

Assessment of Bicycle and Pedestrian System Needs

Adopted Report

**The City of Bend
October 2006**

**This project was funded in part by a grant from the
Oregon Department of Land Conservation and Development**

J. T. ATKINS  COMPANY PC

DESCHUTES
GEO  graphics

Acknowledgements

We would like to thank the project team for their efforts in developing this report. The team worked together to identify and document bicycle and pedestrian transportation opportunities and needs within the City of Bend.

City of Bend

Rick Root

Bend Metro Park and Recreation District

Bruce Ronning

Paul Stell

J.T. Atkins & Company PC

Tom Atkins

Katie Atkins

Deschutes GEO Graphics

Deborah Quinlan

A grant from the Oregon Department of Land Conservation and Development supported development of this report.

Contents

Acknowledgements	i
Contents	iii
Purpose	1
Planning Process	1
Facility Types	1
Part I	3
Methodology	3
Accessway Character Descriptions	4
Analysis Process	5
Inventory Matrix	5
Bridges	6
Right-of-Way	6
Part I: Summary	7
Part II	
Background	9
Primary Trail System Inventory	10
Costs	10
Street Crossings	10
Bridges	12
Right-of Way	12
Surface Type	13
Rails-WITH-Trails	14
Part II: Summary	14
Bend Urban Area Transportation System Plan	18

<u>TABLES</u>		iv
Table I	Summary of Accessway Types	7
Table II	Bicycle and Pedestrian System Bridges	11
 <u>FIGURES</u>		 iv
Figure 1	Bend Accessway System Types	8
Figure 2	Primary Trail System – Proposed Additions	16
Figure 3	Trail System Bridges and Grade Separations	17
 <u>APPENDICES</u>		
Appendix A	Neighborhood Accessway Details	
Appendix B	Primary Trail System Details	
Appendix C	Proposed Amendments to the Bend Urban Area - Transportation System Plan	
Appendix D	Trail Development Standard Guidelines	
Appendix E	DLCD – Bend TSP Remand Items: Bicycle & Pedestrian Plan	

Purpose

In 1993, the State of Oregon Land Conservation and Development Commission (LCDC) adopted the Transportation Planning Rule (TPR). The TPR directed cities and counties in the state to adopt Transportation System Plans (TSP). In accordance with this mandate, the city of Bend adopted the *Bend Urban Area – Transportation System Plan* (TSP) in 2000. Upon reviewing the TSP, and when also considering public comments concerning the plan, the Department of Land Conservation and Development (DLCD) issued a Remand Order in 2001 directing the City to address certain deficiencies that they had identified in the plan.

Part I of this report addresses issues related to bicycle and pedestrian circulation as identified in the TSP Remand. **Part II** of the report addresses complementary changes to the *Primary Trail System Plan* that were identified during the preparation of the Part I inventory work.

Note: The TSP Remand Order items concerning other non-trail or accessway related issues will be addressed by additional work that will be completed outside of the scope and content of this report.

Planning Process

This report presents the existing and future trail and bikeway system within the greater Bend area. This report builds on the information presented in the *Bend Urban Trails Plan* (1995), the *Bend Riverway* planning process (2000) and the *Deschutes River Trail Action Plan* (2002). This plan also incorporates other non-automobile system inventory information that was developed by the city of Bend. This report is the result of a series of meetings and site assessments carried out with the members of the planning team including the city of Bend, Bend Metro Park and Recreation District (the District) staff and the supporting consultant team.

Facility Types

This report describes a wide variety of non-automobile facilities, further described:

- ▶ **Trails** – Soft or hard surface multi-use trails are normally separated by some distance from roadways. The determination of “surface type” is based either on the *volume* or *type* of trail use, or the *setting* that a trail may transect (i.e., canal, ditch-rider roads/trails are typically not paved due to a conflict with canal maintenance, and other trails may run through environmentally sensitive areas and are left as natural as possible). There are principally three types of trails:

1. Single Track Trails – Single-track trails are generally lower use and are typically located on the edges of the community (these are most common on the west side of Bend where they link to an extensive trail system that is on U.S. Forest Service lands). They are typically natural, earth material surface and are approximately 1-2 feet wide.

2. Connector Trails - The City accessway system includes trail linkages that provide convenient connections through and between neighborhoods, and other large blocks of land. Often these trails provide connections to the *Primary Trail* system. Connector Trails, sometimes also referred to as *Secondary Trails*, are typically limited in length (i.e., normally less than a few hundred feet long although some connector trails may be significantly longer) and normally have 5-6 foot wide paved surfaces, although some are natural surface.

3. Primary (Regional) Trails – The primary trail system serves the entirety of the community, is regional in nature and normally carries higher user volumes. In many cases, these trails parallel natural areas, including the river and the irrigation system of canals and laterals. Primary Trails typically have a width of 10-feet (a normal minimum) - *Exception:* In some areas, where a trail also serves access to certain utilities, pavement, trail width and depth may have greater dimensions. Trail surface type and/or width may vary depending on trail location relative to natural areas or to the network of irrigation company ditch-rider roadways (which often *double* as Primary Trails).

► **Sidewalks and shared roadways** – Sidewalks and lower volume local streets support the network of accessways. Due to the very nature of these lower volume local streets, bicycle traffic can comfortably *share the road* with motor vehicle traffic. Normally no special treatment to encourage travel along these facilities is required (i.e., without bike lane striping). However, in some situations, supplemental *signing* or *route markers* can provide accessway user guidance. This type of facility represents the greatest percentage of accessways within the city.

► **Bicycle Lanes** – Bicycle lanes are typically 5 to 6-foot wide, one-way lanes striped on each side of the street and are delineated from the adjacent motor vehicle traffic by an 8-inch solid white line. The lanes are also typically identified with pavement markings and signing for exclusive use by non-motorized travel.

Part I.

Part I. of the report addresses items related to the TSP Remand. Specifically, it “**conducts a general assessment of the bicycle and pedestrian facilities**” of the City. Analysis for Part I of the report:

- **Divides the City into geographic sub areas** with similar characteristics and generally assesses the status of bicycle and pedestrian facilities within each of these distinct areas. This assessment focuses on destinations, within these districts, that include; access to parks, open spaces, schools, shopping areas and employment centers, and other areas where pedestrian and bicycle usage is also likely.
- **Maps the system** of pedestrian and bicycling “accessways” throughout the community, including both existing and proposed facilities.
- **Analyzes deficiencies and identifies remedies**, including an estimation of probable costs for each remedy.
- **Recommends TSP** plan, text and exhibit **amendments** to address the remand issues.
- **Recommends trail development guidelines and standards** that supplement existing state or local standards.

Methodology

The Park District’s - *Neighborhood Parks Service Areas Plan* map was used largely as a basic template for dividing the City into “districts” for this system analysis. The District’s boundary does differ slightly from the city limits boundary, however this neighborhood boundary system does extend beyond the city limits and thus also provides coverage of *most* of the city’s urban (reserve) growth areas (which is the planning area of the TSP). Consequently, this system was deemed as an ideal and a suitable method of dividing the city into sub areas, per the directive of the TSP Remand Order.

The District’s Neighborhood Parks Service Areas divide the City into discrete geographic units that include; existing and proposed neighborhood parks and schools. These are some of the most common destinations for non-motorized travel. The basic philosophy of the neighborhood park planning system is based on the criteria of maintaining similar walkable/bikeable characteristics within each defined area. Fundamentally, the park neighborhood districts are typically bounded by the City’s arterial street network (by design, the areas are intended so neighborhood park patrons won’t be confronted by difficult street crossings), or are restricted by other

topographic or geographic barriers found in the community that impede safe and convenient walking or biking. For the most part, each neighborhood district maintains a relatively compact, focused area that is ideal for facilitating pedestrian and bicycling mobility.

The District currently has 35 - neighborhood park service areas that cover Bend's urbanized area. These neighborhoods are identified in this report as N-1, N-2, etc. In addition to the neighborhoods defined by this plan, it was necessary in this report to address the accessway needs within four other geographic areas that are not included within the District's system or boundary.

One of these areas runs north-south through the middle of the city. It is referred to in this report as the Commercial Corridor (CC). The Commercial Corridor has no significant residential development and consists mostly of commercial strip and industrial areas. It has no existing or planned neighborhood parks and is not included in the District's numbering system.

Three other geographic areas are also identified in this report and are referred to as, *Hunnet-North*, *Cooley-North* and *Lava Ridge-East*. These later designated areas are located along either the northern or the northeastern edge of the city.

Accessway Character Descriptions

This assessment of Bend's bicycle and pedestrian system is composed of a variety of trail types and local street facilities, is defined in this report as the system of "accessways". These accessways provide transportation and recreation mobility opportunities for non-motorized travel throughout the community in the large geographic areas that are formed between the Primary Trail and on-street bike lane systems.

This plan uses generally a geographic spacing for accessways on an interval of approximately every **quarter mile**. Although in many areas, due to topography or other circumstances, there may be deviations from this spacing interval.

The city currently requires a much more extensive system of local streets, each with sidewalks required on both sides of the street. It is the intent of Part I of this report to identify specific corridors that will fulfill the desired quarter-mile grid system of interconnected local streets. Therefore, the map exhibits of this report do not illustrate the full system of ALL planned local streets. Also in some cases, typically situations that require infill of sidewalks on older streets, sidewalk needs are called out for only one side of the street in this report. It is the objective of the city to seek sidewalks on both sides of the street based on a prioritized system as funding resources are identified for this type of system retrofit.

Analysis Process

The assessment of accessways through the community was completed by dividing the City into districts including the 35 - Neighborhood Park areas, plus the 4 supplemental areas. Appendix A presents a detailed assessment that includes a map of each neighborhood, an inventory matrix, a summary table of destinations and a summary analysis of accessway opportunities, constraints, deficiencies, and remedies. (The Primary Trail and On-Street System are also illustrated on the maps, but the analysis of Part I of the report is focused just on the accessway system of intervening local neighborhood streets and trail connections. Further discussion of the Primary Trail system is in Part II of the report.)

Inventory Matrix

The inventory matrix elements presented in Appendix A include the following:

Segment: An individual segment number identifies *Accessway* segments of each neighborhood. *[Note: The numbering system repeats for accessways found in adjacent neighborhoods and typically bears no relation to like-numbered accessways in those adjacent neighborhoods.]* The lower-case letters further delineate subsections of particular accessway corridors. These subsections typically delineate where accessways alternate between existing and proposed routes and vice versa or there is a change in the corridor type. The individual neighborhood maps show existing facilities as solid lines and future accessways as dashed lines.

Proposed: Proposed accessways are identified in the *proposed* column of the matrix with an "X" and with a dashed line on the maps.

Length: The *length* of an accessway segment is delineated in feet, to the nearest 50-foot increment. *[Note: Accessway lengths were determined from scaling of maps. Actual accessway segment lengths may vary and should be field-verified if greater accuracy is needed.]*

Type: Accessway segment *types* are indicated as *roadway* or *trail* with an "X" in the *type* column of the matrix.

R.O.W. (Existing): *Right-of-way* (R.O.W.) segments of accessways are delineated as public (typically *existing* road R.O.W.s), *private* (typically private road R.O.W.s or across privately owned properties) or *easements* (an existing easement that permits public access across privately owned property).

Improvement Need: The following two columns of the matrix anticipate whether the *improvement need* will be born by *public* or *private* funding

resources. *Proposed* accessways are delineated within an “X”. (These dollar figures are rough cost opinions to improve these accessway segments [in 2006 dollars] and are *not* intended to indicate a commitment of *any* public or private funding.)

Improvement Cost: The first column, *segment type*, is a numerical identification that determines the following column’s *unit cost – per linear foot*. [Note: Appendix A, Table A-3, provides additional detail of the associated unit cost as well as a breakdown by the construction elements that make up this unit cost.] The next two columns apply the *unit cost per linear foot (LF)* to the length of the accessway segment. The resultant estimated cost is shown in the respective column for *public cost* or *private cost*.

Location: A general geographic description of the *location* of each respective accessway segment is noted in this column this supplements some of the segment descriptions.

Other Comments: *Other comments* further describe the characteristics or location of the accessway segment is noted in this column.

[Note: Some short accessway segments within neighborhood areas, or other connector trails WITHIN parks, may be identified on the maps without an accompanying matrix detail. Costs have NOT been included for supplemental signing, lighting, arterial street crossing features or any other special treatments]

Bridges

Accessway costs include several smaller, bridge structures that typically cross the City’s irrigation district waterways at various locations. These locations are illustrated on the individual neighborhood accessway plans. The Accessway bridge system contemplated is also summarized in Part II of this report, on Table II.

Right of Way

Right-of-way (ROW) varies on the system of Accessway trails. Generally, most trails follow either public use easements that have been granted to permit recreational use of the property. Typical ROW or easement width is normally ten-feet wide along accessway trails, although in some areas, wider ROWs have been secured. A significant portion of the Accessway, connector trail system falls within property that has either been dedicated for public use or is owned outright (fee title) by either the City or the Park District.

It should be noted, that many of the ***proposed*** connector trails may still follow corridors that are under private ownership and dedications or easements will need to be granted to the public for use as to permit

recreational use. It is anticipated that as the City continues to develop, these ROWs or easements will be acquired over time – largely through the development exaction process.

In addition, there are some trails on City property (such as on Overturf Butte) where public use is permitted today but the primary purpose of the property may be for the expansion or maintenance of public utilities. These trails may need to be relocated in the future if they conflict with City utilities maintenance or expansion plans, and/or there other safety or security issues may arise. As in the Overturf Butte example, Memorandums of Understanding (MOUs) should be developed between the City and Park District to stipulate these conditional requirements and/or to define maintenance roles of the respective agencies.

Part I Summary

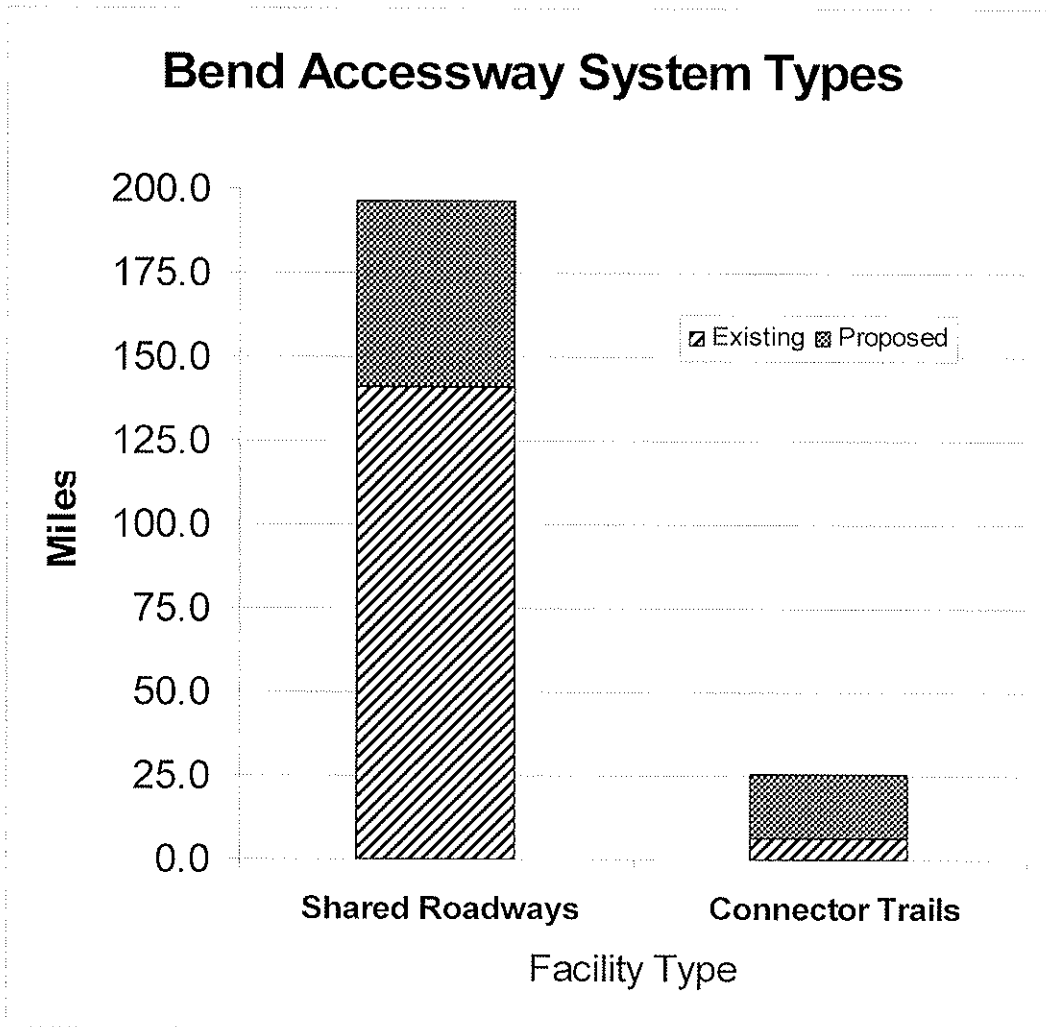
This analysis defines a citywide system of *neighborhood accessways* that total approximately 222 miles. These accessways augment the currently defined, planned Primary Trail and On-Street Bike Lane System depicted in the TSP. A significant percentage of the accessways follow the existing local street system. Table 1 provides a mileage summary of Accessway types envisioned in this system.

The construction opinion of the ***public cost*** needs of accessway improvements total approximately \$4.4 million. Public costs are in 2006 dollars and *exclude* right-of-way acquisition expense. The ***private cost*** needs total approximately \$21.8 million. Private development costs also *exclude* right-of-way expense and are principally just for the construction of sidewalks; the construction cost of a parallel street segment is not included in the cost figures. Appendix A, Table A-2, provides cost opinion summaries for each neighborhood.

Appendix A, Table A-4, provides a full descriptive summary of all accessway types and their respective construction opinion of costs. Figure 1 provides a summary of Bend Accessway System Totals.

<i>Type</i>	<i>Existing</i>	<i>Proposed</i>	<i>Total</i>
Shared Roadways	141	55	196
Connector Trails	6	19	26
Total Miles =	148	74	222
<i>Note: Totals include rounding</i>			

Figure 1



Part II

Background

The Primary Trail System is the network of principal community trails identified in the current TSP¹. These trails, by definition, are the more significant trails that provide service to the entire community, normally covering several miles through and across the city.

The system of “primary” trails provides intra-county community service for the residents of Bend. It should be noted, that a true “regional” system provides service to a much larger geographic area than just the city of Bend. Discussions and planning effort is underway to establish a vision and plan for this larger regional network. Ultimately, a system that will connect Bend with other communities, such as; the neighboring communities of Sisters, Redmond, Prineville and Sunriver is an objective of that work. This is planning work that is outside of the scope of this report.

1 (Excerpt from the TSP:)

“Trails provide important transportation connections and shortcuts to destination points that make travel by foot or bicycle safe, pleasant and convenient. Recreational activity is also a common use of the trail system, with scores of residents and tourists using these areas for walking, jogging, bicycling and other activities.

Trails also provide citizens and visitors with links to the natural environment. One special quality of a trail is the opportunity they provide to escape the bustle of the city - while remaining within the city. This is particularly evident along the Deschutes River trail system. Public opinion supports this sentiment, as people cite the ability to depart from traffic congestion, noise and exhaust as a prime factor in their enjoyment of trails.

The first trail plan was established with the adoption of the Bend Area General Plan in 1981. This has been the policy tool that has provided some protection of trail corridors and has promoted the construction of the current limited system. In 1995, consultants for the City studied Bend’s off road trail network to evaluate the original trail plan. As a result, several additions were adopted by the City and County and incorporated into the General Plan, in 1996. ... The City and the Bend Metro Park and Recreation District are working together in the planning and development of a trail system to meet the recreational and transportation needs of the community.”

Primary Trail System Inventory

The Primary trail system is also depicted on the Accessway System Maps found in Appendix A. During the process of inventorying the system of Bend Accessways, alignment corrections (from those shown on the current TSP Plan Map Exhibit - B) and other modifications that are recommended to this system. Figure 2 depicts the Primary Trails that are recommended for addition to the TSP. These include both trails that have been built (to reflect their actual built location) and future trails to be added to the plan. The system of Primary trails is summarized in the Matrix found in Appendix B. The matrix follows the same system of annotation described in Part I of this report (found beginning on page 5).

Costs

System improvement cost opinions have been provided to bring each Primary Trail segment up to the **plan standard**. It should be noted, that some trails may be shown as *existing* but may not yet be completed to the plan standard. A typical example of this is a ditch-rider road that may have been authorized (by an easement and/or agreement) for trail use but the plan calls for a higher standard for long-term trail use. Hence, cost opinions may have been provided for additional improvements on *existing* trails in the report exhibits. *[Note: Some trails may be built to a standard that "exceeds" that called-out in the TSP. This shall be deemed satisfactory provided City and District officials support those trail standard deviations/modifications.]*

Cost opinions for the Primary Trail system include **four** new bridges over the natural waterway system that supplement the **eight** existing bridges *[Note: The Accessway System also includes another **eight** new proposed bridges.]*

Costs have NOT been included for supplemental signing, lighting, arterial street crossing features, special traffic or railroad crossing signals, nor has any other special facility treatment been included in these cost opinions. Future connector trails - *within parks* - have also NOT been included in these cost opinions.

Street Crossings

Where trails intersect streets, it is important to address this situation in terms of enhancement of user safety. The Bend Urban Trails Plan (1995), a Resource Document of the Bend TSP, provides recommendations as how to treat both at-grade crossings of local and arterial type streets (Chapter 4 of that document), as well as design standards for under- or over-crossing structures.

At-grade crossing of a public street should undergo thorough detailed engineering analysis to determine the scope and cost for each installation.

(No cost opinions have been provided in this report for any supplemental improvements for at-grade trail crossings). Typical improvements might include supplemental lighting, signing and striping, landscaping, construction of curb extensions and/or medians, or the like, with each location requiring varying project elements that will address issues specific to each crossing. Local City approvals may be necessary in order to authorize any recommended improvements within the public right-of-way.

In some of the busier arterial street intersection locations, where the trail crossing is a relatively short distance to a controlled intersection and due to grade difficulties that prevent grade separation, it may be more practical to encourage crossing at the nearest controlled intersection. Examples of this situation are **the Old Pilot Butte Canal at Empire Avenue** and **the Central Oregon Irrigation District (COID) Canal at Third Street**. Costs for these types of improvements have NOT been included in the cost opinion summaries.

Grade separation is an excellent design solution for addressing automobile and trail user conflicts at roadway crossings. Unfortunately, this solution is not always practical due to slight grade differences (between the two facilities) and the cost to make these improvements. When constructing new streets, it provides an excellent opportunity to coordinate facility needs so that a grade-separation of road and trail can be achieved. An example of this is the reconstruction of the **Newport Avenue Bridge** (during the summer of 2006) that will facilitate a **trail undercrossing**. However, due to the high cost to provide this type of facility, funding may still be an obstacle. One possible location where grade separation could be achieved (presuming necessary funding can be secured for this type of trail-roadway feature) is the future connection of **27th Street to Empire Avenue and the North Unit Canal** crossing. Costs for this type of structure have NOT been included in the cost opinion summaries.

Two locations where the grade difference between the trail and the road are favorable for grade-separation are **the Deschutes River Trail at Colorado Avenue** and **the Deschutes River Trail at Portland Avenue**. However, the clearance under the road bridges is insufficient to fulfill the desired vertical headroom standards. However, experience from other communities have shown promise in “coffer-dam” designs where the trail grade is actually lower than the normal river flow level. This design shows promise in terms of achieving grade separation although more research will be necessary to determine the actual construction costs of each crossing, and to determine any maintenance implications and/or safety requirements of the installations.

Other trail-street crossings, either due to the topography of the site or other unique circumstances of the roadway or trail, may make grade separation very difficult, if not impossible. Examples of this situation are the crossing

of the Deschutes River Trail at Archie Briggs Road and the COID Canal Trail at Brookwood Blvd. More analysis will be required to determine the best combination of improvements necessary to enhance user safety at these locations. Costs for these types of improvements have NOT been included in the cost opinion summaries.

There are four existing road-trail grade separations; one at Highway 20-Larkspur Trail, one at Highway 97 (the Parkway) - COID Canal (South) and two at Columbia Street - Deschutes River Trail (both sides of the river).

Bridges

There are two general types of trail bridges referenced in this report; one, bridge crossings of natural waterways (i.e., the Deschutes River and Tumalo Creek) and two, bridges crossing over the man-made, irrigation waterway system (i.e., the system of canals). The first type of trail bridges are included in the Primary Trail system inventory [Appendix B] the second type of bridges are included in the Accessway system inventory [Appendix A].

Table II provides an inventory of *both types* of existing and proposed trail related bridges. Figure 3 provides a map of the proposed Bicycle and Pedestrian System Bridges and Grade Separations.

Table II		
Bicycle and Pedestrian System Bridges		
NATURAL WATERWAYS (Primary Trails)	Existing	Proposed
South UGB Boundary Crossing		6' - 8'
South Canyon Crossing	6'	
Old Mill #1 Crossing	15'	
Old Mill #2 Crossing	28'	
Old Mill #3 Crossing		12'
Colorado Bike-Ped Bridge	24'	
Gilchrist Crossing	8'	
Mirror Pond Crossing	8'	
First Street Rapids Crossing		12'
Sawyer Park Crossing	6'	
Buck Drive (Tumalo Creek) Crossing		6' - 8'
Shevlin Park (Tumalo Creek) Crossing	3'	
IRRIGATION WATERWAYS (Accessway Trails)	Existing	Proposed
N-3, #8e		6' - 8'
N-5, #7a		6' - 8'
N-5, #7b		6' - 8'
N-5, #9		6' - 8'
N-5, #10		6' - 8'
N-29, #11		6' - 8'
N-34, #14		6' - 8'
N-CC, #10		6' - 8'

Right-of-Way

Right-of-way (ROW) varies on the system of Primary trails. As many of the trails follow the irrigation system or the underlying property is owned by the respective irrigation companies, many trails follow either public use easements or joint-use agreements that have been granted to permit recreational use of the ROW. A typical minimum ROW or easement width along a Primary Trail is twenty-feet although widths often vary. A significant portion of the Primary trail system falls within property that has either been dedicated for public use or is owned outright (fee title) by either the City or the Park District.

It should be noted, that many of the ***proposed*** trails may still follow corridors that are under private ownership (or existing easements may only be granted to the City or to irrigation districts for utility service or maintenance access only). As such, ROW or public use easements will need to be acquired to permit public recreational use. It is anticipated that as the City continues to develop, these ROWs or joint-use agreements will be acquired over time – largely through the development exaction process.

Surface Type

Three Trail Surface Types are contemplated for the Primary Trail System: (1) Native, (2) Alternative and (3) Hard.

(1) ***Native Surface:*** Generally, trails of this nature are designated for either sensitive natural areas and/or trail corridors with relatively low projected trail use.

- (a) This type of facility has typically a very low frequency trail use, or
- (b) There are prevailing circumstances, such as; the proximity to sensitive wetlands or there are existing wildlife protection factors that limit the desired trail improvement type, or
- (c) There are other topographic features, such as; significant steep side slopes that make normal trail construction impractical or disproportionate to the amount of trail benefit, etc.

(2) ***Alternative Surface:*** Generally, trails of this nature are designated for conditions similar to the natural surface areas but are likely to generate more moderate trail use or they follow the irrigation, ditch-rider road corridors.

- (a) Surface treatment may vary dependent upon the unique, locational conditions, such as; potential erosion impacts, likelihood of water and silt run-off, or ice build-up, routine maintenance conflicts (i.e., the irrigation system), etc, or
- (b) The trail surface type is not paved but is an alternative surface (e.g., wood chips and/or crushed rock) that will accommodate

both anticipated trail use and accommodate the other requirements that may be unique to that particular trail corridor.

(3) ***Hard Surface*** Generally, this surface treatment is used where trail use is frequent and/or multiple user types are likely.

- (a) Typical users include bicyclists, skaters, joggers, pedestrians and others where anticipated volumes are fairly constant or high, or
- (b) Other factors present warrant a paved surface. Such as needed for maintenance vehicle access or there are special user needs that warrant a hard, smooth rolling surface.

Trail Surface Types are delineated on TSP Map Exhibit C.

Rails WITH Trails

Redevelopment of the Burlington Northern-Santa Fe Railroad corridor in the Bend area could provide a substantial enhancement of the Primary Trail system. The *Bicycle and Pedestrian System Plan* map illustrates the alignment of this “Rails-with-Trails” concept. It should be acknowledged that, due to site-specific railroad operational requirements, alternative parallel accessway/roadway corridors may be more suitable for avoiding problematic sections of this rail-trail corridor. In addition, grade-separated rail-roadway crossings may be difficult to retrofit or may be operationally unsuitable for joint trail and rail operation and parallel alternative routes should be considered. Typically, these alternative routes, if used, should not deviate physically too far from the intended corridor alignment (i.e., follow the nearest parallel alternative corridor). Further discussion with the railroad and field investigation should make this assessment and determination.

This special type of a regional trail is identified on the map with a special graphic but is *not* included in the total of accessway or primary system miles or estimation of probable costs. The intent of depicting this corridor opportunity on the plan maps is to acknowledge the intent to study the feasibility of this corridor being added to the Primary Trail system. Considerable work remains that will require extensive discussions with the railroad company in order to formally permit use of these right-of-way corridors for use as formal primary trails, then to subsequently determine the appropriate location and surface treatment, and also the scope and type of other elements (e.g., fencing, etc.) of the trail along the active rail road line.

Part II Summary

There are approximately 64 miles of existing and planned primary trails within the Bend urban area. The construction opinion of the ***public cost*** needs of Primary Trails (not including Rails-with-Trails) improvements total

approximately \$4.8 million. Public costs are in 2006 dollars and exclude right-of-way acquisition expense. The construction opinion of the ***private cost*** needs total approximately \$4.0 million. Private development costs also *exclude* right-of-way expense.

Appendix B, provides a full descriptive summary of all Primary Trails and their respective construction opinion of costs.

Figure 2

Primary Trail System – Proposed Additions

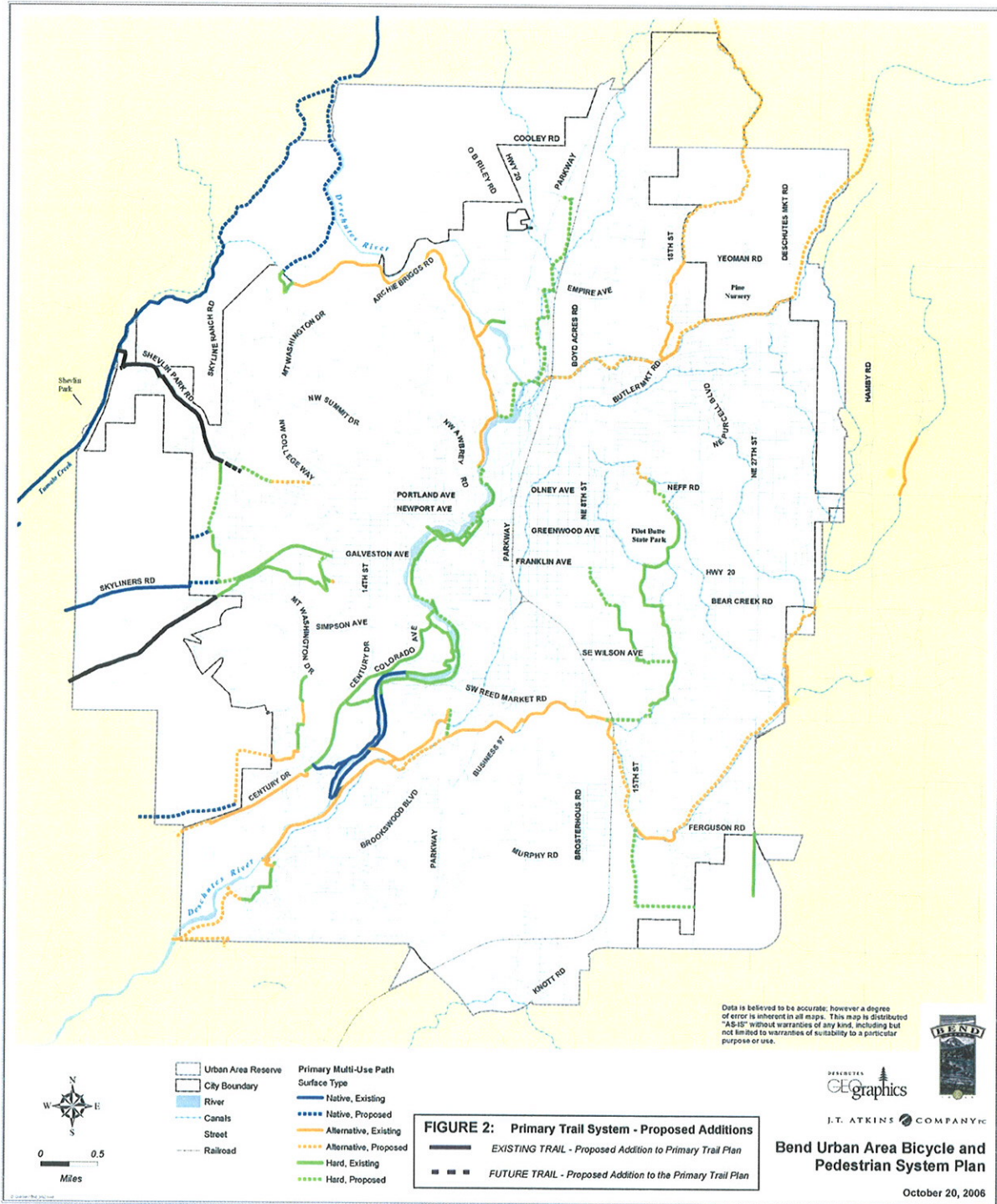
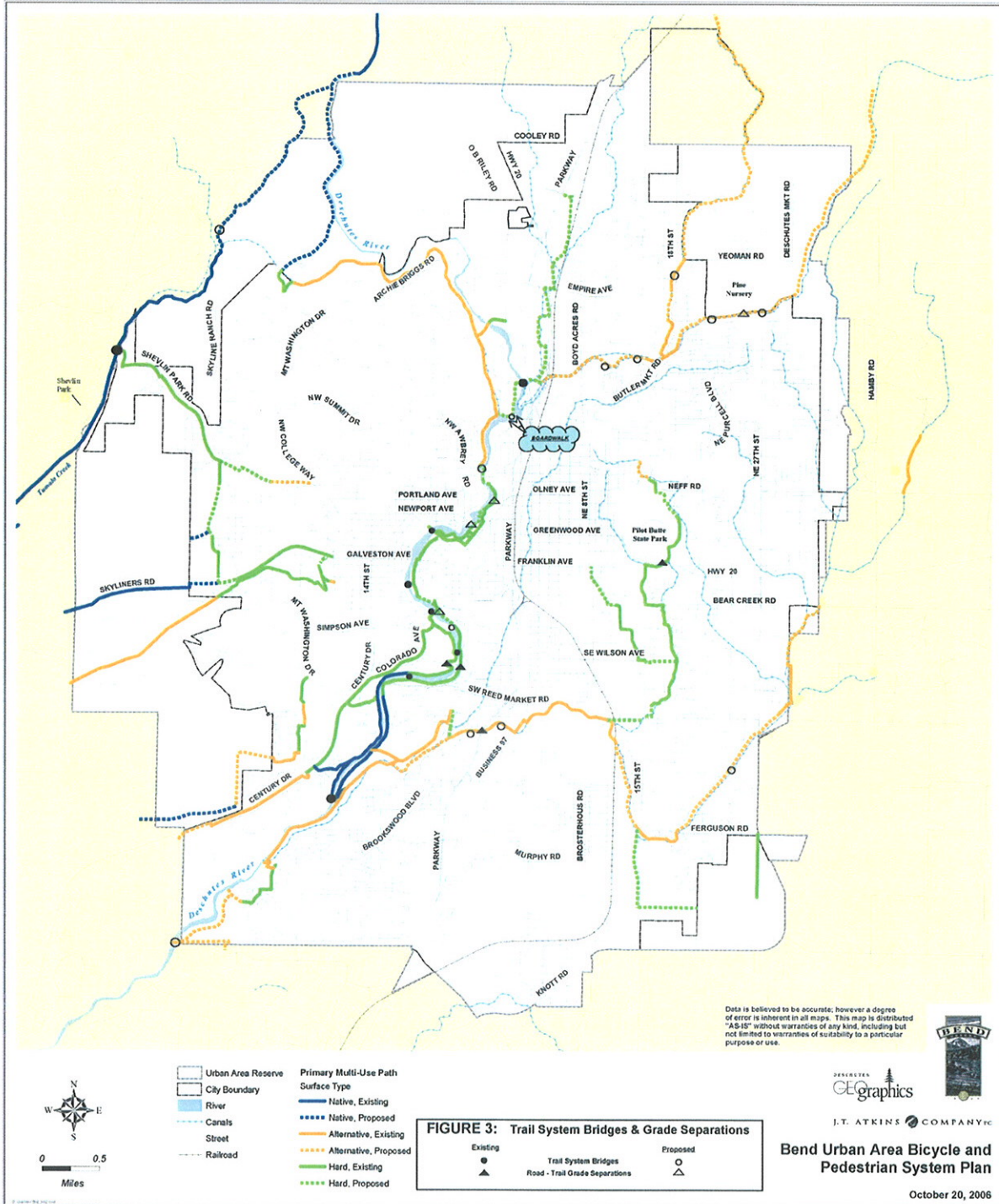


Figure 3

Trail System Bridges and Grade Separations



Bend Urban Area – Transportation System Plan

Recommended amendments to the *Bend Urban Area – Transportation System Plan* that will address TSP Remand issues are included in Appendix C.

Recommended trail development standard guidelines to be included within the City of Bend Standards and Specifications document are included in Appendix D.

A summary of the DLCDC Remand items related to the bicycle and pedestrian plan elements of the Bend Transportation System Plan are included in Appendix E.