

CHAPTER 2

PROJECT ALTERNATIVES

This chapter includes the following information regarding alternative development for the Fern Valley Interchange project:

- A description of the alternatives advanced for analysis in this EA; and
- A summary of the alternatives and options considered, but not advanced for further analysis.

Several groups have played key roles in helping to develop the Fern Valley Interchange project alternatives: the Project Management Team (PMT), Project Development Team (PDT), the Collaborative Environmental and Transportation Agreement for Streamlining (CETAS), Citizens Advisory Committee (CAC), and stakeholders (such as the general public and Tribal representatives). Their roles and membership are described in Chapter 5, Public Involvement and Agency Coordination.

In determining which alternatives to advance for this project, early concepts were considered at a general level to determine basic alignment, engineering, traffic and environmental considerations. The concepts most likely to solve the problem, have the least environmental and socioeconomic impacts, and meet conceptual design and traffic requirements were advanced for further consideration. Throughout the alternative development process, alternatives were evaluated in terms of how well they met the project's purpose and need, goals and objectives, and evaluation criteria. The process for developing these alternatives is described in Chapter 5, Public Involvement and Agency Coordination.

2.1 PROJECT ALTERNATIVES

Two alternatives are evaluated in this document: a No-Build Alternative and a Build Alternative. The proposed Build Alternative description is based on preliminary design concepts only. Projects normally have design changes during the final design phase—after the environmental process is complete and prior to construction.

State highway projects must be designed, constructed, operated, and maintained in accordance with State and Federal regulations, directives, safety standards, design standards, and construction standards. ODOT must meet applicable standards for alternative design (e.g., lane width, distance between intersections, signal locations, and traffic capacity). Exceptions to design standards are allowed as long as safety and the function of the facility are not compromised. Design exceptions are normally granted in situations where the design is close to standard (e.g., 2.8 miles between interchanges instead of the 3.0 miles required by the Oregon Highway Plan), but not in situations where the design is much further from meeting standard (e.g., 1.2 miles between interchanges instead of the 3.0-mile standard). These design exceptions help to provide flexibility in designing transportation facilities, are evaluated by design and traffic

engineers, and must be approved during final design if the Build Alternative is selected for construction. Design exceptions needed for the Build Alternative are specified under Section 2.1.2, Build Alternative.

2.1.1 No-Build Alternative

The No-Build Alternative is evaluated and documented to provide a basis for comparison with the Build Alternative. The No-Build Alternative means the proposed project would not be built. Routine maintenance would be continued and short-term minor safety improvement activities that support continued operation of the existing roadway would occur. Other projects in the area that are planned and programmed would be built.

The following projects, included in the fiscally constrained Regional Transportation Plan, would be built regardless of whether or not the Fern Valley Interchange is rebuilt:

- Realigning the OR 99/Fern Valley Road and Cheryl Lane intersections and upgrading the signal;
- Installing a new signal at the Fern Valley Road/N. Phoenix Road intersection;
- Widening the Bear Creek Bridge;
- Installing a new signal at the Fern Valley Road/Luman Road intersection;
- Providing bike lanes and sidewalks on 1st Street (Rose Street to OR 99 southbound), on 4th Street (Rose Street to Colver Road), on Bolz Road (OR 99 to Fern Valley Road), and on Colver Road (1st Street to the Phoenix southern UGB);
- Providing bike lanes on 4th Street (OR 99 southbound to OR 99 northbound), and on Rose Street (1st Street to 5th Street); and
- Constructing new streets with bike lanes and sidewalks on 3rd Street (existing terminus to OR 99 northbound) and Parking Street (OR 99 northbound to 3rd Street).

Additional information on the projects identified is listed in Chapter 3, Table 3-1, Other Transportation Projects Considered in Cumulative Impact Analysis.

The No-Build Alternative does not include any substantial land development in the interchange area and to the north between the Phoenix and Medford UGBs. This is because the limited capacity of the existing interchange would mean City of Phoenix and State of Oregon land use laws would strictly limit development. Section 3.2.2, Land Use Impacts, explains how City and State laws would constrain development. Regional growth would occur in the parts of the region where the roadway system has capacity to accommodate it.

2.1.2 Build Alternative

The Build Alternative being evaluated in this document is also known as the N. Phoenix Thru Alternative (see Figure 2-1). The Build Alternative generally follows a more north-south orientation than existing conditions. The Build Alternative is estimated to cost about \$72.1 million in 2012 dollars (including construction, right of way and utility

costs). The following description of the Build Alternative is divided in three parts: west of the interchange, the interchange, and east of the interchange.

West of Interchange

Figure 2-2 shows a more detailed view of the Build Alternative west of I-5. The key elements are provided in the bullets below.

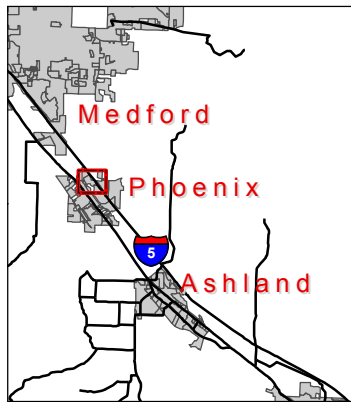
- From MP 11.07 to MP 11.34, OR 99 would be two lanes in each direction (except at intersections). Fern Valley Road would also be two lanes in each direction, but would turn into a one-way road just west of Bear Creek—westbound traffic would follow Fern Valley Road and eastbound traffic would use E. Bolz Road. Turn-lane configurations at the major intersections are shown in Figure 2-3.
- To avoid extensive right of way impacts to adjacent properties, travel lane widths on OR 99 in the project area would be reduced to 11 feet to help accommodate dual left-turn lanes at the OR 99/E. Bolz Road intersection. In addition, 5-foot shoulder widths and 1-foot shy distance¹ on OR 99 are proposed.
- The 2-lane Bear Creek Bridge (36 feet wide) would be replaced with a 4-lane bridge (100 feet wide).
- Bikes on Fern Valley Road and E. Bolz Road would be accommodated by 6-foot shoulders that would be designated by pavement markings for bike travel. Shoulder widths on OR 99 and in transition areas (e.g., when a 4-lane roadway transitions to a 2-lane roadway) would normally be five feet wide.
- OR 99, Fern Valley Road, and E. Bolz Road would have 6-foot sidewalks on both sides of the roadway.
- Coleman Creek Mobile Estates would have a new approach road from OR 99 (located northeast of Cheryl Lane), in addition to the existing approach road from Fern Valley Road (which would be used by westbound traffic).
- Bavarian Motel (located southeast of the OR 99/E. Bolz Road intersection) would have a new approach road south of its existing driveway.
- When the final design for the alternative is developed, some existing pavement may no longer be needed, and would therefore be removed upon completion of the project. Minimal pavement removal is anticipated west of I-5.

¹ “Shy distance” is the off-set distance required between a roadway barrier (e.g., curbs, medians, guardrail, concrete barrier) and the travel lane. This distance compensates for the users’ instinctive tendency to avoid the roadway directly adjacent to the barrier. This distance typically increases with the speed of adjacent vehicles and is required in addition to the standard width specified for the roadway shoulder or turn lane.



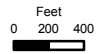
Map Features

- Roadway Alignment
- Interchange Alignment
- Traffic Signals

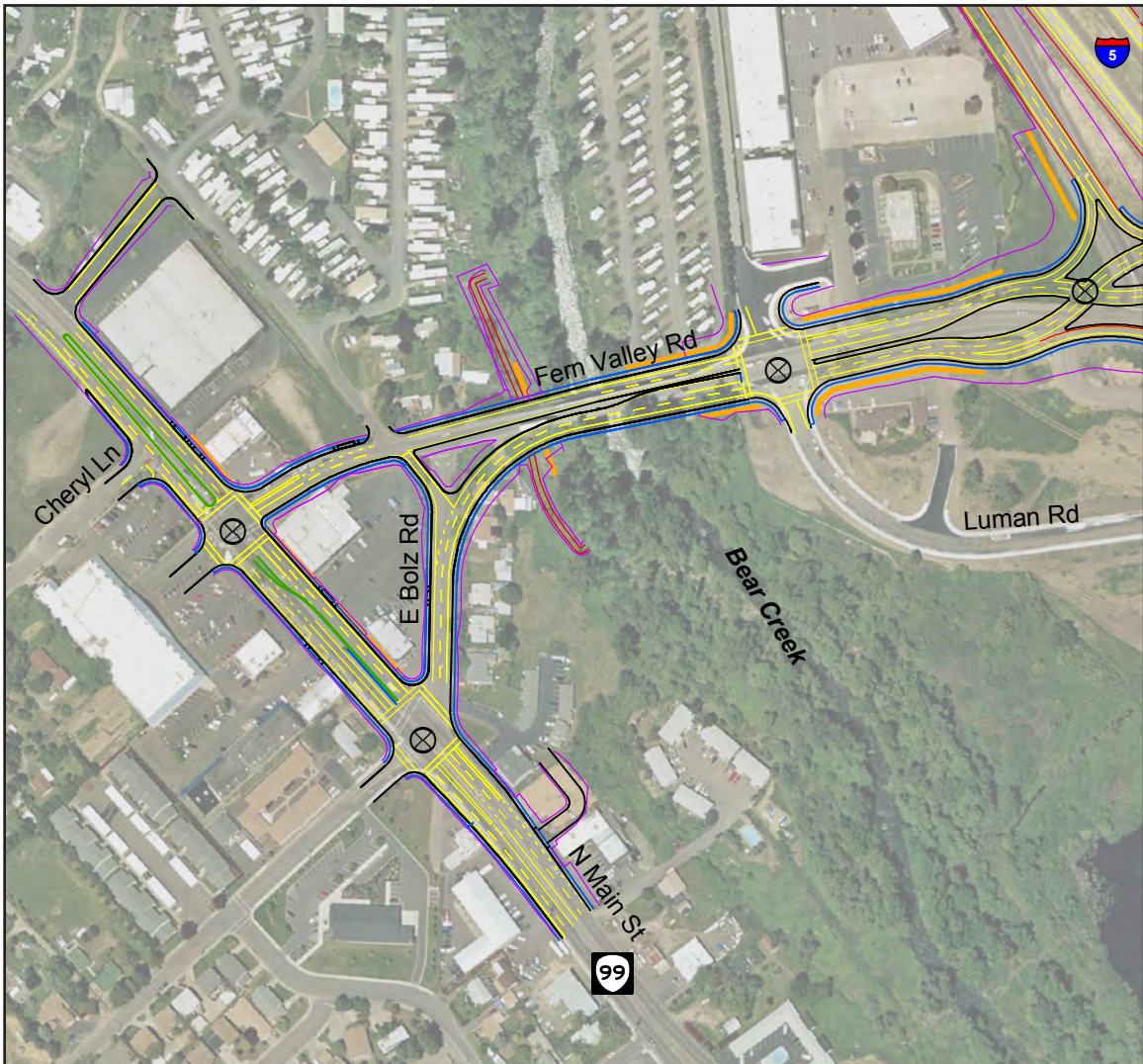


Build Alternative

Figure 2-1
February 2010

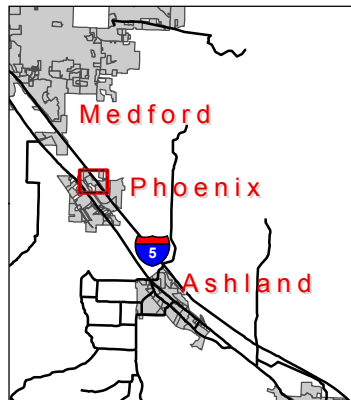


This figure reflects conceptual design, and is subject to change. As the project is refined, some changes may occur.



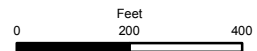
- Map Features**
- Median
 - Striping
 - Sidewalk
 - Slope
 - Edge of Asphalt
 - Curb
 - Retaining Wall (locations are approximate)
 - X Traffic Signal

Fern Valley Interchange



Build Alternative (West Detail)

Figure 2-2
December 2009



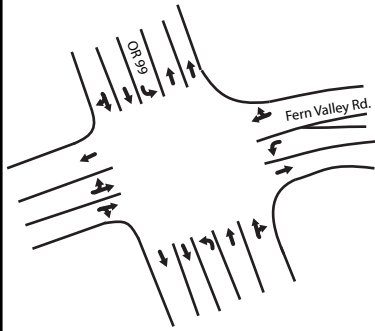
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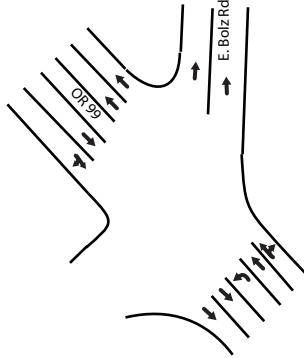
**Figure 2-3
Build Alternative Changes to
Major Intersections (West of I-5)**



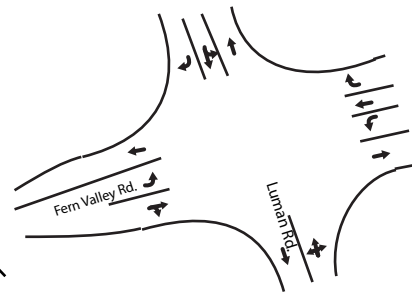
Existing Intersections



OR 99/Fern Valley Road

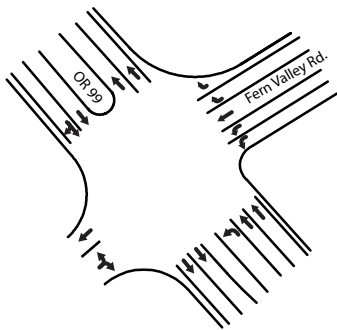


OR 99/E. Bolz Rd.

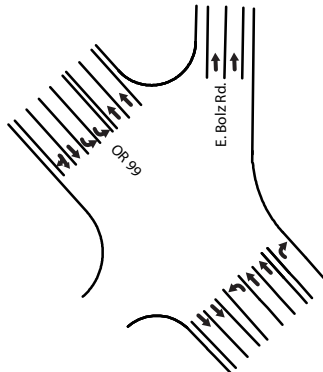


Fern Valley Rd./Luman Rd.

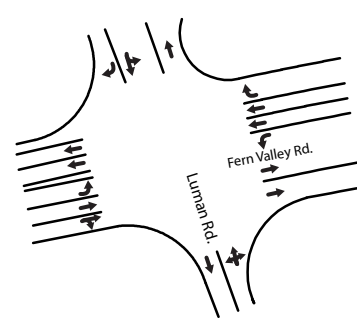
Build Alternative Intersections



OR 99/Fern Valley Road



OR 99/E. Bolz Rd.



Fern Valley Rd./Luman Rd.



Retaining walls may be installed at the following locations (see Figure 2-2; length and height are approximate):

- Along the east side of OR 99 to avoid slope impacts to businesses (500 feet long and one to four feet high)
- At the west end of the Bear Creek Bridge to avoid slope impacts to the multi-use path (190 feet long and 22 feet high)
- At the northeast corner of the Bear Creek Bridge to avoid slope impacts to the RV park (200 feet long and 22 feet high)
- At the southeast corner of the Bear Creek Bridge to avoid slope impacts to the riparian area (100 feet long and 22 feet high)
- At the northeast corner of Fern Valley Road and Luman Road to avoid slope impacts to the mall parking lot (450 feet long and 15 feet high)
- At the southeast corner of Fern Valley Road and Luman Road to avoid slope impacts to the parking lot (300 feet long and 11 feet high)
- At the west end of the I-5 structure (375 feet long and 30 feet high) to avoid impacts to the Bear Creek Greenway

The Build Alternative west of I-5 would require design exceptions for the following:

- Reduced interchange spacing distance (2.8 miles instead of the 3-mile standard)
- Reduced shoulder width on OR 99 (5 feet instead of the 6-foot standard);
- Reduced shy distance to the median curb on OR 99 (1 foot instead of the 2-foot standard); and
- Substandard dual left-turn lane width on OR 99 (22 feet instead of the 24-foot standard)

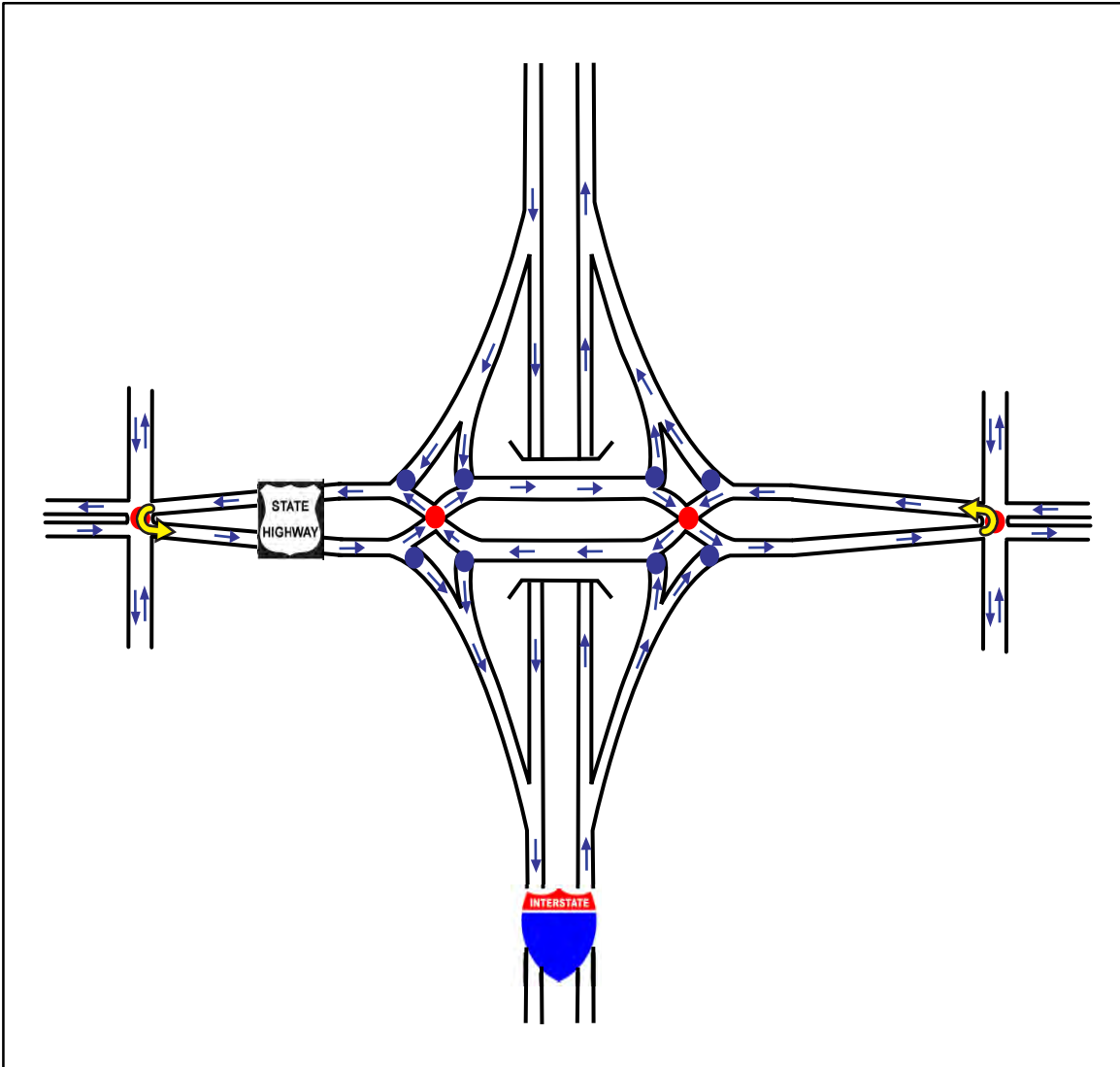
Minimum lane widths are being used on OR 99 in order to minimize impacts to adjacent development. This design exception would be requested from ODOT's Traffic/Roadway Section during final design of the Build Alternative, if selected for construction.

ODOT sometimes grants design exceptions for minor variances from applicable engineering standards, provided that the exception would not compromise safety or system operations. The design exceptions for the Build Alternative were determined to fall into this category. If alternatives would require design exceptions, but would compromise safety or system operations, they were not advanced for further consideration. Further explanation of these design exceptions is provided in Appendix A, Alternatives Considered But Not Advanced.

Interchange

The interchange would be a newer interchange design concept, the Crossing Diamond Interchange (CDI) (also known as the Diverging Diamond Interchange).² With this type of interchange, drivers are directed to the opposite side of the bridge to cross the interstate (see Figure 2-4). This allows drivers to make “free” left turns, without stopping, onto the interchange ramps. The experience is similar to driving on a one-way street.

² This is a newer interchange design, and would be the second CDI in the U.S. and the first CDI in Oregon.
Chapter 2: Project Alternatives *Page 2-7*
Fern Valley Interchange Environmental Assessment



Map Features

- Traffic Signal
- Ramp Terminal
- Traffic Flow
- ↪ Potential U-Turn

Source: ODOT, URS Corporation

**Crossing Diamond
Interchange Traffic Flow**

Figure 2-4
December 2009



This figure reflects conceptual design, and is subject to change. As the project is refined, some changes may occur.



This design concept is very efficient, and has the advantage of a narrower width than the conventional diamond interchange design concept; thus the CDI would result in less right of way impacts. CDIs move traffic more quickly than other interchanges because CDIs reduce the number of places where traffic stops; with a CDI, there are only two places where traffic stops compared with three or more stops required with other interchange types). In some cases, the CDI cuts the volume-to-capacity (v/c) ratio in half.

In addition, the CDI is anticipated to result in a significant improvement in safety—up to a 50% reduction in crashes since there are no left turns crossing opposing traffic.

Bikes would be safely accommodated on the CDI by 6-foot shoulders at most locations; the shoulders would be designated by pavement markings for bike travel (Some locations in transition areas may include 5- to 8-foot shoulders.) Bikes would travel on the shoulders adjacent to traffic using the same travel patterns as vehicular traffic. Pedestrian movement on the CDI would be on 6-foot sidewalks up to the signals at the ramp terminals. At the signals, pedestrians would cross the ramps and Fern Valley Road in designated crosswalks which lead to the center of the CDI, where the pedestrians would be protected by barriers while crossing over the structure.

The new interchange would generally follow the existing alignment of Fern Valley Road, except at the east end, where the alignment would be shifted slightly to the north. Signals would be located at both the west and east interchange ramp terminals. The CDI contains large median areas to safely separate opposing traffic lanes. There would be two lanes in each direction for the CDI.

A deviation from *Oregon Highway Plan* (OHP) spacing standards would be required for the new interchange ramp terminals because the spacing distance between the ramp terminals and the first local roads (both west and east of the interchange) is substandard. The design standard for the distance from the ramp terminals to the first roadway connection is 1,320 feet. With the Build Alternative, the western ramp terminal would be about 540 feet to the nearest roadway west of I-5 (Luman Road)—780 feet less than standard. The eastern ramp terminal would be 850 feet to the nearest roadway east of I-5 (Grove Way/Extended S. Phoenix Road)—about 470 feet less than standard. These exceptions would not adversely affect the operational and safety intent of the applicable standards. While not the ideal configuration, traffic analysis has shown that this configuration would still function within standards in the design year. These exceptions would be requested from ODOT during final design of the Build Alternative, if selected for construction.

The Build Alternative would require design exceptions to the *Highway Design Manual* Interstate v/c standard (0.75) for the following highway sections:

- Southbound I-5 mainline north of the Fern Valley Interchange (v/c = 0.76)
- Southbound I-5 mainline south of the interchange (v/c = 0.77)
- Northbound I-5 mainline south of the interchange (v/c = 0.80)
- Southbound on-ramp merge (v/c = 0.81)
- Southbound off-ramp diverge (v/c = 0.81)
- Northbound off-ramp diverge (v/c = 0.82)










East of Interchange

Figure 2-5 shows a more detailed view of the Build Alternative east of I-5. The key elements are described in the bullets below.

- East of I-5, the Build Alternative would turn north just east of the interchange, and reconnect with existing N. Phoenix Road near Campbell Road. S. Phoenix Road would be extended directly north of the existing Fern Valley Road/N. Phoenix Road intersection, and turn west to connect with Realigned N. Phoenix Road directly across from Grove Way.
- Realigned N. Phoenix Road would be two lanes in each direction until it tapers to reconnect to existing N. Phoenix Road near Campbell Road. Existing Fern Valley Road would be one lane in each direction. Extended S. Phoenix Road would be one lane in each direction with a center turn lane. Grove Way would be one lane in each direction with a center turn lane at the intersection with Realigned N. Phoenix Road. Turn-lane configurations at the major intersections east of I-5 and the Extended S. Phoenix Road cross-section for the Build Alternative are shown in Figure 2-6.
- Bikes on Realigned N. Phoenix Road, Extended S. Phoenix Road, and existing Fern Valley Road would be accommodated on 6-foot shoulders that would be designated by pavement markings for bike travel. (Some locations in transition areas may include 5 to 8-foot shoulders.)
- All roads affected by the project east of the interchange would have 6-foot sidewalks on both sides of the roads.
- Most properties along existing N. Phoenix Road (west of the new alignment) would use a new approach road via Grove Way. Properties east of I-5 in the project area currently use Fern Valley Road and N. Phoenix Road as their approach road.
- Approach roads to developable properties north of Fern Valley Road would be via Extended S. Phoenix Road.
- Short sections of pavement may be removed from existing N. Phoenix Road north of the urban growth boundary (UGB), where not needed for approach roads.
- Retaining walls may be installed at the following locations (see Figure 2-5; length and height are approximate):
 - At the east end of the I-5 structure (325 feet long and 30 feet high)
 - On the north side of the northbound on-ramp to avoid impacts to the Home Depot parking lot (900 feet long and 20 feet high)

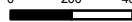





Map Features

- | | |
|---|---|
|  Median |  Retaining wall
(locations are approximate) |
|  Striping |  Traffic Signal |
|  Sidewalk |  Urban Growth Boundary |
|  Slope | |
|  Edge of Asphalt | |
|  Curb | |

**Build Alternative
(East Detail)**

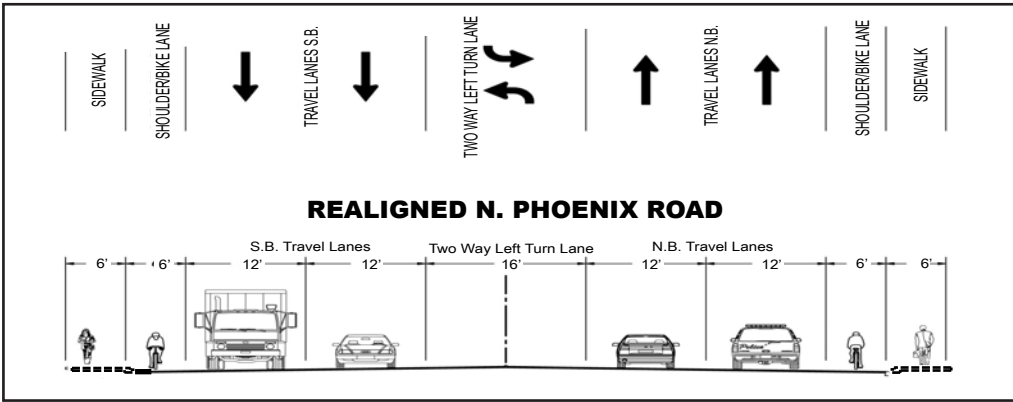
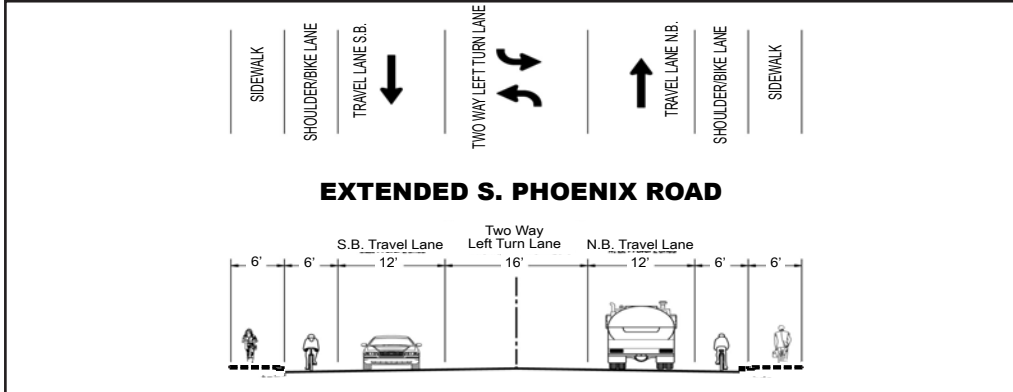
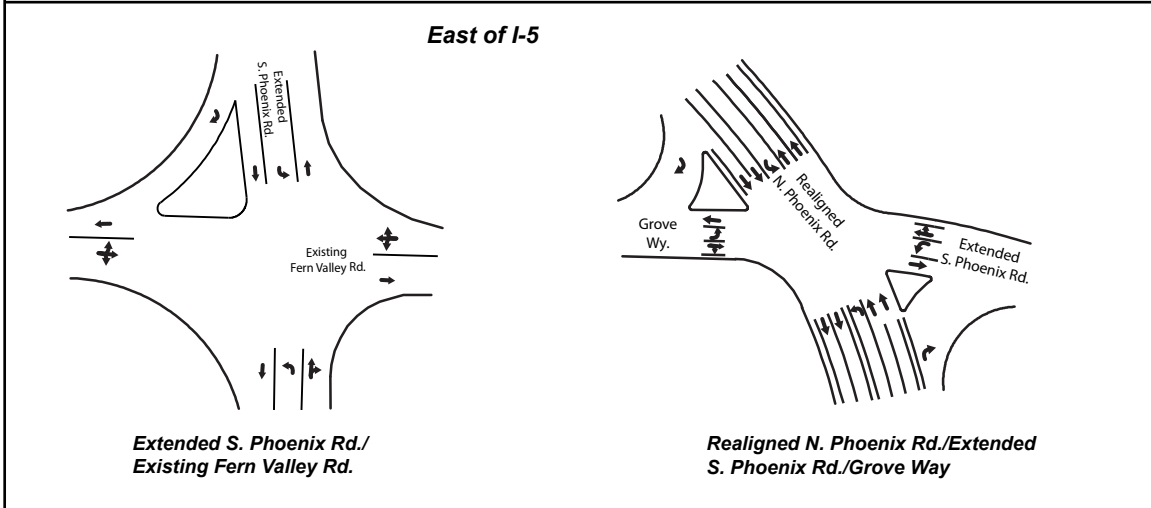
Figure 2-5
December 2009

0 Feet 400





This figure reflects conceptual design, and is subject to change. As the project is refined, some changes may occur.



Figure 2-6
Build Alternative:
Major Intersections and Cross-Sections
(East of I-5)



2.2 Interchange Area Management Plan

High traffic volumes can overload an interchange, using up available traffic capacity so the interchange no longer functions effectively. In order to ensure interchanges function as long as possible, state administrative rules require development of an Interchange Area Management Plan (IAMP) when there would be a major modification to an existing interchange—which is the case for the Fern Valley Interchange project.³ IAMPs include tools to help manage traffic and traffic-generating land uses in developing areas.

The Build Alternative includes an IAMP, which ODOT developed in cooperation with the City of Phoenix (see the IAMP boundaries in Figure 2-7). The IAMP is intended to:

- Preserve the capacity of the proposed interchange for at least the first 20 years of its design life, and the capacity of Fern Valley Road, OR 99, and N. Phoenix Road in the vicinity of the interchange.
- Ensure the safe and efficient operation of the interchange and connecting roadways, and protect the function of the interchange in the transportation system.

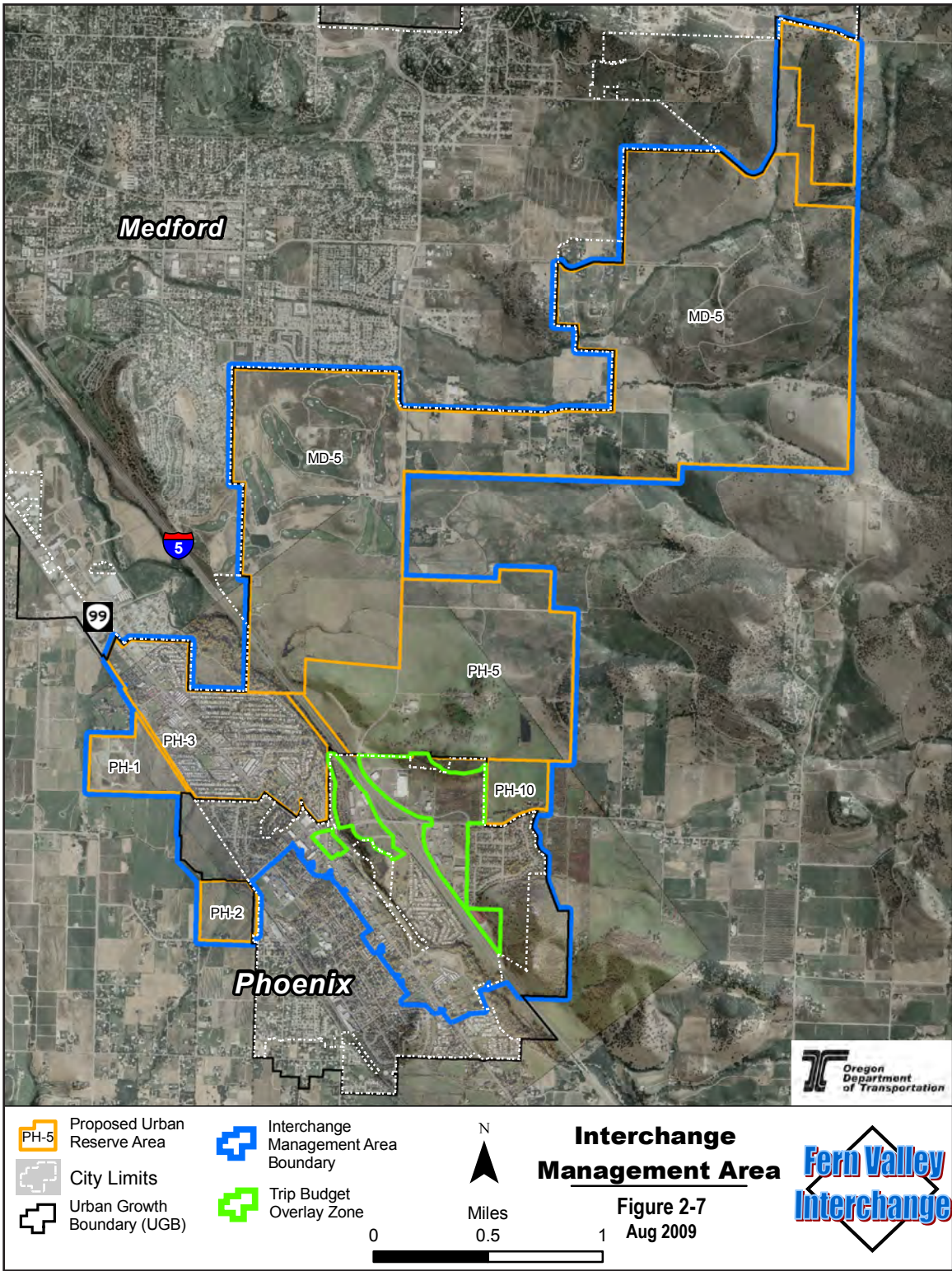
Although specific measures to be included in the IAMP have not been adopted in final form, the measures being considered are intended to:

- Limit the extent of land uses that generate high rates of motor vehicle trips in the interchange area (e.g., fast-food restaurants, discount club stores, and discount “superstores”).
- Apply specific transportation system management (TSM) actions and transportation demand management (TDM) actions. TSM addresses the operation of the roadway system, transit system, and facilities for bicycles and pedestrians. TDM seeks to reduce peak-hour motor vehicle trips by encouraging people to make trips using alternatives to single-occupant motor vehicles or during off-peak times.
- Limit trip generation outside the interchange area if necessary to meet mobility performance standards and preserve interchange capacity.

ODOT worked with the City of Phoenix to develop measures that would be acceptable to the community and meet the obligation of IAMPs to protect interchange performance. ODOT is seeking City of Phoenix adoption of the IAMP because only the City (and not ODOT) could implement most of the management measures proposed in the IAMP. The Oregon Transportation Commission would then adopt the IAMP into the *Oregon Highway Plan* (OHP). Below are the principal measures proposed in the IAMP. These measures may be altered or dropped and other measures added prior to final adoption. The Phoenix Planning Commission has recommended adoption of the IAMP, and the City Council is formally considering the IAMP for adoption.

The IAMP includes the measures listed below in Section 2.2.1 Land Use Measures; Section 2.2.2 Transportation System Management Measures; and Section 2.2.3 Transportation Demand Management Measures.

³ Oregon Administrative Rule (OAR) 734-051-0155(7)



2.2.1 Land Use Measures

Trip Budget Overlay Zone

This measure would allow no more than 2,219 new motor vehicle trips⁴ to be generated by new development in the overlay zone (shown in Figure 2-7). This is the number of additional trips new development could add without causing traffic volumes at the OR 99/Fern Valley Road intersection to exceed the applicable v/c standard. The IAMP would allocate these trips to land parcels in the overlay zone proportionately to each parcel's net area available for development. In combination with trips generated by existing development on a parcel, these allocations equal each parcel's "parcel budget." Development or redevelopment on each parcel would not be allowed to generate more motor vehicle trips than in its parcel budget. Parcels subject to the overlay zone trip budget may transfer trips to another parcel within the overlay zone, if the transferring parcel does not use its full allocation of trips.

Capacity Expansion and Retention

The purpose of this measure is to reduce the extent to which limitations on land development are necessary to prevent traffic volumes from exceeding applicable performance standards. As part of the Build Alternative, ODOT will retain the southbound right-turn lane at the S. Phoenix Road/Fern Valley Road intersection. The City will require as a condition of planning approval that land developers pay to implement the traffic capacity expansions below when traffic impact studies indicate that they are needed to meet applicable performance standards during the planning period. Without these capacity expansions, traffic volumes are forecasted to violate applicable mobility performance standards within the planning period.

- A second westbound left-turn lane at the intersection of N. Phoenix Road and S. Phoenix Road Extension
- A four-way stop at the intersection of Fern Valley Road and S. Phoenix Road

The City of Phoenix or ODOT may require land developers to pay for or both pay for and implement capacity expansions in addition to the ones listed above.

ODOT Adoption of Plan and Code Components

ODOT would adopt key components of the *Jackson County Comprehensive Plan* and *Jackson County Land Development Ordinance* as part of the IAMP. This would enhance ODOT's ability to work with Jackson County to avoid plan or ordinance amendments that would cause violations of mobility standards at the OR 99/Fern Valley Road intersection or other intersections in the interchange area.

⁴ "Motor vehicle trips" here means trips between 4 p.m. to 5 p.m. on weekdays.

South Valley Transportation Strategy

The City of Phoenix and ODOT would commit to working with Jackson County and the Cities of Medford, Talent, and Ashland to formulate a strategy to avoid traffic from outside Phoenix causing congestion on the interchange, N. Phoenix Road, Fern Valley Road, and OR 99.

Alternative Mobility Standard at I-5 Ramp Terminal Intersections

ODOT would apply a stricter mobility performance standard to the ramp terminal intersections if traffic is caused by commercial or residential development rather than if caused by industrial or export service development. Export service development means facilities for the provision of services to customers or clients primarily located outside the region. The reason the stricter mobility performance standards would apply to commercial or residential development is because of these uses tend to generate higher volumes of traffic. Mobility standards would be applied at the time of a land use change (i.e., change in zoning/plan designation). Land use changes could occur without mitigation up to a v/c of 0.75. Between a v/c of 0.75 and 0.85, only changes to industrial land use would be allowed without mitigation. With a v/c 0.86 and above, mitigation would be required for all land use changes. For example, if the v/c reached the 0.75 threshold (the v/c for residential/commercial land uses), then no additional land use changes could be made without additional improvements to the interchange. The only land use changes that could occur otherwise would be to industrial uses.

Building Setback Requirements on OR 99

The City of Phoenix would require new buildings along OR 99 north of the couplet to the city limits to be set back 15 feet from the right of way. This would reduce cost and disruption if OR 99 needs to be widened in the future. The Jackson County Land Development Ordinance already requires a 20-foot setback north of the city limits.

2.2.2 Transportation System Management Measures

Future Bus Transfer Sites and Bus Stop Locations

ODOT and Phoenix would work with the Rogue Valley Transit District (RVTD) to identify bus transfer sites and bus stop locations. RVTD currently uses OR 99 as its route through Phoenix; RVTD does not have a route that traverses Fern Valley Road or N. Phoenix Road. RVTD does not have specific, near-term plans for the additional lines or bus stops. These would be part of a second tier priority in its 10-year capital plan and could be considered in the future if funding becomes available. The design for potential transfer sites has not been completed. If additional land is available from right of way

acquired for this project, RVTD and ODOT could evaluate those properties for future bus transfer sites.

Shared Park-and-Ride Lots

ODOT and Phoenix would help RVTD identify and secure shared park-and-ride lots near the interchange. At shared park-and-ride lots, a property owner allows bus riders to park. Such properties are often churches or shopping centers that have excess parking capacity between commute hours. As with bus transfer site locations, RVTD and ODOT could evaluate additional land available from right of way acquired for this project to determine whether those properties would be suitable for park-and-ride lots.

Other Transportation System Management Measures

The following transportation system management measures are also incorporated into the Build Alternative:

- One-way streets (Fern Valley Road to be westbound only from the Fern Valley Road/E. Bolz Road intersection to OR 99, and E. Bolz Road to be eastbound only)
- Signal synchronization (to be developed during final design)
- Parking removal along E. Bolz Road

2.2.3 Transportation Demand Management Measures

Motor Vehicle Trip Reduction Requirements and Programs

Through the IAMP adoption, the City of Phoenix would require that commitments to reduce motor vehicle trips in applications for amendments to the comprehensive plan and zoning map and for partitions, subdivisions, site design approvals, and conditional use permits be made conditions of approval. Examples would be preferred parking for employee carpools, support for employee telecommuting, bicycle parking facilities, and off-peak shift times.

2.3 ALTERNATIVES CONSIDERED BUT NOT ADVANCED

A wide variety of interchange types, connecting roadway alignments, and highway cross-sections were evaluated throughout the alternative development process. About 30 design concepts were considered—some with mix-and-match options. A summary of the project development process is provided in Chapter 5, Public Involvement and Agency Coordination. The following discussion summarizes the general types of alternatives considered and the key reasons for not advancing these alternatives for further study in

this EA. Detailed descriptions and maps of the alternatives considered throughout the process, and the reasons they were not advanced, are provided in Appendix A.

2.3.1 Alternative Alignment Concepts

As indicated in Chapter 1, Purpose of and Need for Action (Section 1.6, Criteria for Determining Range of Alternatives), potential alternatives went through a two-level evaluation process based on criteria developed by the project teams. If an alternative did not meet the Purpose and Need, it was not advanced for further evaluation. Alternatives that met the screening criteria were considered to meet the project Purpose and Need and were then further evaluated using the evaluation criteria outlined below. Those alternatives that did not meet the following screening criteria were considered to not meet the project Purpose and Need and were dismissed from further consideration.

- **Screening criteria:** Each alternative concept was first evaluated through the filter of screening criteria. Screening criteria are intended to determine if alternatives would meet the Purpose and Need for the proposed project. These screening criteria focus on important transportation design, traffic, safety, and land use criteria that must be met for an alternative to be considered feasible. An alternative must meet these criteria to be considered feasible; however, alternatives that came very close to meeting the screening criteria were considered feasible if they could obtain approvals for minor deviations from the applicable criteria. These approvals (design exceptions) are discussed in Appendix A, Alternatives Considered But Not Advanced. The following screening criteria, discussed in Appendix A, were applied to each alternative under consideration:
 - ***Meet capacity (v/c ratio) standards at key locations for the 20-year design period.*** This criterion is focused on reducing congestion and improving operational conditions in the project area.
 - ***Meet roadway design standards and spacing requirements.*** Roadway and interchange design standards (including spacing requirements) are specified in the *Oregon Highway Plan, Highway Design Manual*, and applicable jurisdictional standards. Design standards help to ensure safety and the efficient operation of the transportation system.
 - ***Provide standard bike and pedestrian facilities.*** Bike facilities are considered acceptable if they provide 5-foot minimum width.
 - ***Improve safety within the project area.*** Safety is best met by ensuring close adherence to design and spacing standards; minimizing traffic, pedestrian, bicycle and transit conflicts; and reducing congestion.
 - ***Be consistent with the Statewide Planning Goals.*** Alternatives were evaluated to determine if the alternative would require exceptions to Oregon's Statewide Planning Goals. There are 19 Statewide Planning Goals, which address a range of planning, environmental, economic, and social values. State of Oregon administrative rules (OAR 660-012) establish standards for when urban-level transportation improvements outside UGBs are exempt from goal exceptions and what must be demonstrated to qualify for exceptions. For this project, some alternatives impacted EFU property outside the UGB, potentially requiring an

exception to Statewide Planning goal #3, Agriculture (OAR660-012-0070). These alternatives were analyzed and dismissed if they had a greater impact on EFU versus other alternatives that met the Purpose and Need of the project.

- *Address off-system improvements to reduce interchange congestion, if needed.*
- *Include a safe crossing of Bear Creek that can handle anticipated traffic capacity.*

Nineteen alternative concepts did not meet the project's Purpose and Need as identified through the screening criteria.

- **Evaluation criteria**, the second filter, were derived from the goals and objectives developed for the project. An alternative did not have to meet all of these criteria, but the criteria helped to evaluate how alternatives compared to each other in terms of potential impacts and benefits. The evaluation criteria generally fall into two categories: environmental impacts and social and economic impacts. Environmental criteria included the alternative's impacts to wetlands, riparian habitat, historic properties and air quality. Social and economic criteria included impacts to existing residences and businesses, impacts to the Bear Creek Greenway, and providing efficient movement of freight and school buses. The evaluation criteria are discussed in Appendix A, Alternatives Considered But Not Advanced.

Ten alternative concepts would have resulted in high levels of adverse impacts and were not advanced because the Build Alternative met the Purpose and Need, but had fewer adverse impacts.

2.3.2 Interchange Types

Five major interchange types were considered in developing the project alternatives: single point urban interchanges (SPUI), split diamond interchanges, regular diamond interchanges, diamond interchanges with loop ramps (partial cloverleaf interchanges), and crossing diamond interchanges (CDI). The interchange types are described below to provide a basic understanding of the types of interchanges considered throughout the process. The reasons for dismissal of particular alternatives are provided in Appendix A.

- Nine SPUI alternatives were considered; none were advanced into this EA. SPUI interchanges have ramps that are very close together with one traffic signal controlling all traffic movements, thus enabling concurrent opposing left turns, which increases the capacity of the interchange. The SPUI interchange design was created to help move large volumes of traffic through limited amounts of space safely and efficiently. SPUI interchanges would have minimized the interchange footprint, but were associated with wider cross-sections (more travel lanes) on the interchange connections with state, county and local roads. Major impacts to adjacent businesses would have occurred because SPUIs would have required widening OR 99 in order to accommodate the higher traffic volumes that these types of interchanges can handle.



Single Point Urban Interchange

- One split diamond interchange was evaluated. This type of interchange would have provided northbound on-ramps and southbound off-ramps separated from the northbound off-ramps and southbound on-ramps by an extensive system of frontage roads. This type of interchange provides a good system of approach connections to businesses and residential areas, but requires a large amount of right of way to accommodate what is essentially two interchanges.



Split Diamond Interchange

- Fourteen regular diamond interchanges were considered. These types of interchanges typically require a substantial amount of right of way and, as with other interchange styles, can result in road connections that have substantial impacts to existing or developable properties and to traffic issues these road connections create in the local transportation system. In most cases, this interchange type did not adequately handle anticipated traffic volumes.



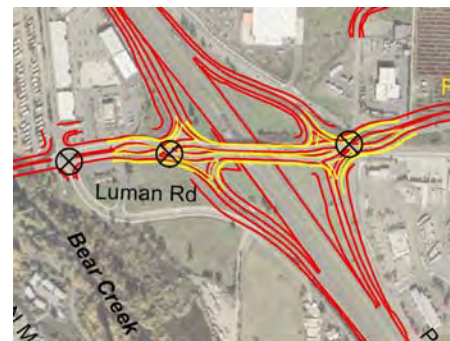
Regular Diamond Interchange

- Five diamond interchanges with various loop ramp configurations were considered. These result in similar impacts compared with the regular diamond interchanges, but require even more right of way in order to construct.



Loop Ramp Configurations

- Two Crossing Diamond Interchanges (CDIs) were considered. One CDI was forwarded into the EA as the Build Alternative and one CDI was not advanced due to statewide goal exception issues. CDIs provide for minimal disruption to traffic flow because turning movements do not cross traffic. Although both CDIs would not have fully met spacing standards from the ramp terminal to the next intersections east and west of I-5, both alternatives would have met applicable operational and safety design standards. The CDI interchange type is discussed in Section 2.1.2, Build Alternative, in this chapter.



Crossing Diamond Interchange

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