NORTHWEST TRANSIT EXCHANGE
EUGENE, OR • 2023

WELCOME

to the

Northwest Transit Exchange

Conference 2023

Hosted by Lane Transit District &
the City of Eugene

Day Two Agenda

- Session One: 9:00 AM – 12:00 PM
- Lunch 12:00-1:30 PM
- Technical Tours: 1:30-4:30 PM
  - West Eugene EmX and Santa Clara Transit Station Tour
    - Team Lead: Tom Schwetz, LTD
  - PeaceHealth Bike Share Tour
    - Team Leads:
      - Jody Trendler, City of Eugene
      - Brodie Hylton, Cascadia Mobility

Up Next:

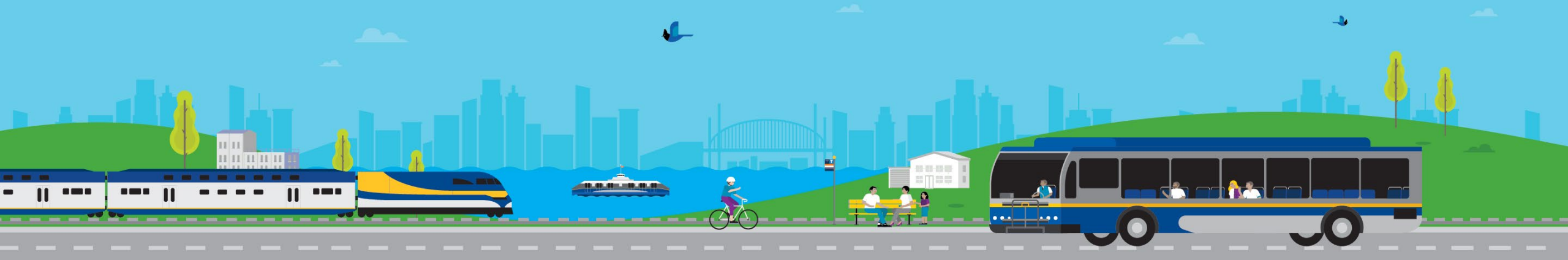
TransLink

Bus Speed and Reliability

TransLink

2023 Bus Speed & Reliability Report

Northwest Transit Exchange
Oct 6, 2023



Agenda

Purpose:

To share how TransLink is building the business case for bus priority in the 2023 Bus Speed & Reliability Report and some lessons learned.

See the full Bus Speed and Reliability Report at translink.ca/buspriority

Contents:

- Overview
- **Delay** and impacts
- **Infrastructure** and results
- **Gaps** in the bus priority network
- **Vision** and next steps
- Resource slides

TL;DR

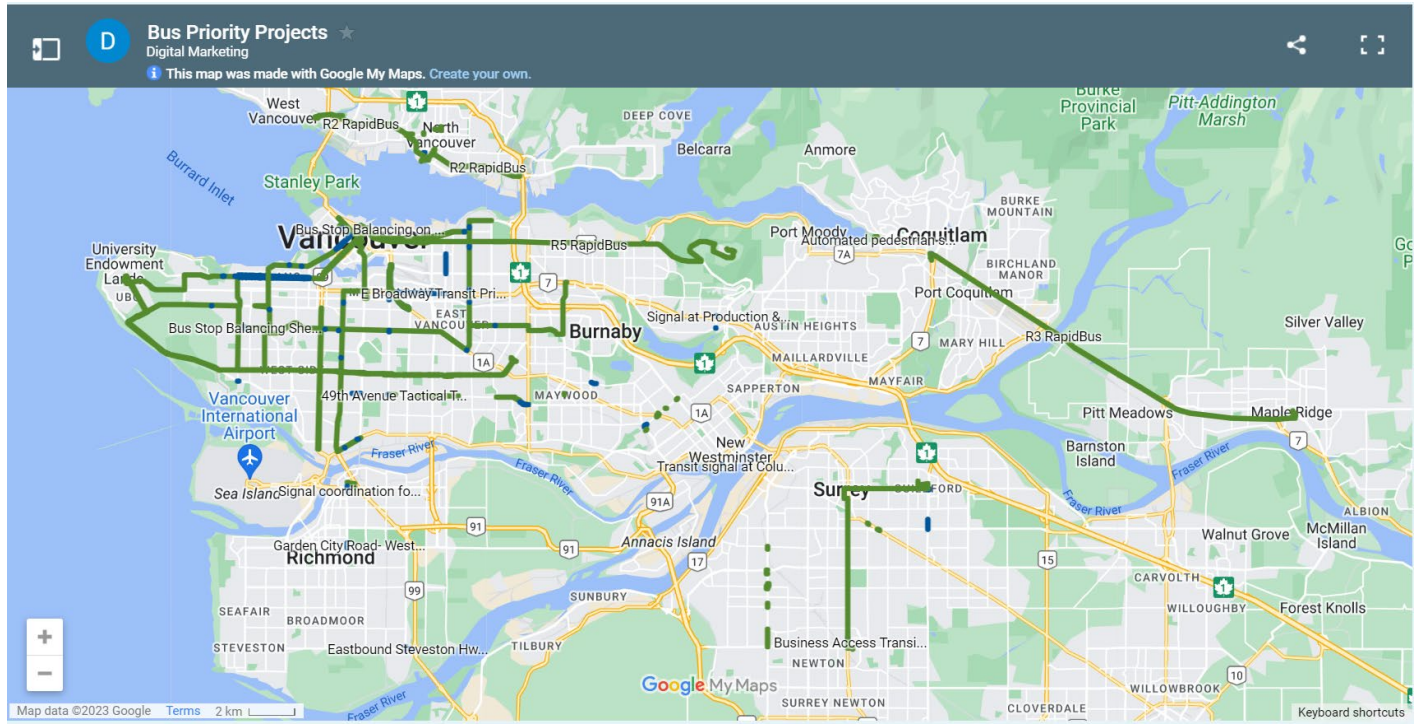
https://youtu.be/KT4KYodShjc

Bus Priority Programs Team

Multi-disciplinary team of 16 people, including planners, engineers, data scientists, public affairs specialists, project managers, and managers to deliver bus priority measures.

- Launched five RapidBus lines (sixth under construction, launching early 2024)
- Launched a competitive funding program and awarded $15M to municipalities to plan, design, and deliver dozens of smaller scale bus priority measures
- Coming Soon: Confirming 2 – 3 BRT corridors to begin planning/design

Bus priority measures since 2019. Includes corridor-scale projects like RapidBus and bus stop balancing and spot-treatments like bus bulbs, queue jumps, turn signals, etc.



Bus priority is key to achieving regional goals

Faster and more reliable buses support each of Transport 2050's Five Goals to improve access for everyone by making transportation more:

- Convenient
- Reliable
- Affordable
- Safe & Comfortable
- Carbon-free

Transport 2050's 10-Year Priorities aims to expand bus priority to the full Frequent Transit Network. By prioritizing the movement of transit on roads, we can more quickly expand the network of reliable and fast transit service—including new Bus Rapid Transit—and improve the effectiveness and efficiency of our fleet.

TransLink's 2023 Bus Speed & Reliability Report

This is the foundation for future investments in bus priority. Our goal is to present a strong business case for bus priority measures that is rooted in customer-service and compelling data.

The report has been divided and published in sections:

- **Delay** and impacts
- **Infrastructure** and results
- **Gaps** in our bus priority network
- **Vision** for future bus priority

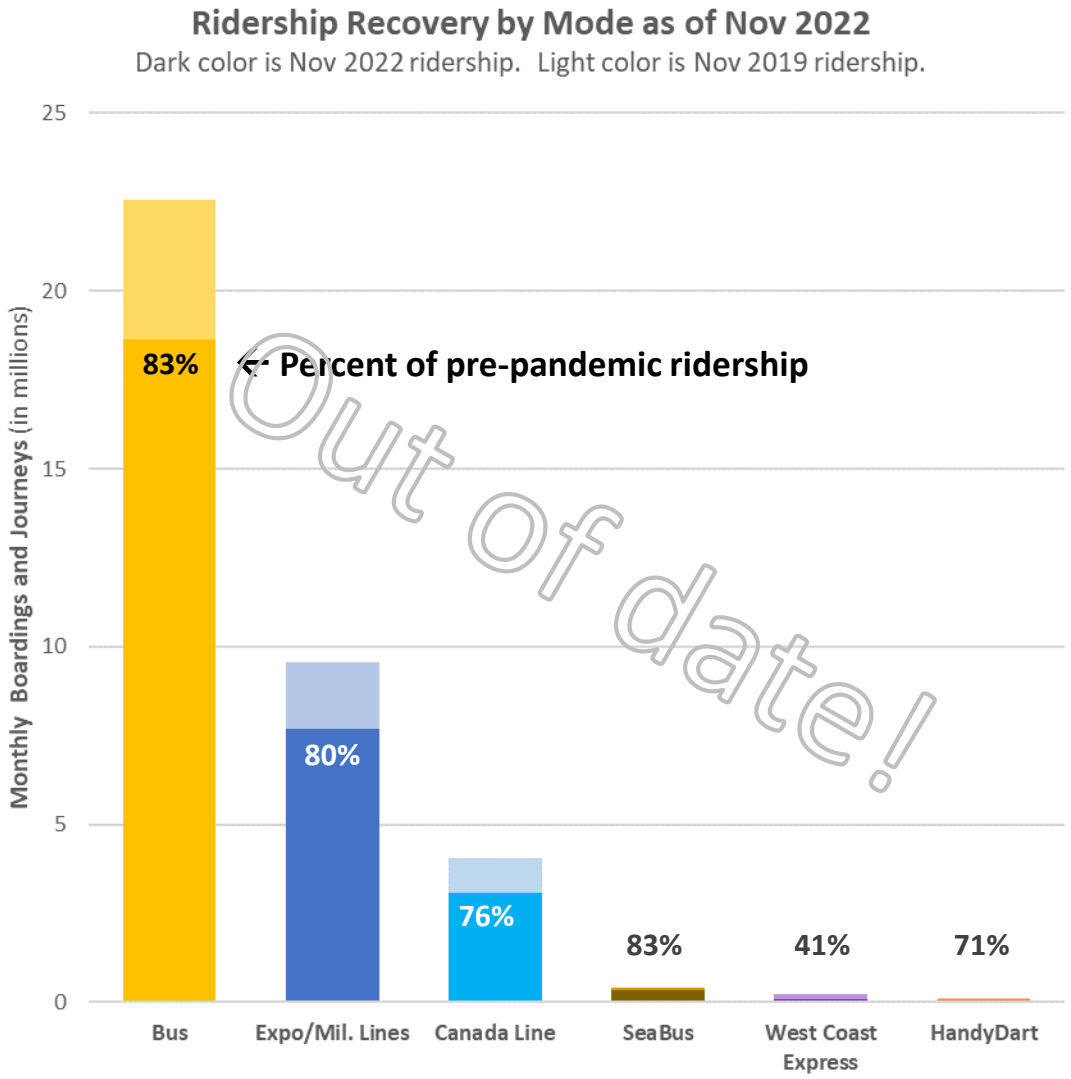
See the full report at
translink.ca/buspriority

Bus delay affects *most* of our customers

Bus ridership is larger than all other transit modes combined. Buses serve

- Almost two-thirds of individual transit trips
- Three-quarters of transit journeys

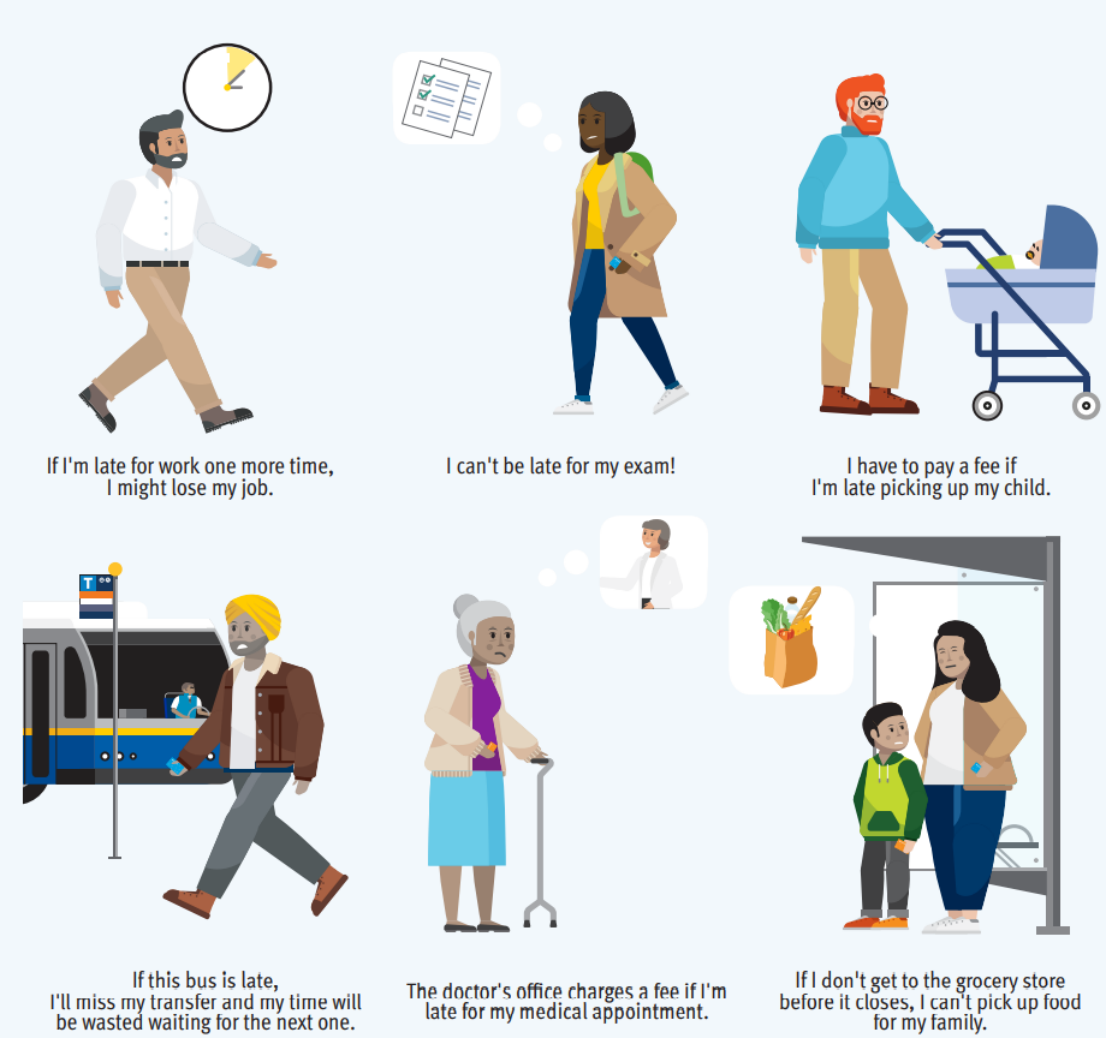
Bus ridership recovery is now at ~~~83%~~ 90% of pre-pandemic levels. *This* is greater than ridership on all other transit modes *before* the pandemic.



Delay has direct impacts on peoples' lives

Bus delays have real impacts on the lives of people who rely on transit. It affects their ability to get to work, school, and medical appointments.

> *In other words, delay to buses causes people to plan their lives around transit, rather than planning transit around their lives*

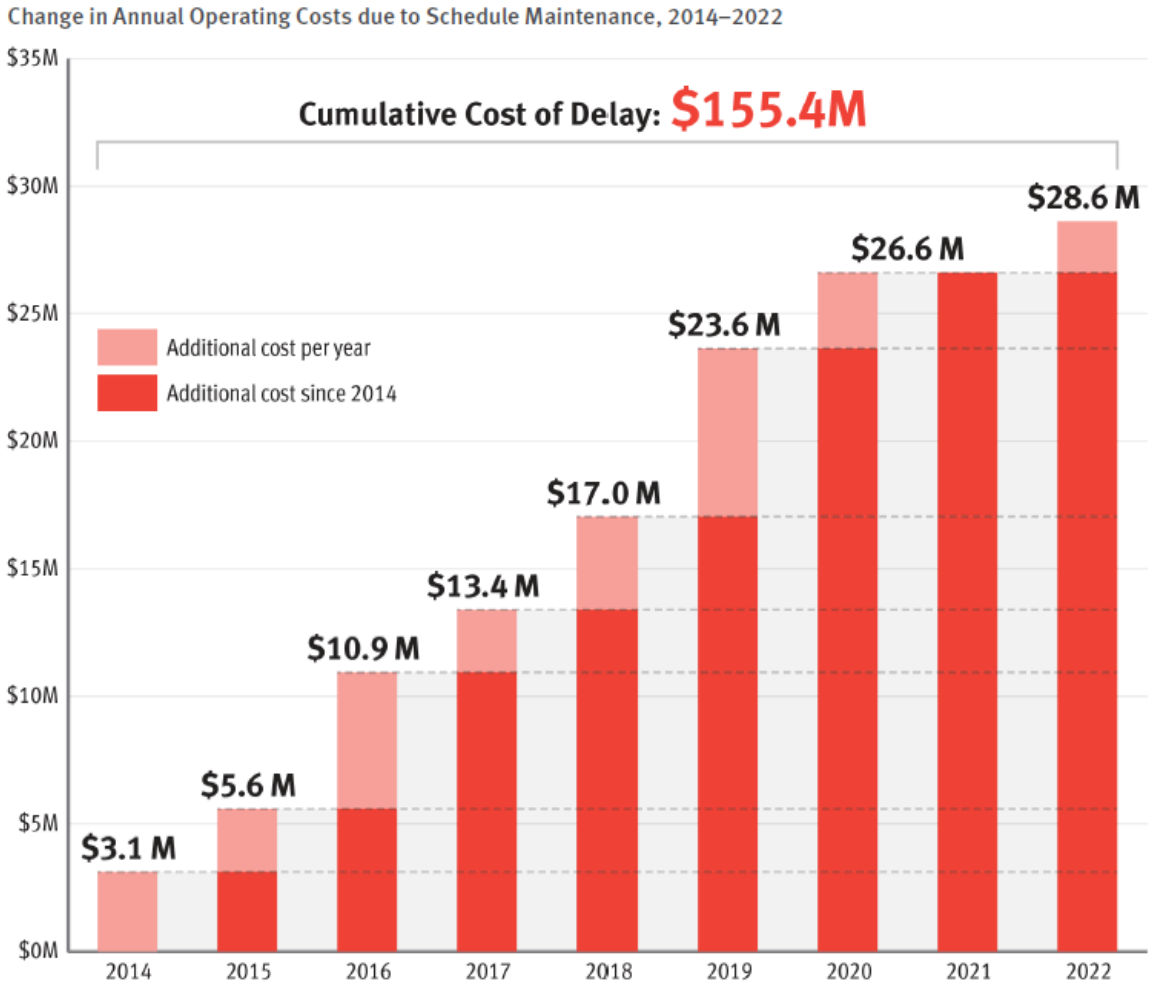


Delay also affects operating costs and service levels

Coast Mountain Bus Company diligently adjusts schedules to reflect road conditions. But that means that as traffic increases, so do operating costs.

Each year, TransLink adds over $2 - $7 million of service to offset the impacts of traffic. That is comparable to introducing a new RapidBus route every 2 years.

Cumulatively we have spent $155 million just to maintain service frequencies as congestion has made buses slower.

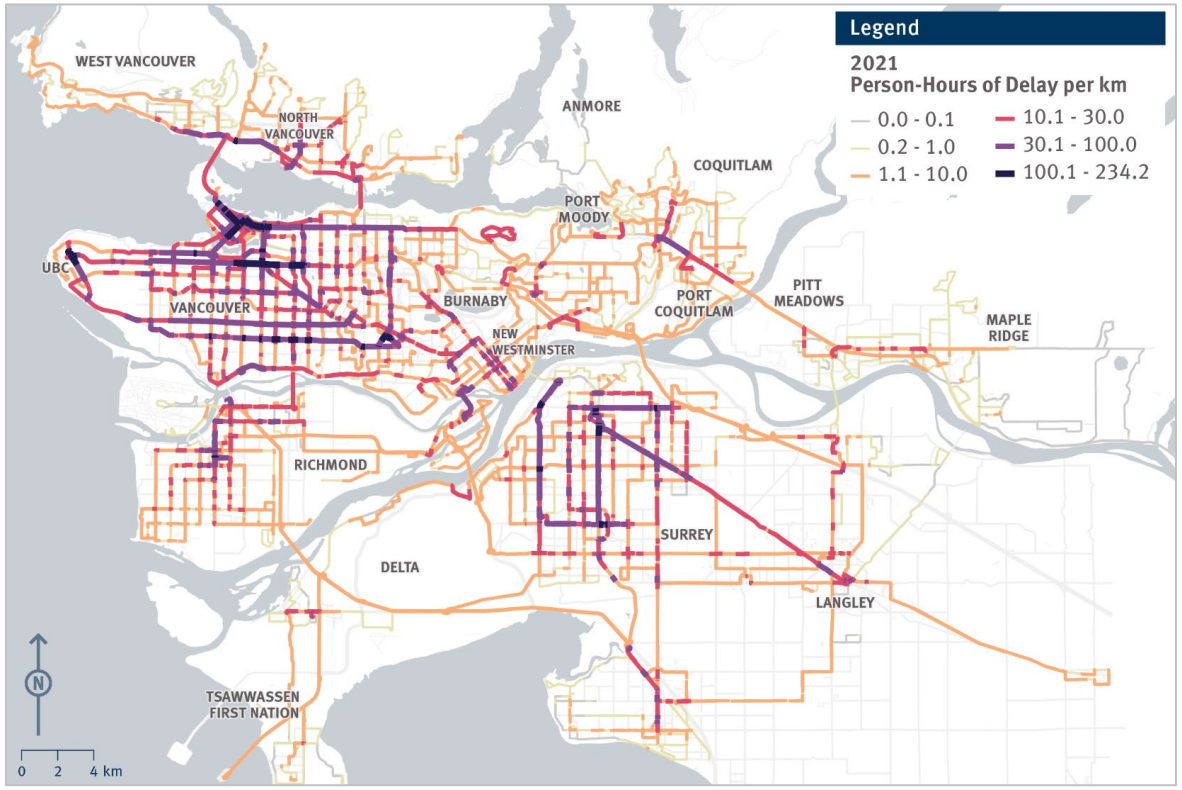


Passenger-delay is concentrated on key corridors

Passenger-delay is concentrated on key corridors. 40% of person-hours of delay is concentrated on less than 10% of the transit network.

This means strategic investments in bus priority can have a disproportionately large benefit to customers and operating costs.

Person-hours of delay per kilometer. Weighted by person delay to reflect customer-service focus; normalized by distance to appropriately reflect acute bottlenecks.



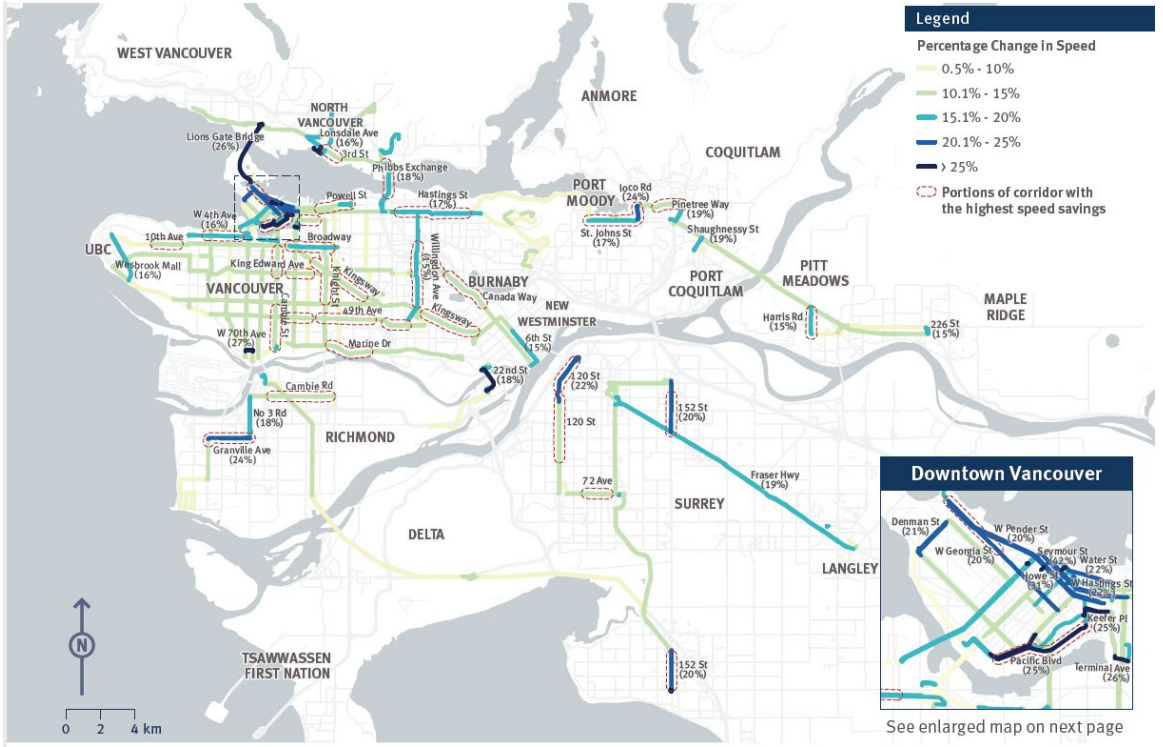
Buses were up to 25% faster during lockdown

The pandemic lockdown allowed us to measure the impact of traffic congestion on buses. During the peak pandemic restrictions in April 2020, when traffic was lowest, bus passengers experienced faster, more reliable travel times.

- 14% faster speeds system-wide
- Up to 25% faster on some of the most well-travelled sections of the bus network

This suggests protecting buses from congestion can significantly improve bus speeds on many corridors in our region.

Change in speed during peak pandemic restrictions.
Comparison of speeds in Feb 2020 and April 2020. Calculation *excludes* time at bus stops. See enlargement on next page.



See enlarged map on next page

Buses carry 30 - 60% of people traveling on key corridors

Buses carry 30 - 60% of the travelers along many key corridors during peak times.

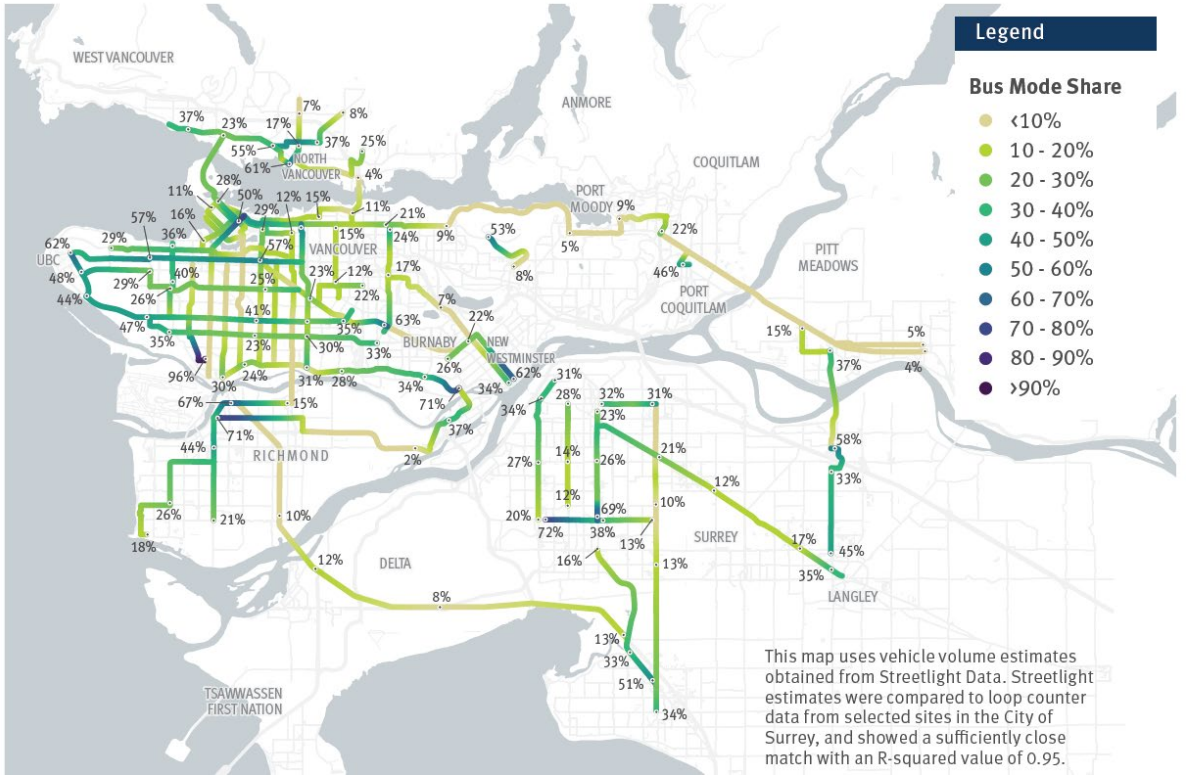
This suggests converting a travel lane to bus lanes is a fairer distribution of limited resources—namely road space.

Estimated bus mode-share at ~200 points on the frequent transit network by comparing vehicle estimates from Streetlight Data and passenger loads from our automatic passenger counters (APC).

We validated Streetlight data by comparing their estimates to loop counter data from the City of Surrey (R-square = 0.95).

We illustrated the lines between points with gradients.

Estimated bus mode-share. Bus mode-share as estimated for approximately 200 points on the frequent transit network using vehicle estimates from Streetlight Data and passenger loads from TransLink's automatic passenger counters.

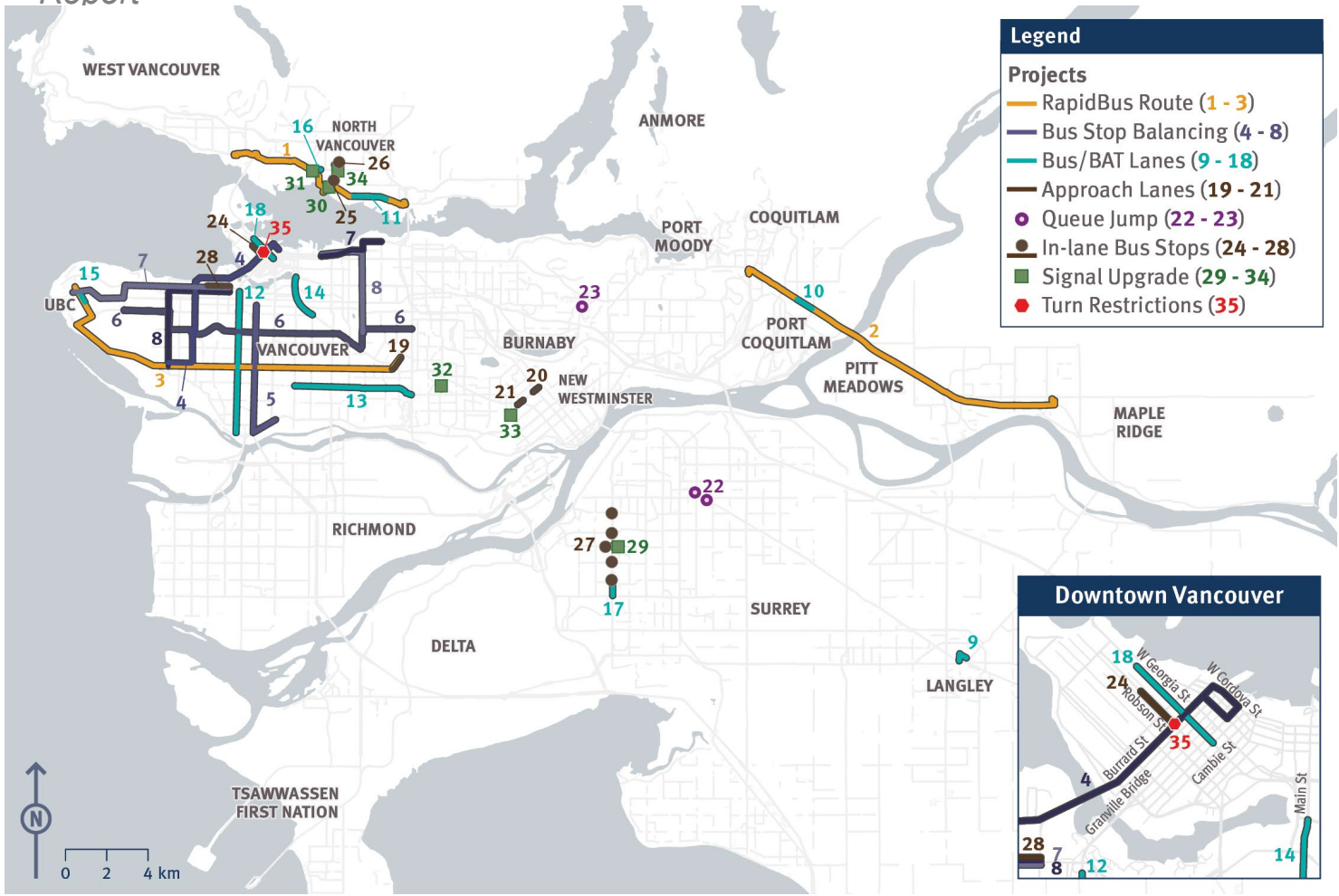


We've achieved a historic expansion of bus priority

We have witnessed a historic expansion of bus priority. Since 2019, TransLink has invested almost **$40 million** in bus priority, including RapidBus.

As a result, the region's bus priority infrastructure has **expanded by 50%.** In this report, we evaluated 35 projects that were completed by Fall 2021.

Map of recent bus priority measures evaluated in the 2023 Bus Speed and Reliability Report



Transit priority is effective (and sometimes cost effective)

Bus priority measures improved bus performance by reducing delay by **up to 35%**. Faster, more reliable buses are more efficient.

Most projects yield a **return-on-investment within 10 years.** Even after the payback period, these savings continue to accrue.

However, while the spot-treatments reduced delay at well-known bottlenecks, they did not yield enough savings to "save a bus" (and sometimes not enough to save any scheduled run time).

Results of bus priority measures. Average weekday travel time savings and return-on-investment

Project Type	Travel time savings (Weekdays)	Return on Investment[2]
RapidBus route[1]	**24 - 35%**	N/A[3]
Bus Stop Balancing[1]	**5 - 10%**	<1 year
Bus/BAT lanes	**Up to 15%**	0 - 10 years
Approach lanes	**Up to 35%**	N/A[4]
Queue jump	**~15%**	<5 years
In-lane bus stops[1]	**Up to 15%**	0 - 15+ years
Signal upgrade	**Up to 20%**	0 - 15+ years
Turn restrictions	**~10%**	N/A[4]

[2] Costs based on funds awarded through the Bus Speed and Reliability municipal funding program.
[3] RapidBus ROI not calculated because RapidBus included significant investments in service.
[4] Insufficient cost data

Transit priority works best at scale

Transit priority works best at scale. Customers and TransLink accrue the most benefits when priority measures are **focused along a corridor** —like RapidBus and Bus Stop Balancing projects.

We can reinvest that savings to enhance or expand service. For example, we reinvested savings from bus stop balancing into service to launch a new peak-hour bus route along Marine Drive.

This means we want to focus on corridor-scale projects moving forward

Bus stop balancing was implemented at the same time as bus bulbs on W 4th Ave in Vancouver. Together, these priority measures helped reduce travel time by 10 – 20% through the corridor.

RapidBus exceeded 20% savings goal

RapidBus has been successful across the region. The three routes with new transit priority are **more than 20% faster** than the previous local service, saving customers **up to 12 – 28 minutes per trip** during the busiest times of day.

This demonstrates the importance of future rapid transit routes for regional mobility, including R6 under construction in (Surrey/Delta), and the nine Bus Rapid Transit corridors in the 10-Year Priorities.

Route (Location)	Travel time savings (weekday avg)	
	Minutes	%
R2 (North Shore)	5 – 12	**24%**
R3 (Maple Ridge/Pitt Meadows)	11 – 28	**35%**
R4 (Vancouver/UBC)	11 – 19	**26%**

More bus priority is needed to meet regional goals

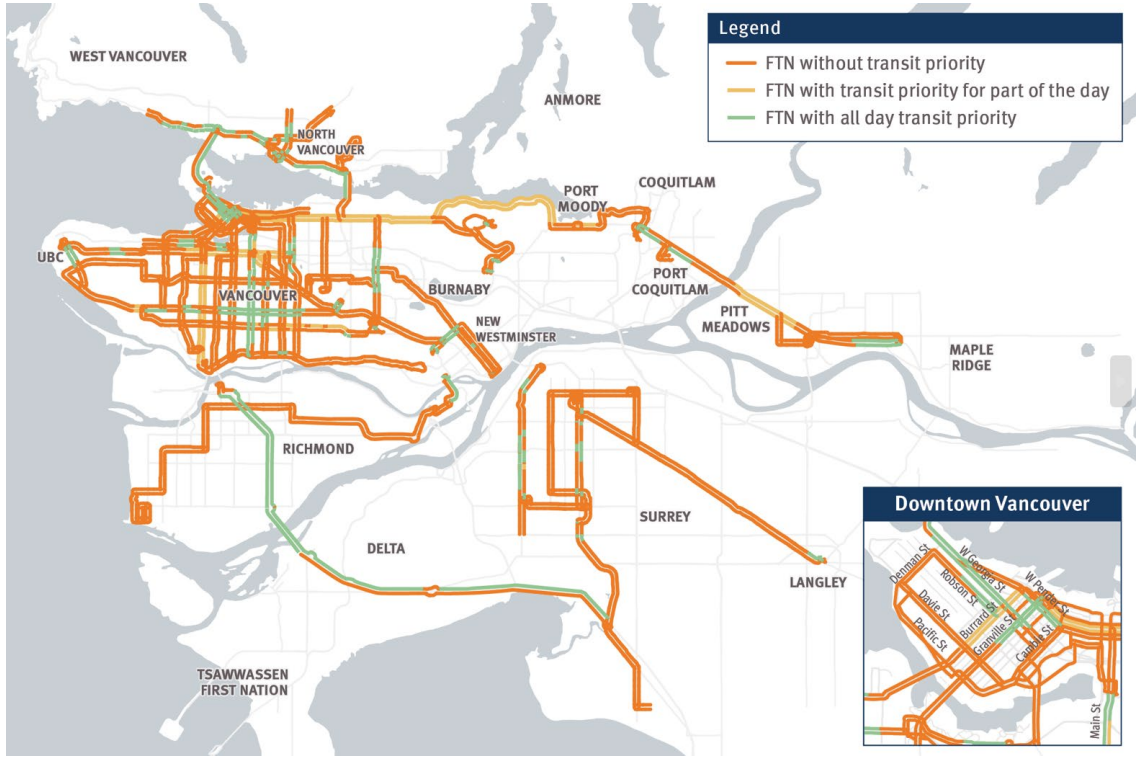
The region must increase the scale and pace of bus priority infrastructure to achieve our regional transportation and climate goals.

The region's "Transport 2050: 10-Year Priorities" aims to expand bus priority to the full Frequent Transit Network (FTN). However,

- **Less than 25%** of the FTN has any bus priority infrastructure
- **About 5%** of the FTN has all day bus priority infrastructure.

"Bus priority" is context specific. It may mean full-time or part-time bus lanes, queue jumps, bus bulbs or boarding islands, or just better bus stop spacing.

Gaps in transit priority along the Frequent Transit Network



Bus Priority Vision

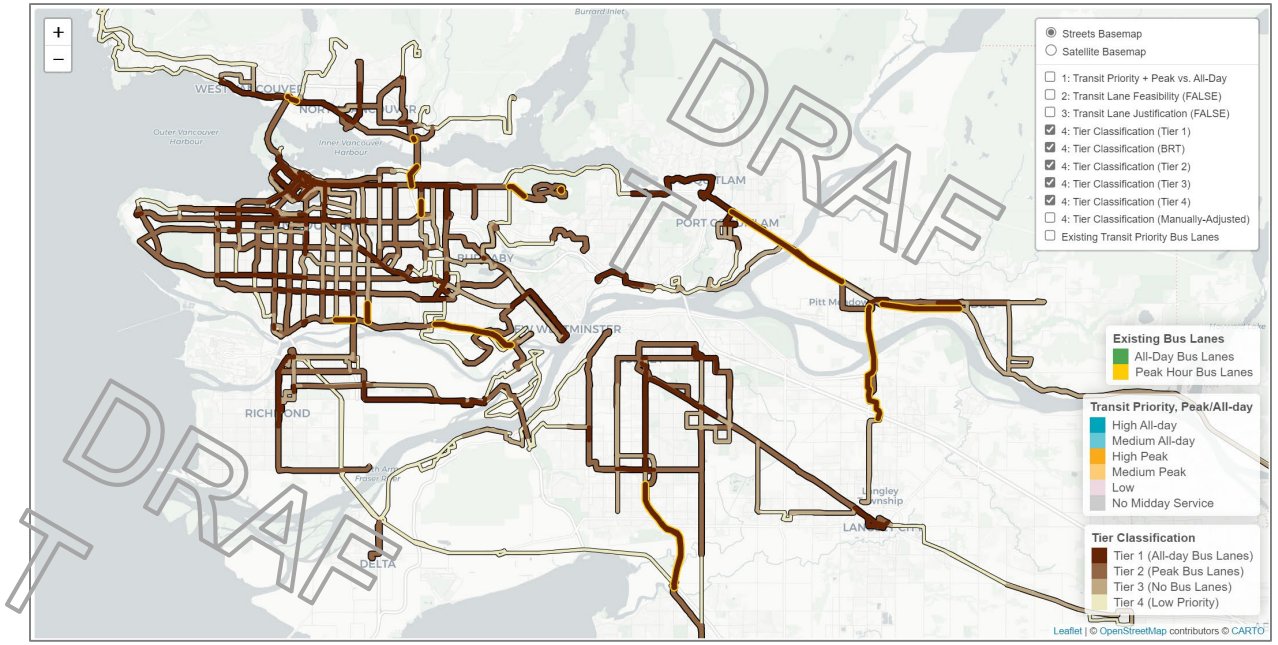
We will identify general levels of bus priority desired, based on existing service, delay, and ridership and/or near-term plans for service improvements. We will limit ourselves to existing roadway widths for most corridors.

Existing delay and opportunity for improvement

- Person-hours of delay (by time of day)
- Road characteristics (e.g. # of lanes/intersections)
- Stop spacing and design

Where available/applicable

- Bike infrastructure
- Land use
- On-street parking
- Existing transit priority
- Planned service (e.g. BRT, RapidBus, Express)
- Mode split (bus vs. private vehicle)
- Traffic volumes



Level of Bus Priority	Bus Lanes	Intersection Improvements	In-lane Bus Stops	Bus Stop Balancing
Tier 1	Full-time	Yes	n/a	Yes
Tier 2	Part-Time	Yes	Maybe	Yes
Tier 3	No	Maybe	Yes	Yes
Tier 4	No	No	Maybe	Yes

Sub-regional Profiles

The report profiles each of the 7 sub-regions to highlight challenges and opportunities across the region.

BURNABY/NEW WESTMINSTER

Corridors in top 20 for systemwide passenger delay

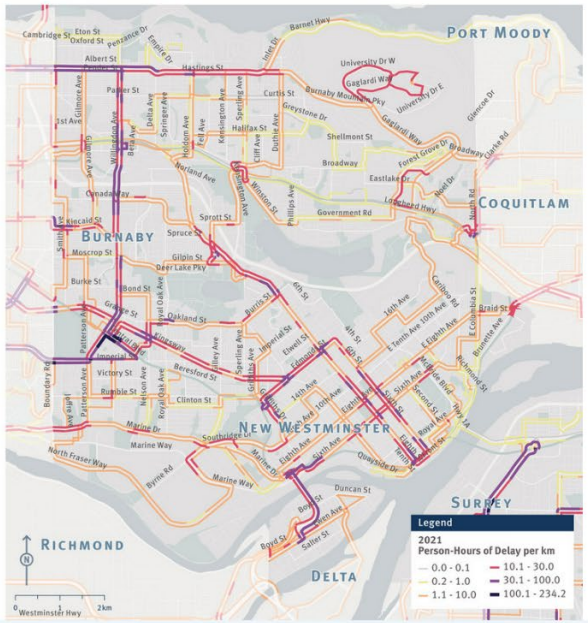
- Willingdon Ave
- Edmonds St

Additional Profile Areas

- Queensborough Bridge/ Hwy 91A
- Canada Way

High Ridership Locations

- Metrotown Station
- Edmonds Station
- Hastings St & Willingdon Ave



Quick Facts

Metric	Sub-Region	Percent of System
Network Kilometres	401	12%
Total Person Delay (Hours)	3,500	12%
Total Bus Delay (Hours)	320	13%
Weekday Daily Ridership	73,300	13%
Weekday Daily Bus Trip-KM	38,000	13%

Statistics for Fall 2021. Ridership is the total for routes in the sub-region. Demographic data is from the 2016 Canadian Census; zero vehicle households data from Insurance Corporation of British Columbia (ICBC).

128,000 Total households

35% Low income households

14% Zero vehicle households

Demographics within 400m of corridors (2016)

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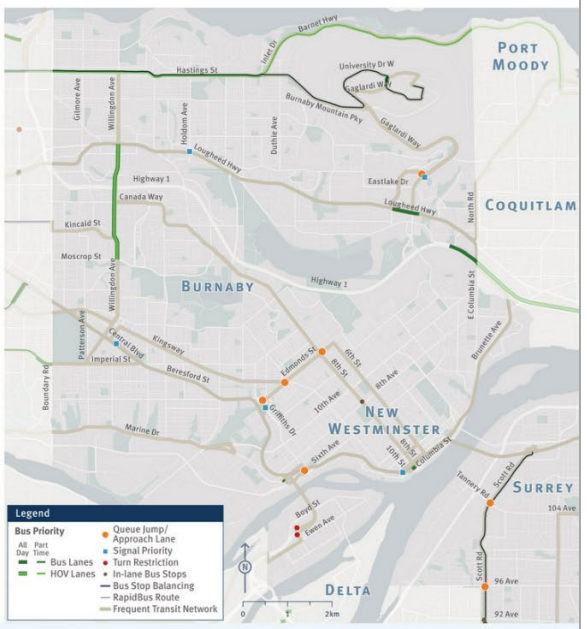
Existing Frequent Transit Network and Bus Priority

- The FTN covers a third of the transit network in the Burnaby/New Westminster sub-region.
- Less than 5% of the FTN is on roadways controlled by MoTI.
- Over 20% of the FTN has some type of bus priority.
- Approximately 2% of the FTN has all-day bus priority.
- Since 2019, five new transit priority projects were implemented in Burnaby/New Westminster with funding assistance from the BSR program, including transit approach lanes, a queue jump, and signal upgrades.



FTN and Bus Priority Statistics

Metric	Kilometres	Percent of FTN
FTN	132 km	-
All bus priority (including HOV lanes)	28.3	21%
All-day bus-only priority (excluding HOV lanes)	2.1	2%

37,000 Weekday Daily Riders Benefiting from Transit Priority

230 Daily Bus Hours Saved from 2019-2022 Projects Evaluated

Notes: FTN km excludes SkyTrain and SeaBus. Statistics include infrastructure under construction as of 2023. Ridership benefitting from transit priority based on Fall 2021 data. Bus hours saved is based on the before/after evaluation of projects completed in 2019-2022 and evaluated in this report.

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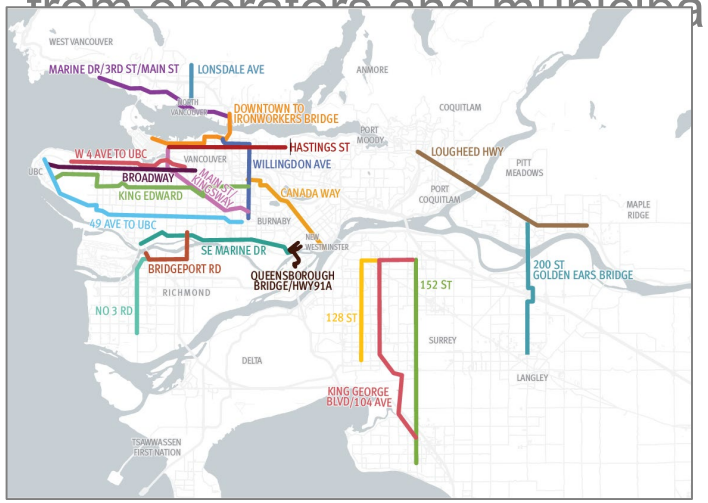
Corridor Profiles

We have identified 20 corridors across the region for speed and reliability improvements. We have identified hotspots and causes of bus delay at specific locations with help from operators and municipal



LONSDALE AVE

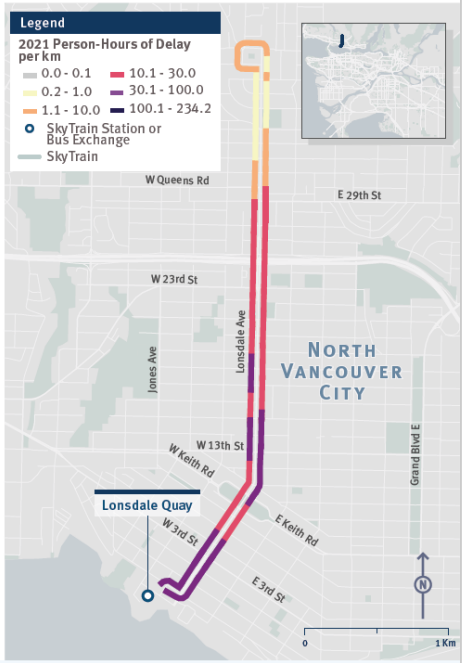
Corridor Description

- Lonsdale Ave is a major and historic north-south transit and commercial corridor for the city of North Vancouver.
- Lonsdale Ave is located in the urban core of the North Shore and has significant commercial and institutional destinations including Lonsdale Quay and The Shipyards.
- Bus service along the corridor provides connections from Lonsdale Quay (SeaBus and bus exchange) at the foot of Lonsdale to the rest of the City and the District of North Vancouver, including commercial centres and important regional cultural and recreation destinations.

Quick Facts

Length	4.2 km
Subregion	North Shore
Primary Routes	230; 228, N24
All Routes	228, 229, 230, 232, 241, 255, R2, N24

Notes: Corridor ranked #24 for person-delay per km in Fall 2021. Profile area varies slightly from the corridor. Ridership is reported for the location with the most cumulative passengers on-board the bus throughout the day; lower end of the range accounts only for routes using the corridor for at least 1 km and upper end of the range reflects all routes.



20	180	14,200	29%	21%
Maximum hourly bus trips per direction	Person-hours of delay per day	Total households (1,500/km² density)	Low income households	Zero vehicle households
2,300-2,700	**18**			
Total ridership (daily load in one direction)	Bus-hours of delay per day			

Demographics within 400m of corridor

Corridor Significance

- **Lonsdale Ave is an important travel corridor connecting to the urban core in the North Shore, with significant commercial and institutional destinations.** More than 7% of all bus journeys in North Shore begin on Lonsdale Ave. It ranks eighth highest in bus delay per kilometre among profile areas. In the southern end of the corridor, buses carry up to 60% of people during morning rush hours. Approximately 10 to 20% of people using the northern part of the corridor are on buses during that time.

Key Challenges for Bus Speed & Reliability

- Lonsdale has parallel parking with high turnover of vehicles (e.g., daytime duration limits of 1 hour). This contributes to delay in the curb lane as general traffic waits for people parking.
- Significantly poor travel times for buses converging to and from Hwy 1 connections.
- Traffic signal phasing must consider bus priority, reducing delay for turn movements, and high pedestrian volumes; Lonsdale Ave is also an important corridor for goods movement and emergency vehicles.

Location of Common Causes of Bus Delay

Issue	Location(s)
Motorists turning left (or other delay from left-turns)	• NB Lonsdale Ave at Esplanade • NB Lonsdale Ave at 2 St • NB Lonsdale Ave at 4 St • NB Lonsdale Ave from 11 St to 13 St • SB Lonsdale Ave from 14 St to 13 St • SB Lonsdale Ave from 18 St to 17 St • NB Lonsdale Ave from 20 St to 21 St • SB Lonsdale at 27 St • NB/SB Lonsdale Ave between Queens Rd and Kings Rd\
Motorists turning right (or other delay from right-turns)	• NB/SB Lonsdale Ave between 2 St to 4 St • SB Lonsdale Ave from Hwy 1 to 11 St • NB Lonsdale Ave from 11 St to 13 St • NB Lonsdale Ave at 15 St • NB Lonsdale Ave from 18 St to 21 St • NB Lonsdale at 29 St • SB Lonsdale at Queens Rd
Roadway congestion	• NB Lonsdale Ave from Esplanade to Kings Rd • SB Lonsdale Ave from Kings Rd to 13 St • SB Lonsdale Ave from 4 St to Esplanade
Closely spaced driveways or other roadways	• SB Lonsdale Ave from 14 St to 13 St
Re-entering traffic from bus stops	• NB/SB Lonsdale Ave at 13 St • NB Lonsdale Ave at 17 St • NB Lonsdale Ave at 29 St
Location of bus stops	• NB Lonsdale at Hwy 1
Short spacing between bus stops	• NB Lonsdale Ave at 2 St
Pedestrian movements (including pedestrian signals)	• NB/SB Lonsdale Ave between Esplanade and 4 St • NB Lonsdale Ave from 11 St to 13 St • NB Lonsdale Ave at 15 St • SB Lonsdale Ave from 18 St to 13 St • NB Lonsdale Ave from 20 St to 21 St • SB Lonsdale Ave at 22 St • SB Lonsdale Ave from Kings Rd to Queens Rd
Uncoordinated traffic signals	• NB Lonsdale Ave at Esplanade

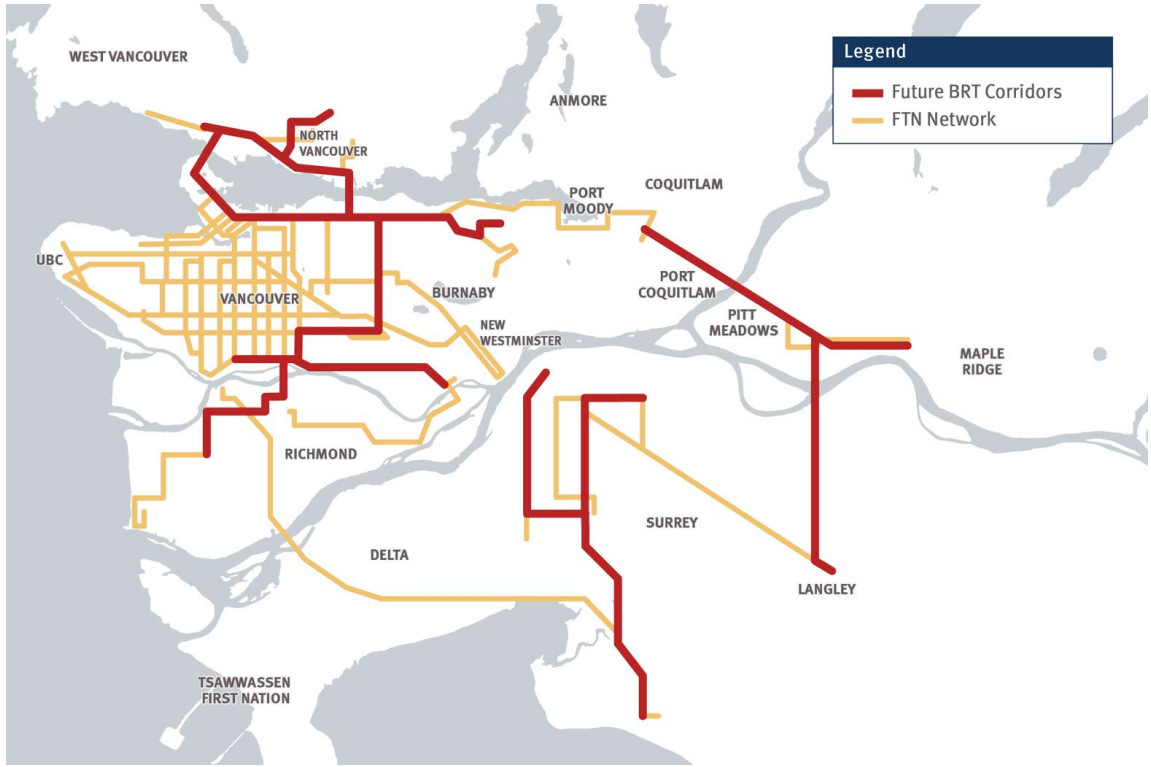
Next Steps

Focus on corridor-scale projects—most likely funded and led by TransLink with in-kind support from municipalities

Restructure municipal funding program to encourage faster delivery of projects that meet our expected level of bus priority. TBD how much emphasis to place on cost-effectiveness.

Structure our team and professional services contracts to support multiple larger-scale projects like BRT, RapidBus, etc.

Map of the Frequent Transit Network (FTN) and future Bus Rapid Transit routes. *BRT alignments are indicative and subject to revision during concept planning.*



Questions/Comments?

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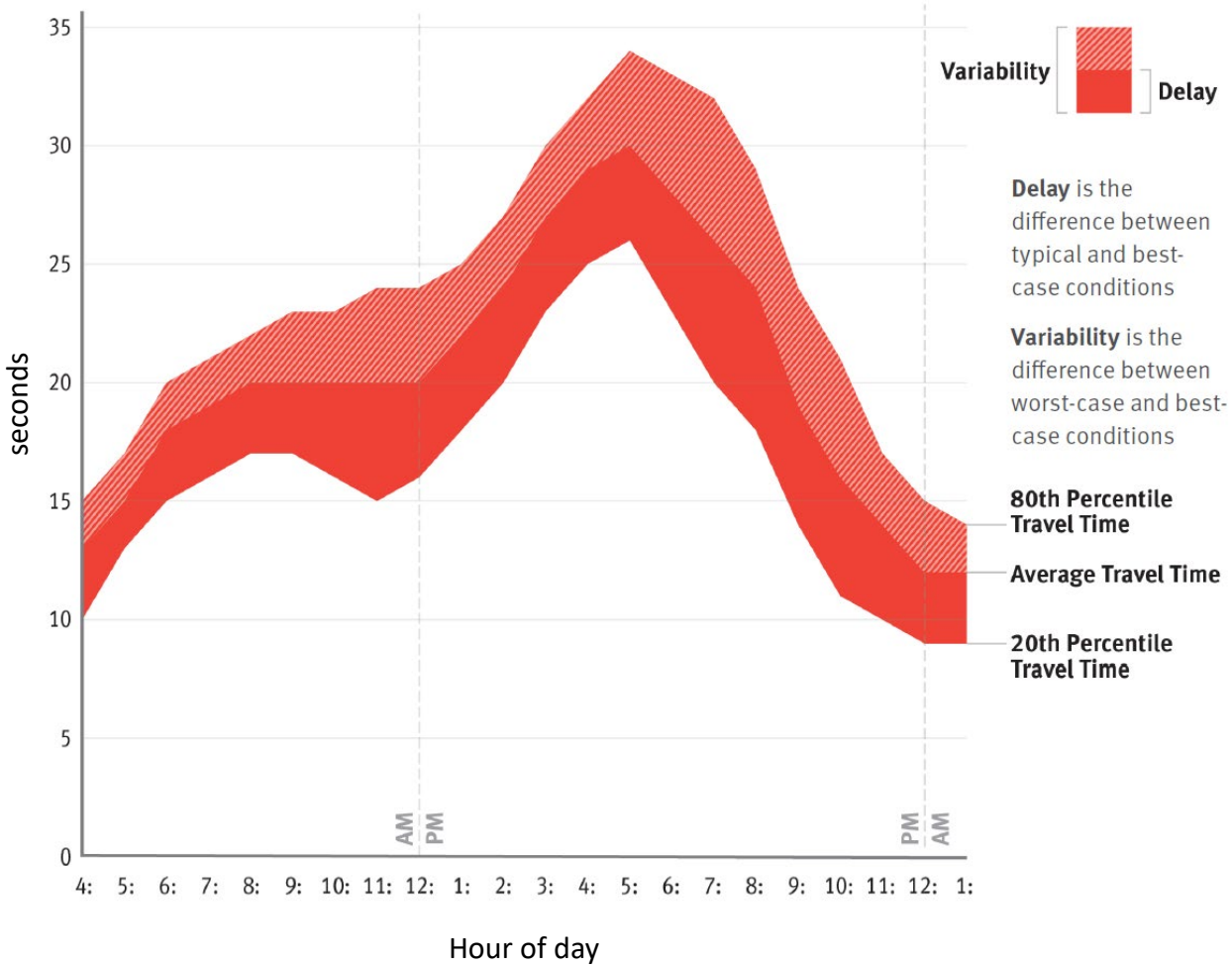
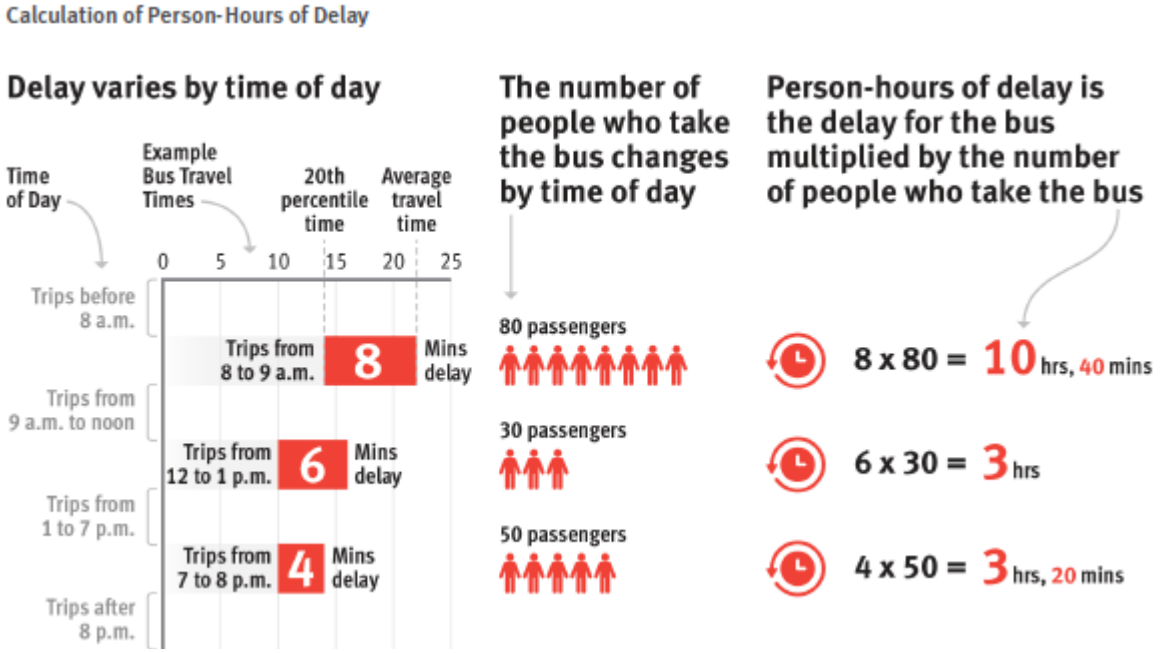
Resource Slides

How we defined “delay”





Project Results | Bus Stop Balancing

Bus stop balancing projects yield savings at scale.

- Corridors with very close & busy stops benefit the most. These opportunities are generally concentrated in Vancouver and urban centres.
- Financial payback is very high, but implementation may require relocation of shelters and coordination with street-furniture vendors.

Project		Percent change per trip		Cost/Benefit
Name	Subregion	Daily Weekday	AM/PM Peak (Weekdays)	Payback period (years)
Route 2 bus stop balancing	Vancouver/UBC	-11%	-14%	0.3
Route 17 bus stop balancing	Vancouver/UBC	-6%	-7%	0.6
Route 25 bus stop balancing	Vancouver/UBC & Burnaby/New Westminster	-6%	-6%	0.4
Route 4 bus stop balancing	Vancouver/UBC & Burnaby/New Westminster	-8%	-7%	-
Route 7 bus stop balancing	Vancouver/UBC	-7%	-4%	-

Benefits include both faster travel time between stops AND reduced dwell time at stops.

Project Results | Bus/BAT Lanes

Bus lanes reduced travel times up to ~15%, with payback in <10 years.

- Dedicated, all-day and well-marked, bus lanes are most effective at protecting mobility, including middays and weekends. Bus lane performance varies based on design and operations.
- Bus lanes are complemented by right-turn pockets and signals, removing friction at intersections.
- Transit signal priority benefits from bus lanes and approach lanes, ensuring buses can reach the signal.

Project		Percent change per trip		Cost/Benefit
Name	Subregion	Daily Weekday	AM/PM Peak (Weekdays)	Payback period (years)
Wesbrook Mall bus lanes	Vancouver/UBC	-15%	-13%	5.7
West Keith Rd transit project	North Shore	-9%	-9%	9.9
Granville St bus lanes	Vancouver/UBC	-6%	-7%	4.8
Lougheed Highway bus lanes	Northeast	-5%	-11%	-
49th Ave transit project	Vancouver/UBC	-4%	-5%	0.4
East 3rd St bus lanes	North Shore	-4%	-4%	-
Main St and Kingsway bus lanes	Vancouver/UBC	-4%	-4%	8.3
Fraser Hwy bus lanes	Southeast	-3%	-3%	7.7
W Georgia St bus lanes	Vancouver/UBC	-3%	5%	1.5
Scott Rd / 120 St BAT lane	Southwest & Southeast	no change	no change	>20

Benefits for bus travel time between stops.

Project Results | Approach Lanes/Queue Jumps

Travel times improved up to 35%, with payback often <5 years.

- Buses must reach front of queue to benefit from approach lanes and transit priority signals (Maybe no longer true with newest TSP technology.)
- Right-turn *pockets* and *signals* are complementary but must be sufficient to protect buses from queues.
- Right-turn *restrictions* are also complementary and have the co-benefit of protecting adjacent bike lanes.

Approach Lanes

Project		Percent change per trip		Cost/Benefit
Name	**Subregion**	**Daily Weekday**	**AM/PM Peak (Weekdays)**	**Payback period (years)**
R4 Joyce Street approach lanes	Vancouver/UBC	-34%	-33%	-
Edmonds St approach lanes at Kingsway	Burnaby/New Westminster	-2%	-2%	>20
Edmonds St approach lanes at Canada Way	Burnaby/New Westminster	0%	-3%	>20

Queue Jumps (approach lanes + signal activation)

Project		Percent change per trip		Cost/Benefit
Name	**Subregion**	**Daily Weekday**	**AM/PM Peak (Weekdays)**	**Payback period (years)**
Fraser Highway queue jumps	Southeast	-15%	-21%	3.3
Broadway and Gaglardi Way queue jump	Burnaby/New Westminster	-15%	-15%	4.1

Benefits focus on travel time between runs.

Project Results | In-Lane Bus Stops

Projects improve travel times up to ~15% and can pay back quickly.

- Stops should be fully in-lane to eliminate time lost to bus merging in/out of traffic at stops.
- Projects improve safety by shortening pedestrian crossing distances and calming traffic.
- They also support retail areas by expanding room for pedestrian activity, parking, loading & unloading, and landscaping, while acting as a complement to street patios.

Project		Percent change per trip		Cost/Benefit
Name	Subregion	Daily Weekday	AM/PM Peak (Weekdays)	Payback period (years)
West 4th Ave bus bulbs	Vancouver/UBC	-14%	-16%	0.3
Robson St transit project	Vancouver/UBC	-8%	-8%	1.8
Lonsdale Ave bus bulbs at 4th St and 5th St	North Shore	-5%	-3%	>20
Lonsdale Ave bus bulbs at 15th St	North Shore	-5%	0%	7.5
Bus pullout infills on 120 St	Southwest & Southeast	0%	-4%	19.3

Benefits include both faster travel time between stops AND reduced dwell time at stops.

Project Results | Signal Upgrades

Projects reduce travel time up to 20% and typically paid back in <5 years.

- Bus-only upgrades that target frequent bus corridors will pay back faster.
- Buses do benefit from intersection improvements that benefit all traffic, but transit-priority signals are more likely to have durable benefits.
- Left-turn pockets can also improve intersection throughput, reducing delay for buses and other motorists.

Project		Percent change per trip		Cost/Benefit
Name	Subregion	Daily Weekday	AM/PM Peak (Weekdays)	Payback period (years)
Signal upgrade at Metrotown bus loop*	Burnaby/New Westminster	-18%	-19%	1.7
Signal upgrade on 18th Ave at Griffiths Dr*	Burnaby/New Westminster	-11%	-13%	0.2
Signal upgrade on NB Scott Rd at 84 Ave	Southeast	-15%	-7%	16.8
Signal upgrade at Marine/Keith/Bewicke	North Shore	-9%	-9%	0.4
Signal upgrade on Lonsdale Avenue at East Esplanade	North Shore	-3%	-6%	1.8
Signal upgrades on W 15th St	North Shore	-2%	-2%	9.8

Benefits based on travel time between stops.
Bus only projects

Project Results | Turn Restrictions

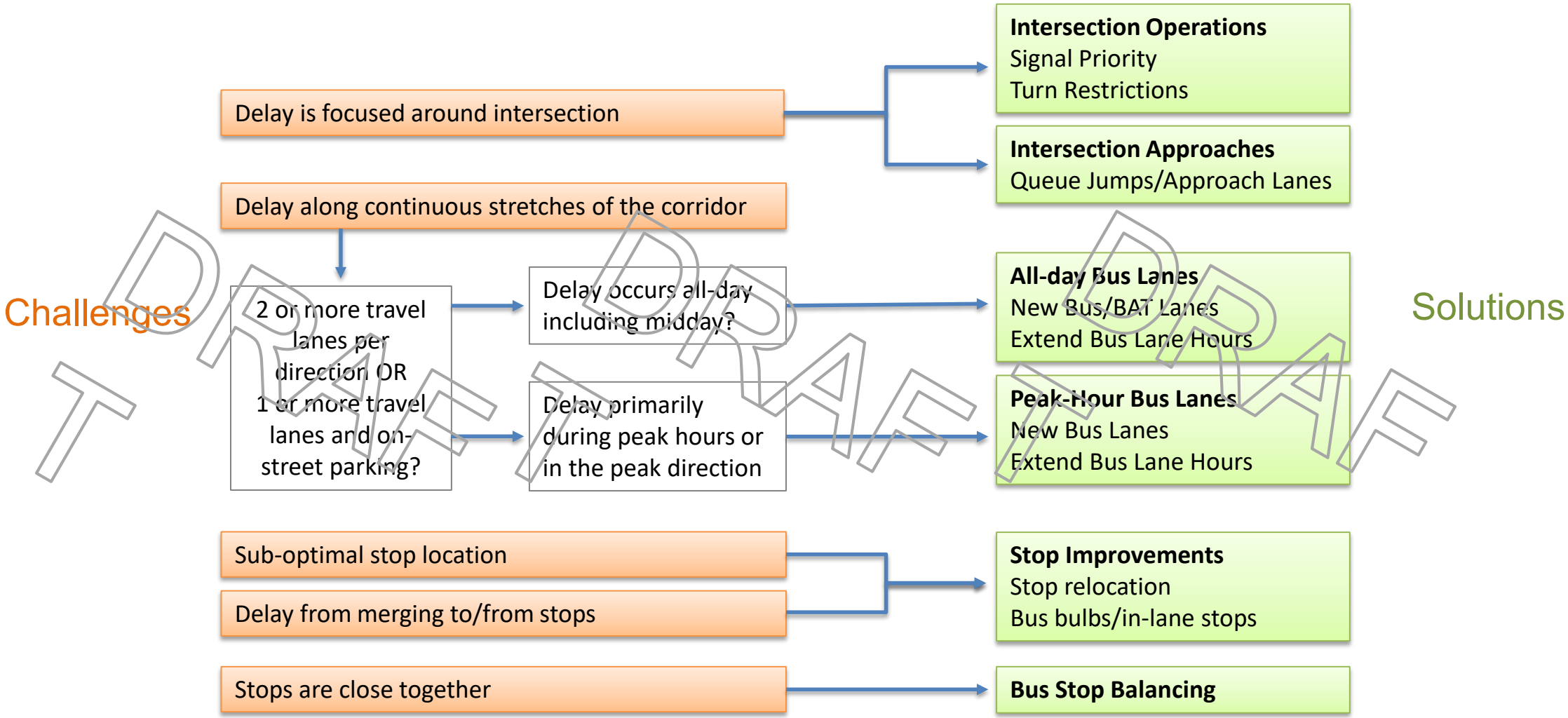
Our one turn restriction project was a success, improving trips 5-10%.

- Turn restrictions can bring low-cost benefits to both buses and general traffic and complement other transit priority measures along a corridor.

Project		Percent change per trip		Cost/Benefit
Name	Subregion	Daily Weekday	AM/PM Peak (Weekdays)	Payback period (years)
Turn restrictions on Robson St	Vancouver/UBC	-9%	-6%	-

Benefits focus on travel time between stops.

DRAFT Simplified decision-tree for bus priority vision



Up Next:

TriMet

Clean Corridor Plan

CLEAN CORRIDORS PLAN

Natasha Muro and Kate Lyman,

TriMet Service Planning Department

TRIMET

Why This Plan?

Guide deployment of zero emissions buses until the fleet is 100% ZEB, using:

- ✓ *Equity*
- ✓ *Air Quality*

National Ambient Air Quality Standards (NAAQS)

1. Particulate matter (PM)
2. Carbon monoxide (CO)
3. Nitrogen dioxide (NO_2)
4. Ground-level ozone (O_3)
5. Lead
6. Sulfur Dioxide

Directly emitted by diesel buses

State and Local Guidelines

Oregon
Secretary of State

Home | Business | Voting | Elections | State Archives | Audits

- OARD Home
- Search Current Rules
- Search Filings
- Access the Oregon Bulletin
- Access the Annual Compilation
- FAQ
- Rules Coordinator / Rules Writer Login

Department of Environmental Quality

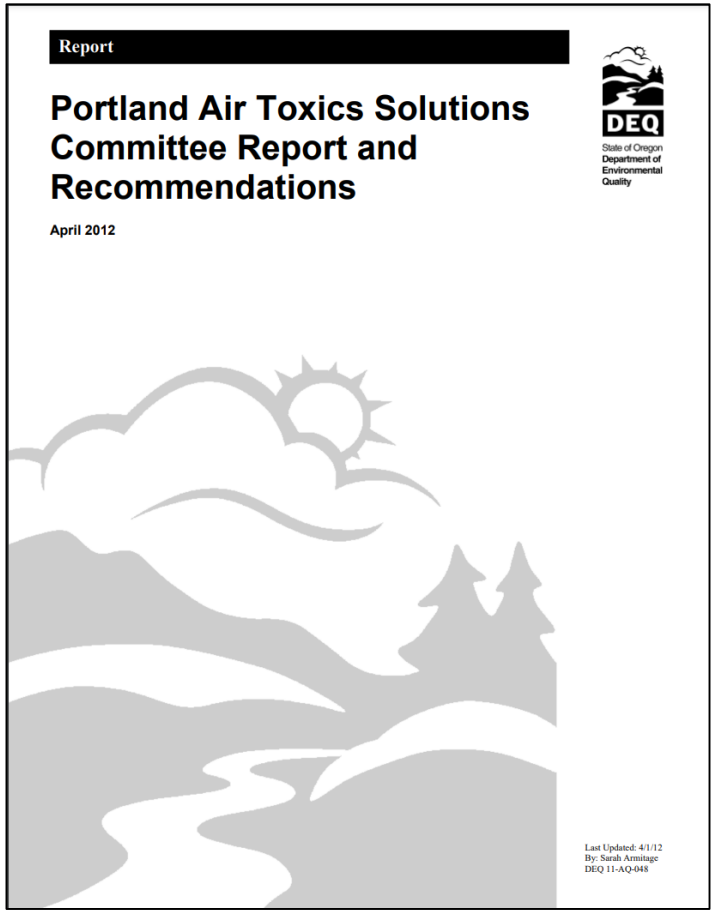
Chapter 340

Division 246
OREGON STATE TOXICS AIR CONTAMINANT PROGRAM

340-246-0010
Policy and Purpose

The purpose of Oregon's state Toxic Air Contaminant Program is to address threats to public health and the environment from toxic air pollutants that remain after implementing the state delegated technology-based strategies of the federal Hazardous Air Pollutants Program in OAR 340-244-0010 through 340-244-0252, Cleaner Air Oregon in OAR 340-245-0005 through 340-245-8050, and OAR 340-244-9000 through 340-244-9090. It also addresses cases of elevated health risks from toxic air contaminant emissions at stationary sources and source categories of toxic air contaminant emissions. In the future, it is also intended to address human exposures to toxic air contaminant emissions from stationary sources that are not addressed by other regulatory programs or the Geographic Program through a Safety Net Program. It is expected that the Safety Net Program will apply only rarely.

Statutory/Other Authority: 468A.015, ORS 468A.135, 468.020, 468.035 & 468A.025
Statutes/Other Implemented: 468A.010(1), ORS 468A.015, 468A.025, ORS 468A.135 & 468.035
History:
DEQ 18-2021, amend filed 11/17/2021, effective 11/17/2021
DEQ 197-2018, amend filed 11/16/2018, effective 11/16/2018
DEQ 187-2018, amend filed 05/14/2018, effective 05/14/2018
DEQ 15-2003, f. & cert. ef. 11-3-03



Report

Portland Air Toxics Solutions Committee Report and Recommendations

April 2012

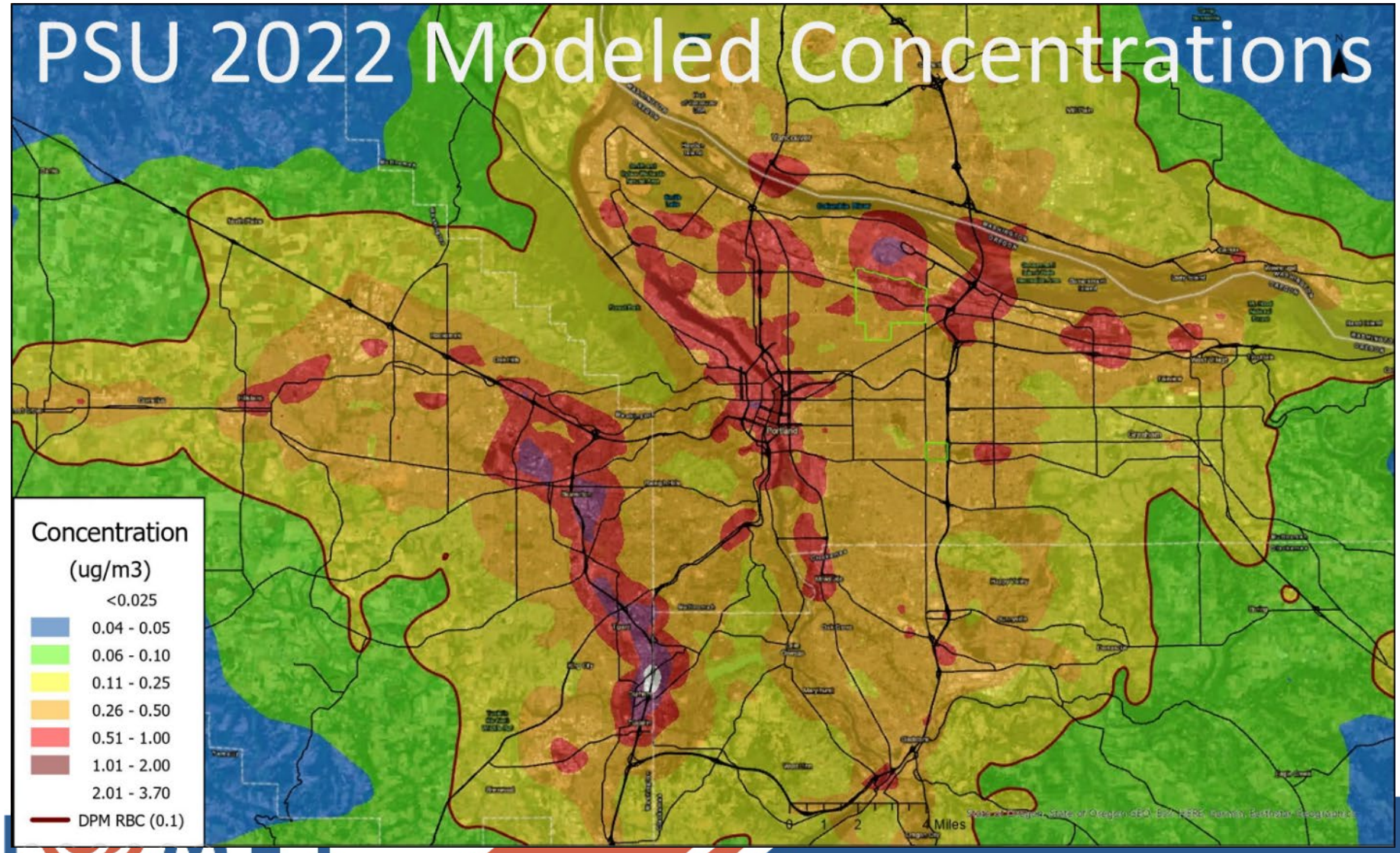
DEQ
State of Oregon
Department of Environmental Quality

Last Updated: 4/1/12
By: Sarah Armitage
DEQ 11-AQ-048

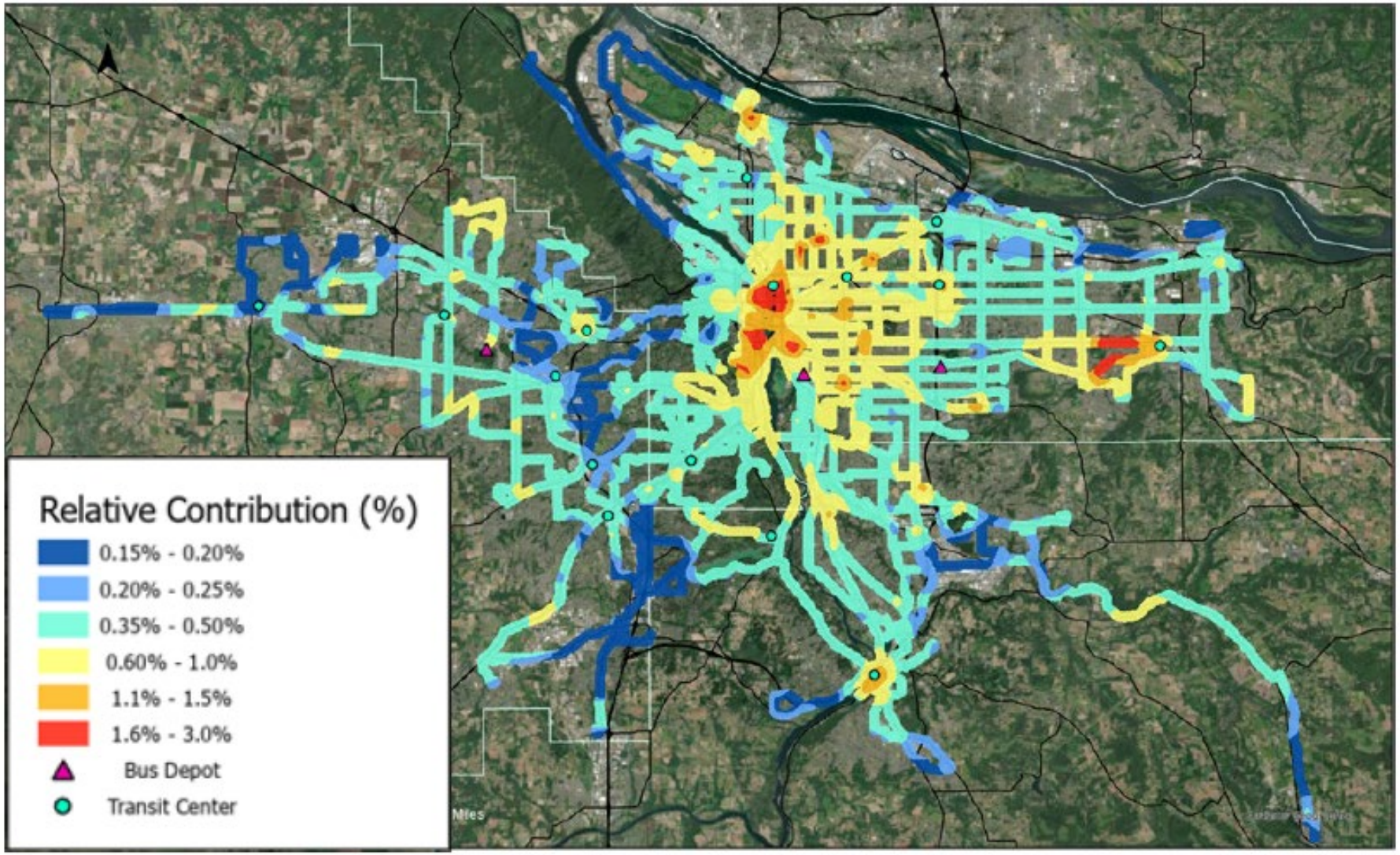
PSU Analysis: Air Quality Effects of TriMet Buses

- Diesel Particulate Matter (DPM)
- Nitrogen Dioxide (NO_2)
- Carbon Monoxide (CO)
- Carbon Dioxide (CO_2)

DPM: All Sources



DPM: Relative concentration contributed by TriMet



Diesel vs. Renewable Diesel

Reduction in Emissions from Renewable Diesel relative to 100% Petroleum Diesel	
DPM	-27%
NO_2	-2.3%
CO	-20%
CO_2	-2.8%

Air Quality Impact Score

50%	Total DPM levels from all sources
20%	Relative contribution of TriMet buses to DPM
30%	Total NO_2 emissions contributed by TriMet

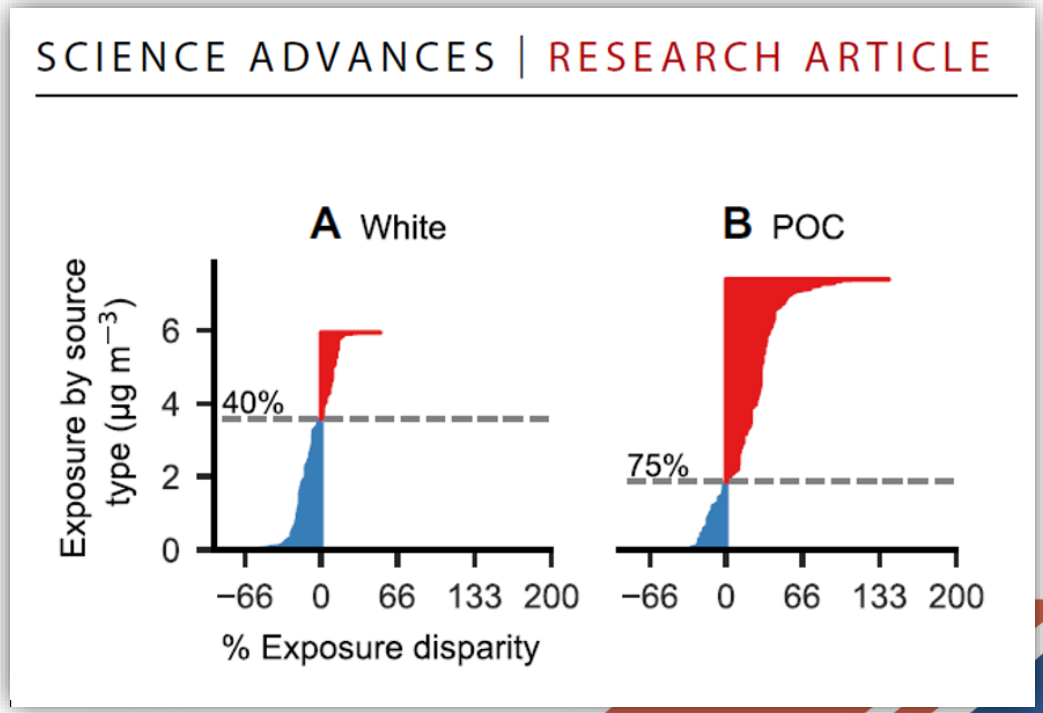
- **CO and CO_2 not included due to their limited *direct* impact on human health**

Top 24 Bus Lines for Air Quality Impact

1	6 MLK	*9*	57 TV Highway	*17*	73 122nd Ave
2	12 Barbur/Sandy	*10*	72 Killingsworth/82nd	*18*	76 Hall/Greenburg
3	8 Jackson Park/NE 15th	*11*	17 Holgate/Broadway	*19*	77 Broadway/Halsey
4	75 Cesar Chavez/Lombard	*12*	14 Hawthorne	*20*	70 12th/NE 33rd
5	2 Division	*13*	71 60th Ave	*21*	62 Murray
6	9 Powell	*14*	33 McLoughlin/King Rd	*22*	35 Macadam/Greeley
7	15 Belmont/NW 23rd	*15*	52 Farmington/185th	*23*	94 Pacific Hwy/Sherwood
8	4 Fessenden	*16*	20 Burnside/Stark	*24*	48 Cornell

Air Pollution and Equity

- Black, Indigenous, People of Color (BIPOC) are most affected by Air Quality
- Environmental Protection Agency (EPA) research completed in 2021 found that People of Color breathed in more particulate air on average across the United States



- Figure displays the racial-ethnic exposure disparities
- 40% exposure of PM for Whites and 75% for POC nationally

TriMet wants to positively impact BIPOC Communities

- On a local level findings from a 2023 Multnomah County report shows BIPOC people live closer to pollution sources
- TriMet is wanting to integrate the Equity Index into deployment efforts

Equity Index

Title VI Populations

- Minority, low-income, limited English proficiency

Barriers to Mobility

- People with disabilities, older adults, youth

Access

- Poor vehicle access, affordable housing units, low/medium wage jobs, services

Equity Index Prioritization

- 12 of the top 24 bus lines for air quality impacts also have high equity index scores
- Those 12 bus lines are recommended for priority ZEB deployment

Recommended Priority Lines* for ZEB Deployment

2	Division
4	Fessenden
9	Powell
12	Barbur/Sandy
17	Holgate/Broadway
20	Burnside/Stark
35	Macadam/Greeley
57	TV Highway
71	60th Ave
72	Killingsworth/82nd Ave
73	122nd Ave
77	Broadway/Halsey

**not listed in priority order*


3805
TRIMET
Zero Emissions
trimet.org
ALL-ELECTRIC BUS
WIND-POWERED BY
CLEAN CORRIDORS PLAN
September 2023
TRIMET

Questions?

Up Next:

Cascadia Mobility

Eugene's Shared Transportation Model

Up Next:

Break!

Up Next:

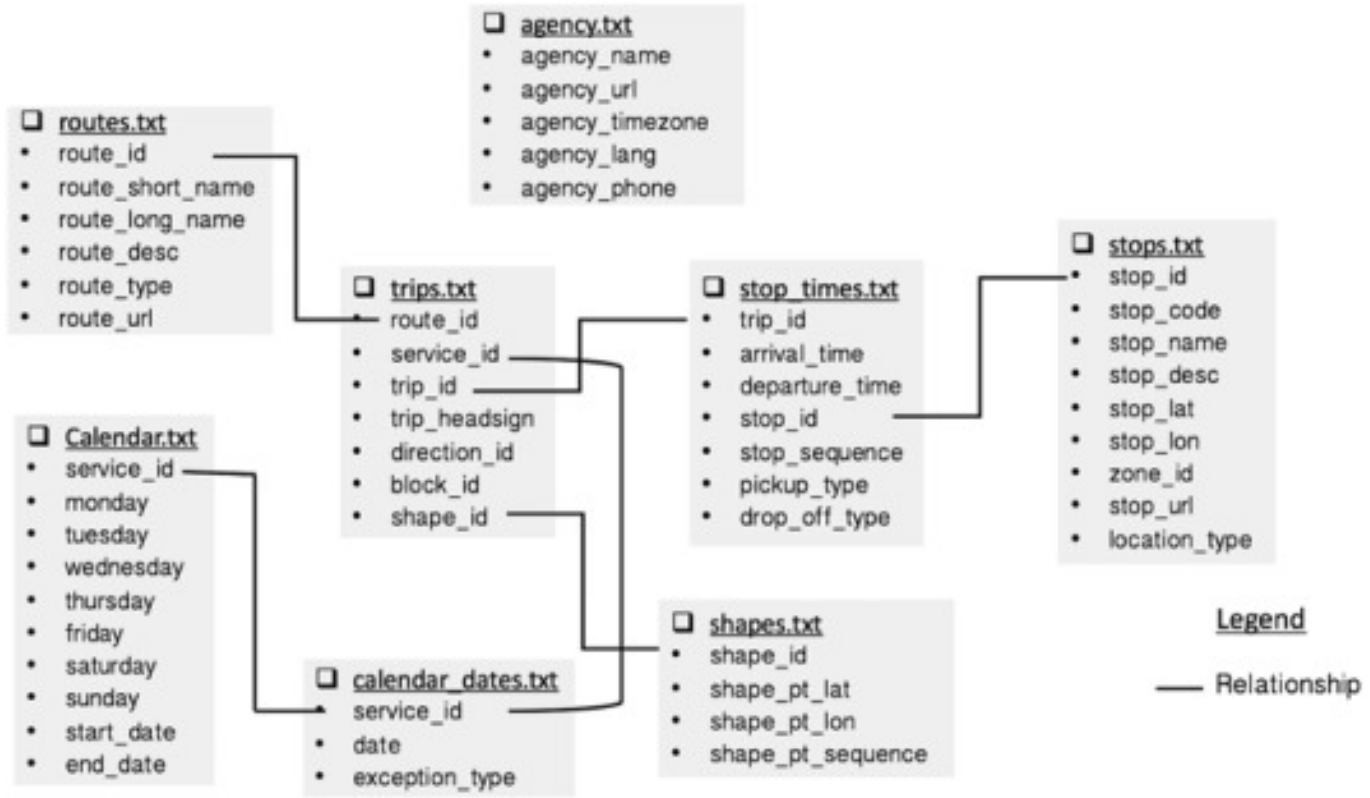
LTD

How Real is Your Real Time Feed?

How Real is Your Realtime Feed?

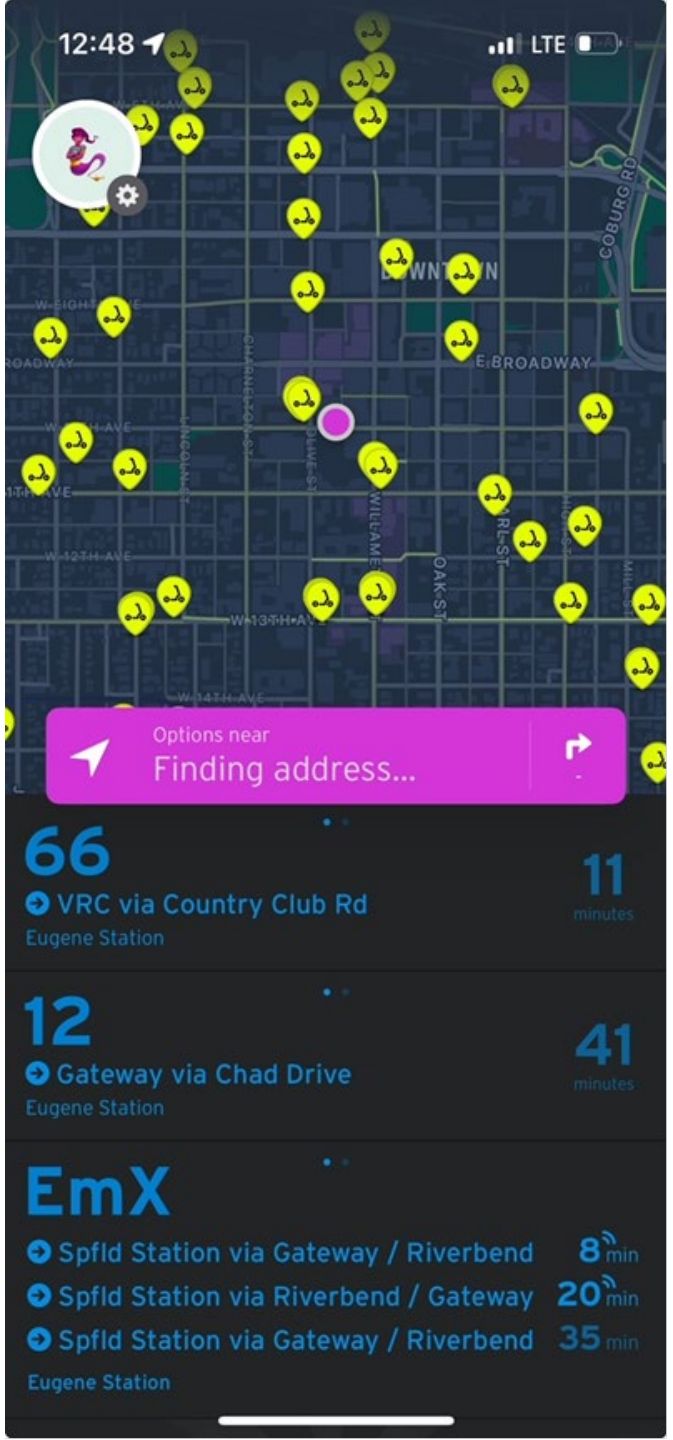
NWTX – 10/6/23

GTFS


agency.txt
agency_name
agency_url
agency_timezone
agency_lang
agency_phone
routes.txt
route_id
route_short_name
route_long_name
route_desc
route_type
route_url
trips.txt
route_id
service_id
trip_id
trip_headsign
direction_id
block_id
shape_id
stop_times.txt
trip_id
arrival_time
departure_time
stop_id
stop_sequence
pickup_type
drop_off_type
stops.txt
stop_id
stop_code
stop_name
stop_desc
stop_lat
stop_lon
zone_id
stop_url
location_type
Calendar.txt
service_id
monday
tuesday
wednesday
thursday
friday
saturday
sunday
start_date
end_date
calendar_dates.txt
service_id
date
exception_type
shapes.txt
shape_id
shape_pt_lat
shape_pt_lon
shape_pt_sequence
Legend
Relationship

GTFS-Realtime

- TripUpdates
- VehiclePositions
- Alerts



Why care?

- Benefits from Realtime feeds include:
  - Perceived reduced wait times
  - Actually reduced wait times
  - *Possibly* reduced travel times
  - Improved perception of transit services
  - Improved perception of safety
  - *Possibly* increased ridership

My first day at LTD – July 2016

Me: Why doesn't LTD provide Realtime transit information to our customers?

IT: We do.

Me: Well then why isn't it on Google Maps?

IT: We don't know.

The Problem

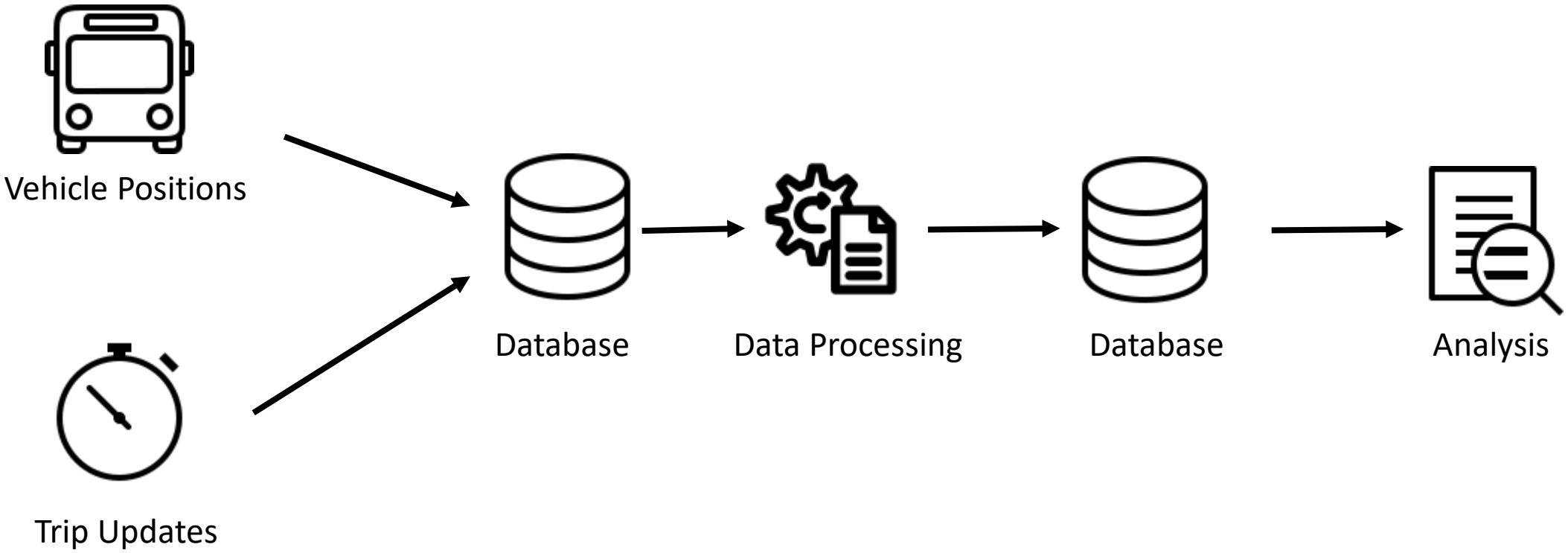
- We don’t know whether our GTFS-rt feed is accurate.

The Approach

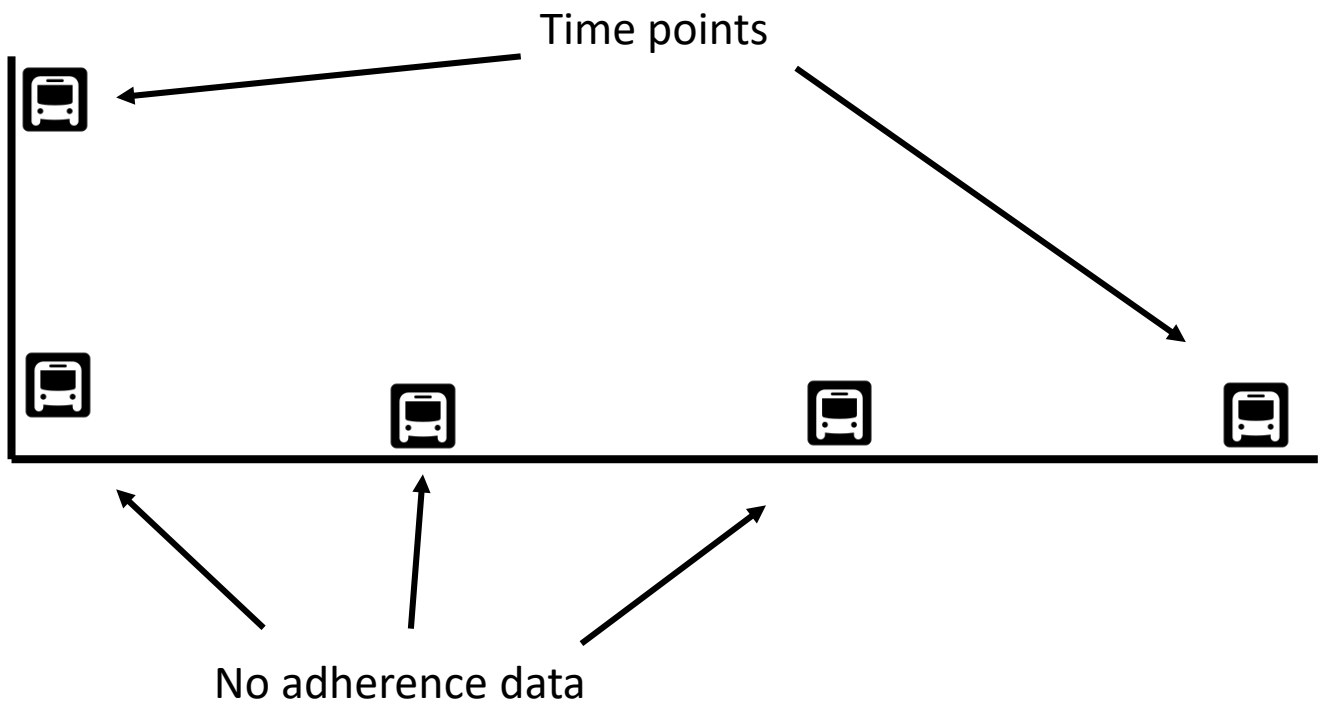
Time to arrival at stop	Prediction accuracy
0-3 minutes	-1 to +1 minutes
3-6 minutes	-1.5 to +2 minutes
6-12 minutes	-2.5 to +3.5 minutes
12-30 minutes	-4 to +6 minutes

A Customer-Focused Methodology for Determining Prediction Accuracy Using Automatically Collected Data
Farah Machlab, Laura Riegel, Rahul Sood, and Ritesh Warade (2017)

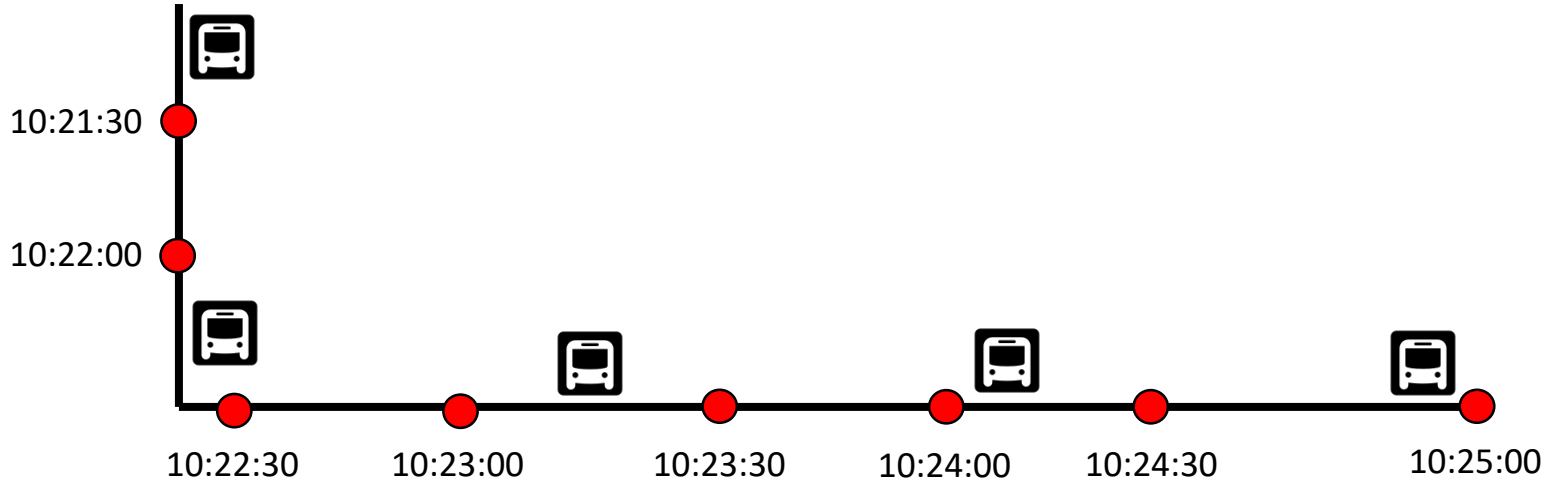
The Approach



The Approach



The Approach



The Results

Percent of results that are “acceptable”:

Timepoints only	0-3 mins	3-6 mins	6-12 mins	12-30 mins
No	28%	44%	65%	59%
Yes	64%	76%	85%	56%

The Results

Route	All Stops	Time Point
1	45%	68%
11	53%	80%
12	39%	70%
13	42%	76%
17	43%	66%
18	51%	73%
24	39%	70%
28	41%	78%
33	52%	
36	56%	83%
40	46%	70%
41	57%	72%
51	46%	73%
52	42%	73%
55	27%	95%
66	41%	73%
67	46%	75%
81	42%	65%
82	37%	65%
85	14%	40%
91	34%	57%
92	44%	32%
93	48%	72%
95	58%	72%
96	46%	
98	43%	48%
103	61%	61%

Next Steps/Broader Conversation

- **Fix the Realtime feed!**
- Apply interpolation methodology to corridor-level and intersection-level speed studies
- Develop standards for customer-facing data quality

Questions

- Are any of your agencies monitoring Realtime information that you produce?
- What is an acceptable accuracy rate?
- How are you monitoring other customer-facing feeds that you generate?

Up Next:

Lane Council of Governments (LCOG)

Link Lane: Starting & Expanding Transit Service in Rural Lane County, Oregon

Link Lane: Starting and Expanding Transit Service in Rural Lane County, Oregon

NWTX

October 6, 2023

Link Lane Background and Update

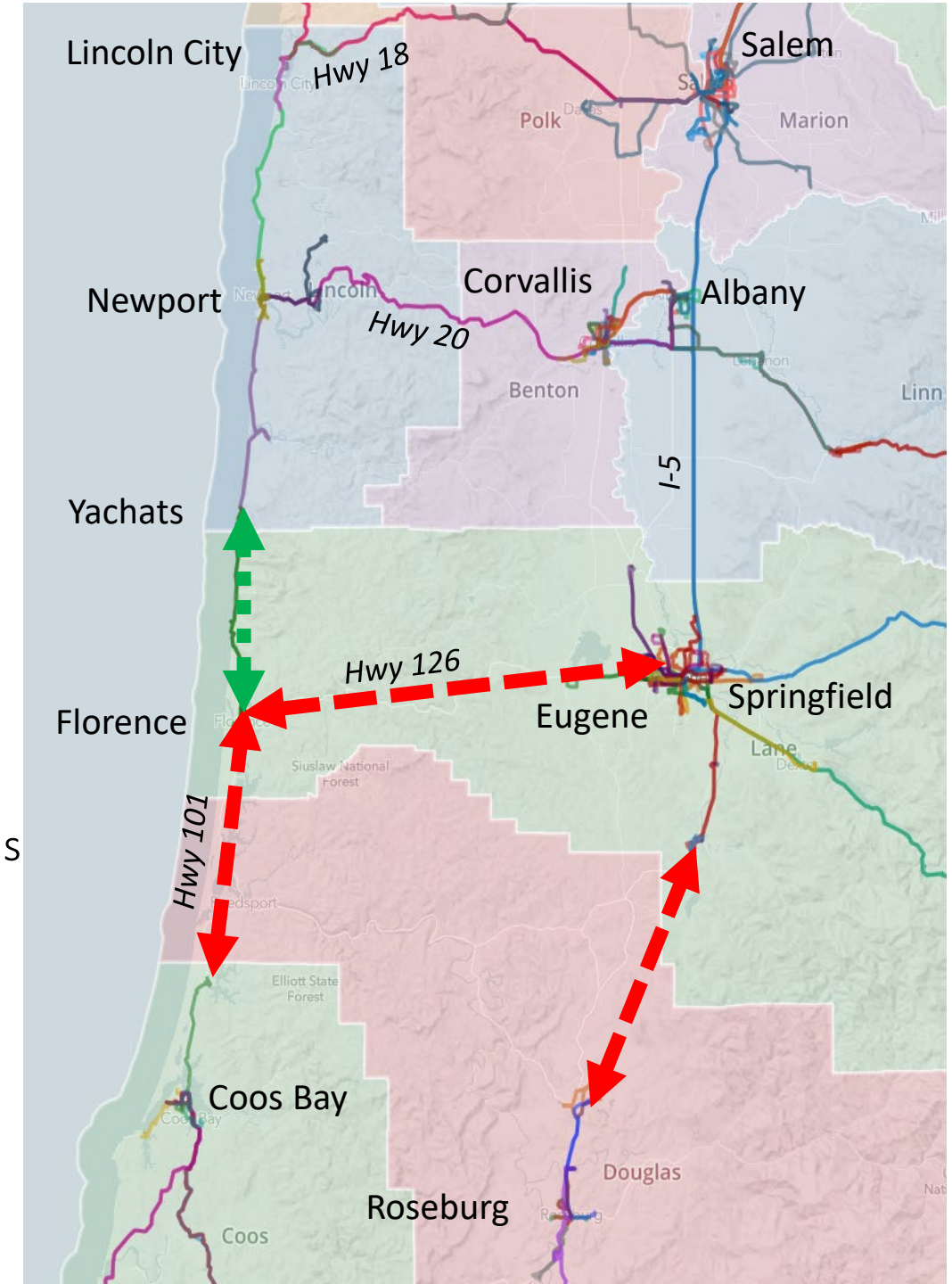
Transit in Rural Lane County: 2018

Gaps

- HWY 129: Eugene-Florence
- HWY 101: North Bend-Florence
- HWY 101: Florence-Yachats (pilot starting)
- I-5: Roseburg-Eugene/Springfield

Eugene-Florence Feasibility Study

- Community driven; ODOT funded; LCOG conducted
- Confederated Tribes of Coos, Lower Umpqua, and Siuslaw Indians partnership
- Heard overwhelming demand for service
- LCOG board approved becoming a public transportation service provider



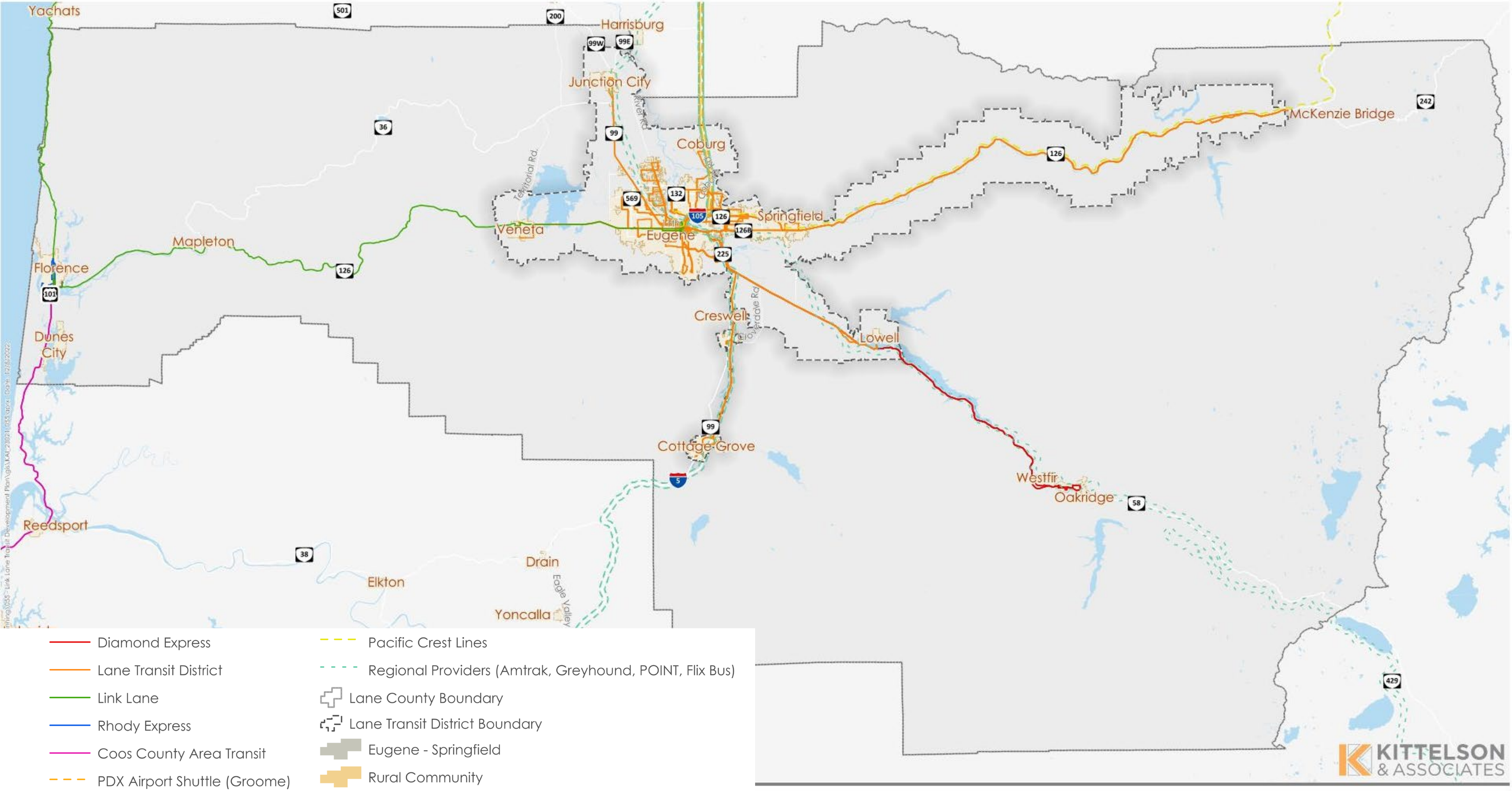
Link Lane

Let us do the driving!

Welcome to Link Lane.

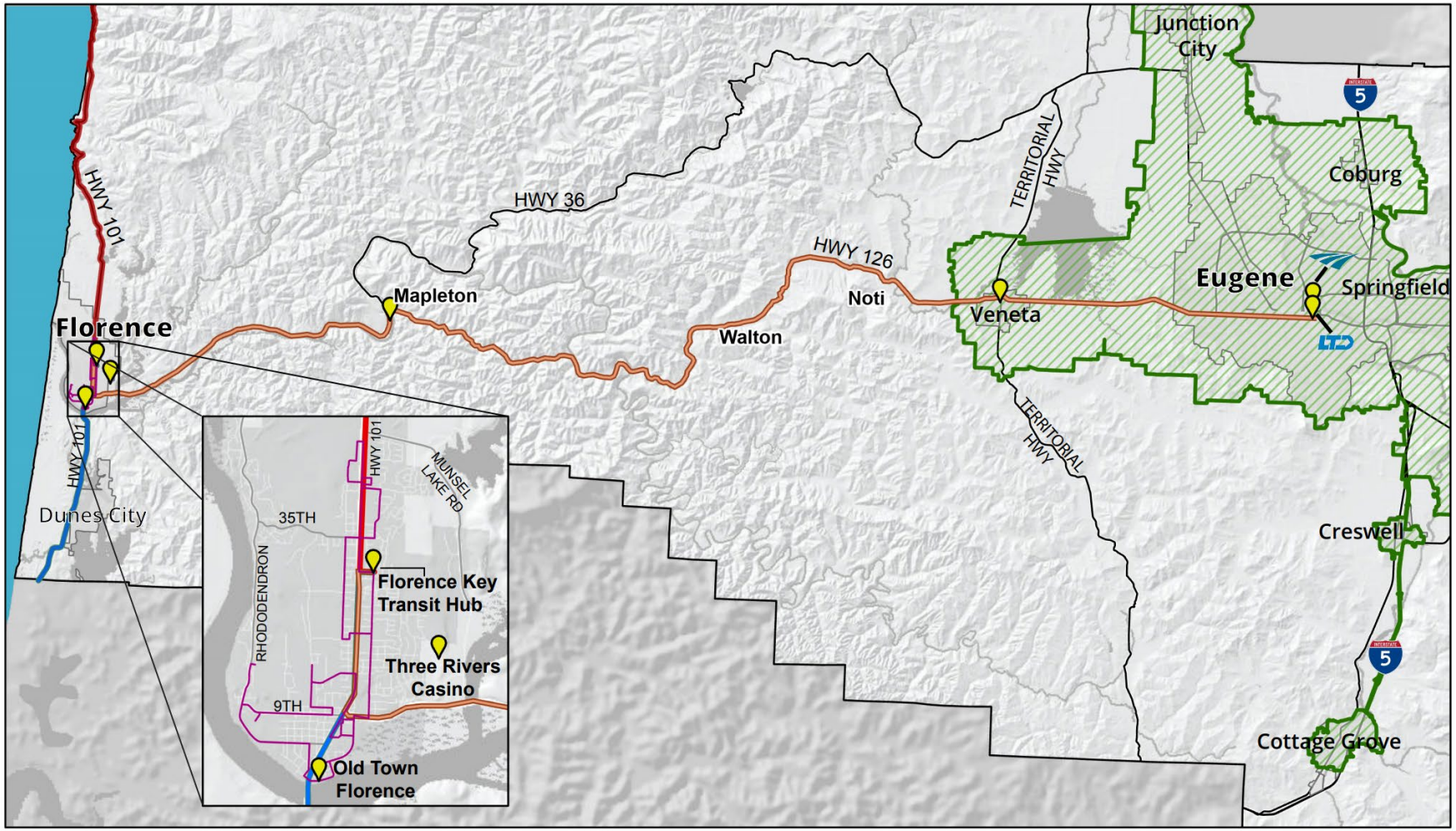
Traveling along the coast and to the valley has never been easier!

With the Link Lane bus service, it is more convenient and affordable than ever to travel between Eugene and Florence Florence and Yachats. You can count on Link Lane to get you there comfortably, stress free and with ease. Take advantage our low fares on a fully accessible bus.


Yachats
Harrisburg
Junction City
Coburg
Springfield
Eugene
Veneta
Mapleton
Florence
Dunes City
Reedsport
Creswell
Lowell
Cottage Grove
Westfir
Oakridge
McKenzie Bridge
Drain
Elkton
Yoncalla
Territorial Rd.
River Rd
Eagle Valley
Diamond Express
Lane Transit District
Link Lane
Rhody Express
Coos County Area Transit
PDX Airport Shuttle (Groome)
Pacific Crest Lines
Regional Providers (Amtrak, Greyhound, POINT, Flix Bus)
Lane County Boundary
Lane Transit District Boundary
Eugene - Springfield
Rural Community
KITTELSON & ASSOCIATES

Eugene-Florence Connector

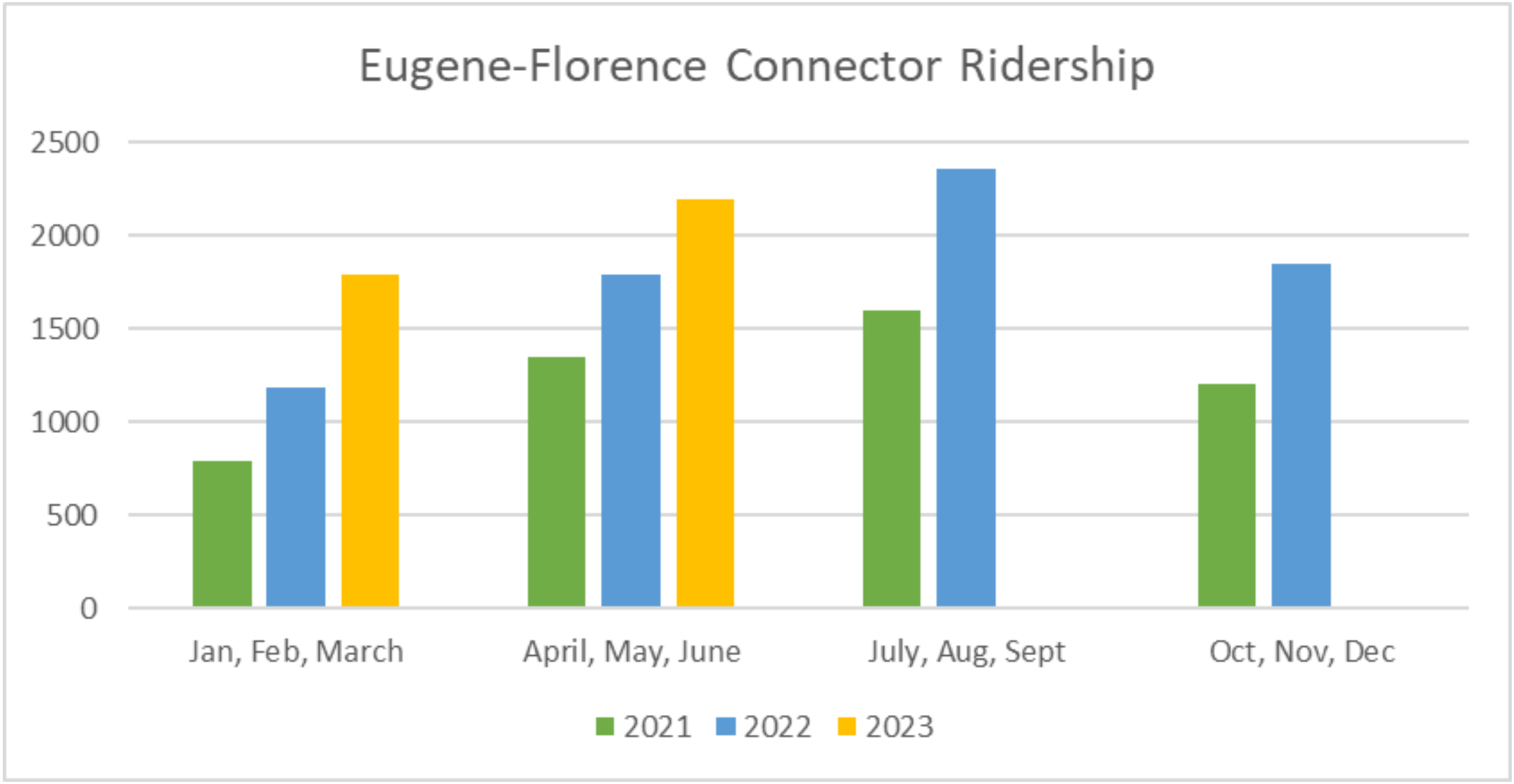
- Connects Eugene and Florence on Highway 126
- Runs two round-trips per day; 7 days per week
- $5.00 for a one-way ticket for the entire route; $1.00 for a one-way ticket between Mapleton and Florence
- Partners making this happen: Confederated Tribes of Coos, Lower Umpqua, and Siuslaw Indians; Lane County; City of Florence; Lane Transit District; ODOT, Amtrak, local residents!



Eugene - Florence Intercommunity Route

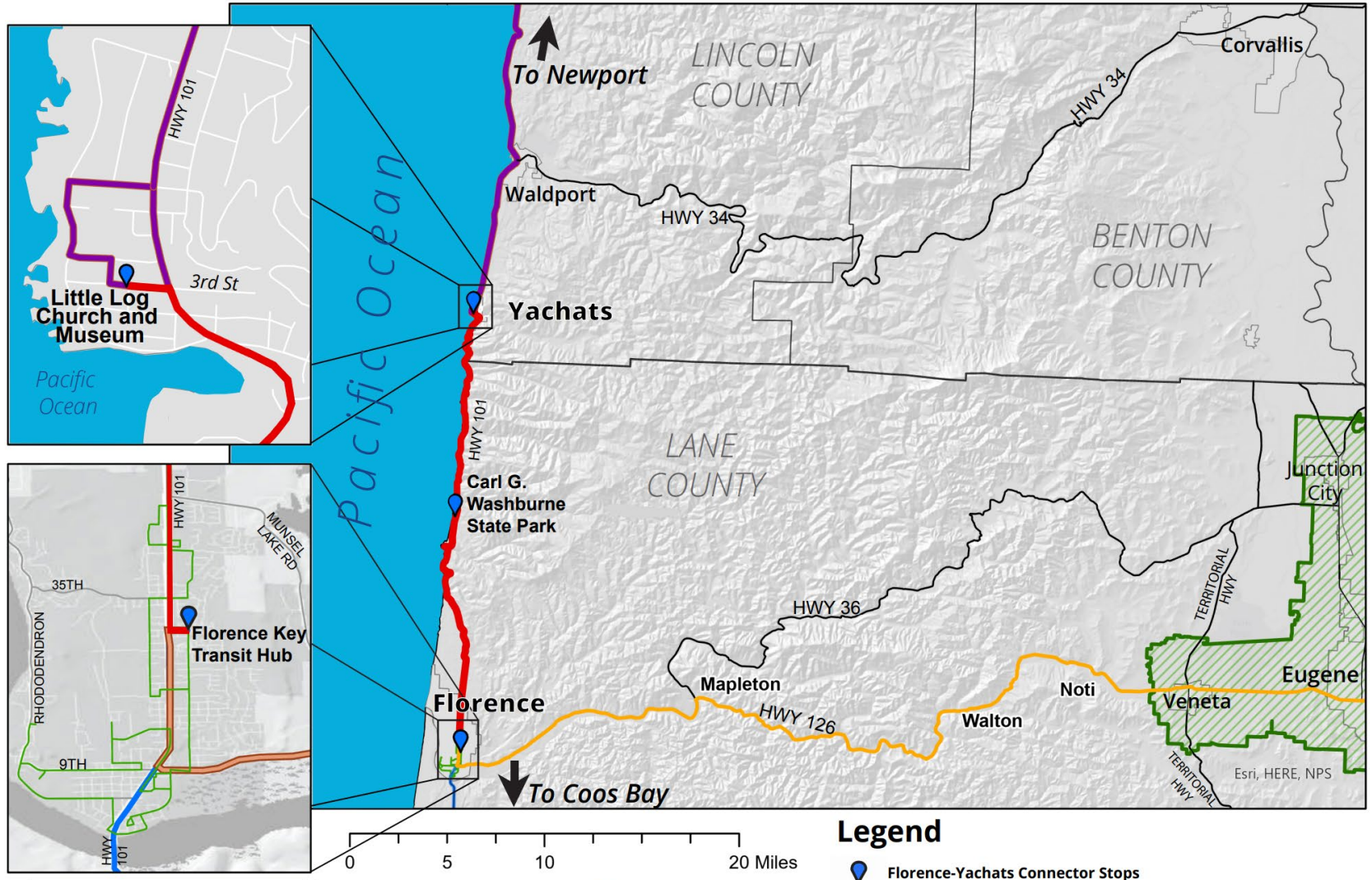
LinkLane

LCOG


Eugene-Florence Connector Ridership
2500
2000
1500
1000
500
0
Jan, Feb, March
April, May, June
July, Aug, Sept
Oct, Nov, Dec
2021
2022
2023

Florence-Yachats Connector

- Connects Florence and Yachats along Highway 101
- Operates Monday through Saturday, 7:30am – 7:25pm except holidays
- Four round-trip routes per day
- $2.50 for a one-way ticket for the entire route



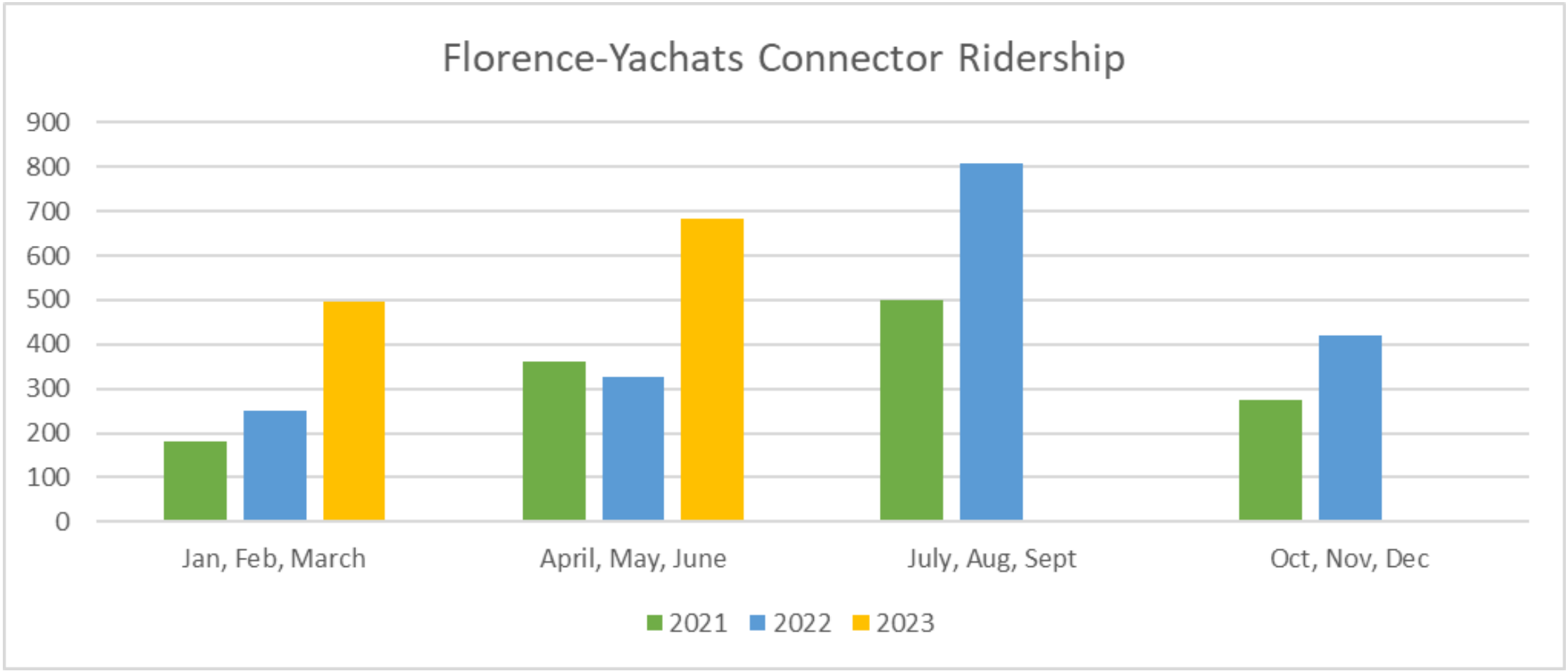
Florence-Yachats Connector Route

LCOG

LinkLane

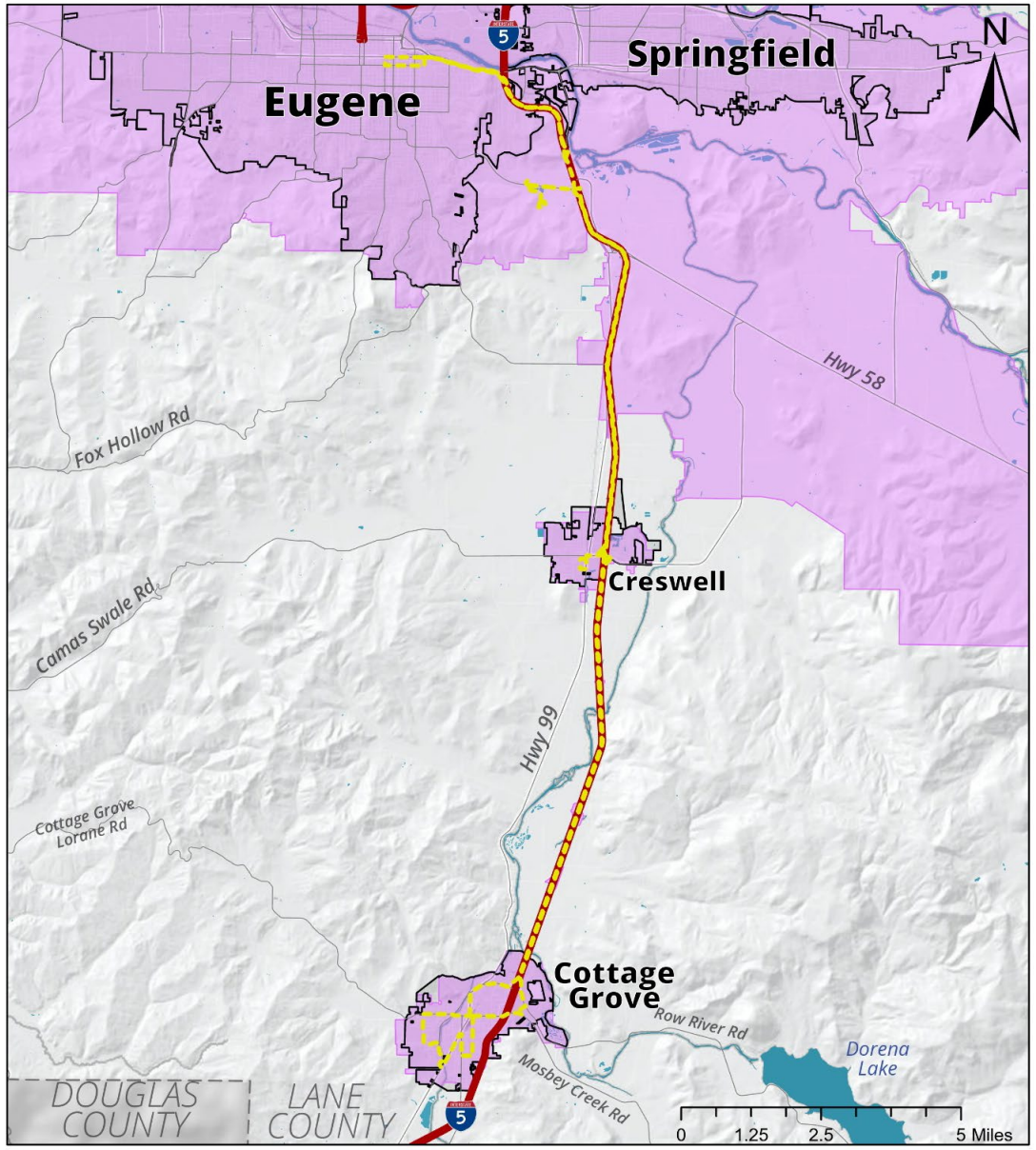
FLORENCE·YACHATS Connector

LTD


Florence-Yachats Connector Ridership
900
800
700
600
500
400
300
200
100
0
Jan, Feb, March
April, May, June
July, Aug, Sept
Oct, Nov, Dec
2021
2022
2023

Metro Shuttle - Pilot

- Reservation based; door-to-door service
- South Lane County to/from points north
- Operates Monday through Friday between 7:30am and 5:30pm except holidays
- Fares range from ~$20-$30
- Historically a Cottage Grove provided service
- Pilot for LCOG; partnership with LTD



Partnerships Supporting Link Lane

- Confederated Tribes of Coos, Lower Umpqua, and Siuslaw Indians
- Lane Transit District
- Lane County
- Travel Lane County
- City partners

Potential Expanded Service Opportunities

- Add On-Demand Service to OR 36 Communities
- Expand On-Demand Service in Cottage Grove
- Add On-Demand Service in Mohawk-Marcola
- Add On-Demand Service in the McKenzie River/McKenzie Pass Area
- Add Local Deviated Fixed-Route Service in Oakridge/ Westfir

Thank you!

Kelly Clarke and Kate Wilson

Closing Remarks

Tom Schwetz

Director of Mobility Planning and Policy

Up Next:

Lunch

Technical tours will begin promptly at 1:30

Technical Tours 1:30-4:00 PM

- **West Eugene EmX** (Meet on 11th Ave across the driveway from EmX, Bay U)
  - Team Lead: Tom Schwetz
- **PeaceHealth Bike Share Tour** (Mary Spilde Center)
  - Team Leads:
    - Jody Trendler, City of Eugene
    - Brodie Hylton, Cascadia Mobility