



TECHNICAL MEMORANDUM #9

Date: June 24, 2019 Project #: 21289
 To: Paige West, RVTD
 From: Susan Wright, PE (Kittelson & Associates, Inc.)
 Ryan Farncomb (Jacobs)
 Jennifer John (Jacobs)
 Stuart Campbell (Jacobs)
 Subject: Service Enhancement Analysis

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INTRODUCTION

This memorandum evaluates potential service enhancements under consideration as part of the RVTD 2040 Transit Master Plan. The sections below describe service concepts and how they perform relative to evaluation criteria developed during previous project tasks. This memorandum includes a comprehensive evaluation of each service enhancement considered during the plan development process and concludes with short term (0-5 years) and long term (5+ years) recommendations for implementation.

IN THIS MEMO

- ▶ Scenario Analysis
- ▶ Project Analysis
- ▶ Initial Recommendations
- ▶ Preferred System

Based on discussion with RVTD staff and their thorough revenue tracking and forecasting, near-term funding is estimated to be approximately \$14,000,000 in yearly operating costs, approximately \$6,000,000 of which is available for new service. This is based on assumptions that the current funding sources will remain in place and with the addition of the Statewide Transportation Improvement Funds (STIF) funds. Funding projections and additional potential funding options will be explored in further detail in Memo #11 (Funding and Revenue Analysis). Unit costs for added service hours were

determined through discussion with RVTD staff. For service added within the current service span (days and hours served), RVTD is able to add additional service hours with minimal additional maintenance, planning, or other supporting staff. Therefore, these types of enhancements will be cost out at \$50 per service hour (rounded up from \$48.69 calculated from the cost per hour across various staffing levels from fiscal year 2017-2018). As enhancements begin to spread outside the existing service span, additional maintenance staff will be needed to operate the system, with a \$75 cost per service hour (rounded up from \$73.37). The full unit cost to add service hours that require new maintenance, planning, and supporting staff is \$90 per service hour (rounded up from \$89.91).

At the end of this memo, a summary is provided of the near term, medium term, and long term projects based on a near-term \$14,000,000 annual operating budget and up to a \$30,000,000 annual operations budget by 2040. The modeling results, public input, and previous memo information used to determine these service enhancements are discussed in the following section.

Process

The team used several tools, including Remix, the Rogue Valley Metropolitan Planning Organization (RVMPO) regional model JEMnR, and TBEST, to comprehensively evaluate service enhancement options and provide details about the benefits and drawbacks of each. For more information about the analysis tools used, see Technical Memorandum #6: Modeling and Analysis Tools Summary.

Modeling Tools at-a-glance:

- The Remix model is a high-level web-based tool for planning transit networks. Remix automates the process of route and schedule testing, allowing users to understand the social and economic impacts of route and schedule changes.
- The JEMnR (Joint Estimation Model written in R) model is a travel demand model maintained by ODOT and the Rogue Valley MPO. Most effective at a regional scale, JEMnR estimates multimodal travel demand, based on future land use, population, and transportation system assumptions.
- The TBEST (Transit Boardings Estimation and Simulation Tool) is a small-scale model for analyzing transit system changes. RVTD has adapted and calibrated this powerful tool to understand transit ridership generated by service changes, as well as the potential socioeconomic effects of those changes.

SCENARIO ANALYSIS

Scenario Description

The project team developed several illustrative transit “scenarios” in order to understand how ridership, transit availability, and other factors might change based on

systemwide changes. These scenarios do not necessarily represent desired transit futures for the region, but instead helped the project team to understand how different service enhancements interact. The enhancements in each Scenario were developed based on suggestions from the Community Transit Vision (Memo 8) and the design charrettes conducted with the TAC, CAC, RVTB Board and RVTB staff. The project team analyzed four illustrative scenarios for 2017 and forecast 2027 conditions. The following summarizes each scenario.

Scenario 0: Baseline

Scenario 0 is the current RVTB transit system. It consists of nine fixed route bus lines, including the 2 West Medford, 10 Ashland, 21 Poplar Square, 24 RVMC, 25 South Medford, 30 Jacksonville, 40 Central Point, 60 White City, 61 RCC – Table Rock. This scenario used current system service hours and bus line frequencies.

Scenario 1: Baseline with More Frequent Service

Scenario 1 is similar to the current baseline RVTB transit system represented in Scenario 0 but operates with 15-minute frequencies instead of the existing 30-minute frequencies (20-minute existing frequency on Route 10). Scenario 1 used current system service hours and the same bus routes as Scenario 0. Doubling the service frequency tested the impacts of increased frequency on ridership and costs.

Scenario 2: Circulator Routes

Scenario 2 adds seven new circulator routes to the current RVTB system to test ridership levels and the effects of providing improved connections to places and services. The seven fixed route bus lines include the Ashland Circulator, Central Point Circulator, East Medford Circulator, Eagle Point Circulator, NW Medford Circulator, Phoenix Circulator, and Talent Circulator. This scenario used 30-minute bus frequencies for the Circulators and assumed existing frequencies on all existing routes. Service was assumed to be provided between 6:00 a.m. to 9:00 p.m. Monday through Saturday, depending on route.

Scenario 3: Crosstown Routes

Scenario 3 adds seven new crosstown routes to the current RVTB system to test ridership levels and the effects of providing service where service currently does not exist. The seven fixed route bus lines include the Central Point-North Medford Crosstown, Central Point-South Medford Crosstown, East Medford Crosstown, Medford-Ashland Express, NE Medford-McAndrews Crosstown, Phoenix-NE Medford Crosstown, and SW Medford Crosstown. This scenario used 30-minute bus frequencies, providing service from 6:00 a.m. to 7:00 p.m. Monday through Friday, depending on route.

Scenario 4: Increase Frequency of Crosstown Routes

Scenario 4 utilizes Scenario 3's crosstown routes and system service hours but increases bus route frequencies from 30-minutes to 15-minutes. Doubling the service frequency tested the impacts on ridership and costs.

Figure 1: Scenario 2 – Circulator Routes

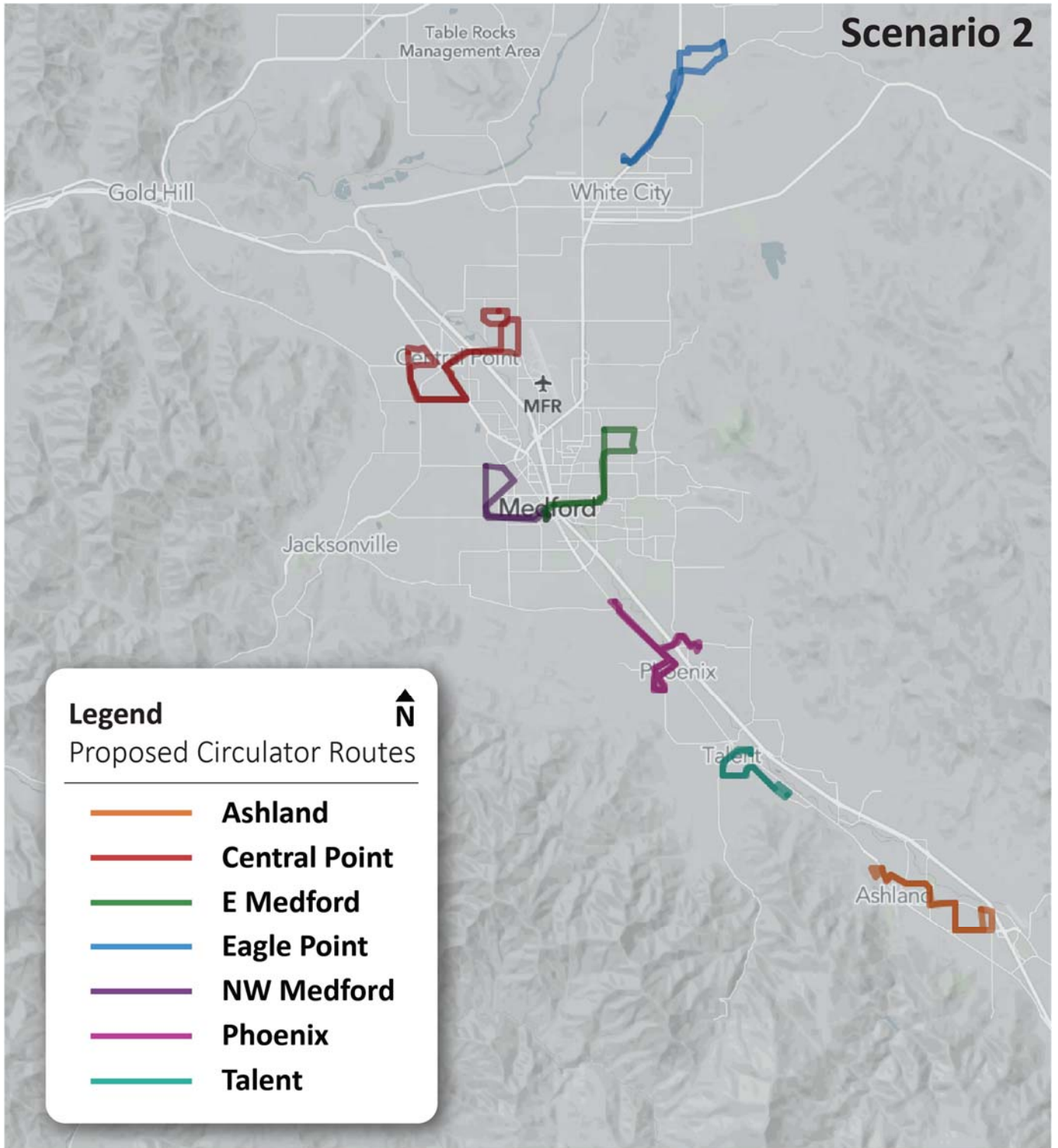
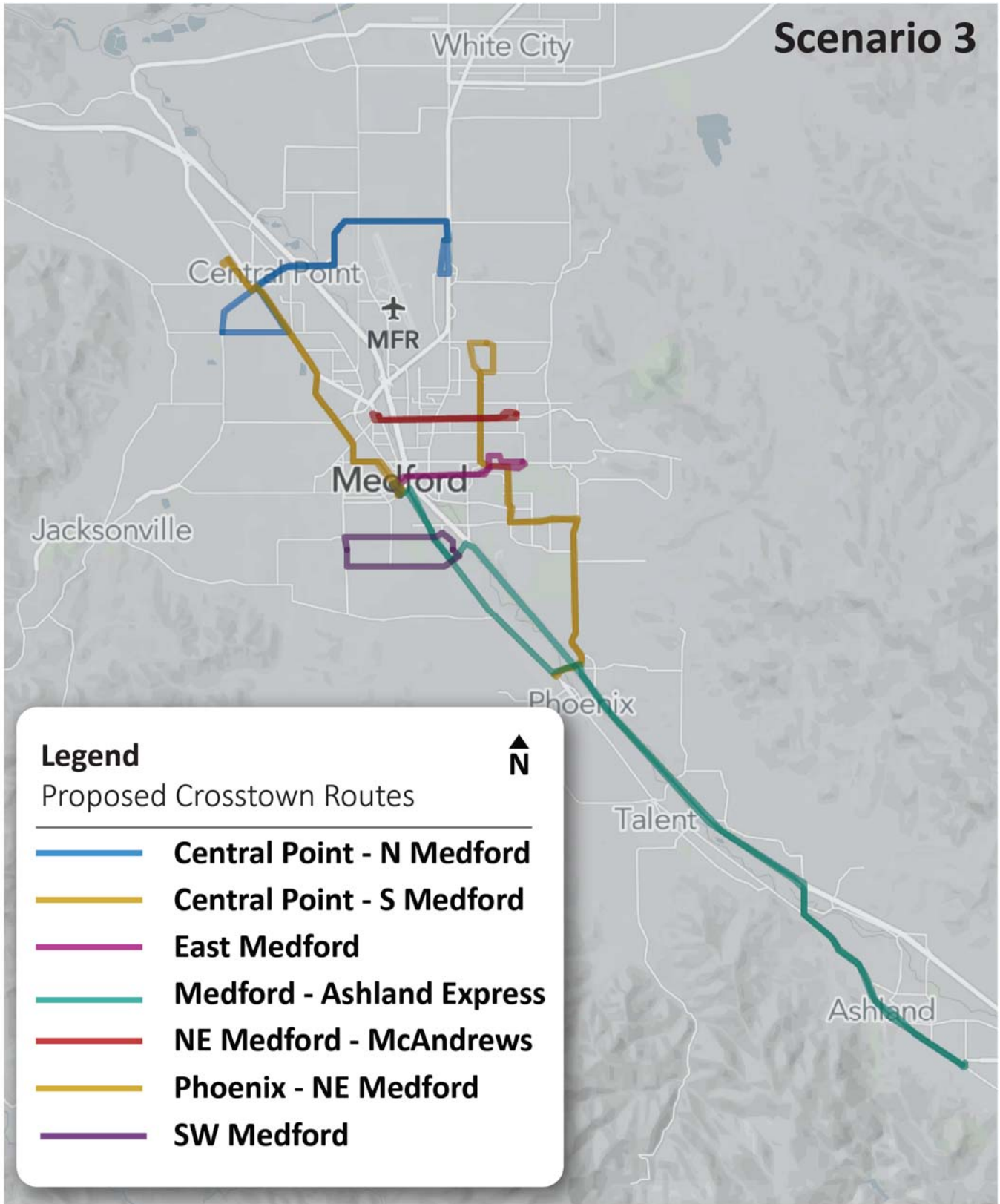


Figure 2: Scenario 3 – Crosstown Routes



Scenario-Level Evaluation Criteria Results

The scenario-level evaluation criteria consist of seven categories, developed based on a review of performance measures associated with the goals of the 2040 Transit Master Plan and they include:

1. Availability
2. Community
3. Economics
4. Environment/Health
5. Funding/Finance
6. Safety and Security
7. Other

The table below provides evaluation results to easily understand and compare results among the different scenarios. Based on the scenario results below, the most productive scenario in terms of additional rides per additional dollar spent is Scenario 2 – Circulator Routes. The other three scenarios have similar ridership output. In terms of providing coverage and providing transit service to a higher percentage of the population and essential destinations, the addition of circulator routes (Scenario 2) also performs best. However, when considering the percentage of regional employment with transit service, the addition of crosstown routes (Scenarios 3 and 4) performs best. A balance of these productivity and coverage model scenarios is likely to provide benefits to a mix of the evaluation criteria.

Table 1: Scenario Evaluation and Comparison

Criteria		Baseline		Scenario 1: Baseline with More Frequent Service ¹²		Scenario 2: Circulator Routes	Scenario 3: Crosstown Routes	Scenario 4: Increase Frequency of Crosstown Routes ¹³
		2017	2027	2017	2027	2027	2027	2027
Availability	Total Daily Boardings ¹	5,400	5,700	9,800	10,500	9,500	10,500	18,600
	Transit Mode Share ²	0.5%	0.5%	0.8%	0.7%	0.7%	0.8%	1.2%
	Population within ¼ mile of 30-minute transit service ³	63,900	68,300	63,900	68,300	94,500	86,700	86,700
	Population within ¼ mile of transit service ³	70,700	75,700	70,700	75,700	100,800	91,100	91,100
	Revenue miles of service per capita per year ⁴	6	6	12	11	8	8	14
	New Boardings per New Service Hours Only	N/A	N/A	23	26	15	14	14
Community	Number of regional essential destinations within ¼ mile of all transit service ⁵	98	98	98	98	127	112	112
	Percentage of regionwide current and future mixed-use/multi-family zoned land within ¼ mile of all transit service ⁶	68%	68%	68%	68%	84%	74%	74%
	Population and jobs within 30-minute transit trip of Front Street Station ⁷	33,000 & 22,300	35,200 & 25,300	60,500 & 35,400	64,700 & 40,400	41,500 & 27,600	43,100 & 28,300	65,800 & 36,500
Economics	Regional employment within ¼ mile of transit service ⁸	42,600	49,300	42,600	49,300	54,900	57,300	57,300
Environment/Health	Estimated reduction in regional GHG emissions (MTCO _{2e}) ⁹	N/A	N/A	800	950	700	400	2,300
Funding/Finance	Total estimated capital costs over existing ¹⁰	-	N/A	\$7,228,000	\$7,228,000	\$8,976,200	\$8,354,200	\$22,895,300
	Total estimated annual additional service hours		2,600	74,400	74,800	39,700	55,300	153,300
	Total estimated annual operations costs from new service only ¹¹	N/A	+\$129,400	+\$3,722,300	+\$3,739,900	+\$1,986,200	+\$2,763,100	+\$9,496,200
	Total estimated new annual operations costs as a percent compared to existing	N/A	+1%	+37%	+37%	20%	+28%	95%
Other	Degree of stakeholder/public support	-			High	Medium	High	

TABLE NOTES:

¹ RVMPO (JEMnR) regional model total daily boardings. ² RVMPO (JEMnR) regional model (transit trips as a share of all person-trips)

³ Population estimates from Remix with growth rates from RVMPO (JEMnR) for future year forecasts.

⁴ Revenue miles of service from Remix

⁵ Regional essential destinations are defined as churches, city halls, community centers, courthouses, grocery stores, libraries, medical facilities, parks, police stations, and educational institutions.

⁶ Zoning data as of 2017. For future years, used existing land use. Measure calculates the total percentage of multi-family within ¼ mile of all service in the alternative as compared to regionwide total multi-family.

⁷ Population and employment estimates from Remix with growth rates from RVMPO/JEMnR for future year forecasts. Data calculations done using ¼ mile buffers around transit lines in ArcMap

⁸ Employment data from RVMPO/JEMnR model; model data is based on Oregon Employment Department ES-202 data and MPO forecasts for future years

⁹ GHG emissions based on changes in vehicle miles travelled from RVMPO/JEMnR model along with average fuel efficiency rate from EPA (<https://www.epa.gov/greenvehicles/greenhouse-gas-emissions-typical-passenger-vehicle>)

¹⁰ Capital costs based on number of buses needed to operate service under each scenario, including spares, as well as stop infrastructure

¹¹ Operations costs based on revenue service hours from TBEST model with assumed average operating cost per hour of \$50 for the current system and all future service enhancements up to 80,000 service hours within the existing service hours and days and \$75/hr for hours above 80,000 or additional days and service span.

¹² Scenario 1 was modeled with service at 15-minute frequency.

¹³ Scenario 4 was modeled with service at 15-minute frequency.

PROJECT ANALYSIS

Project Development and Analysis

This section describes and assesses potential service enhancements (projects) based on feedback received from the public, Technical Advisory Committee (TAC), Community Advisory Committee (CAC), and agency staff. A summary of the analysis performed for the 19 service enhancements is provided below.

Project Analysis Process & Tools

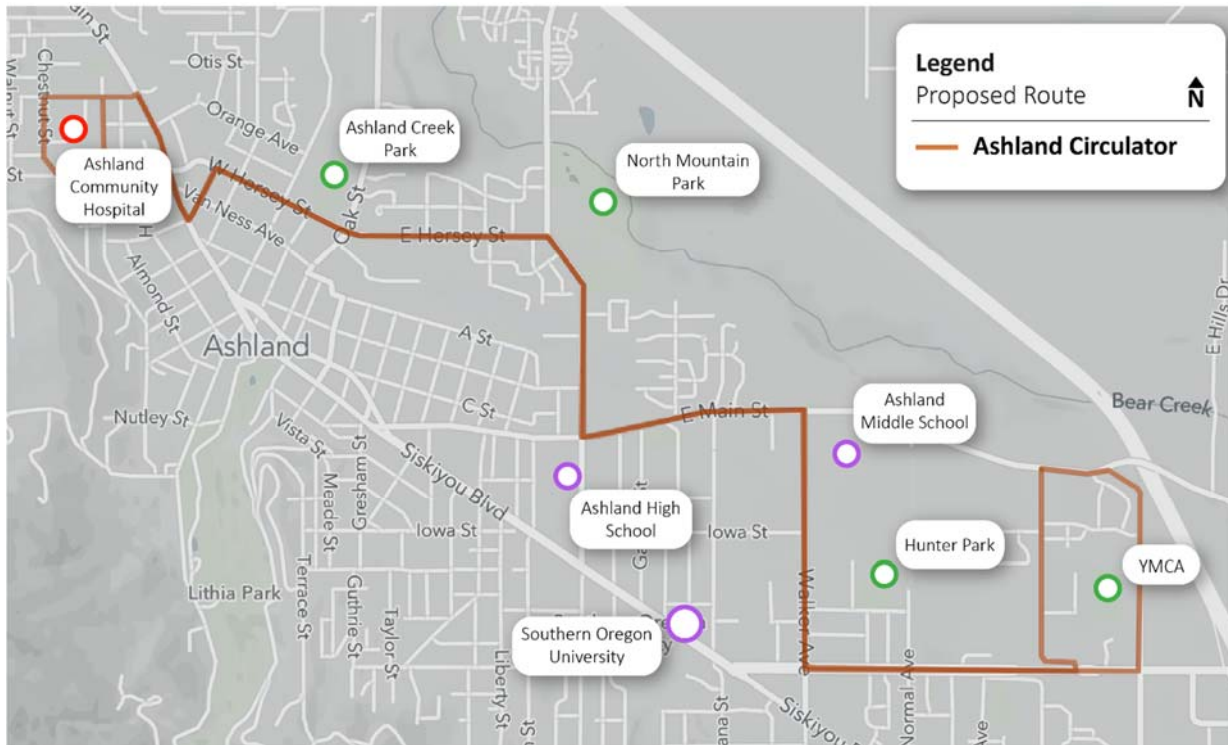
Below is a list of the individual projects evaluated in Scenario 2 and Scenario 3, as well as five frequency enhancements. Scenario 2's projects focused on using circulators to provide connections within the transit areas outlined in TM #7 (Transit Supportive Areas). Circulators provide consistent service within a specific area throughout the day. While not always the case, they often operate in a 'loop' pattern. Scenario 3's projects focused on using crosstown routes to provide connections between areas where a convenient (without going to Front Street Station) transit connection does not already exist. Crosstown bus routes often connect two or more locations together where transit does not already exist, or effectively extending transit service by adding a new connecting service. The five frequency enhancements focused on the impact that increasing bus frequencies and expanding service would have on ridership and costs for the entire system.

- **Scenario 2: Circulators**
 - **Project 1: Ashland Circulator**
 - **Project 2: Central Point Circulator**
 - **Project 3: East Medford Circulator**
 - **Project 4: Eagle Point Circulator**
 - **Project 5: NW Medford Circulator**
 - **Project 6: Phoenix Circulator**
 - **Project 7: Talent Circulator**
- **Scenario 3: Crosstown Routes**
 - **Project 8: Central Point-North Medford Crosstown**
 - **Project 9: Central Point-South Medford Crosstown**
 - **Project 10: East Medford Crosstown**
 - **Project 11: Medford-Ashland Express Crosstown**
 - **Project 12: Northeast Medford-McAndrews Crosstown**
 - **Project 13: Phoenix-Northeast Medford Crosstown**
 - **Project 14: Southwest Medford Crosstown**
- **Additional System Enhancements**
 - **Project 15: Increase RVTD Routes to 15-Minute Frequency**
 - **Project 16: Increase RVTD Routes to 20-Minute Frequency**
 - **Project 17: Increase Weekday Service by 2 Additional Hours on RVTD Routes**
 - **Project 18: Increase Weekday Service by 4 Additional Hours on RVTD Routes**
 - **Project 19: Increase Saturday Service to Weekday Hours on RVTD Routes**
 - **Project 20: Add Sunday Service on RVTD Routes**

3.3 Analysis Results

The following section provides a detailed description of each potential service project and evaluation results.

1. ASHLAND CIRCULATOR



Project Description and Location: The Ashland Circulator is a 10-mile bus route that runs north of Siskiyou Boulevard, spanning the majority of the City of Ashland. The route has stops that are spaced ¼ mile apart, has an approximate runtime of 40 minutes, and would operate at 30-minute frequencies Monday through Saturday.

Ridership / Demographics within ¼ mile		
Criterion	2017	2027
Projected Daily Ridership	-	250
Population	6,300	6,800
Employment	3,000	3,100
Low income	25.2%	-
Minority	16.7%	-
Disabled	12.8%	-
No Access to Vehicles	8.7%	-
No. Essential Destinations	10	-

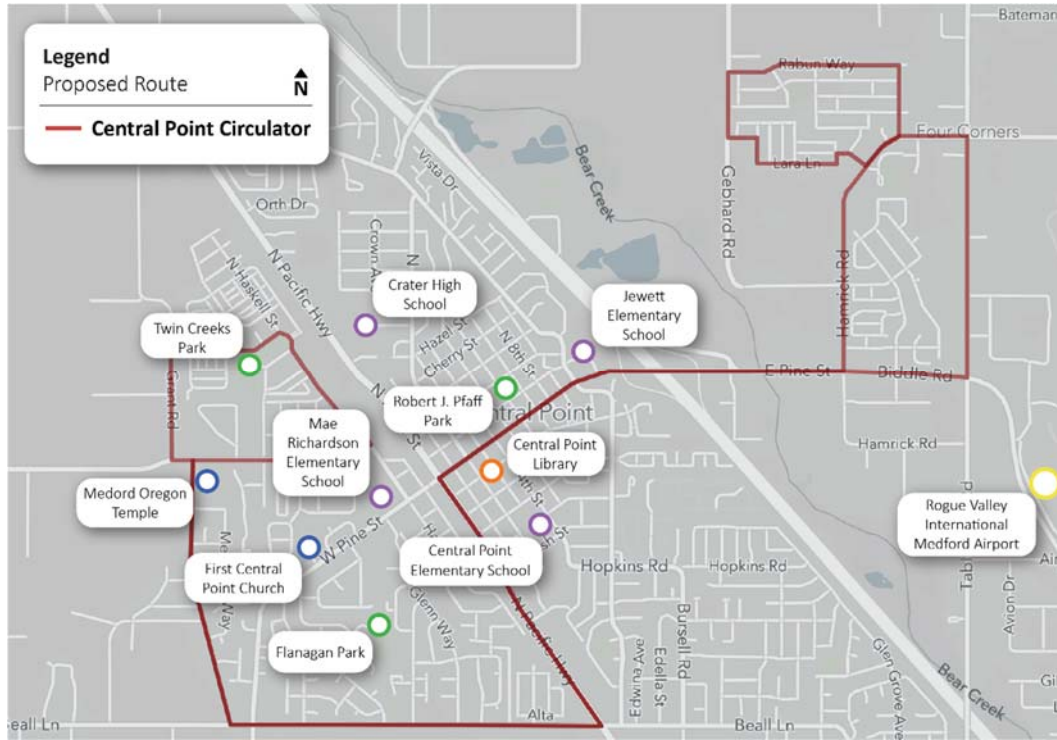
Ashland Circulator Service Details	
Distance	10 mile round trip
Trip Time	20 minutes one-way
Frequency	30 minutes
Number of Buses	2 Required
Capital Cost	\$1,380,000
Annual O & M Cost	\$280,000
Farebox Recovery Ratio by Route	76%
Stakeholder Priority	High

Opportunities: The Ashland Circulator provides key connections to Ashland's most essential destinations. The route provides improved access to Southern Oregon University, Ashland Middle School and High School, several parks, the YMCA, and the Ashland Community Hospital. The Circulator connects with RVTD's Route 10, which provides service between the cities of Ashland and Medford.

Constraints: None noted.

Land Use Considerations: The surrounding land uses along the Ashland Circulator route include a variety of multi-family, single-family, and suburban residential housing. Commercial uses (retail, restaurants, cafes, bars), green space, and offices make up the surrounding land uses.

2. CENTRAL POINT CIRCULATOR



Project Description and Location: The Central Point Circulator is a 14.4-mile bus route that provides widespread coverage across Central Point, OR. The route has stops that are spaced ¼ mile apart, has an approximate runtime of 57 minutes, and would operate at 30-minute frequencies Monday through Saturday.

Ridership/ Demographics within 1/3 mile		
Criterion	2017	2027
Projected Daily Ridership	-	240
Population	7,900	9,000
Employment	3,300	3,900
Low Income	14.2%	-
Minority	17.6%	-
Disabled	17.2%	-
No Access to Vehicles	6.0%	-
No. of Essential Destinations	14	

Service Details	
Distance	14.4 mile round trip
Trip Time	29 minutes one-way
Frequency	30 minutes
Number of Buses	3 Required
Capital Cost	\$2,066,300
Annual O & M Cost	\$372,600
Farebox Recovery Ratio by Route	44%
Stakeholder Priority	Medium

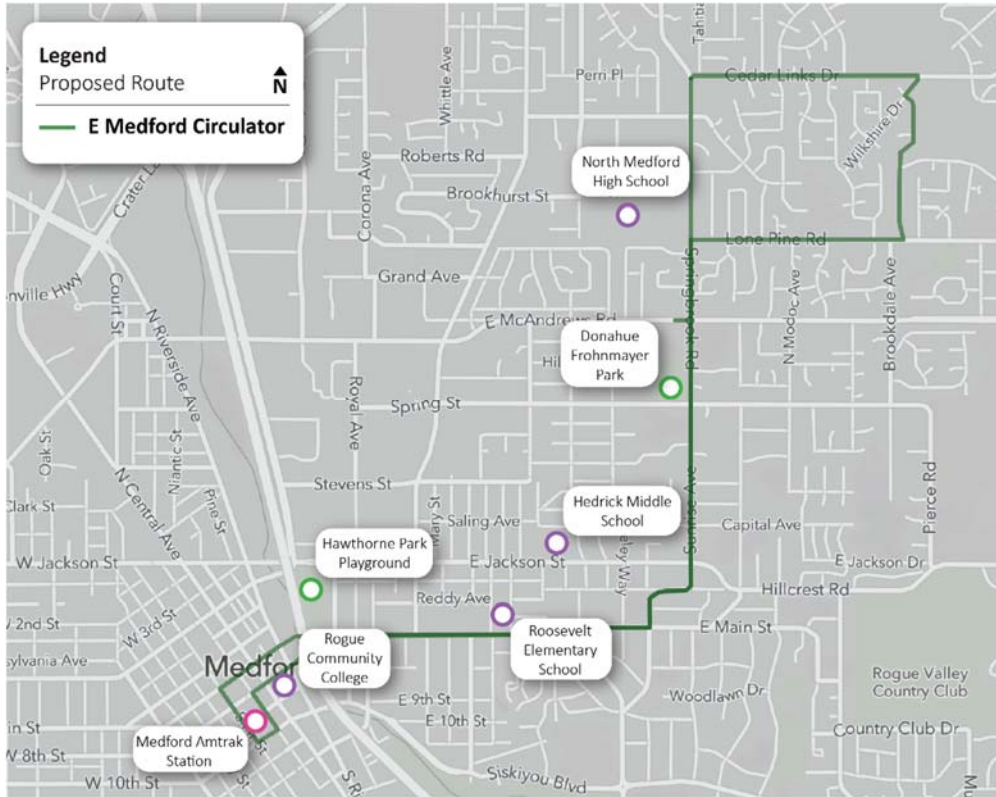
Opportunities: The Central Point Circulator provides access to essential destinations, such as Central Point and Jewett Elementary Schools, Crater High School, Central Point Library, the Medford Oregon Temple, and community parks. The Circulator connects with RVTD Routes 40 and 61, which provide service to Medford and northeast Central Point.

Constraints: Just outside of Central Point's core, the street network quickly changes from a grid pattern to a more suburban development pattern of short dead-end streets. I-5 bisects Central Point creating connectivity challenges. E Pine St is the primary road that crosses over I-5, connecting the east and west sides of Central Point together.

Land Use Considerations: Land uses along the Central Point Circulator are primarily residential, with a mix of single family, multi-family, and higher density mixed use residential/commercial space. The route cuts through the core of Central Point which consists of a tight grid street network with a variety of commercial, retail, restaurants, and newly improved sidewalks and intersections.

Modifications: This route should be reduced in length to be covered by two buses and Coordinated with potential changes to Route 40 to serve Twin Creeks. Consider operating as a deviated fixed route in the short-term. Longer-term, replace with Enhancement #8: East Medford – Central Point Crosstown.

3. E MEDFORD CIRCULATOR



Project Description and Location: The E Medford Circulator is an 8.2-mile bus route that connects downtown to the eastern side of Medford. The route has stops that are spaced ¼ mile apart, has an approximate runtime of 33 minutes, and would operate at 30-minute frequencies Monday through Saturday.

Ridership / Demographics within ¼ mile		
Criterion	2017	2027
Projected Daily Ridership	-	460
Population	9,600	10,500
Employment	5,100	5,300
Low Income	17.4%	-
Minority	15.5%	-
Disabled	16.0%	-
No Access to Vehicles	9.7%	-
No. Essential Destinations	13	-

Service Details	
Distance	8.2 mile round trip
Trip Time	17 minutes one-way
Frequency	30 minutes
Number of Buses	2 Required
Capital Cost	\$1,369,300
Annual O & M Cost	\$220,900
Farebox Recovery Ratio by Route	68%
Stakeholder Priority	High

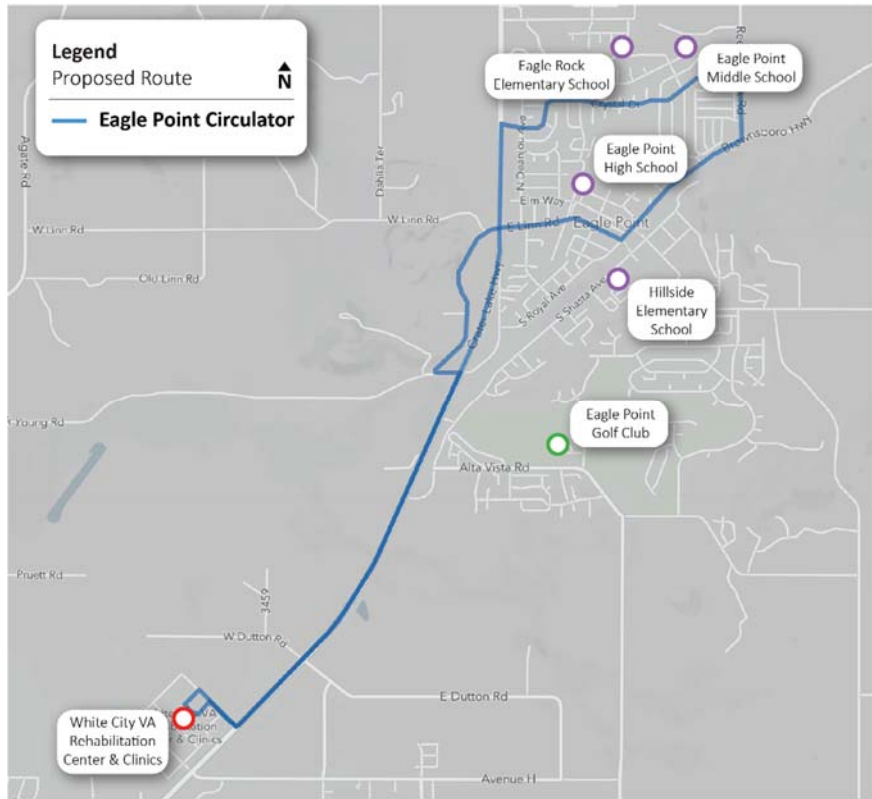
Opportunities: The E Medford Circulator provides access to essential destinations, such as Roosevelt Elementary School, Hedrick Middle School, North Medford High School, Rogue Community College, the Amtrak Station, and community parks. The E Medford Circulator connects with RVTD's Routes 30, 40, 60, and 61, which provide service to a variety of regional destinations.

Constraints: Just outside of Medford's core, the grid pattern street network transforms into larger blocks with fewer through streets. The I-5 viaduct bisects Medford, but the street network follows under the viaduct, allowing for transportation connectivity.

Land Use Considerations: Land uses along the E Medford Circulator are single and multi-family residential, as well as commercial, especially in downtown and along portions of Main Street. Shops and restaurants line the route near downtown and begin to dissipate in eastern and northeastern Medford.

Modifications: In the long-term, replace with East Medford Crosstown (Enhancement #10).

4. EAGLE POINT CIRCULATOR



Project Description and Location: The Eagle Point Circulator is an 8.7-mile bus route that connects Eagle Point to White City to the south. The route has stops that are spaced ¼ mile apart, has an approximate runtime of 35 minutes, and would operate at 30-minute frequencies Monday through Saturday.

Ridership / Demographics within ¼ mile		
Criterion	2017	2027
Projected Daily Ridership	-	90
Population	4,900	5,500
Employment	900	1,000
Low Income	23.3%	-
Minority	16.7%	-
Disabled	18.6%	-
No Access to Vehicles	5.6%	-
No. Essential Destinations	10	-

Service Details	
Distance	8.7 mile round trip
Trip Time	18 minutes one-way
Frequency	30 minutes
Number of Buses	2 Required
Capital Cost	\$1,372,620
Annual O & M Cost	\$275,800
Farebox Recovery Ratio by Route	36%
Stakeholder Priority	Medium

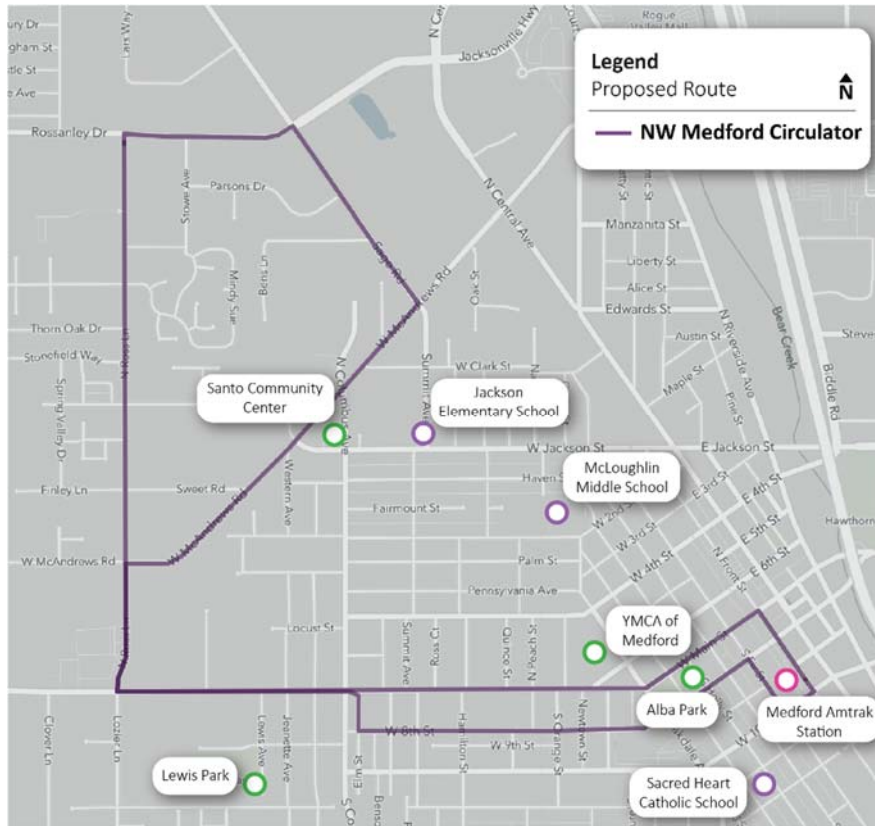
Opportunities: The Eagle Point Circulator provides access to Eagle Rock Elementary School, Eagle Point Middle School, and Eagle Point High School. The route connects the Eagle Point community to the VA Rehabilitation Center and Clinics in White City. The Circulator connected to RVTD's Route 60, which provides service from Medford to White City, by integrating a White City to Eagle Point circulator.

Constraints: Oregon Highway 62 is the only viable connection between White City and Eagle Point, posing potential challenges to service operations during congestion, roadwork, or other obstacles.

Land Use Considerations: Land uses along the Eagle Point Circulator are rural in nature. Agricultural and industrial are the primary uses between White City and Eagle Point. Within White City and Eagle Point, land uses consist of residential and some commercial.

Modifications: Operate 6 to 10 trips per day rather than of 30-minute headways unless annexed into RVTD.

5. NW MEDFORD CIRCULATOR



Project Description and Location: The NW Medford Circulator is a 6.4-mile bus route that connects downtown Medford to the west and northwest side of the City. The route has stops that are spaced ¼ mile apart, has an approximate runtime of 25 minutes, and would operate at 30-minute frequencies Monday through Saturday.

Ridership / Demographics within ¼ mile		
Criterion	2017	2027
Projected Daily Ridership	-	420
Population	7,700	8,300
Employment	4,700	5,100
Low Income	33.7%	-
Minority	34.8%	-
Disabled	19.7%	-
No Access to Vehicles	15.3%	-
No. Essential Destinations	12	-

Service Details	
Distance	6.4 mile round trip
Trip Time	13 minutes one-way
Frequency	30 minutes
Number of Buses	1 Required
Capital Cost	\$698,500
Annual O & M Cost	\$201,300
Farebox Recovery Ratio by Route	81%
Stakeholder Priority	Medium

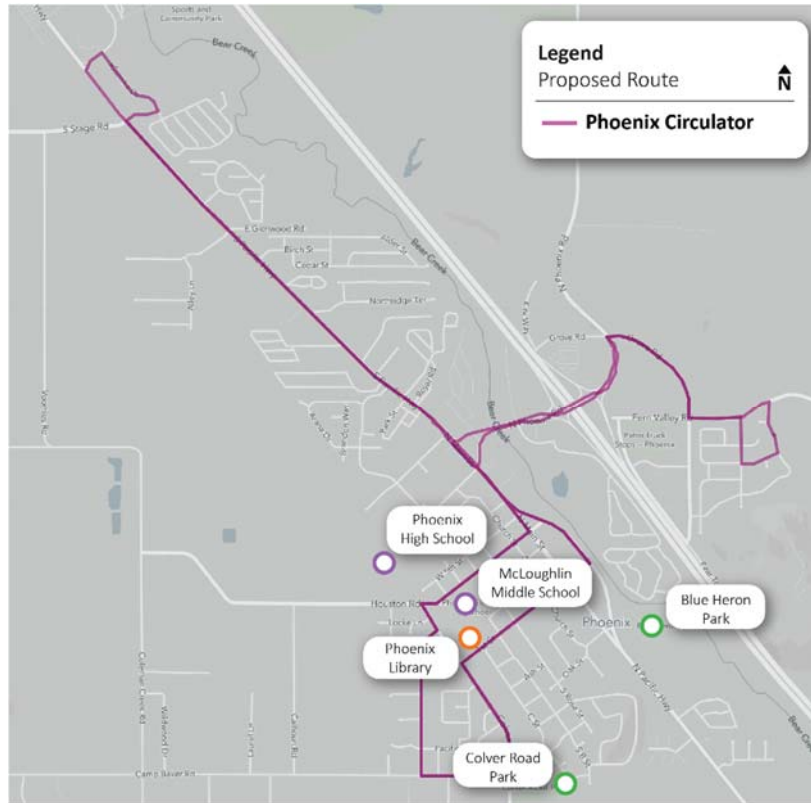
Opportunities: The NW Medford Circulator provides a critical connection between the City's western and northwestern neighborhoods. The Circulator has potential to connect many low income, minority, car free populations into downtown Medford. RVTD routes 2, 25, 30, 40, 60, 61, and the E Medford Circulator become viable transit lines that were previously difficult to connect to.

Constraints: The street network on the northwest side of Medford is slightly disconnected with larger blocks and dead-ends.

Land Use Considerations: Land uses along the NW Medford Circulator are diverse. Heavy and community commercial uses, heavy and general industrial uses, and single and multi-family residential uses. In downtown Medford, commercial uses are varied with shops and restaurants.

Modifications: Modify to include area served by Route 30 (see recommendations on Route 30 below). Longer-term, connect to Enhancement #12 (NE Medford-Ashland Crosstown).

6. PHOENIX CIRCULATOR



Project Description and Location: The Phoenix Circulator is a 11.9-mile bus route that provides service throughout the City of Phoenix. The route has stops that are spaced ¼ mile apart, has an approximate runtime of 47 minutes, and would operate at 30-minute frequencies Monday through Saturday.

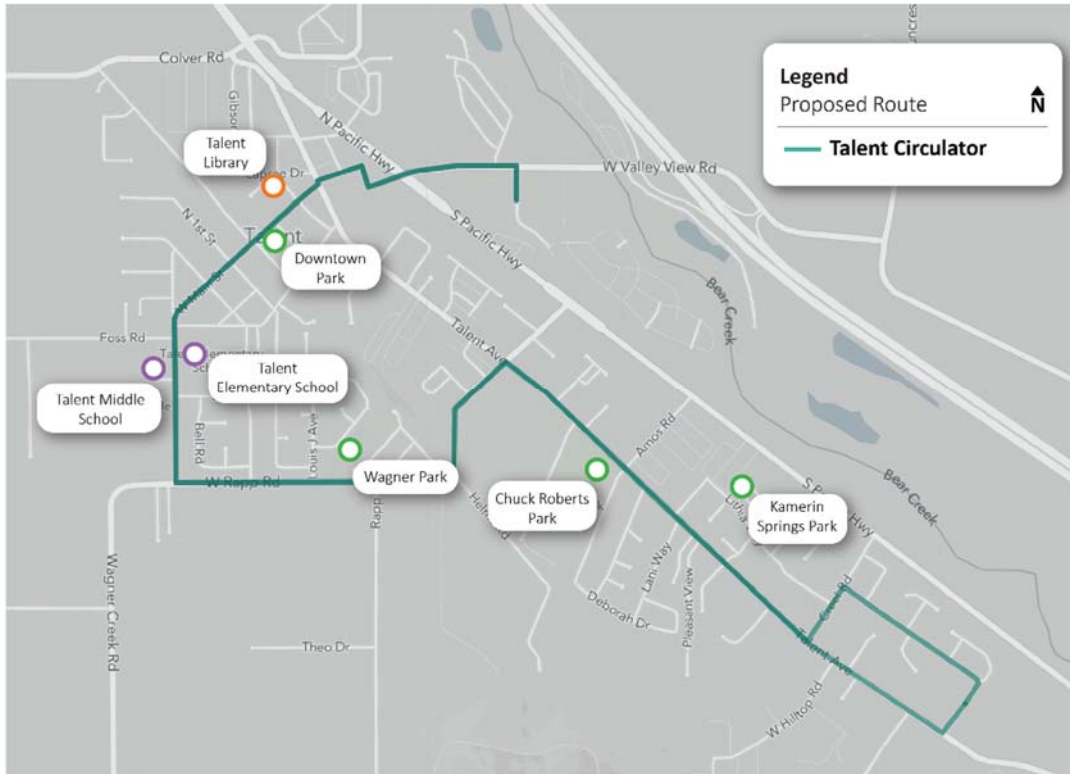
Ridership / Demographics within ¼ mile			Service Details	
Criterion	2017	2027		
Projected Daily Ridership	-	210	Distance	6.4 mile round trip
Population	5,000	5,400	Trip Time	24 minutes one-way
Employment	2,200	2,500	Frequency	30 minutes
Low Income	20.2%	-	Number of Buses	2 Required
Minority	32.4%	-	Capital Cost	\$1,391,500
Disabled	23.1%	-	Annual O & M Cost	\$324,200
No Access to Vehicles	3.7%	-	Farebox Recovery Ratio by Route	65%
No. Essential Destinations	8	-	Stakeholder Priority	Low

Opportunities: The Phoenix Circulator has the potential to provide service to underserved populations during morning and evening peak hours. RVTD route 10 connects with the Phoenix Circulator, allowing for transit service north to Medford or south to Ashland.

Constraints: I-5 divides Phoenix into an east and west side, posing a connectivity challenge for both transportation and community access.

Land Use Considerations: Land uses along the Phoenix circulator consist of light industrial, low density residential, and commercial highway uses.

7. TALENT CIRCULATOR



Project Description and Location: The Talent Circulator is a 6.3-mile bus route that provides service throughout the City of Talent. The route has stops that are spaced ¼ mile apart, has an approximate runtime of 25 minutes, and would operate at 30-minute frequencies Monday through Saturday.

Ridership / Demographics within ¼ mile		
Criterion	2017	2027
Projected Daily Ridership	-	110
Population	3,800	4,400
Employment	700	700
Low Income	23.5%	-
Minority	18.2%	-
Disabled	17.4%	-
No Access to Vehicles	3.3%	-
No. Essential Destinations	8	

Service Details	
Distance	6.3 mile round trip
Trip Time	13 minutes one-way
Frequency	30 minutes
Number of Buses	1 Required
Capital Cost	\$698,000
Annual O & M Cost	\$172,800
Farebox Recovery Ratio by Route	58%
Stakeholder Priority	Low

Opportunities: The Talent Circulator has the potential to serve underserved populations with 30-minute service during morning and evening peak hours. RVT route 10 connects with the Talent Circulator, allowing for transit access north to Medford or south to Ashland.

Constraints: The street network in Talent is not a consistent grid pattern, making transportation connections limited in certain areas.

Land Use Considerations: Land uses along the Talent Circulator include commercial, light industrial, parks, residential high density, residential low density, and residential manufactured home uses.

8. CENTRAL POINT-NORTH MEDFORD CROSTOWN



Project Description and Location: The Central Point – N Medford route is a 12.9-mile bus route that provides service throughout Central Point and North Medford. The route has stops that are spaced ¼ mile apart, has an approximate runtime of 51 minutes, and would operate at 15 or 30-minute frequencies Monday through Saturday.

Ridership / Demographics within ¼ mile		
Criterion	2017	2027
Projected Daily Ridership	-	30 min freq: 230 15 min freq: 560
Population	6,400	7,000
Employment	4,200	6,200
Low Income	15.7%	-
Minority	19.1%	-
Disabled	17.5%	-
No Access to Vehicles	5.7%	-
No. Essential Destinations	10	-

Service Details		
Criterion	2027 (30 min freq.)	2027 (15 min freq.)
Distance	12.9 mile round trip	12.9 mile round trip
Trip Time	26 minutes one-way	26 minutes one-way
Frequency	30 minutes	15 minutes
Number of Buses	2 Required	4 Required
Capital Cost	\$1,397,300	\$2,717,300
Annual O & M Cost	\$597,300	\$1,203,200
Farebox Recovery Ratio by Route	18%	21%
Stakeholder Priority	Low	

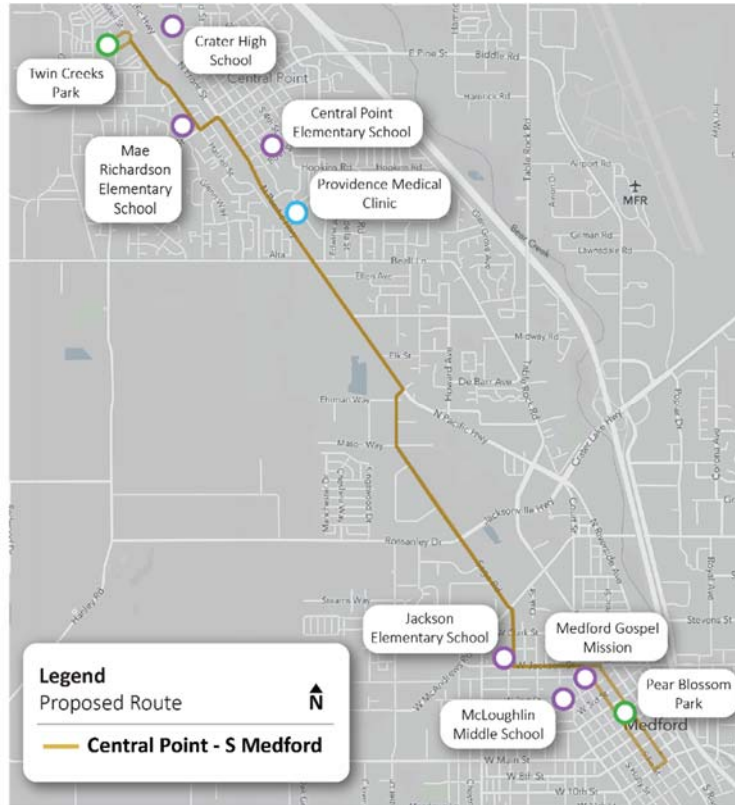
Opportunities: The Central Point – N Medford route provides critical transit connections from Central Point to North Medford. RVTD routes 40, 60, 61, and the proposed Central Point – S Medford route, all intersect with the Central Point – N Medford route. Ridership could be increased by extending the east end of the route south to Delta Waters.

Constraints: Just outside of Central Point’s core, the street network quickly changes from a grid pattern to a more suburban development pattern of short, disconnected streets. I-5 bisects Central Point creating connectivity challenges between the east and west sides. The proposed route circumvents the Rogue Valley International-Medford Airport just east of Central Point to provide service to far North Medford.

Land Use Considerations: Land uses along the route are primarily residential, with a mix of single family residential, multi-family residential, and high mixed use residential/commercial. The route cuts through the core of Central Point which consists of a variety of commercial, retail, restaurants, and newly improved sidewalks and intersections. The route wraps around the Airport as well.

Modifications: Modify to include additional circulation in Central Point (and replace Enhancement #2 – Central Point Circulator), extend east end to Delta Waters/Crater Lake Avenue at a future potential transfer location.

9. CENTRAL POINT - SOUTH MEDFORD CROSTOWN



Project Description and Location: The Central Point – S Medford route is an 11-mile bus route that provides service from Central Point to just south of downtown Medford. The route has stops that are spaced ¼ mile apart, has an approximate runtime of 44 minutes, and would operate at 15 or 30-minute frequencies Monday through Saturday.

Ridership / Demographics within ¼ mile		
Criterion	2017	2027
Projected Daily Ridership	-	30 min freq: 500 15 min freq: 950
Population	9,400	10,200
Employment	6,800	7,200
Low Income	25.1%	-
Minority	26.8%	-
Disabled	19.1%	-
No Access to Vehicles	13.5%	-
No. Essential Destinations	23	-

Service Details		
Criterion	2027 (30 min freq.)	2027 (15 min freq.)
Distance	11 mile round trip	11 mile round trip
Trip Time	22 minutes one-way	22 minutes one-way
Frequency	30 minutes	15 minutes
Number of Buses	2 Required	4 Required
Capital Cost	\$1,385,700	\$2,705,700
Annual O & M Cost	\$516,700	\$1,400,700
Farebox Recovery Ratio by Route	23%	17%
Stakeholder Priority	Low	

Opportunities: The Central Point – S Medford route provides critical transit connections from Central Point to Medford. RVTD routes 25, 30, 40, 60, 61, and the proposed Central Point – N Medford route, East Medford, and Medford-Ashland Express all intersect with the Central Point – S Medford route. The route has potential to improve access for areas of low income and minority populations, as well as people without access to vehicles.

Constraints: Few streets offer the north-south connectivity that N Pacific Highway does, but in certain locations accessing the street/route can be challenging due to disconnected local street.

Land Use Considerations: Land uses along the route are primarily residential, with a mix of single family residential, multi-family residential, and high mixed use residential/commercial.

10. EAST MEDFORD CROSTOWN



Project Description and Location: The East Medford route is a 5.3-mile bus route that provides service from downtown Medford to east Medford. The route has stops that are spaced ¼ mile apart, has an approximate runtime of 21 minutes, and would operate at 15 or 30-minute frequencies Monday through Saturday.

Criterion	2017	2027
Projected Daily Ridership	-	30 min freq: 350 15 min freq: 680
Population	4,900	5,300
Employment	4,700	4,900
Low Income	22.2%	-
Minority	17.2%	-
Disabled	16.2%	-
No Access to Vehicles	11.1%	-
No. Essential Destinations	13	-

Service Details		
Criterion	2027 (30 min freq.)	2027 (15 min freq.)
Distance	5.3 mile round trip	5.3 mile round trip
Trip Time	11 minutes one-way	11 minutes one-way
Frequency	30 minutes	15 minutes
Number of Buses	1 Required	2 Required
Capital Cost	\$691,900	\$1,351,100
Annual O & M Cost	\$229,400	\$556,800
Farebox Recovery Ratio by Route	32%	29%
Stakeholder Priority	Medium	

Opportunities: The East Medford route provides much needed transit access to the far eastside of Medford. RVT routes 10, 21, 25, 40, 60, 61, and the proposed Central Point – S Medford route, Medford-Ashland Express, and Phoenix-NE Medford route all intersect with the proposed East Medford route.

Constraints: Few constraints are apparent on this route.

Land Use Considerations: Land uses along the route are primarily residential as it runs east. Land uses vary in downtown Medford with commercial, retail, and mixed-use development.

Modifications: This enhancement should replace the East Medford Circulator (Enhancement #3) when Enhancement #13 (Phoenix-NE Medford Crosstown) is implemented. Requires 15 headways on connecting routes.

11. MEDFORD – ASHLAND EXPRESS



Project Description and Location: The Medford-Ashland Express is a 29-mile bus route that provides service from that provides service from Medford to Ashland. The route has 4 stops, an approximate runtime of 73 minutes, and would operate at 15 or 30-minute frequencies Monday through Friday, from 12 p.m. to 6 p.m. This reduced service window reflects the low O & M costs.

Ridership / Demographics within ¼ mile		
Criterion	2017	2027
Projected Daily Ridership	-	30 min freq: 870 15 min freq: 1620
Population	12,600	13,400
Employment	13,500	15,600
Low Income	23.5%	-
Minority	23.2%	-
Disabled	17.2%	-
No Access to Vehicles	11.3%	-
No. Essential Destinations	32	-

Service Details		
Criterion	2027 (30 min freq.)	2027 (15 min freq.)
Distance	29 mile round trip	29 mile round trip
Trip Time	36 minutes one-way	36 minutes one-way
Frequency	30 minutes	15 minutes
Number of Buses	2 Required	6 Required
Capital Cost	\$1,425,000	\$4,118,140
Annual O & M Cost	\$81,000	\$387,600
Farebox Recovery Ratio by Route	160%	59%
Stakeholder Priority	High	

Opportunities: The Medford-Ashland Express utilizes I-5 to provide express service between Medford and Ashland. Because the express route links into downtown Medford, it has potential to connect with almost every current and proposed RVTD bus route.

Constraints: The route provides express service using I-5, but could be impacted if construction or road closures were to occur along the route. RVTD previously conducted preliminary testing of a similar express route and found that ridership would likely be highest in off-peak hours; the service may not be utilized by commuters unless it was very time-competitive with driving.

Land Use Considerations: Land use along the route are primarily residential, with a mix of single family residential, multi-family residential, as well as rural uses, such as farms and orchards.

12. NE MEDFORD-MCANDREWS CROSSTOWN



Project Description and Location: The NE Medford-McAndrews route is a 5.1-mile bus route that provides service along McAndrews to currently underserved areas in NE Medford. The route has stops that are spaced ¼ mile apart, has an approximate runtime of 21 minutes, and would operate at 15 or 30-minute frequencies Monday through Saturday.

Ridership / Demographics within ¼ mile			Service Details		
Criterion	2017	2027	Criterion	2027 (30 min freq.)	2027 (15 min freq.)
Projected Daily Ridership	-	30 min freq: 270 15 min freq: 720	Distance	5.1 mile round trip	5.1 mile round trip
Population	6,900	7,400	Trip Time	11 minutes one-way	11 minutes one-way
Employment	3,500	4,000	Frequency	30 minutes	15 minutes
Low Income	25.1%	-	Number of Buses	1 Required	2 Required
Minority	19.4%	-	Capital Cost	\$691,100	\$1,351,100
Disabled	16.6%	-	Annual O & M Cost	\$228,900	\$559,200
No Access to Vehicles	14.2%	-	Farebox Recovery Ratio by Route	31%	29%
No. Essential Destinations	5	-	Stakeholder Priority	High	

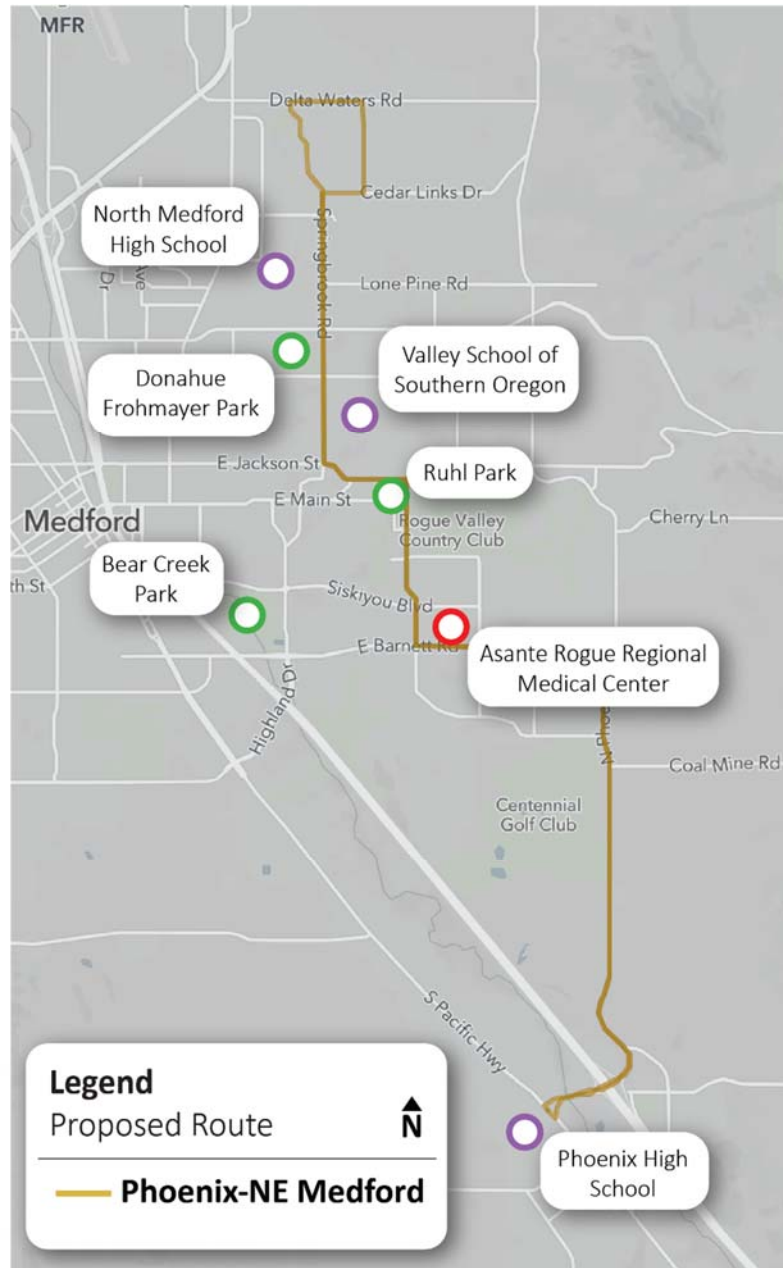
Opportunities: The NE Medford-McAndrews proposed route provides service to northern and eastern Medford. A high number of people without vehicles live near the route, and a new transit route would provide access and transportation connections otherwise not easily available. RVTD routes 21, 40, 60, 61, and the proposed Phoenix-NE Medford route intersect with the NE Medford-McAndrews route. Ridership could be increased if the route was extended further west to connect with a future NE Medford Circulator.

Constraints: The route utilizes McAndrews Rd almost exclusively and accessing it in spots may be challenging due to few through streets.

Land Use Considerations: Land uses along the route are primarily residential, with a mix of single family residential, multi-family residential, parks, and commercial uses on the western end of the route, near downtown Medford.

Modifications: Should connect to Enhancement #5 (NW Medford Circulator) and requires rest of fixed route system to be on 15-minute headways to support efficient transfers with routes 21, 60, 61, and potential #13 Phoenix-NE Medford Crosstown

13. PHOENIX-NE MEDFORD CROSTOWN



Project Description and Location: The Phoenix-NE Medford route is a 16-mile bus route that provides service between Phoenix and NE Medford. The route has stops that are spaced $\frac{1}{4}$ mile apart, has an approximate runtime of 64 minutes, and would operate at 15 or 30-minute frequencies Monday through Saturday.

Opportunities: The Phoenix-NE Medford route has an opportunity to serve homes and those who work in the rural areas between Phoenix and Medford. Pockets of low income households exist as the route moves north into NE Medford.

Constraints: The route has to circumnavigate two large golf courses, which can be a benefit, but increases the run time of the route.

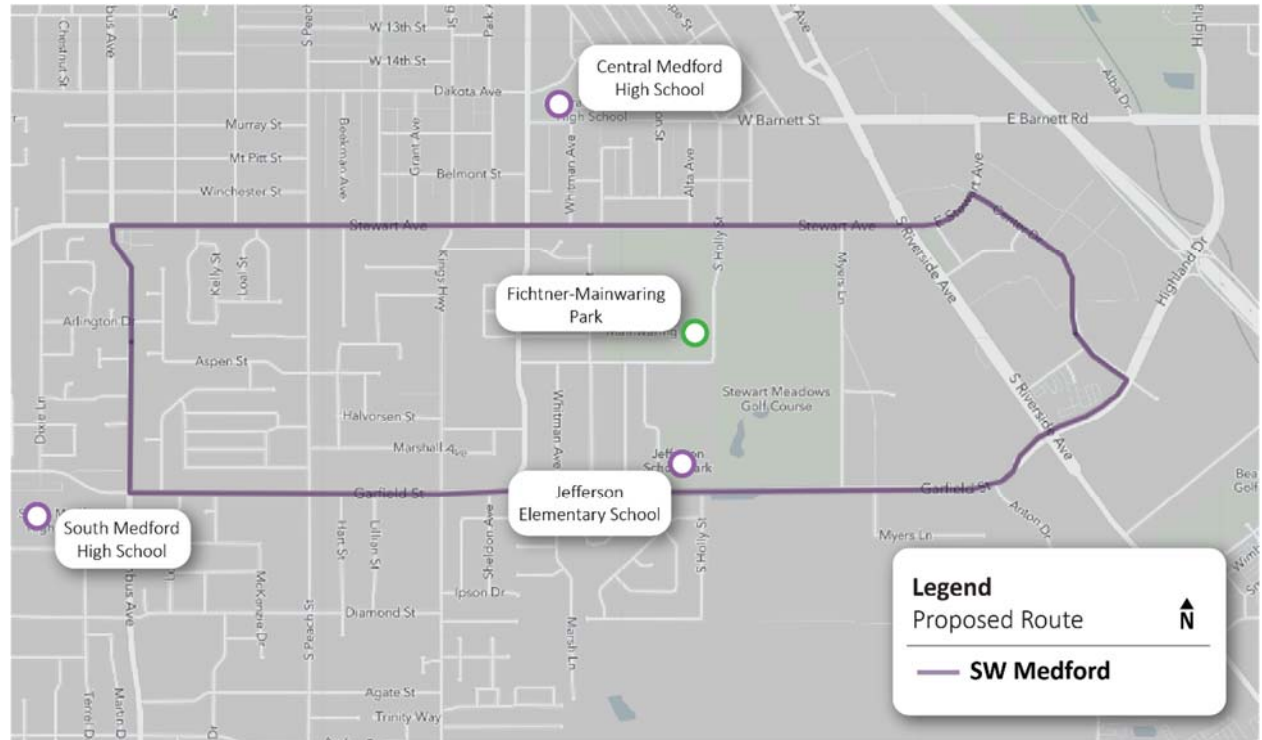
Ridership / Demographics within ¼ mile		
Criterion	2017	2027
Projected Daily Ridership	-	430 800
Population	11,400	12,600
Employment	5,500	6,000
Low Income	15.4%	-
Minority	15.6%	-
Disabled	17.2%	-
No Access to Vehicles	9.8%	-
No. Essential Destinations	7	-

Service Details		
Criterion	2027 (30 min freq.)	2027 (15 min freq.)
Distance	16 mile round trip	16 mile round trip
Trip Time	32 minutes one-way	32 minutes one-way
Frequency	30 minutes	15 minutes
Number of Buses	3 Required	5 Required
Capital Cost	\$2,075,600	\$3,395,600
Annual O & M Cost	\$688,600	\$1,671,200
Farebox Recovery Ratio by Route	21%	19%
Stakeholder Priority	Low	

Land Use Considerations: Land uses along the route are mostly residential with rural farm and orchard land, as well as golf course recreation uses.

Modifications: Consider future transfer location at Delta Waters/Crater Lake Avenue or at Delta Waters and the existing shopping center. Requires 15-minute headways on connecting routes.

14. SW MEDFORD CROSTOWN



Project Description and Location: The SW Medford route is a 4.6-mile bus route that provides service throughout southwest Medford. The route has stops that are spaced ¼ mile apart, has an approximate runtime of 18.5 minutes, and would operate at 15 or 30-minute frequencies Monday through Saturday.

Ridership / Demographics within ¼ mile		
Criterion	2017	2027
Projected Daily Ridership	-	30 min freq: 150 15 min freq: 460
Population	6,500	7,000
Employment	2,700	3,800
Low Income	28.4%	-
Minority	30.8%	-
Disabled	15.8%	-
No Access to Vehicles	5.6%	-
No. Essential Destinations	7	-

Service Details		
Criterion	2027 (30 min freq.)	2027 (15 min freq.)
Distance	4.6 mile round trip	4.6 mile round trip
Trip Time	18 minutes	18 minutes
Frequency	30 minutes	15 minutes
Number of Buses	1 Required	2 Required
Capital Cost	\$687,500	\$1,347,500
Annual O & M Cost	\$229,200	\$556,600
Farebox Recovery Ratio by Route	26%	24%
Stakeholder Priority	High	

Opportunities: The SW Medford route has an opportunity to serve large minority and low-income populations. Two schools are near the route, giving more access to schools without using a personal vehicle. RVTD routes 10 and 25 intersect with the SW Medford route allowing for greater transit mobility in southern and western Medford.

Constraints: Little to no physical constraints exist along the route.

Land Use Considerations: Land uses along the route are mostly residential with parks and schools.

Modifications: When operated at 15-minute headways it could operate in a bi-directional loop. Existing Route 24 should connect with this route at Center Street transfer location (i.e. Walmart). Evaluate modifications to existing Routes 2 and 25.

Additional System Enhancements

The project team analyzed four additional system-level enhancements for the current RVRTD transit network using TBEST.

Evaluation Results							
Criterion	2027 Base	Project 15: 15 Min Freq.	Project 16: 20 Min Freq.	Project 17: 2 Additional Weekday Hours	Project 18: 4 Additional Weekday Hours	Project 19: Increase Saturday Service to Weekday Hours	Project 20: Add Sunday Service
Projected Daily Ridership	4,700	8,700	9,000	5,046	5,392	5,200	5,500
Number of Additional Buses	--	13 Required	13 Required	0	0	0	0
Cost of Additional Buses	--	\$7,228,000	\$7,228,000	0	0	0	0
Additional Annual Service Hours	2,600	74,500	66,600	13,000	21,400	7,900	14,700
Annual Added O & M Cost	\$129,400	\$3,722,300	\$3,330,700	\$974,200	\$1,606,900	\$593,500	\$1,194,300
Total estimated new annual operations costs as a percent compared to existing	+1%	+37%	+33%	+10%	+16%	+6%	+11%
Stakeholder Priority	-	High	High	Medium	Medium	High	Medium

Increase RVTD Routes to 20-Minute Frequency:

Current RVTD routes were increased from 30 to 20-minute frequency to test the impact to ridership and costs. Route 10 was assumed to increase from 20 to 10-minute frequencies. 20-minute frequencies for all routes could be a near-term enhancement, while increasing network frequencies to 15-minutes could be a long-term enhancement.

Increase Weekday Service by 2 and 4 Additional Hours:

Assumes RVTD routes have increased service windows, with most routes running from 5 a.m. to 11 p.m.

Increase Saturday Service to Weekday Service Hours:

Saturday service on all current RVTD routes is increased to weekday service hours, maintaining the same frequencies.

Add Sunday Service:

Sunday service is provided on the nine existing RVTD routes, and set to existing Saturday service, from 7 a.m. to 6 p.m.

EVALUATIONS

The table below summarizes individual projects and the additional system-level enhancements that were analyzed and described in the preceding sections. The intent of this table is to understand and compare the performance of each project. Light green shaded boxes represent numbers that are above the median across all individual project routes (Projects 1 through 14).

Table 2: Service Enhancements

Service Enhancements	Daily boardings (2027) ¹		Population within a ¼ mile of route ²		Employment within a ¼ mile of route ²		Low income population within a ¼ mile of route ³	Minority population within a ¼ mile of route ³	Disabled population within a ¼ mile of route ³	Population with no access to vehicles within ¼ mile of route ³	Regional Essential destinations within ¼ mile of route ⁴	Percentage of regionwide multi-family zoned land within ¼ mile of route ⁵	Farebox recovery ratio (2017) ⁶		Capital Cost ⁷		Annual O & M Cost ⁸	
	30-Min Freq.	15-Min Freq.	2017	2027	2017	2027							30-Min Freq.	15-Min Freq.	30-Min Freq.	15-Min Freq.	30-Min Freq.	15-Min Freq.
Project 1: Ashland Circulator	250	N/A	6,300	6,800	3,000	3,100	25.20%	16.70%	12.80%	8.70%	10	13.09%	76%	N/A	\$1,380,000	N/A	\$280,000	N/A
Project 2: Central Point Circulator	240	N/A	7,900	9,000	3,300	3,900	14.20%	17.60%	17.20%	6.00%	14	5.83%	44%	N/A	\$2,066,300	N/A	\$372,600	N/A
Project 3: East Medford Circulator	460	N/A	9,600	10,500	5,100	5,300	17.40%	15.50%	16.00%	9.70%	13	3.05%	68%	N/A	\$1,369,300	N/A	\$220,900	N/A
Project 4: Eagle Point Circulator	90	N/A	4,900	5,500	900	1,000	23.30%	16.70%	18.60%	5.60%	10	9.10%	36%	N/A	\$1,372,620	N/A	\$275,800	N/A
Project 5: NW Medford Circulator	420	N/A	7,700	8,300	4,700	5,100	33.70%	34.80%	19.70%	15.30%	12	4.70%	81%	N/A	\$698,500	N/A	\$201,300	N/A
Project 6: Phoenix Circulator	210	N/A	5,000	5,400	2,200	2,500	20.20%	32.40%	23.10%	3.70%	8	4.47%	65%	N/A	\$1,391,500	N/A	\$324,200	N/A
Project 7: Talent Circulator	110	N/A	3,800	4,400	700	700	23.50%	18.20%	17.40%	3.30%	8	4.61%	58%	N/A	\$698,000	N/A	\$172,800	N/A
Project 8: Central Point-North Medford Crosstown	230	560	6,400	7,000	4,200	6,200	15.70%	19.10%	17.50%	5.70%	10	5.30%	18%	21%	\$1,397,300	\$2,717,300	\$597,300	\$1,203,200
Project 9: Central Point-South Medford Crosstown	500	950	9,400	10,200	6,800	7,200	25.10%	26.80%	19.10%	13.50%	23	4.17%	23%	17%	\$1,385,700	\$2,705,700	\$516,700	\$1,400,700
Project 10: East Medford Crosstown	350	680	4,900	5,300	4,700	4,900	22.20%	17.20%	16.20%	11.10%	13	2.33%	32%	29%	\$691,900	\$1,351,100	\$229,400	\$556,800
Project 11: Medford-Ashland Express Crosstown	870	1,620	12,600	13,400	13,500	15,600	23.50%	23.20%	17.20%	11.30%	32	21.89%	160%	59%	\$1,425,000	\$4,118,100	\$81,000	\$387,600
Project 12: Northeast Medford-McAndrews Crosstown	270	720	6,900	7,400	3,500	4,000	25.10%	19.40%	16.60%	14.20%	5	2.28%	31%	29%	\$691,100	\$1,351,100	\$228,900	\$559,200
Project 13: Phoenix-Northeast Medford Crosstown	430	800	11,400	12,600	5,500	6,000	15.40%	15.60%	17.20%	9.80%	7	5.68%	21%	19%	\$2,075,600	\$3,395,600	\$688,600	\$1,671,200
Project 14: Southwest Medford Crosstown	150	460	6,500	7,000	2,700	3,800	28.40%	30.80%	15.80%	5.60%	7	0.00%	26%	24%	\$687,500	\$1,347,500	\$229,200	\$556,600
Median	260	720	6,700	7,200	3,850	4,450	23.4%	18.7%	17.20%	9.2%	10	4.7%	39.8%	23.6%	\$1,376,310	\$2,705,700	\$252,600	\$881,200
Project 15: 15-Minute Frequency All Routes	N/A	4,000	70,700	75,700	42,600	49,300	24.7%	25.1%	17.8%	10.6%	98	68%	N/A	32%	N/A	\$6,050,000 (\$1,212,000 match)	N/A	\$3,722,300
Project 16: 20-Minute Frequency All Routes	N/A	4,300											N/A	39%	N/A	\$15,946,600 (\$3,189,320 match)	N/A	\$3,330,700
Project 17: 2 Additional Weekday Hours	300	N/A											15%	N/A	\$0	N/A	\$974,200	N/A
Project 18: 4 Additional Weekday Hours	700	N/A											15%	N/A	\$0	N/A	\$1,606,900	N/A
Project 19: Increase Saturday Service to Weekday Hours	500	N/A											21%	N/A	\$0	N/A	\$593,500	N/A
Project 20: Add Sunday Service	800	N/A											19%	N/A	\$0	N/A	\$1,194,300	N/A

TABLE NOTES:
 All light green shaded boxes in the table reflect values that are above the median for each evaluation measure, considering individual project routes only (Projects 1 through 14).
¹ RVMPO (JEMnR) regional model total daily boardings for individual route values (Project 1 through 14). For Projects 15 through 20, values reflect daily additional ridership compared to 2027 base ridership.
² Population and employment estimates from Remix with growth rates from RVMPO (JEMnR) for future year forecasts. ArcMap used to derive ¼ mile buffers around transit lines.
³ Demographic measures from Remix – Low Income, Minority Population, Disabled Population and Population with no Vehicle Access.

⁴ Regional essential destinations are defined as churches, city halls, community centers, courthouses, grocery stores, libraries, medical facilities, parks, police stations, and educational institutions

⁵ Zoning data as of 2017. For future years, used existing land use. Measure calculates the total percentage of multi-family within ¼ mile of all service in the alternative as compared to regionwide total multi-family.

⁶ Farebox Recovery derived using \$0.98 times ridership divided by cost by route. For Projects 15 through 20, values reflect daily additional ridership compared to 2027 base ridership.

⁷ Capital costs based on number of buses needed to operate service under each scenario, including spares, as well as stop infrastructure

⁸ Operations costs based on revenue service hours from TBEST model with assumed average operating cost per hour of \$50 for the current system and all future service enhancements except for the 2027 15-minute frequency service which assumed an average of \$61.95 per hour based on the assumption that all service up to a specific threshold in that scenario would use \$50/hr and all hours beyond that would use \$75/hr.

PUBLIC AND STAKEHOLDER INPUT

Table 3 is a summary of the feedback received by the public during the first and second open houses and by stakeholders during the design charrettes. The public's and stakeholders' needs and priorities regarding current and potential new RVTD services helps inform the selection process for short-term, mid-term, and long-term projects. The table identifies the public's and stakeholders' priorities for each category by Low, Medium, and High. These values were assigned based on the number of votes per enhancement by feedback period.

The table shows the priorities based on the input from Open House 1 in June 2018 (130 participants online and in-person); input from the Design Charrettes with TAC/CAC, board members, and RVTD staff in October 2018 (six teams); and input from Open House 2 in January and February 2019 (31 participants online and in-person). It is important to understand that participants were able to select more than one option under all questions. Therefore, low, medium, and high priorities for specific services are relative to the results of individual questions. It is also important to understand that not all participants answered all questions, and participants represent different population and perspectives.

Table 3: Public and Stakeholder Priorities

Service Enhancements	Overall Assessment	Open House 1 Input (130 participants)	Design Charrettes (6 teams)	Open House 2 Input (31 participants)	RVTD Staff
Service Enhancement Priorities					
Express Routes	Medium	Medium	High	Medium	Medium
Improved Route Connections	Medium	Medium	--	--	Medium
More Weekday Frequency	High	Medium	High	Medium	High
Access to near Cities	Low	Medium	Low	--	Low
Add Sunday Service	Medium	Medium	High	High	Medium
Local City Circulators	Medium	Medium	Medium	Medium	High
Regional Cross-town Routes	High	High	High	Medium	High

Service Enhancements	Overall Assessment	Open House 1 Input (130 participants)	Design Charrettes (6 teams)	Open House 2 Input (31 participants)	RVTD Staff
Expanded Service Hours					
Early morning service	Medium	Medium	High	Low	Low
Late night service	Medium	High	High	High	Low
Earlier Saturday service	Medium	Low	High	High	Low
Later Saturday service	High	High	High	High	Medium
Sunday service	Medium	High	High	High	Low
Potential New Local City Circulator Routes					
Ashland Circulator	High	Medium	Medium	High	High
Central Point Circulator	High	Medium	High	Low	High
Eagle Point Circulator	Medium	Low	High	Low	Medium
Jacksonville Circulator	Low	Low	--	--	Low
Phoenix Circulator	Low	Low	--	Low	Low
Talent Circulator	Low	Low	Low	Low	Low
White City Circulator	Low	Low	--	--	Low
East Medford Circulator	High	Medium	--	High	High
Northwest Medford Circulator	Medium	Medium	--	Medium	Medium

Service Enhancements	Overall Assessment	Open House 1 Input (130 participants)	Design Charrettes (6 teams)	Open House 2 Input (31 participants)	RVTD Staff
Potential New Cross-town Routes					
Central Point-North Medford Crosstown	Low	--	Low	Low	Low
Central Point-South Medford Crosstown	Low	--	--	Low	Low
East Medford Crosstown	Medium	--	High	Medium	Medium
Medford-Ashland Express	High	--	High	High	High
Northeast Medford-McAndrews Crosstown	High	--	Medium	High	High
Phoenix-Northeast Medford Crosstown	Low	--	Medium	Low	Low
Southwest Medford Crosstown	High	--	--	Medium	High
More Frequent Service					
2 - West Medford	Low	Medium	Low	--	Low
10 - Ashland	Medium	Medium	High	--	Low
21 - North Medford	Low	Low	Low	--	Low
24 - RRMC	Medium	Medium	Low	--	Medium
25 - SW Medford	Low	Low	Low	--	Low
30 - Jacksonville	Low	Low	Low	--	Low
40 - Central Point	Medium	Low	Medium	--	High
60 - White City	Medium	Medium	Medium	--	High
61 - RCC Table Rock	Medium	Medium	Medium	--	Low

Service Enhancements	Overall Assessment	Open House 1 Input (130 participants)	Design Charrettes (6 teams)	Open House 2 Input (31 participants)	RVTD Staff
Implement Express Service					
2 - West Medford	Low	Low	--	--	Low
10 - Ashland	High	High	High	--	High
21 - North Medford	Low	Low	--	--	Low
24 - RRMCC	Low	Low	--	--	Low
25 - SW Medford	Low	Low	--	--	Low
30 - Jacksonville	Low	Low	--	--	Low
40 - Central Point	Medium	Medium	--	--	Medium
60 - White City	Medium	Medium	--	--	Medium
61 - RCC Table Rock	Medium	Medium	--	--	Low
Expanded Service Areas					
Grants Pass	Medium	High	--	--	Low
Eagle Point	High	High	High	--	High
Shady Cove	Medium	Medium	--	--	Low
Klamath Falls	Low	Low	--	--	Low
Applegate	Medium	Medium	--	--	Low
Potential New Dial-a-Ride Service Areas					
Ashland	Medium	Medium	--	--	High
Central Point	Medium	Low	--	--	High
Eagle Point	Medium	Medium	--	--	Low
Jacksonville	Medium	Medium	--	--	Medium
Medford	Medium	Medium	--	--	Low
Phoenix	Low	Low	--	--	Low
Talent	Low	Low	--	--	Low
White City	Medium	Medium	--	--	Low
Rider Experience Priorities					

Service Enhancements	Overall Assessment	Open House 1 Input (130 participants)	Design Charrettes (6 teams)	Open House 2 Input (31 participants)	RVTD Staff
First Mile-Last Mile	Low	Low	--	--	Medium
Right-Sizing Vehicles	Medium	Medium	--	--	High
Shelter Bus Stop	Medium	Medium	--	--	High
Information Technology Priorities					
Wifi on Buses	Medium	Medium	--	--	High
Real Time Arrival Displays on Shelters	High	High	--	--	Medium
Combine Fare Payment and Trip Planning Apps into One App	Medium	Medium	--	--	Medium
Real Time Arrival Displays on Buses	Medium	Medium	--	--	Medium
Configure Fare Payment to allow Credit Cards on Buses	Medium	High	--	--	Low

INITIAL RECOMMENDATIONS

This section identifies the initial recommendations to the TAC and CAC for service projects for the RVTD 2040 Transit Master Plan, based on the evaluation results in the previous section, public feedback, and project team recommendations. The table of recommended projects is organized by timeframe for implementation (short term, medium term, and long term), and other important considerations are noted.

Table 4 summarizes the preliminary team recommendation. Service enhancements are prioritized by timeframe:

- Short term – 0 to 5 years
- Medium term – 5 to 10 years
- Long term – 10 to 20 years

Table 5 includes additional transit supportive (non-vehicle) capital improvements identified in the Community Transit Vision (from prior plans, stakeholder input, and public engagement) not directly evaluated through the evaluation process. These will be considered to support the final service plan.

Table 4: Service Enhancement Recommendations

Service Enhancement	Recommendation	Time frame	Annual Operations Costs	One-Time Vehicle Capital Cost	Justification/notes
New Routes					
1: Ashland Circulator	Recommended	Short	\$280,000	\$1,380,000 (\$276,000 match)	<ul style="list-style-type: none"> • High community priority • High farebox recovery ratio • Would service high percentage of low-income population • Would service high portion of multi-family housing
2: Central Point Circulator	Recommended with changes (shorten route)	Short	\$372,600	\$2,066,300 (\$413,300 match)	<ul style="list-style-type: none"> • Shorten route to be served by 2 buses to reduce costs and increase farebox ratio • Consider changes to Route 40 to help serve Twin Creeks • Consider operating as a deviated fixed route • Medium-term, combine with Enhancement #8
3: East Medford Circulator	Recommended	Short	\$220,900	\$1,369,300 (\$273,900 match)	<ul style="list-style-type: none"> • In the long-term, replace with East Medford Crosstown (Enhancement #10)
4: Eagle Point Circulator	Recommended with changes (reduce frequency)	Short	\$275,800	\$1,372,600 (\$274,500 match)	<ul style="list-style-type: none"> • Limited existing service • Would service high percentage of disabled population • Would service high portion of multi-family housing • Operate 6 to 10 trips per day rather than of 30-minute headways unless Annexed into RVTD • Consider operating as a deviated fixed route
5: NW Medford Circulator	Recommended with changes (Combine with Route 30)	Short	\$201,300	\$698,500 (\$139,700 match)	<ul style="list-style-type: none"> • Modify to include area served by Route 30 (see recommendations on Route 30 below). • Medium-term, connect to Enhancement #12 NE Medford-Ashland Crosstown
6: Phoenix Circulator	Recommended	Medium	\$324,200	\$1,391,500 (\$278,300 match)	<ul style="list-style-type: none"> • High farebox recovery ratio • Would service high percentage of disabled population • Would service high percentage of minority population

Service Enhancement	Recommendation	Time frame	Annual Operations Costs	One-Time Vehicle Capital Cost	Justification/notes
7: Talent Circulator	Recommended	Medium	\$172,800	\$698,000 (\$139,600 match)	<ul style="list-style-type: none"> High farebox recovery ratio Would service high percentage of disabled population Would service high percentage of low income population
8: Central Point-North Medford Crosstown (15-min. frequency)	Recommended with changes (extend route)	Long	\$1,203,200	\$2,717,300 (\$543,500 match)	<ul style="list-style-type: none"> Modify to include additional circulation in Central Point, extend to Delta Waters/Crater Lake Avenue at a future potential transfer location
9: Central Point-South Medford Crosstown (30-min. frequency)	Recommended	Long	\$516,700	\$1,385,700 (\$277,100 match)	<ul style="list-style-type: none"> Limited ridership south of Beall Lane not captured by Route 40 Advantage of bypassing congestion at Hwy 99/OR62
10: East Medford Crosstown (15-min. frequency)	Recommended	Long	\$556,800	\$1,351,900 (\$270,400 match)	<ul style="list-style-type: none"> Replaces East Medford Circulator when #13 Phoenix-NE Medford Cross-town implemented Requires 15 headways on connecting routes
11: Medford-Ashland Express (30-min frequency)	Recommended	Short	\$81,000	\$1,425,000 (\$285,000 match)	<ul style="list-style-type: none"> High ridership potential High farebox recovery ratio
12: Northeast Medford-McAndrews Crosstown (15-min. frequency)	Recommended with changes (connectivity)	Long	\$559,200	\$1,351,100 (\$270,200 match)	<ul style="list-style-type: none"> Should connect to #5 NW Medford Circulator Requires rest of fixed route system to be on 15-minute headways to support efficient transfers with routes 21, 60, 61, and potential #13 Phoenix-NE Medford Crosstown
13: Phoenix-Northeast Medford Crosstown (15-min. frequency)	Recommended	Long	\$1,671,200	\$3,395,600 (\$679,100 match)	<ul style="list-style-type: none"> Consider future transfer location at Delta Waters/Crater Lake Avenue or at Delta Waters and the existing shopping center Requires 15 headways on connecting routes

Service Enhancement	Recommendation	Time frame	Annual Operations Costs	One-Time Vehicle Capital Cost	Justification/notes
14: Southwest Medford Crosstown (15-min frequency)	Recommended	Long	\$556,600	\$1,347,500 (\$269,500 match)	<ul style="list-style-type: none"> When operated at 15-minute headways it could operate in a bi-directional loop. Existing Route 24 should connect with this route at Center Street transfer location (i.e. Walmart) Evaluate modifications to existing Routes 2 and 25
Frequency, Span, and Days					
15: 15-Minute Frequency on All Routes	Recommended	Long	\$3,739,900	\$7,228,000 (\$1,445,600 match)	<ul style="list-style-type: none"> Increased frequency is a high community priority Would require significant capital investment in additional vehicles
16: 20-Minute Frequency on All Routes	Recommended	Medium	\$3,330,700	\$7,228,000 (\$1,445,600 match)	<ul style="list-style-type: none"> Increased frequency is a high community priority
17: 2 Additional Weekday Evening Hours (existing frequency)	Recommended	Short	\$974,200	\$0	<ul style="list-style-type: none"> High community priority Additional service outside the existing service hours will need to be phased in to accommodate added/altered work shifts and added managers/staff
18: 4 Additional Weekday Hours (existing frequency)	Recommended	Medium	\$1,606,900	\$0	<ul style="list-style-type: none"> Medium community priority Additional service outside the existing service hours will need to be phased in to accommodate added/altered work shifts and added managers/staff
19: Increase Saturday Service to Weekday Hours (existing frequency)	Recommended	Short	\$593,500	\$0	<ul style="list-style-type: none"> High community and stakeholder priority Additional service outside the existing service hours will need to be phased in to accommodate added/altered work shifts and added managers/staff

Service Enhancement	Recommendation	Time frame	Annual Operations Costs	One-Time Vehicle Capital Cost	Justification/notes
20: Add Sunday Service (replicate existing Saturday service)	Recommended	Short	\$1104,300	\$0	<ul style="list-style-type: none"> High community priority Additional service outside the existing service hours will need to be phased in to accommodate added/altered work shifts and added managers/staff
Existing Route Modifications					
Ashland Route 10 Speed Enhancements	Recommended	Continuous	Captured in increased frequency scenarios	TBD	<ul style="list-style-type: none"> Continue to look at ways to decrease route runtime (signal priority; limited stop express service on some runs) Monitor long-term for potential conversion to a Bus Rapid Transit (BRT) corridor
Jacksonville Route 30 Conversion to Demand-Response Service	Recommended	Short	Some savings possible	NA	<ul style="list-style-type: none"> Due to low ridership, convert to demand response using smaller vehicles. Incorporate east Medford portion of route into Enhancement #5 (NE Medford Circulator)
			Short-term Costs \$4.1M/yr Short + Medium-term Costs \$9.5M/yr Short + Medium + Long-term Costs \$14.4M/yr	\$1.7M match \$3.5M match \$5.1M match	<ul style="list-style-type: none"> Costs in current dollars Match for a total of \$25M in capital needs (+/- 45 additional buses excluding existing fleet replacement) Match averages out to approximately \$255,000 per year of local match (does not include existing fleet replacement needs)

Table 5: Capital Transit Supportive Improvements and Strategies

Jurisdiction(s)	Location	Enhancement
Route 10		
Ashland	Railroad District	Provide a transit transfer center in the Railroad District
	Railroad District adjacent to Hersey Street	Establish a park-and-ride location or potential central hub
	Plaza	Provide more space for BRT or bus transfers
	The Croman Mill Site	Establish a park-and-ride location or potential central hub
Talent	OR 99	Address lack of bus service on east side of OR 99
	OR 99	Construct pedestrian crossings
	Talent Depot	Create a transit hub in Talent
	Bramo building area (former Walmart site)	Create a park-and-ride
Route 40		
Central Point	Front Street	Construct sidewalks on the east side of the street
	TBD	Create a transfer center
	TBD	Provide Central Point downtown reverse service (currently only the north side of Pine Street receives service)
Route 60		
Central Point	Agate Road near OR 62	Create a park-and-ride
New Routes		
Eagle Point	TBD	Provide park-and-ride facilities
	Town Center	Establish the Town Center as a transit center
Medford	Delta Waters/OR62	Create a transfer center
Medford	South Gateway Walmart	Create a transfer center
Districtwide		
Medford	Front Street Station	Increase capacity by using two sides of the facility
Enhance bus stops to provide covered seating, lighting, schedule information and enhance ADA access.		
Provide connections to existing and proposed pedestrian and bicycle systems		

PREFERRED SYSTEM

A second set of analysis was completed to represent proposed near-term, mid-term, and long-term enhancements after feedback was collected from stakeholders, the public, and RVTD staff. The additional modeling prepared output for two new scenarios, representing the near-term 2027 preferred system (Scenario 4) and long-term 2042 preferred system (Scenario 5). The service enhancements that were modeled include modifications of nine existing routes and the addition of 18 routes in the long-term preferred system. Further description of the preferred system scenario routes is provided in the Transit Master Plan.

Table 6: Scenario Evaluation and Comparison

Criteria	Modeling Tool	Baseline		Scenario 1: Baseline with More Frequent Service ⁸		Scenario 2: Circulator Routes	Scenario 3: Crosstown Routes	Scenario 4: Increase Frequency of Crosstown Routes ⁸	Scenario 5: Short-term Preferred System	Scenario 6: Long-term Preferred System
		2017	2027	2017	2027	2027	2027	2042	2027	2042
Total Daily Boardings	JEMnR	5,400	5,700	9,500	10,500	18,600	12,200	27,500	9,800	10,500
Transit Mode Share ¹	JEMnR	0.5%	0.5%	0.7%	0.8%	1.2%	0.9%	1.50%	0.8%	0.7%
Population within ¼ Mile of 30-minute Transit Service ²	Remix and JEMnR	63,900	68,300	94,500	86,700	86,700	83,000	115,800	63,900	68,300
Population within ¼ Mile of Transit Service ²	Remix and JEMnR	70,700	75,700	100,800	91,100	91,100	99,600	115,800	70,700	75,700
Revenue Miles of Service per Capita per Year	Remix	6	6	8	8	14	8	22	12	11
Number of Regional Essential Destinations within ¼ Mile of Transit Service ³	ArcMap	98	98	127	112	112	124	129	98	98
Percentage of Regionwide Current and Future Mixed-use/Multi-family Zoned Land within ¼ Mile of Transit Service ⁴	ArcMap	68%	68%	84%	74%	74%	81%	86%	68%	68%
Regional Employment within ¼ Mile of Transit Service ⁵	JEMnR	42,600	49,300	54,900	57,300	57,300	58,400	70,200	42,600	49,300
Estimated Reduction in Regional GHG Emissions (MTCO _{2e}) ⁶	JEMnR	N/A	N/A	700	400	2,300	1200	4,150	800	950
Total Estimated Capital Costs over Existing ⁷	Remix	-	N/A	\$8,976,200	\$8,354,200	\$22,895,300	\$10,410,000	\$39,043,100	\$7,228,000	\$7,228,000
Additional Annual Service Hours	TBEST	-	2,600	39,700	55,300	153,300	32,600	214,200	74,400	74,800

1. RVMPO (JEMnR) regional model transit trips as a share of all person-trips.
2. Population estimates from Remix with growth rates from RVMPO (JEMnR) for future year forecasts.
3. Regional essential destinations are defined as churches, city halls, community centers, courthouses, grocery stores, libraries, medical facilities, parks, police stations, and educational institutions.
4. Zoning data as of 2017. For future years, used existing land use. Measure calculates the total percentage of multi-family within ¼ mile of all service in the alternative as compared to regionwide total multi-family.
5. Employment data from RVMPO (JEMnR) regional model; model data is based on Oregon Employment Department ES-202 data and MPO forecasts for future years.
6. GHG emissions based on changes in vehicle miles travelled from RVMPO (JEMnR) regional model along with average fuel efficiency rate from EPA (<https://www.epa.gov/greenvehicles/greenhouse-gas-emissions-typical-passenger-vehicle>).
7. Capital costs based on number of buses needed to operate service under each scenario, including spares, as well as stop infrastructure.
8. Scenario was modeled with service at 15-minute frequency.

ASSUMPTIONS SUMMARY

Assumptions

The project team operated under a set of specific assumptions to complete the objectives of this memo. The list below summarizes the assumptions that were made during the analysis and modeling of service concepts and enhancements.

Operations and Maintenance (O&M) Cost:

- O&M Costs are the daily costs needed to operate a bus route (fuel, maintenance of bus, driver, etc.). Based on conversations with RVTD, the team assumed per-revenue-hour costs of \$50 for enhancements on the current system and \$75 an hour for future service enhancements.
- All costs are presented in present-day dollars.
- Costs are based on revenue hours of service generated in the TBEST model for both individual enhancements and scenarios.

Ridership

- For scenario and evaluation comparison, ridership is based on the JEMnR model.
- For sensitivity testing using Scenario 1 with varied enhancements in 2027, ridership is based on the TBEST model.

Capital Costs:

- Capital costs are the costs that are required to serve a transit route (buses, bus stops, shelters, signs, etc). The project team assumed the following:
 - One standard 40' bus costs \$550,000.
 - Assumed a spare ratio of 20%, which was added to all capital cost assumptions (e.g., if a service enhancement required 1 additional bus, a cost of 1.2 buses was assumed to account for needed spares).
- All costs are presented in present-day dollars.

Regional Destinations:

- Regional destinations are defined as, churches, city halls, community centers, courthouses, grocery stores, libraries, medical facilities, parks, police stations, and educational institutions.

Number of Buses Needed:

- The project team utilized Remix transit modeling software that provided an estimate on the number of buses needed for different route, based on route length and frequencies.

Number of Bus Stops:

- The project team assumed that there is a bus stop every ¼ mile along each bus route.
- The Medford-Ashland Express route deviates from the initial assumption due to the nature of this specific service. For this route, the team assumed 10 total stops (5 pairs) on this route.

Demographic Data:

- For scenarios and individual enhancements, the project team developed demographic information based on data from Remix, which is in turn based on US Census data. Future year figures were generated using growth rates from the JEMnR model.
- The project team evaluated population, employment, low-income populations and other data points using ¼ mile buffered distance around each transit line. ¼ mile is the average distance an able-bodied person is assumed to be willing to walk to access transit.

Mixed-Use/Multi-Family Zoned Land:

- The project team categorized all residential land not zoned for single-family as mixed-use/multifamily. The team used this assumption in the analysis of multifamily housing within a ¼ mile of a transit line or transit stop.

Farebox Ratio:

- Assumed average per-boarding fare of \$0.98, based on 2017 National Transit Database data.

Models:

- The project team used several advanced modeling tools to inform the 2040 Transit Master Plan process. Each tool is designed for different purposes. For example, the Rogue Valley MPO's Joint Estimation Model in R (JEMnR) model estimated the impacts of transit service changes on transportation choices, while RVTD's TBEST model provided a more focused look at how service enhancements would impact transit ridership and costs. The two tools do not produce results that are directly comparable from an absolute ridership standpoint, but they do yield consistent magnitudes of changes for the scenarios under consideration. Using multiple tools provided the fullest picture of benefits and drawbacks of potential service changes and improvements being considered.
- The project scope determined the number of JEMnR model runs. The project team and RVTD decided to test certain models in certain years for now, with the possibility of expanding models into other years.

GHG Reduction Estimate:

- The GHG estimate assumed the calculation of systemwide Vehicle Miles Traveled (VMT) differences between current base levels and transit alternatives used in conjunction with an annualized estimate. The annualized VMT difference is used with an average estimate of fuel efficiency from an EPA calculation for Metric Tons of CO₂ Equivalency value for a single year.