# CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction ................................................. 1</td>
</tr>
<tr>
<td>2</td>
<td>Planning Process ............................................. 3</td>
</tr>
<tr>
<td></td>
<td>Project Management ........................................ 3</td>
</tr>
<tr>
<td></td>
<td>Public Involvement ......................................... 3</td>
</tr>
<tr>
<td></td>
<td>Goals and Evaluation Criteria ........................... 3</td>
</tr>
<tr>
<td></td>
<td>Existing and Future Conditions Review ................ 5</td>
</tr>
<tr>
<td></td>
<td>Development and Evaluation of Alternatives .......... 6</td>
</tr>
<tr>
<td>3</td>
<td>Recommendations .............................................. 7</td>
</tr>
<tr>
<td>4</td>
<td>Conceptual Design of Select Components ............... 11</td>
</tr>
<tr>
<td>5</td>
<td>Implementation ................................................ 22</td>
</tr>
<tr>
<td></td>
<td>Conceptual Level Cost Estimates ......................... 22</td>
</tr>
<tr>
<td></td>
<td>Funding ......................................................... 23</td>
</tr>
<tr>
<td></td>
<td>Phasing ......................................................... 23</td>
</tr>
<tr>
<td></td>
<td>Next Steps ..................................................... 24</td>
</tr>
</tbody>
</table>

**Tables**

1. Evaluation Criteria, Objectives, and Performance Measures........4
4. Potential Funding Sources ........................................ 24

**Figures**

1. Murphy Road Corridor Study Area ..................................1
2. Project Timeline .......................................................2
3. Public Open House (April 2007) .....................................3
4. Existing Conditions Field Review ................................ 5
5. Suggested Cross Section of Murphy Road (west end) ...........7
6. Sample Roundabout Intersection ......................................8
7. Sample Signalized Intersection .......................................8
8. Sample Center Lane Used for Other Purposes ....................9
9. Suggested Cross Section of Murphy Road (east end) ............9

**Appendixes (Located in Volume II)**

A. Public Involvement Documentation
B. Plan and Policy Review
C. Traffic Methodology
D. Existing Conditions
E. Future Conditions and Deficiencies
F. Sensitivity Analysis Test
G. Preliminary Cost Estimates and Financial Plan
H. Alternative Development Evaluation and Evaluation Framework
I. City Council Action
Project Staff

**CITY OF BEND**

Nick Arnis, Transportation Engineering Manager (Project Manager as of 06/2007)
Ken Gould, Project Engineer
Ken Fuller, Public Works Director
Deborah Hogan, Public Involvement Lead
Peggy Spencer, Administrative Assistant

**CH2M HILL**

Dave Simmons, PE, Project Manager
Billy Adams
Theresa Carr, AICP
Diane Kestner
Brandy Steffen
Jose Vasquez, PE
Kathryn Westcott
Tony Woody, PE

Technical Advisory Committee

Nick Arnis, Bend Public Works Department – Transportation Division
Judy Barnes, Central Electric Cooperative
Sandi Baxter, Bend Police Department
Rod Carlile, Cascade Natural Gas
Tyler Deke, Bend Metropolitan Planning Organization
Paul Eggleston, Bend-Lapine School District
Ken Gould, Bend Public Works Department – Engineering Division (until 06/2007)
Dan Graber, Bend Public Works Department – Engineering Division
Tom Hickmann, Bend Public Works Department – Water and Sewer Division
Deborah Hogan, Bend Public Works Department – Engineering Division (until 12/2006)
Dave Knitowski, Bend Community Development Department
Doug Koellermeier, Bend Fire Department
Michael Magee, Bend Public Works Department – Engineering Division
Gary Marshall, Bend Fire Department
Mike Miller, Bend Public Works Department – Capital Improvements and Master Plans
Paul Rheault, Bend Public Works Department – Water and Sewer Division
Wendy Robinson, Bend Community Development Department
Jason Wick, Avion Water
Jim Wodrich, Bend Public Works Department – Engineering Division
1 Introduction

The Murphy Corridor Refinement Plan addresses key transportation issues along the Murphy Road corridor in southern Bend (Figure 1). The study area for this plan includes Murphy Road between 3rd Street to the west and 15th Street to the east. Currently, Murphy Road operates as a two-lane roadway between SE 3rd Street and Brosterhous Road.

The objectives of the Murphy Corridor Refinement Plan are as follows:

- Explore the need for and opportunities to extend Murphy Road to the east (extensions to 15th Street and 27th Street were explored).

- Design needed improvements to the existing Murphy Road corridor for pedestrian, bicycle, and auto circulation, while maintaining Murphy Road’s function as a major collector.

- Coordinate with adjacent ODOT and City of Bend projects west of 3rd Street, including the South Parkway/Murphy Interchange Area Management Plan (IAMP) and the Murphy Crossing westerly extension to Brookswood Boulevard (shown in Figure 1).

The Murphy Corridor Refinement Plan was funded by the City of Bend’s Public Works Department, which hired the consulting team of CH2M HILL to prepare the plan.

Figure 1
Murphy Road Corridor Study Area
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Meetings</td>
<td></td>
<td></td>
<td></td>
<td>January 31</td>
<td>April 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>October 21</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Existing Conditions Analysis</td>
<td>Orange Bar</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Future Conditions Traffic Analysis</td>
<td>Green Bar</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alternatives Development and Analysis</td>
<td>Blue Bar</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Implementation Plan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corridor Improvement Plan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**FIGURE 2**
Project Timeline
Planning Process

This section summarizes the five elements of the project’s planning process: project management; public involvement; goals and evaluation criteria; existing and future conditions analysis; and development and evaluation of alternatives.

Project Management

The City of Bend Department of Public Works led the refinement plan, working on a regular basis with the consultant team to provide consistent, regular guidance and policy direction for this plan.

Public Involvement

Bend community members, stakeholders, and other interested parties actively participated in the development of this plan. A Technical Advisory Committee (TAC) made up of local agency representatives and business owners, met six times between October 2006 and September 2007 to provide feedback to the project team at key milestones (Figure 2). Three public open houses (January, April, and October 2007) allowed for substantial input and feedback to be gathered from the public (Figure 3). Project background information, the project schedule, open house announcements, along with meeting summaries and technical materials were all available on a project website (www.murphycorridor.com). Public comments were also collected through the website. Documentation of the public involvement process is included in Appendix A.

Goals and Evaluation Criteria

The project team developed a set of goals and evaluation criteria for the project based on input from the project team, TAC, and stakeholder interviews of local residents and business owners. The evaluation criteria, objectives, and performance measures (Table 1) established a framework to assure that the plan responded to the goals and desires of the community. Five draft alternatives (Alternatives A-E) were developed to address these criteria. The performance of each alternative was measured against the goals and criteria as a starting point for further evaluation by the TAC, project team, and Bend City Council members. This evaluation helped with the selection of the two “preferred” alternatives, D (reduced width three-lane section with roundabouts at key intersections) and E (reduced width three-lane section with signals at key intersections), which will be reviewed in the future design phase. These recommended improvements are described more fully in Chapter 3 Recommendations. Additional information on the evaluation framework and all five alternatives developed for the Murphy Corridor Refinement Plan are provided as Appendix H.
<table>
<thead>
<tr>
<th>Evaluation Criteria</th>
<th>Objective</th>
<th>Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CONGESTION/MOBILITY</strong></td>
<td>Provide a viable transportation solution that accommodates expected future growth along Murphy Road, improves mobility for both local and regional traffic, and retains access to major commercial areas. To meet this objective, the alternative should meet appropriate travel mobility standards (measured as a ratio of volume-to-capacity (v/c)), and provide a not unreasonable delay, both along Murphy Road and at Murphy Road intersections.</td>
<td>Volume-to-capacity (v/c), Delay.</td>
</tr>
<tr>
<td><strong>CONNECTIVITY</strong></td>
<td>Support relevant City goals for improved connectivity in Bend. Address stated stakeholder needs of improving east-west access and connectivity in south Bend. The alternative would address this need by providing direct and efficient access to and between origins and destinations along Murphy Road, southeastern Bend, the Parkway, and downtown. Support improvements that minimize out-of-direction travel and minimize travel times.</td>
<td>Trip travel distance, travel time.</td>
</tr>
<tr>
<td><strong>CONSTRUCTABILITY</strong></td>
<td>Minimize construction impacts and risks. Consider construction staging, specifically regarding minimizing impacts to traffic and the adjacent residents. Optimize use of existing pavement sections in an effort to reduce overall construction costs.</td>
<td>Assessment of cost efficiencies during construction; comparison of project alternative with other projects around the urban area for funding competitiveness purposes; ability to be built in phases and/or use of existing pavement; and impacts during construction.</td>
</tr>
<tr>
<td><strong>COST</strong></td>
<td>Serve as a cost effective investment of public funds.</td>
<td>Order-of-magnitude cost estimates (to include design, right-of-way acquisition, and construction).</td>
</tr>
<tr>
<td><strong>ENVIRONMENT – BUILT (RESIDENTIAL / BUSINESS IMPACTS)</strong></td>
<td>Avoid, minimize, and/or mitigate impacts to residences and businesses along Murphy Road.</td>
<td>Number of businesses and residences impacted and severity of impact; number of homes or businesses potentially displaced; qualitative assessment of alternative’s impact on air quality and noise; ability to appropriately mitigate impacts.</td>
</tr>
<tr>
<td><strong>ENVIRONMENT – NATURAL</strong></td>
<td>Avoid impacts to the Areas of Special Interest (ASI) located immediately south of Murphy Road, east of Country Club Road, and east of the BNSF railroad tracks. If impossible to avoid the ASIs, minimize impacts and mitigate consistent with the City of Bend Development Code.</td>
<td>Qualitative assessment of alternative’s impact on ASI according to Exhibit C (“Upland Areas of Special Interest”) of Section 2.7.700 of the Bend Development Code.</td>
</tr>
<tr>
<td><strong>MULTIMODAL SOLUTIONS</strong></td>
<td>Develop a balanced transportation solution that serves multiple modes of transportation, including drivers (passenger and commercial), bicyclists, transit riders, and pedestrians; and meets the needs of all users, including youth, elderly, and those with physical disabilities. To provide an interconnected system of pedestrian and bicycle facilities along Murphy Road for commuting and recreational uses.</td>
<td>Qualitative assessment of alternative’s provision of services to users of all modes. Qualitative assessment of safety and continuity of bicycle and pedestrian routes to R.E. Jewell elementary school and the future middle school and high school. Qualitative factors include directness and convenience of route, and quality of environment (in terms of grade, lighting, and drainage).</td>
</tr>
<tr>
<td><strong>SAFETY</strong></td>
<td>Minimize safety conflicts and improve operational safety for all current and future users of the corridor, including autos, freight, transit, bicyclists, and pedestrians. Minimize emergency response times.</td>
<td>Number of conflict points/movements under each alternative, comparison of alternative against design standards, qualitative assessment of ability to divert traffic away from known safety concerns, and qualitative assessment of travel time change for emergency response times.</td>
</tr>
</tbody>
</table>
Existing and Future Conditions Review

Prior to the first TAC meeting, the project team conducted a series of stakeholder interviews, reviewed and documented existing and anticipated future land use and transportation conditions in the project study area (Figure 4), and developed findings that formed the basis of project need. The findings were based on a review of existing plans and policies (Appendix B), analysis of traffic operations and impacts (Appendix C), and a field review (completed in August 2006). The existing conditions, constraints, and opportunities review is included in Appendix D. Key findings were as follows:

- Land along Murphy Road is used primarily for residential purposes and the area is assumed to grow consistently with regional projections. A Sensitivity Analysis Test (Appendix F) was completed to ensure that the alternatives would work with an alternate, high-growth scenario.

- According to Bend City Code, impacts to the two Areas of Special Interest (ASI), both rock outcroppings, in the area should be avoided or minimized.

- Recorded safety incidents mostly resulted in property-damage only and did not cause injury. Historically, crashes were observed to occur at intersections; with the highest crash rates at Parrell Road.

- Sidewalks are not continuous along the corridor. Bike lanes are also missing in some areas.

- Some roadway deficiencies exist, which might lead to crashes. These include a curve in the road that might impact a drivers’ ability to safely navigate the turn, some objects near the road that might block a drivers’ line of sight, and the road from curb-to-curb is narrower than standard.
Development and Evaluation of Alternatives

Following the third TAC meeting (January 2007), the project team developed alternatives to respond to the project needs, purpose, and goals. The alternatives development and evaluation process is detailed as Appendix H.

Key steps in the alternatives development process were:

1. Developed a range of alternatives that seek to meet project goals and objectives. Three initial alternatives (Alternatives A-C) were developed in Spring 2007.

2. Presented three draft alternatives to the TAC for review against the project evaluation framework (March 2007) and revised draft alternatives as necessary to respond to comments. At the TAC’s request, a fourth alternative (Alternative D) was developed.

3. Presented the fourth alternative to the TAC, and all four draft alternatives to the public (April 2007).

4. Modified the four alternatives as necessary to respond to comments. At the City’s request, a fifth alternative (Alternative E) was developed (June-October 2007).

5. Presented the revised five alternatives to the TAC (September 2007), to the Bend City Council (October 2007), and to the public (October 2007).

6. Recommended two preferred alternatives (Alternatives D and E) to the Bend City Council (November 2007). Council members agreed with the two alternatives, but deferred making a decision on recommended intersection type and consistency of cross section until a future phase of the project. The Council voiced an overall support of and preference for roundabouts and raised medians, support that was also heard from the public during the public open houses, but retained the flexibility to consider signals and turn lanes if these features were found through the design phase to be costly or infeasible.
The Refinement Plan forwards two alternatives for further review during the design phase. These are Alternatives D (three-lane section with roundabouts at key intersections) and E (three-lane section with signals at key intersections). The Murphy Corridor Refinement Plan recommendations are illustrated in more detail in Section 4.

**Recommended Improvements**

**1. IMPROVE THE EXISTING SECTION OF MURPHY ROAD**

The following bullets provide a menu of recommendations to improve the existing section of Murphy Road between Parrell Road and Brosterhous Road.

- **Design improvements within existing right-of-way:** The existing and future conditions analysis identified a need for a third lane on the existing section of Murphy Road. The third lane would improve mobility and safety by allowing travelers to pull out of the travel lane into a center lane, to make a turn. Alternatives D and E differ from an earlier alternative (Alternative A) which had been developed to meet full City design standards (80-foot width). Input was received from the TAC and the public to reduce the width of the roadway to 60-feet to minimize impacts on adjacent property owners and the ASI. The suggested cross section is illustrated in Figure 5. A three-lane cross section would allow for emergency vehicles to move around traffic, for traffic to move around disabled vehicles, and for turning traffic to pull out of travel lanes to enter their driveways or local roadways.

- **Add on-street bicycle lanes and sidewalks throughout corridor:** A six-foot sidewalk would be added, or supplemented to the existing sidewalk, on both sides of the road to create a continuous connection for pedestrians along the Murphy Road corridor. On-street bicycle lanes would also be included to improve alternative transportation mode connections and recreation along the corridor.

- **Key intersections:** Intersection stop control was deemed necessary at three key intersections along the Murphy Road Corridor (Parrell Road, Country Club Road, and Brosterhous Road). Intersection stop control is needed at these intersections to facilitate safe and efficient travel along the corridor and maintain City mobility standards. Analysis concluded that both roundabouts and signal stop control methods would be adequate to address future traffic expected along the Murphy Road Corridor.

The Bend City Council has expressed a strong preference for roundabouts at key intersections, and raised landscaped medians. Specific determination of intersection control type and center-lane composition is deferred to the design phase to retain flexibility if these features were found to be costly or infeasible.
2. **DECISIONS DEFERRED TO DESIGN PHASE**

The following bullets describe key corridor elements that have been deferred to the design phase.

- **Defer intersection type decision until the design phase:** The Bend City Council in November 2007 requested that the Murphy Corridor Refinement Plan forward both the roundabout (Figure 6) and signal (Figure 7) intersection control options to the design phase. Both options operate acceptably through the corridor, and both carry pros and cons. These are briefly described below:

  - **Roundabouts:** Provide additional mobility and safety improvements by reducing delay (cars do not need to wait for a light to turn green) and reducing the number of potential conflict points between vehicles. Recent roundabout designs accommodate larger emergency vehicles, and carry the support of Bend Fire and Police Departments. Strong community support was voiced for the roundabout concepts. However, up to seven displacements could be associated with the roundabout concepts; in addition, access issues were of concern for local residents near Parrell Road. Roundabouts may require a detour of traffic away from Murphy Road during construction.

  - **Signals:** Would be dynamic, based on the demand of traffic entering Murphy Road, as opposed to static timed signals (to provide less waiting time for the signal to change). Signals also provide protected crossing for bicycles and pedestrians with separate signals and timing to allow children, the elderly, or physically impaired to cross safely. No displacements were associated with the signals at Parrell Road, Country Club Road, or Brosterhous Road. However, signalized intersections do not reduce the number of conflict points at these key intersections.

- **Consistency of center lane:** An original schematic for Alternatives D and E included a continuous center turn lane along the existing segment of Murphy Road. A letter signed jointly by the Chairs of the Southwest, Southeast, and Old Farm...
Neighborhood Associations in November, 2007 asked the Bend City Council to forward a three-lane design for Murphy Road that consisted of two travel lanes (one in each direction) and a center landscaped median. The project team recognizes the potential difficulties of installing a curbed median along this corridor with its many driveways; however, some portions of the corridor without driveways may be appropriate for such a treatment. The decision on the specific use of the center lane (used as a continuous turn lane or/and landscaped median between regular turn pockets) will be deferred until the project’s design phase.

3. **Extend Murphy Road west over the railroad tracks**

The Refinement Plan recommends extending Murphy Road easterly from its current terminus at Brosterhous Road, to 15th Street. The area to the east of the existing Murphy Road is currently undeveloped. Housing developments are planned in the short and medium term for this area; however, coordination has occurred with these stakeholders and the road extension is not expected to conflict with this development. The Burlington Northern Santa Fe (BNSF) railroad tracks run north and south through the area to the east of Brosterhous Road. An ASI, or rock out-cropping, is located south of the proposed road alignment.

The following bullets describe the main components of the road extension. A further extension to 27th Street was considered to provide greater east-west connectivity, but was eliminated because of low projected use and high costs.

- **Build new section to meet design standards:** Consistent with City of Bend design standards, the new section of Murphy Road between Brosterhous Road and 15th Street would be built with a cross section of a total width of 80-feet. Right of way would need to be acquired for this road extension, though it avoids the ASI to the south of the road.
• **Cross over the railroad tracks:** This extension of Murphy Road to the east would include a new bridge over the BNSF railroad tracks.

• The bridge would meet City design standards and would be a two-span bridge (a pier would support the middle of the two 104-foot spans and would be located outside of the railroad’s clearance zone).

• In order for the bridge to provide enough clearance for trains to pass below the bridge, the slope up to the bridge deck would be a 4 percent incline on the westside of the tracks. On the eastside of the tracks, the slope would be 7 percent; these inclines limit the amount of fill required to raise the bridge above the railroad tracks while still providing enough clearance to cross over the tracks. The bridge deck would have a longitudinal 0.5 percent slope and a normal crown with a 2 percent transverse slope.

• The bridge would be 54-feet wide and would include a 6-foot sidewalk on each side of the bridge. Two 12-foot travel lanes (one in each direction) would be between two eight-foot shoulders. Shoulders would be sufficiently wide to accommodate bicycle lanes.

• **Left turns possible east of the bridge:** City of Bend development code (3.1.400) specifies that 300-feet are required between a driveway and an intersection. There is space for an entrance 300-feet west of the intersection at 15th Street and before the bridge. However, preliminary design did not incorporate this entrance and any access onto Murphy Road in the area between the bridge and 15th Street would require the approval of the City Engineer. More detail will be determined in the design phase.

• **15th Street intersection design:** The analysis for Murphy Road showed that a stop sign at 15th Street would be adequate to manage traffic at that location both currently and in the future. However, if a high-growth scenario was realized, some stop control at this intersection may be needed. Installing a roundabout at the east end of Murphy Road at the intersection of 15th Street was not considered in the initial evaluation, but was suggested during the October 2007 open house and received a favorable endorsement at the November 7, 2007 City Council meeting. This is a design detail that could be evaluated during the design phase of the project, depending on travel forecasting tools.
Figure 10  Key Map of the Murphy Road Corridor

All of the individual section figures illustrate Alternative E (signals). However, the only difference between alternatives is at the intersections and an inset figure is provided for Alternative D (roundabout).

Figure 11  Section A
Figure 12  Section B (Alternative D inset figure)
Figure 13  Section C
Figure 14  Section D (Alternative D inset figure)
Figure 15  Section E
Figure 16  Section F
Figure 17  Section G (Alternative D inset figure)
Figure 18  Section H
Figure 19  Section I
FIGURE 10
Key Map of the Murphy Road Corridor
FIGURE 11
Section A

LEGEND
- Existing Tax Lot
- Existing Right-of-Way
- Proposed Retaining Wall
- Proposed Luminaires
- Proposed Signal
- Existing ASI Area
- Proposed New Pavement
- Existing Pavement Overlay
- Retread Pavement Striping
- Proposed Road of Curb

MURPHY ROAD

Scale in Feet

S

Right-of-Way

Sidewalk

Curb

N

S

Proposed Road of Curb
FIGURE 12
Section B (Alternative D inset figure)
FIGURE 17
Section G
(Alternative D inset figure)
FIGURE 18
Section H

LEGEND
- Existing Tax Lot
- Existing Right-of-Way
- Proposed Retaining Wall
- Proposed Luminaire
- Proposed Signal
- Existing ASI Area
- Proposed New Pavement
- Existing Pavement Overlay
- Raised Pavement Striping
- Proposed Face of Curb

Notes:
1. Right-of-Way Needs to be Adjusted to Contain Proposed Cut/Fill Slopes.
Conceptual Level Cost Estimates

The cost to design and construct the various improvement concepts was estimated at a planning level for Alternative D (Table 2) and Alternative E (Table 3). Based on the conceptual design of each alternative, a 40 percent contingency has been included in the construction cost estimate to account for potential unknowns typically identified during preliminary and final design. The estimates are in 2007 dollars, and include right-of-way costs, but do not include potential environmental permitting, engineering design fees, or utility relocation costs. See Appendix G for more detailed cost estimates of each improvement concept.

The total sum for Alternative E is approximately $16.6 Million (2007 dollars). The total sum for Alternative D is approximately $25 Million (2007 dollars). The roundabouts represent approximately 18.5 percent of the total cost (only construction costs were considered for this percentage, not right-of-way costs). The roundabouts are responsible for the $9 million difference between the two alternatives, since there are increases to construction cost, right-of-way cost, engineering fees, contingency, and other costs that are not required when installing signals. The cost of the railroad crossing is the same for both alternatives.

### Table 2

**Alternative D Conceptual Level Cost Estimates**

<table>
<thead>
<tr>
<th>Project/Element</th>
<th>Estimated Cost (2007 dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parrell Road to Brosterhous Road</td>
<td><strong>$13,900,000</strong> *</td>
</tr>
<tr>
<td>1. Curb, sidewalks, and drainage</td>
<td>$1,400,000</td>
</tr>
<tr>
<td>2. New roadway</td>
<td>$220,000</td>
</tr>
<tr>
<td>3. Overlay of existing roadway</td>
<td>$300,000</td>
</tr>
<tr>
<td>4. Roundabouts</td>
<td>$3,300,000</td>
</tr>
<tr>
<td>5. Illumination</td>
<td>$300,000</td>
</tr>
<tr>
<td>6. Landscaping</td>
<td>$250,000</td>
</tr>
<tr>
<td>- Center lane as landscaped median increases cost to:</td>
<td>+ $50/foot</td>
</tr>
<tr>
<td>7. Right-of-way **</td>
<td>$2,700,000</td>
</tr>
<tr>
<td>Brosterhous Road to 15th Street</td>
<td><strong>$11,100,000</strong> *</td>
</tr>
<tr>
<td>1. Curb, sidewalks, and drainage</td>
<td>$550,000</td>
</tr>
<tr>
<td>2. New roadway</td>
<td>$350,000</td>
</tr>
<tr>
<td>3. Illumination</td>
<td>$100,000</td>
</tr>
<tr>
<td>4. Landscaping</td>
<td>$100,000</td>
</tr>
<tr>
<td>- Center lane as landscaped median increases cost to:</td>
<td>+ $50/foot</td>
</tr>
<tr>
<td>5. Right-of-way **</td>
<td>$2,000,000</td>
</tr>
<tr>
<td>6. Bridges and Walls</td>
<td>$3,500,000</td>
</tr>
<tr>
<td><strong>Total Cost for Alternative D</strong></td>
<td><strong>$25,000,000</strong> *</td>
</tr>
</tbody>
</table>

* Total costs include 40 percent contingency

** Home purchase in the vicinity of Murphy and Parrell not included.
TABLE 3
Alternative E Conceptual Level Cost Estimates

<table>
<thead>
<tr>
<th>Project/Element</th>
<th>Estimated Cost (2007 dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parrell Road to Brosterhous Road</td>
<td>$5,500,000 *</td>
</tr>
<tr>
<td>1. Curb, sidewalks, and drainange</td>
<td>$1,400,000</td>
</tr>
<tr>
<td>2. New roadway</td>
<td>$30,000</td>
</tr>
<tr>
<td>3. Overlay of existing roadway</td>
<td>$350,000</td>
</tr>
<tr>
<td>4. Signals</td>
<td>$500,000</td>
</tr>
<tr>
<td>5. Illumination</td>
<td>$250,000</td>
</tr>
<tr>
<td>6. Landscaping</td>
<td>$250,000</td>
</tr>
<tr>
<td>- Center lane as landscaped median increases cost to:</td>
<td>+ $50/foot</td>
</tr>
<tr>
<td>7. Right-of-way **</td>
<td>$40,000</td>
</tr>
<tr>
<td>Brosterhous Road to 15th Street</td>
<td>$11,100,000 *</td>
</tr>
<tr>
<td>1. Curb, sidewalks, and drainage</td>
<td>$550,000</td>
</tr>
<tr>
<td>2. New roadway</td>
<td>$350,000</td>
</tr>
<tr>
<td>3. Illumination</td>
<td>$100,000</td>
</tr>
<tr>
<td>4. Landscaping</td>
<td>$100,000</td>
</tr>
<tr>
<td>- Center lane as landscaped median increases cost to:</td>
<td>+ $50/foot</td>
</tr>
<tr>
<td>5. Right-of-way **</td>
<td>$2,000,000</td>
</tr>
<tr>
<td>6. Bridges and Walls</td>
<td>$3,500,000</td>
</tr>
<tr>
<td>** Total Cost for Alternative E</td>
<td>$16,600,000 *</td>
</tr>
</tbody>
</table>

* Total costs include 40 percent contingency
** Home purchase in the vicinity of Murphy and Parrell not included.

Funding
A variety of local, state, and federal funding sources can be explored to make these recommended improvements. Most of the federal and state programs are competitive and involve clear documentation of the project needs, costs, and benefits. Local funding for the projects in this transportation plan would typically come from the City of Bend and/or potential future bond or other local revenues. Other local funding sources might include grants and private funds.

Table 4 summarizes potential public funding sources for the Murphy Corridor improvements. Some of these funds are restricted to the type of improvements that qualify for assistance. Typically, state and federal funds require projects to comply with current Americans with Disabilities Act (ADA) guidelines for accessibility.

Phasing
It is not expected that the funds to construct all the proposed project improvements would be available at the same time or necessarily in the short-term. To address this, the project recommendations could be implemented in phases, beginning with any component that is stand-alone and that has an identified funding source.

The project team recommends that the improvements to the existing Murphy Road be completed first, since that section of road can be improved in conjunction with planned sewer and water upgrades in the area. Some components of the project can be funded by, or in association with, development or redevelopment of private properties. Sidewalks and related features, for example, are often required to be constructed and paid for by a property owner at the time of property redevelopment.
### TABLE 4
Potential Funding Sources

<table>
<thead>
<tr>
<th>Source</th>
<th>Description</th>
<th>Type(s) of Eligible Project</th>
<th>Funding Cycle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oregon State Transportation Improvement Program (STIP)</td>
<td>Administered by ODOT. The STIP provides funding for capital improvements on federal, state, county, and city transportation systems. Projects must be regionally significant.</td>
<td>Roadway, public transportation, bicycle, pedestrian, air, freight, bridge</td>
<td>4 years</td>
</tr>
<tr>
<td>Transportation Enhancements</td>
<td>Must serve transportation need.</td>
<td>Bicycle and pedestrian</td>
<td>2 years</td>
</tr>
<tr>
<td>Oregon Bike/Pedestrian Grants</td>
<td>Administered by ODOT’s Pedestrian and Bicycle Program. Must be in public right-of-way.</td>
<td>Bicycle and pedestrian</td>
<td>2 years</td>
</tr>
<tr>
<td>System Development Charges (SDCs)</td>
<td>Fees on new construction allocated for parks, streets, and public improvements. Where available, funds can be used for right-of-way acquisition and trail construction.</td>
<td>Roadway, bicycle, pedestrian</td>
<td>Varies</td>
</tr>
<tr>
<td>Local/County Bond Measures Approved by Voters</td>
<td>Funds can be used for right-of-way acquisition, engineering, design, and construction.</td>
<td>Roadway, bicycle, pedestrian</td>
<td>Varies</td>
</tr>
<tr>
<td>Local Improvement Districts (LiDs)</td>
<td>Districts typically are created by local property owners, imposing a “new tax” to fund improvements. Funds can be used for right-of-way acquisition and construction.</td>
<td>Roadway, bicycle, pedestrian</td>
<td>Varies</td>
</tr>
</tbody>
</table>

### Next Steps

Additional design and engineering will be needed to construct any improvement concept identified in this plan. Design and engineering would occur when improvement concepts are selected for implementation through the state and city capital funding process. There will be opportunities for additional public input on the design of the improvement concepts. Conceptual level engineering specifics and assumptions, though not listed in Tables 2 and 3, are found in Appendix G.