Beltline Facility Plan Phase II: River Road to Coburg Road: Concept Evaluation Process and Results

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This memorandum describes the methodology used to develop and evaluate concepts that address documented issues on the Beltline Highway between River Road and Coburg Road.

The first phase of the Beltline Facility Plan was to gather background information, conduct existing traffic and safety conditions analyses, and define problems on the Beltline Highway based on technical research and community input. This process concluded in October 2008 and resulted in an approved problem statement by the project advisory bodies. The concepts developed in the current phase (Phase 2) address the issues identified in Phase 1.

This memo is organized into three sections: a description of the concept development process including the development of the evaluation framework and concepts, evaluation methods used to evaluate the proposed alternative concepts, and the evaluation of the concepts.

Concept Development Process

Phase 2 of the Beltline Facility Plan began in April of 2009. Its purpose is to generate and evaluate potential solutions, and to identify several viable ideas for detailed study. Concepts were developed and will be evaluated with help from the public and local stakeholders, ODOT, City of Eugene, Lane Council of Governments, LTD, and Lane County.

Evaluation Framework

Before potential concepts or alternatives were developed, an evaluation framework was created to identify a process and set of criteria to evaluate potential alternatives that address the purpose statement mentioned above. The evaluation framework is based on project goals and objectives, and was developed before brainstorming potential improvements to encourage an open and unbiased evaluation process. The evaluation framework was created with input from the project's Project Management Team (PMT), Stakeholder Advisory Committee (SAC), and Project Steering Committee (PSC).

A "consumer reports" rating scale was used to compare alternative concepts. The scale is included below**:**

Rating

The concept addresses the criterion and/or makes substantial improvements in the criteria category

The concept partially addresses the criterion and/or makes some improvements in the criteria category

The concept neither meets nor does not meet intent of criterion. Alternative has no effect, or criterion does not apply

The concept does not support the intent of and/or negatively impacts the criteria category

Using the above rating method, a set of evaluation criteria was developed, consistent with the project goals and objectives as outlined in Phase 1 of the project. These criteria are intended to address the important elements of this project. They are listed below in no particular order; a weight is not intended to be applied to these various categories.

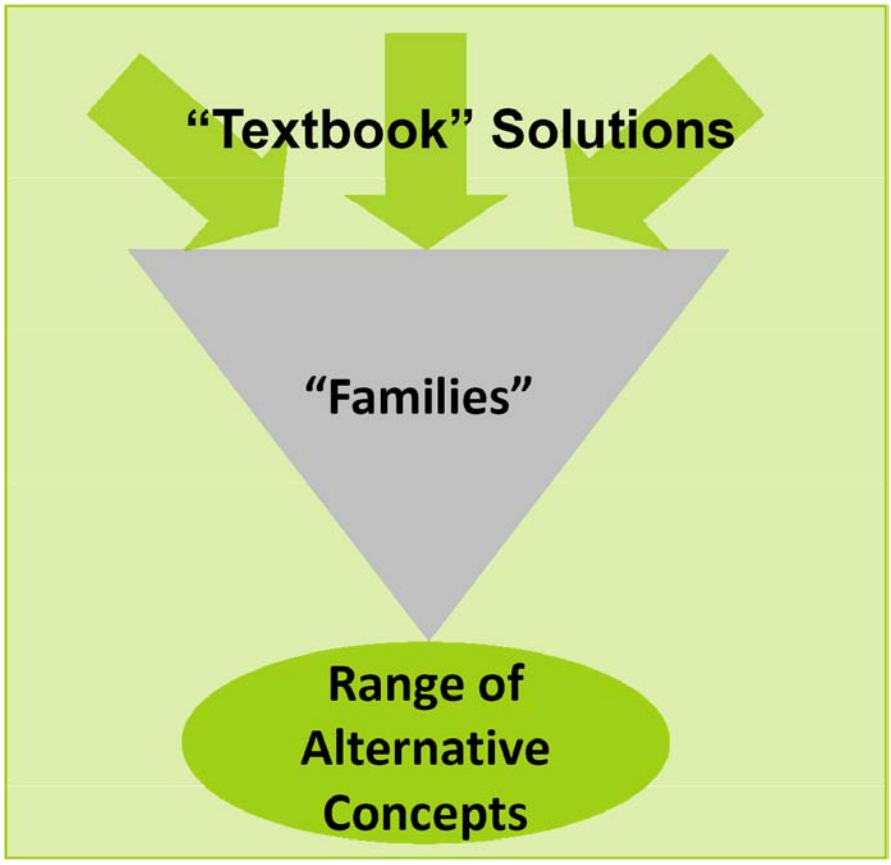
1. **Mobility, reliability and connectivity**
2. **Safety**
3. **Community livability and economic vitality**
4. **Environmental impacts**
5. **Cost effectiveness**

Creating Alternative Concepts

Alternative concepts were developed between July 2009 and December 2009 with input from the public, the PMT, PSC and SAC. Project alternative concepts were developed through a three step process:

1. "Textbook" Solutions - First, the project team identified the textbook solutions to the kinds of problems identified on the Beltline Highway.
2. Families of Concepts – Next, these general solutions were applied to the corridor to examine potential impacts each would have and to understand the acceptability of each approach.
3. Alternative Concepts - Finally, alternative concepts were developed that combined attributes of the families of concepts while minimizing unacceptable impacts. This process is shown in figure 1 and described in detail below.

Figure 1 Alternative Development Process



Textbook Solutions

Once the Evaluation Framework was agreed upon, the technical staff created high level, "textbook" solutions that would be typically used to address the issues found on facilities like the Beltline Highway, and bring it closer to current engineering standards and best practices.

The textbook solutions developed were: System Considerations, Beltline Highway Capacity, and Interchange Capacity.

System considerations textbook solutions consider how the street network can be improved to reduce congestion on the Beltline Highway. The system considerations for the family of concepts included were: Transportation System and Demand Management (TSM and TDM), network improvements, and additional river crossings.

Beltline Highway capacity textbook solutions include adding lanes to the highway. Additional lanes could include increasing the highway to a total of three basic lanes in each direction, adding auxiliary lanes for merging and weaving, or adding a collector-distributor roadway to remove merging and weaving from the facility and placing it on a separate roadway.

Interchange capacity textbook solutions strive to address the congestion and safety concerns found on the on- and off-ramps for the closely spaced study area interchanges. This includes upgrading the interchanges at all locations to bring them to current engineering

standards, removing selected interchanges or ramps to provide more space between interchanges, and add a partial interchange to draw traffic away from the existing congested interchanges.

Families of Concepts

The textbook solutions were discussed with the PMT, SAC, and PSC and further refined into families of concepts that could be specifically applied to the Beltline Highway.

These families include a Ramp Braid option, which would physically separate the on and off ramps on the Beltline Highway, a Collector-Distributor (C-D) road option which would remove the merge/diverge friction to a separate parallel roadway, and a Remove Ramps option which would close the River Avenue/Division Avenue on and off ramps. The SAC members and River Road Businesses agreed through discussion that the remove ramps concept would not be carried forward, as access should be maintained for the River Avenue businesses and technical analysis revealed fatal flaws in traffic operations on River Road due to diverted traffic if the River Avenue/Division Avenue on and off ramps were closed.

Additionally, the ramp braid concept was considered by the SAC to be "overbuilding" a solution on the Beltline Highway due to the large footprint required and potential business and residential impacts. The Ramp Braid family was altered to reduce impacts, and was presented again as lower-impact alternative concept.

In addition to these Highway family concepts, two interchange concepts were developed for the Delta Highway/Beltline Highway interchange, including a system service (flyover) concept similar to the I-5/Beltline Highway flyover, and a partial cloverleaf, which would reduce the loop ramps on the highway from three to two. The SAC and the PMT decided that the system-service concept for the Delta/Beltline Interchange would have major environmental impacts and create a large structure that might to out of context with the surrounding community, and agreed to set this concept aside.

Alternative Concepts

The alternative concepts are the culmination of input from the various advisory groups for the project, and attempt to address both technical concerns and community needs.

The Project Team noted that most of the family concepts require a larger footprint and structures, and developed a range of "low build" alternative concepts to evaluate alongside the higher build due to the reality that current transportation funding is scarce and projected to decrease within the next 20 years.

Three low build alternative concepts, along with two "medium build" concepts were added to the range to be evaluated to address the need for a less costly range of alternative concepts. The PMT, SAC, and PSC approved the full range of concepts prior to beginning the evaluation process.

Eleven alternative concepts were evaluated based on the evaluation framework:

- No-build

- TDM/TSM measures only
- Low Build Concept 1
- Low Build Concept 2
- Low Build Concept 3
- Improve Existing
- Local Arterial
- Auxiliary Lane
- Split Diamond
- Collector-Distributor
- Ramp Braid

Detailed descriptions of the alternative concepts being considered can be found in Appendix A.

Evaluation Methods

The goals were then used by the project team to evaluate the alternative concepts and identify the relative impacts and benefits of each alternative. Each goal has both objectives and measures. A rating scale was developed for each measure and the ratings for each measure will be summarized to a total rating for each objective and presented to the public. The goals, objectives, measures, and ratings are identified below:

Mobility, reliability and connectivity

Improve future mobility, reliability and connectivity within the study area, particularly on the Beltline Highway.

Objectives:

- Design for projected future traffic volumes as a result of future growth and land use changes
- Minimize congestion and optimize traffic flow on the mainline, in the interchange areas, and on critical study area roadways
- Provide transportation improvements that reduce trip length and potential travel times for travel modes within the study area including motor vehicles, freight, transit, bicycles and walking
- Provide improved connectivity across the Willamette River for motorists, bicyclists and pedestrians

Measures:

- Demand-to-capacity (D/C) – planning-level analysis regarding the ability of the transportation system to accommodate the potential vehicular demand on the Beltline Highway mainline, and on other critical study area roadways.

- Traffic operations for study area ramps and ramp terminal interchanges, as evaluated based on ramp spacing and/or eliminating or improving merge, diverge, and weaving maneuvers relative to the Beltline Highway
- Trip length and travel time between key origins and destinations for all modes in the study area
- Improve local connectivity for all modes

Measure	**Rating**
Demand to capacity (D/C) on the Beltline Highway mainline (Evaluated at the Willamette River bridge)	● D/C under 1.0 ◑ D/C between 1.0-1.4 (better than no build) ◍ No change in D/C from no build (~1.4) ○ D/C above 1.4 (Worse than no build)
Merge/diverge operations on the ramps/interchanges	● Merge/diverge is removed from the mainline ◑ Ramps/interchange operations generally are improved (increased spacing and/or improved geometry), but still merging/diverging on the mainline ◍ No change from no build ○ Ramps/interchanges are worse than the no build
Trip Length and Travel Time	● Reduced travel times and/or trip lengths for all types of trips using the Beltline Highway ◑ Some improvements to trip time and travel length for specific O/D pairs, such as local trips between Green Acres and Santa Clara ◍ No measurable change to system wide trip time and travel length ○ N/A
Connectivity for all modes	● New multimodal facilities ◑ New Highway connectivity – with ability to add an adjacent pedestrian and bicycle facility if the Willamette River Bridges are updated ◍ No new local connectivity ○ Worse connectivity than no build

Safety

Provide a transportation network that has the potential to increase safety for all modes.

Objectives:

- Improve Beltline Highway and interchange areas in the study area to increase safety for users and reduce crash frequency and severity, thereby improving reliability
- Consider the needs of emergency response vehicles

Measures:

- Places in the study area where the Beltline Highway or interchanges violate known engineering best practices or design guidelines as related to safety
- Reduce conflict points for motorists and between motorists and bicyclists or pedestrians
- Provide system redundancy and/or enhanced mobility for emergency response routes and vehicles

Measure	**Rating**
Places in the study area where the Beltline Highway or interchanges violate known engineering best practices or design guidelines	● Improvement to geometric deficiencies in multiple areas and movements ◑ Some improvement to geometric deficiencies ◍ Does not address geometric deficiencies ○ Worsens geometric deficiencies
Conflict points for bicyclists and pedestrians with motorists	Not applicable at this level of design. Further design may limit or decrease conflict points for bicyclists and pedestrians with motorists.
Conflict points between motorists on Beltline Highway	● Separates weaving, merging and diverging movements ◑ Removes weaving conflicts between Delta Highway loop ramp(s) ◍ No change ○ Increase conflict points
System redundancy and/or enhanced mobility for emergency response routes and vehicles	● New river crossing for use in event of bridge closure or updated Willamette River Bridges with auxiliary lanes or C/D roads ◑ No new river crossing capacity, but Beltline mainline capacity is added, enhancing emergency vehicle mobility ◍ No new river crossing capacity ○ N/A

Community livability and economic vitality

Support, sustain, and enhance community livability and protect the quality and integrity of residential and business areas near the corridor. Support or maintain the vitality of area businesses and communities.

Objectives:

- Support local and regional goals for mode choices (e.g. bicycle, transit, pedestrian or private vehicle)
- Consider positive and negative effects on adjacent residential and business areas
- Serve existing and planned land uses
- Accommodate freight movement
- Create a facility design that instills community pride

Measures:

- Minimize residential impacts
- Consistent with community and neighborhood goals (Metro Plan, TransPlan, Delta Ponds Vision, Rivers to Ridges Vision, River Road-Santa Clara Facilities Plan, Lane County TSP, RTP, City of Eugene Growth Management Plan, Whiteaker Specific Plan, and Willakenzie Area Plan)
- New or improved multimodal facilities
- Minimize business displacements
- Access to the interchange area businesses that is both safe and convenient
- Consistent with state planning goals

Measure	Rating
Impacts to residential properties	● N/A ◑ N/A ◉ No change ○ Some residential property impacts
Impacts to business properties	● N/A ◑ N/A ◉ No change ○ Some business property impacts
Consistency with community goals	● N/A ◑ More consistent with local goals ◉ No change ○ Less consistent with community goals
New or improved multimodal facilities	● New multimodal connectivity ◑ New highway connectivity ◉ No new local connectivity ○ N/A
Access to the interchange area businesses that is both safe and convenient	● N/A ◑ Access improvements in terms of improved geometry and maintained freeway access ◉ No change ○ N/A
State Planning Goal issues	● N/A ◑ State Planning Goals are enhanced ◉ No State Planning Goals are impacted ○ Would have State Planning Goal impacts

Environmental impacts

Provide a facility that avoids or minimizes adverse impacts to natural and social resources within the project area. In areas where impacts cannot be avoided, ensure that mitigation is likely to be feasible. Identify opportunities to enhance natural resource and recreational opportunities.

Objectives:

- Avoid or minimize impacts to the natural environment including rivers and water bodies, riparian zones, wetlands and habitat areas
- Minimize impacts to the community environment as described in the community livability and economic vitality goals
- Support local sustainability and greenhouse gas reduction goals
- Design features that enhance aesthetic appearance and augment the visual environment where possible
- Identify opportunities to increase or enhance park and recreational areas or natural resources.

Measures:

- Changes to system-wide vehicle miles traveled (proxy for GHG impact)
- Changes to system-wide vehicle delay (proxy for GHG impact)
- Impacts to wetlands and known habitats
- Impacts to parks and trails
- Impacts to Willamette Greenway
- Opportunity to integrate state sustainability goals into facility (e.g. construction reuse of materials, etc.)
- Impacts to cultural and historic resources

Measure	Rating
System wide Vehicle Miles Traveled (VMT, as measured in forecast regional travel demand model) Proxy for Greenhouse Gas emissions	● Significant decrease in system VMT relative to no-build (> 1%) ◑ Modest decrease in system VMT relative to no-build (< 1%) ◉ No change in system VMT relative to no-build ○ Modest increase in system VMT relative to no-build (< 1%)
System wide vehicle delay (VHD, as measured in forecast regional travel demand model) Proxy for Greenhouse Gas emissions	● Significant decrease in system VHD relative to no-build ◑ Modest decrease in system VHD relative to no-build ◉ No change in system VHD relative to no-build ○ Modest increase in system VHD relative to no-build
Impact to wetlands and sensitive habitats	● N/A ◑ Wetland areas are enhanced ◉ No wetland or habitat impacted ○ Would have wetland and habitat impacts
Impacts to parks and trails	Non differentiator; all have minor impacts to isolated pieces of West Bank Trail and trail on the east side of the river, which could be mitigated in the design phase.
Consistency with ODOT sustainability best practices	Cannot be evaluated at this time; sustainability goals focus on construction methods, which will be considered during the design and construction phase.
Impacts to historic and cultural resources	There are no known structures with historic status in the project area, nor are there known cultural resources. Any alternative would undergo a cultural inventory before construction.

Cost effectiveness

Provide solutions that are cost-effective and can be implemented over time.

Objectives:

- Provide solutions that can be implemented in phases that provide incremental benefit
- Provide timely and cost-effective project solutions that perform as designed throughout their expected design life
- Minimize ongoing operations and maintenance costs

Measures:

- Can be constructed in phases that provide incremental benefits
- Construction cost
- Operation and maintenance cost

Measure	Rating
Ability to be phased[1]	● N/A ◑ Project that can be phased ◉ One phase project that is lower cost ○ High cost that cannot be phased
Construction cost	Low – No new bridge structures required Medium – Some new bridge structures High – Major roadway/interchange reconstruction with new bridge structures
Operation and maintenance cost	Cannot be evaluated at this time

Concept Evaluation

The following table shows how each of the alternatives were evaluated based on the above measures.

[1] Phasing, by definition requires that each phase provides benefit and independent utility.

Discussion Draft - Beltline Alternatives Evaluation February 22, 2010

	No-Build	Low Build 1	Low Build 2	Low Build 3	Improve Existing	Local Arterial	Auxiliary Lane	Split Diamond	C-D	Ramp Braid
Mobility, reliability and connectivity										
Demand to capacity (D/C) ratio on the Beltline Highway mainline (evaluated at the Willamette River bridge)	○	○	○	◑	◑	◑	●	●	●	●
Merge/diverge operations on the ramps and interchanges	○	○	○	○	◑	○	◑	◑	●	●
Trip length and travel time	○	○	○	○	○	◑	◑	◑	◑	◑
Connectivity for all modes	○	○	○	○	○	●	●	●	◑	◑
Safety										
Places on Beltline Highway or interchanges that violate engineering best practices or design guidelines	○	○	○	◑	●	○	●	●	●	●
Conflict points for bicyclists and pedestrians with motorists	○	Cannot be evaluated at this time - dependent upon design								
Conflict points between motorists on the Beltline Highway	○	○	○	◑	◑	○	◑	◑	●	●
System redundancy and/or enhanced mobility for emergency response routes and vehicles	○	○	○	◑	◑	●	●	●	●	●
Community livability and economic vitality										
Impacts to residential properties	○	○	○	○	○	○	○	○	○	○
Impacts to business properties	○	○	○	○	○	○	○	○	○	○
Consistency with community goals	○	○	○	○	○	◑	○	○	○	○
New or improved multimodal facilities	○	○	○	◑	◑	●	●	●	◑	◑
Access to the interchange area businesses that is both safe and convenient	○	○	○	○	○	◑	◑	◑	◑	◑
State Planning Goal issues	n/a	Cannot be evaluated at this time - dependent upon design								
Environmental impacts										
System wide Vehicle Miles Traveled (VMT) as a proxy for greenhouse gas emissions	○	○	○	○	○	◑	○	○	○	○
System wide vehicle delay as a proxy for greenhouse gas emissions	○	○	○	○	◑	◑	◑	◑	◑	◑
Impact to wetlands and sensitive habitats	○	○	○	○	○	○	○	○	○	○
Impact to parks and trails	○	Non-differentiator, cannot be evaluated at this time								
Consistency with ODOT sustainability best practices	n/a	Cannot be evaluated at this time - will be considered during the construction phase								
Impacts to historic and cultural resources	○	A cultural inventory will be conducted before construction - no know historic or cultural resources in the direct project area								
Cost effectiveness										
Ability to be phased	n/a	○	○	◑	◑	○	◑	◑	◑	○
Construction cost	None	Low	Low	Medium	Medium	Medium	High	High	High	High
Operation and maintenance cost	Cannot be evaluated at this time									