



**THPRD Westside Trail Bicycle and Pedestrian Bridge Closeout Memo**

**September 2021**

**Tualatin Hills Park & Recreation District**



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## Westside Trail Bicycle and Pedestrian Bridge over Highway 26, Washington County, Beaverton, Oregon

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## 1. Purpose and Need and Project Description

Tualatin Hills Park & Recreation District (THPRD) led a feasibility study that includes conceptual design of a regional trail segment from SW Greenbrier Parkway to NW Cornell Road and a pedestrian and bicycle bridge spanning Sunset Highway (U.S. 26) Milepost (MP) 66.50, called the Westside Trail (Figure 1).

The Westside Trail is a vital regional asset, connecting neighborhoods and communities across Beaverton and Washington County. THPRD estimates that the trail attracts over 100,000 users a year. The purpose of the Westside Trail and Bridge is to link 25 miles of trail for people walking, running, and biking to reach popular destinations, including housing, schools, jobs, shopping, transit, parks, and recreation. A bridge over U.S. 26 will also close a gap in the larger metro regional trail system.

The Westside Trail must cross U.S. 26 to complete the trail connection. The nearest existing bicycle and pedestrian crossing options adjacent to the proposed bridge are the interchange overpasses for NW Murray Boulevard and NW Cornell Road. These options are problematic because of the following issues:

- They are 1.2 miles apart, which is not convenient for many people walking or on bikes
- They have narrow sidewalks and bike lanes
- Heavy motorized traffic travels on five lanes through each interchange

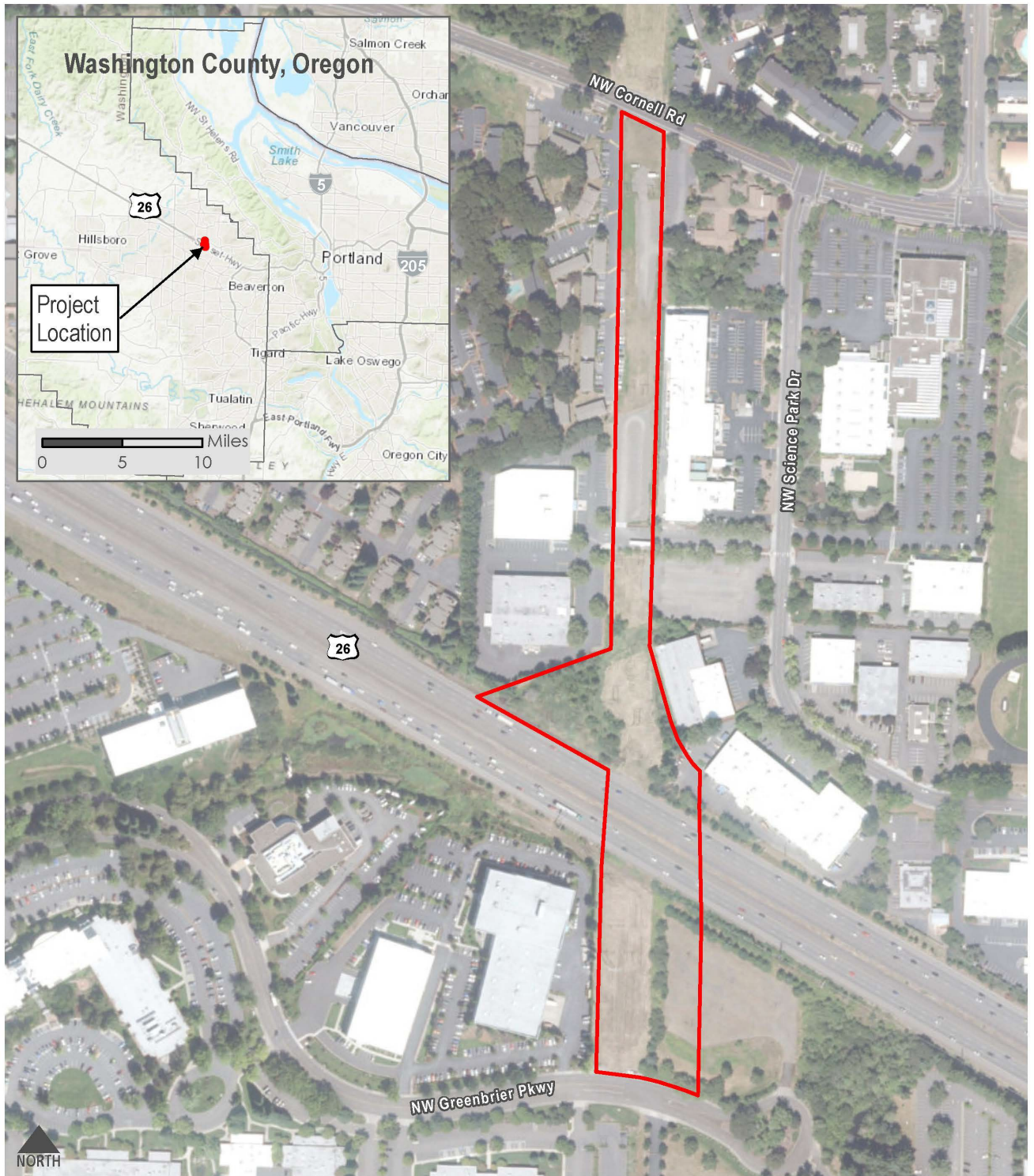


Figure 1

Westside Trail Bridge Project  
Location Map

0 100 200 300 400 Feet

Legend

 Study Area

## **1.1 Document Purpose**

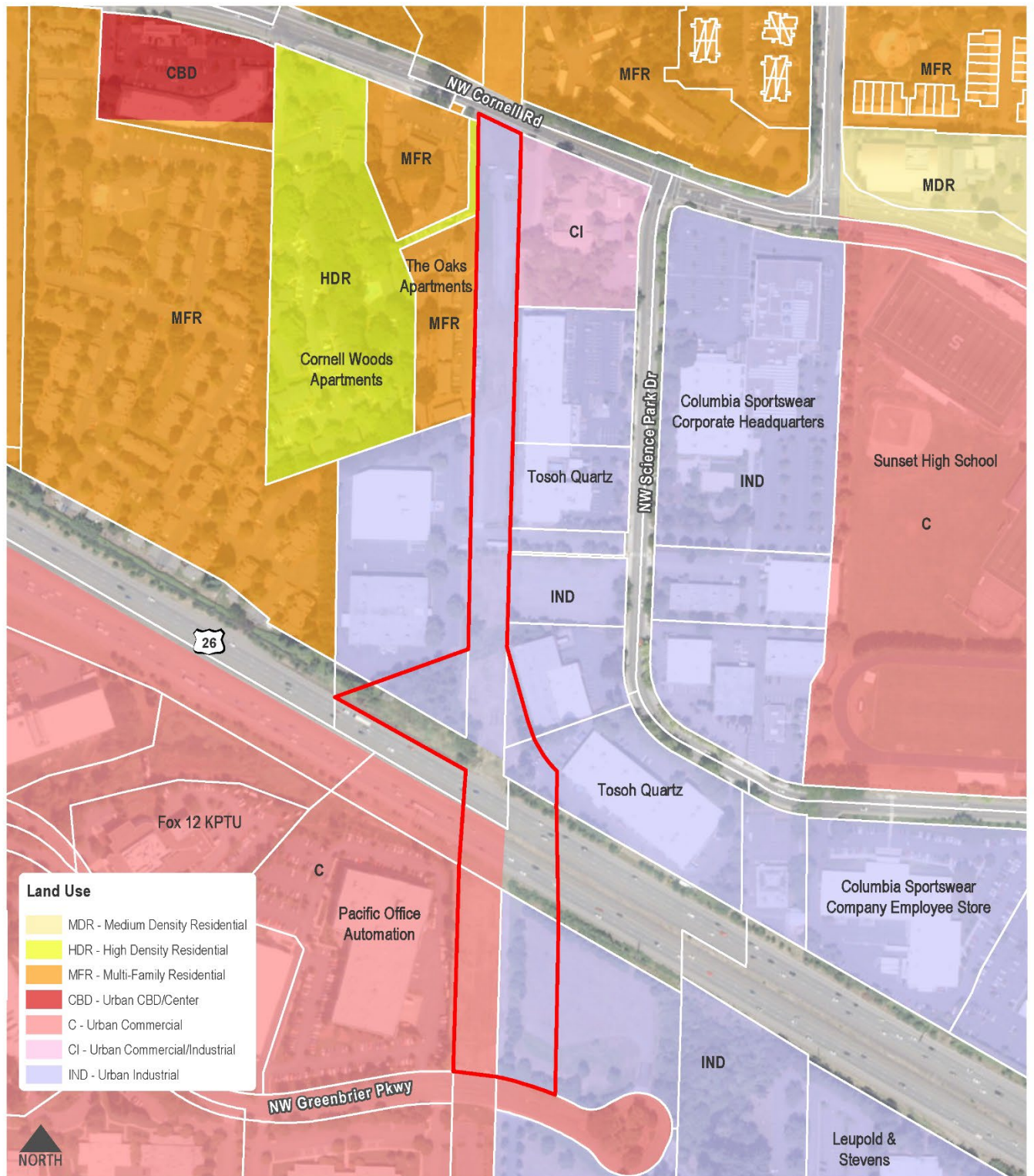
This document provides an overview of the Westside Trail Bridge Project, which includes the project purpose, existing conditions in the project area, the preferred design, cost estimates, and the various environmental and design elements associated with the project.

## **2. Existing Conditions**

The project corridor lies within the jurisdiction of unincorporated Washington County with adjacent land within the City of Beaverton, Oregon. The majority of the project area is situated within the Bonneville Power Administration (BPA) powerline corridor right-of-way (ROW) that extends from NW Greenbrier Parkway north to NW Cornell Road.

### **2.1 Land Use**

Land uses in the area encompass both City of Beaverton and Washington County and generally follow the established zoning classifications. Land uses along the project area of potential impact (API) consist of urban industrial, urban commercial, and multi-family (Figure 2).



Land Use	
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<span style="display:inline-block; width:15px; height:15px; background-color:lightgreen; border:1px solid black;"></span>	HDR - High Density Residential
<span style="display:inline-block; width:15px; height:15px; background-color:orange; border:1px solid black;"></span>	MFR - Multi-Family Residential
<span style="display:inline-block; width:15px; height:15px; background-color:red; border:1px solid black;"></span>	CBD - Urban CBD/Center
<span style="display:inline-block; width:15px; height:15px; background-color:pink; border:1px solid black;"></span>	C - Urban Commercial
<span style="display:inline-block; width:15px; height:15px; background-color:lightpurple; border:1px solid black;"></span>	CI - Urban Commercial/Industrial
<span style="display:inline-block; width:15px; height:15px; background-color:blue; border:1px solid black;"></span>	IND - Urban Industrial

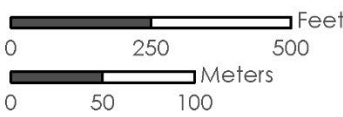


Figure 2  
Westside Trail Bridge Project  
Land Use



## 2.2 Private Properties

The adjacent private properties along the corridor include two large-scale multifamily housing complexes, medical offices, light manufacturing, and industrial commercial businesses. The parking areas that serve the medical offices and Columbia Sportswear, Inc. north of U.S. 26, and the Nike office parking lot south of NW Greenbrier are within BPA owned ROW and will be impacted by the project. The alignments under consideration were developed so as to minimize the level of impact to these parking areas.

## 2.3 Key Destinations

Key destinations within the City of Beaverton directly east and south of the project area include Sunset High School, Sunset Swim Center, and the THPRD Howard M. Terpenning Recreation Complex. Large employers include Pacific Office Automation and Nike Corporate Offices. Columbia Sportswear Corporate Headquarters is located within the Washington County boundary.

## 2.4 Utilities

Overhead PGE electrical distribution lines, transmission lines, and communication lines run east-west on the north side of U.S. 26. Overhead PGE distribution lines and communication lines run east-west on the south side of U.S. 26. While project trail alignment and structures were designed to minimize impacts, approximately 400 feet of the northern distribution and communication lines and 200 feet of the southern communication lines will need to be placed underground for project construction. In addition, vertical utility clearance requirements for overhead BPA electrical transmission lines running north-south will need to be raised to meet minimum clearances. Table 1 provides project corridor utilities clearances that must be met.

Table 1: Project Corridor Utilities

Utility	Minimum Clearance
<b>BPA Transmission Lines</b>	15 feet radial
<b>BPA Transmission Towers</b>	Structures: 25 feet horizontal
<b>Kinder Morgan High Pressure Liquid Natural Gas Line</b>	Structures: 10 feet horizontal
<b>Northwest Natural Gas Pipeline</b>	Structures: 10 feet horizontal
<b>Portland General Electric Transmission Lines</b>	15 feet radial
<b>Portland General Electric Transmission Towers</b>	Structures: 8 feet horizontal*
<b>Tualatin Valley Water District Water Main</b>	Structures :10 feet horizontal

\*PGE requires 25 feet of minimum clearance but are able to reduce up to 8 feet if the project can maintain radial clearances from lines.

## 2.5 Soils

Five soil types are mapped within the study area for soils and vegetation. They include

- Aloha silt loam, which is the predominant soil type occurring within the study area, occupies approximately 60 percent of the area. It is a poorly drained soil.
- Helvetia silt loam occupies approximately 13 percent of the study area. It is located in the northwestern portion of the study area and in the area of US 26. It is a moderately well-drained soil.
- Dayton silt loam occupies approximately 12 percent of the study area and is found in the northern portion of the powerline corridor. It is a poorly drained soil.
- Cove silty clay loam and Cove clay are a poorly drained soils found on floodplains. These soils occupy a combined 14 percent of the study area and generally coincide with the delineated wetlands.

The consultant team conducted a preliminary screening for liquefiable soils and found that the silt and clay soils above a depth of 10 feet, 25 to 40 feet and below 50 feet exhibit none to low liquefaction potential based on the screening criteria discussed in the Project Geotechnical Report. The soils from a depth of 10 feet to a depth of 25 and from 40 to 50 feet exhibit liquefaction potential, and vertical settlements on the order of 3 to 6 inches could result during a design seismic event.

## 2.6 Water Resources

One wetland and one stream were identified within the project area. The wetland is a 1.02-acre palustrine emergent/palustrine forested wetland situated just north of U.S. 26 and on the west side of the project area. The stream is a riverine water that averages five feet in width across the top of bank. The stream originates offsite to the east and flows west and south in a steep-sided channel through a densely vegetated lowland area. It discharges through a culvert under U.S. 26 and with mapped wetlands and an unnamed tributary to Willow Creek, south of the highway. The stream flows in a steep-sided channel approximately 1.5 to 2 feet deep. Testimony and photographic evidence from the Columbia Sportswear Operations Manager indicates metal grating across the culvert that periodically clogs with debris and requires removal to reduce flooding. This stream does not support fish passage.

## 2.7 Transportation

The transportation network in the project area includes public transportation, bicycle and pedestrian facilities, collector and arterial roadways, and private office and commercial access roads (Figure 3).

## 2.7.1 U.S. 26

U.S. 26 is a 6-lane 55 mph expressway under Oregon Department of Transportation (ODOT) jurisdiction that bisects the project area. The eastbound direction consists of a 12.5-foot shoulder, three 12-foot lanes, and a 10.25-foot shoulder. The westbound direction consists of a 12-foot shoulder, three 12-foot lanes, and a 22-foot (max and varies) shoulder. There is a drainage facility crossing under U.S. 26 which carries water from north to south, emptying into an east-west open channel located behind the shoulder of the highway.

## 2.7.2 South of U.S. 26

NW Greenbrier Parkway is under City of Beaverton jurisdiction and is a 30 mph 4-lane, local road with a sidewalk on the south side of the street that forms the project area southern boundary. Other roadways south of U.S. 26 are access roads connecting parking lots or providing access to office buildings.

## 2.7.3 North of U.S. 26

NW Cornell Road is a 40 mph 2-lane arterial with a center left-turn lane, sidewalks, and on-street striped bike lanes that forms the project area northern boundary. The Washington County Transportation System Plan (TSP) indicates NW Cornell Road would become a 4-5 lane arterial if improved to the designated standard. TriMet Bus line 48 provides service on NW Cornell Rd. NW Cornell Rd connects with NW Science Park Drive via a signalized intersection with crosswalks and a pedestrian-activated signal.

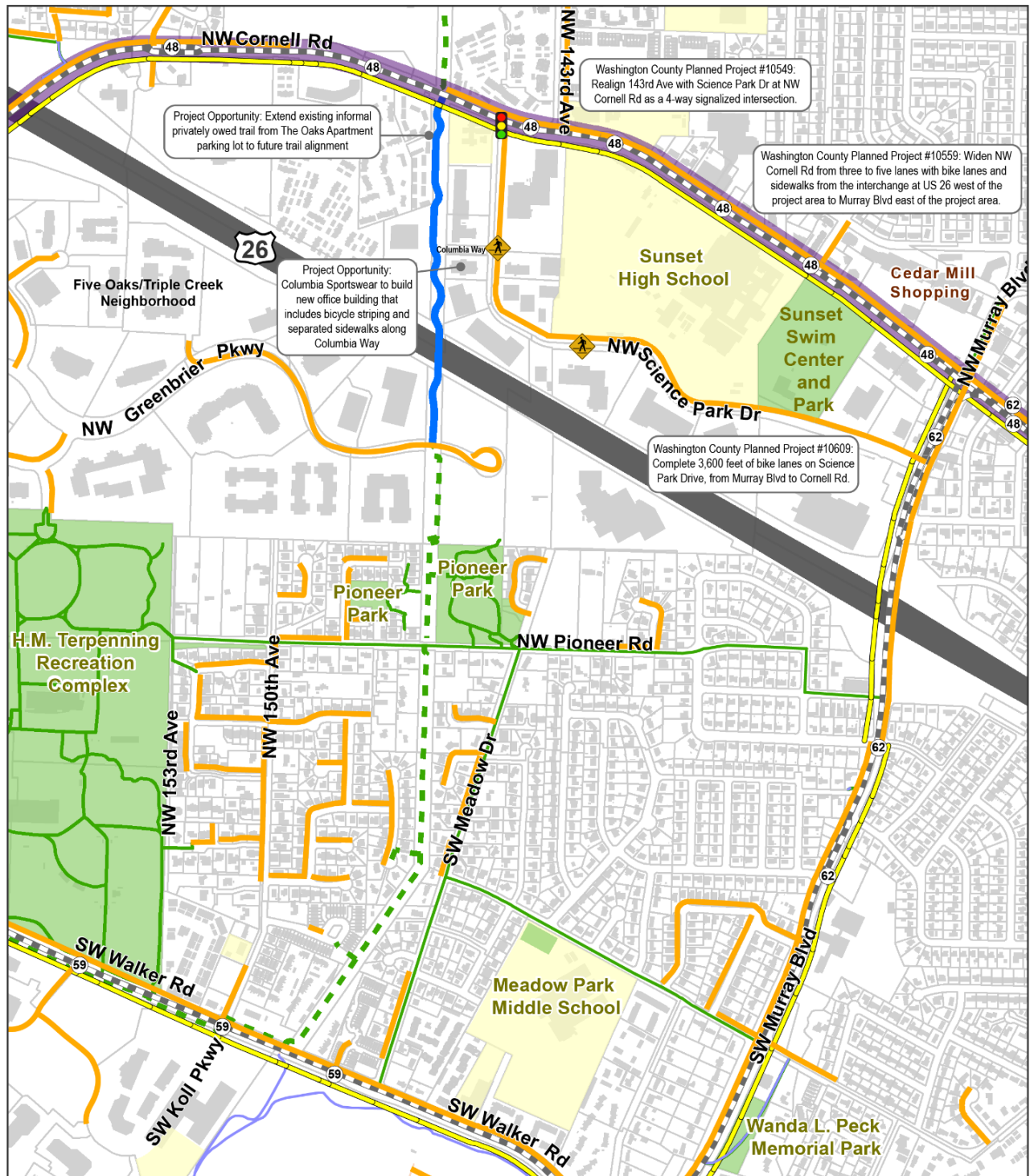
NW Science Park Dr is a 35 mph 2-lane collector under City of Beaverton jurisdiction, with center turn lane, striped bike lanes, and sidewalks, that provides access to adjacent offices, commercial buildings, Sunset High School, and the THPRD Sunset Park Sports Complex directly east of the project area. A mid-block rectangular rapid-flashing beacon (RRFB) protected pedestrian crossing is located on NW Science Park Dr at Columbia Way. Columbia Way is a 2-lane private street with sidewalks that bisects the project area and serves as an accessway between buildings and parking areas within the Columbia Sportswear campus.

Jacobs prepared a Travel Data Analysis Memorandum in October 2020 that describes analyses performed for the project using StreetLight proprietary, anonymous smart phone data from 2018 to better understand how people travel in the area, especially those walking, rolling, and biking, estimate usage of the new crossing, and understand potential equity impacts. The analysis revealed several key findings:

- Many individuals use active transportation – walking, with or without mobility devices, and bicycling - in the project vicinity. StreetLight data revealed there were nearly 70,000 pedestrian trips and over 1,700 bike trips every day, on average, that end within the two miles of the project and start within five miles.
- Relatively few of these pedestrians and cycling trips crossed US Hwy 26: 5.2 percent of pedestrian trips and 7.3 percent of bike trips. This appears to be because the highway acts as a barrier and requires out-of-the-way travel to get across. The nearest places to

the proposed bridge location that people can cross the highway are the overpasses for NW Murray Boulevard and NW Cornell Road. These overpasses are 1.2 miles apart and are not ideal for people walking and on bikes; they have narrow sidewalks, five motor vehicle travel lanes, and accommodate heavy traffic.

- Many people drive to the other side of the highway, and a large portion of those motor vehicle trips originated from a bikeable distance, less than 3-miles away. A new bridge would create a safe connection for people to comfortably make these trips without driving.



0 250 500 Feet



Figure 3: Existing and Planned Transportation Network

Figure 3

## Westside Trail Bridge Project Existing and Planned Transportation Network



### 3. Design Approach and Development

This section describes the alignment development process for the trail and bridge.

#### 3.1 Public and Stakeholder Engagement

Throughout the project development process, THPRD engaged project stakeholders and community members to provide information about the challenges faced by this project and to gather feedback to inform alternatives analysis and development. Though more engagement opportunities will be provided throughout the design and construction of the bridge, the following public and other stakeholders engagement activities influenced the project development:

##### *Stakeholder meetings*

- Two Property and Agency Stakeholder Meetings with attendance of 5 and 8
- Influence of Property and Agency Stakeholder Meetings on alternatives analysis and development:
  - Relays context-specific knowledge from stakeholders to the design team
  - Provides feedback on which preferred alternative given site constraints
  - Conveys landowners preferences and land acquisition feasibility to develop the selected alternative
  - Builds relationships with parties who have or may influence land acquisition and/or project permitting processes
  - Helps the project team identify specific design elements important to stakeholders and those they represent
  - Informs stakeholders and identifies emerging constituencies around design/alternatives

##### *Community meetings*

- Virtual Community Meeting 1 – Attendance: ~25.
- Outdoor, physically distanced In-Person Community Meeting 2 – Attendance: ~30
- Influence of Community Meetings on alternatives analysis and development:
  - Gather feedback on community preferences within emerging alternatives and designs
  - Provides community-wide perspective on how this trail may be used which can then be incorporated into design
    - Also provides community-wide perspective on destinations important to community members
  - Informs the public and helps to build a constituency around emerging designs/alternatives

##### *Online survey*

- THPRD conducted two surveys taken by over 250 respondents (88 respondents to the first and 162 to the second) to better understand how the Westside Trail is used, identify design themes to guide emerging alternative development, and preferred design treatments to inform bridge design. Through these surveys THPRD learned that traffic safety, accessibility, and mobility are the community's top concerns, and that the community is seeking a consistent look and feel in the final bridge concept design that balances the bridges' visual appeal with cost efficiency.
- Influence of community surveys on alternatives analysis and development:
  - Relays feedback on community priorities and preferences within emerging alternatives and designs to the project team
  - Identifies issues important to community members, such as attention to development cost, and relays those issues to the project team
  - Creates broader community awareness of the project for future public involvement activities

### *Letters of Support*

- THPRD has also received letters in support of developing the Westside Trail Bridge concept plan from the Sunset High School Principal (school in closest proximity to the project site) and a current Community Participation Organization (CPO) 7 member and former member of Metro's Westside Trail Advisory Committee.
- Influence of letters of support on alternatives analysis and development:
  - Identifies emerging constituencies around evolving alternatives

### *Other Activities*

- Presentations at CPO meetings
- Presentations to THPRD's patron-led Nature & Trails Advisory Committee and Joint Advisory Committee
- Presentation to the City of Beaverton's Bicycle Advisory Committee
- Engagement of ODOT, Metro, Washington County, and City of Beaverton staff in virtual design review meeting to provide an opportunity to provide input on the Preferred Alternative
- Influence of other public involvement activities on alternatives analysis and development:
  - Provided opportunity to gather additional information on public preferences in alternative and bridge designs
  - Identified emerging constituencies around evolving alternatives
  - Created opportunity to alter alternative and bridge designs based on feedback from current THPRD trail users

## 3.2 Developing the Alignment

In coordination with THPRD, the consultant design team developed and refined trail and structures, as well as horizontal and vertical alignment options through an iterative design process. The designers sought optimal geometry to successfully navigate design constraints while mitigating impacts.

Project constraints include identifying feasible locations for the bridge crossing over U.S. 26 and its foundations, while mitigating impacts to wetlands, adjacent properties, and underground utilities. Maintaining minimum clearances from utility towers and avoiding impacts to underground utilities that consist of a high-pressure gas line, a water main, and a fiber optic cable. The alignment is also constrained by the elevation allowed per ODOT's standard minimum vertical clearance of 17-feet-4-inches for overcrossing facilities.

## 3.3 Alignment Segments

Of the many initial alignments explored, two options emerged that best met the design criteria and construction feasibility. The two options vary by segment as shown in Figure 4. The project has five distinct segments (from south to north):

- A. South Trail
  - At-grade path that starts at NW Greenbrier and heads north to the south ramp
- B. South Ramp
  - This ramp consists of a fill slope starting near the utility towers located north of NW Greenbrier Parkway. The fill slope transitions to an MSE wall as it approaches the bridge crossing over U.S. 26. The MSE wall allows for the path to appropriately ramp up to the elevation needed to cross U.S. 26 without putting fill loads onto existing power poles.
- C. Bridge Crossing over U.S. 26
- D. North Ramp
  - This is a separate bridge structure that starts just north of the bridge crossing over U.S. 26 and ramps down over the wetland area. The bridge ends just north of the wetland area and south of Columbia Way.
- E. North Trail
  - Mostly at-grade path, with some cut, that runs from the north ramp to the intersection of NW Cornell Road



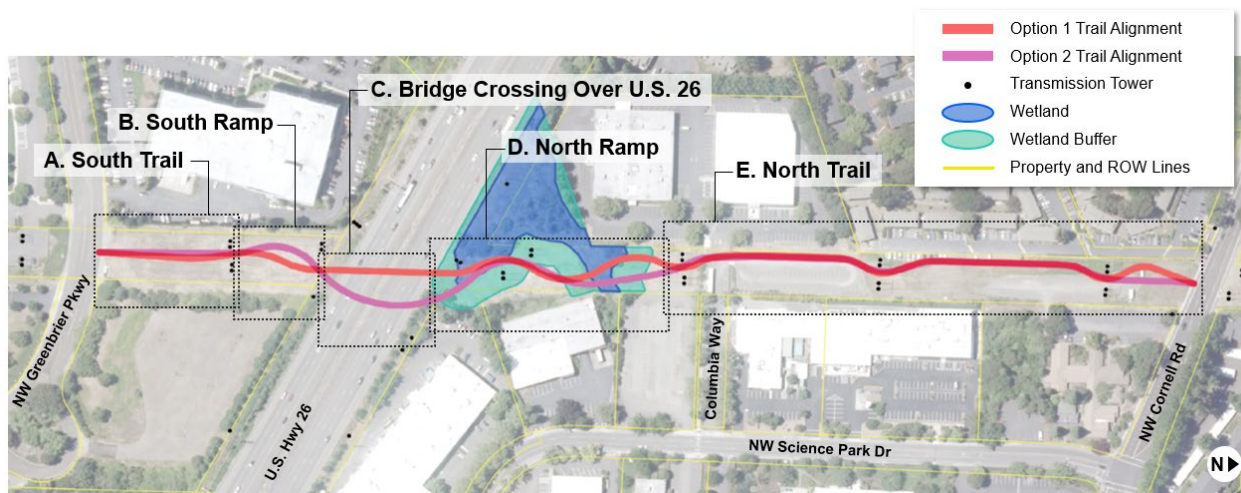


Figure 4: Alignment Segments

Please refer to the Project’s Alternatives Development Report in Appendix G for more details on the two alignment options, the design criteria, evaluation considerations, and guidance documents used in the development of the trail and bridge design.

### 3.4 Trail Design

The trail design was developed to meet ADA guidelines and provide safe and easy movement, safe and convenient trail crossings, wayfinding signage, and include access for ongoing maintenance.

The basic design of the trail includes a 12-foot-wide path and 2-foot-wide shoulders, following the trail cross section from THPRD’s 2016 Trails Function Plan, as shown in Figure 5. ADA accessibility guidelines such as a running grade of less than 5% and a minimum cross slope of

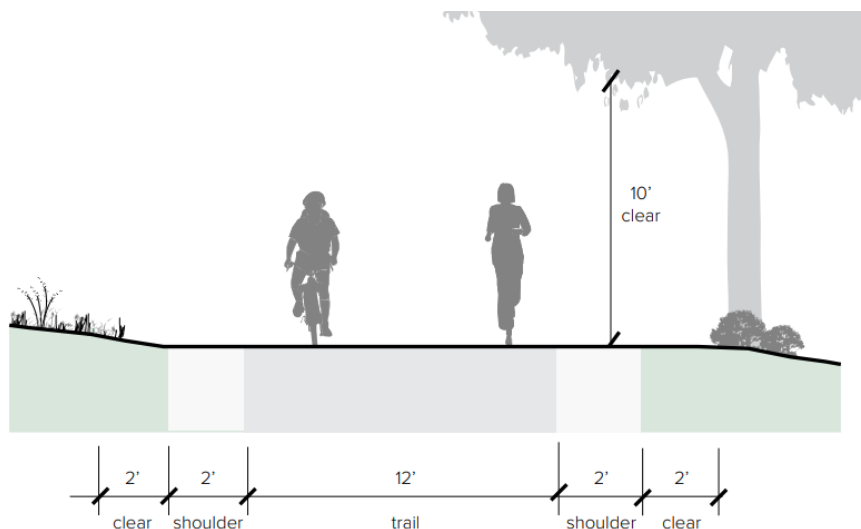


Figure 5: Trail Cross Section - Source: THPRD Trails Functional Plan, 2016

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1% and no stairs are also included in the design. Please refer to the Draft Trail Concept in Appendix A for more detail on the trail design.

## **4. Preferred Alternative and Work to Carry into Final Design**

The alignment development process, highlighted in Section 3, identified two options that met both the project criteria and the community's desires. Further analysis of both options led to the preferred alternative, developed by the community and refined through the professional expertise of the project team, and together reflecting the priorities of THPRD, ODOT, and the region.

This section highlights the preferred alternative, design considerations, and project elements, while also identifying further work needed as the project moves into final design.

### **4.1 Preferred Alternative**

The recommended concept as shown in Figure 6 includes the following elements:

- Straight N-S Bridge Crossing Over U.S. 26
  - Lower cost, easier to construct, shorter distance over highway, less ROW impact
  - Small additional wetland impact, when compared with Option 2
- Flatter approach
  - Community input showed the flatter crossing over U.S. 26, identified in Option 2, was preferred due to improved sight distance.
  - Potentially requires less earthwork on south approach
- Perpendicular approach to Cornell
  - Better visibility
- More detail/refinement for the preferred option on lighting, crossings, wayfinding, etc

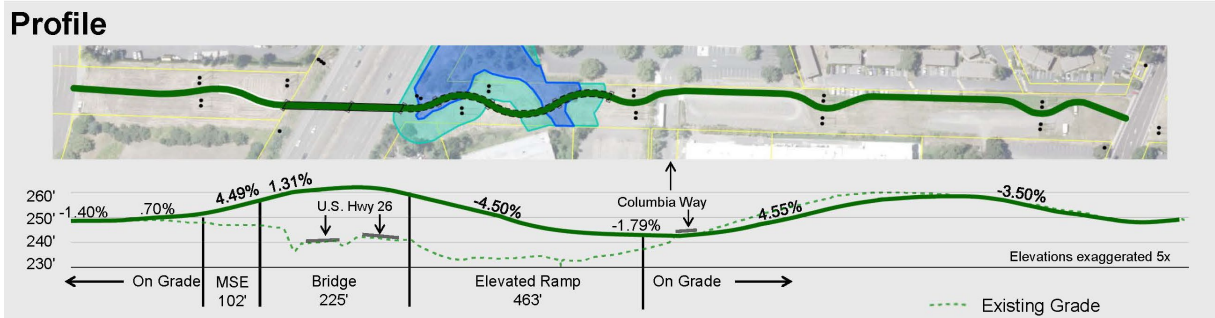
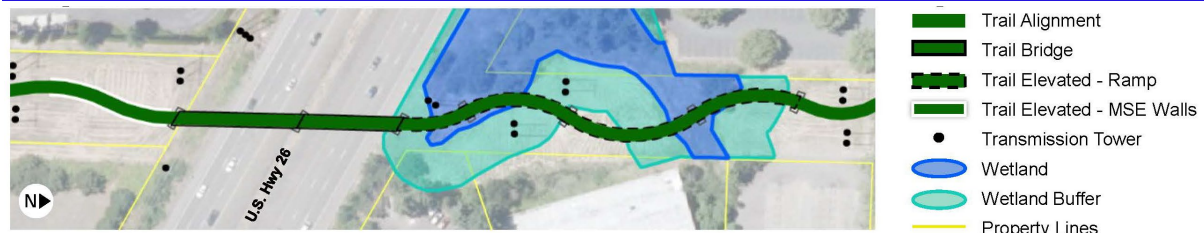


Figure 6: Preferred Alternative Profile

## 4.2 Preferred Alternative Bridge Measurements and Approximate Cost

Table 3 provides a summary of bridge measurements, vertical and horizontal curves, project impacts, and preferred alternative approximate cost.

Table 3: Preferred Alternative Measurements and Approximate Cost

	Preferred Alternative
<b>Length, Total</b>	2,286 feet
<b>Width, Total</b>	12 feet
<b>Length of Elevated Ramps (north of bridge)</b>	462.25 feet
<b>Length of Bridge Crossing Over U.S. 26</b>	247 feet
<b>Length of MSE retaining walls (south of bridge)</b>	102 feet
<b>Minimum distance between elevated trail edge to BPA poles</b>	19.3 feet
<b>Minimum distance between elevated trail edge to PGE poles</b>	11.3 feet
<b>Horizontal Curve on the Bridge Crossing Over U.S. 26</b>	No
<b>Number of Private Properties Impacted</b>	0
<b>Permanent Wetland Impacts*</b>	20 s.f.
<b>Permanent Wetland Buffer Impacts*</b>	10 s.f.

<b>Temporary Wetland Impacts*</b>	710 s.f.
<b>Temporary Wetland Buffer Impacts*</b>	300 s.f.
<b>Approximate Cost</b>	\$9.9 to 18.6 million

\*Wetland impacts rounded to nearest 10 s.f. These values are for estimated excavation and do not account for equipment disturbances to the site.

### 4.3 Key Design Considerations for Bridge

The Jacobs bridge designers considered a number of factors that informed the recommended concept. The bridge crossing over U.S. 26 and the ramp on structure north of this bridge are both designed for pedestrian and non-motorized loads only. During the stakeholder agency design review meeting, a local agency representative questioned the limitation of the project to not accommodate emergency services vehicles. The Metro Westside Trail Master Plan reached a determination that the project would be designed to serve non-motorized trail users. THPRD’s leadership including their Board of Directors affirmed direction that the project would not need to accommodate motorized emergency or maintenance vehicles. Additionally, no consideration for maintenance or emergency vehicles on the bridges are provided for the following reasons:

- The geometry of the trail north of U.S. 26 was carefully “threaded” to meet ODOT design requirements for vertical clearance and ADA requirements for maximum allowable grades needed to meet the grade at Columbia Way. To meet these requirements, the trail curves horizontally at radii that is appropriate for bicyclists and people using mobility device, but that would not be safely accessible to a motorized emergency or maintenance vehicle. Designing for vehicle access across the north ramp would greatly impact the design, and likely render it infeasible to construct.
- The north ramp is designed using steel girders and Fiber Reinforced Polymer (FRP) deck panels. The deck panels are not intended for vehicles loads. To allow for vehicle loads a different deck material (likely concrete) would be needed. The FRP deck panels currently proposed were selected because they are lightweight and modular. These FRP deck panels minimize impacts to the wetlands during construction, allow for replacement of sections in the future, and reduce the overall structure weight, thus reducing the size of substructure elements. Switching to a different deck material would increase weight, the size of foundations, impact area to the wetlands, and the overall cost.
- For emergency responses not related to trail use, there are two adjacent crossings over U.S. 26 located at NW Cornell Road and NW Murray Blvd. that are vehicle rated. The proposed U.S. 26 crossing and north ramp are located between these existing crossings. Both existing crossings provide access for emergency responders and are located 1.25 miles apart from each other. Access via the proposed U.S. 26 crossing and north ramp would not substantially improve emergency response time.
- For emergency responses related to trail use, emergency vehicle and maintenance vehicle access on the south is available up to the first bridge support (at U.S. 26) and

access on the north is available up to the first bridge abutment (about 100' south of Columbia Way). This allows emergency responders to drive up the trail some distance on each side to access anyone needing assistance on the proposed U.S. 26 crossing and north ramp with a short walk. Only 710' of the trail would not be accessible by vehicle. Maintenance vehicle access across the bridge is not needed per THPRD.

Additional design considerations include:

- Bollards will restrict vehicle access to the bridge and therefore pedestrian live load (90 psf) is the only live load that needs to be considered.
- The bridge crossing over U.S. 26 requires throw barriers, a clear width of 14 feet, a vertical clearance of 10 feet above the bridge deck, and a vertical clearance of 17 feet, 4 inches below the bridge.
- The bridge crossing over U.S. 26 requires "Operational" and "Life Safety" seismic design since it spans U.S. 26.
- The north ramp bridge requires only "Life Safety" seismic design since it does not span an active ODOT highway. However, final design may want to consider designing the ramp for "Operational" criteria since both bridges interact during a seismic event.
- The area north of U.S. 26 is predominately wetland, and to minimize impacts, it is important that bridge foundations be as small as possible. Additionally, construction equipment used should be as small as possible to minimize impacts. To achieve both goals, the bridge will use micropile supported foundations and lightweight deck materials. The lightweight deck material reduces the need for larger equipment and reduces seismic loads. The reduction in loads, combined with efficiency of piles, makes for smaller foundation and less overall construction footprint.
- There is liquefaction potential at the site; as such, preliminary design of the micropile foundations supporting bridge spans includes downdrag load.
- Due to the many overhead power lines, driven piles and drilled shafts have been considered infeasible based on the required construction equipment. Micropiles are recommended for support of bridge foundations.

#### **4.4 Bridge Plan Summary and Constructability**

The Bridge Plan and Elevation sheets for the proposed design have been prepared to ODOT standards and are presented in Appendix B. The plan sheets show overall geometry for the bridge, the structure types, clearance over U.S. 26, plan locations for utilities, and support/foundation types.

Constraints near the bridge location make constructability an important consideration, as bridge construction and installation must consider the overhead power lines, impacts to the large volumes of traffic on U.S. 26 and the wetlands in the project area.

One potential option for construction is to "launch" the spans by rolling the prefabricated bridge sections lengthwise into place. Another option would be to install temporary supports behind guardrail that protects vehicle traffic. This will allow the spans hoisted to be shorter than the full bridge length. The shorter segments could then be installed with forklifts from below during

night closures of the highway and eliminate the use of cranes. The spans could be assembled off-site and trucked in for hoisting.

## 4.5 Stormwater Management

Early in the project development process, Jacobs contacted ODOT and Clean Water Services (CWS) staff for any updated information and guidance on these agencies' project approvals/permitting policies including those regarding water resources. Clean Water Services reviewed and offered feedback that we incorporated into our stormwater management strategy.

Jacobs also coordinated with THPRD, the consultant team's bridge and trail designers, and with Jacob's water resources engineer to engage in and advise the evaluation and recommendation of stormwater management techniques and facilities. THPRD and consultant team designers and water resources engineer held an initial project introduction and coordination meeting with CWS including their Development Services Supervisor, Environmental Plan Review Project Manager, and Engineering Plan Review Project Manager to introduce and discuss the project, and to seek guidance and confirmation of Jacobs' interpretation of regulations, impact thresholds and mitigation goals, and to inform THPRD's strategizing for future design phase negotiations concerning any necessary compensatory measures associated with permitting.

A Stormwater Management Strategy Memo was developed to describe the stormwater management considerations for project. The memo summarized data collection and review, field investigation, and the standards required for storm and surface water management. Stormwater management design will be based on the requirements of Clean Water Services (CWS), Oregon Department of Transportation (ODOT), and federal requirements related to the Endangered Species Act (ESA). Please refer to the Stormwater Management Strategy Memo in Appendix H for more detail.

## 4.6 Wetlands

Permanent and temporary impacts to the wetland area and the buffer around it are fairly minimal. Not accounting for temporary impacts from construction equipment, the impacts are summarized into two areas and shown in Table 4.

- Temporary Impact Areas: 710 SQFT for Wetland and 300 SQFT for Wetland Buffer
- Permanent Impact Areas: 20 SQFT for Wetland and 10 SQFT for Wetland Buffer.

Table 4: Wetland Impact Excavation and Backfill Areas

Location	Excavation			Backfill		
	Wetland	Wetland Buffer	Outside	Wetland	Wetland Buffer	Outside

	[cu-yd]	[cu-yd]	[cu-yd]	[cu-yd]	[cu-yd]	[cu-yd]
Bent 3	0.0	43.0	0.0	0.0	33.0	0.0
Bent 4	50.2	0.0	0.0	39.8	0.0	0.0
Bent 5	0.0	12.9	56.0	0.0	11.0	47.5
Bent 6	110.6	0.0	0.0	102.4	0.0	0.0

## 4.7 Anticipated Permits and Approvals

Several permits are anticipated for project construction, including local, state, and federal. For a full list of the permits and approvals, please refer to the Permit Matrix in Appendix E for more detail.

## 4.8 Environmental Conclusions

- **Air Quality** – Air quality analysis will not be needed to determine whether the project meets the Clean Air Act conformity requirements.
- **Archaeological Resources** – No known archaeological resources were determined to be present after a records research and a pedestrian survey with subsurface testing.
- **Biological Resources** – A wetland and perennial stream cover a portion of the BPA ROW north of US 26. There are no threatened and endangered species or critical habitat in the project area. Minimization and mitigation measures are expected to be feasible to incorporate into the project.
- **Hazardous Materials** – A Level 1 Hazardous Materials Corridor Study did not identify potential sites of concern thus a Level 2 study is not recommended unless the more detailed design changes the scope of the area.
- **Historic Resources** – Four built historic properties are present and two are potentially eligible for the National Register of Historic Places (NRHP). Section 106 compliant documentation will be required to determine whether the project would have an adverse effect. A Section 4(f) evaluation will be required if avoidance of adverse effects to the historic properties are not feasible and prudent.
- **Land Use and Zoning** – The project would entail permitting and review by both the City of Beaverton and Washington County. Local permits may be completed after finalization of a Documented Categorical Exclusion but would need to be completed before a Finding of No Significant Impact or Record of Decision.
- **Noise** – Noise-sensitive receivers including residences occur adjacent to the API, but a noise analysis for the project is not anticipated to be needed. It is anticipated that construction windows could be accommodated to offset construction noise impacts to residences.
- **Recreational Resources** – There will be no potential impacts to recreation resources or Section 4(f) resources. The addition of the trail segment will improve connectivity between large segments of a regional multi-use trail.

- **Socioeconomics and Environmental Justice** – The project will be an improvement to multi-modal and recreational opportunities for residents near the Westside Trail bridge or who work or go to school in the project area. Asian populations make up the largest nonwhite population in the project area (21 percent). This large Asian population contributes to a greater total minority population in the study area (32 percent) compared to Washington County (24 percent) and City of Beaverton (25 percent). The project area population has a higher median income than Washington County and Beaverton and no significant low-income population.
- **Visual** – Multi-family residential areas on the northwest end of the project area are sensitive viewing areas. It is not anticipated that visual impacts will be specified as a concern because the trail would improve the aesthetic characteristics of the ROW that is currently populated with parking lots and weedy grasslands.
- **Water Quality/Hydrology** – A water quality management plan for this portion of the API is being developed and unavoidable impacts to water quality and hydrology would be mitigated. The project will need to add stormwater management facilities per the ODOT *Hydraulics Design Manual* to achieve water quality performance expectations. Water quality certification is needed from the Oregon Department of Environmental Quality (ODEQ) as a condition of the federal Section 404 permit that will be obtained. Permits may be required from the City of Beaverton or Washington County for construction, operation, and maintenance of stormwater management facilities.
- **Wetlands** – There is one 1.02-acre wetland in the project area just north of US 26 and one non-wetland water of the state/United States (385 linear feet of a perennial stream). The final jurisdictional determination will be made by the U.S. Army Corps of Engineers (USACE). The project will be designed to minimize impacts to wetlands, but some fill of freshwater emergency and scrub-shrub impacts will be unavoidable and mitigated.

## 4.9 Further Work to be Carried into Final Design

### 4.9.1 Bridge Crossing Over U.S. 26 Deck Surface

The deck surface of the bridge crossing Over U.S. 26 will be finalized in future design. One option is concrete, which is durable but heavy. Another option is FRP panels, which are lighter and will reduce the dead load and seismic load, potentially reducing costs.

### 4.9.2 Ramp Span Fixity

The north ramp has been initially laid out assuming that each span is simply supported. This was done to allow each span to be fabricated, shipped, and erected independently. This approach results in deep girders and therefore slightly higher material costs. The north span could be refined in final design to be continuous over supports, allowing for a more efficient design. Providing continuity would allow for shallower girders and less overall weight. Details for this would need to be coordinated with local steel girder fabricators to ensure that the steel shapes can be rolled and shipped to the site.



### 4.9.3 Aesthetics

The bridge will be highly visible. In addition to trail users crossing over the bridge, approximately 148,000 vehicles travel daily on U.S. 26 at this location. Aesthetic elements may be incorporated into the bridge design, including the finish (paint or weathering steel), lighting, decorative panels, railing, approach wall finishes, and art. These items will be refined further during final design.

### 4.9.4 Steel Finish

Steel requires a finish to protect against rusting. Two common treatments are available: painted steel and weathering steel. Painted steel allows color choices but requires regular maintenance to keep the paint in good shape. Weathering steel develops a rusty patina that protects the steel with minimal maintenance. Either treatment could be applied to the bridge and will be determined in final design.

### 4.9.5 Utility Impacts

The proposed design, as currently detailed, impacts the north/south BPA overhead transmission lines, the east/west PGE overhead distribution lines at the north side of U.S. 26, an east/west overhead communication line at the south side of U.S. 26, and a group of east/west overhead communication lines at the north side of U.S. 26. Relocation and/or adjustment of these utilities will be required. Costs for raising the conflicted BPA power lines, undergrounding the conflicted PGE power lines, and undergrounding the conflicted communication lines has been included in the latest project costs. Relocation of several guy wires has also been included. The project team will work with BPA, PGE, and others in final design.

### 4.9.6 Vertical Profile over U.S. 26

A flatter bridge crossing over U.S. 26 would provide a shorter climb and better sight distance at the peak of the trail. The project team has developed a suitable vertical profile for the preferred alternative that addresses climb and sight distance and will be explored further as the preferred alternative moves into final design.

The flatter profile results in vertical curves at each end of the Highway 26 overcrossing. The feasibility of the vertical curves needs to be further explored with bridge fabricators. Depending on fabrication limitations, the vertical curves may need to be shifted off the prefabricated truss spans and could require a design exception for the trail geometry.

### 4.9.7 Geotechnical Investigation

Additional field explorations and analyses should be conducted for retaining walls and bridge structures in accordance with the ODOT's Geotechnical Design Manual requirements.

### 4.9.8 Easement Needs

While no property acquisition will be needed, Jacobs coordination with BPA included submittal of a preliminary Land Use Application for the Project. BPA is reviewing this application and will need to grant THPRD Land Use Approval for use of their fee owned land that is anticipated with applicable conditions. Additional work should also be

conducted to determine easement needs during the project construction phase with ODOT, Washington County, City of Beaverton, and Columbia Sportswear for temporary and long-term use of portions of their respective rights of way.

#### 4.9.9 Street Crossings

Street crossing/connections at NW Cornell Road, Columbia Way, and Greenbrier will be analyzed and designed in the next phase of the project. The project team will work with local jurisdictions and follow relevant guidance to ensure street crossings are safe, accessible, and designed to serve all users of the new bridge and trail. Conceptual layouts for each crossing can be found in the Draft Trail Concept in Appendix A.

#### 4.9.10 Illumination

Lighting for trail users will be incorporated where appropriate to address safety and security concerns, while considering potential impacts of lighting intensity on habitat and surrounding properties. While illumination details including specific types and aesthetics would need to be resolved during Final Design, the project design team will apply relevant design standards and guidelines and collaborate with THPRD to reach agreement on the most feasible and effective lighting to be incorporated into the Preferred Alternative for reasonable cost estimating and constructability considerations.

The south ramp, the bridge crossing over U.S. 26, and north ramp will all have bicycle railing along their edges to protect users from fall hazards. Lighting can be integrated into the railings to cast direct light onto the path and bridge deck without causing light pollution or glare. Integrated railing lights can also be supplemented with overhead lighting built into the bridge crossing over U.S. 26 to provide additional light if needed.

Lighting will be considered for both the southern and northern trail, utilizing traditional overhead light standards. Lighting will require further coordination and a potential project specific design standard so light pollution is minimized while also providing for safe crossings at night.

#### 4.9.11 Illustrative Site and Planting Concept Plan

An Illustrative Site and Planting Concept Plan can be found in Appendix D, which ensures that landscaping is minimal, clear visibility is provided, and maintenance access is facilitated. The potential to include public art may also be considered in final design.

#### 4.9.12 Wayfinding signage

Both the Intertwine Regional Trail Signage Guidelines and Metro's Livable Streets and Trails Guide provide technical guidance, not standards, in the planning, design, and fabrication of wayfinding signage along regional trails. Among the design guidance provided, Metro's documents states that:

- Street signs within the public right-of-way must follow the Manual on Uniform Traffic Control Devices (MUTCD) standards (Part 2 for signs in general and Part 9 for signs related to bicycles)

- Street signs should not obstruct sight lines and should be spaced appropriately so they do not block each other.
- Signage for transit users' needs to be coordinated with the local transit agency
- Text sizes should be large enough for people of all ages to see
- At intersections, provide decision signage, turn signage and confirmation signage (confirming route) for bicyclists.

A Wayfinding Plan for the preferred alternative was developed in accordance with the Intertwine Regional Trails Signage Guidelines document. Wayfinding sign locations are proposed at decision points located in this section of the trail as shown in the Bicycle and Pedestrian Analysis in Appendix C.

NW Greenbriar Parkway – distances to

- NW 158<sup>th</sup>
- Columbia Access Road
- NW Cornell Rd

NW Columbia Access Road – distances to

- NW Greenbriar Parkway
- NW Cornell Rd
- Sunset High School

NW Cornell Rd – distances to

- NW 158<sup>th</sup>
- Columbia Access Road
- NW Murray Blvd
- Sunset High School

Per the Intertwine Regional Trail Signage Guidelines, mileage markers should be provided every ¼ mile. Mileage markers have not been reflected at this time but should be incorporated at the next design phase.

## 5. Cost Estimate

A cost-based estimate has been produced for the preferred alternative. Cost-based estimates do not rely on historical bid data, but rather are based on determining the contractor's cost for labor, equipment, materials, and specialty subcontractor effort needed to complete the work. This is often called a "bottom-up" estimate. A reasonable amount of contractor overhead and profit is also included.

The cost-based estimate includes costs for construction of the path, MSE Retaining wall, truss spans, and ramp spans. The estimate also includes relocation/adjustment of utilities, construction of drainage facilities, potholing for an underground fiber optic line near the bridge, and potential amenities (such as bollards, artwork, paint/finishes, railing, lighting, signage, etc).

The current cost-based estimate has the preferred option at \$17,483,000<sup>1</sup>. The full estimate report, including assumptions and supporting documentation, can be found in Appendix F.

---

<sup>1</sup> Cost estimate of preferred option is in 2021 dollars and does not include design costs to complete final design, right-of-way, construction engineering and inspection, or owners' costs.

## **6. Appendices**

Appendix A. Draft Trail Concept

Appendix B. Bridge Plan

Appendix C. Bicycle and Pedestrian Analysis Report

Appendix D. Landscaping Concept Plan

Appendix E. Permit Matrix

Appendix F. Bottom-Up Cost Estimate

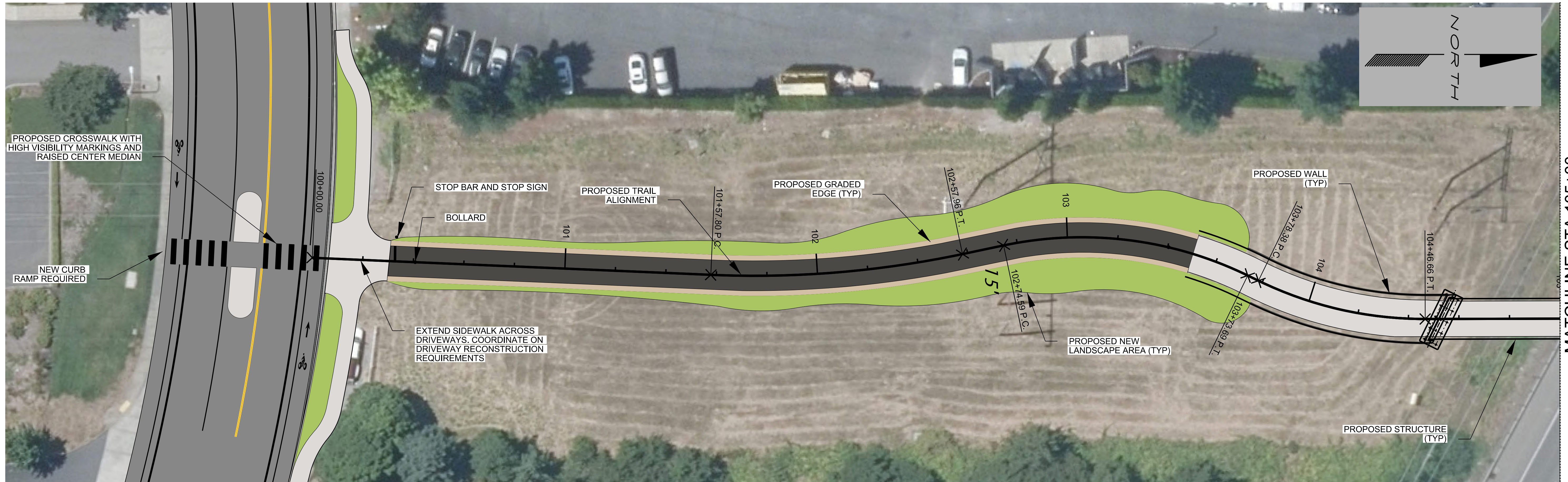
Appendix G. Alternatives Development Report

Appendix H. Stormwater Management memo

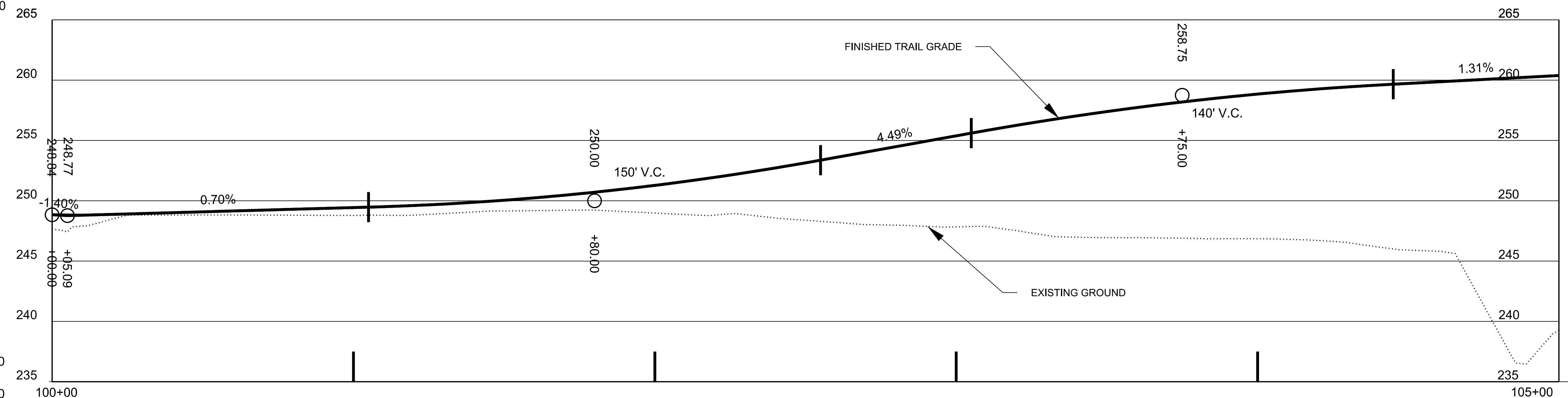
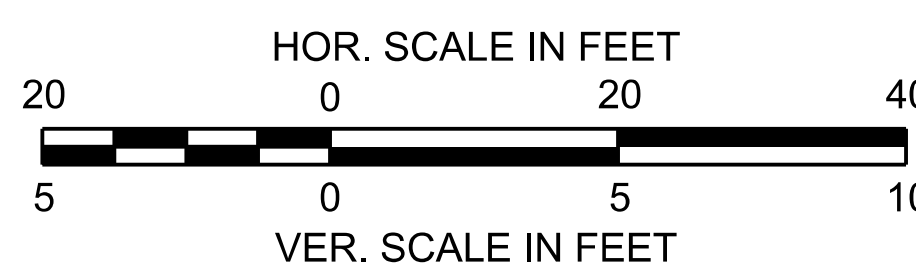
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**Appendix A. Draft Trail Concept**





MATCHLINE STA 105+00



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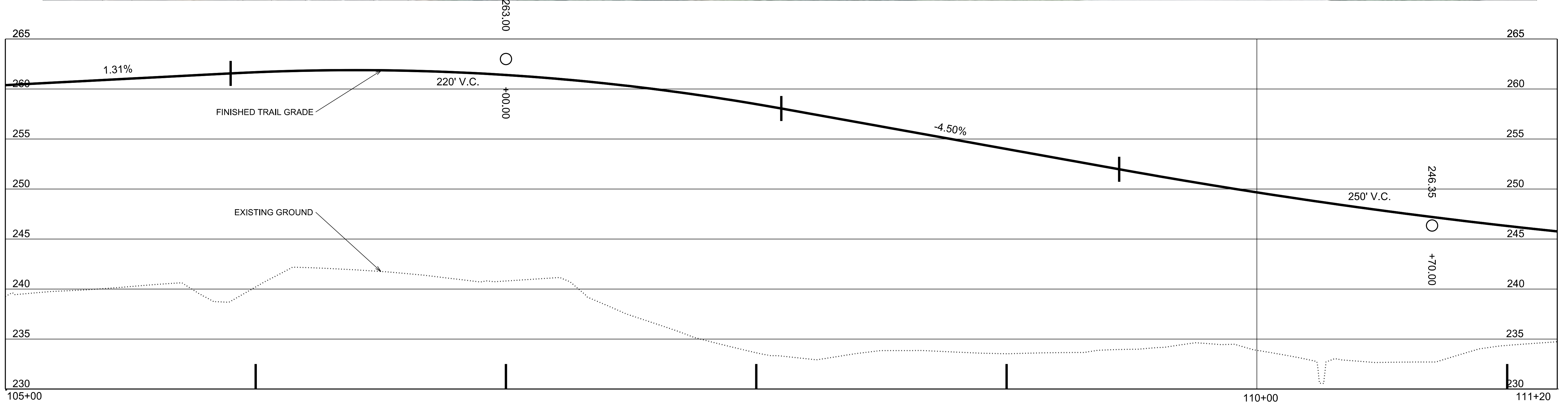
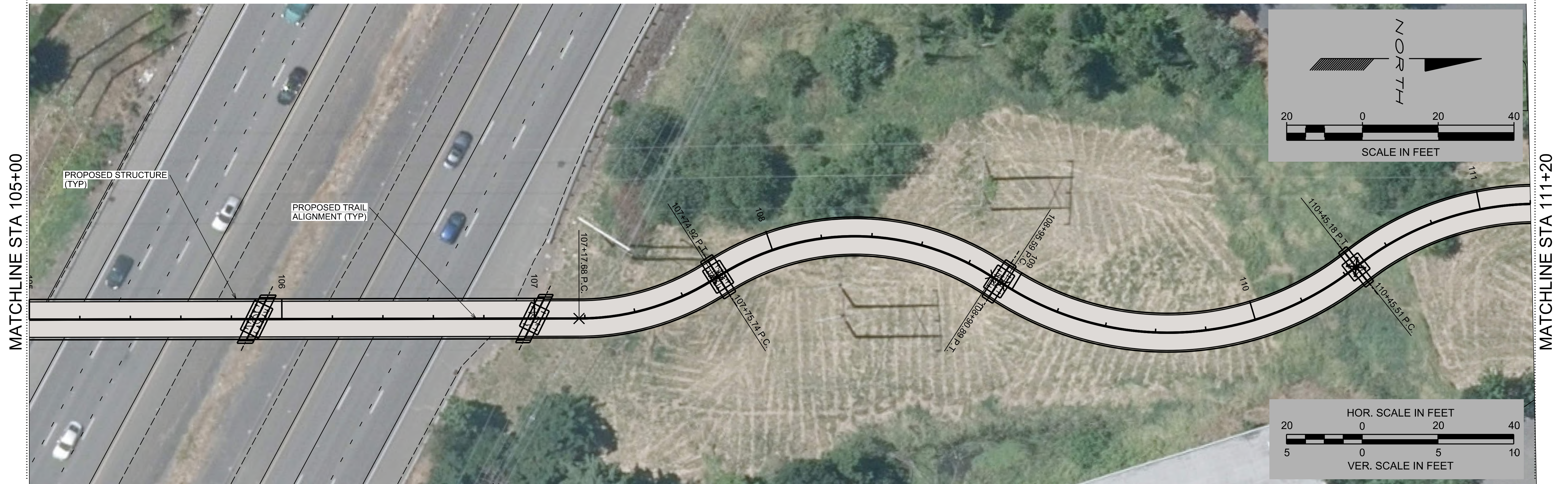
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TRAIL PLAN AND PROFILE	
C2	

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SHEET NO.	2 OF 6





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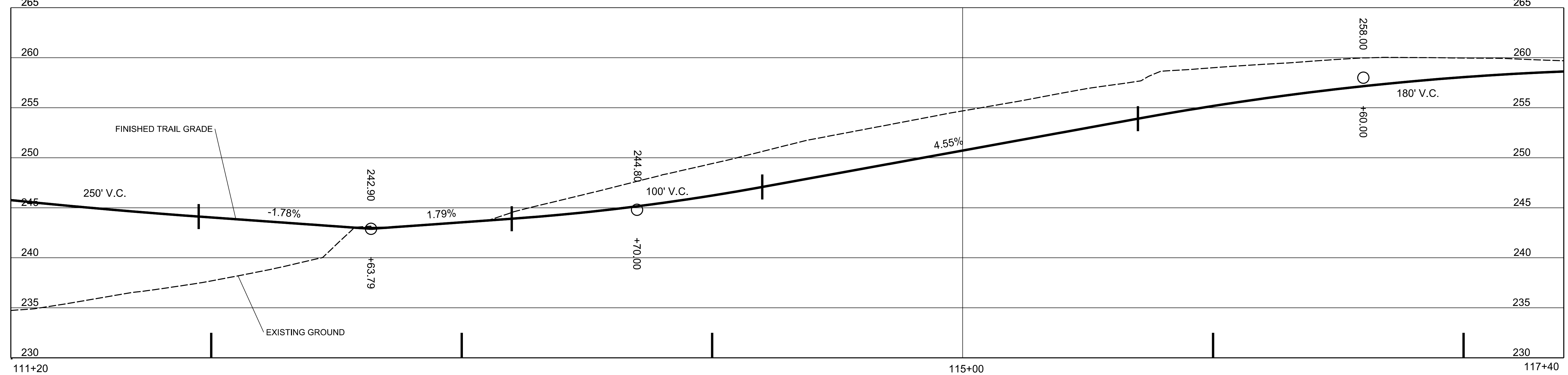
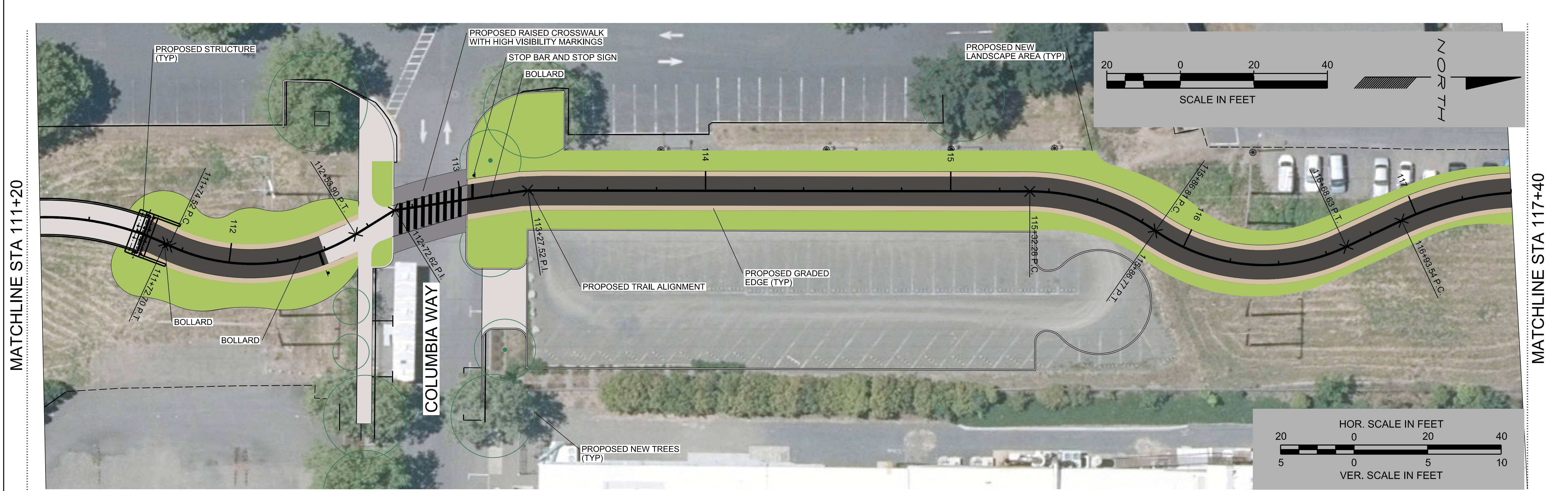
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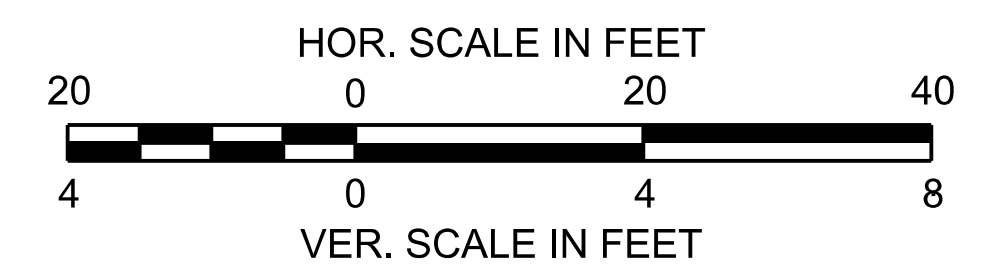
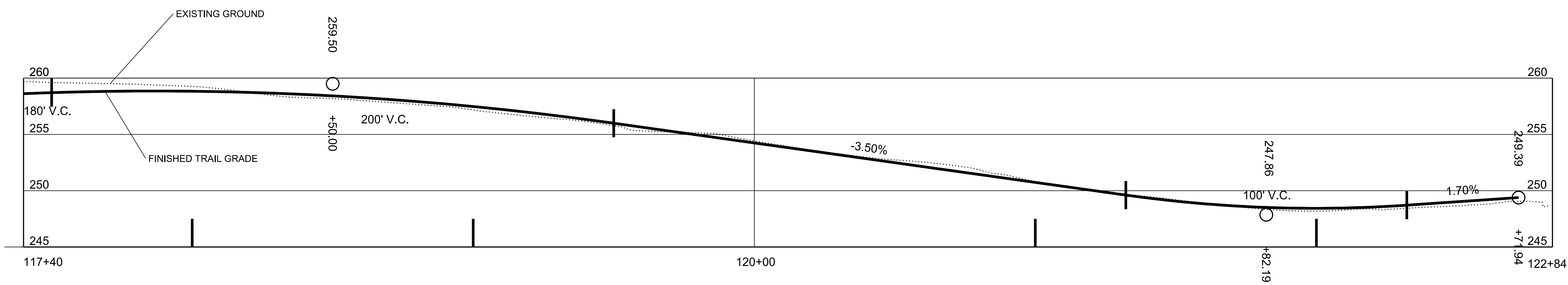
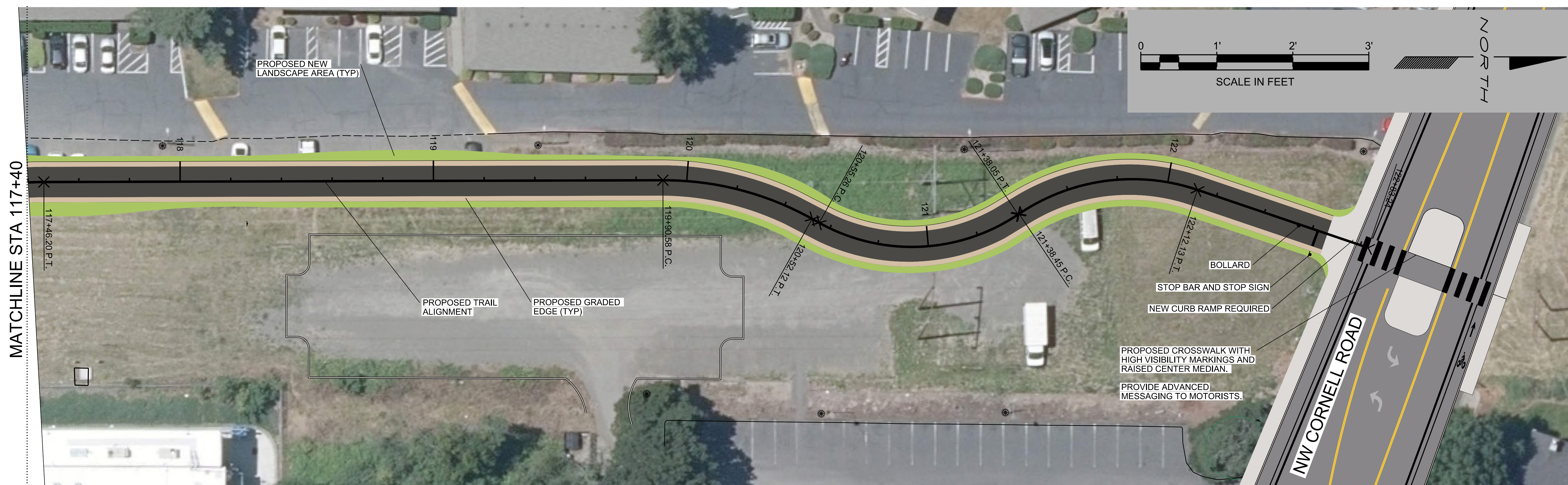
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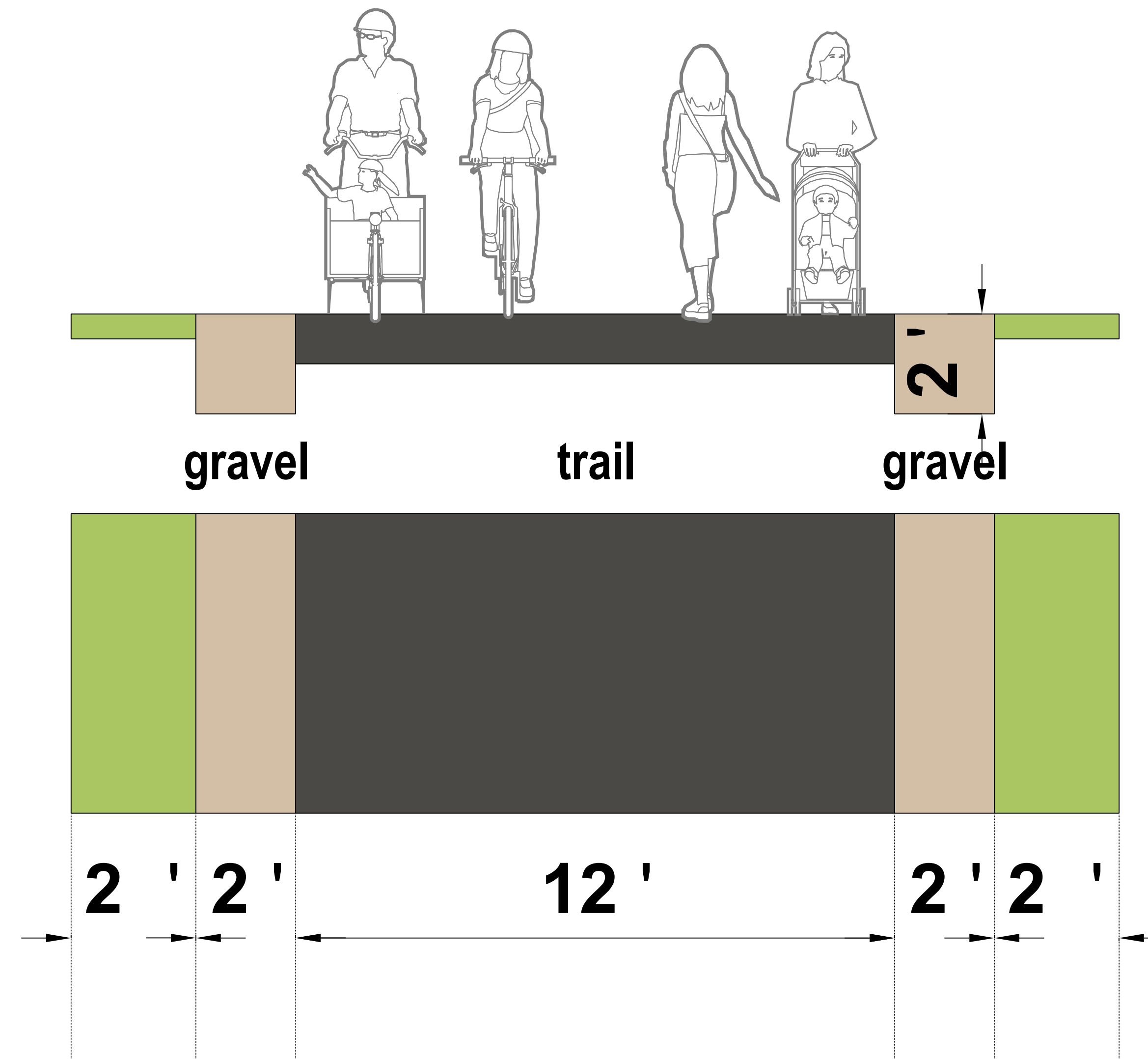
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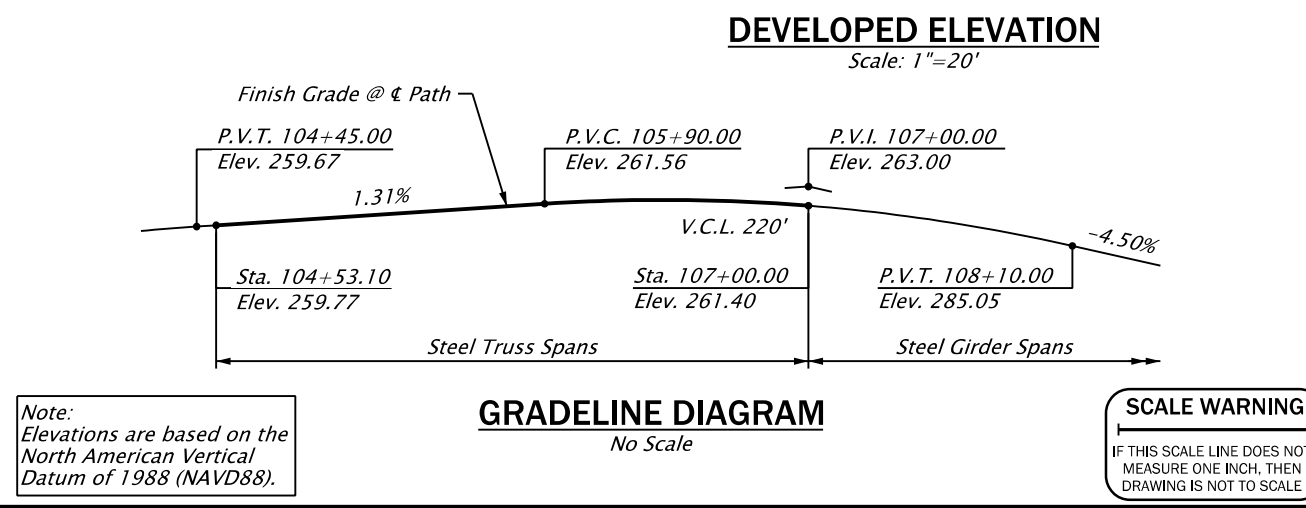
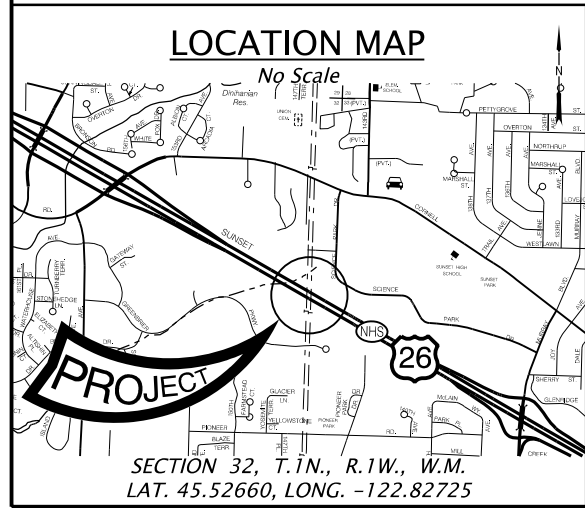
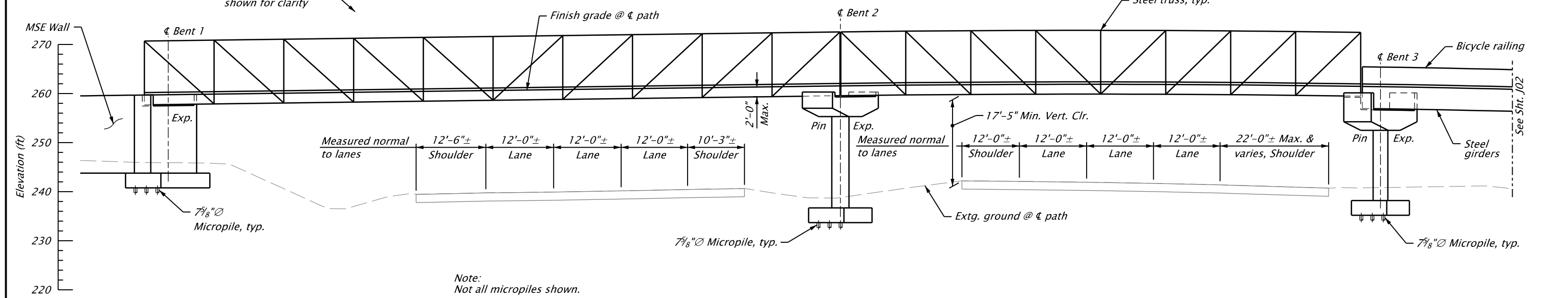
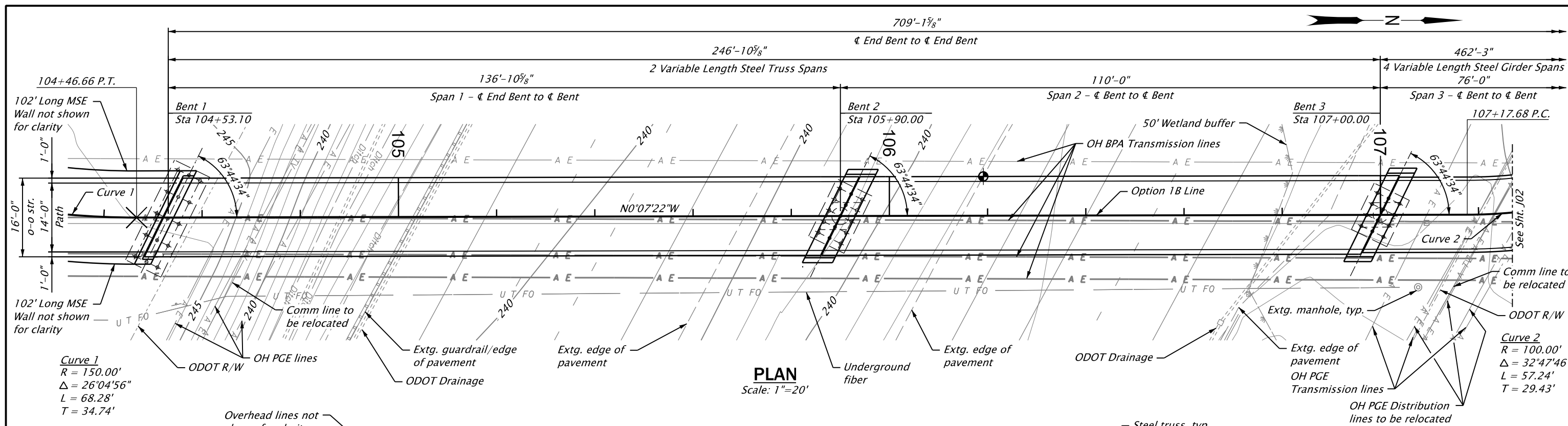
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## Appendix B. Bridge Plan



Accompanied by drawings:  
J02-J03

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M.P.: 66	
COUNTY	Washington
DATE	09/2021

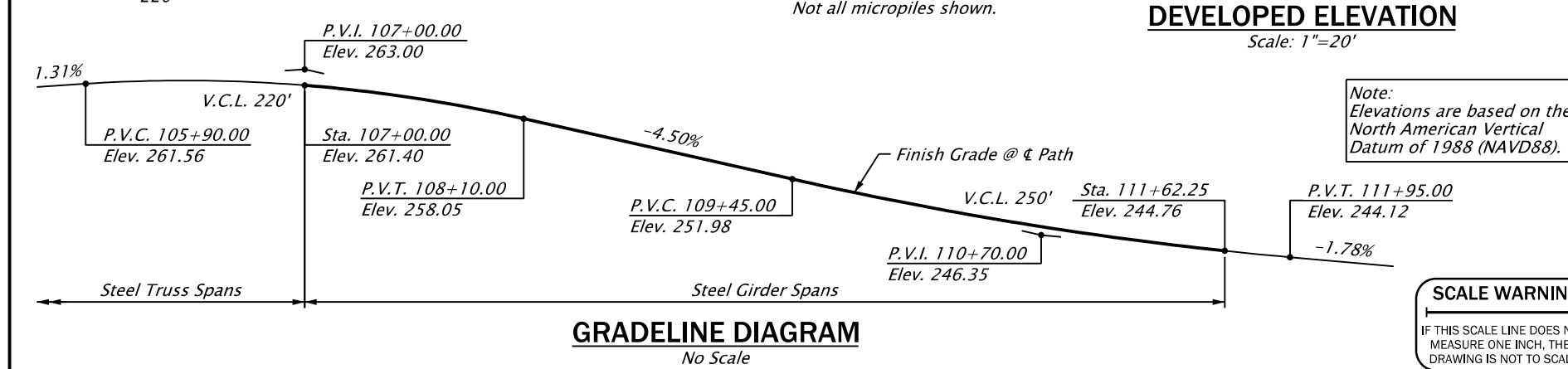
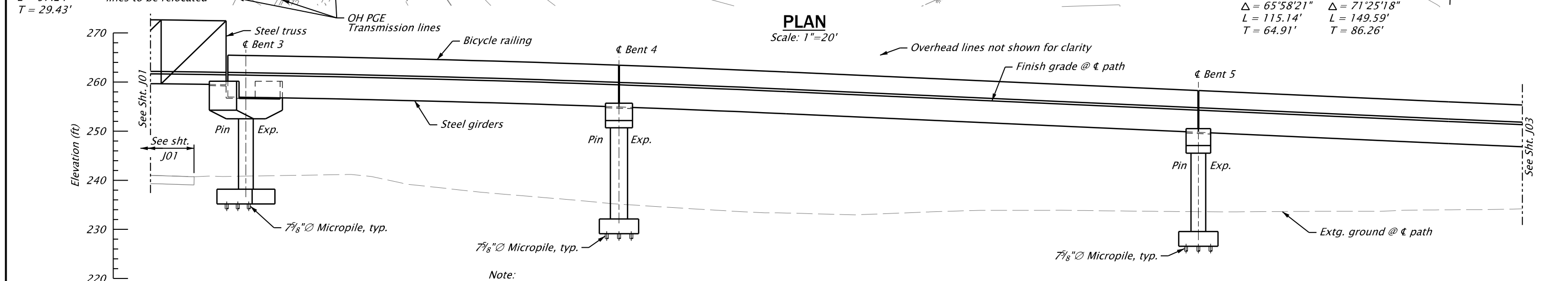
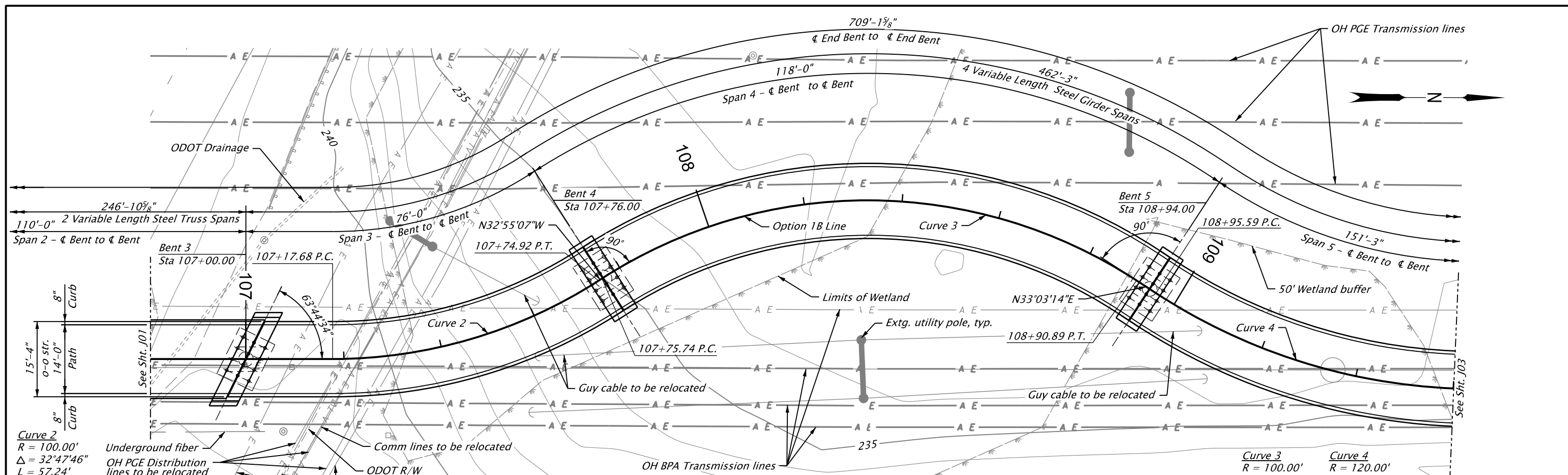
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 Point of minimum vertical clearance

**Jacobs**

HIGHWAY 47 AT MP 66  
**WESTSIDE TRAIL WITH BICYCLE AND PEDESTRIAN BRIDGE OVER US HIGHWAY 26 PROJECT**  
 US 26 SUNSET HIGHWAY  
 WASHINGTON COUNTY

Designer: Robbie Coomes      Reviewer: J.P. Loomis  
 Drafter: Daryl Monk      Checker: J.P. Loomis

**PLAN AND ELEVATION - TRUSS SPANS**      SHEET NO. J01



For accompanied by drawings, see sht. J01

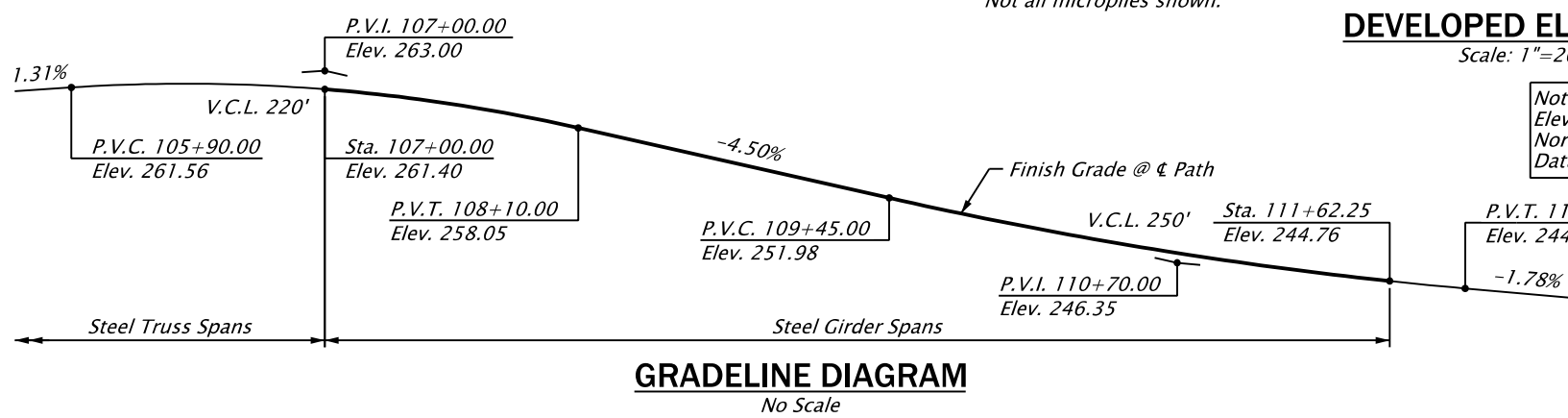
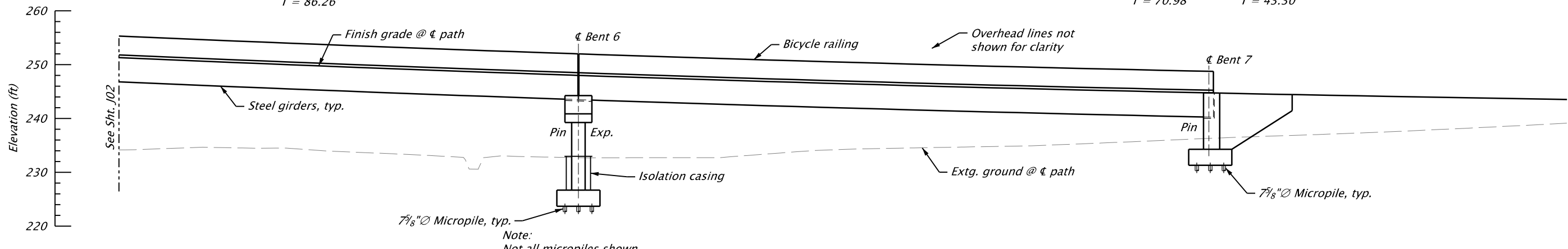
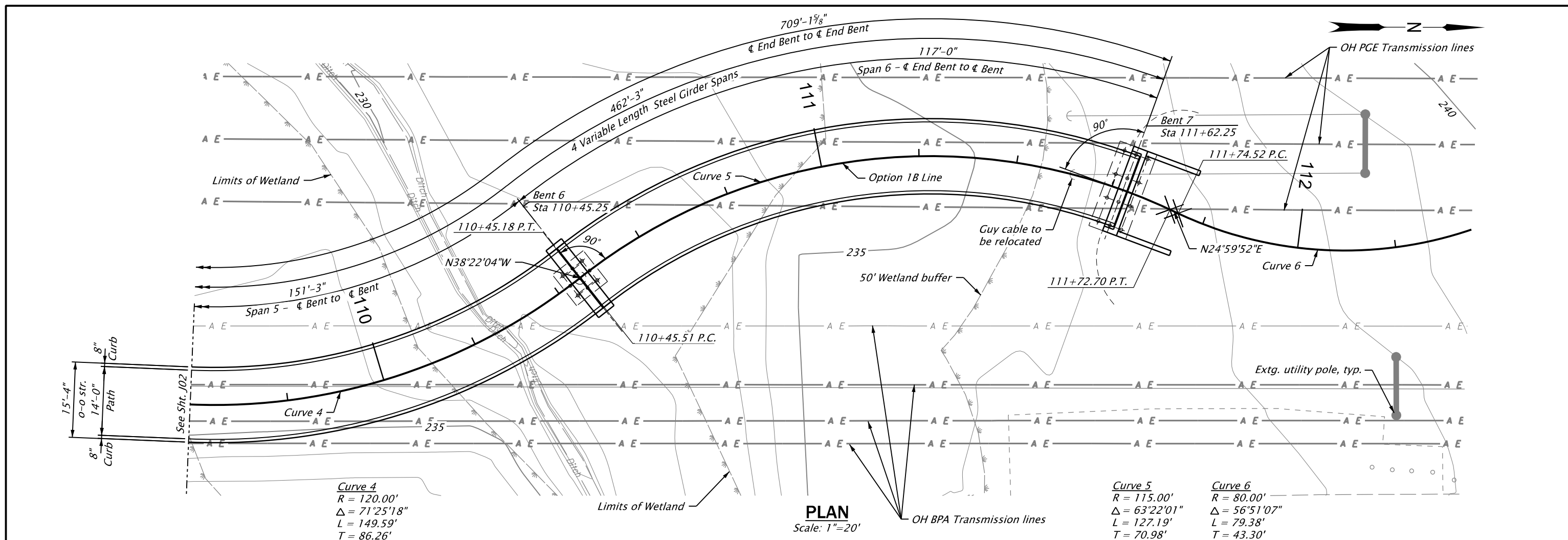
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M.P.: 66	
COUNTY	Washington
DATE	09/2021

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Note: Elevations are based on the North American Vertical Datum of 1988 (NAVD88).

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Drafter: Daryl Monk	Checker: J.P. Loomis	
		SHEET NO. J02



For accompanied by drawings, see sht. J01

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CALC. BOOK	XXXX
HWY: 047	
M.P.: 66	
COUNTY	Washington
DATE	09/2021

**PRELIMINARY COPY**  
**INFORMATION ONLY**

Designer: Robbie Coomes	Reviewer: J.P. Loomis	<b>PLAN AND ELEVATION - RAMP 2</b>
Drafter: Daryl Monk	Checker: J.P. Loomis	
		SHEET NO. J03

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**Appendix C. Bicycle and Pedestrian Analysis Report**

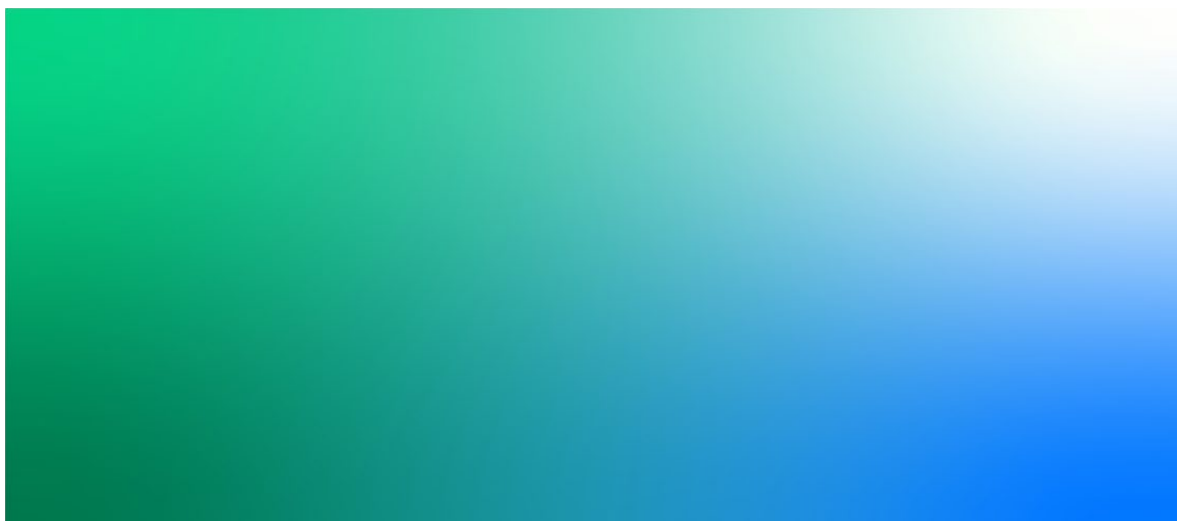
# Jacobs

**Westside Trail Bicycle and Pedestrian Bridge over Highway 26**

**Draft Bicycle and Pedestrian Analysis and Report**

July 2021

**Tualatin Hills Park & Recreation District**



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## Westside Trail Bicycle and Pedestrian Bridge over Highway 26, Washington County, Beaverton, Oregon

This project is funded by Tualatin Hills Park & Recreation District System Development Charge funds and the Metro Regional Flexible Fund. This document was prepared by Jacobs in collaboration with Toole Design.



Project No: D3314900  
Document Title: Bicycle and Pedestrian Analysis Report  
Revision: Revised  
Date: July 2021  
Client Name: Tualatin Hills Park & Recreation District  
Project Manager: Scott Richman  
Author: Stuart Campbell

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## **1. Project Introduction and Background**

Tualatin Hills Park & Recreation District (THPRD) is leading a feasibility study that includes conceptual design of a trail segment and pedestrian and bicycle bridge from SW Greenbrier Parkway to NW Cornell Road, spanning US Highway 26 also known as Sunset Highway (US 26) at Milepost (MP) 66.50 (Figure 1).

The Westside Trail Bicycle and Pedestrian Bridge (project) is a key linkage in the 25-mile regional Westside Trail that allows non-motorized transportation among schools, employment, housing, parks, community recreation centers, commerce, natural areas, and transit in Beaverton and surrounding areas of unincorporated Washington County, Oregon. Most of the project falls within the Bonneville Power Administration (BPA) utility right-of-way (ROW) and spans an Oregon Department of Transportation (ODOT) ROW.

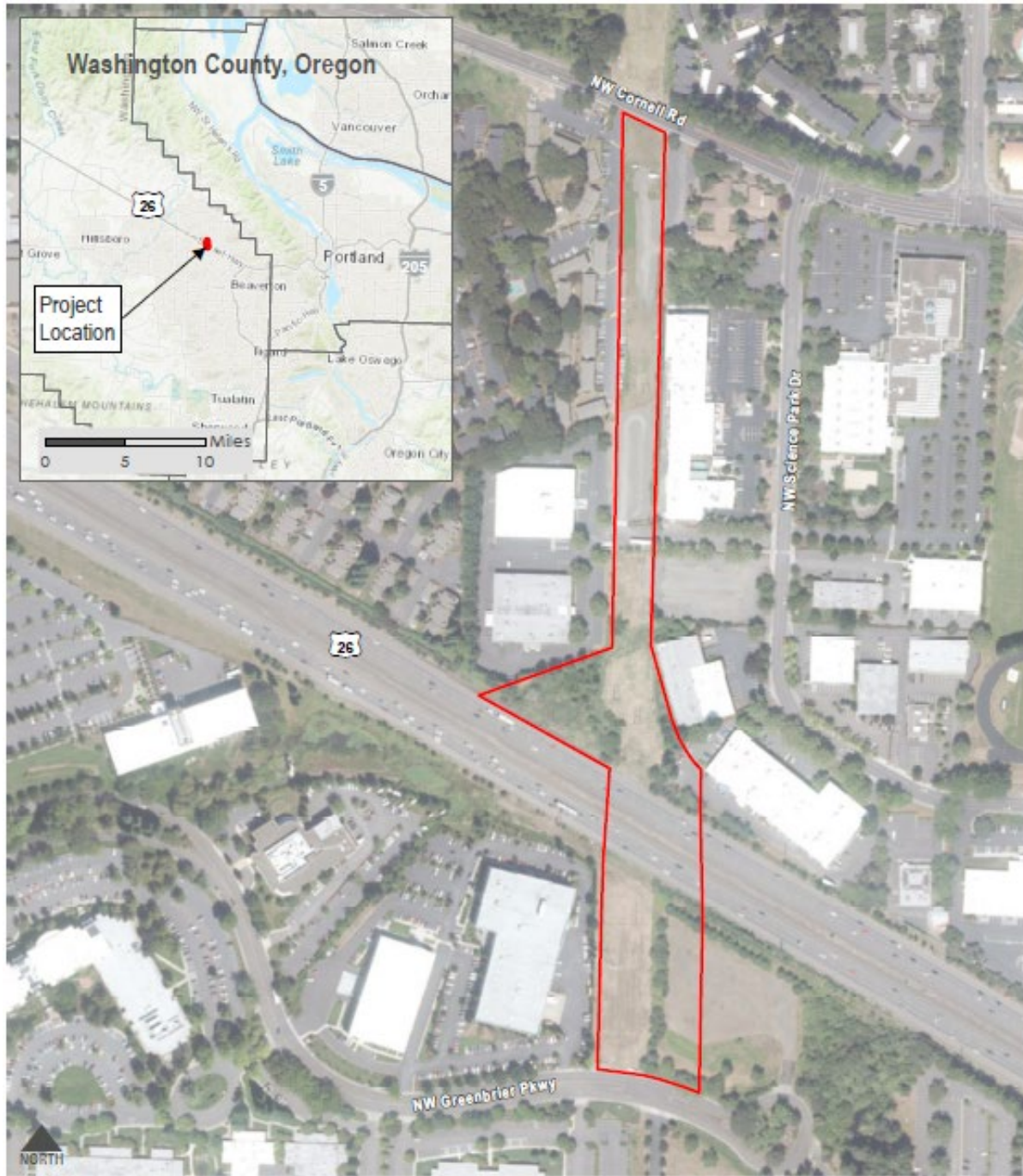


Figure 1

Westside Trail Bridge Project  
Location Map

0 100 200 300 400 Feet

Legend

Study Area

This report provides a high-level understanding of relevant planning projects around the Westside Trail and Bridge project area, pedestrian and bicycle traffic patterns, and access to the Trail and Bridge, highlighted through a wayfinding sketch. A Wayfinding Plan will be developed and integrated into the selected preferred alternative design concept.

The Westside Trail and Bridge is proposed midway between the existing highway crossings (which are 1.2 miles apart) in alignment with the future Westside Trail to the north and south of the highway, providing critical connections across the highway.

The project includes the following elements:

- Trail: 12-foot-wide paved trail segment and two-foot wide shoulders (16-foot total trail width) within the BPA ROW from SW Greenbrier Parkway to US 26 (0.1 mile)
- Bridge: Prefabricated steel truss bridge (14-foot wide path, between structural supports; 16-foot total structure width) designed for bicycle and pedestrian (non-motorized) users spanning US 26 at MP 66.50
- Bridge footings on the south, north, and median of US 26; approximately 250-foot long bent to bent
- The bottom of the Westside Trail and Bridge structure will be elevated at a minimum of 17 feet and 4 inches above the surface of US 26 to meet ODOT clearance requirements. This will be accomplished by a gradual incline on both the south and north approach to the crossing
- Trail: 12-foot-wide paved trail segment and two-foot wide shoulders (16-foot total trail width) within the BPA ROW from US 26 to NW Cornell Road (0.3 mile)
- Integrated landscape the length of the trail and bridge to accommodate stormwater runoff and landscaping requirements of the City of Beaverton and Washington County
- Pedestrian scale lighting

US 26 would not be closed during bridge construction but would likely experience lane closures. Construction is estimated to take approximately two years. Funding is not secured at this time.

## 2. Project Planning and Design Context

### 2.1 Study Area

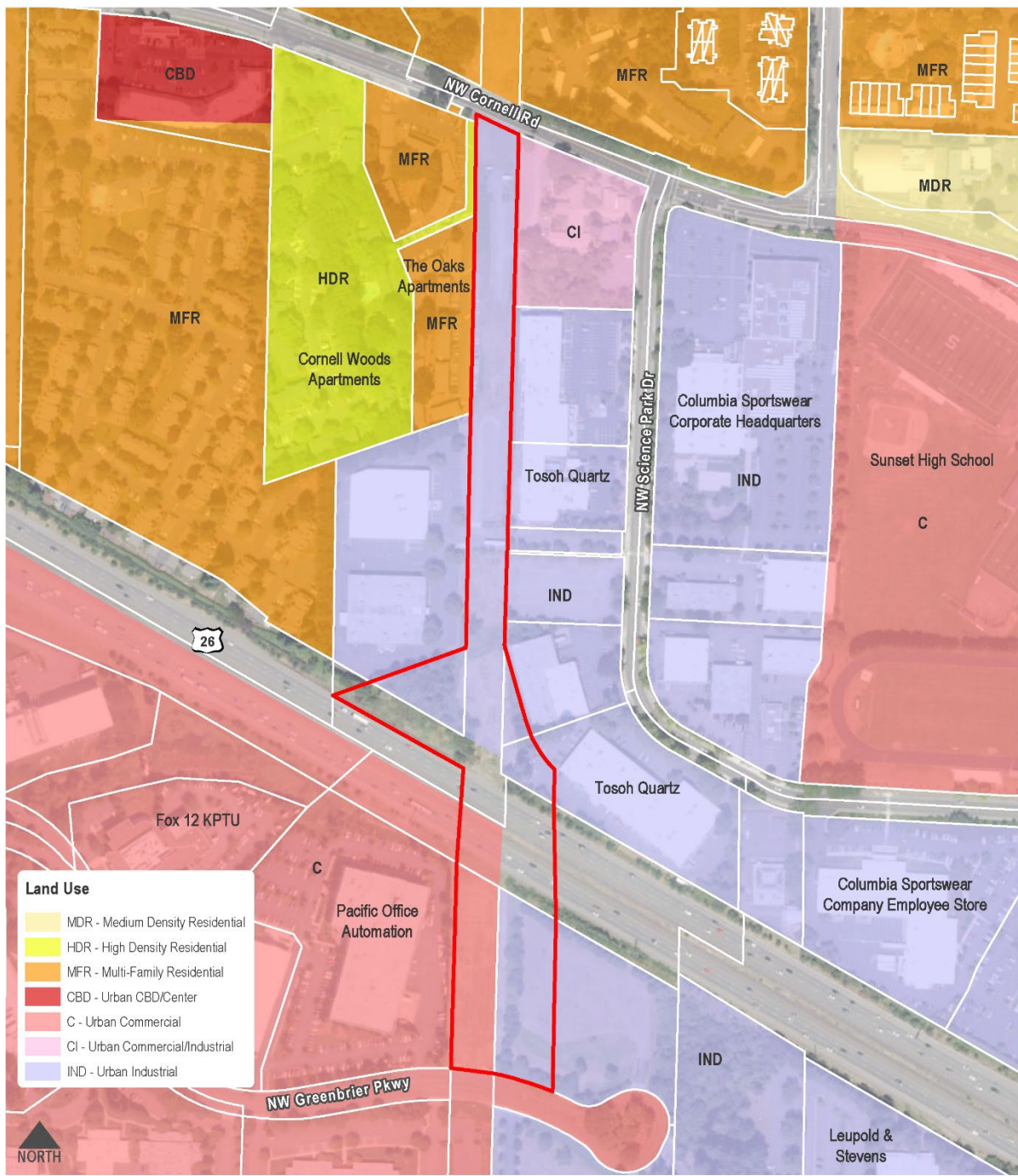
The Westside Trail is a vital regional asset, connecting neighborhoods and communities across Beaverton and Washington County. THPRD estimates that the trail attracts over 100,000 users a year. The purpose of the Westside Trail and Bridge is to link 25 miles of trail for people walking, running, and biking to reach popular destinations, including housing, schools, jobs, shopping, transit, parks, and recreation. A bridge over US 26 would also close a gap in the larger metro regional trail system.

#### 2.1.1 Land Uses and Key Destinations

Land uses in the area encompass both City of Beaverton and Washington County and generally follow the zoning classifications. Land uses along the project area of potential impact (API) consist of urban industrial, urban commercial, and multi-family (Figure 2).

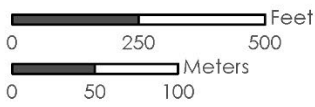
Key destinations within the City of Beaverton directly east and south of the project area include Sunset High School, Sunset Swim Center, and the THPRD Howard M. Terpenning Recreation Complex. Large employers include Pacific Office Automation and Nike Corporate Offices. Columbia Sportswear Corporate Headquarters is located within the Washington County boundary.





**Land Use**

- MDR - Medium Density Residential
- HDR - High Density Residential
- MFR - Multi-Family Residential
- CBD - Urban CBD/Center
- C - Urban Commercial
- CI - Urban Commercial/Industrial
- IND - Urban Industrial



Metro RLIS Land Use 2020

Figure 2  
Westside Trail Bridge Project  
Land Use



Figure 2: Westside Bridge Project Land Use Map

### 2.1.2 Transportation Network

The transportation network in the project area includes public transportation, bicycle and pedestrian facilities, collector and arterial roadways, and private office and commercial access roads (Figure 3).

#### *US Highway 26*

US Highway 26 (US 26) is a 6-lane 55 mph expressway under Oregon Department of Transportation (ODOT) jurisdiction that bisects the project area.

#### *North of US 26*

NW Cornell Road is a 40 mph 2-lane arterial with a center left-turn lane, plus sidewalks, and on-street striped bike lanes that forms the project area northern boundary. The Washington County Transportation System Plan (TSP) indicates NW Cornell Road would become a 4-5 lane arterial if improved to the designated standard. TriMet Bus line 48 provides service on NW Cornell Rd. NW Cornell Rd connects with NW Science Park Drive via a signalized intersection with crosswalks and a pedestrian-activated signal.

NW Science Park Dr is a 35 mph 2-lane collector under City of Beaverton jurisdiction, with center turn lane, striped bike lanes, and sidewalks, that provides access to adjacent offices, commercial buildings, Sunset High School, and the THPRD Sunset Park Sports Complex directly east of the project area. A mid-block rectangular rapid-flashing beacon (RRFB) protected pedestrian crossing is located on NW Science Park Dr at Columbia Way.

Columbia Way is a 2-lane private street with sidewalks that bisects the project area, and serves as an accessway between buildings and parking areas within the Columbia Sportswear campus.

#### *South of US 26*

NW Greenbrier Parkway is under City of Beaverton jurisdiction and is a 30 mph 4-lane, local road with a sidewalk on the south side of the street that forms the project area southern boundary. Other roadways south of US 26 are access roads connecting parking lots or providing access to office buildings.

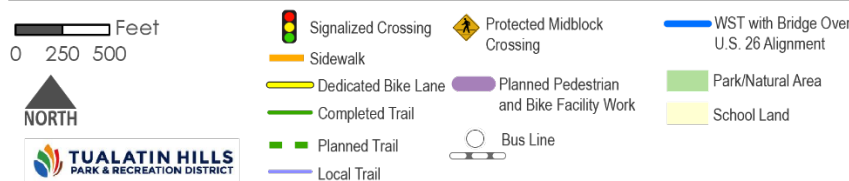


Figure 3  
**Westside Trail Bridge Project**  
Existing and Planned  
Transportation Network

Figure 3: Westside Bridge Project Existing and Planned Transportation Network Map

## 2.2 Applicable Plans and Guidance

Several plans and documents were used to understand the context of the project area and how previous planning efforts have laid a foundation for the new trail and bridge. Below are short descriptions of each document reviewed and incorporated into this report and the broader project.

### 2.2.1 THPRD

#### *THPRD Trails Functional Plan*

The THPRD 2016 Trails Function Plan (TFP) supports implementation of THPRD's Comprehensive Plan. The TFP replaces the 2006 Trails Master Plan and makes new recommendations for THPRD's trail network and trail design standards and new trail prioritization. The TFP lists the bridge crossing as a medium priority. The trail development criteria identified in this Plan helped guide THPRD filling the gap in the Westside Trail by building the new bridges.

### 2.2.2 Metro

#### *Designing Livable Streets and Trails Guide*

Metro's Livable Streets and Trails Guide was completed in October 2019 and supports the implementation of Metro's 2040 Growth Concept by providing guidance for designing, constructing, and maintaining the region's transportation system, including streets and trails. The Westside Trail and Bridge Project incorporated the trail design and development guidance from this document.

Key elements of a regional trail:

- They connect multiple destinations such as centers, parks, and natural areas, transit, and other regional trails
- They serve as important transportation connections for people walking and bicycling, and support longer bicycle trips, often traversing more than one jurisdiction
- They must be at least 75 percent off street
- They are usually multi-use paths for non-motorized users

In addition to the key elements listed above, the Metro Livable Streets Guidelines details trail principles to consider. They include:

- Serve the anticipated users – understand what types of users and how many are likely to use the trail and design for it<sup>1</sup>

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<sup>1</sup> The project team utilized StreetLight data to help determine and plan for anticipated users.

- Provide safety and security – trail design needs to consider safety in terms of protecting against crashes and security in terms of crime
- Integrate trails with the street system and neighborhoods – consider the alignment based on context and by utilizing available right of ways, avoid flood plains and foster local involvement in the creation and connectivity of the trail
- Fit the land use context – ensure that trails fit the context by ensuring slower speeds in busier areas and providing space to allow for the anticipated users
- Respect the natural environment – trail design should be harmonious with the existing wildlife habitat, avoid or minimize environmental impacts, and support trees and natural landscaping

#### *Metro Active Transportation Plan*

The 2014 Regional Active Transportation Plan (ATP) was adopted in July 2014, and provides a vision, plan, and policies for communities in the region to increase transportation options and support economic development, healthy active living, and equity. The Westside Trail and Bridge project helps to fill in gaps in both the regional bicycle and pedestrian networks identified in Chapters 7 and 8 of the ATP.

The Project also helps the region achieve many of its desired outcomes, by providing people safe and reliable transportation choices that enhance their quality of life, minimizing the region's contributions to global warming, ensuring future generations clear air, water, and healthy ecosystems, and providing equitable options across the region.

#### *Metro Regional Transportation Plan*

Metro's Regional Transportation Plan (RTP) was adopted in December 2018 and provides a blueprint for the future of transportation across the Portland region. Active transportation investments have become a growing focus around the region and the Westside Trail and Bridge project is identified within the RTP as a key near-term active transportation project, helping to fill a gap in the regional trail system and improve active transportation for people in the area, and specifically "to provide a continuous off-street active transportation route through the length of the mobility corridor."<sup>2</sup>

#### *Intertwine Regional Trails Signage Guidelines*

The Regional Trails Signage Guidelines manual was developed by Metro, Intertwine, and other partners to serve as a technical resource to guide parks and transportation agencies as they plan, design, and fabricate wayfinding signage along regional trails in the region. These guidelines were incorporated into the project wayfinding plan. They include sign placement, messaging, content, color, size, and typeface.

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<sup>2</sup> 2018 Regional Transportation Plan

### 2.2.3 ODOT

#### *ODOT Bridge Design Manual*

The Bridge Design Manual (BDM) provides a reference for preparing ODOT bridge design deliverables. The manual provided guidance in design standards, bridge type selection and layout, and design quality processes.

#### *ODOT Highway Design Manual*

Chapter 13 of the Highway Design Manual (HDM) provides a reference for designing pedestrian and bicycle facilities within ODOT ROW or designed through ODOT funding. The manual provided guidance in design standards, including maximum longitudinal grades, cross slopes, shoulders and safety railings.

#### *2021 Oregon Standard Specifications for Construction (ODOT-SS)*

The ODOT-SS is the most comprehensive reference for all matters pertaining to transportation infrastructure construction. It contains General Conditions that address the construction contractor solicitation process and contractual relationships, detailed Technical Specifications involved in construction, and Special Provisions.

### 2.2.4 Washington County

#### *Washington County TSP*

The Washington County's Transportation System Plan (TSP) was adopted in on September 26, 2019 and provides guidance on how to build, operate, and maintain Washington County's transportation network. It addresses a diversity of transportation needs while integrating social, economic, environmental, and livability desires. The County's TSP establishes active transportation as a goal among its transportation priorities and emphasizes the need for off-street trails: Objective 8.4 Assist partners in developing and maintaining an off-street trail and accessway network that serves both recreational and transportation functions.

Several strategies within Objective 8.4 mention working with Metro and THPRD to improve the trail network and connectivity and provide guidance in the development and design of trails:

- Strategy 8.4.3: Work with Metro, Tualatin Hills Park & Recreation District, cities, private developers and other entities to plan, map and improve countywide trail connectivity, including filling gaps in existing regional trails and planning new trails in areas lacking in these facilities
- Strategy 8.4.4: Designate a functional classification of existing and planned trails consistent with Metro and THPRD trail planning activities

- Strategy 8.4.5: For appropriate multi-use trails that are intended to serve a utilitarian function, encourage trail design and management solutions that facilitate the safe and efficient movement of trail users, including, but not limited to, the following:
  - A. Using surface materials that are durable, slip-resistant, watershed-friendly, and resistant to ponding
  - B. Avoiding or addressing flood-prone areas
  - C. Minimizing sharp curves and out of direction travel that increase travel times and create blind spots
  - D. In higher-density areas, installing pedestrian-scale trail lighting sensitive to surrounding land uses and wildlife habitat
  - E. Keeping trails legally open during night hours
  - F. Regular maintenance, surface repairs and debris clearing by the responsible jurisdiction
- Strategy 8.4.6: Explore trail provision and management solutions for areas of Washington County that lack a recreation district, parks department or other provider of trails

### *Washington County Street Design Update*

Washington County's Complete Streets Design Update involves the county's road design and construction standards, plan documents, and decision-making process to include design options that make roadways safe and accessible for everyone, including children, older adults, all income levels and ethnicities, those living with disabilities, and more. Complete streets support all types of travel: Vehicles, pedestrians, bicycles, wheelchairs and public transportation.

Designing for Complete Streets helps Washington County meet three important goals:

- **Balance:** Many streets do not have safe and comfortable access for everyone. Missing or poor sidewalks and bicycle facilities, limited crosswalks and wide streets with high speed limits can create an uncomfortable and potentially less safe environment.
- **Plan Implementation:** The TSP prioritizes Complete Streets design. It includes policies that support separate facilities for different users, when possible. This can include separated bicycle lanes and well-marked pedestrian crossings which can improve safety and accessibility.
- **Coordination:** Considering all transportation users in the design process can lead to better coordination with our partners including TriMet, utilities and school districts.

### *Clean Water Service Design & Construction Standards*

Adopted in November, 2019, CWS' current design and construction standards describe administrative and technical requirements for development and construction activities within

CWS' jurisdiction, and cover a range of topics including those relevant to this proposed project such as surface water management, erosion control, and natural resources protection.

### **2.2.5 City of Beaverton**

#### *Beaverton Active Transportation Plan*

The Beaverton Active Transportation Plan focuses on planning for a complete bicycle and pedestrian network that provides access to essential destinations, provision of routes for walkers and bikers of all abilities and providing connectivity to neighboring jurisdictions. This plan provided useful guidance on the Westside Trail and Bridge project for design considerations, trail width, lighting, and crossing treatments.

- Trail width of a regional trail should be 12-feet wide with a 1-foot buffer on each side
- Pavement markings can be used to indicate space for different modes, as well as for wayfinding
- Lighting should be used, but must be designed to avoid adverse impacts on wildlife
- Grade separated crossing – this type of crossing was used for the project because it the best solution when crossing roads with high vehicle volumes and speeds or where the path is naturally located on a different grade than the road
- Raised pedestrian crossing – this treatment was selected for this project to slow vehicles down by raising the roadway to be even with the sidewalk or trail. The high pedestrian volume on the new trail warrants this kind of treatment

This Plan identified several data points that emphasize the need for the Westside Trail and Bridge project as well. The Plan:

- Identifies key destinations near the project areas
- Shows that the area north of the project maintains one of the highest employment densities in the city at roughly 50 employees per acre
- Displays the active transportation infrastructure needs and identified this project area as a future trail

### **2.2.6 American Association of State Highway & Transportation Officials (AASHTO) Bike Guide**

The AASHTO Guide for the Development of Bicycle Facilities provides a reference for designing pedestrian and bicycle facilities. The manual provided guidance in design standards, including maximum longitudinal grades, cross slopes, shoulders and safety railings.



### 3. Planned Projects

There are several planned projects within the project area that could have an impact on the Westside Trail and Bridge, in terms of connectivity and access. They are divided below between North and South of the Project Area.

#### 3.1 Projects North of Project Area

##### *Washington County:*

The following projects on Washington County-owned transportation facilities are identified in Metro's 2018 adopted Regional Transportation Plan as financially constrained projects to be implemented between 2028 and 2040.

- RTP ID #10609: Complete 3,600 feet of bike lanes on Science Park Drive, from Murray Blvd to Cornell Rd
- RTP ID #10549: Realign 143<sup>rd</sup> Ave with Science Park Dr at NW Cornell Rd as a 4-way signalized intersection
- RTP ID #10559: Widen NW Cornell Rd from three to five lanes with bike lanes and sidewalks from the interchange at US 26 west of the project area to Murray Blvd east of the project area

##### *BPA:*

- BPA would continue to lease its 100-ft ROW for compatible uses (including parking) that do not conflict with the purpose of the ROW (to transmit power and collocate other utilities) and allow ongoing maintenance and repairs.

##### *Columbia Sportswear:*

- Columbia Sportswear is finalizing its design and permitting of an office building at 14320 NW Science Park Drive (tax lot 1N132AD-00400). It includes bicycle striping on the roadway and separated sidewalks for pedestrians on Columbia Way. The main entrance as well as service entrance/loading dock will be oriented to Columbia Way. As part of Washington County's approval, Columbia Sportswear is required to show public pedestrian and public bicycle access easements along Columbia Way, improving access in the area, near the Westside Trail and Bridge project.
- Columbia also purchased the Lifeworks Northwest Inc property (tax lot 1N132AD-00100) at 14600 NW Science Park Drive (in the northwest corner of the project area) with the intent to develop another office building.

##### *Oaks Apartments:*

- The Oaks Apartment multi-family housing complex in the northwest corner of the project area has an informal trail leading from their parking lot to the BPA ROW. This could be an opportunity to extend a privately owned trail from the parking lot to the proposed trail.

### **3.2 Projects South of Project Area**

*Leupold and Stevens Inc:*

- Leupold & Stevens Inc. held a pre-permitting meeting in 2020 with the City of Beaverton for a new warehouse facility on NW Greenbrier Parkway to be located directly south and east of the project area.

## 4. Pedestrian and Bicycle Travel, and Access to Trail and Overcrossing

The Westside Trail and Bridge Project is a critical segment in efforts to complete the regional trail network. Ensuring that the project will encourage increased active transportation, and that people can access the new trail and overcrossing is also important. This section compiles major themes around travel patterns in the project vicinity by pedestrians and bicyclists, accessing the trail and overcrossing, as well as other access points that impact the project.

### 4.1 Active Transportation Travel and Key Access Points

#### *StreetLight Travel Data Analysis Memorandum*

The Streetlight Travel Data Analysis Memorandum, prepared by Jacobs in October 2020, describes analyses performed for the project using anonymous smart phone data from 2018 to better understand how people travel in the area, especially those walking, rolling, and biking, estimate usage of the new crossing, and understand potential equity impacts. The analysis revealed several key findings:

- Many individuals use active transportation – walking, with or without mobility devices, and bicycling - in the project vicinity. StreetLight data suggests there were nearly 70,000 pedestrian trips and over 1,700 bike trips every day, on average, that end within the two miles of the project and start within five miles.
- Relatively few of these pedestrian and cycling trips crossed US Hwy 26: 5.2 percent of pedestrian trips and 7.3 percent of bike trips. This appears to be because the highway acts as a barrier and requires out-of-the-way travel to get across. The nearest places to the proposed bridge location that people can cross the highway are the overpasses for NW Murray Boulevard and NW Cornell Road. These overpasses are 1.2 miles apart and are not ideal for people walking and on bikes; they have narrow sidewalks, five motor vehicle travel lanes, and accommodate heavy traffic.
- Many people drive to the other side of the highway, and a large portion of those motor vehicle trips originated from a bikeable distance, less than 3-miles away. A new bridge would create a safe connection for people to comfortably make these trips without driving.

#### *NW Cornell Road*

NW Cornell Road is a key access point for the project. It is a high usage arterial that carries transit, automobiles, bikes, and pedestrians, providing access to nearby residential and commercial developments. As referenced above, the TSP defines Cornell Rd as a four-five lane facility with bike lanes and sidewalks, which would likely increase use of the new overcrossing for active modes. This project will also lay the foundation for a trail extension when the trail extends north of Cornell Road in the future.

#### *Future WST North and South*

The Westside Trail and Bridge project is a critical piece in completing THPRD's Westside Trail and filling a gap within the regional trail network. The completed project will set the stage for additional trail extensions north and south of the new bridge. The Westside Regional Trail currently ends roughly .35 miles north of the project area and does not currently exist south of Greenbrier Parkway. ROW exists immediately south but has not been utilized for a trail. The development of a trail in this area would provide access to residents and potentially connect to the Nike Campus jogging trail at Walker Rd.

## 4.2 Wayfinding

A Wayfinding Plan will be included for the preferred alternative and will be developed in accordance with the Intertwine Regional Trails Signage Guidelines document. Wayfinding sign locations will be proposed at decision points located in this section of the trail (Figure 4):

NW Greenbrier Parkway – distances to

- NW 158<sup>th</sup>
- Columbia Access Road
- NW Cornell Rd

NW Columbia Access Road – distances to

- NW Greenbrier Parkway
- NW Cornell Rd
- Sunset High School

NW Cornell Rd – distances to

- NW 158<sup>th</sup>
- Columbia Access Road
- NW Murray Blvd
- Sunset High School

Per the Intertwine Regional Trail Signage Guidelines, mileage markers should be provided every ¼ mile. Mileage markers have not been reflected at this time but should be incorporated at the next design phase.

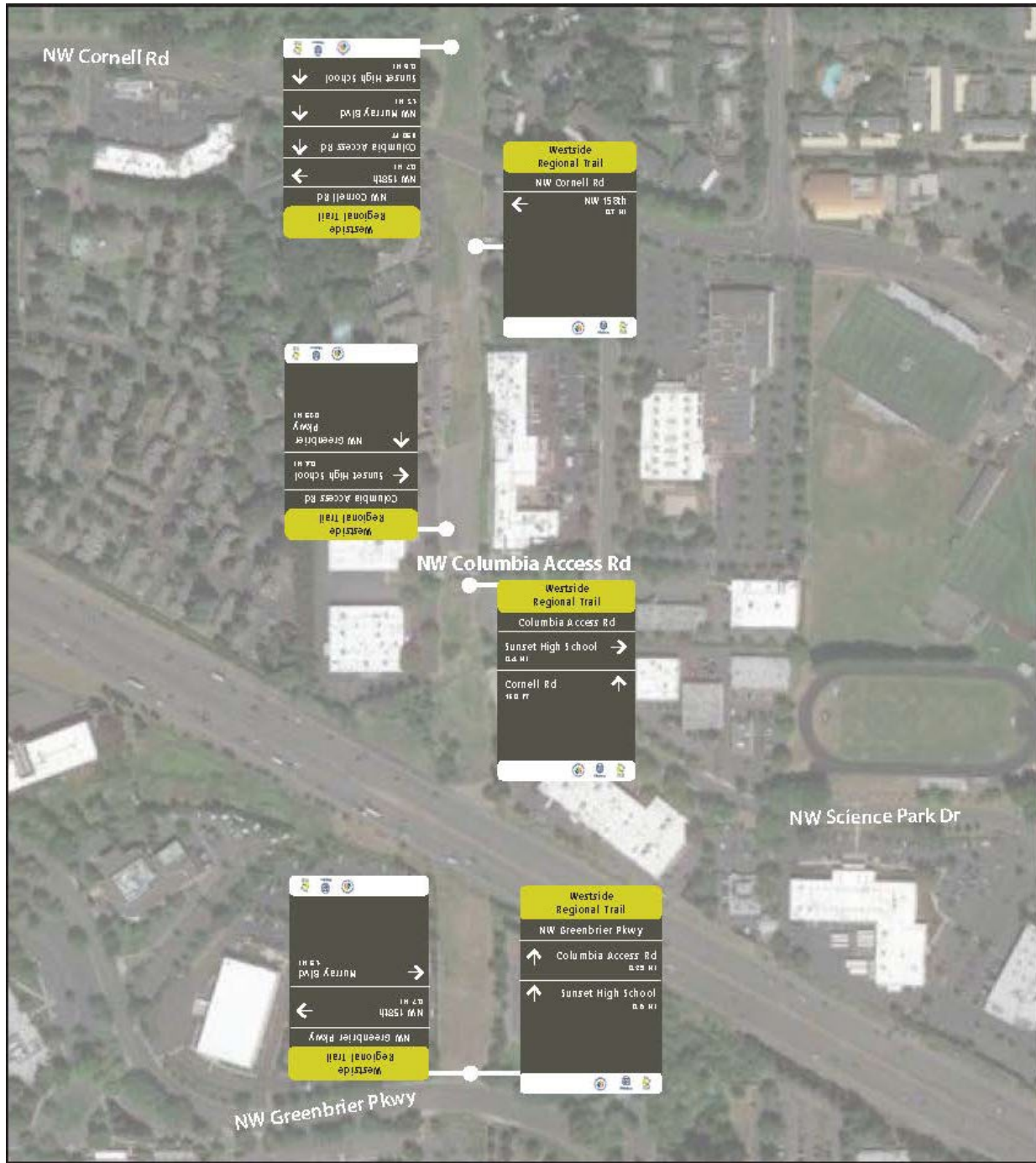


Figure 4

### Westside Trail Bridge Project Wayfinding Signage Locations

Note: Distances on signs are approximate.



Figure 4: Westside Bridge Project Wayfinding Signage Locations

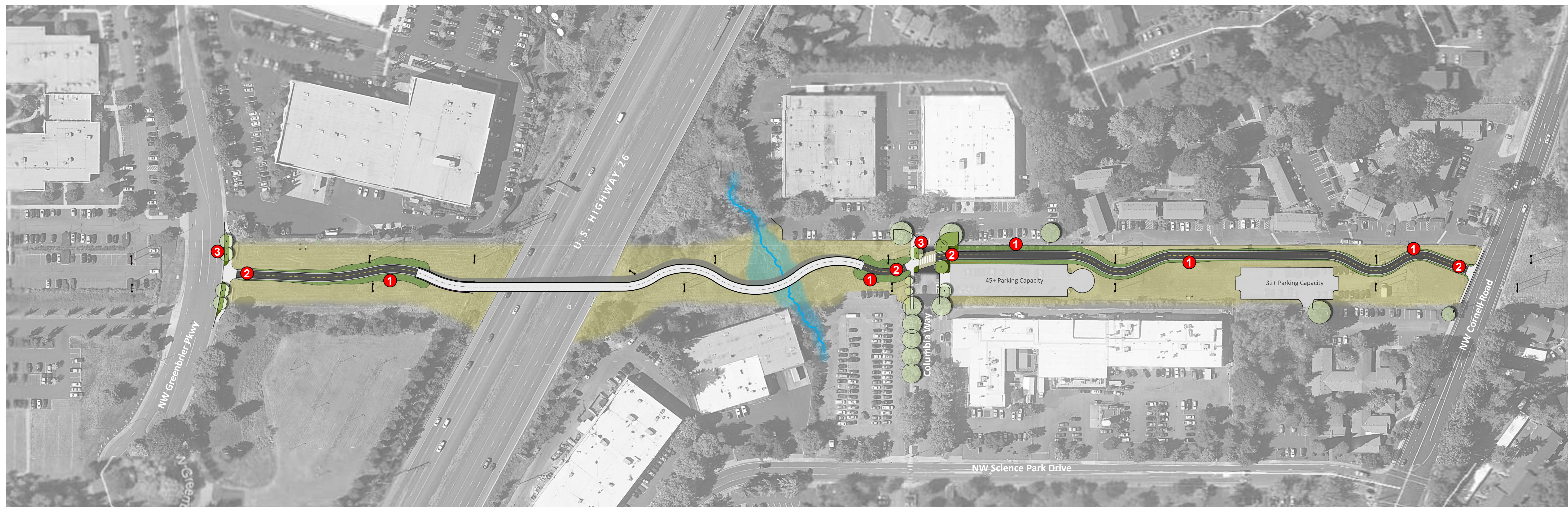
### **4.3 Next Steps**

The Westside Trail and Bridge project is a critical piece of infrastructure that will fill a major gap within the regional bicycle and pedestrian network, setting the stage for future westside trail extensions. The next phase of the project will include Final Design, which will further refine the bridge design, approaches, and street-level crossing. Project construction and implementation will require THPRD to secure the appropriate permits and approvals from ODOT, Washington County, the City of Beaverton, Bonneville Power Administration (BPA), and Clean Water Services (CWS) during Final Design.

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**Appendix D. Landscaping Concept Plan**

# THPRD WESTSIDE TRAIL BRIDGE PROJECT



## Illustrative Site and Planting Concept Plan

■ Existing Wetland   
 ■ Existing Landscape   
 ■ New Landscape Areas   
 ○ Existing Trees   
 ○ Proposed Trees



### KEY LANDSCAPE IMPROVEMENTS

- 1 Native grass seed mix to be placed at all areas where cut or fill soil conditions occur along trail frontage.
- 2 Access points for maintenance vehicles to enter project site. THPRD will enter at trail crossings for maintenance by removing bollards and parking on trail edge.
- 3 Ornamental landscape at street/trail crossing points include new street trees, shrubs, and groundcovers. These landscape improvements would be coordinated with either City or private property owners depending on location. Depending on drainage patterns, these new landscape areas can also potentially capture stormwater runoff from surrounding areas.

### NATIVE GRASS SEED PALETTE



California Oatgrass



Roemer Fescue



Native Red Fescue

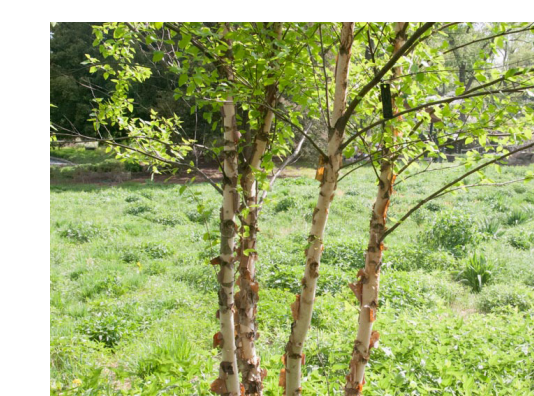
### STREET CROSSING PLANTING PALETTE



Raywood Ash



Pacific Dogwood



River Birch



Karl Foerster Grass



California Gray Rush



Kelsey Dogwood  
(summer)



Kelsey Dogwood  
(winter)



Sunset Rockrose



Creeping Mahonia



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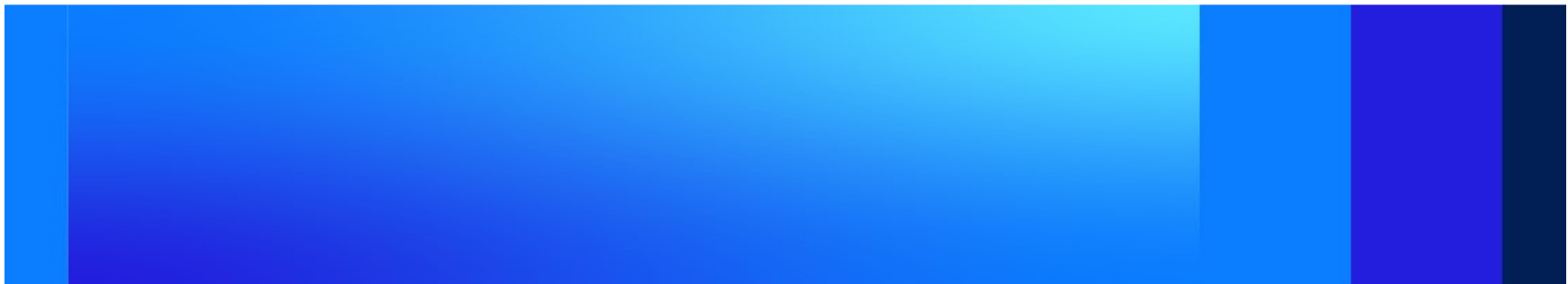
## Appendix E. Permit Matrix



## Permitting and Approvals Matrix

THPRD Westside Trail Bicycle and Pedestrian Bridge Project

August 2021



**Table 2-1. Applicable Permits and Approvals to Construct WST with Bridge Crossing Over US Highway 26 (August 2021)**

Agency and Contact	Legal Citation, Permit, License, Compliance, or Review	Action Requiring Permit, Approval, or Review	Anticipated Fee and Timeframe to Obtain	Assumptions/Notes
<b>Federal</b>				
U.S. Department of Transportation (USDOT), Federal Highway Administration (FHWA) Emily Cline, OR Division Environmental Program Manager	23 CFR § 771.117, FHWA and Oregon DOT CE Closeout Document.	Project development utilizing federal funding administered through the USDOT.	Fee not applicable; 2-6 months to complete.	
U.S. Department of Energy (DOE), Bonneville Power Administration (BPA) Darin Smith, Realty Specialist	57 FR 15144, Apr. 24, 1992, as amended at 61 FR 36221-36243, Jul. 9, 1996; 61 FR 64608, Dec. 6, 1996, 76 FR 63764, Nov. 14, 2011; Subpart D, 10 C.F.R. Part 1021, CX Determination for Land Use Review Request (LURR).	Placement of trail and elevated approaches and bridges in BPA ROW/fee owned corridor, plus BPA actions including modifications and/or relocation of electrical transmission structures and lines.	12-18 months. \$250 fee in initiate review.	As of July 28, 2021, BPA’s response to LU Application submitted on May 20, 2021 is still pending with response from Darin via e-mail that it could take up to 12 months.
U.S. Army Corps of Engineers (USACE) Danielle Erb, Regulatory Coordinator	Section 404 of the Clean Water Act (CWA). Preliminary Jurisdictional Determination and Nationwide Permit, category 14 (NWP 14) for Linear Transportation Projects.	Construction of the project, in all waters of the United States, provided there is no change in preconstruction contours. NWP 14 authorizes up to ½ acre of fill.	Approximately 6 to 9 months for pre-construction notification (PCN) review and approval (if 0.1 ac is disturbed) in conjunction with DSL review and concurrence with the delineation report. No fee.	Wetland impacts are unavoidable but likely greater than 0.1 acre and less than 0.5 acre of fill. NWP 42 could be required if wetlands are impacted by the Project because the wetlands in the Project Area will likely fall under the jurisdiction of the U.S. Army Corps of Engineers.
U.S. Fish and Wildlife Service	Endangered Species Act.	Development of project where federally listed species may be impacted.	Dependent on if listed species are present – up to 18 mo if a formal consultation is required.	The potential presence of 5 plants, 3 birds, and 1 invertebrate is indicated by desktop resources, however, most are unlikely to occur in the powerline ROW

**Table 2-1. Applicable Permits and Approvals to Construct WST with Bridge Crossing Over US Highway 26 (August 2021)**

Agency and Contact	Legal Citation, Permit, License, Compliance, or Review	Action Requiring Permit, Approval, or Review	Anticipated Fee and Timeframe to Obtain	Assumptions/Notes
				adjacent to Hwy 26. Survey required. If absent, a No Effect Memo is sufficient.
National Marine Fisheries (NOAA Fisheries)	Endangered Species Act.	Development of project where federally listed species under the jurisdiction of NMFS may be impacted.	Dependent on if listed species are present – up to 18 mo if a formal consultation is required.	Headwater tributary to Willow Creek occurs north of US 26 and is crossed by the proposed project. If a passable hydrologic connection exists, Oregon Fish Passage and Magnuson-Stevens Fishery Conservation and Management Act compliance will need to be investigated for downstream effects.
Advisory Council on Historic Preservation	Section 106, National Historic Preservation Act Consultation.	Activities affecting cultural resources that are determined eligible for listing on the National Register of Historic Places. Also requires consultation and coordination with Native American Tribes.  The Project Areas have a low probability of containing cultural resources that will require consultation with SHPO and the applicable Native American Tribes.	Timeframe dependent on the Lead Agency determined and their NEPA process. If the federal lead agency is determined to be the USACE, they will consult with SHPO during the 404 Permit process.	More than one federal nexus may exist; possible nexus options include- ODOT (for US DOT funding), USACE (for 404 permitting); or impacts to federally listed species under the ESA.
<b>State of Oregon</b>				
Oregon Department of Transportation (ODOT)	Permit to Occupy or Perform Operations on a State Highway - Miscellaneous Encroachment Permit.	Installation of the bike/pedestrian bridge within the Highway 26 ROW.	3 months.	It is currently anticipated that a Miscellaneous Encroachment Permit will be required. However, Final permitting will be established through coordination with ODOT.  Other Permits may apply.
ODOT	Over-Dimensional permit.	Prior to construction traffic utilizing state and county roads, ODOT will	10 days.	Construction contractor would obtain by the contractor, a Traffic Control Plan

**Table 2-1. Applicable Permits and Approvals to Construct WST with Bridge Crossing Over US Highway 26 (August 2021)**

Agency and Contact	Legal Citation, Permit, License, Compliance, or Review	Action Requiring Permit, Approval, or Review	Anticipated Fee and Timeframe to Obtain	Assumptions/Notes
		need to be consulted to identify what type of requirements will need to be implemented to safely transport oversized loads on state highways.		would be required if any closures would be needed.
Oregon Department of State Lands (DSL) Grey Wolf, Mitigation Specialist	Removal-Fill Permit using the Joint Permit Application (JPA) filed with USACE and DSL; requires DSL concurrence on Wetland Delineation.	Removal or fill of materials into waters of the state exceeding 50 cubic yards.	Fees are variable depending on the final amount of removal and fill; 9 months to a year, via the JPA process (concurrent with USACE 404 process).	Wetland located in the Project site will likely be considered waters of the state. Jacobs recommends including consultation with DSL in the permitting plan.
Oregon Department of Environmental Quality (DEQ) – Federally Delegated	National Pollutant Discharge Elimination System (NPDES) Permit – 1200-C.	Required for construction activities with surface area disturbance greater than 1 acre. NPDES permits regulate stormwater and facility discharges into surface waters (includes an Erosion and Sediment Control Plan).	2 to 6 months for review depending on project; however, must be submitted at least 180 days before needed for construction activities. Current new application fee is \$1,223, annual fee is \$1,257.	Development of any of the Project Areas will likely require this permit due to construction surface disturbance being greater than 1 acre.
	Section 401 Water Quality Certificate (U.S. Environmental Protection Agency delegated to DEQ).	Discharges requiring a federal license or permit must comply with State water quality standards. Required if federal CWA (Section 404) permit is issued. Uses the Joint Permit Application.	Approximately 6 months; done in coordination with USACE permit review. Fee is \$985.	Since mapped wetlands likely fall under the jurisdiction of USACE, a Section 404 permit will be required if wetlands are filled. Therefore, the Project Area will also require this Section 401 Water Quality Certificate.
Oregon Parks and Recreation Department, State Historic Preservation Office (SHPO)	ORS 390.235, Archaeological Permit.	Required if unearthing is needed to identify cultural resources.	30 days.	Not anticipated to apply unless an unanticipated find is made during construction.
<b>Local</b>				

**Table 2-1. Applicable Permits and Approvals to Construct WST with Bridge Crossing Over US Highway 26 (August 2021)**

Agency and Contact	Legal Citation, Permit, License, Compliance, or Review	Action Requiring Permit, Approval, or Review	Anticipated Fee and Timeframe to Obtain	Assumptions/Notes
Clean Water Services (CWS) Lindsey Obermiller,	Service Provider Letter (SPL).	A CWS environmental review is necessary to obtain a SPL which is a prerequisite to obtaining site development, erosion control, and building permits.	1 month after complete submittal.  Basic Site Certification Concurrence fee is \$90. Site assessment application and base review fee is \$650. Tiered Alternative Analysis Review fee is \$1,300.	SPL approval could include condition to enact agreement between ODOT, THPRD, and CWS to restore affected riparian area, and could include removal of invasive vegetation, installation of native vegetation and vegetation establishment monitoring.
Washington County	Pre-application Consultation (Type 2 or 3 Land Use Review).	Development of the bridge in the Industrial zone (IND).	4-6 months. Pre-application conference fee is \$281. Type II to Type III application fee is \$3,307 (deposit on cost) unless initiated by department.	The project doesn't fit a specified use category, but argument could be made that it is substantially similar use to those provided in the code for this zone. A neighborhood meeting and public noticing are required as part of the Type 2 review process.
	Development Application.	Any development in Washington County with new construction requires a Development Review application.	A completeness review is complete within 30 days. Application review is complete within 120 days of the application being deemed complete. This process falls within the Land Use Review Process.  Type II development review fee is \$18,701.	Assumed this project will be deemed substantially similar to a permitted use that can fall under a Type 2 Land Use procedure.

**Table 2-1. Applicable Permits and Approvals to Construct WST with Bridge Crossing Over US Highway 26 (August 2021)**

Agency and Contact	Legal Citation, Permit, License, Compliance, or Review	Action Requiring Permit, Approval, or Review	Anticipated Fee and Timeframe to Obtain	Assumptions/Notes
	Building Permits.	County requires review of facility design for compliance with Oregon State Building Code.	1-2 months. Building permit review fee is \$678.	
City of Beaverton Jean Senechal-Biggs, Transportation Planning Manager Jody Yates, Site Development Manager	ORD 2050 City of Beaverton Development Code; Public Transportation Facility Approval.	Development of the connection of the trail with NW Greenbrier Pkwy in Office Industrial (OI) Zone.	Fee is \$1,393.11.	Based on provisionally identified OI zone at Greenbrier and potential use categories, it is understood that the project would be a permitted or exempt use.  Beaverton Development Code states “Public parks, parkways, recreation facilities, trails and related facilities are exempt from these site development requirements” 20.15.15.G(4).

<sup>a</sup> All timeframes are approximate, but generally conservative and presume no unanticipated issues arise.

<sup>b</sup> The NEPA process will need to occur in conjunction with permitting. It is likely that the FHWA (ODOT as their delegate) will act as the lead Federal Agency, and formal discussion will be required to establish this role. The NEPA pathway will inform the applicability of some permits and processes, hence this table is preliminary only. Generally, a Categorical Exclusion is the expected NEPA document.

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## Appendix F. Bottom Up Cost Estimate





## **THPRD Westside Trail Bicycle and Pedestrian Bridge**

Tualatin Hills Park & Recreation District  
Washington County, OR

### **Class 3 Cost Estimate**

Prepared:  
September 29, 2021

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# Basis of Estimate

# Basis of Estimate

## 1. Project Information

Client/Owner:	Tualatin Hills Park & Recreation District (THPRD)
Project Description:	THPRD Westside Trail Bicycle and Pedestrian Bridge
Location:	Washington County, OR
Estimate Date:	September 29, 2021
Design Level:	10-15%
Estimate Classification	Class 3
Estimate Number:	21-152C
Contracting Method:	Design-Bid-Build (DBB)
Construction Duration:	12 Months

## 2. Purpose of Estimate

The purpose of this Cost Estimate is to develop a range of probable costs.

## 3. General Project Description

The THPRD Westside Trail Bicycle and Pedestrian Bridge will provide a vital connection between northern and southern portions of the Westside Trail. The project will link NW Greenbrier Parkway and NW Cornell Road via a bridge over Highway 26. The bridge, and adjoining path, will be constructed in Bonneville Power Administration (BPA) powerline corridor right-of-way.

## 4. Overall Costs

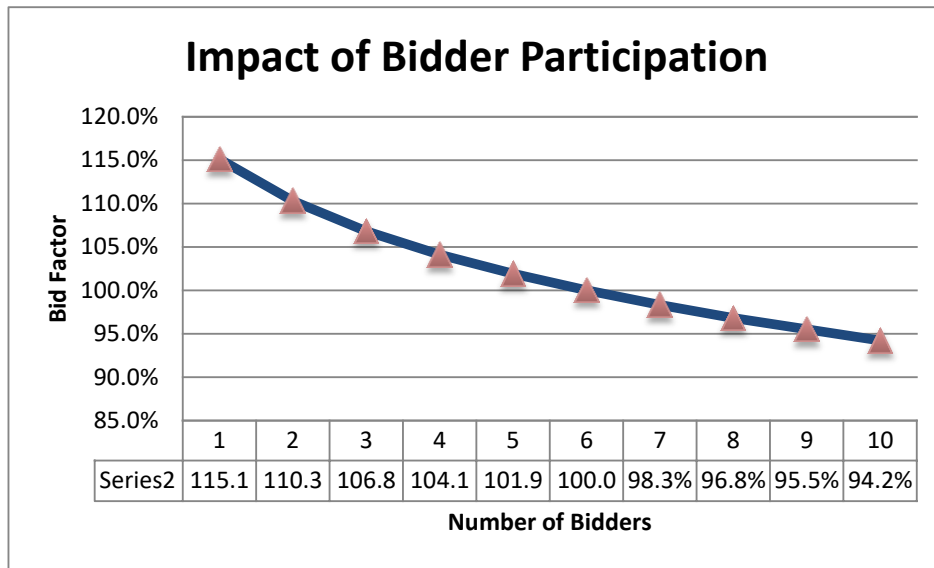
The costs in current 3Q2021 US dollars, escalated to Year of Expenditure (YOE) 2024 is shown below:

Estimated Costs	Estimate Range	
	-20%	+50%
<b>\$17,483,000</b>	<b>\$13,986,000</b>	<b>\$26,225,000</b>

## 5. General Qualifications

- A. We recommend that THPRD and/or designated representative review the estimate in detail for items that may not be consistent with the program intent.
- B. This estimate of probable construction cost is based on our collective experience. We cannot guarantee that proposals, bids, quantities, and actual construction cost will not vary from this report.
- C. The Bid Summary (Appendix A) includes all costs. The Direct Cost Breakdown (Appendix B) displays the costs before markups.

D. This estimate is based upon a DBB procurement with 3-5 bids received from prospective general contractors. It is noted that any single source selection will have an increased impact on the overall cost. Parameters other than price have not been considered in this estimate. See the chart and table below, demonstrating the potential impact of bidder participation.



No. Bidders	Bid Factor
1	115.1%
2	110.3%
3	106.8%
4	104.1%
5	101.9%
6	100.0%
7	98.3%
8	96.8%
9	95.5%
10	94.2%

Data Source: PACES 2007, Mark-ups Screen, Prime and Subcontractor Profit Calculation Factors

## 6. Estimate Basis

### A. Basis

- Reports: THPRD West Alt Analysis\_Cost Estimate\_Final\_update prior to bottom up estimate.xlsx; THPRD WST Option 1 Quantities R05.xlsx
- Drawings: BR\_Option1.pdf; Option 1 Bent Elevations and Sections.pdf; Option 1 Typical Sections.pdf
- Cost Basis: Historical data and cost-based estimating methodology.
- Quantities: The estimate relies on quantities developed by the Jacobs estimating team and as provided by the design team.

### B. Format

This estimate is classified as a Class 3 estimate as defined by the Association for the Advancement of Cost Engineering International (AACE). Refer to Appendix D for more definition. The estimating accuracy for this Class 3 estimate is recommended to be in the range of -20% to +50% due to additional coordination with Bonneville Power Administration (BPA) and Portland General Electric (PGE) and undefined wetland mitigation scope.

### **C. Labor Rates**

The Davis-Bacon Act wage determination General Decision Number: OR20210061 05/28/2021 Washington County has been used, along with the appropriate taxes and fringe benefits. Worker's Compensation Insurance is included. It is anticipated that most work will require overtime premiums, regardless of shift limitations. The base condition assumed is a 50-hour work week.

### **D. Equipment Rates**

Equipment rates utilized are 80% of Blue Book as published by [www.equipmentwatch.com](http://www.equipmentwatch.com). Fuel rates utilized are from the U.S. Energy Information Administration as of August 20, 2021: [http://www.eia.gov/dnav/pet/pet\\_pri\\_gnd\\_dcus\\_Y48SE\\_w.htm](http://www.eia.gov/dnav/pet/pet_pri_gnd_dcus_Y48SE_w.htm)

### **E. Materials**

Permanent materials are a blend of local quotations, vendor pricing and national database resources that are adjusted for Washington County, OR.

### **F. Subcontracts**

Subcontracted scope has not been determined at this time.

### **G. Owner Supplied Materials**

Owner supplied materials are not known at this time.

### **H. Long Lead Items**

No long lead items have been identified at this time.

### **I. Market Conditions**

Market conditions can drastically affect the construction market. This analysis can be based upon bids and comparisons with Engineer's Estimates. Bids can be very erratic with some jobs having a normal number of bidders, others receiving numerous submittals, and some receiving very few. Despite the estimator's best practices and adjustments, bids are driven by current market conditions. A market adjustment factor is beyond the typical contractor mark-ups, normal estimating contingency and normal escalation factors. The costs in this estimate reflect current local market condition, therefore, no additional market condition factor has been included.

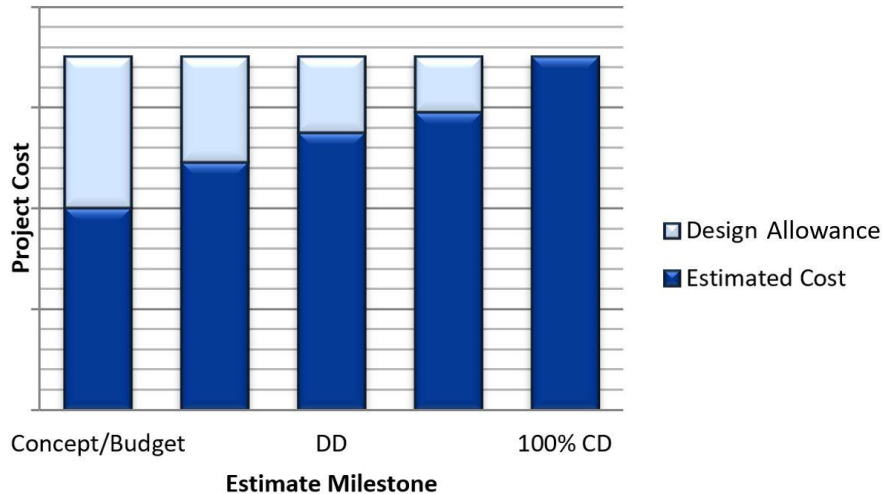
The Market Adjustment would factor:

- Contractor work volume
- Contractors' experience with THPRD & ODOT
- Owner requirements and contracting methodology
- Availability of management staff
- Availability of crafts/trades
- Volatile raw material markets
- Fuel cost uncertainty

### **J. Design Allowance**

At each milestone, design allowance (based on the level of design detail available) is applied against the total estimated construction cost, including General Conditions

(when applicable). This contingency is intended to cover the cost associated with the further refinement of the design and details that are not completed on the plans. As the design details increase from Concept/Budget to Design Development (DD), the allowance will decrease until, at 100% Construction Documents (CD) completion, the design allowance is 0%. The following graph is a theoretical representation of this process.



Design allowance is not intended to cover Owner changes nor does it address unforeseeable events such as labor strikes, natural disasters or extraordinary economic events. Design allowance is accounted for in this cost estimate, spread on a weighted cost basis to all items, except for allowances.

*Design allowance used in this estimate is 10% of the total construction costs.*

#### **K. Project Contingency**

Project Contingency (Change Order Contingency) is a typical consideration on any DBB contract. It is often owned by the project but controlled by the Owner. Meaning, the Owner has approval rights as to whether this contingency fund is utilized. Its purpose is to cover purchasing gaps and omissions in the bidding process and to cover unforeseen costs due to weather or scheduling conflicts.

*Project Contingency used in this estimate is 15% of the total construction costs.*

#### **L. Owner's Contingency**

Owner's Contingency is a recommended amount to cover the costs associated with unforeseen conditions during the construction phase such as unknown site conditions, schedule delays and trade coordination issues that may lead to change orders. This contingency is not meant for scope enhancements or for additions to the project. The suggested percentage for Owner's Contingency is based on Industry standards for the type and location of the project.

*Owner's Contingency is not included in this estimate.*

## M. Escalation

The pricing presented herein is based on current market costs. An escalation rate is often applied at the summary level of the estimate for costs associated with the following:

- Yearly merit raises for open shop contractors.
- Yearly renegotiation of union agreements.
- Material price increases (typically assessed quarterly).

Escalation is not intended to cover increases due to fluctuations in market conditions such as over saturation of projects during the anticipated bidding phase or temporary reductions in availability of manpower for selected labor pools.

Typically, 3% escalation per year used, however, due to material and labor shortages, 5% escalation is used for the first year. 3% per year thereafter is used.

*11.39% Escalation is included in this estimate.*

## N. Estimating Methodology

This estimate is based on cost-based estimating methodology which uses appropriate labor, equipment, materials and subcontractors with reasonable productions to complete the work. In some cases, historical bid data is utilized to expedite the program time constraints. Detailed quantity takeoffs have been used to validate major scope.

**Historical-based estimate methods** are commonly used to develop Engineer's Estimates and are appropriate when design definition has advanced to the point where quantification of units of work is possible. These methods apply historical unit costs to counts or measures of work items to determine a total cost for the item or project. The unit cost data used is typically received in bid documents from prior projects and should be modified or adjusted to reflect current prices (inflated to current time) and project specific conditions such as geographic location, quantity of item needed, and the scheduled timing of project. Techniques such as historical bid pricing, historical percentage, and cost-based estimating are also used to determine unit prices.

**Cost-based estimate methods** do not rely on historical bid data, but rather are based on determining, for an item or set of items, the contractor's cost for labor, equipment, materials and specialty subcontractor effort (if appropriate) needed to complete the work. This often called a "bottom-up estimate". A reasonable amount for contractor overhead and profit is then added. This method is preferable on unique projects or where geographical influences, market factors and volatility of material prices can cause the use of historical bid-based methods to be unreliable. Also, since contractors generally utilize a cost-based estimating approach to prepare bids, this method can provide more accurate and defensible costs to support the decision for contract award/rejection and to support any future price negotiations with the contractor after contract award.



## 7. Markups and Other Indirect Costs

The following soft cost markups have been applied to the direct construction costs:

- General Contractor Overhead & Profit 15%
- Payment and Performance Bond 1.2%
- Construction Engineering 8%
- Permits 2%

## 8. Cost Resources

The following is a list of the various cost resources used in the development of the cost estimate:

- R.S Means
- Vendor Quotes on Materials and Subcontractors, where appropriate.
- ODOT historical bid tabulations
- Estimator Judgment & Historical Data

## 9. Allowances

Allowances are based on information for programmatic costs. Allowances are noted throughout the estimate where details are insufficient to generate quantities and unit prices.

## 10. Major Assumptions:

- 100000) **Mobilization**(0210-0100000A) costs are typically site specific and time dependent indirect costs to mobilize, staff and support direct construction work. At this early stage of design, this item is based on 10% of the construction total all of the following items except for escalation.
- 101000) **Temporary Work Zone Traffic Control** (0221-0101000A) Complete includes labor, equipment, and devices to control traffic through the work zone on Hwy 26 and flagging on local roads for tie-in work for the duration of the work
- 102000) **Erosion Control** (0280-0100000A) is included as a percentage based on 2% of the construction total of the non-percentage items.
- 103000) **Construction Survey Work** (0305-0100000A) is included as a percentage based on 1.5% of the construction total of the non-percentage items.
- 104000) **Removal of Walks and Driveways** (0310-0102000J) areas are provided by the design team. The concrete is assumed to be 6 inches depth.
- 105000) **Clearing and Grubbing** (0320-0100000R) areas are provided by the design team. The area is figured to be light clearing.
- 106000) **Embankment in Place** (0330-0123000K) volumes are provided by the design team. The borrow embankment will utilize existing native excavation when available but will require imported borrow to balance the fill. A cost of \$20/ton is used to deliver import to the jobsite

- 107000) **12 Inch Subgrade Stabilization** (0331-0106000J) The excavated material is hauled to the embankment, subgrade geotextile fabric is placed, and aggregate base is placed, compacted and finished.
- 108000) **Drainage Geotextile, Type 1** (0350-0100000J) Area is provided by the design team and placed in conjunction with the following two items.
- 109000) **Granular Drainage Blanket** (0360-0102000K) Volume is provided by the design team and placed in conjunction with the previous and following item.
- 110000) **8 Inch Drain Pipe** (0430-0100080F) Length is provided by the design team and placed in conjunction with the previous two items.
- 111000) **Shoring, Cribbing and Cofferdams** (0510-0100000A) Areas are provided by the design team and temporary timber shoring placed for the shallow excavation depths.
- 112000) **Structure Excavation** (0510-0101000K) Quantities are provided by the design team and excavation spoils hauled to embankment.
- 113000) **Granular Structural Backfill** (0510-0108000K) Quantities are provided by the design team.
- 114000) **Furnish Micropile Equipment** (0515-0100000A) Cost to mobilize, set up, onsite move and demobilize.
- 115000) **Micropiles** (0515-0110000E) 80' deep micropiles, construct 2 per shift.
- 116000) **Micropile Verification Load Test** (0515-0120000E) 5 sacrificial micropiles, constructed as per production piles and tested.
- 117000) **Micropile Proof Load Test** (0515-0130000E) Testing on production piles.
- 118000) **Reinforcement, Grade 60** (0530-0104000O) Subcontracted item, with general contractor providing hoisting support.
- 119000) **Foundation Concrete, Class 3000** (0540-0111000K) Quantities are provided by the design team and further developed by the estimator.
- 120000) **Deck Concrete, Class HPC4500** (0540-0207100K) The quantities for the deck on truss are provided by the design team and further developed by the estimator.
- 121000) **General Structural Concrete, Class 3300** (0540-0311000K) The quantities for the abutments are provided by the design team and further developed by the estimator.
- 122000) **General Structural Concrete, Class 4000** (0540-0312000K) The quantities for the bents columns & caps are provided by the design team and further developed by the estimator.
- 123000) **Steel Plate Girder** (0560-0102000A) Quantities are provided by the design team and further developed by the estimator.
- 124000) **Furnish Prefabricated Steel Truss** (0561-0100000A) Quantity and material costs are provided by the design team.
- 125000) **Install Truss** (0561-0100000B) Quantities are provided by the design team and further developed by the estimator.
- 126000) **Bridge Drains** (0581-0100000E) Quantities and material costs are provided by the design team.
- 127000) **Bearing Devices, 12 IN W x 12 IN L x 2.5 IN D** (0582-0020000E) Quantities are provided by the design team and further developed by the estimator.
- 128000) **Type "A" Preformed Compression Joint Seal** (0585-0208100A) Quantities are provided by the design team.
- 129000) **Type "C" Preformed Compression Joint Seal** (0585-0210100A) Quantities are provided by the design team.

- 130000) **Type "E" Preformed Compression Joint Seal** (0585-0212100A) Quantities are provided by the design team.
- 131000) **Strip Seal** (0585-0214000A) Quantities are provided by the design team.
- 132000) **Precompressed Foam Silicone Joint Seal** (0585-0215000A) Quantities are provided by the design team.
- 133000) **Pedestrian Rail, Modified** (0587-0128000A) Quantities are provided by the design team.
- 134000) **Ornamental Pedestrian Rail** (0587-0136000A) Quantities are provided by the design team.
- 135000) **Potholing for Utilities** (0589-0101000A) Potholing prior to structure excavation to determine clearance from fiber optic line.
- 136000) **Retaining Wall, MSE** (0596-A002000A) Quantities are provided by the design team and further developed by the estimator.
- 137000) **Fiber Reinforced Deck Panels** (0562-0100000A) Quantities and material costs are provided by the design team and further developed by the estimator.
- 138000) **Aggregate Base** (0641-0102000M) Quantities are provided by the design team and includes base under the pavement and 24 IN deep shoulders adjacent to the path.
- 139000) **Level 2, ½ Inch ACP Mixture** (0744-0202000M) Quantities are provided by the design team.
- 140000) **Type 2A Guard Rail** (0810-0104000F) Guardrail to protect the bent in the center of Highway 26, 475 Feet in each direction are used.
- 141000) **Type C Guard Rail End Section** (0759-0154100E) Included per standards.
- 142000) **Flared Guard Rail Terminal** (0815-0100000E) Included per standards.
- 143000) **Extra for New Curb Ramps** (0930-0116000A) Allowance item.
- 144000) **Bollards** (0940-0201000J) Quantities are provided by the design team.
- 145000) **Pipe Sign Supports** (0990-0106000A) Quantities are provided by the design team.
- 146000) **Signs, Standard Sheeting, Extruded Aluminum** (1030-0103000R) Quantities are provided by the design team.
- 147000) **Flashing Beacon Installation** (1030-0108000R) A Rapid Response Flashing Beacon (RRFB) is installed at NW Cornell Rd.
- 148000) **Temporary Seeding** (1040-0178000E) Quantities are provided by the design team.
- 149000) **Permanent Seeding** (1030-0108000R) Assumes fine grade is covered under embankment pay item. There is no payment for topsoil or amendments as this item assumes hydroseed is used.
- 150000) **Seeding Plants** (1040-0178000E) Quantities are provided by the design team.
- 151000) **Relocate Guy Wire** Guy wires that interfere or could be a hazard to users of the trail.
- 152000) **E/W PGE Line Relocate** There are 6 EA communication lines - 3 would be in direct contact with the bridge and 3 are slightly above the bridge. This item is for moving approximately 400 LF of telecommunication cable underground.
- 153000) **N/S BPA Line Relocate** A 550' section of high voltage line is directly over the bridge. This section will need to be raised approximately 20-25 FT with two new poles. There is a high potential that the existing cable would be too short and new cable will have to be installed between the two closest junction points: to the north at coordinates (45.565382, -122.825939) and to the south at a small sub-station at coordinates (45.502989, -122.837132). Approximately 4.47 miles of cable would need to be replaced.

- 154000) **Bioretention Basins** Use 64' L x 12' W footprint. The basins consist of the following components: Filter fabric lining the sides and bottom, 6" gravel on the bottom, then 6" pea gravel on top of the gravel, 2' of Planting Media (including plants) on top of the Pea Gravel. The northern basin has a 20' entrance pipe and a 60' discharge pipe to a drainage ditch. The southern basin has 100' entrance pipe and a 40' outlet.
- 155000) **Aesthetics** Is for special design elements and artwork which have not been developed at this time. This item is based on 4% of the total of the construction costs except for mobilization and trail lighting.
- 156000) **Trail Lighting** has not been developed at this time. This item is based on 4% of the total of the construction costs except for mobilization and aesthetics.

## 11. General Exclusions:

- Project finance costs.
- Unforeseen sub-surface or existing conditions.
- Owner's Contingency.
- Risk Contingency.
- ROW acquisitions.
- Street tie-ins (not yet designed but covered by cost range).
- Raised Median Across Columbia Way (not yet designed but covered by cost range).
- Wetland Mitigation (not yet designed but covered by cost range).

## 12. Phasing:

Phasing during construction for these projects have not yet been studied.

## 13. Constructability Risks:

Constructability risks have been studied for this report. This is risk associated cost, however no high-risk items have been identified.

## 14. Estimate Validity:

This estimate was prepared in September 2021 and is based on the project layout available at that time. As with all estimates it represents a snapshot in time. The commodities and energy markets are extremely active at this point in time. Changes in either will have dramatic effects to this estimate. Therefore, this estimate should be viewed in that light and if more than 90 days have passed, or there have been significant changes in the commodity markets, this estimate should be updated and reevaluated. The impacts of the COVID-19 pandemic on the construction industry is not known at this time and will likely have some impact on the costs presented herein. This situation should be monitored, and costs adjusted as the impacts become realized and published by the leading industry sources.

## 15. Disclaimer

The opinions of cost (estimates) shown, and any resulting conclusions on project financial or economic feasibility or funding requirements, have been prepared for guidance in project evaluation and implementation from the information available at the time the opinion was prepared. The final costs of the project and resulting feasibility will depend on actual labor and material costs, competitive market conditions, actual site conditions, final project scope, implementation schedule, continuity of personnel and engineering, and other variable factors. The recent increases or decreases in material pricing may have a significant impact which is not predictable and careful review or consideration must be used in evaluation of material prices. As a result, the final project costs will vary from the opinions of cost presented herein. Because of these factors, project feasibility, benefit/cost ratios, risks, and funding needs must be carefully reviewed prior to making specific financial decisions or establishing project budgets to help ensure proper project evaluation and adequate funding.

# Appendix A: Bid Summary

**BID SUMMARY**

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<b>Biditem</b>	<b>Description</b>	<b>Quantity</b>	<b>Units</b>	<b>Unit Price</b>	<b>Bid Total</b>
100000	MOBILIZATION (10%)	1.000	LS	1,055,000.00	1,055,000.00
101000	TEMPORARY WORK ZONE TRAFFIC CONTROL, COMPLETE	1.000	LS	107,000.00	107,000.00
102000	EROSION CONTROL (2%)	1.000	LS	188,540.00	188,540.00
103000	CONSTRUCTION SURVEY WORK (1.5%)	1.000	LS	141,410.00	141,410.00
104000	REMOVAL OF WALKS AND DRIVEWAYS	150.000	SY	40.60	6,090.00
105000	CLEARING AND GRUBBING	2.000	AC	4,035.00	8,070.00
106000	EMBANKMENT IN PLACE	2,000.000	CY	44.30	88,600.00
107000	12 INCH SUBGRADE STABILIZATION	2,450.000	SY	41.20	100,940.00
108000	DRAINAGE GEOTEXTILE, TYPE 1	166.000	SY	5.00	830.00
109000	GRANULAR DRAINAGE BLANKET	19.000	CY	108.00	2,052.00
110000	8 INCH DRAIN PIPE	248.000	LF	13.00	3,224.00
111000	SHORING, CRIBBING, AND COFFERDAMS	1.000	LS	21,250.00	21,250.00
112000	STRUCTURE EXCAVATION	226.000	CY	60.00	13,560.00
113000	GRANULAR STRUCTURE BACKFILL	179.000	CY	149.00	26,671.00
114000	FURNISH MICROPILE EQUIPMENT	1.000	LS	11,600.00	11,600.00
115000	MICROPILES	87.000	EA	10,330.00	898,710.00
116000	MICROPILE VERIFICATION LOAD TEST	5.000	EA	14,250.00	71,250.00
117000	MICROPILE PROOF LOAD TEST	7.000	EA	2,110.00	14,770.00
118000	REINFORCEMENT, GRADE 60	78,600.000	LB	1.42	111,612.00
119000	FOUNDATION CONCRETE, CLASS 3300	84.000	CY	581.00	48,804.00
120000	DECK CONCRETE, CLASS HPC4500	161.000	CY	1,945.00	313,145.00
121000	GENERAL STRUCTURAL CONCRETE, CLASS 3300	43.000	CY	1,145.00	49,235.00
122000	GENERAL STRUCTURAL CONCRETE, CLASS 4000	92.000	CY	2,072.00	190,624.00
123000	STEEL PLATE GIRDER	1.000	LS	2,164,400.00	2,164,400.00
124000	FURNISH PREFABRICATED STEEL TRUSS	1.000	LS	898,700.00	898,700.00
125000	INSTALL PREFABRICATED STEEL TRUSS	1.000	LS	114,000.00	114,000.00
126000	BRIDGE DRAINS	2.000	EA	17,500.00	35,000.00
127000	BEARING DEVICES, 12 IN W x 12 IN L x 2.5 IN D	26.000	EA	700.00	18,200.00
128000	TYPE "A" PREFORMED COMPRESSION JOINT SEAL	1.000	LS	1,275.00	1,275.00
129000	TYPE "C" PREFORMED COMPRESSION JOINT SEAL	1.000	LS	1,425.00	1,425.00
130000	TYPE "E" PREFORMED COMPRESSION JOINT SEAL	1.000	LS	3,975.00	3,975.00
131000	STRIP SEALS	1.000	LS	1,800.00	1,800.00
132000	PRECOMPRESSED FOAM SILICONE JOINT SEAL	1.000	LS	19,625.00	19,625.00
133000	PEDESTRIAN RAIL, MODIFIED	1.000	LS	113,100.00	113,100.00
134000	ORNAMENTAL PEDESTRIAN RAIL	1.000	LS	120,000.00	120,000.00

**BID SUMMARY**

9/22/2021 11:48 PM

<b>Biditem</b>	<b>Description</b>	<b>Quantity</b>	<b>Units</b>	<b>Unit Price</b>	<b>Bid Total</b>
135000	POTHOLING FOR UTILITIES	1.000	LS	15,145.00	15,145.00
136000	RETAINING WALL, MSE	1.000	LS	332,480.00	332,480.00
137000	FIBER REINFORCED DECK PANELS	7,200.000	SF	118.90	856,080.00
138000	AGGREGATE BASE	1,340.000	TON	57.70	77,318.00
139000	LEVEL 2, 1/2 INCH ACP MIXTURE	647.000	TON	180.00	116,460.00
140000	TYPE 2A GUARD RAIL	850.000	LF	25.00	21,250.00
141000	TYPE C GUARD RAIL END SECTION	2.000	EA	150.00	300.00
142000	FLARED GUARD RAIL TERMINAL	2.000	EA	3,500.00	7,000.00
143000	EXTRA FOR NEW CURB RAMPS	4.000	EA	2,500.00	10,000.00
144000	BOLLARDS	14.000	EA	2,000.00	28,000.00
145000	PIPE SIGN SUPPORTS	1.000	LS	3,000.00	3,000.00
146000	SIGNS, STANDARD SHEETING, EXTRUDED ALUMINUM	18.000	SF	250.00	4,500.00
147000	FLASHING BEACON INSTALLATION, _____	1.000	LS	22,250.00	22,250.00
148000	TEMPORARY SEEDING	0.420	AC	10,000.00	4,200.00
149000	PERMANENT SEEDING	0.420	AC	15,000.00	6,300.00
150000	SEEDLING PLANTS	400.000	EA	10.40	4,160.00
151000	RELOCATE GUY WIRE	4.000	EA	20,000.00	80,000.00
152000	E/W PGE LINE RELOCATE	400.000	LF	552.00	220,800.00
153000	N/S BPA LINE RELOCATE	1.000	LS	1,975,000.00	1,975,000.00
154000	BIORETENTION BASINS	2.000	EA	34,700.00	69,400.00
155000	AESTHETICS (4%)	1.000	LS	390,935.00	390,935.00
156000	TRAIL LIGHTING (4%)	1.000	LS	390,935.00	390,935.00
	<b>TOTAL CONSTRUCTION COSTS</b>				<b>\$11,600,000.00</b>
160000	DESIGN ALLOWANCE (10%)	1.000	LS	1,170,000.00	1,170,000.00
170000	PERMITS (2%)	1.000	LS	234,000.00	234,000.00
180000	CONSTRUCTION ENGINEERING (8%)	1.000	LS	936,000.00	936,000.00
190000	PROJECT CONTINGENCY (15%)	1.000	LS	1,755,000.00	1,755,000.00
	<b>CONSTRUCTION COST WITH DESIGN &amp; CONTINGENCY</b>				<b>\$15,695,000.00</b>
200000	ESCALATION TO YEAR OF EXPENDITURE	1.000	LS	1,788,000.00	1,788,000.00
	<b>Bid Total</b>				<b>\$17,483,000.00</b>



# Appendix B: Direct Cost Breakdown

DIRECT COST BREAKDOWN

Activity Resource	Desc	Pcs	Quantity Unit	Unit Cost	Labor	Perm Material	Constr Matl/Exp	Equip Ment	Sub-Contract	Total
BID ITEM = 100000	CLIENT# = 0210-0100000A		Land Item	SCHEDULE: 1	100					RHU
Description = MOBILIZATION (10%)			Unit =	LS	Takeoff Quan:		1.000	Engr Quan:		1.000
100000.10	MOBILIZATION (10%)		Quan:	1.00 LS	Hrs/Shft:	10.00	Cal: 510	WC: CCISP		
4SUB	Subcontract	0.10	0.10 LS	10,544,178.000					1,054,418	1,054,418
\$1,054,417.80				[ ]					1,054,418	1,054,418
									1,054,417.80	1,054,417.80

BID ITEM = 101000	CLIENT# = 0221-0101000A		Land Item	SCHEDULE: 1	100					RHU
Description = TEMPORARY WORK ZONE TRAFFIC CONTROL, COM			Unit =	LS	Takeoff Quan:		1.000	Engr Quan:		1.000
101000.10	Temp Traffic Control Devices		Quan:	1.00 LS	Hrs/Shft:	10.00	Cal: 510	WC: CCISP		
<u>CARP3C</u>	(Mod) Foreman+2 Carpenters w/Crane		20.00 CH	Prod:	2.0000 S	Lab Pcs:	4.00	Eqp Pcs:	3.00	
31TCBARR3	Type 3 barricades	1.00	6.00 EA	75.000		450		450		
31TCCONE	Traffic Cones	1.00	250.00 EA	21.000		5,250		5,250		
31TCIA65	65 mph Temp Impact Attn	1.00	2.00 EA	5,200.000		10,400		10,400		
31TCPCBAR	Temp Precast Barrier	1.00	400.00 LF	12.000		4,800		4,800		
31TCPCBARP	Precast Barrier Pins	1.00	18.00 EA	2.500		45		45		
31TCPCMS	Port Changing Message Sig	1.00	6.00 MO	1,800.000		10,800		10,800		
5TRKFB	Trucking - Flat Bed	1.00	20.00 HR	150.000		3,000		3,000		
8CRANERT700	Crane Grove RT890 75 T	1.00	20.00 HR	197.340			3,947	3,947		
8GEN010	Generator 10 KW	1.00	20.00 HR	25.103			502	502		
8TRKPU70	Pickup Ford F-250 3/4	1.00	20.00 HR	25.830			517	517		
CA01	Carpenter Foreman	1.00	20.00 MH	46.750	1,591				1,591	
CA02	Carpenter Journeyman	2.00	40.00 MH	41.750	2,919				2,919	
OP06	Op Crane < 100T	1.00	20.00 MH	43.990	1,459				1,459	
\$45,679.72	80.0000 MH/LS		80.00 MH	[ 3833.28 ]	5,969	34,745	4,965		45,680	
0.0500	Units/Hr	* 0.0125	Unit/MH	2.0000	Shifts	5,969.26	34,745.00	4,965.46		45,679.72

101000.20	Temp Construction Signs		Quan:	1,000.00 SF	Hrs/Shft:	10.00	Cal: 510	WC: CCISP		
<u>LAB3</u>	Foreman + 2 Laborers		20.00 CH	Prod:	50.0000 UH	Lab Pcs:	3.00	Eqp Pcs:	1.00	
2MISC	Miscellaneous Allowance	1.00	1.00 EA	2,500.000		2,500		2,500		
31TCCONS	Construction Signs	1.00	1,000.00 SF	3.500		3,500		3,500		
8TRKPU70	Pickup Ford F-250 3/4	1.00	20.00 HR	25.830			517	517		
LA01	Laborer-Foreman	1.00	20.00 MH	38.860	1,326				1,326	
LA04	Laborer-Power Tools	2.00	40.00 MH	33.000	2,345				2,345	
\$10,187.42	0.0600 MH/SF		60.00 MH	[ 2.307 ]	3,671	2,500	3,500	517	10,187	
50.0000	Units/Hr	* 16.6667	Unit/MH	2.0000	Shifts	3.67	2.50	3.50	0.52	10.19

101000.30	Traffic Control Labor		Quan:	6.00 MO	Hrs/Shft:	10.00	Cal: 510	WC: CCISP		
1 shift per work week x 6 months.										
<u>TRAF1</u>	(Mod) Traffic Control Super		260.00 CH	Prod:	26.0000 S	Lab Pcs:	1.00	Eqp Pcs:	7.00	
8TRAFFIC04	Arrow Board Solar	2.00	520.00 HR	1.430		744		744		
8TRAFFIC05	Arrow Board Solar Oper	2.00	520.00 HR	0.070		36		36		
8TRAFFIC10	Truck w/Arrow Board	1.00	260.00 HR	30.999		8,060		8,060		
8TRAFFIC11	Truck w/Arrow Board Op	1.00	260.00 HR	20.463		5,320		5,320		
8TRKPU70	Pickup Ford F-250 3/4	1.00	260.00 HR	25.830		6,716		6,716		
LA05	Laborer-Traffic Cont Super	1.00	260.00 MH	27.560	13,389				13,389	
\$34,265.13	43.3333 MH/MO		260.00 MH	[ 1313.693 ]	13,389		20,876		34,265	
0.0231	Units/Hr	* 0.0231	Unit/MH	26.0000	Shifts	2,231.54	3,479.32		5,710.86	

=====>	Item Totals:	101000	-	TEMPORARY WORK ZONE TRAFFIC CONTROL, COM							
\$90,132.27		400.0000	MH/LS	400.00	MH	[ 14022.36 ]	23,029	2,500	38,245	26,358	90,132

DIRECT COST BREAKDOWN

Activity Resource	Desc	Quantity Pcs	Unit	Unit Cost	Labor	Perm Material	Constr Mat/Exp	Equip Ment	Sub-Contract	Total
BID ITEM = 101000	CLIENT# = 0221-0101000A	Land Item	SCHEDULE: 1	100						RHU
Description =	TEMPORARY WORK ZONE TRAFFIC CONTROL, COM	Unit =	LS	Takeoff Quan:			1.000	Engr Quan:		1.000
90,132.270	1 LS				23,029.29	2,500.00	38,245.00	26,357.98		90,132.27

BID ITEM = 102000	CLIENT# = 0280-0100000A	Land Item	SCHEDULE: 1	100						RHU
Description =	EROSION CONTROL (2%)	Unit =	LS	Takeoff Quan:			1.000	Engr Quan:		1.000
102000.10	EROSION CONTROL (2%)	Quan:	1.00 LS	Hrs/Shft:	10.00	Cal:	510	WC:	CCISP	
4SUB	Subcontract	0.02	0.02 LS	9,427,000.000					188,540	188,540
\$188,540.00				[ ]					188,540	188,540
									188,540.00	188,540.00

BID ITEM = 103000	CLIENT# = 0305-0100000A	Land Item	SCHEDULE: 1	100						RHU
Description =	CONSTRUCTION SURVEY WORK (1.5%)	Unit =	LS	Takeoff Quan:			1.000	Engr Quan:		1.000
103000.10	CONSTRUCTION SURVEY WORK (1.5%)	Quan:	1.00 LS	Hrs/Shft:	10.00	Cal:	510	WC:	CCISP	
4SUB	Subcontract@1.5%	1.00	1.00 LS	9,427,000.000					141,405	141,405
\$141,405.00				[ ]					141,405	141,405
									141,405.00	141,405.00

BID ITEM = 104000	CLIENT# = 0310-0102000J	Land Item	SCHEDULE: 1	100						RHU
Description =	REMOVAL OF WALKS AND DRIVEWAYS	Unit =	SY	Takeoff Quan:			150.000	Engr Quan:		150.000
104000.10	Sidewalk Removal	Quan:	150.00 SY	Hrs/Shft:	10.00	Cal:	510	WC:	CCISP	

Depth not provided could be 4" or 6". Use 6" to cover the quantity

150 SY x 6" = 25 CY

DEMO7	(Mod) Concrete Demo (Light)	10.00	CH	Prod:	3.0000	UM	Lab Pcs:	5.00	Eqp Pcs:	6.00
31DFCOCY	Conc Dump Fee - cy	1.00	25.00	CY	25.000		625			625
8BHLD426	BHL CAT 430 (107 Hp) T	1.00	10.00	HR	41.970			420		420
8COMPR04	Compressor 185 CFM 80H	1.00	10.00	HR	12.340			123		123
8DEMO04	Jackhammer 60#	2.00	20.00	HR	0.586			12		12
8TRKHW10	Tandem Truck 12 CY 400	1.00	10.00	HR	62.565			626		626
8TRKPU70	Pickup Ford F-250 3/4	1.00	10.00	HR	25.830			258		258
LA01	Laborer-Foreman	1.00	10.00	MH	38.860	663				663
LA04	Laborer-Power Tools	2.00	20.00	MH	33.000	1,172				1,172
OP09	Op Backhoe < 3Y	1.00	10.00	MH	39.770	674				674
TD02	Teamster Journeyman	1.00	10.00	MH	29.730	553				553
\$5,126.97	0.3333 MH/SY		50.00	MH	[ 12.786 ]	3,063		625	1,439	5,127
15.0000	Units/Hr	3.0000	Unit/MH	* 1.0000	Shifts	20.42		4.17	9.59	34.18

=====>	Item Totals:	104000	-	REMOVAL OF WALKS AND DRIVEWAYS						
\$5,126.97		0.3333	MH/SY	50.00	MH	[ 12.786 ]	3,063	625	1,439	5,127
34.180		150	SY			20.42		4.17	9.59	34.18

BID ITEM = 105000	CLIENT# = 0320-0100000R	Land Item	SCHEDULE: 1	100						RHU
Description =	CLEARING AND GRUBBING	Unit =	AC	Takeoff Quan:			2.000	Engr Quan:		2.000

DIRECT COST BREAKDOWN

Activity Resource	Desc	Pcs	Quantity Unit	Unit Cost	Labor	Perm Material	Constr Matl/Exp	Equip Ment	Sub-Contract	Total
BID ITEM = 105000	CLIENT# = 0320-0100000R		Land Item	SCHEDULE: 1	100					RHU
Description =	CLEARING AND GRUBBING		Unit =	AC	Takeoff Quan:		2.000	Engr Quan:		2.000
105000.10	CLEARING AND GRUBBING		Quan:	2.00 AC	Hrs/Shft:	10.00	Cal: 510	WC: CCISP		
Knock down, grub and grind brush and trees.										
CLEAR2	(Mod) Clearing Brush		10.00 CH	Prod:	0.0333 UM	Lab Pcs:	6.00	Eqp Pcs:	4.00	
31DFBLDLD	Bldg Debris Dump Fee-load	1.00	2.00 LD	250.000		500				500
5TRKED	Trucking - End Dump	1.00	10.00 HR	100.000		1,000				1,000
8BHLD426	BHL CAT 430 (107 Hp) T	1.00	10.00 HR	41.970				420		420
8TRKHW10	Tandem Truck 12 CY 400	1.00	10.00 HR	62.565				626		626
8TRKPU70	Pickup Ford F-250 3/4	1.00	10.00 HR	25.830				258		258
8WOOD2	Wood Chipper Vermeer 1	1.00	10.00 HR	34.849				348		348
LA01	Laborer-Foreman	1.00	10.00 MH	38.860	663					663
LA04	Laborer-Power Tools	3.00	30.00 MH	33.000	1,759					1,759
OP09	Op Backhoe < 3Y	1.00	10.00 MH	39.770	674					674
TD02	Teamster Journeyman	1.00	10.00 MH	29.730	553					553
\$6,801.56		30.0000 MH/AC	60.00 MH	[ 1140.48 ]	3,649		1,500	1,652		6,802
0.2000 Units/Hr		0.0333 Unit/MH	* 1.0000 Shifts		1,824.71		750.00	826.07		3,400.78
===== Item Totals: 105000 - CLEARING AND GRUBBING										
\$6,801.56		30.0000 MH/AC	60.00 MH	[ 1140.48 ]	3,649		1,500	1,652		6,802
3,400.780		2 AC			1,824.71		750.00	826.07		3,400.78

BID ITEM = 106000	CLIENT# = 0330-0123000K		Land Item	SCHEDULE: 1	100					RHU
Description =	EMBANKMENT IN PLACE		Unit =	CY	Takeoff Quan:		2,000.000	Engr Quan:		2,000.000
106000.10	Construct Embankment		Quan:	2,000.00 CY	Hrs/Shft:	10.00	Cal: 510	WC: CCISP		
Dump, lay and compact embankment.										
35 Gallons/CY construction water.										
FG11	Fine Grade - Trail		60.00 CH	Prod:	4.7619 UM	Lab Pcs:	7.00	Eqp Pcs:	5.00	
31MATCW	Construction Water	1.00	70.00 MG	3.500		245				245
8COMPACV06	Compactor Cat CP-64 W=	1.00	60.00 HR	55.701				3,342		3,342
8GRDR120	Grader CAT 140H Rip (1	1.00	60.00 HR	128.370				7,702		7,702
8GRDR210	Grader JD210LJ Skip Lo	1.00	60.00 HR	25.376				1,523		1,523
8TRKPU70	Pickup Ford F-250 3/4	1.00	60.00 HR	25.830				1,550		1,550
8TRKWTR03	Water Truck 4,000 gal	1.00	60.00 HR	19.290				1,157		1,157
LA03	Laborer-General	1.00	60.00 MH	31.830	3,425					3,425
OP00	Op Grade Foreman	1.00	60.00 MH	55.220	5,260					5,260
OP01	Op Grade Checker	1.00	60.00 MH	36.550	3,793					3,793
OP11	Op Loader <6Y	1.00	60.00 MH	41.010	4,144					4,144
OP15	Op Motor Grader	1.00	60.00 MH	41.010	4,144					4,144
OP17	Op Rollers	1.00	60.00 MH	41.010	4,144					4,144
TD02	Teamster Journeyman	1.00	60.00 MH	29.730	3,320					3,320
\$43,749.91		0.2100 MH/CY	420.00 MH	[ 9.12 ]	28,231		245	15,274		43,750
33.3333 Units/Hr		4.7619 Unit/MH	* 6.0000 Shifts		14.12		0.12	7.64		21.87
106000.20	Import Material		Quan:	731.00 CY	Hrs/Shft:	10.00	Cal: 510	WC: CCISP		
1.85 TN/CY for borrow embankment materials (includes yield loss)										
Deduct Structure Excavation...226 CY										
Deduct Subgrade Stabilization..817 CY										
TOTAL..1,043 CY										
2AGC02	Embankment Fill	1.00	1,352.37 TN	20.000		27,047				27,047
\$27,047.40				[ ]		27,047				27,047
						37.00				37.00

DIRECT COST BREAKDOWN

Activity Resource	Desc	Pcs	Quantity Unit	Unit Cost	Labor	Perm Material	Constr Matl/Exp	Equip Ment	Sub-Contract	Total
BID ITEM = 106000	CLIENT# = 0330-0123000K	Land Item	SCHEDULE: 1 100							RHU
Description =	EMBANKMENT IN PLACE	Unit =	CY	Takeoff	Quan: 2,000.000	Engr	Quan: 2,000.000			
106000.90	Mob Earthwork Equipment	Quan:	2.00 EA	Hrs/Shft:	10.00	Cal:	510	WC:	CCISP	
<u>FG11</u>	(Mod) Fine Grade - Trail	10.00	CH	Prod:	0.2000	UM	Lab Pcs:	1.00	Eqp Pcs:	7.00
8COMPACV06	Compactor Cat CP-64 W=	1.00	10.00 HR	55.701				557		557
8GRDR120	Grader CAT 140H Rip (1	1.00	10.00 HR	128.370				1,284		1,284
8GRDR210	Grader JD210LJ Skip Lo	1.00	10.00 HR	25.376				254		254
8TRKHW15	Tractor 400 HP 75K GVW	1.00	10.00 HR	59.694				597		597
8TRKHW30	Lowbed Trailer 60 TN	1.00	10.00 HR	18.896				189		189
8TRKPU70	Pickup Ford F-250 3/4	1.00	10.00 HR	25.830				258		258
8TRKWTR03	Water Truck 4,000 gal	1.00	10.00 HR	19.290				193		193
TD02	Teamster Journeyman	1.00	10.00 MH	29.730	553					553
\$3,884.97	5.0000 MH/EA	10.00	MH	[ 163.515 ]	553			3,332		3,885
0.2000	Units/Hr	0.2000	Unit/MH	*	1.0000	Shifts		276.70		1,665.79
										1,942.49
=====>	Item Totals:	106000	- EMBANKMENT IN PLACE							
\$74,682.28	0.2150 MH/CY	430.00	MH	[ 9.283 ]	28,784	27,047	245	18,606		74,682
37.341	2000 CY				14.39	13.52	0.12	9.30		37.34

BID ITEM = 107000	CLIENT# = 0331-0106000J	Land Item	SCHEDULE: 1 100							RHU
Description =	12 INCH SUBGRADE STABILIZATION	Unit =	SY	Takeoff	Quan: 2,450.000	Engr	Quan: 2,450.000			
107000.00	Grade Subgrade	Quan:	817.00 CY	Hrs/Shft:	10.00	Cal:	510	WC:	CCISP	
Spoils used to build out chockers & embankment (817 CY)										
<u>FG11</u>	(Mod) Fine Grade - Trail	20.00	CH	Prod:	40.8500	UH	Lab Pcs:	8.00	Eqp Pcs:	6.00
31MATCW	Construction Water	1.00	45.06 MG	3.500			158			158
8COMPACV06	Compactor Cat CP-64 W=	1.00	20.00 HR	55.701				1,114		1,114
8GRDR120	Grader CAT 140H Rip (1	1.00	20.00 HR	128.370				2,567		2,567
8GRDR210	Grader JD210LJ Skip Lo	1.00	20.00 HR	25.376				508		508
8TRKHW10	Tandem Truck 12 CY 400	1.00	20.00 HR	62.565				1,251		1,251
8TRKPU70	Pickup Ford F-250 3/4	1.00	20.00 HR	25.830				517		517
8TRKWTR03	Water Truck 4,000 gal	1.00	20.00 HR	19.290				386		386
LA03	Laborer-General	1.00	20.00 MH	31.830	1,142					1,142
OP00	Op Grade Foreman	1.00	20.00 MH	55.220	1,754					1,754
OP01	Op Grade Checker	1.00	20.00 MH	36.550	1,264					1,264
OP11	Op Loader <6Y	1.00	20.00 MH	41.010	1,381					1,381
OP15	Op Motor Grader	1.00	20.00 MH	41.010	1,381					1,381
OP17	Op Rollers	1.00	20.00 MH	41.010	1,381					1,381
TD02	Teamster Journeyman	2.00	40.00 MH	29.730	2,214					2,214
\$17,017.41	0.1958 MH/CY	160.00	MH	[ 8.242 ]	10,517		158	6,343		17,017
40.8500	Units/Hr	* 5.1063	Unit/MH		12.87		0.19	7.76		20.83
107000.10	F&I Subgrade Geotextile	Quan:	1,900.00 SY	Hrs/Shft:	10.00	Cal:	510	WC:	CCISP	
<u>LAB5</u>	(Mod) Foreman + 4 Laborers	10.00	CH	Prod:	31.6667	UM	Lab Pcs:	6.00	Eqp Pcs:	2.00
2EG12	Mirafi 600X (12.5'x360' Rol	1.00	1,900.00 SY	1.250		2,375				2,375
8BHLD426	BHL CAT 430 (107 Hp) T	1.00	10.00 HR	41.970				420		420
8TRKPU70	Pickup Ford F-250 3/4	1.00	10.00 HR	25.830				258		258
LA01	Laborer-Foreman	1.00	10.00 MH	38.860	663					663
LA04	Laborer-Power Tools	4.00	40.00 MH	33.000	2,345					2,345
OP09	Op Backhoe < 3Y	1.00	10.00 MH	39.770	674					674
\$6,735.24	0.0315 MH/SY	60.00	MH	[ 1.219 ]	3,682	2,375		678		6,735
190.0000	Units/Hr	* 31.6667	Unit/MH	*	1.0000	Shifts		1.94	1.25	0.36
										3.54

DIRECT COST BREAKDOWN

Activity Resource	Desc	Pcs	Quantity Unit	Unit Cost	Labor	Perm Material	Constr Matl/Exp	Equip Ment	Sub-Contract	Total
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BID ITEM = 107000 CLIENT# = 0331-0106000J Land Item SCHEDULE: 1 100 RHU  
 Description = 12 INCH SUBGRADE STABILIZATION Unit = SY Takeoff Quan: 2,450.000 Engr Quan: 2,450.000

107000.20 Base Course - Place/Compact Quan: 1,005.00 TN Hrs/Shft: 10.00 Cal: 510 WC: CCISP

Item	Desc	Pcs	Quantity Unit	Unit Cost	Labor	Perm Material	Constr Matl/Exp	Equip Ment	Sub-Contract	Total
FG11	Fine Grade - Trail		20.00 CH	Prod: 50.2500 UH			Lab Pcs: 7.00	Eqp Pcs: 5.00		
2AGDT02	Mineral Aggregate Type 2	1.05	1,055.25 TN	15.000		15,829				15,829
5TRKAG	Trucking Aggregates	1.05	1,055.25 TN	12.000			12,663			12,663
8COMPACV06	Compactor Cat CP-64 W=	1.00	20.00 HR	55.701				1,114		1,114
8GRDR120	Grader CAT 140H Rip (1	1.00	20.00 HR	128.370				2,567		2,567
8GRDR210	Grader JD210LJ Skip Lo	1.00	20.00 HR	25.376				508		508
8TRKPU70	Pickup Ford F-250 3/4	1.00	20.00 HR	25.830				517		517
8TRKWTR03	Water Truck 4,000 gal	1.00	20.00 HR	19.290				386		386
LA03	Laborer-General	1.00	20.00 MH	31.830	1,142					1,142
OP00	Op Grade Foreman	1.00	20.00 MH	55.220	1,754					1,754
OP01	Op Grade Checker	1.00	20.00 MH	36.550	1,264					1,264
OP11	Op Loader <6Y	1.00	20.00 MH	41.010	1,381					1,381
OP15	Op Motor Grader	1.00	20.00 MH	41.010	1,381					1,381
OP17	Op Rollers	1.00	20.00 MH	41.010	1,381					1,381
TD02	Teamster Journeyman	1.00	20.00 MH	29.730	1,107					1,107
\$42,993.37		0.1393 MH/TN	140.00 MH	[ 6.05 ]	9,410	15,829	12,663	5,091		42,993
50.2500 Units/Hr	*	7.1786 Unit/MH	2.0000 Shifts		9.36	15.75	12.60	5.07		42.78

107000.30 Base Course - Finish Marine Quan: 2,450.00 SY Hrs/Shft: 10.00 Cal: 510 WC: CCISP

Item	Desc	Pcs	Quantity Unit	Unit Cost	Labor	Perm Material	Constr Matl/Exp	Equip Ment	Sub-Contract	Total
FG11	Fine Grade - Trail		20.00 CH	Prod: 17.5000 UM			Lab Pcs: 7.00	Eqp Pcs: 5.00		
8COMPACV06	Compactor Cat CP-64 W=	1.00	20.00 HR	55.701				1,114		1,114
8GRDR120	Grader CAT 140H Rip (1	1.00	20.00 HR	128.370				2,567		2,567
8GRDR210	Grader JD210LJ Skip Lo	1.00	20.00 HR	25.376				508		508
8TRKPU70	Pickup Ford F-250 3/4	1.00	20.00 HR	25.830				517		517
8TRKWTR03	Water Truck 4,000 gal	1.00	20.00 HR	19.290				386		386
LA03	Laborer-General	1.00	20.00 MH	31.830	1,142					1,142
OP00	Op Grade Foreman	1.00	20.00 MH	55.220	1,754					1,754
OP01	Op Grade Checker	1.00	20.00 MH	36.550	1,264					1,264
OP11	Op Loader <6Y	1.00	20.00 MH	41.010	1,381					1,381
OP15	Op Motor Grader	1.00	20.00 MH	41.010	1,381					1,381
OP17	Op Rollers	1.00	20.00 MH	41.010	1,381					1,381
TD02	Teamster Journeyman	1.00	20.00 MH	29.730	1,107					1,107
\$14,501.62		0.0571 MH/SY	140.00 MH	[ 2.482 ]	9,410			5,091		14,502
122.5000 Units/Hr		17.5000 Unit/MH	* 2.0000 Shifts		3.84			2.08		5.92

107000.90 Mob Earthwork Equipment Quan: 2.00 EA Hrs/Shft: 10.00 Cal: 510 WC: CCISP

Item	Desc	Pcs	Quantity Unit	Unit Cost	Labor	Perm Material	Constr Matl/Exp	Equip Ment	Sub-Contract	Total
FG11	(Mod) Fine Grade - Trail		10.00 CH	Prod: 0.2000 UM			Lab Pcs: 1.00	Eqp Pcs: 7.00		
8COMPACV06	Compactor Cat CP-64 W=	1.00	10.00 HR	55.701				557		557
8GRDR120	Grader CAT 140H Rip (1	1.00	10.00 HR	128.370				1,284		1,284
8GRDR210	Grader JD210LJ Skip Lo	1.00	10.00 HR	25.376				254		254
8TRKHW15	Tractor 400 HP 75K GVW	1.00	10.00 HR	59.694				597		597
8TRKHW30	Lowbed Trailer 60 TN	1.00	10.00 HR	18.896				189		189
8TRKPU70	Pickup Ford F-250 3/4	1.00	10.00 HR	25.830				258		258
8TRKWTR03	Water Truck 4,000 gal	1.00	10.00 HR	19.290				193		193
TD02	Teamster Journeyman	1.00	10.00 MH	29.730	553					553
\$3,884.97		5.0000 MH/EA	10.00 MH	[ 163.515 ]	553			3,332		3,885
0.2000 Units/Hr		0.2000 Unit/MH	* 1.0000 Shifts		276.70			1,665.79		1,942.49

=====> Item Totals: 107000 - 12 INCH SUBGRADE STABILIZATION  
 \$85,132.61 0.2081 MH/SY 510.00 MH [ 8.791 ] 33,573 18,204 12,821 20,535 85,133  
 34.748 2450 SY 13.70 7.43 5.23 8.38 34.75

DIRECT COST BREAKDOWN

Activity Resource	Desc	Pcs	Quantity Unit	Unit Cost	Labor	Perm Material	Constr Matl/Exp	Equip Ment	Sub-Contract	Total
BID ITEM = 108000	CLIENT# = 0350-0100000J		Land Item	SCHEDULE: 1	100					RHU
Description = DRAINAGE GEOTEXTILE, TYPE 1			Unit = SY	Takeoff Quan:		166.000		Engr Quan:		166.000
108000.1	F&I Subgrade Geotextile		Quan:	166.00 SY	Hrs/Shft:	10.00	Cal: 510	WC: CCISP		
<u>LAB30</u>	Foreman + 2 Laborers		2.00 CH	Prod:	27.6667 UM	Lab Pcs:	3.00	Eqp Pcs:	2.00	
2EG12	Mirafi 600X (12.5'x360' Rol	1.25	207.50 SY		1.250		259			259
8COMPR04	Compressor 185 CFM 80H	1.00	2.00 HR		12.340			25		25
8TRKPU70	Pickup Ford F-250 3/4	1.00	2.00 HR		25.830			52		52
LA01	Laborer-Foreman	1.00	2.00 MH		38.860	133				133
LA04	Laborer-Power Tools	2.00	4.00 MH		33.000	234				234
\$702.81	0.0361 MH/SY		6.00 MH	[ 1.39 ]	367	259		76		703
83.0000 Units/Hr	27.6667 Unit/MH	*	0.2000 Shifts		2.21	1.56		0.46		4.23
=====>	Item Totals: 108000 - DRAINAGE GEOTEXTILE, TYPE 1									
\$702.81	0.0361 MH/SY		6.00 MH	[ 1.39 ]	367	259		76		703
4.234	166 SY				2.21	1.56		0.46		4.23
BID ITEM = 109000	CLIENT# = 0360-0102000K		Land Item	SCHEDULE: 1	100					RHU
Description = GRANULAR DRAINAGE BLANKET			Unit = CY	Takeoff Quan:		19.000		Engr Quan:		19.000
110000.10	GRANULAR DRAINAGE BLANKET		Quan:	19.00 CY	Hrs/Shft:	10.00	Cal: 510	WC: CCISP		
<u>EXC3</u>	Excavate 426 BH Loader		2.00 CH	Prod:	0.3158 MU	Lab Pcs:	3.00	Eqp Pcs:	2.00	
2AGD06	3/4" Crushed Stone	1.20	45.60 TN		25.500		1,163			1,163
8BHLD426	BHL CAT 430 (107 Hp) T	1.00	2.00 HR		41.970			84		84
8TRKPU70	Pickup Ford F-250 3/4	1.00	2.00 HR		25.830			52		52
OP00	Op Grade Foreman	1.00	2.00 MH		55.220	175				175
OP01	Op Grade Checker	1.00	2.00 MH		36.550	126				126
OP09	Op Backhoe < 3Y	1.00	2.00 MH		39.770	135				135
\$1,735.05	0.3157 MH/CY		6.00 MH	[ 15.231 ]	437	1,163		136		1,735
9.5000 Units/Hr	3.1667 Unit/MH		0.2000 Shifts		22.98	61.20		7.14		91.32
=====>	Item Totals: 109000 - GRANULAR DRAINAGE BLANKET									
\$1,735.05	0.3157 MH/CY		6.00 MH	[ 15.231 ]	437	1,163		136		1,735
91.318	19 CY				22.98	61.20		7.14		91.32
BID ITEM = 110000	CLIENT# = 0430-0100080F		Land Item	SCHEDULE: 1	100					RHU
Description = 8 INCH DRAIN PIPE			Unit = LF	Takeoff Quan:		248.000		Engr Quan:		248.000
111000.10	8 INCH DRAIN PIPE		Quan:	248.00 LF	Hrs/Shft:	10.00	Cal: 510	WC: CCISP		
<u>LAB30</u>	Foreman + 2 Laborers		6.00 CH	Prod:	0.0726 MU	Lab Pcs:	3.00	Eqp Pcs:	2.00	
2DB08	8" ADS Pipe	1.21	300.08 LF		4.500		1,350			1,350
8COMPR04	Compressor 185 CFM 80H	1.00	6.00 HR		12.340			74		74
8TRKPU70	Pickup Ford F-250 3/4	1.00	6.00 HR		25.830			155		155
LA01	Laborer-Foreman	1.00	6.00 MH		38.860	398				398
LA04	Laborer-Power Tools	2.00	12.00 MH		33.000	703				703
\$2,680.63	0.0725 MH/LF		18.00 MH	[ 2.791 ]	1,101	1,350		229		2,681
41.3333 Units/Hr	13.7778 Unit/MH		0.6000 Shifts		4.44	5.45		0.92		10.81
=====>	Item Totals: 110000 - 8 INCH DRAIN PIPE									
\$2,680.63	0.0725 MH/LF		18.00 MH	[ 2.791 ]	1,101	1,350		229		2,681
10.809	248 LF				4.44	5.45		0.92		10.81

DIRECT COST BREAKDOWN

Activity Resource	Desc	Quantity Pcs	Unit	Unit Cost	Labor	Perm Material	Constr Matl/Exp	Equip Ment	Sub-Contract	Total
BID ITEM = 111000	CLIENT# = 0510-0100000A	Land Item	SCHEDULE: 1	100						RHU
Description = SHORING, CRIBBING, AND COFFERDAMS	Unit = LS	Takeoff Quan:		1.000				Engr Quan:		1.000

112000.10 SHORING, CRIBBING, AND COFFERDAMS Quan: 1,200.00 SF Hrs/Shft: 10.00 Cal: 510 WC: CCISP

31.41.16.10.3910 Sheet Piling Systems, Wood, Solid Sheeting, Incl. wales, braces, spacers, drive, extract & Salvage, 8' deep excavation.  
----- Blank -----

Location	W [ft]	L [ft]	Em [ft]	D [ft]	Shoring [sqft]
Bent 3	12.5	10.0	2.5	3.0	250.0
Bent 4	12.5	10.0	3.0	3.0	270.0
Bent 5	12.5	10.0	4.0	3.0	320.0
Bent 6	10.0	10.0	6.0	3.0	360.0
					1200.0

----- End Calculation -----

EXC3	Excavate 426 BH Loader	50.00	CH	Prod:	0.1250 MU	Lab Pcs:	3.00	Eqp Pcs:	2.00
31MATMISC	Misc Material	1.00	1,200.00 SF		3.000		3,600		3,600
8BHLD426	BHL CAT 430 (107 Hp) T	1.00	50.00 HR		41.970			2,099	2,099
8TRKPU70	Pickup Ford F-250 3/4	1.00	50.00 HR		25.830			1,292	1,292
OP00	Op Grade Foreman	1.00	50.00 MH		55.220	4,384			4,384
OP01	Op Grade Checker	1.00	50.00 MH		36.550	3,161			3,161
OP09	Op Backhoe < 3Y	1.00	50.00 MH		39.770	3,372			3,372
\$17,906.80			0.1250 MH/SF	150.00 MH	[ 6.029 ]	10,917	3,600	3,390	17,907
24.0000	Units/Hr		8.0000 Unit/MH	5.0000 Shifts		9.10	3.00	2.83	14.92

=====>	Item Totals:	111000	- SHORING, CRIBBING, AND COFFERDAMS						
\$17,906.80		150.0000 MH/LS	150.00 MH	[ 7234.7 ]	10,917		3,600	3,390	17,907
17,906.800		1 LS			10,916.80		3,600.00	3,390.00	17,906.80

BID ITEM = 112000	CLIENT# = 0510-0101000K	Land Item	SCHEDULE: 1	100						RHU
Description = STRUCTURE EXCAVATION	Unit = CY	Takeoff Quan:		226.000				Engr Quan:		226.000

113000.10 STRUCTURE EXCAVATION Quan: 226.00 CY Hrs/Shft: 10.00 Cal: 510 WC: CCISP

Haul to embankment										
EXC3	(Mod) Excavate 426 BH Loader	30.00	CH	Prod:	0.3982 MU	Lab Pcs:	3.00	Eqp Pcs:	2.00	
5TRKTD	Trucking - Tandem Dump	1.00	30.00 HR		95.000		2,850		2,850	
8BHLD426	BHL CAT 430 (107 Hp) T	1.00	30.00 HR		41.970			1,259	1,259	
8TRKPU70	Pickup Ford F-250 3/4	1.00	30.00 HR		25.830			775	775	
OP00	Op Grade Foreman	1.00	30.00 MH		55.220	2,630			2,630	
OP01	Op Grade Checker	1.00	30.00 MH		36.550	1,897			1,897	
OP09	Op Backhoe < 3Y	1.00	30.00 MH		39.770	2,023			2,023	
\$11,434.07			0.3982 MH/CY	90.00 MH	[ 19.207 ]	6,550	2,850	2,034	11,434	
7.5333	Units/Hr		2.5111 Unit/MH	3.0000 Shifts		28.98	12.61	9.00	50.59	

=====>	Item Totals:	112000	- STRUCTURE EXCAVATION						
\$11,434.07		0.3982 MH/CY	90.00 MH	[ 19.207 ]	6,550		2,850	2,034	11,434
50.593		226 CY			28.98		12.61	9.00	50.59

BID ITEM = 113000	CLIENT# = 0510-0108000K	Land Item	SCHEDULE: 1	100						RHU
Description = GRANULAR STRUCTURE BACKFILL	Unit = CY	Takeoff Quan:		179.000				Engr Quan:		179.000



DIRECT COST BREAKDOWN

Activity Resource	Desc	Pcs	Quantity Unit	Unit Cost	Labor	Perm Material	Constr Matl/Exp	Equip Ment	Sub-Contract	Total
BID ITEM = 113000	CLIENT# = 0510-0108000K		Land Item	SCHEDULE: 1	100					RHU
Description =	GRANULAR STRUCTURE BACKFILL		Unit =	CY	Takeoff Quan:		179.000	Engr Quan:		179.000
114000.10	Backfill - Granular		Quan:	179.00 CY	Hrs/Shft:	10.00	Cal: 510	WC: CCISP		
<u>BACKF1</u>	(Mod) Structure Backfill-Large		30.00 CH	Prod:	1.0056 MU	Lab Pcs:	6.00	Eqp Pcs:	6.00	
2AGC06	Structural Backfill	1.25	223.74 CY	20.000		4,475				4,475
8COMPACV04	Compactor Cat CP-433E	1.00	30.00 HR	39.057				1,172		1,172
8COMPACW06	Compactor Plate 25IN	1.00	30.00 HR	12.254				368		368
8COMPACW12	Compactor Bomag BW75S-	1.00	30.00 HR	14.889				447		447
8LDRW950	Loader CAT 950 (221Hp)	1.00	30.00 HR	89.430				2,683		2,683
8TRKPU70	Pickup Ford F-250 3/4	1.00	30.00 HR	25.830				775		775
8TRKWTR04	Water Truck 4,000 gal	1.00	30.00 HR	19.290				579		579
LA04	Laborer-Power Tools	2.00	60.00 MH	33.000	3,517					3,517
OP00	Op Grade Foreman	1.00	30.00 MH	55.220	2,630					2,630
OP11	Op Loader <6Y	1.00	30.00 MH	41.010	2,072					2,072
OP17	Op Rollers	1.00	30.00 MH	41.010	2,072					2,072
TD02	Teamster Journeyman	1.00	30.00 MH	29.730	1,660					1,660
\$22,448.85	1.0055 MH/CY		180.00 MH	[ 42.95 ]	11,952	4,475		6,023		22,449
5.9667 Units/Hr	0.9944 Unit/MH		3.0000 Shifts		66.77	25.00		33.65		125.41
=====>	Item Totals: 113000 - GRANULAR STRUCTURE BACKFILL									
\$22,448.85	1.0055 MH/CY		180.00 MH	[ 42.95 ]	11,952	4,475		6,023		22,449
125.413	179 CY				66.77	25.00		33.65		125.41

BID ITEM = 114000	CLIENT# = 0515-0100000A		Land Item	SCHEDULE: 1	100					RHU
Description =	FURNISH MICROPILE EQUIPMENT		Unit =	LS	Takeoff Quan:		1.000	Engr Quan:		1.000
115000.10	FURNISH MICROPILE EQUIPMENT		Quan:	1.00 LS	Hrs/Shft:	10.00	Cal: 510	WC: CCISP		
<u>PILE20</u>	Tie Back Crew		10.00 CH	Prod:	1.0000 S	Lab Pcs:	7.00	Eqp Pcs:	6.00	
5TRKLB50	Trucking - Low Bed 50T	1.00	20.00 HR	125.000		2,500				2,500
8COMPR12	Compressor 750 CFM 275	1.00	10.00 HR	51.707				517		517
8CONCEQ56	Putzmeister TK-15 Grou	1.00	10.00 HR	28.090				281		281
8DRILLR06	Hydraulic Track Drill	1.00	10.00 HR	95.619				956		956
8GEN010	Generator 10 KW	1.00	10.00 HR	25.103				251		251
8TRKGS10	Flatbed Truck 15K 200H	1.00	10.00 HR	22.663				227		227
8TRKPU70	Pickup Ford F-250 3/4	1.00	10.00 HR	25.830				258		258
LA04	Laborer-Power Tools	1.00	10.00 MH	33.000	586					586
OP06	Op Crane < 100T	1.00	10.00 MH	43.990	730					730
OP09	Op Backhoe < 3Y	1.00	10.00 MH	39.770	674					674
PB01	Pile Buck Foreman	1.00	10.00 MH	43.710	741					741
PB02	Pile Buck Journeyman	3.00	30.00 MH	38.710	2,026					2,026
\$9,747.12	70.0000 MH/LS		70.00 MH	[ 3042.6 ]	4,757		2,500	2,490		9,747
0.1000 Units/Hr	0.0143 Unit/MH		1.0000 Shifts	*	4,757.00		2,500.00	2,490.12		9,747.12
=====>	Item Totals: 114000 - FURNISH MICROPILE EQUIPMENT									
\$9,747.12	70.0000 MH/LS		70.00 MH	[ 3042.6 ]	4,757		2,500	2,490		9,747
9,747.120	1 LS				4,757.00		2,500.00	2,490.12		9,747.12

BID ITEM = 115000	CLIENT# = 0515-0110000E		Land Item	SCHEDULE: 1	100					RHU
Description =	MICROPILES		Unit =	EA	Takeoff Quan:		87.000	Engr Quan:		87.000
116000.10	MICROPILES		Quan:	6,960.00 LF	Hrs/Shft:	10.00	Cal: 510	WC: CCISP		

DIRECT COST BREAKDOWN

Activity Resource	Desc	Pcs	Quantity Unit	Unit Cost	Labor	Perm Material	Constr Matl/Exp	Equip Ment	Sub-Contract	Total
BID ITEM = 115000	CLIENT# = 0515-0110000E		Land Item	SCHEDULE: 1 100						RHU
Description = MICROPILES			Unit = EA	Takeoff Quan:			87.000	Engr Quan:		87.000
Review, Go from 3 pile per day to 2.										
31.63.33.10.5160 Drilled Micro Piles, Pressure grouted pin pile, 5" diam. cased, up to 50 ton, friction, dense sand and gravel										
PILE20	Tie Back Crew		440.00 CH	Prod:	0.4425 MU	Lab Pcs:	7.00	Eqp Pcs:	6.00	
2TBMLF	Tie Back Materials LF	1.50	10,440.00 LF	42.000		438,480				438,480
8COMPR12	Compressor 750 CFM 275	1.00	440.00 HR	51.707				22,751		22,751
8CONCEQ56	Putzmeister TK-15 Grou	1.00	440.00 HR	28.090				12,360		12,360
8DRILLR06	Hydraulic Track Drill	1.00	440.00 HR	95.619				42,072		42,072
8GEN010	Generator 10 KW	1.00	440.00 HR	25.103				11,045		11,045
8TRKGS10	Flatbed Truck 15K 200H	1.00	440.00 HR	22.663				9,972		9,972
8TRKPU70	Pickup Ford F-250 3/4	1.00	440.00 HR	25.830				11,365		11,365
LA04	Laborer-Power Tools	1.00	440.00 MH	33.000	25,794					25,794
OP06	Op Crane < 100T	1.00	440.00 MH	43.990	32,105					32,105
OP09	Op Backhoe < 3Y	1.00	440.00 MH	39.770	29,673					29,673
PB01	Pile Buck Foreman	1.00	440.00 MH	43.710	32,595					32,595
PB02	Pile Buck Journeyman	3.00	1,320.00 MH	38.710	89,141					89,141
\$757,353.11	0.4425 MH/LF		3,080.00 MH	[ 19.235 ]	209,308	438,480		109,565		757,353
15.8182 Units/Hr	2.2597 Unit/MH		44.0000 Shifts		30.07	63.00		15.74		108.82
=====> Item Totals:	115000 - MICROPILES									
\$757,353.11	35.4022 MH/EA		3,080.00 MH	[ 1538.786 ]	209,308	438,480		109,565		757,353
8,705.208	87 EA				2,405.84	5,040.00		1,259.37		8,705.21

BID ITEM = 116000	CLIENT# = 0515-0120000E		Land Item	SCHEDULE: 1 100						RHU
Description = MICROPILE VERIFICATION LOAD TEST			Unit = EA	Takeoff Quan:			5.000	Engr Quan:		5.000
117000.10	MICROPILES		Quan: 400.00 LF	Hrs/Shft: 10.00	Cal: 510	WC: CCISP				
31.63.33.10.5160 Drilled Micro Piles, Pressure grouted pin pile, 5" diam. cased, up to 50 ton, friction, dense sand and gravel										
PILE20	Tie Back Crew		25.00 CH	Prod:	0.4375 MU	Lab Pcs:	7.00	Eqp Pcs:	6.00	
2TBMLF	Tie Back Materials LF	1.50	600.00 LF	42.000		25,200				25,200
8COMPR12	Compressor 750 CFM 275	1.00	25.00 HR	51.707				1,293		1,293
8CONCEQ56	Putzmeister TK-15 Grou	1.00	25.00 HR	28.090				702		702
8DRILLR06	Hydraulic Track Drill	1.00	25.00 HR	95.619				2,390		2,390
8GEN010	Generator 10 KW	1.00	25.00 HR	25.103				628		628
8TRKGS10	Flatbed Truck 15K 200H	1.00	25.00 HR	22.663				567		567
8TRKPU70	Pickup Ford F-250 3/4	1.00	25.00 HR	25.830				646		646
LA04	Laborer-Power Tools	1.00	25.00 MH	33.000	1,466					1,466
OP06	Op Crane < 100T	1.00	25.00 MH	43.990	1,824					1,824
OP09	Op Backhoe < 3Y	1.00	25.00 MH	39.770	1,686					1,686
PB01	Pile Buck Foreman	1.00	25.00 MH	43.710	1,852					1,852
PB02	Pile Buck Journeyman	3.00	75.00 MH	38.710	5,065					5,065
\$43,317.78	0.4375 MH/LF		175.00 MH	[ 19.016 ]	11,893	25,200		6,225		43,318
16.0000 Units/Hr	2.2857 Unit/MH		2.5000 Shifts		29.73	63.00		15.56		108.29
117000.20	Set Reaction Frame, Guages & Perform Tes		Quan: 5.00 EA	Hrs/Shft: 10.00	Cal: 510	WC: CCISP				
FORM3	(Mod) Form Crew 3 Man		50.00 CH	Prod:	30.0000 MU	Lab Pcs:	3.00	Eqp Pcs:	4.00	
31MATMISC	Misc Material	1.00	5.00 EA	200.000		1,000				1,000
8COMPR04	Compressor 185 CFM 80H	1.00	50.00 HR	12.340				617		617
8FORK02	Forklift Pettibone 603	1.00	50.00 HR	42.270				2,114		2,114
8GEN010	Generator 10 KW	1.00	50.00 HR	25.103				1,255		1,255
8TRKPU70	Pickup Ford F-250 3/4	1.00	50.00 HR	25.830				1,292		1,292
CA01	Carpenter Foreman	1.00	50.00 MH	46.750	3,977					3,977

DIRECT COST BREAKDOWN

Activity Resource	Desc	Pcs	Quantity Unit	Unit Cost	Labor	Perm Material	Constr Matl/Exp	Equip Ment	Sub-Contract	Total
BID ITEM = 116000	CLIENT# = 0515-012000E		Land Item	SCHEDULE: 1	100					RHU
Description =	MICROPILE VERIFICATION LOAD TEST		Unit = EA	Takeoff Quan:			5.000	Engr Quan:		5.000
CA02	Carpenter Journeyman	1.00	50.00 MH	41.750	3,649					3,649
LA03	Laborer-General	1.00	50.00 MH	31.830	2,854					2,854
\$16,757.31	30.0000 MH/EA		150.00 MH	[ 1323.63 ]	10,480		1,000	5,277		16,757
0.1000	Units/Hr	0.0333	Unit/MH		2,096.03		200.00	1,055.43		3,351.46
=====>	Item Totals:	116000	- MICROPILE VERIFICATION LOAD TEST							
\$60,075.09	65.0000 MH/EA		325.00 MH	[ 2844.934 ]	22,373	25,200	1,000	11,502		60,075
12,015.018	5 EA				4,474.53	5,040.00	200.00	2,300.48		12,015.02

BID ITEM = 117000	CLIENT# = 0515-013000E		Land Item	SCHEDULE: 1	100					RHU
Description =	MICROPILE PROOF LOAD TEST		Unit = EA	Takeoff Quan:			7.000	Engr Quan:		7.000
118000.10	Set Reaction Frame, Guages & Perform Tes		Quan: 7.00 EA	Hrs/Shft: 10.00	Cal: 510	WC: CCISP				
<u>FORM3</u>	(Mod) Form Crew 3 Man		35.00 CH	Prod: 15.0000	MU	Lab Pcs: 3.00	Eqp Pcs: 4.00			
31MATMISC	Misc Material	1.00	7.00 EA	200.000		1,400				1,400
8COMP04	Compressor 185 CFM 80H	1.00	35.00 HR	12.340			432			432
8FORK02	Forklift Pettibone 603	1.00	35.00 HR	42.270			1,479			1,479
8GEN010	Generator 10 KW	1.00	35.00 HR	25.103			879			879
8TRKPU70	Pickup Ford F-250 3/4	1.00	35.00 HR	25.830			904			904
CA01	Carpenter Foreman	1.00	35.00 MH	46.750	2,784					2,784
CA02	Carpenter Journeyman	1.00	35.00 MH	41.750	2,554					2,554
LA03	Laborer-General	1.00	35.00 MH	31.830	1,998					1,998
\$12,430.14	15.0000 MH/EA		105.00 MH	[ 661.817 ]	7,336		1,400	3,694		12,430
0.2000	Units/Hr	0.0667	Unit/MH		1,048.02		200.00	527.71		1,775.73
=====>	Item Totals:	117000	- MICROPILE PROOF LOAD TEST							
\$12,430.14	15.0000 MH/EA		105.00 MH	[ 661.817 ]	7,336		1,400	3,694		12,430
1,775.734	7 EA				1,048.02		200.00	527.71		1,775.73

BID ITEM = 118000	CLIENT# = 0530-0104000		Land Item	SCHEDULE: 1	100					RHU
Description =	REINFORCEMENT, GRADE 60		Unit = LB	Takeoff Quan:	78,600.000			Engr Quan:	78,600.000	
119000.10	Black Rebar - Subcontract		Quan: 78,600.00 LB	Hrs/Shft: 10.00	Cal: 510	WC: CCISP				
4REBAR	Rebar Sub	1.00	78,600.00 LB	1.100				86,460		86,460
\$86,460.00				[ ]				86,460		86,460
								1.10		1.10
119000.20	Unload & Handle Rebar		Quan: 78,600.00 LB	Hrs/Shft: 10.00	Cal: 510	WC: CCISP				
<u>REBAR2</u>	Rebar Support Light		16.00 CH	Prod: 0.0008	MU	Lab Pcs: 4.00	Eqp Pcs: 2.00			
8CRANERT700	Crane Grove RT890 75 T	1.00	16.00 HR	197.340			3,157			3,157
8TRKPU70	Pickup Ford F-250 3/4	1.00	16.00 HR	25.830			413			413
LA01	Laborer-Foreman	1.00	16.00 MH	38.860	1,061					1,061
LA03	Laborer-General	2.00	32.00 MH	31.830	1,827					1,827
OP06	Op Crane < 100T	1.00	16.00 MH	43.990	1,167					1,167
\$7,625.82	0.0008 MH/LB		64.00 MH	[ 0.033 ]	4,055			3,571		7,626
4,912.5000	Units/Hr	1,228.1391	Unit/MH		0.05			0.05		0.10
=====>	Item Totals:	118000	- REINFORCEMENT, GRADE 60							
\$94,085.82	0.0008 MH/LB		64.00 MH	[ 0.033 ]	4,055			3,571	86,460	94,086
1.197	78600 LB				0.05			0.05	1.10	1.20

DIRECT COST BREAKDOWN

Activity Resource	Desc	Pcs	Quantity Unit	Unit Cost	Labor	Perm Material	Constr Matl/Exp	Equip Ment	Sub-Contract	Total
BID ITEM = 119000 CLIENT# = 0540-0111000K Land Item SCHEDULE: 1 100 RHU Description = FOUNDATION CONCRETE, CLASS 3300 Unit = CY Takeoff Quan: 84.000 Engr Quan: 84.000										
120000.10	Fine Grade Footings		Quan: 1,036.00 SF		Hrs/Shft: 10.00		Cal: 510	WC: CCISP		
2 HR per footing										
FG2	Fine Gade - Small Area		14.00 CH	Prod: 0.0541 MU		Lab Pcs: 4.00	Eqp Pcs: 3.00			
8COMPACW12	Compactor Bomag BW75S-	1.00	14.00 HR	14.889				208		208
8LDRSS232	Skid Steer CAT 272 (95	1.00	14.00 HR	48.580				680		680
8TRKPU70	Pickup Ford F-250 3/4	1.00	14.00 HR	25.830				362		362
LA04	Laborer-Power Tools	2.00	28.00 MH	33.000	1,641					1,641
OP00	Op Grade Foreman	1.00	14.00 MH	55.220	1,227					1,227
OP11	Op Loader <6Y	1.00	14.00 MH	41.010	967					967
\$5,085.93	0.0540 MH/SF		56.00 MH	[ 2.412 ]	3,836			1,250		5,086
74.0000 Units/Hr	18.5000 Unit/MH		1.4000 Shifts		3.70			1.21		4.91
120000.20	F&S Footing		Quan: 875.00 SF		Hrs/Shft: 10.00		Cal: 510	WC: CCISP		
CARP3	Foreman+2 Carpenters		50.00 CH	Prod: 5.8333 UM		Lab Pcs: 3.00	Eqp Pcs: 2.00			
31FMAALL	Oil/Nails/Ties	1.00	875.00 SF	0.350		306				306
31FMACCESS	Form Accessories	1.00	875.00 SF	0.100		88				88
31FMCPSF	Buy Plywood/Stud Forms	0.50	437.50 SF	3.000		1,313				1,313
31FMLMSTK	Stakes	1.00	160.00 EA	1.500		240				240
8GEN010	Generator 10 KW	1.00	50.00 HR	25.103				1,255		1,255
8TRKPU70	Pickup Ford F-250 3/4	1.00	50.00 HR	25.830				1,292		1,292
CA01	Carpenter Foreman	1.00	50.00 MH	46.750	3,977					3,977
CA02	Carpenter Journeyman	2.00	100.00 MH	41.750	7,298					7,298
\$15,767.71	0.1714 MH/SF		150.00 MH	[ 8.187 ]	11,275		1,946	2,547		15,768
17.5000 Units/Hr	5.8333 Unit/MH	*	5.0000 Shifts		12.89		2.22	2.91		18.02
120000.30	Place Concrete		Quan: 84.00 CY		Hrs/Shft: 10.00		Cal: 510	WC: CCISP		
POUR5	Pour Conc 5 man		14.00 CH	Prod: 1.2000 UM		Lab Pcs: 5.00	Eqp Pcs: 4.00			
2CR10	3300 PSI Concrete	1.05	88.20 CY	130.000		11,466				11,466
8COMP004	Compressor 185 CFM 80H	1.00	14.00 HR	12.340				173		173
8CONCEQ28	Conc Vib 2.25" Elec.	1.00	14.00 HR	0.768				11		11
8GEN010	Generator 10 KW	1.00	14.00 HR	25.103				351		351
8TRKPU70	Pickup Ford F-250 3/4	1.00	14.00 HR	25.830				362		362
CA02	Carpenter Journeyman	1.00	14.00 MH	41.750	1,022					1,022
CM02	Cement Mason Journeyman	1.00	14.00 MH	35.520	923					923
LA01	Laborer-Foreman	1.00	14.00 MH	38.860	928					928
LA04	Laborer-Power Tools	2.00	28.00 MH	33.000	1,641					1,641
\$16,877.05	0.8333 MH/CY		70.00 MH	[ 33.39 ]	4,515	11,466		897		16,877
6.0000 Units/Hr	1.2000 Unit/MH	*	1.4000 Shifts		53.74	136.50		10.67		200.92
120000.40	Cure Concrete		Quan: 1,594.00 SF		Hrs/Shft: 10.00		Cal: 510	WC: CCISP		
LAB2	Foreman + 1 Laborer		3.00 CH	Prod: 265.6667 UM		Lab Pcs: 2.00	Eqp Pcs: 1.00			
31FCURECMP	Curing Compound	1.00	1,594.00 SF	0.045		72				72
31FCURESUP	Curing Supplies	1.00	1,594.00 SF	0.030		48				48
8TRKPU70	Pickup Ford F-250 3/4	1.00	3.00 HR	25.830				77		77
LA01	Laborer-Foreman	1.00	3.00 MH	38.860	199					199
LA04	Laborer-Power Tools	1.00	3.00 MH	33.000	176					176
\$571.80	0.0037 MH/SF		6.00 MH	[ 0.149 ]	375		120	77		572
531.3333 Units/Hr	265.6671 Unit/MH	*	0.3000 Shifts		0.24		0.08	0.05		0.36
120000.50	Point & Patch		Quan: 875.00 SF		Hrs/Shft: 10.00		Cal: 510	WC: CCISP		
FIN3	Patch & Finish		5.00 CH	Prod: 0.0171 MU		Lab Pcs: 3.00	Eqp Pcs: 2.00			
31FCFINISH	Patch and Finish Matl	1.00	875.00 SF	0.050		44				44

DIRECT COST BREAKDOWN

Activity Resource	Desc	Pcs	Quantity Unit	Unit Cost	Labor	Perm Material	Constr Matl/Exp	Equip Ment	Sub-Contract	Total
BID ITEM = 119000	CLIENT# = 0540-0111000K		Land Item	SCHEDULE: 1 100						RHU
Description =	FOUNDATION CONCRETE, CLASS 3300		Unit =	CY	Takeoff Quan:		84.000	Engr Quan:		84.000
8CONCEQ14	Conc Mixer 8CF 8 HP	1.00	5.00 HR	3.537				18		18
8TRKPU70	Pickup Ford F-250 3/4	1.00	5.00 HR	25.830				129		129
CM01	Cement Mason Foreman	1.00	5.00 MH	40.520	362					362
CM02	Cement Mason Journeyman	1.00	5.00 MH	35.520	330					330
LA04	Laborer-Power Tools	1.00	5.00 MH	33.000	293					293
\$1,175.86	0.0171 MH/SF		15.00 MH	[ 0.685 ]	985		44	147		1,176
175.0000	Units/Hr	58.3334	Unit/MH	0.5000	Shifts	1.13	0.05	0.17		1.34
120000.60	Misc Conc Hardware		Quan:	84.00 CY	Hrs/Shft:	10.00	Cal:	510	WC:	CCISP
Allowance cost for expendable & reusable form hardware & Const & Permanent bridge materials. Expanded Polystyrene, dobies, spreaders, backer-rod, chamfer, wedges, PVC pipe, nails, misc. matls.										
31MATBI	Misc Bridge Items	1.00	84.00 CY	20.000			1,680			1,680
\$1,680.00				[ ]			1,680			1,680
							20.00			20.00
====>	Item Totals:	119000	- FOUNDATION CONCRETE, CLASS 3300							
\$41,158.35	3.5357 MH/CY		297.00 MH	[ 158.378 ]	20,985	11,466	3,790	4,918		41,158
489.980	84 CY				249.82	136.50	45.11	58.54		489.98

BID ITEM = 120000	CLIENT# = 0540-0207100K		Land Item	SCHEDULE: 1 100						RHU	
Description =	DECK CONCRETE, CLASS HPC4500		Unit =	CY	Takeoff Quan:		161.000	Engr Quan:		161.000	
120000.05	Overhang & Walkway F&S		Quan:	3,698.00 SF	Hrs/Shft:	10.00	Cal:	510	WC:	CCISP	
----- Blank -----											
Install	Grade	Remove	Brackets	OH							
OH	contact	Area	924.5	LF	3,698	SF					
2x4's	for	Joists & rail		10.33ft/lf	9.55	MBF					
4x4's	for	Jacks		2.67ft/lf	2.47	MBF					
OH	Jacks	@ 3'OC			309	EA					
				Plywood	3.70	MSF					
----- End Calculation -----											
FORM4C	(Mod) Form Crew 4 Man w/Crane		90.00	CH	Prod:	0.1217	MU	Lab Pcs:	5.00	Eqp Pcs:	5.00
31FMAALL	Oil/Nails/Ties	1.00	3,698.00	SF	0.350			1,294		1,294	
31FMAACCESS	Form Accessories	1.00	3,698.00	SF	0.100			370		370	
31FMAOHB	Overhang Brackets Rent	1.00	309.00	EA	10.000			3,090		3,090	
31FMLM2X4	Lumber, 2 x 4	1.00	9.55	MBF	655.000			6,255		6,255	
31FMLM4X4	Lumber, 4x4	1.00	2.46	MBF	890.000			2,197		2,197	
31FMLP34CDX	Plywood, 3/4" CDX	1.00	3.69	MSF	622.000			2,300		2,300	
31FMLP34PLY	Plyform, 3/4"	1.00	3.73	MSF	1,094.000			4,081		4,081	
8COMP04	Compressor 185 CFM 80H	1.00	90.00	HR	12.340				1,111	1,111	
8CRANERT700	Crane Grove RT890 75 T	1.00	90.00	HR	197.340				17,761	17,761	
8GEN010	Generator 10 KW	1.00	90.00	HR	25.103				2,259	2,259	
8MLIFT060	Manlift 80' Genie S-80	1.00	90.00	HR	73.860				6,647	6,647	
8TRKPU70	Pickup Ford F-250 3/4	1.00	90.00	HR	25.830				2,325	2,325	
CA01	Carpenter Foreman	1.00	90.00	MH	46.750	7,158				7,158	
CA02	Carpenter Journeyman	2.00	180.00	MH	41.750	13,137				13,137	
LA03	Laborer-General	1.00	90.00	MH	31.830	5,138				5,138	
OP06	Op Crane < 100T	1.00	90.00	MH	43.990	6,567				6,567	
\$81,689.29	0.1216 MH/SF		450.00	MH	[ 5.517 ]	32,000		19,587	30,103	81,689	
41.0889	Units/Hr	8.2178	Unit/MH	9.0000	Shifts	8.65		5.30	8.14	22.09	
120000.10	F/S Wood Deck Btw Girders		Quan:	5,547.00 SF	Hrs/Shft:	10.00	Cal:	510	WC:	CCISP	

DIRECT COST BREAKDOWN

Activity	Desc	Quantity	Unit	Unit Cost	Labor	Perm Material	Constr Matl/Exp	Equip Ment	Sub-Contract	Total
Resource	Pcs									
BID ITEM = 120000	CLIENT# = 0540-0207100K	Land Item	SCHEDULE: 1 100							RHU
Description =	DECK CONCRETE, CLASS HPC4500	Unit =	CY	Takeoff Quan:			161.000	Engr Quan:		161.000
<u>FORM4</u>	(Mod) Form Crew 4 Man	100.00	CH	Prod:	0.0721	MU	Lab Pcs:	4.00	Eqp Pcs:	5.00
31FMCDH	Buy Deck Horses/Hardware	1.00	277.00 EA	25.000			6,925			6,925
31FMCPSF	Buy Plywood/Stud Forms	1.00	5,547.00 SF	3.000			16,641			16,641
31FMLMCOMP	Form Lumber	1.00	0.82 MBF	890.000			730			730
8COMPR04	Compressor 185 CFM 80H	1.00	100.00 HR	12.340				1,234		1,234
8GEN010	Generator 10 KW	1.00	100.00 HR	25.103				2,510		2,510
8MLIFT060	Manlift 80' Genie S-80	2.00	200.00 HR	73.860				14,772		14,772
8TRKPU70	Pickup Ford F-250 3/4	1.00	100.00 HR	25.830				2,583		2,583
CA01	Carpenter Foreman	1.00	100.00 MH	46.750	7,953					7,953
CA02	Carpenter Journeyman	2.00	200.00 MH	41.750	14,597					14,597
LA03	Laborer-General	1.00	100.00 MH	31.830	5,709					5,709
\$73,653.70	0.0721 MH/SF		400.00 MH	[ 3.214 ]	28,259		24,296	21,099		73,654
55.4700	Units/Hr	13.8675	Unit/MH		5.09		4.38	3.80		13.28
120000.15	Edge & End of Deck F&S			Quan:	1,487.00	SF	Hrs/Shft:	10.00	Cal:	510 WC: CCISP
<u>FORM4</u>	Form Crew 4 Man	90.00	CH	Prod:	0.2421	MU	Lab Pcs:	4.00	Eqp Pcs:	3.00
31FMAALL	Oil/Nails/Ties	1.00	1,487.00 SF	0.350			520			520
31FMCPSF	Buy Plywood/Stud Forms	1.00	1,487.00 SF	3.000			4,461			4,461
8COMPR04	Compressor 185 CFM 80H	1.00	90.00 HR	12.340				1,111		1,111
8GEN010	Generator 10 KW	1.00	90.00 HR	25.103				2,259		2,259
8TRKPU70	Pickup Ford F-250 3/4	1.00	90.00 HR	25.830				2,325		2,325
CA01	Carpenter Foreman	1.00	90.00 MH	46.750	7,158					7,158
CA02	Carpenter Journeyman	2.00	180.00 MH	41.750	13,137					13,137
LA03	Laborer-General	1.00	90.00 MH	31.830	5,138					5,138
\$36,108.76	0.2420 MH/SF		360.00 MH	[ 10.791 ]	25,433		4,981	5,695		36,109
16.5222	Units/Hr	4.1306	Unit/MH		17.10		3.35	3.83		24.28
120000.20	Screed&Rail Setup/Grd/Rmv			Quan:	1,000.00	LF	Hrs/Shft:	10.00	Cal:	510 WC: CCISP
<u>FORM5</u>	Form Crew 5 Man	20.00	CH	Prod:	0.1000	MU	Lab Pcs:	5.00	Eqp Pcs:	3.00
31FMCSCRRAIL	Finish Machine Rail	0.20	200.01 LF	5.000			1,000			1,000
8COMPR04	Compressor 185 CFM 80H	1.00	20.00 HR	12.340				247		247
8GEN010	Generator 10 KW	1.00	20.00 HR	25.103				502		502
8TRKPU70	Pickup Ford F-250 3/4	1.00	20.00 HR	25.830				517		517
CA01	Carpenter Foreman	1.00	20.00 MH	46.750	1,591					1,591
CA02	Carpenter Journeyman	3.00	60.00 MH	41.750	4,379					4,379
LA03	Laborer-General	1.00	20.00 MH	31.830	1,142					1,142
\$9,376.88	0.1000 MH/LF		100.00 MH	[ 4.484 ]	7,111		1,000	1,265		9,377
50.0000	Units/Hr	10.0000	Unit/MH		7.11		1.00	1.27		9.38
120000.25	Fin Mach Setup/Grd/Rmv			Quan:	1.00	EA	Hrs/Shft:	10.00	Cal:	510 WC: CCISP
<u>POUR1</u>	Bidwell Set-up	10.00	CH	Prod:	60.0000	MU	Lab Pcs:	6.00	Eqp Pcs:	3.00
8CONCP26	Bid-well 4800 Deck Fin	1.00	10.00 HR	20.590				206		206
8CRANERT700	Crane Grove RT890 75 T	1.00	10.00 HR	197.340				1,973		1,973
8TRKPU70	Pickup Ford F-250 3/4	1.00	10.00 HR	25.830				258		258
CA01	Carpenter Foreman	1.00	10.00 MH	46.750	795					795
CA02	Carpenter Journeyman	1.00	10.00 MH	41.750	730					730
LA03	Laborer-General	1.00	10.00 MH	31.830	571					571
OP00	Op Grade Foreman	1.00	10.00 MH	55.220	877					877
OP03	Op Bidwell	1.00	10.00 MH	41.100	692					692
OP06	Op Crane < 100T	1.00	10.00 MH	43.990	730					730
\$6,831.86	60.0000 MH/EA		60.00 MH	[ 2867.04 ]	4,394			2,438		6,832
0.1000	Units/Hr	0.0167	Unit/MH		4,394.26			2,437.60		6,831.86
120000.30	Deck - Place Conc			Quan:	161.00	CY	Hrs/Shft:	10.00	Cal:	510 WC: CCISP

DIRECT COST BREAKDOWN

Activity	Desc	Quantity	Unit	Unit Cost	Labor	Perm Material	Constr Matl/Exp	Equip Ment	Sub-Contract	Total
BID ITEM = 120000	CLIENT# = 0540-0207100K	Land Item	SCHEDULE: 1 100							RHU
Description =	DECK CONCRETE, CLASS HPC4500	Unit =	CY	Takeoff	Quan:		161.000	Engr	Quan:	161.000
2 crews										
<u>POUR6</u>	Pour Conc 6 man		10.00 CH	Prod:	0.3727 MU	Lab Pcs:	6.00	Eqp Pcs:	4.00	
2CR13	4500 PSI Deck Concrete	1.05	169.05 CY		140.000		23,667			23,667
5CONCP28M	Concrete Pump 32m (105')	1.00	10.00 HR		162.750		1,628			1,628
5CONCP58MC	Cubic Yard Charge 58m-63	1.05	169.05 CY		4.200		710			710
8COMPR04	Compressor 185 CFM 80H	1.00	10.00 HR		12.340			123		123
8CONCEQ28	Conc Vib 2.25" Elec.	1.00	10.00 HR		0.768			8		8
8GEN010	Generator 10 KW	1.00	10.00 HR		25.103			251		251
8TRKPU70	Pickup Ford F-250 3/4	1.00	10.00 HR		25.830			258		258
CA02	Carpenter Journeyman	1.00	10.00 MH		41.750	730				730
CM02	Cement Mason Journeyman	1.00	10.00 MH		35.520	659				659
LA01	Laborer-Foreman	1.00	10.00 MH		38.860	663				663
LA04	Laborer-Power Tools	3.00	30.00 MH		33.000	1,759				1,759
\$30,455.79	0.3726 MH/CY	60.00 MH		[ 14.698 ]	3,811	23,667	2,338	640		30,456
16.1000 Units/Hr	2.6833 Unit/MH	1.0000 Shifts			23.67	147.00	14.52	3.98		189.17

120000.35 Wet Cure Deck Quan: 7,704.00 SF Hrs/Shft: 10.00 Cal: 510 WC: CCISP

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Production = 0.006 MH/SF

Wet cure bridge deck - initial labor to cover deck with curing blankets & to keep moist  
Water at 1/4" per day over deck area

----- Blank -----

8190 sf x 0.021' x 14 days = 2,408 CF x 7.48 CF/G = 18,012 Gal

----- End Calculation -----

<u>LAB3</u>	Foreman + 2 Laborers		15.00 CH	Prod:	0.0058 MU	Lab Pcs:	3.00	Eqp Pcs:	1.00	
31FCUREBLAN	Curing Blankets	1.00	7,704.00 SF		0.500	3,852				3,852
31MATCW	Construction Water	1.00	16.95 MG		3.500	59				59
5TRKWTR	Water Truck	1.00	15.00 HR		120.000	1,800				1,800
8TRKPU70	Pickup Ford F-250 3/4	1.00	15.00 HR		25.830			387		387
LA01	Laborer-Foreman	1.00	15.00 MH		38.860	994				994
LA04	Laborer-Power Tools	2.00	30.00 MH		33.000	1,759				1,759
\$8,851.90	0.0058 MH/SF	45.00 MH		[ 0.225 ]	2,753	5,711	387			8,852
513.6000 Units/Hr	171.2000 Unit/MH	1.5000 Shifts			0.36	0.74	0.05			1.15

120000.40 Point & Patch Quan: 1,487.00 SF Hrs/Shft: 10.00 Cal: 510 WC: CCISP

<u>FIN3</u>	Patch & Finish		8.00 CH	Prod:	0.0161 MU	Lab Pcs:	3.00	Eqp Pcs:	3.00	
31FCFINISH	Patch and Finish Matl	1.00	1,487.00 SF		0.050	74				74
8CONCEQ14	Conc Mixer 8CF 8 HP	1.00	8.00 HR		3.537			28		28
8MLIFT060	Manlift 80' Genie S-80	1.00	8.00 HR		73.860			591		591
8TRKPU70	Pickup Ford F-250 3/4	1.00	8.00 HR		25.830			207		207
CM01	Cement Mason Foreman	1.00	8.00 MH		40.520	580				580
CM02	Cement Mason Journeyman	1.00	8.00 MH		35.520	528				528
LA04	Laborer-Power Tools	1.00	8.00 MH		33.000	469				469
\$2,476.62	0.0161 MH/SF	24.00 MH		[ 0.645 ]	1,576	74	826			2,477
185.8750 Units/Hr	61.9584 Unit/MH	0.8000 Shifts			1.06	0.05	0.56			1.67

120000.45 Rubbed Conc Finish Quan: 1,487.00 SF Hrs/Shft: 10.00 Cal: 510 WC: CCISP

<u>FIN3</u>	Patch & Finish		17.00 CH	Prod:	0.0343 MU	Lab Pcs:	3.00	Eqp Pcs:	3.00	
31FCFINCL1	CL1 Finish Materials	1.00	1,487.00 SF		0.150	223				223
8CONCEQ14	Conc Mixer 8CF 8 HP	1.00	17.00 HR		3.537			60		60
8MLIFT060	Manlift 80' Genie S-80	1.00	17.00 HR		73.860			1,256		1,256
8TRKPU70	Pickup Ford F-250 3/4	1.00	17.00 HR		25.830			439		439
CM01	Cement Mason Foreman	1.00	17.00 MH		40.520	1,232				1,232
CM02	Cement Mason Journeyman	1.00	17.00 MH		35.520	1,121				1,121

DIRECT COST BREAKDOWN

Activity Resource	Desc	Pcs	Quantity Unit	Unit Cost	Labor	Perm Material	Constr Mat/Exp	Equip Ment	Sub-Contract	Total
BID ITEM = 120000	CLIENT# = 0540-0207100K		Land Item	SCHEDULE: 1 100						RHU
Description =	DECK CONCRETE, CLASS HPC4500		Unit =	CY	Takeoff Quan:		161.000	Engr Quan:		161.000
LA04	Laborer-Power Tools	1.00	17.00 MH	33.000	997					997
\$5,327.84	0.0342 MH/SF		51.00 MH	[ 1.371 ]	3,350		223	1,755		5,328
87.4706	Units/Hr	29.1569	Unit/MH	1.7000	Shifts		2.25	0.15	1.18	3.58
120000.50	Cure		Quan:	9,191.00 SF	Hrs/Shft:	10.00	Cal: 510	WC: CCISP		
<u>LAB2</u>	Foreman + 1 Laborer		18.00	CH	Prod:	0.0039	MU	Lab Pcs: 2.00	Eqp Pcs: 1.00	
31FCURECMP	Curing Compound	1.00	9,191.00	SF	0.045			414		414
31FCURESUP	Curing Supplies	1.00	9,191.00	SF	0.030			276		276
8TRKPU70	Pickup Ford F-250 3/4	1.00	18.00	HR	25.830				465	465
LA01	Laborer-Foreman	1.00	18.00	MH	38.860	1,193				1,193
LA04	Laborer-Power Tools	1.00	18.00	MH	33.000	1,055				1,055
\$3,402.83	0.0039 MH/SF		36.00	MH	[ 0.155 ]	2,249		689	465	3,403
510.6111	Units/Hr	255.3059	Unit/MH	1.8000	Shifts		0.24	0.08	0.05	0.37
120000.55	Misc Conc Hardware		Quan:	161.00 CY	Hrs/Shft:	10.00	Cal: 510	WC: CCISP		
Allowance cost for expendable & reusable form hardware & Const & Permanent bridge materials.										
Expanded Polystyrene, dobies, spreaders, backer-rod, chamfer, wedges, PVC pipe, nails, misc. matls.										
31MATBI	Misc Bridge Items	1.00	161.00	CY	20.000			3,220		3,220
\$3,220.00					[ ]			3,220		3,220
								20.00		20.00
120000.60	Equipment Mob		Quan:	1.00 LS	Hrs/Shft:	10.00	Cal: 510	WC: CCISP		
	Small Med Large									
Move out Crane										
Bobcat/Compactor	1									
manlift		1								
Bidwill	2									
Forklift	2									
TOTAL.....	5.....1.....1									
5EML	Equipment Move, Large	1.00	1.00	EA	750.000			750		750
5EMM	Equipment Move, Medium	1.00	1.00	EA	500.000			500		500
5EMS	Equipment Move, Small	1.00	5.00	EA	250.000			1,250		1,250
\$2,500.00					[ ]			2,500		2,500
								2,500.00		2,500.00
=====>	Item Totals:	120000	- DECK CONCRETE, CLASS HPC4500							
\$263,895.47	9.8509	MH/CY	1,586.00	MH	[ 435.683 ]	110,936	23,667	64,620	64,673	263,895
1,639.102		161	CY			689.04	147.00	401.37	401.70	1,639.10

BID ITEM = 121000	CLIENT# = 0540-0311000K		Land Item	SCHEDULE: 1 100						RHU
Description =	GENERAL STRUCTURAL CONCRETE, CLASS 3300		Unit =	CY	Takeoff Quan:		43.000	Engr Quan:		43.000
122000.05	Abut - F&S		Quan:	783.00 SF	Hrs/Shft:	10.00	Cal: 510	WC: CCISP		
<u>CARP4</u>	(Mod) Foreman + 3 Carpenters		30.00	CH	Prod:	5.2200	UM	Lab Pcs: 5.00	Eqp Pcs: 3.00	
31FMAALL	Oil/Nails/Ties	1.00	783.00	SF	0.350			274		274
31FMACESS	Form Accessories	1.00	783.00	SF	0.100			78		78
31FMCPSF	Buy Plywood/Stud Forms	1.00	783.00	SF	3.000			2,349		2,349
31FMLMSTK	Stakes	1.00	139.54	EA	1.500			209		209
8FORK06	Forklift Pettibone 603	1.00	30.00	HR	42.270				1,268	1,268
8GEN010	Generator 10 KW	1.00	30.00	HR	25.103				753	753
8TRKPU70	Pickup Ford F-250 3/4	1.00	30.00	HR	25.830				775	775
CA01	Carpenter Foreman	1.00	30.00	MH	46.750	2,386				2,386
CA02	Carpenter Journeyman	3.00	90.00	MH	41.750	6,568				6,568



DIRECT COST BREAKDOWN

Activity Resource	Desc	Pcs	Quantity Unit	Unit Cost	Labor	Perm Material	Constr Matl/Exp	Equip Ment	Sub-Contract	Total
BID ITEM = 121000	CLIENT# = 0540-0311000K		Land Item	SCHEDULE: 1 100						RHU
Description =	GENERAL STRUCTURAL CONCRETE, CLASS 3300		Unit =	CY	Takeoff Quan:		43.000	Engr Quan:		43.000
OP11	Op Loader <6Y	1.00	30.00 MH	41.010	2,072					2,072
\$16,733.01	0.1915 MH/SF		150.00 MH	[ 8.977 ]	11,026		2,911	2,796		16,733
26.1000 Units/Hr	5.2200 Unit/MH *		3.0000 Shifts		14.08		3.72	3.57		21.37
122000.10	Abut - Place Concrete		Quan:	38.00 CY	Hrs/Shft:	10.00	Cal: 510	WC: CCISP		
<u>POUR4C</u>	Pour Conc 4 man w/crane		5.00 CH	Prod:	1.5200 UM	Lab Pcs:	5.00	Eqp Pcs:	6.00	
2CR10	3300 PSI Concrete	1.05	39.90 CY	130.000		5,187				5,187
8COMPR04	Compressor 185 CFM 80H	1.00	5.00 HR	12.340				62		62
8CONCEQ04	Conc Bucket 1.5 - 3 CY	1.00	5.00 HR	9.750				49		49
8CONCEQ28	Conc Vib 2.25" Elec.	1.00	5.00 HR	0.768				4		4
8CRANERT700	Crane Grove RT890 75 T	1.00	5.00 HR	197.340				987		987
8GEN010	Generator 10 KW	1.00	5.00 HR	25.103				126		126
8TRKPU70	Pickup Ford F-250 3/4	1.00	5.00 HR	25.830				129		129
CM02	Cement Mason Journeyman	1.00	5.00 MH	35.520	330					330
LA01	Laborer-Foreman	1.00	5.00 MH	38.860	331					331
LA04	Laborer-Power Tools	2.00	10.00 MH	33.000	586					586
OP06	Op Crane < 100T	1.00	5.00 MH	43.990	365					365
\$8,154.90	0.6578 MH/CY		25.00 MH	[ 26.685 ]	1,612	5,187		1,356		8,155
7.6000 Units/Hr	1.5200 Unit/MH *		0.5000 Shifts		42.43	136.50		35.68		214.60
122000.15	Abut Backwall - F&S		Quan:	365.00 SF	Hrs/Shft:	10.00	Cal: 510	WC: CCISP		
Buy 1/2 Forms and reuse										
----- Blank -----										
<u>FORM4</u>	Form Crew 4 Man		20.00 CH	Prod:	0.2192 MU	Lab Pcs:	4.00	Eqp Pcs:	3.00	
31FMABRACE	Form Braces	1.00	21.74 EA	5.000		109				109
31FMACESS	Form Accessories	1.00	365.00 SF	0.100		37				37
31FMAONT	Oil, Nails, & Ties	1.00	365.00 SF	0.350		128				128
31FMCPSF	Buy Plywood/Stud Forms	0.50	182.49 SF	3.000		547				547
8COMPR04	Compressor 185 CFM 80H	1.00	20.00 HR	12.340				247		247
8GEN010	Generator 10 KW	1.00	20.00 HR	25.103				502		502
8TRKPU70	Pickup Ford F-250 3/4	1.00	20.00 HR	25.830				517		517
CA01	Carpenter Foreman	1.00	20.00 MH	46.750	1,591					1,591
CA02	Carpenter Journeyman	2.00	40.00 MH	41.750	2,919					2,919
LA03	Laborer-General	1.00	20.00 MH	31.830	1,142					1,142
\$7,737.60	0.2191 MH/SF		80.00 MH	[ 9.769 ]	5,652		820	1,265		7,738
18.2500 Units/Hr	4.5625 Unit/MH		2.0000 Shifts		15.48		2.25	3.47		21.20
122000.20	Abut Backwall-Place Conc		Quan:	6.00 CY	Hrs/Shft:	10.00	Cal: 510	WC: CCISP		
----- Blank -----										
5% waste, includes rollout and cleanup										
=====										
<u>POUR4C</u>	Pour Conc 4 man w/crane		2.00 CH	Prod:	1.6667 MU	Lab Pcs:	5.00	Eqp Pcs:	6.00	
2CR10	3300 PSI Concrete	1.05	6.30 CY	130.000		819				819
2CRSHORT	Short Load Charge	1.00	2.00 EA	50.000		100				100
8COMPR04	Compressor 185 CFM 80H	1.00	2.00 HR	12.340				25		25
8CONCEQ04	Conc Bucket 1.5 - 3 CY	1.00	2.00 HR	9.750				20		20
8CONCEQ28	Conc Vib 2.25" Elec.	1.00	2.00 HR	0.768				2		2
8CRANERT700	Crane Grove RT890 75 T	1.00	2.00 HR	197.340				395		395
8GEN010	Generator 10 KW	1.00	2.00 HR	25.103				50		50
8TRKPU70	Pickup Ford F-250 3/4	1.00	2.00 HR	25.830				52		52
CM02	Cement Mason Journeyman	1.00	2.00 MH	35.520	132					132
LA01	Laborer-Foreman	1.00	2.00 MH	38.860	133					133
LA04	Laborer-Power Tools	2.00	4.00 MH	33.000	234					234
OP06	Op Crane < 100T	1.00	2.00 MH	43.990	146					146
\$2,106.13	1.6666 MH/CY		10.00 MH	[ 67.602 ]	645	919		542		2,106

DIRECT COST BREAKDOWN

Activity Resource	Desc	Pcs	Quantity Unit	Unit Cost	Labor	Perm Material	Constr Matl/Exp	Equip Ment	Sub-Contract	Total	
BID ITEM = 121000	CLIENT# = 0540-0311000K		Land Item	SCHEDULE: 1 100						RHU	
Description =	GENERAL STRUCTURAL CONCRETE, CLASS 3300		Unit =	CY	Takeoff Quan:		43.000	Engr Quan:		43.000	
3.0000	Units/Hr	0.6000	Unit/MH	0.2000	Shifts	107.49	153.17	90.37		351.02	
122000.25	Abutment Drainage		Quan:	470.00 SF	Hrs/Shft:	10.00	Cal: 510	WC: CCISP			
<u>FORM3</u>	Form Crew 3 Man		5.00	CH	Prod:	0.5000 S	Lab Pcs:	3.00	Eqp Pcs:	3.00	
2EG30	Geocomposite Drain	1.10	57.45	SY	3.000	172				172	
31MATMISC	Misc Material	1.00	40.00	LF	20.000		800			800	
8COMP04	Compressor 185 CFM 80H	1.00	5.00	HR	12.340			62		62	
8GEN010	Generator 10 KW	1.00	5.00	HR	25.103			126		126	
8TRKPU70	Pickup Ford F-250 3/4	1.00	5.00	HR	25.830			129		129	
CA01	Carpenter Foreman	1.00	5.00	MH	46.750	398				398	
CA02	Carpenter Journeyman	1.00	5.00	MH	41.750	365				365	
LA03	Laborer-General	1.00	5.00	MH	31.830	285				285	
\$2,336.75		0.0319	MH/SF	15.00	MH	[ 1.408 ]	1,048	172	800	316	2,337
94.0000	Units/Hr	31.3333	Unit/MH	0.5000	Shifts	*	2.23	0.37	1.70	0.67	4.97
122000.30	Cure Abutment Concrete		Quan:	1,305.00 SF	Hrs/Shft:	10.00	Cal: 510	WC: CCISP			
<u>LAB2</u>	Foreman + 1 Laborer		3.00	CH	Prod:	217.5000 UM	Lab Pcs:	2.00	Eqp Pcs:	1.00	
31FCURECMP	Curing Compound	1.00	1,305.00	SF	0.045		59			59	
31FCURESUP	Curing Supplies	1.00	1,305.00	SF	0.030		39			39	
8TRKPU70	Pickup Ford F-250 3/4	1.00	3.00	HR	25.830			77		77	
LA01	Laborer-Foreman	1.00	3.00	MH	38.860	199				199	
LA04	Laborer-Power Tools	1.00	3.00	MH	33.000	176				176	
\$550.13		0.0045	MH/SF	6.00	MH	[ 0.182 ]	375	98	77	550	
435.0000	Units/Hr	217.5001	Unit/MH	* 0.3000	Shifts		0.29	0.08	0.06	0.42	
122000.35	Point & Patch		Quan:	1,147.00 SF	Hrs/Shft:	10.00	Cal: 510	WC: CCISP			
<u>FIN3</u>	Patch & Finish		6.37	CH	Prod:	0.0167 MU	Lab Pcs:	3.00	Eqp Pcs:	2.00	
31FCFINISH	Patch and Finish Matl	1.00	1,147.00	SF	0.050		57			57	
8CONCEQ14	Conc Mixer 8CF 8 HP	1.00	6.37	HR	3.537			23		23	
8TRKPU70	Pickup Ford F-250 3/4	1.00	6.37	HR	25.830			165		165	
CM01	Cement Mason Foreman	1.00	6.37	MH	40.520	462				462	
CM02	Cement Mason Journeyman	1.00	6.37	MH	35.520	420				420	
LA04	Laborer-Power Tools	1.00	6.37	MH	33.000	373				373	
\$1,499.65		0.0166	MH/SF	19.11	MH	[ 0.666 ]	1,255	57	187	1,500	
180.0628	Units/Hr	60.0209	Unit/MH	0.6370	Shifts		1.09	0.05	0.16	1.31	
122000.40	Rubbed Conc Finish		Quan:	313.00 SF	Hrs/Shft:	10.00	Cal: 510	WC: CCISP			
<u>FIN3</u>	Patch & Finish		4.00	CH	Prod:	0.0383 MU	Lab Pcs:	3.00	Eqp Pcs:	2.00	
31FCFINCL1	CL1 Finish Materials	1.00	313.00	SF	0.150		47			47	
8CONCEQ14	Conc Mixer 8CF 8 HP	1.00	4.00	HR	3.537			14		14	
8TRKPU70	Pickup Ford F-250 3/4	1.00	4.00	HR	25.830			103		103	
CM01	Cement Mason Foreman	1.00	4.00	MH	40.520	290				290	
CM02	Cement Mason Journeyman	1.00	4.00	MH	35.520	264				264	
LA04	Laborer-Power Tools	1.00	4.00	MH	33.000	234				234	
\$952.63		0.0383	MH/SF	12.00	MH	[ 1.533 ]	788	47	117	953	
78.2500	Units/Hr	26.0833	Unit/MH	0.4000	Shifts		2.52	0.15	0.38	3.04	
122000.45	Sandblast Conc		Quan:	164.00 SF	Hrs/Shft:	10.00	Cal: 510	WC: CCISP			
<u>FIN1</u>	Sand Blasting		3.00	CH	Prod:	0.0366 MU	Lab Pcs:	2.00	Eqp Pcs:	3.00	
31FCSANDB	Sand Blast Sand	1.00	164.00	SF	0.550		90			90	
8COMP04	Compressor 185 CFM 80H	1.00	3.00	HR	12.340			37		37	
8CONCEQ44	Sandblaster 11 CF	1.00	3.00	HR	3.425			10		10	
8TRKPU70	Pickup Ford F-250 3/4	1.00	3.00	HR	25.830			77		77	
LA01	Laborer-Foreman	1.00	3.00	MH	38.860	199				199	

DIRECT COST BREAKDOWN

Activity Resource	Desc	Pcs	Quantity Unit	Unit Cost	Labor	Perm Material	Constr Mat/Exp	Equip Ment	Sub-Contract	Total
BID ITEM = 121000	CLIENT# = 0540-0311000K		Land Item	SCHEDULE: 1 100						RHU
Description =	GENERAL STRUCTURAL CONCRETE, CLASS 3300		Unit =	CY	Takeoff Quan:		43.000	Engr Quan:		43.000
LA04	Laborer-Power Tools	1.00	3.00 MH	33.000	176					176
\$589.74	0.0365 MH/SF		6.00 MH	[ 1.446 ]	375		90	125		590
54.6667	Units/Hr	27.3333	Unit/MH	0.3000	Shifts		2.29	0.55	0.76	3.60
122000.50	Misc Conc Hardware		Quan:	43.00 CY	Hrs/Shft:	10.00	Cal: 510	WC: CCISP		
Allowance cost for expendable & reusable form hardware & Const & Permanent bridge materials.										
Expanded Polystyrene, dobies, spreaders, backer-rod, chamfer, wedges, PVC pipe, nails, misc. matls.										
31MATBI	Misc Bridge Items	1.00	43.00 CY	20.000			860			860
\$860.00				[ ]			860			860
							20.00			20.00
=====>	Item Totals:	121000	- GENERAL STRUCTURAL CONCRETE, CLASS 3300							
\$41,520.54	7.5141	MH/CY	323.11	MH	[ 334.76 ]	22,776	6,278	5,683	6,783	41,521
965.594		43	CY			529.68	146.01	132.17	157.73	965.59

PARENT ITEM = 122000	CLIENT# = 0540-0312000K									RHU
Description =	GENERAL STRUCTURAL CONCRETE, CLASS 4000		Unit =	CY	Takeoff Quan:		92.000	Engr Quan:		92.000
Listing of Sub-Biditems of Parent Item 122000:										

BID ITEM = 122100			Land Item	SCHEDULE: 1 100						RHU	
Description =	COLUMN		Unit =	CY	Takeoff Quan:		24.000	Engr Quan:		24.000	
2005413.10	Clmn Rnd - Assmbl/Dis Frm		Quan:	434.00 SF	Hrs/Shft:	10.00	Cal: 510	WC: CCISP			
There are 3 sizes of columns, buy 1 of each											
30" x 10' = 81 sf											
36" x 14' = 130 sf											
42" x 20' = 223 sf											
TOTAL = 434 sf											
FORM4C	Form Crew 4 Man w/Crane		10.00	CH	Prod:	0.1152	MU	Lab Pcs:	5.00	Eqp Pcs:	4.00
31FMCCOL	Column Form - Buy	1.00	434.00	SF	48.000			20,832		20,832	
31FMCCOLSV	Column Form - Salvage (40	1.00	434.00	SF	-19.200			-8,334		-8,334	
8COMPR04	Compressor 185 CFM 80H	1.00	10.00	HR	12.340				123	123	
8CRANERT700	Crane Grove RT890 75 T	1.00	10.00	HR	197.340				1,973	1,973	
8GEN010	Generator 10 KW	1.00	10.00	HR	25.103				251	251	
8TRKPU70	Pickup Ford F-250 3/4	1.00	10.00	HR	25.830				258	258	
CA01	Carpenter Foreman	1.00	10.00	MH	46.750	795				795	
CA02	Carpenter Journeyman	2.00	20.00	MH	41.750	1,460				1,460	
LA03	Laborer-General	1.00	10.00	MH	31.830	571				571	
OP06	Op Crane < 100T	1.00	10.00	MH	43.990	730				730	
\$18,660.86	0.1152 MH/SF		50.00	MH	[ 5.223 ]	3,556		12,499	2,606	18,661	
43.4000	Units/Hr	8.6800	Unit/MH	1.0000	Shifts	8.19		28.80	6.00	43.000	

2005413.20	Column Round - F&S		Quan:	736.00 SF	Hrs/Shft:	10.00	Cal: 510	WC: CCISP			
1 shift per column											
FORM3C	Form Crew 3 Man w/Crane		25.00	CH	Prod:	0.1359	MU	Lab Pcs:	4.00	Eqp Pcs:	4.00
31FMAALL	Oil/Nails/Ties	1.00	736.00	SF	0.350			258		258	
8COMPR04	Compressor 185 CFM 80H	1.00	25.00	HR	12.340				309	309	
8CRANERT700	Crane Grove RT890 75 T	1.00	25.00	HR	197.340				4,934	4,934	
8GEN010	Generator 10 KW	1.00	25.00	HR	25.103				628	628	
8TRKPU70	Pickup Ford F-250 3/4	1.00	25.00	HR	25.830				646	646	
CA01	Carpenter Foreman	1.00	25.00	MH	46.750	1,988				1,988	
CA02	Carpenter Journeyman	1.00	25.00	MH	41.750	1,825				1,825	

DIRECT COST BREAKDOWN

Activity Resource	Desc	Pcs	Quantity Unit	Unit Cost	Labor	Perm Material	Constr Matl/Exp	Equip Ment	Sub-Contract	Total
BID ITEM = 122100										
Description =	COLUMN			Land Item Unit =	SCHEDULE: 1 CY	100				RHU 24.000
					Takeoff Quan:		24.000		Engr Quan:	24.000
LA03	Laborer-General	1.00	25.00 MH	31.830	1,427					1,427
OP06	Op Crane < 100T	1.00	25.00 MH	43.990	1,824					1,824
\$13,837.19		0.1358 MH/SF	100.00 MH	[ 6.14 ]	7,064		258	6,515		13,837
29.4400	Units/Hr	7.3600 Unit/MH	2.5000 Shifts		9.60		0.35	8.85		18.80
2005413.30	Column Round - Plc Conc			Quan:	24.00 CY	Hrs/Shft:	10.00	Cal: 510	WC: CCISP	
<u>POUR4C</u>	Pour Conc 4 man w/crane		10.00 CH	Prod:	2.0833 MU	Lab Pcs:	5.00	Eqp Pcs:	6.00	
2CR12	4000 PSI Concrete	1.05	25.20 CY	132.330		3,335				3,335
8COMPR04	Compressor 185 CFM 80H	1.00	10.00 HR	12.340				123		123
8CONCEQ04	Conc Bucket 1.5 - 3 CY	1.00	10.00 HR	9.750				98		98
8CONCEQ28	Conc Vib 2.25" Elec.	1.00	10.00 HR	0.768				8		8
8CRANERT700	Crane Grove RT890 75 T	1.00	10.00 HR	197.340				1,973		1,973
8GEN010	Generator 10 KW	1.00	10.00 HR	25.103				251		251
8TRKPU70	Pickup Ford F-250 3/4	1.00	10.00 HR	25.830				258		258
CM02	Cement Mason Journeyman	1.00	10.00 MH	35.520	659					659
LA01	Laborer-Foreman	1.00	10.00 MH	38.860	663					663
LA04	Laborer-Power Tools	2.00	20.00 MH	33.000	1,172					1,172
OP06	Op Crane < 100T	1.00	10.00 MH	43.990	730					730
\$9,270.53		2.0833 MH/CY	50.00 MH	[ 84.503 ]	3,225	3,335		2,711		9,271
2.4000	Units/Hr	0.4800 Unit/MH	1.0000 Shifts		134.35	138.95		112.97		386.27
2005413.40	Point & Patch			Quan:	736.00 SF	Hrs/Shft:	10.00	Cal: 510	WC: CCISP	
<u>FIN3</u>	Patch & Finish		4.00 CH	Prod:	0.0163 MU	Lab Pcs:	3.00	Eqp Pcs:	2.00	
31FCFINISH	Patch and Finish Matl	1.00	736.00 SF	0.050		37				37
8CONCEQ14	Conc Mixer 8CF 8 HP	1.00	4.00 HR	3.537				14		14
8TRKPU70	Pickup Ford F-250 3/4	1.00	4.00 HR	25.830				103		103
CM01	Cement Mason Foreman	1.00	4.00 MH	40.520	290					290
CM02	Cement Mason Journeyman	1.00	4.00 MH	35.520	264					264
LA04	Laborer-Power Tools	1.00	4.00 MH	33.000	234					234
\$942.48		0.0163 MH/SF	12.00 MH	[ 0.652 ]	788		37	117		942
184.0000	Units/Hr	61.3334 Unit/MH	0.4000 Shifts		1.07		0.05	0.16		1.28
2005413.50	Rubbed Conc Finish			Quan:	736.00 SF	Hrs/Shft:	10.00	Cal: 510	WC: CCISP	
<u>FIN3</u>	Patch & Finish		8.00 CH	Prod:	0.0326 MU	Lab Pcs:	3.00	Eqp Pcs:	2.00	
31FCFINCL1	CL1 Finish Materials	1.00	736.00 SF	0.150		110				110
8CONCEQ14	Conc Mixer 8CF 8 HP	1.00	8.00 HR	3.537				28		28
8TRKPU70	Pickup Ford F-250 3/4	1.00	8.00 HR	25.830				207		207
CM01	Cement Mason Foreman	1.00	8.00 MH	40.520	580					580
CM02	Cement Mason Journeyman	1.00	8.00 MH	35.520	528					528
LA04	Laborer-Power Tools	1.00	8.00 MH	33.000	469					469
\$1,921.79		0.0326 MH/SF	24.00 MH	[ 1.304 ]	1,576		110	235		1,922
92.0000	Units/Hr	30.6667 Unit/MH	0.8000 Shifts		2.14		0.15	0.32		2.61
2005413.60	Sandblast Conc			Quan:	77.00 SF	Hrs/Shft:	10.00	Cal: 510	WC: CCISP	
<u>FIN1</u>	Sand Blasting		2.00 CH	Prod:	0.0519 MU	Lab Pcs:	2.00	Eqp Pcs:	3.00	
31FCSANDB	Sand Blast Sand	1.00	77.00 SF	0.550		42				42
8COMPR04	Compressor 185 CFM 80H	1.00	2.00 HR	12.340				25		25
8CONCEQ44	Sandblaster 11 CF	1.00	2.00 HR	3.425				7		7
8TRKPU70	Pickup Ford F-250 3/4	1.00	2.00 HR	25.830				52		52
LA01	Laborer-Foreman	1.00	2.00 MH	38.860	133					133
LA04	Laborer-Power Tools	1.00	2.00 MH	33.000	117					117
\$375.37		0.0519 MH/SF	4.00 MH	[ 2.053 ]	250		42	83		375
38.5000	Units/Hr	19.2500 Unit/MH	0.2000 Shifts		3.24		0.55	1.08		4.87

DIRECT COST BREAKDOWN

Activity Resource	Desc	Quantity Pcs	Unit	Unit Cost	Labor	Perm Material	Constr Matl/Exp	Equip Ment	Sub-Contract	Total
BID ITEM = 122100			Land Item	SCHEDULE: 1			100			RHU
Description = COLUMN			Unit =	CY	Takeoff Quan:		24.000	Engr Quan:		24.000
2005413.70	Misc Conc Hardware		Quan:	24.00 CY	Hrs/Shft:	10.00	Cal: 510	WC: CCISP		
Allowance cost for expendable & reusable form hardware & Const & Permanent bridge materials.										
Expanded Polystyrene, dobies, spreaders, backer-rod, chamfer, wedges, PVC pipe, nails, misc. matls.										
31MATBI	Misc Bridge Items	1.00	24.00 CY	20.000			480			480
\$480.00				[ ]			480			480
							20.00			20.00
===== Item Totals: 122100 - COLUMN										
\$45,488.22	10.0000 MH/CY		240.00 MH	[ 433.795 ]	16,459	3,335	13,426	12,268		45,488
1,895.343	24 CY				685.79	138.95	559.43	511.18		1,895.34

BID ITEM = 122200			Land Item	SCHEDULE: 1			100			RHU
Description = CAP			Unit =	CY	Takeoff Quan:		68.000	Engr Quan:		68.000
123200.10	Cap - Assmbl/Dis Frm		Quan:	1,105.00 SF	Hrs/Shft:	10.00	Cal: 510	WC: CCISP		
Bent Side Soffit Total										
403...702...1,105 SF										
FORM5C	Form Crew 5 Man w/Crane		10.00 CH	Prod:	0.0543 MU	Lab Pcs:	6.00	Eqp Pcs:	4.00	
31FMBENTPLG	Plate Girder Bent Cap Form	1.00	1,105.00 SF	13.100		14,476				14,476
31FMBENTPLGS	Salvage Plate Girder	1.00	1,105.00 SF	-6.550		-7,239				-7,239
8COMPR04	Compressor 185 CFM 80H	1.00	10.00 HR	12.340			123			123
8CRANERT700	Crane Grove RT890 75 T	1.00	10.00 HR	197.340			1,973			1,973
8GEN010	Generator 10 KW	1.00	10.00 HR	25.103			251			251
8TRKPU70	Pickup Ford F-250 3/4	1.00	10.00 HR	25.830			258			258
CA01	Carpenter Foreman	1.00	10.00 MH	46.750	795					795
CA02	Carpenter Journeyman	3.00	30.00 MH	41.750	2,189					2,189
LA03	Laborer-General	1.00	10.00 MH	31.830	571					571
OP06	Op Crane < 100T	1.00	10.00 MH	43.990	730					730
\$14,129.23	0.0542 MH/SF		60.00 MH	[ 2.467 ]	4,285		7,238	2,606		14,129
110.5000	Units/Hr	18.4167	Unit/MH	1.0000	Shifts	3.88	6.55	2.36		12.79

123200.20 Bent Cap - Falsework, Assemble, F&S Quan: 4,578.00 SF Hrs/Shft: 10.00 Cal: 510 WC: CCISP

FORM BRACE RESOURCE IS SHEAR SUPPORT.  
USE SHEAR SUPPORT FOR PLATE GIRDER FORM.  
PRODUCTION  
SET BRACKETS AND SHEAR BOLTS (2 PER COLUMN) = 2 HOURS  
TORQUE BOLTS = 1 HOUR  
UNBOLT = 1 HOUR  
REMOVE BRACKETS & SHEAR BOLTS = 1 HOUR  
PLUG HOLES = 1 HOUR  
SET/STRIP CAP = 4 HOUR  
TOTAL = 10 HOURS PER BENT 5 EACH...50 HRS

BRACKETS  
SHEAR BOLTS @ 3" DIA X 6/BENT X 6FT. LONG = 24.03 LB/LF X 6 X 6 = 865 LB  
BRACKETS = 6 X 440 = 2,640 LB  
2640 + 865 = 3505 LB TOTAL  
3,505 X \$6/LB = + \$5,000 FREIGHT = \$26,030 TOTAL  
HAVE UP TO 1 SET(S) IN THE AIR AT ONE TIME. = \$26,030  
26,030 / 5 BENTS = \$5,206 USE \$5,250 PER BENT

FORM5C	(Mod) Form Crew 5 Man w/Crane		50.00 CH	Prod:	0.0655 MU	Lab Pcs:	6.00	Eqp Pcs:	6.00	
31FMABRACE	Form Braces	1.00	100.00 EA	5.000		500				500
31FMABSB	Brackets & Shear Bolts	1.00	5.00 EA	5,250.000		26,250				26,250
31FMAONT	Oil, Nails, & Ties	1.00	4,578.00 SF	0.350		1,602				1,602

DIRECT COST BREAKDOWN

Activity Resource	Desc	Pcs	Quantity Unit	Unit Cost	Labor	Perm Material	Constr Matl/Exp	Equip Ment	Sub-Contract	Total
BID ITEM = 122200										
Description = CAP				Land Item Unit =	SCHEDULE: 1 CY	100				RHU 68.000
					Takeoff Quan:		68.000	Engr Quan:		68.000
8COMPR04	Compressor 185 CFM 80H	1.00	50.00 HR					617		617
8CRANERT700	Crane Grove RT890 75 T	1.00	50.00 HR					9,867		9,867
8GEN010	Generator 10 KW	1.00	50.00 HR					1,255		1,255
8MLIFT060	Manlift 80' Genie S-80	2.00	100.00 HR					7,386		7,386
8TRKPU70	Pickup Ford F-250 3/4	1.00	50.00 HR					1,292		1,292
CA01	Carpenter Foreman	1.00	50.00 MH		46.750	3,977				3,977
CA02	Carpenter Journeyman	3.00	150.00 MH		41.750	10,947				10,947
LA03	Laborer-General	1.00	50.00 MH		31.830	2,854				2,854
OP06	Op Crane < 100T	1.00	50.00 MH		43.990	3,648				3,648
\$70,195.68		0.0655 MH/SF	300.00 MH		[ 2.977 ]	21,427		28,352	20,417	70,196
91.5600 Units/Hr		15.2600 Unit/MH	5.0000 Shifts			4.68		6.19	4.46	15.33
123200.30	Bent Cap - Plc Conc			Quan:	68.00 CY	Hrs/Shft: 10.00	Cal: 510	WC: CCISP		
<u>POUR6C</u>	Pour Conc 6 man w/crane		20.00 CH	Prod:	2.0588 MU	Lab Pcs: 7.00	Eqp Pcs: 6.00			
2CR12	4000 PSI Concrete	1.10	74.81 CY		132.330	9,900				9,900
8COMPR04	Compressor 185 CFM 80H	1.00	20.00 HR		12.340			247		247
8CONCEQ04	Conc Bucket 1.5 - 3 CY	1.00	20.00 HR		9.750			195		195
8CONCEQ28	Conc Vib 2.25" Elec.	1.00	20.00 HR		0.768			15		15
8CRANERT700	Crane Grove RT890 75 T	1.00	20.00 HR		197.340			3,947		3,947
8GEN010	Generator 10 KW	1.00	20.00 HR		25.103			502		502
8TRKPU70	Pickup Ford F-250 3/4	1.00	20.00 HR		25.830			517		517
CA02	Carpenter Journeyman	1.00	20.00 MH		41.750	1,460				1,460
CM02	Cement Mason Journeyman	1.00	20.00 MH		35.520	1,319				1,319
LA01	Laborer-Foreman	1.00	20.00 MH		38.860	1,326				1,326
LA04	Laborer-Power Tools	3.00	60.00 MH		33.000	3,517				3,517
OP06	Op Crane < 100T	1.00	20.00 MH		43.990	1,459				1,459
\$24,403.33		2.0588 MH/CY	140.00 MH		[ 83.833 ]	9,081	9,900	5,423		24,403
3.4000 Units/Hr		0.4857 Unit/MH	2.0000 Shifts			133.55	145.58	79.74		358.87
123200.40	Cure Concrete			Quan:	1,714.00 SF	Hrs/Shft: 10.00	Cal: 510	WC: CCISP		
<u>LAB2</u>	Foreman + 1 Laborer		3.00 CH	Prod:	285.6667 UM	Lab Pcs: 2.00	Eqp Pcs: 1.00			
31FCURECMP	Curing Compound	1.00	1,714.00 SF		0.045	77				77
31FCURESUP	Curing Supplies	1.00	1,714.00 SF		0.030	51				51
8TRKPU70	Pickup Ford F-250 3/4	1.00	3.00 HR		25.830			77		77
LA01	Laborer-Foreman	1.00	3.00 MH		38.860	199				199
LA04	Laborer-Power Tools	1.00	3.00 MH		33.000	176				176
\$580.80		0.0035 MH/SF	6.00 MH		[ 0.138 ]	375	129	77		581
571.3333 Units/Hr		285.6669 Unit/MH	* 0.3000 Shifts			0.22	0.08	0.05		0.34
123200.50	Point & Patch			Quan:	1,146.00 SF	Hrs/Shft: 10.00	Cal: 510	WC: CCISP		
<u>FIN3</u>	Patch & Finish		6.00 CH	Prod:	0.0157 MU	Lab Pcs: 3.00	Eqp Pcs: 2.00			
31FCFINISH	Patch and Finish Matl	1.00	1,146.00 SF		0.050	57				57
8CONCEQ14	Conc Mixer 8CF 8 HP	1.00	6.00 HR		3.537			21		21
8TRKPU70	Pickup Ford F-250 3/4	1.00	6.00 HR		25.830			155		155
CM01	Cement Mason Foreman	1.00	6.00 MH		40.520	435				435
CM02	Cement Mason Journeyman	1.00	6.00 MH		35.520	396				396
LA04	Laborer-Power Tools	1.00	6.00 MH		33.000	352				352
\$1,415.80		0.0157 MH/SF	18.00 MH		[ 0.628 ]	1,182	57	176		1,416
191.0000 Units/Hr		63.6667 Unit/MH	0.6000 Shifts			1.03	0.05	0.15		1.24
123200.60	Rubbed Conc Finish			Quan:	1,146.00 SF	Hrs/Shft: 10.00	Cal: 510	WC: CCISP		
<u>FIN3</u>	Patch & Finish		13.00 CH	Prod:	0.0340 MU	Lab Pcs: 3.00	Eqp Pcs: 2.00			
31FCFINCL1	CL1 Finish Materials	1.00	1,146.00 SF		0.150	172				172
8CONCEQ14	Conc Mixer 8CF 8 HP	1.00	13.00 HR		3.537			46		46
8TRKPU70	Pickup Ford F-250 3/4	1.00	13.00 HR		25.830			336		336

DIRECT COST BREAKDOWN

Activity Resource	Desc	Pcs	Quantity Unit	Unit Cost	Labor	Perm Material	Constr Matl/Exp	Equip Ment	Sub-Contract	Total
BID ITEM = 122200			Land Item	SCHEDULE: 1 100						RHU
Description = CAP			Unit =	CY	Takeoff Quan:		68.000	Engr Quan:		68.000
CM01	Cement Mason Foreman	1.00	13.00 MH	40.520	942					942
CM02	Cement Mason Journeyman	1.00	13.00 MH	35.520	857					857
LA04	Laborer-Power Tools	1.00	13.00 MH	33.000	762					762
\$3,115.39		0.0340 MH/SF	39.00 MH	[ 1.361 ]	2,562		172	382		3,115
88.1538 Units/Hr		29.3846 Unit/MH	1.3000 Shifts		2.24		0.15	0.33		2.72
123200.70	Misc Conc Hardware		Quan:	68.00 CY	Hrs/Shft:	10.00	Cal: 510	WC: CCISP		
Allowance cost for expendable & reusable form hardware & Const & Permanent bridge materials. Expanded Polystyrene, dobies, spreaders, backer-rod, chamfer, wedges, PVC pipe, nails, misc. matls.										
31MATBI	Misc Bridge Items	1.00	68.00 CY	20.000			1,360			1,360
\$1,360.00				[ ]			1,360			1,360
							20.00			20.00
=====>	Item Totals:	122200	- CAP							
\$115,200.23		8.2794 MH/CY	563.00 MH	[ 361.365 ]	38,912	9,900	37,308	29,081		115,200
1,694.121		68 CY			572.24	145.58	548.64	427.66		1,694.12

Total of Above Sub-Biditems

=====>	Item Totals:	122000	- GENERAL STRUCTURAL CONCRETE, CLASS 4000							
\$160,688.45		8.7282 MH/CY	803.00 MH	[ 380.26 ]	55,371	13,234	50,734	41,349		160,688
1,746.614		92 CY			601.86	143.85	551.46	449.45		1,746.61

BID ITEM = 123000	CLIENT# = 0560-0102000A		Land Item	SCHEDULE: 1 100						RHU
Description = STEEL PLATE GIRDER			Unit =	LS	Takeoff Quan:		1.000	Engr Quan:		1.000
124000.10	Plate Girder		Quan:	595,500.00 LB	Hrs/Shft:	10.00	Cal: 510	WC: CCISP		
*****										
<u>GIRDR1</u>	(Mod) Steel Girder Erection		80.00 CH	Prod:	0.0013 MU	Lab Pcs:	10.00	Eqp Pcs:	6.00	
2SS02	Structural Steel Plate Girde	1.00	595,500.00 LB	2.500		1,488,750				1,488,750
3S84130	Rigging Supply	1.00	1.00 EA	5,000.000			5,000			5,000
8CRANETK120	Crane Grove GMK4090 12	2.00	160.00 HR	211.942				33,911		33,911
8FORK06	Forklift Pettibone 603	1.00	80.00 HR	42.270				3,382		3,382
8MLIFT060	Manlift 80' Genie S-80	1.00	80.00 HR	73.860				5,909		5,909
8TRKGS10	Flatbed Truck 15K 200H	1.00	80.00 HR	22.663				1,813		1,813
8WELD300	Welder 300 AMP	1.00	80.00 HR	11.040				883		883
IW01	Ironworker Foreman	1.00	80.00 MH	44.100	7,001					7,001
IW02	Ironworker Journeyman	6.00	480.00 MH	39.100	38,862					38,862
OP06	Op Crane < 100T	2.00	160.00 MH	43.990	11,675					11,675
OP07	Op Oiler >100T plus	1.00	80.00 MH	36.550	4,998					4,998
\$1,602,182.13		0.0013 MH/LB	800.00 MH	[ 0.06 ]	62,535	1,488,750	5,000	45,897		1,602,182
7,443.7500 Units/Hr		744.3799 Unit/MH	8.0000 Shifts		0.11	2.50	0.01	0.08		2.69

124000.20	Bolt-up Plate Girders		Quan:	595,500.00 LBS	Hrs/Shft:	10.00	Cal: 510	WC: CCISP		
<u>IRON6</u>	(Mod) Bolt-Up Steel Girders		200.00 CH	Prod:	425.3571 UM	Lab Pcs:	7.00	Eqp Pcs:	6.00	
8COMP04	Compressor 185 CFM 80H	1.00	200.00 HR	12.340				2,468		2,468
8CRANETK120	Crane Grove GMK4090 12	1.00	200.00 HR	211.942				42,388		42,388
8GEN010	Generator 10 KW	1.00	200.00 HR	25.103				5,021		5,021
8MLIFT060	Manlift 80' Genie S-80	1.00	200.00 HR	73.860				14,772		14,772

DIRECT COST BREAKDOWN

Activity Resource	Desc	Pcs	Quantity Unit	Unit Cost	Labor	Perm Material	Constr Matl/Exp	Equip Ment	Sub-Contract	Total
BID ITEM =	123000	CLIENT# =	0560-0102000A	Land Item	SCHEDULE: 1	100				RHU
Description =	STEEL PLATE GIRDER		Unit =	LS	Takeoff Quan:		1.000	Engr Quan:		1.000
8TRKGS10	Flatbed Truck 15K 200H	1.00	200.00 HR	22.663				4,533		4,533
8WELD300	Welder 300 AMP	1.00	200.00 HR	11.040				2,208		2,208
IW01	Ironworker Foreman	1.00	200.00 MH	44.100	17,502					17,502
IW02	Ironworker Journeyman	4.00	800.00 MH	39.100	64,769					64,769
OP05	Op Crane >100T	1.00	200.00 MH	50.220	16,225					16,225
OP07	Op Oiler >100T plus	1.00	200.00 MH	36.550	12,494					12,494
\$182,380.55		0.0023 MH/LBS	1,400.00 MH	[ 0.106 ]	110,991			71,390		182,381
2,977.5000	Units/Hr	425.3582 Unit/MH	* 20.0000 Shifts		0.19			0.12		0.31
124000.30	F/I Static Line on Girders		Quan:	1,390.00 LF	Hrs/Shft:	10.00	Cal:	510	WC:	CCISP
10% utilization										
<u>IRON4</u>	Foreman + 3 Ironworker		10.00 CH	Prod:	0.0288 MU	Lab Pcs:	4.00	Eqp Pcs:	3.00	
31MATCABLE	Safety Line Cable	1.00	1,390.00 LF	1.000		1,390				1,390
31MATPOST	Safety Line Metal Posts	1.00	30.00 EA	25.000		750				750
8COMPR04	Compressor 185 CFM 80H	1.00	10.00 HR	12.340				123		123
8TRKPU70	Pickup Ford F-250 3/4	1.00	10.00 HR	25.830				258		258
8WELD300	Welder 300 AMP	1.00	10.00 HR	11.040				110		110
IW01	Ironworker Foreman	1.00	10.00 MH	44.100	875					875
IW02	Ironworker Journeyman	3.00	30.00 MH	39.100	2,429					2,429
\$5,936.05		0.0287 MH/LF	40.00 MH	[ 1.277 ]	3,304		2,140	492		5,936
139.0000	Units/Hr	34.7500 Unit/MH	1.0000 Shifts		2.38		1.54	0.35		4.27
124000.40	Install Temporary Bracing Plate Girders		Quan:	20.00 EA	Hrs/Shft:	10.00	Cal:	510	WC:	CCISP
Figure bracing every 30', plus the ends										
<u>IRON7</u>	(Mod) X-Brace Steel Girder		12.00 CH	Prod:	3.0000 MU	Lab Pcs:	5.00	Eqp Pcs:	5.00	
31MATMISC	Misc Material	0.20	4.00 EA	25.000		100				100
8COMPR04	Compressor 185 CFM 80H	1.00	12.00 HR	12.340				148		148
8GEN010	Generator 10 KW	1.00	12.00 HR	25.103				301		301
8MLIFT060	Manlift 80' Genie S-80	1.00	12.00 HR	73.860				886		886
8TRKGS10	Flatbed Truck 15K 200H	1.00	12.00 HR	22.663				272		272
8WELD300	Welder 300 AMP	1.00	12.00 HR	11.040				132		132
IW01	Ironworker Foreman	1.00	12.00 MH	44.100	1,050					1,050
IW02	Ironworker Journeyman	3.00	36.00 MH	39.100	2,915					2,915
LA03	Laborer-General	1.00	12.00 MH	31.830	685					685
\$6,489.83		3.0000 MH/EA	60.00 MH	[ 127.532 ]	4,650		100	1,740		6,490
1.6667	Units/Hr	0.3333 Unit/MH	1.2000 Shifts		232.49		5.00	87.00		324.49
124000.50	Set Up/Down Cranes		Quan:	2.00 EA	Hrs/Shft:	10.00	Cal:	510	WC:	CCISP
*****										
Split between Truss and Plate Girder										
<u>GIRDR1</u>	(Mod) Steel Girder Erection		20.00 CH	Prod:	100.0000 MU	Lab Pcs:	10.00	Eqp Pcs:	6.00	
8CRANETK120	Crane Grove GMK4090 12	2.00	40.00 HR	211.942				8,478		8,478
8FORK06	Forklift Pettibone 603	1.00	20.00 HR	42.270				845		845
8MLIFT060	Manlift 80' Genie S-80	1.00	20.00 HR	73.860				1,477		1,477
8TRKGS10	Flatbed Truck 15K 200H	1.00	20.00 HR	22.663				453		453
8WELD300	Welder 300 AMP	1.00	20.00 HR	11.040				221		221
IW01	Ironworker Foreman	1.00	20.00 MH	44.100	1,750					1,750
IW02	Ironworker Journeyman	6.00	120.00 MH	39.100	9,715					9,715
OP06	Op Crane < 100T	2.00	40.00 MH	43.990	2,919					2,919
OP07	Op Oiler >100T plus	1.00	20.00 MH	36.550	1,249					1,249
\$27,108.02		100.0000 MH/EA	200.00 MH	[ 4435.53 ]	15,634			11,474		27,108
0.1000	Units/Hr	0.0100 Unit/MH	2.0000 Shifts		7,816.84			5,737.17		13,554.01
====>	Item Totals:	123000	- STEEL PLATE GIRDER							
\$1,824,096.58		2,500.0000 MH/LS	2,500.00 MH	[ 111880.74 ]	197,113	1,488,750	7,240	130,993		1,824,097
1,824,096.580		1 LS			197,113.17	1,488,750.00	7,240.00	130,993.41		1,824,096.58



DIRECT COST BREAKDOWN

Activity Resource	Desc	Pcs	Quantity Unit	Unit Cost	Labor	Perm Material	Constr Matl/Exp	Equip Ment	Sub-Contract	Total
BID ITEM = 124000	CLIENT# = 0561-0100000A		Land Item	SCHEDULE: 1	100					RHU
Description = FURNISH PREFABRICATED STEEL TRUSS			Unit = LS	Takeoff	Quan:		1.000	Engr	Quan:	1.000
125000.10	Furnish Truss		Quan:	246.89 LF	Hrs/Shft:	10.00	Cal: 510	WC: CCISP		
2SPB02	Ped Truss Bridge-Confab	1.00	1.00 EA	757,400.000		757,400				757,400
\$757,400.00				[ ]		757,400				757,400
						3,067.76				3,067.76
===== Item Totals: 124000 - FURNISH PREFABRICATED STEEL TRUSS										
\$757,400.00				[ ]		757,400				757,400
757,400.000		1 LS				757,400.00				757,400.00

BID ITEM = 125000	CLIENT# = 0561-0100000B		Land Item	SCHEDULE: 1	100					RHU
Description = INSTALL PREFABRICATED STEEL TRUSS			Unit = LS	Takeoff	Quan:		1.000	Engr	Quan:	1.000
120000.10	Bolt Together Ped Bridge Sections		Quan:	246.89 LF	Hrs/Shft:	10.00	Cal: 510	WC: CCISP		
2 Shifts to bolt together each span and stage for erection										
<u>IRON4C</u>	(Mod) Foreman+3 Ironworker+Crane		40.00 CH	Prod:	1.0287 UM	Lab Pcs:	6.00	Eqp Pcs:	3.00	
31MATMISC	Misc Material	1.00	246.89 LF	25.000		6,172				6,172
5TRKLB50	Trucking - Low Bed 50T	1.00	10.00 HR	125.000		1,250				1,250
8CRANETK120	Crane Grove GMK4090 12	1.00	40.00 HR	211.942			8,478			8,478
8FORK06	Forklift Pettibone 603	1.00	40.00 HR	42.270			1,691			1,691
8TRKPU70	Pickup Ford F-250 3/4	1.00	40.00 HR	25.830			1,033			1,033
IW01	Ironworker Foreman	1.00	40.00 MH	44.100	3,500					3,500
IW02	Ironworker Journeyman	3.00	120.00 MH	39.100	9,715					9,715
OP05	Op Crane >100T	1.00	40.00 MH	50.220	3,245					3,245
OP11	Op Loader <6Y	1.00	40.00 MH	41.010	2,763					2,763
\$37,847.32		0.9720 MH/LF	240.00 MH	[ 45.023 ]	19,223		7,422	11,202		37,847
6.1723 Units/Hr		1.0287 Unit/MH	* 4.0000 Shifts		77.86		30.06	45.37		153.30
120000.20	Erect Prefabricated Bridge		Quan:	268.00 LF	Hrs/Shft:	10.00	Cal: 510	WC: CCISP		
Erect 1 Span per night										
<u>IRON5</u>	(Mod) Foreman + 4 Ironworker		20.00 CH	Prod:	1.3400 UM	Lab Pcs:	10.00	Eqp Pcs:	9.00	
8COMPR04	Compressor 185 CFM 80H	1.00	20.00 HR	12.340			247			247
8CRANETK120	Crane Grove GMK4090 12	2.00	40.00 HR	211.942			8,478			8,478
8FORK06	Forklift Pettibone 603	1.00	20.00 HR	42.270			845			845
8GEN010	Generator 10 KW	1.00	20.00 HR	25.103			502			502
8MLIFT060	Manlift 80' Genie S-80	2.00	40.00 HR	73.860			2,954			2,954
8TRKPU70	Pickup Ford F-250 3/4	1.00	20.00 HR	25.830			517			517
8WELD300	Welder 300 AMP	1.00	20.00 HR	11.040			221			221
IW01	Ironworker Foreman	1.00	20.00 MH	44.100	1,750					1,750
IW02	Ironworker Journeyman	4.00	80.00 MH	39.100	6,477					6,477
OP05	Op Crane >100T	2.00	40.00 MH	50.220	3,245					3,245
OP07	Op Oiler >100T plus	2.00	40.00 MH	36.550	2,499					2,499
OP11	Op Loader <6Y	1.00	20.00 MH	41.010	1,381					1,381
\$29,116.06		0.7462 MH/LF	200.00 MH	[ 34.071 ]	15,352			13,764		29,116
13.4000 Units/Hr		1.3400 Unit/MH	* 2.0000 Shifts		57.28			51.36		108.64
120000.30	Mob Equipment In/Out		Quan:	2.00 EA	Hrs/Shft:	10.00	Cal: 510	WC: CCISP		
<u>IRON5</u>	(Mod) Foreman + 4 Ironworker		20.00 CH	Prod:	0.0100 UM	Lab Pcs:	10.00	Eqp Pcs:	9.00	
8COMPR04	Compressor 185 CFM 80H	1.00	20.00 HR	12.340			247			247
8CRANETK120	Crane Grove GMK4090 12	2.00	40.00 HR	211.942			8,478			8,478
8FORK06	Forklift Pettibone 603	1.00	20.00 HR	42.270			845			845
8GEN010	Generator 10 KW	1.00	20.00 HR	25.103			502			502

DIRECT COST BREAKDOWN

Activity Resource	Desc	Pcs	Quantity Unit	Unit Cost	Labor	Perm Material	Constr Matl/Exp	Equip Ment	Sub-Contract	Total
BID ITEM = 125000	CLIENT# = 0561-0100000B		Land Item	SCHEDULE: 1 100						RHU
Description =	INSTALL PREFABRICATED STEEL TRUSS		Unit =	LS	Takeoff Quan:		1.000	Engr Quan:		1.000
8MLIFT060	Manlift 80' Genie S-80	2.00	40.00 HR	73.860				2,954		2,954
8TRKPU70	Pickup Ford F-250 3/4	1.00	20.00 HR	25.830				517		517
8WELD300	Welder 300 AMP	1.00	20.00 HR	11.040				221		221
IW01	Ironworker Foreman	1.00	20.00 MH	44.100	1,750					1,750
IW02	Ironworker Journeyman	4.00	80.00 MH	39.100	6,477					6,477
OP05	Op Crane >100T	2.00	40.00 MH	50.220	3,245					3,245
OP07	Op Oiler >100T plus	2.00	40.00 MH	36.550	2,499					2,499
OP11	Op Loader <6Y	1.00	20.00 MH	41.010	1,381					1,381
\$29,116.06	100.0000 MH/EA		200.00 MH	[ 4565.55 ]	15,352			13,764		29,116
0.1000 Units/Hr	0.0100 Unit/MH	*	2.0000 Shifts		7,676.16			6,881.87		14,558.03
====>	Item Totals: 125000		- INSTALL PREFABRICATED STEEL TRUSS							
\$96,079.44	640.0000 MH/LS		640.00 MH	[ 29377.92 ]	49,928		7,422	38,729		96,079
96,079.440	1 LS				49,928.03		7,422.25	38,729.16		96,079.44

BID ITEM = 126000	CLIENT# = 0581-0100000E		Land Item	SCHEDULE: 1 100						RHU
Description =	BRIDGE DRAINS		Unit =	EA	Takeoff Quan:		2.000	Engr Quan:		2.000
127000	BRIDGE DRAINS		Quan:	2.00 EA	Hrs/Shft:	10.00	Cal: 510	WC: CCISP		
No details provided, use engineer's unit price less markups										
4BRIDGE	Bridge Sub	1.00	2.00 EA	17,500.000				35,000		35,000
\$35,000.00				[ ]				35,000		35,000
								17,500.00		17,500.00

BID ITEM = 127000	CLIENT# = 0582-0020000E		Land Item	SCHEDULE: 1 100						RHU
Description =	BEARING DEVICES, 12 IN W x 12 IN L x 2.5		Unit =	EA	Takeoff Quan:		26.000	Engr Quan:		26.000
128000.10	BEARING DEVICES, 12 IN W x 12 IN L x 2.5		Quan:	26.00 EA	Hrs/Shft:	10.00	Cal: 510	WC: CCISP		
<u>CARP2</u>	Foreman+1 Carpenter		13.00 CH	Prod:	1.0000 MU	Lab Pcs:	2.00	Eqp Pcs:	2.00	
2SB30	Bearing Pad 12" x 12" x 2.5	1.00	26.00 EA	488.000		12,688				12,688
8GEN010	Generator 10 KW	1.00	13.00 HR	25.103				326		326
8TRKPU70	Pickup Ford F-250 3/4	1.00	13.00 HR	25.830				336		336
CA01	Carpenter Foreman	1.00	13.00 MH	46.750	1,034					1,034
CA02	Carpenter Journeyman	1.00	13.00 MH	41.750	949					949
\$15,332.80	1.0000 MH/EA		26.00 MH	[ 48.675 ]	1,983	12,688		662		15,333
2.0000 Units/Hr	1.0000 Unit/MH		1.3000 Shifts		76.26	488.00		25.47		589.72
====>	Item Totals: 127000		- BEARING DEVICES, 12 IN W x 12 IN L x 2.5							
\$15,332.80	1.0000 MH/EA		26.00 MH	[ 48.675 ]	1,983	12,688		662		15,333
589.723	26 EA				76.26	488.00		25.47		589.72

BID ITEM = 128000	CLIENT# = 0585-0208100A		Land Item	SCHEDULE: 1 100						RHU
Description =	TYPE "A" PREFORMED COMPRESSION JOINT SEA		Unit =	LS	Takeoff Quan:		1.000	Engr Quan:		1.000
129000.10	TYPE "A" PREFORMED COMPRESSION JOINT S		Quan:	17.00 LF	Hrs/Shft:	10.00	Cal: 510	WC: CCISP		
No details provided, use engineer's unit price less markups										
4BRIDGE	Bridge Sub	1.00	17.00 LF	75.000				1,275		1,275
\$1,275.00				[ ]				1,275		1,275

Activity Resource	Desc	Quantity Pcs	Unit	Unit Cost	Labor	Perm Material	Constr Matl/Exp	Equip Ment	Sub-Contract	Total
BID ITEM = 128000	CLIENT# = 0585-0208100A	Land Item	SCHEDULE: 1	100						RHU
Description =	TYPE "A" PREFORMED COMPRESSION JOINT SEA	Unit =	LS	Takeoff Quan:			1.000	Engr Quan:		1.000
									75.00	75.00
<hr/>										
BID ITEM = 129000	CLIENT# = 0585-0210100A	Land Item	SCHEDULE: 1	100						RHU
Description =	TYPE "C" PREFORMED COMPRESSION JOINT SEA	Unit =	LS	Takeoff Quan:			1.000	Engr Quan:		1.000
130000.10	TYPE "C" PREFORMED COMPRESSION JOINT S	Quan:	19.00 LF	Hrs/Shft:	10.00	Cal:	510	WC:	CCISP	
No details provided, use engineer's unit price less markups										
4BRIDGE	Bridge Sub	1.00	19.00 LF	75.000					1,425	1,425
\$1,425.00				[ ]					1,425	1,425
									75.00	75.00
<hr/>										
BID ITEM = 130000	CLIENT# = 0585-0212100A	Land Item	SCHEDULE: 1	100						RHU
Description =	TYPE "E" PREFORMED COMPRESSION JOINT SEA	Unit =	LS	Takeoff Quan:			1.000	Engr Quan:		1.000
131000.10	TYPE "E" PREFORMED COMPRESSION JOINT S	Quan:	53.00 LF	Hrs/Shft:	10.00	Cal:	510	WC:	CCISP	
No details provided, use engineer's unit price less markups										
4BRIDGE	Bridge Sub	1.00	53.00 LF	75.000					3,975	3,975
\$3,975.00				[ ]					3,975	3,975
									75.00	75.00
<hr/>										
BID ITEM = 131000	CLIENT# = 0585-0214000A	Land Item	SCHEDULE: 1	100						RHU
Description =	STRIP SEALS	Unit =	LS	Takeoff Quan:			1.000	Engr Quan:		1.000
132000.10	STRIP SEALS	Quan:	36.00 LF	Hrs/Shft:	10.00	Cal:	510	WC:	CCISP	
No details provided, use engineer's unit price less markups										
4BRIDGE	Bridge Sub	1.00	36.00 LF	50.000					1,800	1,800
\$1,800.00				[ ]					1,800	1,800
									50.00	50.00
<hr/>										
BID ITEM = 132000	CLIENT# = 0585-0215000A	Land Item	SCHEDULE: 1	100						RHU
Description =	PRECOMPRESSED FOAM SILICONE JOINT SEAL	Unit =	LS	Takeoff Quan:			1.000	Engr Quan:		1.000
133000.10	PRECOMPRESSED FOAM SILICONE JOINT SEA	Quan:	785.00 LF	Hrs/Shft:	10.00	Cal:	510	WC:	CCISP	
No details provided, use engineer's unit price less markups										
4BRIDGE	Bridge Sub	1.00	785.00 LF	25.000					19,625	19,625
\$19,625.00				[ ]					19,625	19,625
									25.00	25.00
<hr/>										
BID ITEM = 133000	CLIENT# = 0587-0128000A	Land Item	SCHEDULE: 1	100						RHU
Description =	PEDESTRIAN RAIL, MODIFIED	Unit =	LS	Takeoff Quan:			1.000	Engr Quan:		1.000
134000.10	PEDESTRIAN RAIL, MODIFIED	Quan:	1,131.00 LF	Hrs/Shft:	10.00	Cal:	510	WC:	CCISP	

DIRECT COST BREAKDOWN

Activity Resource	Desc	Pcs	Quantity Unit	Unit Cost	Labor	Perm Material	Constr Matl/Exp	Equip Ment	Sub-Contract	Total
BID ITEM = 133000	CLIENT# = 0587-0128000A		Land Item	SCHEDULE: 1	100					RHU
Description =	PEDESTRIAN RAIL, MODIFIED		Unit =	LS	Takeoff Quan:		1.000	Engr Quan:		1.000
No details provided, use engineer's unit price less markups										
4BRIDGE	Bridge Sub	1.00	1,131.00 LF	100.000				113,100		113,100
\$113,100.00				[ ]				113,100		113,100
								100.00		100.00

BID ITEM = 134000	CLIENT# = 0587-0136000A		Land Item	SCHEDULE: 1	100					RHU
Description =	ORNAMENTAL PEDESTRIAN RAIL		Unit =	LS	Takeoff Quan:		1.000	Engr Quan:		1.000
135000.10	ORNAMENTAL PEDESTRIAN RAIL		Quan:	800.00 LF	Hrs/Shft:	10.00	Cal: 510	WC: CCISP		
No details provided, use engineer's unit price less markups										
4BRIDGE	Bridge Sub	1.00	800.00 LF	150.000				120,000		120,000
\$120,000.00				[ ]				120,000		120,000
								150.00		150.00

BID ITEM = 135000	CLIENT# = 0589-0101000A		Land Item	SCHEDULE: 1	100					RHU
Description =	POTHOLING FOR UTILITIES		Unit =	LS	Takeoff Quan:		1.000	Engr Quan:		1.000
136000.10	Potholing for Fiber Optic Cable at Bents		Quan:	3.00 EA	Hrs/Shft:	10.00	Cal: 510	WC: CCISP		
<u>EXC3</u>	(Mod) Excavate 426 BH Loader	20.00	CH	Prod:	26.6667 MU	Lab Pcs:	4.00	Eqp Pcs:	3.00	
8BHLD426	BHL CAT 430 (107 Hp) T	1.00	20.00 HR	41.970			839		839	
8TRKHW10	Tandem Truck 12 CY 400	1.00	20.00 HR	62.565			1,251		1,251	
8TRKPU70	Pickup Ford F-250 3/4	1.00	20.00 HR	25.830			517		517	
OP00	Op Grade Foreman	1.00	20.00 MH	55.220	1,754				1,754	
OP01	Op Grade Checker	1.00	20.00 MH	36.550	1,264				1,264	
OP09	Op Backhoe < 3Y	1.00	20.00 MH	39.770	1,349				1,349	
TD02	Teamster Journeyman	1.00	20.00 MH	29.730	1,107				1,107	
\$8,080.80	26.6666 MH/EA		80.00 MH	[ 1182.647 ]	5,474		2,607		8,081	
0.1500	Units/Hr	0.0375	Unit/MH	2.0000	Shifts	1,824.50	869.10		2,693.60	

136000.20	Backfill - Native		Quan:	1.00 LS	Hrs/Shft:	10.00	Cal: 510	WC: CCISP		
<u>BACKF4</u>	(Mod) Soldier Pile Backfill	10.00	CH	Prod:	50.0000 MU	Lab Pcs:	5.00	Eqp Pcs:	5.00	
8BHLD480	BHL CAT 430 (107 Hp) T	1.00	10.00 HR	41.970			420		420	
8COMPR04	Compressor 185 CFM 80H	1.00	10.00 HR	12.340			123		123	
8TRKHW10	Tandem Truck 12 CY 400	1.00	10.00 HR	62.565			626		626	
8TRKPU70	Pickup Ford F-250 3/4	1.00	10.00 HR	25.830			258		258	
8TRKWTR03	Water Truck 4,000 gal	1.00	10.00 HR	19.290			193		193	
LA01	Laborer-Foreman	1.00	10.00 MH	38.860	663				663	
LA04	Laborer-Power Tools	2.00	20.00 MH	33.000	1,172				1,172	
OP09	Op Backhoe < 3Y	1.00	10.00 MH	39.770	674				674	
TD02	Teamster Journeyman	1.00	10.00 MH	29.730	553				553	
\$4,683.15	50.0000 MH/LS		50.00 MH	[ 1917.96 ]	3,063		1,620		4,683	
0.1000	Units/Hr	0.0200	Unit/MH	1.0000	Shifts	3,063.20	1,619.95		4,683.15	

=====>	Item Totals:	135000	-	POTHOLING FOR UTILITIES						
\$12,763.95		130.0000	MH/LS	130.00	MH	[ 5465.9 ]	8,537		4,227	12,764
12,763.950			1 LS				8,536.70		4,227.25	12,763.95

DIRECT COST BREAKDOWN

Activity Resource	Desc	Pcs	Quantity Unit	Unit Cost	Labor	Perm Material	Constr Matl/Exp	Equip Ment	Sub-Contract	Total
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PARENT ITEM = 136000 CLIENT# = 0596-A002000A RHU  
 Description = RETAINING WALL, MSE Unit = LS Takeoff Quan: 1.000 Engr Quan: 1.000

\*\*\*\* Notes from copying \*\*\*\*  
 Figure 6' wide x 1.5' thick

Use 250#/CY  
 Listing of Sub-Biditems of Parent Item 136000:

BID ITEM = 136010 Land Item SCHEDULE: 1 100 RHU  
 Description = Structure Excavation Unit = CY Takeoff Quan: 113.554 Engr Quan: 113.554

7051810.10 Structure Excavation (Trench) Quan: 182.00 CY Hrs/Shift: 10.00 Cal: 510 WC: CCISP

Quantity Based on Design Team Takeoff;  
 Assume trench averages 4'x 6'x 204'/27 = 182 cy

Code	Description	Unit	Quantity	Unit Cost	Labor	Perm	Constr	Equip	Sub-Contract	Total
EXC3	Excavate 426 BH Loader	CH	30.00	Prod: 6.0667	UH	Lab Pcs: 3.00		Eqp Pcs: 2.00		2.00
8BHLD426	BHL CAT 430 (107 Hp) T	HR	30.00	41.970				1,259		1,259
8TRKPU70	Pickup Ford F-250 3/4	HR	30.00	25.830				775		775
OP00	Op Grade Foreman	MH	30.00	55.220	2,630					2,630
OP01	Op Grade Checker	MH	30.00	36.550	1,897					1,897
OP09	Op Backhoe < 3Y	MH	30.00	39.770	2,023					2,023
\$8,584.07	0.4945 MH/CY	MH	90.00	[ 23.851 ]	6,550			2,034		8,584
6.0667	Units/Hr *	2.0222 Unit/MH	3.0000	Shifts	35.99			11.18		47.17

7051810.20 Haul - To Stockpile Quan: 182.00 CY Hrs/Shift: 10.00 Cal: 510 WC: CCISP

----- Trucking By The CY Short Method -----

INPUT		COMPUTED	
Total CY	647.00	12.44	Total Hours
CY/Hr	52.00	1.24	Total Shifts
Hours/Shift	10.00	520.00	CY/Shift
Min/Round Trip/Truck	25.00	66.02	Total Truckloads
CY/Truckload	9.80	2.21	Needed number of Trucks
Use This Many Trucks	3.00	37.33	Total Truck Hours
Price/Hr for Trucks	135.00	5039.13	Total Price
		7.79	UP/CY

5TRKED	Trucking - End Dump	1.00	182.00 CY	7.790		1,418		1,418
\$1,417.78				[ ]		1,418		1,418
						7.79		7.79

=====>	Item Totals:	136010	- Structure Excavation					
\$10,001.85	0.7925 MH/CY	90.00	MH	[ 38.227 ]	6,550	1,418	2,034	10,002
88.080	113.5541 CY				57.68	12.49	17.91	88.08

BID ITEM = 136020 Land Item SCHEDULE: 1 100 RHU  
 Description = Structure Backfill Unit = CY Takeoff Quan: 910.000 Engr Quan: 910.000

7051820.10 Backfill front of Wall Quan: 60.00 CY Hrs/Shift: 10.00 Cal: 510 WC: CCISP

use 1.8225 tons/cy use 20% yield loss  
 =204' x 4' x 2' = 60

Code	Description	Unit	Quantity	Unit Cost	Labor	Perm	Constr	Equip	Sub-Contract	Total
BACKF2	Structure Backfill-Small	CH	3.12	Prod: 19.2006	UH	Lab Pcs: 2.00		Eqp Pcs: 5.00		5.00
2AGC08	MSE Backfill	TN	1.10	24.000	2,886					2,886

DIRECT COST BREAKDOWN

Activity Resource	Desc	Pcs	Quantity Unit	Unit Cost	Labor	Perm Material	Constr Matl/Exp	Equip Ment	Sub-Contract	Total
BID ITEM = 136020										
Description =	Structure Backfill			Land Item Unit =	SCHEDULE: 1 CY	100				RHU 910.000
					Takeoff Quan:		910.000	Engr Quan:		910.000
8COMPACW06	Compactor Plate 25IN	1.00	3.12 HR					38		38
8COMPACW12	Compactor Bomag BW75S-	1.00	3.12 HR					46		46
8LDRSS232	Skid Steer CAT 272 (95	1.00	3.12 HR					152		152
8LDRW950	Loader CAT 950 (221Hp)	1.00	3.12 HR					279		279
8TRKPU70	Pickup Ford F-250 3/4	1.00	3.12 HR					81		81
LA04	Laborer-Power Tools	2.00	6.25 MH							366
\$3,848.17	0.1041 MH/CY		6.25 MH		[ 3.781 ]	366	2,886	596		3,848
19.2308	Units/Hr *	9.6000	Unit/MH	0.3120	Shifts	6.11	48.10	9.93		64.14
7051820.20	Backfill in Reinforcing Zone			Quan:	850.00 CY	Hrs/Shft:	10.00	Cal:	510	WC: CCISP
use 1.8225 tons/cy use 20% yield loss										
Assume width of granular backfill is 0.8 * average wall height.										
<u>BACKF2</u>	Structure Backfill-Small		50.00 CH	Prod:	17.0000 UH	Lab Pcs:	5.00	Eqp Pcs:	5.00	
2AGC08	MSE Backfill	1.10	1,703.49 TN			40,884				40,884
8COMPACW06	Compactor Plate 25IN	1.00	50.00 HR					613		613
8COMPACW12	Compactor Bomag BW75S-	1.00	50.00 HR					744		744
8LDRSS232	Skid Steer CAT 272 (95	1.00	50.00 HR					2,429		2,429
8LDRW950	Loader CAT 950 (221Hp)	1.00	50.00 HR					4,472		4,472
8TRKPU70	Pickup Ford F-250 3/4	1.00	50.00 HR					1,292		1,292
LA04	Laborer-Power Tools	2.00	100.00 MH			5,862				5,862
OP00	Op Grade Foreman	1.00	50.00 MH			4,384				4,384
OP11	Op Loader <6Y	2.00	100.00 MH			6,906				6,906
\$67,585.20	0.2941 MH/CY		250.00 MH		[ 13.151 ]	17,152	40,884	9,549		67,585
17.0000	Units/Hr *	3.4000	Unit/MH	5.0000	Shifts	20.18	48.10	11.23		79.51
=====>	Item Totals:	136020	- Structure Backfill							
\$71,433.37	0.2815 MH/CY		256.25 MH		[ 12.533 ]	17,519	43,770	10,145		71,433
78.498	910 CY					19.25	48.10	11.15		78.50

BID ITEM = 136030				Land Item	SCHEDULE: 1	100				RHU
Description =	F/P/S MSE Wall Leveling Pad			Unit =	LF	Takeoff Quan:	204.000	Engr Quan:		204.000
7051830.10	Finegrade Leveling Pad			Quan:	612.00 SF	Hrs/Shft:	10.00	Cal:	510	WC: CCISP
<u>FG2</u>	Fine Gade - Small Area		5.00 CH	Prod:	122.4000 UH	Lab Pcs:	4.00	Eqp Pcs:	3.00	
8COMPACW12	Compactor Bomag BW75S-	1.00	5.00 HR					74		74
8LDRSS232	Skid Steer CAT 272 (95	1.00	5.00 HR					243		243
8TRKPU70	Pickup Ford F-250 3/4	1.00	5.00 HR					129		129
LA04	Laborer-Power Tools	2.00	10.00 MH			586				586
OP00	Op Grade Foreman	1.00	5.00 MH			438				438
OP11	Op Loader <6Y	1.00	5.00 MH			345				345
\$1,816.40	0.0326 MH/SF		20.00 MH		[ 1.458 ]	1,370		446		1,816
122.4000	Units/Hr *	30.6000	Unit/MH	0.5000	Shifts	2.24		0.73		2.97
7051830.20	F/S Leveling Pad			Quan:	204.00 SF	Hrs/Shft:	10.00	Cal:	510	WC: CCISP
204' x 1.5' x 0.5' pad = 6 cy										
Buy: Metal Forms for Reuse. 204 x (.5'+.5') = 204 SF										
<u>CARP4</u>	Foreman + 3 Carpenters		5.00 CH	Prod:	0.0980 MU	Lab Pcs:	4.00	Eqp Pcs:	2.00	
31FMAALL	Oil/Nails/Ties	1.00	204.00 SF			71				71
31FMCPUR	Special Form Purchase	1.00	204.00 SF			408				408
31FMLM2X6	Lumber, 2 x 6	1.00	0.23 MBF			655.000				151
31FMLMSTK	Stakes	1.00	171.36 EA			1.500		257		257
8GEN010	Generator 10 KW	1.00	5.00 HR					126		126

DIRECT COST BREAKDOWN

Activity Resource	Desc	Pcs	Quantity Unit	Unit Cost	Labor	Perm Material	Constr Matl/Exp	Equip Ment	Sub-Contract	Total	
BID ITEM = 136030											
Description =	F/P/S MSE Wall Leveling Pad			Land Item Unit =	SCHEDULE: 1 LF	100				RHU	
					Takeoff Quan:		204.000		Engr Quan:	204.000	
8TRKPU70	Pickup Ford F-250 3/4	1.00	5.00 HR	25.830				129		129	
CA01	Carpenter Foreman	1.00	5.00 MH	46.750	398					398	
CA02	Carpenter Journeyman	3.00	15.00 MH	41.750	1,095					1,095	
\$2,634.15		0.0980	MH/SF	20.00	MH	[ 4.637 ]	1,492	887	255	2,634	
40.8000	Units/Hr	10.2000	Unit/MH	0.5000	Shifts		7.32	4.35	1.25	12.91	
7051830.30	Pour Leveling Pad			Quan:	6.00 CY	Hrs/Shft:	10.00	Cal: 510	WC: CCISP		
204'x 1.5' x 0.5' pad = 6 cy											
<u>POUR4</u>	Pour Conc 4 man		6.00 CH	Prod:	4.0000 MU	Lab Pcs:	4.00	Eqp Pcs:	4.00		
2CR08	3000 PSI Concrete	1.25	7.49 CY	120.000		899				899	
8COMPR04	Compressor 185 CFM 80H	1.00	6.00 HR	12.340				74		74	
8CONCEQ28	Conc Vib 2.25" Elec.	1.00	6.00 HR	0.768				5		5	
8GEN010	Generator 10 KW	1.00	6.00 HR	25.103				151		151	
8TRKPU70	Pickup Ford F-250 3/4	1.00	6.00 HR	25.830				155		155	
CM02	Cement Mason Journeyman	1.00	6.00 MH	35.520	396					396	
LA01	Laborer-Foreman	1.00	6.00 MH	38.860	398					398	
LA04	Laborer-Power Tools	2.00	12.00 MH	33.000	703					703	
\$2,779.92		4.0000	MH/CY	24.00	MH	[ 154.418 ]	1,497	899	384	2,780	
1.0000	Units/Hr	0.2500	Unit/MH	0.6000	Shifts		249.48	149.80	64.04	463.32	
=====>	Item Totals:	136030	- F/P/S MSE Wall Leveling Pad								
\$7,230.47		0.3137	MH/LF	64.00	MH	[ 13.553 ]	4,359	899	887	1,085	7,230
35.443		204	LF				21.37	4.41	4.35	5.32	35.44

BID ITEM = 136040				Land Item	SCHEDULE: 1	100				RHU	
Description =	Construct MSE Wall			Unit =	SF	Takeoff Quan:	2,699.999		Engr Quan:	2,700.000	
7051840.20	Install MSE Wall Panels			Quan:	2,700.00 SF	Hrs/Shft:	10.00	Cal: 510	WC: CCISP		
<p>Wall is 102' long, / 8' = panels                      Panels must be supported until all panels are installed and backfill has been placed on straps                      Use concrete deadmen or temp concrete rail pieces and two tilt-up braces per panel                      Set, grade,bolt together 2 CH/EA</p>											
<u>MSE1</u>	(Mod) Install MSE Panels		50.00 CH	Prod:	0.1111 MU	Lab Pcs:	6.00	Eqp Pcs:	4.00		
2PM02	Precast MSE Panels	1.00	2,700.00 SF	20.000		54,000				54,000	
31MATMSE	MSE Wall Accessories	1.00	2,700.00 SF	3.000			8,100			8,100	
31MATMSEB	MSE Pole Brace Rent	1.00	100.00 EA	25.000			2,500			2,500	
8COMPR04	Compressor 185 CFM 80H	1.00	50.00 HR	12.340				617		617	
8FORK04	Forklift Pettibone 603	1.00	50.00 HR	42.270				2,114		2,114	
8TRKPU70	Pickup Ford F-250 3/4	1.00	50.00 HR	25.830				1,292		1,292	
8WELD300	Welder 300 AMP	1.00	50.00 HR	11.040				552		552	
CA01	Carpenter Foreman	1.00	50.00 MH	46.750	3,977					3,977	
CA02	Carpenter Journeyman	2.00	100.00 MH	41.750	7,298					7,298	
LA04	Laborer-Power Tools	2.00	100.00 MH	33.000	5,862					5,862	
OP11	Op Loader <6Y	1.00	50.00 MH	41.010	3,453					3,453	
\$89,764.18		0.1111	MH/SF	300.00	MH	[ 4.833 ]	20,590	54,000	10,600	4,574	89,764
54.0000	Units/Hr	9.0000	Unit/MH	5.0000	Shifts		7.63	20.00	3.93	1.69	33.25
7051840.30	MSE Wall Cleaning			Quan:	2,700.00 SF	Hrs/Shft:	10.00	Cal: 510	WC: CCISP		
<u>LAB4</u>	(Mod) Foreman + 3 Laborers		20.00 CH	Prod:	135.0000 UH	Lab Pcs:	4.00	Eqp Pcs:	3.00		
8COMPR04	Compressor 185 CFM 80H	1.00	20.00 HR	12.340				247		247	
8MLIFT060	Manlift 80' Genie S-80	1.00	20.00 HR	73.860				1,477		1,477	
8TRKPU70	Pickup Ford F-250 3/4	1.00	20.00 HR	25.830				517		517	
LA01	Laborer-Foreman	1.00	20.00 MH	38.860	1,326					1,326	

DIRECT COST BREAKDOWN

Activity Resource	Desc	Pcs	Quantity Unit	Unit Cost	Labor	Perm Material	Constr Mat/Exp	Equip Ment	Sub-Contract	Total
BID ITEM = 136040										
Description =	Construct MSE Wall			Unit = SF	Takeoff Quan:		2,699.999	Engr Quan:		2,700.000
LA04	Laborer-Power Tools	3.00	60.00 MH	33.000	3,517					3,517
\$7,083.86	0.0296 MH/SF		80.00 MH	[ 1.123 ]	4,843			2,241		7,084
135.0000 Units/Hr *	33.7500 Unit/MH		2.0000 Shifts		1.79			0.83		2.62
7051840.40	Pigmented Sealer				Quan: 2,700.00 SF	Hrs/Shft: 10.00	Cal: 510	WC: CCISP		
4COAT	Concrete Coating Sub	1.00	2,700.00 SF	2.000					5,400	5,400
\$5,400.00				[ ]					5,400	5,400
									2.00	2.00
=====>	Item Totals:	136040	- Construct MSE Wall							
\$102,248.04	0.1407 MH/SF		380.00 MH	[ 5.956 ]	25,433	54,000	10,600	6,815	5,400	102,248
37.870	2699.9999 SF				9.42	20.00	3.93	2.52	2.00	37.87

BID ITEM = 136060										
Description =	Cast-In-Place Moment Slab			Unit = LF	Takeoff Quan:		204.000	Engr Quan:		204.000
	Figure 6' wide x 1.5' thick									

7051860.10	Overhang & Walkway F&S				Quan: 816.00 SF	Hrs/Shft: 10.00	Cal: 510	WC: CCISP		
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Jacks @ 4' oc. = 312 each  
 2x4's at 14.33 ft/lf = 11.9 MBF  
 4x4's at 2.67ft/lf = 4.45 MBF  
 Plywood 1250 x 36" = 3.75 MBF

Description	Quantity	Unit	Unit/CH	Crew Hours
Overhang Brackets	312.00	EA	8.75	35.66
E/S Overhang Walkway	3,750.00	SF	25.00	150.00
=====				185.66
Total Crew Hours				185.66
Quantity Total:	Cannot be calculated with varying unit types.			
Lost Time/Delay%: 0.00	Total Crew Hours+Lost Time			185.66
----- Blank -----				

Install	Grade	Remove	Brackets	OH	50	SF/MH	
OH	contact	Area	1280	LF		5,120	SF
2x4's	for	Joists & rail	14.33ft/lf			18.34	MBF
4x4's	for	Jacks	2.67ft/lf			3.42	MBF
OH	Jacks	@ 3'OC				428	EA

----- End Calculation -----

FORM4	Form Crew 4 Man			40.00	CH	Prod:	0.1961	MU	Lab Pcs:	4.00	Eqp Pcs:	3.00
31FMAALL	Oil/Nails/Ties	1.00	816.00	SF		0.350			286			286
31FMACESS	Form Accessories	1.00	816.00	SF		0.100			82			82
31FMAOHB	Overhang Brackets Rent	1.00	68.22	EA		10.000			682			682
31FMLM2X4	Lumber, 2 x 4	1.00	2.92	MBF		655.000			1,913			1,913
31FMLM4X4	Lumber, 4x4	1.00	0.54	MBF		890.000			481			481
31FMLP34CDX	Plywood, 3/4" CDX	1.00	0.82	MSF		622.000			510			510
8COMPR04	Compressor 185 CFM 80H	1.00	40.00	HR		12.340				494		494
8GEN010	Generator 10 KW	1.00	40.00	HR		25.103				1,004		1,004
8TRKPU70	Pickup Ford F-250 3/4	1.00	40.00	HR		25.830				1,033		1,033
CA01	Carpenter Foreman	1.00	40.00	MH		46.750	3,181					3,181
CA02	Carpenter Journeyman	2.00	80.00	MH		41.750	5,839					5,839
LA03	Laborer-General	1.00	40.00	MH		31.830	2,284					2,284
\$17,786.99	0.1960 MH/SF		160.00	MH		[ 8.74 ]	11,303		3,953	2,531		17,787
20.4000 Units/Hr	5.1000 Unit/MH		4.0000 Shifts				13.85		4.84	3.10		21.80



DIRECT COST BREAKDOWN

Activity Resource	Desc	Pcs	Quantity Unit	Unit Cost	Labor	Perm Material	Constr Matl/Exp	Equip Ment	Sub-Contract	Total
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BID ITEM = 136060 Land Item SCHEDULE: 1 100 RHU  
 Description = Cast-In-Place Moment Slab Unit = LF Takeoff Quan: 204.000 Engr Quan: 204.000

7051860.20 Fab Forms Quan: 617.73 SF Hrs/Shft: 10.00 Cal: 510 WC: CCISP

The wall form lumber and the form liner consider the percentage totals of overall sound wall quantity. This particular wall is 15 pours, assume 15 re-uses on form liner, and 15 re-uses on wall forms.

Total purchase required: 4,000 SF

Activity Resource	Desc	Pcs	Quantity Unit	Unit Cost	Labor	Perm Material	Constr Matl/Exp	Equip Ment	Sub-Contract	Total
<u>CARP7</u>	Foreman + 6 Carpenters		8.82 CH	Prod:	10.0000 UM		Lab Pcs:	7.00	Eqp Pcs:	2.00
31FMAALL	Oil/Nails/Ties	1.00	617.73 SF	0.350			216			216
31FMLICUSTOM	Custom Form Liner	1.00	617.73 SF	25.000			15,443			15,443
31FMLMCOMP	Form Lumber	1.00	1.07 MBF	890.000			952			952
31FMLP34HDO	Plywood, 3/4 HDO	1.00	0.57 MSF	1,140.000			650			650
8GEN010	Generator 10 KW	1.00	8.82 HR	25.103				221		221
8TRKPU70	Pickup Ford F-250 3/4	1.00	8.82 HR	25.830				228		228
CA01	Carpenter Foreman	1.00	8.82 MH	46.750	701					701
CA02	Carpenter Journeyman	6.00	52.95 MH	41.750	3,864					3,864
\$22,276.65	0.0999 MH/SF		61.77 MH	[ 4.671 ]	4,566		17,262	449		22,277
70.0374	Units/Hr	10.0005	Unit/MH *	0.8820	Shifts		7.39	27.94	0.73	36.06

7051860.30 MSE Forms Quan: 617.73 SF Hrs/Shft: 10.00 Cal: 510 WC: CCISP

Activity Resource	Desc	Pcs	Quantity Unit	Unit Cost	Labor	Perm Material	Constr Matl/Exp	Equip Ment	Sub-Contract	Total
<u>CARP4</u>	(Mod) Foreman + 3 Carpenters		16.47 CH	Prod:	7.5000 UM		Lab Pcs:	5.00	Eqp Pcs:	3.00
31FMAALL	Oil/Nails/Ties	1.00	617.73 SF	0.350			216			216
31FMACESS	Form Accessories	1.00	617.73 SF	0.100			62			62
31FMCPSF	Buy Plywood/Stud Forms	1.00	617.73 SF	3.000			1,853			1,853
31FMLMSTK	Stakes	1.00	112.15 EA	1.500			168			168
8FORK06	Forklift Pettibone 603	1.00	16.47 HR	42.270				696		696
8GEN010	Generator 10 KW	1.00	16.47 HR	25.103				413		413
8TRKPU70	Pickup Ford F-250 3/4	1.00	16.47 HR	25.830				425		425
CA01	Carpenter Foreman	1.00	16.47 MH	46.750	1,310					1,310
CA02	Carpenter Journeyman	3.00	49.42 MH	41.750	3,607					3,607
OP11	Op Loader <6Y	1.00	16.47 MH	41.010	1,137					1,137
\$9,888.56	0.1333 MH/SF		82.36 MH	[ 6.248 ]	6,054		2,299	1,535		9,889
37.5064	Units/Hr	7.5004	Unit/MH *	1.6470	Shifts		9.80	3.72	2.48	16.01

7051860.40 MSE Wall - Place Conc Quan: 68.00 CY Hrs/Shft: 10.00 Cal: 510 WC: CCISP

Concrete Pump pour: 2.4 sf/lf = 2.4 x 44 / 27 = 4 cy

Activity Resource	Desc	Pcs	Quantity Unit	Unit Cost	Labor	Perm Material	Constr Matl/Exp	Equip Ment	Sub-Contract	Total
<u>POUR7</u>	Pour Conc 7 man		6.80 CH	Prod:	1.4286 UM		Lab Pcs:	7.00	Eqp Pcs:	4.00
2CR12	4000 PSI Concrete	1.05	71.43 CY	130.000		9,286				9,286
5CONCP28M	Concrete Pump 32m (105')	1.00	6.75 HR	95.000			641			641
5CONCPCY	Cubic Yard Charge 17m-39	1.00	68.00 CY	2.250			153			153
8COMPR04	Compressor 185 CFM 80H	1.00	6.80 HR	12.340				84		84
8CONCEQ28	Conc Vib 2.25" Elec.	1.00	6.80 HR	0.768				5		5
8GEN010	Generator 10 KW	1.00	6.80 HR	25.103				171		171
8TRKPU70	Pickup Ford F-250 3/4	1.00	6.80 HR	25.830				176		176
CA02	Carpenter Journeyman	1.00	6.80 MH	41.750	496					496
CM02	Cement Mason Journeyman	2.00	13.60 MH	35.520	897					897
LA01	Laborer-Foreman	1.00	6.80 MH	38.860	451					451
LA04	Laborer-Power Tools	3.00	20.40 MH	33.000	1,196					1,196
\$13,555.39	0.7000 MH/CY		47.60 MH	[ 27.571 ]	3,040	9,286	794	435		13,555
10.0000	Units/Hr	1.4286	Unit/MH *	0.6800	Shifts		44.70	136.56	11.68	6.40

7051860.50 MSE Wall Coping - Cure Quan: 1,822.62 SF Hrs/Shft: 10.00 Cal: 510 WC: CCISP

Activity Resource	Desc	Pcs	Quantity Unit	Unit Cost	Labor	Perm Material	Constr Matl/Exp	Equip Ment	Sub-Contract	Total
<u>LAB2</u>	Foreman + 1 Laborer		3.64 CH	Prod:	249.9959 UM		Lab Pcs:	2.00	Eqp Pcs:	1.00
31FCURECMP	Curing Compound	1.00	1,822.62 SF	0.045			82			82
31FCURESUP	Curing Supplies	1.00	1,822.62 SF	0.030			55			55
8TRKPU70	Pickup Ford F-250 3/4	1.00	3.65 HR	25.830				94		94

DIRECT COST BREAKDOWN

Activity Resource	Desc	Pcs	Quantity Unit	Unit Cost	Labor	Perm Material	Constr Matl/Exp	Equip Ment	Sub-Contract	Total
BID ITEM = 136060										
Description =	Cast-In-Place Moment Slab			Land Item Unit =	SCHEDULE: 1 LF	100	Takeoff Quan: 204.000	Engr Quan: 204.000		RHU 204.000
LA01	Laborer-Foreman	1.00	3.65 MH	38.860	242					242
LA04	Laborer-Power Tools	1.00	3.65 MH	33.000	214					214
\$686.92	0.0040 MH/SF		7.30 MH	[ 0.158 ]	456		137	94		687
500.7198	Units/Hr	249.6742	Unit/MH *	0.3640	Shifts	0.25	0.08	0.05		0.38
7051860.60	Ordinary Surface Finish			Quan: 617.73 SF	Hrs/Shft: 10.00	Cal: 510	WC: CCISP			
<u>FIN3</u>	Patch & Finish		3.43 CH	Prod: 0.0167 MU	Lab Pcs: 3.00	Eqp Pcs: 2.00				
31FCFINISH	Patch and Finish Matl	1.00	617.73 SF	0.050		31				31
8CONCEQ14	Conc Mixer 8CF 8 HP	1.00	3.43 HR	3.537			12			12
8TRKPU70	Pickup Ford F-250 3/4	1.00	3.43 HR	25.830			89			89
CM01	Cement Mason Foreman	1.00	3.43 MH	40.520	249					249
CM02	Cement Mason Journeyman	1.00	3.43 MH	35.520	226					226
LA04	Laborer-Power Tools	1.00	3.43 MH	33.000	201					201
\$807.49	0.0166 MH/SF		10.29 MH	[ 0.666 ]	676		31	101		807
180.0962	Units/Hr	60.0321	Unit/MH	0.3430	Shifts	1.09	0.05	0.16		1.31
7051860.70	Rubbed Conc Finish			Quan: 308.87 SF	Hrs/Shft: 10.00	Cal: 510	WC: CCISP			
<u>FIN3</u>	Patch & Finish		3.43 CH	Prod: 0.0333 MU	Lab Pcs: 3.00	Eqp Pcs: 2.00				
31FCFINCL1	CL1 Finish Materials	1.00	308.87 SF	0.150		46				46
8CONCEQ14	Conc Mixer 8CF 8 HP	1.00	3.43 HR	3.537			12			12
8TRKPU70	Pickup Ford F-250 3/4	1.00	3.43 HR	25.830			89			89
CM01	Cement Mason Foreman	1.00	3.43 MH	40.520	249					249
CM02	Cement Mason Journeyman	1.00	3.43 MH	35.520	226					226
LA04	Laborer-Power Tools	1.00	3.43 MH	33.000	201					201
\$822.93	0.0333 MH/SF		10.29 MH	[ 1.332 ]	676		46	101		823
90.0496	Units/Hr	30.0165	Unit/MH	0.3430	Shifts	2.19	0.15	0.33		2.66
7051860.80	Misc Conc Hardware			Quan: 68.00 CY	Hrs/Shft: 10.00	Cal: 510	WC: CCISP			
Allowance cost for expendable & reusable form hardware & Const & Permanent bridge materials.										
Expanded Polystyrene, dobies, spreaders, backer-rod, chamfer, wedges, PVC pipe, nails, misc. matls.										
31MATBI	Misc Bridge Items	1.00	68.00 CY	20.000		1,360				1,360
\$1,360.00				[ ]		1,360				1,360
						20.00				20.00
7051860.90	Sandblast Conc			Quan: 306.00 SF	Hrs/Shft: 10.00	Cal: 510	WC: CCISP			
<u>FIN1</u>	Sand Blasting		10.20 CH	Prod: 0.0667 MU	Lab Pcs: 2.00	Eqp Pcs: 2.00				
31FCSANDB	Sand Blast Sand	1.00	306.00 SF	0.550		168				168
8CONCEQ44	Sandblaster 11 CF	1.00	10.21 HR	3.425			35			35
8TRKPU70	Pickup Ford F-250 3/4	1.00	10.21 HR	25.830			264			264
LA01	Laborer-Foreman	1.00	10.21 MH	38.860	677					677
LA04	Laborer-Power Tools	1.00	10.21 MH	33.000	599					599
\$1,742.38	0.0667 MH/SF		20.42 MH	[ 2.637 ]	1,275		168	299		1,742
30.0000	Units/Hr	14.9853	Unit/MH	1.0200	Shifts	4.17	0.55	0.98		5.69
7051860.95	Dowel to MSE Wall Panel			Quan: 51.32 EA	Hrs/Shft: 10.00	Cal: 510	WC: CCISP			
Assume dowels every 4 ft. oc.										
<u>CARP3</u>	Foreman+2 Carpenters		5.70 CH	Prod: 0.3333 MU	Lab Pcs: 3.00	Eqp Pcs: 2.00				
2CM18	Epoxy Cartridge	1.00	17.09 EA	25.000		427				427
2RR04	Gr 60 Rebar Dowels	1.00	51.32 EA	2.500		128				128
8GEN010	Generator 10 KW	1.00	5.70 HR	25.103			143			143
8TRKPU70	Pickup Ford F-250 3/4	1.00	5.70 HR	25.830			147			147
CA01	Carpenter Foreman	1.00	5.70 MH	46.750	453					453
CA02	Carpenter Journeyman	2.00	11.40 MH	41.750	832					832
\$2,131.17	0.3332 MH/EA		17.10 MH	[ 15.913 ]	1,285	556		290		2,131

DIRECT COST BREAKDOWN

Activity Resource	Desc	Pcs	Quantity Unit	Unit Cost	Labor	Perm Material	Constr Mat/Exp	Equip Ment	Sub-Contract	Total	
BID ITEM = 136060											
Description =	Cast-In-Place Moment Slab			Land Item Unit =	SCHEDULE: 1 LF	100			RHU		
					Takeoff Quan:		204.000		Engr Quan:	204.000	
9.0035	Units/Hr	3.0012	Unit/MH	0.5700	Shifts	25.05	10.83		5.66	41.53	
=====>	Item Totals:	136060	- Cast-In-Place Moment Slab								
\$71,058.48		2.0447	MH/LF	417.13	MH	[ 90.619 ]	29,332	9,841	26,050	5,835	71,058
348.326			204 LF				143.78	48.24	127.70	28.60	348.33

BID ITEM = 136070											
Description =	Reinforcing Steel			Land Item Unit =	SCHEDULE: 1 LB	100			RHU		
					Takeoff Quan:		15,000.300		Engr Quan:	15,000.300	
	Use 250#/CY										
7051860.10	Reinforcing Steel - Subcontract			Quan:	15,000.30 LB	Hrs/Shft:	10.00	Cal: 510	WC: CCISP		
4REBAR	Rebar Sub	1.00	15,000.30		LB	1.120			16,800	16,800	
\$16,800.34						[ ]			16,800	16,800	
									1.12	1.12	
7051870.20	Unload & Handle Rebar			Quan:	15,000.30 LB	Hrs/Shft:	10.00	Cal: 510	WC: CCISP		
REBAR2	Rebar Support Light		3.00	CH	Prod:	0.0008	MU	Lab Pcs:	4.00	Eqp Pcs:	2.00
8CRANERT700	Crane Grove RT890 75 T	1.00	3.00	HR	197.340				592	592	
8TRKPU70	Pickup Ford F-250 3/4	1.00	3.00	HR	25.830				77	77	
LA01	Laborer-Foreman	1.00	3.00	MH	38.860	199				199	
LA03	Laborer-General	2.00	6.00	MH	31.830	343				343	
OP06	Op Crane < 100T	1.00	3.00	MH	43.990	219				219	
\$1,429.85		0.0007	MH/LB	12.00	MH	[ 0.032 ]	760		670	1,430	
5,000.1000	Units/Hr	1,250.0313	Unit/MH	0.3000	Shifts		0.05		0.04	0.10	
=====>	Item Totals:	136070	- Reinforcing Steel								
\$18,230.19		0.0007	MH/LB	12.00	MH	[ 0.032 ]	760		670	16,800	18,230
1.215			15000.3 LB				0.05		0.04	1.12	1.22

Total of Above Sub-Biditems

=====>	Item Totals:	136000	- RETAINING WALL, MSE									
\$280,202.40		1,219.3800	MH/LS	1,219.38	MH	[ 53562.71 ]	83,954	108,510	38,955	26,584	22,200	280,202
280,202.400			1 LS				83,953.54	108,510.01	38,954.94	26,583.57	22,200.34	280,202.40

BID ITEM = 137000	CLIENT# = 0562-0100000A										
Description =	FIBER REINFORCED DECK PANELS			Land Item Unit =	SCHEDULE: 1 SF	100			RHU		
					Takeoff Quan:		7,200.000		Engr Quan:	7,200.000	
138000.10	Unload & Store Deck Panels			Quan:	7,200.00 SF	Hrs/Shft:	10.00	Cal: 510	WC: CCISP		
2020	Unit cost from manufacturer = \$95 FOB Jobsite										
IRON3C	Foreman+2 Ironworker+Crane		10.00	CH	Prod:	0.0056	MU	Lab Pcs:	4.00	Eqp Pcs:	2.00
2FRDP	Fiber Reinforced Deck Pane	1.00	7,200.00	SF	95.000		684,000			684,000	
8CRANERT700	Crane Grove RT890 75 T	1.00	10.00	HR	197.340				1,973	1,973	
8TRKPU70	Pickup Ford F-250 3/4	1.00	10.00	HR	25.830				258	258	
IW01	Ironworker Foreman	1.00	10.00	MH	44.100	875				875	
IW02	Ironworker Journeyman	2.00	20.00	MH	39.100	1,619				1,619	
OP06	Op Crane < 100T	1.00	10.00	MH	43.990	730				730	

DIRECT COST BREAKDOWN

Activity Resource	Desc	Quantity Pcs	Unit	Unit Cost	Labor	Perm Material	Constr Matl/Exp	Equip Ment	Sub-Contract	Total
BID ITEM = 137000	CLIENT# = 0562-0100000A		Land Item	SCHEDULE: 1	100					RHU
Description = FIBER REINFORCED DECK PANELS			Unit = SF	Takeoff	Quan: 7,200.000			Engr Quan: 7,200.000		
\$689,455.70	0.0055 MH/SF	40.00 MH	[ 0.254 ]	3,224	684,000			2,232		689,456
720.0000 Units/Hr	180.0002 Unit/MH	1.0000 Shifts		0.45	95.00			0.31		95.76
138000.20	Erect Deck Panels		Quan: 7,200.00 SF	Hrs/Shft: 10.00	Cal: 510			WC: CCISP		
<u>IRON5C</u>	(Mod) Foreman+4 Ironworker+Crane	30.00 CH	Prod: 0.0250 MU	Lab Pcs: 6.00	Eqp Pcs: 3.00					
8CRANERT700	Crane Grove RT890 75 T	1.00 30.00 HR	197.340		5,920			5,920		5,920
8FORK02	Forklift Pettibone 603	1.00 30.00 HR	42.270		1,268			1,268		1,268
8TRKPU70	Pickup Ford F-250 3/4	1.00 30.00 HR	25.830		775			775		775
9STRIGL	Rigging - Light	1.00 1.00 LS	1,500.000		1,500			1,500		1,500
IW01	Ironworker Foreman	1.00 30.00 MH	44.100	2,625				2,625		2,625
IW02	Ironworker Journeyman	4.00 120.00 MH	39.100	9,715				9,715		9,715
OP06	Op Crane < 100T	1.00 30.00 MH	43.990	2,189				2,189		2,189
\$23,992.89	0.0250 MH/SF	180.00 MH	[ 1.121 ]	14,530	1,500			7,963		23,993
240.0000 Units/Hr	40.0000 Unit/MH	3.0000 Shifts		2.02	0.21			1.11		3.33
138000.30	Connect Deck Panels to Steel Girders		Quan: 7,200.00 SF	Hrs/Shft: 10.00	Cal: 510			WC: CCISP		
<u>IRON3</u>	(Mod) Foreman + 2 Ironworker	20.00 CH	Prod: 0.0111 MU	Lab Pcs: 4.00	Eqp Pcs: 5.00					
8COMP04	Compressor 185 CFM 80H	1.00 20.00 HR	12.340		247			247		247
8GEN010	Generator 10 KW	1.00 20.00 HR	25.103		502			502		502
8MLIFTS50	Scissor Lift 50' 2500#	2.00 40.00 HR	19.854		794			794		794
8TRKPU70	Pickup Ford F-250 3/4	1.00 20.00 HR	25.830		517			517		517
IW01	Ironworker Foreman	1.00 20.00 MH	44.100	1,750				1,750		1,750
IW02	Ironworker Journeyman	2.00 40.00 MH	39.100	3,238				3,238		3,238
LA03	Laborer-General	1.00 20.00 MH	31.830	1,142				1,142		1,142
\$8,190.08	0.0111 MH/SF	80.00 MH	[ 0.471 ]	6,130				2,060		8,190
360.0000 Units/Hr	90.0000 Unit/MH	2.0000 Shifts		0.85	0.29					1.14
=====> Item Totals: 137000 - FIBER REINFORCED DECK PANELS										
\$721,638.67	0.0416 MH/SF	300.00 MH	[ 1.846 ]	23,884	684,000	1,500		12,255		721,639
100.228	7200 SF			3.32	95.00	0.21		1.70		100.23

BID ITEM = 138000	CLIENT# = 0641-0102000M		Land Item	SCHEDULE: 1	100					RHU
Description = AGGREGATE BASE			Unit = TON	Takeoff	Quan: 1,340.000			Engr Quan: 1,340.000		

\*\*\*\* Notes from copying \*\*\*\*

Item Estimated

139000.10	Base Course - Place/Compact		Quan: 1,340.00 TN	Hrs/Shft: 10.00	Cal: 510			WC: CCISP		
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It should be 1,340 tons (used to be 1,012 tons). We actually need to account for this separate from sub-grade stabilization because quite a bit of the volume is due to having 24" deep agg base shoulders adjacent to the path.

<u>EG11</u>	Fine Grade - Trail	20.00 CH	Prod: 67.0000 UH	Lab Pcs: 7.00	Eqp Pcs: 5.00					
2AGDT02	Mineral Aggregate Type 2	1.00 1,340.00 TN	15.000	20,100				20,100		20,100
5TRKAG	Trucking Aggregates	1.00 1,340.00 TN	12.000		16,080			16,080		16,080
8COMPACV06	Compactor Cat CP-64 W=	1.00 20.00 HR	55.701					1,114		1,114
8GRDR120	Grader CAT 140H Rip (1	1.00 20.00 HR	128.370		2,567			2,567		2,567
8GRDR210	Grader JD210LJ Skip Lo	1.00 20.00 HR	25.376		508			508		508
8TRKPU70	Pickup Ford F-250 3/4	1.00 20.00 HR	25.830		517			517		517
8TRKWTR03	Water Truck 4,000 gal	1.00 20.00 HR	19.290		386			386		386
LA03	Laborer-General	1.00 20.00 MH	31.830	1,142				1,142		1,142
OP00	Op Grade Foreman	1.00 20.00 MH	55.220	1,754				1,754		1,754
OP01	Op Grade Checker	1.00 20.00 MH	36.550	1,264				1,264		1,264
OP11	Op Loader <6Y	1.00 20.00 MH	41.010	1,381				1,381		1,381
OP15	Op Motor Grader	1.00 20.00 MH	41.010	1,381				1,381		1,381

DIRECT COST BREAKDOWN

Activity Resource	Desc	Pcs	Quantity Unit	Unit Cost	Labor	Perm Material	Constr Matl/Exp	Equip Ment	Sub-Contract	Total
BID ITEM = 138000	CLIENT# = 0641-0102000M		Land Item	SCHEDULE: 1 100						RHU
Description =	AGGREGATE BASE		Unit =	TON	Takeoff Quan:		1,340.000	Engr Quan:		1,340.000
OP17	Op Rollers	1.00	20.00 MH	41.010	1,381					1,381
TD02	Teamster Journeyman	1.00	20.00 MH	29.730	1,107					1,107
\$50,681.62		0.1044	MH/TN	140.00 MH	[ 4.537 ]	9,410	20,100	16,080	5,091	50,682
67.0000	Units/Hr *	9.5714	Unit/MH	2.0000 Shifts		7.02	15.00	12.00	3.80	37.82
139000.20	Base Course - Finish			Quan:	1,340.00 SY	Hrs/Shft:	10.00	Cal:	510	WC: CCISP
FG11	Fine Grade - Trail		20.00 CH	Prod:	9.5714 UM	Lab Pcs:	7.00	Eqp Pcs:	5.00	
8COMPACV06	Compactor Cat CP-64 W=	1.00	20.00 HR	55.701				1,114		1,114
8GRDR120	Grader CAT 140H Rip (1	1.00	20.00 HR	128.370				2,567		2,567
8GRDR210	Grader JD210LJ Skip Lo	1.00	20.00 HR	25.376				508		508
8TRKPU70	Pickup Ford F-250 3/4	1.00	20.00 HR	25.830				517		517
8TRKWTR03	Water Truck 4,000 gal	1.00	20.00 HR	19.290				386		386
LA03	Laborer-General	1.00	20.00 MH	31.830	1,142					1,142
OP00	Op Grade Foreman	1.00	20.00 MH	55.220	1,754					1,754
OP01	Op Grade Checker	1.00	20.00 MH	36.550	1,264					1,264
OP11	Op Loader <6Y	1.00	20.00 MH	41.010	1,381					1,381
OP15	Op Motor Grader	1.00	20.00 MH	41.010	1,381					1,381
OP17	Op Rollers	1.00	20.00 MH	41.010	1,381					1,381
TD02	Teamster Journeyman	1.00	20.00 MH	29.730	1,107					1,107
\$14,501.62		0.1044	MH/SY	140.00 MH	[ 4.537 ]	9,410		5,091		14,502
67.0000	Units/Hr	9.5714	Unit/MH *	2.0000 Shifts		7.02		3.80		10.82
=====>	Item Totals:	138000	- AGGREGATE BASE							
\$65,183.24		0.2089	MH/TON	280.00 MH	[ 9.075 ]	18,821	20,100	16,080	10,183	65,183
48.644			1340 TON			14.05	15.00	12.00	7.60	48.64

BID ITEM = 139000	CLIENT# = 0744-0202000M		Land Item	SCHEDULE: 1 100						RHU
Description =	LEVEL 2, 1/2 INCH ACP MIXTURE		Unit =	TON	Takeoff Quan:		647.000	Engr Quan:		647.000
140000.10	128-Hot Mix Asphalt (Type A)			Quan:	647.00 TN	Hrs/Shft:	10.00	Cal:	510	WC: CCISP
390132 - HOT MIX ASPHALT (TYPE A)										
4ASPH	Asphalt Paving Sub	1.00	647.00 TN	180.000				116,460		116,460
\$116,460.00				[ ]				116,460		116,460
								180.00		180.00

BID ITEM = 140000	CLIENT# = 0810-0104000F		Land Item	SCHEDULE: 1 100						RHU
Description =	TYPE 2A GUARD RAIL		Unit =	LF	Takeoff Quan:		850.000	Engr Quan:		850.000
140050.10	TYPE 2A GUARDRAIL			Quan:	850.00 LF	Hrs/Shft:	10.00	Cal:	510	WC: CCISP
Guardrail to protect the bent in the center of Highway 26,					475 Feet in each direction are used.					
4GRAIL	Guard Rail SUB	1.00	850.00 LF	25.000				21,250		21,250
\$21,250.00				[ ]				21,250		21,250
								25.00		25.00

BID ITEM = 141000	CLIENT# = 0759-0154100E		Land Item	SCHEDULE: 1 100						RHU
Description =	TYPE C GUARD RAIL END SECTION		Unit =	EA	Takeoff Quan:		2.000	Engr Quan:		2.000
140050.10	TYPE C GUARD RAIL END			Quan:	2.00 EA	Hrs/Shft:	10.00	Cal:	510	WC: CCISP

Activity Resource	Desc	Quantity Pcs	Unit	Unit Cost	Labor	Perm Material	Constr Mat/Exp	Equip Ment	Sub-Contract	Total
BID ITEM = 141000	CLIENT# = 0759-0154100E		Land Item	SCHEDULE: 1	100					RHU
Description =	TYPE C GUARD RAIL END SECTION		Unit =	EA	Takeoff Quan:		2.000	Engr Quan:		2.000
4GRAIL	Guard Rail SUB	1.00	2.00 EA	150.000					300	300
\$300.00				[ ]					300	300
									150.00	150.00
<hr/>										
BID ITEM = 142000	CLIENT# = 0815-0100000E		Land Item	SCHEDULE: 1	100					RHU
Description =	FLARED GUARD RAIL TERMINAL		Unit =	EA	Takeoff Quan:		2.000	Engr Quan:		2.000
140050.10	FLARED GUARD RAIL TERMINAL		Quan:	2.00 EA	Hrs/Shft:	10.00	Cal: 510	WC: CCISP		
4GRAIL	Guard Rail SUB	1.00	2.00 EA	3,500.000					7,000	7,000
\$7,000.00				[ ]					7,000	7,000
									3,500.00	3,500.00
<hr/>										
BID ITEM = 143000	CLIENT# = 0930-0116000A		Land Item	SCHEDULE: 1	100					RHU
Description =	EXTRA FOR NEW CURB RAMPS		Unit =	EA	Takeoff Quan:		4.000	Engr Quan:		4.000
141000.10	EXTRA FOR NEW CURB RAMPS		Quan:	4.00 EA	Hrs/Shft:	10.00	Cal: 510	WC: CCISP		
No details provided, use engineer's unit price less markups										
4BRIDGE	Bridge Sub	1.00	4.00 EA	2,500.000					10,000	10,000
\$10,000.00				[ ]					10,000	10,000
									2,500.00	2,500.00
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BID ITEM = 144000	CLIENT# = 0940-0201000J		Land Item	SCHEDULE: 1	100					RHU
Description =	BOLLARDS		Unit =	EA	Takeoff Quan:		14.000	Engr Quan:		14.000
142000.10	BOLLARDS		Quan:	14.00 EA	Hrs/Shft:	10.00	Cal: 510	WC: CCISP		
No details provided, use engineer's unit price less markups										
4BRIDGE	Bridge Sub	1.00	14.00 EA	2,000.000					28,000	28,000
\$28,000.00				[ ]					28,000	28,000
									2,000.00	2,000.00
<hr/>										
BID ITEM = 145000	CLIENT# = 0990-0106000A		Land Item	SCHEDULE: 1	100					RHU
Description =	PIPE SIGN SUPPORTS		Unit =	LS	Takeoff Quan:		1.000	Engr Quan:		1.000
143000.10	PIPE SIGN SUPPORTS		Quan:	6.00 EA	Hrs/Shft:	10.00	Cal: 510	WC: CCISP		
4BRIDGE	Bridge Sub	1.00	6.00 EA	500.000					3,000	3,000
\$3,000.00				[ ]					3,000	3,000
									500.00	500.00
<hr/>										
BID ITEM = 146000	CLIENT# = 1030-0103000R		Land Item	SCHEDULE: 1	100					RHU
Description =	SIGNS, STANDARD SHEETING, EXTRUDED ALUMI		Unit =	SF	Takeoff Quan:		18.000	Engr Quan:		18.000
144000.10	SIGNS, STANDARD SHEETING, EXTRUDED ALU		Quan:	18.00 SF	Hrs/Shft:	10.00	Cal: 510	WC: CCISP		

Activity Resource	Desc	Quantity Pcs	Unit	Unit Cost	Labor	Perm Material	Constr Matl/Exp	Equip Ment	Sub-Contract	Total
BID ITEM = 146000	CLIENT# = 1030-0103000R		Land Item	SCHEDULE: 1	100					RHU
Description =	SIGNS, STANDARD SHEETING, EXTRUDED ALUMI		Unit =	SF	Takeoff Quan:		18.000	Engr Quan:		18.000
4BRIDGE	Bridge Sub	1.00	18.00 SF	250.000				4,500		4,500
\$4,500.00				[ ]				4,500		4,500
								250.00		250.00

BID ITEM = 147000	CLIENT# = 1030-0108000R		Land Item	SCHEDULE: 1	100					JKE
Description =	FLASHING BEACON INSTALLATION,		Unit =	LS	Takeoff Quan:		1.000	Engr Quan:		1.000
145000.1	Rapid Response Flashing Beacon		Quan:	1.00 LS	Hrs/Shft:	10.00	Cal: 510	WC: CCISP		
The Trail at NW Cornell Rd	4ELEC/ITS Electric & ITS Sub	1.00	1.00 LS	22,250.000				22,250		22,250
\$22,250.00				[ ]				22,250		22,250
								22,250.00		22,250.00

BID ITEM = 148000	CLIENT# = 1040-0178000E		Land Item	SCHEDULE: 1	100					RHU
Description =	TEMPORARY SEEDING		Unit =	AC	Takeoff Quan:		0.420	Engr Quan:		0.420
146000.10	TEMPORARY SEEDING		Quan:	18,295.20 SF	Hrs/Shft:	10.00	Cal: 510	WC: CCISP		
Typically \$0.05/SF for decent sized areas, minimum for Hydroseeding applies, use \$3,500	4LAND Landscape & Irrigation Sub	1.00	1.00 LS	3,500.000				3,500		3,500
\$3,500.00				[ ]				3,500		3,500
								0.19		0.19

BID ITEM = 149000	CLIENT# = 1030-0108000R		Land Item	SCHEDULE: 1	100					RHU
Description =	PERMANENT SEEDING		Unit =	AC	Takeoff Quan:		0.420	Engr Quan:		0.420
147000.10	PERMANENT SEEDING		Quan:	18,295.20 SF	Hrs/Shft:	10.00	Cal: 510	WC: CCISP		
Typically \$0.05/SF for decent sized areas, minimum for Hydroseeding applies, use \$3,500	4LAND Landscape & Irrigation Sub	1.00	1.00 LS	3,500.000				3,500		3,500
\$3,500.00				[ ]				3,500		3,500
								0.19		0.19

BID ITEM = 150000	CLIENT# = 1040-0178000E		Land Item	SCHEDULE: 1	100					RHU
Description =	SEEDLING PLANTS		Unit =	EA	Takeoff Quan:		400.000	Engr Quan:		400.000
148000.10	SEEDLING PLANTS		Quan:	400.00 EA	Hrs/Shft:	10.00	Cal: 510	WC: CCISP		
32.93.43.10.0140	Planting, Trees, shrubs and ground cover, light soil, bare root seedlings, 17" to 24"									
LAB2	Foreman + 1 Laborer		10.00 CH	Prod:	0.0500 MU	Lab Pcs:	2.00	Eqp Pcs:		1.00
2BRS	Bare Root Seedling	1.00	400.00 EA	5.000		2,000				2,000
8TRKPU70	Pickup Ford F-250 3/4	1.00	10.00 HR	25.830				258		258
LA01	Laborer-Foreman	1.00	10.00 MH	38.860	663					663
LA04	Laborer-Power Tools	1.00	10.00 MH	33.000	586					586
\$3,507.49	0.0500 MH/EA		20.00 MH	[ 1.976 ]	1,249	2,000		258		3,507
40.0000	Units/Hr		20.0000 Unit/MH		1.0000	Shifts		3.12	5.00	0.65
										8.77

=====> Item Totals: 150000 - SEEDLING PLANTS

DIRECT COST BREAKDOWN

Activity Resource	Desc	Quantity Pcs	Unit	Unit Cost	Labor	Perm Material	Constr Matl/Exp	Equip Ment	Sub-Contract	Total
BID ITEM = 150000	CLIENT# = 1040-0178000E		Land Item	SCHEDULE: 1	100					RHU
Description = SEEDLING PLANTS			Unit = EA	Takeoff Quan:			400.000	Engr Quan:		400.000
\$3,507.49	0.0500 MH/EA	20.00 MH		[ 1.976 ]	1,249	2,000		258		3,507
8.769	400 EA				3.12	5.00		0.65		8.77

BID ITEM = 151000			Land Item	SCHEDULE: 1	100					JKE
Description = RELOCATE GUY WIRE			Unit = EA	Takeoff Quan:			4.000	Engr Quan:		4.000
149000.1	RELOCATE GUY WIRE		Quan:	4.00 EA	Hrs/Shft: 10.00	Cal: 510	WC: CCISP			
Relocation of 4 EA guy wires that run into the immediate area of the walking path										
4ELEC/ITS	Electric & ITS Sub	1.00	4.00 EA		20,000.000				80,000	80,000
\$80,000.00				[ ]					80,000	80,000
								20,000.00		20,000.00

BID ITEM = 152000			Land Item	SCHEDULE: 1	100					JKE
Description = E/W PGE LINE RELOCATE			Unit = LF	Takeoff Quan:			400.000	Engr Quan:		400.000
150000.1	E/W PGE LINE RELOCATE		Quan:	400.00 LF	Hrs/Shft: 10.00	Cal: 510	WC: CCISP			
moving approximately 400 LF of telecommunication cable underground										
There are 6 EA communication lines - 3 would be in direct contact with the bridge and 3 are slightly above the bridge										
4ELEC/ITS	Electric & ITS Sub	1.00	400.00 LF		551.620				220,648	220,648
\$220,648.00				[ ]					220,648	220,648
								551.62		551.62

BID ITEM = 153000			Land Item	SCHEDULE: 1	100					JKE
Description = N/S BPA LINE RELOCATE			Unit = LS	Takeoff Quan:			1.000	Engr Quan:		1.000
150050.1	N/S BPA LINE RELOCATE		Quan:	1.00 LS	Hrs/Shft: 10.00	Cal: 510	WC: CCISP			
A 550' section of high voltage line comes directly over the top of the bridge. We need to raise about 20-25 ft, and there is a high potentially that the existing cable would be to short. The method of raising the distribution lines is to erect two new power poles, and restring cable from the closest junction point - approximately 4.47 miles of cable. Northern point I have at (45.565382, -122.825939); southern location is a small sub-station (45.502989, -122.837132)										
raising BPA high voltage distribution lines to a safe level above the bridge.										
4ELEC/ITS	Electric & ITS Sub	1.00	1.00 LS		1,975,263.790				1,975,264	1,975,264
\$1,975,263.79				[ ]					1,975,264	1,975,264
								1,975,263.79		1,975,263.79

PARENT ITEM = 154000	CLIENT# = 154000									
Description = BIORETENTION BASINS			Unit = EA	Takeoff Quan:			2.000	Engr Quan:		2.000
Listing of Sub-Biditems of Parent Item 154000:										
BID ITEM = 154100	CLIENT# = 154100		Land Item	SCHEDULE: 1	100					
Description = Basins			Unit = SF	Takeoff Quan:			1,536.000	Engr Quan:		1,536.000



Activity Resource	Desc	Pcs	Quantity Unit	Unit Cost	Labor	Perm Material	Constr Matl/Exp	Equip Ment	Sub-Contract	Total
BID ITEM = 154100 CLIENT# = 154100 Land Item SCHEDULE: 1 100 Description = Basins Unit = SF Takeoff Quan: 1,536.000 Engr Quan: 1,536.000										
104825.1	Excavation - Bio Retention Basin		Quan: 313.72 CY		Hrs/Shft: 10.00		Cal: 510	WC: CCISP		
<u>AGG3</u>	Agg-Small Area-Dozer		20.00 CH	Prod: 3.1372	UM		Lab Pcs: 5.00	Eqp Pcs: 4.00		
8BDZR03	Bulldozer CAT D4 (92 H)	1.00	20.00 HR	62.260				1,245		1,245
8COMPACW12	Compactor Bomag BW75S-	1.00	20.00 HR	14.889				298		298
8LDRW950	Loader CAT 950 (221Hp)	1.00	20.00 HR	89.430				1,789		1,789
8TRKPU70	Pickup Ford F-250 3/4	1.00	20.00 HR	25.830				517		517
LA04	Laborer-Power Tools	2.00	40.00 MH	33.000	2,345					2,345
OP00	Op Grade Foreman	1.00	20.00 MH	55.220	1,754					1,754
OP08	Op Dozer < D9	1.00	20.00 MH	41.010	1,381					1,381
OP11	Op Loader <6Y	1.00	20.00 MH	41.010	1,381					1,381
\$10,709.08		0.3187 MH/CY	100.00 MH	[ 14.252 ]	6,861			3,848		10,709
15.6860	Units/Hr	3.1372 Unit/MH	* 2.0000 Shifts		21.87			12.27		34.14
104825.2	Haul to Embankment- Bio Retention Basin		Quan: 313.72 CY		Hrs/Shft: 10.00		Cal: 510	WC: CCISP		
10 CY loads, 1.25 trucking hours per load to haul to waste.										
31DFEXCCY	Excavation Dump Fee-cy	1.00	313.72 CY	3.000			941			941
5TRKED	Trucking - End Dump	1.00	39.21 HR	100.000			3,921			3,921
\$4,862.16				[ ]			4,862			4,862
							15.50			15.50
104825.3	Filter Fabric - Bio Retention Basin		Quan: 2,539.05 SF		Hrs/Shft: 10.00		Cal: 510	WC: CCISP		
<u>LAB4</u>	(Mod) Foreman + 3 Laborers		10.00 CH	Prod: 50.7810	UM		Lab Pcs: 5.00	Eqp Pcs: 2.00		
2EG01	Geotextile Fabric	1.15	324.39 SY	0.500		162				162
8LDRW950	Loader CAT 950 (221Hp)	1.00	10.00 HR	89.430				894		894
8TRKPU70	Pickup Ford F-250 3/4	1.00	10.00 HR	25.830				258		258
LA01	Laborer-Foreman	1.00	10.00 MH	38.860	663					663
LA04	Laborer-Power Tools	3.00	30.00 MH	33.000	1,759					1,759
OP11	Op Loader <6Y	1.00	10.00 MH	41.010	691					691
\$4,427.06		0.0196 MH/SF	50.00 MH	[ 0.775 ]	3,112	162		1,153		4,427
253.9050	Units/Hr	50.7810 Unit/MH	* 1.0000 Shifts		1.23	0.06		0.45		1.74
104825.4	Drainage Stone - Bio Retention Basin		Quan: 54.46 TN		Hrs/Shft: 10.00		Cal: 510	WC: CCISP		
<u>AGG3</u>	Agg-Small Area-Dozer		5.00 CH	Prod: 2.1784	UM		Lab Pcs: 5.00	Eqp Pcs: 4.00		
2AGD08	1-1/2" Crushed Stone	1.00	54.46 TN	40.000		2,178				2,178
8BDZR03	Bulldozer CAT D4 (92 H)	1.00	5.00 HR	62.260				311		311
8COMPACW12	Compactor Bomag BW75S-	1.00	5.00 HR	14.889				74		74
8LDRW950	Loader CAT 950 (221Hp)	1.00	5.00 HR	89.430				447		447
8TRKPU70	Pickup Ford F-250 3/4	1.00	5.00 HR	25.830				129		129
LA04	Laborer-Power Tools	2.00	10.00 MH	33.000	586					586
OP00	Op Grade Foreman	1.00	5.00 MH	55.220	438					438
OP08	Op Dozer < D9	1.00	5.00 MH	41.010	345					345
OP11	Op Loader <6Y	1.00	5.00 MH	41.010	345					345
\$4,855.68		0.4590 MH/TN	25.00 MH	[ 20.526 ]	1,715	2,178		962		4,856
10.8920	Units/Hr	2.1784 Unit/MH	* 0.5000 Shifts		31.50	40.00		17.66		89.16
104825.5	Pea Gravel - Bio Retention Basin		Quan: 58.65 TN		Hrs/Shft: 10.00		Cal: 510	WC: CCISP		
<u>AGG3</u>	Agg-Small Area-Dozer		5.00 CH	Prod: 2.3460	UM		Lab Pcs: 5.00	Eqp Pcs: 4.00		
2AGD02	3/8" Pea Stone	1.00	58.65 TN	40.000		2,346				2,346
8BDZR03	Bulldozer CAT D4 (92 H)	1.00	5.00 HR	62.260				311		311
8COMPACW12	Compactor Bomag BW75S-	1.00	5.00 HR	14.889				74		74
8LDRW950	Loader CAT 950 (221Hp)	1.00	5.00 HR	89.430				447		447
8TRKPU70	Pickup Ford F-250 3/4	1.00	5.00 HR	25.830				129		129
LA04	Laborer-Power Tools	2.00	10.00 MH	33.000	586					586

DIRECT COST BREAKDOWN

Activity Resource	Desc	Pcs	Quantity Unit	Unit Cost	Labor	Perm Material	Constr Matl/Exp	Equip Ment	Sub-Contract	Total
BID ITEM = 154100 CLIENT# = 154100 Land Item SCHEDULE: 1 100 Description = Basins Unit = SF Takeoff Quan: 1,536.000 Engr Quan: 1,536.000										
OP00	Op Grade Foreman	1.00	5.00 MH	55.220	438					438
OP08	Op Dozer < D9	1.00	5.00 MH	41.010	345					345
OP11	Op Loader <6Y	1.00	5.00 MH	41.010	345					345
\$5,023.28		0.4262	MH/TN	25.00 MH	[ 19.059 ]	1,715	2,346		962	5,023
11.7300	Units/Hr	2.3460	Unit/MH	* 0.5000 Shifts		29.25	40.00		16.40	85.65
104825.6 Planting Media - Bio Retention Basin Quan: 114.50 CY Hrs/Shft: 10.00 Cal: 510 WC: CCISP										
<u>AGG3</u> Agg-Small Area-Dozer 5.00 CH Prod: 4.5800 UM Lab Pcs: 5.00 Eqp Pcs: 4.00										
2VL000280	Planting Soil	1.00	114.50 CY	21.000		2,405				2,405
8BDZR03	Bulldozer CAT D4 (92 H	1.00	5.00 HR	62.260				311		311
8COMPACW12	Compactor Bomag BW75S-	1.00	5.00 HR	14.889				74		74
8LDRW950	Loader CAT 950 (221Hp)	1.00	5.00 HR	89.430				447		447
8TRKPU70	Pickup Ford F-250 3/4	1.00	5.00 HR	25.830				129		129
LA04	Laborer-Power Tools	2.00	10.00 MH	33.000	586					586
OP00	Op Grade Foreman	1.00	5.00 MH	55.220	438					438
OP08	Op Dozer < D9	1.00	5.00 MH	41.010	345					345
OP11	Op Loader <6Y	1.00	5.00 MH	41.010	345					345
\$5,081.78		0.2183	MH/CY	25.00 MH	[ 9.763 ]	1,715	2,405		962	5,082
22.9000	Units/Hr	4.5800	Unit/MH	* 0.5000 Shifts		14.98	21.00		8.40	44.38
104825.7 Fine Grading - Bio Retention Basin Quan: 171.29 SY Hrs/Shft: 10.00 Cal: 510 WC: CCISP										
<u>AGG3</u> Agg-Small Area-Dozer 5.00 CH Prod: 6.8516 UM Lab Pcs: 5.00 Eqp Pcs: 4.00										
8BDZR03	Bulldozer CAT D4 (92 H	1.00	5.00 HR	62.260				311		311
8COMPACW12	Compactor Bomag BW75S-	1.00	5.00 HR	14.889				74		74
8LDRW950	Loader CAT 950 (221Hp)	1.00	5.00 HR	89.430				447		447
8TRKPU70	Pickup Ford F-250 3/4	1.00	5.00 HR	25.830				129		129
LA04	Laborer-Power Tools	2.00	10.00 MH	33.000	586					586
OP00	Op Grade Foreman	1.00	5.00 MH	55.220	438					438
OP08	Op Dozer < D9	1.00	5.00 MH	41.010	345					345
OP11	Op Loader <6Y	1.00	5.00 MH	41.010	345					345
\$2,677.28		0.1459	MH/SY	25.00 MH	[ 6.526 ]	1,715			962	2,677
34.2580	Units/Hr	6.8516	Unit/MH	* 0.5000 Shifts		10.01			5.62	15.63
=====> Item Totals: 154100 - Basins \$37,636.32 0.1627 MH/SF 250.00 MH [ 7.103 ] 16,834 7,091 4,862 8,849 37,636 24.503 1536 SF 10.96 4.62 3.17 5.76 24.50										

BID ITEM = 154200 CLIENT# = 155200 Land Item SCHEDULE: 1 100 Description = Inlet/Outlet Pipes Unit = LF Takeoff Quan: 220.000 Engr Quan: 220.000										
153200.10 Inlet/Outlet Pipes Quan: 220.00 LF Hrs/Shft: 10.00 Cal: 510 WC: CCISP										
<u>EXC3</u> (Mod) Excavate 426 BH Loader 40.00 CH Prod: 0.5455 MU Lab Pcs: 3.00 Eqp Pcs: 5.00										
2AGF08	Pipe Bedding, FOB project	1.00	100.00 TN	25.500		2,550				2,550
2DE18	18" RCP CL III	1.00	220.00 LF	23.000		5,060				5,060
2DEFES18	18" RCP FES	1.00	4.00 EA	230.000		920				920
8BHLD426	BHL CAT 430 (107 Hp) T	1.00	40.00 HR	41.970				1,679		1,679
8COMPACAW5	Compaction Wheel 46"	1.00	40.00 HR	6.368				255		255
8COMPACW10	Compactor Bomag BW65S-	1.00	40.00 HR	10.220				409		409
8TRKPU70	Pickup Ford F-250 3/4	1.00	40.00 HR	25.830				1,033		1,033
8TRKWTR02	Water Tank and Trailer	1.00	40.00 HR	5.280				211		211
OP00	Op Grade Foreman	1.00	40.00 MH	55.220	3,507					3,507
OP01	Op Grade Checker	1.00	40.00 MH	36.550	2,529					2,529
OP09	Op Backhoe < 3Y	1.00	40.00 MH	39.770	2,698					2,698

DIRECT COST BREAKDOWN

Activity Resource	Desc	Pcs	Quantity Unit	Unit Cost	Labor	Perm Material	Constr Matl/Exp	Equip Ment	Sub-Contract	Total
BID ITEM = 154200			CLIENT# = 155200	Land Item	SCHEDULE: 1	100				
Description = Inlet/Outlet Pipes				Unit = LF	Takeoff Quan:		220.000	Engr Quan:		220.000
\$20,850.16	0.5454 MH/LF		120.00 MH	[ 26.308 ]	8,733	8,530		3,587		20,850
5.5000 Units/Hr	1.8333 Unit/MH		4.0000 Shifts		39.70	38.77		16.30		94.77
=====> Item Totals:	154200		- Inlet/Outlet Pipes							
\$20,850.16	0.5454 MH/LF		120.00 MH	[ 26.308 ]	8,733	8,530		3,587		20,850
94.773	220 LF				39.70	38.77		16.30		94.77

Total of Above Sub-Biditems

=====> Item Totals:	154000		- BIORETENTION BASINS							
\$58,486.48	185.0000 MH/EA		370.00 MH	[ 8348.965 ]	25,568	15,621	4,862	12,436		58,486
29,243.240	2 EA				12,783.80	7,810.55	2,431.08	6,217.81		29,243.24

BID ITEM = 155000			CLIENT# = 155000	Land Item	SCHEDULE: 1	100				RHU
Description = AESTHETICS (4%)				Unit = LS	Takeoff Quan:		1.000	Engr Quan:		1.000
155000.10	AESTHETICS (4%)			Quan:	1.00 LS	Hrs/Shft: 10.00	Cal: 510	WC: CCISP		
For special design elements and artwork which have not been developed at this time. This item is based on 4% of the construction total of all items except for mobilization and escalation.										
4SUB	Subcontract	0.04	0.04 LS		9,763,100.000					390,524 390,524
\$390,524.00					[ ]					390,524 390,524
										390,524.00 390,524.00

BID ITEM = 156000				Land Item	SCHEDULE: 1	100				
Description = TRAIL LIGHTING (4%)				Unit = LS	Takeoff Quan:		1.000	Engr Quan:		1.000
156000.10	TRAIL LIGHTING (4%)			Quan:	1.00 LS	Hrs/Shft: 10.00	Cal: 510	WC: CCISP		
Trail lighting has not been developed at this time. This item is based on 4% of the construction total of all items except for mobilization and escalation.										
4SUB	Subcontract	0.04	0.04 LS		9,763,100.000					390,524 390,524
\$390,524.00					[ ]					390,524 390,524
										390,524.00 390,524.00

BID ITEM = 160000				Land Item	SCHEDULE: 1	100				
Description = DESIGN ALLOWANCE (10%)				Unit = LS	Takeoff Quan:		1.000	Engr Quan:		1.000
1600000.10	DESIGN ALLOWANCE (10%)			Quan:	1.00 LS	Hrs/Shft: 10.00	Cal: 510	WC: CCISP		
4SUB	Subcontract	0.10	0.10 LS		11,700,000.000					1,170,000 1,170,000
\$1,170,000.00					[ ]					1,170,000 1,170,000
										1,170,000.00 1,170,000.00

DIRECT COST BREAKDOWN

Activity Resource	Desc	Pcs	Quantity Unit	Unit Cost	Labor	Perm Material	Constr Matl/Exp	Equip Ment	Sub-Contract	Total
BID ITEM = 170000 Description = PERMITS (2%)				Land Item Unit =	SCHEDULE: 1 LS	100 Takeoff	1.000	Engr	1.000	1.000
1700000.10	PERMITS (2%)			Quan:	1.00 LS	Hrs/Shft:	10.00 Cal:	510 WC:	CCISP	
4SUB \$234,000.00	Subcontract	0.02	0.02 LS		11,700,000.000 [ ]				234,000 234,000 234,000.00	234,000 234,000 234,000.00

BID ITEM = 180000 Description = CONSTRUCTION ENGINEERING (8%)				Land Item Unit =	SCHEDULE: 1 LS	100 Takeoff	1.000	Engr	1.000	1.000
1800000.10	CONSTRUCTION ENGINEERING (8%)			Quan:	1.00 LS	Hrs/Shft:	10.00 Cal:	510 WC:	CCISP	
4SUB \$936,000.00	Subcontract	0.08	0.08 LS		11,700,000.000 [ ]				936,000 936,000 936,000.00	936,000 936,000 936,000.00

BID ITEM = 190000 Description = PROJECT CONTINGENCY (15%)				Land Item Unit =	SCHEDULE: 1 LS	100 Takeoff	1.000	Engr	1.000	1.000
1900000.10	PROJECT CONTINGENCY (15%)			Quan:	1.00 LS	Hrs/Shft:	10.00 Cal:	510 WC:	CCISP	
4SUB \$1,755,000.00	Subcontract	0.15	0.15 LS		11,700,000.000 [ ]				1,755,000 1,755,000 1,755,000.00	1,755,000 1,755,000 1,755,000.00

BID ITEM = 200000 Description = ESCALATION TO YEAR OF EXPENDITURE				Land Item Unit =	SCHEDULE: 1 LS	100 Takeoff	1.000	Engr	1.000	1.000
200000.10	ESCALATION TO YEAR OF EXPENDITURE			Quan:	1.00 LS	Hrs/Shft:	10.00 Cal:	510 WC:	CCISP	
4SUB \$1,788,230.00	Subcontract@11.39%	1.00	1.00 LS		15,700,000.000 [ ]				1,788,230 1,788,230 1,788,230.00	1,788,230 1,788,230 1,788,230.00

\$16,434,941.63    \*\*\* Report Totals \*\*\*    14,038.49 MH    992,355 3,662,393    265,672    565,348    10,949,173    16,434,942

>>> indicates Non Additive Activity

-----Report Notes:-----

The estimate was prepared with TAKEOFF Quantities.

This report shows TAKEOFF Quantities with the resources.

Bid Date: 09/23/21    Owner: THPRD    Engineering Firm: Jacobs  
Estimator-In-Charge: RHU

\* on units of MH indicate average labor unit cost was used rather than base rate.

[ ] in the Unit Cost Column = Labor Unit Cost Without Labor Burdens

In equipment resources, rent % and EOE % not = 100% are represented as XXX%YYY where XXX=Rent% and YYY=EOE%

DIRECT COST BREAKDOWN

Activity Resource	Desc	Pcs	Quantity Unit	Unit Cost	Labor	Perm Material	Constr Matl/Exp	Equip Ment	Sub- Contract	Total
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BID ITEM = 200000      Land Item      SCHEDULE:      1      100  
 Description = ESCALATION TO YEAR OF EXPENDITURE      Unit =      LS      Takeoff Quan:      1.000      Engr Quan:      1.000

-----Calendar Codes-----

- 410      4 Nights @ 10 hrs/night
- 508      5 days @ 8hrs/day
- 509      5 days @ 9 hrs/day
- 510      5 days @ 10hrs/day (Default Calendar)
- 512      5 days @ 12 hrs/day
- 608      6 Days @ 8 hrs/day
- 610      6 Days @ 10 hrs/day
- 712      7 days @ 12 hrs/day

# Appendix C: Estimate Recap Report

# Estimate Recap Report

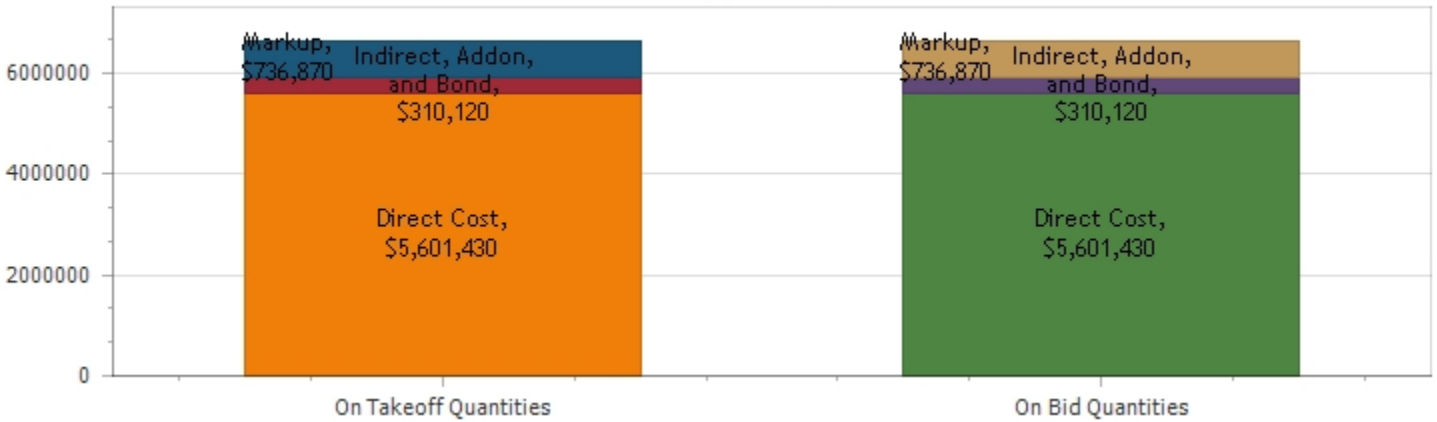
## Project Information

<b>Estimate:</b>	21-152D - THPRD Westside Trail Bicycle & Ped Br	<b>Bid Date:</b>	9/23/2021
<b>Project:</b>	D3314900 - A.PN.OE.A1.13	<b>Review Date:</b>	4/12/2021
<b>Estimator In Charge:</b>	RHU - Rick Hults	<b>Job Duration:</b>	12 months
<b>Owner:</b>	THPRD	<b>State:</b>	OR
<b>Engineer:</b>	Jacobs	<b>Estimate Type:</b>	Estimate
<b>Related Estimate:</b>	21-152A - THPRD West Side Trail - Beaverton OR		

## Estimate Summary

	On Takeoff Quantities	%	On Bid Quantities	%
Direct Cost	5,601,430	32.04%	5,601,430	32.04%
Indirect Cost	0	0.00%	0	0.00%
Addons	99,236	0.56%		
Bond	210,885	1.20%		
Pass Through Cost	10,833,513	61.97%	10,833,513	61.97%
Direct Markup	828,648	4.74%		
Indirect Markup	0	0.00%		
Markup Addons	0	0.00%		
+ / - Adjustments			0	
Pass Through Adjustment			1,067	
Unbalancing Difference			-90,638	-0.52%
Rounding Difference			-73	
<b>Desired Bid</b>			<b>17,574,778.51</b>	
<b>Final Bid Total</b>	<b>17,483,000.00</b>	<b>100.00%</b>	<b>17,483,000.00</b>	<b>100.00%</b>
<b>Final Markup (% Based on Cost)</b>	<b>736,870</b>	<b>12.46%</b>	<b>736,870</b>	<b>12.46%</b>

Takeoff vs Bid Quantity



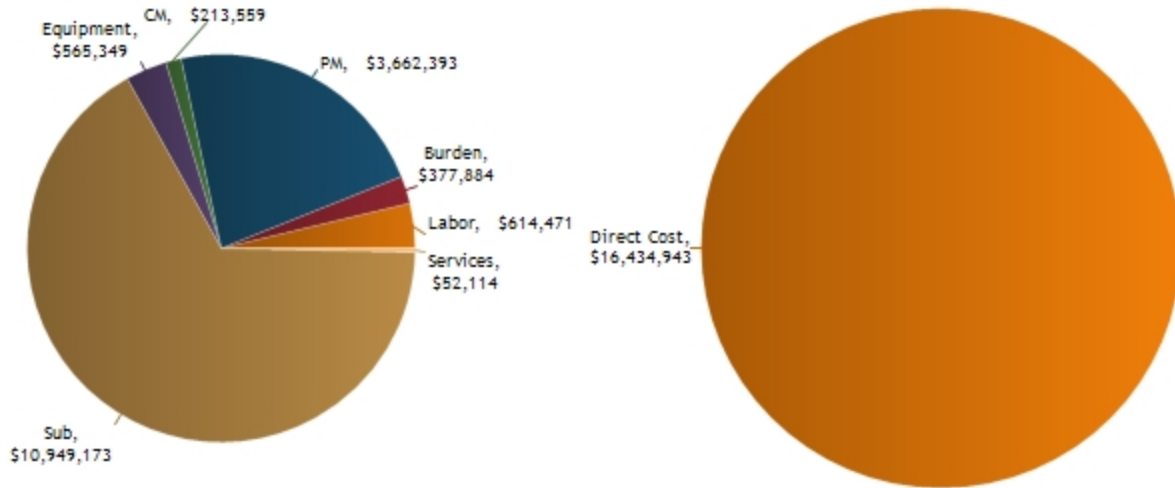
## Other Totals

Total Sales Tax	(\$23,197,365)
Total Escalation	\$0
Labor % of Job Cost	5.93 %
Equipment % of Job Cost	3.38 %

Burden % of Direct Labor	38.08 %
Burden % of Indirect Labor	0.00 %
EOE % of Equipment	56.71 %
Current Minority %	0.00 %

**Totals by Cost Type - Bid Quantities**

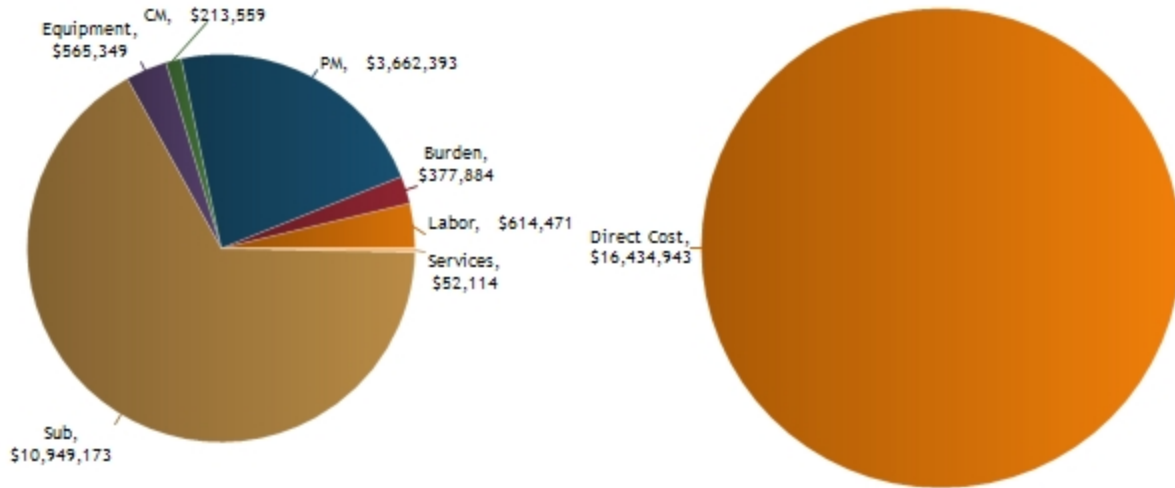
	Direct	Indirect	Total	% of Total
Base Labor	614,471	0	614,471	3.74%
Burden	377,884	0	377,884	2.30%
<b>Total Labor</b>	<b>992,355</b>	<b>0</b>	<b>992,355</b>	<b>6.04%</b>
Inside Equipment	244,755	0	244,755	1.49%
Outside Equipment	0	0	0	0.00%
EOE	320,595	0	320,595	1.95%
<b>Total Equipment</b>	<b>565,349</b>	<b>0</b>	<b>565,349</b>	<b>3.44%</b>
Permanent Materials	3,662,393	0	3,662,393	22.28%
Construction Materials	213,559	0	213,559	1.30%
Subcontractors	10,949,173	0	10,949,173	66.62%
Services	52,114	0	52,114	0.32%
Design	0	0	0	0.00%
Quality	0	0	0	0.00%
<b>Totals</b>	<b>16,434,943</b>	<b>0</b>	<b>16,434,943</b>	<b>100.00%</b>





**Totals by Cost Type - Takeoff Quantities**

	Direct	Indirect	Total	% of Total
Base Labor	614,471	0	614,471	3.74%
Burden	377,884	0	377,884	2.30%
<b>Total Labor</b>	<b>992,355</b>	<b>0</b>	<b>992,355</b>	<b>6.04%</b>
Inside Equipment	244,755	0	244,755	1.49%
Outside Equipment	0	0	0	0.00%
EOE	320,595	0	320,595	1.95%
<b>Total Equipment</b>	<b>565,349</b>	<b>0</b>	<b>565,349</b>	<b>3.44%</b>
Permanent Materials	3,662,393	0	3,662,393	22.28%
Construction Materials	213,559	0	213,559	1.30%
Subcontractors	10,949,173	0	10,949,173	66.62%
Services	52,114	0	52,114	0.32%
Design	0	0	0	0.00%
Quality	0	0	0	0.00%
<b>Totals</b>	<b>16,434,943</b>	<b>0</b>	<b>16,434,943</b>	<b>100.00%</b>



**Fuel Summary**

Fuel Type	Quantity	Units
Gasoline	7,877	Gal
Diesel	12,255	Gal
Off-Road	32,740	Gal

**Sales Tax Summary**

	Setup Tax %	Average Tax %	Total Taxes
Permanent Materials	0.00%	0.00%	0
Construction Materials	0.00%	0.00%	0
Inside Equipment	0.00%	0.00%	0
Outside Equipment	0.00%	0.00%	0
EOE	0.00%	0.00%	0
Subcontractors	0.00%	-67.93%	-23,197,365
Services	0.00%	0.00%	0
Design	0.00%	0.00%	0
Quality	0.00%	0.00%	0
<b>Total Tax</b>			<b>23,197,365</b>

**Escalation Summary**

	Average Escalation %	Total Escalation
Labor	0.00%	0
Inside Equipment	0.00%	0
Outside Equipment	0.00%	0
EOE	0.00%	0
Permanent Materials	0.00%	0
Construction Materials	0.00%	0
Subcontractors	0.00%	0
Services	0.00%	0
Design	0.00%	0
Quality	0.00%	0
<b>Total Escalation</b>		<b>0</b>

**Labor Summary**

	Direct	Indirect	Total
<b>Hourly Labor (MH, MHS, MHR, MHRS)</b>			
Manhours	14,038	0	14,038
Base Labor	558,610	0	558,610
Premium (on Base Labor)	55,861	0	55,861
Burden (includes Premium)	377,884	0	377,884
<b>Total Labor</b>	<b>992,355</b>	<b>0</b>	<b>992,355</b>
<b>Daily Labor (DAY, DAYS, DY, DYS)</b>			
None	0	0	0
<b>Weekly Labor (WK, WKS, WEEK)</b>			
None	0	0	0
<b>Monthly Labor (MO, MON, MNTH, MMO, MMOS)</b>			
None	0	0	0

**Summary IS Current** Last run 9/22/2021 11:40:00 PM  
**Balanced Markup Calculation Spread IS Current** Last run 9/22/2021 11:40:00 PM

	Cost	Markup %	Markup \$
Labor	614,471	15.00%	92,171
Burden	377,884	15.00%	56,683
Permanent Materials	3,662,393	15.00%	549,359
Construction Materials	213,559	15.00%	32,034
Inside Equipment	244,755	15.00%	36,713
Outside Equipment	0	15.00%	0
EOE	320,595	15.00%	48,089
Subcontractors	115,660	5.00%	5,783
Services	52,114	15.00%	7,817
Design	0	15.00%	0
Quality	0	15.00%	0
Overrides	10,833,513	0.00%	0
<b>Total</b>	<b>16,434,943</b>	<b>5.04%</b>	<b>828,648</b>

**Addons, Bond and Markup Summary** **Dependent on Bid Summary**

	Total	%
<b>Cost Addons</b>		
Small Tools & Supplies	49,618	0.28 %
Labor Premium	49,618	0.28 %
<b>Bond</b>		
Bond	210,885	1.21 %
<b>Markup</b>		
Resource Markup	828,648	4.74 %
Total Markup	828,648	4.74 %
<b>Markup, Addons, and Bond Total</b>	<b>1,138,769</b>	<b>6.51 %</b>

**Key Indicators** **Dependent on Bid Summary**

	Result	Formula
% Labor w.r.t. Total Cost	5.93%	Total Labor / Total Cost
% Markup on Labor	74.25%	Actual Markup By Bid Qty / Total Labor
% Markup on Lab & Eq	47.30%	Actual Markup By Bid Qty / Total Labor + Equip \$
% Direct / Indirect WrkHrs	0.00%	Direct Manhours / Indirect Manhours
Indirect Cost / Direct Cost	0.00%	Indirect Cost / Direct Cost
% Subs on Total Bid	62.63%	Total Subcontractors / Bid Total
% Sub on Total Cost	65.39%	Total Subcontractors / Total Cost
% Labor on Total Cost	0.06	Total Labor / Total Cost
% PM on Total Cost	0.22	Total Permanent Materials / Total Cost
% Equip on Total Cost	0.03	Total Equipment / Total Cost

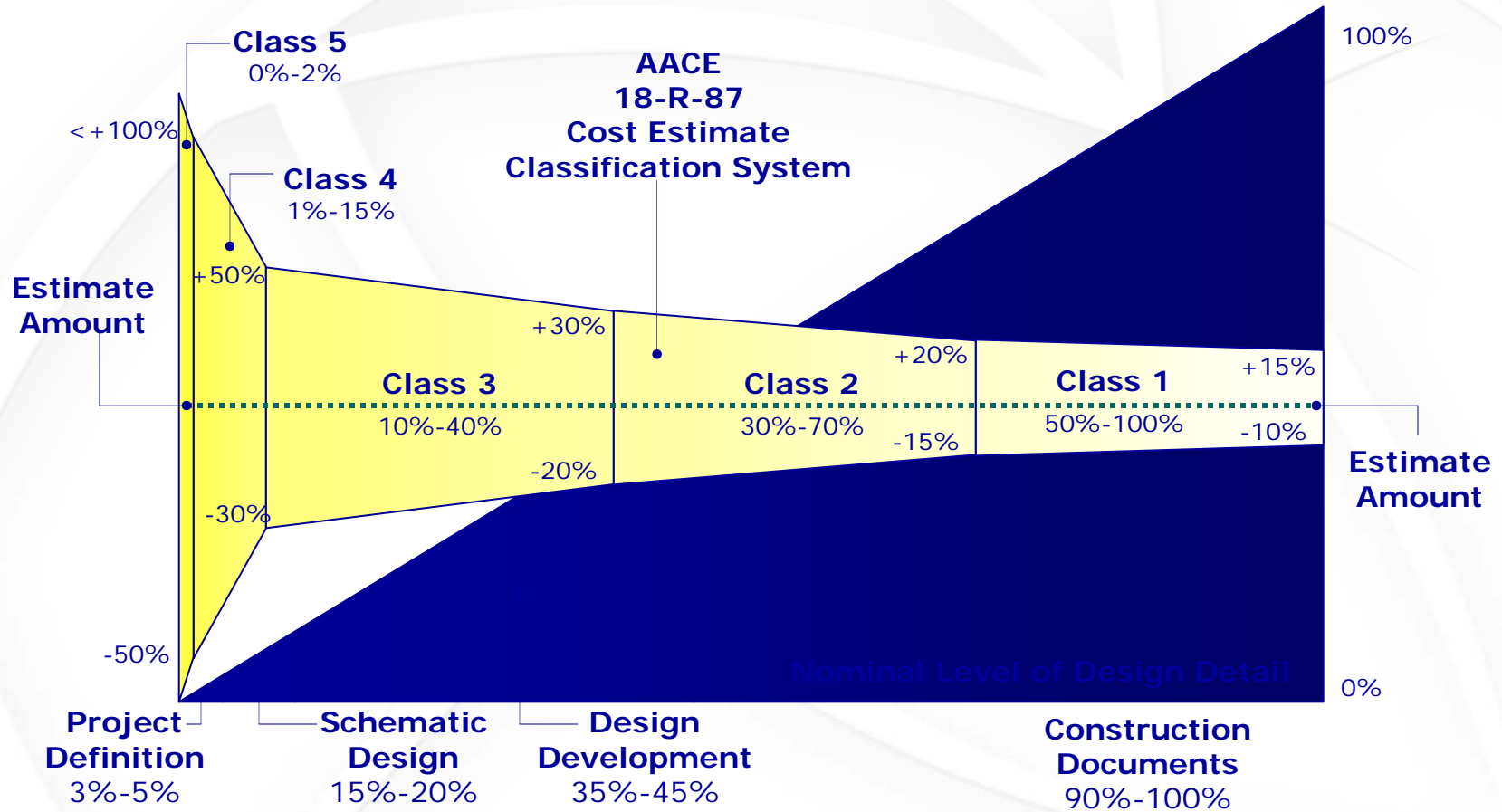
**Estimate Notes**

\*\*\*\*\*Estimate created on: 09/16/2021 by User#: 654 - Rick Hults  
 Source estimate used: Y:\TBG-ENGI\EST\21-152B

\*\*\*\*\*Estimate created on: 09/22/2021 by User#: 654 - Rick Hults  
Source estimate used: Y:\TBG-ENGI\EST\21-152C

# Appendix D: AACE Accuracy Range

# AACE – Classification System



## Construction Cost Estimate Accuracy Ranges



Estimate Class	Class 5	Class 4	Class 3	Class 2	Class 1
<b>LEVEL OF PROJECT DEFINITION</b> Expressed as a % of complete definition	0% to 2%	1% to 15%	10% to 40%	30% to 70%	50% to 100%
<b>END USAGE</b> Typical Purpose of Estimate	Concept Screening	Study or Feasibility	Budget Authorization, or Control	Control or Bid / Tender	Check Estimate or Bid / Tender
<b>METHODOLOGY</b> Typical estimating method	Capacity Factored, Parametric Models, Judgment, or Analogy	Equipment Factored or Parametric Models	Semi-Detailed Unit Costs with Assembly Level Line Items	Detailed Unit Cost with Forced Detailed Take-Off	Detailed Unit Cost with Detailed Take-Off
<b>EXPECTED ACCURACY RANGE</b> Typical variation in low and high ranges [a]	L: -20% to -50%      H: +30% to +100%	L: -15% to -30%      H: +20% to +50%	L: -10% to -20%      H: +10% to +30%	L: -5% to -15%      H: +5% to +20%	L: -3% to -10%      H: +3% to +15%
<b>PREPARATION EFFORT</b> Typical degree of effort relative to least cost index of 1 [b]	1	2 to 4	3 to 10	4 to 20	5 to 100
<b>REFINED CLASS DEFINITION</b>	Class 5 estimates are generally prepared based on very limited information, and subsequently have very wide accuracy ranges. As such, some companies and organizations have elected to determine that due to the inherent inaccuracies, such estimates cannot be classified in a conventional and systematic manner. Class 5 estimates, due to the requirements of end use, may be prepared within a very limited amount of time and with very little effort expended - sometimes requiring less than 1 hour to prepare. Often, little more than proposed plant type, location, and capacity are known at the time of estimate preparation.	Class 4 estimates are generally prepared based on very limited information, and subsequently have very wide accuracy ranges. They are typically used for project screening, determination of feasibility, concept evaluation, and preliminary budget approval. Typically, engineering is from 1% to 5% complete, and would comprise at a minimum the following: plant capacity, block schematics, indicated layout, process flow diagrams (PFDs) for main process systems and preliminary engineered process and utility equipment lists. Level of Project Definition Required: 1% to 15% of full project definition.	Class 3 estimates are generally prepared to form the basis for budget authorization, appropriation, and/or funding. As such, they typically form the initial control estimate against which all actual costs and resources will be monitored. Typically, engineering is from 10% to 40% complete, and would comprise at a minimum the following: process flow diagrams, utility flow diagrams, preliminary piping and instrument diagrams, utility flow diagrams, preliminary piping and instrument diagrams, plot plan, developed layout drawings, and essentially complete engineering process and utility equipment lists. Level Of Project Definition Required: 10% to 40% of full project definition.	Class 2 estimates are generally prepared to form a detailed control baseline against which all project work is monitored in terms of cost and progress control. For contractors, this class of estimate is often used as the "bid" estimate to establish contract value. Typically, engineering is from 30% to 70% complete, and would comprise at a minimum the following: Process flow diagrams, utility flow diagrams, piping and instrument flow diagrams, heat and material balances, final plot plan, final layout drawings, complete engineered process and utility equipment lists, single line diagrams for electrical, electrical equipment and motor schedules, vendor quotations, detailed project execution plans, resourcing and work force plans, etc.	Class 1 estimates are generally prepared for discrete parts or sections of the total project rather than generating this level of detail for the entire project. The parts of the project estimated at this level of detail will typically be used by subcontractors for bids, or by owners for check estimates. The updated estimate is often referred to as the current control estimate and becomes the new baseline for cost/schedule control of the project. Class 1 estimates may be prepared for parts of the project to comprise a fair price estimate or bid check estimate to compare against a contractor's bid estimate, or to evaluate/dispute claims. Typically, engineering is from 50% to 100% complete, and would comprise virtually all engineering and design documentation of the project, and complete project execution and commissioning plans. Level for Project Definition Required: 50% to 100% of full project definition.
<b>END USAGE DEFINED</b>	Class 5 estimates are prepared for any number of strategic business planning purposes, such as but not limited to market studies, assessment of initial viability, evaluation of alternate schemes, project screening, project location studies, evaluation of resource needs and budgeting, long-range capital planning, etc.	Class 4 estimates are prepared for a number of purposes, such as but not limited to, detailed strategic planning, business development, project screening at more developed stages, alternative scheme analysis, confirmation of economic and/or technical feasibility, and preliminary budget approval or approval to proceed to next stage.	Class 3 estimates are typically prepared to support full project funding requests, and become the first of the project phase "control estimate" against which all actual costs and resources will be monitored for variations to the budget. They are used as the project budget until replaced by more detailed estimates. In many owner organizations, a Class 3 estimate may be the last estimate required and could well form the only basis for cost/schedule control.	Class 2 estimates are typically prepared as the detailed control baseline against which all actual costs and resources will now be monitored for variation to the budget, and form a part of the change/variation control program.	Class 1 estimates are typically prepared to form a current control estimate to be used as the final control baseline against which all actual costs and resources will now be monitored for variations to the budget, and form a part of the change/variation control program. They may be used to evaluate bid checking, to support vendor/contractor negotiations, or for claim evaluations and dispute resolution.
<b>ESTIMATING METHODS USED</b>	Class 5 estimates virtually always use stochastic estimating methods such as cost/capacity curves and factors, scale of operations factors, Lang factors, Handy-Whitman factors, Chilton factors, Peters-Timmerhaus factors, Guthrie factors, and other parametric and modeling techniques.	Class 4 estimates virtually always use stochastic estimating methods such as cost/capacity curves and factors, scale of operations factors, Lang factors, Hand factors, Chilton factors, Peters-Timmerhaus factors, Guthrie factors, the Miller method, gross unit costs/ratios, and other parametric and modeling techniques.	Class 3 estimates usually involve more deterministic estimating methods that stochastic methods. They usually involve a high degree of unit cost line items, although these may be at an assembly level of detail rather than individual components. Factoring and other stochastic methods may be used to estimate less-significant areas of the project.	Class 2 estimates always involve a high degree of deterministic estimating methods. Class 2 estimates are prepared in great detail, and often involve tens of thousands of unit cost line items. For those areas of the project still undefined, an assumed level of detailed takeoff (forced detail) may be developed to use as line items in the estimate instead of relying on factoring methods.	Class 1 estimates involve the highest degree of deterministic estimating methods, and require a great amount of effort. Class 1 estimates are prepared in great detail, and thus are usually performed on only the most important or critical areas of the project. All items in the estimate are usually unit cost line items based on actual design quantities.
<b>EXPECTED ACCURACY RANGE</b>	Typical accuracy ranges for Class 5 estimates are -20% to 50% on the low side, and +30% to +100% on the high side, depending on the technological complexity of the project, appropriate contingency determination. Ranges could exceed those shown in unusual circumstances.	Typical accuracy ranges for Class 4 estimates are -15% to -30% on the low side, and +20% to +50% on the high side, depending on the technological complexity of the project, appropriate reference information, and the inclusion of an appropriate contingency determination. Ranges could exceed those shown in unusual circumstances.	Typical accuracy ranges for Class 3 estimates are -10% to 20% on the low side, and +10% to +30% on the high side, depending on the technological complexity of the project, appropriate reference information, and the inclusion of an appropriate contingency determination. Ranges could exceed those shown in unusual circumstances.	Typical accuracy ranges for Class 2 estimates are -5% to 15% on the low side, and +5% to +20% on the high side, depending on the technological complexity of the project, appropriate reference information, and the inclusion of an appropriate contingency determination. Ranges could exceed those shown in unusual circumstances.	Typical accuracy ranges for Class 1 estimates are -3% to 10% on the low side, and +3% to +15% on the high side, depending on the technological complexity of the project, appropriate reference information, and the inclusion of an appropriate contingency determination. Ranges could exceed those shown in unusual circumstances.
<b>EFFORT TO PREPARE (for US\$20MM project):</b>	As little as 1 hour or less to prepare to perhaps more than 200 hours, depending on the project and the estimating methodology used.	Typically, as little as 20 hours or less to perhaps more than 300 hours, depending on the project and the estimating methodology used.	Typically, as little as 150 hours or less to perhaps more than 1500 hours, depending on the project and the estimating methodology used.	Typically, as little as 300 hours or less to perhaps more than 3000 hours, depending on the project and the estimating methodology used. Bid Estimates typically require more effort than estimates used for funding or control purposes	Class 1 estimates require the most effort to create, and as such are generally developed for only selected areas of the project, or for bidding purposes. A complete Class 1 estimate may involve as little as 600 hours or less, to perhaps more than 6,000 hours, depending on the project and the estimating methodology used. Bid estimate typically require more effort than estimates used for funding or control purposes.
<b>ANSI Standard Reference Z94.2-1989 name; Alternate Estimate Names, Terms, Expressions, Synonyms:</b>	Order of Magnitude Estimate; Ratio, ballpark, blue sky, seat-of-pants, ROM, idea study, prospect estimate, concession license estimate, guesstimate, rule-of thumb.	Budget Estimate; Screening, top-down, feasibility, authorization, factored, pre-design, pre-study.	Budget Estimate; Budget, scope, sanction, semi-detailed, authorization, preliminary control, concept study, development, basic engineering phase estimate, target estimate.	Definitive Estimate; Detailed Control, forced detail, execution phase, master control, engineering, bid, tender, change order estimate.	Definitive Estimate; Full detail, release, fall-out, tender, firm price, bottoms-up, final, detailed control, forced detail, execution phase, master control, fair price, definitive, change order estimate.

<b>Estimate Class</b>	<b>Class 5</b>	<b>Class 4</b>	<b>Class 3</b>	<b>Class 2</b>	<b>Class 1</b>
<b>Estimate Input Checklist and Maturity Index</b>	<b>Class 5</b>	<b>Class 4</b>	<b>Class 3</b>	<b>Class 2</b>	<b>Class 1</b>
<b>GENERAL PROJECT DATA</b>					
Project Scope Description	General	Preliminary	Defined	Defined	Defined
Plant Production / Facility Capacity	Assumed	Preliminary	Defined	Defined	Defined
Plant Location	General	Approximate	Specific	Specific	Specific
Soils & Hydrology	None	Preliminary	Defined	Defined	Defined
Integrated Project Plan	None	Preliminary	Defined	Defined	Defined
Project Master Schedule	None	Preliminary	Defined	Defined	Defined
Escalation Strategy	None	Preliminary	Defined	Defined	Defined
Work Breakdown Structure	None	Preliminary	Defined	Defined	Defined
Project Code of Accounts	None	Preliminary	Defined	Defined	Defined
Contracting Strategy	Assumed	Assumed	Preliminary	Defined	Defined
<b>ENGINEERING DELIVERABLES:</b>	<b>Class 5</b>	<b>Class 4</b>	<b>Class 3</b>	<b>Class 2</b>	<b>Class 1</b>
Block Flow Diagrams	Started / Preliminary	Preliminary / Complete	Complete	Complete	Complete
Plot Plans		Started	Preliminary / Complete	Complete	Complete
Process Flow Diagrams (PFDs)		Started / Preliminary	Preliminary / Complete	Complete	Complete
Utility Flow Diagrams (UFDs)		Started / Preliminary	Preliminary / Complete	Complete	Complete
Piping & Instrument Diagrams (P&IDS)		Started	Preliminary / Complete	Complete	Complete
Heat and Material Balances		Started	Preliminary / Complete	Complete	Complete
Process Equipment List		Started / Preliminary	Preliminary / Complete	Complete	Complete
Utility Equipment List		Started / Preliminary	Preliminary / Complete	Complete	Complete
Electrical One Line Drawings		Started / Preliminary	Preliminary / Complete	Complete	Complete
Specifications and Datasheets		Started	Preliminary / Complete	Complete	Complete
General Equipment Arrangement Drawings		Started	Preliminary / Complete	Complete	Complete
Spare Parts Lists			Started / Preliminary	Preliminary	Complete
Architectural Details / Schedules		Started	Preliminary / Complete	Complete	Complete
Structural Details		Started	Preliminary / Complete	Complete	Complete
Mechanical Discipline Drawings			Started	Preliminary	Preliminary / Complete
Electrical Discipline Drawings			Started	Preliminary	Preliminary / Complete
System Discipline Drawings			Started	Preliminary	Preliminary / Complete
Civil/Site Discipline Drawings			Started	Preliminary	Preliminary / Complete
Demolition Details		Started	Preliminary / Complete	Complete	Complete



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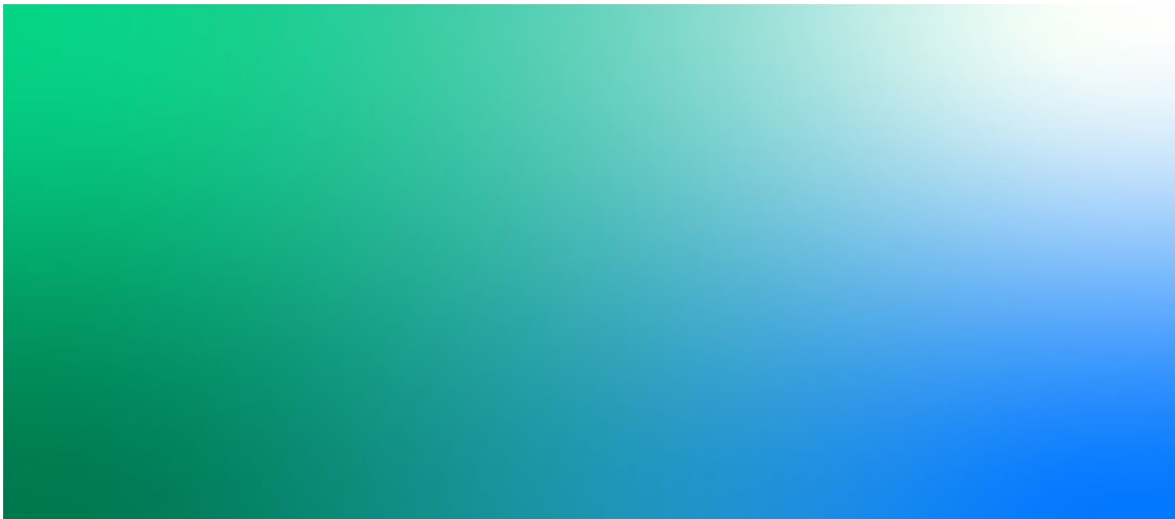
**Appendix G. Alternatives Development Report**



**Alternatives Development Report**

May 2021

**Tualatin Hills Park & Recreation District**



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## Westside Trail Bicycle and Pedestrian Bridge over Highway 26, Washington County, Beaverton, Oregon

This project is funded by Tualatin Hills Park & Recreation District System Development Charge funds and the Metro Regional Flexible Fund. This document was prepared by Jacobs in collaboration with Toole Design Group.



Project No: D3314900  
Document Title: Alternatives Development Report  
Revision: Draft  
Date: May 2021  
Client Name: Tualatin Hills Park & Recreation District  
Project Manager: Scott Richman, Jacobs  
Author: Stuart Campbell, Jacobs

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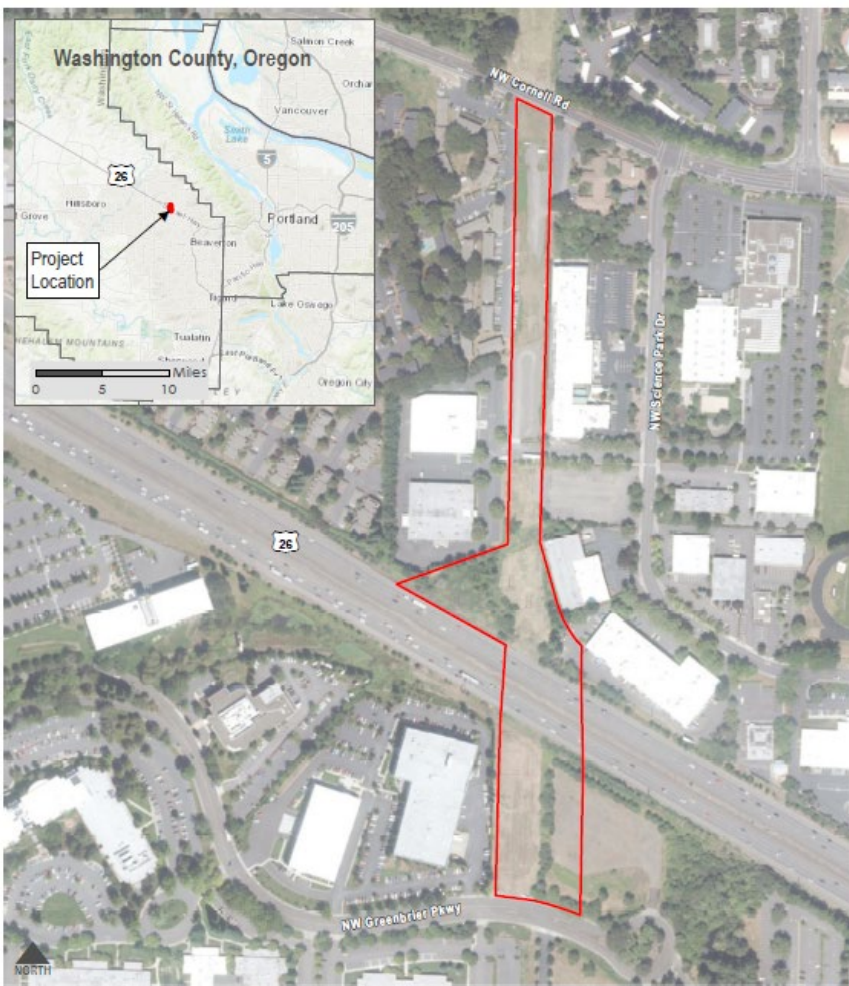
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# 1. Introduction

Tualatin Hills Park & Recreation District (THPRD) is leading a feasibility study that includes conceptual design of a regional trail segment and a pedestrian and bicycle bridge from SW Greenbrier Parkway to NW Cornell Road, spanning Sunset Highway (U.S. 26) Milepost (MP) 66.50 (Figure 1).

The project corridor lies within the jurisdiction of unincorporated Washington County with adjacent land within the City of Beaverton, Oregon. The majority of the project area is situated within the Bonneville Power Administration (BPA) powerline corridor right-of-way (ROW) that extends from NW Cornell Road south to NW Greenbrier Parkway. The project corridor is surrounded by primarily commercial industrial properties with multifamily residences to the north of the corridor.



0 100 200 300 400 Feet

Legend  
 Study Area

Figure 1  
 Westside Trail Bridge Project  
 Location Map



Figure 1: Westside Bridge Project Map

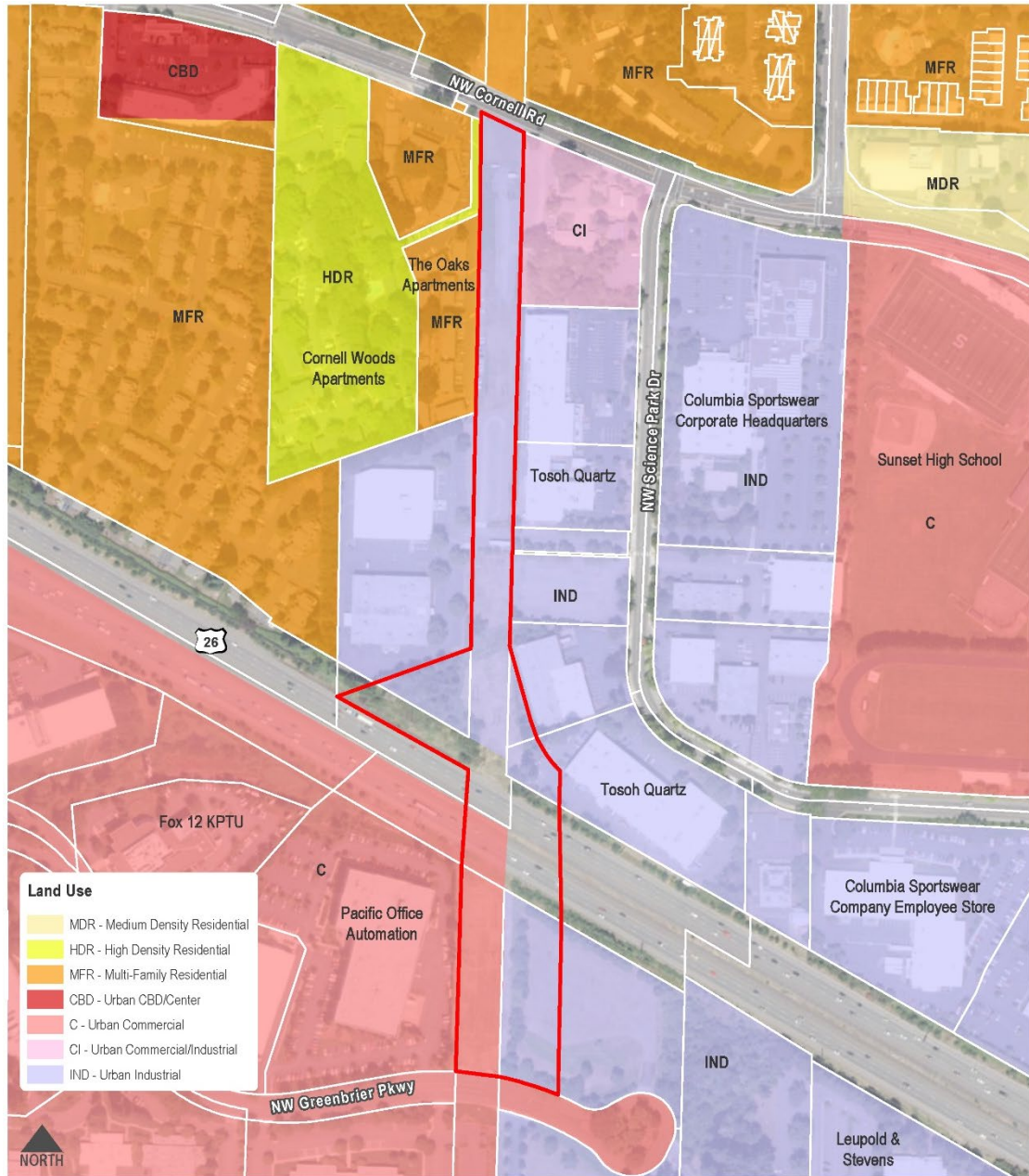
The purpose of this document is to describe the alternatives considered for the Westside Trail's crossing of U.S. 26. Alternatives include:

- Bridge design concept options for the bridge crossing over U.S. 26.
- Bridge design concept from the north end of the U.S. 26 span to north of the wetland and wetland buffer area.
- Retaining wall structure for southern approach to the bridge crossing over U.S. 26.
- At-grade trail alignments north and south of the structures.

## **1.1 Project Context**

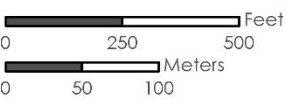
The Westside Trail is part of a vital regional multimodal transportation and recreation network that connects neighborhoods with community destinations across Washington County. THPRD estimates that the Westside Trail attracts over 100,000 users a year. Land uses along the project's area of potential impact (API) consist of urban industrial, urban commercial, and multi-family (Figure 2).

Key destinations within Beaverton's boundary include Sunset High School, Sunset Swim Center, and the THPRD Howard M. Terpenning Recreation Complex. Large employers include Pacific Office Automation and Nike Corporate Offices. The Columbia Sportswear Corporate Headquarters is located one block from the project within the Washington County boundary.



**Land Use**

- MDR - Medium Density Residential
- HDR - High Density Residential
- MFR - Multi-Family Residential
- CBD - Urban CBD/Center
- C - Urban Commercial
- CI - Urban Commercial/Industrial
- IND - Urban Industrial



Area of Potential Effect (APE)

Tax Lots

Figure 2  
Westside Trail Bridge Project  
Land Use

Figure 2: Westside Bridge Project Land Use Map

## 1.2 Public Involvement

THPRD is working to engage project stakeholders and community members to provide information about the challenges faced by this project and gather feedback to inform alternatives analysis and development. Though more engagement opportunities will be provided throughout the design and construction of the bridge, the following is a list of public involvement activities that have influenced project development to date:

### *Stakeholder meetings*

- Two Property and Agency Stakeholder Meetings with attendance of 5 and 8
- Influence of Property and Agency Stakeholder Meetings on alternatives analysis and development:
  - Relays context-specific knowledge from stakeholders to the design team
  - Provides feedback on which preferred alternative given site constraints
  - Conveys landowners preferences and land acquisition feasibility to develop the selected alternative
  - Builds relationships with parties who have or may influence land acquisition and/or project permitting processes
  - Helps the project team identify specific design elements important to stakeholders and those they represent
  - Informs stakeholders and identifies emerging constituencies around design/alternatives

### *Community meetings*

- Virtual Community Meeting 1 – Attendance: ~25.
- Out-door, physically distanced In-Person Community Meeting 2 – Attendance: ~30
- Influence of Community Meetings on alternatives analysis and development:
  - Gather feedback on community preferences within emerging alternatives and designs
  - Provides community-wide perspective on how this trail may be used which can then be incorporated into design
    - Also provides community-wide perspective on destinations important to community members
  - Informs the public and helps to build a constituency around emerging designs/alternatives

### *Online survey*

- THPRD conducted two surveys taken by over 250 respondents (88 respondents to the first and 162 to the second) to better understand how the Westside Trail is used, identify design themes to guide emerging alternative development, and preferred design treatments to inform bridge design. Through these surveys THPRD learned that traffic safety, accessibility, and mobility are the community's top concerns and that the



community is seeking a consistent look and feel in the final bridge concept design that balances the bridges' visual appeal with cost efficiency.

- Influence of community surveys on alternatives analysis and development:
  - Relays feedback on community priorities and preferences within emerging alternatives and designs to the project team
  - Identifies issues important to community members, such as attention to development cost, and relays those issues to the project team
  - Creates broader community awareness of the project for future public involvement activities

#### *Letters of Support*

- THPRD has also received letters in support of developing the Westside Trail Bridge concept plan from the Sunset High School Principal (school in closest proximity to the project site) and a current Community Participation Organization (CPO) 7 member and former member of Metro's Westside Trail Advisory Committee.
- Influence of letters of support on alternatives analysis and development:
  - Identifies emerging constituencies around evolving alternatives

#### *Others Public Involvement Activities*

- Presentations at CPO meetings
- Presentations to THPRD's patron-led Nature & Trails Advisory Committee and Joint Advisory Committee
- Presentation to the City of Beaverton's Bicycle Advisory Committee
- Influence of other public involvement activities on alternatives analysis and development:
  - Provides an opportunity to gather additional information on public preferences in alternative and bridge designs
  - Identifies emerging constituencies around evolving alternatives
  - Creates opportunity to alter alternative and bridge designs based on feedback from current THPRD trail users

### **1.3 Project Purpose**

The purpose of the Westside Trail bridge is to link 25 miles of trail for people walking, running, and biking to reach popular destinations, including housing, schools, jobs, shopping, transit, parks, and recreation. The trail will provide a convenient, comfortable, and safe atmosphere for trail users of all types, ages, and abilities.

The Westside Trail must cross U.S. 26 to complete the trail connection. The nearest existing bicycle and pedestrian crossing options adjacent to the proposed bridge are the interchange overpasses for NW Murray Boulevard and NW Cornell Road. These options are problematic because of the following issues:

- They are 1.2 miles apart, which is not convenient for many people walking or on bikes
- They have narrow sidewalks and bike lanes

- Heavy motorized traffic travels on five lanes through each interchange

U.S. 26 is an Oregon Department of Transportation (ODOT) limited access highway with north-south mobility in the project vicinity limited to grade-separated interchanges. This project explores one feasible design option to utilize existing utility corridors to link the Westside Trail above the highway between the NW Murray Boulevard and NW Cornell Road interchanges.

## 2. Shaping the Alternatives

### 2.1 Project Area

The optimal trail alignment is within the 100-foot wide BPA ROW, while also accommodating several design and construction constraints, including utilities, sensitive natural areas, and private properties. Topography of the site is gently sloped, descending from an elevation of approximately 260 feet at the northern end and 250 feet at the southern end to approximately 240 feet at the bridge crossing over U.S. 26. This trail segment is intended to connect to planned segments of the Westside Trail directly north and south of this project area.

### 2.2 Utilities

Running along and across the site are four sets of overhead power lines, two gas lines, and a water main. Trail alignment and structures were designed to minimize impacts to existing utilities and generally maintained as listed in Table 1. In addition to the utilities listed in the table below, multiple communications lines are located throughout the project area. Project design will resolve relocation of communications lines.

Table 1: Project Corridor Utilities

Utility	Minimum Clearance
<b>BPA Transmission Lines</b>	15 feet radial
<b>BPA Transmission Towers</b>	Structures: 25 feet horizontal
<b>Kinder Morgan High Pressure Liquid Natural Gas Line</b>	Structures: 10 feet horizontal
<b>Northwest Natural Gas Pipeline</b>	Structures: 10 feet horizontal
<b>Portland General Electric Transmission Lines</b>	15 feet radial
<b>Portland General Electric Transmission Towers</b>	Structures: 8 feet horizontal*
<b>Tualatin Valley Water District Water Main</b>	Structures :10 feet horizontal

\*PGE requires 25 feet of minimum clearance but are able to reduce up to 8 feet if the project can maintain radial clearances from lines.

\*Clearances to wires are soon to be updated

### 2.3 Natural Areas

One wetland and one stream were identified within the project area. The wetland is a 1.02-acre palustrine emergent/palustrine forested wetland situated just north of U.S. 26 and on the west side of the project area. The stream is a riverine water that averages five feet in width across the top of bank. The stream originates offsite to the east and flows west and south in a steep-sided channel through a densely vegetated lowland area. It discharges through a culvert under U.S. 26 and with mapped wetlands and an unnamed tributary to Willow Creek, south of the highway. The stream flows in a steep-sided channel approximately 1.5 to 2 feet deep.

### 2.4 Private Properties

The adjacent private properties along the corridor include two large-scale multifamily housing complexes, medical offices, light manufacturing, and industrial commercial businesses. The parking areas that serve the medical offices and Columbia Sportswear, Inc. north of U.S. 26, and the Nike office parking lot south of NW Greenbrier are within BPA owned ROW and will be impacted by the project. The alignments being considered are working to limit the level of impact to these parking areas.

### 2.5 Trail Design Criteria

The trail design closely follows guidelines and regulations from many different planning and engineering documents and manuals. The table below shows key documents reviewed and a snapshot of the applicable guidance.

Guidance Document	Guidance Applied
THPRD Trails Functional Plan, 2016	<ul style="list-style-type: none"> <li>• Trail material, trail width, shoulder width, vertical and horizontal clearance                             <ul style="list-style-type: none"> <li>○ Materials – use asphalt or concrete, may be pervious</li> <li>○ Width – 12 feet with 2-foot gravel shoulder</li> <li>○ Vertical Clearance – 10 feet (from top of trail)</li> <li>○ Horizontal Clearance – 2 feet (from edge of shoulder)</li> </ul> </li> <li>• Amenities – seating, trash receptacles, bollards, signage, pavement striping, fencing/railing, landscaping</li> <li>• ADA Accessibility</li> <li>• Crossings</li> <li>• Safety and Security</li> <li>• Maintenance and Operations</li> </ul>
Metro Active Transportation Plan	<ul style="list-style-type: none"> <li>• Chapter 7 details the recommended regional bicycle network</li> <li>• Chapter 8 details the recommended regional pedestrian network</li> <li>• Identifies elements of a regional bicycle and pedestrian network that includes clear detail for regional bikeways and pedestrian networks</li> </ul>
Metro Designing	Establishes a set of principles that should be considered in the development of streets and trails:

<p>Livable Streets and Trails Guide, 2019</p>	<ul style="list-style-type: none"> <li>• Serve the anticipated users</li> <li>• Provide safety and security</li> <li>• Integrate trails with the street system and neighborhoods</li> <li>• Fit the land use context</li> <li>• Respect the natural environment</li> </ul>
<p>Washington County TSP</p>	<ul style="list-style-type: none"> <li>• Objective 8.4 Assists partners in developing and maintaining an off-street trail and accessway network that serves both recreational and transportation functions.</li> <li>• Strategies under Objective 8.4 include, filling gaps in existing regional trails, using specific surface materials, avoid flood-prone areas, minimize out of direction travel, install appropriate lighting for people and wildlife habitat, etc.</li> </ul>
<p>Intertwine Regional Trails Signage Guidelines, 2017</p>	<ul style="list-style-type: none"> <li>• Wayfinding and Directional Sign placement, messaging, content, color, size, height, and typeface</li> </ul>
<p>AASHTO Guide for the Development of Bicycle Facilities, 2012</p>	<ul style="list-style-type: none"> <li>• Horizontal Alignment/Curves</li> <li>• Vertical Grades/Curves</li> <li>• Cross Slope</li> <li>• Intersections and Traffic Control Considerations</li> </ul>
<p>MUTCD</p>	<ul style="list-style-type: none"> <li>• Regulatory and Warning Sign placement, messaging, content, color, size, height, and typeface</li> </ul>

## 2.6 Bridge/Retaining Wall Structures Design Criteria

Several codes and references were reviewed in the development of the bridge and retaining wall analysis and design. The lists below highlight the documents used and considerations identified during this process.

Codes and references employed in bridge and retaining wall analysis include:

- ODOT Bridge Design Manual, October 2020
- AASHTO LRFD Guide Specification for Design of Pedestrian Bridges, December 2009 with 2015 Interims
- AASHTO LRFD Bridge Design Specifications, 9th Edition, 2020
- AASHTO Guide Specifications for LRFD Seismic Bridge Design, 2nd Edition, 2011 with 2012, 2014, and 2015 Interims
- AASHTO LRFD Bridge Construction Specifications, Fourth Edition, 2017

Key design considerations for bridge:

- Bollards will restrict vehicle access to the bridge and therefore pedestrian live load (90 psf) is the only live load that needs to be considered.
- The bridge crossing over U.S. 26 requires throw barriers, a clear width of 14 feet, a vertical clearance of 10 feet above the bridge deck, and a vertical clearance of 17 feet, 4 inches below the bridge.
- The bridge crossing over U.S. 26 requires "Operational" and "Life Safety" design since it spans U.S. 26.
- The north ramp bridge requires only "Life Safety" design since it does not span an active ODOT highway. However, final design may want to consider designing the ramp for "Operational" criteria since both bridges interact during a seismic event.
- Due to the area north of U.S. 26 being predominately wetland, it is important that bridge foundations be as small as possible. Additionally, construction equipment used should be as small as possible to minimize impacts. To achieve both of these goals the bridge will use pile supported foundations and lightweight deck materials. The lightweight deck material reduces the need for larger equipment and reduces seismic loads. The reduction in loads, combined with efficiency of piles, makes for smaller footing and less overall construction footprint.
- There is liquefaction potential at the site; as such, preliminary design of the micropile foundations supporting bridge spans includes downdrag load.
- Due to the many overhead power lines, driven piles and drilled shafts have been considered infeasible based on the required construction equipment. Micropiles are used for support of bridge foundations.

### 3. Alternatives Development Considerations

Many different considerations were used to evaluate the alternatives. These criteria are based on a combination of community input through public surveys and professional project judgement and are meant to encompass the qualitative and quantitative aspects of a preferred design. The evaluation criteria are listed in Table 2 below, as well as some of the supplementary comments from the community.

Supportive comments:

*"This bridge will be an extraordinary addition to our westside trail system!"*

*"These trails have been a godsend during this pandemic as a safe way to get out and exercise."*

*"I'd love to have a bridge for safety. I'd bike and run more for errands and recreation."*

*"A great throughway for the kids who attend Sunset [High School] and live south of 26."*

Concern:

*“Strongly prefer a bridge further west on the Waterhouse Trail [which is in] much higher usage and connectivity. With Oak Hills discouraging paths throughout their confines, this choice makes little sense.”*

Table 2: Evaluation Considerations

Consideration	Description
<b>Safety</b>	Safety in this context is made up of both safety from traffic crashes and safety from crime. Traffic safety should consider safe crossings and access points to the bridge crossing over U.S. 26 and the North and South Ramps, designated space for people walking and people biking, and a smooth and gravel-free trail surface. The facility should also ensure signage and lighting. Personal safety considerations include pedestrian scale lighting, garbage and recycling receptacles, clear visibility and secure-feeling sightlines, and potential noise abatement from motorists near or below the bridge.
<b>Accessibility and Mobility</b>	Access and mobility considerations should include all ages and abilities for access and travel on the bridge crossing over U.S. 26 and the North and South Ramps. Specific considerations should include, grades and elevations, stairs or long ramps, intuitive and direct connections to trail, connectivity to surrounding neighborhoods and destinations, surface materials that are conducive to running and other travel modes, and ADA compliance.
<b>Nature</b>	Nature considerations focus on the trail, bridges, and lighting impacts to natural resources, wetland habitats, and stormwater management.
<b>Community and Aesthetics</b>	Community and Aesthetics considerations focus on how well the project fits the context of the community, how it fulfills the Westside Trail Master Plan and other relative plans and policies in the area, including how the North Ramp, South Ramp, and the bridge crossing over U.S. 26 looks aesthetically, what materials are used, and how it functions.
<b>ROW and Utilities</b>	ROW and Utility considerations focus on impacts and regulatory compliance with BPA, PGE, and other utilities’ facilities, including impacts to private landowners and businesses.
<b>Construction</b>	Construction considerations focus on maintaining adequate clear distances from overhead and underground utilities, as practicable, and identifying utilities that must be relocated. Construction considerations also focus on providing foundations and superstructure elements that can be constructed with most of the overhead lines remaining in place.
<b>Costs</b>	Cost considerations focus on ROW, wetland mitigation, maintenance/lifecycle, and utilities adjustment costs for each alternative.
<b>Seismic</b>	Seismic considerations focus on providing substructure designs that are resilient, meet ODOT Bridge Design Manual requirements, and accommodate liquefaction while being efficient with materials used. The use of lightweight

deck materials can help minimize the overall dead load of the structure and therefore reduce the seismic demand and overall footprint of substructure elements.

## 4. Trail Alignment Options

In coordination with THPRD, the consultant design team developed and refined trail and structures horizontal and vertical alignment options through an iterative design process, accounting for the criteria listed in Sections 2 and 3. The designers sought optimal geometry that would successfully navigate design constraints while mitigating the impacts of the trail and bridge structures.

The design team explored multiple alignment variations to “thread the needle” through the project area constraints. These constraints included maintaining adequate distances from utilities, identifying opportunities to relocate utilities, avoiding certain wetland impacts, and working with businesses and property owners to both provide access while limiting the extent of disruption or impact to their property and operations. For example, the alignment at the north end of the project was adjusted to maximize parking retention and thereby mitigates impacts to Columbia Sportswear’s parking area. Vertical utility clearance requirements for overhead PGE electrical distribution lines and communication lines running east-west on the north side of U.S. 26 cannot be met with the proposed designs, thus approximately 400 feet of these lines will need to be placed underground.

Of the many initial alignments explored, two options emerged that best met the design criteria and construction feasibility.

The two options vary by segment (Figure 3) as described below. The project has five distinct segments (from south to north):

- A. South Trail
  - At-grade path that starts at NW Greenbrier and heads north to the south ramp
- B. South Ramp
  - This ramp consists of a fill slope starting near the utility towers located north of NW Greenbrier Parkway. The fill slope transitions to an MSE wall as it approaches the bridge crossing over U.S. 26. The MSE wall allows for the path to appropriately ramp up to the elevation needed to cross U.S. 26 without putting fill loads onto existing power poles.
- C. Bridge Crossing over U.S. 26
- D. North Ramp
  - This is a bridge that starts just north of the bridge crossing over U.S. 26 and ramps down over the wetland area. The bridge touches down just after the wetland area and before Columbia Way.
- E. North Trail
  - Mostly at-grade path, with some cut, that runs from the north ramp to the intersection of NW Cornell Road



## Alignment Segments

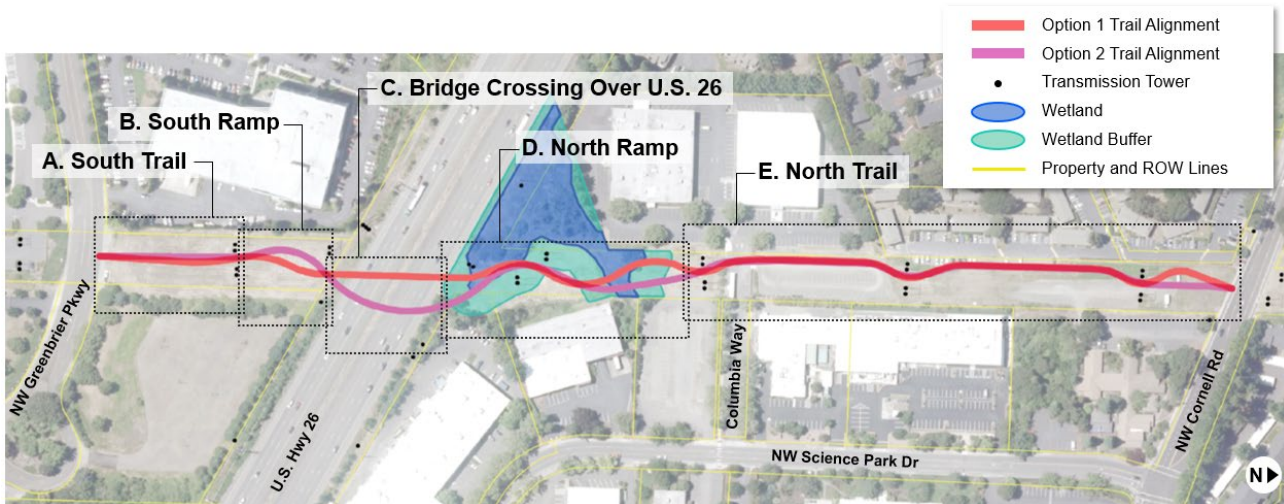


Figure 3: Alignment Segments

The trail alignment options adhere to the design criteria listed above. The full length of each trail will:

- Meet ADA guidelines maintain a running grade of less than 5% and a cross slope of 1%
- Maintain a 12-foot clear width with 1-foot shoulders
- Maintain a 10-foot vertical clearance above the path on the bridge crossing over U.S. 26
- Maintain a minimum of 17-foot, 4-inches clear below the bridge crossing over U.S. 26
- Minimize impact to wetland and wetland buffer areas
- Minimize impacts to adjacent property owners
- Provide ADA compliant connections at Greenbrier Pkwy, Columbia Way and Cornell Road

Design details, such as bridge aesthetics and bridge deck surface, will be decided as the project is refined. These issues are listed below in Section 6.

### 4.1 Bridge Crossing Over U.S. 26

The Bridge crossing over U.S. 26 is the most defining element for this trail project. Trail connections north and south were determined after deciding the type of bridge, its position, and its elevation.

#### Structure Type

A steel truss is recommended as the preferred structure type over the highway. The truss would consist of two simple spans that would be supported by a seat type abutment on the south, a shared concrete bent in the median (between the northbound and southbound travel lanes of U.S. 26.), and a concrete bent on the north. The northern bent would be a shared support and would be the beginning of the northern ramp structure. Option 1 would utilize straight prefabricated steel trusses with skews at the supports to reduce overall cost and construction

schedule. Option 2, a highly curved alignment, would utilize custom steel trusses due to the curvature of the bridge being too large for shipping of prefabricated segments. Supports for Option 2 would be normal to the bridge. Steel trusses were chosen primarily because they minimize below deck structure depth, minimizing elevation gain of the path. Although this structure type costs more than others, the reduced elevation gain lowers the overall project cost by minimizing the amount of rise and length needed for the bridge approaches. The deeper structure depths associated with other bridge types would require taller and longer approaches, adding substantial cost. The structure height is low enough to minimize impacts to overhead power lines. The east-west PGE lines on the north side of U.S. 26 would be the only overhead lines that would need to be relocated. This bridge type is relatively quick to install, minimizing impacts to traffic on U.S. 26.

#### Considerations for Recommended Bridge Structure Type: Steel Truss

- Approximate structure depth: 11 feet between the deck and top chord and 2 feet' between the deck and bottom chord, 13 feet' overall
- Approximate cost:
  - Option 1: \$1.35M to \$2.35M for prefabricated truss
  - Option 2: U.S. 26 spans are 30-35% higher cost due to curvature and need for custom truss
- Option 1 could potentially be constructed without falsework or could use small falsework towers behind temporary barriers on U.S. 26. This would have very little impact to traveling public.
- Option 2 would likely only be able to be constructed in segments on falsework towers set behind temporary barriers on U.S. 26. The towers, however, would not require falsework beams or falsework openings like a cast-in-place bridge. The towers and temporary barriers would have very little impact to traveling public.
- The trusses for both options can be painted or use weathering steel to minimize long term maintenance concerns and costs.
- Accelerated construction when compared to cast-in-place alternatives
- Eliminates the need for extensive use of falsework towers and falsework beams when compared with cast-in-place alternatives
  - Falsework minimum openings for cast-in-place alternatives would require additional increase in profile
- Current designs utilize concrete decks with a steel plate as a curb but could utilize fiber-reinforced polymer (FRP) decks instead. FRP decks would require a truss that is 16 inches wider to accommodate 8-inch curbs, and overall dead load and seismic load would decrease. This would likely save some cost, would allow for a better tie-in with the north ramp and railing, and would eliminate the need to pour a concrete deck over the highway. ODOT would need to accept this, however, due to increased number of joints on the bridge.
- A few precedents exist for steel trusses over U.S. 26 (i.e. the pedestrian bridge at Sunset transit center)

### Alignment

Site constraints limit the feasible locations for the bridge and its footings. The bridge itself must maintain clearances from utility towers and power lines. The footings must allow the bridge to span U.S. 26 while avoiding impacts to wetlands, adjacent properties, and underground utilities including a high-pressure gas line, a water main, and a fiber optic cable. The alignment also aims to minimize elevation gain while maintaining ODOT’s standard minimum vertical clearance of 17-feet 4-inches.

Two alignments proved feasible for further study. The design team consulted with bridge manufacturers to verify the feasibility of these designs. Please refer to Table 3: Comparison of Alignments below for comparison details of the two options.

#### Alignment Option 1

Option 1 spans U.S. 26 with straight north-south trusses just east of center of the project area. This is a simpler alignment that is easier to construct and avoids impacting private properties. However, this option brings the trail closer to the wetland area, which increases the wetland impacts to 710 square feet. The bridge has a vertical curve that gains elevation to the center support (Figure 4).

### Alignment Alternatives: Option 1



### Profile

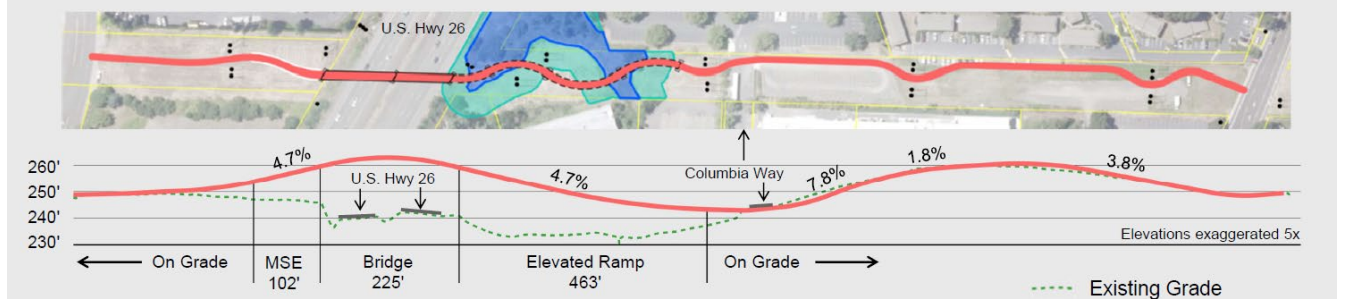


Figure 4: Alignment Option 1

#### Alignment Option 2

Option 2 spans U.S. 26 with trusses that curve to the east to clear the overhead power lines and reduce wetland impacts. However, the trail crosses a portion of private property to the east of the

project right-of-way. This option does not have a vertical curve but does have a very slight uphill slope when headed north.

Prefabricated steel truss structures can be curved both vertically and horizontally. However, there are limitations to the amount of horizontal curvature due to shipping constraints. The curvature required for Option 2 to span the highway, without impacting underground utilities, is too large for the shipping constraints and would require a custom designed truss assembled on-site (Figure 5).

### Alignment Alternatives: Option 2



### Profile

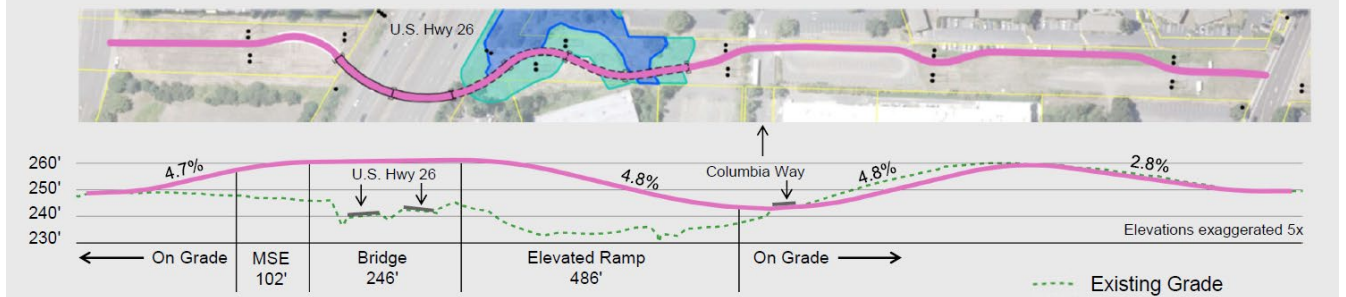


Figure 5: Alignment Option 2

### Constructability

Constraints near the bridge location make constructability an important consideration. Using a crane will be difficult or impossible because of overhead power lines. Bridge construction and installation must also consider impacts to the large volumes of traffic on U.S. 26 and the wetlands in the project area.

Both options are feasible but challenging to construct. The horizontal curve in Option 2 creates an additional challenge by making it more difficult and expensive to assemble on-site and lift into place.

- Option 1 is aligned below BPA power transmission lines. It is not feasible to place the bridge with a crane. One potential option is to “launch” the spans by rolling the prefabricated bridge sections lengthwise into place. Another option would be to install temporary supports behind guardrail that protects vehicle traffic. This will allow the spans hoisted to be shorter than the full bridge length. The shorter segments could then

be installed with forklifts from below during night closures of the highway and eliminate the use of cranes. The spans could be assembled off-site and trucked in for hoisting.

- Option 2 is under power transmission lines at the south end of the bridge. In addition, it has a horizontal curve, making it more difficult to pick with a crane and likely requires additional structural tie downs to keep it in place after it is set. This bridge would likely have to be installed using temporary supports behind guardrail that protects vehicle traffic, similar to Option 1.

## 4.2 Ramps to Bridge

The bridge crossing over U.S. 26 requires a minimum of 17 feet and 4 inches of clear height over the highway below. The trail must climb to this elevation and descend back to the ground while maintaining ADA-compliant grades.

The segment north of the bridge has different site conditions than the segment south of the bridge and uses a different design to reach bridge elevation. The context of each segment was carefully considered to design a ramp that is comfortable for users, fits within the site constraints, and minimizes impacts.

### Ramp North of the Bridge Crossing Over U.S. 26

The area north of U.S. 26 is tightly confined by utilities, private property, and a wetland area. The trail must encroach on the wetland area as it continues north of U.S. 26. However, the alignments of Option 1 and Option 2 differ in their impacts to the wetland and adjacent private property:

- Option 1: the north end is near the center of the right-of-way. The ramp curves left as it works its way north to veer as far away from BPA power poles as practicable. This option results in a slightly larger impact to the wetlands (710 square feet) when compared to Option 2 (120 square feet) but has no private property impacts.
- Option 2: the north end is aligned further east than Option 1 in effort to avoid the overhead lines and reduce impacts to the wetland area. However, Option 2 encroaches on the private property to the east of the right-of-way resulting in the need for property acquisition. The ramp for this option is also curvilinear as it works its way north but has less impact to the wetlands than Option 1.

Each option encroaches onto the wetland to some extent. Both options propose a bridge to elevate the trail out of the wetland, reducing the impacts to only the area of the structural foundations and temporary disturbances from construction. The elevated structure uses an FRP deck supported on steel I-girders. FRP is lightweight and allows the elevated structure to have long spans which reduces the overall dead and seismic loads. This weight savings translates to smaller substructure elements, fewer structural supports, and fewer piles in each support. All of which translates to smaller impacts to the wetland area.

Foundations are positioned to comply with the utility constraints and to be structurally efficient, while also minimizing impacts to the wetland area and the wetland buffer area.

The bridge ends just north of the wetland buffer area and the trail continues on fill to the south side of Columbia Way for both options. The bridge stays below 5% slope to ensure ADA/PROWAG compliance.

**Ramp South of the Bridge Crossing Over U.S. 26**

Constructing the trail on fill to reach the elevation needed to cross U.S. 26 is an economical and durable option, however retaining walls are necessary to reduce the amount of fill needed and avoid adding fill directly against power poles, which would undermine the pole stability. Mechanically stabilized earth retaining walls (MSE walls) are well suited for the wall heights and geometry needed for this project. Cast-in-place and modular block retaining walls were also considered for this site. The cast-in-place option was eliminated as it is more expensive than the MSE wall option. The modular block wall was eliminated as it requires a larger footprint to achieve the design heights needed.

**4.3 North and South End Trail Sections**

The narrow site and multiple constraints limit the options for feasible trail alignments. The two trail alignment alternatives connect to the broader street grid at the same locations on the north and south ends of the project area. The differences between the two trail alignment options occur at the north and south end trail sections.

**North End Trail Section**

The north end trail alignment is similar for both Option 1 and 2, as it threads its way through the transmission towers and limits the amount of parking impacts. The difference occurs at the Cornell Rd approach. Option 1 provides a perpendicular route which improves visibility and Option 2 provides a direct route which creates a shorter distance. The perpendicular approach is more typical and is preferred.

**South End Trail Section**

The south end trail alignment is similar for both Option 1 and 2 as it meets the ramp up to the bridge. There is a slight variation between the two alignments, as Option 1 curves a little earlier before it connects to the ramp, whereas Option 2 provides a straighter alignment right before it connects to the ramp. Both provide the same connection at Greenbrier Parkway.

**4.4 Comparison**

Table 3: Comparison of Alignment Options

	Option 1	Option 2
<b>Length, Total</b>	2,286 feet	2,315 feet

<b>Length of Elevated Ramps (north of bridge)</b>	463.25 feet	486 feet
<b>Length of Bridge Over U.S. 26</b>	248 feet	246 feet
<b>Length of MSE retaining walls (south of bridge)</b>	102 feet	114 feet
<b>Minimum distance between elevated trail edge to BPA poles</b>	19.3 feet	15.2 feet
<b>Minimum distance between elevated trail edge to PGE poles</b>	11.3 feet	9.3 feet
<b>Horizontal Curve on the Bridge Crossing Over U.S. 26</b>	No	Yes
<b>Vertical Curve on the Bridge Crossing Over U.S. 26</b>	Yes	No
<b>Number of Private Properties Impacted</b>	0	1
<b>Permanent Wetland Impacts*</b>	20 s.f.	10 s.f.
<b>Permanent Wetland Buffer Impacts*</b>	10 s.f.	20 s.f.
<b>Temporary Wetland Impacts*</b>	710 s.f.	120 s.f.
<b>Temporary Wetland Buffer Impacts*</b>	300 s.f.	590 s.f.
<b>Approximate Cost</b>	\$6.5 to 11.5 million	\$7.4 to 13 million

\*Wetland impacts rounded to nearest 10 s.f. These values are for estimated excavation and do not account for equipment disturbances to the site.

#### 4.5 Other Concepts Considered but Not Advanced

The project team took a detailed approach in the consideration of a wide variety of concepts for the bridge and trail alignment. Bridge type, costs, property impacts, and interaction with traffic all contributed to developing and settling on Options 1 and 2. Several bridge types were considered for the bridge crossing over U.S. 26 (Table 4) but not advanced due to structure depth, cost, maintenance required, constructability, and aesthetics. Early versions of the trail alignment centered the trail within the entire power line corridor, but the project team ultimately moved the section north of Columbia Way to the west to limit parking impacts. Routing the trail on Columbia Way to Science Park Dr. was also considered, but this was not advanced due to sharing the roadway with traffic.

Table 4: Other Bridge Types Considered but Not Recommended for Crossing Over U.S. 26

Bridge Type	Considerations
<b>Cable Stayed</b>	<ul style="list-style-type: none"> <li>• Not advanced: Conflicts with overhead wires on site</li> <li>• Expensive</li> </ul>
<b>Suspension Bridge</b>	<ul style="list-style-type: none"> <li>• Not advanced: Conflicts with overhead wires on site</li> <li>• Expensive</li> </ul>

Bridge Type	Considerations
<b>Tied Arch</b>	<ul style="list-style-type: none"> <li>• High maintenance</li> <li>• Not advanced: Conflicts with overhead wires on site</li> <li>• Expensive</li> </ul>
<b>Timber Glue-Laminated</b>	<ul style="list-style-type: none"> <li>• Not advanced: Not well suited for this length of span</li> <li>• Expensive</li> <li>• Not likely accepted by ODOT</li> <li>• High maintenance</li> </ul>
<b>Pre-Cast Pre-Stressed Concrete I-Girders</b>	<ul style="list-style-type: none"> <li>• Not advanced: structure depth requires additional elevation gain</li> <li>• Approximate structure depth: 6 feet</li> <li>• Approximate bridge crossing over U.S. 26 cost: \$600,000</li> <li>• Matches other adjacent highway bridges</li> <li>• Commonly accepted by ODOT</li> <li>• Can be constructed without falsework</li> <li>• Accelerated bridge construction</li> <li>• Low maintenance</li> <li>• Low aesthetic value</li> </ul>
<b>Pre-Cast Concrete Tub Girder</b>	<ul style="list-style-type: none"> <li>• Not advanced: structure depth requires additional elevation gain</li> <li>• Approximate structure depth: 5 feet</li> <li>• Approximate bridge crossing over U.S. 26 cost: \$700,000</li> <li>• Commonly accepted by ODOT</li> <li>• Can be constructed without falsework</li> <li>• Accelerated bridge construction</li> <li>• Low maintenance</li> <li>• Low aesthetic value</li> </ul>
<b>Cast-in-Place Post-Tensioned Concrete Box Girder</b>	<ul style="list-style-type: none"> <li>• Not advanced: structure depth requires additional elevation gain</li> <li>• Approximate structure depth: 5 feet, not including falsework depth that would be needed below for construction</li> <li>• Approximate bridge crossing over U.S. 26 cost: \$1,100,000</li> <li>• Commonly accepted by ODOT, though less often than precast or steel structures</li> <li>• Low maintenance</li> <li>• Low aesthetic value</li> <li>• Slow to construct</li> </ul>
<b>Steel Plate Girder</b>	<ul style="list-style-type: none"> <li>• Not advanced: structure depth requires additional elevation gain</li> </ul>



Bridge Type	Considerations
<b>Steel Tub Girder</b>	<ul style="list-style-type: none"> <li>• Approximate structure depth: 5 feet</li> <li>• Approximate bridge crossing over U.S. 26 cost: \$900,000</li> <li>• Commonly accepted by ODOT</li> <li>• Can be constructed without falsework</li> <li>• Accelerated construction</li> <li>• Low maintenance, but higher than concrete options due to need to paint steel over time</li> <li>• Low aesthetic value</li> </ul>
	<ul style="list-style-type: none"> <li>• Not advanced: structure depth requires additional elevation gain</li> <li>• Approximate structure depth: 4.5 feet</li> <li>• Approximate bridge crossing over U.S. 26 cost: \$1,200,000</li> <li>• Commonly accepted by ODOT</li> <li>• Can be constructed without falsework</li> <li>• Low maintenance, but higher than concrete options due to need to paint steel over time</li> <li>• Low aesthetic value</li> </ul>

## 5. Recommended Alternative

The alternatives were evaluated against the considerations detailed in Section 3 – safety, access, mobility, natural environment, aesthetics, ROW, utilities, constructability, and costs. These considerations were developed by the community and refined through the professional expertise of the project team, and together reflect the priorities of THPRD, ODOT, and the region. While final alignment of the bridge and trail is still being determined, the project will follow a set of key concepts that were led by the evaluation considerations.

The recommended concept:

- Straight N-S Bridge Crossing Over U.S. 26
  - Lower cost, easier to construct, shorter distance over highway, less ROW impact
  - Small additional wetland impact, when compared with Option 2
- Flatter approach
  - Community input showed the flatter crossing over U.S. 26, identified in Option 2, was preferred due to improved sight distance.
  - Potentially requires less earthwork on south approach
- Perpendicular approach to Cornell
  - Better visibility
- More detail/refinement for the preferred option on lighting, crossings, wayfinding, etc

## 6. Issues to Be Resolved During Preferred Alternative Conceptual Design Refinement

This section outlines elements of the project that have not yet been completed. These issues will be resolved during the preferred alternative conceptual design and refinement phase of the project.

### 6.1 Bridge

#### *Bridge Crossing Over U.S. 26 Deck Surface*

The deck surface of the bridge crossing Over U.S. 26 will be finalized in future design. One option is concrete, which is durable but heavy. Another option is FRP panels, which are lighter and will reduced the dead load and seismic load, potentially reducing costs.

#### *Aesthetics*

The bridge will be highly visible. In addition to trail users crossing over the bridge, approximately 148,000 vehicles travel daily on U.S. 26 at this location. The bridge can integrate aesthetic elements, including the finish (paint or weathering steel), lighting, decorative panels, railing, and art. These items will be refined further during final design.

#### *Steel Finish*

Steel requires a finish to protect against rusting. Two common treatments are available: painted steel and weathering steel. Painted steel allows color choices but requires regular maintenance to keep the paint in good shape. Weathering steel develops a rusty patina that protects the steel with minimal maintenance. Either treatment could be applied to the bridge.

#### *Utility Impacts*

Option 1, as currently detailed, impacts a fiber optic line that runs through the corridor. Currently, costs to relocate this line into the truss crossing are included. As the design is refined, the bridge crossing over U.S. 26 could be shifted slightly to the west to eliminate this conflict. If the alignment stays the same, details of the relocation will need to be resolved in collaboration with communications utilities providers.

The project team will work with BPA and PGE as the preferred option is developed. Some utilities will need to be relocated, and design exceptions will be required as there is not enough space between BPA and PGE towers to meet the require minimum distances.

#### *Stormwater Treatment*

A Stormwater Management Plan will be completed in the next task of the project. A memo that identifies stormwater design solutions and presents field data gathered will be developed during the concept-level phase to provide a basis for the Stormwater Management Plan.

### 6.2 Trail

#### *Vertical Profile over U.S. 26*

Option 1 is the preferred horizontal alignment; however, a flatter bridge crossing over U.S. 26 is desired as it would provide a shorter climb and a less challenging crossing of U.S. 26. In addition, the flatter crossing would provide better sight distance at the peak of the trail. The project team has developed an alternate profile for Option 1 that addresses this desire and will be explored further as the preferred alternative is developed.

#### *Street crossing designs at NW Cornell Road, Columbia Way, and Greenbrier*

Street crossing/connections at NW Cornell Road, Columbia Way, and Greenbrier will be analyzed and designed in the next phase of the project. The project team will work with local jurisdictions and follow relevant guidance to ensure street crossings are safe, accessible, and designed to serve all users of the new bridge and trail.

#### *Wayfinding signage*

A Wayfinding Plan will be included for the preferred alternative and will be developed in accordance with the Intertwine Regional Trails Signage Guidelines document.

#### *Illumination*

For the Preferred Alternative, lighting for trail users' will be incorporated where appropriate to address safety and security concerns, while considering potential impacts of lighting intensity on habitat and surrounding properties. While illumination details including specific types and aesthetics would need to be resolved during Final Design, the project design team will apply relevant design standards and guidelines and collaborate with THPRD to reach agreement on most feasible and effective lighting to be incorporated into the Preferred Alternative for reasonable cost estimating and constructability considerations.

The south ramp, the bridge crossing over U.S. 26, and north ramp will all have bicycle railing along their edges to protect users from fall hazards. Lighting can be integrated into the railings to cast direct light onto the path and bridge deck without causing light pollution or glare. Integrated railing lights can also be supplemented with overhead lighting built into the bridge crossing over U.S. 26 to provide additional light if needed.

The southern and northern trail will both consider lighting with traditional overhead light standards. Lighting will require further coordination and a potential project specific design standard so light pollution is minimized while also providing a safe crossing at night.

#### *Landscaping*

A Landscape Design Concept will be developed for the preferred alternative and will include a water quality facility, the bridges (bridge crossing over U.S. 26 and north ramp), and other structures. A planting plan will be included, and will ensure that landscaping is minimal, provides clear visibility, and allows for maintenance access. The potential to include public art may also be considered.

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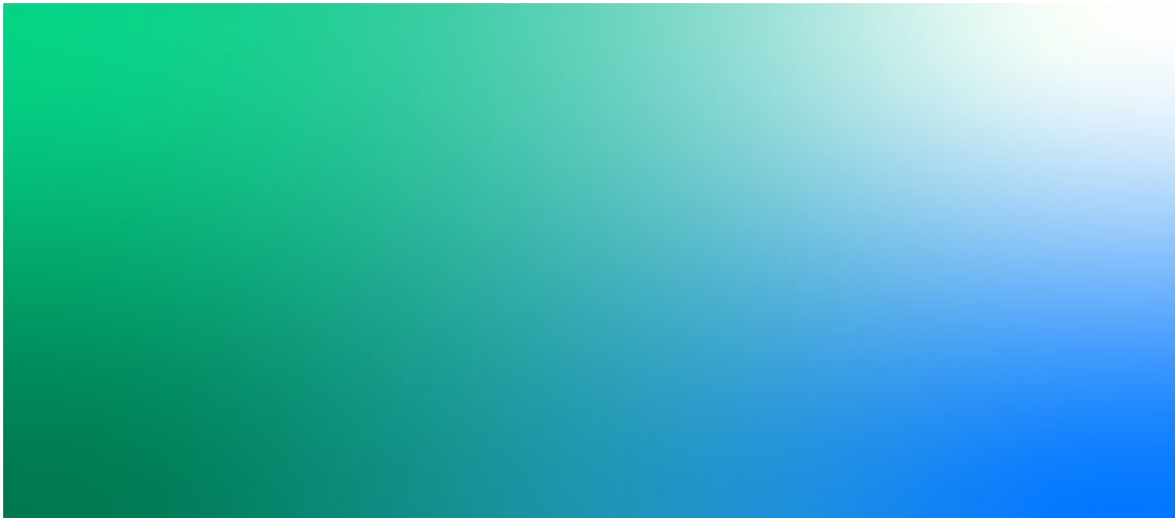
**Appendix H. Stormwater Management memo**



Stormwater Management Strategy Memo

August 2021

Tualatin Hills Park & Recreation District



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Westside Trail Bicycle and Pedestrian Bridge over Highway 26, Washington County, Beaverton, Oregon

This project is funded by Tualatin Hills Park & Recreation District System Development Charge funds and the Metro Regional Flexible Fund. This document was prepared by Jacobs.



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# 1. Introduction

Tualatin Hills Park & Recreation District (THPRD) is leading a feasibility study that includes conceptual design of a regional trail segment and a pedestrian and bicycle bridge from SW Greenbrier Parkway to NW Cornell Road, spanning Sunset Highway (U.S. 26) Milepost (MP) 66.50 (Figure 1).

The project corridor lies within the jurisdiction of unincorporated Washington County with adjacent land within the City of Beaverton, Oregon. The majority of the project area is situated within the Bonneville Power Administration (BPA) powerline corridor right-of-way (ROW) that extends from NW Cornell Road south to NW Greenbrier Parkway. The project corridor is surrounded by primarily commercial industrial properties with multifamily residences to the north of the corridor.

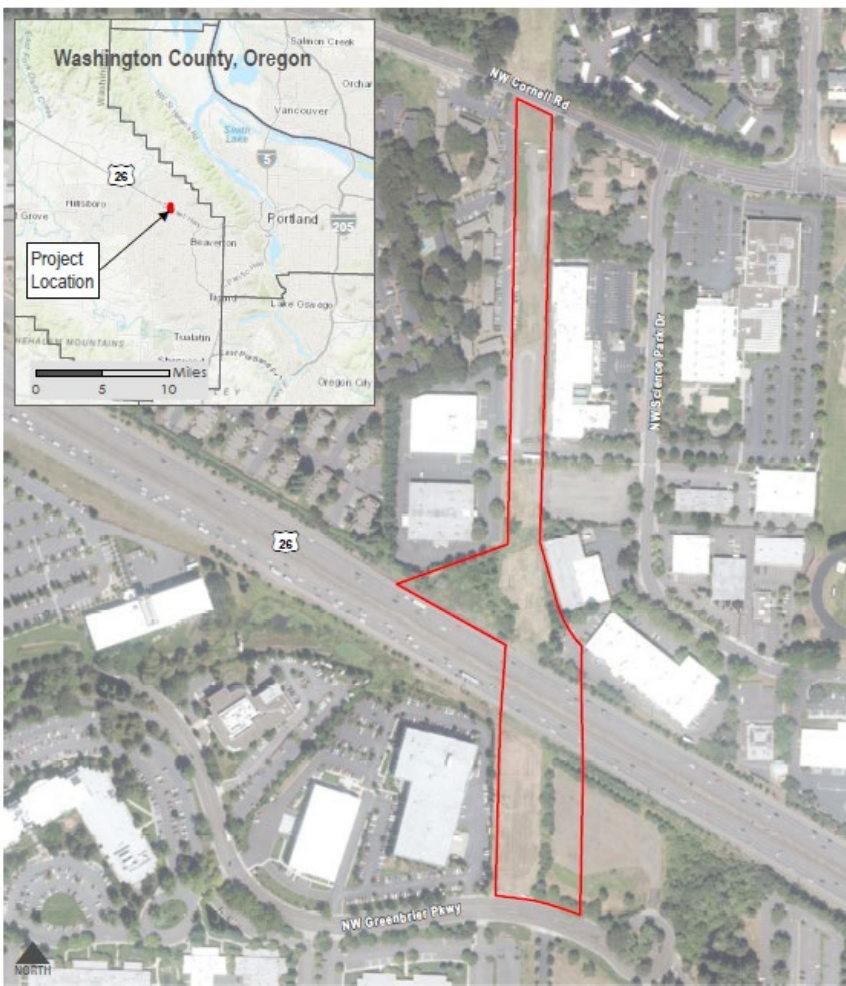


Figure 1  
Westside Trail Bridge Project  
Location Map

Legend  
Study Area

0 100 200 300 400 Feet



Figure 1: Westside Bridge Project Map



The purpose of this document is to describe the stormwater management alternatives considered for the Westside Trail's crossing of U.S. 26. Stormwater management alternatives are designed to meet the requirements of Clean Water Services (CWS), Oregon Department of Transportation (ODOT), and federal requirements related to the Endangered Species Act (ESA).

## **1.1 Project Context**

The Westside Trail is part of a vital regional multimodal transportation and recreation network that connects neighborhoods with community destinations across Washington County. THPRD estimates that the Westside Trail attracts over 100,000 users a year. Land uses along the project's area of potential impact (API) consist of urban industrial, urban commercial, and multi-family (Figure 2).

Key destinations within Beaverton's boundary include Sunset High School, Sunset Swim Center, and the THPRD Howard M. Terpenning Recreation Complex. Large employers include Pacific Office Automation and Nike Corporate Offices. The Columbia Sportswear Corporate Headquarters is located one block from the project within the Washington County boundary.

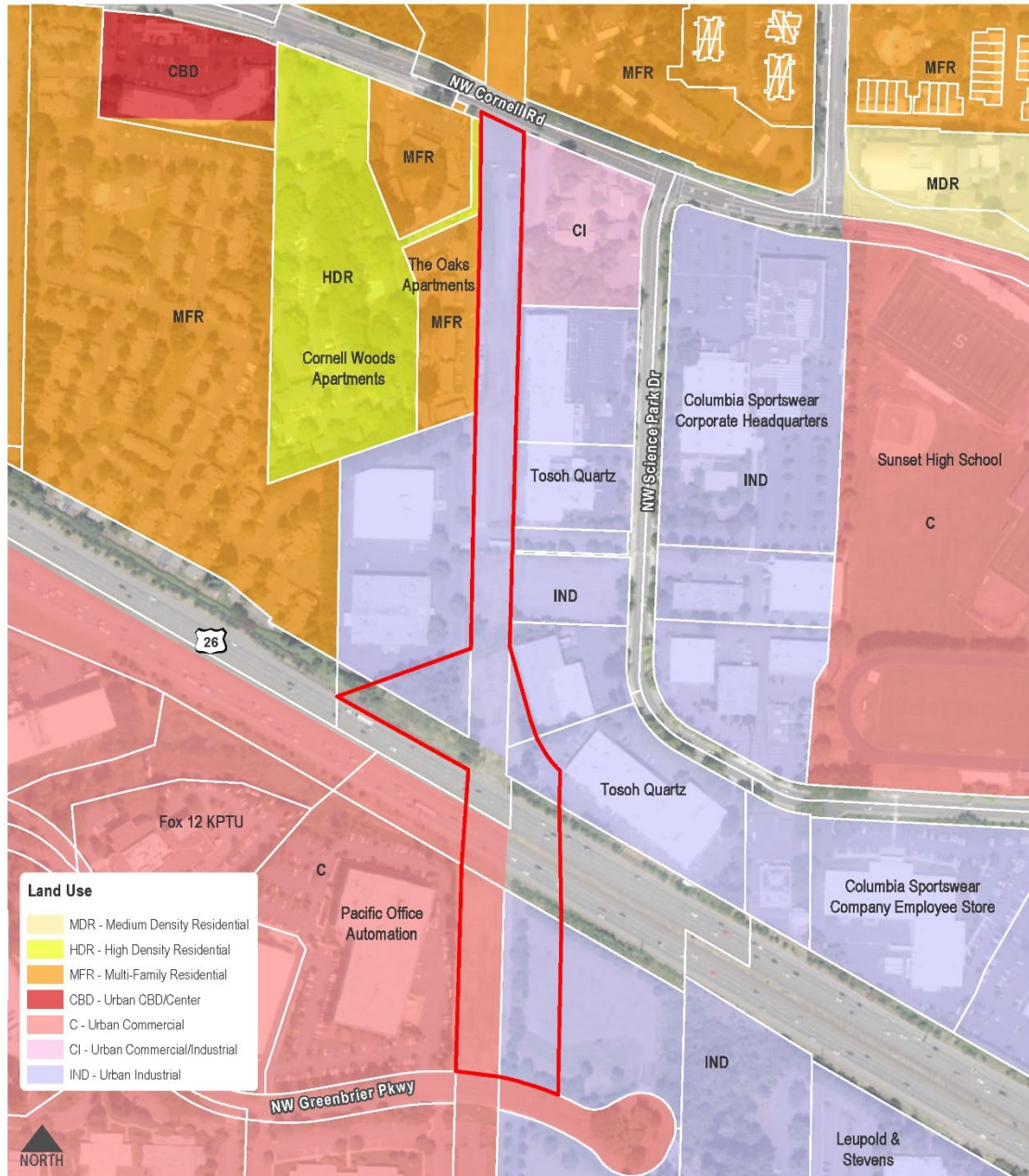
## **1.2 Project Purpose**

The purpose of the Westside Trail bridge is to link 25 miles of trail for people walking, running, and biking to reach popular destinations, including housing, schools, jobs, shopping, transit, parks, and recreation. The trail will provide a convenient, comfortable, and safe atmosphere for trail users of all types, ages, and abilities.

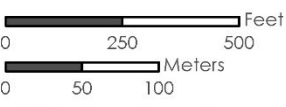
The Westside Trail must cross U.S. 26 to complete the trail connection. The nearest existing bicycle and pedestrian crossing options adjacent to the proposed bridge are the interchange overpasses for NW Murray Boulevard and NW Cornell Road. These options are problematic because of the following issues:

- They are 1.2 miles apart, which is not convenient for many people walking or on bikes
- They have narrow sidewalks and bike lanes
- Heavy motorized traffic travels on five lanes through each interchange

U.S. 26 is an Oregon Department of Transportation (ODOT) limited access highway with north-south mobility in the project vicinity limited to grade-separated interchanges. This project created a preferred design option to utilize existing utility corridors to link the Westside Trail above the highway between the NW Murray Boulevard and NW Cornell Road interchanges.



Land Use	
<span style="display:inline-block; width:15px; height:15px; background-color:yellow; border:1px solid black;"></span>	MDR - Medium Density Residential
<span style="display:inline-block; width:15px; height:15px; background-color:lightgreen; border:1px solid black;"></span>	HDR - High Density Residential
<span style="display:inline-block; width:15px; height:15px; background-color:orange; border:1px solid black;"></span>	MFR - Multi-Family Residential
<span style="display:inline-block; width:15px; height:15px; background-color:red; border:1px solid black;"></span>	CBD - Urban CBD/Center
<span style="display:inline-block; width:15px; height:15px; background-color:lightpink; border:1px solid black;"></span>	C - Urban Commercial
<span style="display:inline-block; width:15px; height:15px; background-color:lightpurple; border:1px solid black;"></span>	CI - Urban Commercial/Industrial
<span style="display:inline-block; width:15px; height:15px; background-color:blue; border:1px solid black;"></span>	IND - Urban Industrial



**TUALATIN HILLS**  
 PARK & RECREATION DISTRICT  
 Metro RLIS Land Use 2020

Area of Potential Effect (APE)  
 Tax Lots

Figure 2  
 Westside Trail Bridge Project  
 Land Use

Figure 2: Westside Bridge Project Land Use Map

## 2. Agency Coordination

Early in the project planning process, Jacobs contacted ODOT and Clean Water Services (CWS) staff for any updated information and guidance on these agencies' project development and approvals/permitting policies including those regarding water resources. As part of the process to complete the environmental baseline conditions inventory investigations and documentation for the project, Jacobs contacted resource and regulatory agencies for current information to review and consider.

Jacobs' has also coordinated with THPRD, the consultant team's bridge and trail designers, and with Jacob's water resources engineer to engage in and advise the evaluation and recommendation of stormwater management techniques and facilities. THPRD and consultant team designers and water resources engineer held an initial project introduction and coordination meeting with CWS including their Development Services Supervisor, Environmental Plan Review Project Manager, and Engineering Plan Review Project Manager. The purpose of this meeting was to introduce and discuss the project, and to seek guidance and confirmation of Jacobs' interpretation of regulations, impact thresholds and mitigation goals, and to inform THPRD's strategizing for future design phase negotiations concerning any necessary compensatory measures associated with permitting. In coordination with THPRD, Jacobs will continue to provide ODOT, Metro, Washington County, CWS, BPA, and City of Beaverton information on the project.

## 3. Data Review

In addition to early coordination with ODOT and CWS, data collected for this project that is relevant to stormwater conditions and management consisted of requested relevant existing information required for the Stormwater Management Strategy. This supporting information reviewed and considered consisted of

- Surveyed base map (prepared by 1-Alliance) Project description and conceptual engineering plans
- Washington County floodplain and NRCS Soil Surveys/mapping
- Project wetland delineation
- Publicly available databases and reports from ODOT, Washington County, City of Beaverton, and CWS
- Draft Geotechnical Engineering Report (prepared by RhinoOne) for the project that provided relevant soil characteristics including groundwater content and infiltration.

In addition, Jacobs inquired with ODOT and CWS about available hydraulic and/or hydrologic studies in the project area, but none were available.

## 4. Field Investigation

The consultant team's specialists - bridge and trail designers, geotechnical engineers, wetlands and habitat biologist, and water resources engineer - conducted field investigations to collect information and data not available from other sources. The field investigations were needed to inform environmental and engineering elements of the project including the Stormwater Management Strategy. This field-collected and documented data can also be used to be later incorporated into a Stormwater Management Plan concurrent with the project final design and permitting phase. Elements of the site investigations relevant to stormwater management consisted of photography, and assessment and mapping of landforms and land uses, vegetation, drainage paths, and channel morphology. Soil infiltration and groundwater content and levels was provided by the geotechnical subsurface investigations for structural elements locations and types.

## 5. Stormwater Conditions and Permitting Summary

### 5.1 Trail Design Elements

The proposed trail consists of approximately 36,000 square feet of new impervious surfacing. According to CWS's Design and Construction Standards, an impervious surface includes pavement, maintained gravel areas, structures, public and private roadways, roofs, and other hard surfaces which are not specifically designed to allow water to infiltrate. The project shall follow the requirements outlined in Chapter 4 of the CWS's Design and Construction Standards for storm and surface water management related to water quality, quantity control, hydromodification, and Low Impact Development Approaches (LIDA). Based on the amount of new impervious surface, the project is classified as a "Medium" sized project (12,000-80,000 square feet).

According to CWS' Hydromodification Planning Tool WebMap, the project is in a Developed Area and discharges to an intermittent stream just north of US 26, which is an unnamed tributary to Willow Creek. This stream is a *riverine* (Federal Geographic Data Committee)/*riverine* (HGM) water averaging 5 feet across at top of bank. The stream originates offsite to the east and flows in a steep-sided channel through densely vegetated lowland area. It discharges through a culvert under US 26 and is presumed to be connected with mapped wetlands and an unnamed tributary to Willow Creek south of the highway. The stream flows in a steep-sided channel approximately 1.5 to 2 feet deep. Ordinary high water follows the top of bank and is demarcated by the line of vegetation. Flow was present to a depth of approximately 14-18 inches at the time of the field visit. CWS' Hydromodification Standards list both Willow Creek and its tributary as "Moderate". Therefore, under CWS and NMFS requirements, this project falls into a Category 2 hydromodification approach for being in a developed area with moderate risk level for a medium-sized project. Projects in Category 2 require quantity and quality control of stormwater runoff of all impervious area by using infiltration facilities and/or Peak-Flow Matching Detention.

For the new development, the area requiring treatment shall be equal to the new impervious area plus three times the area of any modified impervious area within the project area. The water quality design storm for sizing is for a dry weather storm event totaling 0.36 inches of precipitation falling in 4 hours with an average storm return of 96 hours. For design storms to be used in Peak Flow Hydrologic Analysis for runoff quantity control, see Table 4-4 copied below from CWS's.

TABLE 4-4

<b>Recurrence Interval</b>	<b>Total 24-Hour Precipitation Depth (water equivalent inches)</b>
2-year	2.5
5-year	3.10
10-year	3.45
25-year	3.90

For the trail sections at grade, the stormwater management approach best suited for this project is a kind of LIDA using infiltration for treatment and quantity control of runoff. Both structural and non-structural infiltration planter treatment are approved stormwater management approaches according to CWS Design and Construction Standards Section 4.06 and shown below in Table 4-3. A written request to CWS can be made, proposing alternative methods as detailed in CWS Design and Construction Section 1.06.

TABLE 4-3  
SUMMARY OF APPROVABLE APPROACHES

Stormwater Management Approach	May be approved for Public System <sup>2</sup>	Quantity for Conveyance Capacity	Hydromodification Approach	Water Quality Treatment Approach	Low Impact Development Approach
Water Quality Manhole <sup>1</sup>	✓	✓	✓	✓	
Detention Pond	✓	✓	✓		✓
Underground Detention	✓	✓	✓		
Vegetated Swale	✓			✓	✓
Extended Dry Basin	✓	✓	✓	✓	✓
Constructed Water Quality Wetland	✓	✓	✓	✓	✓
Structural Infiltration Planter	✓	✓	✓	✓	✓
Non-Structural Infiltration Planter (Rain Garden)	✓	✓	✓	✓	✓
Structural Flow-Through Planter	✓			✓	✓
Non-Structural FlowThrough Planter/Rain Garden	✓			✓	✓
Street-Side Planter	✓	✓	✓	✓	✓
Landscape Filter Strip	✓			✓	✓
Vegetated Corridor as a Filter Strip	✓			✓	✓
Green Roofs		✓	✓		✓
Porous Pavement	✓	✓	✓		✓
Stormwater Tree			✓		✓
Structural Soils	✓		✓		✓
Proprietary Treatment System	✓			✓	
Vegetated Corridor Preservation					✓

1. Pretreatment only.
2. Approaches in the right-of-way must be approved by the local road authority.

Initial investigation of soil characteristics are discussed in the Draft Geotech Report for this project, and based on NRCS’s web soil survey the site is primarily underlain by Aloha silt loam, Dayton silt loam, and Cove silty clay loam, which are all classified in the C/D hydrologic soil group and described as somewhat to poorly drained soils. These soils have a fairly shallow depth to groundwater of 0-24 inches. Preliminary infiltration sizing rates for Simplified Sizing approaches range from 0.1-0.2 inches/hour based on Table 4-5 in the CWS Design and Construction Standards. Onsite infiltration tests will be required for each location of proposed infiltration facility, prior to final sizing of each facility.

**TABLE 4-5  
HYDROLOGIC PROPERTIES OF COMMON SOILS IN URBAN WASHINGTON COUNTY**

Soil Series	Hydrologic Soil Group	Drainage Class	Depth to Restrictive Layer (inches)	Depth to Ground-water (inches)	Infiltration Rates For Simplified Sizing (inches/hour)
Aloha silt loam	C/D	somewhat poorly drained	>80	18-24	0.2
Amity silt loam	C/D	somewhat poorly drained	>80	6-18	0.2
Briedwell stony silt loam	B	well drained	25	>80	2
Cascade silt loam	C	somewhat poorly drained	20-30*	18-30	0.5
Cascade-Urban complex	C	somewhat poorly drained	20-30	18-30	0.5
Chehalis silty clay loam	B	well drained	>80	48-80	2
Cornelius & Kinton silt loams	C	moderately well drained	30-40*	27-37	0.5
Cornelius variant silt loam	C	moderately well drained	30-40*	27-37	0.5
Cove clay	D	poorly drained	>80	0-12	0.1
Cove silty clay loam	D	poorly drained	>80	0-12	0.1
Dayton silt loam	D	poorly drained	0-24	0-24	0.1
Delena silt loam	D	poorly drained	20-30*	0-18	0.1
Helvetia silt loam	C	moderately well drained	>80	36-72	0.5
Hillsboro loam	B	well drained	>80	>80	2
Huberly silt loam	C/D	poorly drained	38*	0-8	0.2
Laurelwood silt loam	B	well drained	>80	>80	2
McBee silty clay loam	C	moderately well drained	>80	24-36	0.5
Quatama loam	C	moderately well drained	>80	24-36	0.5
Saum silt loam	C	well drained	20-30*	18-30	0.5
Urban land	Not specified; site-specific infiltration testing required				
Verboort silty clay loam	D	poorly drained	12-26	0-8	0.1
Wapato silty clay loam	C/D	poorly drained	>80	0-12	0.2
Willamette silt loam	B	well drained	>80	>80	2
Woodburn silt loam	C	moderately well drained	>80	25-32	0.5
Xerocrepts & Haploxerolls	B	well drained	>80	>80	2
Xerocrepts-rock outcrop	B	well drained	>80	>80	2

\* indicates presence of fragipan below which infiltration increases

Source: USDA/NRCS National engineering Handbook, Chapter 7, "Hydrologic Soil Groups" (2009), City of Gresham Stormwater Manual Appendix D (2018), and Web Soil Survey

Note: data for soil series not listed in this table are available from Web Soil Survey, except for Assumed Infiltration Rate, which can be determined from Hydrologic Soil Group.

Generally, each facility shall be sized where there is less than 15,000 square feet of contributing area, and the required water quality surface area shall be 6% of the contributing drainage area, and 12% for vegetated facilities if sizing for hydromodification. For vegetated filter strips used for water quality, such as areas that cannot have infiltration or are on a slope, the max contributing drainage area can be 2,640 feet per 50 lineal feet adjacent to impervious surface.

## **5.2 Bridge Design Elements**

For the bridge structures crossing over US 26 and ramping down to grade north of the highway, and the elevated section of trail on retained fill south of US 26, runoff from the deck and trail surface sections will be concentrated and not likely amenable to natural dispersion. Quality and quantity treatment will need to be provided by engineered infiltration treatment facilities, both north and south of Highway 26 at each end of the elevated trail section where stormwater will flow and collect. Infiltration treatment facilities will be preferred, providing both quality and quantity management. Their optimal effectiveness and design will need to be determined and refined based on depth to groundwater and infiltration potential during final design. If infiltration is determined to be unsuitable, vegetated swales or other engineered facilities with appropriate retention would be used that meet an approvable stormwater management approach as listed in CWS Table 4-3.

## **5.3 Permitting**

A Service Provider Letter by CWS is required and will identify local natural resource protection and enhancement requirements that must be addressed through local permitting, per CWS Design and Construction Chapter 3, prior to permit issuance. All stormwater management will be required to meet NMFS standards under the Endangered Species Act (ESA).

Clean Water Act (CWA) Section 401 Water Quality Certification. This water quality certification is needed from Oregon Department of Environmental Quality as a condition of the federal Section 404 permit for wetland impacts.