



I-5 PEDESTRIAN BRIDGE: BARBER STREET TO WILSONVILLE TOWN CENTER

Bridge Concepts Memo | City of Wilsonville Project #4202

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1. PROJECT BACKGROUND

The City of Wilsonville (City) first identified the Interstate 5 (I-5) Pedestrian Bridge crossing when Wilsonville's original Town Center Plan was created in 1973. The City's 2006 Bicycle and Pedestrian Master Plan, and the 2013 and 2016 Transportation System Plans confirmed the need for a safe I-5 crossing and identified the bridge project as a high priority. In 2019, the City adopted the Wilsonville Town Center Plan (Plan) with strong community support. This Plan identified the bridge and a gateway plaza as a key framework project for spurring redevelopment of Town Center.

The City is undertaking this project to develop the preliminary and final design for the I-5 Pedestrian Bridge and a gateway plaza on the east approach. In February, the project held its first open house, and in March, the Wilsonville Planning Commission and City Council concurred with the public feedback regarding the bridge type alternatives:

- Evaluate three bridge types: cable-stayed, arch, and modern artistic
- Consider four bridge forms: structural, open, semi-enclosed, and architectural
- Consider four bridge amenities: separated modes of travel, unique lighting, natural features, and sustainable features

Additionally, the Planning Commission and City Council advised the design team that the preferred bridge type must be iconic, evoke the spirit of Wilsonville, and serve as a regional landmark in the heart of Wilsonville.

Reference images provided to the public for the bridge types, forms, and amenities are included as Appendix 1.

This memo focuses on the concept evaluation of the three bridge types. The evaluation process considered constructability and traffic impacts, ODOT approval, future accommodations, and cost.



2.0 DESIGN STANDARDS

The proposed bridge is intended to serve multiple functions. It will provide a safe crossing of I-5 for pedestrians and bicyclists and will allow future use by autonomous transit vehicles (AVs). Any bridge type must meet functionality requirements and effectively address site constraints.

Through the initial public engagement, separated modes of travel was identified by the public as one of the top features to incorporate into the project. Based on this feedback the design team identified an 18 foot wide clear path. This width will provide one foot of shy, two 5-foot bicycle lanes, and seven feet for pedestrians (see Figure 1).

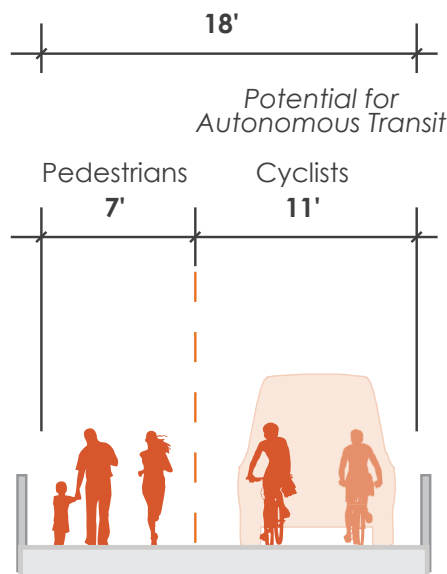


Figure 1
Section view

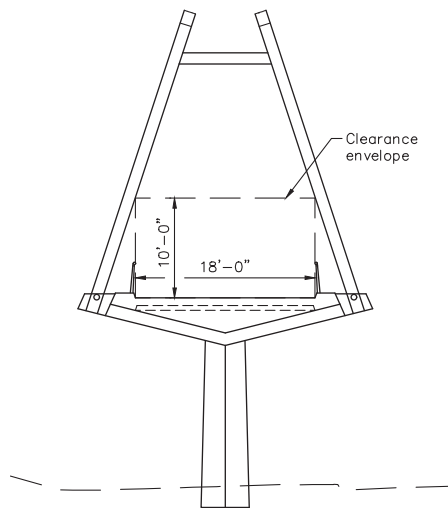
In coordination with South Metro Area Regional Transit (SMART), and research of pilot AV projects in other states, the 18-foot-wide clear path was determined to be sufficient to accommodate AVs. In the future, AVs would share the bicycle lane. As an AV uses the bridge, bicycles would merge with pedestrians. A full width separated AV lane requires a much wider bridge path and was determined to not be cost-effective. In addition, to maintain the usable path width for future users, the bridge supports cannot restrict the path width. Providing the additional width would have increased project costs and right-of-way (ROW) needs, while reducing the usable plaza.

Minimum vertical clearances, based on City, ODOT and AASHTO standards, are:

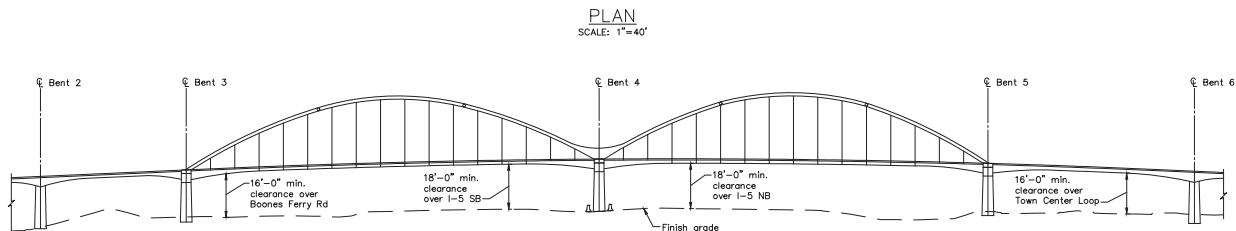
- 10 feet on the path (see Figure 2)
- 18 feet over I-5, including potential future additional lanes (see Figure 3)
- 16 feet over Boones Ferry Road and West Town Center Loop (see Figure 3)



← **Figure 2**
10-foot Minimum Vertical
Clearance Required over
Pedestrian Path



↓ **Figure 3**
18-foot Minimum Vertical
Clearance Required over
I-5 and 16-foot Minimum
Vertical Clearance over
City Streets



2.1 Bridge

The bridge will be designed in accordance with the following:

- 2017 American Association of State Highway and Transportation Officials (AASHTO) Load and Resistance Factor Design (LRFD) Bridge Design Specifications, 8th edition
- 2009 AASHTO LRFD Guide Specification for the Design of Pedestrian Bridges, 2nd edition
- 2011 AASHTO Guide Specifications for LRFD Seismic Bridge Design, 2nd edition

The design live loading is 90 pounds per square foot of pedestrian loading or a medium-duty maintenance or inspection (boom lift) vehicle. The seismic design criteria is for the bridge to remain serviceable following a Cascadia Subduction Zone seismic event and to avoid collapse during the 1,000-year return period earthquake.



2.2 Pedestrian Path

The pedestrian path will need to comply with the Americans with Disabilities Act (ADA). The constructed maximum slope along the path cannot exceed 5% and the constructed maximum cross slope cannot exceed 2%, as outlined in the AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities, 1st edition. To provide a construction tolerance of 0.5%, the maximum design longitudinal slope will be 4.5% and the maximum design cross slope will be 1.5%.

The minimum radius of curvature used on the path needs to accommodate both bicycle use and the design vehicle. A standard design speed of 18 miles per hour for cyclists using a 20-degree lean angle results in a radius of 60 feet, per the AASHTO Guide for the Development of Bike Facilities, 4th edition. The design speed and radius may be reduced to 14 miles per hour and 36 feet, respectively, as the path approaches the eastern plaza area. These radii will accommodate the H10 vehicle and AVs, which have minimal off-tracking.

3.0 BRIDGE CONCEPT ALTERNATIVE DESCRIPTIONS

Several span arrangements were investigated, but to achieve two roughly symmetrical, balanced main spans, the team selected a 170-foot span over I-5 southbound and Boones Ferry Road, and a 160-foot span over I-5 northbound for each alternative. The three bridge alternatives are all unique in form but have commonalities. All three bridge alternatives will have a concrete wearing surface and protective screening over I-5. Protective screening over City streets is not required by law but is recommended for safety.

All three bridge types will include at least two of the four bridge amenities identified by public feedback: unique lighting and separated modes of travel. The bridge lighting will be determined after a preferred alternative is selected. The modes of travel will be delineated using striping on the bridge deck.

The other two bridge amenities, natural features and sustainable features, along with the approach bridge spans, retaining walls, and ramps, will be evaluated after selecting a bridge alternative as part of the 30% Design.

Unique aspects for the three alternatives are described in the sections below.

3.1 Cable-Stayed

Cable-stayed bridges rely on rods or cables (stays) to support the deck system from tall pylons or towers. Cable-stayed structures can support long spans and have a shallow deck section.

The cable-stayed alternative consists of a center pylon located in the I-5 median with the main deck spans extending over I-5 northbound and southbound, and Boones Ferry Road. The guiding principles for the project determined during the initial public engagement, called for an iconic bridge design that evokes Wilsonville. In response to this guidance, the design team proposed a unique stay arrangement rather than a typical fan arrangement. A parabolic-shaped pylon configuration is proposed to accommodate the geometrics of the unique stay arrangement.

The pylon could be constructed of steel or precast concrete. The pylon extends approximately 84 feet above the deck with a total height of approximately 105 feet.

The deck will consist of a series of shallow precast concrete panels spanning between the hangers. These panels will be placed over a series of days. Once all of the precast panels are in place, a topping slab is cast on top of the panel and then the entire system is longitudinally post-tensioned together to minimize the possibility of cracks in the wearing surface.

This alternative is being evaluated as it is a distinctive signature-type structure, is capable of achieving the necessary span lengths, and can be designed with a very shallow deck system over I-5. The shallow deck minimizes the height the path needs to climb to pass over the freeway, and consequently, the length of the path, reducing required ROW and increasing usable area on the east approach for a gateway plaza.



Figure 4
*Isometric View of the
Cable-Stayed Alternative*

Cable-stayed options with two pylons were considered but not carried forward as they would have approximately doubled the cost for foundations and pylons



Figure 5
*View from the Path of the
Cable-Stayed Alternative*

The cable-stayed alternative offers a structural form as users travel between the stay cables and parabolic pylon.

Different stay colors are used in the renderings for visibility. This is also a feature that could be a different color based on public input. Full-sized renderings of this bridge type and plan, elevation, and section drawings are included in Appendix 2.



3.2 Tied-Arch

Arches span significant distances by transferring the vertical deck loads into axial compression (thrust) in the arch ribs. These structures can be extremely varied. For example, they can be formed out of concrete or steel; they can apply the thrust into the foundations or be tied together on itself like a bowstring; and the ribs can be fully below the deck, fully above the deck, or some combination thereof.

The tied-arch alternative presented here consists of two main spans with the arch ribs fully above the deck. The arch configuration will be a “basket handle” arrangement where the arch on either side is inclined inward such that the ribs will be connected at the top of the arch.

The tied-arch will have a similar precast concrete post-tensioned deck panel as previously discussed for the cable-stayed alternative.

Similar to the cable-stayed alternative, the tied-arch alternative is being evaluated as it is a distinctive signature-type structure capable of achieving the necessary span lengths and can be designed with a very shallow deck system over the freeway and Boones Ferry Road. The shallow deck system minimizes the height the path needs to climb to pass over the freeway, and consequently, the length of the path, reducing required ROW and increasing usable area on the east approach for a gateway plaza.



Figure 6
Isometric View of the Tied-Arch Alternative

The design team considered a one-span tied-arch that crossed Boones Ferry Road and both directions of I-5. This alternative was not presented for several reasons: constructability would be considerably more difficult; it would require shoring over I-5 for a long period of time; and construction costs would be notably higher. Also, the rise of the arch above the deck would feel disproportionately large for the site.

Other arch configurations were considered, such as a single arch rib spanning outward away from the deck, a single arch rib spanning diagonally across the deck, and two arches each leaning outward away from the deck. Constructability and cost were the primary reasons why these options were not carried forward.

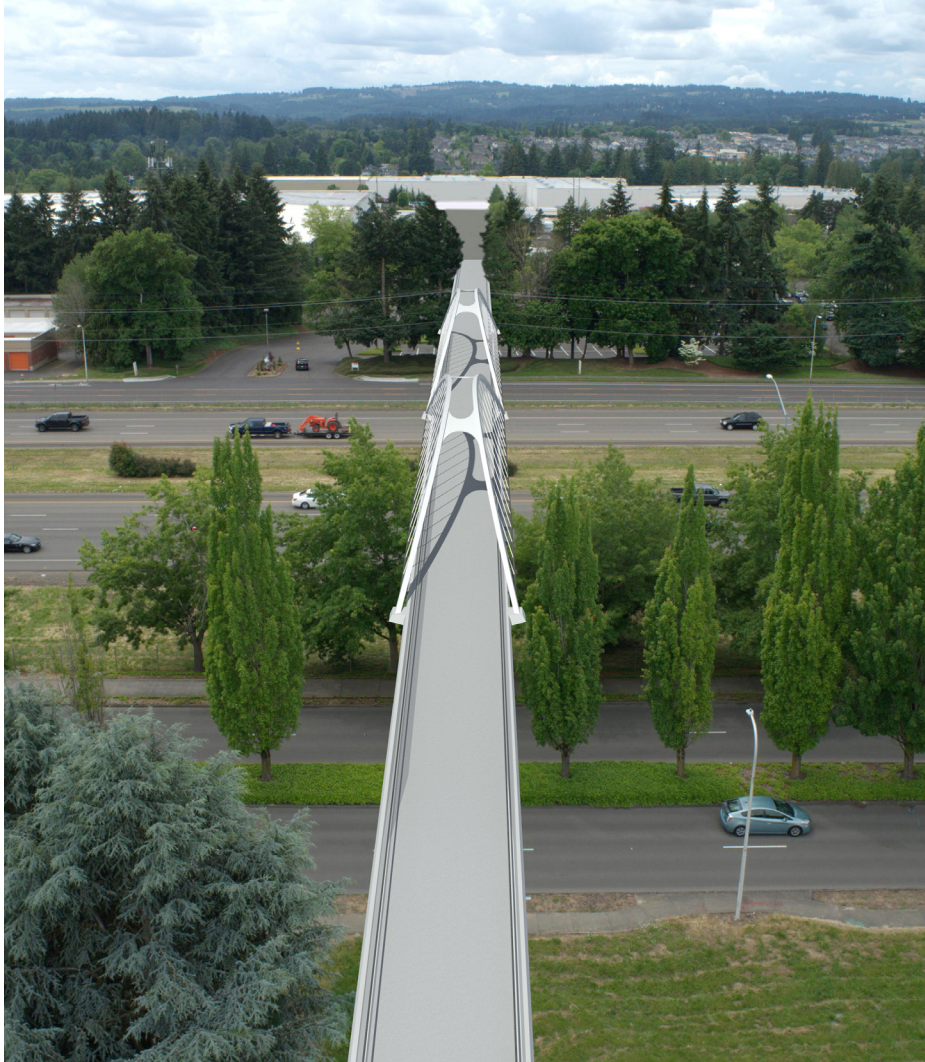


Figure 7

*View from the Path of the
Tied-Arch Alternative*

The tied-arch alternative offers a structural form as users travel between the arches.

Different tie colors are used in the renderings for visibility. This is also a feature that could be a different color based on public input. Full-sized renderings of this bridge type and plan, elevation, and section drawings are included in Appendix 3.



3.3 Modern Artistic

The modern artistic bridge concept will incorporate artistic and architectural features into the design to provide both the path users and vehicles approaching the bridge a unique experience. The main support structure of the bridge will be a traditional steel I-girder design with a concrete deck. The artistic and architectural features will be incorporated into the bridge railing and into an overhead canopy structure supported by the bridge.

The canopy structure will resemble a meandering river, reminding users of the nearby Willamette River, and will include lighting to highlight various parts of the artistic feature. The bridge railing structure will feature an open-air design to complement the artistic canopy. The bridge supports will feature spires or pylons to support the canopy and railing structure and balance the look of the artistic canopy. The artistic canopy could extend onto the approach spans.

The proposed design of the steel plate girders includes three girders and a concrete deck. To facilitate easier construction and minimize traffic impacts, the deck will consist of stay-in-place precast concrete deck form panels spanning the full width of the structure. Once all precast panels are in place, a concrete top slab will be cast on top of the panels.

The horizontal alignment will include a short curved section in the bridge near the west approach, which can be accommodated by varying the deck alignment on top of the girders. The bridge will be supported by concrete foundations at the same locations as for the cable-stayed and tied-arch alternatives.



Figure 8
*Isometric View of
the Modern Artistic
Alternative*

The profile for this alternative will be higher since the steel girders are deeper than the cable-stayed or tied-arch decks. This will result in longer approaches to meet ADA grade requirements.



Figure 9

*View from the Path of the
Modern Artistic Alternative*

The modern artistic alternative offers a combination of the semi-enclosed and architectural bridge form by use of the meandering river canopy structure overhead and protective screening.

Full-sized renderings of this bridge type and plan, elevation, and section drawings are included in Appendix 4.

3.4 Evoking Wilsonville

All three bridge alternatives have been developed to evoke the spirit of Wilsonville. Wilsonville is a community defined by connections. The Boones Ferry was the original way travelers crossed the Willamette River into the City. When I-5 became the new connection across the river it unintentionally bisected the City. This new I-5 Pedestrian Bridge will create a safe, vital connection for the community across I-5.

This bridge will become a new connection affirming and enhancing Wilsonville to its community and travelers throughout the Willamette Valley.

Once a bridge type is selected, other opportunities exist to speak to the heritage, history and future of Wilsonville such as custom designed bridge rail and screening, patterning and shaping the columns, and pylons at the bridge supports to symbolize the Boones Ferry, tying the past of Wilsonville to the future. See Appendix 5 for more information on how each bridge evokes Wilsonville.



4.0 CONSTRUCTABILITY AND TRAFFIC IMPACTS

Constructability is one major factor because of the need to work over I-5 and the related traffic impacts. Developing a constructable solution that is acceptable to the Oregon Department of Transportation's (ODOT) Mobility Advisory Committee (MAC) will be a key element for a successful project. Constructability concerns for Boones Ferry Road and West Town Center Loop are anticipated to be similar to that of I-5.

The foundations for all three bridge types are assumed to be drilled shafts. Drilled shafts are more easily constructed in constrained settings, such as along I-5, but they are more expensive than driven piling. Given the proximity to traffic, shallow gravel layers, and seismic loads, drilled shafts are preferred. Drilled shafts are a common construction technique and don't differentiate the alternatives.

4.1 Cable-Stayed

The cable-stayed bridge construction has two major elements to consider related to this factor: construction of the pylon and placement of the precast concrete deck panels.

The main pylon will be constructed in the median of I-5. Access for constructing the foundations is adequate in the existing median. It is anticipated that the pylon would be constructed of concrete members or bolted and/or welded steel members. Lifting and placing the pieces would require a large crane in the median. It is likely that nighttime lane closures would be required on I-5 for safety of the traveling public and construction access.

The placement of the precast concrete deck panels would start at the pylon and move outward. As one deck panel is placed on one side, the similar panel on the opposite side of the pylon would be placed to balance the pylon loading. This sequence would require nighttime lane closures in both directions of I-5. A significant temporary support structure would be required around the pylon in the median to stabilize the pylon and cantilevered deck panels during placement. The portion of roadway under the deck panel being placed would need to be closed until the connections are complete.

The cable-stayed bridge alternative has the most complex construction sequencing of the three bridge alternatives. This alternative is likely to have the most lane closures but does not require any full closures of I-5.

4.2 Tied-Arch

The tied-arch bridge construction has two major elements to consider related to this factor: construction of the arches and placement of the deck panels.



The arch ribs for each span would be constructed on the shoulder or median of I-5. The arches would be lifted and placed on the foundations, likely requiring two cranes. Temporary supports for stability in this stage would be required. Deck panels would be placed after the tied-arches are placed.

The lifting and placement of the tied-arches would require a full closure of I-5 in each direction, anticipated to be one night for each span. This closure would likely be from a few hours to up to a full night. It is likely that nighttime lane closures would be required on I-5 for deck panel placement and construction access.

The tied-arch would have similar deck panels to the cable-stayed alternative, but the deck panels could be placed sequentially in each arch span. This makes construction less complex than the cable-stayed bridge.

The tied-arch alternative is considered less complex construction than the cable-stayed bridge alternative, but the full closure of I-5 is considered a more severe traffic impact than the additional lane closures required for the cable-stayed alternative.

4.3 Modern Artistic

The modern artistic bridge construction has two major elements to consider related to this factor: placement of the steel girders and placement of the deck panels.

The modern artistic bridge is a conventional steel girder bridge that is constructed frequently on and over state highways. The steel girders would be lifted and set in place using a limited-duration closure of up to a few hours. To minimize construction impacts, the design would connect the girders together on the shoulder of the freeway and set them as a group.

The deck would use thin, precast concrete members to serve as deck forms and facilitate quick construction over I-5 by eliminating the need to construct custom deck forms over the freeway, reducing traffic impacts. Lane closures over I-5 would be required while placing the deck panels, similar to the other two alternatives. The construction and placement of these panels is anticipated to be quicker than the other alternatives.

The modern artistic alternative uses the least complex construction techniques but would result in similar traffic impacts to the tied-arch alternative.

5.0 ODOT APPROVAL

The pedestrian bridge over I-5 will be owned and maintained by the City of Wilsonville; however, due to its placement over an ODOT facility, coordination with ODOT is required for the project to be approved and constructed. All work within ODOT ROW requires a road permit; additionally, plans and permit applications, including State Historic

Preservation Office (SHPO), environmental permits, and an ODOT ROW permit, will require ODOT review.

As discussed in Section 2.0, ODOT stipulates that 18'-0" of vertical clearance would be required over I-5. The design team prepared profiles of the three alternatives and presented the controlling profile to the MAC on May 14, 2020. The MAC gave a Record of Support for the project and the new vertical clearance constraint over I-5. The design team will return to the MAC as traffic control plans and construction techniques are developed for the preferred alternative.

Another coordination item the team vetted with ODOT was constructing a pier in the median. The pier will be in the clear zone, which will require concrete barriers.

ODOT will be involved as the project progresses, and they will have review opportunities at milestone submissions. It is anticipated that ODOT will be highly focused on the traffic impacts to I-5.

All three bridge alternatives have been developed to accomplish the City's goals while also meeting ODOT standards to be approved for a ROW permit.

The cable-stayed alternative may be the easiest to gain approval due to the traffic impacts being limited to lane closures only, while the other two alternatives require directional full closures on I-5.

While there is precedent for constructing tied-arches and steel girder bridges over highways in Oregon, these two alternatives will likely be more difficult to gain approval due to the required directional full closures of I-5.

Regardless of the alternative selected, the design will be focused on active communication with ODOT through the design process to gain their approval and reduce traffic impacts on I-5 to the greatest extent possible.

6.0 FUTURE ACCOMMODATIONS

Future developments were considered while developing the bridge alternatives. The first consideration was the feasibility for AVs on the bridge in collaboration with SMART. As previously discussed in Section 2.0, the bridge width for all alternatives was widened from 14 feet to 18 feet to separate modes of travel. This proposed width of 18 feet is sufficient to accommodate an AV.

Also as discussed previously, all three bridge profiles accommodate the future widening of I-5 on either side of the existing lanes in both directions of travel and provide a minimum of 18 feet of vertical clearance over the existing and future lanes.

The Town Center Plan also reconfigures West Town Center Loop near the east landing and gateway plaza. All three alternatives accommodate the future West Town Center Loop alignment.



7.0 COST SUMMARY

The cost estimates include items related to the main span of the bridge only and do not include all needed construction items, such as mobilization, traffic control, approach bridge spans and retaining walls, at-grade path, ROW acquisition, and Wilsonville Town Center plaza construction. The cost estimates are intended to be comparative in nature for the purpose of selecting a main span structure type.

The cost estimates' unit prices are based on previous pedestrian bridge projects completed by DOWL, historical unit cost data summarized by ODOT for bridge projects and increased for inflation and unique challenges for this site. The cost of the main spans over I-5 were estimated using assumed component sizes and weights based on previous bridge designs and preliminary analyses. The quantities used in the cost estimates are based on preliminary design assumptions. Unit costs and quantities will be refined following selection of a bridge concept.

All cost estimates include a contingency range for each bid item of +10% to +30% or +40% to account for uncertainty in this early stage of the project. The planning-level construction cost estimates for the three proposed bridge types are provided in Appendix 6.

The tied-arch bridge alternative is the most expensive of the three bridge types. The modern artistic alternative is the least expensive. Relative cost comparison is shown below in Table 1.

Cable-Stayed Bridge	Tied-Arch Bridge	Modern Artistic Bridge
+20% to +25%	+60% to +65%	0% to +10%

Table 1
Relative Cost Comparison

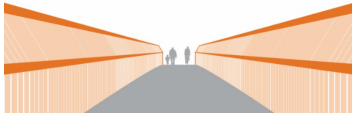
APPENDIX 1

Stock Images

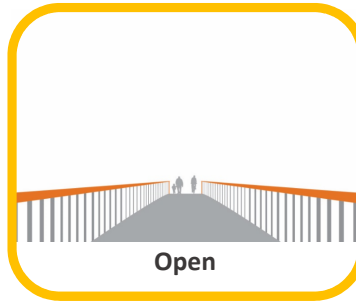


BRIDGE AND PLAZA ELEMENTS

Bridge Form



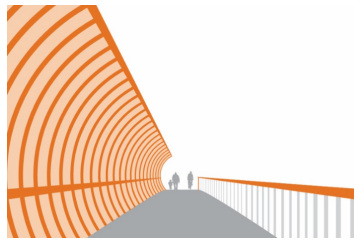
Solid Walled



Open



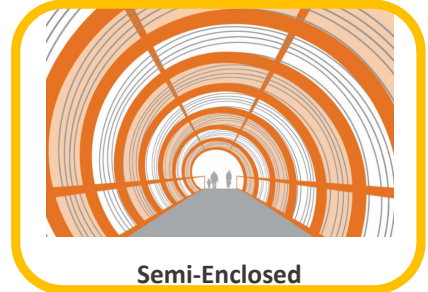
Architectural



Semi-Protected



Structural



Semi-Enclosed

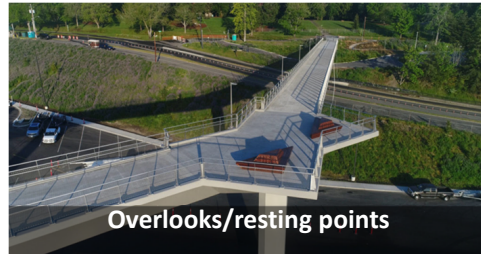
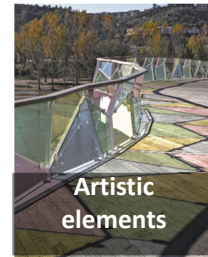


Other



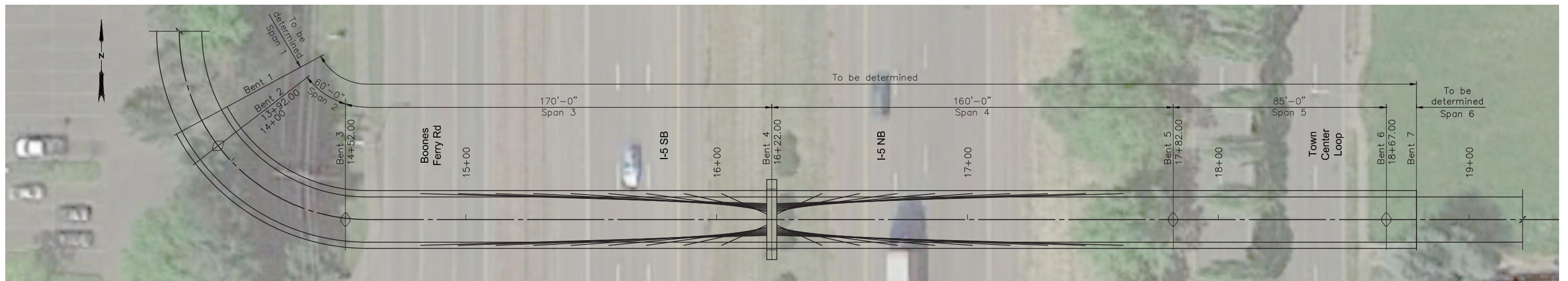
BRIDGE AND PLAZA ELEMENTS

Bridge Amenities

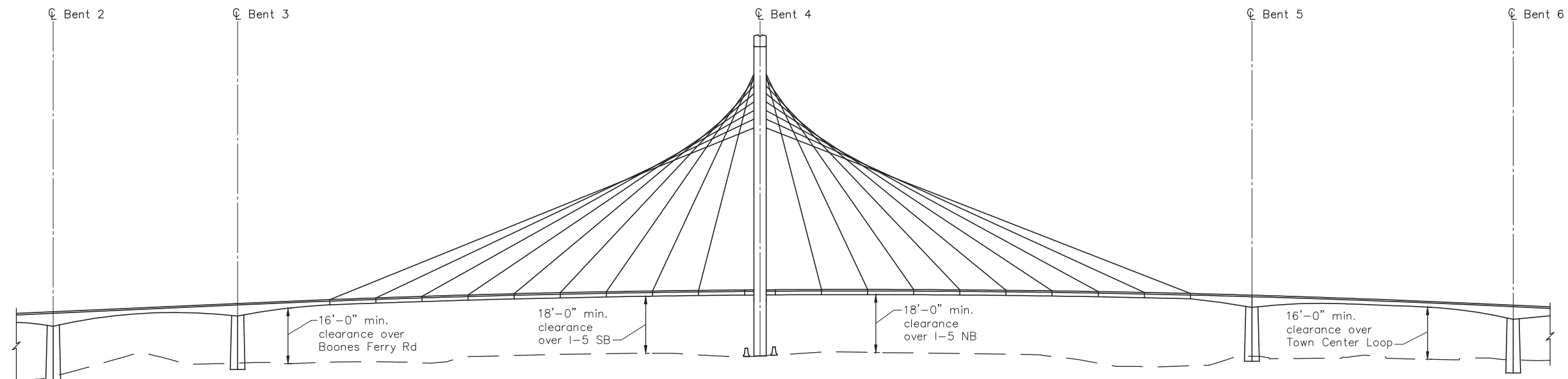


APPENDIX 2

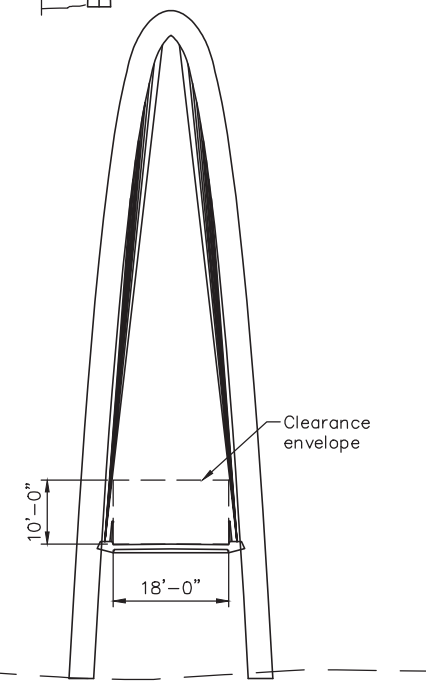
Cable-Stayed



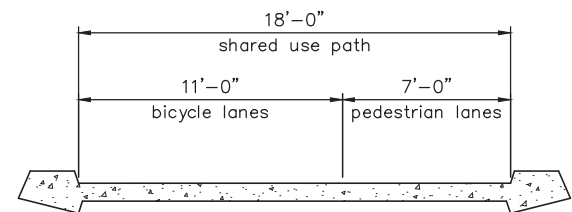
PLAN
SCALE: 1"=40'



ELEVATION
SCALE: 1"=40'



TYPICAL SECTION
SCALE: 1"=30'

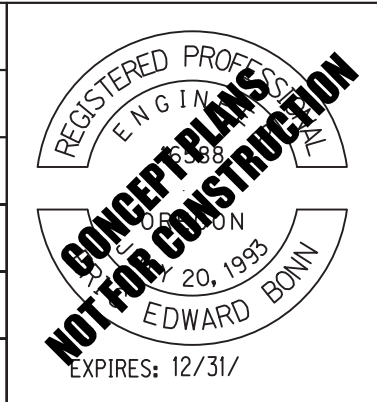


DECK SECTION
SCALE: 1/8"=1'-0"



SCALE WARNING
If scale bar doesn't measure one inch then drawing is not to scale

STRUCTURE NO.	_____
BDS DWG NO.	_____
CALC. BOOK	_____
HWY:	_____
M.P.:	_____
COUNTY	Clackamas
DATE	July 2020



DOWL www.dowl.com

I-5 PEDESTRIAN BRIDGE: BARBER STREET TO WILSONVILLE TOWN CENTER
CLACKAMAS COUNTY

Designer: Eric Bonn, PE Reviewer: Jared Trowbridge, PE
 Drafter: Yuka Garzenelli Checker: Kenton Alldritt, PE

CABLE-STAY ALTERNATIVE

SHEET NO. FIG. 1







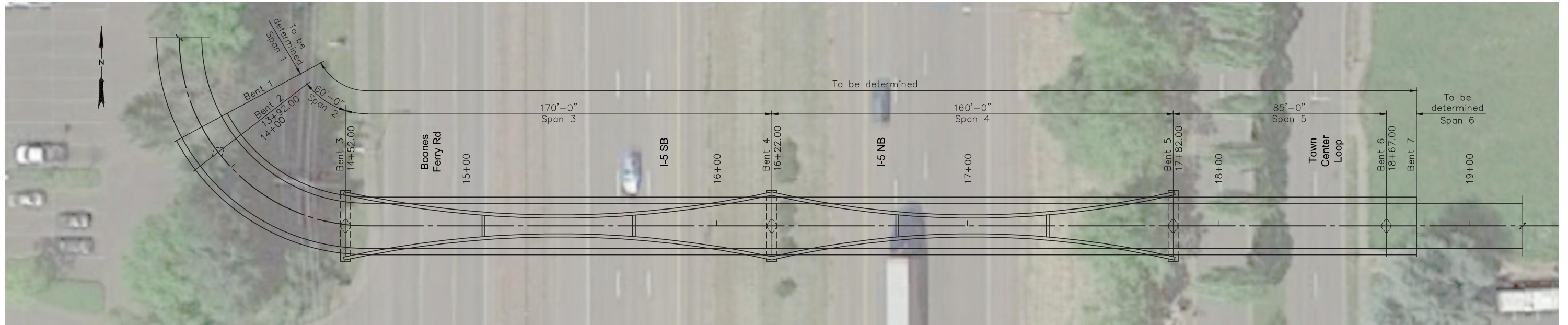
LES SCHWAB Tires

LES SCHWAB TIRE CENTER

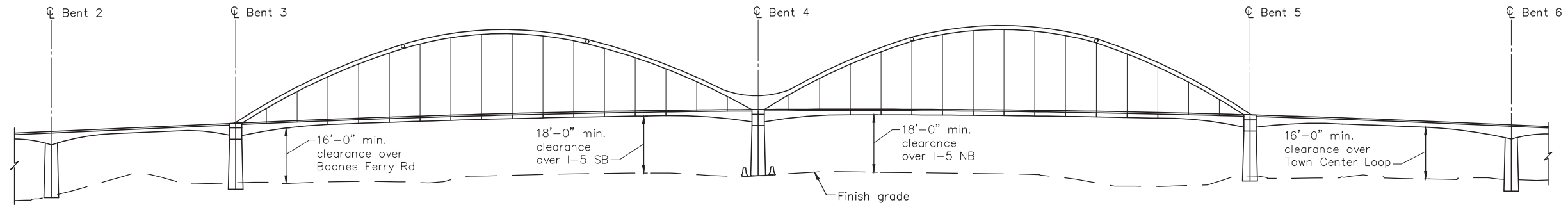


APPENDIX 3

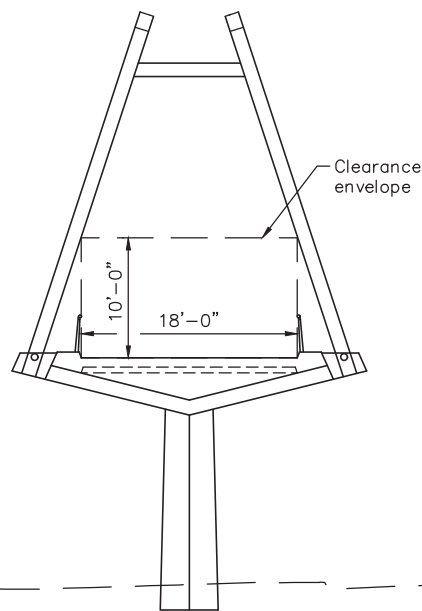
Tied Arch



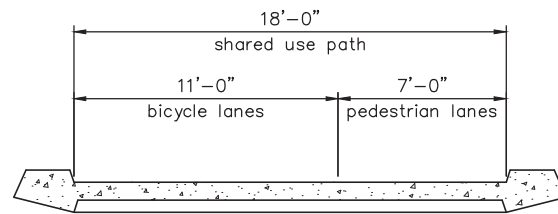
PLAN
SCALE: 1"=40'



ELEVATION
SCALE: 1"=40'



TYPICAL SECTION
SCALE: 1/16"=1'-0"

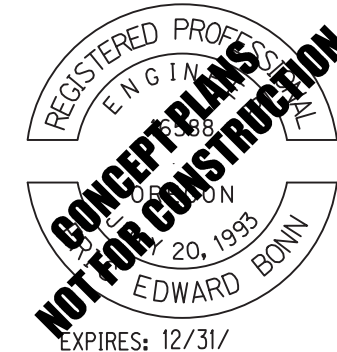


DECK SECTION
SCALE: 1/8"=1'-0"



SCALE WARNING
If scale bar doesn't measure one inch then drawing is not to scale

STRUCTURE NO.	_____
BDS DWG NO.	_____
CALC. BOOK	_____
HWY:	_____
M.P.:	_____
COUNTY	Clackamas
DATE	July 2020



**I-5 PEDESTRIAN BRIDGE: BARBER STREET
TO WILSONVILLE TOWN CENTER
CLACKAMAS COUNTY**

Designer: Eric Bonn, PE Reviewer: Jared Trowbridge, PE
 Drafter: Yuka Garzenelli Checker: Kenton Alldritt, PE

ARCH ALTERNATIVE

SHEET NO.
FIG. 2







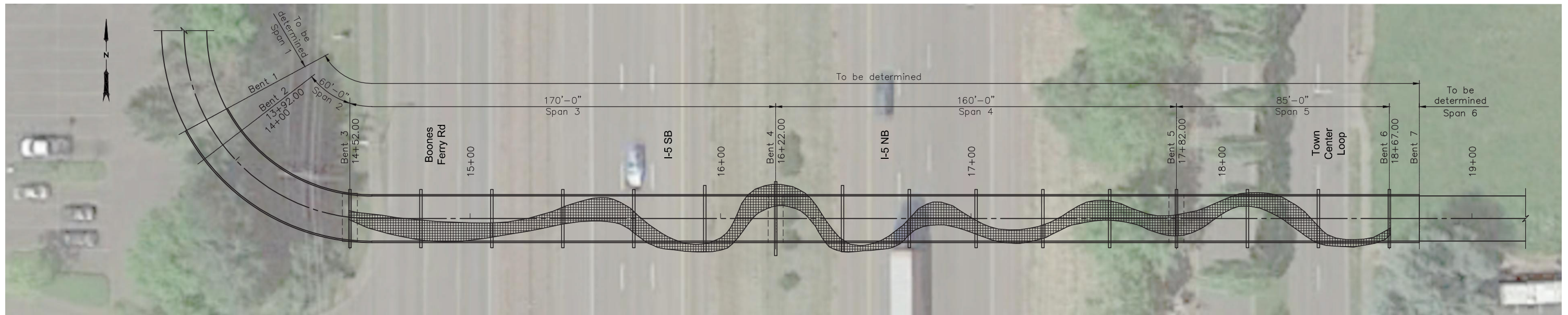
LES SCHWAB tires

LES SCHWAB TIRE CENTER

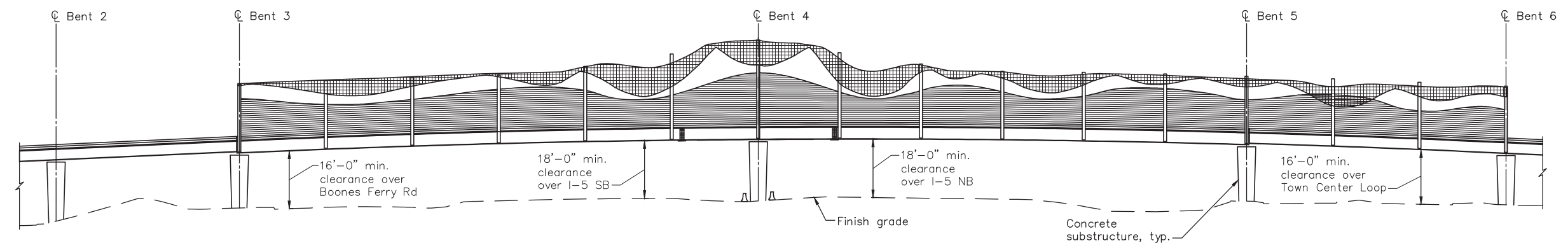


APPENDIX 4

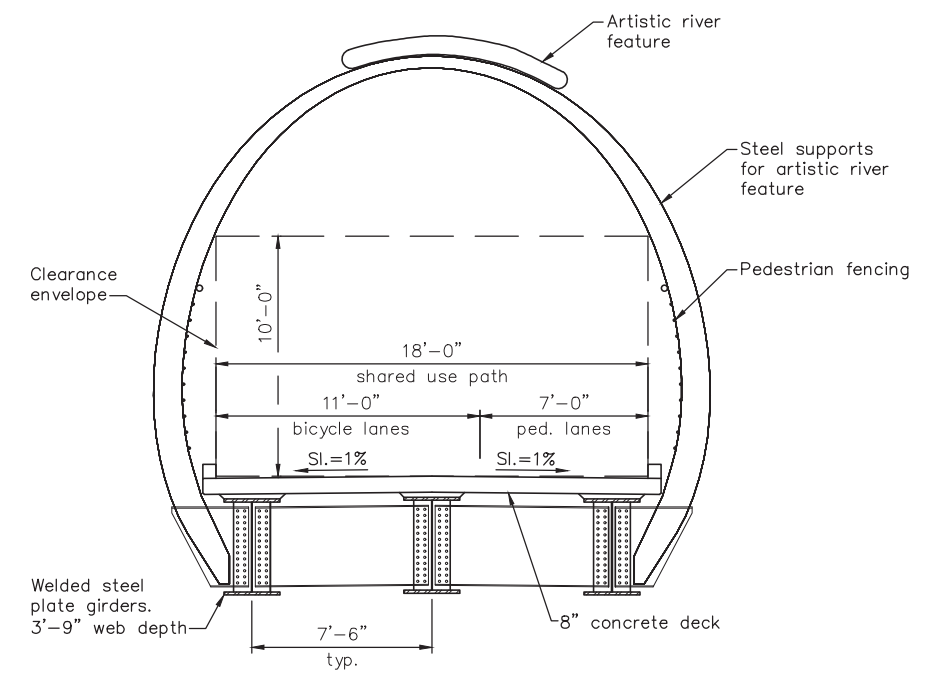
Modern Artistic



PLAN
SCALE: 1"=40'



ELEVATION
SCALE: 1"=40'




TYPICAL SECTION
SCALE: 1/8"=1'-0"



SCALE WARNING
If scale bar doesn't measure one inch then drawing is not to scale

STRUCTURE NO.	—
BDS DWG NO.	—
CALC. BOOK	—
HWY:	—
M.P.:	—
COUNTY	Clackamas
DATE	July 2020



 www.dowl.com	
I-5 PEDESTRIAN BRIDGE: BARBER STREET TO WILSONVILLE TOWN CENTER CLACKAMAS COUNTY	
Designer: Kenton Alldritt, PE	Reviewer: Jared Trowbridge, PE
Drafter: Yuka Garzenelli	Checker: Eric Bonn, PE
MODERN ARTISTIC ALTERNATIVE	
SHEET NO. FIG. 3	

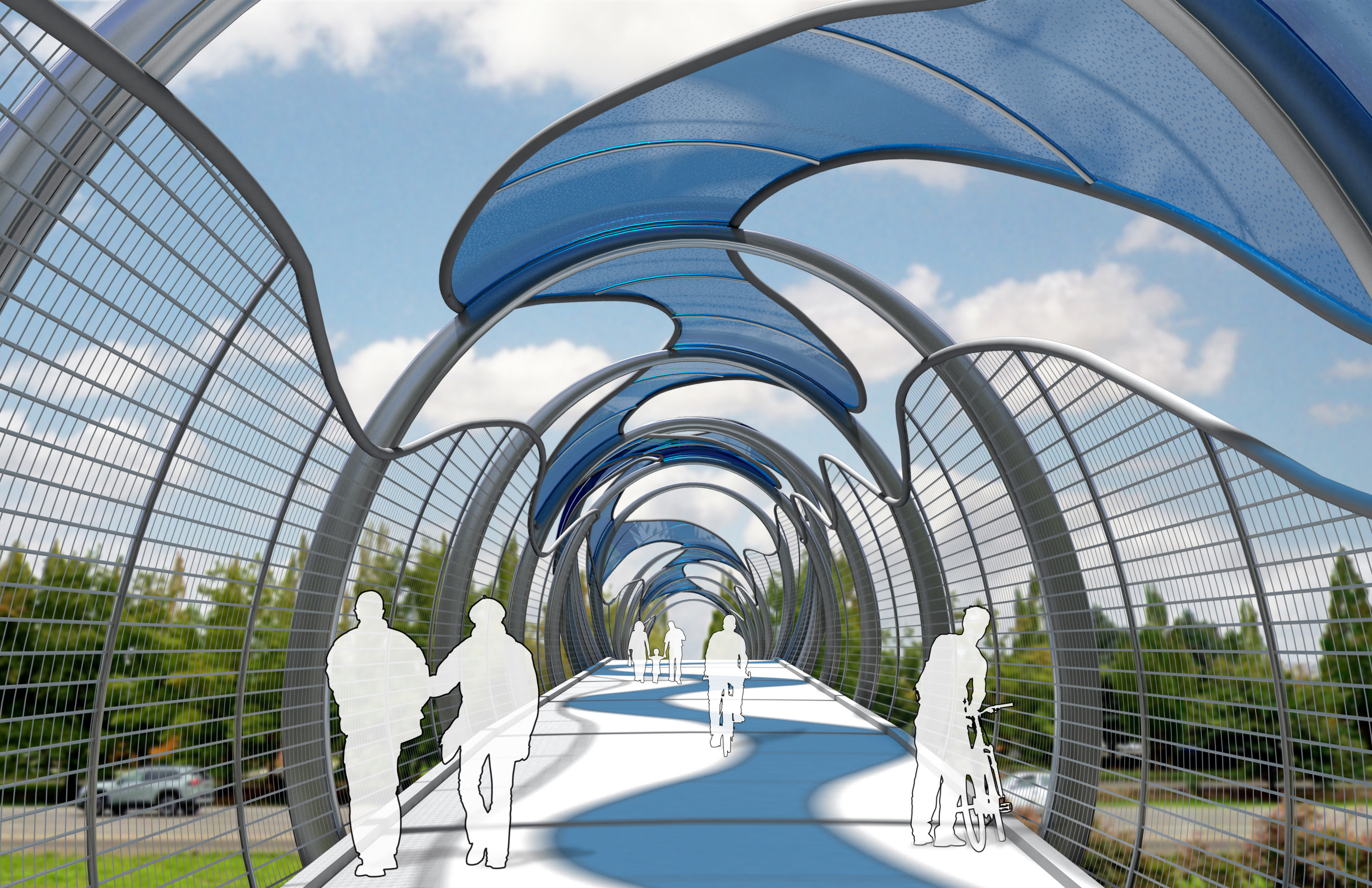






LES SCHWAB tires

LES SCHWAB tires



APPENDIX 5

Evoking Wilsonville



EVOKING WILSONVILLE

Wilsonville is a community defined by connections. The Boones Ferry was the original way travelers crossed the Willamette River into the City. When I-5 became the new connection across the river it unintentionally bisected the City. This new I-5 Pedestrian Bridge will create a safe, vital connection for the community across I-5.

This bridge will become a new connection affirming and enhancing Wilsonville to its community and travelers throughout the Willamette Valley.

Other opportunities exist to speak to the heritage, history and future of Wilsonville such as custom designed bridge rail and screening, patterning and shaping the columns, and pylons at the bridge supports to symbolize the Boones Ferry, tying the past of Wilsonville to the future.



Cable-Stayed Bridge

In response to the public feedback in late 2019, this bridge presents a structurally impressive, modern design with distinctive elements. For example, the stay cable arrangement is unique to Wilsonville and all of Oregon. The cables could be reminiscent of the old cable system used by the Boones Ferry. The structural nature will draw bicyclists and pedestrians to the bridge, and spur Town Center redevelopment.



Tied Arch Bridge

In response to the public feedback in late 2019, this bridge has a form that is clean, and elegant yet still structurally impressive. While Oregon has similar single span tied arch bridges, the two-span configuration, and detailing of the arches and columns would include unique shapes and colors to reflect Wilsonville. The structural nature will draw bicyclists and pedestrians to the bridge, and spur Town Center redevelopment.



Modern Artistic Bridge

In response to the public feedback in late 2019, this bridge is explicitly artistic using a traditional steel girder bridge type as the canvas. The artistic ribbon pays homage to the history of Wilsonville: the Willamette River as a connection or the wind blowing through the Willamette Valley. Unlike the other two bridge types, it will not be the structural feel that draws users to this bridge, but the artistic features. With a simpler structure, more opportunities exist to enhance the bridge rail, columns and other elements.

APPENDIX 6

Cost Estimates



Cable-Stayed Alternative



I5 Wilsonville Pedestrian Bridge
Bridge
Clackamas County

Engineer's Cost Estimate (Concept)
Date 7/31/2020
Cable-Stay Alternative*

Spec. No.	Item No.	Item	Bid Unit	Est. Unit	Quantity	Unit Price	Contingency		Total Price	
							(low)	(high)	(low)	(high)
CABLE-STAY BRIDGE										
00512	10	Furnish Drilling Equipment	Lump Sum	Lump Sum	1	\$ 75,000.00	10%	30%	\$ 82,500.00	\$ 97,500.00
00512	20	Drilled Shaft Concrete	Lump Sum	Cu Yd	330	\$ 600.00	10%	30%	\$ 217,800.00	\$ 257,400.00
00512	30	Drilled Shaft Reinforcement	Lump Sum	Lbs	100,000	\$ 1.50	10%	30%	\$ 165,000.00	\$ 195,000.00
00512	40	CSL Test Access Tubes	Foot	Foot	1,600	\$ 15.00	10%	30%	\$ 26,400.00	\$ 31,200.00
00512	50	CSL Tests	Each	Each	4	\$ 1,200.00	10%	30%	\$ 5,280.00	\$ 6,240.00
00512	60	Drilled Shaft Excavation, 72 inch Diameter	Foot	Foot	100	\$ 800.00	10%	30%	\$ 88,000.00	\$ 104,000.00
00512	70	Drilled Shaft Excavation, 96 inch Diameter	Foot	Foot	120	\$ 1,200.00	10%	30%	\$ 158,400.00	\$ 187,200.00
00530	80	Reinforcement, Grade 60	Lump Sum	Lbs	181,000	\$ 1.60	10%	30%	\$ 318,560.00	\$ 376,480.00
00540	90	Deck Concrete, Class HPC4500	Lump Sum	Cu Yd	101	\$ 1,000.00	10%	30%	\$ 111,100.00	\$ 131,300.00
00540	100	General Structural Concrete, Class 4000	Lump Sum	Cu Yd	25	\$ 1,000.00	10%	30%	\$ 27,500.00	\$ 32,500.00
00540	110	General Structural Concrete, Class 5000	Lump Sum	Cu Yd	285	\$ 1,500.00	10%	30%	\$ 470,250.00	\$ 555,750.00
00541	120	Temporary Pylon Support	Lump Sum	Lump Sum	1	\$ 200,000.00	10%	40%	\$ 220,000.00	\$ 280,000.00
00550	130	Precast Concrete Deck Panels	Each	Sq Ft	6,210	\$ 85.00	10%	40%	\$ 580,635.00	\$ 738,990.00
00555	140	Deck Post-Tensioning	Lump Sum	Lbs	17,000	\$ 2.50	10%	40%	\$ 46,750.00	\$ 59,500.00
00560	150	Suspender Cables	Lump Sum	Lbs	37,000	\$ 13.50	10%	40%	\$ 549,450.00	\$ 699,300.00
00581	160	Bridge Drains	Each	Each	4	\$ 10,000.00	10%	30%	\$ 44,000.00	\$ 52,000.00
00583	170	1.5 Inch Electrical Conduit	Foot	Foot	1,500	\$ 10.00	10%	30%	\$ 16,500.00	\$ 19,500.00
00585	180	Type "C" Preformed Compression Joint Seals	Lump Sum	Foot	40	\$ 200.00	10%	30%	\$ 8,800.00	\$ 10,400.00
00587	190	Ornamental Protective Fencing and Handrail	Lump Sum	Foot	660	\$ 400.00	10%	40%	\$ 290,400.00	\$ 369,600.00
00970	200	Pylon & Bridge Lighting	Lump Sum	Lump Sum	1	\$ 100,000.00	10%	40%	\$ 110,000.00	\$ 140,000.00

Total of Biddable Items, PE, and CE (2020 Dollars) **\$ 3,537,300.00 \$ 4,343,860.00**

* Note: Cost estimate is for bridge type comparison purposes. Estimate includes costs for the main bridge span and does not include costs for all needed construction items for the I-5 Pedestrian Bridge and Gateway Plaza project. Items not included in estimate include: mobilization, traffic control, approach bridge spans, retaining walls, at-grade path, right-of-way acquisition and east Gateway Plaza construction. A full construction cost estimate will be provided with the 30% Design Submittal.





Tied Arch Alternative



15 Wilsonville Pedestrian Bridge
Bridge
Clackamas County

Engineer's Cost Estimate (Concept)
Date 7/31/2020
Tied Arch Alternative*

Spec. No.	Item No.	Item	Bid Unit	Est. Unit	Quantity	Unit Price	Contingency		Total Price	
							(low)	(high)	(low)	(high)
TIED ARCH BRIDGE										
00512	10	Furnish Drilling Equipment	Lump Sum	Lump Sum	1	\$ 75,000.00	10%	30%	\$ 82,500.00	\$ 97,500.00
00512	20	Drilled Shaft Concrete	Lump Sum	Cu Yd	220	\$ 600.00	10%	30%	\$ 145,200.00	\$ 171,600.00
00512	30	Drilled Shaft Reinforcement, Grade 60	Lump Sum	Lbs	65,000	\$ 1.50	10%	30%	\$ 107,250.00	\$ 126,750.00
00512	40	CSL Test Access Tubes	Foot	Foot	1,080	\$ 15.00	10%	30%	\$ 17,820.00	\$ 21,060.00
00512	50	CSL Tests	Each	Each	3	\$ 1,100.00	10%	30%	\$ 3,630.00	\$ 4,290.00
00512	60	Drilled Shaft Excavation, 72 inch Diameter	Foot	Foot	100	\$ 800.00	10%	30%	\$ 88,000.00	\$ 104,000.00
00512	70	Drilled Shaft Excavation, 96 inch Diameter	Foot	Foot	60	\$ 1,200.00	10%	30%	\$ 79,200.00	\$ 93,600.00
00530	70	Reinforcement, Grade 60	Lump Sum	Lbs	120,000	\$ 1.60	10%	30%	\$ 211,200.00	\$ 249,600.00
00540	80	Deck Concrete, Class HPC4500	Lump Sum	Cu Yd	102	\$ 1,000.00	10%	30%	\$ 112,200.00	\$ 132,600.00
00540	90	General Structural Concrete, Class 4000	Lump Sum	Cu Yd	32	\$ 1,000.00	10%	30%	\$ 35,200.00	\$ 41,600.00
00540	100	General Structural Concrete, Class 5000	Lump Sum	Cu Yd	160	\$ 1,500.00	10%	30%	\$ 264,000.00	\$ 312,000.00
00541	110	Temporary Arch Support	Lump Sum	Lump Sum	1	\$ 50,000.00	10%	30%	\$ 55,000.00	\$ 65,000.00
00550	120	Precast Concrete Deck Panels	Lump Sum	Sq Ft	5,800	\$ 85.00	10%	30%	\$ 542,300.00	\$ 640,900.00
00555	130	Arch Post-tensioning	Lump Sum	Lbs	3,500	\$ 9.00	10%	30%	\$ 34,650.00	\$ 40,950.00
00555	140	Deck Post-tensioning	Lump Sum	Lbs	11,000	\$ 9.00	10%	30%	\$ 108,900.00	\$ 128,700.00
00560	150	Structural Steel Arches	Lump Sum	Lbs	152,000	\$ 10.00	10%	30%	\$ 1,672,000.00	\$ 1,976,000.00
00560	160	Suspender Cables	Lump Sum	Lbs	25,000	\$ 13.50	10%	30%	\$ 371,250.00	\$ 438,750.00
00560	170	Steel Floorbeams	Lump Sum	Lbs	110,000	\$ 5.00	10%	30%	\$ 605,000.00	\$ 715,000.00
00581	170	Bridge Drains	Each	Each	4	\$ 10,000.00	10%	30%	\$ 44,000.00	\$ 52,000.00
00583	180	1.5 Inch Electrical Conduit	Foot	Foot	1,500	\$ 10.00	10%	30%	\$ 16,500.00	\$ 19,500.00
00585	190	Type "C" Preformed Compression Joint Seals	Lump Sum	Foot	40	\$ 200.00	10%	30%	\$ 8,800.00	\$ 10,400.00
00587	200	Ornamental Protective Fencing and Handrail	Lump Sum	Foot	660	\$ 400.00	10%	30%	\$ 290,400.00	\$ 343,200.00
00970	210	Bridge Lighting	Lump Sum	Lump Sum	1	\$ 100,000.00	10%	40%	\$ 110,000.00	\$ 140,000.00

Total of Biddable Items, PE, and CE (2020 Dollars) \$ 5,005,000.00 \$ 5,925,000.00

* Note: Cost estimate is for bridge type comparison purposes. Estimate includes costs for the main bridge span and does not include costs for all needed construction items for the I-5 Pedestrian Bridge and Gateway Plaza project. Items not included in estimate include: mobilization, traffic control, approach bridge spans, retaining walls, at-grade path, right-of-way acquisition and east Gateway Plaza construction. A full construction cost estimate will be provided with the 30% Design Submittal.





Modern Artistic Alternative



15 Wilsonville Pedestrian Bridge
Bridge
Clackamas County

Engineer's Cost Estimate (Concept)
Date 7/31/2020
Modern Artistic Alternative*

Spec. No.	Item No.	Item	Bid Unit	Est. Unit	Quantity	Unit Price	Contingency		Total Price	
							(low)	(high)	(low)	(high)
MODERN ARTISTIC BRIDGE										
00512	10	Furnish Drilling Equipment	Lump Sum	Lump Sum	1	\$ 75,000.00	10%	30%	\$ 82,500.00	\$ 97,500.00
00512	20	Drilled Shaft Concrete	Lump Sum	Cu Yd	200	\$ 600.00	10%	30%	\$ 132,000.00	\$ 156,000.00
00512	30	Drilled Shaft Reinforcement, Grade 60	Lump Sum	Lbs	50,000	\$ 1.50	10%	30%	\$ 82,500.00	\$ 97,500.00
00512	40	CSL Test Access Tubes	Foot	Foot	1,080	\$ 15.00	10%	30%	\$ 17,820.00	\$ 21,060.00
00512	50	CSL Tests	Each	Each	3	\$ 1,200.00	10%	30%	\$ 3,960.00	\$ 4,680.00
00512	60	Drilled Shaft Excavation, 72 inch Diameter	Foot	Foot	180	\$ 800.00	10%	30%	\$ 158,400.00	\$ 187,200.00
00530	70	Reinforcement, Grade 60	Lump Sum	Lbs	81,000	\$ 1.60	10%	30%	\$ 142,560.00	\$ 168,480.00
00540	80	Deck Concrete, Class HPC4500	Lump Sum	Cu Yd	105	\$ 1,000.00	10%	30%	\$ 115,500.00	\$ 136,500.00
00540	90	General Structural Concrete, Class 4000	Lump Sum	Cu Yd	65	\$ 1,200.00	10%	30%	\$ 85,800.00	\$ 101,400.00
00550	100	Precast Deck Panels	Lump Sum	Sq Ft	6,350	\$ 80.00	10%	30%	\$ 558,800.00	\$ 660,400.00
00560	110	Steel Plate Girder	Lump Sum	Lbs	475,000	\$ 1.75	10%	30%	\$ 914,375.00	\$ 1,080,625.00
00581	120	Bridge Drains	Each	Each	4	\$ 10,000.00	10%	30%	\$ 44,000.00	\$ 52,000.00
00582	130	Bearing Devices	Each	Each	9	\$ 6,000.00	10%	30%	\$ 59,400.00	\$ 70,200.00
00583	140	1.5 Inch Electrical Conduit	Foot	Foot	1,500	\$ 10.00	10%	30%	\$ 16,500.00	\$ 19,500.00
00585	150	Type "C" Preformed Compression Joint Seals	Lump Sum	Foot	40	\$ 200.00	10%	30%	\$ 8,800.00	\$ 10,400.00
00587	160	Ornamental Protective Fencing and Handrail	Lump Sum	Foot	660	\$ 400.00	10%	40%	\$ 290,400.00	\$ 369,600.00
	170	Artistic Feature with Bridge Lighting	Lump Sum	Lump Sum	1	\$ 250,000.00	10%	40%	\$ 275,000.00	\$ 350,000.00

Total of Biddable Items (2020 Dollars) \$ 2,988,300.00 \$ 3,583,000.00

* Note: Cost estimate is for bridge type comparison purposes. Estimate includes costs for the main bridge span and does not include costs for all needed construction items for the I-5 Pedestrian Bridge and Gateway Plaza project. Items not included in estimate include: mobilization, traffic control, approach bridge spans, retaining walls, at-grade path, right-of-way acquisition and east Gateway Plaza construction. A full construction cost estimate will be provided with the 30% Design Submittal.

