FUTURE SERVICE OPPORTUNITIES MEMORANDUM

Date:	January 17, 2019 Project #: 23254.0
To:	Tom Strader, SCTD Carol Landsman, Landsman Transportation Planning, LLC Seth Brumley and Hector Rodriguez-Ruiz, Oregon Department of Transportation
From:	Susan Wright, Krista Purser, and Rachel Grosso, Kittelson & Associates, Inc.
Project:	SCTD Transit Development and Master Plan Update
Subject:	Memorandum #6 – Future Service Opportunities (Subtask 5.8)

TABLE OF CONTENTS

INTRODUCTION

This memorandum presents the service opportunities developed for South Clackamas Transportation District's (SCTD's) Transit Development and Master Plan (TDMP). The analyses documented in *Memo #4: Future Transportation Needs* provide the foundation for the service opportunities to address service gaps and needs. The content of this memo is divided into two main parts:

- *Assumptions Informing Future Service Opportunities – This section summarizes the assumed future conditions documented in previous memos:*
  - *Stakeholder Input*
  - *Population, Employment, and Land Use Growth*
  - *Transit Demand*
- *Future Service Opportunities – This section outlines opportunities responding to identified existing and future needs:*
  - *Existing Route Service Enhancements*
  - *New Service Opportunities*
  - *Information & Technology*
  - *Bus Stop & Facilities*

This memorandum serves to describe and identify costs for service opportunities developed to address potential service gaps and needs. These opportunities will be evaluated using the criteria identified in *Memo #5: Evaluation Framework* and prioritized based on their evaluation in *Memo #7: Future Service Opportunities Evaluation and Prioritization and Monitoring Program*.

ASSUMPTIONS INFORMING FUTURE SERVICE OPPORTUNITIES

This section summarizes the findings from *Memo #4: Future Transportation Needs* that affect the development of future service opportunities. Findings include stakeholder input; population, employment, and land use growth; and transit demand.

STAKEHOLDER INPUT

Expanded Service

Riders and non-riders indicated interest in expanded service to existing routes, including increased frequency, extended service hours, and weekend service. Details about these improvements include the following:

- *Approximately 40% of riders are commuting to work, with more commuters on the Molalla to Clackamas Community College (CCC)/Oregon City weekday and Molalla to Canby routes and fewer on the Molalla to CCC weekend and Molalla City routes.*
    - Expanding service hours on SCTD routes may increase commute riders on SCTD services and improve access to jobs.
- *In ranking service improvements, the overall highest priority for riders was increased frequency, followed closely by extended hours and weekend service. By route the survey respondents were riding on, the following service improvements were the highest priorities:*
    - *Molalla City:*
        - *Weekend Service (7)*
        - *Extended Hours (3)*
        - *Increased Frequency (2)*
    - *Molalla to Canby:*
        - *Weekend Service (7)*
        - *Extended Hours (5)*
        - *Increased Frequency (5)*
    - *Molalla to CCC:*
        - *Increased Frequency (36)*
        - *Extended Hours (23)*
        - *Weekend Service (23)*
- ***Takeaway**: increased frequency, extended hours (earlier and/or later service hours), and weekend service are high priorities for existing riders.*

Existing & Desired Connections

- No riders on the Molalla City service indicated that they were transferring to another service.

- *Two (2) Molalla to Canby riders transferred to non-SCTD services to access Wilsonville and Donald* using the CAT99X and the 3X Canby.
- Forty-seven (47) of the 85 *Molalla to* CCC riders transferred to non-SCTD services to access the following places:
  - Aloha (3)
  - Beavercreek (1)
  - Canby (6)
  - Carus (1)
  - Clackamas (3)
  - Gladstone (2)
  - Lake Oswego (1)
  - Milwaukie (6)
  - Mulino (2)
  - Oregon City (Not CCC, 16)
  - Portland (3)
  - Silverton (1)
  - Tualatin (1)
  - West Linn (1)

*T*he following areas were noted by respondents as desired service destinations:

- *Woodburn (5)*
  - Three (3) of the onboard survey respondents, who were CCC riders, indicated there is a need for a Woodburn service. All onboard survey respondents originated in Molalla, with final destinations in Portland or at CCC.
  - One online survey respondent who was an existing rider requesting a direct route.
  - One outreach event attendee indicated interest in Woodburn service.
- *Colton (2)*
  - Two of the respondents, who were CCC weekday riders, indicated a desire for a Colton service. Both originating from Molalla, their final destinations were CCC and Oregon City.
- *Service to more destinations was the top service improvement priority for non-riders*

Regardless of transfer, origin-destination pairs reported by 2 or more onboard survey respondents are delineated in Table 1:

Table 1. Origin-Destination Pairs - Onboard Survey Respondents

Number of Riders	Origin-Destination or Destination-Origin Pair
30	Molalla - Oregon City
13	Molalla - Canby
13	Molalla - Molalla
11	Molalla - CCC
5	Molalla - Milwaukie
4	Molalla - Portland
3	Molalla - Mulino
3	Mulino - Oregon City
3	Oregon City - Oregon City
2	Molalla - Aloha
2	Molalla - Clackamas Town Center
2	Molalla - Gladstone
2	Oregon City - CCC

- *Approximately 60% of riders who reported both an origin and destination have at least one end of their trip at CCC, with approximately 55% indicating a transfer at CCC.*
- ***Takeaway**: SCTD provides both local and regional connections with riders and non-riders interested in expanded service destinations.*

Information, Technology, and Facility Improvements

- *Providing real-time vehicle arrival information was the top desired tool identified on the survey.*
- *Many riders walk or bike to and from bus stops.*
- *The Molalla TSP Update identified new sidewalks along OR 211, OR 213, Toliver Road, E Heintz Street, and several other roadways served by SCTD routes.*
- *The Molalla TSP Update specifically recommends new or enhanced bus stops at OR 213/Meadow Drive, OR 213/Toliver Road, OR 211/OR 213, OR 211/Leroy Avenue, OR 211/Kennel Avenue, and Meadow Drive/Meadowlawn Place/Toliver Road.*
- *Existing riders indicated in the survey that long transfers and different fare payments were a barrier to ridership.*
- *Existing riders indicated that current fare payment system was a barrier to ridership.*
- *Public outreach indicated the one-bag rule was a challenge for riders.*
- ***Takeaway**: Improved tools for ridership such as real-time vehicle arrival information, fare payment options, and online/mobile trip planning tools can encourage increased ridership. Additionally, modification to the one-bag rule, improvements to bus stops, and connections to stops such as sidewalks and crosswalks would improve the customer experience and possibly increase ridership.*

POPULATION, EMPLOYMENT, AND LAND USE GROWTH

Key transit market population and employment characteristics and planned land use growth for the SCTD service area are described below.

Existing Population, Employment, and Land Use

- *Most residents of the district area drive alone for their commute (79%).*
- *About 6% of general population households report not having access to a vehicle, compared with 35% of surveyed existing riders.*
- *About 43% of households in Molalla earn less than the 200% poverty level.*
- *Approximately 3,698 workers lived in Molalla. Of these, 439 (11.9%) worked within Molalla, while 3,259 (88.1%) were employed outside Molalla. For those traveling outside Molalla for employment, Portland, Oregon City, and Canby were the primary work locations.*
- *Approximately 2,025 people were employed in Molalla, with 439 (21.7%) living in Molalla and 1,586 (78.3%) commuting into Molalla. For those traveling to Molalla for employment, Woodburn, Oregon City, and Salem are the primary home locations.*
- *Approximately 57% of Molalla City residents commute before the Molalla City Loop and Molalla to Canby routes begin service.*

- ***Takeaway**: Many residents of the district area drive alone to work with most employees traveling out of Molalla for work and Molalla employees traveling into Molalla from other cities. Many existing SCTD riders do not have access to a vehicle, especially compared to the general population. Additionally, much of the service area earn less than the 200% poverty level and would benefit from transit service for access to jobs.*

Future Population, Employment, and Land Use Growth

- *Molalla's population is projected to grow 2.2% annually between 2017 and 2035, and 1.5% annually between 2035 and 2040. Molalla is among the fastest-growing cities in the area served by SCTD, alongside Canby and Oregon City, .*
- *Employment is expected to increase with 122,900 new jobs across the tri-counties in 2027, a 13% increase and 1.3% annual growth rate from 2017.*
- *Land use growth areas near existing SCTD services include residential growth in northern Molalla, employment growth in southwestern Molalla, employment and residential growth in the Beavercreek and Henrici, South End communities of Oregon City, and residential growth in the Northeast Canby Master Plan Area.*
- *Land use growth in neighboring communities include the Clackamas Industrial Park, UGB expansion in Woodburn, and the Downtown and Riverside Area Plan for Estacada.*
- ***Takeaway:** Population and employment growth within Molalla and the surrounding area are expected to increase transit demand. In addition, route modifications to serve land use growth near existing SCTD services may help better serve customers as these areas develop. Land use growth in neighboring communities not directly served by SCTD may increase demand for transit to these communities. Incorporating transit infrastructure, such as bus pullouts and stops, during the land use review process can help to support future transit.*

TRANSIT DEMAND

- *Transit demand is anticipated to increase in conjunction with population and employment growth. The transit demand for the Molalla City Loop is estimated to be 31,600 annual 1-way passenger trips in 2040, a 23% increase over the 2018 estimated demand of 24,300.*
- *With a total of 12,200 annual 1-way trips estimated for 2040 conditions, the demand for the Molalla to Canby route is projected to increase 54% over 22 years, or about 4% annually.*
- *With a total of 19,400 annual 1-way commuter trips estimated for 2040 conditions, commuter demand for the Molalla to CCC route is projected to increase 48% over 22 years, or about 3% annually.*
- ***Takeaway**: In order to continue to continue to meet the transit demand, improvements to existing services or new services should be considered, including service enhancements such as increased frequency, expanded hours of service, adding weekend service, or make using transit easier via online tools, public information campaigns, and technological services.*

FUTURE SERVICE OPPORTUNITIES

This section discusses potential service opportunities, including modifications to existing services, new services, information and technology improvements, and bus stop and facilities improvements. These opportunities were

developed based on stakeholder input; population, employment, and land use growth; and existing and future transit demand.

Each existing or new route opportunity includes a description of the service change, changes to the number of operating buses (capital cost), annual operating cost, and estimated ridership. Information and technology improvements and bus stop and facilities improvements are described qualitatively with high-level cost estimates. Table 2 includes the existing SCTD services and their characteristics.

These opportunities will be evaluated using the criteria identified in *Memo #5: Evaluation* Framework, which includes stakeholder support derived from TAC meetings, outreach events, and onboard and online surveys. Opportunities identified to advance will be prioritized based on their evaluation and documented in *Memo #7: Future Service Opportunities Evaluation and Prioritization and Monitoring Program*. Detailed methodology for developing cost and ridership estimates for these opportunities is included in Appendix A.

Table 2. Existing Service Summary

Route	Service Span		Headway	Operating Buses	Annual Service Hours	Annual Service Miles	Annual Operating Cost	Cost per Hour	Annual Rides
	Weekends	Saturdays							
Molalla City	7:30 AM – 5:35 PM	9:30 AM – 3:45 PM[1]	1 Hour	1	2,540	15,510	$163,000	$64.33	24,051
Molalla to Canby	6:30 AM – 6:15 PM[2]	No Service	1 Hour	1	2,540	54,864	$181,297	$71.38	14,075
Molalla to CCC	5:00 AM – 8:30 PM	7:00 AM – 4:55 PM	½ Hour Weekday Peak[3]; 1 Hour Otherwise	2	3,090	181,616	$483,936	$74.25	53,951

[1]Saturday Service Began August 2019. Annual Operating Cost does not yet include Saturday service cost. Annual service hours, service miles, operating costs, and ridership is based on service prior to these changes.
[2]Additional 2 hours of service began August 2019. Previous service hours were 7:30 AM – 5:15 PM. Annual service hours, service miles, operating costs, and ridership is based on service prior to these changes.
[3]Weekday morning peak service was expanded in August 2019, adding 2 additional runs before 9 AM. Annual service hours, service miles, operating costs, and ridership is based on service prior to these changes.

MOLALLA CITY LOOP SERVICE OPPORTUNITIES

The following 7 opportunities are considered for the Molalla City Loop Route. Service span (time of day), headways, operating buses, cost, and rides are described for each alternative, with any changes to these service elements in **bold**.

- ***MC1: Peak Hour Increased Frequency**: Increase frequency to half hour headways between the hours of 7:30 – 9:30 AM and 3:35 – 5:35 PM. Increasing frequency would encourage ridership and increase access to job opportunities. Increasing peak hour frequency would also increase service hours, miles, and operating cost.*
  - *Service span remains the same.*
  - ***½ Hour** Headways during Peaks instead of 1 hour* ***1 New** Operating Bus*
  - ***$65,600 More** Annual Operating Cost; Total Annual Operating Cost of **$229,000***

- *Estimated **5,500-6,500 (+25%) More** Annual Rides; Total of **27,900 Annual Rides** Estimated*
- *Addresses identified need for expanded service via increased frequency as identified in survey findings and future transit demand*

» ***MC2: Increased Frequency Throughout the Day**: Increase frequency to half hour headways during all service hours (between 7:30 AM – 5:35 PM). Increasing frequency would encourage ridership and increase access to job opportunities, educational opportunities, healthcare, social service, and economic activity. Increasing peak hour frequency would also increase service hours, miles, and operating cost.*

- *Service span remains the same.*
- ***½ Hour** Headways throughout the Day instead of 1 hour **1 New** Operating Bus*
- ***$163,000 More** Annual Operating Cost; Total Annual Operating Cost of **$327,000**.*
- *Estimated **13,000-16,000 (+60%) More** Annual Rides; Total of **38,900 Annual Rides** Estimated*
- *Addresses identified need for expanded service via increased frequency as identified in survey findings and future transit demand*

» ***MC3: Simplified Route:** Modify the Molalla City Loop to a figure-8 loop, shortening headways to ½ hour instead of 1 hour. Modifying the loop provides shorter headways with only one bus, also resulting in no change to service hours or cost. The route serves fewer streets, resulting in reduced ridership from reduced population and employment in the ¼ mile capture area. However, the improved headways may encourage higher ridership than the existing route. Given the Molalla City Loop deviates and this alternative serves fewer streets than existing, this may result in more deviation requests than SCTD currently receives. Services such as bikeshare and scooter share may help to fill first-mile, last-mile gaps in the future.*

- *Service span remains the same.*
- ***½ Hour** Headways throughout the Day instead of 1 hour No New Operating Buses*
- *No Change to Annual Operating Cost; Total Annual Operating Cost of $163,000.*
- *Estimated **2,852 Residents** Served, a decrease of 145 residents; Estimated **422 Jobs** Served, a decrease of 34 jobs*
- *Addresses identified need for expanded service via increased frequency as identified in survey findings and future transit demand*

Figure 1. Molalla City Existing Route

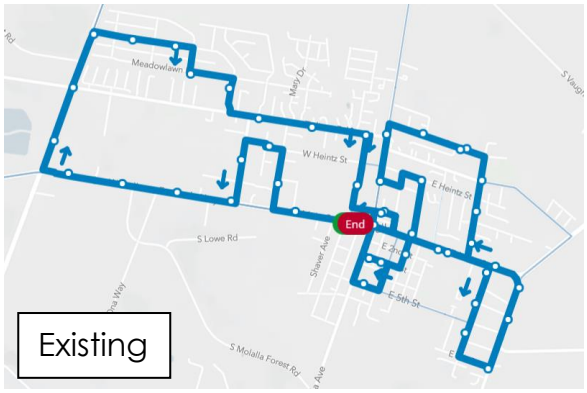
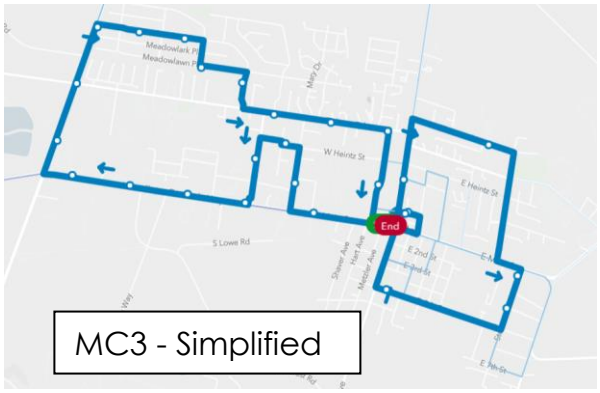
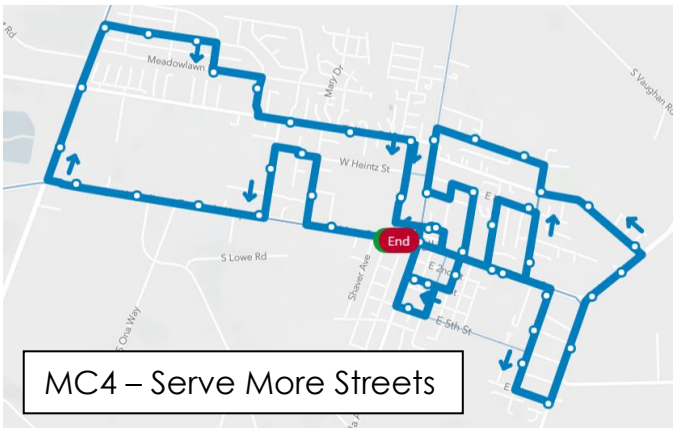


Figure 2. Molalla City Simplified Route (MC3)



- ***MC4: Route Modification - Serve More Streets:*** *Modifying the Molalla City Loop towards the route outlined in the Molalla TSP to serve Shirley Street, Highway 211, and Main Street would capture more residents and more jobs, while still operating with the same frequency and service hours.*
  - *Service span remains the same.*
  - *1 Hour Headways remain the same. No New Operating Buses*
  - *No Change to Annual Operating Cost; Total Annual Operating Cost of $163,000.*
  - *Estimated **3,070 Residents** Served, an increase of 73 residents; Estimated **472 Jobs** Served an increase of 16 jobs*
  - *Addresses identified need for service to the northeast residential area as identified in the Molalla TSP and land use review*

Figure 3. Molalla City Route Modification - Serve More Streets (MC4)



- ***MC5: Earlier Morning Service:*** *Add two hours of service in the early morning (5:30 – 7:30 AM). Increasing service hours would encourage ridership and increase access to job opportunities, educational opportunities, healthcare, social service, and economic activity. Increased service hours could also improve access to adjacent transit services.*
  - ***Additional 2 Hours** of **Morning** Service*
  - *1 Hour Headways remain the same No New Operating Buses*
  - ***$32,800 More** Annual Operating Cost; Total Annual Operating Cost of **$196,000**.*
  - *Estimated **2,500-3,500 (+10%) More** Annual Rides; Total of **27,200 Annual Rides** Estimated*
  - *Addresses identified need for expanded service via expanded service span as identified in survey findings and future transit demand*
- ***MC6: Later Evening Service:*** *Add two hours of service in the late evening (5:35 – 7:35 PM). Increasing service hours would encourage ridership and increase access to job opportunities, educational opportunities, healthcare, social service, and economic activity. Increased service hours could also improve access to adjacent transit services.*
  - ***Additional 2 Hours** of **Evening** Service*
  - *1 Hour Headways remain the same No New Operating Buses*
  - ***$32,800 More** Annual Operating Cost; Total Annual Operating Cost of **$196,000**.*
  - *Estimated **2,500-3,500 (+10%) More** Annual Rides; Total of **27,200 Annual Rides** Estimated*

- *Addresses identified need for expanded service via expanded service span as identified in survey findings and future transit demand*

- ***MC7: Sunday Service:*** *Add service on Sundays 9:35 AM – 3:45 PM, similar to the new Saturday service. Sunday service would encourage ridership and increase access to job opportunities, recreational opportunities, and economic activity. Adding Sunday service would also increase service hours, miles, and operating cost but should only be considered after the productivity of recent Saturday service additions can be evaluated.*
  - ***Adds Sunday Service 9:35 AM – 3:45 PM***
  - *1 Hour Headways* *No New Operating Buses*
  - ***$24,800 More*** *Annual Operating Cost; Total Annual Operating Cost of* ***$188,100****.*
  - *Estimated* ***1,500-2,500 (+10%) More*** *Annual Rides; Total of* ***26,500 Annual Rides*** *Estimated*
  - *Addresses identified need for expanded service via weekend service as identified in survey findings and future transit demand*

MOLALLA TO CANBY SERVICE OPPORTUNITIES

The following 8 opportunities are considered for the Molalla to Canby Route. Service span, headways, operating buses, cost, and rides are described for each alternative, with any changes to these **bolded**.

- ***Canby1: Route Modification – 2-way service on west side of the route instead of Loop***
  - *Service span remains the same.*
  - *1 Hour Headways remain the same* *No New Operating Buses*
  - *No Change to Annual Operating Cost; Total Annual Operating Cost of $181,300.*
  - *Remix estimates 69.1 minute runtime as compared to the 63.4 minute existing runtime. This approaches the 72 minute headway time and may need to be evaluated further.*
  - *The west side of the route serves approximate* ***5,036*** *residents and* ***1,119*** *jobs. This side of the route is not served by other routes. Existing total residents and jobs served are 9,589 and 2,058, respectively; however, some of these residents and employees may have long travel times.*
    - *Loop services can cause long transit trips for riders. For example, a rider boarding in Canby and alighting in Mulino will have a short trip. However, that same rider boarding in Mulino and alighting in Canby will have a long trip. Providing service on one side of the loop back-and-forth (line service) would shorten transit trips. Recent survey efforts and ridership information are being analyzed to understand which side of the Canby Route is most heavily used.*

Figure 5. Molalla to Canby Existing Route

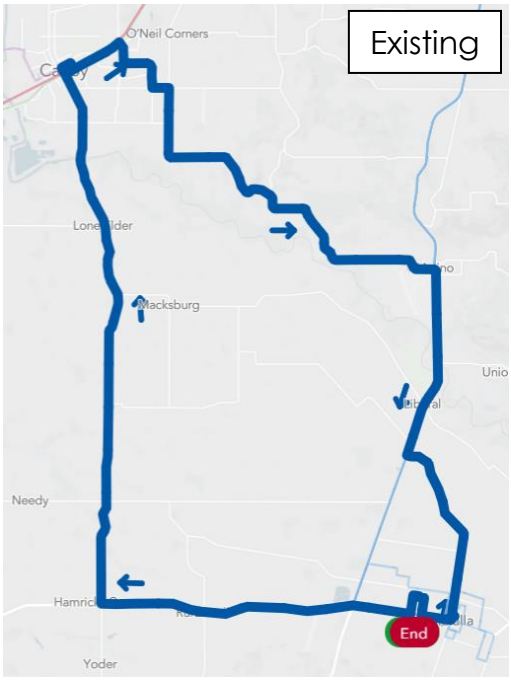


Figure 4. Molalla to Canby - Canby1 West Side

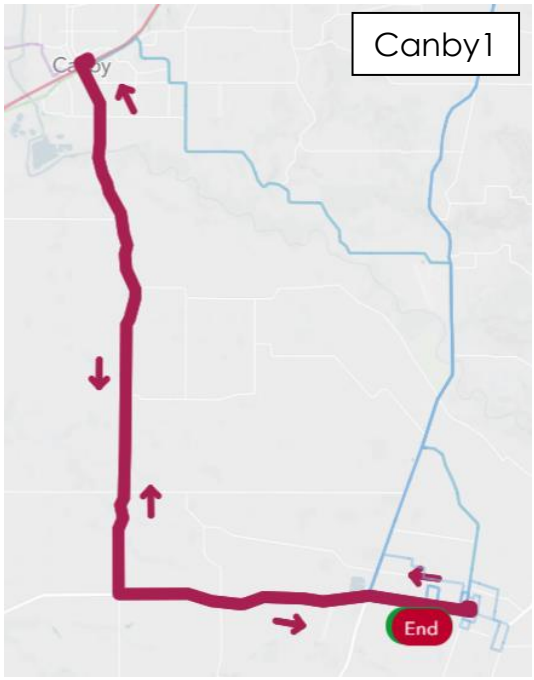
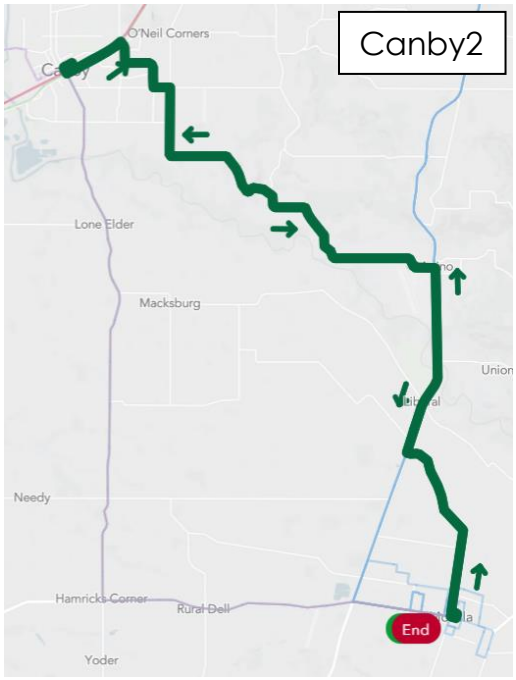


Figure 6. Molalla to Canby - Canby2 East Side



- ***Canby2: Route Modification – 2-way service on east side of the route instead of Loop***
  - *Service span remains the same.*
  - *1 Hour Headways remain the same*
  - *No New Operating Buses*
  - *No Change to Annual Operating Cost; Total Annual Operating Cost of $181,300.*
  - *Remix estimates 64.1 minute runtime as compared to the 63.4 minute existing runtime.*
  - *The east side of the route serves approximate **6,153 residents** and **1,367 jobs**. The Mulino and Liberal areas are also served by the Molalla to CCC route, though residents in these areas traveling between Canby would have to transfer if this side was eliminated. Existing total residents and jobs served are 9,589 and 2,058, respectively; however, some of these residents and employees may have long travel times.*
    - *Loop services can cause long transit trips for riders. For example, a rider boarding in Canby and alighting in Mulino will have a short trip. However, that same rider boarding in Mulino and alighting in Canby will have a long trip. Providing service on one side of the loop back-and-forth (line service) would shorten transit trips. Recent survey efforts and ridership information are being analyzed to understand which side of the Canby Route is most heavily used.*

- ***Canby3: Peak Hour Increased Frequency:*** *Increase frequency to half hour headways between the hours of 7:30 – 9:30 AM and 3:15 – 5:15 PM. Increasing frequency would encourage ridership and increase access to job opportunities. Increasing peak hour frequency would also increase service hours, miles, and operating cost.*
  - *Service span remains the same.*
  - ***½ Hour*** *Headways during Peaks instead of 1 hour* ***1 New*** *Operating Bus*
  - ***$72,800 More*** *Annual Operating Cost; Total Annual Operating Cost of* ***$254,100***
  - *Estimated* ***4,000-6,000 (+35%) More*** *Annual Rides; Total of* ***19,200 Annual Rides*** *Estimated*
    - *Peak hours are likely to be more productive than estimates report.*
  - *Addresses identified need for expanded service via increased frequency as identified in survey findings and future transit demand*
- ***Canby4: Increased Frequency Throughout the Day:*** *Increase frequency to half hour headways during all service hours (between 7:30 AM – 5:15 PM). Increasing frequency would encourage ridership and increase access to job opportunities, educational opportunities, healthcare, social service, and economic activity. Increasing frequency throughout the day would increase service hours, miles, and operating cost.*
  - *Service span remains the same.*
  - ***½ Hour*** *Headways throughout the Day instead of 1 hour* ***1 New*** *Operating Bus*
  - ***$181,300 More*** *Annual Operating Cost; Total Annual Operating Cost of* ***$362,600****.*
  - *Estimated* ***12,000-14,000 (+90%) More*** *Annual Rides; Total of* ***26,800 Annual Rides*** *Estimated*
    - *Peak hours are likely to be more productive than estimates report.*
  - *Addresses identified need for expanded service via increased frequency as identified in survey findings and future transit demand*
- ***Canby5: Earlier Morning Service:*** *Add two hours of service in the early morning (5:30 – 7:30 AM). Increasing service hours would encourage ridership and increase access to job opportunities educational opportunities, healthcare, social service, and economic activity. Increased service hours could also improve access to adjacent transit services. Adding additional service hours would also increase service miles and operating cost. This option also improves connection opportunities to neighboring services which expanded their hours in April 2019.*
  - *Additional* ***2 Hours of Morning*** *Service*
  - *1 Hour Headways reaming the same No New Operating Buses*
  - ***$32,800 More*** *Annual Operating Cost; Total Annual Operating Cost of* ***$214,100****.*
  - *Estimated* ***5,000-6,000 (+40%) More*** *Annual Rides; Total of* ***19,700 Annual Rides*** *Estimated*
  - *Addresses identified need for expanded service via expanded service span as identified in survey findings, census commute information, and future transit demand*
- ***Canby6: Later Evening Service:*** *Add two hours of service in the late evening (5:15 – 7:15 PM). Increasing service hours would encourage ridership and increase access to job opportunities educational opportunities, healthcare, social service, and economic activity. Increased service hours could also improve access to adjacent transit services. Adding additional service hours would also increase service and operating cost. Though the initial estimates for this service appear low, they are based on the general population's commute times. The existing condition of near 40% of Canby riders using the service for*

commute purposes suggests that the service may capture employees with later shifts, such as those in the service industry whose shifts may be later and who may be more transit-dependent.

- *Additional **2 Hours of Evening** Service*
- *1 Hour Headways remain the same No New Operating Buses*
- ***$32,800 More** Annual Operating Cost; Total Annual Operating Cost of **$214,100**.*
- *Estimated **500-1,500 (+5%) More** Annual Rides; Total of **15,100 Annual Rides** Estimated*
- *Addresses identified need for expanded service via expanded service span as identified in survey findings, census commute information, and future transit demand*

» ***Canby7: Saturday Service:** Add service on Saturdays 8 AM – 6 PM. Saturday service would encourage ridership and increase access to job opportunities, recreational opportunities, and economic activity. Adding Saturday service would also increase service hours, miles, and operating cost but should only be considered after the productivity of recent Saturday service additions to the Molalla City Loop can be evaluated.*

- ***Adds Saturday Service 8 AM – 6 PM***
- *1 Hour Headways remain the same No New Operating Buses*
- ***$39,300 More** Annual Operating Cost; Total Annual Operating Cost of **$220,600**.*
- *Estimated **3,500-4,500 (+30%) More** Annual Rides; Total of **18,000 Annual Rides** Estimated*
- *Addresses identified need for expanded service via weekend service as identified in survey findings and future transit demand*

» ***Canby8: Weekend Service:** Add service on Saturdays and Sundays. Saturday and Sunday service would encourage ridership and increase access to job opportunities, recreational opportunities, and economic activity. Adding Weekend service would also increase service hours, miles, and operating cost but should only be considered after the productivity of recent Saturday service additions to the Molalla City Loop can be evaluated.*

- ***Adds Saturday and Sunday Service 8 AM – 6 PM***
- *1 Hour Headways remain the same No New Operating Buses*
- ***$78,500 More** Annual Operating Cost; Total Annual Operating Cost of **$260,000**.*
- *Estimated **7,000-9,000 (+60%) More** Annual Rides; Total of **22,000 Annual Rides** Estimated*
- *Addresses identified need for expanded service via weekend service as identified in survey findings and future transit demand*

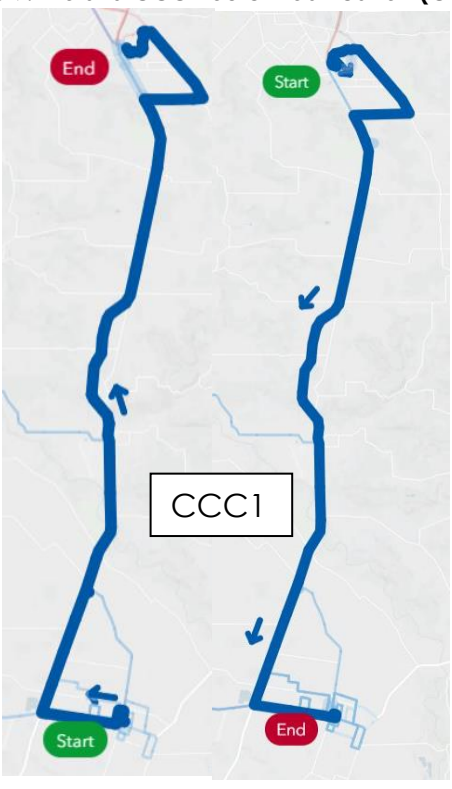
MOLALLA TO CCC SERVICE OPPORTUNITIES

The following 7 opportunities are considered for the Molalla to CCC Route. Service span, headways, operating buses, cost, and rides are described for each alternative, with any changes to these **bolded**.

- ***CCC1: Henrici Route Modification:*** *Modify existing route to serve Henrici Road and Beavercreek Road. Routing modification could be made while maintaining 1 hour headways. In addition, this alternative provides service to Oregon City High School and would support student transportation in the area. It should be noted that TriMet is exploring rerouting Route 32 along Beavercreek Road and Meyers Road and Oregon City is beginning a Last-Mile Shuttle Service to the Beavercreek/Henrici areas.*
  - *Service span remains the same.*
  - *1 Hour Headways remain the same No New Operating Buses*
    - *Remix estimates indicate travel time increases from 47 minutes to 50 minutes of runtime. However, several drivers indicated the peak period runs often operate several minutes behind schedule. As AVL is implemented on SCTD's system and Beavercreek/Henrici areas develop, the travel time estimates to maintain 1 hour headways should be further examined.*
  - *No Change to Annual Operating Cost; Total Annual Operating Cost of $484,000.*
  - *Estimated **17,000-20,000 (+35%) More** Annual Rides; Total of **72,500 Annual Rides** Estimated*
    - *Note: Ridership estimates based on existing demographics and does not factor future growth anticipated in these areas.*
  - *Addresses identified need for service to the Beavercreek/Henrici area as identified in the survey findings and land use review*

Figure 8. Molalla to CCC Existing Route

Figure 7. Molalla CCC Route Modification (CCC1)

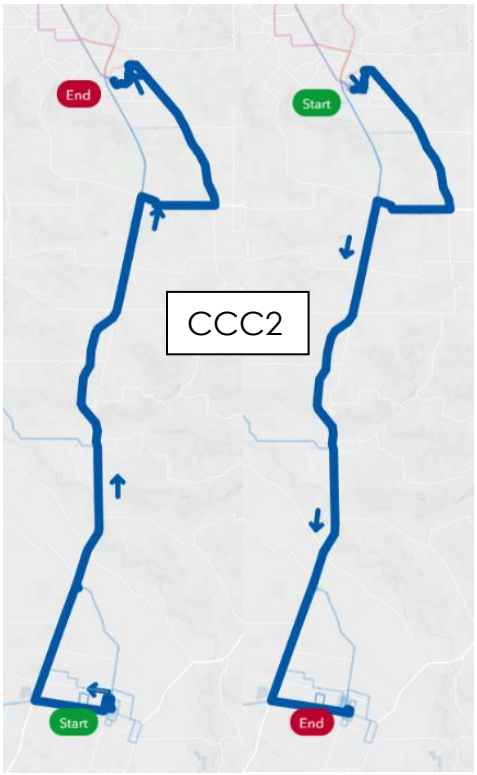


- ***CCC2: Leland Route Modification:*** *Modify existing route to serve Leland Road and Beavercreek Road. Routing modification could be made while maintaining 1 hour headways. In addition, this alternative*

provides service to Oregon City High School and would support student transportation in the area. It should be noted that TriMet is exploring rerouting Route 32 along Beavercreek Road and Meyers Road and Oregon City is beginning a Last-Mile Shuttle Service to the Beavercreek/Henrici areas.

- *Service span remains the same.*
- *1 Hour Headways remain the same No New Operating Buses*
  - *Remix estimates indicate travel time increases from 47 minutes to 56 minutes of runtime. However, several drivers indicated the peak period runs often operate several minutes behind schedule. As AVL is implemented on SCTD's system and Beavercreek/Henrici areas develop, the travel time estimates to maintain 1 hour headways should be further examined.*
- *No Change to Annual Operating Cost; Total Annual Operating Cost of $484,000.*
- *Estimated **3,500-5,000 (+10%) More** Annual Rides; Total of **58,300 Annual Rides** Estimated*
  - *Note: Ridership estimates based on existing demographics and does not factor future growth anticipated in these areas. Additionally, the Leland Road area is on a census block where population and employment is averaged over a large area. The lower ridership estimates as compared to the Henrici route is due to this averaging. Henrici still has higher densities along the route compared to Leland, but Leland ridership should be higher as densities near the route are higher than the census block average.*
- *Addresses identified need for service to the Beavercreek/Henrici area as identified in the survey findings and land use review*

Figure 9. Molalla CCC Route Modification (CCC2)



- ***CCC3: Peak Hour Increased Frequency**: Increase frequency to 20-minute headways between the hours of 6:00 – 8:00 AM and 4:00 – 6:00 PM on weekdays. Increasing frequency would encourage ridership and increase access to job opportunities. Increasing peak hour frequency would also increase service hours, miles, and operating cost. This should only be considered after the existing 30-minute headway peak hour service vehicles are operating near capacity.*
  - *Service span remains the same.*
  - ***20-Minute** Headways during Peaks instead of 1/2 hour **1 New** Operating Bus*
  - ***$75,800 More** Annual Operating Cost; Total Annual Operating Cost of **$559,700***
  - *Estimated **3,500-5,000 (+10%) More** Annual Rides; Total of **58,200 Annual Rides** Estimated*
    - *Peak hours are likely to be more productive than estimates report.*
  - *Addresses identified need for expanded service via increased frequency as identified in survey findings and future transit demand*
- ***CCC4: Increased Frequency Throughout the Day:** Increase frequency to half hour headways during all service hours (between 5:00 AM – 8:30 PM) on weekdays. Increasing frequency would encourage ridership and increase access to job opportunities, educational opportunities, healthcare, social service, and economic activity. Increasing frequency throughout the day would also increase service hours, miles, and operating cost. This should only be considered after the existing 1 hour headway service vehicles are operating at higher capacity.*
  - *Service span remains the same.*
  - ***½ Hour** Headways throughout the Day instead of 1 hour No New Operating Buses*
    - *Buses are available from current peak service, which operates at ½ hour headways*
  - ***$94,700 More** Annual Operating Cost; Total Annual Operating Cost of **$578,600***
  - *Estimated **8,500-10,500 (+20%) More** Annual Rides; Total of **63,400 Annual Rides** Estimated*
    - *Peak hours are likely to be more productive than estimates report.*
  - *Addresses identified need for expanded service via increased frequency as identified in survey findings and future transit demand*
- ***CCC5: Earlier Morning Service:** Add one hour of service in the early morning (4:00 – 5:00 AM) on weekdays. Increasing service hours would encourage ridership and increase access to job opportunities educational opportunities, healthcare, social service, and economic activity. Increased service hours could also improve access to adjacent transit services. Additional service hours will also increase service miles and operating cost. This should only be considered if the on-board surveys identify this as a need.*
  - *Additional **1 Hour of Morning** Service*
  - *1 Hour Headways remain the same No New Operating Buses*
  - ***$19,000 More** Annual Operating Cost; Total Annual Operating Cost of **$502,900**.*
  - *Estimated **up to 1,000 (<5%) More** Annual Rides, Total of **54,300 Annual Rides** Estimated*
  - *Addresses identified need for expanded service via expanded service span as identified in survey findings, census commute information, and future transit demand*
- ***CCC6: Later Evening Service:** Add two hours of service in the late evening (8:30 – 10:30 PM) on weekdays. Increasing service hours would encourage ridership and increase access to job opportunities educational opportunities, healthcare, social service, and economic activity. Increased service hours could also improve*

access to adjacent transit services. Later evening service would also increase service hours, miles, and operating cost. This should only be considered if the on-board surveys identify this as a need. Additionally, the CCC campus shuttle's recently-extended hours to 10:40 PM may support increased ridership on both services given increased transfer availability.

- *Additional **2 Hours of Evening** Service*
- *1 Hour Headways remain the same No New Operating Buses*
- ***$37,900 More** Annual Operating Cost; Total Annual Operating Cost of **$521,800**.*
- *Estimated **up to 1,000 (<5%) More** Annual Rides, Total of **54,100 Annual Rides** Estimated*
- *Addresses identified need for expanded service via expanded service span as identified in survey findings, census commute information, and future transit demand*

» ***CCC7: Sunday Service:** Add service on Sundays 8AM – 6PM. Sunday service would encourage ridership and increase access to job opportunities, recreational opportunities, and economic activity. Adding Sunday service would also increase service hours, miles, and operating cost but should only be considered after further evaluation of Saturday and weekend services on other routes.*

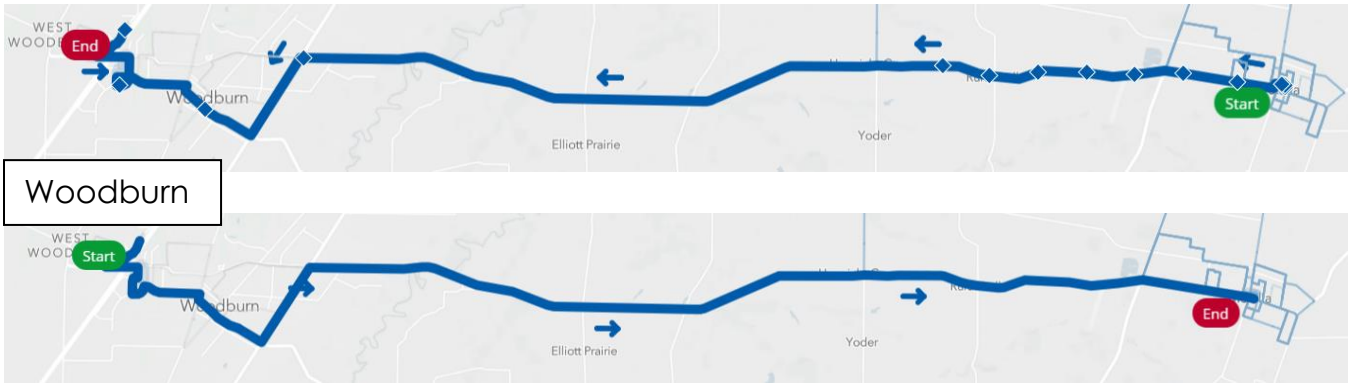
- ***Adds Sunday Service 8 AM – 6 PM***
- *1 Hour Headways remain the same No New Operating Buses*
- ***$40,800 More** Annual Operating Cost; Total Annual Operating Cost of **$524,800**.*
- *Estimated **4,000-6,000 (+10%) More** Annual Rides; Total of **59,000 Annual Rides** Estimated*
- *Addresses identified need for expanded service via weekend service as identified in survey findings and future transit demand*

NEW SERVICES

» ***Woodburn**: Provide direct service from Molalla to Woodburn. The route provides access to the Ross Street Transit Center, Woodburn Transit Center, Walmart, and Woodburn Premium Outlets. Cost estimates assume 6 runs per day, with 90-minute headways in order to operate with only 1 bus. This new intercity service may be eligible for discretionary inter-community funds and/or supportive of funding partnerships with neighboring transportation providers.*

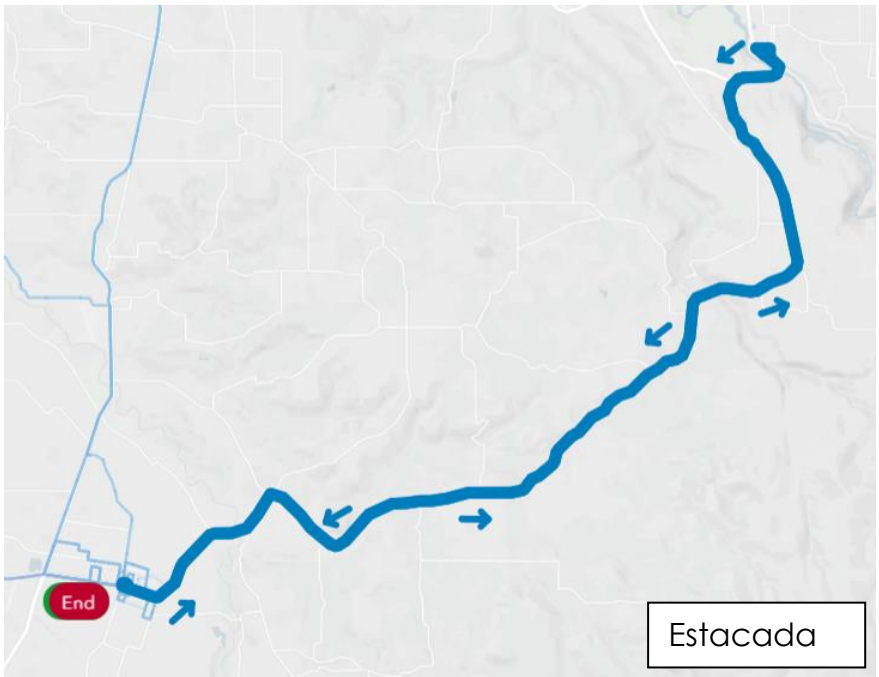
- ***Weekdays, 8AM – 5PM***
  - *Example: Ross Street Departures at 8AM, 9:30AM, 11AM, 12:30AM, 2PM, 3:30PM*
- ***1½ Hour** Headways **1 New** Operating Bus*
- *Total New Annual Operating Cost of **$168,600**.*
- *Estimated Total of **9,000-11,000 Annual Rides** Estimated*
  - *Ridership estimates are higher for Molalla - Woodburn due to higher demand from both Molalla residents working in Woodburn and Woodburn residents working in Molalla.*
- *Addresses identified interest in new service as identified in survey findings, census commute information, and future transit demand*

Figure 10. Molalla to Woodburn Route



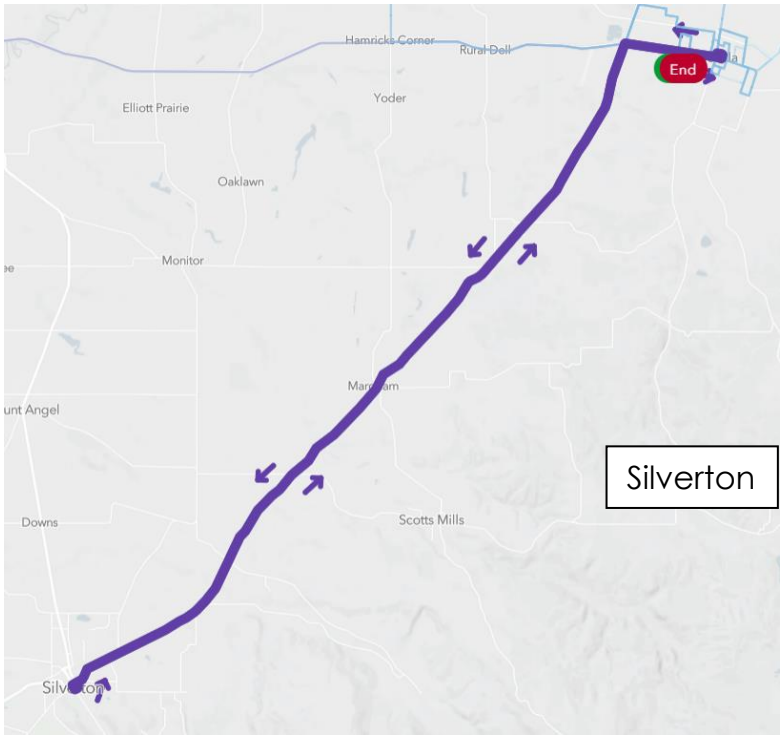
- ***Estacada**: Provide direct service from Molalla to Estacada. The route provides access to Ross Street Transit Center and Estacada's Riverfront. Cost estimates assume 4 runs per day, with 120-minute headways in order to operate with only 1 bus. This route is not recommended for further evaluation in this plan for fixed-route transit.*
  - ***Weekdays, 8AM – 4PM***
    - *Example: Ross Street Departures at 9AM, 11AM, 1PM, 3PM*
  - ***2 Hour** Headways* ***1 New** Operating Bus*
  - *Total New Annual Operating Cost of **$149,800**.*
  - *Estimated Total of **1,000-2,000 Annual Rides** Estimated*
    - *Ridership estimates are lower for Molalla – Estacada due to lower demand from both Molalla residents working in Estacada and Estacada residents working in Molalla.*
  - *Addresses identified interest in new service as identified in survey findings, census commute information, and future transit demand*

Figure 11. Molalla to Estacada Route



- ***Silverton**: Provide direct service from Molalla to Silverton. The route provides access to the Ross Street Transit Center and downtown Silverton. Cost estimates assume 6 runs per day, with 90-minute headways in order to operate with only 1 bus. This route is not recommended for further evaluation in this plan for regular fixed-route transit. This new intercity service may be eligible for discretionary inter-community funds and/or supportive of funding partnerships with neighboring transportation providers.*
  - ***Weekdays, 8AM – 5PM***
    - *Example: Ross Street Departures at 8AM, 9:30AM, 11AM, 12:30AM, 2PM, 3:30PM*
  - ***1½ Hour** Headways* ***1 New** Operating Bus*
  - *Total New Annual Operating Cost of **$168,600**.*
  - *Estimated Total of **3,000-4,000 Annual Rides** Estimated*
    - *Ridership estimates are lower for Molalla – Silverton due to lower demand from both Molalla residents working in Silverton and Silverton residents working in Molalla.*
  - *Addresses identified interest in new service as identified in survey findings, census commute information, and future transit demand*

Figure 12. Molalla to Silverton Route



- ***Commuter Service to Employment Areas**: SCTD could explore organized buses and/or shuttles to major employment areas, such as the Clackamas Industrial Area and the Woodburn Outlets. These services would need to be coordinated with major employment centers with employees living in SCTD's service areas. An existing SCTD bus could be used to transport commuters or shuttles could be purchased in the future to reduce operating costs. Commuter services have higher chances of directional deadhead miles; a bus operating in the reverse commute would likely have very low ridership. This new intercity service may be*

eligible for discretionary inter-community funds and/or supportive of funding partnerships with neighboring transportation providers.

- ***Weekdays, One Morning and One Evening Run***
- ***Two Scheduled*** *Runs per Day* ***1 New*** *Operating Bus*
- ***Ridership*** *and* ***costs*** *scenarios based on a 20-seat bus and varying amount of commuters to be determined via coordination with employment centers are as described in Table 3.*
- *Provides low-income and general population riders access to jobs, addresses need for service to employment areas as identified in the survey findings and the census commute demand information*

Table 3. Commuter Costs and Ridership

Commuters per Weekday	Annual Commute Rides	Vehicles to Accommodate Commuters	Annual Operating Cost
10	4,000 - 6,000	1	$74,900
20	9,000 - 11,000	1	$74,900
30	14,000 - 16,000	2	$149,800
40	19,000 - 21,000	2	$149,800
50	24,000 - 26,000	3	$224,800

- ***On-demand Shuttle Service****: Provide curb-to-curb shuttle service within the City of Molalla. Josephine County recently explored these types of programs. Preliminary costs for these services to be operated by a Transportation Network Company (TNC) such as Uber or Lyft were estimated from $400,000 to $525,000 annually and costs to be operate this type of service in-house were estimated from $585,000 to $837,000. Ridership estimates ranged from 9-15 rides during the peak hour and 119-188 daytime trips depending on efficiency. Each shuttle would be able to accommodate near 5-7 rides per hour (the Molalla City Loop currently averages 9.57 trips per hour). As these services would be intended for riders not currently on or near an SCTD route that serves their origin and destination and SCTD has a smaller service area, this analysis assumed the lower end of the ridership estimates, costs, and one shuttle vehicle to start service. ODOT expects providers to maintain GTFS-flex data for demand-response trip planning and is pursuing federal research funding to implement this data to the Open Trip Planner Oregon (https://getthereoregon.org).*
  - ***Weekdays 7AM – 6PM***
  - ***On-Demand*** ***1 New*** *Operating Shuttle*
  - *Total New Annual Operating Cost of* ***$200,000****.*
  - *Estimated Total of* ***16,000-18,000 Annual Rides*** *Estimated*
  - *Provides improved access to health-supporting destinations, especially for people with mobility issues, addresses transit demand for general and transit-disadvantaged population*

FUTURE ROUTING SERVICE OPPORTUNITY SUMMARY

Table 4 shows the estimated additional new bus, additional operating costs, and additional annual rides for each alternative, as well as the new cost for each new ride.

Table 4. Future Route Service Opportunity Summary

Opportunity		New Buses	Additional Annual Operating Cost	Estimated Additional Annual Rides	New Cost per New Ride
MC1	**Peak Hour Increased Frequency**	1	$65,600	5,500-6,500	$10.67
MC2	**Increased Frequency Throughout the Day**	1	$163,000	13,000-16,000	$11.00
MC3	**Simplified Route**	-	-	-	No Cost
MC4	**Serve More Streets**	-	-	-	No Cost
MC5	**Earlier Morning Service**	-	$32,800	2,500-3,500	$10.42
MC6	**Later Evening Service**	-	$32,800	2,500-3,500	$10.42
MC7	**Sunday Service**	-	$24,800	1,500-2,500	$11.26
Canby1	**West Side Only**	-	-	-	No Cost
Canby2	**East Side Only**	-	-	-	No Cost
Canby3	**Peak Hour Increased Frequency**	1	$72,800	4,000-6,000	$14.31
Canby4	**Increased Frequency Throughout the Day**	1	$181,300	12,000-14,000	$14.26
Canby5	**Earlier Morning Service**	-	$32,800	5,000-6,000	$5.86
Canby6	**Later Evening Service**	-	$32,800	500-1,500	$32.81
Canby7	**Saturday Service**	-	$39,300	3,500-4,500	$10.08
Canby8	**Weekend Service**	-	$78,500	7,000-9,000	$10.08
CCC1	**Henrici Road**	-	-	17,000-20,000	No Cost
CCC2	**Leland Road**	-	-	3,500-5,000	No Cost
CCC3	**Peak Hour Increased Frequency**	1	$75,800	3,500-5,000	$17.95
CCC4	**Increased Frequency Throughout the Day**	1	$94,700	8,500-10,500	$9.97
CCC5	**Earlier Morning Service**	-	$19,000	Up to 1,000	$63.20
CCC6	**Later Evening Service**	-	$37,900	Up to 1,000	$378.68
CCC7	**Sunday Service**	-	$40,800	4,000-6,000	$8.16
Woodburn		1	$168,600	9,000-11,000	$16.99
Estacada		1	$149,800	1,000-2,000	$115.77
Silverton		1	$168,600	3,000-4,000	$48.84
Commuter Service to Employment Areas		Varies	Varies	Varies	$7.34 - $14.69
On-Demand Shuttle		1	$200,000	16,000-18,000	$11.90

INFORMATION & TECHNOLOGY

Information and technology services can improve the ridership experience and increase ridership by improving ease of transit use and providing information to SCTD. The following sections describe the potential implications and high-level cost estimates for information and technology improvements, including real-time vehicle arrival information, fare payment options, online/mobile trip planning tools, and cameras. The impacts to transit ridership vary strongly by provider when implementing these services and thus ridership is not explored for these improvements.

In addition to improving existing service, data gathered from technologies such as real-time vehicle arrival information and AVL can help to analyze the performance of existing and future service opportunities. For example, AVL data could be assessed to adjust schedules based on delay points and improve transfer connections.

Real-Time Vehicle Arrival Information

SCTD posts schedules for all routes but does not currently provide real-time vehicle arrival information. Real-time information helps improve the ridership experience by reducing passenger wait times, providing confidence that a bus has not been missed, and generally creating a more informed and comfortable rider. This information can be made accessible via SCTD's website, smartphones, and through "push" technologies such as text messages. TCRP Synthesis 48 reports costs for AVL system implementation of smaller systems (10-25 AVL-equipped vehicles), with total capital cost between $60,000 and $171,000 and per-vehicle cost between $3,000 and $8,101. However, these cost data were collected when the technology was newer; improved system efficiencies have led to decreased costs. These costs should be explored further with vendors. SCTD is in the process of investigating AVL technology. ODOT encourages providers to buy systems that support GTFS-Realtime (GTFS-rt).

Fare Payment Options

Fare payment options include smart card-based electronic fare collection systems, mobile ticketing, and more. Offering additional fare payment options may increase ridership; several survey respondents and drivers noted that the existing paper ticket and $1 bill system was constraining and confused new riders. In addition to potential ridership increase and improved customer experience, transitioning to mobile systems would reduce the effort of collecting and processing paper tickets and $1 bills. Costs can range for implementation; large systems estimate $35,000 to $50,000 per vehicle to upgrade and smaller systems have implemented as low as $21,000 per vehicle.[1] Additionally, there exists the potential for administration savings as well as an improved ability to make minor adjustments to fares over time, as the coinage barrier is lowered. Currently, SCTD is participating in a regional effort among smaller rural transit providers to study the feasibility of an integrated, regional fare collection system to provide seamless transfers across different transit providers. The study is funded through a STIF Discretionary grant program. ODOT encourages providers to buy systems that support GTFS-ride data format for fare collection systems and/or automated passenger counters.

Online/Mobile Trip Planning Tool

Trip planning tools can help the public get travel information at any day or time. While some providers create proprietary trip planning tools, free and readily available trip planning tools are available and more fitting to SCTD's size and needs. These tools include Google Maps, OneBusAway, Moovit, and Transit. All of these tools depend on the open data format for GTFS-Realtime. SCTD now offers a Google Maps-based trip-planning tool, available from its website. The trip planner provides step-by-step transit directions to get to a destination using SCTD buses, as well as other regional transit services.

Cameras

On-vehicle surveillance provides for documentation of criminal acts and can also be used to absolve the transit agency of fault in litigation involving passenger incidents. Security cameras (Closed Circuit Television, or CCTV) should also be considered for transit centers.

[1]https://www.itsknowledgeresources.its.dot.gov/ITS/benecost.nsf/ID/3960B2C6B48F4EE785257F0F004DDAE0?OpenDocument&Query=CApp

CCTV can be used to enhance safety and security at transit centers. Criminal behavior can be documented and recordings used to help prosecute perpetrators. In addition, the presence of a camera at a transit center can deter criminal activity and add to the sense of security for riders. For that reason, the presence of the cameras at the transit centers should be communicated. CCTV cameras pointed at a bicycle parking area can enhance security for bike parking that may be located at or next to a transit center.

CCTV can act as standalone units that record video that can be accessed as needed in response to an incident. They can also be paired with many other technologies, such as radio communications, silent alarms, and Automatic Vehicle Location (AVL) to create a broader security system Currently, SCTD operates 2 security cameras on all buses.

FACILITIES IMPROVEMENTS

Facilities improvements include transit centers and major stops, bus stops, fleet improvements, bicycle and pedestrian amenities, park-and-ride lots, and other bus and administrative facilities. Similar to information and technology improvements, safe and comfortable facilities can improve the ridership experience and increase ridership by improving stop visibility, providing protection from poor weather, and improving access to transit. The following sections describe the potential implications and high-level cost estimates for facility improvements, but do not include ridership estimates as these vary significantly by provider and community. Many cost estimates are based on *Transit in Small Cities: A Primer for Planning, Siting, and Designing Transit Facilities in Oregon*.[2]

Transit Centers and Major Transit Stops

Transit centers provide a transfer point for bus routes, while major transit stops are typically provided at major activity centers. In addition to providing greater passenger amenities that improve rider comfort, transit centers and major transit stops provide visibility for the transit service, reminding residents and visitors of the availability of the service within their community. Currently, transit centers are provided at Canby, CCC, and Ross Street within SCTD's system. Major bus stops within the system could include the Molalla Safeway. As service and ridership increase, SCTD could consider enhancing other bus stops to improve rider experience. The following key concepts should be considered when constructing transit centers or major transit stops:

- *The location of the stop or transit center should consider pedestrian access to nearby destinations, ease of access by bus that reduces out-of-direction travel and allows for safe bus operations, and a location that is highly visible, both to publicize the service and to enhance rider safety and security.*
- *The stop or transit center should be sized to accommodate planned 20-year growth, both in terms of the number of buses accommodated and the size of rider amenities, such as a passenger shelter.*
- *Materials used should consider life-cycle costing, which usually points toward high quality, long-lasting materials that have lower on-going maintenance costs. This feature is especially important in coastal communities that are subject to high winds, heavy rains, and salt air.*
- *The stop or transit center design should use Crime Prevention Through Environmental Design (CPTED) principles to improve rider security. CPTED principles include maintaining clear sight lines into and across the station, eliminating "hiding" spots, and providing adequate lighting.*

[2]http://www.oregon.gov/LCD/TGM/docs/fulltransitprimer4-4-13.pdf

- *Public art should be considered for transit centers. Art has been shown to discourage vandalism and can also be used to involve the local art community in the transit center project. Regulations now require that public art funded through FTA be "functional." Art associated with railings, benches, pavement, windscreens, or any other element of the shelter would meet the FTA requirement. Free-standing art, such as a sculpture, would not.*
- *Information case should be located at transit centers and at some major stops to provide system-wide data, transfer times between routes, and general schedule and overall system information.*

Current bus stops that have more than ten boardings a day should be considered major stops, and merit consideration for a higher level of improvement (relative to the base level amenities found at all bus stops), such as a shelter or information case. Though the March 2019 onboard survey indicated the Molalla Safeway as the only major stop outside of transit centers, consistent stop-level ridership information may identify other stops, such as the Molalla Adult Center or Canby Fred Meyer, as major stops. Final decisions about transit center locations and other stop improvements depend on the final service network.

Bus Stops

Waiting at a bus stop is generally the first part of a rider's journey on SCTD's transit system, and a comfortable and safe stop helps enhance the transit system. Designated bus stops have the following advantages:

- *They provide awareness of the service, improving the visibility of SCTD in the community.*
- *The stop can be located to assure safe bus and passenger access.*
- *The stop can be improved with a paved landing pad, for example, to facilitate access by riders needing to use the bus lift or ramp.*
- *They can consolidate access, reducing the number of stops a bus makes.*
- *They can help communicate service if information such as route numbers are included on the signs.*

The cost for a new bus stop signage and pole, installed, can range from $300 to $1,000, depending on the material and the installation conditions. It is recommended that route names be placed on the signs to assist riders in identifying the service. Bus stop displays with specific route, schedule, and fare information can also be very helpful, though they require updating when there are services or fare changes, which adds to operating cost. If service and fare changes are relatively infrequent, the more specific rider information at the highly used bus stops is recommended. This option is especially important in areas where visitors tend to use the SCTD service, because they are less likely to be familiar with the fares, routes and schedules.

Bus stops should be located to allow for safe bus and passenger access. Where possible, bus stops would be located at locations that have existing or planned sidewalks or other pedestrian connections, and that allow for safe pedestrian crossing of the street. On major roadways, such as state highways, bus stops should allow for the bus to stop out of the traffic lane to avoid rear end collisions and discourage unsafe passing of the bus by motorists. Major bus stops should have some lighting and accommodations for bicycle parking such as racks.

Locations identified for improvements in the Molalla TSP Update include:

- *OR 213/ Meadow Drive (NB)*
- *OR 213/ Toliver Road*
- *OR 211/ OR213 (EB)*
- *OR211/ Leroy Avenue (EB)*
- *OR211/ Kennel Avenue (EB)*
- *Meadow Drive / Meadowlawn Place/ Toliver Road*

Shelters

Passenger shelters add to the comfort of using transit and are generally very popular with riders. An "off the shelf" passenger shelter (there are several companies that provide them) typically costs approximately $6,000 plus installation. In addition to initial capital costs, passenger shelters will incur maintenance costs, both for routine on-going cleaning and repair and replacement as needed. The primary maintenance issues for shelters, apart from the routine cleaning, are vandalism and fading/clouding of the windscreen. For routine cleaning, trash receptacles, if included, would dictate the frequency that the shelter should be serviced. If trash receptacles are not provided, the regular cleaning and servicing of shelters can be as low as once per month.

Passenger shelters must be designed to meet the requirements of the Americans with Disabilities Act (ADA) and should be located so as to provide safe and convenient pedestrian connections with nearby destinations. Coordination of shelter placement with sidewalk and other pedestrian improvements projects planned by Oregon Department of Transportation (ODOT) or local agencies is encouraged. In addition to the overhead protection (roof), shelter amenities can include:

- *Windscreens*
- *Benches*
- *Trash receptacles*
- *Passenger information*

Passenger shelters are recommended at high-use stops and all transit centers. SCTD currently has 8 bus stops with shelters, some of which have schedule boards. All major stops should have shelters; all currently do, but shelters should be installed at major stops moving forward. The condition of existing shelters at these locations should be reviewed and additional amenities considered, although final prioritization depends on the future service plan.

There is a tradeoff between the level of wind/weather protection provided through the use of windscreens and an open shelter design, without a windscreen, that reduces maintenance costs. If vandalism is not a major problem for SCTD, windscreens are recommended for SCTD shelters both to address winds and because the infrequent service can lead to longer wait times which suggests the need for a higher level of protection from the weather. Glass in lieu of acrylic should be considered to address weathering and fading issues.

Benches

An alternative to a shelter for a stop that has less ridership is a bench. Benches should be considered for stops with at least three boardings per day, although other factors, such as the proximity to senior housing and nearby businesses willing to contribute to the costs, should be factored into the decision a well. Benches that attach to the bus stop pole, such as the Simmi-Seat (see Figure 12) take up very little space, have low maintenance, and are relatively inexpensive. Installed benches vary in price from $500 to $1,500, depending on materials, the quality of the product, and the installation conditions.

Figure 13. Simmi Seat

Fleet Improvements

This section reviews the opportunities for the existing and future fleet, including fuel types and low floor bus options. Clean and operational vehicles improve rider experience and properly-maintained and replaced vehicles reduce

the likelihood of vehicle breakdowns and/or disruptions to service. The following sections describe the existing transit fleet and potential fleet improvements.

Vehicle Types

SCTD currently owns six buses and regularly operates five of them, with one bus in reserve. The average age of the active fleet is 2.3 years of use. A summary of the current fleet is shown in Table 5, below.

Table 5. Transit Fleet

Asset Model	Year	Seats	ADA Seats	Last Condition	Odometer Reading	EUL Category	Fuel Type	Status
Van	2014	16	2	Poor	283,614	7 yrs/200,000 miles	Diesel	Reserve
Starcraft Allstar XL	2016	20	2	Poor	151,024	7 yrs/200,000 miles	Diesel	Active
Starcraft Allstar XL	2016	20	2	Adequate	192,468	7 yrs/200,000 miles	Diesel	Active
Starcraft Allstar XL	2018	20	2	Excellent	97,815	7 yrs/200,000 miles	Diesel	Active
Starcraft Allstar XL	2018	20	2	Excellent	74,598	7 yrs/200,000 miles	Diesel	Active
Starcraft Allstar XL	2018	20	2	Excellent	58,284	7 yrs/200,000 miles	Diesel	Active

Of the active fleet, three vehicles are in excellent condition, one in adequate condition, and one in poor condition. Two vehicles are above 150,000 miles, nearing their expected useful life (EUL) of 200,000 miles and potentially needing replacement sooner than their 7-year EUL timelines. SCTD operates approximately 250,000 vehicle revenue miles per year. With EUL's of 200,000 miles, SCTD is anticipated to need a replacement vehicle every 1.25 years on average. This replacement schedule, alongside any increases to service that accelerates the rate of fleet replacement, should be taken into consideration when developing a fleet plan.

The fleet plan should also address the types of vehicles to be purchased. Transit agencies face the issue of balancing the efficiency advantages of fleet standardization with the benefits of matching vehicle size and other vehicle attributes with specific service needs. Benefits of fleet standardization are greater flexibility in vehicle assignments and a reduced need for spare vehicles since sub-fleets each require their own spare vehicles, and smaller fleets typically require a greater spare ratio. In addition, fleet standardization reduces maintenance costs by requiring less parts inventory and letting mechanics focus on a reduced number of vehicle models, which allows them to become more familiar with the specific maintenance requirements of those vehicles. The benefit of having several diverse vehicle types is that a vehicle can be more closely tailored to a specific service need or operating environment. For example, the on-demand shuttle alternative would be more appropriately served by a small, shuttle-type vehicle, while a longer route, such as the intercity services, would be better served by larger buses with amenities such as softer seats and reading lights.

Other recommendations for the fleet are:

- *Purchase vehicles in larger batches. There is an advantage in having multiple vehicles that are identical in terms of parts and maintenance needs. Even very similar vehicles purchased in different years will have differences that may impact maintenance costs.*
- *Maintain an average fleet age that is less than half of the average life span of the vehicles. For example, a sub-fleet of 10-year buses should have an average fleet age of five years or less.*
- *One concern of the one-bag rule was spilled groceries rolling into the driver area; consider vehicles that would elevate the driver seat and reduce the need for the one-bag rule.*

Fleet Size

The size of the fleet is determined by the service needs, and a final size recommendation will be made once the future service plan has been established and financial forecasts are finalized.

Typically, a 20 percent spare ratio is recommended. Adequate spare buses are particularly important for small fleets, since one or two buses that are out of service for an extended period can have a significant impact on the ability to meet service needs. In addition, with some routes operating with long headways, missing a trip due to not having an available spare bus will have a significant impact on service.

There are two approaches to establishing the spare fleet. One approach is that spares are composed of older buses that are no longer cost-effective for daily service but are maintained to the point that they can be used on a limited basis. Typically, the maintenance costs to keep the older buses in running condition are higher than for a newer bus.

The other option is to have a spare fleet that is similar in age to the in-service fleet. In this case, the spare buses can be rotated into service, which can reduce the mileage accrued on individual vehicles and extend vehicle life. In addition, the incidence of road calls with a newer spare fleet is likely to be lower.

Fuel Types

SCTD has been purchasing diesel buses. While diesel engines have been getting "cleaner" as a result of stricter federal emissions standards, SCTD could consider the purchase of lower-emission vehicles, such as buses using hybrid-electric propulsion. A bus with hybrid-electric propulsion costs $150,000 to $200,000 more than a similar bus with diesel propulsion but will generally reduce fuel costs by approximately 25 to 30 percent. Given these costs and savings, the payback on the initial higher purchase price is very likely to be insufficient to justify the purchase of hybrid-electric buses simply on a direct cost-benefit basis. However, some transit agencies believe that there is additional value to hybrid technology resulting from reduced emissions and an improved community perception of the transit agency. In addition, there are occasionally federal funding incentives for the purchase of low-emission buses that may make the purchase of hybrid-electric buses more feasible.

There have also been substantial advancements in all-electric buses. A promising option for all-electric bus technology appears to be quick re-charging of batteries while the bus is stopped at a station or at a layover spot, often without substantial service delay. TriMet is testing a quick re-charge station at the Sunset Transit Center and a few transit agencies in Oregon have purchased several all-electric buses and installed charging stations at their vehicle storage yards. Other agencies can learn from their experiences and should consider accommodating higher-voltage electrical connections at new or reconstructed stations. This can simply involve incorporating the appropriate conduit when the facility is constructed.

A third fuel type option is compressed natural gas (CNG) buses. Natural gas is an abundant, domestically produced fuel that is used in transit vehicle throughout the United States. Advantages of CNG buses include the current low cost of natural gas, which is typically from 25 to 45 percent lower than a gallon of diesel fuel. Another advantage is that CNG buses typically produce approximately 20 percent less greenhouse gases when compared with diesel buses. Challenges in using CNG is the additional cost of purchasing new vehicles (typically $25,000 to $50,000 more than comparable diesel models) need to have duel fueling facilities, the availability of natural gas, CNG storage, and development of an implementation schedule in regards to fleet conversion.

Low Floor

The transit vehicle market is trending toward low-floor buses. Low-floor buses eliminate the steps in the vehicle, provide easier access for riders, speed boarding and alighting, and are much easier for drivers to operate than

traditional lifts. This is particularly important for riders with mobility challenges, and for people who may have strollers or carts. Routes with challenging topography and stops where it is difficult to maintain an ADA-compliant slope on the ramp, for example, are best served by buses with lift systems to accommodate passengers with disabilities. Eventually, as part of the normal bus replacement schedule and as sidewalk infrastructure improves, replace any remaining high-floor buses with low-floor models. SCTD has recently tested a low-floor demo bus on the Molalla City route for a day, with excellent reviews from both riders and drivers.

Bicycle and Pedestrian Amenities

Bicycle and pedestrian access is very important to transit. Virtually every bus rider is also a pedestrian, and bicycles provide an important "last mile" option for transit, particularly for a system such as SCTD which serves residents that may be fairly dispersed. While SCTD is not able to provide safe and convenient pedestrian access to transit stops on its own, SCTD can work with local cities and Clackamas County to prioritize pedestrian improvements that serve transit stops. In addition, pedestrian improvements in the immediate vicinity of a transit center or shelter can sometimes be funded by other projects.

It is of particular importance and a legal requirement to provide for access by persons with disabilities. Transit centers, shelters, and new or relocated bus stops should be designed to meet the requirements of the ADA. It is recommended that cities, the county, and ODOT prioritize street corners near transit centers and shelters for ADA ramps. This is also particularly relevant to SCTD due to the high proportion of persons with disabilities in its service district.

The bicycle/transit connection can be facilitated by providing for bike parking at transit centers and, space permitting, transit shelters. Proposed development code amendments to encourage bike parking can be explored further in Memo 8: Transit Benchmarks, which includes potential policy and plan amendments. All SCTD buses have the capability to carry bikes, and the agency should make this information more prominent on its website and other promotional materials.

Locations identified in the Molalla TSP Update for pedestrian improvements include:

- *OR 213*
- *OR 211*
- *Molalla Avenue*
- *Toliver Road*
- *Shirley Street*
- *Ridings Avenue*
- *Leroy Avenue*
- *E 5th Street*
- *Cole Avenue*
- *Mathias Road*
- *Frances Street*
- *Kennel Avenue*
- *E Heintz Street*
- *Industrial Way*
- *Stowers Road*
- *E 7th St*

Locations identified in the Molalla TSP Update for bicycle improvements include:

- *OR 213*
- *OR 211*
- *Molalla Avenue*
- *Toliver Road*
- *Shirley Street*
- *Mathias Road*
- *Leroy Avenues*
- *5th Street*
- *Ridings Avenue*
- *Cole Avenue*
- *Frances Street*

Park-and-Ride Lots

Park-and-ride lots are typically feasible in situations where there is either a parking charge or parking shortages at the rider's destination, or if there is a substantial savings in travel cost or time by using transit. Without one or more of these factors, park-and-ride use is generally very low.

The intercity park-and-ride demand is likely to be relatively small due to free parking at CCC and near the Canby Transit Center. Thus, it may not make sense for SCTD to invest in a substantial park-and-ride program. Instead, agreements with local business, local government, and community organizations that allow use of a few spaces for "informal" park-and-ride usage is recommended, such as the parking lot near Ross Street Transit Center. This approach can be used to test park-and-ride demand without a substantial investment by SCTD. Proposed development code amendments to allow for informal systems can be explored further in Memo 8: Transit Benchmarks, which includes potential policy and plan amendments.

NEXT STEPS

The Project Management Team and Technical Advisory Committee will review the future service opportunities and provide comments, revisions, and initial screening for the service opportunities to evaluate further. These opportunities will be evaluated using the criteria identified in *Memo #5: Evaluation Framework* and prioritized based on their evaluation in *Memo #7: Future Service Opportunities Evaluation and Prioritization and Monitoring Program*.

APPENDIX

A. Service Opportunity Development Methodology

APPENDIX A SERVICE OPPORTUNITY DEVELOPMENT METHODOLOGY

Cost estimates are calculated using the cost per hour rates developed in *Memo #2: Existing Conditions*. Ridership estimates are developed depending on the type of service alternative:

- *Molalla City Loop service hour expansions (MC1, MC2, MC5, MC6, MC7) are estimated using TCRP Report 161 methodology.*
- *Routing changes (MC3, MC4, Canby1, CCC1) are estimated comparing population and employment capture in a ¼ mile radius from transit service.*
- *Increased frequency on the CCC and Canby are estimated based on TCRP Report 95 guidance, where every 1% increase in transit service frequency corresponds to an 0.5% increase in ridership for general areas and 0.9% increase in ridership for central business districts (Canby2, Canby3, CCC2, CCC3).*
- *Expanded service hours on the CCC and Canby are estimated based on commute departure time to work information and availability of transit to work and back from a 9-hour workday (Canby4, Canby5, Canby 6, CCC4, CCC5). Departure time for work is based on Census information.*
- *Additional weekend service on the CCC and Canby are estimated based on existing weekday and weekend ridership (Canby7, Canby8, CCC6).*
- *New intercity services are estimated based on census information on departure time for work, commute demand, and existing rider characteristics on SCTD intercity services. An example of Molalla to Canby Service Opportunities' projected ridership factors are shown below.*

Table A-1. CCC Departure Time for Work Documentation

Departure Time for Work	Number of Commuters	Percent of Commuters	Transit Available for Commuter?		
			Current	Add Morning Service	Add Morning and Evening Service
12:00 a.m. to 4:59 a.m.	519	13%		X	X
5:00 a.m. to 5:29 a.m.	304	8%	X	X	X
5:30 a.m. to 5:59 a.m.	344	9%	X	X	X
6:00 a.m. to 6:29 a.m.	429	11%	X	X	X
6:30 a.m. to 6:59 a.m.	610	16%	X	X	X
7:00 a.m. to 7:29 a.m.	511	13%	X	X	X
7:30 a.m. to 7:59 a.m.	341	9%	X	X	X
8:00 a.m. to 8:29 a.m.	177	5%	X	X	X
8:30 a.m. to 8:59 a.m.	154	4%	X	X	X
9:00 a.m. to 9:59 a.m.	168	4%	X	X	X
10:00 a.m. to 10:59 a.m.	42	1%	X	X	X
11:00 a.m. to 11:59 a.m.	51	1%			X
12:00 p.m. to 3:59 p.m.	116	3%			X
4:00 p.m. to 11:59 p.m.	153	4%			
Total	**3,919**	**100%**			
Sum of Commuters with Transit Access for Departure Time for Work			97%	97%	97%
Growth Factor from Current Percent of Commuters Served				0.16	0.21
Existing Oregon City TCRP 161 Commuter Demand	1,800	**Projected Additional Ridership**		***300***	***400***

Table A-2. Canby Departure Time for Work Documentation

Departure Time for Work	Number of Commuters	Percent of Commuters	Transit Available for Commuter?				
			Pre-August 2019	Current	Add Morning Service	Add Evening Service	Add Morning and Evening Service
12:00 a.m. to 4:59 a.m.	519	13%					
5:00 a.m. to 5:29 a.m.	304	8%			X		X
5:30 a.m. to 5:59 a.m.	344	9%			X		X
6:00 a.m. to 6:29 a.m.	429	11%			X		X
6:30 a.m. to 6:59 a.m.	610	16%		X	X	X	X
7:00 a.m. to 7:29 a.m.	511	13%		X	X	X	X
7:30 a.m. to 7:59 a.m.	341	9%	X	X	X	X	X
8:00 a.m. to 8:29 a.m.	177	5%		X	X	X	X
8:30 a.m. to 8:59 a.m.	154	4%		X	X	X	X
9:00 a.m. to 9:59 a.m.	168	4%				X	X
10:00 a.m. to 10:59 a.m.	42	1%				X	X
11:00 a.m. to 11:59 a.m.	51	1%					
12:00 p.m. to 3:59 p.m.	116	3%					
4:00 p.m. to 11:59 p.m.	153	4%					
Total	**3,919**	**100%**					
Sum of Commuters with Transit Access for Departure Time for Work			9%	47%	75%	52%	80%
Growth Factor from Pre-August 2019 Percent of Commuters Served				4.22	7.33	4.78	7.89
Existing Canby TCRP 161 Commuter Demand	1,800	**Projected Additional Ridership**		***7,600***	***13,200***	***8,600***	***14,200***