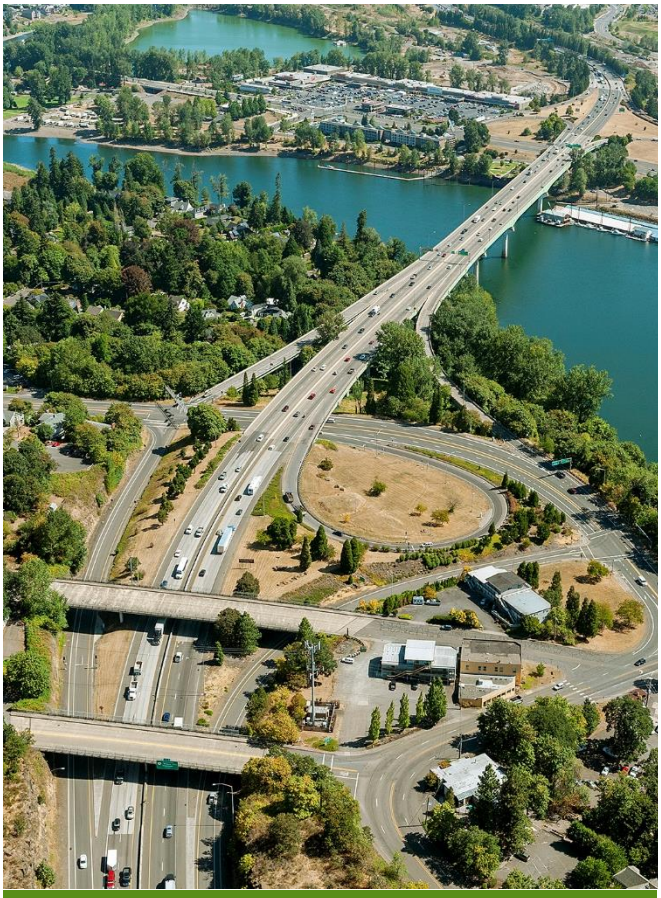

Cost-to-Complete Report for the Combined Interstate 205 Abernethy Bridge and Widening Projects

ODOT | K19786 I-205: Stafford Road to OR 213

ODOT EA: C6035200
HDR Project #10063137

January 5, 2018

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Acronyms

ATM	active traffic management
BVC	best value contracting
CE	Construction Engineering
CIA	contributing impervious area
CM/GC	Construction Manager/General Contractor
Consultant	HDR Engineering, Inc. and subconsultant partners
County	Multnomah County, Oregon or Washington County, Oregon
CRCP	continuously reinforced concrete pavement
CTC	cost to complete
DAP	Design Acceptance Package
EUAC	Equivalent Uniform Annual Cost
FHWA	Federal Highway Administration
GMP	guaranteed maximum price
Hwy	Highway
I-205	Interstate 205
ITS	intelligent transport systems
LED	light-emitting diode
LCCA	life cycle cost analysis
M	million(s)
MP	milepost
MUTCD	Manual on Uniform Traffic Control Devices
NB	northbound
NEPA	National Environmental Policy Act
ODOT	Oregon Department of Transportation
OR	Oregon Route
PE	Preliminary Engineering
PDT	Project Team
Project	I-205: Stafford Road to OR 213 or the combined Interstate 205 Abernethy Bridge and Interstate 205 Freeway Widening Projects
Project Team	ODOT and HDR Engineering, Inc. and subconsultant partners
PS&E	Plans, Specifications, and Estimate
ROW	right-of-way
SB	southbound
SPIS	Safety Priority Index System
VAS	variable advisory speed signs
VMS	variable message signs

Purpose of this Cost-to-Complete Report

With the passage of House Bill 2017 *Keep Oregon Moving*, the Oregon Legislature made a significant investment in transportation to help further Oregonians' values: a vibrant economy with good jobs, strong communities with a good quality of life, a clean environment, and safe, healthy people. This is a historic, once-in-a-generation investment in Oregon's transportation system that will pay dividends for decades to come.

A key tenant of the bill is that the Oregon Department of Transportation (ODOT) will effectively deliver programs and projects in an accountable, transparent, and efficient manner. With this goal in mind, the Oregon Legislature mandated the Oregon Transportation Commission and ODOT conduct a study and make a report on its findings for the cost to complete the combined Interstate 205 (I-205) Abernethy Bridge and I-205 Freeway Widening Projects (Project). The deadline for this report is February 1, 2018. ODOT will provide a report and its findings to the Joint Committee on Transportation established under Section 27c of House Bill 2017, as well as to the appropriate fiscal and policy committees or interim committees of the Legislative Assembly. The pertinent provision extracted from the bill is as follows:

Figure 1. Section 27c of House Bill 2017

SECTION 27c. The Oregon Transportation Commission shall conduct a study and make a report on its findings to the Joint Committee on Transportation established under section 26 of this 2017 Act and to the appropriate fiscal and policy committees or interim committees of the Legislative Assembly as follows:

(1) No later than February 1, 2018, the costs to complete the Interstate 205 Abernethy Bridge Project and the Interstate 205 Freeway Widening Project.

This Cost-to-Complete (CTC) Report provides the plan for how ODOT will deliver the Project in an accountable, transparent, and efficient manner. The CTC Report defines the Project's scope and benefits, recommends a Project phasing plan and delivery method, and outlines future steps for the Oregon Transportation Commission and the Oregon Legislature to consider. The CTC Report consists of a comprehensive narrative supported by appendices that further illustrate the Project's recommended design, construction phasing plan, and delivery method.

Executive Summary

The CTC Report provides the Project Team's recommended plan for the delivery of the combined I-205 Abernethy Bridge and Freeway Widening projects in an accountable, transparent, and efficient manner. The CTC Report defines the Project's scope and benefits, and recommends a Project phasing plan and delivery method that cost-effectively completes the Project by 2025. It also outlines future steps for the Oregon Transportation Commission and the Oregon Legislature to consider while answering the following key questions.

1. What is the Project purpose?
   - *The Project's purpose is to:*
     - *Provide seismic resiliency to ensure the corridor functions as a statewide north-south lifeline route after a major earthquake. The Project accomplishes this by retrofitting or replacing each of the seismically vulnerable bridges that carries I-205 or conflicts with the proposed freeway widening.*
     - *Reduce congestion in the Project corridor by adding an additional through-lane in the northbound (NB) and southbound (SB) directions between Stafford Road and Oregon Route (OR) 99E. It also maintains the I-205 auxiliary lanes in both directions between OR 43 and OR 99E, and adds a new NB auxiliary lane from OR 99E to OR 213. Because this is the last segment of I-205 without a third lane, the Project remedies multiple bottleneck locations within its seven-mile corridor.*
     - *Improve mobility and travel time reliability within the corridor. Once the Project is complete, travel times during peak hours will decrease by as much as 25 percent versus today's times and more than 50 percent versus anticipated times in 2040.*[1]
2. What is the proposed Project scope and cost?
   - *In 2016, ODOT presented a preliminary Project scope and cost of $452 million (M) to the State Legislature. Since that time, the Project Team advanced and refined the design to a 15-percent level. Despite having the same general scope, Project cost estimate rose to $500 M primarily due to inflation and the decision to shift from asphalt to concrete pavement. The five elements of Project's general scope are explained below:*
     - *I. Seismic Upgrades: The Project upgrades the Abernethy Bridge and the eight other I-205 bridge sites in the Project area to withstand a major earthquake. ODOT designated I-205 as a statewide north-south lifeline route, which means it must be operational quickly after a disaster renders other roadways unusable or impassable. This critical route will provide supplies and services to the region.*

[1] Project Charter for: I-205 Stafford Rd – OR 99E, pg 2, internal document

II. *I-205 Widening: The Project adds a third lane in each direction on the seven-mile stretch of I-205 between Stafford Road and OR 99E. It also adds a NB auxiliary ("entrance-to-exit") lane between OR 99E and OR 213. Widening I-205 requires blasting in order to remove the rock from the rock slope located in West Linn* adjacent to the I-205 NB direction *between the Sunset Avenue overcrossing and just south of the OR 43 interchange. The Project Team will conduct refined noise, vibration, and traffic staging studies in Spring 2018 to determine the exact impacts of the blasting, the extent of noise mitigation measures (such as noise walls), and the duration of work anticipated. At this time, the cost estimate assumes noise walls based on preliminary noise analyses.*

III. *Bridge Replacements: Widening I-205 requires rebuilding the West A Street and Sunset Avenue bridges, which cross over I-205, due to column conflicts with the location of the new lanes. The Project will also replace the I-205 bridges over the Tualatin River, Borland Road, and Woodbine Road. These replacements are less costly than retrofitting and widening the bridges.*

IV. *Interchange Improvements: To improve I-205 safety and travel-time predictability, the Project makes changes to entrance ramps, exit ramps and intersections around the OR 43 and OR 99E interchanges. At the OR 43 interchange, the Project consolidates the two I-205 NB entrance-ramps points to reduce merging and weaving issues and reduce rear-end crashes. The Project removes the Broadway Street bridge overcrossing to enhance the functionality of the consolidated interchange. At the OR 99E interchange, the Project modifies the ramps to conform to the widened freeway lanes. The Project will not modify the existing ramp terminals.*

V. *Traveler Information Signs (active traffic management (ATM) improvements): The Project includes ODOT RealTime traffic information signs to help travelers get where they are going safely and efficiently. These signs can display traffic flow information, roadway conditions, and advisory speeds limits.*

3. How have costs changed since last presented to the Oregon Legislature in 2016?

   - *The following are the key Project changes since the 2016 conceptual design. For some items, the changes resulted in cost increases, while others resulted in cost savings. Combined, the Project changes resulted in a net $48 M cost increase. An explanation of the estimate changes are listed below:*

     - *Changes to the type of freeway pavement (net cost increase of $25 M): The 2016 estimate assumed that the freeway would consist of an asphalt pavement section. After further analysis, the Project Team proposes a concrete pavement section, which increases its life expectancy and reduces the overall long-term cost once constructed. It also minimizes the number of maintenance cycles required, which reduces the number of*

construction hazards that pose safety risks to ODOT, construction crews, and the traveling public.

- *Inflation Extended to the Year of Construction (net cost increase of $56 M): The 2016 estimate did not account for escalation. Based on an analysis of the current bidding environment, bid prices are expected to increase before the year of construction. To account for this, the Project Team applied a three-percent-per-year inflationary factor on the 2018 unit prices to the mid-point of each construction package.*
- *Project Size Economy of Scale (net cost reduction of $19 M): To account for an economy of scale resulting from the proposed phasing plan, the Project Team implemented a four-percent cost reduction factor for large quantity cost efficiencies.*
- *Design Refinements (Net cost increase of $10.3 M): The Project Team examined the Project's design elements to determine if any quantity, cost, or design approach changes were warranted. As a result, most bid item quantities or costs were changed, with some increasing the total cost and others decreasing it. The notable elements include (with the complete list provided in Section 4.2 of this CTC Report):*
  - *Traffic control (cost increase) – due to the number of phases required for keeping traffic moving during construction.*
  - *Change in bridge scope to replacement (cost decrease) – due to the elimination of foundation retrofits at the Tualatin River, Borland Road, and Woodbine Road bridges. This also reduces long-term maintenance costs.*
  - *Rock blasting costs (cost increase) – due to increased quantities and controlled blasting requirements adjacent to an active freeway and existing buildings.*
  - *Abernethy Bridge (cost decrease) – due to implementing an innovative construction technique (transversely shifting the existing bridges) that capitalizes on its reserve structural capacity and reconstructing the in-water piers to decrease construction risks.*
  - *Retaining walls (cost decrease) – due to refined grading information that decreased the number and height of retaining walls.*
  - *Noise walls (cost increase) – due to increase in number and length of noise walls.*
  - *Construction contingency (cost increase) – due to a different cost risk methodology than was used in the 2016 estimate.*
  - *Construction and Preliminary Engineering (CE and PE, respectively) (cost increase) – updated costs to be commensurate with the Project's proposed scope.*

- *Right-of-way (ROW) acquisition and utility relocations (cost increase) – due to a more accurate understanding of the Project's construction needs*

4. What is the recommended construction contracting, or phasing, plan?

   ➢ *The Project Team recommends that the Project be constructed using three separately phased construction contracts, or "packages", as follows:*

   - ***Package A: Northern Package (Abernethy Bridge plus adjacent interchanges) estimated cost at $248.0 M.*** *Package A consists of the Abernethy Bridge widening and retrofit, the OR 43 and OR 99E interchange reconstructions on either end of the bridge, the widening and retrofit of the Main Street Bridge, and the construction of a new I-205 NB auxiliary lane from OR 99E to OR 213.*
   - ***Package B: Southern Package (I-205 Widening) estimated cost at $197.4 M.*** *Package B consists of the I-205 widening from Stafford Road to the Abernethy Bridge. It also includes the rock cut required to widen the roadway between Sunset Avenue and OR 43, the West A Street and Sunset Avenue bridge replacements, the Broadway Street Bridge removal, and the replacement or widening and retrofit of all bridges carrying I-205 from 10th Street to Stafford Road.*
   - ***Package C: ATM Package estimated cost at $5.1 M.*** *Package C consists of the ATM improvements throughout the Project limits, except those attached to the Sunset Avenue Bridge (which will be constructed as an element within Package B).*

5. What is the total Project cost and how was it derived?

   ➢ *The Project Team estimates the total Project cost, in the year of construction, to be approximately **$500 M (see Table 1).** This value includes the cost components, derived from the 15 percent preliminary engineering performed to support this report.*

Table 1. Total Project Cost Estimate

Project Phase	Programmatic Costs ($ millions)		
Preliminary Engineering (PE)	$45.0 M total ($32.5 M is needed to complete the PE phase)		
ROW acquisition	$1.4 M		
Utility relocation	$2.7 M		
Per-Package Costs ($ millions)			
Project Phase	**Package A (Northern Package)**	**Package B (Southern Package)**	**Package C (ATM Package)**
Construction + Construction Engineering (CE)	$248.0 M	$197.4 M	$5.1 M
Total Project Cost: $ 499.6 M			

6. What is the Project Team's recommended delivery method and why?

   - *The Project Team analyzed multiple delivery methods to optimally achieve the Project purpose. This analysis included options for traditional, low-bid delivery methods, alternative contracting methods that combine low-bid with qualification parameters (known as Design-Bid-Build (DBB) Best Value Contracting (BVC), and alternative delivery methods such as Design-Build (DB) and Construction Manager/General Contractor (CM/GC).*

     Based on this analysis, the Project Team recommends the following delivery methods for the proposed construction packages:

     - ***Package A: Northern Package (Abernethy Bridge)***
       - *DBB (BVC) using the parameters of A (Price) + C (Qualifications) + D (Approach) specifically for the Abernethy Bridge construction method and in-water drilled shaft work*
     - ***Package B: Southern Package (I-205 Freeway Widening)***
       - *DBB (BVC) using the parameters of A (Price) + C (Qualifications) + D (Approach) specifically for the rock blasting and removal work*
     - ***Package C: ATM Package***
       - *Traditional Low-bid DBB*

     The rationale for these recommendations is as follows:

     - ***Lowest Initial Cost with Embedded Innovations.*** *The DBB method achieves a lower initial cost when versus either the DB or CM/GC options. The Project Team also incorporated cost-saving design and construction innovations within the preliminary design phase based on input from two contractors within the team. This provides confidence in the construction estimate.*
     - ***Shortest Construction Duration.*** *After creating a detailed Project schedule to evaluate each delivery method's timelines, the Project Team determined that the DBB method provides the same early operational and safety benefits as the other methods without their associated cost premiums. This is primarily due to the procurement timelines and risk mitigation designs required for the DB and CM/GC methods that inhibit their construction acceleration.*
     - ***Strong Decision-making Role by ODOT.*** *As part of the stewardship agreement with the Federal Highway Administration (FHWA) and commitments made to external partner agencies and regulators, ODOT is required to maintain safe and functional operations for all interstate facilities, including I-205. Because of this, ODOT needs to maintain a strong role in all decisions that affect construction, maintenance, and design.*

- ***Unique Project Elements (for Packages A and B only).*** *Package A and B each have unique construction elements that warrant additional construction qualifications or a specialized approach from the proposing contractors. For each of these packages, the Project Team recommends implementing a DBB, multi-parameter bidding process. For Package C, the Project Team recommends the Traditional DBB delivery method because of its size and lack of any unique construction challenges.*

To confirm the delivery method recommendations, ODOT applied a preliminary version of its Alternative Delivery Recommendation tool to the Project. Similar to the Project Team's recommendation, the tool also recommended the DBB (BVC) delivery method for Packages A and B, and Traditional DBB for Package C.

7. What year will the Project be complete and what are the Project Team's proposed "next steps" to achieve Project completion?

   ➢ *To achieve maximum safety and avoid increasing costs due to inflation, the Project Team recommends that the Oregon Legislature fully fund the $500 M combined Project so that it can be completed by January 2025. The Project Team also recommends that the Project be delivered according to the phasing timelines listed below:*

   - ***Package A: Northern Package (Abernethy Bridge)***
     - *Final Design Phase: July 2018 to December 2019 (Bid Let Date)*
     - *Construction Phase: March 2020 to June 2024 (Construction Complete)*
   - ***Package B: Southern Package (I-205 Freeway Widening)***
     - *Final Design Phase: September 2018 to March 2020 (Bid Let Date)*
     - *Construction Phase: June 2020 to December 2024 (Construction Complete)*
   - ***Package C: ATM Package***
     - *Final Design Phase: September 2018 to May 2019 (Bid Let Date)*
     - *Construction Phase: September 2019 to August 2020 (Construction Complete)*

1 Project Definition

1.1 Problem Statement

The section of I-205 from Stafford Road (beginning at milepost [MP] 2.9) to just beyond OR 99E (MP 9.6) is the last remaining segment of two-lane freeway on the I-205 corridor, resulting in congestion and crashes. Insufficient capacity, as well as the closely spaced interchanges (OR 43, OR 99E, and OR 213) and the current OR 43 NB entrance ramp configuration, results in significant I-205 travel delays in both the morning (AM) and evening (PM) peak periods. Collectively, these conditions contribute to safety and travel-time predictability issues, which result in significant delays to passenger and freight traffic. Regional growth is also expected to expand the congested peak periods, further reducing the number of hours vehicles can move on the system without major delay (Appendix M).

1.1.1 Seismic Resiliency

There is a 30-percent chance that a magnitude 8 or greater earthquake will occur in Oregon within the next 50 years. Transportation infrastructure resilience is one of the primary components required for an effective recovery following this significant natural disaster. In the event of the earthquake, this route may be the only connection between Oregon and Washington. ODOT designated I-205 as a Phase 1 statewide north-south lifeline route, which means it must be operational quickly after a disaster renders other roadways unusable or impassable. This critical route will provide supplies and services to the region (Figure 2).[2]

1.1.2 Congestion Relief

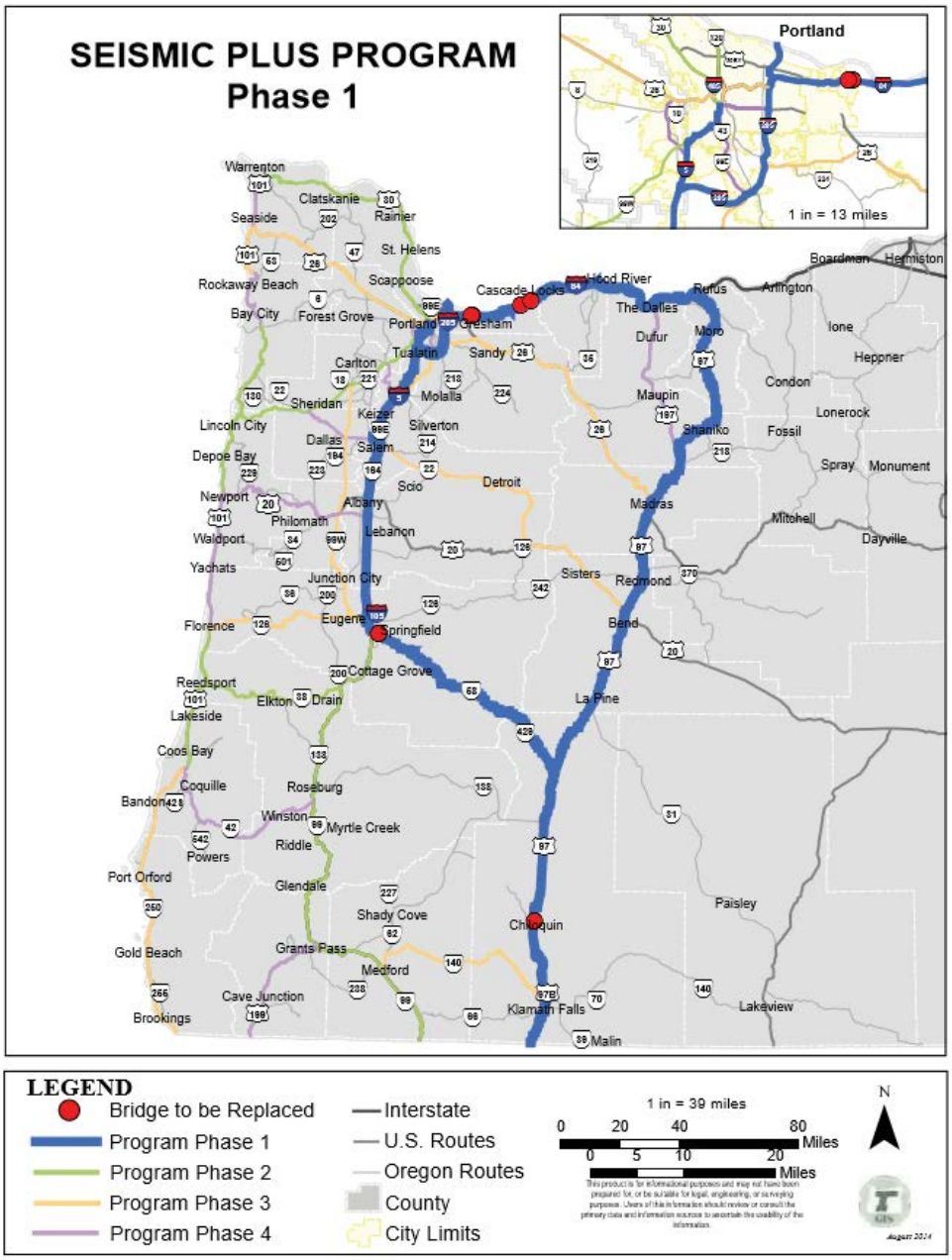
Portland freeways have shown increasing congestion, decreasing travel speeds, greater delays, and unreliable trip times. Traffic congestion can now occur at any hour of the day, including holidays and weekend. It is no longer a weekday, peak hour problem. In 2013, 11.3 percent of all travel in the Portland metropolitan region took place in congested conditions. In 2015, that number increased to 13.7 percent.

I-205 NB has one of the lowest operating speeds in the region, one of the largest deteriorations of speed during peak hours, and the most congested conditions during the PM peak period. One of the most severe bottlenecks is located NB at the Abernethy Bridge. This reoccurring bottleneck has developed over recent years and is quickly growing. This bottleneck commonly lasts from approximately 3:15 p.m. to 6:15 p.m. (Figure 3). This section had the second highest reduction in peak- hour travel speeds, more than seven miles per hour, with a queue that extends approximately nine miles.[3]

[2] Oregon Highways Seismic Plus Report, 2014, http://library.state.or.us/repository/2014/201411130942124/index.pdf

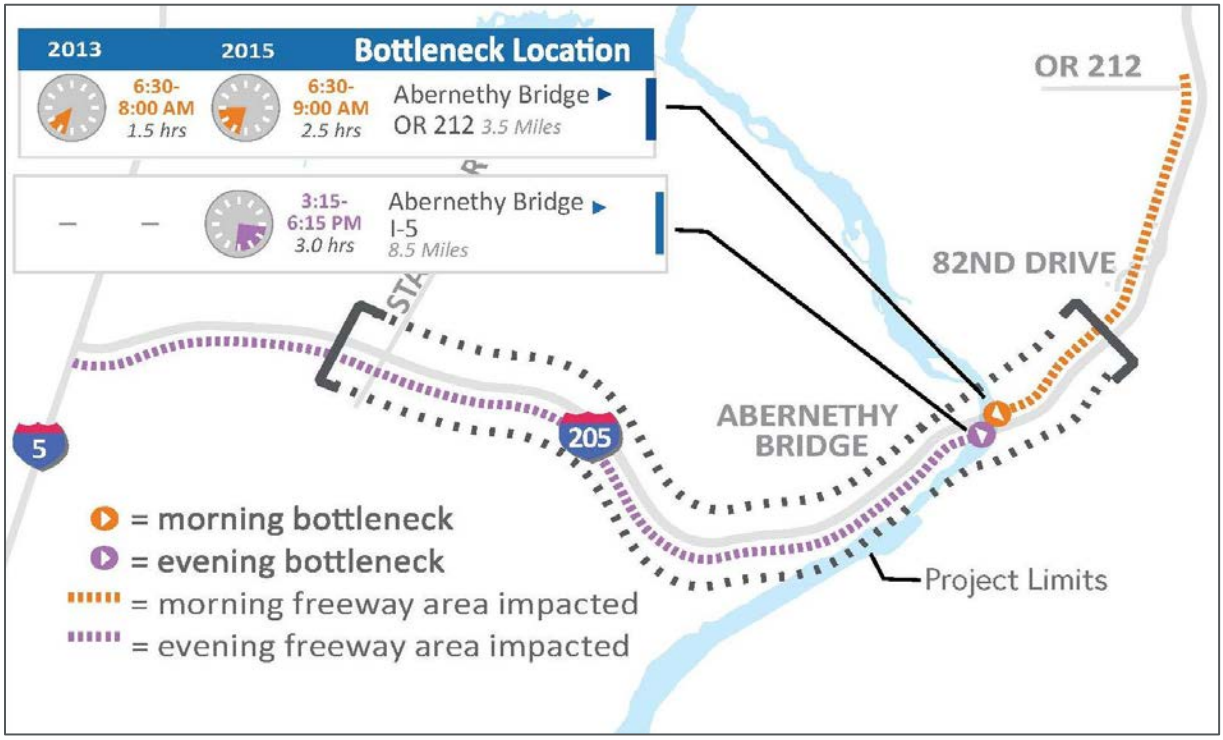
[3] 2016 Traffic Performance Report, pg 30, http://www.oregon.gov/ODOT/Regions/Documents/Region1/2016_TPR_FinalReport.pdf

Figure 2. Phase 1 Seismic Lifeline Route (per ODOT Seismic Plus Report)



Buffer time is the extra cushion of time a driver adds to their trip to make it to their destination on time. It is a measurement of reliability along the corridor. From 2013 to 2015, there was a 12-minute increase (39.1 percent) in travel time during the PM peak for I-205 NB. This additional traffic and congestion makes it more challenging for travelers to get to work and appointments on time. Because this corridor serves many of Oregon City and Clackamas industrial areas, the impact of delays on freight and the cost to providing goods and services are also concerns. I-205 has the second highest freight volume in the region, ranging from 7,900 to 13,100 trucks per day.

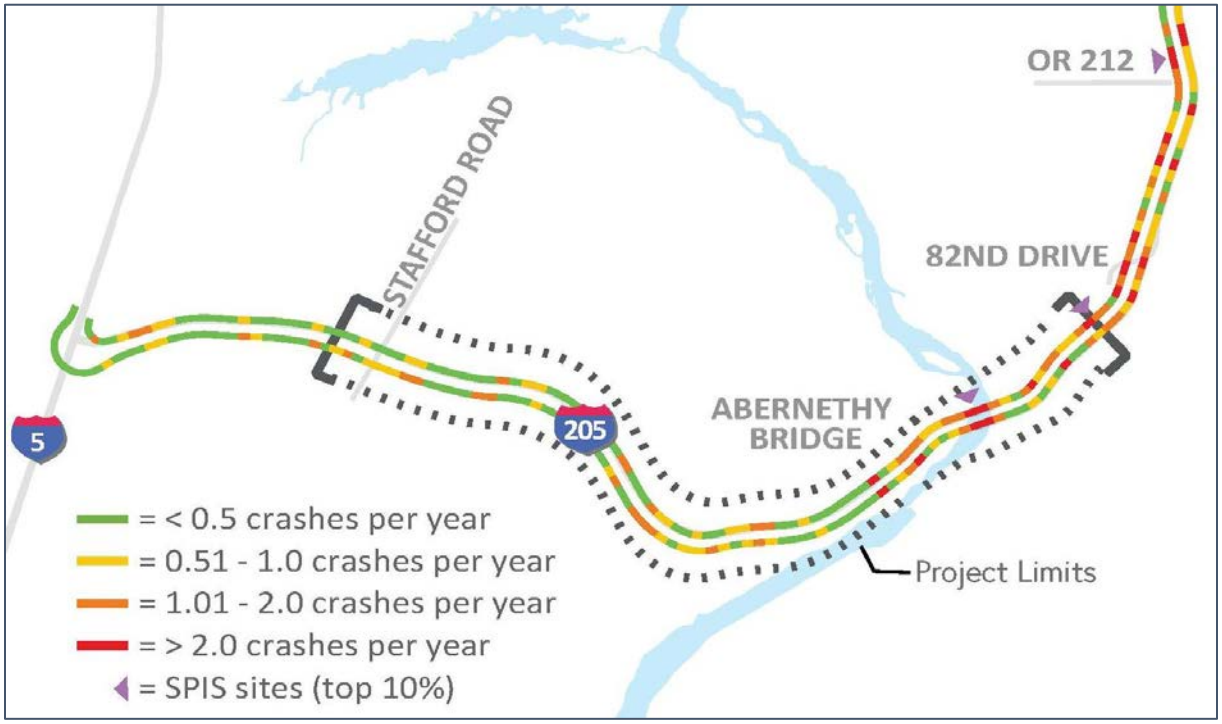
Figure 3. Locations of Recurring Bottlenecks (as of 2016)



1.1.3 Safety

The crash rate in the Project area is nearly three times the state average, largely due to inadequate interchange spacing and lack of freeway capacity. The number of crashes have increased on I-205. There were 702 crashes in 2013 and 906 in 2015, an increase of 29 percent, with the majority of crashes directly contributable to congestion (70 percent rear-end and 18 percent side-swipe/overtaking). These types of crashes mainly occurred in the peak commute periods. The Safety Priority Index System (SPIS) is ODOT's systematic scoring method for identifying potential safety problems on state highways based on the frequency, rate, and severity of crashes. There are two in the top 10 percent of SPIS sites on I-205 in the Project area, most of which were in areas of high congestion (Figure 4).

Figure 4. Existing Crash Data per Tenth of a Mile (2011-2015)



1.2 Project Purpose

The purpose of the Project is to:

1. Reduce congestion in the Project corridor by adding an additional through-lane in the NB and SB direction between Stafford Road and OR 99E, maintaining the auxiliary lanes in the both directions between OR 43 and OR 99E, and adding an auxiliary lane in the NB direction from OR 99E to OR 213.
2. Improve mobility, travel time reliability, and safety within the corridor. Once the Project is complete, travel times during peak hours will decrease by as much as 25 percent versus today's times and more than 50 percent versus anticipated times in 2040.[4]
3. Provide seismic resiliency to ensure the corridor functions as a statewide north-south lifeline route after a major earthquake. This includes seismically retrofitting or replacing each of the vulnerable bridges that carries I-205 or conflicts with the proposed freeway widening.

1.3 Project Description and Physical Components

The Project area consists of an urban freeway that includes two existing travel lanes in each direction with auxiliary lanes at the Abernethy Bridge. The existing I-205 third

[4] Project Charter for I-205 Stafford Rd – OR 99E, pg 2, internal document

general-purpose lane currently ends near the northern end of the Project at the OR 99E interchange.

The Project adds a third through travel lane in each direction and a new NB auxiliary lane between OR 99E and OR 213. To conform to the new I-205 widths, the Project will minimally adjust impacted interchanges, and remove a redundant I-205 entrance ramp to improve safety and traffic flow through the corridor.

The Project widens the Abernethy Bridge to address AM and PM operational bottlenecks, which have grown to a duration 3.75 hours from 2013 to 2015. Within the Project limits, users experience approximately 5.5 hours of congestion, which impacts more than 100,000 daily drivers and 8,900 freight vehicles daily. In addition, the Project will widen and seismically upgrade eight bridges, reconstruct eight bridges, completely remove one bridge and a portion of another, adjust the OR 43 and OR 99E interchanges to conform to the widened freeway, and add a NB auxiliary lane between OR 99E and OR 213. Figure 5, also provided in Appendix A, shows the proposed improvement locations.

Figure 5. Project Scope

Details of the proposed Project are provided below:

- Add a third I-205 through lane NB and SB from Stafford Road (MP 2.9) to OR 99E (MP 9.6).
- Reconstruct the I-205 SB auxiliary lane from OR 99E exit ramp to OR 43 entrance ramp (across the Abernethy Bridge)
- Reconstruct and extend the I-205 NB auxiliary lane from OR 43 entrance ramp to OR 99E exit ramp (across the Abernethy Bridge)
- Construct NB auxiliary lane from OR 99E entrance ramp to OR 213 exit ramp.
- Adjust the OR 99E interchange ramp geometries to conform to the additional freeway lanes.

- Modify the OR 43 interchange by consolidating the entrance and exit ramps and removing the existing OR 43 NB entrance ramp that connects to the Abernethy Bridge.
- Remove the portion of the rock slope adjacent to the I-205 NB direction to support the freeway widening.
- Add ATM elements throughout the Project limits, consistent with the ODOT Region 1 ATM Project Atlas (published April 2016).
- Widen and seismically retrofit the following bridges:
  - I-205 NB over Blankenship Road – MP 5.84
  - I-205 SB over Blankenship Road – MP 5.90
  - I-205 NB over 10th Street (West Linn) – MP 6.40
  - I-205 SB over 10th Street (West Linn) – MP 6.42
  - I-205 over Willamette River (Abernethy) – MP 9.03
  - I-205 SB Connector #2 to OR 43 (West Linn interchanges) – MP 9.14
  - I-205 NB Connector #1 to OR 99E (Oregon City interchange) – MP 9.30
  - I-205 over Main Street (Oregon City) – MP 9.51
- Replace the following bridges, which eliminates existing seismic vulnerabilities:
  - I-205 NB over Borland Road – MP 3.82
  - I-205 SB over Borland Road – MP 3.81
  - I-205 NB over the Tualatin River – MP 4.10
  - I-205 SB over the Tualatin River – MP 4.08
  - I-205 NB over Woodbine Road – MP 5.14
  - I-205 SB over Woodbine Road – MP 5.19
  - Sunset Avenue (West Linn) over I-205 – MP 8.28
  - West A Street (West Linn) over I-205 – MP 8.64
- Permanently remove the following conflicting bridges:
  - Broadway Street (West Linn) over I-205 and OR 43 Connector #1 – MP 8.69
  - OR 43 NB Connector to I-205 NB (Abernethy Bridge) – MP 9.00

2 Project Phasing and Delivery Method Recommendation

2.1 Project Phasing Evaluation

At the onset of the 30-percent DAP design phase, the Project Team was tasked with determining the Project's recommended construction phasing, sequence, and delivery

method. To accomplish this, the Project Team implemented the following three-step process:

- Step 1 – Establish the phasing goals and evaluation criteria
- Step 2 – Develop, refine, and evaluate the phasing alternatives
- Step 3 – Select the recommended alternative

2.1.1 Step 1: Establish Phasing Goals and Evaluation Criteria

The overall purpose of the Project is to achieve seismic resiliency, relieve congestion, increase mobility, and enhance safety on I-205 between Stafford Road and OR 213. The Project Team reviewed ODOT's Corridor Bottleneck Operations Study and interviewed ODOT's Executive Management to ensure the phasing goals meet the Project purpose. The Project team established the following goals to evaluate the phasing alternatives:

- **Minimize Initial Project Cost.** Because funding is limited, the Project requires as low an initial cost as possible. Methods to achieve this goal include:
    - For roadway work, limit the Project footprint to only that needed to widen the freeway for operational needs through 2045, or to reconnect adjacent facilities to the newly widened roadway, without precluding future work by ODOT or others
    - For bridge work, limit the Project footprint to only that needed to widen and seismically retrofit the I-205 structures
    - Implement practical design principles, including Design Exceptions
    - Shorten the overall construction duration to minimize escalation costs
    - Capitalize on innovative cost-saving designs and construction methods
    - Combine similar work types to gain efficiencies
    - Combine work in the same geography to minimize contractor overlap
    - Capitalize on economies of scale for quantity unit prices
    - Minimize ROW acquisition and/or utility relocations

The recommended alternative must have as low an overall cost as possible, unless there are alternative treatments that meet the Project purpose with benefits that greatly exceed the least cost option.

- **Promote Construction Ease, Work zone Safety, and Traffic Mobility.** Different phasing combinations have a myriad of effects on how well the work progresses. Beyond necessary contracting sequencing, the Project Team considered items such as construction overlap (i.e., avoiding throw-away work that increases cost), reducing conflict between contractors (which can result in costly construction change Orders and delays), and traffic handling methods. The recommended alternative must promote construction ease, as well as safety and mobility during both construction and in perpetuity, relative to the other alternatives considered.
- **Achieve Early Operational and/or Safety Improvements.** Because the Project's fundamental purpose is to reduce freeway congestion, which will increase safety, a

phasing plan that constructs the priority improvements early is important. The priority improvements are listed below, and shown in Appendix M:

- Priority 1. Relieve congestion and enhance safety on I-205 NB (on the Abernethy Bridge) between OR 43 and OR 99E.
- Priority 2. Relieve congestion on I-205 NB between OR 99E and OR 43.
- Priority 3. Relieve congestion on I-205 SB (on the Abernethy Bridge) between OR 43 and OR 99E.
- Priority 4a. Relieve congestion on I-205 NB and SB between 10th Street and the Abernethy Bridge
- Priority 4b. Relieve congestion on I-205 NB and SB between Stafford Road and 10th Street

The recommended alternative must achieve the priority operational improvements as early as possible.

- **Enhance Construction Quality for Abernethy Bridge and I-205 Rock Removal.** The recommended alternative must incorporate mechanisms to increase quality for the Abernethy Bridge improvements and rock blasting operations (e.g., using A (Price) + C (Qualifications) + D (Approach) alternative bidding to pre-qualify contractors). These portions of the Project are exceedingly technical and require proven contractor experience. By utilizing pre-qualified contractors for these portions of the Project, construction risks to ODOT and the traveling public will decrease and final solutions will have higher quality outcomes.
- **Minimize Construction Duration.** Minimizing the Project's construction duration reduces escalation costs. It also limits the construction impacts and inconvenience to the traveling public, disruptions to freight and commerce, and the length of time construction operations impact local businesses and residents. The recommended alternative must have a short construction duration relative to the other alternatives considered.
- **Maximize Oregon-based Contractor Participation.** A large project such as this serves as an economic driver for the construction industry. Maximizing local contractor participation is vital for sustaining and creating jobs in the region. The recommended alternative must provide a mechanism to support the local construction industry labor-market.

2.1.2 Step 2: Develop, Refine, and Evaluate the Phasing Alternatives

The Project Team conducted a series of workshops to develop and refine the Project alternatives and utilize the goals described above as evaluation criteria. The Project Team developed conceptual phasing plans, rough order-of-magnitude costs, and construction schedules for the following feasible alternatives:

- Alternative 1 – Baseline with a single mega-project
- Alternative 2 – Baseline with staggered, phased delivery
- Alternative 3 – Staggered and phased by work type and location

- Alternative 4 – Staggered and phased by work-type (only)
- Alternative 5 – Early operational improvements
- Alternative 6 – Lowest cost and early operational improvements

The Project Team considered other alternatives, such as bundling all bridge and roadway work separately, but each was deemed infeasible due to their significant construction staging challenges, and/or excessive cost and schedule risks. Appendix E describes, rates, and compares each feasible alternative.

2.1.3 Step 3: Select Recommended Alternative

Based on the evaluation criteria ratings and each alternative's benefits (Appendix E), the recommended phasing alternative is Alternative 6, which features the lowest cost and early operational improvements. Figure 6 (also contained in Appendix B) illustrates the phasing plan and construction schedule for each package.

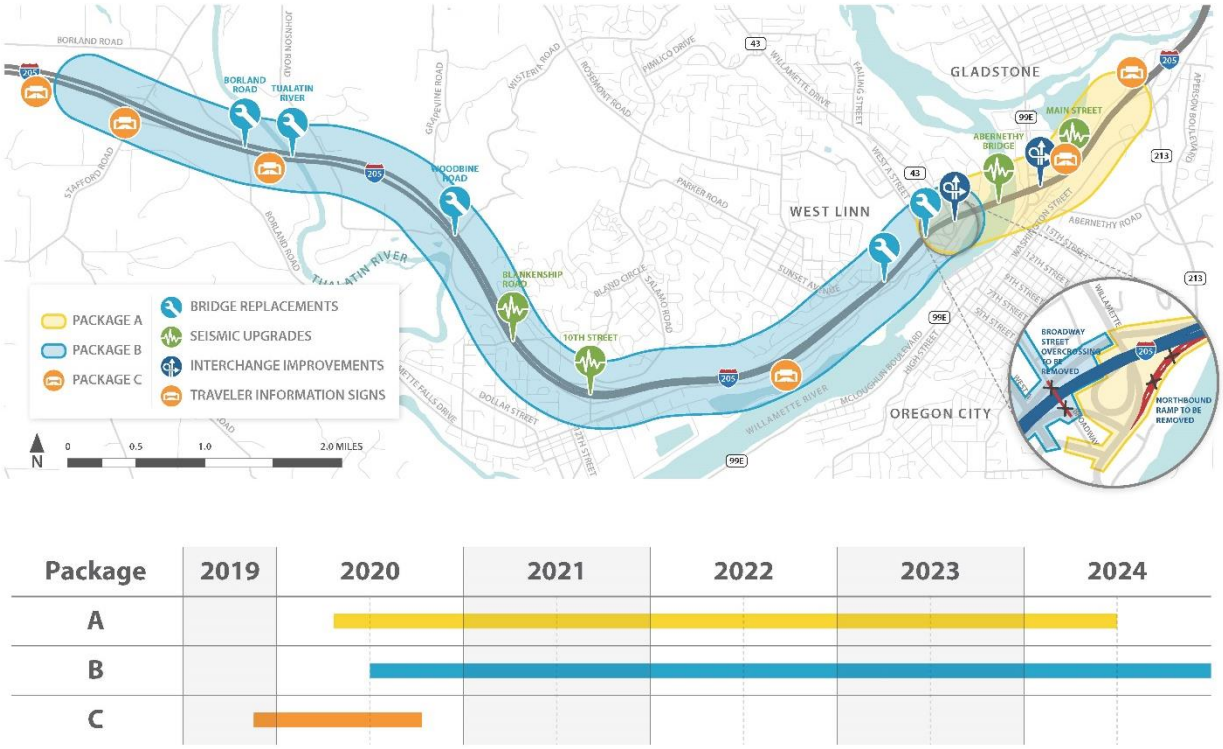
Alternative 6 offers the lowest cost and earliest operational and safety benefits. This alternative consists of three Design-Bid-Build construction packages, defined as Packages A, B, and C. Section 3 describes these packages in detail.

The general benefits of the recommended phasing plan are as follows:

- It reduces cost by minimizing throw-away work and avoids contractor overlap because of well-defined work limits.
- It prioritizes construction for the most urgent operational solutions (eliminating the bottlenecks near Abernethy Bridge), safety solutions (eliminating the conflicting NB entrance ramp from OR 43), and most challenging seismic solutions (Abernethy Bridge) before 2021. This includes early interim contractor milestones for the NB operational improvements.
- It delivers two large DBB (BVC) construction packages (Package A: $248 M Bridge, and Package B: $197 M Roadway and conventional structures, respectively) and yields the following specific benefits:
    - Each package will generate competition due to their work compositions and scale, compared to a single project or multiple smaller contracts. Further, separating the major work types into different packages mitigates the risk because specialty contractors will prime each package. Additionally, due to each construction package’s size, contractors should provide an economy-of-scale cost savings for the large quantities of work involved. Lastly, the number of large contractors that will be attracted to each package should generate additional cost savings.
    - The bid let dates are staggered so that large contractors can elect to bid on one or both packages, subject to their particular fields of expertise.
    - Local contractors are anticipated to be subcontractors to the prime contractors, and package compositions were developed to satisfy ODOT’s Disadvantaged Business Enterprise (DBE) Minority-Owned Business Enterprise (MBE) Women-Owned Business Enterprise (WBE) and Emerging Small Business (ESB) goals.

- Package A has been composed to enable early operational improvements (i.e., eliminating the priority bottlenecks near the Abernethy Bridge) by 2021.

Figure 6. Alternative 6 – Recommended Phasing



Package	2019	2020	2021	2022	2023	2024
A						
B						
C						

- It will provide advance communications through an early ATM package (Package C: $5 M) to freeway travelers both during and following construction.
- It offers flexibility to phase work if full funding is not provided.
- It offers flexibility to implement a DB delivery method (although not recommended) if it were required. The Project Team would implement this change by breaking Package B into two parts, bifurcated at the 10th Street Bridge. Converting to a DB delivery method is likely to increase the overall Project cost by at least $30 M due to the premium with shifting the technical and construction risks to the DB contractor, and for the additional procurement time and inflation costs of delayed bidding.

In addition to the seismic, operational, and safety benefits that come with the Project, Alternative 6 also provides other beneficial Project outcomes as follows:

- Traffic mobility, operations, and safety
  - Freight mobility – Improves freight mobility by adding at least six inches of vertical clearance in the I-205 NB direction, a regional over-dimensional freight route. This also eliminates out-of-direction detours for over-dimensional vehicles, which currently diverts them from the I-205 mainline due to substandard overcrossing clearance at Broadway Street Bridge.

  - Removes diversion to local streets – Reduces regional "cut-through" traffic on local streets by providing more freeway capacity and reducing delay.
  - Temporary traffic impacts – Maintains local and regional connectivity during construction with only limited lane restrictions and/or detours.
  - Rock fall – Mitigates existing slope stability concerns (primarily consisting of rocks tumbling onto the freeway) and reduces future maintenance needs at the new rock cut area.
  - Bicycle and pedestrian facilities – Improves bicycle and pedestrian connections on OR 43 within the Project area.
  - Corridor lighting – Upgrades illumination corridor-wide and under-deck navigational lighting below Abernethy Bridge.
- Environmental
  - Stormwater – Improves water quality for all receiving waters by providing treatment of stormwater to meet current standards.
  - Air Quality – Improves air quality through reduced congestion and improved operations.
  - River Hydraulics – Enhances hydraulic flow by removing existing bridge columns from the Tualatin River.
  - Noise – Mitigates noise impacts to adjacent sensitive noise receptors using sound walls where necessary.
- Maintenance:
  - Stormwater – Decrease future maintenance needs with modern stormwater treatment facilities within the Project limits.
  - Bridges –Increases service life and minimizes maintenance costs for bridges within the Project limits, especially the bridges proposed for replacement.
  - Pavement – Resets the serviceable life of the freeway and reduces significantly maintenance life-cycle expenses by installing reinforced concrete pavement throughout the corridor.

2.2 Project Delivery Method Evaluation

2.2.1 Project Delivery Method Alternatives

The Project Team analyzed multiple delivery methods to optimally achieve the Project purpose. This analysis included options for traditional delivery methods, alternative contracting methods, and alternative delivery methods. Sections 2.2.2 through 2.2.5 describe in detail the options considered, with a recommended option cited in Section 2.2.6:

- Traditional Delivery Methods
  - Traditional DBB (Low Bid) – Section 2.2.2
- Alternative Contracting Delivery Methods

- DBB (BVC) – Section 2.2.3

- Alternative Delivery Methods
  - DB – Section 2.2.4
  - CM/GC – Section 2.2.5

2.2.2 Traditional Design-Bid-Build (Low Bid)

Traditional DBB (Low Bid) is ODOT's standard method of procuring construction services by private construction contractors. ODOT has a long, successful history of implementing this method on projects of all sizes, complexities, and types. Its key attributes are as follows:

1. The method has a linear project development process in which one phase (Design) is followed in series by another phase (Construction) (i.e., There is no overlap in the phases).
2. This method requires 100-percent Plans, Specifications, and Estimate (PS&E) to be complete before bidding the construction phase.
3. Contractors bid the project exactly as designed, and the work is awarded based on the lowest bid.

The key advantages for the DBB delivery method are:

1. It usually results in the lowest initial cost.
2. It requires projects to have a well-defined scope.
3. It is a common delivery method to both ODOT and its contractors, and it does not require special exemptions to implement.
4. Its procurement process is simple to manage and ODOT has all of the necessary systems and processes in place.
5. It is well suited for simple, uncomplicated projects that do not have extra-ordinary schedule drivers nor have scopes that are subject to change.

The key disadvantages for the DBB delivery method are:

1. Under certain situations, the linear "design then build" process can delay the start of construction compared to other delivery methods, such as DB or CM/GC, in which final design is concurrent with some construction activities. However, to determine whether this is an actual disadvantage, a detailed schedule comparing procurement and other pre-design activities must be developed for comparison (see Sections 2.2.3 and 2.2.4 for additional discussion).
2. Construction contractors need only to satisfy a minimum set of pre-qualifications to bid on a project; therefore, there is little control over the contractor selection process.
3. There is no design or cost input from the selected contractor during the design process. This can sometimes lead to missed cost saving constructability opportunities.
4. There is limited flexibility for change without significant Construction Change Order ramifications. This is because ODOT controls all design decisions used to generate

the bid package. If any of the decisions were erroneous or based on untrue assumptions (such as unknown site conditions), resulting cost increases would be the responsibility of ODOT.

2.2.3 Design-Bid-Build (Best Value Contracting)

As defined by ODOT, DBB (BVC), also known as source selection or multiple-parameter bidding, is a procurement method that presents an alternative to the traditional low-bid method of contracting. BVC awards projects to the contractor offering the best combination of price and other factors, instead of solely to the contractor with the lowest bid. When properly implemented, BVC rewards high-performance contractors who have trained, skilled workers and other essential qualifications for performing high quality projects in a safe, timely, and cost-efficient manner.

ODOT usually implements BVC on projects with very specific project goals. Issues that may justify a BVC approach include public safety, rapid project completion, minimal disruption to traffic or adjacent land owners, unusually technical or complex project elements coupled with a need for specialized construction expertise, and/or highly coordinated work scheduling.

The multiple parameters that ODOT commonly uses on DBB (BVC) projects include:

- Parameter A – Cost
- Parameter B – Time
- Parameter C – Qualifications
- Parameter D – Approach
- Parameter E – Sustainability, etc.

These parameters can be defined as anything that could affect project success, including: cost, project approach, time, relevant project experience, project management, personnel and subcontractors, disadvantaged business participation, safety initiative, law compliance, and other criteria unique to the specific project.

Oregon law requires the use of low-bid procurement for highway construction (Oregon Revised Statutes 279C.300), but allows exemption from this requirement if required findings provided in an exemption order are approved (Oregon Revised Statute 279C.335). The DBB (BVC) method is an example of a method needing an exemption.

The key advantages for the DBB (BVC) delivery method are the same as Traditional DBB, with the following addition:

- By scoring the values ODOT deems as vital for the Project (e.g., experience constructing complicated seismic retrofits on steel bridges, controlling the freeway closure time to transversely launching the Abernethy Bridge, or understanding the construction contractors approach to safely perform the rock blasting adjacent to I-205), ODOT would have more control over the outcome of the construction phase.

The key disadvantages for the DBB (BVC) delivery method are the same as Traditional DBB, except the limited pre-qualification (disadvantage #2) is eliminated.

2.2.4 Design-Build

Under the DB delivery method, a single entity provides the Final Design and performs the construction activities. This usually requires at least a 30-percent design for all elements, plus a more advanced design level to resolve and/or mitigate the project's key risks or uncertainties. The level of this "risk mitigation design" depends on how ODOT decides to manage each risk. Common risk mitigation design examples include acquiring ROW, coordinating and facilitating utility relocations, obtaining environmental and construction permits, prescribing traffic control requirements, and designing rehabilitation and/or seismic retrofit elements.

DB projects employ a two-phase, qualification-based (e.g., BVC) procurement process. For ODOT, this includes both a Request-for-Qualifications and a Request-for-Proposal step. Although templates can be used as their basis, each document is crafted to suit the goals and objectives of the project. Producing procurement documents can take many months to a couple years, depending on the Project circumstances and status of the procurement templates. In the past, ODOT has conducted industry review meetings in which bidders have the opportunity to provide input on the procurement documents and process. At its conclusion, the DB contractor provides both a lump Sum price and a qualifications-based proposal for scoring.

Once the DB contractor is selected, design and construction activities are executed concurrently with the expectation that construction will begin for some elements while other elements are still being designed.

The key advantages for the DB delivery method are:

1. When implemented early, there is usually some construction acceleration compared to other delivery methods. This is because construction can begin before final design is complete. However, this requires a detailed project delivery schedule to demonstrate this, including procurement timelines.
2. There is a single point of accountability for design and construction.
3. During the bidding process, the DB contractor can develop risk responses that drive innovation to, ideally, lower the overall price. Price reductions, however, must overcome the premiums for uncertainties on other items.
4. Subject to the project delivery schedule, cost clarity often comes earlier than other delivery methods. If cash flow is a major concern, this method can help inform decisions for other ODOT projects.

The key disadvantages for the DB delivery method are:

1. Because design risks are generally transferred to the DB contractor, many of which are not fully known or resolved prior to bidding, initial costs are usually higher than for the DBB delivery method.
2. The DB procurement documents must be accurate and comprehensive, and must precisely convey the design and outcome requirements for every design element. Inaccurate, incomplete, or undefined provisions can result in significant change orders.

3. ODOT must be willing to give up control of many design decisions, and owner expectations might not be achieved based on the Request-for-Proposal performance requirements. This can be mitigated by modifying the DB procurement documents from years of “lessons learned” while executing DB, but ODOT design standards must be updated to more specifically regulate design methodologies and construction outcomes.
4. The DB contractor controls and owns the risk contingency, which is part of the lump sum bid price. If the risk does not materialize, the DB contractor still receives the risk contingency.
5. The effort to develop procurement documents can be extensive and time consuming.
6. ODOT and the DB contractor may have differing goals, which can make managing the project expectations difficult.
7. DB is not well suited for small projects.

2.2.5 Construction Manager/General Contractor

The CM/CG delivery method allows ODOT to select a construction contractor, based on qualifications and competitive price proposals, to influence the construction method(s) during the design phase. Then, ultimately, the CM/GC contractor will construct the project. The CM/GC and a design consultant are each contracted by ODOT to perform their respective roles. At ODOT’s option, a third party owner's representative could also be contracted to administer the Project on ODOT’s behalf. Alternatively, the design consultant could also perform these services.

The CM/GC delivery method utilizes a two-phased project delivery approach: pre-construction and construction. During pre-construction, the CM/GC, ODOT, and the designer work together to develop technical solutions with the preferred construction method and risk strategies. The CM/GC then develop cost proposals for the construction phase, called the guaranteed maximum price (GMP), at each major milestone until ODOT accepts the proposed GMP. The CM/GC is paid a fee for its pre-construction services and for developing the GMPs. If an acceptable GMP is not achieved, the design would be completed and bid according to the traditional DBB method.

During the construction phase, defined as any point after ODOT has accepted the GMP, the CM/GC contractor performs similarly to a DB contractor. The CM/GC will complete the design and construct the project according to the GMP contract terms.

The key advantages for the CM/GC delivery method are:

1. If an acceptable GMP is achieved, the method provides ODOT with both a GMP value and date-certain schedule earlier than usually occurs during the DBB method. This is subject, however, to the findings from a detailed delivery schedule for each project.
2. The CM/GC’s early involvement with design, estimating, and constructability reviews can lead to cost-saving construction innovations. This collaboration also fosters alignment on the project goals and objectives throughout all phases of project delivery.

3. Collaboration between ODOT, the design consultant, and the CM/GC create the opportunity to jointly identify, allocate, and resolve project risks.
4. When implemented early, there is usually some construction acceleration compared to the DBB delivery method. This is because construction can begin before final design is complete. However, a detailed project delivery schedule must be developed to demonstrate this, including procurement timelines for the CM/GC pre-construction and construction phases. If an acceptable GMP is not achieved, additional time for traditional bidding must be added to the schedule.
5. Once the GMP is accepted and its contract is executed, the CM/GC takes responsibility for delivering the project on-schedule and within budget.
6. ODOT and the CM/GC manage the contingency budget jointly. Therefore, if the risk does not materialize, ODOT will retain some of the risk contingency.
7. Subject to the project delivery schedule, cost clarity often comes earlier than the DBB delivery method. If cash flow is a major concern, this can help inform decisions for other projects.

The key disadvantages for the CM/GC delivery method are:

1. Because the CM/GC is the sole bidder for the construction phase, the lack of competition can lead to higher construction costs. To mitigate this risk, the Owner's Representative develops an Independent Cost Estimate (ICE) at each major milestone for comparison against the CM/GC's proposed GMP. With each milestone, a decision is made for whether to accept the GMP or to advance the pre-construction design to the next milestone.
2. The CM/GC contract documents must precisely convey the design and outcome requirements for every design element. Inaccurate, incomplete, or undefined provisions can result in significant change orders beyond the GMP amount.
3. The effort to develop procurement documents is more extensive and time consuming than that for the DBB method, but much less extensive than the DB method.
4. The contract management effort is much greater for the CM/GC delivery method than either the DBB or DB methods. Additionally, ODOT must be an active participant in the project's decision and contingency management. This usually requires technical resources and skill sets that ODOT typically does not have in-house. To mitigate this, owner's representative services are recommended to support ODOT with project management and technical oversight tasks.

2.2.6 Recommended Project Delivery Method

After considering the relative merits of each delivery method described above, the Project Team recommends the DBB (BVC) delivery method for Packages A and B, and the Traditional DBB delivery method for Package C. The rationale for these recommendations is as follows:

1. **Lowest Initial Cost with Embedded Innovations.** The DBB method will achieve the lowest initial cost for this Project. This is because it: 1) avoids costly contractor dependencies, overlapping work zones, and risks; 2) maximizes the number of contractor bids, thereby increasing competition; 3) will garner cost efficiencies by

eliminating design unknowns; and 4) avoids the cost premiums resulting from either the DB or CM/GC methods for the Project. In addition, the Project Team includes two contractors to incorporate cost-saving innovations within the preliminary design phase. Examples of these include recommending a transversely launched construction method to reduce construction risk, recommending reconstruction of in-water piers to avoid large cofferdams, and establishing feasible contractor access and storage areas to minimize environmental permitting risks.

2. **Shortest Construction Duration.** After creating a detailed Project schedule to evaluate the durations for each delivery method, the Project Team determined that the DBB method provides the same early operational and safety benefits as the other methods without their associated cost premiums. This is largely because of the procurement timelines and risk mitigation designs required for the DB and CM/GC methods to achieve any construction acceleration versus the DBB method.
3. **Strong Decision-making Role by ODOT.** As part of the stewardship agreement with the FHWA and commitments made to external partner agencies and regulators, ODOT is required to maintain safe and functional operations for all interstate facilities, including I-205. Because of this, ODOT needs to maintain a strong role in all decisions that affect construction, maintenance, and design. The Project contains many complex design issues, such as determining the best mobility strategy for the rock removal and determining the appropriate roadway Design Exceptions that must be resolved during the design phase. The DBB (BVC) delivery method maximizes ODOT's ability to influence the most appropriate and cost-effective decisions for both short-term and long-term operations, especially compared to the DB method, without limiting private sector innovation. Examples of the key design issues include:
    a. Resolution of environmental issues such as 4(f) and 6(f) property impacts, US Coast Guard approvals, avoidance of archaeological sites, mitigation of noise impacts, and achieving a National Environmental Policy Act (NEPA) Categorical Exclusion.
    b. Finalizing the seismic retrofit design based on the Project's seismic design criteria
    c. Achieving acceptable roadway Design Exceptions from ODOT Technical Services
    d. Ensuring acceptable mobility and construction staging methods during the rock cutting and blasting operations near OR 43
    e. Acquiring the minimum amount of ROW and utility relocations necessary to construct the Project
    f. Appropriately siting any necessary stormwater and contaminated materials within the Project limits
4. **Unique Project Elements (For Packages A and B only).** Package A and B each have unique construction elements that warrant additional construction qualifications or a specialized approach by the contractors. Package A includes widening the Abernethy Bridge via a transversely launched construction method and the installation of large drilled shafts within the Willamette River. Package B includes safely blasting and removing rock adjacent to an active I-205 freeway. For each of

these packages, the Project Team recommends a multi-parameter bidding process, likely consisting of DBB plus A+C+D. For Package C, the Project Team recommends the traditional DBB delivery method because of its size and lack of any unique construction challenges.

To confirm this recommendation, ODOT applied a preliminary version of its Alternative Delivery selection tool to the recommended phasing option. It also recommended the DBB (BVC) delivery method for Packages A and B, and Traditional DBB for Package C.

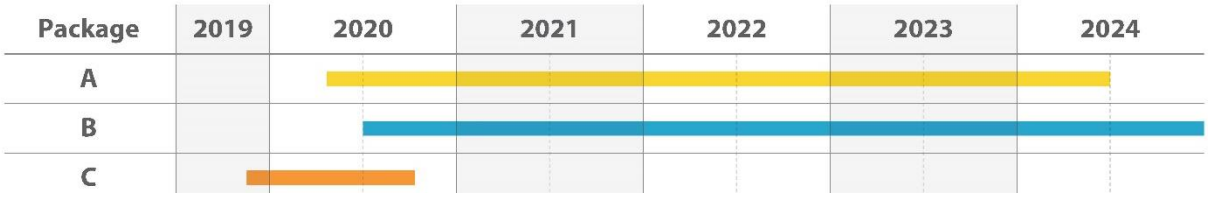
3 Recommended Alternative and Phasing

Alternative 6 (Figure 7 and illustrated in Appendix B) has the lowest cost and earliest operational safety benefits. It consists of three DBB construction packages (Packages A, B, and C, described in detail in Sections 3.2 through 3.4.

As shown in Figure 7, the Project will construct the packages in a sequenced manner as follows:

- The construction of Package C will commence in Fall 2019. Consisting of most of the corridor's ATM improvements, it will be built prior to Packages A and B in order to provide real-time communications to the traveling public during their construction.
- The construction of Package A will then be started in Spring 2020. It consists of the Abernethy Bridge widening and seismic retrofit, the OR 43 and OR 99E interchange improvements, and a new NB auxiliary lane from OR 99E and OR 213. By starting this work before the first regulated in-water work window, the most urgent operational improvements will be constructed by 2022.
- Package B, consisting of the roadway and bridge improvements south of the Abernethy Bridge, begins its construction in the Fall 2020. This timing allows the Project to be completed before 2025.

Figure 7. Alternative 6 – Recommended Phasing



3.1 Project-wide Attributes of the Recommended Alternative

The following attributes apply to the entire Project.

- Reduced life cycle and maintenance costs – Through the construction of a reinforced concrete overlay pavement, this Project will significantly extend the roadway's serviceable life and reduce the cost and frequency of subsequent maintenance cycles. This results in long-term cost savings for ODOT, as well as reduced user delay costs associated with future projects. Continually reinforced concrete pavement (CRCP) has a maintenance cycle that is typically 2.5 times longer than its equivalent asphalt pavement alternative. It avoids safety risks to the traveling public, ODOT, and construction staff during repaving by eliminating interim projects that asphalt concrete pavement would require.
- Traffic mobility during construction – The Project maintains two lanes of traffic (plus auxiliary lanes where present) on the I-205 mainline during weekday business hours. Other mobility strategies proposed for the Project are described below:
    - Limited use of nighttime or weekend full-closures of I-205 (e.g., for bridge demolition or special rock blasting and cutting operations) and ramp closures (e.g., to shift traffic)
    - Significant amounts of nighttime and weekend lane closures (for general construction operations) compliant within pre-approved lane closure periods

  - Significant amounts of 20-minute rolling slow-downs during daytime hours (e.g., to safely perform rock blasting) and nighttime hours (e.g., for bridge girder erection)

- Contaminated materials and stormwater siting – Freeway widening requires the removal of approximately 300 cubic yards of potentially contaminated materials from the freeway shoulders. On-site disposal locations reduce hauling and disposal costs, and these locations are preliminarily sited (Appendix N). To avoid conflicts with other Project needs, the graphic in Appendix N also displays potential locations for new stormwater facilities.

- Active Transportation – There are existing bicycle and pedestrian facilities at the OR 43 and OR 99E interchanges, as well as a local street network that parallels I-205. The Project maintains these connections at OR 99E and enhances them at the OR 43 interchange between the NB and SB ramp terminals. Bicycles are currently not allowed on the Abernethy Bridge due to the high-speed merges and weaves. No new provisions for bicycles or pedestrian modes are included on the bridge because the same high-speed merging and weaving conditions will remain. South of OR 43, bicycles are permitted on the freeway shoulders between Stafford Road and OR 43. The Project will improve this condition by increasing shoulder widths from 10 to 12 feet on this section of I-205. This approach is consistent with Oregon Revised Statute 366.514 (the Oregon Bike Bill).

- Design Exceptions – The Project Team developed a Project Design Criteria Sheet consistent with ODOT Technical Bulletin R 08-02(B) to document the applicable geometric design criteria. A number of Design Exceptions are anticipated throughout the corridor with varying levels of risk and impact. The majority of these Design Exceptions represent pre-existing conditions that will be maintained or even improved by the Project. ODOT Technical Services is currently reviewing the exceptions for preliminary approval.

- Aesthetics – ODOT policy directs projects to “avoid expenditures for aesthetic effect that are disproportionate to the project as a whole.” The Project Team has concluded that appropriate, context-sensitive aesthetics include features such as in-kind replacement of trees and ground seeding, low-maintenance landscaping for stormwater facilities, and surface treatments for retaining walls and exposed bridge elements. The Project Team will review similar features during the Final Design phase.

  Additionally, the Clackamas County Transportation System Plan (Section 5.I) designates I-205 west of the Willamette River a Rural Scenic Roadway. Clackamas County's review of Development and Zoning Ordinances contain vague requirements for improvements of shoulders for bicycles and pedestrians and provisions for turnouts at viewpoints. The Clackamas County standards provide discretion to ODOT to make decisions regarding roadside development. Based on the Project Team's preliminary research, the designation of the Rural Scenic Roadway does not appear to have an impact on the development of the Project.

- Adjacent projects – This Project is just one of many within a wider context of improvements along I-205. The Project team will consider the following projects during the Final Design and construction phases:

- K20329 OR 43 Multimodal Transportation Project
- K20508 I-205 Abernethy Bridge to SE 82nd Avenue IM Paving Project (PS&E October 31, 2019)
- K20475 I-205 at OR 43 West Linn Operations (PS&E May 9, 2019)
- I-5 Trunnion Replacement Project (anticipated 2019 construction)

- NEPA classification – Based on the Project's cumulative effects, early consultation with FHWA, and the proposed work described herein, the Project Team expects the Project's NEPA classification to be a Categorical Exclusion.
- Stakeholder outreach – The Project Team has been engaging with stakeholders, which has consisted of presentations to stakeholder organizations, one-on-one meetings with groups and affected stakeholders, a newsletter, email notifications, and an online open house.

  As of December 12, 2017, 147 people had provided comments using the Project's online open house and the Project website comment form. Listed below are the common themes from those responses, with the number of responses corresponding to each theme included in parentheses.

Figure 8. Comments Received from Project Online Open House

Note: Numbers on graphic are located at approximate location of the comment's content (when possible) and correspond with list below.

1. Project support (43)
2. Belief that building for congestion will not help reduce congestion (11)
3. Concern about construction impacts on traffic congestion (on I-205 and local roads) (10)
4. Request for sound walls as part of the Project and/or noise concerns (8)
5. Comments and questions about proposed OR 43 interchange, and in some cases, wanting more improvements beyond the I-205 and OR 43 interchange (7)

6. Concerns about blasting impacts (5) and (1) specifically not concerned
7. Questions about why Broadway Street Bridge will be removed and its impacts to the area (5)
8. Questions and concerns about the Project cost and who is going to pay for it (4)
9. Disagreement with or concerns about the removal of the OR 43 NB entrance ramp (3)
10. Questions about biking and pedestrian connectivity and improvements at the interchanges (3)
11. Desire to have 10th Street interchange improved (2)
12. Questions about improvements to the OR 99E ramps (2)

3.2 Package A: Northern Package (Abernethy Bridge) Description

Figure 9. Package A – Work Limits

3.2.1 General Information

Package A begins at MP 8.75 south of the Abernethy Bridge and extends to the easterly end of the Project (MP 10.25). This package generally consists of the Abernethy Bridge widening and retrofit, the OR 43 and OR 99E interchange improvements, the Main Street Bridge widening and retrofit, and the construction of the NB auxiliary lane extension from OR 99E to OR 213 (Figure 9).

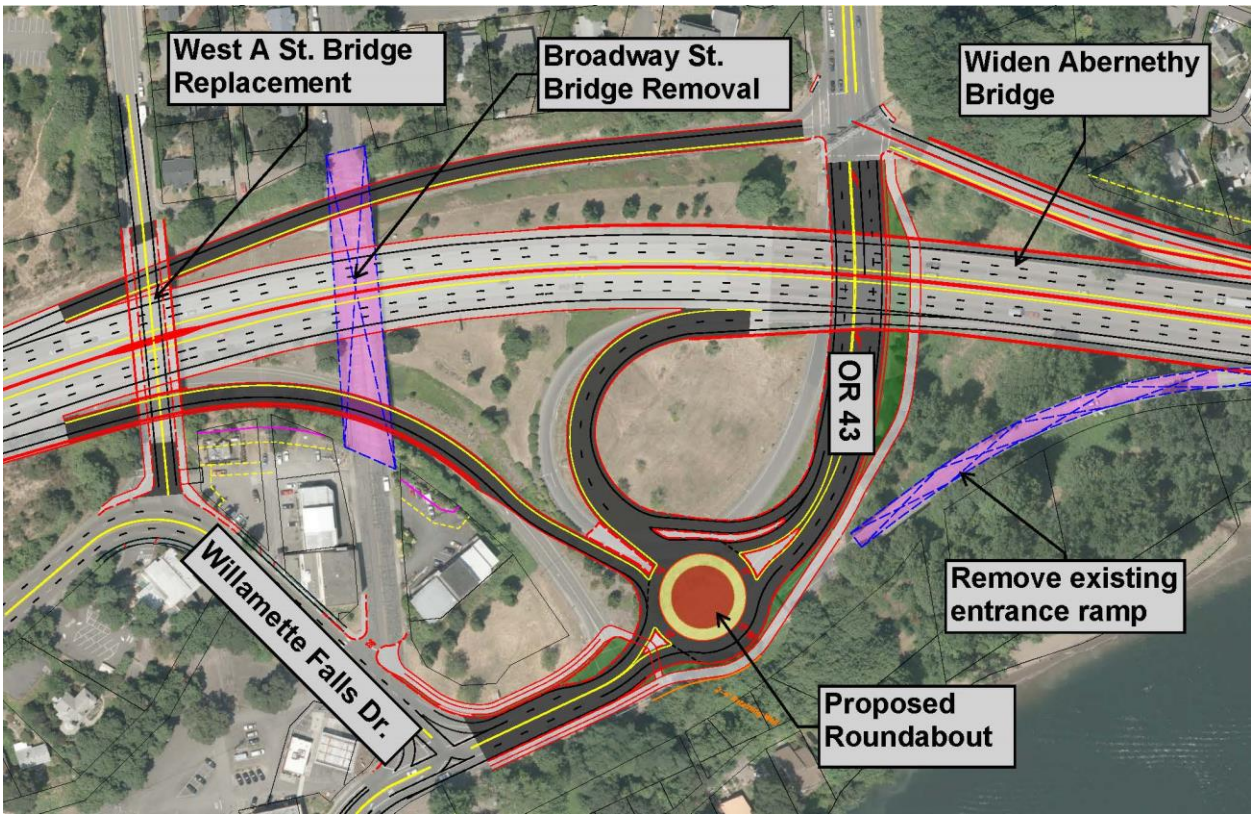
Package A's attributes include:

- The existing Abernethy Bridge consists of two general-purpose lanes in each direction, an existing auxiliary lane in each direction between OR 43 and OR 99E, a nominal six-foot left median, and right shoulders in each direction. Package A widens the Abernethy Bridge structure to add a third general purpose lane and maintain the auxiliary lanes between OR 43 and OR 99E. The package also improves the existing six-foot right shoulder to a proposed 10-foot-width, which meets the standard width

for an auxiliary lane. The Project will maintain the existing six-foot median shoulder width that does not meet the standard median shoulder width for a three-lane freeway. The Project Team will seek a Design Exception for this in Spring 2018.

- Package A will reconfigure the OR 43 interchange to consolidate the entrance and exit ramps into a single location (Figure 10). The Project Team examined multiple interchange types, including roundabouts, signalized intersections, and stop controlled intersection designs. After consideration of traffic operations, the Project Team selected a single roundabout at the I-205 NB ramp terminal.

Figure 10.OR 43 Interchange with Proposed Roundabout



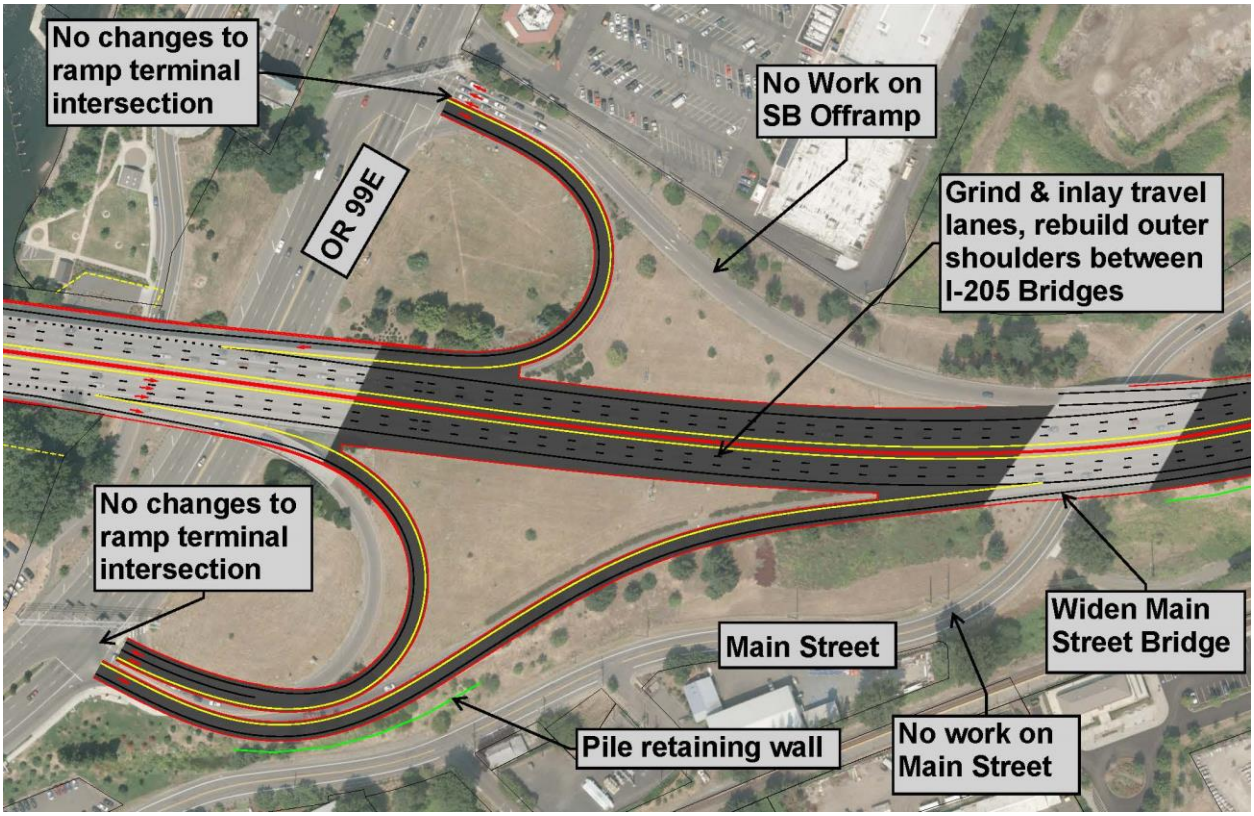
Compared to the other alternatives, a single roundabout satisfies the key criteria of: 1) having sufficient volume to capacity for the forecasted movements onto the freeway at both the AM and PM peak volumes, 2) a minimized Project footprint, and 3) not worsening operational conditions to adjacent local streets as compared to the existing condition. Other benefits that come with selecting the roundabout are listed below:

- Less rework on OR 43 and Willamette Falls Drive.
- Improved safety for bicycles and pedestrians due to a wider intersection (reduced conflicts with turning movements and the SB drop lane on OR 43 at Willamette Falls Drive).

- Reduced number of crashes and their severities compared to signalized intersections.

- Package A connects the OR 99E interchange ramps with the widened Abernethy Bridge (Figure 11). The added third mainline travel lanes are carried through the OR 99E interchange and ties into the three lanes north of OR 99E. No work is included to increase capacity on the ramps; therefore, no ramp widening is included other than to meet geometric standards. Ramp meter locations will be adjusted during Final Design if there is an advantage to do so. The Project does not include any improvements on OR 99E; therefore the ramp terminals will remain in their existing locations on OR 99E. The Project will construct a retaining wall between the OR 99E NB exit ramp and Main Street to eliminate impacts to Main Street or existing ROW.

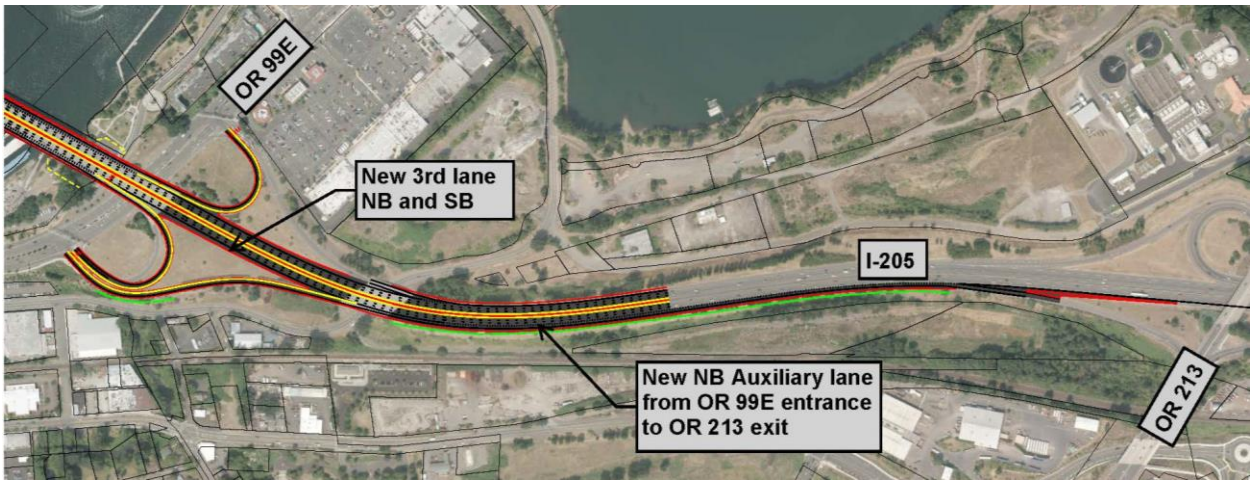
Figure 11. OR 99E Interchange



- Package A constructs a NB auxiliary lane that connects the OR 99E interchange to the OR 213 interchange NB exit ramp (Figure 12). Between the two interchanges, I-205 NB will have three through lanes plus a 1,500-foot-long auxiliary lane, which widens the freeway by 12 feet. Without the proposed NB auxiliary lane, traffic operations after completion of construction would fail and a bottleneck would remain. The Project Team performed an operational analysis of the OR 99E to OR 213 auxiliary lane and a safety assessment based on the National Cooperative Highway Research Program *Report 687: Guidelines for Ramp and Interchange Spacing*. Including a NB auxiliary lane between OR 99E and OR 213 is expected to reduce the

total number of crashes and the number of fatal and serious injury crashes within the segment by approximately 20 percent.

Figure 12. NB Auxiliary Lane from OR 99E to OR 213



- Package A will upgrade both the Abernethy Bridge and Main Avenue Bridge to meet current seismic design standards.

3.2.2 Roadway Improvements

Within the limits of Package A, the I-205 freeway widening will maintain the existing freeway centerline alignment, with the widening occurring symmetrically to the outside in both directions.

The Project Team elected the widening strategy to achieve the objectives:

- Limit the Project footprint to avoid or minimize impacts to ROW and environmentally-sensitive features
- Minimize the modification of entrance and exit ramps at the interchanges
- Minimize retaining walls, illumination relocations, and camera and/or radar site relocations
- Minimize the amount of freeway reconstruction work on the north side of the Abernethy Bridge to reduce cost
- Minimize the amount of OR 43 and OR 99E improvements while ensuring that current I-205 ramp work does not preclude future external improvements on adjacent local roadways, OR 43, or OR 99E

The Project establishes 12-foot outside shoulders for I-205 throughout the Project limits, with the exception of sections including auxiliary lanes that require a slightly narrower 10-foot outside shoulder.

The revised I-205 mainline and interchange geometries were established based on the following considerations:

- Maintaining the existing I-205 horizontal, vertical, and super-elevation geometries to the maximum extent possible
- Eliminating Design Exceptions, where feasible, by implementing geometric improvements. For some roadway design elements, the Project Team will seek Design Exceptions approvals.
- Maintaining existing driveway connections where possible. A number of existing driveways within the areas of OR 43 and Willamette Falls Drive will likely require modification to reconnect to the proposed improvements. No driveway closures are assumed.
- The Abernethy Bridge widening may result in the reduction of the existing vertical clearance on OR 43. Preliminary discussions with the Motor Carrier Advisory Committee indicated that because this is not a designated freight route, some reduction would be acceptable. Although the initial findings indicate that the vertical clearance on the eastern edge of OR 43's pavement may be less than 15 feet, there is enough clearance in the adjacent lane to permit higher loads to pass. Therefore, the bridge widening is expected to be approved by the Committee.
- The point of minimum vertical clearance over OR 99E is 17'-8" at the exterior lane line in the NB direction (below the NB exit ramp). Widening the Abernethy Bridge reduces the vertical clearance unless a thinner steel girder is used. Changes to vertical clearances based on the grades, super-elevation, new loop exit ramp geometry, and the Abernethy Bridge girder depths are under review and any reduction requires approval by the Motor Carrier Advisory Committee.

3.2.3 Construction Staging and Maintenance of Traffic

The assumed construction staging sequence and access and maintenance of traffic for this package is described below.

3.2.3.1 Abernethy Bridge (Construction Sequence)

The Abernethy Bridge construction sequencing assumes that multiple bridge sections will be under construction simultaneously. Early work includes foundation improvements on the west approach spans, which will be accessed outside of the ordinary high water line. There are several key widening areas at existing gore points near the OR 43 NB entrance and OR 99E NB exit ramps. To access these areas, traffic will shift to the median shoulder. Weekend ramp closures may be required to access and complete closure pours required to accommodate later phases of work.

The majority of the first two construction seasons will focus on foundation improvements and substructure work. During the first in-water work season, the contractor will install temporary work bridges, which allows continued access to the foundations. As the approach structure foundations are completed, the contractor will widen the roadway to the outside with limited directional night or weekend lane reductions, or directional closures during girder placement and closure pour work.

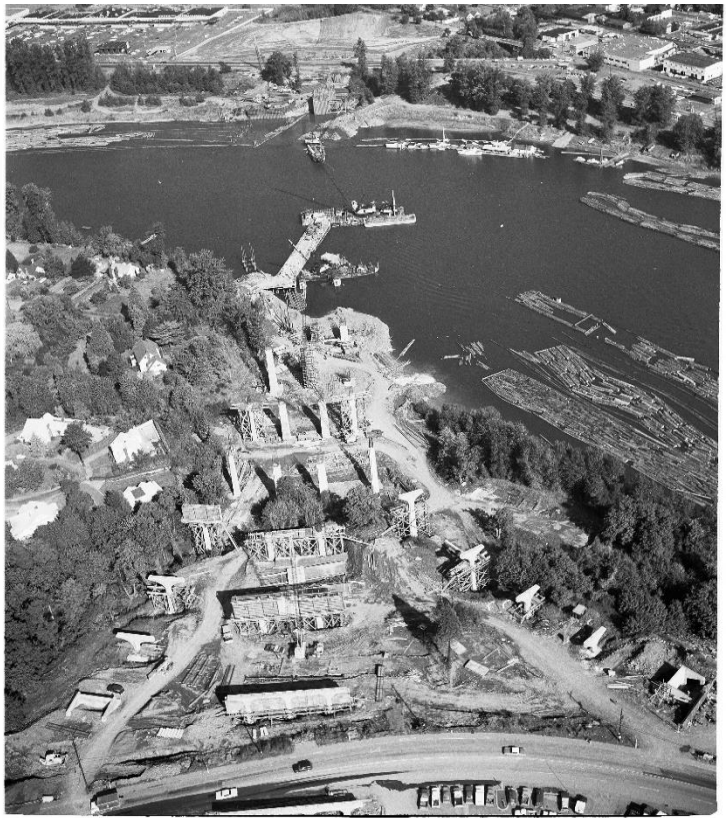
The main span of the Abernethy Bridge will be widened using a technique of transversely shifting the existing box girders approximately 8-feet toward the outside, one direction at a time, under a weekend closure. This activity could be completed in as little as one

night; however, weekend closures are currently proposed to accommodate any approach transitions or traffic control shifts that may be required prior to opening to traffic. After the transverse slide, the contractor will continue the cantilever widening (left and right shoulders) for each independent main span structure. Much of this work will be performed after traffic has been moved to the opposing shoulder.

3.2.3.2 Abernethy Bridge (Construction Access)

Gaining access to the bridge substructure and working beneath the bridge will be challenging. When the original bridge was built, there were no physical obstructions or traffic that impeded construction activities. There was unlimited headroom for the large, tall equipment to construct the bridge (Figure 13). Now, however, the existing bridge, boat ramps, docks, parks, and the McLean House Park pose restrictions on construction access locations. (Figure 14).

Figure 13. Abernethy Bridge Construction



c. 1968

Work platforms located on both sides of the bridge will access the main river span. The work bridge decks need to be 30- to 35-feet-wide to accommodate cranes and other large equipment. They will be elevated above the ordinary water surface to allow for the seasonal rises in the river. This only leaves 35 to 40 feet of headroom for large equipment.

Due to the access difficulties beneath the existing bridge to strengthen the existing substructure and foundations at Piers 3-6, these supports will be replaced with a “superbent.” The superbent consists of new drilled shaft foundations and columns located outside the edge of the deck of the widened bridge, along with a new bent cap that will span between the columns to support the bridge. The drilled shaft and columns will be located sufficiently away from the bridge to avoid the tapered steel pile foundations of the existing bents. Pier 3 is located adjacent to a boat ramp (an identified 6(f) resource) and Abernethy Creek, which feeds into the Willamette River next to the south column of this bent. Footing construction will impact the creek and will require it to be permanently diverted since the new replacement bent column lands within the creek.

Figure 14. View of the Abernethy Bridge and Sportscraft Landing Park with Boat Ramp from the East Bank

Willamette River water levels vary significantly. The majority of foundation work will be performed from work bridges that will accommodate the fluctuation in river elevations. The Willamette River sees seasonal elevations that commonly reach between 25 and 29 feet. The contractor will maintain public access to the existing boat ramp and privately rented boat docks throughout construction. The Project Team is assuming the use of a barge to access Pier 4 would limit or completely avoid public access impacts. Construction access options are still under investigation and will continue to be a primary focus as the foundation design solutions are refined.

3.2.3.3 Main Street Bridge

The Project will widen and seismically retrofit the Main Street Bridge. The median shoulders are not wide enough to accommodate traffic shifts needed for construction. Because of this, the selected seismic retrofit components are limited to those that can be constructed beneath the bridge. The widening work on the NB side of the bridge can be completed by shifting traffic toward the median with a temporary barrier on the right shoulder.

3.2.3.4 OR 43 Interchange

OR 43 construction sequence will be directly affected by the West A Street and Broadway Street construction activities. To minimize the duration of the temporary reduction in allowable high loads, the OR 43 ramp reconfiguration and removal of the Broadway Street Bridge will have interim completion dates. The temporary reduction in vertical clearance allows for the OR 43 widening and lane modifications, as well as the entrance loop reconstruction to occur before or with the work on the West A Street and Broadway Street structures. If a temporary reduction in vertical clearance for NB traffic is not permitted, sequencing alternatives may be considered that have other overlapping work or alternative local circulation options. Over-height loads will access the interchange ramps using the new roundabout.

The majority of the reconstruction of the OR 43 NB entrance ramp can be completed without impacting access to the existing ramp. Some of the work requires some weekend ramp closures to complete portions of the ramp that overlap with the existing loop ramp. Additionally, some weekend ramp closures may be required to reconstruct the proposed I-205 NB to OR 43 exit ramp. For additional information related to construction staging, see Appendix J.

3.2.3.5 OR 99E NB Exit Ramp

The first 300 feet of the OR 99E exit ramp is located on the Abernethy Bridge. To keep the exit ramp open during construction, it will be temporarily relocated. The Project will shift the existing freeway travel lanes toward the existing median barrier to provide a work area for widening the southernmost approach span. This will accommodate a temporary loop exit ramp to carry traffic for the remaining widening and exit ramp reconstruction.

3.2.3.6 NB I-205 Auxiliary Lane

Construction of I-205 NB auxiliary lane will widen the pavement to the outside. Traffic will be maintained by shifting lanes toward the median barrier. A temporary concrete barrier will separate the work area from traffic. A nighttime ramp closure is necessary to make the connection to the OR 213 exit ramp.

3.2.4 Pavement Type

3.2.4.1 OR 43 and OR 99E Interchanges

Where widening or grade modifications are required, ramps will be reconstructed with a new asphalt structural section comparable to the existing section.

3.2.4.2 North of the Abernethy Bridge

Because of the proximity of the Abernethy Bridge and Main Street Bridge, a structural overlay is not feasible for the lanes not impacted by the widening. The unwidened portions of the freeway will receive a 2-inch grind and inlay within the existing travel lanes. The through travel lane between Main Street and the Abernethy Bridge will be reconstructed with concrete pavement. The new right shoulder will receive a full depth concrete pavement reconstruction and the auxiliary lanes will be constructed with a full-depth asphalt pavement.

3.2.4.3 South of the Abernethy Bridge

The roadway section immediately south of the Abernethy Bridge will consist of reconstructed, full-depth concrete pavement. It will then transition into the concrete section consistent with Package B.

3.2.5 Stormwater

Package A adds approximately 3.3 acres of contributing impervious area (CIA) to the 32.3 acres of existing freeway CIA, for a total CIA of 35.6 acres.

The existing OR 43 interchange stormwater collection system discharges directly into the Willamette River. The Project will include treatment facilities for the runoff volume for the entire interchange and the portion of OR 43 that drains to the Project area, including a portion from Package B. Existing inlets and drainage pipes will be utilized where possible, but additional inlets and larger pipes will likely be required to meet the design criteria. Based on the preliminary design, there is available ROW to accommodate the construction of the stormwater management facilities where the existing NB entrance ramp is being removed.

At the OR 99E interchange, the widening and retrofit construction will not change the existing drainage patterns with the exception of additional CIA. Based on preliminary sizing, the existing OR 99E interchange collection system will be utilized where possible, but retrofits and improvements will be necessary to meet current stormwater standards and the increased flows.

Within the extent of the NB auxiliary lane, there is an existing stormwater conveyance system. From a conceptual level of analysis, it appears the system discharges the roadway runoff into the adjacent ROW without providing treatment.

3.2.6 Traffic Improvements

Traffic Improvements consist of signing, lighting, signalization, and ATM and/or intelligent transport systems (ITS) improvements.

3.2.6.1 Signing

The Project updates I-205 SB signing to match the new lane configuration for OR 99E (Exit 9), and to meet current Manual on Uniform Traffic Control Devices (MUTCD) standards. The Project updates signs outside the Project limits, including signs north of OR 213 impacted by the new lane configuration. The Project proposes two new signs for the existing sign bridge just east of Exit 10: “EXIT 9” – “99E/Oregon City/Gladstone/ ¾ MILE” and “EXIT 10” – “213 SOUTH/Oregon City/Molalla/EXIT ONLY”. Additional SB signing will match the new lane configuration. NB signs will be updated to meet current MUTCD standards. The lane-widening and configuration changes will affect the signage of I-205 throughout the limits of Package A. With upgrades to the OR 99E interchange, sign support structures and signage may be impacted and require replacement. See Appendix M for sign structure locations.

The Abernethy Bridge widening will require two new sign bridges. The construction timing of the new sign bridges will depend on the bridge construction sequence.

The Project adds sign support structures in the area of NB OR 99E to the OR 213 auxiliary lane. These supports will improve existing sign spacing and accommodate new signing in the SB direction, as well as the NB direction for the auxiliary lane. These proposed improvements include two new sign bridges with the removal of one sign bridge, two cantilevers, and one butterfly support. Updated NB signing will include the auxiliary lane to Exit 10 with new “EXIT ONLY” signs.

3.2.6.2 Lighting

Based on discussions with ODOT Lighting Design staff, most of the existing lighting systems along the I-205 mainline and interchanges are at the end of their useful life. These systems consist of high-pressure sodium cobra head-style luminaires (typically 400 watts) supported on poles consisting of single and twin luminaire mountings a located along the freeway's median and outside shoulders. The Project will replace the existing lighting systems with in-kind systems throughout the mainline and within the OR 43 and OR 99E interchange areas. The replacement systems will include new base-mounted service cabinets, conduit, wiring, poles, foundations, and light-emitting diode (LED) luminaires.

3.2.6.3 Signalization

Package A improvements include minor modifications to the pedestrian push buttons at the traffic signals at the OR 99E interchange and the OR 43 and I-205 SB ramps. The existing traffic signal at OR 43 and I-205 NB will be removed and replaced with a roundabout. Ramp meters may also be modified or replaced at each entrance ramp for the OR 43 and OR 99E interchanges, subject to findings during Final Design.

3.2.6.4 ATM and ITS

Package C will construct the majority of the ATM improvements prior to the construction of this package. Because Package A widens the freeway and adds an auxiliary lane, it is anticipated that some of the temporary ATM conduits placed to power and communicate with Package C equipment will need to be reconstructed within Package A. Some additional ITS restoration is also required due to Project impacts. This includes fiber optic communications, cameras, cabinets, or any other impacted equipment.

3.2.7 Bridge and Geotechnical Improvements

Within Package A, two bridges will be widened and retrofitted: the Abernethy Bridge and I-205 over Main Street in Oregon City. The scope for these bridges was determined based on the following (summarized in Table 2):

- The cost to widen and retrofit the bridges is significantly less expensive than to replace them.
- The traffic, environmental, and construction impacts associated with widening and retrofitting are far less severe than those for replacement are.

Table 2. Bridge Scope Recommendations

Bridge Name	MP	Scope
Br. 09403 I-205 over Willamette River (Abernethy Bridge)	9.03	Widen and seismically retrofit
Br. 09403A OR 43 NB Conn to I-205 NB (Abernethy Bridge)	9.00	Permanently remove

Bridge Name	MP	Scope
Br. 09403C I-205 SB Conn #2 to OR 43(West Linn interchanges) (Abernethy Bridge)	9.14	Widen and seismically retrofit
Br. 09403R I-205 NB Conn #1 to OR 99E (Oregon City interchange) (Abernethy Bridge)	9.30	Widen and seismically retrofit
Br. 09702 I-205 over Main Street (Oregon City) (Main Street Bridge)	9.51	Widen and seismically retrofit

Key characteristics of the bridge types influencing scope are as follows:

- Other than the Glen Jackson Bridge over the Columbia River, the 2,717-foot-long by 104-foot-wide Abernethy Bridge is the most significant bridge on I-205 in the Portland metropolitan area. Its sheer size makes it an “essential” structure as defined in the FHWA *Seismic Retrofit Manual*. If it were severely damaged in an earthquake, it would cost hundreds of millions of dollars and years to repair or replace. Given this significance, it is a vital structure on the I-205 corridor, a designated “seismic lifeline”.
- The Abernethy Bridge has the following physical characteristics:
    - The steel girder bridge conveys three lanes of I-205 in each direction over the Willamette River. The bridge is composed of two parallel and independent bridge decks (superstructures). That is, two separate, adjacent bridges carry the NB and SB travel lanes. These bridges share a common substructure but the decks are independent of each other. This portion of the bridge will be symmetrically widened and seismically retrofitted.
    - The north approach spans (Spans 1-3) consist of simple span steel plate girders of varying spacing and depth. This section of the bridge is 452-feet-long and varies in width to accommodate the entrance and exit ramps from OR 99E. The girder depth varies from 6 feet at Abutment 1 up to 15 feet at Pier 3 as the spans get longer and transition to the main spans. The girders in Spans 2 and 3 are haunched. This portion of the bridge will be symmetrically widened and seismically retrofitted.
    - The main spans of the bridge (Spans 4-6) consist of steel box girders with floor beams spanning transversely between them to support the concrete deck. The box girders are also haunched and vary in depth from 15 feet at Piers 3 and 6, to 13 feet in the middle prismatic section of the girder, to 21 feet at Piers 4 and 5. This portion of the bridge will be symmetrically widened and seismically retrofitted.
    - The south approach spans (Spans 7-15) consist of continuous steel plate girders of varying spacing and depth, similar to Spans 1-3. The bridge gets progressively wider from Spans 7-9, with the deck splitting in Span 9 on each side of the bridge to connect to separate entrance and exit ramp structures from OR 43. Spans 10-15 are constant width and girder spacing. Again, the girder depth varies as the spans range from 193 feet in Span 7 down to 54 feet in Span 15.

Package A symmetrically widens and seismically retrofits this portion of the bridge.

  - The existing NB entrance ramp structure is 615-feet-long with a 24-foot-wide deck between bridge rails. Package A permanently removes this six-span ramp structure.
  - The SB exit ramp structure is 510-feet-long with a 34-foot-wide deck between bridge rails. This five-span structure is composed of five lines of steel plate girders and is supported on single column hammerhead bents supported on driven steel pile foundations. Package A widens and seismically retrofits this portion of the bridge.

- All bridges will be designed to remain operational after the anticipated Magnitude 8+ Cascadia Subduction Zone Earthquake and to avoid collapse after a 1,000-year return period earthquake.
- The Abernethy Bridge has numerous seismic deficiencies and most of its substructure components require strengthening. The foundation deficiencies are the most significant. On-land supports require substantial enlargement and strengthening, including additional piles or drilled shafts.
- As described previously, the Project replaces the in-water foundations (Piers 3-6) with a superbent consisting of new drilled shaft foundations and columns outside of the widened bridge. A new bent cap will span between the new columns, and the existing columns will be removed completely. The superbent must be wider than the widened bridge to avoid conflicts with battered piles foundations of the existing piers. In addition, the superbent as currently designed does not have sufficient structural or foundation capacity to support a future widening of the bridge. If this capability is desired, its foundations will have to be greatly enlarged, with a significant additional cost of approximately $25 M.
- The Project widens the Abernethy Bridge by 16 feet on each side to provide a new lane and additional shoulder width. The main span widening will be constructed by shifting the twin bridges 8-feet-away from each other by first jacking the bridge up, and then sliding it apart on guide-tracks. The bridge will then be lowered onto its new bearings. The widening will be constructed using cantilever beams that frame into the existing crossbeams. The load ratings for the existing steel boxes showed that the bridge has sufficient reserve capacity to carry the additional loads for the cantilever widening. This construction method will significantly reduce construction costs versus fabricating and erecting a new girder line on each side of the bridge. The remaining spans of the bridge will be widened with additional girders. Figure 15 and Figure 16 show a comparison of the existing Abernethy Bridge to the future widening and pier replacement.

Figure 15. Rendering of the Existing Abernethy Bridge

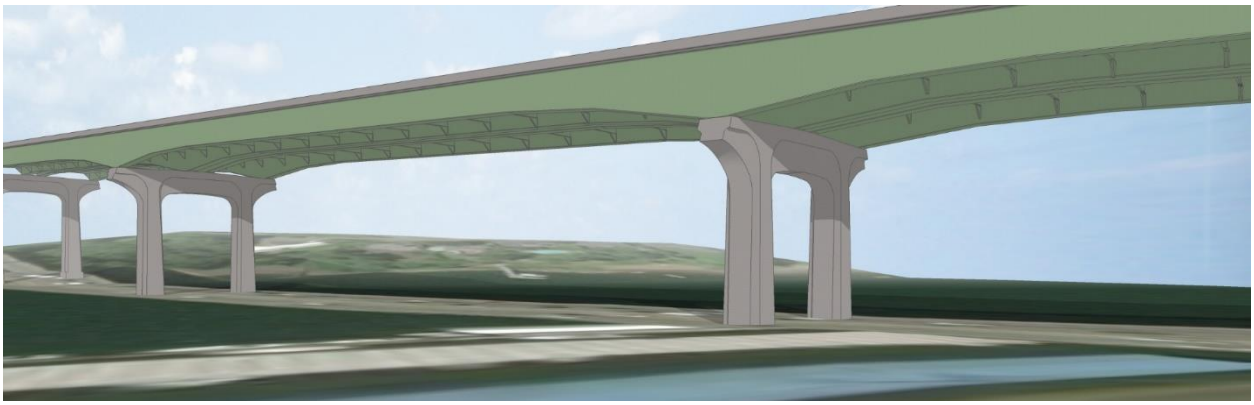
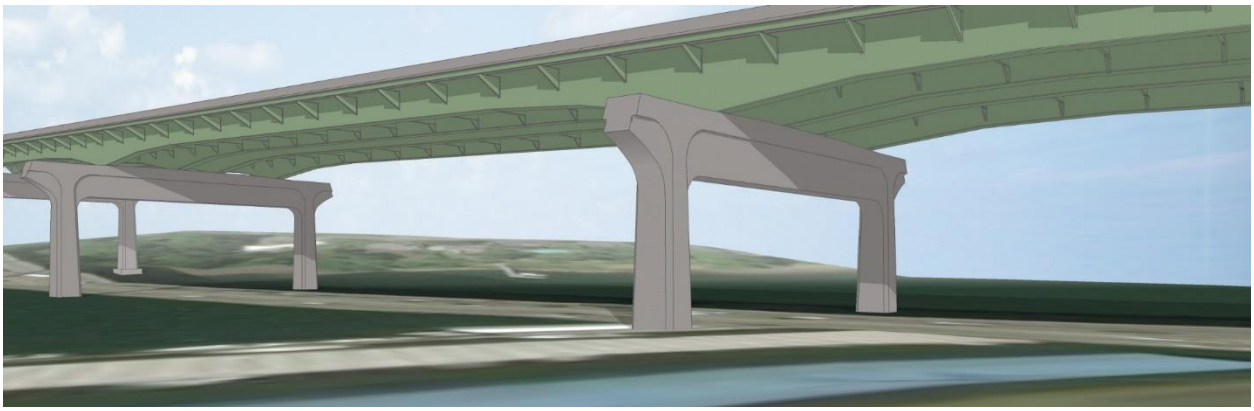


Figure 16. Rendering of the Future Widening and Pier Replacement of the Abernethy Bridge



- There is a high potential for geotechnical hazards, namely subsurface soil liquefaction and lateral spreading, at both banks of the Willamette River. A large cost allocation has been included in the estimate to mitigate this condition. The assumed mitigation consists of deep soil mixing or jet grouting. The Project Team will conduct further analyses of the geotechnical hazards in early 2018.
- The Project widens the Main Street Bridge by 12 feet on the NB side to accommodate the proposed auxiliary lane between the OR 99E entrance ramp and OR 213 exit ramp. Shoulders on the existing bridge will match the existing widths.

3.2.8 ROW Impacts and Anticipated Acquisitions

The Project was designed to avoid or minimize ROW impacts. Twelve parcels have been identified for acquisition (for both Packages A and B, resulting in an estimated $1.4 M of total Project acquisition costs). See Appendix G for a summary of potential ROW impacts.

For this package, the ROW impacts can be categorized as follows:

- Partial acquisitions – a “sliver take” to accommodate construction (e.g., the partial removal of a floating dock below the Abernethy Bridge).

- Temporary construction easements – to facilitate construction operations.
- Parks lands with Land and Water Conservation Funds (LWCF) protections – Park occupation that exceed 180 days may require mitigation through a fee conversion. Conversion is anticipated adjacent to the Abernethy Bridge.

3.2.9 Utility Impacts and Anticipated Relocations

The following utilities have been identified within Package A.

- A 24-inch City of West Linn water line is suspended from the Abernethy Bridge. It will be protected during construction, so no relocation costs are anticipated.
- A submarine cable is located in the Willamette River beneath the Abernethy Bridge. The exact location of the cable is unknown, but a relocation cost has been allocated. Other minor utilities exist and have been accounted for in the Project estimate.
- ODOT has empty conduit on the Abernethy Bridge for future use.
- The Project Team does not anticipate any critical utilities to be impacted by construction activities within the OR 43 interchange.
- Within the limits of the OR 99E interchange, there are two utilities that may be impacted. One is a City of West Linn 24-inch waterline located within the NB exit ramp to OR 99E towards 17th Street and is deemed potentially critical to the Project schedule and/or cost. NW Natural has a 4.5-inch steel line on the eastern side of OR 99E that is also within the NB exit ramp to 17th Street. Relocation may be necessary for both utilities depending on changes to the current ramp geometry. There are many other utilities adjacent to the work, mostly along OR 99E and Clackamette Drive, that are not anticipated to be impacted during construction.
- On I-205 north of Abernethy Bridge, many utilities exist either nearby or cross under or over I-205. However, there are no anticipated impacts from the improvements.

3.2.10 Environmental Impacts

The key environmental elements for Package A consist of visual, culverts, wetlands, noise and vibration, endangered species, in-water work, archaeological, river navigation, historic, environmental justice, and 4(f) and 6(f) resources.

3.2.10.1 Visual

The Abernethy Bridge is not a listed historic resource. As such, changes to the structure resulting from the retrofit and widening are not regulated for visual effects from an environmental permitting perspective.

3.2.10.2 Culverts

Except for the Abernethy Creek culvert, there are many small culverts running below the freeway within the limits of Package A; the proposed temporary and permanent work will not trigger the Oregon fish passage statute. However, the Abernethy Creek culvert is a 20-foot-diameter, approximately 650-foot-long concrete culvert that begins east of Main Street and empties near where Abernethy Creek flows into the Willamette River. The

culvert crosses beneath Main Street, the I-205 NB entrance and exit ramps, OR 99E, and Clackamette Drive before emerging adjacent to the Jon Storm Park parking lot beneath the Abernethy Bridge. Abernethy Creek is considered fish habitat and has documented use by Coho, fall Chinook, and winter steelhead salmon. Due to construction impacts, it is likely that the Project will need to relocate the portion of the creek extending between the culvert outfall and the Willamette River.

3.2.10.3 Wetlands

The work in Package A is not anticipated to impact any wetlands.

3.2.10.4 Noise and Vibration

Based on preliminary noise analysis results, the FHWA cost-benefit threshold for noise mitigation was satisfied for the northern edge of the Abernethy Bridge. After comparing these areas against ODOT's guidelines for reasonableness and feasibility, an allocation for potential sound walls has been included in the cost estimate and will be evaluated further during final design.

3.2.10.5 Endangered Species

The Willamette River contains federal Endangered Species Act listed species. The Project is expected to utilize the existing FHWA programmatic biological opinion to obtain coverage for potential impacts to listed species.

Peregrine falcons are known to use the Abernethy Bridge for reproduction. This is not considered a design risk at this time. The Project will coordinate with the Animal and Plant Health Inspection Service and the Audubon Society as the design progresses to determine the best strategy.

3.2.10.6 In-water Work

In-water work will be restricted to the in-water work window from July 1 through October 31, and pile driving will only be permitted from July 10 through October 15. Work within cofferdams, if required, is permitted year-round as long as the area remains isolated from the actively flowing channel and salvages all fish. To offset the risk of inundating the cofferdams, the height of the cofferdam walls will be designed to the 10-year flood elevation. Similar in-water restrictions exist for the large diameter drilled shaft construction.

Temporary impacts to Abernethy Creek, located adjacent to Jon Storm Park, are anticipated to facilitate access to seismically upgrade the foundations. Although the extent of this work is uncertain at this time, it is anticipated that temporary water management and maintenance of fish passage will be required.

Similar to Abernethy Creek, McLean Creek will likely be impacted by the expansion of the pier footing. The work area will be isolated from the actively flowing channel if water is present and impacts will be mitigated.

3.2.10.7 Archaeological

There are known archaeological sites in the vicinity of the Abernethy Bridge on both banks of the Willamette River. Subsurface archaeological investigations are underway. Adverse impacts to intact archaeological resources are not anticipated.

3.2.10.8 River Navigation

Along with maintaining access to the boat ramp at Sportcraft Landing Park, the Project is required to maintain safe passage for recreational and commercial boat traffic in the Project vicinity. The main navigation channel will maintain horizontal and vertical clear zones to facilitate the passage requirements of Oregon State Marine Patrol and the US Coast Guard.

3.2.10.9 Historic

There are several buildings determined to be eligible for listing on the National Register of Historic Places and others that may be eligible for listing. These are located to the west of the Willamette River in the vicinity of the OR 43 interchange modifications. The Project will avoid adversely impacting these potentially historic structures.

3.2.10.10 Environmental Justice

The Project is not anticipated to disproportionately adversely affect the environmental justice communities located near the OR 43 interchange. The Project will use standard mitigation measures to minimize impacts and will maintain access to critical services throughout construction.

3.2.10.11 4(f) and 6(f) Resources

The parks located on east bank of the Willamette River that are considered 4(f) resources are Jon Storm Park, the Willamette Greenway Trail, and Sportscraft Landing Park. The Project expects any impacts to the Jon Storm Park, owned and managed by Oregon City Parks and Recreation, will be temporary, will not disrupt the functions of the park, and will be processed utilizing the FHWA 4(f) *de minimis* process (Figure 17). The Willamette Greenway trail may be impacted by the Project, but pedestrian and bicycle access through the construction area will be maintained and impacts can be minimized to *de minimis*.

Temporary occupancy of a portion of Sportscraft Landing Park may be unavoidable (Figure 18). Along with the protections afforded by 4(f), Sportscraft Landing Park utilized Land and Water Conservation Funds and is protected by the 6(f) regulations. Construction access may necessitate a conversion if occupied for more than 180 consecutive days. The Project plans to avoid potential “use” of the park, as defined by 4(f), by constructing temporary access bridges so the boat ramp can remain functional for the duration of the Project.

Figure 17. Jon Storm Park on the East Bank of the Willamette River

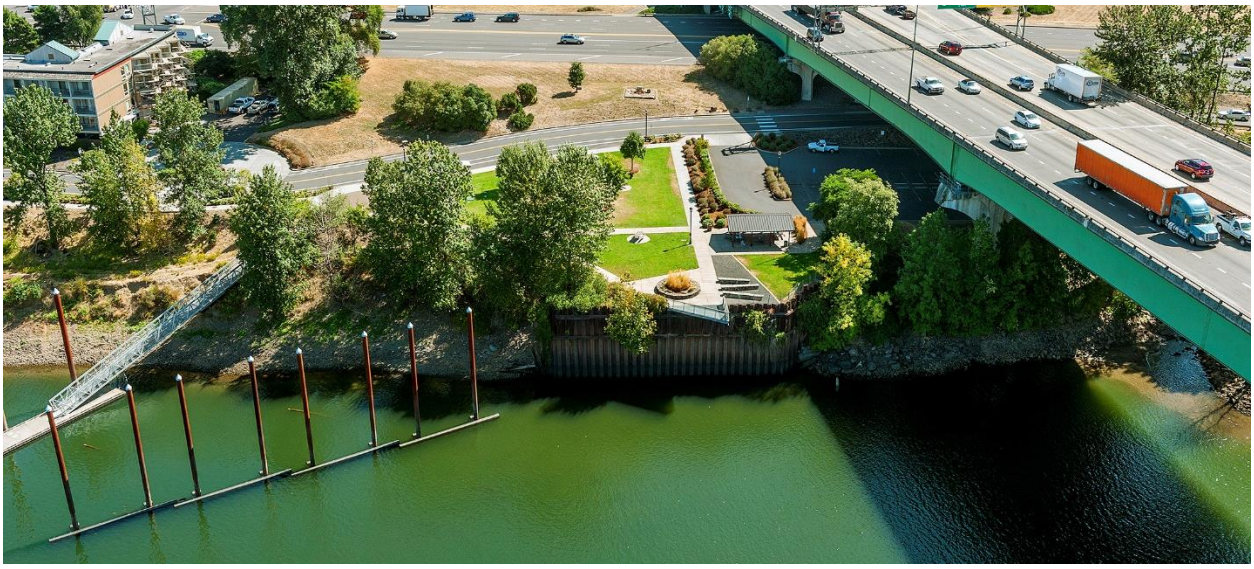
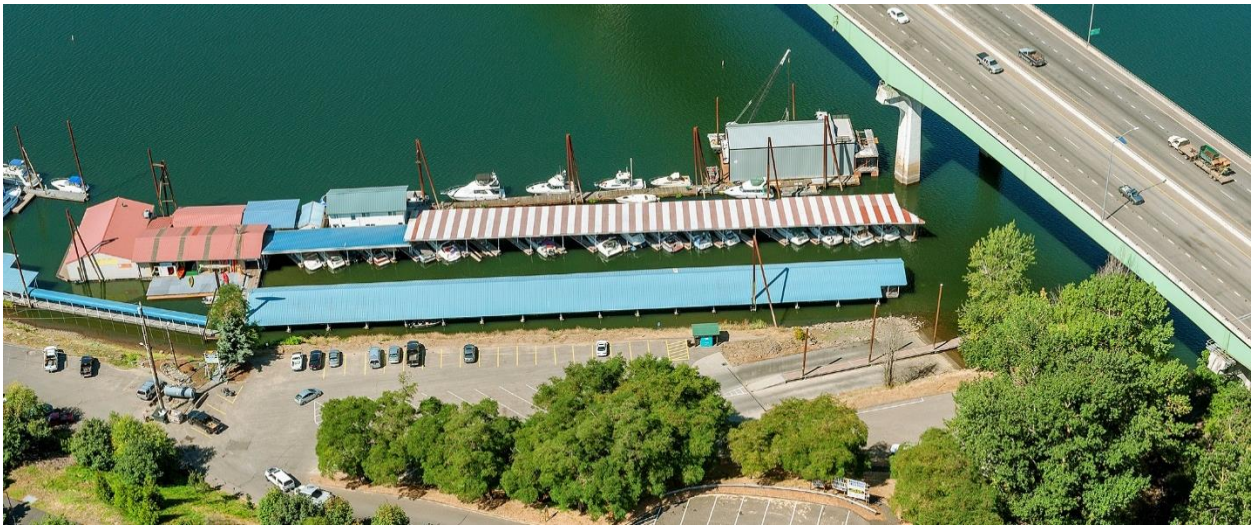


Figure 18. Sportscraft Landing Park and Boat Ramp



On the west side of the Willamette River, the City of West Linn Parks and Recreation owns and operates West Bridge Park (a 4(f) resource) and the McLean House (a historic 4(f) and 6(f) resource). The Project is not expected to impact West Bridge Park. Minor temporary impacts to the McLean House may be necessary to facilitate access through the park. The Project may occupy the McLean House property for more than 180 consecutive days, but impacts will be temporary or beneficial in nature and are unlikely to affect the limited recreational use of the property. It is unknown at this time if the Project access will create an adverse effect to the historic property, but the Project will adjust as necessary to avoid an adverse effect. In addition to the parks, a Willamette Greenway Trail traverses the park and ODOT ROW under the Abernethy Bridge. The Project will maintain bicycle and pedestrians access under the bridge during construction.

3.2.11 Other Key Package Unknowns or Assumptions

The other key package unknowns or assumptions are presented below.

3.2.11.1 Willamette Falls Drive Intersection with OR 43

No modifications to the stop-controlled intersection of OR 43 and Willamette Falls Drive are included in the Project. This intersection is beyond the Project limits required to reconnect the NB entrance and exit ramps to OR 43. The Project should reduce cut-through traffic that uses this intersection, and it does not preclude future improvements to this intersection, such as another roundabout, if a local public agency desires to construct it.

3.2.11.2 Access Management

There are several existing driveways along OR 43 within the influence area of the proposed interchange modifications. The Project assumes existing driveways on OR 43 will remain operational and median islands and/or traffic separators will not be installed within existing driveway areas. For OR 99E, an existing driveway into an adjacent shopping center is within 100 feet from the SB ramp intersection. At this time, no access changes are anticipated, but refined access management analyses will be performed during the DAP phase (Spring 2018).

3.2.11.3 Geotechnical Hazard Mitigation

The east bank of the Willamette River consists of deep alluvium over bedrock. The alluvium may experience significant lateral spreading during an earthquake, which would endanger the pile foundation of the Abernethy Bridge supports on this side of the river. Subsurface investigations are complete and the analysis to evaluate the potential for this occurrence is underway. Results are expected in early 2018 and changes to the assumed mitigation may occur, potentially leading to a cost reduction.

The Abernethy Bridge in-water pier foundations are covered with rock backfill. The as-constructed plans indicate the rock extends 30 feet outside the footings in all directions. If the rock actually extends beyond those limits, it would interfere with sheet pile installation for the cofferdams and additional costs would be incurred to remove the rock by clamshell excavation.

The Abernethy Bridge seismic analyses are ongoing and will conclude in Summer 2018. The retrofit costs contained in this report, therefore, are based on preliminary results only and changes to the assumed seismic retrofit may occur leading to a potential cost variation.

3.2.11.4 OR 99E Ramp Terminal Operations

The existing ramp terminals are operating at or above standard volume to capacity ratios. The existing single turn lanes and freeway ramp meters result in traffic queues from the SB and NB entrance ramps extending back onto OR 99E during peak hours. The Project will not address this operational issue, but it will be designed to accommodate future improvements to OR 99E

3.2.11.5 Main Street Bridge

At the Main Street Bridge, the potential for liquefaction of a deep soil layer (at approximately a 75-foot depth) has been identified. This potentially liquefiable layer is below the tips of the existing foundation piles at the southern end of the bridge, and the bridge could experience some differential settlement between adjacent bents. This will be studied further during the final design phase.

3.3 Package B: Southern Package (I-205 Freeway Widening) Description

Figure 19. Package B – Work Limits

3.3.1 General Information

Package B begins at MP 2.83, just south of the Stafford Road interchange entrance and exit ramps, and continues to MP 8.75, just south of the Abernethy Bridge (Figure 19). This package generally consists of the I-205 freeway widening from Stafford Road to the Abernethy Bridge, upgrading freeway signing, performing rock cut required to widen the freeway between Sunset Avenue to OR 43, replacing and/or widening and retrofitting all bridges that carry I-205 or conflict with the proposed rock cut, and adding a small retaining wall.

Package B's attributes include:

- The Package B freeway centerline alignment meanders slightly compared to the existing alignment. The subtle changes utilize the existing terrain to avoid obstacles, lessen earthwork costs, and minimize environmental, ROW, and utility conflicts. See Section 3.3.2 for a more detailed description of the alignment adjustments.
- I-205 freeway widening (western Project limit start to 10th Street) – This freeway section experiences recurring congestion in each direction, particularly in the NB direction where three travel lanes are reduced to two travel lanes near the Stafford Road interchange. The extension of the third travel lane is anticipated to eliminate

this recurring congestion. The current and projected 2045 freeway and ramp volumes for the area between Stafford Road and the 10th Street interchange do not require any additional auxiliary lanes.

- I-205 freeway widening (10th Street to Abernethy Bridge) – The area between the 10th Street interchange and the Sunset Avenue overcrossing will transition from the inside widening, which occurs from Stafford Road to 10th Street, to widening entirely towards the Willamette River just prior to the Sunset Avenue overcrossing. The south side widening will extend to the Abernethy Bridge section where the proposed 12-foot median shoulders will transition back to match the existing median shoulder width of 6 feet on the Abernethy Bridge.
- Rock slope removal and cutting – The rock cut slopes (4V:1H) will be similar to the existing rock surface and will range in height from 20 to 70 feet over a distance of more than a quarter mile. To limit impacts, the extent of rock cut and widening is limited to only support the three-lane construction in each direction. However, the Sunset Avenue and West A Street bridge supports are located beyond the cut to avoid conflicting with future auxiliary lanes if ODOT desires them during the bridge's 75-year design life.

3.3.2 Roadway Improvements

Within the limits of Package B, the Project widens I-205 by slightly altering the freeway centerline alignment and widening in the directions shown in Table 3.

Table 3. I-205 Mainline Widening Locations and Directions

Location	I-205 (NB Direction)	I-205 (SB Direction)
Between MP 2.83 (Start of Project / south of Stafford Rd) and MP 6.75 (north of 10th St)	Widen toward the inside median	Widen toward the inside median
Between MP 6.75 (east of 10th St) and MP 8.00 (south of Sunset Ave):	Widen toward the inside median	Widen toward the outside shoulder
Between MP 8.00 (south of Sunset Ave) and MP 8.65 (West A St):	Widen toward the outside shoulder	Widen toward the inside median
Between MP 8.65 (West A St) and MP 8.75 (south of Abernethy Bridge):	Widen toward the outside shoulder	Widen toward the outside shoulder

After considering various factors, the Project Team elected to widen the freeway in the locations identified above based on the following objectives:

- Limit the Project footprint to avoid or minimize impacts to ROW and environmentally-sensitive features
- Balance earthwork volumes, including removal of part of an earth berm, for cost-effectiveness
- Minimize the modification and/or reconnection of entrance and exit ramps at the interchanges
- Reduce median tree removal, guardrail needs, and sign relocations

- Increase the freeway vertical clearances
- Enable space for water quality facilities and contaminated materials (existing roadway shoulder material) storage
- Minimize retaining walls and camera and/or radar site relocations

The Project will establish 12-foot outside shoulders for I-205 throughout the Package B limits to maintain a safe space in the event of vehicular breakdowns (Figure 20).

Figure 20. Rendering of a Typical Example of Future Roadway Improvements

The Project Team established the I-205 mainline geometry based on the following factors:

- Maintain or adjust the existing I-205 horizontal, vertical, and super-elevation geometries in a manner that to minimizes the Project cost. In general, only slight alterations to the freeway geometry were made. This includes raising the highway profile by 9 inches to construct a continuously reinforced concrete pavement (CRCP) overlay section. The replacement bridges will conform to the new freeway profile, and the widened and retrofitted bridges will match the revised vertical profile. The bridge raising activity reduces the overall Project cost by eliminating the costly full-depth approach roadway reconstruction that would otherwise be required if the bridges remained at their previous elevations.
- Implement slight geometric improvements to minimize the need for Design Exceptions, where feasible. For the majority of the Project elements, the proposed improvements will conform to the design standards. For some elements, the Project Team will request Design Exceptions for approval. The most important Design

Exceptions for preserving the current cost estimate include changes to the vertical clearance (although the vertical clearances will remain greater than the required minimums) and maintaining the existing vertical profile grades on the West A Street and Sunset Avenue Bridges. If these are not approved, the estimate will need to be significantly increased. Each of the preliminary Design Exception elements, however, have been discussed with ODOT Technical Services and all are likely to be approved.

- As a major benefit, the Project increases the NB vertical clearance by 6 inches (from 17'-5" to 17'-11"), and maintains the SB direction's vertical clearance at 18'-2". Both exceed ODOT's minimum vertical clearance requirement of 17'-4".
- In an effort to promote safety for ODOT staff, the construction contractor, and the travelling public, staging will utilize crossovers to the maximum extent possible. Where crossovers are not feasible, primarily between Sunset Avenue and the Abernethy Bridge, the available traffic width during construction will be at least 28 feet with barrier-separated work zones to protect both Construction staff and the traveling public. This is consistent with current ODOT mobility requirements and was successfully implemented during the prior I-205: I-5 to Stafford Road widening project. To avoid modal conflicts during construction, bicycles will be prohibited from using the freeway shoulders (bicycles on freeway shoulders is currently permitted between I-5 and 10th Street).
- There is a large wooded area in the median between the Tualatin River Bridges and 10th Street. With the inside widening, some of the vegetation and trees require removal. Additional guardrail and/or drainage curbs will be constructed to minimize tree removals (see Appendix F for graphics at two locations within this stretch of I-205).

3.3.3 Rock Cut Excavation and Containment

The area beginning approximately 1,000 feet south of Sunset Avenue and continuing to OR 43 includes existing, nearly vertical rock slopes. The existing rock slopes were constructed with a fallout area approximately 24-feet-wide extending beyond the edge pavement. The rock slopes were excavated on slope angles of approximately 4V to

Figure 21. View of an Existing Project Rock Cut Area

1H. During the 2006-2007 I-5 to Stafford Road widening project, rock scaling was performed within this area (Figure 21).

Rock slope angles of 4H to 1V, similar to the existing cut slopes in this section, are proposed. Based upon the FHWA *Rockfall Catchment Area Design Guide* (November 2001, FHWA-OR-RD-02-04), the Project Team proposes a 10-foot containment area for rock heights less than 40 feet, transitioning to a 20-foot containment area for rock heights of up to 70 feet, both with a concrete shoulder barrier as additional mitigation for potential rock rollout. The Project Team is evaluating the geophysical survey information for the existing rock bluff, and ongoing explorations will occur in early 2018. The proposed alignment does not affect or improve the northern rock face.

3.3.4 Construction Staging and Maintenance of Traffic

There are generally two major independent work zones sections within the Package B work limits. These two areas and the assumed construction staging sequence for this package are described below.

3.3.4.1 Section between Stafford Road and South of Sunset Avenue

This section of Package B is generally independent of any construction activities occurring within the Package A work limits. The roadway is a divided roadway with an existing median, and the assumption for traffic maintenance includes widening the existing roadway and utilizing temporary crossovers. The construction staging is anticipated to include the following stages:

- Stage 1 – Construct the widening and interim roadway improvements in the NB direction. This requires shifting NB traffic to the existing right shoulder, and then grading and partially constructing the new NB widening (to support traffic under stage 2). The NB-direction bridge widenings and replacements will provide additional width to support temporary crossover traffic. Traffic will run at the existing roadway grade (e.g., no concrete overlays will have been constructed).
- Stage 2 – Using the crossovers, shift the SB traffic onto the widened roadway and structures completed in stage 1. This allows the contractor full access to the SB roadway to complete all bridge and roadway work, including the final CRCP overlay over the existing travel lanes and shoulders.
- Stage 3 – Using the crossovers, shift traffic (in both the SB and NB directions) onto the newly widened SB travel lanes. Complete the NB CRCP overlay, construct the SB bridge replacements, and raise the widened / retrofitted bridges to their final elevation.
- Stage 4 – Relocate traffic (in both the SB and NB directions) into the final configuration, and remove any temporary facilities.

3.3.4.2 Section between Abernethy Bridge and South of Sunset Avenue

Many factors, including the Sunset Avenue and West A Street overcrossing replacements sequence, the rock cut and pavement widening, and the freeway pavement rehabilitation, influence the construction staging sequence within this section (see Figure 22 for existing conditions). The construction sequencing and traffic staging of

Package A also influences the construction sequence of this section. Based on a number of design requirements and considerations (i.e., vertical clearance, maintaining traffic, ease of construction, and staging between contractors), the Project Team developed the following conceptual construction sequence for this segment:

- Package A work (prior to beginning Package B work) – Complete the OR 43 improvements and the NB auxiliary lane extension between OR 43 and OR 99E.
- Package B overview – for work north of Sunset Avenue
    - Construct Sunset Avenue and West A Street overcrossing replacements
    - Perform rock cut via blasting and conventional ripping
    - Perform freeway pavement rehabilitation and widening

This high-level strategy provides maximum contractor access with minimal traffic control stages. The existing Sunset Avenue, West A Street, and Broadway Street bridges act as traffic obstructions for the rock cut and pavement operations. Because of this, they will be reconstructed first. Once the existing structures are removed and their new columns are placed, there is a wider range of staging options available to maintain freeway operations.

To maintain local access, the Sunset Avenue replacement must be completed in phases. Initial work includes a partial demolition of the existing structure and a temporary freeway widening in order to accommodate traffic. Once the new overcrossing is built, Sunset Avenue traffic shifts onto the new structure and the existing bridge is removed. The removal of the existing bridge footing allows space to shift freeway traffic away from the rock cut area during rock blasting and removal operations.

Figure 22. Photograph of Broadway Bridge (to be removed), West A Street Bridge (to be replaced), and Rock Slope area

West A Street Bridge will be reconstructed with traffic primarily detoured to OR 43 via McKillican Street, which has a signalized intersection with OR 43. A secondary local access detour route is via Broadway Street. During demolition activities, portions of the rock cut work will be concurrent with the bridge replacement work. Package A staging and temporary traffic routing is shown in Appendix J.

After the demolition of the existing overcrossings and successful rock slope removal, the remaining roadway rehabilitation will move forward. Traffic will be staged to construct the roadway improvements in approximately one-third widths, maintaining two travel lanes in each direction. Interim OR 43 ramp connections are required and may necessitate a series of weekend closures.

3.3.5 Pavement Type

The I-205 pavement section from Stafford Road to the Abernethy Bridge generally consists of a sacrificial 2-inch layer of asphalt over 8 inches of CRCP. The original CRCP section was constructed in the late 1960s and was most recently repaved the summer of 2017. While the existing CRCP is more than 50 years old and is nearing its end of life, the sacrificial asphalt layer has generally protected the lower CRCP from studded tire wear and has helped to extend its design life. The pavement has had good service to date, but is aging. To optimize the design, ODOT Pavement Services considered several design variations for both asphalt and concrete pavement types. To maximize cost savings, the various pavement sections assumed a reuse of the existing pavement as part of the final pavement section. Construction for both the CRCP and the asphalt overlay options assumed normal methods and both were found to provide a good return on investment due to efficient staging and reuse of the existing CRCP as a structural element.

ODOT Pavement Services performed a life cycle cost analysis (LCCA) for both asphalt and CRCP overlay options. A LCCA is a process for evaluating the total economic worth of a useable project segment by analyzing the initial costs and discounted future costs, considering aspects such as maintenance, reconstruction, rehabilitation, restoring, and resurfacing costs over the life of the Project. FHWA requires an LCCA to evaluate both initial cost and a standardized Equivalent Uniform Annual Cost (EUAC). Together, these findings represent a combined present versus future value associated with maintaining the highway in a state of good repair. Based to the cost data and the LCCA results, CRCP has a higher initial cost than asphalt, but has lower future maintenance costs because it requires less frequent maintenance and preservation cycles. Table 4 provides the findings from the analysis.

Table 4. Pavement LCCA Results

Pavement Option	Initial Cost ($M, in 2018)	Equivalent Uniform Annual Cost (EUAC) ($M)
Asphalt Overlay Section	$34.5 M	$2.36 M
CRCP Overlay Section	$60.3 M	$2.52 M

The higher initial cost for concrete than asphalt is because of its much higher cost for supplying and constructing CRCP .This cost difference is exacerbated by the fact that

Oregon constructs much more asphalt concrete pavement than concrete, and the Project Team found only a few projects of similar size and complexity to this Project. This resulted in reduced confidence in the unit pricing assumed, thereby increasing its contingency value.

The LCCA also showed that the annualized initial and future costs for each option are very similar (i.e., over the analysis period of the life of the pavement, the costs were nearly the same). Therefore, in accordance with ODOT Design Guidance, a to type selection meeting to discuss factors besides cost was held with Region 1 Management, ODOT leadership, the Project Team, and ODOT Pavement Services. The other factors included:

- User delay costs
- Future maintenance needs
- Future preservation projects for the corridor
- Safety of workers (exposure to traffic)
- Initial and future construction complexity
- Repair and maintenance familiarity with the materials
- Material and contractor availability
- Project phasing

The Project Team recommended proceeding with the CRCP option for two primary reasons, with both providing opportunities to reduce live traffic exposure risks to ODOT and contractor employees:

1. Based on construction history data from ODOT's pavement management system, the asphalt option requires a recurring, 12-year rehabilitation or preservation cycle until the section is ultimately replaced. In contrast, the CRCP option extends the rehabilitation or preservation recurrence to a 30-year cycle.
2. The asphalt option requires a partial replacement at periodic intervals, which causes two issues: 1) increased user delays and 2) increased worker exposure to the paving activities.

Figure 23. Rendering of Typical Future Improvements to Project Roadway

The Project estimate (see Appendix D) includes the costs for the CRCP overlay alternative. Figure 23 is a rendering of the typical pavement for this portion of the Project.

3.3.6 Stormwater

Based on preliminary quantities, Package B adds approximately 30.7 acres of CIA to the 79.3 acres of existing freeway CIA. The Project design will include best management practices to meet the ODOT and Clackamas County stormwater design criteria for water quality and, where applicable, detention for the new total CIA (i.e., 110 acres).

The Project modifies the existing stormwater facilities located within the ODOT ROW south of the Tualatin River to meet current stormwater requirements. Stormwater management for the remainder of this package will utilize a combination of vegetated filter strips, vegetated swales, bio-retention, and extended detention ponds. This package is anticipated to need stormwater facilities within the median.

From Sunset Avenue to OR 43, stormwater treatment is challenging due to the shallow depth to bedrock. The Project will convey the stormwater runoff from this section east along the north side of the highway and discharge into the Willamette River. The Project proposes to incorporate stormwater treatment from Package B into the Package A facility located on the south side of the OR 43 interchange (within existing ODOT ROW) before discharging it into the Willamette River.

3.3.7 Traffic Improvements

Traffic Improvements consist of signing, lighting, signalization, and ATM and/or ITS improvements.

3.3.7.1 Signing

The proposed lane changes will affect the signage of I-205 NB before the Stafford Road interchange. The Project will update NB signing to replace the three signs mounted on cantilevers with “EXIT ONLY” designations. The Project will upgrade I-205 SB diagrammatic signs to “Overhead Arrow-per-Lane" signs to remain consistent with ODOT’s current use of the sign type. The proposed signs are larger than the existing diagrammatic signs, so the existing sign structures will be assessed to determine if they have adequate capacity for the larger signs. Ground-mounted signs will remain in place with minor modifications to meet current standards. The project will construct major signage using either cantilever, sign bridges, or bridge mounts, whichever is most cost-effective and provides the appropriate siting. See Appendix M for sign structure locations.

The Project proposes a new ground-mounted advanced guide sign “EXIT 8” – “43/West Linn/Lake Oswego/1 MILE” for the NB direction just west of the viewpoint. It also proposes a NB cantilever to replace the existing cantilever structure at I-205 NB Exit 9. This structure will support a new exit direction sign “EXIT 8” – “43/West Linn/Lake Oswego/ (Type A arrow)” and an advanced guide sign “EXIT 9” – “99E/Oregon City/Gladstone/¾ MILE” direction sign, and an advance guide sign. All other existing ground-mounted signs will remain in place with minor modifications to meet current standards.

3.3.7.2 Lighting

Based on discussions with ODOT Lighting Design staff, most of the existing lighting systems along the I-205 mainline and interchanges are at the end of their useful life. These systems consist of high-pressure sodium cobra head-style luminaires (typically 400 watts). Poles consist of single and twin luminaire mountings and are located along the freeway’s median and outside shoulders. The Project will replace the existing lighting systems throughout the mainline and within the OR 43 and OR 99E interchange areas. The replacement systems will include new base-mounted service cabinets, conduit, wiring, poles, foundations, and LED luminaires.

3.3.7.3 Signalization

Package B improvements include ramp meter modification or replacement at each entrance ramp between the Stafford Road and 10th Street interchanges.

3.3.7.4 ATM and ITS

Package C will construct the majority of the ATM improvements prior to the construction of this package. For Package B, Variable Advisory Speed (VAS) signs for both directions will be attached to the reconstructed Sunset Bridge to avoid the unnecessary construction of independent sign structures. Once installed, these signs will integrated with the ATM installed as part of Package C. Because Package B widens the freeway, it is anticipated that some of the temporary ATM conduits placed to power and communicate with Package C will be reconstructed within Package B. Some additional ITS restoration is also required due to Project impacts. This includes fiber optic communications, cameras, cabinets, or any other impacted equipment.

3.3.8 Bridge and Geotechnical Improvements

The Project replaces, widens, and seismically retrofits thirteen bridges. Originally, all of the bridges between MP 3.81 (Borland Road) and MP 8.64 (10th Street) possessed a widening and seismically retrofitted scope. However, during the preliminary analysis process, it was determined to be more cost-effective to replace the Borland Road, Tualatin River, and Woodbine Road bridges. Replacement is preferred to retrofitting for the following reasons:

- Borland Road and Woodbine Road Bridges – The replacement cost of each bridge is lower than the widening and retrofit cost. This is due to the significant complexities with constructing the retrofitting, and the cost of rebuilding bridge roadway approaches versus overlay.
- Tualatin River Bridges – The replacement cost for each bridge is within 20 percent of the retrofit cost (i.e., they had an 80 percent retrofit-to-replace cost ratio). If a retrofitted bridge were constructed, the Tualatin River would also need to be widened to mitigate the hydraulic effects of more columns in the river. Further, replacing these structures allows the new NB bridge to be reconstructed during a single in-water work season and significantly reduces the overall duration of Package B construction.
- All bridges will be designed to remain operational after the anticipated Magnitude 8+ Cascadia Subduction Zone Earthquake and to avoid collapse after a 1,000-year return period earthquake.
- The Project achieves cost savings for approach roadway reconstruction by raising the profile grade of each replacement bridge. Raising the bridge profile allows the approach roadway sections to be cost-effectively overlaid rather than requiring a complete freeway removal and reconstruction.
- The Project will reconstruct the Borland Road and Tualatin River Bridges by permanently relocating the NB bridge alignment into the median. This eliminates the need for a temporary freeway bridge to maintain traffic, shortens the overall construction schedule, and is safer than a staged construction operation (the relocation acts to protect workers and traveling public by separating live traffic from the construction zone).

Other benefits that come with replacing each bridge include:

- Longer service life (i.e., the design code is based on a 75-year-minimum service life) as the existing bridges are each more than 45 years old.
- Meets all current safety and maintenance standards for bridge rails, clearances, bridge deck concrete condition, scour deficiencies, and more.
- Lower life cycle costs because of improved materials that come with modern design standards.
- More reliable seismic behavior and performance after seismic events because each bridge has modern materials.

Table 5 lists the recommended scopes for the thirteen bridges in Package B:

Table 5. Bridge Scope Recommendations

Bridge Name	MP	Scope
Br. 09738 I-205 NB over Borland Road	3.82	Replace
Br. 09738A I-205 SB over Borland Road	3.81	Replace
Br. 09737 Tualatin River, I-205 NB	4.10	Replace
Br. 09737A Tualatin River, I-205 SB	4.08	Replace
Br. 09735 I-205 NB over Woodbine Road	5.14	Replace
Br. 09735A I-205 SB over Woodbine Road	5.19	Replace
Br. 09734 I-205 NB over Blankenship Road	5.84	Raise, widen, and seismically retrofit
Br. 09734A I-205 SB over Blankenship Road	5.90	Raise, widen, and seismically retrofit
Br. 09728 I-205 NB over 10th Street	6.40	Raise, widen, and seismically retrofit
Br. 09728A I-205 SB over 10th Street	6.42	Raise, widen, and seismically retrofit
Br. 09724 Sunset Avenue over I-205	8.28	Replace
Br. 09704 West A Street over I-205	8.64	Replace
Br. 09703 Broadway Street over I-205	8.69	Permanently remove

Key characteristics of the various bridge scope types are as follows:

- All bridges will be designed to remain operational after the anticipated Magnitude 8+ Cascadia Subduction Zone Earthquake and to avoid collapse after a 1,000-year return period earthquake.
- The Project widens all I-205 bridges by 18 feet to provide a new clear width of 60 feet.
- The Project raises the widened and retrofitted I-205 bridges to avoid the need to replace the freeway approach sections.
- The new Sunset Avenue Bridge accommodates the additional I-205 width and has a width consistent with Clackamas County standards for the existing roadway classification. This includes 8-foot sidewalks (wider than Clackamas County standard), 6-foot shoulders, and two 12-foot travel lanes, resulting in a bridge slightly narrower than the existing bridge section but still wider than the roadway approaches. To maintain traffic during construction and optimize the bridge dimensions, the Project also slightly realigns Sunset Avenue to the south.
- The Project replaces the West A Street Bridge in its existing alignment. There is sufficient room in the gore areas of the ramps for additional supports; this bridge will be converted to a four-span steel girder superstructure, effectively reducing the depth of the superstructure by more than 1 foot versus the existing bridge. This reduces the freeway earthwork volumes to reduce cost while achieving the new 17'-11" minimum vertical clearance. The new West A Street Bridge will maintain approximately the same width as the existing bridge, but will re-allocate the existing over-wide shoulders to widen the multi-use sidewalks. The new cross-section will include 12-foot lanes, 6-foot shoulders, and 11-foot sidewalks in each direction.

- The Project removes the existing Broadway Avenue Bridge overcrossing. The existing structure replicates parallel connections at West A Street and OR 43 and has very low traffic volumes. The existing columns are in conflict with the future conditions (the existing median columns conflict with the future travel lane and act as a vertical clearance obstruction for freeway freight traffic). To mitigate these impacts, the structure alignment and profile will be modified to significantly alter the connections to the adjacent street. The Project Team determined that it has a very low cost-to-benefit ratio and that its replacement is not warranted.
- To understand the existing traffic operations and demands, the Project Team obtained traffic counts for several facilities within the project area (including West A Street and Broadway Street). The counts indicate very low usage of the Broadway Street Bridge. Subsequent traffic analyses demonstrated that no detrimental impacts occur after shifting the traffic volumes from the Broadway Street Bridge to the West A Street Bridge. In fact, the elimination of this bridge improves the OR 43 interchange operations and improves the non-standard intersection between Broadway Avenue and Willamette Falls Drive.
- Due to the limited funds for the initial design, foundation recommendations and geotechnical design parameters for the bridges west of Sunset Avenue are based on existing boring logs and other geotechnical data. While previous boring data is typically representative of adjacent conditions, additional geotechnical hazards may be identified as part of future investigations, resulting in added cost. To mitigate the possible risk associated with geotechnical unknowns, the Project Team will perform additional geotechnical investigations in Spring 2018.

3.3.9 ROW Impacts and Anticipated Acquisitions

The Project was designed to avoid or minimize ROW impacts. As a result, minimal ROW impacts for a project of this scale are anticipated. Twelve parcels have been identified for acquisition (for both Packages A and B, resulting in an estimated $1.4 M of total Project acquisition costs). See Appendix G for a summary of potential ROW impacts.

For this package, the ROW impacts can be categorized as follows:

- Partial Acquisitions – A “sliver take” to accommodate construction (e.g., additional rock cut near the West A Street and Broadway Street overcrossings) or to permanently occupy portions of properties currently located outside of State ROW.
- Temporary Construction Easements – To facilitate construction operations.

3.3.10 Utility Impacts and Anticipated Relocations

South of 10th Street, Package B contains many utilities that are nearby or cross under or over I-205. For this freeway section, there are no anticipated reimbursable utility impacts.

North of 10th Street, the Project could impact multiple utilities (Figure 24 including a Verizon cell tower, a Portland General Electric power pole, and NW Natural gas pressure reduction station. These facilities are located on top of the rock cut between the West A Street and Broadway Street overcrossings, immediately east of the OR 43 NB exit ramp and are outside the existing public ROW. The Project does not anticipate impacts to the

cell tower by the proposed rock cut operation, but additional evaluation is required as the rock cut limits are better defined. A mitigation cost has been included in the cost estimate for this circumstance. The Project may impact the existing Portland General Electric power pole during the rock cut and widening operations, and its relocation costs has been included in the estimate. The NW Natural reduction station appears to be outside the proposed rock cut limits. The Project anticipates that the service may be shut off during rock removal, but measures will be required during construction to ensure no permanent damage to the existing infrastructure.

Figure 24. Photograph of Potential Rock Cut and Blasting Impacts along I-205

Other major utility relocation costs include the relocation of a utility duct bank currently residing in the to-be-removed Broadway Bridge. Amongst the utilities are a gas main and water line that serve City of West Linn residents. The Project will relocate the existing utilities to the West A Street Bridge as part of the bridge replacement process.

3.3.11 Key Environmental Elements

The key environmental elements for Package B consist of visual, culverts, wetlands, noise / vibration, endangered species, in-water work, archaeological, recreational activities, historic, environmental justice, and 4(f) and 6(f).

3.3.11.1 Visual

Package B runs through the Clackamas County designated Rural Scenic Roadway. The existing I-205 median east of the Tualatin River contains a dense grove of vegetation and trees. These trees are considered contributing elements to the scenic character of the corridor. The Project will preserve these trees to the maximum extent feasible.

3.3.11.2 Culverts

While there are many small culverts under the freeway within the limits of Package B, the proposed temporary and permanent work does not trigger the fish passage statute.

3.3.11.3 Wetlands

The Project's highest likelihood of wetland presence and impacts occur within Package B. The Project will utilize wetland mitigation bank credits to mitigate for any impacts. Work has not been completed to determine the applicable Water Environment Services habitat conservation area or water quality resource area buffer, but it is also assumed any applicable Water Environment Services mitigation requirements will be met on-site.

3.3.11.4 Noise and Vibration

Based on preliminary noise analysis results, the FHWA cost-to-benefit threshold for noise mitigation will be exceeded for over 2 miles of the package. After comparing these areas against ODOT's guidelines for reasonableness and feasibility, an allocation for potential sound walls has been included in the cost estimate. Rock blasting will create noise and vibrations that could impact adjacent structures. Based on preliminary noise and vibration analyses for the small charge sizes anticipated, the noise and vibrations are not anticipated to have a negative impact on any structures.

3.3.11.5 Endangered Species

There are known populations of listed planted within Package B. The Project will avoid impacts to listed plants and have no impact to Endangered Species Act listed plants or wildlife.

3.3.11.6 In-water work

Work below the ordinary high water delineation of the Tualatin River will be obligated to the regulated in-water work period and will follow the design guidelines of the Federal Aid Highway Programmatic Biological Opinion for temporary and permanent installations.

3.3.11.7 Archaeological

While Package B contains areas with a high probability of archaeological deposits, none of the proposed work is anticipated to disturb these sites.

3.3.11.8 Recreational Activities

The Tualatin River is used for recreational boating. Any temporary work bridge to support its reconstruction will be required to maintain recreational navigation; the proposed placement of any new permanent piers will not create a navigational hazard.

3.3.11.9 Historic

The Project will avoid an adverse effect to the potentially historic structures located near West A Street.

3.3.11.10 Environmental Justice

The Project is not anticipated to disproportionately adversely affect environmental justice communities potentially located in the vicinity of Package B. The Project will use standard mitigation measures to minimize impacts and will maintain access to critical services throughout construction.

3.3.11.11 4(f) and 6(f) Resources

There are no known 4(f) and 6(f) resources within the limits of Package B.

3.3.12 Other Key Package Unknowns or Assumptions

The other key package unknowns or assumptions are presented below.

3.3.12.1 Rock Cut Catchment Area and Constructability Impacts

A detailed evaluation of the potential blasting impacts to adjacent properties and the existing cell tower are still required to accurately capture the effect of the proposed cut. Two existing buildings will be located within 100 feet of the proposed rock cut area. Evaluation of the existing structural condition and potential mitigation measures may be required to confirm that the Project will not impact these structures. If blasting activity results in permanent displacement, there is the potential for more than $3 M in ROW acquisition and relocation expenses. The Project currently assumes that the rock removal can be completed without impacting the existing buildings. In addition, a more rigorous construction staging analysis is required for the blasting operation.

3.3.12.2 Clackamas County and City of West Linn Approvals

Both West A Street and Sunset Avenue are part of the Clackamas County transportation network. Concurrence will likely be required by both Clackamas County and the City of West Linn before the Project can be finalized. Initial coordination has occurred, and the Project Team believes that these approvals will be obtained.

3.3.12.3 Motor Carrier Advisory Committee Approvals

There are several locations where existing vertical clearance will be modified as a result of the Project improvements. Any modification to existing clearance on a designated reduction review route, whether permanent or temporary, requires concurrence from the ODOT Motor Carrier Advisory Committee. Vertical clearance on 10th Street is anticipated to be reduced from an existing clearance of approximately 16'-9" to an estimated 15'-3", despite the proposed mitigation of a 9” bridge raising. While 10th Street does not carry a freight designation beyond the interchange area, the area between the existing ramp terminals will require the Motor Carrier Advisory Committee approval. Failure to receive approval could result in additional reconstruction and/or asymmetrical widening of the NB 10th Street Bridge, either of which would add cost to the Project. Other locations within Package B that will also require similar approvals include the structures at Stafford Road, Johnson Road, Sunset Avenue, and West A Street. All of these locations, however, satisfy the required mobility clearance minimums.

3.4 Package C: ATM Package Description

Figure 25. Package C – Work Limits

3.4.1 General Information

Package C includes ATM improvements throughout the Project area, with the exception of the advisory signs mounted to the Sunset Avenue Bridge (which are constructed with Package B) (Figure 25). The Project's ATM types are based on the 2016 ODOT Region 1 ATM Atlas. The ATM Atlas was developed without consideration for the proposed Project when determining ATM locations. The Project team has revised the proposed locations to take into consideration the proposed widening. The recommended ATM locations, types, and structural supports within Package C are listed in Table 6 and Table 7.

Table 6. ATM Type and Location – NB Direction

Location	ATM Type	Support type
MP 0.6	1 Variable Message Speed (VMS) signs; 3 VAS signs	New sign bridge
MP 3.2	3 VAS	Mount to existing Stafford Road Bridge overcrossing
MP 4.1	1 VMS	New sign bridge (over NB lanes only)
MP 7.7	1 VMS and 3 VAS	New sign bridge (over SB lanes only)

Table 7. ATM Type and Location – SB Direction

Location	ATM Type	Support type
MP 10.2	3 VAS	New sign bridge structure
MP 11.7	Replace existing VMS	Existing sign bridge

The ATM improvements include VAS and VMS. The NB queue warning VMS east of Stafford Road interchange (MP 4.1) provides queuing warnings near the 10th Street interchange. The NB VMS north of 10th Street provides queuing warnings near the OR 43 interchange area. The SB VMS north of OR 213 at MP 11.7 provides queuing warnings near the OR 99E interchange. The combination of VMS and queue warning VMS is expected to improve travel time reliability and reduce crashes caused by queuing. The VAS signs at approximately MP 8.4 (as part of Package B) completes the NB and SB operational segments and provides additional benefits for crash reduction.

Figure 26. Example of VMS within Project

Because Package C will be constructed before any other Project work, the ATM system will provide real-time communications to the traveling public during construction of Packages A and B (such as the example in Figure 26).

3.4.2 Construction Staging and Maintenance of Traffic

The Project assumes all proposed ATM features will be constructed without daytime lane closures. For some of the sign structure installation and sign mounting, 20-minute rolling slowdowns or nighttime lane restrictions may be utilized.

3.4.3 ROW Impacts and Anticipated Acquisitions

There are no ROW impacts anticipated as part of the ATM improvements. The Project will complete all work within the existing ODOT freeway ROW and, when necessary, have electrical power conduits suspended from the freeway bridges.

3.4.4 Utility Impacts and Anticipated Relocations

Package C contains many utilities that are nearby or cross under or over I-205. However, no utilities are anticipated to be impacted during construction. The Project will adjust ATM equipment locations to avoid utility impacts. Power service and communications will be provided for each location from existing ODOT power sources.

3.4.5 Key Environmental Elements

3.4.5.1 Environmental

There are no key environmental elements associated with this component.

3.4.6 Other Key Package Unknowns or Assumptions

The other key package unknowns or assumptions are presented below.

- Technology could change or complimentary ITS upgrades could impact the design and budget of some ATM sites. It is common for ODOT maintenance to request small additions to enhance the functionality at a given ITS site. Items like additional cameras, radar sensors, weather sensors or communications upgrades may be requested. Under the current cost model, these would be covered by the Contingency allocation.

4 Project Cost Estimate

4.1 Current Project Cost Estimate

Using the recommended phasing schedule and applying the DBB delivery method, the Project Team developed a detailed Project cost estimate (see Appendix D). The estimate (summarized by cost component in Table 8) resulted in a total Project cost of $**499.6 M**. It was derived using the following guidelines:

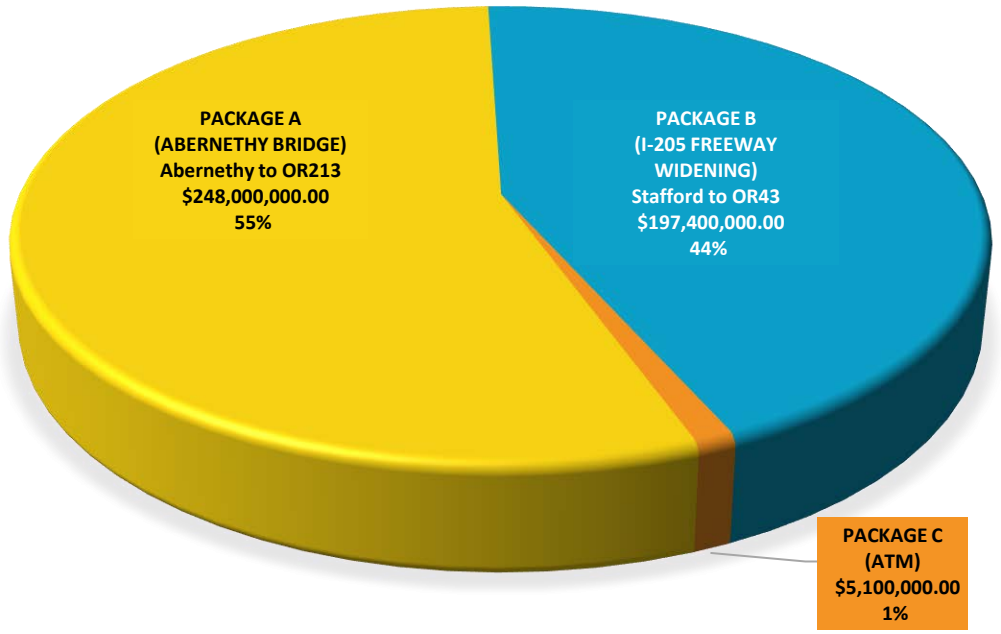
- On a per-package basis, approximate quantities and unit costs (in 2018 dollars) were developed for each item of work anticipated.
- To account for cost variability in the estimated quantity or unit cost, a “construction variability” contingency was applied to each item of work. This value ranged from zero to 20 percent, depending on the Project Team’s confidence in the unit price or estimated quantity for each item of work.
- An additional 15 percent “unknowns” contingency was included as a line item for all construction items on a per-package basis. As such, the total contingency percentage ranges from 15 percent to 35 percent, subject to the item or work. This results in a cumulative contingency value of 27 percent for the constructed items.
- The construction cost for each package was escalated at a simple, 3 percent rate from 2018 to the mid-point of construction.
- A 4 percent “economy of scale” discount was deducted from each package to account for an anticipated price efficiency resulting from the large construction package sizes.

Table 8. Project Cost Components

Project phase	Programmatic costs ($M)
Preliminary Engineering (PE)	$45.0 M (including DAP phase)
ROW acquisition	$1.4 M
Utility relocation	$2.7 M

Per-Package Costs (See Figure 27) ($M)			
Project phase	**Package A (Northern Package)**	**Package B (Southern Package)**	**Package C (ATM Package)**
Construction + Construction Engineering (CE)	$248.0 M	$197.4 M	$5.1 M
Total Project Cost: $499.6 M			

Figure 27. Package Construction + CE Cost Distribution



4.2 Current Estimate Comparison to the 2016 Project Cost Estimate

In 2016, ODOT presented a project cost estimate to the State Legislature that reflected a total Project cost of $452 M. That estimate was based on an early conceptual design that has since been updated by this CTC Report (Table 9).

Table 9. Project Cost Comparison Log

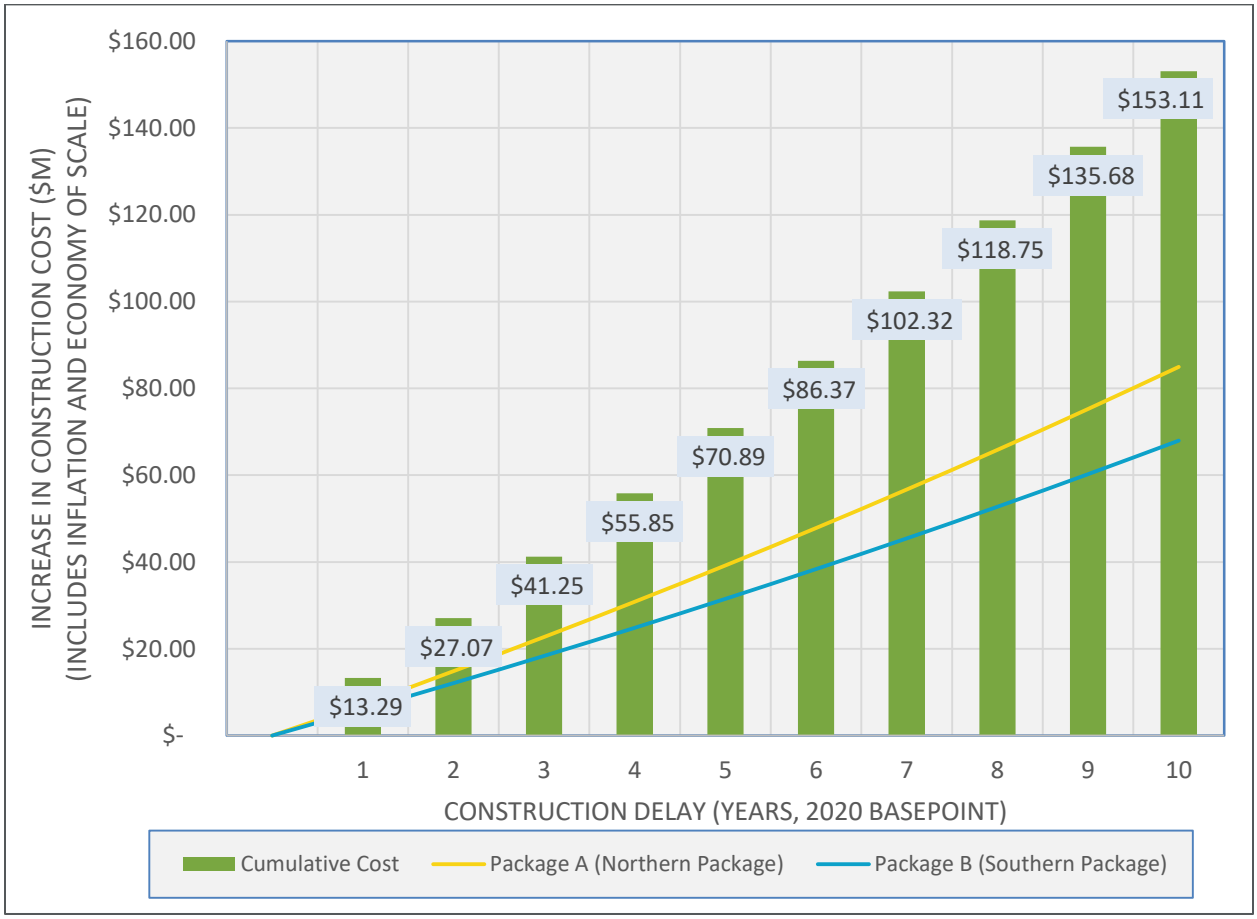
Project-wide Work Item Costs			
Work Item	**2016 Project Estimate** ($M)	**CTC Report Estimate Delta** ($M)	**Comment**
Section 0200 – Temp. Features	$35.1	+ $11.8	• Training added • 8% vs 5% temp. protection and direction of traffic (P&DT) • Stockpile contaminated media within API
Section 0300 - Roadwork	$15.2	- $3.5	• 100% vs 50% subgrade stabilization • Refined pavement sections
Section 0400 – Drainage and Sewers	$3.9	- $1.0	• Reduced quantities
Section 0400 – Rock Cut	$2.6	+ $3.7	• Rock cut unit price increased • Pre-/post-survey included
Section 0500 – Bridges (Except Abernethy)	$59.0	- $9.3	• Many bridges replaced to reduce cost (but general cost increase vs original estimate)
Section 0500 – Bridges (Abernethy only)	$141.0	- $12.0	• Transverse launch with cantilevers
Section 0500 – Retaining Walls / Sound Walls	$7.2	- $4.1	• Reduced retaining wall needs
Section 0600 – Bases	$5.8	- $1.4	• Reduced quantities
Section 0700 – Paving	$23.2	+ 14.8	• Cost now includes CRCP (asphalt concrete was used in the 2016 estimate)
Section 0700 – Concrete (Curb, ramps, walks, islands)	$0.06	+ 0.8	• Increased quantities
Section 0800 – Perm. Traffic Safety	$1.9	+ 1.2	• Impact attenuators added • Cable median barriers added
Section 0800 – Striping	$0.19	+ $0.6	• Increased quantities
Section 0800 – Perm. Traffic Control	$13.5	+ $0.9	• Increased quantities
1000 – ROW Development & Control	$7.4	+ $0.9	• Increased quantities

Project-wide Work Item Costs			
Unknown contingency	$58.6	- $10.7	• Refined estimate uses a 15% value for unknowns
Construction Engineering (CE)	$29.4	+ $7.3	• Used $36.7 M for CE
Anticipated Items	$3.6	+ $0.5	• Cross-overs, environmental mitigation, etc.
Preliminary Engineering (PE)	$38.3	+ $6.7	• Used $45.0 M for PE
ROW acquisition (ROW)	$1.0	+ $0.4	• Increased for additional ROW
Utility relocations	$0	+ $2.7	• No utility relocations were in the 2016 estimate
SUBTOTAL (without inflation or economy of scale)	**$447**	**+ $10.3**	• **Subtotal increase for all Project cost items above** • **Includes $29.2 M of Bid item construction variability contingency costs**
Inflation	$0	+ $56	• 3% to midpoint of construction; Inflation was not included in the 2016 estimate
Economy of scale	$0	- $18.7	• 4% reduction (for large packages); This reduction was not accounted for in the 2016 estimate
TOTAL (with inflation and economy of scale)	**$452**	**+ $48**	• **Increase from $452 M to $500 M for all items above**

4.3 Construction Delay Costs

The $500 M total Project cost assumes that the Project will be delivered according to the schedule identified in this CTC Report. Figure 28 illustrates the potential construction cost increases for Packages A and B, if delays to the bid date of each is encountered. Although not shown in the graph, Package C has an average escalation premium of $170,000 per year for 10 years.

Figure 28. Costs of Delayed Construction



Appendix A.
Proposed Project Solutions

January 5, 2018

Proposed Project Solutions

SEISMIC UPGRADES

The project upgrades the **Abernethy Bridge and the eight other I-205 bridges** in the project area to withstand a major earthquake. I-205 is designated as a **statewide north-south lifeline route**, which means it must be operational quickly after a disaster renders other roadways unusable or impassable. This critical route will provide supplies and services to the region.

I-205 WIDENING

- The project **adds a third lane** in each direction on the seven-mile stretch of I-205 between Stafford Road and OR 99E. It also adds a northbound auxiliary ("entrance-to-exit") lane between OR 99E and OR 213.
- Widening I-205 requires **blasting in order to remove the rock** from the rock slope located in West Linn on the northbound side of I-205 between the Sunset Avenue overcrossing and just south of the OR 43 interchange. We will conduct additional analyses next year to determine impacts of the blasting, potential mitigations and duration of the work.

INTERCHANGE IMPROVEMENTS

In order to improve safety and travel-time predictability on I-205, the project makes changes to **on- and off-ramps and intersections around interchanges**.

- **OR 43 interchange:** the project removes the current I-205 northbound on-ramp from OR 43 northbound. Northbound traffic will instead use a new left turn to access the existing on-ramp loop to I-205 northbound. Consolidating these two separate northbound access points eliminates the merging and weaving that currently occurs and reduces rear end crashes. The Broadway Street bridge overcrossing will also be removed. See inset below.
- Analysis is still underway for other intersection improvements at OR 43 and OR 99E. We will present these findings later in the design process.

BRIDGE REPLACEMENTS

Widening I-205 requires **rebuilding West A Street and Sunset Avenue**, which cross over I-205. The Tualatin River, Borland Road and Woodbine Road bridges will also be replaced.

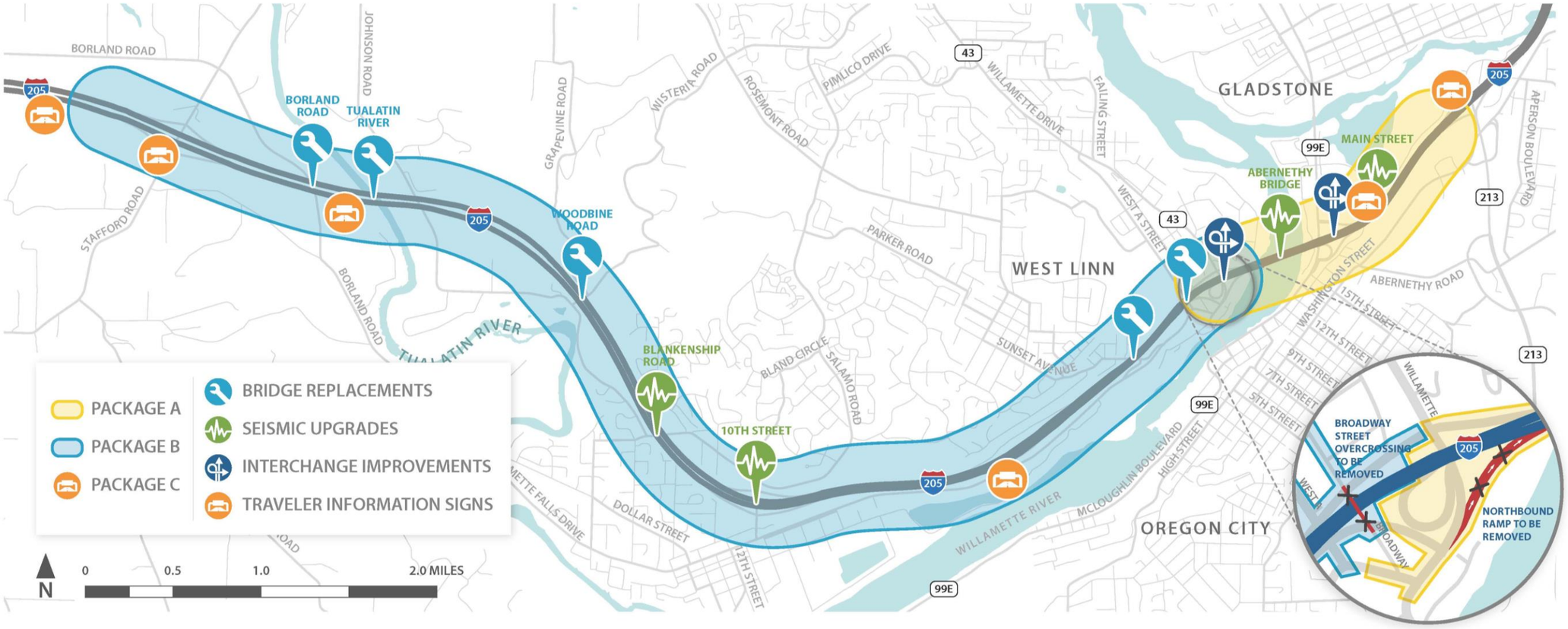
TRAVELER INFORMATION SIGNS

The project includes **ODOT RealTime traffic information signs** to help travelers get to where they're going more safely and efficiently. These signs can display traffic flow information, roadway conditions and advisory speeds limits.

Appendix B. Recommended Alternative Phasing Map and Schedule

January 5, 2018

Recommended Construction Phasing Map and Schedule

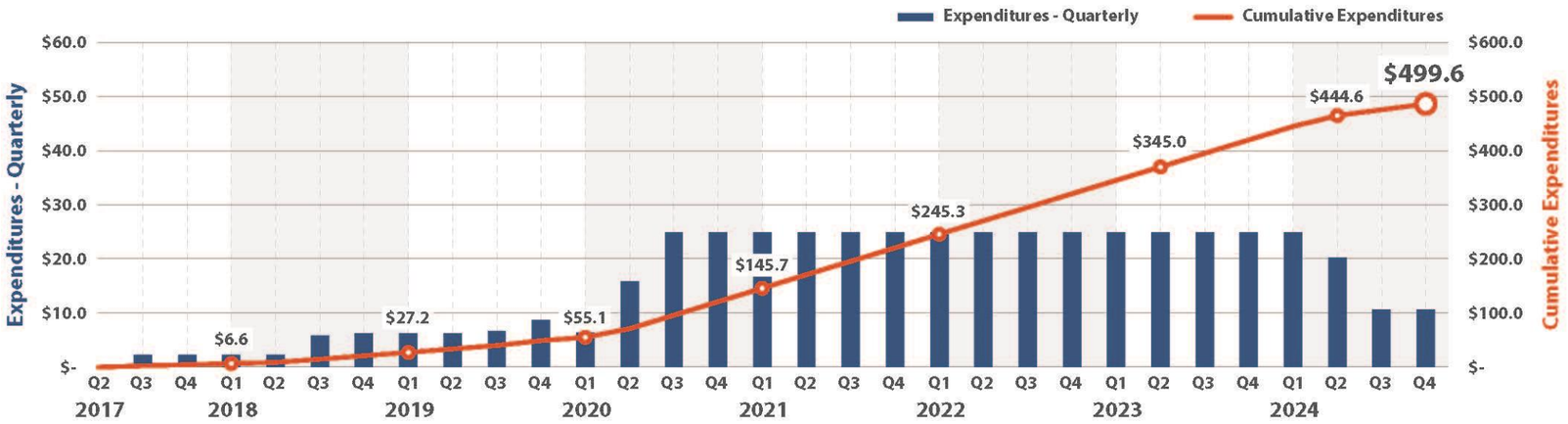


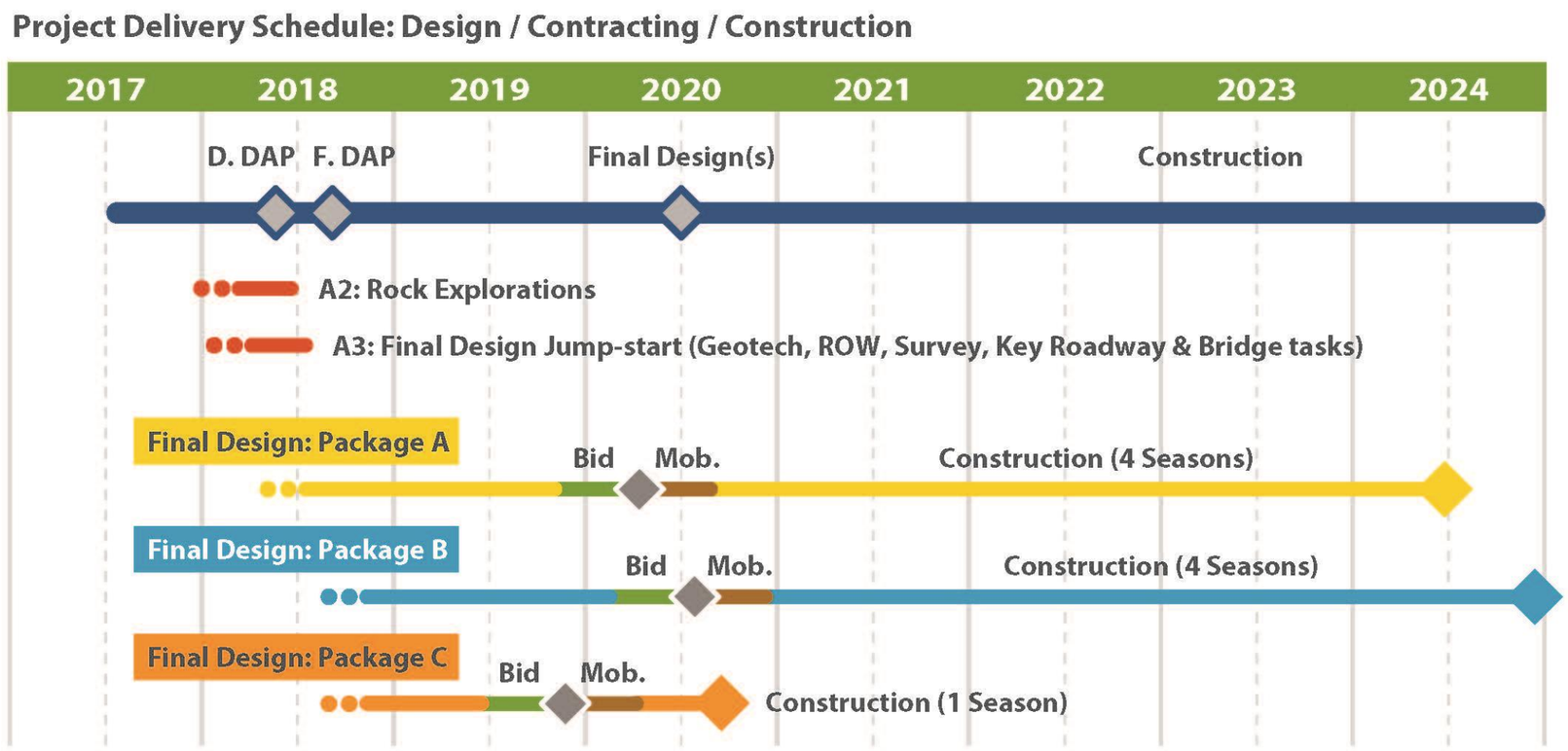
Package	2019	2020	2021	2022	2023	2024
A						
B						
C						

Appendix C. Project Delivery Schedule and Cash-Flow Curve

January 5, 2018

Expenditures for the Proposed Solution (3 Packages)





Appendix D. Recommended Alternative – Detailed Project Cost Estimate

January 5, 2018

Detailed Project Cost Estimate

PROGROMMATIC OPINION OF COST							
ITEM NO.	BID ITEM CODE	ITEM	CONSTRUCTION VARIABILITY CONTINGENCY (Range 0%-20%)	Northern Package PACKAGE A (ABERNETHY BRIDGE)	Southern Package PACKAGE B (I-205 FREEWAY WIDENING)	PACKAGE C (ATM)	TOTAL COST
200 - TEMPORARY FEATURES AND APPURTENANCES							
0010	0210-0100000A	MOBILIZATION	0%	$ 14,826,200.00	$ 11,650,800.00	$ 319,600.00	$26,796,600.00
0020	0100-0101000T	TRAINING	0%	$ 370,700.00	$ 291,300.00	$ 8,000.00	$670,000.00
0030	0225-0100000A	TEMPORARY PROTECTION AND DIRECTION OF TRAFFIC	0%	$ 7,413,100.00	$ 5,825,400.00	$ 159,800.00	$13,398,300.00
0040	0256-0109000J	TEMPORARY RETAINING WALL	10%	$ 112,200.00	$ -	$ -	$112,200.00
0050	0280-0100000A	EROSION CONTROL	0%	$ 1,482,600.00	$ 1,165,100.00	$ 32,000.00	$2,679,700.00
0060	0294-	HAZMAT	0%	$ 741,300.00	$ 582,500.00	$ 16,000.00	$1,339,800.00
0070	0294-9Z90000K	CONTAMINATED SOIL MANAGEMENT	15%	$ 175,400.00	$ 1,784,800.00	$ -	$1,960,200.00
							$46,956,800.00
300 - ROADWORK							
0080	0305-0100000A	CONSTRUCTION SURVEY WORK	0%	$ 1,482,600.00	$ 1,165,100.00	$ 32,000.00	$2,679,700.00
0090	0310-0106000A	REMOVAL OF STRUCTURES AND OBSTRUCTIONS	0%	$ 741,300.00	$ 582,500.00	$ 16,000.00	$1,339,800.00
0100	0320-0100000R	CLEARING AND GRUBBING	15%	$ 157,300.00	$ 421,800.00	$ -	$579,100.00
0110	0330-0105000K	GENERAL EXCAVATION	15%	$ 780,000.00	$ 3,650,700.00	$ -	$4,430,700.00
0120	0331-0112000J	24 INCH SUBGRADE STABILIZATION	10%	$ 128,400.00	$ 377,700.00	$ -	$506,100.00
0130	0344-0101000J	TREATED SUBGRADE, 9 INCHES THICK	10%	$ 119,500.00	$ 1,211,300.00	$ -	$1,330,800.00
0140	0344-0108000M	PORTLAND CEMENT	10%	$ 47,800.00	$ 484,000.00	$ -	$531,800.00
0150	0350-0105000J	SUBGRADE GEOTEXTILE	15%	$ 37,700.00	$ 284,600.00	$ -	$322,300.00
							$11,720,300.00
400 - DRAINAGE AND SEWERS							
0160	0405-0100000K	ROCK EXCAVATION	20%	$ -	$ 5,478,000.00	$ -	$5,478,000.00
0170		ROCK PRE-SPLITTING	20%	$ -	$ 600,000.00	$ -	$600,000.00
0180		PRE-SURVEY	20%	$ -	$ 120,000.00	$ -	$120,000.00
0190		POST-SURVEY	20%	$ -	$ 120,000.00	$ -	$120,000.00
0200	04XX-	DRAINAGE	20%	$ 945,600.00	$ 1,339,500.00	$ -	$2,285,100.00
0210		4F/6F MITIGATION	10%	$ 220,000.00	$ 330,000.00	$ -	$550,000.00
							$9,153,100.00
510 - Bridge Nos. 09738 & 09738A (Borland Rd.)							
0220	05XX-	REPLACEMENT	10%	$ -	$ 6,908,000.00	$ -	$6,908,000.00
							$6,908,000.00
515 - Bridge Nos. 09737 & 09737A (Tualatin River)							
0230	05XX-	REPLACEMENT	10%	$ -	$ 21,692,000.00	$ -	$21,692,000.00
							$21,692,000.00
520 - Bridge Nos. 09735 & 09735A (Woodbine Rd.)							
0240	05XX-	REPLACEMENT	15%	$ -	$ 4,692,000.00	$ -	$4,692,000.00
							$4,692,000.00
525 - Bridge Nos. 09734 & 09734A (Blankenship Rd.)							
0250	05XX-	RETROFIT/WIDENING/BRIDGE RAISING	10%	$ -	$ 2,420,000.00	$ -	$2,420,000.00
							$2,420,000.00
530 - Bridge Nos. 09728 & 09728A (10th St.)							
0260	05XX-	RETROFIT/WIDENING/BRIDGE RAISING	10%	$ -	$ 2,420,000.00	$ -	$2,420,000.00
							$2,420,000.00
535 - Bridge No. XXXXX (Sunset Ave.)							
0270	05XX-	REPLACEMENT	10%	$ -	$ 2,684,000.00	$ -	$2,684,000.00
							$2,684,000.00
540 - Bridge No. XXXXX (West A St.)							
0280	05XX-	REPLACEMENT	10%	$ -	$ 3,410,000.00	$ -	$3,410,000.00
0290	05XX-	TRAFFIC MITIGATION	10%	$ -	$ 137,500.00	$ -	$137,500.00
							$3,410,000.00
545 - Bridge No. 09703 (Broadway St.)							
0300	05XX-	DEMOLITION/REMOVAL	10%	$ -	$ 748,000.00	$ -	$748,000.00
							$748,000.00
550 - Bridge Nos. 09403, 09403A, 09403C, 09403R (Abernethy)							
0310	05XX-	ABERNETHY BRIDGE	15%	$ 106,800,500.00	$ -	$ -	$106,800,500.00
0320	05XX-	ABERNETHY BRIDGE, SB RAMP	10%	$ 5,104,000.00	$ -	$ -	$5,104,000.00
0330	05XX-	ABERNETHY BRIDGE, NB RAMP	10%	$ 357,500.00	$ -	$ -	$357,500.00
0340	05XX-	HYDRAULIC MITIGATION	10%	$ 154,000.00	$ -	$ -	$154,000.00
0350	05XX-	ABERNETHY CREEK MITIGATION	10%	$ 544,500.00	$ -	$ -	$544,500.00
0360	05XX-	TEMPORARY WATER MANAGEMENT	10%	$ 330,000.00	$ -	$ -	$330,000.00
0370	05XX-	GEOTECHNICAL MITIGATION FOR LATERAL SPREAD	5%	$ 15,750,000.00	$ -	$ -	$15,750,000.00
							$129,040,500.00
555 - Bridge No. 09702 (Main St.)							
0380	05XX-	RETROFIT/WIDENING	10%	$ 4,807,000.00	$ -	$ -	$4,807,000.00
							$4,807,000.00
560 - Retaining Walls							
0390	0596-0108000A	RETAINING WALL, MSE NO. 001	10%	$ -	$ 154,000.00	$ -	$154,000.00
0400	0596-0108000A	RETAINING WALL, CAST-IN-PLACE GRAVITY	10%	$ 1,221,000.00	$ -	$ -	$1,221,000.00
0410	0597-0100000J	SOUND WALLS	10%	$ -	$ 1,654,800.00	$ -	$1,654,800.00
							$3,029,800.00
600 - BASES							
0410	0620-0120000J	COLD PLANE PAVEMENT REMOVAL, 2 INCHES DEEP	15%	$ 10,100.00	$ 3,700.00	$ -	$13,800.00
0420	0640-XXXXXXX	ICTB	10%	$ -	$ 95,600.00	$ -	$95,600.00
0430	0640-XXXXXXX	ICTB PORTLAND CEMENT	10%	$ -	$ 157,100.00	$ -	$157,100.00
0440	0641-0102000M	AGGREGATE BASE	10%	$ 786,500.00	$ 3,378,100.00	$ -	$4,164,600.00
							$4,431,100.00

PROGROMMATIC OPINION OF COST (CONT.)

ITEM NO.	BID ITEM CODE	ITEM	CONSTRUCTION VARIABILITY CONTINGENCY (Range 0%-20%)	Northern Package PACKAGE A (ABERNETHY BRIDGE)	Southern Package PACKAGE B (I-205 FREEWAY WIDENING)	PACKAGE C (ATM)	TOTAL COST
700 - WEARING SURFACES							
0450	0730-0100000M	EMULSIFIED ASPHALT FOR TACK COAT	10%	$ 4,400.00	$ 49,500.00	$ -	$53,900.00
0460	0745-0402000M	LEVEL 4, 1/2 INCH ACP	10%	$ 1,455,000.00	$ 5,623,500.00	$ -	$7,078,500.00
0470	0745-0640100M	PG 70-22ER ASPHALT IN LEVEL 4, 1/2 INCH ACP	10%	$ 13.00	$ 50.00	$ -	$63.00
0480	0755-0104000J	CONTINUOUSLY REINFORCED CONCRETE PAVEMENT 9 INCH THICK	10%	$ 200,200.00	$ 20,413,300.00	$ -	$20,613,500.00
0490	0755-0107000J	CONTINUOUSLY REINFORCED CONCRETE PAVEMENT 11 INCH THICK	10%	$ -	$ 10,230,000.00	$ -	$10,230,000.00
0500	0759-0110000F	CONCRETE CURBS, STANDARD CURB	15%	$ 117,300.00	$ 20,600.00	$ -	$137,900.00
0510	0759-0106000F	CONCRETE CURBS, LOW PROFILE MOUNTABLE CURB	15%	$ -	$ 104,900.00	$ -	$104,900.00
0520	0759-0122000J	CONCRETE ISLANDS	15%	$ 111,400.00	$ -	$ -	$111,400.00
0530	0759-0128000J	CONCRETE WALKS	15%	$ 221,900.00	$ 52,400.00	$ -	$274,300.00
0540	0759-0154000E	EXTRA FOR NEW SIDEWALK RAMPS	15%	$ 92,000.00	$ 71,900.00	$ -	$163,900.00
0550	0759-0510000E	TRUNCATED DOMES ON NEW SURFACES	15%	$ 18,400.00	$ 14,400.00	$ -	$32,800.00
							$38,801,163.00
800 - PERMANENT TRAFFIC SAFETY AND GUIDANCE DEVICES							
0560	0810-0129000E	GUARDRAIL TERMINALS, NON-FLARED	10%	$ 2,800.00	$ 200,800.00	$ -	$203,600.00
0570	0810-0146000F	31 INCH GUARDRAIL, TYPE 2A	10%	$ 88,300.00	$ 989,200.00	$ -	$1,077,500.00
0580	0810-0146000F	31 INCH GUARDRAIL, TYPE 3	10%	$ -	$ 21,200.00	$ -	$21,200.00
0590	0811-0102000F	CABLE BARRIER, TEST LEVEL 4	10%	$ -	$ 198,000.00	$ -	$198,000.00
0600	0820-0100000F	CONCRETE BARRIER	10%	$ -	$ -	$ -	$0.00
0610	0820-0127000F	CONCRETE BARRIER, TALL	10%	$ -	$ 1,262,000.00	$ -	$1,262,000.00
0620	0830-0125000E	IMPACT ATTENUATOR	10%	$ 99,000.00	$ 198,000.00	$ -	$297,000.00
0630	08XX-	PAVEMENT MARKING	10%	$ 58,400.00	$ 697,100.00	$ -	$755,500.00
							$3,814,800.00
900 - PERMANENT TRAFFIC CONTROL AND ILLUMINATION SYSTEMS							
0640	09XX-	SIGNING	10%	$ 368,500.00	$ 231,000.00	$ -	$599,500.00
0650	0930-0101000A	TRUSS SIGN BRIDGE	10%	$ 2,310,000.00	$ -	$ -	$2,310,000.00
0660	0930-0104000A	MONOTUBE CANTILEVER SIGN STRUCTURE	10%	$ -	$ 220,000.00	$ -	$220,000.00
0670	0930-0105000A	BRIDGE STRUCTURE MOUNTS	10%	$ 44,000.00	$ -	$ -	$44,000.00
0680	0970-	ILLUMINATION	15%	$ 1,150,000.00	$ 2,070,000.00	$ -	$3,220,000.00
0690	0990-0101000A	TRAFFIC SIGNAL INSTALLATION	10%	$ 770,000.00	$ -	$ -	$770,000.00
0700	0990-0102000A	TRAFFIC SIGNAL MODIFICATION	10%	$ 55,000.00	$ -	$ -	$55,000.00
0710	0990-	DETECTOR INSTALLATION	10%	$ 385,000.00	$ -	$ -	$385,000.00
0720	0990-0104000A	RAMP METER SIGNAL INSTALLATION	10%	$ 880,000.00	$ 880,000.00	$ -	$1,760,000.00
0730	0990-9Z90000A	TELECOMMUNICATIONS, (FIBER)	10%	$ 66,000.00	$ 1,089,000.00	$ -	$1,155,000.00
							$10,518,500.00
910 - NB ATM/VMS IMPROVEMENTS							
0740	0990-9Z90000A	MP 0.6 - VMS & ADVISORY SPEED	10%	$ -	$ -	$ 858,000.00	$858,000.00
0750	0990-9Z90000A	MP 3.2 - ADVISORY SPEED	10%	$ -	$ -	$ 242,000.00	$242,000.00
0760	0990-9Z90000A	MP 4.1 - FULL VMS	10%	$ -	$ -	$ 676,500.00	$676,500.00
0770	0990-9Z90000A	MP 7.7 - VMS & ADVISORY SPEED	10%	$ -	$ -	$ 759,000.00	$759,000.00
0780	0990-9Z90000A	MP 8.5 - ADVISORY SPEED	10%	$ -	$ 357,500.00	$ -	$357,500.00
							$2,893,000.00
920 - SB ATM/VMS IMPROVEMENTS							
0790	0990-9Z90000A	MP 11.7 - REPLACE EXTG VMS	10%	$ -	$ -	$ 302,500.00	$302,500.00
0800	0990-9Z90000A	MP 10.2 - ADVISORY SPEED	10%	$ -	$ -	$ 357,500.00	$357,500.00
0810	0990-9Z90000A	MP 8.3 - ADVISORY SPEED	10%	$ -	$ 357,500.00	$ -	$357,500.00
							$1,017,500.00
1000 - RIGHT OF WAY DEVELOPMENT AND CONTROL							
0820	1012-	WATER QUALITY	10%	$ 778,300.00	$ 2,432,100.00	$ -	$3,210,400.00
0830	1012-	DETENTION	10%	$ 278,300.00	$ 1,648,600.00	$ -	$1,926,900.00
0840	1030-0101000R	WEED CONTROL	10%	$ 58,500.00	$ 156,900.00	$ -	$215,400.00
0850	1030-0108000R	PERMANENT SEEDING	10%	$ 60,200.00	$ 161,400.00	$ -	$221,600.00
0860	1040-	LANDSCAPING	0%	$ 1,482,600.00	$ 1,165,100.00	$ 32,000.00	$2,679,700.00
							$8,254,000.00
SUBTOTAL FOR CONSTRUCTION W/O ENGINEERING, CONTINGENCIES OR ANTICIPATI							**$319,411,563.00**
		UNKNOWNS CONTINGENCIES (idependent of design contingencies above)	15%	$ 26,520,300.00	$ 20,819,700.00	$ 571,600.00	$47,911,600.00
							$47,911,600.00
SUBTOTAL FOR CONSTRUCTION W/O ANTICIPATED ITEMS							**$367,323,163.00**
		AGGREGATE CONTINGENCY		**$43,723,400.00**	**$32,512,000.00**	**$862,100.00**	**$77,097,500.00**
ANTICIPATED ITEMS							
		ANTICIPATED ITEMS	0%	$ 1,482,600.00	$ 1,165,100.00	$ 32,000.00	$2,679,700.00
		ENVIRONMENTAL MITIGATION	0%	$ 741,300.00	$ 582,500.00	$ 16,000.00	$1,339,800.00
		CONSTRUCTION ENGINEERING (CE)	0%	$ 20,332,300.00	$ 15,961,800.00	$ 438,200.00	$36,732,300.00
							$40,751,800.00
SUBTOTAL FOR CONSTRUCTION (CURRENT DOLLARS)				**$ 225,900,000.00**	**$ 177,400,000.00**	**$ 4,900,000.00**	**$408,200,000.00**
CONSTRUCTION YEAR COST INCLUDING INFLATION (TO MIDPOINT OF OF CONSTRUCTION)				**$ 258,300,000.00**	**$ 205,600,000.00**	**$ 5,300,000.00**	**$469,200,000.00**
			2017.5	**2022.5**	**2023**	**2020.5**	
POTENTIAL COST FOR MEGA PROJECT (TO MIDPOINT OF CONSTRUCTION, INCLUDES ECONOMY OF SCALE)				**$ 248,000,000.00**	**$ 197,400,000.00**	**$ 5,100,000.00**	**$ 450,500,000.00**
PROGROMATIC ITEMS							
						PROFESSIONAL ENGINEERING (PE)	$45,000,000.00
						RIGHT OF WAY (ROW)	$1,400,000.00
						(ASSUMED) REIMBURSABLE UTILITES	$2,700,000.00
							49,100,000.00
						TOTAL PROJECT COST	**$499,600,000.00**

PACKAGE A - NORTHERN PACKAGE (ABERNETHY BRIDGE)
OPINION OF COST

ITEM NO.	BID ITEM CODE	ITEM	UNIT	QUANTITY	UNIT COST	CONSTRUCTION VARIABILITY CONTINGENCY (Range 0%-20%)	TOTAL PRICE
200 - TEMPORARY FEATURES AND APPURTENANCES							
0010	0210-0100000A	MOBILIZATION	LS	10.0%	$14,826,186.23	0%	$14,826,186.23
0020	0100-0101000T	TRAINING	LS	0.25%	$370,654.66	0%	$370,654.66
0030	0225-0100000A	TEMPORARY PROTECTION AND DIRECTION OF TRAFFIC	LS	5.0%	$7,413,093.11	0%	$7,413,093.11
0040	0256-0109000J	TEMPORARY RETAINING WALL	SQFT	1,200	$85.00	10%	$112,200.00
0050	0280-0100000A	EROSION CONTROL	LS	1.0%	$1,482,618.62	0%	$1,482,618.62
0060	0294-	HAZMAT	LS	0.5%	$741,309.31	0%	$741,309.31
0070	0294-9Z90000K	CONTAMINATED SOIL MANAGEMENT	CUYD	19,060	$8.00	15%	$175,352.00
					Subtotal		**$25,121,413.93**
300 - ROADWORK							
0080	0305-0100000A	CONSTRUCTION SURVEY WORK	LS	1.0%	$1,482,618.62	0%	$1,482,618.62
0090	0310-0106000A	REMOVAL OF STRUCTURES AND OBSTRUCTIONS	LS	0.5%	$741,309.31	0%	$741,309.31
0100	0320-0100000R	CLEARING AND GRUBBING	ACRE	15	$9,000.00	15%	$157,320.00
0110	0330-0105000K	GENERAL EXCAVATION	CUYD	35,700	$19.00	15%	$780,045.00
0120	0331-0112000J	24 INCH SUBGRADE STABILIZATION	SQYD	4,668	$25.00	10%	$128,356.25
0130	0344-0101000J	TREATED SUBGRADE, 9 INCHES THICK	SQYD	10,868	$10.00	10%	$119,542.50
0140	0344-0108000M	PORTLAND CEMENT	TON	362	$120.00	10%	$47,769.18
0150	0350-0105000J	SUBGRADE GEOTEXTILE	SQYD	32,800	$1.00	15%	$37,720.00
					Subtotal		**$3,494,680.87**
400 - DRAINAGE AND SEWERS							
0160	0405-0100000K	ROCK EXCAVATION	CUYD	0	$55.00	20%	$0.00
0170		ROCK PRE-SPLITTING	LS	1	$0.00	20%	$0.00
0180		PRE-SURVEY	LS	1	$0.00	20%	$0.00
0190		POST-SURVEY	LS	1	$0.00	20%	$0.00
0200	04XX-	DRAINAGE	LS	1	$788,000.00	20%	$945,600.00
0210		4F/6F MITIGATION	LS	1	$200,000.00	10%	$220,000.00
					Subtotal		**$1,165,600.00**
510 - Bridge Nos. 09738 & 09738A (Borland Rd.)							
0220	05XX-	REPLACEMENT	LS	1	$0.00	10%	$0.00
					Subtotal		**$0.00**
515 - Bridge Nos. 09737 & 09737A (Tualatin River)							
0230	05XX-	REPLACEMENT	LS	1	$0.00	10%	$0.00
					Subtotal		**$0.00**
520 - Bridge Nos. 09735 & 09735A (Woodbine Rd.)							
0240	05XX-	REPLACEMENT	LS	1	$0.00	15%	$0.00
					Subtotal		**$0.00**
525 - Bridge Nos. 09734 & 09734A (Blankenship Rd.)							
0250	05XX-	RETROFIT/WIDENING/BRIDGE RAISING	LS	1	$0.00	10%	$0.00
					Subtotal		**$0.00**
530 - Bridge Nos. 09728 & 09728A (10th St.)							
0260	05XX-	RETROFIT/WIDENING/BRIDGE RAISING	LS	1	$0.00	10%	$0.00
					Subtotal		**$0.00**
535 - Bridge No. XXXXX (Sunset Ave.)							
0270	05XX-	REPLACEMENT	LS	1	$0.00	10%	$0.00
					Subtotal		**$0.00**
540 - Bridge No. XXXXX (West A St.)							
0280	05XX-	REPLACEMENT	LS	1	$0.00	10%	$0.00
0290	05XX-	TRAFFIC MITIGATION	LS	1	$0.00	10%	$0.00
					Subtotal		**$0.00**
545 - Bridge No. 09703 (Broadway St.)							
0300	05XX-	DEMOLITION/REMOVAL	LS	1	$0.00	10%	$0.00
					Subtotal		**$0.00**
550 - Bridge Nos. 09403, 09403A, 09403C, 09403R (Abernethy)							
0310	05XX-	ABERNETHY BRIDGE	LS	1	$92,870,000.00	15%	$106,800,500.00
0320	05XX-	ABERNETHY BRIDGE, SB RAMP	LS	1	$4,640,000.00	10%	$5,104,000.00
0330	05XX-	ABERNETHY BRIDGE, NB RAMP	LS	1	$325,000.00	10%	$357,500.00
0340	05XX-	HYDRAULIC MITIGATION	LS	1	$140,000.00	10%	$154,000.00
0350	05XX-	ABERNETHY CREEK MITIGATION	LS	1	$495,000.00	10%	$544,500.00
0360	05XX-	TEMPORARY WATER MANAGEMENT	LS	1	$300,000.00	10%	$330,000.00
0370	05XX-	GEOTECHNICAL MITIGATION FOR LATERAL SPREAD	LS	1	$15,000,000.00	5%	$15,750,000.00
					Subtotal		**$129,040,500.00**
555 - Bridge No. 09702 (Main St.)							
0380	05XX-	RETROFIT/WIDENING	LS	1	$4,370,000.00	10%	$4,807,000.00
					Subtotal		**$4,807,000.00**
560 - Retaining Walls							
0390	0596-0108000A	RETAINING WALL, MSE NO. 001	SF	0	$100.00	10%	$0.00
0400	0596-0108000A	RETAINING WALL, CAST-IN-PLACE GRAVITY	SF	14,800	$75.00	10%	$1,221,000.00
0410	0597-0100000J	SOUND WALLS	SF	0	$20.00	10%	$0.00
					Subtotal		**$1,221,000.00**

PACKAGE A - NORTHERN PACKAGE (ABERNETHY BRIDGE)
OPINION OF COST

ITEM NO.	BID ITEM CODE	ITEM	UNIT	QUANTITY	UNIT COST	CONSTRUCTION VARIABILITY CONTINGENCY (Range 0%-20%)	TOTAL PRICE
600 - BASES							
0410	0620-0120000J	COLD PLANE PAVEMENT REMOVAL, 2 INCHES DEEP	SQYD	8,750	$1.00	15%	$10,062.50
0420	0640-XXXXXXX	iCTB	SQYD	0	$2.00	10%	$0.00
0430	0640-XXXXXXX	iCTB PORTLAND CEMENT	TON	0	$120.00	10%	$0.00
0440	0641-0102000M	AGGREGATE BASE	TON	32,500	$22.00	10%	$786,500.00
					Subtotal		**$796,562.50**
700 - WEARING SURFACES							
0450	0730-0100000M	EMULSIFIED ASPHALT FOR TACK COAT	TON	16	$250.00	10%	$4,400.00
0460	0745-0402000M	LEVEL 4, 1/2 INCH ACP	TON	20,350	$65.00	10%	$1,455,025.00
0470	0745-0640100M	PG 70-22ER ASPHALT IN LEVEL 4, 1/2 INCH ACP	TON	1,215	$0.01	10%	$13.37
0480	0755-0104000J	CONTINUOUSLY REINFORCED CONCRETE PAVEMENT 9 INCH THICK	SQYD	2,800	$65.00	10%	$200,200.00
0490	0755-0107000J	CONTINUOUSLY REINFORCED CONCRETE PAVEMENT 11 INCH THICK	SQYD	0	$75.00	10%	$0.00
0500	0759-0110000F	CONCRETE CURBS, STANDARD CURB	FOOT	5,100	$20.00	15%	$117,300.00
0510	0759-0106000F	CONCRETE CURBS, LOW PROFILE MOUNTABLE CURB	FOOT	0	$16.00	15%	$0.00
0520	0759-0122000J	CONCRETE ISLANDS	SQFT	11,400	$8.50	15%	$111,435.00
0530	0759-0128000J	CONCRETE WALKS	SQFT	32,155	$6.00	15%	$221,869.50
0540	0759-0154000E	EXTRA FOR NEW SIDEWALK RAMPS	EA	32	$2,500.00	15%	$92,000.00
0550	0759-0510000E	TRUNCATED DOMES ON NEW SURFACES	EA	32	$500.00	15%	$18,400.00
					Subtotal		**$2,220,642.87**
800 - PERMANENT TRAFFIC SAFETY AND GUIDANCE DEVICES							
0560	0810-0129000E	GUARDRAIL TERMINALS, NON-FLARED	EA	1	$2,500.00	10%	$2,750.00
0570	0810-0146000F	31 INCH GUARDRAIL, TYPE 2A	FOOT	3,650	$22.00	10%	$88,330.00
0580	0810-0146000F	31 INCH GUARDRAIL, TYPE 3	FOOT	0	$55.00	10%	$0.00
0590	0811-0102000F	CABLE BARRIER, TEST LEVEL 4	FOOT	0	$12.00	10%	$0.00
0600	0820-0100000F	CONCRETE BARRIER	FOOT	0	$55.00	10%	$0.00
0610	0820-0127000F	CONCRETE BARRIER, TALL	FOOT	0	$65.00	10%	$0.00
0620	0830-0125000E	IMPACT ATTENUATOR	EA	3	$30,000.00	10%	$99,000.00
0630	08XX-	PAVEMENT MARKING	LF	26,550	$2.00	10%	$58,410.00
					Subtotal		**$248,490.00**
900 - PERMANENT TRAFFIC CONTROL AND ILLUMINATION SYSTEMS							
0640	09XX-	SIGNING	LS	1	$335,000.00	10%	$368,500.00
0650	0930-0101000A	TRUSS SIGN BRIDGE	EA	6	$350,000.00	10%	$2,310,000.00
0660	0930-0104000A	MONOTUBE CANTILEVER SIGN STRUCTURE	EA	0	$200,000.00	10%	$0.00
0670	0930-0105000A	BRIDGE STRUCTURE MOUNTS	LS	1	$40,000.00	10%	$44,000.00
0680	0970-	ILLUMINATION	LS	1	$1,000,000.00	15%	$1,150,000.00
0690	0990-0101000A	TRAFFIC SIGNAL INSTALLATION	EA	2	$350,000.00	10%	$770,000.00
0700	0990-0102000A	TRAFFIC SIGNAL MODIFICATION	EA	1	$50,000.00	10%	$55,000.00
0710	0990-	DETECTOR INSTALLATION	EA	5	$70,000.00	10%	$385,000.00
0720	0990-0104000A	RAMP METER SIGNAL INSTALLATION	EA	4	$200,000.00	10%	$880,000.00
0730	0990-9Z90000A	TELECOMMUNICATIONS, (FIBER)	LS	1	$60,000.00	10%	$66,000.00
					Subtotal		**$6,028,500.00**
910 - NB ATM/VMS IMPROVEMENTS							
0740	0990-9Z90000A	MP 0.6 - VMS & ADVISORY SPEED	LS	1	$0.00	10%	$0.00
0750	0990-9Z90000A	MP 3.2 - ADVISORY SPEED	LS	1	$0.00	10%	$0.00
0760	0990-9Z90000A	MP 4.1 - FULL VMS	LS	1	$0.00	10%	$0.00
0770	0990-9Z90000A	MP 7.7 - VMS & ADVISORY SPEED	LS	1	$0.00	10%	$0.00
0780	0990-9Z90000A	MP 8.5 - ADVISORY SPEED	LS	1	$0.00	10%	$0.00
					Subtotal		**$0.00**
920 - SB ATM/VMS IMPROVEMENTS							
0790	0990-9Z90000A	MP 11.7 - REPLACE EXTG VMS	LS	1	$0.00	10%	$0.00
0800	0990-9Z90000A	MP 10.2 - ADVISORY SPEED	LS	1	$0.00	10%	$0.00
0810	0990-9Z90000A	MP 8.3 - ADVISORY SPEED	LS	1	$0.00	10%	$0.00
					Subtotal		**$0.00**
1000 - RIGHT OF WAY DEVELOPMENT AND CONTROL							
0820	1012-	WATER QUALITY	LS	1	$707,500.00	10%	$778,250.00
0830	1012-	DETENTION	LS	1	$253,000.00	10%	$278,300.00
0840	1030-0101000R	WEED CONTROL	ACRE	15	$3,500.00	10%	$58,520.00
0850	1030-0108000R	PERMANENT SEEDING	ACRE	15	$3,600.00	10%	$60,192.00
0860	1040-	LANDSCAPING	LS	1.0%	$1,482,618.62	0%	$1,482,618.62
					Subtotal		**$2,657,880.62**
SUBTOTAL FOR CONSTRUCTION W/O ENGINEERING, CONTINGENCIES OR ANTICIPATED ITEMS							**$176,802,270.79**
		UNKNOWNS CONTINGENCIES (idependent of design contingencies above)	LS		15%		$26,520,340.62
					Subtotal		**$26,520,340.62**
SUBTOTAL FOR CONSTRUCTION W/O ANTICIPATED ITEMS							**$203,322,611.41**
					AGGREGATE CONTINGENCY		**$43,723,371.74**
ANTICIPATED ITEMS							
		ANTICIPATED ITEMS	LS	1.0%	$1,482,618.62	0%	$1,482,618.62
		ENVIRONMENTAL MITIGATION	LS	0.5%	$741,309.31	0%	$741,309.31
		CONSTRUCTION ENGINEERING (CE)	LS	10.0%	$20,332,261.14	0%	$20,332,261.14
					Subtotal		**$22,556,189.08**
SUBTOTAL FOR CONSTRUCTION (CURRENT DOLLARS)							**$225,878,800.48**
					2017.5		
CONSTRUCTION YEAR COST INCLUDING INFLATION (TO MIDPOINT OF OF CONSTRUCTION)					**2022.5**	**3.00%**	**$258,300,000.00**
POTENTIAL COST FOR MEGA PROJECT (TO MIDPOINT OF CONSTRUCTION, INCLUDES ECONOMY OF SCALE)							**$247,968,000.00**

PACKAGE B - SOUTHERN PACKAGE (I-205 FREEWAY WIDENING)
OPINION OF COST

ITEM NO.	BID ITEM CODE	ITEM	UNIT	QUANTITY	UNIT COST	CONSTRUCTION VARIABILITY CONTINGENCY (Range 0%-20%)	TOTAL PRICE
200 - TEMPORARY FEATURES AND APPURTENANCES							
0010	0210-0100000A	MOBILIZATION	LS	10.0%	$11,650,766.76	0%	$11,650,766.76
0020	0100-0101000T	TRAINING	LS	0.25%	$291,269.17	0%	$291,269.17
0030	0225-0100000A	TEMPORARY PROTECTION AND DIRECTION OF TRAFFIC	LS	5.0%	$5,825,383.38	0%	$5,825,383.38
0040	0256-0109000J	TEMPORARY RETAINING WALL	SQFT	0	$85.00	10%	$0.00
0050	0280-0100000A	EROSION CONTROL	LS	1.0%	$1,165,076.68	0%	$1,165,076.68
0060	0294-	HAZMAT	LS	0.5%	$582,538.34	0%	$582,538.34
0070	0294-9Z90000K	CONTAMINATED SOIL MANAGEMENT	CUYD	194,000	$8.00	15%	$1,784,800.00
					Subtotal		**$21,299,834.32**
300 - ROADWORK							
0080	0305-0100000A	CONSTRUCTION SURVEY WORK	LS	1.0%	$1,165,076.68	0%	$1,165,076.68
0090	0310-0106000A	REMOVAL OF STRUCTURES AND OBSTRUCTIONS	LS	0.5%	$582,538.34	0%	$582,538.34
0100	0320-0100000R	CLEARING AND GRUBBING	ACRE	41	$9,000.00	15%	$421,762.50
0110	0330-0105000K	GENERAL EXCAVATION	CUYD	167,080	$19.00	15%	$3,650,698.00
0120	0331-0112000J	24 INCH SUBGRADE STABILIZATION	SQYD	13,735	$25.00	10%	$377,712.50
0130	0344-0101000J	TREATED SUBGRADE, 9 INCHES THICK	SQYD	110,120	$10.00	10%	$1,211,320.00
0140	0344-0108000M	PORTLAND CEMENT	TON	3,667	$120.00	10%	$484,043.47
0150	0350-0105000J	SUBGRADE GEOTEXTILE	SQYD	247,470	$1.00	15%	$284,590.50
					Subtotal		**$8,177,741.99**
400 - DRAINAGE AND SEWERS							
0160	0405-0100000K	ROCK EXCAVATION	CUYD	83,000	$55.00	20%	$5,478,000.00
0170		ROCK PRE-SPLITTING	LS	1	$500,000.00	20%	$600,000.00
0180		PRE-SURVEY	LS	1	$100,000.00	20%	$120,000.00
0190		POST-SURVEY	LS	1	$100,000.00	20%	$120,000.00
0200	04XX-	DRAINAGE	LS	1	$1,116,225.00	20%	$1,339,470.00
0210		4F/6F MITIGATION	LS	1	$300,000.00	10%	$330,000.00
					Subtotal		**$7,987,470.00**
510 - Bridge Nos. 09738 & 09738A (Borland Rd.)							
0220	05XX-	REPLACEMENT	LS	1	$6,280,000.00	10%	$6,908,000.00
					Subtotal		**$6,908,000.00**
515 - Bridge Nos. 09737 & 09737A (Tualatin River)							
0230	05XX-	REPLACEMENT	LS	1	$19,720,000.00	10%	$21,692,000.00
					Subtotal		**$21,692,000.00**
520 - Bridge Nos. 09735 & 09735A (Woodbine Rd.)							
0240	05XX-	REPLACEMENT	LS	1	$4,080,000.00	15%	$4,692,000.00
					Subtotal		**$4,692,000.00**
525 - Bridge Nos. 09734 & 09734A (Blankenship Rd.)							
0250	05XX-	RETROFIT/WIDENING/BRIDGE RAISING	LS	1	$2,200,000.00	10%	$2,420,000.00
					Subtotal		**$2,420,000.00**
530 - Bridge Nos. 09728 & 09728A (10th St.)							
0260	05XX-	RETROFIT/WIDENING/BRIDGE RAISING	LS	1	$2,200,000.00	10%	$2,420,000.00
					Subtotal		**$2,420,000.00**
535 - Bridge No. XXXXX (Sunset Ave.)							
0270	05XX-	REPLACEMENT	LS	1	$2,440,000.00	10%	$2,684,000.00
					Subtotal		**$2,684,000.00**
540 - Bridge No. XXXXX (West A St.)							
0280	05XX-	REPLACEMENT	LS	1	$3,100,000.00	10%	$3,410,000.00
0290	05XX-	TRAFFIC MITIGATION	LS	1	$125,000.00	10%	$137,500.00
					Subtotal		**$3,410,000.00**
545 - Bridge No. 09703 (Broadway St.)							
0300	05XX-	DEMOLITION/REMOVAL	LS	1	$680,000.00	10%	$748,000.00
					Subtotal		**$748,000.00**
550 - Bridge Nos. 09403, 09403A, 09403C, 09403R (Abernethy)							
0310	05XX-	ABERNETHY BRIDGE	LS	1	$0.00	15%	$0.00
0320	05XX-	ABERNETHY BRIDGE, SB RAMP	LS	1	$0.00	10%	$0.00
0330	05XX-	ABERNETHY BRIDGE, NB RAMP	LS	1	$0.00	10%	$0.00
0340	05XX-	HYDRAULIC MITIGATION	LS	1	$0.00	10%	$0.00
0350	05XX-	ABERNETHY CREEK MITIGATION	LS	1	$0.00	10%	$0.00
0360	05XX-	TEMPORARY WATER MANAGEMENT	LS	1	$0.00	10%	$0.00
0370	05XX-	GEOTECHNICAL MITIGATION FOR LATERAL SPREAD	LS	1	$0.00	5%	$0.00
					Subtotal		**$0.00**
555 - Bridge No. 09702 (Main St.)							
0380	05XX-	RETROFIT/WIDENING	LS	1	$0.00	10%	$0.00
					Subtotal		**$0.00**
560 - Retaining Walls							
0390	0596-0108000A	RETAINING WALL, MSE NO. 001	SF	1,400	$100.00	10%	$154,000.00
0400	0596-0108000A	RETAINING WALL, CAST-IN-PLACE GRAVITY	SF	0	$75.00	10%	$0.00
0410	0597-0100000J	SOUND WALLS	SF	75,220	$20.00	10%	$1,654,840.00
					Subtotal		**$1,808,840.00**

PACKAGE B - SOUTHERN PACKAGE (I-205 FREEWAY WIDENING)
OPINION OF COST

ITEM NO.	BID ITEM CODE	ITEM	UNIT	QUANTITY	UNIT COST	CONSTRUCTION VARIABILITY CONTINGENCY	TOTAL PRICE
600 - BASES							
0410	0620-0120000J	COLD PLANE PAVEMENT REMOVAL, 2 INCHES DEEP	SQYD	3,200	$1.00	15%	$3,680.00
0420	0640-XXXXXXX	ICTB	SQYD	43,450	$2.00	10%	$95,590.00
0430	0640-XXXXXXX	ICTB PORTLAND CEMENT	TON	1,190	$120.00	10%	$157,080.00
0440	0641-0102000M	AGGREGATE BASE	TON	139,590	$22.00	10%	$3,378,078.00
					Subtotal		**$3,634,428.00**
700 - WEARING SURFACES							
0450	0730-0100000M	EMULSIFIED ASPHALT FOR TACK COAT	TON	180	$250.00	10%	$49,500.00
0460	0745-0402000M	LEVEL 4, 1/2 INCH ACP	TON	78,650	$65.00	10%	$5,623,475.00
0470	0745-0640100M	PG 70-22ER ASPHALT IN LEVEL 4, 1/2 INCH ACP	TON	4,558	$0.01	10%	$50.14
0480	0755-0104000J	CONTINUOUSLY REINFORCED CONCRETE PAVEMENT 9 INCH THICK	SQYD	285,500	$65.00	10%	$20,413,250.00
0490	0755-0107000J	CONTINUOUSLY REINFORCED CONCRETE PAVEMENT 11 INCH THICK	SQYD	124,000	$75.00	10%	$10,230,000.00
0500	0759-0110000F	CONCRETE CURBS, STANDARD CURB	FOOT	895	$20.00	15%	$20,585.00
0510	0759-0106000F	CONCRETE CURBS, LOW PROFILE MOUNTABLE CURB	FOOT	5,700	$16.00	15%	$104,880.00
0520	0759-0122000J	CONCRETE ISLANDS	SQFT	0	$8.50	15%	$0.00
0530	0759-0128000J	CONCRETE WALKS	SQFT	7,600	$6.00	15%	$52,440.00
0540	0759-0154000E	EXTRA FOR NEW SIDEWALK RAMPS	EA	25	$2,500.00	15%	$71,875.00
0550	0759-0510000E	TRUNCATED DOMES ON NEW SURFACES	EA	25	$500.00	15%	$14,375.00
					Subtotal		**$36,580,430.14**
800 - PERMANENT TRAFFIC SAFETY AND GUIDANCE DEVICES							
0560	0810-0129000E	GUARDRAIL TERMINALS, NON-FLARED	EA	73	$2,500.00	10%	$200,750.00
0570	0810-0146000F	31 INCH GUARDRAIL, TYPE 2A	FOOT	40,875	$22.00	10%	$989,175.00
0580	0810-0146000F	31 INCH GUARDRAIL, TYPE 3	FOOT	350	$55.00	10%	$21,175.00
0590	0811-0102000F	CABLE BARRIER, TEST LEVEL 4	FOOT	15,000	$12.00	10%	$198,000.00
0600	0820-0100000F	CONCRETE BARRIER	FOOT	0	$55.00	10%	$0.00
0610	0820-0127000F	CONCRETE BARRIER, TALL	FOOT	17,650	$65.00	10%	$1,261,975.00
0620	0830-0125000E	IMPACT ATTENUATOR	EA	6	$30,000.00	10%	$198,000.00
0630	08XX-	PAVEMENT MARKING	LF	316,850	$2.00	10%	$697,070.00
					Subtotal		**$3,566,145.00**
900 - PERMANENT TRAFFIC CONTROL AND ILLUMINATION SYSTEMS							
0640	09XX-	SIGNING	LS	1	$210,000.00	10%	$231,000.00
0650	0930-0101000A	TRUSS SIGN BRIDGE	EA	0	$350,000.00	10%	$0.00
0660	0930-0104000A	MONOTUBE CANTILEVER SIGN STRUCTURE	EA	1	$200,000.00	10%	$220,000.00
0670	0930-0105000A	BRIDGE STRUCTURE MOUNTS	LS	1	$0.00	10%	$0.00
0680	0970-	ILLUMINATION	LS	1	$1,800,000.00	15%	$2,070,000.00
0690	0990-0101000A	TRAFFIC SIGNAL INSTALLATION	EA	0	$350,000.00	10%	$0.00
0700	0990-0102000A	TRAFFIC SIGNAL MODIFICATION	EA	0	$50,000.00	10%	$0.00
0710	0990-	DETECTOR INSTALLATION	EA	0	$70,000.00	10%	$0.00
0720	0990-0104000A	RAMP METER SIGNAL INSTALLATION	EA	4	$200,000.00	10%	$880,000.00
0730	0990-9Z90000A	TELECOMMUNICATIONS, (FIBER)	LS	1	$990,000.00	10%	$1,089,000.00
					Subtotal		**$4,490,000.00**
910 - NB ATM/VMS IMPROVEMENTS							
0740	0990-9Z90000A	MP 0.6 - VMS & ADVISORY SPEED	LS	1	$0.00	10%	$0.00
0750	0990-9Z90000A	MP 3.2 - ADVISORY SPEED	LS	1	$0.00	10%	$0.00
0760	0990-9Z90000A	MP 4.1 - FULL VMS	LS	1	$0.00	10%	$0.00
0770	0990-9Z90000A	MP 7.7 - VMS & ADVISORY SPEED	LS	1	$0.00	10%	$0.00
0780	0990-9Z90000A	MP 8.5 - ADVISORY SPEED	LS	1	$325,000.00	10%	$357,500.00
					Subtotal		**$357,500.00**
920 - SB ATM/VMS IMPROVEMENTS							
0790	0990-9Z90000A	MP 11.7 - REPLACE EXTG VMS	LS	1	$0.00	10%	$0.00
0800	0990-9Z90000A	MP 10.2 - ADVISORY SPEED	LS	1	$0.00	10%	$0.00
0810	0990-9Z90000A	MP 8.3 - ADVISORY SPEED	LS	1	$325,000.00	10%	$357,500.00
					Subtotal		**$357,500.00**
1000 - RIGHT OF WAY DEVELOPMENT AND CONTROL							
0820	1012-	WATER QUALITY	LS	1	$2,211,000.00	10%	$2,432,100.00
0830	1012-	DETENTION	LS	1	$1,498,700.00	10%	$1,648,570.00
0840	1030-0101000R	WEED CONTROL	ACRE	41	$3,500.00	10%	$156,887.50
0850	1030-0108000R	PERMANENT SEEDING	ACRE	41	$3,600.00	10%	$161,370.00
0860	1040-	LANDSCAPING	LS	1.0%	$1,165,076.68	0%	$1,165,076.68
					Subtotal		**$5,564,004.18**
SUBTOTAL FOR CONSTRUCTION W/O ENGINEERING, CONTINGENCIES OR ANTICIPATED ITEMS							**$138,797,893.62**
		UNKNOWNS CONTINGENCIES (idependent of design contingencies above)	LS		15%		$20,819,684.04
					Subtotal		**$20,819,684.04**
SUBTOTAL FOR CONSTRUCTION W/O ANTICIPATED ITEMS							**$159,617,577.67**
						AGGREGATE CONTINGENCY	**$32,512,021.55**
ANTICIPATED ITEMS							
		ANTICIPATED ITEMS	LS	1.0%	$1,165,076.68	0%	$1,165,076.68
		ENVIRONMENTAL MITIGATION	LS	0.5%	$582,538.34	0%	$582,538.34
		CONSTRUCTION ENGINEERING (CE)	LS	10.0%	$15,961,757.77	0%	$15,961,757.77
					Subtotal		**$17,709,372.78**
SUBTOTAL FOR CONSTRUCTION (CURRENT DOLLARS)							**$177,326,950.45**
					2017.5		
CONSTRUCTION YEAR COST INCLUDING INFLATION (TO MIDPOINT OF OF CONSTRUCTION)					**2023**	**3.00%**	**$205,600,000.00**
POTENTIAL COST FOR MEGA PROJECT (TO MIDPOINT OF CONSTRUCTION, INCLUDES ECONOMY OF SCALE)							**$197,376,000.00**

PACKAGE C - ATM PACKAGE
OPINION OF COST

ITEM NO.	BID ITEM CODE	ITEM	UNIT	QUANTITY	UNIT COST	CONSTRUCTION VARIABILITY CONTINGENCY (Range 0%-20%)	TOTAL PRICE
200 - TEMPORARY FEATURES AND APPURTENANCES							
0010	0210-0100000A	MOBILIZATION	LS	10.0%	$319,550.00	0%	$319,550.00
0020	0100-0101000T	TRAINING	LS	0.25%	$7,988.75	0%	$7,988.75
0030	0225-0100000A	TEMPORARY PROTECTION AND DIRECTION OF TRAFFIC	LS	5.0%	$159,775.00	0%	$159,775.00
0040	0256-0109000J	TEMPORARY RETAINING WALL	SQFT	0	$85.00	10%	$0.00
0050	0280-0100000A	EROSION CONTROL	LS	1.0%	$31,955.00	0%	$31,955.00
0060	0294-	HAZMAT	LS	0.5%	$15,977.50	0%	$15,977.50
0070	0294-9Z90000K	CONTAMINATED SOIL MANAGEMENT	CUYD	0	$8.00	15%	$0.00
					Subtotal		**$535,246.25**
300 - ROADWORK							
0080	0305-0100000A	CONSTRUCTION SURVEY WORK	LS	1.0%	$31,955.00	0%	$31,955.00
0090	0310-0106000A	REMOVAL OF STRUCTURES AND OBSTRUCTIONS	LS	0.5%	$15,977.50	0%	$15,977.50
0100	0320-0100000R	CLEARING AND GRUBBING	ACRE	0	$9,000.00	15%	$0.00
0110	0330-0105000K	GENERAL EXCAVATION	CUYD	0	$19.00	15%	$0.00
0120	0331-0112000J	24 INCH SUBGRADE STABILIZATION	SQYD	0	$25.00	10%	$0.00
0130	0344-0101000J	TREATED SUBGRADE, 9 INCHES THICK	SQYD	0	$10.00	10%	$0.00
0140	0344-0108000M	PORTLAND CEMENT	TON	0	$120.00	10%	$0.00
0150	0350-0105000J	SUBGRADE GEOTEXTILE	SQYD	0	$1.00	15%	$0.00
					Subtotal		**$47,932.50**
400 - DRAINAGE AND SEWERS							
0160	0405-0100000K	ROCK EXCAVATION	CUYD	0	$55.00	20%	$0.00
0170		ROCK PRE-SPLITTING	LS	1	$0.00	20%	$0.00
0180		PRE-SURVEY	LS	1	$0.00	20%	$0.00
0190		POST-SURVEY	LS	1	$0.00	20%	$0.00
0200	04XX-	DRAINAGE	LS	1	$0.00	20%	$0.00
0210		4F/6F MITIGATION	LS	1	$0.00	10%	$0.00
					Subtotal		**$0.00**
510 - Bridge Nos. 09738 & 09738A (Borland Rd.)							
0220	05XX-	REPLACEMENT	LS	1	$0.00	10%	$0.00
					Subtotal		**$0.00**
515 - Bridge Nos. 09737 & 09737A (Tualatin River)							
0230	05XX-	REPLACEMENT	LS	1	$0.00	10%	$0.00
					Subtotal		**$0.00**
520 - Bridge Nos. 09735 & 09735A (Woodbine Rd.)							
0240	05XX-	REPLACEMENT	LS	1	$0.00	15%	$0.00
					Subtotal		**$0.00**
525 - Bridge Nos. 09734 & 09734A (Blankenship Rd.)							
0250	05XX-	RETROFIT/WIDENING/BRIDGE RAISING	LS	1	$0.00	10%	$0.00
					Subtotal		**$0.00**
530 - Bridge Nos. 09728 & 09728A (10th St.)							
0260	05XX-	RETROFIT/WIDENING/BRIDGE RAISING	LS	1	$0.00	10%	$0.00
					Subtotal		**$0.00**
535 - Bridge No. XXXXX (Sunset Ave.)							
0270	05XX-	REPLACEMENT	LS	1	$0.00	10%	$0.00
					Subtotal		**$0.00**
540 - Bridge No. XXXXX (West A St.)							
0280	05XX-	REPLACEMENT	LS	1	$0.00	10%	$0.00
0290	05XX-	TRAFFIC MITIGATION	LS	1	$0.00	10%	$0.00
					Subtotal		**$0.00**
545 - Bridge No. 09703 (Broadway St.)							
0300	05XX-	DEMOLITION/REMOVAL	LS	1	$0.00	10%	$0.00
					Subtotal		**$0.00**
550 - Bridge Nos. 09403, 09403A, 09403C, 09403R (Abernethy)							
0310	05XX-	ABERNETHY BRIDGE	LS	1	$0.00	15%	$0.00
0320	05XX-	ABERNETHY BRIDGE, SB RAMP	LS	1	$0.00	10%	$0.00
0330	05XX-	ABERNETHY BRIDGE, NB RAMP	LS	1	$0.00	10%	$0.00
0340	05XX-	HYDRAULIC MITIGATION	LS	1	$0.00	10%	$0.00
0350	05XX-	ABERNETHY CREEK MITIGATION	LS	1	$0.00	10%	$0.00
0360	05XX-	TEMPORARY WATER MANAGEMENT	LS	1	$0.00	10%	$0.00
0370	05XX-	GEOTECHNICAL MITIGATION FOR LATERAL SPREAD	LS	1	$0.00	5%	$0.00
					Subtotal		**$0.00**
555 - Bridge No. 09702 (Main St.)							
0380	05XX-	RETROFIT/WIDENING	LS	1	$0.00	10%	$0.00
					Subtotal		**$0.00**
560 - Retaining Walls							
0390	0596-0108000A	RETAINING WALL, MSE NO. 001	SF	0	$100.00	10%	$0.00
0400	0596-0108000A	RETAINING WALL, CAST-IN-PLACE GRAVITY	SF	0	$75.00	10%	$0.00
0410	0597-0100000J	SOUND WALLS	SF	0	$20.00	10%	$0.00
					Subtotal		**$0.00**

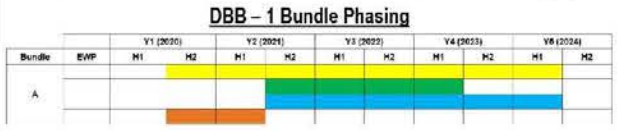
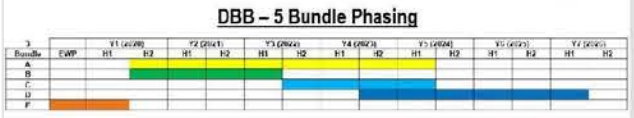
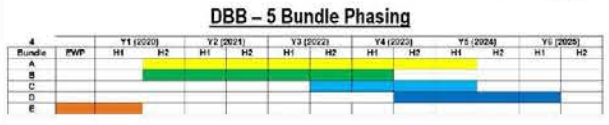
PACKAGE C - ATM PACKAGE
OPINION OF COST

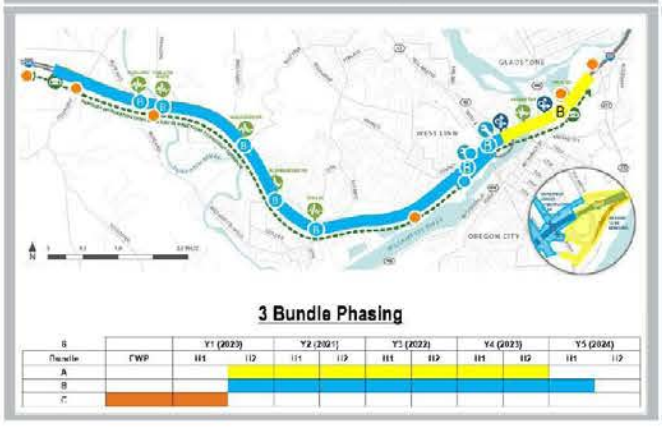
ITEM NO.	BID ITEM CODE	ITEM	UNIT	QUANTITY	UNIT COST	CONSTRUCTION VARIABILITY CONTINGENCY (Range 0%-20%)	TOTAL PRICE
600 - BASES							
0410	0620-0120000J	COLD PLANE PAVEMENT REMOVAL, 2 INCHES DEEP	SQYD	0	$1.00	15%	$0.00
0420	0640-XXXXXXX	iCTB	SQYD	0	$2.00	10%	$0.00
0430	0640-XXXXXXX	iCTB PORTLAND CEMENT	TON	0	$120.00	10%	$0.00
0440	0641-0102000M	AGGREGATE BASE	TON	0	$22.00	10%	$0.00
					Subtotal		**$0.00**
700 - WEARING SURFACES							
0450	0730-0100000M	EMULSIFIED ASPHALT FOR TACK COAT	TON	0	$250.00	10%	$0.00
0460	0745-0402000M	LEVEL 4, 1/2 INCH ACP	TON	0	$65.00	10%	$0.00
0470	0745-0640100M	PG 70-22ER ASPHALT IN LEVEL 4, 1/2 INCH ACP	TON	0	$0.01	10%	$0.00
0480	0755-0104000J	CONTINUOUSLY REINFORCED CONCRETE PAVEMENT 9 INCH THICK	SQYD	0	$65.00	10%	$0.00
0490	0755-0107000J	CONTINUOUSLY REINFORCED CONCRETE PAVEMENT 11 INCH THICK	SQYD	0	$75.00	10%	$0.00
0500	0759-0110000F	CONCRETE CURBS, STANDARD CURB	FOOT	0	$20.00	15%	$0.00
0510	0759-0106000F	CONCRETE CURBS, LOW PROFILE MOUNTABLE CURB	FOOT	0	$16.00	15%	$0.00
0520	0759-0122000J	CONCRETE ISLANDS	SQFT	0	$8.50	15%	$0.00
0530	0759-0128000J	CONCRETE WALKS	SQFT	0	$6.00	15%	$0.00
0540	0759-0154000E	EXTRA FOR NEW SIDEWALK RAMPS	EA	0	$2,500.00	15%	$0.00
0550	0759-0510000E	TRUNCATED DOMES ON NEW SURFACES	EA	0	$500.00	15%	$0.00
					Subtotal		**$0.00**
800 - PERMANENT TRAFFIC SAFETY AND GUIDANCE DEVICES							
0560	0810-0129000E	GUARDRAIL TERMINALS, NON-FLARED	EA	0	$2,500.00	10%	$0.00
0570	0810-0146000F	31 INCH GUARDRAIL, TYPE 2A	FOOT	0	$22.00	10%	$0.00
0580	0810-0146000F	31 INCH GUARDRAIL, TYPE 3	FOOT	0	$55.00	10%	$0.00
0590	0811-0102000F	CABLE BARRIER, TEST LEVEL 4	FOOT	0	$12.00	10%	$0.00
0600	0820-0100000F	CONCRETE BARRIER	FOOT	0	$55.00	10%	$0.00
0610	0820-0127000F	CONCRETE BARRIER, TALL	FOOT	0	$65.00	10%	$0.00
0620	0830-0125000E	IMPACT ATTENUATOR	EA	0	$30,000.00	10%	$0.00
0630	08XX-	PAVEMENT MARKING	LF	0	$2.00	10%	$0.00
					Subtotal		**$0.00**
900 - PERMANENT TRAFFIC CONTROL AND ILLUMINATION SYSTEMS							
0640	09XX-	SIGNING	LS	1	$0.00	10%	$0.00
0650	0930-0101000A	TRUSS SIGN BRIDGE	EA	0	$350,000.00	10%	$0.00
0660	0930-0104000A	MONOTUBE CANTILEVER SIGN STRUCTURE	EA	0	$200,000.00	10%	$0.00
0670	0930-0105000A	BRIDGE STRUCTURE MOUNTS	LS	1	$0.00	10%	$0.00
0680	0970-	ILLUMINATION	LS	1	$0.00	15%	$0.00
0690	0990-0101000A	TRAFFIC SIGNAL INSTALLATION	EA	0	$350,000.00	10%	$0.00
0700	0990-0102000A	TRAFFIC SIGNAL MODIFICATION	EA	0	$50,000.00	10%	$0.00
0710	0990-	DETECTOR INSTALLATION	EA	0	$70,000.00	10%	$0.00
0720	0990-0104000A	RAMP METER SIGNAL INSTALLATION	EA	0	$200,000.00	10%	$0.00
0730	0990-9Z90000A	TELECOMMUNICATIONS, (FIBER)	LS	1	$0.00	10%	$0.00
					Subtotal		**$0.00**
910 - NB ATM/VMS IMPROVEMENTS							
0740	0990-9Z90000A	MP 0.6 - VMS & ADVISORY SPEED	LS	1	$780,000.00	10%	$858,000.00
0750	0990-9Z90000A	MP 3.2 - ADVISORY SPEED	LS	1	$220,000.00	10%	$242,000.00
0760	0990-9Z90000A	MP 4.1 - FULL VMS	LS	1	$615,000.00	10%	$676,500.00
0770	0990-9Z90000A	MP 7.7 - VMS & ADVISORY SPEED	LS	1	$690,000.00	10%	$759,000.00
0780	0990-9Z90000A	MP 8.5 - ADVISORY SPEED	LS	1	$0.00	10%	$0.00
					Subtotal		**$2,535,500.00**
920 - SB ATM/VMS IMPROVEMENTS							
0790	0990-9Z90000A	MP 11.7 - REPLACE EXTG VMS	LS	1	$275,000.00	10%	$302,500.00
0800	0990-9Z90000A	MP 10.2 - VMS & ADVISORY SPEED	LS	1	$325,000.00	10%	$357,500.00
0810	0990-9Z90000A	MP 8.5 - ADVISORY SPEED	LS	1	$0.00	10%	$0.00
					Subtotal		**$660,000.00**
1000 - RIGHT OF WAY DEVELOPMENT AND CONTROL							
0820	1012-	WATER QUALITY	LS	1	$0.00	10%	$0.00
0830	1012-	DETENTION	LS	1	$0.00	10%	$0.00
0840	1030-0101000R	WEED CONTROL	ACRE	0	$3,500.00	10%	$0.00
0850	1030-0108000R	PERMANENT SEEDING	ACRE	0	$3,600.00	10%	$0.00
0860	1040-	LANDSCAPING	LS	1.0%	$31,955.00	0%	$31,955.00
					Subtotal		**$31,955.00**
SUBTOTAL FOR CONSTRUCTION W/O ENGINEERING, CONTINGENCIES OR ANTICIPATED ITEMS							**$3,810,633.75**
		UNKNOWNS CONTINGENCIES (idependent of design contingencies above)	LS		15%		$571,595.06
					Subtotal		**$571,595.06**
SUBTOTAL FOR CONSTRUCTION W/O ANTICIPATED ITEMS							**$4,382,228.81**
					AGGREGATE CONTINGENCY		**$862,095.06**
ANTICIPATED ITEMS							
		ANTICIPATED ITEMS	LS	1.0%	$31,955.00	0%	$31,955.00
		ENVIRONMENTAL MITIGATION	LS	0.5%	$15,977.50	0%	$15,977.50
		CONSTRUCTION ENGINEERING (CE)	LS	10.0%	$438,222.88	0%	$438,222.88
					Subtotal		**$486,155.38**
SUBTOTAL FOR CONSTRUCTION (CURRENT DOLLARS)							**$4,868,384.19**
					2017.5		
CONSTRUCTION YEAR COST INCLUDING INFLATION (TO MIDPOINT OF OF CONSTRUCTION)					**2020.5**	**3.00%**	**$5,300,000.00**
POTENTIAL COST FOR MEGA PROJECT (TO MIDPOINT OF CONSTRUCTION, INCLUDES ECONOMY OF SCALE)							**$5,088,000.00**

Appendix E. Phasing Alternatives Evaluation Table

January 5, 2018

Phasing Alternatives Evaluations Table

Phasing Alternatives Evaluations Table Most Negative (- -); Neutral = O; Most Positive (+ +)						
Phasing Alternatives Evaluated	1 Minimize initial project cost	2 Maximize construction ease, work zone safety, and traffic mobility	3 Achieve early operational and/or safety improvements	4 Enhanced quality for Abernethy Bridge & rock removal	5 Minimize construction duration	6 Maximize Oregon-based contractor participation
Alternative 1 (Dismissed): Single, fast mega-project	-	+ +	+	o	+ +	- -
 **DBB – 1 Bundle Phasing** 	Notes associated with above criteria: 1. Very limited pool of large, out-of-state Prime contractors without ODOT experience results in high bids and few bidders 2. Worksite control is easier with a single contractor 3. Able to prioritize work to achieve early operational and safety improvements 4. Limited opportunity to obtain specialty subcontractors 5. Shortest construction duration (completed by July, 2024) 6. No single OR contractor has enough contracting capacity Other notes: • Interim completion dates are easy to implement					
Alternative 2 (Dismissed): Maximum staggering	- -	- -	-	+	- -	+
 **DBB – 4 Bundle Phasing** 	Notes associated with above criteria: 1. Significant work overlap significantly increases cost risks 2. Very difficult worksite control with 4 overlapping contractors 3. Difficult to achieve early operational and safety benefits 4. Good opportunity to obtain specialty subcontractors 5. Long construction duration (completed by July, 2025) 6. Good packaging for OR contractors' skills and capacities Other notes: • Minimizes contractor delay risks					
Alternative 3 (Dismissed): Staggered work type and location phasing	-	-	-	+	- -	+
 **DBB – 5 Bundle Phasing** 	Notes associated with above criteria: 1. Limited pool of large, out-of-state prime contractors without ODOT experience results in high bids and few bidders; complex construction staging between contractors increases costs 2. Very difficult worksite control with 3 overlapping contractors 3. Difficult to achieve early operational and safety benefits 4. Good opportunity to obtain specialty subcontractors 5. Very long construction duration (completed by July, 2026) 6. Good packaging for OR contractors' skills and capacities					
Alternative 4 (Dismissed): Phased by work-type	o	-	-	+	-	+
 **DBB – 5 Bundle Phasing** 	Notes associated with above criteria: 1. Significant work area overlap increases cost despite work-type efficiencies; rock surplus requires haul-off vs reuse (higher costs) 2. Fair worksite control with 3 staggered contractors; 1-year of construction overlap 3. Difficult to achieve early operational and safety benefits 4. Good opportunity to obtain specialty subcontractors 5. Long construction duration (completed by July, 2025) 6. Good packaging for OR contractors' skills and capacities Other notes: • Design-Build compatible for Bundle D • Early work potential with ATM bundle					

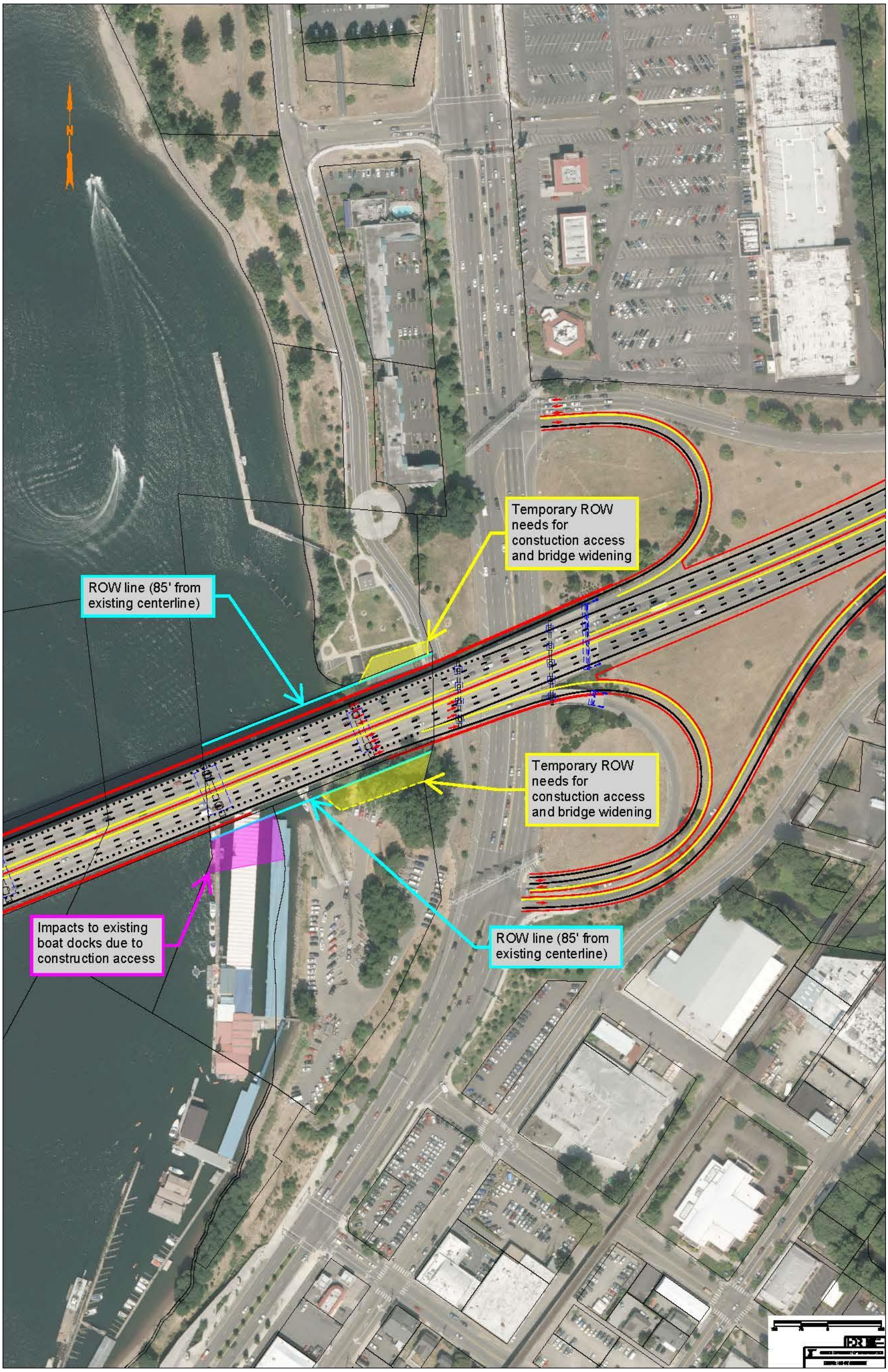
Phasing Alternatives Evaluations Table Most Negative (- -); Neutral = O; Most Positive (+ +)						
Phasing Alternatives Evaluated	1 Minimize initial project cost	2 Maximize construction ease, work zone safety, and traffic mobility	3 Achieve early operational and/or safety improvements	4 Enhanced quality for Abernethy Bridge & rock removal	5 Minimize construction duration	6 Maximize Oregon-based contractor participation
Alternative 5 (Dismissed): Early operations	+	o	+ +	+ +	+	+
 **DBB – 4 Bundle Phasing**	Notes associated with above criteria: 1. Minimal work overlap decreases cost; cost optimized due to balance of "economy of scale" and number of bidders 2. Fair worksite control with 3 staggered contractors; small amounts of construction overlap 3. Achieves early operational improvements (by end of 2021) 4. Good opportunity to obtain specialty subcontractors 5. Long construction duration (completed by July, 2024) 6. Good packaging for OR contractors' skills and capacities Other notes: • Design-Build compatible for Bundle D • Early work potential with ATM bundle					
Recommended Alternative 6: Lowest cost and early operations	+ +	+	+ +	+	+	+
 **3 Bundle Phasing**	Notes: 1. Low cost by balancing of "economy of scale" with bidder quantity 2. Minimizes contractor work zone overlap 3. Achieves early operational improvements (by end of 2021) 4. Very limited throw-away work and avoids contractor overlap 5. Long construction duration (completed by July, 2024) 6. Good packaging for OR contractors' skills and capacities Offers flexibility for: • Scalable scope (if full funding is not provided) • Implementing Design-Build (west of 10th Street, if desired) • Supports ODOT's DMWESB goals for all bundles • Early work potential with ATM bundle • Includes all benefits of Alternative 5 plus additional benefits					

Appendix F. Recommended Alternative – Project Element Roll Map

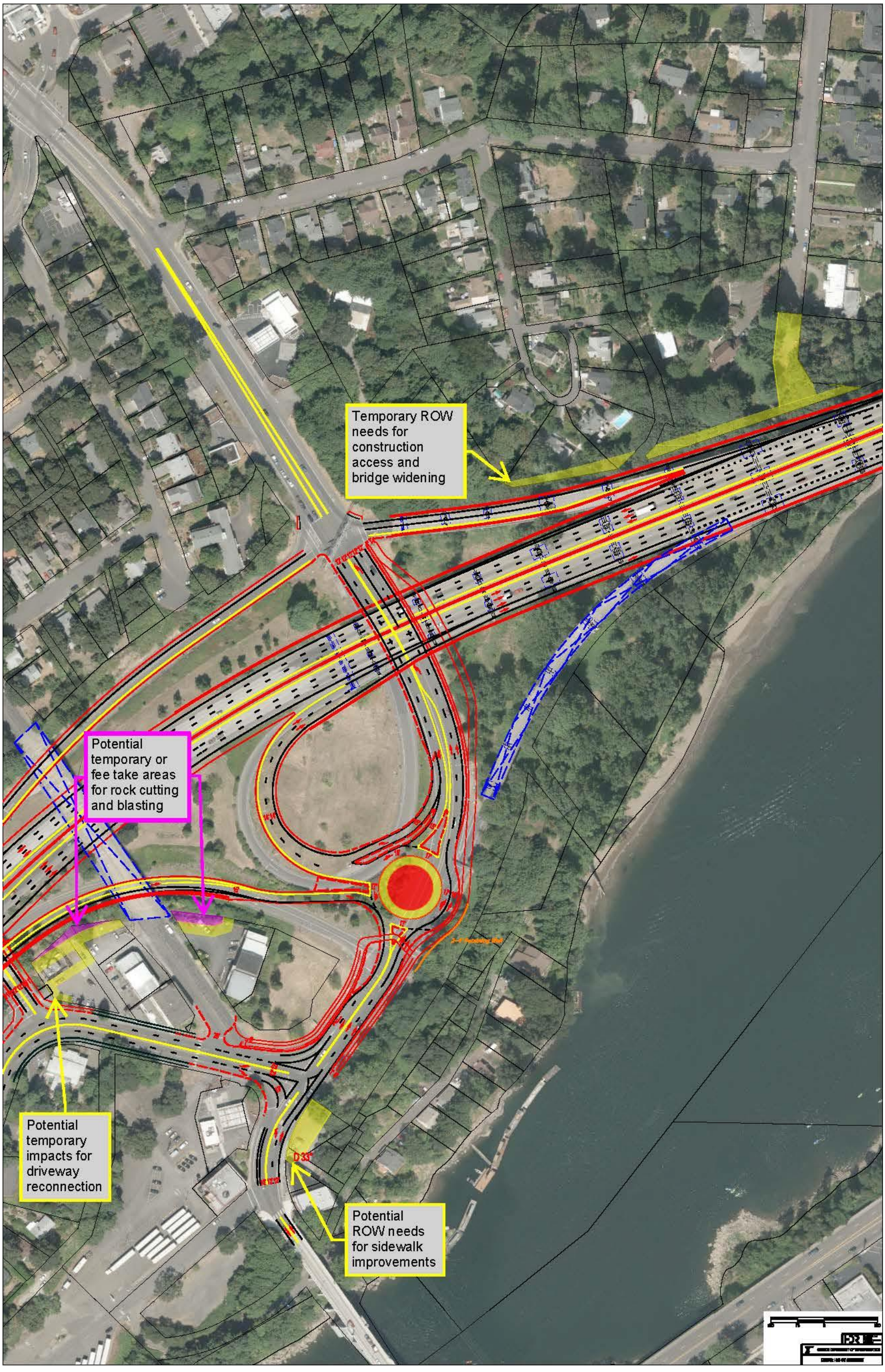
(See additional attachment)

Appendix G.
ROW Impacts Map

Conceptual ROW Impacts Map – OR 99E



Conceptual ROW Impacts Map – OR 43



Appendix H. Recommended Alternative – Supporting Roadway Graphics *Typical Section Renderings*

January 5, 2018

I-205 View South of Overlook – Current View

I-205 View South of Overlook – Future View

I-205 View NB of Woodbine Road – Current View

I-205 View NB of Woodbine Road – Future View

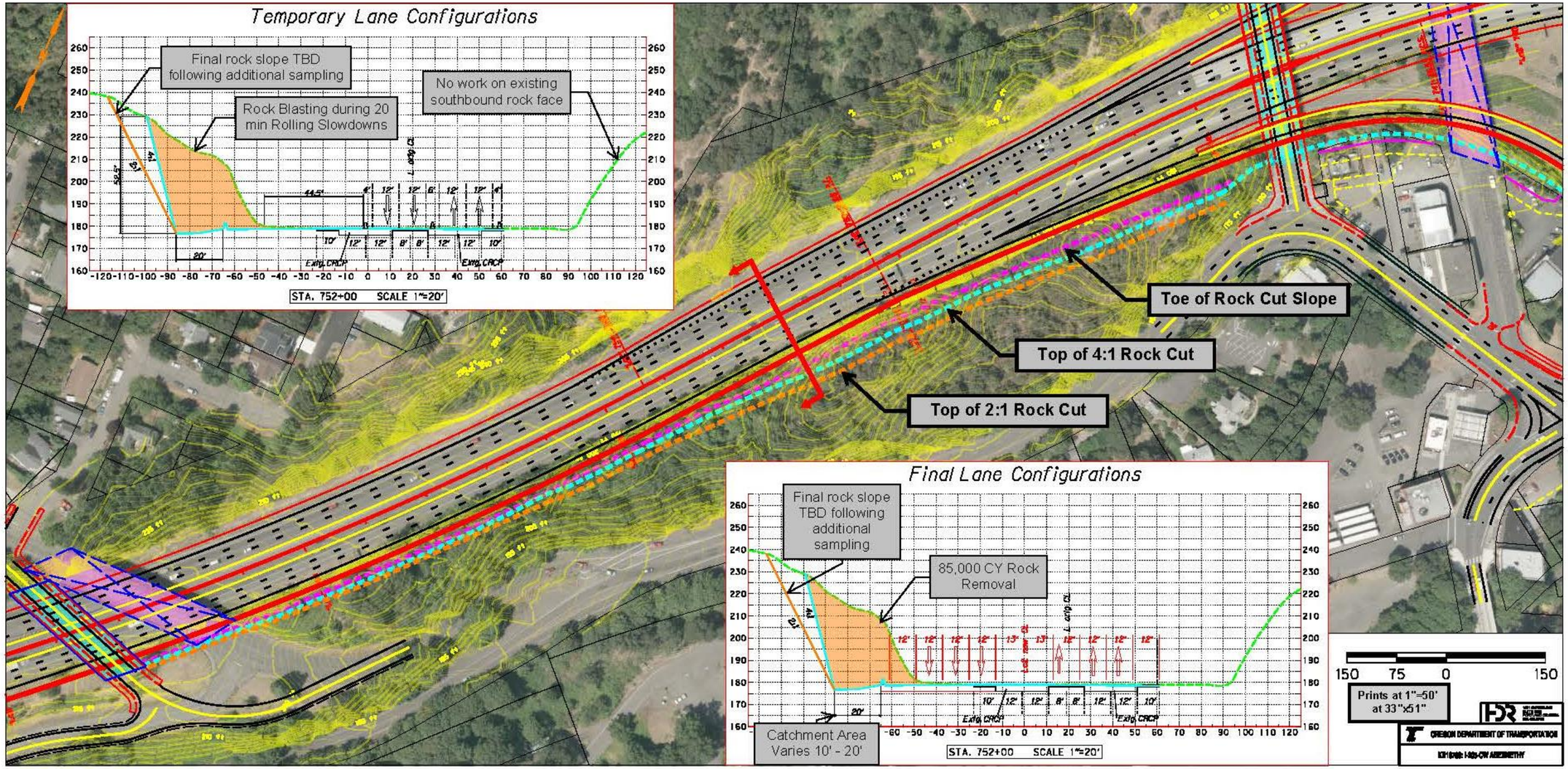
I-205 View NB Towards Tualatin River Bridge – Current View

I-205 View NB Towards Tualatin River Bridge – Future View

Appendix I. Recommended Alternative – Supporting Roadway Graphics *Rock Cut Limits*

January 5, 2018

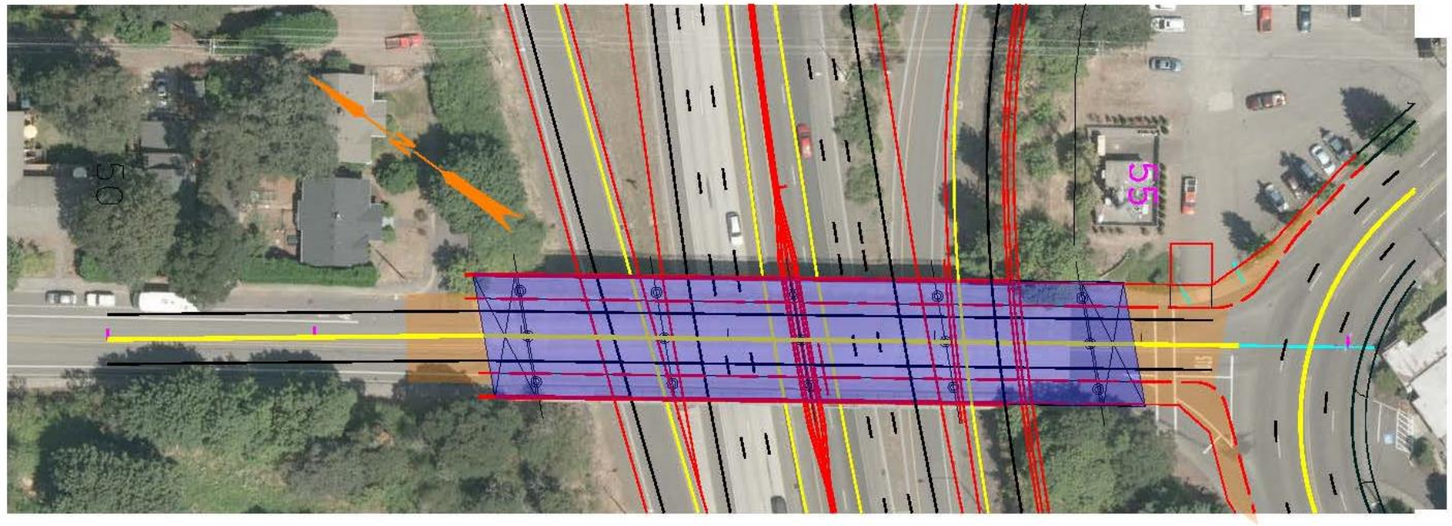
Rock Cut Area – Final Configuration

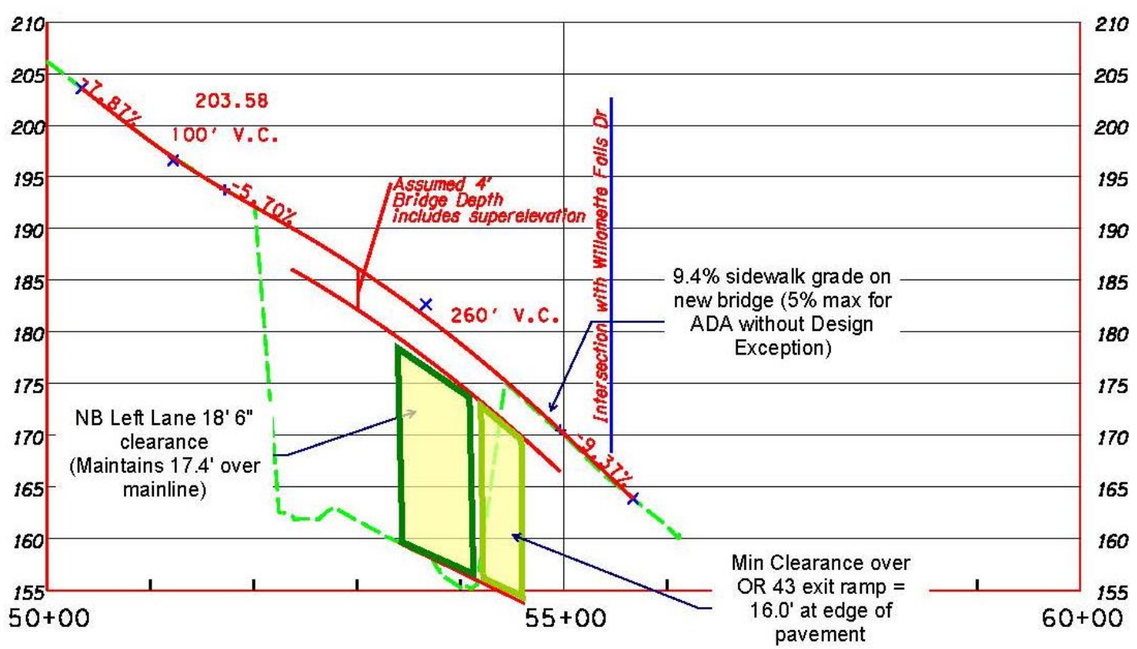


Appendix J. Recommended Alternative – Supporting Roadway Graphics *West A Street Bridge Replacement Details*

January 5, 2018

West A Street Plans and Profile View



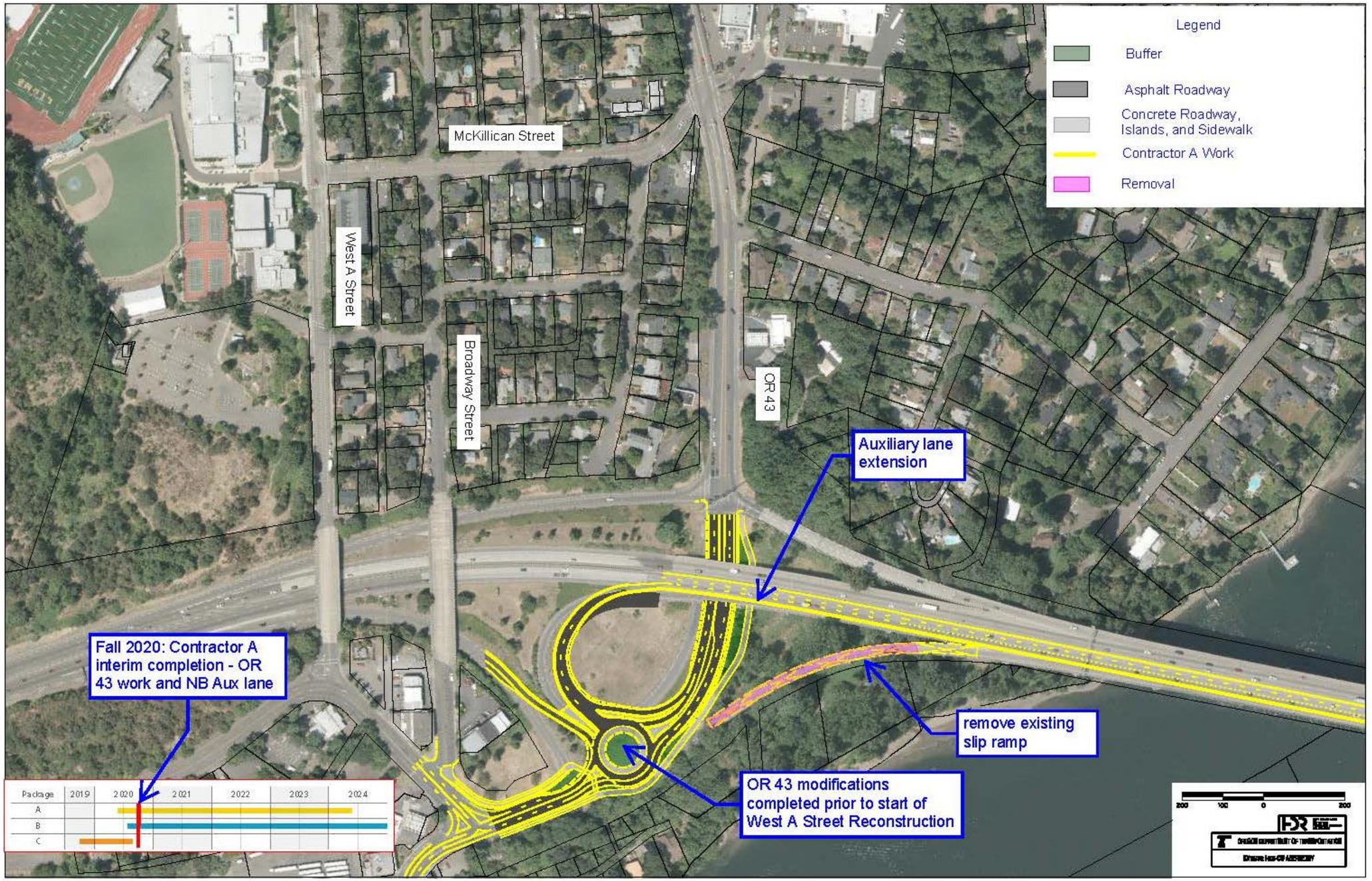


Existing Vertical Clearance at West A (Northbound):
Left Lane = 17' 11"
Right Lane = 17' 6"
Off Ramp = 17' 5"

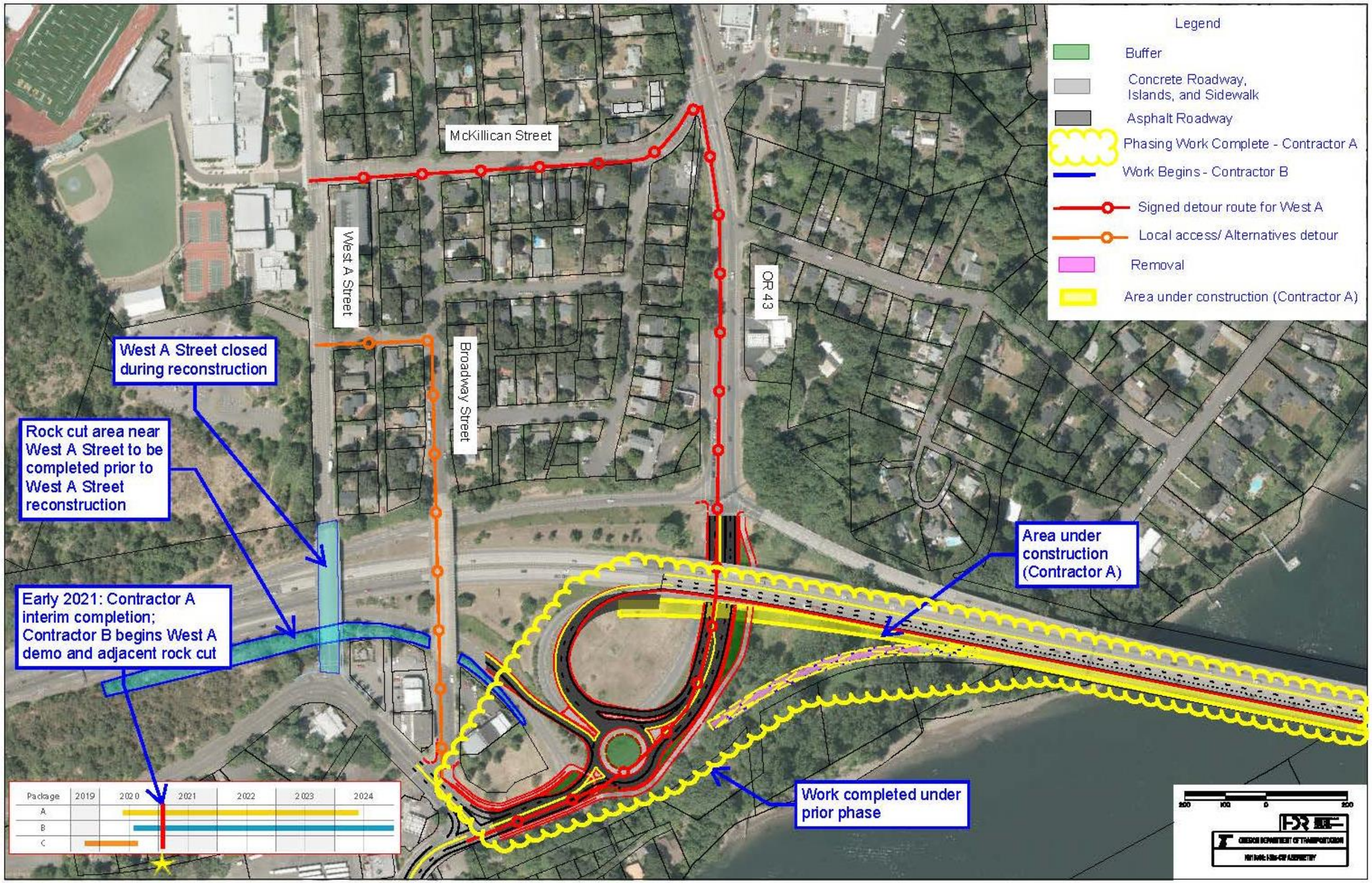
Proposed Vertical Clearance at West A:
Left Lane (new) = 18' 6"
Middle lane = 18' 1"
Right lane = 17' 9"
Off Ramp (lane) = 16' 5"

--- Proposed bent location
— · Existing bent location
Clearances include an assumed 9" CRCP overlay

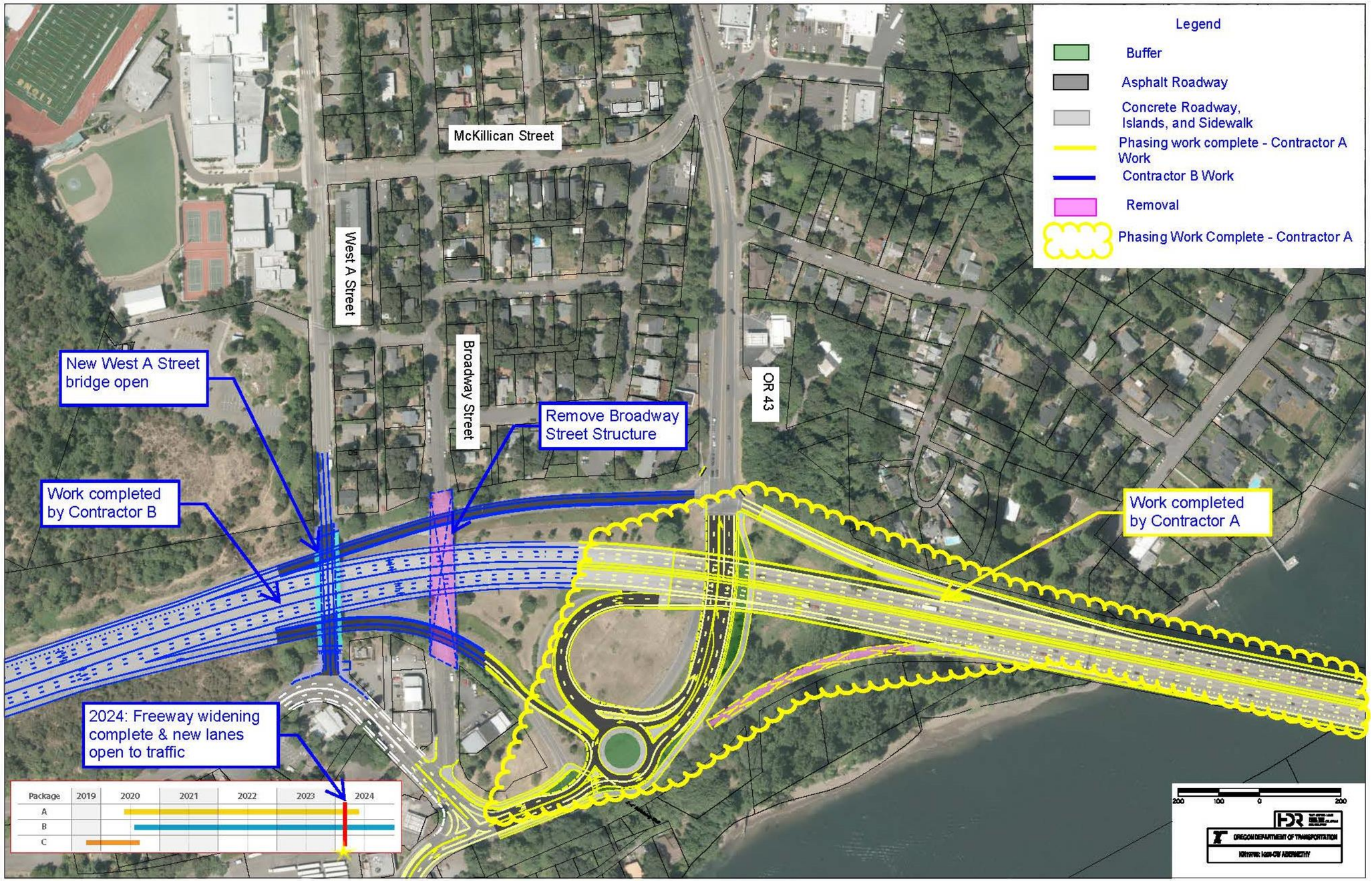
OR 43 and West A Street Bridge Construction Phasing – Phase 1 of 3.



OR 43 and West A Street Bridge Construction Phasing – Phase 2 of 3.

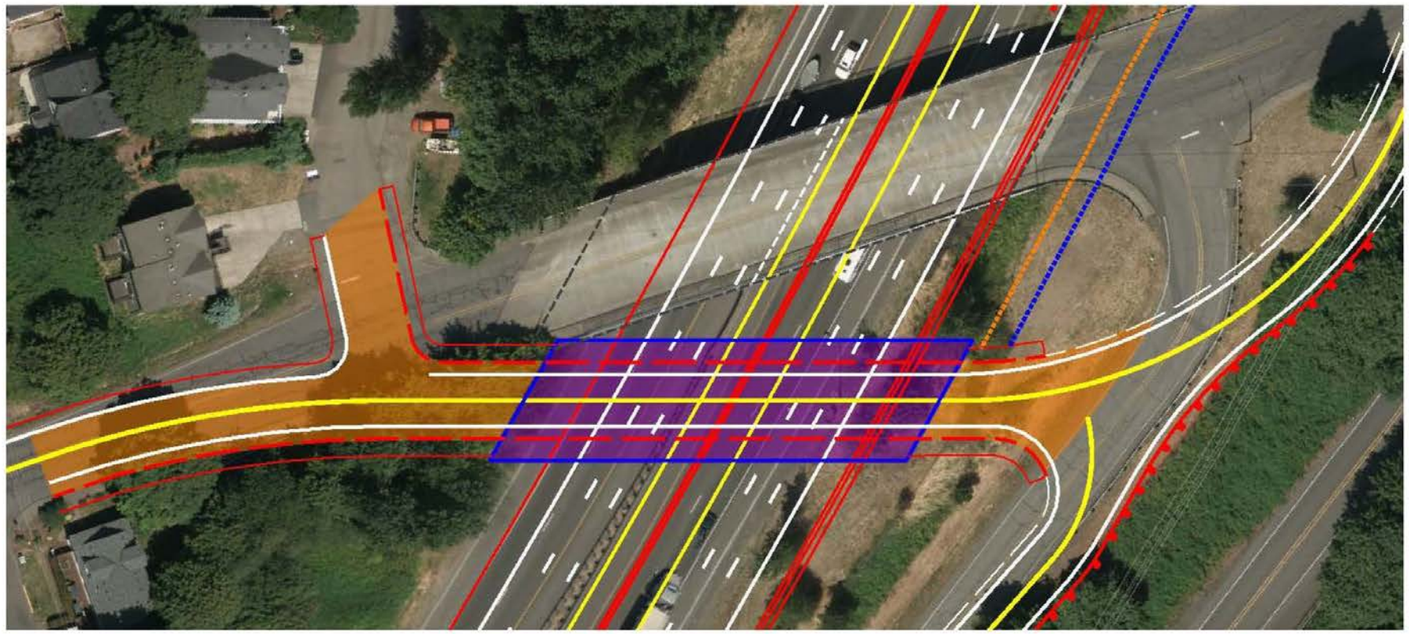


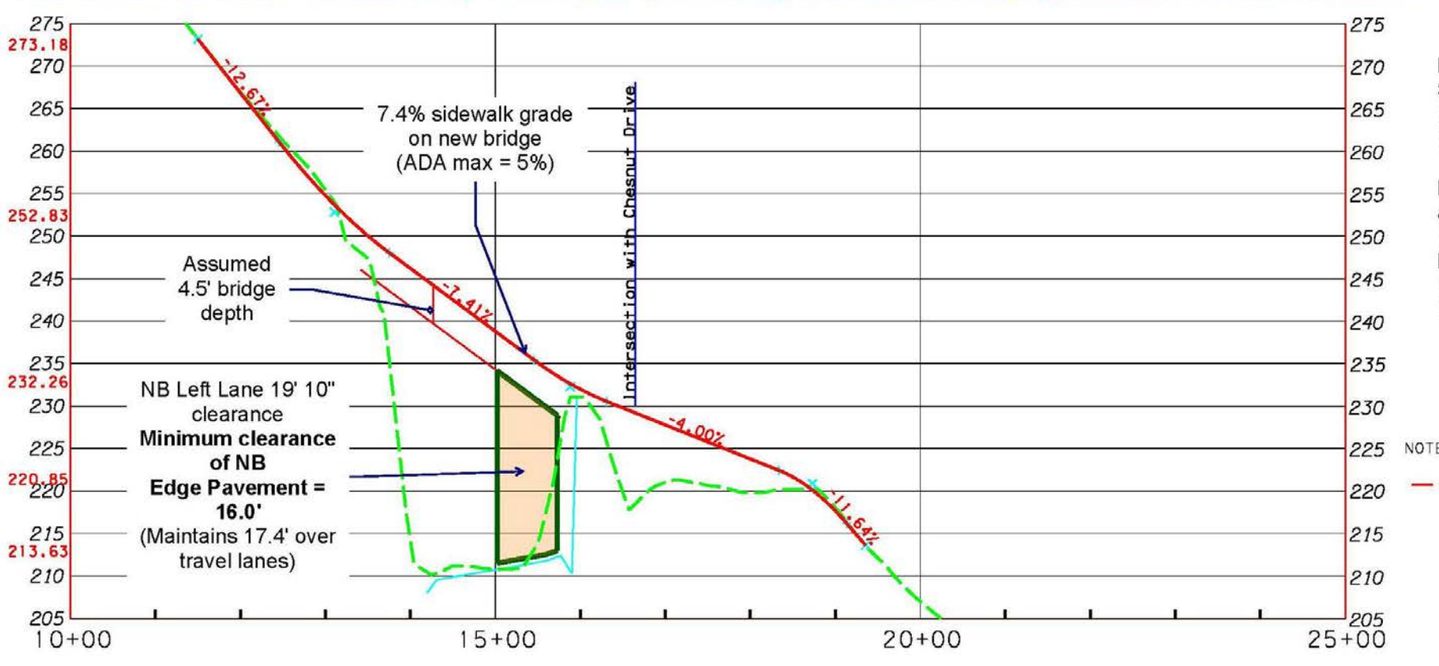
OR 43 and West A Street Bridge Construction Phasing – Phase 3 of 3.



Appendix K. Recommended Alternative – Supporting Roadway Graphics *Sunset Avenue Bridge Replacement Details*

Sunset Avenue Plans and Profile View





Existing Vertical Clearance at Sunset (Northbound):
Left Lane = 20' 6"
Right Lane = 19' 3"

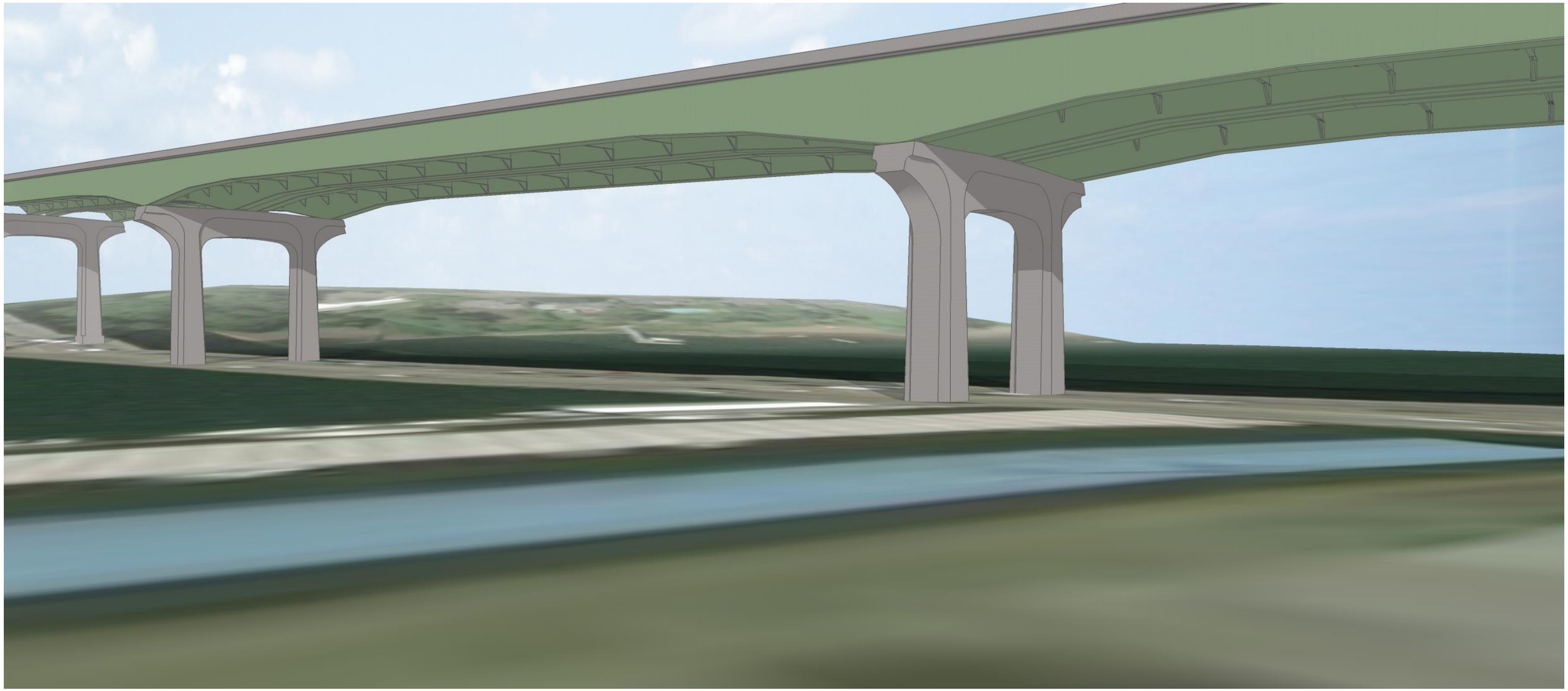
Proposed Vertical Clearance at Sunset:
Left Lane (new) = 19' 10"
Middle lane = 18' 6"
Right lane = 17' 4"
Right Edge of Pavement = 16'

NOTE - Clearances include an assumed 9" CRCP overlay.
Proposed bent location

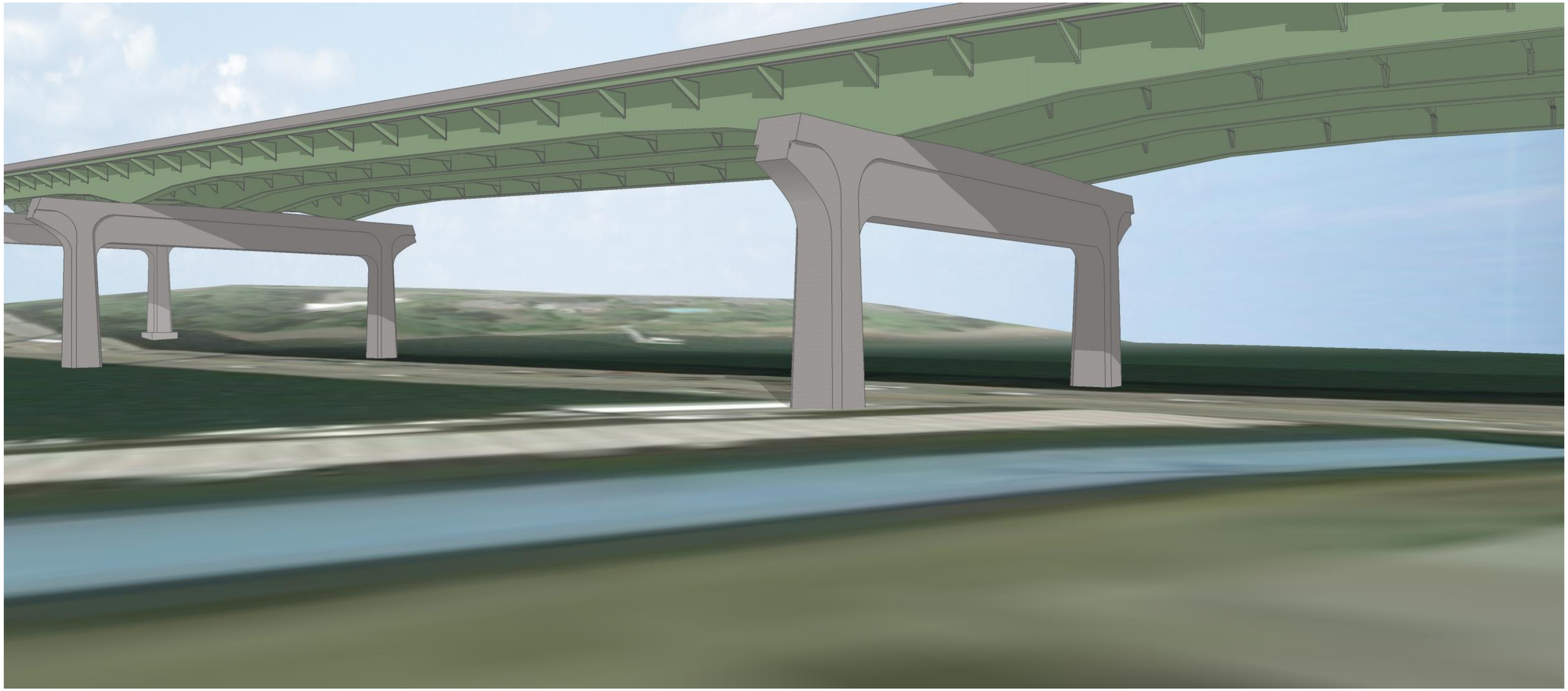
Appendix L. Recommended Alternative – Supporting Abernethy Bridge Graphics

January 5, 2018

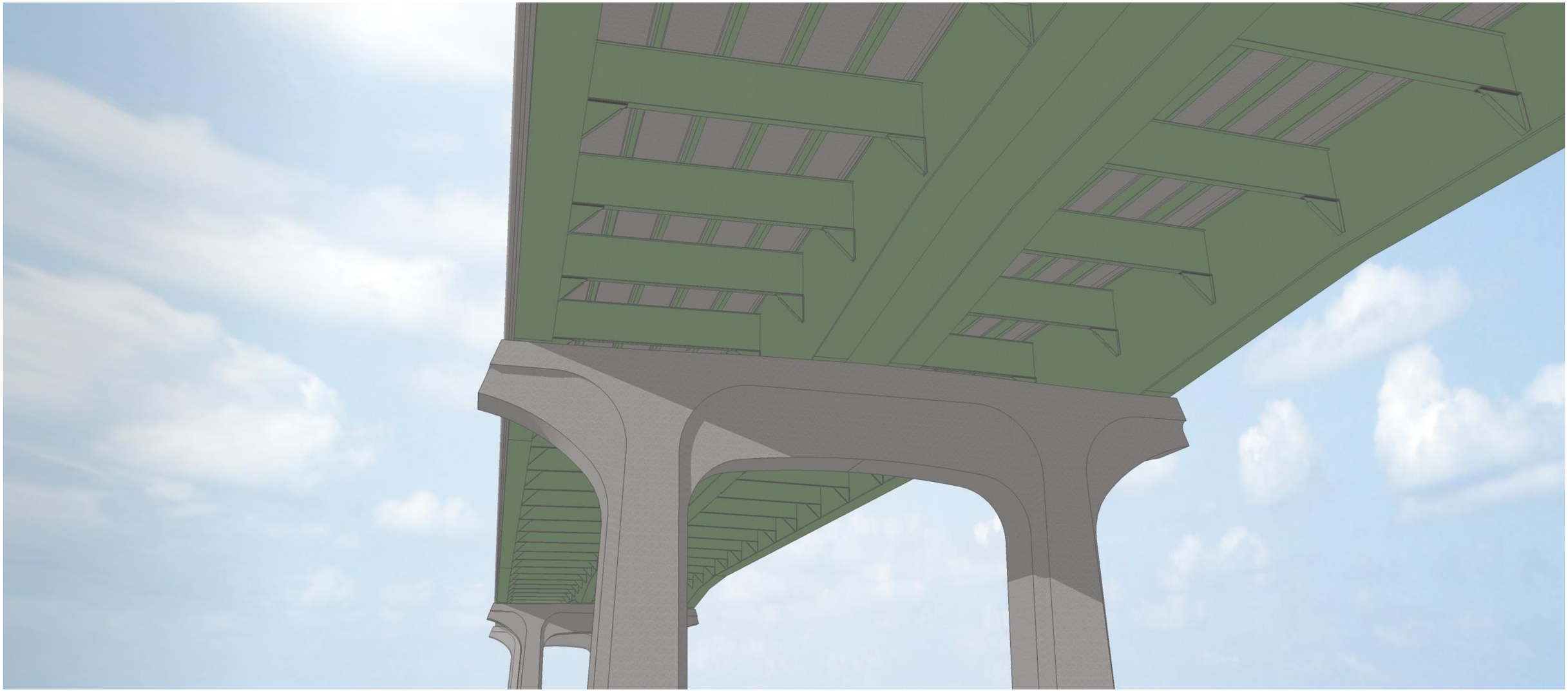
Abernethy Bridge – View 1 – Current View



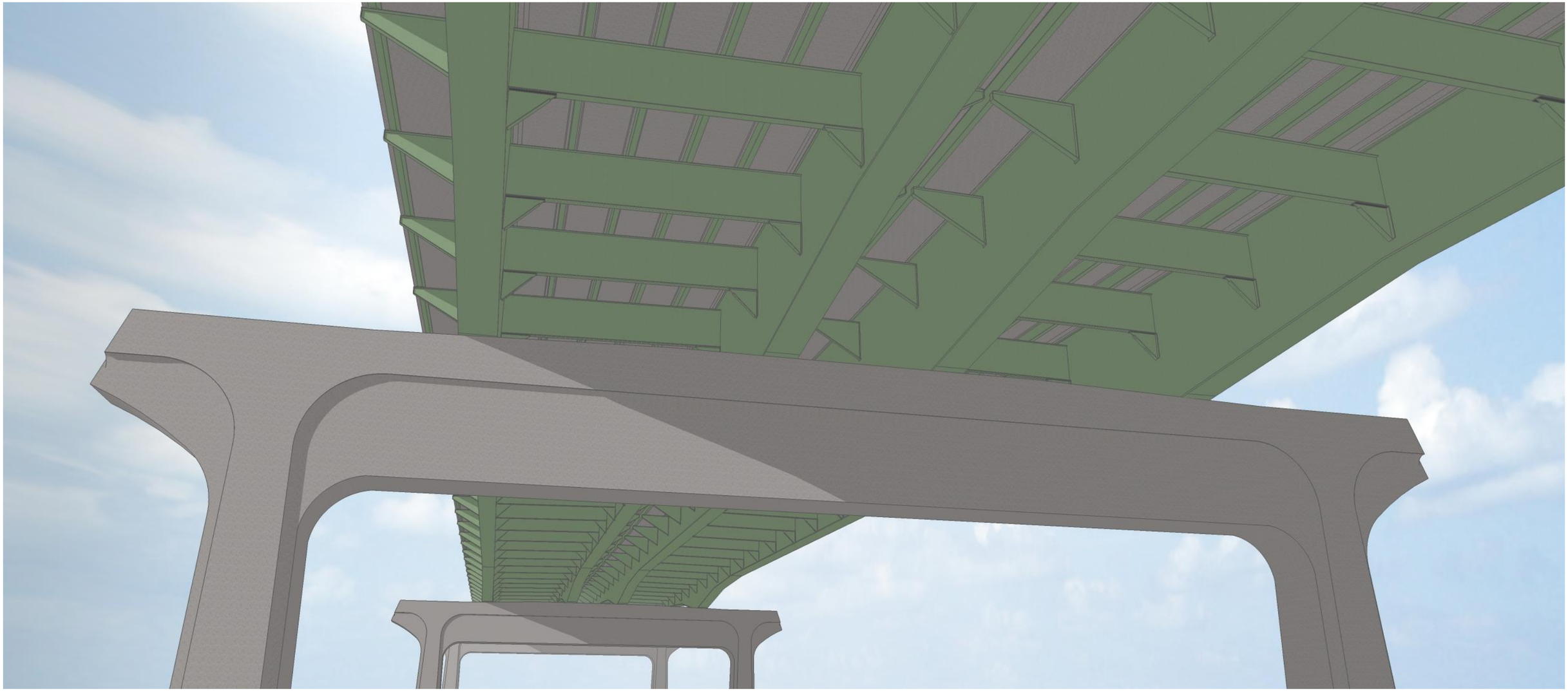
Abernethy Bridge – View 1 – Future Widening and Pier Replacement



Abernethy Bridge – View 2 – Current View



Abernethy Bridge – View 2 – Future Widening and Pier Replacement

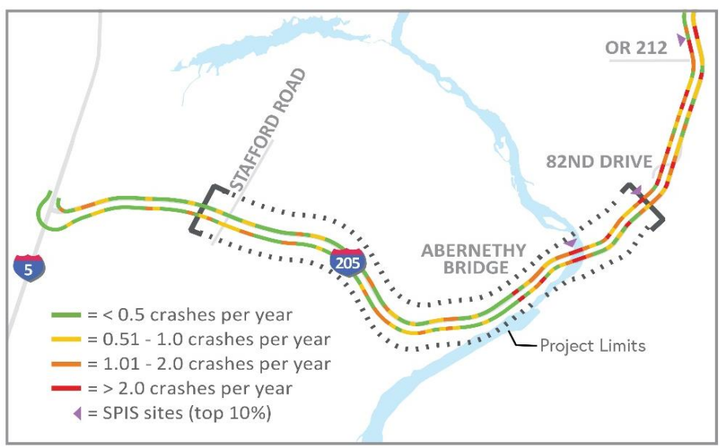


Appendix M. Recommended Alternative – Traffic Operational Improvements

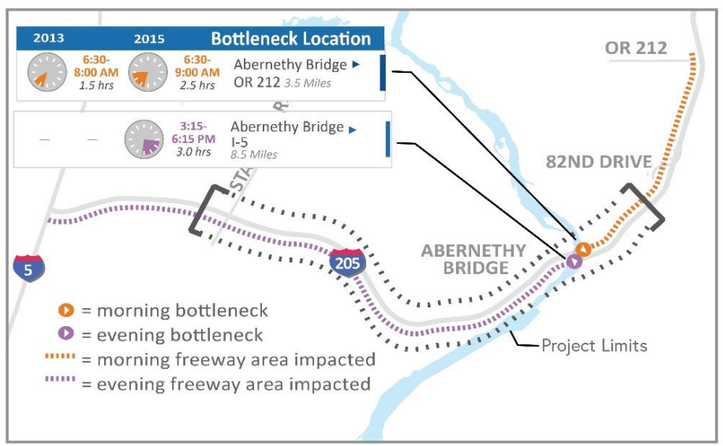
January 5, 2018

Existing bottlenecks and Project solutions

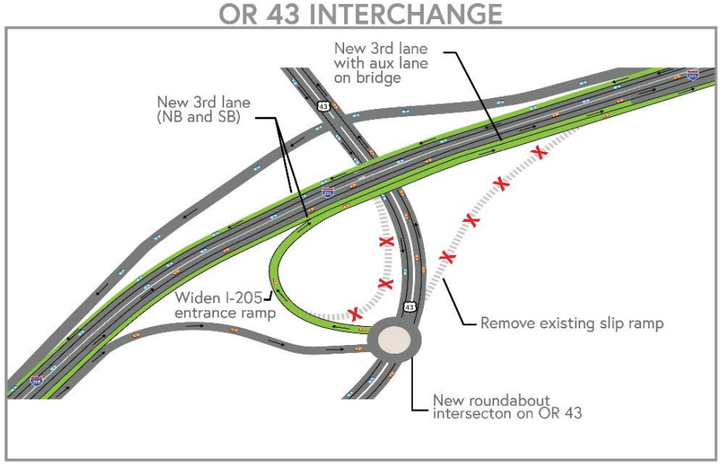
EXISTING CRASH FREQUENCY PER 10TH OF A MILE



EXISTING BOTTLENECK LOCATIONS AND DURATIONS



PROPOSED I-205 IMPROVEMENTS AT OR 43 INTERCHANGE



Appendix N. Stormwater and Contaminated Materials Storage Roll Map

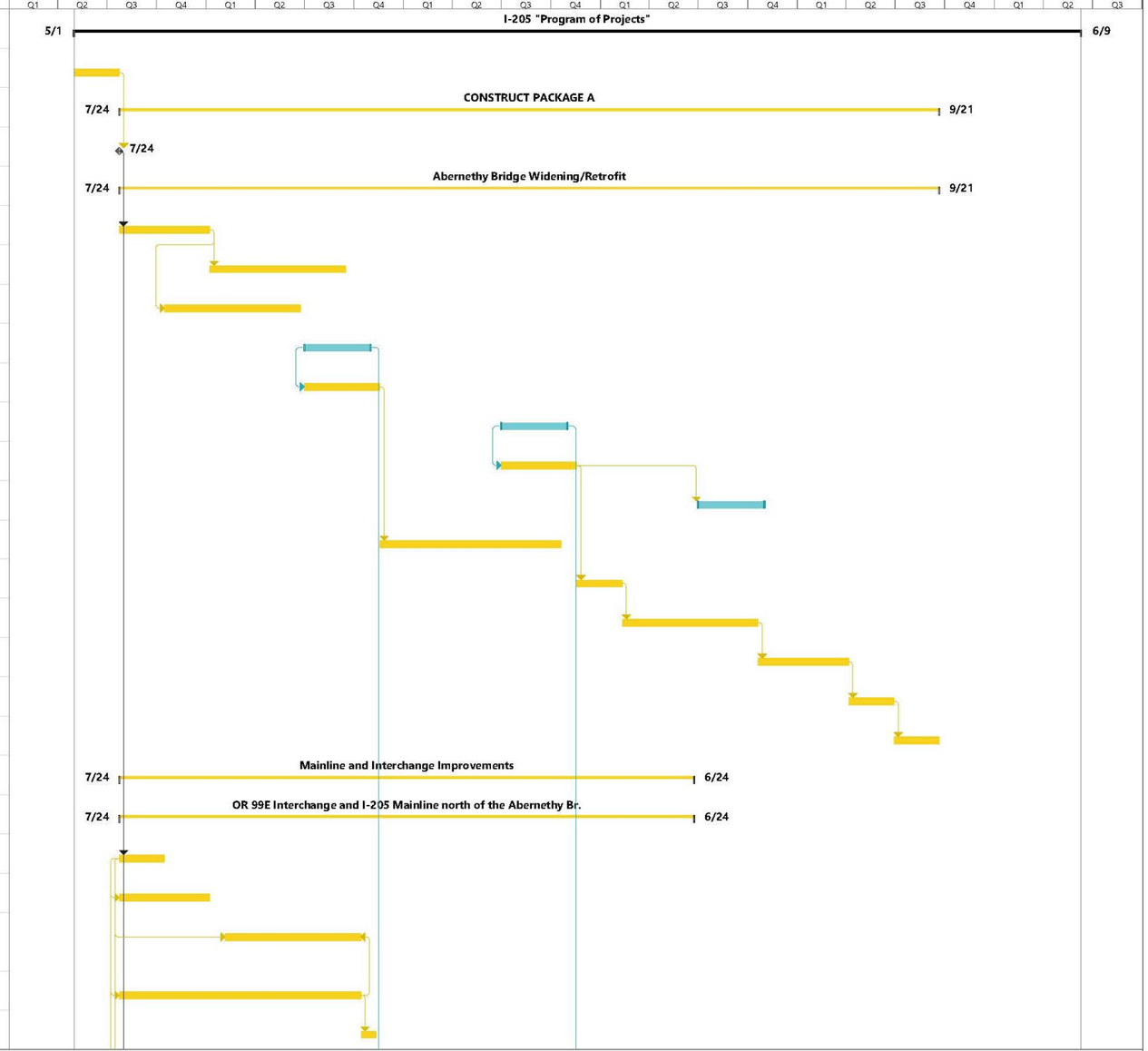
(See additional attachment)

Appendix O. Recommended Alternative – Detailed Schedule

Detailed Project Construction Schedule

Construction Schedule
Combined Interstate 205 Abernethy Bridge and Widening Project

ID	Task Name	Duration	Start	Finish
1	**I-205 "Program of Projects"**	**66.66 mons**	**Wed 5/1/19**	**Sun 6/9/24**
2	Bid, Award, and Mob	3 mons	Wed 5/1/19	Wed 7/24/19
3	**CONSTRUCT PACKAGE A**	**54.29 mons**	**Wed 7/24/19**	**Thu 9/21/23**
4	Construction NTP	0 mons	Wed 7/24/19	Wed 7/24/19
5	**Abernethy Bridge Widening/Retrofit**	**54.29 mons**	**Wed 7/24/19**	**Thu 9/21/23**
6	Begin approach span foundation work	6 mons	Wed 7/24/19	Wed 1/8/20
7	Complete OR 43 NB entrance gore widening and closure pour	9 mons	Wed 1/8/20	Wed 9/16/20
8	Complete OR 99 NB exit gore widening and closure pour	9 mons	Wed 10/16/19	Wed 6/24/20
9	In-water work (IWW): Build work bridges and coffer dams	4.37 mons	Wed 7/1/20	Sat 10/31/20
10	Pier 3 foundation improvements	5 mons	Wed 7/1/20	Wed 11/18/20
11	IWW: Build/Remove work bridges and coffer dams (2nd season)	4.37 mons	Thu 7/1/21	Sun 10/31/21
12	Complete remaining foundation improvements	5 mons	Thu 7/1/21	Thu 11/18/21
13	IWW: Remove Temp Work Bridge and coffer dams	4.37 mons	Fri 7/1/22	Mon 10/31/22
14	Widen approach spans	12 mons	Wed 11/18/20	Wed 10/20/21
15	Complete Columns & Cap and complete Transverse Slide under successive weekends	3 mons	Thu 11/18/21	Thu 2/10/22
16	Outside widening of each main span superstructure	9 mons	Thu 2/10/22	Thu 10/20/22
17	Widen main spans in the median	6 mons	Thu 10/20/22	Thu 4/6/23
18	Bridge rail and deck overlay	3 mons	Thu 4/6/23	Thu 6/29/23
19	Final seeding, grading, signing, etc.	3 mons	Thu 6/29/23	Thu 9/21/23
20	**Mainline and Interchange Improvements**	**38.07 mons**	**Wed 7/24/19**	**Fri 6/24/22**
21	**OR 99E Interchange and I-205 Mainline north of the Abernethy Br.**	**38.07 mons**	**Wed 7/24/19**	**Fri 6/24/22**
22	Shift traffic toward median; Begin grading and widening for NB improvements	3 mons	Wed 7/24/19	Wed 10/16/19
23	Full depth pavement rebuild of existing shoulder NB between Abernethy and Main (night or weekend)	6 mons	Wed 7/24/19	Wed 1/8/20
24	Construct temp NB exit ramp at OR99E (includes widening at span 1), rebuild new thru lanes between Abernethy and Main, extend proposed accel lane N of Main.	9 mons	Wed 2/5/20	Wed 10/14/20
25	Widen and Retrofit Main Ave Bridge	16 mons	Wed 7/24/19	Wed 10/14/20
26	Open interim NB 3rd through lane beyond OR 99E	1 mon	Wed 10/14/20	Wed 11/11/20



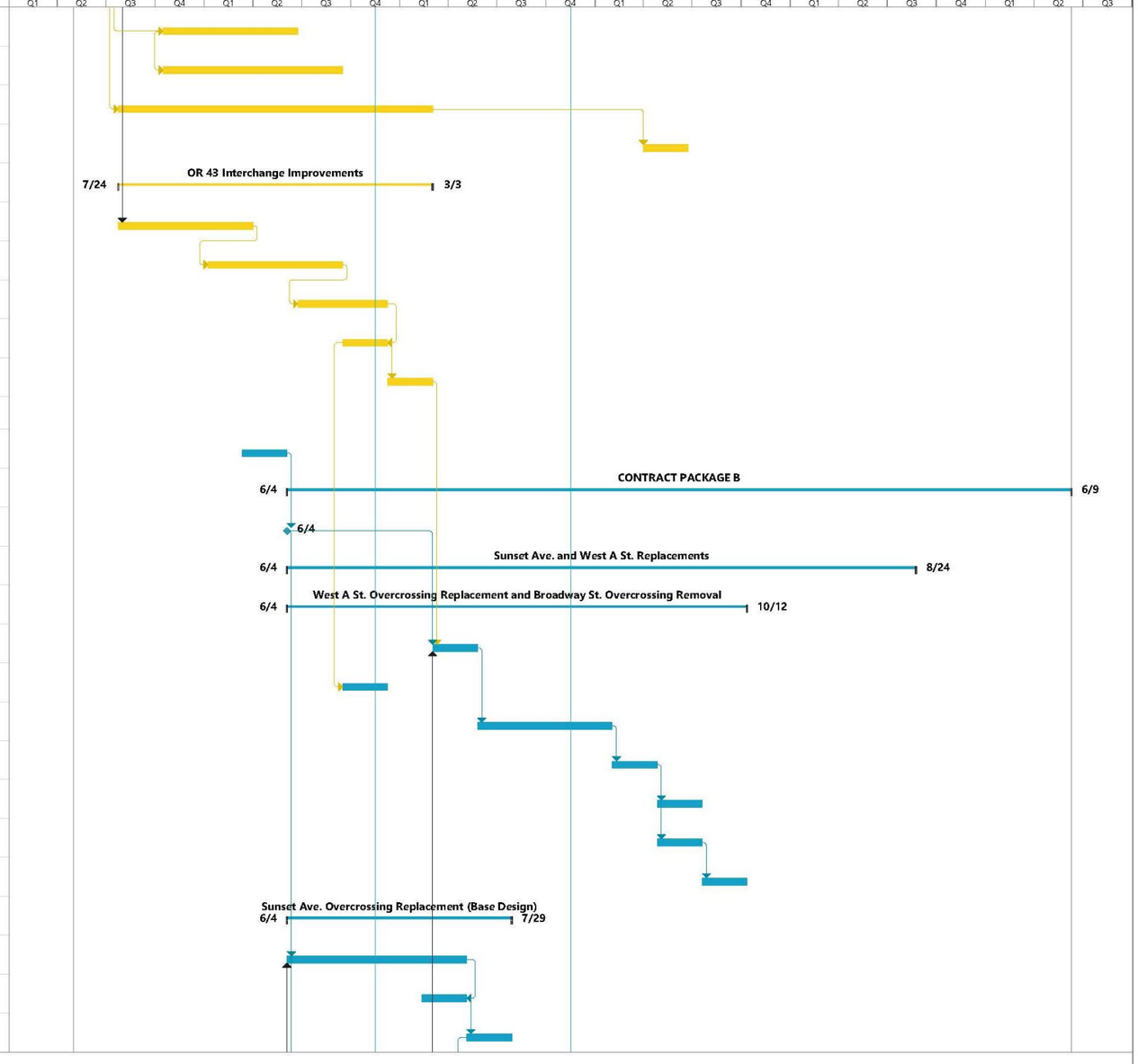
Project: Appendix N_K19786-re
Date: Thu 12/21/17

Task | Summary | Inactive Milestone | Duration-only | Start-only | External Milestone | Manual Progress
Split | Project Summary | Inactive Summary | Manual Summary Rollup | Finish-only | Deadline
Milestone | Inactive Task | Manual Task | Manual Summary | External Tasks | Progress

Page 1

Construction Schedule
Combined Interstate 205 Abernethy Bridge and Widening Project

ID	Task Name	Duration	Start	Finish
27	Construct perm NB exit ramp and widening	9 mons	Wed 10/16/19	Wed 6/24/20
28	Sign structures, drainage, illumination, misc.	12 mons	Wed 10/16/19	Wed 9/16/20
29	All SB work N of Abernethy (will not extend SB lane until Contractor C completes widening)	21 mons	Wed 7/24/19	Wed 3/3/21
30	Top lift paving NB	3 mons	Fri 4/1/22	Fri 6/24/22
31	**OR 43 Interchange Improvements**	**21 mons**	**Wed 7/24/19**	**Wed 3/3/21**
32	Construct new NB entrance loop and OR43 widening under traffic	9 mons	Wed 7/24/19	Wed 4/1/20
33	Complete intersection interim "switch over" to new ramp, remove existing slip ramp	9 mons	Wed 1/8/20	Wed 9/16/20
34	Construct remaining widening along OR43, entrance ramp and remove NB entrance.	6 mons	Wed 6/24/20	Wed 12/9/20
35	Top lift and striping	3 mons	Wed 9/16/20	Wed 12/9/20
36	Final seeding, grading, signing, etc.	3 mons	Wed 12/9/20	Wed 3/3/21
37				
38	Bid, Award and Mob	3 mons	Thu 3/12/20	Thu 6/4/20
39	**CONTRACT PACKAGE B**	**52.37 mons**	**Thu 6/4/20**	**Sun 6/9/24**
40	Construction NTP	0 mons	Thu 6/4/20	Thu 6/4/20
41	**Sunset Ave. and West A St. Replacements**	**42 mons**	**Thu 6/4/20**	**Thu 8/24/23**
42	**West A St. Overcrossing Replacement and Broadway St. Overcrossing Removal**	**30.71 mons**	**Thu 6/4/20**	**Wed 10/12/22**
43	Shift West A St. traffic to Broadway St.; confirm utility relocations; Demolish West A St. Overcrossing	3 mons	Wed 3/3/21	Wed 5/26/21
44	Perform Widening & Crossovers for Temporary Construction (I-205 Mainline)	3 mons	Wed 9/16/20	Wed 12/9/20
45	West A St. Overcrossing Replacement	9 mons	Wed 5/26/21	Wed 2/2/22
46	Confirm all utilities relocations to West A St. complete	3 mons	Wed 2/2/22	Wed 4/27/22
47	Demolish Broadway St. Overcrossing	3 mons	Wed 4/27/22	Wed 7/20/22
48	Complete remaining road approach modifications to West A St. and Broadway St.	3 mons	Wed 4/27/22	Wed 7/20/22
49	Final seeding, grading, signing, etc.	3 mons	Wed 7/20/22	Wed 10/12/22
50	**Sunset Ave. Overcrossing Replacement (Base Design)**	**15 mons**	**Thu 6/4/20**	**Thu 7/29/21**
51	Partial demo of existing; Rebuild Sunset on new alignment	12 mons	Thu 6/4/20	Thu 5/6/21
52	Complete all utlitity relocates	3 mons	Thu 2/11/21	Thu 5/6/21
53	Demolish remainder of existing Sunset Ave. Overcrossing and construct remaining widening	3 mons	Thu 5/6/21	Thu 7/29/21

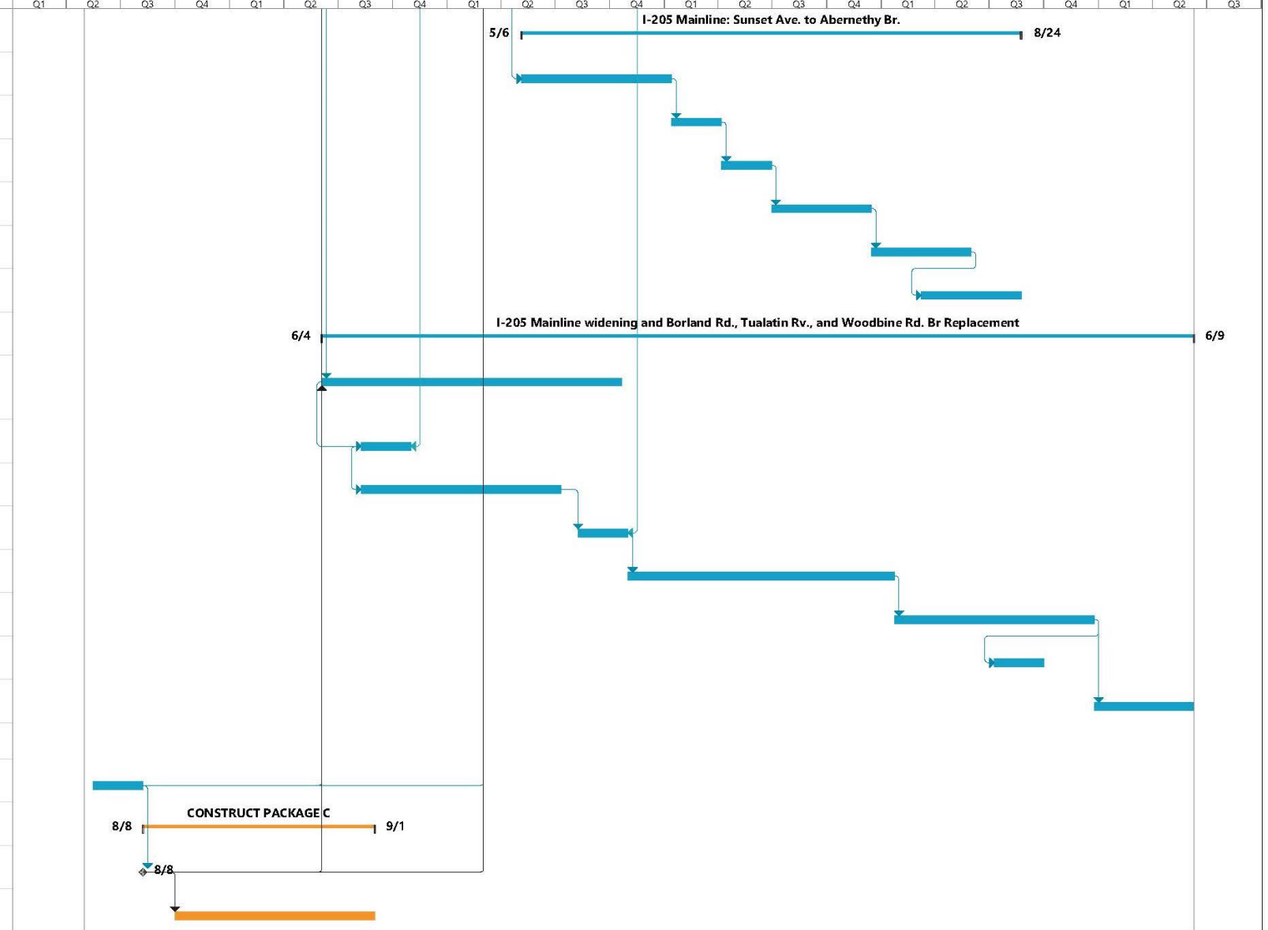


Project: Appendix N_K19786-re
Date: Thu 12/21/17

Task | Summary | Inactive Milestone | Duration-only | Start-only | External Milestone | Manual Progress
Split | Project Summary | Inactive Summary | Manual Summary Rollup | Finish-only | Deadline
Milestone | Inactive Task | Manual Task | Manual Summary | External Tasks | Progress

Construction Schedule
Combined Interstate 205 Abernethy Bridge and Widening Project

ID	Task Name	Duration	Start	Finish
54	**I-205 Mainline: Sunset Ave. to Abernethy Br.**	**30 mons**	**Thu 5/6/21**	**Thu 8/24/23**
55	Rock blasting and removal	9 mons	Thu 5/6/21	Thu 1/13/22
56	Mainline & ramp paving, NB	3 mons	Thu 1/13/22	Thu 4/7/22
57	Mainline paving, median	3 mons	Thu 4/7/22	Thu 6/30/22
58	Winter shut-down	6 mons	Thu 6/30/22	Thu 12/15/22
59	Mainline and ramp paving, SB	6 mons	Thu 12/15/22	Thu 6/1/23
60	Final drainage, striping, signing, barrier, etc.	6 mons	Thu 3/9/23	Thu 8/24/23
61	**I-205 Mainline widening and Borland Rd., Tualatin Rv., and Woodbine Rd. Br Replacement**	**52.37 mons**	**Thu 6/4/20**	**Sun 6/9/24**
62	Begin inside widening NB, both temp pavement and bridge widening. Build temp crossovers (South of Sunset Ave. only). Start Tualatin Rv. work above OHW.	18 mons	Thu 6/4/20	Thu 10/21/21
63	Construct NB Tualatin Rv. And Borland Rd. temp work bridges and IWW containment (if required)	3 mons	Sat 8/8/20	Sat 10/31/20
64	Construct NB Tualatin Rv. And Borland Rd. structures on new alignment	12 mons	Sat 8/8/20	Sat 7/10/21
65	Move both NB and SB traffic to new structure, demo Tualatin Rv. Br. NB & SB and build IWW containment (if required)	3 mons	Sun 8/8/21	Sun 10/31/21
66	Demo and construct SB Borland Rd., Tualatin Rv., and Woodbine Rd. structures; Complete SB widening and CRCP overlay	16 mons	Sun 10/31/21	Sun 1/22/23
67	Shift NB & SB Traffic to widened SB; Overlay NB; Raise structures to match overlay	12 mons	Sun 1/22/23	Sun 12/24/23
68	Remove temp work bridge at Tualatin Rv.	3 mons	Sun 7/9/23	Sun 10/1/23
69	Shift NB and SB traffic to permanent location; Remove temporary striping, finalize drainage, striping, signing, etc.	6 mons	Sun 12/24/23	Sun 6/9/24
70				
71	Bid, Award and Mob	3 mons	Thu 5/16/19	Thu 8/8/19
72	**CONSTRUCT PACKAGE C**	**13.93 mons**	**Thu 8/8/19**	**Tue 9/1/20**
73	Construction NTP	0 mons	Thu 8/8/19	Thu 8/8/19
74	**ATM/ITS**	**12 mons**	**Tue 10/1/19**	**Tue 9/1/20**



Project: Appendix N_K19786-re
Date: Thu 12/21/17

Task	Summary	Inactive Milestone	Duration-only	Start-only	External Milestone	Manual Progress
Split	Project Summary	Inactive Summary	Manual Summary Rollup	Finish-only	Deadline	
Milestone	Inactive Task	Manual Task	Manual Summary	External Tasks	Progress	