Final Memorandum 1.12C

I-5 MEDFORD VIADUCT PLANNING & ENVIRONMENTAL STUDY

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Subject: **Task 1.12C Supplemental Design Option Comparisons**

The purpose of this memorandum and the other early anchoring activity memorandums in Phase 1A of the project is to inform the Draft Problem Statement and guide further development of the project.

Introduction

Memorandum 1.12a Preliminary Seismic Retrofit Concept outlined five potential widening options:

- Option 1A – Widen to 94' Standard – 28-foot widening to the west
- Option 1B – Widen to 94' Standard – 28-foot widening to the east
- Option 1C – Widen to 94' Standard – 14-foot widening to both sides
- Option 2A – Widen to 84' – 18-foot widening to the west
- Option 2B – Widen to 84' – 18-foot widening to the east

Of the five widening options, the Project Management Team (PMT) selected Options 1B and 1C to be modeled seismically for determining the scope and cost of construction to meet current seismic design standards. ODOT has asked the PMT to outline the differences between Options 1A and 1B, and Options 2A versus 1A by making inferences from the analyses and findings for Memorandum 1.12. This memorandum identifies the seismic performance, environmental and constructability impacts, and construction cost differences between design options 1A and 1B and design options 2A and 1A.

Design Option 1A and 1B Comparison

Seismic Performance

Per Memorandum 1.12, Option 1B performed better seismically than Option 1C with respect to net top of column displacement. Option 1C displaced more because the new west side columns were longer and more flexible than the new east side columns. Option 1A will experience the same behavior, except the new west side column lengths will be even longer due to the increased widening limits (28-feet versus 14-feet). Therefore, it is reasonable to assume Option 1B will perform better seismically. Furthermore, Option 1A may require larger diameter columns to provide enough structural stiffness to keep seismic displacement within the design standard limits.

Environmental and Constructability Impacts

The biggest differences in environmental and constructability impacts between Options 1A and 1B are the impacts on Bear Creek, Hawthorne Park, and I-5 travel lanes. Option 1A widening construction activities will impact Bear Creek significantly more since the majority of the columns will be located within the regulatory limits of Bear Creek. As such, construction of the columns will require temporary work platforms and stream water isolation measures. Option 1B has limited impacts to Bear Creek since all widening is on the east side.

Both options will impact Hawthorn Park and the Break Creak Greenway Trail, primarily in constructing a temporary access road along the east side of the existing bridge. Option 1A impacts will be less, and primarily only during construction, because all of the widening is to the west. The east side impacts for Existing (Non-Widening) Option, as described in Memorandum 1.12, are fairly reflective of the impacts for Option 1A.

Option 1A is likely to significantly increase the number and duration of lane closures on I-5 during construction of the new girders and concrete deck because of the proximity of Bear Creek below the existing bridge. By comparison, it is anticipated that most of the new girders and concrete deck from Option 1B will be constructed from the access road below the east edge of the existing bridge. Additional environmental and constructability differences are outlined in Memorandum 1.12b.

Construction Costs

Option 1A will have significantly more construction impacts to Bear Creek, resulting in an overall higher construction cost. Additionally, Option 1A may result in larger columns and additional seismic retrofit improvements beyond those required for Option 1B. It is anticipated that the cost increase is roughly $2.5 to $5.0 million. The additional costs were approximated using the same methodology and assumptions outlined in Memorandum 1.12.

Design Option 2A and 1A Comparison

Seismic Performance

The reduced structure width of Option 2A will result in slightly shorter west side widening column lengths and overall less structure mass. Both of these factors should result in an improved seismic performance compared to Option 1A.

Environmental and Constructability Impacts

Option 2A environmental impacts will be slightly less, but similar to Option 1A. The impacts to Hawthorne Park, Bear Creek Greenway Trail, and I-5 traffic are the same for either option. The most significant difference, which is fairly minor in the overall scope of the project, will be reducing the most westerly footprint of the project's impacts by about 10-feet for the length of the bridge. The widening column locations may shift east slightly, as well. Neither of these changes results in substantially different environmental or constructability impacts.

Construction Costs

As a result of its narrow width, Option 2A will cost less than Option 1A. Cost savings will be realized in reducing the bridge deck width and eliminating a girder line for the widened superstructure. It is anticipated that the cost reduction is roughly $2.5 to $3.5 million. The costs savings were approximated using the same methodology and assumptions outlined in Memorandum 1.12. However, this relatively small cost savings comes as a result of constructing a non-standard four-lane freeway roadway section.