City of Oregon City

625 Center Street
Oregon City, OR 97045
503-657-0891

Meeting Agenda

City Commission

Tuesday, November 12, 2019 | **6:00 PM** | **Commission Chambers**

Work Session

1. Convene Work Session and Roll Call

2. Future Agenda Items

The Commission's adopted goals and available staff resources shall be considered when recommending future agenda items. The Commission may add an item to a future agenda with consensus of the Commission.

2a. 19-629 List of Future Work Session Agenda Items

Sponsors: City Manager Tony Konkol
Attachments: List
Ranking of Future Work Session Items

3. Discussion Items

3a. PC 19-121 Downtown Transportation Demand Management (TDM) Plan Implementation Update Including After-Hours Parking Program

Sponsors: Community Development Director Laura Terway
Attachments: Staff Report
Draft Shared Parking Signage Design
Adopted TDM Plan

3b. PC 19-120 Beavercreek Road Concept Plan: Beavercreek Road Design

Sponsors: Public Works Director John Lewis and Community Development Director Laura Terway
Attachments: Staff Report
Staff Memo
Roundabout Conceptual Study
Beavercreek Road Design Survey Link
November 4, 2019 ODOT Letter
DKS Associates Analysis (August 6, 2019)
DKS Associates Analysis Appendix
DKS Transportation Zone Change Memo (June 21, 2019)
Citizen Comment Received

3c. 19-626 2020 City Commission Meeting Calendar

Sponsors: City Recorder Kattie Riggs
Attachments: Staff Report
Draft Calendar for 2020

4. City Manager's Report

4a. 19-631 Metro’s 2020 Transportation Investment Measure Presentation

Sponsors: Public Works Director John Lewis
Attachments: Staff Report
Metro Staff Recommended Investment Package

5. Commission Committee Reports

a. Beavercreek Employment Area Blue Ribbon Committee - Commissioner Frank O'Donnell

b. Brownfield Grant Committee - Mayor Dan Holladay

c. Citizen Involvement Committee Liaison - Commissioner Rachel Lyles Smith

d. Clackamas County Coordinating Committee (C4) - Mayor Dan Holladay and Commissioner Rachel Lyles Smith

e. Clackamas Heritage Partners - Commissioner Rocky Smith, Jr.

f. Downtown Oregon City Association Board - Commissioner Denyse McGriff

g. Metro Policy Advisory Committee (MPAC) - Commissioner Rachel Lyles Smith

h. Oregon Governor's Willamette Falls Locks Commission - Mayor Dan Holladay

i. South Fork Water Board (SFWB) - Mayor Dan Holladay, Commissioners Frank O'Donnell and Rocky Smith, Jr.

j. Willamette Falls and Landings Heritage Area (Previously Willamette Falls Heritage Area Coalition) - Commissioner Denyse McGriff

k. Willamette Falls Legacy Project Liaisons - Mayor Dan Holladay and Commissioner Frank O'Donnell

6. Adjournment

Citizen Comments: The following guidelines are given for citizens presenting information or raising issues relevant to the City but not listed on the agenda.

**Complete a Comment Card prior to the meeting and submit it to the City Recorder.*
**When the Mayor calls your name, proceed to the speaker table and state your name and city of residence into the microphone.*
**Each speaker is given 3 minutes to speak. To assist in tracking your speaking time, refer to the timer on the table.*
**As a general practice, the City Commission does not engage in discussion with those making comments.*
**Electronic presentations are permitted, but shall be delivered to the City Recorder 48 hours in advance of the meeting.*

Agenda Posted at City Hall, Pioneer Community Center, Library, City Web site.
Video Streaming & Broadcasts: The meeting is streamed live on Internet on the Oregon City's Web site at www.orcity.org and available on demand following the meeting. The meeting can be viewed live on Willamette Falls Television on channel 28 for Oregon City area residents. The meetings are also rebroadcast on WFMC. Please contact WFMC at 503-650-0275 for a programming schedule.

City Hall is wheelchair accessible with entry ramps and handicapped parking located on the east side of the building. Hearing devices may be requested from the City Recorder prior to the meeting. Disabled individuals requiring other assistance must make their request known 48 hours preceding the meeting by contacting the City Recorder's Office at 503-657-0891.

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Staff Report

File Number: 19-629

Agenda Date: 11/12/2019

Status: Agenda Ready

To: City Commission

Agenda #: 2a.

From: City Manager Tony Konkol

File Type: Report

SUBJECT:
List of Future Work Session Agenda Items

BACKGROUND:
Next Month (These items may get moved depending upon various circumstances)
Tourism Strategy Update
Temporary Obstructions in the Right-of-way (Letter recieved from Oregon City Chamber of Commerce)
Planning Fee Adjustments

Additional Upcoming Items (These items are in no particular order)
Abandoned Buildings
Beavercreek Concept Plan Implementation
Canemah Area - Obstructions in the Right-of-Way
Clackamas County Water Environmental Services (WES) Rate Differential
Climate Action Plan Presentation (City of Milwaukie)
Code Enforcement Complaint Process
Construction Excise Tax (CET)
Cross Street and Utility Pole Banners
Marijuana Tax and Funds from the Tax Discussion
Policies for Non-Profits - Discussion
South Fork Water Board - Mountain Line Easements Vacation
Transportation Demand Management (TDM) Plan Implementation Update
Union Pacific Railroad Quiet Zone Project
Water System Risk and Resiliency Review
Willamette Falls Legacy Project Operations and Maintenance Discussion

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Willamette Falls Legacy Project Operations and Maintenance Discussion

Future Work Session Topics	Ranking	
Code Amendments: Shelters	1	Done 8/13 and 9/18
Clackamas County Director of Housing and Housing Services, Jill Smith, presenting on the Metro Housing Bond and the Holcomb Blvd property	2	Done 7/17
Canemah Area – Obstructions in the Right-of-Way	3	10/16/2019, again in 2020
Code Amendments: Approach to Short-Term Rental Policy	4	Done 9/10
Water Capital Improvement Project (CIP) List Discussion, Rate Study and Changes to System Development Charges	5	Done 8/7
Buildable Land Inventory and Housing Needs Analysis Presentation	6	Done 10/8
Joint Work Session with PRAC: Clackamette Park Boat Ramp	7	10/8, again in 2020
Beavercreek Concept Design and Parks/Transportation Needs Analysis	8	11/12, again in 2020
Policies for Non-Profits - Discussion	9	
Available Public Parking and Parking Signage Discussion	10	Scheduled for 11/12/2019
Homelessness Presentation by Oregon City Police and Parks Departments	11	Done 9/18
Joint Work Session with Planning Commission: New DLCD Landslide Guide	12	Done 10/8
WFLP Operations and Maintenance Discussion	13	
Joint Work Session with OC Together, Oregon City School District, and Oregon City Police Regarding Resources for Marijuana Education (tentative)	14	Done 8/13
Marijuana Tax and Funds from the Tax Discussion	15	
Clackamas County Water Environmental Services (WES) Rate Differential	16	
Construction Excise Tax (CET)	17	
Transportation Demand Management (TDM) Plan Implementation Update	18	Scheduled for 11/12/2019
Align Oregon City Food Cart Definitions with Portland Food Cart Pod Group/Design Standards/SDC's	19	Done 9/10
Code Enforcement Complaint Process	20	
Cross Street and Utility Pole Banners	21	
South Fork Water Board - Mountain Line Easements Vacation	22	
Union Pacific Railroad Quiet Zone Update	23	
Climate Action Plan Presentation (City of Milwaukie)	24	
Food Cart Pod on specific publically owned property	25	Done 9/10
Abandoned buildings	26	
Plastic bag and container ban	REMOVE	

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Staff Report

File Number: PC 19-121

Agenda Date: 11/12/2019

Status: Agenda Ready

To: City Commission

Agenda #: 3a.

From: Community Development Director Laura Terway

File Type: Planning Item

SUBJECT:

Downtown Transportation Demand Management (TDM) Plan Implementation Update Including After-Hours Parking Program

RECOMMENDED ACTION (Motion):

No action is needed by the Commission.

BACKGROUND:

Transportation Demand Management Implementation

In 2017, the City Commission adopted a Transportation Demand Management Plan for the Willamette Falls Legacy Project and surrounding downtown area. The plan lays out future actions that will improve access to the Riverwalk and to downtown Oregon City through improved management of parking and transportation. The goal of the plan is to “increase the universe of trips” while minimizing congestion by creating safe connections to the Riverwalk, using multiple transportation modes, and managing parking efficiently.

The Transportation Demand Management (TDM) Plan will add parking and trip capacity to our downtown, benefiting business owners, employees, customers, and residents. The City has gathered a Working Group of stakeholders to implement the plan and has been awarded a Regional Travel Options grant to fund the next three years of TDM projects.

The projects proposed and underway for the next three years include:

1. After Hours Parking Program (see details below)
2. Data Collection, including a new parking study and a Travel Behavior Survey
3. A pedestrian, bicycle, and wayfinding needs inventory and action plan
4. Coordination with the Riverwalk team to plan for the Riverwalk parking

The group has been hard at work coordinating and implementing the TDM plan. Staff will discuss recent projects including data collection and an after-hours parking program.

After Hours Parking Program

The City of Oregon City, in conjunction with the downtown Transportation Demand Management (TDM) Working Group, is facilitating an After-Hours Shared Parking program for downtown Oregon City. The City hopes to work with owners of downtown and bluff area parking lots to make their parking spaces available to the general public during evening and weekend hours when the parking lot is not utilized for the primary business. The intent of this program is to provide convenient parking for downtown visitors and customers in the busy evening and weekend hours, when many restaurant and retail uses on Main Street are at their peak.

The City is seeking property owners who would like to participate in the program. The details of the program will be captured in an agreement between the City and each participating property owner. Our current assumptions include:

- The parking will be free of charge. In the future, paid parking may be pursued with an amended agreement.
- The hours of public parking are proposed as 6PM to midnight on weekdays and 7AM to midnight on weekends, or otherwise determined by the needs of the property owner.
- The City will provide attractive signage to advertise the parking lot with the hours and business name or logo. This sign will also indicate that the property owner is not liable for damage to vehicles.
- The Downtown Association clean team will ensure that the parking lot is cleaned of any debris resulting from the after-hours use.
- Property owners may opt out of the program for any reason with notice to the City.

The City plans to include the City Hall parking lot in the program, and staff has been in touch with two downtown property owners who are interested in participating.

BUDGET IMPACT:
Amount: $150,000 of grant funding for TDM work, plus $1,000 - $2,000 in funding for parking lot signage.
FY(s): now through 2022
Funding Source: Regional Travel Options grant, Tourism budget for signage

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FREE
AFTER HOURS
PUBLIC PARKING

WEEKDAYS
6PM - 12AM

WEEKENDS
7AM - 12AM

COURTESY OF
OREGON CITY

PRIVATE PARKING ONLY DURING BUSINESS HOURS

NO OVERNIGHT PARKING

PARK AT OWN RISK.

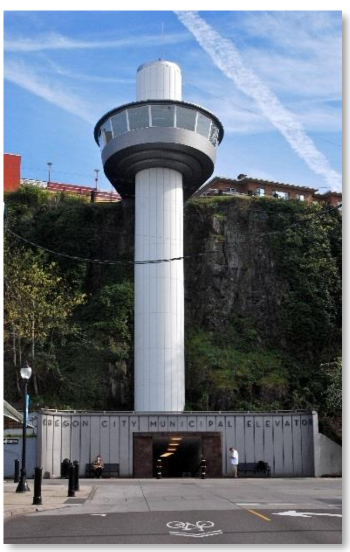
2017

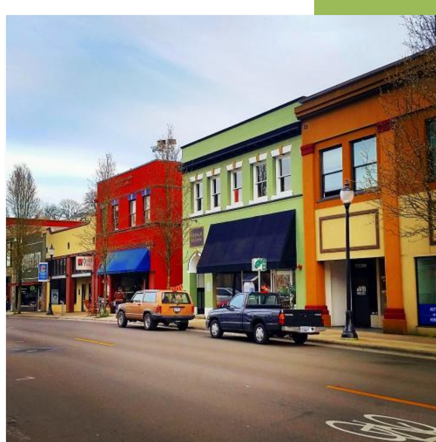
City of Oregon City, Oregon
Transportation Demand Management Plan

PROJECT SUMMARY AND RECOMMENDATIONS FOR TRANSPORTATION DEMAND MANAGEMENT

FINAL REPORT

November 2017





RICK WILLIAMS CONSULTING
Parking & Transportation

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IX. APPENDICES

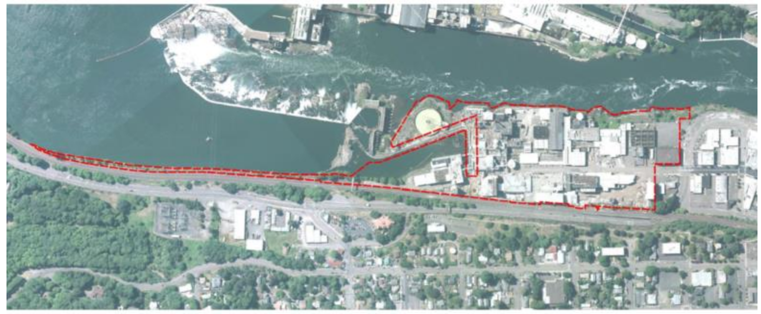
Appendix I. 2016 Oregon City Parking Study

Appendix II. Stakeholder Engagement Summary

City of Oregon City: Transportation Demand Management Plan

I. BACKGROUND

Figure A: Project Study Area

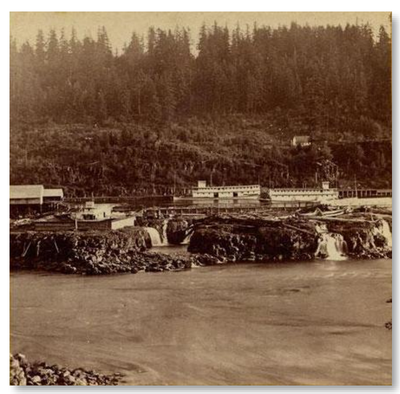


The City of Oregon City commissioned a Transportation Demand Management (TDM) Plan to examine opportunities and challenges in parking, access, and transportation related to the redevelopment of the Willamette Falls Legacy Project, which is directly adjacent to existing downtown Oregon City. The plan outlines and prioritizes TDM strategies for Oregon City, leveraging existing conditions and providing the flexibility to respond to opportunities for action as they arise. These strategies will help guide the City toward efficient," right sized" parking while integrating reasonable, attractive, and effective alternative mode options into the project study area. That area is bounded by the Willamette River and Oregon Route 99E, as illustrated in **Figure A**.

Incorporating industry best practices along with input from local stakeholders, the plan provides the foundation for a new multi-modal vision for the greater Oregon City downtown.

II. PROJECT SIGNIFICANCE

In addition to astounding natural beauty, Willamette Falls possesses a rich history that predates the establishment of Oregon City in 1842. Since time immemorial, the falls have been an important cultural and fishing site for Native American tribes. By the late 1800s the area around the Falls had been settled by pioneers and was home to numerous mills, including the Oregon City Paper Manufacturing Company. The company changed hands several times, then eventually closed. In 2014, privately owned Falls Legacy LLC purchased the 22-acre mill property out of bankruptcy.



Recognizing the tremendous potential of the Willamette Falls Legacy Project to redefine Oregon City, community groups and partners including Oregon City, Metro, Clackamas County, and the State of Oregon have been working together to develop a vision for the site that recognizes the significance of its past while embracing a bold and innovative future. Ensuring public access to the site is one of the four core values that underpin this vision. Public access will be established through the construction of a public riverwalk that offers views, connections to the river, and restored habitat along the shoreline.

The four public partners have adopted a design for the riverwalk, have obtained an easement on the property for the project, and have amassed almost $20 million to begin construction. The riverwalk will be built in phases and is expected to catalyze private redevelopment of the remainder of the former mill site.

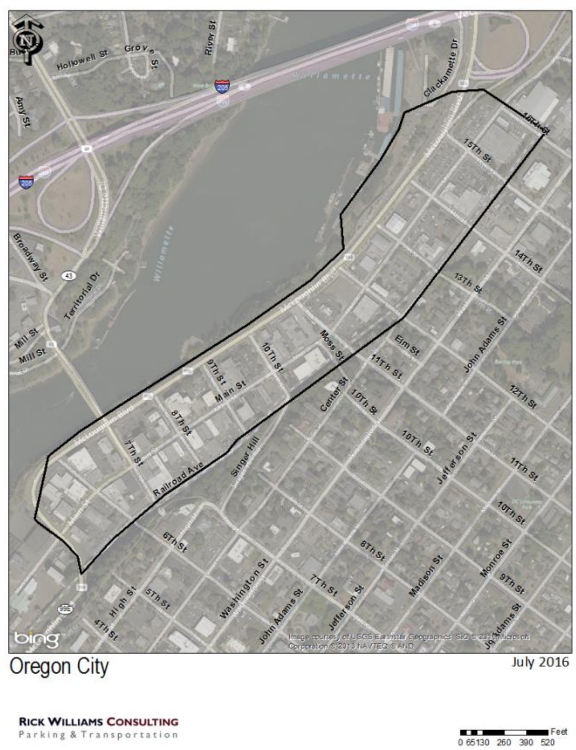
Creating safe connections to the riverwalk and full site through multiple transportation modes and efficient parking standards will complement the Falls area and Downtown Oregon City for years to come.

> *"It was a beautiful sight when viewed from a distance, but it became grand and almost sublime as we approached it nearer.' John Kirk Townsend, 1835*

III. DECISION-MAKING ELEMENTS

The outline of the decision-making elements below is intended to summarize the important aspects that have influenced and guided the recommended multi-phased strategies. Again, these elements have helped place parameters on achieving realistic programs and projects that would be appropriate for the development site and its intended users.

Figure B: 2016 Parking Study Area



City & Regional Improvements

Capitalizing on local and regional land use and transportation improvements as they occur allows for greater efficiencies and more successful TDM programs. Creating meaningful partnerships and tracking projects will be vital to the future of the Willamette Falls Legacy Project.

Proposed safety improvements include:

- Intelligent transportation systems designed to warn traffic approaching the 99E tunnel of hazardous conditions ahead.
- Prohibition of left turns northbound from OR 99E to Main Street, and modification of the right-turn geometry from 99E to Railroad Avenue to allow turning traffic to slow and maneuver outside the travel lanes on a curve with limited sight distance.

- A pork-chop island (or raised median) at the intersection of Water Avenue and OR 99E to prevent unsafe movements and reinforce right-in, right-out access.

McLoughlin Boulevard Enhancement Plan – Phase 3

The McLoughlin Boulevard Enhancement Plan (2005) is a conceptual design for long-term roadway improvements that coordinate with property redevelopment to create a multi-modal friendly environment that connects downtown Oregon City to the Willamette River waterfront. The overall project will be implemented in several phases. Phase 1 – 10th to I-205 (2011) and Phase 2 – I-205 to Gladstone Bridge (2015) have been completed. The remaining phase (Union Pacific Tunnel to 10th Street) will be implemented as funds are available. During design of each phase, the City will work with pre-existing uses to develop access and design approaches that maintain and enhance safe access and circulation that will accommodate the needs of the pre- existing uses. However, as redevelopment occurs along the corridor, property orientation and access restrictions to McLoughlin Boulevard will be pursued to fully implement the conceptual design and meet ODOT access spacing requirements.

- **Highway 99E Viaduct repair/replacement**. The Highway 99E viaduct & partial viaduct structures are 75 years old and are currently identified as functionally obsolete due to width and deck geometry, as well as substandard railings. Highway 99E is a major arterial roadway, classified by ODOT as a Tier 2 Lifeline route with no accessible parallel routes, and a 4.7 mile detour to bypass. Unfortunately, the structures are also considered seismically vulnerable and the October 2014 Oregon Highways Seismic Plus Report identifies the viaducts in Phase 5 of the unfunded program. The proposed project would replace the viaducts with context sensitive modern bridges meeting all current standards and evaluating the opportunity to include: raised center medians, new pedestrian refuges and turn lanes, 8-foot parallel parking, 10-foot wide walk on southeast side and 18-foot wide multi-use path on the northwest side. Viaduct construction is preliminary estimated at $38M, the remaining Phase 3 is estimated to be an additional $8.5M.

These efforts will create a safer traffic flow in and around the development site.

Downtown Oregon City Parking Study (2016)

Building upon a similar effort in 2008, in 2016 Oregon City conducted a parking study that concentrated on the historic downtown area, as seen in **Figure B**. The study collected data for on- and off-street parking on both a weekday (Thursday, July 7th) and weekend (Saturday, July 9th). A comparison of the 2008 and 2016 findings was made, and a" high-occupancy node", a small portion of the study area demonstrating high parking use, was evaluated.

Given the proximity of the study area to the Willamette Falls Legacy Project site, findings from the study can provide valuable guidance on managing parking at the site. For additional information on the 2016 Oregon City Parking Study, please see the attached *Appendix – Parking Study Findings*.

Public Outreach Process (2017)

In coordination with Oregon City staff, a public outreach process was developed to understand and incorporate local stakeholders' views on transportation, access, and parking related to the Willamette Falls Legacy Project. Workshops and open houses provided a forum for local residents and business owners to share their thoughts and opinions.

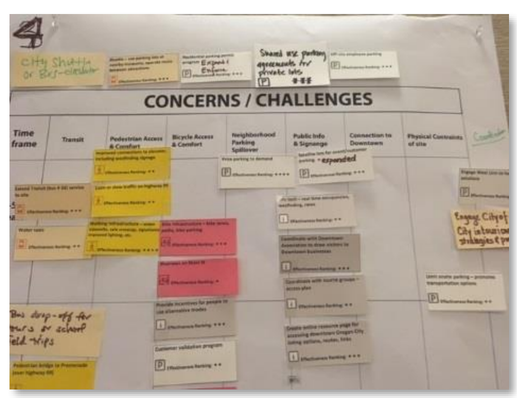
Workshop Schedule

	Meeting 1	Meeting 2	Meeting 3
Date	Wednesday, April 26^{th}	Wednesday, May 24^{th}	Wednesday, July 26^{th}
Time	6:00-8:00PM	6:00-8:00PM	6:00-8:00PM
Location	Oregon City, City Hall	Oregon City, City Hall	Oregon City, City Hall

Open House Schedule

	Open House
Date	Wednesday, July 12^{th}
Time	4:00-8:00PM
Location	Oregon City, City Hall

Outreach workshops began with an overview of the Willamette Falls Legacy Project. Participants were then given an introduction to TDM and parking best practices to help focus discussion and provide a common language from which to offer feedback on the site's strengths, weaknesses, opportunities, and challenges.



IV. INDUSTRY BEST PRACTICES

To help guide the stakeholder outreach effort, industry best practices were presented to inform the discussion on transportation, access and parking issues pertinent to the Willamette Falls Legacy Project site. An overview of applicable Transportation Demand Management (TDM) programs, projects and services were provided as a starting point from which the outreach effort evolved, with the notion that additional local ideas were welcome. Parking management best practices were also presented along with the 2016 Oregon City parking study results.

Below is an overview of both the best practices framework for TDM and parking management practices which helped guide the Oregon City outreach process for the Willamette Falls Legacy Project.

Transportation Demand Management (TDM) Strategies:

Transportation Demand Management increases the efficiency of transportation systems by shifting trips from single-occupant vehicles (SOV) to non-SOV modes, or from peak to non-peak periods. TDM seeks to increase the universe of trips by increasing travel options, encouraging individuals to modify their travel behavior, or reducing the need for travel through efficient land uses. TDM programs often cost little while yielding high impacts, and are typically implemented by employers or public agencies, or via public-private partnerships.

This section provides a summary of TDM strategies for consideration as applies to the Falls Legacy Project Development Strategy and future citywide demand management initiatives. Strategies were selected based on the development potential at the site, applicability to Oregon City and direction provided by Oregon City project and design team staff. The following strategies, as well as others, are presented as an introduction to TDM and used to facilitate/create a customized implementation timeline for prioritized projects/programs/services specific to the Willamette Fall Legacy Project site. Summary of TDM Best Practices Categories

TDM Industry Best Practices	
Transit Connectivity and Frequency	
Transit Incentive Programs	
Bicycle Infrastructure and Access Network	

TDM Industry Best Practices	
Carsharing Services	
Parking Management	
Walkability and Wayfinding	
Transportation Management Association (TMA)	

Transit Connectivity and Frequency

Growth in employment and tourism at the Willamette Falls Legacy Project site will necessitate better connections to the regional transit network. Transit infrastructure likely cannot be provided through the project itself, and will require discussions and planning among the developers, Oregon City, Metro, and TriMet. At present, connections to transit service are not strong, with the transit center located at the eastern end of the downtown. Improved connections and frequencies between the transit center and the site could significantly augment other supportive TDM strategies that might include transit subsidies/incentives, parking pricing and right sized parking.

The following bus routes currently serve the transit center:

- 32-Oatfield
- 33-McLoughlin
- 34-River Rd
- 35-Macadam/ Greeley
- 79-Clackamas/ Oregon City
- 99-McLoughlin Express
- 154-Willamette

Opportunities	Challenges
Proximity to McLoughlin and Transit Hub. Extension of the 33 line along Main Street (in Willamette Falls Master Plan (CP 14-02)	Primary and secondary access from 99E Southbound

Transit Incentive Programs

Incentive programs are generally implemented at the local level by transit providers or individual employers, or through Transportation Management Associations (TMAs). The most common incentive is a discounted fare program. For example, TriMet's Universal Pass offers unlimited use of regional transit services at a highly discounted rate for employees whose employers purchase the program. The feasibility of such programs and their impact on parking demand are heavily influenced by both the amount of available parking and the out-of-pocket cost of transit versus the cost of parking for a similar trip.

Opportunities	Challenges
♦ Formation of TMA through development. ♦ Downtown Business Association could potentially help coordinate an incentive program.	♦ Lack of high-quality transit lines currently. ♦ Uncertain of employer/employee numbers.

Bicycle Infrastructure and Access Network

Successful programs to reduce auto trips through increased bicycling generally include four components:

(1) Safe access through the public right-of-way.

This includes bike lanes, sharrows and other networks of public right-of-way access that ensure a reasonable means of using bikes in a manner that connects users to local and regional origins and destinations. The Willamette Falls Legacy Project will need to evaluate how bikes are linked to adjacent areas and how bikes can access the site from external locations.

Opportunities	Challenges
♦ Create a shared street design	♦ Auto speeds along McLoughlin/OR99E.
♦ Multi-use path implementation.	♦ Limited width of right-of-way and crowded sidewalks.
♦ Mixed use urban form. Recent Multi-modal mixed use designation (MMA).	♦ Intersection safety (28 crashes in past 5 years at Main & McLoughlin/OR99E intersection).
♦ Reintroduction of Water	♦ Few safe bike/pedestrian crossings across McLoughlin.
♦ Planned riverwalk Bike/Ped bridge over McLoughlin /OR99E to Promenade	

(2) Safe and secure bike parking at the destination

Bicyclists should feel that they can access their destinations as conveniently as someone arriving by car. On-site bike parking should be tailored for both commuter and visitor bike trips, and may include ground or wall racks, lockers, or bike hubs, conveniently located and adequate to demand. Existing bike parking requirements may need to be reevaluated.

(3) On-site bike/pedestrian amenities

Amenities may include shower and locker facilities for commuters as well as bike repair stations.

(4) Information and incentives

Bike trips can be encouraged and supported through incentive programs as well as outreach and communications that inform users on how to access the site—e.g., trip planning, maps, website, etc.

Opportunities	Challenges
♦ TDM welcome packets to employees	♦ Bike/pedestrian-friendly infrastructure to encourage non-auto travel
♦ Wayfinding & information kiosks	

(5) Bike Sharing

A bike share system, or public bicycle system, is a public transit service where bicycles are made available for shared use to individuals for very short trips for a price. Bike Share systems allow people to use a bike from point A to point B. Bike Share systems are a great complement to transit and are popular with both local residents and tourists alike.

Carsharing

Carsharing programs provide access to a fleet of centrally owned and maintained vehicles located near homes, workplaces, or transit hubs. Members typically reserve shared vehicles for a specific timeframe and pay for use through some combination of hourly, overhead, and mileage-based rates

Carsharing offers compelling TDM and parking management benefits. By distributing the fixed costs of car ownership across the marginal cost of every trip made, carsharing reduces the total number of trips made by participants. By offering an alternative to individual ownership, carsharing contributes to lower ownership rates. By increasing the number of users per vehicle and encouraging more frequent use throughout the day, carsharing reduces parking demand while preserving the convenience and flexibility of automobile use.

In the Portland metropolitan area, services such as ZipCar, Car2Go, ReachNow, Turo, and Getaround are options to explore. For the Willamette Falls Legacy Project, carsharing programs could be offered through individual businesses, the property owner, or a Transportation Management Association (see Item 6 below). Some municipalities and developers own and operate their own carsharing service for residents through Turo or Getaround, which provide software, insurance, and customer support services.

The Willamette Legacy Falls Project development team could work with carsharing companies to provide services by reserving parking spaces in prime locations for carsharing vehicles. There are opportunities for collaborating with these companies on discounted introductory memberships for residents and businesses.

Opportunities	Challenges
♦ Partnerships with carsharing companies. ♦ Developer or business could potentially own and operate local carshare program.	♦ Car2Go's boundaries do not extend to Oregon City. ♦ Need density for the system to work.

Walkability and Wayfinding

Better pedestrian environments, including good signage and wayfinding, are essential to encouraging walking. The Willamette Falls Legacy Project will need to enhance pedestrian connections to transit, the historic downtown, and the water.

Opportunities	Challenges
♦ Unique branding opportunity on signage to create on-site circulation, as well as directing people to and from destinations.	♦ Competing transportation options-friendly infrastructure (e.g., signage, messaging, etc.).

Transportation Management Association (TMA)

A Transportation Management Association, as outlined in the *Transportation Demand Management Encyclopedia* (Victoria Transport Policy Institute, 2010), is a nonprofit, member-controlled organization that provides transportation services in a particular area, such as a commercial district, mall, campus, industrial park, or transportation corridor. A TMA's particular focus is on more efficient use of transportation and parking resources to improve access and support economic development. It is generally a public-private partnership, consisting primarily of area businesses with local government support. For the most part, TMAs form as 501(c)4 or (c)6 organizations under Federal nonprofit statutes.

TMAs in the Portland metropolitan area include Go Lloyd, Explore Washington Park, South Waterfront TMA, and the Central Eastside Transportation and Parking Management Association, all in Portland, and the Westside Transportation Alliance in Washington County.

A TMA framework can create economies of scale, leverage, and equity, and enable smaller entities to provide trip-reduction services comparable to those offered by large entities. TMAs build partnerships and community within defined boundaries, which allows them to be proactive rather than reactive to transportation concerns. TMA services can include:

- Access management
- Advocacy
- Education and outreach
- Flextime support for employees
- Emergency Ride Home programs
- Incentive and reward programs
- Individualized trip-planning services
- Marketing and promotion
- Parking management
- Pedestrian and bicycle planning
- Rideshare matching and vanpool coordination
- Shared parking coordination
- Shuttle services
- Telework support
- Transit fare products and incentives
- Transit improvements
- Transportation access guides

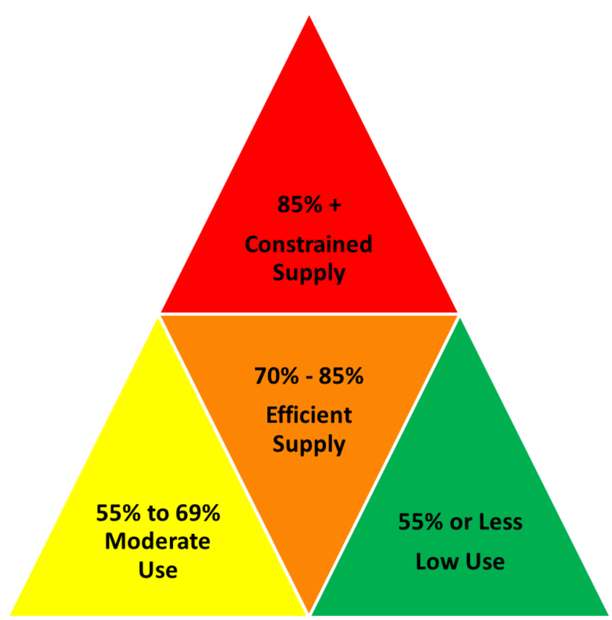
The Willamette Falls Legacy Project could be greatly facilitated by a TMA, particularly if such an organization included a partnership with the downtown, possibly through the Downtown Oregon City Association.

Opportunities	Challenges
♦ TMA could be supported through a shared LID/BID mechanism to grow with the community's needs.	♦ Creating ongoing public and private partnerships to leverage for TDM success.

Parking Management Strategies

Parking Management encourages more efficient use of parking facilities, reduces parking demand, and shifts travel to non-SOV modes. Smart management of parking helps ensure access to businesses and attractions and supports neighborhood vitality.

The availability of free or inexpensive parking is cited as a key factor in choosing to drive a personal auto rather than travel by another mode. In addition, free or inexpensive parking is often abused by long-term parkers who occupy valuable spaces at the expense of short-term parkers.



Parking demand that exceeds supply leads to the common phenomenon of circling—cars going around and around the area searching for parking, leading to congestion and delay. Several recent studies show that circling accounts for between 30% and 45% of all traffic in dense urban districts.

Parking Management strategies include:

- Shared Parking/Park Once
- Parking Ratios (Minimums and Maximums)
- Parking Districts
- Timed Parking
- Priced Parking
- Monitoring of Parking Occupancy and Turnover
- Parking Enforcement
- Unbundling Parking
- Residential Parking Permits
- Bicycle Parking
- Electronic Parking Guidance Systems
- Parking Lot/Garage Design and Placement

Shared Parking/Park Once

Shared Parking/ Park Once seeks to shift parking into shared public facilities rather than a proliferation of dedicated accessory lots, reducing the volume of parking and vehicle trips as well as the number of curb cuts on sidewalks. It allows people to park their car once and move throughout an area on transit or on foot.

This strategy can be accomplished by brokering shared-parking agreements among private lot owners[1] or through construction of public facilities in areas of dense, mixed land uses. Overall, shared parking creates

[1] Shared parking agreements are typically established in conjunction with new development. However, they can also be established when an existing development is redeveloped or changes use. Shared-parking agreements can be formal and documented in the deed, lease, or contract as required by city code, or informal.

an efficient parking system, allows for denser development, and reduces the amount of land required for parking.

Opportunities	Challenges
♦ A shared facility could allow for efficient, centralized parking that is less burdensome than individual on-site parking and lowers development costs.	♦ Determining applicable funding mechanism and shared-use agreements.

Parking Ratios (Minimums and Maximums)

Parking ratios are used to determine the minimum number of stalls needed to support new development and the maximum number of stalls allowed. Parking minimums ensure that developers provide enough parking to satisfy demand, while parking maximums ensure that developers do not overbuild parking. Oregon City currently has parking minimums and maximums as described in Title 17 of the municipal code (17.52.020).

As the Willamette Falls Legacy Project evolves, the City and project partners should evaluate current parking requirements to ensure that the supply of parking meets the project's needs.

Parking Districts

Parking districts can include permit programs, meters, and other programs to manage parking demand, and may place restrictions on who can park, when they can park, and for how long.

The most common types of parking districts are residential and commercial districts where parking is managed through permits and/or pricing. Priced parking and parking permits are described below. Parking benefit districts dedicate net revenue from the sale of permits or from meters to improvements such as pedestrian/bicycle amenities, information systems, or new parking supply. Parking benefit districts can also be a source of ongoing support for TDM programs (see TDM Strategies section).

Parking benefit districts are in place in Portland's Lloyd, Central Eastside, and Northwest Parking Plan districts. Revenue is shared with stakeholders, generally through a TMA format, and invested directly in transportation programs and infrastructure. Examples of investments made by Parking Benefit Districts are:

- New and improved crosswalks
- Transit information screens – with 'real time' arrival information
- Clean and Safe program, i.e. street cleaners
- Improved wayfinding and signage for all travel modes
- Discounted transit passes and bike share memberships for residents and employees
- Purchase bicycle infrastructure – racks, bike cages, work/maintenance stations, compressed air station, etc.

Timed Parking

Timed parking limits the amount of time a vehicle can remain in a parking space. It requires signage and enforcement to ensure that regulations are followed. Limits of 15 minutes to one hour should be used only in areas where land uses require high levels of turnover; otherwise, these shorter limits do not provide sufficient time for visitors and patrons of local businesses. Longer time limits between two and eight hours should be used in areas that require longer stays for visitors and employees.

Priced Parking

Priced parking charges motorists fees for using parking facilities. Priced parking programs can be used to manage parking demand, recover the cost of construction, and generate revenue for TDM programs and TMAs. Priced parking is already in place in the Oregon City downtown.

Priced parking is often difficult to implement, and may require a political process to transition an area from free to paid parking. However, when high demand, low turnover, and generally poor parking conditions exist, it is often the most effective way to change travel behavior, manage the available parking supply, and support alternative travel modes. The fact that pricing is already in place in the downtown supports employing a similar strategy for the Willamette Falls Legacy Project. This would create a seamless transition between areas and support TDM programs and measures to increase use of alternative modes.

Monitoring of Parking Occupancy and Turnover

Monitoring the performance of the parking system will ensure that it continues to meet the needs of its users. Monitoring programs typically involve the collection of parking data on a routine basis. Using locally derived data provides the most accurate information on parking use and need.

Monitoring programs need not be elaborate, but they should be consistent, routine, and structured to answer relevant questions about occupancy, turnover, duration of stay, patterns of use, and enforcement. A methodology for collecting and analyzing parking data is provided in *Parking Made Easy: A Guide to Managing Parking in Your Community*.

The City has already collected parking data on its downtown as part of this project. Information from that study will inform ideas, strategies, and programs for the Willamette Falls Legacy Project.

Parking Enforcement

Parking enforcement often carries a negative connotation, but when performed properly it can manage demand, improve turnover, deter habitual offenders, and improve the efficiency of the entire parking system. Proper enforcement should be focused on education and promoting behavioral change, rather than generating additional revenue.

Enforcement systems already in place in the downtown can be expanded as appropriate to the Willamette Falls Legacy Project site.

Unbundling Parking

Unbundling parking separates the cost of a parking space from the cost of a building lease or purchase agreement, often for residential or commercial uses. It monetizes the parking space, allowing tenants to pay only for the parking they need.

Requiring new developments at the Willamette Falls Legacy Project site to unbundle parking would likely necessitate changes to the municipal code. Such a requirement could also be negotiated as a part of a larger master plan or development agreement for the site.

Unbundling parking is an equitable way of distributing parking resources. It promotes alternative mode choices by equalizing the cost of parking and other modes, and reduces parking demand and vehicle miles traveled.

Residential Parking Permits

Residential parking permit programs work to distribute parking resources across a variety of users, primarily residents and commercial visitors and employees. Such programs allow permit holders to park on-street in residential areas and limit the stays of non-permit holders (e.g., employees and visitors) during enforcement hours. They are particularly effective in areas where commercial development creates parking overflow in residential neighborhoods. This could become an issue with the Willamette Legacy Falls Project, as growth in the number of employees and visitors may impact adjacent residential areas.

Bicycle Parking

Bicycle parking facilities provide safe and secure places for people to park their bikes. Bicycle parking is critical to promoting bicycling as a viable transportation option.

Bicycle parking is already required for new development in Oregon City's municipal code (17.52.040). These requirements may need to be reevaluated given the Willamette Falls Legacy Project's vision for attracting a high number of visitors and supporting increasing use of non-auto modes. Biking will be a key component of this vision.

Electronic Parking Guidance Systems

Electronic Parking Guidance Systems direct motorists from main access roads to parking facilities with available spaces. Information for a specific facility or for a defined area is displayed on signs, and may also be presented via phone, internet, or in-vehicle navigation systems. These systems are sometimes called Dynamic Parking Guidance Systems, as the numbers change every few minutes. This strategy reduces traffic, which leads to a reduction in emissions, fuel consumption and wasted time. It promotes better use of parking capacity and can direct parking traffic onto dedicated roads.

Such systems, provided at the front end of development, can effectively distribute traffic within the Willamette Falls Legacy Project site, but also offer the opportunity to link the site to parking resources in the larger downtown. For more information on these types of systems, see the SF*park* Technical Manual. http://sfpark.org/resources/docs_techmanual/

Parking Lot/Garage Design and Placement

Design standards for parking facilities can help to ensure that off-street parking will accommodate access and circulation while meeting the needs of the development. Placement standards can help to ensure that facilities do not impact existing or future development, or the sharing of parking between developments. Both standards can also help to ensure that parking facilities meet the aesthetic vision of the community.

Oregon City's current code focuses on design, placement, and landscaping of surface lots (17.52.060) and some architectural requirements in (17.62.050) it does not provide a lot of direction for the development of successful garages. Guidance on exterior design, access points, integration with other modes, shared parking, and ground-floor active uses is lacking. All elements of the City's code for parking facility design and location should be reevaluated to ensure that off-street parking facilities will be designed appropriately, will accommodate vehicle access and circulation, and are placed to optimize land-use efficiency.

V. APPROACH

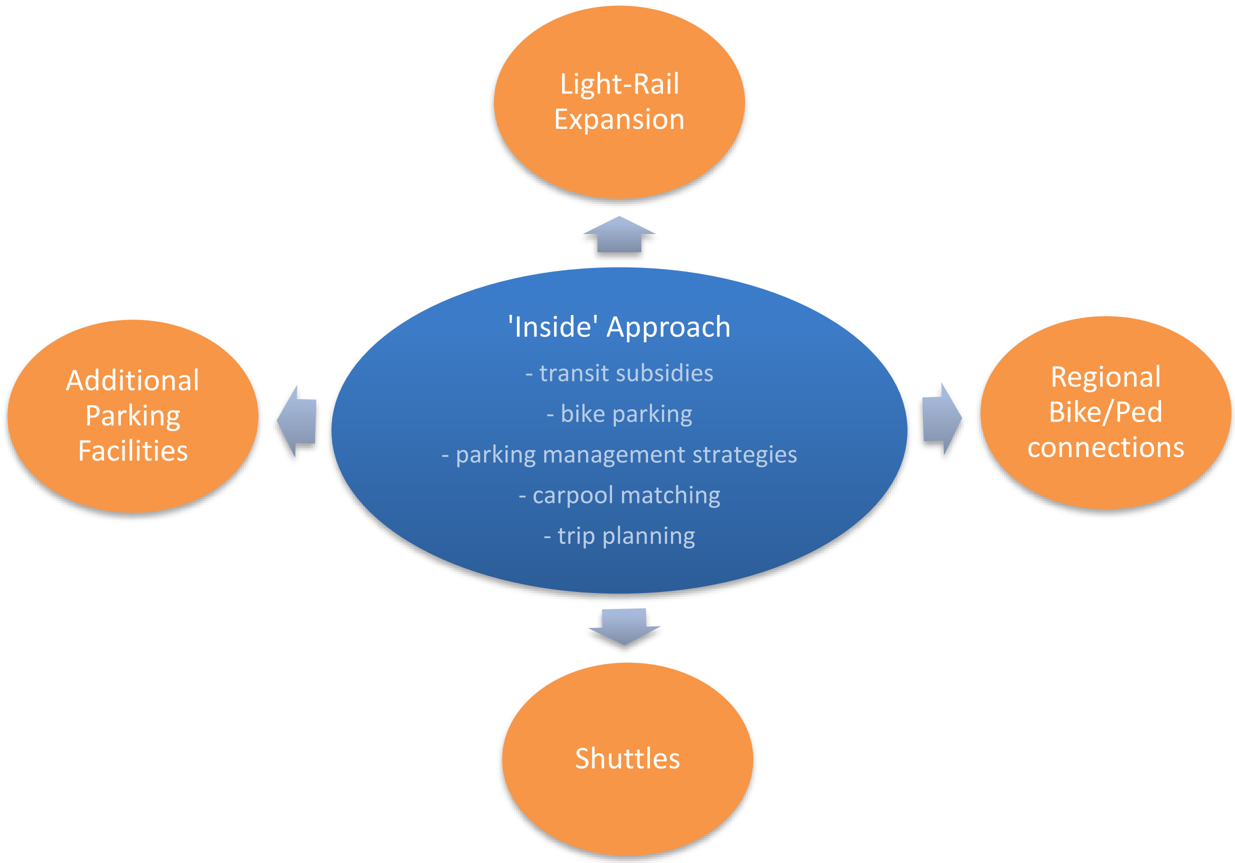
An "Inside/Outside" methodology was used to prioritize TDM and parking management strategies and create a timeline to inform decision-making and implementation.

The Inside/Outside methodology aims to maximize existing infrastructure through easy-to-implement programs, services, and projects, building on what municipalities already have "inside" their City. Stakeholders also mentioned the desire to implement strategies based upon development plans. Without a more concrete timeline and land use plan, a rigid TDM plan is difficult to determine. A key aspect of this plan is its emphasis on flexibility based on many factors including by not limited to:

- Land use development (residential vs. commercial needs)
- Local/Regional capital improvement projects (99E improvements, local street improvements)
- Downtown parking operational/management changes (time stays, permit zones, rates, etc.)
- Local transit changes (bus lines)

After "inside" strategies are implemented, "outside" TDM and parking management strategies should be explored. These are often costlier, longer-term projects requiring outside funding sources and partnerships. Examples include major capital improvements such as transit expansion and regional bicycle/pedestrian connections, and links to remote infrastructure like shuttles or additional parking facilities.

The following diagram below graphically illustrates the "Inside/Outside" approach.



VI. RECOMMENDATION STRATEGIES

Guided by the Inside/Outside approach and industry best practices, stakeholders prioritized TDM and parking strategies into near, mid and long-term solutions. Likely strategies were categorized into theme areas (i.e. Pedestrian, Information & Options, Parking, Bicycle, Transit). Additional strategies were added by stakeholders. The implementation of strategies is not meant to be completed step-by-step in order, rather the strategies work to complement each other and can be implemented based on need and/or opportunities. However, the near-term strategies must be completed before the mid and long-term strategies can be effectively implemented, again reinforcing the 'inside/outside' approach.

Strategy Summary Table

	Strategy	Category	Timeline	Page
	Near-Term Strategies			
1	Centralize Coordination and Implementation of the TDM Plan	Coordination	Near-Term	20

	Strategy	Category	Timeline	Page
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3	Provide Interim Onsite Parking (Pay to Park)	Parking	Near-Term	21
4	Develop Needs Inventory of Walking and Bicycling Infrastructure	Walking & Bicycling	Near-Term	22
5	Walking & Bicycling Infrastructure Action Plan	Walking & Bicycling	Near-Term	22
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7	Coordination with Tourism Groups	Coordination	Near-Term	23
8	Coordination with Downtown Oregon City Association (DOCA)	Coordination	Near-Term	24
9	Shared Use Parking Agreements with Private Owners of Off-Street Supply	Parking	Near-Term	24
10	Enhance/Expand Existing Residential Parking Program (RPP)	Parking	Near-Term	25
11	Price Parking to Demand-Tiered Rate Systems for On and Off-Street Public Supply	Parking	Near-Term	25
12	Extend Bus Service from Existing Downtown Transit Center Closer to the Site	Transit	Near-Term	26
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14	Improve Pedestrian Infrastructure	Walking	Mid-Term	27
15	Improve Bicycling Infrastructure	Bicycling	Mid-Term	27
16	Identify Potential Remote Parking Sites to Support Future Shuttle Opportunities	Transit	Mid-Term	28
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18	Calm Traffic On 99E	Walking	Mid-Term	29
19	Explore Formation of a Transportation Management Association (TMA)	Coordination	Mid-Term	29
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21	Private Development Onsite Implement TDM Tools	Info & Options	Mid-Term	30

	Strategy	Category	Timeline	Page
22	Explore Carshare agreements and spaces	Info & Options	Mid-Term	31
23	Improve Information Technology	Info & Options	Mid-Term	31
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25	Extend High Capacity Transit (HCT) Line to Oregon City	Transit	Long-Term	33
26	Water Taxis	Transit	Long-Term	33
27	Bikeshare Program	Bicycling	Long-Term	33
28	Form a TMA	Info & Options	Long-Term	34

Near-Term Strategies

The following near-term strategies (immediate – 4 years after riverwalk opening) focus on creating a baseline for ongoing monitoring, management and implementation of TDM strategies. The projects/programs aim to target 'low-hanging fruit', in other words, transportation options solutions that focus on simple changes that can be implemented in the near future.

Near Term Strategies		
1. Centralize Coordination and Implementation of the TDM Plan		
Rationale	Most strategies require ongoing monitoring, especially measurement of onsite parking usage, parking pricing, walking and bicycling access improvements, off-site parking and shuttle programs, residential parking permits, and hours of parking enforcement.	
Priority	#1	
Effectiveness	****	
Relative Cost	$	
Triggers	Plan approval/adoption.	

Near Term Strategies

Implementation steps:

- Within six months of plan adoption, designate a single staff person (interim TDM manager) responsible for plan implementation.
- Establish a representative TDM access plan implementation.
- Establish a staff working group that will look at a public's ability to plan for and support completion of near, medium and long term projects.
- Advisory committee to be charged with assisting in the coordination and implementation of the TDM plan.
- Initiate routine meeting schedule, provide consultant support as needed.

2. Develop Ongoing Monitoring Data Collection Plan

Rationale	Ensure stakeholder coordination and forward movement of TDM plan.
Priority	#1
Effectiveness	****
Relative Cost	$$
Triggers	Plan approval/adoption.

Implementation steps:

- Review existing monitoring methods and determine what is missing (approach, level of detail).
- Include as an annual or biannual budget item.
- Identify stakeholders who can provide paid or volunteer support for data collection tasks.
- Identify staff to own and manage project.
- Determine appropriate schedule.
- Hire consultants as needed.

3. Provide Interim Onsite Parking (Pay to Park)

Rationale	Provide limited onsite parking opportunities for riverwalk visitors to promote transportation options but still accommodate vehicle trips.
Priority	#1
Effectiveness	***
Relative Cost	$$$
Triggers	Opening day of riverwalk.

Near Term Strategies

Implementation steps:

- Evaluate code provisions to allow for interim conditional use of commercial parking (non-accessory) at the site.
- Identify location of interim parking (parcel or existing building) on site.
- Initiate necessary improvements (e.g., paving, striping, lighting, signage, pay stations)
- Initiate operations.

4. Develop an existing condition report and Needs Inventory of Walking and Bicycling Infrastructure

Rationale	Need to improve access for people walking and biking. First need an inventory to identify top projects.
Priority	#1
Effectiveness	****
Relative Cost	$$
Triggers	Plan approval/adoption

Implementation steps:

- Review existing city inventories to date for downtown area.
- Hire consultants and solicit volunteer help as needed.
- Develop report on existing conditions, identifying sidewalk, bike lanes, connectivity, ADA, signage, lighting and other barriers to a walkable and bikable connected environment through site and between site and other downtown destinations. Review and provide a priority list for implementation.

5. Walking & Bicycling Infrastructure Action Plan

Rationale	Improve safe access and multimodal connections. Beneficial to existing Downtown.
Priority	#1
Effectiveness	****
Relative Cost	$$
Triggers	Plan approval/adoption

Near Term Strategies

Implementation steps:

- Finalize an action plan for addressing barriers and recommended improvements in the existing conditions report, including estimated costs and potential funding sources/processes.
- Ensure plan is regional in scope and takes advantage of nearby trails such as the Trolley Trail.
- Present Action Plan to City Council for review and approval.
- Work with affected City divisions and TDM Manager to coordinate and prioritize projects with internal planning and funding.

6. Wayfinding Action Plan

Rationale	Improve wayfinding for people walking and bicycling, especially connections to elevator.
Priority	#1
Effectiveness	**
Relative Cost	$
Triggers	Opening day of Riverwalk

Implementation steps:

- Using the walking and biking needs inventory plan, develop a plan to improve wayfinding system.
- Coordinate and partner with stakeholders currently investing in wayfinding downtown (DOCA, Tourism, Public Works, ODOT etc.).
- Develop a list of downtown destinations to be used in wayfinding signage that can be located at the elevator and repeated at strategic locations throughout the downtown.
- Identify funding sources

7. Coordination with Tourism Groups

Rationale	As the site develops, ensure visitor access is well coordinated and efficient.
Priority	#2
Effectiveness	**
Relative Cost	$$
Triggers	When on-site parking is over 85% occupancy and there is overflow on nearby streets, OR when additional development on-site generates a significant number of new trips.

Near Term Strategies

Implementation steps:

- Engage with Tourism Plan project now and continue to integrate plan goal and strategies.
- Engage with Mt. Hood Territory organization and local tourist destinations.
- Identify shared needs and goals; identify opportunities for collaboration and coordination especially around large events.
- Continue wayfinding and online resources website coordination.
- Consider formal tourism position on the TDM Access Plan Implementation Committee to act as a liaison between the City's TDM effort and the tourist groups.

8. Coordinate with Downtown Oregon City Association (DOCA)		
Rationale	Creating useful and up-to-date information by coordinating with the Downtown Association is necessary and will benefit both destinations.	
Priority	#2	
Effectiveness	***	
Relative Cost	$	
Triggers	Opening day of Riverwalk	

Implementation steps:

- Set up a plan with DOCA and relevant stakeholders to identify common goals and opportunities for collaboration.
- Hold regular meetings with DOCA and stakeholders for information sharing and to monitor programs and initiatives.
- Consider DOCA position on the TDM Access Plan Implementation Committee to act as a liaison between the City's TDM effort and the Main Street association.

9. Shared Use Parking Agreements with Private Owners of Off-Street Supply		
Rationale	Facilitate shared-use parking agreements for existing off-street private parking lots	
Priority	#1	
Effectiveness	***	
Relative Cost	$	
Triggers	Begin process now, implement when off-street parking occupancy is regularly above 85%.	

Near Term Strategies

Implementation steps:

- Evaluate and possibly amend code provisions to ensure that shared-use non-accessory parking is or becomes an allowed use downtown.
- Use data from the 2016 parking study to identify facilities that could serve as shared-use "opportunity sites." Criteria could include proximity to downtown, a meaningful supply of empty stalls, pedestrian/bike connectivity, walk distance/time, safety and security issues, etc.
- Based on the above, develop a short list of opportunity sites and identify owners.
- Establish a target goal (number) of downtown employees to transition into opportunity sites.
- Through DOCA, begin outreach to owners of private lots.
- Negotiate shared-use agreements through DOCA or an appropriate private entity.
- Obtain agreements from downtown businesses to participate in employee assignment program.
- Incorporate program information, including identified shared-use lots, on the resources website.

10. Enhance/Expand Existing Residential Parking Program (RPP)		
Rationale	Expand the residential permit program to manage on-street parking in residential neighborhoods.	
Priority	#2	
Effectiveness	***	
Relative Cost	$$	
Triggers	When on street parking occupancy in upper neighborhoods is above 85% and/or the neighborhood requests such a program.	

Implementation steps:

- Begin conversation on current protocols and processes related to existing RPP. Provide a revised outreach packet for neighborhood education.
- Reaffirm and/or revise current protocols to limit RPPs to block faces zoned Residential.
- Consider implementing a monthly or annual fee for residential permits to provide support for administration of RPP program and stronger localized enforcement.
- Implement revised program.

11. Price Parking to Demand-Tiered Rate Systems for On and Off-Street Public Supply		
Rationale	Ensure that on- and off-street parking stalls are priced to efficiently distribute demand and encourage use of transportation options.	
Priority	#1	
Effectiveness	****	
Relative Cost	$	

Near Term Strategies	
Triggers	When parking occupancy on street is above 85%

Implementation steps:

- Evaluate distribution of parking demand in downtown per 2016 parking study.
- Conduct demand analysis of Bluff parking.
- Re-calibrate on-street parking to demand using the 85% occupancy standard.
- Consider pricing on commercial streets on Bluff, coordinated with residential permit parking re-evaluation.
- Review pricing of existing City off-street permit program to ensure market pricing of off-street permits.
- Provide outreach to visitors and business owners on benefits of demand pricing.

12. Extend Bus Service from Downtown Transit Center to the Site

Rationale	Extend bus service closer to the site. The current stop is too far for most people to conveniently walk.
Priority	#2
Effectiveness	***
Relative Cost	$$
Triggers	Opening day of Riverwalk

Implementation steps:

- Begin discussions with TriMet.
- Identify location for bus stop and route access to bus stop
- Implement necessary infrastructure (striping, shelter, signage).
- Work with TriMet to launch service change.

13. Create Resource Website

Rationale	Create online information resource website outlining transportation options, routes, links, etc.
Priority	#1
Effectiveness	***
Relative Cost	$$
Triggers	Opening day of Riverwalk

Near Term Strategies

Implementation steps:

- Convene a group of stakeholders to identify target audiences and key information.
- Develop a list of transportation resources for employers, employees, and visitors.
- Identify and procure funds for website development and maintenance.
- Link to social media to keep it fresh.
- Promote launch of website and find influential stakeholders and community leaders to drive traffic to the site.
- Regularly monitor and evaluate the site's information and usability.

Mid-Term Strategies

Mid-term strategies (4 – 10 years after riverwalk opening) present a mix of infrastructure improvements and program management solutions for both TDM and parking. These strategies require a bit more time, coordination and, in some cases, funding; therefore, developing them may take more time and resources.

Mid Term Strategies

14. Improve Pedestrian Infrastructure		
Rationale	Increase the number of visitors accessing the site on foot, improve safety and comfort for people walking	
Priority	#2	
Effectiveness	***	
Relative Cost	$$	
Triggers	Approval of the Walking & Biking Action Plan	

Implementation steps:

- Using the Walking & Biking Action Plan, prioritize projects that improve pedestrian access: additional wayfinding signage, improved crossings, pedestrian scale lighting, etc.
- Review TSP for previously identified pedestrian infrastructure projects.
- Pursue funding.

15. Improve Bicycle Infrastructure		
Rationale	Increase the number of bike lanes, paths, bike parking, etc.	
Priority	#2	
Effectiveness	***	
Relative Cost	$$	

Mid Term Strategies	
Triggers	Approval of the Walking & Biking Action Plan

Implementation steps:

- Using the inventory and needs plan, prioritize projects that improve bicycle access: add bike parking, repaint sharrows, improve wayfinding and crossings, etc.
- Review TSP for previously identified bicycle infrastructure projects.
- Identify funding.

16. Identify Potential Remote Parking Sites to Support Future Shuttle Opportunities

Reason(s)/ Rationale	Ensure successful multi-modal routes and efficient parking	 
Priority	#2	
Effectiveness	**	
Relative Cost	$	
Triggers	On-site and downtown parking exceeds 85% with new tiered pricing implemented	

Implementation steps:

- Use the TDM implementation Committee to work with DOCA, area property owners, developers, etc. to:
- Identify opportunity sites (e.g., West Linn, Oregon Trail Interpretative Center, Clackamette Park, Amtrak station, etc.)
- Assess actual parking use at sites to determine whether surpluses are available.
- Evaluate code provisions to allow for commercial parking (non-accessory) at opportunity sites.
- Engage property owners in agreements for use.

17. Customer Validation Program

Reason(s)/ Rationale	Encourage longer-term parking off-street as site/downtown develop	
Priority	#1	
Effectiveness	**	
Relative Cost	$$	
Triggers	When off-street parking remains under-used but on-street occupancies are above 85%	

Mid Term Strategies

Implementation steps:

- Convene businesses to determine validation program parameters.
- Conduct research on best practices of validation programs.
- Through DOCA on behalf of the Implementation Committee, draft agreements on how much and how businesses will refund the city's parking fees.
- Draft marketing materials and conduct focus groups on best messaging techniques.
- Plan a program roll out media event.
- Regularly monitor program effectiveness with DOCA, businesses, etc.

18. Calm Traffic on 99E	
Rationale	Vehicular traffic is felt to be unsafe for pedestrians
Priority	#1
Effectiveness	**
Relative Cost	$$
Triggers	When development of projects in adopted Willamette Falls Framework Plan is triggered by onsite redevelopment, or when funding is acquired for TSP street-calming projects downtown

Implementation steps:

- Implementation of planned safety projects: A. Tunnel illumination & Intelligent transportation signage improvements in spring 2019 at 99E, B. Railroad realignment at 99E, C. Right in and right out at 99E and Water Ave.
- Coordinate with Oregon City Public Works and ODOT on proposed and planned Transportation System Plan (TSP) projects in the downtown that support pedestrian comfort and safety.

19. Explore Formation of a Transportation Management Association	
Rationale	Incentive programs encourage people to use transportation options.
Priority	#1
Effectiveness	****
Relative Cost	$$
Triggers	Significant development on-site and in downtown and/or continued parking constraints.

Mid Term Strategies

Implementation steps:

- Have TDM Implementation Committee work with DOCA, property owners, and the City to identify concerns and goals for a possible TMA.
- Conduct Business Improvement District feasibility study to be a primary funding source for the TMA.
- Research other TMAs.
- Identify project champions and empower them to lead the charge.

20. Shuttles

Rationale	Encourage a "park once" philosophy.
Priority	#1
Effectiveness	***
Relative Cost	$$$
Triggers	When on-site parking is over 85% occupancy and there is overflow to nearby streets, OR when additional development on-site generates a significant number of new trips.

Implementation steps:

- Research other shuttle programs (e.g., Explore Washington Park, BUZZ Bus in Palm Springs, Columbia River Gorge Express).
- Reach out to partners such as tourist locations (End of Oregon Trail Museum, DOCA, etc.) to gauge interest and explore possible funding opportunities.
- Identify possible routes and stop locations.
- Identify funding.
- Develop RFP for operators.
- Launch shuttle service with big media event.
- Monitor shuttle performance regularly.

21. Private Development Onsite Use of TDM Tools

Rationale	Provide incentives for employees and visitors to use alternate modes onsite and ensure full use of parking spaces
Priority	#2 & 3
Effectiveness	***
Relative Cost	$$$
Triggers	Approval of private development on the Willamette Falls Legacy Project site will require a TDM plan.

Mid Term Strategies

Implementation steps:

- Private development will provide proportional support to the TDM plan. Tools could include:
  - New employee welcome procedures explaining transportation options
  - Installing bike parking and changing rooms on-site
  - Discounted/subsidized or pre-tax transit passes for employees
  - Bike/walk bucks using the federal biking transit tax benefit program
  - Annual travel surveys of employees
  - Workplace challenges to raise awareness about options and "gamify" commuting.

22. Explore Carsharing Agreements

Rationale	Add more transportation options to support multi-modal access
Priority	#2
Effectiveness	***
Relative Cost	$$
Triggers	When on-site parking is over 85% occupancy and there is overflow to nearby streets, OR when additional development on-site generates a significant number of new trips.

Implementation steps:

- City to begin dialog with regional carsharing companies to understand potential marketplace barriers (for private development sites and for public on/off-street locations)
- City/DOCA to facilitate conversations with private developers to incorporate dedicated carsharing stalls into their properties – could be strategy to reduce minimum parking requirements
- City to negotiate agreement with carsharing operators to deploy vehicles in public parking supply (with supportive parking utilization and market demand data)

23. Improve Information Technology

Rationale	Improve information technology infrastructure
Priority	#2
Effectiveness	***
Relative Cost	$$$
Triggers	Increased private development onsite. List can be developed in conjunction with shared use parking agreements and tiered parking pricing options.

Mid Term Strategies

Implementation steps:

- With TDM Manager, develop a list of technology applications that enhance the user experience and improve information delivery.
- Technology improvements could include:
  - Pay by phone payment service
  - License plate reading technology for enforcement
  - Off-street sensors and real-time availability information via web and mobile apps.
  - Evaluate list of technology applications for feasibility including cost, maximizing user coverage, return on investment, and ease of adoption.
  - Prioritize list based on factors above.

Long-Term Strategies

Long-term strategies (10 – 20 years after riverwalk opening) require the greatest amount of coordination, organization, and often, funding. Below are a number of strategies that may be applicable in the future as the Willamette Fall Legacy Project is developed and as Oregon City continues to thrive.

Long Term Strategies

24. Build Parking Garage		
Rationale	As the site becomes a popular destination, vehicle parking will become a concern	
Priority	#1	
Effectiveness	***	
Relative Cost	$$$$	
Triggers	When new development on the site generates a significant number of additional trips.	

Implementation steps:

- Identify potential locations future public/private parking garage in downtown and or mill site.
- Conduct market and feasibility study.
- Determine base parking rate to cover construction and operating cost.
- Identify possible locations.
- Develop pro forma for construction.
- Identify possible public and private funding sources.
- Develop RFP for operator and construction company.
- Monitor parking garage performance regularly and adjust rates.

Long Term Strategies

25. Extend High Capacity Transit (HCT) to Oregon City

Rationale	Extend MAX Orange Line or Bus Rapid Transit to Oregon City
Priority	#2
Effectiveness	***
Relative Cost	$$$$$
Triggers	When significant dense development generates enough trips to and from the Downtown area.

Implementation steps:

- Oregon City continues role in regional planning for line extension.
- Collaborates with stakeholders, when needed to show support.

26. Water Taxis

Reason(s)/ Rationale	Create transit connections across and along the Willamette River
Priority	#2
Effectiveness	**
Relative Cost	$$$
Triggers	Driven by outside investment in this mode (tourism or transportation based).

Implementation steps:

- Build proposed boat dock onsite or provide shuttle service from Jon Storm dock and or other docks along both sides of the lower Willamette.

27. Bikeshare Program

Rationale	Create a bikeshare program to facilitate multi-modal transportation option
Priority	#2
Effectiveness	**
Relative Cost	$$
Triggers	When additional dense mixed-use development on-site generates a significant number of new trips.

Long Term Strategies

Implementation steps:

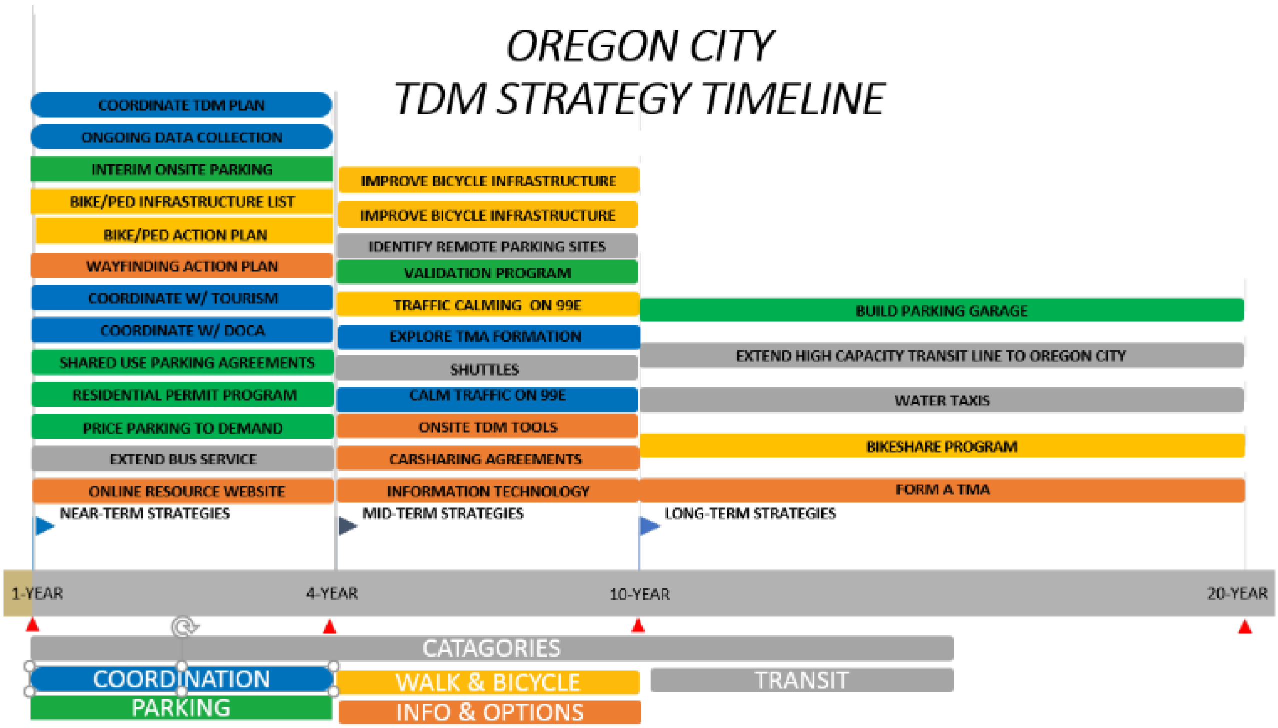
- Conduct feasibility study.
- Identify key partners (City, DOCA, tourist groups, etc.)
- Procure funding for planning (federal or regional grants, Bikeshare Foundation, etc.)
- Develop RFQ for bikeshare operator.
- Identify possible operators and negotiate contract.
- Work with operator to determine best funding mechanism and price structure.
- Work with operator to determine station locations.
- Procure necessary permits and/or agreement for station locations.
- Roll out marketing campaign and media event.
- Monitor program regularly.

28. Form a Transportation Management Association (TMA)

Rationale	Have a central organizing group responsible for implementing and monitoring transportation demand programs and access.
Priority	#2
Effectiveness	*****
Relative Cost	$$$
Triggers	When there is development on-site and continued strain on parking and transportation access.

Implementation steps:

- Use key findings from earlier feasibility study to develop strategy and work plan for a TMA, with timelines and milestones identified.
- Establish a Business Improvement District (BID) to fund TMA.
- Develop language to codify the BID.
- Recruit board members to oversee the TMA.
- Develop organizational framework, bylaws, goals, etc.



VII. TDM Strategies in Action

The following examples provide an overview summary of a Transportation Demand Management program put into practice, specifically shuttles, which the community expressed high support for through the public outreach process.

Transportation Management Associations (TMAs)

While Transportation Demand Management programs can be effective implemented through employers or business associations alone, often the impact is greater when multiple entities work cooperatively. Transportation Management Organizations or Associations or TMO/TMAs are typically nonprofit organizations charged with coordinating a neighborhood, district, or regions Transportation Demand Management programs. Since they are independent entities pooling resources and convening stake holders they can take advantage of government grant funds and are able to do more creative marketing and outreach activities reaching a wide range of individuals.

There are a few creative funding mechanisms for TMAs, from membership dues, parking revenue, district assessments/taxes, and grants.

- **District assessment/tax -** an assessment or additional tax can be levied through a business improvement district to help fund a TMA's program. These are often the largest source of revenue for organizations.

- **Parking revenue -** Parking revenue can be used to help pay for TDM programs as well infrastructure in a neighborhood or district. This requires coordination, collection and oversight from the City.
- **Membership Dues or Direct employer contributions -** Direct dues are often a common way to start or fund a small organization.
- **Local government contributions -** for start-up funding or for special projects, local or regional governments often provide grants. These are often given out on a short term basis.

For more on forming a TMA visit the Association for Commuter Transportation's website and look for their TMA Handbook- http://actweb.org/wp-content/uploads/2016/11/tma_handbook_final.pdf

Organization	Location	Community Served	Funding Sources	Impact
North Shore TMA NORTH SHORE TMA *"We want to grow. We need new businesses coming here, but how do we manage all that traffic and flow? The TMA evolved from those kinds of discussions."* Mayor Kimberley Driscoll City of Salem, Mass.	Salem, Beverly, Danvers, Lynn, and Peabody, MA Suburbs/small towns Founded in 2008	10,000 employees + 10,000 students	• Membership dues • State grants	Compliance assistance with Massachusetts Rideshare Regulation Roundtables for property managers, developers, and facility managers Telework support
Go Lloyd GO LLOYD MOVING. CONNECTING. GROWING. *"You guys are the best! Seriously, I wouldn't have bike commuted if it wasn't for your help."* PacifiCorp Employee	Lloyd Neighborhood, Portland, OR Neighborhood in mid-size city Founded in 1994	25,000 employees 3,000 residents 18 million + visitors each year	• Parking Meter Revenue • Business Improvement District Funds • Transit Pass Sale Commissions	Since 1997, Go Lloyd has reduced employee drive alone trips by more than 25% 4.5 million lbs. reduction in greenhouse gas emissions annually 1,200 few vehicles driving to work daily

Organization	Location	Community Served	Funding Sources	Impact
Boulder Junction TOD TDM Access District	Large (160 acres) Transit Oriented Development Site in Boulder, CO Small City	*Currently operational:* 400 residential units 2 restaurants 1 hotel *In development/ construction:* 800+ units 400,000+ sq ft of commercial space	• Parking Meter Revenue • Development fees known as "TDM Access District" • City grant funds	Their goal is 45% SOV rate. They are at 58% now, but just opened this year.

Shuttles

Shuttles can be very effective at moving people to destinations, especially popular sites such as Multnomah Falls in the Columbia River Gorge. They can, however, be expensive to operate and require both sufficient ridership demand and sustainable funding to be effective. The table below offers a few examples of shuttle programs in small cities and regional tourist destinations.

Shuttle Name -- Location	Operating Schedule	Funding Sources	Direct Operating Expenses
Columbia Gorge Express—Portland to Gorge, Oregon *Destination-based* 	Pilot started in 2016 Seasonally (May-September) Friday, Saturday, Sunday only Hourly, 9am-7pm	A combination of: • Local and regional economic development funds (e.g. Travel Portland) • Federal Highway Administration funds • Friends of the Columbia Gorge and more • Passenger fare: $5 per person round-trip	• $225,000 per season

Shuttle Name -- Location	Operating Schedule	Funding Sources	Direct Operating Expenses
BUZZ Trolley–Palm Springs, California *Loop/Circulator* 	Started in 2014 Year round Thursday-Sunday Every 15 minutes from 11am-1am	• City sale & use tax passed for downtown revitalization purposes, 1% (Measure J) • Business sponsorship coming soon • Free rides to anyone	• $847,000 per year
Explore Washington Park Shuttle—Portland, OR *Loop/Circulator* 	Started in 2015 Seasonally April- October Weekends only 9am-7pm May-September Daily 9am-7pm Every 15 minutes	• On-site parking fees fund the TMA, Explore Washington Park. which operates and pays for the shuttle	• $330,000 per year
CCC Xpress Shuttle—Clackamas County Community College, OR *Destination-based* 	September-June Monday-Friday Every 15 minutes during peak, then every 30 minutes 6:45am-6:45pm		• $60 per Shuttle hour for 2 shuttles running daily, plus a 3rd shuttle during peak hours • $180,000 per school year
Mt. Hood Express – operated by Clackamas County between Sandy and Government Camp	7 days per week 5:15am-6:15pm 6 runs per day, one additional run Dec 1 – March 31	Public/Private partnership – Timberline Lodge, Mt. Hood Ski Bowl, and Resort at the Mountain are major contributors	• $558,298 per year

Shuttle Name -- Location	Operating Schedule	Funding Sources	Direct Operating Expenses
		Passenger fare: $2 one-way, $5 round-trip	

Parking Permit Programs

Area parking permit programs seek to manage on-street parking spaces and encourage visitor turn over so local residents can access spaces more easily. Permit programs are intended for residential/business use within a defined boundary. Area permit programs are requested by neighborhood stakeholders to address an access issue. Programs are administered by the City with permit fees coving the cost of administration and some base level of enforcement. Typically visitors can only stay 30 minutes to 2 hours in an on-street space unless they display a permit for that zone. While the primary role of the parking permit program is to manage demand, some cities have used parking permit revenue (with an added surcharge) to fund local street improvement projects and encouragement programs. Examples of encouragement activities include discounted or free transit passes and bike share memberships to local residents and employees, improved wayfinding signage, new and improved crosswalks and bus shelters, etc.

NW Parking Permit District

The NW Portland neighbors recently agreed to price their permits based on parking demand to better manage their on-street parking supply. They agreed to add a surcharge to the permit fee to help fund area improvements. If residents chose not to purchase the a permit at the new price, they could opt out and receive a $100 transit card with a free annual Bikeshare membership or 50% discount on an annual transit pass. This is an example of a city working with neighbors to help resolve an on-going parking program with an innovate approach that directly funds solutions (alternatives to parking).

VIII. RECOMMENDATIONS

The Willamette Falls Legacy Project presents an opportunity to transform the Oregon City waterfront and write an exciting new chapter in the site's long history. Incorporating the valuable input of local stakeholders and guided by industry best practices, TDM and parking strategies provide an important set of tools with which to shape land use and infrastructure development for the betterment of the site and of Oregon City. General recommendations include:

TDM Management Plan Adoption:

- Adopt and actively manage the Oregon City Transportation Demand Management Plan to guide TDM and Parking Management strategies for the Willamette Falls Legacy site, as well as for Oregon City as a whole. Continue to collect data, coordinate with local and regional agencies and governments, and "right-size" parking.

Data Driven Actions

- Use this document's strategies and recommendations not as a step-by-step prescription, but as a guide on how to react when changes occur or opportunities develop. Near-, mid-, and long-term strategies should be viewed as a set of tools to be used when most beneficial for Oregon City, not as a chronological checklist.

Oregon City as a Whole:

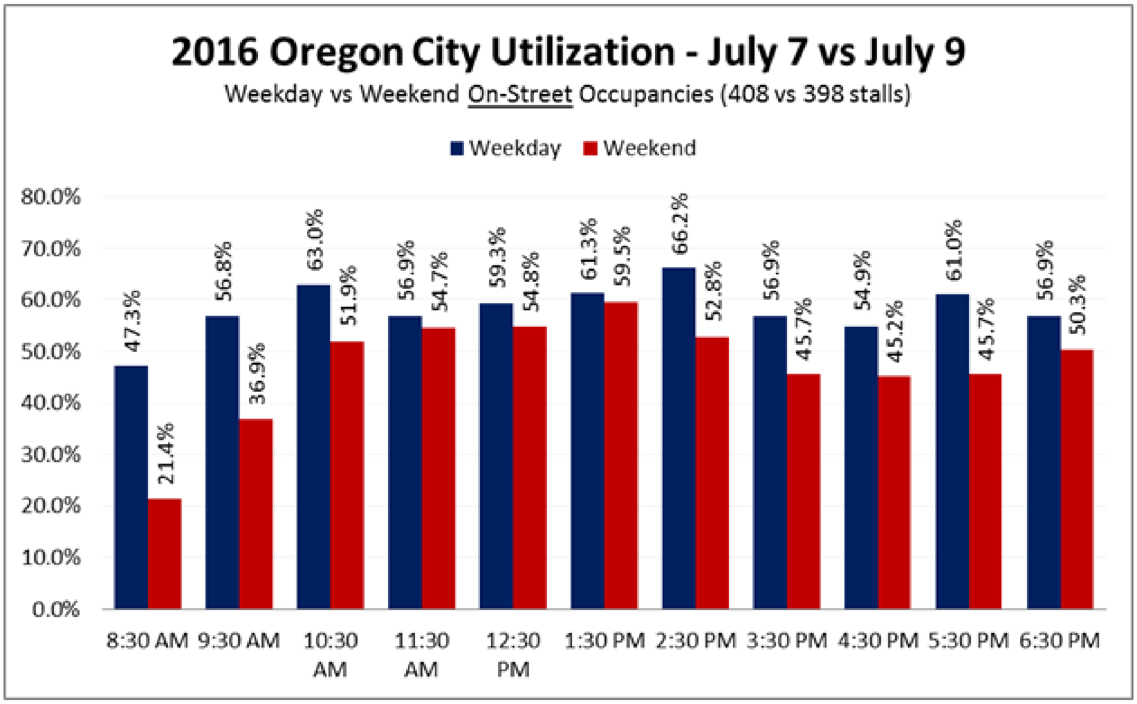
- As the Willamette Falls Legacy Project evolves, TDM and parking solutions should complement and support the success of Oregon City as a whole.

IX. APPENDICES

Appendix I. 2016 Oregon City Parking Study

On-Street Findings:

2016 On-Street Parking Hourly Utilization



Key findings include:

Survey Period	Peak Occupancy (Peak Hour)
Peak Occupancy - Weekday	66.2% (2:00 – 3:00PM)
Peak Occupancy - Weekend	59.5% (1:00 – 2:00PM)

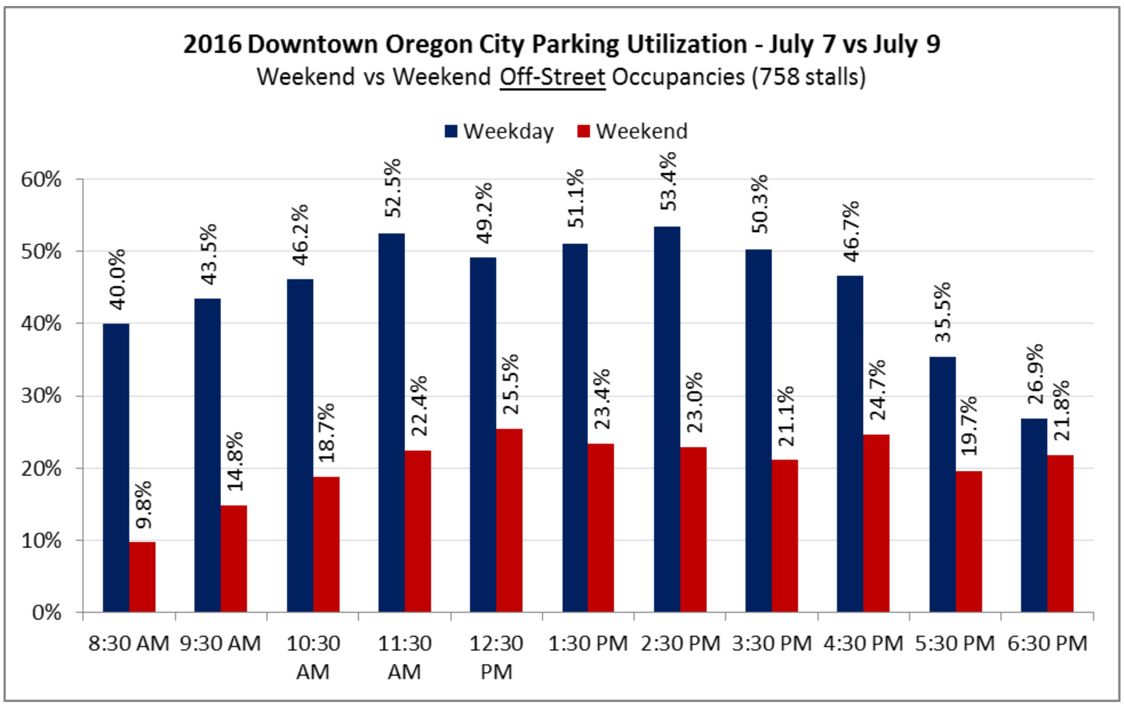
- The weekday peak hour is 2:00 to 3:00 PM, when occupancies reach 66.2%.
- The weekend peak hour is 1:00 to 2:00 PM, when occupancies reach 59.5%.
- Hourly occupancies are higher throughout the day on the weekday compared to the weekend.
- Hourly occupancies are substantially higher in the morning and late afternoon/evening on the weekday.

- Both the weekday and weekend show a small spike in the evenings after 4:00 PM, indicating that the downtown experiences a resurgence of activity at dinner time. The spike occurs earlier on the weekday (between 5:00 and 6:00 PM) than on the weekend (between 6:00 and 7:00 PM).

On-street parking in downtown Oregon City is efficient and occupancy levels are not constrained. Parking metrics indicate a vibrant downtown that is well managed through metering and enforcement. These characteristics will allow for increased parking demand from neighboring developments to be absorbed, and provide a sound baseline for on-street parking management as the downtown grows.

Off-Street Findings:

2016 Off-Street Parking Hourly Utilization



Key findings include:

Survey Period	Peak Hour Occupancy (Peak Hour)
Peak Occupancy - Weekday	53.4% (2:00 – 3:00PM)
Peak Occupancy - Weekend	25.5% (12:00 – 1:00PM)

- Weekday peak occupancy is 53.4% and occurs between 2:00 and 3:00 PM.
- Weekend peak occupancy is 25.5% and occurs between noon and 1:00 PM.

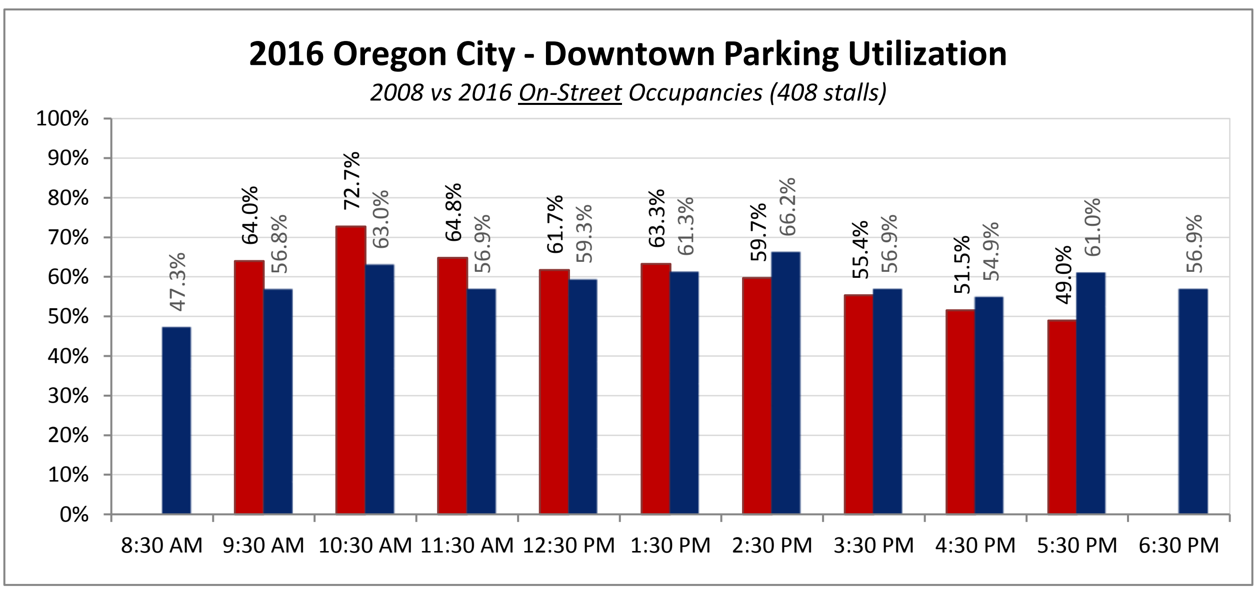
- Hourly occupancy rates are higher throughout the day on the weekday compared to the weekend.
- Hourly occupancy rates are relatively consistent on the weekday and taper off after 4:30 PM.
- Both weekday and weekend occupancy rates are not constrained and show ample room to absorb additional vehicles.
- At the weekday peak hour, 405 vehicles are parked, leaving 353 stalls empty. At the weekend peak hour, 193 vehicles are parked, leaving 565 stalls empty. Both days yield surplus space to which existing or new users could be directed.

The off-street parking supply is not constrained and, through shared-use agreements, can absorb a significant number of additional vehicles throughout the week. These findings are particularly relevant as the Willamette Falls Legacy Project considers short- and long-term off-street parking facilities for the Riverwalk and related developments.

2016 Oregon City On-Street Peak Hour Parking Utilization Comparison

2016 Oregon City On-Street Parking Utilization – Comparative							
Stall Type	Year	Stalls	Peak Hour	Peak Occupancy	Stalls Available	Average Length of Stay	Violation Rate
On-Street Peak	*2008*	*392*	*10:00 – 11:00 AM*	*72.7%*	*107*	*2 hr/ 10 min.*	*9.6%*
	2016	*408*	*2:00 – 3:00 PM*	*66.2%*	*138*	*1 hr/ 53 min*	*10.8%*

2016 vs. 2008 Oregon City On-Street Hourly Parking Utilization Comparison



Appendix II. Stakeholder Engagement Summary

There were opportunities throughout the process for community members to provide feedback on this plan, both online and in person. The City held three public meetings that acted as workshops, one open house, and two online surveys. Input from these were incorporated into the plan.

Meeting # 1 (April 26, 2017)

Challenges/Concerns

- Transit
  - No bus or transit access to site
  - No MAX or high capacity transit (HCT) connection
- Highway 99E
  - High traffic speeds make it feel unsafe and unpleasant to walk or bike
- Pedestrian access & comfort
- Bicycle access & comfort
- Connection to Downtown
- Neighborhood parking overflow
- Lack of information or signage
- Constrained site generally

Tools/Ideas

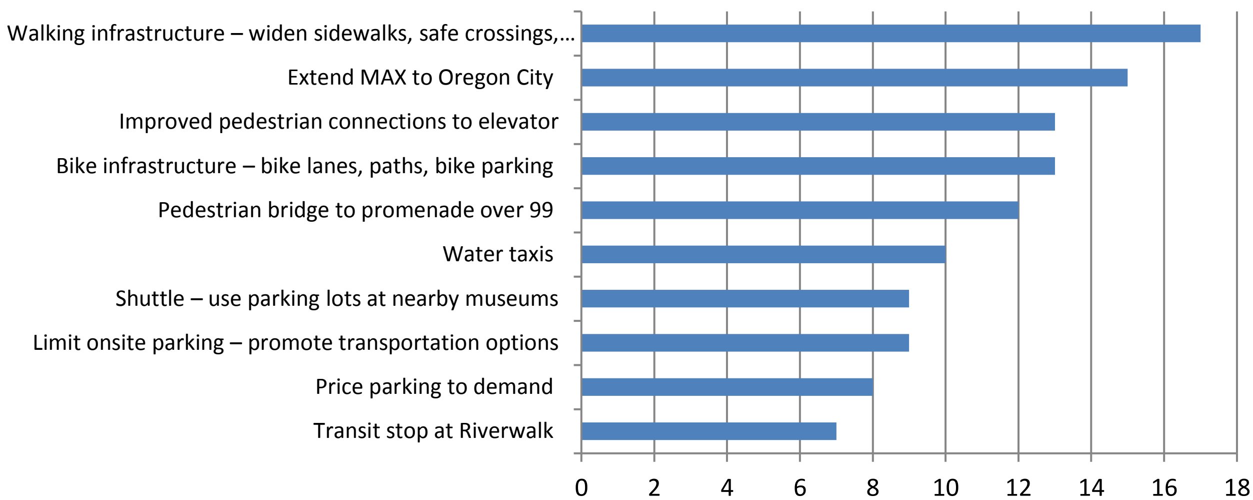
- Improve pedestrian access and comfort
  - Calm traffic on 99E
  - Pedestrian overcrossing from 99e to promenade
- Build/expand bicycle infrastructure
  - Bike lanes, paths, bike parking and wayfinding signage
  - Bikeshare or bike rental programs
- Think outside the box(car)
  - Encourage people to get there without driving, limit onsite parking
- River access
  - Water taxis
- Residential Parking Programs
  - Especially in McLoughlin and Canemah neighborhoods
- Shuttle service
- Coordinate tourist attractions and access
  - Use parking lots at nearby museums for a shuttle
- Traffic calming on Highway 99
- Smart parking pricing
- Charge for parking

- Customer validation program
- Encourage employees to park elsewhere
- Improve parking information and wayfinding signage
- Work with TriMet on expanding service to site

Meeting # 2 (May 24, 2017)

The community was asked to prioritize TDM strategies. There was strong support for most, and many community members were eager to implement them sooner rather than later. The chart below shows the top ten strategies as identified by meeting attendees and online survey respondents. Extending MAX to Oregon City was the most controversial.

Preferred TDM Strategies

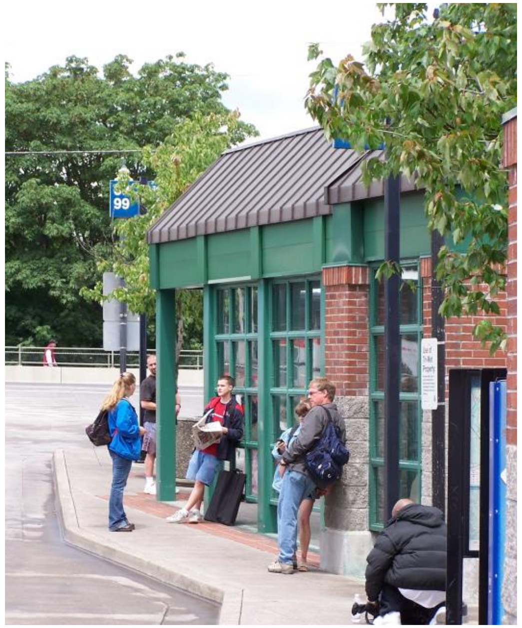


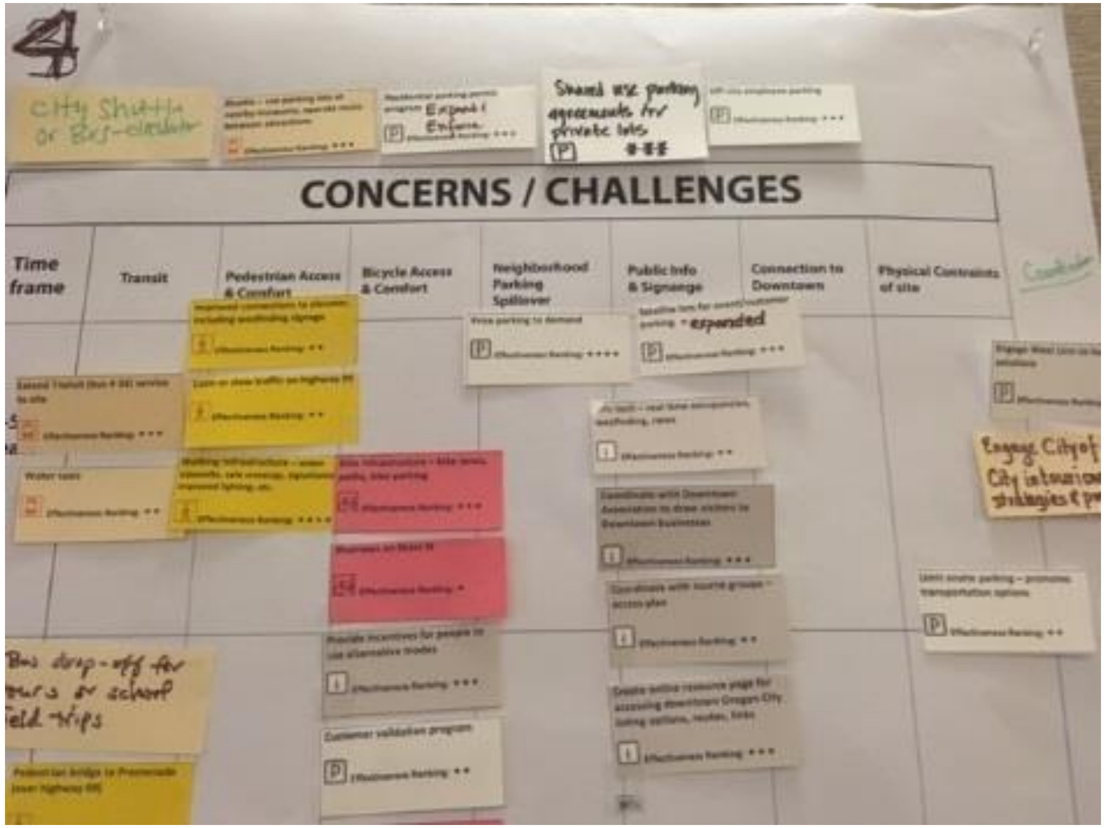
Meeting # 3 (July 26, 2017)

At this meeting, the draft plan was presented to the community to ensure that all ideas and concerns had been captured. Community members were generally in agreement with the strategies and timeline. Comments included:

- Work with regional trails such as Trolley Trail to improve bike access.
- Work with Downtown Oregon City Association on advisory committee and ongoing monitoring.
- Important to identify funding for city staff time early on.

Downtown TDM




4
CONCERNS / CHALLENGES
Time frame
Transit
Pedestrian Access & Comfort
Bicycle Access & Comfort
Neighborhood Parking Spillover
Public Info & Signage
Connection to Downtown
Physical Constraints of site

FREE
AFTER HOURS
PUBLIC PARKING

PRIVATE PARKING ONLY DURING BUSINESS HOURS

NO OVERNIGHT PARKING

PARK AT OWN RISK.

WEEKDAYS
6PM - 12AM

WEEKENDS
7AM - 12AM

COURTESY OF

OREGON CITY

Beaverton Downtown Association ···
May 3 · Edited ·

A special shout out to our friends at Columbia Bank in Beaverton! They are participating in the BDA After Hours Public Parking Program, which means the public can park in their lot (28 spaces!) after business hours for free.

Perfect time to come explore Downtown Beaverton this weekend!

•
•
•

#beaverton #downtownbeaverton #community #partnerships #collaboration #communitybank

61 4 Comments 15 Shares

Like Comment Share

Most Relevant

Amy Barnard We need a parking garage down there. Also one near 1st and Lombard. There's the nice new restaurants there but I've given up several times on trying to park there. I have a disability so I can't normally walk too far. 😔
Like · Reply · 13w · Edited 2

Marc San Soucie Excellent! Great bank people.
Like · Reply · 13w

Cynthia Wyant Bahl Fantastic!
Like · Reply · 13w

Write a comment...

SURVEY COMPLETION ENTERS YOU TO WIN

Black Ink/White Rabbit gift card, notebooks, T-shirts, blankets, and elevator ornaments

OREGON CITY

Downtown Travel Survey

bit.ly/octravelsurvey

OPEN UNTIL NOV. 27

Downtown Travel Survey

bit.ly/octravelsurvey

OPEN UNTIL NOV. 27

As part of the ongoing effort to implement our Transportation Demand Management Plan, Oregon City is seeking input on how employees and visitors access Downtown.

The Travel Behavior and Perception Survey should take less than 10 minutes to complete. Feedback will help shape how we will invest in parking and mobility improvements in Downtown over the coming years. All information collected will be kept confidential and reported only in aggregate. Please feel free to share the link with friends and family. Thank you in advance for sharing your time and insights!

parkingplan.typeform.com/to/GoXjof

Apps

1→ To help focus the survey to questions relevant to you, do you **own/operate a business** in Downtown Oregon City? "Downtown" refers to the area shown in the image Note: If you work Downtown but don't own/operate a business, select No. *

Y Yes

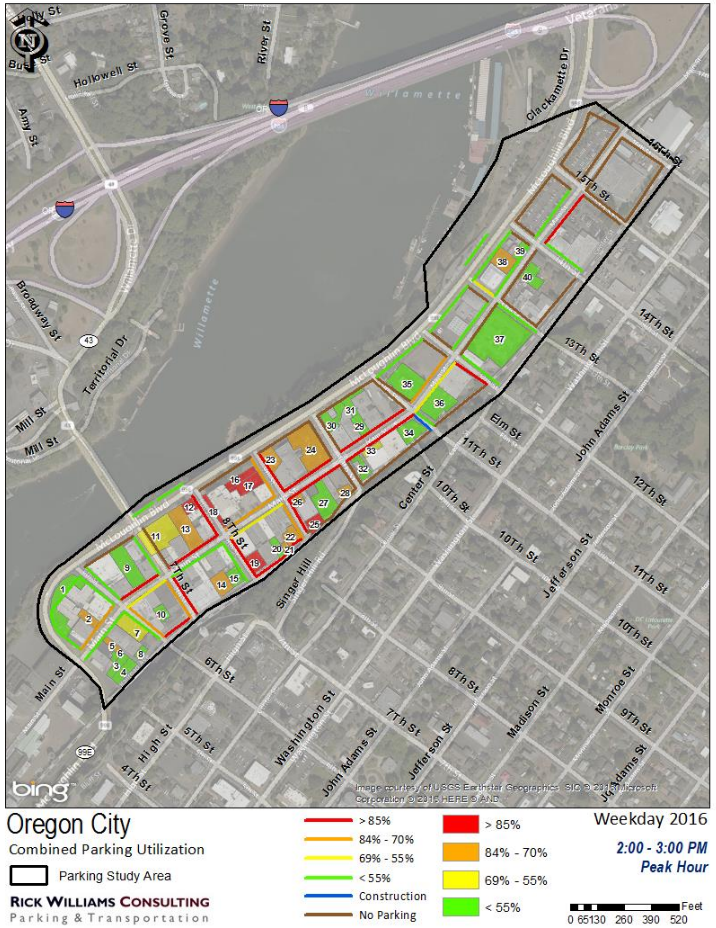
N No

0% completed

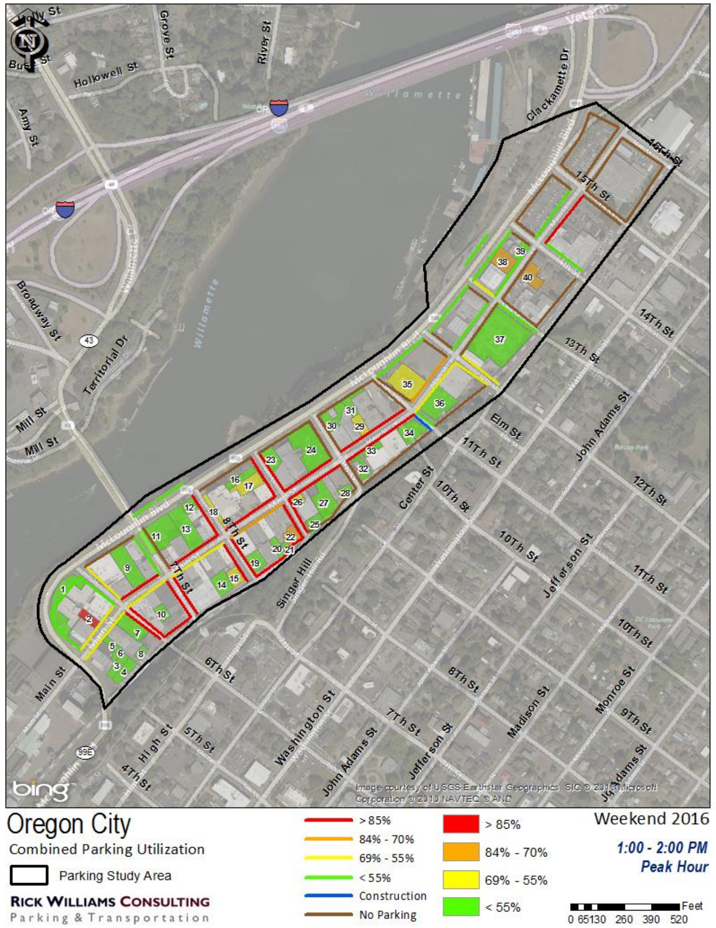
Powered by Typeform

2016 KEY FINDINGS: Off/On-Street Peak Hours

Weekday



Weekend



City of Oregon City

625 Center Street
Oregon City, OR 97045
503-657-0891

Staff Report

File Number: PC 19-120

Agenda Date: 11/12/2019

Status: Agenda Ready

To: City Commission Work Session

Agenda #: 3b.

From: Public Works Director John Lewis and Community Develop

File Type: Planning Item

SUBJECT:
Beavercreek Road Concept Plan: Beavercreek Road Design

RECOMMENDED ACTION (Motion):
Broad direction on the following items:

How many lanes should Beavercreek Road be within the Concept Plan corridor?
What type of intersections should Beavercreek Road have within the Concept Plan corridor?
Should the City renegotiate with ODOT to revise the Alternate Mobility Standard by removing Holly Lane connection projects from Transportation System Plan (TSP)?
Should Beavercreek Road along the Concept Plan corridor be constructed by developers incrementally with development or as a capital improvement project at once?

BACKGROUND:
The city is currently updating the Comprehensive Plan and Oregon City Municipal Code (OCMC) to allow planned housing and mixed-use development in the Beavercreek Road Concept Plan area. Development of each newly zoned parcel will be based on market conditions, which could take many years to build out fully. Transportation impacts will be addressed at the time of each development application, which requires compliance with the Concept Plan and city development standards. More information can be found at www.orcity.org/Beavercreekroadconceptplan

However, staff and City Commissioners were hearing from the public that 11 years after Concept Plan adoption, a fresh look may be needed to see if the adopted 3-lane design of Beavercreek Road (roughly Old Acres Road to Clairmont Road) reflected the community vision compared to a 5-lane section and the type of intersection control (roundabouts or traffic lights) along the corridor should also be reviewed.

At the August 13, 2019 City Commission work session, the City Commission requested that staff return at a future work session with more detail about the cost and design impacts of roadways width and intersection control for the area of Beavercreek Road that abuts the Beavercreek Road Concept Plan boundary as well as more feedback from the public.

The following memo and attachments will provide additional background on the different approaches to the road design of Beavercreek and provide options for next steps on this issue and public responses to an online poll will also be provided at the meeting. Staff is looking for general direction from the City Commission on the following:

How many lanes should Beavercreek Road be within the Concept Plan corridor?

- 3 lanes
- 5 lanes
- A transition from 5 lane to 3 lanes at either Meyers or Loder Roads.

What type of intersections should Beavercreek Road have within the Concept Plan corridor?

- Traffic signals
- Roundabouts
- Both (Should the City further investigate roundabout designs at specific intersections?)

Should the City renegotiate with ODOT to revise the Alternate Mobility Standard by removing Holly Lane connection projects from Transportation System Plan (TSP)?

- No
- Yes

Should Beavercreek Road along the Concept Plan corridor be constructed by developers incrementally as development is built or pursued as a capital improvement project all at once?

- The roadway should be constructed incrementally as development occurs.
- The City should create a funding mechanism for building the roadway as a single project.

Depending on the design approach, an additional work session focused on funding strategies may be needed. Once the preferred cross-section and intersection control are identified, the Transportation System Plan (TSP), Transportation Capital Improvement Project list (CIP), and the Beavercreek Road Concept Plan will be amended to include the preferred projects.

625 Center Street
Oregon City, OR 97045
503-657-0891

City of Oregon City

Staff Report

File Number: PC 19-120

Agenda Date: 11/12/2019

Status: Agenda Ready

To: City Commission Work Session

Agenda #: 3b.

From: Public Works Director John Lewis and Community Develop

File Type: Planning Item

SUBJECT:
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RECOMMENDED ACTION (Motion):
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- A transition from 5 lane to 3 lanes at either Meyers or Loder Roads.

What type of intersections should Beavercreek Road have within the Concept Plan corridor?

- Traffic signals
- Roundabouts
- Both (Should the City further investigate roundabout designs at specific intersections?)

Should the City renegotiate with ODOT to revise the Alternate Mobility Standard by removing Holly Lane connection projects from Transportation System Plan (TSP)?

- No
- Yes

Should Beavercreek Road along the Concept Plan corridor be constructed by developers incrementally as development is built or pursued as a capital improvement project all at once?

- The roadway should be constructed incrementally as development occurs.
- The City should create a funding mechanism for building the roadway as a single project.

Depending on the design approach, an additional work session focused on funding strategies may be needed. Once the preferred cross-section and intersection control are identified, the Transportation System Plan (TSP), Transportation Capital Improvement Project list (CIP), and the Beavercreek Road Concept Plan will be amended to include the preferred projects.

Community Development – Planning

698 Warner Parrott Road | Oregon City OR 97045
Ph (503) 722-3789 | Fax (503) 722-3880

To: Mayor Holladay and City Commission

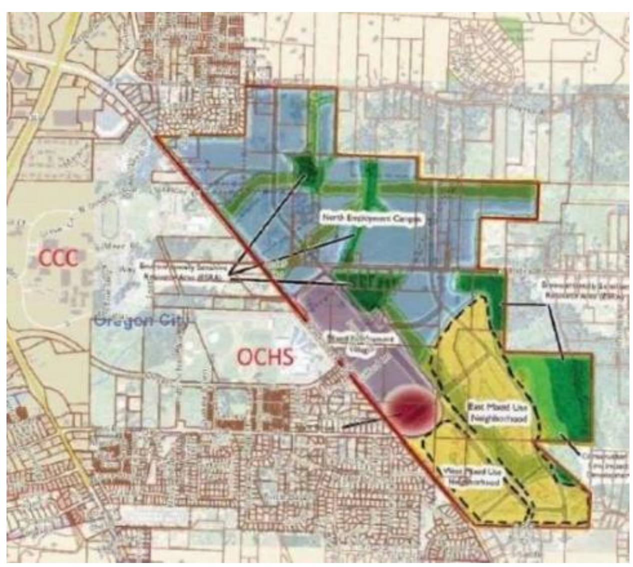
From: Christina Robertson-Gardiner, Senior Planner
Dayna Webb, City Engineer
John Replinger, PE, Replinger & Associates LLC

RE: Beavercreek Road Design

Date: November 5, 2019

The Beavercreek Road Concept Plan (BRCP) is a guide to the creation of a new neighborhood in southeast Oregon City. The adopted plan provides a framework for urbanization of 453 acres within the urban growth boundary including a diverse mix of uses (an employment campus north of Loder Road, mixed-use districts along Beavercreek Road, and two mixed-use neighborhoods), all woven together by open space, trails, a network of green streets, and sustainable development practices. The plan has been crafted to create a multi-use community linking Clackamas Community College, Oregon City High School, and adjacent neighborhoods together.

The city is currently updating the Comprehensive Plan and Oregon City Municipal Code (OCMC) to allow planned housing and mixed-use development in the Beavercreek Road Concept Plan area. Development of each newly zoned parcel will be based on market conditions, which could take many years to build out fully. Transportation impacts will be addressed at the time of each development application, which requires compliance with the Concept Plan and city development standards. More information can found at www.orcity.org/Beavercreekroadconceptplan.



Beavercreek Road Concept Plan Boundary

However, staff and City Commissioners were hearing from the public that 11 years after Concept Plan adoption, a fresh look may be needed to see if the adopted 3-lane design of Beavercreek Road (roughly Old Acres Road to Clairmont Road) reflected the community vision compared to a 5-lane section and review the type of intersection control (roundabouts or traffic lights) along the corridor.

At the August 13, 2019 City Commission work session, the City Commission requested that staff return at a future work session with more detail about the cost and design impacts of roadways width and intersection control for the area of Beavercreek Road that abuts the Beavercreek Road Concept Plan boundary as well as more feedback from the public.

The following memo and attachments will provide additional background on the different approaches to the road design of Beavercreek and provide options for next steps on this issue.

City Commission Direction

Staff is looking for direction from the City Commission on a variety of items. Depending on the design approach, an additional work session focused on funding strategies may be needed.

- **How many lanes should Beavercreek Road be within the Concept Plan corridor?**
  - 3 lanes
  - 5 lanes
  - A transition from 5 lane to 3 lanes at either Meyers or Loder Roads.

- **What type of intersections should Beavercreek Road have within the Concept Plan corridor?**
  - Traffic signals
  - Roundabouts
  - Both (Should the City further investigate roundabout designs at specific intersections?)

- **Should the City renegotiate with ODOT to revise the Alternate Mobility Standard by removing Holly Lane connection projects from the Transportation System Plan (TSP)?**
  - No
  - Yes

- **Should Beavercreek Road along the Concept Plan corridor be constructed by developers incrementally as development is built or pursued as a capital improvement project all at once?**
  - The roadway should be constructed incrementally as development occurs.
  - The City should create a funding mechanism for building the roadway as a single project.

Once the preferred cross-section and intersection control are identified, the Transportation System Plan (TSP), Transportation Capital Improvement Project list (CIP), and the Beavercreek Road Concept Plan will be amended to include the preferred projects. Considerations for the City Commission to inform the above is provided below.

Tradeoffs – Number of Lanes

Creating additional lanes help vehicles move quicker through areas during peak traffic periods. However, during off-peak periods there may be little effect on travel times. Additional lanes also generally allow turning movements to and from the minor streets to be made with less delay. Additional lanes, particularly near signalized intersection, will reduce the length of the vehicle queues allowing cars to stop closer to the intersection rather than stretching the congestion out in a longer line. This additional capacity that results from added lanes can erode over time; however, as other drivers chose the newly expanded street over their previous commute route, also known as **induced demand**. Increasing the number of lanes generally results in increased travel speeds by motorists. The resulting increase in travel speed does not result in increased capacity as drivers feel the need to create additional buffer space in front and beside them. Increased travel speeds do result in more severe crashes that are particularly devastating for pedestrians and bicyclists. More lanes and higher speeds also require longer intervals for pedestrian crossing signals and longer yellow times. These decrease the overall efficiency of signalized intersections.

Overall, increasing the number of lanes vary from no change in travel time during off-peak periods to real reductions in travel time at peak periods if regional growth is greater than predicted and if vehicle demand approaches or exceeds the capacity of the number of lanes provided on a road. It is difficult to provide definitive prediction of the travel time on a particular section of road as a three-lane or five-lane section because of the various factors that influence a prediction including use of alternative routes and the timing of completion of projects further along the corridor that reduce congestion such as the dedicated right turn lane to Highway 213 northbound.

Addressing Future Growth
Traffic models account for growth in other jurisdictions and their effects on Oregon City. Clackamas County, Oregon City, and the Oregon Department of Transportation all look at how growth is affecting their transportation network and create a list of funded projects that can address safety concerns or add system capacity. As you can imagine, this is not an easy task. Every year there are more project needs than budgeted funds. It is up to Oregon City to assure that all of the necessary projects are identified, even if we do not own the roadway.

Future Major Transportation Projects
Oregon City has identified a few automobile projects that will add connectivity and additional capacity to the road network in this area.

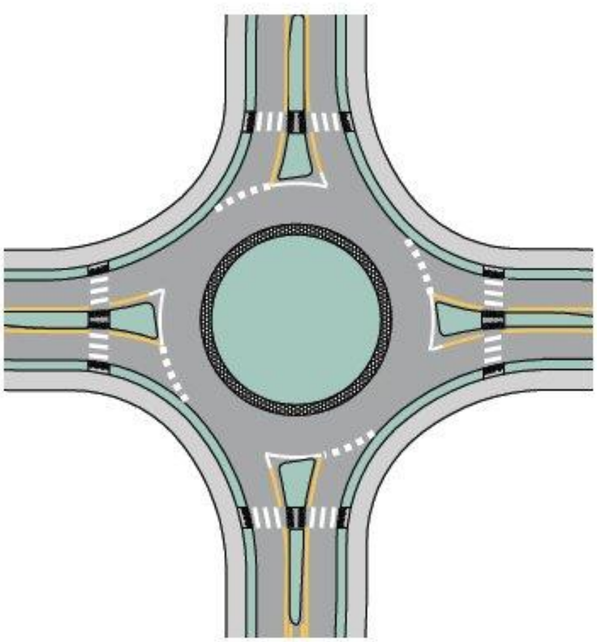
1. The Meyers Road Extension Project from 213 to the Oregon City High School
2. Extension of High School Avenue to Loder Road
3. Creation of a north/south road parallel to Beavercreek within the Concept Plan boundary
4. Improvements to Highway 213 and Beavercreek Road (conversion of the existing yield to free-flow right Turn lane onto northbound 213 from Beavercreek Road Northbound acceleration lane to merge into with traffic).

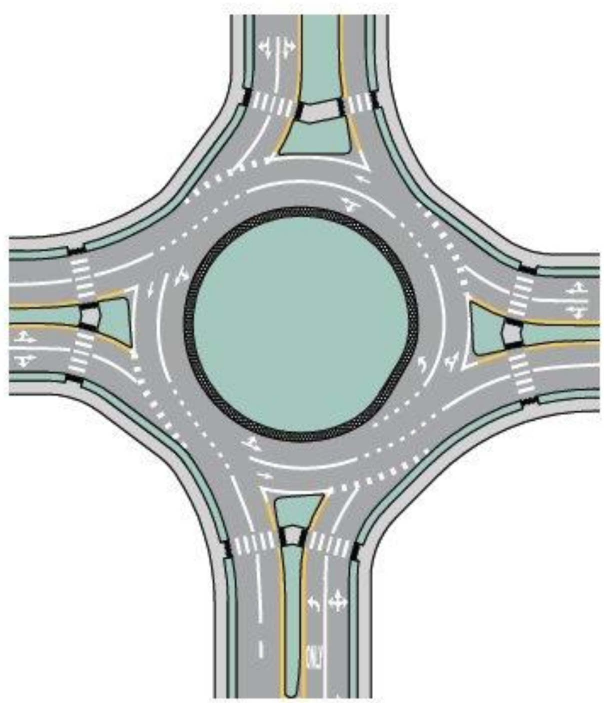
Adding more road connections, like Meyers Road, provides drivers alternate routes and decreases the dependency on using any one road. For example, currently most of the vehicles going to the high school from the west side of Hwy 213 are traveling on Hwy 213 to Beavercreek Road or Glen Oak Road, then to the High School. The Meyers Road extension will create a new east-west connection, removing a portion of the trips from both Hwy 213 and Beavercreek Road. In addition to the vehicular connections above, additional bicycle and pedestrian improvements are also identified.

Access Management/Intersection Control (Roundabouts vs. Signals)
When the Concept Plan area is developed, access to Beavercreek Road will only occur through the existing intersections (Clairmont Drive, Loder Road, Meyers Road, and Glen Oak Road). No new driveways will be allowed on Beavercreek Road. The 2008 Concept Plan identified roundabouts as a good approach to intersections, but the Transportation System Plan (TSP) also identifies some traffic signals along the roadway.

Roundabouts
Roundabouts are circular intersections designed to eliminate left turns by requiring traffic to exit to the right of the circle. Drivers travel counterclockwise around a center island. There are no traffic signals or

stop signs in a modern roundabout. Drivers yield at entry to traffic in the roundabout, then enter the intersection and exit at their desired street.





3- LANE ROUNDABOUT

5-LANE ROUNDABOUT

Think of roundabouts as a series of "T" intersections, where entering vehicles yield to one-way traffic coming from the left. A driver approaching a roundabout must slow down or stop for vehicles stopped ahead, yield to pedestrians in the crosswalk, and yield to traffic already in the roundabout. Roundabouts are designed to accommodate fire trucks and large vehicles. Large trucks may have to drive on the concrete apron around the central island in order to get through the roundabout.

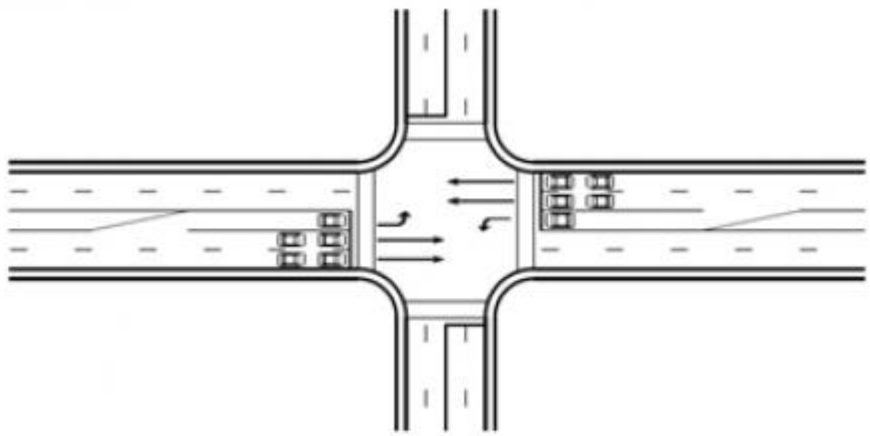
What are the advantages and disadvantages of roundabouts?

- Greater safety is achieved primarily by slower speeds and elimination of left turns which can greatly decrease the number & severity of accidents.
- Operation is improved by smooth flowing traffic (with less stop and go than a signalized intersection).
- Aesthetics are enhanced by landscaping.
- Roundabouts can distinguish the Concept Plan area as different than others in the City.
- Additional landscaping requires a long-term maintenance commitment but normally costs less in the long run than signal maintenance.
- Drivers must pay attention; pedestrians don't have a signal to help them cross and bicyclists must merge with motor vehicles to enter the roundabout or utilize a larger shared-use ped/bike sidewalk. This can be intimidating for people trying to cross the road.
- In general, multi-lane roundabouts are not recommended in areas with high levels of pedestrian and bicycle activity due to safety concerns of multiple threat crashes for pedestrians, especially those with visual impairments, and bicyclists.

- The process to acquire additional needed property can require more time and money compared to a signal installation in an existing urban intersection. Though once built, the long-term maintenance cost for roundabout can be less than traditional signal maintenance, assuming slow growing and low maintenance landscaping amenities are provided.
- Legs of a signalized intersection can be built in phases, whereas roundabouts need to be substantially built in the first phase of construction.
- Repaving or utility construction through an estabished roundabout is complicated and often more impactful to the traveling public than it would be through a signalized intersection due to the site limitations that result from curved lanes and medians.

Signalized Intersections (Traffic Signals)

Traffic signals are designed to allow for the safe and efficient passage of road users when demand exists.



What are the advantages and disadvantages of signalized intersections?

- Legs of a signalized intersection can be built in phases, whereas roundabouts need to be substantially built in the first phase of construction.
- Pedestrians have priority when crossing signalized intersections. However, accidents can prove more fatal from cars running intersections at full speed compared to cars that slow down to yield at a roundabout.
- Construction costs can be less for standard intersections, but long-term signal timing and maintenance will increase the overall cost.
- Multi-lane intersections create a longer crossing distance but can be configured to allow additional pedestrian crossing time, whereas multi-lane roundabouts can create confusion between pedestrians, bikes, and vehicles on who has the right of way.
- Signalized intersections do not create a unique sense of place.
- Cars often speed up and slow down between intersections, especially on a wider road.

Roundabout Conceptual Study

Attached are conceptual overlays of 3 and 5 lane roundabouts along existing intersections that abut the Concept Plan boundary. This was an inhouse exercise that took standard roundabout designs and overlaid them to the existing city maps, centered at the existing intersections, to allow the City Commission to see how different approaches to intersection design could affect neighboring properties.

Though this is just a high-level exercise to see the comparative difference in scale between the size of a 3 and 5 lane roundabout, one can see that a 5 lane roundabout requires much more land than a 3 lane roundabout and that the land around many of the intersections on Beavercreek Road is constrained with existing homes. In the event Commission directs staff to move forward with roundabouts more work would be required to identify the exact location, shape, and configuration of the roundabout at each intersection to minimize conflicts with adjacent properties.

Survey
A survey was released on October 24, 2019 to get an understanding of public opinion about Beavercreek Road design along the Concept Plan Corridor. The questions were set to be more of a value-based approach to understanding priorities and perception of using roundabouts and signals at intersections. While this was shared widely including through the project eblast list, Neighborhood Associations, Oregon City School District, Chamber of Commerce, Hamlet of Beavercreek, social media platforms, etc., it should not be viewed as a statistically significant sample. Rather, the results of this survey allow the City Commission to get a pulse of community members who may not have time to attend a Commission hearing or send in public comment but are interested in the topic. The survey closes on November 11, 2019 and a final analysis will be shared with the City Commission at the November 12th work session.

Jurisdictional Transfer
The portion of Beavercreek Road within the Concept Plan boundary is owned by Clackamas County, though much of it is within the city limits of Oregon City. Through the Clackamas County Coordinating Committee (C4) and discussions about the Clackamas County Vehicle Registration Fee (VRF), the County has agreed to set aside a "Strategic Investment Fund" which would allocate 10% of the revenues collected from the VRF for projects like jurisdictional transfers and other joint agency interest roadway capital projects. The details of this are currently under consideration by the County and C4. In those discussions Beavercreek Road is tentatively identified as Oregon City's priority Road/project.

City staff began conversations with Clackamas County about a jurisdictional transfer of the roadway so that it may be design and maintained to City standards. In order to move forward with this, staff would need to let the County formally know we are interested in taking jurisdiction of Beavercreek Road. If that is desired, the two agencies will create an Intergovernmental Agreement or Memo of Understanding, related to the future transfer of the roadway. This document will lay out the interim terms of the ownership and maintenance between now and the formal transfer of jurisdiction in the future. This would include who maintains the pavement, ditches, street lighting, traffic signals, and who will have permitting authority for franchise permits and development along the corridor.

Holly Lane
During the Transportation System Plan (TSP) update in 2012, it was determined that the intersection of Hwy 213 & Beavercreek Road would be too congested in the future and would not meet Oregon Highway Plan mobility standards through the TSP planning horizon year of 2035. The TSP recommended the City move forward with a project to address the need for a refinement plan at the intersections.

Over the next 3 years, the City worked with ODOT and a Technical Advisory Group and a Community Advisory Group identified a variety of reasonable improvements to increase the capacity and/or safety of the intersection along with alternative mobility targets for measuring congestion which was adopted by the City and the Oregon Transportation Commission. Holly Lane and its long-term connection to the Concept Plan area through Maple Lane and Thayer Road was identified as an alternate route to the intersection of Beavercreek and Highway 213. Seth Brumley, Region 1 Planner with the Oregon

Department of Transportation (ODOT) submitted a letter identifying that removing Holly Lane extension projects from the TSP would require the City to revise the alternate mobility target and provide an alternate project that meets or exceeds the benefit of the Holly Lane extension. Staff is currently unable to identify an alternate project which is affordable and has not allocated funding or staff time towards the creation of such an alternative. The city is currently working with Clackamas County on the implementation of the Holly Lane connection and believes that the project is an important alternate route to the system to ease congestion in this area.

Conceptual Cost Estimates
Staff has completed the following order of magnitude cost estimate of the options being discussed. The following cost estimates of the initial construction of various road width and intersection controls were created utilizing the methodology from the Transportation System Plan (TSP) and are based on conceptual designs only with the assumptions noted below. The costing exercise looks at the adopted 3-lane street section and a more standard urban 3 and 5-lane configuration. Please note that the assumptions were used for a costing exercise and the final cross-section may be different than identified below.

Beavercreek Road Options	**Adopted 3-Lane** 90 feet wide ROW	**Optimal 3-Lane Roadway** 76 feet wide ROW	**Optimal 5-Lane Roadway** 100 feet wide ROW
Signals	$26M	$22M	$34M
Roundabouts	$32M	$29M	$48M

The following assumptions were used in creating the conceptual cost estimates:

Adopted 3-lane (90 feet ROW)

- 6’ sidewalks, 10’ planter, 6’ bike lane + 2’ bike buffer each side, 12’ travel lanes (2) and an 18’ center turn lane/median
- Approximately 15 tax lots would be impacted by property acquisition along the corridor. Acquisition cost assumptions vary along the corridor.

Optimal 3-lane Roadway (76 feet ROW)

- 6’ sidewalks, 6’ planter, 6’ bike lane + 2’ bike buffer each side, 12’ travel lanes (2) and a 12’ center turn lane/median
- Approximately 15 tax lots would be impacted by property acquisition along the corridor. Acquisition cost assumptions vary along the corridor.

Optimal 5-lane Roadway (100 feet ROW)

- 6’ sidewalks, 6’ planter, 6’ bike lane + 2’ bike buffer each side, 12’ travel lanes (4) and a 12’ center turn lane/median
- Over 40 tax lots would be impacted by property acquisitions along the corridor, many of these are along the west side of the corridor
- Acquisition cost assumptions vary along the corridor, some parcels include full acquisition.

Options to mitigate the total project cost:

- The order of magnitude cost estimates are based on traditional lane widths, we could identify slightly narrower lane widths, which would provide a small cost savings in both right of way acquisitions and construction costs.
- The footprint of roundabouts is much larger than a signalized intersection, due to this larger right of way requirement, a roundabout is more expensive than a signalized intersection to construct.
- If a 5-lane cross-section is selected, it will be expensive and difficult to construct the second southbound lane due to the existing development along the west side of the roadway. One option that would decrease the overall cost of the 5-lane project is shifting the centerline of the roadway. This decreases the cost as the land on the east side is undeveloped, and the price per square foot of undeveloped land is less than developed land. The downside to this option is that the downsides to this option are:
    1. It utilizes more of the land allocated to job creation.
    2. It impacts a planned and land use approved live-work development at Beavercreek Road and Meyers Road
    3. It still impacts a few existing homes but would reduce the number of home acquisitions
    4. This option also requires the project be built all as one, not incrementally by development
- Creating additional refined details for the preferred design on this corridor will require additional funding and a timeline for completion. This work would be completed in cooperation with a contracted consulting firm, and the level of design work would be matched with the needed level of certainty of the design. Without further refinement of the question being asked and the level of detailed needed to answer the question, the cost for preliminary design work could be anywhere from $50,000 to $300,000 for this corridor.

Funding Large Scale Improvements

Many agencies struggle with how to transition from a two-lane roadway to fully built roadway. If a roadway is built as development occurs, it can and will be piece-meal. Often not occurring linearly along a corridor, which creates difficulties in implementing a center turn lane. If the city wants to build this before development occurs, we will need to identify how we fund a project of this magnitude.

Current Approach

- The adopted TSP project cost for Beaverceek Road was solely based on repaving and for a standard two-lane section with some sidewalk additions. The cost for the Beavercreek Corridor is identified as $8.6 million, assuming 2 lane roundabouts at Glen Oak Road and Loder Road, leaving existing signals at Clairmont Drive and Meyers Road.
- Currently, our transportation SDC methodology identifies projects in the Beavercreek Road corridor that total $8.6 million, of which $3.8 million is attributed to growth and therefore would be funded by SDC's. The remaining $4.8 million, would come from other sources.
- This $8.6 Million is insufficient to fund all the improvements called for in a 3 lane configuration and well under the need for a 5 lane configuration. However, identified capital improvement projects within the Beavercreek Concept area total a growth share of nearly $50 Million. Similar to the bond supported LID option, a capital funding bond could be authorized and reimbursed through future SDC revenues after the project is funded and built. The City would need to take a more detailed look into the entire Beavercreek Concept area project list and determine how onsite funding for transportation projects might be allocated less to the internal streets and more toward Beavercreek Road

Other Funding Options

- Another option to fund the improvements is the implementation of a Local Improvement District. A Local Improvement District (LID) is a method by which a group of property owners can share in the cost of infrastructure improvements. The LID is a method of providing public financing for the construction of public works improvement projects that benefit private properties. The property owners within the LID benefit area are responsible for repaying the costs of the project. If the project also benefits the general public, in addition to private property within the LID, the City can assist with those costs.
- LID's are a good way to share the cost amongst several benefitting property owners and in this case, the LID generated funds would be one element of the financial leverage plan contributing to the overall project costs which would include developer funding, SDC's, and possibly other smaller funding options. LID's are typically funded using existing City funds which are reimbursed over time which in this case would complicate the City's cash flow unless supported via a capital improvement bond.
- Urban Renewal is a mechanism that can assist in funding the development of a growing area. The creation of an Urban Renewal District is complex and requires voter approval.
- Projects that abut mixed-use or low-density residential along the urban fringe do not score well for state and federal grants. The highest scoring projects provide safety improvements, congestion relief along existing urban corridors, are in areas of historically underrepresented communities that are regionally important and leverage other funding sources. Currently, this corridor is not likely to score well with these criteria.
- Another option to fund the transportation improvements in the Beavercreek Concept Plan area is the creation of an area-specific Transportation System Development Fee (SDC). Typically, these additional SDCs are collected in an overlay area, that is intended to only be used in that area. Depending on the size of the area and the cost of the additional projects, the resulting Transportation SDC increase could have a negative effect on attracting new businesses and keeping housing affordable. The Bethany and Witch Hazel Village South (Hillsboro) Concept Plan areas utilize this approach.
- Beavercreek Road is a multi-jurisdictional roadway that is currently under the authority of Clackamas County, and a significant volume of traffic using Beavercreek Road is generated from outside the City. A meaningful Clackamas County contribution to the full development of Beavercreek Road is a policy issue that should be raised with the Board of County Commissioners (BCC). It is common for the BCC to support multi-jurisdictional roadway improvements in other cities within the County

Staff Recommendation

- **How many lanes should Beavercreek Road be within the Concept Plan corridor?**
  - A transitional section extending the existing 5 lane section near Maple Lane and transitioning to a 3 lane section at Loder Road.

- **What type of intersections should Beavercreek Road have within the Concept Plan corridor?**
  - Traffic signals

- **Should the City renegotiate with ODOT to revise the Alternate Mobility Standard by removing Holly Lane connections from Transportation System Plan (TSP)?**

  - No

- **Should Beavercreek Road along the Concept Plan corridor be constructed by developers incrementally as development is built or pursued as a capital improvement project all at once?**
  - The roadway should be constructed incrementally as development occurs.

Additional Design Considerations

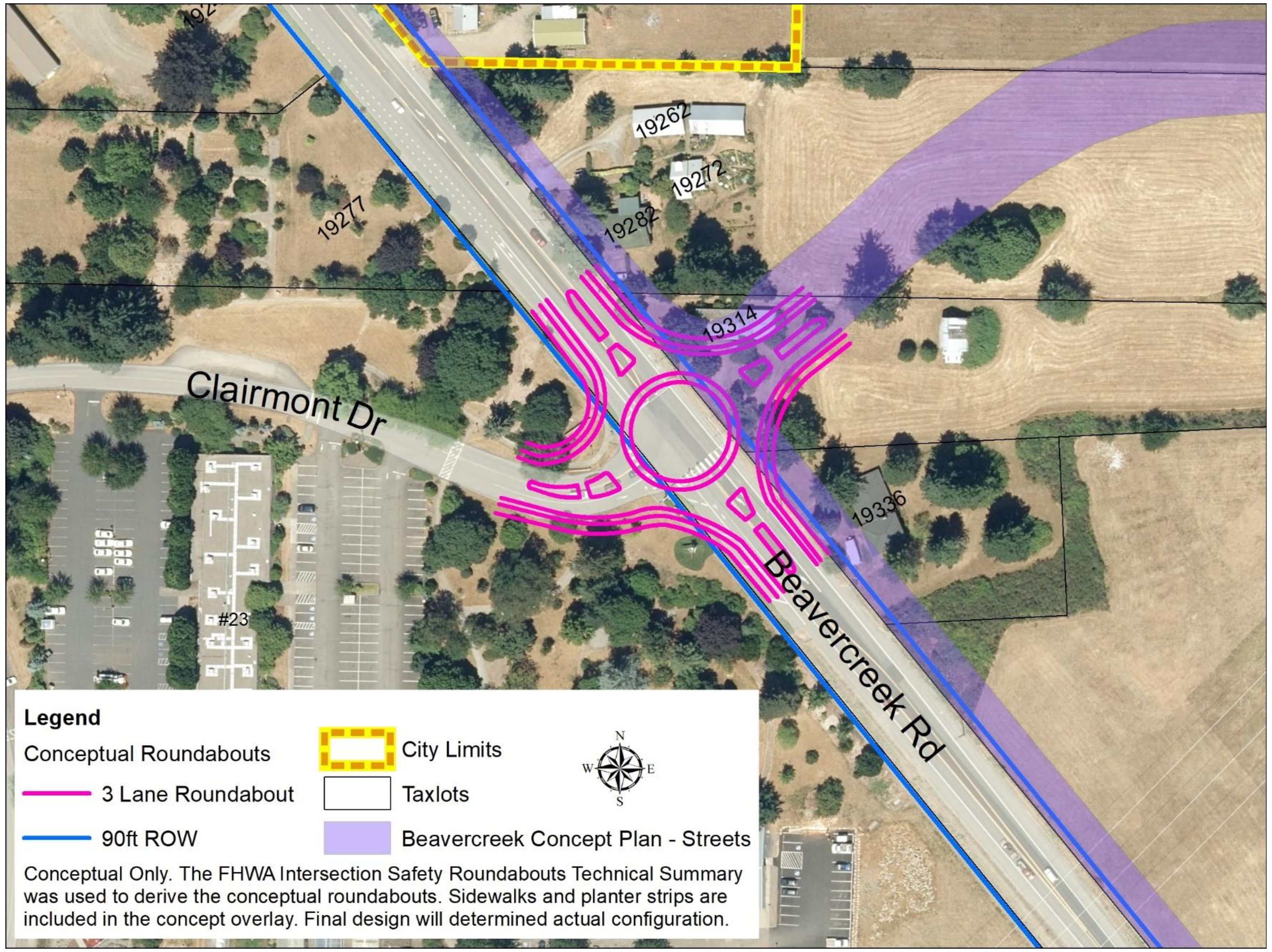
- To be able to utilize a fully built out 5-lane Beavercreek Road, staff recommends that the center lane of the road is shifted to the east. This approach also is very hard to build incrementally and should be pursued as a capital improvement project.
- A 3-lane Beavercreek Road can be built as a capital improvement project or incrementally.
- Roundabouts (3 or 5-lane) should be pursued as a capital improvement project.
- If the City Commission wishes a transition from 5 to 3-lanes through incremental development, staff suggest transitioning from 5 lanes to 3 lanes at Loder Road. Existing patterns at Meyers Road and Glen Oak Roads would result in only the northbound section of Beavercreek Road to be built out over time, in effect having 2 lanes northbound and 1 lane southbound at Concept Plan buildout.
- The adopted 90 feet wide 3-lane cross-section shows a large inverted crown stormwater section in the middle of the road. Abutting grades and the location of existing utilities make this design very difficult to implement. Staff recommends moving the stormwater area to the outside planter section of the road for both the 3 and 5- lane configurations.
- Keeping the adopted 90-foot width for the 3-lane section would allow for an increased width of the pedestrian/bikeway, which could include a separated bike lane on the eastside. A standard 12 feet planter medium can remain in the center turn lane.

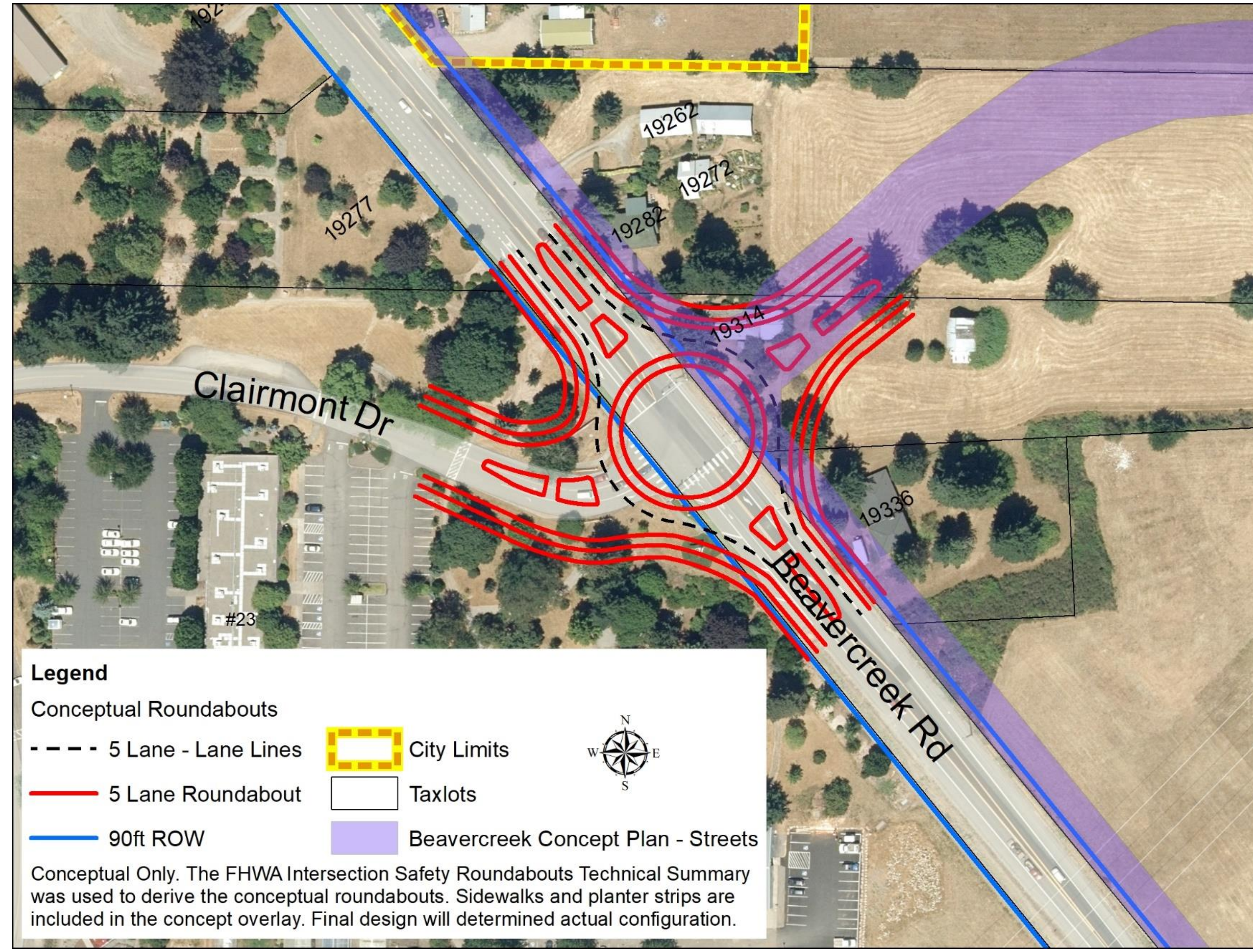
Transportation System Plan (TSP) Consistency and Transportation Planning Rule (TPR) Compliance
Overall, the current TSP includes projects in and around the Beavercreek Road Concept Plan area, including the 3-lane segment along Beavercreek Road comply with the Statewide Transportation Planning Rule (TPR) and best practice congestion standards and planned intersection management solutions at key locations. These are required to be met when rezoning property within the city. If the City Commission would like to add additional lanes on Beavercreek Road or replace traffic signals identified in the TSP with roundabouts identified in the Concept Plan, those would also meet the TPR requirements. The Legislative file (**LEG 19-00003**) implementing the Zoning in the Concept Plan area can move forward concurrently with the Beavercreek Road design refinement process without delaying the adoption process. A final condition of approval could even be added that limits development until a final Beavercreek Road design is adopted.

Next Steps
Staff is looking for broad direction with the questions found at the front of the memo. All of the proposed configurations have cost implications that will need further City Commission direction and may require some additional engineering studies. Depending on the design approach – an additional work session focused on funding strategies is recommended.

Conceptual Study

Clairmont Drive and Beavercreek Road





3-Lane Roundabout

Land acquisition implications: Property not part of a land use application would need to be acquired prior to construction. These could include portions of Clackamas Community College Property abutting Clairmont Drive & 19314 Beavercreek Road.

Alignment considerations: The roundabout is currently centered on the intersection. The Clairmont Drive intersection is currently not built out, which provides more opportunities to identify a design and construct a roundabout without impacting existing development and structures.

Cost considerations: The footprint and property required for a 3 lane roundabout is larger than is required for a signalized intersection. The cost is also greater for a 3 lane roundabout than a signalized intersection.

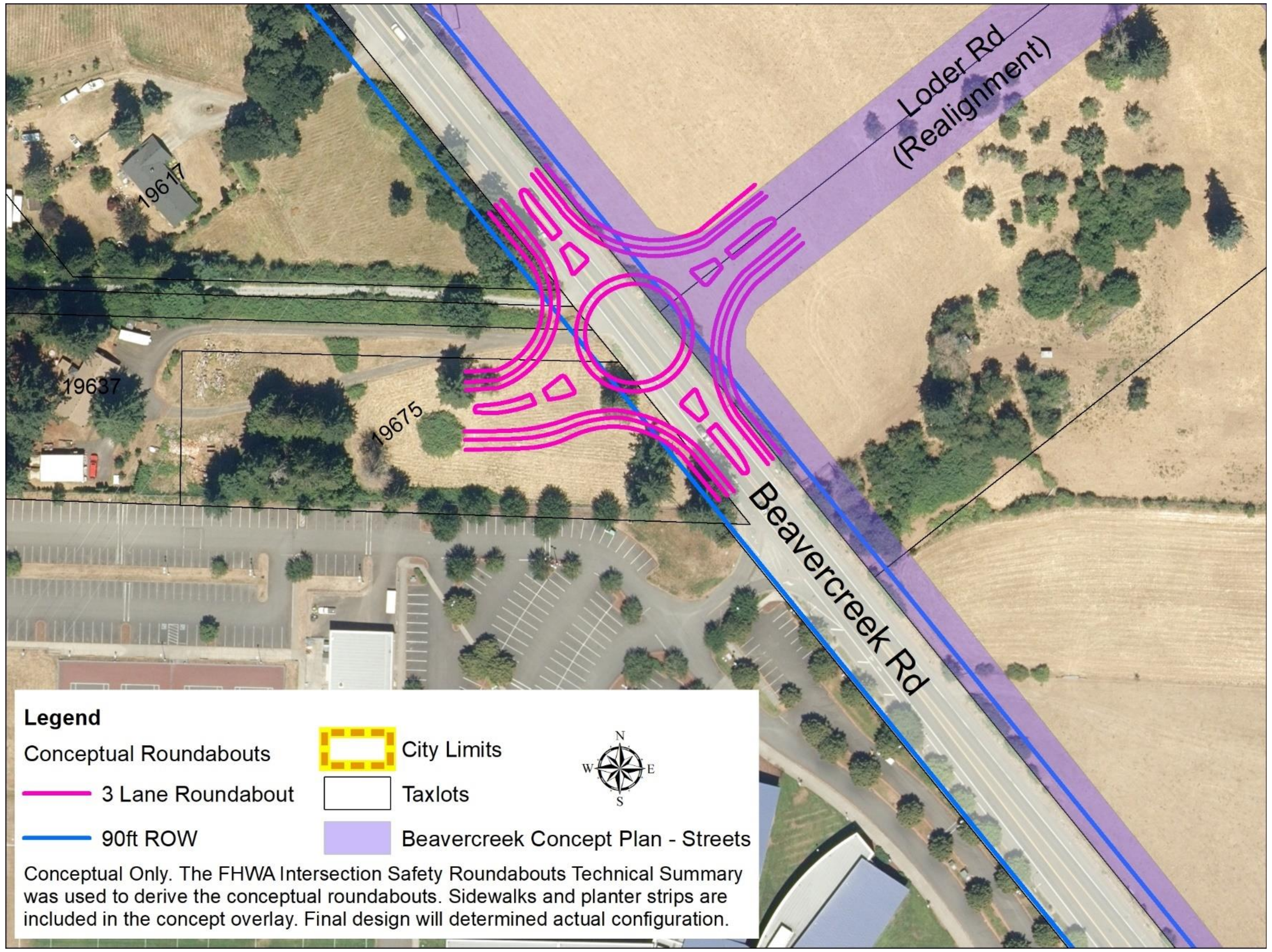
5-Lane Roundabout

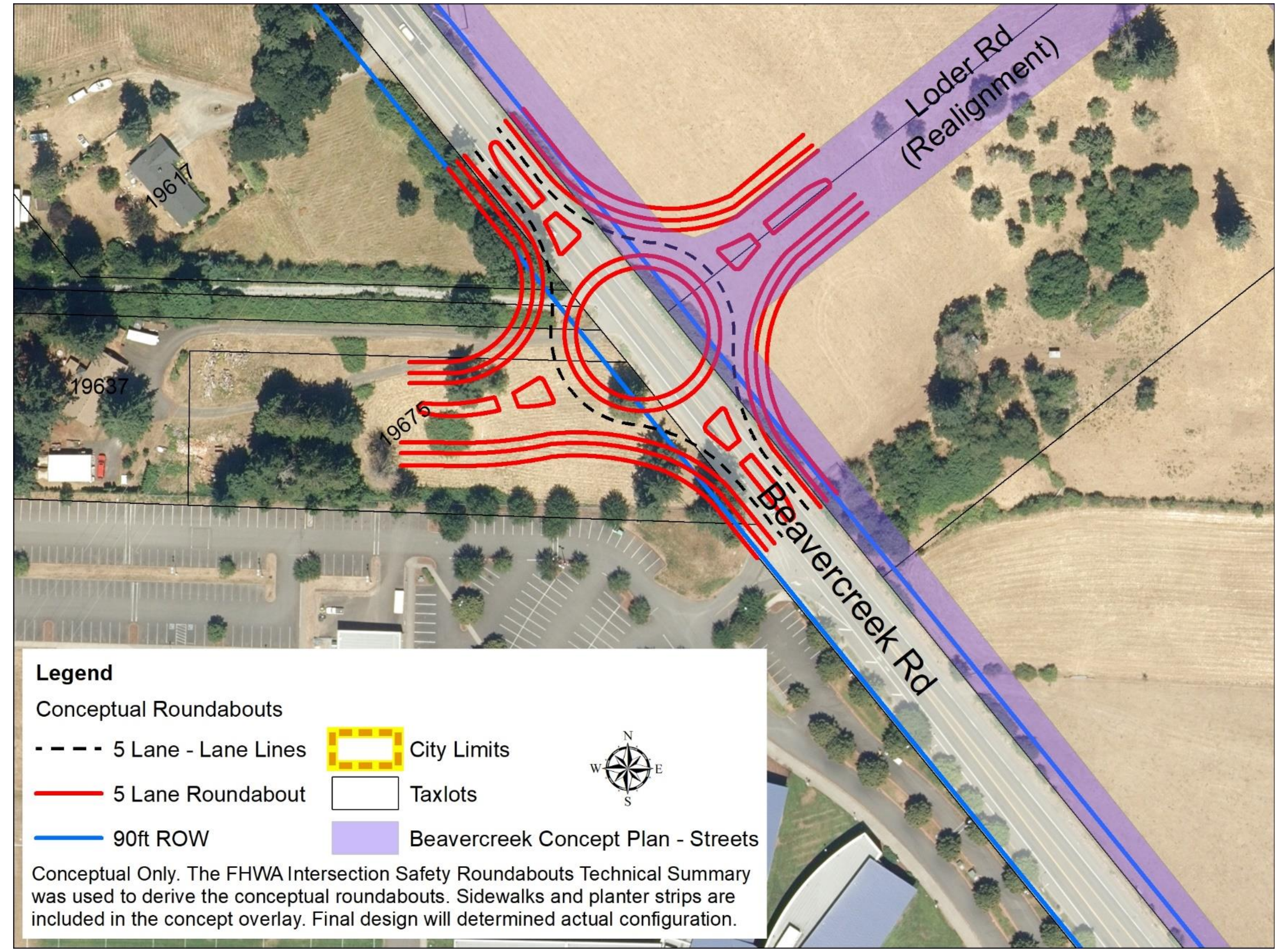
Land acquisition implications: Property not part of a land use application would need to be acquired prior to construction. These could include portions of Clackamas Community College Property abutting Clairmont Drive & 19314 Beavercreek Road.

Alignment considerations: The roundabout is currently centered on the intersection. The Clairmont Drive intersection is currently not built out, which provides more opportunities to identify a design and construct a roundabout without impacting existing development and structures.

Cost considerations: The footprint and property required for a 5 lane roundabout is larger than is required for a 3 lane roundabout. The cost is also greater for a 5 lane roundabout than a 3 lane roundabout or signalized intersection.

Loder Road and Beavercreek Road





3-Lane Roundabout

Land acquisition implications: Property not part of a land use application would need to be acquired prior to construction.

Alignment considerations: The roundabout is currently centered on the intersection. The Loder Road intersection is currently not built out, which provides more opportunities to identify a design and construct a roundabout without impacting existing development and structures.

Cost considerations: The footprint and property required for a 3 lane roundabout is larger than is required for a signalized intersection. The cost is also greater for a 3 lane roundabout than a signalized intersection.

5-Lane Roundabout

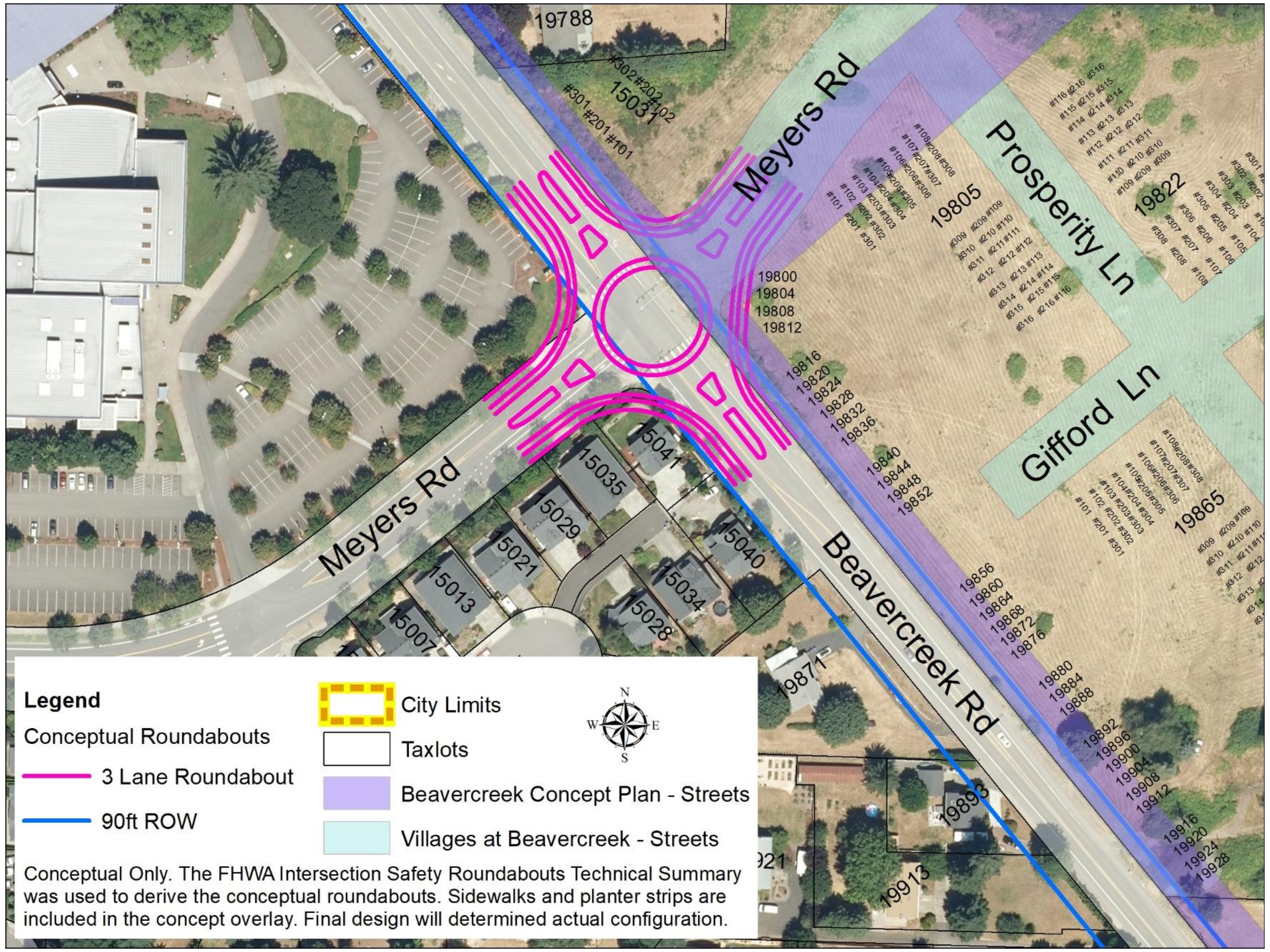
Land acquisition implications: Property not part of a land use application would need to be acquired prior to construction.

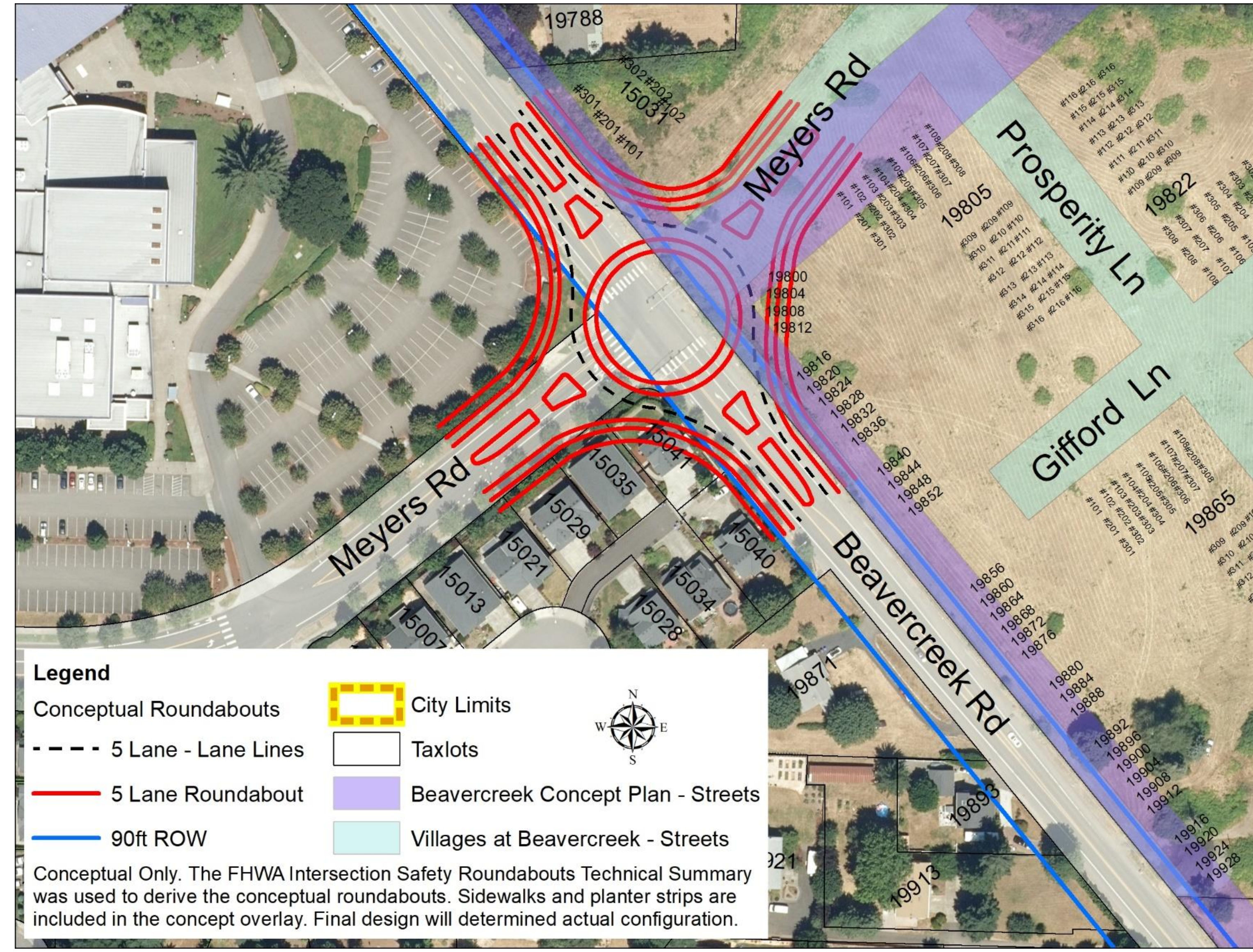
Alignment considerations: The roundabout is currently centered on the intersection. The Loder Road intersection is currently not built out, which provides more opportunities to identify a design and construct a roundabout without impacting existing development and structures.

Cost considerations: The footprint and property required for a 5 lane roundabout is larger than is required for a 3 lane roundabout. The cost is also greater for a 5 lane roundabout than a 3 lane roundabout or signalized intersection.

Conceptual Study

Meyers Road and Beavercreek Road





3-Lane Roundabout

Land acquisition implications: Property not part of a land use application would need to be acquired prior to construction these could include portions of Oregon City High School parking lot, 15041& 15035 Emerson Court, and some portions of approved but not built Villages at Beavercreek Apartments located southeast of the intersection.

Alignment considerations: The roundabout is currently centered on the intersection. The Meyers Road intersection is fairly built out, which provides few opportunities to identify a design and construct a roundabout without impacting existing development and structures.

Cost considerations: The footprint and property required for a 3 lane roundabout is larger than what is currently available with the signalized intersection. The cost is also greater for a 3 lane roundabout than a signalized intersection.

5-Lane Roundabout

Land acquisition implications: Property not part of a land use application would need to be acquired prior to construction these could include portions of Oregon City High School parking lot, 15040, 15041& 15035 Emerson Court, and some portions of approved but not built Villages at Beavercreek Apartments located southeast of the intersection.

Alignment considerations: The roundabout is currently centered on the intersection. The Meyers Road intersection is fairly built out, which provides few opportunities to identify a design and construct a roundabout without impacting existing development and structures.

Cost considerations: The footprint and property required for a 5 lane roundabout is larger than is required for a 3 lane roundabout and a signalized intersection. The cost is also greater for a 5 lane roundabout than a 3 lane roundabout and a signalized intersection.

Conceptual Study

Glen Oak Road and Beavercreek Road

3-Lane Roundabout

Land acquisition implications: Property not part of a land use application would need to be acquired prior to construction. These could include portions of 15135 & 15140 Glen Oak Road (CRW Pump Station), 15053 & 15049 Homestead Drive.

Alignment considerations: The roundabout is currently centered on the intersection. The Glen Oak Road intersection is fairly built out, which provides few opportunities to identify a design and construct a roundabout without impacting existing development and structures.

Cost considerations: The footprint and property required for a 3 lane roundabout is larger than what is currently available with the signalized intersection. The cost is also greater for a 3 lane roundabout than a signalized intersection.

5-Lane Roundabout

Land acquisition implications: Property not part of a land use application would need to be acquired prior to construction. These could include portions of 15125, 15135 & 15140 Glen Oak Road (CRW Pump Station), 15045, 15053 & 15049 Homestead Drive and 20007 Beavercreek Road.

Alignment considerations: The roundabout is currently centered on the intersection. The Glen Oack Road intersection is fairly built out, which provides few opportunities to identify a design and construct a roundabout without impacting existing development and structures.

Cost considerations: The footprint and property required for a 5 lane roundabout is larger than is required for a 3 lane roundabout and a signalized intersection. The cost is also greater for a 5

Oregon
Kate Brown, Governor

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11/4/19

City of Oregon City
Community Development Division
PO Box 3040
698 Warner Parrott Rd.
Oregon City, OR 97045

ODOT Case No: 9386

Subject: Beavercreek Road Concept Plan Traffic Analysis

Attn: Christina Robertson-Gardiner, Senior Planner

We have reviewed the applicant's proposed Oregon City Beavercreek Analysis from DKS Associates dated August 6, 2019. The Oregon City Commission is holding a work session on November 12th and ODOT would like to provide some context regarding the Holly Lane extension between Maple Lane Rd and Thayer Rd.

The traffic study relies on an alternative mobility target for the Highway 213/Beavercreek Rd intersection to show that the transportation system can accommodate proposed land use changes in the Beavercreek Road Concept Plan area. The Transportation Planning Rule (OAR 660-012) requires Cities to adopt transportation system plans to support the planned land uses in their comprehensive plans. The adequacy of the transportation system is measured with mobility targets found in the Oregon Highway Plan (OHP). OHP policy 1F.3 allows Cities to adopt alternative mobility targets "where it is infeasible or impractical to meet the mobility targets".

Oregon City and the Oregon Transportation Commission adopted an alternative mobility target for the Highway 213/Beavercreek Rd intersection in 2018. That target relies on the Holly Lane extension as a key parallel route in the Highway 213 corridor. If this connection is not included in future plans, the alternative mobility target would be jeopardized, the transportation system plan would need to be updated, and development in the area, including the Beavercreek Road Concept Plan, may not be able to be implemented as envisioned. While this connection may be difficult to complete in the near term, in the future it will provide essential connectivity for all modes of transportation in the community.

Thank you for providing ODOT the opportunity to participate in this review. If you have any questions regarding this matter, please contact me at 503.731.8234.

Sincerely,

Seth Brumley
ODOT Senior Planner

C: Avi Tayar, P.E., ODOT Region 1 Traffic

DRAFT MEMORANDUM

720 SW Washington St.
Suite 500
Portland, OR 97205
503.243.3500
www.dksassociates.com

DATE: August 6, 2019

TO: Christina Robertson-Gardiner, City of Oregon City

FROM: Kevin Chewuk, DKS Associates
Amanda Deering, DKS Associates

SUBJECT: Oregon City Beavercreek Analysis P19082-000

This memorandum summarizes a traffic study for the Oregon City Beavercreek Road Concept Plan. The study area comprises the adopted 2008 Beavercreek Road Concept Plan area. The objective of this traffic study is to:

1. Compare future development and infrastructure recommendations in the Beavercreek Road Concept Plan to that of the 2013 Transportation System Plan (TSP) and Municipal Code
2. Ensure Transportation Planning Rule consistency
3. Provide responses to three questions asked by city staff in response to public comments during the public engagement phase of the Beavercreek Road Concept Plan Zoning and Code amendments project. The responses contained in this memo address staff's questions from a transportation capacity and design lens. Additional legal, fiscal, construction, or maintenance factors may be part of the larger discussion and are not identified in this report

Staff Questions

1. **Holly Lane Connection**. How important is the Holly Lane connection to the transportation model? What if it does not connect for a very long time, or is removed?
2. **Intersection Control Analysis**. What is the optimal design for intersection control along the Beavercreek Road Concept Plan boundary- traffic signals or roundabouts?
3. **Road Network Evaluation**. What is the optimal cross section for Beavercreek Road?

Findings

Overall, the current TSP includes adequate transportation system projects for the Beavercreek Road Concept Plan area to comply with the Transportation Planning Rule (TPR) as adopted (3 lane section with roundabouts). All transportation impacts as a result of the projected 2019 housing units and employees in the Beavercreek Road Concept Plan (5,700 new jobs and 1,100 new dwelling units) area are addressed by current TSP projects.

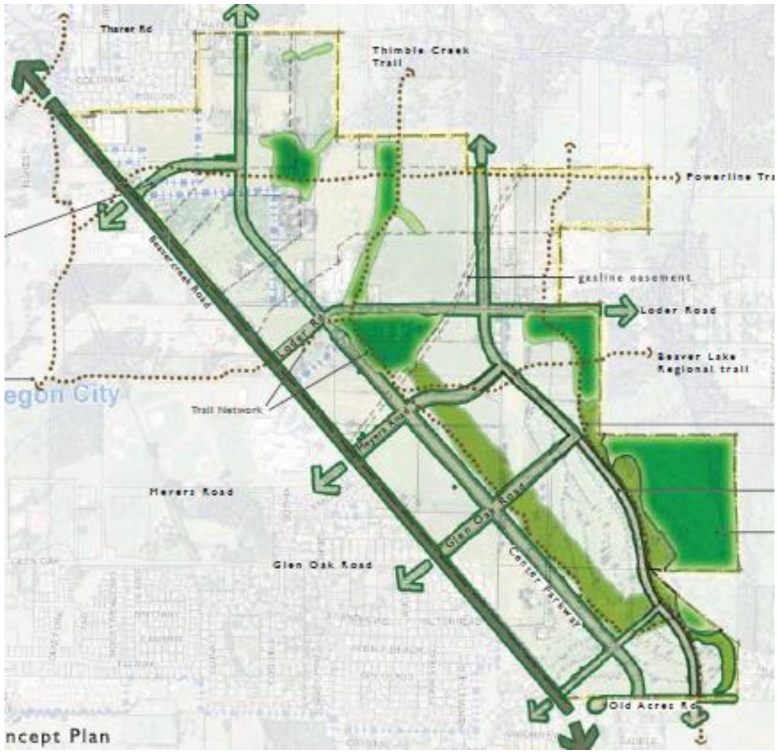
Likewise, a revised 5-lane cross-section and replacement of signals for roundabouts as intersection control also meets the TPR requirements. In addition, with the recommended intersection improvements, classifications and cross-sections listed later in this document, no additional provisions are needed beyond current TSP projects to accommodate potential growth in the Beavercreek Road Concept Plan area without the Holly Lane extension between Maple Lane Road to Thayer Road.

Study Area

The study area (see Figure 1) comprises the adopted 2008 Beavercreek Road Concept Plan area which established land use designations, design guidelines and future transportation infrastructure needs. The Beavercreek Road Concept Plan area is roughly bounded by the Urban Growth Boundary to the east, Beavercreek Road to the west, Old Acres Road to the south and Thayer Road to the north. The following list provides the study intersections with existing and future control, as applicable:

1. Highway 213 / Beavercreek Road (existing signalized intersection)
2. Beavercreek Road / Maple Lane Road (existing signalized intersection)
3. Beavercreek Road / Clairmont Drive (existing signalized intersection)
4. Beavercreek Road / Loder Road (existing unsignalized intersection; planned future roundabout)
5. Beavercreek Road / Meyers Road (existing signalized intersection)
6. Beavercreek Road / Glen Oak Road (existing unsignalized intersection; planned future roundabout)

Figure 1: Study Area



Land Use Assumptions

The Beavercreek Road Concept Plan area includes about 5,700 new jobs and 1,100 new housing units based on the current analysis prepared by EcoNW and 3J Consulting (2019) as part of current zoning and code amendment project. These numbers are consistent with the initial 2008 Concept Plan projection of 5,000 jobs and 1,023 housing units. Table 1 describes the assumptions that were used.

For the Oregon City TSP, vehicle trips within the Beavercreek Road Concept Plan area were estimated based on around 1,639 new jobs and 355 new households. The Beavercreek Road Concept Plan was being litigated by the Oregon Land Use Board of Appeals (LUBA) during the 2013 update to the Oregon City TSP, thus the zoning in the Beavercreek Road Concept Plan area reflected existing conditions and did not reflect the projected housing and jobs resulting from the plan. Once the Concept Plan was readopted in 2016, the regional transportation model was updated to include 2008 Beavercreek Road Concept Plan jobs and housing projections (5,000 jobs and 1,023 housing units).

Land Use and Motor Vehicle Trip Generation Assumptions

The impact of the increased vehicle trip generation on the surrounding transportation system, as a result of the Beavercreek Road Concept Plan, was evaluated through the year 2035 (consistent with the horizon year of the current TSP).

For the current Oregon City TSP, vehicle trips were estimated based on the existing land use assumptions (see Table 1). These trips are included in the 2035 TSP Baseline scenario. For the TPR analysis, the Beavercreek Road Concept Plan utilized the projected 2019 numbers which was estimated to accommodate 750 more housing units and 4,095 more employees than the current TSP.

Vehicle trips that would be generated by the increased housing units and employees were estimated by applying the Metro Regional Travel Forecast model trip generation rates by land use type. This model assumes development and redevelopment within Oregon City as well as throughout the region and thus accounts for consequences of development outside Oregon City. Overall, the Beavercreek Road Concept Plan is expected to generate about 2,584 motor vehicle trips during the p.m. peak hour, or 925 more than what was assumed in the current TSP.

Table 1: Land Use Assumptions

Scenario	New Housing Units	New Employees	Forecasted Weekday PM Peak Hour Vehicle Trip End Growth
TSP Baseline (without Beavercreek Road Concept Plan)	355	1,639	1,659
Beavercreek Road Concept Plan *2019 Code and Zoning Amendments Projection*	1,105	5,734	2,584
Change (With Beavercreek Road Concept Plan – Without Beavercreek Road Concept Plan)	**+750**	**+4,095**	**+925**

DKS

Traffic Forecasting

Future p.m. peak hour traffic forecasts were prepared for two land use scenarios, with and without the Beavercreek Road Concept Plan to provide a baseline for identifying new transportation improvement needs beyond those included in the TSP; these scenarios include:

- **TSP Baseline (without Beavercreek Road Concept Plan) –** This scenario assumes the land use within the Beavercreek Road Concept Plan will be built out consistent with the prior TSP analysis (1,639 new jobs and 355 new households). It includes the improvement projects listed in the "Baseline Transportation System Improvements" section as envisioned in the Beavercreek Road Concept Plan.

- **Beavercreek Road Concept Plan –** This scenario assumes full buildout of Beavercreek Road Concept Plan area (5,700 new jobs and 1,100 new housing units). It includes the improvement projects listed in the "Baseline Transportation System Improvements" section as envisioned in the Beavercreek Road Concept Plan.

With each of these two land use scenarios, a sensitivity option was tested that assumed the planned segment of Holly Lane between Maple Lane Road and Thayer Road would not be completed. The forecast will include 2035 volumes to match the TSP horizon year.

Baseline Transportation System Improvements

The starting point for the future operations analysis relied on a list of street system improvement projects contained in the Oregon City TSP. These projects represent only those that are expected to be reasonably funded, and therefore can be included in the Baseline scenario. Many of the projects in the Beavercreek Road Concept Plan area will be constructed as private development occurs. Others will be constructed as part of public infrastructure improvements or concurrent with adjacent private developments. The improvements assumed include:

- Roundabout installation at the **Beavercreek Road/Glen Oak Road** intersection (TSP Project D39)
- Roundabout installation at the **Beavercreek Road/Loder Road** intersection (TSP Project D44)
- **Meyers Road** extension from OR 213 to High School Avenue (TSP Project D46)
- **Meyers Road** extension from Beavercreek Road to the Meadow Lane Extension (TSP Project D47)
- **Clairmont Drive** extension from Beavercreek Road to the Holly Lane South Extension (TSP Project D54)

- **Glen Oak Road** extension from Beavercreek Road to the Meadow Lane Extension (TSP Project D55)
- **Timbersky Way** extension from Beavercreek Road to the Meadow Lane Extension (TSP Project D56)
- **Holly Lane** extension from Thayer Road to the Meadow Lane Extension (TSP Projects D58 and D59)
- **Meadow Lane** extension to the Urban Growth Boundary, north of Loder Road (TSP Projects D60 and D61)
- **Loder Road** extension from Beavercreek Road to Glen Oak Road (TSP Project D64)
- **Beavercreek Road** improvements from Clairmont Drive to the Urban Growth Boundary, south of Old Acres Lane (TSP Projects D81 and D82)
- **Loder Road** improvements from Beavercreek Road to the Urban Growth Boundary (TSP Project D85)
- Construct westbound right-turn merge lane at the **Highway 213 / Beavercreek Road** intersection (Highway 213 Corridor Alternative Mobility Targets Study)

Estimating Driving Trips

Determining future street network needs requires the ability to forecast traffic volumes resulting from estimates of future population and employment for the Beavercreek Road Concept Plan area, and the rest of the City and Metro region. The objective of the transportation planning process is to provide the information necessary for making decisions about how and where improvements should be made to create a safe and efficient transportation system that provides travel options.

Metro Regional Travel Demand Model

The travel demand forecasting process generally involves estimating travel patterns for new development based on the decisions and preferences demonstrated by existing residents, employers and institutions around the region. Travel demand models are mathematical tools that help us understand future commuter, school and recreational travel patterns including information about the length, mode and time of day a trip will be made. The latest travel models are suitable for motor vehicle and transit planning purposes, and can produce total volumes for autos, trucks and buses on each street and highway in the system.

Land use data for the entire Metro region is split into geographical areas called transportation analysis zones (TAZs), which represent the sources of vehicle trip generation in the Metro Regional Travel Forecast model. The TAZs extend beyond the current UGB and include land use assumptions for the entire region and rural communities surrounding Oregon City. The Beavercreek Road Concept Plan area includes one TAZ, which was updated with land use data from Table 1. Vehicle trips that would be generated by the proposed land use was estimated by applying the Metro Regional Travel Forecast model trip generation rates by land use type. Model forecasts are refined by comparing outputs with observed counts and behaviors on the local system. This refinement step is completed before any evaluation of system performance is made. Once the traffic forecasting process is complete, the future volumes are used to determine the areas of the street network that are expected to be congested and that may need future investments to accommodate growth.

The modeling and volume forecasting performed for the previous 2013 TSP was based on the year 2010 (existing) and year 2035 (horizon) Metro models. The current Metro travel demand models are for years 2015 and 2040. These models have updated land uses that assume less growth than the previous 2010-2035 land use growth. In addition, the new Metro models have "peak spreading" built into them, which means the peak period of two hours is modeled, rather than just the single peak hour. When comparing the 2010 and 2015 base years, the 2010 model year shows higher volumes than the 2015 model. This is due to a correction that happened after the 2008 recession. The recent 2019 counts collected for this project more closely match the magnitude of the 2015 volumes. Due to this correction and the lower land use growth assumptions, the Metro 2040 model shows notably lower volumes along the Beavercreek Road corridor and the surrounding region. As a result, the new forecasted 2035 volumes are lower than the 2035 TSP volume set.

2035 Motor Vehicle Operations

Motor vehicle conditions were evaluated for each future scenario during the p.m. peak hour at the study intersections (see Table 2). The future conditions include the improvements summarized in the "Baseline Transportation System Improvements" section.

During the evening peak hour, a few study intersections are expected to exceed standards under each scenario, including the Beavercreek Road / Loder Road and Beavercreek Road / Glen Oak Road intersections. These intersections are currently unsignalized and the side street approach is over capacity given the limited gaps to turn onto Beavercreek Road in the future. Transportation solutions for these intersections are identified later in this report.

The Highway 213 / Beavercreek Road has an adopted alternative mobility target that changes the standard analysis parameters used or the time period to which the targets/standards apply from the design hour[1] to an average weekday, which better represents traffic volumes experienced throughout the majority of the year. The intersection is expected to meet the alternative mobility target with the Beavercreek Road Concept Plan.

Holly Lane Extension

The portion of the proposed Holly Lane extension project between Maple Lane Road and Thayer Road (TSP project D57) is blocked by existing development and therefore the proposed alignment must divert outside of the Urban Growth Boundary. To ensure the future roadway network can accommodate potential growth, the future volumes and study intersection operations under the 2035 Beavercreek Road Concept Plan without this segment of the Holly Lane Extension scenario were reviewed.

As shown in Table 2, the re-routed traffic associated with removing the segment of the proposed Holly Lane extension is expected to have little impact on intersection operations when compared to the scenario with the segment. The greatest impact would be expected at the two existing unsignalized intersections, Loder Road and Glen Oak Road, since more traffic would be utilizing these intersections to enter and exit the Beavercreek Road Concept Plan area without the segment of the Holly Lane extension. However, this issue is resolved once the recommended traffic signal is assumed at these intersections. Overall, with the recommended intersection improvements, classifications and cross-sections listed later in this document, no additional provisions are needed to accommodate potential growth in the Beavercreek Road Concept Plan area without the Holly Lane extension between Maple Lane Road to Thayer Road. However, this segment of the Holly Lane extension project is still recommended long-term to provide an alternative route to Highway 213 and option for local motor vehicle, pedestrian and bicycle circulation.

[1] On state highways in Oregon City, the design hour volume generally occurs during the summer season when traffic volumes are higher than typical weekday peaks hours.

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Table 2: Future Intersections Operations (2035 PM Peak Hour)

Intersection (traffic control)	Mobility Target	TSP Baseline (without Beavercreek Road Concept Plan)	Beavercreek Road Concept Plan (with Holly Lane Extension)	Beavercreek Road Concept Plan (without Holly Lane Extension)
Highway 213 / Beavercreek Road (signalized intersection)	1.00 v/c AWD	-	0.99 (AWD)	0.99 (AWD)
Beavercreek Road / Maple Lane Road (signalized intersection)	0.99 v/c	0.80	0.94	0.95
Beavercreek Road / Clairmont Drive (signalized intersection)	0.99 v/c	0.99	0.75	0.75
Beavercreek Road / Loder Road (unsignalized intersection)	0.99 v/c	**1.12**	**>2.00**	**>2.00**
Beavercreek Road / Meyers Road (signalized intersection)	0.99 v/c	**1.05**	0.80	0.82
Beavercreek Road / Glen Oak Road (unsignalized intersection)	0.99 v/c	0.82	**1.50**	**1.70**

Bolded red values indicate intersection exceeding the mobility target

Intersection Control Analysis

The traffic control at the Beavercreek Road / Loder Road and Beavercreek Road / Glen Oak Road intersections was assessed with a traffic signal and a roundabout. A signal warrant analysis was performed for these study intersections to determine if side-street volumes are high enough to justify (i.e. warrant) the construction of a traffic signal. For this analysis, ODOT's preliminary traffic signal warrants form[2] was utilized. This warrant is based on the MUTCD Signal Warrant 1, Case A and Case B, which deals primarily with high volumes on the intersecting minor roadway and high volumes on the major roadway. The result of the analysis found that a traffic signal would be warranted at both intersections by 2035.

These intersections are expected to meet mobility targets through 2035 with either a traffic signal or roundabout. Although both options would work, signals are recommended at these intersections. Existing intersections along the corridor surrounding Loder Road and Glen Oak Road are signalized,

[2] Analysis Procedures Manual, ODOT TPAU

including Clairmont Drive and Meyers Road. Installation of traffic signals at these two intersections would create for consistency along the corridor. The traffic signals could also be interconnected and timed to allow for traffic to flow smoothly along the corridor with minimal delay. Installation of a roundabout at one or both intersections would break up the flow of traffic and cause random arrivals of vehicles and more delay at the existing signalized intersections along the corridor.

If the cross-section of Beavercreek Road was expanded to incorporate a 5-lane section the design of future intersections is easier with signals over roundabouts. Existing and future signalized intersections along a corridor could be designed to accommodate a 5-lane section without requiring the full roadway width to be constructed. A roadway can be built with a 3-lane section and widened later to a 5-lane section with only minor changes needed at the intersections. Conversely, a roundabout must be designed and constructed to the expected future width of the roadway to avoid having to rebuild the intersection. For example, if you build the roundabout to only accommodate 3-lanes and ultimately need 5-lanes in the future, the roundabout would have to be rebuilt. This is further complicated by portions of the west side of Beavercreek Road near Glen Oak Road that are built out or not likely to be redeveloped any time soon.

A traffic signal also allows for flexibility in improving the intersection over time as adjacent parcels are developed. Each individual approach can be improved incrementally over time without any modifications to the other approaches to the intersection. The flexibility is lost when constructing a roundabout as the entire intersection must be built at once.

With the through volume of traffic forecasted to be over 1,500 vehicles during the peak hour, and with travel speeds up to 40 miles per hour along this segment of Beavercreek Road, a traffic signal would provide a controlled pedestrian crossing opportunity for pedestrians and cyclists. A center median could provide refuge between the vehicle traffic lanes for those crossing with either a 3-lane or 5-lane section.

Pedestrians and cyclists must use an unsignalized crossing in a roundabout, however, they are designed for vehicles to travel at a slower rate of speed when compared to a signalized intersection. In a roundabout, crosswalks are set further back from vehicle traffic, allowing drivers more time to react to people in the roadway before merging into or out of the roundabout. Triangular islands between lanes of vehicle traffic give people moving through the roundabout a safe place to wait if they choose to cross only one direction of traffic at a time. People on bikes can choose to ride through the roundabout with traffic or walk their bicycles through the pedestrian crosswalks.

Roadway Network Evaluation

Streets in the plan area were sized based on future capacity needs with full buildout of the Beavercreek Road Concept Plan. Forecasted volumes along Beavercreek Road can be accommodated with a 3-lane or 5-lane section within the adopted 90-foot road right-of-way.

A 5-lane section provides more capacity but could draw more traffic to Beavercreek Road from Highway 213 and reduce the benefit of the added capacity. This is referred to by the term induced demand. Whereby additional lane capacity is filled by drivers who previously chose to travel on different routes or at different times but changed their behavior upon the creation of new capacity on a specific road segment.

A 5-lane section would be supportive of more population growth beyond the planning horizon when compared to a 3-lane section. However, the timing of growth is uncertain. Alternatively, a 3-lane section is built to meet the needs of the adjacent development, provides less capacity for through traffic and helps keeps more traffic with destinations outside of Oregon City on Highway 213.

A 3-lane section would encourage slower travel speeds, would be more inviting to pedestrians and cyclists and would reduce the crossing distance of Beavercreek Road, especially for students traveling between the neighborhoods on the east side and the school on the west side. A 3-lane section could also allow for a larger buffer between the roadway and sidewalk and allow for wider travel lanes to better facilitate the large trucks expected at the northern end of the Concept Plan area.

Given the City’s standards, the projection of traffic volumes on area streets, and overall circulation needs, the recommended TSP classifications and cross-sections are to be maintained, as follows:

- Maintain classification of Beavercreek Road as a major arterial, provide three-lane cross-section with 90-feet of right-of-way
- Maintain classification of the Meyers Road extension as a minor arterial, provide three-lane cross-section
- Maintain classification of the Clairmont Drive extension as a collector, provide a three-lane cross-section
- Maintain classification of the Glen Oak Road extension as a collector, provide two-lane cross-section
- Maintain classification of the Timbersky Way extension as a collector, provide two-lane cross-section
- Maintain classification of the Holly Lane extension as a collector, provide three-lane cross-section

- Maintain classification of the Meadow Lane extension as a collector, provide two-lane cross-section
- Maintain classification of Loder Road as a collector, provide three-lane cross-section
- Classify all remaining streets in the Beavercreek Road Concept Plan area as local streets

Recommended Improvements

The recommended improvements for the intersections that are expected to exceed mobility targets in the 2035 Beavercreek Road Concept Plan scenarios can be seen in Table 3. Overall, the current TSP includes adequate transportation system projects for the Beavercreek Road Concept Plan area to comply with the Transportation Planning Rule (TPR). All transportation impacts as a result of the additional housing units and employees in the Beavercreek Road Concept Plan area are addressed by current TSP projects. This includes the widening of Beavercreek Road through the project area to a 3-lane cross-section and intersection control improvements to the Loder Road and Glen Oak Road intersections with Beavercreek Road.

If a 5-lane section is desired along a portion of Beavercreek Road adjacent to the Concept Plan boundary, a logical transition point back to a 3-lane section could be the Loder Road intersection. This location will serve as a primary access point to the industrial employment and the associated heavy vehicle traffic at the northern end of the Beavercreek Road Concept Plan area. South of this intersection, the land use transitions to a mixed use neighborhood. In any case, the City should design intersections and obtain right-of-way to accommodate the ultimate cross-section in the future.

Table 3: Operations with Beavercreek Road Concept Plan and Recommended Improvements (2035 PM Peak Hour)

Intersection (traffic control)	Mobility Target	Beavercreek Road Concept Plan (with Holly Lane Extension)	Beavercreek Road Concept Plan (without Holly Lane Extension)	Recommended Improvements
Beavercreek Road / Loder Road (unsignalized intersection)	0.99 v/c	0.89	0.89	Install a traffic signal
Beavercreek Road / Glen Oak Road (unsignalized intersection)	0.99 v/c	0.71	0.72	Install a traffic signal

Bolded red values indicate intersection exceeds the mobility target

DKS

Appendix

Turning Movement Counts

Synchro HCM Reports

Sidra Reports

Preliminary Signal Warrants

Turning Movement Counts

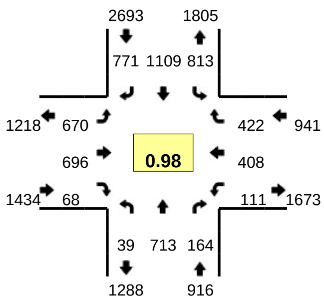
Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

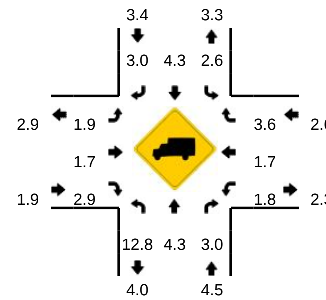
LOCATION: Cascade Hwy -- S Beavercreek Rd | **QC JOB #:** 14414702

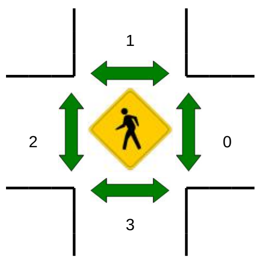
CITY/STATE: Oregon City, OR | **DATE:** Tue, May 16 2017

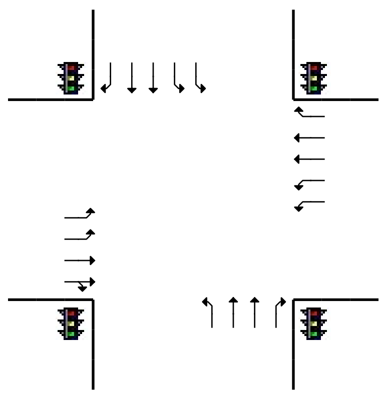
Peak-Hour: 4:30 PM -- 5:30 PM

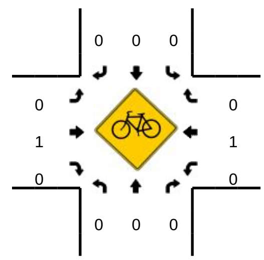
Peak 15-Min: 5:05 PM -- 5:20 PM

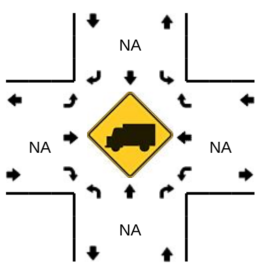


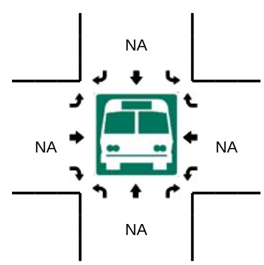












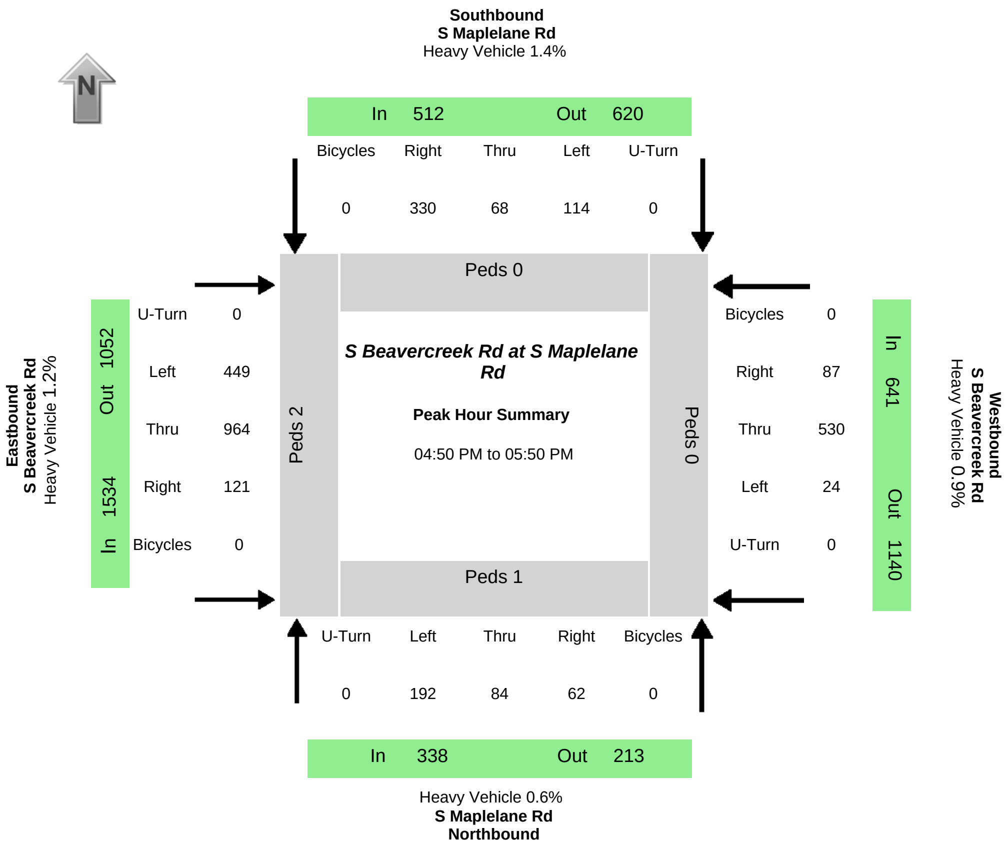
5-Min Count Period Beginning At	Cascade Hwy (Northbound) Left	Thru	Right	U	Cascade Hwy (Southbound) Left	Thru	Right	U	S Beavercreek Rd (Eastbound) Left	Thru	Right	U	S Beavercreek Rd (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:00 PM	3	63	14	0	45	74	63	0	59	55	8	0	9	41	33	0	467	5599
4:05 PM	3	45	12	0	63	83	76	0	54	63	10	0	6	32	34	0	481	5635
4:10 PM	3	70	11	0	46	104	66	0	52	52	8	1	4	33	40	0	490	5692
4:15 PM	1	58	10	0	58	86	56	1	61	53	3	0	21	26	29	0	463	5702
4:20 PM	2	44	12	0	57	87	65	0	44	56	7	0	17	51	36	0	478	5719
4:25 PM	4	46	14	0	71	78	68	0	44	72	7	0	16	27	36	0	483	5724
4:30 PM	5	62	19	0	65	79	63	0	49	62	4	0	7	32	25	0	472	5735
4:35 PM	2	58	11	0	66	118	60	0	49	55	7	0	7	32	41	0	506	5801
4:40 PM	6	54	17	0	63	70	64	0	61	64	4	0	15	35	35	0	488	5761
4:45 PM	3	59	14	0	68	102	69	0	68	61	7	0	12	26	46	0	535	5842
4:50 PM	4	51	16	0	59	97	58	0	55	58	6	0	10	45	31	0	490	5856
4:55 PM	5	67	9	0	56	112	63	0	47	56	10	0	14	33	24	0	496	5849
5:00 PM	5	52	13	0	88	81	62	0	48	65	8	0	6	35	27	0	490	5872
5:05 PM	0	67	17	0	55	59	78	0	78	61	4	0	7	34	29	0	489	5880
5:10 PM	2	57	8	0	76	102	67	0	62	63	6	0	9	30	50	0	532	5922
5:15 PM	4	56	18	0	74	91	48	0	57	61	3	0	10	41	48	0	511	5970
5:20 PM	3	64	12	0	68	95	68	0	45	51	7	0	4	33	36	0	486	5978
5:25 PM	0	66	10	0	75	103	71	0	51	39	2	0	10	32	30	0	489	5984
5:30 PM	3	48	12	0	70	84	44	0	50	54	10	0	6	30	33	0	444	5956
5:35 PM	1	70	8	0	64	102	72	0	56	49	8	0	11	29	32	0	502	5952
5:40 PM	6	36	14	0	76	73	55	0	62	70	2	0	11	40	44	0	489	5953
5:45 PM	3	59	20	0	66	97	53	0	52	65	2	0	15	33	19	0	484	5902
5:50 PM	4	71	15	0	56	93	57	0	35	53	5	0	6	28	27	0	450	5862
5:55 PM	6	45	11	0	61	70	51	0	47	54	5	0	11	30	24	0	415	5781

Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	24	720	172	0	820	1008	772	0	788	740	52	0	104	420	508	0	6128
Heavy Trucks	0	36	4		24	60	20		0	8	0		4	12	12		180
Pedestrians		8				0				4				0			12
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street	*S Maplelane Rd*
E/W street	*S Beavercreek Rd*
City, State	Oregon City OR
Site Notes	
Location	45.331096 - -122.572045
Start Date	Tuesday, April 23, 2019
Start Time	04:00:00 PM
Weather	
Study ID #	
Peak Hour Start	04:50:00 PM
Peak 15 Min Start	05:05:00 PM
PHF (15-Min Int)	0.96



Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
192	84	62	0	114	68	330	0	449	964	121	0	24	530	87	0	338	512	1534	641	213	620	1052	1140

Percent Heavy Vehicles

0.0%	1.2%	1.6%	0.0%	5.3%	0.0%	0.3%	0.0%	0.9%	1.3%	0.8%	0.0%	0.0%	1.1%	0.0%	0.0%	0.6%	1.4%	1.2%	0.9%	0.5%	0.8%	0.7%	1.8%

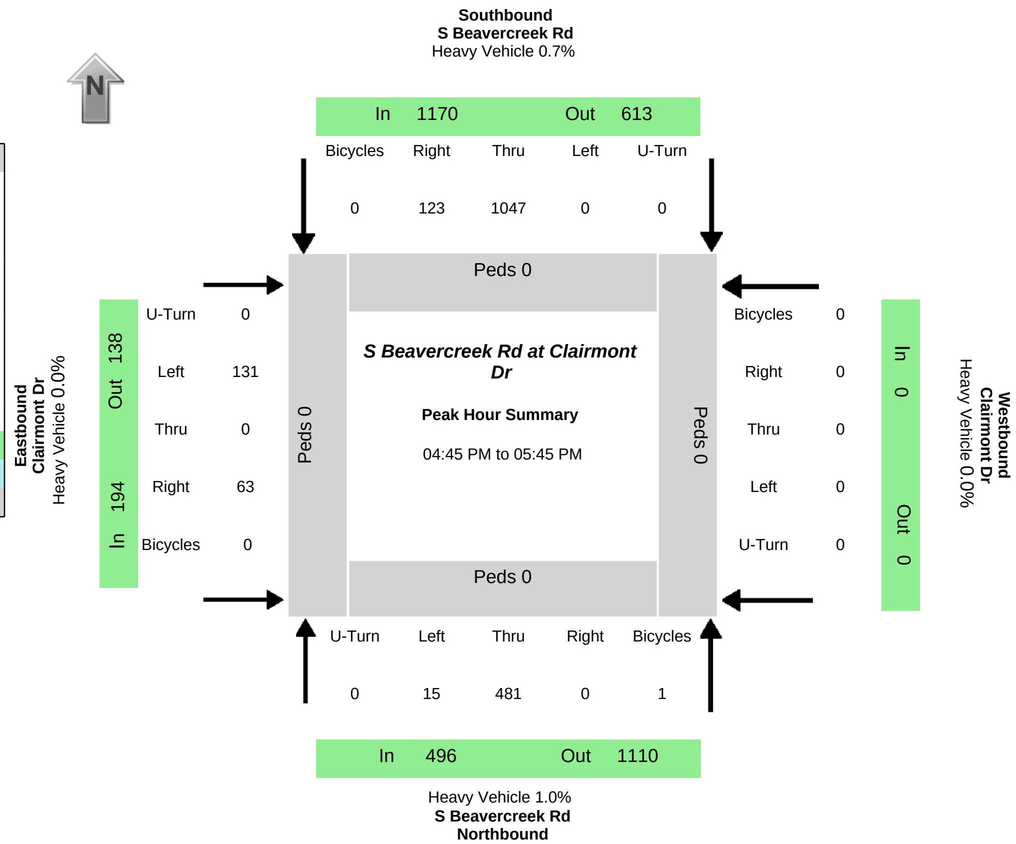
PHV- Bicycles																	PHV - Pedestrians				
Northbound				Southbound				Eastbound				Westbound					in Crosswalk				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**	NB	SB	EB	WB	**Sum**
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	0	3

All Vehicle Volumes

	Northbound S Maplelane Rd				Southbound S Maplelane Rd				Eastbound S Beavercreek Rd				Westbound S Beavercreek Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:00:00 PM	13	1	2	0	7	5	22	0	36	93	11	0	2	46	6	0		
04:05:00 PM	23	5	3	0	8	6	19	0	26	58	9	0	5	38	8	0		
04:10:00 PM	16	10	2	0	11	6	23	0	48	93	10	0	0	39	3	0	713	
04:15:00 PM	19	2	5	0	6	5	21	0	35	56	7	0	0	38	8	0	671	
04:20:00 PM	15	4	3	0	7	6	25	0	34	91	7	0	0	34	6	0	695	
04:25:00 PM	14	4	7	0	10	2	18	0	22	61	4	0	1	37	5	0	619	
04:30:00 PM	10	3	4	0	3	5	23	0	37	85	16	0	1	38	6	0	648	
04:35:00 PM	14	3	2	0	4	2	20	0	45	66	10	0	4	54	7	0	647	
04:40:00 PM	16	6	11	0	9	5	40	0	29	84	11	0	0	44	4	0	721	
04:45:00 PM	12	7	5	0	5	3	24	0	35	100	6	0	1	42	8	0	738	
04:50:00 PM	15	4	3	0	5	5	21	0	36	76	7	0	3	56	12	0	750	
04:55:00 PM	15	6	6	0	11	12	18	0	28	79	15	0	1	37	12	0	731	2784
05:00:00 PM	36	6	6	0	2	2	20	0	39	87	10	0	0	42	3	0	736	2793
05:05:00 PM	19	11	5	0	18	3	32	0	37	56	4	0	4	49	9	0	740	2832
05:10:00 PM	10	8	2	0	14	8	32	0	35	87	12	0	2	64	8	0	782	2853
05:15:00 PM	17	6	6	0	7	2	29	0	50	82	9	0	2	41	8	0	788	2910
05:20:00 PM	6	7	6	0	5	0	40	0	54	84	4	0	0	34	3	0	784	2921
05:25:00 PM	14	8	4	0	10	10	32	0	34	92	8	0	3	51	6	0	774	3008
05:30:00 PM	11	10	9	0	10	4	21	0	41	60	11	0	0	32	4	0	728	2990
05:35:00 PM	13	2	4	0	7	6	28	0	33	90	14	0	1	36	9	0	728	3002
05:40:00 PM	22	9	9	0	13	10	29	0	30	83	11	0	4	36	5	0	717	3004
05:45:00 PM	14	7	2	0	12	6	28	0	32	88	16	0	4	52	8	0	773	3025
05:50:00 PM	15	11	4	0	7	3	23	0	28	69	11	0	0	44	2	0	747	2999
05:55:00 PM	20	5	7	0	8	5	27	0	37	62	6	0	0	29	5	0	697	2970

KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street	*S Beavercreek Rd*
E/W street	*Clairmont Dr*
City, State	Oregon City OR
Site Notes	
Location	45.326787 - -122.566487
Start Date	Tuesday, April 23, 2019
Start Time	04:00:00 PM
Weather	
Study ID #	
Peak Hour Start	04:45:00 PM
Peak 15 Min Start	04:45:00 PM
PHF (15-Min Int)	0.95



Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
15	481	0	0	0	1047	123	0	131	0	63	0	0	0	0	0	496	1170	194	0	1110	612	138	0
Percent Heavy Vehicles																							
0.0%	1.0%	0.0%	0.0%	0.0%	0.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.0%	0.7%	0.0%	0.0%	0.7%	0.8%	0.0%	0.0%

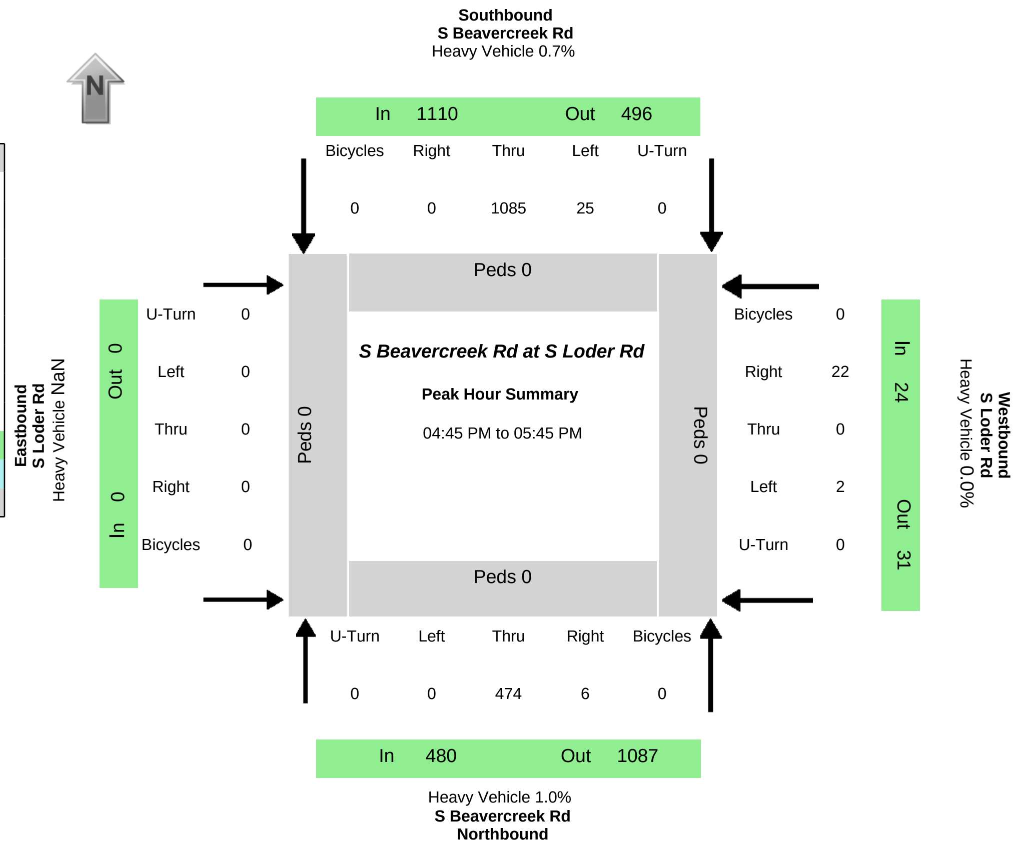
PHV- Bicycles																	PHV - Pedestrians				
Northbound				Southbound				Eastbound				Westbound					in Crosswalk				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**	NB	SB	EB	WB	**Sum**
0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0

All Vehicle Volumes

	Northbound				Southbound				Eastbound				Westbound					
	S Beavercreek Rd				S Beavercreek Rd				Clairmont Dr				Clairmont Dr				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:00:00 PM	3	43	0	0	0	74	7	0	8	0	7	0	0	0	0	0		
04:05:00 PM	2	33	0	0	0	87	8	0	14	0	4	0	0	0	0	0		
04:10:00 PM	2	43	0	0	0	99	5	0	6	0	2	0	0	0	0	0	447	
04:15:00 PM	1	36	0	0	0	66	13	0	4	0	1	0	0	0	0	0	426	
04:20:00 PM	1	39	0	0	0	78	6	0	6	0	4	0	0	0	0	0	412	
04:25:00 PM	1	30	0	0	0	76	8	0	2	0	3	0	0	0	0	0	375	
04:30:00 PM	1	45	0	0	0	74	7	0	9	0	4	0	0	0	0	0	394	
04:35:00 PM	1	32	0	0	0	78	4	0	18	0	1	0	0	0	0	0	394	
04:40:00 PM	3	42	0	0	0	88	8	0	8	0	5	0	0	0	0	0	428	
04:45:00 PM	0	47	0	0	0	96	13	0	11	0	6	0	0	0	0	0	461	
04:50:00 PM	2	51	0	0	0	93	12	0	8	0	9	0	0	0	0	0	502	
04:55:00 PM	0	31	0	0	0	85	4	0	14	0	6	0	0	0	0	0	488	1738
05:00:00 PM	3	41	0	0	0	87	9	0	8	0	4	0	0	0	0	0	467	1748
05:05:00 PM	0	42	0	0	0	70	10	0	31	0	3	0	0	0	0	0	448	1756
05:10:00 PM	2	40	0	0	0	87	11	0	9	0	4	0	0	0	0	0	461	1752
05:15:00 PM	1	38	0	0	0	90	8	0	7	0	4	0	0	0	0	0	457	1779
05:20:00 PM	1	41	0	0	0	89	13	0	7	0	5	0	0	0	0	0	457	1801
05:25:00 PM	1	31	0	0	0	88	4	0	9	0	3	0	0	0	0	0	440	1817
05:30:00 PM	0	35	0	0	0	73	11	0	9	0	7	0	0	0	0	0	427	1812
05:35:00 PM	1	42	0	0	0	87	9	0	6	0	3	0	0	0	0	0	419	1826
05:40:00 PM	4	42	0	0	0	102	19	0	12	0	9	0	0	0	0	0	471	1860
05:45:00 PM	2	36	0	0	0	87	13	0	4	0	3	0	0	0	0	0	481	1832
05:50:00 PM	2	40	0	0	0	97	12	0	6	0	2	0	0	0	0	0	492	1816
05:55:00 PM	6	36	0	0	0	71	11	0	8	0	3	0	0	0	0	0	439	1811

KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street	*S Beavercreek Rd*
E/W street	*S Loder Rd*
City, State	Oregon City OR
Site Notes	
Location	45.323869 - -122.562808
Start Date	Tuesday, April 23, 2019
Start Time	04:00:00 PM
Weather	
Study ID #	
Peak Hour Start	04:45:00 PM
Peak 15 Min Start	04:45:00 PM
PHF (15-Min Int)	0.94



Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
0	474	6	0	25	1085	0	0	0	0	0	0	2	0	22	0	480	1110	0	24	1087	496	0	31

Percent Heavy Vehicles

0.0%	1.1%	0.0%	0.0%	8.0%	0.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.0%	0.7%	NaN	0.0%	0.6%	1.0%	NaN	6.5%

PHV- Bicycles / PHV - Pedestrians

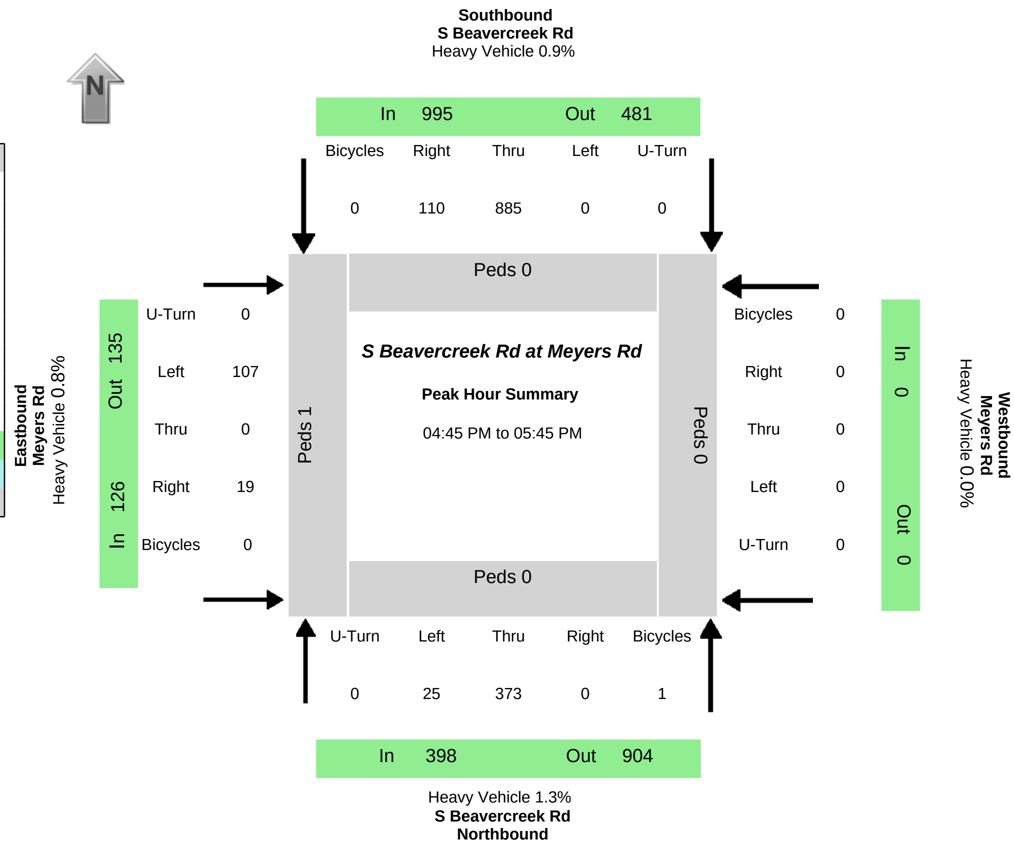
Northbound				Southbound				Eastbound				Westbound					in Crosswalk				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**	NB	SB	EB	WB	**Sum**
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

All Vehicle Volumes

	Northbound S Beavercreek Rd				**Southbound** S Beavercreek Rd				**Eastbound** S Loder Rd				**Westbound** S Loder Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:00:00 PM	0	44	1	0	1	80	0	0	0	0	0	0	1	0	2	0		
04:05:00 PM	0	34	1	0	0	91	0	0	0	0	0	0	0	0	1	0		
04:10:00 PM	0	44	0	0	3	98	0	0	0	0	0	0	1	0	1	0	403	
04:15:00 PM	0	37	1	0	1	66	0	0	0	0	0	0	0	0	0	0	379	
04:20:00 PM	0	39	1	0	2	80	0	0	0	0	0	0	1	0	1	0	376	
04:25:00 PM	0	30	0	0	3	76	0	0	0	0	0	0	0	0	1	0	339	
04:30:00 PM	0	43	1	0	0	78	0	0	0	0	0	0	0	0	3	0	359	
04:35:00 PM	0	31	0	0	1	78	0	0	0	0	0	0	0	0	2	0	347	
04:40:00 PM	0	43	0	0	5	88	0	0	0	0	0	0	0	0	2	0	375	
04:45:00 PM	0	43	1	0	1	101	0	0	0	0	0	0	0	0	4	0	400	
04:50:00 PM	0	51	1	0	1	101	0	0	0	0	0	0	0	0	2	0	444	
04:55:00 PM	0	29	0	0	2	89	0	0	0	0	0	0	0	0	2	0	428	1545
05:00:00 PM	0	42	1	0	2	89	0	0	0	0	0	0	0	0	2	0	414	1552
05:05:00 PM	0	41	1	0	2	71	0	0	0	0	0	0	0	0	1	0	374	1541
05:10:00 PM	0	41	0	0	1	90	0	0	0	0	0	0	0	0	1	0	385	1527
05:15:00 PM	0	38	0	0	4	90	0	0	0	0	0	0	0	0	1	0	382	1555
05:20:00 PM	0	41	1	0	1	93	0	0	0	0	0	0	0	0	1	0	403	1568
05:25:00 PM	0	28	0	0	2	89	0	0	0	0	0	0	2	0	4	0	395	1583
05:30:00 PM	0	33	1	0	3	77	0	0	0	0	0	0	0	0	2	0	378	1574
05:35:00 PM	0	43	0	0	0	90	0	0	0	0	0	0	0	0	0	0	374	1595
05:40:00 PM	0	44	0	0	6	105	0	0	0	0	0	0	0	0	2	0	406	1614
05:45:00 PM	0	38	0	0	3	87	0	0	0	0	0	0	0	0	0	0	418	1592
05:50:00 PM	0	39	0	0	3	96	0	0	0	0	0	0	0	0	3	0	426	1577
05:55:00 PM	0	41	1	0	2	72	0	0	0	0	0	0	0	0	1	0	386	1572

KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street	*S Beavercreek Rd*
E/W street	*Meyers Rd*
City, State	Oregon City OR
Site Notes	
Location	45.319726 - -122.557943
Start Date	Tuesday, April 23, 2019
Start Time	04:00:00 PM
Weather	
Study ID #	
Peak Hour Start	04:45:00 PM
Peak 15 Min Start	04:45:00 PM
PHF (15-Min Int)	0.95



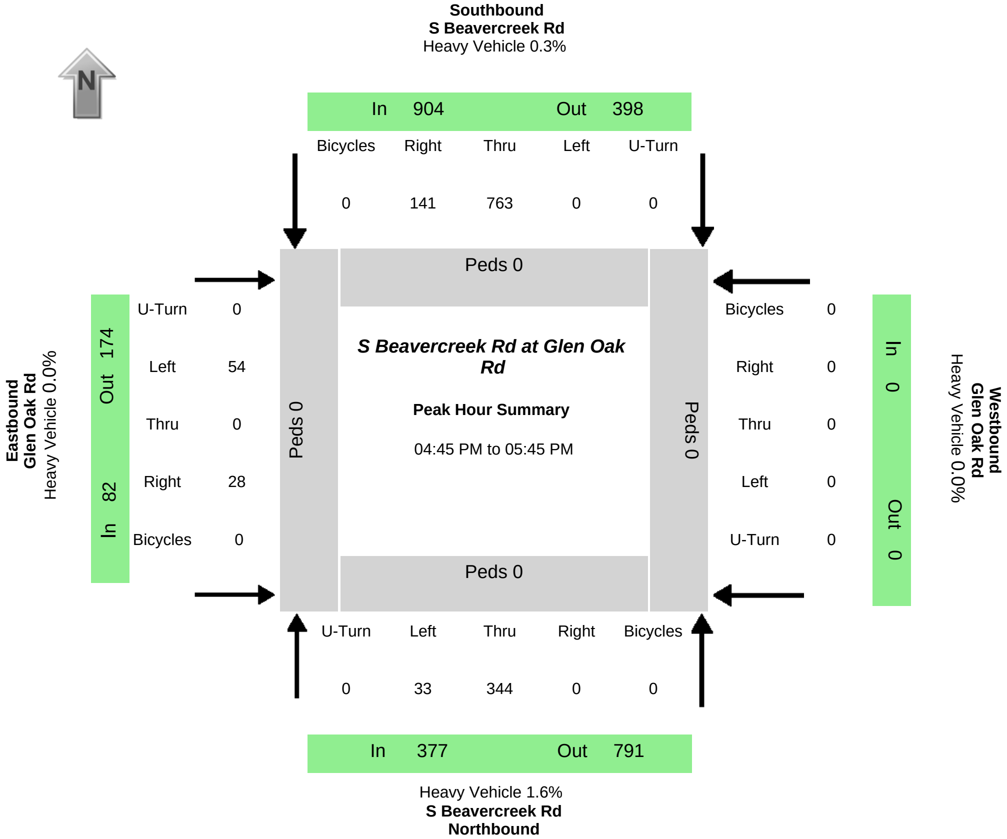
Peak-Hour Volumes (PHV)																							
Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
25	373	0	0	0	885	110	0	107	0	19	0	0	0	0	0	398	995	126	0	904	480	135	0
Percent Heavy Vehicles																							
8.0%	0.8%	0.0%	0.0%	0.0%	0.2%	6.4%	0.0%	0.0%	0.0%	5.3%	0.0%	0.0%	0.0%	0.0%	0.0%	1.3%	0.9%	0.8%	0.0%	0.3%	0.6%	6.7%	0.0%

PHV- Bicycles																	PHV - Pedestrians				
Northbound				Southbound				Eastbound				Westbound					in Crosswalk				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**	NB	SB	EB	WB	**Sum**
0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	1

All Vehicle Volumes																		
	Northbound				Southbound				Eastbound				Westbound					
	S Beavercreek Rd				S Beavercreek Rd				Meyers Rd				Meyers Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:00:00 PM	1	35	0	0	0	63	13	0	11	0	4	0	0	0	0	0		
04:05:00 PM	0	18	0	0	0	74	12	0	14	0	0	0	0	0	0	0		
04:10:00 PM	1	29	0	0	0	79	12	0	11	0	2	0	0	0	0	0	379	
04:15:00 PM	0	30	0	0	0	67	5	0	8	0	2	0	0	0	0	0	364	
04:20:00 PM	0	25	0	0	0	70	9	0	5	0	1	0	0	0	0	0	356	
04:25:00 PM	2	25	0	0	0	64	12	0	9	0	4	0	0	0	0	0	338	
04:30:00 PM	2	33	0	0	0	66	7	0	10	0	0	0	0	0	0	0	344	
04:35:00 PM	2	28	0	0	0	70	15	0	8	0	0	0	0	0	0	0	357	
04:40:00 PM	0	38	0	0	0	57	15	0	4	0	0	0	0	0	0	0	355	
04:45:00 PM	2	45	0	0	0	78	8	0	8	0	0	0	0	0	0	0	378	
04:50:00 PM	7	36	0	0	0	74	10	0	6	0	3	0	0	0	0	0	391	
04:55:00 PM	4	20	0	0	0	73	14	0	10	0	2	0	0	0	0	0	400	1472
05:00:00 PM	2	28	0	0	0	76	1	0	15	0	1	0	0	0	0	0	382	1468
05:05:00 PM	0	34	0	0	0	49	15	0	8	0	1	0	0	0	0	0	353	1457
05:10:00 PM	1	28	0	0	0	79	7	0	11	0	1	0	0	0	0	0	357	1450
05:15:00 PM	3	31	0	0	0	75	10	0	5	0	1	0	0	0	0	0	359	1463
05:20:00 PM	4	32	0	0	0	63	13	0	10	0	5	0	0	0	0	0	379	1480
05:25:00 PM	0	28	0	0	0	89	7	0	3	0	0	0	0	0	0	0	379	1491
05:30:00 PM	1	22	0	0	0	77	8	0	6	0	1	0	0	0	0	0	369	1488
05:35:00 PM	1	35	0	0	0	57	8	0	14	0	2	0	0	0	0	0	359	1482
05:40:00 PM	0	34	0	0	0	95	9	0	11	0	2	0	0	0	0	0	383	1519
05:45:00 PM	2	22	0	0	0	69	13	0	10	0	0	0	0	0	0	0	384	1494
05:50:00 PM	3	36	0	0	0	76	11	0	8	0	1	0	0	0	0	0	402	1493
05:55:00 PM	3	32	0	0	0	61	9	0	8	0	0	0	0	0	0	0	364	1483

KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street	*S Beavercreek Rd*
E/W street	*Glen Oak Rd*
City, State	Oregon City OR
Site Notes	
Location	45.317037 - -122.554661
Start Date	Tuesday, April 23, 2019
Start Time	04:00:00 PM
Weather	
Study ID #	
Peak Hour Start	04:45:00 PM
Peak 15 Min Start	04:45:00 PM
PHF (15-Min Int)	0.95



Peak-Hour Volumes (PHV)																							
Northbound				**Southbound**				**Eastbound**				**Westbound**				**Entering**				**Leaving**			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
33	344	0	0	0	763	141	0	54	0	28	0	0	0	0	0	377	904	82	0	791	398	174	0
Percent Heavy Vehicles																							
3.0%	1.5%	0.0%	0.0%	0.0%	0.3%	0.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.6%	0.3%	0.0%	0.0%	0.3%	1.3%	1.1%	0.0%

PHV- Bicycles																	PHV - Pedestrians				
Northbound				**Southbound**				**Eastbound**				**Westbound**					in Crosswalk				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**	NB	SB	EB	WB	**Sum**
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

All Vehicle Volumes																		
	Northbound				**Southbound**				**Eastbound**				**Westbound**					
	S Beavercreek Rd				S Beavercreek Rd				Glen Oak Rd				Glen Oak Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:00:00 PM	3	34	0	0	0	55	12	0	2	0	1	0	0	0	0	0		
04:05:00 PM	4	18	0	0	0	63	11	0	0	0	5	0	0	0	0	0		
04:10:00 PM	1	26	0	0	0	69	12	0	4	0	1	0	0	0	0	0	321	
04:15:00 PM	4	26	0	0	0	61	8	0	4	0	3	0	0	0	0	0	320	
04:20:00 PM	2	20	0	0	0	59	12	0	5	0	1	0	0	0	0	0	318	
04:25:00 PM	5	26	0	0	0	63	5	0	1	0	0	0	0	0	0	0	305	
04:30:00 PM	1	32	0	0	0	57	9	0	3	0	1	0	0	0	0	0	302	
04:35:00 PM	3	28	0	0	0	63	7	0	2	0	0	0	0	0	0	0	306	
04:40:00 PM	2	32	0	0	0	50	7	0	6	0	2	0	0	0	0	0	305	
04:45:00 PM	2	34	0	0	0	56	22	0	13	0	1	0	0	0	0	0	330	
04:50:00 PM	2	41	0	0	0	66	11	0	2	0	2	0	0	0	0	0	351	
04:55:00 PM	3	22	0	0	0	63	12	0	2	0	3	0	0	0	0	0	357	1288
05:00:00 PM	2	24	0	0	0	77	0	0	6	0	3	0	0	0	0	0	341	1293
05:05:00 PM	3	30	0	0	0	37	13	0	4	0	3	0	0	0	0	0	307	1282
05:10:00 PM	2	24	0	0	0	70	10	0	5	0	3	0	0	0	0	0	316	1283
05:15:00 PM	3	29	0	0	0	66	10	0	5	0	2	0	0	0	0	0	319	1292
05:20:00 PM	3	32	0	0	0	63	5	0	4	0	2	0	0	0	0	0	338	1302
05:25:00 PM	1	25	0	0	0	71	18	0	3	0	4	0	0	0	0	0	346	1324
05:30:00 PM	4	20	0	0	0	64	14	0	3	0	2	0	0	0	0	0	338	1328
05:35:00 PM	3	30	0	0	0	46	13	0	6	0	2	0	0	0	0	0	329	1325
05:40:00 PM	5	33	0	0	0	84	13	0	1	0	1	0	0	0	0	0	344	1363
05:45:00 PM	0	22	0	0	0	55	14	0	2	0	3	0	0	0	0	0	333	1331
05:50:00 PM	2	32	0	0	0	65	12	0	7	0	3	0	0	0	0	0	354	1328
05:55:00 PM	4	30	0	0	0	56	5	0	5	0	0	0	0	0	0	0	317	1323

Synchro HCM Reports

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	490	950	70	110	665	535	65	765	130	980	1510	665
Future Volume (vph)	490	950	70	110	665	535	65	765	130	980	1510	665
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	0.97	0.95		0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3495		3433	3539	1553	1597	3471	1568	3400	3471	1568
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3495		3433	3539	1553	1597	3471	1568	3400	3471	1568
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	500	969	71	112	679	546	66	781	133	1000	1541	679
RTOR Reduction (vph)	0	5	0	0	0	386	0	0	106	0	0	268
Lane Group Flow (vph)	500	1035	0	112	679	160	66	781	27	1000	1541	411
Confl. Peds. (#/hr)	1		3	3		1			2	2		
Confl. Bikes (#/hr)			1			1						
Heavy Vehicles (%)	2%	2%	3%	2%	2%	4%	13%	4%	3%	3%	4%	3%
Turn Type	Prot	NA		Prot	NA	Prot	Prot	NA	Prot	Prot	NA	Prot
Protected Phases	7	4		3	8	8	1	6	6	5	2	2
Permitted Phases												
Actuated Green, G (s)	14.7	31.1		4.1	20.5	20.5	4.0	20.8	20.8	32.5	49.3	49.3
Effective Green, g (s)	15.2	31.6		4.6	21.0	21.0	4.5	22.8	22.8	33.0	51.3	51.3
Actuated g/C Ratio	0.14	0.28		0.04	0.19	0.19	0.04	0.20	0.20	0.29	0.46	0.46
Clearance Time (s)	5.5	5.5		5.5	5.5	5.5	5.5	7.0	7.0	5.5	7.0	7.0
Vehicle Extension (s)	2.3	2.3		2.3	2.3	2.3	2.3	4.7	4.7	2.3	4.7	4.7
Lane Grp Cap (vph)	465	986		140	663	291	64	706	319	1001	1589	718
v/s Ratio Prot	0.15	c0.30		0.03	c0.19	0.10	0.04	c0.22	0.02	c0.29	0.44	0.26
v/s Ratio Perm												
v/c Ratio	1.08	1.05		0.80	1.02	0.55	1.03	1.11	0.08	1.00	0.97	0.57
Uniform Delay, d1	48.4	40.2		53.2	45.5	41.2	53.8	44.6	36.1	39.5	29.6	22.3
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	63.4	42.6		26.0	41.2	1.6	121.5	66.8	0.2	28.0	16.0	1.6
Delay (s)	111.8	82.8		79.3	86.7	42.8	175.2	111.4	36.4	67.5	45.6	23.9
Level of Service	F	F		E	F	D	F	F	D	E	D	C
Approach Delay (s)		92.2			68.2			105.5			47.8	
Approach LOS		F			E			F			D	

Intersection Summary			
HCM 2000 Control Delay	69.3	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.07		
Actuated Cycle Length (s)	112.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	98.1%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	475	1440	115	30	815	55	180	110	110	60	70	315
Future Volume (vph)	475	1440	115	30	815	55	180	110	110	60	70	315
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.99		1.00	0.99		1.00	0.93		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1787	3535		1805	3537		1805	1718		1717	1900	1615
Flt Permitted	0.95	1.00		0.95	1.00		0.46	1.00		0.45	1.00	1.00
Satd. Flow (perm)	1787	3535		1805	3537		882	1718		806	1900	1615
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	485	1469	117	31	832	56	184	112	112	61	71	321
RTOR Reduction (vph)	0	4	0	0	3	0	0	26	0	0	0	80
Lane Group Flow (vph)	485	1582	0	31	885	0	184	198	0	61	71	241
Confl. Peds. (#/hr)	1					1			2	2		
Heavy Vehicles (%)	1%	1%	1%	0%	1%	0%	0%	1%	2%	5%	0%	0%
Turn Type	Prot	NA		Prot	NA		pm+pt	NA		pm+pt	NA	pm+ov
Protected Phases	5	2		1	6		3	8		7	4	5
Permitted Phases							8			4		4
Actuated Green, G (s)	37.2	81.0		2.8	46.6		29.5	17.9		16.4	9.3	46.5
Effective Green, g (s)	37.2	81.5		2.8	47.1		30.0	18.4		17.4	9.8	46.5
Actuated g/C Ratio	0.29	0.65		0.02	0.37		0.24	0.15		0.14	0.08	0.37
Clearance Time (s)	4.0	4.5		4.0	4.5		4.5	4.5		4.5	4.5	4.0
Vehicle Extension (s)	2.5	4.0		2.5	4.0		2.5	2.5		2.5	2.5	2.5
Lane Grp Cap (vph)	526	2281		40	1319		327	250		165	147	594
v/s Ratio Prot	c0.27	c0.45		0.02	0.25		c0.07	c0.12		0.02	0.04	0.12
v/s Ratio Perm							0.06			0.03		0.03
v/c Ratio	0.92	0.69		0.78	0.67		0.56	0.79		0.37	0.48	0.41
Uniform Delay, d1	43.1	14.4		61.4	33.1		41.0	52.1		48.7	55.8	29.6
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	21.8	1.8		59.7	2.7		1.8	15.3		1.0	1.8	0.3
Delay (s)	64.9	16.2		121.1	35.8		42.8	67.4		49.7	57.6	30.0
Level of Service	E	B		F	D		D	E		D	E	C
Approach Delay (s)		27.6			38.7			56.3			37.0	
Approach LOS		C			D			E			D	

Intersection Summary			
HCM 2000 Control Delay	34.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	126.3	Sum of lost time (s)	16.0
Intersection Capacity Utilization	80.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	60	20	10	10	10	60	10	485	45	15	1145	125
Future Volume (vph)	60	20	10	10	10	60	10	485	45	15	1145	125
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.95			0.90		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	1805			1696		1752	1859		1805	1870	
Flt Permitted	0.69	1.00			0.96		0.10	1.00		0.44	1.00	
Satd. Flow (perm)	1306	1805			1639		190	1859		842	1870	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	61	20	10	10	10	61	10	495	46	15	1168	128
RTOR Reduction (vph)	0	9	0	0	55	0	0	2	0	0	3	0
Lane Group Flow (vph)	61	21	0	0	26	0	10	539	0	15	1293	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	3%	1%	0%	0%	0%	1%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	7.8	7.8			7.8		66.8	66.8		66.8	66.8	
Effective Green, g (s)	7.8	7.8			7.8		66.8	66.8		66.8	66.8	
Actuated g/C Ratio	0.09	0.09			0.09		0.81	0.81		0.81	0.81	
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	123	170			154		153	1503		680	1512	
v/s Ratio Prot		0.01						0.29			c0.69	
v/s Ratio Perm	c0.05				0.02		0.05			0.02		
v/c Ratio	0.50	0.12			0.17		0.07	0.36		0.02	0.86	
Uniform Delay, d1	35.5	34.3			34.4		1.6	2.1		1.5	4.9	
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.1	0.3			0.5		0.2	0.1		0.0	5.0	
Delay (s)	38.7	34.6			34.9		1.8	2.3		1.6	9.9	
Level of Service	D	C			C		A	A		A	A	
Approach Delay (s)		37.3			34.9			2.3			9.8	
Approach LOS		D			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	10.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	82.6	Sum of lost time (s)	8.0
Intersection Capacity Utilization	86.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	190	85	65	70	65	40	20	785	95	75	1350	190
Future Volume (vph)	190	85	65	70	65	40	20	785	95	75	1350	190
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.95	0.95			1.00		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.94			0.97		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	0.99			0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1715	1693			1805		1805	1849		1805	1881	1615
Flt Permitted	0.55	0.94			0.62		0.06	1.00		0.23	1.00	1.00
Satd. Flow (perm)	988	1608			1150		116	1849		432	1881	1615
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	194	87	66	71	66	41	20	801	97	77	1378	194
RTOR Reduction (vph)	0	24	0	0	12	0	0	5	0	0	0	28
Lane Group Flow (vph)	169	154	0	0	166	0	20	893	0	77	1378	166
Confl. Bikes (#/hr)									1			
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Turn Type	custom	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases					8			2			6	
Permitted Phases	4	4		8			2			6		6
Actuated Green, G (s)	16.7	16.7			16.7		65.5	65.5		65.5	65.5	65.5
Effective Green, g (s)	16.7	16.7			16.7		65.5	65.5		65.5	65.5	65.5
Actuated g/C Ratio	0.19	0.19			0.19		0.73	0.73		0.73	0.73	0.73
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	182	297			212		84	1342		313	1365	1172
v/s Ratio Prot								0.48			c0.73	
v/s Ratio Perm	c0.17	0.10			0.14		0.17			0.18		0.10
v/c Ratio	0.93	0.52			0.78		0.24	0.67		0.25	1.01	0.14
Uniform Delay, d1	36.2	33.1			35.0		4.1	6.5		4.1	12.4	3.8
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	46.1	1.5			16.9		1.5	1.3		0.4	26.7	0.1
Delay (s)	82.2	34.7			51.9		5.6	7.8		4.5	39.1	3.8
Level of Service	F	C			D		A	A		A	D	A
Approach Delay (s)		57.8			51.9			7.8			33.3	
Approach LOS		E			D			A			C	

Intersection Summary			
HCM 2000 Control Delay	29.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	90.2	Sum of lost time (s)	8.0
Intersection Capacity Utilization	100.3%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	60	105	80	10	110	60	45	780	20	50	1295	140
Future Volume (vph)	60	105	80	10	110	60	45	780	20	50	1295	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.96			0.95			1.00			0.99	
Flt Protected		0.99			1.00			1.00			1.00	
Satd. Flow (prot)		1794			1810			1872			1852	
Flt Permitted		0.75			0.97			0.86			0.95	
Satd. Flow (perm)		1368			1764			1608			1763	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	61	107	82	10	112	61	46	796	20	51	1321	143
RTOR Reduction (vph)	0	20	0	0	20	0	0	1	0	0	4	0
Lane Group Flow (vph)	0	230	0	0	163	0	0	861	0	0	1511	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	8%	1%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		16.0			16.0			66.5			66.5	
Effective Green, g (s)		16.0			16.0			66.5			66.5	
Actuated g/C Ratio		0.18			0.18			0.73			0.73	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		241			311			1181			1295	
v/s Ratio Prot												
v/s Ratio Perm		c0.17			0.09			0.54			c0.86	
v/c Ratio		0.96			0.52			0.73			1.17	
Uniform Delay, d1		36.9			33.8			6.9			12.0	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		45.2			1.6			2.3			83.7	
Delay (s)		82.1			35.4			9.1			95.7	
Level of Service		F			D			A			F	
Approach Delay (s)		82.1			35.4			9.1			95.7	
Approach LOS		F			D			A			F	

Intersection Summary			
HCM 2000 Control Delay	64.0	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.12		
Actuated Cycle Length (s)	90.5	Sum of lost time (s)	8.0
Intersection Capacity Utilization	126.5%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	110	20	20	180	25	280	25	505	75	170	1085	130
Future Volume (vph)	110	20	20	180	25	280	25	505	75	170	1085	130
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.93			0.92		1.00	0.98		1.00	0.98	
Flt Protected	0.95	1.00			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	1715			1720		1671	1841		1803	1857	
Flt Permitted	0.37	1.00			0.86		0.06	1.00		0.37	1.00	
Satd. Flow (perm)	712	1715			1508		114	1841		706	1857	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	112	20	20	184	26	286	26	515	77	173	1107	133
RTOR Reduction (vph)	0	16	0	0	54	0	0	6	0	0	5	0
Lane Group Flow (vph)	112	24	0	0	442	0	26	586	0	173	1235	0
Confl. Peds. (#/hr)									1	1		
Confl. Bikes (#/hr)									1			
Heavy Vehicles (%)	0%	0%	5%	0%	0%	0%	8%	1%	0%	0%	0%	6%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	20.0	20.0			20.0		62.0	62.0		62.0	62.0	
Effective Green, g (s)	20.0	20.0			20.0		62.0	62.0		62.0	62.0	
Actuated g/C Ratio	0.22	0.22			0.22		0.69	0.69		0.69	0.69	
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	158	381			335		78	1268		486	1279	
v/s Ratio Prot		0.01						0.32			c0.67	
v/s Ratio Perm	0.16				c0.29		0.23			0.25		
v/c Ratio	0.71	0.06			1.32		0.33	0.46		0.36	0.97	
Uniform Delay, d1	32.3	27.6			35.0		5.7	6.4		5.8	13.0	
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	13.6	0.1			162.7		11.1	1.2		2.0	18.2	
Delay (s)	45.9	27.7			197.7		16.8	7.6		7.8	31.2	
Level of Service	D	C			F		B	A		A	C	
Approach Delay (s)		41.1			197.7			8.0			28.4	
Approach LOS		D			F			A			C	

Intersection Summary			
HCM 2000 Control Delay	55.7	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	113.5%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	735	825	80	165	585	730	40	695	170	855	1145	750
Future Volume (vph)	735	825	80	165	585	730	40	695	170	855	1145	750
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	0.97	0.95		0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3482		3433	3539	1553	1597	3471	1568	3400	3471	1568
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3482		3433	3539	1553	1597	3471	1568	3400	3471	1568
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	750	842	82	168	597	745	41	709	173	872	1168	765
RTOR Reduction (vph)	0	6	0	0	0	385	0	0	135	0	0	277
Lane Group Flow (vph)	750	918	0	168	597	360	41	709	38	872	1168	488
Confl. Peds. (#/hr)	1		3	3		1			2	2		
Confl. Bikes (#/hr)			1			1						
Heavy Vehicles (%)	2%	2%	3%	2%	2%	4%	13%	4%	3%	3%	4%	3%
Turn Type	Prot	NA		Prot	NA	Prot	Prot	NA	Prot	Prot	NA	Prot
Protected Phases	7	4		3	8	8	1	6	6	5	2	2
Permitted Phases												
Actuated Green, G (s)	14.7	31.1		4.1	20.5	20.5	3.2	22.3	22.3	30.7	49.8	49.8
Effective Green, g (s)	15.2	31.6		4.6	21.0	21.0	3.7	24.3	24.3	31.2	51.8	51.8
Actuated g/C Ratio	0.14	0.28		0.04	0.19	0.19	0.03	0.22	0.22	0.28	0.46	0.46
Clearance Time (s)	5.5	5.5		5.5	5.5	5.5	5.5	7.0	7.0	5.5	7.0	7.0
Vehicle Extension (s)	2.3	2.3		2.3	2.3	2.3	2.3	4.7	4.7	2.3	4.7	4.7
Lane Grp Cap (vph)	467	985		141	665	291	52	755	341	949	1609	727
v/s Ratio Prot	c0.22	0.26		0.05	0.17	c0.23	0.03	c0.20	0.02	c0.26	0.34	0.31
v/s Ratio Perm												
v/c Ratio	1.61	0.93		1.19	0.90	1.24	0.79	0.94	0.11	0.92	0.73	0.67
Uniform Delay, d1	48.2	39.0		53.6	44.3	45.4	53.6	43.0	35.0	39.0	24.2	23.3
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	282.6	14.8		136.4	14.7	132.8	51.6	19.7	0.3	13.4	2.0	3.0
Delay (s)	330.8	53.8		189.9	59.0	178.2	105.2	62.7	35.3	52.4	26.2	26.3
Level of Service	F	D		F	E	F	F	E	D	D	C	C
Approach Delay (s)		177.9			132.3			59.4			34.4	
Approach LOS		F			F			E			C	

Intersection Summary			
HCM 2000 Control Delay	93.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.11		
Actuated Cycle Length (s)	111.7	Sum of lost time (s)	20.0
Intersection Capacity Utilization	98.0%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	465	970	315	75	755	115	380	130	95	105	135	350
Future Volume (vph)	465	970	315	75	755	115	380	130	95	105	135	350
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.96		1.00	0.98		1.00	0.94		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1787	3443		1805	3497		1805	1743		1717	1900	1615
Flt Permitted	0.95	1.00		0.95	1.00		0.31	1.00		0.41	1.00	1.00
Satd. Flow (perm)	1787	3443		1805	3497		594	1743		740	1900	1615
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	474	990	321	77	770	117	388	133	97	107	138	357
RTOR Reduction (vph)	0	21	0	0	8	0	0	18	0	0	0	29
Lane Group Flow (vph)	474	1290	0	77	879	0	388	212	0	107	138	328
Confl. Peds. (#/hr)	1					1			2	2		
Heavy Vehicles (%)	1%	1%	1%	0%	1%	0%	0%	1%	2%	5%	0%	0%
Turn Type	Prot	NA		Prot	NA		pm+pt	NA		pm+pt	NA	pm+ov
Protected Phases	5	2		1	6		3	8		7	4	5
Permitted Phases							8			4		4
Actuated Green, G (s)	38.7	79.6		5.0	45.9		37.8	21.9		25.7	14.3	53.0
Effective Green, g (s)	38.7	80.1		5.0	46.4		38.3	22.4		26.7	14.8	53.0
Actuated g/C Ratio	0.29	0.59		0.04	0.34		0.28	0.17		0.20	0.11	0.39
Clearance Time (s)	4.0	4.5		4.0	4.5		4.5	4.5		4.5	4.5	4.0
Vehicle Extension (s)	2.5	4.0		2.5	4.0		2.5	2.5		2.5	2.5	2.5
Lane Grp Cap (vph)	510	2036		66	1198		342	288		231	207	632
v/s Ratio Prot	c0.27	0.37		0.04	c0.25		c0.16	0.12		0.04	0.07	0.15
v/s Ratio Perm							c0.16			0.05		0.05
v/c Ratio	0.93	0.63		1.17	0.73		1.13	0.73		0.46	0.67	0.52
Uniform Delay, d1	47.0	18.1		65.2	39.1		44.9	53.7		46.6	57.9	31.5
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	23.4	1.5		162.9	4.0		90.3	8.8		1.1	7.1	0.5
Delay (s)	70.4	19.6		228.1	43.1		135.2	62.5		47.7	65.0	32.0
Level of Service	E	B		F	D		F	E		D	E	C
Approach Delay (s)		33.1			57.9			108.2			42.4	
Approach LOS		C			E			F			D	

Intersection Summary			
HCM 2000 Control Delay	52.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	135.4	Sum of lost time (s)	16.0
Intersection Capacity Utilization	91.8%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Int Delay, s/veh	62.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	65	30	30	60	35	175	35	355	40	85	740	140
Future Vol, veh/h	65	30	30	60	35	175	35	355	40	85	740	140
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	-	-	-	115	-	-	150	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	98	98	98	98	98	98	98	98	98	98	98	98
Heavy Vehicles, %	0	0	0	0	0	0	3	1	0	0	0	1
Mvmt Flow	66	31	31	61	36	179	36	362	41	87	755	143

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1563	1476	827	1487	1527	383	898	0	0	403	0	0
Stage 1	1001	1001	-	455	455	-	-	-	-	-	-	-
Stage 2	562	475	-	1032	1072	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.13	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.227	-	-	2.2	-	-
Pot Cap-1 Maneuver	92	127	375	104	119	669	752	-	-	1167	-	-
Stage 1	295	323	-	589	572	-	-	-	-	-	-	-
Stage 2	515	561	-	284	299	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 45	112	375	69	105	669	752	-	-	1167	-	-
Mov Cap-2 Maneuver	~ 45	112	-	69	105	-	-	-	-	-	-	-
Stage 1	281	299	-	561	545	-	-	-	-	-	-	-
Stage 2	336	534	-	217	277	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	249.5	296.8	0.8	0.7
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	752	-	-	45	172	184	1167	-	-
HCM Lane V/C Ratio	0.047	-	-	1.474	0.356	1.497	0.074	-	-
HCM Control Delay (s)	10	-	-	$ 445.5	37.1	296.8	8.3	-	-
HCM Lane LOS	B	-	-	F	E	F	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	6.5	1.5	17.4	0.2	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	125	10	75	70	10	155	65	800	35	70	985	140
Future Volume (vph)	125	10	75	70	10	155	65	800	35	70	985	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.95	0.95			1.00		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.89			0.91		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	0.99			0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1715	1592			1705		1805	1868		1805	1881	1615
Flt Permitted	0.49	0.94			0.87		0.14	1.00		0.22	1.00	1.00
Satd. Flow (perm)	882	1511			1505		267	1868		427	1881	1615
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	128	10	77	71	10	158	66	816	36	71	1005	143
RTOR Reduction (vph)	0	61	0	0	76	0	0	2	0	0	0	34
Lane Group Flow (vph)	111	43	0	0	163	0	66	850	0	71	1005	109
Confl. Bikes (#/hr)									1			
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Turn Type	custom	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases					8			2			6	
Permitted Phases	4	4		8			2			6		6
Actuated Green, G (s)	13.2	13.2			13.2		42.9	42.9		42.9	42.9	42.9
Effective Green, g (s)	13.2	13.2			13.2		42.9	42.9		42.9	42.9	42.9
Actuated g/C Ratio	0.21	0.21			0.21		0.67	0.67		0.67	0.67	0.67
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	181	311			309		178	1250		285	1258	1080
v/s Ratio Prot								0.45			c0.53	
v/s Ratio Perm	c0.13	0.03			0.11		0.25			0.17		0.07
v/c Ratio	0.61	0.14			0.53		0.37	0.68		0.25	0.80	0.10
Uniform Delay, d1	23.1	20.8			22.7		4.7	6.4		4.2	7.5	3.8
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	6.0	0.2			1.6		1.3	1.5		0.5	3.6	0.0
Delay (s)	29.2	21.0			24.3		6.0	8.0		4.7	11.2	3.8
Level of Service	C	C			C		A	A		A	B	A
Approach Delay (s)		25.2			24.3			7.8			9.9	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	11.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	64.1	Sum of lost time (s)	8.0
Intersection Capacity Utilization	85.4%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Int Delay, s/veh	645.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	25	35	30	50	25	180	30	695	40	90	1015	30
Future Vol, veh/h	25	35	30	50	25	180	30	695	40	90	1015	30
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	98	98	98	98	98	98	98	98	98	98	98	98
Heavy Vehicles, %	0	0	0	0	0	0	0	1	0	8	1	0
Mvmt Flow	26	36	31	51	26	184	31	709	41	92	1036	31

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	2133	2048	1052	2061	2043	730	1067	0	0	750	0	0
Stage 1	1236	1236	-	792	792	-	-	-	-	-	-	-
Stage 2	897	812	-	1269	1251	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.18	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.272	-	-
Pot Cap-1 Maneuver	36	57	278	~ 41	57	426	661	-	-	833	-	-
Stage 1	218	250	-	385	404	-	-	-	-	-	-	-
Stage 2	337	395	-	208	246	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 7	38	278	~ 5	38	426	661	-	-	833	-	-
Mov Cap-2 Maneuver	~ 7	38	-	~ 5	38	-	-	-	-	-	-	-
Stage 1	200	182	-	354	371	-	-	-	-	-	-	-
Stage 2	164	363	-	108	179	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	$ 2005.6	$ 4968.2	0.4	0.8
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	661	-	-	20	23	833	-	-
HCM Lane V/C Ratio	0.046	-	-	4.592	11.313	0.11	-	-
HCM Control Delay (s)	10.7	0		$ 2005.6	$ 4968.2	9.9	0	-
HCM Lane LOS	B	A	-	F	F	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	11.9	32.6	0.4	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	150	15	25	105	30	165	60	485	45	110	835	140
Future Volume (vph)	150	15	25	105	30	165	60	485	45	110	835	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.90			0.93		1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	1666			1729		1671	1855		1803	1843	
Flt Permitted	0.41	1.00			0.87		0.17	1.00		0.41	1.00	
Satd. Flow (perm)	784	1666			1526		293	1855		777	1843	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	153	15	26	107	31	168	61	495	46	112	852	143
RTOR Reduction (vph)	0	21	0	0	50	0	0	4	0	0	6	0
Lane Group Flow (vph)	153	20	0	0	256	0	61	537	0	112	989	0
Confl. Peds. (#/hr)									1	1		
Confl. Bikes (#/hr)									1			
Heavy Vehicles (%)	0%	0%	5%	0%	0%	0%	8%	1%	0%	0%	0%	6%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	17.9	17.9			17.9		62.2	62.2		62.2	62.2	
Effective Green, g (s)	17.9	17.9			17.9		62.2	62.2		62.2	62.2	
Actuated g/C Ratio	0.20	0.20			0.20		0.71	0.71		0.71	0.71	
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	159	338			310		206	1309		548	1301	
v/s Ratio Prot		0.01						0.29			c0.54	
v/s Ratio Perm	c0.20				0.17		0.21			0.14		
v/c Ratio	0.96	0.06			0.83		0.30	0.41		0.20	0.76	
Uniform Delay, d1	34.8	28.3			33.6		4.8	5.4		4.4	8.2	
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	59.8	0.1			16.2		3.6	1.0		0.8	4.2	
Delay (s)	94.5	28.4			49.8		8.4	6.3		5.3	12.4	
Level of Service	F	C			D		A	A		A	B	
Approach Delay (s)		80.6			49.8			6.5			11.7	
Approach LOS		F			D			A			B	

Intersection Summary			
HCM 2000 Control Delay	21.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	88.1	Sum of lost time (s)	8.0
Intersection Capacity Utilization	90.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	735	825	80	165	585	740	40	695	170	865	1140	750
Future Volume (vph)	735	825	80	165	585	740	40	695	170	865	1140	750
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	0.97	0.95		0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3482		3433	3539	1553	1597	3471	1568	3400	3471	1568
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3482		3433	3539	1553	1597	3471	1568	3400	3471	1568
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	750	842	82	168	597	755	41	709	173	883	1163	765
RTOR Reduction (vph)	0	6	0	0	0	385	0	0	136	0	0	276
Lane Group Flow (vph)	750	918	0	168	597	370	41	709	37	883	1163	489
Confl. Peds. (#/hr)	1		3	3		1			2	2		
Confl. Bikes (#/hr)			1			1						
Heavy Vehicles (%)	2%	2%	3%	2%	2%	4%	13%	4%	3%	3%	4%	3%
Turn Type	Prot	NA		Prot	NA	Prot	Prot	NA	Prot	Prot	NA	Prot
Protected Phases	7	4		3	8	8	1	6	6	5	2	2
Permitted Phases												
Actuated Green, G (s)	14.7	31.1		4.1	20.5	20.5	3.2	22.2	22.2	30.9	49.9	49.9
Effective Green, g (s)	15.2	31.6		4.6	21.0	21.0	3.7	24.2	24.2	31.4	51.9	51.9
Actuated g/C Ratio	0.14	0.28		0.04	0.19	0.19	0.03	0.22	0.22	0.28	0.46	0.46
Clearance Time (s)	5.5	5.5		5.5	5.5	5.5	5.5	7.0	7.0	5.5	7.0	7.0
Vehicle Extension (s)	2.3	2.3		2.3	2.3	2.3	2.3	4.7	4.7	2.3	4.7	4.7
Lane Grp Cap (vph)	466	984		141	664	291	52	751	339	954	1611	727
v/s Ratio Prot	c0.22	0.26		0.05	0.17	c0.24	0.03	c0.20	0.02	c0.26	0.34	0.31
v/s Ratio Perm												
v/c Ratio	1.61	0.93		1.19	0.90	1.27	0.79	0.94	0.11	0.93	0.72	0.67
Uniform Delay, d1	48.3	39.1		53.6	44.4	45.4	53.7	43.1	35.2	39.1	24.1	23.3
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	284.1	14.9		136.4	14.8	146.4	51.6	20.7	0.3	14.2	1.9	3.0
Delay (s)	332.4	54.0		190.0	59.2	191.8	105.3	63.8	35.4	53.3	26.0	26.3
Level of Service	F	D		F	E	F	F	E	D	D	C	C
Approach Delay (s)		178.7			139.5			60.4			34.7	
Approach LOS		F			F			E			C	

Intersection Summary			
HCM 2000 Control Delay	95.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.12		
Actuated Cycle Length (s)	111.8	Sum of lost time (s)	20.0
Intersection Capacity Utilization	98.6%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	475	970	305	75	775	125	365	130	95	105	140	360
Future Volume (vph)	475	970	305	75	775	125	365	130	95	105	140	360
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.96		1.00	0.98		1.00	0.94		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1787	3446		1805	3493		1805	1743		1717	1900	1615
Flt Permitted	0.95	1.00		0.95	1.00		0.30	1.00		0.41	1.00	1.00
Satd. Flow (perm)	1787	3446		1805	3493		576	1743		747	1900	1615
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	485	990	311	77	791	128	372	133	97	107	143	367
RTOR Reduction (vph)	0	20	0	0	9	0	0	18	0	0	0	28
Lane Group Flow (vph)	485	1281	0	77	910	0	372	212	0	107	143	339
Confl. Peds. (#/hr)	1					1			2	2		
Heavy Vehicles (%)	1%	1%	1%	0%	1%	0%	0%	1%	2%	5%	0%	0%
Turn Type	Prot	NA		Prot	NA		pm+pt	NA		pm+pt	NA	pm+ov
Protected Phases	5	2		1	6		3	8		7	4	5
Permitted Phases							8			4		4
Actuated Green, G (s)	39.2	79.6		5.0	45.4		38.1	22.2		26.0	14.6	53.8
Effective Green, g (s)	39.2	80.1		5.0	45.9		38.6	22.7		27.0	15.1	53.8
Actuated g/C Ratio	0.29	0.59		0.04	0.34		0.28	0.17		0.20	0.11	0.40
Clearance Time (s)	4.0	4.5		4.0	4.5		4.5	4.5		4.5	4.5	4.0
Vehicle Extension (s)	2.5	4.0		2.5	4.0		2.5	2.5		2.5	2.5	2.5
Lane Grp Cap (vph)	516	2034		66	1181		340	291		233	211	640
v/s Ratio Prot	c0.27	0.37		0.04	c0.26		c0.16	0.12		0.04	0.08	0.15
v/s Ratio Perm							c0.15			0.05		0.06
v/c Ratio	0.94	0.63		1.17	0.77		1.09	0.73		0.46	0.68	0.53
Uniform Delay, d1	47.1	18.1		65.3	40.2		44.8	53.6		46.5	58.0	31.3
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	25.1	1.5		162.9	4.9		76.4	8.2		1.0	7.6	0.6
Delay (s)	72.2	19.6		228.2	45.1		121.3	61.8		47.6	65.6	31.9
Level of Service	E	B		F	D		F	E		D	E	C
Approach Delay (s)		33.9			59.2			98.5			42.4	
Approach LOS		C			E			F			D	

Intersection Summary			
HCM 2000 Control Delay	51.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	135.7	Sum of lost time (s)	16.0
Intersection Capacity Utilization	92.7%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Int Delay, s/veh	78.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	65	30	30	60	35	190	35	355	40	100	750	145
Future Vol, veh/h	65	30	30	60	35	190	35	355	40	100	750	145
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	-	-	-	115	-	-	150	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	98	98	98	98	98	98	98	98	98	98	98	98
Heavy Vehicles, %	0	0	0	0	0	0	3	1	0	0	0	1
Mvmt Flow	66	31	31	61	36	194	36	362	41	102	765	148

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1613	1518	839	1529	1572	383	913	0	0	403	0	0
Stage 1	1043	1043	-	455	455	-	-	-	-	-	-	-
Stage 2	570	475	-	1074	1117	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.13	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.227	-	-	2.2	-	-
Pot Cap-1 Maneuver	85	120	369	97	111	669	742	-	-	1167	-	-
Stage 1	280	309	-	589	572	-	-	-	-	-	-	-
Stage 2	510	561	-	269	285	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 39	104	369	62	96	669	742	-	-	1167	-	-
Mov Cap-2 Maneuver	~ 39	104	-	62	96	-	-	-	-	-	-	-
Stage 1	266	282	-	560	544	-	-	-	-	-	-	-
Stage 2	322	534	-	201	260	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	$ 312.5	$ 364	0.8	0.8
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	742	-	-	39	162	176	1167	-	-
HCM Lane V/C Ratio	0.048	-	-	1.701	0.378	1.652	0.087	-	-
HCM Control Delay (s)	10.1	-	-	$ 564	40.1	$ 364	8.4	-	-
HCM Lane LOS	B	-	-	F	E	F	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	7	1.6	19.8	0.3	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	125	5	70	70	10	155	65	820	35	70	990	140
Future Volume (vph)	125	5	70	70	10	155	65	820	35	70	990	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.95	0.95			1.00		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.89			0.91		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	0.99			0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1715	1592			1705		1805	1869		1805	1881	1615
Flt Permitted	0.48	0.90			0.87		0.14	1.00		0.22	1.00	1.00
Satd. Flow (perm)	873	1449			1506		269	1869		411	1881	1615
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	128	5	71	71	10	158	66	837	36	71	1010	143
RTOR Reduction (vph)	0	57	0	0	77	0	0	2	0	0	0	33
Lane Group Flow (vph)	105	42	0	0	162	0	66	871	0	71	1010	110
Confl. Bikes (#/hr)									1			
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Turn Type	custom	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases					8			2			6	
Permitted Phases	4	4		8			2			6		6
Actuated Green, G (s)	12.8	12.8			12.8		43.0	43.0		43.0	43.0	43.0
Effective Green, g (s)	12.8	12.8			12.8		43.0	43.0		43.0	43.0	43.0
Actuated g/C Ratio	0.20	0.20			0.20		0.67	0.67		0.67	0.67	0.67
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	175	290			302		181	1259		277	1267	1088
v/s Ratio Prot								0.47			c0.54	
v/s Ratio Perm	c0.12	0.03			0.11		0.25			0.17		0.07
v/c Ratio	0.60	0.15			0.54		0.36	0.69		0.26	0.80	0.10
Uniform Delay, d1	23.2	21.0			22.8		4.5	6.4		4.1	7.3	3.6
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	5.5	0.2			1.8		1.3	1.7		0.5	3.6	0.0
Delay (s)	28.6	21.2			24.7		5.7	8.0		4.6	10.9	3.7
Level of Service	C	C			C		A	A		A	B	A
Approach Delay (s)		25.0			24.7			7.9			9.7	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	11.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	63.8	Sum of lost time (s)	8.0
Intersection Capacity Utilization	85.4%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Int Delay, s/veh	432.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	25	30	25	50	25	175	30	720	40	90	1015	30
Future Vol, veh/h	25	30	25	50	25	175	30	720	40	90	1015	30
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	98	98	98	98	98	98	98	98	98	98	98	98
Heavy Vehicles, %	0	0	0	0	0	0	0	1	0	8	1	0
Mvmt Flow	26	31	26	51	26	179	31	735	41	92	1036	31

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	2156	2074	1052	2082	2069	756	1067	0	0	776	0	0
Stage 1	1236	1236	-	818	818	-	-	-	-	-	-	-
Stage 2	920	838	-	1264	1251	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.18	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.272	-	-
Pot Cap-1 Maneuver	35	54	278	~ 40	55	411	661	-	-	814	-	-
Stage 1	218	250	-	373	393	-	-	-	-	-	-	-
Stage 2	327	384	-	210	246	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 6	36	278	~ 8	36	411	661	-	-	814	-	-
Mov Cap-2 Maneuver	~ 6	36	-	~ 8	36	-	-	-	-	-	-	-
Stage 1	200	180	-	342	360	-	-	-	-	-	-	-
Stage 2	158	352	-	114	177	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	$ 2322.8	$ 3154.7	0.4	0.8
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	661	-	-	16	34	814	-	-
HCM Lane V/C Ratio	0.046	-	-	5.102	7.503	0.113	-	-
HCM Control Delay (s)	10.7	0		$ 2322.8	$ 3154.7	10	0	-
HCM Lane LOS	B	A	-	F	F	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	11	30.7	0.4	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	155	15	25	115	30	175	55	505	45	110	855	140
Future Volume (vph)	155	15	25	115	30	175	55	505	45	110	855	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.90			0.93		1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	1666			1729		1671	1856		1803	1844	
Flt Permitted	0.41	1.00			0.86		0.15	1.00		0.39	1.00	
Satd. Flow (perm)	779	1666			1522		266	1856		750	1844	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	158	15	26	117	31	179	56	515	46	112	872	143
RTOR Reduction (vph)	0	21	0	0	49	0	0	3	0	0	6	0
Lane Group Flow (vph)	158	20	0	0	278	0	56	558	0	112	1009	0
Confl. Peds. (#/hr)									1	1		
Confl. Bikes (#/hr)									1			
Heavy Vehicles (%)	0%	0%	5%	0%	0%	0%	8%	1%	0%	0%	0%	6%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	18.6	18.6			18.6		62.0	62.0		62.0	62.0	
Effective Green, g (s)	18.6	18.6			18.6		62.0	62.0		62.0	62.0	
Actuated g/C Ratio	0.21	0.21			0.21		0.70	0.70		0.70	0.70	
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	163	349			319		186	1298		524	1290	
v/s Ratio Prot		0.01						0.30			c0.55	
v/s Ratio Perm	c0.20				0.18		0.21			0.15		
v/c Ratio	0.97	0.06			0.87		0.30	0.43		0.21	0.78	
Uniform Delay, d1	34.7	28.0			33.8		5.1	5.7		4.7	8.8	
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	60.6	0.1			22.0		4.1	1.0		0.9	4.8	
Delay (s)	95.3	28.1			55.8		9.2	6.8		5.6	13.6	
Level of Service	F	C			E		A	A		A	B	
Approach Delay (s)		81.5			55.8			7.0			12.8	
Approach LOS		F			E			A			B	

Intersection Summary			
HCM 2000 Control Delay	23.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	88.6	Sum of lost time (s)	8.0
Intersection Capacity Utilization	92.2%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

see alternate mobility target option

HCM Signalized Intersection Capacity Analysis
16: OR 213 & Beavercreek Road

08/01/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	735	825	80	165	585	740	40	695	170	865	1140	750
Future Volume (vph)	735	825	80	165	585	740	40	695	170	865	1140	750
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	3.5	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	0.97	0.95		0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3482		3433	3539	1533	1597	3471	1568	3400	3471	1568
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3482		3433	3539	1533	1597	3471	1568	3400	3471	1568
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	750	842	82	168	597	755	41	709	173	883	1163	765
RTOR Reduction (vph)	0	6	0	0	0	0	0	0	135	0	0	275
Lane Group Flow (vph)	750	918	0	168	597	755	41	709	38	883	1163	490
Confl. Peds. (#/hr)	1		3	3		1			2	2		
Confl. Bikes (#/hr)			1			1						
Heavy Vehicles (%)	2%	2%	3%	2%	2%	4%	13%	4%	3%	3%	4%	3%
Turn Type	Prot	NA		Prot	NA	Free	Prot	NA	Prot	Prot	NA	Prot
Protected Phases	7	4		3	8		1	6	6	5	2	2
Permitted Phases						Free						
Actuated Green, G (s)	14.7	30.6		4.1	20.0	111.2	3.1	22.2	22.2	30.8	49.9	49.9
Effective Green, g (s)	15.2	31.1		4.6	20.5	111.2	3.6	24.2	24.2	31.3	51.9	51.9
Actuated g/C Ratio	0.14	0.28		0.04	0.18	1.00	0.03	0.22	0.22	0.28	0.47	0.47
Clearance Time (s)	5.5	5.5		5.5	5.5		5.5	7.0	7.0	5.5	7.0	7.0
Vehicle Extension (s)	2.3	2.3		2.3	2.3		2.3	4.7	4.7	2.3	4.7	4.7
Lane Grp Cap (vph)	469	973		142	652	1533	51	755	341	957	1620	731
v/s Ratio Prot	c0.22	c0.26		0.05	c0.17		0.03	c0.20	0.02	c0.26	0.34	0.31
v/s Ratio Perm						0.49						
v/c Ratio	1.60	0.94		1.18	0.92	0.49	0.80	0.94	0.11	0.92	0.72	0.67
Uniform Delay, d1	48.0	39.2		53.3	44.5	0.0	53.4	42.8	34.9	38.8	23.8	23.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	279.5	16.7		133.1	17.4	1.1	57.2	19.7	0.3	13.9	1.8	3.0
Delay (s)	327.5	55.9		186.4	61.9	1.1	110.7	62.5	35.1	52.7	25.6	26.0
Level of Service	F	E		F	E	A	F	E	D	D	C	C
Approach Delay (s)		177.6			45.5			59.5			34.2	
Approach LOS		F			D			E			C	

Intersection Summary			
HCM 2000 Control Delay	74.7	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	111.2	Sum of lost time (s)	20.0
Intersection Capacity Utilization	97.7%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	475	970	305	75	775	125	365	130	95	105	140	360
Future Volume (vph)	475	970	305	75	775	125	365	130	95	105	140	360
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.96		1.00	0.98		1.00	0.94		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1787	3446		1805	3493		1805	1743		1716	1900	1615
Flt Permitted	0.95	1.00		0.95	1.00		0.30	1.00		0.62	1.00	1.00
Satd. Flow (perm)	1787	3446		1805	3493		566	1743		1111	1900	1615
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	485	990	311	77	791	128	372	133	97	107	143	367
RTOR Reduction (vph)	0	20	0	0	9	0	0	18	0	0	0	50
Lane Group Flow (vph)	485	1281	0	77	910	0	372	212	0	107	143	317
Confl. Peds. (#/hr)	1					1			2	2		
Heavy Vehicles (%)	1%	1%	1%	0%	1%	0%	0%	1%	2%	5%	0%	0%
Turn Type	Prot	NA		Prot	NA		pm+pt	NA		pm+pt	NA	pm+ov
Protected Phases	5	2		1	6		3	8		7	4	5
Permitted Phases							8			4		4
Actuated Green, G (s)	38.7	70.4		8.5	40.2		43.2	27.7		25.3	14.3	53.0
Effective Green, g (s)	38.7	70.9		8.5	40.7		43.7	28.2		26.3	14.8	53.0
Actuated g/C Ratio	0.29	0.52		0.06	0.30		0.32	0.21		0.19	0.11	0.39
Clearance Time (s)	4.0	4.5		4.0	4.5		4.5	4.5		4.5	4.5	4.0
Vehicle Extension (s)	2.5	4.0		2.5	4.0		2.5	2.5		2.5	2.5	2.5
Lane Grp Cap (vph)	511	1808		113	1052		411	363		267	208	633
v/s Ratio Prot	c0.27	0.37		0.04	c0.26		c0.17	0.12		0.03	0.08	0.14
v/s Ratio Perm							c0.13			0.04		0.05
v/c Ratio	0.95	0.71		0.68	0.86		0.91	0.58		0.40	0.69	0.50
Uniform Delay, d1	47.2	24.3		62.0	44.6		39.5	48.2		46.7	57.9	31.0
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	27.2	2.4		14.4	9.5		22.9	2.0		0.7	8.3	0.5
Delay (s)	74.4	26.7		76.3	54.1		62.4	50.1		47.4	66.3	31.5
Level of Service	E	C		E	D		E	D		D	E	C
Approach Delay (s)		39.6			55.8			57.7			42.3	
Approach LOS		D			E			E			D	

Intersection Summary			
HCM 2000 Control Delay	46.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	135.1	Sum of lost time (s)	16.0
Intersection Capacity Utilization	92.7%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	65	30	30	60	35	190	35	355	40	100	750	145
Future Volume (vph)	65	30	30	60	35	190	35	355	40	100	750	145
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.93			0.91		1.00	0.98		1.00	0.98	
Flt Protected	0.95	1.00			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	1758			1711		1752	1854		1805	1851	
Flt Permitted	0.42	1.00			0.92		0.17	1.00		0.50	1.00	
Satd. Flow (perm)	801	1758			1592		322	1854		944	1851	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	66	31	31	61	36	194	36	362	41	102	765	148
RTOR Reduction (vph)	0	24	0	0	80	0	0	5	0	0	9	0
Lane Group Flow (vph)	66	38	0	0	211	0	36	398	0	102	904	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	3%	1%	0%	0%	0%	1%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	12.8	12.8			12.8		37.3	37.3		37.3	37.3	
Effective Green, g (s)	12.8	12.8			12.8		37.3	37.3		37.3	37.3	
Actuated g/C Ratio	0.22	0.22			0.22		0.64	0.64		0.64	0.64	
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	176	387			350		206	1190		606	1188	
v/s Ratio Prot		0.02						0.21			c0.49	
v/s Ratio Perm	0.08				c0.13		0.11			0.11		
v/c Ratio	0.38	0.10			0.60		0.17	0.33		0.17	0.76	
Uniform Delay, d1	19.3	18.0			20.4		4.2	4.7		4.2	7.3	
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.3	0.1			2.9		0.4	0.2		0.1	2.9	
Delay (s)	20.6	18.2			23.3		4.6	4.9		4.3	10.2	
Level of Service	C	B			C		A	A		A	B	
Approach Delay (s)		19.4			23.3			4.9			9.6	
Approach LOS		B			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	11.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	58.1	Sum of lost time (s)	8.0
Intersection Capacity Utilization	85.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	125	5	70	70	10	155	65	820	35	70	990	140
Future Volume (vph)	125	5	70	70	10	155	65	820	35	70	990	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.95	0.95			1.00		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.89			0.91		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	0.99			0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1715	1592			1705		1805	1869		1805	1881	1615
Flt Permitted	0.49	0.91			0.87		0.13	1.00		0.21	1.00	1.00
Satd. Flow (perm)	887	1463			1510		256	1869		400	1881	1615
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	128	5	71	71	10	158	66	837	36	71	1010	143
RTOR Reduction (vph)	0	56	0	0	76	0	0	2	0	0	0	34
Lane Group Flow (vph)	105	43	0	0	163	0	66	871	0	71	1010	109
Confl. Bikes (#/hr)									1			
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Turn Type	custom	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases					8			2			6	
Permitted Phases	4	4		8			2			6		6
Actuated Green, G (s)	13.8	13.8			13.8		43.5	43.5		43.5	43.5	43.5
Effective Green, g (s)	13.8	13.8			13.8		43.5	43.5		43.5	43.5	43.5
Actuated g/C Ratio	0.21	0.21			0.21		0.67	0.67		0.67	0.67	0.67
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	187	309			319		170	1245		266	1253	1075
v/s Ratio Prot								0.47			c0.54	
v/s Ratio Perm	c0.12	0.03			0.11		0.26			0.18		0.07
v/c Ratio	0.56	0.14			0.51		0.39	0.70		0.27	0.81	0.10
Uniform Delay, d1	23.0	20.9			22.8		4.9	6.8		4.4	7.9	3.9
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	3.8	0.2			1.4		1.5	1.7		0.5	3.9	0.0
Delay (s)	26.9	21.1			24.2		6.4	8.6		5.0	11.7	3.9
Level of Service	C	C			C		A	A		A	B	A
Approach Delay (s)		24.1			24.2			8.4			10.4	
Approach LOS		C			C			A			B	

Intersection Summary			
HCM 2000 Control Delay	12.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	65.3	Sum of lost time (s)	8.0
Intersection Capacity Utilization	85.4%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	30	25	50	25	175	30	720	40	90	1015	30
Future Volume (vph)	25	30	25	50	25	175	30	720	40	90	1015	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.96			0.91			0.99			1.00	
Flt Protected		0.98			0.99			1.00			1.00	
Satd. Flow (prot)		1792			1704			1866			1857	
Flt Permitted		0.67			0.93			0.94			0.88	
Satd. Flow (perm)		1216			1597			1750			1648	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	26	31	26	51	26	179	31	735	41	92	1036	31
RTOR Reduction (vph)	0	19	0	0	96	0	0	2	0	0	1	0
Lane Group Flow (vph)	0	64	0	0	160	0	0	805	0	0	1158	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	8%	1%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		12.2			12.2			63.0			63.0	
Effective Green, g (s)		12.2			12.2			63.0			63.0	
Actuated g/C Ratio		0.15			0.15			0.76			0.76	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		178			234			1325			1247	
v/s Ratio Prot												
v/s Ratio Perm		0.05			c0.10			0.46			c0.70	
v/c Ratio		0.36			0.68			0.61			0.93	
Uniform Delay, d1		32.0			33.7			4.5			8.3	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		1.3			7.9			0.8			11.9	
Delay (s)		33.2			41.6			5.3			20.2	
Level of Service		C			D			A			C	
Approach Delay (s)		33.2			41.6			5.3			20.2	
Approach LOS		C			D			A			C	

Intersection Summary			
HCM 2000 Control Delay	17.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	83.2	Sum of lost time (s)	8.0
Intersection Capacity Utilization	115.7%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	155	15	25	115	30	175	55	505	45	110	855	140
Future Volume (vph)	155	15	25	115	30	175	55	505	45	110	855	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.90			0.93		1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	1666			1729		1671	1856		1803	1844	
Flt Permitted	0.41	1.00			0.86		0.15	1.00		0.39	1.00	
Satd. Flow (perm)	786	1666			1522		262	1856		747	1844	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	158	15	26	117	31	179	56	515	46	112	872	143
RTOR Reduction (vph)	0	20	0	0	49	0	0	3	0	0	6	0
Lane Group Flow (vph)	158	21	0	0	278	0	56	558	0	112	1009	0
Confl. Peds. (#/hr)									1	1		
Confl. Bikes (#/hr)									1			
Heavy Vehicles (%)	0%	0%	5%	0%	0%	0%	8%	1%	0%	0%	0%	6%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	19.0	19.0			19.0		62.0	62.0		62.0	62.0	
Effective Green, g (s)	19.0	19.0			19.0		62.0	62.0		62.0	62.0	
Actuated g/C Ratio	0.21	0.21			0.21		0.70	0.70		0.70	0.70	
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	167	355			324		182	1292		520	1284	
v/s Ratio Prot		0.01						0.30			c0.55	
v/s Ratio Perm	c0.20				0.18		0.21			0.15		
v/c Ratio	0.95	0.06			0.86		0.31	0.43		0.22	0.79	
Uniform Delay, d1	34.5	27.9			33.7		5.2	5.9		4.8	9.0	
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	53.4	0.1			19.6		4.3	1.1		0.9	4.9	
Delay (s)	87.9	27.9			53.3		9.5	6.9		5.8	13.9	
Level of Service	F	C			D		A	A		A	B	
Approach Delay (s)		75.6			53.3			7.1			13.1	
Approach LOS		E			D			A			B	

Intersection Summary			
HCM 2000 Control Delay	22.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	89.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	92.2%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

see alternate mobility target option

HCM Signalized Intersection Capacity Analysis
16: OR 213 & Beavercreek Road

08/02/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	735	825	80	165	585	730	40	695	170	855	1145	750
Future Volume (vph)	735	825	80	165	585	730	40	695	170	855	1145	750
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	3.5	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	0.97	0.95		0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3482		3433	3539	1533	1597	3471	1568	3400	3471	1568
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3482		3433	3539	1533	1597	3471	1568	3400	3471	1568
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	750	842	82	168	597	745	41	709	173	872	1168	765
RTOR Reduction (vph)	0	6	0	0	0	0	0	0	135	0	0	275
Lane Group Flow (vph)	750	918	0	168	597	745	41	709	38	872	1168	490
Confl. Peds. (#/hr)	1		3	3		1			2	2		
Confl. Bikes (#/hr)			1			1						
Heavy Vehicles (%)	2%	2%	3%	2%	2%	4%	13%	4%	3%	3%	4%	3%
Turn Type	Prot	NA		Prot	NA	Free	Prot	NA	Prot	Prot	NA	Prot
Protected Phases	7	4		3	8		1	6	6	5	2	2
Permitted Phases						Free						
Actuated Green, G (s)	14.8	30.6		4.1	19.9	111.1	3.1	22.3	22.3	30.6	49.8	49.8
Effective Green, g (s)	15.3	31.1		4.6	20.4	111.1	3.6	24.3	24.3	31.1	51.8	51.8
Actuated g/C Ratio	0.14	0.28		0.04	0.18	1.00	0.03	0.22	0.22	0.28	0.47	0.47
Clearance Time (s)	5.5	5.5		5.5	5.5		5.5	7.0	7.0	5.5	7.0	7.0
Vehicle Extension (s)	2.3	2.3		2.3	2.3		2.3	4.7	4.7	2.3	4.7	4.7
Lane Grp Cap (vph)	472	974		142	649	1533	51	759	342	951	1618	731
v/s Ratio Prot	c0.22	c0.26		0.05	c0.17		0.03	c0.20	0.02	c0.26	0.34	0.31
v/s Ratio Perm						0.49						
v/c Ratio	1.59	0.94		1.18	0.92	0.49	0.80	0.93	0.11	0.92	0.72	0.67
Uniform Delay, d1	47.9	39.1		53.2	44.5	0.0	53.4	42.6	34.7	38.7	23.9	23.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	275.0	16.5		133.1	18.0	1.1	57.2	18.9	0.3	13.1	1.9	2.9
Delay (s)	322.9	55.6		186.3	62.6	1.1	110.6	61.5	35.0	51.9	25.8	25.9
Level of Service	F	E		F	E	A	F	E	D	D	C	C
Approach Delay (s)		175.4			46.0			58.7			33.9	
Approach LOS		F			D			E			C	

Intersection Summary			
HCM 2000 Control Delay	74.1	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	111.1	Sum of lost time (s)	20.0
Intersection Capacity Utilization	97.4%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	465	970	315	75	755	115	380	130	95	105	135	350
Future Volume (vph)	465	970	315	75	755	115	380	130	95	105	135	350
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.96		1.00	0.98		1.00	0.94		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1787	3443		1805	3497		1805	1743		1716	1900	1615
Flt Permitted	0.95	1.00		0.95	1.00		0.31	1.00		0.62	1.00	1.00
Satd. Flow (perm)	1787	3443		1805	3497		586	1743		1111	1900	1615
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	474	990	321	77	770	117	388	133	97	107	138	357
RTOR Reduction (vph)	0	21	0	0	8	0	0	18	0	0	0	50
Lane Group Flow (vph)	474	1290	0	77	879	0	388	212	0	107	138	307
Confl. Peds. (#/hr)	1					1			2	2		
Heavy Vehicles (%)	1%	1%	1%	0%	1%	0%	0%	1%	2%	5%	0%	0%
Turn Type	Prot	NA		Prot	NA		pm+pt	NA		pm+pt	NA	pm+ov
Protected Phases	5	2		1	6		3	8		7	4	5
Permitted Phases							8			4		4
Actuated Green, G (s)	38.2	70.4		8.5	40.7		43.4	27.9		25.1	14.1	52.3
Effective Green, g (s)	38.2	70.9		8.5	41.2		43.9	28.4		26.1	14.6	52.3
Actuated g/C Ratio	0.28	0.52		0.06	0.30		0.32	0.21		0.19	0.11	0.39
Clearance Time (s)	4.0	4.5		4.0	4.5		4.5	4.5		4.5	4.5	4.0
Vehicle Extension (s)	2.5	4.0		2.5	4.0		2.5	2.5		2.5	2.5	2.5
Lane Grp Cap (vph)	504	1804		113	1064		418	365		265	205	624
v/s Ratio Prot	c0.27	0.37		0.04	c0.25		c0.17	0.12		0.03	0.07	0.14
v/s Ratio Perm							c0.13			0.04		0.05
v/c Ratio	0.94	0.71		0.68	0.83		0.93	0.58		0.40	0.67	0.49
Uniform Delay, d1	47.4	24.5		62.1	43.7		39.9	48.1		47.0	58.1	31.4
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	25.9	2.5		14.4	7.3		26.6	1.9		0.7	7.7	0.4
Delay (s)	73.4	27.0		76.4	51.0		66.5	50.0		47.7	65.7	31.9
Level of Service	E	C		E	D		E	D		D	E	C
Approach Delay (s)		39.3			53.1			60.4			42.5	
Approach LOS		D			D			E			D	

Intersection Summary			
HCM 2000 Control Delay	46.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	135.3	Sum of lost time (s)	16.0
Intersection Capacity Utilization	91.8%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	65	30	30	60	35	175	35	355	40	85	740	140
Future Volume (vph)	65	30	30	60	35	175	35	355	40	85	740	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.93			0.91		1.00	0.98		1.00	0.98	
Flt Protected	0.95	1.00			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	1758			1715		1752	1854		1805	1852	
Flt Permitted	0.45	1.00			0.92		0.18	1.00		0.50	1.00	
Satd. Flow (perm)	858	1758			1589		332	1854		944	1852	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	66	31	31	61	36	179	36	362	41	87	755	143
RTOR Reduction (vph)	0	24	0	0	74	0	0	5	0	0	9	0
Lane Group Flow (vph)	66	38	0	0	202	0	36	398	0	87	889	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	3%	1%	0%	0%	0%	1%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	12.5	12.5			12.5		35.9	35.9		35.9	35.9	
Effective Green, g (s)	12.5	12.5			12.5		35.9	35.9		35.9	35.9	
Actuated g/C Ratio	0.22	0.22			0.22		0.64	0.64		0.64	0.64	
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	190	389			352		211	1180		600	1178	
v/s Ratio Prot		0.02						0.21			c0.48	
v/s Ratio Perm	0.08				c0.13		0.11			0.09		
v/c Ratio	0.35	0.10			0.57		0.17	0.34		0.14	0.75	
Uniform Delay, d1	18.5	17.5			19.6		4.2	4.7		4.1	7.2	
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.1	0.1			2.3		0.4	0.2		0.1	2.8	
Delay (s)	19.6	17.6			21.8		4.6	4.9		4.2	10.0	
Level of Service	B	B			C		A	A		A	A	
Approach Delay (s)		18.6			21.8			4.9			9.5	
Approach LOS		B			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	10.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	56.4	Sum of lost time (s)	8.0
Intersection Capacity Utilization	83.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	125	10	75	70	10	155	65	800	35	70	985	140
Future Volume (vph)	125	10	75	70	10	155	65	800	35	70	985	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.95	0.95			1.00		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.89			0.91		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	0.99			0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1715	1592			1705		1805	1868		1805	1881	1615
Flt Permitted	0.50	0.95			0.87		0.13	1.00		0.22	1.00	1.00
Satd. Flow (perm)	898	1519			1510		250	1868		413	1881	1615
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	128	10	77	71	10	158	66	816	36	71	1005	143
RTOR Reduction (vph)	0	60	0	0	75	0	0	2	0	0	0	35
Lane Group Flow (vph)	111	44	0	0	164	0	66	850	0	71	1005	108
Confl. Bikes (#/hr)									1			
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Turn Type	custom	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases					8			2			6	
Permitted Phases	4	4		8			2			6		6
Actuated Green, G (s)	14.5	14.5			14.5		43.6	43.6		43.6	43.6	43.6
Effective Green, g (s)	14.5	14.5			14.5		43.6	43.6		43.6	43.6	43.6
Actuated g/C Ratio	0.22	0.22			0.22		0.66	0.66		0.66	0.66	0.66
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	196	333			331		164	1232		272	1240	1065
v/s Ratio Prot								0.45			c0.53	
v/s Ratio Perm	c0.12	0.03			0.11		0.26			0.17		0.07
v/c Ratio	0.57	0.13			0.50		0.40	0.69		0.26	0.81	0.10
Uniform Delay, d1	23.0	20.7			22.6		5.2	7.0		4.6	8.2	4.1
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	3.7	0.2			1.2		1.6	1.6		0.5	4.1	0.0
Delay (s)	26.7	20.9			23.8		6.8	8.7		5.1	12.3	4.1
Level of Service	C	C			C		A	A		A	B	A
Approach Delay (s)		23.9			23.8			8.5			11.0	
Approach LOS		C			C			A			B	

Intersection Summary			
HCM 2000 Control Delay	12.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	66.1	Sum of lost time (s)	8.0
Intersection Capacity Utilization	85.4%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	35	30	50	25	180	30	695	40	90	1015	30
Future Volume (vph)	25	35	30	50	25	180	30	695	40	90	1015	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.95			0.90			0.99			1.00	
Flt Protected		0.99			0.99			1.00			1.00	
Satd. Flow (prot)		1789			1703			1866			1857	
Flt Permitted		0.69			0.92			0.93			0.89	
Satd. Flow (perm)		1252			1587			1746			1655	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	26	36	31	51	26	184	31	709	41	92	1036	31
RTOR Reduction (vph)	0	20	0	0	99	0	0	2	0	0	1	0
Lane Group Flow (vph)	0	73	0	0	162	0	0	779	0	0	1158	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	8%	1%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		12.3			12.3			62.2			62.2	
Effective Green, g (s)		12.3			12.3			62.2			62.2	
Actuated g/C Ratio		0.15			0.15			0.75			0.75	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		186			236			1316			1247	
v/s Ratio Prot												
v/s Ratio Perm		0.06			c0.10			0.45			c0.70	
v/c Ratio		0.39			0.69			0.59			0.93	
Uniform Delay, d1		31.7			33.3			4.5			8.3	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		1.4			8.1			0.7			11.9	
Delay (s)		33.1			41.3			5.2			20.3	
Level of Service		C			D			A			C	
Approach Delay (s)		33.1			41.3			5.2			20.3	
Approach LOS		C			D			A			C	

Intersection Summary			
HCM 2000 Control Delay	18.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	82.5	Sum of lost time (s)	8.0
Intersection Capacity Utilization	116.0%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	150	15	25	105	30	165	60	485	45	110	835	140
Future Volume (vph)	150	15	25	105	30	165	60	485	45	110	835	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.90			0.93		1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	1666			1729		1671	1855		1803	1843	
Flt Permitted	0.42	1.00			0.87		0.16	1.00		0.41	1.00	
Satd. Flow (perm)	799	1666			1526		284	1855		772	1843	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	153	15	26	107	31	168	61	495	46	112	852	143
RTOR Reduction (vph)	0	21	0	0	50	0	0	4	0	0	7	0
Lane Group Flow (vph)	153	20	0	0	256	0	61	537	0	112	988	0
Confl. Peds. (#/hr)									1	1		
Confl. Bikes (#/hr)									1			
Heavy Vehicles (%)	0%	0%	5%	0%	0%	0%	8%	1%	0%	0%	0%	6%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	18.7	18.7			18.7		62.1	62.1		62.1	62.1	
Effective Green, g (s)	18.7	18.7			18.7		62.1	62.1		62.1	62.1	
Actuated g/C Ratio	0.21	0.21			0.21		0.70	0.70		0.70	0.70	
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	168	350			321		198	1297		539	1288	
v/s Ratio Prot		0.01						0.29			c0.54	
v/s Ratio Perm	c0.19				0.17		0.21			0.15		
v/c Ratio	0.91	0.06			0.80		0.31	0.41		0.21	0.77	
Uniform Delay, d1	34.2	28.0			33.3		5.1	5.7		4.7	8.7	
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	44.4	0.1			12.9		4.0	1.0		0.9	4.4	
Delay (s)	78.7	28.1			46.2		9.1	6.6		5.6	13.1	
Level of Service	E	C			D		A	A		A	B	
Approach Delay (s)		68.0			46.2			6.9			12.3	
Approach LOS		E			D			A			B	

Intersection Summary			
HCM 2000 Control Delay	20.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	88.8	Sum of lost time (s)	8.0
Intersection Capacity Utilization	90.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

alternate mobility target option

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↰	↑↱		↰↰	↑↑	↱	↰	↑↑	↱	↰↰	↑↑	↱
Traffic Volume (vph)	715	800	80	60	565	720	40	675	165	840	1105	730
Future Volume (vph)	715	800	80	60	565	720	40	675	165	840	1105	730
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	3.5	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	0.97	0.95		0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3481		3433	3539	1533	1597	3471	1568	3400	3471	1568
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3481		3433	3539	1533	1597	3471	1568	3400	3471	1568
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	715	800	80	60	565	720	40	675	165	840	1105	730
RTOR Reduction (vph)	0	6	0	0	0	0	0	0	129	0	0	281
Lane Group Flow (vph)	715	874	0	60	565	720	40	675	36	840	1105	449
Confl. Peds. (#/hr)	1		3	3		1			2	2		
Confl. Bikes (#/hr)			1			1						
Heavy Vehicles (%)	2%	2%	3%	2%	2%	4%	13%	4%	3%	3%	4%	3%
Turn Type	Prot	NA		Prot	NA	Free	Prot	NA	Prot	Prot	NA	Prot
Protected Phases	7	4		3	8		1	6	6	5	2	2
Permitted Phases						Free						
Actuated Green, G (s)	16.0	32.3		3.2	19.5	111.1	3.1	22.3	22.3	29.8	49.0	49.0
Effective Green, g (s)	16.5	32.8		3.7	20.0	111.1	3.6	24.3	24.3	30.3	51.0	51.0
Actuated g/C Ratio	0.15	0.30		0.03	0.18	1.00	0.03	0.22	0.22	0.27	0.46	0.46
Clearance Time (s)	5.5	5.5		5.5	5.5		5.5	7.0	7.0	5.5	7.0	7.0
Vehicle Extension (s)	2.3	2.3		2.3	2.3		2.3	4.7	4.7	2.3	4.7	4.7
Lane Grp Cap (vph)	509	1027		114	637	1533	51	759	342	927	1593	719
v/s Ratio Prot	c0.21	0.25		0.02	c0.16		0.03	c0.19	0.02	c0.25	0.32	0.29
v/s Ratio Perm						0.47						
v/c Ratio	1.40	0.85		0.53	0.89	0.47	0.78	0.89	0.11	0.91	0.69	0.62
Uniform Delay, d1	47.3	36.8		52.8	44.4	0.0	53.4	42.1	34.7	39.0	23.9	22.8
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	193.7	6.7		2.8	13.9	1.0	51.7	13.0	0.3	12.1	1.6	2.3
Delay (s)	241.0	43.6		55.6	58.3	1.0	105.0	55.1	35.0	51.1	25.4	25.0
Level of Service	F	D		E	E	A	F	E	C	D	C	C
Approach Delay (s)		132.1			27.5			53.6			33.4	
Approach LOS		F			C			D			C	

Intersection Summary			
HCM 2000 Control Delay	59.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	111.1	Sum of lost time (s)	20.0
Intersection Capacity Utilization	95.3%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

alternate
mobility target
option

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	715	800	80	160	565	710	40	675	165	830	1110	730
Future Volume (vph)	715	800	80	160	565	710	40	675	165	830	1110	730
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	3.5	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	0.97	0.95		0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3481		3433	3539	1533	1597	3471	1568	3400	3471	1568
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3481		3433	3539	1533	1597	3471	1568	3400	3471	1568
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	715	800	80	160	565	710	40	675	165	830	1110	730
RTOR Reduction (vph)	0	6	0	0	0	0	0	0	128	0	0	278
Lane Group Flow (vph)	715	874	0	160	565	710	40	675	37	830	1110	452
Confl. Peds. (#/hr)	1		3	3		1			2	2		
Confl. Bikes (#/hr)			1			1						
Heavy Vehicles (%)	2%	2%	3%	2%	2%	4%	13%	4%	3%	3%	4%	3%
Turn Type	Prot	NA		Prot	NA	Free	Prot	NA	Prot	Prot	NA	Prot
Protected Phases	7	4		3	8		1	6	6	5	2	2
Permitted Phases						Free						
Actuated Green, G (s)	14.7	30.1		4.1	19.5	109.7	3.1	22.5	22.5	29.5	48.9	48.9
Effective Green, g (s)	15.2	30.6		4.6	20.0	109.7	3.6	24.5	24.5	30.0	50.9	50.9
Actuated g/C Ratio	0.14	0.28		0.04	0.18	1.00	0.03	0.22	0.22	0.27	0.46	0.46
Clearance Time (s)	5.5	5.5		5.5	5.5		5.5	7.0	7.0	5.5	7.0	7.0
Vehicle Extension (s)	2.3	2.3		2.3	2.3		2.3	4.7	4.7	2.3	4.7	4.7
Lane Grp Cap (vph)	475	970		143	645	1533	52	775	350	929	1610	727
v/s Ratio Prot	c0.21	c0.25		0.05	c0.16		0.03	c0.19	0.02	c0.24	0.32	0.29
v/s Ratio Perm						0.46						
v/c Ratio	1.51	0.90		1.12	0.88	0.46	0.77	0.87	0.11	0.89	0.69	0.62
Uniform Delay, d1	47.2	38.1		52.6	43.6	0.0	52.6	41.1	33.9	38.3	23.2	22.1
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	238.1	11.2		110.7	12.5	1.0	46.4	11.2	0.2	10.8	1.5	2.2
Delay (s)	285.4	49.3		163.3	56.2	1.0	99.0	52.3	34.1	49.1	24.7	24.3
Level of Service	F	D		F	E	A	F	D	C	D	C	C
Approach Delay (s)		155.1			40.8			51.0			32.2	
Approach LOS		F			D			D			C	

Intersection Summary			
HCM 2000 Control Delay	66.4	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	109.7	Sum of lost time (s)	20.0
Intersection Capacity Utilization	95.0%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

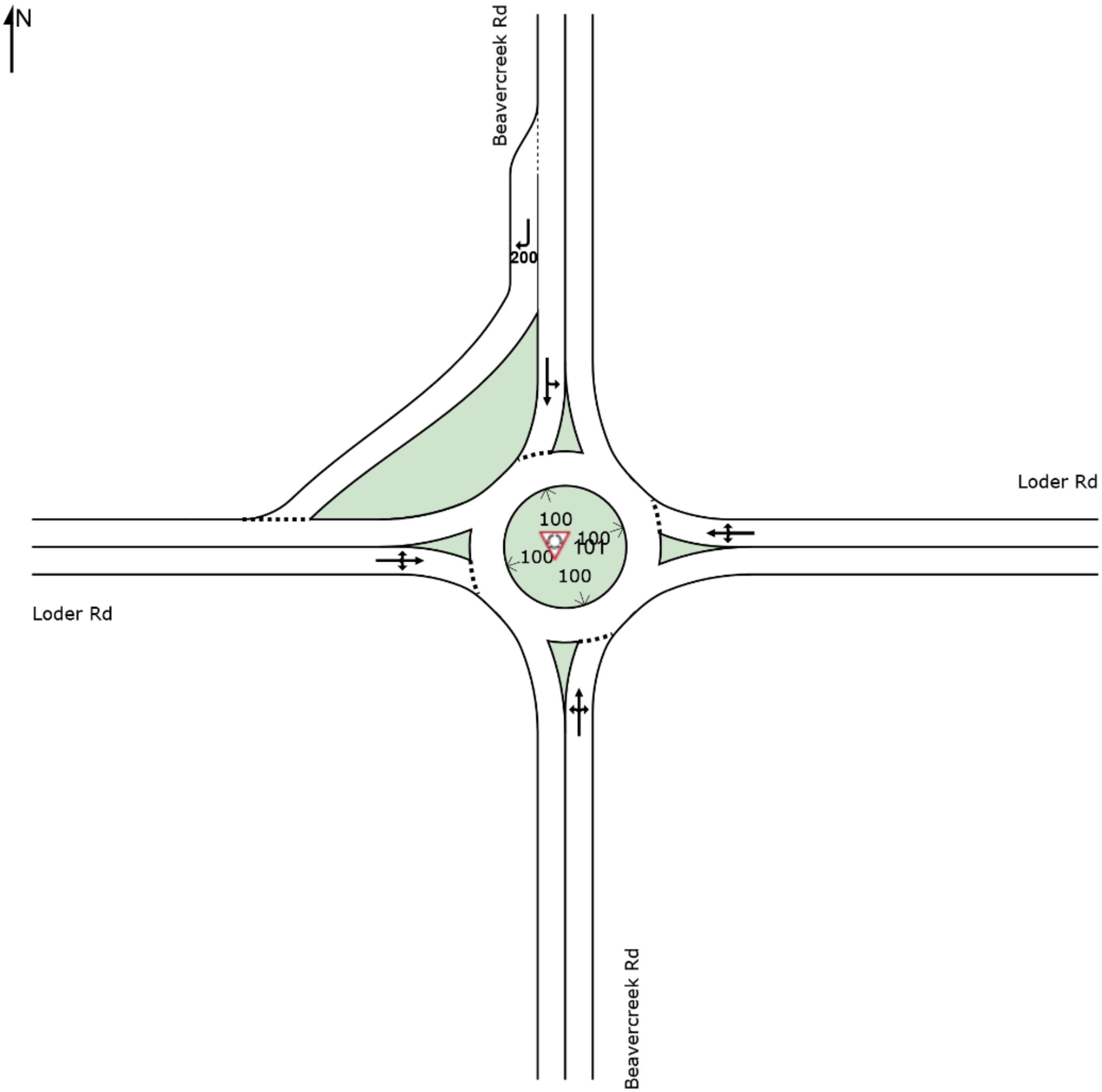
DKS

Sidra Reports

SITE LAYOUT

Site: 101 [Beavercreek and Loder]

Site Category: (None)
Roundabout



MOVEMENT SUMMARY

Site: 101 [Beavercreek and Loder]

Site Category: (None)
Roundabout

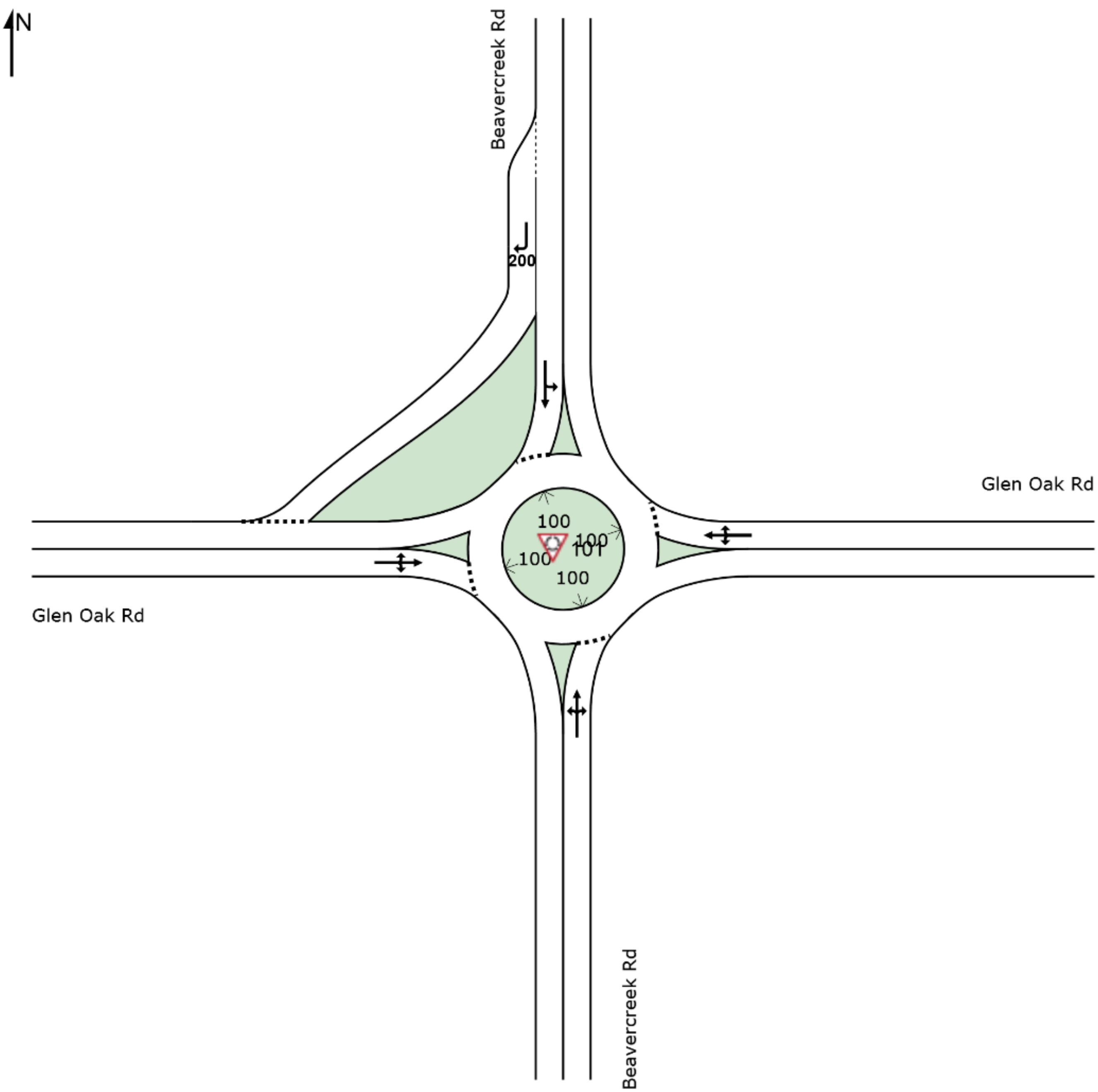
Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
South: Beavercreek Rd												
3	L2	30	2.0	0.708	13.8	LOS B	8.5	215.1	0.69	0.51	0.76	31.0
8	T1	745	2.0	0.708	13.8	LOS B	8.5	215.1	0.69	0.51	0.76	30.9
18	R2	40	2.0	0.708	13.8	LOS B	8.5	215.1	0.69	0.51	0.76	30.1
Approach		815	2.0	0.708	13.8	LOS B	8.5	215.1	0.69	0.51	0.76	30.9
East: Loder Rd												
1	L2	55	2.0	0.459	13.5	LOS B	2.6	64.8	0.75	0.85	1.06	30.6
6	T1	25	2.0	0.459	13.5	LOS B	2.6	64.8	0.75	0.85	1.06	30.6
16	R2	190	2.0	0.459	13.5	LOS B	2.6	64.8	0.75	0.85	1.06	29.8
Approach		270	2.0	0.459	13.5	LOS B	2.6	64.8	0.75	0.85	1.06	30.0
North: Beavercreek Rd												
7	L2	95	2.0	0.943	31.8	LOS D	47.9	1216.3	1.00	1.01	1.60	24.8
4	T1	1090	2.0	0.943	31.8	LOS D	47.9	1216.3	1.00	1.01	1.60	24.8
14	R2	30	2.0	0.023	2.9	LOS A	0.1	2.2	0.15	0.05	0.15	35.3
Approach		1215	2.0	0.943	31.1	LOS D	47.9	1216.3	0.98	0.98	1.56	25.0
West: Loder Rd												
5	L2	25	2.0	0.242	13.9	LOS B	0.9	22.2	0.78	0.78	0.78	30.4
2	T1	35	2.0	0.242	13.9	LOS B	0.9	22.2	0.78	0.78	0.78	30.3
12	R2	30	2.0	0.242	13.9	LOS B	0.9	22.2	0.78	0.78	0.78	29.5
Approach		90	2.0	0.242	13.9	LOS B	0.9	22.2	0.78	0.78	0.78	30.1
All Vehicles		2390	2.0	0.943	22.6	LOS C	47.9	1216.3	0.85	0.80	1.20	27.5

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: 101 [Beavercreek and Glen Oak]

Site Category: (None)
Roundabout



MOVEMENT SUMMARY

Site: 101 [Beavercreek and Glen Oak]

Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
South: Beavercreek Rd												
3	L2	35	2.0	0.437	7.9	LOS A	2.7	68.4	0.49	0.34	0.49	33.6
8	T1	380	2.0	0.437	7.9	LOS A	2.7	68.4	0.49	0.34	0.49	33.5
18	R2	70	2.0	0.437	7.9	LOS A	2.7	68.4	0.49	0.34	0.49	32.6
Approach		485	2.0	0.437	7.9	LOS A	2.7	68.4	0.49	0.34	0.49	33.4
East: Glen Oak Rd												
1	L2	60	2.0	0.349	8.5	LOS A	1.7	42.6	0.63	0.60	0.63	32.9
6	T1	40	2.0	0.349	8.5	LOS A	1.7	42.6	0.63	0.60	0.63	32.8
16	R2	185	2.0	0.349	8.5	LOS A	1.7	42.6	0.63	0.60	0.63	31.9
Approach		285	2.0	0.349	8.5	LOS A	1.7	42.6	0.63	0.60	0.63	32.2
North: Beavercreek Rd												
7	L2	90	2.0	0.721	13.7	LOS B	7.1	180.9	0.63	0.41	0.63	30.9
4	T1	795	2.0	0.721	13.7	LOS B	7.1	180.9	0.63	0.41	0.63	30.9
14	R2	150	2.0	0.116	3.7	LOS A	0.5	12.3	0.19	0.08	0.19	34.8
Approach		1035	2.0	0.721	12.2	LOS B	7.1	180.9	0.57	0.36	0.57	31.4
West: Glen Oak Rd												
5	L2	70	2.0	0.257	10.8	LOS B	1.0	25.5	0.70	0.70	0.70	31.1
2	T1	30	2.0	0.257	10.8	LOS B	1.0	25.5	0.70	0.70	0.70	31.0
12	R2	30	2.0	0.257	10.8	LOS B	1.0	25.5	0.70	0.70	0.70	30.2
Approach		130	2.0	0.257	10.8	LOS B	1.0	25.5	0.70	0.70	0.70	30.8
All Vehicles		1935	2.0	0.721	10.5	LOS B	7.1	180.9	0.57	0.41	0.57	31.9

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Preliminary Signal Warrants

Oregon Department of Transportation
Transportation Development Branch
Transportation Planning Analysis Unit

Preliminary Traffic Signal Warrant Analysis[1]

Major Street:	Beavercreek Rd	**Minor Street:**	Glen Oak Rd
Project:	Beavercreek Concept Plan	**City/County:**	Oregon City
Year:	2040	**Alternative:**	Metro model w Holly ext

Preliminary Signal Warrant Volumes

Number of Approach lanes		ADT on major street approaching from both directions		ADT on minor street, highest approaching volume	
Major Street	Minor Street	Percent of standard warrants 100	70	Percent of standard warrants 100	70
Case A: Minimum Vehicular Traffic					
1	1	8850	6200	2650	1850
2 or more	1	10600	7400	2650	1850
2 or more	2 or more	10600	7400	3550	2500
1	2 or more	8850	6200	3550	2500
Case B: Interruption of Continuous Traffic					
1	1	13300	9300	1350	950
2 or more	1	15900	11100	1350	950
2 or more	2 or more	15900	11100	1750	1250
1	2 or more	13300	9300	1750	1250
X	100 percent of standard warrants				
	70 percent of standard warrants[2]				

Preliminary Signal Warrant Calculation

	Street	Number of Lanes	Warrant Volumes	Approach Volumes	Warrant Met
Case A	Major	1	8850	15200	Y
	Minor	1	2650	2900	
Case B	Major	1	13300	15200	Y
	Minor	1	1350	2900	
Analyst and Date:			Reviewer and Date:		

Oregon Department of Transportation
Transportation Development Branch
Transportation Planning Analysis Unit

Preliminary Traffic Signal Warrant Analysis1

Major Street:	Beavercreek Rd	**Minor Street:**	Loder Rd
Project:	Beavercreek Concept Plan	**City/County:**	Oregon City
Year:	2040	**Alternative:**	Metro model w Holly ext

Preliminary Signal Warrant Volumes

Number of Approach lanes		ADT on major street approaching from both directions		ADT on minor street, highest approaching volume	
Major Street	Minor Street	Percent of standard warrants 100	70	Percent of standard warrants 100	70
Case A: Minimum Vehicular Traffic					
1	1	8850	6200	2650	1850
2 or more	1	10600	7400	2650	1850
2 or more	2 or more	10600	7400	3550	2500
1	2 or more	8850	6200	3550	2500
Case B: Interruption of Continuous Traffic					
1	1	13300	9300	1350	950
2 or more	1	15900	11100	1350	950
2 or more	2 or more	15900	11100	1750	1250
1	2 or more	13300	9300	1750	1250
X	100 percent of standard warrants				
	70 percent of standard warrants2				

Preliminary Signal Warrant Calculation

	Street	Number of Lanes	Warrant Volumes	Approach Volumes	Warrant Met
Case A	Major	1	8850	20300	N
	Minor	1	2650	1434	
Case B	Major	1	13300	20300	Y
	Minor	1	1350	1434	
Analyst and Date:			Reviewer and Date:		

[1] Meeting preliminary signal warrants does **not** guarantee that a signal will be installed. When preliminary signal warrants are met, project analysts need to coordinate with Region Traffic to initiate the traffic signal engineering investigation as outlined in the Traffic Manual. Before a signal can be installed, the engineering investigation must be conducted or reviewed by the Region Traffic Manager who will forward signal recommendations to headquarters. Traffic signal warrants must be met and the State Traffic Engineer's approval obtained before a traffic signal can be installed on a state highway.

[2] Used due to 85th percentile speed in excess of 40 mph or isolated community with population of less than 10,000.

DRAFT MEMORANDUM

720 SW Washington St.
Suite 500
Portland, OR 97205
503.243.3500
www.dksassociates.com

DATE: June 21, 2019

TO: Christina Robertson-Gardiner, City of Oregon City

FROM: Kevin Chewuk, DKS Associates
Amanda Deering, DKS Associates

SUBJECT: Oregon City Beavercreek Land Use Review P19082-001

This memorandum summarizes how the requirements of Oregon Administrative Rule (OAR) 660-012-0060, the Transportation Planning Rule (TPR), are met for the Beavercreek Concept Plan area in Oregon City, Oregon. The study area comprises the adopted 2008 Beavercreek Concept Plan area which established land use designations, design guidelines and future transportation infrastructure needs. The Beavercreek Concept Plan area is roughly bounded by the Urban Growth Boundary to the east, Beavercreek Road to the west, Old Acres Road to the south and Thayer Road to the north. The following sections describe the consistency of the Beavercreek Concept Plan with the current Oregon City Transportation System Plan (TSP).

Land Use Assumptions

The Beavercreek Concept Plan area includes about 5,700 new jobs and 1,100 new housing units. Table 1 describes the assumptions that were used. For the Oregon City TSP, vehicle trips within the Beavercreek Concept Plan area were estimated based on around 1,639 new jobs and 355 new households. The Beavercreek Concept Plan was held up in the Oregon Land Use Board of Appeals (LUBA) during the recent update to the Oregon City TSP, thus the zoning in the Beavercreek Concept Plan area did not reflect the rezoned land resulting from the plan.

Land Use and Motor Vehicle Trip Generation Assumptions

The impact of the increased vehicle trip generation on the surrounding transportation system, as a result of the Beavercreek Concept Plan, will be evaluated through the year 2035 (consistent with the horizon year of the current TSP).

For the current Oregon City TSP, vehicle trips were estimated based on the existing land use assumptions (see Table 1). These trips are included in the 2035 TSP Baseline scenario. For the TPR analysis, the Beavercreek Concept Plan was estimated to accommodate 750 more housing units and 4,095 more employees than the current TSP.

Vehicle trips that would be generated by the increased housing units and employees were estimated by applying the Metro Regional Travel Forecast model trip generation rates by land use type. Overall, the Beavercreek Concept Plan is expected to generate about 2,584 motor vehicle trips during the p.m. peak hour, or 925 more than what was assumed in the current TSP.

Table 1: Land Use Assumptions

Scenario	New Housing Units	New Employees	Forecasted Weekday PM Peak Hour Vehicle Trip End Growth
TSP Baseline (without Beavercreek Concept Plan)	355	1,639	1,659
Beavercreek Concept Plan	1,105	5,734	2,584
Change (With Beavercreek Concept Plan – Without Beavercreek Concept Plan)	**+750**	**+4,095**	**+925**

2035 Motor Vehicle Operations

Future p.m. peak hour traffic forecasts were prepared for two land use scenarios, including:

- **TSP Baseline (without Beavercreek Concept Plan) –** This scenario assumes the land use within the Beavercreek Concept Plan will be built out consistent with the prior TSP analysis. It includes the improvement projects listed in the "Baseline Transportation System Improvements" section.
- **Beavercreek Concept Plan –** This scenario assumes full buildout of Beavercreek Concept Plan area. It includes the improvement projects listed in the "Baseline Transportation System Improvements" section.

With each of these two land use scenarios, a sensitivity option was tested that assumed the planned segment of Holly Lane between Maple Lane Road and Thayer Road would not be completed. The forecast will include 2035 volumes to match the TSP horizon year.

Baseline Transportation System Improvements

The starting point for the future operations analysis relied on a list of street system improvement projects contained in the Oregon City TSP. These projects represent only those that are expected to be reasonably funded, and therefore can be included in the Baseline scenario. Many of the projects in the Beavercreek Concept Plan area will be constructed as private development occurs. Others will be constructed as part of public infrastructure improvements or concurrent with adjacent private developments. The improvements assumed include:

- Roundabout installation at the **Beavercreek Road/Glen Oak Road** intersection (TSP Project D39)
- Roundabout installation at the **Beavercreek Road/Loder Road** intersection (TSP Project D44)
- **Meyers Road** extension from OR 213 to High School Avenue (TSP Project D46)
- **Meyers Road** extension from Beavercreek Road to the Meadow Lane Extension (TSP Project D47)
- **Clairmont Drive** extension from Beavercreek Road to the Holly Lane South Extension (TSP Project D54)
- **Glen Oak Road** extension from Beavercreek Road to the Meadow Lane Extension (TSP Project D55)
- **Timbersky Way** extension from Beavercreek Road to the Meadow Lane Extension (TSP Project D56)
- **Holly Lane** extension from Thayer Road to the Meadow Lane Extension (TSP Projects D58 and D59)
- **Meadow Lane** extension to the Urban Growth Boundary, north of Loder Road (TSP Projects D60 and D61)
- **Loder Road** extension from Beavercreek Road to Glen Oak Road (TSP Project D64)
- **Beavercreek Road** improvements from Clairmont Drive to the Urban Growth Boundary, south of Old Acres Lane (TSP Projects D81 and D82)
- **Loder Road** improvements from Beavercreek Road to the Urban Growth Boundary (TSP Project D85)

Intersection Operations

During the evening peak hour, all study intersections operate within adopted mobility targets under all scenarios after assuming the baseline transportation system improvements from the TSP. The traffic analysis results are summarized in a separate memorandum.

TPR Findings

Overall, the current TSP includes adequate transportation system projects for the Beavercreek Concept Plan area to comply with the Transportation Planning Rule (TPR). All transportation impacts as a result of the additional housing units and employees in the Beavercreek Concept Plan area are addressed by current TSP projects. This includes the widening of Beavercreek Road through the project area to a 3 or 5-lane cross-section (to be determined in separate memorandum) and intersection control improvements to the Loder Road and Glen Oak Road intersections with Beavercreek Road (roundabout or traffic signals, to be determined in separate memorandum).

Kattie Riggs

Subject: FW: Beavercreek Rd. Concept plan comments

From: kristina browning <kristinamwright@yahoo.com>
Sent: Monday, November 4, 2019 12:04 PM
To: Christina Robertson-Gardiner <crobertson@orcity.org>
Subject: Beavercreek Rd. Concept plan comments

I tried to put this into the Beavercreek Rd Concept Plan Implementation Contact Page but I think it was too long and it wouldn't let me send it.

After looking at this new updated concept (it's looking great!) I wanted to add something I just noticed: I live in the massive neighborhood East of Thayer Rd that butts right up next to the North Employment Campus. There are hundreds and hundreds of homes in this neighborhood. There are 65 in just the front three streets alone which is the most recent to be built. They connect to those homes built in the previous phase to the North via connected streets.

I see a lot more OPEN SPACE and parks weaved through the new Beavercreek plans which I LOVE SO MUCH but I noticed that there is no clear connection from this massive neighborhood to those walkable areas. These spaces will not be safely accessible unless the sidewalks that surround our neighborhood are connected to these new areas. Right now there is no way for us to even safely walk the VERY SMALL distance to Albertsons (8 minute walk at most) because there is no sidewalk on this side of MapleLane forcing us to cross traffic without a crosswalk (which I am not doing with a six year old.)

My concern is if that isn't considered, this neighborhood will become an island still forcing us all to DRIVE in order to safely GET to these green spaces for walking, jogging, playing etc. thereby negating all the effort for a walkable community forcing hundreds of people to drive down the street and park to have safe access. Please consider connecting where all the people currently live NOW to these new green spaces and the mixed use center. WE WANT TO WALK AND BIKE. Don't force us to drive. More people walking means less traffic and less road maintenance, a healthy population and more connection and gathering between neighbors.

Cheers,

Kristina Browning
Home Functionality Coach
Realtor & Podcaster
Space + Reason Properties
c: 503-505-3798
e: kristina@SpaceAndReason.com
licensed with 503 Properties

Beavercreek Road Design

November 12, 2019 City Commission Work Session

Beavercreek Background

Project Purpose- Implement the Beavercreek Concept Plan by adopting new Zoning and Comprehensive Plan Maps and creating development code to implement vision of the plan

Grant- Department of Land Conservation and Development (DLCD)

Build upon existing public process that adopted the Concept plan in 2008 and readopted in 2016

Public Comments Spring 2019- 11 years later a fresh look may be needed to see if the adopted 3-lane design of Beavercreek Road reflected the community vision

Presented initial findings

DKS Associates-all potential road configurations met the requirements for rezoning, including the Transportation Planning Rule (TPR)

City Commission asked for additional information on Holly Lane Extension projects, roundabout design and lane costs

Staff reached out to the public with Beavercreek Road Design Survey and mailed information to abutting property owners

Staff ready to present additional information-looking for broad direction on design approach.

August 13, 2019 City Commission Worksession

City Commission Direction

How many lines should Beavercreek Road be within the Concept Plan corridor?

- 3 lanes
- 5 lanes
- A transition from 5 lane to 3 lanes at either Meyers or Loder Roads.

What type of intersections should Beavercreek Road have within the Concept Plan corridor?

- Traffic signals
- Roundabouts
- Both

City Commission Direction

Should the City renegotiate with ODOT to revise the Alternate Mobility Standard by removing Holly Lane connection projects from the Transportation System Plan (TSP)?	Should Beavercreek Road along the Concept Plan corridor be constructed by developers incrementally as development is built or pursued as a capital improvement project all at once?
• No • Yes	• The roadway should be constructed incrementally as development occurs. • The City should create a funding mechanism for building the roadway as a single project.

What We Learned

COST IMPLICATIONS

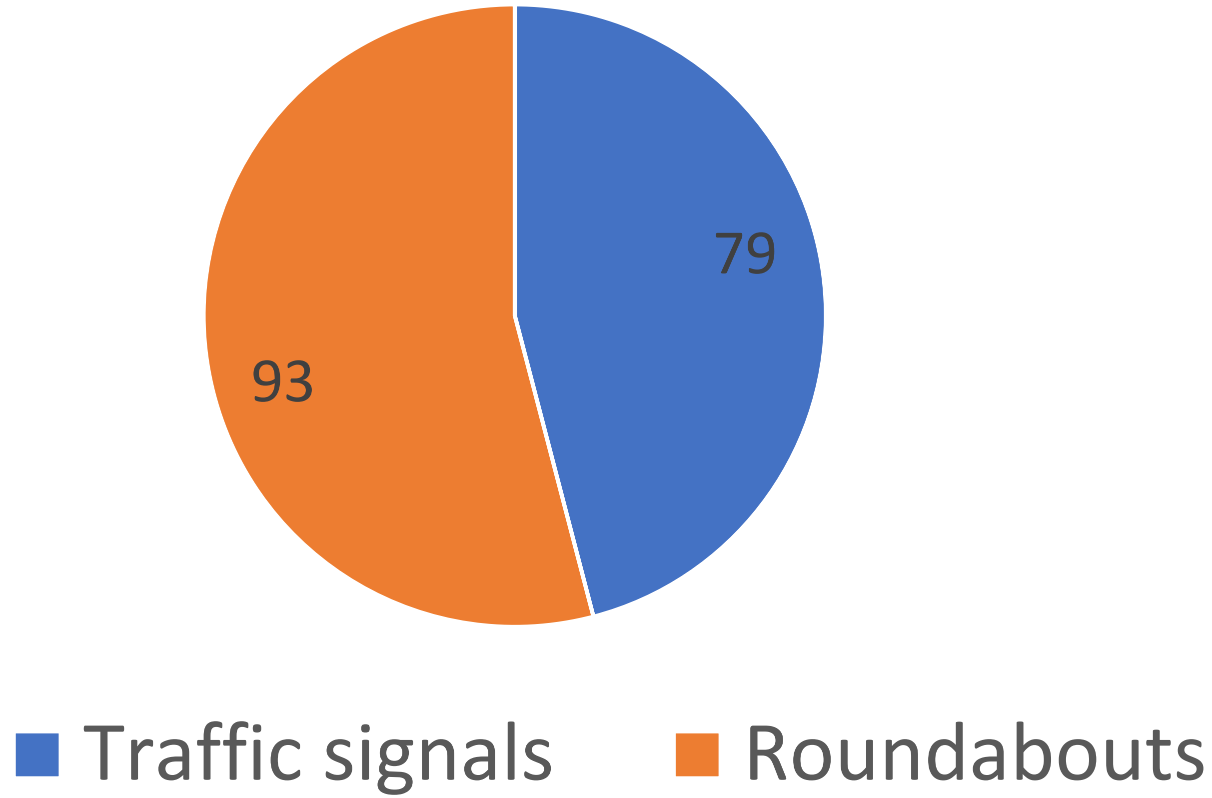
NEIGHBOR IMPACT

PROCESS TO BUILD

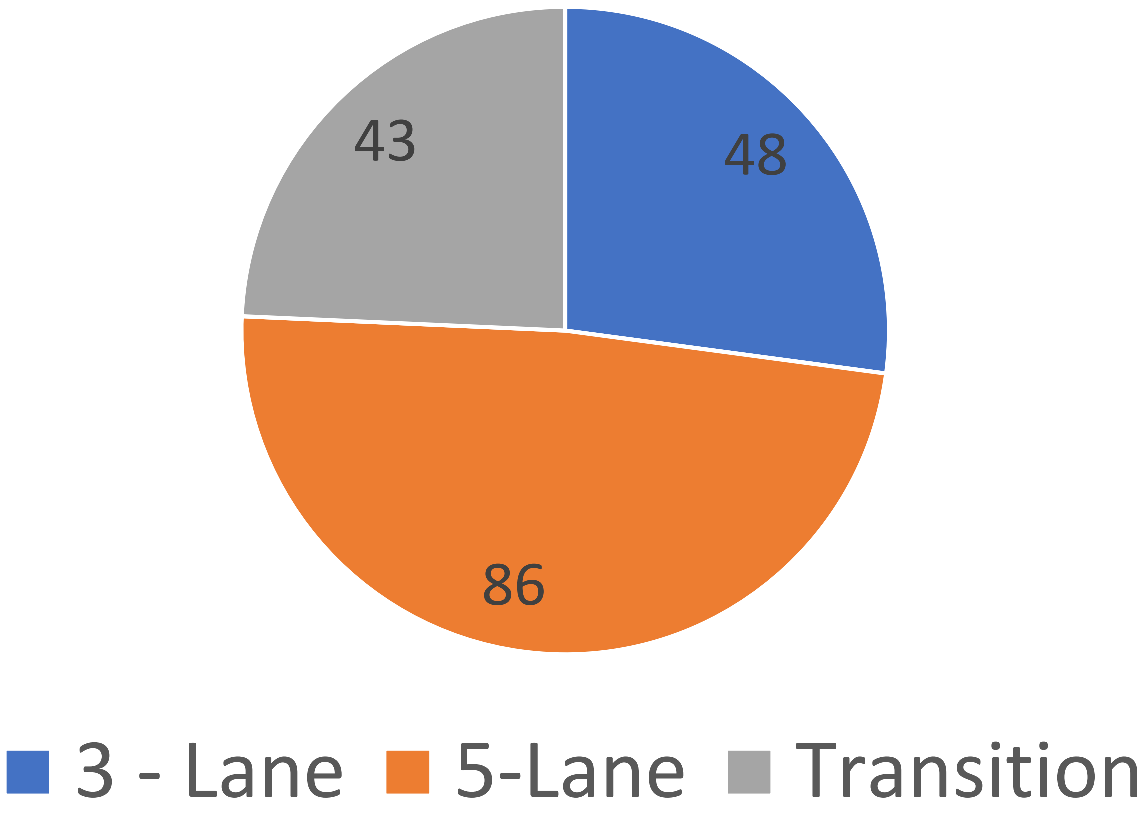
Survey Results

October 24, 2019 to November 11, 2019

Would you prefer using roundabouts or traffic signals along this section of Beavercreek Road?



Would you prefer seeing a 3-lane section, 5-lane section or a transition from 5-lanes to 3 lanes along this section of Beavercreek Road?



Transportation decisions often involve tradeoffs, knowing that price may be a limiting factor, what elements of Beavercreek Road are important to you?

	Very Import	Somewhat Important	Important	Not Important	Not Important At All
Pedestrian safety	106	20	32	4	3
Bike safety	77	30	37	11	8
Aesthetics/creating a sense of place	36	36	51	30	6
Reducing vehicle congestion	121	31	15	3	1
Ease of long-term maintenance	54	44	56	10	2
Ease of crossing Beavercreek Road	70	39	37	12	4

Selected Comments

- “Move the traffic and make it happen. Roundabouts work great, people just need a little time to figure them out.”
- “Traffic signals will allow for safer pedestrian and bicycle traffic. Will also allow for safer methods to cross Beavercreek Rd. especially in the school zone at the high school.”
- “OC is not going to stop future growth along BC Rd. There are no other access roads to get to 213 from Beavercreek due to topography and existing housing. This road will only get busier. Build it out for the future, not just for today.”
- “It sounds as if the traffic studies completed do not recommend a 5-lane cross section. This seems overkill, especially given the future transportation projects mentioned above. I do feel that the posted 20 mph speed limit during 7-5 p.m. on school days is one of the major causes of congestion.”
- “Mostly DON'T want a transition from 5 to 3 lane since it creates such a bottleneck and as a resident of the area already have to deal with that on 213 which is most unpleasant.”

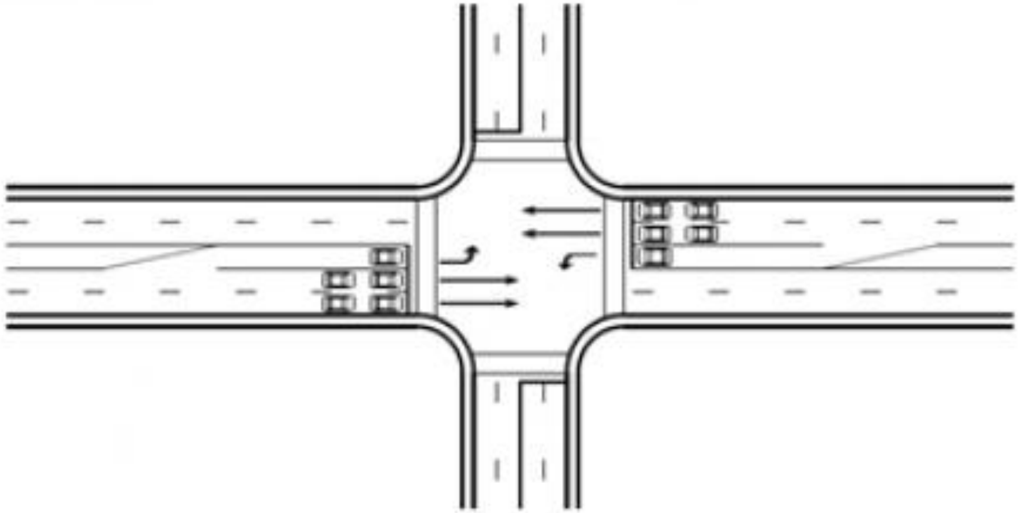
Considerations

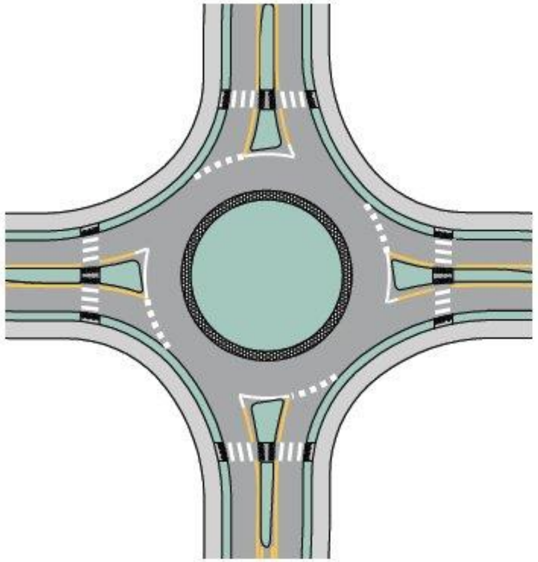
Tradeoffs – Number of Lanes

Addressing Future Growth

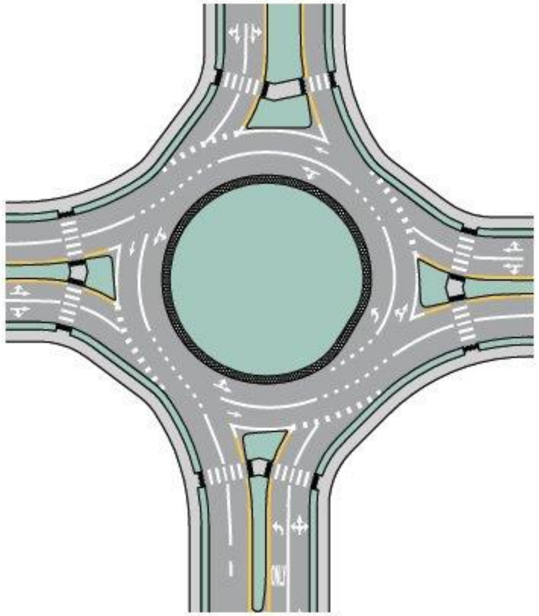
Future Major Transportation Projects

Intersection Control



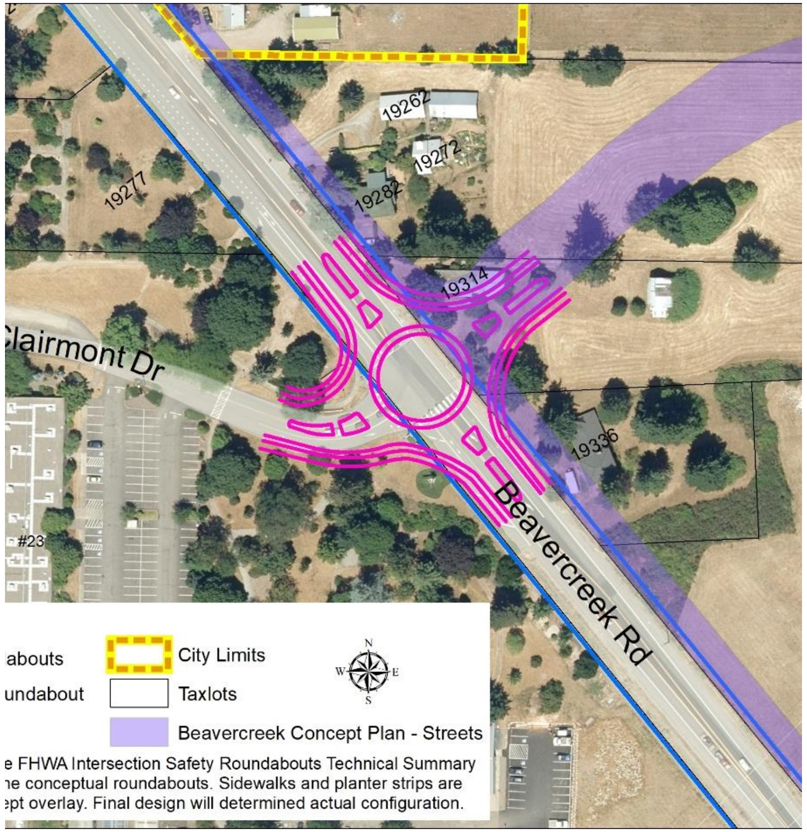


3- LANE ROUNDABOUT

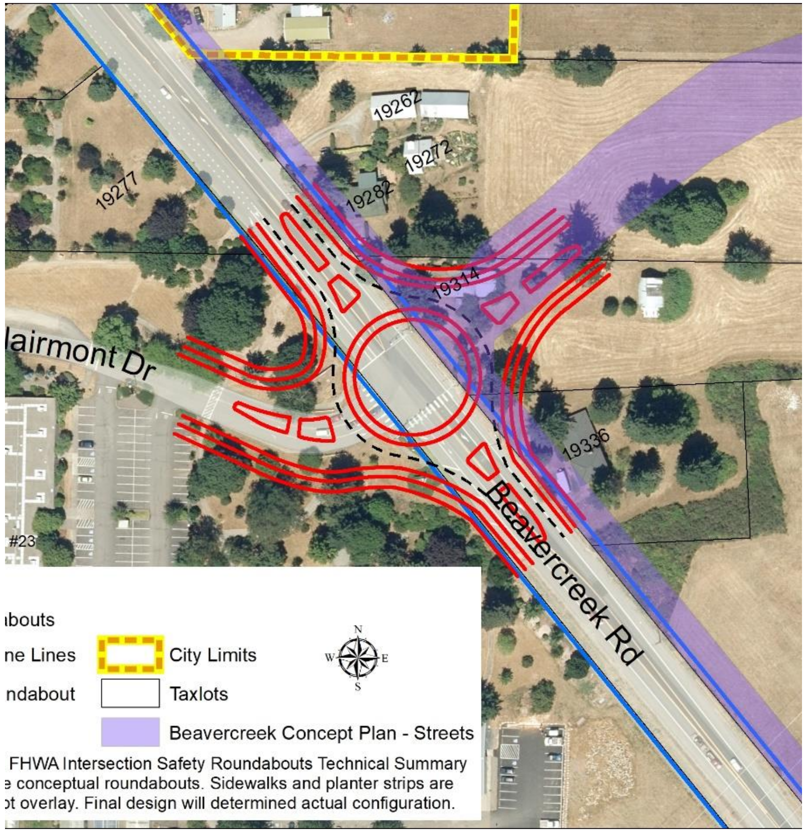


5-LANE ROUNDABOUT

Existing



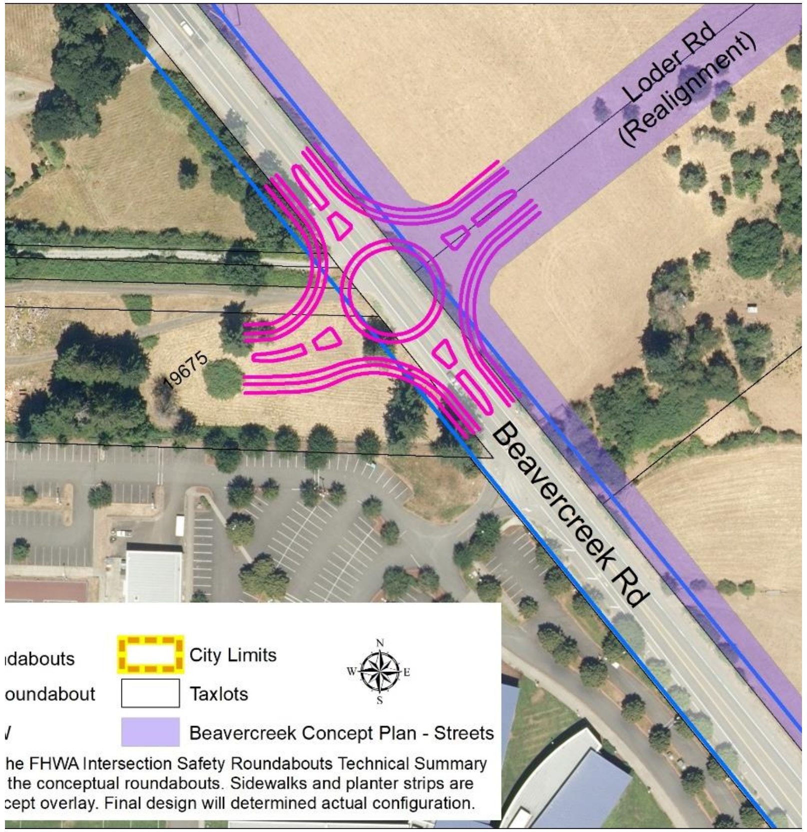
3-Lane



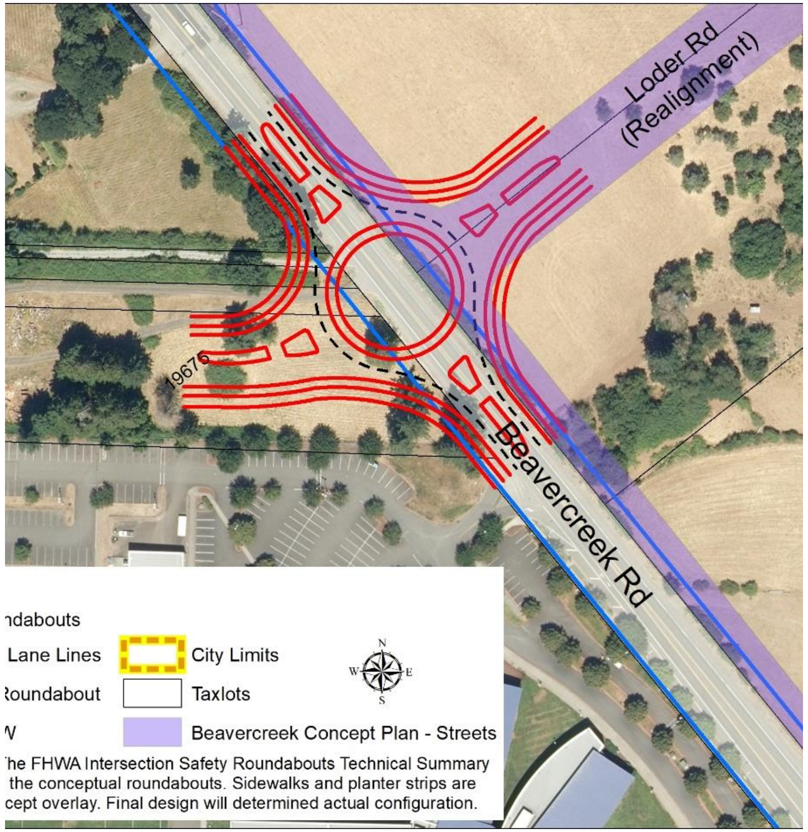
5-Lane

Clairmont Drive and Beavercreek Road

Existing

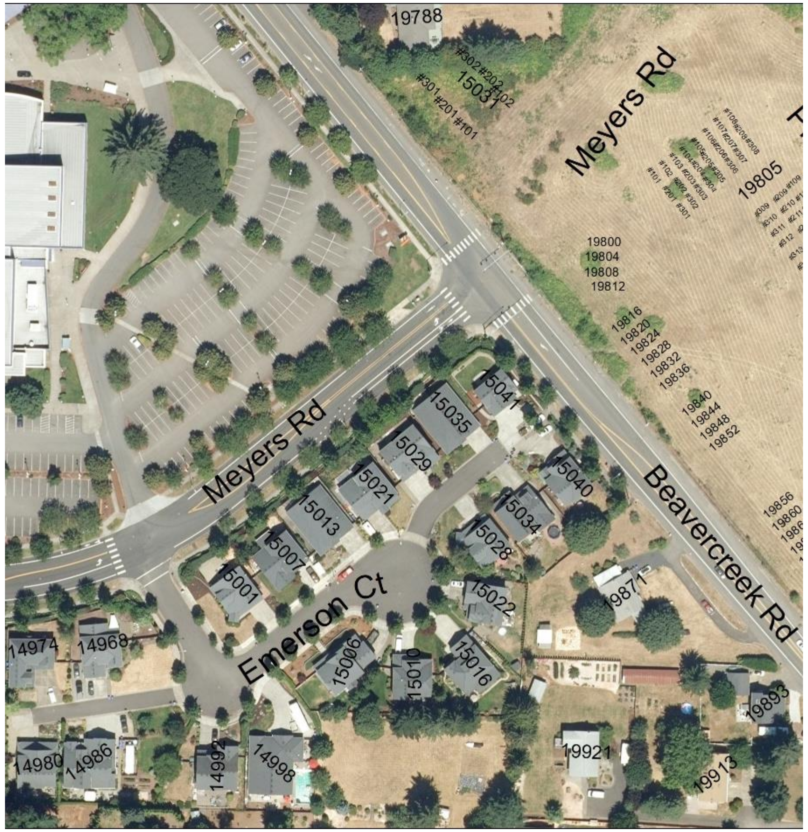


3-Lane

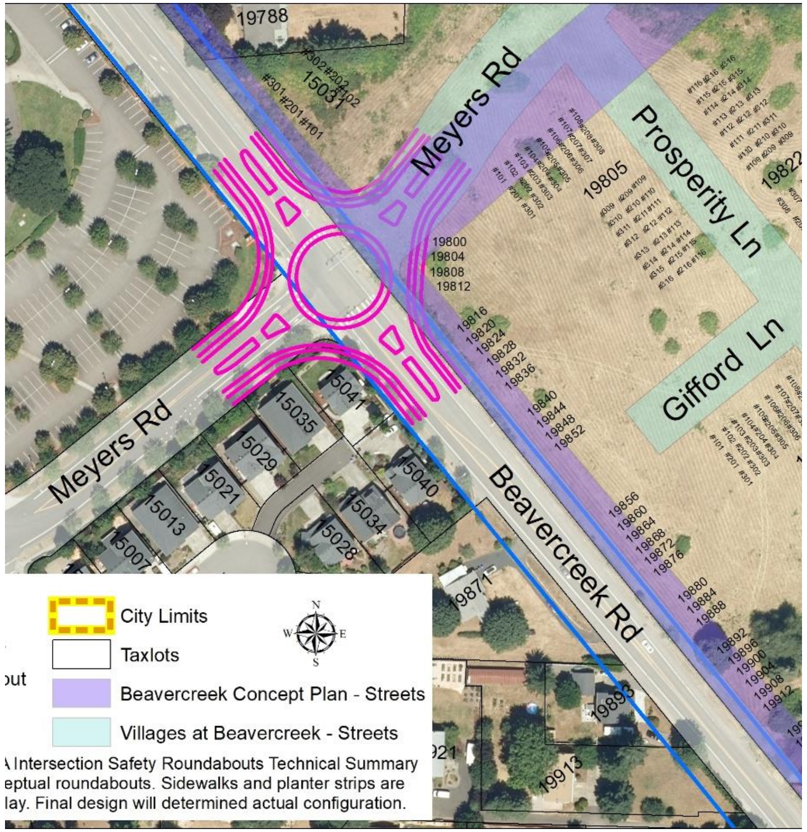


5-Lane

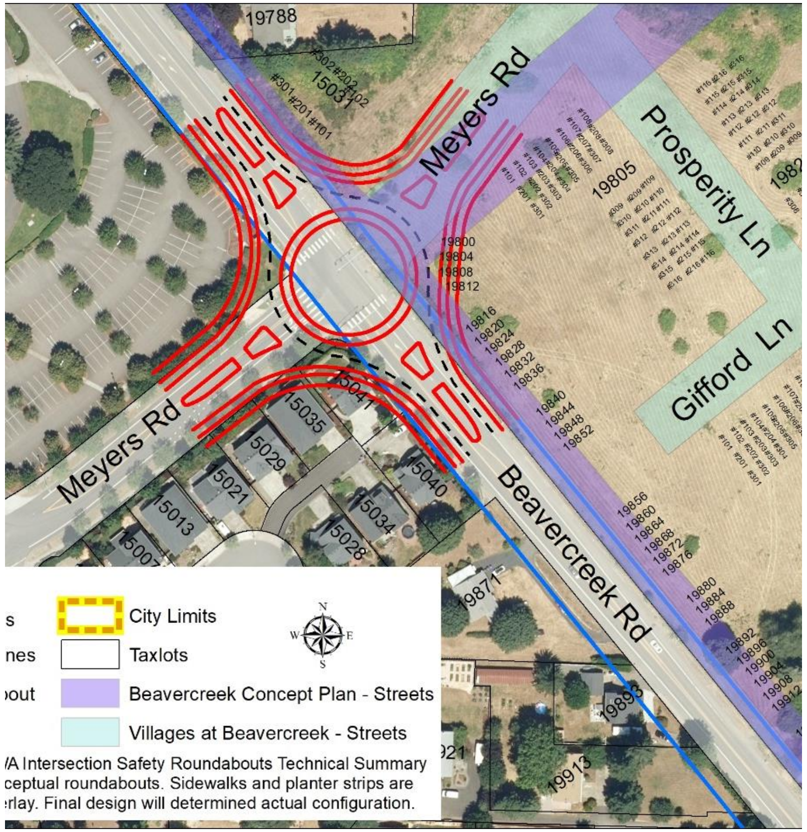
Loder Road and Beavercreek Road



Existing



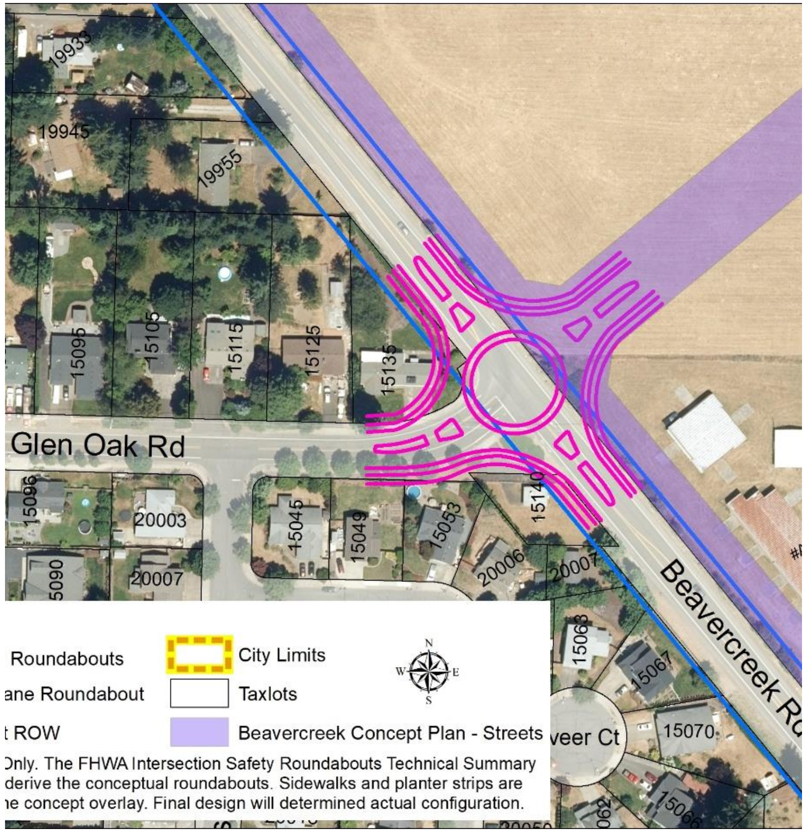
3-Lane



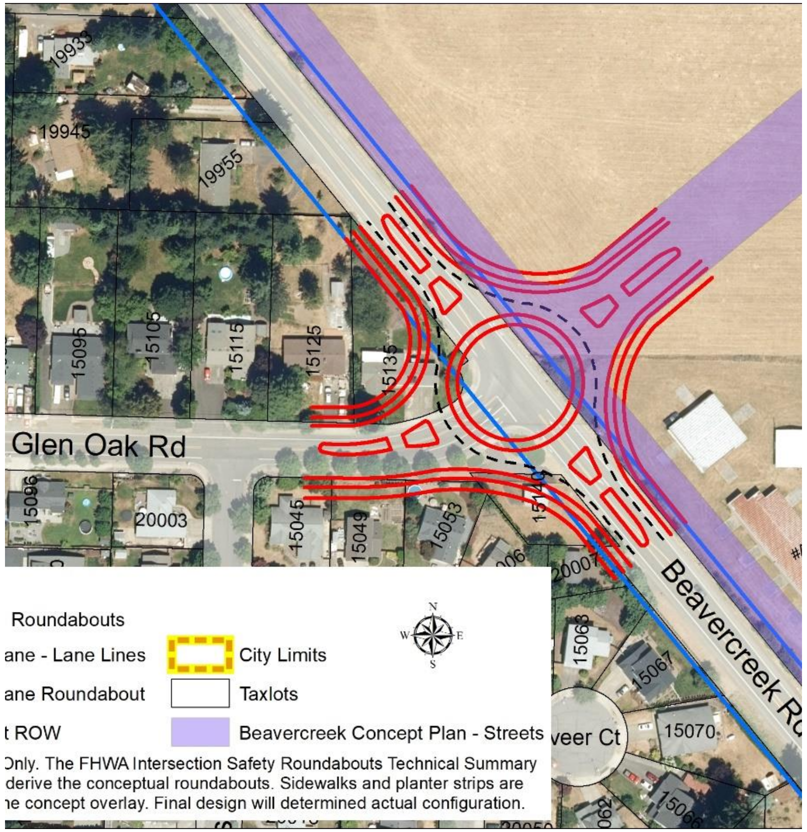
5-Lane

Meyers Road and Beavercreek Road

Existing



3-Lane



5-Lane

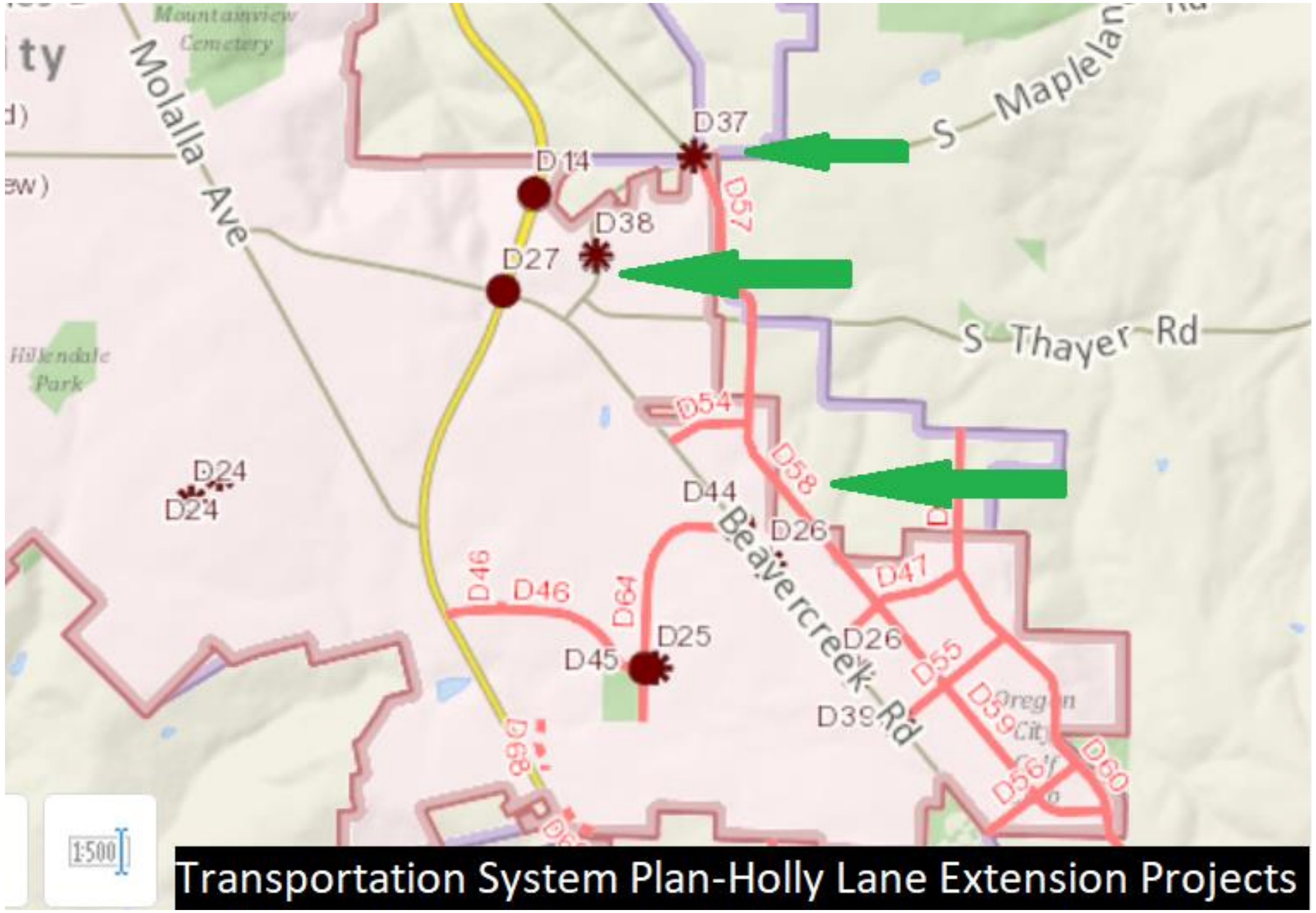
Glen Oak Road and Beavercreek Road

Conceptual Cost Estimates

Beavercreek Road Options	Adopted 3-Lane 90 feet wide ROW	Optimal 3-Lane Roadway 76 feet wide ROW	Optimal 5-Lane Roadway 100 feet wide ROW
Signals	$26M	$22M	$34M
Roundabouts	$32M	$29M	$48M

Holly Lane Extension-Alternate Mobility

- Removing Holly Lane extension projects from the TSP would require the City to revise the alternate mobility target and provide an alternate project that meets or exceeds the benefit of the Holly Lane extension.
- Staff is currently unable to identify an alternate project which is affordable and has not allocated funding or staff time towards the creation of such an alternative.
- The city must continue work with Clackamas County on the implementation of the Holly Lane connection and believes that the project is an important alternate route to the system to ease congestion in this area.



D37- roundabout at Maple Lane and Holly Lane
D83- Holly Lane -improve cross-section from Redland Road to Maple Lane *(joint County TSP project)*
D57 & D58 new collector road

Funding Large Scale Improvements

- Developer Funded
- Local Improvement District (LID)
- Urban Renewal
- Grants
- Area-specific Transportation System Development Fee (SDC).
- Jurisdictional Transfer

Staff Recommendation

How many lanes should Beavercreek Road be within the Concept Plan corridor?

A transitional section extending the existing 5 lane section near Maple Lane and transitioning to a 3- lane section at Loder Road.

Staff Recommendation

What type of intersections should Beavercreek Road have within the Concept Plan corridor?

Traffic signal

Staff Recommendation

Should the City renegotiate with ODOT to revise the Alternate Mobility Standard by removing Holly Lane connections from Transportation System Plan (TSP)?

No

Staff Recommendation

Should Beavercreek Road along the Concept Plan corridor be constructed by developers incrementally as development is built or pursued as a capital improvement project all at once?

The roadway should be constructed incrementally as development occurs.

Questions and Next Steps

Kattie Riggs

Subject: FW: Beavercreek Road Concept and Glen Oak intersection

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From: Debbie Riggen <dlhptown@comcast.net>
Sent: Monday, November 11, 2019 10:36 PM
To: Christina Robertson-Gardiner <crobertson@orcity.org>
Subject: Beavercreek Road Concept and Glen Oak intersection

Hi Christina,

My husband and I read with great dismay the letter and the concept plan for the Beavercreek and Glen Oak intersection. We own the house at 15049 Homestead Drive and the 5 lane roundabout especially concerns us as it appears you'd be taking a large section of our back yard and our neighbor's yards, leaving us with no enjoyable backyard space for our dog, and greatly diminished value for our house, as the road would be much closer to our house,and our lot would be significantly smaller. Even the 3 lane roundabout had impact to our property. We are concerned that with this plan, any future attempt to sell our house would be difficult and would have considerable direct financial impact for us.

As this is the more expensive option, and to be truthful, we do not see the value in a roundabout based on the traffic flow we see every day, we do not understand why this option is being considered. I can envision trying to go left on Beavercreek from Glen Oak using a roundabout where you can never even get a chance to get into the traffic flow safely, as the traffic entering the roundabout from both ends of Beavercreek is much higher than that from Glen Oak. I also can see a huge backup on Beavercreek as people try to get into the flow of the roundabout, which leads to impatient drivers cutting each other off to get in and the resulting fender benders or near misses.

In contrast, traffic lights have a definitive stop and go. You can have dedicated left turn arrows to allow traffic to safely turn left without an immense delay. And you won't have to cut my back yard in half and diminish the value of the properties my family and my neighbors own.

I would ask that the City consider the traffic light option and disregard the option for roundabouts in this particular intersection.

Sincerely,

Debbie Riggen

Beavercreek Road Concept Plan- Beavercreek Road Design Survey

October 24, 2019 to November 11, 2019

Transportation decisions often involve tradeoffs, knowing that price may be a limiting factor, what elements of Beavercreek Road are important to you?

	Very Import	Somewhat Important	Important	Not Important	Not Important At All
Pedestrian safety	106	20	32	4	3
Bike safety	77	30	37	11	8
Aesthetics/creating a sense of place	36	36	51	30	6
Reducing vehicle congestion	121	31	15	3	1
Ease of long term maintenance	54	44	56	10	2
Ease of crossing Beavercreek Road	70	39	37	12	4

Would you prefer using roundabouts or traffic signals along this section of Beavercreek Road?

Traffic signals 79

Roundabouts 93

Would you prefer seeing a 3-lane section, 5-lane section or a transition from 5-lanes to 3 lanes along this section of Beavercreek Road?

3-lane section the length of the Concept Plan boundary (Clairmont to southern golf course boundary)	48
5-lane section the length of the Concept Plan boundary (Clairmont to southern golf course boundary)	86
A transition from a 5-lane section to a 3-lane section somewhere along the length of the Concept Plan boundary (Clairmont to southern golf course boundary)	33

Tell us some information about you (click all that apply).

I am a resident of Oregon City	120
I am a resident of Clackamas County	116
I am a resident of the Caufield Neighborhood	38
I have a child enrolled in the Oregon City School District	49

(*Please note that the 1st 25 respondants were unable to chose more than once option)

Can you let us know what factors led to your decision (# of Lanes)?

The 5 lane transition would be a nightmare in congestion at the transition point. Oregon City residence have yet to absorb the zipper concept as you can see on Hwy 213 at Meyers.

Beavercreek needs a full 5 lanes for current and future traffic. Traffic only backs up when transitioning to fewer lanes. Learn from ORE 213.

Transition from 5 lane to 3 lane at Glen Oak. Most of the traffic on Beavercreek goes to the school and Glen Oak. If there is a round a bout at Glen oak and it transitions down to three anes going forward from glen Oak that would make the most sense. Trying to transition down to two lanes at the southern end by the gulf course would cause a major backup with the light at Henrici.

Overall traffic congestion improvements, including high school, CCC and daily commuter flow

Minimize the adverse impact that the overall Plan will have to traffic.
Due to the present and anticipated traffic volumes, vehicle left turns off of Beavercreek will be a problem. Referencing the experience with Molalla from Warner Milne to Division, when it was four lanes (with no center turn lane) rear end accident rate was high. The three lane section reduced that rate.

Also with 4 travel lanes it encourages drivers to "lane shift" to maintain a higher overall velocity.

1. The solution should respect the pre-existing through traffic that predates this concept plan proposal and even predates much south Oregon City development. Staff has on occasion called slowed traffic a solution -- the public does NOT agree; both neighborhood and regional traffic does not like wasting time nor wasting carbon dioxide in an inefficient transportation system. Slow downs also affect emergency vehicles like police, fire and ambulances and put people's lives in danger.
2. Cost should not be a factor as it is in the introduction "Every year there are more projects than budgeted funds." Really this statement means that the governments being discussed have not properly adjusted their System Development Charges for local and regional road improvements although Oregon law provides for both. Adjust the System Development Charges so that the road system is NOT degraded by this development. Growth should pay its own way. It should be a net benefit to the city. It should not require the subsidies and the life deterioration of the city's residents.
3. A 5-lane road, when needed, can have a "sense of place", a sense of beauty and tranquility e.g. if the landscaping is so construed.
4. If road speeds make bicyclists uncomfortable, as stated, (and many unwilling to bike), then the bike lane separation needs to be increased (whether by a greater distance or by a hump or curb or whatever it takes) especially in this area where cycling is supposed to increase.
5. Ordinary speakers of English interpret the City Comprehensive Plan and Code to require that "livability" in the city is protected; this potential development should not make life more inconvenient nor time-consuming or hazardous or frustrating or unpleasant for road way users.
6. Road way users should not have the continuous feeling that the road is over-crowded, over-capacity, that

they are put upon, that life is annoying frustrating, a headache, that the city staff didn't do their job, that they should throw them all out. The traffic experience should not even be noticeable "livable" so the person can focus on the rest of their day.
7. The Oregon City Code provides for 5 lane roads for major arterials for a reason and that reason is valid here. Unless necessary I don't see the need for five lands across the entire plan. If the traffic demand increases I would expect the plan to be expanded to be all five lanes. Having five lanes I would expect to have less congestion as there's no flow restriction other than the traffic light.

Reduce speeding

I am fine with either a 3 lane or 5 lane as long as the idea is also for long term growth in that area and the ability to allow cross streets like Glen Oak to be able to turn and sidewalks for pedestrians.

I used to live near a four lane road. That one was changed to one lane in each direction, a center turn lane (and bike lanes.). Traffic, surprisingly, moved better after that change as the left turners we're out of the way.

I would not like to see Beavercreek become a high speed highway.

It sounds as if the traffic studies completed do not recommend a 5-lane cross section. This seems overkill, especially given the future transportation projects mentioned above. I do feel that the posted 20 mph speed limit during 7-5 p.m. on school days is one of the major causes of congestion. I also think that a traffic study that is 11 years old, should be revisited and refreshed before making a decision. Perhaps the High School speed zone can be reevaluated when the study is revisited?

It seems like it would be confusing to transition the lanes from 3 - 5 lanes.

There would be better visibility with 3 lanes, and less potential for accidents.
the current traffic loads at 630a-8a and 3p-5p can be significant between 213 and Henrici and if more traffic is going to be dumped in this area more lanes are needed

I have a bias toward prioritizing bike and pedestrian facilities and safety. 3 lanes is ideal for a safe road that is a real destination rather than a stroad.
Too busy as it is right now. Traffic congestion will increase shortly

traffic is already a problem by the high school to 213. The number of vehicles joining the traffic flow from the new development will make it impossible to get to 213 in the mornings without several more lanes including merging lanes onto 213.

from OCHS to Hwy 213 needs 5 lanes with all the growth planned in that corridor.
Having to wait 30 - 45 seconds for traffic to clear during morning commute hours and having to be in long lines of cars and missing traffic lights (chiefly at Meyers Road). And I remind you, that this is BEFORE any development of businesses or retail stores in the Thimble Creek Business Park. Why did Kruse Way in Lake Oswego have to be 5 lanes? I submit that it was because it was a main throughway from I-5/Hwy 217 into Lake Oswego. Beavercreek Road is a similar throughway.

Build for the future not the next 10 years.

Less land used and less traffic

Mostly DON'T want a transition from 5 to 3 lane since it creates such a bottleneck and as a resident of the area already have to deal with that on 213 which is most unpleasant. If a protected ped/bike lane is incorporated and other improvements are actually made such as the free flow right turn lane,this might be enough.

I don't think 5 lanes are necessary the entire distance given the increased speed issue stated in your concerns above and with the Myers Rd adjustment, there should be alternate routes to get where you want to go. I am all for promoting walking and biking!

Traffic is already at a standstill during main commute hours

Please see my additional comments. I am concerned that there is little language in your plan thus far to include making the area a neighborhood that is not only safe but enjoyable to walk and bike around. With the parklike setting of CCC and the high school fields, you should consider ways to provide community walking access across beavercreek road.

Making a compromise between traffic congestion and the cost of construction and maintenance

This section of Beavercreek has substantial backups in peak hours due to the lack of lanes. This could prohibit freight along this corridor. A 5 lane section will provide opportunity for freight. It may be reasonable to transition to a 3 lane road at some point depending on projections that a traffic consultant could provide.

Increase density with apartment, truck traffic, bike and walking paths

I guess I need to leave that to the traffic experts.

Threat of even more than current congestion.

Consistency seems to help the flow

OC is not going to stop future growth along BC Rd. There are no other access roads to get to 213 from Beavercreek due to topography and existing housing. This road will only get busier. Build it out for the future, not just for today.

Since I drive daily on Beavercreek Road and time my driving to avoid school congestion, I believe the road from Clairmont to Glen Oak really must be five lanes wide. South of Glen Oak towards Henrici there should be a transition to three-lanes. The right-of-way there seems to be adequate for future expansion if it become necessary. The 20-mile-an-hour speed limit in front of the High School during school days significantly hampers traffic on Beavercreek Road. The bottlenecks on Beavercreek Road occur at Meyers Road during school hours (7am to 5pm) September-June, and at Marjorie Lane north of Clairmont due to stacking at Maple Lane and Highway 213 in the mornings, from 7:00 to 9:30 am all year. I have lived here for twelve years and do not witness excessive speed on Beavercreek Road, except when school lets out and the teenagers are turned loose.

A 3-lane section could reduce the amount of total traffic that uses Beavercreek Rd. A 3-lane section will also allow for more space for sidewalks and bike lanes improving the overall safety of the corridor.

Do not want more people driving along here. Want pedestrian, bike safety (alternate transportation than cars) to be safe. Would like better shoulder especially by the golf course but not more lanes. More lanes are much more dangerous for pedestrians and bikes.

As a cyclist and pedestrian, a 3-lane section is safer for me than a 5-lane section. The 3-lane section is also safer for all other road users. While motorists may think widening the road to a 5-lane section will speed up their trip, induced demand has shown repeatedly that the long-term result of widening the road is a similar or worse level of service. Please do not widen the road to 5 lanes!

Whenever there is lane merge/reductions traffic congestion's and if we can mitigate the reduction more smoothly traffic will flow better.

Building for the future, not for right now

Seeing what works

I don't want to see any more left hook pedestrian fatalities. They are life changing events and we can not have any more simply because people fear change.
Construct as 3-lane but allow room for future 5-lane development as growth increases.

the transitions can be tricky for traffic backup....ie, the "Zipper" on 213.

This is a busy road and congestion is a problem.

This is a busy road and congestion is a problem.

I would prefer that any roads be over-built for the plan rather than having to be redone in 10 years so my initial thought was the 5 lanes all the way but it seems silly to go from 5 lanes to two so a gradual transition seems best.

Plan for the future! As the area develops be prepared for the increased traffic/congestion
Agree that more lanes, while convenient, would lead to more people choosing that route. Let the new upcoming road connectors take care of the congestion.

Because the more lanes the better. Transition lanes just creates back up and bottlenecks. OC is already getting crowded.

Portland epitomizes how to underlane development. Thats all the evidence needed. Take a look at Division st, Holgate Blvd, and so manynother examples. Don't do that.

Beavercreek Road is already very busy and traffic is horrible around the time I pick up my high school student. Having more lanes would help with the congestion of cars.

I would like to see more consideration on Hwy 213 improved flow. If Beavercreek Road is changed to a 5 lane road then it will become the desired route instead of Hwy 213.

I think 5 lane at least to the high school. Traffic decreases south of Myers Road, so could go either way from there.

The new developments in the BCDP will lead to higher population density in the planned area. In addition, Beavercreek Hamlet is also increasing in size with new developments. This section of road will be utilized heavily in the coming 10 years and we should reduce overhead of continued expansion projects by getting the appropriate intersections and lane sizing correct during this initial project. I believe a 3 lane or 5 to 3 lane convergence will need to be upgraded in less than 10 years and the overall cost at that point will be larger than just doing it now.

No feelings.

Provides opportunity for dedicated left and right turn lanes to allow through traffic to be maintained.

Growth will happen, plan for it now.

The area is already congested and backs up from the light at 213 in the morning. More lane options would allow better flow.

this would likely cause more congestion than 5 lanes, but would slow people down and make it faster to cross at crosswalks.

If you go 5 lanes, then it's going to be a bottleneck at the golf course to go back down to less lanes. I live in Beavercreek and would prefer not to have that.

More road and possible bike lanes
Property backs to Beavercreek road in the noted area. Preference to not reduce green spaces between home and road

The 5 lane section will help the most busy area which would allow traffic to better flow through. However, The city has to account for the new business park to get a lot more traffic. Commercial as well as the new residential building on the golf course will warrant 5 lanes.

Speed! Traffic rips along Beavercreek now, I can only imagine how it would be with 5 lanes. How would 5 lanes impact the 20 mph at the High School. Doesn't sound again very bike or pedestrian friendly.

Merging into less lanes causes accidents and slows traffic down even more.
I visualize future grow down Beavercreek Road and if not now, in the future a need for a 5 lane road. If we reduce the road to three lanes at the end of the golf course it would be expectable and future expansion could be added when and if it becomes necessary in the future.

hope to avoid bottlenecks like the one at Meyers and 213 which is a daily occurrence

Traffic is getting heavier and needs more lanes.

It seems to often cities start with the 3 lane, and down the road they need to add lanes. the community is growing fast, development in the proposed corridor, plus the growth outside the city limits warrants a need to move more traffic from point A to point B with less congestion and back up of traffic during rush hours. Single lane with turn lanes backs traffic up for blocks, which tends to irritate drivers and make at times for unsafe conditions.

We need to create enough capacity in the Beavercreek Road Design Plan, that eliminates any and all justification for directing traffic (incidents of travel) in any way to Holly Lane. Holly Lanes cannot be improved to meet the standards of a major arterial, going through multiple known landslide areas. Additionally, incidents of travel are growing exponentially fast east of the Beavercreek Plan area at this time, where a 3 lane Beavercreek Road would have an inadequate capacity as soon as it was built. I have been on the Clackamas County Transportation Commission as part of creating their TSP.

More lanes just make things more complicated

Want to keep traffic flowing but do not want to induce demand for more traffic on an already congested road. An very worried that reading will increase to the point that area becomes unlivable. Do not want to lose the rural/natural areas of Beavercreek road.

I don’t want to see Beavercreek road speed up.

No note, just opinion

Expected volume of traffic

Volume of vehicles at slow "School Zone" speeds.

Turning left from a street that isn't at a light is way better with 3 lanes than 5. As long as cars can pull to middle to wait to turn left, it would be better than current.
Traffic congestion currently.

the definitions of roundabouts and number of lane explanations.
Traffic is already heavy along Beavercreek Road. 5 lanes with traffic signals would move traffic well.

Long-term costs. It will only be more expensive to expand from 3 to 5 lanes in the future.

While more complex, I have seen them in place in other areas of Portland and they are functional while allowing more traffic.

Better traffic flow and works with existing roads near 213.

Volume forecasts for Beavercreek Road, especially south of Clairmont, do not warrant a five-lane cross-section, which would significantly reduce safety and ensure the long tradition of car-centric neighborhoods in Oregon City. There are schools and parks west of Beavercreek that should be accessed by families that walk or bike from the new neighborhoods in the concept plan area.

Less pavement is better.

Take a drive on a school day at 7:45am on beavercreek rd starting at the college and driving south. Let me know what you think. It would be great to have that insight when planning your design. Don't let a builder go in and permit him to design a parking lot like oc point. The parking spaces are too cramped.

I've experienced near accidents in 5-lane section roundabouts and think that the 3-lane would be safer and more cost effective all around.

Creating a large shoulder for five lanes would be a happy medium to allow for future expansion to five lanes and start with three lanes the entire length to see how it goes and lower initial investment cost of improvements.
Plan for a 5-lane section regardless in terms of right-of-way. Build a 3-lane section where possible if cost is a factor.
Build to road you need for the future today vs going back an widening it later when the Hamlett of Beavercreek becomes the next area to boom.
5 lane has to be very expensive. They would encourage high speeds.

It would add unwanted congestion if traffic went from 5 to 3 lanes...example is the 205 congestion's OC bridge!
at th
Hopefully, a transition back to three lanes would be help to some extent to keep development from spreading further towards Beavercreek.
as stated above.

Traffic flow is important.

My kids going to OCHS. Traffic is already bad there at drop off and pick up. I don't want my kids sitting forever in cars waiting to get to and from school.

"the great intellectual black hole in city planning, the one professional certainty that everyone thoughtful seems to acknowledge, yet almost no one is willing to act upon."

3 lanes is just going to extend the morning backup that already exists from 213 back to CCC each morning.

The increased speed issue is more important than the congestion issue.

There is sooo much traffic using that corridor now that a round about would not necessarily, in our opinion, allow for merging in a timely manner to facilitate movement of the less than main traffic flow. And the pedestrian/bike traffic would not necessarily be safer using this area.
Necking down lanes only backs up traffic needlessly.
Ease of driving

We need to think we'll into the future. 5 lanes are needed. If there's a transition then there will be bottle necks.

Obviously with what is planned, Beavercreek will need to be widened, but it should be done incrementally with development and structured to impact the fewest current residents.

For the amount of construction/congestion being proposed, a 5 lane will be needed in order to keep traffic moving... THAT IS ONLY IF THE HWY 213 AND BEAVERCREEK ROAD INTERSECTION IS FIXED WITH A GRADE SEPARATION. Otherwise 5 lanes will go to a bottleneck and not be helpful at all.

I think consistency is important and reduces confusion.

Can you let us know what factors led to your decision? (Intersection)

There is too much traffic passing through on BC Road and the round about is going to cause congestion. Beavercreek Rd has far too much traffic and delays already, only to install more traffic signals that back up traffic more than it is already.

More traffic lights on beavercreek will not ease congestion, will only make it worse.

Continuous flow of traffic; better flow on stretch between Henrici and Clairmont intersections

Constantly moving traffic.

pedestrians and bikes are slower and need more thought to allow their movement safely across and along the streets.

Roundabouts are not good for this area because 1) they seem more for local traffic as they slow things and they don't respect pre-existing through traffic; 2) make the travel distance longer which people-powered transportation cares about; 3) this area is supposed to increase walking and bicycling; 4) they are confusing and unsafe for pedestrians and bicyclists and the pedestrian feels lost and wants to walk the shortest distance (across the island) and many people are kept from biking by the thought of having to mix with traffic.

I find roundabouts to be effective at reducing congestion and increases driver alertness to yield and look for cars as well as pedestrians.

Roundabouts, as used in Oregon, appear to reduce congestion and are more pleasant than traffic signals. However, for very high traffic flows, roundabouts appear to increase congestion in my experience. Roundabout also are more aesthetically pleasing and encourage a greater sense of community.

I am having a hard time visualizing the roundabouts along Beavercreek with so many driveways. Also, there is so much traffic on Beavercreek that there are times that I can't turn in either direction (also slightly hard to see cars coming from high school towards Henrici because of where the stop line is) for quite some time. If Beaver creek is backed up because of the High School, no one will be able to turn left from Glen Oak to Beavercreek with a round about. Also, there needs to be more of a connection sidewalk for pedestrians. I have seen groups of

High Schoolers running along Beavercreek for track or cross country training and there is no sidewalk or safety space.

Experience with roundabouts. Lights are safer for pedestrians and bikes and easier for drivers when traffic is heavy. If we add the number of people in the plan area to what we already have, we will have heavy traffic...at least at certain times of the day.

Creating a sense of place and 'parkway' feel to Beavercreek Road would be desirable via a roundabout instead of traffic lights. I do have concerns about how pedestrians and bicycles are safely incorporated into a roundabout design. It almost seems as if these two components should be separated from a roundabout design by providing a wide, multi-use path/trail that stretches from the southern extents of the concept plan (S Old Acres Ln) to at least Hwy 213. It could connect to the future Newel Creek Canyon, to other amenities and natural areas within the City, eventually to downtown and the Willamette Falls Riverwalk via the Oregon City Loop Trail!

In some ways the roundabouts seem safer.

the current traffic loads at 630a-8a and 3p-5p can be significant between 213 and Henrici.

I have a general belief that roundabouts are more effective all around. I would defer to experts though.
There is presently very little to no pedestrian or bike traffic. Driver ease is better with traffic lights. roundabouts require very more concentration of surrounding traffic.

really might need both what with all the school bus traffic around OCHS.

This is a main throughway (along with Hwy 213) for residents living beyond Henrici Road. Roundabouts are fine on feeder or back road intersections, but not on main throughways - they slow down traffic way too much.

TIMED lights would be appropriate. Keep them few, but of longer length (i.e., only 2 or 3 main intersections with lights, but make them so many cars could get through at the rush hour peaks); If you have 5 lanes (with a turning lane) commuters should be able to use the turning lanes without impeding traffic flow.

Future growth and inclusion of urban reserves first to UGB and then to the city to the south of Beavercreek concept plan will only increase traffic flow through the concept plan. Build for the future not now.
Roundabouts take up more land.

I would like to see both. Pedestrian safety by the high school is hugely important and roundabout would not address this, but may be better for traffic flow. If current signal at Meyers Rd is kept for busses and residents of Glen Oak to get in and out but put roundabouts at other road crossings
Roundabouts keep traffic flow moving and I would like to see more infrastructure encouraging walking and biking.

in your own words:
"In general, multi-lane roundabouts are not recommended in areas with high levels of pedestrian and bicycle activity because of safety concerns of multiple threat crashes for pedestrians, especially those with visual impairments, and bicyclists."

with the high school adjacent to Beavercreek Rd there will be a large number of pedestrians and bicycles along the roadways during school hours especially if the new complex will house restaurants and coffee shops.

We have got to plan ahead beyond the next ten years towards a time when more and more people will need to walk and bike places. Pedestrian safety is our future, but also our present. I am a daily walker, jogger, who often must cross traffic at bad spots or be on the road without a sidewalk or bike lane. Please plan for people like myself, and plan for the future and make this a neighborhood area that will attract people who want to live and walk and bicycle here!

Safety for non-motorized travelers is important to me.

A roundabout will negatively impact freight which is necessary for economic development and jobs. Beavercreek is a road that should have as much through traffic as possible without delays. With the amount of crossings that may occur between potential residential, school and jobs - pedestrians will have safety issues with roundabouts whereas they will have signalized safe opportunities if signalized. Roundabouts do not provide proper safe crossings for bikes or pedestrians especially in heavy traffic volume or speeds which Beavercreek will have.

Power outages and maintenance

Need to slow traffic at intersection

Safety - though you can't put. crosswalk on a roundabout, can you?
Clarity of a signalized intersection is needed for safety especially considering inexperienced High School-age drivers ... in cars & on bicycles; & pedestrians, too.

5-Lanes on Beavercreek Rd is absolutely needed to address congestion of future area development growth, College & High School traffic, & much more attractive to prospective buyers of commercial property in this Beavercreek Rd Concept area.
More attractive and has a community feel

Roundabouts allow for ease of traffic and reduce speeds. Pedestrians will still be able to use the crossing at Meyers Rd to get to/from HS and any shops across the street.

I drive regularly up Stafford Road through the roundabout at Borland Rd. I very rarely encounter excess vehicle stacking at that site. However, the roundabout at Stafford and Rosemont seems to be always difficult to negotiate. At peak times between 3:00 pm and 6:00 pm the traffic headed north on Stafford Road can be stacked up past Johnson Road to the south. This occurs because the majority of traffic coming south on Stafford from Lake Oswego/High School area has priority traveling west to Rosemont and the West Linn housing/business area. Traffic going north on Stafford simply sits waiting for a break. I see this exact problem happening on Beavercreek Road at /Henrici/Glen Oak/Meyers/Loder if roundabouts are used. My driveway onto Beavercreek Road is between Meyers and Glen Oak. I sometimes have to wait up to 4-5 minutes to get a break to turn north. Without the traffic lights moderating the flow, I might never get out. With a roundabout at Glen Oak, I am assuming there will be no option to turn north out of my driveway and I will be forced to turn right to go around the roundabout in order to continue north. This would be exactly the problem at the Stafford/Rosemont roundabout.

Traffic signals will allow for safer pedestrian and bicycle traffic. Will also allow for safer methods to cross Beavercreek Rd. especially in the school zone at the high school.

I do not like roundabouts. I don't think it would work very well on Beavercreek Road because there is too much traffic.

A well-designed roundabout can improve safety, operations and aesthetics of the intersection.

Round abouts work better.

Roundabouts are much more efficient for vehicle traffic and would reduce congestion
Roundabouts work very well in Central Oregon

It is already congested Trying to go from 213 to Glen Oak on Beavercreek Road. We need more lanes to help the congestion. Need more lights, especially a light or a roundabout at Glen Oak road. It is going to be difficult to get out with the increased traffic

As a world traveler I see fist hand the tremendous safety inherent to roundabouts. They all but eliminate fatalities both traffic related and pedestrian. There is a misconception of confusion associated with roundabouts but they are quickly adapted to. Fear and an anxiety should not be factors associated with road design. The citizens need good leadership and part of that is designing what's best for the citizens.

A 5-lane roundabout seems confusing and would create accidents.

They work well in western Washington County and in the Bend area.

Close to Highschool, so less need to slow down traffic in addition to school zone. Do need access to Beavercreek to Glen Echo signaled for safety.

Traffic signals i feel are a better option. They're less confusing and people usually know how to navigate them.

It's bad enough when people run stop signs and signals. Can you imagine what they'll do when faced with a roundabout!?! The average driver is not accustom to roundabouts, so be ready for more accidents then normal.

It would really depend on what type of building there will be across from the high school and CCC. If there will be only houses, then most people will use their cars to get places and roundabouts would be better. But if it is going to be mixed use buildings ie mostly houses but some businesses, small stores, fast food places, then lights would be a better option because of the pedestrian traffic from the schools and houses.

roundabouts keep traffic moving reducing backups
Experience driving that road, and experience with roundabouts in other areas.

When people know how to use roundabouts they ease waiting and keep the flow going. It's just a steep learning curve and with a lot of new drivers along Beavercreek due to the HS some community education needs to happen.

Because there is always flowing traffic. Beavercreek Rd & 213 get too backed up ie signal lights. In my whole driving life I have never seen a backup through a roundabout. I have also never seen a crash at a roundabout. They are safer.

Roundabouts are remarkably efficient and convenient. Traffic flows constantly by design as opposed to lighted intersections. Having driven through western Europe, I am a roundabout fan.

Roundabouts are confusing sometimes on which way you can turn. That could slow down traffic even more on Beavercreek Road.

The traffic now on Beavercreek road is very congested in the AM and PM commutes. The right turn lane from Beavercreek Rd to Hwy 213 should have a lane to merge which would reduce congestion in the area. Also the left turn from Hwy 213 onto Beavercreek Road is dangerous in the commute as the left turn onto Maple Lane backs up onto Hwy 213. These items should be addressed before adding additional traffic on Beavercreek Road. The Loder Road area is currently unsafe and if additional traffic is added it will need to be addressed with a stop light and turn lanes. Also, many people use Beavercreek Road as Hwy 213 between Clackamas Community College and Myers Road due to the traffic on Hwy 213 which is heavily congested during commute hours. If the lane that ends at Meyers Road were extended out to Leland Road your traffic flow would be much better and reduce the need to use Beavercreek Road. If you choose to increase the number of lanes on Beavercreek Road then careful consideration needs to be made around the High School area. I have witnessed too many close calls with Pedestrians as people do not adhere to the school zone in that area. Additionally, it is dark in that area during the Winter and visibility is poor.

Pedestrian and bicycle safety. There are many kids in the neighborhoods along Glen Oak and also more coming with the new apartments that will be built across the street from the high school.

Roundabouts provide a smoother flow of traffic, are easier to maintain long term, and are more aesthetically pleasing. Additionally, roundabouts REDUCE the types of crashes where people are seriously hurt or killed by 78-82% when compared to conventional stop-controlled and signalized intersections, per the AASHTO Highway Safety Manual. Given these statistics and my priorities, roundabouts make the most sense for Beavercreek road.

There will be no broadside impacts since all the traffic will be going in the same direction. I like the idea of landscaping. Traffic flow will have to be slower too.

It doesn't seem that development will have frontage focused on the highway. While peds and bikes will use Beavercreek Rd., this area is not really a town center, even with the High School, that would generate an abundance of ped traffic.

You have young teen drivers in the area getting to the High School. Traffic lights are less confusing which would then make them safer.

I've experienced the positive effect of roundabouts. I think they are the best choice.

Flow of traffic is more efficient and the there is already so much congestion near the Highschool.
Less waiting around with a roundabout.

I have used roundabouts and have found them to provide smoother traffic flow.

You get such crazy people that don't understand roundabouts and they don't yield correctly. I think it would cause more accidents, especially the two lane ones.

Roundabouts are so successful in Europe and I would love to see more here
Smoother transition

I feel that this section of BeaverCreek Rd is way too busy for a roundabout. I would be very concerned about pedestrian safety and cyclists on the road.

I believe there is too much traffic on Beavercreek Road for a roundabout. I usually turn left from Glen Oak onto Beavercreek. It would seem that the roundabout would only take one car at a time entering the roundabout to turn left. That car would have to wait for traffic before entering Beavercreek Road. I think there would be a back-up of cars on Glen Oak. Also this is supposed to be a bike and pedestrian friendly development, but roundabouts are not friendly for them.

More signals mean more traffic back up! Roundabouts makes traffic move better.

Pedestrian traffic crossing Beavercreek Road safely is a real concern with the development of a downtown area across from Glen Oak. I see many on the West side of Beavercreek Road walking to this downtown area and I believe a signal would be a safer crossing. Other intersections may work better with Roundabouts.
long term maintenance and power outages affecting signals

Ease of travel.

I agree that traffic signals will move more traffic at a given time and with heavy traffic people tend to be confused with roundabouts, there not sure when to yield, stop, or go, which then creates a slow down or back up.

Roundabouts are far too expensive, take up too much land on critical corners and reduce their value and ability to develop them. New traffic lights are becoming more affordable and more reliable. Traffic Lights work better and are less problematic for emergency vehicles. Pedestrians have a better and safer route crossing intersection with traffic lights.

There is already so much vehicle congestion and the use of roundabouts can help eliminate that traffic.

Roundabouts improve traffic flow

We lived overseas for four years and roundabouts keep traffic moving. (One is needed at Glen Oak onto Beavercreek. I don't know how those residents get out at that intersection)

The teenage drivers and community college young adults are not mature or experienced to responsibly operate roundabouts, additionally it poses a risk to pedestrians. My husband also added the the high schoolers will probably make a game of the round about practicing drifting and other reckless maneuvers

Expected volume of traffic

There is already a school zone for the High School, so traffic is already slowed. 5 lanes would be preferable.

I was originally thinking a light at Glen Oak would be better, but I think a light would back traffic up even more so. Exiting Fairway Downs subdivision is going to be difficult enough without a line of cars. Maybe a roundabout will keep traffic moving. I do think that the morning commute and the evening after work drive is going to be especially affected.

For pedestrians, this is a no brainer. Intersection for sure. I wouldn't allow my preteen to cross a roundabout by himself!

i have a current high school freshman and an incoming freshman in 2 yrs. They will be traveling on Beavercreek a lot.

Lots of high school kids walk home on Beavercreek Road -- needs to be safe. Traffic signals seem safer for the kids.

It is contradicting to say that roundabouts are more aesthetic with landscaping, although large trucks have to drive through the center area. I think this is a nightmare for large trucks. Also, many people do not stop at a roundabout and it is dangerous for the car behind you as they may hit you if you cant get in (having to yield) also, during high traffic periods, it could become very difficult to get into the round about.
1. Saftey
2. Environmental impacts; air quality, fuel consumption, etc. not mentioned above.
3. Long-term costs

Roundabouts remove the 'straightaway' where cars race up and down Beaver Creek road today.
With the existing signals I believe they could be synchronized. and take up less land.

I would not make a blanket recommendation for one or the other at all major intersections along the route. Selection should be location-specific.

Do less transportation planning for cars and more planning for people and bikes. Roundabouts keep traffic moving but also tend to be fairly pedestrian friendly when designed with pedestrians in mind.

Experience.

Put a school traffic light on beavercreek rd like the light on molalla ave by carus grade school slowing traffic to 20mph in the morning when children are arriving and afternoon when they're departing. The old high school had many drop off sites on every side of the building and never a wait to drop off students. The current high school has always been a congested mess when dropping off or picking up students and is the main problem of congestion on beavercreek rd. More entry and exit choices around the school and a driving route thru ccc from beavercreek rd to ochs for student drop off and pickup. Take some of the lawn out between beavercreek rd and the high school and add additional space for cars to pull in to drop off students

Roundabouts cause traffic because of unfamilar with merging.

To encourage free-flowing traffic and fewer delays.

Long term vision is important to me. If there are fewer lanes to begin with, can we plan for the additional lanes in the future with ease of making improvements?

Aesthetics are important as visual appeals brings pride in community and creates a culture of positive reinforcement. Safety for pedestrians and bicyclists can be achieved with great visual appeal.

Roundabouts are a better long term solution with better aesthetic appeal and no left turn safety concerns. A roundabout also requires less maintenance than timing traffic control devices.

Roundabouts keep traffic moving and does not hold up vehicles unnecessarily.

Move the traffic and make it happen. Roundabouts work great, people just need a little time to figure them out.

Traffic flow, less major crashes, safety

I feel round abouts lessen congestion and do keep speed down

Prior experience with roundabouts

It will allow ease of traffic during peak times of student release from CCC ond OCHS. Also possibly reduce the speeding of teen drivers which is very common.

I believe the cons outweigh the pros

Better flow

Experience.

Roundabouts will be too expensive and will require the city too condemn property that is integral to the land use component of the concept plan.

Lights cause unnecessary delays.

Because of the high school, there are MANY first and second year drivers using this exact section of Beavercreek road daily. Any changes to the area need to take student safety and ease of navigation into consideration.

I feel much more safe on single lane roundabouts than I do the double lane roundabouts.

I feel the roundabouts are much safer than traffic signals.

Roundabouts, hands down handle traffic congestion better than traffic signals. Traffic lights only back up traffic, in some cases to the point of traffic grid lock. Case in point, Beavercreek Rd & HW 213 intersection.

Roundabouts do not work. Look what happened to the 213 road at the bottom of the hill leading to the hardware store. Heavy traffic and people afraid of the situation of using a roundabout. Not the way to go.

Have you driven this section of road at peak volume? A Round-about will slow things down you say. There needs to be a solution that relieves this traffic congestion, not creating more.

There are a number of pedestrians, particularly students from the high school and college who walk on that road. It is already unsafe.

Personal preference

I have seen many accidents in round about a. I don't believe they are safe. Beavercreek rd is already backed up at times. With more traffic there is a definite need for more lanes.

Roundabouts are ok in higher traffic areas, but should not be in residential neighborhoods and by schools where you have a lot of pedestrian traffic.

Keeps traffic moving

Under the existing conditions

If we are to help encourage commuters to walk or bicycle to their destinations, thereby reducing the number of vehicles on the road, we MUST make travel safer.

In addition, there may be individuals who do not own a vehicle, and need to walk or cycle to their destination. We should be able to encourage and help those individuals who have employment but no vehicle.

Do you have any additional comments/ideas/concerns that should be part of the discussion?

Yes, everywhere I see roundabouts, the municipality feels the need to landscape the crap out of the middle, only reducing the visibility and safety of the traffic entering and already in the circle. Please don't plant anything that grows higher than 18". Anything higher makes it difficult for drivers, especially those not in a jacked up 4X4, to see traffic entering and already in the circle. This is basic common sense! Kind of like feeling the need to plant trees along the sidewalks, only to later have to replace sidewalks after the root structure has damaged the concrete. A waste of taxpayer dollars!

I live off of Beavercreek Rd, next to the golfcourse, and have to deal with this traffic mess every day. It starts at 5:30am out here! In the afternoon, I've waited for several traffic signal changes at the high school just to get from the Chevron station to Golf course... sometimes over 20 minutes. I'm sure the city and county can improve on this!

Scrap the whole idea.

Traffic congestion that this development would contribute to and interact with should be solved e.g. Beavercreek Rd./Hwy 213 intersection, Hwy 213 itself, and the regional system. It is not enough to say, "if there is congestion ahead, additional lanes can help stack cars closer to the congestion." This plan should have some expectation and adequate mechanisms to correct known problems that will diminish area livability, or it should not proceed.

The Hwy 213 "free flow" right turn lane ignores bicyclists and pedestrians and their safety which is already a problem. The staff Including the attorney) should be required to walk and bike through this situation before recommending it (defending it). This concept plan is supposed to increase pedestrians and bicyclists in this area, but this "solution" works against both and makes most people too uncomfortable to walk or bike.

There should not be parallel parking off of Beavercreek Rd. e.g. at the development opposite the high school. Parallel parking could be handled like in the Willamette area where it is separated from the street by a sidewalk.

The high school speed zone is unnecessary and affects the BRCP situation. This needs to be solved in the plan.

I live off of Glen Oak, I ride my bike, run and so do others along Beavercreek Rd, to get anywhere. There is no safe space to run longer than 2 miles or if people want to walk/bike to Beavercreek or more into town (Berry Hill and other side of 213). I would like to see the stretch of Beavercreek that is in the Concept Plan have more walk ability and the ability for cars pulling into Beavercreek from their driveways and other road.

I live at xxxxx Old Acres Ln and even though I am technically a Clackamas County resident, I am directly impacted by the Beavercreek Road Concept Plan, as my house abuts the southern extents of the golf course. I bought my house in 2016, knowingly in support of this project. I appreciate the City's communication and project updates. Keep up the great work!

do not limit access of Old Acres Lane on to Beaver Creek Rd. this is due to both our ability to come and go from our neighborhood and access of life safety equipment (our only fire hydrant is located at this intersection).

I think this is a complete waste of time I hate to see that this is happening!!!!!

I am not looking forward to the nightmare of traffic for the many years during the building phase. Build out the road improvements before any actual construction!

I think that the intersection flow of Hwy 213/Beavercreek Road should be solved very soon by the city/county/state. If 5 lanes are not considered for development in the first phases of the development of businesses in Thimble Creek Business Park and only 3 lanes are considered, then AT A MINIMUM, the city should REQUIRE an easement of the equivalent of 2 more lanes on the vacant land side (East side??) of the entirety of Beavercreek Road. This would assure a low amount of disruption to businesses and homes when the other 2 lanes would go in. Business could use the area for parking or some other use that would not cause great disruption when uprooted for the new 2 lanes.

P.S. I could only click on one item below; not "all that apply"

Please take into consideration the extra traffic also to be added as the property at the corner of Beavercreek &213 (the old bus barn) gets ready to be developed and how that will further slow down Beavrrcreek.

I would like to see more infrastructure encouraging walking and biking. People who live along Beavercreek should not be REQUIRED to get into their vehicles to run daily errands. My hope is that it can all be done on foot or by bike. Grocery shopping, eating out, doctor visits, vet visits, gym visits etc would ideally all be non-driving activities. More walking and biking cuts down on long term maintenance of roads because there are simply less cars than there otherwise would be.

Don't build multi-story (4 or 5 story) buildings like in Portland and Milwaukie. These buildings do not provide for a sense of community instead they create congestion.

I believe that we can relieve traffic congestion with this plan, HOWEVER please consider ways to include pedestrian and bicycle safety. This might include new highway crossing areas with pedestrian lights for neighbors to cross beavercreek to access the trails at CCC. If you are going to expand traffic considerations, you should find a way to do the same to make this area a place people can enjoy walking through.

I hope that the businesses in the "employment Par" or whatever you called it are small local businesses. I would love a food cart pod with the safe ability to cross (maybe a pedestrian bridge) from the high school (they don't have the capacity to channel all those kids through on-site meals, and they take off in cars over lunch to get junk food elsewhere. Healthier choices, please. . No Walmarts, McDonalds, Targets, Panda Expresses, national or international chains. It's already tacky enough up "on the Hill" and we are all mourning the addition of Hobby Lobby in our community. Take the hill the way Main Street is going, and please let international food carts into our community for we can get a little ethnic variety!!
Safety of crossing Beavercreek Rd will need to be high on list of considerations with new residential housing being planned with kids crossing to attend OCHS & CCC; also, current residents will be walking across Beavercreek Rd to get new centralized town businesses & cafes at corner of Glen Oak Rd.
You all are going great!

Build the road before you approve building permits. Remember what they did on Sunnyside Road by allowing a buildout past 132nd and then decided to widen the road - it was a nightmare. Insist that the developers pay their share of the road improvements before they are allowed to break ground on development.

There is significant heavy equipment, tractor-trailers, log trucks and commercial vehicle traffic along Beavercreek Road all day long. The idea of a fully-loaded log truck barrelling north on Beavercreek Road at 6:00 am and delicately driving around a cute little roundabout at Glen Oak Road is positively ludicrous. There is virtually no pedestrian traffic along Beavercreek Road from Clairmont to Glen Oak, except just before and after High School sessions, and then only on the west side. There are perhaps 3 people who bike along the road on a daily basis. Should the Beavercreek Apartments project ever really come to be, the idea of parallel parking on Beavercreek Road to allow more housing units to be built in that development is an insane proposition. There should never be any kind of parking along Beavercreek Road. Ever. Parallel or otherwise.

The speed limit of the Beavercreek Rd. corridor is currently too high. I would suggest that the highest speed limit should be 35 mph. I would also suggest installing automatic school zone flashers for the high school. This will make it easier for drivers to know when school zone hours are in effect and will help to improve the overall safety of Beavercreek Rd. for students.

pedestrian bridge?

I reviewed the traffic study and I could not find transit data in the intersection counts. TriMet and the CCC Xpress Shuttle should have data in the Beavercreek Road and Highway 213 intersection. The CCC Xpress Shuttle also operates on Beavercreek Road to Clairmont Hall on the Oregon City campus. Transit data needs to be included in the traffic study.

We need bike lanes or trails as motorists are hostile to cyclists on the existing roads.

The traffic will increase tremendously, what are you planning to do for the additional noise for the houses in the Caufield neighborhood whose backyards line Beavercreek road? Beavercreek is going to become a highway more or less and the vehicle noise is going to double if not triple the current noise. What is the plan for the intersection at Glen Oak and Beavercreek? It is hard to cross as is, with the increased traffic, it will become unsafe to cross. It is already hard to see the oncoming traffic as it is.

We need roundabouts

Is the city using imminent domain for the 51 (unsure) properties needed for this development?

I hope that this plan will be similar to the Happy Valley area with mostly houses but some stores and small strip malls strategically placed so that there is some incentive to live there because there is everything you need in your neighborhood. The housing developments off of Holcomb hold no appeal for me because it’s a food desert. It’s very inconvenient for a quick run to the store because I forgot one ingredient for dinner. Or a quick run to a restaurant because I don’t want to cook dinner. Mixed use geared towards people being able to have everything they need in their neighborhood appeals to me.

The school zone by the high school needs to have the school zone signal lights. Because people who don't have kids in school don't always know when there isnt school = don't need to drive 20mph in the zone. Would help with traffic flow as well if we only had to dive 20mph when the lights are flashing vs. 7-5pm.

Please make sure there is a time specific school zone signal for the High School. The system jow is as frustrating as it can be.

Several areas need improvement before additional development should be considered.
Sidewalks, sidewalks, sidewalks!! I get so nervous for the kids I see walking along Beavercreek Road and Glen Oak Road where they have to walk in the street. It 's so dangerous.....especially now that kids are looking down at their phones rather than at the traffic coming towards them.

No.

I am definitely concerned about the addition of so many homes in an area that already has such bad traffic congestion.

Just getting out to Beavercreek is getting to be a traffic mess. There are so many people that go farther out than Henrici now. Don't forget about us. There is also more developing going on out there. Also can you get a flashing high school light with their speed showing to slow people down only during times the kids are actually around?

Also can something be done to help the Beavercreek, Leland, Kamrath intersection? I'm surprised there aren't more accidents there. It's very unsafe.

My biggest concern is that we do just enough to satisfy needs for today and not consider future growth that would add major additional costs that we could have because of thinking about today and not tomorrow.

There is a need for a "Separated Bike and Pedestrian Path" extending on the south side of Beavercreek Road at Highway 213 and the Berry Hill Shopping Center to and just past Oregon City High School. This requirement is to provide enhanced and thus expanded use of multi-mode options and development that does not require a car.

A roundabout on the intersection of 213 and Beavercreek would be great. I know this isn't about that but it would cut wait times immensely.

Traffic has changed in the last few years on Beavercreek rd. More traffic, more congestion. Please tell me you look at models in other areas with similar development has occurred with like establishments. I would like to see it stay more neighborhood friendly, not warehouses.

Video surveillance

Need lights at each intersection...Loder, Meyers, Glen Oak and Clairmont

Nothing matters if the intersection of 213 and Beavercreek is not addressed first. Need to create the right hand passthru lane first before any work on the concept plan.

I would not be in favor of 2 lane roundabouts. It sounds confusing and dangerous for pedestrians.

Non-residents of Oregon City should not influence this decision - unless they want to pay for what they use.

Yes I would eliminate the parallel road in the concept plan that runs along Beavercreek. It takes up way to much land for what it gains. The cost benefit is just not there.

I can appreciate the desire for public and stakeholder engagement, but most of these questions should not be put to a popularity contest. These are technical considerations that people build careers to consider and address. The general public opinion, particularly in suburban areas and particularly in Clackamas County is that more lanes, higher speeds, and free flow car travel is the gold standard. The City of Oregon City has been pretty progressive for a suburban community, so I hope that this practice will continue on Beavercreek Road.

I would love to go to a concert or movie in the park. Walking trails are important and giving as many houses and businesses as possible, thru your design, to enjoy the beautiful view of mt hood. Beautiful natural spaces are important

Create sustainable value in the improvements that can be maintained well with current resources is my goal. If resources increase then we can use them to maintain what we have sustainably.

Property owners abutting Beavecreek Road need to participate and let their thoughts be known now or never.

Please take seriously the unique use of this road with busses and students. I am also concerned that Beavercreek citizens are not identified on the last section of this survey. Beavercreek road is our main access out of the hamlet. 213 at Meyers gets very backed up where it switches to 2 lanes and making the trip to I-205 even longer is a significant lifestyle impact.

Call me in and let me give you my comments

I would like to have more information from the college as to if they actually intend to purchase property outside of the current campus that would lead to expansion across Beavercreek. I would also like to hear about real businesses and development companies willing to take on these projects. Given that there is already undeveloped land for businesses within the current city boundaries it seems strange to me that this development down Beavercreek is necessary.

I think this area should be left as is with no development. Leave the green space alone.

I agree with the committee's recommendations in regards to traffic signals over roundabouts and the Holly lane connector should be implemented. Growth is an unknown commodity, where assumptions can be made, but economics and preferences still play a large role in how accurate predictions are. The greatest impact of road design should be factored into the new development and not destroy homes and land values of people that chose this area 10-20 years ago.

Please consider to set up the BUMP at the long straight street in the residential area.

City of Oregon City

625 Center Street
Oregon City, OR 97045
503-657-0891

Staff Report

File Number: 19-626

Agenda Date: 11/12/2019

Status: Agenda Ready

To: City Commission

Agenda #: 3c.

From: City Recorder Kattie Riggs

File Type: Report

SUBJECT:
2020 City Commission Meeting Calendar

RECOMMENDED ACTION (Motion):
Staff recommends the City Commission review the draft 2020 meeting schedule and make any necessary changes.

BACKGROUND:
Each year the City Commission considers the dates for the next year's meeting schedule. Included with this report is a draft version of the 2020 schedule that includes meeting dates for the City Commission regular meetings, Work Sessions, and Enhancement Grant Committee meeting.

Please note, the first City Commission meeting is scheduled for Thursday, January 2, 2020 because Wednesday, January 1, 2020 is a holiday. In the Charter of Oregon City, Chapter 9 - Commission, Section 14 - Meetings, it states, *If a meeting date falls on a legal holiday, then it shall be held on the following day*. The Commission, if it so wishes, could choose to cancel this meeting making it's first meeting of the new year a Work Session on Tuesday, January 7, 2020. Also noted, the Enhancement Grant Committee meeting is scheduled for June 4, 2020.

The calendar is set in advance to allow the Commission opportunity to plan ahead and avoid conflicts throughout the year. Review of the calendar also provides notice to the public of the next year's scheduled meetings.

City of Oregon City

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CITY OF OREGON CITY
2020 City Commission Meeting Calendar

City Commission Meeting Date	Staff Reports Due	Ordinances Due	Ordinances Posted	Packets Distributed
Jan. 2, 2020	Dec. 23, 2019	Dec. 26, 2019	Dec. 26, 2019	Dec 26, 2019
Jan. 7, 2020 Work Session				
Jan. 15, 2020	Jan. 6, 2020	Jan. 6, 2020	Jan. 8, 2020	Jan. 8, 2020
MID-BIENNIUM GOALS UPDATE RETREAT - TBD				
Feb. 5, 2020	Jan. 27	Jan. 27	Jan. 29	Jan. 29
Feb. 11, 2020 Work Session				
Feb. 19, 2020	Feb. 10	Feb. 10	Feb 12	Feb 12
Mar. 4, 2020	Feb. 24	Feb. 24	Feb. 26	Feb. 26
Mar. 10, 2020 Work Session				
Mar. 18, 2020	Mar. 9	Mar. 9	Mar. 11	Mar. 11
Apr. 1, 2020	Mar. 23	Mar. 23	Mar. 25	Mar. 25
Apr. 7, 2020 Work Session				
Apr. 15, 2020	Apr. 6	Apr. 6	Apr. 8	Apr. 8
May 6, 2020	Apr. 27	Apr. 27	Apr. 29	Apr. 29
May 12, 2020 Work Session				
May 20, 2020	May 4	May 4	May 6	May 6
June 3, 2020	May 26	May 26	May 27	May 27
June 4, 2020 Enhancement Grant Committee Meeting				
June 9, 2020 Work Session				
June 17, 2020	June 8	June 8	June 10	June 10
July 1, 2020	June 22	June 22	June 24	June 24
July 7, 2020 Work Session				
July 15, 2020	July 6	July 6	July 8	July 8
Aug. 5, 2020	July 27	July 27	July 29	July 29
Aug. 11, 2020 Work Session				
Aug. 19, 2020	Aug. 10	Aug. 10	Aug. 12	Aug. 12
Sept. 2, 2020	Aug. 24	Aug. 24	Aug. 26	Aug. 26
Sept. 8, 2020 Work Session				
Sept. 16, 2020	Sep. 8	Sep. 8	Sep. 9	Sep. 9
Oct. 7, 2020	Sep. 28	Sep. 28	Sep. 30	Sep. 30
Oct. 13, 2020 Work Session				
Oct. 21, 2020	Oct. 12	Oct. 12	Oct. 14	Oct. 14
Nov. 4, 2020	Oct. 26	Oct. 26	Oct. 28	Oct. 28
Nov. 10, 2020 Work Session				
Nov. 18, 2020	Nov. 9	Nov. 9	Nov. 10	Nov. 10
Dec. 2, 2020	Nov. 23	Nov. 23	Nov. 25	Nov. 25
Dec. 8, 2020 Work Session				
Dec. 16, 2020	Dec. 7	Dec. 7	Dec. 9	Dec. 9

City of Oregon City

625 Center Street
Oregon City, OR 97045
503-657-0891

Staff Report

File Number: 19-631

Agenda Date: 11/12/2019

Status: Agenda Ready

To: City Commission

Agenda #: 4a.

From: Public Works Director John Lewis

File Type: Presentation

SUBJECT:
Metro's 2020 Transportation Investment Measure Presentation

BACKGROUND:
The Metro Council is working with partners and the community to develop a potential 2020 transportation investment measure that could be a bold leap for our region. In early 2019, Metro convened a Task Force to identify a number of values and outcomes for a possible transportation investment measure. Additionally, Metro identified Local Investment Teams in each County to dive into the needs of the identified corridors. Based on the feedback from the Local Investment Teams, Metro staff has shared and presented their draft recommended investment package to the Task Force.

Within this presentation, City staff will provide an update on the potential measure, an overview of the Metro staff recommended investment package, and how this would benefit Oregon City.

625 Center Street
Oregon City, OR 97045
503-657-0891

City of Oregon City

Staff Report

File Number: 19-631

Agenda Date: 11/12/2019

Status: Agenda Ready

To: City Commission

Agenda #: 4a.

From: Public Works Director John Lewis

File Type: Presentation

SUBJECT:
Metro's 2020 Transportation Investment Measure Presentation

BACKGROUND:
The Metro Council is working with partners and the community to develop a potential 2020 transportation investment measure that could be a bold leap for our region. In early 2019, Metro convened a Task Force to identify a number of values and outcomes for a possible transportation investment measure. Additionally, Metro identified Local Investment Teams in each County to dive into the needs of the identified corridors. Based on the feedback from the Local Investment Teams, Metro staff has shared and presented their draft recommended investment package to the Task Force.

Within this presentation, City staff will provide an update on the potential measure, an overview of the Metro staff recommended investment package, and how this would benefit Oregon City.

Metro

2020 TRANSPORTATION FUNDING MEASURE

Preliminary Staff Recommendation for Corridor Investments and Regionwide Programs

In early 2019 the Task Force identified a number values and outcomes for the measure. These provided a key guide for the staff recommendation. We encourage Task Force members to revisit those values as you consider the package overall. These values include the following. More details can be found at **oregonmetro.gov/transportation**.

- Improve safety
- Prioritize investments that support communities of color
- Make it easier to get around
- Support resiliency
- Support clean air, clean water, and healthy ecosystems
- Support economic growth
- Increase access to opportunity for low-income Oregonians
- Leverage regional and local investments

Memo

Date: Friday, October 18, 2019
To: Transportation Funding Task Force Members
From: Margi Bradway, Deputy Director of Planning and Development Department
Anthony Buczek, Project Manager of Project Development for Transportation Measure
Subject: Staff recommended corridor investments

Background: From Tier 1 corridors to potential project opportunities

At a work session on June 4, 2019, the Metro Council directed staff to work with local partners to move forward 13 "Tier 1" travel corridors to identify possible projects for consideration in a transportation investment measure. In its direction, the council considered a number of factors, including community engagement, input from jurisdictional partners and values and outcomes identified by the Transportation Funding Task Force and the Metro Council in early 2019. Projects in these corridors are expected to constitute most of the investment of a potential 2020 transportation funding measure; they will be supplemented by regionwide funding programs that provide benefits and address key community and transportation needs beyond these corridors.

Between June and September 2019, Metro staff collaborated with regional and local agencies and consultant teams to plan, develop and assess potential costs of project opportunities along the 13 corridors identified as Tier 1 by the Metro Council.

Metro staff met with staff from transportation agencies across the region, including cities, counties, TriMet, and the Oregon Department of Transportation, to identify potential project opportunities consistent with the Task Force and Council outcomes, which could be delivered as part of a potential funding measure. Based on projects identified in the 2018 Regional Transportation Plan, local Transportation System Plans, TriMet's System Plan, and other corridor plans, Metro staff documented a list of project opportunities and project details such as key goals, project elements, and current cost estimates. Metro also considered new opportunities for projects based other information, such as safety reviews and supplementary analysis of potential transit performance.

Local Investment Teams

On each Tier 1 corridor, Metro identified a project or series of projects based on the work discussed above. In some cases, these projects are specific to a location or jurisdiction. In other cases, such as transit projects, the project termini extend the entire corridor or through the majority of the corridor. This interplay between location-specific projects and overlapping projects is illustrated in the individual Draft Project Recommendations. The projects that were identified or developed through this process were presented to Local Investment Teams described below for their feedback and to better understand how those projects might address key community needs.

During July and August 2019, Local Investment Teams in each county considered project opportunities and provided valuable feedback, recommendations, and key priorities or themes to inform the potential project mix to advance within each corridor. These teams were composed of 10 to 12 community members with experience living, working and traveling in each county. Members were asked to apply this personal experience to reviewing and providing feedback on potential projects.

Working with our facilitation consultant, Metro completed reports summarizing all Local Investment Team feedback on the corridor projects and finalized these with input from the teams. These reports were shared with the Task Force, which heard the feedback from Local Investment Team members at its Sept. 18 meeting in Beaverton.

Metro is deeply grateful to the Local Investment Team members for their time and insight.

Developing staff project recommendations

The initial Staff Project Recommendations show current project opportunities identified on the corridor, which defined the overall "corridor need" identified in the technical process. Within each corridor, staff is recommending to advance a project or set of projects for further project development and/or construction.

In recommending projects to advance on each corridor, Metro staff carefully considered and weighed a number of factors:

- Metro Council outcomes for the Transportation Measure
- Task Force outcomes for the Transportation Measure
- Local Investment Team input
- Regional and local plans
- Analysis of transit opportunities on corridor
- Agency staff knowledge of readiness and opportunity
- Metro staff review of consistency with Regional Transportation Plan principles
- Expected scale of potential revenue
- Feasibility of delivering projects within the near future

In summary, projects were recommended for advancement based on their feasibility and ability to implement outcomes and objectives defined within the factors listed above.

How to read these recommendations

Each corridor worksheet provides a brief description of the corridor, identifies the projects reviewed by the Local Investment Team on the corridor, and highlights the projects that staff recommend considering for investment as part of a possible regional funding measure. Project costs and key outcomes are identified. If a project cost is a range, that means that there is still additional need to further develop the project to understand its cost. In some of these cases Metro staff recommend funding the higher cost, in other cases staff recommend funding a portion of the cost. (In order to be included in a final recommendation to Metro Council, project delivery agencies will need to further refine project costs and identify any additional needed funding.)

In some cases, a project is identified as one that brings additional leverage, i.e. identified additional funds from other sources. For more discussion of what that means, please review the cost estimates discussion above.

A table in the upper right corner of each worksheet indicates the values that the Local Investment Team identified as particularly important on that corridor, and a Metro staff evaluation of whether the project meets those values. This evaluation is based on staff's best analysis as well as Local Investment Team feedback.

Cost estimates

The initial Staff Project Recommendations include an initial cost estimate for each project with a range of potential costs estimated for each. The cost estimates for the project opportunities exist in varying levels of detail and certainty – from well-developed cost estimates based on preliminary designs to rough planning-level estimates. The range of potential costs provided in the initial Staff Project Recommendations are intended to give the Task Force and Metro Council a sense of need and scale on each corridor. The staff recommendations show the range of needs compared to the scale of the recommended investment by a possible funding measure.

The recommendations in corridors also list funding that could be leveraged from other sources. In some cases this is local funding that may already be secured or committed from a city, county, or other transportation agency. In other cases, leveraged funding will be sought from another source, such as the federal government, but is not yet confirmed.

About contingency

Contingency is an amount of money, based on the project cost, that is set aside to account for potential project cost increases as the project is further developed. Project costs can increase due to a variety of issues, including learning about structural challenges (e.g. unstable soil, landslide risks), additional needs (e.g. stormwater management, more significant maintenance issues), project scope changes (e.g. more significant treatments are needed to achieve the result), and other external challenges, such as costs of materials, labor costs and availability, etc.

Uncertainty usually equates to eventual higher project costs. Therefore, staff undertook a review of best practices for assigning a working contingency at this planning level. Based upon the contingency review, staff have used a tiered approach of assigning a working contingency to each project based on its stage of cost estimate development in order to determine an overall program contingency. Projects with very rough estimates were assigned a higher working contingency, while those with more developed and detailed estimates were assigned a lower working contingency. This working contingency is in addition to the individual project-level contingencies that are assumed for each project cost estimate. The overall program contingency is the sum of the individual project-level working contingencies. The overall program contingency seeks to account for factors such as expected variations in actual project costs as they are further developed and escalation to year of expenditure, which has not yet been determined for each project.

Following further Task Force discussion and Metro Council direction on projects, Metro staff will continue to lead formal technical work with the project delivery agencies to refine and improve the certainty of the individual project cost estimates between now and a potential Metro Council referral decision in late spring 2020. This work will also include developing a schedule for the implementation of projects which will set a planned year of expenditure for each project. As this work progresses, it is expected that the program contingency will be reduced in concert with updated cost estimates and increased cost certainty. It is important for realistic budgeting to retain this program contingency in the interim to address the reality that project costs are likely to increase as they are refined.

Overall package cost

The Task Force will discuss revenue mechanisms and overall funding considerations at its December 15 and January 18 meetings. For the purpose of the Task Force project recommendation conversation at this stage, the total amount of the staff recommendation should be considered a ceiling. If Task Force members are interested in adding additional funding or projects, they will need to identify equivalent opportunities to reduce or remove funding for other projects.

Next steps

The Task Force will discuss these recommendations at its Oct. 30 meeting. The Task Force is expected to vote on recommendations to the Metro Council on Nov. 20. The Metro Council will then be asked to provide staff direction on which projects to advance for further development.

Project Delivery Agencies are the agencies who are likely to deliver a project or set of projects. These agencies are often the authority owning the road or other infrastructure, but they could also be an agency with a significant interest or investment in the corridor. Following Metro Council direction on projects to advance, Metro staff will continue to support and coordinate with these agencies on the next phases of project development. Projects are at different stages of project development and some projects will require more resources and focus than others.

The project list advanced by the Metro Council following Task Force review and input will likely change several times prior to the Metro Council's consideration of whether to refer a measure to voters in late spring 2020. This must happen for several reasons. First, all projects will undergo a more rigorous cost assessment process to bring them to a consistent set of cost assumptions. This will produce a revised program cost which will need to be matched to updated revenue projections. All projects will also undergo a risk assessment, to assess and document the level and type of risk associated with each project. Some projects will inherently have more risk, due to factors such as complex project elements, potential environmental impacts, or unresolved design questions. Risks will also be taken into account when building a timeline for the overall delivery of the transportation funding measure, with some projects needing more time for further development than others.

These factors, along with increased clarity on the likely revenue scale, will inform another decision point at which the Task Force and Metro Council may recommend to add, modify, or remove projects from a measure package. This conversation will happen for the Task Force at meetings in March and April 2020.

Summary

The Staff Project Recommendations reflect known needs on the Tier 1 corridors based on a variety of factors and engagement outlined above. Staff have sought to ensure the recommended projects on each corridor align with Metro Council values, Task Force values and the Local Investment Team feedback. It is now up to the Task Force to consider what it wishes to recommend to the Metro Council for moving forward.

Preliminary identified impacts

Staff have conducted a preliminary assessment of how well the recommended projects advance the above outcomes through rough metrics related to transit mobility, climate, equity, safety, and system impacts. Additional and more labor and time intensive metrics, such as systemwide ridership and traffic performance data, will be produced later in the process and provided to Task Force members for future decisionmaking.

The measures shown below were produced using a combination of travel demand model analysis to preliminarily evaluate effects of proposed transit infrastructure improvements, analysis of crash data, and assessment of project goals relative to their estimated costs. All measures are very preliminary estimates and are likely to shift after further project development. However, in the interest of giving Task Force members some understanding of what investments will mean on the ground, we are providing these initial estimates earlier in the process. Note that these measures are for corridor investments only; they do not include potential outcomes of regionwide programs expected to be included in the possible funding measure to make investments beyond the identified corridors.

Estimated Potential Investment Benefits: Overall Corridor Package

	TRANSIT		CLIMATE	EQUITY	SAFETY			
	Transit investment	Reduction in hours of passenger delay	Investment in greenhouse gas reduction*	Investment in equity focus areas	Estimated safety investment	Estimated safety investment in equity focus areas	% of Metro Region fatal crashes addressed	% of Metro Region serious crashes addressed
Amount	$1.92B	1,175 hours per day or more	$1.92B	$2.33B	$1.06B	$1.02B	21%	20%
% of Package	62%		62%	75%	34%	33%		

* Transit projects are a Tier 1 Climate Smart Strategy, and are included in this estimate. Projects that improve biking and walking are likely to have a small impact in reducing greenhouse gas emissions, but we are not able to calculate that at this time.

Estimated Potential Investment Benefits: By Corridor

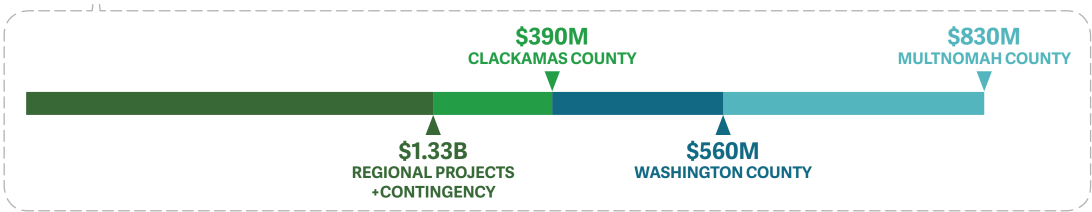
	TRANSIT				CLIMATE	EQUITY	SAFETY			
	Recommends transit project?	Travel time reduction	Daily passenger hours saved	Daily boardings	Est. funding addressing GHG emissions	% of corridor in equity focus area	Estimated safety investment	Fatalities 2007-17	Severe Injuries 2007-17	% of regional severe crashes
TV Highway	✔	15%	143	+400	$260M	85%	$270M	29	175	3.8%
185th	✔	9%	63	+50	$100M	90%	$20M	5	40	0.8%
82nd	✔	15%-35%	150-350 or more	+800-4,300	$110M	74%	$190M	19	177	3.6%
Burnside	✔	23%	730	+2,100	$50M	71%	$30M	16	125	2.6%
Powell	Plan: new HCT service			+27,700	$20M	84%	$0M	22	137	2.9%
122nd	✔	10%	40	+100	$20M	88%	$70M	9	66	1.4%
McLoughlin	✔	15%	49	+300	$110M	59%	$60M	20	113	2.5%
C2C/181st					$0M	37%	$70M	7	61	1.3%
Sunrise					$0M	34%	$10M	5	43	0.9%
Central City	Plan: improved LRT			+36,600	$150M	97%	$170M	11	90	1.9%
162nd					$0M	92%	$70M	3	31	0.6%
SW Corridor	Adds new LRT service			+39,100	$975M	32%	$50M	8	34	0.8%
Albina					$0M	100%	$40M	6	32	0.7%

Metro

Corridor Scenario Investment Summary

Staff recommendation is based on feedback from Local Investment Teams and other public engagement, the Regional Transportation Funding Task Force and Metro Council values and outcomes, and the feasibility of delivering projects to the public within a reasonable time frame.

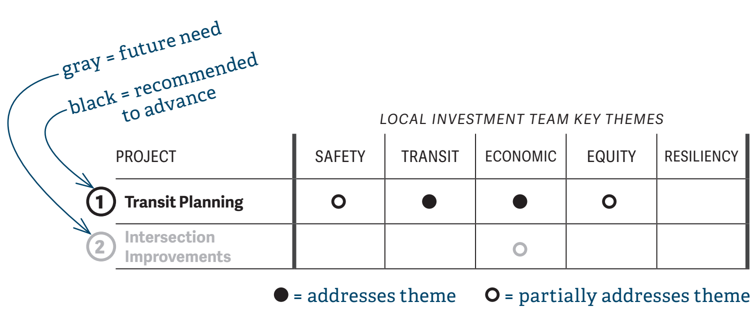
PROPOSED CORRIDOR FUNDING **$3.11B** + **POTENTIAL LEVERAGED FUNDS** **$2.13B** = **TOTAL CORRIDOR INVESTMENT** **$5.24B**



CORRIDOR	PROPOSED REGIONAL MEASURE FUNDING	LEVERAGED FUNDS	IDENTIFIED CORRIDOR NEED
Southwest Corridor	$975M	$1.4B	$2.4B
McLoughlin	$200M		$280M
Clackamas to Columbia/181st	$50M / $80M		$280M
Sunrise	$70M		$560M
Tualatin Valley Highway	$350M	$50M	$600M
185th Ave	$200M	$20M	$270M
82nd Ave	$35M / $70M / $265M	$160M	$820M
Burnside	$80M / $150M	$450M	$890M
Central City	$170M / $50M	$50M	$390M
122nd Ave	$90M		$160M
162nd Ave	$70M	$10M	$170M
Albina Vision	$55M		$75M
Powell	$30M		$40M

DELIVERY AGENCIES

- **ODOT** Oregon Department of Transportation
- **M** Metro
- **TM** TriMet
- **PBOT** Portland Bureau of Transportation
- **WC** Washington County
- **CC** Clackamas County
- **PP** Port of Portland
- **G** City of Gresham
- **MW** City of Milwaukie
- **GL** City of Gladstone
- **OC** Oregon City



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SW Corridor

Southwest Corridor Light Rail will address congestion in the I-5 corridor and expand the MAX system to growing communities in SW Portland, Tigard and Tualatin, serving more people with fast, affordable high-capacity transit. It will increase access to living wage jobs in Tigard and Tualatin and connect to educational opportunities at PCC Sylvania, OHSU and PSU.

The project includes bicycle and pedestrian network improvements, like protected bike lanes and better sidewalks on Barbur Boulevard. Bus service improvements will complement light rail, including a two-mile shared trackway near Downtown Portland where buses can drive on the tracks to avoid traffic delays. The project will improve safety in a corridor where **42** serious injuries and fatalities occurred between 2007-2017. **32%** of this corridor is in an equity focus area.

The project is paralleled by the **Southwest Corridor Equitable Development Strategy (SWEDS)**, a collaboration of public and private partners working to generate equitable economic opportunity, and preserve and expand affordable housing along the light rail route.

[SEE PROJECT MAP NEXT PAGE]

Staff recommendation is based on feedback from Local Investment Teams and other public engagement, the Task Force and Metro Council values and outcomes, and the feasibility of delivering projects to the public within a reasonable time frame.

SW Corridor

SW Corridor MAX

Portland to Tigard to Bridgeport Village (11 miles)

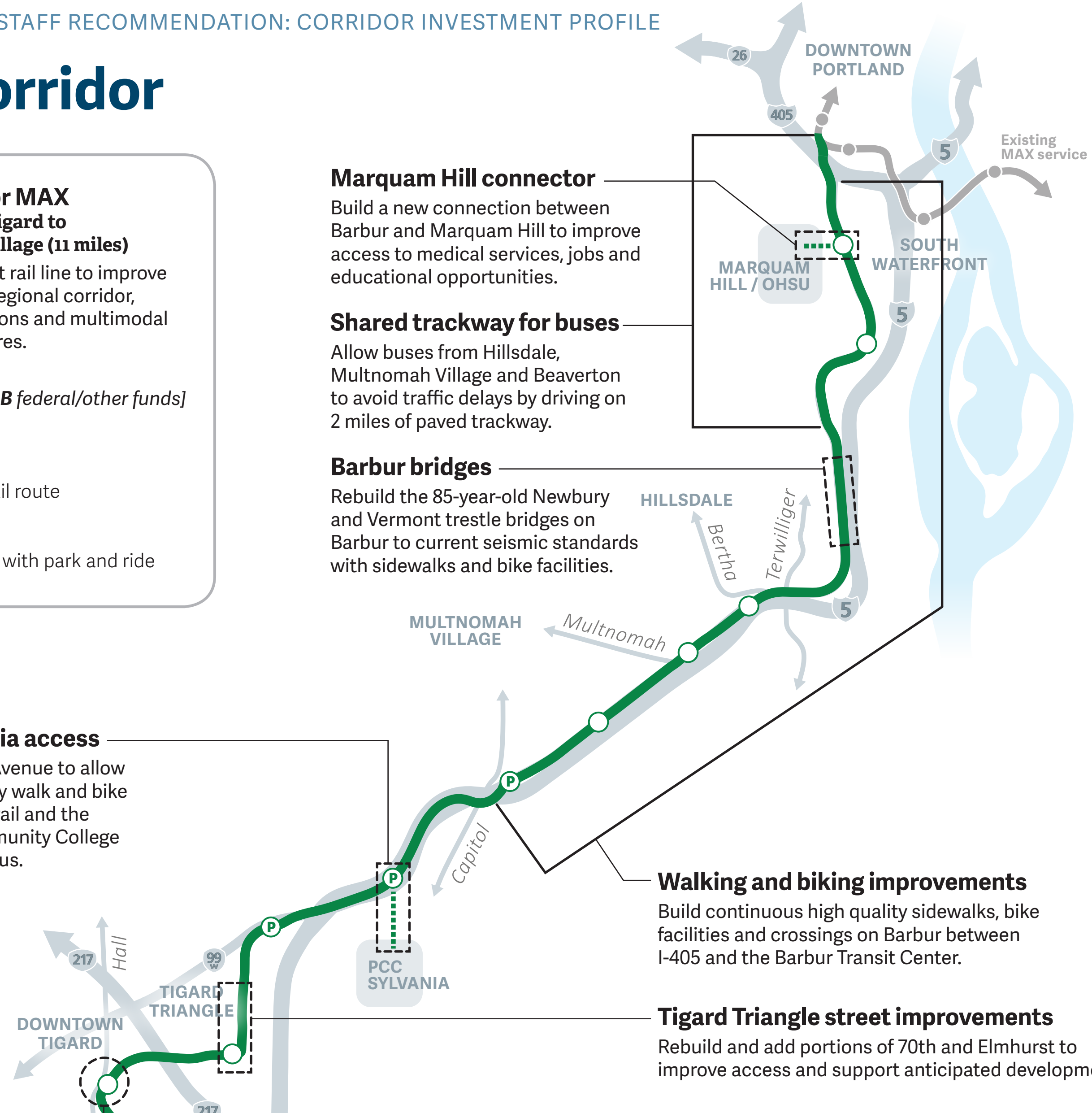
Construct light rail line to improve transit in key regional corridor, including stations and multimodal roadway features.

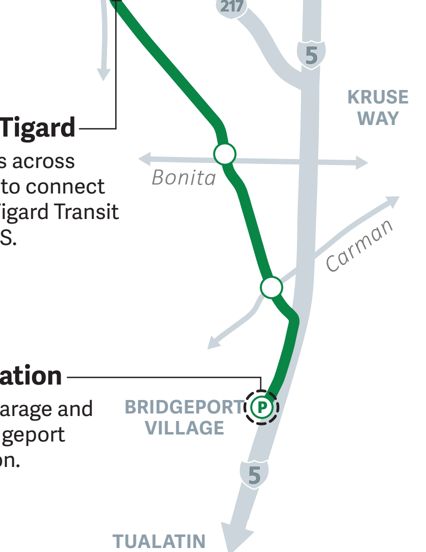
$975M

*[leverages **$1.4B** federal/other funds]*

TM

- Light rail route
- Station
- Station with park and ride





Marquam Hill connector
Build a new connection between Barbur and Marquam Hill to improve access to medical services, jobs and educational opportunities.

Shared trackway for buses
Allow buses from Hillsdale, Multnomah Village and Beaverton to avoid traffic delays by driving on 2 miles of paved trackway.

Barbur bridges
Rebuild the 85-year-old Newbury and Vermont trestle bridges on Barbur to current seismic standards with sidewalks and bike facilities.

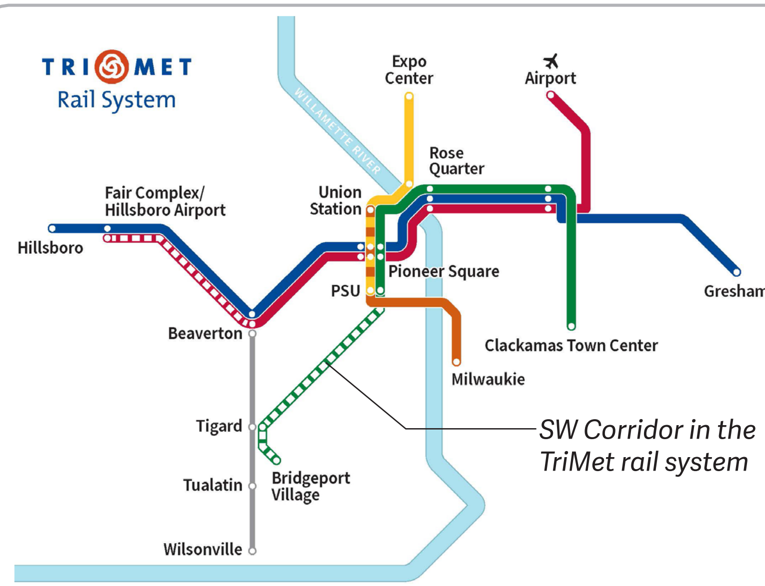
PCC-Sylvania access
Improve 53rd Avenue to allow people to safely walk and bike between light rail and the Portland Community College Sylvania Campus.

Walking and biking improvements
Build continuous high quality sidewalks, bike facilities and crossings on Barbur between I-405 and the Barbur Transit Center.

Tigard Triangle street improvements
Rebuild and add portions of 70th and Elmhurst to improve access and support anticipated development.

Downtown Tigard
Improve access across Hall Boulevard to connect people to the Tigard Transit Center and WES.

Terminus station
Build parking garage and bus hub at Bridgeport Village terminus station.



SW Corridor in the TriMet rail system

2020 TRANSPORTATION FUNDING MEASURE

Staff recommendation is based on feedback from Local Investment Teams and other public engagement, the Task Force and Metro Council values and outcomes, and the feasibility of delivering projects to the public within a reasonable time frame.

20061

Metro

McLoughlin Blvd

McLoughlin Boulevard connects communities in Clackamas and Multnomah counties to jobs, housing, and transit. The corridor serves as an alternative to I-205 and other routes between Portland and Clackamas County, and has been identified by TriMet as a key corridor to increase ridership. Locally, it is a main street for various communities, and provides local access and circulation. There were **133** serious injuries and fatalities on this corridor between 2007-2017. **59%** of this corridor is in an equity focus area.

LOCAL INVESTMENT TEAM KEY THEMES

PROJECT Recommended / Future Need	SAFETY	ACCESS/ TRANSIT	ECONOMIC	EQUITY
1 Enhanced Transit	○	●		○
2 Safety	●	●		○
3 Kellogg Creek Dam (Future Need)			●	
4 I-205 Ramp Improvements			○	
5 Trolley Trail Planning				○
6 Reedway Bike Overcrossing (Future Need)			○	
7 Willamette Falls Bike/ Ped Plan			●	
8 Park Ave Park & Ride Expansion		●		
9 Portland Ave Streetscape (Future Need)	○			
10 Corridor Planning	●	○	●	

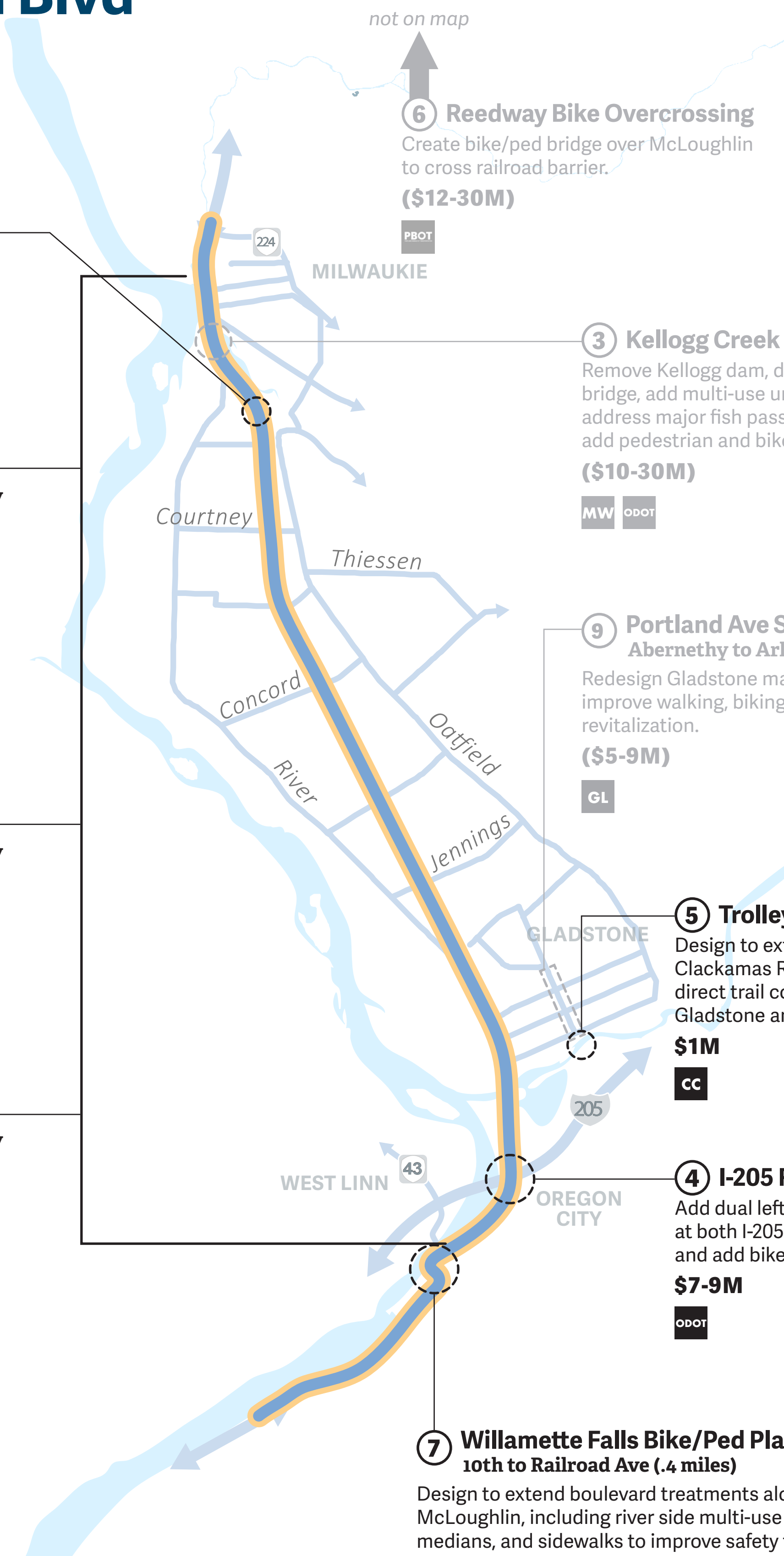
[SEE PROJECTS MAP NEXT PAGE]

Staff recommendation is based on feedback from Local Investment Teams and other public engagement, the Task Force and Metro Council values and outcomes, and the feasibility of delivering projects to the public within a reasonable time frame.

20061

Metro

McLoughlin Blvd



8 Park Ave Park & Ride Expansion

Add two levels to existing park & ride facility at current Orange Line terminus.

$16-19M

TM

1 Enhanced Transit

Milwaukie to Oregon City (6.5 miles)

Bus enhancements for Lines 33 and 99 (operations, station enhancements, targeted bus lanes, signal priority) to improve speed and reliability, station access and rider experience.

$85-102M

TM ODOT

2 Safety

Milwaukie to Oregon City (6.5 miles)

Add/improve sidewalks, crossings and lighting to reduce severe injury and fatal crashes.

$40-60M

ODOT

10 Corridor Planning

Milwaukie to Oregon City (6.5 miles)

Design for longer term transportation improvements including transit.

$5M

M

6 Reedway Bike Overcrossing

Create bike/ped bridge over McLoughlin to cross railroad barrier.

($12-30M)

PBOT

3 Kellogg Creek Dam

Remove Kellogg dam, drain lake, replace bridge, add multi-use underpass to address major fish passage barrier and add pedestrian and bike facilities.

($10-30M)

MW ODOT

9 Portland Ave Streetscape

Abernethy to Arlington (.5 miles)

Redesign Gladstone main street to improve walking, biking, and downtown revitalization.

($5-9M)

GL

5 Trolley Trail Planning

Design to extend Trolley Trail over Clackamas River to create a more direct trail connection between Gladstone and Oregon City.

$1M

CC

4 I-205 Ramp Improvements

Add dual left turn lanes to McLoughlin at both I-205 ramps to ease congestion, and add bike/ped facilities.

$7-9M

ODOT

7 Willamette Falls Bike/Ped Plan

10th to Railroad Ave (.4 miles)

Design to extend boulevard treatments along McLoughlin, including river side multi-use path, medians, and sidewalks to improve safety for people walking and biking.

$1-2M

OC

Staff recommendation is based on feedback from Local Investment Teams and other public engagement, the Task Force and Metro Council values and outcomes, and the feasibility of delivering projects to the public within a reasonable time frame.

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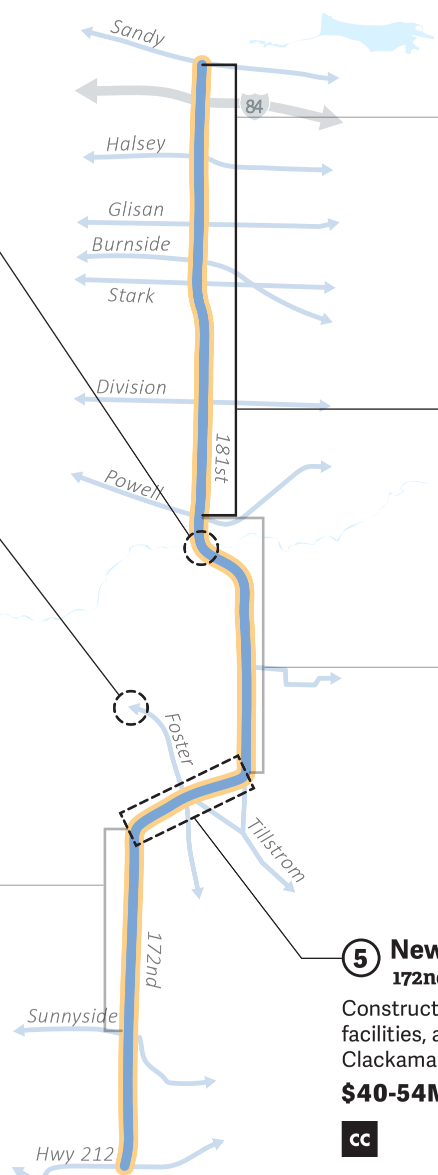
C2C/181st Ave

C2C (Clackamas to Columbia) /181st Avenue is a major North-South connection between rapidly developing Happy Valley and the Columbia Corridor through Western Gresham. It connects I-84 and US 26 (Powell) and is a North-South alternative to I-205. This corridor also connects employment with low-income areas, affordable housing, schools, parks and other neighborhood amenities. There were **68** serious injuries and fatalities on this corridor between 2007-2017. **37%** of this corridor is in an equity focus area.

LOCAL INVESTMENT TEAM KEY THEMES

PROJECT **Recommended** / Future Need	SAFETY	ACCESS/ EASE	ECONOMIC	HEALTHY	EQUITY
1 Enhanced Transit	●	●	○	●	○
2 Safety	●	○	○	●	○
3 Roundabout	●	●			○
4 Widen 190th/Highland		●	○		
5 New Connector Road		●	●		
6 172nd Expansion		●	●		
7 190th/Highland Bridge Replacement	○	●	○	○	

SCENARIO INVESTMENT $130M — $280M CORRIDOR NEED



7 190th/Highland Bridge Replacement
Over Johnson Creek and Springwater Corridor Trail
Four-lane bridge replacement with sidewalks and bike facilities, seismic upgrade.
$9-12M
G

3 Roundabout
172nd/Foster
Convert intersection to roundabout to improve safety and ease traffic congestion.
$5-6M
MC

6 172nd Expansion
N of Hemrick Rd to Sunnyside (1.2 miles)
Widen 172nd to 4-5 lanes with bike/ped facilities to develop continuous corridor.
($35-54M)
CC

1 Enhanced Transit
Sandy to Powell (4 miles)
Bus enhancements for Line 87 (operations, station enhancements, targeted bus lanes, signal priority) to improve speed and reliability, station access and amenities.
($15-20M)
G

2 Safety
Sandy to Powell (4 miles)
Add/improve sidewalks, crossings, lighting to roadway to reduce severe injury and fatal crashes.
$41-62M
G

4 190th/Highland Expansion
Powell to county line (2 miles)
Widen 190th to 4-5 lanes with medians, sidewalks, and bike/ped facilities to develop continuous 4 lane corridor.
($35-54M)
G

5 New Connector Road
172nd to 190th (1.25 miles)
Construct new roadway with sidewalks, bike facilities, and roundabouts to create a continuous Clackamas to Columbia corridor.
$40-54M
CC

Sunrise Corridor

Highway 212 and the Sunrise Corridor connect future residential and employment areas to existing job centers near I-205. The potential future connection is intended to provide access to jobs and affordable housing in Clackamas County and serve as an alternative connection from the future Clackamas-to-Columbia corridor to I-205. The corridor supports freight movement to US 26, provides connections to recreation areas, and is an important bicycle connector. There were **48** serious injuries and fatalities on this corridor between 2007-2017. **32%** of this corridor is in an equity focus area.

LOCAL INVESTMENT TEAM KEY THEMES

PROJECT **Recommended** / Future Need	SAFETY	EASE	HEALTHY	EQUITY	ECONOMIC
(1) Sunrise Corridor Phase 2 (2 lane)		●	○		●
(2) Sunrise Corridor Phase 2 (4-lane)		●	○		●
(3) **Sunrise Planning**		●	○		○
(4) **Highway 212 Multimodal**	●	●	●	●	●

SCENARIO INVESTMENT **$70M** — $560M CORRIDOR NEED

(1) Sunrise Corridor Phase 2 (2 lane)
122nd to 172nd (3 miles)

Build limited access roadway with parallel multi-use path to increase capacity for future development.

($440-530M)

CC ODOT

(2) Sunrise Corridor Phase 2 (4 lane)
122nd to 172nd (3 miles)

Build limited access roadway with parallel multi-use path to increase capacity for future development.

($460-560M)

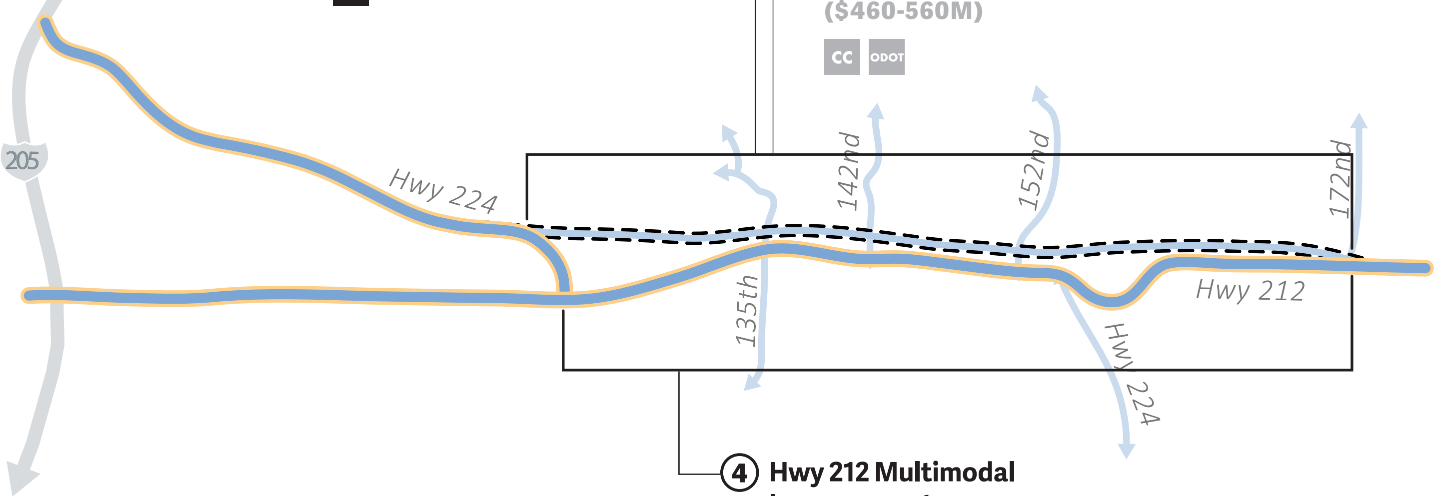
CC ODOT

(3) Sunrise Planning
122nd to 172nd (3 miles)

Design for limited access roadway with parallel multi-use path to serve future development.

$45-53M

CC



(4) Hwy 212 Multimodal Improvements

Add or enhance sidewalks, bicycle facilities and crossings to improve access for people walking and biking.

$10-14M

CC

Staff recommendation is based on feedback from Local Investment Teams and other public engagement, the Task Force and Metro Council values and outcomes, and the feasibility of delivering projects to the public within a reasonable time frame.

Metro

TV Highway

Tualatin Valley (TV) Highway connects multiple community centers, including Forest Grove, Cornelius, Hillsboro, Aloha, Beaverton and Portland. The corridor serves many communities of color, limited English proficiency speakers and lower income communities, and supports one of the highest ridership bus lines in the region. The corridor also supports significant freight movement. It has multiple regional trail crossings and serves several Urban Growth Boundary expansion areas. There were **204** serious injuries and fatalities on this corridor between 2007-2017. **85%** of this corridor is in an equity focus area.

LOCAL INVESTMENT TEAM KEY THEMES

PROJECT **Recommended** / Future Need	SAFETY	EQUITY	ACCESS/ TRANSIT	HEALTHY
(1) **Enhanced Transit**	○	●	●	●
(2) **Canyon Rd/Downtown Beaverton**	●	●	○	●
(3) **Safety**	●	●	●	●
(4) **"Complete Street"**	●	●	○	●
(5) **FG Street Improvements**	●	●	○	●
(6) Council Creek Trail		●	○	●
(7) Canyon/West Slope	●			○
(8) **Hillsboro Transit Center**		●	●	●
(9) **Corridor Planning**		●	●	●

SCENARIO INVESTMENT

$350M **$50M (LEVERAGED)**

$600M CORRIDOR NEED

[SEE PROJECTS MAP NEXT PAGE]

Staff recommendation is based on feedback from Local Investment Teams and other public engagement, the Task Force and Metro Council values and outcomes, and the feasibility of delivering projects to the public within a reasonable time frame.

20061

Metro

TV Highway

(1) Enhanced Transit
Forest Grove to Beaverton Transit Center (16 miles)

Bus enhancements for Line 57 (operations, station enhancements, targeted bus lanes, signal priority) to improve speed and reliability, station access and amenities throughout the corridor.

$53M *[could leverage federal funds]*

WC TM

(6) Council Creek Trail
Hillsboro to Forest Grove (5.5 miles)

Regional trail connecting Hillsboro, Cornelius and Forest Grove.

($25-37M)

WC

(8) Hillsboro Transit Center

Convert transit center and adjacent streets to 2-way to allow buses to circulate more directly (traffic reconfiguration, signal replacements, platform modifications).

$10-12M

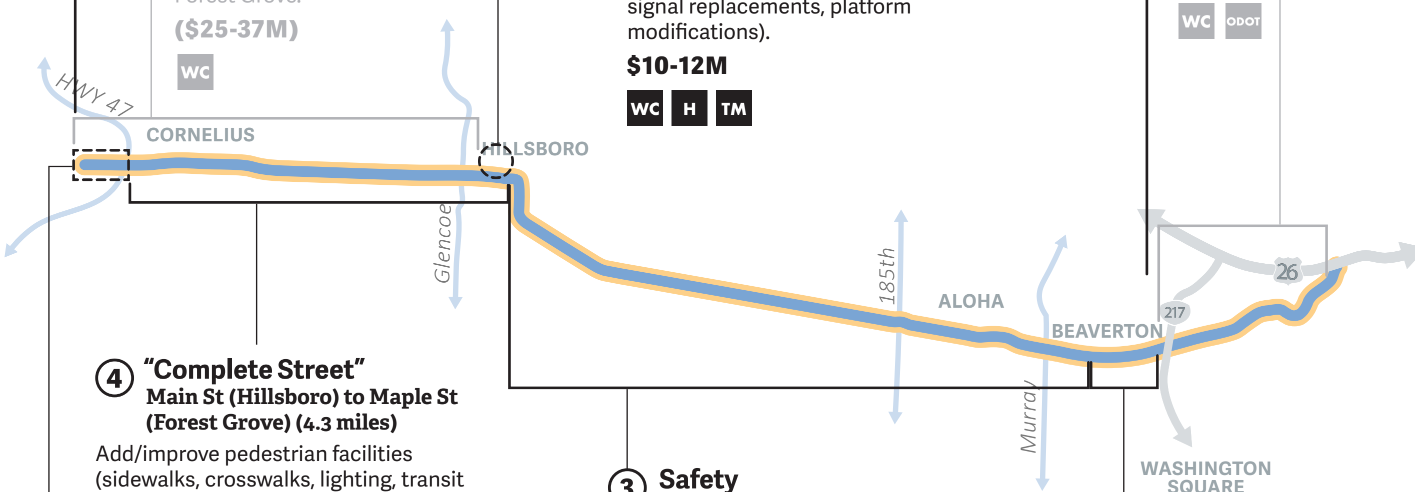
WC H TM

(7) Canyon/West Slope
117th to Camelot (2.9 miles)

Add/improve walking and biking facilities including crossings.

($15-24M)

WC ODOT



(4) "Complete Street"
Main St (Hillsboro) to Maple St (Forest Grove) (4.3 miles)

Add/improve pedestrian facilities (sidewalks, crosswalks, lighting, transit improvements), bicycle facilities, safety features, stormwater facilities.

$40-48M

WC ODOT

(3) Safety
Hocken (Beaverton) to Maple (Hillsboro) (8.1 miles)

Improve sidewalks, crossings, lighting and bicycle facilities to reduce severe injury and fatal crashes.

$154-185M

WC ODOT TM

(2) Canyon Rd/Downtown Beaverton
Hocken to 117th (.9 miles)

Update street with medians, crosswalks, sidewalk improvements and railroad "quiet zone" to support land uses and improve safety.

$20-27M

WC ODOT

(5) Forest Grove Street Improvements
B Street to Highway 47 (2.7 miles)

Improve pedestrian facilities (sidewalks, crosswalks, lighting, transit improvements), bicycle facilities, safety features, stormwater facilities.

$5-7M

WC

(9) Corridor Planning
Forest Grove to Portland Union Station (26 miles)

Planning work for longer-term corridor investments including transit enhancements to improve speed and reliability, station access and amenities. Alternatives analysis for transportation, transit, land use, railroad interface.

$12-14M

M WC TM

Staff recommendation is based on feedback from Local Investment Teams and other public engagement, the Task Force and Metro Council values and outcomes, and the feasibility of delivering projects to the public within a reasonable time frame.

Metro

185th Ave

SW 185th Avenue carries up to 65,000 vehicles and over 3,900 people on transit a day. It serves a concentration of communities of color, lower-income communities and provides access to education centers and medical clinics. It has high transit ridership potential, a high safety need, and a concentration (**90%** of corridor) of equity focus areas. There were **45** serious injuries and fatalities on this corridor between 2007-2017.

LOCAL INVESTMENT TEAM KEY THEMES

PROJECT **Recommended** / Future Need	TRANSIT	ACESS/ EASE	EQUITY	SAFETY	LEVERAGE
(1) Enhanced Transit	●	●	●	○	●
(2) MAX Overcrossing	○	●			
(3) Mid-block Crossings	○		●	●	●
(4) Intersection Improvements	○		○	●	●
(5) "Complete Street"		○	●	●	

SCENARIO INVESTMENT — **$200M** **$20M (LEVERAGED)** — $270M CORRIDOR NEED

(1) Enhanced Transit
Rock Creek Blvd to Farmington (entire corridor, 5 miles)

Bus enhancements for Line 52 (operations, station enhancements, targeted bus lanes, signal priority) to improve speed and reliability, station access and rider experience throughout corridor.

$50-60M

WC TM

(2) MAX Overcrossing
185th/Baseline

Build bridge for MAX Blue Line over 185th to reduce traffic, and bus and train delays.

$70-87M

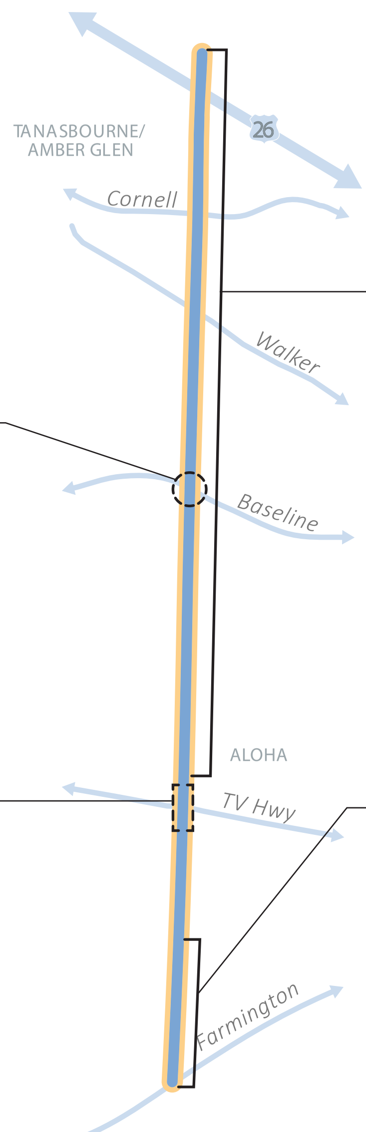
TM

(4) Intersection Improvements
Alexander to Blanton (.25 miles)

Fix intersections to improve safety and efficiency for all users (intersection alignment at Blanton, crossing signal at Alexander).

$10-14M

WC



(3) Mid-block Crossings
Cascade to West Union (4 miles)

Add actuated pedestrian crossings at four locations to improve access for people walking.

$8-11M

WC

(5) "Complete Street"
Kinnaman to Farmington (.7 miles)

Widen to 3 lanes, add curbs, sidewalks, crossings, lighting, bike facilities, stormwater facilities.

$24-32M

WC

Staff recommendation is based on feedback from Local Investment Teams and other public engagement, the Task Force and Metro Council values and outcomes, and the feasibility of delivering projects to the public within a reasonable time frame.

Metro

82nd Ave

82nd Avenue connects Clackamas Town Center, the Jade District, Montavilla and Roseway neighborhoods, and the Portland International Airport. It is an alternative route to I-205 and serves one of the most diverse populations in the region. 82nd Avenue also has the highest bus line ridership in the region and provides access to the Blue, Red, and Green MAX lines. It serves as a main street for various communities, provides local access and circulation, and is a Civic Corridor within the City of Portland. There were **196** serious injuries and fatalities on this corridor between 2007-2017. **74%** of this corridor is in an equity focus area.

LOCAL INVESTMENT TEAM KEY THEMES

PROJECT **Recommended** / Future Need	SAFETY	EQUITY	ACCESS/ EASE	TRANSIT
1 Enhanced Transit/BRT	○	●	●	●
2 Airport Way				
3 Safety (Portland)	●	●	●	
4 Alderwood-Killingsworth Path Planning	●	●	●	●
5 Max Station Access Planning	○	●	●	●
6 Safety (Clackamas)	●	●	●	
7 State of Good Repair				

SCENARIO INVESTMENT: $370M — $160M (LEVERAGED) — $820M CORRIDOR NEED

4 Alderwood-Killingsworth Path Planning
(1 mile)

Design multi-use path to address complete lack of safe walking/biking facility.

$.5-.6M

PP ODOT

3 Safety (Portland)
Killingsworth to Clatsop (7 miles)

Add/improve sidewalks, crossings, lighting to reduce severe injury and fatal crashes.

$120-144M

PBOT ODOT

7 State of Good Repair
Killingsworth to Clatsop (7 miles)

Address maintenance issues (rebuild street and signals, address ADA needs) to facilitate jurisdictional transfer from ODOT to PBOT.

$30M *[additional investments needed]*

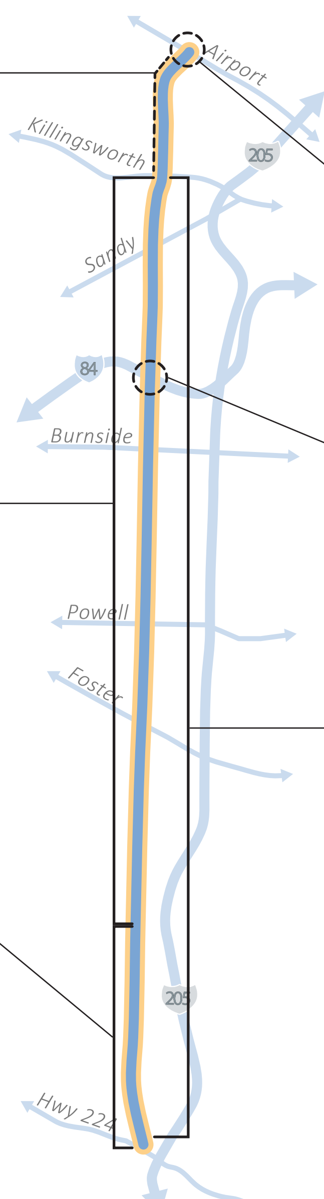
ODOT PBOT

6 Safety (Clackamas)
Clatsop to Sunnybrook (2 miles)

Add/improve sidewalks, crossings, lighting to reduce severe injury and fatal crashes.

$30-45M

ODOT



2 Airport Way
Intersection with 82nd Ave

Partial grade separation to reduce auto congestion and accommodate airport growth.

$35M *[leverages Port of Portland funds]*

PP

5 MAX Station Access Planning
82nd Ave Station

Design to improve station access to the west side of 82nd to reduce the need for dangerous pedestrian crossings.

$.5M

TM

1 Enhanced Transit/ Bus Rapid Transit
Killingsworth to Clackamas Transit Center (9 miles)

Bus enhancements for Line 72 (operations, station enhancements, targeted bus lanes, signal priority) to improve speed and reliability, station access and amenities.

$113M *[could leverage federal funds]*

TM M

Burnside

Burnside Street connects Washington County (where it's known as Barnes Rd) and East Multnomah County through downtown Portland. It is a designated "emergency lifeline" route and aids emergency vehicles during disaster recovery efforts. It is a critical Willamette River crossing for all users and a Main Street for numerous commercial centers. It also provides connections to MAX and Gresham Transit facilities. There were **141** serious injuries and fatalities on this corridor between 2007-2017. **71%** of this corridor is in an equity focus area.

LOCAL INVESTMENT TEAM KEY THEMES

PROJECT **Recommended** / Future Need	SAFETY	EQUITY	ACCESS/ EASE
1 Enhanced Transit	○	●	●
2 EQRB Bridge	●		
3 Safety (Portland)	●	○	○
4 Safety (Gresham)	●	●	○
5 Transit Center Planning	○	●	○
6 W 95th Ave Trail	●		○
7 "Complete streets"	○		○

SCENARIO INVESTMENT

$230M

$450M (LEVERAGED)

$890M CORRIDOR NEED

6 W 95th Ave Trail
Morrison to Sunset Transit Center

Multimodal trail along W 95th.

($10-13M)

WC

7 "Complete Streets"
89th to Portland city limit

Widen to 3-5 lanes and build to urban standard (curbs, sidewalks, lighting, bike and stormwater facilities).

($32-54M)

WC

2 Earthquake Ready Burnside Bridge
W 3rd to MLK

Replacement or seismic upgrade of Burnside Bridge to improve safety and lifeline route.

$150M *[leverages state/ county/federal funds]*

MC

3 Safety (Portland)
E 12th to Gresham city limit (8 miles)

Add sidewalks, crossings, lighting to reduce severe injury and fatal crashes.

$10-15M

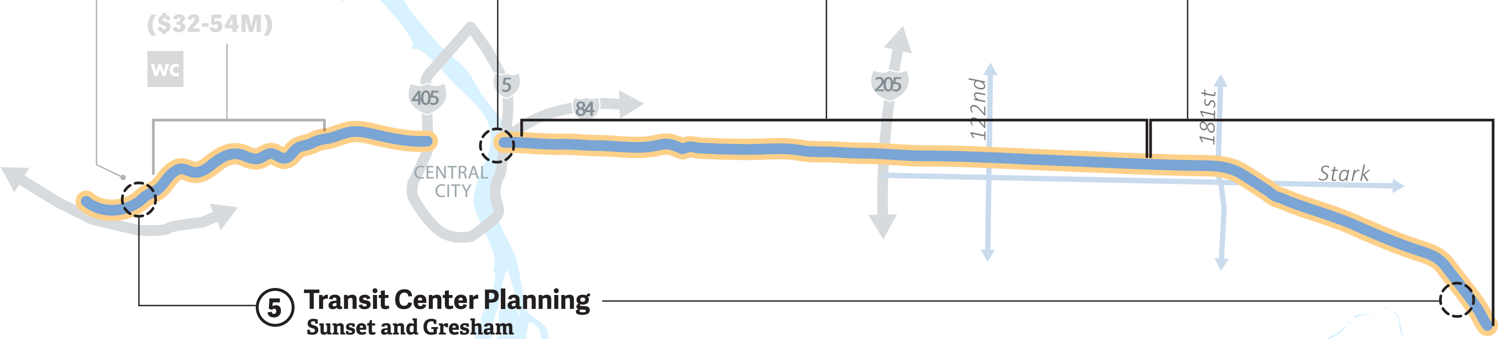
PBOT

4 Safety (Gresham)
Gresham city limit to Powell (5 miles)

Add sidewalks, crossings, lighting to reduce severe injury and fatal crashes.

$10-15M

G



5 Transit Center Planning
Sunset and Gresham Transit Centers

Design multimodal access improvements (e.g., sidewalks, crossings, bike facilities, plaza).

$1M

TM WC G

1 Enhanced Transit
Sunset Transit Center to NE Kane (entire corridor, 19 miles)

Bus enhancements for Line 20 (operations, station enhancements, targeted bus lanes, signal priority) to improve speed and reliability, station access and amenities throughout the corridor.

$50M

PBOT TM WC

Central City

The Central City is the center of the Metro region and a key engine of the state's economy. It has the largest concentration of jobs and affordable housing in the state and is expected to receive over 30% of the city's projected future growth. The corridor also has a multi-modal transportation network with a wide variety of demands on the streets- walking, biking, MAX, streetcar, buses, scooters, freight delivery vehicles, cars and more. All MAX lines and 75% of the region's frequent bus lines serve and pass through the Central City. There were **101** serious injuries and fatalities on this corridor between 2007-2017. **97%** of this corridor is in an equity focus area.

PROJECT **Recommended** / Future Need	ACCESS/ TRANSIT	EQUITY
	LOCAL INVESTMENT TEAM KEY THEMES	
① **Central City in Motion**	●	●
② Green Loop Connections (Future Need)	●	
③ **MAX Tunnel Planning**	●	●
④ **Ross Island Bridgehead**	●	

SCENARIO INVESTMENT: **$220M** · **$50M LEVERAGED** · $390M CORRIDOR NEED

① Central City in Motion
Across Central City

Treatments to improve walking, biking and transit to make it easier and safer to take transit, walk and bike in the Central City.

$80-96M

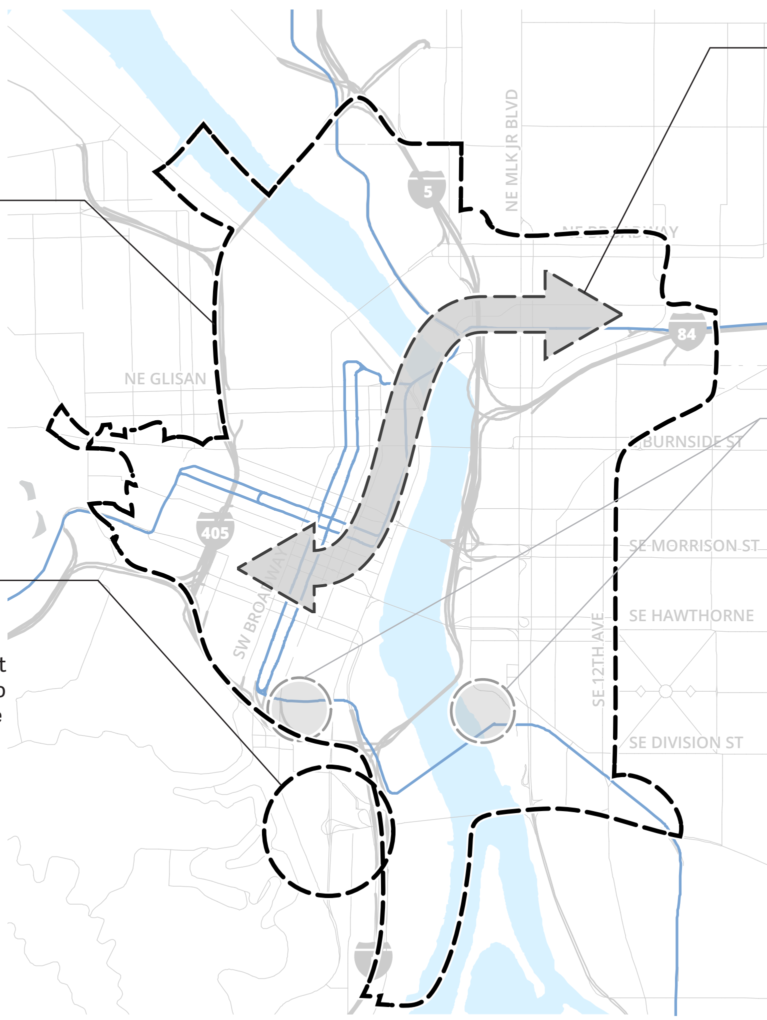
PBOT TM

④ Ross Island Bridgehead
Harrison to Barbur/Naito (1 mile)

Reconstruct streets at west end of Ross Island Bridge to improve access and reduce neighborhood barriers.

$50-75M

PBOT



③ MAX Tunnel Planning
Goose Hollow to Lloyd Center (3 miles)

Plan and design downtown tunnel to improve speed and reliability of MAX service, and address the region's most significant transit bottleneck.

$50M

M TM

② Green Loop Key Connections
SE and SW quadrants

Create bike/ped connections across key barriers for future Green Loop.

($10-40M)

PBOT

Staff recommendation is based on feedback from Local Investment Teams and other public engagement, the Task Force and Metro Council values and outcomes, and the feasibility of delivering projects to the public within a reasonable time frame.

Metro

122nd Avenue

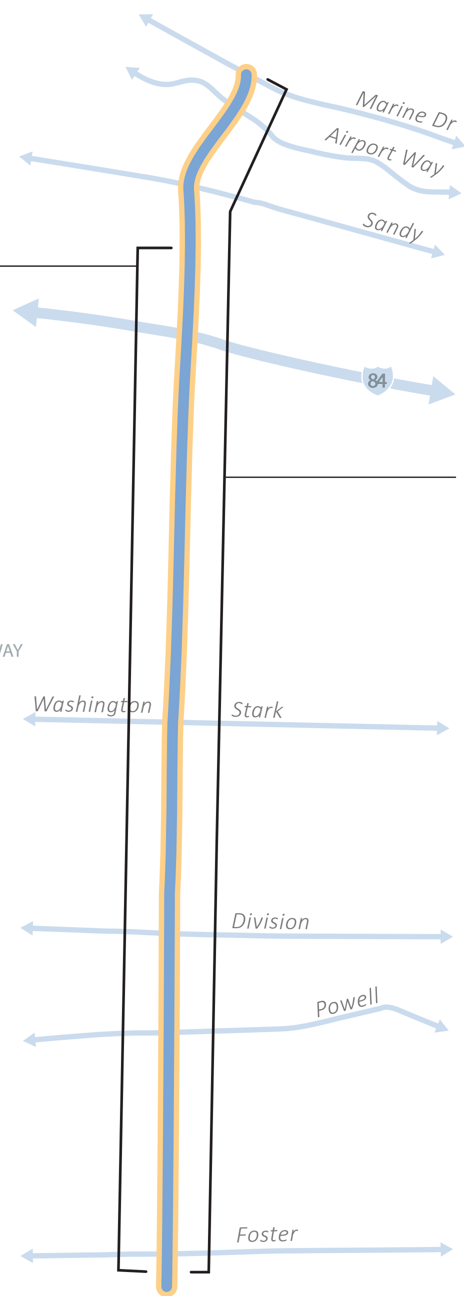
122nd Avenue connects Foster Road to Marine Drive. The corridor serves TriMet Line 73 and connects to various East-West transit lines, including the MAX Blue line. It is identified as a Civic Corridor by the City of Portland from NE Sandy to Foster, and provides access to trails, including the Marine Drive trail, I-84 trail, and Springwater Corridor. There were **75** serious injuries and fatalities on this corridor between 2007-2017. **88%** of this corridor is in an equity focus area.

LOCAL INVESTMENT TEAM KEY THEMES

PROJECT **Recommended** / Future Need	SAFETY	ECONOMIC	EQUITY	TRANSIT
① **Enhanced Transit**	○	○	●	●
② **Safety**	●	○	●	

SCENARIO INVESTMENT $90M

$160M CORRIDOR NEED



① Enhanced Transit
Skidmore to Foster (5.5 miles)

Bus enhancements for Line 73 (operations, station enhancements, targeted bus lanes, signal priority) to improve speed and reliability, station access and rider experience.

$15-18M

PBOT TM

② Safety
Marine Dr to Foster Rd

Add proven safety countermeasures (sidewalks, crossings, lighting) to roadway to reduce severe injury and fatal crashes. May include **I-84 trail connection** (add two-way buffered or curb-protected bikeway to extend I-84 trail toward I-205 path), and **Sandy intersection reconfiguration** (convert highway-style ramps at 122nd/ Sandy into an urban intersection with signals and crosswalks to improve access and safety).

$50-68M

PBOT

Staff recommendation is based on feedback from Local Investment Teams and other public engagement, the Task Force and Metro Council values and outcomes, and the feasibility of delivering projects to the public within a reasonable time frame.

20061

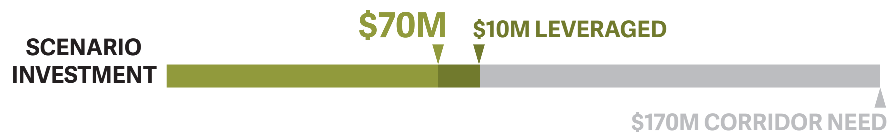
Metro

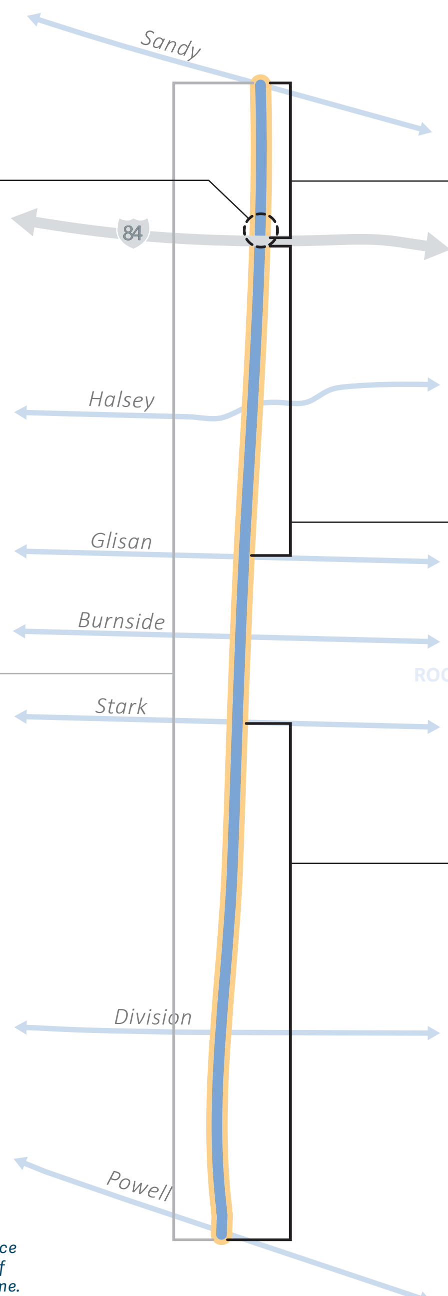
162nd Ave

162nd Avenue connects NE Sandy Blvd and SE Powell Blvd on the border between Portland and Gresham. This corridor serves historically marginalized communities in the Rockwood neighborhood and provides access to schools, residential neighborhoods and commercial areas. It serves as a North-South bus connection to various East-West transit lines and provides access to Powell Butte trails and I-84 trail. There were **34** serious injuries and fatalities on this corridor between 2007-2017. **92%** of this corridor is in an equity focus area.

LOCAL INVESTMENT TEAM KEY THEMES

PROJECT **Recommended** / Future Need	SAFETY	TRANSIT	EASE	EQUITY
1 Enhanced Transit	○	●		●
2 **Safety**	●	○	○	●
3 **"Complete Streets" Gresham**	●	○	●	●
4 **"Complete Streets" Portland**	●	○	●	●
5 **Railroad Undercrossing**	●		●	●





5 Railroad Undercrossing
Add bicycle/pedestrian access at existing railroad overcrossing.
$5-9M
G MC

4 "Complete Streets" Portland
I-84 to Sandy
Add turn lanes, and add improved/ continuous curbs, sidewalks, lighting, bike and stormwater facilities.
$10-18M
PBOT

3 "Complete Streets" Gresham
Glisan to I-84 (1 mile)
Widen to 3 lanes and add improved/ continuous curbs, sidewalks, lighting, bike and stormwater facilities.
$30-41M
G

1 Enhanced Transit
Sandy to Powell (entire corridor, 4 miles)
Bus enhancements for Line 74 (operations, station enhancements, targeted bus lanes, signal priority) to improve speed and reliability, station access and amenities throughout the corridor.
($12-16M)
PBOT

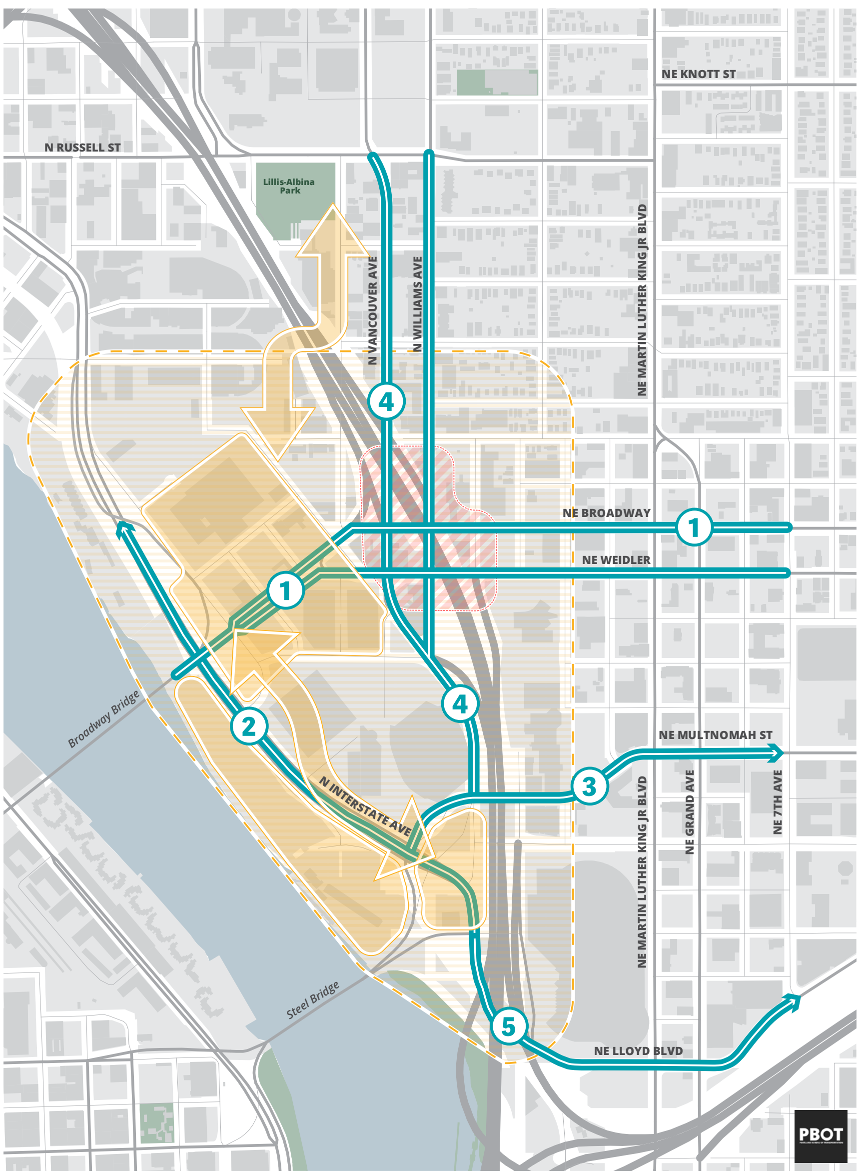
2 Safety
Stark to Powell (2 miles)
Add sidewalks, crosswalks, medians and lighting to reduce severe injury and fatal crashes.
$5-7M
PBOT

Staff recommendation is based on feedback from Local Investment Teams and other public engagement, the Task Force and Metro Council values and outcomes, and the feasibility of delivering projects to the public within a reasonable time frame.

Metro

Albina Vision

The Albina Vision concept offers a bold image of a new neighborhood in the historic Lower Albina area of N/NE Portland. The concept includes a reconfigured street grid, large open spaces, and direct access to the Willamette River for all people, including children. Achieving this long-term vision will require thorough study, extensive public engagement, coordination with existing land-owners, and major public investments. Plans and strategies would synthesize the Portland City Council-adopted Central City 2035 Plan with the Albina Vision concept to establish a groundwork for future investment and expand upon Metro-funded work around public engagement and early design concepts. These projects are intended to provide short-term improvements to the neighborhood as a larger restorative vision is developed. There were **38** serious injuries and fatalities on this corridor between 2007-2017. **100%** of this corridor is in an equity focus area.



1. **Broadway/Weidler Streetscape**
   Broadway Bridge to NE 7th (.6 miles)
   Develop an Albina "main street" with street lighting, public art, and enhanced transit stations to improve access and safety for all.
   $8-10M

2. **Interstate/N. Portland Greenway**
   Steel Bridge to NE Tillamook (.8 miles)
   Enhanced crossings and a multi-use path to connect the Rose Quarter Transit Center to employment and housing areas further north.
   $13-16M

3. **Multnomah Blvd Streetscape**
   NE Interstate to 7th Ave (.5 miles)
   Green street features, lighting and upgraded transit stations to provide safe connections between Lower Albina, Convention Center and Lloyd neighborhoods.
   $5-6M

4. **Vancouver/Williams**
   NE Russell to Multnomah (.8 miles)
   Street lighting, better transit stops, and improvements to existing bikeway.
   $7-8M

5. **Lloyd Blvd**
   Steel Bridge to NE 7th Ave (.5 miles)
   Multi-use path to strengthen mulitmodal connection between Albina, Lloyd and SE Portland.
   $3-4M

6. **Albina Urban Design Strategy**
   Areawide
   Develop plans and strategies to guide Albina Vision implementation. Key elements include: urban design strategy, Rose Quarter TC, bridgehead and river connections, multimodal connections.
   $12M

Staff recommendation is based on feedback from Local Investment Teams and other public engagement, the Task Force and Metro Council values and outcomes, and the feasibility of delivering projects to the public within a reasonable time frame.

Metro

Powell Blvd

Powell Boulevard links Portland's west side to East Multnomah County for all modes, including freight, and connects historically underserved communities. TriMet identifies Powell as a key corridor to increase ridership. This corridor serves as main street for numerous commercial centers. There were **159** serious injuries and fatalities on this corridor between 2007-2017. **84%** of this corridor is in an equity focus area.

LOCAL INVESTMENT TEAM KEY THEMES

PROJECT **Recommended** / Future Need	SAFETY	TRANSIT	ECONOMIC	EQUITY	RESILIENCY
(1) Transit Planning	○	●	●	○	
(2) Intersection Improvements			○		
(3) Intersection Capacity			○		
(4) Downtown Gresham Bikeway	●		●	●	

SCENARIO INVESTMENT $30M

$40M CORRIDOR NEED
[ADDITIONAL NEED PENDING ODOT "STATE OF GOOD REPAIR" ANALYSIS]

(1) Transit Planning
Willamette River to I-205 (5 miles)

Design for longer-term transit enhancements such as Bus Rapid Transit or MAX. (Short-term bus enhancements have been studied and determined not to be a good opportunity for this corridor.)

$20M

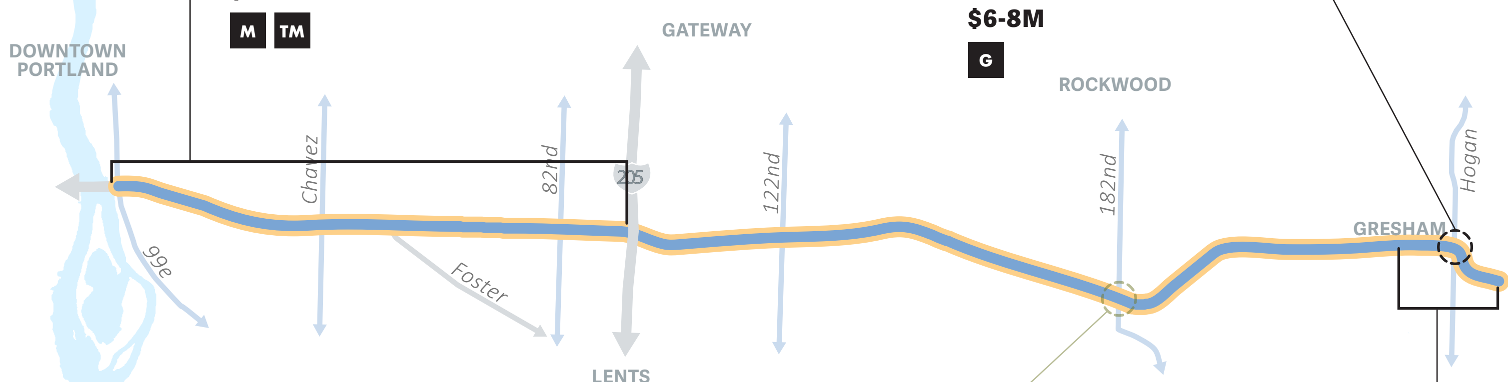
M TM

(3) Intersection Capacity
Hogan/Powell

Add second northbound lane to Hogan at Powell to ease traffic congestion.

$6-8M

G



(2) Intersection Improvements
182nd/Powell

Add dual left turn lanes to 182nd in both directions at Powell to ease traffic congestion.

($3-7M)

G

(4) Downtown Gresham Bikeway
Cleveland to 1st (.5 miles)

Add two-way curb-protected bikeway on north side of Powell to connect Gresham to Powell Valley neighborhoods.

$3-4M

G

2020 TRANSPORTATION FUNDING MEASURE

Staff recommendation is based on feedback from Local Investment Teams and other public engagement, the Task Force and Metro Council values and outcomes, and the feasibility of delivering projects to the public within a reasonable time frame.

20061

Metro

Regionwide Program Investment Summary

Preventing displacement in investment corridors

The Metro Council and Transportation Funding Task Force want to make sure that transportation investments support the people that live along the corridor. To that end, they are proposing that 2% of each corridor's funding be set aside to bring individuals and organizations together to identify policy and funding needs to strengthen the community, reduce the risk of displacement, and support existing businesses and residents ahead of possible transportation investments. A portion of these funds will also be available to enact the needs and strategies identified through this equitable development strategy process, and many of the programs discussed below will also likely be beneficial in supporting identified needs.

Benefits beyond corridors: Regionwide programs

The Metro Council has directed that the potential transportation funding measure include regionwide programs to provide benefit and meet community needs beyond specifically identified transportation projects like those in these recommendations.

Based on community engagement and input from the Transportation Funding Task Force, the Metro Council directed staff to proceed with further development of the following potential programs on September 24, 2019.

Proposed program criteria, processes and funding commitments will be further developed through engagement with community and partners in the coming months.

Likely programs

Safe Routes to School
Projects and programs that help students get to school safely, affordably, and efficiently by walking, biking and taking transit.

Safety Hot Spots
Reducing crashes where they happen most through grants to improve safety at key high-crash corridors and intersections throughout the region.

Better Bus
Strategic investments to make transit better by improving capacity and reliability and reducing delays along major bus lines.

Active Transportation Regional Connections
Grants and technical assistance to fill critical gaps in the regional pedestrian and bicycle networks, such as off-street trails, bridges and paths.

Transit Vehicle Electrification
Funding for TriMet and SMART to achieve their goals of phasing out diesel bus fleets.

Main Streets Revitalization
Creating welcoming business districts by investing in sidewalks, crosswalks, bikeways, lighting, street trees and vegetation, seating and art.

Fare Affordability: Students
Free transit passes for lower-income high school students throughout the region.

Protecting and Preserving Multi-Family Housing
Acquire and rehabilitate multifamily housing to protect affordability amid transportation investments.

Future Corridor Planning
Preparing for what's next by funding planning for future transit investments and other major improvements.

Metro

Metro's 2020 Transportation Investment Measure

City Commission Update

November 12, 2019

#getmoving2020

Let's get moving




The Metro Council is working with partners and the community to develop a potential 2020 transportation investment measure that could be a bold leap for our region.

Key Values & Outcomes

- Ease Congestion
- Clean Air, Water & Health
- Improve Safety
- Equity
- Support Resiliency
- Economic Growth
- Leverage

Preliminary Metro Staff Recommendation

$3.11B Investment Scenario	
$1.33B	• Regional Projects
$390M	• Clackamas County
$560M	• Washington County
$830M	• Multnomah County

Regional Investments

Projects	Programs
• Southwest Corridor • Portions of 82nd Avenue, Burnside & Central City	• Safe Routes to School • Active Transportation Regional Connections • Main Streets Revitalization

McLoughlin Boulevard Corridor

LOCAL INVESTMENT TEAM KEY THEMES

PROJECT **Recommended** / Future Need	SAFETY	ACCESS/ TRANSIT	ECONOMIC	EQUITY
(1) **Enhanced Transit**	○	●		○
(2) **Safety**	●	●		○
(3) Kellogg Creek Dam			●	
(4) **I-205 Ramp Improvements**			○	
(5) **Trolley Trail Planning**				○
(6) Reedway Bike Overcrossing			○	
(7) **Willamette Falls Bike/ Ped Plan**			●	
(8) **Park Ave Park & Ride Expansion**		●		
(9) Portland Ave Streetscape	○			
(10) **Corridor Planning**	●	○	●	

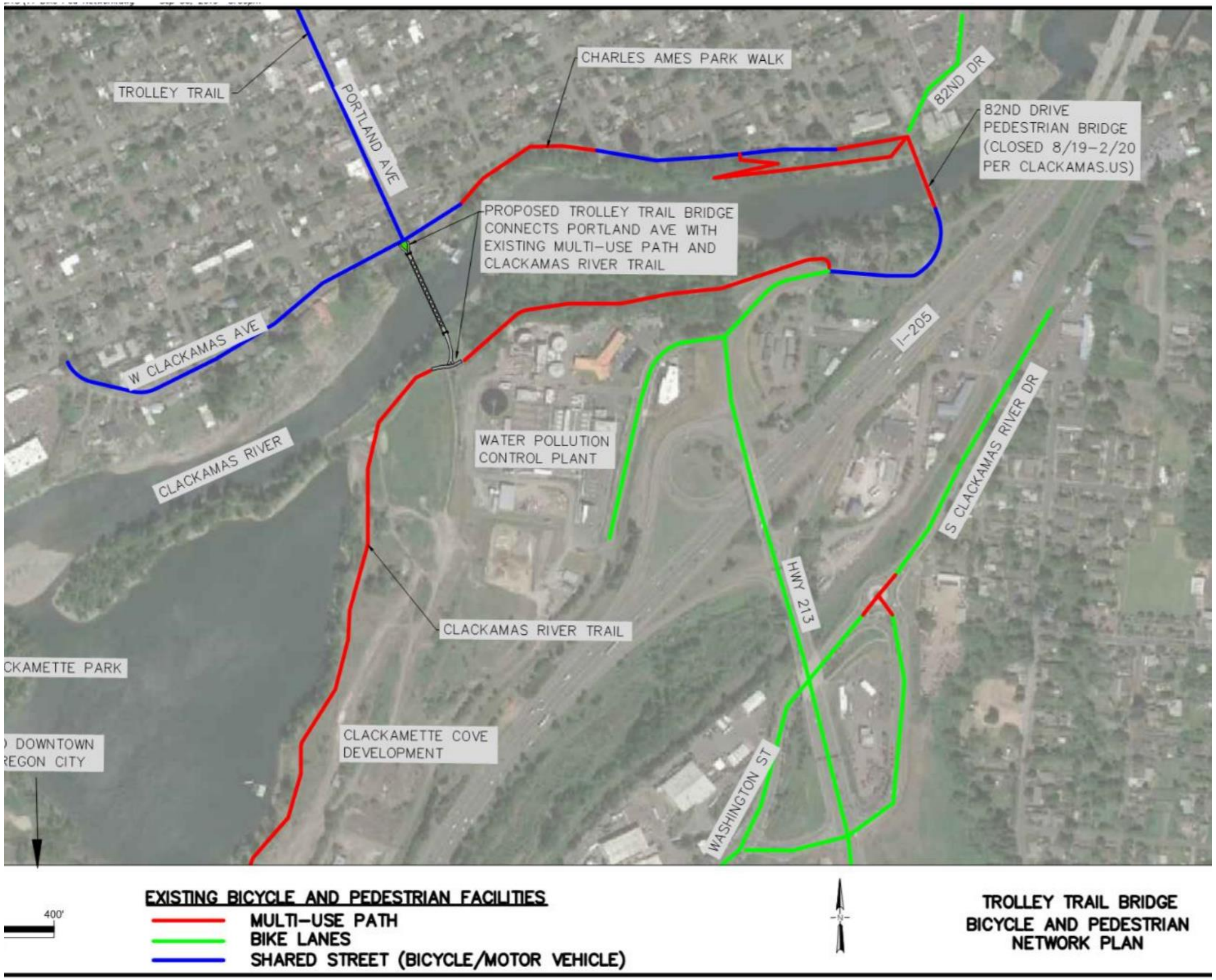
SCENARIO INVESTMENT

MAX Orange Line Park Avenue Park & Ride Expansion

$16-19M

Enhanced Transit: Milwaukie to Oregon City

$85-102M



Trolley Trail Pedestrian & Bicycle Bridge Final Design

$1M

I-205 & 99E Interchange Area

$7-9M

Willamette Falls Bike and Pedestrian Plan: 10th Street to Railroad Avenue

$1-2M

Next Steps

November – Metro Council Update & Task Force Meeting

Early December – Metro Council work session & public comment on projects

Mid December – Task Force Meeting

Late May – Metro Council decision on whether to refer package to voters in November 2020