Basin Transit Service
Transit Development Plan
Klamath Falls, Oregon

May 2013

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TRANSPORTATION ENGINEERING/PLANNING

MOVING**FORWARD**THINKING™

Transit Development Plan

Basin Transit Service

Klamath Falls, Oregon

Draft

May 2013

Transit Development Plan

Basin Transit Service

Klamath Falls, Oregon

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Appendix C Technical Memorandum #3 – Future Transit Alternatives

Section 1
Executive Summary

EXECUTIVE SUMMARY

The Basin Transit Service (BTS) Transit Development Plan (TDP) was prepared to guide the future of BTS through a variety of possible future scenarios. The plan was developed through a collaborative effort of members of the Project Management Team (PMT), Technical Advisory Committee (TAC), and Project Advisory Committee (PAC).

EXISTING TRANSIT SYSTEM

Currently, BTS operates within a tight fiscal reality and has little margin for error in terms of revenue and operating expenses. From year to year, maintenance expenses and unexpected increases in operating costs due to fuel prices or other expenses can cause the system to run a budget deficit. Even so, BTS maintains an effective transit system that serves the vast majority of areas within the Klamath Falls Urban Area with Fixed Route service that operates 6 days a week. Additional services are provided via Dial-a-Ride and Extended Service Programs. In addition, numerous public and private entities provide transit services to the general population or to specific user sets that enhance the services provided by BTS. More details are provided in Section 3.

Needs, Opportunities, and Constraints

Based on the existing conditions analysis conducted, the following identifies the existing needs within the current transit service provided, future opportunities for transit system growth or modification, and constraints that will need to be overcome.

- Fare box recovery for the agency has been below 17 percent for fixed route service and below 8 percent for Dial-A-Ride service. As such, the agency is highly dependent on property taxes to fund the majority of its operating costs. This reality should be considered when future service expansions are considered, especially outside the existing transit service boundary, where the BTS charter requires expanded service be funded fully through property tax revenue .
- Growth in the tax revenue alone will not keep pace with estimated increases in operating costs and will not provide sufficient funding for increases in transit service.

- Outlying areas of the BTS service area are currently served largely by an extended service program where riders may request a ride from a BTS bus stop to a location within the BTS service boundary but that is not served by fixed route service. The expansion of fixed route service to some of the areas with frequent calls for extended service should be considered in conjunction with a funding feasibility analysis of such service. This is discussed in Section 5.
- The transit service currently operates six days a week from roughly 6:00 a.m to 7:30 p.m. on weekdays. Ridership and funding analyses should be considered prior to expanding services beyond this time. Currently, no funds exist to provide longer service periods.
- Many local transit service providers, both public and private, operate within the BTS service area. These alternative options provide a critical supplement to BTS services.
- Public outreach should continue to be an integral part of the BTS mission. Informing the service population of transit service and transit service modifications should be continued and expanded where necessary.

USER, EMPLOYEE, AND STAKEHOLDER SURVEYS

Based on surveys conducted on BTS users, employees, and stakeholders, the current BTS service is doing well to meet the needs of its users. The average rating of the system on a scale of 1 to 5 with 1 being poor and 5 being outstanding was approximately 4.

Feedback related to improvement areas included the following themes:

- New buses or better maintenance to reduce breakdowns
- Request for more stops along routes
- Expanded service hours – daily and weekly
- Expanded service areas – within and outside of existing service area
- Better customer service from bus drivers
- Better on time performance
- More accessible bus route information

Further information is provided in Section 4, including a summary of the survey provided to each group.

FUNDING ALTERNATIVES

While actual future tax revenues are unknown and depend on a number of variables not explicitly accounted for by the estimates shown, the follwing provides an order-of-magnitude estimate about the potential for future service enhancements. For comparison purposes, additional operating revenue of $400,000/year could support the following based on an estimated cost of $326,000[1] to operate one bus for one year:

- One (1) new fixed route bus (two [2] 30 minute routes or one [1] 60 minute route) (cost estimate: $326,000/year)
- Lengthen weekday service span by three (3) hours on all routes (cost estimate: $385,000 year)
- Add six (6) hours Sunday service and extend weekday service by two (2) hours (cost estimate: $411,000/year)

TRANSIT ALTERNATIVES

Based on the analyses conducted, feedback from transit user groups, employees, and stakeholders, and evaluation of future development possibilities, several transit alternatives were developed for future considerations. While all of these options might not be needed, the alternatives outlined are intended to provide a vision and options for the future of BTS. A brief summary of the options outlined are shown below. A more detailed description of the alternatives is included in Section 5.

Route Modifications

Table 1-1 shows events that could happen and appropriate response in terms of route modifications that may be implemented. Where appropriate, figure numbers are provided where the potential route modification is shown visually. The figures shown are included in Section 5 of this plan.

[1] Estimate based on an average cost of $86/hour to operate fixed route service today.

Table 1-1 Existing Route Modifications

Event	Route Modification	Description	Figure
Growth in KCC ridership demand	• Modify Route 6 to serve Homedale Area • Modify Route 2 to serve KCC resulting in 30 minute service to KCC based on the existing Route 1 service to KCC	• Alternative routing for Route 6 could be planned if Anderson Avenue extension occurs for vehicle and/or pedestrian travel • Could result in a longer (~45 minute) Route 6 and would impact the schedule for Route 4 and Route 6.	5-2
Serve Amtrak demand	• Modify Route 1 to serve Amtrak	• Route modification would alter how Route 1 departs downtown but is not recommended if it impacts 30 minute headways.	5-3
Increased demand in early morning/late evening for BTS services	• Extend service on Route 1 & 2 for 3 hours	• Would also require extension of service for DAR services	5-4

Note: KCC = Klamath Community College
DAR = Dial-A-Ride

Expand Transit Service

Expanding the BTS service areas could include an expansion of the existing service within the current service boundary as well as an expansion of the transit service boundary itself. Both alternatives are discussed herein. Expanding service outside the existing service boundary would need to be coordinated with an expansion of the transit service boundary to collect property tax revenues from those areas, given BTS' high reliance on property tax revenue.

Within Existing Service Area

The developed land within the existing BTS service area is well served in the coverage area of fixed route service. However, as vacant land develops in the future, additional transit supportive areas may be created. Based on current land use projections, Table 1-2 presents areas within the existing service area with the potential need for additional transit service.

Table 1-2 Internal Service Areas

Internal Service Area	Description
Dan O'Brien Way	• The Dan O'Brien Way area is expected to have adequate density in the future for transit service. • This area could be served by modifications to Route 5 converting it to a two-way route approximately 45 minutes in each direction rather than a loop, as shown in **Figure 5-5**. An additional bus would likely be required to service this route, freeing up the potential for a new service area to be served by the Route 3 bus in alternating half hours (such as the Southview area). The route modification shown is intended to reduce extended service currently provided to the Dan O'Brien area. By providing the modification shown, 3 routes would be available for service to OIT with connections downtown.
Copper Valley	• Copper Valley is a planned development south of Foothills Boulevard, north of Shasta Way, and east of Crater Lake Parkway. This area has long been discussed as a development area. • Service to Copper Valley will likely need to be coupled with service to the existing Klamath County Juvenile Center and Klamath County Mental Health Center. • **Figure 5-6** shows a proposed route modification to Route 4 to serve this area. This may result in Route 4 being converted to a 45-minute loop rather than a 30-minute loop and could be done in conjunction with changes to Route 6 shown in Figure 5-2. The result would be 90 minute service instead of 60 minute service on Routes 4 and 6.
Southview	• Southview is already under development. The recent economy has slowed construction, but the area is expected to have adequate density in the future to support transit service. • Service will likely require a new route. Service may possibly be provided in an alternating arrangement with Route 3 (in the Stewart-Lennox area) if Route 5 were modified to require its own bus.
Basin View	• Basin View is expected to have adequate density in the future to support transit service. • Service will likely require a new route and could allow for Foothills Boulevard and Shasta Way to have directional rather than loop service with Foothills Boulevard being a new route and Shasta Way being a modification to Route 4.
East Main Street Extension	• East Main Street is planned to extent south and east of its current alignment to connect South 6th Street with Crosby Avenue. When constructed, this area could present a good opportunity for future transit coverage through a modification of Route 1 or 2 but is not recommended if it impacts 30 minute headways.

External to Existing Service Area

Areas outside the BTS service area were evaluated to estimate their potential service population and potential property tax revenue. These areas were considered related to the following conditions:

- Is density high enough to support transit?
- Are enough households present to form a viable tax base?

Table 1-3 provides population, estimated households, median house value, estimated property tax base, and potential tax revenue based on BTS' existing millage rate for the towns of Merrill, Malin, Midland, Keno, Falcon Heights, Henley, Running Y, and Shield Crest. As shown in Table 1-3, estimated tax revenue for the towns surrounding the Klamath Falls urban area range from approximately $7,000 to $135,000 per year. These values are based on the reported median house value which could be higher than the average assessed values for these areas.

Table 1-3 Estimated Tax Revenue for Surrounding Towns

Town	Population[1]	Households[2]	Median House Value[1]	Estimated Property Tax Base	Potential Tax Revenue ($0.4822/$1,000)
Merrill	843	351	$105,498	$37,030,000	$17,900
Malin	804	335	$97,004	$32,496,000	$15,700
Midland	212	88	$162,933	$14,338,000	$6,900
Keno	3,423	1,426	$196,660	$280,437,000	$135,200
Falcon Heights[3]	-	291	$110,000	$32,010,000	$15,450
Henley[3]	-	133	$125,000	$16,625,000	$8,000
Running[3]Y	-	577	$300,000	$173,100,000	$83,500
Shield Crest[3]	-	723	$300,000	$216,900,000	$104,589

Note: [1] Source: www.city-data.com
[2] Assumes an average of 2.4 people per household
[3] Household number and house value information estimated

Of the external areas considered, Keno, Shield Crest, and Running Y have the potential combination of density and total households to potentially support future transit service. The others areas are either too spread out or lack the population base to make transit viable. In all cases, alternatives to dedicated BTS service should be considered before such a route is implemented. Such alternatives include private shuttle services, commuter bus routes, and others.

Cost Saving Alternatives

The following identifies potential service cuts that seek to maintain the integrity of the system as a whole to the extent possible while providing budget savings for BTS. These alternatives represent a last resort in the event additional revenue cannot be raised from other sources, such as those described in Section 5.

- **Eliminate or reduce Saturday service:** Eliminating Saturday service would save $143,000 and $25,000 from fixed route and Dial-a-Ride (DAR) service, respectively. It should be noted that these cost savings would be reduced by lost fare revenue for the trips no longer being served. Based on 2011/2012 data, the loss of fare revenue is estimated to be approximately $25,000 annually.
- **Reduce weekday hours of operations:** This modification would save an estimated $86/fixed route bus hour eliminated and an estimated $74/hour of DAR service eliminated.
    - Options for this modification include, but are not limited to, the following:
        - Eliminate four hours of service [Estimated savings: $200,000]
        - Increase headways (longer time between buses) during non-peak periods (10 a.m. – 12 p.m., 12 – 2 p.m., etc.) [Estimated savings: $70,000]
- **Eliminate service on Routes 3 and 5:** This modification would save $285,000 and $28,000 on weekdays and Saturdays, respectively. DAR service is only required to be provided within

¾ mile of fixed route service so this type of service reduction would reduce DAR service as well. However, if BTS provided extended service to this area based on existing protocols, some of the savings would be reduced. Fare revenue from the fixed route service would also be reduced by approximately $56,000, assuming no riders travel to board a different route.

- **Eliminate or reduce extended service program:** BTS serves a number of users through the extended service program. While an important service to those that use it, the extended service program could be temporarily eliminated or reduced while maintaining service through fixed route and DAR options.
- **Dial-A-Ride Service for disabled passengers only:** BTS currently provides DAR service for senior citizens, which provides an amenity to the senior community but is not required by federal transit guidelines. The outcome of eliminating this service is estimated to be the reduction of DAR buses from the current active fleet of 3 to 2, potentially reducing hourly DAR costs from $74 to approximately $50.

Revenue Considerations

BTS operates within a tight fiscal reality that requires constant attention to balancing revenue and operating costs. Each year, BTS is faced with the potential for uncertainty related to rising operating costs in the form of fuel, maintenance, or other factors as well as the potential for reductions in revenue through decreases in ridership or property tax revenue.

To proactively manage revenue streams in the future, BTS should consider the following modifications to revenue streams on an annual basis

- **Millage rate increase:** BTS has the ability to increase their millage rate by up to 3 percent per year to match increases in inflation. To maintain the existing level of service provided to BTS users, BTS should implement an annual increase of at least 1.5 percent every year to offset increases in operating expenses.
- **Fare increases:** BTS has historically increased fares at irregular intervals. However, maintaining existing levels of funding will likely require more regular increases in fares, possibility on an annual basis. Minimal fare increases are recommended to occur annually to reduce the impacts to customers of irregular larger increases. Any increase in fare should consider impacts to ridership and the ease for users to pay, including the currency intervals.
- **Group user pricing:** OIT currently has a system in place where students may purchase yearly transit passes for the price of a typical monthly pass. In this system the cost is being paid by the user but at a substantially discounted rate. In contrast, KCC has a system in place where all students and staff can ride the BTS system for free based on a fee paid to BTS by KCC per FTE (full-time equivalent student). In this system the cost is being paid by the school and provides less funds per actual rider to BTS. BTS should consider transitioning KCC to a pay structure similar to the Oregon Institute of Technology (OIT) to provide a more equitable service to KCC students and staff and increase revenue. In addition, the pricing structure for

these group plans should be reviewed annually and pricing adjusted as needed to maintain adequate level of fare recovery to provide service.

BTS Facility Expansion

As transit service in Klamath Falls grows, additional buses may be required, which, in turn, may require additional space for bus storage and/or maintenance. A review of the number of additional buses that could be accommodated at the existing BTS facility with regards to storage and maintenance should be reviewed and compared with the agreed potential for future buses at the conclusion of the alternatives analysis. Expansion of the existing BTS facilities should be considered and/or planned for as necessary. The exact date of such a need is difficult to predict due to the many factors that would determine the appropriate timing of such an expansion. However, the need for additional space or facilities should be considered in conjunction with an expansion of service.

TRANSIT DESIGN TOOLBOX

The transit design toolbox includes guidance and alternatives related to:

- Transit Vehicle Guidelines
- Transit Route Modification Thresholds and Guidelines
- Transit Stop Criteria (location, spacing, amenities)
- Dial-A-Ride Operations
- Transit Signal Priority Guidelines
- Transit Supportive Land Use Guidance
- Transit Facility Guidelines

Section 6 provides additional details on each of items as well as American With Disabilities Act (ADA) considerations are they relate to transit facilities.

Section 2
Introduction

INTRODUCTION

The purpose of Basin Transit Service Transportation District is to provide safe, efficient, and accessible transportation, enhancing the livability of the community.

BTS Transit Development Plan Vision Statement

The purpose of the Basin Transit Service (BTS) Transit Development Plan (TDP) Update is to develop a program of service improvement alternatives for Basin Transit with a series of options to pursue over the ten year horizon of the plan. Given the uncertainty of future development alternatives within the BTS service area, the contents of this plan have been structured in a way that provide flexibility for BTS to proactively address fluctuation in future transit demand and/or the availability of funding for transit services.

The analysis conducted during the development of this plan focused on several areas. These included:

- How well does the transit system serve users today?
- How could the system be improved now or in the future?
- When considering system modifications in the future, what factors should be considered?
- How much funding is available to maintain or expand transit service now or in the future?

These questions were addressed through several means, including technical analyses, user surveys, and best practice review of other similar transit agencies around the country. The following sections document these findings.

BACKGROUND

The content of this TDP has been informed by a number of technical memorandums created and reviewed throughout the TDP process. In lieu of restating the information previously presented in these documents in full, the memorandums that support this TDP have been included in the respective appendices listed below.

- Appendix A: Technical Memorandum #1 – Plan & Policy Review
- Appendix B: Technical Memorandum #2 – Existing Conditions/Future Needs for Transit Access
- Appendix C: Technical Memorandum #3 – Future Alternatives Memorandum[2]

[2] Technical Memorandum #3 also includes a summary of the Driver, Project Advisory Committee, and User surveys. In addition, the full surveys are included in the appendix of that memorandum.

PROJECT PARTICIPANTS

A Project Management Team (PMT) and Technical Advisory Committee (TAC) were formed to help guide the development of the TDP, provide input throughout the project, review draft documents, and provide input at key decisions points. Members are shown in Table 2-1.

Table 2-1 Project Management Team and Technical Advisory Committee Participants

Organization	Participant(s)
Basin Transit Service	Ernest Palmer, Starla Davis
City of Klamath Falls Community Development	Sandra Fox
City of Klamath Falls Public Works	Mark Willrett
Klamath County Planning Department	Bill Adams
Klamath County Road Department	Stan Strickland
ODOT Region 4	Devin Hearing, Joni Bramlett
ODOT District 11	Mike Stinson, Butch Hansen, & Martin Matejsek
Kittelson & Associates, Inc.	Susan Wright, Robert Kniefel, Matt Kittelson, & Jenny Miner

In addition to the individuals listed above, several organizations were kept aware of the process throughout the development of the TDP. These organizations include:

- Central Oregon Intergovernmental Council (COIC)
- Commute Options of Central Oregon
- Klamath Falls Senior Center
- Klamath County Mental Health
- Reach Inc.
- Tribal Transit Program
- SPOKES
- Klamath Falls Chamber of Commerce
- Pelican Pointe, El Dorado Heights, Linkville
- Oregon Tech
- Klamath Community College
- Skylakes Medical Center
- Klamath Falls City School District
- Klamath County School District

Section 3
Existing Conditions

EXISTING CONDITIONS

This section inventories the existing Basin Transit Service (BTS) transit system and discusses its current performance. The purpose of the existing conditions inventory and performance evaluation is to document the baseline transit service within the BTS service area. The majority of the inventory and analysis results are presented in figures and tabular form with supplemental text provided as needed.

BACKGROUND

The Basin Transit Service Transportation District was created in 1981 through voter approval. The services provided by BTS include fixed route and paratransit services within the transit service area. The service area, which is a little larger than the Klamath Falls Urban Growth Boundary (UGB), includes the city of Klamath Falls, surrounding suburban neighborhoods and other locations within and beyond the UGB. The service area population is approximately 45,000 people.

LAND USE AND POPULATION

The purpose of the land use and population inventory is to document existing and planned land uses within the BTS service area and how well those land use densities would support transit service. The land use and population inventory help inform the existing and future conditions analyses of the TDP.

Figure 3-1 illustrates activity centers that are likely destinations for motorists, transit users, bicyclists, pedestrians, and other active modes of transportation (e.g., rollerblading and skateboarding). The location of activity centers were considered when transit alternatives were developed.

Key destinations identified include Oregon Institute of Technology (OIT), Klamath Community College (KCC), Klamath Union High School, Mazama High School, Ponderosa Junior High School, Brixner Junior High School, Ella Redkey Municipal Pool, and Sky Lakes Medical Center. The downtown core is another significant destination for residents, as well as the concentration of shopping and commercial uses along Washburn Way and Shasta Way including Fred Meyer, Bi-Mart, K-Mart and Walmart. There are also recreational uses spread through the urban area including Moore Park, the sports complex along Foothills Boulevard and the YMCA located on Eberlein Avenue. These locations represent facilities all users of the Klamath Falls transportation system desire access to, including transit users.

Figure 3-2 illustrates the current basic land use zoning designations throughout the urban area. It was created from highly detailed land use zoning information obtained from the City and County that included 54 different designations. These designations were consolidated into eight categories that reflect the fundamental intended use of the land (e.g., residential, commercial, industrial). The original

54 designations were consolidated in Figure 3-2 to make it easier to identify land use trends across the urban area. Outside of the UGB the majority of land is zoned for forestry, exclusive farm use and/or agricultural uses. Within the UGB but outside of the city limits the primary land uses are suburban residential with some commercial and industrial zoned areas. Within the city limits, industrial zoned uses tend to be adjacent to the railroad lines passing through the City. The downtown area is primarily zoned for commercial uses with some mixed use designated areas. There are residential zoned uses of varying densities interspersed with neighborhood commercial uses spread throughout the City.

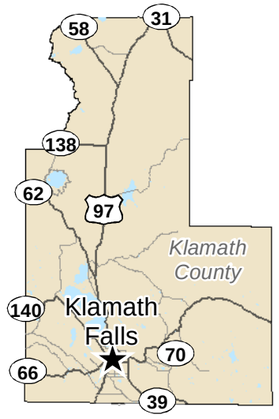
Figure 3-3 and Figure 3-4 respectively illustrate the overall population density and minority population density by census block within the Klamath Falls urban area. The purpose of mapping this information is to be aware of where potential transit users live, while considering their needs to access different destinations. Figure 3-3 illustrates that the highest population densities are located within the City limits in the areas east of the railroad tracks, north of Shasta Way and south of Crater Lake Parkway (OR 39). The area northwest and north of downtown also tends to have higher densities than the areas outside of the city limits but within the UGB. From Figure 3-4, it is evident the highest density of minority (non-Caucasian) residents live within the City limits in the areas east of the railroad tracks, north of Shasta Way, and south of Crater Lake Parkway (OR 39).

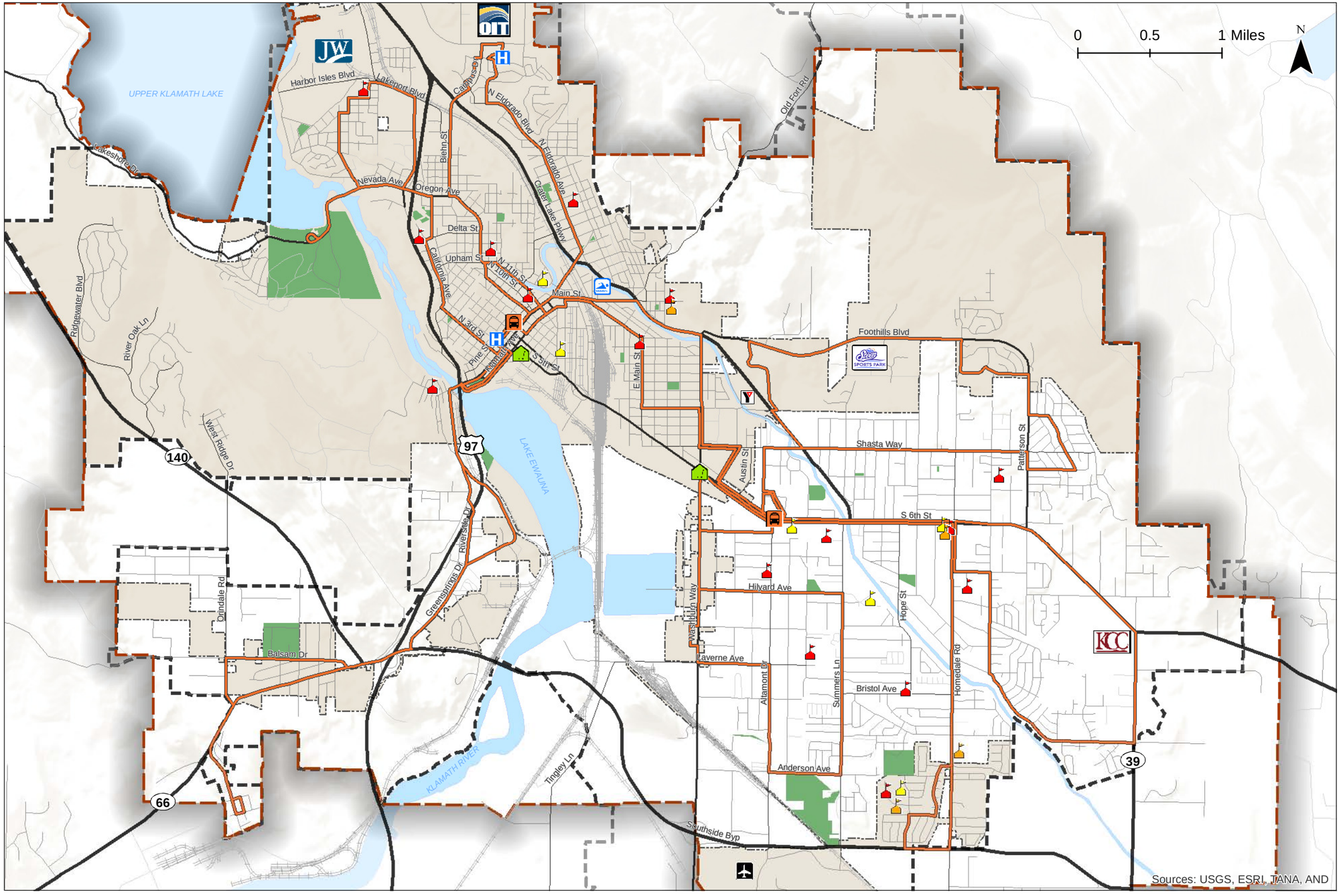
Figure 3-5 illustrates the employment density within the Klamath Falls urban area mapped by transportation analysis zone (TAZ) from the Klamath Falls Urban Area Transportation System Plan (TSP). This mapping shows concentrations of employees relative to other areas within the urban area. From this figure, high density employment areas exist within the urban area within the downtown area, along Washburn Way near South 6th Street, and near OIT and the Sky Lakes medical center.

BASIN TRANSIT SERVICE

"On the go for you..." BTS

- Elementary Schools
- Middle Schools
- High Schools
- Municipal Pool
- Hospitals
- Commerce Centers
- Transit Centers
- Airport
- Parks
- Basin Transit Routes
- BTS District
- Klamath Falls City Limits
- Urban Growth Boundary





Activity Centers
Klamath Falls, Oregon

Figure
3-1

Coordinate System: NAD 1983 HARN StatePlane Oregon South FIPS 3602 Feet Intl
Data Source: City of Klamath Falls, Klamath County,

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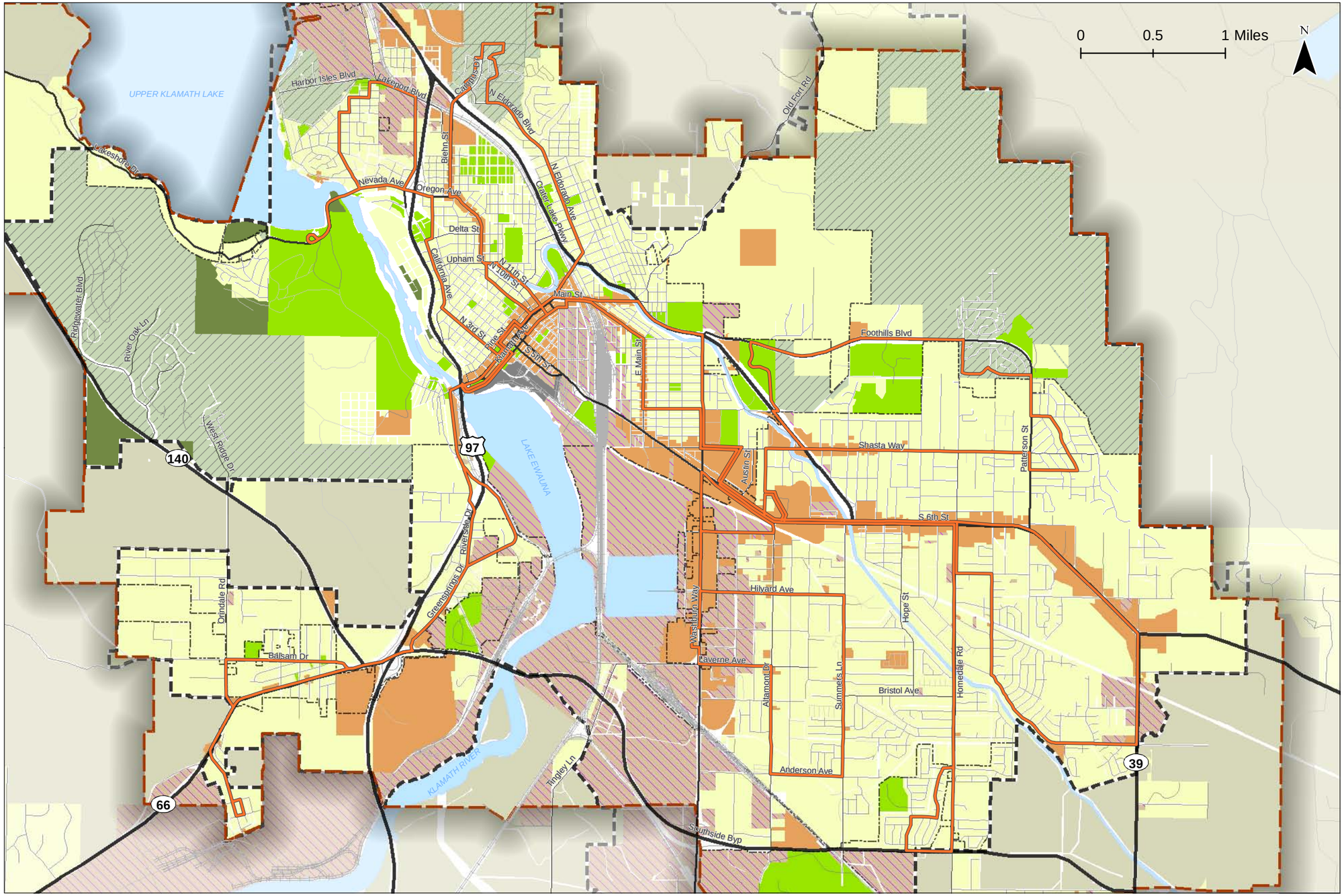
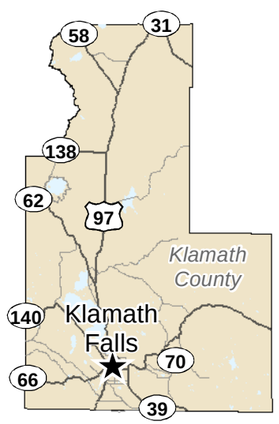
BASIN TRANSIT SERVICE

"On the go for you..." BTS

Zoning Designation

- Residential
- Public Facility
- Planned Unit Development
- Commercial
- Industrial
- Mixed Use
- Forest & Agriculture
- Special Reserve
- Basin Transit Routes
- BTS District
- Klamath Falls City Limits
- Urban Growth Boundary





Land Use Zoning Designations
Klamath Falls, Oregon

Figure
3-2

Coordinate System: NAD 1983 HARN StatePlane Oregon South FIPS 3602 Feet Intl
Data Source: City of Klamath Falls, Klamath County,

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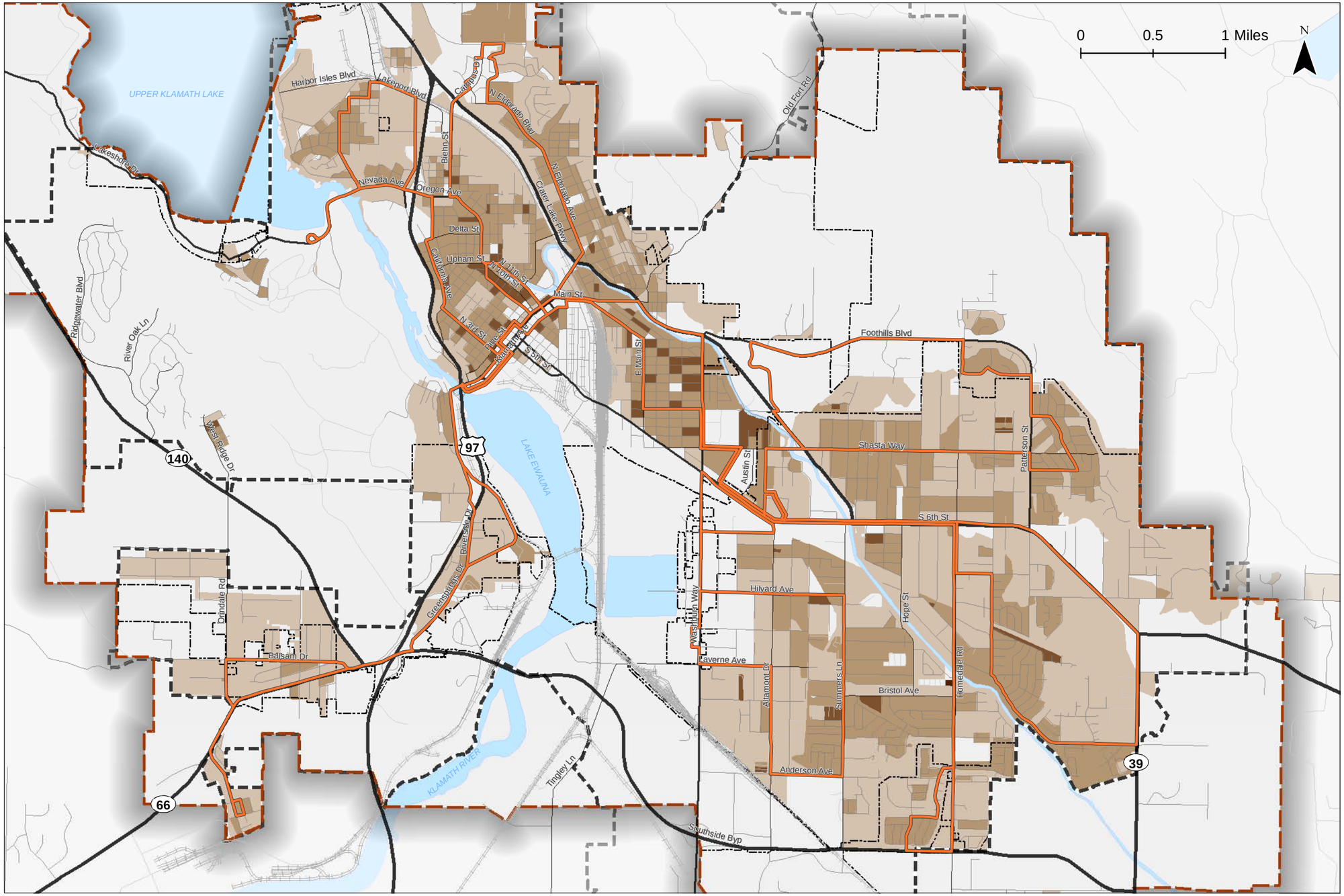
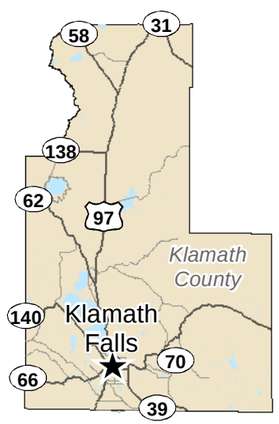
BASIN TRANSIT SERVICE

"On the go for you..." BTS

People per Acre

- 0 - 1
- 2 - 5
- 6 - 15
- 16 - 50
- > 50
- Basin Transit Routes
- BTS District
- Klamath Falls City Limits
- Urban Growth Boundary





Total Population Density
Klamath Falls, Oregon

Figure
3-3

Coordinate System: NAD 1983 HARN StatePlane Oregon South FIPS 3602 Feet Intl
Data Source: 2010 US Census,

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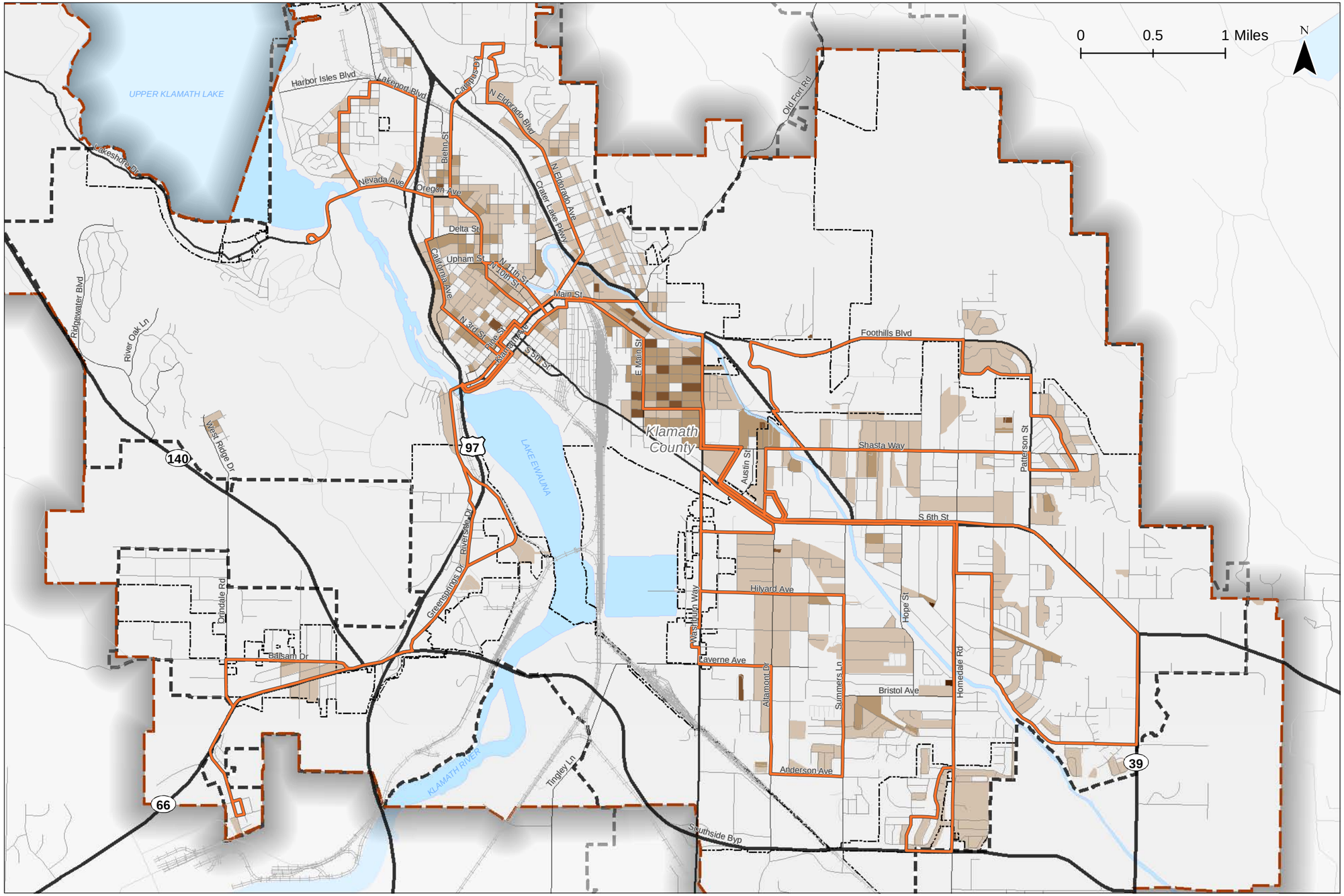
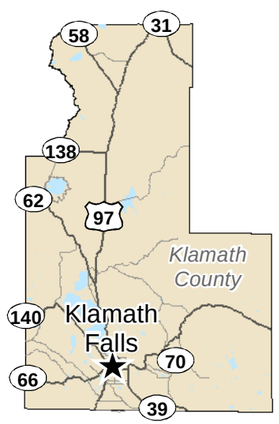
BASIN TRANSIT SERVICE

"On the go for you..." BTS

Minorities per Acre

- 0 - 1
- 2 - 3
- 4 - 6
- 7 - 15
- > 15
- Basin Transit Routes
- BTS District
- Klamath Falls City Limits
- Urban Growth Boundary





Minority Population Density
Klamath Falls, Oregon

Figure
3-4

Coordinate System: NAD 1983 HARN StatePlane Oregon South FIPS 3602 Feet Intl
Data Source: 2010 US Census

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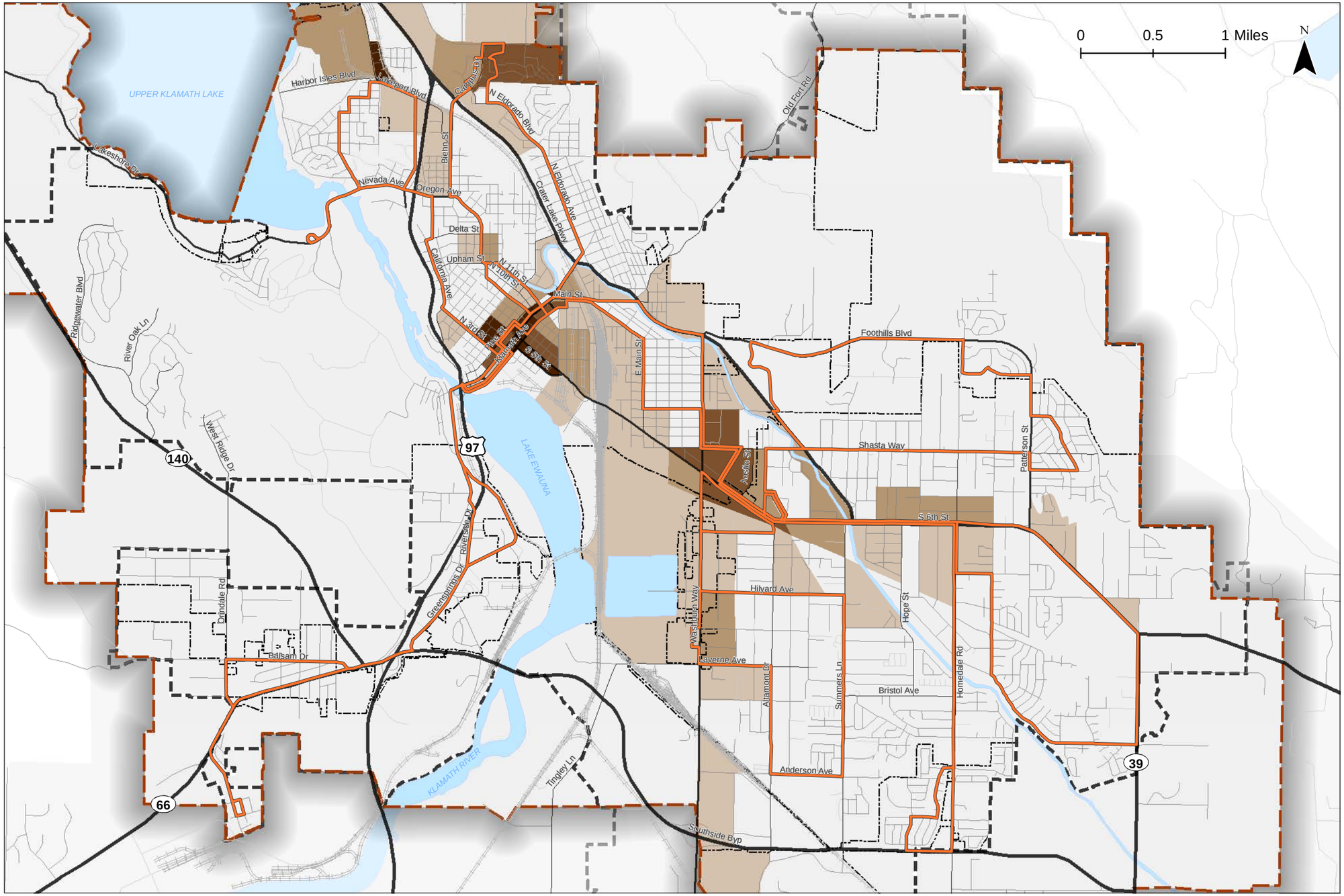
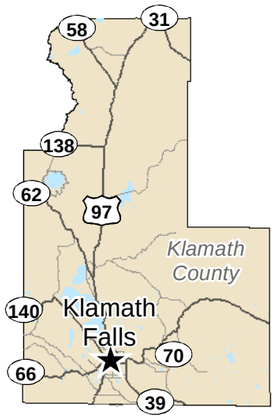
BASIN TRANSIT SERVICE

"On the go for you..." BTS

Employees per Acre

- 0 - 1
- 2 - 3
- 4 - 8
- 9 - 15
- > 15
- Basin Transit Routes
- BTS District
- Klamath Falls City Limits
- Urban Growth Boundary





Employment Density
Klamath Falls, Oregon

Figure
3-5

Coordinate System: NAD 1983 HARN StatePlane Oregon South FIPS 3602 Feet Intl
Data Source: ODOT Transportation Planning Analysis Unit

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EXISTING TRANSIT SYSTEM

BTS is the public transit agency for the Greater Klamath Falls Urban Area. The Transit District extends from Terminal City in the north to the OR 140 Southside Expressway in the south and from the Klamath Falls western city limits near Orindale Road to OR 39 in the east. Within this area, BTS provides three forms of service: 1) Fixed Route Bus Service; 2) Dial-A-Ride Services (including service required by the Americans with Disabilities Act [ADA] and "Extended Service" to customers needing service within the district boundary not served by fixed route) and 3) Historical Trolley Tours. Each of these services is discussed below.

Fixed Route Bus Service

Figure 3-6 illustrates the existing transit routes, bus stops, and bus stop amenities within the BTS Service area. The latest information on fixed route bus service can be found online at http://www.basintransit.com/.

As can be seen from Figure 3-6, there are six fixed routes in operation in the Klamath Falls urban area and two key transit centers: 1) Downtown Transit Center at 7th Street & Pine Street; and 2) Fairgrounds Transit Center at Altamont Drive & South 6th Street. Routes 1 and 2 are collectively considered the "Mainline Route" providing northwest to southeast backbone service from Oregon Institute of Technology (OIT) and Pelican City to Wal-Mart and KCC and points in between. Routes 3 through 6 are considered "Feeder Routes." Feeder Routes 3 and 5 serve the western portions of the urban area, Route 4 provides coverage in the northeastern portion of the urban area and Route 6 covers the southern portion. Currently no bus routes extend far enough south to provide service to the airport. Service to the airport had been provided in the past but was eliminated due to the lack of ridership. The fixed bus routes stop within ¼-mile of the Amtrak Station in downtown Klamath Falls; however, there are no stops at the train station.

BTS provides service on their fixed routes Monday through Saturday; service is not provided on Sundays. Headways on all fixed routes are approximately 1 hour with stops in downtown and on South 6th Street being served every 30 minutes due to the overlap areas of Mainline Route 1 and Route 2. The combination of Mainline Route 1 and 2 also result in OIT and the hospital having bus service to downtown every 30 minutes. Table 3-1 summarizes the location and times each route starts and ends service. Table 3-2 summarizes the current fare schedule for fixed route service. Additional route information is included in Appendix B.

Table 3-1 Basin Transit Service Fixed Routes Time of Day Service[1]

Routes	Route Begins	Monday through Friday		Saturday	
		Time First Bus Departs[2]	Time Last Bus Departs[2]	Time First Bus Departs[2]	Time Last Bus Departs[2]
Route 1 North	Keller Rd	6:30 a.m.	6:57 p.m.	9:57 a.m.	3:57 p.m.
Route 1 South	OIT	6:30 a.m.	7:13 p.m.	10:30 a.m.	4:13 p.m.
Route 2 North	Gatewood	6:27 a.m.	7:27 p.m.	10:27 a.m.	4:27 p.m.
Route 2 South	OIT	6:43 a.m.	6:43 p.m.	10:43 a.m.	3:43 p.m.
Route 3	Stewart Lennox	6:00 a.m.	6:00 p.m.	10:12 a.m.	4:00 p.m.[4]
Route 4	Fairgrounds	6:18 a.m.	6:18 p.m.	10:03a.m.[3]	4:18 p.m.
Route 5	Pelican City	6:30 a.m.	6:30 p.m.	10:12 a.m.	4:30 p.m.[5]
Route 6	Fairgrounds	6:48 a.m.	6:48 p.m.	10:18 a.m.	3:48 p.m.

Notes:

[1]Source: http://www.basintransit.com/routesrates.shtml

[2]This is the time the first bus departs from the first stop on the route.

[3]First departs from Mia's & Pia's.

[4]Last bus departs from Stewart Lennox.

[5]Last bus departs from Downtown.

Table 3-2 Basin Transit Service Ridership Fares for Fixed Routes[1]

Fare Type	Adult[2]	Student[3]	Senior[4]	Disabled[5]
Single Ride Fare	$1.50	$1.50	$0.75	$0.75
Ten Ride Ticket	$15.00	$15.00	$7.50	$7.50
Monthly Pass	$54.00	$54.00[6]	$27.00	$27.00
Tokens (20)	$30.00	$30.00	$15.00	$15.00

Notes:

[1]Source: http://www.basintransit.com/routesrates.shtml accessed 01/23/2013

[2]Children 6 years old and under ride free with an adult.

[3]A "Student" is a full-time student from Kindergarten through College. Students of Klamath Community College and Eagle Ridge High School ride BTS buses free when they show a valid identification card. OIT students must show a valid identification card and the current OIT special bus pass.

[4]A "Senior" is 65 years and older.

[5]A "Disabled Person" is a person with a physical or mental impairment that substantially limits one or more of the major life activities of such an individual; has a record of such impairment; or is regarded as having such impairment.

[6]OIT students pay for an annual pass, which is $54/year, opposed to the monthly pass of $54/month.

Dial-A-Ride Service

Dial-A-Ride service by BTS provides curb-to-curb transportation within the Basin Transit Service District for customers over 65 years old and/or those with disabilities who are unable to use the fixed route bus service. The specific qualifying definition of disabled/handicapped is:

Handicapped persons means those individuals who, by reason of illness, injury, age, congenital malfunction, or other permanent or temporary incapacity or disability, including those who are non-ambulatory wheelchair bound and those with semi-ambulatory capabilities are unable without special facilities or special planning or design to utilize mass transportation facilities and services as effectively as persons who are not so affected (49 CFR, Chapter IV, Part 609.3).

Customers must be pre-certified to use the BTS dial-a-ride service; the certification includes filling out a form available online or at BTS offices and participating in an interview with BTS staff where the customer also receives training on how to use Dial-A-Ride services in conjunction with the fixed route service if feasible.

Dial-A-Ride service is available Monday through Friday from 6:00 a.m. to 7:00 p.m. and Saturday from 10:00 a.m. to 4:30 p.m. Service is not provided on Sundays, New Years Day, Presidents Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, or Christmas Day. Customers schedule appointments at 541-883-2877. The cost to ride is $3.00 per trip (a trip is one-way service), a 10 ride ticket can be purchased for $30.00, or a 20 ride ticket can be purchased for $54.00. Additional information is available at: http://www.basintransit.com/dialaride.shtml and in Appendix B.

Extended Service

Residents who live or work within the transit district boundary but in the sparsely populated areas, such as Henley, Columbia Plywood, Wocus Road, the Airport, Green Acres, NEW Corp, and ESI, are provided transit service through the Extended Service program. The Extended Service program is similar to the Dial-A-Ride service except that additional provisions apply. These provisions[3] include the following:

- Service hours are Monday through Friday 8:00 AM to 5:00 PM. After hours service can be requested via the van driver.
- Appointments may be made up to five (5) days in advance. On demand requests are generally serviced within 30-60 minutes of the initial request.
- The cost for this service is the regular Dial-A-Ride fare (currently $3.00). Transfers are permitted from regular Dial-A-Ride service.
- Persons going from an extended service ride to the regular bus, will be picked up at their curb and delivered to the nearest sheltered bus stop.

[3] Guideline information referenced from http://www.basintransit.com/routesrates.shtml

- Extended Service is restricted to paved roadways in good repair.

Transit System Evaluation

Transit service within the BTS service area is evaluated based on performance measures grouped into value categories. These categories include:

- Integrity
- Efficiency
- Safety
- Support
- Development
- Community Networking

Based on these values, several performance measures and applicable standards have been developed and evaluated. As shown in Table 3-3, all the measures expect 5 meet the applicable performance standard. Except for DAR subsidy per passenger, the current system performance measures not meeting standards are very near the desirable range.

Table 3-3 Transit System Evaluation

Value	Performance Measure	Standard	Standard Met?
Integrity	Number of service refusals for demand responsive	< one per day	Yes – 2 refusals for December and January
	Provide BTS school presentations	>=5 per year	Yes – 5 in the past year
	Increase annual ridership	1.5% growth per year	Yes– Averaging 1.5% per year for Total and FR
	Develop, adopt and implement a current Transit Development Plan	Annual Review with three year updates	Yes
Efficiency	Maximum DAR wait time	Less than 30 minute from scheduled times	Yes – 15 minutes
	Percent pickups within 0-10 minutes of scheduled time	90% on time	No – 88% on time in January
	Passengers per revenue hour	DAR > 2 FR > 10	Yes – DAR average 3, FR average 19
	Fare box recovery	DAR > 10% of cost FR > 20% of cost	No: DAR 8%, FR 15% in 2011/2012
	Subsidy per passenger	DAR < $5.50 per passenger FR < $3.50 per passenger	No – DAR $21.08 Yes – FR $3.25
	Implement and maintain vehicles	< 1% per year when scheduled routes are not covered	Yes – routes are always covered
Safety	Miles between preventable incidents	Greater than 60,000 vehicle miles per preventable incidents	No – Average is about 1 per 60,000 miles
	Passengers per 100,000 vehicle miles	< 2 injuries per 100,000 vehicle miles	No – Average is about 3 per 100,000 vehicle miles
	Employee work days lost to injuries	Less than 10 days per year	Yes – ½ day in the last year
Support	Walking routes to/from stops and scheduled improvements	Annual review	Yes
Development	Staff review of development projects using BTS guidelines	Pro-active	Yes
	Staff coordination with local governments to encourage transit oriented development	Pro-active	Yes
Community Networking	Develop cooperative relationships with private providers	Pro-active	Yes
	Develop cooperative relationships with net zero cost with health and educational institutions	Pro-active	Yes

Notes: FR – Fixed Route
DAR – Dial-A-Ride

BASIN TRANSIT SERVICE

"On the go for you..." BTS

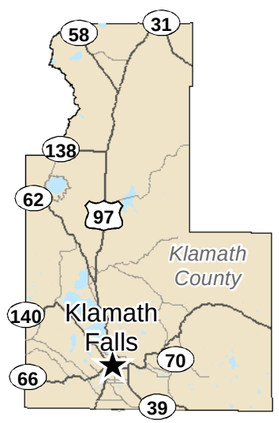
Basin Transit Routes

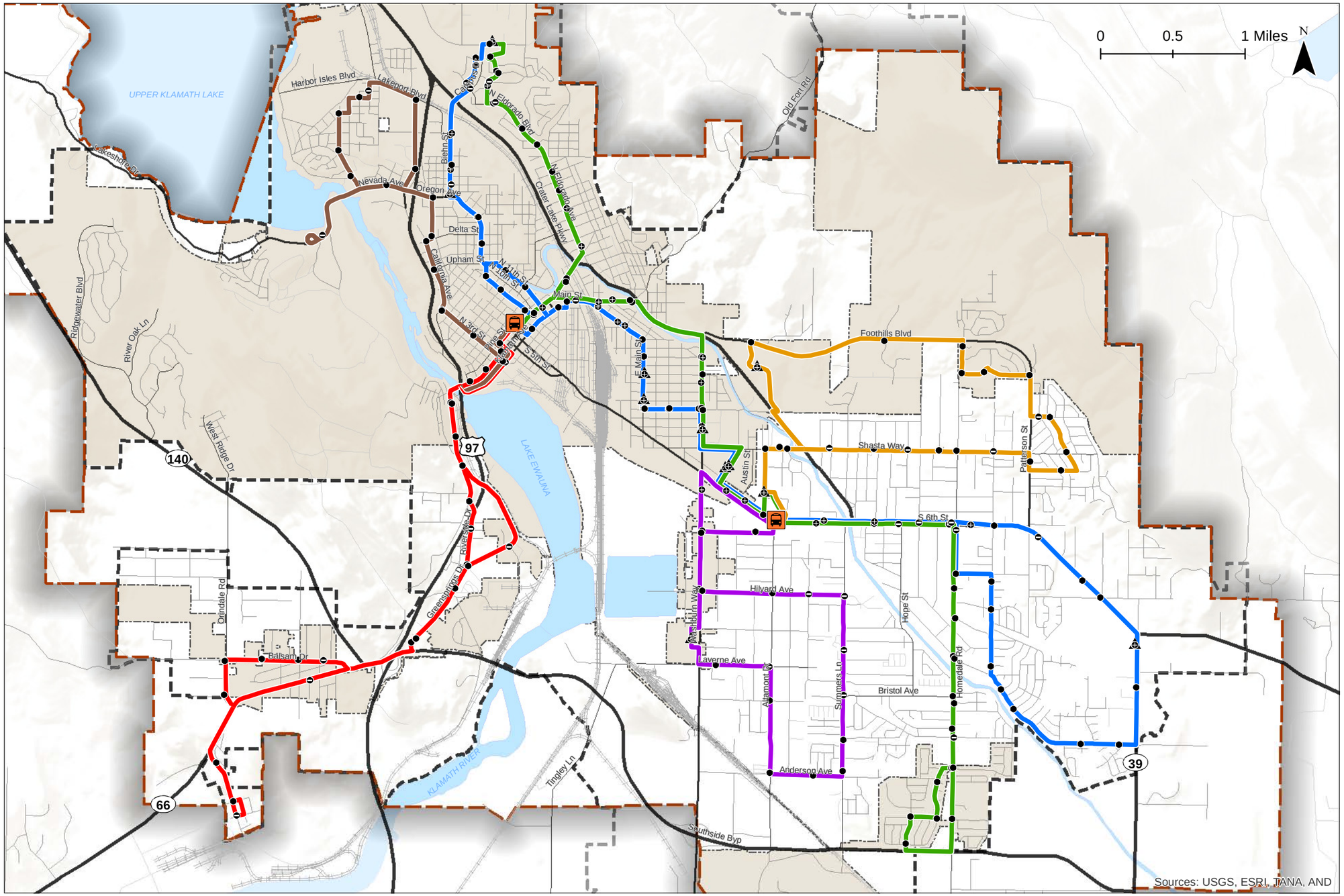
- Route 1
- Route 2
- Route 3
- Route 4
- Route 5
- Route 6

Bus Stops

- Shelter & Bench
- Full Bench
- Semi-Bench
- No Seating

- Transit Centers
- BTS District
- Klamath Falls City Limits
- Urban Growth Boundary





Transit Facilities
Klamath Falls, Oregon

Figure
3-6

Coordinate System: NAD 1983 HARN StatePlane Oregon South FIPS 3602 Feet Intl
Data Source: City of Klamath Falls

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Other Transit Providers

In addition to Basin Transit, there are a number of public and private agencies that provide transit services to users for trips both internal and external to the BTS service area. The transit services available to the public include:

- Amtrak
  - The Coast Starlight route provides daily service between Seattle and Los Angeles with stops at most major cities in Washington, Oregon, and California including Portland, Sacramento, and San Francisco.
  - Oregon cities served include Portland, Salem, Albany, Eugene/Springfield, Chemult, & Klamath Falls.
    - Connecting bus service is provided to Pendleton, Corvallis, Newport, Ontario, Coos Bay, Bend, Sunriver, Crater Lake, and Brookings via the train stops listed.
  - Daily service is provided along this route from the Klamath Falls Amtrak station.
    - Northbound trains depart at 8:17 a.m.
    - Southbound trains depart at 10:00 p.m.[4]
  - The Klamath Shuttle provides private service between the Klamath Falls Amtrak Station and the Medford Greyhound Station. Service is provided 365 days a year.
- The Klamath Tribes
  - Fixed Route Service
    - Service to/from Chiloquin, Beatty, and Klamath Falls Monday through Friday.
      - Free transfers provided to BTS service
      - Connections in Klamath Falls include the BTS station downtown and the Sherm's Thunderbird parking lot.
  - Dialysis Route Service
    - Operates on Monday, Wednesday, and Friday. Service is provided to the entire Klamath Falls community, but priority is given to tribal members. Currently serving four regular clients.
  - Dial-A-Ride

[4] Route information obtained from http://www.amtrak.com/train-schedules-timetables accessed 01/23/2013. Route information was last updated 01/14/2013.

- Provides service from Klamath Falls and Chiloquin to medical appointments at Klamath Falls Medical and Dental Clinics in Chiloquin.
- Provides service from Chiloquin to Klamath Falls for medical and dental appointments.
- Provides medical transports for tribal members to Medford, Bend, and Portland.

A sampling of private and alternative service transit options available within Klamath Falls are listed in Appendix B. These services generally serve a specific user group or provide on-demand service for a fee, such as taxi cabs or fixed route shuttles.

FUNDING ANALYSIS

BTS operates the transit service with a relatively small operating budget compared to larger, more robust transit systems. As such, the margin for error in terms of budgeting transit service expenditures is small.

Table 3-4 provides an overview of expenses and revenues for BTS for the five most recent fiscal years where data is available. As shown, revenues, expenses, and boardings have all generally stayed constant during the periods considered. The variations in the data are relatively subtle and likely indicate natural fluctuations in expenses and revenue.

Table 3-4 BTS Funding Analysis (2007/2008 to 2011/2012)

Financial Metric	2007/2008	2008/2009	2009/2010	2010/2011	2011/2012
Farebox Recovery Ratios:					
Fixed Routes	17%	16%	16%	13%	15%
Dial-A-Ride	7%	8%	8%	6%	8%
Passenger Boardings	367,132	406,483	396,227	409,650	407,436
Operating Costs	$1,744,857	$1,953,958	$1,890,095	$2,169,428	$2,073,843
Cost/Passenger Boarding					
Total	$4.75	$4.81	$4.77	$5.30	$5.09
Fixed Route	$3.69	$3.69	$3.91	$6.48	$3.23
Dial-A-Ride	$21.71	$21.71	$24.36	$38.86	$18.96
Passenger Revenue	$253,379	$263,682	$253,618	$238,879	$255,409
Revenue/Passenger Boarding	$0.69	$0.65	$0.64	$0.58	$0.63

Note: Information from BTS End of Year Reports 2008, 2009, 2010, 2011, and 2012.

As shown in Table 3-4, the average revenue per passenger boarding is well below the standard one-way fare of $1.50 and even below the discounted fare of $0.75. This is attributable to the ridership profile shown in Exhibit 3-1. As seen, regular fare riders make up roughly one third of the total BTS boardings. Other riders are purchasing fares for a discounted rate indvidually, through group plans (such as OIT and KCC), transfering from another route, or riding for free (children under 6). In the most recent survey, OIT and KCC represent about 27 percent of the BTS ridership with equal numbers between the two.

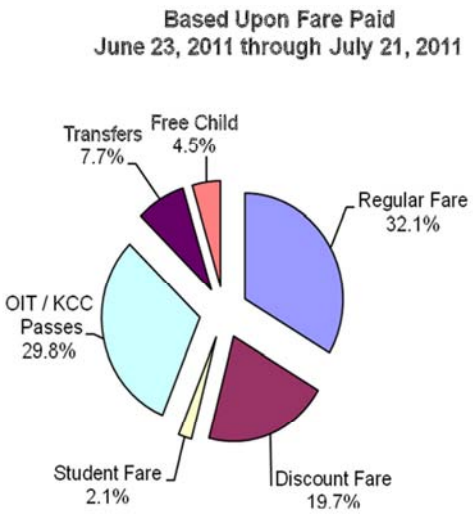

Exhibit 3-1 BTS Ridership Profile
Source: BTS 2012 End of Year Report

However, the most recent snapshot of this data (collected in December 2012) shows an increase in regular fare riders as a percentage of overall ridership. This data is shown in Figure 3-2.

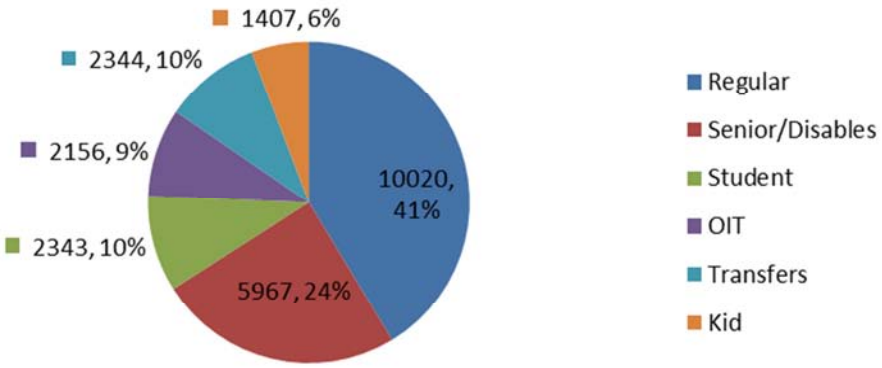

Exhibit 3-2 December 2012 Rides by Type (Fixed Route Service Only)

Exhibit 3-3 and Exhibit 3-4 show the source of expenses and revenue for BTS during the 2010/2011 fiscal year, respestively. As shown, the bulk of expenditures for BTS are related to wages and benefits of employees. In terms of revenue, over half of what BTS receives comes from property taxes. The current tax rate is $0.4822 per thousand of assessed value for houses within the transit district. By comparison, farebox user fees represent a relativley small portion of revenue (fare box recovery for fixed route service has ranged from 13-17 percent over the last five years, as shown in

Table 3-3). As such, BTS is heavily reliant on property taxes to support service. In addition, roughly one quarter of revenue comes from state and federal operating grants.

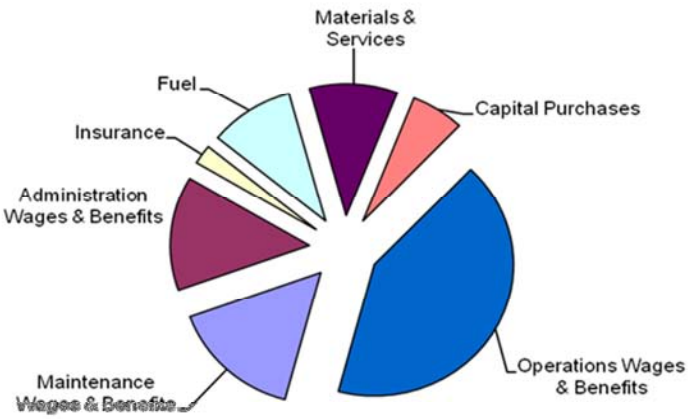

Exhibit 3-3 2010/2011 Un-audited Expenses
Source: BTS 2012 End of Year Report

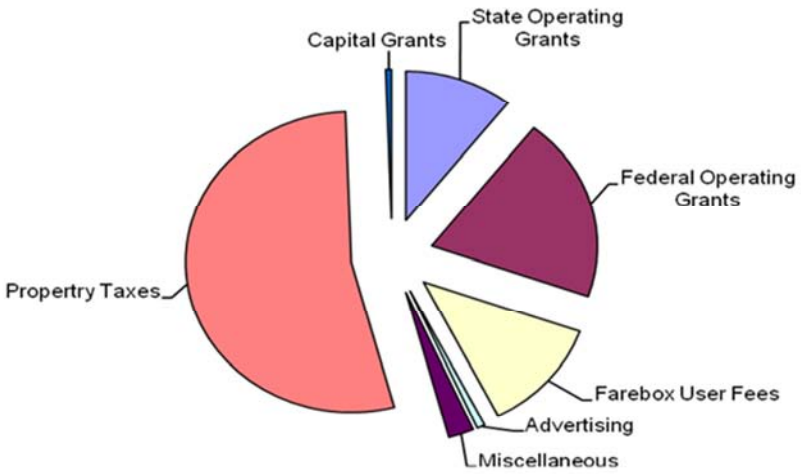

Exhibit 3-4 2010/2011 Un-audited Revenues
Source: BTS 2012 End of Year Report

In the 2012-2013 tax year, BTS received about $1.09 million from property taxes. The $1.09 million was from a tax rate of 0.4822 cents per thousand of assessed property value on about a $2.36 billion tax base. The estimated cost to run one bus route per year is about $326,000. Based on the current tax rate, about $300-600 million in tax base is required to support one bus route. This estimate provides for variability of future funding. Depending this variability and the assessed values of the homes, it could take between 2,500 and 6,000 homes to provide this tax base. Table 3-5 is a summary of BTS' property tax revenue for the past 11 years.

Table 3-5 BTS Property Tax Summary

Property Tax Summary - Basin Transit Service				
Tax Year	Value Used to Compute Taxes	Taxes Received	Increase Over Previous Year	Estimated Increase Due To Growth
2012/2013	$2,360,873,903	$1,097,663	$88,163	None
2011/2012	$2,336,286,524	$1,009,500	$9,489	None
2010/2011	$2,315,428,247	$1,000,011	($69,672)	None
2009/2010	$2,295,686,944	$1,069,683	$36,434	$5,436
2008/2009	$2,363,783,540	$1,033,249	$68,571	$45,972
2007/2008	$2,108,293,319	$964,678	$15,872	None
2006/2007	$1,956,540,383	$948,806	$118,938	$94,042
2005/2006	$1,859,475,089	$829,868	$29,510	$4,974
2004/2005	$1,760,360,305	$800,358	$17,689	None
2003/2004	$1,697,231,510	$782,669	$50,136	$28,161
2002/2003	$1,633,912,173	$732,533	$9,147	None

FACILITY & BUS INVENTORY

As of December 31, 2012, BTS maintains 13 buses and 1 trolley. An inventory of the fleet is shown in Table 3-6.

Table 3-6 BTS Fleet Inventory

Vehicle Number	Year Built	Vehicle Type	Odometer Mileage	Vehicle Condition
2001	2000	Gillig	427,691	Poor
2002	2000	Gillig	458,253	Poor
2003	2000	Gillig	465,524	Poor
2004	2001	Gillig	395,910	Poor
2005	2001	Gillig	433,233	Poor
2006	2001	Gillig	402,300	Poor
TBD	*2014*	*Gillig*	*n/a*	*New*
TBD	*2014*	*Gillig*	*n/a*	*New*
2009	2008	Freightliner CTS	115,201	Good
2010	2009	Chev Startrans S	145,206	Good
2011	2010	Chevrolet Startrans	40,858	Good
2012	2010	Chevrolet Startrans	42,811	Good
2013	2010	Ford Startrans	55,312	Good
2014	2010	Ford Startrans	58,615	Good
2015	2010	Ford Startrans	54,849	Good
Trolley	1996	Chance Trolley	25,831	Good

Note: Shading indicates new buses on order expected to be delivered in 2014. These buses will replace 2002 & 2003.

NEEDS, OPPORTUNITIES, AND CONSTRAINTS

Based on the existing conditions analysis conducted, the following identifies the existing needs within the current transit service provided, future opportunities for transit system growth or modification, and constraints that will need to be overcome.

- Fare box recovery for the agency has been below 17 percent for fixed route service and below 8 percent for Dial-A-Ride service. As such, the agency is highly dependent on property taxes to fund the majority of its operating costs. This reality should be considered when future service expansions are considered, especially outside the existing transit service boundary, where the BTS charter requires expanded service be funded fully through property tax revenue.
- Growth in the tax revenue alone will not keep pace with estimated increases in operating costs and will not provide sufficient funding for increases in transit service.
- Outlying areas of the BTS service area are currently served largely by an extended service program where riders may request a ride from a BTS bus stop to a location within the BTS service boundary but that is not served by fixed route service. The expansion of fixed route service to some of the areas with frequent calls for extended service should be considered in conjunction with a funding feasibility analysis of such service. This is discussed in Section 5.
- The transit service currently operates six days a week from roughly 6:00 a.m to 7:30 p.m. on weekdays. Ridership and funding analyses should be considered prior to expanding services beyond this time. Currently, no funds exist to provide longer service periods.
- Many local transit service providers, both public and private, operate within the BTS service area. These alternative options provide a critical supplement to BTS services.
- Public outreach should continue to be an integral part of the BTS mission. Informing the service population of transit service and transit service modifications should be continued and expanded where necessary.

Section 4
Survey Results

SURVEY RESULTS

Surveys of the Basin Transit Staff, Project Advisory Committee (PAC), and users of the transit system were taken throughout the months of January and February 2013. The average rating of the system on a scale of 1 to 5 with 1 being poor and 5 being outstanding was approximately 4.

The following subsections describe the surveys conducted for each user group. The information provided by the respondents should inform the alternatives developed related to the future modification of the BTS system.

Basin Transit Staff

The survey of the Basin Transit staff involved 14 staff members including 11 drivers/supervisors and three maintenance staff. The staff interviewed had been working at BTS an average of 12 and 8.7 years for the drivers/supervisors and maintenance staff, respectively. The average rating on a scale of 1 to 5 with 1 being poor and 5 being outstanding was 3.8 among the drivers/supervisors and 3.5 among the maintenance staff. When asked what could improve the score a variety of answers were given with some of the most common being new bus equipment (vehicles and lifts), bus stop improvements or additions, and reduced headways on existing routes. Recommendations to improve service were also requested. If additional funding was available, the majority of the staff said it should be spent on new buses and lift equipment. Other reoccurring responses were to reduce headways, reduce headways specifically for KCC, and expand the Mainline service areas. Most recommendations involved getting new, improving, or better maintenance of equipment and the service including more service throughout the day or varied depending on demand, more frequent stops, and run times being too short.

Project Advisory Committee (PAC)

The survey of the PAC involved 6 members from a range of organizations including the City of Klamath Falls, Oregon Department of Transportation, Klamath Tribes, and other local organizations. Half of the interviewees do not use the system or haven't since childhood, while the other half represented local organizations that provide services to people that use the transit system frequently for shopping, social, and medical needs trips. The average rating with the same 1 to 5 scale as mentioned previously was a 4.3 with all interviewees saying that the system ran well. If the system were to have additional funding the PAC suggestions included extending the service area or expanding routes, reducing headways, and extending service times. The PAC also had recommendations on additional areas to service. Some of the areas mentioned included the Running Y, Old Fort Road, Shield Crest, the airport and Amtrak Station, Falcon Heights, Henley area, as well as potentially a shuttle hook up to areas beyond. Other general comments and suggestions received included additional pass programs such as for the senior population, good bus service for the size of the community, and smaller, more economical vehicles.

Transit Users

A survey of BTS users was conducted from January 28 – February 10, 2013. Surveys of the riders of the system were handed out and collected by drivers of the buses as well as online. The rider surveys were longer and had more of a variety of questions than the BTS staff and PAC surveys. There were three categories of questions: respondent demographics, trip characteristics, and BTS performance.

Riders between the age of 15 and 24 years old represented the greatest proportion of transit users. The other age ranges from 25 to 74 are each roughly proportionate ranging from 11 to 16 percent of the riders while riders under the age of 14 and above 75 each make up only 2% of riders. Nearly all (91 percent) of the riders had annual income of the less than $30,000 per year. About 63 percent earned less than $15,000 annually.

The primary purpose of the survey respondents' trip on the day of the survey was asked. The responses were well distributed with no one trip purpose being the majority; however, shopping was the most common response followed by school and work.

The riders were asked to rate the transit system on the previously mentioned scale of 1 to 5. Most of the riders (74 percent) rated BTS with a 4 or a 5 and only 6 percent rated it with a 2 or below. When asked how to improve the system, responses were equally split between:

- Customer Service
- Extend Route
- Fleet Maintenance
- Service Frequency
- Time Reliability
- Transfers
- ITS/Route Information
- Prices and Miscellaneous

Common answers included having the bus drivers be more polite, more bus stops, extend operating hours, buses need to be on time, new buses or better maintenance of buses, post schedules at terminals, better information about transfers, and lower ticket prices.

Summary

Respondents generally expressed positive feedback related to BTS and overall service performance. Feedback related to improvement areas included the following themes:

- New buses or better maintenance to reduce breakdowns
- Request for more stops along routes
- Expanded service hours – daily and weekly
- Expanded service areas – within and outside of existing service area
- Better customer service from drivers
- Better on time performance
- More accessible bus route information

For a full summary of the surveys from BTS Staff, BTS Users, and the PAC, see Appendix C.

Section 5 Future Transit Alternatives

FUTURE TRANSIT ALTERNATIVES

This section presents the transit alternatives developed to guide the future of BTS. The content of this section is divided into two main parts:

- **Development of Future Transit Assumptions –** This subsection provides background as to how the future scenario related to transit ridership, funding, and expenses were generated.
- **Future Transit Alternatives –** Based on the initial assumptions, this subsections outlines details related to how transit service could be modified based on future scenarios.

DEVELOPMENT OF FUTURE TRANSIT ASSUMPTIONS

Future transit assumptions were developed based on two main factors: transit ridership projections and funding projections. The former informs how much demand for BTS services could change in the future and latter informs how much funding may or may not be available to fund new services or maintain existing services.

Transit Ridership Growth

Future transit ridership demands for the BTS service area was forecasted based on two factors:

1. Assumed household growth within the service area
2. Projection of historical growth trends

Both projections are presented herein. The results show a difference in ridership 10 years in the future (2023) of about 40,000 rides, or 10 percent of the total projected ridership. As such, the projections presented a reasonable range of future ridership levels given the uncertainty of how ridership will grow over time.

Household Growth

The Klamath Falls Urban Area Travel Demand Model projects traffic conditions for the area within the urban growth boundary (UGB). The UGB roughly aligns with the BTS service area. Therefore, the land use assumptions included within the Klamath Falls Urban Area Travel Demand Model are assumed to represent an existing and future year land use scenario for the transit district.

The model shows an increase of 4,093 households from 2008 to 2037. The highest amount of this growth is projected to happen in the area south and west of Lakeshore Drive along the Upper Klamath

Lake (Southview area) and the area north of Foothills Boulevard (Basin View area). Table 5-1 shows where the projected household growth is anticipated to occur within the Klamath Falls urban area. The data are grouped by the transportation analysis zones (TAZs) defined within the model.

Table 5-1 shows the estimated growth in households and employment for the Klamath Falls Urban Area by gross increase, total percent increase, and average yearly percent increase.

Table 5-1 Klamath Falls Urban Area Land Use Assumptions

Land Use Type	2008	2037	Increase	Total Percent Increase	Average Yearly Percent Increase
Households	18,818	22,911	4,093	21.75%	0.68%
All Jobs	19,951	24,024	4,073	20.42%	0.64%
Agricultural/Industrial Jobs	*2,371*	*2,388*	*17*	*0.72%*	*0.02%*
Commercial/Service Jobs	*11,940*	*14,708*	*2,768*	*23.18%*	*0.72%*
Education/Government Jobs	*3,286*	*4,258*	*972*	*29.58%*	*0.90%*
Other Jobs	*2,354*	*2,670*	*316*	*13.42%*	*0.44%*

Correlating this information to existing ridership numbers provides one way to estimate future transit ridership. Table 5-2 provides estimates of future transit ridership based on the existing rides per household rate and projected growth in households.

Table 5-2 Existing and Estimated Future Transit Ridership Based on Household Growth

Year	Households[1]	Transit Ridership		
		Fixed Route (FR)	Dial-A-Ride (DAR)	Total
2008	18,818	371,544	19,378	390,922
2023	*20,935*	*413,343*	*21,558*	*434,901*
2037[2]	*22,911*	*452,356*	*23,593*	*475,949*
Estimated Growth:	*4,093*	*80,813*	*4,215*	*85,027*

Note: [1]Household estimates based on estimates included in the Klamath Falls Urban Area Travel Demand Model
[2]2037 transit ridership estimates based on projecting a consistent transit ridership of 20.77 rides/household

As shown, transit ridership is expected to increase by approximately 85,000 rides through the horizon year based on household growth. The bulk of this growth is expected to occur within the fixed route service area. This represents approximately 22% growth over 29 years, an annual rate of 0.75%.

It should be noted that the estimates shown in Table 5-2 assume that current trends (ridership percentage, fixed route/dial-a-ride split, etc.) continue into the future. In reality, these trends might change as the Klamath Falls Urban Area grows.

Figure 5-1 shows the distribution of household growth throughout the Klamath Falls urban area.

BASIN TRANSIT SERVICE

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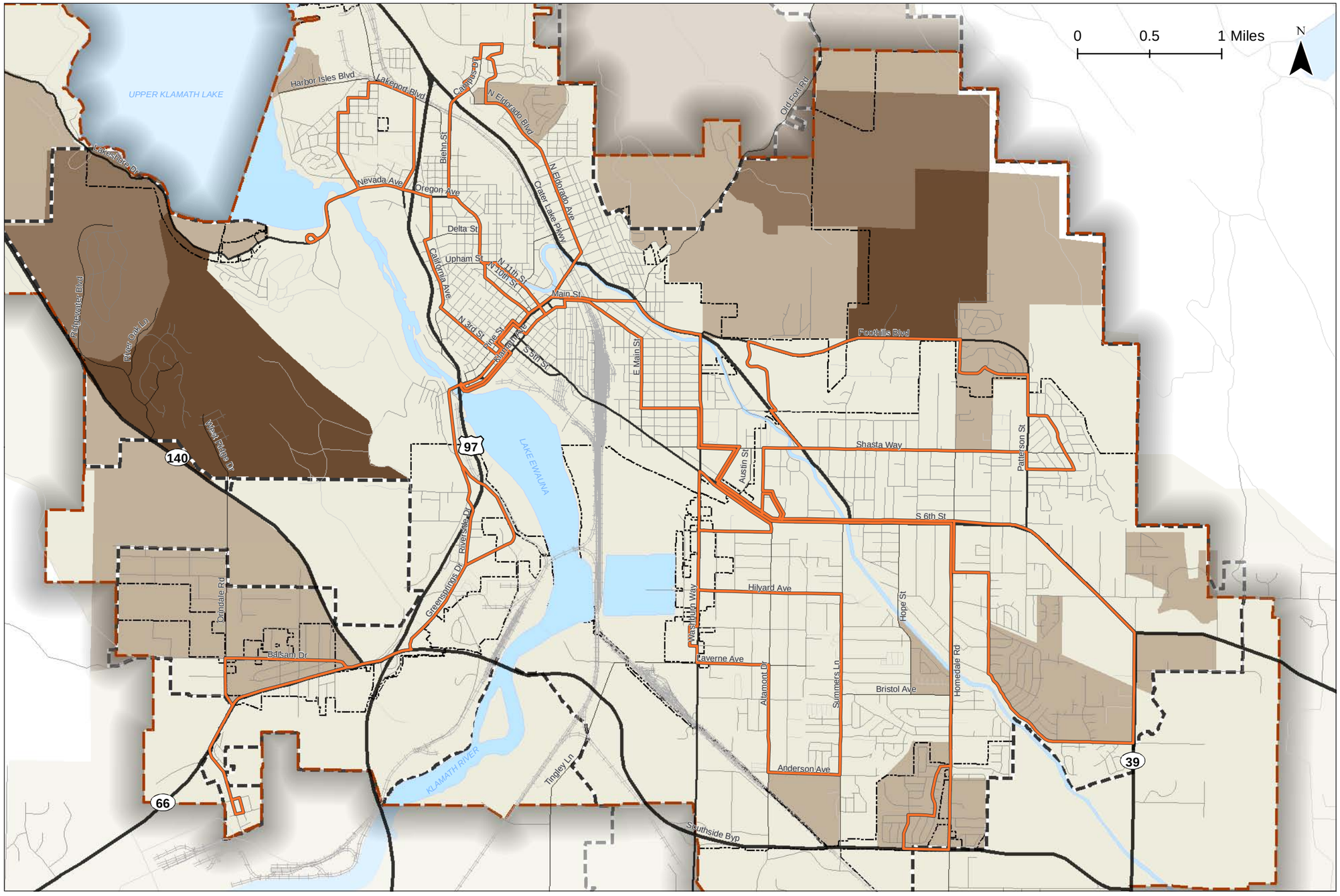
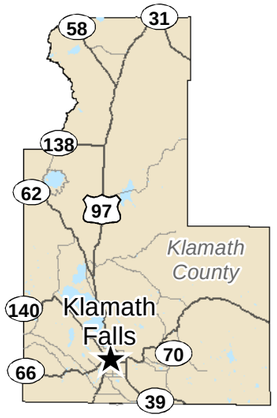
Households Increase Per Acre

- 0 - 20 Households
- 21 - 99 Households
- 100 - 249 Households
- 250 - 699 Households
- 700 - 1029 Households
- Basin Transit Routes
- BTS District
- Klamath Falls City Limits
- Urban Growth Boundary





Household Increase 2008-2037
Klamath Falls, Oregon

Figure **5-1**

Coordinate System: NAD 1983 HARN StatePlane Oregon South FIPS 3602 Feet Intl
Data Source: ODOT Transportation Planning Analysis Unit

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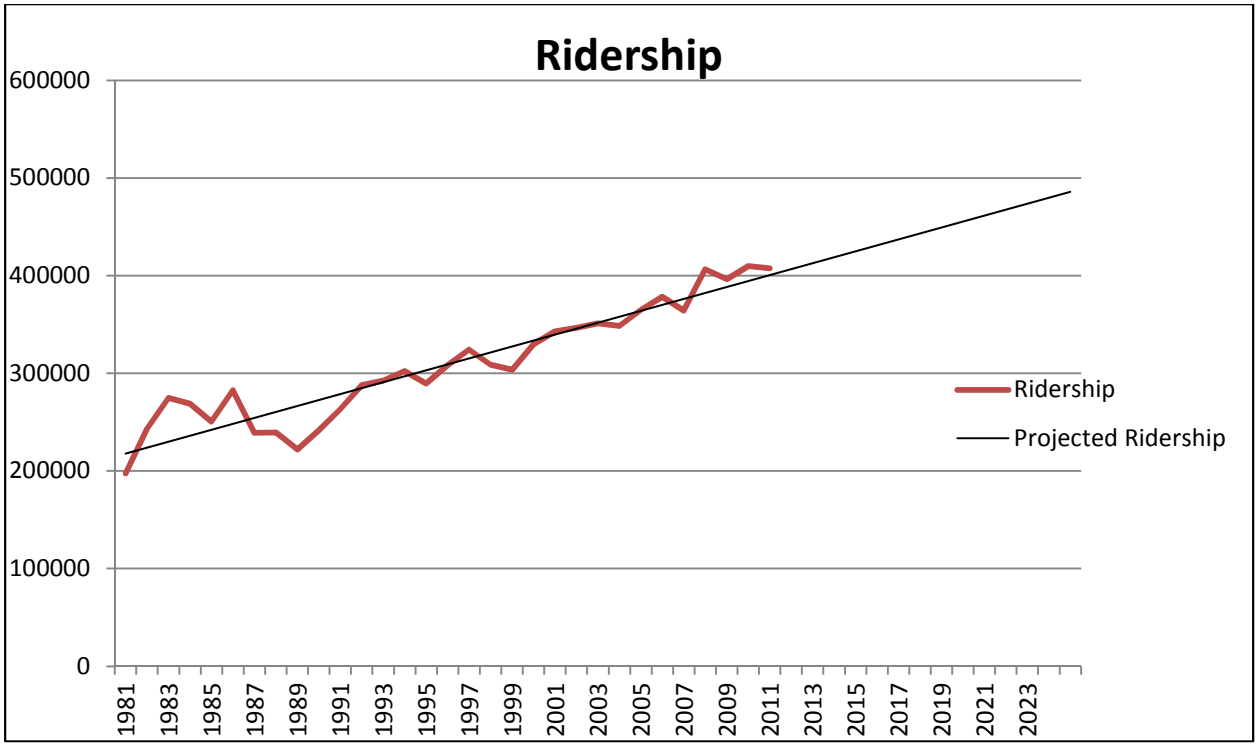
Projection of Historical Ridership Trends

Future ridership projections were also compared to historic ridership rates and growth. Exhibit 5-1 shows annual rides from 1981 to 2011 and includes a projection out to 2023 based on the historic trend. As shown in Exhibit 5-1, historic growth rates would indicate future ridership to be approximately 476,000 in 2023 and 553,000 in 2037. This represents an annual growth rate of approximately 2.8% per year and is significantly higher than the projected population growth rate and would indicate an increased use of the system per household. The difference between these two projection methods is a difference of approximately 40,000 rides per year in the ten year horizon of 2023.

Exhibit 5-1 Historic and Projected Ridership



Funding Analysis

BTS provides transit service with a relatively small operating budget compared to larger, more robust transit systems. The bulk of expenditures for BTS are related to employee wages and benefits. In terms of revenue, over half of what BTS receives comes from property taxes. The current tax rate is $0.4822 per thousand dollars of assessed value for houses within the transit district. By comparison, farebox user fees represent a relatively small portion of revenue (farebox recovery for fixed route service has ranged from 13-17 percent over the last five years). As such, BTS is heavily reliant on property taxes to support service. In addition, roughly one quarter of revenue comes from state and federal operating grants.

Future Funding Scenarios

Because BTS is heavily reliant on tax revenue, estimates of how tax revenue could change over time are critical to determining future service alternatives. To estimate how future tax revenue might grow, estimates were generated based on growth in assessed value of existing homes, growth from increases in the millage rate (BTS property tax rate per thousand dollars of assessed home value), and growth from new construction. Also considered were revenue increases from additional farebox revenue and increases (tied to inflation) in state and federal grants. The projected revenue from each funding source was compared against future estimated increases in operating costs for the next ten years. This information is shown in Table 5-3.

Table 5-3 Projected Operating Costs and Property Tax Revenue

Projected Year	Fuel Costs[1]	Operating Cost (not including fuel costs)[2]	Total Projected Operating Costs	Projected Property Tax Revenue	Projected Farebox Revenue	Projected State & Federal Grants	Projected Total Revenue
2015	$276,220	$2,096,422	$2,372,642	$1,221,439	$299,619	$415,158	$1,936,216
2017	$308,203	$2,263,542	$2,571,745	$1,389,400	$305,494	$438,658	$2,133,552
2019	$340,186	$2,430,662	$2,770,848	$1,575,588	$311,369	$462,157	$2,349,114
2021	$372,168	$2,597,782	$2,969,951	$1,781,739	$317,244	$485,657	$2,584,640
2023	$404,151	$2,764,903	$3,169,054	$2,009,744	$323,119	$509,156	$2,842,019

Note: [1]Fuel costs assume a 7% annual increase based on historical data.
[2]Operating costs assume a 4.5% annual increase based on historical data

As shown, the total operating costs are expected to grow at a similar rate as total revenue; however this still results in projected deficits of $400,000 to $500,00 per year. These projections are based on the the lower ridership growth projection of 1 percent per year without fare increases. Steadily increasing fares based on inflation would generate approximately an additional $100,000 per year by 2023. While these estimates should continue to be refined, the results reinforce the fact that growth in the tax base alone will not keep pace with increases in costs and not provide sufficient funding for increases in transit service. Annual increases in the millage rate and fares need to occcur to keep pace with the inflation of costs.

Funding Alternatives

While actual future tax revenues are unknown and depend on a number of variables not explicitly accounted for by the estimates shown, the follwing provides an order-of-magnitude estimate about the potential for future service enhancements. For comparison purposes, additional reveneue of $400,000/year could support the following based on an estimated cost of $326,000[5] to operate one bus for one year:

[5] Estimate based on an estimated cost of $86/hour to operate fixed route service today.

- One (1) new fixed route bus (two [2] 30 minute routes or one [1] 60 minute route) (cost estimate: $326,000/year)
- Lengthen weekday service span by three (3) hours on all routes (cost estimate: $385,000 year)
- Add six (6) hour Sunday service and extend weekday service by two (2) hours (cost estimate: $411,000/year)

FUTURE TRANSIT ALTERNATIVES

This subsection describes the possible modifications to the transit service provided by BTS based on a number of different future scenarios. The list provided is not intended to present a comprehensive list. Rather, the intention of the information shown is to inform future transit decisions based on scenarios that could occur as a result of reasonable development patterns with the service area and/or future funding scenarios. In addition, this subsection presents recommendations as to how funding can be maintained in the future to cover the existing services provided by BTS today.

Modifications to Existing Routes

This subsection describes modifications that could be made to existing routes in response to increases in demand and/or future developments within the existing BTS service area.

Table 5-4 shows events that could happen and appropriate response in terms of route modifications that may be implemented. Where appropriate, figure numbers are provided where the potential route modification is shown visually.

Table 5-4 Existing Route Modifications

Event	Route Modification	Description	Figure
Growth in KCC ridership demand	• Modify Route 6 to serve Homedale Area • Modify Route 2 to serve KCC resulting in 30 minute service to KCC based on the existing Route 1 service to KCC	• Alternative routing for Route 6 could be planned if Anderson Avenue extension occurs for vehicle and/or pedestrian travel • Could result in a longer (~45 minute) Route 6 and would impact the schedule for Route 4 and Route 6.	5-2
Serve Amtrak demand	• Modify Route 1 to serve Amtrak	• Route modification would alter how Route 1 departs downtown but is not recommended if it impacts 30 minute headways.	5-3
Increased demand in early morning/late evening for BTS services	• Extend service on Route 1 & 2 for 3 hours	• Would also require time extension for DAR service as well within ¾ mile of Routes 1 and 2	5-4

May 2013

BASIN TRANSIT SERVICE

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Modified Transit Routes

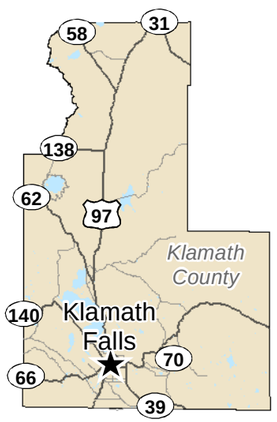
- Route 2
- Route 6

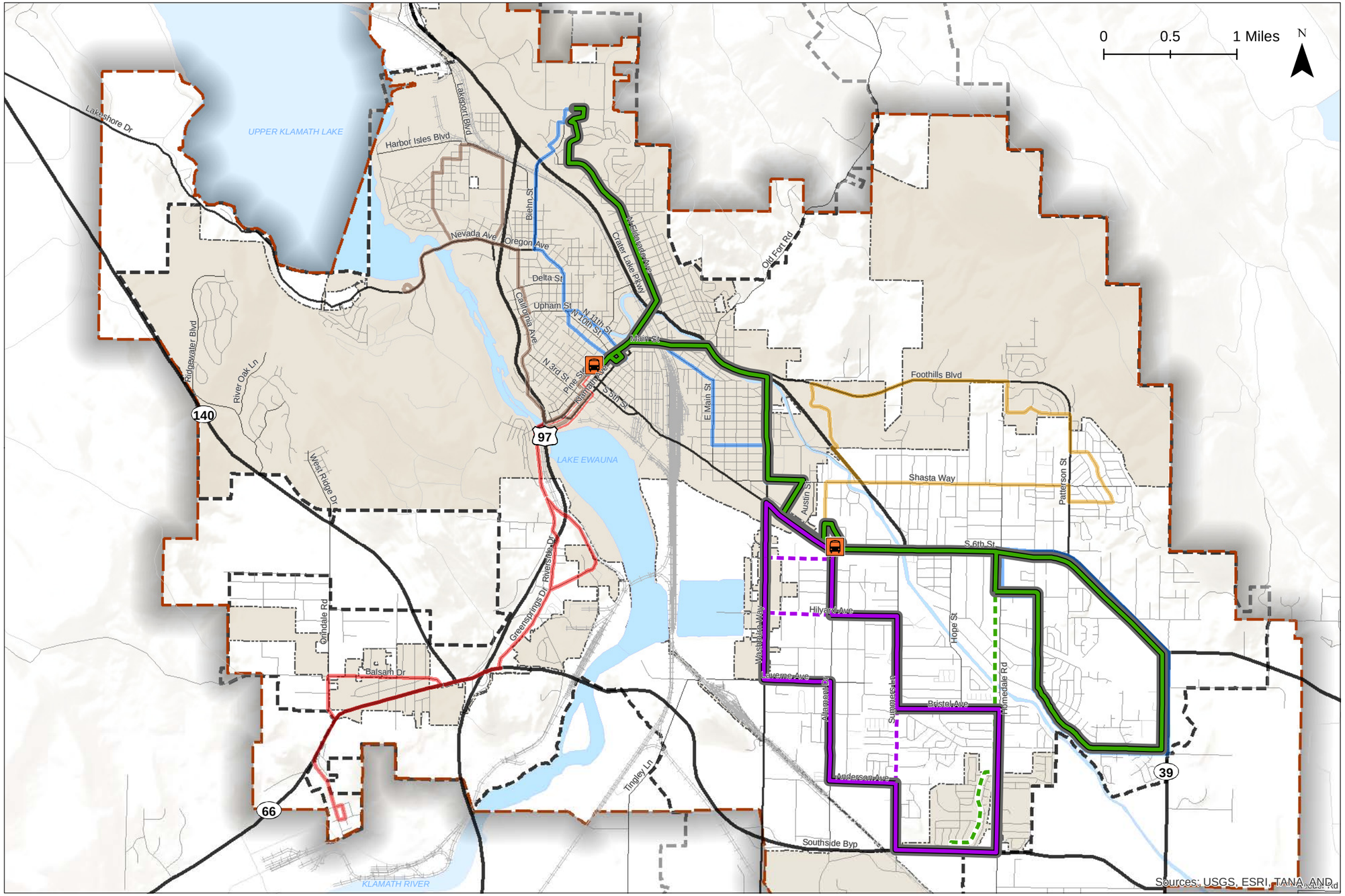
Discontinued Routes

- Discontinued Route 2
- Discontinued Route 6

Maintained Routes

- Route 1
- Route 3
- Route 4
- Route 5
- Transit Centers
- BTS District
- Klamath Falls City Limits
- Urban Growth Boundary





KCC Demand Alternative
Klamath Falls, Oregon

Figure **5-2**

Coordinate System: NAD 1983 HARN StatePlane Oregon South FIPS 3602 Feet Intl
Data Source: City of Klamath Falls

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BASIN TRANSIT SERVICE

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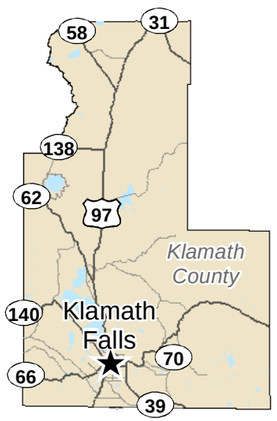
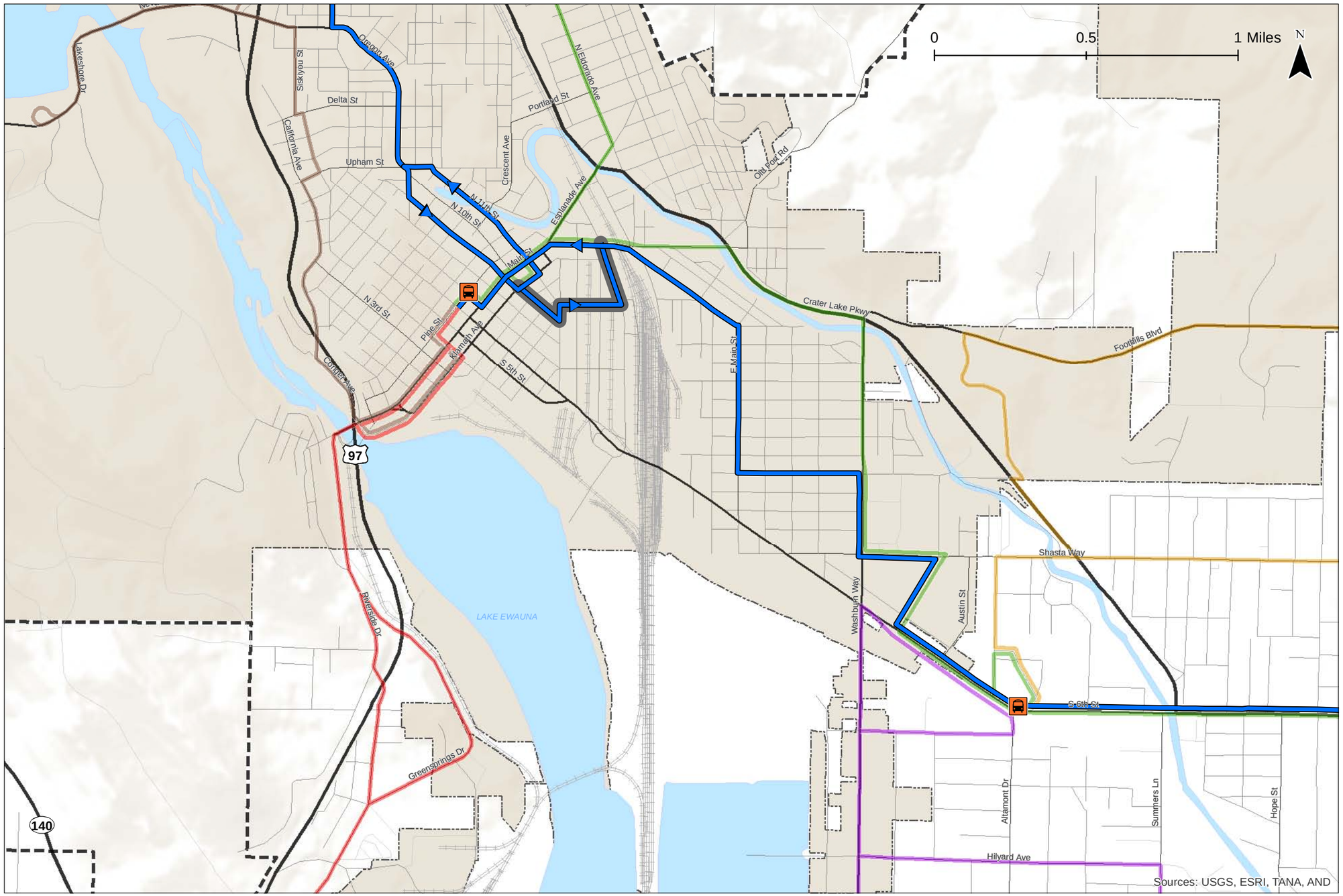
Route 1 Modification

Maintained Routes

- Route 2
- Route 3
- Route 4
- Route 5
- Route 6
- Transit Centers
- BTS District
- Klamath Falls City Limits
- Urban Growth Boundary





Amtrak Demand Alternative
Klamath Falls, Oregon

Figure
5-3

Coordinate System: NAD 1983 HARN StatePlane Oregon South FIPS 3602 Feet Intl
Data Source: City of Klamath Falls

BASIN TRANSIT SERVICE

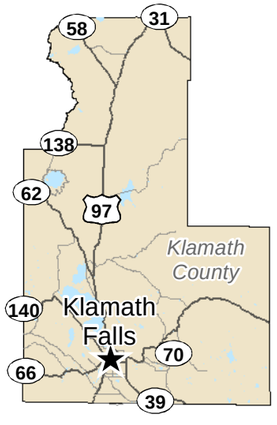
"On the go for you..." BTS

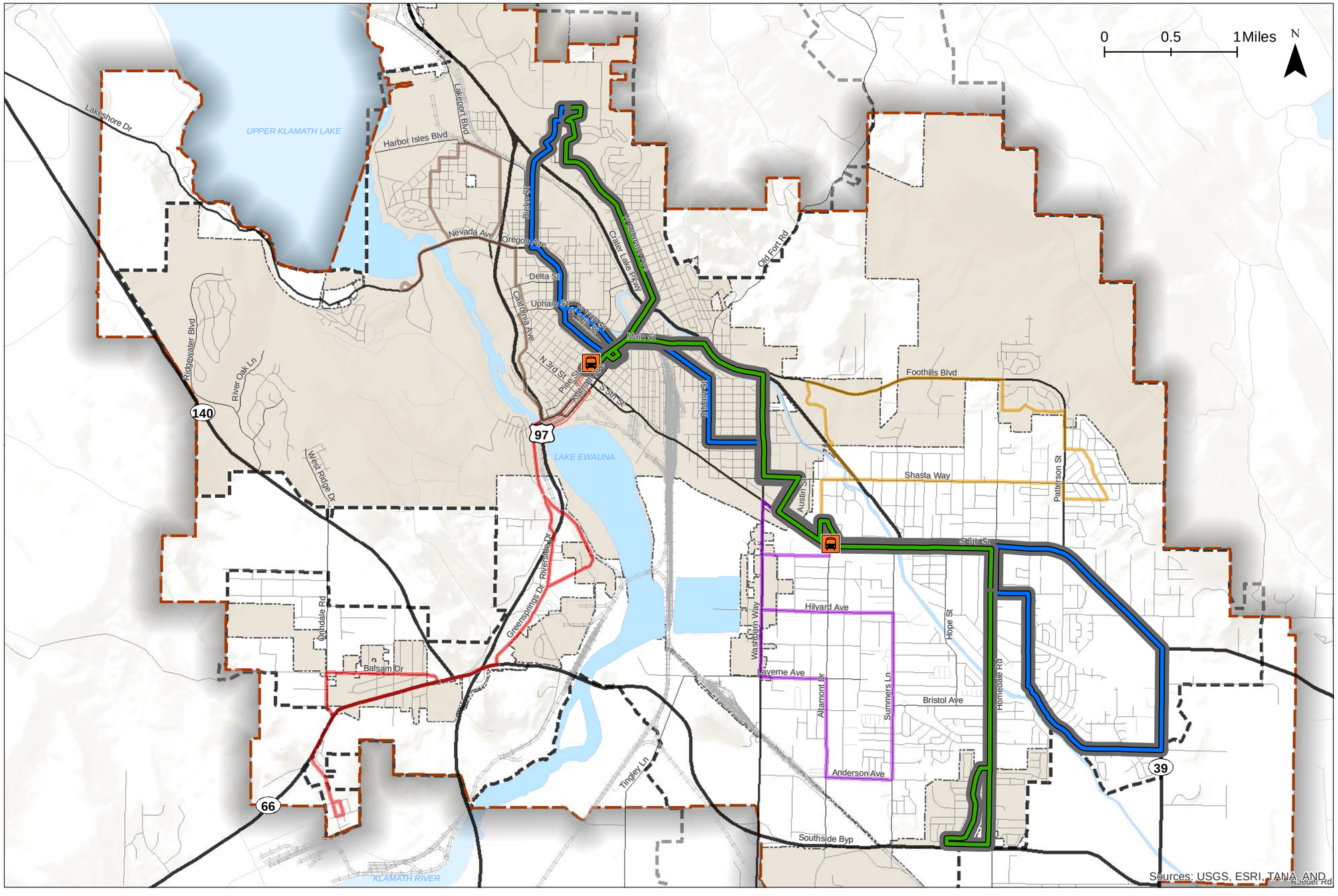
Routes for 3 Hour Extended Service

- Route 1
- Route 2

Maintained Routes

- Route 3
- Route 4
- Route 5
- Route 6
- Transit Centers
- BTS District
- Klamath Falls City Limits
- Urban Growth Boundary





Increase Route 1& 2 Service
Klamath Falls, Oregon

Figure
5-4

Coordinate System: NAD 1983 HARN StatePlane Oregon South FIPS 3602 Feet Intl
Data Source: City of Klamath Falls

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Expand Transit Service

Expanding the BTS service areas could include an expansion of the existing service within the current service boundary as well as an expansion of the transit service boundary itself. Both alternatives are discussed herein. It should be noted that expansion of service outside the existing service boundary needs to be coordinated with an expansion of the transit service boundary to collect property tax revenues from those areas based on BTS' high reliance on property tax revenue.

Within Existing Service Area

The developed land within the existing BTS service area is well served in the coverage area of fixed route service. However, as vacant land develops in the future, additional transit supportive areas may be created. Based on current land use projections, Table 5-5 presents areas within the existing service area with the potential needs for additional transit service. These potential service areas are shown on Figure 5-7.

Table 5-5 Internal Service Areas

Internal Service Area	Description
Dan O'Brien Way	• The Dan O'Brien Way area is expected to have adequate density in the future for transit service. • This area could be served by modifications to Route 5, converting it to a two-way route approximately 45 minutes in each direction rather than a loop, as shown in **Figure 5-5**. An additional bus would likely be required to service this route, freeing up the potential for a new service area to be served by the Route 3 bus in alternating half hours (such as the Southview area). The route modification shown is intended to reduce extended service currently provided to the Dan O'Brien area. By providing the modification shown, 3 routes would be available for service to OIT with connections downtown.
Copper Valley	• Copper Valley is a planned development south of Foothills Boulevard, north of Shasta Way, and east of Crater Lake Parkway. This area has long been discussed as a development area. • Service to Copper Valley will likely need to be coupled with service to the existing Klamath County Juvenile Center and Klamath County Mental Health Center. • **Figure 5-6** shows a proposed route modification to Route 4 to serve this area. This may result in Route 4 being converted to a 45-minute loop rather than a 30-minute loop and could be done in conjunction with changes to Route 6 shown in Figure 5-2. The result would be 90 minute service instead of 60 minute service on Routes 4 and 6.
Southview	• Southview is already under development. The recent economy has slowed construction, but the area is expected to have adequate density in the future to support transit service. • Service will likely require a new route. Service may possibly be provided in an alternating arrangement with Route 3 (in the Stewart-Lennox area) if Route 5 were modified to require its own bus.
Basin View	• Basin View is expected to have adequate density in the future to support transit service. • Service will likely require a new route and could allow for Foothills Boulevard and Shasta Way to have directional rather than loop service with Foothills Boulevard being a new route and Shasta Way being a modification to Route 4.
East Main Street Extension	• East Main Street is planned to extent south and east of its current alignment to connect South 6th Street with Crosby Avenue. When constructed, this area could present a good opportunity for future transit coverage through a modification of Route 1 or 2 but is not recommended if it impacts 30 minute headways.

While these areas represent likely service expansion areas, others areas not currently considered may become viable options in the future, potentially ahead of the areas listed. The *Transit Capacity and*

Quality of Service Manual defines "transit-supportive" areas as locations that can support at least hourly transit. Such areas have a minimum of:

- 3 households per gross acre or
- 4 jobs per gross acre.

As such, future development or densification areas that meet these thresholds should be considered for transit service.

One area of note inside the existing transit service area not currently served by fixed route service is the Klamath Falls airport. This facility has been served by fixed route service in the past, but minimal demand and increasingly infrequent airline service have made such a route infeasible under current conditions. If airline service to the airport increases in the future, or flight times change such that airport employees or passengers could be served during BTS hours, such a route could be reconsidered.

BASIN TRANSIT SERVICE

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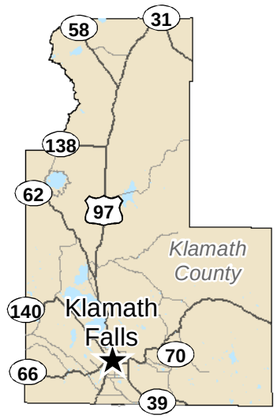
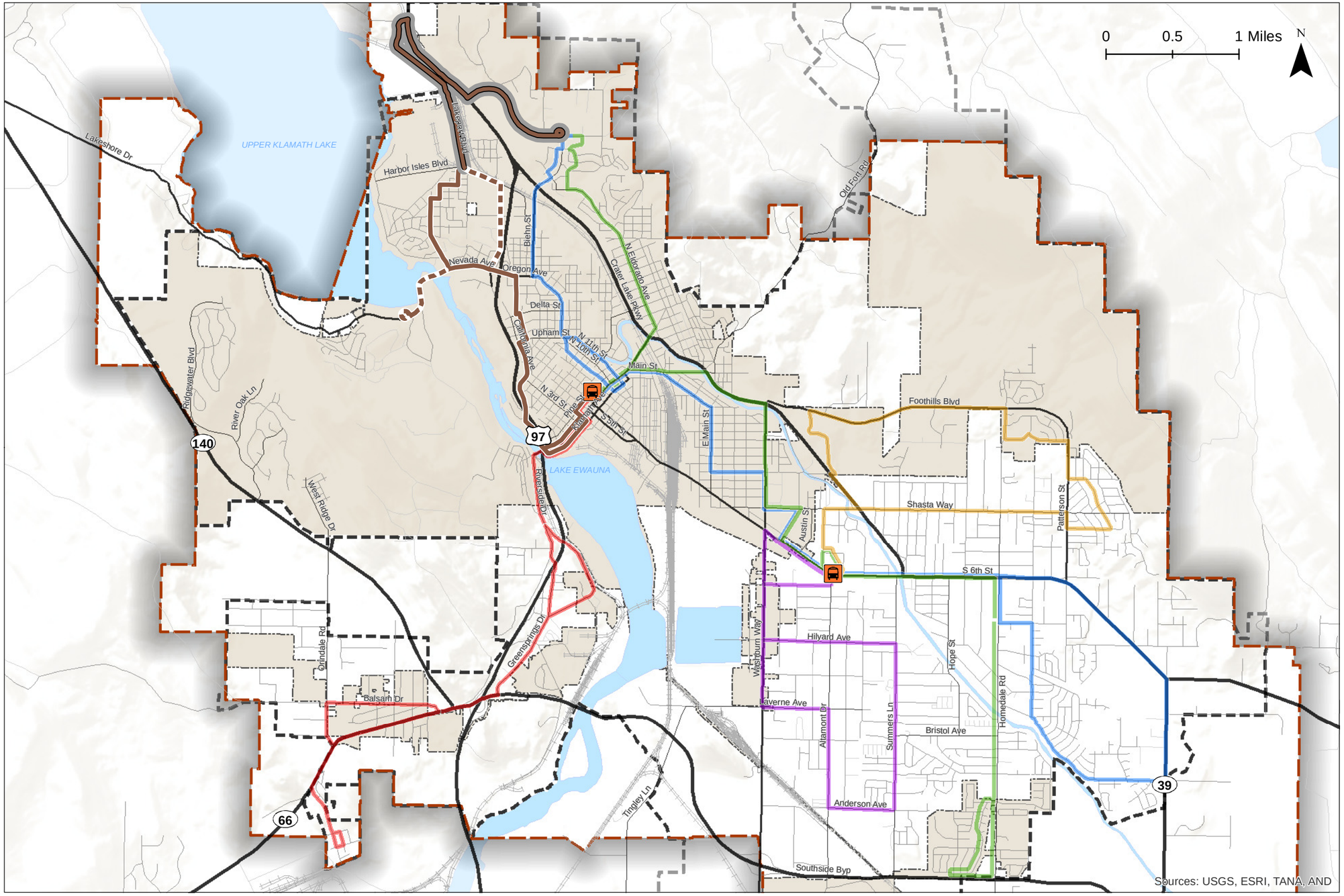
Route 5 Modification

- Extension
- Discontinued

Maintained Routes

- Route 1
- Route 2
- Route 3
- Route 4
- Route 6
- Transit Centers
- BTS District
- Klamath Falls City Limits
- Urban Growth Boundary





Route 5 Modification
Klamath Falls, Oregon

Figure
5-5

Coordinate System: NAD 1983 HARN StatePlane Oregon South FIPS 3602 Feet Intl
Data Source: City of Klamath Falls

BASIN TRANSIT SERVICE

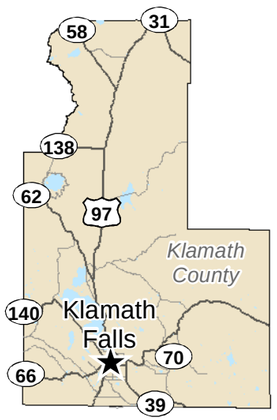
"On the go for you..." BTS

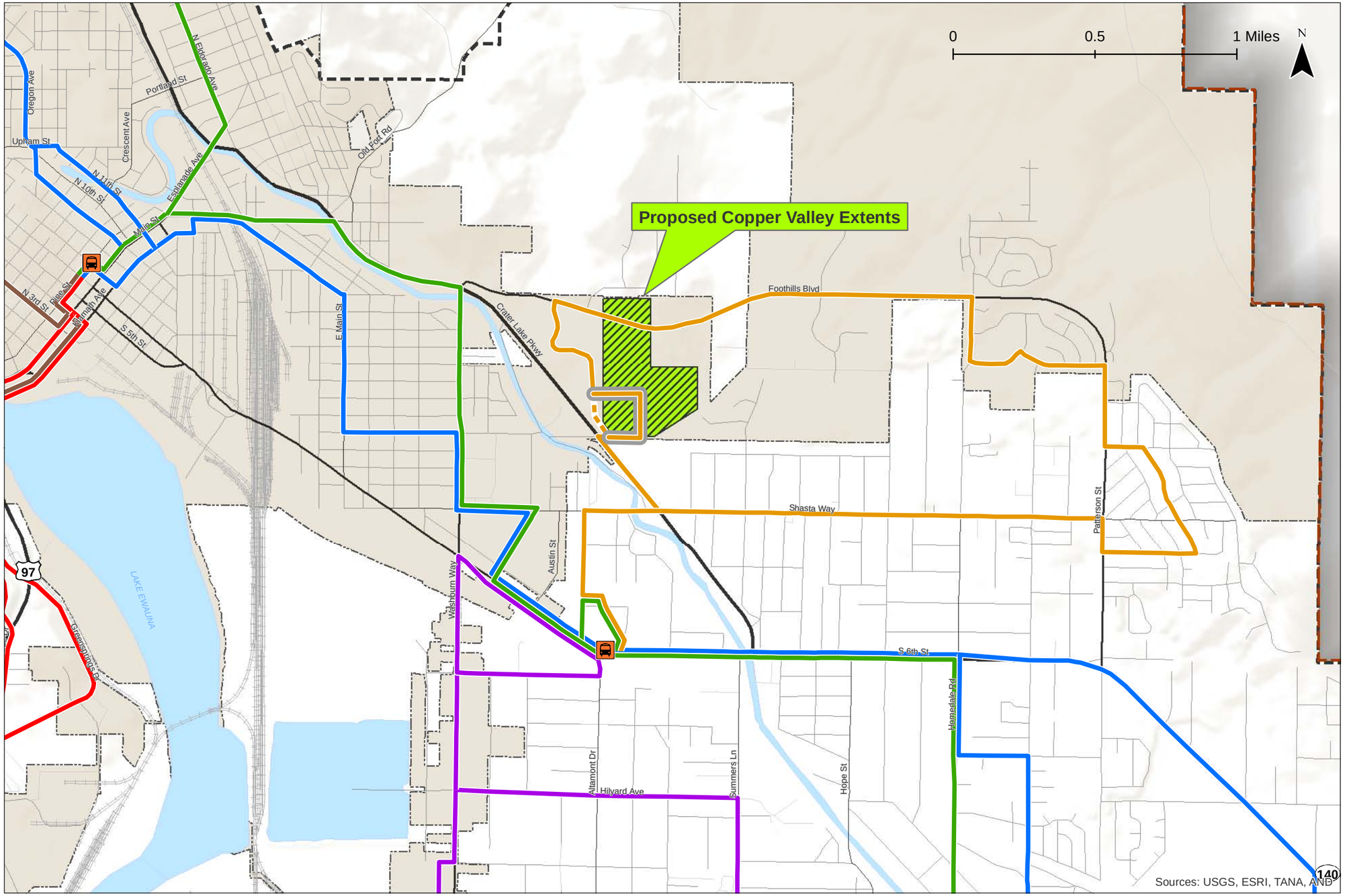
Route 4 Modification

- Extension
- Discontinued

Maintain Routes

- Route 1
- Route 2
- Route 3
- Route 5
- Route 6
- Transit Centers
- BTS District
- Klamath Falls City Limits
- Urban Growth Boundary





Copper Valley Expansion Area
Klamath Falls, Oregon

Figure
5-6

Coordinate System: NAD 1983 HARN StatePlane Oregon South FIPS 3602 Feet Intl
Data Source: City of Klamath Falls

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BASIN TRANSIT SERVICE

"On the go for you..." BTS

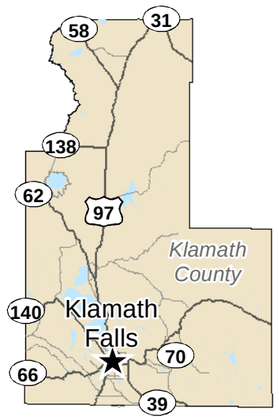
Route 1 Modifications

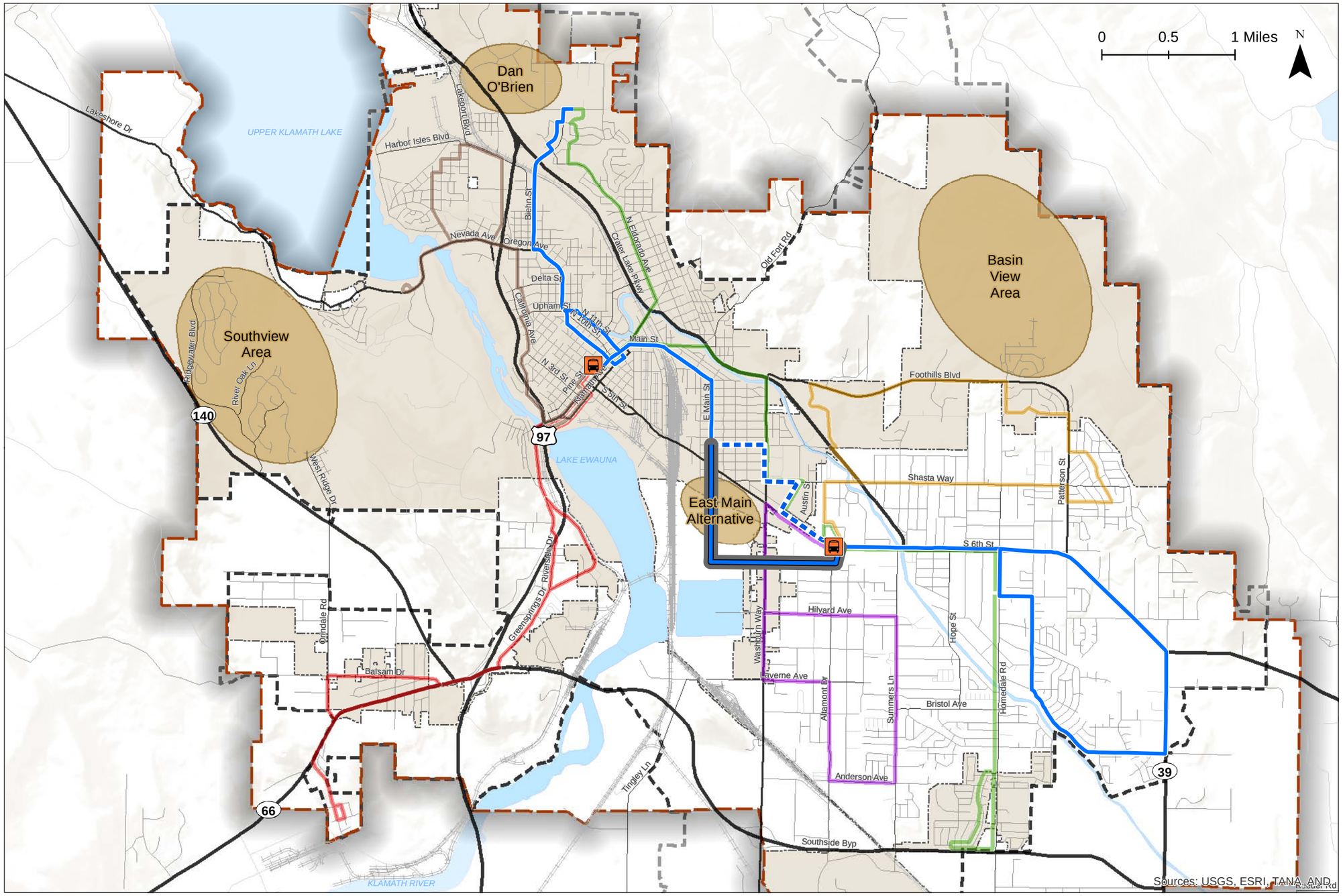
- Extension
- Discontinued

Maintain Routes

- Route 2
- Route 3
- Route 4
- Route 5
- Route 6

- Transit Centers
- BTS District
- Klamath Falls City Limits
- Urban Growth Boundary





Internal Study Areas
Klamath Falls, Oregon

Figure
5-7

Coordinate System: NAD 1983 HARN StatePlane Oregon South FIPS 3602 Feet Intl
Data Source: City of Klamath Falls

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External to Existing Service Area

Areas outside the BTS service area were evaluated to estimate their potential service population and potential property tax revenue. These areas were considered related to the following conditions:

- Is density high enough to support transit?
- Are enough households present to form a viable tax base?

Table 5-6 provides population, estimated households, median house value, estimated property tax base, and potential tax revenue based on BTS' existing millage rate for the towns of Merrill, Malin, Midland, Keno, Falcon Heights, Henley, Running Y, and Shield Crest. These areas are shown in Figure 5-8. As shown in Table 5-6, estimated tax revenue for the towns surrounding the Klamath Falls urban area range from approximately $7,000 to $135,000 per year. These values are based on the reported median house value which could be higher than the average assessed values for these areas.

Table 5-6 Estimated Tax Revenue for Surrounding Towns

Town	Population[1]	Households[2]	Median House Value[1]	Estimated Property Tax Base	Potential Tax Revenue ($0.4822/$1,000)
Merrill	843	351	$105,498	$37,030,000	$17,900
Malin	804	335	$97,004	$32,496,000	$15,700
Midland	212	88	$162,933	$14,338,000	$6,900
Keno	3,423	1,426	$196,660	$280,437,000	$135,200
Falcon Heights[3]	-	291	$110,000	$32,010,000	$15,450
Henley[3]	-	133	$125,000	$16,625,000	$8,000
Running[3]Y	-	577	$300,000	$173,100,000	$83,500
Shield Crest[3]	-	723	$300,000	$216,900,000	$104,589

Note: [1] Source: www.city-data.com
[2] Assumes an average of 2.4 people per household
[3] Household number and house value information estimated

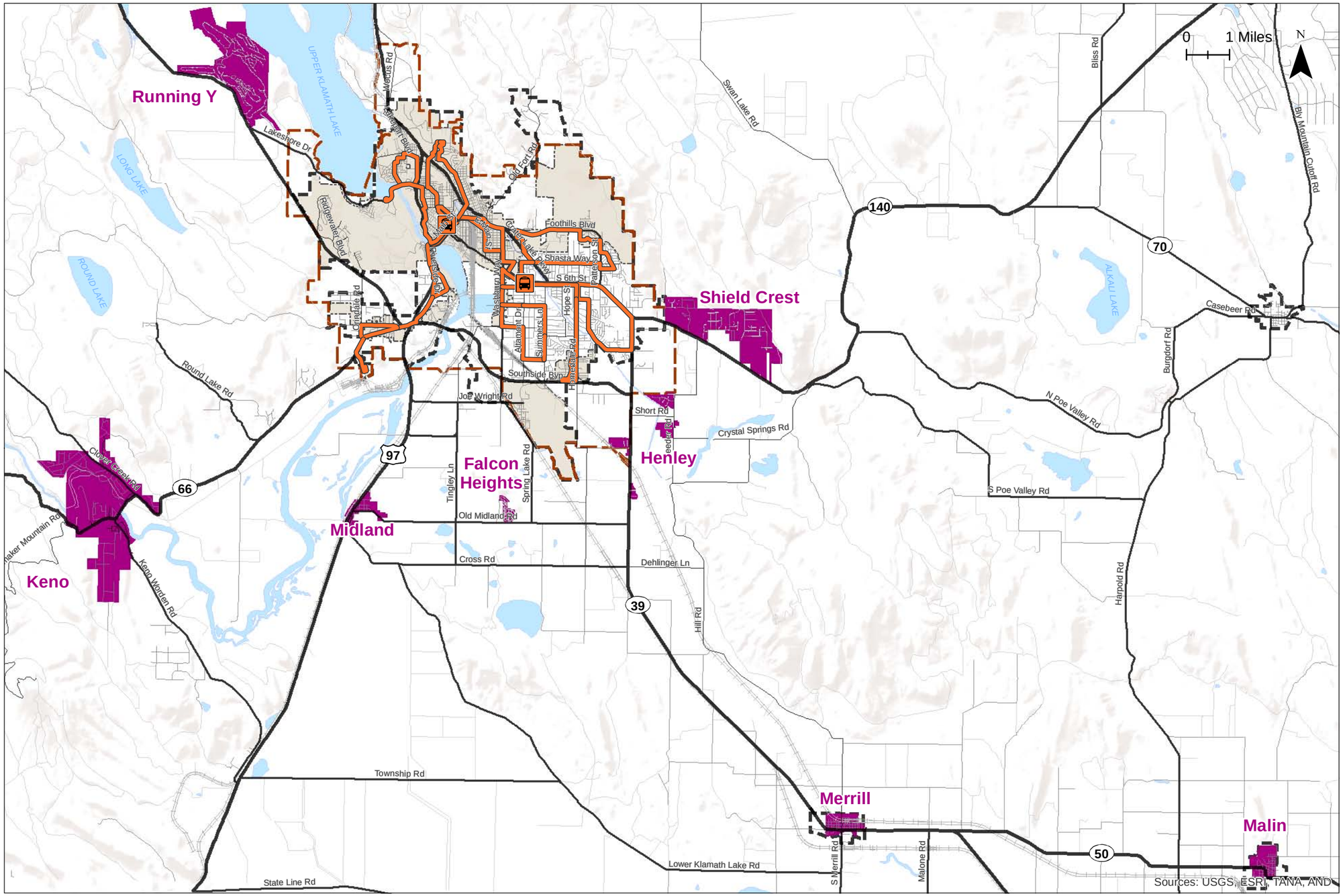
Of the external areas considered, Keno, Shield Crest, and Running Y have the potential combination of density and total households to potentially support future transit service. The others areas are either too spread out or lack the population base to make transit viable. In all cases, alternatives to dedicated BTS service should be considered before such a route is implemented. Such alternatives include private shuttle services, commuter bus routes, and others.

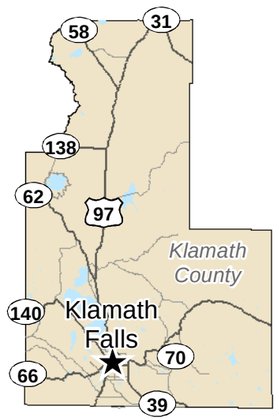
It should be noted that Chiloquin has recently established an agreement for service to and from Klamath Falls. As such, that community was excluded from this analysis.

BASIN TRANSIT SERVICE

"On the go for you..." BTS

- Transit Centers
- Transit_Routes
- External Service Areas
- BTS District
- Klamath Falls City Limits
- Urban Growth Boundary





External Service Areas
Klamath Falls, Oregon

Figure **5-8**

Coordinate System: NAD 1983 HARN StatePlane Oregon South FIPS 3602 Feet Intl
Data Source: City of Klamath Falls

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Cost Saving Alternatives

In the event of projected budget deficits, service cuts should be the last option sought to address budget gaps after all cost savings and feasible revenue increases are exhausted (discussed in the next subsection).

The following identifies potential service cuts that seek to maintain the integrity of the system as a whole to the extent possible while providing budget savings for BTS.

- **Eliminate or reduce Saturday service:** Eliminating Saturday service would save $143,000 and $25,000 from fixed route and DAR service, respectively. It should be noted that these cost savings would be reduced by lost fare revenue for the trips no longer being served. Based on 2011/2012 data, the loss of fare revenue is estimated to be approximately $25,000 annually.
- **Reduce weekday hours of operations:** This modification would save an estimated $86/fixed route bus hour eliminated and an estimated $74/hour of DAR service eliminated.
    - Options for this modification include, but are not limited to, the following:
        - Eliminate four hours of service [Estimated savings: $200,000]
        - Increase headways during non-peak periods (10 a.m. – 12 p.m., 12 – 2 p.m., etc.) [Estimated savings: $70,000]
- **Eliminate service on Routes 3 and 5:** This modification would save $285,000 and $28,000 on weekdays and Saturdays, respectively. DAR service is only required to be provided within ¾ mile of fixed route service so this type of service reduction would reduce DAR service as well. However, if BTS provided extended service to this area based on existing protocols, some of the savings would be reduced. Fare revenue from the fixed route service would also be reduced by approximately $56,000, assuming no riders travel to board a different route.
- **Eliminate or reduce extended service program:** BTS serves a number of users through the extended service program. While an important service to those that use it, the extended service program could be temporarily eliminated or reduced while maintaining service through fixed route and DAR options.
- **Dial-A-Ride Service for disabled passengers only:** BTS currently provides DAR service for senior citizens, which provides an amenity to the senior community but is not required by federal transit guidelines. The outcome of eliminating this service is estimated to be the reduction of DAR buses from the current active fleet of 3 to 2, potentially reducing hourly DAR costs from $74 to approximately $50.

Revenue Considerations

BTS operates within a tight fiscal reality that requires constant attention to balancing revenue and operating costs. Each year, BTS is faced with the potential for uncertainty related to rising operating costs in the form of fuel, maintenance, or other factors as well as the potential for reductions in revenue through decreases in ridership or property tax revenue.

To proactively manage revenue streams in the future, BTS should consider the following modifications to revenue streams on an annual basis

- **Millage rate increase:** BTS has the ability to increase their millage rate by up to 3 percent per year to match increases in inflation. To maintain the existing level of service provided to BTS users, BTS should implement an annual increase of at least 1.5 percent every year to offset increases in operating expenses.
- **Fare increases:** BTS has historically increased fares at irregular intervals. However, maintaining existing levels of funding will likely require more regular increases in fares, possibility on an annual basis. Minimal fare increases are recommended to occur annually to reduce the impacts to customers of irregular larger increases. Any increase in fare should consider impacts to ridership and the ease for users to pay, including the currency intervals.
- **Group user pricing:** OIT currently has a system in place where students may purchase yearly transit passes for the price of a typical monthly pass. In this system the cost if being paid by the user but at a substantially discounted rate. In contrast, KCC has a system in place where all students and staff can ride the BTS system for free based on a fee paid to BTS by KCC per FTE (full-time equivalent student). In this system the cost is being paid by the school and provides less funds per actual rider to BTS. BTS should consider transitioning KCC to a pay structure similar to OIT to provide a more equitable service to KCC students and staff and increase revenue. In addition, the pricing structure for these group plans should be reviewed annually and pricing adjusted as needed to maintain adequate level of fare recovery to provide service.

Funding Revenue Sources

Identifying new transit funding sources is often necessary to fund short-term capital improvements, long-term system expansions, or even to maintain current funding levels given the uncertainty of existing funding sources. This subsection is intended to serve as a starting place for identifying possible funding sources for BTS in the event additional funding is needed or desired. The list provided includes sources that may be highly likely and others that may be more unlikely. However, the list is intended to include a variety of sources used by other transit providers as a reference for BTS.

- **Tax Increment Financing** can be used to capture additional property taxes generated in the vicinity of transit specific improvements or areas. This type of funding can also be used to capture a portion of property value caused by a particular investment.

- **Tax Incentive Zones** provide an indirect avenue for transit funding by potentially increasing fare revenue, sponsorship revenue, etc. by providing tax incentives for businesses and residents residing near transit oriented or transit friendly developments.
- **Multimodal Impact Fees** are similar to System Development Charges (SDCs) but focused on improvements to multimodal transportation options. The Klamath Falls and Klamath County areas have long debated implementing SDCs. In the event that an SDC is established, BTS could work to allocate a portion of the funds towards transit enhancing improvements.
- **Advertising/Sponsorship** opportunities could provide BTS small amounts of consistent revenue. BTS does some sponsorship today, but additional opportunities may be possible. Some transit providers sell sponsorship for facility names, individual transit vehicles, within brochures, transit corridor guide books, etc.
- **Parking Fees/Fines** have the ability to provide incentives for users to use transit to reach desirable areas of the city, such as downtown Klamath Falls. The implementation of a parking strategy could increase transit ridership and thus fare box recovery as well as increase parking revenue.
- A number of **Grant Programs** are available that provide funding sources to local transit agencies. BTS receives some funds from such sources today, but others are available. Grant programs regularly are added and removed based on funding priorities or changing fiscal programs. A sampling of current known grant programs is included below[6]:
    - Federal Transit Administration (FTA)
        - Section 5309 – Bus and Bus Facilities
            - Provides capital assistance for bus facility needs and purchases
        - Section 5310 - Special Needs for Elderly Individuals and Individuals with Disabilities
            - Allocated by ODOT Public Transit Division along with the Oregon Special Transportation Funds (STF) discretionary funds by a population formula to Oregon counties.
        - Section 5311 - Small Cities and Rural Areas programs
            - The Intercity Passenger (FTA Section 5311(f))
        - Section 5317 - New Freedom

[6] The level of funding available from these programs and the eligibility of projects to receive continued support vary by program. In general, however, these grant programs are not considered stable sources of annual funding. Rather, these programs can help fund the purchase of vehicles, capital investments, or fund temporary operations of a new services or special programs.

- Provides funding for projects going "beyond ADA" requirements

- Section 5316 - Job Access and Reverse Commute (JARC) (Section 5316)
  - Provides funding opportunities to provide transportation options for low income individuals and welfare recipients

BTS Facility Expansion

As transit service in Klamath Falls grows, additional buses may be required, which, in turn, may require additional space for bus storage and/or maintenance. A review of the number of additional buses that could be accommodated at the existing BTS facility with regards to storage and maintenance should be reviewed and compared with the agreed potential for future buses at the conclusion of the alternatives analysis. Expansion of the existing BTS facilities should be considered and/or planned for as necessary. The exact date of such a need is difficult to predict due to the many factors that would determine the appropriate timing of such an expansion. However, the need for additional space or facilities should be considered in conjunction with an expansion of service.

Section 6 Transit Design Toolbox

TRANSIT DESIGN TOOLBOX

This section outlines the transit design alternatives for Basin Transit Service (BTS). These design alternatives include:

- Transit Vehicle Guidelines
- Transit Route Modification Thresholds and Guidelines
- Transit Stop Criteria (location, spacing, amenities)
- Dial-A-Ride Operations
- Transit Signal Priority Guidelines
- Transit supportive land use guidance
- Transit Facility Guidelines

The following subsections address these focus areas and are intended to provide BTS with guidance for future transit system upgrades or modifications. The content of this section is based on best practices observed within other transit service districts throughout the country.

TRANSIT VEHICLE GUIDELINES

The vehicle spare ratios for the fixed and DAR system should be kept at 1 spare for each 5 vehicles in regular service. The largest bus for Basin Transit Service is a 40’ long, 8.5’ wide Gillig. The physical characteristics of this bus should be considered in all transit related street design issues. Because the bus is similar to the American Association of State Highway and Transportation Officials (AASHTO) City Transit Bus (CITY-BUS) this design vehicle should be used in determining transit related geometric design requirements. Exhibit 6-1 depicts the front and side views of the standard bus and summarizes its’ critical dimensions and clearance requirements. The DAR vehicles are 28.75 feet long and 8 feet wide. These vehicles are much smaller than the larger buses described previously. However, route design should consider the ability for such buses to traverse the roadway network. The bus dimensions for such vehicles are shown in Exhibit 6-2.

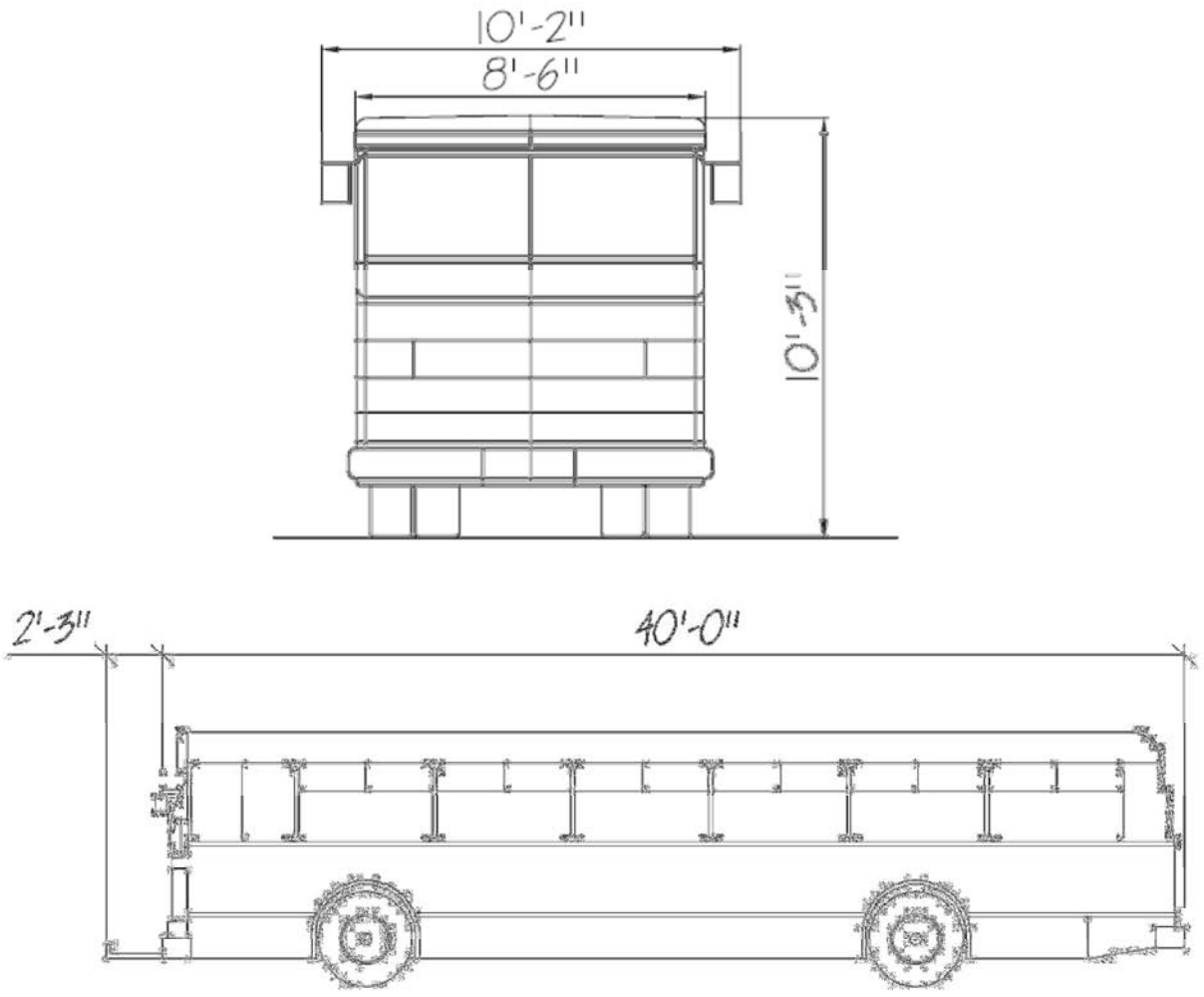

Exhibit 6-1 Standard 40-foot bus dimensions

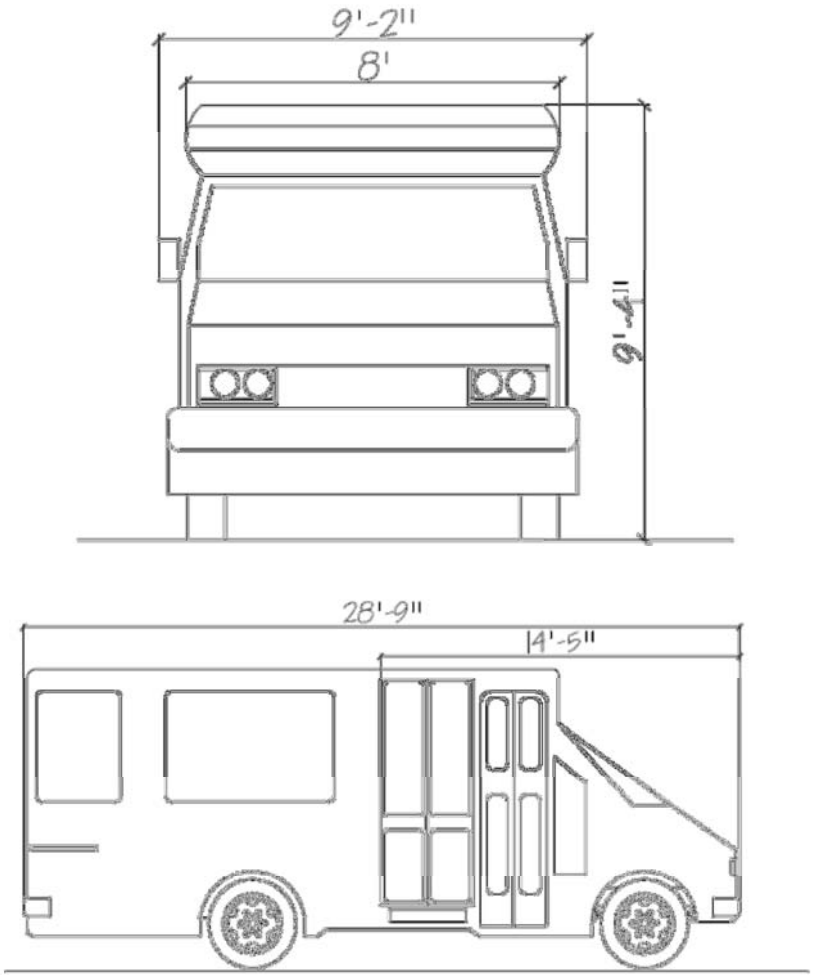

Exhibit 6-2 Dial-A-Ride bus dimensions

TRANSIT ROUTE MODIFICATION THRESHOLDS AND GUIDELINES

As the BTS area experiences changes to land use and population, it will be necessary to review the current fixed route buses, their frequency and schedules. A systematic review of these items should occur on a regular basis with normal schedule changes to occur not more than once every two years. This review should incorporate estimates of ridership changes in the system, a consideration of current operations for schedules and areas served, along with the ability to acquire and maintain proper equipment all within the limits of the financial capabilities of BTS.

The basis for the fixed route bus review should consider the following criteria:

- **Buses on those routes appearing to be overcrowded** - Identify the number of the peak hours per day fixed route passenger usage is exceeding 110% of the bus seating capacity and the number of non-peak hours with greater than 95% of the seating capacity occupied
- **Buses run times are exceed scheduled run times** – Evaluate if bus run times are exceeding schedule run times by more than 5 minutes on more than 20% of the scheduled routes

- **Major land use changes** - Shifting population or planned development with high residential densities or major commercial/institutional components are moving into the design and construction phases

TRANSIT STOP CRITERIA

The location and design of transit stops are essential for Basin Transit Service to efficiently and comfortably meet the needs of its passengers. The following guidelines are factors that should be considered when new transit stops are being planned or when existing stops are being relocated or modified.

Transit Stop Location

When siting potential stop locations, as much of the following criteria as possible should be met:

- The roadway design speed is less than or equal to 45 mph.
- There is adequate space in the right-of-way for the bus stop sign and the potential addition of a transit shelter or bench.
- ADA access can be provided for passengers with disabilities.
- The stop is located to adequately serve nearby trip generators with access to walking routes to facilities.
- Connections exist to pedestrian facilities.
- Pedestrian street crossing options are nearby.
- Street/bus stop lighting is provided.
- Adequate curb length is present to accommodate the bus stop zone in curb side locations

When a general location for a site has been determined, the specific location of the site should consider the following:

- Stops should be located at intersections where other traffic has the opportunity to get past a stopped bus (i.e., streets with 2 or more travel lanes in a given direction or when a bus bay is provided).
- Stops should be located so that passengers are not forced to wait for a bus in the middle of a driveway.
- The stopped bus should not block a driveway.
- Stops should be located so that patrons board or alight directly from the stop area rather than from the driveway.
- Stops should be located so that the front door ADA landing pad is located outside a driveway area.

- Consider relocating a bus stop to a downstream parcel should a corner location prove to be unacceptable.

Near-Side Stops

Near-side stops should be located at least 100 feet in advance of the intersection in order to avoid conflicts with vehicles. Use nearside stops on two lane roads, where vehicles are restricted from going around the bus, in order to prevent the stacking of vehicles in the intersection. Near-side bus stops are also appropriate:

- at signalized intersections with transit signal priority;
- when the bus must stop in the travel lane because of curb-side parking in order for the front door of the bus to access an intersection and crosswalk;
- in combination with curb extensions or bus bulbs to provide direct access from the bus to the sidewalk; and,
- in a right-turn lane if a queue jump signal is provided to allow the bus to merge back into the travel lane and if accompanied by a sign on the side of the road.

Avoid near-side stops at intersections with dedicated right-hand turn lanes where right-on-red turning is permitted.

Mid-Block Stops

Mid-block stops are generally to be avoided. They are only appropriate when:

- route alignments require a right turn and the curb radius is short; the distances between intersections is unusually long and major transit generators are located mid-block and cannot be served at the nearest intersection; and,
- a pedestrian crossing is provided, accompanied by pavement markings, signage, and road lighting.

Far-Side Stops

Far side stops can result in fewer traffic delays, provide better vehicle and pedestrian sight distances, and cause fewer conflicts among buses, cars, pedestrians and bicyclists. They are recommended for use under these circumstances:

- in areas where the right-of-way permits cars to pass the bus and especially in areas where a near-side stop will impede other motorists;
- where a route alignment requires the bus to turn left before stopping; and,

- where buses can take advantage of progression provided to general traffic (i.e., where bus stops are separated by 2 or more traffic signals).

Table 6-1 lists the minimum distances between the point of bus traffic re-entry and any upstream bus turning movement at various speeds.

Table 6-1 Far-Side Bus Stop Placement

Design Speed (MPH)	Minimum distance between point of bus traffic re-entry and any upstream turning movement
20 - 35	75 feet
40	75 feet
45	100 feet
50	135 feet

Roundabouts should be treated similarly to conventional intersections. The goal when locating a bus stop in relation to a roundabout should be to avoid the queuing of vehicles back into the circulatory roadway. Since the bus stop should, where possible, be located on the far side of the roundabout after the exit, the stop should either utilize a bus bay or be far enough downstream from the splitter island to avoid a long queue from interfering with circulation within the roundabout.

A depiction of near-side, far-side, and mid-block stop locations is shown in Figure 6-1.

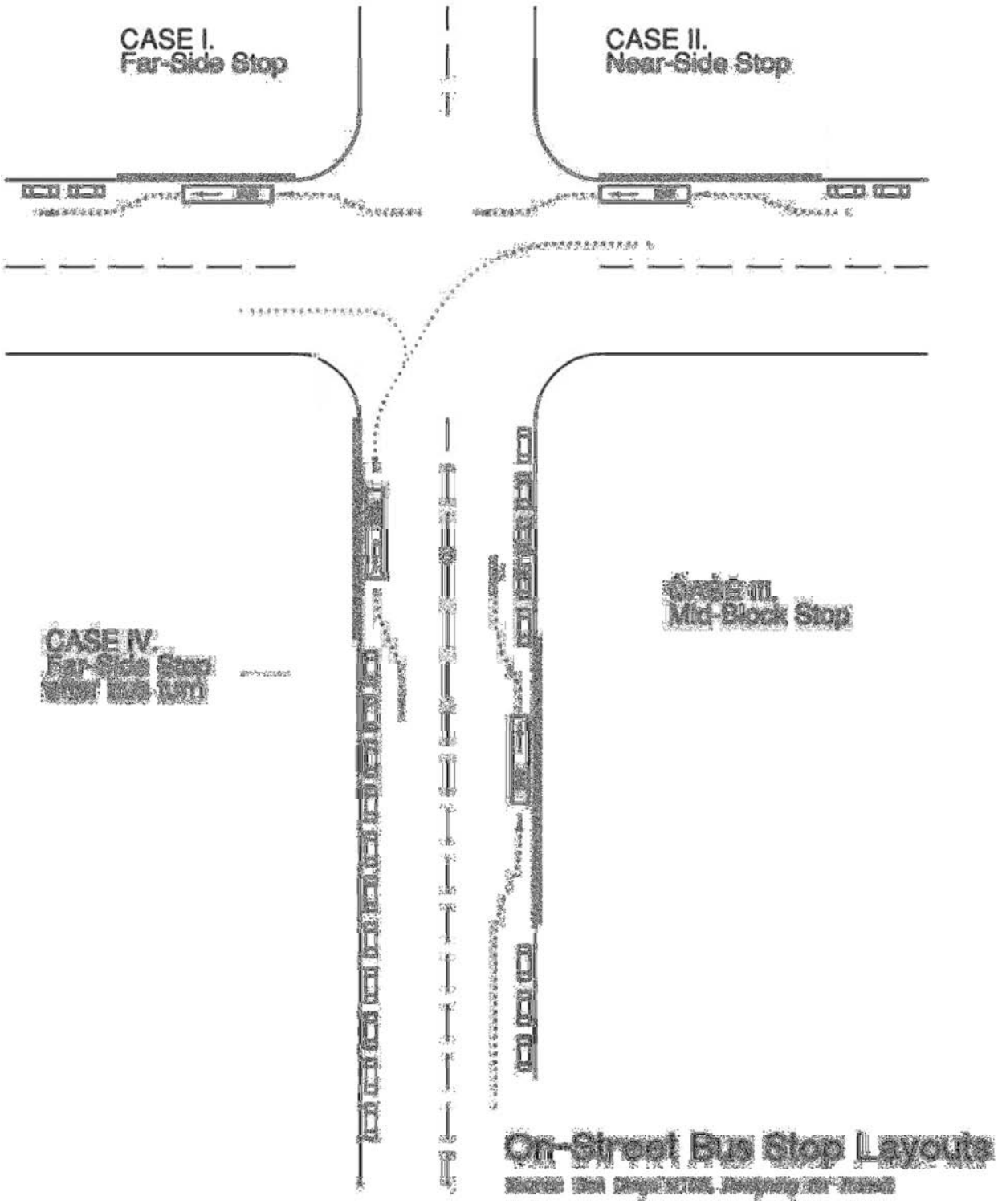

Figure 6-1 Bus Stop Layout Example

Special Consideration for Schools

Transit facilities near schools should have the following safety related measures:

- near primary schools, stops should be placed in an area where they can be visually monitored by school personnel and/or crossing guards to increase security; and,
- mid-block stops near schools are not recommended.

Transit Stop Spacing

Bus stop spacing should be related to the ridership density with stops being close together at major commercial areas (i.e. Central Business District) and farther apart in the outlying areas. Increasing the density of stops can lead to a more accessible system for users; however, increasing stop density too much can lead to slower service, schedule reliability issues, and excessive maintenance costs.

Table 6-2 shows observed spacing ranges for four different area types based on two research reports conducted by the Transit Cooperative Research Program (TCRP) and National Cooperative Highway Research Program (NCHRP). Given that the areas surveyed typically have higher density and more transit demand than the Klamath Falls area, BTS should expect that an appropriate stop spacing density for its system would be near the upper ends of the ranges shown below. However, if a particular service area has increase ridership demand, land use density, or both, higher transit stop density should be considered.

Table 6-2 National Transit Stop Spacing Averages

	TCRP Report 19	NCHRP Report 69
	Range (feet) (typical spacing)	Range (feet)
High Density Residential Areas, CBDs, and Major Employment Centers	300-1000 (600)	440-528
High Density Residential/Employment Centers	500-1000 (750)	660-880
Suburban Residential Areas	600-2500 (1000)	1056-2640
Rural Areas	650-2640 (1250)	1320-2640

For the BTS area the suggested bus stop spacing is as follows:

- Major Commercial area (i.e. CBD) 500 – 800 feet (appx. 6-10 stops per mile)
- Urban Area 700 – 1,000 feet (appx. 5-7 stops per mile)
- Outlying/Rural area 1,200 – 1,800 feet (appx. 3-4 stops per mile)

Transit Stop Amenities

The provision of bus stop amenities can range from a simple bus stop sign to a full shelter treatment. The type of bus stop improvements is usually based upon the number of persons using the stop or if it is a transfer point between routes. Requests for bus stop improvements should be documented including the results of the review.

Bus Stop Sign - At a minimum, each bus stop should have a bus stop sign facing the approaching direction of bus travel. For bus driver recognition in dark service times, the signs should be printed on a high intensity reflective sign material. The design of the sign should include the standard bus stop logo and if a transfer location the numbers of all bus routes serving that location. For Transfer points, it is critical to provide bus route signage that shows where the transfer buses will be stopping. This reduces passenger confusion and allows for better coordination between routes.

Bus Stop Pads - Bus stops that have accessible pedestrian access should include a surfaced bus stop pad meeting ADA criteria. The pads provide a clear waiting area out of the dirt and mud, provide a base area for the deployment of the bus ramp/lift access and promotes a good image to the ridership.

Stop Benches or Seats - The placement of bus stop benches or seats should be based upon the number of boarding passenger per day and should be considered when these numbers are greater than 10 passengers per day. There may also be special circumstances when passengers with special needs need a bench or seat while waiting.

Bus Shelters – Shelters should be used at transfer points when the daily passenger boarding's approach 20 passengers per day. Due to the high maintenance cost of shelters (cleaning, vandalism, lighting, etc.) the placement of shelters must be carefully reviewed. Shelters should be designed to allow good driver visibility of the interior of the shelter as the bus approaches. The shelter should be covered and provide wind breaks.

Bus Stop Lighting – It is very important that bus stops and shelters be located so the bus stop area has lighting provided by a light at the stop or an adjacent street light. This is important for safety concerns, driver recognition of passengers waiting, and roadway drivers seeing the waiting passengers. All transfer centers should have lighting providing access roadway lighting along with shelter lighting.

Trash Containers – Providing trash containers helps to keep a clean stop appearance. However, the maintenance costs for pickup and cleaning of the trash is a concern. BTS should consider a volunteer program in which the adjacent property owner empties the trash on a regular basis. This has been successful in other locations as adjacent property owners typically desire a well maintained stop with a

clean appearance. It is very important to service trash containers on the buses to help reduce the trash collection at the stops. At a minimum, trash containers should be provided at transfer points.

Bus Stop Schedules and Route Maps – Providing visual information at each stop showing the bus route and the schedule times is a definite service to the traveling public. At a minimum, bus schedules and maps should be displayed at any transfer point. The maintenance of the schedules is critical and BTS should develop a plan to implement the placement of bus stop schedules at all stops over a five year period.

Americans with Disabilities Act (ADA) Guidelines

ADA standards ensure that public facilities are accessible for all users. Specific requirements of this act apply to the construction or alteration of transit stop amenities. The following guidelines should be considered when new or modified transit stops are being constructed.

- New or altered transit stop at a location where an existing (possibly non-ADA compliant) sidewalk exists:
    - Provide a minimum 5-foot by 8-foot clear paved landing pad at the stop and, if necessary, a paved connection to the sidewalk that meets the PROWAG width/grade/surface requirements for a pedestrian access route (R302). No modification to the existing sidewalk is required, but would be desirable to maximize the stop's accessibility (see the discussion of agency coordination below).
    - A bench and/or shelter can be provided, provided that the landing pad and sidewalk are not obstructed and that the required clear area(s) and an accessible route to the boarding area are provided.
- New or altered transit stop at a location without sidewalks and local design standards call for sidewalks when the road is modernized.
    - Provide a minimum 5-foot by 8-foot clear paved landing pad at the stop.
    - Provide a compliant sidewalk connection to the nearest intersection, including a curb ramp. *This provides a street connection as required by R308.1, as any informal pedestrian path that may exist at the site is highly unlikely to meet the "pedestrian circulation path" requirements for firmness, slip-resistance, smoothness, etc. In addition, court cases have held that even though transit agencies are not the lead agency for providing sidewalks, a pattern of installing stops at inaccessible locations violates the "equal access" provisions of the ADA and transit agencies have been required to fund access improvements to stops. Furthermore, installing a bench or shelter at an existing stop would also violate the "equal access" provision, as a new facility has been provided that is not accessible by all. The stop is recommended to be located as close to the intersection as practical, both to reduce construction costs and to encourage passengers to cross the roadway at the intersection.*

- A bench and/or shelter can be provided, provided that the landing pad and future sidewalk are not obstructed and that the required clear area(s) and an accessible route to the boarding area are provided.

- New or altered transit stop at a truly rural location where no sidewalks would be installed when the road is modernized and a paved shoulder or low-volume intersecting road is intended to serve as the pedestrian route.
  - Provide a minimum 5-foot by 8-foot clear paved landing pad at the stop. Connect the landing pad to the roadway (or the intersecting roadway) via an accessible route and ramp.
  - A bench and/or shelter can be provided, provided that the landing pad and accessible route between street and boarding area are not obstructed and that the required clear area(s) and an accessible route to the boarding area are provided.
- If none of the above can be met, a different location for the transit stop should be considered.

BTS should coordinate with the city and county when programming stop alterations to take advantage of possible capital cost savings when both the transit stop and connecting sidewalk/curb ramps are upgraded at the same time. Providing accessible routes to transit stops can potentially reduce paratransit operating costs, as persons with disabilities can better use the lower-cost fixed-route system, as well as make the transit service more convenient (and attractive) to all users.

DIAL-A- RIDE (DAR) OPERATIONS REVIEW

The ADA required Dial-A-Ride operation is a key component of the BTS package of transportation services. Due to the much higher DAR cost per passenger versus the fixed route service, a continuous monitoring of the DAR effort is critical. Currently BTS uses the fixed route, the DAR and the hybrid "Extended Service" which combines rides on the fixed route with van service to reach areas not directly served by the fixed route service.

Key elements that would trigger an operational analysis and review should include:

- Subscription service requests regularly exceeding the 50% maximum subscription trip usage
- Additions/deletions in the fixed route bus operation that affect the DAR schedule
- Requests for the extended service

TRANSIT SIGNAL PRIORITY GUIDELINES

One of the methods to improve transit route times is through transit signal priority. As traffic volumes grow over time, congestion increases causing a general slowing of traffic speeds which affect the bus speeds. A large number of cities around the nation have installed traffic signal preemption systems to

enhance emergency vehicle response throughout their area. This technology has been adapted in a number of locations to allow for transit vehicles to get a lower-priority extension of the green signal or an earlier return to green if the signal is already red. The ability to use the signal pre-empt relies upon the signal operator to allow the installation of both the high and low priority connections. While not an issue at this time, BTS should monitor proposed signal changes with the signal operators for any opportunity to include low priority transit signal pre-emption.

TRANSIT SUPPORTIVE LAND USE GUIDANCE

Similar to the issues identified in the BTS goals and objectives, a key to future changes in the service deal with how new residential and commercial/institutional development design is accomplished. A review of the current relationships between BTS and their planning and public works partners at the City of Klamath Falls and Klamath County show this effort works well and needs to be on-going. Transit access and ridership is improved through development design when:

- at least one potential through transit street,
- physical pedestrian access links between all parts of the development area and the transit street, or
- pedestrian access links from the commercial development directly to the transit roadway/bus stop constructed as part of the development.

TRANSIT FACILITY GUIDELINES

In addition to providing for the review of the vehicles and their operations, BTS needs to maintain a long-term facilities plan to ensure they continue to have proper maintenance and administrative facilities available. The current location includes a combined administrative, operations and maintenance facility along with some vehicle storage on adjacent lots. A long-term facilities plan would address the specific needs to handle the projected growth in the system. The plan should include the building and equipment needs for administration and operations along with maintenance areas. Typical items would look at the need to acquire additional land adjacent to the current site to allow for growth of the system, any changes to the communications system, updated maintenance equipment, vehicle storage areas, transit and employee parking areas, and other needs.

The long-term facilities plan should also include sections on bus stop improvements, transit center upgrades as needed, along with improvements to the fare collection and data gathering systems. Continued advances in the type and complexity of these ITS systems will work to improve the system information and help BTS make system decisions based upon good information.