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INTRODUCTION

Built in 1962, the I-5 Medford Viaduct is located between Mileposts 28.3 and 28.9, approximately midway between the North and South Medford I-5 interchanges. It is a four-lane, 3,200-foot long structure, which carries I-5 over several streets and Bear Creek adjacent to downtown Medford.

I-5 is a critical north-south freight route on the West Coast between Canada and Mexico. The Medford Viaduct carries approximately 51,000 vehicles on an average weekday with a projected increase to 61,700 vehicles by the year 2040. It also carries approximately 6,000 trucks per day and is projected to carry approximately 7,000 trucks per day in 2040. This forecasted demand is based on the Rogue Valley Metropolitan Planning Organization (RVMPO) travel demand model and not anticipated to exceed the Oregon Highway Plan mobility target of 0.85 until approximately 2065.
TRANSPORTATION PROBLEM STATEMENT

The Medford Viaduct has the following deficiencies:

**Seismic Safety** The Oregon Seismic Lifelines Identification Project (2012) identified the segment of I-5 that includes the Medford Viaduct as part of the Tier 1 Lifeline Route network, which was recommended to receive top priority for seismic upgrade projects to maintain a network of lifeline routes in the event of a major earthquake. The subsequent Oregon Department of Transportation (ODOT) Seismic Plus Report, published in 2014, established phasing for projects to seismically upgrade the entire statewide highway system. The Seismic Plus Report identified the segment of I-5 through Medford as part of the Program Phase 2 network. This means that this segment of I-5 has been identified for seismic upgrades to occur within approximately the next 20 years.

The Medford Viaduct structure does not conform with current structural design codes, which means it may be rendered inoperable after a Cascadia Subduction Zone earthquake or other local seismic event. A Phase I seismic retrofit was performed on the Medford Viaduct in 2003, which only provided retrofit repairs to prevent the bridge deck and girders from moving excessively during an earthquake and shifting off their support columns. The retrofit did not address the substructure’s ability to adequately perform during a seismic event, leaving the overall structure vulnerable.

**Deficient Roadway Cross-Section** The I-5 roadway cross-section on the viaduct does not meet current roadway design standards. The existing roadway cross-section includes 12-foot travel lanes and minimal three-foot shoulders between the edge of the travel lanes and the parapet wall and median barriers on either side (see Figure 1). The narrow shoulder widths present a problem in the event of a crash, disabled vehicle, or other maintenance/incident related need (e.g., maintenance and/or emergency workers responding to disabled vehicles or maintenance issues) because there are no refuge locations to pull vehicles out of traffic for the entire 3,200-foot span. The narrow shoulders and barriers also limit stopping sight distance to as low as approximately 450 feet. If this structure were to be built new today, the ODOT Highway Design Manual would call for 12-foot shoulders on the right side and eight-foot shoulders on the left side with at least 570 feet of stopping sight distance (60 mph design speed).
THE STUDY

The I-5 Medford Viaduct Planning and Environmental Study, sponsored by ODOT in conjunction with the Federal Highway Administration and the City of Medford, identified possible solutions to these problems. The study team evaluated three categories of alternatives:

- **Reroute**: 13 miles of new freeway, 3 new freeway interchanges, $1.1 billion
- **Build**: New viaduct, at-grade crossing, or tunnel, $250–500 million
- **Retrofit**: Seismic deficiencies of existing viaduct addressed, viaduct could be widened, $40–90 million

<table>
<thead>
<tr>
<th>DISMISSED:</th>
<th>DISMISSED:</th>
<th>RECOMMENDED:</th>
</tr>
</thead>
<tbody>
<tr>
<td>cost + region-wide environmental impacts</td>
<td>cost + potential impacts to Bear Creek and Hawthorne Park</td>
<td>Least cost and impact</td>
</tr>
</tbody>
</table>

The study team recommended the third alternative, seismically retrofitting the viaduct and widening it from 66 to 94 feet, providing an 8-foot inside shoulder, two 12-foot travel lanes, and a 12-foot outside shoulder in each direction. This alternative addresses the viaduct’s existing deficiencies and is forecast to provide sufficient roadway capacity through 2065 at the current traffic growth rate. It should be noted that the 28-foot widening under the retrofit alternative provides the option of accommodating a third lane in each direction beyond 2065.

The team further recommends that all widening occur on the east side of the structure. Design Option 1B. This retrofit design option provides better seismic performance at a lower cost and minimizes impacts to Bear Creek and downtown Medford.

The Summary Report

The remainder of this report examines the following:

» The study’s findings regarding existing structure and site conditions:
  - Safety
  - Traffic Patterns
  - Traffic Operations
  - Maintenance & Incidents

» The various alternatives the study team evaluated, their potential impacts, and why they were dismissed or recommended

» Seismic modeling predictions and findings of the seismic hazards investigation

» More in-depth information about the study team’s shortlisted and recommended alternatives

Before and after rendering showing retrofit design Option 1B, east-side-only widening
SAFETY

Operational Safety
The viaduct’s crash rate is lower than that of adjacent sections of I-5 and much lower than the statewide average for urban Interstate freeways. Of the eight reported crashes on the viaduct between 2010 and 2014, half occurred during rain, snow, or ice conditions, and three-quarters were at night, dawn, or dusk. Most crashes along I-5 in Medford happened at or near the North or South Medford interchanges.

The viaduct’s narrow shoulders leave no margin for avoiding a potential crash, and the adjacent barriers make it hard to see any debris in the roadway just beyond the viaduct’s bend. As traffic volumes increase, these issues may contribute to future crashes.

### FIGURE 1

<table>
<thead>
<tr>
<th>Type of Crash</th>
<th>Number of Crashes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viaduct Crashes</td>
<td>84 reported crashes</td>
</tr>
<tr>
<td>Interchange Area Crashes</td>
<td>8 reported crashes</td>
</tr>
<tr>
<td>Other I-5 Mainline Crashes</td>
<td>23 reported crashes</td>
</tr>
</tbody>
</table>

Seismic Safety
As noted in the problem statement, the Medford Viaduct was not designed to present-day structural codes and a major earthquake could render it inoperable. The Viaduct received a seismic retrofit in 2003 to prevent the bridge decks from moving excessively during an earthquake and sliding off their crossbeam supports, but this retrofit did not address the substructure’s ability to adequately perform during a seismic event, leaving the overall structure vulnerable. The need to upgrade or replace the viaduct was identified in ODOT’s 2014 Seismic Plus Report, with improvements recommended within 20 years.

Maintenance & Emergency Response

Personal Safety
The viaduct’s narrow roadway cross section and minimal shoulders amplify safety risks to emergency responders, people with stalled or crashed vehicles, and police tasked with addressing and clearing incidents. Emergency vehicles may park on the opposite side to more easily access a crash site, but this leads to lane closures in both travel directions. Crashes may also require closing upstream on-ramps to prevent additional traffic from entering I-5. Narrow shoulders make any maintenance performed on the viaduct difficult and dangerous for crews. Nearly all work requires lane closures and has to happen at night to minimize traffic delays. Workers are located near traffic with no escape route in the event of an out-of-control vehicle or other hazard. Hazards such as fallen debris from vehicles often remain in the roadway longer than they should because of the intensive coordination required for safe removal.

Another key safety issue is drainage. The viaduct’s drainage system clogs on a regular basis and lacks adequate capacity. This results in water backing up and pooling on the roadway, forcing traffic to slow. As traffic slows unexpectedly, distracted or unprepared drivers are more likely to cause a crash.
TRAFFIC PATTERNS

The Medford Viaduct is the busiest roadway section in Southern Oregon and a key link for travel along the West Coast. On an average day, 51,000 vehicles cross the viaduct, and this number is expected to grow to 61,700 by 2040.

During the weekday morning rush hour, about 20% of the northbound traffic on the viaduct is traveling between the North and South Medford interchanges. About 50% of the traffic is traveling to, from, or between Phoenix, Medford, and Central Point. The remaining 30% consists of through trips on I-5.

Figures 2

Depending on the analysis window and time period, the following are percentages of all I-5 trips passing within the study area boundary that were identified.

- **Local Trips**: 7-10%
- **Rogue Valley Regional Trips**: 14-19%

Majority of reported crashes were located near Merge & Diverge areas

Local Trips originating from North Medford interchange

- Approximately 55% Local Trips exiting at South Medford Interchange

- Decreasing Local Trips would...
  - reduce vehicle exposure
  - decrease crashes
  - reduce volume-to-capacity ratios
  - increase through trips
  - maintain operations

Local Trips originating from South Medford interchange

- Approximately 40% Local Trips exiting at North Medford Interchange

The relatively high proportion of local travelers using the viaduct contributes to crashes at the North and South Medford interchanges and takes up roadway capacity that could otherwise be used for longer-distance trips. Measures to reduce the amount of local traffic on the viaduct would extend the length of time the existing four-lane cross-section will continue to work effectively.

Figures 1

Trip Types Within Study Area

Interstate trips were examined as they interacted with Bluetooth® readers located at and between the four study area interchanges. Trips were classified into the following categories:

- **Local Trip**: A trip that starts and ends at the North and South Medford interchanges (or vice versa)
- **Rogue Valley Regional Trip**: A trip that starts and ends at one of the four study interchanges, but is not a Local Trip.
- **Entering Rogue Valley Trip**: A trip that begins outside the study area and ends at one of the four study interchanges.
- **Exiting Rogue Valley Trip**: A trip that begins at one of the four study interchanges and ends outside of the study area.
- **Through Trip**: An I-5 trip that does not use any of the four study area interchanges.

Figures 2

Northbound I-5 Trips on the Viaduct

- Summer
  - Daily
  - AM Peak
  - PM Peak
- School
  - Daily
  - AM Peak
  - PM Peak

0% 50% 100% 0% 50% 100%
TRAFFIC OPERATIONS

To preserve I-5’s ability to reliably serve traffic, the Oregon Highway Plan’s mobility target for I-5 in Medford is a volume-to-capacity (v/c) ratio of 0.85. In other words, traffic volumes should not exceed 85% of the roadway’s capacity.

Medford Viaduct Operational Results

The viaduct is currently at 59% capacity in the peak direction (northbound) during the weekday evening rush hour. Medford’s regional traffic model forecasts that it will increase to 72% by 2040. At the current rate of traffic growth, the viaduct’s mobility target will not be exceeded until 2065.

Travel over the viaduct is generally reliable, with no major seasonal differences in travel times, and trips during peak travel times typically no more than 25% longer than at other times.

Slowdowns, defined as two consecutive 5-minute periods with speeds below 45 mph, occur once every 7–8 days on average in each direction of the viaduct. About 33% of slowdowns can be matched to an incident (e.g., a stalled vehicle, debris in the roadway, high water) or a crash, with the remainder due to unreported incidents, inclement weather, and backups from downstream off-ramps.

Travel Demand Forecasting Results

Travel backs up while responders clear the viaduct roadway. Source: ODOT
The narrow viaduct poses challenges for emergency responders and maintenance personnel that result in delays for travelers.

**Stalled Vehicles**
Stalled vehicles cause traffic backups, making it difficult for tow trucks to reach and remove them, restoring traffic flow. The narrow shoulders do not permit responders to bypass backups or move stalled vehicles out of the travel lane. Responders must instead push stalled vehicles to the end of the viaduct, which takes more time.

**Emergency Response**
For the same reason, crashes can be difficult and unsafe for emergency responders and tow trucks to access. Responders may park on the opposite side of the viaduct to more easily access a crash site, but this requires closing lanes in both directions. On-ramps near the viaduct may also need to be closed to prevent more traffic from entering I-5.

**Roadway Debris**
Debris on the roadway typically requires a rolling slowdown to clear. This requires coordination between agencies and leaves the hazard on the roadway for a longer period of time, increasing the risk of a crash.

**Maintenance**
The viaduct’s narrow shoulders make maintenance difficult and dangerous for crews. Because these activities require a lane closure, nearly all work on the viaduct must happen at night to minimize traffic delays. Workers are close to traffic and have no escape route from their work area. Access to the underside of the viaduct is difficult given the current and planned development near and under the viaduct.

**Standing Water**
The viaduct’s drainage system routinely clogs, resulting in water backing up and pooling on the viaduct. This forces traffic to slow, and increases the risk of a crash. Ideally, the drains should be fully cleaned four times a year, but in practice, this happens only three times a year, as the activity requires multiple lane closures and is very time- and resource-intensive.

The recommended retrofit will address all of these issues.
The alternatives identified by the I-5 Medford Viaduct Planning and Environmental Study team fall into three categories: Reroute, Rebuild, and Retrofit.

In the first of these categories, I-5 would be rerouted around the east side of Medford, resulting in about 12 miles of new freeway with three new or reconstructed interchanges. Cost would be about $1.1 billion. Status: Rejected. This is highest-cost alternative and would remove $126 million worth of recently-built improvements at the North and South Medford interchanges. It could also cause severe, region-wide environmental impacts, disrupt neighborhoods and commercial districts, and displace residents and businesses. It would fundamentally change regional travel patterns by creating new connections in some parts of the region and removing others.

In the second category, the current viaduct would be removed and I-5 would be rebuilt along its current alignment either at-grade, as a new viaduct, or through a tunnel, in conformance with current design standards. If rebuilt at grade, all roadways that currently travel under the viaduct would need to be elevated to cross both I-5 and Bear Creek, and many intersections and driveways would need to be reconstructed, along with the entrances to some buildings. Bear Creek would have to be placed in a culvert or partially diverted. This alternative would cost about $250 million. Status: Rejected due to high cost and potentially substantial impacts to Bear Creek, Hawthorne Park, and downtown Medford businesses.

If rebuilt as a new viaduct, the structure would need to be located partially or completely east of the existing viaduct, so that traffic flow could be maintained during construction. Hawthorne Park would be significantly impacted as a result. This alternative would cost about $410 million. Status: Rejected due to expense and the potential for significant impacts to Hawthorne Park and adjacent residential areas. The cost estimate does not include the price of realigning the roadway at both ends of the rebuilt viaduct, north to the North Medford interchange and south the South Medford interchange.

If rebuilt as a tunnel, I-5 would need to be placed about 100 feet below grade to provide sufficient clearance below Bear Creek, resulting in a 3-mile-long tunnel that would surface beyond the North and South Medford interchanges. This alternative would cost more than $700 million. Status: Rejected due to high cost, construction feasibility issues, and loss of recent regional transportation investment along I-5.

In the third category, the viaduct would be retrofitted to meet current seismic standards. The viaduct could also be widened to address safety, operations, and maintenance issues. The cost of these alternatives ranges from $40 to $90 million and includes design options retrofitting the existing structure and maintaining the existing bridge cross-section to widening it by 18 or 28 feet to one or both sides. Status: Two of the four identified retrofit options were selected for conceptual design and cost estimates. Both options would widen the existing structure by 28 feet, either to the west (Option 1A) or to the east (Option 1B). Option 1C, which called for 14-foot widening to both sides was not advanced due to impacts on both sides of the existing structure and higher costs.

Two retrofit options were selected for more detailed conceptual design and cost estimates.
Several different retrofitting options, with and without widening the viaduct, were modeled to compare their performance. These included retrofit without widening, with 14-foot widening on both sides of the viaduct, and with 28-foot widening on the east side. Each option was costed in greater detail and its environmental, construction, right-of-way, and other effects evaluated.

The initial alternative concepts were developed through meetings with ODOT Region 3, FHWA, the City of Medford, project stakeholders, and the public. As a result of those discussions and through development and subsequent removal of alternatives from consideration, two retrofit alternatives were advanced for further consideration. Both would widen the existing structure by 28 feet, either to the west (Option 1A) or the east (Option 1B).

**Option 1A (West-Side Widening)**

Design Option 1A (Appendix A) includes widening the viaduct structure 28 feet to the west and the I-5 mainline north and south of the viaduct to accommodate the 20-foot lane shift offset of the widened viaduct.

Design Option 1A is estimated to have an order-of-magnitude conceptual cost of $89.0 million inclusive of all construction and soft cost items and right of way.

Seismic analysis was performed specifically for Option 1B. Seismic modeling was not conducted specifically for Option 1A but spacing and location assumptions for new columns are assumed to be similar.

**Option 1B (East-Side Widening)**

Design Option 1B (Appendix B) includes widening the viaduct structure 28 feet to the east and the I-5 mainline north and south of the viaduct to accommodate the 20-foot lane shift offset of the widened viaduct.

Retrofit Design Option 1B is estimated to have an order-of-magnitude conceptual cost of $84.2 million inclusive of all construction and soft cost items and right of way.

---

### Design Options Total Cost*

<table>
<thead>
<tr>
<th>Design Options</th>
<th>Total Cost*</th>
<th>Bridge**</th>
<th>ROW &amp; Easements</th>
<th>Traffic Control</th>
<th>Storm &amp; Drainage</th>
<th>I-5 Mainline</th>
<th>Surface Streets</th>
<th>Retaining Walls</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A - Widening to West</td>
<td>$89.0M</td>
<td>$59.5M</td>
<td>$4.6M</td>
<td>$4.3M</td>
<td>$7.0M</td>
<td>$1.0M</td>
<td>$1.0M</td>
<td>$17.0M</td>
</tr>
<tr>
<td>1B - Widening to East</td>
<td>$84.2M</td>
<td>$54.5M</td>
<td>$1.7M</td>
<td>$5.8M</td>
<td>$3.7M</td>
<td>$16.7M</td>
<td>$1.3M</td>
<td>$0.6M</td>
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</tbody>
</table>

*Detailed cost estimate information is contained in Technical Memo #12.
**Includes increased costs for addressing the higher connection design forces associated with the site class D soil (see page 23).
SEISMIC MODELING

As part of the study, the viaduct was modeled to see how it would perform in both a Cascadia Subduction Zone offshore earthquake and the 1,000-year return period local earthquake. These design earthquakes have different magnitudes, durations, depths, and locations, and therefore affect the viaduct’s components in different ways.

The model showed that most of the viaduct’s substructure components would be vulnerable to damage in these seismic events and that seismic retrofit is needed.

The forces acting on Medford-area bridges during a design earthquake are lower than at sites closer to the coast. In addition, the viaduct’s design, with relatively short spans paired with column lengths roughly equal to half the span length, works in its favor. Therefore, the model indicated that retrofitting the viaduct to withstand the design earthquakes was a feasible option.

SEISMIC HAZARDS

Soil type has a strong bearing on earthquake effects. Soft soils amplify ground shaking, often resulting in greater damage to structures.

Soil engineers use a classification system to grade site soils from A (hard rock) through F (very soft, liquefiable soils). The original seismic modeling conducted as part of this study assumed soil site class C based on historical records; however, later site specific boring beneath the Medford I-5 Viaduct revealed that the soil is site class D—not site class C.

This reclassification comes with more robust design requirements so the retrofitted structure will be able to withstand greater seismic loading—meaning a higher degree of shaking during a seismic event—and higher design forces at the column-footing and column-crossbeam connections.

The specific effects of the soil site class reclassification will be determined during final design by further seismic modeling. However, based on the seismic analysis to date, findings, and conclusions of this study, the current seismic retrofit strategy still appears to be viable.

The bridge cost estimates included in this report have been adjusted to include an additional $2.7M (Option 1B) and $2.9M (Option 1A) to account for potential cost increases for the columns, footings, and crossbeam due to the expected increased seismic loading required by site class D soils. These costs will be further refined through the final seismic modeling and design process.

<table>
<thead>
<tr>
<th>Design Option</th>
<th>Original Bridge Cost</th>
<th>Columns Add'l Cost</th>
<th>Footings Add'l Cost</th>
<th>Crossbeam Add'l Cost</th>
<th>Recommended Bridge Cost</th>
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</thead>
<tbody>
<tr>
<td>Existing (Non-widening)</td>
<td>$32.8M</td>
<td>$0.3M</td>
<td>$1.0M</td>
<td>$0.4M</td>
<td>$34.5M</td>
</tr>
<tr>
<td>1A—One-Sided Widening to the West</td>
<td>$56.6M</td>
<td>$0.4M</td>
<td>$1.8M</td>
<td>$0.7M</td>
<td>$59.5M</td>
</tr>
<tr>
<td>1B—One-Sided Widening to the East</td>
<td>$51.8M</td>
<td>$0.5M</td>
<td>$1.6M</td>
<td>$0.6M</td>
<td>$54.5M</td>
</tr>
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</table>
## FINDINGS

### OPTION 1A (WEST WIDENING) vs. OPTION 1B (EAST WIDENING)

<table>
<thead>
<tr>
<th>Feature</th>
<th>Option 1A</th>
<th>Option 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addresses safety issues?</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Addresses maintenance issues?</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Allows future six-lane restriping?</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Meets seismic design standards?</td>
<td>Yes, performs better than one-sided widening to the west and two-sided widening.</td>
<td>Yes, performs better than one-sided widening to the west and two-sided widening.</td>
</tr>
<tr>
<td>Environmental impacts</td>
<td>Yes, Key impacts include:</td>
<td>Yes, Key impacts include:</td>
</tr>
<tr>
<td>Direct impacts to Bear Creek from 16 new columns</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potential impacts to nine structures within the Twelfth Street Mobile Home Park</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impact to artwork on the columns and skate park underneath the viaduct within Hawthorne Park</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impacts to the Bear Creek Greenway trail north of Jackson Street</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction impacts</td>
<td>Construction of new bridge columns may impact sidewalks at these locations: the 8th Street Bridge, Bear Creek, Twelfth Street Mobile Home Park, and Bear Creek Greenway</td>
<td>Construction of new bridge columns may impact Biddle Road, Hawthorne Park parking lot, Bear Creek Greenway, 8th Street, Medford Senior Center parking and driveway, 10th Street Bridge, and the Twelfth Street Mobile Home Park</td>
</tr>
<tr>
<td>Traffic impacts</td>
<td>Extended Bear Creek Greenway Path closure or temporary re-routing, periodic sidewalk re-routing, and lane closures on 8th Street</td>
<td>Temporary closure of southbound lanes of E Biddle to E 4th Street; Extended Bear Creek Greenway Path closure or detour and permanent re-routing in two locations</td>
</tr>
</tbody>
</table>

### Traffic Control Costs

<table>
<thead>
<tr>
<th>Option</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>OPTION 1A (WEST WIDENING)</td>
<td>$6.4M</td>
</tr>
<tr>
<td>OPTION 1B (EAST WIDENING)</td>
<td>$5.8M</td>
</tr>
</tbody>
</table>

### Traffic Management Consideration

Both design options will require reducing I-5 from four to three total travel lanes during the deck expansion construction phase. This will require an extensive transportation management plan and reducing either northbound or southbound traffic to a single lane. To manage traffic during construction, extensive public outreach will be needed to minimize the majority of localized trips using I-5 between the Central Point and Phoenix interchanges, provide alternative routes (US97 and OR58) to west coast travel, and promote non-peak hour travel and other transportation demand management strategies.

### Right-of-way Acquisition

<table>
<thead>
<tr>
<th>Option</th>
<th>Cost</th>
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<tbody>
<tr>
<td>OPTION 1A (WEST WIDENING)</td>
<td>$0.3M</td>
</tr>
<tr>
<td>OPTION 1B (EAST WIDENING)</td>
<td>$1.7M</td>
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### Estimated Cost

<table>
<thead>
<tr>
<th>Option</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>OPTION 1A (WEST WIDENING)</td>
<td>$89.0M</td>
</tr>
<tr>
<td>OPTION 1B (EAST WIDENING)</td>
<td>$84.2M</td>
</tr>
</tbody>
</table>

### Conceptual Images Illustrating the Potential Environmental Impacts

- **Existing Conditions**: Direct impacts to Bear Creek (existing conditions and with proposed Option 1A, west widening)
- **Proposed Widening**: Potential impacts to nine structures within the Twelfth Street Mobile Home Park (Option 1A)
- **Above**: Potential impacts to six structures within the Twelfth Street Mobile Home Park (Option 1B)
- **Above Right**: Potential impacts to the Hawthorne dog leash park (Option 1B)
- **Below Right**: Potential impacts to the Hawthorne dog leash park (Option 1B)

[Images of environmental impacts are shown in the document.]
CONCLUSION

The study team’s recommendation is to seismically retrofit the viaduct to the east (Option 1B) and widen it to a 94-foot cross-section, providing an 8-foot inside shoulder, two 12-foot travel lanes, and a 12-foot outside shoulder in each direction. This option addresses the viaduct’s safety, traffic operations, and maintenance issues and is forecast to provide sufficient roadway capacity through 2065 at the current traffic growth rate. This retrofit widening option also allows for bicycles to use this segment of I-5 and for a potential future reconfiguration to accommodate three travel lanes in each direction, if needed. The team further recommends that all widening occur on the east side of the structure, as this option provides better seismic performance at a lower cost and minimizes impacts to Bear Creek and downtown Medford.

Current Cross-Section of the Medford Viaduct

Preferred Option 1B (East Widening) Cross-Section

Potential Forward Compatibility of Option 1B—Future Restriping to Six Lanes
Environmental Process: More detailed environmental assessment may be needed before the project can enter final engineering design. The remaining environmental work will likely be completed through a NEPA Categorical Exclusion process, pending City of Medford and FHWA reviews. ODOT will need to develop a final scope of work and budget before work can proceed.

Final Engineering Design: ODOT will need to prepare a final scope of work and budget for this phase.

Near-term Viaduct Safety and Operational Improvement Considerations: While funding is being sought for the full viaduct retrofit project, ODOT will be considering the following near-term investments to improve the safety and operations of the viaduct:
- South Medford interchange southbound off-ramp queuing mitigation
- Lighting installation
- Variable Message Signs (VMS)/Variable Speed Limits (VSL)
- Ramp metering
- Additional incident response vehicles

NEXT STEPS

Local Resolution & STIP Adoption: ODOT will seek a resolution of support from the City of Medford and then work with the Rogue Valley Area Commission of Transportation (RVACT) to add the viaduct project to the Statewide Transportation Improvement Plan (STIP). Medford City Council passed resolution 2019-27 supporting the retrofitting and widening of the Viaduct to the east by 28 feet on April 18, 2019.

Funding: ODOT and local partners seek federal, state, local, and other funding sources in the range of $85 million (2018 dollars) to move the Medford viaduct project forward to addressing the identified needs of this critical link in the western US interstate system.

Additional Seismic Modeling: Though Option 1B appears to be viable despite the change in soil site class designation from C to D, the next phase of the project will need to complete additional seismic modeling to verify.
The following technical memoranda provide the environmental and engineering support for the recommended Medford Viaduct Retrofit Alternative Design Option 1B (east widening of the viaduct by 28 feet).

1.1 Travel Time Reliability Memorandum
1.2 Travel Demand Model Capacity Assessment Memorandum
1.3 Origin-Destination Memorandum
1.4 Safety Analysis Memorandum
1.5 Estimated Costs for Retrofit, Rebuild, and Reroute Scenarios Memorandum
1.6 Development of Seismic Modeling Approach Memorandum
1.7 Project-Specific GIS Data Inventory & Gap Identification Memorandum
1.8 Summary of Task 1 Anchoring Activities Memorandum
1.9 Phase 1 Methodology & Assumptions Memorandum
1.10 Existing Structure Maintenance Deficiencies and No-Build Maintenance Costs of Existing Structure
1.11 Existing Structure Baseline Seismic Performance Memorandum
1.12 Seismic Retrofit Concepts Memorandum
1.12.2a Geographical Seismic Hazard Evaluation Impacts
1.12c Supplemental Design Option Comparisons Memorandum
4.2 Public Involvement and Communication Plan (PICP) Outline
4.3 Stakeholder Interview Strategy Memorandum
5.0 Website Outline
9C.1 Initial Phase 2 Scope Items to Consider During Seismic Modeling Memorandum
10.0 Alternatives Considered and Dismissed Memorandum
1.11A Design Option 1A Cost Summary Memorandum
12.0 Conceptual Designs and Cost Estimates for Retrofit Options 1A and 1B Memorandum
12.1 I-5 Medford Viaduct Reconnaissance Report
12.2 Geotechnical Seismic Hazard Evaluation Report
Medford City Council Resolution 2019-27 supporting the east side retrofit of the Interstate 5 Viaduct Bridge in Medford, OR