Oregon
Kate Brown, Governor

Department of Transportation
Delivery and Operations Division – Region 2
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Phone: (503) 986-2600

DATE: February 27, 2022

TO: Kristopher W. Strickler
Director

FROM: Mike Baker
Region 3 Planning Manager

SUBJECT: Approve the request to adopt the I-5 Medford Viaduct Planning and Environmental Study Compliance Findings and approve amending the Statewide Transportation System Plan

The Oregon Transportation Commission has delegated authority to approve minor, non-substantive plan amendments, such as refinement plans, to the Director.

Requested Action:

Approve the request to adopt the I-5 Medford Viaduct Planning and Environmental Study (Study) Compliance Findings and approve amending the Statewide Transportation System Plan. This adoption will include the recommended Medford Viaduct Retrofit Alternative Design Option 1B (east widening of the viaduct by 28 feet) and near-term safety and operational improvements as listed in the document.

Background:

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.

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 1 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. 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 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 reroute, rebuild, and retrofit options. The study team recommended Design Option 1B to seismically retrofit the viaduct and widen 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 seismic safety and roadway cross-section 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 Study included robust public outreach aimed to incorporate feedback at the local, regional, statewide, and federal level. Public involvement goals and activities complied with OAR 731-015-0065 Coordination Procedures for Adopting Final Facility Plans (Attachment 01). The City of Medford adopted the Study and Design Option 1B on December 15, 2022. The Department of Land Conservation and Development received notice of adoption on November 3, 2022. ODOT is not exceeding its authority.

Attachments & Supporting Documents:

Attachment 1 –	I-5 Medford Viaduct Planning & Environmental Study Findings of Compliance
Supporting Document –	I-5 Medord Viaduct Planning & Environmental Study
Supporting Document –	I-5 Medford Viaduct Planning & Environmental Study Technical Memorandums

Copies to:
Lisa Cornutt
Amanda Pietz
Darrin Neavoll
OHP Manager

Attachment 1:

Findings of Compliance with OAR 731-015-0065
Medford Viaduct Planning and Environmental Study (Plan): Compliance Findings – February 2023

The Oregon Department of Transportation (ODOT) State Agency Coordination Agreement requires that the Director of the Oregon Transportation Commission (OTC) and/or ODOT Director adopt findings of fact when making minor amendments to ODOT Facility Plans (OAR 731-015-0065). Pursuant to these requirements ODOT provides the following findings to support the adoption of the Medford Viaduct Planning and Environmental Study and projects within the Plan. This plan shall be adopted into the Statewide Transportation System Plan.

OAR 731-015-0065 Coordination Procedures for Adopting Final Facility Plans

Except in the case of minor amendments, [ODOT] shall involve DLCD and affected metropolitan planning organizations, cities, counties, state and federal agencies, special districts and other interested parties in the development of amendment of a facility plan. This involvement may take the form of mailings, meetings or other means that [ODOT] determines are appropriate for the circumstances. [ODOT] shall hold at least one public meeting on the plan prior to adoption.

Findings: *The requested action is considered a minor amendment with review authority delegated to the Director by the OTC; as such this section does not apply. Adding the Medford Viaduct and Environmental Study (Study) is a minor amendment to the Oregon State Transportation System Plan (TSP). It is an amendment to the TSP to widen the existing I-5 Medford Viaduct 28 feet to the East.*

Notwithstanding, the development of the Study included a process for public and agency involvement. The process used a jurisdictional work session, Agency Partner meetings, interviews with City staff, Incident Response and Maintenance workers, City Council presentations, and Rogue Valley Transportation Advocacy Committee (TRADCO) and Rogue Valley Area Commission on Transportation for the public involvement strategy. Notifications were sent through ODOT mailing lists, agency contact information, and citizens requests for participation. Advertisements were placed in local papers and media releases.

City of Medford Transportation System Plan adoption meetings occurred as follows:

- *City Council study session – November 10, 2022*
- *Planning Commission study session – November 14, 2022*
- *Transportation Commission meeting – November 16, 2022*

- *Planning Commission Hearing – December 1, 2022*
- *City Council Hearing – December 15, 2022*
-

The Department of Land Conservation and Development received notice of adoption on November 3, 2022.

Requirement: OAR 731-015-0065(2)

[ODOT] shall provide a draft of the proposed facility plan to planning representatives of all affected cities, counties and metropolitan planning organization and shall request that they identify any specific plan requirements which apply, any general plan requirements which apply and whether the draft facility plan is compatible with the acknowledged comprehensive plan. If no reply is received from an affected city, county or metropolitan planning organization within 30 days of [ODOT's] request for a compatibility determination, [ODOT] shall deem that the draft plan is compatible with that jurisdiction's acknowledged comprehensive plan. [ODOT] may extend the reply time if requested to do so by an affected city, county, or metropolitan planning organization.

Findings: *ODOT engaged with the City of Medford (City) to develop the Study. The Interstate 5 Medford Viaduct is under the jurisdictional authority of the State of Oregon. The Study has been confirmed as containing needed system improvements by its inclusion in the City of Medford TSP. Improvements have been found in compliance with applicable Statewide Planning Goals as part of the Medford City Council's amendment to the TSP; the Study inclusion in the TSP ensures consistency between State and locally adopted plans. The City informed the Department of Land Conservation and Development of plans to adopt on November 3, 2022.*

Requirement: OAR 731-015-0065(3)

If any statewide goal or comprehensive plan conflicts are identified, [ODOT] shall meet with the local government planning representative to discuss ways to resolve the conflicts. These may include:

(1) Changing the draft facility plan to eliminate the conflicts;
(2) Working with the local governments to amend the local comprehensive plans to eliminate the conflicts; or
(3) Identifying the conflicts in the draft facility plan and including policies that commit [ODOT] to resolving the conflicts prior to the conclusion of the transportation planning program for the affected portions of the transportation facility.

Finding: *ODOT worked with the City of Medford to include the Study and its projects in the City of Medford TSP. No Statewide or comprehensive plan conflicts are identified.*

Requirement: OAR 731-015-0065(4)

[ODOT] shall evaluate and write draft findings of compatibility with acknowledged comprehensive plans of affected cities and counties, findings of compliance with any statewide planning goals which specifically apply as determined by OAR 660-030-0065(3)(d), and findings of compliance with all provisions of other statewide planning goals that can be clearly defined if the comprehensive plan of an affected city or county contains no conditions specifically applicable or any general provisions, purposes or objectives would be substantially affected by the facility plan.

Findings: *Facility improvements have been found to be in compliance with applicable Statewide Planning Goals as part of the Medford City Council's legislative amendment to the TSP (Ordinance 2022-148) adopting the applicable projects and Study by reference.*

This document comprises the findings of compliance with applicable statewide planning goals and compatibility with the local comprehensive plan of the affected local jurisdictions (see sections below).

Requirement: OAR 731-015-0065(5)

[ODOT] shall present to the Transportation Commission the draft plan, findings of compatibility with the acknowledged comprehensive plans of affected cities and counties and findings of compliance with applicable statewide planning goals.

Finding: *These findings are submitted to ODOT Director* Kristopher W. Strickler *for adoption per the recent OTC guidance on review and adoption for ODOT Facility Plans. The cover letter and findings documentation satisfy this requirement. See sections below for additional findings.*

Requirement: OAR 731-015-0065(7)

[ODOT] shall provide copies of the adopted final facility plan and findings to DLCD, to affected metropolitan planning organizations, cities, counties, state federal agencies, special districts and to others who request to receive a copy.

Finding: *Staff will provide copies of the Study, including all required findings, to DLCD, the affected local jurisdictions, and others who request a copy.*

Statewide Planning Goals

ODOT's Facility Plan Adoption Process requires findings to be written for applicable statewide planning goals. Pursuant to this requirement, the following goals pertain to the Study.

STATEWIDE PLANNING GOAL 1: To develop a citizen involvement program that ensures the opportunity for citizens to be involved in all phases of the planning process.

FINDING:

The development of the Study included a process for citizen and agency involvement. The process used a jurisdictional work session, Agency Partner meetings, interviews with City staff, Incident Response and Maintenance workers, Public City Council presentations, and Rogue Valley Transportation Advocacy Committee (TRADCO) and Rogue Valley Area Commission on Transportation for the public involvement strategy. Notifications were sent through ODOT mailing lists, agency contact information, and citizens requests for participation. Advertisements were placed in local papers and media releases.

In addition to the meetings held during the development of the Study, the City of Medford held public hearings on the local adoption of the Study as an amendment to the City's Transportation System Plan – the transportation element of the local Comprehensive Plan.

City of Medford Transportation System Plan adoption meetings occurred as follows:

- *City Council study session – November 10, 2022*
- *Planning Commission study session – November 14, 2022*
- *Transportation Commission meeting – November 16, 2022*
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- *City Council Hearing – December 15, 2022*

STATEWIDE PLANNING GOAL 2: To establish a land use planning process and policy framework as a basis for all decision and actions related to use of land and to assure an adequate factual base for such decisions and actions.

FINDING: *This goal is not applicable to the requested action. The Study amends the Oregon TSP to add retrofitting the Medford Viaduct existing structure 28 feet to the east to address seismic, safety, operations, and maintenance issues.*

The initial work on the I-5 Medford Viaduct project consisted of a facility analysis that evaluated current and future capacity, safety, operations, seismic resiliency, and deficiencies. This evaluation identified how the documents influence planning for the Study.

A Project Management Team (PMT) was established to guide the planning process. The PMT consisted of the City of Medford, ODOT, and the Federal Highway Administration.

STATEWIDE PLANNING GOAL 3: To preserve and maintain agricultural land.

FINDING: *This goal is not applicable to the requested action.*

STATEWIDE PLANNING GOAL 4: To conserve forest lands.

FINDING: *This goal is not applicable to the requested action.*

STATEWIDE PLANNING GOAL 5: To protect natural resources and conserve scenic and historic areas and open spaces.

FINDING: *Several different retrofitting options, with and without widening the viaduct were modeled and compared their impacts on Bear Creek, Hawthorne Park, and downtown Medford. The seismic retrofit to widen 28 feet to the east minimizes impacts to Bear Creek and the park.*

STATEWIDE PLANNING GOAL 6: To maintain and improve the quality of air, water, and land resources of the state.

FINDING: *This goal is not applicable to the requested action.*

STATEWIDE PLANNING GOAL 7: To protect life and property from natural disasters and hazards.

FINDING: *This goal is not directly applicable to the requested action. 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. The need to seismically retrofit the viaduct 28 feet to the east was identified to retrofit the structure to seismic standards.*

STATEWIDE PLANNING GOAL 8: To satisfy the recreational needs of the citizens of the state and visitors, and, where appropriate, to provide for the siting of necessary recreational facilities including destination resorts.

FINDING: *This goal is not applicable to the requested action.*

STATEWIDE PLANNING GOAL 9: To provide adequate opportunities throughout the state for a variety of economic activities vital to the health, welfare, and prosperity of Oregon's citizens.

FINDING: *This goal is not applicable to the requested action.*

STATEWIDE PLANNING GOAL 10: To provide for the housing needs of citizens of the state.

FINDING: *This goal is not applicable to the requested action.*

STATEWIDE PLANNING GOAL 11: To plan and develop a timely, orderly and efficient arrangement of public facilities and services to serve as a framework for urban and rural development.

FINDING: *This goal is not applicable to the requested action.*

STATEWIDE PLANNING GOAL 12: To provide and encourage a safe, convenient and economic transportation system.

FINDING: *The Study identifies seismically retrofitting the viaduct 28 feet to the east. Retrofitting the viaduct will meet today's seismic standards and improve safety and operations by providing a wider cross-section for emergency and maintenance vehicles.*

STATEWIDE PLANNING GOAL 13: To conserve energy.

FINDING: *This goal is not applicable to the requested action.*

STATEWIDE PLANNING GOAL 14: To provide for an orderly and efficient transition from rural to urban land use, to accommodate urban population and urban employment inside urban growth boundaries, to ensure efficient use of land, and to provide for livable communities.

FINDING: *This goal is not directly applicable to the requested action.*

STATEWIDE PLANNING GOAL 15: Willamette River Greenway

FINDING: *This goal is not applicable to the requested action.*

STATEWIDE PLANNING GOAL 16: Estuarine resources

FINDING: *This goal is not applicable to the requested action.*

STATEWIDE PLANNING GOAL 17: Coastal Shorelands

FINDING: *This goal is not applicable to the requested action.*

STATEWIDE PLANNING GOAL 18: Beaches and Dunes

FINDING: *This goal is not applicable to the requested action.*

STATEWIDE PLANNING GOAL 19: Ocean Resources

FINDING: *This goal is not applicable to the requested action.*

Compatibility with the Oregon Transportation Plan

OREGON TRANSPORTATION PLAN

The Oregon Transportation Plan (OTP) is a policy document developed by ODOT in response to the federal and state mandates for systematic planning for the future of Oregon's transportation system. The OTP is intended to meet statutory requirements (ORS 184.618(1)) to develop a state transportation policy and comprehensive long-range plan for a multi-modal transportation system that addresses economic efficiency, orderly economic development, safety, and environmental quality.

FINDING: *The OTP does not specifically address improvements to Interstate 5 Medford Viaduct but offers a broad policy framework standard for improving state highway systems. The Study has been developed to be consistent with the OTP, specifically the Oregon Highway Plan (OHP) which is an element of the OTP (see section below).*

Oregon Highway Plan

The following applicable sections of the Oregon Highway Plan (OHP) contain findings of consistency for the Study.

Goal 1: System Definition

Policy 1A – Highway Classification

This policy calls for ODOT to apply the state highway classification system to guide priorities for system investment and management.

Finding: *The Medford Viaduct is located on Interstate 5, which is part of the National Highway System. The Study includes recommendations for improvements consistent with the Interstate classification and a major freight route.*

Policy 1B – Land Use and Transportation

This policy recognizes the role of both the State and local governments related to the state highway system and calls for a coordinated approach to land use and transportation planning.

Finding: *Coordination between ODOT and the City occurred throughout the preparation of the Study. A PMT was formed to guide the project that included the City, and FHWA. The PMT coordinated throughout the project, including participating in meetings to review draft documents and inform alternative selection.*

Policy 1C – State Highway Freight System

This policy recognizes the need for the efficient movement of freight through the state.

Finding: *The Medford Viaduct is located on Interstate 5, which is listed in the OHP as a Designated Freight Route. The Study includes recommendations that will improve safety and mobility for freight movement. The preferred alternative meets Highway Design Mobility (HDM) standards with future traffic volumes and modern design standards.*

Policy 1E – Lifeline Routes

This policy provides for a secure lifeline network of streets, highways, and bridges to facilitate emergency services response and to support rapid economic recovery after a disaster.

Finding: *The Oregon Seismic Lifelines Identification Project (2012) identified the segment of Interstate 5 that includes the Medford Viaduct as part of the Tier 1 Lifeline Route network. The Study recommends seismically retrofitting the viaduct and widening it from 66 to 94 feet. This alternative addresses seismic deficiencies and allows emergency services and maintenance workers to access the viaduct by providing a refuge to pull vehicles out of traffic. The Study*

recommends the widening occur on the east side of the structure because it provides better seismic performance at a lower cost.

Policy 1F – Highway Mobility Standards

This policy addresses the state highway performance expectations, providing guidance for managing access and traffic control systems related to the state highway system. This policy sets mobility standards for ensuring a reliable and acceptable level of mobility on the highway system by identifying necessary improvements that would allow the corridor to function in a manner consistent with the OHP. The OHP sets volume-to-capacity ratio standards for state highways that are not to be exceeded.

Finding: *The OHP mobility target for Interstate 5 in Medford is a volume-to-capacity ratio of 0.85. In other words, traffic volumes should not exceed 85% of the roadway's capacity. The Viaduct was at 59% capacity in the peak direction 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 would not be exceeded until 2065. The retrofit and widening of the viaduct by 28 feet to the east should allow it meet mobility standards for much longer.*

Policy 1G – Major Improvements

This policy directs ODOT to maintain highway performance and improve safety by improving system efficiency and management before adding capacity.

Finding: *No vehicular capacity projects are proposed in the Study. The retrofit and widening will improve seismic performance and safety and allows emergency services and maintenance workers to access the viaduct by providing a refuge to pull vehicles out of traffic. However, retrofitting and widening 28 feet to the east will allow for restriping to three lanes in each direction.*

Goal 2: System Management

Policy 2D – Public Involvement

This policy provides standards for ensuring that citizens, businesses, regional and local governments, state agencies, and tribal governments have opportunities to have input into decisions that impact the state highway system.

Finding: *The development of the Study included a process for public involvement. The process used a jurisdictional work session, Agency Partner meetings, interviews with City staff, Incident Response and Maintenance workers, Public City Council presentations, and Rogue Valley Transportation Advocacy Committee (TRADCO) and Rogue Valley Area Commission on Transportation for the public involvement strategy. Notifications were sent through ODOT*

mailing lists, agency contact information, and citizens requests for participation. Advertisements were placed in local papers and media releases.

In addition to the meetings held during the development of the Study, the City of Medford held public hearings on the local adoption of the Study as an amendment to the City's Transportation System Plan – the transportation element of the local Comprehensive Plan.

City of Medford Transportation System Plan adoption meetings occurred as follows:

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- *Transportation Commission meeting – November 16, 2022*
- *Planning Commission Hearing – December 1, 2022*
- *City Council Hearing – December 15, 2022*

The Department of Land Conservation and Development was notified of plans to adopt on November 3, 2022.

Policy 2E – Intelligent Transportation Systems

This policy provides standards for the consideration of Intelligent Transportation Systems (ITS) to improve system efficiency and safety in a cost-effective manner.

Finding: *ITS solutions were included in the Study to enhance safety. The Study calls for lighting installation, variable message signs, variable speed limits, and ramp metering as near-term investments to improve safety and operations of the viaduct.*

Policy 2F – Traffic Safety

This policy directs the continual improvement of safety for all users of the highway system using solutions involving engineering, education, enforcement, and emergency medical services.

Finding*: The Study, Memorandum 1.4 Safety Analysis Memorandum documented system operation and safety conditions to inform the evaluation and alternatives. The retrofit and widening will address the identified safety deficiencies by addressing the viaduct's narrow shoulders, seismic deficiencies, and maintenance and emergency response access and safety.*

Policy 4A – Efficiency of Freight Movement

Finding: *The Medford Viaduct is located on Interstate 5, which is listed in the OHP as a Designated Freight Route. The Study includes recommendations that will improve safety and mobility for freight movement. The preferred alternative meets Highway Design Mobility (HDM) standards with future traffic volumes and modern design standards.*

I-5 MEDFORD VIADUCT PLANNING & ENVIRONMENTAL STUDY

PROJECT SUMMARY MEMORANDUM

CITY OF MEDFORD OREGON

Oregon Department of Transportation

April 2019

ACKNOWLEDGMENTS

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Medford I-5
Viaduct today
Source: ODOT

Medford I-5
Viaduct in 1966,
Source: ODOT

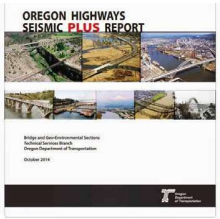
INTRODUCTION

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.

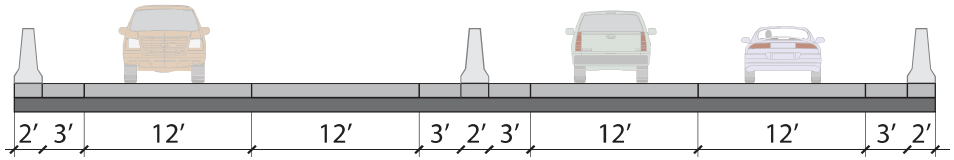
The Medford Viaduct structure does not conform with current structural design codes, which means it may be rendered inoperable after a Cascadia Subduction Zone earthquake or other local seismic event. A Phase 1 seismic retrofit was performed on the Medford Viaduct in 2003, which only provided retrofit 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

Existing roadway cross-section, Medford I-5 Viaduct. Source: OBEC

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).

Existing Cross-Section of the Medford Viaduct



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	REBUILD	RETROFIT
13 miles of new freeway 3 new freeway interchanges	New viaduct, at-grade crossing, or tunnel	Seismic deficiencies of existing viaduct addressed, viaduct could be widened
$1.1 billion	$250–500 million	$40–90 million
DISMISSED: cost + region-wide environmental impacts	**DISMISSED:** cost + potential impacts to Bear Creek and Hawthorne Park	**RECOMMENDED:** Least cost and impact

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 Operations
  - Traffic Patterns
  - 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

Viaduct crashes were located on the Viaduct.

Interchange Area crashes were located on I-5 in the vicinity of the North Medford and South Medford interchanges and within their merge and diverge influence areas.

Other I-5 Mainline crashes were located on other basic freeway segments in the study area.

84 reported crashes
During the five-year study period (2010 - 2014)

No ODOT 2014 SPIS locations were identified

8 reported crashes were on the Viaduct

53 reported crashes within an Interchange Area

23 reported crashes on Other I-5 Mainline

5-Year Crash Rate for the Viaduct
0.08 Crashes
per million vehicle miles

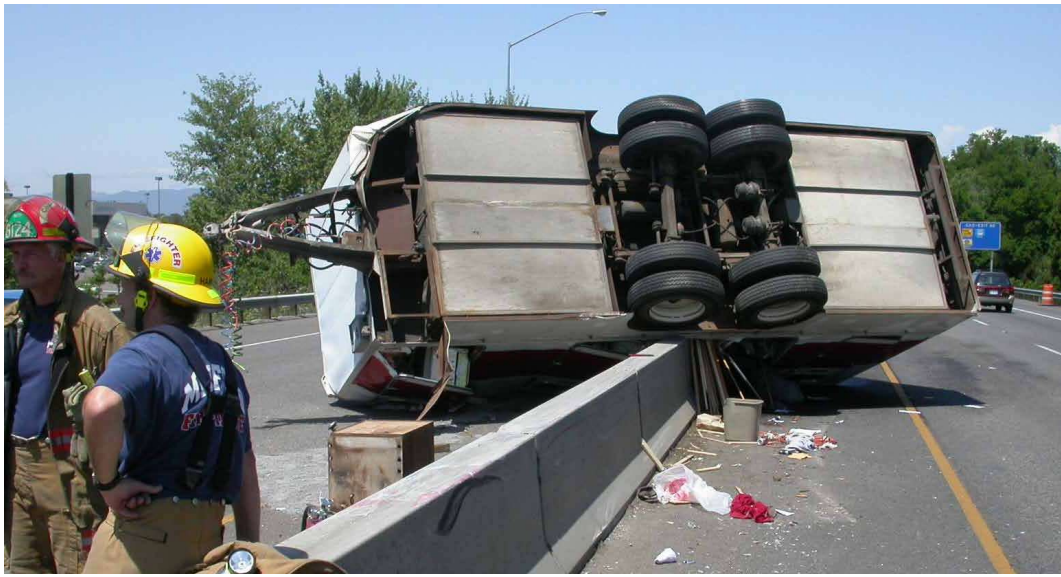
5-Year Crash Rate for I-5 from MP 26.86 to MP 30.61
0.13 Crashes
per million vehicle miles

5-Year Statewide Average for Urban Interstate Facilities
0.55 Crashes
per million vehicle miles

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.

Collapsed viaduct, Vespucio Norte Hwy, Chile, 2010. Source: Wikimedia Commons, Esteban Maldonado



Trailer rollover on the viaduct. Source: ODOT

Maintenance & Emergency Response Personal Safety

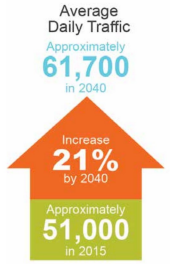
The viaduct's narrow roadway cross section and minimal shoulders amplify safety risks to emergency responders, people with stalled or crashed vehicles, and police tasked with addressing and clearing incidents. Emergency vehicles may park on the opposite side to more easily access a crash site, but this 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.

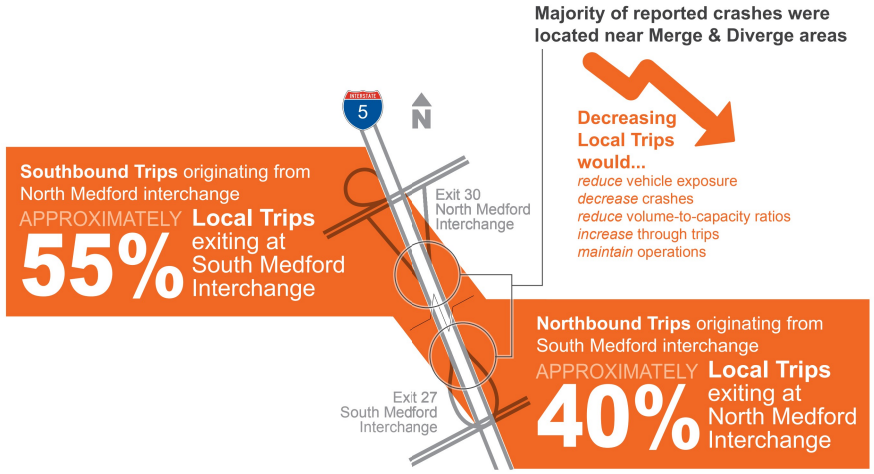
Another key safety issue is drainage. The viaduct's drainage system clogs on a regular basis and lacks adequate capacity. This results in water backing up and pooling on the roadway, forcing traffic to slow. As traffic slows unexpectedly, distracted or unprepared drivers are more likely to cause a crash.

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.





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.

FIGURE 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.

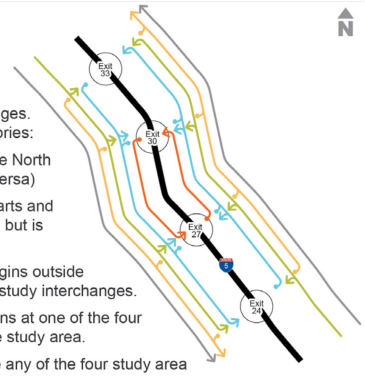
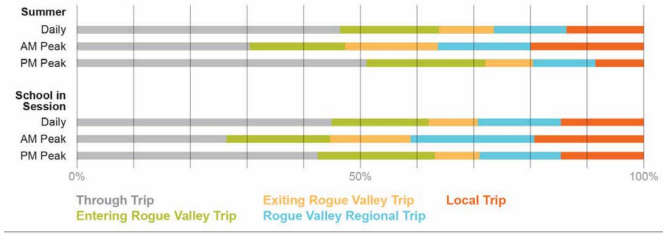


FIGURE 2
Northbound I-5 Trips on the Viaduct



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.

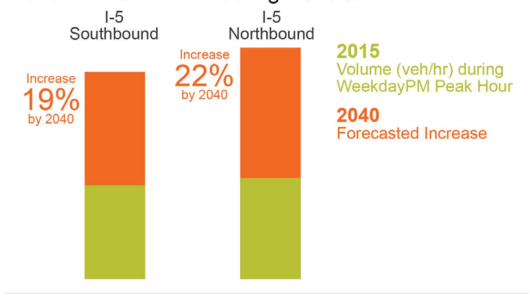
Medford Viaduct Operational Results

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.

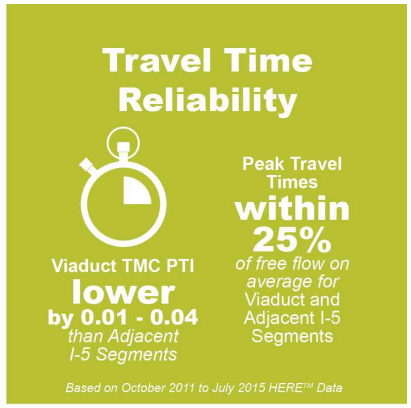
Travel over the viaduct is generally reliable, with no major seasonal differences in travel times, and trips during peak travel times typically no more than 25% longer than at other times.

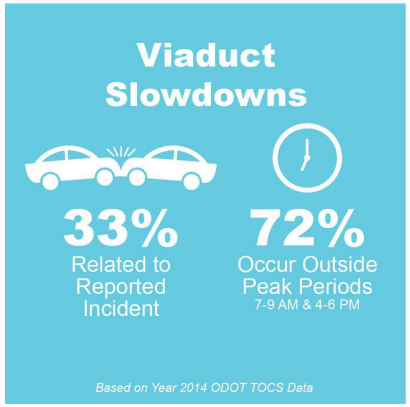
Slowdowns, defined as two consecutive 5-minute periods with speeds below 45 mph, occur once every 7–8 days on average in each direction of the viaduct. About 33% of slowdowns can be matched to an incident (e.g., a stalled vehicle, debris in the roadway, high water) or a crash, with the remainder due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

Travel Demand Forecasting Results



Traffic backs up while responders clear the viaduct roadway. Source: ODOT





MAINTENANCE & INCIDENTS

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 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.

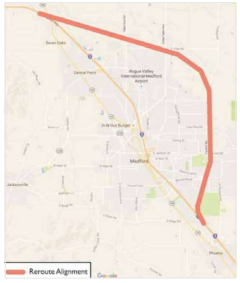
Workers making repairs on the Medford I-5 Viaduct at night to minimize traffic disruption. Source: ODOT

ALTERNATIVES

The alternatives identified by the I-5 Medford Viaduct Planning and Environmental Study team fall into three categories: Reroute, Rebuild, and Retrofit.

REROUTE

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.

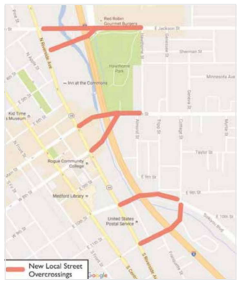


Reroute alternative

REBUILD

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.

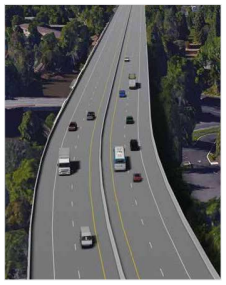
If rebuilt at grade, all roadways that currently travel under the viaduct would need to be elevated to cross both I-5 and Bear Creek, and many intersections and driveways would need to be reconstructed, along with the entrances to some buildings. Bear Creek would have to be placed in a culvert or partially 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.



Rebuild at grade alternative

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.

Rebuild new viaduct alternative


Rendering of retrofitted, widened viaduct cross-section

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.

RETROFIT

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.

	Conceptual Alternative	Preliminary Order-of-Magnitude Cost Estimate	Design Life
REROUTE	New 13-mile realignment	$1.1B	75+ years
REBUILD	At-grade rebuild	$250M	75+ years
	New replacement viaduct on similar alignment	$410M	75+ years
	New 3-mile-long tunnel	$700M	75+ years
RETROFIT	Seismic retrofit and widening with 4 standards lanes and shoulders	$40-90M	30+ years (deck) 75+ years (structure)

RETROFIT OPTIONS

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)

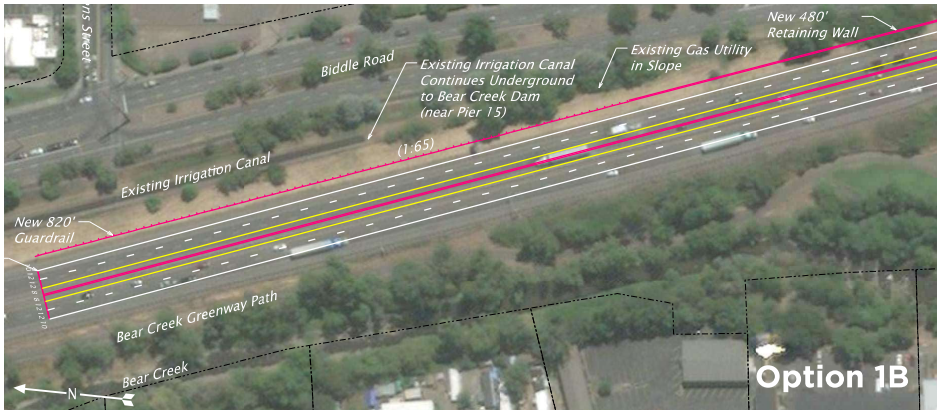
Design Option 1B (Appendix B) includes widening the viaduct structure 28 feet to the east and the I-5 mainline north and south of the viaduct to accommodate the 20-foot lane shift offset of the widened viaduct.

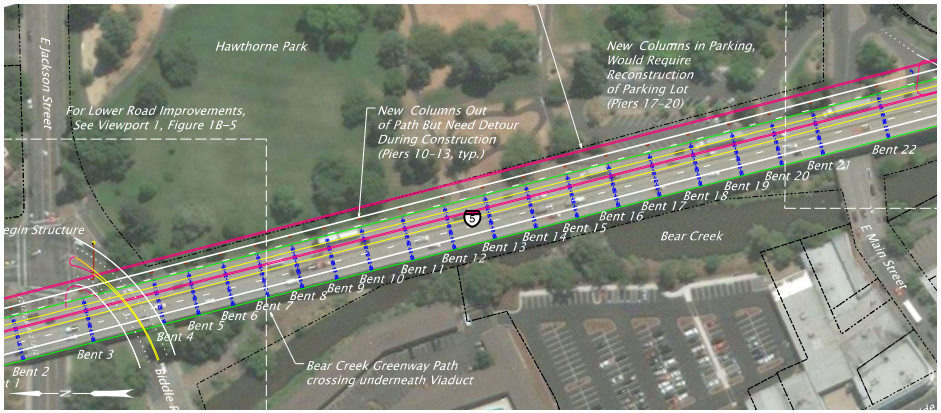
Retrofit Design Option 1B is estimated to have an order-of-magnitude conceptual cost of $84.2 million inclusive of all construction and soft cost items and right of way.

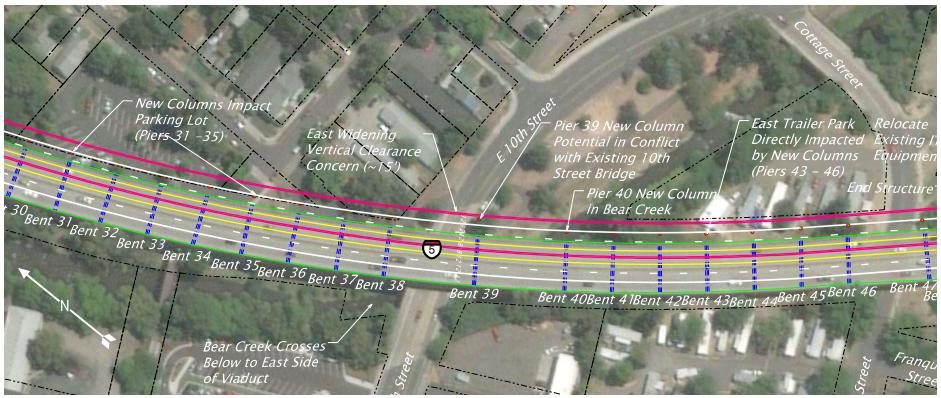
Design Options	Total Cost*	Bridge**	ROW & Easements	Traffic Control	Storm & Drainage	I-5 Mainline	Surface Streets	Retaining Walls
1A - Widening to West	**$89.0M**	$59.5M	$0.3M	$6.4M	$4.1M	$17.0M	$0.7M	$1.0M
1B - Widening to East	**$84.2M**	$54.5M	$1.7M	$5.8M	$3.7M	$16.7M	$1.3M	$0.6M

*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.

Viaduct substructure

SEISMIC HAZARDS

Viaduct piers in the soil near Bear Creak

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 addition $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.

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

FINDINGS

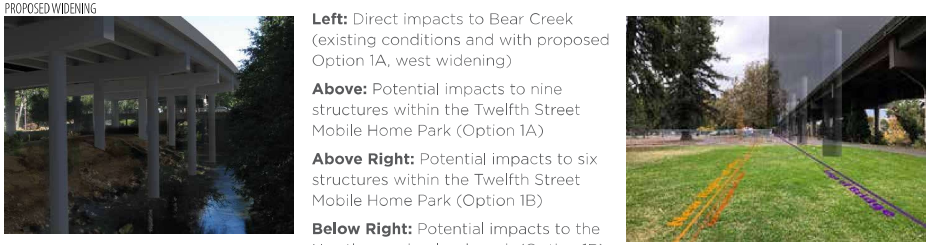
RETROFIT	OPTION 1A (WEST WIDENING)	OPTION 1B (EAST WIDENING)
Addresses safety issues?	Yes	Yes
Addresses maintenance issues?	Yes	Yes
Allows future six-lane restriping?	Yes	Yes
Meets seismic design standards?	Yes	Yes, performs better than one-sided widening to the west and two-sided widening.
Environmental impacts	Yes. Key impacts include: » Direct impacts to Bear Creek from 16 new columns » Potential impacts to nine structures within the Twelfth Street Mobile Home Park » Impact to artwork on the columns and skate park underneath the viaduct within Hawthorne Park » Impacts to the Bear Creek Greenway trail north of Jackson Street	Yes. Key impacts include: » A single new column in Bear Creek » Potential impacts to six structures within the Twelfth Street Mobile Home Park » Impact to artwork on the columns and skate park underneath the viaduct within Hawthorne Park » Potential partial impacts to the Hawthorne dog leash park
Construction impacts	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	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
Traffic impacts	Extended Bear Creek Greenway Path closure or temporary re-routing, periodic sidewalk and lane closures on 8th Street	Temporary closure of south bound lanes of E Biddle to E 4th Street; Extended Bear Creek Greenway Path closure or detour and permanent re-routing in two locations

RETROFIT	OPTION 1A (WEST WIDENING)	OPTION 1B (EAST WIDENING)
Traffic control costs	$6.4M. Option 1A will require a longer construction period due to the placement of the 16 new columns in Bear Creek.	$5.8M
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	$0.3M	$1.7M
Transition required to/from current I-5 alignment	Yes	Yes
Estimated cost	**$89.0M**	**$84.2M**

Conceptual images illustrating the potential environmental impacts

EXISTING CONDITIONS

PROPOSED WIDENING



West Side Retrofit Widening Impacts to Bear Creek

Left: Direct impacts to Bear Creek (existing conditions and with proposed Option 1A, west widening)

Above: Potential impacts to nine structures within the Twelfth Street Mobile Home Park (Option 1A)

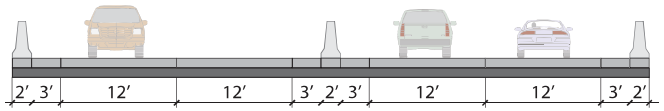
Above Right: Potential impacts to six structures within the Twelfth Street Mobile Home Park (Option 1B)

Below Right: Potential impacts to the Hawthorne dog leash park (Option 1B)

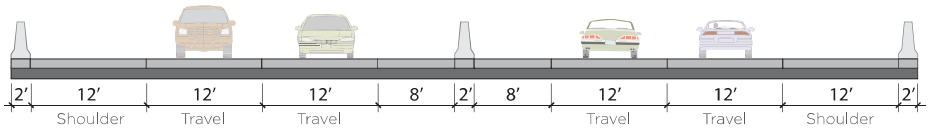
CONCLUSION

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.

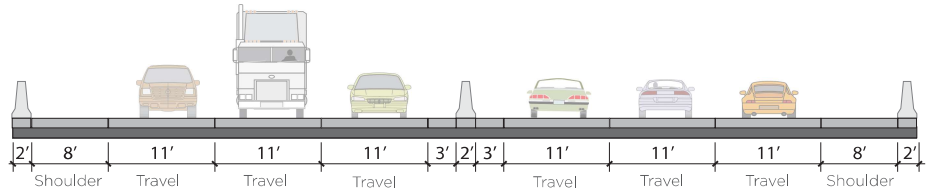
Current Cross-Section of the Medford Viaduct



Preferred Option 1B (East Widening) Cross-Section



Potential Forward Compatability of Option 1B—Future Restriping to Six Lanes



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.

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

Photo Source: ODOT

SUPPORTING TECHNICAL MEMORANDA

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

KITTELSON & ASSOCIATES