APPENDIXES FOR THE MURPHY CORRIDOR REFINEMENT PLAN

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
APPENDIX A

PUBLIC INVOLVEMENT DOCUMENTATION
Murphy Road Corridor Study:
Summary of Stakeholder Interviews

This memorandum summarizes the ten stakeholder interviews that were conducted by CH2M HILL in September 2006. The purpose of these interviews was to obtain stakeholder input on the existing and planned uses along Murphy Road, and the need for improvements to the Murphy corridor. Information from the stakeholder interviews will be used to establish the project’s goals and objectives, and will be used to inform the project’s decision framework. The decision framework will in turn be used to evaluate potential project alternatives.

Dave Simmons and Theresa Carr of CH2M HILL conducted face-to-face interviews with eight stakeholders or stakeholder groups in Bend on September 13 and 14, 2006. All interviews were approximately one hour in length. When possible, interviews were held at the interviewee’s place of business or location of choice. Two additional interviews were conducted via telephone the following week. The list of stakeholder interviews is provided in Table 1 below and illustrated in Figure 1.

### Table 1
List of Stakeholders Interviewed for Murphy Road Corridor Study

<table>
<thead>
<tr>
<th>Interview No.</th>
<th>Person</th>
<th>Affiliation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ken Fuller, Michael Magee, Paul Rheault, Tom Hickman, Mike Miller</td>
<td>City of Bend Public Works</td>
</tr>
<tr>
<td>2</td>
<td>Mont Green</td>
<td>Bend Golf and Country Club</td>
</tr>
<tr>
<td>3</td>
<td>Harold Anderson</td>
<td>Southeast Neighborhood Association</td>
</tr>
<tr>
<td>4</td>
<td>Mel Oberst</td>
<td>City of Bend Community Development Department</td>
</tr>
<tr>
<td></td>
<td>Paul Eggleston</td>
<td>Bend/La Pine School District</td>
</tr>
<tr>
<td>6</td>
<td>Doug Koellermeyer</td>
<td>Bend Fire Department</td>
</tr>
<tr>
<td>7</td>
<td>Mike Lovely</td>
<td>Southwest Neighborhood Association</td>
</tr>
<tr>
<td>8</td>
<td>Nancy Loveland, Daryl Loveland, Mark Schindel</td>
<td>Old Farm Neighborhood Association</td>
</tr>
</tbody>
</table>
The list of stakeholders was provided by the City of Bend Public Works Department. The team was unsuccessful in scheduling one additional interview with the Mayor of Bend. Figure 2 illustrates the location of current and expected future development in the Murphy corridor.

Interview questions were open-ended to the extent possible, and interviewees were encouraged to talk about their (or their organization’s/member’s) use of Murphy Road; their observations of current conditions along Murphy Road; their understanding or knowledge of future area growth expectations; and the expected impact of future growth to Murphy Road. In general, interviews with City of Bend staff focused on conveyance of information (other studies underway, development trends, etc.) and interviews with non-City staff focused on use and need for improvements along Murphy Road.

Findings from the non-City of Bend stakeholder interviews are illustrated in Figure 3 and described over the next several pages. Highlights are listed below:

- **Support for Easterly Extension to 15th Street.** All stakeholders interviewed voiced support for an extension of Murphy to 15th Street. Although the specific rationale varied by stakeholder interest, general support for the extension stemmed from a desire for improved access.

- **Extend Eastern Study Parameter to 27th Street.** Most stakeholders questioned the eastern study parameter of 15th Street and requested that analysis be conducted for an extension of Murphy Road to 27th Street. Many stakeholders felt that extending Murphy Road to 27th Street would alleviate pressure from Reed Market and Knott. One stakeholder, however, thought that the extension of Murphy to 27th would be aligned too close to Knott and not remove traffic from either Knott or Reed Market.

- **Support for Westerly Extension to Brookswood Boulevard.** Many stakeholders also voiced support for the westerly extension of Murphy Road over the Parkway and the connection to Brookswood Boulevard. This support appeared to stem from a desire to improve access to the Parkway and to create another true east-west connection across Bend.

- **Growth in Southeast Bend.** All stakeholders referred to increasing development pressures in southeast Bend, both along Murphy Road and along or near the potential alignment to the east. One action item resulting from the stakeholder interviews for CH2M HILL was to verify that land use assumptions in the Bend travel demand model accurately represent these expected development trends.
• **Deficiencies along Existing Corridor.** Stakeholders did not consistently cite deficiencies along the existing Murphy Road corridor between 3rd Street and Brosterhous Road. Most felt that the existing corridor met the current needs of its users, but would need capacity improvements to meet future demands. Some stakeholders cited safety concerns due to limited site distance at the corner of Murphy Road and Parrell Road and the lack of continuous sidewalks along Murphy Road as existing needs. Others cited a concern for access to 3rd Street with the planned Murphy overcrossing project. Others cited a concern for a potential bottleneck on the western end of Murphy (near Brookswood) if that segment is designed as a two-lane facility.

The remainder of this memo summarizes findings on an interview-by-interview basis.
This page left blank intentionally.
This page left blank intentionally.
This page left blank intentionally.
Figure 3
Murphy Road Corridor Issues Map
Bend, Oregon

LEGEND
Murphy Road (Existing)
Other Streets
Railroad
Tax Lots
City Limits
Urban Growth Boundary

- Parrell is sometimes used as a frontage road
- Retain access between Murphy and 3rd
- Old Farm NA encourages consideration of freight along Murphy
- Sidewalks are not continuous at west end of Murphy
- Emergency services avoid at-grade RR crossings.
- Murphy extension expected to alleviate traffic from Reed Market
- Sight distance concerns
- This section of Murphy is narrow
- City is sensitive to existing constraints along corridor
- Several stakeholders suggested focusing on intersection needs
- School District interested in retaining access control along Murphy
- Emergency services avoid at-grade RR crossings.
- When ahead of schedule, trains block at-grade crossings at Wilson and Reed Market
- Concern about impacts of Murphy extension to side streets such as Ferguson
- Pahlisch and Ward support a southerly alignment for Murphy to 15th
- Desire to avoid or minimize impacts to the ASI
- Fire Department encourages future roundabouts to be two-lane, equipped with Opticom, and with a slip lane for emergency vehicles.

All stakeholders interviewed supported an extension of Murphy Road to 15th on the east and Brookwood on the west.

Most stakeholders requested extending analysis to 27th

* Public Works and Community Development staff did not advocate any project recommendations through the stakeholder interview process
This page left blank intentionally.
Interview #1: Bend Public Works

Wednesday, September 13, 2006
12:00 p.m. 2:00 p.m.
City of Bend Public Works Department
575 NE 15th Street

Attendees:

Ken Fuller, Director of Public Works
Michael Magee, Engineering Division
Mike Miller, Capital Improvements and Master Plans Division
Paul Rheault, Water and Sewer Division
Tom Hickman, Water and Sewer Division

Interview Summary:

Thoughts on Murphy Road Corridor

• Extension of Murphy Corridor to 15th and to Brookswood is expected to alleviate some of the demand on the Reed Market Corridor, though to what extent is uncertain. Sees Reed Market and Murphy playing a critical role in serving east-west demand in Bend.

• Trains run along tracks about 12 times a day. Mixture of cargo, no passenger. There is no expectation at this time that the railroad wishes to expand switch capacity south to Murphy area.

• Bend is open to innovative design concepts, but will need to fully understand the impacts of various alternatives. Areas of specific analysis need to be acuteness and duration of congestion, and ability to address safety needs.

• The Reed Market study calls for a grade-separated crossing of the tracks at Reed Market. If the Murphy Road extension were built first it would help meet demands during construction for this Reed Market crossing.

City Objectives

• Wants to be sensitive to existing constraints, minimize impacts to property owners and develop a solution that is implementable, cost effective, and fundable.

• Wants to address not just current needs along Murphy Road, but be aware of Murphy’s role as an east-west connector within all of southern Bend, and within all of Bend. The
desire is to think about expected growth in Bend over the long-term, and what role Murphy Road will play in serving this growth.

- The City wants an implementation schedule for phasing improvements in over time, and a realistic plan that can be achieved.
- Looking for innovative funding solutions to constructing grade separated crossings of railroad tracks.

Other Efforts Underway Along Murphy

- There is an effort identified and budgeted to install a new 12” water line from Country Club Road to Brosterhous Road. The draft timeline for this extension is July 2007, though this can be held if it makes sense to sync improvements with the Murphy Road improvements.
- There is a conceptual plan to extend a 12” water line from Brosterhous Road to 15th Street along the new alignment of Murphy Road but funding is not specifically identified at this time.
- Sewer system along Murphy Road is nearing capacity with pump station near Brosterhous Road pumping approximately 17 hours/day.
- Plans exist for expanding the sewer infrastructure and two options have been explored. Cost of the new facility and the pace of new development will play a role in what method is selected.
- Drivers for the sewer line extension include development proposals along the eastern end of the existing Murphy Road corridor. The sewer line extension may be built incrementally but a solution will be needed within 5 years.
- Pahlisch Homes has a site development proposal submitted to the City for 75 acres immediately east of 15th Street. (See Interview #10 with Pahlisch Homes for more information about this development.)
- Check in with the Planning Department about current and future proposed developments and zoning applications.

Location-Specific Considerations

- Focus on what is needed at intersections – Murphy/Parrell, Murphy Brosterhous, etc.
- Consider using a lower design speed to encourage more appropriate travel speeds through school and residential areas.
- Evaluate the potential for Murphy Road and 15th Street intersection as a double lane roundabout.
- The Public Works and Community Development departments are in the process of evaluating extending Murphy Road to 27th Street. This evaluation may become part of this study as it moves forward.
Interview #2: Bend Golf and Country Club

Wednesday, September 13, 2006
2:30 p.m. 3:30 p.m.
Bend Golf and Country Club
61045 Country Club Drive

Attendees:
Mont Green, General Manager

Interview Summary:

Background and Operation of Golf Club
- Golf course area was annexed into the city approximately 8-9 years ago
- The Country Club hosts large functions, including weddings, rotary club meetings (approximately 100 attendees on Wednesdays, and 70 attendees on Fridays), and monthly chamber of commerce meetings (approximately 150 attendees).
- Country Club also hosts large golf tournaments approximately once a week during the summer season.
- The composition of club members has evolved. The majority of members (approx. 75-80%) have lived in Bend for 10 years or less. A smaller but still significant percentage of members have been living in the City for 20 years or longer.
- Activity at the Club is largely seasonal. During the winter the only activities are associated with the indoor elements of the club, including the health club (indoor pool, tennis, weight room) and the restaurant.
- Overflow parking is along grass north of existing parking lot, and across Country Club Road.
- Primary access is along Country Club Road. There is a secondary access along Fairway.
- Non-member or employee traffic includes trash pickup (three times a week) and delivery trucks to the restaurant (daily during off-peak hours). The loading dock is located along the east side of the building.
Future Plans at Golf Club

- Development plans at the Club include improvements to the health club facilities, including an expansion from two to four indoor tennis courts, and a two-story 3,000 s.f. building for weights and aerobic facilities.

- The Country Club wishes to lease a ½ - 1-acre area across Country Club Road from the School District for overflow parking.

Understanding of Needs (Along Murphy, Elsewhere)

- Murphy Road operates fine right now.

- Intersection of Country Club and Murphy is only a problem during peak events when everyone is leaving at one time.

- Supports extension of Murphy to both the east and the west, and sees that as helping their members access the Golf Club.

- Non-Murphy needs include:
  - Additional/improved access at Wilson and the Parkway
  - Improved access at Reed Market and 3rd Street
  - Improvements along China Hat Road, Baker Road, and Knott Road to address limited site distance and reduce speeds

Distribution of Information to Golf Club Members

- The Country Club is willing to poll its members and alert them of upcoming public meetings for the corridor study.
Interview #3: Southeast Neighborhood Association

Wednesday, September 13, 2006
4:00 p.m. 5:00 p.m.
Simply Organic Coffee
5 SW Bond Street

Attendees:
Harold Anderson, Neighborhood Association Chairman

Interview Summary:

Background of Southeast Neighborhood Association
- The Southeast Neighborhood Association was formed last month (August, 2006).
- Currently there are 50 members of the Neighborhood Association. They are currently conducting a membership drive. The Neighborhood Association is scheduling its general meeting in October.
- The association received funding of $2,500 to outreach with the neighborhood.
- The Chairs of all neighborhood associations in Bend meet once a month (11am-noon) to discuss issues of interest and share information. Following that meeting the chairs will meet with a city staff person to talk about a particular project or effort.

Expected Growth in Southeast Bend
- There are 800 acres in Southeast Bend, including 1,800 taxlots available for development (out of a total of 2,450 taxlots).
- Murphy and Brosterhous – residential development expected in this vicinity (cited 137 homes on 151 acres).
- Southeast Bend is most likely to see and receive the focus of future development.
- Bend is seeing an increase of 1.5 families/day\(^1\).

\(^1\) As per an early morning report on Bend Radio 1110.
• Residential developments in this neighborhood association include Stone Gate (79 homes), Wood Hill, Mountain High, Timber Ridge, Golf Crest, and Hunters Green.

• The Golf Course is putting a 140’ cell tower in the center of the golf course. It looks like a Ponderosa Pine tree. Because it has been built to blend in with the area, the golf course and the neighborhood association support it.

Thoughts and Concerns about Murphy Corridor and Southern Bend

• The Southeast Neighborhood Association supports a five-lane cross section of Murphy extending from Brookwood Boulevard to 27th Street, to serve existing and expected future development.\(^2\)

• The association wants to see ample road width to avoid choke points. The roundabouts need to be constructed so they are big enough to accommodate traffic and emergency vehicles. According to Harold, the Old Farm Neighborhood Association has voiced concerns regarding access to and from Murphy Road, involving choke points and road width, including the alignment of the proposed extension.

• The intersection of Murphy and Parrell is of concern. The intersection is blocked by trees and is on a curve, so it is very difficult for cars on Parrell to see if it is clear to make a turn or go across Murphy. A fence is being constructed by a homeowner in the area that could (in Harold’s opinion) worsen sight distance issues.

• Concerned that with overcrossing project (to west of Murphy Corridor Study) access from Murphy to 3rd Street will be eliminated. Residents of the Southeast Neighborhood Association need access to the businesses along 3rd Street.

• Reed Market is congested and Murphy Road is expected to alleviate some of the congestion along Reed Market.

• The train is an issue, because it switches just north of Murphy Road. If it is early or late, it stops, blocking the at-grade crossings at Wilson or Reed Market. This has been observed to occur for up to 20 minutes at a time. Cars have few alternatives to waiting for the tracks to clear.

• The Southeast Neighborhood Association is concerned about potential for increased residential densities.

\(^2\) It should be noted that the Southeast Neighborhood Association, being a new organization, may not represent all residents located within its boundaries. Further outreach is recommended to homes along Murphy Road.
Interview #4: City of Bend Community Development Department

Wednesday, September 13, 2006
5:30 p.m. 6:30 p.m.
Bend City Hall
710 NW Wall Street

Attendees:
Mel Oberst, Community Development Director

Interview Summary:

Urban Growth Boundary Expansion Efforts

- The City is currently assessing the need to expand its Urban Growth Boundary (UGB).

- The process for recommending an expansion to the UGB is dependent on a variety of factors, including water and sewer capacity, transportation, topography, and lot patterns. There is a ranking system that will rank all areas being considered. This will facilitate the immediate expansion recommendations, and will assist future UGB expansions as well.

- A master plan is required of all areas wishing to be annexed into the UGB. The specific content of master plans will differ depending on the area.

- The timeline on recommending the area for UGB expansion is within the next few months. A public meeting is expected in January.

- The Oregon Division of State Lands owns a large tract currently outside the UGB. This area is immediately east of the UGB boundary, east of 27th, north of Murphy Road. This area has completed a master planning effort.

- There is interest in expanding the UGB to the southeast, though a master plan has not been conducted at this time.

- The area outside the UGB immediately east of Murphy does not have a master plan for water, and sewer is considered difficult as well. Avion water serves this area. The City is considering a $40 Million sewer trunk line down 27th Street.
Bend Economy

- The Bend economy is doing well. The unemployment rate is the lowest in the state. There is little manufacturing, many small businesses, high tech/electronics, alternative fuels, and investment firms. The medical segment is thriving, and Bend is becoming known for its medical professionalism and specialty. Bend serves as the primary medical provider for all of eastern Oregon.

- Bend has the highest number of home business occupations in the state.

- The airport is thriving.

- Bend has an ordinance dictating a fee on all new home construction go into a fund for building affordable housing. (Note: this is not low income housing, but built for 80% of the median annual income).

Growth Assumptions

- The City (Nick Arnis) has created a map that shows approved and pending development applications in southeast Bend, which will be useful for assessing accuracy of the model’s land use assumptions.

- Development in Bend has been consistently underestimated, which can put many parties in reactive mode. There is a desire to be more proactive with improvements, to plan for growth in a more comprehensive manner.

Thoughts on Murphy Corridor

- Murphy corridor should be expected to serve as a significant east-west connector for southern Bend.

- Anticipates transit running along this corridor in the 20-year time period.

- The City is considering various potential funding sources for the westerly improvements of Murphy Road, including an urban renewal district, and a recovery district. A recovery district is when a property owner puts in the initial improvements and is “reimbursed” by subsequent developments.

Staff Resources

- Planning staff to serve as resources include Damian Syrnyk, Wendy Robinson, and Colin Stevens.
Interview #5: Bend / LaPine School District

Thursday, September 14, 2006
8:00 a.m. 9:00 a.m.
Bend / LaPine School District Administrative Offices
520 NW Wall Street

Attendees:
Paul Eggleston, Director of Facilities

Interview Summary:

Information on School District and Jewell Elementary School

- There are 25 schools in total in the Bend / LaPine School District. A total of 22 of these schools are located in Bend.

- There is an existing elementary school (Jewell) north of Murphy Road. Jewell Elementary School currently serves between 550 and 600 children and is one of 14 elementary schools in Bend/LaPine.

- There are six busses that serve the school. Busses enter and exit the school via Brosterhous Road, dropping off children in the AM and picking them up in the PM. Some busses also serve the school at lunchtime.

- Food deliveries are made once or twice a day (usually mid-morning). Garbage pickup is daily as well. Delivery and garbage trucks access the school via Brosterhous.

- Parent pick up/drop off is off of Murphy.

- Public parking is off of Murphy, to the west of the elementary school.

- Teachers also access the elementary school from Murphy.

- There are recreational facilities (two ballfields north of the school) used by children and adults after school hours. The school district coordinates the use of these facilities. There is a small little league field, and a larger field which is used for little league but also for adult recreational softball teams. Rae Road provides access to the ballfields from the west.

- Ray Road used to connect to Brosterhous Road but was disconnected by the City.
• The school district is working on a parking agreement with the Country Club for them to establish overflow parking on part of their parcel off Country Club Road.

Plans for Future Schools in Vicinity of Murphy Road

• The school district owns a parcel to the west of the existing elementary school. This is planned for a future middle school, to be built in the 2010-2015 timeframe.

• The future middle school would serve approximately 800 children

• The parking area is expected to be shared between the elementary and the middle school.

• The school district owns 55 acres off of Country Club Road which is planned for a future High School. This high school is forecast for buildout in the 2010-2015 timeframe.

• The school district does not expect to continue its agreement with the Country Club for overflow parking after the Country Club Road site is developed for a future high school

November’s Bond Measure

• Bend is experiencing an increase of about 500 students/year. The Bond Measure would be $119 Million over four years to build 175 projects including three new elementary schools, and improvements to 25 schools.

Needs along Murphy Road

• No serious traffic concerns have been observed to date along Murphy Corridor.

• No sidewalks exist on the west end of Murphy Road, which is an issue because walkers access the school from all directions

• Brosterhous to 15th Street opens up a different set of bus routes and may shift the school district boundaries.

• Connection to 27th Street creates a southern bypass and an alternative to Reed Market and may further serve to shift school district boundaries

• Support for an extension to 15th Street

• Support for an extension to 27th Street

• Interested in maintaining controlled accesses off of Murphy.

Coordination and Information Sharing

• Paul has data on future school-related growth in the area that may be helpful to compare against land use assumptions.
Interview #6: Bend Fire Department

Thursday, September 14, 2006
9:00 a.m. 10:00 a.m.
Bend Fire Department Administrative Offices
1212 SW Simpson Avenue

Attendees:
Doug Koellermeier, Deputy Chief of Operations

Interview Summary:

Background Information about Fire Department

- Bend’s Fire Department responds to calls for service in a geographical area consisting of approx. 1500 sq. miles. This also includes ambulance service vehicles.

- Bend has five fire stations. Four have a minimum three person crew and one has a minimum of two personnel. When staffing allows additional staffing is currently added to the North (305) and East (304) fire stations. Apparatus used by the fire department includes a brush fire truck, a water tender, an ambulance, and a fire truck in each station. One station has a rescue vehicle and one has a ladder truck. Crews will respond with the appropriate apparatus based on the need. Other apparatus remain in the station and unmanned until the crew returns. Any additional apparatus and personnel needs for the same or additional incidents are received from next nearest station.

- Station 303 is located at the corner of Murphy Road and Country Club Road. It has a three-person crew.

- The Bend Fire Department consists mainly of career staff with just a few volunteers.

- The Fire Department has property in the vicinity of 15th and Bear Creek to be built as funding allows. Time frames are yet to be determined.

Overall Concerns of Fire Department

- The Bend Fire Department’s major concerns are with roundabouts and railroad tracks
  - Railroad Crossings – Emergency services avoids at-grade crossings of the railroad tracks for any type of emergency response situation. This includes the at-grade crossings of Reed Market and Country Club Road. Station 303 will typically follow
Murphy Road east to Brosterhous Road south because there is a railroad undercrossing at Brosterhous. Train traffic is increasing every year and the at-grade crossing issue is not expected to improve in the near future. The Fire Department supports addressing signaling devices to alert drivers at nearest major cross streets of train traffic on the tracks. This will allow the Fire Department to potentially use at grade crossings thus decreasing response times for Emergency vehicles.

- **Roundabouts** – Current roundabouts are known to delay an emergency vehicle by 9-10 seconds. This could be due in part to the geometry of smaller roundabouts, but is also just due to traffic flow within a roundabout. Vehicles are uncomfortable stopping or pulling over in a roundabout, or there is no place to pull over. Larger vehicles such as fire trucks, snow plows, tractor trailers, and buses have difficulty maneuvering through the roundabout. In emergency response every second counts and going through current (smaller) roundabouts costs time.

  Bigger, full two-lane roundabouts would work better. Slip lanes allow for immediate right hand turn needs however do not provide for through traffic needs of emergency apparatus.

- There are flood and snow runoff issues associated with major thunderstorm and snowstorms. Franklin/3rd and Greenwood/3rd flood regularly. When flooding issues occur combined with train traffic, snow burms, etc., emergency response routes are considerably reduced.

- Skinny streets are an issue for emergency services.

**Thoughts and Concerns along Murphy Road**

- The western end of the existing corridor between 3rd and Benham Road is narrow, with blind corners.

- The intersection of 3rd Street and Murphy Road can be congested.

- East-west connectivity is needed. The Parkway provides the north-south connectivity.

- Emergency services supports an extension of Murphy Road to 27th Street. This extension would allow them to more quickly access a growing area of the region.

- Emergency Services wants:
  - Murphy to cross the railroad tracks as a grade-separated crossing
  - Tie to 27th Street
  - Tie to Brookwood Boulevard
  - Would prefer no roundabouts on arterial roads or highways.
  - If roundabouts are constructed, make them larger full 2-lane, equipped with Opticom.
Interview #7: Southwest Neighborhood Association

Thursday, September 14, 2006
10:30 a.m. 11:30 a.m.
Simply Organic Coffee
5 SW Bond Street

Attendees:
Mike Lovely, Neighborhood Association Chairman

Interview Summary:

Background Information about Southwest Neighborhood Association

- The boundaries of the Southwest Neighborhood Association are Powers on the north to the City boundary on the south, 3rd Street to the east and the Deschutes River to the west.

- The Neighborhood Association had approximately 3,037 lots as of last April. This area has seen the largest growth in taxlots in the City.

- The Southwest Neighborhood Association is the first association recognized by the City (5 years ago)

- The Neighborhood Association has approximately 500 members, though not all are active.

- The Neighborhood Association is currently focused on code enforcement and traffic and safety.

Participation in Murphy Crossing Study

- The Neighborhood Association has been involved in the Murphy Crossing study and supports the extension to Brookswood. The Pinebrook Homeowners Association has recently voiced concerns about sewer.
Concerns and Needs for Murphy Corridor

- Parrell to 3rd – what happens to Murphy? Wants access to 3rd from a right turn from Murphy. Interested in knowing what happens to that existing leg.
- Concerned that the Albertsons is not engaged
- Need left turn lanes at intersections
- Doesn’t like medians – City ends up having to maintain the medians along the Parkway. Appreciates Xeriscaping, and design so that water runoff in the median drains into the center.
- Development is happening quickly on the east end of Murphy. Warned that timing is critical so an alignment is not locked in for us.
- Southerly alignment of Murphy avoids impacts to the ASI and existing development.
- Murphy needs to be extended to 27th Street. Recommends that we look at this now.
- Pedestrian safety is a problem – there is no standardized pedestrian policy in Bend.
- Asks that the team look at a four lane option to the Parkway with left turn pockets at intersections.

Distribution of Information to Neighborhood Association Members

- Willing to distribute project information and announcements of upcoming meetings to neighborhood association members. We can also coordinate with the neighborhood associations on a blurb on Channel 11, an insert in the city newspaper, and at the neighborhood association sponsorship of local football games.
Interview #8: Old Farm Neighborhood Association

Thursday, September 14, 2006
11:30 a.m. 12:30 p.m.
Simply Organic Coffee
5 SW Bond Street

Attendees:
Nan Loveland, Neighborhood Association Chairman
Daryl Loveland, Neighborhood Association Land Use Committee Chair
Mark Schindel, Neighborhood Association Transportation Committee Chair

Interview Summary:

Background Information about Old Farm Neighborhood Association

- The Old Farm Neighborhood Association began in June 2003 to address land use issues associated with the Stone Haven and Silver Crest housing developments.
- The Neighborhood Association has approximately 5,000 members representing 3,000 taxlots. There are 30 commercial members.

Growth in Southeast Bend and Murphy Corridor

- Jewell Elementary School is overflowing – there are 2-3 modular buildings outside the school now.
- There are 1,700 housing units built, in the process of being built, or pending over the past three years.
- Parrell is used as a frontage road to the Parkway. Locals use it as a parallel route.
- The number of trains per day in Bend is increasing.
- An effort is underway to expand the UGB, possibly near this potential extension corridor.

Thoughts and Concerns about Murphy Corridor Study

- Improvements to the Murphy corridor will take pressure off of Reed Market.
• Consider freight needs – an extension to 15th Street is a way to access freight which has difficulty moving in the east/west direction through town.

• Concern that a two-lane section west of the Parkway is going to be too narrow.

• The Neighborhood Association has concerns about impacts to side streets, such as Parrell, Brosterhous, Ferguson, and Knott. What are the impacts to side streets when Murphy is improved? What happens when Murphy is extended to 15th, and traffic needs to go to 27th? They travel to the 15th and Ferguson intersection, and travel Ferguson to 27th Street. So what are the impacts of the Murphy extension on Ferguson? Wants to make sure that this is being considered.

• The Neighborhood Association supports an extension of Murphy Road to 27th Street and strongly encourages the technical team to analyze out to 27th Street.

• It is important to consider over to 27th Street, considering the DSL property and the UGB expansion efforts.

• What will the impacts be to the ASI of the extension of Murphy Road? Will we be able to avoid impacting it?

• What happens to access to 3rd Street from Murphy with the overcrossing project?

• Maintenance concerns about the medians. Design them so the storm drainage is in the middle and be careful what you plant. Cobblestones are okay to some, and Xeriscaping, including Rabbit Brush and Sage Brush.

**Distribution of Information to Neighborhood Association Members**

• Willing to distribute project information and announcements of upcoming meetings to neighborhood association members.

• The Neighborhood Association sent out a survey to their members and have to date received 40-50 responses. The due date for responses is September 28.
Interview #9: Wood Hill Homes

Friday, September 15, 2006
2:00 p.m. 3:00 p.m.
By Telephone

Attendees:
Shane LaBelle

Interview Summary:

- Wood Hill Homes is developing a tract of land east of Brosterhous Road, west of the railroad tracks and south of the proposed extension of Murphy Road between Brosterhous Road and 15th Street for single family homes. The site formerly served as a manufactured home park.

- Wood Hill Homes has a Bend office, but Shane is based out of their Portland location. He is familiar with the proposal to extend Murphy east of Brosterhous through discussions with the City regarding the alignment and right-of-way needs for the road along the north boundary of their development. He indicated that Wood Hill Homes did not support shift of the alignment south near the tracks, due to impacts it would cause on their development.

- Shane did not have any feedback on the Murphy Road Corridor Study and did not identify any issues or concerns with the existing transportation system on or around Murphy Road.

- Wood Hill Homes is working for Matrix Development in the development of this site. Shane asked that future correspondence regarding this project be directed to David Oringdulph at Matrix Development.
Interview #10: Pahlisch Homes

Tuesday, September 19, 2006
3:00 p.m. 4:00 p.m.
By Telephone

Attendees:
Dennis Pahlisch, Owner
Steve Miller, Planner

Interview Summary:

- Pahlisch Homes owns 75 acres on the east side of 15th Street. They have submitted an application for a PUD of 375 homes on this 75 acres. The development, called Shadow Glen, would be built in four phases over the next three years. The estimated completion date is the end of 2009. The preliminary site layout is attached.

- The PUD includes a potential roundabout at the connection of Murphy and 15th Street, at the intersection of H Street of the Shadow Glen development.

- Pahlisch Homes supports an extension of Murphy Road to the north, around the ASI and connecting with Shadow Glen at H Street. They do not support a southern alignment of Murphy Road connecting with A Street at the south end of the Shadow Glen development. It is in Dennis’ opinion that Jan Ward would also not support a southern alignment of Murphy Road.

- The southerly alignment of Murphy is believed by Pahlisch Homes to have greater impacts on the ASI, and cuts up the heart of a developable tract owned by Mr. Ward. This property could be developed for residential in the next couple of years.

- Pahlisch Homes doesn’t believe a further extension of Murphy Road to 27th Street would be of much help, especially with the southerly alignment because they believe Murphy would be too close to Knott and wouldn’t attract any trips.

- They support an extension to 15th because they see a benefit to their residents, who will have reduced travel time to reach the Parkway.

- Pahlisch Homes has often served as a liaison between Jan Ward and the City of Bend, and they are happy to serve in that role. Their City liaison has been Ken Fuller of the PublicWorks Department.
**Murphy Road Corridor Study**

Technical Advisory Committee Meeting # 1  
Tuesday, October 3, 2006  
1:30 – 2:30 p.m.  
City Council Chambers  
710 NW Wall Street, Bend

**Agenda**

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Presenter</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Welcome, Review of Agenda</td>
<td></td>
<td>1:30 p.m.</td>
</tr>
<tr>
<td>2.</td>
<td>Project Overview and Role of TAC</td>
<td></td>
<td>1:40 p.m.</td>
</tr>
<tr>
<td>3.</td>
<td>Stakeholder Interviews</td>
<td></td>
<td>1:50 p.m.</td>
</tr>
<tr>
<td>4.</td>
<td>Discussion of Project Need and Objectives</td>
<td></td>
<td>2:00 p.m.</td>
</tr>
<tr>
<td>5.</td>
<td>Update on Technical Products</td>
<td></td>
<td>2:20 p.m.</td>
</tr>
<tr>
<td></td>
<td>• Project Website</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Traffic Methodology and Assumptions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Schedule Next Meetings / Adjourn</td>
<td></td>
<td>2:30 p.m.</td>
</tr>
</tbody>
</table>
Handouts included the meeting agenda and draft Technical Memorandum 2.1: Summary of Stakeholder Interviews. This meeting summary covers questions and discussion related to each of the TAC meeting agenda items. Please refer to the meeting handouts for more detail on agenda topics.

1. Welcome, Review of Agenda
Ken Gould welcomed the group and discussed the importance of TAC involvement and review of key project deliverables. He acknowledged that all TAC members may not be able to attend all meetings.

2. Project Overview and Role of TAC
Dave Simmons gave a brief overview of the Murphy Road Corridor Study. The objective of this project is to identify needed improvements to Murphy Road between 3rd Street and Brosterhous Road, and evaluate an extension of Murphy Road east to 15th Street. Ken Fuller
said that the extension of Murphy Road to 15th Street, including a grade-separated crossing of the railroad tracks, was cited as the highest public works priority in the City.

The project timeline runs from August, 2006 through May, 2007.

3. Stakeholder Interviews
Theresa Carr provided an overview of the stakeholder interviews. Dave Simmons and Theresa Carr of CH2M HILL met with ten stakeholder groups on September 13 and 14 in Bend. The purpose of these interviews was to obtain stakeholder input on the existing and planned uses along Murphy Road, and the need for improvements to the Murphy corridor. Information from the stakeholder interviews will be used to establish the project’s goals and objectives, and will be used to inform the project’s decision framework. The decision framework will in turn be used to evaluate potential project alternatives.

The main findings from the stakeholder interviews were:

- All stakeholders interviewed voiced support for an extension of Murphy to 15th Street.
- Stakeholders also voiced support for the westerly extension of Murphy Road over the Parkway and the connection to Brookswood Boulevard.
- Many stakeholders requested that analysis consider extending Murphy Road to 27th Street. The City agreed with this request and authorized an analysis of traffic pattern variations associated with an extension of Murphy Road to 27th Street.
- All stakeholders referred to increasing development pressures in southeast Bend, both along Murphy Road and along or near the potential alignment to the east.
- Stakeholders did not consistently cite deficiencies along the existing Murphy Road corridor between 3rd Street and Brosterhous Road. Most felt that the existing corridor met the current needs of its users, but would need capacity improvements to meet future demands.

Please refer to Technical Memorandum 2.1 Summary of Stakeholder Interviews for more information.

4. Discussion of Project Need and Objectives
Theresa facilitated a group discussion on project need and objectives. This began with the needs and objectives identified through the 10 stakeholder interviews:

<table>
<thead>
<tr>
<th>Stakeholder-Identified Project Needs and Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Need</td>
</tr>
<tr>
<td>Improve Connectivity</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Address Future Growth</td>
</tr>
<tr>
<td>Improve Safety</td>
</tr>
</tbody>
</table>
Stakeholder-Identified Project Needs and Objectives

<table>
<thead>
<tr>
<th>Need</th>
<th>Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>o Grade-separated crossing of railroad tracks and extension to 15th to reduce response times to emergencies east of Brosterhous</td>
</tr>
<tr>
<td></td>
<td>o Sight distance issues at Murphy and Parrell</td>
</tr>
<tr>
<td></td>
<td>o Inconsistent sidewalks on west end of Murphy</td>
</tr>
<tr>
<td></td>
<td>o Safe routes to school for students at Jewell Elementary School.</td>
</tr>
<tr>
<td>Retain but Streamline Access</td>
<td>Retain connection between Murphy and 3rd to continue access to businesses.</td>
</tr>
<tr>
<td></td>
<td>Provide access management along Murphy Road in conjunction with new development</td>
</tr>
</tbody>
</table>

The TAC added the following needs and objectives to this list:

- **Take a Balanced Approach** – consider the needs of all stakeholders including businesses, residents, the school, emergency services, and local and regional travelers.

- **Analyze the Network** – look at SE Bend as a network, and don’t focus on just the Murphy corridor. Recommend that we look at how improvements to Murphy affect the overall network, including Reed Market.

- **Consider Roadway Classification** – extending Murphy Road to Brookswood and to 15th is likely to change the character of its use. The team should consider whether Murphy Road needs to be reclassified as a Minor Arterial, and what that would mean (80’ vs. 100’ right of way).

- **Coordinate with Utilities** – this includes water, sewer, natural gas, and phone. Central Electric operates east of 15th though extensions would be expected to serve future development. Pacific Power operates west of 15th Street. Upgraded gas line on 15th, would want to look at extending down Murphy west of 15th Street.

- **Lack of Shoulders** – Bend Police cited the need for adequate shoulders for vehicles to pull over and allow emergency vehicles to pass, for disabled vehicles, and for police to use in traffic violation situations. Innovative design features should be balanced with safety needs shown with design features.

  Bend Police also cited concerns with at-grade railroad crossings in town.

- **Engage the Public** – regular communication with the neighborhoods is important, and the Neighborhood Associations provide a good avenue for this communication. The project should consider producing a project newsletter.

- **Improve Accessibility** – adhere to standards laid out in the Americans with Disabilities Act (ADA) for sidewalk widths and grades and curb ramps.
• **Retain Good School Access** – the Murphy corridor is home to one school and will be home to two future schools within the 20 year planning horizon. Access to schools for pedestrians and bicyclists will be very important.

### 5. Update on Technical Products

Dave gave an update on technical products, including:

- **Website:** the technical team has purchased the domain name [www.murphycorridor.com](http://www.murphycorridor.com), and has produced a draft website with tabs on project overview, team, products, meetings, schedule, and upcoming meetings. The website is expected to go live within the next two weeks and when this occurs a message will be sent to the TAC.

- **Traffic Methodology and Assumptions:** The technical team has developed a memo documenting the proposed project traffic methodology and list of assumptions. This has been distributed to the City for review. Nick Arnis also requested a copy of this memo.

### 6. Schedule Next Meetings / Adjourn

The group scheduled future TAC meetings for the first Tuesday of the month (not all months were scheduled). Future meetings are listed below. Please NOTE that the next TAC meeting will be a workshop-style format, with a subgroup of TAC members. All TAC members are invited to participate, though it is not expected.

<table>
<thead>
<tr>
<th>No.</th>
<th>Date</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>2*</td>
<td>November 7</td>
<td>Discuss evaluation framework</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Present existing conditions</td>
</tr>
<tr>
<td>3</td>
<td>December 5</td>
<td>Adopt evaluation framework</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Summarize Existing and Future conditions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pre-public meeting #1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Brainstorm alternatives</td>
</tr>
<tr>
<td>4</td>
<td>January 9</td>
<td>Evaluate alternatives</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pre-public meeting #2</td>
</tr>
<tr>
<td>5</td>
<td>March 6</td>
<td>Review/discuss preferred alternative</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Approach to corridor improvement plan</td>
</tr>
<tr>
<td>6</td>
<td>May 1</td>
<td>Review draft corridor improvement plan</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pre-public meeting #3</td>
</tr>
</tbody>
</table>

Not all TAC members are expected to participate in TAC Meeting #2.

The meeting was adjourned at approximately 2:45 p.m. The actions listed below will be completed by the 2nd TAC meeting.
## Action Items

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Responsible</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Develop draft evaluation framework based on stakeholder and TAC discussion of objectives and project needs.</td>
<td>CH2M HILL</td>
<td>October</td>
</tr>
<tr>
<td>2.</td>
<td>Send message to TAC when website is live.</td>
<td>CH2M HILL</td>
<td>Mid-October</td>
</tr>
<tr>
<td>3.</td>
<td>Review traffic methodology memo</td>
<td>Nick Arnis, Dave Knitowski, Tyler Deke</td>
<td>Early-October</td>
</tr>
<tr>
<td>4.</td>
<td>Make note of all remaining TAC meetings</td>
<td>All</td>
<td>Immediately</td>
</tr>
</tbody>
</table>
Technical Advisory Committee Meeting # 2
Tuesday, November 7, 2006
1:30 – 2:30 p.m.
City Council Chambers
710 NW Wall Street, Bend

Agenda
NOTE: This will be a subgroup meeting for TAC members interested in discussing the project’s evaluation framework and existing conditions.

The full TAC will be briefed on the 11/7 discussion through meeting notes and at the 12/5 TAC meeting.

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Presenter</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Welcome, Review of Agenda</td>
<td>Ken</td>
<td>1:30 p.m.</td>
</tr>
<tr>
<td>2.</td>
<td>Project Status Update</td>
<td>Dave</td>
<td>1:35 p.m.</td>
</tr>
<tr>
<td>3.</td>
<td>Existing Conditions</td>
<td>Dave/Theresa</td>
<td>1:45 p.m.</td>
</tr>
<tr>
<td>4.</td>
<td>Evaluation Framework</td>
<td>Theresa</td>
<td>2:00 p.m.</td>
</tr>
<tr>
<td>5.</td>
<td>Next Steps</td>
<td>Ken</td>
<td>2:30 p.m.</td>
</tr>
</tbody>
</table>

Handouts
1. Agenda
2. Draft Tech Memo 4.1 Existing Conditions
Meeting Summary

The City of Bend held a public open house on Thursday, April 5, 2007 at the Bend Golf and Country Club for the Murphy Road Corridor project. The main purpose of the meeting was to present four preliminary alternatives and to gather feedback on the alternatives, or suggestions for new alternatives, from the public. The public was also encouraged to tell the project team which alternative would most benefit the corridor. The open house began at 4:00 p.m. and concluded at 6:00 p.m.

The project team posted a meeting announcement on the Murphy Road Corridor’s and the City of Bend’s websites and issued a press release to local newspapers, including the Bend Bulletin. Project postcards were sent to 1,102 local residents, businesses, and community leaders to notify them of the open house. A follow up email was sent to the local neighborhood associations’ chairs and stakeholders that were interviewed during the early phases of the project, as well as individuals that had provided email addresses on the website. A display ad promoting the Open House appeared in the Bend Bulletin on Sunday, April 1, 2007.

An open house format was used at the meeting, allowing members of the public to attend at their convenience and have the opportunity to discuss the project and the four alternatives with staff members. Ken Gould, the City of Bend Project Manager, and Dave Simmons, CH2M HILL made two brief presentations, at 4:00 p.m. and 5:00 p.m. Both presentations were followed by a question and answer session.

Attendees were encouraged to submit comments on the project by completing a form asking for input about important issues and for suggestions on future improvements; these comments are attached. They were also encouraged to contribute ideas on flip charts placed around the room, however, there were no comments collected this way. The majority of the comments received were during the question and answer portion after the presentations. Approximately 70 people attended the meeting.

The following items were on display at the meeting:

♦ Project schedule, description of open house format, and how to get involved
♦ Four alternatives (Alternatives A1, B, C, and A2) with graphic and textual description
Evaluation Criteria and results of the criteria
Next Steps for the project

Handouts distributed at the open house included the following:
- Comment form
- Project postcard
- All technical memorandums produced to date

The following comments were submitted on individual comment sheets, via the website comment form, or were offered during the question and answer period after each of the presentations.

**Verbal Comments**

Questions asked during the presentation sessions are listed below, followed by responses from the City of Bend and the consultant team. Questions are denoted by a diamond-shaped bullet (♦). Responses are denoted by a circle-shaped bullet (●)

- Are roundabouts more expensive?
  - Roundabouts are about 1/3 more expensive to install, but take less to maintain so over time signals and roundabouts are about the same cost.

- What about the intersection at 15th?
  - That will be a “T” intersection, with right and left turns only, and based on the traffic model will operate adequately with a stop sign. Recent development plans were included in the traffic analysis.

- How do you perform traffic analysis?
  - Traffic analysis was performed using the Bend Metropolitan Planning Organization’s travel demand model, with post-processing and intersection-level analysis performed in the traffic analysis software, Synchro. All alternatives operated acceptably, though Alternatives B and C may not operate as efficiently as Alternatives A1 and A2 because they do not include a continuous left turn lane.

- Is the project expected to increase traffic volumes along the corridor and throughout the area?
  - The extension of Murphy to 15th will increase traffic both along the Murphy Road corridor and along 15th Street. However, the analysis estimates that the volumes are not terribly high and both Murphy Road and 15th Street would operate well during peak periods.

- Does this project extend to Highway 97 South?
• This project starts at 3rd Street (Hwy 97 Business) on the west. The Oregon Department of Transportation is working on another project that creates an overpass of Highway 97 at Murphy Road.

♦ I live on Murphy. How much of my property will be taken?

• Property impacts vary by alternative and are preliminary at this time. One-on-one discussions about specific property impacts can be accommodated after the group presentation or at the property owner’s convenience.

♦ Who will be using Murphy when it is extended to 15th compared to using Reed Market? Why are you making this connection?

• The Murphy Road extension would serve existing residents of southeast Bend, as well as current and future development east of the railroad. Murphy Road would be another parallel route to Reed Market that would serve the southeast neighborhood. Also, the proposed alternatives would provide a crossing over the railroad, needed by the fire station and emergency vehicles. The extension would also allow the school district to better serve residents east of the railroad tracks.

♦ Is Alternative A1 the only one with sidewalks?

• No, all the alternatives would have continuous sidewalks.

♦ Has the cost been figured out for these alternatives?

• Preliminary cost estimates have been prepared for the Alternatives. Alternative A1 is the most expensive, followed by A2, Alternative C, and Alternative B. Cost estimates include right of way acquisition.

♦ There is a big development on Murphy that would increase left and right turns and I am concerned about accidents. I am also concerned about people turning onto and from side streets, Murphy is already busy.

• Safety concerns are part of the evaluation. The continuous left turn lane can increase safety. The only way to limit turns onto or from side streets is to install a median that would prohibit entrance to driveways and side streets. That would be more expensive and cause the road to be widened further.

♦ What is the size of these roundabouts? Is there an example in Bend? Will it accommodate fire trucks?

• Smaller than the one at 8th and Bond and Reed Market but larger than the one at Bear Creek Road. The fire department has been involved throughout the Murphy Road study process and roundabouts built on Murphy Road would accommodate fire trucks.

♦ How is stormwater management addressed?

• The project team is coordinating with City of Bend water and sewer, but specific drainage issues would be addressed at a later phase of the project.

♦ What are the advantages and disadvantages of the alternatives?
Specific advantages and disadvantages are explained in the boards that describe alternatives evaluation and evaluation criteria.

I am concerned about the roundabouts restricting access to homes. Also, you need to have another survey of the homes because your aerial is two or three years old.

That has been considered and access restrictions are one of the challenges of roundabouts. The project will have new aerial photos of the corridor within the next few months.

Will the railroad crossing be an overpass?

Yes.

I am concerned about the roundabout aprons accommodating commercial vehicles, which can be up to 75 feet long.

That is a good issue to raise. Roundabouts would be built to accommodate commercial vehicles, with mountable aprons.

Will there be street lights? Where will be located?

Street lighting will be determined during the design phase. However, there is an ordinance against light pollution (that is directed upward).

Is there a comparison of the traffic flow at 15th (after Murphy is extended) to another location in Bend?

The comparison of those other streets was not included in the project, although it is possible to compare to a similarly sized road there are always individual circumstances that will pertain only to this location.

Will Murphy Road be connected to 27th?

The project did some traffic modeling to look at extensions to 27th, however, development near Ferguson limits a direct, parallel route to 27th. Pushing Murphy to 27th at a more southern alignment did not have a lot of value to the greater Bend community.

How far along are the Murphy Over-crossing and South Parkway projects?

Those projects are being led by the City of Bend and ODOT respectively. They are moving at a similar pace as the Murphy Corridor study. Links to these studies will be posted on our website.

Will the roundabout at Parrell have a fifth leg?

This is unlikely, however, the new alignment that will connect to the over crossing project has not been determined yet.

When will construction begin?

First the project needs to establish a preferred alternative and funding mechanism. Then the final design will be determined. The city may decide to move around some
budget to begin some phases of the project within the next few years. However, the project will be constructed in phases based on the funding available.

♦ Will you get money from the developers?
  • A portion of the funding comes from system development charges but the project will also look at other funding possibilities, including state and federal money.

♦ If Juniper Ridge goes ahead, where would this project fall in the pecking order?
  • Several projects could be constructed at the same time. However, the construction timeframe is not known at this time.

♦ Can you explain the sizes of the alternatives?
  • Alternative A1 is 80 feet wide from curb to curb. Alternative A2 is between 60 and 70 feet between Parrell Road and Brosterhous Road, depending on right of way availability.

♦ How do the alternatives compare to each other for the cost of construction?
  • Alternative A1 is the most expensive, next A2, then C, and finally B is the least expensive.

♦ What would the speed limit be on Murphy for these alternatives?
  • The speed limit is expected to be left at the current 35 MPH.

♦ Will the extension out to 15th occur at the same time as improvements along the existing Murphy Road?
  • The project will be set up to allow for phased construction based upon available funding.

♦ Did the traffic analysis look at the number of cars turning onto Murphy?
  • Yes

♦ It may be hard to find gaps to enter roundabouts from side streets onto Murphy.
  • The project did consider a high volume of traffic and through traffic, however, it would be substantially less than Reed Market. Since Murphy is more southern, it will attract more local traffic so there will still be gaps in the traffic at a roundabout to allow traffic from side streets to get onto Murphy.

♦ Is the traffic model data available to the public?
  • While the model itself is proprietary, the results of the model for this project are available in Technical Memorandum 5.1 (available at open house and on website)

♦ Has there been any evaluation of the roundabout on 15th and Franklin? Or at Bear Creek? Specifically with roundabouts close to schools?
• Children as pedestrians use the roundabout in different ways. There are trade offs between traffic signals and roundabouts. Safe routes to schools in the area are important and were considered. There is also the possibility of adding crosswalks along Murphy Road between intersections. We can take your request to examine existing roundabouts to the Technical Advisory Committee.

♦ I have a problem with the roundabout at Country Club because of the fire station. With a signal, the fire station can control the signal.

• We have had a fire department representative on the Technical Advisory Committee to examine the design of the roundabout. It may be more of an effort to educate drivers on what to do when they are in the roundabout and an emergency vehicle is approaching.

♦ What about a pedestrian crossing overpass over Murphy Road at Jewell Elementary School?

• Pedestrian overpasses usually don’t get used, especially in neighborhood environments like this one. However, the project will consider the safest and most appropriate methods to address crossing of the corridor by the number of young walkers and drivers.

♦ Will there be sound walls?

• No

♦ What part of the project cost will be paid by development in the area?

• Transportation System Development charges are collected for all new developments. No additional assessments are allowed under current City code.

♦ Will this project reduce traffic on Reed Market?

• It will keep Reed Market in the future from getting worse. With so much new development on Murphy, not creating an extension to 15th could cause problems.

♦ What will the impact be to Knott and 15th?

• The project team has updated traffic data from the initial model outputs (see Technical Memorandum 5.1 and the project website). Earlier assessments showed the 15th and Knott intersection as operating poorly, but subsequent analysis shows that this intersection operates at an acceptable level in the future forecast year (2027).

♦ Will there be transit on Murphy in the future?

• The City anticipates that there will be and that assumption is built into the traffic model.
Written Comments

What do you like best about each alternative? What would you improve or change?

♦ Alternative A1:
  • No, 80 foot, too wide, most expensive
  • To merge with 15th will be a nightmare on 15th
  • This one is excellent, although I realize it is probably the most expensive, and it may
take some property from existing owners.
  • No signals please!

♦ Alternative A2:
  • No, 70 foot, 3 lanes, next most expensive
  • I like this alternative the best! Narrower thru lanes. Improved roundabouts.
  Somehow, try to encourage drivers to make fewer left turns into driveways and use
the roundabouts more. The narrower lanes create less impact on homes. Use utmost
effort to create least impact on homes at roundabouts. I want creative – low-impact
storm run-off/drainage planned for this project (slope and curb drain slots,
settlement basins with plantings – (more & smaller) street lighting at intersections
only.
  • To stop at 15th will create jams on 15th
  • I believe this is the best overall alternative of the 4 presented.
  • I like this best but want to see the roundabout at Country Club to be moved
southeast as much as possible to lessen the adverse affect of the homes at that
intersection. If you need to choose between someone’s property being taken and an
old tree – take the tree and USE IT then plan 3-5 new trees!!
  • This one is excellent also, although I prefer “on-demand” signals.
  • Because of all the houses on Murphy Road, I think 3 lanes would be best.
  Roundabouts are a lot easier for drivers, I think.
  • I think this is the best plan. There is not a perfect plan. I like the roundabouts, they
seem to keep things moving. Also during low traffic, you most likely wouldn’t have
to stop at all – final savings.

♦ Alternative B:
  • 60 foot, prefer roundabouts unless dangerous for school children and pedestrians
  • Think beyond Murphy
  • Don’t like with increased traffic no center turn lane, too dangerous
  • This would not be an improvement over present ability to move traffic.
  • No signals please!

♦ Alternative C:
  • 60 foot, prefer roundabouts unless dangerous for school children and pedestrians
  • New Road no improvement at 15th improving Murphy pressures 15th
  • Don’t like with increased traffic no center turn lane, too dangerous
  • This would not be an improvement over present ability to move traffic.
  • Because of all the houses on Murphy Road, I think 3 lanes would be best.
  Roundabouts are a lot easier for drivers, I think.
Which alternative serves the community best?

♦ Alternative A2 seems best compromise. I much prefer roundabouts to signals. 3-12 foot traffic lanes would be sufficient for projected traffic flow while minimizing impact to adjoining homeowners.

♦ 15th has a traffic flow and 40 MPH – Murphy becomes a corridor, people using Murphy are avoiding Reed at 3rd how will 15th and Murphy handle a stop sign? Traffic back-up? It would make “sense” to do a roundabout at 15th?? Avoiding stops at key commute times.

♦ A2 – I believe roundabouts function better than traditional intersections and will greatly enhance the Murphy Road corridor.

♦ A2

♦ I feel A1 and A2 would handle future traffic best.

Do you have any other comments or questions?

♦ 15th and Murphy need more attention. It is the key to a flow of traffic on Murphy – it needs more attention.

♦ I would like to see the existing portion of Murphy Road worked on first, before the traffic increased when the extension to 15th Street is finished.

Website Comments

♦ I am responding regarding the Open House held April 5 at Bend Country Club. My preference of the 4 choices presented is A2. Reason 1: I think the road should be as wide as possible now rather than redoing the road later when unforeseen traffic has developed. 1. Future development of Ward land, 2. current developments along Brosterhous, Murphy, Parrell and 15th, 3. two new schools planned for the area will all add considerable traffic. Plus having an RR overpass will pull traffic not to mention the traffic that will gravitate to Murphy when Reed Market is being overhauled. Reason 2: I am a big fan of round-abouts. Reason 3: I like the continuous turn lane.
Handouts included the meeting agenda and three draft Technical Memoranda – Tech Memo 3.1 Plan and Policy Review; Tech Memo 4.1 Existing Conditions and Deficiencies; and Tech Memo 7.1 Evaluation Framework. This meeting summary covers questions and discussion related to each of the TAC meeting agenda items. Please refer to the meeting handouts for more detail on agenda topics.

1. Welcome, Review of Agenda
Ken Gould welcomed the group to the 2nd TAC meeting and thanked everyone for their participation in the Murphy Corridor project.

2. Project Status Update
Dave Simmons gave a brief status of work products to date:

- Tech Memo 2.1 Stakeholder Interviews Completed
- Project website is live (www.murphycorridor.com)
- Tech Memo 3.1 Plan and Policy Review drafted
- Tech Memo 3.2 Traffic Analysis Methodology drafted
- Tech Memo 4.1 Existing Conditions and Deficiencies drafted
- Tech Memo 7.1 Evaluation Framework drafted
The team is now focused on receiving outputs from the traffic model for future no build and build conditions scenarios to complete Task 5 (Future Conditions and Deficiencies). It is expected that the team will receive this information from ODOT in early December. This delays the project schedule by at least one month.

3. Existing Conditions
Theresa Carr provided an overview of existing conditions and deficiencies. Highlights from this analysis are listed below: Please refer to Technical Memorandum 3.1 Existing Conditions and Deficiencies for more information.

- **Land Use Assumptions** – The project analysis assumes growth consistent with regional projections, but will conduct a sensitivity analysis for the preferred alternative to ensure that it will be effective under an alternate, expedited-growth scenario.

- **Areas of Special Interest** – There are two Areas of Special Interest (ASIs) located in the study area. One ASI is located south of the existing Murphy Road between Country Club Drive and Brosterhous Road. The second ASI is located east of the existing terminus of Murphy Road at Brosterhous Road and immediately east of the railroad tracks. According to Section 10-10.26C-D of the Bend Code, public streets can be placed within an ASI if it is shown that no other practicable method exists to avoid the ASI.

- **Social Characteristics** – There are a higher percent of the study area aged 65 or higher than the City, County, and State average.

- **Corridor Crash Rate** – The crash rate for the existing Murphy Corridor was 2.25 per million vehicle miles (MVM). The statewide average crash rate for urban collectors for the period 1999-2003 was 3.84 per MVM.

- **Intersection-Level Crash Rate** – The highest crash rate was located at Parrell Road, with a crash rate of 0.53 per million entering vehicles (MEM). Crash rates below 1.0 do not indicate a safety concern.

- **Pedestrian Facilities** – Sidewalks do not exist on the western end of Murphy Road and are intermittent between Mel Court and Brosterhous Road. Sidewalks should be continuous and at least 5 feet wide on both sides of the roadway to meet city standards. Future sidewalks will need to meet requirements from the Americans with Disabilities Act (ADA), including wheelchair ramps at intersection corners.

- **Horizontal Alignment** – Near Parrell Road and Mel Court, horizontal curve radii are shorter than design standard. This reduced radius may impact a drivers’ ability to safely navigate the curve at the posted speed.

- **Sight Distance** – Near Parrell Road and Mel Court, drivers on Murphy Road have restricted horizontal sight distance due to objects, such as trees, located close to the roadway on the inside of the curve. Objects that can obstruct a drivers line of sight through a corner need to be set back a specific distance from the centerline of the inside lane to provide the necessary stopping sight distance.
• **Median Width** – The current alignment of Murphy Road is a curb-to-curb width of 36 feet. This allows for two 12’ travel lanes and two 6’ bike lanes. As a Major Collector, the curb-to-curb width should be 52’ to also allow for a 16’ continuous center turn lane.

• **Intersection Operations** – Three study intersections are currently above acceptable levels of traffic mobility. None of these intersections are along Murphy Road.
  – **Pinebrook Boulevard/SE 3rd Street** – The eastbound approach of Pinebrook Boulevard at SE 3d Street currently is operating at LOS F
  – **Pinebrook Boulevard/Brookswood Boulevard** – The westbound approach of Pinebrook Boulevard at Brookswood Boulevard is operating at LOS F
  – **China Hat Road/Ponderosa/US 97** – The westbound approach of China Hat Road/Ponderosa at US 97 operates at LOS F

• **Queuing Analysis** – The intersections of US97/China Hat-Ponderosa, 3rd/Pinebrook, 3rd/Murphy, and Brookwood/Pinebrook all have at least one lane group that has a 95th percentile queue that exceeds 200 feet. Potential areas of concern for these intersections are safety issues associated with the long queue or spillback of the queue to the previous intersection.

Comments from the TAC included:

• Include some mention in the memo that Murphy Road’s character is very likely to change over time.

• Is Murphy Road a freight route? (No, it is not)

• Include some mention of emergency services routes along Murphy

• Add language about any funded or planned utility projects related to sewer/infrastructure

Ken Gould requested comments on the Existing Conditions memo to be submitted by COB next Thursday, 11/16.

### 4. Evaluation Framework

Theresa presented the draft evaluation framework. The framework will be used by the technical team and the TAC to evaluate the performance of each alternative against a broad range of important project characteristics, representing a full range of city and stakeholder values. The evaluation criteria tie back to the findings from the September 13-14, 2006 stakeholder interviews and the October 2, 2006 TAC meeting. There are seven proposed criteria:

• Congestion/Mobility
• Connectivity
• Cost
• Environment – Built (Residential/Business Impacts)
• Environment – Natural
• Multimodal Solutions
• Safety
The TAC made the following changes and suggestions to the evaluation framework:

- **Ratings** – The ratings value the “not applicable” rating the same as the most negative rating (“0”). Suggest making “not applicable” a value of “0” and the negative rating a value of “-2.” Specify that the value of “0” rating indicates not applicable or no effect.

- **Congestion Mobility** – For congestion/mobility criterion, use either V/C or LOS (not both). There was some discussion among group members about dropping the delay measure, though after the discussion the group recommended keeping delay.

- **Connectivity** – There was discussion of dropping the connectivity criterion because it is unlikely to be different for each alternative. However, the group decided to keep the criterion to look at trip travel times and to reflect the importance given to connectivity.

- **Cost** – it was recommended to separate cost estimates from the other performance measures under the “Cost” criterion. The group recommended splitting the “Cost” criterion into two criteria, including “Cost” which would consist of cost estimates, and “Constructability” which would look at phasing and use of existing pavement.

The discussion on evaluation framework ended before going through the entire evaluation framework, due to time constraints. Ken Gould asked the group to submit comments by the end of the day next Thursday, 11/16.

**5. Next Steps**

The project next steps are focused on finalizing the evaluation framework and conducting the future conditions work. If the model is ready, future scenario outputs can be expected the second week in December. This delays the project schedule by approximately one month. For this reason, the December TAC meeting will be delayed until January. The January 9 TAC meeting will adopt the final evaluation framework, discuss future deficiencies along Murphy, and brainstorm possible project alternatives. An open house will also be held in January. If the model is delayed further, the January TAC meeting will also be postponed. More information will be available on December 8.

The meeting was adjourned at approximately 2:45 p.m. The actions listed below will be completed by the 3rd TAC meeting.

**Action Items**

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Responsible</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>Comment on Tech Memo 4.1 Existing Conditions</td>
<td>TAC</td>
<td>November 16</td>
</tr>
<tr>
<td>3.</td>
<td>Comment on Tech Memo 7.1 Evaluation Framework</td>
<td>TAC</td>
<td>November 16</td>
</tr>
<tr>
<td>4.</td>
<td>Finalize Tech Memo 3.2 Traffic Methodology</td>
<td>CH2M HILL</td>
<td>November 16</td>
</tr>
<tr>
<td>5.</td>
<td>Finalize Tech Memos 3.1, 4.1, and 7.1</td>
<td>CH2M HILL</td>
<td>December 1</td>
</tr>
<tr>
<td>6.</td>
<td>Remove December 5 TAC meeting from calendars</td>
<td>TAC</td>
<td>Immediately</td>
</tr>
<tr>
<td>7.</td>
<td>Confirm or postpone January 9 TAC meeting</td>
<td>CH2M HILL</td>
<td>December 8</td>
</tr>
</tbody>
</table>
Murphy Road Corridor Study

Technical Advisory Committee Meeting # 3
Wednesday, January 17, 2007
1:30 – 3:00 p.m.
Annex Conference Room 2
745 NW Bond Street, Bend

Draft Agenda

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Presenter</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Welcome, Review of Agenda</td>
<td>Ken</td>
<td>1:30 p.m.</td>
</tr>
<tr>
<td>2.</td>
<td>Project Status Update</td>
<td>Dave</td>
<td>1:35 p.m.</td>
</tr>
<tr>
<td>3.</td>
<td>Results of Future Conditions Analysis</td>
<td>Craig</td>
<td>1:45 p.m.</td>
</tr>
<tr>
<td>4.</td>
<td>Discussion of Potential Solutions</td>
<td>Dave</td>
<td>2:15 p.m.</td>
</tr>
<tr>
<td>5.</td>
<td>Next Steps</td>
<td>Theresa</td>
<td>2:30 p.m.</td>
</tr>
<tr>
<td></td>
<td>– Project Open House</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>– Development of Potential Solutions</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>– Evaluation of Potential Solutions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Adjourn</td>
<td>Ken</td>
<td>3:00 p.m.</td>
</tr>
</tbody>
</table>

Handouts
1.    Agenda
2.    Draft Tech Memo 5.1 Future Conditions
3.    Final Tech Memo 4.1 Existing Conditions
Meeting Summary

ATTENDEES

<table>
<thead>
<tr>
<th>Committee</th>
<th>Consultant Team</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nick Arnis, Bend Public Works, Transportation</td>
<td>Mike Miller, Bend Public Works</td>
</tr>
<tr>
<td>Judy Barnes, Central Electric Cooperative</td>
<td>Paul Rheault, Bend Public Works</td>
</tr>
<tr>
<td>Tyler Deke, Bend Metropolitan Planning Organization</td>
<td>Wendy Robinson, Bend Long-Range Planning</td>
</tr>
<tr>
<td>Ken Gould, Bend Public Works Engineering</td>
<td>Ron Taylor, Bend Police (for Sandi Baxter)</td>
</tr>
<tr>
<td>Dave Knitowski, Bend Community Development</td>
<td>Jim Wodrich, Bend Public Works Engineering</td>
</tr>
<tr>
<td>Doug Koellermeier, Bend Fire Department</td>
<td></td>
</tr>
<tr>
<td>Guests</td>
<td>Consultant Team</td>
</tr>
<tr>
<td>Mike Linkoff, Bend Public Works</td>
<td>Dave Simmons, CH2M HILL</td>
</tr>
<tr>
<td>Kevin Ramsey, Bend Street</td>
<td>Theresa Carr, CH2M HILL</td>
</tr>
<tr>
<td></td>
<td>Tony Woody, CH2M HILL (phone)</td>
</tr>
</tbody>
</table>

Handouts included the meeting agenda and three Technical Memoranda – a draft of Tech Memo 5.1 Future Conditions and Deficiencies; a final Tech Memo 4.1 Existing Conditions and Deficiencies; and a final Tech Memo 7.1 Evaluation Framework.

This meeting summary covers questions and discussion related to each of the TAC meeting agenda items. Please refer to the meeting handouts for more detail on agenda topics.

1. Welcome, Review of Agenda
Ken Gould welcomed the group to the 3rd TAC meeting and thanked everyone for their participation in the Murphy Corridor project.

2. Project Status Update
Dave Simmons gave a brief status of the project since the last TAC meeting (November 7th):

- Tech Memos 4.1 and 7.1 were finalized to reflect comments received from the TAC
The consultant team coordinated with the MPO and ODOT’s Transportation Planning and Analysis Unit (TPAU) on future condition model scenarios to be run for the Murphy Road Corridor study. Modeling outputs were received from the MPO and future conditions analysis was completed. This required some iterative analysis including some rework due to changes in underlying model assumptions from TPAU.

Tech Memo 5.1 Future Traffic Conditions and Deficiencies was drafted (see Agenda Item #3)

3. Results of Future Conditions Analysis

Tony Woody provided an overview of future conditions and deficiencies. The future traffic analysis identified expected future traffic conditions and congested-related deficiencies within the project study area. The purpose of the task was to determine how improvements to Murphy Road, including a westerly extension to Brookswood Boulevard and an easterly extension to 15th Street, affect future travel patterns and future traffic operations within the study area and southeast Bend. Highlights from this analysis are listed below:

- Traffic volumes along Murphy Road increase under all future scenarios.
- Traffic increases are higher under scenarios where improvements are made to Murphy Road, although the net difference observed from widening to a five-lane cross section was not significant.
- The addition of signals at Parrell Road, Country Club Road, and 15th Street, and left turn pockets along Murphy Road at each intersection between 3rd Street and 15th Street bring traffic operations along Murphy Road into compliance with relevant City of Bend and Oregon Department of Transportation (ODOT) mobility standards.
- An extension of Murphy Road east to 27th Street shifts a low to moderate amount of traffic onto Murphy Road from 15th Street and Knott Road.

Please refer to Technical Memorandum 5.1 Existing Conditions and Deficiencies for more information.

Questions from the TAC are listed below:

- Differentiation is needed between the Model Scenario (called the Murphy Crossing Scenario) and the Murphy Crossing study, which analyzed a westerly extension of Murphy Road between the Parkway and Brookwood Boulevard.

Ken Gould requested comments on the Future Conditions memo to be submitted by COB next Friday January 26th.

4. Discussion of Potential Solutions

Dave facilitated a group discussion on potential solutions. The TAC felt that due to the findings of the traffic analysis, a five-lane section does not need to be developed any further. The group also felt that an extension to 27th Street would have limited utility. This is

---

1 Traffic signals were analyzed at Parrell Road, Country Club Drive and 15th Street. Though it is anticipated that roundabouts would work at these locations as well, further operations analysis at these locations would be required prior to final recommendation.
because existing residential developments south of Ferguson would make a connection to that street east of 15th Street too impactful, and to avoid the school Murphy Road would need to be brought to the south, near its connection with Knott Road. That limits its usefulness as a route for anything except local use. Therefore, the TAC recommended against further development of that extension as an alternative.

The TAC recommended development of three alternatives:

1. A three-lane section for the entire length of Murphy Road, between 3rd Street and 15th Street. This would be built to be consistent with City Design Standards.

2. A two-lane section for Murphy Road between 3rd Street and Brosterhous Road, expanding to a three lane section between Brosterhous and 15th Street (the new roadway section), with signals at key intersections.

3. An alternative similar to #2 above except with roundabouts at key intersections instead of signals.

The team will present these three potential alternatives to the public at the January 31 open house and solicit additional ideas before proceeding towards alternatives development and evaluation.

5. Next Steps
Theresa presented next steps, which are to:

- Hold Public Meeting #1 to present findings to date and request input on draft corridor design alternatives
- Develop potential corridor alternatives
- Evaluate potential corridor alternatives

The meeting was adjourned at approximately 3:00 p.m. The actions listed below will be completed by the 4th TAC meeting.

Action Items

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Responsible</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Comment on Tech Memo 5.1 Future Conditions and Deficiencies</td>
<td>TAC</td>
<td>January 26</td>
</tr>
<tr>
<td>2.</td>
<td>Hold Public Meeting #1</td>
<td>All</td>
<td>January 31</td>
</tr>
<tr>
<td>3.</td>
<td>Finalize Tech Memo 5.1 Future Conditions and Deficiencies</td>
<td>CH2M HILL</td>
<td>February</td>
</tr>
<tr>
<td>4.</td>
<td>Develop draft corridor alternatives based on TAC direction and public input</td>
<td>CH2M HILL</td>
<td>February</td>
</tr>
<tr>
<td>5.</td>
<td>Develop order-of-magnitude cost estimates for draft corridor alternatives</td>
<td>CH2M HILL</td>
<td>February</td>
</tr>
<tr>
<td>6.</td>
<td>Evaluate draft corridor alternatives based on project evaluation framework</td>
<td>CH2M HILL</td>
<td>March</td>
</tr>
</tbody>
</table>
First Project Open House  
Wednesday, January 31, 2007  
4:00 to 6:00 p.m.  
Bend City Council Chambers  
710 NW Bond Street, Bend  

Meeting Summary  
The City of Bend held a public open house on Wednesday, January 31, 2007 at the City Council Chambers for the Murphy Road Corridor project. The main purpose of the meeting was to present background information on the project, including the project’s objectives, existing land use, environmental, and traffic conditions, and future traffic conditions, and to gather suggestions for improvement from the public. The open house began at 4:00 p.m. and concluded at 6:00 p.m.  
The project team posted a meeting announcement on the Murphy Road Corridor’s and the City of Bend’s websites and issued a press release to local newspapers, including the Bend Bulletin. Project postcards were sent to approximately 1,090 local residents, businesses, and community leaders to notify them of the open house. A follow up email was sent to the local neighborhood associations’ chairs and stakeholders that were interviewed during the early phases of the project, asking to inform their members of the upcoming meeting. A display ad promoting the Open House appeared in the Bend Bulletin on Sunday, January 28, 2007.  

An open house format was used at the meeting, allowing members of the public to attend at their convenience and have the opportunity to discuss the project and issues surrounding it with staff members. Ken Gould, the City of Bend Project Manager, and Dave Simmons, CH2M HILL made two brief presentations, at 4:00 p.m. and 5:00 p.m. Both presentations were followed by a question and answer session.  

Attendees were encouraged to submit comments on the project by completing a form asking for input about important issues and for suggestions on future improvements. They were also encouraged to contribute ideas on flip charts placed around the room. The majority of the comments received were during the question and answer portion after the presentations. Approximately 75 people attended the meeting.  

The following items were on display at the meeting:  
♦ Project schedule and map of the project area in relation to the other projects occurring in the area  
♦ Stakeholder interview comments, existing conditions, future traffic conditions, and the evaluation criteria
Handouts distributed at the open house included the following:
- Comment form
- Project postcard
- All project documents produced to date, including agendas and meeting materials from the Technical Advisory Committee meetings

The following comments were submitted on individual comment sheets and were offered during the question and answer period after each of the presentations.

**Verbal Comments**

Questions asked during the presentation sessions are listed below, followed by responses from the City of Bend and the consultant team. Questions are denoted by a diamond-shaped bullet (♦). Responses are denoted by a circle-shaped bullet (●)

- **Existing conditions** doesn't have water drainage, there is standing water on the road. Will the project fix that? Also Reed Market construction starts this summer; people will head south on Murphy, what will happen to Ferguson?
  - Any alternative that will move forward, will address water drainage issues along Murphy Road. Ferguson will most likely experience some additional traffic from the Reed Market construction, which is understood to be an inconvenience.

- The Murphy overcrossing project shows the alignment of Murphy shifted to the south, starting around Parrell. What happens to the existing Murphy alignment, between Parrell and 3rd? Will this section become a dead-end?
  - That is a different study, being conducted by ODOT, and so they would need to be consulted on that. The alignment for the section of Murphy Road from 3rd Street to Parrell has not been decided yet.

- Concerned about noise, especially with a 5-lane road. Will there be adjustments made?
  - It is a City policy not to install sound walls and studies for other City projects have shown that they do not significantly reduce the noise due to the need for frequent openings in the walls for access. While the project initially looked at 5-lanes, it was decided that three lanes were adequate.

- Concerned about the speed of cars; what will be the speed?
  - It is estimated now that the speed will be 35 miles per hour with a 20 mile per hour school zone near Jewell Elementary.

- Have you considered an extension to Ferguson (which would be a shorter road) instead of going down to 27th?
  - Creating an extension to Ferguson would cause more of an impact to the existing built environment than having the alignment to the south.
♦ I want to raise the idea of curbs with slots that slope to the center that has plants in it to filter the runoff.
  • The city has created something like this at 27th and we will have to see if that works there.
♦ What is your best guess about an extension to 27th versus stopping at 15th?
  • It is not in the near future because 27th is outside the City limits. If it starts to develop, the City and County can tie it into the City’s Urban Growth Boundary.
♦ Where is this project in the CIP?
  • Murphy Road is within a five year plan, which will be aggressively pursued. However, the railroad over crossing is a multi-million dollar effort with lots of coordination, so it may take more time.
♦ I appreciate seeing Knott and 15th is a red circle [does not meet mobility standards] because that intersection is a problem today. Speed limit signs help a bit. Please do coordinate with the County. Not coordinating doesn’t help those out there. For example, a Rickard Road upgrade could easily link to Burns and serve as a bypass.
  • The City will coordinate with the County on what improvements are needed at the 15th and Knott intersection.
♦ With the new building on Reed Market and 15th, what happens to 15th if Murphy stops there? I would hate to live there with the morning traffic.
  • The City is looking at traffic patterns for the larger transportation network, including Murphy, 15th, and Reed Market. The future traffic analysis indicates some moderate increase in traffic on 15th north of Murphy, but lower traffic volumes on 15th south of Murphy.
♦ Will the improvements to Reed Market be built first or will Murphy Road be constructed to 15th Street first?
  • The improvements to Reed Market between 15th and 27th are being designed and will be constructed first. The timing for construction of the improvements to Reed Market between 3rd and 15th relative to the Murphy Road extension to 15th Street has not been determined. Constructing Murphy Road first would provide for an alternate route while Reed Market is under construction and would provide immediate benefits as an emergency response route.
♦ It seems that moving traffic and connectivity are the main concerns, rather than impacts to the residents who live along Murphy Road.
  • Considering impacts to existing homes and businesses is one of this project’s evaluation criteria. However, Murphy Road is a collector street. In March, when the Evaluation Criteria will be considered, that is when we can discuss this concern at the detail level.
Is there coordination with this project and the possible sewer extension that will take place along Murphy Road?

- Yes, coordination is taking place between this project and the sewer improvements.

Will there be cut outs installed for buses along Murphy Road?

- The project is coordinating with the transit authority; however, the project is not at that level of detail.

Is the criterion for two lanes sufficient? A few years ago, a report came out that said there was one car per seven seconds on the road.

- For this project, we have taken traffic volumes, the number of cars, where they are going, the land use for future development and related car usage to create a traffic model. The traffic analysis found that three lanes are sufficient to carry traffic volumes on Murphy Road.

Will the scenarios consider Highway 97 blocked off by barricades?

- Yes, the project at China Hat Road is included.

Did you consider current zoning standards (5,000 additional homes allowed) for the future conditions? There is a huge amount of growth forecasted. One lane in each direction seems too small.

- The project assumes that most vacant land would build up and took a large forecast look at another option for high density. The project is also conducting a sensitivity analysis to see what happens when growth occurs at a more intense level than what was assumed by the travel demand model.

Have you looked at scenarios of southeast Bend being brought into the Urban Growth Boundary? Will this project dovetail with the new Urban Growth Boundary?

- It was assumed that there would be some level of growth outside the Urban Growth Boundary, along 27th Road. The City will correlate this project with the new Urban Growth Boundary maps.

If the existing dedicated right of way is not enough for a three lane, is the assumption that the Ward property will be taken?

- The main concern for inadequate existing right of way is along the older sections of development along Murphy Road. Newer development is required to have a wider space set aside than what it may appear to have.

Have the new high school and middle school be considered?

- Yes, they have been considered in the project.

Is there an idea regarding the change of traffic? How many more cars will there be along Murphy Road?
Murphy Road is a collector, which means that it is expected to carry vehicles traveling between local streets and the arterial system. The road will eventually carry more traffic than it does today, however, improvements will be consistent with the designation of a collector street.

I assume this project is because of Reed Market. Will you look at the impact it has on Reed Market? If Murphy were extended to 15th, would it reduce traffic on Reed Market? What about to 27th?

From initial work, it appears that Murphy serves a specific role in southeast Bend and that improvements to Murphy will help address some of the growth, but it won’t draw a large volume of traffic off Reed Market. It appears that traffic using Reed Market will continue to use it and not be redirected to Murphy.

If Murphy Road is extended to 15th will there be an at-grade rail crossing, or will it be above or below grade?

The railroad crossing will be an over crossing.

What is the schedule to build?

Construction is the most expensive part of the process and so it is difficult to schedule. We are looking at funding options and it is a high priority for the city.

In one of the boards, you indicated that you plan to add a traffic signal at Murphy and Country Club. Don’t use a roundabout there because of the fire department on Country Club Drive.

Emergency response is a huge consideration. The Technical Advisory Committee for the project has a fire representative and the project has been working with them. The project is looking at either signals or roundabouts for congested intersections. For the alternative selection, both options will be examined.

There is a lot of constraint in southeast Bend because of the sewer capacity. Are you coordinating with sewer improvements?

Yes.

What is the plan and timeframe for 3rd? What about for Parrell to Brosterhous?

The segment of Murphy Road in the vicinity of 3rd requires coordination with the ODOT Murphy Road overcrossing project. This will affect the timeframe. They are just now formulating concepts. For Parrell to Brosterhous, the phasing and budget will be determined when there is a better idea of the preferred alternative.

What about Brosterhous; going down to Knott and American Lane?

There are no improvements planned along Brosterhous, with this project. However, we are looking at the situation there as it related to the improvements on Murphy and how they could affect traffic on Brosterhous and American Lane.

Is connecting Chase Road to Brosterhous in the pipeline.
• There is rapid growth and an inadequate road, but that must be done when
development is occurring so that the corridor plan and private development will
improve it.

♦ Is the green line to 27th [on the PowerPoint modeling slide] the preferred alignment?
• No. That alignment was drawn for traffic analysis only, and was drawn to avoid
impacts to existing residential directly south of Ferguson Road, and the school on
27th. The traffic analysis indicates that an extension of Murphy Road to 15th appears
adequate.

♦ What if the Urban Growth Boundary were pushed out, would the Murphy extension to
27th help in the future?
• The modeling did not show a huge impact at this stage.

♦ I would suggest that you do look at an extension to 27th Street now, because it could end
up with a situation like at Ferguson. Have to do it now. I realize that it is an ongoing
question that the City has to develop growth, not the developer.
• With the traffic model developed, the City now has a tool to be more proactive in
working with developers to plan new street connections.

♦ Is the point of this project to update the Transportation System Plan (TSP) once the
preferred alternative is adopted?
• The road is already a collector and we are not proposing to change the designation,
therefore no change to the TSP would be needed. There would be a need to update
the TSP if Murphy were extended to 27th.

♦ What is the next step?
• After a preferred alternative is selected, the City Council will vote to adopt it, the
capital development project will go to final design, it will be bid out, and built.

♦ Is it easier to get developers to pay if we have a plan?
• A plan helps to keep everything on the same page.

Written Comments
♦ Think about a traffic circle at Country Club Drive and Murphy.
Technical Advisory Committee Meeting # 4
Tuesday, March 6, 2007
1:30 – 3:00 p.m.
Council Chambers
710 NW Wall Street, Bend

Agenda

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Presenter</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Welcome, Review of Agenda</td>
<td>Ken</td>
<td>1:30 p.m.</td>
</tr>
<tr>
<td>2.</td>
<td>Project Status Update</td>
<td>Dave</td>
<td>1:35 p.m.</td>
</tr>
<tr>
<td></td>
<td>– Project Open House (January 31)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>– Development of Draft Corridor Alternatives</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>– Evaluation of Corridor Alternatives</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Presentation of Murphy Road Corridor Alternatives</td>
<td>Jose</td>
<td>1:40 p.m.</td>
</tr>
<tr>
<td>4.</td>
<td>Discussion of Draft Alternative Evaluation</td>
<td>Theresa</td>
<td>2:00 p.m.</td>
</tr>
<tr>
<td>5.</td>
<td>Next Steps</td>
<td>Dave</td>
<td>2:45 p.m.</td>
</tr>
<tr>
<td></td>
<td>– Project Open House (April 5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>– Select Preferred Corridor Alternative</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>– Draft Refinement Plan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Adjourn</td>
<td>Ken</td>
<td>3:00 p.m.</td>
</tr>
</tbody>
</table>

Handouts
1. Agenda
2. Final Tech Memo 5.1 Future Conditions
3. Draft Corridor Alternatives
4. Draft Corridor Alternative Evaluation
Murphy Road Corridor Study

Technical Advisory Committee Meeting # 4
Tuesday, March 6, 2006
1:30 – 3:30 p.m.
710 NW Wall Street (City Council Chambers)

Meeting Summary

ATTENDEES

<table>
<thead>
<tr>
<th>Committee</th>
<th>Consultant Team</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nick Arnis, Bend Public Works, Transportation</td>
<td>Dave Knitowski, Bend Community Development</td>
</tr>
<tr>
<td>Ron Taylor, Bend Police Dept (for Sandi Baxter)</td>
<td>Doug Koellermeier, Bend Fire Department</td>
</tr>
<tr>
<td>Eric Hagan, Bend Police Dept (for Sandi Baxter)</td>
<td>Mike Miller, Bend Public Works</td>
</tr>
<tr>
<td>Ken Gould, Bend Public Works Engineering</td>
<td></td>
</tr>
<tr>
<td>Guests</td>
<td></td>
</tr>
<tr>
<td>Julia Wellner, Bend Public Works</td>
<td>Dave Simmons, CH2M HILL</td>
</tr>
<tr>
<td></td>
<td>Theresa Carr, CH2M HILL</td>
</tr>
<tr>
<td></td>
<td>Jose Vasquez, CH2M HILL</td>
</tr>
</tbody>
</table>

Handouts included the meeting agenda, the three draft alternatives (Alternatives A, B, and C), order-of-magnitude cost estimates for all three alternatives, and the technical team’s preliminary evaluation of the three alternatives. The team also distributed the final Tech Memo 5.1 Future Conditions and Deficiencies. This meeting summary covers questions and discussion related to each of the TAC meeting agenda items. Please refer to the meeting handouts for more detail on agenda topics.

1. Welcome, Review of Agenda
Ken Gould welcomed the group to the 4th TAC meeting and thanked everyone for their participation in the Murphy Corridor project.

2. Project Status Update
Dave Simmons gave a brief status of progress since the last TAC meeting (January 17th):

- Public Meeting #1 was held on January 31st at Bend City Council Chambers. Approximately 75 people attended the meeting. A summary of the workshop is available on the project website.
- The team developed conceptual designs for three corridor alternatives, labeled Alternatives A, B, and C. These alternatives were developed based on direction from the
January TAC meeting and input received at the January 31 Public Meeting (see Agenda Item #3)

- The technical team performed a preliminary evaluation of the three alternatives (see Agenda Item #4)
- The traffic team received future build traffic volumes from the MPO following the January 31 open house which affected the future traffic analysis at three intersections:

1. **15th and Knott** – earlier analysis showed this intersection as deficient. Subsequent analysis found this intersection operating at an acceptable level

2. **15th and Ferguson** – earlier data showed this intersection operating as acceptable in future conditions (2030). However, updated data received from the MPO affected operations at this intersection. It was noted that – though the intersection is deemed deficient in 2030 – the issue at the intersection was fairly minor (affecting 15 eastbound vehicles turning left onto 15th).

3. **27th and Ferguson** – similar to the 15th and Ferguson intersection above, the 27th and Ferguson intersection showed as operating at an acceptable level in earlier analysis, but using updated data from the MPO this intersection does not operate at an acceptable level. Delay indicates that some treatment (signal, roundabout) will be needed at this intersection in future years. This will be pursued further by the City as part of a separate effort.

Tech Memo 5.1 has been finalized to reflect the updated information described above.

### 3. Presentation of Murphy Road Corridor Alternatives

Jose Vasquez presented the three draft corridor alternatives. These alternatives will be made available on the project website. All alternatives address improvements to the existing Murphy Road between Parrell and Brosterhous, and an extension of Murphy Road between Brosterhous and 15th. All alternatives complete the sidewalk system between Parrell and 15th, and retain on-street bicycle lanes. A description of the three alternatives is provided below:

- **Alternative A:** This alternative widens Murphy Road to meet City standards, as outlined in the City of Bend Development Code. The cross section of Murphy Road for Alternative A includes two 14’ travel lanes (one lane in each direction), a 16’ center-turn lane, and 6’ bicycle lanes, 6’ planter strips, and 6’ sidewalks on both sides of Murphy Road. The minimum right-of-way needed for this alternative is 80’. Signals and left-turn lanes are installed at Parrell Road, Country Club Road, and Brosterhous Road. A left-turn lane is installed at 15th Street, though this intersection will be stop-controlled.

- **Alternative B:** This alternative installs signals at Parrell Road, Country Club Road, and Brosterhous Road. Between Parrell and Brosterhous, the corridor remains similar to what exists today, with two 12’ travel lanes (one in each direction) and 6’ on-street bicycle lanes. The 6’ width sidewalk network is extended to Parrell Road on both sides of Murphy Road, making continuous sidewalks throughout the corridor. Between Brosterhous and 15th Street, Murphy Road is built to City design standards, with a three lane section and a left-turn lane at 15th Street. The intersection of Murphy Road and 15th Street is stop controlled.
• **Alternative C**: This alternative is similar to Alternative B, but installs roundabouts in lieu of signals at Parrell Road, Country Club Road, and Brosterhous Road. Diameter of the roundabout would be 120’ and approach widths would be 14’.

4. Discussion of Draft Alternatives Evaluation Framework

Theresa presented the preliminary alternative evaluation that was conducted by the technical team using the evaluation framework outlined in Technical Memorandum 7.1. The evaluation framework ties back to the findings from the September 13-14, 2006 stakeholder interviews and the October 2 and November 7, 2006 TAC meetings. There are seven criteria:

- Congestion/Mobility
- Connectivity
- Cost
- Environment – Built (Residential/Business Impacts)
- Environment – Natural
- Multimodal Solutions
- Safety

The TAC discussed all criteria as they related to the three alternatives, and made several important revisions to the alternatives evaluation. Major elements of discussion are listed below. The revised evaluation of alternatives is included as an attachment to this meeting summary.

- **Congestion/Mobility** – the TAC retained the variation of scores (a 4 for Alternative A, and a 2(3) for Alternatives B and C) to reflect that the center turn lane for Alternative A will minimize delay along the corridor by allowing left-turning vehicles to pull out of the travel lane. The group ranked Alternatives B and C lower than A because even though operations were acceptable at intersections along Murphy Road, delay would occur between intersections. Mike Miller asked for a comparison of future traffic volumes between the Murphy Road and Reed Market corridors – the Murphy Road volumes are approximately 1,000 vehicles/hour near Parrell Road.

- **Connectivity** – The group agreed that all alternatives equally met the objective of this criterion by extending eastward to 15th Street.

- **Constructability** – The technical team originally ranked Alternative C lower than the other two alternatives because of perceived costs and impacts associated with utility relocation, and also because it was perceived that pavement could be best reused under Alternative B. However, the TAC stated that pavement would likely not be reusable under any alternative, and that utility relocation would likely be of issue under any alternative. The revised rankings were a “4” for Alternative B, and a “2” for Alternatives A and C.

- **Cost** – no changes were made to the Cost evaluation – Alternative B appears to be the lowest cost due to minimal right of way acquisition needs, with Alternatives A and C having very similar costs.
• **Environment – Built (Residential/Business Impacts)** – no changes were made to this criteria evaluation. Alternative A impacts more residents and businesses because a swath of land is required from many parcels to construct the alternative to design code requirements. Alternative B has minimal direct impacts to homes and businesses. The impacts of Alternative C are limited to the roundabout locations.

• **Environment – Natural** – The scores of this criterion were not changed by the TAC. Alternative A contains some impacts to the Area of Special Interest (ASI) located immediately south of Murphy Road, east of Country Club Road. This occurs because Alternative A widens the Murphy Road cross section in that area. Alternatives B and C contain no impacts to that ASI. None of the alternatives impact the ASI located east of the railroad tracks.

• **Multimodal** – the TAC had a good discussion about comfort of pedestrians and bicyclists of crossing Murphy Road under each of the alternatives. Elements of this discussion included the comfort of pedestrians crossing through roundabouts, and how the width of a cross section impacts pedestrian comfort levels. At the end the group decided that all alternatives met the objective of this criterion, meeting the needs of all users of the road (bicyclists, vehicles, pedestrians, youth, elderly, and physically disabled).

• **Safety** – the TAC also had an extensive discussion on the safety criterion, centered around the expected vehicle speeds and emergency response times for each alternative. At the end, the group decided to give Alternatives A and C a “2” rating, and gave Alternative B a “0” rating (0 ratings indicate non-applicable). The pros and cons of each alternative, as outlined by the TAC, are listed in the attachment.

After rating each of the criterion, the TAC spent some time discussing what they liked and disliked about each of the alternatives. The group agreed that they liked the safety and mobility elements of the three-lane cross section, but disliked the residential impacts associated with its wide cross section. They liked the safety advantages of roundabouts, which reduce intersection-area conflicts and are linked to substantial safety benefits due to reduced crash rates and reduced severity of crashes. There was concern that Alternative B, though it is lower cost and minimizes impacts, would not have any safety or mobility benefits.

The group requested that the technical team develop a hybrid alternative that combines elements of Alternatives A and C, to include a three-lane section with roundabouts at key intersections. The hybrid alternative would reduce the cross section of Murphy Road to minimize residential and business impacts. This Alternative, labeled “A2,” would require an exception from City design standards.

The technical team will develop and conduct a preliminary evaluation of this alternative, to be discussed by the TAC prior to the next Public Meeting (scheduled for April 5).
5. Next Steps

The immediate next steps are for the technical team to develop Hybrid Alternative A2 for evaluation by the TAC prior to the next public meeting.

Public Meeting #2 will be held Thursday April 5 from 4-6pm in the Pines Room of the Bend Golf and Country Club (61045 Country Club Drive). The purpose of this meeting will be to obtain feedback from the public on the four Murphy Road corridor alternatives.

Bend Public Works will make a presentation to Bend City Council in mid-April on alternatives. It is the intent that a preferred alternative will be selected at this meeting.

The next TAC meeting (TAC Meeting #5) is scheduled for Tuesday, May 1, 2007.

The meeting was adjourned at approximately 3:30 p.m. The actions listed below will be completed by the 5th TAC meeting.

Action Items

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Responsible</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Develop Alternative A2 – minimum three-lane cross section with roundabouts at key intersections</td>
<td>CH2M HILL</td>
<td>March 16</td>
</tr>
<tr>
<td>2.</td>
<td>Prepare preliminary evaluation of Alternative A2 for review by TAC</td>
<td>CH2M HILL</td>
<td>March 16</td>
</tr>
<tr>
<td>3.</td>
<td>Revise evaluation of Alternative A2</td>
<td>TAC</td>
<td>March 30</td>
</tr>
<tr>
<td>4.</td>
<td>Hold Public Meeting #2</td>
<td>All</td>
<td>April 5</td>
</tr>
<tr>
<td>5.</td>
<td>Present Alternatives to Bend City Council</td>
<td>Ken Gould, with support from CH2M HILL</td>
<td>Mid-April</td>
</tr>
</tbody>
</table>
**Murphy Road Corridor Plan**
*Revised Evaluation of Corridor Alternatives by TAC*
*As of: March 6, 2007*

### ALTERNATIVE SCORING

The TAC evaluated each alternative against the objectives, measures, and rating descriptions outlined in the Murphy Road Corridor Study evaluation framework (Technical Memorandum 7.1). This evaluation was revised from a preliminary evaluation conducted by the technical team. Members populated the notes section of the table first, and then used the descriptions in the framework and summarized in general below to rate the alternative. The table below displays the scores and notes from the technical team and the TAC.

<table>
<thead>
<tr>
<th>Rating</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Alternative directly and positively addresses the intent of the criterion.</td>
</tr>
<tr>
<td>2</td>
<td>Alternative partially meets the intent of the criterion, addressing some but not all of the objectives.</td>
</tr>
<tr>
<td>0</td>
<td>Alternative neither meets nor does not meet intent of criterion. Alternative has no effect, or criterion does not apply.</td>
</tr>
<tr>
<td>-2</td>
<td>Alternative does not support the intent of, or negatively impacts, the criterion.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Specific Objectives and Criteria</th>
<th>Alternative A (Continuous Three-Lane Section)</th>
<th>Alternative B (Two-Lane Section With Increased Capacity at Key Intersections)</th>
<th>Alternative C (Two-Lane Section with Roundabouts at Key Intersections)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CONGESTION/MOBILITY MEASURE: V/C, DELAY</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RATING</td>
<td>4</td>
<td>2 (3)</td>
<td>2 (3)</td>
</tr>
<tr>
<td>NOTES</td>
<td>- All alternatives will improve congestion over the no build.</td>
<td>- Alternative will improve congestion when compared to no build.</td>
<td>- Alternative will improve congestion when compared to no build.</td>
</tr>
<tr>
<td></td>
<td>- Alternative A performs better than Alternatives B and C by removing left-turn vehicles from the main through movement traffic streams along EB/WB Murphy Road through movements.</td>
<td>- A slight increase in delay may occur over Alternative A due to mid-block left turn vehicles blocking through trips along EB/WB Murphy through movements.</td>
<td>- A slight increase in delay may occur over Alternative A due to mid-block left turn vehicles blocking through trips along EB/WB Murphy through movements.</td>
</tr>
<tr>
<td>Specific Objectives and Criteria</td>
<td>Alternative A (Continuous Three-Lane Section)</td>
<td>Alternative B (Two-Lane Section With Increased Capacity at Key Intersections)</td>
<td>Alternative C (Two-Lane Section with Roundabouts at Key Intersections)</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>-----------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>CONNECTIVITY</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>MEASURE:</strong> TRIP TRAVEL DISTANCE, TRAVEL TIME</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RATING</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>NOTES</td>
<td>- All alternatives will improve connectivity when compared to no build</td>
<td>- All alternatives will improve connectivity when compared to no build</td>
<td>- All alternatives will improve connectivity when compared to no build</td>
</tr>
<tr>
<td><strong>CONSTRUCTABILITY</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>MEASURE:</strong> COST EFFICIENCIES, FUNDING COMPETITIVENESS, PHASING POTENTIAL, IMPACTS DURING CONSTRUCTION</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RATING</td>
<td>2</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>NOTES</td>
<td>- Alternative impacts driveway connections to Murphy Road. A moderate amount of existing pavement is used, though it is not clear whether the condition of the pavement substructure will allow reuse.</td>
<td>- The largest amount of existing pavement is used under this alternative, though it is not clear whether the condition of the pavement substructure will allow reuse.</td>
<td>- This alternative has the highest initial construction cost, and the largest impact to construction phasing. Utility relocations were originally felt to be greatest under this alternative but it is now understood that they will be approximately the same among alternatives.</td>
</tr>
<tr>
<td><strong>COST</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>MEASURE:</strong> ORDER-OF-MAGNITUDE COST ESTIMATES</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RATING</td>
<td>2</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>NOTES</td>
<td>- Highest ROW acquisition and initial construction cost.</td>
<td>- Least amount of ROW acquisition, storm sewer &amp; utility relocations.</td>
<td>- ROW acquisition 2\textsuperscript{nd} highest. Most storm sewer modifications.</td>
</tr>
<tr>
<td><strong>ENVIRONMENT – BUILT (RESIDENTIAL/BUSINESS IMPACTS)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>MEASURE:</strong> BUSINESS AND RESIDENCES IMPACTED, BUSINESSES AND RESIDENCES DISPLACED, AIR QUALITY, NOISE, ABILITY TO MITIGATE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RATING</td>
<td>-2</td>
<td>4</td>
<td>2</td>
</tr>
</tbody>
</table>
## Specific Objectives and Criteria

<table>
<thead>
<tr>
<th>Alternative A (Continuous Three-Lane Section)</th>
<th>Alternative B (Two-Lane Section With Increased Capacity at Key Intersections)</th>
<th>Alternative C (Two-Lane Section with Roundabouts at Key Intersections)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOTES</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Air quality and noise were not determining factors for any of these alternatives.</td>
<td>- No residences or businesses are displaced and a minimal amount of property will be taken at intersections.</td>
<td>- Impacts are at the roundabouts, including impacts to built environment and access to road.</td>
</tr>
<tr>
<td></td>
<td>- An estimated 29 houses or businesses are within 30’ of the existing right of way.</td>
<td>- Three houses or businesses are within 30’ of the existing right of way and would be negatively impacted. Two of these are at Parrell and Murphy Road, so ODOT’s design of this intersection greatly determines the magnitude of impact. The third is at Brosterhous and Murphy, but it is a sliver of land taken.</td>
</tr>
<tr>
<td></td>
<td>- An estimated four houses would be displaced.</td>
<td>- One or more houses are expected to be displaced, though specific number is unclear due to level of design detail and new housing construction in the vicinity of Country Club and Brosterhous. If this alternative were selected, shifting location to avoid displacements would be explored.</td>
</tr>
</tbody>
</table>

### Environment – Natural Measure: Impact on ASI

<table>
<thead>
<tr>
<th>RATING</th>
<th>2</th>
<th>4</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOTES</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Approximately 10’ to 15’ of the ASI immediately east of Country Club Road would be impacted. Since the ASI boundary was already entered, and this alternative would expand on the exiting roadway, the impacts are minimal.</td>
<td>- There are no additional impacts to the ASI immediately east of Country Club Road.</td>
<td>- There are no additional impacts to the ASI immediately east of Country Club Road.</td>
<td></td>
</tr>
<tr>
<td>- There are no impacts to the ASI immediately east of the railroad tracks.</td>
<td>- There are no impacts to the ASI immediately east of the railroad tracks.</td>
<td>- There are no impacts to the ASI immediately east of the railroad tracks.</td>
<td></td>
</tr>
</tbody>
</table>
### Specific Objectives and Criteria

<table>
<thead>
<tr>
<th>Multimodal Solutions Measure: Provision of Services to Users of All Modes, Safety and Continuity of Bicycle and Pedestrian Routes to Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RATING</strong></td>
</tr>
<tr>
<td>NOTES</td>
</tr>
<tr>
<td>– The pedestrian and bicycle facilities are connected and form a continuous link.</td>
</tr>
<tr>
<td>– All users benefit from this alternative.</td>
</tr>
<tr>
<td>– Suggested pedestrian crossing slightly west of the old school drive to Jewell Elementary to provide safe, mid-block connections.</td>
</tr>
<tr>
<td>– Future improvements for buses can be built incrementally; bus pullout may be beneficial for traffic flow. Pullouts could be added later with minimal impacts to some areas of the road.</td>
</tr>
<tr>
<td>– Good visibility is positive.</td>
</tr>
<tr>
<td>A median refuge may be needed, and/or longer signal time to allow safe crossings for elderly, physically disabled, and/or youths.</td>
</tr>
</tbody>
</table>

### Safety Measure: Number of Conflict Points/Movements, Comparison Against Design Standards, Ability to Divert Traffic Away From Known Concerns, Travel Times for Emergency Response

<p>| RATING | 2 | 0 | 2 |</p>
<table>
<thead>
<tr>
<th>Specific Objectives and Criteria</th>
<th>Alternative A (Continuous Three-Lane Section)</th>
<th>Alternative B (Two-Lane Section With Increased Capacity at Key Intersections)</th>
<th>Alternative C (Two-Lane Section with Roundabouts at Key Intersections)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOTES</td>
<td>- Separates mid-block turning vehicles from through lanes.</td>
<td>- Number of conflict points is not reduced, and the alternative does not improve or harm response time. The Alternative neither meets nor does not meet the intent of this criterion.</td>
<td>- Alternative reduces number of turning vehicle conflicting points and decreases severity of crashes in intersection vicinity.</td>
</tr>
<tr>
<td></td>
<td>- Concern about higher vehicle speeds due to wider roadway, leading to a greater number of and more severe crashes.</td>
<td>- The Alternative may increase response time, though all agreed that design of roundabout should include adequate approach widths and internal radius to best accommodate and serve emergency vehicles.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Response time is improved when compared to no build and to Alternatives B and C.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL SCORE</td>
<td>18</td>
<td>26 (27)</td>
<td>22 (23)</td>
</tr>
</tbody>
</table>
Meeting Summary
The City of Bend held a public open house on Thursday, April 5, 2007 at the Bend Golf and Country Club for the Murphy Road Corridor project. The main purpose of the meeting was to present four preliminary alternatives and to gather feedback on the alternatives, or suggestions for new alternatives, from the public. The public was also encouraged to tell the project team which alternative would most benefit the corridor. The open house began at 4:00 p.m. and concluded at 6:00 p.m.

The project team posted a meeting announcement on the Murphy Road Corridor’s and the City of Bend’s websites and issued a press release to local newspapers, including the Bend Bulletin. Project postcards were sent to 1,102 local residents, businesses, and community leaders to notify them of the open house. A follow up email was sent to the local neighborhood associations’ chairs and stakeholders that were interviewed during the early phases of the project, as well as individuals that had provided email addresses on the website. A display ad promoting the Open House appeared in the Bend Bulletin on Sunday, April 1, 2007.

An open house format was used at the meeting, allowing members of the public to attend at their convenience and have the opportunity to discuss the project and the four alternatives with staff members. Ken Gould, the City of Bend Project Manager, and Dave Simmons, CH2M HILL made two brief presentations, at 4:00 p.m. and 5:00 p.m. Both presentations were followed by a question and answer session.

Attendees were encouraged to submit comments on the project by completing a form asking for input about important issues and for suggestions on future improvements; these comments are attached. They were also encouraged to contribute ideas on flip charts placed around the room, however, there were no comments collected this way. The majority of the comments received were during the question and answer portion after the presentations. Approximately 70 people attended the meeting.

The following items were on display at the meeting:

- Project schedule, description of open house format, and how to get involved
- Four alternatives (Alternatives A1, B, C, and A2) with graphic and textual description
♦ Evaluation Criteria and results of the criteria
♦ Next Steps for the project

Handouts distributed at the open house included the following:
♦ Comment form
♦ Project postcard
♦ All technical memorandums produced to date

The following comments were submitted on individual comment sheets, via the website comment form, or were offered during the question and answer period after each of the presentations.

**Verbal Comments**

Questions asked during the presentation sessions are listed below, followed by responses from the City of Bend and the consultant team. Questions are denoted by a diamond-shaped bullet (♦). Responses are denoted by a circle-shaped bullet (●)

♦ Are roundabouts more expensive?
  • Roundabouts are about 1/3 more expensive to install, but take less to maintain so over time signals and roundabouts are about the same cost.

♦ What about the intersection at 15th?
  • That will be a “T” intersection, with right and left turns only, and based on the traffic model will operate adequately with a stop sign. Recent development plans were included in the traffic analysis.

♦ How do you perform traffic analysis?
  • Traffic analysis was performed using the Bend Metropolitan Planning Organization’s travel demand model, with post-processing and intersection-level analysis performed in the traffic analysis software, Synchro. All alternatives operated acceptably, though Alternatives B and C may not operate as efficiently as Alternatives A1 and A2 because they do not include a continuous left turn lane.

♦ Is the project expected to increase traffic volumes along the corridor and throughout the area?
  • The extension of Murphy to 15th will increase traffic both along the Murphy Road corridor and along 15th Street. However, the analysis estimates that the volumes are not terribly high and both Murphy Road and 15th Street would operate well during peak periods.

♦ Does this project extend to Highway 97 South?
• This project starts at 3rd Street (Hwy 97 Business) on the west. The Oregon Department of Transportation is working on another project that creates an overpass of Highway 97 at Murphy Road.

♦ I live on Murphy. How much of my property will be taken?

• Property impacts vary by alternative and are preliminary at this time. One-on-one discussions about specific property impacts can be accommodated after the group presentation or at the property owner’s convenience.

♦ Who will be using Murphy when it is extended to 15th compared to using Reed Market? Why are you making this connection?

• The Murphy Road extension would serve existing residents of southeast Bend, as well as current and future development east of the railroad. Murphy Road would be another parallel route to Reed Market that would serve the southeast neighborhood. Also, the proposed alternatives would provide a crossing over the railroad, needed by the fire station and emergency vehicles. The extension would also allow the school district to better serve residents east of the railroad tracks.

♦ Is Alternative A1 the only one with sidewalks?

• No, all the alternatives would have continuous sidewalks.

♦ Has the cost been figured out for these alternatives?

• Preliminary cost estimates have been prepared for the Alternatives. Alternative A1 is the most expensive, followed by A2, Alternative C, and Alternative B. Cost estimates include right of way acquisition.

♦ There is a big development on Murphy that would increase left and right turns and I am concerned about accidents. I am also concerned about people turning onto and from side streets, Murphy is already busy.

• Safety concerns are part of the evaluation. The continuous left turn lane can increase safety. The only way to limit turns onto or from side streets is to install a median that would prohibit entrance to driveways and side streets. That would be more expensive and cause the road to be widened further.

♦ What is the size of these roundabouts? Is there an example in Bend? Will it accommodate fire trucks?

• Smaller than the one at 8th and Bond and Reed Market but larger than the one at Bear Creek Road. The fire department has been involved throughout the Murphy Road study process and roundabouts built on Murphy Road would accommodate fire trucks.

♦ How is stormwater management addressed?

• The project team is coordinating with City of Bend water and sewer, but specific drainage issues would be addressed at a later phase of the project.

♦ What are the advantages and disadvantages of the alternatives?
Specific advantages and disadvantages are explained in the boards that describe alternatives evaluation and evaluation criteria.

I am concerned about the roundabouts restricting access to homes. Also, you need to have another survey of the homes because your aerial is two or three years old.

That has been considered and access restrictions are one of the challenges of roundabouts. The project will have new aerial photos of the corridor within the next few months.

Will the railroad crossing be an overpass?

Yes.

I am concerned about the roundabout aprons accommodating commercial vehicles, which can be up to 75 feet long.

That is a good issue to raise. Roundabouts would be built to accommodate commercial vehicles, with mountable aprons.

Will there be street lights? Where will be located?

Street lighting will be determined during the design phase. However, there is an ordinance against light pollution (that is directed upward).

Is there a comparison of the traffic flow at 15th (after Murphy is extended) to another location in Bend?

The comparison of those other streets was not included in the project, although it is possible to compare to a similarly sized road there are always individual circumstances that will pertain only to this location.

Will Murphy Road be connected to 27th?

The project did some traffic modeling to look at extensions to 27th, however, development near Ferguson limits a direct, parallel route to 27th. Pushing Murphy to 27th at a more southern alignment did not have a lot of value to the greater Bend community.

How far along are the Murphy Over-crossing and South Parkway projects?

Those projects are being led by the City of Bend and ODOT respectively. They are moving at a similar pace as the Murphy Corridor study. Links to these studies will be posted on our website.

Will the roundabout at Parrell have a fifth leg?

This is unlikely, however, the new alignment that will connect to the over crossing project has not been determined yet.

When will construction begin?

First the project needs to establish a preferred alternative and funding mechanism. Then the final design will be determined. The city may decide to move around some
budget to begin some phases of the project within the next few years. However, the project will be constructed in phases based on the funding available.

♦ Will you get money from the developers?
  • A portion of the funding comes from system development charges but the project will also look at other funding possibilities, including state and federal money.

♦ If Juniper Ridge goes ahead, where would this project fall in the pecking order?
  • Several projects could be constructed at the same time. However, the construction timeframe is not known at this time.

♦ Can you explain the sizes of the alternatives?
  • Alternative A1 is 80 feet wide from curb to curb. Alternative A2 is between 60 and 70 feet between Parrell Road and Brosterhous Road, depending on right of way availability.

♦ How do the alternatives compare to each other for the cost of construction?
  • Alternative A1 is the most expensive, next A2, then C, and finally B is the least expensive.

♦ What would the speed limit be on Murphy for these alternatives?
  • The speed limit is expected to be left at the current 35 MPH.

♦ Will the extension out to 15th occur at the same time as improvements along the existing Murphy Road?
  • The project will be set up to allow for phased construction based upon available funding.

♦ Did the traffic analysis look at the number of cars turning onto Murphy?
  • Yes

♦ It may be hard to find gaps to enter roundabouts from side streets onto Murphy.
  • The project did consider a high volume of traffic and through traffic, however, it would be substantially less than Reed Market. Since Murphy is more southern, it will attract more local traffic so there will still be gaps in the traffic at a roundabout to allow traffic from side streets to get onto Murphy.

♦ Is the traffic model data available to the public?
  • While the model itself is proprietary, the results of the model for this project are available in Technical Memorandum 5.1 (available at open house and on website)

♦ Has there been any evaluation of the roundabout on 15th and Franklin? Or at Bear Creek? Specifically with roundabouts close to schools?
Children as pedestrians use the roundabout in different ways. There are trade-offs between traffic signals and roundabouts. Safe routes to schools in the area are important and were considered. There is also the possibility of adding crosswalks along Murphy Road between intersections. We can take your request to examine existing roundabouts to the Technical Advisory Committee.

I have a problem with the roundabout at Country Club because of the fire station. With a signal, the fire station can control the signal.

We have had a fire department representative on the Technical Advisory Committee to examine the design of the roundabout. It may be more of an effort to educate drivers on what to do when they are in the roundabout and an emergency vehicle is approaching.

What about a pedestrian crossing overpass over Murphy Road at Jewell Elementary School?

Pedestrian overpasses usually don’t get used, especially in neighborhood environments like this one. However, the project will consider the safest and most appropriate methods to address crossing of the corridor by the number of young walkers and drivers.

Will there be sound walls?

No

What part of the project cost will be paid by development in the area?

Transportation System Development charges are collected for all new developments. No additional assessments are allowed under current City code.

Will this project reduce traffic on Reed Market?

It will keep Reed Market in the future from getting worse. With so much new development on Murphy, not creating an extension to 15th could cause problems.

What will the impact be to Knott and 15th?

The project team has updated traffic data from the initial model outputs (see Technical Memorandum 5.1 and the project website). Earlier assessments showed the 15th and Knott intersection as operating poorly, but subsequent analysis shows that this intersection operates at an acceptable level in the future forecast year (2027).

Will there be transit on Murphy in the future?

The City anticipates that there will be and that assumption is built into the traffic model.
Written Comments

What do you like best about each alternative? What would you improve or change?

♦ Alternative A1:
  • No, 80 foot, too wide, most expensive
  • To merge with 15th will be a nightmare on 15th
  • This one is excellent, although I realize it is probably the most expensive, and it may take some property from existing owners.
  • No signals please!

♦ Alternative A2:
  • No, 70 foot, 3 lanes, next most expensive
  • I like this alternative the best! Narrower thru lanes. Improved roundabouts. Somehow, try to encourage drivers to make fewer left turns into driveways and use the roundabouts more. The narrower lanes create less impact on homes. Use utmost effort to create least impact on homes at roundabouts. I want creative – low-impact storm run-off/drainage planned for this project (slope and curb drain slots, settlement basins with plantings – (more & smaller) street lighting at intersections only.
  • To stop at 15th will create jams on 15th
  • I believe this is the best overall alternative of the 4 presented.
  • I like this best but want to see the roundabout at Country Club to be moved southeast as much as possible to lessen the adverse affect of the homes at that intersection. If you need to choose between someone’s property being taken and an old tree – take the tree and USE IT then plan 3-5 new trees!!
  • This one is excellent also, although I prefer “on-demand” signals.
  • Because of all the houses on Murphy Road, I think 3 lanes would be best. Roundabouts are a lot easier for drivers, I think.
  • I think this is the best plan. There is not a perfect plan. I like the roundabouts, they seem to keep things moving. Also during low traffic, you most likely wouldn’t have to stop at all – final savings.

♦ Alternative B:
  • 60 foot, prefer roundabouts unless dangerous for school children and pedestrians
  • Think beyond Murphy
  • Don’t like with increased traffic no center turn lane, too dangerous
  • This would not be an improvement over present ability to move traffic.
  • No signals please!

♦ Alternative C:
  • 60 foot, prefer roundabouts unless dangerous for school children and pedestrians
  • New Road no improvement at 15th improving Murphy pressures 15th
  • Don’t like with increased traffic no center turn lane, too dangerous
  • This would not be an improvement over present ability to move traffic.
  • Because of all the houses on Murphy Road, I think 3 lanes would be best. Roundabouts are a lot easier for drivers, I think.
Which alternative serves the community best?

♦ Alternative A2 seems best compromise. I much prefer roundabouts to signals. 3-12 foot traffic lanes would be sufficient for projected traffic flow while minimizing impact to adjoining homeowners.

♦ 15th has a traffic flow and 40 MPH – Murphy becomes a corridor, people using Murphy are avoiding Reed at 3rd how will 15th and Murphy handle a stop sign? Traffic back-up? It would make “sense” to do a roundabout at 15th?? Avoiding stops at key commute times.

♦ A2 – I believe roundabouts function better than traditional intersections and will greatly enhance the Murphy Road corridor.

♦ A2

♦ I feel A1 and A2 would handle future traffic best.

Do you have any other comments or questions?

♦ 15th and Murphy need more attention. It is the key to a flow of traffic on Murphy – it needs more attention.

♦ I would like to see the existing portion of Murphy Road worked on first, before the traffic increased when the extension to 15th Street is finished.

Website Comments

♦ I am responding regarding the Open House held April 5 at Bend Country Club. My preference of the 4 choices presented is A2. Reason 1: I think the road should be as wide as possible now rather than redoing the road later when unforeseen traffic has developed. 1. Future development of Ward land, 2. current developments along Brosterhous, Murphy, Parrell and 15th, 3. two new schools planned for the area will all add considerable traffic. Plus having an RR overpass will pull traffic not to mention the traffic that will gravitate to Murphy when Reed Market is being overhauled. Reason 2: I am a big fan of round-abouts. Reason 3: I like the continuous turn lane.
Technical Advisory Committee Meeting # 5  
Wednesday, April 18, 2007  
10:30 a.m. – 12:00 p.m.  
Pilot Butte Conference Room  
710 NW Wall Street, Bend

Agenda

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Presenter</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Welcome, Review of Agenda</td>
<td>Ken</td>
<td>10:30 a.m.</td>
</tr>
<tr>
<td>2.</td>
<td>TAC Discussion of Preferred Murphy Road Alternative</td>
<td>Dave</td>
<td>10:45 a.m.</td>
</tr>
<tr>
<td></td>
<td>– Discussion of Alternative A2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>– Comments from Open House #2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>– Operations at Key Intersections (Signals vs. Roundabouts)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Next Steps</td>
<td>Theresa</td>
<td>11:45 a.m.</td>
</tr>
<tr>
<td></td>
<td>– Reschedule Next TAC Meeting (Currently Scheduled for May 1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>– City Council Briefing (May 2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>– Draft Refinement Plan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Adjourn</td>
<td>Ken</td>
<td>12:00 p.m.</td>
</tr>
</tbody>
</table>
## Murphy Road Corridor Study

### Technical Advisory Committee Meeting # 6
Friday, September 14, 2007  
10:30 a.m. – 12:00 p.m.  
Pilot Butte Conference Room  
710 NW Wall Street, Bend

### Agenda

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Presenter</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Welcome, Review of Agenda</td>
<td>Nick</td>
<td>10:30 a.m.</td>
</tr>
<tr>
<td>2.</td>
<td>Status Update</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Collection of Survey Data</td>
<td>Dave</td>
<td>10:45 a.m.</td>
</tr>
<tr>
<td></td>
<td>- Development of New Alternative (Alternative E)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Updated Alternatives Evaluation</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Coordination with Projects at Murphy’s West End</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Overview of Updated Alternatives Evaluation</td>
<td>Theresa</td>
<td>11:00 a.m.</td>
</tr>
<tr>
<td>4.</td>
<td>Next Steps</td>
<td>Dave</td>
<td>11:45 a.m.</td>
</tr>
<tr>
<td></td>
<td>- City Council Briefing (Information Only, September 19)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Open House (October 11)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- City Council Briefing (Consider Staff Recommended Preferred Alternative, November 7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Adjourn</td>
<td>Nick</td>
<td>12:00 p.m.</td>
</tr>
</tbody>
</table>
Memorandum

To:       Bend City Council

From:     Ken Fuller, Public Works Director
          Nick Arnis, Transportation Engineering Manager

Subject:  Murphy Road Corridor Study Overview

Date:     September 19, 2007

Issue:
The Murphy Road Corridor study is examining possible improvements to the roadway between Parrell Road and 15th Street. Five alternatives have been developed and two are being recommended as possible solutions. This meeting will give a general overview of the study and the alternatives; no decision will be made at this time. The public will also review the same information at an open house on October 11 and will review the two recommended alternatives. On November 7, the City Council will review public comments about the alternatives and will recommend one for implementation.

Background:
Murphy Road is located in southern Bend. The study area for this project is between SE 3rd Street on the west to SE 27th Street on the east. Murphy Road is classified as a Major Collector in the City of Bend’s Transportation System Plan (TSP) and currently exists as a two-lane roadway from SE 3rd Street to Brosterhous Road. The Burlington Northern Sante Fe (BNSF) Railroad operates in a north-south direction through the project area, between Brosterhous Road and SE 15th Street. There are rock outcroppings in the area immediately east of the railroad tracks that have been designated by the City of Bend as an Area of Special Interest (ASI).

A project website has been live since the start of the project and has received 17 comments from the site. In January 2007, about 75 people attended an open house where background information on the project was presented, including the project’s objectives, existing land use, environmental, and traffic conditions, and future traffic conditions, in addition to gathering public suggestions for improving the project. In April 2007, a second open house was
attended by 70 people. The four preliminary alternatives were presented and feedback on the alternatives, or suggestions for new alternatives, was gathered from the public. The public was asked which alternative would most benefit the corridor. A third open house is scheduled for October 11, 2007. All five alternatives will be presented and the public will be asked for their comments on the two alternatives that are recommended for implementation (Alternatives D and E). Public comments will be brought to the Council on November 7 for review and final recommendation on one preferred alternative.

Analysis:
The evaluation criteria used by the technical team and the Technical Advisory Committee (TAC) to evaluate the performance of each alternative against a broad range of important project characteristics, representing a full range of city and stakeholder values are listed below. The evaluation criteria tie back to the findings from the September 13-14, 2006 stakeholder interviews and the October 2, 2006 TAC meeting. The criteria were revised based on comments from the TAC at its November 7, 2006 meeting.

- **Congestion/Mobility criteria** – measured by the travel mobility standards (measured as a ratio of volume-to-capacity \([v/c]\)) and amount of delay on the corridor.

- **Connectivity criteria** – measured by direct and efficient access to and between origins and destinations along Murphy Road, southeastern Bend, the Parkway, and downtown; amount of out-of-direction travel; and travel times.

- **Constructability criteria** – measured by the 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.

- **Cost criteria** – measured by the order-of-magnitude cost estimates (to include design, right of way acquisition, and construction).

- **Built (Residential/Business Impacts) Environment criteria** – measured by the number of businesses and residences impacted and severity of impact; number of homes or businesses displaced; qualitative assessment of alternative’s impact on air quality and noise; and the ability to appropriately mitigate impacts.

- **Natural Environment criteria** – measured by the ability to avoid impacts to the Area of Special Interest (ASI) located immediately east of the BNSF railroad tracks, according to Exhibit C (“Upland Areas of Special Interest”) of Section 2.7.700 of the Bend Development Code.
• **Multimodal Solutions criteria** – measured by the alternative’s provision of services to users of all modes; safety and continuity of bicycle and pedestrian routes to R.E. Jewell elementary school and the future middle school and high school; directness and convenience of route; and quality of environment (in terms of grade, lighting, and drainage).

• **Safety criteria** – measured by the number of conflict points/movements; comparison of alternative against design standards; ability to divert traffic away from known safety concerns; and travel time change for emergency response times.

Five alternatives have been developed for the Murphy Road Corridor between Parrell Road and 15th Street. Three (Alternatives A-C) were presented at a TAC meeting on March 6, 2007. The fourth (Alternative D) was presented at a public open house on April 5th and a TAC meeting on April 18th. The fifth (Alternative E) was developed upon the request of the City of Bend in July 2007. All alternatives provide improvements to the existing Murphy Road corridor between Parrell Road and Brosterhous Road, as well as including an extension of Murphy Road between Brosterhous Road and 15th Street. All alternatives complete the sidewalk system between Parrell Road and 15th Street, retain and continue on-street bicycle lanes, and install a stop sign at the 15th Street intersection. A description of the five alternatives is provided below:

• **Alternative A (Continuous Three-Lane Section, Consistent with City Design Standards):** This alternative would widen Murphy Road to meet City design standards, as outlined in the City of Bend Development Code. The cross section of Murphy Road for Alternative A includes two 14’ travel lanes (one lane in each direction), a 16’ center-turn lane, and two 6’ on-street bicycle lanes, as well as 6’ planter strips and 6’ sidewalks on both sides of Murphy Road. The minimum right-of-way needed for this alternative is 80’, this alternative requires 10’ of right-of-way on both the north and the south of Murphy Road. Signals and left-turn lanes would be installed at Parrell Road, Country Club Road, and Brosterhous Road.

• **Alternative B (Two-Lane Section with Increased Capacity at Key Intersections):** This alternative consists of a two-lane cross section between Parrell and Brosterhous with signals at key intersections, similar to what exists today with two 12’ travel lanes (one in each direction), 6’ on-street bicycle lanes, and 6’ wide sidewalks. Signals would be installed at Parrell Road, Country Club Road, and Brosterhous Road. Between Brosterhous Road and 15th Street, Murphy Road would be comprised of two 14’ travel lanes and an extended 16’ left-turn pocket (approaching 15th Street); additionally two 6’ on-street bicycle lanes and 6’ sidewalks would be located on both sides of Murphy Road. The minimum right-of-way needed for this alternative is 48’ (less than the existing right-of-way line). An exception from
City design standards (for the section between Parrell Road and Brosterhous Road) would be needed.

- **Alternative C (Two-Lane Section with Roundabouts at Key Intersections):** Similar to Alternative B, but roundabouts would be installed instead of signals at Parrell Road, Country Club Road, and Brosterhous Road. The radius of the roundabouts is estimated to be 55’ and with entry widths of 14’ (similar to existing roundabouts in Bend). Between Brosterhous Road and 15th Street, Murphy Road would be comprised of two 14’ travel lanes and an extended 16’ left-turn pocket (approaching 15th Street); additionally two 6’ on-street bicycle lanes and 6’ sidewalks would be located on both sides of Murphy Road. An exception from City design standards (for the section between Parrell Road and Brosterhous Road) would be needed.

- **Alternative D (Reduced Width Three-Lane Section with Roundabouts at Key Intersections):** This alternative would include roundabouts at key intersections, while reducing the cross section of the roadway to minimize right-of-way acquisition between intersections. The radius of the roundabouts is estimated to be 56’ and with entry widths of 16’. From Parrell Road to Brosterhous Road, the corridor would have three 12’ travel lanes (one in each direction and a center turn lane) as well as a 6’ on-street bicycle lane and a 6’ sidewalk on both sides of Murphy Road. Between Brosterhous Road and 15th Street, Murphy Road would be comprised of two 14’ travel lanes and an extended 16’ left-turn pocket (approaching 15th Street); additionally two 6’ on-street bicycle lanes and 6’ sidewalks would be located on both sides of Murphy Road. An exception from City design standards (for the section between Parrell Road and Brosterhous Road) would be needed.

Between April and July 2007, new aerial photographs were taken and additional survey data were collected to assist in the refinement of the above alternatives. The technical team created a variation of Alternative D after this new data was available, to compare the impacts of signalized versus roundabout intersections along Murphy Road.

- **Alternative E (Reduced Width Three-Lane Section with Signals at Key Intersections):** Identical to Alternative D’s cross section, but would include signals at key intersections (Parrell Road, Country Club Road, and Brosterhous Road) instead of roundabouts. Between Parrell Road and Brosterhous Road, the corridor would have three 12’ travel lanes (one in each direction and a center turn lane). There would also be a 6’ on-street bicycle lane and 6’ sidewalk on both sides of Murphy Road through this section. Between Brosterhous and 15th Street, Murphy Road would be comprised of two 14’ travel lanes and an extended 16’ left-turn pocket (approaching 15th Street); additionally two 6’ on-street bicycle lanes and 6’ sidewalks would be located on both sides of Murphy Road. An exception
from City design standards (for the section between Parrell Road and Brosterhous Road) would be needed.

During the evaluation, the technical team, TAC, and City of Bend staff found that Alternatives D and E presented a benefit for the study area. Alternative E scored the highest in the criteria evaluation, specifically with a smaller cross section reducing the impacts to the built and natural environment, while keeping costs low. Keeping the center turn lane also increased the mobility and safety of the alternative. Alternative D scored lower because of the impacts of the roundabouts to the built environment and to the project’s cost. Access issues were also of concern for local residents. Roundabouts would also require a detour of traffic from Murphy Road during construction.

Both of these alternatives would provide the benefits of a three lane cross section but would be narrower than what is required by City design standards. However, roundabouts (as opposed to signals) provide congestion and safety improvements which warranted its advancement. Roundabouts generally decrease the severity of crashes, allow for aesthetic improvements, and meet Bend City desires to incorporate roundabouts in roadway improvements. Signals generally cost less due to a smaller size (which doesn’t require as many residential relocations), allow for traffic to travel on the road during construction, and are adequate in handling the amount of traffic projected on Murphy Road in the future.

**Recommendation:**
The City Council is not being asked for a decision at this time. The above information will be presented to the public at an open house on Thursday, October 11, 2007. Public comments about the information and the two recommended alternatives will be brought back to the Council on November 7, 2007 for their recommendation.
Murphy Road Corridor Study

Third Project Open House
Thursday, October 11, 2007
4:00 to 6:00 p.m.
Bend Golf and Country Club
61045 Country Club Drive, Bend

Meeting Summary
The City of Bend held a public open house on Thursday, October 11, 2007 at the Bend Golf and Country Club for the Murphy Road Corridor study. The main purpose of the meeting was to present five preliminary alternatives developed for the corridor and to gather feedback from the public on which alternative to recommend to the Technical Advisory Committee (TAC) and the Bend City Council. Approximately 80 people attended the open house between 4:00 p.m. and 6:00 p.m.

The project team posted a meeting announcement on the Murphy Road Corridor’s and the City of Bend’s websites and placed an ad in the Bend Bulletin for the Sunday preceding the open house (October 7, 2007). Postcards announcing the open house were sent to over 1,100 local residents, businesses, and community leaders. An email was sent to the local neighborhood association chairs, to stakeholders that were interviewed during the early phases of the project, as well as to individuals that had provided email addresses on the website or at the previous open houses.

An open house format was used at the meeting, allowing members of the public to attend at their convenience and have the opportunity to discuss the project and the five alternatives with staff members. Nick Arnis, the City of Bend Project Manager, and Dave Simmons, CH2M HILL, made two brief presentations at 4:00 p.m. and 5:00 p.m. Both presentations were followed by a question and answer session.

Attendees were encouraged to submit comments on the project by completing a comment form; these comments are attached. They were also encouraged to contribute ideas on flip charts placed around the room, however, there were no comments collected this way. The majority of the comments were received during the question and answer portion following the presentations.

The following items were on display at the open house:

♦ Description of open house format and how to voice comments during the evening
♦ Five alternatives (Alternatives A, B, C, D, and E) with graphic and textual description
♦ Evaluation Criteria and results of the evaluation process
Next Steps for the project

Handouts distributed at the open house included the following:

- Comment form
- Project postcard

The following comments were submitted on individual comment sheets, via the website comment form, or were offered during the question and answer period after each of the presentations.

**Verbal Comments**

Questions asked during the presentation sessions are listed below, followed by responses from the City of Bend and the consultant team. Questions are denoted by a diamond-shaped bullet (♦). Responses are denoted by a circle-shaped bullet (●)

- Why did you give up studying the extension to 27th Street?
  - Due to existing residential development, the connection would need to be further south than the current alignment of Murphy Road. It was evaluated that a southern alignment would not attract a large enough percentage of travelers to warrant this extension.

- Are roundabouts more efficient?
  - There are benefits to roundabouts. One of those is that if there is only one car at an intersection, they don’t need to stop, as they would at a signal.

- Is there less pollution and car fumes with roundabouts?
  - In theory, if fewer cars are idling there would be less pollution.

- Will there be medians on Murphy Road to limit access?
  - Several project alternatives (A, D, and E) include a center lane. The project team will be looking at how best to use this space. Options include a center turn lane or landscaped medians in certain sections.

- I am concerned with speeding in school zones. Is there any way to add speed bumps?
  - Since Murphy road is considered a collector, it is intended to move traffic. This means that calming methods like speed bumps is not typical. However, other ways to improve safety in school zones, such as providing pedestrian refuges, will be considered.

- The only roundabout that I can think of is near old Kenwood, but I think it is different that the alternatives you are presenting. For Murphy Road, I am concerned about kids getting from the north to the south of the street.
• Since the area near Jewell Elementary is on a straight stretch of road, some concepts have been considered to increase safety, such as changing the middle lane and turning it into a pedestrian refuge/median and adding a crosswalk.

♦ Could we save money on this project by only having the sidewalk on one side?

• Yes, that would save money, but you typically find that people use both sides of the streets even if there isn’t a sidewalk. Also, the savings wouldn’t be substantial and for all alternatives except Alternative A, the sidewalk is within the existing right of way, so very little property would be taken.

♦ If there are a lot of bicyclists and pedestrians on a street, are roundabouts safer than signals?

• It depends upon the community. Since Bend has so many roundabouts, drivers are comfortable using them. Also, roundabouts tend to heighten drivers’ senses and make them more aware of pedestrians. Signals do have protected movements for pedestrians; however, roundabouts typically reduce vehicular speeds and result in fewer and less damaging injuries than stop-controlled or signalized intersections.

♦ Why weren’t roundabouts considered on 15th Street?

• Projected traffic at this intersection over our 20 year planning horizon (year 2030) does not warrant a signalized intersection or roundabout – a stop sign is expected to be sufficient. If additional traffic is anticipated in the future, a roundabout could be explored.

♦ Aren’t roundabouts more dangerous?

• The roundabouts used in these alternatives are larger than the first generation roundabouts in Bend. The City has been looking at methods to improve the design of roundabouts based on experiences from these first generation designs. Roundabouts are intended to address conflicts at intersections and they eliminate T-bone conflicts.

♦ Would the signals be “on demand” or on a fixed sequence?

• The signals would be “on demand,” meaning that vehicles driving along Murphy Road wouldn’t have to stop and wait unless there was another car at the intersection’s side streets.

♦ What is the timeline? Where is Murphy in the City’s list of construction priorities?

• Funding is a main issue. There are many corridors within the city that need to be improved. The city will need to compare the costs, benefits, and urgency of this project against others within the City.

♦ Did the evaluation study the limited access on China Hat Road and the impacts that it will have on Murphy Road?

• All future modeling included the median at China Hat Road.

♦ Could there be a mix and match of roundabouts and signals?
• Our preference would be for a roundabout corridor or a signalized corridor.

♦ I have a house on a corner along Murphy Road. I like roundabouts since they give more of a neighborhood feeling than signals, but will you need to take property?

• Roundabouts have a larger footprint than signals. Alternatives D and E are identical except for the intersection type (Alternative D has roundabouts at intersections, Alternative E has signals at intersections). Alternative D requires more right-of-way acquisition than Alternative E.

♦ Was a right of way acquisition done?

• No, we have the footprint of the roundabout and we used aerial photographs, but we would like to study Alternatives D and E more to consider those impacts.

♦ What about the connections to the east and west? There is no way to disperse traffic at the end and we need relief to the east, since they are continuing to build there.

• We are hoping to relieve congestion soon, but really funding is an issue. We probably can’t build up only one corridor at a time, so it will be a matter of phasing and trying to maximize what we have and what we can build, such as the bridge over the railroad.

♦ Just based on what’s happened in the last six years, it doesn’t seem like there has been adequate planning. Even something built in three years will be way over due (Reed Market is already failing)?

• That is why we are having this open house tonight, to try to plan for the future.

♦ After you do this project, are you going to tear it up to put in a sewer?

• We are working with the sewer company to do more than the road and that may influence when this project is built.

♦ Is Juniper Ridge taking money away from this project?

• No.

♦ I think that there will be a lot of new traffic along Murphy with the middle and high schools and then if it is extended to 15th Street, a lot of people will take 15th and Murphy instead of Reed Market.

• The traffic models assumed that the middle and high schools would be built within the planning timeframe.

♦ When Reed Market is done, will that help Murphy?

• The improvements on Reed Market should not have an impact on Murphy Road.

♦ Could you extend the road over the railroad, without a bridge?

• No, a bridge is required to cross the railroad tracks.
Is the post office involved in this project? The reason that I ask, is that we have to cross the street to get the mail and that is dangerous with all of the traffic and future expected traffic. It would be better to have mailboxes on both sides of the street.

- That is a federal government issue and while we are trying to consolidate design, that is something that we would talk about later on during the process.

Written Comments

Questions and comments collected from the comment sheets.

Which alternative(s) should be recommended to the Bend City Council? (Check all that apply)

Alternative A: (2 in favor)
- The planter strips but I would rather have roundabouts and I have three kids that go to Jewell. Roundabouts are just more attractive and easier.
- Continuous left turn lane makes it easier for residents to get in and out of their street. However, do take more property from homeowners than Alternative E. Prefer signals. Do not like roundabouts when small radius.

Alternative B: (0 in favor)
- No responses in favor of this alternative

Alternative C: (5 in favor)
- I like roundabout option. Two lanes would be cheaper to build and slow traffic.
- Less expensive to build
- See comment below about D (Roundabouts provide safe and convenient pedestrian crossings particularly when safe haven medians are included in the design.)
- If we have save money than this.
- Roundabouts are safest and move traffic well in medium density areas. Roundabouts enhance the look of the area and conform with Bend’s westside.

Alternative D: (13 in favor)
- Roundabouts keep traffic flowing, less pollution, problem with it more cost.
- Roundabouts provide safe and convenient pedestrian crossings particularly when safe haven medians are included in the design.
- Roundabouts will help slow traffic as well as provide a true thoroughfare from 3rd to 15th on Murphy.
- The roundabouts create smooth flow for traffic. They will also slow the general traffic for the schools.
- Like roundabouts.
- Prefer the advantage of safety over footprint.
- Roundabouts!
- Roundabouts are fine with me but I would not be unhappy with lights. I think my road Tapedera will have more traffic because people will cut through to avoid the lights and maybe roundabouts.
- Prefer roundabouts for aesthetics collision reasons, and environmental.
Seems to me to be safest. My concern – though no in this plan – is school traffic in this area.

Roundabouts are great, but make them big enough for traffic to yield to emergency traffic.

A narrower roadway lowers speeds, which meshes well with roundabouts and school zone. Need roundabout at 15th because of high speeds on 15th.

Alternative E: (3 in favor)

Also like the continuous left turn lanes even though narrower than Alternative A. Prefer signals, especially at Country Club Lane for fire trucks. 50-second delay (wait) does seem too long.

Prefer signals vs. small roundabouts.

Second choice: If cost prohibits Alternative D I would go with this one sooner than later!

Do you have any other comments or questions?

I’m not happy about how close the road will be to my house.

I would suggest we add a roundabout at Murphy and 15th street. This needs to get on the CIP so it can be built fairly. Traffic will warrant this as it tries to bypass Reed Market Road.

We got an answer to our question of people cutting through Hamilton and Roats Lanes to get to Parrell from the Old Murphy (private dirt roads) the answer of course is deal with it. Thanks.

Have you considered a separated, hard surface trail along the north side of the full length of the project? Such a trail could provide safe, convenient, and attractive connections to and from schools, neighborhoods, and the commercial area along 3rd Street. Also, would provide an additional east and west trail connection to the future north/south trial east of 15th Street and to the planned CODD trail route.

D looks great!

Would like to see Bend PD step up patrols in school zone around Jewell. Increase penalties for speeders through school zones.

I absolutely support roundabouts versus traffic lights. Please no traffic light. There may be a little learning curve for some people, but the benefit far outweighs lights. Thanks.

I am definitely concerned about the Murphy Road-15th Avenue intersection and load on 15th from there to Reed Market.

I definitely do not want no left turns with median down center.

Make a number of crosswalks no matter what alternative is chosen. It is difficult to get across 3 lanes (young/old) safely if not lit with street lights/sidewalks and crossing with a push button to activate a crosswalk light! Especially with Jewell School!! Make it slow/safe!! Use better signage – flashing lights on signs, etc.

Need to treat east Bend like west Bend. Since roundabouts are on westside they should be on eastside. Also, if safety is the city’s number one priority, roundabouts are clearly safer than the alternatives. Serious consideration should be given to creating a right of way between 15th and 27th before more subdivision are approved and block all access. Since Bend ranks in top 10 of cities nationwide for percent of hybrid vehicle owners, the lower speeds of roundabout roadways mean greater fuel savings. Plug-in hybrids are coming soon. Let’s think ahead.
See the attached from Southeast Bend, Southwest Bend, and Old Farm Neighborhood Associations (see scanned and attached document).

Website Comments

Questions and comments collected from the online comment form or from emails sent directly to the project team members.

Roundabouts and landscaping are desperately needed on the east side of bend. I would like to see a road with two lanes and the center lane for left turns and landscaping with landscaped roundabouts to beautify, slow, and calm traffic. Should I send my comments to the city councilors?

Thank you for a good meeting on Thursday. Here are some of my thoughts which I will also be passing along to Southwest Neighborhood Association and South East Neighborhood Association.

1. Build a roundabout at 15th and Murphy. 15th has a roundabout at Bear Creek and will have roundabouts at Wilson and Reed Market. I believe this will keep the continuity for the roadway. A signal at this intersection would be a break from the city's design for the 3 intersections to the north. Also, Dennis Pahlisch wants to have a roundabout as an entrance to his Bridges at Shadow Glen community. If the roundabout is part of the study and the resulting CIP, he will build half of it. I'm willing to bet he'd also place artwork in the roundabout which would be a definite plus for Southeast Bend.

2. Include a turn lane and a pedestrian crossing at Jewell. These will provide for safety of children as well as drivers.

Old Farm District Neighborhood Association board would like to request that bus turnouts be part of the plan for Murphy Road.

Reasons:
1. Murphy Rd. is/will be a busy east-west corridor for Bend. Bus routes will definitely be in the corridor's future.
2. Without pre-planned bus stops, cars are forced to stop behind buses as they pick up customers (as they do in Portland). Allowing that situation to occur by default does not seem reasonable when Bend is in a planning process to avoid congestion.
3. Currently an elementary school is located on Murphy; a middle school will be built on it within 10 years and will a high school on Country Club Rd. Students will use city buses to access the middle and high school.
4. Bus turnouts give passengers a safe area for entering and exiting the bus.

I am unable to attend this next meeting but I am very interested in the project and did attended the last meeting. If you can't do the whole project at once, my recommendation would be don't worry about the existing Murphy Road, get the new part to 15th underway.

And just when do we SW residents get to hear about the frontage road that's supposed to connect to Murphy? That @$%& barrier is a huge inconvenience, making me drive two to three miles out of the way each time I want to travel to east Bend.
APPENDIX A

PUBLIC INVOLVEMENT DOCUMENTATION
Murphy Road Corridor Study
Plan and Policy Review

Introduction

This technical memorandum describes relevant regional and local plans and policies as they relate to the Murphy Road Corridor Study. This review assists the project team in identifying policy parameters that need to be addressed during the alternatives development task. Relevant policy goals may also be used as evaluation measures for various alternatives. Although each document reviewed contains many policies, only those policies considered most pertinent to Murphy Road are presented, to help focus the discussion.

Documents Reviewed

The four adopted plans and policies reviewed as part of this memorandum are listed below.

- Bend Area General Plan (City of Bend) – adopted 1976, last updated 2002
- City of Bend Development Code (City of Bend) – July 2006
- Bend Urban Area Transportation System Plan (City of Bend) – 2000
- Bend 2030 Vision, Phase I (City of Bend) (including the Community Profile and Trends Report) – August 2005, Endorsed by City Council June 2006

In addition, several plans and studies were reviewed that were either recently completed (but not yet adopted), or are currently underway. These plans, listed below, were reviewed at a cursory level to provide the project team with an awareness of the project scopes, timelines, and recommendations. These plans are described in Appendix A.

- Murphy Crossing Refinement Plan (City of Bend)
- Reed Market Corridor Refinement Plan (City of Bend)
- South Bend Parkway Refinement Study (Oregon Department of Transportation)
- Metropolitan Transportation Plan (Bend Metropolitan Planning Organization)
- Residential Lands Study (City of Bend)
The remainder of this memorandum is organized by plan. Each plan is briefly described, focusing on those policies most relevant to the Murphy Road Corridor Study. Each section then details the project relevancy. Information on project relevancy is provided in italics.

**Bend Area General Plan (City of Bend) – 1981, updated 2002**

The Bend Area General Plan is a long range (2020) comprehensive plan for the Bend metropolitan area. The following goals and policies relevant to the Murphy Road Corridor Study are listed below by relevant chapter:

**Chapter 2 - Natural Features and Open Space**

**Goals**
- to preserve interesting and distinct geologic formations and areas of natural vegetation;
- to soften the appearance of street corridors with planter and median strips;

**Policy 7:** Major rock outcrops, stands of trees, or other prominent natural features identified in the General Plan shall be preserved as a means of retaining the visual character and quality of the community.

**Project Relevance:**
There is a rock outcropping located directly to the east of the railroad tracks. This rock outcropping has been designated by the City as an area of special interest (ASI). The easterly extension of Murphy Road will need to avoid or minimize the impacts to the outcropping. Mitigation requirements are examined in the City of Bend Development Code.

**Chapter 6 – The Economy and Lands for Economic Growth**

**Goal: Commercial Development**

**Policy 30:** An area south of Murphy Road on the west side of Highway 97 has been marked for highway commercial with a flexible "sawtooth" boundary. This area shall be approved for development only when a system of frontage road and limited access control is created that will protect the capacity and safety of Highway 97 and South 3rd Street.

**Project Relevance:**
While this area marked for highway commercial is to the west of the study area, this expected development is likely to increase traffic levels along Murphy Road.

**Policy 31:** It is the intent of the Plan to allow commercial development adjacent to arterial streets and highways in areas designated for commercial development, provided that the developments access onto frontage roads or interior roads, and that access onto the highway or arterial will be limited. Points of access will be encouraged that provide for adequate and safe entrances and exits, and that favor right turns and merging over the use of traffic signals.
Project Relevance:

Currently Murphy Road is classified as a major collector, however, a request could be made as part of this study to modify this classification. If Murphy Road were reclassified as an arterial, access will need to be limited; also right turns and merging will need to be favored over traffic signals.

Chapter 7 – Transportation Systems

Goal: Transportation and Land Use

- To promote land use patterns that support fewer vehicle trips and shorter trip lengths
- To ensure that future development, including re-development will not interfere with the completion of Bend’s transportation system

Goal: Transportation System Management

- Provide cost effective transportation improvements and implement strategies that will improve the efficiency and function of existing roadways

Policy 1: The City shall adopt land use regulations to limit the location and number of driveways and access points, and other access management strategies on all major collector and arterial streets.

Project Relevance:

City policies regarding access management have been adopted and the details are explained in the next section (City of Bend Development Code), section 3.1.400 Vehicular Access Management.

Policy 3: The City and State shall implement transportation system management measures to increase safety, reduce traffic congestion to improve the function of arterial and collector streets, and protect the function of all travel modes.

Project Relevance:

Transportation System Management (TSM) measures need to be considered prior to recommending major capacity improvements. Access standards developed for principal arterials need to consider Oregon Department of Transportation (ODOT) access management policies along state highways, including the South Bend Parkway. However, specific TSM measures are not outlined in the General Plan.

Goal: Pedestrian and Bicycle Systems

- To support and encourage increased levels of bicycling and walking as an alternative to the automobile
- To provide safe, accessible and convenient bicycling and walking facilities

Policy 4: The City shall develop safe and convenient bicycle and pedestrian circulation to major activity centers, including the downtown, schools, shopping areas and parks. East-
west access to the downtown area needs particular emphasis across major obstacles, such as 3rd Street, the Bend Parkway and the railroad.

**Project Relevance:**

*The City has identified 3rd Street, the Bend Parkway, and the railroad as major obstacles for bicycle and pedestrian crossing. The Murphy Road Corridor Study will address improvements to 3rd Street and will therefore need to coordinate with the City as necessary to allow for an accessible and easy bicycle and pedestrian crossing. The study area is located to the east of the Bend Parkway, but the Burlington Northern Santa Fe (BNSF) railroad intersects the potential expansion of Murphy Road between Brosterhous and 15th Avenue, requiring the study to coordinate with the City on that issue as well.*

**Policy 5:** The City shall facilitate easy and safe bicycle and pedestrian crossings of major collector and arterial streets. Intersections shall be designed to include pedestrian refuges or islands, curb extensions and other elements where needed for pedestrian safety. Also, bike lanes shall be extended to meet intersection crosswalks.

**Project Relevance:**

*Since Murphy Road is classified as a major collector, improvements to intersections recommended as part of the Murphy Road Corridor Study will need to include refuges/islands, curb extensions, and/or other elements to enhance pedestrian safety, as well as extending bike lanes into the intersection crosswalks for easy and safe bicycle and pedestrian crossing.*

**Policy 6:** Bike lanes shall be included on all new and reconstructed arterials and major collectors, except where bikeways are authorized by the Transportation System Plan (TSP). Bike lanes shall also be provided when practical on local streets within commercial and industrial areas. Bike lanes shall be added to existing arterial and major collector streets on a prioritized schedule. Specific effort shall be made to fill the gaps in the on-street bikeway system. An appropriate means of pedestrian and bicyclist signal actuation should be provided at all new or upgraded traffic signal installations.

**Project Relevance:**

*This policy would be relevant for the easterly extension of Murphy Road and for improvements to the existing collector. As per this policy bicycle facilities will need to be part of the Murphy Road recommendations.*

**Policy 7:** Property-tight sidewalks shall be included on both sides of all new streets except where extreme slopes, severe topographical constraints, or special circumstances exist. Landscape strips shall separate curbs and sidewalks on new and reconstructed roads. Sidewalks shall be added to all existing arterial and collector streets to fill the gaps in the pedestrian system.
Project Relevance:

Murphy Road does not have a continuous sidewalk system and is not restricted by topographical constraints, so improvements to the corridor should include filling the gaps in the pedestrian system with property-tight sidewalks, with landscaped strips between the curb and sidewalks, on both sides of Murphy Road. This policy will also apply to the easterly extension of Murphy Road. Specific size requirements for these features are examined in the City of Bend Development Code.

Goal: Street System

- To provide a practical and convenient means of moving people and goods within the urban area that accommodates various transportation modes
- To provide a safe and efficient means to access all parts of the community
- To provide an attractive, tree-lined, pedestrian friendly streetscape sensitive to protecting the livability of the community

Policy 1: Streets shall be located, designed and constructed to meet their planned function and provide space for adequate planting strips, sidewalks, motor vehicle travel and bike lanes (where appropriate). Specific effort should be made to improve and enhance east-west circulation patterns for all modes of travel throughout the community.

Project Relevance:

The City of Bend is currently underserved by east-west connections. Improvements to Murphy Road would assist in improving these east-west circulation patterns for all travel modes.

Policy 3: Streets shall be classified and generally located according to the Bend Urban Area - Roadway System Plan (Figure 7-7), the Street Functional Classification (Table 7-1), and the Street Grid System (Figure 7-5). Street rights-of-way and improvements standards shall be developed to meet the needs of the Transportation Plan and Functional Classification System.

Project Relevance:

Murphy Road is listed as a major collector in the Bend Urban Area-Roadway System Plan, the Street Functional Classification, and the Street Grid System. Third Street (Business US 97) is classified as a Arterial, Parrell, Country Club, and Brousterhous are all designated as major collectors, while 15th Street is classified as a minor arterial.

Collector roadways are intended to provide access and circulation to nearby arterial roadways in a multi-modal fashion. Bike lanes and sidewalks are typical characteristics on both sides of the street and street parking is typically not permitted. Trip lengths are generally half a mile in distance. Major Collectors are normally located at about every half mile (according to Table 7-1 of the General Plan). The typical volume of traffic on a major collector is 1,500 to 9,000 vehicles per day (Table 7-1).

The function of a Minor Arterial is to carry traffic from one part of town to another. The Minor Arterial street network interconnects and augments the Principal and Major Arterial street system. Trip lengths are normally of moderate distances. Minor Arterials often border and establish the edge of neighborhoods. Minor arterials often support local or neighborhood commercial areas. Minor
Arterials are normally located at about every half mile to one mile (according to Table 7-1 and Figure 29 of the TSP and Table 12 and Figure 7-5 of the General Plan). The nearest parallel east-west arterial to Murphy Road is Reed Market Road, more than one mile away to the north. The typical volume of traffic on a Minor Arterial is 5,000 to 18,000 vehicles per day (according to Table 7-1 of the TSP and Table 12 of the General Plan).

The year 2030 traffic forecast on Murphy Road from the City of Bend travel demand model is 2,900 vehicles per day (in the residential areas) to 8,900 vehicles per day (in the vicinity of the Bend Parkway and Business 97).

Policy 4: In order to reduce vehicle speed, avoid construction of excessive pavement, and create livable neighborhoods, the City shall adopt standards that allow for narrower streets and lane standards, on-street parking, and other pedestrian friendly design elements.

**Project Relevance:**

*The design standards are described in detail in the City of Bend Development Code.*

Policy 6: Access control shall be part of the design standards for major collectors, arterials, principal arterials and expressways to ensure that adequate public safety and future traffic carrying capacity is maintained while at the same time preserving appropriate access to existing development and providing for appropriate access for future development.

**Project Relevance:**

*Any changes in the current policies will affect Murphy Road. Updated policies regarding access control on collectors and arterials, along with changes to raised median requirements will affect the study area.*

Policy 8: Traffic signals or roundabouts shall be constructed in accordance with the design, spacing and standards adopted by the City and State.

**Project Relevance:**

*These standards are examined in the City of Bend Development Code.*

Policy 12: Traffic calming devices may be considered anywhere traffic impacts are adverse to residential livability.

**Project Relevance:**

*Traffic calming measures may be appropriate at intersections of high pedestrian or bicycle usage or at areas of high crash rates.*

Policy 21: The City shall evaluate the effect of transportation demand management (TDM) and transportation system management (TSM) measures that would successfully eliminate or delay the need for minor arterial street widening beyond the existing travel lanes within the twenty-year design life of a proposed roadway project. The design analysis of roadway widening shall consider the impacts on all modes of travel, adjacent affected travel corridors.
and the impact on properties immediately adjacent to the contemplated road widening. The most effective and appropriate TDM and TSM measures recommended by the evaluation, as selected by the City Council, shall be implemented either in conjunction with, or before, the road widening project. The City Council shall receive this evaluation report that makes the aforementioned analysis of TDM and TSM measures, and the evaluation of roadway widening design options, prior to considering authorization of proceeding with the road widening project.

Project Relevance:
If the classification for Murphy Road is redesignated to an arterial the above information will apply to improvements or street widening. The project would need to provide an evaluation report that includes TDM and TSM measures before the City will authorize road widening.

Chapter 9 - Community Appearance
Policy 2: Community appearance shall continue to be a major concern and the subject of a major effort in the area. Major natural features, such as rock outcrops or stands of trees, should be preserved as a community asset as the area develops.

Project Relevance:
There are rock outcroppings at the east end of the study area which have been designated by the City to be an area of special interest and all efforts should be made to preserve them. If impacts to the ASI are unavoidable, mitigation efforts are examined in the City of Bend Development Code.

Policy 7: The city shall develop designs for arterial and collector streets that include landscaped planter strips and medians. Such designs shall include trees in the planter and median strips when practical and safe.

Project Relevance:
As a major collector, Murphy Road should have landscaped planter strips and medians where practicable and safe. Design requirements are examined in the City of Bend Development Code.

City of Bend Development Code - July 2006
The City of Bend Development Code is is a comprehensive land use and development code that governs all of the land within the incorporated city limits of Bend. The Chapters of the code are used together to review land use applications. Relevant sections of the code are described over the following pages.

Chapter 1
1.1.300 Consistency with Plan and Laws. Each development and use application and other procedure initiated under this Code shall be consistent with the adopted comprehensive plan of the City of Bend as implemented by this Code, and with applicable state and federal
laws and regulations. All provisions of this Code shall be construed in conformity with the adopted Bend Area General Plan.

Chapter 2 Land Use Districts

Chapter 2.7.700 Upland Areas of Special Interest Overlay Zone

The upland features consist of scattered rock outcrops, stands of trees, and dominant ridges and faults that are typical of the Central Oregon landscape.

B. Applicability:

1. **Affected Property.** The procedures and requirements of the Upland Areas of Special Interest Overlay Zone apply to any real property designated as having an ASI as mapped on the Bend Area General Plan map and the City Zoning Map. These standards shall be in addition to the standards of the underlying zone.

2. **Activities Subject to Review.** Unless specifically exempted from review as described in Section B(3) below, activities subject to review and which require a permit, shall include all development on properties including Site modifications including grading, excavation or fill, installation of new utilities, construction of roads, driveways, or paths.

C. ASI Review Process

For all activity subject to the Upland Area of Special Interest Overlay review, the following shall apply:

1. The ASI Review shall be processed as a “Land Use Permit” as defined in Chapter 4.1, Land Use and Review Procedures. When practicable, the ASI Review shall be processed concurrently with other land use permits.

2. The ASI Review application is subject to the provisions of this Chapter.

3. The ASI Review application shall be filed on a form provided by the City and shall be accompanied by a filing fee, drawings and information specified in this Chapter.

D. Development Standards

The ASI Boundary is delineated by the outside edge of the boundary line shown on the Bend Area General Plan map and the City Zoning Map. No development as defined in this Chapter shall occur within an Upland Area of Special Interest boundary unless expressly permitted by the provisions of this Chapter.

The Development Standards shall apply to structures, fences, impervious surfaces including streets and driveways except where provided for in this Section and landscaping as described in Section D(5) below.

**Streets and driveways.** Public or private streets and driveways may be placed within an Upland Area of Special Interest to access development activities if it is shown that no other practicable method of access exists. If allowed, the applicant shall demonstrate that:

a. No other practicable access to the buildable area exists, or access from an off-site location through the use of easements is not possible;
b. Roads and driveways are designed to be the minimum width necessary and the minimum intrusion into the Upland Area of Special Interest while also allowing safe passage of vehicles and/or pedestrians;

c. The need for future extensions of shared access, access easements, or private streets to access potential new building sites have been considered at the time of this application in order to avoid subsequent encroachments into an Upland Area of Special Interest.

F. Areas of Special Interest Mitigation Standards

The development activities listed in Section B and D may trigger a requirement for mitigation. When a proposed development impacts an Upland Area of Special Interest by grading, excavation, or fill, the placement of impervious surfaces, or by the removal of vegetation, a mitigation plan prepared by a qualified professional shall be submitted to the review authority. The mitigation plan shall include the following:

- The location of the impact, the existing conditions and area size of the resource prior to impact, the location and size of the proposed mitigation area, and a proposed mitigation plan that represents a 1:1 replacement value;

- Additional mitigation measures may be required based on the nature of the impact such as:
  - Site reclamation
  - Screening of structures, cuts or fills
  - Increased vegetative quantities and/or sizes

Project Relevance:

From the Upland Areas of Special Interest map, in this document, there is an ASI to the west of 15th Street, which has been identified as a rock outcropping. The study will try to avoid the area, but if any activity takes place in the ASI boundary, review and a permit is necessary to build a road in the area. Roads must be of the minimum size and needs to be planned for future development so that there isn’t additional impact to the ASI.

Chapter 3 – Design Standards

3.1.100 Purpose

B. Street Connectivity and Formation of Blocks Required.

1. Block Length and Perimeter. The block lengths and perimeters shall not exceed the following standards as measured from centerline to centerline of through intersecting streets.

   a. 660 feet block length and 2,000 feet block perimeter in all Residential zones;

   b. 400 feet block length and 1,500 feet block perimeter in the Central Business District, Convenience Commercial, Mixed Use Riverfront and Professional Office Districts;
2. New street connections to arterials and collectors shall be governed by those requirements in Section 3.1.400; Vehicular Access Management.

Project Relevance:
Since Murphy Road is adjacent to both residentially and commercially zoned land, the requirements in Section 3.1.400 are applicable, as well as the required block length for the commercial and residential zones.

3.1.300 Pedestrian Access and Circulation

C. Pedestrian Facility Development Standards.

On-site pedestrian facilities shall conform to the following standards:

1. On-site pedestrian walkways shall have a minimum width of 5-feet.

2. Pedestrian walkways shall be lighted in conformance with Section 3.5.200; Outdoor Lighting Standards.

3. The City may require landscaping adjacent to a pedestrian walkway for screening and the privacy of adjoining properties. The specific landscaping requirements shall balance the neighbors’ privacy with the public safety need for surveillance of users of the public walkway.

4. The Planning Director may determine, based upon facts in the application and other public records, that a walkway is impractical due to: physical or topographic conditions (e.g., freeways, railroads, extremely steep slopes, sensitive lands, and similar physical constraints).

Project Relevance:
Improvements to Murphy Road sidewalks will need to be a minimum of 5-feet wide, with appropriate outdoor lighting, and screening landscaping between the sidewalk and private properties. The study will need to conclude whether walkways are practical near the railroad on the east end of the project area and determine proper efforts to maintain connectivity.

E. Other Design and Construction Considerations.

Public pedestrian facilities shall conform to all of the standards in Subsections 1-4 listed below:

1. Vehicle/walkway Separation. Where walkways are parallel and adjacent to a driveway or street (public or private), they shall be raised six inches and curbed, or separated from the driveway/street by a five-foot minimum landscaped strip. Special designs may be permitted if this five-foot separation cannot be achieved.

2. Housing/walkway Separation. Pedestrian walkways shall be separated a minimum of five (5) feet from all residential living areas on the ground floor, except at building entrances. Separation is measured from the walkway edge to the closest dwelling unit. The separation area shall be landscaped in conformance with the provisions of Chapter 3.2 Landscaping, Street Trees, Fences & Walls. No walkway/building separation is required for commercial, industrial, public, or institutional uses.
3. Walkway Surface. Walkway surfaces shall be concrete, asphalt, brick/masonry pavers, or other durable surface that makes a smooth surface texture, and shall conform to ADA requirements. Multi-use paths (i.e., for bicycles and pedestrians) shall be the same materials.

**Project Relevance:**

*Sidewalk improvements or new sidewalks need to be separated from the street by five feet with a raised curb of six inches. There should also be a five foot separation from sidewalks and private properties. The walkway surface needs to be of appropriate material and conform to ADA requirements.*

### 3.1.400 Vehicular Access Management

**G. Access Spacing.**

Driveway access spacing onto roadways under the jurisdiction of the City shall be regulated by the following standards, unless otherwise approved by the City Engineer:

1. **Driveway Spacing:**
   
   b. **Collector Streets** shall be three hundred feet (300’) minimum spacing as measured from centerline of driveway to centerline of driveway.

   c. **Arterial Streets** shall be three hundred feet (300’) minimum spacing as measured from centerline of driveway to centerline of driveway.

   d. Driveways onto arterials and collectors may have directional restrictions depending on the roadway’s characteristics including number of lanes, queuing at nearby intersections/driveways, and locations of signals or roundabouts.

2. **Spacing between Driveways and Intersections:**

   b. Three hundred feet (300’) is the minimum distance between driveways onto collector/arterial roadways and intersections as measured from centerline of driveway to centerline of street. Driveways to arterials and collectors may have directional restrictions depending on the roadway’s characteristics including number of lanes, queuing at nearby intersections/driveways, and locations of signals or roundabouts.

   c. Three hundred feet (300’) is the minimum distance between driveways onto local/collector/arterial roadways and intersections that are controlled with a traffic signal or roundabout as measured from centerline of driveway to centerline of controlled intersection. Driveways to locals/collectors/arterials located at least 300’ from controlled intersections may still have directional restrictions depending on the roadway’s characteristics including number of lanes, queuing at nearby intersections/driveways, and operations of signal or roundabout.

3. **Access to Arterial and Collector Roadways.** Access to arterials and collectors is permitted provided the intersection or driveway can be constructed to comply with the City of Bend Standards and Specifications, as well as all of the requirements of this Chapter of the Bend Development Code. Overall, full access intersections or driveways...
are allowed every 900 feet on arterials and collectors, while limited access intersections or driveways on arterials and collectors are allowed every 300 feet.

Project Relevance:

Access through smaller streets or private driveways may be restricted if the spacing is not in compliance with the standard distances for collector and arterial roadways. Spacing required between driveways is 300 feet on collector and arterial roads, however, there may be directional restrictions onto the roadway. Spacing between driveways and intersections on collectors and arterial roads, with or without traffic signal control, is a minimum of 300 feet. Again, directional restrictions may be required and are dependent upon the nature and travel use of the roadway. Full access intersections or driveways are allowed every 900 feet on arterials and collectors.

### 3.2.400 Street Trees.

This section sets standards and requirements for planting trees along all streets for shading, comfort, safety and aesthetic purposes. Street trees shall be planted for all developments that are subject to Site Development Review. Street trees shall conform to the following standards and guidelines:

A. City of Bend Approved Tree List. The City has developed a list of desirable trees for planting along streets in three size classes: low, medium and tall choices of trees shall be limited to the following list.

D. Spacing and Location. Street trees shall be planted within existing and proposed planting strips, or in City approved sidewalk tree wells on streets without planting strips. Small stature trees shall be planted no closer to the curb or sidewalk than three (3) feet, medium trees - three (3) feet and large trees - four (4) feet. Root barriers may be required with street tree planting to protect the City’s curb and sidewalk. Street tree spacing shall be based upon the type of tree(s) selected and the canopy size at maturity. Small canopy trees and columnar shaped trees shall be planted no further than thirty (30) feet apart; medium and large canopy trees shall be planted no further than forty (40) feet apart, except where planting a tree would conflict with existing trees, retaining walls, utilities and similar physical barriers.

Project Relevance:

When planting trees in the sidewalk planting strip, tree selection must be from the City approved list of trees. Small and medium trees must be planted three feet from the curb and sidewalk and large trees must be planted four feet away. Spacing between trees will depend upon the canopy type, small trees can not be planted more than thirty feet apart, while medium to large trees can be planted no more than forty feet apart. Tree wells are required for all street trees planted within the sidewalk.

### Chapter 3.4 - Public Improvement Standards

#### 3.4.200 Transportation Improvement Standards

A. Development Requirements.

2. Development of new streets, and additional street width or improvements planned as a portion of an existing street, shall be improved in accordance with this Section,
and public streets shall be dedicated to the applicable City, county or state jurisdiction.

3. All new and/or existing streets and alleys shall be paved per the City of Bend Standards and Specifications document.

E. Street Location, Width and Grade. Except as noted below, the location, width and grade of all streets shall conform to the City of Bend Standard and Specifications document, the provisions of this Chapter and an approved street plan or subdivision plat. Street location, width and grade shall be determined in relation to existing and planned streets, topographic conditions, public convenience and safety, and in appropriate relation to the proposed use of the land to be served by such streets.

1. Street grades shall be designed and/or constructed as approved by the City Engineer in accordance with the design standards in the tables below.

### Table A: Improvement Standards for Dedicated Public Roadways in Residential Zones (UAR, RL, RS, RM-10, RM AND RH)

<table>
<thead>
<tr>
<th>Street Classification</th>
<th>Minimum Right of Way</th>
<th>Minimum Pavement Width</th>
<th>Minimum Planter Strip</th>
<th>Max Grade (3)</th>
<th>Sidewalks Both Sides</th>
<th>Bike Lanes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principal Arterial (2)</td>
<td>100’</td>
<td>76’</td>
<td>5’</td>
<td>6%</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Major Arterial</td>
<td>100’</td>
<td>76’</td>
<td>5’</td>
<td>6%</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Minor Arterial</td>
<td>100’</td>
<td>56’</td>
<td>7’</td>
<td>6%</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Major Collector</td>
<td>80’</td>
<td>56’</td>
<td>6’</td>
<td>8%</td>
<td>6’</td>
<td>Yes</td>
</tr>
<tr>
<td>Local Street RM or RH</td>
<td>60’</td>
<td>36’</td>
<td>6’</td>
<td>10%</td>
<td>6’</td>
<td>No</td>
</tr>
<tr>
<td>Local Street (1) UAR, RL, RS, RM-10</td>
<td>60’</td>
<td>24’/28’/32’</td>
<td>7’</td>
<td>10%</td>
<td>5’</td>
<td>No</td>
</tr>
<tr>
<td>Cul-de-sac all residential zones</td>
<td>60’</td>
<td>24’</td>
<td>7’</td>
<td>10%</td>
<td>5’</td>
<td>No</td>
</tr>
<tr>
<td>Alley</td>
<td>20’</td>
<td>20’</td>
<td>None</td>
<td>10%</td>
<td>None</td>
<td>No</td>
</tr>
</tbody>
</table>

Notes:
1. Local Streets:
   a. 24 foot wide street – No parking allowed on either side of the street.
   b. 28 foot wide street – Parking allowed on one side in alternating parking bays (Parking bays shall alternately side to side of the street to provide parking from both directions, and shall be 8-feet wide and meet City of Bend Standards and Specifications)
   c. 32 foot wide street – Parking allowed both sides in UAR, RL, RS, and RM-10 zones
   d. 36 foot wide street – Parking allowed both sides in RM and RH zones
   e. Special Street widths (see Section 3.4.200 (G) (3))
2. Expressways and Arterials that are Oregon Department of Transportation (ODOT) facilities shall meet ODOT design standards.
3. See Table “E” for grade exceptions in steep terrain areas.
Table B: Improvement Standards for Dedicated Public Roadways in Commercial Zones
CB, CC, CL, CG, ME, MR and PO

<table>
<thead>
<tr>
<th>Street Classification</th>
<th>Minimum Right of Way</th>
<th>Minimum Pavement Width</th>
<th>Minimum Planter Strip Width</th>
<th>Minimum Turn Lane/Median Island Width (1)</th>
<th>Maximum Grade (2)</th>
<th>Direct Site Access</th>
<th>Sidewalks Both Sides</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principal Arterial (3)</td>
<td>100’</td>
<td>76’</td>
<td>5’</td>
<td>11’/16’</td>
<td>6%</td>
<td>No</td>
<td>6’</td>
</tr>
<tr>
<td>Major Arterial</td>
<td>100’</td>
<td>76’</td>
<td>5’</td>
<td>11’/16’</td>
<td>6%</td>
<td>No</td>
<td>6’</td>
</tr>
<tr>
<td>Minor Arterial</td>
<td>100’</td>
<td>56’</td>
<td>8’</td>
<td>11’/16’</td>
<td>6%</td>
<td>No</td>
<td>6’</td>
</tr>
<tr>
<td>Major Collector</td>
<td>80’</td>
<td>56’</td>
<td>6’</td>
<td>11’/16’</td>
<td>6%</td>
<td>Yes</td>
<td>6’</td>
</tr>
<tr>
<td>Local</td>
<td>60’</td>
<td>36’</td>
<td>7’</td>
<td>None</td>
<td>10%</td>
<td>Yes</td>
<td>5’</td>
</tr>
<tr>
<td>Alley (4)</td>
<td>20’</td>
<td>20’</td>
<td>None</td>
<td>None</td>
<td>10%</td>
<td>Yes</td>
<td>None</td>
</tr>
</tbody>
</table>

Notes:
1. The first dimension is the minimum required width of the turn lane while the second dimension applies to the raised median width constructed between intersections:
   a) Intersection turn lane pocket width is 11-feet while the median end cap width is 5-feet in width.
2. See: Table “E” for grade exceptions in steep terrain areas.
3. Expressways and Arterials that are Oregon Department of Transportation (ODOT) facilities shall meet ODOT design standards.

Project Relevance:

Any improvements to or an extension of Murphy Road needs to follow these standards. Since Murphy Road is a major collector, the improvement standards are an 80 foot minimum right of way, 56 foot minimum pavement width, a six foot minimum planter strip, Bike lanes, sidewalks on both sides of the street that are six feet wide, and an 6% maximum grad. In a commercial zone, direct site access is allowed and there is an 11 foot minimum turn lane, along with a 16 foot median island width.

H. Medians. The use of landscaped medians improves community appearance, helps maintain system mobility and reduces the effects of wide street widths to all modes of travel. Medians will be landscaped with water efficient plant materials unless otherwise indicated below.

1. At intersections where left turn pockets are constructed, the 16-foot wide median will transition to an 11-foot wide left turn lane with a five-foot pedestrian refuge median separating the left turn lane from oncoming traffic. Intersections and access must comply with Chapter 3.1, Access, Circulation and Lot Design.

2. A lesser median standard may be approved by the City Engineer under the following conditions:
   a. A 12-foot landscape median may be approved if pedestrian refuges are not required because adequately spaced offset intersections safely accommodate pedestrian crossings at the 12-foot median opposite a 12 foot turn pocket.
b. A 6-foot landscaped median may be approved where the 20-year projected average daily traffic (ADT) volumes are less than 5000 and where pedestrian refuge is required.

c. Collector streets with no medians may be approved if 20-year projected ADT volumes are less than 5000 and no pedestrian crossing safety issues are identified.

3. In Commercial and Industrial zones, medians may be approved as painted islands or two-way left turn lanes when all of the following conditions exist.

   a. Pavement width is 56-feet or less.
   b. Significant truck turning activity is anticipated and demonstrated.
   c. No alternate access route for trucks is available.
   d. Public safety will not be compromised.

**Project Relevance:**

*Medians are recommended in the Bend General Plan to soften the visual appearance of the street, as well as increase safety and direct traffic. Water efficient and native plants should be used when appropriate. When used at an intersection the median should transition from 16-feet to 11-feet wide to serve as a left turn lane. A five-foot pedestrian refuge should separate the left turn lane from oncoming traffic. There may be other situations that alter the size of the median. The study must check the Bend General Plan to see if new street policies have been adopted, through policy 6 from the Street Systems goal, to require the cost of installation and maintenance of raised medians before they are approved or required.*

I. Future Street Plan and Extension of Streets.

1. When a street plan has been developed and adopted by City Council along with an area plan, such as a Refinement Plan, that street plan shall guide the location and spacing of future streets pursuant to City of Bend Standards and Specifications.

**Project Relevance:**

*There is a proposed extension for Murphy Road to SE 15th Street in the Bend General Plan, Roadway System Plan.*

K. Sidewalks, Planter Strips, Bicycle Lanes. Sidewalks, planter strips, and bicycle lanes shall be installed in conformance with the applicable provisions of the Bend Urban Area Transportation System Plan; the General Plan, City of Bend Standards and Specifications and the following standards:

1. The planter strip distance is measured from the face of the curb to the inside edge of the sidewalk.

2. Sidewalks shall be separated from the street by a planter strip and placed at the property line, where practicable, or as otherwise directed by the City Engineer.
3. (not applicable)

4. Bicycle lanes shall be constructed on all collector and arterial streets unless otherwise designated.

5. (not applicable)

6. In no instance shall the planter strip be wider than 7-feet at the intersection. This may require the sidewalk to taper from the property line alignment to within 7-feet of the curb.

7. Where practical, sidewalks shall be allowed to meander around existing trees in conformance with the requirements of the Americans with Disabilities Act.

**Project Relevance:**

Planter strips are required between the sidewalk and the street. The strip should not be wider than seven feet at an intersection, this may require that the sidewalk be located closer to the street than the property line. When possible, sidewalks should meander around existing street trees, as long as ADA requirements are met. Bike lanes should be on Murphy Road, since it is a collector.

**L. Intersection Angles.** Streets shall be laid out so as to intersect at an angle as near to a right angle as practicable, except where topography requires a lesser angle. In no case shall the centerline angle be less than 80°. In addition, the following standards shall apply:

1. Street design shall provide a minimum of 50 feet of centerline tangent past the intersecting right-of-way unless a lesser distance is approved by the City Engineer.

2. Intersections that are not at right angles shall have a minimum corner radius of 20 feet along the right-of-way lines of the acute angle.

3. Right-of-way lines at intersections with arterial streets shall have a corner radius of not less than 30 feet.

**Project Relevance:**

The location of the ASI east of the BNSF railroad tracks may require alteration of the street to intersect 15th Street lesser than a right angle. If that is the case, the centerline angle can not be less than 80°, there must be a minimum of 50 feet of centerline tangent past the intersecting right-of-way, and the must be a minimum corner radius of 30 feet along the right-of-way lines of the acute angle.

Q. Street Adjacent to Railroad Right-of-Way. Wherever the proposed development contains or is adjacent to a railroad right-of-way, a street approximately parallel to and on each side of such right-of-way at a distance suitable for the appropriate use of the land shall be created. New railroad crossings and modifications to existing crossings are subject to review and approval by the Oregon Department of Transportation and the rail service provider.

**Project Relevance:**

Murphy Road extension will cross the Burlington Northern Santa Fe Railroad line.
Chapter 4 – Application and Review Procedures

Chapter 4.7 Transportation Analysis

4.7.100 Purpose and Authority.

A. Purpose. The City will review land use actions and major roadway projects for potential impacts and to ensure that new development contributes to the orderly development of the Bend Urban Area Transportation System Plan network of roads, bikeways, and pedestrian facilities by:

- Establishing policies and procedures for evaluation of land use actions and major roadway projects to protect existing and future operations of roadways;
- Establishing service level standards (operations standards) for transportation facilities identified in the Bend Urban Area Transportation System Plan;
- Ensuring consistency with the functions, capacities, and service level standards of facilities identified in local and regional transportation system plans and the City of Bend Development Code;
- Extending transportation facilities to and through development property;
- Ensuring conditions are applied to mitigate the full extent of impacts and protect transportation facilities so that all land use proposals contribute their fair share towards the transportation system plan.

C. Applicability. Land use actions will be reviewed for impacts and potential mitigation through a Transportation Impact Study.

2. Roadway Projects Initiated by a Public Agency. A Transportation Impact Study shall be performed to determine geometric requirements when a major roadway infrastructure project involves one or more of the following:

- The project is inconsistent with the regional or local Bend Urban Area TSP; or
- The project considers removal of an existing traffic signal or roundabout; or
- The project considers installation of a traffic signal or roundabout at an intersection other than a ramp terminal, arterial-arterial intersection, arterial-collector intersection or a collector-collector intersection.

B. Required Information

1. Sight Distance Measurements. For all driveways, study area intersections, and new intersections created by the development (with the exception of single family residential driveways), an intersection sight distance measurement shall be provided that shows compliance with City of Bend Standards and Specifications for the posted or 85th percentile speed (whichever is greater). Field measurements shall be used wherever possible, and plan measurements from civil drawings provided for planned intersections or driveways.

2. Adjacent and nearby driveways and street connecting points. For arterial and collector roadways, the applicant’s Transportation Impact Study shall document the location of
all existing driveways and street connecting points near the frontage of the property. This shall be used in evaluating compliance with access management standards as provided in Chapter 3.1; Access, Circulation and Lot Design. In all instances, the documentation shall provide sufficient detail to address the requirements of Chapter 3.1; Access, Circulation and Lot Design.

3. **Pedestrian and Bicycle System.** The applicant’s Transportation Impact Study shall document the location of all existing and planned sidewalk and trail system elements within the study area of the proposed project for use in evaluating compliance with the Bend Urban Area Transportation System Plan, City of Bend Standards and Specifications, and the City of Bend Development Code.

4. **Crash Histories.** Crash histories and a calculated crash rate shall be reported for all study area intersections or those locations required by the City Engineer or designee. Crash histories shall provide a three (3) year history of ODOT and Bend Police Department reported crashes.

5. **Access Management Standards.** Land use applications that take access or seek to take access directly onto a collector or arterial facility or access within 300 feet of an interchange, ramp terminal, arterial-arterial intersection, arterial-collector intersection or collector-collector intersection will need to demonstrate compliance with the Access Management Standards provided in Chapter 3.1; Access, Circulation and Lot Design. Access to a state facility or within jurisdictional coverage of a state facility shall comply with ODOT requirements.

6. Individual scopes of work for Transportation Impact Studies for major roadway infrastructure will vary depending on the project, but shall be established by the City Engineer or designee for non-ODOT projects. The scope of the study for ODOT projects shall be coordinated with the City and agreed upon by the City Engineer or designee. The purpose of this requirement is to promote cooperative planning efforts and to help assure that the impacts of major transportation projects consider system-wide impacts. Scopes for major roadway projects, in addition to the items previously listed in this Chapter of the Bend Development Code, shall include at a minimum:

   - Determination and identification of existing system status (access management, queuing/storage, crash rates, sight distance, volumes, operations, etc.);
   - Projection of future demands (volumes, queuing/storage, etc.);
   - Development of alternatives that will mitigate existing system deficiencies and operate within the operations standards of the facility as defined in this Code;
   - Assess compliance with the Oregon Administrative Rule, 660 Division 12, Transportation Planning, the Bend Urban Area Transportation System Plan, and the City of Bend Development Code.

C. **Transportation Planning Rule Compliance.** This section implements the City’s Bend Urban Area Transportation System Plan with regard to level of service and operation standards. The Transportation Impact Study provided for a zone change and/or Bend Urban Area General Plan map amendment shall comply with and provide information on
the requirements of the Oregon Administrative Rule section 660-012-060 (known as the Transportation Planning Rule [TPR]) and demonstrate that the proposed land uses are consistent with the identified function, capacity, and performance standards (level of service, volume to capacity ratio and widths) of the facility as defined in the adopted Bend Urban Area Transportation System Plan and the City of Bend Development Code. The operations standards in the City of Bend Development Code implement the policies of the Bend Urban Area Transportation System Plan.

Project Relevance:

The Murphy Road Corridor Study will analyze a potential extension to 27th Street, which is not included in the Bend TSP. In addition, traffic signals or roundabouts could be part of the recommended set of improvements. The background analysis that will be conducted as part of the Corridor Study will include an analysis of sight distance issues, roadway approaches, bicycle/pedestrian elements, crash histories, and access management.

Bend Urban Area Transportation System Plan (City of Bend) - Adopted October 2000

The purpose of the Bend Urban Area TSP is to help guide the development of a transportation system that will meet the forecast needs of the Bend community. This plan provides policy and a plan framework that will enable Bend to design a balanced transportation system for the near-term and the next twenty years. Strategies for planning and implementing a wide range of transportation components are addressed in the TSP including automobile, public transportation, bicycle and pedestrian travel. The TSP has been specifically designed to meet requirements of the TPR, which is an administrative rule enacted by the Land Conservation and Development Commission (LCDC), to better fulfill the state of Oregon’s Land Use Goal on Transportation (State Land Use Goal #12).

Chapter 2 – Existing Transportation System Plans, Policies & Standards

2.1.4 City of Bend - Street Policies

In Resource Document A.1, Bend Urban Area Street Inventory table, Murphy Road is listed as a major collector from Highway 97 to Brosterhous. Totaling 1.17 miles, pavement width 36 feet between inside face of curb, number of lanes varies between 2 and 3, roadway conditions are very good as of 1996, and curbs and bike lanes exist throughout this road, however sidewalks are not connected or are partially constructed. In 2000, the pavement width had changed to vary between 36 to 46 feet and sidewalks were present on the entire street length.

Project Relevance:

Information on Murphy’s existing condition will be helpful in determining existing deficiencies that need to be addressed by project alternatives.
Chapter 3 – Current Transportation Conditions

3.5.1.1 Freight Rail Service: The Burlington Northern-Santa Fe Railroad provides freight rail service to Bend. The rail line runs generally north/south through the center of town. The rail activity is primarily freight that is being hauled through the area.

Project Relevance:
The Murphy Road study will explore an easterly extension over the BNSF railroad tracks. Knowledge of current rail activity is critical for identifying construction constraints.

Chapter 4 – Transportation Needs Analysis

4.2.1.1 Modernization and Capacity Improvements

Modernization Improvements: Traditionally, roadways have been “modernized” through improvements that include adding sidewalks, bike lanes, bus turn-outs, turn lanes and other measures that help aid alternate mode travel and improve the efficiency of a roadway. This is quite common within developing areas as many of the old “farm-to-market” roads typically, over time, face increasing urbanization pressures. In fact, many of these roadways do get improved as the area around them intensifies. In this fashion, new developments take on the financial responsibility to make these improvements, thus helping to offset the increased demand that these new person-trips place on the transportation system. In other situations, city, county and state government financial resources are utilized to reconstruct or “modernize” these roadways.

Capacity Improvements: Capacity improvements, or in most cases the widening of roadways, are the most common means of compensating for the eventual loss in roadway level of service or performance. Roadways that are most likely to need additional widening are discussed, in Chapter 5, under the discussion of alternatives. For many of Bend’s older arterial streets, this typically means widening of the road to accommodate a center turn lane (otherwise known as creating a 3-lane roadway). In some cases, another alternative to the road widening may be as simple as re-striping the roadway to skinnier lane widths (e.g., taking a 40-foot wide, 2-lane roadway with parking, and converting it into 3 vehicle lanes, 2 bike lanes and no parking). Where traffic speeds, volumes or parking demands are low enough it may permit this kind of street retrofitting. In other cases, typically along the principal and major arterial street system, traffic demands are much greater and 4 to 5-lane wide roadways may be necessary to address system capacity problems.

Timing of Future Roadway Improvements: Many of the collector and arterial streets in the Bend urban area will be modernized or widened during the twenty-year planning period. Therefore, it is assumed (in the planning effort) that either one of these two roadway improvement mechanisms (modernization or capacity improvements) will be used to make these types of improvement to the roadway.

Project Relevance:
Improvements to Murphy Road will fall into one of the two categories described above.

Chapter 5 – Alternatives Analysis

5.5.2 – Public Transportation
The City engineering standards and specifications shall also be modified, as appropriate, to accommodate and provide details concerning transit service on roadways. The design of all arterial and collector streets shall incorporate appropriate elements such as augmented street sections (e.g., wider lane widths, increased sub grade sections), transit pull-outs and waiting areas, etc., that will encourage or better accommodate transit vehicle activity and/or patronage.

**Project Relevance:**
Any design options for the Murphy Road Corridor Study needs to incorporate elements, such as transit pull-outs, waiting areas for transit, and other options that will encourage transit vehicle activity and patronage.

5.5.5 – Street System
Completion of the roadway system will also fulfill the need (and Plan goals) to access land, address safety issues, and provide the community with street connectivity that will minimize out-of-direction travel and maximize travel choices and route options.

**Project Relevance:**
While Murphy Road is not listed in this document as a high priority for street connectivity, extending Murphy road to 15th Street will increase east-west travel for South Bend and maximize travel choices and route options for all modes of travel. It is also listed for sidewalk improvements in Figure 16b Sidewalk System Improvement Priorities of this document.

Chapter 6 – Transportation System Plan
6.5.1.1 – Roadway Classifications, Expressways
Highway 97 - south of the Parkway. According to the TSP, ODOT has suggested evaluating alternatives that would extend Murphy Road to a point west of the Parkway (including grade separation) to meet a future frontage road (on the west side of the Parkway). Once this system is in place, the Parkway traffic signals at Pinebrook Blvd. and the south Highway 97 intersection should be removed. As a part of these system changes, the former street intersections should also be disconnected from the Parkway. Also, a grade separation of China Hat at Highway 97 may eventually be warranted.

6.5.2.9 Railroad Grade Crossings
Historically, train delays at road/railroad crossings have not been a major traffic problem in Bend. However since the merger of the Burlington Northern and Santa Fe railroads, it is anticipated that train crossing caused traffic interruptions may increase over time. One future crossing, proposed in the TSP, is an eastward extension of Murphy Road to 15th Street. This new road/railroad crossing should be grade separated.

**Project Relevance:**
The Bend TSP includes the extension of Murphy Road both to the west (over the Parkway) and to the east (to SE 15th Street, over the BNSF railroad tracks).
Chapter 7 – Transportation System Implementation

7.3 – Project Prioritization

Transportation System Priorities: Transportation system priorities for the community are separated into three categories; near, intermediate and far term. Near term priorities are projects that have been identified in the 5-year CIP process. Intermediate priorities are the list of other projects shown in the CIP that are beyond the funding capabilities of the current CIP, but none-the-less other important transportation needs. Far term priorities represent basically everything else needed to complete the entire transportation system.

Project Relevance:
The extension of Murphy Road to SE 15th Street is included in the Appendix as a future major collector, and is listed as a far term priority, meaning that it is one of the many projects needed to complete the entire transportation system.

Bend 2030 Vision, Phase I (City of Bend) – August 2005, Endorsed by City Council June 2006

The Bend 2030 Vision is not meant to replace ongoing city planning and decision-making, but it is intended to make these activities better informed, more strategic, and more effective. Several features are highlighted in the 2030 Vision that relate to the Murphy Road corridor.

Land Use, Growth, and Development - Key Issues

- Finding innovative ways to manage transportation challenges presented by residents, visitors and growth.
- Heighten land use efficiency—create appropriate in-fill neighborhoods, allow for more compact growth/density, promote mixed use developments, encourage “island” commercial developments so people can drive shorter distances to basic services/needs, improve grid system efficiency for drivers and pedestrians.

At the top of City lists are the following current activities for the coming year:

- Updating key elements of the General Plan (transportation, public facilities, housing and residential lands, economic lands and community appearance).
- Updating and refining the Development Code.
- Planning for re-development of sections of Third Street.

Project Relevance:
The Murphy Road Corridor Study will consider the general goals of the City of Bend to find innovative transportation solutions and increase land use efficiency. The study will need to coordinate with the city to ensure that the General Plan updates are considered in the study, as well as any changes to the Development Code. Any re-development efforts already started for Third Street should be coordinated with the Murphy Road Corridor Study.
**Transportation**

Key road and highway projects planned for Bend in the short- and mid-term include:

Improvements to Murphy Road from Brookswood to 15th Street (includes new overpass at the Parkway and an extension to 15th Street); numerous bicycle and pedestrian improvements; upgrades to many existing arterial and collector roadways; construction of new arterial and collector roadways (example: Skyline Ranch Road).

The City is working to increase traffic system safety, particularly at key intersections along Highway 97 (Third Street), where the greatest number of traffic accidents occur annually. The City has a 20-year plan to modernize and/or widen many of its collector and arterial streets. Cost to complete all projects is pegged at $185 million in Year 2000 dollars. The City is also working to in-fill gaps in the sidewalk system and to retrofit intersections in older sections of the city with ramps to accommodate the disabled. The City also has plans to continue to improve bike lanes recognizing that some arterial and collector streets may have to be widened in order to accommodate standard bike lanes.

The Bend Metropolitan Planning Organization is beginning development of the regional transportation plan in 2005–2006. The plan will evaluate the needs for all transportation modes through the year 2030.

**Project Relevance:**

The Murphy Road Corridor Study will coordinate with the City to increase traffic safety at the intersection of Murphy Road and Third Street; to in-fill gaps in the sidewalk system and make them ADA compliant; and to improve bike lanes, even if it requires widening the street to accommodate standard bike lane-widths. The study will also need to examine the Bend Metropolitan Planning Organization’s (MPO’s) regional transportation plan to see if there is any relevance to the study.
Appendix A: Plans and Studies in Process

Murphy Crossing Refinement Plan (City of Bend)

This plan proposes a Refinement Plan Overlay District in the area to the west and south of the Murphy Road Corridor Study. The proposal will also seek to alter the location of the Murphy Road over crossing alignment and to fix the location of the north/south Frontage Road alignment along the west side of the Bend Parkway. The Murphy Crossing Refinement plan will address the conditions outlined in the South Bend Parkway Refinement Study, H-1 Modified design plan.

As the Parkway was being constructed a decision was made to lower a length of the parkway road grades between Pinebrook Boulevard and the terminus of Third Street. This would enable the future extension of Murphy Road over the parkway to serve the Southwest area of Bend. It was always assumed that at some time the City’s TSP would be amended to include a fixed alignment for Murphy Road. The Murphy Crossing Refinement Plan has provided that opportunity to fix that alignment in the context of a greater land use plan.

The proposal includes realigning Murphy Road slightly to the south and reclassifying it from a Major Collector to a Minor Arterial between Business 97 and Parrell Road. The TSP Map will also be amended by adding Murphy Road as a new Minor Arterial between Business 97 and Brookswood Boulevard. Murphy Road will cross over the Bend Parkway with no direct access to the highway. The existing TSP Map does not include a Minor Arterial in this area. As a Minor Arterial, Murphy Road will have sidewalks and bicycle lanes; therefore, it will improve and enhance east-west circulation patterns in the area for all modes of travel.

From Parrell Road west to the new frontage road west of the Parkway, Murphy Road will have a three lane cross section with raised center medians and center turn lanes within a 100-foot right-of-way. The wide right-of-way is needed to accommodate auxiliary turn lanes at the intersection of Business 97. This new section of Murphy Road between Brookswood Boulevard and Parrell Road will have bicycle lanes and sidewalks on both sides of the roadway.

Project Relevance

This plan, which has not yet been adopted, will set the required street alignments slightly to the south of the existing Murphy Road. If this is the case, the Murphy Road Corridor Study will need to coordinate efforts to ensure that the streets align. The Refinement plan would reclassify Murphy Road from a major collector to a minor arterial between Business 97 and Parrell Road (the first section of the Murphy Road Corridor Study). As a Minor Arterial, Murphy Road would be required to have sidewalks and bicycle lanes to improve and enhance east-west circulation patterns in the area for all modes of travel. The Refinement Plan recommends improving the intersection operations at the intersection of Murphy Road and Parrell Road to meet City of Bend performance standards by using all-way stop control, construct a southbound left turn pocket and westbound right turn pocket, add a
traffic signal with south- and northbound left turn pockets, or to construct a single lane roundabout. The Murphy Road Corridor Study will track the adoption of the Refinement Plan and take into consideration the TSP reclassification of Murphy Road, along with the recommendations set down by the Refinement Plan.

South Bend Parkway Refinement Study (Oregon Department of Transportation)

The City of Bend has partnered with the Oregon Department of Transportation on the South Parkway Refinement Plan, looking specifically at the safety and function of the Bend Parkway south of Powers Road. The Oregon Transportation Commission and the City of Bend agreed on a design alternative called HModified, Option 1. This alternative came with several conditions that need to be accomplished prior to the implementing of the H-Modified Design. The refinement plan is now working in coordination with ODOT on an Interchange Area Management Plan (IAMP). The IAMP includes only the proposed South Bend Parkway/Murphy Interchange and does not include modifications to the Powers Road Interchange.

Project Relevance

Many of the requirements that the Oregon Transportation Commission (OTC) laid out for the City are addressed in the Murphy Crossing Refinement Plan. Adoption of the Refinement Plan would establish define adjacent land uses and fulfill the OTC requirements. Adoption of either plan will alter zoning in the study area. Connections between SE 3rd Street and Murphy Road to the west of the Parkway will be determined by both the South Parkway Refinement Study and the Murphy Crossing Refinement Plan.

Reed Market Corridor Refinement Plan (City of Bend)

The Reed Market Road corridor from the Bend Parkway to SE 27th Street is one of only three designated “Major Arterial” Roadways included in the City of Bend Transportation System Plan. The City’s rapid growth and shifting transportation trends have resulted in significant traffic pressure on Reed Market Road. The roadway cross section varies along the corridor from two lanes of pavement with gravel shoulders to four lanes with bike lanes and sidewalks.

Relevant recommendations from the Reed Market Corridor Refinement Plan include:

1. It is suggested that the TSP Update address the need to create a backbone transportation system of arterial and collector roads in the developing southeastern portion of the city to serve development as it occurs. This backbone system should emphasize:
   - Appropriate spacing of facilities serving major arterial, minor arterial and major collector functions.
   - Connectivity into, through and out of this section of the city to provide a link between local streets and the regional system.
2. Provision of an appropriately spaced and interconnected system of roads will significantly benefit travel on Reed Market Road and other major existing streets by disbursing trips over a wider network. The pending Murphy Road extension to 15th Street and/or possibly 27th Street could help to reduce future traffic growth on Reed Market Road by providing an alternative route for new and existing development in its vicinity. An assessment of traffic diversion from Reed Market Road to the extended Murphy Road should be conducted using the regional travel model.

It is also recommended that the City also consider revising its Transportation Policy 6 to ensure that new developments that impact major arterials such as Reed Market Road contribute an appropriate amount to failing intersections.

Project Relevance
The Murphy Road Corridor Study will use the regional travel demand model to assess travel patterns on Murphy Road when extended to SE 15th Street and SE 27th Street. It is anticipated that extending Murphy Road could assuage some of the demand on Reed Market Road.

The provision of appropriately spaced and interconnected system of collectors and arterials will also be addressed by the Murphy Road Corridor Study. One of the elements to be addressed is whether Murphy Road should retain its current classification of Major Collector, or whether the road should be reclassified upon extension to the east and/or the west as a Minor Arterial.

Metropolitan Transportation Plan (Bend Metropolitan Planning Organization)
The Metropolitan Transportation Plan (MTP) is designed to serve as the Bend metropolitan area's long term transportation plan. It addresses all travel modes, including pedestrians, bicycles, public transit, motor vehicles, freight, water, air, and pipelines, in an effort to address the region's long term projected transportation needs associated with future population growth. Projects identified in the MTP must be within projected levels of available financial resources and must also meet federal and state planning requirements. The primary objective of the plan is to identify both short-term and long-term actions in order to maintain the efficient movement of people and goods.

Project Relevance
The MTP listed Murphy Road east of the Bend Parkway as having sidewalk deficiencies. Parrell Road, Third Street, and 15th Street were also listed as having sidewalk deficiencies in the study area. Pedestrian crashes were examined and enhanced pedestrian crossings were suggested both at intersections and mid-block locations if the crash data support their placement. There was one pedestrian crash on Murphy Road east of Parrell Road and west of Country Club Road, between 1995 and 2004. Murphy Road is listed as having adequate bike lanes and a proposed bike lane at the possible extension along Murphy Road to 15th Street.

The collector roadways are intended to provide access and circulation to nearby arterial roadways in a multi-modal fashion. Murphy Road is classified as a major collector, but the Murphy Crossing Refinement Plan suggested reclassifying it as an arterial. Third Street is classified as a Principal Arterial, Parrell, Country Club, and Brosterhous are all designated as major collectors, while SE 15th
Street is classified as a minor arterial. Minor arterials have a general speed limit of 25-45 mph and collector roadways have posted speeds ranging from 20-40 mph. Murphy Road has a posted speed of 35 mph and has two lanes.

The existing traffic signal at SE 3rd Street and Murphy Road had a level of service rating of C, a 25.2 second delay per vehicle and a .32 volume/capacity rates. In 2005, BNSF was operating approximately 12-15 trains per 24 hours through the study area, while UP was operating one train daily in each direction. Additionally, BNSF operates a switch engine which transports freight to and from local businesses within the study area. BNSF runs through the proposed extension area of Murphy Road.

Residential Lands Study (City of Bend)

This study, prepared by the City of Bend Long Range Planning Division, will update Chapter 5 of the Bend Area General Plan (Housing and Residential Land) with respect to housing and residential lands to meet Statewide Planning Goal 10, Housing.

In September 2005, the County adopted a coordinated population forecast for the county and all three cities. By the year 2025, this forecast estimates 240,811 people living in Deschutes County. Bend’s UGB population forecast for the year 2025 is 109,389 people. This forecast represents an increase of 57,360 people, or 110 percent, since the 2000 Census. The 1998 General Plan estimated Bend would need approximately 14,000 new housing units to meet its housing needs by the year 2020. Bend planning staff has developed a preliminary estimate of 20,000 needed housing units by the year 2025, based on this new population forecast.

State law first requires cities to examine their inventory of buildable lands and determine if land can be used more efficiently inside the UGB. If so, the city will need to decide how to do so, and this decision-making process may involve changes to the allowed density and mix of housing currently allowed inside the UGB.

Project Relevance

The coordinated population forecast for the regional area estimated large amounts of growth in the 20-year period. Population growth influences traffic volumes and travel patterns, which in turn influence the roadway improvements needed to serve additional jobs and households. The Murphy Road Corridor Study is using the regional travel demand model for traffic forecasts and analysis. Development of this model has been coordinated with the residential lands study, and reflects current growth projections. In addition, an alternate land use scenario will be tested for the Murphy Road preferred alternative to ensure that the improvements will be effective for both expected and potential expedited growth along the corridor.

One of the key requirements of Goal 10 is to accommodate future housing needs inside the existing UGB before expanding it. The easterly extension of Murphy Road to SE 15th Street would be consistent with this requirement. Future housing in-fill would require additional roadway connections, such as the Murphy Road extension, as well as improvements along the existing section to accommodate the increased travel capacity.
This technical memorandum outlines the process for conducting the Murphy Road Corridor Study traffic analysis. Based on the project schedule, an existing conditions memorandum is due in October 2006. Comments were received from City of Bend, Bend MPO and TPAU staff in October, 2006. This memorandum has been revised to reflect these comments.

Data Collection and Existing Volumes

A total of 13 intersections will be analyzed in this project, based on discussions with the City. The complete list of intersections are identified below in Table 1 and on a study area map included as Figure 1.

<table>
<thead>
<tr>
<th>#</th>
<th>Main Street</th>
<th>Cross Street</th>
<th>Jurisdiction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SW Powers Road</td>
<td>US 97 (Bend Parkway S) SB Ramps</td>
<td>ODOT</td>
</tr>
<tr>
<td>2</td>
<td>SW Powers Road</td>
<td>US 97 (Bend Parkway N) NB Ramps</td>
<td>ODOT</td>
</tr>
<tr>
<td>3</td>
<td>SE Parrell Road</td>
<td>SW Powers Road</td>
<td>City of Bend</td>
</tr>
<tr>
<td>4</td>
<td>SE 15th Street</td>
<td>SE Ferguson Road / SE Sherwood Forest Drive</td>
<td>City of Bend</td>
</tr>
<tr>
<td>5</td>
<td>US 97</td>
<td>SW Ponderosa Drive / SE China Hat Road</td>
<td>ODOT</td>
</tr>
<tr>
<td>6</td>
<td>SE Knott Road</td>
<td>SE 15th Street / Tekampe Road</td>
<td>City of Bend</td>
</tr>
<tr>
<td>7</td>
<td>SW Brookswood Boulevard</td>
<td>SW Pinebrook Boulevard</td>
<td>City of Bend</td>
</tr>
<tr>
<td>8</td>
<td>SE 3rd St</td>
<td>SW Pinebrook Boulevard / Driveway</td>
<td>City of Bend</td>
</tr>
<tr>
<td>9</td>
<td>SE 3rd St</td>
<td>SE Murphy Road / Driveway</td>
<td>City of Bend</td>
</tr>
<tr>
<td>10</td>
<td>SE Murphy Road</td>
<td>SE Parrell Road</td>
<td>City of Bend</td>
</tr>
<tr>
<td>11</td>
<td>SE Murphy Road</td>
<td>SE Country Club Road</td>
<td>City of Bend</td>
</tr>
<tr>
<td>12</td>
<td>SE Murphy Road</td>
<td>SE Brosterhous Road</td>
<td>City of Bend</td>
</tr>
<tr>
<td>13*</td>
<td>SE Murphy Road</td>
<td>SE 15th Street</td>
<td>City of Bend</td>
</tr>
</tbody>
</table>
TABLE 1
Murphy Road Corridor Study Intersections

<table>
<thead>
<tr>
<th>#</th>
<th>Main Street</th>
<th>Cross Street</th>
<th>Jurisdiction</th>
</tr>
</thead>
<tbody>
<tr>
<td>14*</td>
<td>SE Murphy Road</td>
<td>SE 27th Street</td>
<td>City of Bend</td>
</tr>
<tr>
<td>15</td>
<td>SE 27th Street</td>
<td>SE Ferguson Road</td>
<td>City of Bend</td>
</tr>
</tbody>
</table>

* Intersections 13 and 14 (SE Murphy Rd & SE 15th Street, and SE Murphy Road and SE 27th Street) are potential future intersections. They will only be analyzed in future scenarios.

Full movement traffic counts for study intersections 1-13 were collected on Tuesday, August 29, 2006 for both the AM and PM peak hour periods. Based on recent intersection counts, intersections 1-11 were taken from 7:00 - 9:00 a.m. and 4:00 - 6:00 pm. Historical data on file for intersection 12 (Murphy Rd & Brosterhous Rd), suggested an earlier PM peak period therefore the count was collected at 7:00 - 9:00 a.m. and 3:00 - 6:00 pm. While traffic data was collected for both the AM and PM peak period, only a PM analysis will be conducted as traffic volumes were determined to be higher in the afternoon than the morning. The AM counts may be used at a later date for verifying potential design issues. Intersections 14 and 15 were collected on Tuesday, September 26, 2006 using the same methodology as previous intersections.

As the majority of intersection count data was collected on the same day it is expected there will be no volume data adjustments, such as seasonal adjustments, performed to the data. Any minor volume adjustments would be done to only provide consistent entering/exiting volumes between closely spaced intersections.

The traffic data collected (counts and field inventory) will be compared to the City’s TRAFFIX file to ensure an accurate existing conditions analysis.

**Traffic Forecast Methodology**

To determine future traffic conditions, the Bend Metropolitan Planning Organization (MPO) travel demand model will be used to produce traffic volume estimates. The decision to use this model was determined by a conference call with the Bend MPO, City of Bend and CH2M HILL staff on August 23rd, 2006. Key to this determination was that ODOT’s Transportation Planning Analysis Unit (TPAU) has sufficiently developed the baseline future condition with additional build future scenarios that align with the proposed project conditions, to an extent that it can be used for project analysis. The four scenarios that will be used to provide future traffic volumes for this project are:

- 2030 No-Build – which includes a mixture of STIP, CIP and privately funded road improvement projects
- 2030 Murphy Crossing Scenario – 3 lane connection from Brookwood Road to 15th Street.

These first two scenarios described above are forecasts that have been already modeled by TPAU as part of the on-going planning efforts of the City and Bend MPO. The follow two scenarios are project-specific conditions that will be addressed.
• 2030 Murphy Crossing Scenario Modification A– 3 lane connection from Brookswood Road to 15th Street with 5 lane section from 3rd to 15th Street. (The modeling request will be communicated by Bend MPO staff to TPAU staff.)

• 2030 Murphy Crossing Scenario Modification B – 5 lane section from 3rd to 15th Street with a 3 lane connection from 15th Street to 27th Street. (The modeling request will be communicated by Bend MPO staff to TPAU staff for modeling.)

These future 2030 forecasts are built upon the Bend MPO Existing 2003 calibrated model. This existing model will be used to generate the volume growth between the 2003 and future 2030 demand models. The post-processing of turning movement volumes will follow the guidelines in National Cooperative Highway Research Program (NCHRP) 255 to ensure a valid post-processing technique. The basic forecasting post-process will be to take the traffic growth between the model’s calibrated existing (2003) year and the future 2030 forecast conditions and apply that growth to the existing PM peak hour traffic volumes to establish future 2030 traffic volumes. Because of the large study area, the level of detail used to forecast growth will be determined from link volumes. As part of the model effort, detailed select link information will be requested to ensure the appropriate trip assignments.

Two sensitivity analyses will be conducted as part of Task 5 Future Conditions.

a) To ensure that known future developments are included and captured within the model’s assumed land use growth. This will consist of comparing the land use (household and employment estimates) associated with the model’s traffic analysis zones (TAZs) against the expected land use proposed by these developments.

b) To gauge travel pattern shifts of extending Murphy Road to 27th Street the traffic forecasts will be reviewed to understand how influential this connector has on traffic patterns in the study area. No detailed traffic analysis will be conducted with this scenario.

Future Baseline Projects

Two future scenarios – the 2030 No-Build and a 2030 Murphy Crossing Scenario – will be analyzed, following discussion with the Bend MPO and the City of Bend. The baseline projects included in these two scenarios are discussed in-detail in Attachment 1 (page 7). The list of projects assumed for the 2030 No-Build condition includes the:

• Cooley Road/US 97 Intersection project
• Empire Avenue connection to 27th Street/Butler Market Road
• Deschutes Market Road/US 97 Interchange
• US 97 access management projects

The Murphy Crossing scenario assumes the same committed/no-build projects, projects in the 2020 TSP and extending Murphy Road west across US 97 to Brookswood Boulevard and east to 15th Street. While this scenario includes a different set of future projects as it includes the TSP project list, based on discussions with the City and Bend MPO these projects are expected to not alter the traffic patterns within the project area.
### Traffic Analysis Software and Input Assumptions

Synchro software, version 6, will be used for the intersection analysis. The reported results will be LOS and V/C ratios from the Highway Capacity Manual (HCM) report. The assumptions are listed in Table 2 below.

**TABLE 2**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Arterial Intersection Parameters</th>
<th>Existing (2005)</th>
<th>Design Year (2030) No-Build and Build Alternatives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak Hour Factor</td>
<td>From traffic count.</td>
<td>- 0.85 for collector streets&lt;br&gt;- 0.90 for minor arterials&lt;br&gt;- 0.95 for major arterials such as US 97&lt;br&gt;Note: If the existing traffic count has higher PHFs then continue using the existing PHFs.</td>
<td></td>
</tr>
<tr>
<td>Conflicting Bikes and Pedestrian per Hour</td>
<td>From traffic count, if not provided, assume 10 peds/bikes per approach</td>
<td>Same as existing</td>
<td></td>
</tr>
<tr>
<td>Area Type</td>
<td>“Other” Area</td>
<td>Same as existing</td>
<td></td>
</tr>
<tr>
<td>Ideal Saturation Flow Rate per Lane</td>
<td>1800</td>
<td>Same as existing</td>
<td></td>
</tr>
<tr>
<td>Lane Width</td>
<td>From As-built or field visit; otherwise 12 feet</td>
<td>Same as existing</td>
<td></td>
</tr>
<tr>
<td>Percent Heavy Vehicles</td>
<td>From traffic count, otherwise 2%</td>
<td>Same as existing</td>
<td></td>
</tr>
<tr>
<td>Percent Grade</td>
<td>From As-built, otherwise 0%</td>
<td>Same as existing</td>
<td></td>
</tr>
<tr>
<td>Parking Maneuvers per Hour</td>
<td>If on-street parking allowed, assume some maneuvers (approx. 1 maneuver per stall)</td>
<td>Same as existing</td>
<td></td>
</tr>
<tr>
<td>Bus Blockages</td>
<td>From field visit, otherwise assume 0.</td>
<td>Same as existing</td>
<td></td>
</tr>
<tr>
<td>Intersection signal phasing and coordination</td>
<td>From field visit and signal timing plans</td>
<td>Optimize phase and cycle length, phase sequence and offset (if signals are coordinated)</td>
<td></td>
</tr>
<tr>
<td>Intersection signal timing optimization limits</td>
<td>N/A</td>
<td>60 to 120 seconds depending on the number of phases</td>
<td></td>
</tr>
<tr>
<td>Minimum Green time</td>
<td>From signal timing plans</td>
<td>For existing signals, same as existing. If additional signal warranted, 10 seconds if no pedestrian time is required</td>
<td></td>
</tr>
<tr>
<td>Yellow and all-red time</td>
<td>From signal timing plans</td>
<td>For existing signals, same as existing. If additional signal warranted, ( (Y) = 4 ) seconds and ( (R) = 1 ) second</td>
<td></td>
</tr>
<tr>
<td>Right Turn on Red</td>
<td>From field visit.</td>
<td>From existing conditions, if additional signal, then “allow”.</td>
<td></td>
</tr>
<tr>
<td>Vehicle Queues</td>
<td>For City intersections: 95th Percentile queue.&lt;br&gt;For ODOT intersections:&lt;br&gt;V/C &lt; 0.70, use 95th Percentile results from Synchro reports&lt;br&gt;For V/C &gt; 0.70, use SimTraffic report (the average of at least 5 runs of 1 hour length with 15-min peak divided out)</td>
<td>Same as existing</td>
<td></td>
</tr>
<tr>
<td>Level of service goals for US 97</td>
<td>US 97 (#4) is categorized as a Freight</td>
<td>No-Build: Apply Existing Conditions</td>
<td></td>
</tr>
</tbody>
</table>
## TABLE 2
Synchro Operations Parameters/Assumptions

<table>
<thead>
<tr>
<th>Condition</th>
<th>Arterial Intersection Parameters</th>
<th>Existing (2005)</th>
<th>Design Year (2030) No-Build and Build Alternatives</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Route on a Statewide Highway (NHS) inside the Urban Growth Boundary in the MPO</td>
<td>V/C Thresholds</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Posted speed &gt;= 45 mph:</strong></td>
<td><strong>Posted speed &gt;= 45 mph:</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Major Road V/C threshold = 0.80</td>
<td>Major Road V/C threshold = 0.75</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Side-street V/C threshold is 0.90</td>
<td>Side-street V/C threshold is 0.85</td>
</tr>
<tr>
<td></td>
<td>Level of service goals for City jurisdiction intersections.</td>
<td>Two-Way Stop Control – average delay for critical lane group less than or equal to 50 seconds.</td>
<td>Same as existing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>All-way stop control – average delay for the intersection less than or equal to 80 seconds.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Roundabout – volume to capacity ratio for the intersection less than or equal to 1.0.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Signalized intersection – the volume to capacity ratio for the intersection less than or equal to 1.0.</td>
<td></td>
</tr>
</tbody>
</table>

1- The simulation will be for one hour with the peak 15-minutes in the first 15 minutes. The results from this simulation will be applied to signalized and unsignalized intersections. Instructions provided by TPAU.
3– City of Bend Development Code; Chapter 4.7.400 (B) - Operations Standards
Attachment 1

COMMITTED/NO-BUILD PROJECT LIST
### Road Improvement Projects Constructed or Under Construction

<table>
<thead>
<tr>
<th>Map #</th>
<th>Sponsor</th>
<th>Road</th>
<th>From</th>
<th>To</th>
<th>Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>City</td>
<td>27th Street</td>
<td>Forum Shopping Center</td>
<td>Neff Road</td>
<td>Widen to 4 thru lanes plus center turn lane</td>
</tr>
<tr>
<td>2</td>
<td>City</td>
<td>15th Street</td>
<td>US20/Greenwood</td>
<td>Bear Creek Road</td>
<td>New 2 lane connection</td>
</tr>
<tr>
<td>3</td>
<td>City</td>
<td>Empire Avenue</td>
<td>Lower Meadow Drive</td>
<td>High Desert Lane</td>
<td>New 2 lane connection</td>
</tr>
<tr>
<td>4</td>
<td>City</td>
<td>Hunnell Road</td>
<td>Robal Rd</td>
<td>Cooley Rd</td>
<td>Full connection</td>
</tr>
</tbody>
</table>

### Road Improvement Projects Funded in STIP or CIP

<table>
<thead>
<tr>
<th>Map #</th>
<th>Sponsor</th>
<th>Road</th>
<th>From</th>
<th>To</th>
<th>Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>City/ODOT</td>
<td>Cooley Road</td>
<td>US97</td>
<td></td>
<td>At-grade improvement (graphic attached)</td>
</tr>
<tr>
<td>6</td>
<td>City</td>
<td>Empire Avenue</td>
<td>Purcell</td>
<td>Butler Mkt/27th St</td>
<td>New 2 lane connection w/center turn lane</td>
</tr>
<tr>
<td>8</td>
<td>ODOT</td>
<td>US97</td>
<td>Parkway</td>
<td>China Hat Road</td>
<td>Install median barrier (Right-in/Right-Out access)</td>
</tr>
</tbody>
</table>

### Privately Funded Road Improvements Included in Approved Developments

<table>
<thead>
<tr>
<th>Map #</th>
<th>Sponsor</th>
<th>Road</th>
<th>From</th>
<th>To</th>
<th>Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Private</td>
<td>Skyline Ranch Rd</td>
<td>Skyliner Road</td>
<td>Century Drive</td>
<td>New 2 lane road</td>
</tr>
<tr>
<td>10</td>
<td>Private</td>
<td>American Lane</td>
<td>Carmen Loop</td>
<td>Brosterhous</td>
<td>Realign and modernize. Remove sharp turn at N end of Foxborough subdivision.</td>
</tr>
<tr>
<td>11</td>
<td>Private</td>
<td>Metolius Drive</td>
<td>Skyliner Ranch Road</td>
<td>existing Metolius Dr</td>
<td>May not be in model network</td>
</tr>
<tr>
<td>12</td>
<td>Private</td>
<td>New E-W Collector</td>
<td>Mt Washington</td>
<td>Shevlin Park Rd</td>
<td>New 2 lane road</td>
</tr>
<tr>
<td>13</td>
<td>Private</td>
<td>New N-S Collector</td>
<td>New Road (#12 above)</td>
<td>Galveston</td>
<td>New 2 lane road</td>
</tr>
</tbody>
</table>

### Traffic Signal Projects Funded in STIP or CIP

<table>
<thead>
<tr>
<th>Map #</th>
<th>Sponsor</th>
<th>Road</th>
<th>From</th>
<th>To</th>
<th>Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>19</td>
<td>City</td>
<td>Empire Avenue</td>
<td>Boyd Acres Rd</td>
<td></td>
<td>Signal</td>
</tr>
<tr>
<td>20</td>
<td>ODOT</td>
<td>Reed Market Road</td>
<td>US97</td>
<td></td>
<td>Traffic signal at NB off-ramp termini</td>
</tr>
</tbody>
</table>
Murphy Road Corridor Project
Existing Conditions and Deficiencies

PREPARED FOR: Ken Gould, City of Bend

PREPARED BY: Billy Adams, CH2M HILL
Darren Muldoon, CH2M HILL
Brandy Steffen, CH2M HILL
Tony Woody, CH2M HILL

COPIES: Dave Simmons, CH2M HILL
Theresa Carr, CH2M HILL
Steve Katko, CH2M HILL

DATE: October 27, 2006, REVISED December 4, 2006

Table of Contents
Key Findings .........................................................................................................................2
Existing Conditions Analysis .................................................................................................7
Overview of Study Area ...........................................................................................................7
Existing Land Use Conditions ..............................................................................................8
  Zoning Designations ...........................................................................................................8
  Description of Existing Uses ............................................................................................14
  Development Applications ...............................................................................................15
Existing Environmental Conditions ......................................................................................16
  Areas of Special Interest ................................................................................................21
  Environmental Reconnaissance .........................................................................................19
  Social Elements Reconnaissance ......................................................................................20
Existing Safety Conditions ....................................................................................................23
  Corridor Crash Analysis .................................................................................................23
  Intersection Crash Analysis ............................................................................................24
Existing Roadway Geometric Conditions ...........................................................................25
  Segment 1: SE 3rd Street to Parrell Road ........................................................................26
  Segment 2: Parrell Road to Brosterhous Road .................................................................27
Existing Traffic Operations ...................................................................................................27
  Study Intersections and Raw Traffic Counts ..................................................................27
  Analysis Methodology .....................................................................................................28
  Average Daily Traffic Volumes ........................................................................................34
  Traffic Operations .............................................................................................................34
  Queuing Analysis ...............................................................................................................35
Existing Utilities ...................................................................................................................36
Next Steps .............................................................................................................................40
Introduction

This technical memorandum outlines the existing roadway and land use conditions in the vicinity of Murphy Road in southeast Bend. The study area for this analysis, as illustrated in Figure 1, is Murphy Road from SE 3rd Street to SE 27th Street. Parcels immediately to the north and south of Murphy Road are also considered. Where appropriate, the analysis has been organized by corridor segment as follows:

- **Segment 1** – SE 3rd Street to Parrell Road
- **Segment 2** – Parrell Road to Brosterhous Road
- **Segment 3** – Brosterhous Road to SE 15th Street
- **Segment 4** – SE 15th Street to SE 27th Street

The purpose of analyzing existing conditions is to identify geometric, traffic, or safety deficiencies in the study area, and flag potential land use and environmental constraints. A solid understanding of current deficiencies and constraints is critical for the project team as they move into the alternatives development and evaluation phase.

Key findings from this analysis are summarized below. The remainder of the memorandum includes a description of the project area, a brief inventory of current land uses and environmental constraints, a description of existing roadway geometry, and a traffic operations, safety, and utilities analysis.

Key Findings

Key deficiencies and constraints, as identified from the existing conditions analysis, are summarized over the next few pages.

Land Use Constraints

- **Land Use Assumptions** – The land use parcels along Murphy Road are largely zoned for residential use, with exceptions for a commercial uses near SE 3rd Street, future convenience near Brosterhous Road, and existing and future schools between Country Club Road and Brosterhous Road. The project analysis will assume growth consistent with regional projections in the area, but will conduct a sensitivity analysis for the preferred alternative to ensure that it will be effective under an alternate, expedited-growth scenario.

Environmental Constraints

- **Areas of Special Interest** – There are two Areas of Special Interest (ASIs) located in the study area. One ASI is located south of the existing Murphy Road between Country Club Drive and Brosterhous Road. The second ASI is located east of the existing terminus of Murphy Road at Brosterhous Road and immediately east of the railroad tracks. According to Section 2.7.700 of the Bend Code, public streets can be placed within an ASI if it is shown that no other practicable method exists to avoid the ASI.
Western Extent of Study Area: Brookswood Blvd.

Eastern Extent of Study Area: SE 27th Street
This page intentionally left blank.
• **Social Characteristics** – The residents living within the social elements study area are of similar levels of diversity as the City of Bend and Deschutes County, though less diverse than the State of Oregon as a whole. The percent of residents in the study area that are below the poverty threshold are lower than the City and State average, though similar to the County average. There is a higher percent of the study area aged 65 or higher than the City, County, and State average.

**Safety Deficiencies**

• **Corridor Crash Rate** – The crash rate for the existing Murphy Corridor was 2.25 per million vehicle miles (MVM). The statewide average crash rate for urban collectors for the period 1999-2003 was 3.84 per MVM.

• **Intersection-Level Crash Rate** – A majority (63 percent) of intersection-level crashes were property-damage only (PDO) and did not cause injury. There were no fatalities recorded. Angle crashes were the most common intersection crash type (35 percent). The highest crash rate was located at Parrell Road, with a crash rate of 0.53 per million entering vehicles (MEV). Crash rates below 1.0 do not indicate a safety concern.

**Roadway Deficiencies**

• **Pedestrian Facilities** — Sidewalks do not exist on the western end of Murphy Road and are intermittent between Mel Court and Brosterhous Road. Sidewalks should be continuous and at least 5 feet wide on both sides of the roadway to meet minimum city standards. Future sidewalks will need to meet requirements from the Americans with Disabilities Act (ADA), including wheelchair ramps at intersection corners.

• **Horizontal Alignment** — Near Parrell Road and Mel Court, horizontal curve radii are shorter than design standard. This reduced radius may impact a drivers’ ability to safely navigate the curve at the posted speed.

• **Sight Distance** — Near Parrell Road and Mel Court, drivers on Murphy Road have restricted horizontal sight distance due to objects, such as trees, located close to the roadway on the inside of the curve. Objects that can obstruct a drivers line of sight through a corner need to be set back a specific distance from the centerline of the inside lane to provide the necessary stopping sight distance.

• **Median Width** — The current alignment of Murphy Road is a curb-to-curb width of 36 feet. This allows for two 12’ travel lanes and two 6’ bike lanes. As a Major Collector, the curb-to-curb width should be 52’ to also allow for a 16’ continuous center turn lane.

**Traffic Operations Deficiencies**

• Three study intersections are currently above acceptable levels of traffic mobility, defined as level-of-service (LOS). LOS is described in the main body of the existing conditions report. None of these intersections are along Murphy Road.
  
  – **Pinebrook Boulevard/SE 3rd Street** – The eastbound approach of Pinebrook Boulevard at SE 3rd Street currently is operating at LOS F
- **Pinebrook Boulevard/Brookswood Boulevard** – The westbound approach of Pinebrook Boulevard at Brookswood Boulevard is operating at LOS F.

- **China Hat Road/Ponderosa/US 97** – The westbound approach of China Hat Road/Ponderosa at US 97 operates at LOS F.

- The intersections of US97/China Hat-Ponderosa, 3rd/Pinebrook, 3rd/Murphy, and Brookswood/Pinebrook all have at least one lane group that has a 95th percentile queue that exceeds 200 feet. Potential areas of concern for these intersections are safety issues associated with the long queue or spillback of the queue to the previous intersection.

**Utilities Constraints**

- **Cascade Natural Gas** – All of Cascade’s facilities are located underground and therefore will have minimal impacts while roadway improvements to Murphy Road are being constructed. Except for Segment 1, no new easements or right of way acquisition will be needed to remove/replace Cascade Natural Gas facilities. For Segment 1, the City of Bend will need to either have Cascade remove and relocate their existing gas main to Murphy’s new alignment or maintain an easement for their utility in its current location. In Segment 2, existing facilities like meters, for example, will need to relocated/adjusted to fit within the Murphy Road improvements.

- **Pacific Power** – Utilities will probably have the largest impact to the proposed roadway improvements. The right of way acquisition needed to make Murphy Road meet city requirements should be adequate to provide Pacific Power room to relocate their utilities. For Segment 1, the City of Bend will need to either have Pacific Power remove and relocate their existing power poles to Murphy’s new alignment or maintain an easement for their utility in its current location.

- **Central Electric** – The right of way acquisition needed for meeting city requirements should be adequate to provide Central Electric room to relocate their utilities.

- **USWEST/QWEST** – Telephone pedestals and utility locator poles at various locations along the road will need to be relocated to fit within the roadway improvements. The right of way acquisition needed to help Murphy Road meet city requirements should be adequate to provide USWEST/QWEST room to relocate their utilities.

- **Avion Water** – Impact to Avion Water’s facilities from roadway construction are expected to be minimal.

- **Roats Water** – The impacts to Roats Water facilities cannot be fully determined until more information is provided. The right of way acquisition needed to meet city requirements should provide room for Roats Water to relocate their utilities within the right of way. For Segment 1, the City of Bend will need to either have Roats Water remove and relocate their existing underground utilities to Murphy’s new alignment or maintain an easement for their utility in its current location.

- **City of Bend Water Department** – Impacts to the City’s Water facilities cannot be fully determined at this time. Right of way acquisition to meet city requirements should provide room for utility relocation within existing right of way, if needed.
Existing Conditions Analysis

Overview of Study Area

The City of Bend is located in Central Oregon at the eastern foothills of the Cascade Mountain Range, 131 miles southeast of Salem. At an elevation of approximately 3,600 feet, the city’s Urban Growth Boundary (UGB) encompasses 32 square miles. Bend was incorporated in 1904 and serves as the Deschutes County Seat.

Central Oregon’s population grew by 53 percent between 1995 and 2005, mostly due to immigration. Bend, as Central Oregon’s largest city, saw a population increase from 29,425 in 1995 to over 70,328 in 2005. Following the 2000 Census, Bend’s population growth triggered the formation of the Bend Metropolitan Planning Organization (MPO)\(^1\). Bend comprises the population majority for Deschutes County, which had a total population of 135,450 in 2005.

Listed below are some general demographic characteristics of Bend Residents, as obtained from the Bend Chamber of Commerce\(^2\).

- The median age for Bend residents is 34.8 years
- Of the total population, 27.3% are under the age of 19
- The Bend/LaPine School District enrolled 13,194 children at 5 high, 5 middle, 9 elementary, and 3 magnet schools in 2005. There are also several private schools in the Bend city limits.
- The Central Oregon Community College in Bend had 7,108 students (Full-time, Part-time, and Non-Credit) and OSU’s Cascades Campus has 435 students, as of 2005.
- The Bend Police Department had 70 sworn officers and 24 staff in 2005. The Fire Department has 76 paid staff and 20 volunteers at four stations.
- The Mt. Bachelor ski area was the initial draw for the visitor industry, which has expanded into industrial and commercial expansion. In 2003, approximately 7,585 employees worked in the Tourism Services industry; followed by 5,569 working in Health and Social Assistance. Bend is also the retail center of Central Oregon. Recreation is a large draw for the City and there are 37 developed city parks.
- The 2004 average price for a home in Bend was $271,457, while the median price was $227,500. Rental housing in the Bend area is estimated to average $935 and up for a three bedroom, two bath home.
- Property tax in 2004, for a home with an assessed value of $100,000 was $1,516.
- US 97/Bend Parkway provides north/south travel through Bend, while US Highway 20 provides access to cities to the west and east of Bend.

---

1 As per the Federal Aid Highway Act of 1962, metropolitan areas with a population of 50,000 persons or more must form a regional agency for the purpose of coordinated long-range transportation planning.
2 Information in the list above was obtained from the Bend Chamber of Commerce, http://www.bendchamber.org/about/glance1.asp (last accessed October 18, 2006)
• There is one municipal airport. AMTRAK passenger services do not extend to Bend, but Burlington Northern and Union Pacific provide freight service through Bend. Greyhound Bus Lines has a terminal in Bend.
• There is a Dial-A-Ride service in Bend that offers rides to the general public, as well as to the senior and disabled communities of Bend. The Bend Area Transit system now operates seven bus routes within city limits.

Murphy Road is located in southern Bend. The study area for this project is between SE 3rd Street on the west to SE 27th Street on the east. Murphy Road is classified as a Major Collector in the City of Bend’s Transportation System Plan (TSP) and currently exists as a two-lane roadway from SE 3rd Street to Brosterhous Road. The Burlington Northern Sante Fe (BNSF) Railroad operates in a north-south direction through the project area, between Brosterhous Road and SE 15th Street. There are rock outcroppings in the area immediately east of the railroad tracks that have been designated by the City of Bend as an Area of Special Interest (ASI).

Existing Land Use Conditions

Zoning Designations
The current zoning for parcels along Murphy Road includes Residential Low Density (RL), Residential Medium Density (RM), Residential Standard Density (RS) General Commercial (CG), Commercial Convenience (CC), and Urban Area Reserve 10 Acre Minimum (UAR10). These are illustrated in Figure 2 and described over the following pages.

The City of Bend’s Comprehensive Plan designations (shown in Figure 3) are largely consistent with the current zoning. There is one difference of note, which is the designation of areas currently used for schools or planned for future schools designated as Public Facility (PF) in the Comprehensive Plan, yet designated as residential or urban reserve in the Zoning Code.

Allowed and conditional uses for all zoning designations in the study area are described below.

Residential Zones
The RS zone is intended to provide opportunities for a wide variety of residential housing types at the most common residential densities in places where community sewer and water services are available. The residential density range in this district is 2.0 to 7.3 dwelling units per gross acre. Childcare facility (13 or fewer children) and personal services (barber shops, salons, etc.) are permitted land uses.

The RM zone is intended to provide primarily for the development of multiple family residential housing in areas where sewer and water service are available. The residential density range in the District is 7.3 to 21.7 units per gross acre and shall provide a transitional use area between other residential districts and other less restrictive areas.
Figure 2
Murphy Road Corridor
Zoning Map
Bend, Oregon

LEGEND

Murphy Road
Other Streets
Railroad
City Limits
Urban Growth Boundary

City of Bend
Zoning Designations
CC, COMMERCIAL
CONVENIENCE
CG, COMMERCIAL GENERAL
IL, INDUSTRIAL LIMITED
PF, PUBLIC FACILITY
RM, RESIDENTIAL MEDIUM DENSITY
RL, RESIDENTIAL LOW DENSITY
RS, RESIDENTIAL STANDARD DENSITY
SM, SURFACE MINING

Deschutes County
Zoning Designations
EFUTRB, EFU - TUMALO / REDMOND / BEND SUBZONE
MUA10, MULTI USE AGRICULTURAL
PF, PUBLIC FACILITY
RR10, RURAL RESIDENTIAL
UAR10, URBAN AREA RESERVE 10 ACRE MIN
This page intentionally left blank.
The RL zone consists of large urban residential lots that are served with a community water system and Department of Environmental Quality (DEQ) permitted community or municipal sewer systems. The residential density range in this district is 1.1 to 2.2 dwelling units per gross acre.

Permitted land uses for all residential zones are:

- Single-family detached housing
- Accessory dwellings
- Manufactured homes on individual lots
- Adult foster homes (5 or fewer residents)
- Family Childcare home (16 or fewer children)
- Accessory Uses and Structures
- Neighborhood Parks
- Vacation Home Rental

Conditional Use applies to these uses in all residential zones:

- Temporary Housing
- Churches and places of worship
- Clubs, lodges, and similar uses
- Government offices and facilities
- Libraries, Community centers, museums, and similar uses
- Community and Regional parks, as well as recreational facilities
- Schools (Public and Private)
- Cemetery/Mausoleum
- Hospitals
- Childcare facilities (17 or more children)
- Food services less than 2,000 square feet, (with or without alcohol) excluding automobile dependent and automobile-oriented, drive-in, and drive-through uses
- Repair services, conducted entirely within building; excluding vehicle repair, small engine repair and similar services
- Bed & Breakfast Inns and Vacation rentals

**Commercial Zones**

The two commercial zones in the study area (CG and CC) allow many similar types of development. The CG zone is intended to provide a broad mixing of commercial uses that have large site requirements, are oriented to the highway, and provide services to the traveling public. The CC zone is typically adjacent and connected to a residential district, and provides larger scale uses and area than the neighborhood commercial zone. The CC zone provides for frequent shopping and service needs of nearby residents. New Convenience Commercial nodes shall develop as commercial centers rather than a commercial strip and be limited in size up to 5 acres.

Permitted land uses for the CG and CC zones are:

- Existing and new residential uses
• Retail sales and service (building footprint greater than 50,000 square feet is not permitted in the CC zone)
• Restaurants/food services without drive-through (with drive-through is conditional in CC)
• Offices and clinics
• Lodging
• Commercial and public parking
• Schools (colleges and vocational schools are not permitted in CC)
• Manufacturing and production less than 5,000 sq. ft. with retail outlet. Other industrial uses are permitted or conditional in CG zones.
• Mixed-use development is allowed, as long as the business/retail use is compatible with the zoning.

Urban Area Reserve 10 Acre Minimum Zone

The Urban Area Reserve District is a holding zone for urban development. The UAR10 zone allows a maximum residential density of 1 dwelling unit per 10 gross acres.

Public Facility Zone

The PF zone is intended to provide area for buildings and facilities that are owned and operated by federal, state, or local governments, public utilities, special districts, or non-profit organizations, and which are occupied to provide governmental or public services. This zone is also intended to provide for school sites, public parks and recreational facilities, natural areas, trails, wetlands, and similar types of open space owned and managed by a local government or special district. Some land uses are permitted on a conditional basis, including magnet and high schools operated by the Bend/LaPine School District, public utility maintenance facilities and operation yards with outdoor storage of supplies and materials, ball fields and similar outdoor recreational areas that have night lighting or amplified sound systems, public transmission tower sites, County solid waste disposal sites or solid waste transfer sites, Correctional facilities for adults and juveniles including work farms and training centers, and park sites with outdoor amphitheater or facilities for community events.

Description of Existing Uses

Existing uses along the corridor are described below by corridor segment (defined in introduction).

1. **SE 3rd Street to Parrell Road** – The current alignment of Murphy Road in this segment is next to land that is zoned for CG, RM, RS, and RL. The land use in the area conforms to the current zoning regulations with some automobile oriented businesses to the east of SE 3rd Street; there are several empty lots and a few apartments or duplexes directly on Murphy Road, while most of the houses are of low density and single story.

2. **Parrell Road to Brosterhous Road** – The land adjacent to Murphy Road in this segment is zoned for CC, RS, and RL. The land use in the area conforms to the current zoning regulations with the majority of the homes consisting of low density to moderate density. There are a few empty lots, mostly of flat, grassy terrain, and there is also one rock outcropping designated as an Area of Special Interest (ASI), which is adjacent to a
forested empty lot and a ridge with trees on it. The Jewell Elementary School is located at the eastern portion of this segment, which is acceptable under the RS zoning on a conditional use. There is also a parking lot for the Bend Area Transit buses and a utilities building on land that is zoned for RS, these uses are most likely permitted on a conditional basis. A single family farm is in this area and may have been built before zoning regulations, so it does not conform to zoning regulations. The section of this segment zoned for CC has an RV park on it; this is consistent with the zoning if the park is considered residential, lodging, or commercial parking.

3. **Brosterhous Road to SE 15th Street** – Murphy Road currently terminates at Brosterhous Road. East of Brosterhous, the land is zoned RS. West of the railroad (north of Murphy Road’s terminus), there is housing development that is consistent with the zoning regulation. There is also a former mobile home park to the west of the railroad (south of Murphy Road’s terminus). To the east of the railroad, where Murphy Road does not extend, there are empty lands that are flat in the northern section and in the southern section, there is a large rock outcropping that has been designated by the City of Bend as an ASI (described in future section on environmental constraints).

4. **SE 15th Street to SE 27th Street** – This section, which is partially located outside the City’s urban growth boundary, is zoned for UAR10, RS, and RL. The UAR10 land is consistent with the zoning designations, as most of the land is vacant and characterized by field or forest. The land to the north, at Ferguson Road, is zoned RL and that area is also consistent with current designations. The High Desert Middle school is located in this segment, which is acceptable under the RL zoning as a conditional use.

**Development Applications**

As of October 2006, the City of Bend is considering the following development applications for areas within the Murphy Road corridor.

- **Crown Villa North** – This proposed development is located in the vicinity of the RV Park near the intersection of Murphy Road and Brosterhous. There are 99 lots proposed for residential use.

- **Crown Villa South** – This proposed development is located in the vicinity of the RV Park near the intersection of Murphy Road and Brosterhous. There are 82 lots proposed for residential use.

- **South Point** – This proposed development is located north of Murphy Road, off of Brosterhous Road. There are 33 lots proposed for residential use, with no direct access onto Murphy Road.

- **Shadow Glen** – This proposed development is located east of SE 15th Street, immediately south of the Central Oregon Canal. There are 368 lots proposed for residential use.

- **Wood Hill** – This proposed development is east of Brosterhous Road and west of the railroad tracks, at the former location of a mobile home park. There are an estimated 159 lots proposed for residential use.
Existing Environmental Conditions

The purpose of this section is to document the general existing environmental conditions in the Murphy Road corridor. The survey of existing environmental conditions identified three main subject areas. This section of the memorandum is organized by the following subject areas:

- Areas of Special Interest
- Environmental Reconnaissance
- Social Elements Reconnaissance

Figure 4 illustrates these areas of environmental consideration.

Areas of Special Interest

ASIs have been identified by the City of Bend as important features in the landscape intended to be preserved as growth occurs. According to the City of Bend Development Code, ASIs “consist of scattered rock outcrops, stands of trees, and dominant ridges and faults that are typical of the Central Oregon landscape. These areas contain high points or changes in elevation that break the line of sight so that the area retains a feeling of undeveloped open space.”

ASIs are mapped on the Bend Area General Plan Map and the City Zoning Map. The Upland Areas Special Interest Overlay Zone implements the vision of the Bend Area General Plan to retain and conserve the natural character of Bend. This overlay zone is intended to protect valuable natural resources within the Bend urban growth boundary and establishes clear and objective design and development standards to protect designated ASIs.

There are two ASIs in the Murphy Road corridor as identified in Section 2.7.700 of the Bend Development Code. These are illustrated in Figure 4.

According to the Bend Urban Area General Plan map, the first ASI is located south of Murphy Road, east of Country Club Drive. This ASI is aligned approximately northwest to southeast, and is approximately 2/10 mile wide by 1/3 mile long. At its southern end, the ASI parallels Country Club Drive. The northern boundary of the ASI roughly parallels Murphy Road, appearing to touch the existing right-of-way (ROW) approximately 500 feet east of Country Club Road. Alternatives widening Murphy Road to the south could touch this ASI. The project team will need to be aware of this constraint when developing and evaluating alternatives.

The second ASI is located east of Brosterhous Road and immediately east of the existing railroad tracks. According to the Bend Urban Area General Plan map, the ASI is approximately 1/4 mile wide and 2/10 mile long, and extends from the railroad tracks to the east past SE 15th Street, which cuts across the ASI. The ASI is aligned approximately southwest to northeast. An extension of Murphy Road due east of its current alignment would intersect with the ASI. The project team will need to be aware of this constraint when developing and evaluating alternatives.
**ASI Review and Development Standards**

According to the Bend Development Code, road construction within the boundaries of an ASI is subject to ASI Review and is processed as a land use permit. The ASI Review application requires a form, filing fee, drawings, and other information, as specified in Section 2.7.700 (Upland Areas of Special Interest Overlay Zone).

The ASI boundary is delineated by the outside edge of the boundary line shown on the Bend Area General Plan map and the City Zoning Map. Development standards in Section 2.7.700 apply to road construction.

Section 2.7.700 also states that public or private streets and driveways can be placed within an Upland Area of Special Interest if it is shown that no other practicable method exists. The permanent alternation of an ASI by grading, excavation, or fill; the placement of impervious surfaces; or the removal of existing vegetation is only permitted if the following conditions are demonstrated (per Section 2.7.700):

- No other practicable access to the buildable area exists, or access from an off-site location through the use of easements is not possible;
- Roads and driveways are designed to be the minimum width necessary and the minimum intrusion into the Upland Area of Special Interest while also allowing safe passage of vehicles and/or pedestrians;
- The need for future extensions of shared access, access easements, or private streets to access potential new building sites have been considered at the time of this application in order to avoid subsequent encroachments into an Upland Area of Special Interest.

Section 2.7.700 contains additional standards for other development types, including utilities and drainage facilities. When a development impacts an ASI by grading, excavation, or fill; the placement of impervious surfaces; or by the removal of vegetation, a mitigation plan is required. Specifics of the mitigation plan are outlined in 2.7.700 of the Bend Code.

**Environmental Reconnaissance**

**Air Quality**

The Murphy Road corridor is not located in a DEQ designated Maintenance Area or Non-Attainment Area. Therefore, the air quality in the Murphy Road corridor meets the National Ambient Air Quality Standards (NAAQS) set by the Environmental Protection Agency (EPA).

**Floodplains and Floodways**

Floodplain boundaries are identified on Flood Insurance Rate Maps (FIRM), prepared by the Federal Emergency Management Agency (FEMA). None of the study area is within a FEMA designated 100-year floodplain or floodway.

**Hazardous Substances**

According to the DEQ’s Environmental Cleanup Site Information (ECSI) database, there are no sites within the study area with known contamination from hazardous substances.
Historic and Cultural Resources

There are no properties listed on the National Register of Historic Places (NRHP) in the Murphy Road corridor. Additionally, no portion of the corridor is located within a National Historic District. Analysis of state records of historic and cultural resources was not conducted as part of this project.

Natural Hazards

According to Deschutes County GIS data for the Murphy Road corridor:

- There are no slopes of 25 percent or greater; the probability of a landslide is “low.”
- There are no earthquake fault lines located along the corridor.
- Much of the eastern segment of the study area is located within a Deschutes County designated Wildfire Hazard area. Wildfire Hazard Areas are identified based on criteria including fuel, topography, weather, and development.

Topography

The topography of the corridor is generally flat with some rolling terrain. The primary vegetation in the corridor is Ponderosa Pine and bitterbrush.

Water Resources

The Murphy Road corridor lies within the Upper Deschutes River Sub-basin of the Deschutes River Basin. There are no free-flowing hydrologic features in the corridor, and therefore no riparian areas.

Wetlands

Wetlands within the City of Bend were inventoried and evaluated in 2000. According to Figures 2-4 of the Bend Area General Plan, there are no “significant” or “non-significant” wetlands in the Murphy Road corridor.

The National Wetland Inventory (NWI) identifies one wetland in the corridor, located in the southeast quadrant of the Paulina Lane/Murphy Road intersection. This wetland is approximately 0.89 acres, and has a Cowardin classification\(^3\) of *Palustrine Unconsolidated Semipermanently Flooded (PUBFx)*\(^4\).

Social Elements Reconnaissance

Data were collected from the U.S. Census Bureau’s 2000 Decennial Census to determine if there are any disproportionately high minority, low-income, or elderly populations in the Murphy Road corridor. Due to the linear extent of the corridor, U.S. Census block groups

---

\(^3\) A comprehensive classification system of wetlands and deepwater habitats developed in 1979 for the U.S. Fish and Wildlife Service.

\(^4\) Palustrine (P) - All nontidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens, Unconsolidated Bottom (UB) – All wetland and deepwater habitats with at least 25% cover of particles smaller than stones, and a vegetative cover less than 30%. Semipermanently Flooded (Fx) – Surface water persists throughout the growing season in most years. When surface water is absent, the water table is usually at or very near the land surface. For more information on wetland classification, see: http://www.fws.gov/nwi/Pubs_Reports/Class_Manual/class_titlepg.htm
were determined to be the appropriate geographic level for analysis. A study area was developed using block group boundaries and was defined as all block groups in the Murphy Road corridor between SE 3rd Street and SE 27th Street. This study area is illustrated as the “Social Elements Study Area” in Figure 4 and is called the “study area” for the remainder of this section. The three block groups that are within this area and define the boundary of the study area are:

- Census Tract 9918, Block Group 4
- Census Tract 9919, Block Group 2
- Census Tract 9919, Block Group 3

The following summarizes the census data for minority, low-income, and elderly populations within the study area and compares the proportion of minority, low-income, and elderly populations to the City of Bend, Deschutes County, and the State of Oregon.

**Minority Populations**

Those races considered as part of minority populations analysis include African American, Hispanic, Asian American, and American Indian/Alaska Native. Table 1 below illustrates the breakdown of Bend area residents by race and ethnicity.

**Table 1**

<table>
<thead>
<tr>
<th>Race or Ethnicity</th>
<th>Study Area (Percentage of Residents)</th>
<th>City of Bend</th>
<th>Deschutes County</th>
<th>State of Oregon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caucasian</td>
<td>93.0%</td>
<td>91.6%</td>
<td>92.9%</td>
<td>83.5%</td>
</tr>
<tr>
<td>African American</td>
<td>0.2%</td>
<td>0.3%</td>
<td>0.2%</td>
<td>1.6%</td>
</tr>
<tr>
<td>American Indian/Alaskan Native</td>
<td>0.9%</td>
<td>0.7%</td>
<td>0.8%</td>
<td>1.2%</td>
</tr>
<tr>
<td>Asian</td>
<td>0.6%</td>
<td>1.0%</td>
<td>0.7%</td>
<td>2.9%</td>
</tr>
<tr>
<td>Native Hawaiian and Other</td>
<td>0.1%</td>
<td>0.1%</td>
<td>0.1%</td>
<td>0.2%</td>
</tr>
<tr>
<td>Pacific Islander</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>0.1%</td>
<td>0.1%</td>
<td>0.1%</td>
<td>0.1%</td>
</tr>
<tr>
<td>Two or More Races</td>
<td>1.7%</td>
<td>1.7%</td>
<td>1.6%</td>
<td>2.4%</td>
</tr>
<tr>
<td>Hispanic or Latino</td>
<td>3.5%</td>
<td>4.6%</td>
<td>3.7%</td>
<td>8.0%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>100.1%</td>
<td>100.1%</td>
<td>100.1%</td>
</tr>
</tbody>
</table>

Source: U.S Census Bureau, 2000 Decennial Census. Summary File 1, Table P8.

The study area is substantially less racially diverse than the state, though has similar diversity to the City of Bend and Deschutes County. In the 2000 U.S. Census, 93 percent of the total population in the study area considered themselves to be Caucasian, as compared to 83.5 percent of people in the State of Oregon, 91.6 percent of people in the City of Bend, and 92.9 percent of people in Deschutes County. People of Hispanic ethnicity compose 3.5 percent of the study area population.
**Low-Income Populations**

A low-income individual is defined as a person whose median household income is at, or below, U.S. Department of Health and Human Services poverty guidelines for that size of household. 2000 U.S. Census data indicate that the study area has the same proportion of households below the poverty level (6.3 percent) as Deschutes County (6.3 percent) and a lower proportion of households below the poverty level than the City of Bend (10.5 percent) and the State of Oregon (11.6 percent) (Table 2).

**Table 2**

Low-Income Composition by Geographic Area (2000)

<table>
<thead>
<tr>
<th>Geographic Area</th>
<th>Below the Poverty Line</th>
</tr>
</thead>
<tbody>
<tr>
<td>Census Tract 9918, Block Group 4</td>
<td>3.5%</td>
</tr>
<tr>
<td>Census Tract 9919, Block Group 2</td>
<td>8.0%</td>
</tr>
<tr>
<td>Census Tract 9919, Block Group 3</td>
<td>6.8%</td>
</tr>
<tr>
<td>Social Elements Study Area</td>
<td>6.3%</td>
</tr>
<tr>
<td>City of Bend</td>
<td>10.5%</td>
</tr>
<tr>
<td>Deschutes County</td>
<td>6.3%</td>
</tr>
<tr>
<td>State of Oregon</td>
<td>11.6%</td>
</tr>
</tbody>
</table>

Source: U.S Census Bureau, 2000 Decennial Census. Summary File 3, Table P87.

**Elderly Populations**

Elderly populations are defined as people aged 65 years and older. The percentage of elderly persons for the block groups in the study area ranged between 11.0 and 19.3 percent. For the entire study area, elderly persons averaged 15.6 percent of the total population (see Table 3). The percentage of elderly persons is slightly higher than the corresponding values for the City of Bend (12.4 percent), Deschutes County (13.0 percent), and the State of Oregon (12.8 percent).

**Table 3**

Elderly Composition by Geographic Area (2000)

<table>
<thead>
<tr>
<th>Geographic Area</th>
<th>Percent Elderly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Census Tract 9918, Block Group 4</td>
<td>11.0%</td>
</tr>
<tr>
<td>Census Tract 9919, Block Group 2</td>
<td>14.9%</td>
</tr>
<tr>
<td>Census Tract 9919, Block Group 3</td>
<td>19.3%</td>
</tr>
<tr>
<td>Social Elements Study Area</td>
<td>15.6%</td>
</tr>
<tr>
<td>City of Bend</td>
<td>12.4%</td>
</tr>
<tr>
<td>Deschutes County</td>
<td>13.0%</td>
</tr>
<tr>
<td>State of Oregon</td>
<td>12.8%</td>
</tr>
</tbody>
</table>

Source: U.S Census Bureau, 2000 Decennial Census. Summary File 1, Table P12.
Existing Safety Conditions

Crash data were obtained from the City of Bend for the past three years (between January 1, 2003 and December 31, 2005) for the existing Murphy Road corridor, located between SE 3rd Street and Brosterhous Road.

Corridor Crash Analysis

Crash rates are expressed in crashes per million vehicle miles (MVM) traveled. This rate describes how many crashes might be expected of vehicles traveling through a particular section of a roadway for a cumulative total of one million miles.

There were 16 crashes reported along Murphy Road during the three year study period. Of the 16 crashes, 11 crashes (69 percent) occurred at or west of the Parrell Road intersection. The predominant crash types were turning and angle accidents (38 percent for both crash types). Turning movement accidents occur when one or more vehicles making a turn collides with another vehicle and angle accidents are those that occur when a vehicle traveling one direction collides with vehicle entering from another road or access point. Half of the crashes were property damage only (PDO) and half were injury crashes; there were no fatalities accidents along the corridor. The crash rate for the three-year study period was 2.25 per MVM (Table 4).

Table 4
Murphy Road Three-Year Crash History: January 1, 2003 to December 31, 2005

<table>
<thead>
<tr>
<th>Location</th>
<th>Crash Type</th>
<th>Crash Severity</th>
<th>Total Crashes</th>
<th>Crash Rate (per MVM)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rear End</td>
<td>Turning</td>
<td>Angle</td>
<td>Other</td>
</tr>
<tr>
<td>Murphy Road</td>
<td>4</td>
<td>6</td>
<td>6</td>
<td>0</td>
</tr>
</tbody>
</table>

Data Source: City of Bend, 2006

The majority of crashes on Murphy Road occurred on a dry roadway surface (75 percent) and during daylight conditions (69 percent) (Table 5).

Table 5
Murphy Road Corridor Crash Conditions: January 1, 2003 to December 31, 2005

<table>
<thead>
<tr>
<th>Condition</th>
<th>Number of Crashes</th>
<th>Percentage of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roadway Surface</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dry</td>
<td>12</td>
<td>75%</td>
</tr>
<tr>
<td>Wet</td>
<td>3</td>
<td>19%</td>
</tr>
<tr>
<td>Ice</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Snow</td>
<td>1</td>
<td>6%</td>
</tr>
<tr>
<td>Light</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Day</td>
<td>11</td>
<td>69%</td>
</tr>
</tbody>
</table>

5 Other includes: Fixed Object, Sideswipe, Pedestrian, and Head-on
Table 5
Murphy Road Corridor Crash Conditions: January 1, 2003 to December 31, 2005

<table>
<thead>
<tr>
<th>Condition</th>
<th>Number of Crashes</th>
<th>Percentage of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dark</td>
<td>4</td>
<td>25%</td>
</tr>
<tr>
<td>Dusk</td>
<td>1</td>
<td>6%</td>
</tr>
<tr>
<td>Dawn</td>
<td>0</td>
<td>0%</td>
</tr>
</tbody>
</table>

Source: City of Bend, 2006

Intersection Crash Analysis

Intersection crash rates are calculated in the same way as corridor crashes, but do not include a segment distance because they occur at a single location. The number of crashes per million entering vehicles (MEV) is used to calculate an intersection crash rate. A crash rate greater than 1.0 per MEV is the common threshold to identify intersections with high crash rates. The Murphy Road study intersections with reported crashes during the 3-year study period were:

- SE 3rd Street
- Parrell Road
- Country Club Drive
- Brosterhous Road

Table 6 identifies the crash type, severity, and crash rates for the study intersections where crashes were reported. Of the 16 intersection crashes, 7 crashes (44 percent) occurred at the SE 3rd Street intersection, and 6 crashes (38 percent) occurred at the SE Parrell Road intersection. Therefore, 13 of the 16 intersection crashes (81 percent) occurred at these two intersections.

Table 6
Murphy Road Crash Descriptions: January 1, 2003 to December 31, 2005

<table>
<thead>
<tr>
<th>Murphy Road Intersection</th>
<th>Crash Type</th>
<th>Crash Severity</th>
<th>Total Crashes</th>
<th>Crash Rate (per MEV)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rear End</td>
<td>Turning</td>
<td>Angle</td>
<td>Other</td>
</tr>
<tr>
<td>SE 3rd Street</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Parrell Road</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Country Club Drive</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Brosterhous Road</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>All Intersections</td>
<td>5</td>
<td>5</td>
<td>6</td>
<td>0</td>
</tr>
</tbody>
</table>

Source: City of Bend, August 2006

6 Others includes: Fixed Object, Sideswipe, Pedestrian, and Head-on
A majority (63 percent) of the crashes were PDO accidents. Angle crashes were the most common intersection crash type (38 percent). The highest crash rate was located at the Parrell Road intersection, which has a crash rate of 0.53 per MEV. None of the Murphy Road study intersections have a crash rate that exceeds 1.0 per MEV. Crash rates below 1.0 do not indicate a safety concern.

The majority of study intersection crashes occurred on a dry roadway surface (71 percent) and during daylight conditions (59 percent) (Table 7).

Table 7
Murphy Road Corridor Crash Conditions: January 1, 2003 to December 31, 2005

<table>
<thead>
<tr>
<th>Condition</th>
<th>Number of Crashes</th>
<th>Percentage of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roadway Surface</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dry</td>
<td>12</td>
<td>71%</td>
</tr>
<tr>
<td>Wet</td>
<td>4</td>
<td>24%</td>
</tr>
<tr>
<td>Ice</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Snow</td>
<td>1</td>
<td>6%</td>
</tr>
<tr>
<td>Light</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Day</td>
<td>10</td>
<td>59%</td>
</tr>
<tr>
<td>Dark</td>
<td>6</td>
<td>35%</td>
</tr>
<tr>
<td>Dusk</td>
<td>1</td>
<td>6%</td>
</tr>
<tr>
<td>Dawn</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>17</td>
<td>101%</td>
</tr>
</tbody>
</table>

Source: City of Bend, 2006

Existing Roadway Geometric Conditions

Roadway design standards are developed to support safety and mobility goals. Roadway deficiencies can have an impact on the safe and efficient use of the road by all travelers. This section highlights the existing roadway deficiencies of Murphy Road.

This analysis surveyed the geometric, access, and bicycle/pedestrian conditions in the vicinity of Murphy Road. These current conditions were compared with relevant City standards, supplemented by AASHTO standards. Data for analysis were collected from field measurements. The review of deficiencies was completed using:

- Posted Speed: 35 mph
- Design Speed for Deficiency Review: 40 mph
- City designation: Major Collector

A review of the vertical alignment of Murphy Road will not be addressed at this time, due to a lack of as-built information.
Throughout the corridor, Murphy Road runs east and west, has a speed limit of 35 mph and is classified as a Major Collector by the City of Bend. Murphy Road has one travel lane in each direction with turn pockets at some intersections. There are also bike lanes on each side of the roadway. Sidewalks are provided intermittently along both sides of Murphy Road.

The existing roadway conditions analysis of Murphy Road has been organized into two segments, as listed below:

- **Segment 1**—SE 3rd Street to Parrell Road
- **Segment 2**—Parrell Road to Brosterhous Road

**Segment 1: SE 3rd Street to Parrell Road**

The list below summarizes existing geometric deficiencies for Segment 1. Design features that meet standards are not discussed.

- **Pedestrian Facilities** — There are no sidewalks on either side along most of Segment 1. Sidewalks should be at least 5’ wide on both sides of the roadway to meet minimum city standards. Any sidewalks constructed in the future will also need to meet Americans with Disabilities Act (ADA) requirements, including wheelchair ramps at all intersection corners.

- **Horizontal Alignment** — Murphy Road is an urban street with no superelevation through any of its horizontal curves. Drivers on this urban corridor anticipate normal-crown curves and adjust their driving accordingly. Therefore, the standards for a low-speed urban street may be applied. The first curve near Parrell Road, contains a curve with an approximately 500’ radius. The minimum radius for a low speed, urban street should be 675’ to meet current design standards\(^7\). This reduced radius may impact a driver’s ability to safely navigate the curve at the posted speed.

- **Sight Distance** — Through the same curve, traffic traveling west on Murphy Road has restricted horizontal sight distance due to objects, such as trees, located close to the roadway on the inside of the curve. Objects that can obstruct a driver’s line of sight through a corner need to be set back a specific distance from the centerline of the inside lane to provide the necessary stopping sight distance. In this case, trees located approximately 18’ from the centerline of the inside lane restrict drive line of sight. To meet current safety standards, no objects that block line of sight should be closer than 23’ for this curve. This restriction reduces the safe stopping sight distance from the standard of 305’ to 267’ or from a design speed 40 mph to 35 mph.

- **Median Width** — To the east of the signalized intersection with SE 3rd Street, Segment 1 narrows down to a curb-to-curb width of 36’. This allows for two 12’ travel lanes and two 6’ bike lanes. As a Major Collector, the curb-to-curb width should be 52’ to also allow for a 16’ continuous center turn lane.

Segment 2: Parrell Road to Brosterhous Road
The list below summarizes geometric deficiencies for Segment 2. Design elements that meet standards are not discussed.

- **Pedestrian Facilities** — In this segment, there are limited sidewalks along most of the south side. Sidewalks are also lacking on the north side of Murphy Road from Parrell Road to Mel Court. Sidewalks should be at least 5’ wide on both sides of the roadway to meet minimum city standards. Any sidewalks constructed in the future will also need to meet ADA requirements, including wheelchair ramps at all intersection corners.

- **Horizontal Alignment** — As discussed above, the standards for a low-speed urban street are applied through this segment. This segment contains a horizontal curve by Mel Court, which does not meet current design standards. The radius of the curve is 400’. To meet current design standards the radius needs to be at least 675’. This reduced radius may impact a driver’s ability to safely navigate the curve at the posted speed.

- **Sight Distance** — Through the same curve, traffic traveling east on Murphy Road have restricted horizontal sight distance due to objects, such as trees, located close to the roadway on the inside of the curve. Objects that can obstruct a driver’s line of sight through a corner need to be set back a specific distance from the centerline of the inside lane to provide the necessary stopping sight distance. In this case, a group of trees located approximately 12’ from the centerline of the inside lane restrict drive line of sight. To meet current safety standards, no objects that block line of sight should be closer than 23’ for this curve. This restriction reduces the safe stopping sight distance from the standard of 305’ to 218’ or from a design speed 40 mph to 30 mph.

- **Median Width** — The entire length of Segment 2’s curb-to-curb width is 36’. This allows for two 12’ travel lanes and two 6’ bike lanes. As a Major Collector, the curb-to-curb width should be 52’ to also allow for a 16’ continuous center turn lane.

**Existing Traffic Operations**
The Murphy Road study area has been analyzed for motor vehicle operations for the existing (2006) P.M. peak hour conditions based on the existing roadway geometry and lane configuration. Traffic counts have been taken at the study area intersections in August and September 2006 for use in this analysis. These data are used to determine roadway operating conditions within the study area.

**Study Intersections and Raw Traffic Counts**
The intersections included in the Murphy Road corridor study are listed below. The only signalized intersection is SE 3rd Street and Murphy Road. The first 13 intersections exist today. The final two intersections are potential future intersections of Murphy Road and both SE 15th Street and SE 27th Street. See Figure 5 for study intersection locations, channelization, and traffic control.

---

1. Powers Road and US 97/Bend Parkway (SB Ramps)
2. Powers Road and US 97/Bend Parkway (NB Ramps)
3. Parrell Road and Powers Road
4. SE 15th Street and Ferguson Road/Sherwood Forest Drive
5. US 97 and Ponderosa Drive/China Hat Road
6. Knott Road and SE 15th Street/Tekampe Road
7. Brookswood Boulevard and Pinebrook Boulevard
8. SE 3rd Street and Pinebrook Boulevard
9. SE 3rd Street and Murphy Road
10. Murphy Road and Parrell Road
11. Murphy Road and Country Club Road
12. Murphy Road and Brosterhous Road
13. SE 27th Street and Ferguson Road
14. Murphy Road and SE 15th Street between Ferguson Road and Knott Road
15. Murphy Road and SE 27th Street between Ferguson Road and Knott Road

As part of this study’s next phase (future conditions), the extension of Murphy Road will be considered and analyzed. This analysis will look at the possibility of extending Murphy Road east to either SE 15th Street or SE 27th Street. This would create two new intersections, one at Murphy Road and SE 15th Street as well as Murphy Road and SE 27th Street. Because of this potential extension a description of SE 15th Street and SE 27th Street are provided.

Each of the study intersections is described below. Appendix A provides an overview of the traffic analysis methodology. Appendix B contains raw traffic volumes for each intersection.

- **SE 3rd Street and Murphy Road** – The intersection of Murphy Road and SE 3rd Street is controlled by a traffic signal. The west leg of the intersection is a driveway. Both SE 3rd Street approaches provided two-way traffic operations with two lanes per direction and left turn pockets. The north leg also provides a right turn pocket. SE 3rd Street classified by the City of Bend as a Principal Arterial with posted speeds of 45 miles per hour on each leg.

- **Parrell Road and Murphy Road** – Parrell Road provides two-way traffic with one lane per direction at the intersection with Murphy Road. It is currently stopped controlled on Parrell Road approaches with a posted speed of 40 miles per hour. Parrell Road is classified as a Major Collector by the City of Bend.

- **Country Club Road and Murphy Road** – Country Club Road is a two-way road with one lane in each direction at the Murphy Road intersection. Country Club Road has a posted speed of 40 miles per hour on the south leg and 25 miles per hour on the north leg. The south leg of Country Club road is striped with one lane in each direction. On-street parking is only allowed on the north leg of the intersection. Country Club Road is classified as a Major Collector south of Murphy Road by the City of Bend.
• **Brosterhous Road and Murphy Road** – Murphy Road currently terminates at Brosterhous Road. If Murphy Road is extended to the east, this will be the origin of the potential extension project. Brosterhous Road is a two-way road with one lane in each direction, has a posted speed of 40 miles per hour, and is functional classified by the City of Bend as a Major Collector.

• **SE 15th Street and Murphy Road** – If Murphy Road is extended to the east, it could intersect with SE 15th Street. Currently, SE 15th Street varies between 40 and 55 mph between Ferguson Road and Knott Road. Between these intersections, SE 15th Street is a two-way road with one lane per direction. It is currently classified as a Minor Arterial.

• **SE 27th Street and Murphy Road** – If Murphy Road is further extended to the east, it could also intersect with SE 27th Street. Currently, SE 27th Street has a posted speed of 45 mph between Ferguson Road and Knott Road. Between these roads, SE 27th Street operates as a three-lane roadway with one lane operating in both directions with a two-way left turn lane. SE 27th Street is currently classified as a Minor Arterial.

• **Powers Road and US 97/Bend Parkway (Southbound Ramps)** – The US 97/Bend Parkway southbound ramps join together to form a T-intersection with Powers Road; west of US 97 and on the south side of Powers Road. The southbound loop on-ramp provides access onto US 97/Bend Parkway for vehicles traveling on Powers Road in both the west and east directions. (Vehicles from the east on Powers Road that want to head south on US 97, proceed through the US 97 signalized intersection and turn left at this on-ramp.) Likewise the southbound off-ramp provides access to Powers Road in both directions and is stop controlled. Powers Road provides two-way traffic operations with one lane in each direction as well as a left-turn pocket for vehicles heading south onto US 97. Powers Road’s posted speed limit is at 35 mph. Powers Road and the parkway ramps provide bike lanes on both sides of the road.

• **Powers Road and US 97/Bend Parkway (Northbound Ramps)** – The intersection of Powers Road and the US 97/Bend Parkway is served by on and off-loop ramps that form a T-intersection; east of US 97 on the north side of Powers Road. The northbound on-ramp to US 97/Bend Parkway provides access for vehicles on Powers Road in both the west and eastbound directions. (Vehicles from the west on Powers Road that want to head north on US 97, proceed through the US 97 signalized intersection and turn left at this on-ramp.) Likewise, the northbound off-ramp provides east and west access for vehicles coming from US 97 and is the intersection’s stop-controlled approach. Powers Road provides two-way traffic operations with one lane in each direction with a posted speed limit is 35 mph. A left turn pocket onto northbound US 97 on-ramp is provided for vehicles coming from the west along Powers Road. The north leg of the intersection (US 97/Bend Parkway ramp) is stop controlled. Powers Road and the parkway ramps provide bike lanes on both sides of the road.

• **Parrell Road and Powers Road** – The intersection of Parrell Road and Powers Road is three-legged with Parrell Road being the stop controlled approach. There is a fourth approach to the intersection which generates a very low amount of traffic. Powers Road is the east and west road, while Parrell Road aligns to the north and south. Each leg of the intersection provides one travel lane in each direction. Parrell Road has striped shoulders on each side of the roadway. The posted speed limit on Parrell Road north of...
Powers Road is 35 mph and south of Powers Road 40 mph. The speed limit on Powers Road, is posted at 35 mph. Both Parrell and Powers Roads are classified as Major Collectors.

- **SE 15th Street and Ferguson Road/Sherwood Forest Drive** – The intersection of SE 15th Street and Ferguson Road/Sherwood Forest Drive is four-legged and stop controlled on the Ferguson Road/Sherwood Forest Drive approaches. SE 15th Street runs north/south and has a speed limit of 40 mph. Ferguson Road is a skewed northwest approach with a speed limit of 40 mph. Sherwood Forest Drive is a skewed northeast approach that is a private road servicing a housing development. Ferguson Road is the only leg with bicycle lanes, which are on both sides of the roadway. All four legs provide one travel lane in each direction. SE 15th Street is classified as a Minor Arterial and Ferguson Road is classified as a Major Collector.

- **SE 27th Street and Ferguson Road** – The intersection of SE 27th Street and Ferguson Road is a three-legged intersection that is stop controlled on the Ferguson Road approach. SE 27th Street is a north/south arterial and has a posted speed limit of 40 mph. Ferguson Road is an east/west collector road that is eastern terminus is at SE 27th Street. Ferguson Road has a posted speed limit of 40 mph. The SE 27th Street south leg has one through lane and a left turn pocket, the north leg has a through lane and a right turn pocket. Ferguson Road provides a shared right/left turn lane. SE 27th Street is classified as a Minor Arterial and Ferguson Road is classified as a Major Collector.

- **US 97 and Ponderosa Drive/China Hat Road** – US 97 at Ponderosa Drive/China Hat Road is a four-legged intersection with the Ponderosa Drive/China Hat Road approaches being stop controlled. US 97 is a north/south facility with a speed limit of 55 mph. There are two general travel lanes in each direction, with right and left turn pockets in each direction at the intersection. The east leg of the intersection, China Hat Road provides one travel lane in each direction with a posted speed limit of 40 mph. China Hat Road widens at the intersection to provide a left turn pocket. The western leg of the intersection, Ponderosa Drive, provides one travel lane in each direction with a posted speed limit of 25 mph. The north, south, and east legs of the intersection have striped shoulders of varying width. US 97 is classified as an Expressway by ODOT and both China Hat Road and Ponderosa Drive are classified as Major Collectors by the City of Bend.

- **Knott Road and SE 15th Street/Tekampe Road** – The four-legged intersection of Knott Road and SE 15th Street/Tekampe Road is stop controlled on the SE 15th Street/Tekampe Road approaches. Knott Road is an east/west road with a posted speed limit of 40 mph to the west of the intersection and 45 mph to the east of the intersection. The north leg of the intersection is SE 15th Street has a speed limit of 40 mph while the south leg, Tekampe Road, has a speed limit of 25 mph. Each leg of the intersection provides a travel lane in each direction. Knott Road though provides east and westbound left turn pockets at the intersection. The north, east, and west legs have striped shoulders of varying widths. Both Knott Road and SE 15th Street are classified as Minor Arterials. Tekampe Road is classified as a Local Road by the City of Bend.

- **Brookswood Boulevard and Pinebrook Boulevard** – The three-leg intersection of Brookswood Boulevard and Pinebrook Boulevard is stop controlled on the Pinebrook
Boulevard approach. Brookswood Boulevard is a north/south road with a speed limit of 35 mph. Pinebrook Boulevard’s western terminus forms the T-intersection. The posted speed limit on Pinebrook Boulevard is 25 mph. Each intersection approach has one travel lane in each direction, as well as bike lanes. There is also a southbound left turn pocket on Brookswood Boulevard. Brookswood Boulevard is classified as a Minor Arterial and Pinebrook Boulevard is classified as a Local Road.

**Analysis Methodology**

Operational analysis of existing conditions for the thirteen study intersections was performed using Synchro analysis software. Appendix C provides the complete report output for each intersection.

Chapter 4.7 of the Bend Development Code (City of Bend Traffic Impact Analysis Development Requirements), the following operations standards define acceptable intersection operations within the City of Bend.

- **Two-Way Stop Control (TWSC):**
  - Delay for individual lane groups < or equal to 50 seconds,
  - V/C Ratio for individual lane groups < or equal to 1.0, and
  - 95th Percentile queuing is < or equal to storage length available.

- **All-Way Stop Control (AWSC):**
  - Delay for intersection as a whole < or equal to 80.0 seconds.

- **Roundabout:**
  - V/C ratio for the intersection as a whole < or equal to 1.0

- **Signalized Intersection:**
  - Delay for intersection as a whole < or equal to 80.0 seconds,
  - V/C ratio for the intersection as a whole < or equal to 1.0, and
  - 95th Percentile queuing is < or equal to storage length available.

The Level-of-service (LOS) of an intersection is based on the average total delay that a vehicle experiences at an intersection as outlined in the Highway Capacity Manual. The City of Bend only uses the average total delay, and not the corresponding LOS to determine if an intersection is operating at an acceptable level.

The Oregon Department of Transportation uses the V/C ratio of the major road and side street to determine acceptable intersection operations. For the intersections along US 97 that were located within ODOT’s jurisdiction, the following V/C standards were used.

- **Major Road V/C Ratio** < 0.90
- **Side Street V/C Ratio** < 0.80

---

9 Bend’s Traffic Impact Analysis (TIA) Development Requirements are found at www.ci.bend.or.us/online_forms_and_documents/docs/Street_Policy_6_Traffic_Impact_Analysis_May_7_-3.doc
Average Daily Traffic Volumes

Average daily traffic (ADT) volumes for key study roadways are reported in Table 8.

Since ADT field counts were only collected at two locations within the study area, the ADT for the majority of roadways were calculated using a peak factor ratio. ADT field counts were collected for both directions along SE 15th Street south of Ferguson Road (2004) and along SE 27th Street south of Ferguson Road (2006). A peak hour ratio (P.M. peak hour volume/ADT) was then calculated from each of these daily field counts. The average peak hour ratio from the two locations determined the study area’s peak hour ratio of 0.09.

Table 8
Average Daily Traffic Volumes

<table>
<thead>
<tr>
<th>Roadway Section</th>
<th>Direction</th>
<th>P.M. Peak Hourly Volume</th>
<th>ADT Volume¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pinebrook Blvd.– East of Brookswood Boulevard</td>
<td>E-W</td>
<td>380</td>
<td>4,220</td>
</tr>
<tr>
<td>Powers Road – West of Parrell Road</td>
<td>E-W</td>
<td>185</td>
<td>2,060</td>
</tr>
<tr>
<td>Parrell Road – South of Powers Road</td>
<td>N-S</td>
<td>285</td>
<td>3,170</td>
</tr>
<tr>
<td>Parrell Road – North of Murphy Road</td>
<td>N-S</td>
<td>180</td>
<td>2,000</td>
</tr>
<tr>
<td>SE 3rd Street – North of Pinebrook Boulevard</td>
<td>N-S</td>
<td>1,380</td>
<td>15,330</td>
</tr>
<tr>
<td>SE 3rd Street – South of Murphy Road</td>
<td>N-S</td>
<td>1,120</td>
<td>12,440</td>
</tr>
<tr>
<td>US 97 – South of China Hat Road</td>
<td>N-S</td>
<td>2,535</td>
<td>28,170</td>
</tr>
<tr>
<td>SE 27th Street – South of Ferguson Road²</td>
<td>N-S</td>
<td>815</td>
<td>9,550</td>
</tr>
<tr>
<td>SE 15th Street – South of Ferguson Road</td>
<td>N-S</td>
<td>320</td>
<td>3,560</td>
</tr>
<tr>
<td>SE 15th Street – North of Knott Road</td>
<td>N-S</td>
<td>295</td>
<td>3,280</td>
</tr>
<tr>
<td>Murphy Road – West of Brosherhous Road</td>
<td>E-W</td>
<td>470</td>
<td>5,220</td>
</tr>
<tr>
<td>Murphy Road – West of Country Club Road</td>
<td>E-W</td>
<td>630</td>
<td>7,000</td>
</tr>
<tr>
<td>Murphy Road – West of Parrell Road</td>
<td>E-W</td>
<td>785</td>
<td>8,720</td>
</tr>
</tbody>
</table>

¹ – ADT values were obtained by applying a peak hour ratio of 0.09 to the P.M. peak hour volumes. The peak hour ratio of 0.09 was obtained from an average of four field count locations: NB & SB SE 15th Street and NB & SB SE 27th Street

² – Actual measured ADT is reported for the intersection of SE 27th Street/Ferguson Road.

Traffic Operations

Manual turning movement counts were collected for 15 intersections within the City of Bend on typical weekdays in August and September 2006. All counts were collected during the P.M. peak period (4:00-6:00 P.M.), which is when traffic volumes were determined to be highest on the study area roadways. These counts were collected to evaluate the existing roadways and intersection operations within the City of Bend. Appendices A – C provide a summary of the traffic methodologies, raw traffic data, and the raw traffic operational analysis results.

The operational analysis of the existing (2006) conditions is provided in Table 9 below.
The table shows that three of the thirteen intersections are currently operating at unacceptable levels. For intersections within the City of Bend’s jurisdiction, the eastbound approach of Pinebrook Boulevard at SE 3rd Street currently is operating at LOS F and the westbound approach of Pinebrook Boulevard at Brookswood Boulevard is operating at LOS F also. The westbound approach of China Hat Road/Ponderosa at US 97 lies within the Oregon Department of Transportation’s jurisdiction and currently operates at LOS F. The main reason for the high v/c ratios on these approaches is the difficulty in stopped vehicles finding a gap in the main street’s traffic stream. Therefore significant delay occurs on these approaches.

**Queuing Analysis**

The vehicle queue lengths at an intersection can impact overall operations by delaying and restricting the corridor’s ability to function adequately. Significant queues lengths can result in spillback into the main roadway section, thereby blocking side-street private driveways and hindering through traffic from proceeding even if that movement has a green signal, or blocking an upstream intersection from operating appropriately. Additionally, if the stop-controlled approach only provides one lane, traffic turning left can delay right-turning vehicles while they wait for a safe gap in the uncontrolled traffic stream to turn.
The existing vehicle storage length and 95th percentile queue length during the PM peak hour is reported for all stop controlled approaches at unsignalized intersections and for all approaches at the signalized SE 3rd Street at Murphy Road intersection. The Synchro software package was used to provide the queue lengths for all intersections except at US 97 at China Hat Road/Ponderosa Drive intersection where the Synchro/Simtraffic traffic simulation software package was used to abide by ODOT guidelines for intersections that operate over a v/c ratio of 0.70 (see Appendix D).

There are no queues that exceed past the pocket length. The intersections of US97/China Hat-Ponderosa, 3rd/Pinebrook, 3rd/Murphy, and Brookswood/Pinebrook all have at least one lane group that has a 95th percentile queue that exceeds 200 feet. Potential areas of concern for these intersections are with safety issues associated with the long queue or spillback of the queue to the previous intersection.

Existing Utilities

This section describes existing utilities within the Murphy Road Corridor. For the purposes of discussion, the corridor has been organized into the following four segments:

Cascade Natural Gas

Cascade Natural Gas is the utility service provider for the Murphy Road corridor. All of Cascade’s facilities are located underground and therefore will have minimal impacts while roadway improvements to Murphy Road are being constructed. Except for Segment 1, no new easements or right of way acquisition will be needed to remove/replace Cascade Natural Gas facilities.

- **Segment 1** – Along Segment 1, Cascade Natural Gas has an existing 2” gas main running along the south side of Murphy Road from SE 3rd Street to Parrell Road. Residential services are provided off of this 2” main. The eminent realignment of Segment 1 means consideration will be needed to determine the future location of this utility between SE 3rd Street and Parrell Road. The City of Bend will need to either have Cascade remove and relocate their existing gas main to Murphy’s new alignment or maintain an easement for their utility in its current location. Residential services will also need to be restored if the relocation of the main is decided upon.

- **Segment 2** – The 2” gas main continues into Segment 2 along Murphy Road’s south side to about Mel Court. Starting from about Mel Court east to Paulina Lane the 2” main changes over to a 4” main and runs along the south side of Murphy Road. Several residences and local cross streets are serviced off of these mains. Existing facilities like meters, for example, will need to relocated/adjusted to fit within the Murphy Road improvements.

- **Segment 3** – There are no existing gas facilities located in Segment 3, except for a 6” high-pressure main on SE 15th Street. The 6” main runs north to south along the west

---

10 The 95th percentile queue is defined as the queue threshold where 95% of queues experienced at a particular lane group are less than.
side of SE 15th Street. Coordination between proposed utilities and this gas line will be needed to minimize potential conflicts.

- **Segment 4** – In Segment 4, Cascade Natural Gas provides residential services from its 2” main, running under the neighborhood streets in the neighborhood just south of Ferguson Road. There is also a 2” and 4” main running north to south on SE 27th Street. Some work will be needed by the gas company to accommodate the location of the new Murphy Road alignment.

**Pacific Power**

Pacific Power is a power service provider for the majority of the Murphy Road corridor; their service area includes all of Segments 1, 2, and 3. Facilities along Murphy are located both above ground on poles and underground. Their utilities will probably have the largest impact to the proposed roadway improvements. The right of way acquisition needed to make Murphy Road meet city requirements should be adequate to provide Pacific Power room to relocate their utilities.

- **Segment 1** – Power lines run along the south side of Segment 1 on power poles spaced at about 225 feet apart. The eminent realignment of Segment 1 means consideration will be needed to determine the future location of this utility between SE 3rd Street and Parrell Road. The City of Bend will need to either have Pacific Power remove and relocate their existing power poles to Murphy’s new alignment or maintain an easement for their utility in its current location. There are also large transmission line towers running north to south along the eastside of SE 3rd Street. The towers along SE 3rd Street are spaced about 200 feet apart and consideration will be taken to avoid these towers, if possible, when new alignments for Murphy Road are discussed.

- **Segment 2** – The power poles continue along Segment 2 and are on the south side of Murphy Road from Parrell Road to Mel Court, from there the poles move over to the north side of the road. Also at various locations along this segment there are underground service lines, which cross over Murphy to serve residencies on the other side of the street. At Country Club Road the power poles cross over Murphy and run south along Country Club Road. From Country Club Road east along Murphy Road to Paulina Lane there are no existing power facilities except for a utility vault, which will need to be relocated to fit the roadway improvements. From Paulina Lane east to Brosterhous Road power poles are located on the south side of Murphy Road and are spaced at 215 feet apart. The power lines on Murphy then join lines running north to south along the west side of Brosterhous Road.

- **Segment 3** – There should be no conflicts with Pacific Power’s existing or proposed facilities along Segment 3’s roadway construction. The proposed development south of the proposed Murphy Road alignment will be serviced by Pacific Power via underground lines. Coordination between proposed utilities and underground power lines will be needed to minimize potential conflicts.

- **Segment 4** – There are no existing or proposed Pacific Power facilities located in Segment 4. This segment is Central Electric’s service area.
Central Electric

Central Electric is the power service provider for Segment 4 of the Murphy Road corridor. Their service area includes everything east of SE 15th Street within the project area. Their facilities along Segment 4 are both above ground on poles and are also underground sporadically around the area of interest. The right of way acquisition needed to help Murphy Road meet city requirements should be adequate to provide Central Electric room to relocate their utilities.

- **Segment 1** – There are no existing or proposed Central Electric facilities located in Segment 1. This segment is part of Pacific Power’s service area.
- **Segment 2** – There are no existing or proposed Central Electric located facilities in Segment 2. This segment is also part of Pacific Power’s service area.
- **Segment 3** – There are no existing or proposed Central Electric facilities located in Segment 3. This segment is also a part of Pacific Power’s service area.
- **Segment 4** – Central Electric is the power service provider for Segment 4 and has sporadic facilities in the area of interest. The neighborhood south of Ferguson Road is served off of transmission lines running along Ferguson. The majority of facilities in this neighborhood are underground lines servicing the residents, but there are also some various locations with overhead lines. Central Electric also has underground lines on the east side SE 27th Street running south from Ferguson to serve the Public Works building and to serve the local middle school.

USWEST/QWEST

USWEST/QWEST has facilities located along the majority of Murphy Road. There are telephone pedestals and utility locator poles at various locations along the road, which will need to be relocated to fit within the roadway improvements. The impacts to USWEST/QWEST facilities cannot be fully determined until more information is provided by USWEST/QWEST. The right of way acquisition needed to help Murphy Road meet city requirements should be adequate to provide USWEST/QWEST room to relocate their utilities.

- **Segment 1** – There is a utility locator pole marking the presence of underground utilities on the south side of Murphy Road about 2 feet behind the curb. The eminent realignment of Segment 1 means consideration will be needed to determine the future location of this utility between SE 3rd Street and Parrell Road. The City of Bend will need to either have USWEST/QWEST remove and relocate their existing underground utilities to Murphy’s new alignment or maintain an easement for their utility in its current location.
- **Segment 2** – There are several telephone pedestals/vaults and locator posts spaced along the north side of Murphy Road. Their utility features and lines will need to be relocated to fit the proposed roadway improvements. More information from USWEST/QWEST is needed to determine their extent of underground facilities.
- **Segment 3** – There is no presence of there being any existing USWEST/QWEST facilities along Segment 3. Verification will need to be made on the location of existing utilities, if any exist.

- **Segment 4** – There is no presence of there being any existing USWEST/QWEST facilities along Segment 4. Verification will need to be made on the location of existing utilities, if any exist.

**Avion Water**

Avion Water is the water service provider for Segment 4 of Murphy Road’s improvements and currently has no existing facilities in any of the other segments. Their service area includes the area east of SE 15th Street up to and including land east of SE 27th Street. Impact to their facilities from roadway construction should be minimal. The right of way acquisition needed to extend Murphy Road to SE 27th Street should provide room for Avion Water to relocate their utilities within the right of way.

- **Segment 1** – There are no existing or proposed Avion Water facilities located in Segment 1. This segment is Roats Water service area.

- **Segment 2** – There are no existing or proposed Avion Water facilities in Segment 2. This segment is Roats Water and City of Bend Water Department’s service area.

- **Segment 3** – There are no existing or proposed Avion Water facilities in Segment 3. This segment is part of City of Bend Water Department’s service area.

- **Segment 4** – Avion Water is the water service provider for all of Segment 4. They have a 12” water main running north to south along SE 15th Street and also have 8” water mains running under most of the streets in the neighborhood south of Ferguson Road. An 18” main also runs north to south in the field east of the neighborhood and there is also a 10” line on SE 27th Street. Some work maybe needed to accommodate the location of the new Murphy Road alignment.

**Roats Water**

Roats Water is the water service provider for Murphy Road’s Segment 1. Their service area also includes the area east of Parrell Road along Murphy Road to Country Club Road. The impacts to Roats Water facilities cannot be fully determined until more information is provided. The right of way acquisition needed to meet city requirements should provide room for Roats Water to relocate their utilities within the right of way.

- **Segment 1** – Roats Water provides water service to all residents and businesses along Segment 1 of Murphy Road. The locations and sizes of water mains to be affected by Murphy Road improvements have not been determined at this time. The eminent realignment of Segment 1 means consideration will be needed to determine the future location of this utility between SE 3rd Street and Parrell Road. The City of Bend will need to either have Roats Water remove and relocate their existing underground utilities to Murphy’s new alignment or maintain an easement for their utility in its current location.

- **Segment 2** – Roats Water also provides water services to a portion of Segment 2. They provide water service to all residences west of Country Club Road. Water service east of
Country Club Road is provided by the City of Bend Water Department. Water main location and sizes have not been determined at this time.

- **Segment 3** – There are no existing or proposed Roats Water facilities in Segment 3. This segment is part of City of Bend Water Department’s service area.

- **Segment 4** – There are no existing or proposed Roats Water facilities in Segment 4. This segment is part of Avion’s water service area.

### City of Bend Water Department

The City of Bend is the water service provider for a portion of Segment 2. Their service area includes everything along Murphy Road east of Country Club Road to SE 15th Street. The impacts to the City’s Water facilities cannot be fully determined until more information is provided. The right of way acquisition needed to meet city requirements should provide room for the Water Department to relocate their utilities within the right of way, if needed.

- **Segment 1** – There are no existing or proposed City Water facilities in Segment 1. This segment is part of Roats Water service area.

- **Segment 2** – The City of Bend and Roats Water provides water service to Segment 2. The City of Bend provides water to residences east of Country Club Road. The size and locations of existing water mains have not been determined at this time, but the impact to their facilities should be minimal.

- **Segment 3** – It has been determined that the City of Bend has existing water facilities located in Segment 3 from the presence of utility locate poles in the grass field west of SE 15th Street. These utility locate poles are used as a warning to existing underground facilities in the area. The size and depth of this existing main is still to be determined.

- **Segment 4** – There are no existing or proposed City of Bend water facilities in Segment 4. This segment is part of Avion’s water service area.

### Next Steps

The next task will explore how expected residential and employment growth in Bend will impact the Murphy corridor over the next 20 years. Potential improvements to rectify current deficiencies and accommodate future growth will be developed and tested, with the objective of identifying one preferred set of improvements to recommend in the corridor study.
APPENDIX E

FUTURE CONDITIONS AND DEFICIENCIES
Introduction

The future traffic analysis for the Murphy Road Corridor Project was conducted to identify expected future traffic conditions and congested-related deficiencies within the project study area. The purpose of this task is to determine how improvements to Murphy Road, including a westerly extension to Brookwood Boulevard and an easterly extension to 15th Street, affect future travel patterns and future traffic operations within the study area and southeast Bend.

Findings from the analysis indicate that traffic volumes along Murphy Road increase under all future scenarios. Traffic increases are higher under scenarios where improvements are made to Murphy Road, although the net difference observed from widening to a five-lane cross section was not significant. Furthermore, the addition of signals at Parrell Road, Country Club Road, and 15th Street, and left turn pockets along Murphy Road at each intersection between 3rd Street and 15th Street bring traffic operations along Murphy Road into compliance with relevant City of Bend and Oregon Department of Transportation (ODOT) mobility standards. The analysis also shows that an extension of Murphy Road east to 27th Street shifts a low to moderate amount of traffic onto Murphy Road from 15th Street and Knott Road.

Methodology and Assumptions

Future travel patterns and volumes were obtained through the Bend Metropolitan Planning Organization (MPO) EMME/2 travel demand model. Model runs were conducted by ODOT’s Transportation Planning and Analysis Unit (TPAU). Future land use assumptions were developed by the Bend MPO and used in all models developed by TPAU. The year 2030 was set as the future forecast target year.

1 Traffic signals were analyzed at Parrell Road, Country Club Drive and 15th Street. Though it is anticipated that roundabouts would work at these locations as well, further operations analysis at these locations would be required prior to final recommendation.
Two groups of future conditions scenarios were analyzed as part of the Murphy Road Project:

1. 2030 No Build (future traffic volumes with no major changes to transportation network)

2. 2030 Build – Improvements to Murphy Corridor Only
   a. Three-Lane Murphy Road between 3rd and Brosterhous, westerly extension of Murphy Road to Brookswood and easterly extension to 15th Street
   b. Similar to (a) above, except widening Murphy Road to a five-lane cross section between 3rd and Brosterhous
   c. Similar to (a) above, except continue extension of Murphy Road to 27th Street to the east.

A description of each scenario is presented in the sections below. Improvements for all 2030 scenarios are shown in Figure 1.

2030 No Build

The 2030 No Build scenario includes future land use assumptions, future background projects that are part of the City of Bend’s Capital Improvement Program (CIP) and the State of Oregon’s State Transportation Improvement Program (STIP), and privately funded projects that are funded and expected to be built in the near term. In the 2030 No Build scenario, Murphy Road is a 2-lane section that terminates at 3rd Street to the west and Brosterhous Road to the east.

2030 Build – Improvements to Murphy Road Only

2030 Build - Murphy Crossing and Extension Only

The 2030 Build - Murphy Crossing and Extension Only scenario includes widening Murphy Road to a three-lane section along its existing alignment and extending the corridor to 15th Street to the east as a three lane roadway. This scenario includes all background projects that are included within the 2030 No Build scenario. The 2030 Build - Murphy Crossing and Extension Only scenario also includes the Murphy Road Crossing project from 3rd Street to Brookswood Boulevard to the west.

Along the Murphy Road corridor between 3rd Street and 15th Street, left turn pockets were added at each east and west approach at Parrell Road, Country Club Road, Brosterhous Road, and 15th Street. Signals were added at the intersections of Murphy Road/Parrell Road, Murphy Road/Country Club Road, and Murphy Road/Brosterhous Road. Roundabouts could also be considered at these locations. Based on the 2001/2002 Bend City Council Transportation Implementation Plan, the city has a policy of considering roundabouts as the preferred option of intersection control.
Murphy Road Project Improvements:

2030 Build - Murphy Crossing:
- Add Left Turn Pockets on E/W Approaches
- Extension of Murphy to 15th Street
- Improve to 3-Lane Section
- Signalize Parrell, Country Club, & Brosterhous*
- Signalize 3rd Street/Pinebrook in “Build” Scenarios

2030 Build - Murphy Crossing, Modification A
- Includes 2030 Murphy Crossing Project Improvements
- Improve Murphy to 5-Lane section between 3rd Street and Brosterhous Road

2030 Build - Murphy Crossing, Modification B
- Includes 2030 Murphy Crossing Project Improvements
- Included extension of Murphy Road to 27th Street.

Planned Future Improvement:
- Extend Murphy Road to Brookswood Blvd.
- Construct Murphy Road as 3-Lane Roadway
- Included in All “Build” Scenarios

Murphy Road Project Improvements:

2030 Build - Murphy Crossing, Modification B
- Includes 2030 Murphy Crossing Project Improvements
- Included extension of Murphy Road to 27th Street.

Figure 1. Murphy Crossing and Extension Project Improvements

*Roundabouts may be considered at Parrell Road, Country Club Road, and Brosterhous along Murphy Road. Further analysis would be required to determine if acceptable operations will occur with the inclusion of roundabouts.
2030 Build - Modification A
The 2030 Build Modification A is based off of the 2030 Build - Murphy Crossing and Extension Only scenario, but expands Murphy Road to a five-lane cross-section between 3rd Street and Brosterhous Road. This requires an additional lane of capacity in each direction on this section of road. Future background committed projects and the portion of Murphy Road between Brosterhous Road and SE 15th Street remain the same as the 2030 No Build and 2030 Build - Murphy Crossing and Extension Only scenarios.

2030 Build - Modification B
The 2030 Build - Modification B scenario, extends Murphy Road to 27th Street as a three-lane roadway. The connection of Murphy Road at 27th Street will be near the 27th Street/Rickard Road intersection. Future background committed projects and the portion of Murphy Road between Brookswood Boulevard and 15th Street remain the same as the 2030 No Build and 2030 Build - Murphy Crossing and Extension Only scenarios.

Model Forecast Results
PM peak future roadway volumes were estimated by TPAU through the Bend MPO EMME/2 travel demand model for each of the scenarios. Volume difference plots were created to determine the level and types of impacts that occurred due to each scenario. Green bars represent areas where the first scenario is larger than the second scenario and red bars represent roadway where the second scenario is larger than the first scenario. Raw EMME/2 travel demand model volumes were used to develop the volume difference plots for the scenarios described below.

2030 No Build
In relationship to existing conditions, the 2030 No Build scenario showed traffic growth occurring on all roadways. As illustrated in Figure 2 below, roadways with the largest amount of growth included Brosterhous Road, Bend Parkway, and 15th Street.

Figure 2 shows the traffic volume difference plot for the [2030 No Build (−) Existing] scenarios.
2030 Build – Murphy Crossing and Extension Only

In comparison to the 2030 No Build scenario, the 2030 Build - Murphy Crossing and Extension Only scenario shows growth of traffic volumes occurring along Murphy Road between Brookswood Boulevard and 15th Street, along 15th Street between Reed Market Road and Murphy Road, and to a lesser extent, along Ferguson Road and 27th Street north of Ferguson Road. The 2030 Build - Murphy Crossing and Extension Only scenario also shows a reduction in traffic volumes along Country Club Road, the Bend Parkway, 27th Street/Knott Road between 15th Street and Ferguson Road, and along 15th Street south of Murphy Road. The reduction of traffic volumes at these locations is attributed to the fact that the extension of Murphy Road to 15th Street causes Murphy Road to become more attractive for trips traveling east-west and thus draws trips from other available routes that may not be as desirable. Figure 3 shows the traffic volume difference plot for the [2030 Build – Murphy Crossing and Extension Only] (-) [2030 No Build] scenarios.
Figure 3. [2030 Build – Murphy Crossing and Extension Only] (-) [2030 No Build] Volume Difference Plot

2030 Build – Modification A

The 2030 Build - Modification A scenario results in virtually the same travel patterns and volumes as the 2030 Build - Murphy Crossing and Extension Only scenario. There is no significant difference between the roadway volumes of these two scenarios. A potential reason for their similarity is because both scenarios include the Murphy Road extension between Brosterhous Road and 15th Street and both scenarios have the same capacity at this location. If the 2030 Build - Modification A scenario were to extend the five-lane cross-section of Murphy to 15th Street, it could potentially draw more trips to the Murphy corridor. Further analysis would need to be conducted to make this assessment. Current analysis shows that Murphy Road would operate at an acceptable level as a three-lane cross section.

Figure 4 shows the traffic volume difference plot for the [2030 Build –Modification A] (-) [2030 No Build] scenarios. Figure 5 shows the traffic volume difference plot for the [2030 Build – Modification A] (-) [2030 Build – Murphy Crossing and Extension Only] scenarios.
2030 Build – Modification B

The 2030 Build - Modification B scenario results in a similar increase in roadway volumes as the 2030 Build - Murphy Crossing and Extension Only scenario for all roadways except 15th Street south of Murphy Road and 27th Street/Knott Road between 15th Street and Ferguson.
Road, where volumes are decreased due to the extension of Murphy Road to 27th Street. By extending Murphy Road to 27th Street, the extension becomes a more desirable route for vehicles trying to travel east-west due to its direct connection to 27th Street. This in turn causes 27th Street and Knott Road between 15th Street and Ferguson Road to become less desirable and reduces traffic volumes along these roadways. The 2030 Build – Modification B scenario shows approximately 400 vehicles/hour using the new portion of Murphy Road between 15th Street and 27th Street. These volumes are substantially lower than what is observed on the existing section of Murphy Road (approximately 1,000 vehicles/hour immediately east of the Parrell Road intersection). Although extending Murphy Road to 27th Street provides moderate relief to Knott Road, other effects of this extension are not substantial.

Figure 6 shows the traffic volume difference plot for the [2030 Build – Modification B] (-) [2030 No Build] scenarios. Figure 7 shows the traffic volume difference plot for the [2030 Build – Modification B] (-) [2030 Build – Murphy Crossing and Extension Only] scenarios.

Figure 6. [2030 Build – Modification B] (-) [2030 No Build] Volume Difference Plot
Traffic Operations

A PM peak hour operational and queuing analysis was conducted for all 14 study area intersections for the 2030 No Build and 2030 Build - Murphy Crossing and Extension Only scenarios using the Synchro (version 6) traffic analysis software package. Future turning movement volumes were obtained by post-processing raw turning movement volumes from the Bend MPO EMME/2 travel demand model according to standards described in National Cooperative Highway Research Program (NCHRP) Report 255. The software program WTURNS, which utilizes NCHRP 255 standards, was used to post-process the raw EMME/2 turning movement volumes.

Operational Analysis Results

The intersection operational analysis showed that two intersections operate at levels greater than the mobility standard in the 2030 No Build scenario, and three intersections will be operating at higher than acceptable levels in the 2030 Build - Murphy Crossing and Extension Only scenario. The 2030 No Build analysis is illustrated as Figure 8, and the 2030 Build – Murphy Crossing and Extension Only analysis is illustrated as Figure 9. The intersections of Knott Road/15th Street and 3rd Street/Pinebrook Boulevard are not expected to meet City of Bend traffic operations requirements in both scenarios. In addition, the intersection of Murphy Road/Brosterhous Road is not expected to meet traffic operations requirements in the 2030 No Build scenario. The unacceptable operations at Murphy Road/Brosterhous Road will be resolved with the improvements to Murphy Road as part of the project. The unacceptable operation at Knott Road/15th Street is not attributable to the Murphy Crossing project since they are expected to fail in the 2030 No Build scenario.
**FIGURE 8**

Murphy Road Corridor
Bend, Oregon

Study Area: Intersection
LOS, Volumes, Channelization
2030 No Build Conditions and Deficiencies

**LEGEND**

1. Meets Bend’s Traffic Operational Requirements
2. Does Not Meet Bend’s Traffic Operational Requirements
3. Meets TWSC or AWSC
4. Channelization
5. Stop Controlled Intersection/Approach
6. Signalized Intersection
7. HV% = Percent Heavy Vehicles (by approach)

**NOTE:** For TWSC or AWSC, delay is reported for the highest minor street lane group delay.
This page left blank intentionally.
1 SW Powers Rd & US 97 SB Ramps
Intersection Delay: 30.7
V/C: 0.72
Intersection Delay: 30.8
V/C: 0.38

515
3.3% 140
turn
5
310
345
2.2% 545
3.4%

2 SW Powers Rd & US 97 NB Ramps
Intersection Delay: 12.3
V/C: 0.42

3 SE Powers Rd & SE Parrell Rd
Intersection Delay: 50.9
V/C: 0.30

4 SE Ferguson Rd & SE 15th St
Intersection Delay: 23.0
V/C: 0.53

5 US 97 & Ponderosa/China Hat
Intersection Delay:

6 SE Knott Rd & SE 15th St
Intersection Delay: 35.2
V/C: 0.56

7 SW Pinebrook & SW Brookswood
Intersection Delay: 14.5
V/C: 0.25

8 SW Pinebrook Blvd & SE 3rd St
Intersection Delay: 10.4
V/C: 0.53

9 SE Murphy Rd & SE 3rd St
Intersection Delay: 28.7
V/C: 0.67

10 SE Murphy Rd & SE Parrell Rd
Intersection Delay: 11.8
V/C: 0.68

11 SE Murphy Rd & SE Country Club Rd
Intersection Delay: 16.3
V/C: 0.79

12 SE Murphy Rd & SE Brosterhous Rd
Intersection Delay: 18.3
V/C: 0.35

14 SE Ferguson Rd & SE 27th St
Intersection Delay: 185
V/C: 1.50

Intersection Number
Murphy Road Corridor
Bend, Oregon
Study Area Intersection
LOS, Volumes, Channelization
2030 Build Conditions and Deficiencies

***FIGURE 9***

LEGEND

V/C = Percent Heavy Vehicles (by approach)
NOTE: For TWSC or AWSC, delay is reported for the highest minor street lane group delay
This page left blank intentionally.
The 2030 Build – Murphy Crossing and Extension Only scenario assumes that signals are constructed at 3rd Street/Pinebrook Road, Murphy Road/Parrell Road, Murphy Road/Country Club Road, and Murphy Road/Brosterhous Road as part of the project. Without signals at these intersections, it is expected that they will have unacceptable operations in the 2030 Build scenario. Further analysis of these intersections is required to determine if roundabouts at these locations will achieve acceptable operations in the 2030 Build scenario and whether signal warrants will be met at these locations. The city has a policy of considering roundabouts as the preferred option of intersection control.

With the expected improvements made to Murphy Road intersections as part of the project, all of the study intersections along Murphy Road between 3rd Street and 15th Street are expected to meet the city’s traffic operations requirements.

### TABLE 1
Intersection Operational Analysis – 2030 No Build and 2030 Build – Murphy Crossing and Extension Only

<table>
<thead>
<tr>
<th>Intersection</th>
<th>2030 No Build</th>
<th>2030 Build - Murphy Crossing and Extension Only</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control Type(^{\text{a}})</td>
<td>V/C Ratio(^{1})</td>
</tr>
<tr>
<td>Powers Road at Bend Pkwy (SB Ramps)</td>
<td>TWSC</td>
<td>0.55</td>
</tr>
<tr>
<td>Powers Road at Bend Pkwy (NB Ramps)</td>
<td>TWSC</td>
<td>0.57</td>
</tr>
<tr>
<td>Parrell Road at Powers Rd.</td>
<td>TWSC</td>
<td>0.25</td>
</tr>
<tr>
<td>SE 15th Street at Ferguson Rd.</td>
<td>TWSC</td>
<td>0.18</td>
</tr>
<tr>
<td>US 97 at Ponderosa Dr./China Hat Rd.</td>
<td>TWSC</td>
<td>0.53</td>
</tr>
<tr>
<td>Knott Road at SE 15th St/Tekampe Rd.</td>
<td>TWSC</td>
<td>&gt;1.50</td>
</tr>
<tr>
<td>Brookwood Blvd at Pinebrook Blvd.</td>
<td>TWSC</td>
<td>0.51</td>
</tr>
<tr>
<td>SE 3rd Street at Pinebrook Blvd.</td>
<td>TWSC</td>
<td>&gt;1.50</td>
</tr>
<tr>
<td>SE 3rd Street at Murphy Rd.</td>
<td>Signal</td>
<td>0.70</td>
</tr>
<tr>
<td>Murphy Road at Parrell Rd.</td>
<td>TWSC</td>
<td>0.52</td>
</tr>
<tr>
<td>Murphy Road at Country Club Rd.</td>
<td>TWSC</td>
<td>0.42</td>
</tr>
<tr>
<td>Murphy Road at Brosterhous Rd.</td>
<td>TWSC</td>
<td>0.98</td>
</tr>
<tr>
<td>Murphy Road at 15th St.</td>
<td>Does Not Exist in No Build Scenario</td>
<td></td>
</tr>
<tr>
<td>Ferguson Road at 27th St.</td>
<td>TWSC</td>
<td>0.64</td>
</tr>
</tbody>
</table>

**Notes:**
1 – The maximum individual lane group volume-to-capacity ratio (v/c ratio) from the intersection analysis.
2 – For TWSC or AWSC intersections, reported delay is for the highest minor street lane group delay.
* Information reported in **bold** font indicates higher than acceptable levels of congestion.
\(^{\text{a}}\) Control Definitions: TWSC = Two Way Stop Controlled, AWSC = All Way Stop Controlled

**Queuing Results**
An analysis of the 95th percentile queue length during the PM peak hour for the 2030 No Build and 2030 Build – Murphy Crossing and Extension Only scenario is reported for all stop...
controlled approaches at unsignalized intersections and for all approaches at the signalized SE 3rd Street at Murphy Road intersection. The Synchro software package was used to provide the queue lengths for all study area intersections.

The intersections of Knott Road/15th Street, Pinebrook Blvd./3rd Street, and Murphy Road/3rd Street all have at least one lane group that has a 95th percentile queue that exceeds 200 feet in the 2030 No Build scenario. The intersections of Knott Road/15th Street, Pinebrook Blvd./3rd Street, Murphy Road/3rd Street, Murphy Road/Parrell Road, Murphy Road/Country Club Road, Murphy Road/Brosterhous Road, Ferguson Rd./27th Street, and Powers Road/Bend Parkway SB Ramps all have at least one lane group where the 95th percentile queue exceeds 200 feet in the 2030 Build- Murphy Crossing and Extension Only scenario. A potential area of concern for approaches where the 95th percentile queue exceeds 200 feet is with safety issues associated with the long queue or spillback of the queue to the previous intersection.

**Summary of Key Findings**

The 2030 model forecast results show that extending Murphy Road to Brookswood Boulevard on the west and 15th Street on the east as a three-lane roadway (2030 Build - Murphy Crossing and Extension Only) will increase traffic volumes along Murphy Road and 15th Street to the north of Murphy Road, and decrease traffic volumes along Brosterhous Road, Knott Road, 27th Street, and the Bend Parkway. The model forecasts show essentially the same traffic volume results with both the three-lane (2030 Build - Murphy Crossing and Extension Only) and five-lane (2030 Build, Modification A) Murphy Road cross-section. Results from the travel demand model show that the majority of trips destined to eastbound Murphy Road originate from west of Bend Parkway, with a smaller amount originating from 3rd Street to the north and south of Murphy Road. The majority of trips destined to westbound Murphy Road originate from east of 27th Street and then utilize SB 15th street, with a smaller amount utilizing SB Brosterhous Road.

Extending Murphy Road to 27th Street (2030 Build - Modification B) generally adds traffic volumes along Murphy Road and 15th Street north of Murphy Road, and decreases traffic along 15th Street south of Murphy and along Knott Road and 27th Street. The extension of Murphy Road to 27th Street shifts a slight to moderate amount of traffic traveling along Knott Road and 27th Street to utilize the more direct connection of the Murphy Road extension.

In the 2030 Build - Murphy Crossing and Extension Only scenario, all intersections along Murphy Road between 3rd Street and 15th Street are expected to operate at an acceptable level-of-service when left turn pockets are added on the east and west approaches and signals are added at Murphy Road/Brosterhous Road, Murphy Road/Country Club Road, and Murphy Road/Parrell Road. Roundabouts could also be considered at these locations.

It is expected that two intersections outside of the Murphy Road corridor (Knott Road/15th Street and Pinebrook Blvd./3rd Street), will not meet the City of Bend’s traffic operations standards in the 2030 No Build scenario. In the 2030 Build - Murphy Crossing and Extension Only scenario, two intersections, Ferguson Road/15th Street and Ferguson Road/27th Street, are expected to not meet the city’s traffic operations standards.
APPENDIX F

FUTURE CONDITIONS AND DEFICIENCIES
This memorandum describes future transportation conditions, deficiencies, and needs along and adjacent to the Murphy Road corridor under a future “high growth” land use scenario. This alternate land use scenario was explored as a sensitivity test for the Murphy Road preferred alternative. The objective of the sensitivity test was to identify whether the recommended Murphy Road corridor transportation improvements would be adequate to address a greater level of growth than what is currently anticipated in the Bend Metropolitan Planning Organization (MPO) regional travel demand model.

Methodology and Assumptions
The Bend MPO’s travel demand model assumed moderate growth rates along the corridor, to include development along the corridor and in the larger area of southeast Bend. The travel demand model (referred to in this memo as “base case” land use) includes recent and anticipated development projects, and assumes growth consistent with the City’s comprehensive plan.

Several members of the Murphy Road Corridor Study Technical Advisory Committee (TAC) met in November 2006 to determine what specific areas in southeast Bend could experience development in addition to what was assumed in the regional travel demand model. This “potential additional development” was translated into households and jobs organized by Traffic Analysis Zone (TAZ), in order to be reflected in the regional travel demand model. Additions were then reviewed by the City of Bend, the Oregon Department of Transportation (ODOT), and the Bend MPO. The revised changes to the base case scenario that resulted from this exercise are listed below by TAZ. The location of these TAZs is illustrated in Figure 1.

- TAZ 472 - Modify land use from RL (Low Density Residential) to RM (Medium Density Residential) and provide the maximum number of housing units based on RM zoning (21.7 housing units/acre)
- TAZ 492 - Modify household units based on maximum RM density, currently established at 21.7 housing units/acre
• TAZ 556 – Modify land use to RS and modify household units to 6.6 units/acre and increase employment to 50 people/acre (based on Steven Tract Master Plan)

• TAZ 557 – Modify land use to RS and modify household units to 6.6 units/acre and increase employment to 50 people/acre (based on Steven Tract Master Plan).

The net difference in households and jobs by affected TAZ are provided in Table 1 below. Overall, the high growth land use scenario added more than 2,300 households and almost 50 jobs to the southeast Bend area.

<table>
<thead>
<tr>
<th>TAZ</th>
<th>High Growth Zoning</th>
<th>2030 Base Case</th>
<th>2030 High Growth Scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Households</td>
<td>Employment</td>
</tr>
<tr>
<td>472</td>
<td>RM</td>
<td>148</td>
<td>6</td>
</tr>
<tr>
<td>492</td>
<td>RM</td>
<td>2</td>
<td>95</td>
</tr>
<tr>
<td>556</td>
<td>RS</td>
<td>753</td>
<td>330</td>
</tr>
<tr>
<td>557</td>
<td>RS</td>
<td>480</td>
<td>0</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>1,383</td>
<td>431</td>
</tr>
<tr>
<td>NET DIFFERENCE</td>
<td></td>
<td>2,345</td>
<td>46</td>
</tr>
</tbody>
</table>

ODOT’s Transportation Planning and Analysis Unit (TPAU) modified the 2030 base case with the expected growth land use scenario (referred to as “Murphy Crossing Only” scenario) and the high growth land use scenario. The Murphy Crossing Only scenario differs from the future No Build in that it considers Murphy Road extended to Brookswood Boulevard on the west and to 15th Street on the east. Please refer to Technical Memorandum 5.1 Future Conditions and Deficiencies for more information on this analysis scenario.

**Model Forecast Results**

Peak PM hour future roadway volumes were estimated by TPAU through the Bend MPO EMME/2 travel demand model for the high growth land use scenario. Volume difference plots were created to determine the level and types of impacts that occurred due to each scenario. Green bars represent areas where the first scenario is larger than the second scenario and red bars represent roadway where the second scenario is larger than the first scenario. Raw EMME/2 travel demand model volumes were used to develop the volume difference plots for the following two scenarios (see Figures 2 and 3).
Figure 1: TAZs Impacted by High Growth Scenario
Back of Figure 1
- 2030 High Growth Scenario (-) 2030 No Build
- 2030 High Growth Scenario (-) 2030 Murphy Crossing Only

Figure 2: 2030 High Growth Scenario (-) 2030 No Build

Figure 2 shows a moderate increase in traffic along Murphy Road between Brookswood Boulevard and 15th Street between the future high growth land use scenario and the future no build. Traffic increases are more pronounced in the eastbound than in the westbound direction, and at the east and west ends (between Brosterhous and 15th, and between Brookswood and 3rd) than along the existing corridor. The high growth land use scenario also creates additional traffic along Parrell Road, along 15th Street north of Murphy Road, along Ferguson Road, and along 27th Street north of Ferguson Road. Traffic appears to shift from the Parkway to Murphy Road between the highway and Brookswood Boulevard.

Figure 3 illustrates the delta difference in traffic volumes between the high growth land use scenario and the 2030 Murphy Crossing Scenario.
As shown in Figure 3, traffic volume differences between the future base case scenario and the future high growth land use scenario were slight along Murphy Road, between a decrease in traffic by 34 vehicles (westbound direction between Brosterhous and Country Club) and an increase by 152 vehicles (in westbound direction between 15th and Brosterhous). Traffic increases along Brosterhous Road north of Murphy, and along Parrell Road north of Murphy. Traffic increases are also seen along Ferguson east of 15th, and along 27th Street north of Ferguson.

Traffic Analysis Results
A PM peak hour operational analysis was conducted for all 14 study area intersections for the 2030 Build - Murphy Crossing and Extension Only “High Growth” scenario using the Synchro (version 6) traffic analysis software package. Future turning movement volumes were obtained by post-processing raw turning movement volumes from the Bend MPO EMME/2 travel demand model according to standards described in National Cooperative Highway Research Program (NCHRP) Report 255.

Table 2 shows the results of the analysis. The 2030 Build - Murphy Crossing and Extension Only “High Growth” scenario is expected to have four intersections that do not meet the City of Bend’s traffic operational requirements, 15th St./Ferguson Rd., 15th St./Knott Rd., 15th St./Murphy Rd., and 27th St./Ferguson Rd.

Figure 4 shows turning movements volumes, level-of-service results and intersection channelization for all study intersections.
### Table 2

Intersection Operational Analysis Results

<table>
<thead>
<tr>
<th>Intersection</th>
<th>2030 No Build</th>
<th>2030 Build: Expected Growth</th>
<th>2030 Build: High Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control Type</td>
<td>V/C Ratio</td>
<td>Delay (sec/veh)</td>
</tr>
<tr>
<td>Powers Road at Bend Pkwy (SB Ramps)</td>
<td>TWSC</td>
<td>0.55</td>
<td>21.4</td>
</tr>
<tr>
<td>Powers Road at Bend Pkwy (NB Ramps)</td>
<td>TWSC</td>
<td>0.57</td>
<td>14.7</td>
</tr>
<tr>
<td>Parrell Road at Powers Rd.</td>
<td>TWSC</td>
<td>0.25</td>
<td>10.5</td>
</tr>
<tr>
<td>SE 15th Street at Ferguson Rd.</td>
<td>TWSC</td>
<td>0.18</td>
<td>25.4</td>
</tr>
<tr>
<td>US 97 at Ponderosa Dr./China Hat Rd.</td>
<td>TWSC</td>
<td>0.53</td>
<td>19.0</td>
</tr>
<tr>
<td>Knott Road at SE 15th St/Tekampe Rd.</td>
<td>TWSC</td>
<td>&gt;1.50</td>
<td>&gt;150.0</td>
</tr>
<tr>
<td>Brookswood Blvd at Pinebrook Blvd.</td>
<td>TWSC</td>
<td>0.51</td>
<td>35.4</td>
</tr>
<tr>
<td>SE 3rd Street at Pinebrook Blvd.</td>
<td>TWSC</td>
<td>&gt;1.50</td>
<td>&gt;150.0</td>
</tr>
<tr>
<td>SE 3rd Street at Murphy Rd.</td>
<td>Signal</td>
<td>0.70</td>
<td>27.4</td>
</tr>
<tr>
<td>Murphy Road at Parrell Rd.</td>
<td>TWSC</td>
<td>0.52</td>
<td>37.6</td>
</tr>
<tr>
<td>Murphy Road at Country Club Rd.</td>
<td>TWSC</td>
<td>0.42</td>
<td>22.1</td>
</tr>
<tr>
<td>Murphy Road at Brosterhous Rd.</td>
<td>TWSC</td>
<td>0.98</td>
<td>77.0</td>
</tr>
<tr>
<td>Murphy Road at 15th St.</td>
<td>DNE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ferguson Road at 27th St.</td>
<td>TWSC</td>
<td>0.64</td>
<td>43.6</td>
</tr>
</tbody>
</table>

**Notes:**
1. The maximum individual lane group volume-to-capacity ratio (v/c ratio) from the intersection analysis.
2. For TWSC or AWSC intersections, reported delay is for the highest minor street lane group delay.
3. Information reported in **bold** font indicates higher than acceptable levels of congestion.
4. **Control Definitions:** TWSC = Two Way Stop Controlled, AWSC = All Way Stop Controlled.
As shown in Table 2, the two intersections shown as not meeting relevant City of Bend mobility standards in the future Murphy Crossing scenario are shown as deficient in the high growth land use scenario as well. These are the 15th and Ferguson and the 27th and Ferguson intersections. The first, the 15th and Ferguson intersection, worsens from a 0.30 v/c to a >1.5 v/c. The second, 27th and Ferguson, was shown to be >1.5 v/c in the base case =Murphy Crossing land use scenario as well.

Two area intersections that operated at an acceptable level in the base case = Murphy Crossing land use scenario were identified as deficient under the high growth land use scenario. These included the 15th Street and Knott Road intersection and the 15th Street and Murphy Road intersection. Both intersections were shown as a two-way stop control.

**Next Steps**

The Murphy Road Corridor Study TAC will consider the deficiencies identified by the sensitivity test above, to determine whether adjustments to the preferred alternative are warranted to ensure the Murphy Road corridor operates at an acceptable level of mobility in the future. Potential adjustments could include additional traffic controls or improvements, monitoring, or potential land use controls. The modified preferred alternative will be presented to the public and described in the Murphy Road Refinement Plan.
**FIGURE 4**

Murphy Road Corridor
Bend, Oregon

Study Area Intersection
LOS, Volumes, Channelization
2030 Build Conditions and Deficiencies
High Growth Scenario

**Legend**
- Helps Meet Bend's Traffic Operational Requirements
- Does Not Meet Bend's Traffic Operational Requirements
- Turning Movement Volume
- Existing Channelization
- Proposed Channelization
- Stop Controlled Intersection Approach
- Signalized Intersection
- Proposed Signalized Intersection

**HV% = Percent Heavy Vehicles (by approach)**

**NOTE:** For TWSC or AWSC, delay is reported for the highest minor street lane group delay.
<table>
<thead>
<tr>
<th>ALTERNATIVE</th>
<th>IMPROVEMENT</th>
<th>BEGIN</th>
<th>END</th>
<th>PROJECT COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>CTWLTL</td>
<td>SE Parrell Rd</td>
<td>SE Brosterhous Rd</td>
<td>$9,164,880</td>
</tr>
<tr>
<td>B</td>
<td>Left Turn Pockets</td>
<td>SE Parrell Rd</td>
<td>SE Brosterhous Rd</td>
<td>$3,521,186</td>
</tr>
<tr>
<td>C</td>
<td>Roundabouts</td>
<td>SE Parrell Rd</td>
<td>SE Brosterhous Rd</td>
<td>$9,540,018</td>
</tr>
<tr>
<td>D</td>
<td>CTWLTL &amp; Roundabouts</td>
<td>SE Parrell Rd</td>
<td>SE Brosterhous Rd</td>
<td>$13,833,590</td>
</tr>
<tr>
<td>E</td>
<td>CTWLTL &amp; Signals</td>
<td>SE Parrell Rd</td>
<td>SE Brosterhous Rd</td>
<td>$5,473,592</td>
</tr>
<tr>
<td>A, B, C</td>
<td>CTWLTL</td>
<td>SE Brosterhous Rd</td>
<td>SE 15TH St</td>
<td>$12,747,161</td>
</tr>
<tr>
<td>D, E</td>
<td>2 Lane with Turn Pockets</td>
<td>SE Brosterhous Rd</td>
<td>SE 15TH St</td>
<td>$11,155,891</td>
</tr>
<tr>
<td>A</td>
<td>CTWLTL</td>
<td>SE Parrell Rd</td>
<td>SE 15TH St</td>
<td>$21,912,041</td>
</tr>
<tr>
<td>B</td>
<td>Left Turn Pockets</td>
<td>SE Parrell Rd</td>
<td>SE 15TH St</td>
<td>$16,268,346</td>
</tr>
<tr>
<td>C</td>
<td>Roundabouts</td>
<td>SE Parrell Rd</td>
<td>SE 15TH St</td>
<td>$22,287,179</td>
</tr>
<tr>
<td>D</td>
<td>CTWLTL &amp; Roundabouts</td>
<td>SE Parrell Rd</td>
<td>SE 15TH St</td>
<td>$24,989,481</td>
</tr>
<tr>
<td>E</td>
<td>CTWLTL &amp; Signals</td>
<td>SE Parrell Rd</td>
<td>SE 15TH St</td>
<td>$16,629,483</td>
</tr>
</tbody>
</table>

Items Included In This Estimate:
- Overlay of existing pavement
- New Asphalt Concrete and Aggregate Base for widening
- Excavation / Embankment
- Concrete Curbs
- Pavement Markings
- Concrete Curbs
- Sidewalks
- Storm Sewer RCP
- Catch Basins
- Manholes
- Illumination
- Traffic Signals
- Retaining Walls
- Reinforced Backfill
- Bridge
- Landscaping
### ALTERNATIVE A:

**PROJECT:** Murphy Road from Parrell Rd to Brosterhous

**DESIGN LEVEL:** Corridor Study

**KIND OF WORK:** Widening, Overlay, Drainage, Signals, CTWLTL

<table>
<thead>
<tr>
<th>NO.</th>
<th>ITEM</th>
<th>UNIT</th>
<th>QUANTITY</th>
<th>UNIT COST</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Curb, Sidewalks &amp; Drainage</td>
<td>Mi.</td>
<td>0.98</td>
<td>$1,412,000</td>
<td>$1,383,760</td>
</tr>
<tr>
<td>2</td>
<td>Bike Boulevard</td>
<td>Mi.</td>
<td>0.00</td>
<td>$117,000</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>New Roadway</td>
<td>Lane-Mi.</td>
<td>2.50</td>
<td>$248,000</td>
<td>620,000</td>
</tr>
<tr>
<td>4</td>
<td>Overlay Existing Roadway</td>
<td>Lane-Mi.</td>
<td>3.30</td>
<td>$108,000</td>
<td>356,400</td>
</tr>
<tr>
<td>5</td>
<td>Reconstruct Existing Roadway</td>
<td>Lane-Mi.</td>
<td>0.00</td>
<td>$266,000</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>Roundabout</td>
<td>EA</td>
<td>0.00</td>
<td>$1,100,000</td>
<td>0</td>
</tr>
<tr>
<td>7</td>
<td>Restriping Existing Roadway</td>
<td>Lane-Mi.</td>
<td>0.00</td>
<td>$15,000</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>Interconnect Signal</td>
<td>LS</td>
<td>3.00</td>
<td>$30,000</td>
<td>90,000</td>
</tr>
<tr>
<td>9</td>
<td>New Signal</td>
<td>EA</td>
<td>3.00</td>
<td>$140,000</td>
<td>420,000</td>
</tr>
<tr>
<td>10</td>
<td>Signal Modifications</td>
<td>EA</td>
<td>0.00</td>
<td>$60,000</td>
<td>0</td>
</tr>
<tr>
<td>11</td>
<td>Transit Enhancements</td>
<td>EA</td>
<td>0.00</td>
<td>$25,000</td>
<td>0</td>
</tr>
<tr>
<td>12</td>
<td>Traffic Calming</td>
<td>%</td>
<td>0.0%</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>13</td>
<td>Illumination</td>
<td>Mi.</td>
<td>0.98</td>
<td>$260,000</td>
<td>254,800</td>
</tr>
<tr>
<td>14</td>
<td>Landscaping</td>
<td>Mi.</td>
<td>0.98</td>
<td>$250,000</td>
<td>245,000</td>
</tr>
<tr>
<td>15</td>
<td>Bridges</td>
<td>SF</td>
<td>0.00</td>
<td>$200</td>
<td>0</td>
</tr>
<tr>
<td>16</td>
<td>Walls</td>
<td>SF</td>
<td>0.00</td>
<td>$171</td>
<td>0</td>
</tr>
</tbody>
</table>

**SUBTOTAL** $3,369,960

<table>
<thead>
<tr>
<th>ITEM</th>
<th>RANGE</th>
<th>PERCENTAGE</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction Surveying</td>
<td>1.0-2.5%</td>
<td>2.0%</td>
<td>$67,000</td>
</tr>
<tr>
<td>TP &amp; DT</td>
<td>3.0-8.0%</td>
<td>8.0%</td>
<td>$270,000</td>
</tr>
<tr>
<td>Mobilization</td>
<td>8.0-10.0%</td>
<td>10.0%</td>
<td>$337,000</td>
</tr>
<tr>
<td>Erosion Control</td>
<td>0.5-2.0%</td>
<td>1.0%</td>
<td>$34,000</td>
</tr>
<tr>
<td>Contingency</td>
<td>40.0%</td>
<td>40.0%</td>
<td>$1,348,000</td>
</tr>
<tr>
<td>Escalation (per year)</td>
<td>0.5-2.0%</td>
<td>2.0%</td>
<td>$202,000</td>
</tr>
<tr>
<td>-current year</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TOTAL CONSTRUCTION COST** $5,627,960

<table>
<thead>
<tr>
<th>Right-of-Way</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Parcels</td>
<td>EA 4</td>
</tr>
<tr>
<td>R/W</td>
<td>SF 80,240</td>
</tr>
<tr>
<td>Design Engineering</td>
<td>13.0%</td>
</tr>
<tr>
<td>Construction Engineering</td>
<td>10.0%</td>
</tr>
</tbody>
</table>

**TOTAL PROJECT COST** $9,164,880

**Assumptions:**

- Proposed Width: 2 x 6' Bike Lanes, 2 x 14' Travel Lanes, 16' Center Median, 2 X 6' planter strips, 2 x 6' Sidewalks. (56' Curb to Curb)
- Pavement Section: 2" Inlay For Existing
- 6" Asphalt Over 10" Aggregate Base For New
- Home purchase on SW corner of Murphy and Parrell is not included.
- Proposed R/W Width of 80'; Existing R/W Width ~ 60'

Page 2 of 8
**PROJECT:** Murphy Road from Parrell Rd to Brosterhous  
**REFERENCE NAME/PHONE:** Jose Vasquez / 503.235.5000  
**DESIGN LEVEL:** Corridor Study  
**KIND OF WORK:** Widening, Overlay

### Quick Cost Estimate

<table>
<thead>
<tr>
<th>NO.</th>
<th>ITEM</th>
<th>UNIT</th>
<th>QUANTITY</th>
<th>UNIT COST</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Curb, Sidewalks &amp; Drainage</td>
<td>Mi.</td>
<td>0.33</td>
<td>$1,412,000</td>
<td>$461,307</td>
</tr>
<tr>
<td>2</td>
<td>Bike Boulevard</td>
<td>Mi.</td>
<td>0.00</td>
<td>$117,000</td>
<td>$0</td>
</tr>
<tr>
<td>3</td>
<td>New Roadway</td>
<td>Lane-Mi.</td>
<td>1.21</td>
<td>$248,000</td>
<td>$299,469</td>
</tr>
<tr>
<td>4</td>
<td>Overlay Existing Roadway</td>
<td>Lane-Mi.</td>
<td>3.22</td>
<td>$108,000</td>
<td>$348,023</td>
</tr>
<tr>
<td>5</td>
<td>Reconstruct Existing Roadway</td>
<td>Lane-Mi.</td>
<td>0.00</td>
<td>$266,000</td>
<td>$0</td>
</tr>
<tr>
<td>6</td>
<td>Roundabout</td>
<td>EA</td>
<td>0.00</td>
<td>$1,100,000</td>
<td>$0</td>
</tr>
<tr>
<td>7</td>
<td>Restriping Existing Roadway</td>
<td>Lane-Mi.</td>
<td>0.00</td>
<td>$15,000</td>
<td>$0</td>
</tr>
<tr>
<td>8</td>
<td>Interconnect Signal</td>
<td>LS</td>
<td>3.00</td>
<td>$30,000</td>
<td>$90,000</td>
</tr>
<tr>
<td>9</td>
<td>New Signal</td>
<td>EA</td>
<td>3.00</td>
<td>$140,000</td>
<td>$420,000</td>
</tr>
<tr>
<td>10</td>
<td>Signal Modifications</td>
<td>EA</td>
<td>0.00</td>
<td>$60,000</td>
<td>$0</td>
</tr>
<tr>
<td>11</td>
<td>Transit Enhancements</td>
<td>EA</td>
<td>0.00</td>
<td>$25,000</td>
<td>$0</td>
</tr>
<tr>
<td>12</td>
<td>Traffic Calming</td>
<td>%</td>
<td>0.0%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>13</td>
<td>Illumination</td>
<td>Mi.</td>
<td>0.33</td>
<td>$260,000</td>
<td>$84,943</td>
</tr>
<tr>
<td>14</td>
<td>Landscaping</td>
<td>Mi.</td>
<td>0.33</td>
<td>$250,000</td>
<td>$81,676</td>
</tr>
<tr>
<td>15</td>
<td>Bridges</td>
<td>SF</td>
<td>0.00</td>
<td>$200</td>
<td>$0</td>
</tr>
<tr>
<td>16</td>
<td>Walls</td>
<td>SF</td>
<td>0.00</td>
<td>$171</td>
<td>$0</td>
</tr>
</tbody>
</table>

**SUBTOTAL** $1,785,418

### Additional Costs

<table>
<thead>
<tr>
<th>ITEM</th>
<th>RANGE</th>
<th>PERCENTAGE</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction Surveying</td>
<td>1.0-2.5%</td>
<td>2.0%</td>
<td>$36,000</td>
</tr>
<tr>
<td>TP &amp; DT</td>
<td>3.0-8.0%</td>
<td>1.0%</td>
<td>$18,000</td>
</tr>
<tr>
<td>Mobilization</td>
<td>8.0-10.0%</td>
<td>10.0%</td>
<td>$179,000</td>
</tr>
<tr>
<td>Erosion Control</td>
<td>0.5-2.0%</td>
<td>1.0%</td>
<td>$18,000</td>
</tr>
<tr>
<td>Contingency</td>
<td>40.0%</td>
<td>40.0%</td>
<td>$714,000</td>
</tr>
<tr>
<td>Escalation (per year)</td>
<td>0.5-2.0%</td>
<td>2.0%</td>
<td>$107,000</td>
</tr>
<tr>
<td></td>
<td>-current year</td>
<td>2008</td>
<td></td>
</tr>
</tbody>
</table>

**TOTAL CONSTRUCTION COST** $2,857,418

### Right-of-Way Costs

<table>
<thead>
<tr>
<th>ITEM</th>
<th>UNIT</th>
<th>QUANTITY</th>
<th>UNIT COST</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parcels</td>
<td>EA</td>
<td>0</td>
<td>$400,000.00</td>
<td>$0</td>
</tr>
<tr>
<td>R/W</td>
<td>SF</td>
<td>846</td>
<td>$8.00</td>
<td>$6,768</td>
</tr>
<tr>
<td>Design Engineering</td>
<td></td>
<td></td>
<td></td>
<td>$371,000</td>
</tr>
<tr>
<td>Construction Engineering</td>
<td></td>
<td></td>
<td></td>
<td>$286,000</td>
</tr>
</tbody>
</table>

**TOTAL PROJECT COST** $3,521,186

**Assumptions:**

- Approx. 1/3rd of the segment will need widening reconstruction for the addition of turn pockets.
- Proposed Width: 2 x 6’ Bike Lanes, 2 x 12’ Travel Lanes, 2 x 6’ Sidewalks.
  (36’ Curb to Curb)
- Pavement Section: 2” Inlay For Existing
  6” Asphalt Over 10” Aggregate Base For New
- Home purchase on SW corner of Murphy and Parrell is not included.
- Proposed R/W Width of 48’; Existing R/W Width of ~ 60’
## ALTERNATIVE C:

**SUMMARY - QUICK COST ESTIMATE**

**PROJECT:** Murphy Road from Parrell Rd to Brosterhous  
**REFERENCE NAME/PHONE:** Jose Vasquez / 503.235.5000  
**DESIGN LEVEL:** Corridor Study  
**KIND OF WORK:** Widening, Overlay, Drainage, Signals, Roundabouts  
**LENGTH (MI.):** 0.98  
**DATE:** 8/10/2007  
**NAME:**

<table>
<thead>
<tr>
<th>NO.</th>
<th>ITEM</th>
<th>UNIT</th>
<th>QUANTITY</th>
<th>UNIT COST</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Curb, Sidewalks &amp; Drainage</td>
<td>Mi.</td>
<td>0.33</td>
<td>$1,412,000</td>
<td>$461,307</td>
</tr>
<tr>
<td>2</td>
<td>Bike Boulevard</td>
<td>Mi.</td>
<td>0.00</td>
<td>$117,000</td>
<td>$0</td>
</tr>
<tr>
<td>3</td>
<td>New Roadway</td>
<td>Lane-Mi.</td>
<td>0.00</td>
<td>$248,000</td>
<td>$0</td>
</tr>
<tr>
<td>4</td>
<td>Overlay Existing Roadway</td>
<td>Lane-Mi.</td>
<td>2.45</td>
<td>$108,000</td>
<td>$265,092</td>
</tr>
<tr>
<td>5</td>
<td>Reconstruct Existing Roadway</td>
<td>Lane-Mi.</td>
<td>0.00</td>
<td>$266,000</td>
<td>$0</td>
</tr>
<tr>
<td>6</td>
<td>Roundabout</td>
<td>EA</td>
<td>3.00</td>
<td>$1,100,000</td>
<td>$3,300,000</td>
</tr>
<tr>
<td>7</td>
<td>Restriping Existing Roadway</td>
<td>Lane-Mi.</td>
<td>0.00</td>
<td>$15,000</td>
<td>$0</td>
</tr>
<tr>
<td>8</td>
<td>Interconnect Signal</td>
<td>LS</td>
<td>0.00</td>
<td>$30,000</td>
<td>$0</td>
</tr>
<tr>
<td>9</td>
<td>New Signal</td>
<td>EA</td>
<td>0.00</td>
<td>$140,000</td>
<td>$0</td>
</tr>
<tr>
<td>10</td>
<td>Signal Modifications</td>
<td>EA</td>
<td>0.00</td>
<td>$60,000</td>
<td>$0</td>
</tr>
<tr>
<td>11</td>
<td>Transit Enhancements</td>
<td>EA</td>
<td>0.00</td>
<td>$25,000</td>
<td>$0</td>
</tr>
<tr>
<td>12</td>
<td>Traffic Calming</td>
<td>%</td>
<td>0.0%</td>
<td>-</td>
<td>$0</td>
</tr>
<tr>
<td>13</td>
<td>Illumination</td>
<td>Mi.</td>
<td>0.33</td>
<td>$260,000</td>
<td>$84,943</td>
</tr>
<tr>
<td>14</td>
<td>Landscaping</td>
<td>Mi.</td>
<td>0.33</td>
<td>$250,000</td>
<td>$81,167</td>
</tr>
<tr>
<td>15</td>
<td>Bridges</td>
<td>SF</td>
<td>0.00</td>
<td>$200</td>
<td>$0</td>
</tr>
<tr>
<td>16</td>
<td>Walls</td>
<td>SF</td>
<td>0.00</td>
<td>$171</td>
<td>$0</td>
</tr>
</tbody>
</table>

**SUBTOTAL** $4,193,018

### ADDITIONAL COSTS

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>RANGE</th>
<th>PERCENTAGE</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction Surveying</td>
<td>1.0-2.5%</td>
<td>2.0%</td>
<td>$84,000</td>
</tr>
<tr>
<td>TP &amp; DT</td>
<td>3.0-8.0%</td>
<td>1.0%</td>
<td>$42,000</td>
</tr>
<tr>
<td>Mobilization</td>
<td>8.0-10.0%</td>
<td>10.0%</td>
<td>$419,000</td>
</tr>
<tr>
<td>Erosion Control</td>
<td>0.5-2.0%</td>
<td>1.0%</td>
<td>$42,000</td>
</tr>
<tr>
<td>Contingency</td>
<td>40.0%</td>
<td>40.0%</td>
<td>$1,677,000</td>
</tr>
<tr>
<td>Escalation (per year)</td>
<td>0.5-2.0%</td>
<td>2.0%</td>
<td>$252,000</td>
</tr>
<tr>
<td>-current year</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TOTAL CONSTRUCTION COST** $6,709,018

### RIGHT-OF-WAY COSTS

<table>
<thead>
<tr>
<th>ITEM</th>
<th>UNIT</th>
<th>QUANTITY</th>
<th>COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right-of-Way</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parcels</td>
<td>EA</td>
<td>3</td>
<td>$400,000</td>
</tr>
<tr>
<td>R/W</td>
<td>SF</td>
<td>11,000</td>
<td>$8.00</td>
</tr>
<tr>
<td>Design Engineering</td>
<td>13.0%</td>
<td>13.0%</td>
<td></td>
</tr>
<tr>
<td>Construction Engineering</td>
<td>10.0%</td>
<td>10.0%</td>
<td></td>
</tr>
</tbody>
</table>

**TOTAL PROJECT COST** $9,540,018

### Assumptions:

- Approx. 1/3rd of the segment will need widening reconstruction for the addition of turn pockets.
- Proposed Width: 2 x 6' Bike Lanes, 2 x 12' Travel Lanes, 16' Center Median, 2 x 6' Sidewalks. (36' Curb to Curb)
- Pavement Section: 6" Asphalt Over 10" Aggregate Base
- Home purchase on SW corner of Murphy and Parrell is not included.
- Proposed R/W Width of 64'; Existing R/W Width of ~ 60'
**PROJECT:** Murphy Road from Parrell Rd to Brosterhous

**REFERENCE NAME/PHONE:** Jose Vasquez / 503.235.5000

**DESIGN LEVEL:** Corridor Study

**KIND OF WORK:** Widening, Overlay, Drainage, & Roundabouts

<table>
<thead>
<tr>
<th>NO.</th>
<th>ITEM</th>
<th>UNIT</th>
<th>QUANTITY</th>
<th>UNIT COST</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Curb, Sidewalks &amp; Drainage</td>
<td>Mi.</td>
<td>0.98</td>
<td>$1,412,000</td>
<td>$1,383,920</td>
</tr>
<tr>
<td>2</td>
<td>Bike Boulevard</td>
<td>Mi.</td>
<td>0.00</td>
<td>$117,000</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>New Roadway</td>
<td>Lane-Mi.</td>
<td>0.88</td>
<td>$248,000</td>
<td>$217,795</td>
</tr>
<tr>
<td>4</td>
<td>Overlay Existing Roadway</td>
<td>Lane-Mi.</td>
<td>2.37</td>
<td>$108,000</td>
<td>$255,929</td>
</tr>
<tr>
<td>5</td>
<td>Reconstruct Existing Roadway</td>
<td>Lane-Mi.</td>
<td>0.00</td>
<td>$266,000</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>Roundabout</td>
<td>EA</td>
<td>3.00</td>
<td>$1,100,000</td>
<td>$3,300,000</td>
</tr>
<tr>
<td>7</td>
<td>Restriping Existing Roadway</td>
<td>Lane-Mi.</td>
<td>0.00</td>
<td>$15,000</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>Interconnect Signal</td>
<td>LS</td>
<td>0.00</td>
<td>$30,000</td>
<td>0</td>
</tr>
<tr>
<td>9</td>
<td>New Signal</td>
<td>EA</td>
<td>0.00</td>
<td>$140,000</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>Signal Modifications</td>
<td>EA</td>
<td>0.00</td>
<td>$60,000</td>
<td>0</td>
</tr>
<tr>
<td>11</td>
<td>Transit Enhancements</td>
<td>EA</td>
<td>0.00</td>
<td>$25,000</td>
<td>0</td>
</tr>
<tr>
<td>12</td>
<td>Traffic Calming</td>
<td>%</td>
<td>0.0%</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>13</td>
<td>Illumination</td>
<td>Mi.</td>
<td>0.98</td>
<td>$260,000</td>
<td>$254,830</td>
</tr>
<tr>
<td>14</td>
<td>Landscaping</td>
<td>Mi.</td>
<td>0.98</td>
<td>$250,000</td>
<td>$245,028</td>
</tr>
<tr>
<td>15</td>
<td>Bridges</td>
<td>SF</td>
<td>0.00</td>
<td>$200</td>
<td>0</td>
</tr>
<tr>
<td>16</td>
<td>Walls</td>
<td>SF</td>
<td>0.00</td>
<td>$171</td>
<td>0</td>
</tr>
</tbody>
</table>

**ADDITIONAL COSTS**

<table>
<thead>
<tr>
<th>ITEM</th>
<th>RANGE</th>
<th>PERCENTAGE</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction Surveying</td>
<td>1.0-2.5%</td>
<td>2.0%</td>
<td>$113,000</td>
</tr>
<tr>
<td>TP &amp; DT</td>
<td>3.0-8.0%</td>
<td>1.0%</td>
<td>$57,000</td>
</tr>
<tr>
<td>Mobilization</td>
<td>8.0-10.0%</td>
<td>10.0%</td>
<td>$566,000</td>
</tr>
<tr>
<td>Erosion Control</td>
<td>0.5-2.0%</td>
<td>1.0%</td>
<td>$57,000</td>
</tr>
<tr>
<td>Contingency</td>
<td>40.0%</td>
<td>40.0%</td>
<td>$2,263,000</td>
</tr>
<tr>
<td>Escalation (per year) - current year</td>
<td>0.5-2.0%</td>
<td>2.0%</td>
<td>$339,000</td>
</tr>
</tbody>
</table>

**TOTAL CONSTRUCTION COST**

$9,052,502

<table>
<thead>
<tr>
<th>ITEM</th>
<th>UNIT</th>
<th>QUANTITY</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right-of-Way</td>
<td>EA</td>
<td>6</td>
<td>$400,000</td>
</tr>
<tr>
<td>R/W</td>
<td>SF</td>
<td>37,386</td>
<td>$8.00</td>
</tr>
<tr>
<td>Design Engineering</td>
<td>13.0%</td>
<td>13.0%</td>
<td>$1,177,000</td>
</tr>
<tr>
<td>Construction Engineering</td>
<td>10.0%</td>
<td>10.0%</td>
<td>$905,000</td>
</tr>
</tbody>
</table>

**TOTAL PROJECT COST**

$13,833,590

Assumptions:

Proposed Width: 2 x 6' Bike Lanes, 2 x 12' Travel Lanes, 12' Center Median, 2 x 6' Sidewalks.
(48' Curb to Curb)

Pavement Section: 6" Asphalt Over 10" Aggregate Base

Home purchase on SW corner of Murphy and Parrell is not included.

Proposed R/W Width of 60'; Existing R/W Width ~ 60'
## PROJECT: Murphy Road from Parrell Rd to Brosterhous

### DESIGN LEVEL: Corridor Study

### KIND OF WORK: Widening, Overlay, Drainage, & Signals

### LENGTH (MI.): 0.98

### DATE: 8/10/2007

### NAME:

### NO. UNIT QUANTITY UNIT COST TOTAL

1. Curb, Sidewalks & Drainage Mi. 0.98 $1,412,000 $1,383,920
2. Bike Boulevard Mi. 0.00 $117,000 $0
3. New Roadway Lane-Mi. 0.12 $248,000 $29,290
4. Overlay Existing Roadway Lane-Mi. 3.13 $108,000 $338,020
5. Reconstruct Existing Roadway Lane-Mi. 0.00 $266,000 $0
6. Roundabout EA 0.00 $1,100,000 $0
7. Restriping Existing Roadway Lane-Mi. 0.00 $15,000 $0
8. Interconnect Signal LS 3.00 $30,000 $90,000
9. New Signal EA 3.00 $140,000 $420,000
10. Signal Modifications EA 0.00 $60,000 $0
11. Transit Enhancements EA 0.00 $25,000 $0
12. Traffic Calming % 0.00 - $0
13. Illumination Mi. 0.98 $260,000 $254,830
14. Landscaping Mi. 0.98 $250,000 $245,028
15. Bridges SF 0.00 $200 $0
16. Walls SF 0.00 $171 $0

**SUBTOTAL** $2,761,088

### ADDITIONAL COSTS

<table>
<thead>
<tr>
<th>itemName</th>
<th>range</th>
<th>percentage</th>
<th>total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction Surveying</td>
<td>1.0-2.5%</td>
<td>2.0%</td>
<td>$55,000</td>
</tr>
<tr>
<td>TP &amp; DT</td>
<td>3.0-8.0%</td>
<td>1.0%</td>
<td>$28,000</td>
</tr>
<tr>
<td>Mobilization</td>
<td>8.0-10.0%</td>
<td>10.0%</td>
<td>$276,000</td>
</tr>
<tr>
<td>Erosion Control</td>
<td>0.5-2.0%</td>
<td>1.0%</td>
<td>$28,000</td>
</tr>
<tr>
<td>Contingency</td>
<td>40.0%</td>
<td>40.0%</td>
<td>$1,104,000</td>
</tr>
<tr>
<td>Escalation (per year)</td>
<td>0.5-2.0%</td>
<td>2.0%</td>
<td>$166,000</td>
</tr>
<tr>
<td>-current year</td>
<td>2008</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TOTAL CONSTRUCTION COST** $4,418,088

### Right-of-Way

<table>
<thead>
<tr>
<th>itemName</th>
<th>Unit</th>
<th>Quantity</th>
<th>Unit Cost</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parcels</td>
<td>EA</td>
<td>0</td>
<td>$400,000</td>
<td>$0</td>
</tr>
<tr>
<td>R/W</td>
<td>SF</td>
<td>4,938</td>
<td>$8.00</td>
<td>$39,504</td>
</tr>
<tr>
<td>Design Engineering</td>
<td></td>
<td>13.0%</td>
<td></td>
<td>$574,000</td>
</tr>
<tr>
<td>Construction Engineering</td>
<td>10.0%</td>
<td>10%</td>
<td></td>
<td>$442,000</td>
</tr>
</tbody>
</table>

**TOTAL PROJECT COST** $5,473,592

### Assumptions:

- Proposed Width: 2 x 6' Bike Lanes, 2 x 12' Travel Lanes, 12' Center Median, 2 x 6' Sidewalks.
- (48' Curb to Curb)
- Home purchase on SW corner of Murphy and Parrell is not included.
- Pavement Section: 6" Asphalt Over 10" Aggregate Base
- Proposed R/W Width of 60'; Existing R/W Width ~ 60'
ALTERNATIVES A, B, C: BROSTERHOUS TO 15TH ST.

CH2M HILL
SUMMARY - QUICK COST ESTIMATE

PROJECT: Murphy Road - Brosterhous Road to 15th Street
REFERENCE NAME/PHONE: Jose Vasquez / 503.235.5000
SHEET: 1 of 1
DESIGN LEVEL: Corridor Study
KIND OF WORK: Roadway New Construction Bridge, Retaining Walls
LENGTH (MI.): 0.38
DATE: 2/22/2007
NAME: 

<table>
<thead>
<tr>
<th>NO.</th>
<th>ITEM</th>
<th>UNIT</th>
<th>QUANTITY</th>
<th>UNIT COST</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Curb, Sidewalks &amp; Drainage</td>
<td>Mi.</td>
<td>0.38</td>
<td>$1,412,000</td>
<td>$535,383</td>
</tr>
<tr>
<td>2</td>
<td>Bike Boulevard</td>
<td>Mi.</td>
<td>0.00</td>
<td>$117,000</td>
<td>$0</td>
</tr>
<tr>
<td>3</td>
<td>New Roadway</td>
<td>Lane-Mi.</td>
<td>1.77</td>
<td>$248,000</td>
<td>$438,822</td>
</tr>
<tr>
<td>4</td>
<td>Overlay Existing Roadway</td>
<td>Lane-Mi.</td>
<td>0.00</td>
<td>$108,000</td>
<td>$0</td>
</tr>
<tr>
<td>5</td>
<td>Reconstruct Existing Roadway</td>
<td>Lane-Mi.</td>
<td>0.00</td>
<td>$266,000</td>
<td>$0</td>
</tr>
<tr>
<td>6</td>
<td>Roundabout</td>
<td>EA</td>
<td>0.00</td>
<td>$1,100,000</td>
<td>$0</td>
</tr>
<tr>
<td>7</td>
<td>Restriping Existing Roadway</td>
<td>Lane-Mi.</td>
<td>0.00</td>
<td>$15,000</td>
<td>$0</td>
</tr>
<tr>
<td>8</td>
<td>Interconnect Signal</td>
<td>LS</td>
<td>0.00</td>
<td>$30,000</td>
<td>$0</td>
</tr>
<tr>
<td>9</td>
<td>New Signal</td>
<td>EA</td>
<td>0.00</td>
<td>$140,000</td>
<td>$0</td>
</tr>
<tr>
<td>10</td>
<td>Signal Modifications</td>
<td>EA</td>
<td>0.00</td>
<td>$60,000</td>
<td>$0</td>
</tr>
<tr>
<td>11</td>
<td>Transit Enhancements</td>
<td>EA</td>
<td>0.00</td>
<td>$25,000</td>
<td>$0</td>
</tr>
<tr>
<td>12</td>
<td>Traffic Calming</td>
<td>%</td>
<td>0.0%</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>13</td>
<td>Illumination</td>
<td>Mi.</td>
<td>0.38</td>
<td>$260,000</td>
<td>$98,583</td>
</tr>
<tr>
<td>14</td>
<td>Landscaping</td>
<td>Mi.</td>
<td>0.38</td>
<td>$250,000</td>
<td>$94,792</td>
</tr>
<tr>
<td>15</td>
<td>Bridges</td>
<td>SF</td>
<td>14,560.00</td>
<td>$200</td>
<td>$2,912,000</td>
</tr>
<tr>
<td>16</td>
<td>Walls</td>
<td>SF</td>
<td>7,300.00</td>
<td>$171</td>
<td>$1,248,300</td>
</tr>
</tbody>
</table>

**SUBTOTAL** $5,327,881

<table>
<thead>
<tr>
<th>ADDITIONAL COSTS</th>
<th>RANGE</th>
<th>PERCENTAGE</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction Surveying</td>
<td>1.0-2.5%</td>
<td>2.0%</td>
<td>$107,000</td>
</tr>
<tr>
<td>TP &amp; DT</td>
<td>3.0-8.0%</td>
<td>4.0%</td>
<td>$213,000</td>
</tr>
<tr>
<td>Mobilization</td>
<td>8.0-10.0%</td>
<td>10.0%</td>
<td>$533,000</td>
</tr>
<tr>
<td>Erosion Control</td>
<td>0.5-2.0%</td>
<td>1.0%</td>
<td>$53,000</td>
</tr>
<tr>
<td>Contingency</td>
<td>40.0.0%</td>
<td>40.0%</td>
<td>$2,131,000</td>
</tr>
<tr>
<td>Escalation (per year)</td>
<td>0.5-2.0%</td>
<td>2.0%</td>
<td>$320,000</td>
</tr>
</tbody>
</table>

**TOTAL CONSTRUCTION COST** $8,684,881

<table>
<thead>
<tr>
<th>Right-of-Way</th>
<th>ITEM</th>
<th>UNIT</th>
<th>QUANTITY</th>
<th>UNIT COST</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parcels</td>
<td>EA</td>
<td>0</td>
<td>$400,000</td>
<td>$0</td>
<td></td>
</tr>
<tr>
<td>R/W</td>
<td>SF</td>
<td>258,160</td>
<td>$8.00</td>
<td>$2,065,280</td>
<td></td>
</tr>
<tr>
<td>Design Engineering</td>
<td>13.0%</td>
<td>13.0%</td>
<td>$1,129,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction Engineering</td>
<td>10.0%</td>
<td>10.0%</td>
<td>$868,000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TOTAL PROJECT COST** $12,747,161

Assumptions:

Proposed Width: 2 x 6' Bike Lanes, 2 x 14' Travel Lanes, 16' Center Median, 2 x 6' Planter Strips, 2 x 6' Sidewalks. (68’ Curb to Curb)
Proposed Width on Structure: 2 x 6' Bike Lanes, 2 x 14' Travel Lanes, 16' Center Median, 2 x 6' Sidewalks. (56’ Curb to Curb)
Pavement Section: 6" Asphalt Over 10" Aggregate Base
Proposed R/W Varies 80’-250’
### CH2M HILL

**SUMMARY - QUICK COST ESTIMATE**

**PROJECT:** Murphy Road - Brosterhous Road to 15th Street

**REFERENCE NAME/PHONE:** Jose Vasquez / 503.235.5000

**DESIGN LEVEL:** Corridor Study

**KIND OF WORK:** Roadway New Construction Bridge, Retaining Walls

**LENGTH (MI.):** 0.38

**DATE:** 3/14/2007

**NO.** | **ITEM** | **UNIT** | **QUANTITY** | **UNIT COST** | **TOTAL** |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Curb, Sidewalks &amp; Drainage</td>
<td>Mi.</td>
<td>0.38</td>
<td>$1,412,000</td>
<td>$535,383</td>
</tr>
<tr>
<td>2</td>
<td>Bike Boulevard</td>
<td>Mi.</td>
<td>0.00</td>
<td>$117,000</td>
<td>$0</td>
</tr>
<tr>
<td>3</td>
<td>New Roadway</td>
<td>Lane-Mi.</td>
<td>1.41</td>
<td>$248,000</td>
<td>$349,153</td>
</tr>
<tr>
<td>4</td>
<td>Overlay Existing Roadway</td>
<td>Lane-Mi.</td>
<td>0.00</td>
<td>$108,000</td>
<td>$0</td>
</tr>
<tr>
<td>5</td>
<td>Reconstruct Existing Roadway</td>
<td>Lane-Mi.</td>
<td>0.00</td>
<td>$266,000</td>
<td>$0</td>
</tr>
<tr>
<td>6</td>
<td>Roundabout</td>
<td>EA</td>
<td>0.00</td>
<td>$1,100,000</td>
<td>$0</td>
</tr>
<tr>
<td>7</td>
<td>Restriping Existing Roadway</td>
<td>Lane-Mi.</td>
<td>0.00</td>
<td>$15,000</td>
<td>$0</td>
</tr>
<tr>
<td>8</td>
<td>Interconnect Signal</td>
<td>LS</td>
<td>0.00</td>
<td>$30,000</td>
<td>$0</td>
</tr>
<tr>
<td>9</td>
<td>New Signal</td>
<td>EA</td>
<td>0.00</td>
<td>$140,000</td>
<td>$0</td>
</tr>
<tr>
<td>10</td>
<td>Signal Modifications</td>
<td>EA</td>
<td>0.00</td>
<td>$60,000</td>
<td>$0</td>
</tr>
<tr>
<td>11</td>
<td>Transit Enhancements</td>
<td>EA</td>
<td>0.00</td>
<td>$25,000</td>
<td>$0</td>
</tr>
<tr>
<td>12</td>
<td>Traffic Calming</td>
<td>%</td>
<td>0.0%</td>
<td>-</td>
<td>$0</td>
</tr>
<tr>
<td>13</td>
<td>Illumination</td>
<td>Mi.</td>
<td>0.38</td>
<td>$260,000</td>
<td>$98,583</td>
</tr>
<tr>
<td>14</td>
<td>Landscaping</td>
<td>Mi.</td>
<td>0.38</td>
<td>$250,000</td>
<td>$94,792</td>
</tr>
<tr>
<td>15</td>
<td>Bridges</td>
<td>SF</td>
<td>11,232.00</td>
<td>$200</td>
<td>$2,246,400</td>
</tr>
<tr>
<td>16</td>
<td>Walls</td>
<td>SF</td>
<td>7,300.00</td>
<td>$171</td>
<td>$1,248,300</td>
</tr>
</tbody>
</table>

**SUBTOTAL** $4,572,611

<table>
<thead>
<tr>
<th><strong>ADDITIONAL COSTS</strong></th>
<th><strong>RANGE</strong></th>
<th><strong>PERCENTAGE</strong></th>
<th><strong>TOTAL</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction Surveying</td>
<td>1.0-2.5%</td>
<td>2.0%</td>
<td>$91,000</td>
</tr>
<tr>
<td>TP &amp; DT</td>
<td>3.0-8.0%</td>
<td>4.0%</td>
<td>$183,000</td>
</tr>
<tr>
<td>Mobilization</td>
<td>8.0-10.0%</td>
<td>10.0%</td>
<td>$457,000</td>
</tr>
<tr>
<td>Erosion Control</td>
<td>0.5-2.0%</td>
<td>1.0%</td>
<td>$46,000</td>
</tr>
<tr>
<td>Contingency</td>
<td>40.0%</td>
<td>40.0%</td>
<td>$1,829,000</td>
</tr>
<tr>
<td>Escalation (per year)</td>
<td>0.5-2.0%</td>
<td>2.0%</td>
<td>2008</td>
</tr>
</tbody>
</table>

**TOTAL CONSTRUCTION COST** $7,452,611

| **Right-of-Way** | **Parcels** | **EA** | 0 | **$400,000** | $0 |
| R/W | SF | 248,660 | $8.00 | $1,989,280 |
| Design Engineering | 13.0% | 13.0% | $969,000 |
| Construction Engineering | 10.0% | 10.0% | $745,000 |

**TOTAL PROJECT COST** $11,155,891

**Assumptions:**

- Proposed Width: 2 x 6' Bike Lanes, 2 x 14' Travel Lanes, 16' Center Median, 2 x 6' Planter Strips, 2 x 6' Sidewalks. (56' Curb to Curb)
- Proposed Width on Structure: 2 x 8' Shoulders, 2 x 12' Travel Lanes, 2 x 6' Sidewalks. (40' Curb to Curb)
- Pavement Section: 6" Asphalt Over 10" Aggregate Base
- Proposed R/W Width Varies 80'-230'
APPENDIX H

ALTERNATIVE DEVELOPMENT EVALUATION AND EVALUATION FRAMEWORK
Murphy Road Corridor Study: Evaluation Framework

The purpose of this memorandum is to outline the proposed alternative evaluation process and evaluation criteria for the Murphy Road Corridor project. The evaluation criteria will be used by the technical team and the Technical Advisory Committee (TAC) to evaluate the performance of each alternative against a broad range of important project characteristics, representing a full range of city and stakeholder values. The evaluation criteria tie back to the findings from the September 13-14, 2006 stakeholder interviews and the October 2, 2006 TAC meeting. The criteria were revised based on comments from the TAC at its November 7, 2006 meeting. Where possible, evaluation criteria are composed to highlight differences among alternatives.

The evaluation will contain a mixture of quantitative and qualitative measures. Draft performance measures have been developed to rate each evaluation criterion. Performance measures rate the extent to which the alternative achieves the criteria. All criteria will have a constructed scale, generally following the layout described in Table 1 below:

**TABLE 1**
Overview of Murphy Corridor Study Evaluation Scale

<table>
<thead>
<tr>
<th>Rating</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Alternative directly and positively addresses the intent of the criterion.</td>
</tr>
<tr>
<td>2</td>
<td>Alternative partially meets the intent of the criterion, addressing some but not all of the objectives.</td>
</tr>
<tr>
<td>0</td>
<td>Alternative neither meets nor does not meet intent of criterion. Alternative has no effect, or criterion does not apply.</td>
</tr>
<tr>
<td>-2</td>
<td>Alternative does not support the intent of, or negatively impacts, the criterion.</td>
</tr>
</tbody>
</table>

The eight proposed evaluation criteria for the Murphy Road Corridor Study are listed below and described over the next several pages.

- Congestion/Mobility
- Connectivity
• Constructability
• Cost
• Environment – Built (Residential/Business Impacts)
• Environment – Natural
• Multimodal Solutions
• Safety

The evaluation will be conducted at a segment level, with up to ten alternatives being evaluated in total for the Murphy Road Corridor. Organizing alternatives at a segment level allows the team to focus in on those aspects that are most important for each segment. Right of way constraints, for example, may be more critical at one portion of the corridor where environmental impacts may be most critical for another segment. The alternatives may be broken out into segments as follows:

• Segment 1 – SE 3rd Street to Parrell Road: two alternatives assumed, representing two different cross sections
• Segment 2 – Parrell Road to Brosterhous Road: two alternatives assumed, representing two different cross sections
• Segment 3 – Brosterhous Road to SE 15th Street: three alternatives assumed, representing three horizontal alignments for one cross section
• Segment 4 – SE 15th Street to SE 27th Street: zero to three alternatives assumed, planning level for one cross section

No alternatives will be considered west of SE 3rd Street, though the preferred Murphy Corridor alternative will align with the proposed overpass.

Planning level analysis of an alignment east of SE 15th Street will be dependant on the results of initial traffic modeling work, which will identify whether an extension to SE 27th Street should be added to the Bend Transportation System Plan (TSP). If an extension is warranted, the planning level analysis would determine at a cursory level what should be shown in the TSP.

Once the initial evaluation is completed, the preferred options for each segment will be linked and the team will analyze them together at a corridor scale.

**Evaluation Criteria**

Evaluation criteria are used to differentiate and identify the strengths and weaknesses of each alternative and are most effective when they highlight differences between alternatives. Evaluation criteria must also be measurable and well-defined, allow for a clear comparison among alternatives, and create a mutual understanding of its meaning. The seven draft evaluation criteria for the Murphy Road Corridor project are described over the following pages.
**Congestion/Mobility**

*Objective:* To 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. Relevant mobility standards for all study intersections along Murphy Road are a \(v/c\) for individual lane groups less than or equal to 1.0. Unreasonable delay is defined as a delay for any individual lane group of more than 50 seconds for a two-way stop control intersection, or a delay of more than 80 seconds for an all-way stop control or signalized intersection.

*Measure:* Volume-to-capacity \((v/c)\), Delay

<table>
<thead>
<tr>
<th>Rating</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Alternative improves expected future traffic flow along Murphy Road when compared to the future no build alternative. The alternative meets relevant (v/c) standards and is within acceptable levels of delay at all Murphy Road intersections.</td>
</tr>
<tr>
<td>2</td>
<td>Alternative slightly improves expected future traffic flow along Murphy Road when compared to the future no build alternative. The alternative meets relevant (v/c) standards and is within acceptable levels of delay at some, but not all Murphy Road intersections.</td>
</tr>
<tr>
<td>0</td>
<td>Alternative has no effect, or neither meets nor does not meet intent of criterion. Criterion does not apply.</td>
</tr>
<tr>
<td>-2</td>
<td>Expected future traffic flow along Murphy Road is the same or worse when compared to the future no build alternative. It does not reduce, and may increase, congestion at intersections in terms of (v/c) and delay.</td>
</tr>
</tbody>
</table>

**Connectivity**

*Objective:* 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.

*Measure:* Trip travel distance, travel time.

<table>
<thead>
<tr>
<th>Rating</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Alternative provides new connection or improves an existing connection point or facility that substantially minimizes travel time and/or out-of-direction travel.</td>
</tr>
</tbody>
</table>
travel for regional, local, visitor, and commercial trips, and for non-auto modes.

<table>
<thead>
<tr>
<th>Rating</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Alternative provides a new connection or improves an existing connection point or facility, leading to a minor reduction in travel time and/or out-of-direction travel for regional, local, visitor, and commercial trips, and for non-auto modes.</td>
</tr>
<tr>
<td>0</td>
<td>Alternative has no impact on travel time or directness of travel.</td>
</tr>
<tr>
<td>-2</td>
<td>Alternative limits or reduces transportation options or connectivity, increases travel time; and/or requires out-of-direction travel for large portion of users.</td>
</tr>
</tbody>
</table>

**Constructability**

*Objective:* 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.

*Measure:* 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.

<table>
<thead>
<tr>
<th>Rating</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Alternative provides a cost effective solution. Construction impacts are minimal and construction staging maintains traffic flow while completing utility relocations, drainage system installations, road grade changes, and other elements of construction. The largest square footage of existing pavement is used in this alternative. Alternative provides opportunities to be built in phases</td>
</tr>
<tr>
<td>2</td>
<td>Cost effectiveness of alternative is not clear. The alternative has limited opportunities for building in phases. Construction impacts are moderate and construction staging reduces traffic flow. A moderate amount of existing pavement is used in this alternative.</td>
</tr>
<tr>
<td>0</td>
<td>Alternative neither meets nor does not meet intent of criterion. Criterion does not apply.</td>
</tr>
<tr>
<td>-2</td>
<td>The alternative is not considered cost effective. There is a limited opportunity for phasing. Construction impacts are substantial and construction staging greatly reduces traffic flow. A small percentage of existing pavement is used in this alternative.</td>
</tr>
</tbody>
</table>

**Cost**

*Objective:* To serve as a cost effective investment of public funds.
Measure: Order-of-magnitude cost estimates (to include design, right of way acquisition, and construction).

<table>
<thead>
<tr>
<th>Rating</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Alternative provides a cost effective solution and/or alternative cost estimate is within lower third of all alternatives.</td>
</tr>
<tr>
<td>2</td>
<td>Cost effectiveness of alternative is not clear, and/or alternative cost estimate is within second lower third of all alternatives.</td>
</tr>
<tr>
<td>0</td>
<td>Alternative neither meets nor does not meet intent of criterion. Criterion does not apply.</td>
</tr>
<tr>
<td>-2</td>
<td>The alternative is not considered cost effective, and/or alternative cost estimate is within highest third of all alternatives.</td>
</tr>
</tbody>
</table>

Environment – Built (Residential/Business Impacts)

Objective: To avoid, minimize, and/or mitigate impacts to residences and businesses along Murphy Road.

Measure: Number of businesses and residences impacted and severity of impact; number of homes or businesses displaced; qualitative assessment of alternative’s impact on air quality and noise; ability to appropriately mitigate impacts.

<table>
<thead>
<tr>
<th>Rating</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Alternative avoids or contains minimal impacts to businesses and residences. No residences or business are displaced. Smallest number of businesses/residences within 30 feet of the existing road (edge of the pavement) that will have a reduced distance to the proposed curb of the alternative. No intersections along Murphy Road have a v/c of higher than 0.90 (proxy for air quality), and total volumes not expected to increase substantially when compared to the no build (proxy for noise).</td>
</tr>
<tr>
<td>2</td>
<td>Alternative has minor impacts that may be difficult to mitigate, or major impacts that can be mitigated. Second smallest number of businesses/residences within 30 feet of the existing road (edge of the pavement) that will have a reduced distance to the proposed curb of the alternative. One intersection maintains a v/c of higher than 0.90 (proxy for air quality). Total traffic volumes increase substantially, but not more than 200%, compared to no build (proxy for noise).</td>
</tr>
<tr>
<td>0</td>
<td>Alternative neither meets nor does not meet intent of criterion. Criterion does not apply.</td>
</tr>
<tr>
<td>-2</td>
<td>Alternative has impacts that are considered substantial and/or may not easily be mitigated. Three or more residences or business are displaced. Third smallest number of businesses/residences within 30 feet of the existing road (edge of the pavement) that will have a reduced distance to the proposed curb of the alternative. One intersection maintains a v/c of higher than 0.90 (proxy for air quality). Total traffic volumes increase substantially, but not more than 200%, compared to no build (proxy for noise).</td>
</tr>
</tbody>
</table>
Environment – Natural

**Objective**: To avoid impacts to the Area of Special Interest (ASI) located immediately east of the BNSF railroad tracks. If impossible to avoid the ASI, minimize impacts and mitigate consistent with the City of Bend Development Code.

**Measure**: 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.

<table>
<thead>
<tr>
<th>Rating</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Alternative avoids impacts to ASI, and/or protects and enhances the ASI.</td>
</tr>
<tr>
<td>2</td>
<td>Alternative has minimal impacts on ASI, which are easy to mitigate in a manner consistent with the Bend Development Code.</td>
</tr>
<tr>
<td>0</td>
<td>Alternative has substantial impacts to the ASI, which may be difficult to mitigate in a manner consistent with the Bend Development Code.</td>
</tr>
<tr>
<td>NA</td>
<td>Alternative neither meets nor does not meet intent of criterion. Criterion does not apply.</td>
</tr>
</tbody>
</table>

Multimodal Solutions

**Objective**: To 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.

**Measure**: 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).

<table>
<thead>
<tr>
<th>Rating</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Alternative creates or completes a continuous bicycle and/or pedestrian link to serve commuters and/or recreational users, accommodates future bus transit along Murphy Road, and clearly benefits all users, including youth, elderly, and those with disabilities.</td>
</tr>
</tbody>
</table>
MURPHY ROAD CORRIDOR STUDY:
EVALUATION FRAMEWORK

2 Alternative makes minimal improvements to the bike and sidewalk network along Murphy Road. Alternative benefits a subset of the population, and benefits to the youth, elderly, and physically disabled populations are minor and/or indirect. Alternative accommodates future bus transit along Murphy Road

0 Alternative makes no improvements to the bicycle and pedestrian network along Murphy Road, and/or detracts from the existing bicycle and pedestrian network. The alternative does not serve or benefit youth, elderly, and those with physical disabilities. Alternative does not accommodates future bus transit along Murphy Road

NA Alternative neither meets nor does not meet intent of criterion. Criterion does not apply.

Safety

Objective: To 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.

Measure: 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.

<table>
<thead>
<tr>
<th>Rating</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Alternative addresses known operational safety issues (if any), provides a lower number of potential conflict points than other alternatives, and is largely consistent with City design standards. Emergency response times are improved under this alternative.</td>
</tr>
<tr>
<td>2</td>
<td>Alternative is largely consistent with City design standards, but does not directly address or minimally addresses known safety issues. Number of potential conflict points is not reduced or is the same as or greater than other alternatives. Alternative neither improves nor harms emergency response times.</td>
</tr>
<tr>
<td>0</td>
<td>Alternative adds conflict points or otherwise creates an additional safety problem for users, and may increase emergency response times.</td>
</tr>
<tr>
<td>NA</td>
<td>Alternative neither meets nor does not meet intent of criterion. Criterion does not apply.</td>
</tr>
</tbody>
</table>
Murphy Road Corridor Study: Alternatives
Development and Evaluation Process

TO: Nick Arnis, City of Bend
    Julia Wellner, City of Bend

FROM: Brandy Steffen, CH2M HILL
      Jose Vasquez, CH2M HILL
      Billy Adams, CH2M HILL

DATE: August 13, 2007

Introduction

This technical memorandum describes the five alternatives developed for the Murphy Road Corridor, between Parrell Road and 15th Street, and the results of an evaluation process performed on these alternatives. Findings from the evaluation process are included. This memo is intended to assist the City of Bend and the project’s Technical Advisory Committee (TAC) in weighing the benefits and limitations of each alternative and selecting one preferred alternative for recommendation to City Council at their September 19th meeting. This memo will be revised once a preferred alternative has been selected and endorsed to document that decision process.

Overview

Evaluation criteria were developed for the Murphy Road Corridor Study. These criteria were used by the technical team and the TAC to evaluate the performance of each alternative against a broad range of important project characteristics, representing a full range of city and stakeholder values. Where possible, evaluation criteria were composed to highlight differences among alternatives.

All criteria had a constructed scale, generally following the layout described in Table 1 below (except where noted):

<table>
<thead>
<tr>
<th>Rating</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Alternative directly and positively addresses the intent of the criterion.</td>
</tr>
<tr>
<td>2</td>
<td>Alternative partially meets the intent of the criterion, addressing some but not all of the objectives.</td>
</tr>
</tbody>
</table>
TABLE 1
Overview of Murphy Corridor Study Evaluation Scale

<table>
<thead>
<tr>
<th>Rating</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Alternative neither meets nor does not meet intent of criterion. Alternative has no effect or criterion does not apply.</td>
</tr>
<tr>
<td>-2</td>
<td>Alternative does not support the intent of, or negatively impacts, the criterion.</td>
</tr>
</tbody>
</table>

Note: Some alternatives received a (3) or a (-1) rating, to provide differentiation from other alternatives. In these cases, the alternative was somewhere between a 2 and 4 rating or between 0 or -2 rating. Details are provided in the notes.

The eight evaluation criteria for the Murphy Road Corridor Study are listed below and described in more detail in the Evaluation Framework Memo (Technical Memo 7.1).

- Congestion/Mobility
- Connectivity
- Constructability
- Cost
- Environment – Built (Residential/Business Impacts)
- Environment – Natural
- Multimodal Solutions
- Safety

Overview of Alternatives

Five alternatives were developed for the Murphy Road Corridor between Parrell Road and 15th Street. Three (Alternatives A-C) were presented at a TAC meeting on March 6, 2007. The fourth (Alternative D) was presented at a public open house on April 5th (along with the original three) and at a TAC meeting on April 18th. The fifth (Alternative E) was developed upon the request of the City of Bend in July 2007. All alternatives provided improvements to the existing Murphy Road corridor between Parrell Road and Brosterhous Road, as well as including an extension of Murphy Road between Brosterhous Road and 15th Street. All alternatives completed the sidewalk system between Parrell Road and 15th Street, and retained and continued on-street bicycle lanes. A description of the five alternatives is provided below:

- **Alternative A (Continuous Three-Lane Section, Consistent with City Design Standards):** This alternative widens Murphy Road to meet City design standards, as outlined in the City of Bend Development Code. The cross section of Murphy Road for Alternative A includes two 14’ travel lanes (one lane in each direction), a 16’ center-turn lane, and two 6’ on-street bicycle lanes, as well as 6’ planter strips and 6’ sidewalks on both sides of Murphy Road (see Figure 1). The minimum right-of-way needed for this alternative is 80’. Because existing right-of-way is 60’, this alternative requires 10’ of right-of-way on both the north and the south of Murphy Road. Signals and left-turn lanes are installed at Parrell Road, Country Club Road, and Brosterhous Road (see Figure 2). The 15th Street intersection would be stop controlled with an extended left turn pocket on Murphy Road.
• **Alternative B (Two-Lane Section with Increased Capacity at Key Intersections):** This alternative consists of a two-lane cross section between Parrell and Brosterhous with signals at key intersections. Under Alternative B, the corridor remains similar to what exists today; with two 12’ travel lanes (one in each direction), 6’ on-street bicycle lanes, and 6’ wide sidewalks (see Figure 3). The sidewalk network is extended to create a continuous sidewalk network throughout the corridor. This alternative installs signals at Parrell Road, Country Club Road, and Brosterhous Road. The minimum right-of-way needed for this alternative is 48’ (less than the existing right-of-way line). Between Brosterhous Road and 15th Street, Murphy Road would be comprised of two 14’ travel lanes and an extended 16’ left-turn pocket (approaching 15th Street); additionally two 6’ on-street bicycle lanes and 6’ sidewalks would be located on both sides of Murphy Road (see Figure 4). The 15th Street intersection would be stop-controlled. This alternative requires an exception from City design standards (for the section between Parrell Road and Brosterhous Road).
**Alternative C (Two-Lane Section with Roundabouts at Key Intersections):** This alternative is similar to Alternative B, but installs roundabouts in lieu of signals at Parrell Road, Country Club Road, and Brosterhous Road (see Figure 3). The radius of the roundabouts is estimated to be 55’ and with entry widths of 16’ (see Figure 5). Between Brosterhous Road and 15th Street, Murphy Road would be comprised of two 14’ travel lanes and an extended 16’ left-turn pocket (approaching 15th Street); additionally two 6’ on-street bicycle lanes and 6’ sidewalks would be located on both sides of Murphy Road (see Figure 4). The 15th Street intersection would be stop-controlled. This alternative requires an exception from City design standards (for the section between Parrell and Brosterhous).

**Alternative D (Reduced Width Three-Lane Section with Roundabouts at Key Intersections):** This alternative includes roundabouts at key intersections, while reducing the cross section of the roadway, to minimize right-of-way acquisition between intersections. The radius of the roundabouts is estimated to be 55’ and with entry widths of 16’ (see Figure 5). From Parrell Road to Brosterhous Road, the corridor has three 12’ travel lanes (one in each direction and a center turn lane) as well as a 6’ on-street bicycle lane.
lane and a 6’ sidewalk on both sides of Murphy Road (see Figure 6). Between Brosterhous Road and 15th Street, Murphy Road would be comprised of two 14’ travel lanes and an extended 16’ left-turn pocket (approaching 15th Street); additionally two 6’ on-street bicycle lanes and 6’ sidewalks would be located on both sides of Murphy Road (see Figure 4). The 15th Street intersection would be stop-controlled. This alternative requires an exception from City design standards (for the section between Parrell and Brosterhous).

Between April and July 2007, new aerial photographs were taken and additional survey data were collected to assist in the refinement of the above alternatives. The technical team created a variation of Alternative D after this new data was available, to compare the impacts of signalized versus roundabout intersections along Murphy Road. This new alternative, Alternative E, is described below.

- **Alternative E (Reduced Width Three-Lane Section with Signals at Key Intersections):**
  The cross section of this alternative is identical to Alternative D (see Figure 6), but includes signals at key intersections (Parrell Road, Country Club Road, and Brosterhous Road). Between Parrell Road and Brosterhous Road, the corridor has three 12’ travel lanes (one in each direction and a center turn lane). There is also a 6’ on-street bicycle lane and 6’ sidewalk on both sides of Murphy Road through this section. Between Brosterhous and 15th Street, Murphy Road would be comprised of two 14’ travel lanes and an extended 16’ left-turn pocket (approaching 15th Street); additionally two 6’ on-street bicycle lanes and 6’ sidewalks would be located on both sides of Murphy Road (see Figure 4). The 15th Street intersection would be stop-controlled. This alternative requires an exception from City design standards (for the section between Parrell and Brosterhous).
Evaluation of Alternatives

Table 2 summarizes the results of the alternatives evaluation process. This matrix documents the measurement methods, performance of each alternative, and any assumptions made by the technical team and the TAC when evaluating the five Murphy Road Corridor alternatives.

<table>
<thead>
<tr>
<th>Objectives &amp; Criteria</th>
<th>Alternative A</th>
<th>Alternative B</th>
<th>Alternative C</th>
<th>Alternative D</th>
<th>Alternative E</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CONGESTION/MOBILITY</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEASURE: V/C, DELAY</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RATING</td>
<td>4</td>
<td>2 (3)</td>
<td>2 (3)</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>NOTES</td>
<td>- All alternatives will improve congestion over the no build. - Alternative A performs better than Alternatives B and C by removing left-turn vehicles from the main through movement traffic streams along EB/WB Murphy Road.</td>
<td>- Alternative will improve congestion when compared to no build. - A slight increase in delay may occur over Alternative A due to mid-block left turn vehicles blocking through trips along EB/WB Murphy.</td>
<td>- Alternative will improve congestion when compared to no build. - A slight increase in delay may occur over Alternative A due to mid-block left turn vehicles blocking through trips along EB/WB Murphy.</td>
<td>- Alternative will improve congestion when compared to no build. - Alternative D performs better than Alternatives B and C by removing left-turn vehicles from the main through movement traffic streams along EB/WB Murphy Road.</td>
<td>- Alternative will improve congestion when compared to no build. - Alternative E performs better than Alternatives B and C by removing left-turn vehicles from the main through movement traffic streams along EB/WB Murphy Road.</td>
</tr>
<tr>
<td><strong>CONNECTIVITY</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEASURE: TRIP TRAVEL DISTANCE, TRAVEL TIME</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RATING</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>NOTES</td>
<td>- All alternatives will improve connectivity when compared to no build.</td>
<td>- All alternatives will improve connectivity when compared to no build.</td>
<td>- All alternatives will improve connectivity when compared to no build.</td>
<td>- All alternatives will improve connectivity when compared to no build.</td>
<td>- All alternatives will improve connectivity when compared to no build.</td>
</tr>
</tbody>
</table>
### TABLE 2
Evaluation of Alternatives Matrix

<table>
<thead>
<tr>
<th>Objectives &amp; Criteria</th>
<th>Alternative A</th>
<th>Alternative B</th>
<th>Alternative C</th>
<th>Alternative D</th>
<th>Alternative E</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CONSTRUCTABILITY</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>MEASURE:</strong> Cost Efficiencies, Funding Competitiveness, Phasing Potential, Impacts during Construction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>RATING</strong></td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td><strong>NOTES</strong></td>
<td>- This alternative impacts driveway connections to Murphy Road. A moderate amount of existing pavement is used, though it is not clear whether the condition of the pavement substructure will allow reuse.</td>
<td>- The largest amount of existing pavement is used under this alternative, though it is not clear whether the condition of the pavement substructure will allow reuse.</td>
<td>- This alternative has the highest initial construction cost, and the largest impact to construction phasing. Require detours during construction of roundabouts</td>
<td>- A moderate amount of existing pavement is used under this alternative, though it is not clear whether the condition of the pavement substructure will allow reuse.</td>
<td>- A moderate amount of existing pavement is used under this alternative, though it is not clear whether the condition of the pavement substructure will allow reuse.</td>
</tr>
<tr>
<td><strong>COST</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>MEASURE:</strong> Order-of-Magnitude Cost Estimates</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>RATING</strong></td>
<td>2</td>
<td>4</td>
<td>-2</td>
<td>-2</td>
<td>4</td>
</tr>
<tr>
<td><strong>NOTES</strong></td>
<td>- Third highest ROW acquisition and initial construction cost.</td>
<td>- The lowest cost, due to low ROW acquisition, storm sewer &amp; utility relocations.</td>
<td>- Second highest ROW acquisition. Most storm sewer modifications.</td>
<td>- Highest acquisition cost and increased cost to widen and reconstruct storm sewer system and incorporate roundabouts.</td>
<td>- Second lowest cost; due to low ROW acquisition cost, with a smaller cost to widen road and reconstruct storm sewer system.</td>
</tr>
</tbody>
</table>
### TABLE 2
Evaluation of Alternatives Matrix

<table>
<thead>
<tr>
<th>Objectives &amp; Criteria</th>
<th>Alternative A</th>
<th>Alternative B</th>
<th>Alternative C</th>
<th>Alternative D</th>
<th>Alternative E</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ENVIRONMENT – BUILT (RESIDENTIAL/BUSINESS IMPACTS)</strong>&lt;br&gt;Measure: Business and residences impacted, businesses and residences displaced, air quality, noise, ability to mitigate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RATING</td>
<td>-2</td>
<td>2</td>
<td>-2 (-1)</td>
<td>-2</td>
<td>2</td>
</tr>
<tr>
<td>NOTES</td>
<td>- An estimated one house would be displaced (ODOT design/connectio n).&lt;br&gt;- An estimated 30 houses or businesses are within 30’ of the existing right of way.</td>
<td></td>
<td></td>
<td></td>
<td>- One residence would be displaced and a minimal amount of property will be acquired at intersections (ODOT design/connectio n).&lt;br&gt;- No houses or businesses are within 30’ of the existing right of way and could be negatively impacted.</td>
</tr>
<tr>
<td><strong>ENVIRONMENT – NATURAL</strong>&lt;br&gt;Measure: Impact on ASI</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RATING</td>
<td>2</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>NOTES</td>
<td>- Approximately 10’ to 15’ of the ASI immediately east of Country Club Road would be impacted. Since the ASI boundary was already entered, and this alternative would expand on the existing roadway, the impacts are minimal.</td>
<td>- There are no additional impacts to the ASI immediately east of Country Club Road.</td>
<td>- There are no additional impacts to the ASI immediately east of Country Club Road.</td>
<td>- There are no additional impacts to the ASI (immediately east of Country Club Road) outside of the existing right of way line, however, some of the ASI within that area may be affected.</td>
<td>- There are no additional impacts to the ASI (immediately east of Country Club Road) outside of the existing right of way line, however, some of the ASI within that area may be affected.</td>
</tr>
<tr>
<td>Objectives &amp; Criteria</td>
<td>Alternative A</td>
<td>Alternative B</td>
<td>Alternative C</td>
<td>Alternative D</td>
<td>Alternative E</td>
</tr>
<tr>
<td>-----------------------</td>
<td>---------------</td>
<td>---------------</td>
<td>---------------</td>
<td>---------------</td>
<td>---------------</td>
</tr>
<tr>
<td><strong>MULTIMODAL SOLUTIONS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>MEASURE: Provision of services to users of all modes, safety and continuity of bicycle and pedestrian routes to schools</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>RATING</strong></td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td><strong>NOTES</strong></td>
<td>- Good visibility throughout corridor. - A median refuge may be needed, and/or longer signal time to allow safe crossings for elderly, physically disabled, and/or youths. - Suggested pedestrian crossing slightly west of the old school drive to Jewell Elementary to provide a safe, mid-block connection. - Future improvements for buses can be built incrementally; bus pullout may be beneficial for traffic flow. Since the alternative is within the existing right of way, pullouts could be added later with minimal impacts to some areas of the road. - Good visibility throughout corridor.</td>
<td>- Future improvements for buses can be built incrementally; bus pullout may be beneficial for traffic flow. Since the alternative is within the existing right of way, pullouts could be added later with minimal impacts to some areas of the road. - Visibility is good between roundabouts. - Elderly, disabled, and/or young users of the road may have difficulty crossing the road at the roundabout. It may require longer waits or more information (to users of the road and signage). However, the comfort level of pedestrians and bicyclists with roundabouts is high in Bend, and this was not felt to be of great concern.</td>
<td>- Visibility is good between roundabouts. - Elderly, disabled, and/or young users of the road may have difficulty crossing the road at the roundabout. It may require longer waits or more information (to users of the road and signage). However, the comfort level of pedestrians and bicyclists with roundabouts is high in Bend, and this was not felt to be of great concern.</td>
<td>- Good visibility throughout corridor. - A median refuge may be needed, and/or longer signal time to allow safe crossings for elderly, physically disabled, and/or youths.</td>
<td></td>
</tr>
</tbody>
</table>
TABLE 2
Evaluation of Alternatives Matrix

<table>
<thead>
<tr>
<th>Objectives &amp; Criteria</th>
<th>Alternative A</th>
<th>Alternative B</th>
<th>Alternative C</th>
<th>Alternative D</th>
<th>Alternative E</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAFETY</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEASURE: NUMBER OF CONFLICT POINTS/MOVEMENTS, COMPARISON AGAINST DESIGN STANDARDS, ABILITY TO DIVERT TRAFFIC AWAY FROM KNOWN CONCERNS, TRAVEL TIMES FOR EMERGENCY RESPONSE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RATING</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>NOTES</td>
<td>- Separates mid-block turning vehicles from through lanes. Concern about higher vehicle speeds due to wider roadway, leading to a greater number of and more severe crashes. - Emergency response time is improved when compared to no build and to Alternatives B and C.</td>
<td>- Number of conflict points is not reduced, and the alternative does not improve or harm response time. - The Alternative neither meets nor does not meet the intent of this criterion.</td>
<td>- Alternative reduces number of turning vehicle conflicting points and decreases severity of crashes in intersection vicinity. - The alternative may increase response time for emergency vehicles, though all agreed that design of roundabout should include adequate approach widths and internal radius to best accommodate and serve emergency vehicles.</td>
<td>- This alternative provides the least number of conflicting points at intersections and segments within the intersections. - The flush medians and wider radius, inscribed circle diameter and lane width within roundabout provides easier maneuvering of emergency vehicles. - Emergency response time between roundabouts is improved when compared to no build and to Alternatives B and C.</td>
<td>- Separates mid-block turning vehicles from through lanes. Concern about higher vehicle speeds due to wider roadway, leading to a greater number of and more severe crashes. - Emergency response time is improved when compared to no build and to Alternatives B and C.</td>
</tr>
<tr>
<td>TOTAL SCORE</td>
<td>18</td>
<td>24 (25)</td>
<td>14 (16)</td>
<td>18</td>
<td>28</td>
</tr>
</tbody>
</table>

Findings

The five alternatives ranged from a high total score of 28 points (for Alternative E) to a low of 14 points (for Alternatives C). The general findings are as listed below; alternatives are listed in order from the highest score to the lowest:

- **Alternative E (Reduced Width Three-Lane Section with Signals at Key Intersections):** This alternative scored the highest of the five. The reduced cross section helped to reduce the impact to the built and natural environment, while keeping costs low. Keeping the center turn lane also increased the mobility and safety of the alternative.

- **Alternative B (Two-Lane Section with Increased Capacity at Key Intersections):** This alternative received the second highest score. Since it was a smaller cross section it cost the least, had minor impacts to the built environment and no additional impacts to the
natural environment. However, this alternative had no safety improvements when compared to the current Murphy Road.

- **Alternative A (Continuous Three-Lane Section):** While this cross section met City design standards, it required right-of-way acquisition from over 30 properties and impacted one of the areas of special interest (ASI). The full width, three-lanes also carried a high cost estimate.

- **Alternative D (Reduced Width Three-Lane Section with Roundabouts at Key Intersections):** This alternative scored low for the same reasons as Alternative C, with larger costs and impacts to the built environment. However, this alternative did provide a center turn lane which increased the mobility and safety of the alternative. Roundabouts would also require a detour of traffic from Murphy Road during construction.

- **Alternative C (Two-Lane Section with Roundabouts at Key Intersections):** This alternative received the lowest total score. While congestion and safety improvements were made due to the roundabouts, it carried an increased cost and impacts to the built environment. The highest number of houses would be displaced with this alternative because of the right-of-way needed at each intersection. Access would also be of concern for residences that were not displaced, but would be located too near the roundabout to safely access the street. Roundabouts would also require a detour of traffic from Murphy Road during construction.

**Next Steps**

The results of this evaluation process were discussed with the City of Bend and the TAC in September 2007. Comments from these groups were incorporated into the evaluation framework and into this memorandum. The TAC recommended selecting alternatives D and E as preferred alternatives at the Bend City Council during their September 19, 2007 meeting. On November 7, 2007 the City Council agreed with the recommendations and deferred a decision as to specific intersection design and consistency of the center lane to the design phase.
Memorandum

To: Bend City Council

From: Ken Fuller, Public Works Director
       Nick Arnis, Transportation Engineering Manager

Subject: Murphy Road Corridor Study Overview

Date: September 19, 2007

Issue:
The Murphy Road Corridor study is examining possible improvements to the roadway between Parrell Road and 15th Street. Five alternatives have been developed and two are being recommended as possible solutions. This meeting will give a general overview of the study and the alternatives; no decision will be made at this time. The public will also review the same information at an open house on October 11 and will review the two recommended alternatives. On November 7, the City Council will review public comments about the alternatives and will recommend one for implementation.

Background:
Murphy Road is located in southern Bend. The study area for this project is between SE 3rd Street on the west to SE 27th Street on the east. Murphy Road is classified as a Major Collector in the City of Bend’s Transportation System Plan (TSP) and currently exists as a two-lane roadway from SE 3rd Street to Brosterhous Road. The Burlington Northern Sante Fe (BNSF) Railroad operates in a north-south direction through the project area, between Brosterhous Road and SE 15th Street. There are rock outcroppings in the area immediately east of the railroad tracks that have been designated by the City of Bend as an Area of Special Interest (ASI).

A project website has been live since the start of the project and has received 17 comments from the site. In January 2007, about 75 people attended an open house where background information on the project was presented, including the project’s objectives, existing land use, environmental, and traffic conditions, and future traffic conditions, in addition to gathering public suggestions for improving the project. In April 2007, a second open house was...
attended by 70 people. The four preliminary alternatives were presented and feedback on the alternatives, or suggestions for new alternatives, was gathered from the public. The public was asked which alternative would most benefit the corridor. A third open house is scheduled for October 11, 2007. All five alternatives will be presented and the public will be asked for their comments on the two alternatives that are recommended for implementation (Alternatives D and E). Public comments will be brought to the Council on November 7 for review and final recommendation on one preferred alternative.

**Analysis:**
The evaluation criteria used by the technical team and the Technical Advisory Committee (TAC) to evaluate the performance of each alternative against a broad range of important project characteristics, representing a full range of city and stakeholder values are listed below. The evaluation criteria tie back to the findings from the September 13-14, 2006 stakeholder interviews and the October 2, 2006 TAC meeting. The criteria were revised based on comments from the TAC at its November 7, 2006 meeting.

- **Congestion/Mobility criteria** – measured by the travel mobility standards (measured as a ratio of volume-to-capacity \([v/c]\)) and amount of delay on the corridor.

- **Connectivity criteria** – measured by direct and efficient access to and between origins and destinations along Murphy Road, southeastern Bend, the Parkway, and downtown; amount of out-of-direction travel; and travel times.

- **Constructability criteria** – measured by the 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.

- **Cost criteria** – measured by the order-of-magnitude cost estimates (to include design, right of way acquisition, and construction).

- **Built (Residential/Business Impacts) Environment criteria** – measured by the number of businesses and residences impacted and severity of impact; number of homes or businesses displaced; qualitative assessment of alternative’s impact on air quality and noise; and the ability to appropriately mitigate impacts.

- **Natural Environment criteria** – measured by the ability to avoid impacts to the Area of Special Interest (ASI) located immediately east of the BNSF railroad tracks, according to Exhibit C ("Upland Areas of Special Interest") of Section 2.7.700 of the Bend Development Code.
• **Multimodal Solutions criteria** – measured by the alternative’s provision of services to users of all modes; safety and continuity of bicycle and pedestrian routes to R.E. Jewell elementary school and the future middle school and high school; directness and convenience of route; and quality of environment (in terms of grade, lighting, and drainage).

• **Safety criteria** – measured by the number of conflict points/movements; comparison of alternative against design standards; ability to divert traffic away from known safety concerns; and travel time change for emergency response times.

Five alternatives have been developed for the Murphy Road Corridor between Parrell Road and 15th Street. Three (Alternatives A-C) were presented at a TAC meeting on March 6, 2007. The fourth (Alternative D) was presented at a public open house on April 5th and a TAC meeting on April 18th. The fifth (Alternative E) was developed upon the request of the City of Bend in July 2007. All alternatives provide improvements to the existing Murphy Road corridor between Parrell Road and Brosterhous Road, as well as including an extension of Murphy Road between Brosterhous Road and 15th Street. All alternatives complete the sidewalk system between Parrell Road and 15th Street, retain and continue on-street bicycle lanes, and install a stop sign at the 15th Street intersection. A description of the five alternatives is provided below:

• **Alternative A (Continuous Three-Lane Section, Consistent with City Design Standards):** This alternative would widen Murphy Road to meet City design standards, as outlined in the City of Bend Development Code. The cross section of Murphy Road for Alternative A includes two 14’ travel lanes (one lane in each direction), a 16’ center-turn lane, and two 6’ on-street bicycle lanes, as well as 6’ planter strips and 6’ sidewalks on both sides of Murphy Road. The minimum right-of-way needed for this alternative is 80’, this alternative requires 10’ of right-of-way on both the north and the south of Murphy Road. Signals and left-turn lanes would be installed at Parrell Road, Country Club Road, and Brosterhous Road.

• **Alternative B (Two-Lane Section with Increased Capacity at Key Intersections):** This alternative consists of a two-lane cross section between Parrell and Brosterhous with signals at key intersections, similar to what exists today with two 12’ travel lanes (one in each direction), 6’ on-street bicycle lanes, and 6’ wide sidewalks. Signals would be installed at Parrell Road, Country Club Road, and Brosterhous Road. Between Brosterhous Road and 15th Street, Murphy Road would be comprised of two 14’ travel lanes and an extended 16’ left-turn pocket (approaching 15th Street); additionally two 6’ on-street bicycle lanes and 6’ sidewalks would be located on both sides of Murphy Road. The minimum right-of-way needed for this alternative is 48’ (less than the existing right-of-way line). An exception from
City design standards (for the section between Parrell Road and Brosterhous Road) would be needed.

- **Alternative C (Two-Lane Section with Roundabouts at Key Intersections):** Similar to Alternative B, but roundabouts would be installed instead of signals at Parrell Road, Country Club Road, and Brosterhous Road. The radius of the roundabouts is estimated to be 55’ and with entry widths of 14’ (similar to existing roundabouts in Bend). Between Brosterhous Road and 15th Street, Murphy Road would be comprised of two 14’ travel lanes and an extended 16’ left-turn pocket (approaching 15th Street); additionally two 6’ on-street bicycle lanes and 6’ sidewalks would be located on both sides of Murphy Road. An exception from City design standards (for the section between Parrell Road and Brosterhous Road) would be needed.

- **Alternative D (Reduced Width Three-Lane Section with Roundabouts at Key Intersections):** This alternative would include roundabouts at key intersections, while reducing the cross section of the roadway to minimize right-of-way acquisition between intersections. The radius of the roundabouts is estimated to be 56’ and with entry widths of 16’. From Parrell Road to Brosterhous Road, the corridor would have three 12’ travel lanes (one in each direction and a center turn lane) as well as a 6’ on-street bicycle lane and a 6’ sidewalk on both sides of Murphy Road. Between Brosterhous Road and 15th Street, Murphy Road would be comprised of two 14’ travel lanes and an extended 16’ left-turn pocket (approaching 15th Street); additionally two 6’ on-street bicycle lanes and 6’ sidewalks would be located on both sides of Murphy Road. An exception from City design standards (for the section between Parrell Road and Brosterhous Road) would be needed.

Between April and July 2007, new aerial photographs were taken and additional survey data were collected to assist in the refinement of the above alternatives. The technical team created a variation of Alternative D after this new data was available, to compare the impacts of signalized versus roundabout intersections along Murphy Road.

- **Alternative E (Reduced Width Three-Lane Section with Signals at Key Intersections):** Identical to Alternative D’s cross section, but would include signals at key intersections (Parrell Road, Country Club Road, and Brosterhous Road) instead of roundabouts. Between Parrell Road and Brosterhous Road, the corridor would have three 12’ travel lanes (one in each direction and a center turn lane). There would also be a 6’ on-street bicycle lane and 6’ sidewalk on both sides of Murphy Road through this section. Between Brosterhous and 15th Street, Murphy Road would be comprised of two 14’ travel lanes and an extended 16’ left-turn pocket (approaching 15th Street); additionally two 6’ on-street bicycle lanes and 6’ sidewalks would be located on both sides of Murphy Road. An exception
from City design standards (for the section between Parrell Road and Brosterhous Road) would be needed.

During the evaluation, the technical team, TAC, and City of Bend staff found that Alternatives D and E presented a benefit for the study area. Alternative E scored the highest in the criteria evaluation, specifically with a smaller cross section reducing the impacts to the built and natural environment, while keeping costs low. Keeping the center turn lane also increased the mobility and safety of the alternative. Alternative D scored lower because of the impacts of the roundabouts to the built environment and to the project’s cost. Access issues were also of concern for local residents. Roundabouts would also require a detour of traffic from Murphy Road during construction.

Both of these alternatives would provide the benefits of a three lane cross section but would be narrower than what is required by City design standards. However, roundabouts (as opposed to signals) provide congestion and safety improvements which warranted its advancement. Roundabouts generally decrease the severity of crashes, allow for aesthetic improvements, and meet Bend City desires to incorporate roundabouts in roadway improvements. Signals generally cost less due to a smaller size (which doesn’t require as many residential relocations), allow for traffic to travel on the road during construction, and are adequate in handling the amount of traffic projected on Murphy Road in the future.

**Recommendation:**
The City Council is not being asked for a decision at this time. The above information will be presented to the public at an open house on Thursday, October 11, 2007. Public comments about the information and the two recommended alternatives will be brought back to the Council on November 7, 2007 for their recommendation.
Memorandum

To: Mayor Abernethy and City Council
   Andy Anderson, City Manager

From: Ken Fuller, Public Works Director
      Nick Arnis, Transportation Engineering Manager

Subject: Murphy Road Corridor Study Overview

Date: September 19, 2007

Issue:
The Murphy Road Corridor Study is examining possible improvements to the roadway between Parrell Road and 15th Street. Five alternatives have been developed and two are being recommended as possible solutions. This Council Work Session will give a general overview of the study and the alternatives; staff is not asking the City Council to make a decision at this time. The public will also have an opportunity to review the five alternatives at an open house on October 11th. Staff will utilize the public input to make a final determination on the preferred corridor alternative. On November 7th, the City Council will review public comments from that open house and will be asked to consider approval of the staff recommendation.

Background:
The corridor study’s goal is to analyze improvements that are required to accommodate future needs of all transportation users, as well as address existing mobility, connectivity, and safety concerns. The corridor study project began in August, 2006.

The study area consists of Murphy Road between SE 3rd Street on the west and SE 27th Street on the east. Murphy Road is classified as a Major Collector in the City of Bend’s Transportation System Plan (TSP) and currently exists as a two-lane roadway from SE 3rd Street to Brosterhous Road. The Burlington Northern Sante Fe (BNSF) Railroad operates in a north-south direction through the project area, between Brosterhous Road and SE 15th Street. There are rock outcroppings in the area immediately east of the railroad tracks that have been designated by the City of Bend as an Area of Special Interest (ASI). The project team is working closely with a Technical Advisory Committee (TAC) comprised of City staff, Metropolitan Planning Organization (MPO) staff, and other area stakeholders. The TAC has held five meetings to date at key project milestones. The project consultant is CH2M HILL, Inc. A project website has been live since the start of the project and City staff has received 17 comments through the site. In January 2007, approximately 75 people attended an open house where background
information on the project was presented, and ideas were gathered for improving the corridor. A second open house was held in April 2007, attended by 70 people. Three preliminary alternatives (Alternatives A through C) were presented and feedback solicited.

Coordination with Murphy Road Overcrossing and the Southeast Interceptor Project

The City of Bend, Oregon Department of Transportation (ODOT) and WinCo Foods are working on an agreement for highway access to the WinCo Foods site at the 3rd street and Highway 97 (Parkway) intersection. The agreement is intended to provide a short term solution for all three partners that will (1) allow access to the WinCo site during the start of their store construction and (2) provide the City and ODOT with an interim fix to traffic issues. The longer term solutions include a variety of transportation projects (the interchange and bridge over the Parkway) that will be designed and implemented over the course of the next five to ten years. The City has already begun coordination meetings with ODOT, WinCo and their consultants to strategize and begin planning for the long term improvements. City staff will be updating the City Council about the progress of the Murphy Road Overcrossing project at a work session in the near future.

City staff is also working diligently to coordinate the timing of the Murphy Road Project construction with the Southeast Interceptor Project along Murphy Road. The purpose of this coordination is to ensure that the road, water, and wastewater projects for Murphy Road are designed and constructed efficiently and in a timely manner.

Analysis:
Five alternatives were developed for the Murphy Road Corridor between Parrell Road and 15th Street. All of the alternatives would provide improvements to the existing Murphy Road corridor between Parrell Road and Brosterhous Road and extend Murphy Road east of Brosterhous Road to 15th Street. All of the alternatives would complete the sidewalk system between Parrell Road and 15th Street, as well as retain and continue on-street bicycle lanes.

A brief description of the five alternatives is provided below:

- **Alternative A (Continuous Three-Lane Section, Consistent with City Design Standards):** This alternative would widen Murphy Road to meet City design standards, as outlined in the City of Bend Development Code. The cross section of Murphy Road for Alternative A includes two 14’ travel lanes (one lane in each direction), a 16’ center-turn lane, and two 6’ on-street bicycle lanes, as well as 6’ planter strips and 6’ sidewalks on both sides of Murphy Road. The minimum right-of-way needed for this alternative is 80’ and since existing right-of-way is 60’, this alternative requires 10’ of right-of-way on both the north and the south of Murphy Road. Signals and left-turn lanes would be installed at Parrell Road, Country Club Road, and Brosterhous Road.

- **Alternative B (Two-Lane Section with Increased Capacity at Key Intersections):** This alternative consists of a two-lane cross section between Parrell and Brosterhous with signals at key intersections, similar to what exists today with two
12’ travel lanes (one in each direction), 6’ on-street bicycle lanes, and 6’ wide sidewalks. Signals would be installed at Parrell Road, Country Club Road, and Brosterhous Road. Between Brosterhous Road and 15th Street, Murphy Road would be comprised of two 14’ travel lanes and an extended 16’ left-turn pocket (approaching 15th Street); additionally two 6’ on-street bicycle lanes and 6’ sidewalks would be located on both sides of Murphy Road. The minimum right-of-way needed for this alternative is 48’ (less than the existing right-of-way line). An exception from City design standards (for the section between Parrell Road and Brosterhous Road) would be needed.

- **Alternative C (Two-Lane Section with Roundabouts at Key Intersections):** Similar to Alternative B, but roundabouts would be installed instead of signals at Parrell Road, Country Club Road, and Brosterhous Road. The radius of the roundabouts is estimated to be 55’ and with entry widths of 14’ (similar to existing roundabouts in Bend). Between Brosterhous Road and 15th Street, Murphy Road would be comprised of two 14’ travel lanes and an extended 16’ left-turn pocket (approaching 15th Street); additionally two 6’ on-street bicycle lanes and 6’ sidewalks would be located on both sides of Murphy Road. An exception from City design standards (for the section between Parrell Road and Brosterhous Road) would be needed.

- **Alternative D (Reduced Width Three-Lane Section with Roundabouts at Key Intersections):** This alternative would include roundabouts at key intersections, while reducing the cross section of the roadway to minimize right-of-way acquisition between intersections. The radius of the roundabouts is estimated to be 56’ and with entry widths of 16’. From Parrell Road to Brosterhous Road, the corridor would have three 12’ travel lanes (one in each direction and a center turn lane) as well as a 6’ on-street bicycle lane and a 6’ sidewalk on both sides of Murphy Road. Between Brosterhous Road and 15th Street, Murphy Road would be comprised of two 14’ travel lanes and an extended 16’ left-turn pocket (approaching 15th Street); additionally two 6’ on-street bicycle lanes and 6’ sidewalks would be located on both sides of Murphy Road. An exception from City design standards (for the section between Parrell Road and Brosterhous Road) would be needed.

- **Alternative E (Reduced Width Three-Lane Section with Signals at Key Intersections):** Identical to Alternative D’s cross section, but would include signals at key intersections (Parrell Road, Country Club Road, and Brosterhous Road) instead of roundabouts. Between Parrell Road and Brosterhous Road, the corridor would have three 12’ travel lanes (one in each direction and a center turn lane). There would also be a 6’ on-street bicycle lane and 6’ sidewalk on both sides of Murphy Road through this section. Between Brosterhous and 15th Street, Murphy Road would be comprised of two 14’ travel lanes and an extended 16’ left-turn pocket (approaching 15th Street); additionally two 6’ on-street bicycle lanes and 6’ sidewalks would be located on both sides of Murphy Road. An exception from City design standards (for the section between Parrell Road and Brosterhous Road) would be needed.
Four (Alternatives A-D) were presented at a public open house on April 5th. The fifth alternative (Alternative E) was developed by City staff in July 2007 and will be presented for public comment at the October 11th open house.

**Evaluation Criteria:**

A series of evaluation criteria were used by the technical team and the TAC to evaluate the performance of each alternative against a broad spectrum of project characteristics that represent a full range of City and stakeholder values. Brief descriptions of the project evaluation criterion are listed below.

- **Congestion/Mobility**– measured by the travel mobility standards (measured as a ratio of volume-to-capacity \([v/c]\)) and amount of delay on the corridor.

- **Connectivity**– measured by direct and efficient access to and between origins and destinations along Murphy Road, southeastern Bend, the Parkway, and downtown; amount of out-of-direction travel; and travel times.

- **Constructability**– measured by the 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.

- **Cost**– measured by the order-of-magnitude cost estimates (to include design, right-of-way acquisition, and construction).

- **Built (Residential/Business Impacts) Environment**– measured by the number of businesses and residences impacted and severity of impact; number of homes or businesses displaced; qualitative assessment of alternative’s impact on air quality and noise; and the ability to appropriately mitigate impacts.

- **Natural Environment**– measured by the ability to avoid impacts to the Area of Special Interest (ASI) located immediately east of the BNSF railroad tracks, according to Exhibit C (“Upland Areas of Special Interest”) of Section 2.7.700 of the Bend Development Code.

- **Multimodal Solutions**– measured by the alternative’s provision of services to users of all modes; safety and continuity of bicycle and pedestrian routes to R.E. Jewell elementary school and the future middle school and high school; directness and convenience of route; and quality of environment (in terms of grade, lighting, and drainage).

- **Safety**– measured by the number of conflict points/movements; comparison of alternative against design standards; ability to divert traffic away from known safety concerns; and travel time change for emergency response times.

**Evaluation Results and Discussion of Alternatives D and E:**

During the evaluation the technical team, TAC, and City of Bend staff found that Alternatives D and E presented the greatest benefits for the study area. Alternative E scored the highest in the criteria evaluation, specifically with a smaller intersection.
footprint which results in reducing the impacts to the built environment. Keeping the center turn lane also increased the mobility and safety of the alternative. Alternative D scored lower because of the impacts of the roundabouts to the built environment and to the project’s cost. Access issues were also of concern for local residents. Roundabouts are expected to require a detour of traffic from Murphy Road during construction.

Both Alternatives D and E would provide the benefits of a three lane cross section but would be narrower than City development code design standards, however, the narrower cross section meets the safety and operational criteria for the roadway. The roundabout element of Alternative D would be expected to provide additional improvements for congestion and safety. Roundabouts typically decrease the frequency and severity of crashes, are less expensive to maintain, allow for aesthetic improvements, and meet Bend City goals to incorporate roundabouts in roadway improvements. Alternative E would require fewer residential displacements, would allow for traffic to travel on the road during construction, and would be adequate in handling the amount of traffic projected on Murphy Road in the future.

**Recommendation:**
Staff requests that the City Council review the information provided and comment on the current direction of the Murphy Road Corridor Study. The City Council is not being asked for a decision at this time.

The above information will be presented to the public at an open house on Thursday, October 11, 2007. Public comments will be used to further analyze the alternatives and staff will bring that information back to the City Council on November 7, 2007 with a staff recommendation on a preferred alternative. At that time, council will be asked to endorse or modify the staff recommended alternative.
Southeast Bend

Murphy Road Corridor Study

Project Status

Bend City Council Meeting

September 19, 2007
Improvements to Murphy Road between Parrell Road and 15th Street

Five alternatives developed, with two looking most promising

No action requested of council at this time
background

• Limited east-west connectivity in SE Bend

• Improvements needed to address expected future growth

• Emergency services and school district desire better connectivity

• Public involvement to date
  – Six meetings of Technical Advisory Committee
  – Interviews with 12 area stakeholders
  – Website live since start of project
  – Two open houses
    • January 31, 2007 (75 people)
    • April 5, 2007 (70 people)
## Project Timeline

<table>
<thead>
<tr>
<th>Event</th>
<th>Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAC Meetings</td>
<td>October 3, November 7, January 17, March 6, September 14, late October (date TBA)</td>
</tr>
<tr>
<td>Public Meetings</td>
<td></td>
</tr>
<tr>
<td>Existing Conditions Analysis</td>
<td>January 31, April 5, October 11</td>
</tr>
<tr>
<td>Future Conditions Traffic</td>
<td></td>
</tr>
<tr>
<td>Analysis</td>
<td></td>
</tr>
<tr>
<td>Alternatives Development and Analysis</td>
<td></td>
</tr>
<tr>
<td>Implementation Plan</td>
<td></td>
</tr>
<tr>
<td>Corridor Improvement Plan</td>
<td></td>
</tr>
</tbody>
</table>
There are eight project evaluation criteria:

- Congestion/mobility
- Connectivity
- Constructability
- Cost
- Environment—built (residential/business impacts)
- Environment—natural
- Multimodal solutions
- Safety
<table>
<thead>
<tr>
<th>Objectives &amp; Criteria</th>
<th>Alternative A</th>
<th>Alternative B</th>
<th>Alternative C</th>
<th>Alternative D</th>
<th>Alternative E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Congestion/Mobility</td>
<td>4</td>
<td>2 (3)</td>
<td>2 (3)</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Connectivity</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Constructability</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Cost</td>
<td>2</td>
<td>4</td>
<td>-2</td>
<td>-2</td>
<td>4</td>
</tr>
<tr>
<td>Environment – Built (Residential/Business Impacts)</td>
<td>-2</td>
<td>2</td>
<td>-2 (-1)</td>
<td>-2</td>
<td>2</td>
</tr>
<tr>
<td>Environment – Natural</td>
<td>2</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Multimodal Solutions</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Safety</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>TOTAL SCORE</td>
<td>18</td>
<td>24 (25)</td>
<td>14 (16)</td>
<td>18</td>
<td>28</td>
</tr>
</tbody>
</table>
two alternatives look most promising

- Alternative D
  - Roundabouts improve safety, provide landscaping options, and comply with Bend City code for building roundabouts

- Alternative E
  - Signals have a smaller footprint, impacting fewer homes, and accommodate expected future traffic on Murphy Road
alternative D

Reduced Width Three-Lane Section with Roundabouts at Key Intersections
alternative E

Reduced Width Three-Lane Section with Signals at Key Intersections

Parrell Road to Brosterhous Road

Brosterhous Road to 15th Street
next steps

• Alternatives will be presented at a public open house on October 11, 2007.

• Staff will present comments from open house and recommend an alternative for council endorsement on November 7, 2007.
alternative A

Continuous Three-Lane Section, Consistent with City Design Standards
alternative B

Two-Lane Section with Increased Capacity at Key Intersections

Parrell Road to Brosterhous Road

Brosterhous Road to 15th Street
alternative C

Two-Lane Section with Roundabouts at Key Intersections

Parrell Road to Brosterhous Road

Brosterhous Road to 15th Street
Memorandum

To: Mayor Abernethy and City Council  
Andy Anderson, City Manager

From: Ken Fuller, Public Works Director  
Nick Arnis, Transportation Engineering Manager

Subject: Murphy Road Corridor Study  
Staff Recommendation on Preferred Corridor Alternative

Date: November 7, 2007

Issue:
This memo requests City Council endorsement of a staff recommendation to proceed with a three-lane cross section design along Murphy Road between 3rd Street and 15th Street. This cross section would be comprised of two travel lanes (one lane in each direction), a center lane for turning at intersections or throughout the corridor, and continuous on-street bicycle lanes and sidewalks on both sides of the road. Landscaping strips would be incorporated where feasible. The width of the cross section would vary between 60’ and 80’, depending on available right-of-way and existing constraints of the surrounding area. To maintain flexibility, staff recommends that a decision on specific intersection type at key intersections (roundabouts vs. signals) and the specific composition of the center lane (width, location of allowable turns) be deferred until the Murphy Road corridor project moves from the planning phase into design.

Background:
The Murphy Road Corridor Study project limits include Murphy Road between SE 3rd Street and SE 27th Street. Murphy Road is classified as a Major Collector in the City of Bend’s Transportation System Plan (TSP) and currently exists as a two-lane roadway from SE 3rd Street to Brosterhous Road. The Burlington Northern Sante Fe (BNSF) Railroad operates in a north-south direction through the project area, between Brosterhous Road and SE 15th Street. There are rock outcroppings in the area immediately east of the railroad tracks that have been designated by the City of Bend as an Area of Special Interest (ASI).

The City is also coordinating a study of the Murphy Road Overcrossing with the Oregon Department of Transportation (ODOT) and the consultants and representatives from WinCo foods. An update to Council about this process will occur in the near future. The two projects, Murphy Road Corridor and the Overcrossing, are being coordinated although the projects will likely have different timelines and funding strategies. Other
projects that are being coordinated with in regards to financing and timing include the SE Interceptor Study and the 16-inch Water Main from Murphy Pump Station to Timber Ridge neighborhood. There will be public meetings on the SE Interceptor Study starting in January 2008.

The planning study for the Murphy Road Corridor includes a needs assessment which identified east-west connectivity and ability to accommodate future (Year 2030) local and regional traffic as primary project goals. The project team then developed a total of five alternatives that address these project needs. These alternatives, which have been discussed with the Technical Advisory Committee (TAC), the public, and City Council, are described briefly below:

Alternative A: *Continuous Three-Lane Section, Consistent with City Design Standards*
- Minimum 80’ right of way (two 14’ travel lanes, one 16’ center-turn lane, on-street bicycle lanes, planter strips and sidewalks (all 6’) on both sides of Murphy Road.
- Requires 10’ of right-of-way on both sides of Murphy Road (total of 20’).
- Signals at Parrell Road, Country Club Road, and Brosterhous Road.

Alternative B: *Two-Lane Section with Increased Capacity at Key Intersections*
- Minimum 48’ of right of way (two 12’ travel lanes and on-street bicycle lanes and sidewalks (both 6’) on both sides of Murphy Road.
- Fits within existing right of way.
- Left-turn pockets and signals would be installed at Parrell Road, Country Club Road, and Brosterhous Road.

Alternative C: *Two-Lane Section with Roundabouts at Key Intersections*
- Similar to Alternative B, except that roundabouts would be installed instead of signals at Parrell Road, Country Club Road, and Brosterhous Road.

Alternative D: *Reduced Width Three-Lane Section with Roundabouts at Key Intersections*
- Modified three-lane section to achieve safety and mobility benefits while being sensitive to existing right of way constraints
- Minimum 60’ right of way (three 12’ travel lanes (one in each direction and a center turn lane) as well as on-street bicycle lanes and sidewalks (both 6’) on both sides of Murphy Road.
- Roundabouts would be installed at Parrell Road, Country Club Road, and Brosterhous Road.

Alternative E: *Reduced Width Three-Lane Section with Signals at Key Intersections*
- Similar to Alternative D, except that left-turn pockets and signals would be installed at Parrell Road, Country Club Road, and Brosterhous Road.
All five alternatives met the primary goals of accommodating future traffic and improving east-west connectivity in south Bend. Additional evaluation factors considered by the project team and the TAC helped to differentiate amongst alternatives. These are described in the section below.

**Analysis:**
The five corridor alternatives were evaluated against the following set of criteria:

- Congestion
- Connectivity
- Constructability
- Cost
- Environment (Built – Residential/Commercial)
- Environment (Natural)
- Multimodal Solutions
- Safety

The alternatives evaluation was not weighted and therefore top scoring alternatives were not intended to be the ones “chosen.” Rather, the evaluation process was intended to generate a discussion among agency and citizen stakeholders about the project tradeoffs. A summary of these tradeoffs is included below.

The project team found that Alternatives D and E presented the greatest benefit of the alternatives assessed. This is because these two alternatives achieved the mobility and safety benefits of having a center turn lane (to allow turning traffic to pull out of the travel lane), while avoiding the right-of-way impacts, environmental impacts, and higher costs associated with the wider cross section (Alternative A).

Alternatives D and E differ by intersection type – Alternative D has roundabouts at key intersections whereas Alternative E has signalized intersections. Alternative E scored higher by the project team than Alternative D because its smaller footprint minimized residential displacements at intersections. In fact, no displacements were associated with the signals at Parrell Road, Country Club Road, or Brosterhous Road. Up to seven displacements were associated with the roundabout concept, and in addition access issues were also of concern for local residents in the vicinity of Parrell Road. Roundabouts would also require a detour of traffic away from Murphy Road during construction.

However, the roundabouts in Alternative D provided mobility and safety improvements by reducing intersection delay (cars do not need to wait for a light to turn green) and reduces the number of potential conflict points at intersections.

Comments received from the public at the October 11, 2007 open house indicated support for the modified three-lane cross section associated with Alternatives D and E, and support for roundabouts as an intersection type (Alternative D). About eighty people attended the Open House. This was the third Open House held for the corridor plan. Those members of the public that voiced concerns with roundabouts pointed to the small inscribed radii of earlier roundabout designs and the need to accommodate
emergency vehicles. The current project designs address these concerns, accommodate larger emergency vehicles, and have the support of Bend Fire and Police. Public Works Transportation Engineering will continue to involve the Fire and Police Departments through the design stages of the project. In addition, staff received strong support in the Open House for a roundabout at the proposed Murphy Road and 15th Street intersection.

Following the open house a letter signed jointly by the Chairs of the Southwest, Southeast, and Old Farm Neighborhood Associations was received by the City of Bend. This letter urged the City to forward a three lane design for Murphy Road that consisted of two travel lanes (one in each direction) and a center landscaped median. Although the project team recognizes the potential difficulties of installing a curbed median along this corridor with its many driveways, it was felt that some portions of the corridor without driveways may be appropriate for such a treatment. In the second Open House held in April, 2007, staff received many comments in support of a center turn lane particularly in the section from 3rd Street to Country Club Road. This section includes numerous direct driveway accesses to Murphy Road.

Currently the project team is weighing the tradeoffs of community support for roundabouts with reduced impacts with signals including the idea for a roundabout at the Murphy Road and 15th Street intersection. Although some of the potential impacts associated with Alternative D may be minimized or avoided as the project is designed (by shifting the location of the roundabout, or reducing the inscribed radius), not enough information is known at this time to make this determination.

Both the consistency of the center lane and the intersection treatment are details that are difficult to address in the planning phase. Therefore, the staff recommendation is to forward both Alternatives D and E for the Murphy Road Corridor Study planning document, comprised of the following design elements:

- Extend Murphy Road eastward between Brosterhous Road and 15th Street, to include a new bridge over the BNSF railroad tracks
- Include a roundabout at the east end of Murphy Road with the intersection of 15th Street
- Build new section of Murphy Road consistent with City design standards (a total width of 80’)
- Improve the existing section of Murphy Road to a three lane cross section between Parrell Road and Brosterhous Road
- Design improvements along existing segment of Murphy Road within existing 60’ right of way
- Include continuous three lane section with on-street bicycle lanes and sidewalks on both sides of Murphy Road throughout corridor
- Incorporate landscaping strips or medians within corridor as feasible/appropriate
- Defer decision on intersection type (roundabouts vs. signals) to the project’s design phase
- Defer decision on specific use of center lane (continuous turn lane or/and landscaped median between regular turn pockets) to the project’s design phase
**Recommendation:**
Staff recommends project Alternatives “D” and “E” be forwarded as the recommended alignments for the Murphy Road Corridor Plan, and defer a decision as to specific intersection design and consistency of the center lane to the design phase.
Bend City Council
November 7, 2007 Council Meeting

Issue Summary
Department: Public Works                     Staff Member: Nick Arnis / Ken Fuller

Murphy Road Corridor Alternative Selection

Staff Review and Recommendation to Council:
Approve Murphy Road Corridor Study Alternatives D and E for further design with the design elements listed below.

History:
August, 2006: City begins Murphy Road Corridor Study
January 31, 2007: First Public Open House (Project Overview)
April 5, 2007: Second Public Open House (Alternatives Presentation)
September 19, 2007: Update to City Council
October 11, 2006: Third Public Open House (Review Alternatives and Staff Preference)

Background:
Please refer to the attached staff memo about the Murphy Road Corridor. City staff is currently coordinating with the Oregon Department of Transportation (ODOT) and representatives from WinCo Foods about the Murphy Road Overcrossing implementation plan. The Murphy Road Overcrossing is a separate process and will be presented to Council later in November.

Discussion of the Issue and Alternatives Explored:
Please refer to the attached staff memo.

Secondary Issues:

Committee Review and Recommendation to Council:
Approve the Murphy Road Corridor alternatives D and E for further design with the following design elements:

- Extend Murphy Road eastward between Brosterhous Road and 15th Street, to include a new bridge over the BNSF railroad tracks
- Include a roundabout at the east end of Murphy Road with the intersection of 15th Street
- Build new section of Murphy Road consistent with City design standards (a total width of 80’)
- Improve the existing section of Murphy Road to a three lane cross section between Parrell Road and Brosterhous Road
- Design improvements along existing segment of Murphy Road within existing 60’ right of way
- Include continuous three lane section with on-street bicycle lanes and sidewalks on both sides of Murphy Road throughout corridor
- Incorporate landscaping strips or medians within corridor as feasible/appropriate
- Defer decision on intersection type (roundabouts vs. signals) to the project’s design phase
- Defer decision on specific use of center lane (continuous turn lane or/and landscaped median between regular turn pockets) to the project’s design phase

Budgetary Considerations:
Preliminary cost estimate for Alternatives D and E is $25 to $17 million. The preliminary cost estimate includes a 40% contingency; this is a very rough cost estimate. There is $ 5.3 million budgeted in the five year Capital Improvement Program (CIP). The City will issue a Request for Proposals (RFP) for future design work.
1. Roll Call

The regular meeting of the Bend City Council was called to order at 7:12 P.M. in the City Council Chambers at Bend City Hall, 710 NW Wall. Present upon roll call by City Recorder Patty Stell were Bend City Councilors Linda Johnson, Mark Capell, Peter Gramlich, Bill Friedman, Jim Clinton, and Mayor Bruce Abernethy. Councilor Chris Telfer was absent.

2. Pledge of Allegiance

The Pledge of Allegiance was recited.

3. Receive Visitors

Keith Scott discussed the water reservoir in Woodriver Village and the charge to individual lots. He suggested that Avion Water Utility install larger waterlines. There are septic issues in Woodriver Village.

Dick Tobiason invited the Council to the Veterans’ Day Parade and the dedication of the Veterans’ Memorial Bridge and the Randy Newman Memorial Walkway this Saturday. He thanked Council for honoring veterans by naming the bridge and walkway. The memorials will be added to the state list of veterans’ memorials.

Dayton Herron discussed the Mobile Home Park Ordinance. The ordinance was praised when it was adopted. He believes the City should maintain its control over the ordinance rather than allowing the state to regulate this issue through statute.

Barbara Rebenstorf discussed the Mobile Home Park Ordinance. She does not support the recommendation to remove the ordinance and let the state regulate. She encouraged Council to keep the ordinance.

Nate Lund discussed the Mobile Home Park Ordinance expressing his appreciation for Council’s work to establish it. The ordinance provides fairness and foresight. The house bill does not protect tenants the way the City’s ordinance does.

Paul Claeyssens, past president of Boyd Acres Neighborhood Association, expressed disappointment for the removal of the mixed use in plans for Juniper Ridge. BANA has been involved since the beginning when the Juniper Ridge property was proposed at 300 acres and has remained involved throughout the process to its current concept. BANA is most affected by the Juniper Ridge development. The worst option is that the 500 acres be used exclusively for industrial land. The best scenario is for a mixed use development.

Councilor Friedman assured Mr. Claeyssens that Juniper Ridge remains a mixed use development.

Mike Lovely supports a ban on open burning. He contacted County Commissioners about getting extended days on free yard debris at the landfill. They indicated there would be more days if the ordinance banning open burning is passed.

Connie Kenard supports Juniper Ridge as a mixed use development as it was proposed by the developer. The master plan is at risk and she wants results from the City. She polled her members of the Neighborhood Association and implored Council to take Juniper Ridge Partners’ offer and salvage what can be salvaged. Mayor Abernethy echoed Councilor Friedman’s comments. The Council likes the master plan, but the risk is great. Council does not desire to go back to 500 acres.

Bruce White discussed the MOU with ODOT. He represents property owners north of Cooley Road. The property is currently surrounded by the City and served by City
services and is a candidate for inclusion in the UGB. He is concerned that the MOU not be used to skew the decision about the inclusion of his client's property in the UGB expansion. He requested a statement in the MOU stating that the MOU won't be used to bias the ongoing UGB legislative process. He proposed specific language.

4. **Good of the Order**

No reports.

5. **Consider Approval of Murphy Road Corridor Study Alternatives D and E for Further Design (Issue Summary) (Staff Report)**

Transportation Engineer Nick Arnis reviewed the rating of the alternatives. Input from the open houses preferred a three lane section with raised and landscaped medians and preferred roundabouts. He feels that roundabouts can be reworked at a design level to minimize right-of-way impacts. He discussed the details of the preferred alternatives. Cost estimates will be refined during the design process, but the project is estimated at $17 to $24 million. Councilor Friedman recommended that maintenance costs be included in the cost estimates.

Councilor Gramlich confirmed that comments from open houses preferred three lane roundabouts even though alternative B scored higher in the criteria.

Councilor Johnson requested pictures of the design when it is brought back to Council.

Councilor Clinton asked if staff is aware of any talk about prohibiting left turns over a double line like other states do. Mr. Arnis is not aware of this consideration.

Council authorized staff to proceed with further design for alternatives D and E.

6. **Authorize the City Manager to sign a Memorandum of Understanding with Oregon Department of Transportation and Deschutes County for Transportation relating to Juniper Ridge (Issue Summary) (MOU)**

Mr. Arnis explained the MOU between the City, Deschutes County, and ODOT. The MOU is non-binding and doesn’t obligate the City to funding commitments. It directs the City as follows:

- Responsibility for design, funding, and construction of the Highway 97/Cooley improvements
- The City must coordinate the Highway 97 and Cooley Road intersection improvements with the long range EIS process for Highway 97 and 20.
- The City will develop a Northeast Bend Transportation study.
- City may pursue alternative transportation performance measures such as level of service for the Oregon Transportation Commission (OTC) consideration

Additional language will be added as requested by Councilor Friedman to state that the City recognizes that access to existing and future businesses must be considered as the design concept is developed for the mid-term improvement project at US97 and Cooley Road. Council is asked to authorize the City Manager to sign the MOU with ODOT and Deschutes County. The MOU must still be approved by the other agencies. Councilors Capell, Friedman, and Clinton have reviewed the MOU. If there are significant changes, it will be brought back to Council.

Councilor Clinton finds the MOU non-symmetric with respect to the obligations of the City and the other agencies. Particularly, obligation number 2 requiring the City to fund mid-term improvement. Originally, ODOT had obligated $15 million to the project, but this has been withdrawn. The MOU is unacceptable as written. Mr. Arnis explained that if the City is committed to the funding it would need to seek consortium partnerships.
Councilor Johnson asked if signing of the agreement would allow ODOT not to participate in the funding. Mr. Arnis discussed the history of the process. Council sought $15 Million for Cooley and 97 improvements. When presented to the Oregon Transportation Commission, it wanted to look at a broader area. There was, at one point, a commitment to look at the intersection, but it moved away from that. Councilor Johnson would like to include a statement requiring ODOT to advocate for and reconsider granting the $15 million.

Mark DeVoney with ODOT Planning clarified the MOU and funding commitments. Originally, ODOT committed $15 million for the Cooley Road interchange with the understanding that that was the long range solution for Hwy 97. As the project progressed, it was determined that it was not an appropriate long range solution. The money is still there and dedicated for a long range solution, but the solution is much more costly. The MOU clarifies priorities and how to work together. It is not binding.

Councilor Friedman believes that the City works effectively with ODOT staff. The challenge is with the Transportation Commission. We’ve painted ourselves in a corner for transportation dollars. The Transportation Commission believes the highways are for travel between communities and they don’t have money. Councilor Friedman suggested approval of the MOU, but make it clear to the Transportation Commission and the region that, when we find a long range solution, the City gets the credit for its contribution to the project. He will support the MOU.

Councilor Gramlich was alarmed by language about recitals 14 and 15 stating the understanding that ODOT will not support rezone of any additional acreage in Juniper Ridge until they have a funding obligation. ODOT is not a land use agency. He does not want to come across that ODOT has final say about rezone of lands into the UGB. It’s not their role. Mr. DeVoney explained that state administrative rule puts ODOT in a critical role in participating in zone changes as the protector of the public transportation system. ODOT has to show that there are planned facilities and funding for them in order to approve zone changes. Councilor Gramlich does not disagree with the intent but isn’t comfortable with how it is phrased. Mr. DeVoney suggested the addition of language indicating that ODOT is placed in this role by administrative rule.

Mayor Abernethy referred to Bruce White’s previous comments and to what extent this focuses on Juniper Ridge. He asked if Council is interested in additional language to ensure that this wouldn’t bias other entities with respect to the UGB expansion. Councilor Capell read Mr. White’s comments and reflected on the work session topic about direction to the Planning Commission. He doesn’t see this as an issue where his client’s land could be impacted by this MOU. He found the letter to be irrelevant. Councilor Friedman agrees.

Councilor Friedman moved to authorize the City Manager to execute the agreement with the County and ODOT. Councilor Johnson seconded the motion which passed with Councilor Clinton opposed and other Councilors present supporting the motion, 5/1.

7. An Ordinance Amending the City of Bend Development Code No. NS-2016 in Response to the DLCD (Department of Land Conservation and Development) Remand Order No. 001718 (Issue Summary and Ordinance)

City Manager Andy Anderson advised that staff recommends proceeding with the first reading and waiting for DLCD to proceed with its process before the second reading.

Long Range Planner Wendy Robinson advised that there have been no additional written comments since the continuation of the hearing. The ordinance has been prepared and presented in the Council packet.

Councilor Johnson believes that wording clarification is needed related to front yard setbacks exceptions (unenclosed covered porches not exceeding 18 inches in height).

A. Continue the Public Hearing (from October 3, 2007)
Mayor Abernethy opened the public hearing at 8:16 P.M. Hearing no comments, the public hearing was closed.

**B. Consider the first reading of proposed Ordinance**

The first reading was held.

**8. Consider the first reading of an Ordinance Vacating an Easement that lies within the SE ¼ of the NW ¼ of Section 31, Township 17 South, Range 12 East, Willamette Meridian, City of Bend, Deschutes County, Oregon. Location: Within Lexington Ave. Perpendicular to the Terminus of Rockwood Ln. (Issue Summary and Ordinance)**

Public Works Director Ken Fuller explained this housekeeping issue to clean up a 1992 vacation. The easement had been reserved in case it was needed for utilities or roads.

The first reading was held.

**9. Consider the first reading of Discuss the Mobile Home Park Closure Ordinance Revision (Ordinance to be provided after discussion at Monday’s Work Session)**

Affordable Housing Manager Jim Long asked for Council direction at the last meeting. As directed by Council payments will be consistent with state statute. There were questions about relocation. Professional movers don’t believe $7,000 is sufficient for relocation costs of a double wide mobile home. There was a proposal to take the state required payments and add an additional amount. There was also recommendation to make park owners responsible by allowing them to pay directly to mobile home owners.

Legal Counsel Pete Schannauer explained that this is the last time Council has opportunity to amend the ordinance. This will streamline the ordinance. For those owner-occupied units able to be moved, it will eliminate the relocation plan and substitute additional money to cover the cost of relocation. The costs would be indexed according to CPI.

Councilor Capell would prefer to eliminate the portion of the City’s ordinance now covered by state statute. It would reduce the City’s risk. Mr. Schannauer explained that for units that can’t be relocated, owner-tenants would receive the greater of the state amount or the assessed value of the units.

Councilor Gramlich confirmed that state law does not require a relocation plan. Mr. Schannauer explained that the amendment would allow the park owner not to plan for relocation, but can pay the owner tenant for the relocation. This would waive the need to address distance of relocation.

Councilor Clinton asked if the state statute applies to movable and non-movable units. Mr. Long advised it is a flat amount for either.

Mr. Long explained that the amendments would shift the City’s exposure and ensure that there is adequate money to relocate mobile homes. Counsel Schannauer advised that the amendments don’t impact exposure but make the procedure easier.

Councilor Johnson asked about provisions for homes that can’t be moved. Who pays the cost of removing them? Mr. Long explained that, if the park owner takes advantage of density bonuses, the park owner would pay. For the ones that can be moved, the park owner is responsible for moving them. Councilor Johnson is concerned that this requires the park owner to pay twice – once to the tenant for displacement, and then pay to remove the mobile home. She asked that the language address this.

Mayor Abernethy wants to ensure that staff is still looking for land available for mobile home parks and working with park owners to retain parks.
Councilor Capell is pleased that the state has taken action to protect mobile home owners, and is glad the City has taken measures of protection, but, now that the state adopted a statute, he would rather repeal the City ordinance. If this is not approved, he recommends keeping the density bonus from the City’s ordinance in place and taking care of those who fall through the cracks of the state ordinance, but repealing the remainder of the ordinance. Mayor Abernethy does not support this recommendation.

Mayor Abernethy summarized direction of the Council to add additional funds to the state regulations on relocation and add protections so that park owners don’t have to pay twice. Councilor Clinton clarified that everyone gets the state amount except those who qualify for additional funds (up to a certain amount), if moving expenses are over the state amount. Council agreed.

10. Hold a discussion regarding whether or not to hear two appeals of Hearings Officer Tim Elliott’s decision on File #PZ 06-254. The applicant, Renaissance Development Corp., received Tentative Plan and Conditional Use approval for a 100-unit Planned Unit Development (PUD) located in the RL Zone. Appeals were filed by the applicant and by the RiverRim Community Association (Aaron Henson) (Issue Summary) (Hearings Officer Decision) (Decision on Reconsideration)

Planner Aaron Henson distributed a map of the subdivision. Two appeals were received; one by the applicant for two of the conditions of approval related to the gates they want to install at the entrance and the 10 space parking lot.

The other appeal was filed on behalf of the RiverRim Community Association and its concerns are density and transportation impacts.

Staff does not feel these issues have community-wide impact. If Council hears the appeal, there will likely be an appeal to LUBA anyway. Staff recommends that Council not hear the appeal.

Councilor Clinton pointed out that the appeals were not included in the packet materials and he does not want to vote on the matter until he has had a chance to review the appeals. This item will be included on the next agenda and copies of the appeals will be provided in the Council packet.

11. Consider a Motion to approve the Consent Agenda A:
   A. Consider approval of the City Council meeting minutes:
      • Monday, October 15, 2007 Work Session
      • Wednesday, October 17, 2007 Work Session
      • Wednesday, October 17, 2007 Regular Meeting
   B. Approve the Intergovernmental Agreement Contract No. 2007-453 between the City of Bend Police Department and Deschutes County for the Radio Communication System (Issue Summary) (IGA)
   C. Authorize the City Manager to sign a Quitclaim Deed for Monta Vista, LLC (Issue Summary)
   D. Authorize the City Manager to sign Quitclaim Deeds (Issue Summary)
      • Remove waterline easements for 360 Bond, LLC.
      • Remove sewer easement for Rocky Mountain Land, LLC.
      • Remove temporary fire truck turnaround for Tucker E. and Jan S. Mayberry
   E. Authorize the City Manager to execute an amendment to the lease with Blue Moon Imports, LLC for ground floor space in Centennial Parking Plaza (Issue Summary) (Amendment to Lease)
   F. Authorize the City Manager to execute Vacant Land Real Estate Sale Agreement to sell affordable housing land to Cascade Community Development near 27th Street & Butler Market (Issue Summary)
   G. Receive Report on Liquor License Endorsements (Report)
Councilor Friedman moved approval of Consent Agenda A. Councilor Johnson seconded the motion. Councilor Capell pulled items E and F. The motion to approve Consent Agenda A without items E and F passed unanimously, 6/0.

Councilor Capell referred to item E, the amendment to the lease with Blue Moon Imports. He pointed out that a 1272 square foot error was made in the size of the building. He supports the amendment, but wants Council to be aware of the lease. Mr. Russell explained that staff was able to negotiate an extra year on the lease.

Councilor Capell referred to item F, the sale of vacant land as part of a right-of-way purchase. Not all the land will be needed for the right-of-way, so the remaining land will be sold for affordable housing. He pointed out that 36 percent of the original purchase price of the land was paid for by SDC money and the issue summary talks about how the money would go back to the general fund. He cautioned that the money should go back to SDCs correctly. There will likely be need for adjustment when it is determined how much land is used for right-of-way.

Items E and F on Consent Agenda A were approved unanimously, 6/0.

12. Council Action and Reports

Councilor Friedman mentioned that measure 49 passed providing relief to measure 37.

Councilor Gramlich reminded staff of Council’s previous direction about a committee to look into a cottage code. Staff will provide a status report.

Councilor Johnson and Councilor Friedman will be leaving on Tuesday afternoon for New Orleans for the National League of Cities Conference.

Council returned to the discussion of the UGB statements about UGB expansion from the preceding work session.

Councilor Johnson discussed items 9 and 13 in the statements. Item 9 talks about disruptive residential infill. Item 13 seeks boundary configuration that is logical and promotes efficient use of land and avoids creation of islands. These could be interpreted to be in conflict with each other. She asked, how is “disruptive residential infill” defined and, if residential infill is too restrictive, how is the creation of islands avoided. Planner Brian Shetterly does not see these as connected. Item 13 was intended to address the shape of the UGB to avoid configuration that would drastically skew things in one direction or take in a certain amount of area while leaving an unurbanized island. Regarding item 9, defining disruptive residential, the idea was to state a preference for looking for opportunities for up-zone, higher density residential development in other areas than existing, stable neighborhoods. Councilor Johnson does not want this statement interpreted that Council is opposed to accessory dwelling units or small, tasteful infill with some cottage zones or similar.

Councilor Gramlich asked who determines the factor used for schools, parks, and rights-of-way, and how they increase the stated land need for residential and employment lands. Mr. Shetterly responded that this is determined by the state.

Councilor Gramlich discussed item 14 – development of findings supporting the UGB expansion. He believes this leans toward a larger UGB rather than a smaller UGB. He asked for a reference point for this. Community Development Director Mel Oberst believes Council has directed to use reasonable numbers that are generally more acreage and not less. Councilor Johnson is not supportive of expansion at all costs. It has to be rational and supportable and can't decrease density overall. She supports a slow, steady increase in density. Councilor Gramlich pointed out that the general plan policies and 2030 vision should be supported in the UGB expansion.

Staff will bring the statements back for Council endorsement on November 19th.

13. Receive City Manager's Report
A. Upcoming meeting schedule
   • Monday, November 19, 2007, at 5:00 P.M. - Work Session and Regular Council Meeting; Location: City Council Chambers (Wednesday, November 21, 2007, Meeting cancelled)
   • Tuesday, November 27, 2007, at 5:00 P.M. – Joint Meeting with Bend LaPine School District; Location: Education Center Board Room
   • Thursday, November 29, 2007, at 6:00 P.M. – Joint Meeting with Bend Planning Commission; Location: Deschutes Services Building Barnes and Sawyer Rooms
   • Wednesday, December 12, 2007 at 5:30 P.M. - Joint meeting with Parks Department

Mr. Anderson asked Council to add the referenced meetings to their calendars.

14. Adjourn

The meeting adjourned at 9:08 p.m.

Respectfully submitted,

Kim Meyers
Deputy City Recorder