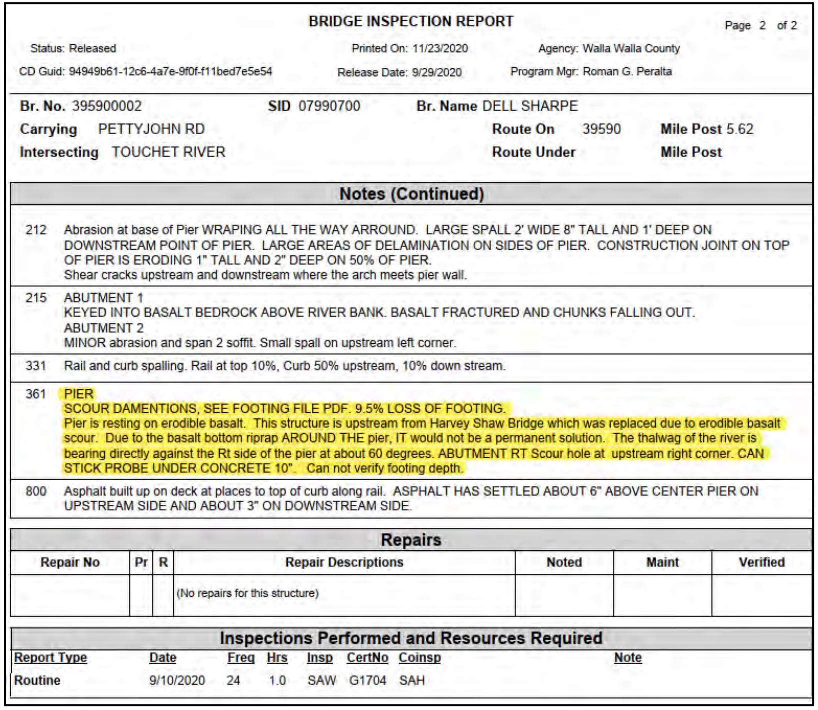
Element	Element Description	Total	Units	State 1	State 2	State 3	State 4
145	Earth Filled Concrete Arch	112	LF	112	0	0	0
212	Concrete Submerged Pier Wall	22	LF	0	0	20	2
215	Concrete Abutment	88	LF	88	0	0	0
331	Concrete Bridge Railing	300	LF	0	300	0	0
361	Scour	3	EA	2	1	0	0
800	Asphaltic Concrete (AC) Overlay	2300	SF	2300	0	0	0

Notes

0 All bridge references are given from upstream looking downstream.

11 PLANS ARE FOR DEMENTIONS ONLY NOT REINFORCMENT, Administrative Rating.

145 Luten Arch
Arch has 2 equal spans and consists of three parallel rings and edge spandrell walls. Span 1 has a spall on bottom of east spandrell wall. Water percolates through the earth fill to the top of the concrete arch and flows along the top surface to the spring point at Pier and then seeps through the construction joints leaving large leaching cracks.



BRIDGE INSPECTION REPORT

Page 2 of 2

Status: Released | Printed On: 11/23/2020 | Agency: Walla Walla County

CD Guid: 94949b61-12c6-4a7e-9f0f-f11bed7e5e54 | Release Date: 9/29/2020 | Program Mgr: Roman G. Peralta

Br. No. 395900002 **SID** 07990700 **Br. Name** DELL SHARPE

Carrying PETTYJOHN RD **Route On** 39590 **Mile Post** 5.62

Intersecting TOUCHET RIVER **Route Under** **Mile Post**

Notes (Continued)

212 Abrasion at base of Pier WRAPING ALL THE WAY ARROUND. LARGE SPALL 2' WIDE 8" TALL AND 1' DEEP ON DOWNSTREAM POINT OF PIER. LARGE AREAS OF DELAMINATION ON SIDES OF PIER. CONSTRUCTION JOINT ON TOP OF PIER IS ERODING 1" TALL AND 2" DEEP ON 50% OF PIER.
Shear cracks upstream and downstream where the arch meets pier wall.

215 ABUTMENT 1
KEYED INTO BASALT BEDROCK ABOVE RIVER BANK. BASALT FRACTURED AND CHUNKS FALLING OUT.
ABUTMENT 2
MINOR abrasion and span 2 soffit. Small spall on upstream left corner.

331 Rail and curb spalling. Rail at top 10%, Curb 50% upstream, 10% down stream.

361 PIER
SCOUR DAMENTIONS, SEE FOOTING FILE PDF. 9.5% LOSS OF FOOTING.
Pier is resting on erodible basalt. This structure is upstream from Harvey Shaw Bridge which was replaced due to erodible basalt scour. Due to the basalt bottom riprap AROUND THE pier, IT would not be a permanent solution. The thalwag of the river is bearing directly against the Rt side of the pier at about 60 degrees. ABUTMENT RT Scour hole at upstream right corner. CAN STICK PROBE UNDER CONCRETE 10". Can not verify footing depth.

800 Asphalt built up on deck at places to top of curb along rail. ASPHALT HAS SETTLED ABOUT 6" ABOVE CENTER PIER ON UPSTREAM SIDE AND ABOUT 3" ON DOWNSTREAM SIDE.

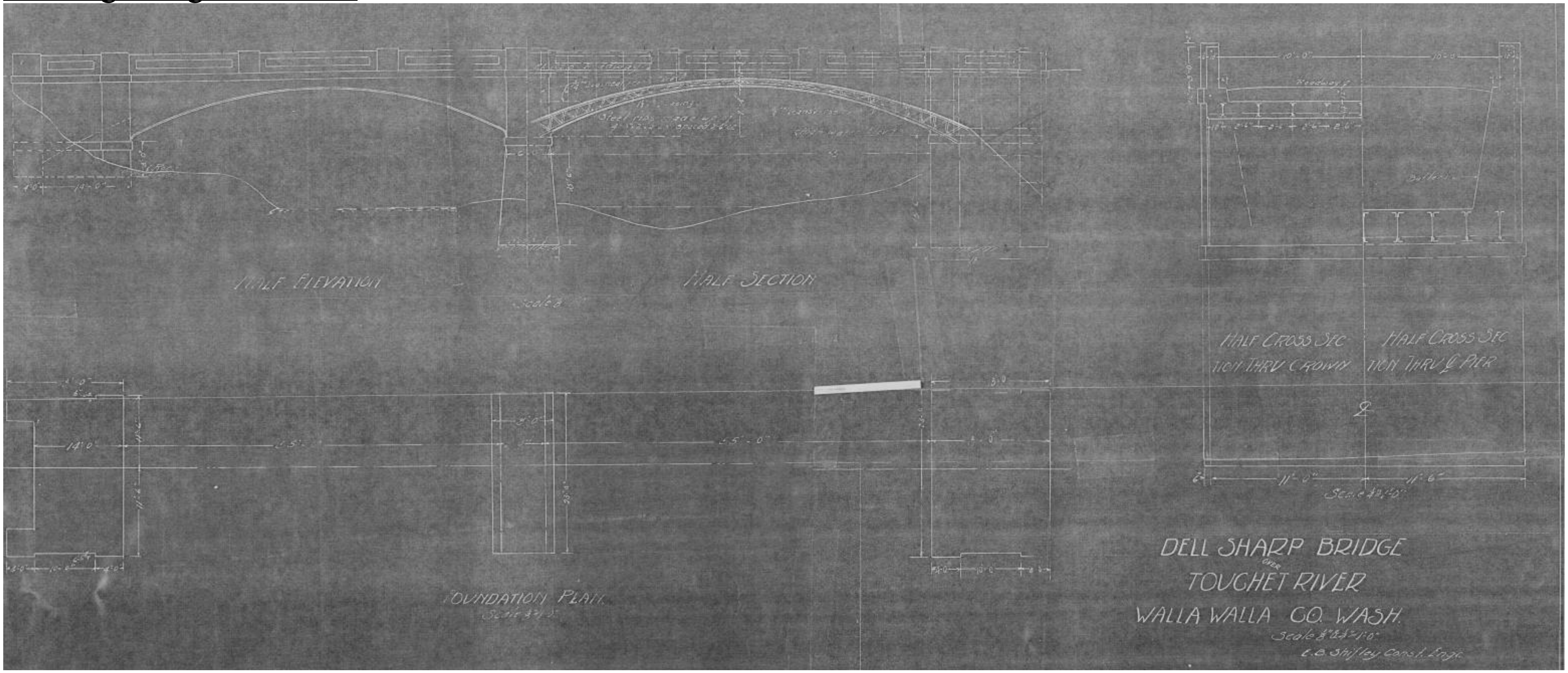
Repairs

Repair No	Pr	R	Repair Descriptions	Noted	Maint	Verified
			(No repairs for this structure)			

Inspections Performed and Resources Required

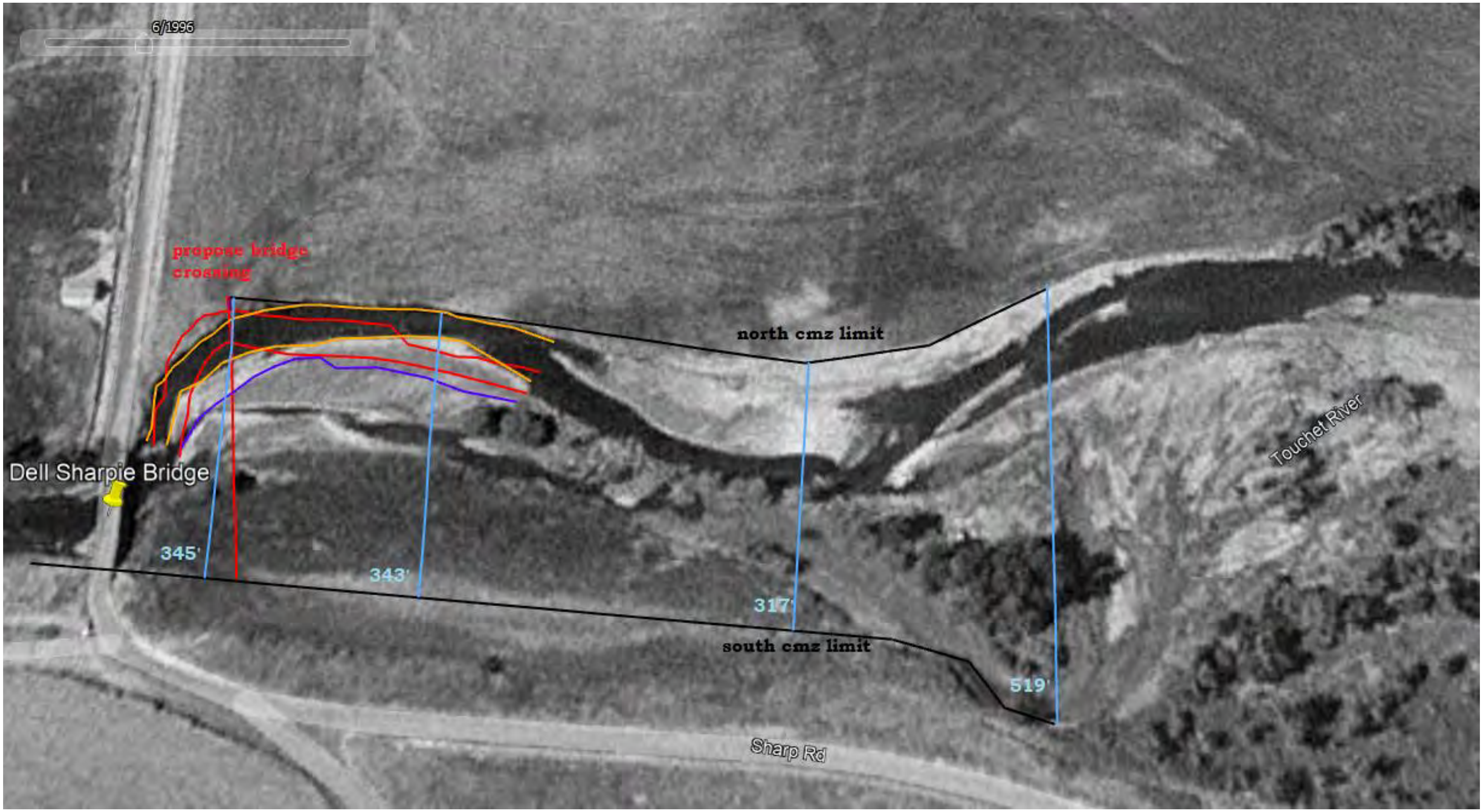
Report Type	Date	Freq	Hrs	Insp	CertNo	Coinsp	Note
Routine	9/10/2020	24	1.0	SAW	G1704	SAH	

Existing Bridge As Builts



Geomorphology

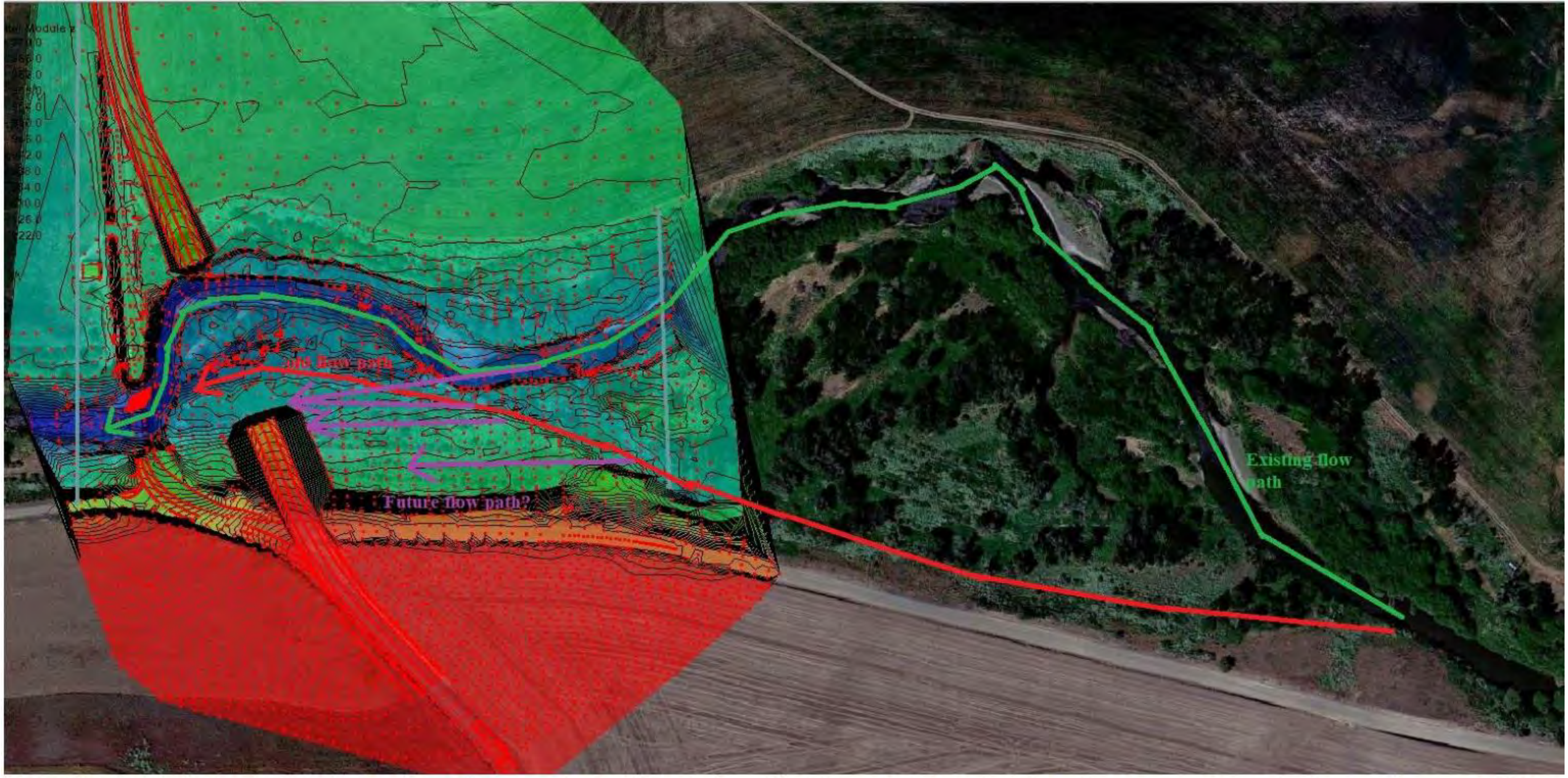
Channel Migration Zone from 1996 in the orange Google Earth Aerial views
you can see the north limits of the meander have not gone further north than from 1996



Channel Migration Zone from 2019 in the red delination Google Aerial views
meander is starting to move west along the roadway embankment but has not gone further north since 1996. The gravel bars have established tree growth as seen along the 317ft span from 1996 to 2019.

The proposed bridge span in the cmz is located where the perpendicular channel migration zone distance is approximately 345ft. On the same skew of the proposed bridge, it is a little longer approximately 355ft. **Lateral scour migration should match this distance of approximately 355ft**.

Flow paths Existing in green, Old in red, Future in purple



Stream Stability Memo

MP Stormwater

MP Stormwater Engineering LLC
PO Box 27, East Olympia, WA 98540

March 5, 2021

Mr. Kash Nikzad, PhD PE
TRANTECH Engineering, LLC
365-118th Ave SE, Suite No. 100
Bellevue, WA 98005

Subject: Dell Sharpe Bridge Replacement- Stream Stability Issues

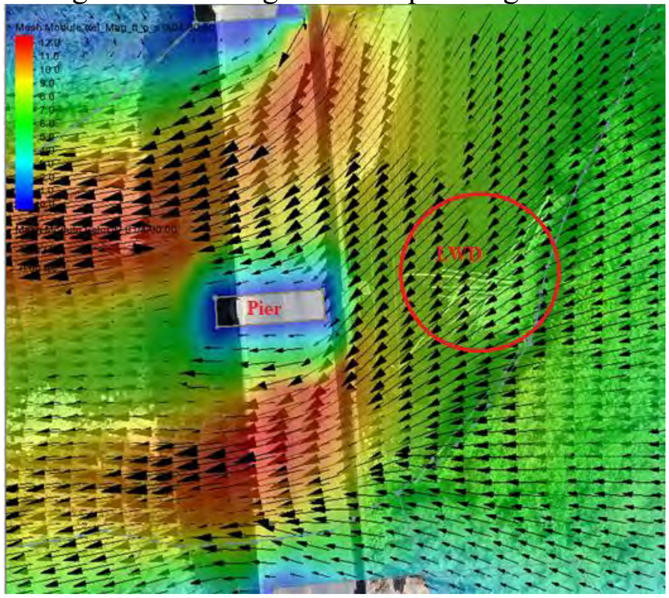
Dear Mr. Nikzad:

This memo is in response to Seth Walker request from Walla Walla County to provide a stream hydraulic engineering justification on why the existing bridge crossing should be removed. The main reason the existing bridge crossing should be removed is due to stream stability issues. This memo will identify the different stream stabilities the Touchet River is having and why the bridge should be removed.

First, stream instability is caused because a river changes through time since it is a dynamic system, and a bridge does not change. This creates issues with bridges inside the channel migration zone (CMZ). Bridges inside the CMZ will have to anticipate and accommodate for instabilities as well as plan for additional maintenance in monitoring and inspections of the instabilities to avoid bridge or bridge approach failures. The existing bridge crossing is currently inside the channel migration zone, it does not span the 100yr floodplain. The Touchet River in this section has lateral migration, causing the channel to meander and have low and high flow channels. If a bridge can span the channel migration zone, then the river can move freely within its floodplain. The proposed bridge design parameters address the CMZ, where the existing bridge does not.

Second, the center pier of the existing bridge causes a constriction in the flow and catches LWD (large woody debris), which cannot be conveyed through the existing structure. The LWD has to either be removed by maintenance or wait until it can be pushed through with very large flow events. This is one of those stream instabilities that would require additional maintenance issues to be addressed. There is currently more LWD upstream in the gravel bar areas that will eventually move down the system. Figure 1 shows the SMS modeling of the existing bridge where you can see the center pier and just upstream LWD that has not yet moved through the bridge.

Figure 1- Existing Dell Sharpe Bridge Model



Third, with the debris pile up at the center pier, the higher flows are redirected to the embankment, scouring the banks and abutment footings. This creates a higher risk of bridge failure if the footing to the north begins to be exposed. Fortunately, the south end is protected since it has been embedded to fractured rock, but still is eroding. Another stream instability due to the LWD creating scour issues and additional maintenance and repairs for the existing structure. Figure 1 shows the SMS modeling of the existing bridge where you can see the center pier forcing the flow around the pier and to the embankments. Currently there is no debris on the pier, but if there is then more flow would be pushed to the embankments. The flows do merge back together downstream but at this point they are split.

Fourth, the debris and constrictions create backwater, increasing the water surface elevation and therefore increasing the aggradation in the system. The buildup of sediment (aggradation) immediately upstream of the existing bridge thus splits the flows making it harder for the river to move out the sediment. This would then tend to snag more debris in the system. Currently upstream from the existing bridge the Touchet River does a hard 90-degree bend because the center of the channel has been aggrading, pushing out the banks, and eroding the current riparian zone of the channel with trees and vegetation.

These are just a few stream instabilities that point out why the existing bridge should be removed. If it is not removed these issues will continue thus more maintenance and eventually the bridge or bridge approaches could fail. If you have any questions, or would like to discuss this further, please call me at (360) 534-9503

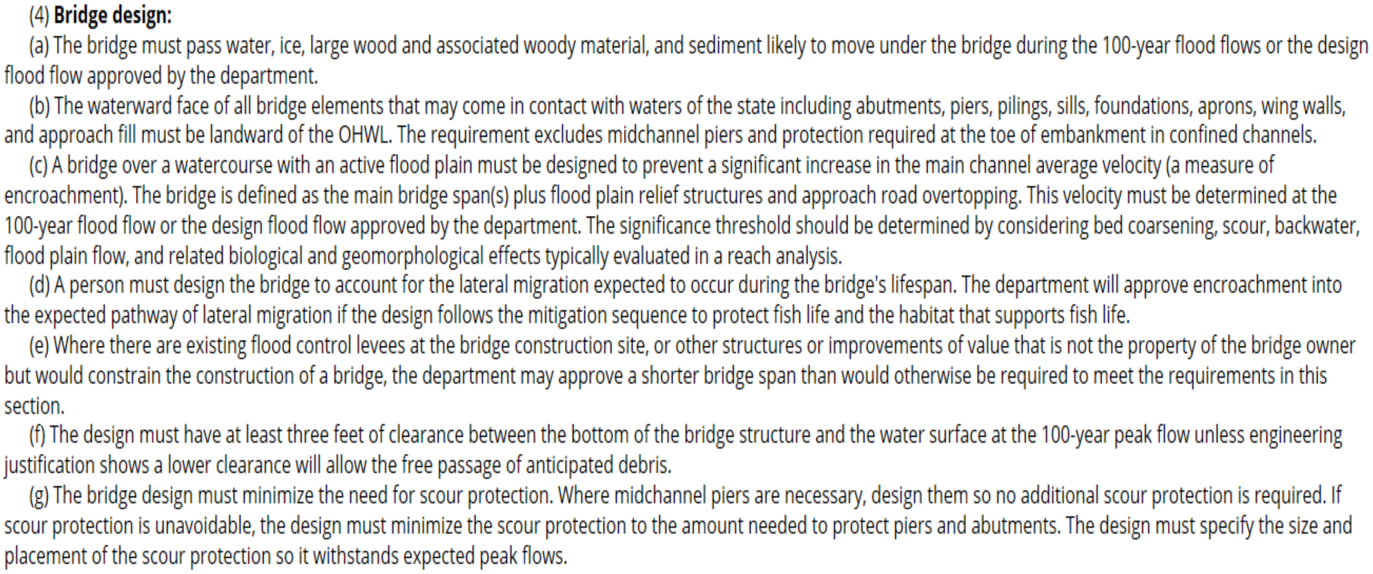
Sincerely,

Rocio Peralta

Rocio Peralta,

DFW Criteria

DFW WAC 220-660-190



(4) **Bridge design:**

(a) The bridge must pass water, ice, large wood and associated woody material, and sediment likely to move under the bridge during the 100-year flood flows or the design flood flow approved by the department.

(b) The waterward face of all bridge elements that may come in contact with waters of the state including abutments, piers, pilings, sills, foundations, aprons, wing walls, and approach fill must be landward of the OHWL. The requirement excludes midchannel piers and protection required at the toe of embankment in confined channels.

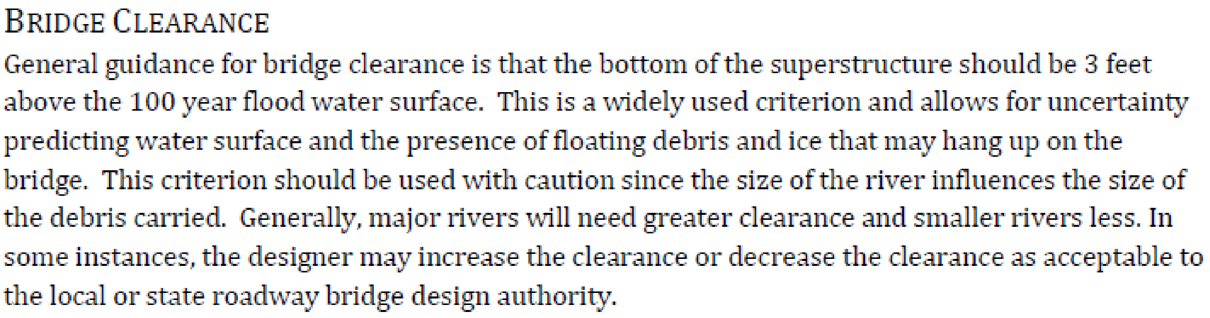
(c) A bridge over a watercourse with an active flood plain must be designed to prevent a significant increase in the main channel average velocity (a measure of encroachment). The bridge is defined as the main bridge span(s) plus flood plain relief structures and approach road overtopping. This velocity must be determined at the 100-year flood flow or the design flood flow approved by the department. The significance threshold should be determined by considering bed coarsening, scour, backwater, flood plain flow, and related biological and geomorphological effects typically evaluated in a reach analysis.

(d) A person must design the bridge to account for the lateral migration expected to occur during the bridge's lifespan. The department will approve encroachment into the expected pathway of lateral migration if the design follows the mitigation sequence to protect fish life and the habitat that supports fish life.

(e) Where there are existing flood control levees at the bridge construction site, or other structures or improvements of value that is not the property of the bridge owner but would constrain the construction of a bridge, the department may approve a shorter bridge span than would otherwise be required to meet the requirements in this section.

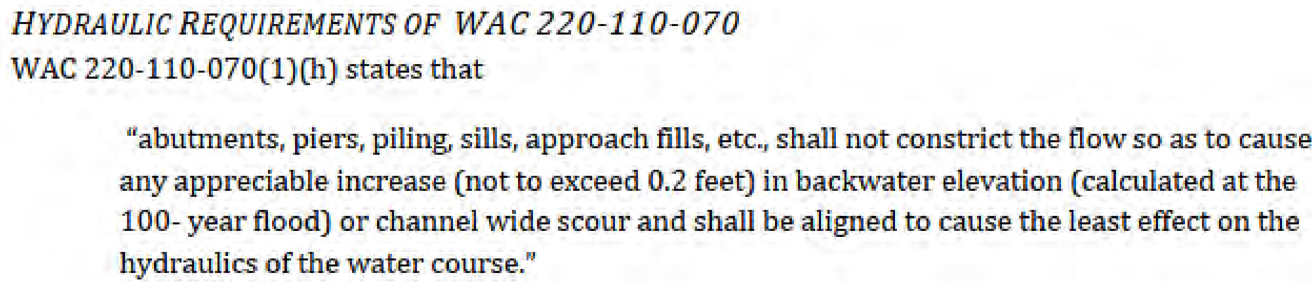
(f) The design must have at least three feet of clearance between the bottom of the bridge structure and the water surface at the 100-year peak flow unless engineering justification shows a lower clearance will allow the free passage of anticipated debris.

(g) The bridge design must minimize the need for scour protection. Where midchannel piers are necessary, design them so no additional scour protection is required. If scour protection is unavoidable, the design must minimize the scour protection to the amount needed to protect piers and abutments. The design must specify the size and placement of the scour protection so it withstands expected peak flows.



BRIDGE CLEARANCE

General guidance for bridge clearance is that the bottom of the superstructure should be 3 feet above the 100 year flood water surface. This is a widely used criterion and allows for uncertainty predicting water surface and the presence of floating debris and ice that may hang up on the bridge. This criterion should be used with caution since the size of the river influences the size of the debris carried. Generally, major rivers will need greater clearance and smaller rivers less. In some instances, the designer may increase the clearance or decrease the clearance as acceptable to the local or state roadway bridge design authority.



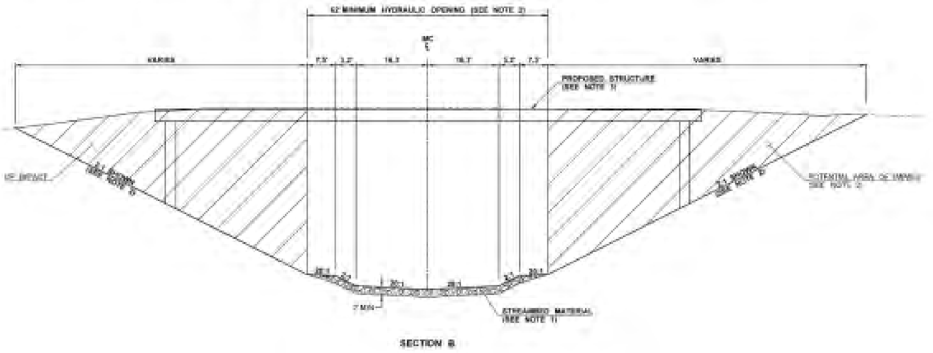
HYDRAULIC REQUIREMENTS OF WAC 220-110-070

WAC 220-110-070(1)(h) states that

> "abutments, piers, piling, sills, approach fills, etc., shall not constrict the flow so as to cause any appreciable increase (not to exceed 0.2 feet) in backwater elevation (calculated at the 100- year flood) or channel wide scour and shall be aligned to cause the least effect on the hydraulics of the water course."

Minimum Hydraulic Opening

Figure 7-3 Minimum Hydraulic Opening



There are three methods for determining the minimum hydraulic opening: stream simulation, confined bridge, and unconfined bridge. However, the process used for confined bridge is the same as stream simulation. All methods are dependent on the floodplain utilization ration (FUR), which determines how confined a stream is. The minimum hydraulic opening is determined from Equation 7-1 (2013 WCDG, Equation 3.2), unless otherwise approved by the HQ Hydraulics Section.

$$W_{HYO} = 1.2 * W_{bf} + 2 \text{ feet} \quad (7\text{-}1)$$

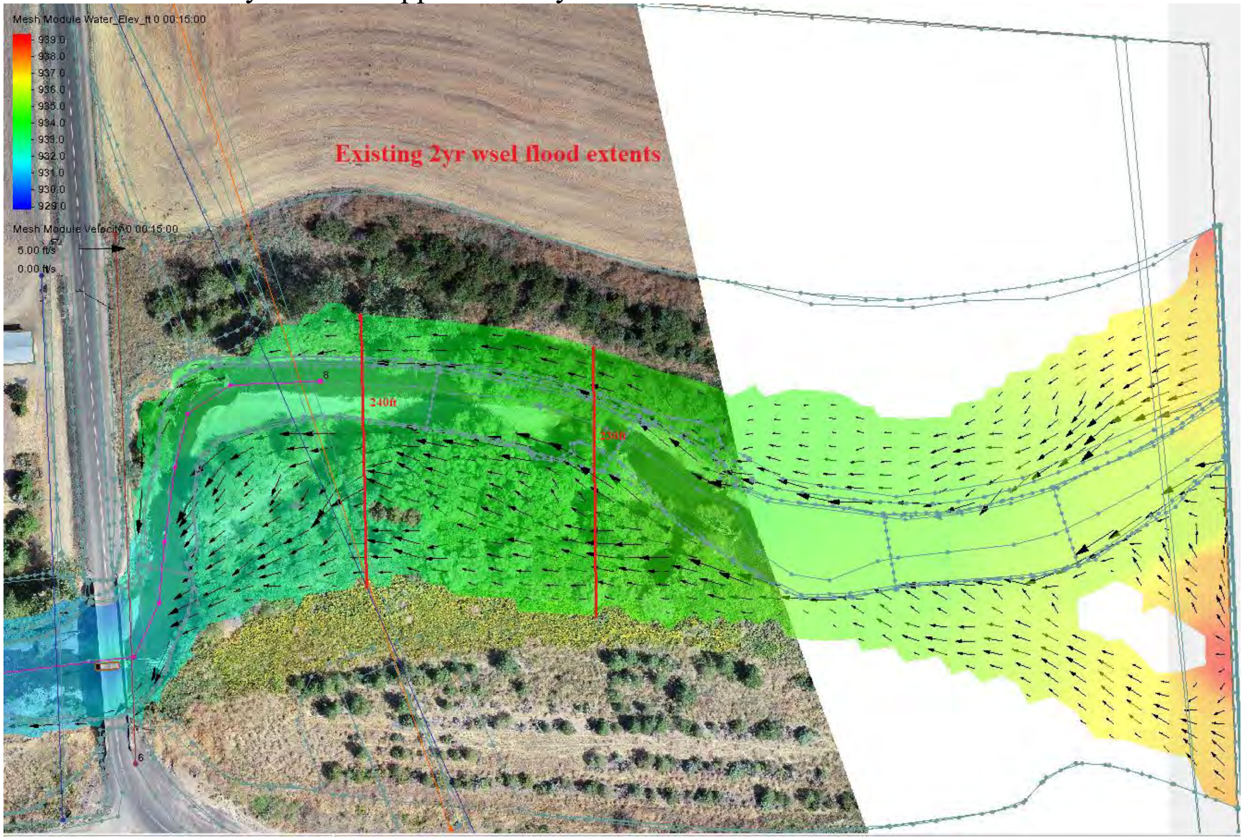
Where

W_{HYO} = Width of hydraulic opening

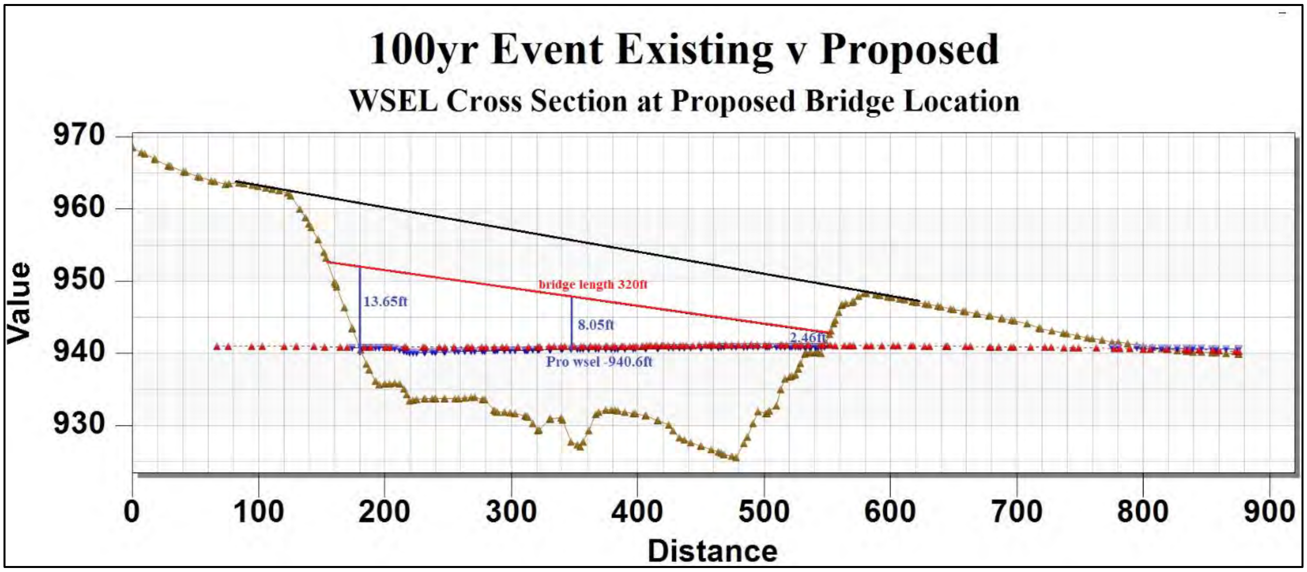
W_{bf} = BFW

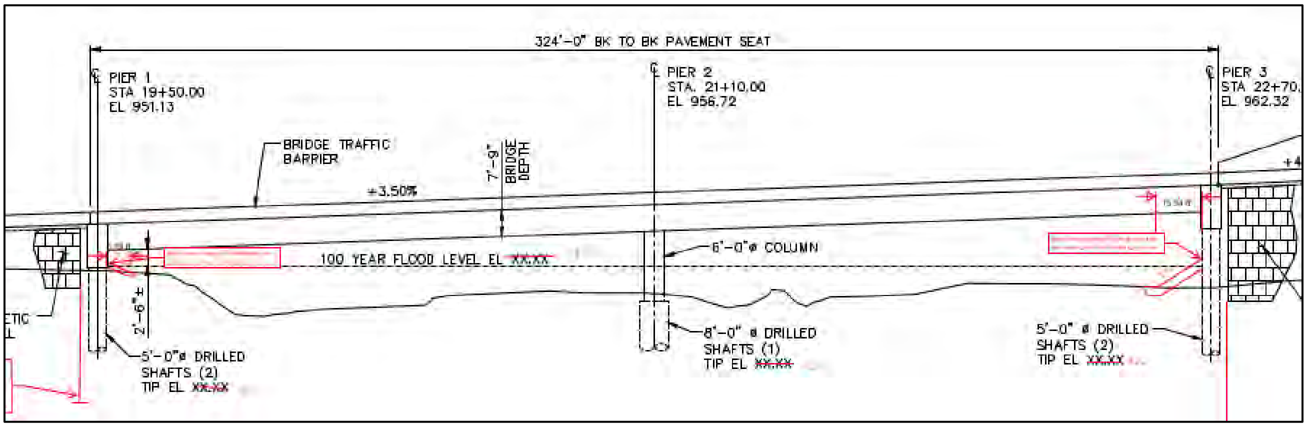
Minimum Hydraulic Opening
Whyo=1.2(240) +2=290ft

The 2yr flow width taken from the SRH-2D model represent approximately channel bank full width. Cross sections were taken approximately where the new proposed bridge will be placed. The bank full width for the 2yr event is approximately 240ft.



Thus, the recommendation for the bridge opening should be at least 290ft at a minimum Looking at the proposed cross section from SRH-2D it shows at bridge width of 320ft and the proposed bridge plan.   It exceeds the criteria for minimum hydraulic opening by 30ft.

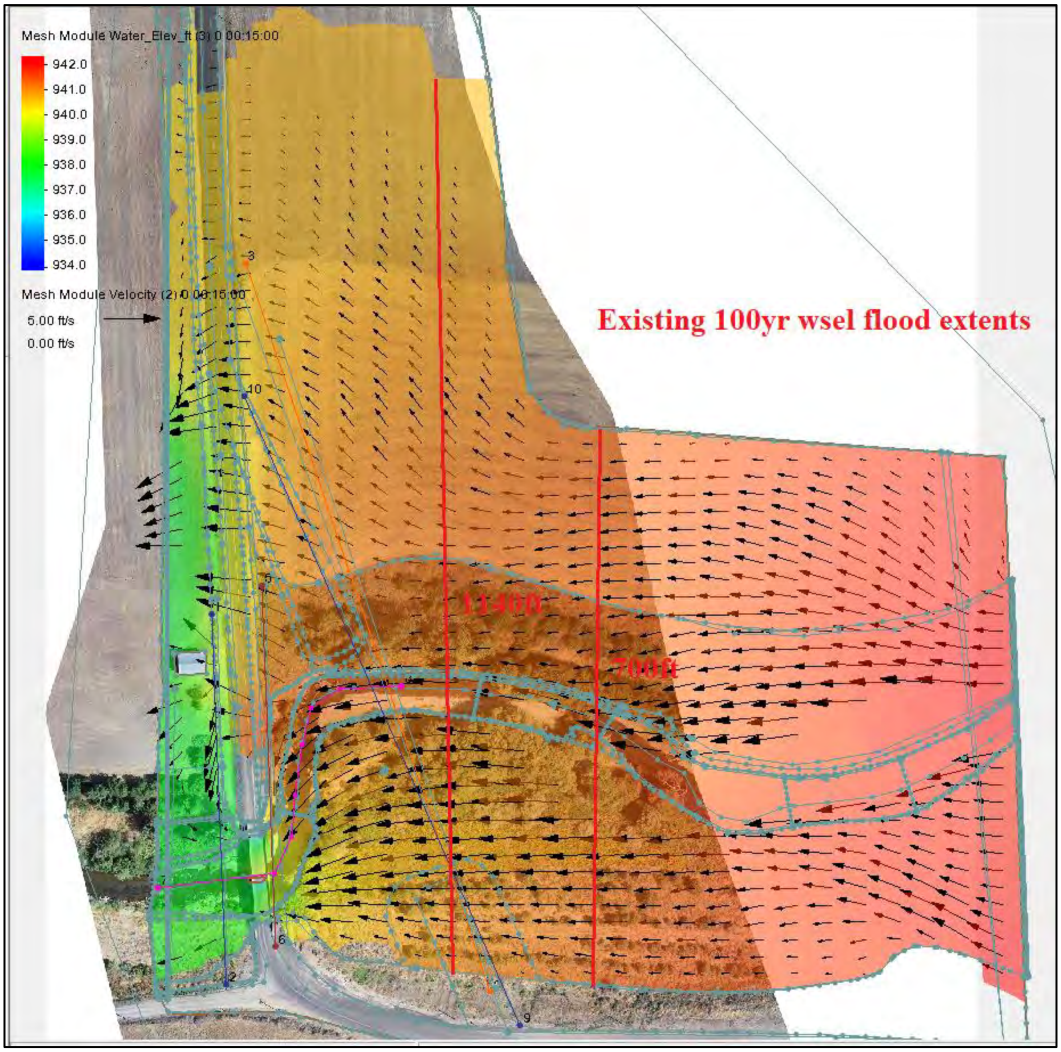




Another item to check is the Floodplain Utilization Ratio. The floodplain is wider than the bankful width of the channel as seen in the SRH-2D 100yr flood extents compared to the 2yr flood extent at bankful width. For this location, the floodplain is very wide due to the geographic location of the river. It traverses across the Palouse farmland which is very flat in this area so it has the ability to meander.

Floodplain Utilization Ratio
FPW/BFW > 3
Unconfined System

FPW=1140ft & BFW=240ft
1140/240=4.75>3



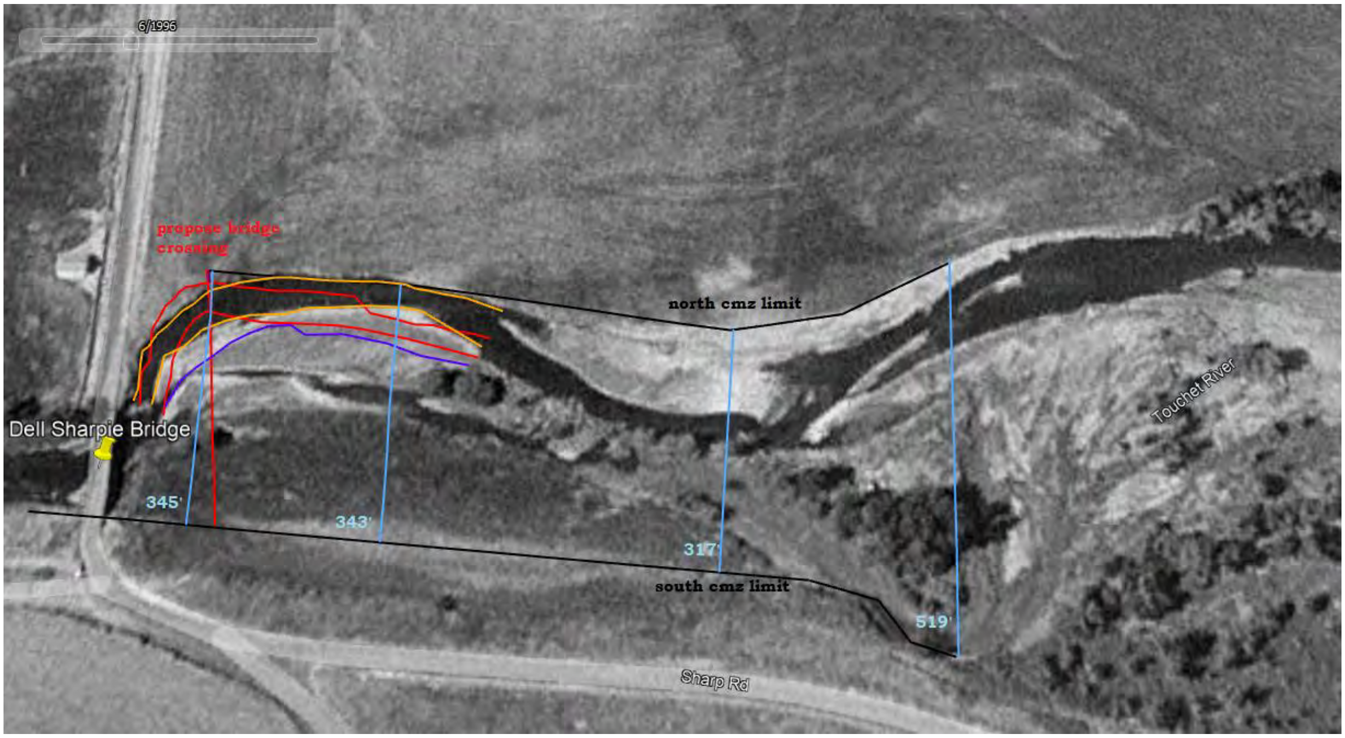
1-Check Vn v Vb ratio less 1.1: project at 1.11 for 2yr and 1.33 for 100yr and check backwater

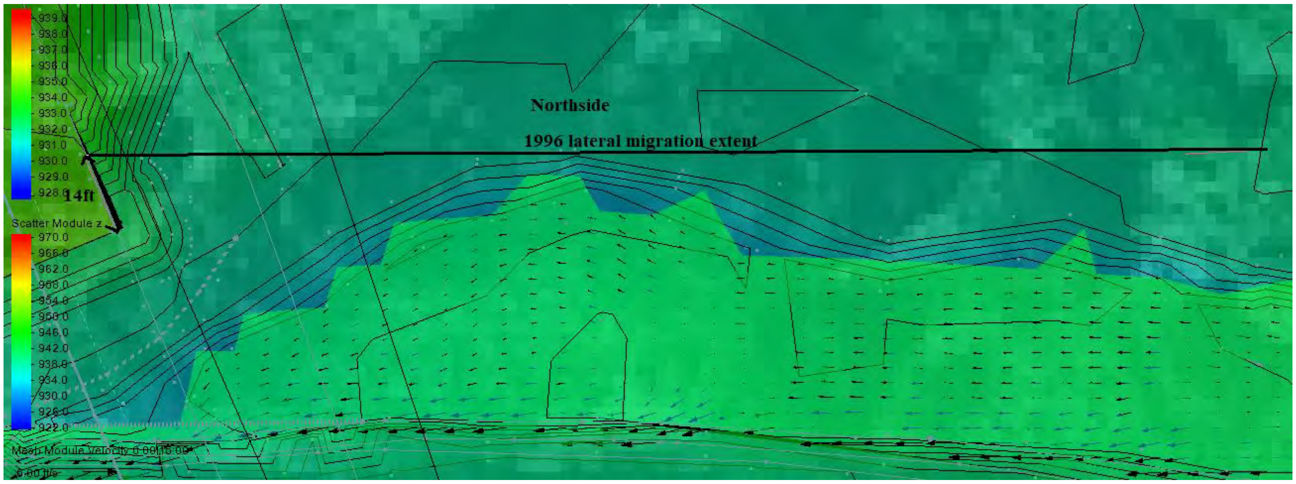
Even though the velocity ratio is greater than 1.1 for the 100yr, Vb is the average velocity in the main channel of the proposed bridge waterway and Vn is the average velocity in the main channel existing conditions. Vb100yr =3.67fps and Vn100yr is 2.75fps = 3.67/2.75=1.33 for the 100yr event. The velocity for the 2yr at bankfull width is within tolerance of the ratio. Vb2yr= 4.04fps and Vn2yr=3.65fps=4.04/3.65=1.11 since the velocity are low it's okay for the ratio to be exceeded for the 100yr since the 2yr is within tolerance but will need to check backwater next.

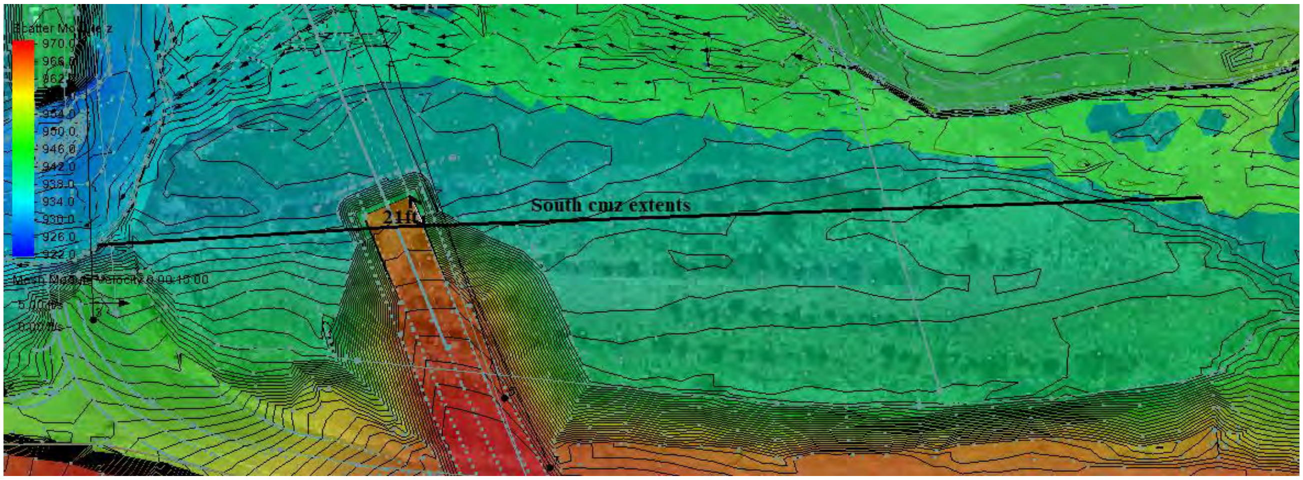
2-Check backwater less than 0.2ft: project no backwater for propose decreased by 0.4ft
The existing backwater elevation for the 100yr at the existing bridge crossing created a 2.5ft backwater. By removing the existing bridge, that has opened up the hydraulic capacity downstream. The proposed location of the bridge results in a decreased in 0.4ft water surface elevation than existing conditions. Existing 100yr wsel 941ft -Proposed 100yr wsel 940.6ft =0.4ft decrease. So, it's an overall hydraulic improvement in the river system. Last item to check is the lateral migration.

		Proposed 100yr		Existing 100yr	
		Vel_Mag (ft/s)	Water_Elev(ft)	Vel_Mag (ft/s)	Water_Elev(ft)
Reach	Station	Ave	Ave	Ave	Ave
1-Ex br ds	89.264	4.09	938.36	4.96	938.38
2-Ex br us	152.182	5.22	939.94	5.14	940.53
3-Pr br us	457.85	3.67	940.63	2.77	940.95
4-Us xs	1286.08	3.27	941.77	3.14	941.92

3- Check Lateral Migration: project incorporates CMZ and deep foundation design.
The channel migration zone defines the boundary of the lateral migration. In the Geomorphology section above, the CMZ was defined to be approximately 345ft perpendicular to the river. Looking at the location of the proposed bridge and the furthest lateral migration to the north and then looking at the south limit. It's recommended that the bridge have an approximate minimum 355ft lateral migration extent protection. Currently the bridge opening is 320ft that would require a minimum of 35ft with 14ft to the north and 21ft to the south at a minimum. The proposed retaining wall design is to extent the lateral migration 14ft to the north and 23ft to the south with the riprap toe protection extending 15ft to the north and 24ft.

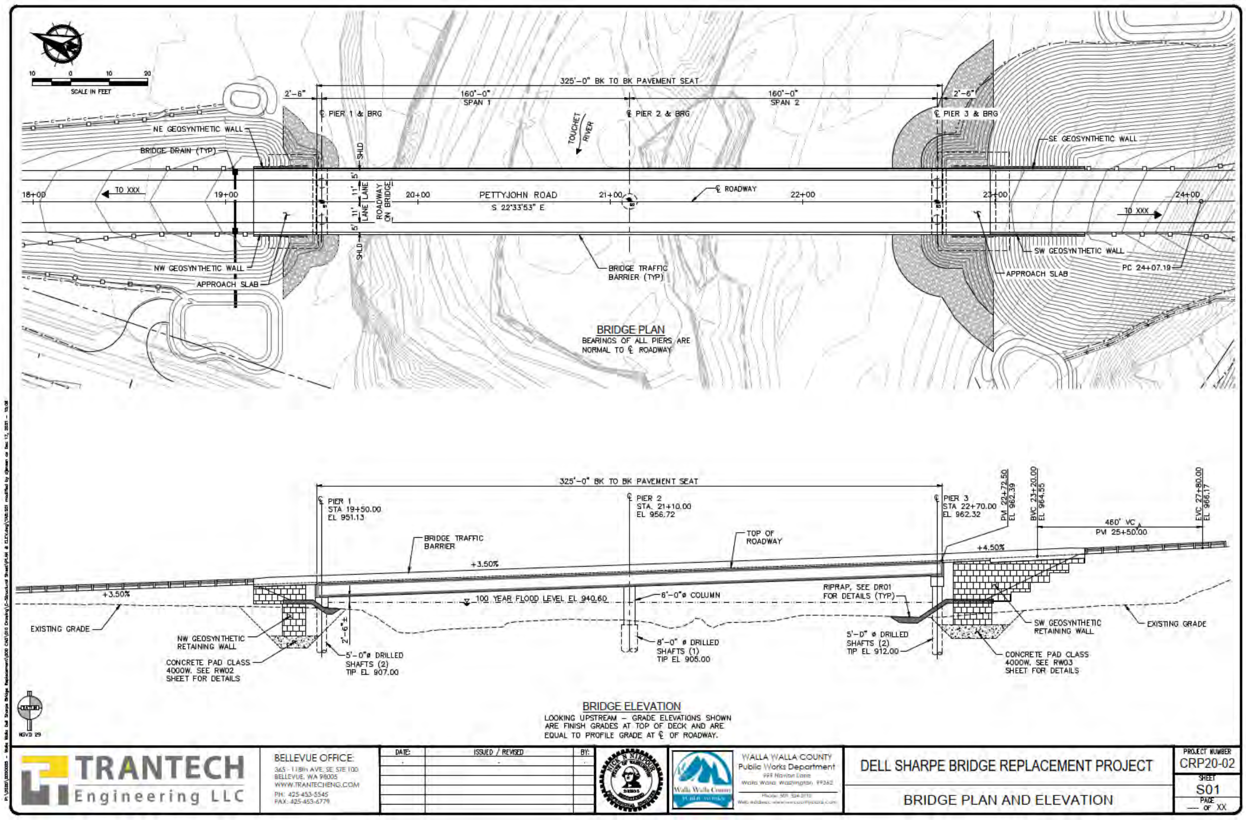



939.0
938.0
937.0
936.0
935.0
934.0
933.0
932.0
931.0
930.0
929.0
928.0
14ft
Northside
1996 lateral migration extent
Scatter Module z
970.0
966.0
962.0
958.0
954.0
950.0
946.0
942.0
938.0
934.0
930.0
926.0
922.0
Mesh Module Velocity 0 00:15:00
0.00 ft/s

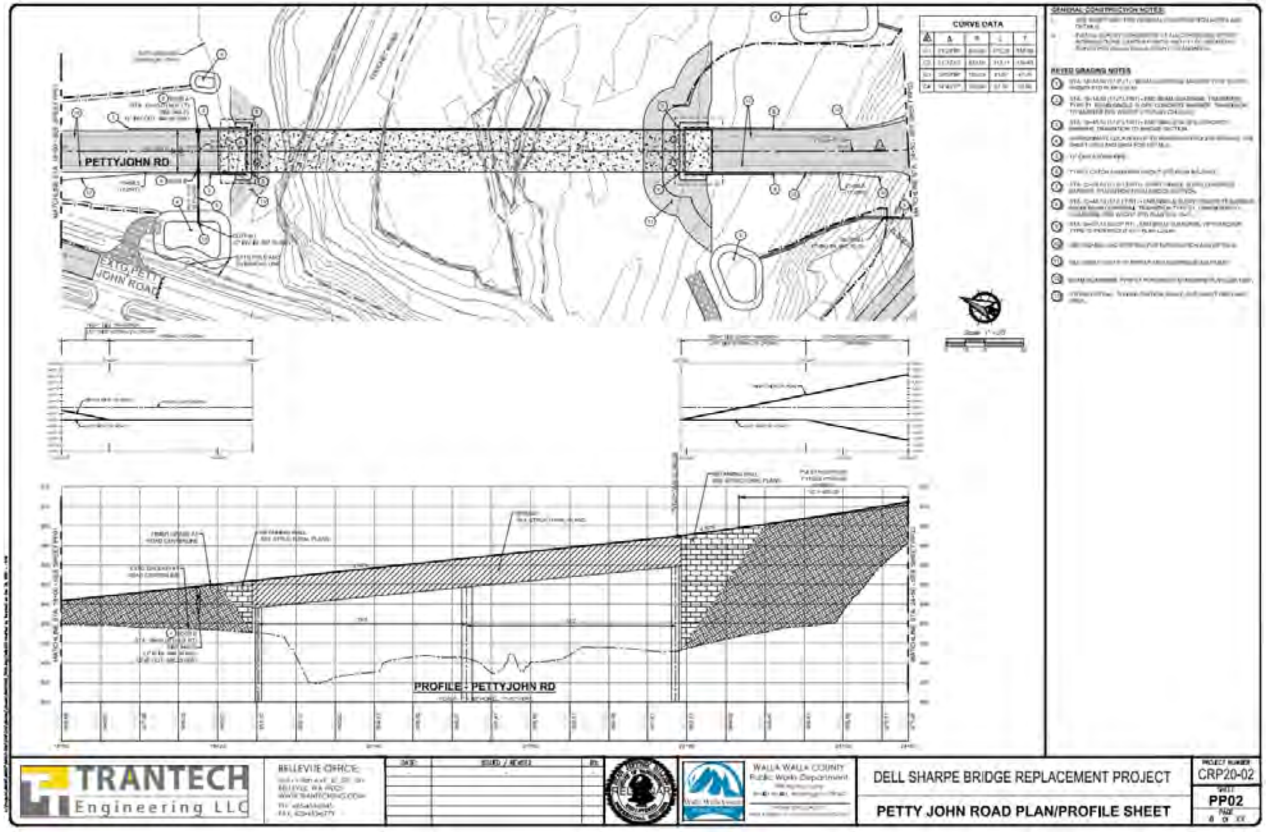

Scatter Module z
970.0
966.0
962.0
954.0
950.0
946.0
942.0
938.0
934.0
930.0
926.0
922.0
21ft
South cmz extents
Mesh Module Velocity 0 00:15:00
5.00 ft/s
0.00 ft/s

Appendix C-SRH-2D Results

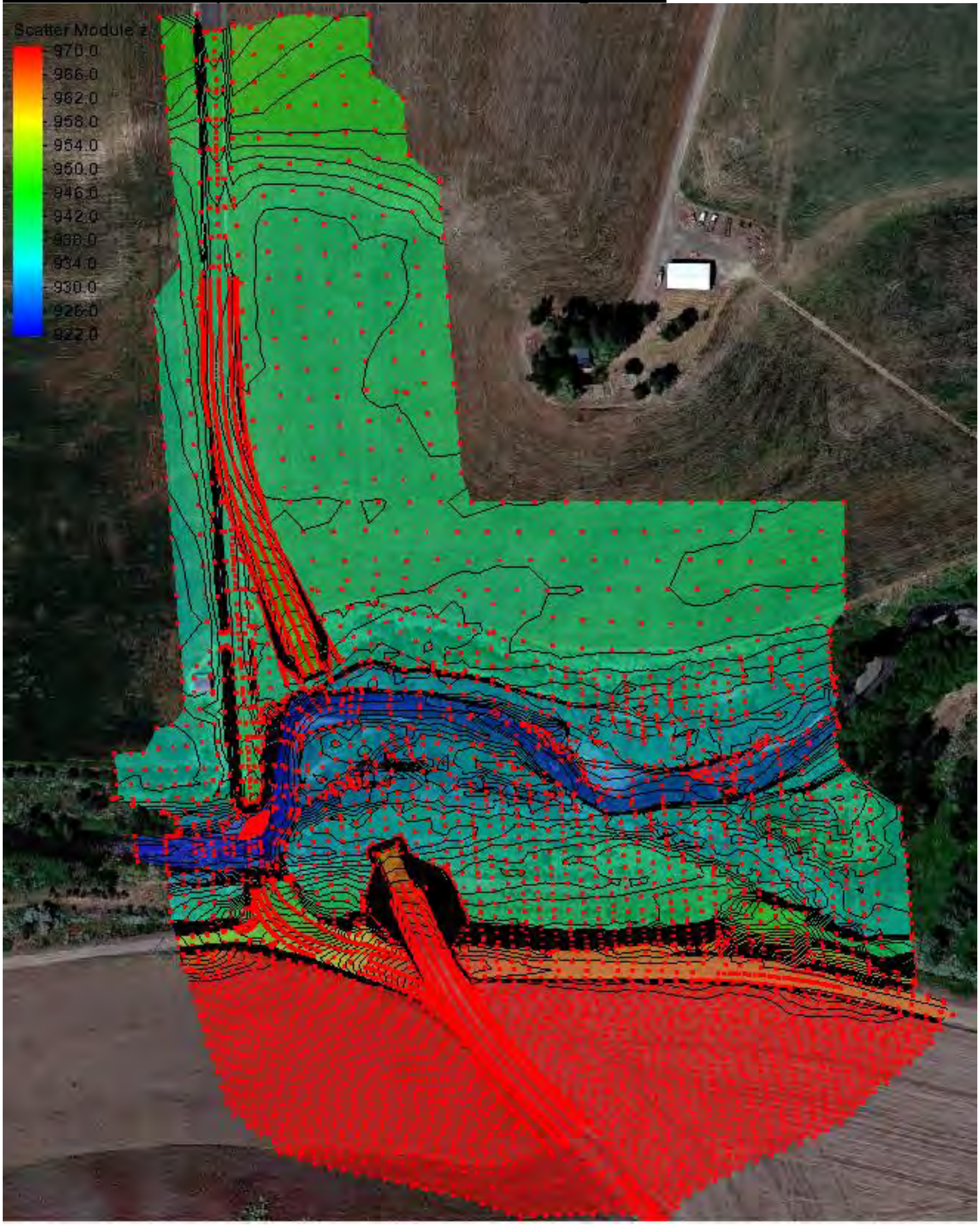
Proposed Bridge Cross Section



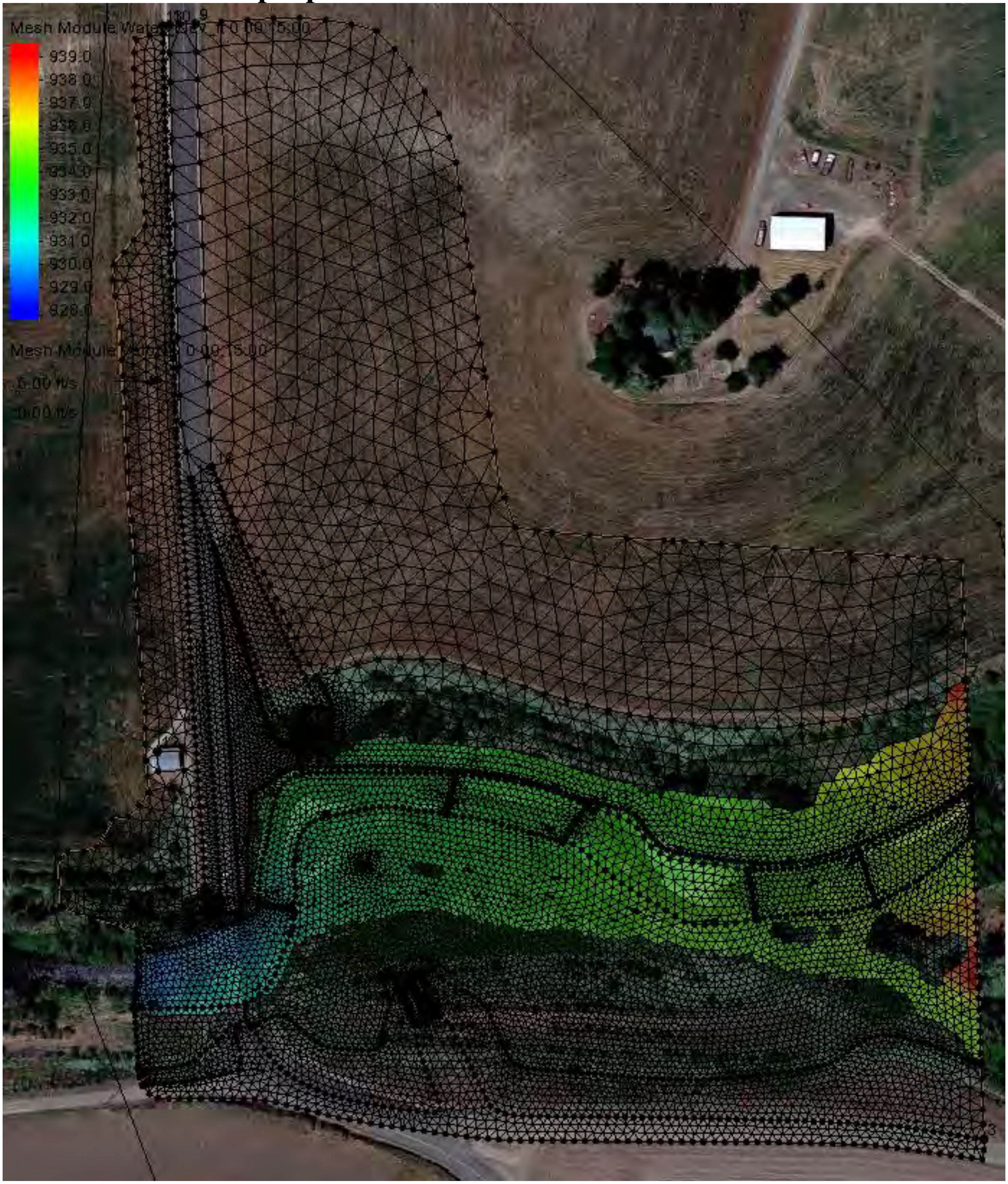
Proposed Bridge Profile



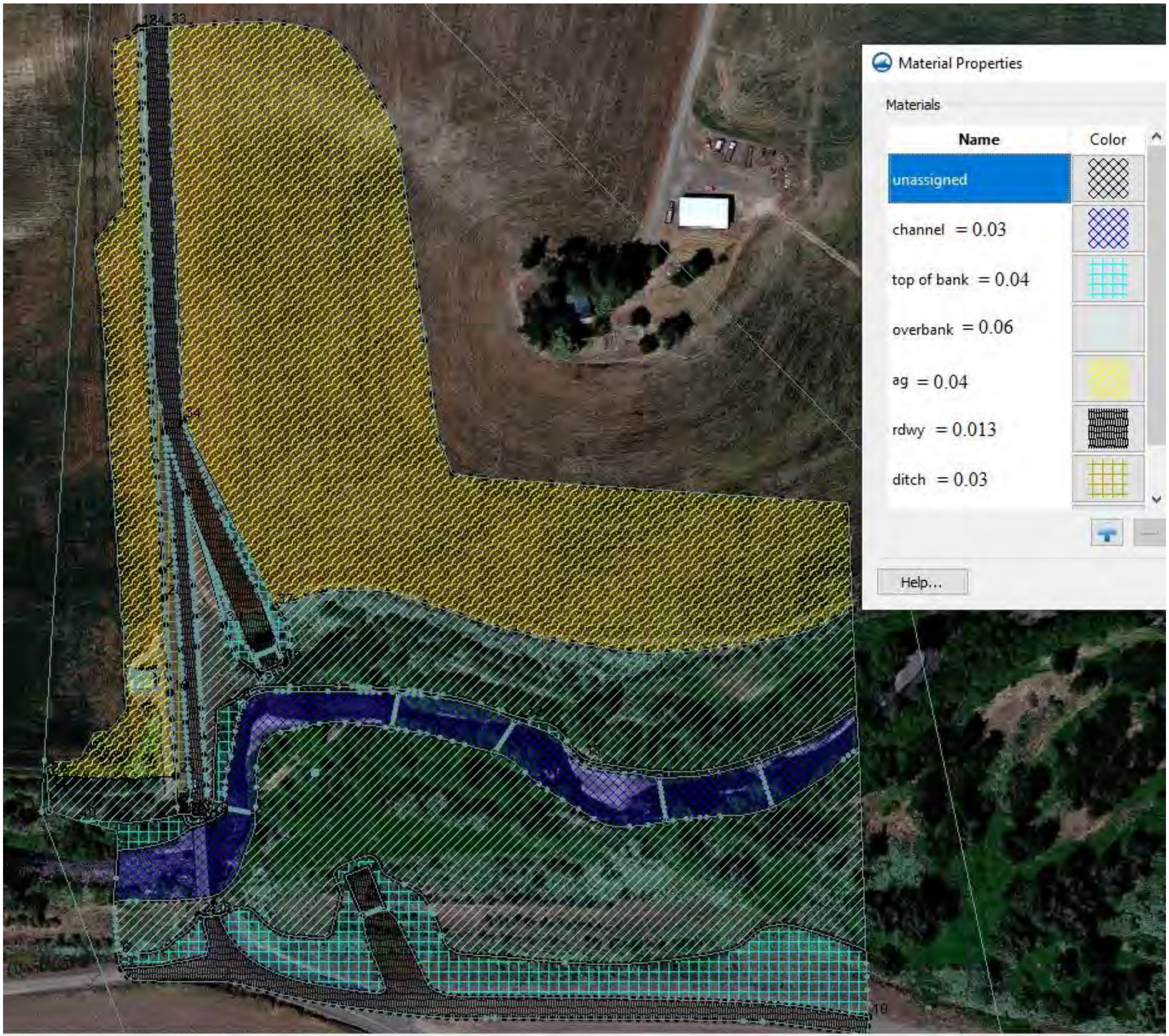
SRH-2D Survey Plan View of River and points



SHR-2D Mesh for proposed



SRH-2D Materials



unassigned

channel = 0.03

top of bank = 0.04

overbank = 0.06

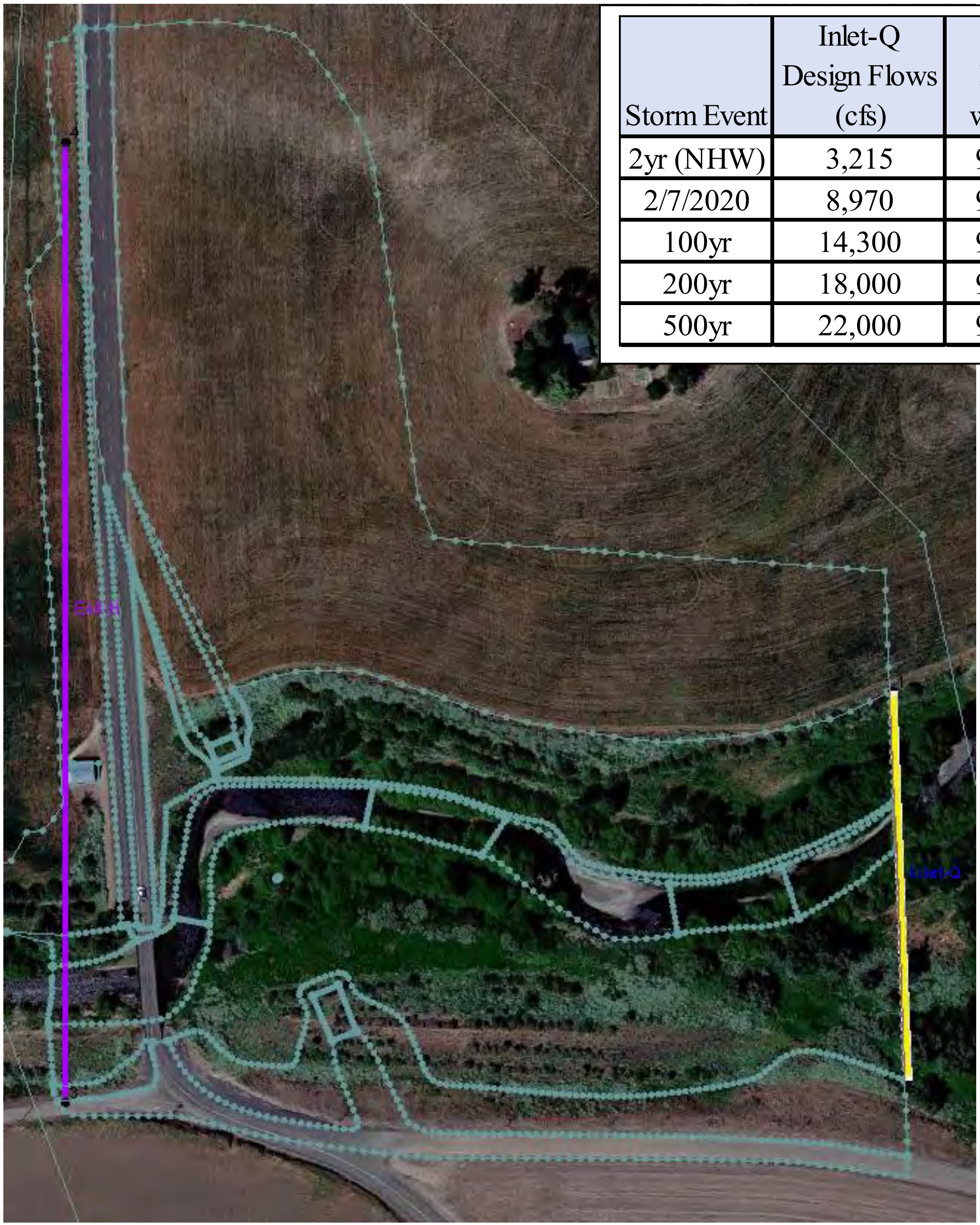
ag = 0.04

rdwy = 0.013

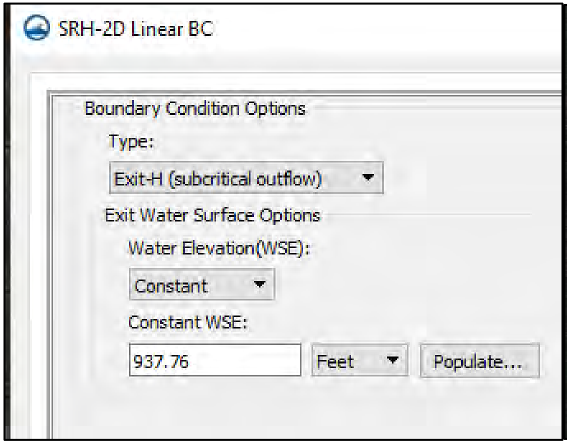
ditch = 0.03

SRH-2D Boundary Conditions

The inlet and outlet conditions are changed for each event.



Storm Event	Inlet-Q Design Flows (cfs)	Exit-H wsel (ft)
2yr (NHW)	3,215	929.73
2/7/2020	8,970	933.94
100yr	14,300	937.76
200yr	18,000	938.35
500yr	22,000	938.83



SRH-2D Linear BC

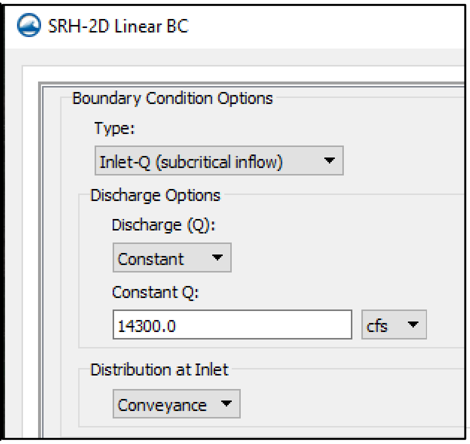
Boundary Condition Options

Type: Exit-H (subcritical outflow)

Exit Water Surface Options

Water Elevation(WSE): Constant

Constant WSE: 937.76 Feet



SRH-2D Linear BC

Boundary Condition Options

Type: Inlet-Q (subcritical inflow)

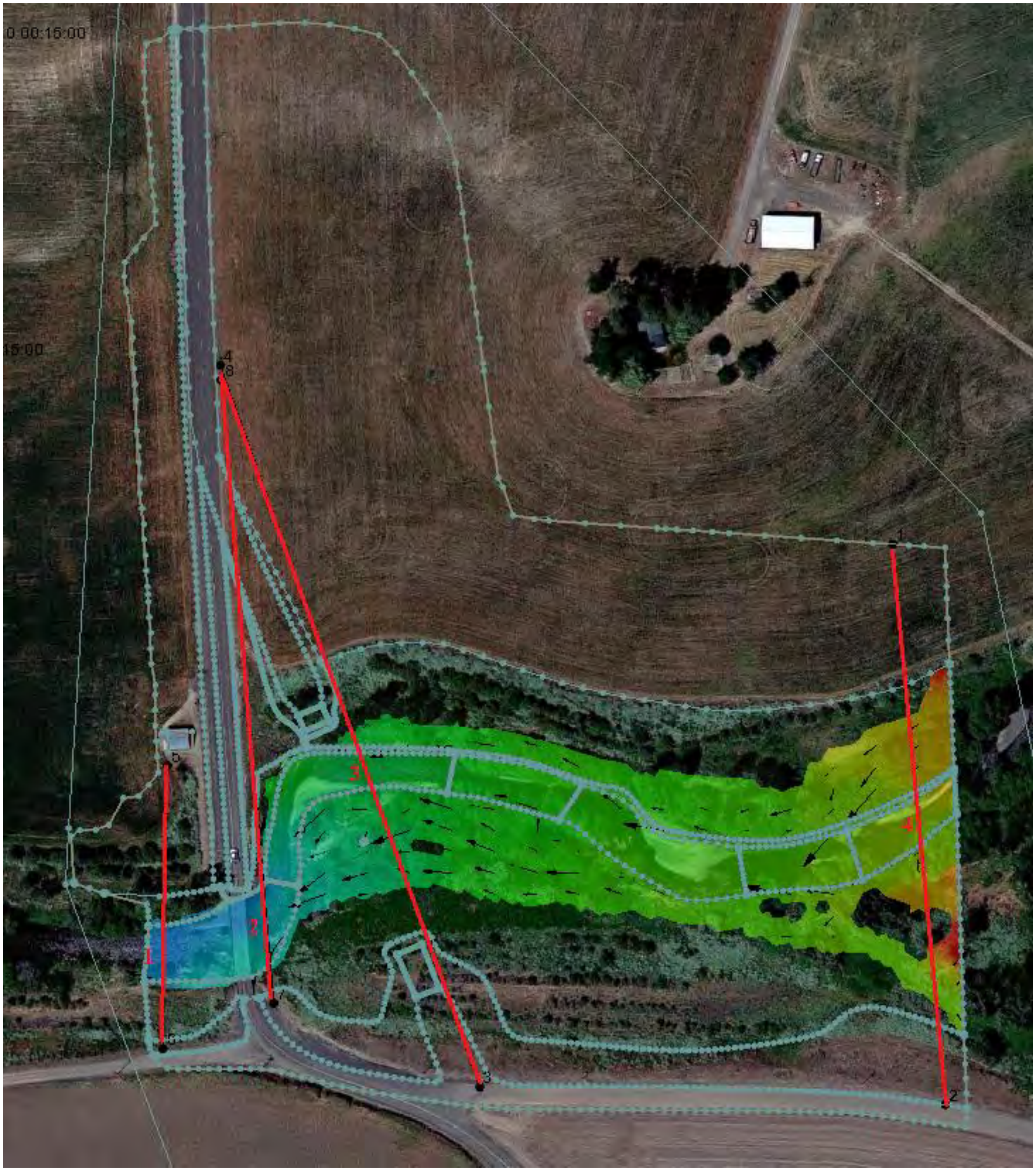
Discharge Options

Discharge (Q): Constant

Constant Q: 14300.0 cfs

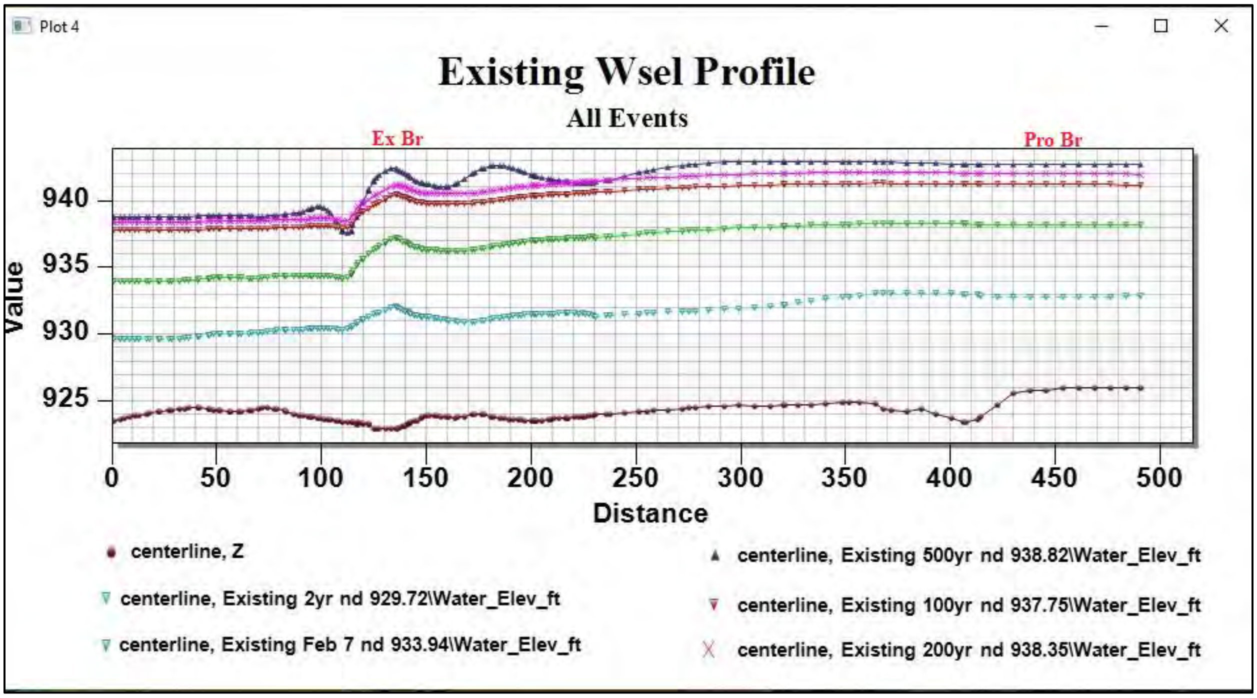
Distribution at Inlet: Conveyance

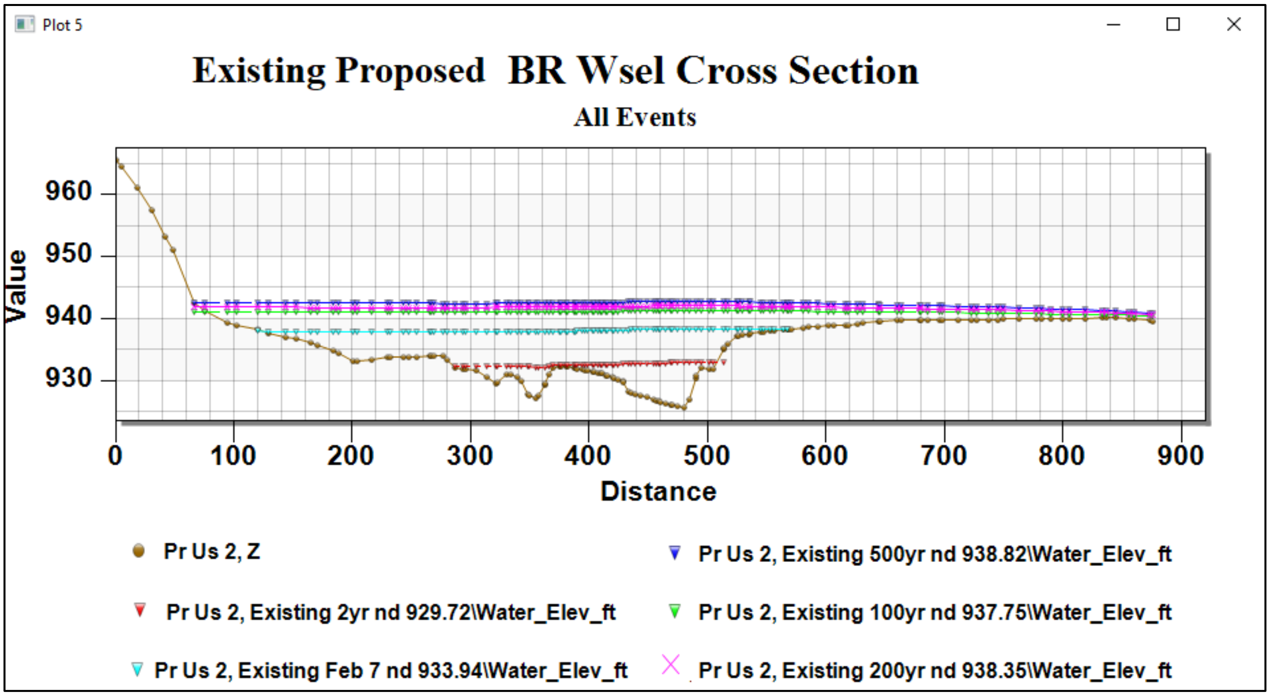
SHR-2D Monitor Locations



Existing Results

		Existing 2yr nd 929.72			Existing 100yr nd 937.75			Existing 200yr nd 938.35			Existing 500yr nd 938.82			Existing Feb 7 nd 933.94		
		Vel_Mag (ft/s)	Water_Depth (ft)	Water_Elev (ft)	Vel_Mag (ft/s)	Water_Depth (ft)	Water_Elev (ft)	Vel_Mag (ft/s)	Water_Depth (ft)	Water_Elev (ft)	Vel_Mag (ft/s)	Water_Depth (ft)	Water_Elev (ft)	Vel_Mag (ft/s)	Water_Depth (ft)	Water_Elev (ft)
Reach	Station	Ave	Ave	Ave	Ave	Ave	Ave	Ave	Ave	Ave	Ave	Ave	Ave	Ave	Ave	Ave
1-Ex br ds	89.264	6.59	4.21	930.22	4.96	4.62	938.38	5.26	5.17	938.93	6.02	5.41	939.29	8.55	6.61	934.11
2-Ex br us	152.182	7.95	5.66	931.11	5.14	6.68	940.53	5.91	7.4	941.25	6.47	7.7	941.83	5.98	6.23	936.99
3-Pr br us	457.85	3.65	2.6	932.5	2.77	5.2	940.95	3.46	5.9	941.65	4.1	6.49	942.24	2.99	5.34	937.96
4-Us xs	1286.08	3.26	2.17	936.18	3.14	5.12	941.92	3.61	5.92	942.72	4.03	6.64	943.44	3.05	3.77	939.61

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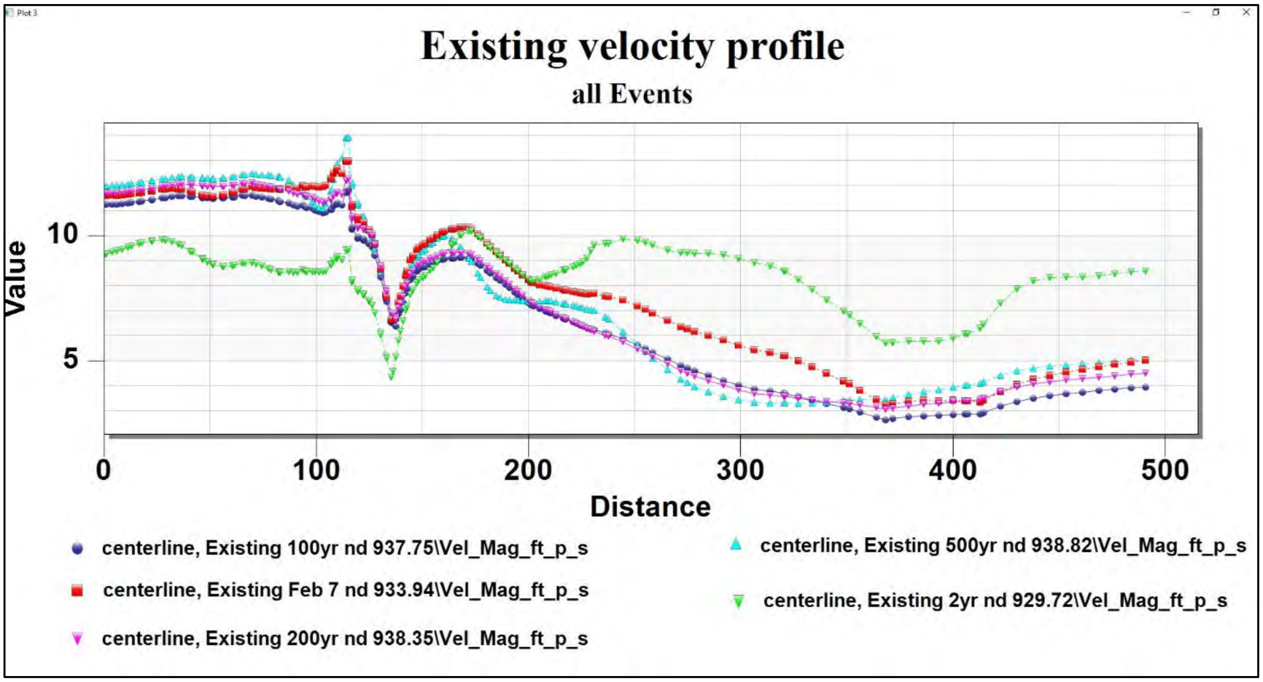
Existing Proposed BR Wsel Cross Section
All Events
Value
960
950
940
930
0
100
200
300
400
500
600
700
800
900
Distance
Pr Us 2, Z
Pr Us 2, Existing 500yr nd 938.82\Water_Elev_ft
Pr Us 2, Existing 2yr nd 929.72\Water_Elev_ft
Pr Us 2, Existing 100yr nd 937.75\Water_Elev_ft
Pr Us 2, Existing Feb 7 nd 933.94\Water_Elev_ft
Pr Us 2, Existing 200yr nd 938.35\Water_Elev_ft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Existing velocity profile
all Events
Value
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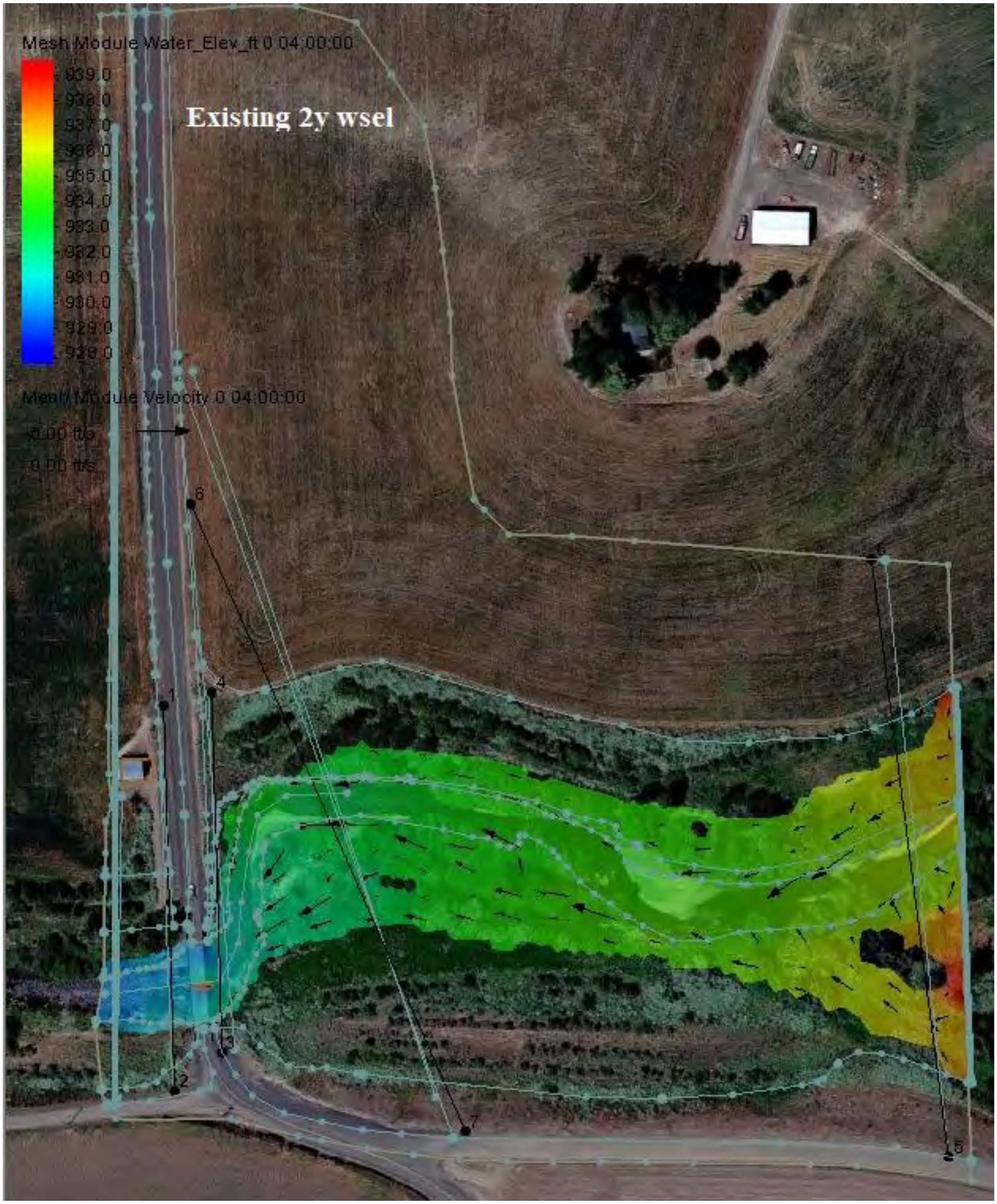
5
0
100
200
300
400
500
Distance
centerline, Existing 100yr nd 937.75\Vel_Mag_ft_p_s
centerline, Existing Feb 7 nd 933.94\Vel_Mag_ft_p_s
centerline, Existing 200yr nd 938.35\Vel_Mag_ft_p_s
centerline, Existing 500yr nd 938.82\Vel_Mag_ft_p_s
centerline, Existing 2yr nd 929.72\Vel_Mag_ft_p_s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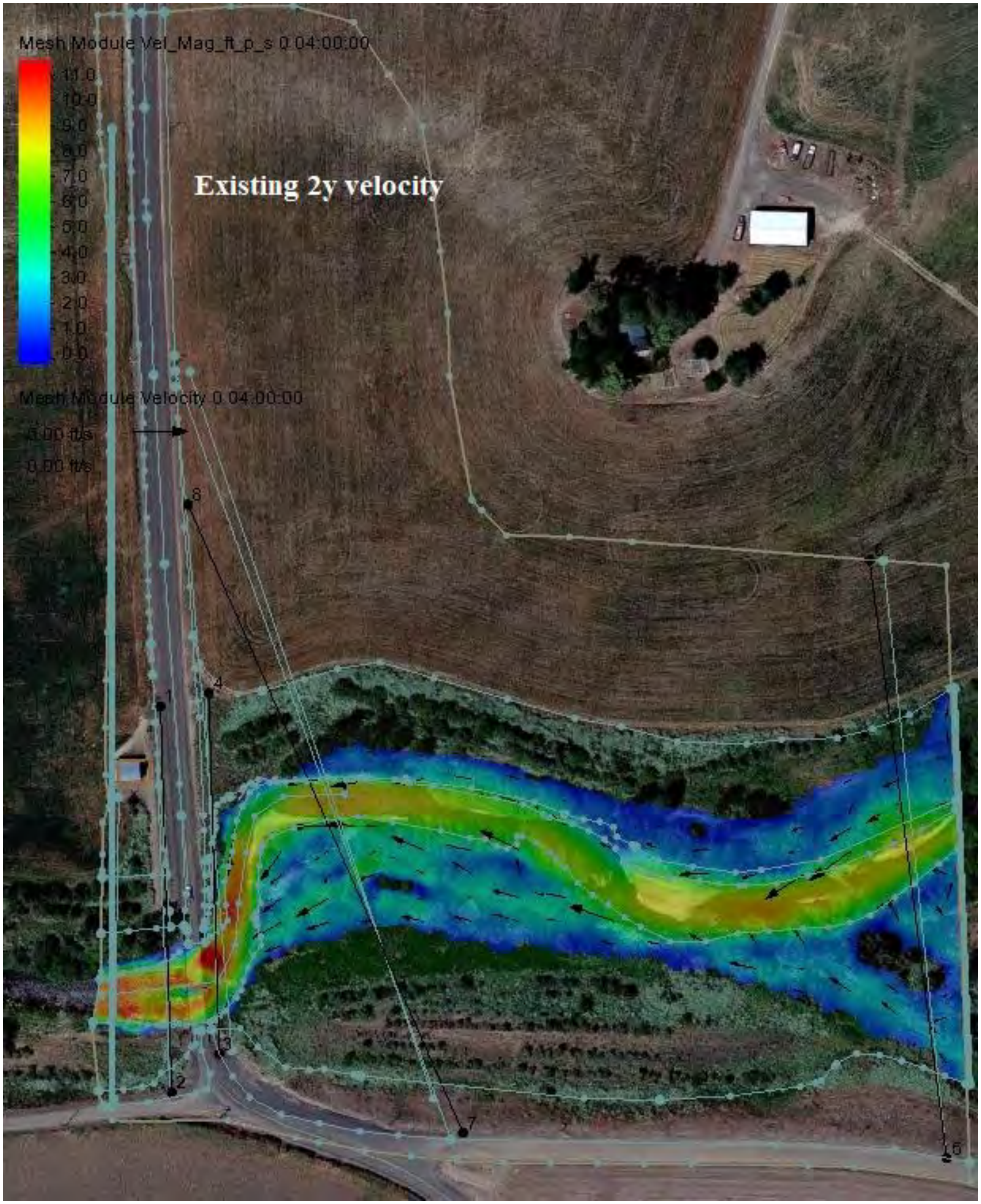
938.0
937.0
936.0
935.0
934.0
933.0
932.0
931.0
930.0
929.0
928.0
Existing 2y wsel
Mesh Module Velocity 0 04:00:00
5.00 ft/s
0.00 ft/s
8
4
1
6
3
2
7
5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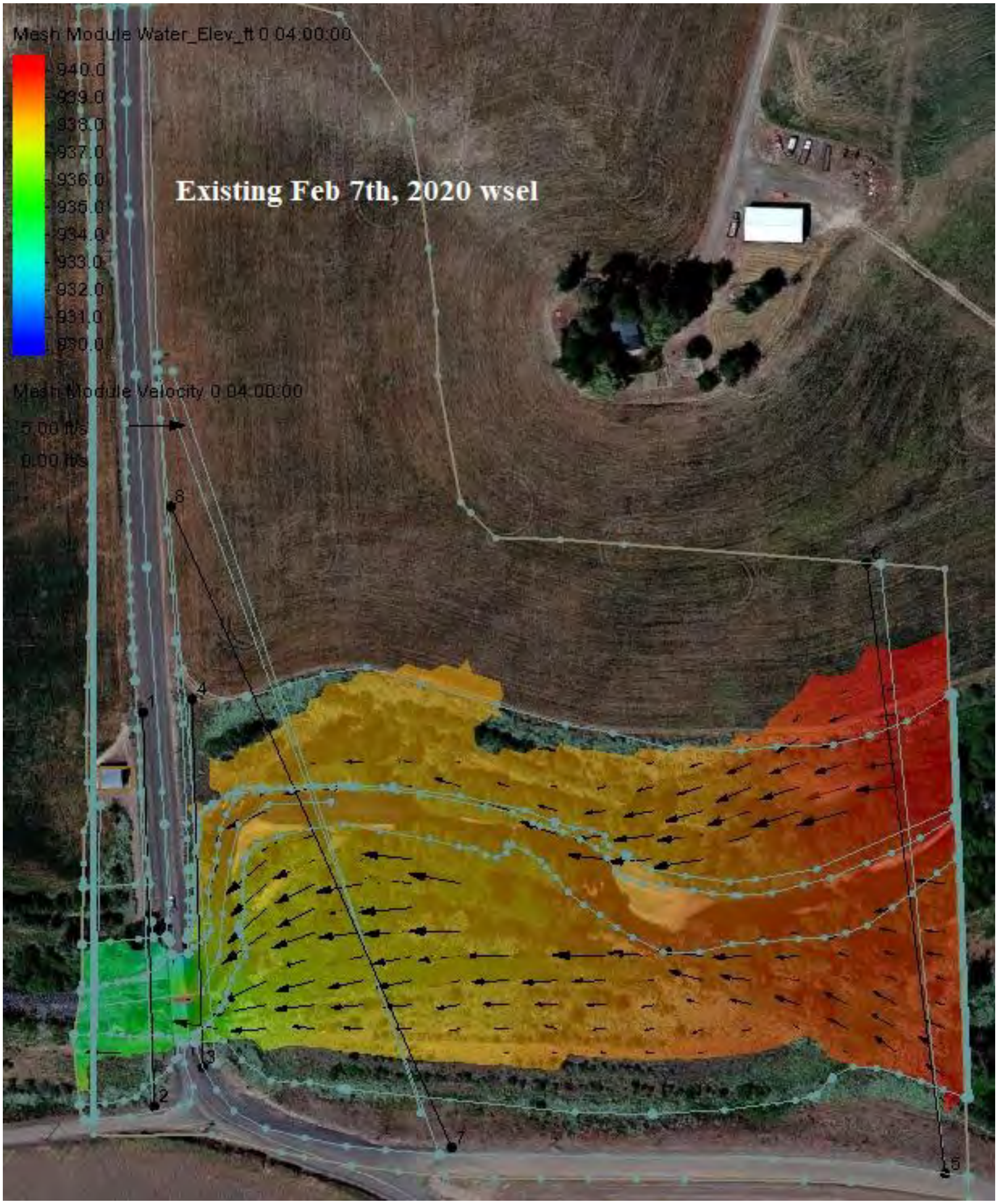
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
Existing 2y velocity
Mesh Module Velocity 0 04:00:00
5.00 ft/s
0.00 ft/s
8
4
1
3
2
7
6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940.0
939.0
938.0
937.0
936.0
935.0
934.0
933.0
932.0
931.0
930.0
Existing Feb 7th, 2020 wsel
Mesh Module Velocity 0 04:00:00
5.00 ft/s
0.00 ft/s
8
4
1
2
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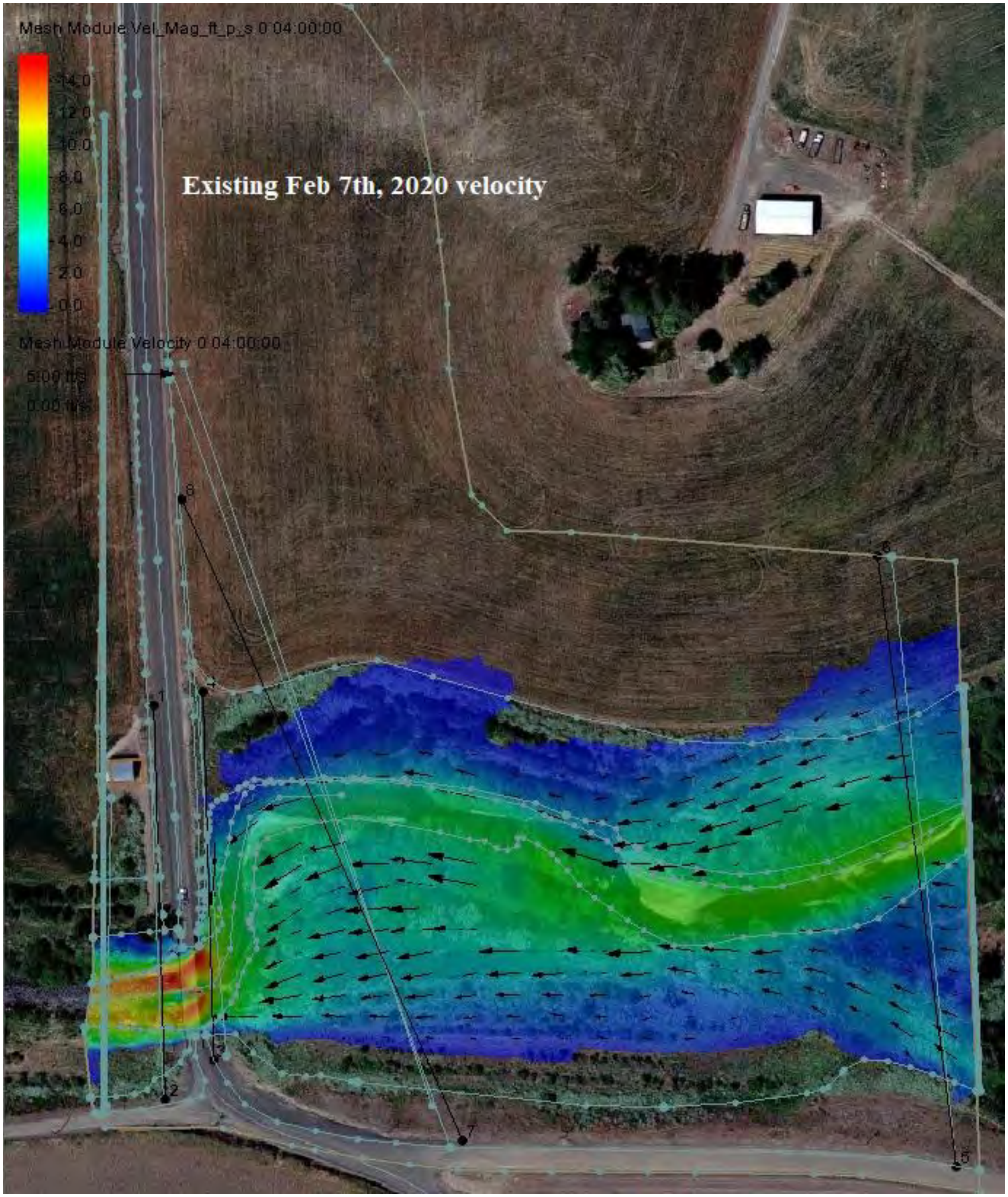
6
7
5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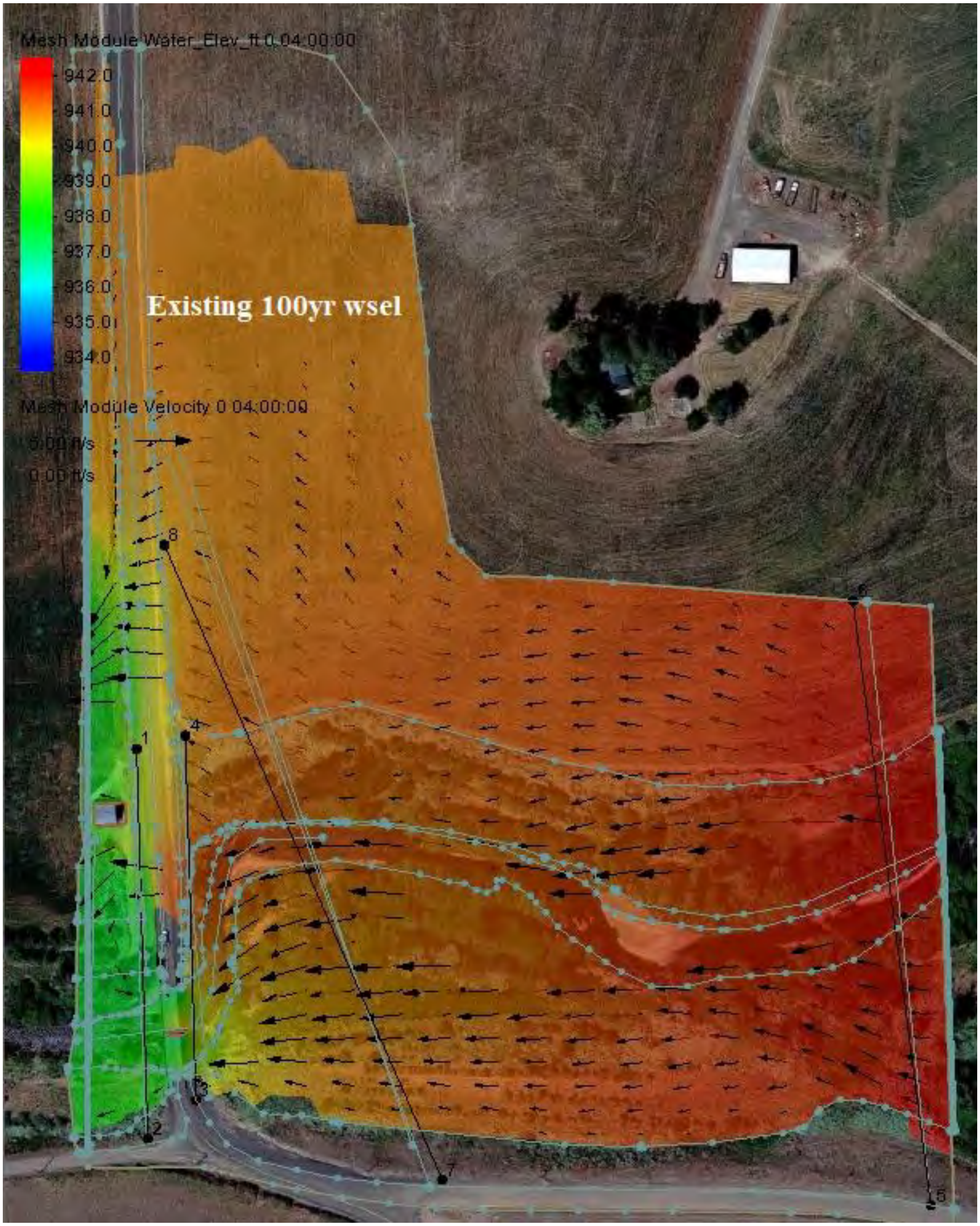
10.0
8.0
6.0
4.0
2.0
0.0
Existing Feb 7th, 2020 velocity
Mesh Module Velocity 0:04:00:00
5.00 ft/s
0.00 ft/s
1
2
5
6
7
8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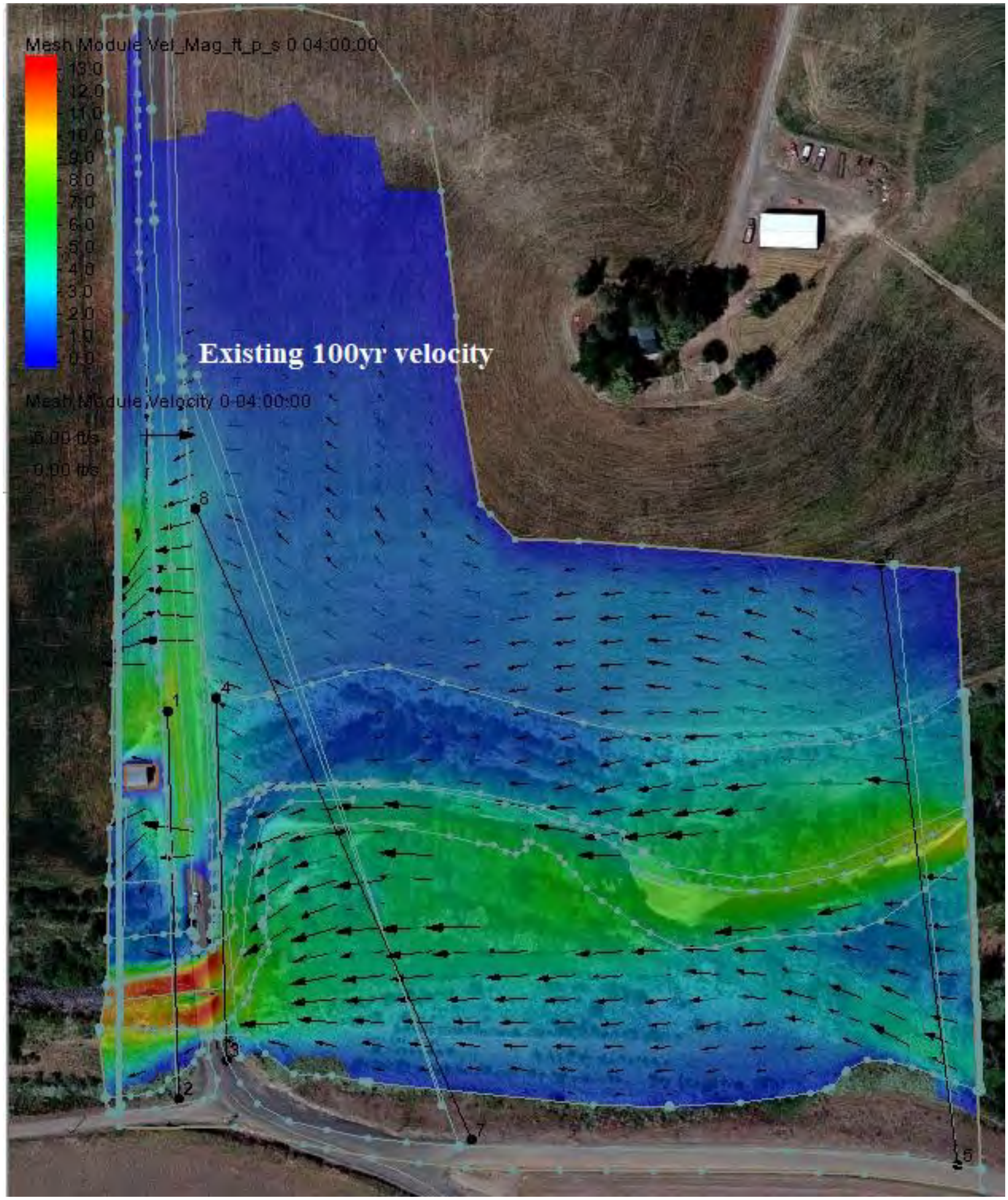
941.0
940.0
939.0
938.0
937.0
936.0
935.0
934.0
Existing 100yr wsel
Mesh Module Velocity 0 04:00:00
5.00 ft/s
0.00 ft/s
1
2
3
4
5
6
7
8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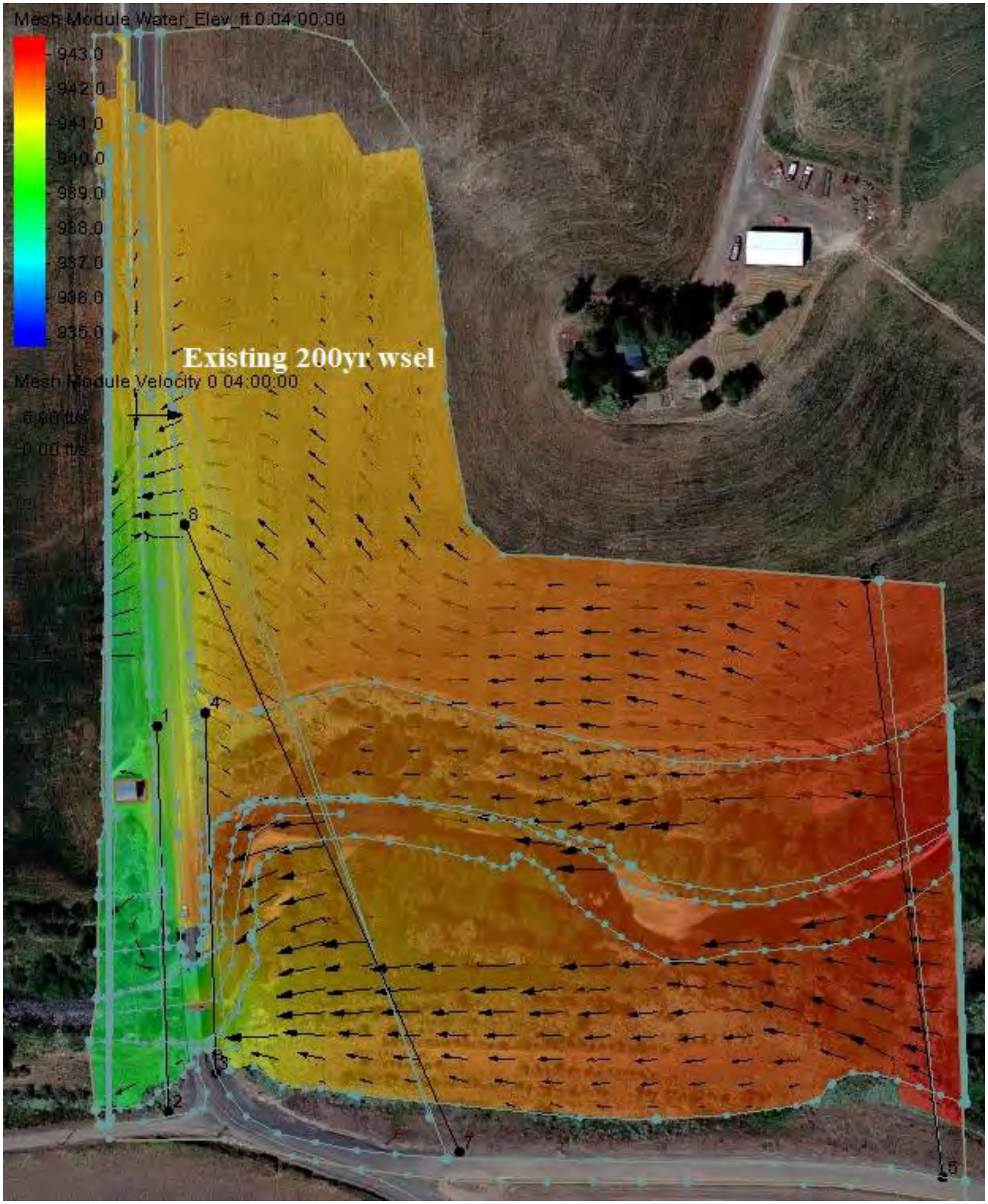
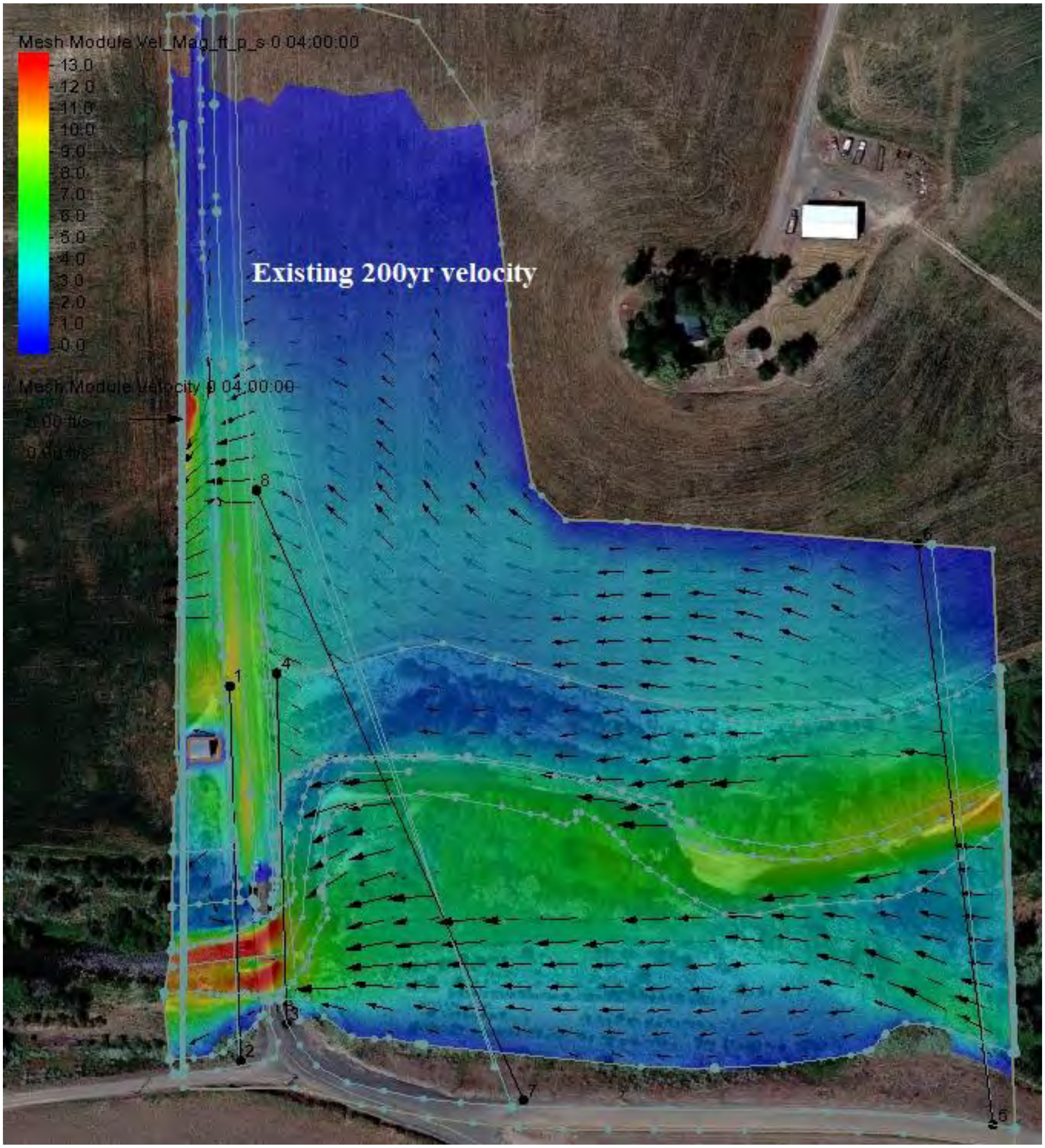
12.0
11.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
Existing 100yr velocity
Mesh Module Velocity 0 04:00:00
5.00 ft/s
0.00 ft/s
1
2
3
4
5
6
7
8


Mesh Module Water_Elev_ft 0 04:00:00
943.0
942.0
941.0
940.0
939.0
938.0
937.0
936.0
935.0
Existing 200yr wsel
Mesh Module Velocity 0 04:00:00
5.00 ft/s
0.00 ft/s
8
1
4
3
2
7
6
5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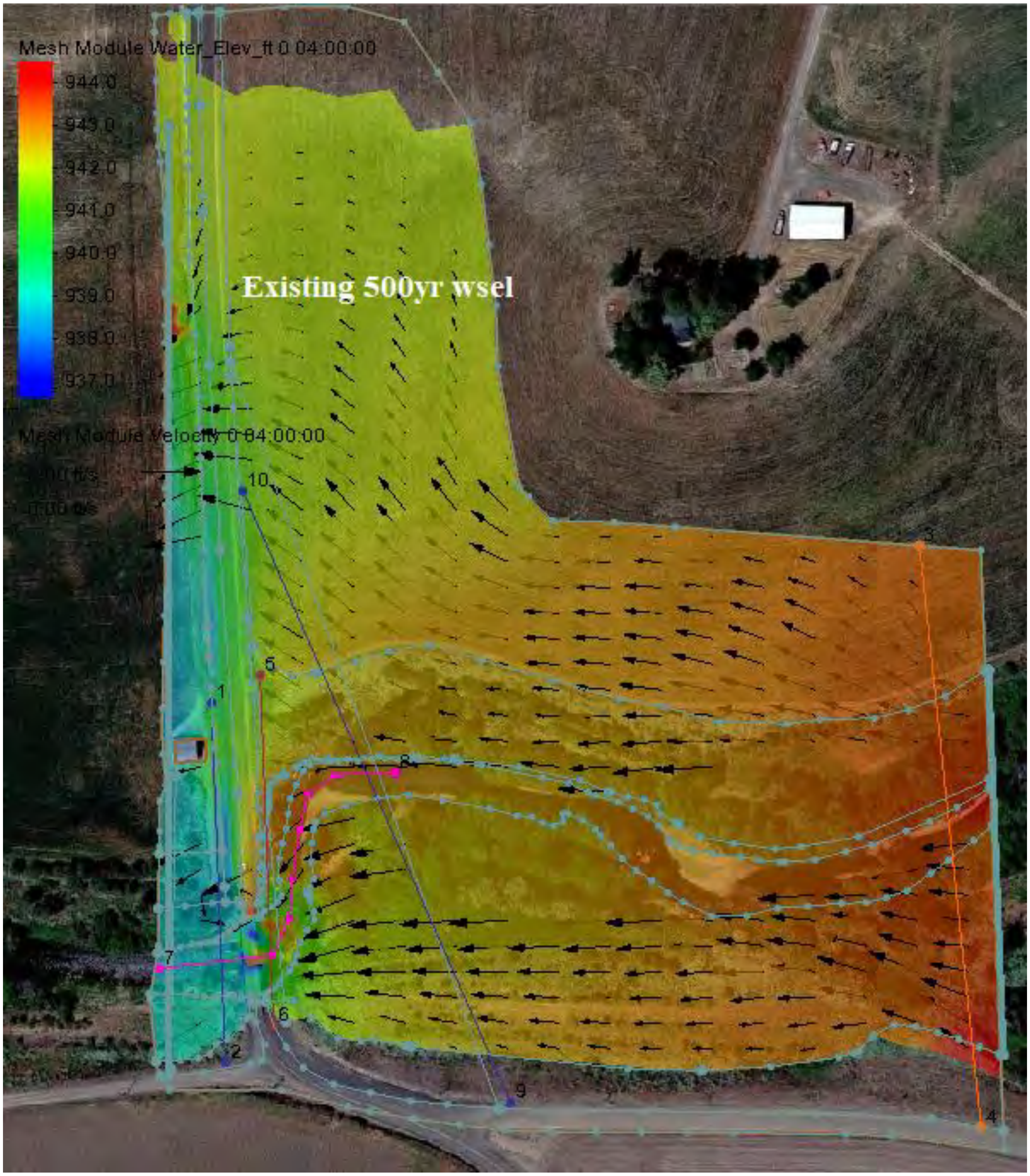
12.0
11.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
Existing 200yr velocity
Mesh Module Velocity 0 04:00:00
2.00 ft/s
0.00 ft/s
1
2
3
4
5
6
7
8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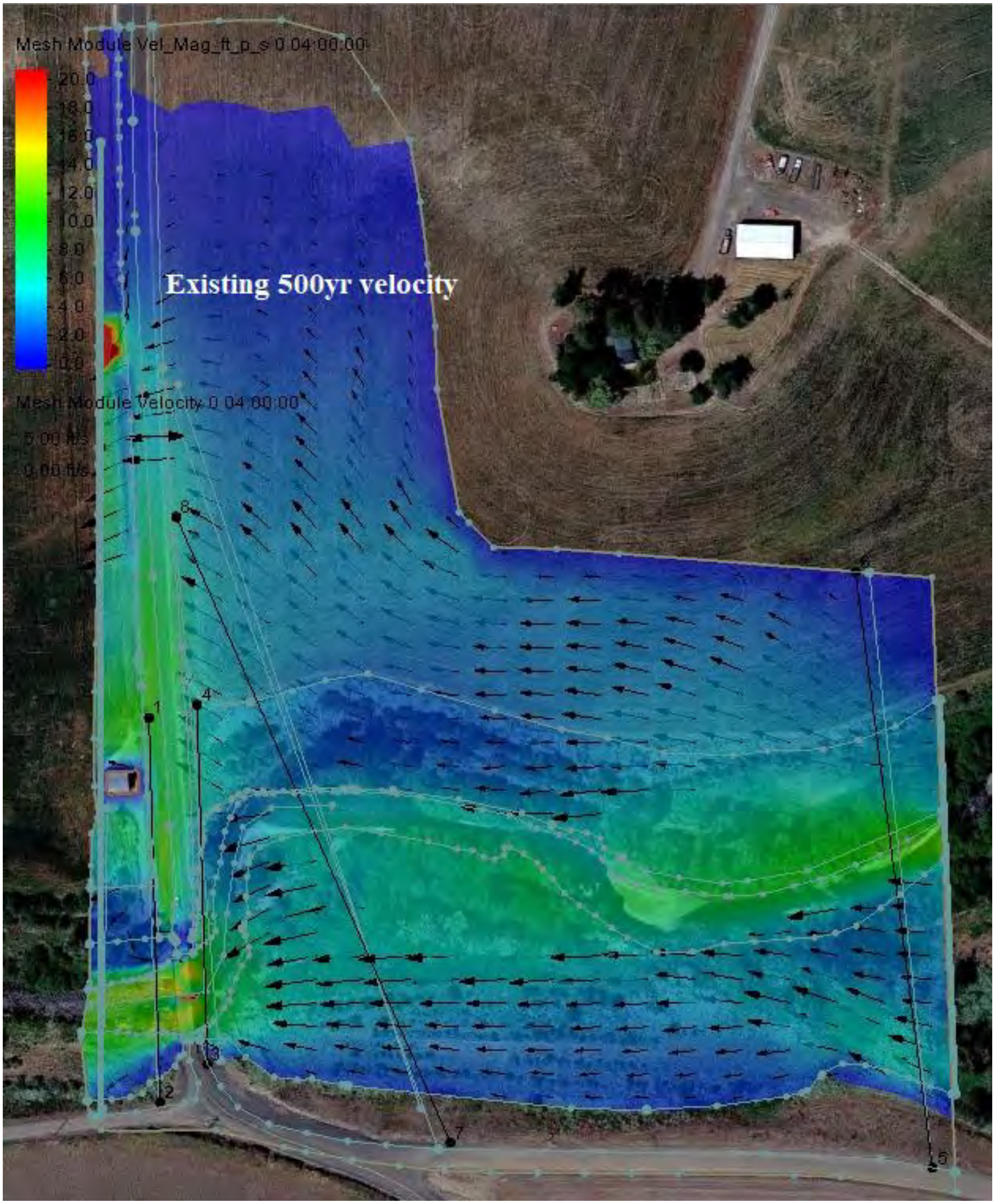
943.0
942.0
941.0
940.0
939.0
938.0
937.0
Existing 500yr wsel
Mesh Module Velocity 0 04:00:00
0.00 ft/s
10
3
5
1
8
7
6
2
9
4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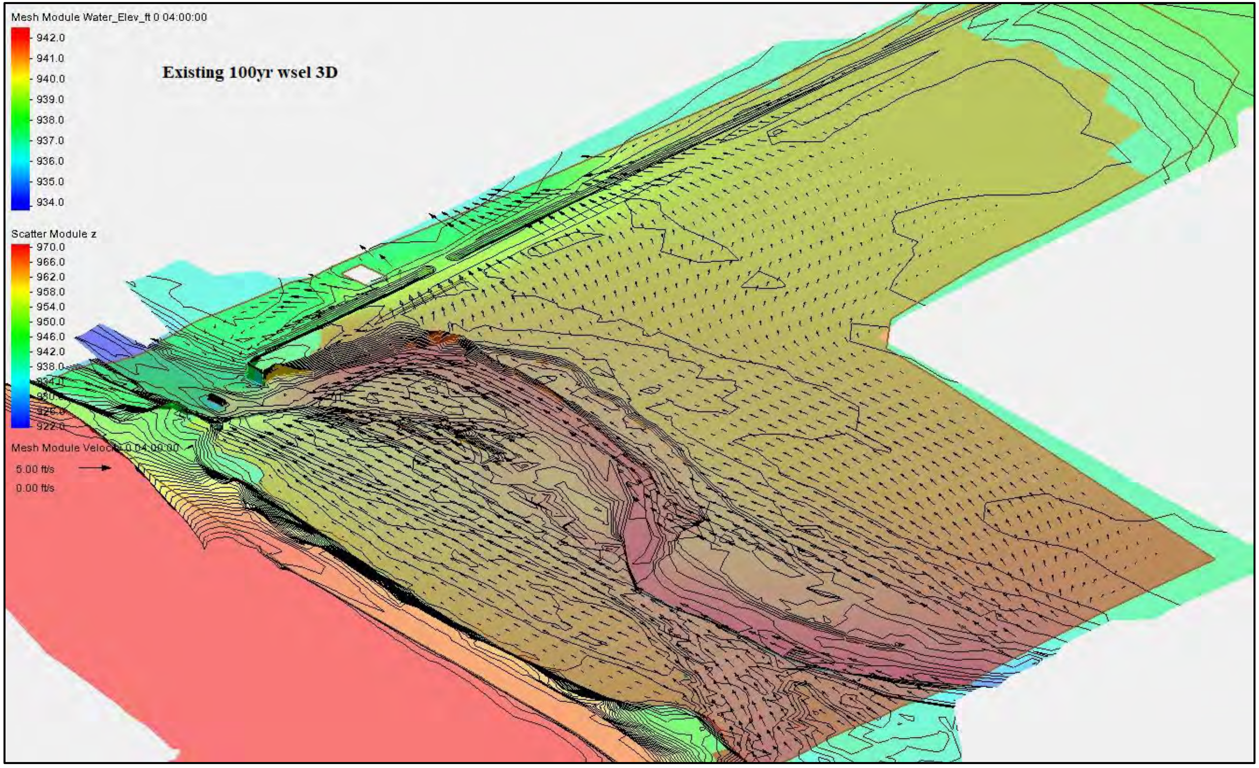
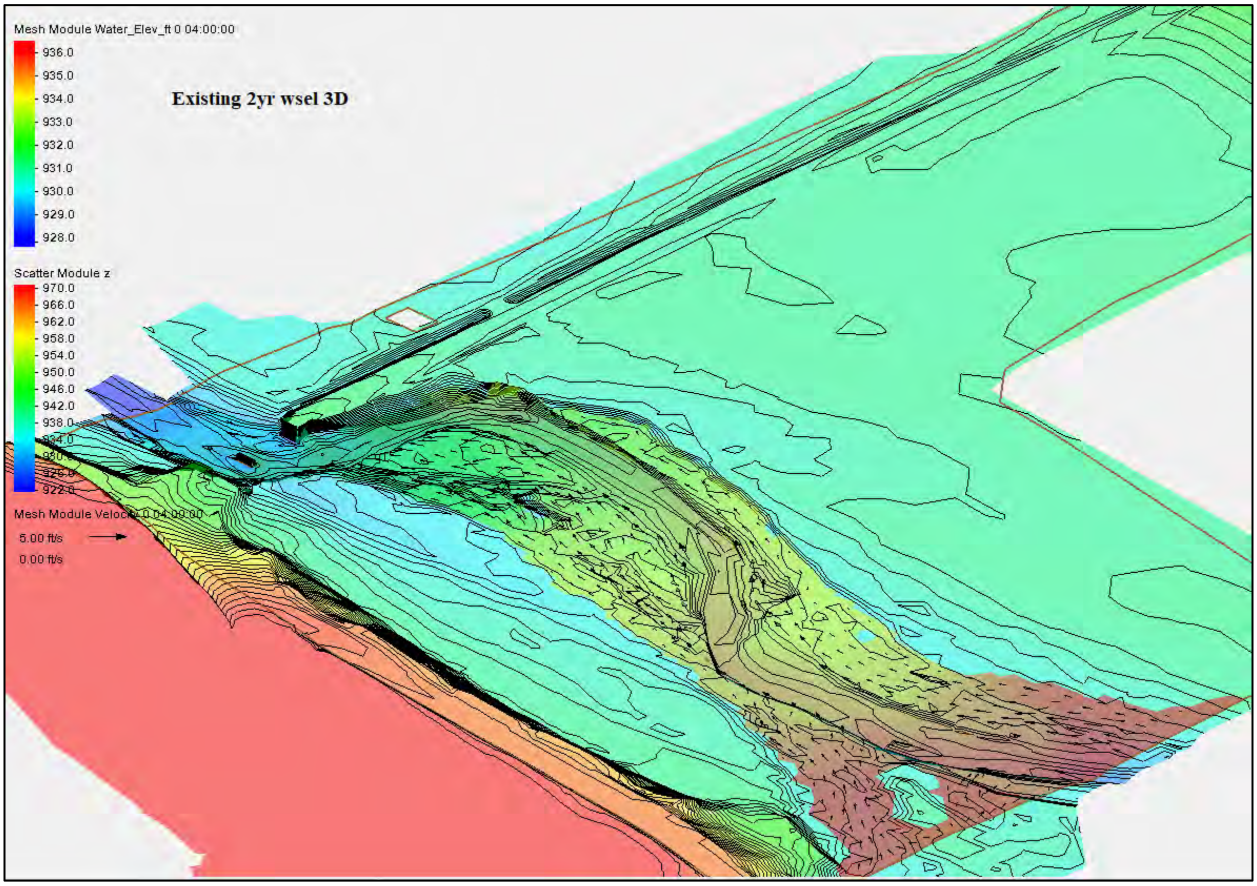
20.0
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
Existing 500yr velocity
Mesh Module Velocity 0 04:00:00
5.00 ft/s
0.00 ft/s
1
2
3
4
5
6
7
8

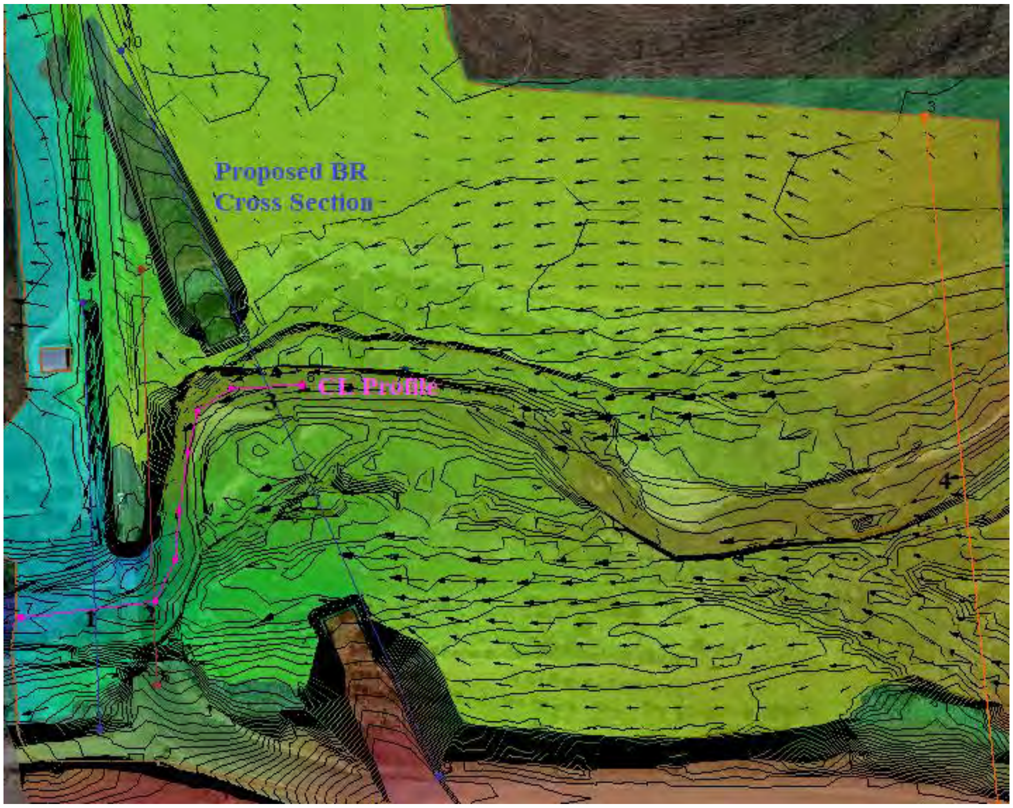
Existing 100yr wsel 3D

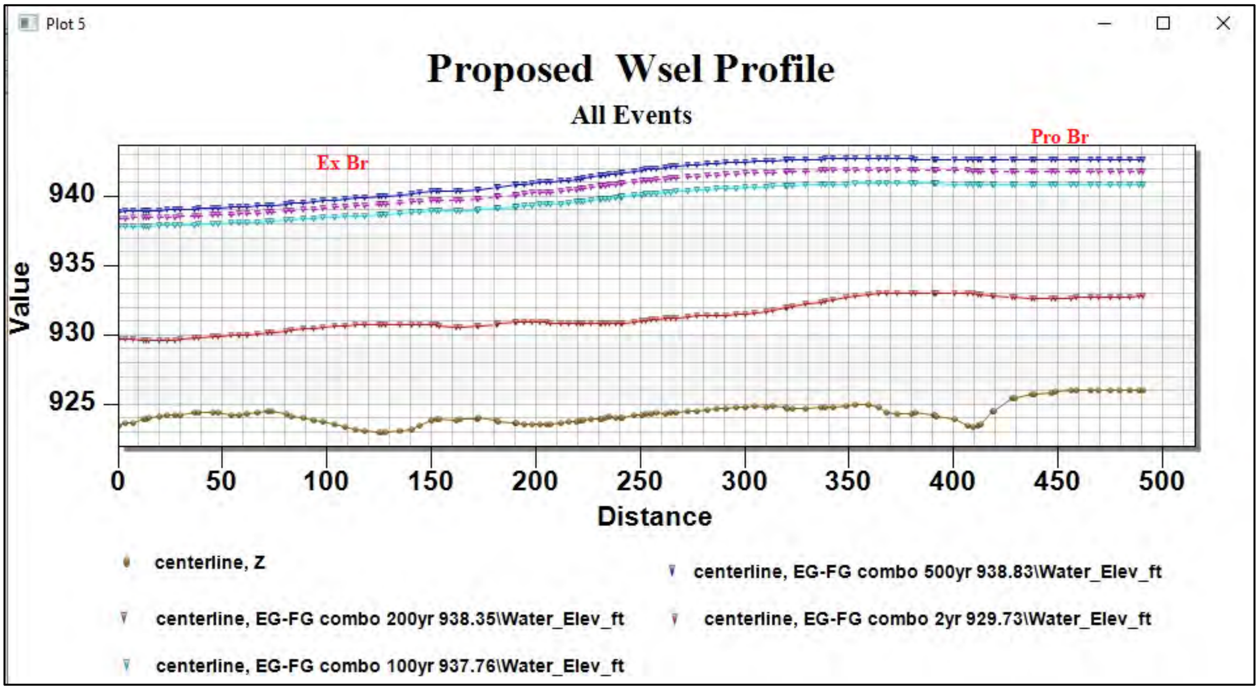


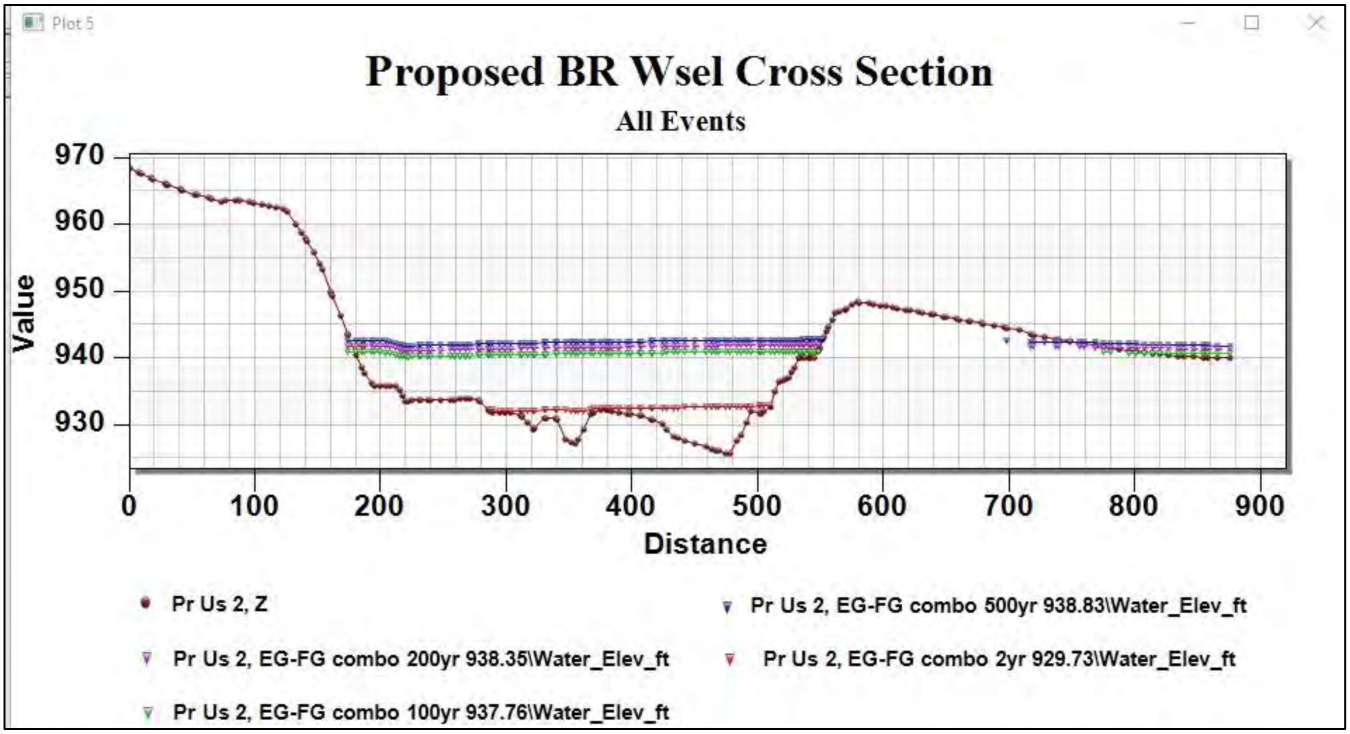


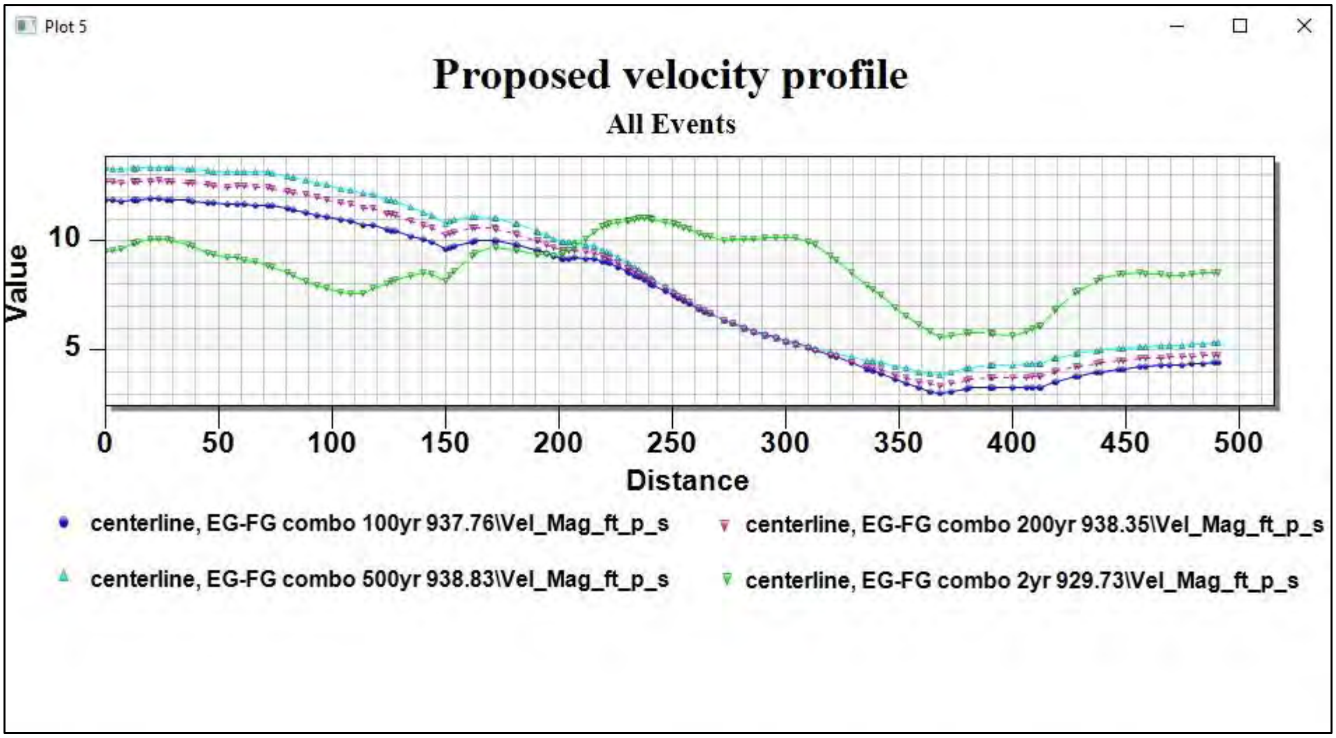
Proposed Results

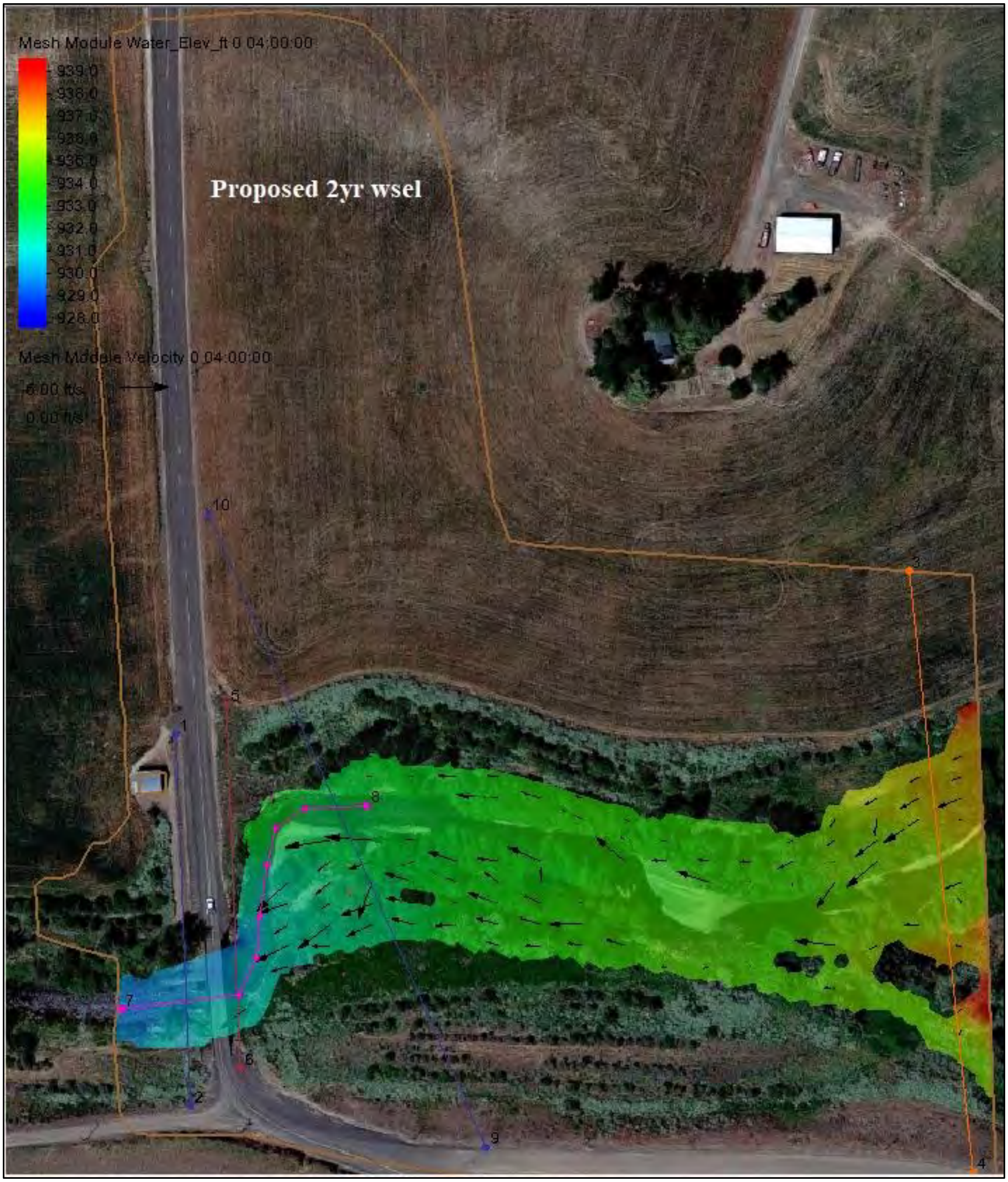
		Pro-EG-FG combo 2yr 929.73			Pro-EG-FG combo 100yr 937.76			Pro-EG-FG combo 200yr 938.35			Pro-EG-FG combo 500yr 938.83		
		Vel_Mag (ft/s)	Water_Depth (ft)	Water_Elev (ft)	Vel_Mag (ft/s)	Water_Depth (ft)	Water_Elev (ft)	Vel_Mag (ft/s)	Water_Depth (ft)	Water_Elev (ft)	Vel_Mag (ft/s)	Water_Depth (ft)	Water_Elev (ft)
Reach	Station	Ave	Ave	Ave	Ave	Ave	Ave	Ave	Ave	Ave	Ave	Ave	Ave
1-Ex br ds	89.264	6.22	3.94	930.33	4.09	4.33	938.36	4.82	5.01	939.04	5.5	5.53	939.56
2-Ex br us	152.182	7.1	5.11	930.54	5.22	5.61	939.94	6.18	6.41	940.74	7.01	7.05	941.38
3-Pr br us	457.85	4.04	2.53	932.39	3.67	6.82	940.63	3.98	7.11	941.54	4.31	7.25	942.27
4-Us xs	1286.08	3.17	2	935.9	3.27	5.17	941.77	3.61	5.89	942.7	4.01	6.68	943.5






Plot 5
Proposed BR Wsel Cross Section
All Events
970
960
950
940
930
Value
0
100
200
300
400
500
600
700
800
900
Distance
Pr Us 2, Z
Pr Us 2, EG-FG combo 500yr 938.83\Water_Elev_ft
Pr Us 2, EG-FG combo 200yr 938.35\Water_Elev_ft
Pr Us 2, EG-FG combo 2yr 929.73\Water_Elev_ft
Pr Us 2, EG-FG combo 100yr 937.76\Water_Elev_ft


Plot 5
Proposed velocity profile
All Events
10
5
Value
0
50
100
150
200
250
300
350
400
450
500
Distance
centerline, EG-FG combo 100yr 937.76\Vel_Mag_ft_p_s
centerline, EG-FG combo 200yr 938.35\Vel_Mag_ft_p_s
centerline, EG-FG combo 500yr 938.83\Vel_Mag_ft_p_s
centerline, EG-FG combo 2yr 929.73\Vel_Mag_ft_p_s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939.0
938.0
937.0
936.0
935.0
934.0
933.0
932.0
931.0
930.0
929.0
928.0
Mesh Module Velocity 0 04:00:00
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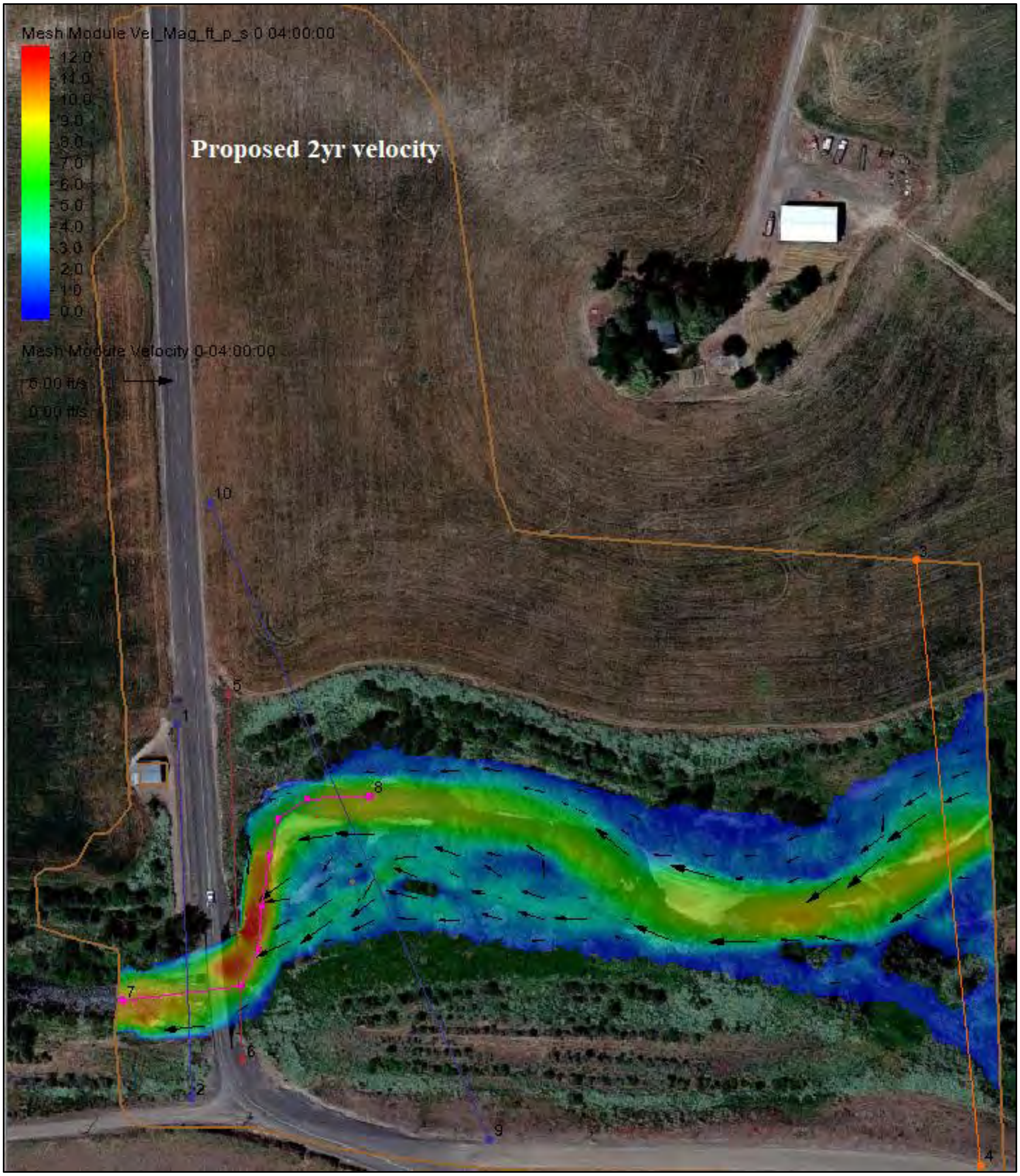
0.00 ft/s
Proposed 2yr wsel
10
3
5
1
8
7
6
2
9
4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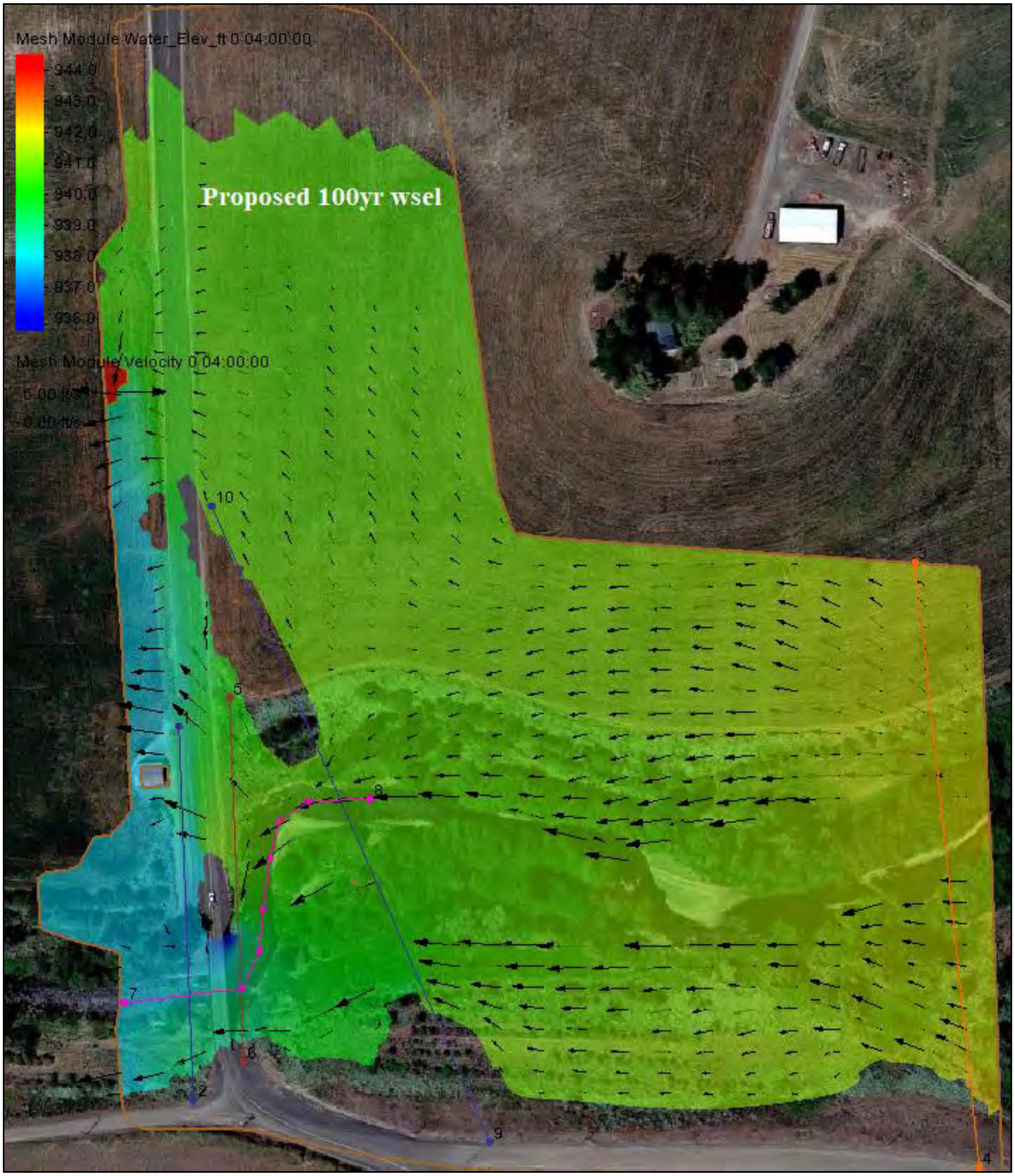
12.0
11.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
Proposed 2yr velocity
Mesh Module Velocity 0 04:00:00
5.00 ft/s
0.00 ft/s
10
3
5
1
8
7
6
2
9
4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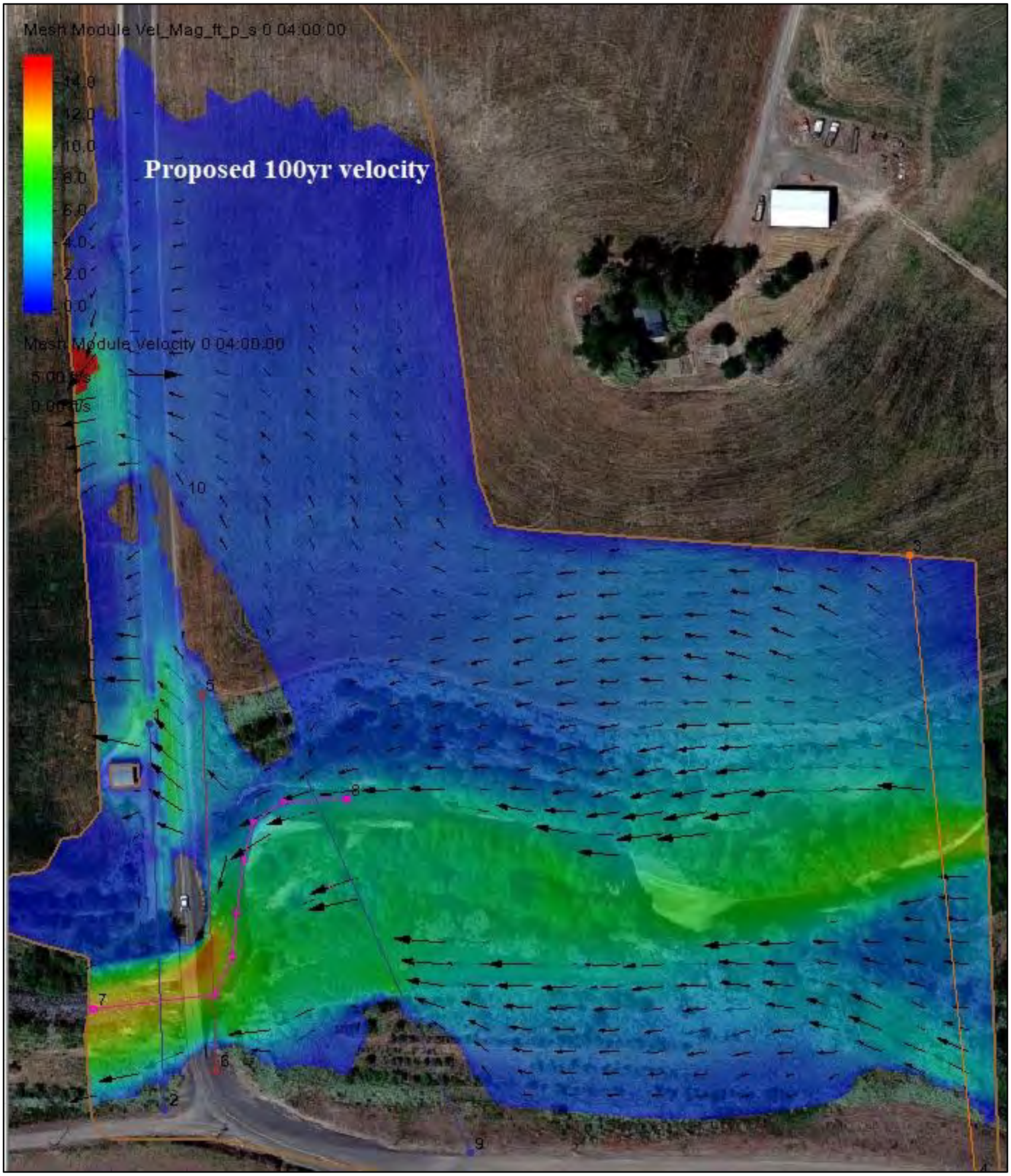
943.0
942.0
941.0
940.0
939.0
938.0
937.0
936.0
Proposed 100yr wsel
Mesh Module Velocity 0 04:00:00
5.00 ft/s
0.00 ft/s
10
3
5
8
7
1
6
2
9
4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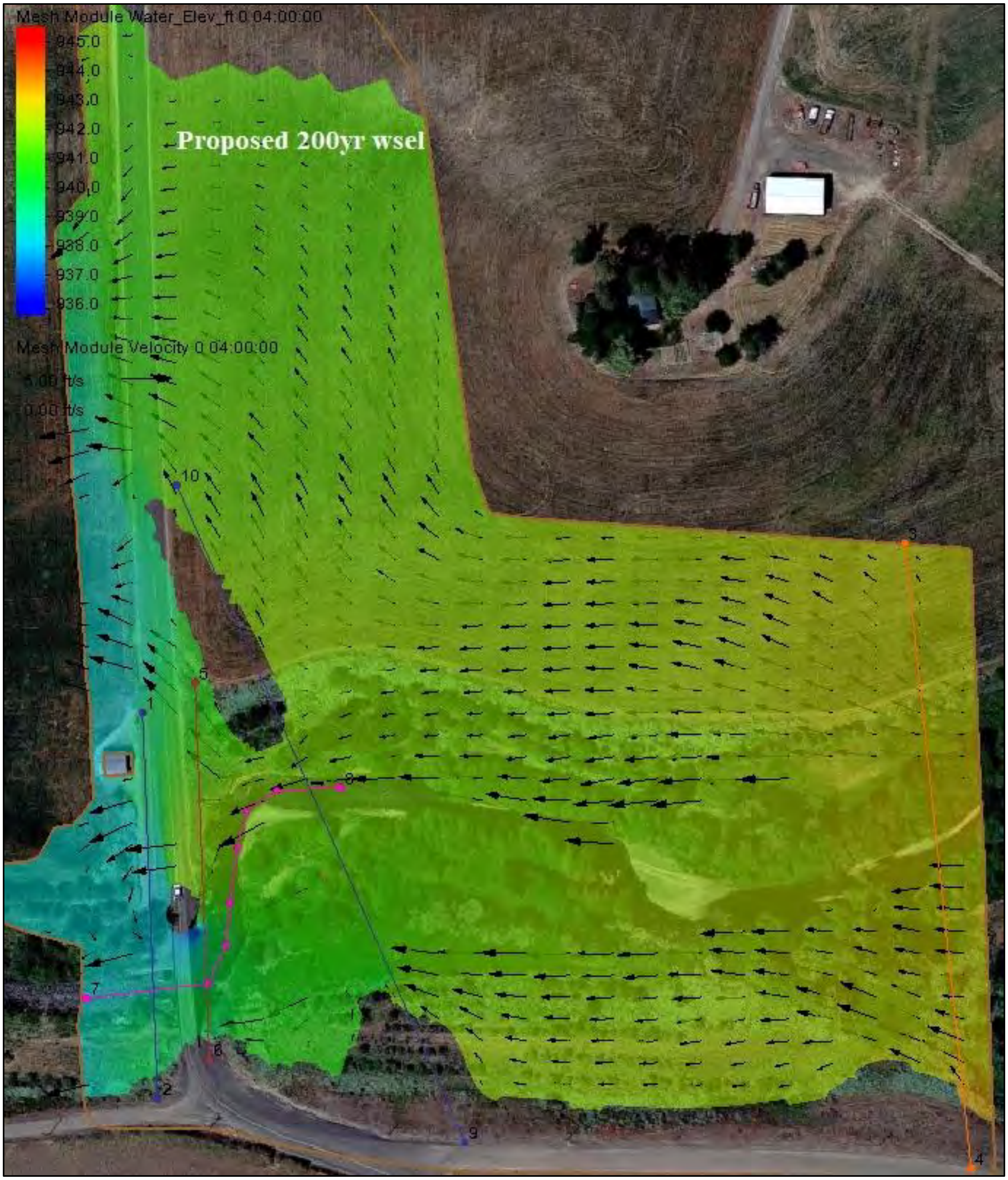
12.0
10.0
8.0
6.0
4.0
2.0
0.0
Proposed 100yr velocity
Mesh Module Velocity 0 04:00:00
5.00 ft/s
0.00 ft/s
10
3
5
1
8
7
6
2
9
4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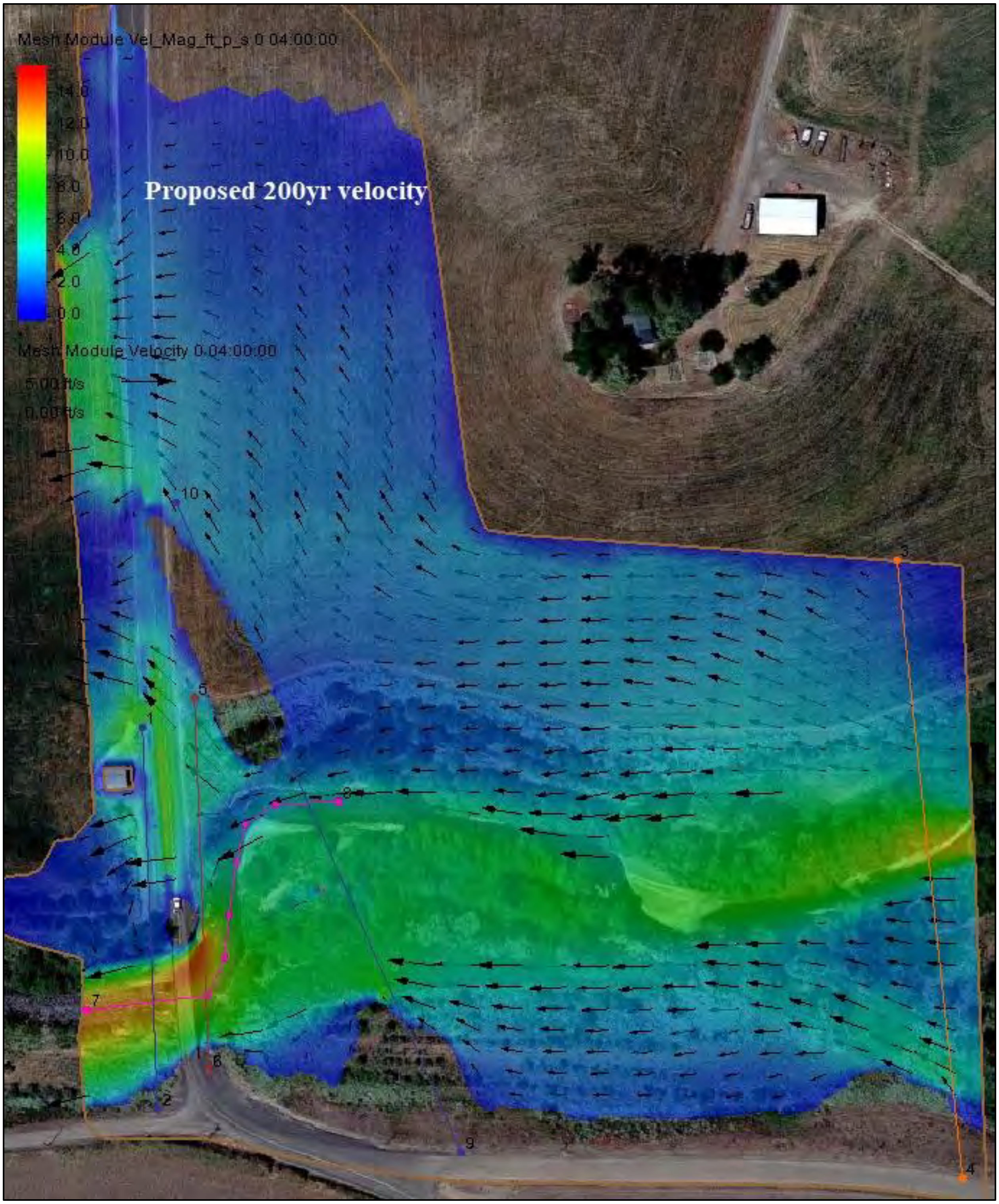
944.0
943.0
942.0
941.0
940.0
939.0
938.0
937.0
936.0
Proposed 200yr wsel
Mesh Module Velocity 0 04:00:00
5.00 ft/s
0.00 ft/s
10
3
5
1
8
7
6
2
9
4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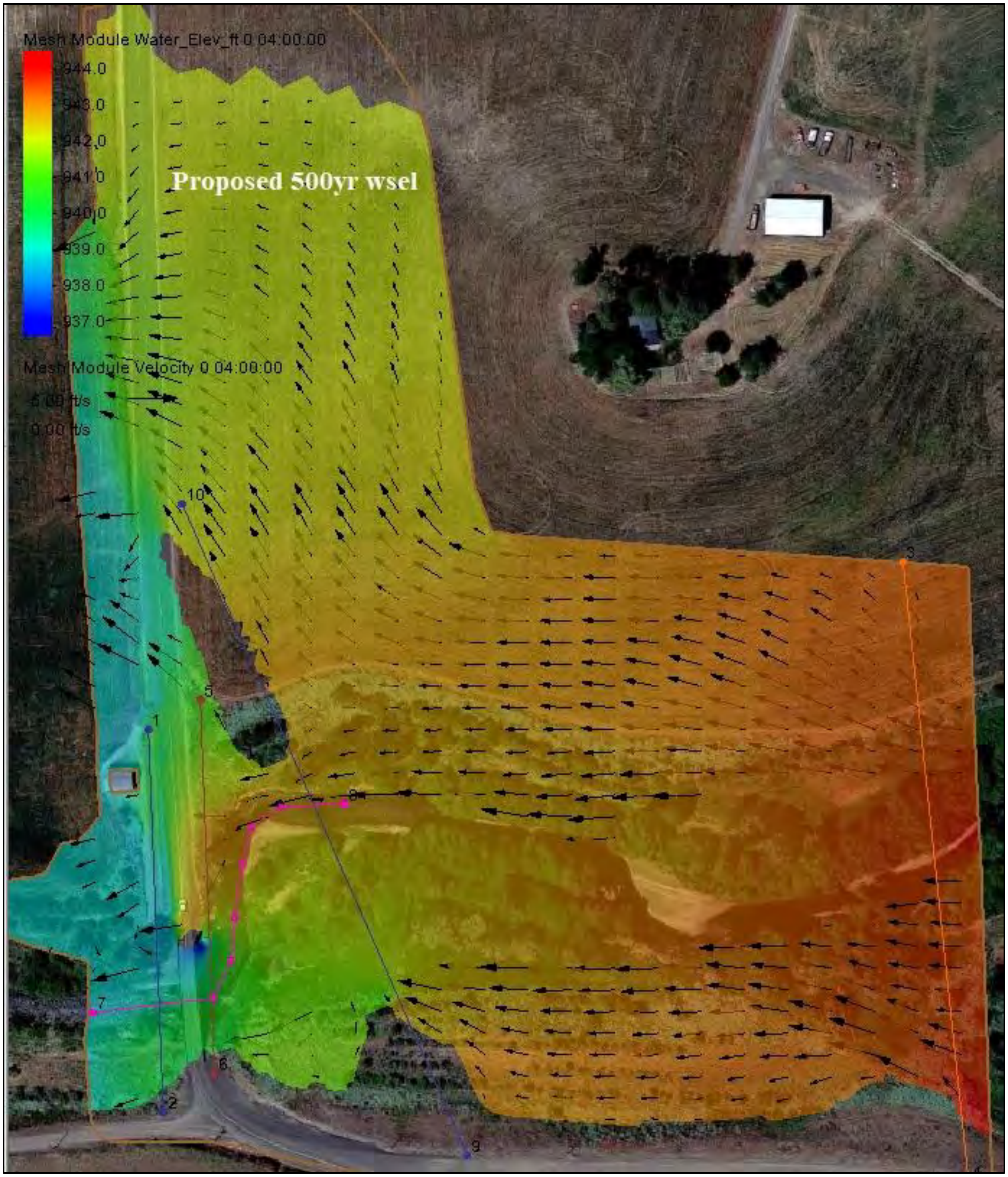
8.0
6.0
4.0
2.0
0.0
Proposed 200yr velocity
Mesh Module Velocity 0 04:00:00
5.00 ft/s
0.00 ft/s
10
3
5
1
8
7
7
6
2
9
4


Mesh Module Water_Elev_ft 0 04:00:00
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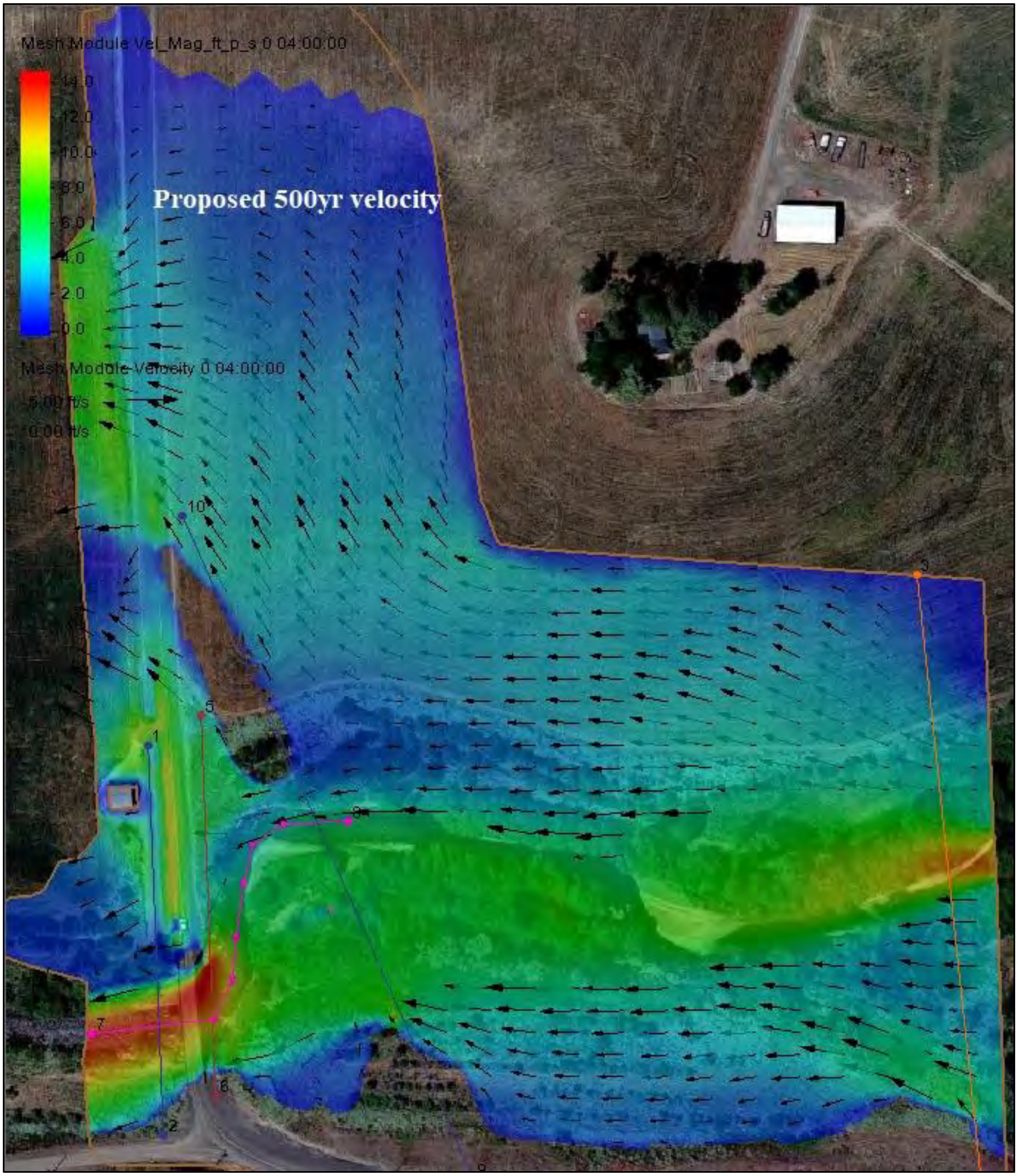
943.0
942.0
941.0
940.0
939.0
938.0
937.0
Proposed 500yr wsel
Mesh Module Velocity 0 04:00:00
5.00 ft/s
0.00 ft/s
1
2
3
5
6
7
8
9
10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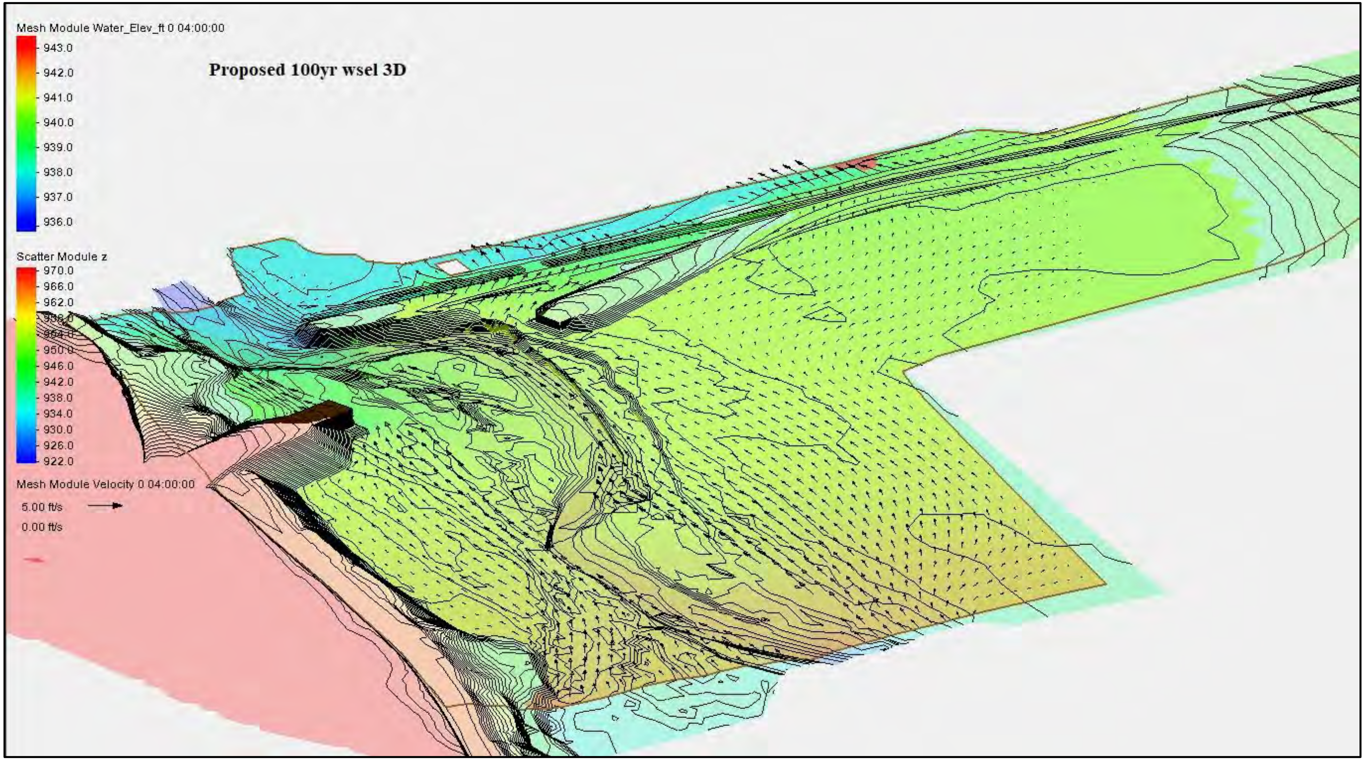
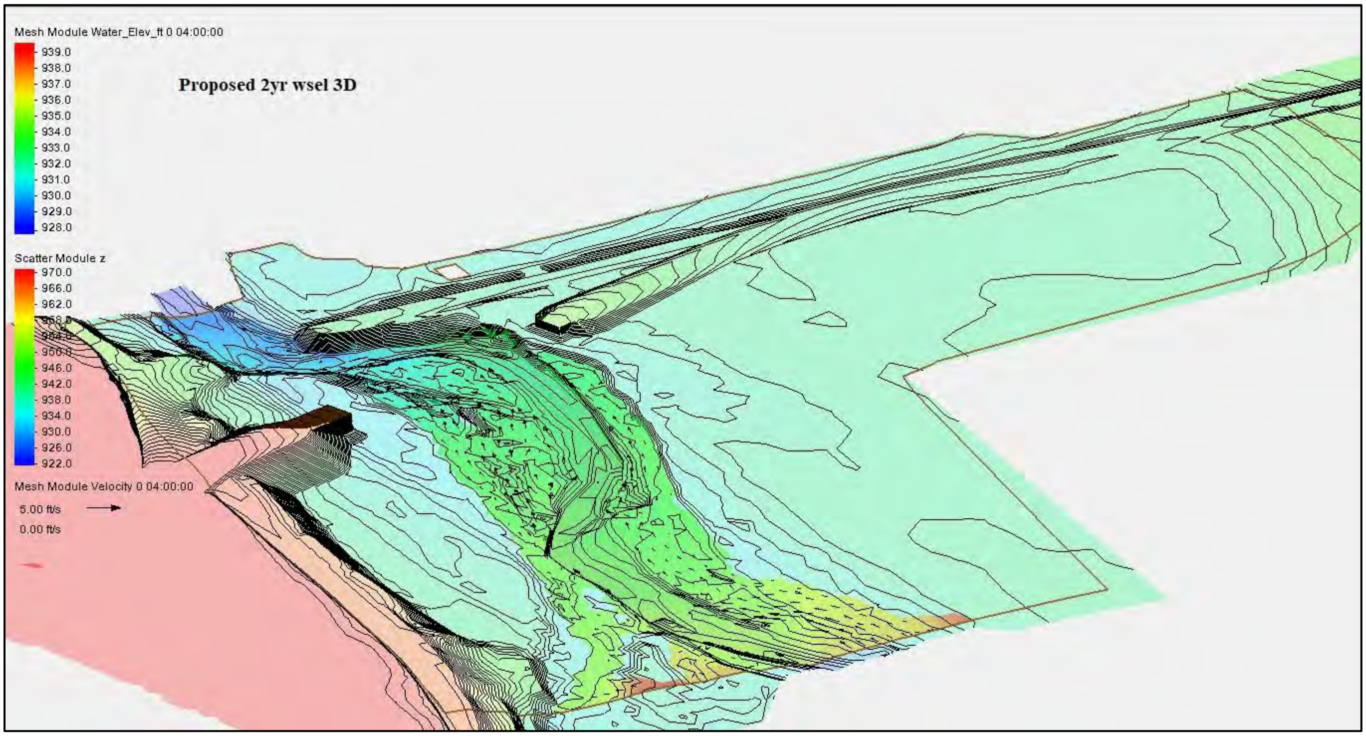
12.0
10.0
8.0
6.0
4.0
2.0
0.0
Proposed 500yr velocity
Mesh Module Velocity 0 04:00:00
5.00 ft/s
0.00 ft/s
10
3
5
1
8
7
6
2
9

Proposed 100yr wsel 3D





Vertical Clearance Memo

MP Stormwater Engineering LLC
PO Box 27, East Olympia, WA 98540

May 19, 2021
Mr. Kash Nikzad, PhD, PE
TranTech Engineering, LLC.
365-118th Ave SE, Suite No. 100
Bellevue, WA 98005

Subject: Dell Sharpe Bridge Replacement
Vertical Clearance Modeling Memo

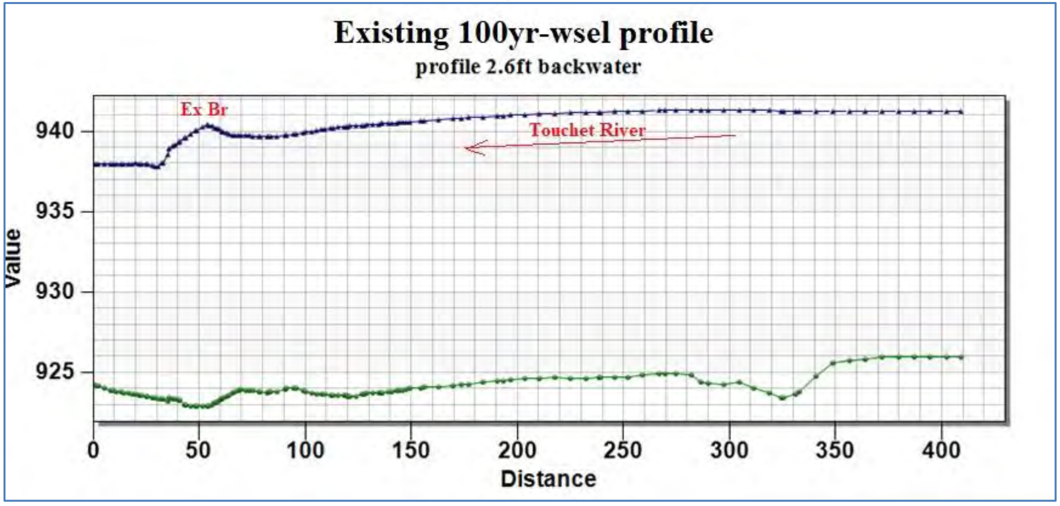
Dear Mr. Nikzad:

This memo provides a summary for Task 5.6 on the vertical clearance modeling. The purpose of this task is to increase the proposed vertical clearance on the north end of proposed bridge span. It was noted with the previous modeling that the proposed bridge does not meet the 3-foot clearance on the north, it currently has approximately 0.49ft of vertical clearance but on the south, it has 11.69ft of clearance. It was identified that the existing roadway prism is the downstream controlling factor that is creating a rise in the water surface elevation on the north compared to the south where the existing bridge has been removed in the proposed condition. This task is to provide one scenario with a couple of iterations that will modify the existing roadway prism approach to see how much the water surface elevation will decrease on the north end.

Water Surface Elevations for Existing Conditions

It was noted in the 30% Hydraulic Analysis Memo from March 23, 2021, that the existing bridge crossing is a current constriction creating approximately 2.6ft of backwater. This is seen in Figure 1 below with the 100yr water surface elevation (WSEL) profile.

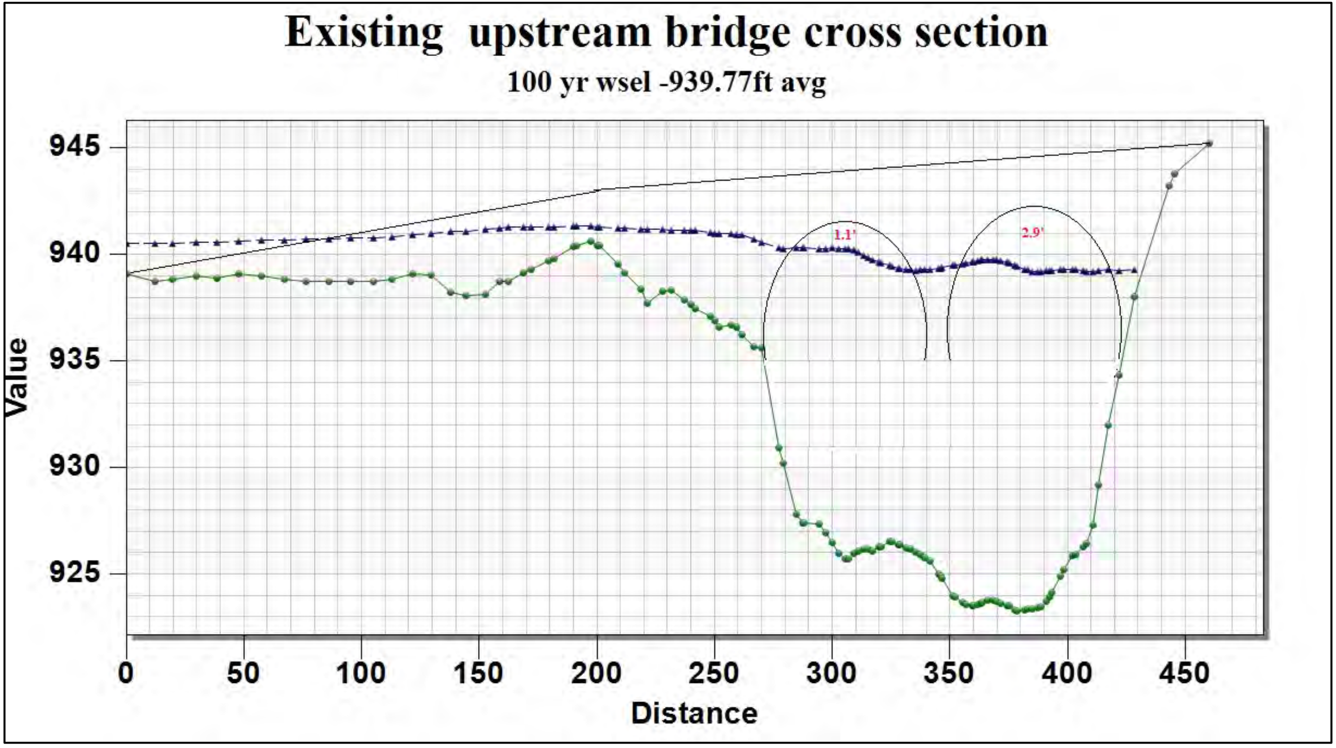
Figure 1



The water surface elevation will drop with the proposed changes including removal of the existing bridge. Removing the existing bridge and pier will open the hydraulic conveyance and reduce the upstream water surface elevation.

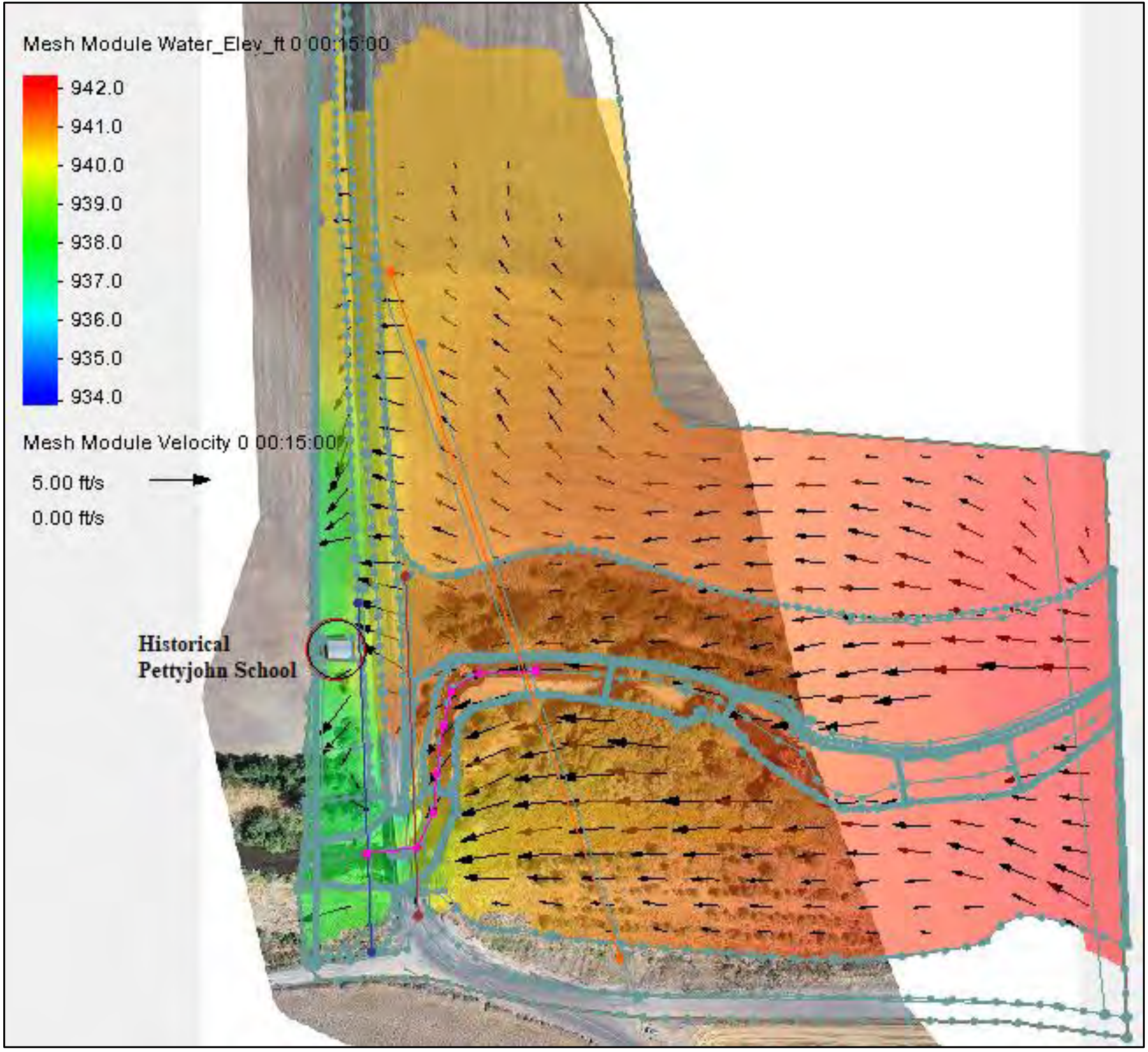
The 30% Hydraulic Analysis memo also shows that the existing bridge does not have the minimum 3ft vertical clearance for the 100-yr event. The north end arch has approximately 1.1ft vertical clearance in the top arch section and the south end arch has approximately 2.9ft vertical clearance in the top arch section. This may not provide sufficient clearance for debris.

Figure 2



The SMS plan view in Figure 3 shows the existing 100-year WSEL flood extents. The 100-year flood overtops the existing roadway on north and south of the Pettyjohn School. However, approximately 100ft of the existing roadway profile does not over top. This forces the river to run parallel to the roadway acting like a levee until it gets to the bridge opening. This creates high velocities around the bridge opening.

Figure 3

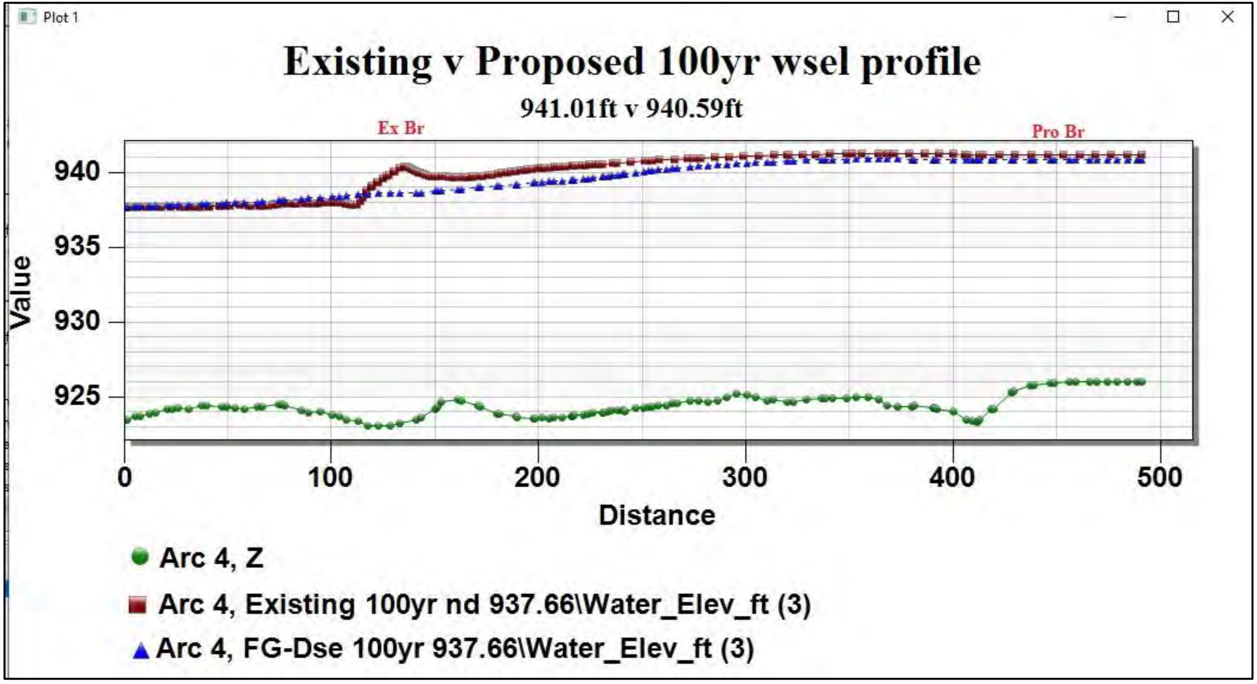


Water Surface Elevations for Proposed Conditions

When modeling the proposed conditions, the first run will remove the existing bridge and laying back the slopes to catch at the existing grade. No changes will be made on the existing roadway prism.

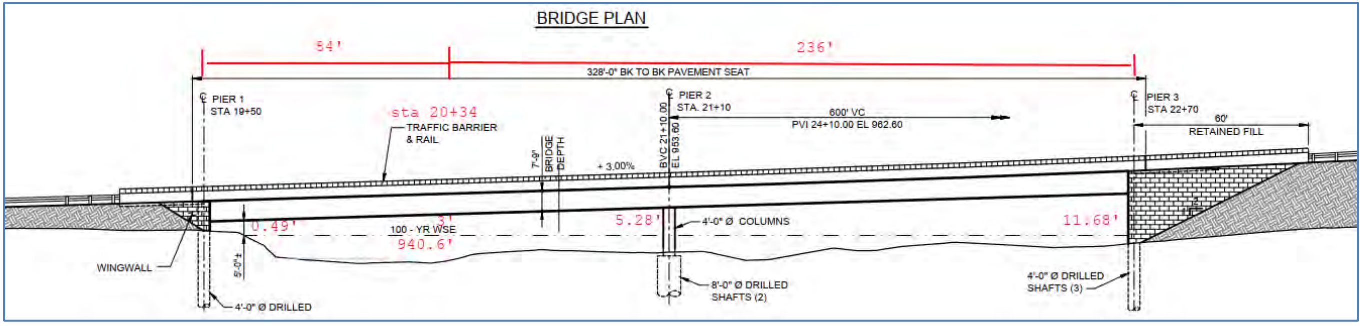
Looking at Figure 4, removing the existing bridge flattened out the WSEL at the existing bridge crossing. However, there is still a slight backwater effect on the water surface profile.

Figure 4



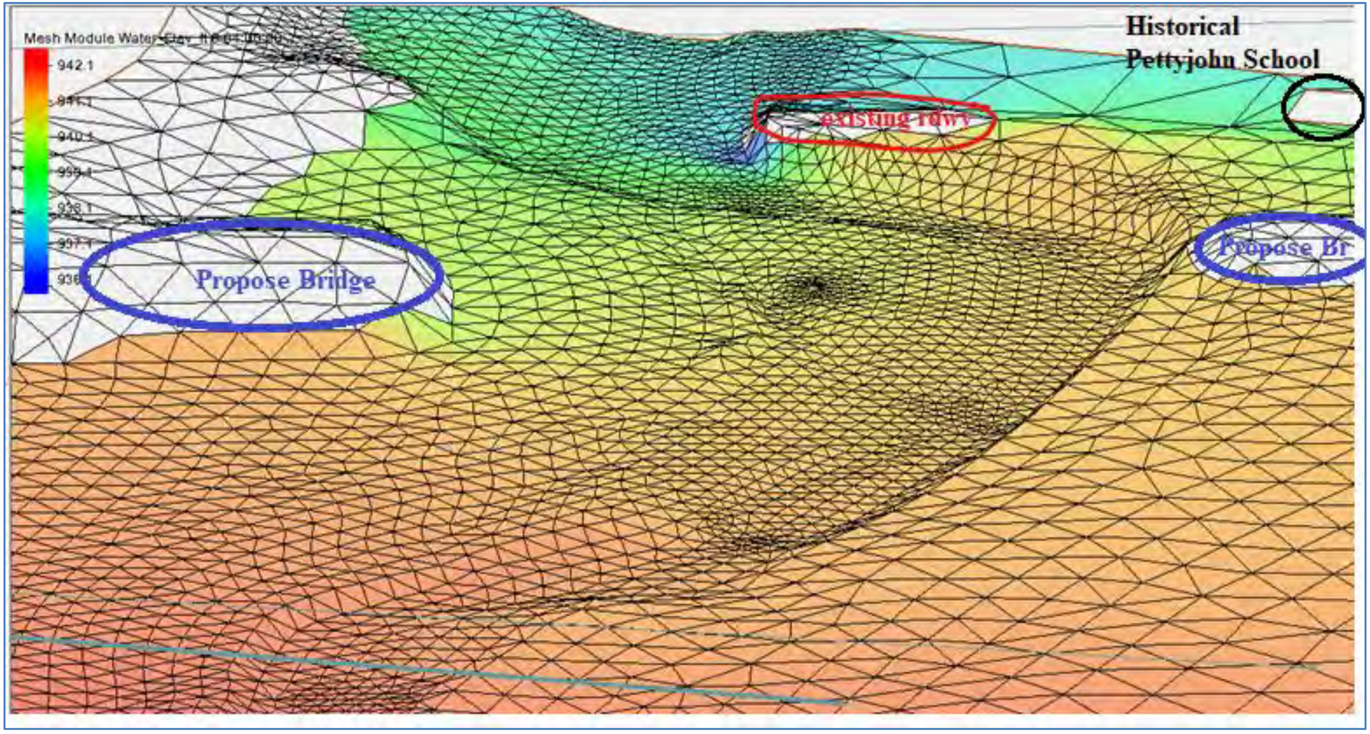
The WSEL at the proposed bridge location is approximately elevation 940.59ft with the Future Grade at Dell Sharpe (FG-Dse) and elevation 941.01ft with Existing conditions. Looking at Figure 4, the water surface elevation from the existing in the brown square compared to the proposed bridge in the blue triangle dropped 0.42ft. at the proposed bridge location. It was also noted that on the north end the vertical clearance for the proposed bridge is approximately 0.49ft. Thus, from station 19+50 where it is 0.49ft of clearance to station 20+34 where it does meet the 3ft clearance is 84ft. 26% of the proposed bridge does not meet the recommended criteria, but the remaining 74% of the proposed bridge exceeds it with 11.69ft of vertical clearance on the south end as seen in Figure 5.

Figure 5



Looking at Figure 6, it shows the SMS 3D view where the WSEL is flowing downstream from the proposed bridge to the updated existing bridge open section. It is noted in the red circle below that this section of the existing roadway does not overtop for approximately 84ft. If this area is lowered it might decrease the WSEL upstream at the proposed bridge crossing since the existing roadway is the downstream controlling elevation. The top of the existing roadway is around elevation 943ft and would need to drop down 4ft to elevation 939ft to result in overtopping and not be below the existing roadway elevation in front of the Historical Pettyjohn School.

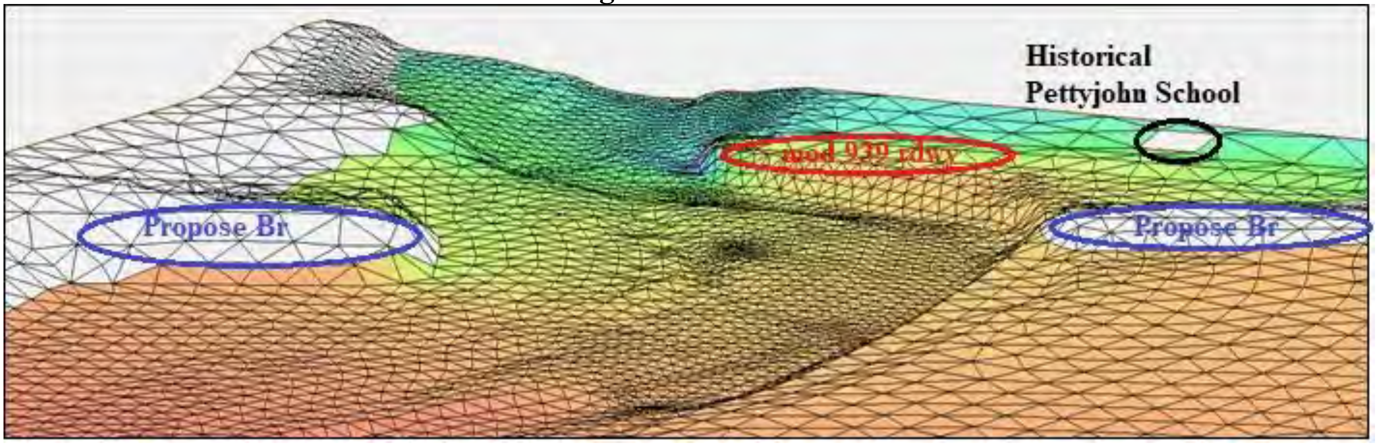
Figure 6



Water Surface Elevations for Modified Existing Conditions.

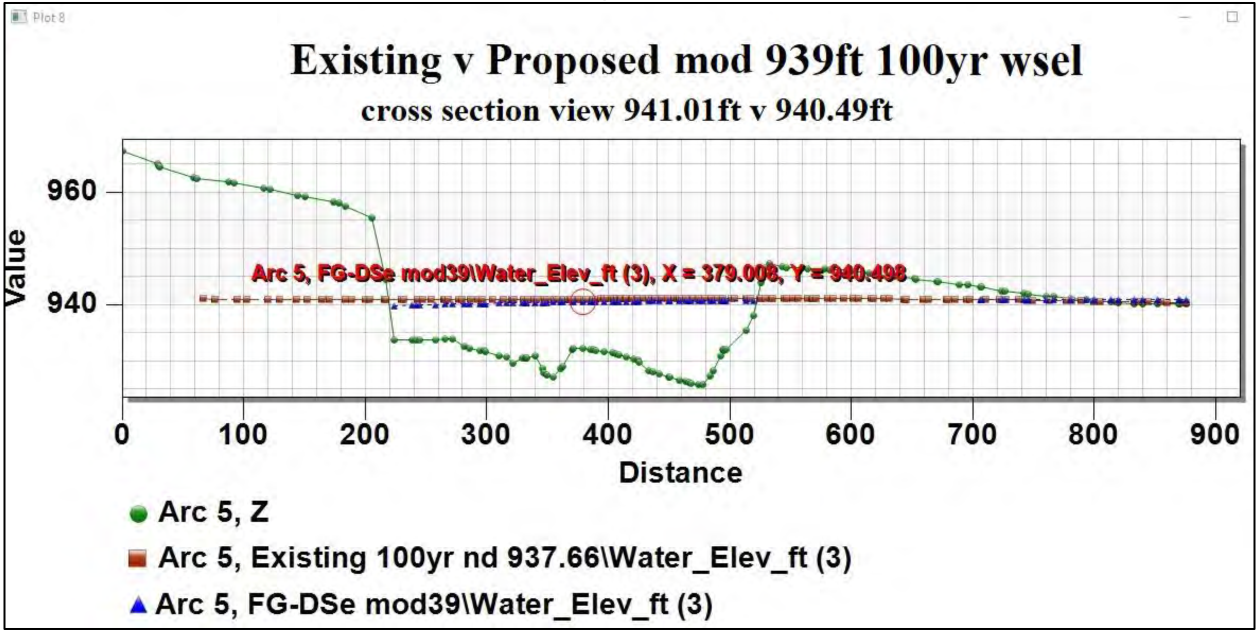
The first iteration was to regrade the existing roadway down to elevation 939ft and keeping everything the same. In Figure 7, the 3D view shows the existing roadway is overtopping in the red circled area since there are no white areas showing.

Figure 7



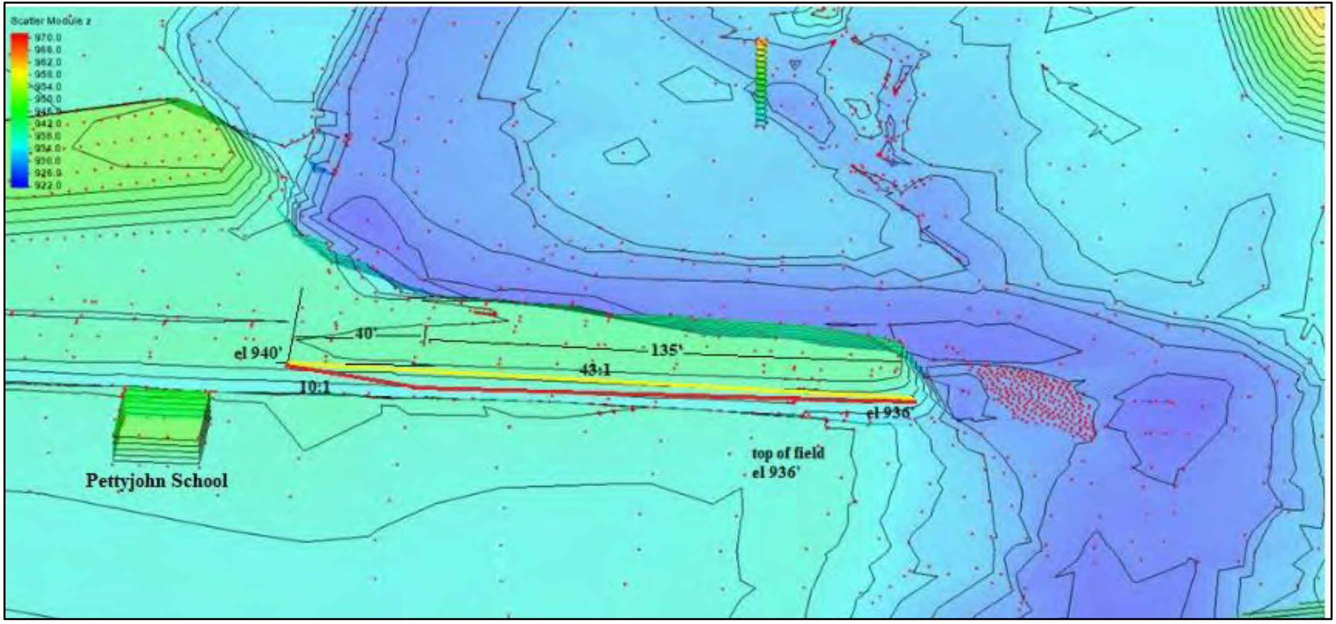
The WSEL lowered to elevation 940.49ft at the proposed bridge location, which is only 0.10ft compared to the previous proposed model with no modifications. This is not enough to make a major difference in the vertical clearance as seen in Figure 8. However, the velocity decreased since the entire roadway is overtopping and not being forced along the roadway like a levee system as before.

Figure 8



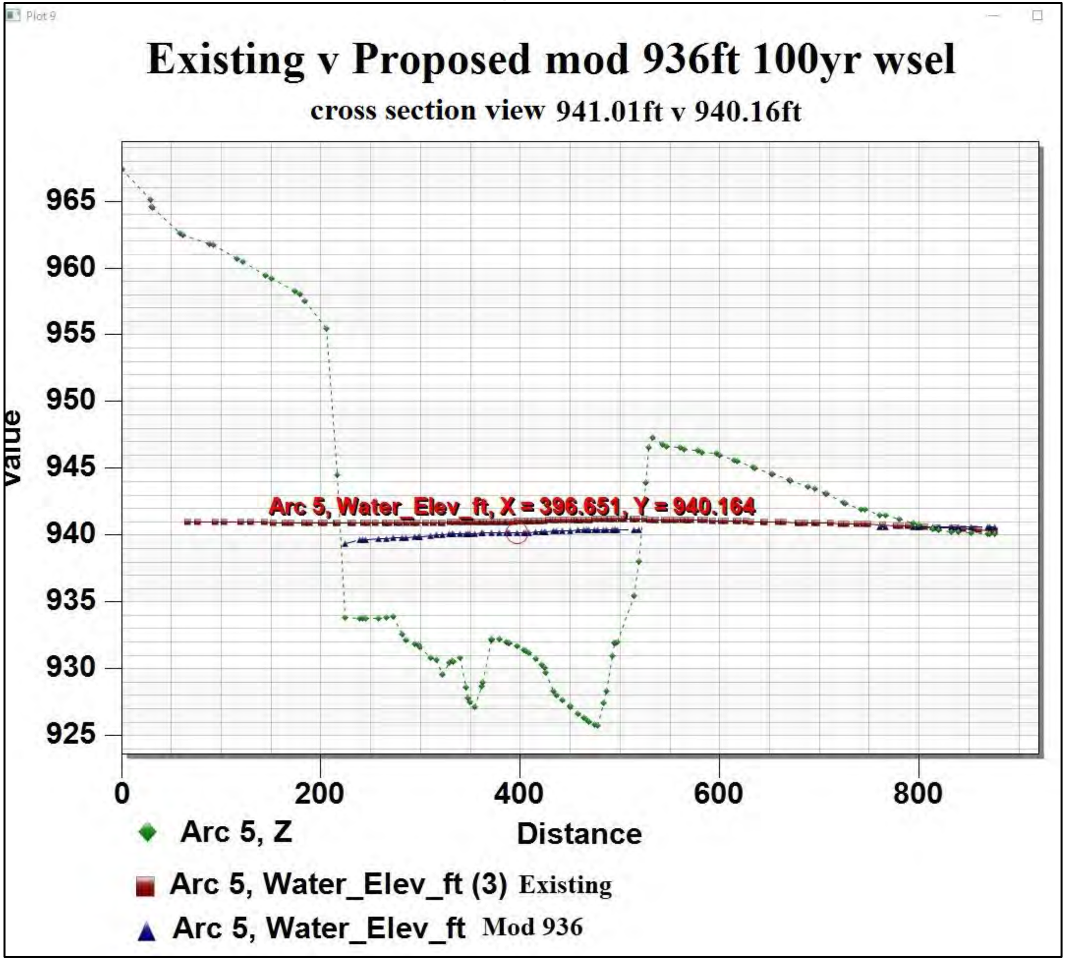
These findings were presented during the Bi-Weekly meeting on May 4th, and the County asked if an additional modification to the existing roadway could be run as another scenario. This scenario would lower the roadway down to elevation 936ft for 135ft and then taper back to elevation 940ft for 40ft. The elevation at 936ft was chosen since it matches the downstream side of the existing field as seen below in Figure 9.

Figure 9



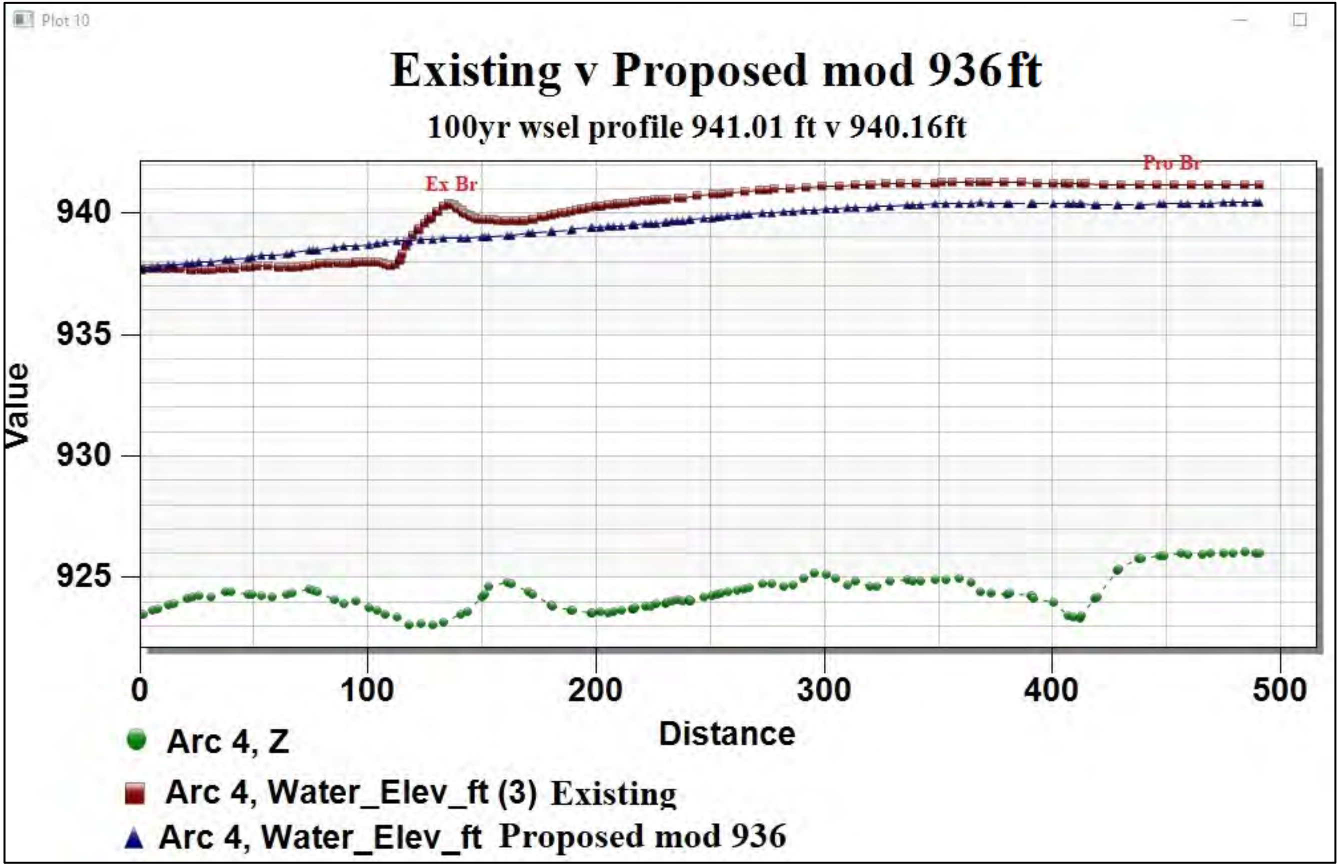
Looking at Figure 10, the modified existing roadway at elevation 936ft flattened out the WSEL because the existing roadway which was acting as a levee was removed. The water surface elevation at the proposed bridge location for this modified 936ft scenario is approximately elevation 940.16ft which is a vertical clearance of 0.92ft or almost one foot.

Figure 10



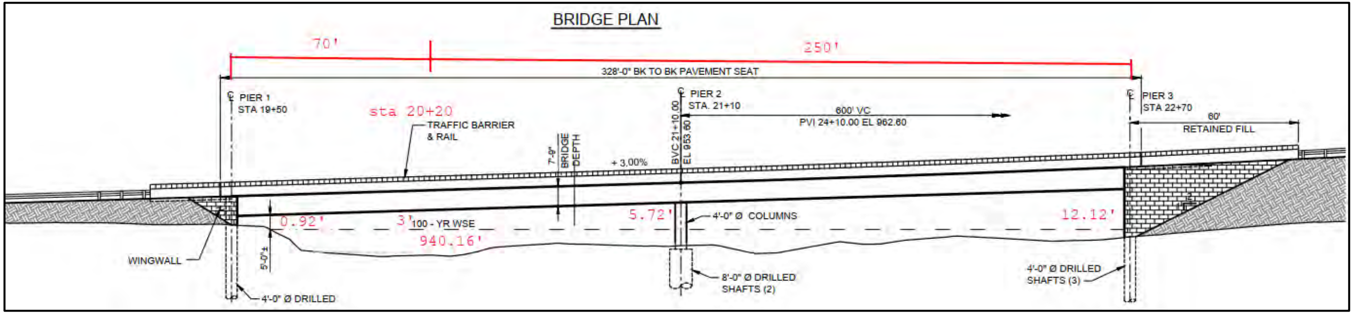
Looking at Figure 11, you can see the WSEL profile from the existing in the brown square compared to the proposed in the blue triangle dropped 0.85ft, which is an improvement. However, looking downstream is also important because the proposed conditions need to tie back to the existing conditions and to ensure that no new impacts are being created. The difference between the existing conditions WSEL at 937.67ft and the proposed mod 936ft WSEL at 937.73ft is 0.06ft at the downstream limits, which is less than a 0.1ft tolerance. Typically, for the WSEL for proposed conditions should tie back into the WSEL for existing conditions for a couple of cross sections at the downstream limits. Not only do we have to look at tying in the WSEL determines any vertical downstream impacts, but horizonal downstream impacts must also be assessed. The proposed mod 936ft scenario does not keep the water in the same places as existing and changes the water boundaries in the floodplain.

Figure 11



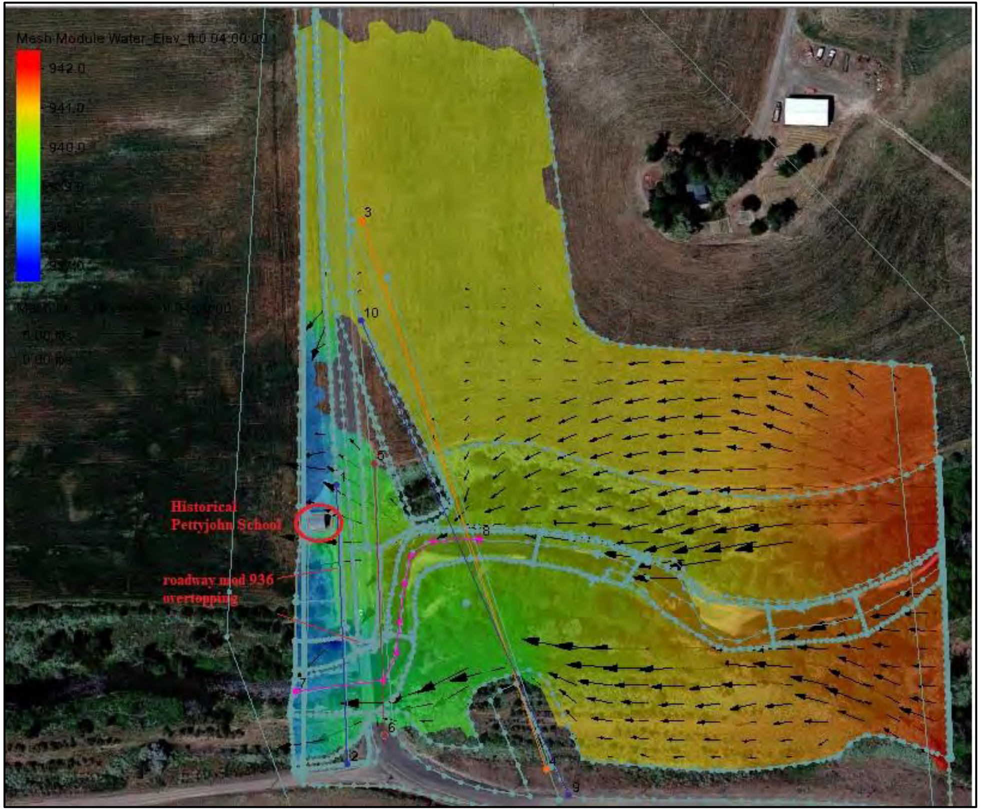
With the new modification to the existing roadway, the proposed north end of the bridge vertical clearance is approximately 0.92ft. Thus, the length from station 19+50 where it is 0.92ft of clearance to station 20+20 where it meets the 3ft clearance is 70ft. 22% of the proposed bridge does not meet the recommended criteria, but the remaining 78% of the proposed bridge exceeds it at 12.1ft on the south end as seen in Figure 12. The modification improved the vertical clearance by 4%.

Figure 12



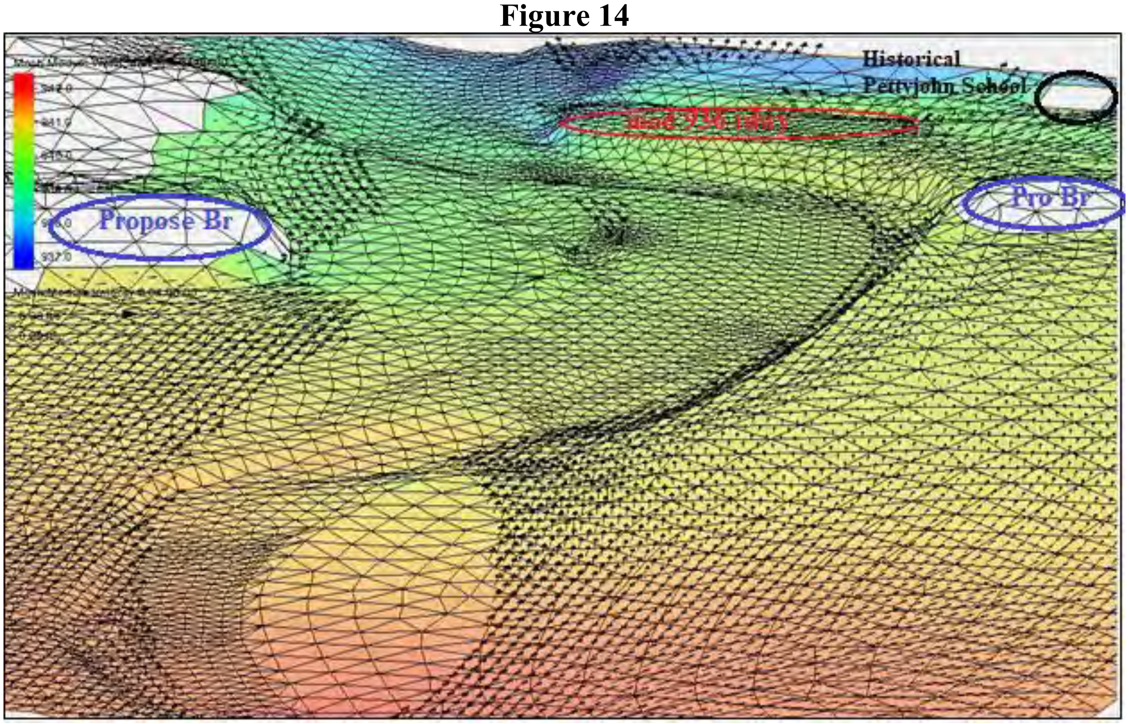
The SMS plan view in Figure 13 shows the Proposed mod 936ft 100-year WESL flood extents. It shows that the existing roadway is overtopping however there is still some flow running parallel to the existing roadway. The modified 936ft scenario has dissipated the velocities in the channel, improving the overall system.

Figure 13



However, now there is flow going downstream along the floodplain where it once was not. This can be seen in Figure 14. The 3D SMS view shows where the WSEL is flowing downstream from the proposed bridge to the new open bridge section. The red circle indicates the existing roadway modification location overtops for approximately 135ft in length at elevation 936ft. The velocity arrows show the direction where the flow is going now. This will need to be further investigated since the WSEL does not tie back into existing conditions downstream exactly.

Figure 14



Summary

In summary, Table 1 compares the existing conditions to the three proposed modeling scenarios. In all three cases, the proposed WSEL decreases compared to the existing conditions resulting in higher vertical clearance. However, these modifications will require downstream investigation. Currently the channel survey does not extend further downstream. Although the additional Lidar captures the floodplain, it does not include the channel where the information is needed.

Table 1

	Proposed bridge crossing	Vertical Clearance	Vertical Clearance	Vertical Clearance
Model	100yr wsel (ft)	sta 19+50 (ft)	sta 22+70 (ft)	Average (ft)
Existing	941.01	0.07	11.27	5.67
Proposed no modification	940.59	0.49	11.69	6.09
Proposed modification 939ft	940.49	0.59	11.79	6.19
Proposed modification 936ft	940.16	0.92	12.12	6.52

Figure 15 captures all four model runs for the 100yr WSEL profile and shows the difference between the existing and proposed condition. There is a significant improvement in the river system by removing the existing bridge and flattening the WSEL profile.

Figure 15

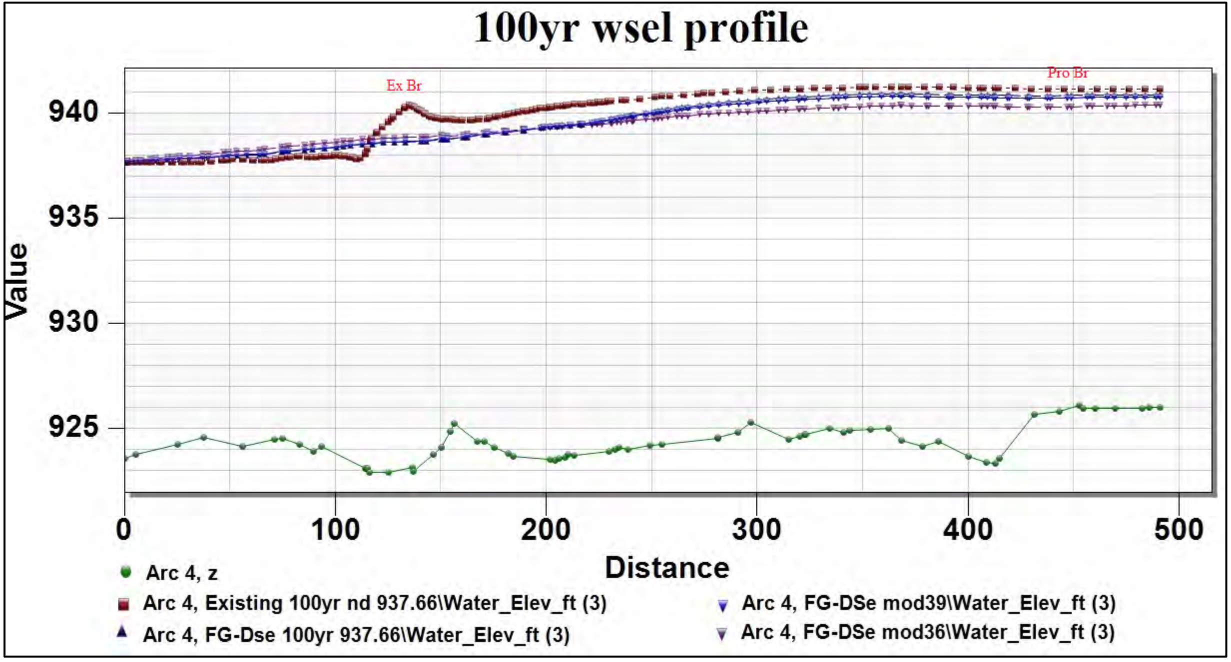
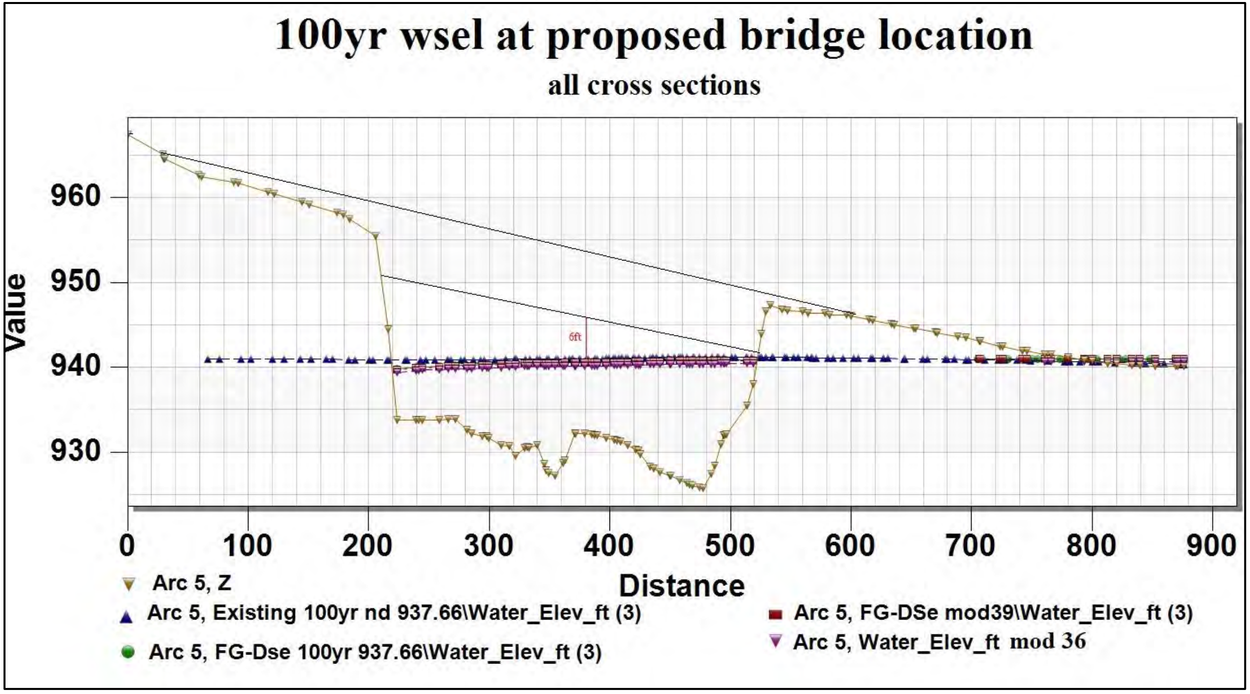


Figure 16 shows the proposed bridge location and what all the WSELs would be with the bridge. It gives a better perspective that there is enough vertical clearance for debris to move through the bridge. If something does get trapped on the north end, the flow from the floodplain will push it to the center of the channel where there is enough clearance.

Figure 16



It is my recommendation to not make the modification to the existing roadway. The proposed bridge has an average vertical clearance of 6.09ft and it would not change the existing flow paths downstream in the floodplain since it would only overtop in the areas it currently overtops. The downstream proposed WSEL is within 0.02ft tolerance for tying back to existing 100yr WSEL and the downstream horizontal impacts are minimal since the horizontal limits of the 100yr flood are close to the same floodplain limits under existing conditions.

If you have any questions, please contact Rose Peralta, at (360) 534-9503.

Sincerely,

Rocio Peralta

Rocio Peralta, PE

Appendix D-Scour Calculations

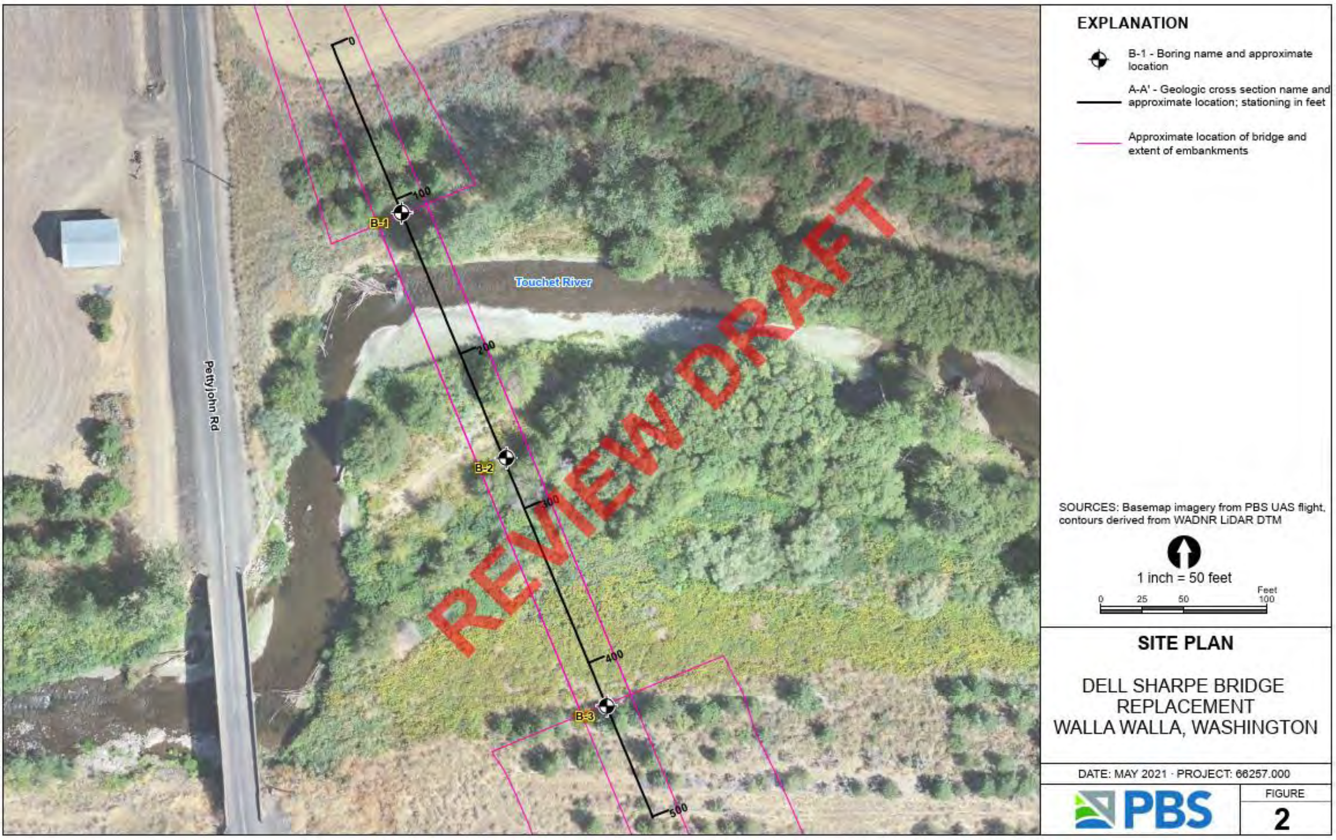
Geotechnical Engineering Report

Dell Sharpe Bridge Replacement
Pettyjohn Road
Walla Walla County, Washington

Prepared for:

TranTech Engineering, LLC
365 - 118th Avenue SE, Suite 100
Bellevue, Washington 98005

May 10, 2021
PBS Project 66257.000



EXPLANATION

⊕ B-1 - Boring name and approximate location

A-A' - Geologic cross section name and approximate location; stationing in feet

Approximate location of bridge and extent of embankments

SOURCES: Basemap imagery from PBS UAS flight, contours derived from WADNR LiDAR DTM

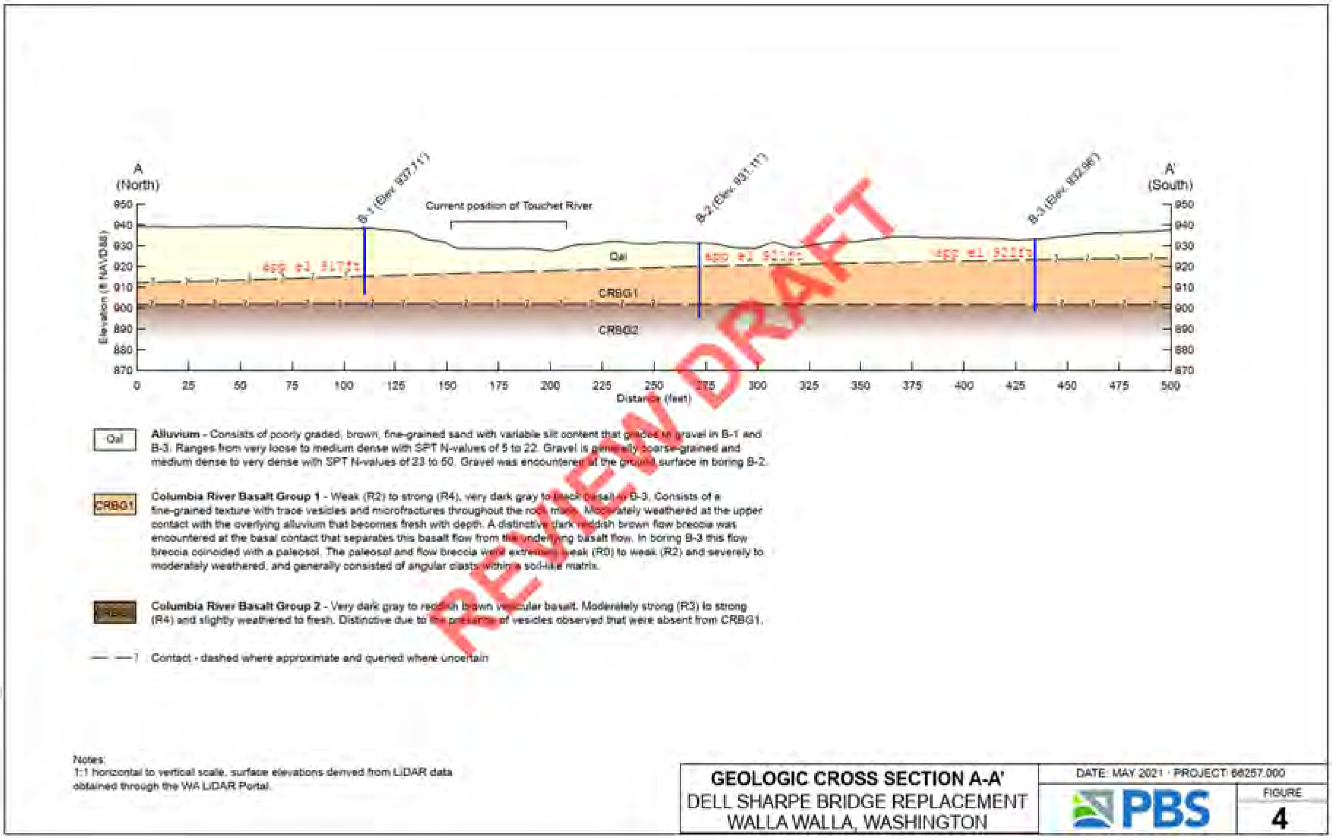
SITE PLAN

DELL SHARPE BRIDGE REPLACEMENT
WALLA WALLA, WASHINGTON

DATE: MAY 2021 · PROJECT: 66257.000

PBS

FIGURE
2



Qal	**Alluvium** - Consists of poorly graded, brown, fine-grained sand with variable silt content that grades to gravel in B-1 and B-3. Ranges from very loose to medium dense with SPT N-values of 5 to 22. Gravel is generally coarse-grained and medium dense to very dense with SPT N-values of 23 to 50. Gravel was encountered at the ground surface in boring B-2.
CRBG1	**Columbia River Basalt Group 1** - Weak (R2) to strong (R4), very dark gray to black basalt in B-3. Consists of a fine-grained texture with trace vesicles and microfractures throughout the rock mass. Moderately weathered at the upper contact with the overlying alluvium that becomes fresh with depth. A distinctive dark reddish brown flow breccia was encountered at the basal contact that separates this basalt flow from the underlying basalt flow. In boring B-3 this flow breccia coincided with a paleosol. The paleosol and flow breccia were extremely weak (R0) to weak (R2) and severely to moderately weathered, and generally consisted of angular clasts within a soil-like matrix.
RBG	**Columbia River Basalt Group 2** - Very dark gray to reddish brown vesicular basalt. Moderately strong (R3) to strong (R4) and slightly weathered to fresh. Distinctive due to the presence of vesicles observed that were absent from CRBG1.
— —?	Contact - dashed where approximate and queried where uncertain

Notes:
1:1 horizontal to vertical scale, surface elevations derived from LiDAR data obtained through the WA LiDAR Portal.

GEOLOGIC CROSS SECTION A-A'
DELL SHARPE BRIDGE REPLACEMENT
WALLA WALLA, WASHINGTON

DATE: MAY 2021 · PROJECT: 66257.000

PBS

FIGURE
4

PBS

DELL SHARPE BRIDGE REPLACEMENT
WALLA WALLA, WASHINGTON

PBS PROJECT NUMBER:
66257.000

BORING B-1

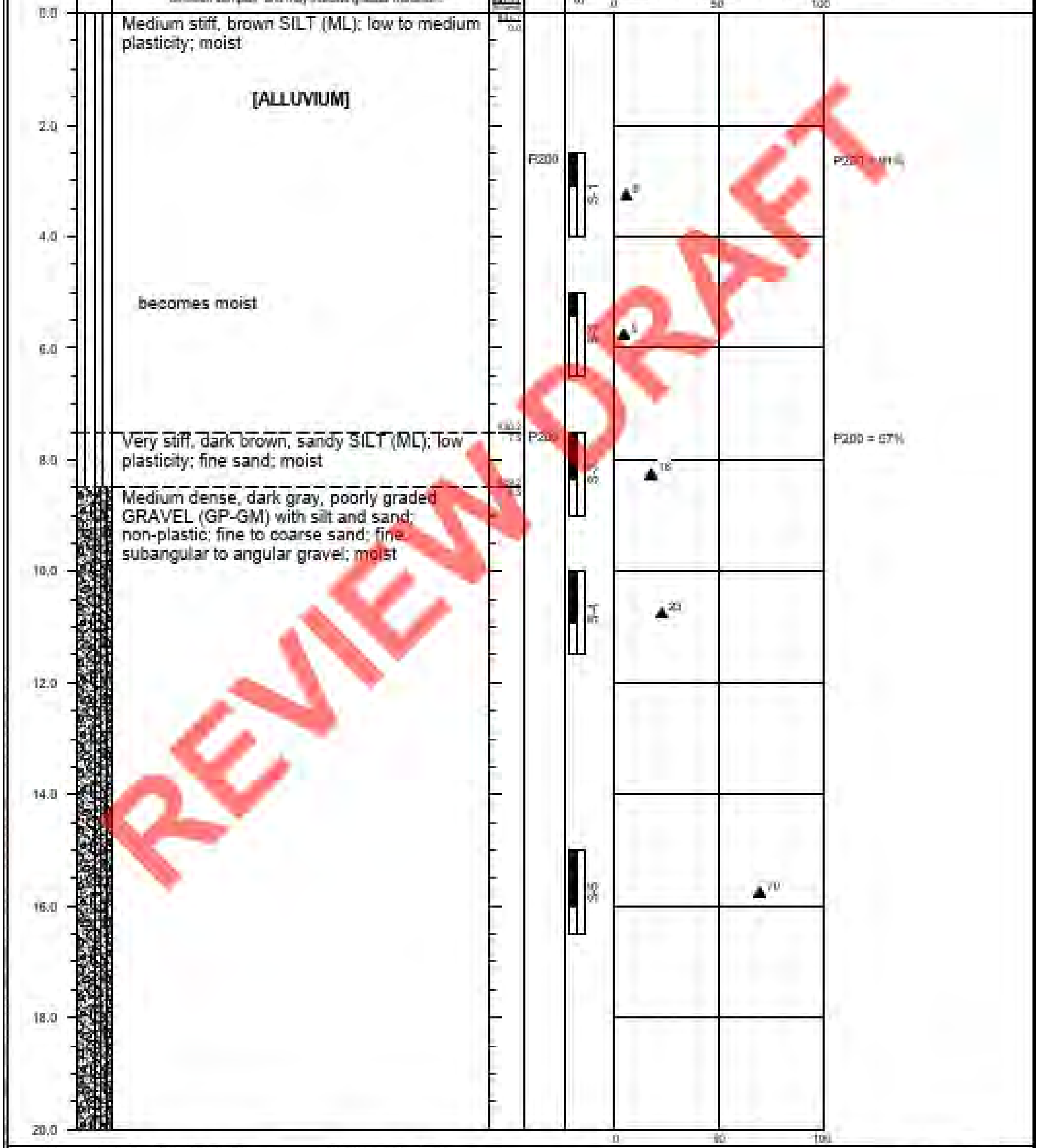
APPROX. BORING B-1 LOCATION:
(See Site Plan)
Lat: 46.29449 Long: -118.10772

DEPTH FEET | GRAPHIC LOG | MATERIAL DESCRIPTION | ELEV. / DEPTH | TESTING | SAMPLE TYPE / SAMPLE ID | INSTALLATION AND COMMENTS

NOTE: Lines representing the interface between soil/rock units of differing description are approximate only, inferred where between samples, and may indicate gradual transition.

▲ BLOW COUNT
✦ DYNAMIC CONE PENETROMETER
● MOISTURE CONTENT %
▥ RQD%
▨ CORE REC%

Surface Conditions: Grass



Medium stiff, brown SILT (ML); low to medium plasticity; moist

[ALLUVIUM]

becomes moist

Very stiff, dark brown, sandy SILT (ML); low plasticity; fine sand; moist

Medium dense, dark gray, poorly graded GRAVEL (GP-GM) with silt and sand; non-plastic; fine to coarse sand; fine subangular to angular gravel; moist

P200 — P200 = 91%

P200 — P200 = 57%

DRILLING METHOD: Mud Rotary/HQ Rock Coring
DRILLED BY: Holt Services, Inc.
LOGGED BY: C. Nealey

BIT DIAMETER: 4 7/8 Inches
HAMMER EFFICIENCY PERCENT: 89.9
LOGGING COMPLETED: 1/21/2021

FIGURE A1
Page 1 of 2

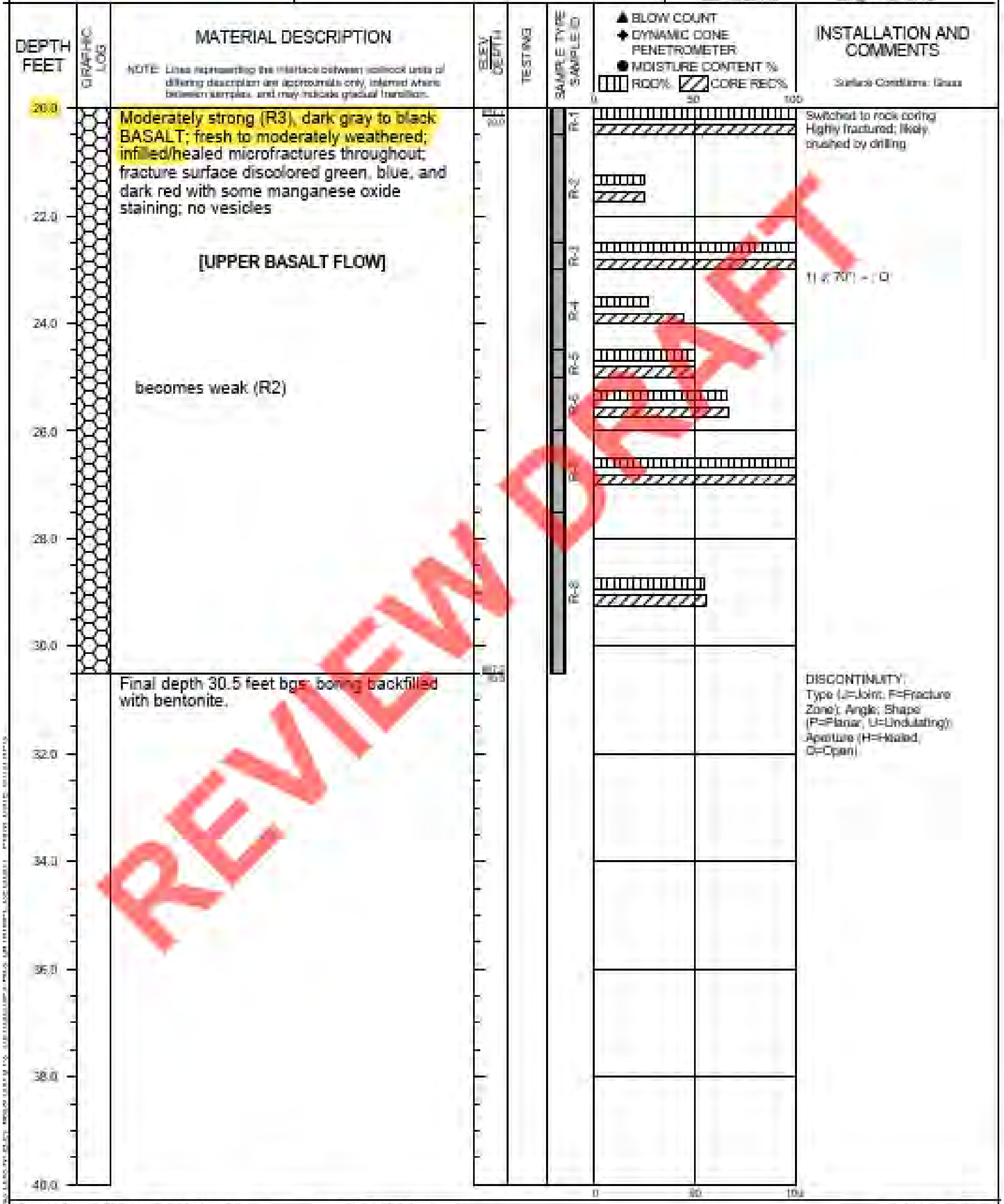
PBS

DELL SHARPE BRIDGE REPLACEMENT
WALLA WALLA, WASHINGTON

PBS PROJECT NUMBER:
66257.000

BORING B-1
(continued)

APPROX. BORING B-1 LOCATION:
(See Site Plan)
Lat: 46.29449 Long: -118.10772



MATERIAL DESCRIPTION

NOTE: Lines representing the interface between soil/rock units of differing description are approximate only, inferred where between samples, and may indicate gradual transition.

Moderately strong (R3), dark gray to black BASALT; fresh to moderately weathered; infilled/healed microfractures throughout; fracture surface discolored green, blue, and dark red with some manganese oxide staining; no vesicles

[UPPER BASALT FLOW]

becomes weak (R2)

Final depth 30.5 feet bgs; boring backfilled with bentonite.

INSTALLATION AND COMMENTS

Surface Conditions: Grass

Switched to rock coring
Highly fractured; likely crushed by drilling

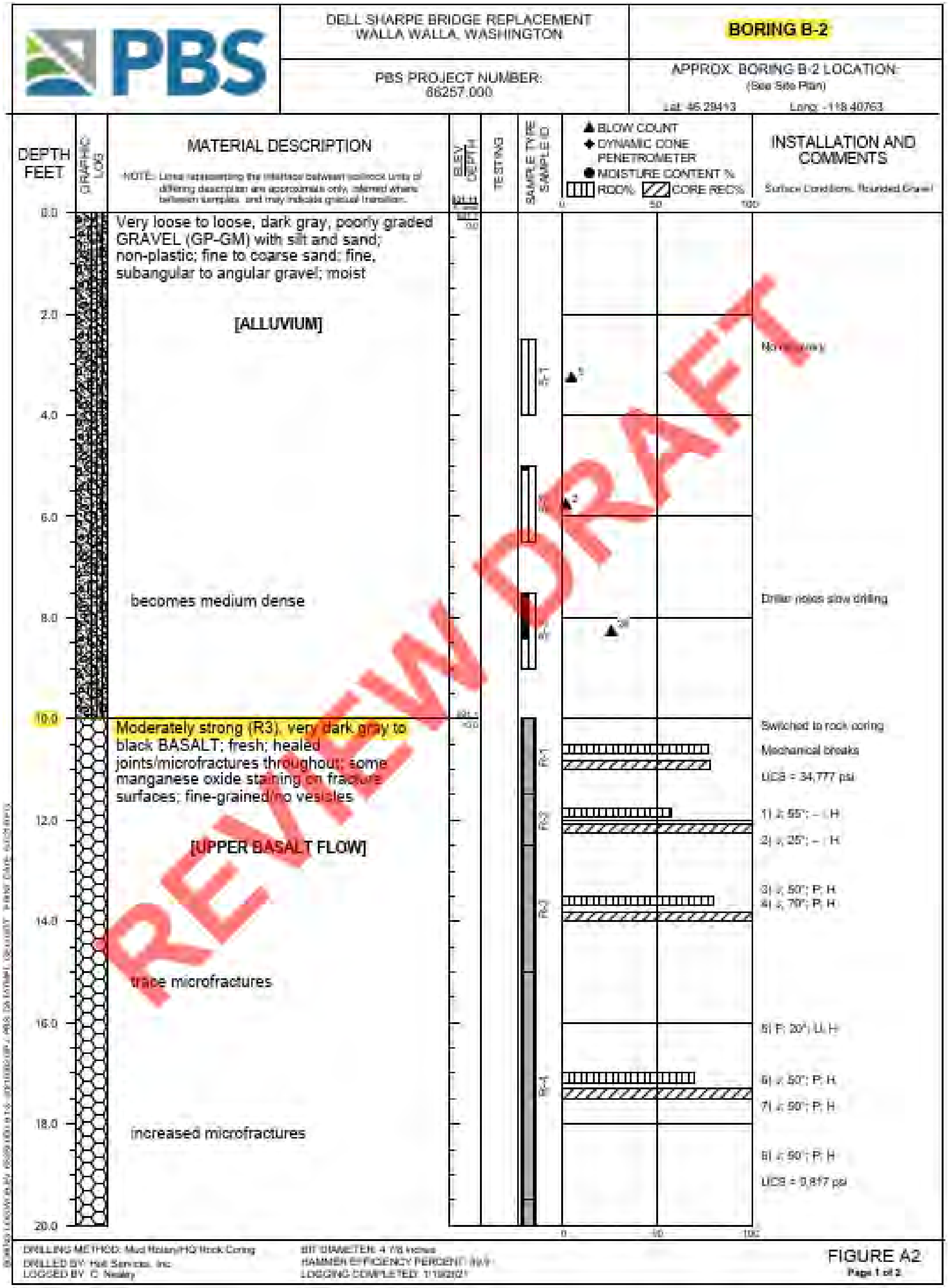
[illegible]

DISCONTINUITY:
Type (J=Joint, F=Fracture Zone); Angle; Shape (P=Planar, U=Undulating); Aperture (H=Healed, O=Open)

DRILLING METHOD: Mud Rotary/HQ Rock Coring
DRILLED BY: Holt Services, Inc.
LOGGED BY: C. Nealey

BIT DIAMETER: 4-7/8 inches
HAMMER EFFICIENCY PERCENT: 89.9
LOGGING COMPLETED: 1/21/2021

FIGURE A1
Page 2 of 2



DELL SHARPE BRIDGE REPLACEMENT
WALLA WALLA, WASHINGTON

BORING B-2

PBS PROJECT NUMBER:
86257.000

APPROX. BORING B-2 LOCATION:
(See Site Plan)
Lat: 46.29413 Long: -118.40763

MATERIAL DESCRIPTION

NOTE: Lines representing the interface between soil/rock units of differing description are approximate only, inferred where between samples, and may indicate gradual transition.

▲ BLOW COUNT
✦ DYNAMIC CONE PENETROMETER
● MOISTURE CONTENT %
▥ RQD%
▨ CORE REC%

INSTALLATION AND COMMENTS

Surface Conditions: Rounded Gravel

Very loose to loose, dark gray, poorly graded GRAVEL (GP-GM) with silt and sand; non-plastic; fine to coarse sand; fine, subangular to angular gravel; moist

[ALLUVIUM]

becomes medium dense

Moderately strong (R3), very dark gray to black BASALT; fresh; healed joints/microfractures throughout; some manganese oxide staining on fracture surfaces; fine-grained/no vesicles

[UPPER BASALT FLOW]

trace microfractures

increased microfractures

No recovery

Driller notes slow drilling

Switched to rock coring

Mechanical breaks

UCS = 34,777 psi

1) J; 55°; – ; H

2) J; 25°; – ; H

3) J; 50°; P; H
4) J; 70°; P; H

5) F; 20°; U; H

6) J; 50°; P; H

7) J; 50°; P; H

8) J; 50°; P; H

UCS = 0,817 psi

DRILLING METHOD: Mud Rotary/HQ Rock Coring
DRILLED BY: Holt Services, Inc.
LOGGED BY: C. Nealey

BIT DIAMETER: 4 7/8 Inches
HAMMER EFFICIENCY PERCENT: N/A
LOGGING COMPLETED: 1/19/2021

FIGURE A2
Page 1 of 2

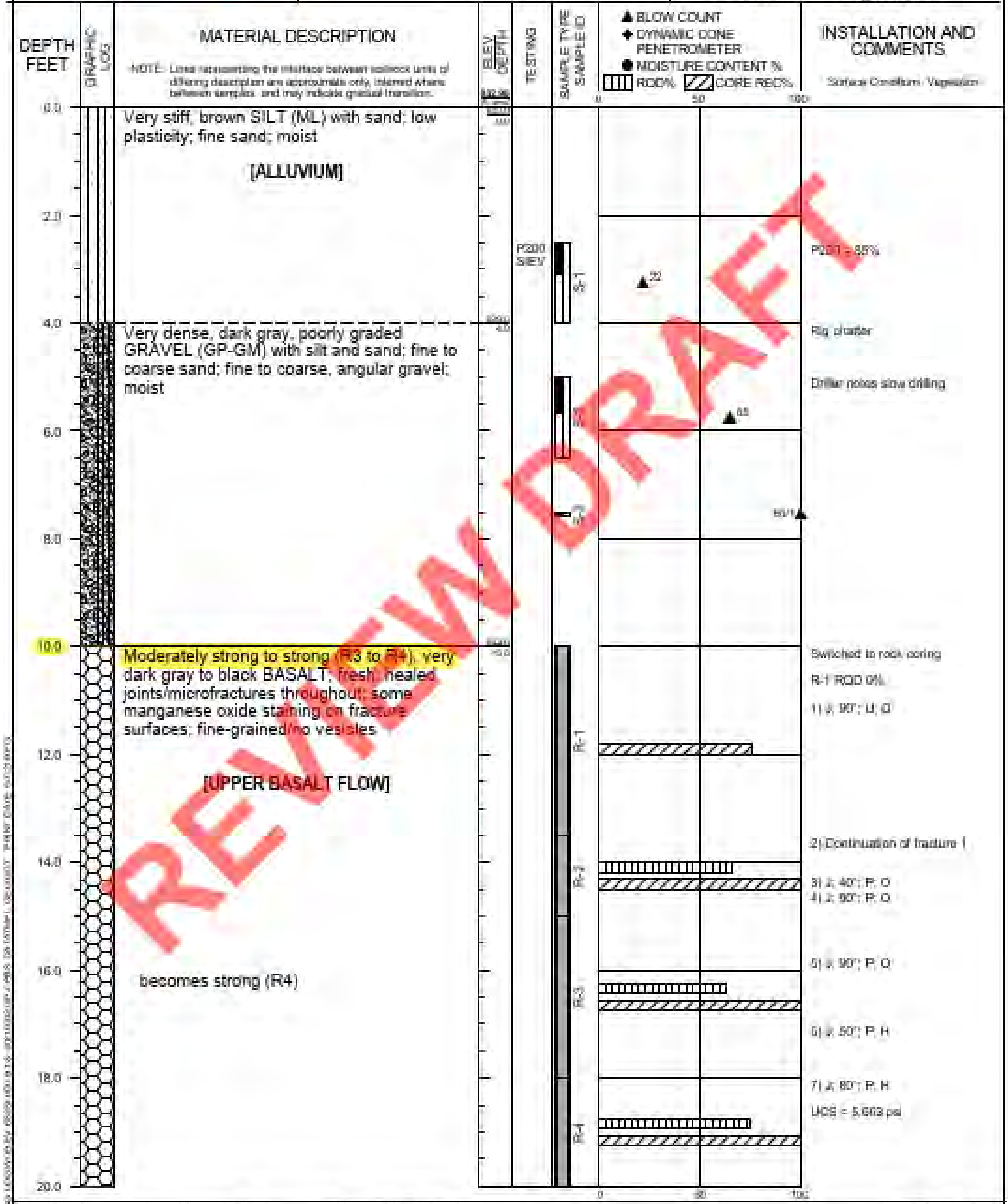
DELL SHARPE BRIDGE REPLACEMENT
WALLA WALLA, WASHINGTON

BORING B-3

PBS PROJECT NUMBER:
66257.000

APPROX. BORING B-3 LOCATION:
(See Site Plan)
Lat: 46.29375 Long: -118.40733

NOTE: Lines representing the interface between soil/rock units of differing description are approximate only, inferred where between samples, and may indicate gradual transition.



Very stiff, brown SILT (ML) with sand; low plasticity; fine sand; moist

[ALLUVIUM]

Very dense, dark gray, poorly graded GRAVEL (GP-GM) with silt and sand; fine to coarse sand; fine to coarse, angular gravel; moist

Moderately strong to strong (R3 to R4), very dark gray to black BASALT; fresh; healed joints/microfractures throughout; some manganese oxide staining on fracture surfaces; fine-grained/no vesicles

[UPPER BASALT FLOW]

becomes strong (R4)

P200 = 85%

Rig chatter

Driller notes slow drilling

Switched to rock coring

R-1 RQD 0%

1) J; 90°; U; O

2) Continuation of fracture 1

3) J; 40°; P; O

4) J; 90°; P; O

5) J; 90°; P; O

6) J; 50°; P; H

7) J; 80°; P; H

UCS = 5,663 psi

DRILLING METHOD: Mud Rotary/HQ Rock Coring
DRILLED BY: Holt Services, Inc.
LOGGED BY: C. Nealey

BIT DIAMETER: 4 7/8 inches
HAMMER EFFICIENCY PERCENT: 89.9
LOGGING COMPLETED: 1/18/2021

FIGURE A3
Page 1 of 2

Pebble Count

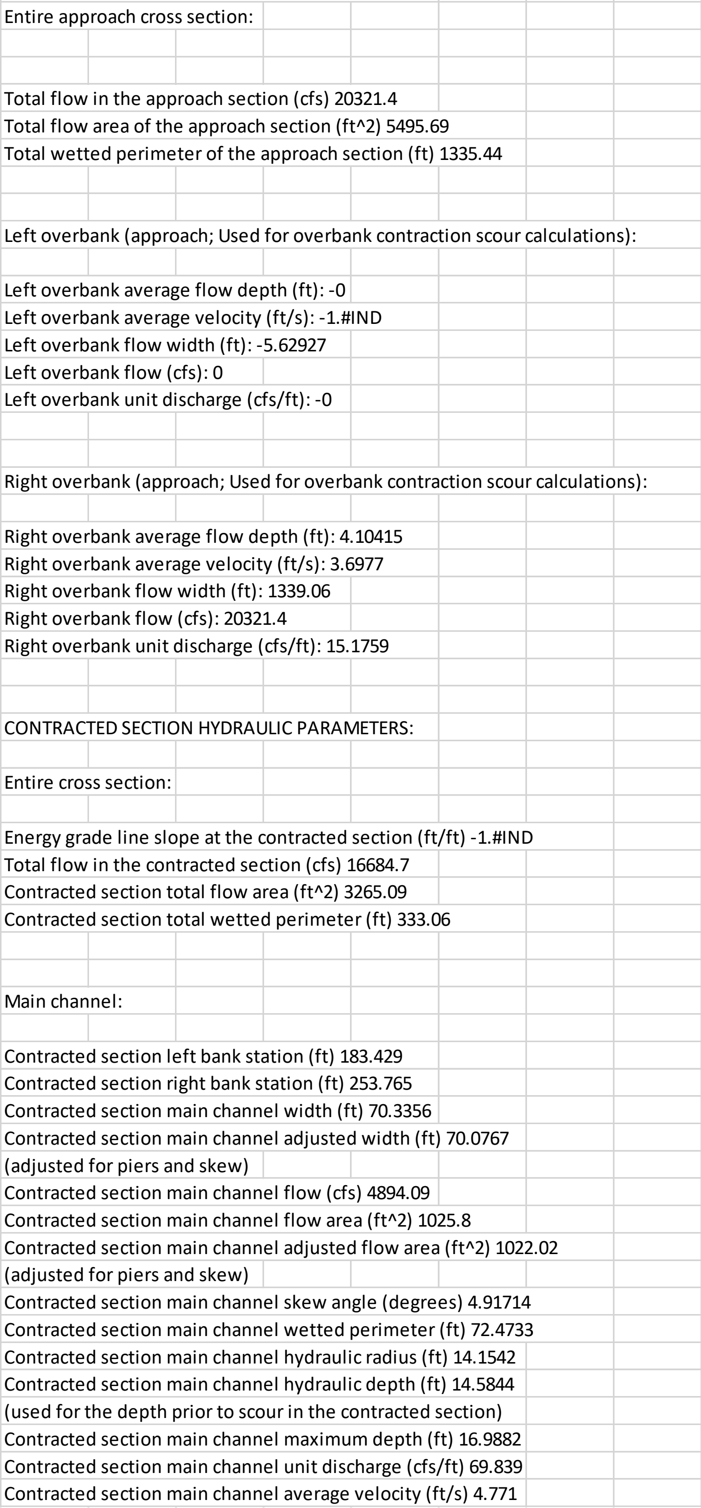
# of samples	size gravel (in	size gravel (ft)	assorted small to large (ft)
1	1.09	0.26	0.021666667
2	1.15	0.36	0.03
3	0.56	0.42	0.035
4	1.12	0.42	0.035
5	0.72	0.45	0.0375
6	0.98	0.46	0.038333333
7	1.12	0.46	0.038333333
8	0.84	0.47	0.039166667
9	1.01	0.51	0.0425
10	1.63	0.52	0.043333333
11	0.81	0.53	0.044166667
12	1.27	0.53	0.044166667
13	1.13	0.56	0.046666667
14	0.85	0.56	0.046666667
15	1.79	0.56	0.046666667
16	1.04	0.58	0.048333333
17	0.65	0.58	0.048333333
18	0.46	0.58	0.048333333
19	0.52	0.58	0.048333333
20	0.94	0.61	0.050833333
21	0.26	0.61	0.050833333
22	1.27	0.62	0.051666667
23	0.95	0.64	0.053333333
24	0.42	0.65	0.054166667
25	0.82	0.67	0.055833333
26	0.88	0.68	0.056666667
27	0.62	0.71	0.059166667
28	0.8	0.72	0.06
29	1.43	0.72	0.06
30	2.46	0.73	0.060833333
31	1.06	0.74	0.061666667
32	0.91	0.76	0.063333333
33	0.76	0.78	0.065
34	1.69	0.79	0.065833333
35	2.35	0.8	0.066666667
36	1.63	0.81	0.0675
37	1.07	0.81	0.0675
38	0.45	0.82	0.068333333
39	0.81	0.84	0.07
40	0.79	0.84	0.07
41	0.64	0.85	0.070833333
42	0.53	0.85	0.070833333
43	1.23	0.87	0.0725
44	0.71	0.88	0.073333333
45	0.58	0.88	0.073333333
46	0.58	0.88	0.073333333
47	0.73	0.91	0.075833333
48	0.53	0.92	0.076666667
49	1.37	0.94	0.078333333
50	0.68	0.94	0.078333333
51	0.85	0.95	0.079166667
52	1.41	0.98	0.081666667
53	1	1	0.083333333
54	2.03	1.01	0.084166667
55	1.2	1.02	0.085
56	1.45	1.04	0.086666667
57	1.72	1.06	0.088333333
58	1.19	1.06	0.088333333
59	0.74	1.07	0.089166667
60	1.13	1.09	0.090833333
61	2	1.12	0.093333333
62	0.58	1.12	0.093333333
63	1.5	1.13	0.094166667
64	0.67	1.13	0.094166667
65	1.02	1.13	0.094166667
66	0.47	1.15	0.095833333
67	0.92	1.16	0.096666667
68	1.93	1.19	0.099166667
69	1.62	1.19	0.099166667
70	1.51	1.2	0.1
71	1.69	1.22	0.101666667
72	0.87	1.23	0.1025
73	1.19	1.27	0.105833333
74	0.51	1.27	0.105833333
75	0.42	1.35	0.1125
76	0.46	1.37	0.114166667
77	1.06	1.41	0.1175
78	0.84	1.43	0.119166667
79	0.88	1.45	0.120833333
80	0.36	1.5	0.125
81	1.13	1.51	0.125833333
82	0.58	1.51	0.125833333
83	1.35	1.56	0.13
84	2.22	1.61	0.134166667
85	1.56	1.62	0.135
86	1.22	1.63	0.135833333
87	1.61	1.63	0.135833333
88	0.61	1.69	0.140833333
89	0.72	1.69	0.140833333
90	1.51	1.72	0.143333333
91	1.16	1.72	0.143333333
92	0.78	1.79	0.149166667
93	0.61	1.93	0.160833333
94	2.26	2	0.166666667
95	0.56	2.02	0.168333333
96	2.02	2.03	0.169166667
97	0.94	2.22	0.185
98	1.72	2.26	0.188333333
99	0.56	2.35	0.195833333
100	0.88	2.46	0.205

D16=0.0483ft D84=0.134ft D100=0.205ft

D50=0.0783ft D95=0.168ft

Photo of gravel where pebble count was taken

200yr Scour Input



200yr Scour input values from SRH-2D model

Entire approach cross section:

Total flow in the approach section (cfs) 20321.4
Total flow area of the approach section (ft^2) 5495.69
Total wetted perimeter of the approach section (ft) 1335.44

Left overbank (approach; Used for overbank contraction scour calculations):

Left overbank average flow depth (ft): -0
Left overbank average velocity (ft/s): -1.#IND
Left overbank flow width (ft): -5.62927
Left overbank flow (cfs): 0
Left overbank unit discharge (cfs/ft): -0

Right overbank (approach; Used for overbank contraction scour calculations):

Right overbank average flow depth (ft): 4.10415
Right overbank average velocity (ft/s): 3.6977
Right overbank flow width (ft): 1339.06
Right overbank flow (cfs): 20321.4
Right overbank unit discharge (cfs/ft): 15.1759

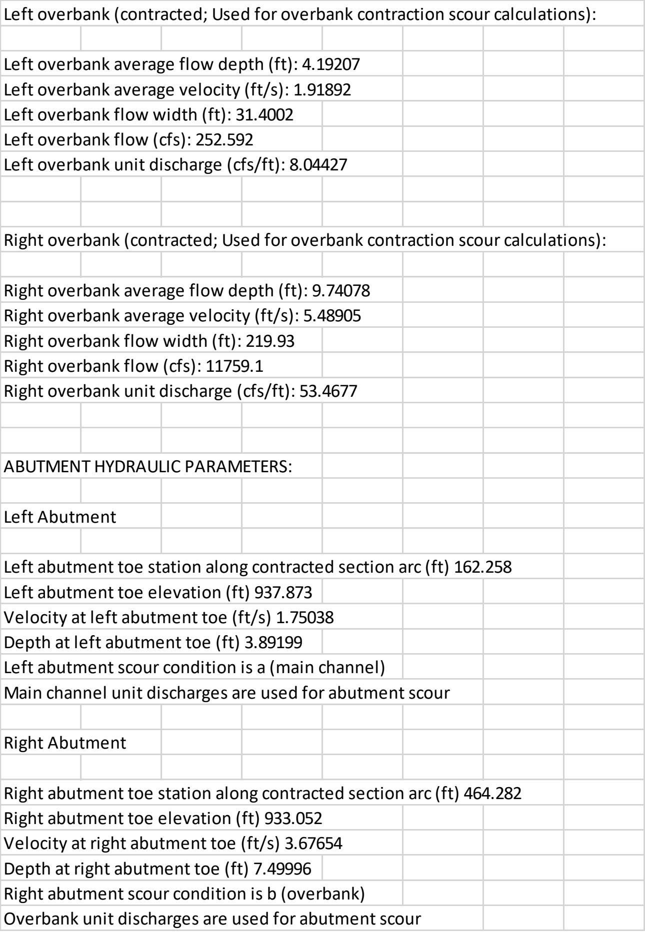
CONTRACTED SECTION HYDRAULIC PARAMETERS:

Entire cross section:

Energy grade line slope at the contracted section (ft/ft) -1.#IND
Total flow in the contracted section (cfs) 16684.7
Contracted section total flow area (ft^2) 3265.09
Contracted section total wetted perimeter (ft) 333.06

Main channel:

Contracted section left bank station (ft) 183.429
Contracted section right bank station (ft) 253.765
Contracted section main channel width (ft) 70.3356
Contracted section main channel adjusted width (ft) 70.0767
(adjusted for piers and skew)
Contracted section main channel flow (cfs) 4894.09
Contracted section main channel flow area (ft^2) 1025.8
Contracted section main channel adjusted flow area (ft^2) 1022.02
(adjusted for piers and skew)
Contracted section main channel skew angle (degrees) 4.91714
Contracted section main channel wetted perimeter (ft) 72.4733
Contracted section main channel hydraulic radius (ft) 14.1542
Contracted section main channel hydraulic depth (ft) 14.5844
(used for the depth prior to scour in the contracted section)
Contracted section main channel maximum depth (ft) 16.9882
Contracted section main channel unit discharge (cfs/ft) 69.839
Contracted section main channel average velocity (ft/s) 4.771



Left overbank (contracted; Used for overbank contraction scour calculations):

Left overbank average flow depth (ft): 4.19207
Left overbank average velocity (ft/s): 1.91892
Left overbank flow width (ft): 31.4002
Left overbank flow (cfs): 252.592
Left overbank unit discharge (cfs/ft): 8.04427

Right overbank (contracted; Used for overbank contraction scour calculations):

Right overbank average flow depth (ft): 9.74078
Right overbank average velocity (ft/s): 5.48905
Right overbank flow width (ft): 219.93
Right overbank flow (cfs): 11759.1
Right overbank unit discharge (cfs/ft): 53.4677

ABUTMENT HYDRAULIC PARAMETERS:

Left Abutment

Left abutment toe station along contracted section arc (ft) 162.258
Left abutment toe elevation (ft) 937.873
Velocity at left abutment toe (ft/s) 1.75038
Depth at left abutment toe (ft) 3.89199
Left abutment scour condition is a (main channel)
Main channel unit discharges are used for abutment scour

Right Abutment

Right abutment toe station along contracted section arc (ft) 464.282
Right abutment toe elevation (ft) 933.052
Velocity at right abutment toe (ft/s) 3.67654
Depth at right abutment toe (ft) 7.49996
Right abutment scour condition is b (overbank)
Overbank unit discharges are used for abutment scour

PIER HYDRAULIC PARAMETERS:
Piers
Pier 1

Pier centerline station (ft) 321.597
Pier width (ft) 6
Pier length (ft) 4.85408
Pier local approach depth (ft) 10.517
Pier local approach velocity (ft/s) 5.08492
Pier flow angle of attack (degrees) 18.9352

Pier 2
Pier centerline station (ft) 157.079
Pier width (ft) 5
Pier length (ft) 5.49255
Pier local approach depth (ft) 1.38954
Pier local approach velocity (ft/s) 2.00073
Pier flow angle of attack (degrees) 33.6482

Pier 3
Pier centerline station (ft) 156.979
Pier width (ft) 5
Pier length (ft) 5.24619
Pier local approach depth (ft) 0.723809
Pier local approach velocity (ft/s) 1.79352
Pier flow angle of attack (degrees) 41.575

Pier 4
Pier centerline station (ft) -1
Pier width (ft) 5
Pier length (ft) 4.96847
Pier local approach depth (ft) 0.433227
Pier local approach velocity (ft/s) 5.30667
Pier flow angle of attack (degrees) 61.077

Pier 5
Pier centerline station (ft) 468.526
Pier width (ft) 5
Pier length (ft) 5.53282
Pier local approach depth (ft) 0.483256
Pier local approach velocity (ft/s) 6.14067
Pier flow angle of attack (degrees) 63.3152

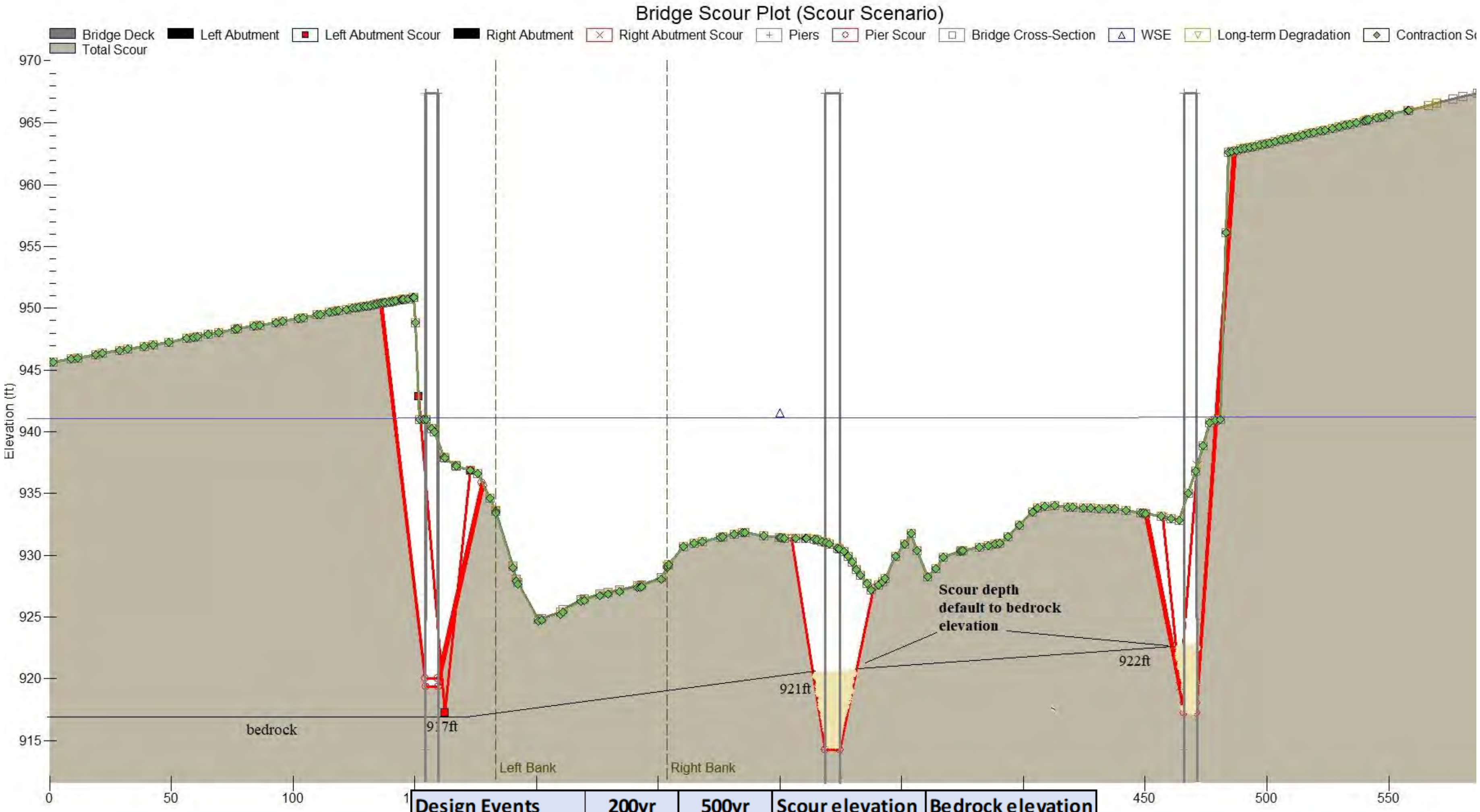
Pier summary

Highest unit discharge approaching piers (cfs/ft) 80.435
(location based on longest pier length (offset from bridge centerline))
Station of the highest unit discharge approaching piers (ft) 240.029
Pier design velocity (ft/s) 5.62467
Left overbank (approach; Used for overbank contraction scour calculations):

Left overbank average flow depth (ft): -1
Left overbank average velocity (ft/s): -1.#IND
Left overbank flow width (ft): -5.62928
Left overbank flow (cfs): 1
Left overbank unit discharge (cfs/ft): -1

200yr Scour Results

Scenario					
Bridge Geometry					
Bridge Cross-Section					
WSE					
Long Term Degradation					
Long Term Degradation (LTD)	0.13	ft	Controlled by Armoring		
Minimum Channel Elevation with LTD	924.68	ft			
Contraction Scour					
Applied Contraction Scour Depth	924.68	ft	Clear-Water or Live-Bed Scour		
Clear Water Contraction Scour Depth	924.68	ft	Clear-Water or Live-Bed Scour		
Applied Contraction Scour Elevation with LTD	924.68	ft	Clear-Water or Live-Bed Scour		
Approach Cross-Section					
Local Scour at Piers					
Plot Pier Scour					
Piers					
Pier Name- Center Pier 6ft	Pier 1				
Pier Scour Depth	10.45	ft	Computation Method: Pier 1		
Total Scour at Pier	5.18	ft			
Total Scour Elevation at Pier	914.24	ft			
Piers					
Pier Name- NorthwestPier 5ft	Pier 2				
Pier Scour Depth	5.3	ft	Computation Method: Pier 2		
Total Scour at Pier	0.04	ft			
Total Scour Elevation at Pier	919.38	ft			
Piers					
Pier Name-Northeast pier 5ft	Pier 3				
Pier Scour Depth	4.63	ft	Computation Method: Pier 3		
Total Scour at Pier	-0.63	ft			
Total Scour Elevation at Pier	920.05	ft			
Piers					
Pier Name- Southwest pier 5ft	Pier 4				
Pier Scour Depth	6.61	ft	Computation Method: Pier 4		
Total Scour at Pier	1.35	ft			
Total Scour Elevation at Pier	918.07	ft			
Piers					
Pier Name Southeast pier 5ft	Pier 5				
Pier Scour Depth	7.43	ft	Computation Method: Pier 5		
Total Scour at Pier	2.16	ft			
Total Scour Elevation at Pier	917.26	ft			
Local Scour at Abutments					
Left Abutment					
Plot Left Abutment Scour					
Abutment Scour Depth	7.41	ft			
Total Scour at Abutment	7.41	ft			
Total Scour Elevation at Abutment	917.28	ft			
Right Abutment					
Plot Right Abutment Scour					
Abutment Scour Depth	13.68	ft	NCHRP Method		
Total Scour at Abutment	13.68	ft			



Design Events	200yr	500yr	Scour elevation	Bedrock elevation
General Scour	0.15ft	0.09ft	***924.67ft***	917ft
Contraction Scour	0.00ft	0.00ft	***924.67ft***	917ft
Local Pier Scour				
center pier	10.5ft	11ft	914.22ft	***921ft***
northeast pier	4.6ft	5.5ft	***920.03ft***	917ft
northwest pier	5.3ft	5.9ft	***919.63ft***	917ft
southeast pier	7.4ft	9.2ft	917.24ft	***922ft***
southwest pier	6.6ft	8.2ft	918.06ft	***922ft***
Abutment Scour				
north	7.4ft	8.4ft	***917.26ft***	917ft
south	13.7ft	16.8ft	919.6ft	***922ft***

500yr Scour Input

500yr APPROACH SECTION HYDRAULIC PARAMETERS: 16ft

Total flow in the approach section (cfs) 25349.5
Total flow area of the approach section (ft^2) 6450.77
Total wetted perimeter of the approach section (ft) 1341.07

Left overbank (approach; Used overbank contraction scour calculations):

Left overbank average flow depth (ft): 1.#INF
Left overbank average velocity (ft/s): 0
Left overbank flow width (ft): 0
Left overbank flow (cfs): 0
Left overbank unit discharge (cfs/ft): -1.#IND

Right overbank (approach; Used overbank contraction scour calculations)

Right overbank average flow depth (ft): 4.8174
Right overbank average velocity (ft/s): 3.92969
Right overbank flow width (ft): 1339.06
Right overbank flow (cfs): 25349.5
Right overbank unit discharge (cfs/ft): 18.9309

CONTRACTED SECTION HYDRAULIC PARAMETERS:

Total flow in the contracted section (cfs) 19534.6
Contracted section total flow area (ft^2) 3511.08
Contracted section total wetted perimeter (ft) 337.726

Main channel:

Contracted section left bank station (ft) 183.429
Contracted section right bank station (ft) 253.765
Contracted section main channel width (ft) 70.3356
Contracted section main channel adjusted width (ft) 69.8455
(adjusted for piers and skew)
Contracted section main channel flow (cfs) 5767.64
Contracted section main channel flow area (ft^2) 1080.95
Contracted section main channel adjusted flow area (ft^2) 1073.42
(adjusted for piers and skew)
Contracted section main channel skew angle (degrees) 6.76721
Contracted section main channel wetted perimeter (ft) 72.4733
Contracted section main channel hydraulic radius (ft) 14.9152
Contracted section main channel hydraulic depth (ft) 15.3685
(used for the depth prior to scour in the contracted section)
Contracted section main channel maximum depth (ft) 17.7746
Contracted section main channel unit discharge (cfs/ft) 82.577
Contracted section main channel average velocity (ft/s) 5.33569

Left overbank (contracted; Used overbank contraction scour calculations)

Left overbank average flow depth (ft): 0.851005
Left overbank average velocity (ft/s): 2.44274
Left overbank flow width (ft): 183.429
Left overbank flow (cfs): 381.31
Left overbank unit discharge (cfs/ft): 2.07878

Right overbank (contracted; Used overbank contraction scour calculation

Right overbank average flow depth (ft): 10.1745
Right overbank average velocity (ft/s): 5.90272
Right overbank flow width (ft): 227.11
Right overbank flow (cfs): 13639.5
Right overbank unit discharge (cfs/ft): 60.0569

ABUTMENT HYDRAULIC PARAMETERS:

Left Abutment

Left abutment toe station along contracted section arc (ft) 162.258
Left abutment toe elevation (ft) 937.873
Velocity at left abutment toe (ft/s) 2.52909
Depth at left abutment toe (ft) 4.6672
Left abutment scour condition is a (main channel)
Main channel unit discharges are used for abutment scour

Right Abutment

Right abutment toe station along contracted section arc (ft) 464.282
Right abutment toe elevation (ft) 933.052
Velocity at right abutment toe (ft/s) 4.18408
Depth at right abutment toe (ft) 8.15052
Right abutment scour condition is b (overbank)
Overbank unit discharges are used for abutment scour

PIER HYDRAULIC PARAMETERS:

Piers

Pier 1

Pier centerline station (ft) 321.597
Pier width (ft) 6
Pier length (ft) 4.85408
Pier local approach depth (ft) 11.3066
Pier local approach velocity (ft/s) 5.46237
Pier flow angle of attack (degrees) 20.8905

Pier 2

Pier centerline station (ft) 157.112
Pier width (ft) 5
Pier length (ft) 5.49255
Pier local approach depth (ft) 2.26252
Pier local approach velocity (ft/s) 2.48483
Pier flow angle of attack (degrees) 20.5543

Pier 3

Pier centerline station (ft) 156.979
Pier width (ft) 5
Pier length (ft) 5.24619
Pier local approach depth (ft) 1.50092
Pier local approach velocity (ft/s) 2.24412
Pier flow angle of attack (degrees) 27.5239

Pier 4

Pier centerline station (ft) -1
Pier width (ft) 5
Pier length (ft) 4.96847
Pier local approach depth (ft) 0.868923
Pier local approach velocity (ft/s) 6.58434
Pier flow angle of attack (degrees) 51.8443

Pier 5

Pier centerline station (ft) 468.538
Pier width (ft) 5
Pier length (ft) 5.53282
Pier local approach depth (ft) 0.957294
Pier local approach velocity (ft/s) 7.69204
Pier flow angle of attack (degrees) 55.3542

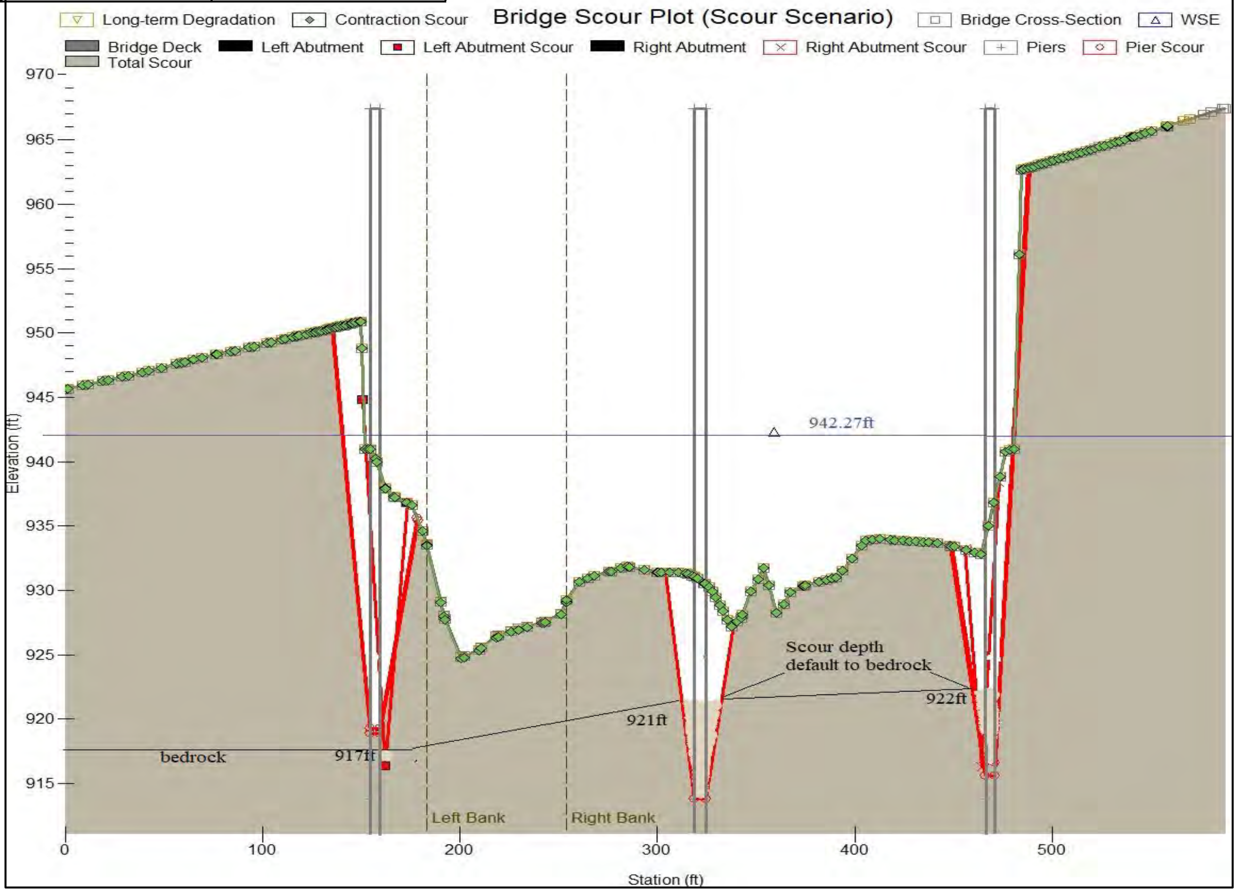
Pier summary

Highest unit discharge approaching piers (cfs/ft) 92.7702
(location based on longest pier length (offset from bridge centerline))
Station of the highest unit discharge approaching piers (ft) 230.844
Pier design velocity (ft/s) 5.9638
(Velocity magnitude at the highest unit discharge approaching piers)
Depth at the highest unit discharge approaching piers (ft) 15.3824

500yr Scour Results

Scenario					
Bridge Geometry					
Bridge Cross-Section					
WSE					
Long Term Degradation					
Long Term Degradation (LTD)	0.16	ft	Controlled by Armoring		
Minimum Channel Elevation with LTD	924.65	ft			
Contraction Scour					
Applied Contraction Scour Depth	924.65	ft	Clear-Water or Live-Bed Scour		
Clear Water Contraction Scour Depth	924.65	ft	Clear-Water or Live-Bed Scour		
Applied Contraction Scour Elevation with LTD	924.65	ft	Clear-Water or Live-Bed Scour		
Approach Cross-Section					
Local Scour at Piers					
Plot Pier Scour					
Piers					
Pier Name- Center Pier 6ft	Pier 1				
Pier Scour Depth	10.97	ft	Computation Method: Pier 1		
Total Scour at Pier	6.29	ft			
Total Scour Elevation at Pier	913.69	ft			
Piers					
Pier Name- NorthwestPier 5ft	Pier 2				
Pier Scour Depth	5.87	ft	Computation Method: Pier 2		
Total Scour at Pier	1.2	ft			
Total Scour Elevation at Pier	918.78	ft			
Piers					
Pier Name-Northeast pier 5ft	Pier 3				
Pier Scour Depth	5.45	ft	Computation Method: Pier 3		
Total Scour at Pier	0.77	ft			
Total Scour Elevation at Pier	919.21	ft			
Piers					
Pier Name- Southwest pier 5ft	Pier 4				
Pier Scour Depth	8.15	ft	Computation Method: Pier 4		
Total Scour at Pier	3.47	ft			
Total Scour Elevation at Pier	916.51	ft			
Piers					
Pier Name Southeast pier 5ft	Pier 5				
Pier Scour Depth	9.15	ft	Computation Method: Pier 5		
Total Scour at Pier	4.48	ft			
Total Scour Elevation at Pier	915.5	ft			
Local Scour at Abutments					
Left Abutment					
Plot Left Abutment Scour					
Abutment Scour Depth	8.38	ft	NCHRP Method		
Total Scour at Abutment	8.38	ft			
Total Scour Elevation at Abutment	916.28	ft			
Right Abutment					
Plot Right Abutment Scour					
Abutment Scour Depth	16.76	ft	NCHRP Method		
Total Scour at Abutment	16.76	ft			

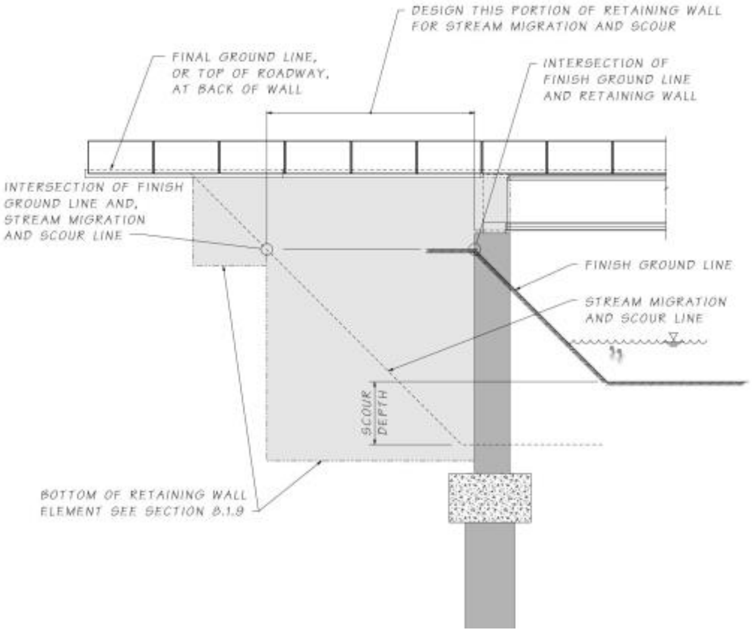
Design Events	**200yr**	**500yr**	**Scour elevation**	**Bedrock elevation**
General Scour	0.15ft	0.09ft	***924.67ft***	917ft
Contraction Scour	0.00ft	0.00ft	***924.67ft***	917ft
Local Pier Scour				
center pier	10.5ft	11ft	914.22ft	***921ft***
northeast pier	4.6ft	5.5ft	***920.03ft***	917ft
northwest pier	5.3ft	5.9ft	***919.63ft***	917ft
southeast pier	7.4ft	9.2ft	917.24ft	***922ft***
southwest pier	6.6ft	8.2ft	918.06ft	***922ft***
Abutment Scour				
north	7.4ft	8.4ft	***917.26ft***	917ft
south	13.7ft	16.8ft	919.6ft	***922ft***



Scour assessment for Retaining Walls-Stream Migration and Abutment Scour

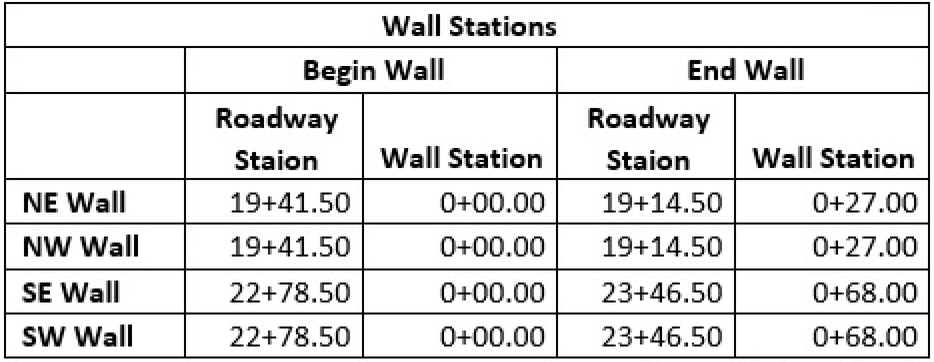
Chapter 8 **Walls and Buried Structures**

Figure 8.1.9-3 Stream migration WITH Scour



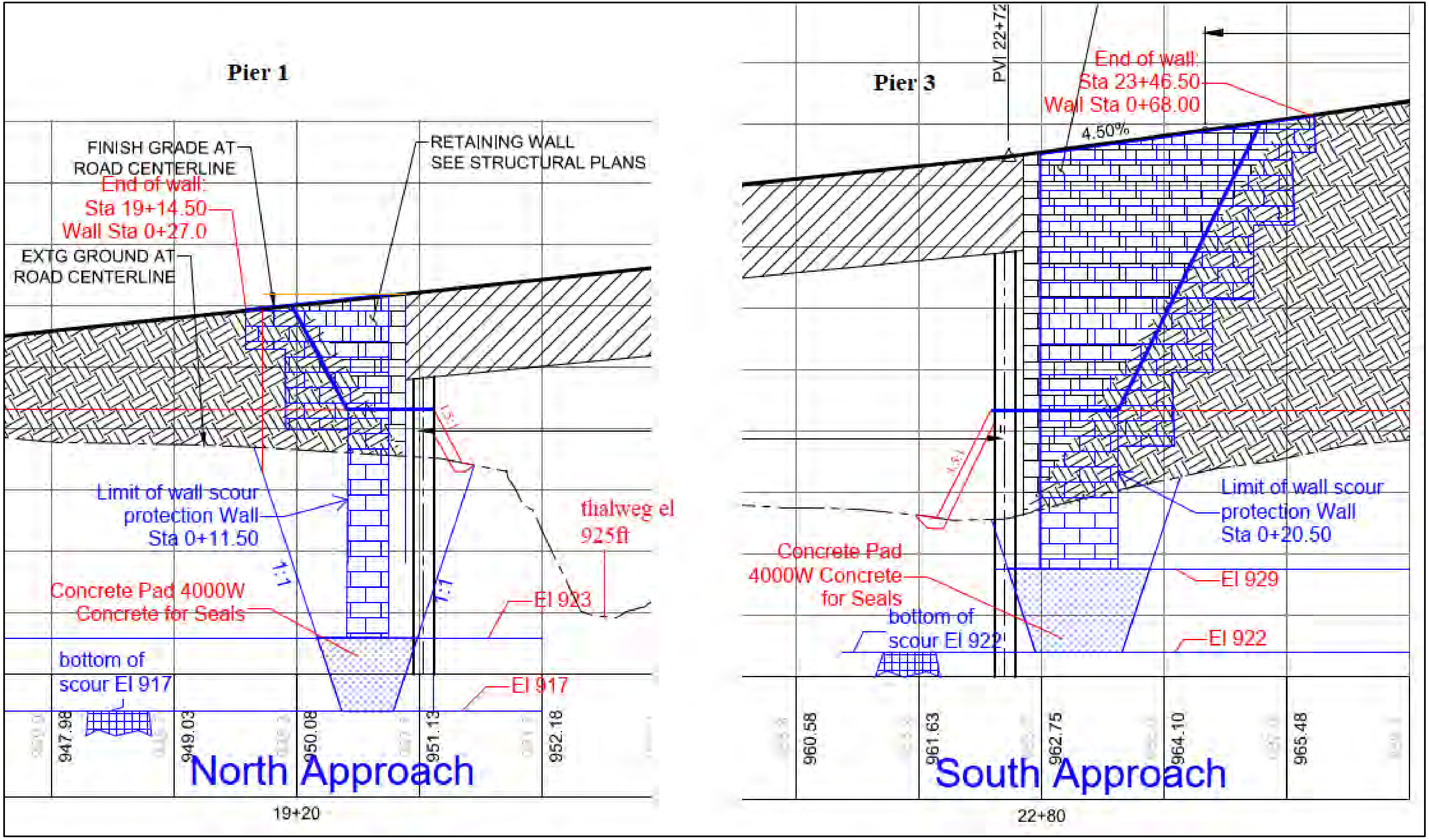
The limits of the retaining wall length are approximately 14 ft on the north and 23 ft on the south. The retaining wall limits match the limits of the channel migration zone, see Appendix B for channel migration zone limits. This is to provide the scour protection required for lateral migration of the river.

A concrete pad is also required to provide full scour depth protection from abutment scour. The concrete pad should extend down to the bedrock and up to the groundwater elevation during the summer months.



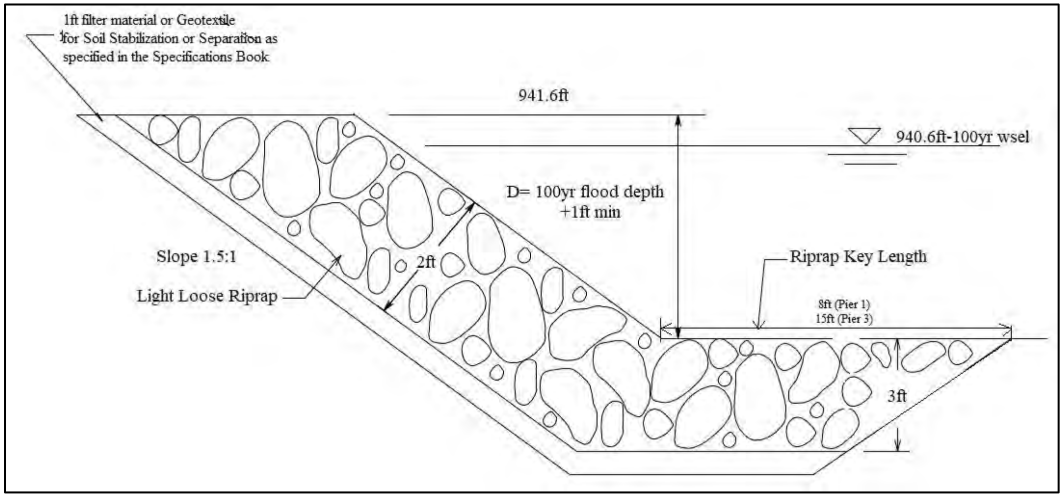
Wall Stations				
	Begin Wall		End Wall	
	Roadway Staion	Wall Station	Roadway Staion	Wall Station
NE Wall	19+41.50	0+00.00	19+14.50	0+27.00
NW Wall	19+41.50	0+00.00	19+14.50	0+27.00
SE Wall	22+78.50	0+00.00	23+46.50	0+68.00
SW Wall	22+78.50	0+00.00	23+46.50	0+68.00

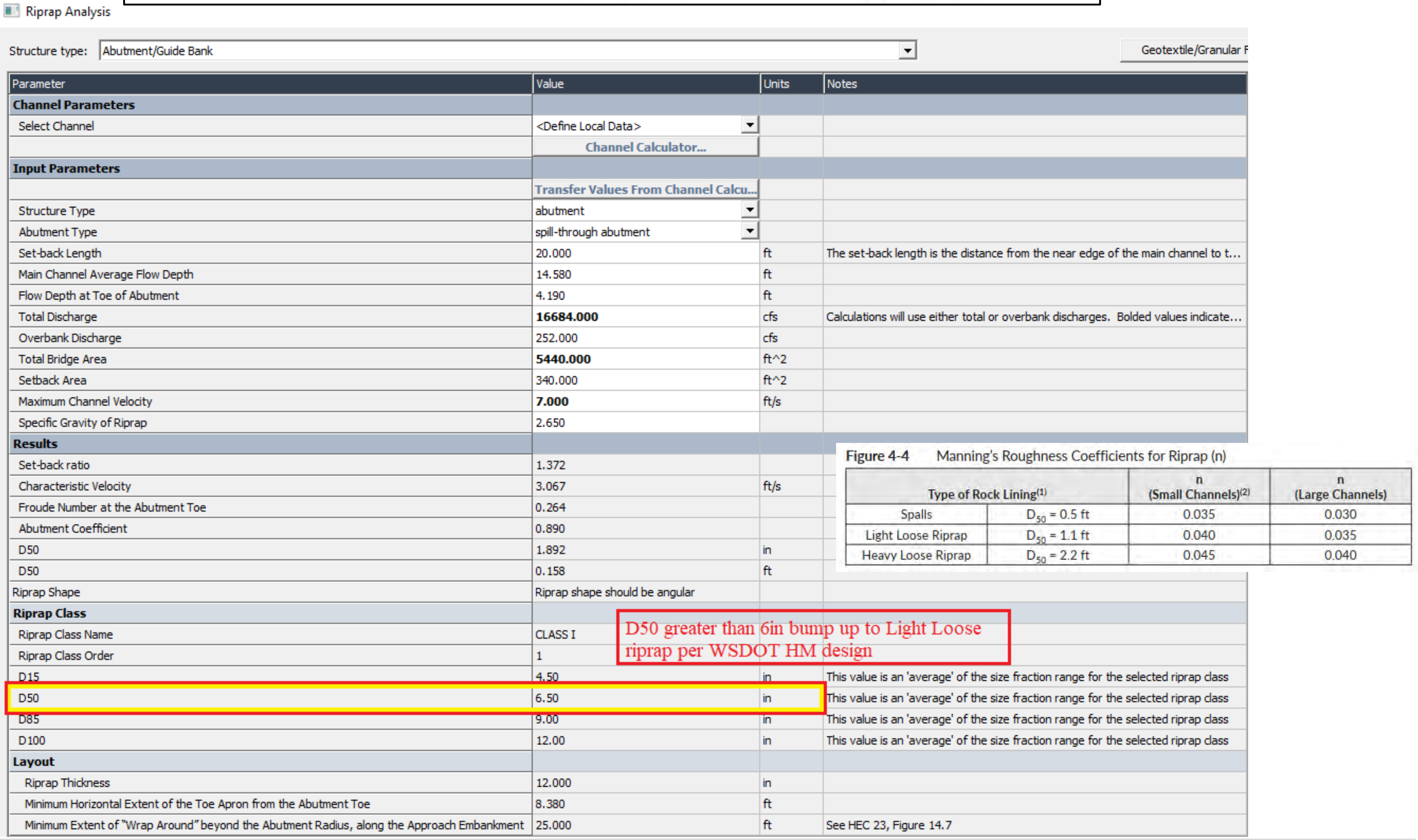
Retaining wall details



Bedrock at Pier 1 approx el 917ft   Bedrock at Pier 3 approx el 922ft

Riprap Design





Structure type: Abutment/Guide Bank

Parameter	Value	Units	Notes
Channel Parameters			
Select Channel	<Define Local Data>		
	Channel Calculator...		
Input Parameters			
	Transfer Values From Channel Calcu...		
Structure Type	abutment		
Abutment Type	spill-through abutment		
Set-back Length	20.000	ft	The set-back length is the distance from the near edge of the main channel to t…
Main Channel Average Flow Depth	14.580	ft	
Flow Depth at Toe of Abutment	4.190	ft	
Total Discharge	**16684.000**	cfs	Calculations will use either total or overbank discharges. Bolded values indicate…
Overbank Discharge	252.000	cfs	
Total Bridge Area	**5440.000**	ft^2	
Setback Area	340.000	ft^2	
Maximum Channel Velocity	**7.000**	ft/s	
Specific Gravity of Riprap	2.650		
Results			
Set-back ratio	1.372		
Characteristic Velocity	3.067	ft/s	
Froude Number at the Abutment Toe	0.264		
Abutment Coefficient	0.890		
D50	1.892	in	
D50	0.158	ft	
Riprap Shape	Riprap shape should be angular		
Riprap Class			
Riprap Class Name	CLASS I		
Riprap Class Order	1		
D15	4.50	in	This value is an 'average' of the size fraction range for the selected riprap class
D50	6.50	in	This value is an 'average' of the size fraction range for the selected riprap class
D85	9.00	in	This value is an 'average' of the size fraction range for the selected riprap class
D100	12.00	in	This value is an 'average' of the size fraction range for the selected riprap class
Layout			
Riprap Thickness	12.000	in	
Minimum Horizontal Extent of the Toe Apron from the Abutment Toe	8.380	ft	
Minimum Extent of "Wrap Around" beyond the Abutment Radius, along the Approach Embankment	25.000	ft	See HEC 23, Figure 14.7

Figure 4-4 Manning's Roughness Coefficients for Riprap (n)

Type of Rock Lining[1]		n (Small Channels)[2]	n (Large Channels)
Spalls	D_{50} = 0.5 ft	0.035	0.030
Light Loose Riprap	D_{50} = 1.1 ft	0.040	0.035
Heavy Loose Riprap	D_{50} = 2.2 ft	0.045	0.040

D50 greater than 6in bump up to Light Loose riprap per WSDOT HM design

Riprap Extents

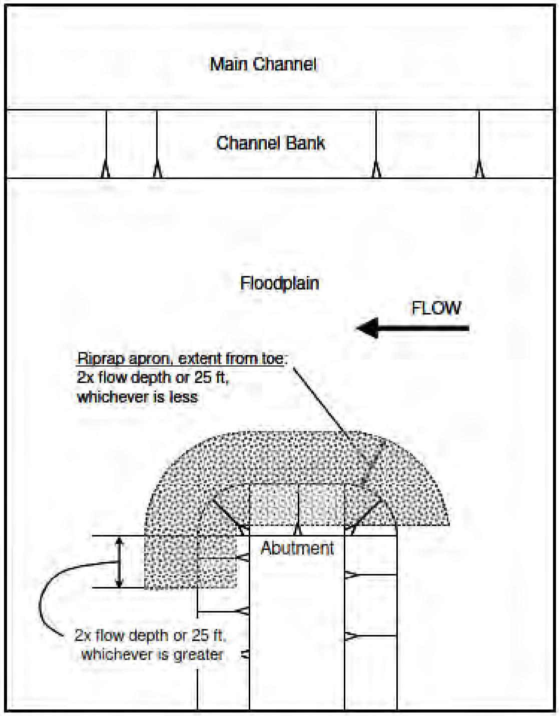
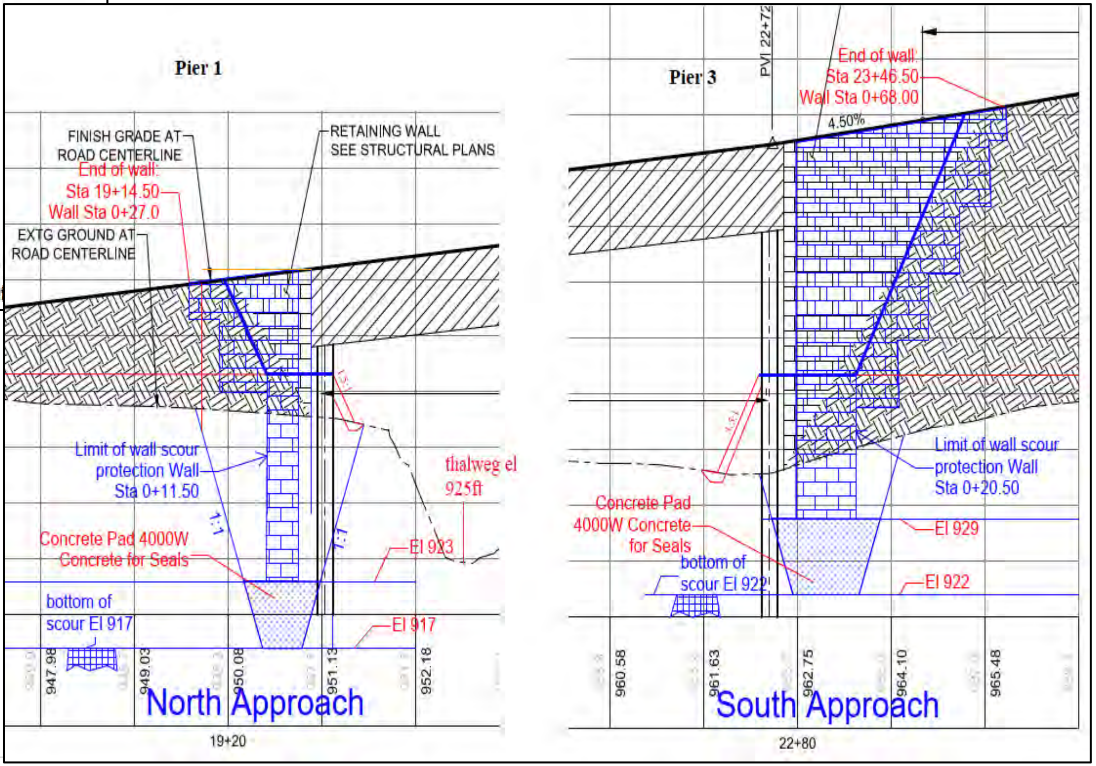


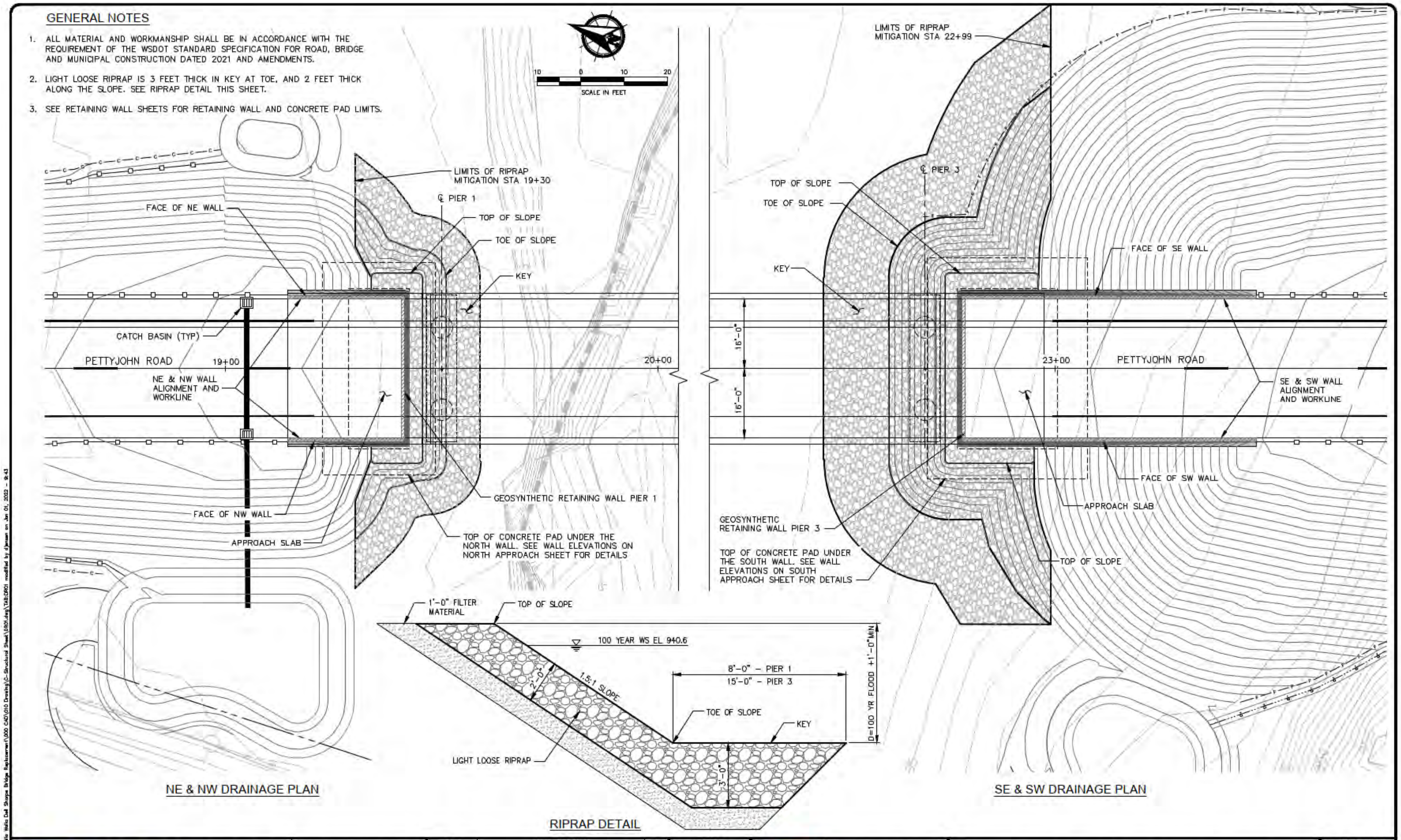
Figure 14.7. Plan view of the extent of rock riprap apron (Lagasse e

The flow depth around Pier 1 is approximately 4ft, and the flow depth around Pier 3 is approximately 7.5 ft thus following the HEC23 Figure 14. Criteria the riprap extent for Pier1 would be 8ft and 15ft for Pier 3

However, the limits of the riprap will extend to match the retaining wall length approximately 15 ft on the north and 24 ft on the south. The retaining wall limits match the limits of the channel migration zone, see Appendix B for channel migration zone limits. This is to provide the scour protection required for lateral migration of the river and build a concrete pad to the limits of the scour depth or bedrock, default to the lower of the two elevations



Riprap Detail Sheet



GENERAL NOTES

1. ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE REQUIREMENT OF THE WSDOT STANDARD SPECIFICATION FOR ROAD, BRIDGE AND MUNICIPAL CONSTRUCTION DATED 2021 AND AMENDMENTS.
2. LIGHT LOOSE RIPRAP IS 3 FEET THICK IN KEY AT TOE, AND 2 FEET THICK ALONG THE SLOPE. SEE RIPRAP DETAIL THIS SHEET.
3. SEE RETAINING WALL SHEETS FOR RETAINING WALL AND CONCRETE PAD LIMITS.

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.	.	.

ROCIO C. PERALTA

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Phone: 509. 524-2710
Web Address: www.wwcountyroads.com

DELL SHARPE BRIDGE REPLACEMENT PROJECT

RIPRAP DETAILS

PROJECT NUMBER CRP20-02
SHEET DR01
PAGE ---- OF XX

Appendix E- Bridge Deck Calculations

Curb and Gutter Design bypass analysis

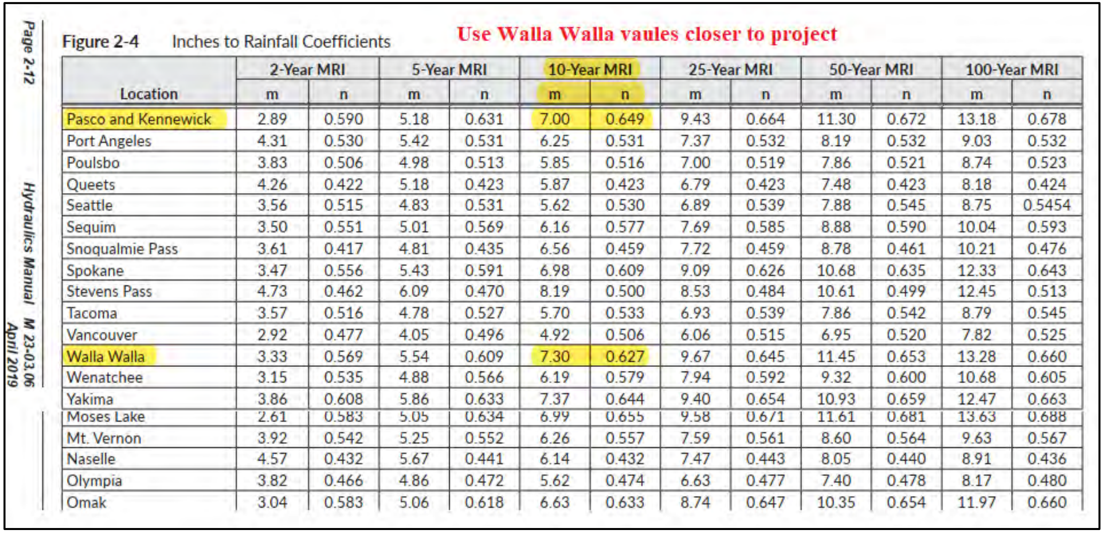

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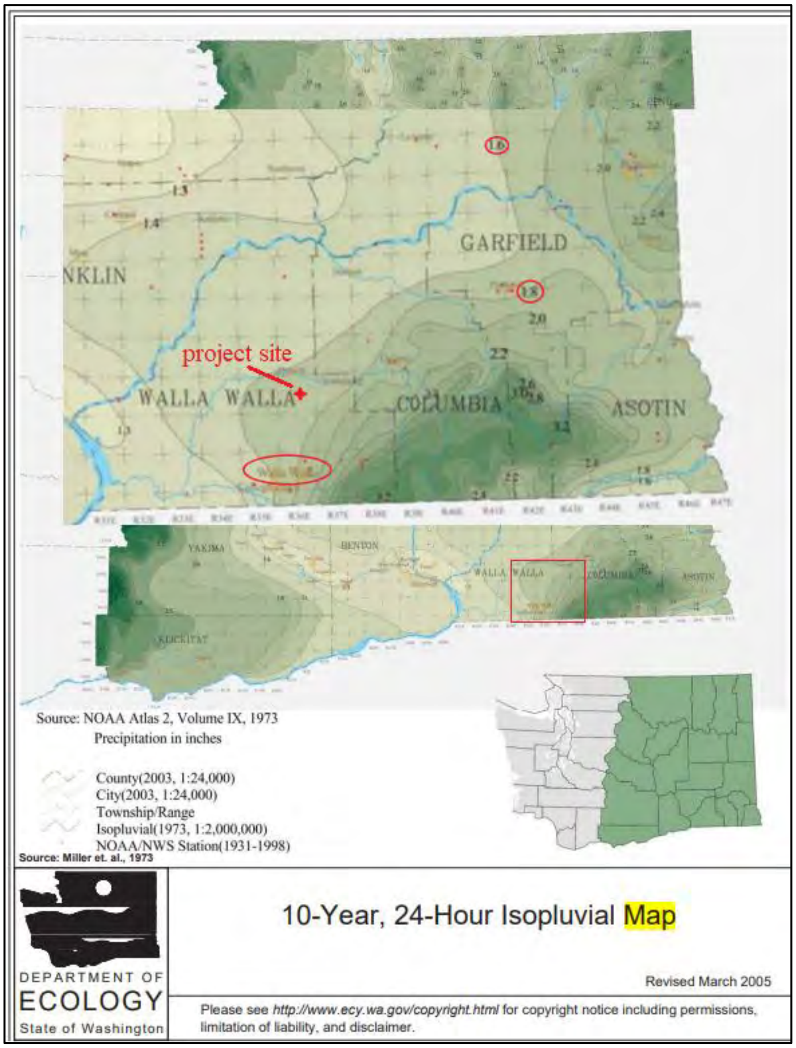
Figure 2-4 Inches to Rainfall Coefficients

Use Walla Walla vaules closer to project

Location	2-Year MRI		5-Year MRI		10-Year MRI		25-Year MRI		50-Year MRI		100-Year MRI	
	m	n	m	n	m	n	m	n	m	n	m	n
Pasco and Kennewick	2.89	0.590	5.18	0.631	7.00	0.649	9.43	0.664	11.30	0.672	13.18	0.678
Port Angeles	4.31	0.530	5.42	0.531	6.25	0.531	7.37	0.532	8.19	0.532	9.03	0.532
Poulsbo	3.83	0.506	4.98	0.513	5.85	0.516	7.00	0.519	7.86	0.521	8.74	0.523
Queets	4.26	0.422	5.18	0.423	5.87	0.423	6.79	0.423	7.48	0.423	8.18	0.424
Seattle	3.56	0.515	4.83	0.531	5.62	0.530	6.89	0.539	7.88	0.545	8.75	0.5454
Sequim	3.50	0.551	5.01	0.569	6.16	0.577	7.69	0.585	8.88	0.590	10.04	0.593
Snoqualmie Pass	3.61	0.417	4.81	0.435	6.56	0.459	7.72	0.459	8.78	0.461	10.21	0.476
Spokane	3.47	0.556	5.43	0.591	6.98	0.609	9.09	0.626	10.68	0.635	12.33	0.643
Stevens Pass	4.73	0.462	6.09	0.470	8.19	0.500	8.53	0.484	10.61	0.499	12.45	0.513
Tacoma	3.57	0.516	4.78	0.527	5.70	0.533	6.93	0.539	7.86	0.542	8.79	0.545
Vancouver	2.92	0.477	4.05	0.496	4.92	0.506	6.06	0.515	6.95	0.520	7.82	0.525
Walla Walla	3.33	0.569	5.54	0.609	7.30	0.627	9.67	0.645	11.45	0.653	13.28	0.660
Wenatchee	3.15	0.535	4.88	0.566	6.19	0.579	7.94	0.592	9.32	0.600	10.68	0.605
Yakima	3.86	0.608	5.86	0.633	7.37	0.644	9.40	0.654	10.93	0.659	12.47	0.663
Moses Lake	2.61	0.583	5.05	0.634	6.99	0.655	9.58	0.671	11.61	0.681	13.63	0.688
Mt. Vernon	3.92	0.542	5.25	0.552	6.26	0.557	7.59	0.561	8.60	0.564	9.63	0.567
Naselle	4.57	0.432	5.67	0.441	6.14	0.432	7.47	0.443	8.05	0.440	8.91	0.436
Olympia	3.82	0.466	4.86	0.472	5.62	0.474	6.63	0.477	7.40	0.478	8.17	0.480
Omak	3.04	0.583	5.06	0.618	6.63	0.633	8.74	0.647	10.35	0.654	11.97	0.660



Source: NOAA Atlas 2, Volume IX, 1973
Precipitation in inches

Source: Miller et. al., 1973

10-Year, 24-Hour Isopluvial Map

Revised March 2005

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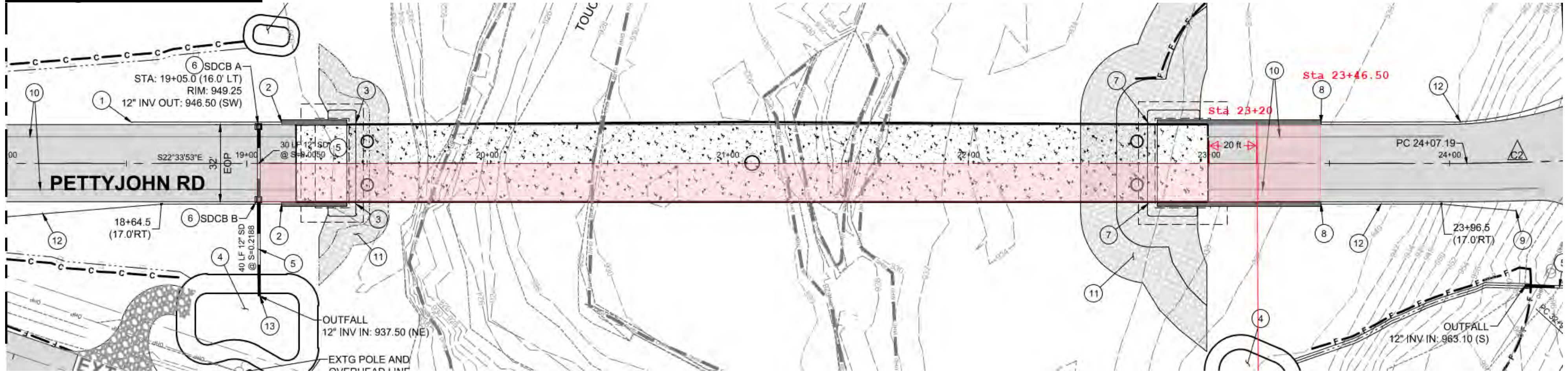
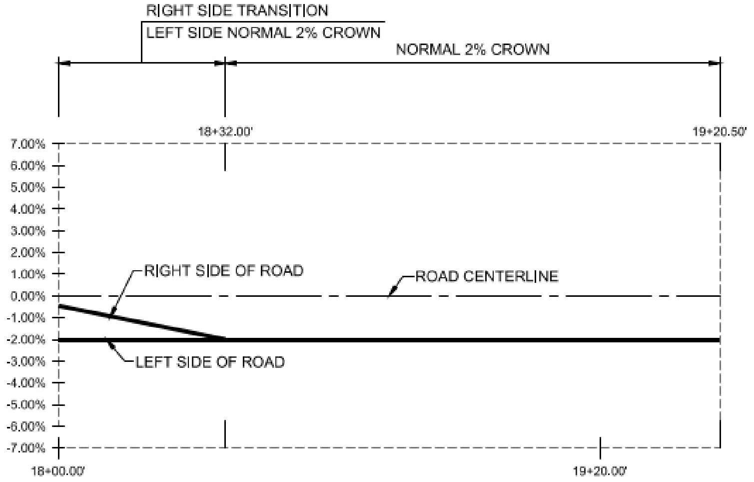
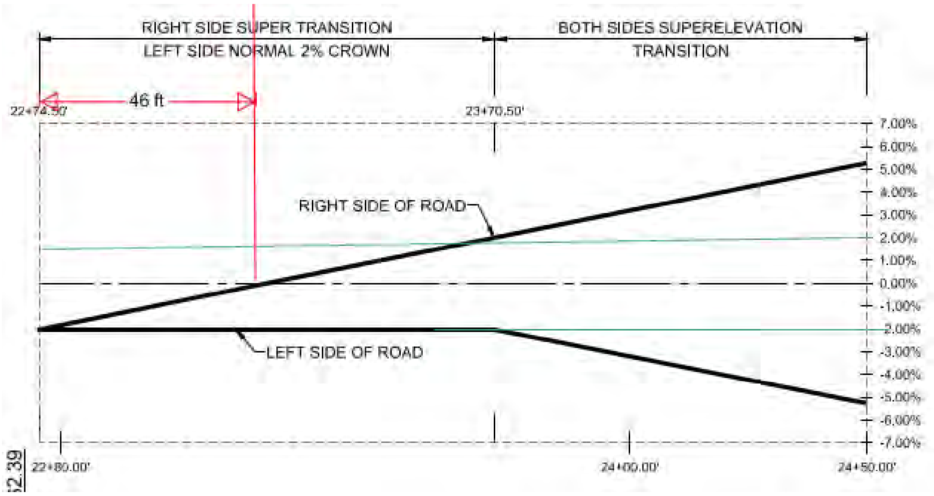
The project site is closer to 1.8in 10yr -24hr Isopluvial as it is at Walla Walla than the 1.6in. Therefore, the rainfall amount and type should be similar at the project site as in Walla Walla

Bridge Deck Area

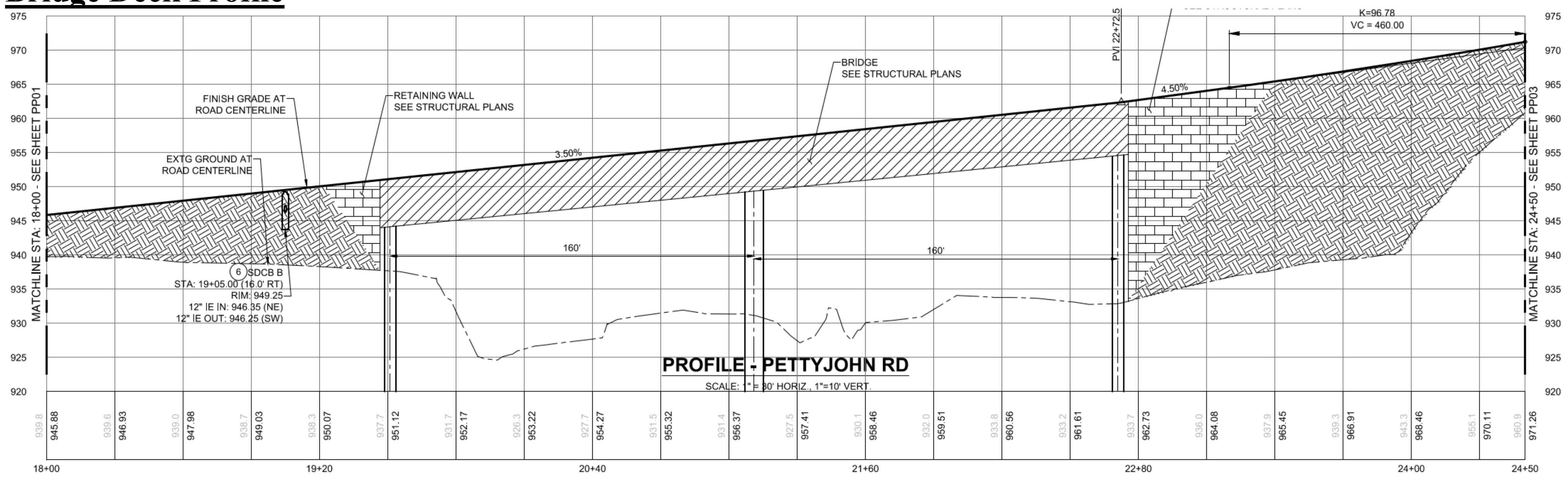


Bridge Deck Super





Bridge Deck Profile



Dell Sharpe Br Lt- 10yr

2019 INLET SPACING - CURB AND GUTTER SPREADSHEET (ENGLISH UNITS)

Fill in the data for the *grey shaded areas* only

Tc =	5.00
C =	0.90
I =	2.66
m=	7.30
n=	0.627

Project Name: Touchet River Br Lt -10yr
Project #:
S.R.: Pettyjohn Rd
Designed By: RCP   RCP updated   RCP revised
Date: 8/2/2021   11/1/2021   12/30/2021

Structure ID	Station	Distance (ft)	Width (ft)	Area (ft2)	Δ Q cfs (cfs)	Σ Q (cfs)	Slope L (ft/ft)	Super T (ft/ft)	Grate Type HM Figure 5-11	GRATE WIDTH (ft)	GRATE LENGTH (ft)	Roadway Classification	Enter Requested Information		Allowable Spread Policy	Driving Lane Width (ft)	Shoulder Width (ft)	Allowable Zd (ft)	Calculated Z_d (ft)	Depth of Flow at Face of Curb d (inches)	Manning's n for Street and Pavement Gutter	Velocity fo Gutter Flow (ft/sec)	Ratio of Frontal Flow to Total Gutter Flow E_o	Splash-Over Velocity V_o (ft/sec)	Ratio of Frontal Flow Intercepted to Full Frontal Flow R_f	Ratio of Side Flow Intercepted to Total Side Flow R_s	Effiency of Grate E	Q_i (cfs)	Q_{bp} (cfs)	Z_d Check	Q_{bp} Check
----------	23+20.00	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------
	22+97.96	22.04	16.00		0.02	0.02	0.05	0.01	NO GRATE	0.00	0.00	Interstate, Principal, Minor Arterial, or Divided	Enter Speed (mph) -------------->	55	Shoulder	11.00	5.00	5.00	1.92	0.23	0.016	1.04	0.00	0.00	0.00	0.00	0.00	0.00	0.02	Zd Allowable > Zd Design	
	22+74.50	23.46	16.00		0.02	0.04	0.04	0.02	NO GRATE	0.00	0.00	Interstate, Principal, Minor Arterial, or Divided	Enter Speed (mph) -------------->	55	Shoulder	11.00	5.00	5.00	1.71	0.41	0.016	1.35	0.00	0.00	0.00	0.00	0.00	0.00	0.04	Zd Allowable > Zd Design	
	22+70.00	4.50	16.00		0.00	0.04	0.04	0.02	NO GRATE	0.00	0.00	Interstate, Principal, Minor Arterial, or Divided	Enter Speed (mph) -------------->	55	Shoulder	11.00	5.00	5.00	1.77	0.43	0.016	1.39	0.00	0.00	0.00	0.00	0.00	0.00	0.04	Zd Allowable > Zd Design	
	19+50.00	320.00	16.00		0.28	0.33	0.04	0.02	NO GRATE	0.00	0.00	Interstate, Principal, Minor Arterial, or Divided	Enter Speed (mph) -------------->	55	Shoulder	11.00	5.00	5.00	3.76	0.90	0.016	2.29	0.00	0.00	0.00	0.00	0.00	0.00	0.33	Zd Allowable > Zd Design	
	19+10.50	39.50	16.00		0.03	0.36	0.04	0.02	NO GRATE	0.00	0.00	Interstate, Principal, Minor Arterial, or Divided	Enter Speed (mph) -------------->	55	Shoulder	11.00	5.00	5.00	3.91	0.94	0.016	2.35	0.00	0.00	0.00	0.00	0.00	0.00	0.36	Zd Allowable > Zd Design	
	19+05.00	5.50	16.00		0.00	0.37	0.04	0.02	Standard Plan B-30.30-03 Rectangular Vaned Grate	1.67	2.00	Interstate, Principal, Minor Arterial, or Divided	Enter Speed (mph) -------------->	55	Shoulder	11.00	5.00	5.00	3.92	0.94	0.016	2.36	0.77	4.60	1.00	0.12	0.80	0.29	0.07	Zd Allowable > Zd Design	Qbp < 0.1 CFS

Dell Sharpe Br Rt- 10yr

2019 INLET SPACING - CURB AND GUTTER SPREADSHEET (ENGLISH UNITS)

Fill in the data for the *grey shaded areas* only

Tc =	5.00
C =	0.90
I =	2.66
m=	7.30
n=	0.627

Project Name: Touchet River Br Rt -10yr
Project #:
S.R.: Pettyjohn Rd
Designed By: RCP   RCP updated   RCP revised
Date: 8/2/2021   11/1/2021   12/30/2021

Structure ID	Station	Distance (ft)	Width (ft)	Area (ft2)	Δ Q cfs (cfs)	Σ Q (cfs)	Slope L (ft/ft)	Super T (ft/ft)	Grate Type HM Figure 5-11	GRATE WIDTH (ft)	GRATE LENGTH (ft)	Roadway Classification	Enter Requested Information		Allowable Spread Policy	Driving Lane Width (ft)	Shoulder Width (ft)	Allowable Zd (ft)	Calculated Z_d (ft)	Depth of Flow at Face of Curb d (inches)	Manning's n for Street and Pavement Gutter	Velocity fo Gutter Flow (ft/sec)	Ratio of Frontal Flow to Total Gutter Flow E_o	Splash-Over Velocity V_o (ft/sec)	Ratio of Frontal Flow Intercepted to Full Frontal Flow R_f	Ratio of Side Flow Intercepted to Total Side Flow R_s	Effiency of Grate E	Q_i (cfs)	Q_{bp} (cfs)	Z_d Check	Q_{bp} Check
----------	23+46.50	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------
	23+37.18	9.32	32.00		0.02	0.02	0.05	0.02	NO GRATE	0.00	0.00	Interstate, Principal, Minor Arterial, or Divided	Enter Speed (mph) -------------->	55	Shoulder	11.00	5.00	5.00	1.17	0.28	0.016	1.19	0.00	0.00	0.00	0.00	0.00	0.00	0.02	Zd Allowable > Zd Design	
	23+20.00	17.18	32.00		0.03	0.05	0.05	0.02	NO GRATE	0.00	0.00	Interstate, Principal, Minor Arterial, or Divided	Enter Speed (mph) -------------->	55	Shoulder	11.00	5.00	5.00	2.07	0.37	0.016	1.44	0.00	0.00	0.00	0.00	0.00	0.00	0.05	Zd Allowable > Zd Design	
	22+97.96	22.04	16.00		0.02	0.07	0.04	0.02	NO GRATE	0.00	0.00	Interstate, Principal, Minor Arterial, or Divided	Enter Speed (mph) -------------->	55	Shoulder	11.00	5.00	5.00	2.07	0.50	0.016	1.54	0.00	0.00	0.00	0.00	0.00	0.00	0.07	Zd Allowable > Zd Design	
	22+70.00	27.96	16.00		0.02	0.09	0.04	0.02	NO GRATE	0.00	0.00	Interstate, Principal, Minor Arterial, or Divided	Enter Speed (mph) -------------->	55	Shoulder	11.00	5.00	5.00	2.33	0.56	0.016	1.66	0.00	0.00	0.00	0.00	0.00	0.00	0.09	Zd Allowable > Zd Design	
	19+50.00	320.00	16.00		0.28	0.37	0.04	0.02	NO GRATE	0.00	0.00	Interstate, Principal, Minor Arterial, or Divided	Enter Speed (mph) -------------->	55	Shoulder	11.00	5.00	5.00	3.95	0.95	0.016	2.37	0.00	0.00	0.00	0.00	0.00	0.00	0.37	Zd Allowable > Zd Design	
	19+10.50	39.50	16.00		0.03	0.41	0.04	0.02	NO GRATE	0.00	0.00	Interstate, Principal, Minor Arterial, or Divided	Enter Speed (mph) -------------->	55	Shoulder	11.00	5.00	5.00	4.09	0.98	0.016	2.42	0.00	0.00	0.00	0.00	0.00	0.00	0.41	Zd Allowable > Zd Design	
	19+05.00	5.50	16.00		0.00	0.41	0.04	0.02	Standard Plan B-30.30-03 Rectangular Vaned Grate	1.67	2.00	Interstate, Principal, Minor Arterial, or Divided	Enter Speed (mph) -------------->	55	Shoulder	11.00	5.00	5.00	4.11	0.99	0.016	2.43	0.75	4.60	1.00	0.12	0.78	0.32	0.09	Zd Allowable > Zd Design	Qbp < 0.1 CFS

Appendix F- Field Notes & Photo Log

Dell Sharpe Bridge Field Notes

December 7,2020 at Bridge Site

Attendees: Rocio Peralta- MP Stormwater, Tony Garcia, and Seth Walker from Walla Walla County

1- The site visit was from 8:00am to 10:00am and it was a clear, cold 30 degrees with fog. The previous days have been similar but with freezing fog Tony and Seth stated.

2- It was low flow in the channel that day, which made it easy to walk down and see the exposed footing and take photos of the gravel bar sediments.

3- Double checked the as built for the bridge arch width at 55ft and pier widths 6ft that matched the drawings. The height from the edge of water to the low cord of the arch was approximately 16.5ft approximately 15ft from the middle pier.

4- There is a lot of rock outcrop on the surface of the channel and used as embankment protection on the south end of the bridge. The north end has more silt and gravel.

5- The roadway width is approximately 22ft and it narrows to 19ft at the bridge. The total length is approximately 150ft. There are no bridge drains on the arch, the bridge runoff slopes to the north.

6- No existing stormwater treatment for the bridge it all drains to the north and sheet flows down the embankment slope down to the river.

7- Took several photos upstream and downstream at bridge site from underneath bridge and from the top as well as from a far distance from the south and north.

8- The existing bridge abutment on the south seem to be in better shape since the rock outcrop is still providing protection. Even though it is beginning to erode, it is still providing protection. On the north end there is no protection at all exposing the abutment/pier 1.

9- The low flow thalweg is more towards the northwest side of the river right splitting the flow by the small gravel bar between pier 1 and pier 2.

10- There is extensive scour noted on pier1 and pier2 as well as lateral bank erosion upstream. It was evident that aggradation is an issue and not degradation with the gravel bars in the river system. There are several gravel bars upstream and along the inside of the southeast side of the creek.

11- The bridge did have high water marks probably from February 7, 2020, event. Along the side of the top side of the arch, you can see the high-water line.

12- The size of particle that we saw was a combination of rock outcrop and with silt and gravel in the river. The floodway is a combination of trees, brush, grass with vertical bank along the bends for the active channel with trees at the setback floodway bank line before the farm fields.

13- Lateral migration is very evident in the river, scour along the bank line is noticed at this time. We did see several side channels and high flow channels.

14- Walked up stream and notice several Control Points (CP) from the survey. Double checked to make sure the distance was correct for the extent of the river survey. Making sure the survey captures when the river begins to overflow on the south.

15- Looking upstream the channel is meandrous and currently due to the gravel bars runs parallel to the roadway where there is riprap placed then does a 90-degree bend. The main flow runs along the north side of the channel migration zone of the river. Looking straight upstream slightly to the right you can also see a high flow channel. This confirms our aerial view from google maps.

16- Looking downstream the river is straight for a good distance and stable with no gravel bars or lateral migration.

17- There is a down tree that have moved through the bridge on the downstream north side of the bridge. There is also another down tree just upstream from pier 2.

18- Confirmed with Tony and Seth if ice was an issue and they said no.

19- The main concern we see is the white building on the northwest side of the existing roadway. Tony and Seth asked what our plan was to protect the historic Pettyjohn School. It was the first time, I heard this was a school, assumed it was the farmers field shop.

20-

MODIFIED STREAM RECONNAISSANCE

Based on Thorne (1998)

SECTION 1 - SITE DESCRIPTION

ROAD NAME/NUMBER Petty John Rd DATE 12-7-20

BRIDGE NUMBER Dell Sharpe

STREAM NAME Touchet River

GPS COORDINATES

SECTION 2 - REGION AND VALLEY DESCRIPTION

PART 1: WATERSHED

Land Use
- ○ Natural
- ☒ Agricultural
- ○ Urban
- ○ Suburban
- ○ Rural
- ○ Industrial
- ○ Cattle grazing

Vegetation
- ○ None
- ○ Grass
- ☒ Pasture
- ○ Crops
- ☒ Shrubs
- ○ Deciduous Forest/trees
- ○ Coniferous Forest/trees

PART 2: RIVER VALLEY CONDITION

Valley Side Failures
- ○ None
- ☒ Occasional
- ○ Frequent

Failure Locations
- ○ None
- ○ Away from river
- ☒ Along river

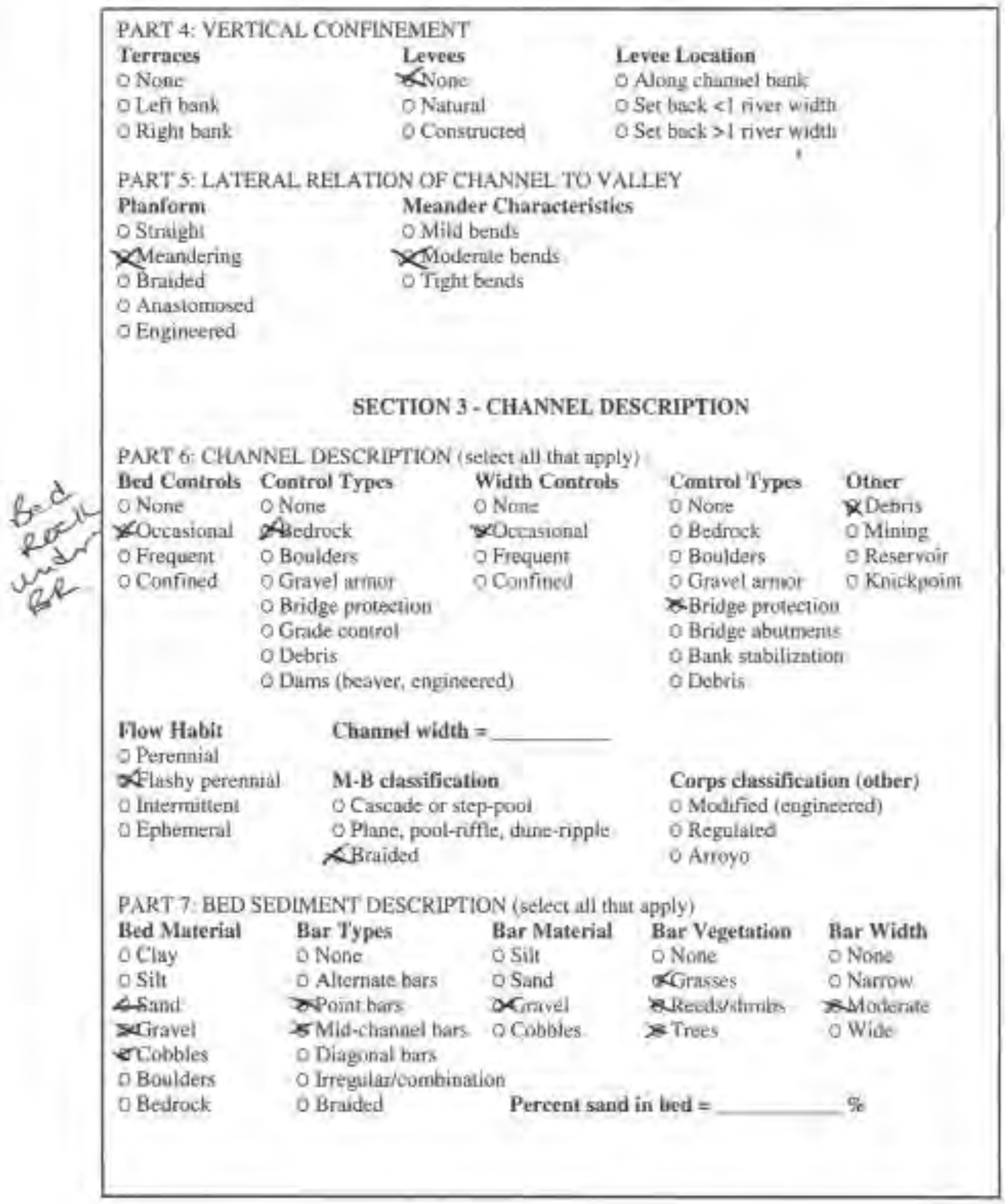
PART 3: FLOODPLAIN

Floodplain Width
- ○ None
- ○ <1 river width
- ☒ 1-5 river widths
- ○ 5-10 river widths
- ○ >10 river widths

Land Use
- ○ Natural
- ☒ Agricultural
- ○ Urban
- ○ Suburban
- ○ Rural
- ○ Industrial
- ○ Mining
- ○ Cattle grazing

Veoetation
- ○ None
- ○ Grass
- ☒ Pasture
- ○ Orchards
- ○ Crops
- ☒ Shrubs
- ○ Deciduous Forest/trees
- ○ Coniferous Forest/trees

Riparian Buffer Strip
- ○ None
- ☒ <1 river width
- ○ 1-5 river widths
- ○ >5 river widths



PART 4: VERTICAL CONFINEMENT

Terraces
- ○ None
- ○ Left bank
- ○ Right bank

Levees
- ☒ None
- ○ Natural
- ○ Constructed

Levee Location
- ○ Along channel bank
- ○ Set back <1 river width
- ○ Set back >1 river width

PART 5: LATERAL RELATION OF CHANNEL TO VALLEY

Planform
- ○ Straight
- ☒ Meandering
- ○ Braided
- ○ Anastomosed
- ○ Engineered

Meander Characteristics
- ○ Mild bends
- ☒ Moderate bends
- ○ Tight bends

SECTION 3 - CHANNEL DESCRIPTION

PART 6: CHANNEL DESCRIPTION (select all that apply)

Bed rock under BR

Bed Controls
- ○ None
- ☒ Occasional
- ○ Frequent
- ○ Confined

Control Types
- ○ None
- ☒ Bedrock
- ○ Boulders
- ○ Gravel armor
- ○ Bridge protection
- ○ Grade control
- ○ Debris
- ○ Dams (beaver, engineered)

Width Controls
- ○ None
- ☒ Occasional
- ○ Frequent
- ○ Confined

Control Types
- ○ None
- ○ Bedrock
- ○ Boulders
- ○ Gravel armor
- ☒ Bridge protection
- ○ Bridge abutments
- ○ Bank stabilization
- ○ Debris

Other
- ☒ Debris
- ○ Mining
- ○ Reservoir
- ○ Knickpoint

Flow Habit
- ○ Perennial
- ☒ Flashy perennial
- ○ Intermittent
- ○ Ephemeral

Channel width = __________

M-B classification
- ○ Cascade or step-pool
- ○ Plane, pool-riffle, dune-ripple
- ☒ Braided

Corps classification (other)
- ○ Modified (engineered)
- ○ Regulated
- ○ Arroyo

PART 7: BED SEDIMENT DESCRIPTION (select all that apply)

Bed Material
- ○ Clay
- ○ Silt
- ☒ Sand
- ☒ Gravel
- ☒ Cobbles
- ○ Boulders
- ○ Bedrock

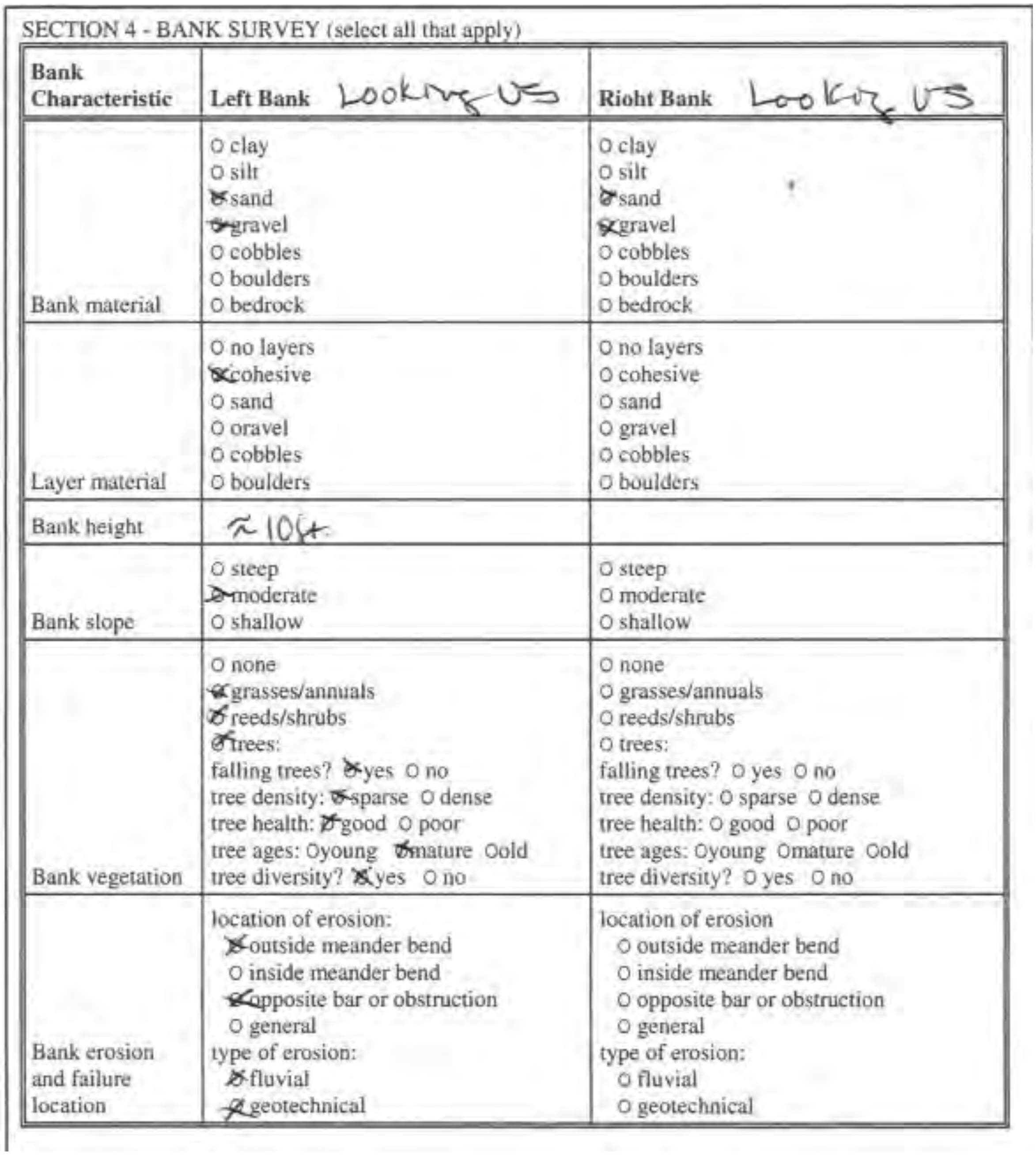
Bar Types
- ○ None
- ○ Alternate bars
- ☒ Point bars
- ☒ Mid-channel bars
- ○ Diagonal bars
- ○ Irregular/combination
- ○ Braided

Bar Material
- ○ Silt
- ○ Sand
- ☒ Gravel
- ○ Cobbles

Bar Vegetation
- ○ None
- ☒ Grasses
- ☒ Reeds/shrubs
- ☒ Trees

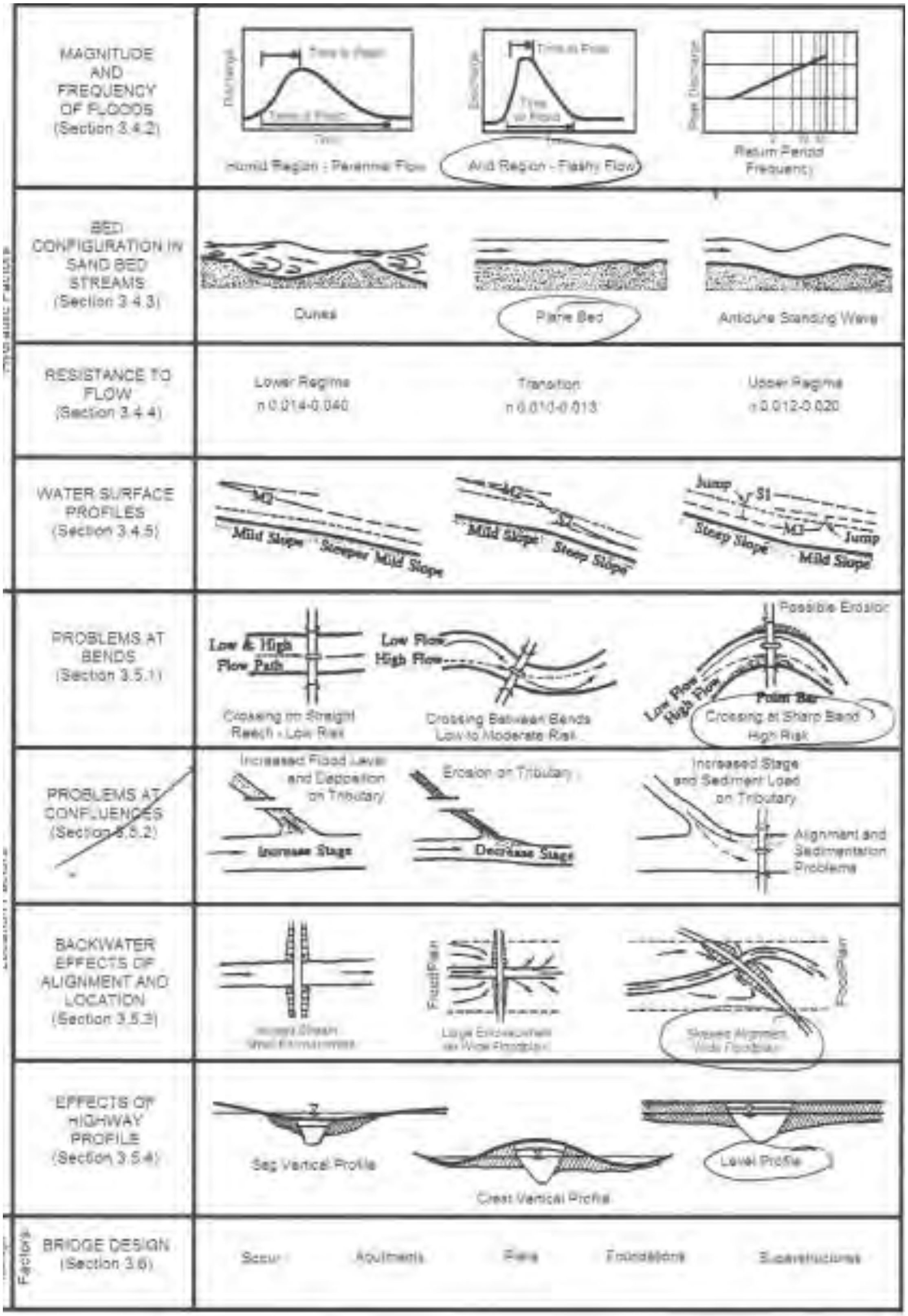
Bar Width
- ○ None
- ○ Narrow
- ☒ Moderate
- ○ Wide

Percent sand in bed = __________ %

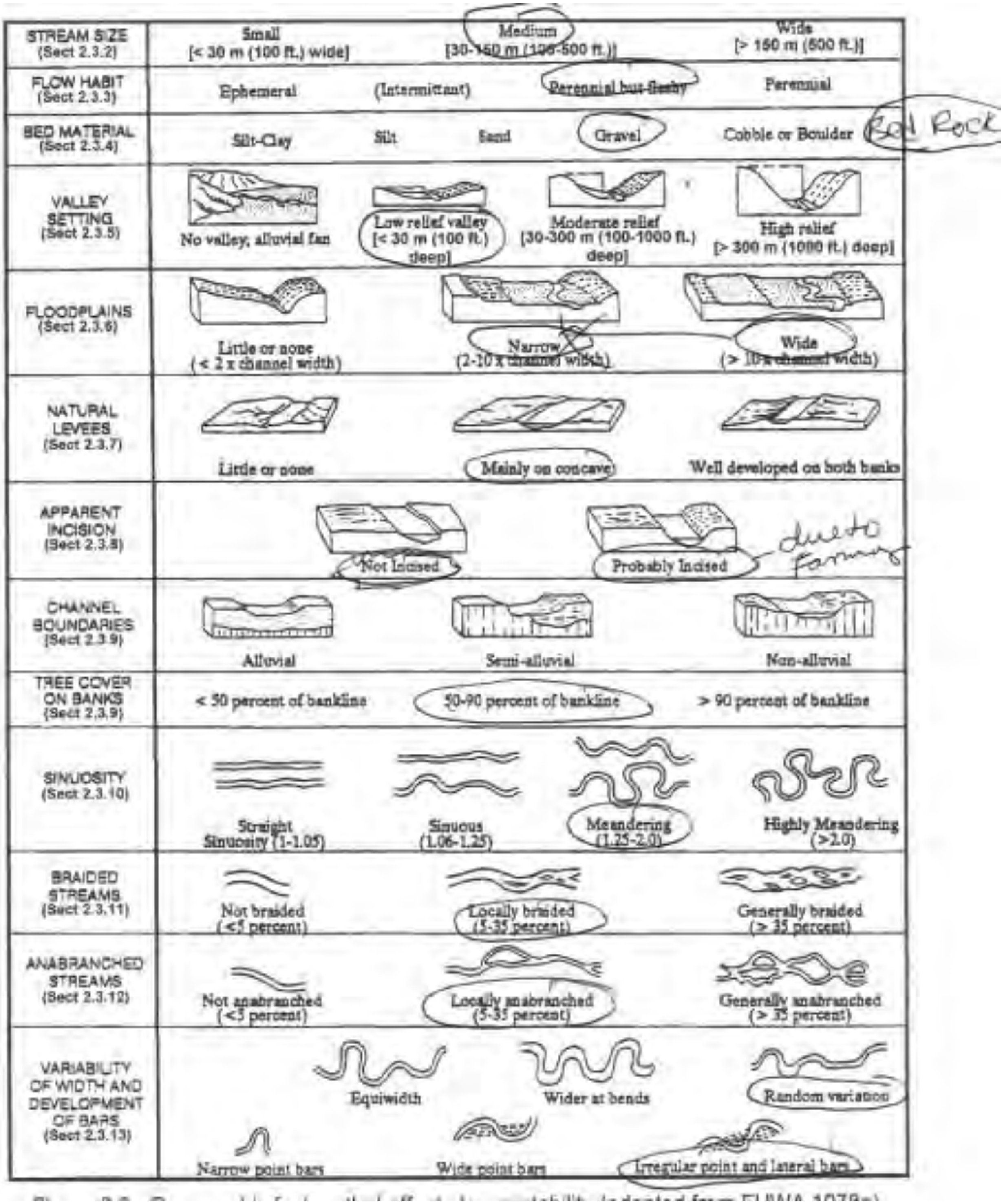


SECTION 4 - BANK SURVEY (select all that apply)

Bank Characteristic	Left Bank Looking US	Rioht Bank Looking US
Bank material	○ clay ○ silt ☒ sand ☒ gravel ○ cobbles ○ boulders ○ bedrock	○ clay ○ silt ☒ sand ☒ gravel ○ cobbles ○ boulders ○ bedrock
Layer material	○ no layers ☒ cohesive ○ sand ○ oravel ○ cobbles ○ boulders	○ no layers ○ cohesive ○ sand ○ gravel ○ cobbles ○ boulders
Bank height	≈ 10 ft	
Bank slope	○ steep ☒ moderate ○ shallow	○ steep ○ moderate ○ shallow
Bank vegetation	○ none ☒ grasses/annuals ☒ reeds/shrubs ☒ trees: falling trees? ☒ yes ○ no tree density: ☒ sparse ○ dense tree health: ☒ good ○ poor tree ages: ○ young ☒ mature ○ old tree diversity? ☒ yes ○ no	○ none ○ grasses/annuals ○ reeds/shrubs ○ trees: falling trees? ○ yes ○ no tree density: ○ sparse ○ dense tree health: ○ good ○ poor tree ages: ○ young ○ mature ○ old tree diversity? ○ yes ○ no
Bank erosion and failure location	location of erosion: ☒ outside meander bend ○ inside meander bend ☒ opposite bar or obstruction ○ general type of erosion: ☒ fluvial ☒ geotechnical	location of erosion ○ outside meander bend ○ inside meander bend ○ opposite bar or obstruction ○ general type of erosion: ○ fluvial ○ geotechnical

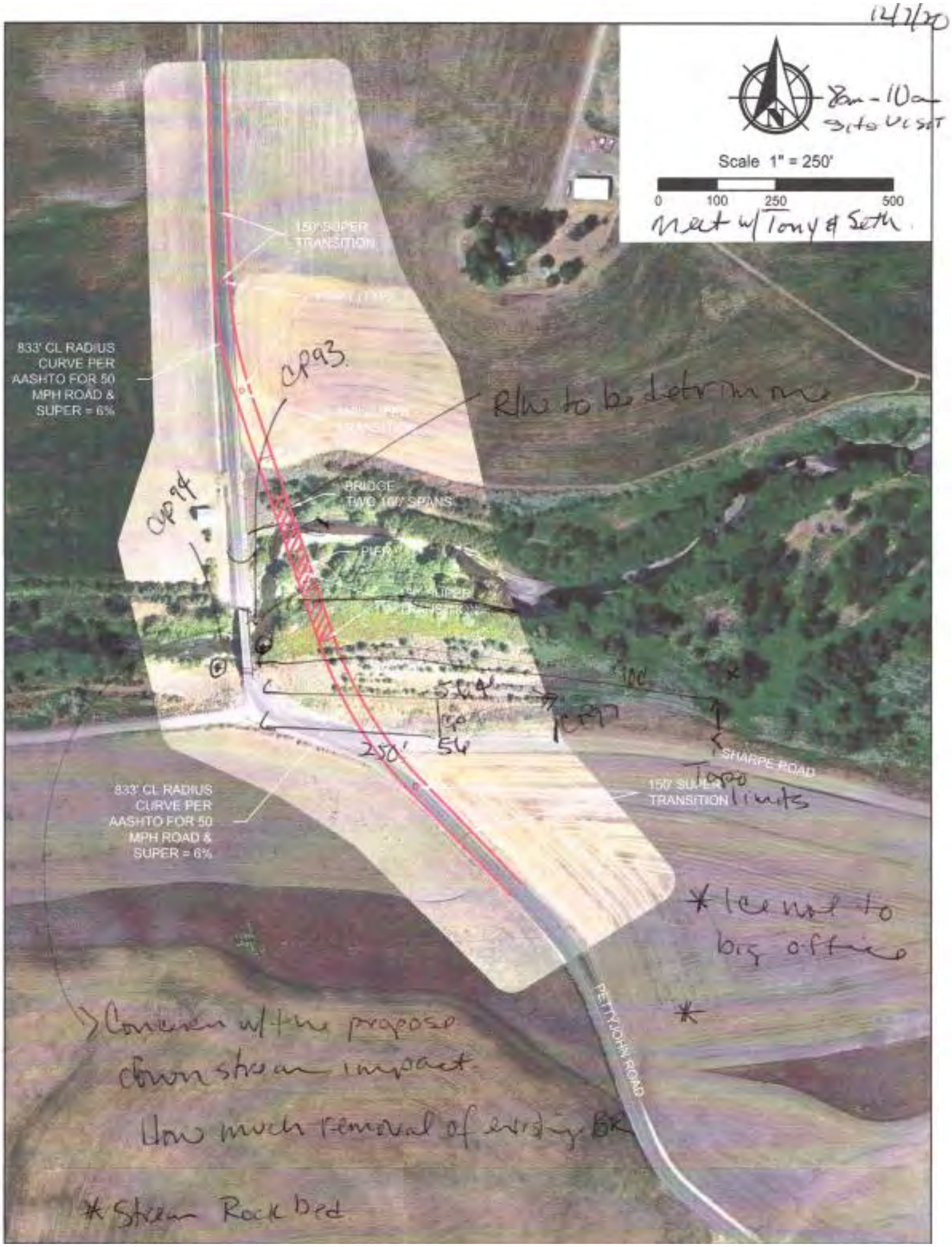


MAGNITUDE AND FREQUENCY OF FLOODS (Section 3.4.2)	Humid Region : Perennial Flow		Arid Region - Flashy Flow		Return Period (Frequency)
BED CONFIGURATION IN SAND BED STREAMS (Section 3.4.3)	Dunes		Plane Bed		Antidune Standing Wave
RESISTANCE TO FLOW (Section 3.4.4)	Lower Regime n 0.014-0.040		Transition n 0.010-0.013		Upper Regime n 0.012-0.020
WATER SURFACE PROFILES (Section 3.4.5)					
PROBLEMS AT BENDS (Section 3.5.1)	Crossing on Straight Reach - Low Risk		Crossing Between Bends Low to Moderate Risk		Crossing at Sharp Bend High Risk
PROBLEMS AT CONFLUENCES (Section 3.5.2)	Increased Flood Level and Deposition on Tributary		Erosion on Tributary		Increased Stage and Sediment Load on Tributary
BACKWATER EFFECTS OF ALIGNMENT AND LOCATION (Section 3.5.3)	Normal Stream Small Encroachment		Large Encroachment on Wide Floodplain		Skewed Alignment Wide Floodplain
EFFECTS OF HIGHWAY PROFILE (Section 3.5.4)	Sag Vertical Profile		Crest Vertical Profile		Level Profile
BRIDGE DESIGN (Section 3.6)	Scour	Abutments	Piers	Foundations	Superstructures



STREAM SIZE (Sect 2.3.2)	Small [< 30 m (100 ft.) wide]	[✓ Medium [30-150 m (100-500 ft.)]]	Wide [> 150 m (500 ft.)]		
FLOW HABIT (Sect 2.3.3)	Ephemeral	(Intermittant)	[✓ Perennial but flashy]	Perennial	
BED MATERIAL (Sect 2.3.4)	Silt-Clay	Silt	Sand	[✓ Gravel]	Cobble or Boulder [✓ Bed Rock]
VALLEY SETTING (Sect 2.3.5)	No valley; alluvial fan	[✓ Low relief valley [< 30 m (100 ft.) deep]]	Moderate relief [30-300 m (100-1000 ft.) deep]	High relief [> 300 m (1000 ft.) deep]	
FLOODPLAINS (Sect 2.3.6)	Little or none (< 2 x channel width)	Narrow (2-10 x channel width)	[✓ Wide (> 10 x channel width)]		
NATURAL LEVEES (Sect 2.3.7)	Little or none	[✓ Mainly on concave]	Well developed on both banks		
APPARENT INCISION (Sect 2.3.8)	[✓ Not Incised]	[✓ Probably Incised] due to Farming			
CHANNEL BOUNDARIES (Sect 2.3.9)	Alluvial	Semi-alluvial	Non-alluvial		
TREE COVER ON BANKS (Sect 2.3.9)	< 50 percent of bankline	[✓ 50-90 percent of bankline]	> 90 percent of bankline		
SINUOSITY (Sect 2.3.10)	Straight Sinuosity (1-1.05)	Sinuous (1.06-1.25)	[✓ Meandering (1.25-2.0)]	Highly Meandering (>2.0)	
BRAIDED STREAMS (Sect 2.3.11)	Not braided (<5 percent)	[✓ Locally braided (5-35 percent)]	Generally braided (> 35 percent)		
ANABRANCHED STREAMS (Sect 2.3.12)	Not anabranched (<5 percent)	[✓ Locally anabranched (5-35 percent)]	Generally anabranched (> 35 percent)		
VARIABILITY OF WIDTH AND DEVELOPMENT OF BARS (Sect 2.3.13)	Equiwidth	Wider at bends	[✓ Random variation]		
	Narrow point bars	Wide point bars	[✓ Irregular point and lateral bars]		

12/7/20



8am - 10am site visit

Met w/ Tony & Seth

R/W to be determine

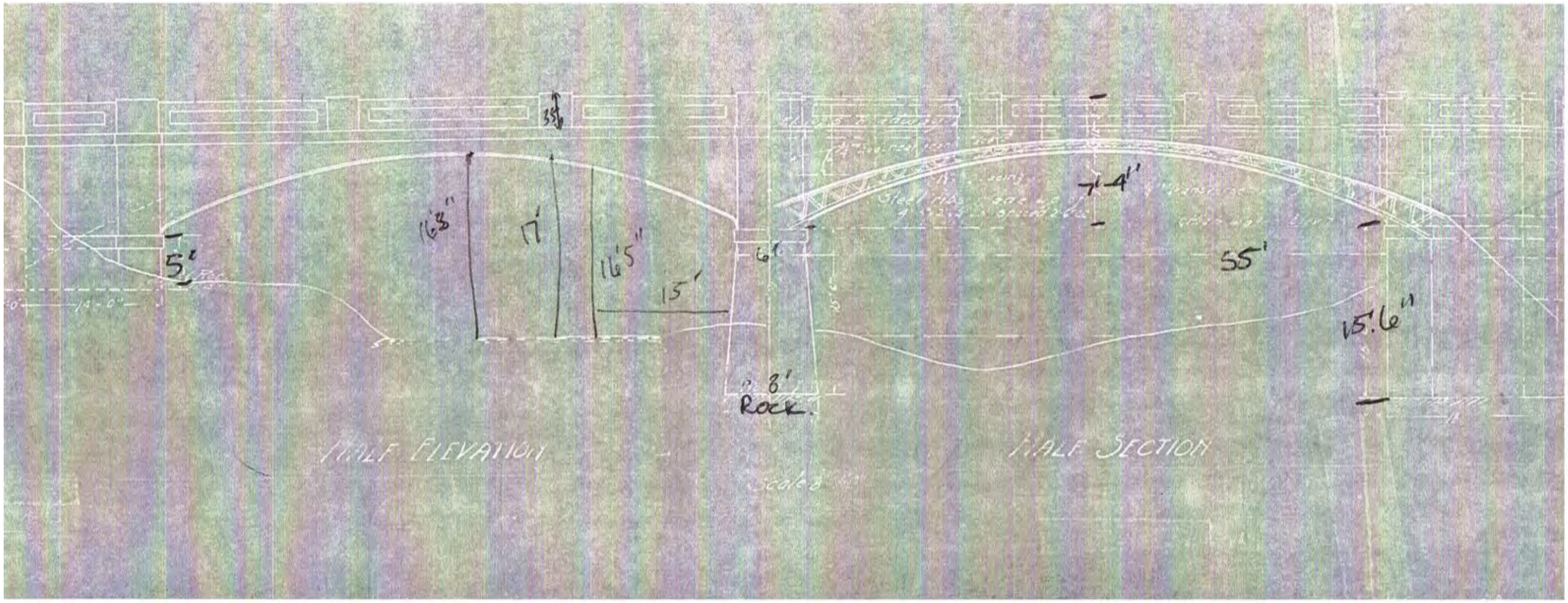
Topo limits

* lee not to big office

> Concern w/ the propose downstream impact

How much removal of existing BR

* Stream Rock Bed



Rdwy = 11'-6" lanes. total BR width = 23 ft.

.

Appendix F– Field Notes & Photo Log

Dell Sharpe Bridge Site Visit- Photo Log

December 7, 2020

1-Looking north from the south of the bridge upstream, see the river next to the roadway, and highwater line under arch.

2-Looking north from the south of the bridge abutment wingwall where there is still rock protection. There's a small gravel deposition in the first span as well.

3-Looking on the upstream of the bridge at the 90 degree bend and bank erosion around 10:00am

4-Closer view of the center pier that has been hit with debris and has small debris on the north side.

5-Looking south from the north on the upstream side of the bridge. Can see some debris upstream and protection on the embankment.

6-Looking at the center pier can see a lot of erosion o the concrete from being hit and exposed with leachin

7-Looking at pier1 from upstream to downstream There is not protection left on the pier abutment and more erosion on the concrete.

8-Looking at middle pier downstream side, also has concrete erosion and scouring. The south bank embankment on the downstream still has protection.

9- Looking downstream to south bank from north bank under bridge

10-Looking downstream to north bank from north bank under bridge, there is wood debris downstream along the bank

11- Looking upstream from at the south abutment rock outcrop.

12- Looking upstream from the south abutment, lots of vegetation on the bank.

13- Looking downstream from the south abutment, can see the rockout crop in river.

14- Gradation size of gravel bar deposition under bridge.

15- From top of the bridge deck looking down on the south bank at river channel to capture stream gradation and to see if rockout crop continues

16- From top of the bridge deck looking down on the north bank at river channel to capture stream gradation and to see if there is any rockout crop

17-Looking upstream to north from under the bridge on the northside on the gravel bar.

18-Looking directly upstream to overflow high flow area from under the bridge on the northside on the gravel bar. Can see lots of vegetation on bank.

19-Looking upstream to the southeast overflow high flow area, from under the bridge on the northside on the gravel bar.

20-Looking upstream to the southeast overflow high flow area, from under the bridge on the northside on the gravel bar.

21-Looking upstream from the bend to the east, can see more debris in the river from down trees falling from the bank.

21-Looking upstream at the eroding bank on the bend, can see fresh vertical bank sloughing with dirt on the top and gravels on the bottom of the bank.

22- Bank has some stability at toe where there's riprap at the edge of the bank parallel to the roadway.

23- Looking directly in the river at the toe of riprap where the river is parallel to the roadway.

24- Looking directly across from the bend on the opposite bank. You can see small gravel build up and lot of vegetation on the bank.

25- Looking to the north from the roadway where the river bends. The roadway is flat.

26- Looking to the west from the roadway where the river bends. This is the historic Pettyjohn School.

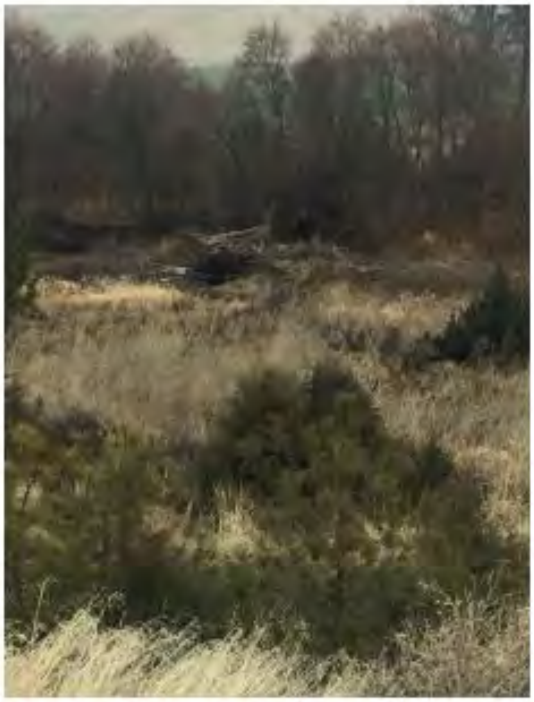
27- Looking southeast from the stake location where the new bridge alignment would traverse across.

28- Looking to the east from the roadway top of bank of the river and the farmer's field. Very flat once the river overtops the bank.

29- Farmers house surrounded by field, flat not much elevation change.

30- Looking northwest along new alignment would traverse across the valley. You can see the Pettyjohn School house and the telephone pole in the distance for approximate location.

31- Stake location is CP56 approximately 250ft upstream perpendicular from existing bridge. To capture river valley survey.



32- There seems to be debris build up on the floodplain slightly upstream from CP56

33 . Stake location is CP97 approximately 560ft upstream perpendicular from existing bridge. To capture river valley survey

34 . Stake location is Topo limit approximately 900ft upstream perpendicular from existing bridge. To capture river valley survey

35 . Stake location is Topo limit looking downstream back to existing bridge location across floodplain.

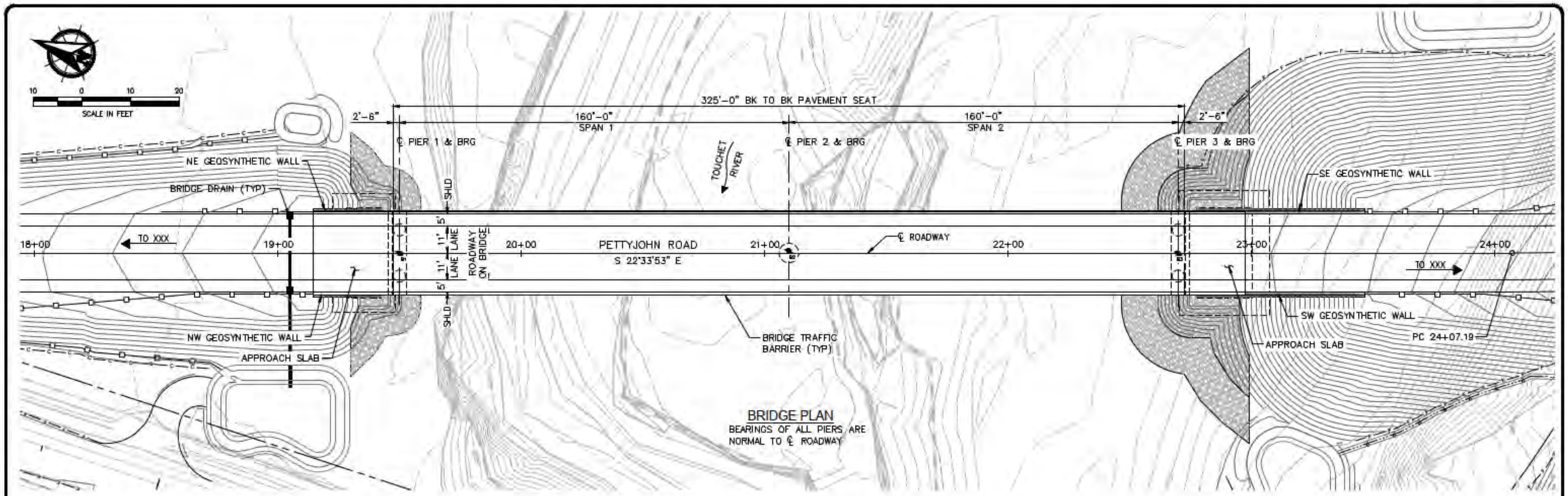
36 . Looking upstream from Topo limit stake, to capture where the high flow overflow goes.

37 . Looking upstream from bridge to Topo limit stake along dirt road to the 3rd telephone pole to the south, to capture where the high flow overflow goes.

38 . Looking upstream from bridge to the north, to capture where the high flow overflow goes.

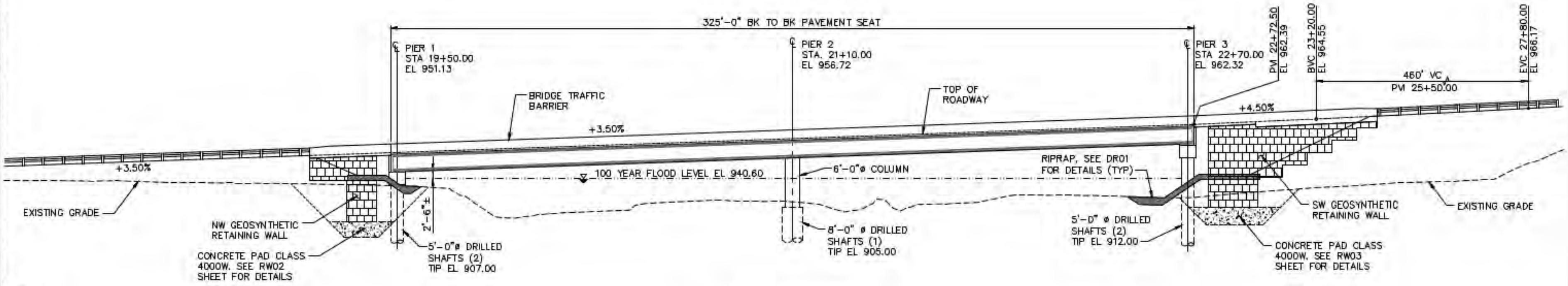
39 . Looking northwest at existing bridge from the top of the dirt road.

Appendix G – Project Plan Sheet



BRIDGE PLAN

BEARINGS OF ALL PIERS ARE NORMAL TO ℄ ROADWAY



DATUM
NGVD 29

BRIDGE ELEVATION

LOOKING UPSTREAM – GRADE ELEVATIONS SHOWN ARE FINISH GRADES AT TOP OF DECK AND ARE EQUAL TO PROFILE GRADE AT ℄ OF ROADWAY.

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DATE:	ISSUED / REVISED	BY:
-	-	-

NICK N NIKPOUR

WALLA WALLA COUNTY
Public Works Department
990 Navion Lane
Walla Walla, Washington 99362
Phone: 509 524-2710
Web address: www.co.walla-walla.wa.us

DELL SHARPE BRIDGE REPLACEMENT PROJECT

BRIDGE PLAN AND ELEVATION

PROJECT NUMBER
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S01
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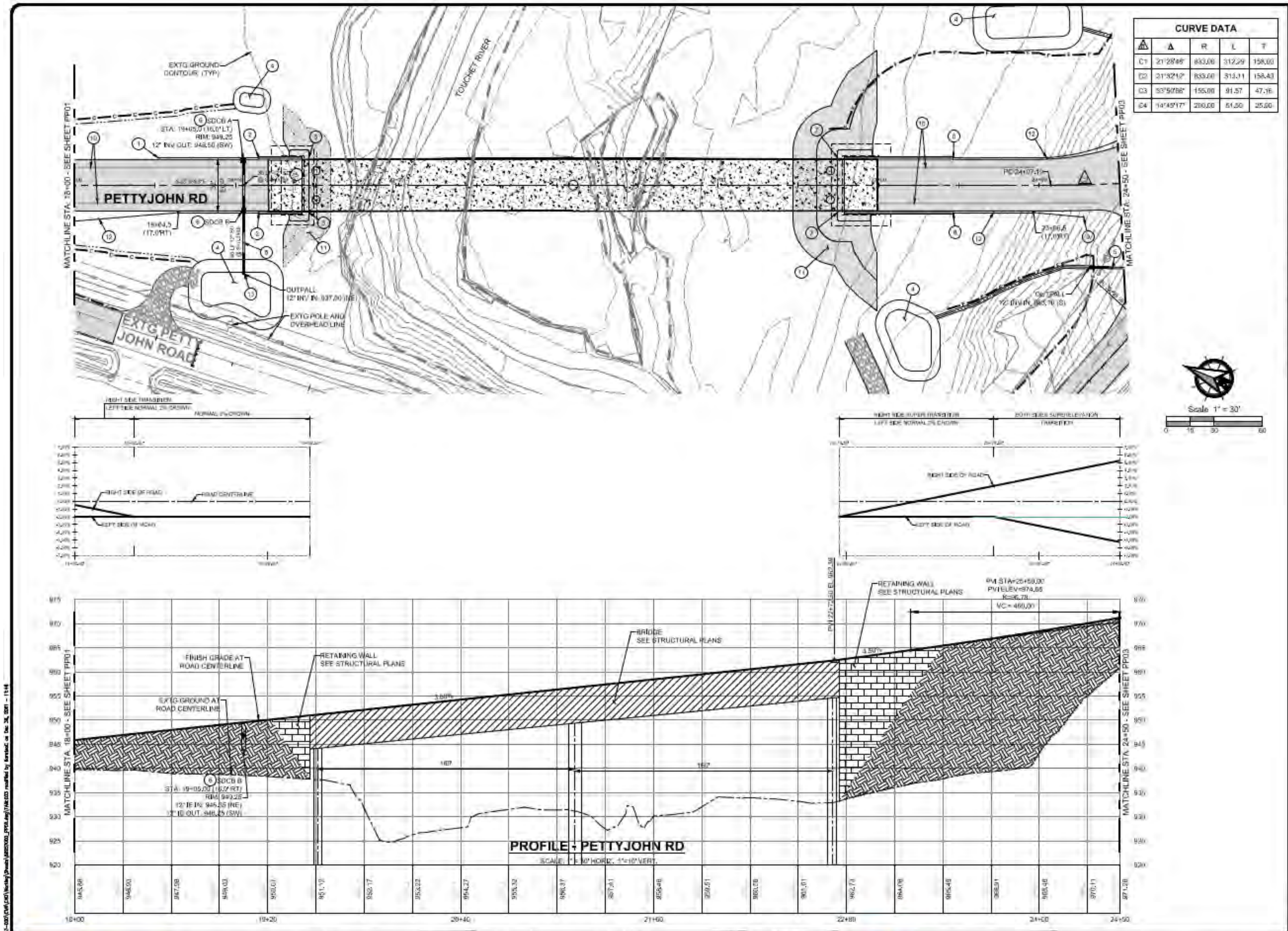

CURVE DATA				
⚠	Δ	R	L	T
C1	21°28'46"	833.00	312.29	158.00
C2	21°32'12"	833.00	313.11	158.43
C3	33°50'56"	155.00	91.57	47.16
C4	14°45'17"	200.00	51.50	25.00

GENERAL CONSTRUCTION NOTES:

1. SEE SHEET GN01 FOR GENERAL CONSTRUCTION NOTES AND DETAILS.
2. INSTALL SURVEY MONUMENTS AT ALL CENTERLINE STREET INTERSECTIONS, CENTER POINTS, AND PT / PC GEOMETRY POINTS PER WALLA WALLA COUNTY STANDARDS.

KEYED GRADING NOTES

① STA: 18+52.00 (17.0' LT) - BEAM GUARDRAIL ANCHOR TYPE 10 PER WSDOT STD PLAN C23.60

② STA: 19+14.50 (17.0' LT/RT) - END BEAM GUARDRAIL TRANSITION TYPE 21. BEGIN SINGLE SLOPE CONCRETE BARRIER. TRANSITION TO BARRIER PER WSDOT STD PLAN C24.10-02.

③ STA: 19+45.50 (17.0' LT/RT) - END SINGLE SLOPE CONCRETE BARRIER. TRANSITION TO BRIDGE SECTION.

④ APPROXIMATE LOCATION OF STORMWATER FACILITIES/SWALE. SEE SHEET GR03 AND GR04 FOR DETAILS.

⑤ 12" CMP STORM PIPE.

⑥ TYPE 1 CATCH BASIN PER WSDOT STD PLAN B-5.20-03.

⑦ STA: 22+74.00 (17.0' LT/RT) - START SINGLE SLOPE CONCRETE BARRIER. TRANSITION FROM BRIDGE SECTION.

⑧ STA: 23+46.50 (17.0 LT/RT) - END SINGLE SLOPE CONCRETE BARRIER BEGIN BEAM GUARDRAIL TRANSITION TYPE 21. TRANSITION TO GUARDRAIL PER WSDOT STD PLAN C24.10-02.

⑨ STA: 24+27.14 (20.07' RT) - END BEAM GUARDRAIL WITH ANCHOR TYPE 10. PER WSDOT STD PLAN C23.60.

⑩ SEE SIGNING AND STRIPING FOR INFORMATION AND DETAILS.

⑪ SEE SHEET DR01 FOR RIPRAP AROUND BRIDGE ABUTMENT.

⑫ BEAM GUARDRAIL TYPE 31 PER WSDOT STANDARD PLAN C-20.10-07.

⑬ STORM OUTFALL TO INFILTRATION SWALE. SEE SHEET GR03 AND GR04.

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-	-	-

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Public Works Department
990 Navion Lane
Walla Walla, Washington 99362
Phone: 509-524-2710

DELL SHARPE BRIDGE REPLACEMENT PROJECT

PETTY JOHN ROAD PLAN/PROFILE SHEET

PROJECT NUMBER
CRP20-02
SHEET
PP02
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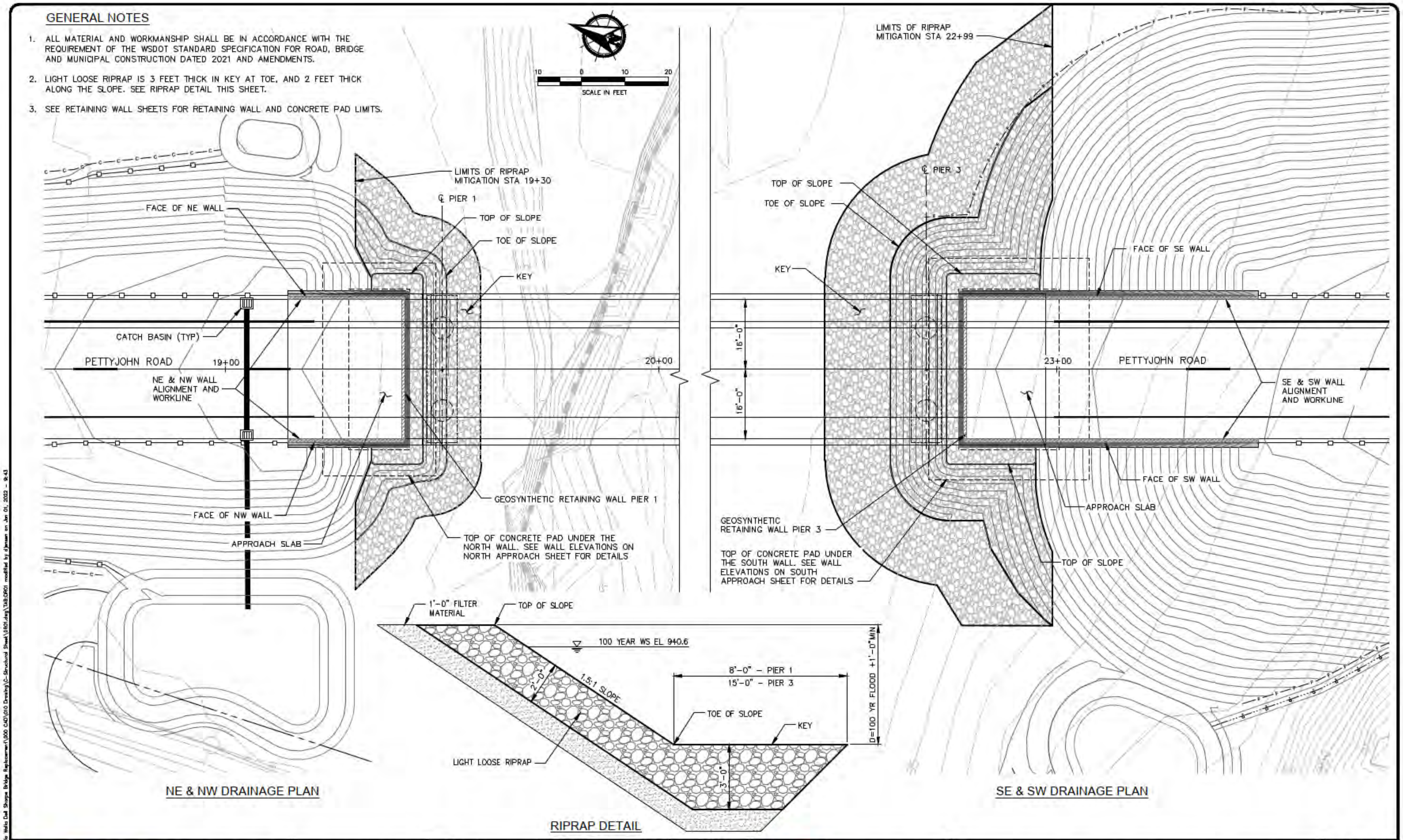
GENERAL NOTES

1. ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE REQUIREMENT OF THE WSDOT STANDARD SPECIFICATION FOR ROAD, BRIDGE AND MUNICIPAL CONSTRUCTION DATED 2021 AND AMENDMENTS.
2. LIGHT LOOSE RIPRAP IS 3 FEET THICK IN KEY AT TOE, AND 2 FEET THICK ALONG THE SLOPE. SEE RIPRAP DETAIL THIS SHEET.
3. SEE RETAINING WALL SHEETS FOR RETAINING WALL AND CONCRETE PAD LIMITS.



NE & NW DRAINAGE PLAN

RIPRAP DETAIL

SE & SW DRAINAGE PLAN

P:\2020\2020025 - Walla Walla Dell Sharpe Bridge Replacement\000 CAD\010 Drawing\C-Structural Sheet\DR01.dwg\TAB:DR01 modified by djensen on Jan 01, 2022 - 9:43

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DELL SHARPE BRIDGE REPLACEMENT PROJECT

RIPRAP DETAILS

PROJECT NUMBER
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DR01
PAGE
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Exhibit 15

Storm Drainage Report

Dell Sharpe Bridge
Walla Walla County, Washington

Prepared for:

Walla Walla County
Attn: Public Work Department
990 Navion Lane
Walla Walla, Washington 99352

Final Report - January 2022
PBS Project No. 66257.000

PBS
5 NORTH COLVILLE ST, STE 200
WALLA WALLA, WA 99362
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866.727.0140 FAX
PBSUSA.COM

TABLE OF CONTENTS

SUPPORTING DATA

TABLES

FIGURES

APPENDIX

CERTIFICATE OF ENGINEER

Storm Drainage Report
Dell Sharpe Bridge
Walla Walla County, WA

Design for the storm system was done in accordance with the Department of Ecology Stormwater Management Manual for Eastern Washington, current edition and Walla Walla County requirements. The technical information and data contained in this report was prepared under the direction and supervision of the undersigned, whose seal, as a professional engineer licensed to practice as such, is affixed below.

Prepared by: Kimberly Selph
Kimberly Selph, E.I.T.

RYAN JEFFREY BILLEN
46338

1/18/2022

Approved by:
Ryan Billen, P.E.

1 PROJECT DESCRIPTION

The proposed project will construct a new bridge over the Touchet River and remove the existing concrete arched bridge on Pettyjohn Road near the town of Prescott in Walla Walla County, WA. The new bridge will be located to the east of the existing bridge alignment. Site improvements include bridge and roadway improvements, and stormwater quality and quantity control. The site is in Sections 34 and 35 of Township 10 north, Sections 2 and 3 of Township 9 north, Range 35 east of the Willamette Meridian.

2 EXISTING CONDITIONS

The existing conditions for the project site are described in the following subsections.

2.1 Land Use

The site is currently a vacant field with wheat/natural vegetation. The project site is zoned as Primary Agriculture 40. Adjacent land use consists of vacant land that may be used for farming practices. The bridge is over the Touchet River on Pettyjohn Road near the intersection with Sharpe Road.

2.2 Drainage Patterns & Topography

The existing ground north of the proposed bridge is relatively flat. The existing Touchet River embankment is at approximately 2:1 slope on the north side and 3:1 slope on the south side. The existing ground on the south end of the bridge is 9%-10% slope.

Based on site observations and a topographic survey on and around the site, stormwater appears to disperse onto adjacent pervious surfaces and infiltrate into the ground. The only evidence of channelized runoff was observed on the northwest side of the bridge where an existing channel is present. In the event that overland flow occurs, stormwater would runoff into the Touchet River. The existing conditions map is shown in Figure 1.

2.3 Soil Conditions

On site soils consist of various types of silty and sandy loam based on information gained during geotechnical explorations along with Web Soil Survey information obtained for the site. See Attachment 2 for Web Soil Survey report showing soil types within the area and Hydrologic Soil group classifications (type B for all soils).

The site was explored by drilling three borings, designated B-1 through B-3, to depths of 30.5 to 35 feet bgs. The drilling was performed by Holt Services, Inc., of Vancouver, Washington, using a track-mounted B-57 drill rig and mud rotary and rock coring drilling techniques.

Silt with sand to sandy silt was encountered from the ground surface to approximately 8.5 and 4 feet bgs in borings B-1 and B-3, respectively. The silt was generally brown, moist, and ranged from medium stiff to very stiff. The sand content ranged from 9% to 15% for the silt with sand and 43% for the sandy silt. Dark gray, poorly graded gravel was encountered at the ground surface in B-2 and underlying the sand to sand with silt in borings B-1 and B-2. The gravel was generally coarse-grained with poor recovery and ranged from medium dense to very dense. Basalt was encountered in all three borings beneath the gravel. The basalt was generally weak (R2) to moderately strong (R3) in borings B-1 and B-2, and moderately strong to strong (R4) in B-3.

Static groundwater was not identified during explorations due to the use of drilling fluids necessary to advance the drill bit, particularly when coring rock. Based on a review of regional groundwater logs available from the Washington State Department of Ecology, the static groundwater level is anticipated at a depth less than 20 feet bgs.

See project Geotechnical report for additional information related to soil conditions onsite.

3 DESIGN AND PROJECT COMPLIANCE

Walla Walla County applies the requirements and recommendations of the Stormwater Management Manual for Eastern Washington (SWMMEW), current edition (Washington State Department of Ecology Publication Number 04-10-076, August 2019). Per section 2.5 of the SWMMEW, new development is the conversion of previously undeveloped or pervious surfaces to impervious surfaces. This section refers to certain Core Elements that must be addressed. This project will need to comply with Core Elements 1, 2, 3, 4, 5, 7, and 8 listed in the SWMMEW. This location of Touchet River is exempt and there is no designed discharge of stormwater to it therefore Core Element 6 is not required.

4 CORE ELEMENTS

The eight applicable Core Elements are addressed in the following subsections.

4.1 Core Element 1: Preparation of a Stormwater Site Plan

The stormwater site plan will include the necessary qualitative and informational gathering steps required to address the impacts of the project. The stormwater site plan will be comprised of this report and the construction documents.

The disturbed area consists of approximately 3.6 acres and all construction stormwater shall be kept onsite. A Temporary Erosion and Sediment Control (TESC) Plan will be included as part of the grading plan to assist the contractor with erosion and sediment control.

4.2 Core Element 2: Construction Stormwater Pollution Prevention

The intent of this element is to ensure adequate measures are taken to address construction stormwater. TESC Best Management Practices (BMPs) shall be installed and are referenced on the construction documents. The contractor, selected by the owner, will be appointed as the Erosion Control Lead for this project and will be responsible for preparation of the Stormwater Pollution Prevention Plan (SWPPP). The SWPPP will outline the general requirements and responsibilities the contractor shall follow to eliminate sediment laden stormwater and dust from leaving the project area during construction. During construction, BMPs will be utilized to ensure water and air quality are preserved to the maximum extent possible.

4.3 Core Element 3: Source Control of Pollution

The intent of source control BMPs is to prevent pollutants from coming into contact with stormwater. Following construction, projects shall apply all known, available, and reasonable source control BMPs. Source control BMPs shall be selected, designed, and maintained according to the SWMMEW. Applicable means of source control include but are not limited to preventative maintenance, spill prevention and cleanup, employee training, inspections, and good housekeeping.

4.4 Core Element 4: Preservation of Natural Drainage Systems

Based on site observations and a topographic survey on and around the site, the existing ground slopes toward the river but stormwater appears to infiltrate nears its source via dispersion. No evidence of runoff or flooding was observed. In the event that overland flow occurs, stormwater runoff into the Touchet River. Natural drainage toward the Touchet River will be maintained with this project.

4.5 Core Element 5: Runoff Treatment

The project site has a silt (ML) soil classification above gravel based on the geotechnical analysis on site. From Table 5.21 of the SWMMEW Chapter 5, the silt soil in the project area provides high treatment capacity. Per the above referenced table, the gravel will provide low treatment. The groundwater table was not identified during onsite test, based on a review of near by well logs, ground water is assumed to be at less than 20 feet below ground surface (bgs).

4.6 Core Element 6: Flow Control

The project is exempt from this core element since it is located adjacent to the Touchet River, a flow control exempt waterbody downstream of the confluence with Petit Creek.

4.7 Core Element 7: Operation and Maintenance

Upon project completion, all stormwater facilities on the property will be owned and maintained by Walla Walla County and will be subject to the current operations and maintenance programs compliant with the County's current stormwater maintenance program. Basic maintenance checklists for the proposed stormwater infrastructure are included as Attachment 5.

4.8 Core Element 8: Local Requirements

Walla Walla County requires that stormwater disposal methodologies be compliant with the SWMMEW and current Walla Walla County Standard Plans and Specifications. A construction stormwater general permit from Washington State Department of Ecology is required if an acre or greater is disturbed, which requires a notice of intent to the public.

5 STORMWATER SYSTEM DESIGN

5.1 Stormwater Design

A detailed stormwater plan has been developed showing planned stormwater facilities (see Figure 2). The stormwater system was designed in accordance with the SWMMEW. Based on the observed soil characteristics –including sandy with silt soil – a design infiltration rate of 0.5 inches/hour was used for this project. Walla Walla County requires that the stormwater system be designed for the 25-year, 24-hour design storm.

The project consists of a new bridge over the Touchet River and associated improvements to Pettyjohn Road. The new section of roadway will be comprised of asphalt pavement and the bridge will consist of portland cement concrete surfacing. The sides of the bridge will include concrete barrier, which will convey stormwater on the bridge to catch basins at the north end, which will route stormwater to swales on the north side of the river. The stormwater from the roadway will sheet flow into roadside ditches and infiltrate onsite. Any ditch overflow will runoff into the swales located on the north and south sides of the river.

5.2 Stormwater Quality Control

New and replaced pollution generation impervious surfaces within the project limits will be categorized as having a low pollutant loading classification due to an ADT of less than 15,000. Infiltration swales and ditches will be used to retain and infiltrate the stormwater onsite, with underlying soil used to provide treatment of the stormwater runoff. Design and calculations for the infiltration swales are discussed in more detail in Section 5.3.

Stormwater from the project surfaces will sheet flow to the infiltration swales and receive treatment from soils underlying the swales. See section 5.2.1 for additional discussion on how the soil suitability criteria will be met for surface infiltration. The roadside ditches preceding the infiltration pond areas will provide pre-settlement prior to discharging into the infiltration pond swales. See Figure 2 for the proposed basin map which shows the various catchment/basin areas associated with the project. See Table 1 for a breakdown of the surface types within each of these basin areas.

Table 1: Basin Surfaces

Surface Type	CN	Percent, %	Area, sf (acres)
Basin 1			
PGIS[1]	98	69.6	13,789 (0.32)
Pervious	79	30.4	6,321 (0.14)
Total	98/79	100	20,110 (0.46)
Basin 2			
PGIS[1]	98	64.7	18,992 (0.44)
Pervious	79	35.3	10,465 (0.24)
Total	98/79	100	29,457 (0.68)
Basin 3			
PGIS[1]	98	45.8	4,988 (0.11)
Pervious	79	54.2	5,633 (0.13)
Total	98/79	100	10,621 (0.24)
Basin 4			
PGIS[1]	98	82.1	10,103(0.23)
Pervious	49	17.9	2,310 (0.05)
Total	91	100	12,413 (0.28)
Basin 5			
PGIS[1]	98	33	7,496 (0.29)
Pervious	79	77	31,027 (0.71)
Total	98/79	100	38,523 (0.88)
Basin 6			
PGIS[1]	98	47.6	19,168 (0.44)
Pervious	79	52.4	17,368 (0.40)
Total	98/79	100	36,536 (0.84)
Basin 7			
PGIS[1]	98	36	2,355 (0.05)
Pervious	79	64	4,174 (0.10)
Total	98/79	100	6,529 (0.15)
Basin 8			
PGIS[1]	98	(32.8)	1,727 (0.04)
Pervious	79	(67.1)	3,533 (0.08)
Total	98/79	100	5,260 (0.12)

[1] PGIS = Pollutant-Generating Impervious Surfaces

[2] NPGIS = Non-Pollutant-Generating Impervious Surfaces (none for project)

5.2.1 Soil Suitability

The project site has a silt (ML) soil classification above gravel based on the geotechnical analysis on site. The follow bullets describe how the various soil suitability criteria will be fulfilled for this project.

- SSC-1 Setback Criteria – Project will meet setback criteria for slopes and building foundation. The only building in close proximity is the historic schoolhouse which is upslope of the stormwater facilities.
- SSC-2 Ground Water Protection Area – No known groundwater protection areas located in the vicinity of the project. Project will have adequate treatment to protect groundwater quality in accordance with Ecology requirements.
- SSC-3 High Vehicle Traffic Areas – Not applicable, project is low volume with an expected average daily traffic count of less than 100 vehicles.
- SSC-4 Soil Infiltration Rate/Drawdown Time – A design rate of 0.5 inches per hour has been used to design the infiltration swales, which falls within the guidelines of SSC-4. Pond depths are kept shallow to promote drawdown of the pond level within 72-hours after inflow has ceased. Peak pond depth will be less than 18-inches for all project swales, which will ensure a maximum draw-down time of 36-hours or less at an infiltration rate of 0.5 inches/hour.
- SSC-5 Depth to Bedrock, Groundwater Table or Impermeable layer – Adequate separation from groundwater will be provided as required by SSC-5 (5-feet minimum from bottom of facility)
- SSC-6 Soil Physical Properties and Chemical Suitability for Treatment – The existing silty soil in the vicinity of the swale areas is expected to be suitable for providing treatment, including organic content and Cation Exchange Capacity. If unexpected material is encountered that does not meet the criteria, imported material with sufficient soil characteristics will be installed to a depth of 6-inches below the vegetated portions of the swale areas, or 18-inches below rock lined portions.
- SSC-7 Seepage Analysis and Control – No adverse effects of seepage are anticipated with this project. Any seepage is anticipated to flow toward the Touchet River. No structures are located between the swale areas and any potential seepage path.
- SSC-8 Cold Climate and Impact of Roadway Deicing Chemicals – Deicing chemicals may be used occasionally for the bridge during cold weather, however, impacts to potable water wells is not expected to be an issue considering that the bridge is relatively narrow (less deicer required) and there are no wells in close proximity. Based on Washington State Department of Ecology water well maps, there are no Group A or Group B well systems anywhere close to the project site. The closest system is in Prescott, several miles to the east. The closest known private well is located near a building several thousand feet east of the project on Sharpe Road.
- SSC-9 Previously Contaminated Soils or Unstable Soils – No known contaminated soils in the project site.

5.3 Stormwater Facility Design and Performance

Eight infiltration swales will be placed throughout the project area, with four on the northside of the new bride, and four on the south side. Each swale will be constructed as either a roadside swale or a pond type swale as described in the following bullets. See Table 2 for pertinent information related to each swale, including the type, area, and ponding depth associated with the design storm event.

- Roadside swales: The project includes roadside swales that will capture and infiltration stormwater runoff that is received from the adjacent roadway surface. This type of infiltration BMP is part of the County’s typical roadway standard detail and is the primary method of managing stormwater on rural roadways. Check dams will be placed along roadside swales where needed to promote ponding and infiltration. This includes the south end of the project where the roads will have steeper grades.

- Pond swales: This type of swale will be located away from the roadway and used to manage stormwater being conveyed in pipes and channels. Each facility will have a flat bottom and peak ponding depth of less than 18 inches during the design storm. This type of facility is needed where grade constraints prevent the swale from being adjacent to the roadway, such as at the bridge abutments.

All infiltration swales were designed per BMP T5.21 of the 2019 SWMMEW. The size and ponding depth of each swale varies as described in Table 2. Each swale will retain and infiltrate the 25-year, 24-hour storm per requirements of Walla Walla County. Stormwater calculations were prepared using HydroCAD software in accordance with the 2019 SWMMEW. The Soil Conservation Service (SCS) TR-20 method was used to analyze the Type IA, 25-year, 24-hour design storm for the proposed project, including a rainfall depth of 1.9 inches. This depth was determined based on the physical location of the site and a review of the 25-year, 24-hour isopluvial map. See Figure 4 for reference.

Table 2: Infiltration Facility Sizing

Facility ID & Description	Facility Bottom Area, ft^2	Storage[1] ft^3	Ponding Depth 25-year 24-hour, ft
SW1 – Northeast roadside swale	400	711	0.55
SW2 – Northwest pond swale	935	1,690	1.27
SW3 – Northeast pond swale	100	79	0.53
SW4 – Northwest roadside swale	500	92	0.12
SW5 – Southwest pond swale	1,000	1,006	0.75
SW6 – Southeast pond swale	800	1,710	1.15
SW7 – Southwest roadside swale	209	99	0.24
SW8 – Southeast roadside swale	122	86	0.31

[1] Peak storage during 25-year storm event

5.4 Off-Site Stormwater Design

The Dell Sharpe Bridge project is located in a rural area with existing drainage features consisting of roadside ditches and dispersions onto adjacent pervious surfaces. While most of the existing roadside swales appear to contain and infiltrate stormwater runoff from adjacent road surfaces, the ditch that runs along the northwest side of the existing bridge in front of the existing school appears to serve a larger area and may convey water from offsite into Touchet River. This existing ditch will remain in service after the project is completed. The proposed realignment and superelevation of Pettyjohn Road for the new bridge will allow stormwater from new and replaced impervious surface to be routed toward new swales. As a result, the amount of stormwater entering this existing conveyance ditch from the proposed project will be reduced as compared to existing conditions.

6 CONVEYANCE SYSTEM DESIGN

The proposed conveyance system will consist of two ditch inlets to collect water from the roadside swales on the south side of the bridge, as well as two catch basins on the north end of the bridge to collect water from bridge. See Figure 2 for location of proposed ditch inlets and catch basins. Storm drain piping will convey stormwater away from these structures and into nearby infiltration swales for disposal. The inlet analysis results for the two catch basins are shown below in Table 3. Results for pipe conveyance are shown in Table 4.

The catch basin inlet analysis and pipe conveyance calculations were performed using HydroCAD version 10.10 in conjunction with the 10-year, 3-hour short duration storm event for Eastern Washington. The process outlined in section 4.2.6 of the 2019 SWMMEW was used to calculate a rainfall depth of 0.7 inches for the 10-year short duration storm – see Attachment 3 for calculations. See Attachment 1 for HydroCAD report showing the short duration storm runoff calculations for basins CB1 and CB2.

Table 3: Catch Basin Inlet Analysis Results

Structure ID	Peak Flow[1] (cfs)	Max. Flow Spread (ft)	Non-flooded width (ft)	Intercepted Flow (cfs)	Bypass Flow (cfs)
Catch Basin 1	0.26	3.37	12.63	0.22	0.04
Catch Basin 2	0.26	3.37	12.63	0.22	0.04

[1] Peak Flow during the 10-year, 3-hour short duration storm event

Table 3 presents the maximum flow spread from the face of curb immediately upstream of each inlet, along with the amount of flow that will be intercepted and bypassed for each inlet. As shown in the Table, the maximum flow spread during the 10-year short duration storm event will provide for an adequate portion of non-flooded roadway, including over 12 feet of clear travel lane in each direction. A small amount of bypass is anticipated past the catch basins; this flow will continue past the inlet and runoff the roadway onto the embankment and be captured in the roadside ditches on the north side of the bridge. Calculations for flow spread and inlet performance can be found in Attachment 4.

Table 4: Pipe and Channel Conveyance Results

Link ID	Segment	Peak Flow[1] (cfs)	Slope (%)	Capacity (cfs)	Flow Depth (ft)	Velocity (ft/sec)
P1	CB1 to CB2	0.26	0.5	2.73	0.21	2.18
P2	CB 2 to SW2	0.51	22.8	18.44	0.11	10.25
P3	DI1 to CH1	0.64	6.6	9.90	0.17	7.09
CH1	CH1 to SW6	0.64	41.7	27.9	0.15	3.30
P4	DI2 to CH2	0.25	2.78	6.43	0.13	3.96
CH2	CH2 to SW5	0.25	22.0	20.31	0.10	1.96

[1] Peak Flow during the 10-year, 3-hour short duration storm event

Table 4 presents the conveyance capacity calculation results from the HydroCAD calculations included in Attachment 1. As shown in the Table, all segments of the conveyance system will have capacity carry runoff from the 10-YR, 3-Hour short duration storm event without surcharging. The system will have significant capacity above what is required to convey the 10-year event. This will be beneficial in handling runoff from larger storm events as well as any unanticipated runoff from the area south of the project that could potentially be tributary to segments P3, CH1, P4, and CH2.

7 TEMPORARY EROSION & SEDIMENT CONTROL

TESC BMPs will be provided during construction. All downstream boundaries should have silt fencing or straw wattles in place to prevent sediment laden runoff from leaving the site. Appropriate check dams, wattles, or silt fence should also be constructed to prevent sediment laden stormwater from entering the low-lying areas of the site where stormwater will infiltrate. Any disturbed soils should be stabilized and seeded or sodded as necessary once construction is completed. All constructed stormwater facilities shall be protected from sediment intrusion until disturbed soils are stabilized and the work is accepted by the engineer and County.

To prevent wind-blown erosion the contractor should use person operated watering devices, no unattended watering of the site should be allowed. A stabilized construction entrance should be used to eliminate any sediment from being transported onto County roadways. Any mud or debris that is tracked onto County roads should be removed before the end of each working day. This maintenance shall be the responsibility of the contractor during construction.

8 CONCLUSION

The stormwater system designed and described in this report will meet the requirements of Walla Walla County and the 2019 SWMMEW. Additional information has been provided for precautionary measures during construction and maintenance to ensure a reliable system.

9 REFERENCES

PBS Engineering and Environmental, Preliminary Geotechnical Engineering Recommendations, Dell Sharpe Bridge Replacement, Walla Walla County, Washington, PBS Project No. 66257.000. April 2021.

Washington State Department of Ecology. (2019, February). *2019 Stormwater Management Manual for Eastern Washington*. Water Quality Program. Publication Number 18-10-044.

Web Soil Survey. United States Department of Agriculture, Natural Resources Conservation Service, 10 Aug. 2016, websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx. Accessed 8 September 2021.

FIGURES

PBS Engineering and Environmental Inc.
400 Bradley Blvd, Ste 106
Richland, WA 99352
509.942.1600

pbsusa.com

FIGURE 1 - EXISTING CONDITIONS MAP FOR:
DELL SHARPE BRIDGE
A PROJECT LOCATED IN WALLA WALLA COUNTY

811 Know what's **below.** **Call** before you dig.

DESIGNED:
KAS

CHECKED:
RJB

SEPTEMBER 2021
66257.000

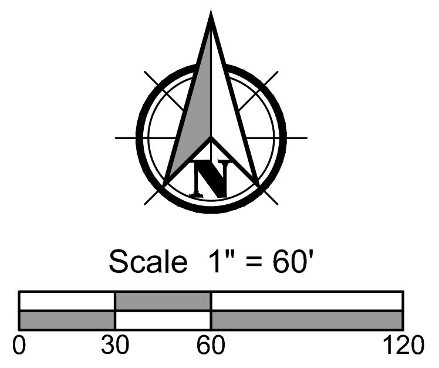
SHEET ID

SHEET 1 OF 1

Filename: L:\Projects\66000\66257\66257-000\Civil\CAD\Working\Exhibits\66257_ExistingConditionsMap.dwg Layout Tab: LAYOUT1 User: Ryan Billen CAD Plot Date/Time: 11/22/2021 11:37:43 AM

Full Size Sheet Format Is 22x34; If Printed Size Is Not 22x34, Then This Sheet Format Has Been Modified & Indicated Drawing Scale Is Not Accurate.

FACILITY ID	TRIB. BASIN ID	TRIB. BASIN HATCH	NEW & REPLACED IMPERVIOUS AREA	PERVIOUS AREA
SW-1	B1	🟥	13,789 SQFT	6,321 SQFT
SW-2	B2	🟦	18,992 SQFT	10,465 SQFT
SW-3	B3	🟪	4,988 SQFT	5,633 SQFT
SW-4	B4	🟧	2,310 SQFT	10,103 SQFT
SW-5	B5	🟩	7,496 SQFT	31,027 SQFT
SW-6	B6	🟪	19,168 SQFT	17,368 SQFT
SW-7	B7	🟦	2,355 SQFT	4,174 SQFT
SW-8	B8	🟨	1,727 SQFT	3,533 SQFT
TOTAL			**70,825 SQFT**	**88,624 SQFT**



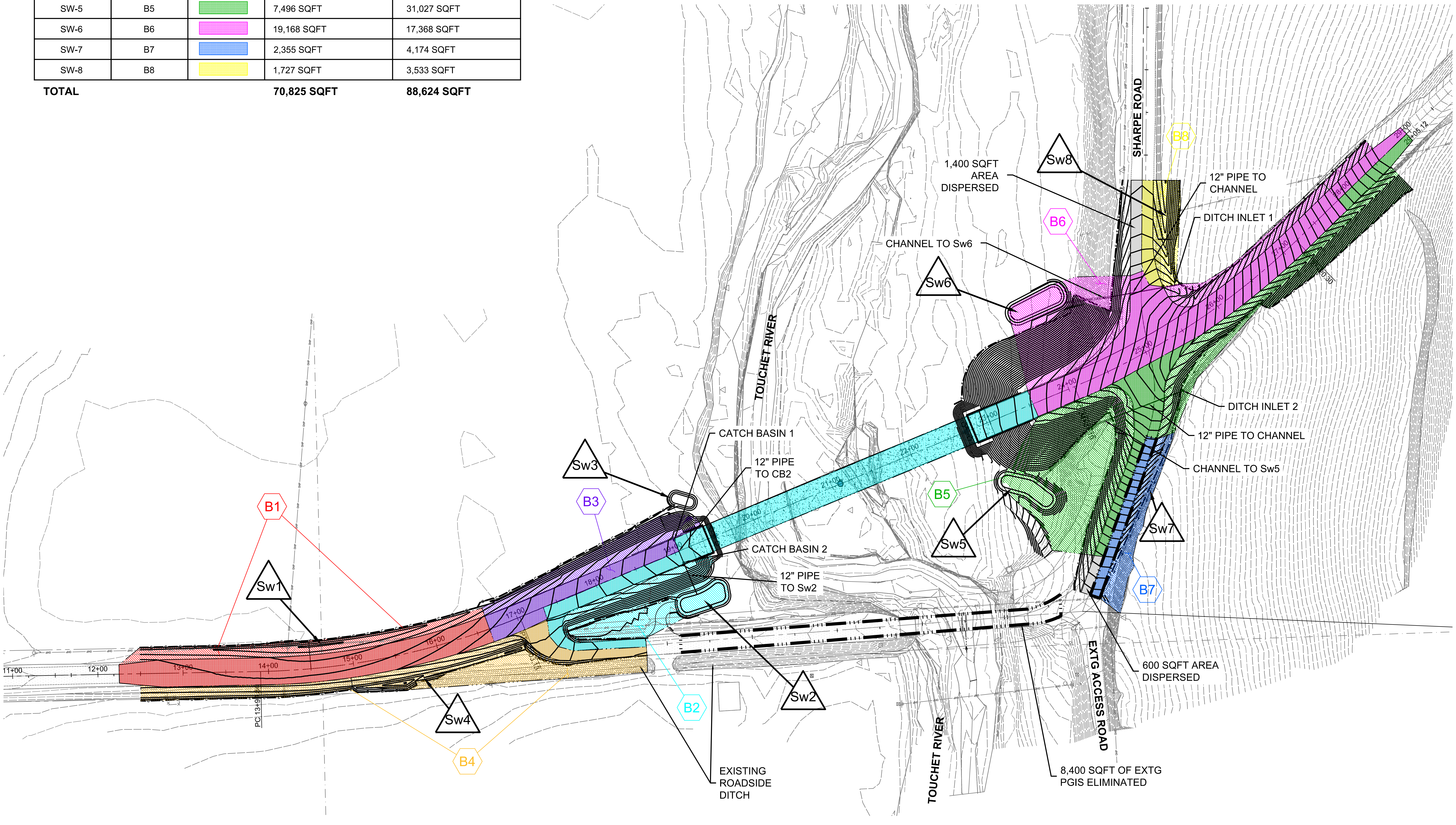


FIGURE 2 - PROPOSED DRAINAGE MAP FOR:

DELL SHARPE BRIDGE

A PROJECT LOCATED IN WALLA WALLA COUNTY

PBS Engineering and Environmental Inc.
400 Bradley Blvd, Ste 106
Richland, WA 99352
509.942.1600
pbsusa.com

Know what's below. Call before you dig.

DESIGNED: KAS
CHECKED: RJB
SEPTEMBER 2021
66257.000
SHEET ID
SHEET 1 OF 1

Filename: L:\Projects\66000\66257\66257-000\Civil\CAD\Working\Exhibits\66257_Basin-Map.dwg Layout Tab: LAYOUT1 User: Ryan Billen CAD Plot Date/Time: 11/22/2021 11:26:04 AM

Eastern Washington Stormwater Manual

2-Year 2-Hour Isopluvial Map

Isopluvials of 2-Year 2-Hour

Precipitation in Tenths of an Inch

SOURCE: *Dam Safety Guidelines, Technical Note 3, Design Storm Construction, Washington State Department' of Ecology, Water Resources Program, report 92-55G April 1993.*

N
W
E
S

Scale 1:1,600,000

0 10 20 30 40 50

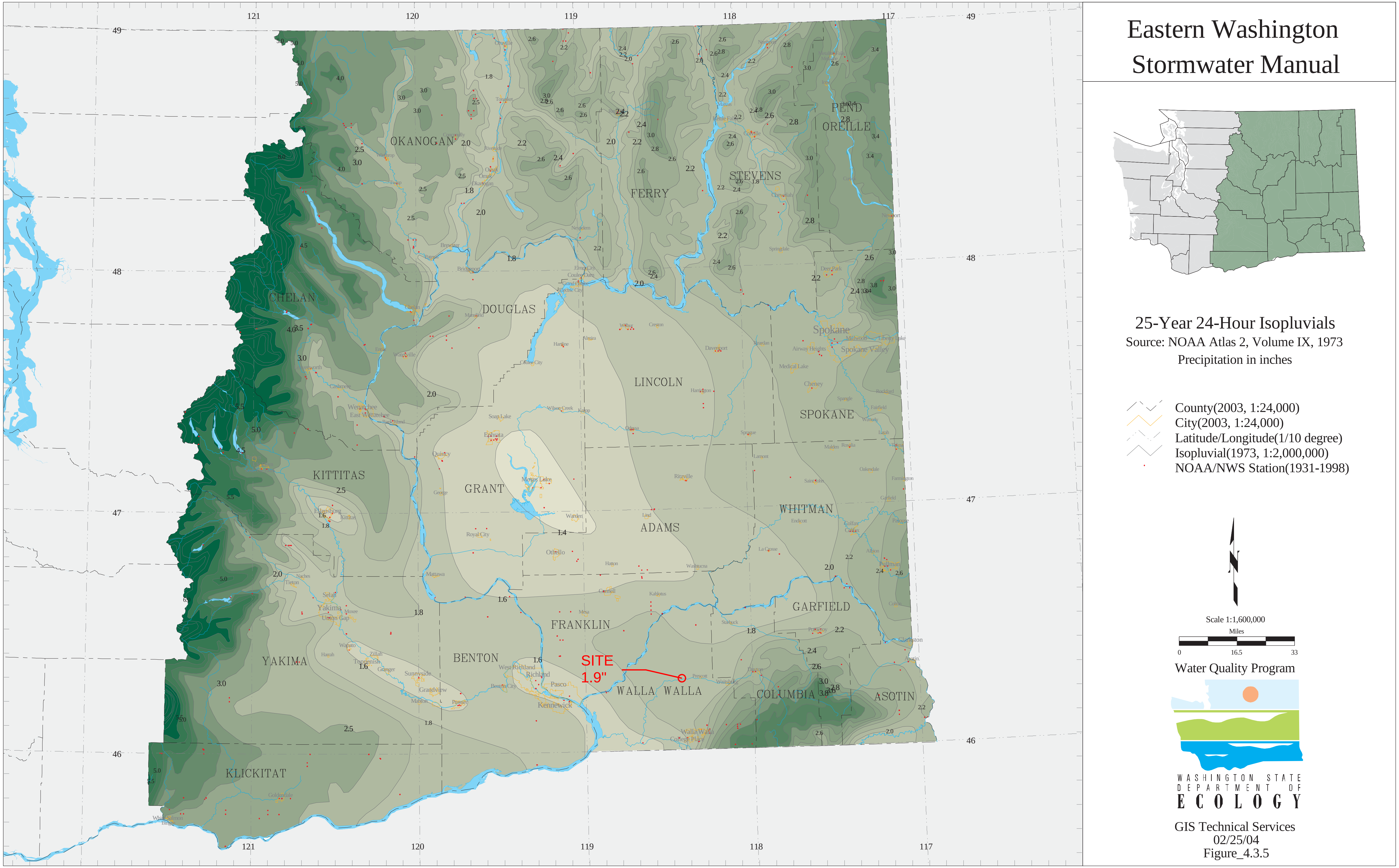
Map projection: State Plane Washington South, NAD 27

Created on April 23, 2002

Stormwater Management FOR EASTERN WASHINGTON

Figure 4.3.2

Eastern Washington Stormwater Manual



25-Year 24-Hour Isopluvials
Source: NOAA Atlas 2, Volume IX, 1973
Precipitation in inches

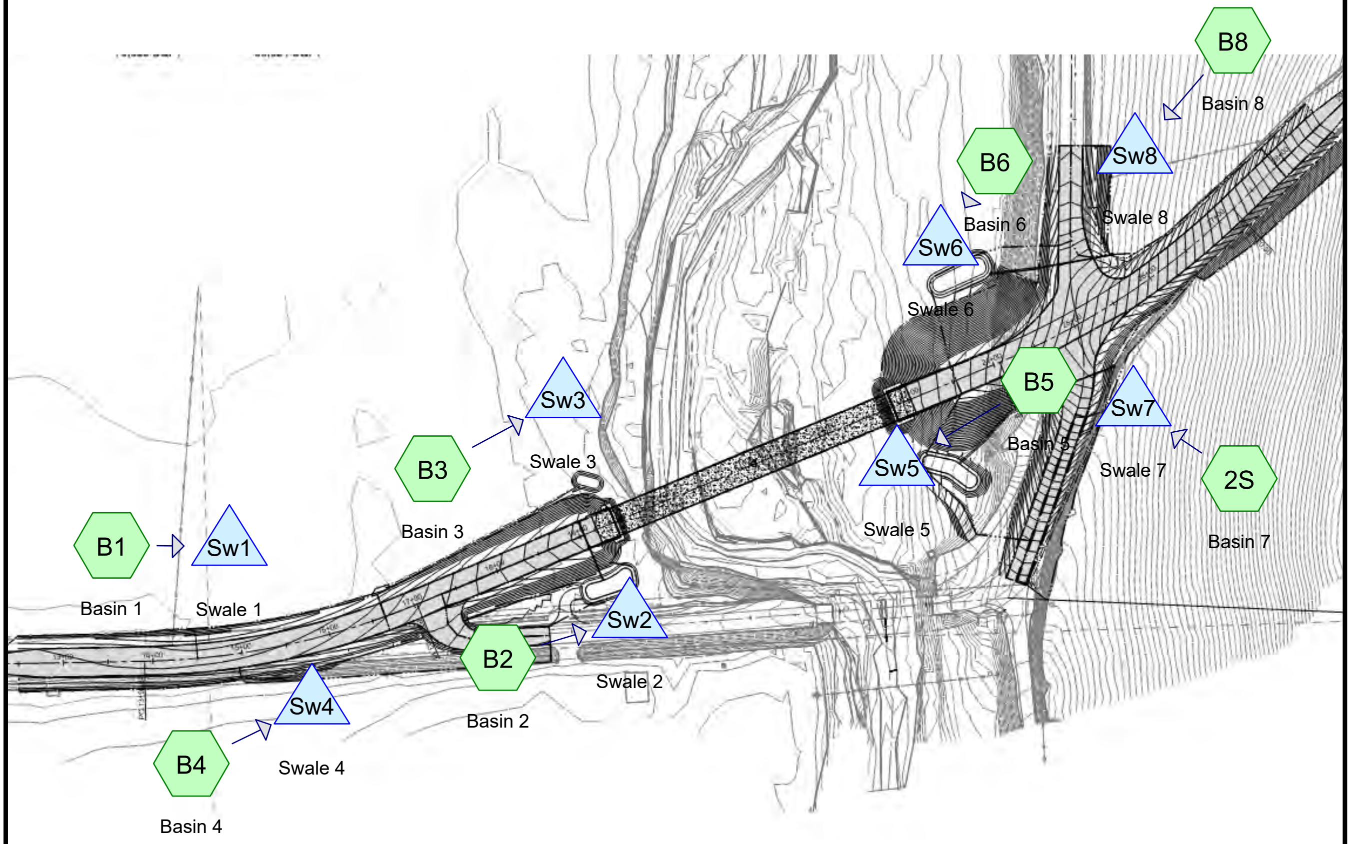
Water Quality Program

WASHINGTON STATE
DEPARTMENT OF
ECOLOGY

GIS Technical Services
02/25/04
Figure_4.3.5

APPENDIX A

Attachment 1. HydroCAD Report
Attachment 2. Web Soil Survey Information
Attachment 3. Short Duration 3-Hour Storm Even Calculations
Attachment 4. Inlet Analysis Calculations
Attachment 5. SWMMEW Maintenance Checklist



Subcat

Reach

Pond

Link

Routing Diagram for 66257_HydroCAD_25YR
Prepared by PBS Engineering and Environmental Inc., Printed 11/22/2021
HydroCAD® 10.10-4a s/n 00702 © 2020 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
88,624	79	<50% Grass cover, Poor, HSG B (2S, B1, B2, B3, B4, B5, B6, B8)
23,595	98	PGIS (B1, B4, B5)
47,230	98	Roadway (2S, B2, B3, B6, B8)

Summary for Subcatchment 2S: Basin 7

Runoff = 0.03 cfs @ 7.94 hrs, Volume= 490 cf, Depth> 0.90"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-year Rainfall=1.90"

	Area (sf)	CN	Description
	4,174	79	<50% Grass cover, Poor, HSG B
*	2,355	98	Roadway
	6,529	86	Weighted Average
	4,174	79	63.93% Pervious Area
	2,355	98	36.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment B1: Basin 1

Runoff = 0.15 cfs @ 7.89 hrs, Volume= 2,167 cf, Depth> 1.29"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-year Rainfall=1.90"

	Area (sf)	CN	Description
*	13,789	98	PGIS
	6,321	79	<50% Grass cover, Poor, HSG B
	20,110	92	Weighted Average
	6,321	79	31.43% Pervious Area
	13,789	98	68.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment B2: Basin 2

Runoff = 0.20 cfs @ 7.90 hrs, Volume= 3,053 cf, Depth> 1.24"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-year Rainfall=1.90"

	Area (sf)	CN	Description
	10,465	79	<50% Grass cover, Poor, HSG B
*	18,992	98	Roadway
	29,457	91	Weighted Average
	10,465	79	35.53% Pervious Area
	18,992	98	64.47% Impervious Area

```
    Tc  Length   Slope  Velocity  Capacity  Description
 (min)  (feet)  (ft/ft)  (ft/sec)     (cfs)
   5.0                                      Direct Entry,
```

Summary for Subcatchment B3: Basin 3

```
Runoff     =     0.06 cfs @   7.92 hrs,  Volume=           913 cf,  Depth>  1.03"
```

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-year Rainfall=1.90"

```
      Area (sf)   CN   Description
         5,633    79   <50% Grass cover, Poor, HSG B
*        4,988    98   Roadway
        10,621    88   Weighted Average
         5,633    79   53.04% Pervious Area
         4,988    98   46.96% Impervious Area

    Tc  Length   Slope  Velocity  Capacity  Description
 (min)  (feet)  (ft/ft)  (ft/sec)     (cfs)
   5.0                                      Direct Entry,
```

Summary for Subcatchment B4: Basin 4

```
Runoff     =     0.04 cfs @   7.98 hrs,  Volume=           713 cf,  Depth>  0.69"
```

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-year Rainfall=1.90"

```
      Area (sf)   CN   Description
*        2,310    98   PGIS
        10,103    79   <50% Grass cover, Poor, HSG B
        12,413    83   Weighted Average
        10,103    79   81.39% Pervious Area
         2,310    98   18.61% Impervious Area

    Tc  Length   Slope  Velocity  Capacity  Description
 (min)  (feet)  (ft/ft)  (ft/sec)     (cfs)
   5.0                                      Direct Entry,
```

Summary for Subcatchment B5: Basin 5

```
Runoff     =     0.12 cfs @   7.98 hrs,  Volume=         2,245 cf,  Depth>  0.70"
```

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-year Rainfall=1.90"

	Area (sf)	CN	Description
*	7,496	98	PGIS
	31,027	79	<50% Grass cover, Poor, HSG B
	38,523	83	Weighted Average
	31,027	79	80.54% Pervious Area
	7,496	98	19.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment B6: Basin 6

Runoff = 0.22 cfs @ 7.91 hrs, Volume= 3,345 cf, Depth> 1.10"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-year Rainfall=1.90"

	Area (sf)	CN	Description
	17,368	79	<50% Grass cover, Poor, HSG B
*	19,168	98	Roadway
	36,536	89	Weighted Average
	17,368	79	47.54% Pervious Area
	19,168	98	52.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment B8: Basin 8

Runoff = 0.02 cfs @ 7.95 hrs, Volume= 377 cf, Depth> 0.86"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-year Rainfall=1.90"

	Area (sf)	CN	Description
	3,533	79	<50% Grass cover, Poor, HSG B
*	1,727	98	Roadway
	5,260	85	Weighted Average
	3,533	79	67.17% Pervious Area
	1,727	98	32.83% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Pond Sw1: Swale 1

Inflow Area = 20,110 sf, 68.57% Impervious, Inflow Depth > 1.29" for 25-year event
Inflow = 0.15 cfs @ 7.89 hrs, Volume= 2,167 cf
Outflow = 0.03 cfs @ 13.39 hrs, Volume= 1,625 cf, Atten= 83%, Lag= 329.6 min
Discarded = 0.03 cfs @ 13.39 hrs, Volume= 1,625 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 0.55' @ 13.39 hrs Surf.Area= 2,187 sf Storage= 711 cf

Plug-Flow detention time= 323.9 min calculated for 1,625 cf (75% of inflow)
Center-of-Mass det. time= 165.4 min (870.8 - 705.4)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	2,025 cf	**1.00'W x 400.00'L x 1.00'H Prismatoid Z=4.0**

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**0.500 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.03 cfs @ 13.39 hrs HW=0.55' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Summary for Pond Sw2: Swale 2

Inflow Area = 29,457 sf, 64.47% Impervious, Inflow Depth > 1.24" for 25-year event
Inflow = 0.20 cfs @ 7.90 hrs, Volume= 3,053 cf
Outflow = 0.02 cfs @ 24.00 hrs, Volume= 1,363 cf, Atten= 90%, Lag= 966.2 min
Discarded = 0.02 cfs @ 24.00 hrs, Volume= 1,363 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 1.27' @ 24.00 hrs Surf.Area= 1,767 sf Storage= 1,690 cf

Plug-Flow detention time= 432.1 min calculated for 1,363 cf (45% of inflow)
Center-of-Mass det. time= 140.9 min (850.6 - 709.7)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	2,123 cf	**17.00'W x 55.00'L x 1.50'H Prismatoid Z=4.0**

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**0.500 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.02 cfs @ 24.00 hrs HW=1.27' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Summary for Pond Sw3: Swale 3

Inflow Area = 10,621 sf, 46.96% Impervious, Inflow Depth > 1.03" for 25-year event
Inflow = 0.06 cfs @ 7.92 hrs, Volume= 913 cf
Outflow = 0.03 cfs @ 8.41 hrs, Volume= 913 cf, Atten= 56%, Lag= 29.3 min
Discarded = 0.03 cfs @ 8.41 hrs, Volume= 913 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 0.53' @ 8.41 hrs Surf.Area= 203 sf Storage= 79 cf

Plug-Flow detention time= 15.8 min calculated for 913 cf (100% of inflow)
Center-of-Mass det. time= 15.4 min (748.2 - 732.8)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	201 cf	**10.00'W x 10.00'L x 1.00'H Prismatoid Z=4.0**

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**5.400 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.03 cfs @ 8.41 hrs HW=0.53' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Summary for Pond Sw4: Swale 4

Inflow Area = 12,413 sf, 18.61% Impervious, Inflow Depth > 0.69" for 25-year event
Inflow = 0.04 cfs @ 7.98 hrs, Volume= 713 cf
Outflow = 0.01 cfs @ 10.95 hrs, Volume= 679 cf, Atten= 70%, Lag= 178.3 min
Discarded = 0.01 cfs @ 10.95 hrs, Volume= 679 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 0.12' @ 10.95 hrs Surf.Area= 994 sf Storage= 92 cf

Plug-Flow detention time= 98.7 min calculated for 679 cf (95% of inflow)
Center-of-Mass det. time= 68.7 min (868.9 - 800.2)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	2,525 cf	**1.00'W x 500.00'L x 1.00'H Prismatoid Z=4.0**

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**0.500 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.01 cfs @ 10.95 hrs HW=0.12' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Summary for Pond Sw5: Swale 5

Inflow Area = 38,523 sf, 19.46% Impervious, Inflow Depth > 0.70" for 25-year event
Inflow = 0.12 cfs @ 7.98 hrs, Volume= 2,245 cf
Outflow = 0.02 cfs @ 24.00 hrs, Volume= 1,239 cf, Atten= 84%, Lag= 961.3 min
Discarded = 0.02 cfs @ 24.00 hrs, Volume= 1,239 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 0.75' @ 24.00 hrs Surf.Area= 1,696 sf Storage= 1,006 cf

Plug-Flow detention time= 330.7 min calculated for 1,239 cf (55% of inflow)
Center-of-Mass det. time= 77.5 min (874.7 - 797.3)

```
Volume      Invert    Avail.Storage   Storage Description
  #1          0.00'        1,461 cf   10.00'W x 100.00'L x 1.00'H Prismatoid  Z=4.0

Device   Routing          Invert   Outlet Devices
  #1     Discarded         0.00'   0.500 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.02 cfs @ 24.00 hrs  HW=0.75'   (Free Discharge)
└─1=Exfiltration  (Exfiltration Controls 0.02 cfs)
```

Summary for Pond Sw6: Swale 6

```
Inflow Area =          36,536 sf,  52.46% Impervious,  Inflow Depth >   1.10"    for  25-year event
Inflow      =       0.22 cfs @    7.91 hrs,  Volume=             3,345 cf
Outflow     =       0.03 cfs @   22.93 hrs,  Volume=             1,639 cf,  Atten= 88%,  Lag= 900.7 min
Discarded  =        0.03 cfs @   22.93 hrs,  Volume=             1,639 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 1.15' @ 22.93 hrs   Surf.Area= 2,234 sf   Storage= 1,710 cf

Plug-Flow detention time= 433.7 min calculated for 1,639 cf (49% of inflow)
Center-of-Mass det. time= 153.8 min ( 878.4 - 724.6 )

Volume      Invert    Avail.Storage   Storage Description
  #1          0.00'        2,577 cf   10.00'W x 80.00'L x 1.50'H Prismatoid  Z=6.0

Device   Routing          Invert   Outlet Devices
  #1     Discarded         0.00'   0.500 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.03 cfs @ 22.93 hrs  HW=1.15'   (Free Discharge)
└─1=Exfiltration  (Exfiltration Controls 0.03 cfs)
```

Summary for Pond Sw7: Swale 7

```
Inflow Area =           6,529 sf,  36.07% Impervious,  Inflow Depth >   0.90"    for  25-year event
Inflow      =       0.03 cfs @    7.94 hrs,  Volume=               490 cf
Outflow     =       0.01 cfs @   11.27 hrs,  Volume=               438 cf,  Atten= 76%,  Lag= 199.3 min
Discarded  =        0.01 cfs @   11.27 hrs,  Volume=               438 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 0.24' @ 11.27 hrs   Surf.Area= 616 sf   Storage= 99 cf

Plug-Flow detention time= 174.2 min calculated for 438 cf (89% of inflow)
Center-of-Mass det. time= 105.0 min ( 857.6 - 752.6 )

Volume      Invert    Avail.Storage   Storage Description
  #1          0.00'        1,070 cf   1.00'W x 209.00'L x 1.00'H Prismatoid  Z=4.0

Device   Routing          Invert   Outlet Devices
  #1     Discarded         0.00'   0.500 in/hr Exfiltration over Surface area
```

Discarded OutFlow Max=0.01 cfs @ 11.27 hrs HW=0.24' (Free Discharge)
⮤**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Summary for Pond Sw8: Swale 8

Inflow Area = 5,260 sf, 32.83% Impervious, Inflow Depth > 0.86" for 25-year event
Inflow = 0.02 cfs @ 7.95 hrs, Volume= 377 cf
Outflow = 0.01 cfs @ 12.63 hrs, Volume= 317 cf, Atten= 78%, Lag= 280.8 min
Discarded = 0.01 cfs @ 12.63 hrs, Volume= 317 cf

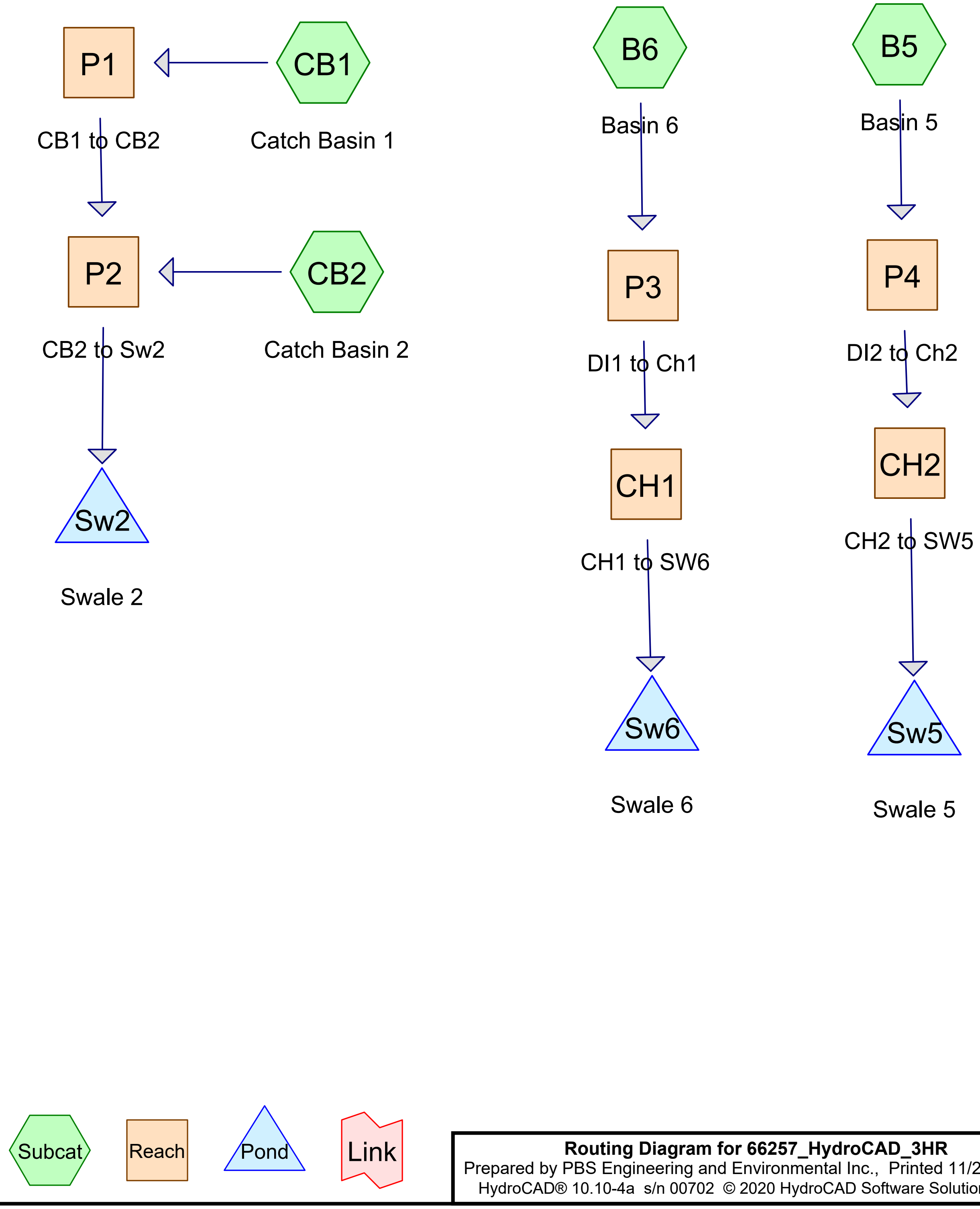
Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 0.31' @ 12.63 hrs Surf.Area= 434 sf Storage= 86 cf

Plug-Flow detention time= 216.3 min calculated for 317 cf (84% of inflow)
Center-of-Mass det. time= 114.2 min (873.9 - 759.7)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	635 cf	**1.00'W x 122.00'L x 1.00'H Prismatoid Z=4.0**

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**0.500 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.01 cfs @ 12.63 hrs HW=0.31' (Free Discharge)
⮤**1=Exfiltration** (Exfiltration Controls 0.01 cfs)



Routing Diagram for 66257_HydroCAD_3HR
Prepared by PBS Engineering and Environmental Inc., Printed 11/22/2021
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Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
15,300	98	(CB1, CB2)
48,395	79	<50% Grass cover, Poor, HSG B (B5, B6)
7,496	98	PGIS (B5)
19,168	98	Roadway (B6)

Summary for Subcatchment B5: Basin 5

Runoff = 0.25 cfs @ 0.99 hrs, Volume= 340 cf, Depth= 0.11"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
E-WA Short 3-hr EW Short - 10YR Rainfall=0.70"

	Area (sf)	CN	Description
*	7,496	98	PGIS
	31,027	79	<50% Grass cover, Poor, HSG B
	38,523	83	Weighted Average
	31,027	79	80.54% Pervious Area
	7,496	98	19.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment B6: Basin 6

Runoff = 0.64 cfs @ 0.99 hrs, Volume= 819 cf, Depth= 0.27"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
E-WA Short 3-hr EW Short - 10YR Rainfall=0.70"

	Area (sf)	CN	Description
	17,368	79	<50% Grass cover, Poor, HSG B
*	19,168	98	Roadway
	36,536	89	Weighted Average
	17,368	79	47.54% Pervious Area
	19,168	98	52.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment CB1: Catch Basin 1

Runoff = 0.26 cfs @ 0.99 hrs, Volume= 321 cf, Depth= 0.50"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
E-WA Short 3-hr EW Short - 10YR Rainfall=0.70"

	Area (sf)	CN	Description
*	7,650	98	
	7,650	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment CB2: Catch Basin 2

Runoff = 0.26 cfs @ 0.99 hrs, Volume= 321 cf, Depth= 0.50"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
E-WA Short 3-hr EW Short - 10YR Rainfall=0.70"

	Area (sf)	CN	Description
*	7,650	98	
	7,650	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Reach CH1: CH1 to SW6

Inflow Area = 36,536 sf, 52.46% Impervious, Inflow Depth = 0.27" for EW Short - 10YR event
Inflow = 0.64 cfs @ 0.99 hrs, Volume= 819 cf
Outflow = 0.63 cfs @ 1.00 hrs, Volume= 819 cf, Atten= 1%, Lag= 0.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.30 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 1.33 fps, Avg. Travel Time= 0.8 min

Peak Storage= 12 cf @ 1.00 hrs
Average Depth at Peak Storage= 0.15' , Surface Width= 1.59'
Bank-Full Depth= 1.00' Flow Area= 3.0 sf, Capacity= 27.94 cfs

1.00' x 1.00' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 5.00'
Length= 60.0' Slope= 0.4167 '/'
Inlet Invert= 962.00', Outlet Invert= 937.00'

Summary for Reach CH2: CH2 to SW5

```
Inflow Area =        38,523 sf, 19.46% Impervious,  Inflow Depth =  0.11"   for  EW Short - 10YR event
Inflow      =      0.25 cfs @    1.00 hrs,  Volume=              340 cf
Outflow     =      0.24 cfs @    1.03 hrs,  Volume=              340 cf,  Atten= 5%,  Lag= 1.8 min
```

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.96 fps, Min. Travel Time= 1.0 min
Avg. Velocity = 0.80 fps, Avg. Travel Time= 2.5 min

Peak Storage= 15 cf @ 1.01 hrs
Average Depth at Peak Storage= 0.10' , Surface Width= 1.41'
Bank-Full Depth= 1.00' Flow Area= 3.0 sf, Capacity= 20.31 cfs

1.00' x 1.00' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 5.00'
Length= 118.0' Slope= 0.2203 '/'
Inlet Invert= 963.00', Outlet Invert= 937.00'

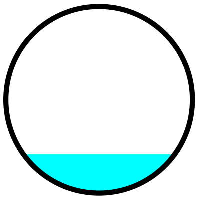
Summary for Reach P1: CB1 to CB2

```
Inflow Area =         7,650 sf,100.00% Impervious,  Inflow Depth =  0.50"   for  EW Short - 10YR event
Inflow      =      0.26 cfs @    0.99 hrs,  Volume=              321 cf
Outflow     =      0.25 cfs @    1.00 hrs,  Volume=              321 cf,  Atten= 1%,  Lag= 0.4 min
```

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.18 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 0.94 fps, Avg. Travel Time= 0.6 min

Peak Storage= 4 cf @ 0.99 hrs
Average Depth at Peak Storage= 0.21' , Surface Width= 0.81'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 2.73 cfs

12.0" Round Pipe
n= 0.012
Length= 34.0' Slope= 0.0050 '/'
Inlet Invert= 946.50', Outlet Invert= 946.33'



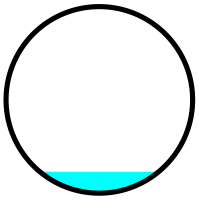
Summary for Reach P2: CB2 to Sw2

Inflow Area = 15,300 sf,100.00% Impervious, Inflow Depth = 0.50" for EW Short - 10YR event
Inflow = 0.51 cfs @ 0.99 hrs, Volume= 642 cf
Outflow = 0.51 cfs @ 1.00 hrs, Volume= 642 cf, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 10.25 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 4.51 fps, Avg. Travel Time= 0.1 min

Peak Storage= 2 cf @ 0.99 hrs
Average Depth at Peak Storage= 0.11' , Surface Width= 0.64'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 18.44 cfs

12.0" Round Pipe
n= 0.012
Length= 40.0' Slope= 0.2282 '/'
Inlet Invert= 946.13', Outlet Invert= 937.00'



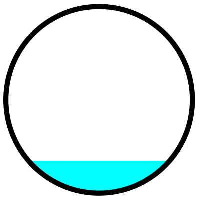
Summary for Reach P3: DI1 to Ch1

Inflow Area = 36,536 sf, 52.46% Impervious, Inflow Depth = 0.27" for EW Short - 10YR event
Inflow = 0.64 cfs @ 0.99 hrs, Volume= 819 cf
Outflow = 0.64 cfs @ 0.99 hrs, Volume= 819 cf, Atten= 1%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 7.09 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 3.15 fps, Avg. Travel Time= 0.4 min

Peak Storage= 7 cf @ 0.99 hrs
Average Depth at Peak Storage= 0.17' , Surface Width= 0.76'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 9.90 cfs

12.0" Round Pipe
n= 0.012
Length= 76.0' Slope= 0.0658 '/'
Inlet Invert= 969.00', Outlet Invert= 964.00'



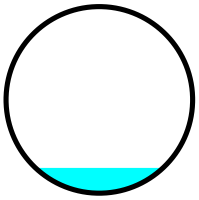
Summary for Reach P4: DI2 to Ch2

Inflow Area = 38,523 sf, 19.46% Impervious, Inflow Depth = 0.11" for EW Short - 10YR event
Inflow = 0.25 cfs @ 0.99 hrs, Volume= 340 cf
Outflow = 0.25 cfs @ 1.00 hrs, Volume= 340 cf, Atten= 1%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.96 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 1.82 fps, Avg. Travel Time= 0.8 min

Peak Storage= 6 cf @ 0.99 hrs
Average Depth at Peak Storage= 0.13' , Surface Width= 0.68'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 6.43 cfs

12.0" Round Pipe
n= 0.012
Length= 90.0' Slope= 0.0278 '/'
Inlet Invert= 965.50', Outlet Invert= 963.00'



Summary for Pond Sw2: Swale 2

Inflow Area = 15,300 sf,100.00% Impervious, Inflow Depth = 0.50" for EW Short - 10YR event
Inflow = 0.51 cfs @ 1.00 hrs, Volume= 642 cf
Outflow = 0.01 cfs @ 2.14 hrs, Volume= 642 cf, Atten= 97%, Lag= 68.9 min
Discarded = 0.01 cfs @ 2.14 hrs, Volume= 642 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 0.49' @ 2.14 hrs Surf.Area= 1,232 sf Storage= 528 cf

Plug-Flow detention time= 372.9 min calculated for 640 cf (100% of inflow)
Center-of-Mass det. time= 373.7 min (445.7 - 71.9)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	2,123 cf	**17.00'W x 55.00'L x 1.50'H Prismatoid Z=4.0**

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**0.500 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.01 cfs @ 2.14 hrs HW=0.49' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Summary for Pond Sw5: Swale 5

Inflow Area = 38,523 sf, 19.46% Impervious, Inflow Depth = 0.11" for EW Short - 10YR event
Inflow = 0.24 cfs @ 1.03 hrs, Volume= 340 cf
Outflow = 0.01 cfs @ 1.80 hrs, Volume= 340 cf, Atten= 94%, Lag= 45.9 min
Discarded = 0.01 cfs @ 1.80 hrs, Volume= 340 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 0.22' @ 1.80 hrs Surf.Area= 1,198 sf Storage= 243 cf

Plug-Flow detention time= 183.3 min calculated for 340 cf (100% of inflow)
Center-of-Mass det. time= 183.0 min (261.5 - 78.5)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	1,461 cf	**10.00'W x 100.00'L x 1.00'H Prismatoid Z=4.0**

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**0.500 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.01 cfs @ 1.80 hrs HW=0.22' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Summary for Pond Sw6: Swale 6

Inflow Area = 36,536 sf, 52.46% Impervious, Inflow Depth = 0.27" for EW Short - 10YR event
Inflow = 0.63 cfs @ 1.00 hrs, Volume= 819 cf
Outflow = 0.02 cfs @ 3.03 hrs, Volume= 819 cf, Atten= 97%, Lag= 121.4 min
Discarded = 0.02 cfs @ 3.03 hrs, Volume= 819 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 0.60' @ 3.03 hrs Surf.Area= 1,495 sf Storage= 679 cf

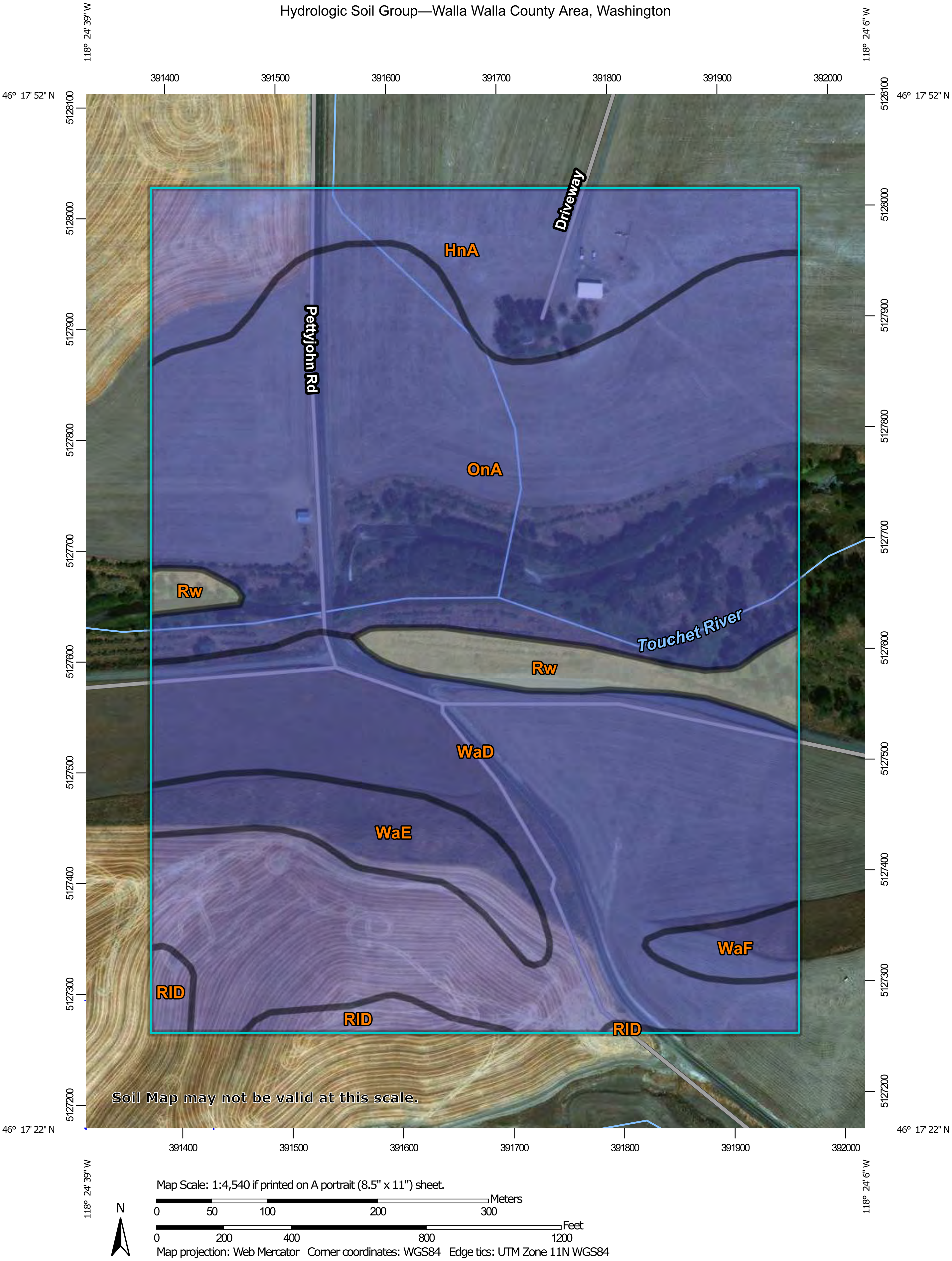
Plug-Flow detention time= 422.1 min calculated for 819 cf (100% of inflow)
Center-of-Mass det. time= 421.8 min (495.3 - 73.5)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	2,577 cf	**10.00'W x 80.00'L x 1.50'H Prismatoid Z=6.0**

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**0.500 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.02 cfs @ 3.03 hrs HW=0.60' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Hydrologic Soil Group—Walla Walla County Area, Washington



Map Scale: 1:4,540 if printed on A portrait (8.5" x 11") sheet.

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)

▢ Area of Interest (AOI)

Soils

Soil Rating Polygons

▢ A

▢ A/D

▢ B

▢ B/D

▢ C

▢ C/D

▢ D

▢ Not rated or not available

Soil Rating Lines

〰 A

〰 A/D

〰 B

〰 B/D

〰 C

〰 C/D

〰 D

〰 Not rated or not available

Soil Rating Points

■ A

■ A/D

■ B

■ B/D

■ C

■ C/D

■ D

■ Not rated or not available

Water Features

〰 Streams and Canals

Transportation

┼┼┼ Rails

〰 Interstate Highways

〰 US Routes

〰 Major Roads

〰 Local Roads

Background

▨ Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:31,700.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Walla Walla County Area, Washington
Survey Area Data: Version 5, Jun 4, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 7, 2014—Oct 27, 2016

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
HnA	Hermiston very fine sandy loam, 0 to 3 percent slopes	B	14.8	13.3%
OnA	Onyx silt loam, 0 to 3 percent slopes	B	44.6	40.2%
RlD	Ritzville silt loam, 8 to 30 percent slopes	B	1.9	1.7%
Rw	Riverwash		4.7	4.2%
WaD	Walla Walla silt loam, 8 to 30 percent slopes	B	37.7	33.9%
WaE	Walla Walla silt loam, 30 to 45 percent slopes	B	5.6	5.1%
WaF	Walla Walla silt loam, 45 to 60 percent slopes	B	1.6	1.5%
Totals for Area of Interest			**111.0**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

10-year, 3-hour Precipitation Calculations

Given:

From Section 4.2.6 of the SMMEW, the equation used to determine the 3-hour precipitation for a selected return period:

$P_{sds} = 1.06 * C_{sds} * P_{2yr2hr}$

Where:

P_{sds} = the 3-hour precipitation (inches) for a selected return period for a short- duration storm;

1.06 = the multiplier use for **all** climatic regions to convert x-year, 2-hour precipitation to x-year, 3-hour precipitation;

C_{sds} = the coefficient (from Table 4.2.11 of the SMMEW) for converting 2-year, 2-hour precipitation to x-year, 2-hour precipitation;

P_{2yr2hr} = the 2-year, 2-hour precipitation (from the 2-year 2-hour isopluvial map, Figure 4.3.2 of the SMMEW)

Find:

The 2-year, 3-hour short storm precipitation for the project area.

Solution:

C_{sds} = 1.47 (the storm will be a 10-year storm in Region 3)

P_{2yr2hr} = 0.45 inches (from the 2-year 2-hour isopluvial map)

Therefore:

P_{sds} = 1.06 * 1.47 * 0.45 = **0.70 inches**

The 10-year, 3-hour short storm event will produce a precipitation of 0.70 inches.

Job Name: **Dell Sharpe Bridge**

Job Number: 66257

Date: 11/19/2021

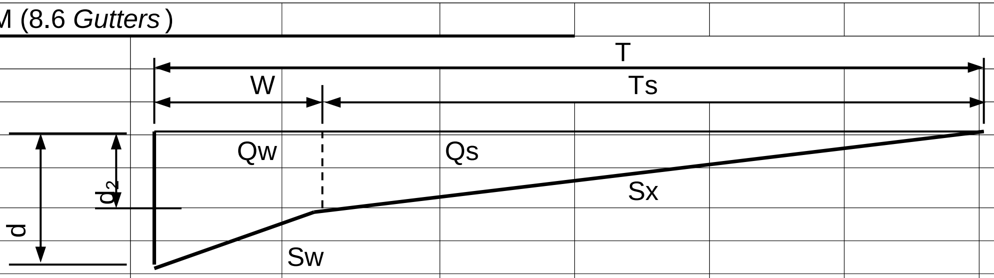
Inlet Location: SDCB 1 & 2

☐ *Design Values*

🟨 *Results*

Flow Spread in Gutters

From SRSM (8.6 *Gutters*)



$Qs = (0.56/n*Sx)*S^{1/2}(d_2^{2.67})$

$Qw = (0.56/n*Sw)S^{1/2}(d^{2.67}-d_2^{2.67})$

Where: d = Ts*Sx+W*S

d = Ts*Sx

$Q = Qs+Qw$

$V = 2*Q/(Ts^2*Sx+W^2*2*Sw+2*W*Ts*Sx)$

Where:

Q = Total gutter flow (cfs)

Q_s = Partial gutter flow (cfs)

Qw = Depressed gutter flow (cfs)

n = Manning's "n" value

Sx = Gutter cross slope (ft/ft)

S = Longitudinal gutter slope (ft/ft)

(For sump locations S=0.3%, HEC 12, Pg 72)

T = Flow width in gutter (ft)

V = Average gutter flow velocity (fps)

d = Flow depth at curb (ft)

d_2 = Flow depth at break in cross slope

Sw = Depressed gutter cross slope (ft/ft

W = Depressed gutter width (ft)

Q = 0.26 cfs

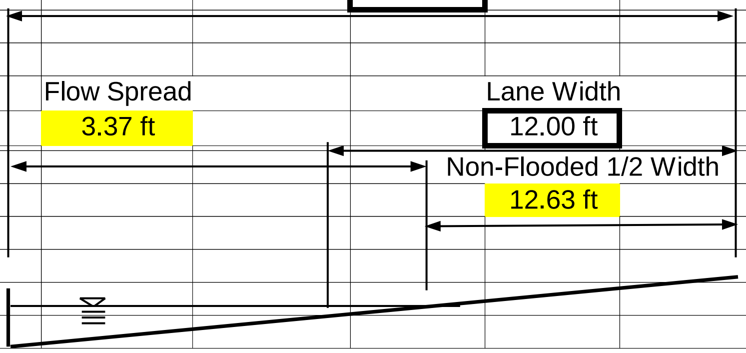
S = 3.50% (Longitudinal)

n = 0.015

Sx = 2.00% Pavement X-Slope

W = 1.00 ft Gutter Width

Sw = 2.00% Gutter X-Slope



Road 1/2 Width 16.00 ft

Flow Spread 3.37 ft

Lane Width 12.00 ft

Non-Flooded 1/2 Width 12.63 ft

Design Summary

Non-Flooded 1/2 Width 12.63 ft Greater than 6': Design OK

Job Name: **Dell Sharpe Bridge**
Job Number: 66257
Date: 11/22/21 9:21 AM
Inlet Location: SDCB 1 & 2

☐	*Design Values*
🟨	*Results*

Flow Spread (T) = 3.37 ft
Q = 0.26 cfs
S = 3.50%
Sx = 2.00%
n = 0.015

d = 0.07 ft

V = 2.29 fps

Grated Inlet Capacity Against a Curb, Ongrade Condition

Note: HEC-12, CH 7.4 states that combination curb inlets should be analysized ignoring the curb opening. Therefore this spreadsheet also applies to combination curb inlets.

FROM HEC-12

(Eq 7) Eo = 1 - (1 - W/T)^2.67

Where:

Eo = Ratio of frontal flow intercepted to total frontal flow
W = Grate width (1.67' for herringbone pattern)
T = Total flow spread

W = 1.67 ft

Eo = 84%

(Eq 9) Rf = 1 - 0.09*(V - Vo)

Where:

Rf = Ratio of frontal flow intercepted to total frontal flow
V = Velocity of flow
Vo = Splash-over Velocity (5 fps for herringbone pattern grate, WSDOT)

Vo = 2.29 fps

Rf = 100%
Qif = 0.22 cfs

(Eq 8) Qs/Q = 1 - Eo

Where:

Qs/Q = Ratio of side flow to total flow

Qs/Q = 16%

(Eq 10) Rs = 1 / (1 + (0.15*V^1.18)/(Sx*L^2.3))

Where:

Rs = Ratio of side flow intercepted to total side flow
L = Grate length (2.00' for herringbone pattern)

L = 2.00 ft

Rs = 13%
Qis = 0.01 cfs

Grate Summary

Qi = 0.22 cfs
Qbp = 0.04 cfs (Flow Bypassed)
E = 86% Grate efficiency

5.A.8 Maintenance Criteria for Energy Dissipaters

Table 5.42: Maintenance Criteria for Energy Dissipaters

Maintenance Components	Defect	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed
External			
Rock Pad	Missing or Moved Rock	Only one layer of rock exists above native soil in area ≥ 5 square feet (sf), or any exposure of native soil.	Rock pad replaced to design standards.
	Erosion	Soil erosion in or adjacent to rock pad.	Rock pad replaced to design standards.
Dispersion Trench	Pipe Plugged With Sediment	Accumulated sediment > 20% of the design depth.	Pipe cleaned/flushed so that it matches design.
	Not Discharging Water Properly	Visual evidence of water discharging at concentrated points along trench (normal condition is a “sheet flow” of water along trench). Intent is to prevent erosion damage.	Trench redesigned or rebuilt to standards.
	Perforations Plugged	> 50% of the perforations in pipe are plugged with debris and sediment.	Perforated pipe cleaned or replaced.
	Water Flowing out Top of “Distributor” Catch Basin	Maintenance person observes or receives credible report of water flowing out during any storm less than the design storm or is causing or appears likely to cause damage.	Energy dissipater rebuilt or redesigned to standards.
	Receiving Area Oversaturated	Water in receiving area is causing or has potential of causing landslide problems.	No danger of landslides.
Internal			
Manhole/ Chamber	Worn or Damaged Post, Baffles, or Side of Chamber	Structure dissipating flow deteriorates to one-half the original size or any concentrated worn spot > 1 sf, which would make structure unsound.	Structure replaced to design standards.
	Other Defects	See criteria in Table 5.40: Maintenance Criteria for Catch Basins (continued).	See criteria in Table 5.40: Maintenance Criteria for Catch Basins (continued).

5.A.9 Maintenance Criteria for Biofiltration Swales

Table 5.43: Maintenance Criteria for Biofiltration Swales

Maintenance Component	Defect or Problem	Condition When Maintenance Is Needed	Recommended Maintenance to Correct Problem
General	Sediment Accumulation on Grass	Sediment depth > 2 inches.	Remove sediment deposits on grass treatment area of the biofiltration swale. When finished, swale should be level from side to side and drain freely toward outlet. There should be no areas of standing water once inflow has ceased.
	Standing Water	When water stands in the swale between storms and does not drain freely.	Any of the following may apply: remove sediment or trash blockages, improve grade from head to foot of swale, remove clogged check dams, add underdrains or convert to a wet biofiltration swale.
	Flow Spreader	Flow spreader uneven or clogged so that flows are not uniformly distributed through entire swale width.	Level the spreader and clean so that flows are spread evenly over entire swale width.
	Constant Base Flow	When small quantities of water continually flow through the swale, even when it has been dry for weeks, and an eroded, muddy channel has formed in the swale bottom.	Add a low-flow pea-gravel drain the length of the swale or by-pass the base flow around the swale.
	Poor Vegetation Coverage	When grass is sparse or bare or eroded patches occur in > 10% of the swale bottom.	Determine why grass growth is poor and correct that condition. Replant with plugs of grass from the upper slope: plant in the swale bottom at 8-inch intervals. Or reseed into loosened, fertile soil.

5.A.18 Maintenance Criteria for Bioretention

Table 5.52: Maintenance Criteria for Bioretention

Maintenance Component	Activity	Objective	Schedule	Notes
Routine Maintenance				
Vegetation	Maintain drip irrigation system without breaks or blockages. Hand water as needed for specific plants.	Establish vegetation with a minimum 80% survival rate	Twice annually (May and July) or as indicated by plant health	Plants should be selected to be drought tolerant and not require watering after establishment (2 to 3 years). Watering may be required during prolonged dry periods after plants are established.
	Remove and/or prune vegetation	Maintain adequate plant coverage and plant health. Reduce shading of understory if species require sun. Maintain soil health and infiltration capability. Maintain clearances from utilities and sight distances.	Once or twice annually	Depending on aesthetic requirements, occasional pruning and removing dead plant material may be necessary.
	Remove undesired vegetation by hand weeding.	Reduce competition for desired vegetation. Improve aesthetics.	Prior to major weed species disbursing seeds (usually twice annually)	Periodic weeding is necessary until plants are established. The weeding schedule should become less frequent if the appropriate plant species and planting density have been used and, as a result, undesirable plants excluded.
Curb cuts	Remove any accumulation of debris from gutter and entrance to bioretention area.	Maintain proper flow of stormwater from paved/ impervious areas to bioretention BMP.	Twice annually (October and January)	
Mulch	Replace or add mulch with hand tools to a depth of 2 to 3 inches.	Replenish organic material in soil, reduce erosion, prolong good soil moisture level, and filter pollutants.	Once annually or every 2 years	Consider replacing mulch annually in bioretention BMPs where high pollutant loading is likely (e.g., contributing areas that include quick marts). Use compost in the bottom of the BMP and wood chips on side slopes and rim (above typical water levels).
General	Trash removal	Maintain aesthetics and prevent clogging of infrastructure.	Twice annually	
Nonroutine Maintenance				
Inlets/ Outlets	Clear vegetation within 1 foot of inlets and outlets to maintain access pathways.	Prevent clogging of infrastructure and maintain sight lines and access for inspections.	Once annually	If sediment is deposited in the bioretention area, immediately determine the source within the contributing area and stabilize.
Bioretention Area	Shovel or rake out sediment within vegetated areas. Vacuum catch basins or other sediment structures.	Reduce sediment transport and clogging of infrastructure. Maintain desired plant survival and appearance of the BMP. Maintain proper elevations and ponding depths.	Determined by inspection	
Underdrains	Jet clean or rotary cut debris/roots from underdrains.	Maintain proper subsurface drainage, ponding depths, and dewatering rates.	Determined by inspection of clean-outs	Bioretention BMPs should be designed with a proper elevation drop from pavement to vegetated area to prevent blockage of storm flows by vegetation into infiltration area.
Vegetation	Reseed or replant bare spots or poorly performing plants.	Maintain dense vegetation cover to prevent erosion, encourage infiltration and exclude unwanted weed species.	Determined by inspection	Soil mixes for bioretention BMPs are designed to maintain long-term fertility and pollutant processing capability. Estimates from metal attenuation research suggest that metal accumulation should not present an environmental concern for at least 20 years in bioretention systems. Replacing mulch in bioretention BMPs where heavy metal and hydrocarbon deposition is likely provides additional of protection for prolonged performance.

Table 5.52: Maintenance Criteria for Bioretention (continued)

Maintenance Component	Activity	Objective	Schedule	Notes
Soil Medium	Remove vegetation (save as much plant material as possible for replanting) and excavated soil with backhoe, excavator or, if small BMP, by hand.	Replace soil medium to maintain infiltration, soil fertility, and pollutant removal capability	Determined by inspection (visual, infiltration, pollutant, and soil fertility tests)	
General	Remove excess vegetation at the intersection of pavement and vegetation with a line trimmer, vacuum sweeper, rake or shovel.	Prevent accumulation of vegetation at pavement edge and maintain proper sheet flow of stormwater from paved/impervious areas to bioretention BMP.	Determined by inspection	If specific plants have a high mortality rate, assess the cause and replace with appropriate species.
	Various activities to maintain walls, intake and outfall pads, weirs, and other hardscape elements.	Rebuild or reinforce structures to maintain proper drainage and aesthetics and prevent erosion.	Determined by inspection	
	Maintain proper slope with hand tools, back hoe, or excavator; replant exposed areas.	Regrade or recontour side slopes to prevent erosion where side slopes have been disturbed by foot or vehicle intrusion.	Determined by inspection	

5.A.19 Maintenance Criteria for Media Filter Drains (MFDs)

Table 5.53: Maintenance Criteria for Media Filter Drains (MFDs)

Maintenance Component	Defect	Condition When Maintenance Is Needed	Results Expected When Maintenance Is Performed
General	Sediment Accumulation on Grass Filter Strip	Sediment depth > 2 inches or creates uneven grading that interferes with sheet flow.	Remove sediment deposits on grass treatment area of the embankment. When finished, embankment should be level from side to side and drain freely toward the toe of the embankment slope. There should be no areas of standing water once inflow has ceased.
	No-Vegetation Zone/ Flow Spreader	Flow spreader is uneven or clogged so that flows are not uniformly distributed over entire embankment width.	Level the spreader and clean to spread flows evenly over entire embankment width.
	Poor Vegetation Coverage	Grass is sparse or bare, or eroded patches are observed in > 10% of the grass strip surface area.	Determine why grass growth is poor and correct the offending condition. Reseed into loosened, fertile soil or compost; or, replant with plugs of grass from the upper slope.
	Vegetation	Grass becomes excessively tall (> 10 inches); nuisance weeds and other vegetation start to take over.	Mow vegetation or remove nuisance vegetation to not impede flow. Mow grass to a height of 6 inches.
	Media Filter Drain Mix Replacement	Water is seen on the surface of the media filter drain mix long after the storms have ceased. Typically, the 6-month, 24-hour precipitation event should drain within 48 hours. More common storms should drain within 24 hours. Maintenance also needed on a 10-year cycle and during a preservation project.	Excavate and replace all of the media filter drain mix contained within the media filter drain.
	Excessive Shading	Grass growth is poor because sunlight does not reach embankment.	If possible, trim back overhanging limbs and remove brushy vegetation on adjacent slopes.
	Trash and	Trash and debris have accumulated on embankment.	Remove trash and debris from embankment.

6.A.2 Maintenance Criteria for Detention Ponds

Table 6.15: Maintenance Criteria for Detention Ponds

Maintenance Component	Defect	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed
General	Trash and Debris	Any trash and debris > 5 cubic feet (cf) per 1,000 square feet (sf), which is about equal to the amount of trash it would take to fill up one standard size garbage can. In general, there should be no visual evidence of dumping. If less than threshold all trash and debris will be removed as part of next scheduled maintenance.	Trash and debris cleared from site.
	Poisonous Vegetation and Noxious Weeds	Any poisonous or nuisance vegetation which may constitute a hazard to maintenance personnel or the public. Any evidence of noxious weeds as defined by State or local regulations. (Apply requirements of adopted integrated pest management (IPM) policies for the use of herbicides).	No danger of poisonous vegetation where maintenance personnel or the public might normally be. (Coordinate with local health department). Complete eradication of noxious weeds may not be possible. Compliance with State or local eradication policies required.
	Contaminants and Pollution	Any evidence of oil, gasoline, contaminants or other pollutants (Coordinate removal/cleanup with local water quality response agency).	No contaminants or pollutants present.
	Rodent Holes	Any evidence of rodent holes if pond is acting as a dam or berm, or any evidence of water piping through dam or berm via rodent holes.	Rodents destroyed and dam or berm repaired. (Coordinate with local health department and Ecology Dam Safety Office if pond ≥ 10 acre-feet).
	Beaver Dams	Dam results in change or function of the pond.	Pond is returned to design function. (Coordinate trapping of beavers and removal of dams with appropriate permitting agencies).
	Insects	When insects such as wasps and hornets interfere with maintenance activities.	Insects destroyed or removed from site. Apply insecticides in compliance with adopted IPM policies.
	Tree Growth and Hazard Trees	Tree growth does not allow maintenance access or interferes with maintenance activity (i.e., slope mowing, silt removal, vacuuming, or equipment movements). If trees are not interfering with access or maintenance, do not remove If dead, diseased, or dying trees are identified (Use a certified arborist to determine health of tree or removal requirements)	Trees do not hinder maintenance activities. Harvested trees should be recycled into mulch or other beneficial uses (e.g., alders for firewood). Remove hazard trees.
Side Slopes of Pond	Erosion	Eroded damage over 2 inches deep where cause of damage is still present or where there is potential for continued erosion. Any erosion observed on a compacted berm embankment.	Slopes should be stabilized using appropriate erosion control measure(s); e.g., rock reinforcement, planting of grass, compaction. If erosion is occurring on compacted berms a licensed engineer in the state of Washington should be consulted to resolve source of erosion.
Storage Area	Sediment	Accumulated sediment that exceeds 10% of the designed pond depth unless otherwise specified or affects inletting or outletting condition of the pond.	Sediment cleaned out to designed pond shape and depth; pond reseeded if necessary to control erosion.
	Liner	Liner is visible and has > three 0.25-inch holes in it.	Liner repaired or replaced. Liner is fully covered.

Table 6.15: Maintenance Criteria for Detention Ponds (continued)

Maintenance Component	Defect	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed
	(if applicable)		
Pond Berms (Dikes)	Settlements	Any part of berm which has settled 4 inches lower than the design elevation. If settlement is apparent measure berm to determine amount of settlement. Settling can be an indication of more severe problems with the berm or outlet works. A licensed engineer in the state of Washington should be consulted to determine the source of the settlement.	Dike is built back to the design elevation.
	Piping	Discernible water flow through pond berm. Ongoing erosion with potential for erosion to continue. (Recommend a licensed engineer in the state of Washington with geotechnical expertise be called in to inspect and evaluate condition and recommend repair of condition.	Piping eliminated. Erosion potential resolved.
Emergency Overflow/Spillway	Tree Growth	Tree growth on emergency spillways creates blockage problems and may cause failure of the berm due to uncontrolled overtopping. Tree growth on berms > 4 feet in height may lead to piping through the berm which could lead to failure of the berm.	Trees should be removed. If root system is small (base < 4 inches) the root system may be left in place. Otherwise the roots should be removed and the berm restored. A licensed engineer in the state of Washington should be consulted for proper berm/spillway restoration.
	Piping	Discernible water flow through pond berm. Ongoing erosion with potential for erosion to continue. (Recommend a licensed engineer in the state of Washington with geotechnical expertise be called in to inspect and evaluate condition and recommend repair of condition.	Piping eliminated. Erosion potential resolved.
	Emergency Overflow/ Spillway	Only one layer of rock exists above native soil in area ≥ 5 sf, or any exposure of native soil at the top of outflow path of spillway. (Riprap on inside slopes need not be replaced.)	Rocks and pad depth are restored to design standards.
	Erosion	See Side Slopes of Pond.	

6.A.4 Maintenance Criteria for Control Structures

Table 6.17: Maintenance Criteria for Control Structures

Maintenance Component	Defect	Condition When Maintenance Is Needed	Results Expected When Maintenance Is Performed
General	Trash and Debris (includes sediment)	Material exceeds 25% of sump depth or 1 foot below orifice plate.	Control structure orifice is not blocked. All trash and debris removed.
	Structural Damage	Structure is not securely attached to manhole wall.	Structure securely attached to wall and outlet pipe.
		Structure is not in upright position (allow up to 10% from plumb).	Structure in correct position.
		Connections to outlet pipe are not watertight and show signs of rust.	Connections to outlet pipe are water tight; structure repaired or replaced and works as designed.
		Any holes—other than designed holes—in the structure.	Structure has no holes other than designed holes.
Clean-out Gate	Damaged or Missing	Clean-out gate is not watertight or is missing.	Gate is watertight and works as designed.
		Gate cannot be moved up and down by one maintenance person.	Gate moves up and down easily and is watertight.
		Chain/rod leading to gate is missing or damaged.	Chain is in place and works as designed.
		Gate is rusted > 50% of its surface area.	Gate is repaired or replaced to meet design standards.
Orifice Plate	Damaged or Missing	Control device is not working properly due to missing, out of place, or bent orifice plate.	Plate is in place and works as designed.
	Obstructions	Any trash, debris, sediment, or vegetation blocking the plate.	Plate is free of all obstructions and works as designed.
Overflow Pipe	Obstructions	Any trash or debris blocking (or having the potential of blocking) the overflow pipe.	Pipe is free of all obstructions and works as designed.
Manhole	See criteria for vaults/tanks in Table 6.16: Maintenance Criteria for Detention Vaults/Tanks.		
Catch Basin	See criteria in Table 6.18: Maintenance Criteria for Catch Basins (continued).		

6.A.5 Maintenance Criteria for Catch Basins

Table 6.18: Maintenance Criteria for Catch Basins

Maintenance Component	Defect	Condition When Maintenance Is Needed	Results Expected When Maintenance Is Performed
General	Trash and Debris	Trash or debris which is located immediately in front of the catch basin opening or is blocking inletting capacity of the basin by > 10%.	No trash or debris located immediately in front of catch basin or on grate opening.
		Trash or debris (in the basin) that exceeds 60% of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case < 6 inches clearance from the debris surface to the invert of the lowest pipe.	No trash or debris in the catch basin.
		Trash or debris in any inlet or outlet pipe blocking > one-third its height.	Inlet and outlet pipes free of trash or debris.
		Dead animals or vegetation that could generate odors that could cause complaints or dangerous gases (e.g., methane).	No dead animals or vegetation present within the catch basin.
	Sediment	Sediment (in the basin) that exceeds 60% of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case < 6 inches clearance from the sediment surface to the invert of the lowest pipe.	No sediment in the catch basin

Table 6.18: Maintenance Criteria for Catch Basins (continued)

Maintenance Component	Defect	Condition When Maintenance Is Needed	Results Expected When Maintenance Is Performed
		Measured from the bottom of basin to invert of the lowest pipe into or out of the basin.	
	Structure Damage to Frame and/or Top Slab	Top slab has holes larger than 2 square inches or cracks > 0.25 inches. (Intent is to make sure no material is running into basin).	Top slab is free of holes and cracks.
		Frame not sitting flush on top slab, i.e., separation of > 0.75 inches of the frame from the top slab. Frame not securely attached.	Frame is sitting flush on the riser rings or top slab and firmly attached.
	Fractures or Cracks in Basin Walls/Bottom	Maintenance person judges that structure is unsound.	Basin replaced or repaired to design standards.
		Grout fillet has separated or cracked > 0.5 inches and longer than 1 foot at the joint of any inlet/outlet pipe or any evidence of soil particles entering catch basin through cracks.	Pipe is regrouted and secure at basin wall.
	Settlement/ Misalignment	If failure of basin has created a safety, function, or design problem.	Basin replaced or repaired to design standards.
	Vegetation	Vegetation growing across and blocking > 10% of the basin opening.	No vegetation blocking opening to basin.
		Vegetation growing in inlet/outlet pipe joints that is > 6 inches tall and < 6 inches apart.	No vegetation or root growth present.
	Contamination and Pollution	See Table 6.15: Maintenance Criteria for Detention Ponds (continued).	No pollution present.
Catch Basin Cover	Cover Not in Place	Cover is missing or only partially in place. Any open catch basin requires maintenance.	Catch basin cover is closed
	Locking Mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts into frame have < 0.5 inches of thread.	Mechanism opens with proper tools.
	Cover Difficult to Remove	One maintenance person cannot remove lid after applying normal lifting pressure. (Intent is keep cover from sealing off access to maintenance.)	Cover can be removed by one maintenance person.
Ladder	Ladder Rungs Unsafe	Ladder is unsafe due to missing rungs, not securely attached to basin wall, misalignment, rust, cracks, or sharp edges.	Ladder meets design standards and allows maintenance person safe access.
Metal Grates (if applicable)	Grate opening Unsafe	Grate with opening > 7/8 inches.	Grate opening meets design standards.
	Trash and Debris	Trash and debris that is blocking > 20% of grate surface inletting capacity.	Grate free of trash and debris.
	Damaged or Missing	Grate missing or broken member(s) of the grate.	Grate is in place and meets design standards.

6.A.8 Maintenance Criteria for Evaporation Ponds

Table 6.21: Maintenance Criteria for Evaporation Ponds

Maintenance Component	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Trash and Debris	See Table 6.15: Maintenance Criteria for Detention Ponds (continued)	See Table 6.15: Maintenance Criteria for Detention Ponds (continued)
	Poisonous/ Noxious Vegetation	See Table 6.15: Maintenance Criteria for Detention Ponds (continued)	See Table 6.15: Maintenance Criteria for Detention Ponds (continued)
	Contaminants and Pollution	See Table 6.15: Maintenance Criteria for Detention Ponds (continued)	See Table 6.15: Maintenance Criteria for Detention Ponds (continued)
	Rodent Holes	See Table 6.15: Maintenance Criteria for Detention Ponds (continued)	See Table 6.15: Maintenance Criteria for Detention Ponds (continued)
Side Slopes of Pond	Erosion	See Table 6.15: Maintenance Criteria for Detention Ponds (continued)	See Table 6.15: Maintenance Criteria for Detention Ponds (continued)
Storage Area	Sediment	Accumulated sediment that exceeds 10% of the designed pond depth unless otherwise specified or affects inletting or outletting condition of the pond.	Sediment cleaned out to designed pond shape and depth; pond reseeded if necessary to control erosion.
	Liner (if applicable)	Liner is visible and has > three 0.25-inch holes in it.	Liner repaired or replaced. Liner is fully covered.
Pond Berms (Dikes)	Settlements	Any part of berm which has settled 4 inches lower than the design elevation. If settlement is apparent, measure berm to determine amount of settlement. Settling can be an indication of more severe problems with the berm or outlet works. A licensed engineer in the state of Washington should be consulted to determine the source of the settlement.	Dike is built back to the design elevation.
	Piping	Discernable water flow through pond berm. Ongoing erosion with potential for erosion to continue. (Recommend a licensed engineer in the state of Washington with geotechnical expertise be called in to inspect and evaluate condition and recommend repair of condition.	Piping eliminated. Erosion potential resolved.

Table 6.21: Maintenance Criteria for Evaporation Ponds (continued)

Maintenance Component	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Inlet Pipe	Inlet pipe clogged with sediment and/or debris material.	No clogging or blockage in the inlet and outlet piping.
	Oil Sheen on Water	Prevalent and visible oil sheen.	Oil removed from water using oil-absorbent pads or Vactor truck. Source of oil located and corrected. If chronic low levels of oil persist, plant wetland plants such as *Juncus effusus* (soft rush) which can uptake small concentrations of oil.
	Erosion	Erosion of the pond's side slopes and/or scouring of the pond bottom that exceeds 6 inches, or where continued erosion is prevalent.	Slopes stabilized using proper erosion control measures and repair methods.
	Overflow Spillway	Rock is missing and soil is exposed at top of spillway or outside slope.	Rocks replaced to specifications.
	Snow	Snow removal operations deposit snow into evaporation pond.	This added factor must be considered in the water budget, especially if snow from another basin is put into the system. Temporary sediment ponds should be included in the design, to prevent sediment-laden runoff from entering the pond and storm disposal system during construction.

6.A.9 Maintenance Criteria for Rainwater Harvesting

Table 6.22: Maintenance Criteria for Rainwater Harvesting

Activity	Objective	Schedule
Remove debris from roof: Sweep, rake or use leaf blower.	Prevent debris from entering collection and filter system	Determined by inspection
Clean gutters: By hand or use leaf blower.	Prevent debris from entering collection and filter system	Determined by inspection (generally September, November, January, and April). The most critical cleaning is in mid-spring to late spring to flush the pollen deposits from surrounding trees.[a]
Clean downspout basket screens: Remove debris from screens at top of downspout.	Prevent debris from entering collection and filter system, and clogging of system	Same as gutters
Clean prefilters	Prevent debris from entering collection and filter system, and clogging of system	Monthly
Clean storage tanks of debris: Drain tank and remove debris from bottom of tank.	Prevent contamination	Determined by inspection
Clean particle filters	Prevent contamination	6 months or determined by pressure drop in system.
Clean and replace ultraviolet (UV) filters	Prevent contamination	Clean every 6 months and replace bulb every 12 months or according to manufacturer's recommendation.
Chlorinate storage tank: Chlorinate to 0.2 to 0.5 parts per million (ppm) (0.25 cup of household bleach [5.25%] at the rate of 1 cup of bleach to 1,000 gallons of stored water)	Prevent contamination	Quarterly
Flush household taps: Remove carbon filter and flush until chlorine odor is noticed at taps. Chlorinated water should be left standing in the piping for 30 minutes. Replace the carbon filter.	Prevent contamination	When storage tanks are cleaned
[a] Covers for gutters may be appropriate for specific locations, but can make regular cleaning more difficult and will not prevent pollen from entering filter system.		

Exhibit 16

Geotechnical Engineering Report

Dell Sharpe Bridge Replacement
Pettyjohn Road
Walla Walla County, Washington

Prepared for:

TranTech Engineering, LLC
365 118th Avenue SE, Suite 100
Bellevue, Washington 98005

December 16, 2022
PBS Project 66257.000

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1 INTRODUCTION

1.1 General

This report presents results of PBS Engineering and Environmental Inc. (PBS) geotechnical engineering services for the proposed bridge replacement located along Pettyjohn Road in Walla Walla County, Washington (site). The general site location is shown on the Vicinity Map, Figure 1. The locations of PBS' explorations in relation to existing and proposed site features are shown on the Site Plan, Figure 2.

1.2 Purpose and Scope

The purpose of PBS' services was to develop geotechnical design and construction recommendations in support of the planned bridge replacement. This was accomplished by performing the following scope of services.

1.2.1 Literature and Records Review

PBS reviewed various published geologic maps of the area for information regarding geologic conditions and hazards at or near the site.

1.2.2 Subsurface Explorations

Three borings were advanced to depths ranging from approximately 30.5 to 35 feet below the existing ground surface (bgs) within the development area. The borings were logged and representative soil samples collected by a member of the PBS geotechnical engineering staff. The approximate boring locations are shown on the Site Plan, Figure 2. The interpreted boring logs are presented as Figures A1 through A3 in Appendix A, Field Explorations.

1.2.3 Soil and Rock Testing

Soil and rock samples were returned to our laboratory and classified in general accordance with the Unified Soil Classification System (ASTM D2487) and/or the Visual-Manual Procedure (ASTM D2488). Laboratory tests included natural moisture contents and grain-size analyses for the soil samples and unconfined compressive strength for rock core samples. Laboratory test results are included in the exploration logs in Appendix A, Field Explorations; and in Appendix B, Laboratory Testing.

1.2.4 Geotechnical Engineering Analysis

Data collected during the subsurface exploration, literature research, and testing were used to develop site-specific geotechnical design parameters and construction recommendations.

1.2.5 Report Preparation

This Geotechnical Engineering Report summarizes the results of our explorations, testing, and analyses, including information relating to the following:

- Field exploration logs and site plan showing approximate exploration locations
- Laboratory test results
- Groundwater levels and considerations
- Liquefaction potential
- Shallow foundation recommendations:
  - Minimum embedment
  - Allowable bearing pressure
  - Estimated settlement
  - Sliding coefficient

- Lateral earth pressures for retaining wall design including:
    - Active, passive, and at-rest earth pressures
    - Seismic lateral force
    - Allowable bearing pressure
    - Sliding coefficient
    - Groundwater and drainage considerations
- Earthwork and grading, cut, and fill recommendations:
    - Structural fill materials and preparation
    - Utility trench excavation and backfill requirements
    - Slab and pavement subgrade preparation
    - Wet weather considerations
- Seismic design criteria in accordance with the 2017 AASHTO LRFD and the 2019 WSDOT Geotechnical Design Manual (GDM)

1.3 Project Understanding

PBS understands Walla Walla County plans to replace the current Dell Sharpe Bridge with a new multi-span bridge located upstream of the Touchet River. Major goals of the relocation are to end the ongoing foundation stability and maintenance problems associated with the current bridge and to straighten the alignment, which currently presents a safety concern as Pettyjohn Road turns sharply just south of the bridge. Midspan support is planned in a vegetated sandbar bounded by the main body of the Touchet River running to the north and a narrow backwater flow channel to the south.

Table 1 below includes the compressive axial demands for each pier provided by TranTech Engineering. Piers 1, 2, and 3 refer to the north, middle, and south piers, respectively.

Table 1. Factored Compressive Axial Demands Per Shaft

Load Condition	Pier 1	Pier 2	Pier 3
Service-I Limit State (kips)	1175	3155	1200
Strength Limit State (kips)	1335	5350	1400
Extreme Event-I Limit State (kips)	950	3725	1000

2 SITE CONDITIONS

2.1 Surface Description

The site is located within the Touchet Valley in an unincorporated portion Wall Walla County. The Touchet Valley is a relatively flat, east-west oriented alluvial basin occupied by the Touchet River positioned along the south side of the valley. The Touchet River drains from its headwaters westward before exiting the Touchet Valley and into the Columbia Basin, where it turns southward and drains into the Walla Walla River. The proposed alignment will be oriented approximately north-south and span the Touchet River.

Review of available Washington Department of Natural Resources (WADNR) light detection and ranging data (LiDAR) indicates the presence of a series of three fluvial terraces within the Touchet Valley (WADNR, 2021).

These terraces have been designated T1: Holocene Terrace, T2: Holocene/Pleistocene Terrace, and T3: Pleistocene Terrace. The Touchet River and its associated floodplain and meander belt are bound and inset between the T1 terraces (Figure 3). These terraces were designated based on relative position from the modern channel, cross valley elevation difference, and mapped geology (to be discussed below). We note that T2 is absent from the south side of Touchet Valley in the local vicinity of the proposed alignment.

The proposed alignment will span the Touchet River from the T1 terrace located north of the Touchet River to the proposed embankment to be positioned along a degraded portion of the T1 terrace located south of the Touchet River. The proposed embankment will bring the alignment to grade with the current position of Sharp Road and the proposed connection with Pettyjohn Road.

2.2 Geologic Setting

The site is located within the southern extent of the Columbia Basin geologic province. The province is composed primarily of Tertiary volcanic basement rocks of the Columbia River Basalt Group (CRBG) subdivided into smaller recognizable flows and members that are overlain by Quaternary deposits (Derkey et al., 2006). These older flood basalts were generated by volcanic eruptions in eastern Oregon, eastern Washington, and western Idaho between 16.7 million years ago (Ma) and 5.5 Ma (Reidel, 2004).

The Yakima fold and thrust belt is an actively deforming series of faults and folds that is accommodating clockwise rotation through crustal shortening within the western Columbia Province (McCaffrey et al., 2016). Active Quaternary and Holocene faults are found throughout this sub-province. Northwest-southeast and east-west trending anticlinal ridges and wide synclinal valleys dominate much of the Yakima fold and thrust belt. Reverse faulting is pervasive along the flanks of these anticline-syncline complexes (Gomberg et al., 2012). The eastern-most extent of the Yakima fold and thrust belt is continued across the Oregon-Washington border by the Horse Heaven Anticline (locally referred to as the Horse Heaven Hills) and the Wallula fault system before reaching the Blue Mountains province of Oregon.

The Horse Heaven Anticline forms a linear ridgeline along the southern margin of the Columbia Basin, and has been continuously incised by the ancestral and historical Columbia River resulting in a narrow water gap that drains the basin westward (Reidel and Fecht, 1994; Schuster, 1994). Throughout the Pleistocene, cataclysmic outburst flood waters from Glacial Lake Missoula resulted in rapid sedimentation as floodwaters ponded behind the Horse Heaven Anticline. Slowing flood waters blanketed the basin with slackwater flood deposits over much of the low-lying areas, as well as created extensive gravel bar complexes near the Columbia River. Reworking of fine-grained material by aeolian processes has created deposits of loess in elevated areas that were not directly affected by glacial floodwaters.

2.3 Local Geology

The bridge alignment is mapped as underlain by Holocene to Pleistocene age alluvium (Schuster, 1994). These sediments consist of clay, silt, sand, and gravel of varying thicknesses and varying degrees of sorting. Sediments commonly include reworked loess and Mazama Tephra, inferring an age of approximately 7,000 years old. The alluvium mapped by Schuster (1994) is undifferentiated geomorphically between the terraces identified in Figure 3.

Pleistocene age silt and sand outburst flood sediments are mapped adjacent to the south side of the alignment on what we have designated the T3 terrace. Comparing the position of these mapped sediments at the location of T3 south of the Touchet River to T3 located north of Hwy 124 forms the basis for classifying T3 as a Pleistocene age terrace. The outburst sediments are described as lacustrine silt and fine sand of predominated quartz and felspar, and rhythmically bedded with stringers of coarse-grained sand and gravel.

These sediments were deposited by outburst floods originating from glacial Lake Missoula that inundated the Columbia Basin and Touchet Valley numerous times during the last ice age.

2.4 Subsurface Conditions

The site was explored by drilling three borings, designated B-1 through B-3, to depths of 30.5 to 35 feet bgs. The drilling was performed by Holt Services, Inc., of Vancouver, Washington, using a track-mounted B-57 drill rig and mud rotary and rock coring drilling techniques.

PBS has summarized the subsurface units as follows:

SILT with SAND [ALLUVIUM]:	Silt with sand to sandy silt was encountered from the ground surface to approximately 8.5 and 4 feet bgs in borings B-1 and B-3, respectively. The silt was generally brown, moist, and ranged from medium stiff to very stiff with SPT N-values of 5 to 22. The sand content ranged from 9% to 15% for the silt with sand and 43% for the sandy silt.
GRAVEL [ALLUVIUM]:	Dark gray, poorly graded gravel was encountered at the ground surface in B-2 and underlying the sand to sand with silt in borings B-1 and B-2. The gravel was generally coarse-grained with poor recovery, and ranged from medium dense to very dense with SPT N-values of 23 to greater than 50 (refusal).
BASALT BEDROCK [CRBG1]:	Basalt CRBG1 was encountered in all three borings beneath the gravel. The basalt was generally weak (R2) to moderately strong (R3) in borings B-1 and B-2, and moderately strong to strong (R4) in B-3. The basalt was typically very dark gray to black with a fine-grained texture and trace amounts of vesicles throughout the rock mass. Microfractures were observed throughout the CRBG1 rock core that resulted in numerous mechanical breaks during the drilling process. The rock mass was moderately weathered near its upper contact and became fresh with depth. Iron-oxide and manganese-oxide staining was observed around some joints and microfractures. A distinctive dark reddish brown flow breccia was encountered at the basal contact of CRBG1 in borings B-2 and B-3. In boring B-3 this flow breccia coincided with a paleosol. The paleosol and flow breccia were extremely weak (R0) to weak (R2) and severely to moderately weathered, and generally consisted of angular clasts within a soil-like matrix.
BASALT BEDROCK [CRBG2]:	Basalt CRBG2 was encountered below CRBG1 and delineated by the flow breccia positioned above it. CRBG2 was encountered in borings B-2 and B-3 and was distinctive from CRBG1 due to the large presence of vesicles encountered throughout the recovered core, as well as the color, which ranged from very dark gray to dark reddish brown.

A cross section depicting our interpretation of subsurface conditions can be found on Figure 4. The alluvium encountered borings B-1 and B-3 coincided with the T1 terrace and degraded T1 terrace scarp indicated on Figure 3. In boring B-2, the alluvium did not consist of finer-grained soils, which we attribute to the erosion and stripping of fines by fluvial processes due to its slightly lower elevation and position within the modern channel and flood plain.

The elevation of CRBG1 bedrock increases from south to north, from an elevation of 923 feet amsl in B-3 to 917 feet amsl in B-1, indicating a sloping contact between CRBG1 and the overlying alluvium. We hypothesize the cause for this is likely erosional from downcutting and scouring of the ancestral Touchet River, as the elevation of CRBG2 is 903 feet amsl in B-2 and 901 feet amsl in B-3. CRBG2 was not encountered in boring B-1 due to the boring termination depth.

2.5 Groundwater

Static groundwater was not identified during our explorations due to the use of drilling fluids necessary to advance the drill bit, particularly when coring rock. Based on a review of regional groundwater logs available from the Washington State Department of Ecology, we anticipate that the static groundwater level is present at a depth less than 20 feet bgs. Ordinary high water is at an elevation of approximately 929 feet amsl as a result of influence by the Touchet River. Please note that groundwater levels can fluctuate during the year depending on climate, irrigation season, extended periods of precipitation, drought, and other factors.

3 CONCLUSIONS AND RECOMMENDATIONS

3.1 Geotechnical Design Considerations

The subsurface conditions at the site consist of silt and fine to coarse-grained gravel overlying fractured basalt bedrock. Based on our observations and analyses, foundation support on drilled shafts or spread footings is feasible for the proposed new bridge. Excavation of the surface soils (silt) with conventional equipment is feasible at the site.

The grading and final development plans for the project had not been completed when this report was prepared. Once completed, PBS should be engaged to review the project plans and update our recommendations as necessary.

3.2 Foundation Recommendations

3.2.1 Shallow Foundations

Shallow spread footings bearing on basalt bedrock may be used to support loads associated with the planned bridge, provided the recommendations in this report are followed.

3.2.1.1 Nominal Bearing Resistance and Resistance Factor

Assuming flat conditions, and a minimum footing width of 5 feet and a minimum embedment of 24 inches, footings can be designed with a nominal bearing resistance of 20 kips per square foot (ksf). The nominal bearing resistance should be reduced using a resistance factor of 0.45. The settlement of spread footings, founded as described and designed with a bearing pressure less than or equal to the factored resistance above, should be less than 1 inch.

3.2.1.2 Footing Embedment Depths

PBS recommends that all footings be founded a minimum of 24 inches below the lowest adjacent grade and should consider estimated scour depths.

3.2.1.3 Footing Preparation

Excavations for footings should be carefully prepared to a neat and undisturbed state. A representative from PBS should confirm suitable bearing conditions and evaluate all exposed footing subgrades. Observations should also confirm that loose or soft materials have been removed from new footing excavations and concrete slab-on-grade areas. Localized deepening of footing excavations may be required to penetrate loose, wet, or deleterious materials.

3.2.1.4 Lateral Resistance and Resistance Factors

Lateral loads can be resisted by passive earth pressure on the face or sides of footings and by friction across the base. For footings founded on bedrock, we recommend using a nominal friction coefficient of 0.7 for cast-in-place (CIP) concrete and a nominal passive resistance of 500 pounds per square foot (psf), with resistance factors of 0.8 and 0.5 (AASHTO LRFD Table 10.5.5.2.2-1), respectively. The provided passive resistance assumes the ground surface is flat for a distance of 2D, where D is the depth of the footing below the ground surface.

3.2.2 Drilled Shafts

Due to the relatively high loads associated with support of the bridge, the proposed new bridge may be supported on deep foundations that derive their capacity entirely from shaft resistance in the underlying basalt bedrock. PBS completed analyses to evaluate the capacity of drilled shafts at both the north and south abutments as well as the middle pier. PBS considered a minimum pile embedment of 2.5B, where B is the diameter of the shaft, for shafts of 4 feet in diameter or less, and 2B where shafts are greater than 4 feet in diameter. The actual length of the drilled shafts should also consider lateral pile loading and the need to establish fixity, which may result in longer shafts than required for axial compressive or uplift resistance.

3.2.2.1 Nominal Axial Compressive Resistance for Drilled Shafts

We analyzed drilled shaft diameters of 5 feet at the abutments, Pier 1 and Pier 3, and 8 and 9 feet at Pier 2. Drilled shafts derive their capacity from shaft resistance in the underlying basalt bedrock only. Table 2 presents the static nominal axial compressive resistance for the shafts analyzed. Detailed results of our analyses are presented as nominal capacity versus depth on Figure 5. The nominal resistance should be reduced using a resistance factor of 0.55.

Table 2. Nominal Axial Compressive Resistance for Drilled Shafts

Pier	Shaft Diameter (feet)	Minimum Depth of Penetration into Rock (feet)*	Pile Tip Elevation (feet)	Nominal Axial Compressive Resistance (kips)**
1	5	15	902.7	2,615
2	9	19	902.1	9,930
3	5	10***	909.0	3,150

* This value represents the length of embedment into competent rock, not shaft length. Longer shafts and deeper embedment may be required based on the required lateral capacity.

**Capacities assume that if casing is used, it will be removed after the shaft installation. If, however, the casing is left in place, grouting should be used to fill all potential voids around the casing and the capacities given above should be re-evaluated.

*** 10 feet of embedment into rock at Pier 3 is required to achieve 2B embedment, where B is the diameter of the shaft.

The axial compressive resistances provided in Table 2 assume a minimum shaft center-to-center spacing of 3 diameters. Calculated capacities are based on soil support capacities and do not consider the ultimate structural capacity of the shaft; therefore, we recommend that the structural engineer check the allowable stress capacity of the shafts.

3.2.2.2 Nominal Axial Uplift Resistance for Drilled Shafts

The nominal axial compressive resistance was developed considering shaft resistance in rock only. As a result, these capacities can also be considered for the nominal uplift resistance. From AASHTO LRFD: *"The resistance factors for uplift are lower than those for axial compression. One reason for this is that drilled shafts in tension unload the soil, thus reducing the overburden effective stress and hence the uplift side resistance of the drilled shaft. Empirical justification for uplift resistance factors is provided in Article C10.5.5.2.3."*

The axial uplift resistances assume a minimum shaft center-to-center spacing of 3 diameters. Calculated capacities are based on soil support capacities and do not consider the ultimate structural capacity of the shaft; therefore, we recommend that the structural engineer check the allowable stress capacity of the shafts.

3.2.3 LPILE Parameters

We anticipate the lateral loading of drilled shafts will be evaluated using the software LPILE by Ensoft, assuming that the drilled shafts are spaced at least 3 diameters (center-to-center) apart. A summary of recommended input parameters is provided in Table 3, Table 4, and Table 5 for the north abutment, middle pier, and south abutment, respectively. The top of pile elevations should be considered when developing the LPILE soil profile, as these were provided from the existing ground surface.

Table 3. Soil Profile and LPILE Soil Parameters – North Abutment

Depth (feet bgs)	L-Pile Model	Total Unit Weight, γ (pcf)	Friction Angle, ϕ (deg)	Intact Rock Strength, σ_{ci} (psi)	Hoek-Brown Material Index, m_i	Poisson's Ratio, ν	Geologic Strength Index (GSI)	Rock Mass Modulus, E_{rm} (psi)$^{1, 2}$
0 – 8.5	Sand (Reese)	115	28	N/A	N/A	N/A	N/A	N/A
8.5 – 20	Sand (Reese)	125	35	N/A	N/A	N/A	N/A	N/A
20 – 30.5	Massive Rock	145	N/A	5,600	25	0.3	80	559,000

1. Estimated from Yang (2006)
2. Use of the rock mass modulus is Option 2 in the LPILE menu for Massive Rock Properties, Value for the intact rock modulus, Option 1, will be ignored. We have estimated the intact rock modulus (E_i) in Yan's (2006) formula using a modulus ratio (MR) of 250.

Table 4. Soil Profile and LPILE Soil Parameters – Middle Pier

Depth (feet bgs)	L-Pile Model	Total Unit Weight, γ (pcf)	Friction Angle, ϕ (deg)	Intact Rock Strength, σ_{ci} (psi)	Hoek-Brown Material Index, m_i	Poisson's Ratio, ν	Geologic Strength Index (GSI)	Rock Mass Modulus, E_{rm} (psi)$^{1, 2}$
0 – 7.5	Sand (Reese)	125	30	N/A	N/A	N/A	N/A	N/A
7.5 – 10	Sand (Reese)	125	32	N/A	N/A	N/A	N/A	N/A
10 – 28	Massive Rock	145	N/A	9,800	25	0.3	80	978,000
28 – 35	Massive Rock	145	N/A	4,300	25	0.3	80	429,000

1. Estimated from Yang (2006)
2. Use of the rock mass modulus is Option 2 in the LPILE menu for Massive Rock Properties, Value for the intact rock modulus, Option 1, will be ignored. We have estimated the intact rock modulus (E_i) in Yang's (2006) formula using a modulus ratio (MR) of 250.

Table 5. Soil Profile and LPILE Soil Parameters – South Abutment

Depth (feet bgs)	L-Pile Model	Total Unit Weight, γ (pcf)	Friction Angle, ϕ (deg)	Intact Rock Strength, σ_{ci} (psi)	Hoek-Brown Material Index, m_i	Poisson's Ratio, ν	Geologic Strength Index (GSI)	Rock Mass Modulus, E_{rm} (psi)[1, 2]
0 – 4	Sand (Reese)	120	30	N/A	N/A	N/A	N/A	N/A
4 – 14	Sand (Reese)	130	38	N/A	N/A	N/A	N/A	N/A
14 – 29	Massive Rock	145	N/A	5,600	25	0.3	80	559,000
29 – 34	Massive Rock	145	N/A	2,600	25	0.3	80	259,000

1. Estimated from Yang (2006)
2. Use of the rock mass modulus is Option 2 in the LPILE menu for Massive Rock Properties, Value for the intact rock modulus, Option 1, will be ignored. We have estimated the intact rock modulus (E_i) in Yang's (2006) formula using a modulus ratio (MR) of 250.

To account for group effects, lateral resistance for single, isolated shafts should be reduced in accordance with AASHTO 10.7.2.4 (Table 10.7.2.4-1) by applying the load-reduction factors summarized in the following Table 6. Lateral load reduction factors should be applied to shafts where the spacing between adjacent shafts is less than 5 shaft diameters (center-to-center) but greater than 3 diameters.

Table 6. Lateral Group Action Reduction Factors

Pile Spacing*	Load-Reduction Factor		
	Row 1	Row 2	Row 3 and higher
3B	0.8	0.4	0.3
5B	1.0	0.85	0.7

* In the direction of loading
B=pile or shaft diameter

3.3 Retaining Walls

3.3.1 Discussion

Current plans include construction of permanent geosynthetic walls around both the north and south abutments. The U-shaped walls will wrap around the abutments and be up to approximately 35 feet in height, tapering to match existing grades on the slopes. The permanent geosynthetic walls should be designed in accordance with WSDOT Standard Plan D-3.09-00.

3.3.1.1 Soil Parameters for Retaining Wall Design

The soil parameters commonly used for the design of retaining wall structures are soil unit weight "γ," soil internal friction angle "φ," and soil cohesion "c." The soil parameters recommended for use in the permanent retaining structure design are presented in the following Table 7 and Table 8, Soil Parameters for Retaining Wall Design. Passive resistance should be neglected over the top 12 inches of embedment.

Table 7. Soil Parameters for Retaining Wall Design – Flat Conditions

Soil Material	Unit Weight, γ (pcf)	Friction Angle, φ (degrees)	Cohesion, c (psf)	Lateral Earth Pressure Coefficient		
				Active, K_a	Passive, K_p	At-Rest, K_o
Medium Stiff SILT (ML)	115	30	0	0.3	5.1	0.5
WSDOT Gravel Backfill for Walls	130	35	0	0.27	6.4	0.43
WSDOT Gravel Borrow for Structural Earth Walls	130	37	0	0.23	7.25	0.4

The parameters in Table 7 assume flat ground surface conditions in front of and behind the wall. The passive lateral earth pressure coefficients should be factored as required to account for the amount of deflection required to engage full passive pressures.

Table 8. Soil Parameters for Retaining Wall Design – 2H:1V Slope

Soil Material	Unit Weight, γ (pcf)	Friction Angle, φ (degrees)	Cohesion, c (psf)	Lateral Earth Pressure Coefficient		
				Active, K_a	Passive, K_p	At-Rest, K_o
Medium Stiff SILT (ML)	115	30	0	0.52	1.25	0.72
WSDOT Gravel Backfill for Walls	130	35	0	0.38	1.53	0.62
WSDOT Gravel Borrow for Structural Earth Walls	130	37	0	0.33	1.57	0.58

The parameters in Table 8 are based on a 2H:1V (horizontal to vertical) slope behind the wall (active and at-rest) and a 2H:1V slope in front of the wall (passive). The passive lateral earth pressure coefficients should be reduced as required to account for the amount of deflection required to engage full passive pressures.

3.3.2 Permanent Geosynthetic Walls

Current plans include permanent geosynthetic walls up to approximately 35 feet tall. The following recommendations consider both sloping and flat conditions in front of and behind the wall and fully drained backfill.

The facing of the permanent geosynthetic wall must be offset at least 4 feet from the edge of slope, with a relatively flat bench built between the edge of slope and the wall. Current plans incorporate a 2H:1V fill slope around the wall perimeter protected with riprap (below ordinary high water) inclined at 1.5H:1V in front of and around the abutments.

In order to meet the maximum height requirements for geosynthetic walls and protect soils beneath the wall from scour, a concrete pad composed of 4000 psi concrete will be founded on rock and constructed to the proposed bottom of wall elevation. The footprint of the concrete pad should extend a minimum of 1 foot beyond the proposed geosynthetic wall dimensions. Our current understanding is that the drilled shafts will be constructed prior to pouring the permanent geosynthetic wall foundation. Subsequently, consideration should be given to whether there should be separation between the concrete pad and drilled shafts.

3.3.2.1 Lateral Earth Pressures

For walls allowed to rotate at least 0.005H about the base, where H is the height of the wall, we recommend that an active earth pressure be developed using the soil properties listed in Table 7 and Table 8. Where walls are constrained against rotation, we recommend an at-rest earth pressure be developed using the soil properties listed in Table 7 and Table 8. We recommend any retaining walls founded on native soil or compacted structural fill be provided with adequate drainage and backfilled with clean, angular, crushed rock fill, in accordance with the recommendations provided in section 4.4 of this report.

If vertical surcharge loads, q, are present within 0.5H of the wall, a lateral surcharge of 0.3q (for walls allowed to rotate) and 0.5q (for restrained walls) should be applied as a uniform horizontal surcharge active over the full height of the wall.

3.3.2.2 Seismic Loading

For seismic loading, we recommend using the Mononobe-Okabe equation, with $k_h = ½ A_s$, which assumes 1 to 2 inches of lateral translation during or following an earthquake is acceptable. Walls should be designed by applying the active earth pressure plus the seismic loading.

3.3.2.3 Nominal Bearing Resistance and Resistance Factor

The bottom of permanent geosynthetic walls should be embedded a minimum of 2 feet below the finished ground surface or such that the edge of the footing is at least 4 feet from the face of slope, whichever results in greater embedment. For walls founded as recommended, the nominal bearing resistance will exceed the maximum factored bearing stress presented in WSDOT Standard Plan D-3.09-00. The settlement of geosynthetic walls founded on medium stiff silt, structural fill, or basalt bedrock should be less than 1 inch.

3.3.2.4 Lateral Resistance and Resistance Factors

Lateral loads can be resisted by passive earth pressure on the face or sides of footings/walls and by friction across the base. For footings founded on medium stiff silt or structural fill, we recommend using a nominal friction coefficient of 0.5 and a nominal passive resistance of 500 psf, with resistance factors of 0.8 and 0.5 (AASHTO LRFD Table 10.5.5.2.2-1), respectively. The provided passive resistance assumes the ground surface is flat for a distance of 2D, where D is the depth of the footing below the ground surface.

Sliding resistance for walls, where the reinforced backfill consists of crushed, angular rock fill founded on the native silt, can be calculated using a nominal friction coefficient of 0.7 with a resistance factor of 0.9 (AASHTO LRFD Table 10.5.5.2.2-1).

3.3.2.5 Drainage

Recommended lateral earth pressures assume that walls are fully drained and no hydrostatic pressures develop. We understand that weep holes are planned to accommodate wall drainage.

3.4 Seismic Design Considerations

3.4.1 Code-Based Seismic Design Parameters

The 2019 WSDOT Geotechnical Design Manual (GDM) (WSDOT, 2019) requires evaluation of the response and performance of structures and foundation materials for the 1,000-year return seismic event. The performance design criteria should meet or exceed the following:

- For a 1,000-year event (approximate probability of exceedance [PE] of 7% in 75 years or approximately 5% in 50 years)

In accordance with the WSDOT GDM, peak ground acceleration (PGA) and other seismic ground motion parameters can be obtained from the 2014 US Geological Survey (USGS) Seismic Hazard Maps for the Pacific Northwest Region, summarized in three figures presented in Appendix 6B of the WSDOT GDM. Deaggregation of probabilistic seismic hazards indicate that the primary seismic hazard at the site consists primarily of shallow crustal sources. The modal PGA value corresponds to a magnitude 5.1 earthquake at a distance of 14 kilometers (km).

The recommend seismic design parameters provided in Table 9 were developed using the following latitude and longitude (NAD83/WGS84):

- Latitude = 46.294055° N
- Longitude = 118.407733° W

Table 9. Seismic Design Parameters

Parameter	Short Period	1 Second
Maximum Credible Earthquake Spectral Acceleration	$S_s = 0.23$ g	$S_1 = 0.07$ g
Site Class	B	
Site Coefficient	$F_a = 0.9$	$F_v = 0.8$
Peak Horizontal Ground Acceleration on Rock	PGA = 0.105 g	
Site Coefficient for Peak Ground Surface Acceleration	$F_{PGA} = 0.9$	
Design Spectral Peak Ground Acceleration	$A_s = 0.09$ g	

g= Acceleration due to gravity

3.4.2 Liquefaction Potential

Liquefaction is defined as a decrease in the shear resistance of loose, saturated, cohesionless soil (e.g., sand) or low plasticity silt soils, due to the buildup of excess pore pressures generated during an earthquake. This results in a temporary transformation of the soil deposit into a viscous fluid. Liquefaction can result in ground settlement, foundation bearing capacity failure, and lateral spreading of ground.

Based on a review of the Washington Division of Geology and Earth Resources, the site is shown as having a moderate to high liquefaction hazard. However, based on the soil type, soil consistency/relative density, presence of relatively shallow bedrock, and depth of groundwater, the risk of structurally damaging liquefaction at the site is low.

3.5 Temporary and Permanent Slopes

All temporary cut slopes should be excavated with a smooth-bucket excavator, with the slope surface repaired if disturbed. In addition, upslope surface runoff should be rerouted to not run down the face of the slopes. Equipment should not be allowed to induce vibration or infiltrate water above the slopes, and no surcharges are allowed within 25 feet of the slope crest.

Permanent cut and fill slopes up to 10 feet high can be inclined at 2.5H:1V in medium dense or better silty sand and sand or compacted structural fill. If slow seepage is present, use of a rock blanket or a suitably revegetated, reinforced erosion control blanket may be required. PBS should be consulted if seepage is present; additional erosion control measures, such as additional drainage elements, and/or flatter slopes, may also be required. Exposed soils that are soft or loose may also require these measures. Fill slopes should be over-built and cut back into compacted structural fill at the design inclination using a smooth-bucket excavator. Erosion control is critical to maintaining slopes.

4 CONSTRUCTION RECOMMENDATIONS

4.1 Site Preparation

Construction of the proposed bridge will involve clearing and grubbing of the existing vegetation or demolition of possible existing structures. Demolition should include removal of existing pavement, utilities, etc., throughout the proposed new development. Underground utility lines or other abandoned structural elements should also be removed. The voids resulting from removal of foundations or loose soil in utility lines should be backfilled with compacted structural fill. The base of these excavations should be excavated to firm native subgrade before filling, with sides sloped at a minimum of 1H:1V to allow for uniform compaction. Materials generated during demolition should be transported off site or stockpiled in areas designated by the owner’s representative.

4.1.1 Subgrade Verification

Following site preparation and prior to backfilling, the exposed retaining wall subgrades should be evaluated by PBS using a steel foundation probe. We recommend that PBS be retained to observe the subgrade verifications. Unsuitable areas identified during the field evaluation should be compacted to a firm condition or be excavated and replaced with structural fill.

4.1.2 Wet/Freezing Weather and Wet Soil Conditions

Due to the presence of fine-grained silt and sands in the near-surface materials at the site, construction equipment may have difficulty operating on the near-surface soils when the moisture content of the surface soil is more than a few percentage points above the optimum moisture required for compaction. Soils disturbed during site preparation activities, or unsuitable areas identified during proofrolling or probing, should be removed and replaced with compacted structural fill.

Site earthwork and subgrade preparation should not be completed during freezing conditions, except for mass excavation to the subgrade design elevations. We recommend the earthwork construction at the site be performed during the dry season.

Protection of the subgrade is the responsibility of the contractor. Construction of granular haul roads to the project site entrance may help reduce further damage to the pavement and disturbance of site soils. The actual thickness of haul roads and staging areas should be based on the contractors’ approach to site development, and the amount and type of construction traffic. The imported granular material should be placed in one lift over the prepared undisturbed subgrade and compacted using a smooth-drum, non-vibratory roller. A geotextile fabric should be used to separate the subgrade from the imported granular material in areas of repeated construction traffic. Depending on site conditions, the geotextile should meet Washington State Department of Transportation (WSDOT) SS 9-33.2 – Geosynthetic Properties for soil separation or stabilization. The geotextile should be installed in conformance with WSDOT SS 2-12.3 – Construction Geosynthetic (Construction Requirements) and, as applicable, WSDOT SS 2-12.3(2) – Separation or WSDOT SS 2-12.3(3) – Stabilization.

4.2 Drilled Shafts

The drilled shaft installation procedures provided below are applicable to the drilled shaft sizes, lengths, and capacities provided above for the Dell Sharpe Bridge.

The installation procedures should follow the Washington Standard Specifications (2020) Section 6-19 with appropriate special provisions to address the unique aspects of the site conditions and design approach for the drilled shaft foundations. The key issues for the drilled shaft installation are summarized below.

4.2.1 Soil and Rock Drilling

Drilled shafts will require drilling through soil and highly fractured and massive rock. Drilling equipment and techniques need to be capable of excavating and removing variably fractured rock both above and below the groundwater. Temporary casing is not anticipated in the rock. However, local caving may occur, especially if penetrating below the groundwater table. This may require temporary casing above the rock, or drilling slurry, at the contractor’s option.

4.2.2 Maintain Lateral Capacity

The condition of the ground near the top of the shafts is the most critical in resisting the large lateral loads. Therefore, effort must be implemented to prevent disturbance to the ground surface during drilling, and to remove disturbed rock and soil after drilling and prior to placement of concrete. As a minimum, either drilling slurry or temporary casing should be anticipated for shafts drilled in fill soils or weathered mudstone below groundwater.

4.2.3 Shaft End Bearing Condition

Nominal compressive resistances were developed based on shaft resistance in rock only. Although tip resistance has been neglected, appropriate shaft construction should provide a reasonably clean bearing surface at the base of the shaft.

4.2.4 Shaft Quality Control

Methods to confirm shaft cross sectional integrity and tolerances along the full depth of shafts should be implemented. For in situ quality control testing, we recommend that WSDOT Standard Specifications be followed with special provisions for either crosshole sonic log (CSL) testing in accordance with ASTM D6760 or thermal integrity profiling (TIP) testing in accordance with ASTM D7949 performed on each shaft. The requirement to test each shaft should be included in the special provisions. Per the procedures discussed in ASTM D6760, a minimum of one access duct for every 0.25 to 0.30 m (0.8 to 1.0 foot) of shaft diameter, with a minimum of three, spaced equally around the circumference, should be installed in each shaft. The testing and interpretation of results could be performed under the direction of the Construction Manager; however, we recommend that the testing be performed by a pre-approved CSL specialty subcontractor. During construction, we recommend full-time observation by a qualified representative from the design team be present to log the activities, observe subsurface conditions encountered, record and evaluate quantities of materials excavated and backfilled, and monitor key activities. We assume periodic visits of the design geotechnical and structural engineers of record will be made.

4.2.5 Shaft Casing

Based on the subsurface conditions present, casing may be necessary during excavation. The capacities provided in section 3.2.2 of this report assume that if casing is used, it will be removed after drilled shaft installation. However, if casing is not removed, at least 2 additional feet of penetration into rock will be necessary, and PBS should be consulted to update the drilled shaft capacities provided in this report. If permanent casing is used, it should meet the criteria specified in WSDOT Bridge Design Manual Section 7.8.2 – Structural Design and Detailing, considering the minimum embedment presented in Figure 7.8.2-2 – Shaft Casing Details.

4.3 Excavation

The near-surface soils at the site can be excavated with conventional earthwork equipment. Sloughing and caving should be anticipated. All excavations should be made in accordance with applicable Occupational Safety and Health Administration (OSHA) and state regulations. The contractor is solely responsible for adherence to the OSHA requirements. Trench cuts should stand relatively vertical to a depth of approximately 4 feet bgs, provided no groundwater seepage is present in the trench walls. Open excavation techniques may be used provided the excavation is configured in accordance with the OSHA requirements, groundwater seepage is not present, and with the understanding that some sloughing may occur. Trenches/excavations should be flattened if sloughing occurs or seepage is present. Use of a trench shield or other approved temporary shoring is recommended if vertical walls are desired for cuts deeper than 4 feet bgs. If dewatering is used, we recommend that the type and design of the dewatering system be the responsibility of the contractor, who is in the best position to choose systems that fit the overall plan of operation.

4.4 Structural Fill

Structural fill should be placed over subgrade that has been prepared in conformance with the Site Preparation and Wet/Freezing Weather and Wet Soil Conditions sections of this report. Structural fill material should consist of relatively well-graded soil, or an approved rock product that is free of organic material and debris, and contains particles not greater than 4 inches nominal dimension.

The suitability of soil for use as compacted structural fill will depend on the gradation and moisture content of the soil when it is placed. As the amount of fines (material finer than the US Standard No. 200 Sieve) increases, soil becomes increasingly sensitive to small changes in moisture content and compaction becomes more difficult to achieve. Soils containing more than about 5% fines cannot consistently be compacted to a dense, non-yielding condition when the water content is significantly greater (or significantly less) than optimum.

If fill and excavated material will be placed on slopes steeper than 5H:1V, these must be keyed/benched into the existing slopes and installed in horizontal lifts. Vertical steps between benches should be approximately 2 feet.

4.4.1 On-Site Soil

On-site soils encountered in our explorations are generally suitable for placement as structural fill during moderate, dry weather when moisture content can be maintained by air drying and/or addition of water. The fine-grained fraction of the site soils are moisture sensitive, and during wet weather, may become unworkable because of excess moisture content. In order to reduce moisture content, some aerating and drying of fine-grained soils may be required. The material should be placed in lifts with a maximum uncompacted thickness of approximately 8 inches and compacted to at least 95% of the maximum dry density, as determined by AASHTO T-99 (standard proctor).

4.4.2 Imported Granular Materials

Imported granular material used during periods of wet weather or for haul roads, staging areas, etc., should be pit or quarry run rock, crushed rock, or crushed gravel and sand, and should meet the specifications provided in WSDOT SS 9-03.14(2) – Select Borrow. In addition, the imported granular material should be fairly well graded between coarse and fine, and of the fraction passing the US Standard No. 4 Sieve, less than 5% by dry weight should pass the US Standard No. 200 Sieve.

Imported granular material should be placed in lifts with a maximum uncompacted thickness of 9 inches and be compacted to not less than 100% of the maximum dry density, as determined by AASHTO T-99 (standard proctor).

4.4.3 Base Aggregate

Base aggregate beneath pavements should be clean crushed rock or crushed gravel. The base aggregate should contain no deleterious materials, meet specifications provided in WSDOT SS 9-03.9(3) – Crushed Surfacing Base Course, and have less than 5% (by dry weight) passing the US Standard No. 200 Sieve. The imported granular material should be placed in one lift and compacted to at least 100% of the maximum dry density, as determined by AASHTO T-99 (standard proctor).

4.4.4 Foundation Base Aggregate

Imported granular material placed at the base of excavations for spread footings, slabs-on-grade, and other below-grade structures should be clean, crushed rock or crushed gravel, and sand that is fairly well graded between coarse and fine. The granular materials should contain no deleterious materials, have a maximum particle size of 1½ inch, and meet WSDOT SS 9-03.12(1)A – Gravel Backfill for Foundations (Class A). The imported granular material should be placed in one lift and compacted to not less than 100% of the maximum dry density, as determined by AASHTO T-99 (standard proctor).

4.4.5 Retaining Wall Backfill

Backfill material placed behind retaining walls and extending a horizontal distance of 0.5H, where H is the height of the retaining wall, should consist of granular material meeting WSDOT SS 9-03.12(2) – Gravel Backfill for Walls. We recommend the granular wall backfill be separated from general fill, native soil, and/or topsoil using a geotextile fabric that meets the requirements provided in WSDOT SS 9-33.2 – Geosynthetic Properties, Table 3, for separation geotextile.

The wall backfill should be compacted to a minimum of 100% percent of the maximum dry density, as determined by AASHTO T-99 (standard proctor). However, backfill located within a horizontal distance of 3 feet from the retaining walls should only be compacted to approximately 95% of the maximum dry density, as determined by AASHTO T-99 (standard proctor). Backfill placed within 3 feet of the wall should be compacted in lifts less than 6 inches thick using hand-operated tamping equipment (such as jumping jack or vibratory plate compactor).

4.4.6 Gravel Borrow for Structural Earth Walls

Reinforced backfill for structural earth walls must meet the specifications provided in WSDOT SS 9-03.14(4) – Gravel Borrow for Structural Earth Walls. The granular material should be placed in maximum 12-inch-thick lifts compacted to at least 100% of the maximum dry density, as determined by AASHTO T-99 (standard proctor).

4.4.7 Stabilization Material

Stabilization rock should consist of pit or quarry run rock that is well-graded, angular, crushed rock consisting of 4- or 6-inch-minus material with less than 5% passing the US Standard No. 4 Sieve. The material should be free of organic matter and other deleterious material. WSDOT SS 9-13.1(5) – Quarry Spalls can be used as a general specification for this material with the stipulation of limiting the maximum size to 6 inches.

5 ADDITIONAL SERVICES AND CONSTRUCTION OBSERVATIONS

In most cases, other services beyond completion of a final geotechnical engineering report are necessary or desirable to complete the project. Occasionally, conditions or circumstances arise that require additional work that was not anticipated when the geotechnical report was written. PBS offers a range of environmental, geological, geotechnical, and construction services to suit the varying needs of our clients.

PBS should be retained to review the plans and specifications for this project before they are finalized. Such a review allows us to verify that our recommendations and concerns have been adequately addressed in the design.

Satisfactory earthwork performance depends on the quality of construction. Sufficient observation of the contractor's activities is a key part of determining that the work is completed in accordance with the construction drawings and specifications. We recommend that PBS be retained to observe general excavation, stripping, fill placement, footing subgrades, and/or pile installation. Subsurface conditions observed during construction should be compared with those encountered during the subsurface explorations. Recognition of changed conditions requires experience; therefore, qualified personnel should visit the site with sufficient frequency to detect whether subsurface conditions change significantly from those anticipated.

6 LIMITATIONS

This report has been prepared for the exclusive use of the addressee, and their architects and engineers, for aiding in the design and construction of the proposed development and is not to be relied upon by other parties. It is not to be photographed, photocopied, or similarly reproduced, in total or in part, without express written consent of the client and PBS. It is the addressee's responsibility to provide this report to the appropriate design professionals, building officials, and contractors to ensure correct implementation of the recommendations.

The opinions, comments, and conclusions presented in this report are based upon information derived from our literature review, field explorations, laboratory testing, and engineering analyses. It is possible that soil, rock, or groundwater conditions could vary between or beyond the points explored. If soil, rock, or groundwater conditions are encountered during construction that differ from those described herein, the client is responsible for ensuring that PBS is notified immediately so that we may reevaluate the recommendations of this report.

Unanticipated fill, soil and rock conditions, and seasonal soil moisture and groundwater variations are commonly encountered and cannot be fully determined by merely taking soil samples or completing explorations such as soil borings or test pits. Such variations may result in changes to our recommendations and may require additional funds for expenses to attain a properly constructed project; therefore, we recommend a contingency fund to accommodate such potential extra costs.

The scope of work for this subsurface exploration and geotechnical report did not include environmental assessments or evaluations regarding the presence or absence of wetlands or hazardous substances in the soil, surface water, or groundwater at this site.

If there is a substantial lapse of time between the submission of this report and the start of work at the site, if conditions have changed due to natural causes or construction operations at or adjacent to the site, or if the basic project scheme is significantly modified from that assumed, this report should be reviewed to determine the applicability of the conclusions and recommendations presented herein. Land use, site conditions (both on and off site), or other factors may change over time and could materially affect our findings; therefore, this report should not be relied upon after three years from its issue, or in the event that the site conditions change.

7 REFERENCES

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Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, you can benefit from a lowered exposure to problems associated with subsurface conditions at project sites and development of them that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed herein, contact your GBA-member geotechnical engineer. Active engagement in GBA exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Understand the Geotechnical-Engineering Services Provided for this Report

Geotechnical-engineering services typically include the planning, collection, interpretation, and analysis of exploratory data from widely spaced borings and/or test pits. Field data are combined with results from laboratory tests of soil and rock samples obtained from field exploration (if applicable), observations made during site reconnaissance, and historical information to form one or more models of the expected subsurface conditions beneath the site. Local geology and alterations of the site surface and subsurface by previous and proposed construction are also important considerations. Geotechnical engineers apply their engineering training, experience, and judgment to adapt the requirements of the prospective project to the subsurface model(s). Estimates are made of the subsurface conditions that will likely be exposed during construction as well as the expected performance of foundations and other structures being planned and/or affected by construction activities.

The culmination of these geotechnical-engineering services is typically a geotechnical-engineering report providing the data obtained, a discussion of the subsurface model(s), the engineering and geologic engineering assessments and analyses made, and the recommendations developed to satisfy the given requirements of the project. These reports may be titled investigations, explorations, studies, assessments, or evaluations. Regardless of the title used, the geotechnical-engineering report is an engineering interpretation of the subsurface conditions within the context of the project and does not represent a close examination, systematic inquiry, or thorough investigation of all site and subsurface conditions.

Geotechnical-Engineering Services are Performed for Specific Purposes, Persons, and Projects, and At Specific Times

Geotechnical engineers structure their services to meet the specific needs, goals, and risk management preferences of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client.

Likewise, geotechnical-engineering services are performed for a specific project and purpose. For example, it is unlikely that a geotechnical-engineering study for a refrigerated warehouse will be the same as one prepared for a parking garage; and a few borings drilled during a preliminary study to evaluate site feasibility will not be adequate to develop geotechnical design recommendations for the project.

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project or purpose;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, the reliability of a geotechnical-engineering report can be affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying the recommendations in it. A minor amount of additional testing or analysis after the passage of time – if any is required at all – could prevent major problems.

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read the report in its entirety. Do not rely on an executive summary. Do not read selective elements only. *Read and refer to the report in full.*

You Need to Inform Your Geotechnical Engineer About Change

Your geotechnical engineer considered unique, project-specific factors when developing the scope of study behind this report and developing the confirmation-dependent recommendations the report conveys. Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the elevation, configuration, location, orientation, function or weight of the proposed structure and the desired performance criteria;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project or site changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept* *responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface using various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing is performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgement to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team through project completion to obtain informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, they are <u>not</u> final, because the geotechnical engineer who developed them relied heavily on judgement and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* exposed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a continuing member of the design team, to:

- confer with other design-team members;
- help develop specifications;
- review pertinent elements of other design professionals' plans and specifications; and
- be available whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction-phase observations.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for information purposes only.* To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. This happens in part because soil and rock on project sites are typically heterogeneous and not manufactured materials with well-defined engineering properties like steel and concrete. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are <u>Not</u> Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually provide environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures.* If you have not obtained your own environmental information about the project site, ask your geotechnical consultant for a recommendation on how to find environmental risk-management guidance.

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

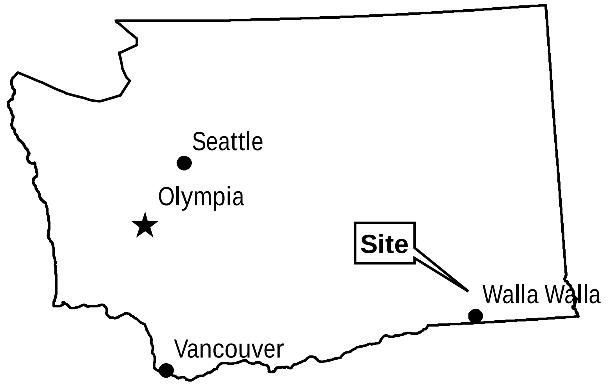
While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, the engineer's services were not designed, conducted, or intended to prevent migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will <u>not</u> of itself be sufficient to prevent moisture infiltration. Confront the risk of moisture infiltration*** by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are <u>not</u> building-envelope or mold specialists.***

GBA
GEOPROFESSIONAL
BUSINESS
ASSOCIATION

Telephone: 301/565-2733
e-mail: info@geoprofessional.org www.geoprofessional.org

Figures

Source: ESRI Topographic



VICINITY MAP

DELL SHARPE BRIDGE REPLACEMENT
WALLA WALLA, WASHINGTON

DATE: DEC 2022 · PROJECT: 66257.000

PBS

FIGURE

1

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EXPLANATION

⊕ B-1 - Boring name and approximate location

— A-A' - Geologic cross section name and approximate location; stationing in feet

— Approximate location of bridge and extent of embankments

SOURCES: Basemap imagery from PBS UAS flight, contours derived from WADNR LiDAR DTM

1 inch = 50 feet

0 25 50 100 Feet

SITE PLAN

DELL SHARPE BRIDGE
REPLACEMENT
WALLA WALLA, WASHINGTON

DATE: DEC 2022 · PROJECT: 66257.000

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FIGURE
2

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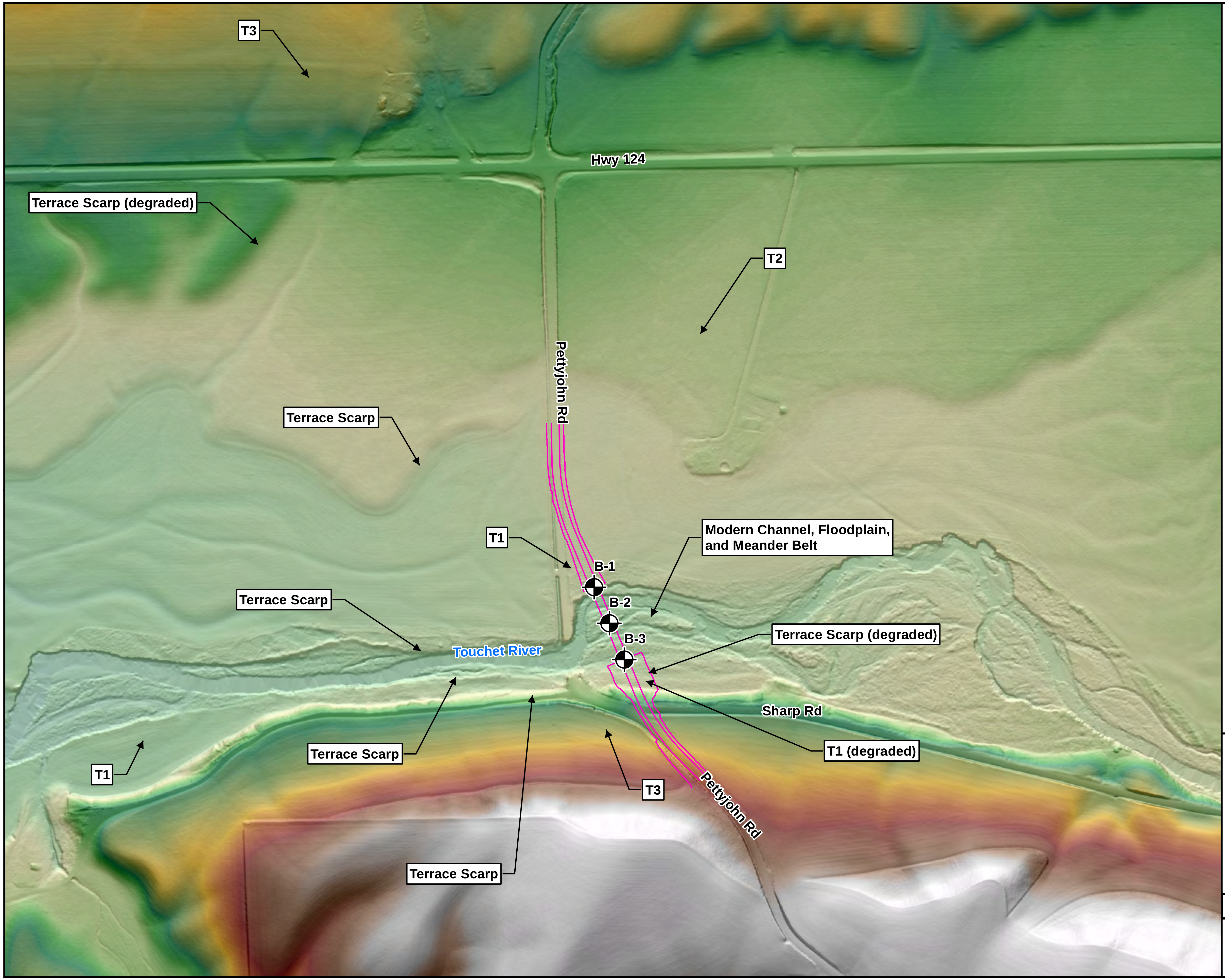

EXPLANATION

⊕ B-1 - Boring name and approximate location

— Approximate location of bridge and extent of embankments

WADNR LiDAR DTM (feet; NAVD88)

High : 1205

Low : 917

T1: Holocene age terrace
T2: Holocene/Pleistocene age terrace
T3: Pleistocene terrace

SOURCES: Hillshade and contours derived from WADNR LiDAR DTM

1 inch = 400 feet

LIDAR HILLSHADE

DELL SHARPE BRIDGE
REPLACEMENT
WALLA WALLA, WASHINGTON

DATE: DEC 2022 · PROJECT: 66257.000

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FIGURE

3

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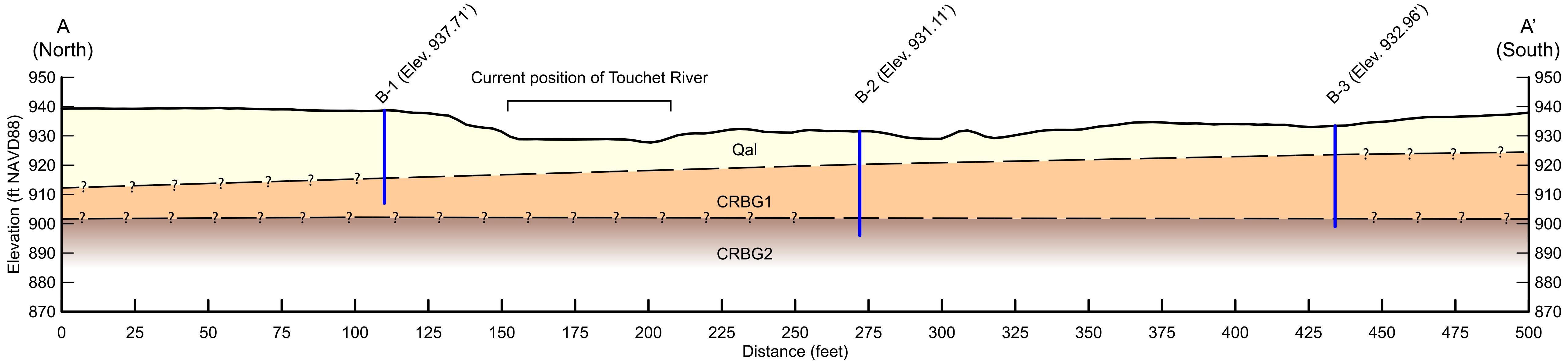

Qal	**Alluvium** - Consists of poorly graded, brown, fine-grained sand with variable silt content that grades to gravel in B-1 and B-3. Ranges from very loose to medium dense with SPT N-values of 5 to 22. Gravel is generally coarse-grained and medium dense to very dense with SPT N-values of 23 to 50. Gravel was encountered at the ground surface in boring B-2.
CRBG1	**Columbia River Basalt Group 1** - Weak (R2) to strong (R4), very dark gray to black basalt in B-3. Consists of a fine-grained texture with trace vesicles and microfractures throughout the rock mass. Moderately weathered at the upper contact with the overlying alluvium that becomes fresh with depth. A distinctive dark reddish brown flow breccia was encountered at the basal contact that separates this basalt flow from the underlying basalt flow. In boring B-3 this flow breccia coincided with a paleosol. The paleosol and flow breccia were extremely weak (R0) to weak (R2) and severely to moderately weathered, and generally consisted of angular clasts within a soil-like matrix.
CRBG2	**Columbia River Basalt Group 2 -** Very dark gray to reddish brown vesicular basalt. Moderately strong (R3) to strong (R4) and slightly weathered to fresh. Distinctive due to the presence of vesicles observed that were absent from CRBG1.
— —?	Contact - dashed where approximate and queried where uncertain

Notes:
1:1 horizontal to vertical scale, surface elevations derived from LiDAR data obtained through the WA LiDAR Portal.

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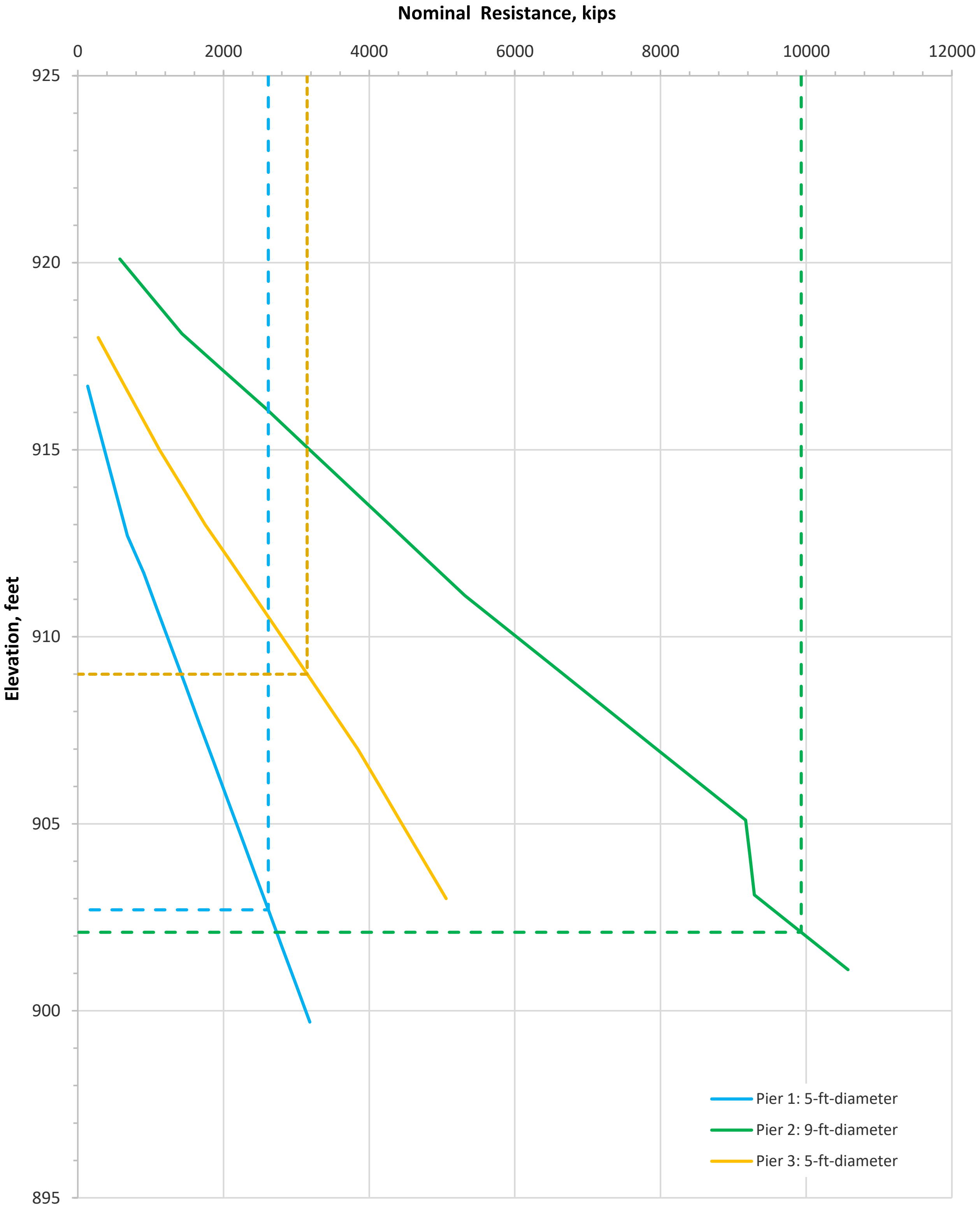
GEOLOGIC CROSS SECTION A-A'
DELL SHARPE BRIDGE REPLACEMENT
WALLA WALLA, WASHINGTON

DATE: DEC 2022 · PROJECT: 66257.000

PBS

FIGURE
4



Estimated capacities assume that if casing is used, it will be removed after the shaft installation. If, however, the casing is left in place, grouting should be used to fill all potential voids around the casing and the estimated capacities given above should be re-evaluated.

PBS

DRILLED SHAFT NOMINAL AXIAL RESISTANCE

DELL SHARPE BRIDGE REPLACEMENT
WALLA WALLA COUNTY, WASHINGTON

DEC 2022
66257.000

FIGURE
5

Appendix A

Field Explorations

Appendix A: Field Explorations

A1 GENERAL

PBS explored subsurface conditions at the project site by advancing three borings to depths of up to approximately 35 feet bgs between January 18 and 21, 2021. The approximate locations of the explorations are shown on Figure 2, Site Plan. The procedures used to advance the borings, collect samples, and other field techniques are described in detail in the following paragraphs. Unless otherwise noted, all soil sampling and classification procedures followed engineering practices in general accordance with relevant ASTM procedures. "General accordance" means that certain local drilling and descriptive practices and methodologies have been followed.

A2 BORINGS

A2.1 Drilling

Borings were advanced using a track-mounted B-57 drill rig provided and operated by Holt Services, Inc., of Vancouver, Washington. Borings were advanced using mud rotary drilling techniques until bedrock was encountered. Borings were continued using rock coring techniques for the purpose of collecting information on the composition and quality of bedrock. The borings were observed by a member of the PBS geotechnical staff, who maintained a detailed log of the subsurface conditions and materials encountered during the course of the work.

A2.2 Sampling

Disturbed soil samples were taken in the borings at selected depth intervals. Soil samples were obtained using a standard 2-inch outside diameter, split-spoon sampler following procedures prescribed for the standard penetration test (SPT). Using the SPT, the sampler is driven 18 inches into the soil using a 140-pound hammer dropped 30 inches. The number of blows required to drive the sampler the last 12 inches is defined as the standard penetration resistance (N-value). The N-value provides a measure of the relative density of granular soils such as sands and gravels, and the consistency of cohesive soils such as clays and plastic silts. The disturbed soil samples were examined by a member of the PBS geotechnical staff and then sealed in plastic bags for further examination and physical testing in our laboratory.

A2.3 Rock Coring

Continuous wireline rock coring was used to core bedrock. Rock cores from the borings were visually classified and described in the field. The core recovery (presented graphically on the boring logs) was calculated by dividing the length of core recovered in the barrel by the total drilled run length, expressed as a percent. The Rock Quality Designation (RQD) was determined for each core run. The RQD is a modified core recovery percentage in which only pieces of intact rock more than four inches in length are measured. The smaller pieces are considered to be the result of close jointing, fracturing or weathering in the rock mass, and are excluded from the determination. The RQD is defined as the cumulative total length of all pieces four inches long or longer, divided by the total run length, expressed as a percentage. Difficulties such as distinguishing natural fractures in the rock core from mechanical breaks due to drilling operations and the insensitivity of the RQD to the tightness of individual joints restrict the use of the RQD in evaluating in-situ rock properties. It does, however, provide a subjective estimate of rock mass quality and a comparison of rock quality between borings. The RQD values are presented graphically on the boring logs provided in Appendix A.

A2.4 Boring Logs

The boring logs show the various types of materials that were encountered in the borings and the depths where the materials and/or characteristics of these materials changed, although the changes may be gradual. Where material types and descriptions changed between samples, the contacts were interpreted. The types of samples taken during drilling, along with their sample identification number, are shown to the right of the classification of materials. The N-values and natural water (moisture) contents are shown farther to the right.

A3 MATERIAL DESCRIPTION

Initially, samples were classified visually in the field. Consistency, color, relative moisture, degree of plasticity, and other distinguishing characteristics of the soil samples were noted. Afterward, the samples were reexamined in the PBS laboratory, various standard classification tests were conducted, and the field classifications were modified where necessary. The terminology used in the soil classifications and other modifiers are defined in Table A-1, Terminology Used to Describe Soil and Rock.

Soil Descriptions

Soils exist in mixtures with varying proportions of components. The predominant soil, i.e., greater than 50 percent based on total dry weight, is the primary soil type and is capitalized in our log descriptions (SAND, GRAVEL, SILT, or CLAY). Smaller percentages of other constituents in the soil mixture are indicated by use of modifier words in general accordance with the ASTM D2488-06 Visual-Manual Procedure. “General Accordance” means that certain local and common descriptive practices may have been followed. In accordance with ASTM D2488-06, group symbols (such as GP or CH) are applied on the portion of soil passing the 3-inch (75mm) sieve based on visual examination. The following describes the use of soil names and modifying terms used to describe fine- and coarse-grained soils.

Fine-Grained Soils (50% or greater fines passing 0.075 mm, No. 200 sieve)

The primary soil type, i.e., SILT or CLAY is designated through visual-manual procedures to evaluate soil toughness, dilatency, dry strength, and plasticity. The following outlines the terminology used to describe fine-grained soils, and varies from ASTM D2488 terminology in the use of some common terms.

Primary soil NAME, Symbols, and Adjectives			Plasticity Description	Plasticity Index (PI)
SILT (ML & MH)	**CLAY (CL & CH)**	**ORGANIC SOIL (OL & OH)**		
SILT		Organic SILT	Non-plastic	0 – 3
SILT		Organic SILT	Low plasticity	4 – 10
SILT/Elastic SILT	Lean CLAY	Organic SILT/ Organic CLAY	Medium Plasticity	10 – 20
Elastic SILT	Lean/Fat CLAY	Organic CLAY	High Plasticity	20 – 40
Elastic SILT	Fat CLAY	Organic CLAY	Very Plastic	>40

Modifying terms describing secondary constituents, estimated to 5 percent increments, are applied as follows:

Description	% Composition	
With Sand	% Sand ≥ % Gravel	15% to 25% plus No. 200
With Gravel	% Sand < % Gravel	
Sandy	% Sand ≥ % Gravel	≤30% to 50% plus No. 200
Gravelly	% Sand < % Gravel	

Borderline Symbols, for example CH/MH, are used when soils are not distinctly in one category or when variable soil units contain more than one soil type. **Dual Symbols,** for example CL-ML, are used when two symbols are required in accordance with ASTM D2488.

Soil Consistency terms are applied to fine-grained, plastic soils (i.e., PI ≥ 7). Descriptive terms are based on direct measure or correlation to the Standard Penetration Test N-value as determined by ASTM D1586-84, as follows. SILT soils with low to non-plastic behavior (i.e., PI < 7) may be classified using relative density.

Consistency Term	SPT N-value	Unconfined Compressive Strength	
		tsf	kPa
Very soft	Less than 2	Less than 0.25	Less than 24
Soft	2 – 4	0.25 – 0.5	24 – 48
Medium stiff	5 – 8	0.5 – 1.0	48 – 96
Stiff	9 – 15	1.0 – 2.0	96 – 192
Very stiff	16 – 30	2.0 – 4.0	192 – 383
Hard	Over 30	Over 4.0	Over 383

Soil Descriptions

Coarse - Grained Soils (less than 50% fines)

Coarse-grained soil descriptions, i.e., SAND or GRAVEL, are based on the portion of materials passing a 3-inch (75mm) sieve. Coarse-grained soil group symbols are applied in accordance with ASTM D2488-06 based on the degree of grading, or distribution of grain sizes of the soil. For example, well-graded sand containing a wide range of grain sizes is designated SW; poorly graded gravel, GP, contains high percentages of only certain grain sizes. Terms applied to grain sizes follow.

Material NAME	Particle Diameter	
	Inches	Millimeters
SAND (SW or SP)	0.003 – 0.19	0.075 – 4.8
GRAVEL (GW or GP)	0.19 – 3	4.8 – 75
Additional Constituents:		
Cobble	3 – 12	75 – 300
Boulder	12 – 120	300 – 3050

The primary soil type is capitalized, and the fines content in the soil are described as indicated by the following examples. Percentages are based on estimating amounts of fines, sand, and gravel to the nearest 5 percent. Other soil mixtures will have similar descriptive names.

Example: Coarse-Grained Soil Descriptions with Fines

>5% to < 15% fines (Dual Symbols)	≥15% to < 50% fines
Well graded GRAVEL with silt: GW-GM	Silty GRAVEL: GM
Poorly graded SAND with clay: SP-SC	Silty SAND: SM

Additional descriptive terminology applied to coarse-grained soils follow.

Example: Coarse-Grained Soil Descriptions with Other Coarse-Grained Constituents

Coarse-Grained Soil Containing Secondary Constituents	
With sand or with gravel	≥ 15% sand or gravel
With cobbles; with boulders	Any amount of cobbles or boulders.

Cobble and boulder deposits may include a description of the matrix soils, as defined above.

Relative Density terms are applied to granular, non-plastic soils based on direct measure or correlation to the Standard Penetration Test N-value as determined by ASTM D1586-84.

Relative Density Term	SPT N-value
Very loose	0 – 4
Loose	5 – 10
Medium dense	11 – 30
Dense	31 – 50
Very dense	> 50

Rock Descriptions

Scale of Rock Strength

Description	Designation	Unconfined Compressive Strength, psi	Unconfined Compressive Strength, MPa	Field Identification
Extremely weak rock	R0	35 – 150	0.25 – 1	Indented by thumbnail.
Very weak rock	R1	150 – 725	1 – 5	Crumbles under firm blows with point of geology pick; can be peeled by a pocket knife.
Weak rock	R2	725 – 3,500	5 – 25	Can be peeled with a pocket knife; shallow indentation made by firm blow with point of geological hammer.
Medium weak rock	R3	3,500 – 7,000	25 – 50	Cannot by scraped or peeled with a pocket knife; specimen can be fractured with a single firm blow of geological hammer.
Strong rock	R4	7,000 – 15,000	50 – 100	Specimen requires more than one blow with a geological hammer to fracture it.
Very strong rock	R5	15,000 – 36,000	100 – 250	Specimen requires many blows of geological hammer to fracture it.
Extremely strong rock	R6	> 36,000	> 250	Specimen can only be chipped with geological hammer.

Descriptive Terminology for Joint Spacing or Bedding

Descriptive Term	Spacing of Joints	
Very close	< 2 inches	< 50 mm
Close	2 inches – 1 foot	50 mm – 300 mm
Moderately close	1 foot – 3 feet	300 mm – 1 m
Wide	3 feet –10 feet	1 m – 3 m
Very wide	> 10 feet	> 3 m

Descriptive Terminology for Vesicularity

Descriptive Term	Percent voids by volume
Dense	< 1%
Slightly vesicular	1 – 10%
Moderately vesicular	10 – 30%
Highly vesicular	30 – 50%
Scoriaceous	> 50%

Correlation of RQD and Rock Quality

Rock Quality Descriptor	RQD Value
Very poor	0 – 25
Poor	25 – 50
Fair	50 – 75
Good	75 – 90

Rock Descriptions

Scale of Rock Weathering

Stage	Description	Quality Distinction
Fresh	Rock is fresh, crystals are bright, few joints may show slight staining as a result of ground water.	No discoloration
Very Slight	Rock is generally fresh, joints are stained, some joints may have thin clay coatings, crystals in broken face show bright.	Discoloration only on major discontinuity surfaces [1]
Slight	Rock is generally fresh, joints are stained and discoloration extends into rock up to 1 inch. Joints may contain clay. In granitoid rocks some feldspar crystals are dull and discolored. Rocks ring under hammer if crystalline.	Discoloration on all discontinuity surfaces and on rock
Moderate	Significant portions of rock show discoloration and weathering effects. In granitoid rocks, most feldspars are dull and discolored; some are clayey. Rock has dull sound under hammer and shows significant loss of strength as compared with fresh rock.	Decomposition and/or disintegration < 50% of rock [2]
Moderately Severe	All rock, except quartz discolored or stained. In granitoid rocks, all feldspars dull and discolored and majority show kaolinization. Rock shows severe loss of strength and can be excavated with geologist's pick. Rock goes "clunk" when struck.	Decomposition and/or disintegration > 50%, but not complete
Severe	All rock, except quartz, discolored or stained. Rock "fabric" is clear and evident, but reduced in strength to strong soil. In granitoid rocks, all feldspars kaolinized to some extent. Some fragments of harder rock usually left, such as corestones in basalt.	
Very Severe	All rock, except quartz, discolored or stained. Rock "fabric" is discernible, but mass effectively reduced to "soil" with only fragments of harder rock remaining.	Decomposition and/or disintegration 100% with structure/fabric intact
Complete	Rock is reduced to "soil." Rock "fabric" is not discernible, or only in small scattered locations. Quartz may be present as dikes or stringers.	Decomposition and/or disintegration 100% with structure/fabric destroyed

NOTES:

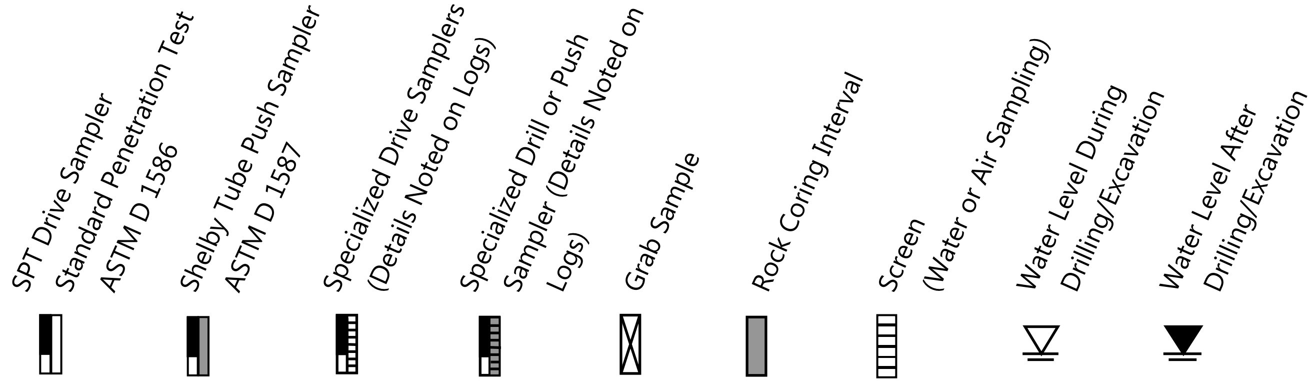
[1] Discontinuities consist of any natural break (joint, fracture or fault) or plane of weakness (shear or gouge zone, bedding plane) in a rock mass

[2] Decomposition refers to chemical alteration of mineral grains; disintegration refers to mechanical breakdown

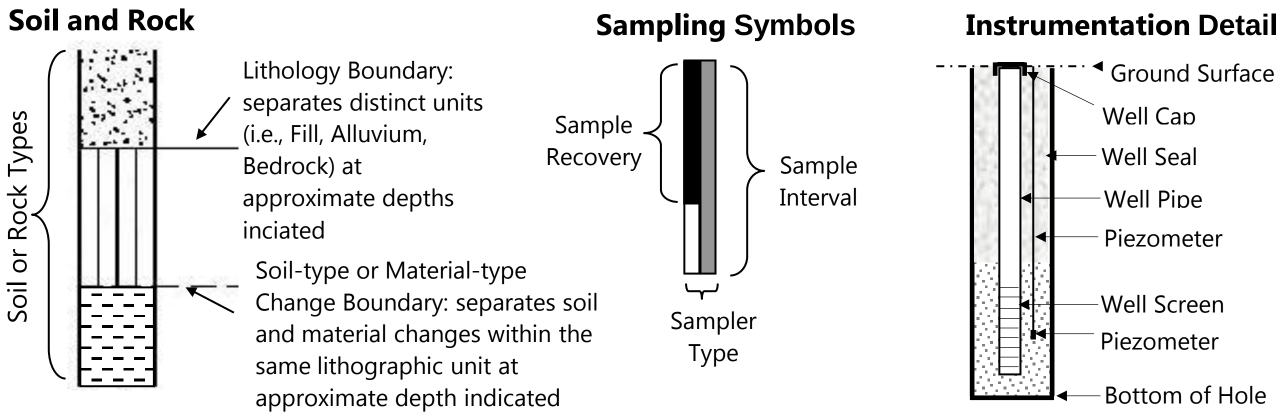
[3] Stage and description from ASCE Manual No. 56 (1976), quality distinction from Murray (1981)

Table A-2
Key To Test Pit and Boring Log Symbols

SAMPLING DESCRIPTIONS



LOG GRAPHICS



Geotechnical Testing Acronym Explanations

PP	Pocket Penetrometer	HYD	Hydrometer Gradation
TOR	Torvane	SIEV	Sieve Gradation
DCP	Dynamic Cone Penetrometer	DS	Direct Shear
ATT	Atterberg Limits	DD	Dry Density
PL	Plasticity Limit	CBR	California Bearing Ratio
LL	Liquid Limit	RES	Resilient Modulus
PI	Plasticity Index	VS	Vane Shear
P200	Percent Passing US Standard No. 200 Sieve	bgs	Below ground surface
OC	Organic Content	MSL	Mean Sea Level
CON	Consolidation	HCL	Hydrochloric Acid
UC	Unconfined Compressive Strength		

Details of soil and rock classification systems are available on request.

DELL SHARPE BRIDGE REPLACEMENT
WALLA WALLA, WASHINGTON

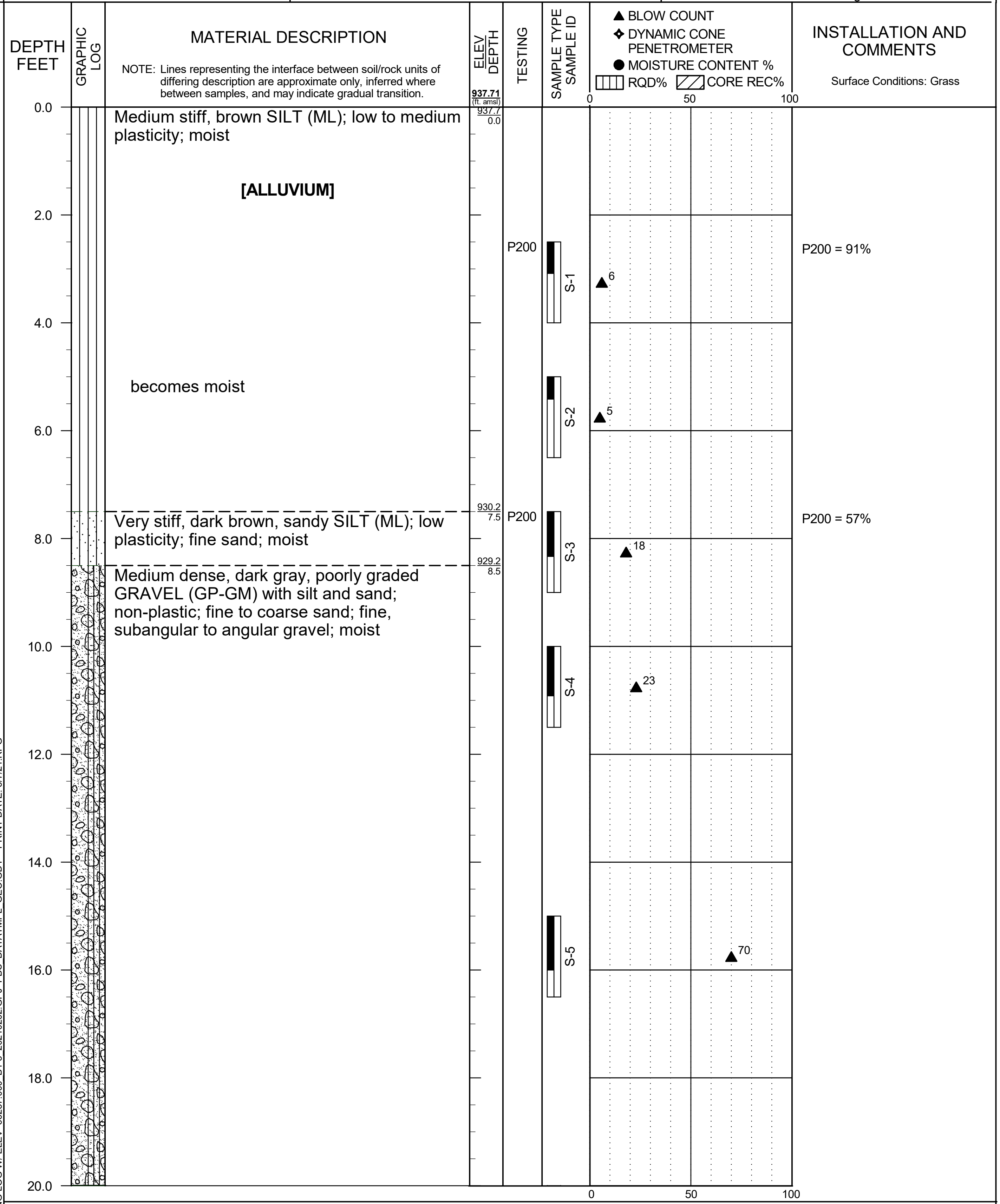
PBS PROJECT NUMBER:
66257.000

BORING B-1

APPROX. BORING B-1 LOCATION:
(See Site Plan)
Lat: 46.29449 Long: -118.10772

NOTE: Lines representing the interface between soil/rock units of differing description are approximate only, inferred where between samples, and may indicate gradual transition.

Surface Conditions: Grass



DEPTH FEET	MATERIAL DESCRIPTION	ELEV / DEPTH	TESTING	SAMPLE ID	BLOW COUNT	INSTALLATION AND COMMENTS
0.0	Medium stiff, brown SILT (ML); low to medium plasticity; moist **[ALLUVIUM]**	937.7 / 0.0				
			P200	S-1	6	P200 = 91%
	becomes moist			S-2	5	
7.5	Very stiff, dark brown, sandy SILT (ML); low plasticity; fine sand; moist	930.2 / 7.5	P200	S-3	18	P200 = 57%
8.5	Medium dense, dark gray, poorly graded GRAVEL (GP-GM) with silt and sand; non-plastic; fine to coarse sand; fine, subangular to angular gravel; moist	929.2 / 8.5		S-4	23	
				S-5	70	

DRILLING METHOD: Mud Rotary/HQ Rock Coring
DRILLED BY: Holt Services, Inc.
LOGGED BY: C. Nealey

BIT DIAMETER: 4 7/8 inches
HAMMER EFFICIENCY PERCENT: 89.9
LOGGING COMPLETED: 1/21/2021

FIGURE A1

DELL SHARPE BRIDGE REPLACEMENT
WALLA WALLA, WASHINGTON

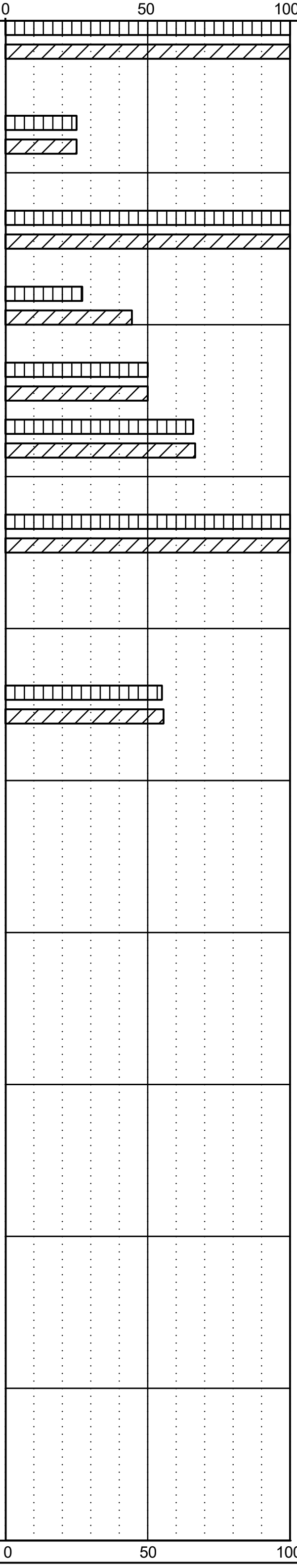
PBS PROJECT NUMBER:
66257.000

BORING B-1
(continued)

APPROX. BORING B-1 LOCATION:
(See Site Plan)
Lat: 46.29449 Long: -118.10772

DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEV / DEPTH	TESTING	SAMPLE TYPE / SAMPLE ID	▲ BLOW COUNT ◆ DYNAMIC CONE PENETROMETER ● MOISTURE CONTENT % ▥ RQD% ▨ CORE REC% (0 – 50 – 100)	INSTALLATION AND COMMENTS
							Surface Conditions: Grass
20.0		Moderately strong (R3), dark gray to black BASALT; fresh to moderately weathered; infilled/healed microfractures throughout; fracture surface discolored green, blue, and dark red with some manganese oxide staining; no vesicles	917.7 / 20.0		R-1		Switched to rock coring Highly fractured; likely crushed by drilling
					R-2		
22.0		**[UPPER BASALT FLOW]**			R-3		1) J; 70°; -- ; O
24.0					R-4		
		becomes weak (R2)			R-5		
					R-6		
26.0					R-7		
28.0					R-8		
30.0		Final depth 30.5 feet bgs; boring backfilled with bentonite.	907.2 / 30.5				DISCONTINUITY: Type (J=Joint, F=Fracture Zone); Angle; Shape (P=Planar, U=Undulating); Aperture (H=Healed, O=Open)
32.0							
34.0							
36.0							
38.0							
40.0							

NOTE: Lines representing the interface between soil/rock units of differing description are approximate only, inferred where between samples, and may indicate gradual transition.



DRILLING METHOD: Mud Rotary/HQ Rock Coring
DRILLED BY: Holt Services, Inc.
LOGGED BY: C. Nealey

BIT DIAMETER: 4 7/8 inches
HAMMER EFFICIENCY PERCENT: 89.9
LOGGING COMPLETED: 1/21/2021

FIGURE A1
Page 2 of 2

DELL SHARPE BRIDGE REPLACEMENT
WALLA WALLA, WASHINGTON

BORING B-2

PBS PROJECT NUMBER:
66257.000

APPROX. BORING B-2 LOCATION:
(See Site Plan)
Lat: 46.29413 Long: -118.40763

NOTE: Lines representing the interface between soil/rock units of differing description are approximate only, inferred where between samples, and may indicate gradual transition.

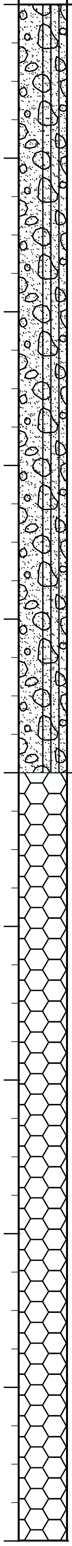
▲ BLOW COUNT
✧ DYNAMIC CONE PENETROMETER
● MOISTURE CONTENT %
▥ RQD%
▨ CORE REC%

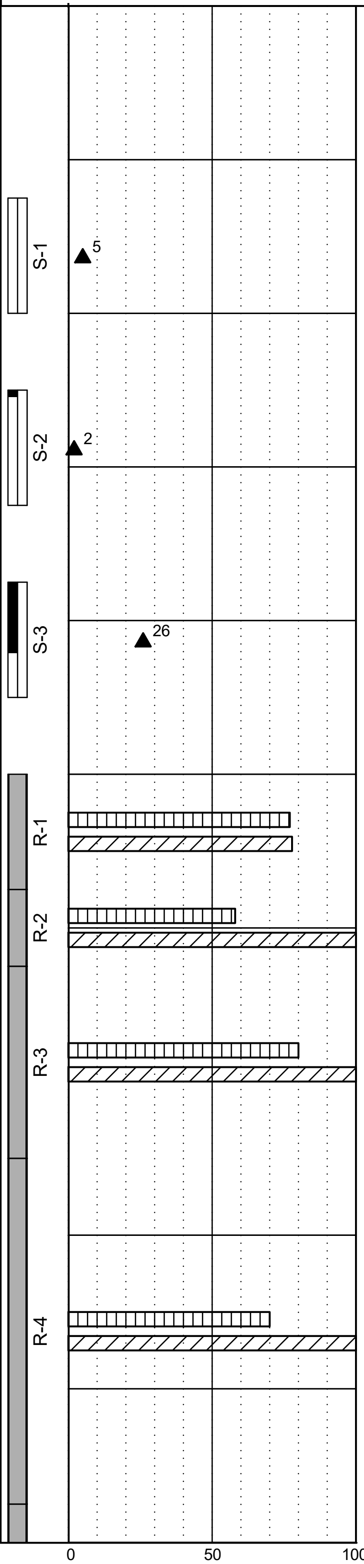
INSTALLATION AND COMMENTS

Surface Conditions: Rounded Gravel

ELEV/DEPTH: 931.11 (ft. amsl)

DEPTH FEET	MATERIAL DESCRIPTION	ELEV DEPTH	SAMPLE TYPE SAMPLE ID	BLOW COUNT / RQD% / CORE REC%	INSTALLATION AND COMMENTS
0.0	Very loose to loose, dark gray, poorly graded GRAVEL (GP-GM) with silt and sand; non-plastic; fine to coarse sand; fine, subangular to angular gravel; moist	931.1 0.0			
2.0	**[ALLUVIUM]**				
3.0			S-1	5	No recovery
5.5			S-2	2	
7.5	becomes medium dense				Driller notes slow drilling
8.0			S-3	26	
10.0	Moderately strong (R3), very dark gray to black BASALT; fresh; healed joints/microfractures throughout; some manganese oxide staining on fracture surfaces; fine-grained/no vesicles	921.1 10.0	R-1		Switched to rock coring Mechanical breaks UCS = 34,777 psi
12.0			R-2		1) J; 55°; -- ; H 2) J; 25°; -- ; H
12.5	**[UPPER BASALT FLOW]**				
13.5			R-3		3) J; 50°; P; H 4) J; 70°; P; H
15.0	trace microfractures				
16.0					5) F; 20°; U; H
17.5			R-4		6) J; 50°; P; H 7) J; 50°; P; H
18.0	increased microfractures				
19.0					8) J; 50°; P; H UCS = 9,817 psi
20.0					





DRILLING METHOD: Mud Rotary/HQ Rock Coring
DRILLED BY: Holt Services, Inc.
LOGGED BY: C. Nealey

BIT DIAMETER: 4 7/8 inches
HAMMER EFFICIENCY PERCENT: 89.9
LOGGING COMPLETED: 1/19/2021

FIGURE A2

DELL SHARPE BRIDGE REPLACEMENT
WALLA WALLA, WASHINGTON

BORING B-2
(continued)

PBS PROJECT NUMBER:
66257.000

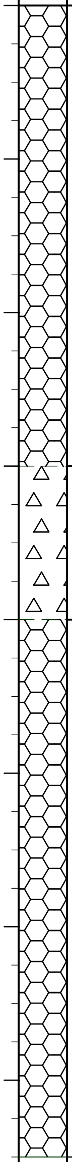
APPROX. BORING B-2 LOCATION:
(See Site Plan)
Lat: 46.29413 Long: -118.40763

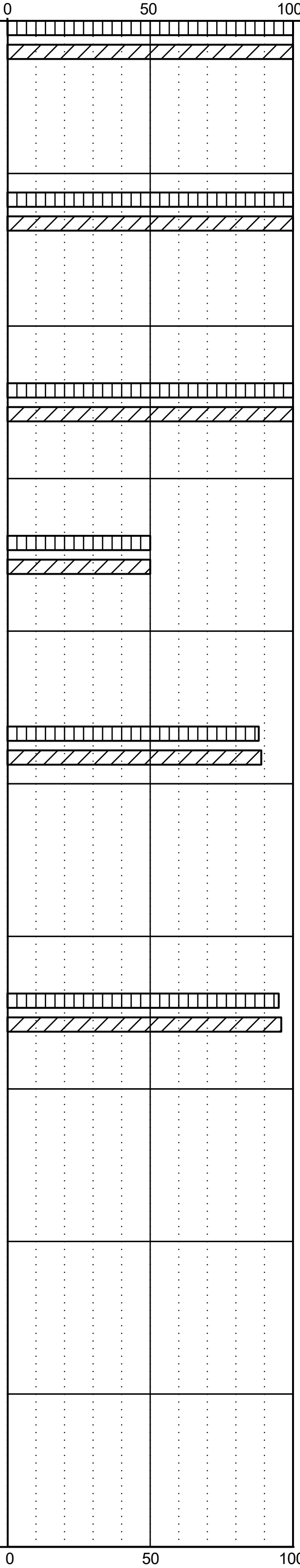
NOTE: Lines representing the interface between soil/rock units of differing description are approximate only, inferred where between samples, and may indicate gradual transition.

▲ BLOW COUNT
✦ DYNAMIC CONE PENETROMETER
● MOISTURE CONTENT %
▥ RQD% ▨ CORE REC%

Surface Conditions: Rounded Gravel

DEPTH FEET	MATERIAL DESCRIPTION	ELEV / DEPTH	TESTING	SAMPLE TYPE / SAMPLE ID	INSTALLATION AND COMMENTS
20.0	Moderately strong (R3), very dark gray to black BASALT; fresh; healed joints/microfractures throughout; some manganese oxide staining on fracture surfaces; no vesicles iron oxide and manganese oxide staining along breaks; rare vesicles	911.1 / 20.0		R-5	Mechanical breaks throughout
22.0				R-6	
24.0				R-7	
26.0	Weak (R2), dark reddish-brown BRECCIA; fresh to moderately weathered; angular clasts in a soil-like matrix with calcium carbonate/ash	905.1 / 26.0		R-8	
28.0	Strong (R4), very dark gray to dark reddish-brown BASALT; fresh to very slightly weathered; no microfractures; some manganese oxide staining; highly vesicular (50%) with infilled vesicles **[LOWER BASALT FLOW]**	903.1 / 28.0		R-9	
30.0					
32.0				R-10	UCS = 4,324 psi
34.0					
35.0	Final depth 35.0 feet bgs; boring backfilled with bentonite.	896.1 / 35.0			DISCONTINUITY: Type (J=Joint, F=Fracture Zone); Angle; Shape (P=Planar, U=Undulating); Aperture (H=Healed, O=Open)
36.0					
38.0					
40.0					





DRILLING METHOD: Mud Rotary/HQ Rock Coring
DRILLED BY: Holt Services, Inc.
LOGGED BY: C. Nealey

BIT DIAMETER: 4 7/8 inches
HAMMER EFFICIENCY PERCENT: 89.9
LOGGING COMPLETED: 1/19/2021

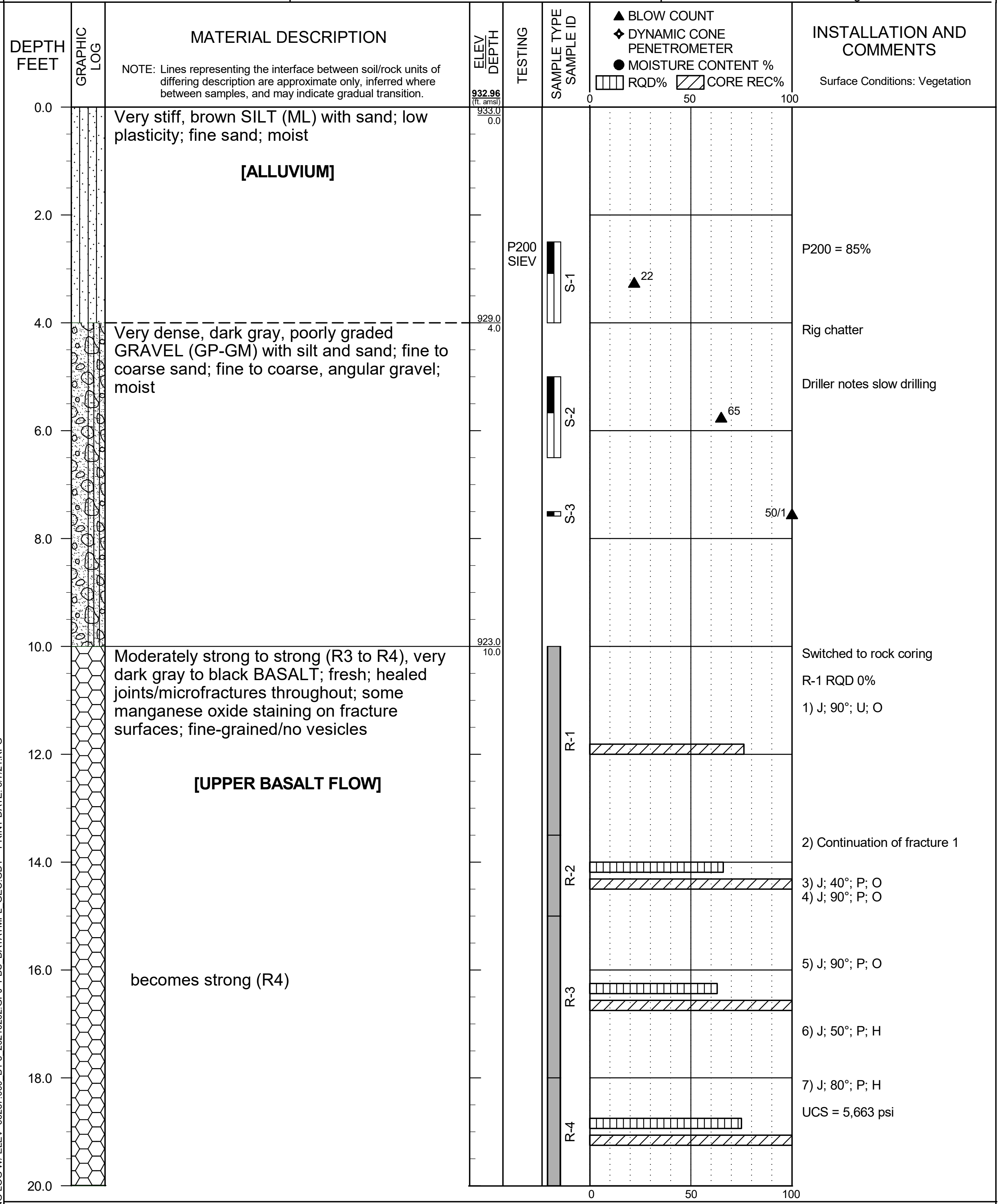
FIGURE A2

DELL SHARPE BRIDGE REPLACEMENT
WALLA WALLA, WASHINGTON

BORING B-3

PBS PROJECT NUMBER:
66257.000

APPROX. BORING B-3 LOCATION:
(See Site Plan)
Lat: 46.29375 Long: -118.40733



MATERIAL DESCRIPTION

NOTE: Lines representing the interface between soil/rock units of differing description are approximate only, inferred where between samples, and may indicate gradual transition.

INSTALLATION AND COMMENTS

Surface Conditions: Vegetation

Depth (ft)	Material Description	Elev / Depth	Testing	Sample ID	Installation and Comments
0.0	Very stiff, brown SILT (ML) with sand; low plasticity; fine sand; moist **[ALLUVIUM]**	933.0 / 0.0			
~3			P200 SIEV	S-1	P200 = 85%
4.0	Very dense, dark gray, poorly graded GRAVEL (GP-GM) with silt and sand; fine to coarse sand; fine to coarse, angular gravel; moist	929.0 / 4.0			Rig chatter Driller notes slow drilling
~5.5				S-2	
~7.5				S-3	
10.0	Moderately strong to strong (R3 to R4), very dark gray to black BASALT; fresh; healed joints/microfractures throughout; some manganese oxide staining on fracture surfaces; fine-grained/no vesicles **[UPPER BASALT FLOW]**	923.0 / 10.0		R-1	Switched to rock coring R-1 RQD 0% 1) J; 90°; U; O
~13.5				R-2	2) Continuation of fracture 1 3) J; 40°; P; O 4) J; 90°; P; O
~16	becomes strong (R4)			R-3	5) J; 90°; P; O 6) J; 50°; P; H
~18				R-4	7) J; 80°; P; H UCS = 5,663 psi

DRILLING METHOD: Mud Rotary/HQ Rock Coring
DRILLED BY: Holt Services, Inc.
LOGGED BY: C. Nealey

BIT DIAMETER: 4 7/8 inches
HAMMER EFFICIENCY PERCENT: 89.9
LOGGING COMPLETED: 1/18/2021

FIGURE A3

DELL SHARPE BRIDGE REPLACEMENT
WALLA WALLA, WASHINGTON

PBS PROJECT NUMBER:
66257.000

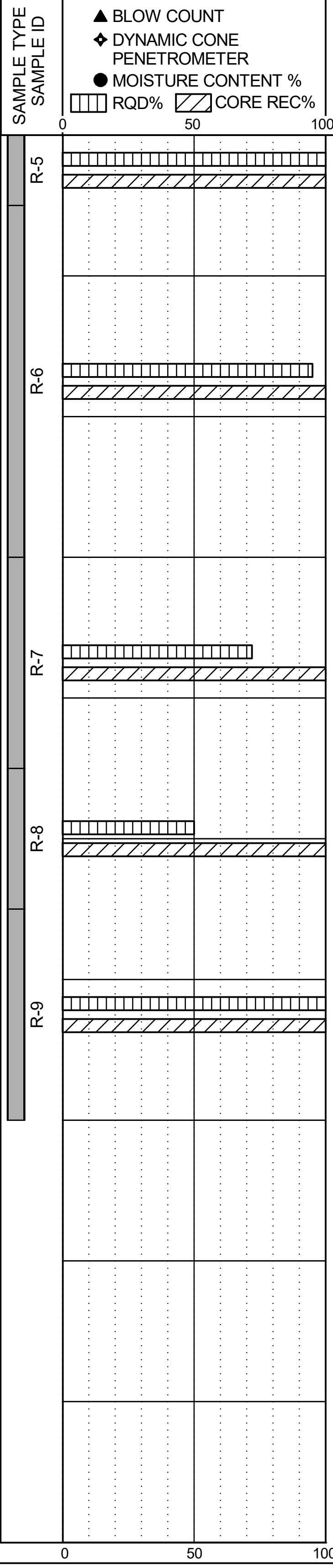
BORING B-3
(continued)

APPROX. BORING B-3 LOCATION:
(See Site Plan)
Lat: 46.29375 Long: -118.40733

NOTE: Lines representing the interface between soil/rock units of differing description are approximate only, inferred where between samples, and may indicate gradual transition.

Surface Conditions: Vegetation

DEPTH FEET	MATERIAL DESCRIPTION	ELEV / DEPTH	INSTALLATION AND COMMENTS
20.0	Strong (R4), very dark gray to black BASALT; fresh; irregular microfractures; some manganese oxide staining on fracture surfaces; rare vesicles becomes moderately strong (R3); moderately weathered; trace microfractures	913.0 / 20.0	
22.0			8) J; 15°; P; H
24.0			
26.0			9) J; 80°; P; O
28.0			10) J; 20°; P; H 11) J; 20°; P; H
	Extremely weak (R0), dark reddish-brown BRECCIA; severely weathered; angular basalt fragments in a soil-like matrix	904.0 / 29.0	
	Moderately strong (R3), very dark gray to black BASALT; fresh; trace microfractures; fine-grained/no vesicles	903.5 / 29.5	
30.0	becomes very weak (R1), very dark brown, baked paleosol with glassy texture	901.8 / 31.2	
32.0	Moderately strong (R3), very dark gray to black BASALT; fresh; trace microfractures; moderately vesicular (20%) with infilled vesicles and some plagioclase phenocrysts **[LOWER BASALT FLOW]**		UCS = 2,582 psi
34.0	Final depth 34.0 feet bgs; boring backfilled with bentonite.	899.0 / 34.0	DISCONTINUITY: Type (J=Joint, F=Fracture Zone); Angle; Shape (P=Planar, U=Undulating); Aperture (H=Healed, O=Open)
36.0			
38.0			
40.0			



DRILLING METHOD: Mud Rotary/HQ Rock Coring
DRILLED BY: Holt Services, Inc.
LOGGED BY: C. Nealey

BIT DIAMETER: 4 7/8 inches
HAMMER EFFICIENCY PERCENT: 89.9
LOGGING COMPLETED: 1/18/2021

FIGURE A3

Appendix B

Laboratory Testing

SUMMARY OF LABORATORY DATA

DELL SHARPE BRIDGE REPLACEMENT
WALLA WALLA, WASHINGTON

PBS PROJECT NUMBER:
66257.000

SAMPLE INFORMATION				MOISTURE CONTENT (PERCENT)	DRY DENSITY (PCF)	SIEVE			ATTERBERG LIMITS		
EXPLORATION NUMBER	SAMPLE NUMBER	SAMPLE DEPTH (FEET)	ELEVATION (FEET)			GRAVEL (PERCENT)	SAND (PERCENT)	P200 (PERCENT)	LIQUID LIMIT (PERCENT)	PLASTIC LIMIT (PERCENT)	PLASTICITY INDEX (PERCENT)
B-1	S-1	2.5	935.2	28.4				91			
B-1	S-3	7.5	930.2	29.5				57			
B-3	S-1	2.5	930.5	20.7				85			

LAB SUMMARY 66257.000_B1-3_20210202.GPJ PBS_DATATMPL_GEO.GDT PRINT DATE: 2/24/21:RPG

FIGURE B1

Appendix B: Laboratory Testing

B1 GENERAL

Samples obtained during the field explorations were examined in the PBS laboratory. The physical characteristics of the samples were noted and field classifications were modified where necessary. During the course of examination, representative samples were selected for further testing. The testing program for the soil samples included standard classification tests, which yield certain index properties of the soils important to an evaluation of soil behavior. The testing procedures are described in the following paragraphs. Unless noted otherwise, all test procedures are in general accordance with applicable ASTM standards. "General accordance" means that certain local and common descriptive practices and methodologies have been followed.

B2 CLASSIFICATION TESTS

B2.1 Visual Classification of Soil

The soils were classified in accordance with the Unified Soil Classification System with certain other terminology, such as the relative density or consistency of the soil deposits, in general accordance with engineering practice. In determining the soil type (that is, gravel, sand, silt, or clay) the term that best described the major portion of the sample is used. Modifying terminology to further describe the samples is defined in Table A-1, Terminology Used to Describe Soil and Rock, in Appendix A.

B2.2 Moisture (Water) Contents

Natural moisture content determinations were made on samples of the fine-grained soils (that is, silts, clays, and silty sands). The natural moisture content is defined as the ratio of the weight of water to dry weight of soil, expressed as a percentage. The results of the moisture content determinations are presented on the exploration logs in Appendix A and on Figure B1, Summary of Laboratory Data, in Appendix B.

B2.3 Grain-Size Analyses (P200 Wash)

Washed sieve analyses (P200) were completed on samples to determine the portion of soil samples passing the No. 200 Sieve (i.e., silt and clay). The results of the P200 test results are presented on the exploration logs in Appendix A and on Figure B1, Summary of Laboratory Data, in Appendix B.

B3 ROCK STRENGTH TESTS

B3.1 Unconfined Compression of Rock

Unconfined compression tests were performed on select rock core specimens. The test consists of a rock core cut to length and ends made flush. The rock specimen is then placed in a loading frame. An axial load is applied at a constant rate upon the rock core and vertical deformation is monitored as a function of load. Measurements made during the test are used to calculate the peak unconfined compressive strength. The unconfined compressive strengths are presented on the boring logs in Appendix A and on Figures B2 through B6 in Appendix B.

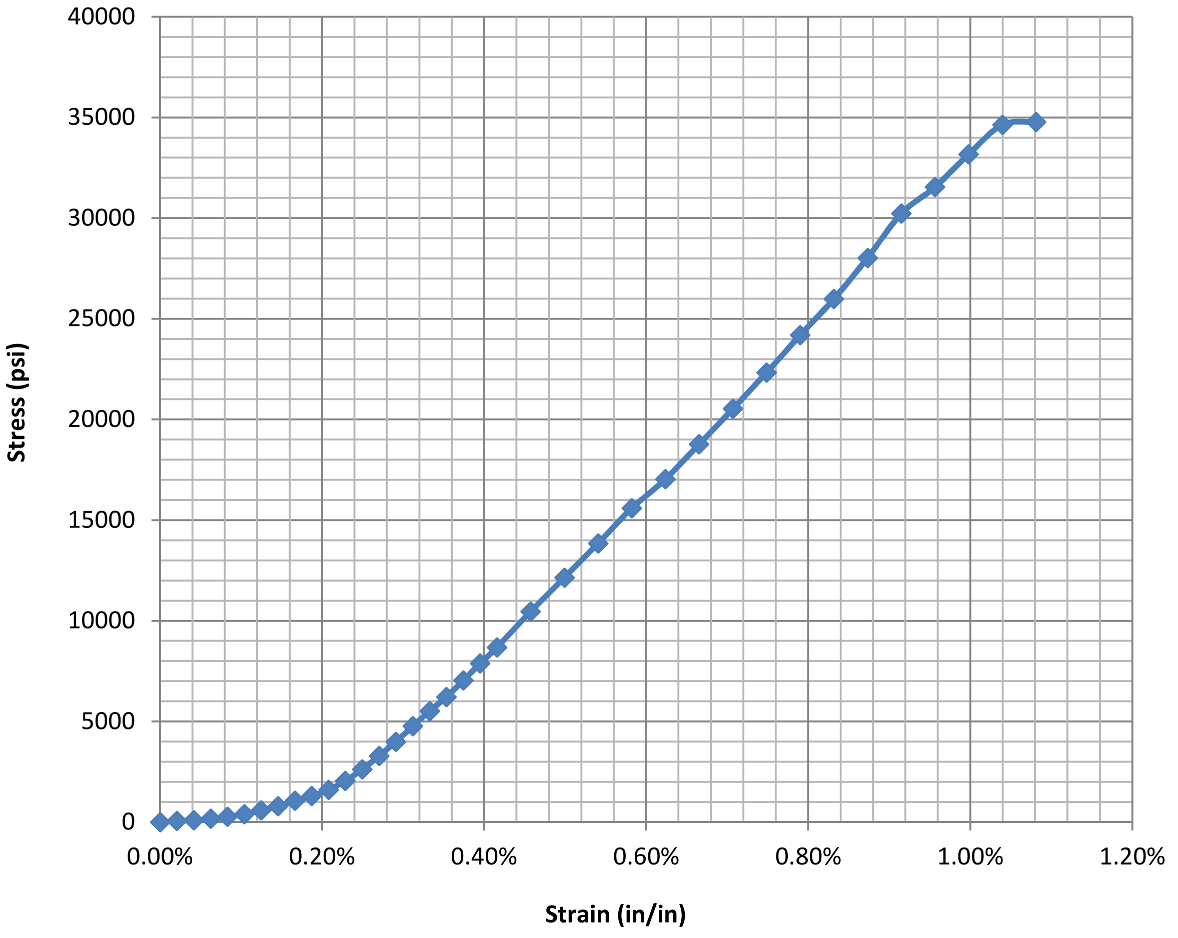
TECHNICAL REPORT

Report To:	Mr. Ryan White, P.E., G.E. PBS Engineering and Environmental, Inc. 4412 S. Corbett Avenue Portland, Oregon 97239	**Date:** **Lab No.:**	03/08/2021 21-088
Project:	Laboratory Testing	**Project No.:**	3621.1.1

Laboratory Testing

Compressive Strength of Intact Rock Core Specimens
(ASTM D7012 Method C)

Sample ID	Diameter (inches)	Height (inches)	Rate of Loading (lbs/s)	Uniaxial Compressive Strength (psi)
B-2 @ 11.0 – 11.5 Ft.	2.39	4.81	317	34777



SHEET 2 of 6 REVIEWED BY: Michael A. Ginsbach

FIGURE B2

Northwest Testing, Inc.
A Division of Northwest Geotech, Inc.
9120 SW Pioneer Court, Suite B, Wilsonville, Oregon 97070 | ph: 503.682.1880 fax: 503.682.2753 | www.nwgeotech.com

TECHNICAL REPORT

Report To: Mr. Ryan White, P.E., G.E.
PBS Engineering and Environmental, Inc.
4412 S. Corbett Avenue
Portland, Oregon 97239

Date: 03/08/2021

Lab No.: 21-088

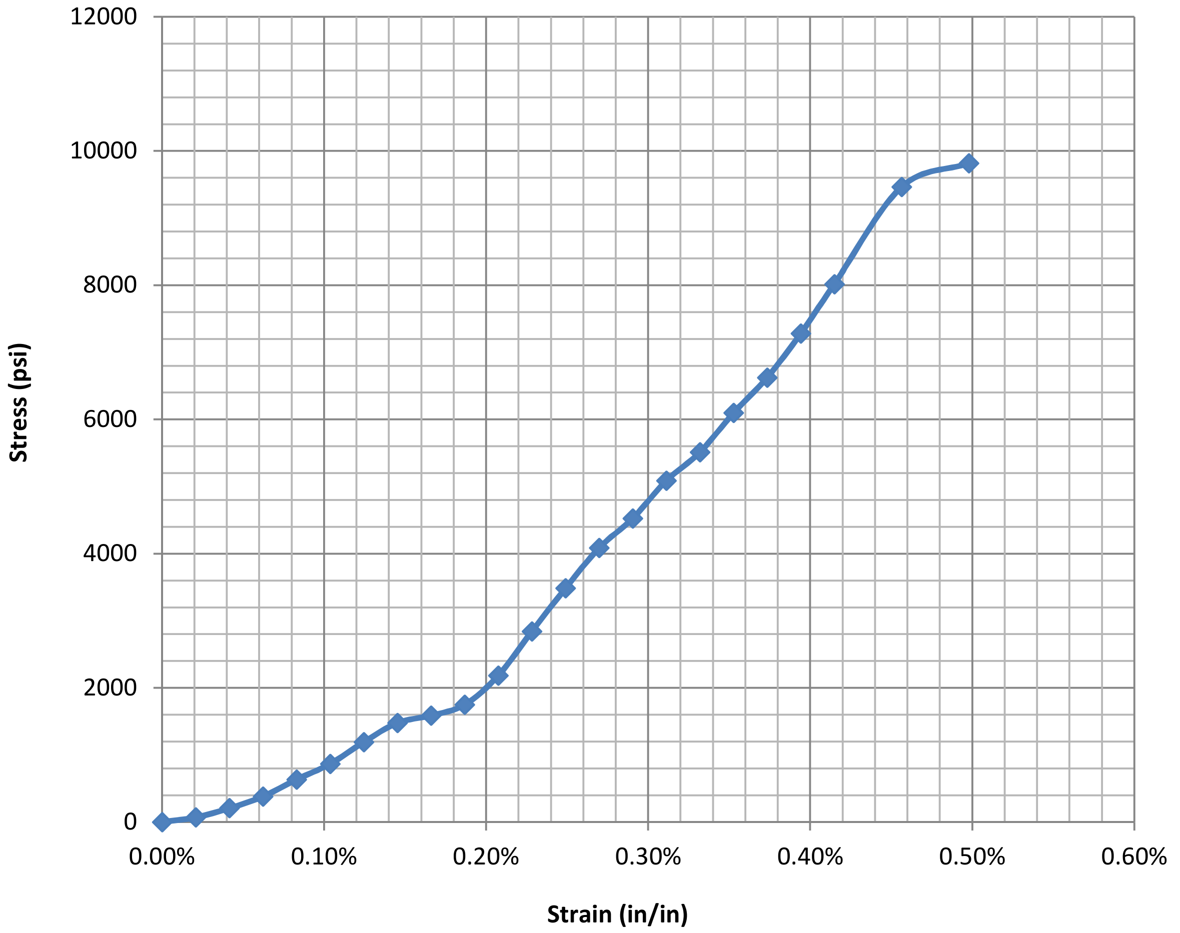
Project: Laboratory Testing

Project No.: 3621.1.1

Laboratory Testing

Compressive Strength of Intact Rock Core Specimens (ASTM D7012 Method C)

Sample ID	Diameter (inches)	Height (inches)	Rate of Loading (lbs/s)	Uniaxial Compressive Strength (psi)
B-2 @ 19.0 – 19.5 Ft.	2.40	4.82	284	9817



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REVIEWED BY: Michael A. Ginsbach

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4412 S. Corbett Avenue
Portland, Oregon 97239

Date: 03/08/2021

Lab No.: 21-088

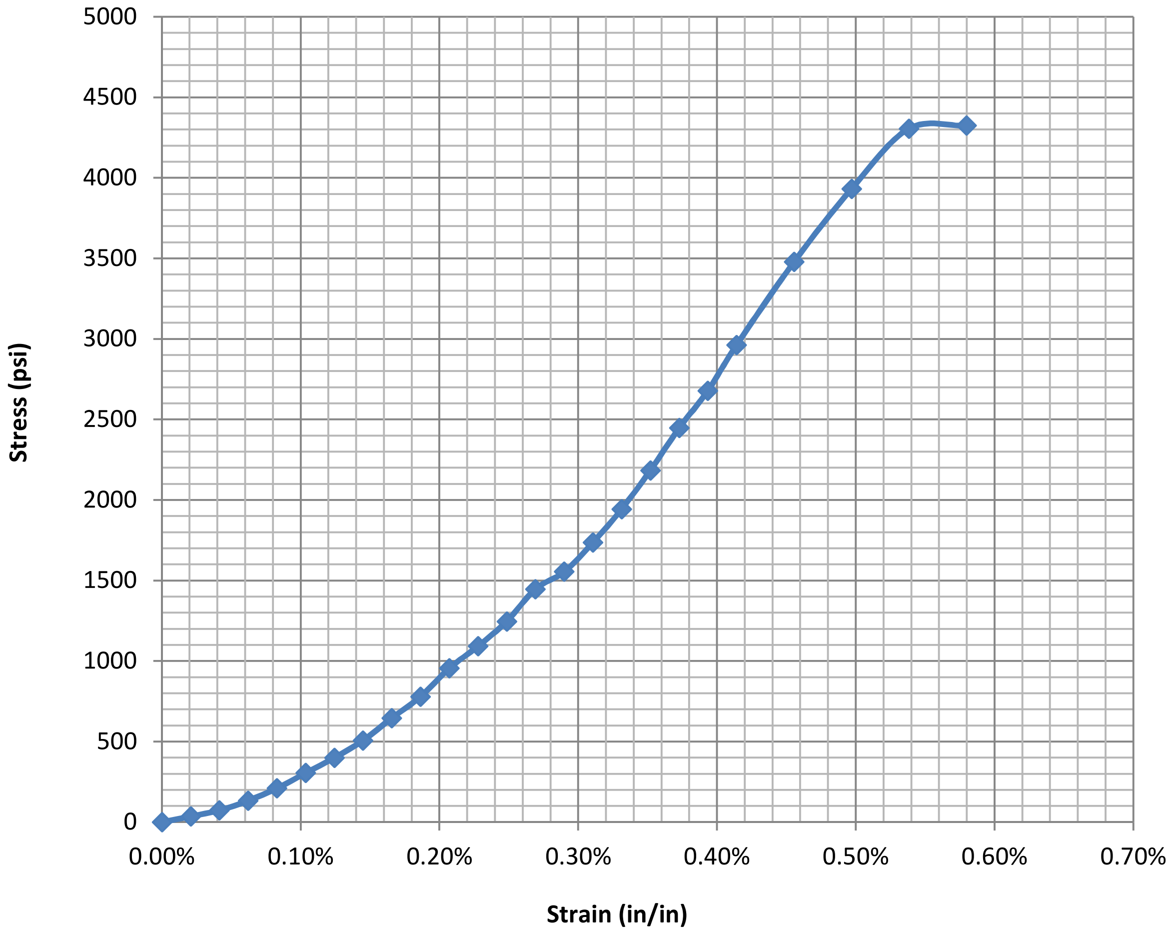
Project: Laboratory Testing

Project No.: 3621.1.1

Laboratory Testing

Compressive Strength of Intact Rock Core Specimens (ASTM D7012 Method C)

Sample ID	Diameter (inches)	Height (inches)	Rate of Loading (lbs/s)	Uniaxial Compressive Strength (psi)
B-2 @ 32.0 – 32.9 Ft.	2.39	4.83	136	4324



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Portland, Oregon 97239

Date: 03/08/2021

Lab No.: 21-088

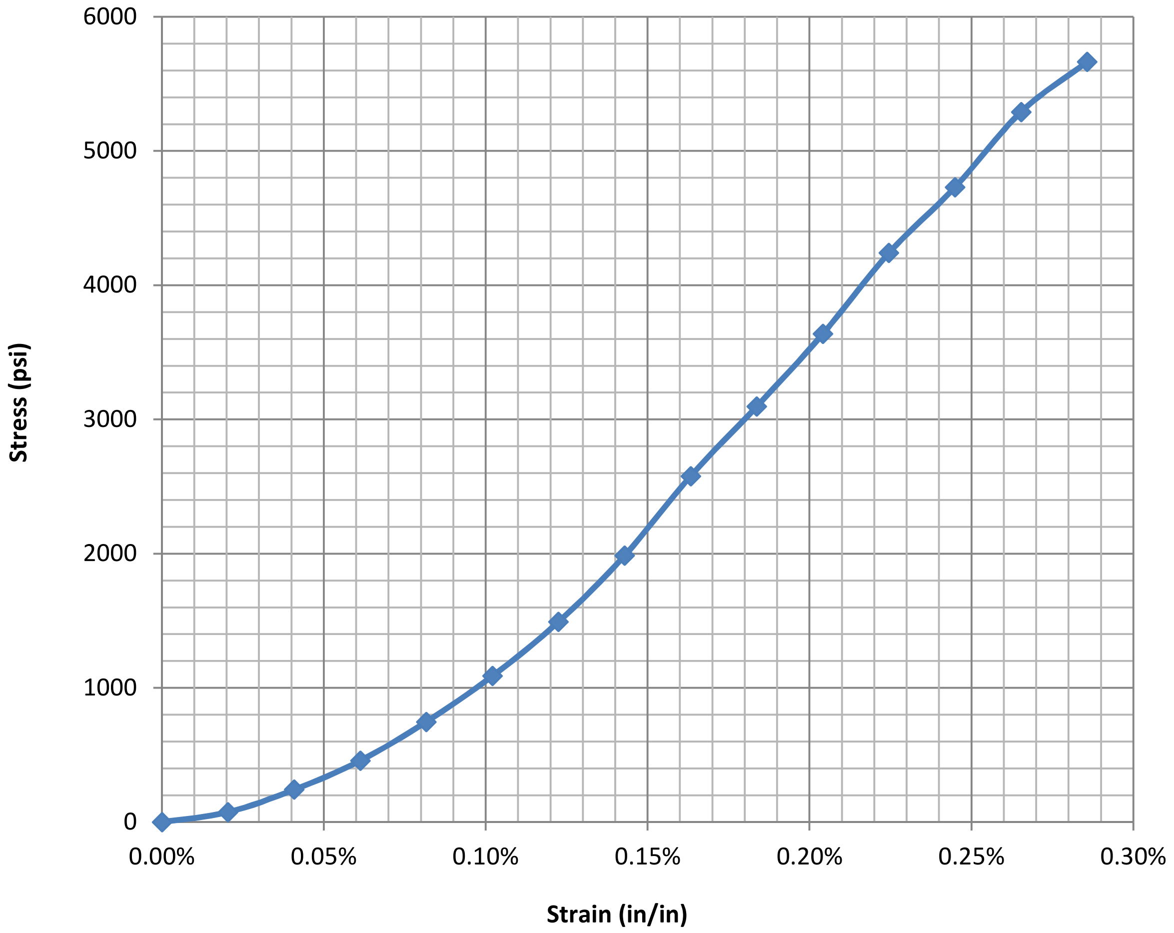
Project: Laboratory Testing

Project No.: 3621.1.1

Laboratory Testing

Compressive Strength of Intact Rock Core Specimens
(ASTM D7012 Method C)

Sample ID	Diameter (inches)	Height (inches)	Rate of Loading (lbs/s)	Uniaxial Compressive Strength (psi)
B-3 @ 18.4 – 19.2 Ft.	2.40	4.90	244	5663



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REVIEWED BY: Michael A. Ginsbach

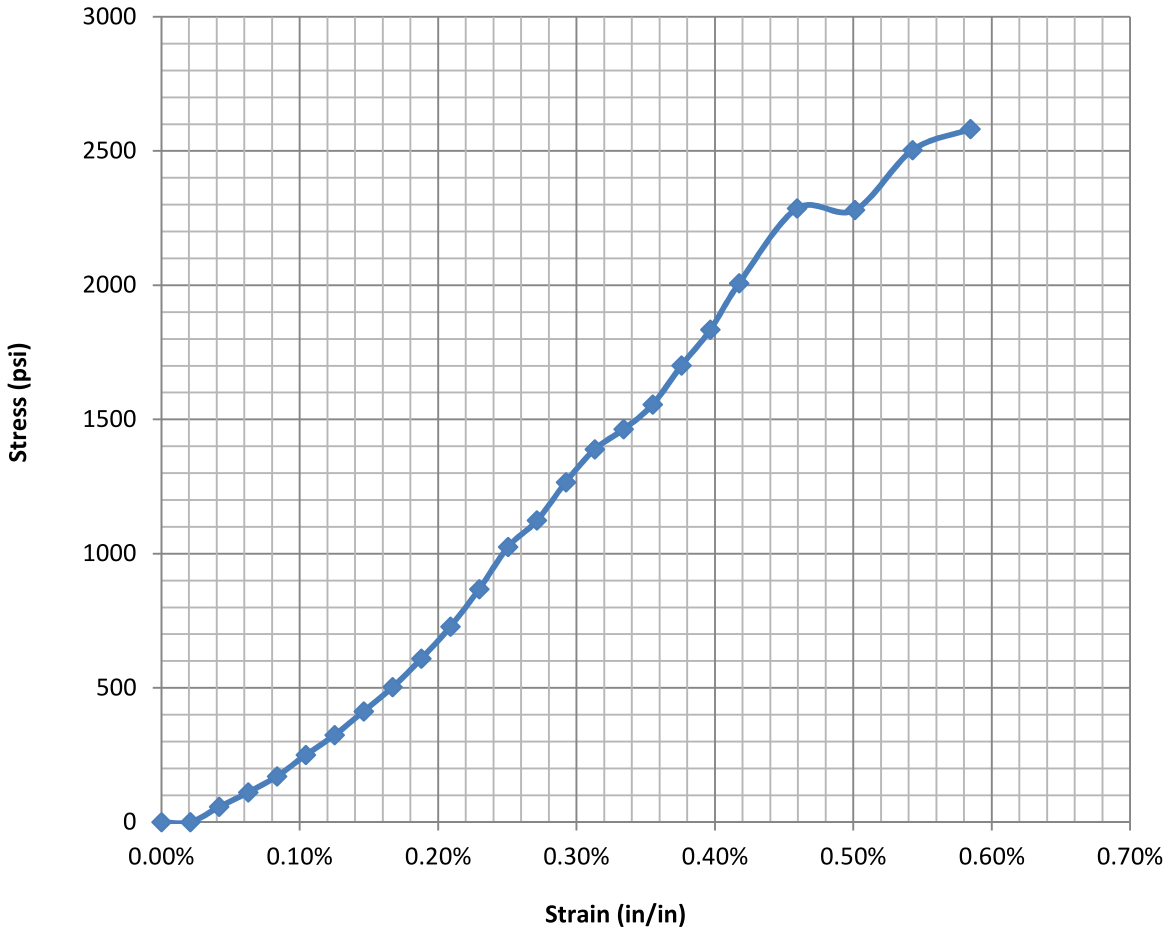
TECHNICAL REPORT

Report To:	Mr. Ryan White, P.E., G.E. PBS Engineering and Environmental, Inc. 4412 S. Corbett Avenue Portland, Oregon 97239	**Date:** **Lab No.:**	03/08/2021 21-088
Project:	Laboratory Testing	**Project No.:**	3621.1.1

Laboratory Testing

Compressive Strength of Intact Rock Core Specimens (ASTM D7012 Method C)

Sample ID	Diameter (inches)	Height (inches)	Rate of Loading (lbs/s)	Uniaxial Compressive Strength (psi)
B-3 @ 33.0 – 33.5 Ft.	2.39	4.79	87	2582



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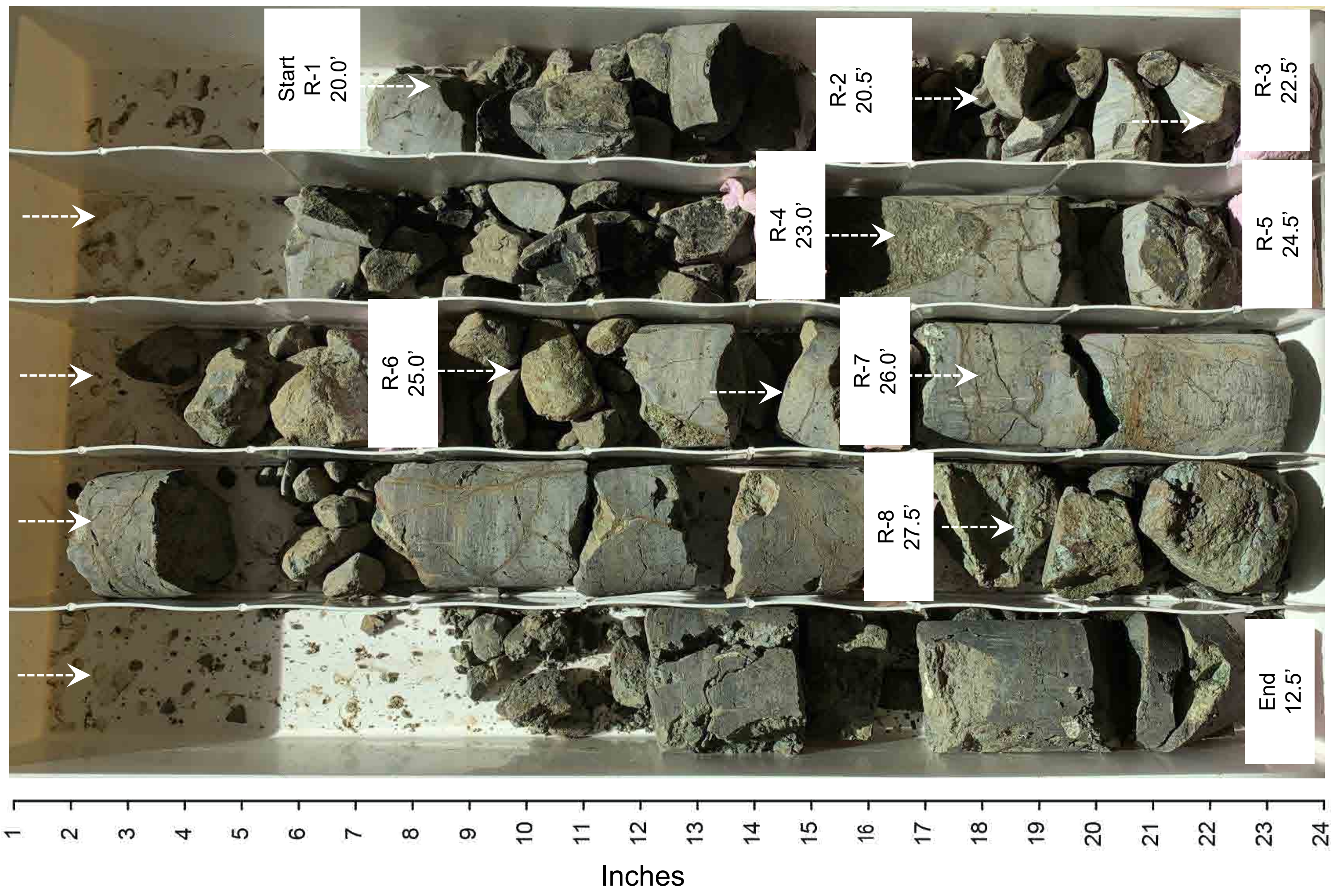
REVIEWED BY: Michael A. Ginsbach

Appendix C

Rock Core Photographs

BORING B-1

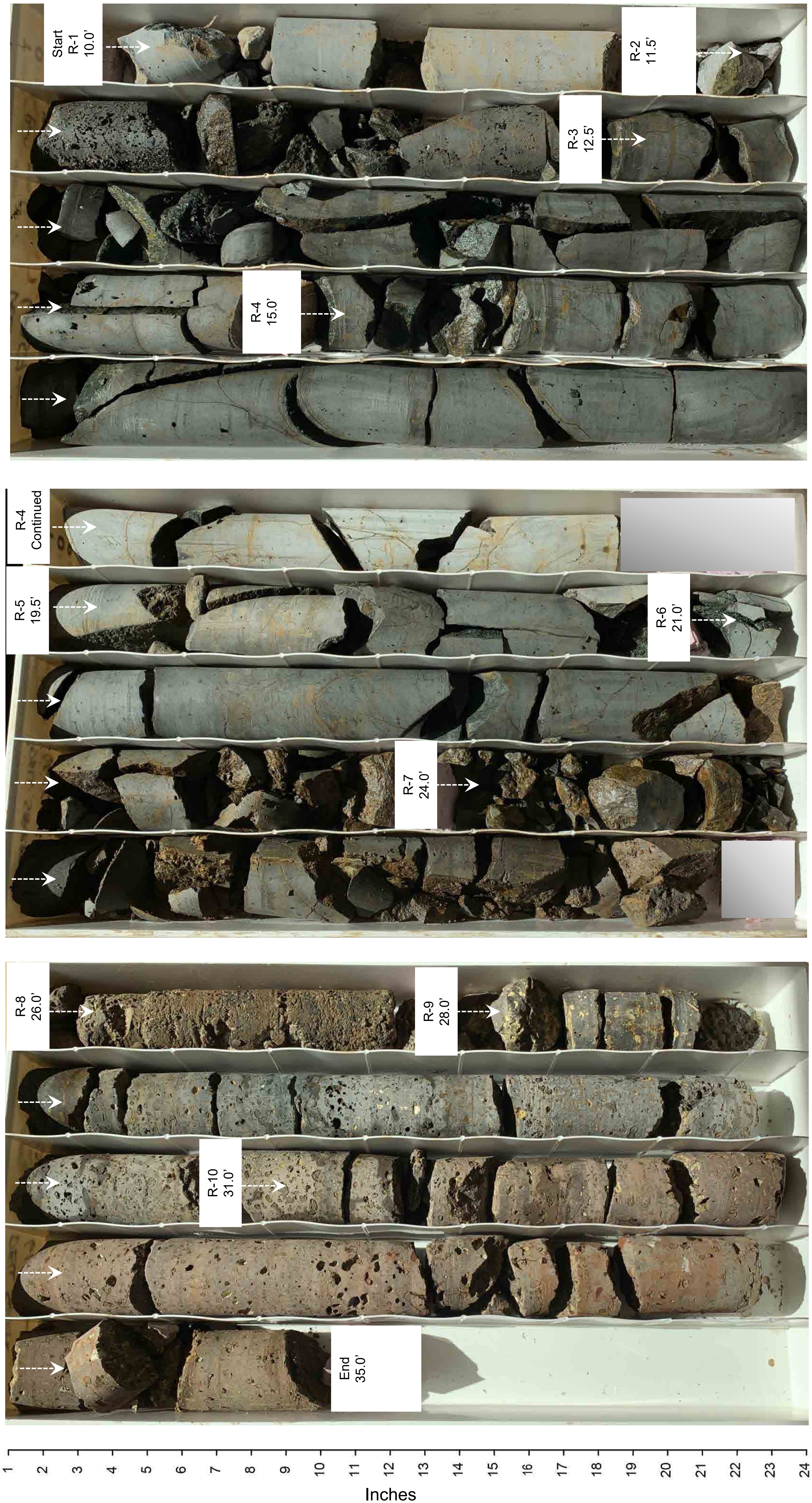


PROJECT:	66257.000
DATE:	DEC 2022
FIGURE:	C1

ROCK CORE PHOTOGRAPHS

DELL SHARPE BRIDGE REPLACEMENT
WALLA WALLA, WASHINGTON

BORING B-2



PROJECT:	66257.000
DATE:	DEC 2022
FIGURE:	**C2**

ROCK CORE PHOTOGRAPHS

DELL SHARPE BRIDGE REPLACEMENT
WALLA WALLA, WASHINGTON

BORING B-3

PROJECT:	66257.000
DATE:	DEC 2022
FIGURE:	C3

ROCK CORE PHOTOGRAPHS

DELL SHARPE BRIDGE REPLACEMENT
WALLA WALLA, WASHINGTON

Exhibit 17

SURVEYS & PLATS

1) WALLA WALLA COUNTY CRP 40 JONOTHAN PETTYJOHN ROAD (STUB ROAD), FILE 01–G–016.
2) WALLA WALLA COUNTY CRP 41 JONOTHAN PETTYJOHN ROAD, FILE 01–G–014 & 015.
3) SURVEY RECORDED IN BOOK U OF SURVEYS AT PAGES 83–85 IN THE RECORDS OF WALLA WALLA COUNTY, STATE OF WASHINGTON.

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2) STATUTORY WARRANTY DEED RECORDED AS AUDITOR'S FILE NO. 2010–03103 ON APRIL 20, 2010 IN THE RECORDS OF WALLA WALLA COUNTY, STATE OF WASHINGTON.
3) WARRANTY DEED RECORDED AS AUDITOR'S FILE NO. 1991–01031 ON FEBRUARY 22, 1991 IN VOLUME 187 OF DEEDS AT PAGE 1445 IN THE RECORDS OF WALLA WALLA COUNTY, STATE OF WASHINGTON.
4) SPECIAL WARRANTY DEED RECORDED AS AUDITOR'S FILE NO. 2016–00693 ON JANUARY 29, 2016 IN THE RECORDS OF WALLA WALLA COUNTY, STATE OF WASHINGTOIN.

BASIS OF SURVEY

NAD 83(2011) WASHINGTON STATE PLANE, SOUTH ZONE, ALL DISTANCES SHOWN HEREON ARE GROUND DISTANCES. MULTIPLY DISTANCES SHOWN BY THE COMBINED FACTOR OF 0.9998831186290518 TO GET GRID DISTANCES.

THE CENTERLINES OF BOTH SHARPE ROAD AND PETTYJOHN ROAD IN THE VICINITY OF THE DELL–SHARPE BRIDGE WERE DRAWN ACCORDING TO CRP NO. 40 JONOTHAN PETTYJOHN ROAD (SHARPE ROAD) AND CRP NO. 41 JONOTHAN PETTYJOHN ROAD (PETTYJOHN ROAD). THE CENTERLINES WERE ALIGNED BASED ON TWO MONUMENTS FOUND IN THE FIELD THAT ARE SHOWN ON CRP NO. 41. THE PUMP BAR FOUND AT THE SOUTHEAST CORNER OF THE NORTHEAST QUARTER OF THE NE QUARTER OF THE NORTHEAST QUARTER OF SECTION 3 IS SHOWN ON CRP NO. 41 AS BEING 508.9 FEET SOUTHERLY OF THE PI OF A CURVE ON PETTYJOHN ROAD. CRP NO. 41 ALSO SHOWS AN AXLE AT THE NORTHEAST CORNER OF THE NORTHEAST QUARTER OF THE NORTHWEST QUARTER OF SECTION 11 AS BEING N89°57'W A DISTANCE OF 333.63 FEET FROM A POINT ON THE CENTERLINE OF PETTYJOHN ROAD. UNFORTUNATELY IT IS NOT CLEAR IF THE POINT IS ON THE CENTERLINE OR ON THE SEMI–TANGENT LINE. A POINT HALFWAY BETWEEN THE CENTERLINE AND SEMI–TANGENT WAS HELD AT THE ANGLE (ADJUSTED ANTICLOCKWISE BY THE CONVERGENCE ANGLE 1°31'10") AND DISTANCE SHOWN ON CRP NO. 41. WITH THOSE TWO CONSTRAINTS THE COMBINED CENTERLINES FOR BOTH ROADS WAS FITTED FOR THE BEST ALIGNMENT WITH THE ROADS AS IT EXISTS NOW BASED ON THE FIELD SURVEY DATA.

THE NORTHWEST CORNER OF SECTION 2 WAS CALCULATED AS BEING THE PI OF STATION NO. 305+19.2 AS SHOWN ON CRP NO. 41 (STATION 305+23.11 AS SHOWN HEREON). THE WEST LINE OF THE NORTHWEST QUARTER OF THE NORTHWEST QUARTER OF SECTION 2 WAS DRAWN FROM THIS NORTHWEST CORNER TO THE FOUND PUMP BAR MARKING THE SOUTHWEST CORNER OF THE NORTHWEST QUARTER OF THE NORTHWEST QUARTER OF SECTION 2 AS SHOWN ON THE SURVEY RECORDED IN BOOK U AT PAGES 83–85 (BOOK U SURVEY). THE MEASURED DISTANCE BETWEEN THE NORTHWEST CORNER OF SECTION 2 AND THE FOUND PUMP BAR IS 1400.67 FEET. THE BOOK U SURVEY SHOWS A DISTANCE OF 1405 FEET BETWEEN THE NORTHWEST CORNER OF SECTION 2 AND THE PUMP BAR.

THE FOUND AXLE AS SHOWN ON BOOK U SURVEY WAS HELD AS THE SOUTH QUARTER CORNER OF SECTION 2. THE ORIENTATION OF THE SOUTH LINE OF THE SOUTHWEST QUARTER OF SECTION 2 WAS ESTABLISHED BY HOLDING THE ANGULAR RELATIONSHIP BETWEEN SAID SOUTH LINE AND THE NEAREST TANGENT SECTION OF THE CENTERLINE OF PETTYJOHN ROAD JUST SOUTH OF SAID SOUTH LINE. THE SOUTHWEST CORNER OF SECTION 2 WAS ESTABLISHED BY INTERSECTING THE SOUTH LINE OF THE SOUTHWEST QUARTER OF SECTION 2 AS JUST DESCRIBED AND THE PROLONGATION OF THE WEST LINE OF THE NORTHWEST QUARTER OF THE NORTHWEST QUARTER OF SECTION 2 AS DESCRIBED HEREIN. THIS RESULTS IN THE WEST LINE OF SECTION 2 BEING AN OVERALL LENGTH OF 5386.14 FEET. THE BOOK U SURVEY GIVES A DISTANCE OF 5417 FEET AND THE GLO MAP GIVES A DISTANCE OF 5346 FEET FOR THE LENGTH OF THE WEST LINE OF SECTION 2.

THE SOUTH LINE OF THE SOUTHEAST QUARTER OF SECTION 2 WAS ESTABLISHED BY MAINTAINING THE SAME BEARING AND LENGTH AS THE SOUTH LINE OF THE SOUTHWEST QUARTER OF SECTION 2 AS DESCRIBED HEREIN.

THE NORTH LINE OF SECTION 2 WAS ESTABLISHED AS ORIGINATING AT THE NORTHWEST CORNER OF SECTION 2 AS DESCRIBED HEREIN AND BEING PARALLEL TO THE SOUTH LINE OF SECTION 2 AS DESCRIBED HEREIN AND GOING THE RECORD DISTANCE OF 5280 FEET AS SHOWN ON THE GLO MAP OF SECTION 2.

THE EAST LINE OF SECTION 2 WAS ESTABLISHED BY DRAWING A LINE BETWEEN THE EAST END OF THE NORTH LINE OF SECTION 2 AS DESCRIBED HEREIN AND THE EAST END OF THE SOUTH LINE OF THE SOUTHEAST QUARTER OF SECTION 2 AS DESCRIBED HEREIN.

LEGEND

- ✕ *CALCULATED POINT*
- ○ *FOUND PROPERTY CORNER MON. AS NOTED*
- ● *SET MONUMENT PER RIGHT OF WAY PLANS CRP 20–02*
- ⊕ *FOUND MONUMENT OF RECORD PER CRP #41, FILE 01–G–015 & 016*
- *X.XX R OR (X.XX R) RECORD PER CRP #41, FILE 01–G–015 & 016*
- *APN AUDITOR'S PARCEL NUMBER*
- *AFN ASSESSOR'S FILE NUMBER*
- *PR LINE PETTYJOHN ROAD RIGHT OF WAY CENTERLINE CALCULATED PER CRP #41*
- *S LINE SHARPE ROAD RIGHT OF WAY CENTERLINE CALCULATED PER CRP #40*
- —— *NEW PETTYJOHN ROAD CENTERLINE (L LINE)*
- —— R/W —— *PROPOSED RIGHT OF WAY*
- – – – *SECTION SUBDIVISION LINE*
- — — R/W — *EXISTING RIGHT OF WAY*
- —— *EXISTING CENTERLINE OF RIGHT OF WAY (PR & S LINES)*
- ▨ *RIGHT OF WAY ACQUISITION AREA*
- ▨ *TEMPORARY CONSTRUCTION EASEMENT AREA*

VICINITY MAP—NOT TO SCALE

NOTES:

PR LINE– ORIGINAL PETTYJOHN ROAD CENTERLINE
L LINE– NEW PETTYJOHN ROAD CENTERLINE
S LINE– ORIGINAL SHARPE ROAD CENTERLINE
C LINE– CONSTRUCTION CENTERLINE (SEE CONSTRUCTION PLANS)

UNLESS OTHERWISE NOTED STATION OFFSETS ARE FROM THE L LINE.

SEE PAGE 2 OF 2 FOR RECORD AND MEASURED VALUES OF PETTYJOHN ROAD CENTERLINE, SHARPE ROAD CENTERLINE AND SECTION 2 OF TOWNSHIP 9 NORTH, RANGE 35 EAST OF THE WILLAMETTE MERIDIAN.

RIGHT OF WAY ACQUISITION, TEMPORARY CONSTRUCTION EASEMENT AREAS, AND RIGHT OF ENTRY

OWNER	PARCEL NUMBER	SIZE IN AC.	R/W ACQUISITION IN AC.	R/W ACQUISITION IN SQ.FT.	NET AREA IN AC.	TEMP. CONST. EASEMENT IN AC.	TEMP. CONST. EASEMENT IN SQ.FT.	RIGHT OF ENTRY
MELVIN L TALBOTT	351035310004	300.93	0.025	1083	300.90	0.00	0.00	YES
MELVIN L TALBOTT	350902210003	84.71	3.59	156593	81.12	0.25	10794	YES
MONESA M GRANT	350903110001	525.95	0.00	0.00	525.95	0.55	24031	YES
MONESA M GRANT	350902220006	4.00	0.15	6411	3.85	0.00	0.00	YES
MARK S GRANT	350902240002	94.91	0.15	6688	94.76	0.00	0.00	YES

SURVEYOR'S CERTIFICATE

THIS MAP CORRECTLY REPRESENTS A SURVEY MADE BY ME OR UNDER MY DIRECTION IN CONFORMANCE WITH THE SURVEY RECORDING ACT, MEETS ALL PROVISIONS PUT FORTH IN WAC 332–130, AND WAS PERFORMED AT THE REQUEST OF WALLA WALLA COUNTY.

Greg Flowers
GREG FLOWERS PLS 19619

GREG E. FLOWERS
19619
01/17/2023

FEDERAL AID PROJECT NUMBER

BROS–2036(035)
TA–6958

PETTYJOHN ROAD AT SHARPE ROAD

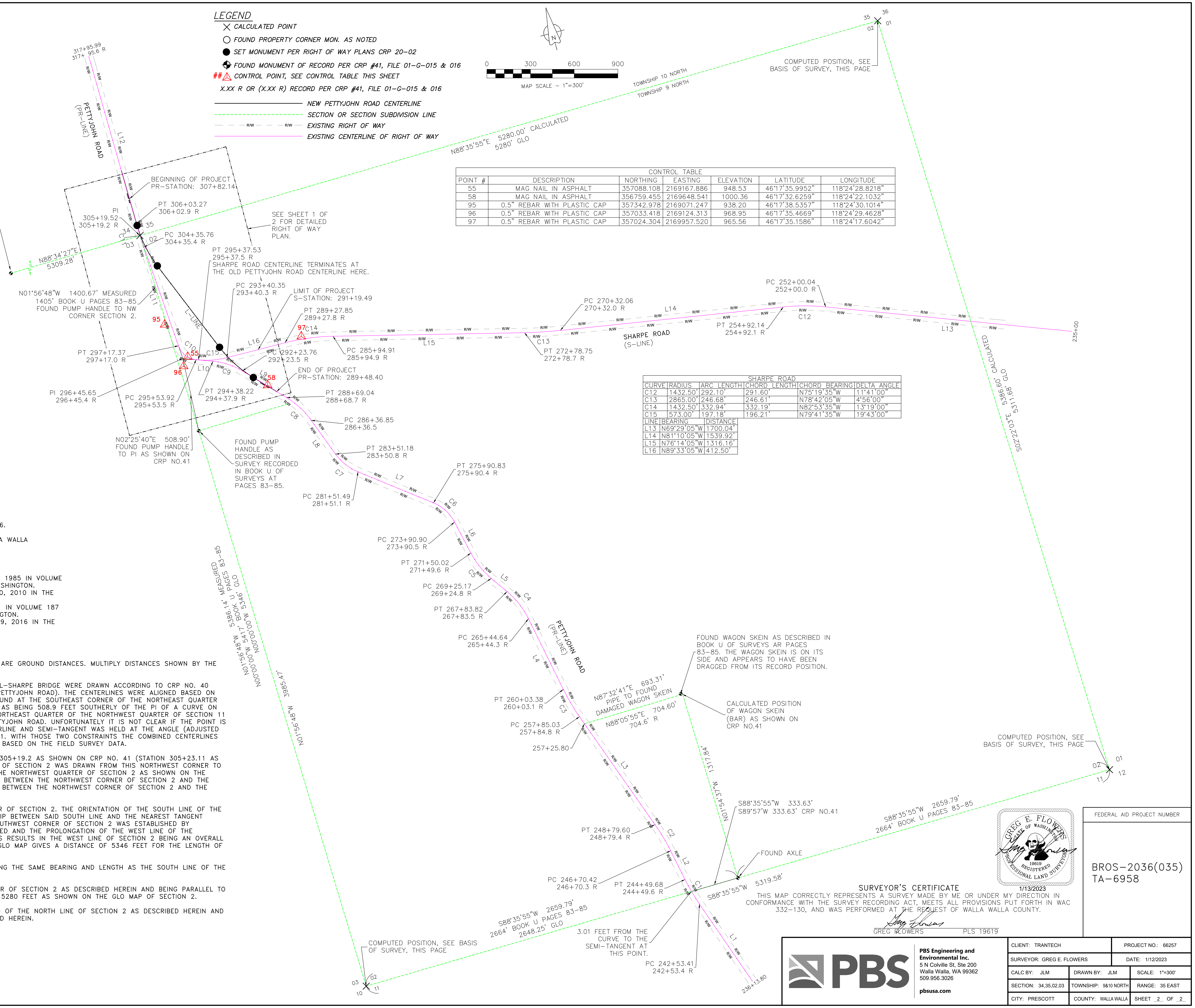
RIGHT OF WAY PLAN CRP 20–02

PBS

PBS Engineering and Environmental Inc.
5 N Colville St, Ste 200
Walla Walla, WA 99362
509.956.3026

pbsusa.com

CLIENT: TRANTECH
PROJECT NO.: 66257
SURVEYOR: GREG E. FLOWERS
DATE: 1/12/2023
CALC BY: JLM
DRAWN BY: JLM
SCALE: 1"=50'
SECTION: 34,35,02,03
TOWNSHIP: 9&10 NORTH
RANGE: 35 EAST
CITY: PRESCOTT
COUNTY: WALLA WALLA
SHEET 1 OF 2



LEGEND

- X CALCULATED POINT
- ○ FOUND PROPERTY CORNER MON. AS NOTED
- ● SET MONUMENT PER RIGHT OF WAY PLANS CRP 20–02
- ⊕ FOUND MONUMENT OF RECORD PER CRP #41, FILE 01–G–015 & 016
- ##△ CONTROL POINT, SEE CONTROL TABLE THIS SHEET
- X.XX R OR (X.XX R) RECORD PER CRP #41, FILE 01–G–015 & 016
- NEW PETTYJOHN ROAD CENTERLINE
- SECTION OR SECTION SUBDIVISION LINE
- — R/W — EXISTING RIGHT OF WAY
- EXISTING CENTERLINE OF RIGHT OF WAY

CONTROL TABLE

POINT #	DESCRIPTION	NORTHING	EASTING	ELEVATION	LATITUDE	LONGITUDE
55	MAG NAIL IN ASPHALT	357088.108	2169167.886	948.53	46°17'35.9952"	118°24'28.8218"
58	MAG NAIL IN ASPHALT	356759.455	2169648.541	1000.36	46°17'32.6259"	118°24'22.1032"
95	0.5" REBAR WITH PLASTIC CAP	357342.978	2169071.247	938.20	46°17'38.5357"	118°24'30.1014"
96	0.5" REBAR WITH PLASTIC CAP	357033.418	2169124.313	968.95	46°17'35.4669"	118°24'29.4628"
97	0.5" REBAR WITH PLASTIC CAP	357024.304	2169957.520	965.56	46°17'35.1586"	118°24'17.6042"

PETTYJOHN ROAD

CURVE	RADIUS	ARC LENGTH	CHORD LENGTH	CHORD BEARING	DELTA ANGLE
C1	1432.50'	196.26'	196.11'	N15°42'35"W	7°51'00"
C2	1432.50'	209.18'	209.00'	N15°58'05"W	8°22'00"
C3	1432.50'	218.35'	218.14'	N15°47'05"W	8°44'00"
C4	573.00'	239.18'	237.45'	N23°22'35"W	23°55'00"
C5	573.00'	224.85'	223.41'	N24°05'35"W	22°29'00"
C6	286.50'	199.93'	195.90'	N32°50'35"W	39°59'00"
C7	358.10'	199.69'	197.11'	N36°51'35"W	31°57'00"
C8	573.00'	232.18'	230.60'	N32°29'35"W	23°13'00"
C9	477.50'	214.46'	212.66'	N56°58'05"W	25°44'00"
C10	143.20'	163.45'	154.72'	N37°08'05"W	65°24'00"
C11	2865.00'	167.51'	167.49'	N02°45'35"W	3°21'00"

LINE	BEARING	DISTANCE
L1	N19°38'05"W	639.61'
L2	N11°47'05"W	220.74'
L3	N20°09'05"W	905.44'
L4	N11°25'05"W	541.25'
L5	N35°20'05"W	141.35'
L6	N12°51'05"W	240.88'
L7	N52°50'05"W	560.66'
L8	N20°53'05"W	285.68'
L9	N44°06'05"W	354.72'
L10	N69°50'05"W	115.70'
L11	N04°26'05"W	718.39'
L12	N01°05'05"W	1192.72'

SHARPE ROAD

CURVE	RADIUS	ARC LENGTH	CHORD LENGTH	CHORD BEARING	DELTA ANGLE
C12	1432.50'	292.10'	291.60'	N75°19'35"W	11°41'00"
C13	2865.00'	246.68'	246.61'	N78°42'05"W	4°56'00"
C14	1432.50'	332.94'	332.19'	N82°53'35"W	13°19'00"
C15	573.00'	197.18'	196.21'	N79°41'35"W	19°43'00"

LINE	BEARING	DISTANCE
L13	N69°29'05"W	1700.04'
L14	N81°10'05"W	1539.92'
L15	N76°14'05"W	1316.16'
L16	N89°33'05"W	412.50'

SURVEYS & PLATS

1) WALLA WALLA COUNTY CRP 40 JONOTHAN PETTYJOHN ROAD (STUB ROAD), FILE 01–G–016.
2) WALLA WALLA COUNTY CRP 41 JONOTHAN PETTYJOHN ROAD, FILE 01–G–014 & 015.
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BASIS OF SURVEY

NAD 83(NSRS2007) WASHINGTON STATE PLANE, SOUTH ZONE, ALL DISTANCES SHOWN HEREON ARE GROUND DISTANCES. MULTIPLY DISTANCES SHOWN BY THE COMBINED FACTOR OF 0.9998831186290518 TO GET GRID DISTANCES.

THE CENTERLINES OF BOTH SHARPE ROAD AND PETTYJOHN ROAD IN THE VICINITY OF THE DELL–SHARPE BRIDGE WERE DRAWN ACCORDING TO CRP NO. 40 JONOTHAN PETTYJOHN ROAD (SHARPE ROAD) AND CRP NO. 41 JONOTHAN PETTYJOHN ROAD (PETTYJOHN ROAD). THE CENTERLINES WERE ALIGNED BASED ON TWO MONUMENTS FOUND IN THE FIELD THAT ARE SHOWN ON CRP NO. 41. THE PUMP BAR FOUND AT THE SOUTHEAST CORNER OF THE NORTHEAST QUARTER OF THE NE QUARTER OF THE NORTHEAST QUARTER OF SECTION 3 IS SHOWN ON CRP NO. 41 AS BEING 508.9 FEET SOUTHERLY OF THE PI OF A CURVE ON PETTYJOHN ROAD. CRP NO. 41 ALSO SHOWS AN AXLE AT THE NORTHEAST CORNER OF THE NORTHEAST QUARTER OF THE NORTHWEST QUARTER OF SECTION 11 AS BEING N89°57'W A DISTANCE OF 333.63 FEET FROM A POINT ON THE CENTERLINE OF PETTYJOHN ROAD. UNFORTUNATELY IT IS NOT CLEAR IF THE POINT IS ON THE CENTERLINE OR ON THE SEMI–TANGENT LINE. A POINT HALFWAY BETWEEN THE CENTERLINE AND SEMI–TANGENT WAS HELD AT THE ANGLE (ADJUSTED ANTICLOCKWISE BY THE CONVERGENCE ANGLE 1°31'10") AND DISTANCE SHOWN ON CRP NO. 41. WITH THOSE TWO CONSTRAINTS THE COMBINED CENTERLINES FOR BOTH ROADS WAS FITTED FOR THE BEST ALIGNMENT WITH THE ROADS AS IT EXISTS NOW BASED ON THE FIELD SURVEY DATA.

THE NORTHWEST CORNER OF SECTION 2 WAS CALCULATED AS BEING THE PI OF STATION NO. 305+19.2 AS SHOWN ON CRP NO. 41 (STATION 305+23.11 AS SHOWN HEREON). THE WEST LINE OF THE NORTHWEST QUARTER OF THE NORTHWEST QUARTER OF SECTION 2 WAS DRAWN FROM THIS NORTHWEST CORNER TO THE FOUND PUMP BAR MARKING THE SOUTHWEST CORNER OF THE NORTHWEST QUARTER OF THE NORTHWEST QUARTER OF SECTION 2 AS SHOWN ON THE SURVEY RECORDED IN BOOK U AT PAGES 83–85 (BOOK U SURVEY). THE MEASURED DISTANCE BETWEEN THE NORTHWEST CORNER OF SECTION 2 AND THE FOUND PUMP BAR IS 1400.67 FEET. THE BOOK U SURVEY SHOWS A DISTANCE OF 1405 FEET BETWEEN THE NORTHWEST CORNER OF SECTION 2 AND THE PUMP BAR.

THE FOUND AXLE AS SHOWN ON BOOK U SURVEY WAS HELD AS THE SOUTH QUARTER CORNER OF SECTION 2. THE ORIENTATION OF THE SOUTH LINE OF THE SOUTHWEST QUARTER OF SECTION 2 WAS ESTABLISHED BY HOLDING THE ANGULAR RELATIONSHIP BETWEEN SAID SOUTH LINE AND THE NEAREST TANGENT SECTION OF THE CENTERLINE OF PETTYJOHN ROAD JUST SOUTH OF SAID SOUTH LINE. THE SOUTHWEST CORNER OF SECTION 2 WAS ESTABLISHED BY INTERSECTING THE SOUTH LINE OF THE SOUTHWEST QUARTER OF SECTION 2 AS JUST DESCRIBED AND THE PROLONGATION OF THE WEST LINE OF THE NORTHWEST QUARTER OF THE NORTHWEST QUARTER OF SECTION 2 AS DESCRIBED HEREIN. THIS RESULTS IN THE WEST LINE OF SECTION 2 BEING AN OVERALL LENGTH OF 5386.14 FEET. THE BOOK U SURVEY GIVES A DISTANCE OF 5417 FEET AND THE GLO MAP GIVES A DISTANCE OF 5346 FEET FOR THE LENGTH OF THE WEST LINE OF SECTION 2.

THE SOUTH LINE OF THE SOUTHEAST QUARTER OF SECTION 2 WAS ESTABLISHED BY MAINTAINING THE SAME BEARING AND LENGTH AS THE SOUTH LINE OF THE SOUTHWEST QUARTER OF SECTION 2 AS DESCRIBED HEREIN.

THE NORTH LINE OF SECTION 2 WAS ESTABLISHED AS ORIGINATING AT THE NORTHWEST CORNER OF SECTION 2 AS DESCRIBED HEREIN AND BEING PARALLEL TO THE SOUTH LINE OF SECTION 2 AS DESCRIBED HEREIN AND GOING THE RECORD DISTANCE OF 5280 FEET AS SHOWN ON THE GLO MAP OF SECTION 2.

THE EAST LINE OF SECTION 2 WAS ESTABLISHED BY DRAWING A LINE BETWEEN THE EAST END OF THE NORTH LINE OF SECTION 2 AS DESCRIBED HEREIN AND THE EAST END OF THE SOUTH LINE OF THE SOUTHEAST QUARTER OF SECTION 2 AS DESCRIBED HEREIN.

SURVEYOR'S CERTIFICATE

THIS MAP CORRECTLY REPRESENTS A SURVEY MADE BY ME OR UNDER MY DIRECTION IN CONFORMANCE WITH THE SURVEY RECORDING ACT, MEETS ALL PROVISIONS PUT FORTH IN WAC 332–130, AND WAS PERFORMED AT THE REQUEST OF WALLA WALLA COUNTY.

Greg Flowers
GREG FLOWERS PLS 19619

GREG E. FLOWERS 19619
1/13/2023

FEDERAL AID PROJECT NUMBER

BROS–2036(035)
TA–6958

PETTYJOHN ROAD AT SHARPE ROAD

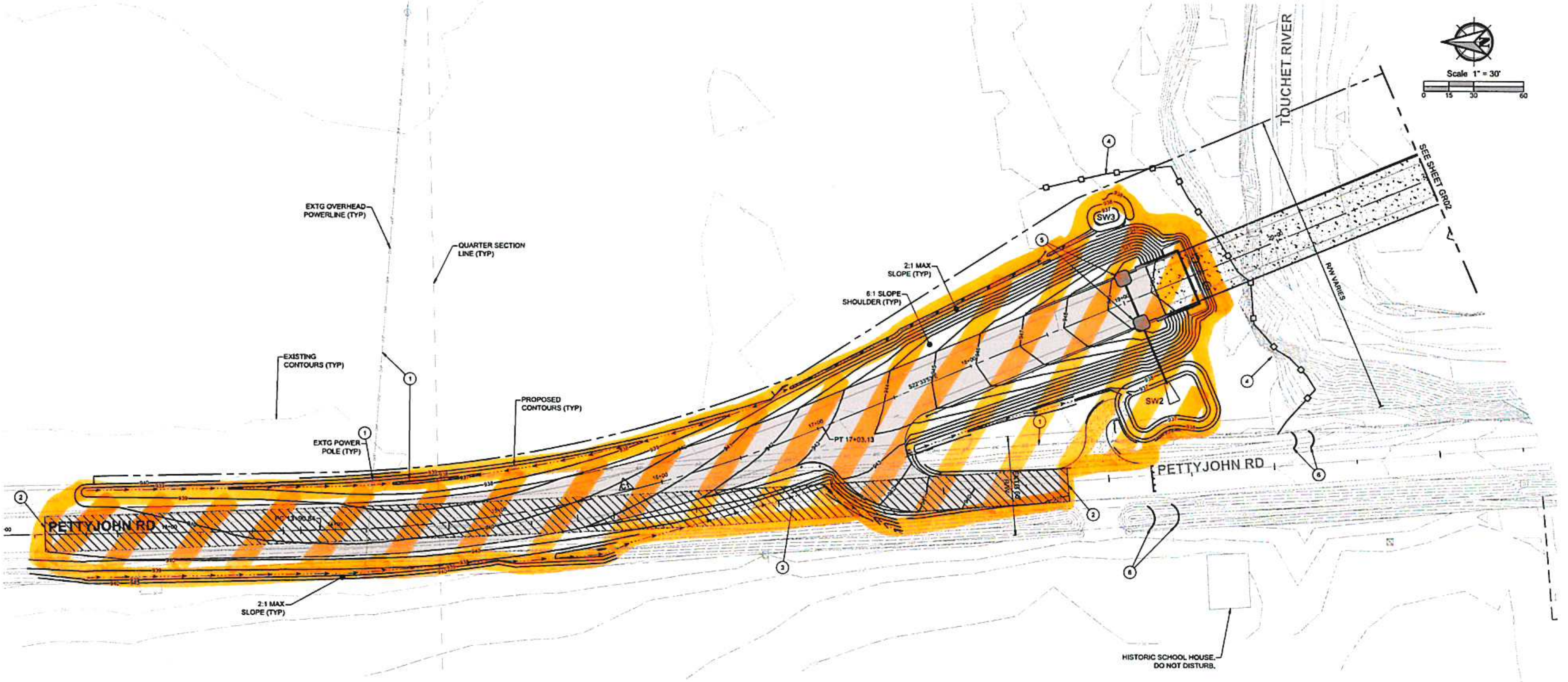
RIGHT OF WAY PLAN CRP 20–02

PBS Engineering and Environmental Inc.
5 N Colville St, Ste 200
Walla Walla, WA 99362
509.956.3026
pbsusa.com

CLIENT: TRANTECH	PROJECT NO.: 66257
SURVEYOR: GREG E. FLOWERS	DATE: 1/12/2023

CALC BY: JLM	DRAWN BY: JLM	SCALE: 1"=300'
SECTION: 34,35,02,03	TOWNSHIP: 9&10 NORTH	RANGE: 35 EAST
CITY: PRESCOTT	COUNTY: WALLA WALLA	SHEET 2 OF 2

Exhibit 18



EROSION CONTROL NOTES:

SEE SHEET GN01 FOR TYPICAL ROAD SECTION GEOMETRY.

EROSION CONTROL MEASURES SHALL BE ADJUSTED AS NECESSARY BASED ON THE STAGE OF THE PROJECT. COORDINATE WITH ENGINEER OR THE "STORMWATER MANAGEMENT MANUAL FOR EASTERN WASHINGTON" FOR APPROVED METHODS.

KEYED GRADING NOTES

① ALL EXISTING UTILITIES SHALL BE PROTECTED DURING GRADING ACTIVITIES UNLESS OTHERWISE NOTED.

② SAWCUT ASPHALT CONCRETE. REMOVE EXISTING ASPHALT AND BASE COURSE MATERIAL FROM WORK AREAS.

③ REMOVE EXISTING PAVEMENT.

④ HIGH VISIBILITY SILT FENCE PER WSDOT STANDARD PLAN I-30.17-01.

⑤ INLET PROTECTION PER WSDOT STANDARD PLAN I-40.20-00.

⑥ BIODEGRADABLE CHECK DAM PER WSDOT STANDARD PLAN I-50.20-01.

TRANTECH
Engineering LLC

BELLEVUE OFFICE:
365 - 118th AVE. SE, STE 100
BELLEVUE, WA 98005
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DATE:	ISSUED / REVISED	BY:
.	.	.

RYAN JEFFREY BILLEN
PRELIMINARY

WALLA WALLA COUNTY
Public Works Department
999 Navion Lane
Walla Walla, Washington, 99362
Phone: 509, 524-2710
FEDERAL AID PROJECT NUMBER
BROS - 2036(035)
TA - 6958

DELL SHARPE BRIDGE REPLACEMENT PROJECT

GRADING AND EROSION CONTROL PLAN - NORTH

PROJECT NUMBER
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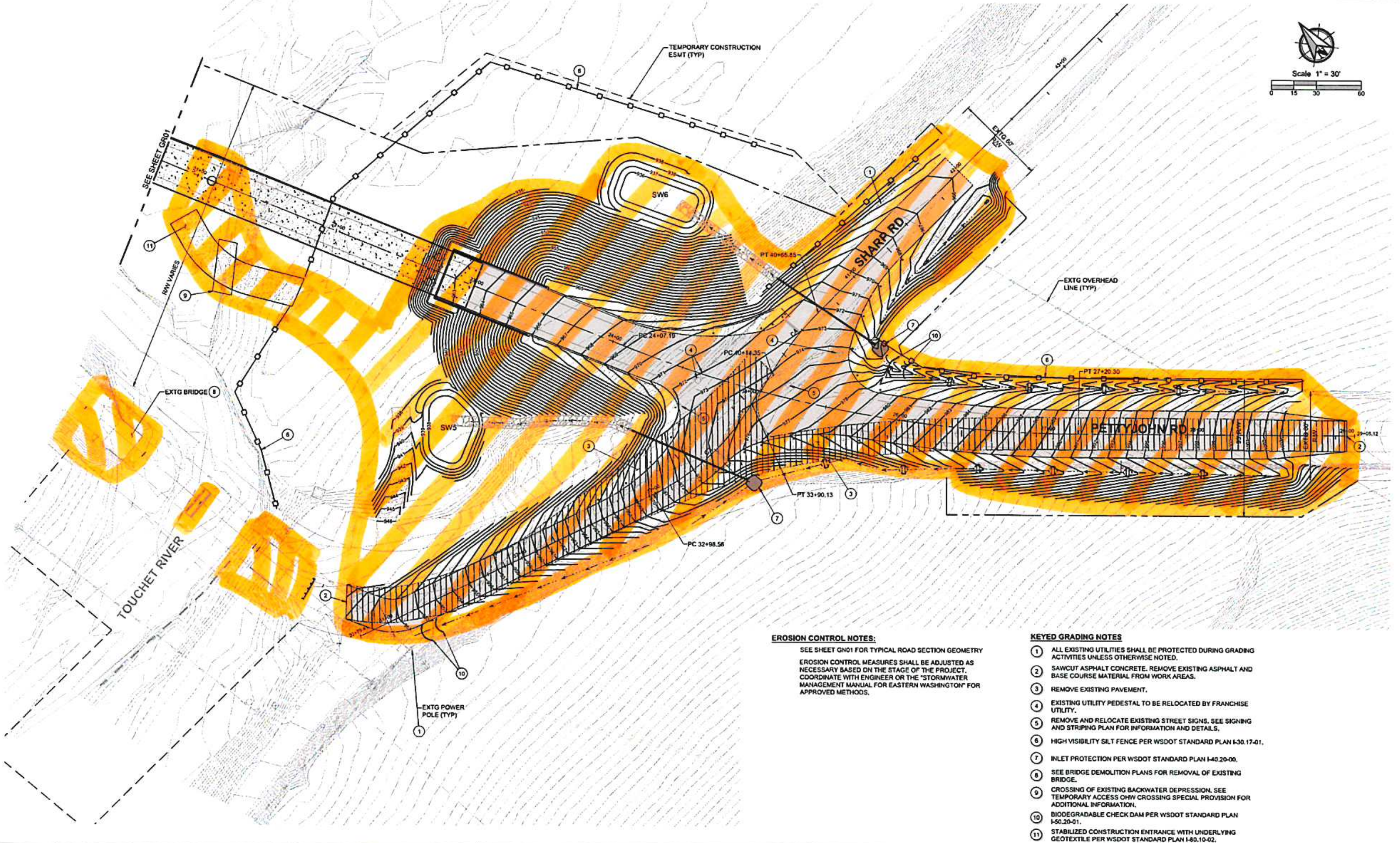

EROSION CONTROL NOTES:

SEE SHEET GN01 FOR TYPICAL ROAD SECTION GEOMETRY

EROSION CONTROL MEASURES SHALL BE ADJUSTED AS NECESSARY BASED ON THE STAGE OF THE PROJECT. COORDINATE WITH ENGINEER OR THE "STORMWATER MANAGEMENT MANUAL FOR EASTERN WASHINGTON" FOR APPROVED METHODS.

KEYED GRADING NOTES

① ALL EXISTING UTILITIES SHALL BE PROTECTED DURING GRADING ACTIVITIES UNLESS OTHERWISE NOTED.

② SAWCUT ASPHALT CONCRETE. REMOVE EXISTING ASPHALT AND BASE COURSE MATERIAL FROM WORK AREAS.

③ REMOVE EXISTING PAVEMENT.

④ EXISTING UTILITY PEDESTAL TO BE RELOCATED BY FRANCHISE UTILITY.

⑤ REMOVE AND RELOCATE EXISTING STREET SIGNS. SEE SIGNING AND STRIPING PLAN FOR INFORMATION AND DETAILS.

⑥ HIGH VISIBILITY SILT FENCE PER WSDOT STANDARD PLAN I-30.17-01.

⑦ INLET PROTECTION PER WSDOT STANDARD PLAN I-40.20-00.

⑧ SEE BRIDGE DEMOLITION PLANS FOR REMOVAL OF EXISTING BRIDGE.

⑨ CROSSING OF EXISTING BACKWATER DEPRESSION. SEE TEMPORARY ACCESS OHW CROSSING SPECIAL PROVISION FOR ADDITIONAL INFORMATION.

⑩ BIODEGRADABLE CHECK DAM PER WSDOT STANDARD PLAN I-50.20-01.

⑪ STABILIZED CONSTRUCTION ENTRANCE WITH UNDERLYING GEOTEXTILE PER WSDOT STANDARD PLAN I-80.10-02.

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FEDERAL AID PROJECT NUMBER
BROS - 2036(035)
TA - 6958

DELL SHARPE BRIDGE REPLACEMENT PROJECT

GRADING AND EROSION CONTROL PLAN - SOUTH

PROJECT NUMBER
CRP20-02
SHEET
GR02
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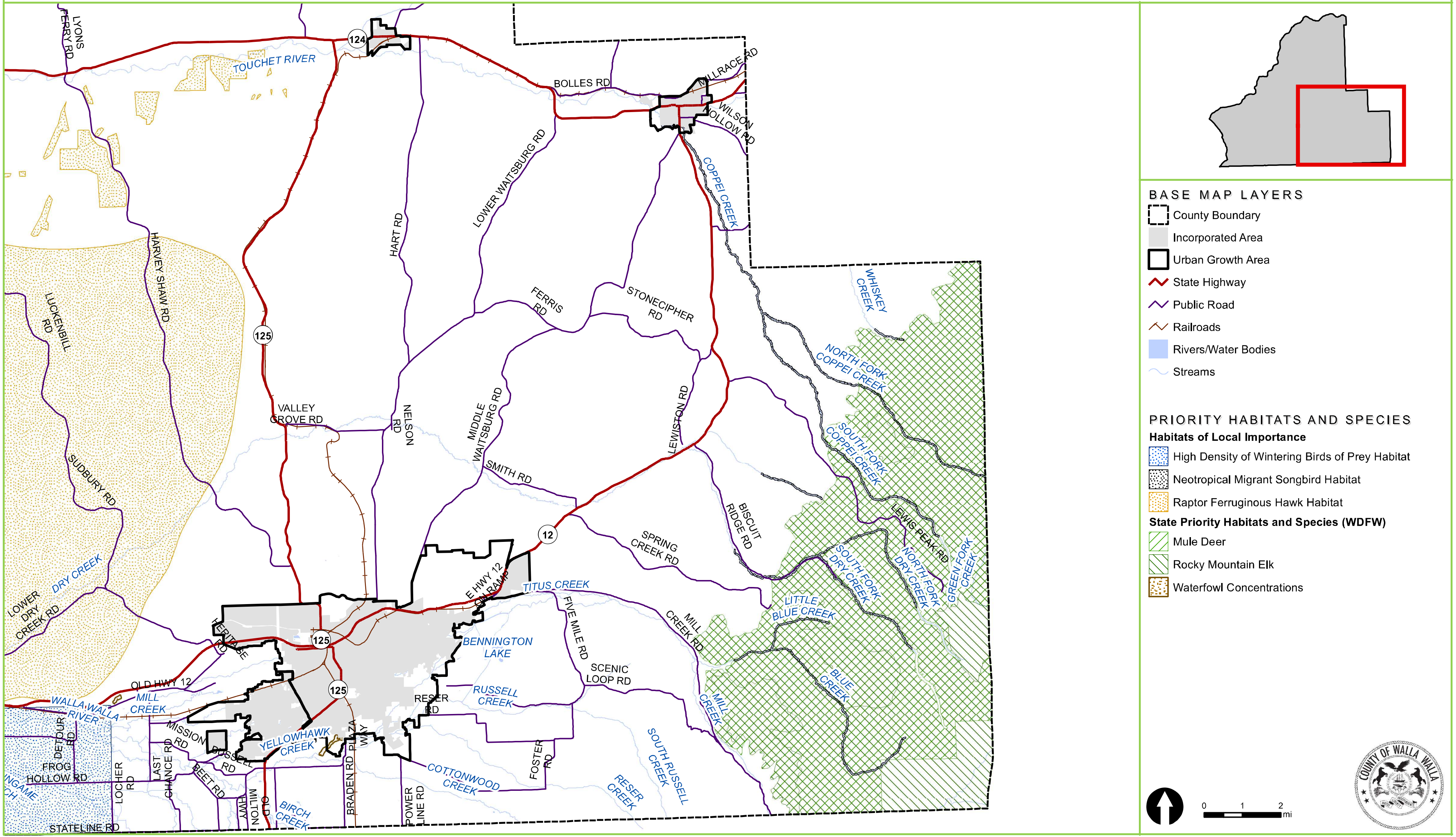
Exhibit 19

CRITICAL AREAS ORDINANCE UPDATE - WALLA WALLA COUNTY **MAP CA-5B**

FISH AND WILDLIFE HABITAT CONSERVATION AREAS - Priority Habitats and Species - Southeast County



Walla Walla Community Development Department - Suite 200, 310 West Poplar, Walla Walla, WA 99362 - (509) 524-2610

Print Date: 7/24/2019