

TRANSIT SPEED & RELIABILITY

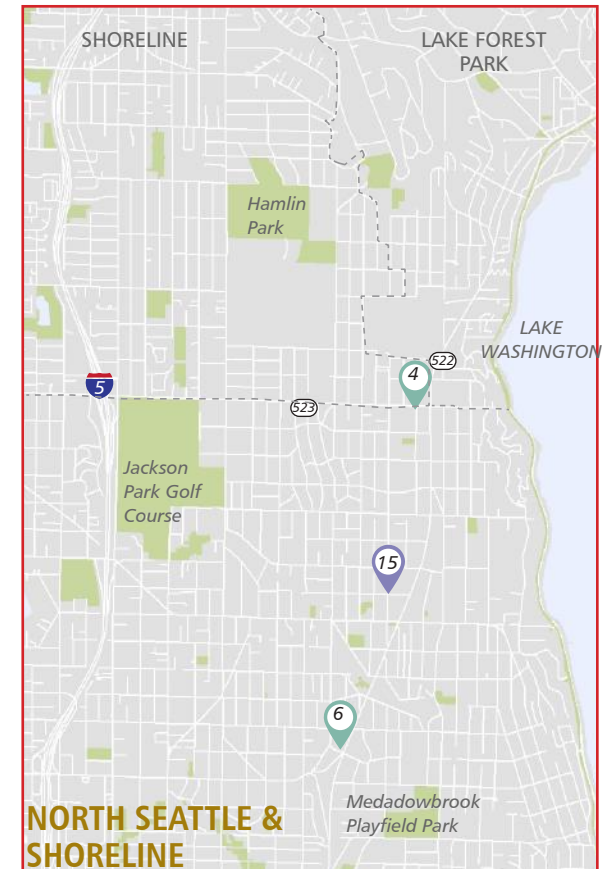
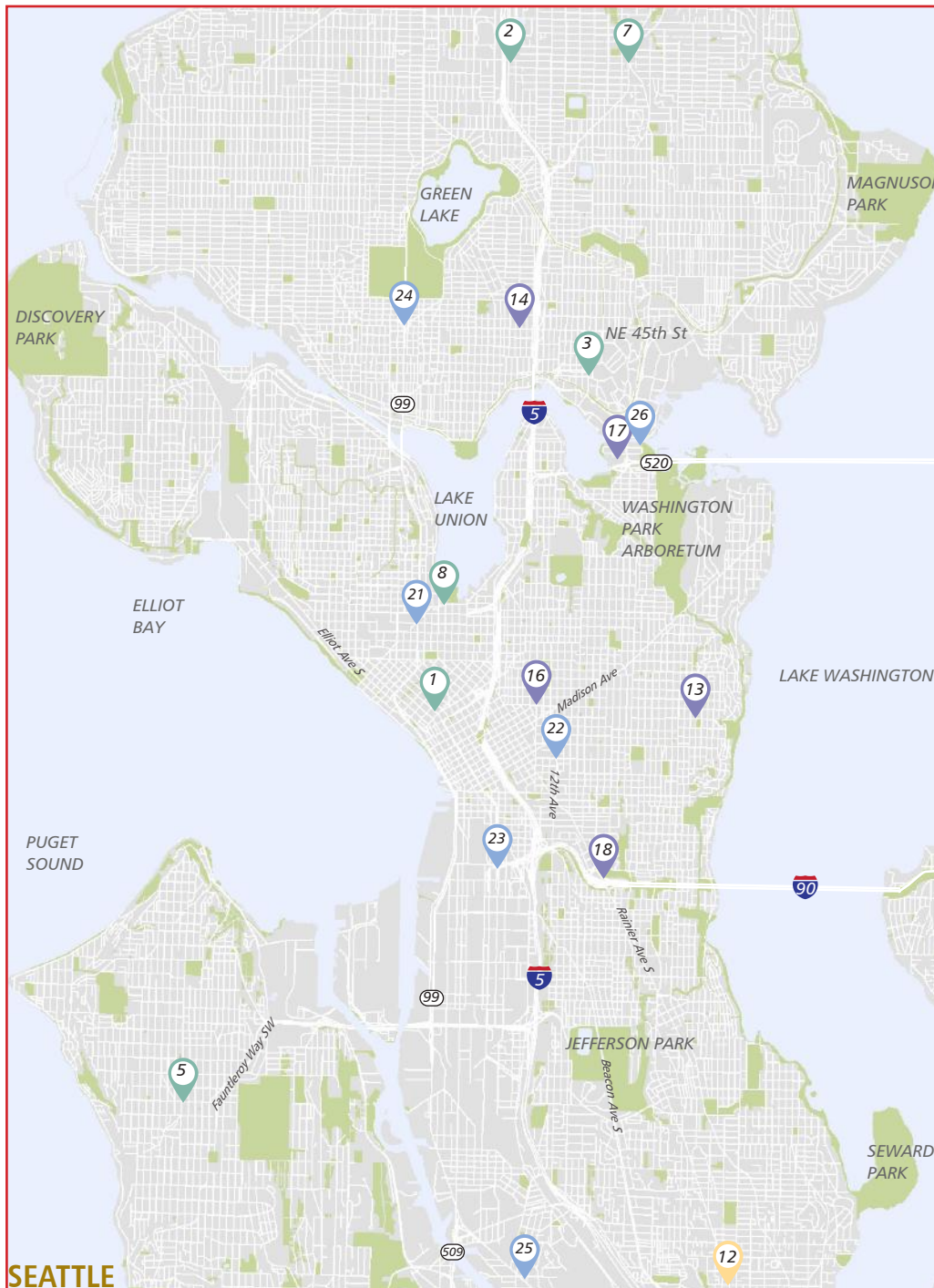
2021 ANNUAL SPOT IMPROVEMENTS END OF YEAR REPORT

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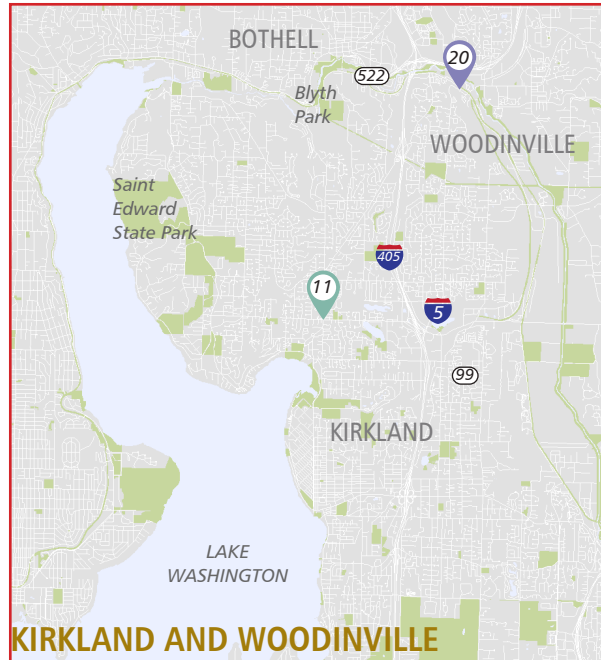
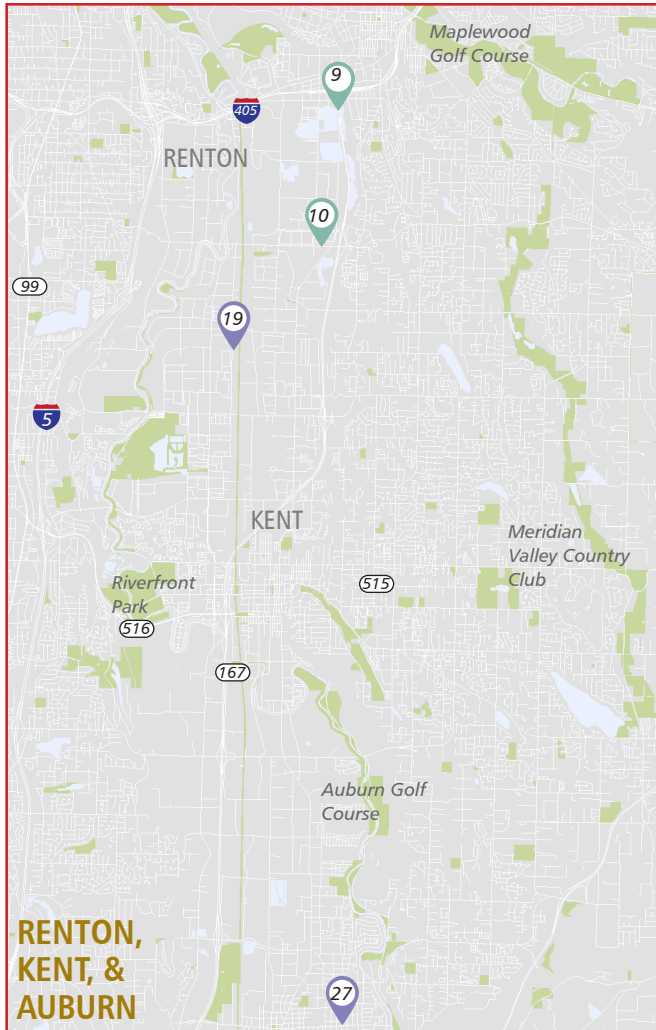
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25. ELLIS AVE S / S MYRTLE ST
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27. E MAIN ST / M ST



- Street and Intersection Design Improvement
- Bus Stops and Routing Improvement
- Traffic Regulations Improvement
- Signals Improvement

WOODINVILLE
AND KIRKLAND
RENTON
AND KENT
 KING COUNTY



- Street and Intersection Design Improvement
- Bus Stops and Routing Improvement
- Traffic Regulations Improvement
- Signals Improvement

1. 3RD AVE, VIRGINIA STREET – STEWART STREET
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27. E MAIN ST / M ST

INTRODUCTION

This annual report describes the spot improvements that were implemented in 2021 through partnerships with local traffic agencies. Spot improvements are low-cost capital investments aimed at improving bottleneck conditions and operational issues that affect bus travel times and reliability, which results in increased attraction to public transit as a travel mode of choice. The complexity of spot improvements can range from less complex projects, such as traffic signal timing adjustments, to more-complicated projects requiring design and public outreach, such as new bus-only lanes.

The Spot Improvement Program supports King County Metro Mobility Framework policy recommendations to implement investments that increase speed, reliability, and safety. Spot improvement projects utilize a set of transit supportive toolboxes identified in [Metro's 2021 Transit Speed & Reliability Guidelines and Strategies](#). Examples of these transit supportive strategies are shown in the Speed and Reliability Toolbox Table (Page 2), and the improvements featured in this report are grouped by strategy type.

In 2021, Metro completed several projects to support the [Renton, Kent, and Auburn Mobility Project](#) (RKAAMP) that went into effect in Fall 2020. Metro also completed several improvements to support the North Link Connections Mobility Project (NorCon) that went into effect in Fall 2021. A few higher-complexity projects from both RKAAMP and North Link Connections are anticipated to be completed in 2022. In 2022, we will begin planning for projects to support the East Link Connections Mobility Project, which will go into effect in 2023.

Spot improvement delivery in 2021 continued to experience challenges due to the COVID-19 pandemic and competition for limited city staff and financial resources. The Spot Improvement Program developed adaptations to these limitations by batching together projects of similar type and utilizing a hybrid delivery model where Metro Engineering Services, Construction Management, and on-call contractor can supplement city resources; these adaptations have proved to be successful, allowing us to complete more projects in 2021 compared to recent years.

The success of each implementation was made possible with the support of cities and their willingness to make operational changes to roadway infrastructure and traffic signal systems to benefit transit riders. In addition, several projects completed this year were made possible through funding by a [WSDOT Regional Mobility Grant](#). For additional information regarding this program, please contact Owen Kehoe at 206-477-5811/owen.kehoe@kingcounty.gov.

Spot Improvement program 2021 expenditures: **\$1,403,271**. This includes Metro staff time and reimbursed city costs to develop conceptual designs, develop final designs (when needed), construct these improvements, as well as administer the spot improvement program as a whole.

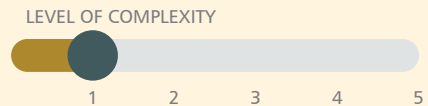
The **27** Spot improvement projects highlighted in this report benefited:

- » **206,630 WEEKDAY RIDERS**
- » **96 BUS ROUTES**

Resulting in:

- » **\$1,162,000 IN AVOIDED ADDITIONAL OPERATING COST ANNUALLY; OPERATING DOLLARS THAT WOULD OTHERWISE NEED TO BE SPENT MAINTAINING SCHEDULE RELIABILITY EACH YEAR.**
- » **IMPROVED BUS OPERATIONAL SAFETY AT 6 LOCATIONS IN 2021.**

Spot improvements can range in complexity depending on the level of jurisdictional coordination, public outreach, design work, and funding sources needed. The complexity of the projects presented in this report are rated on a 1-5 scale, a "1" being the least complex project, for example a signal timing adjustment, to "5" for the most complicated of the projects, such as new bus-only lanes.



RESTRUCTURE



GRANT FUNDED

SPEED AND RELIABILITY TOOLBOX TABLE

| CHALLENGES | | | | | | | | | | | | | | COST | COORDINATION |
|---|---------|----------------|--------|------------|-----------|------------------------|--------------------------|------------------|------------|-------------------|-------------|----------|-----------|------|--------------|
| INTERSECTION | ROADWAY | FREWAY ON-RAMP | SIGNAL | RIGHT TURN | LEFT TURN | OTHER, TRAFFIC RELATED | INEFFICIENT ROUTE DESIGN | LEAVING BUS STOP | DWELL TIME | BUS ZONE CAPACITY | PEDESTRIANS | CYCLISTS | MOTORISTS | | |
| CONGESTION | | | DELAY | | | | OPERATIONS | | | | SAFETY | | | | |
| \$: UNDER \$50,000 \$\$: \$50,000-\$100,000 \$\$\$: \$100,000-\$250,000 \$\$\$\$: OVER \$250,000 | | | | | | | | | | | | | | | |

STRATEGY



A. Street and Intersection Design

| | | | | | | | | | | | | | | | | |
|-------------------------------|-----|-----|----|-----|-----|-----|----|----|----|-----|----|--|---|----|-------------|------------|
| Dedicated Bus Lane | ♦♦♦ | ♦♦♦ | | ♦♦♦ | ♦♦♦ | ♦♦♦ | | ♦♦ | ♦♦ | ♦♦♦ | ♦♦ | | ♦ | ♦♦ | \$ - \$\$\$ | High |
| Queue Bypass (Short Bus Lane) | ♦♦♦ | ♦♦ | ♦♦ | | ♦♦ | ♦♦ | ♦♦ | ♦♦ | ♦♦ | | | | ♦ | ♦ | \$ - \$\$\$ | High |
| Roadway Channelization | ♦ | | | ♦ | ♦♦ | ♦♦ | | ♦ | ♦ | | | | ♦ | ♦ | \$ | Low/Medium |
| Turn Radius Improvements | | ♦ | | | ♦♦ | ♦♦ | | | | | | | | | \$\$\$ | Medium |
| Speed Hump Modifications | | | | | | | ♦♦ | | | | | | | | \$ - \$ | Low |



B. Bus Stops and Routing

| | | | | | | | | | | | | | | | | |
|----------------------|---|---|--|---|--|--|--|-----|----|----|-----|----|----|--|---------------|--------|
| Bus Stop Location | ♦ | | | ♦ | | | | ♦ | ♦♦ | ♦ | ♦ | ♦♦ | ♦♦ | | \$\$ - \$\$\$ | Medium |
| Route Design | ♦ | ♦ | | ♦ | | | | ♦♦♦ | ♦ | ♦ | ♦ | | | | \$\$ | High |
| Bus Stop Lengthening | | | | | | | | | ♦ | ♦♦ | ♦♦♦ | | | | \$\$ | High |
| Bus Bulbs | | | | | | | | | ♦ | ♦♦ | ♦♦ | | | | \$\$ - \$\$\$ | High |
| Boarding Islands | | | | | | | | | ♦ | ♦♦ | ♦♦ | | ♦♦ | | \$\$ - \$\$\$ | High |



C. Traffic Regulations

| | | | | | | | | | | | | | | | | | |
|------------------------------|---|----|--|---|----|----|---|---|----|--|--|--|---|---|---|----|-----|
| Turn Restrictions/Exemptions | ♦ | | | ♦ | ♦♦ | ♦♦ | ♦ | ♦ | ♦ | | | | ♦ | ♦ | ♦ | \$ | Low |
| Parking Removal/ Alterations | | ♦♦ | | | | | | | ♦♦ | | | | | | | \$ | Low |



D. Signals

| | | | | | | | | | | | | | | | | | |
|----------------------------------|-----|----|----|-----|-----|-----|-----|-----|----|--|--|--|---|---|---|-------------|------------|
| Passive Traffic Signal Retiming | ♦♦ | ♦ | | ♦♦ | ♦ | ♦ | | ♦♦ | | | | | ♦ | ♦ | ♦ | \$ - \$ | Low |
| Transit Signal Priority (Active) | ♦♦♦ | | | ♦♦♦ | ♦♦♦ | ♦♦♦ | ♦♦♦ | ♦♦♦ | | | | | | | | \$ - \$ | Low |
| Signal Phase Modification | ♦♦ | ♦ | | ♦ | ♦ | | ♦♦ | | | | | | ♦ | | | \$ - \$\$\$ | Low-Medium |
| New Signal Installation | ♦♦ | ♦ | | ♦ | ♦ | | ♦♦ | | | | | | ♦ | | | \$ - \$\$\$ | Low-Medium |
| Queue Jumps | ♦♦♦ | ♦♦ | ♦♦ | | ♦♦ | ♦♦ | | ♦♦ | ♦♦ | | | | ♦ | ♦ | | \$ - \$\$\$ | Medium |

Benefits: ♦ LOW ♦♦ MEDIUM ♦♦♦ HIGH

2021 SPOT IMPROVEMENTS



S 212TH STREET/ 64TH AVENUE S, KENT



SW ALASKA STREET (42ND AVENUE SW – 36TH AVENUE SW), SEATTLE



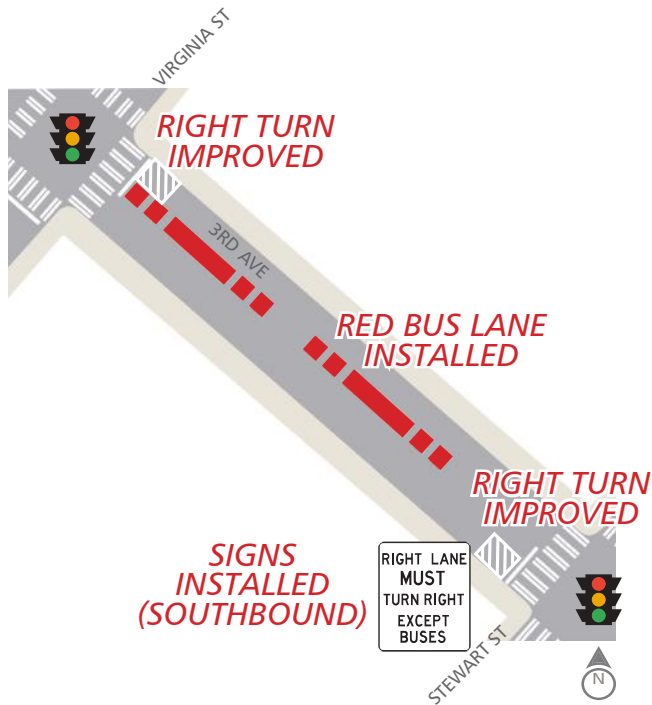
WESTLAKE AVENUE N / ROY STREET / VALLEY STREET, SEATTLE



NE WOODINVILLE DRIVE / NE 175TH STREET, WOODINVILLE



GRANT FUNDED
WSDOT REGIONAL MOBILITY GRANT



3RD AVENUE (VIRGINIA STREET – STEWART STREET)

ISSUE

Southbound buses were delayed on this block due to southbound general-purpose congestion, and a large number of non-authorized vehicles were continuing south on 3rd Avenue into the Pike Street/Pine Street area. Also, northbound buses turning right from 3rd Avenue onto Virginia Street were experiencing difficulty due to an awning from the adjacent building extending nearly to the curb line.

IMPROVEMENTS MADE



STREET AND INTERSECTION DESIGN

A southbound red bus lane was added, and all southbound general-purpose traffic must now turn right onto Stewart Street, reducing congestion and transit delay along 3rd Avenue. Channelization along 3rd Avenue between Stewart Street and Virginia Street was adjusted to accommodate curb buffers allowing wider right turns for buses, making it easier for northbound buses to turn right onto Virginia Street.

PROJECT i

METRO ROUTES IMPACTED: 1, 2, 3, 4, 13, 14, 21, 24, 26, 27, 28, 33, 40, 55, 56, 57, 62, 120, 124, 131, 132, C LINE, D LINE, E LINE

PROJECT PARTNERS

ACKNOWLEDGEMENTS
Jonathan Dong, Summer (Meng) Xia (SDOT)

SEATTLE

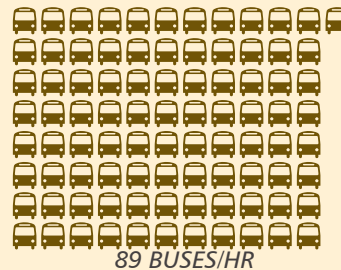
BUS DELAY IMPROVEMENTS



34 SEC

DELAY REDUCED ON
AVERAGE PER TRIP
IN THE PM PEAK
BETWEEN JUNE 2020
AND JUNE 2021

ROUTE BENEFIT



TRANSIT BENEFITS

DAILY PASSENGER BENEFIT (1 person icon = 1000 PERSONS)



2 1ST AVENUE NE / NE 92ND STREET

ISSUE

Buses making the southbound right turn from 1st Avenue NE to NE 92nd Street were running over the curb. The curb had been rebuilt by SDOT previously but was insufficiently designed to accommodate Metro bus turns.

IMPROVEMENTS MADE



STREET AND INTERSECTION DESIGN

The curb was rebuilt with a larger curb radius.

PROJECT



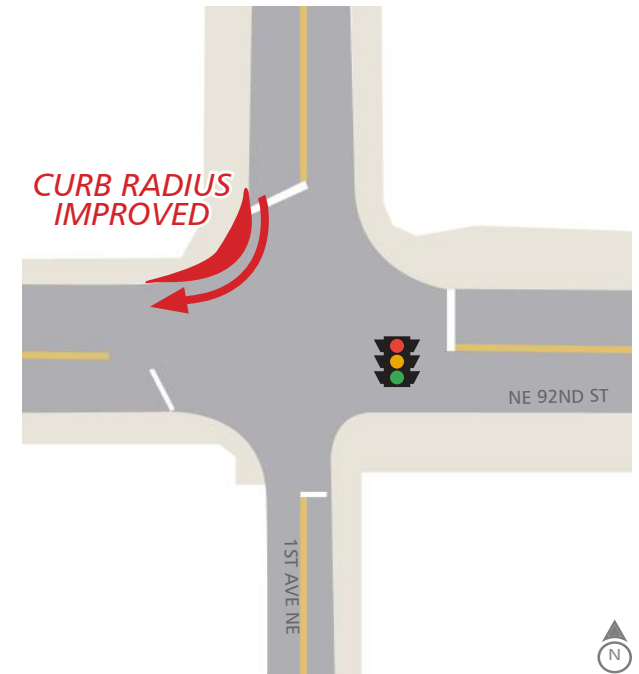
METRO ROUTES IMPACTED: **20, 40, 345, 346 LINE**

PROJECT PARTNERS



ACKNOWLEDGEMENTS

Peter Trinh, Chris Barnes (SDOT)



TRANSIT BENEFITS

SAFETY



Buses are now able to safely make the southbound right turn without running over the curb and no longer have to be rerouted to an inconvenient pathway for riders.

ROUTE BENEFIT



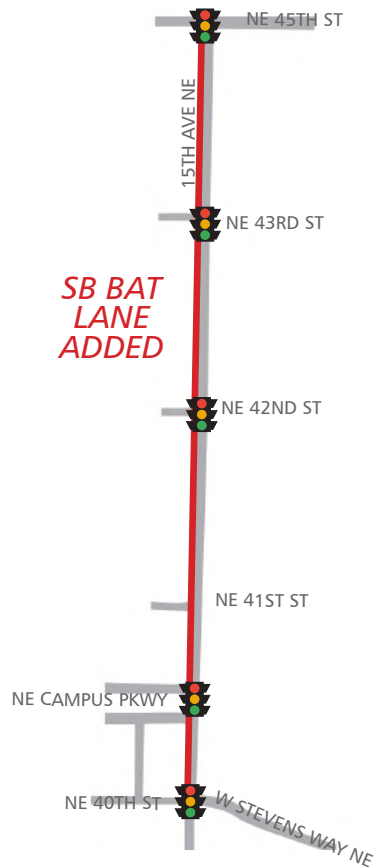
15 BUSES/HR

DAILY PASSENGER BENEFIT (1 person icon = 1000 PERSONS)



8,350 RIDERS

15TH AVENUE NE (NE 40TH STREET – NE 45TH STREET)



ISSUE

Buses were experiencing delay while traveling on 15th Avenue NE, one of the busiest corridors in the U-District. This delay resulted in a slow and unreliable experience for thousands of people taking transit to, from, and through the U-District area.

IMPROVEMENTS MADE



A new southbound BAT lane was installed on 15th Avenue NE between NE 43rd Street and NE 40th Street in Seattle's U-District neighborhood.

SEATTLE

PROJECT i

METRO ROUTES IMPACTED: 20, 31, 32, 43, 44, 48, 49, 65, 70, 79, 167, 255, 271, 372, 542, 556, 586

PROJECT PARTNERS

ACKNOWLEDGEMENTS
Janet Loriz, Kelly Kobashigawa (SDOT)

BUS DELAY IMPROVEMENTS



29 sec

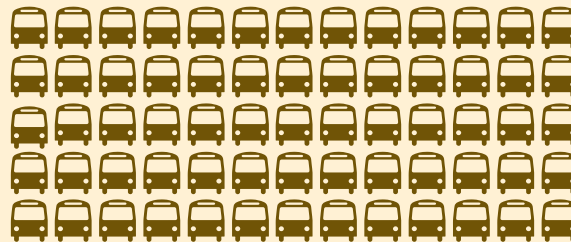
DELAY REDUCED PER TRIP IN THE AM PEAK BETWEEN SEPT AND OCT 2021



8 sec

DELAY REDUCED PER TRIP IN THE PM PEAK BETWEEN AUG AND OCT 2021

ROUTE BENEFIT



65 BUSES/HR

TRANSIT BENEFITS

DAILY PASSENGER BENEFIT (1 person icon = 1000 PERSONS)



16,810 RIDERS

4 NE 145TH STREET / 30TH AVENUE NE

ISSUE

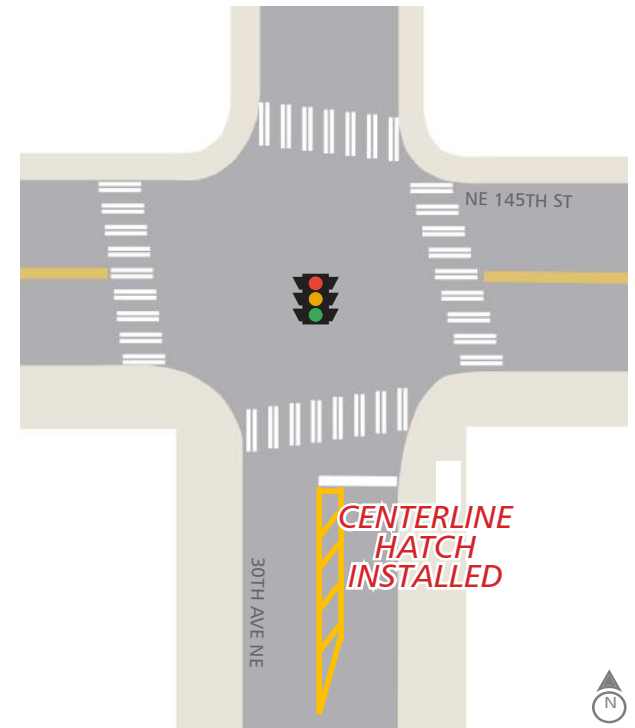
Buses eastbound on NE 145th Street approaching 30th Avenue NE were experiencing difficulties turning right due to the shallow curb radius on the southwest corner and the narrow southbound lane.

IMPROVEMENTS MADE



STREET AND INTERSECTION DESIGN

The northbound lane was narrowed to accommodate a hatched buffer between the northbound and southbound lanes. Buses turning eastbound right from NE 145th Street onto 30th Avenue NE can now drive over the buffer, giving them more space to make the turn safely. These improvements needed to be coordinated with both City of Seattle and City of Shoreline.



PROJECT



METRO ROUTES IMPACTED: **64, 65**

PROJECT PARTNERS



ACKNOWLEDGEMENTS

Eric Sill, Fred Perez (SDOT), Kendra Dedinsky (Shoreline)



SEATTLE / SHORELINE

TRANSIT BENEFITS

BUS DELAY IMPROVEMENTS



8 SEC

ON AVERAGE PER TRIP IN THE PM PEAK BETWEEN APRIL 2021 AND SEPTEMBER 2021



Narrowing the northbound lane and adding a hatched buffer provides more space for buses to make the eastbound right turn, enabling safer turns and reducing chances of collisions between turning buses and northbound cars

ROUTE BENEFIT



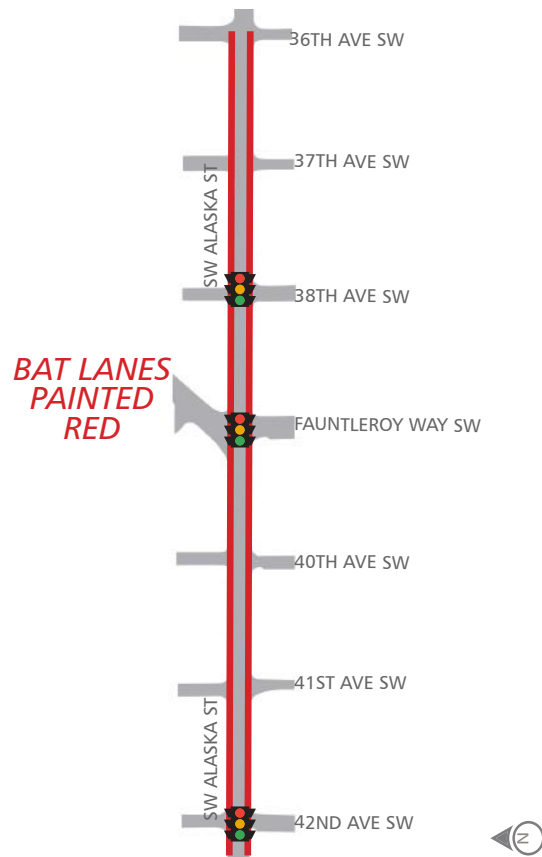
9 BUSES/HR

DAILY PASSENGER BENEFIT (1 person icon = 1000 PERSONS)



2,350 RIDERS

SW ALASKA STREET (42ND AVENUE SW – 36TH AVENUE SW)



ISSUE

Buses on SW Alaska Street were occasionally experiencing delay when general purpose traffic was causing congestion in the BAT lanes. The BAT lanes had a few signs and "BUS ONLY" pavement markings to show drivers that the lane should not be used by general purpose through traffic, so the status of the BAT lane may not have been clear to drivers.

IMPROVEMENTS MADE



The existing BAT lanes on SW Alaska Street between 42nd Avenue SW and 36th Avenue SW were painted red in select locations to emphasize that general purpose traffic is not allowed in the lane at all times of day, except for right turns at selected locations. This reduces congestion in the bus lane and reduces confusion for drivers, helping ensure the BAT lane is clear for buses.

PROJECT i



METRO ROUTES IMPACTED: **50, 55, 773, C LINE**

PROJECT PARTNERS



ACKNOWLEDGEMENTS

Caylen Beaty, Trevor Partap, Laeth Al-Rashid (SDOT)

BUS DELAY IMPROVEMENTS



13 SEC

DELAY REDUCED ON AVERAGE PER TRIP IN THE PM PEAK BETWEEN OCTOBER 2020 AND SEPTEMBER 2021

The improvement also provides reliability benefits during congested periods.

ROUTE BENEFIT



20 BUSES/HR

TRANSIT BENEFITS

DAILY PASSENGER BENEFIT (= 1000 PERSONS)



7,480 RIDERS

6 LAKE CITY WAY NE / NE NORTHGATE WAY

LEVEL OF COMPLEXITY



ISSUE

A roadway restriping project along Lake City Way NE resulted in the removal of the southbound free right turn pocket at NE Northgate Way, with the stop bar being extended over all lanes. Since the stop bar formerly did not extend over all the right turn pocket (there are no conflicting signalized vehicular movements), buses were previously making safe right turns without stopping, regardless of the signal indication. Buses and other vehicles began stopping at the newly extended stop bar, resulting in delay.

IMPROVEMENTS MADE



STREET AND INTERSECTION DESIGN

The former southbound lane configuration was restored, including a right turn pocket without a stop bar. Buses and other vehicles can now make a safe free right turn again, regardless of the signal indication, reducing delay.



RESTRUCTURE NORTH LINK



PROJECT



METRO ROUTES IMPACTED: **20, 320**

PROJECT PARTNERS



ACKNOWLEDGEMENTS

Kelly Kobashigawa, Oli Frenchowicz (SDOT)



TRANSIT BENEFITS

BUS DELAY IMPROVEMENTS



5 SEC

DELAY REDUCED OF DELAY FOR THE WORST-PERFORMING (95TH PERCENTILE) PM PEAK TRIPS BETWEEN NOV 2020 AND NOV 2021

ROUTE BENEFIT



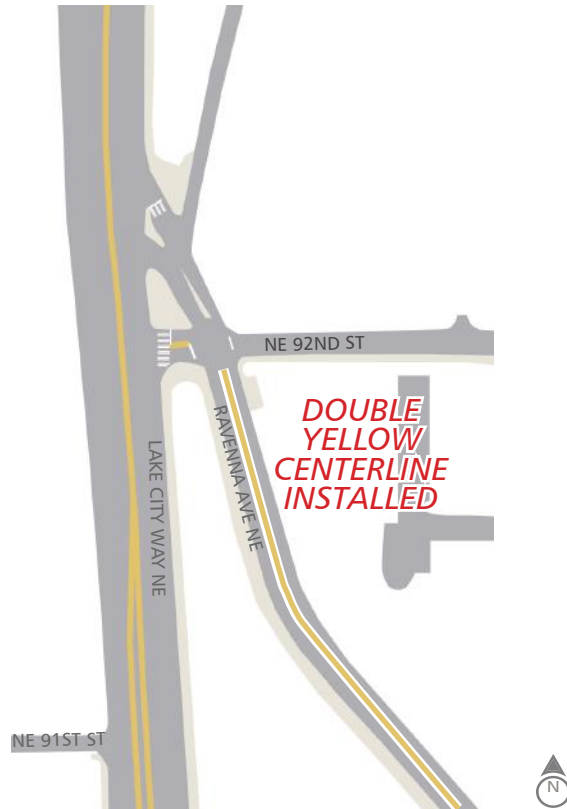
6 BUSES/HR

DAILY PASSENGER BENEFIT (1 person icon = 1000 PERSONS)



830 RIDERS

RAVENNA AVENUE NE / NE 92ND STREET



ISSUE

Buses were experiencing difficulties serving stops along Ravenna Avenue NE at NE 92nd Street due to other vehicles passing buses in the adjacent opposite-direction lane. This made it difficult for buses to safely accelerate after serving the stops.

IMPROVEMENTS MADE



STREET AND INTERSECTION DESIGN

A double yellow centerline was installed along Ravenna Avenue NE at the bus stops at NE 92nd Street. Drivers are now prohibited from passing other vehicles, including stopped buses.



SEATTLE

PROJECT i

METRO ROUTES IMPACTED: **372**

PROJECT PARTNERS



ACKNOWLEDGEMENTS

Kelly Kobashigawa (SDOT)

SAFETY



Drivers are now less likely to pass stopped buses on Ravenna Ave NE, making it easier and safer for buses to stop and re-enter traffic along the street.

ROUTE BENEFIT



10 BUSES/HR

TRANSIT BENEFITS

DAILY PASSENGER BENEFIT (1 person icon = 1000 PERSONS)



7650 RIDERS

8 WESTLAKE AVENUE N / ROY STREET / VALLEY STREET

ISSUE

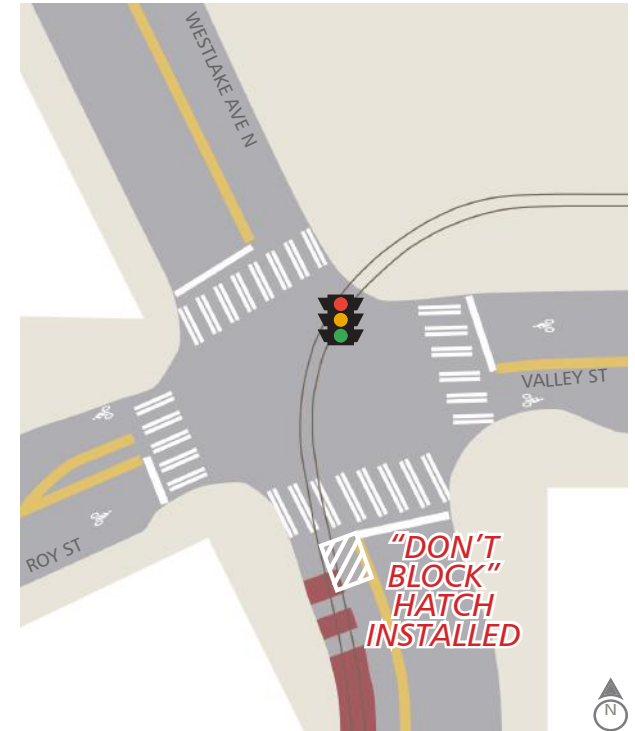
Southbound queues on Westlake Avenue N sometimes extend from Mercer Street into the Roy/Valley Street intersection, blocking buses (particularly the C Line) and the South Lake Union Streetcar turning left from Valley Street onto Westlake Avenue N and causing delay.

IMPROVEMENTS MADE



STREET AND INTERSECTION DESIGN

A small section of white hatching was installed in the left-hand southbound through lane just south of Roy Street/Valley Street. The cross-hatching helps prevent vehicles from blocking buses and streetcars in the intersection – drivers must not block the hatched section.



PROJECT



METRO ROUTES IMPACTED: **C LINE, 40, SOUTH LAKE UNION STREETCAR (98)**

PROJECT PARTNERS



ACKNOWLEDGEMENTS

Laura Wojicki, Pauh Wang, Jonathan Dong, Oli F. (SDOT)



TRANSIT BENEFITS

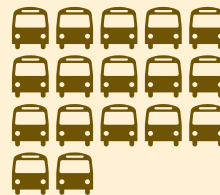
BUS DELAY IMPROVEMENTS



14 SEC

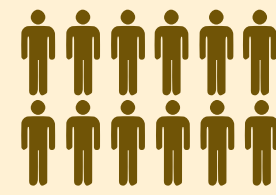
DELAY REDUCED ON AVERAGE PER TRIP IN THE PM PEAK BETWEEN JUNE 2020 AND JUNE 2021

ROUTE BENEFIT



17 BUSES/HR

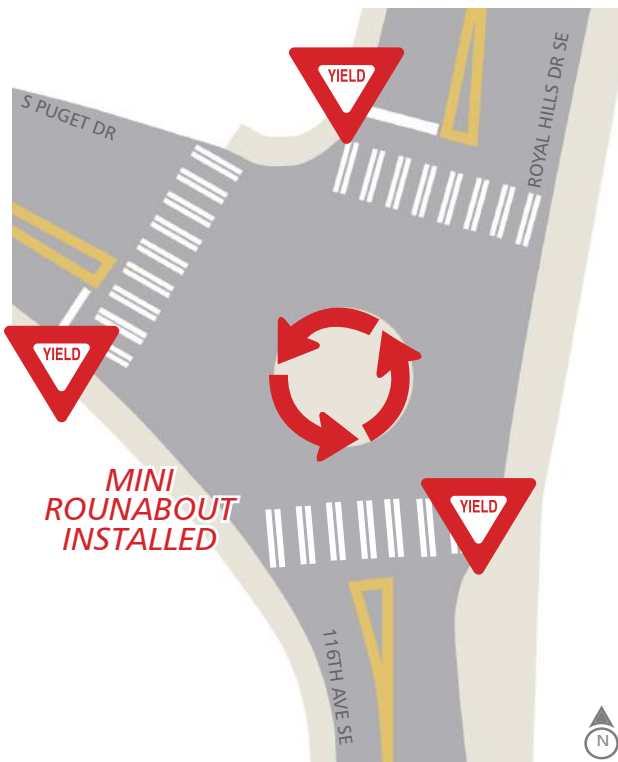
DAILY PASSENGER BENEFIT (1 person icon = 1000 PERSONS)



11,960 RIDERS

S PUGET DRIVE / ROYAL HILLS DRIVE SE / 116TH AVENUE SE

**RESTRUCTURE
RKAAMP**



ISSUE

As part of the RKAAMP restructure, Route 148 was revised through the intersection of S Puget Drive, Royal Hills Drive SE, and 116th Avenue SE, serving all legs of the intersection and making new turns. Because of the skew and size of the intersection and stop control on Royal Hills Dr, buses would experience difficulties with visibility and delay, particularly when making left turns.

IMPROVEMENTS MADE

STREET AND INTERSECTION DESIGN

A mini roundabout was installed at the intersection, with yield signs on all legs, making turns safer and easier for buses and all other vehicles. Sidewalks were improved and crosswalks added, improving pedestrian access to transit.

PROJECT *i*



i RENTON

METRO ROUTES IMPACTED: **102, 148**

PROJECT PARTNERS



ACKNOWLEDGEMENTS

Vangie Garcia, Chris Barnes, Blake Costa (Renton)

BUS DELAY IMPROVEMENTS



8 SEC

DELAY REDUCED ON AVERAGE PER TRIP IN THE AM PEAK BETWEEN OCTOBER 2020 AND SEPTEMBER 2021



The improvement also provides enhanced safety for buses making turns at the intersection, pedestrian crossing enhancements, and reliability benefits during congested periods.

ROUTE BENEFIT



4 BUSES/HR

TRANSIT BENEFITS

DAILY PASSENGER BENEFIT (*i* = 1000 PERSONS)



910 RIDERS

10 LIND AVENUE SW / SW 43RD STREET (S 180TH STREET)

ISSUE

Southbound left-turning buses would experience delay turning from Lind Avenue SW to SW 43rd Street (S 180th Street) due to the shared thru/left lane and intersection/signal configuration. The split-phased signal provided little time for SB left turns, and thru traffic in the thru/left lane caused long queues and delay for left-turning buses.

IMPROVEMENTS MADE



STREET AND INTERSECTION DESIGN

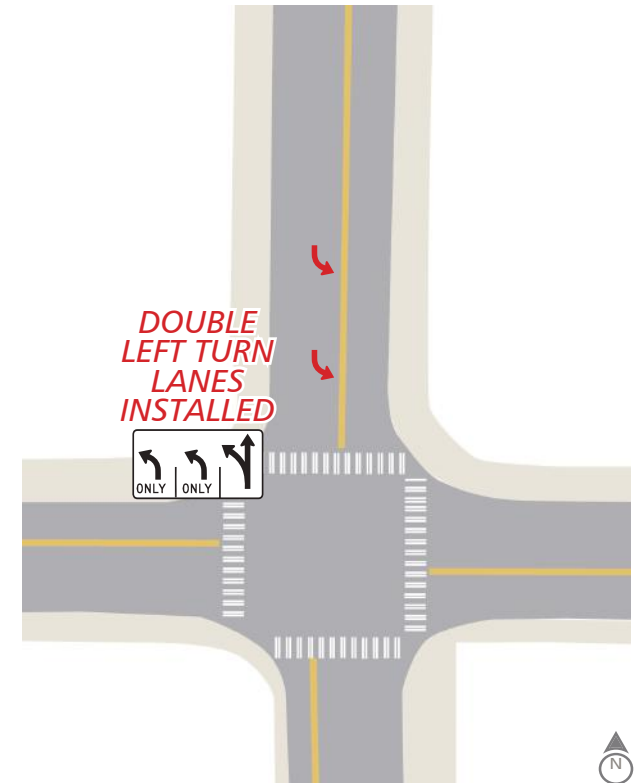
The SB thru/left lane was converted to a second left turn only lane, with the right turn lane becoming a thru/right lane. Signals, signs, and pavement markings were updated to show the new lane configuration.

LEVEL OF COMPLEXITY

2



RESTRUCTURE
RKAAMP



PROJECT



METRO ROUTES IMPACTED: **153**

PROJECT PARTNERS



ACKNOWLEDGEMENTS

Chris Barnes, Vangie Garcia, Flora Lee, Eric Cutshall (Renton)



RENTON

TRANSIT BENEFITS

BUS DELAY IMPROVEMENTS



15 SEC

DELAY REDUCED ON AVERAGE PER TRIP IN THE PM PEAK BETWEEN NOV 2020 AND NOV 2021

ROUTE BENEFIT



2 BUSES/HR

DAILY PASSENGER BENEFIT (1 person icon = 1000 PERSONS)



500 RIDERS



GRANT FUNDED
WSDOT REGIONAL MOBILITY GRANT

NE 124TH STREET / 100TH AVENUE NE 11

ISSUE

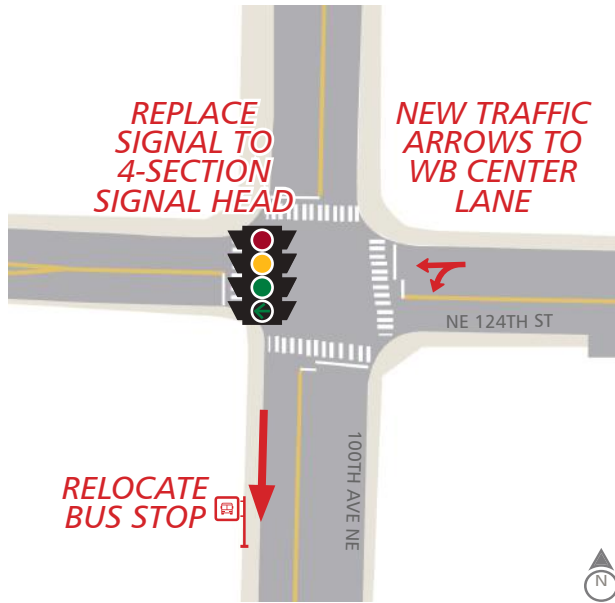
Westbound left-turning buses were experiencing delay turning from NE 124th Street to 100th Avenue NE.

IMPROVEMENTS MADE



STREET AND INTERSECTION DESIGN

The project includes deployment of new signal phasing and timing, as well as updated channelization and signage, and shifting the bus stop on 100th Avenue NE. The signal phasing and timing was optimized to benefit transit movements and pavement marking modifications included modifying the NE 124th Street westbound center lane traffic arrow pavement marking from thru to left/thru and adding a guide radius for the westbound left-turn. The southbound bus stop on 100th Avenue NE was relocated 50 feet south to mitigate traffic queuing after buses make the turn and stop.



PROJECT *i*



KIRKLAND

METRO ROUTES IMPACTED: **255**

PROJECT PARTNERS



ACKNOWLEDGEMENTS

Laura Drake (Kirkland)

TRANSIT BENEFITS

BUS DELAY IMPROVEMENTS



10-20 SEC

DELAY REDUCED ON AVERAGE PER TRIP

ROUTE BENEFIT



9 BUSES/HR

DAILY PASSENGER BENEFIT (= 1000 PERSONS)



2,800 RIDERS

12 MARTIN LUTHER KING JR WAY S / S MYRTLE STREET

LEVEL OF COMPLEXITY



ISSUE

Route 50 buses southbound on MLK Jr Way S approaching S Othello St were experiencing delay trying to merge into the left turn pocket due to long southbound through queues blocking the turn pocket. After turning right onto MLK Jr Way S from S Myrtle Street, buses had to serve the stop just south of S Myrtle Street, then merge left two lanes into the left turn pocket in 300 feet. Buses had to wait to merge and were delayed by heavy southbound traffic as a result.

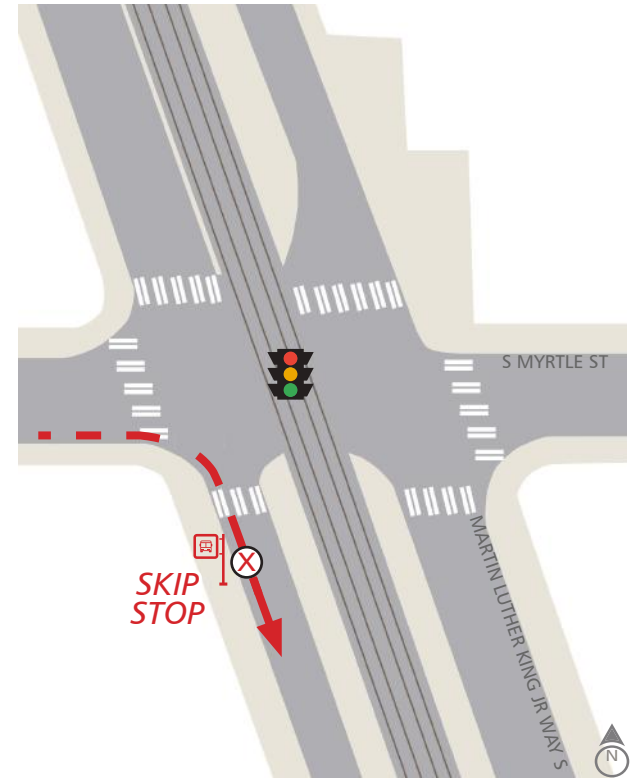
IMPROVEMENTS MADE

BUS STOPS AND SPACING

Route 50 was changed to no longer serve the southbound stop just south of S Myrtle Street, allowing buses to turn right from Myrtle onto MLK Jr Way S and immediately enter the left-hand southbound through lane. Buses can now more easily – and safely – merge into the southbound left turn pocket at S Othello Street.



GRANT FUNDED
WSDOT REGIONAL MOBILITY GRANT



PROJECT



METRO ROUTES IMPACTED: **50**

PROJECT PARTNERS



ACKNOWLEDGEMENTS

Pierce Canser (Metro)



TRANSIT BENEFITS

SAFETY



ROUTE BENEFIT



3 BUSES/HR

DAILY PASSENGER BENEFIT (1 person icon = 1000 PERSONS)



2,590 RIDERS

33RD AVENUE (E SPRING STREET – E UNION STREET) 13

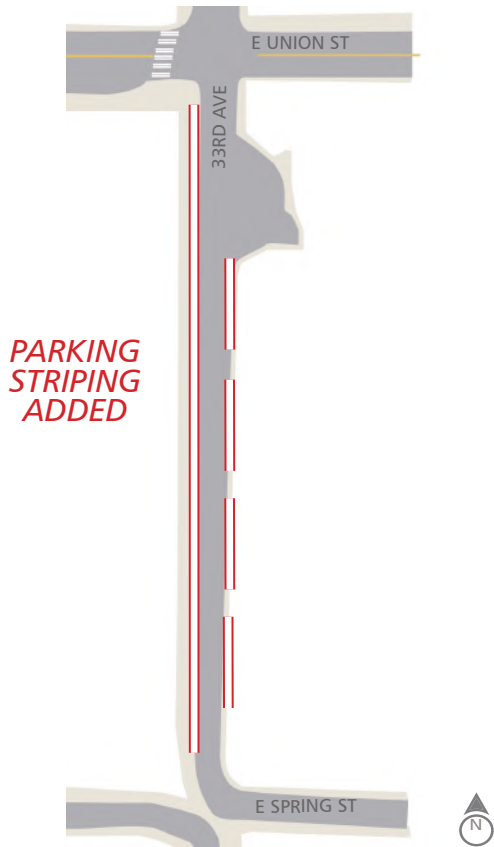
ISSUE

Buses northbound on 33rd Avenue were experiencing difficulties navigating around parked cars lining both sides of 33rd Avenue. Cars – including wider box trucks - would sometimes park too far from the curb, making the street too narrow for buses to safely pass.

IMPROVEMENTS MADE

TRAFFIC REGULATIONS

White lines were installed on both sides of 33rd Avenue to show people parking cars along the street where to park and to encourage them to avoid blocking the street. This reduces the chances of parked cars blocking buses and makes it easier for buses to travel along 33rd Avenue.



PARKING STRIPING ADDED

PROJECT i



SEATTLE

METRO ROUTES IMPACTED: **3**

PROJECT PARTNERS



ACKNOWLEDGEMENTS

Reiner Blanco, Oli F. (SDOT)

SAFETY



Adding white pavement lines/channelization along the edges results in fewer parked cars blocking the street, improving safety for buses and transit riders along the street and improving speed and reliability for buses and other large vehicles traveling on 33rd Ave.

ROUTE BENEFIT



3 BUSES/HR

TRANSIT BENEFITS

DAILY PASSENGER BENEFIT (= 1000 PERSONS)



4,000 RIDERS

14 NE 45TH STREET AT LATONA AVENUE N & THACKERAY PLACE N

LEVEL OF COMPLEXITY



ISSUE

Southbound left-turning buses at Latona Avenue NE/NE 45th Street and westbound right-turning buses at NE 45th Street/ Thackeray Place N would experience difficulties making the turns due to parked vehicles along the NE corner of Latona Avenue N /NE 45th Street and NW corner of Thackeray Place N/NE 45th Street. Buses on new Route 20 as part of the North Link service restructure would be making both turns.

IMPROVEMENTS MADE



TRAFFIC REGULATIONS

Remove parking on at the start and end of the turn, including marking the curb with red paint. Shift the centerline on the approach to widen the lane the bus is using.



RESTRUCTURE
NORTH LINK

PROJECT



METRO ROUTES IMPACTED: **20**

PROJECT PARTNERS



ACKNOWLEDGEMENTS

Kelly K., Bryce Beason, Oli F. (SDOT)



TRANSIT BENEFITS

BUS DELAY IMPROVEMENTS



5-10 SECS

DELAY REDUCED
PER BUS PER
INTERSECTION

Bus are also able to operate more safely
with less risk of colliding with other cars.

ROUTE BENEFIT

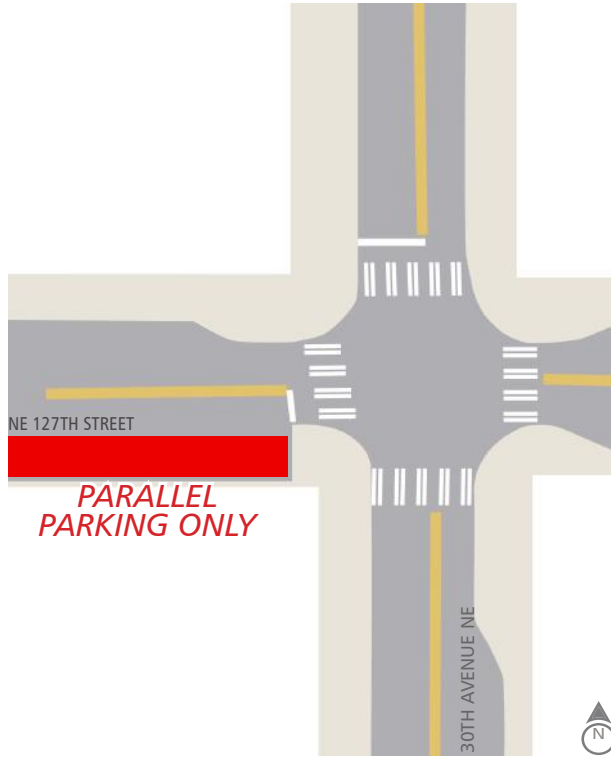


4 BUSES/HR

DAILY PASSENGER BENEFIT (1 person icon = 1000 PERSONS)



1,290 RIDERS



ISSUE

Buses eastbound on NE 127th Street approaching 30th Avenue NE were experiencing difficulty traveling along NE 127th Street due to cars parked perpendicularly along the south side of the street. The cars were not parking legally and were reducing the roadway width for buses and people walking along the south shoulder of the street.

IMPROVEMENTS MADE

TRAFFIC REGULATIONS

“Parallel parking only” signs were installed along the fence on the south side of NE 127th Street to clarify that cars should not park perpendicularly there. Cars now park parallelly in compliance with the signs, making travel easier and safer for buses and pedestrians on NE 127th Street. Property owner cooperation was required to install signs on the fence.

PROJECT



SEATTLE

METRO ROUTES IMPACTED: **64,65**

PROJECT PARTNERS



ACKNOWLEDGEMENTS

Morgan Siedel, Howard W, James Gallagher (SDOT), Bill Pierre Ford (Property Owner)

TRANSIT BENEFITS

SAFETY



Reinforcing parallel parking along 127th improves safety for buses, passengers, and people walking along the street and improves the speed and reliability of buses on 127th.

ROUTE BENEFIT



9 BUSES/HR

DAILY PASSENGER BENEFIT (1 person icon = 1000 PERSONS)



2,350 RIDERS

16 BROADWAY / E UNION STREET

LEVEL OF COMPLEXITY

4

ISSUE

Buses eastbound on E Union Street were delayed by long left turn queues blocking the through lane. Parking was restricted in the PM peak to allow for a second eastbound through lane, but people parking along Union would sometimes violate the restriction and park close to the intersection in the PM peak, preventing buses from bypassing queues and causing delay, also delays during off-peak hours were increasing.

IMPROVEMENTS MADE

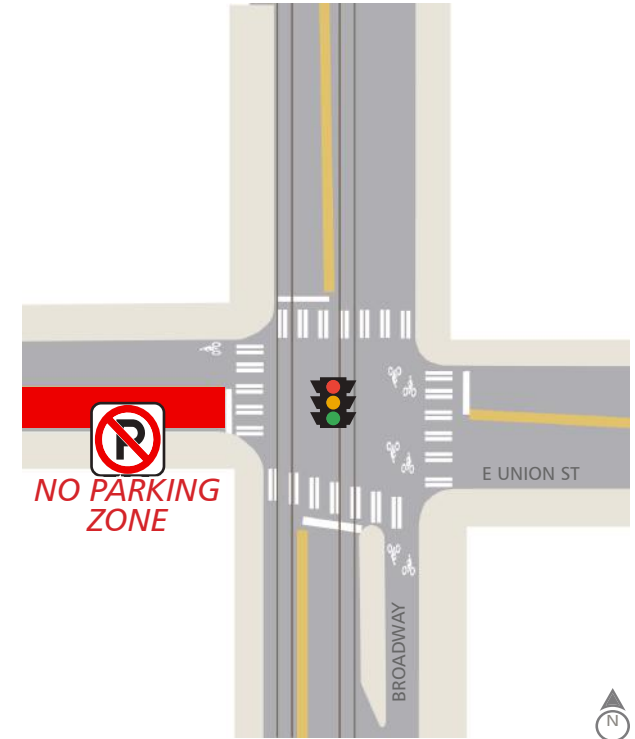


TRAFFIC REGULATIONS

Parking was restricted full-time just west of Broadway, allowing buses to more reliably and safely pass the left turn queues throughout the day. Signage and overhead trolleybus wire were adjusted to allow buses to travel closer to the curb – farther from left-turning cars – approaching the intersection.



GRANT FUNDED
WSDOT REGIONAL MOBILITY GRANT



PROJECT



METRO ROUTES IMPACTED: 2

PROJECT PARTNERS



ACKNOWLEDGEMENTS

Fred Perez (SDOT)



SEATTLE

TRANSIT BENEFITS

BUS DELAY IMPROVEMENTS



29 SEC

DELAY REDUCED FOR THE WORST-PERFORMING (95TH PERCENTILE) PM PEAK TRIPS BETWEEN JUNE 2020 AND JUNE 2021

ROUTE BENEFIT



6 BUSES/HR

DAILY PASSENGER BENEFIT (1 person icon = 1000 PERSONS)



6,050 RIDERS



ISSUE

Vehicles turning right from southbound Montlake Blvd E to the eastbound SR 520 on-ramp would sometimes turn at the bus stop at the intersection, instead of using the slip lane as intended. These cars would block southbound buses from accessing the bus stop, causing delay.

IMPROVEMENTS MADE



Signs prohibiting southbound right turns at the bus stop at the intersection were installed, with a transit exemption for buses serving the stop and proceeding onto SR 520. Vehicles will now use the slip lane as intended instead of blocking the bus stop, so buses can now more easily access the bus stop.

PROJECT *i*



SEATTLE

METRO ROUTES IMPACTED: **43, 48, 167, 271, 277, 542, 556**

PROJECT PARTNERS



ACKNOWLEDGEMENTS

Jonathan Dong, Andrew Merkle (SDOT)

BUS DELAY IMPROVEMENTS



15 SEC

DELAY REDUCED ON AVERAGE PER TRIP IN THE PM PEAK BETWEEN OCTOBER 2020 AND APRIL 2021

ROUTE BENEFIT



17 BUSES/HR

TRANSIT BENEFITS

DAILY PASSENGER BENEFIT (*i* = 1000 PERSONS)



7,830 RIDERS

18 RAINIER AVENUE S / I-90 EB ON-RAMP

ISSUE

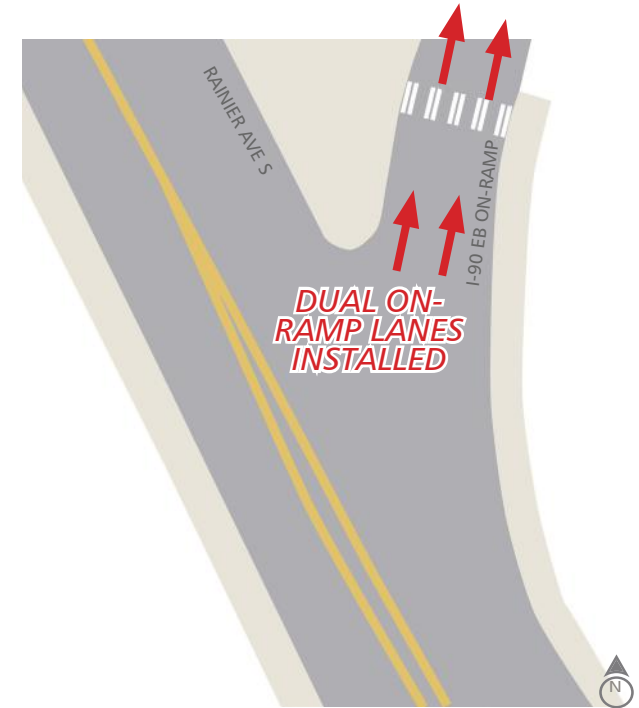
Buses northbound on Rainier Avenue S at I-90 were experiencing delay due to long queues at the EB on-ramp meter. Queues spilled back and blocked lanes on Rainier Avenue S often in the peak hours, in part because of the single metered on-ramp lane and HOV bypass lane.

IMPROVEMENTS MADE



TRAFFIC REGULATIONS

The HOV bypass lane was converted into a second metered on-ramp lane, increasing the ramp capacity and reducing the chances of queues blocking northbound traffic on Rainier Ave. In addition, the ramp intersection was reconfigured to a single lane at the crosswalk, increasing pedestrian safety.



PROJECT



METRO ROUTES IMPACTED: **7, 9**

PROJECT PARTNERS



ACKNOWLEDGEMENTS

Maan Sidhu (WSDOT)



TRANSIT BENEFITS

BUS DELAY IMPROVEMENTS



20 SEC

DELAY REDUCED ON AVERAGE PER TRIP IN THE PM PEAK BETWEEN APRIL AND SEPTEMBER 2021

The improvement also provides reliability benefits during congested periods.

ROUTE BENEFIT



7 BUSES/HR

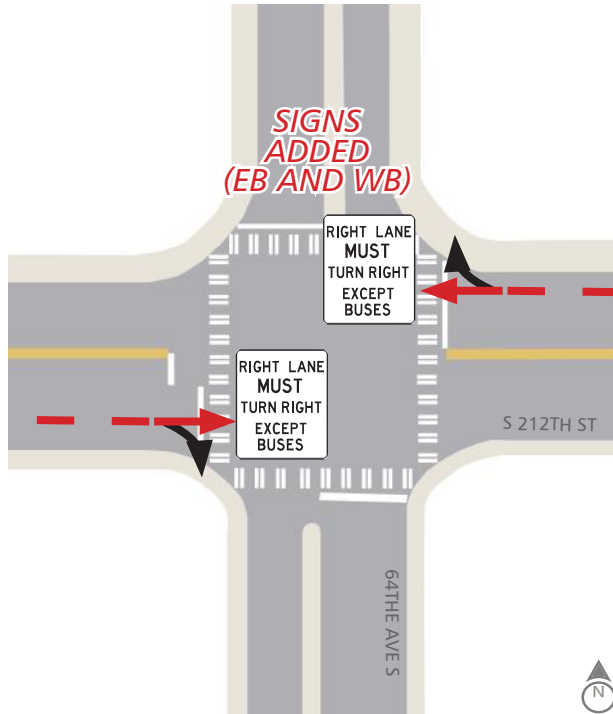
DAILY PASSENGER BENEFIT (1 person icon = 1000 PERSONS)



8,200 RIDERS



RESTRUCTURE
RKAAMP



ISSUE

After the RKAAMP restructure, a new Route 161 was created, serving stops on S 212th Street across the Kent Valley. This resulted in more frequent buses throughout the day proceeding westbound/eastbound through the 64th Avenue S intersection. Buses were experiencing delay waiting in general-purpose traffic queues at the intersection, but there was much less queueing in the adjacent right turn lanes.

IMPROVEMENTS MADE



Transit exemption placards were installed below existing lane control signs westbound and eastbound on S 212th Street approaching 64th Avenue S. Buses can now proceed through the intersection from the right turn lanes to serve far-side stops; buses no longer need to wait in the queues for general-purpose through traffic.

PROJECT



KENT

METRO ROUTES IMPACTED: **161**

PROJECT PARTNERS



ACKNOWLEDGEMENTS

Rob Brown (Kent)

TRANSIT BENEFITS

BUS DELAY IMPROVEMENTS



8 sec

DELAY REDUCED
PER TRIP IN THE
PM PEAK



5 sec

DELAY REDUCED
PER TRIP IN
THE AM PEAK
BETWEEN APRIL
AND MAY 2021

ROUTE BENEFIT



4 BUSES/HR

DAILY PASSENGER BENEFIT (1 person icon = 1000 PERSONS)



2,380 RIDERS

20 NE WOODINVILLE DRIVE / NE 175TH STREET

ISSUE

Buses on NE 175th Street just east of NE Woodinville Drive were experiencing delay when making required safety stops at two railroad crossings across NE 175th Street. Bus drivers had to stop to check for oncoming trains, even though the tracks are not actively used.

IMPROVEMENTS MADE



TRAFFIC REGULATIONS

"Tracks out of service" signs were installed at multiple railroad crossings near the intersection of NE 175th Street and Woodinville Drive, exempting buses from having to stop and check for approaching trains at the crossings.

PROJECT



METRO ROUTES IMPACTED: **231**

PROJECT PARTNERS

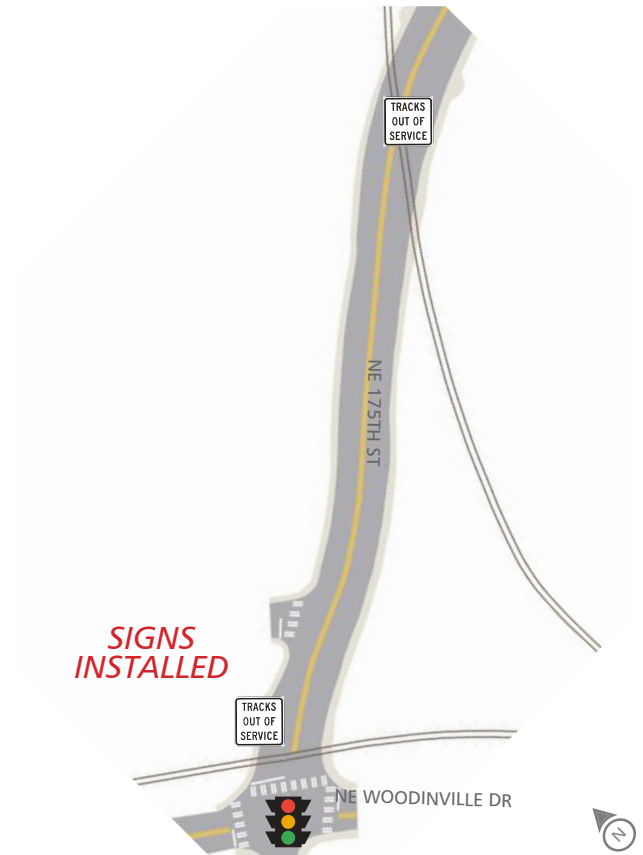


ACKNOWLEDGEMENTS

Rick Roberts (Woodinville)



WOODINVILLE



TRANSIT BENEFITS

BUS DELAY IMPROVEMENTS



9 SEC

DELAY REDUCED ON AVERAGE PER TRIP IN THE MIDDAY BETWEEN APRIL 2021 AND SEPTEMBER 202

ROUTE BENEFIT

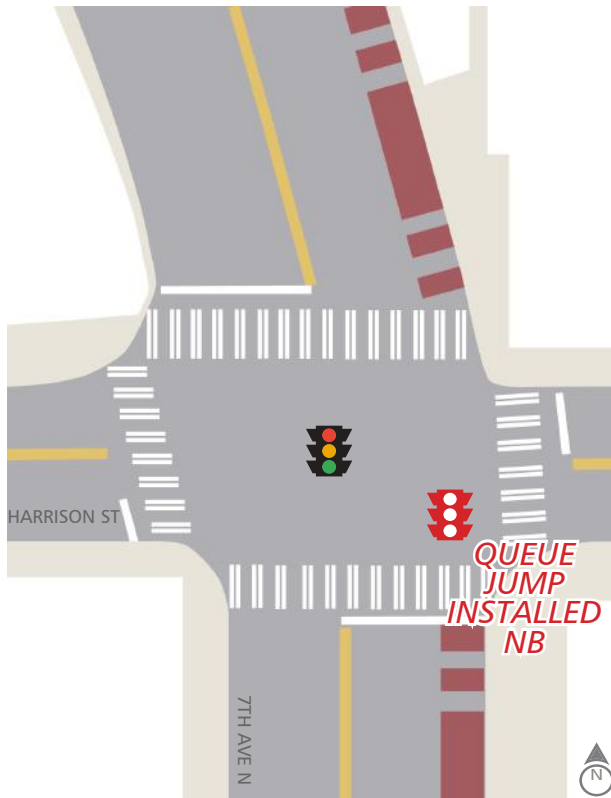


4 BUSES/HR

DAILY PASSENGER BENEFIT (= 1000 PERSONS)



180 RIDERS



ISSUE

Buses northbound on 7th Avenue N approaching Harrison Street were experiencing delay due to heavy northbound traffic and long queues. A northbound BAT lane was recently installed along 7th Avenue N as part of the SR 99 tunnel project, but the BAT lane ends just north of Harrison Street, so buses must merge into the general purpose traffic lanes to access SR 99.

IMPROVEMENTS MADE



A queue jump was installed at the intersection, allowing buses in the northbound BAT lane to bypass northbound queues when entering SR 99. Buses are now less likely to be delayed by northbound general purpose traffic.

PROJECT



SEATTLE

METRO ROUTES IMPACTED: **5, 26, 28, E LINE**

PROJECT PARTNERS



ACKNOWLEDGEMENTS

Summer Xia, Christiana Farrell (SDOT)

BUS DELAY IMPROVEMENTS



11 SEC

DELAY REDUCED FOR THE WORST-PERFORMING (95TH PERCENTILE) AM PEAK TRIPS BETWEEN OCTOBER 2020 AND SEPTEMBER 2021

ROUTE BENEFIT



29 BUSES/HR

TRANSIT BENEFITS

DAILY PASSENGER BENEFIT (1 person icon = 1000 PERSONS)



18,000 RIDERS

22 12TH AVENUE / E JEFFERSON STREET

LEVEL OF COMPLEXITY



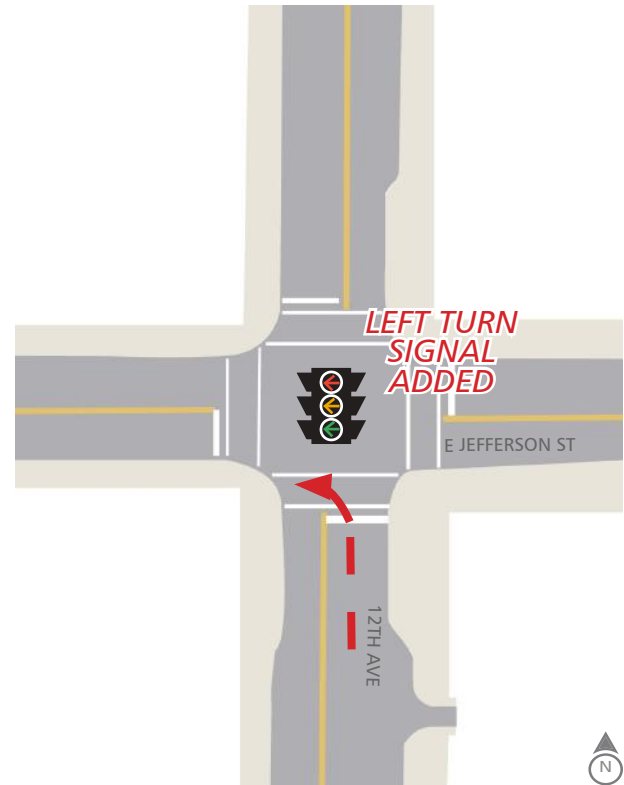
ISSUE

Northbound left-turning buses would experience difficulties turning from 12th Avenue to E Jefferson Street due to heavy southbound traffic during peak periods. Buses on new Route 322 as part of the North Link service restructure would be making the turn.

IMPROVEMENTS MADE



A northbound left turn protected signal phase was added, allowing more time for northbound-left-turning vehicles – including route 322 buses – to make the turn each cycle and reducing signal delay.



PROJECT *i*

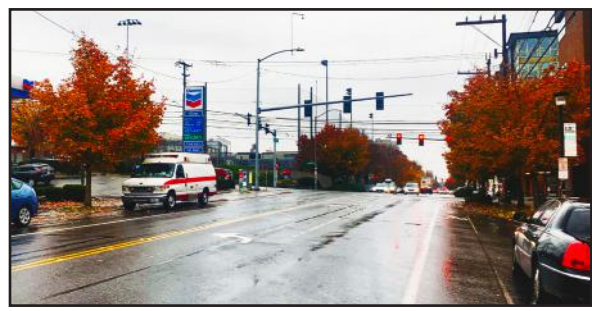
METRO ROUTES IMPACTED: **322**

PROJECT PARTNERS



ACKNOWLEDGEMENTS

Tom Le, Laura Wojicki, Andrew Natzel, Kelly Kelly Kobashigawa, Andy Merkeley (SDOT)



TRANSIT BENEFITS

BUS DELAY IMPROVEMENTS



15 SEC DELAY REDUCED PER BUS

ROUTE BENEFIT



2 BUSES/HR

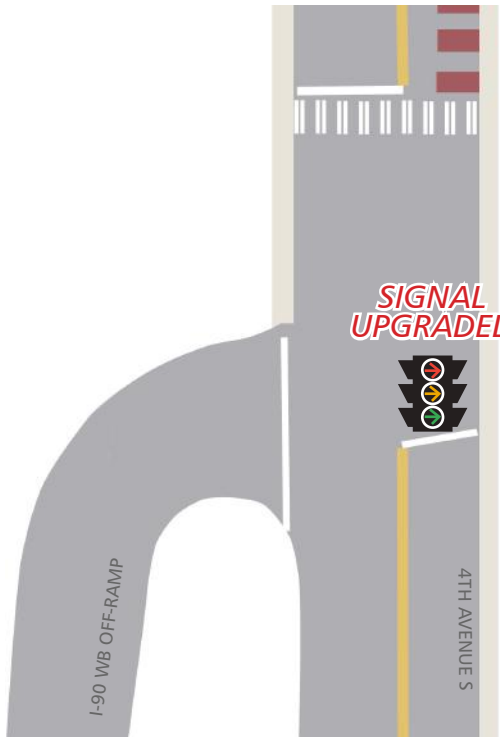
DAILY PASSENGER BENEFIT (1 person icon = 1000 PERSONS)



140 RIDERS



GRANT FUNDED
WSDOT REGIONAL MOBILITY GRANT



I-90 WB OFF-RAMP / 4TH AVENUE S 23

ISSUE

The signal head controlling right turns from the I-90 off-ramp at 4th Avenue S was a conventional 3-section "ball" signal head, which sometimes gave a green indication when northbound traffic had a green indication. Since buses could turn left from the right turn lane, transit operators were sometimes confused and turned left on a red left arrow (but green ball). Due to the potential safety hazard, transit operators stopped turning left from the right lane, resulting in delay for buses waiting in the general-purpose left turn queues.

IMPROVEMENTS MADE



The 3-section conventional signal head was replaced with a 3-section right turn arrow display, clarifying to transit operators that they should only turn left on a green left arrow indication. This allowed buses to return to turning left from the right turn lane, bypassing general-purpose left turn queues.

SEATTLE

PROJECT i

METRO ROUTES IMPACTED: **111, 212, 218, 550**

PROJECT PARTNERS

ACKNOWLEDGEMENTS

Laura Wojcicki (SDOT)

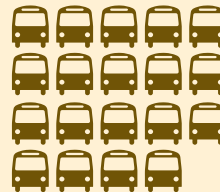
BUS DELAY IMPROVEMENTS



11 SEC

DELAY REDUCED ON AVERAGE PER TRIP IN THE AM PEAK BETWEEN MAY 2019 AND MAY 2021

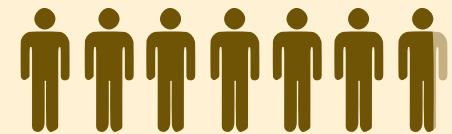
ROUTE BENEFIT



19 BUSES/HR

TRANSIT BENEFITS

DAILY PASSENGER BENEFIT (= 1000 PERSONS)



6,720 RIDERS

24 AURORA AVENUE N / N PHINNEY WAY / N 46TH STREET



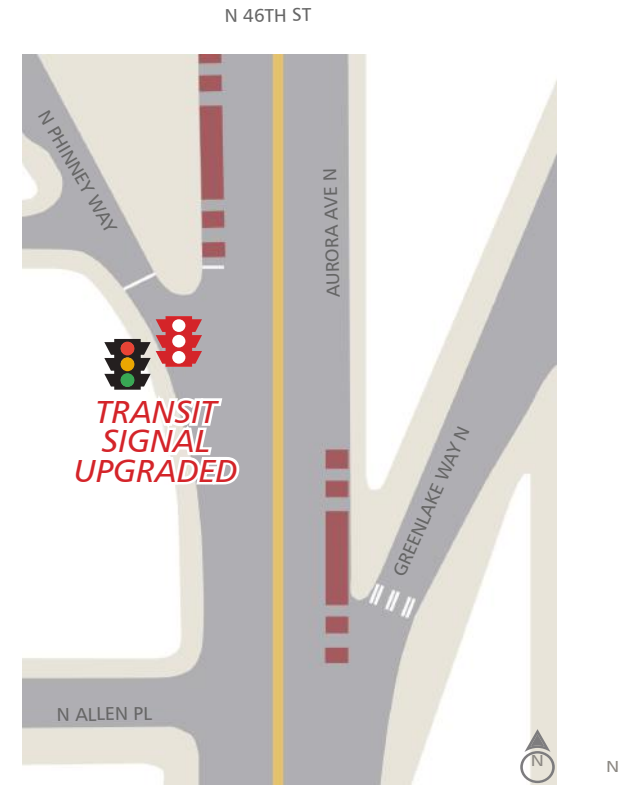
ISSUE

Buses southbound on Aurora Avenue N approaching N Phinney Way just south of N 46th Street are able to proceed past N Phinney Way while traffic on N Phinney Way stops at the signal, providing a protected merge for approaching buses. However, the signal controlling buses was a nonstandard "blue light" display no longer used for this purpose.

IMPROVEMENTS MADE

TRAFFIC SIGNALS

The transit signal was replaced with a new LRT-style 3-section signal head. It has indications for go (vertical line), caution (triangle), and stop (horizontal line) and is clearer for transit operators to understand, matching other bus signals countywide.



PROJECT



METRO ROUTES IMPACTED: **E LINE**

PROJECT PARTNERS



ACKNOWLEDGEMENTS

Laura Wojcicki (SDOT)



TRANSIT BENEFITS

SAFETY



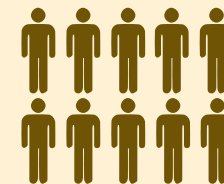
Upgrading the transit signal to an LRT-style head similar to queue jump signals countywide reduces driver confusion and clarifies traffic control for transit operators, reducing the chances of collisions and delay to buses and other road users - therefore, this improvement enhances transit safety and reliability.

ROUTE BENEFIT

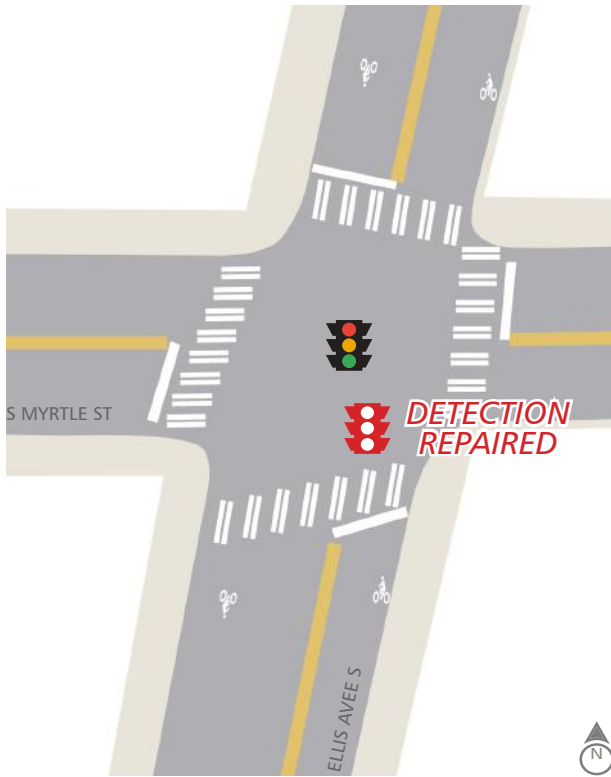


11 BUSES/HR

DAILY PASSENGER BENEFIT (1 person icon = 1000 PERSONS)



10,140 RIDERS



ISSUE

Despite low traffic volumes westbound and eastbound on S Myrtle Street at Ellis Avenue S, the signal was granting green time to S Myrtle Street during each cycle. Southbound route 124 buses were delayed by frequent red signal indications due to S Myrtle Street getting more green time than necessary – buses on Ellis Avenue S would often wait at the signal while there was no traffic on S Myrtle Street.

IMPROVEMENTS MADE

TRAFFIC SIGNALS

Signal detection for the westbound and eastbound approaches was restored. More green time is available for southbound route 124 buses on Ellis Avenue S when no vehicles are detected on S Myrtle Street, therefore reducing transit delay.

PROJECT



SEATTLE

METRO ROUTES IMPACTED: **60, 124**

PROJECT PARTNERS



ACKNOWLEDGEMENTS

Laura Wojcicki (SDOT)

TRANSIT BENEFITS

BUS DELAY IMPROVEMENTS



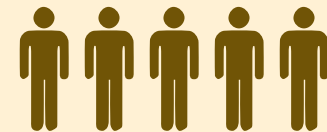
15 SEC
 DELAY REDUCED FOR THE WORST-PERFORMING (95TH PERCENTILE) MIDDAY TRIPS BETWEEN OCT 2020 AND FEB 2021

ROUTE BENEFIT



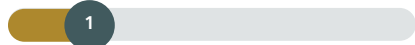
8 BUSES/HR

DAILY PASSENGER BENEFIT (1 person icon = 1000 PERSONS)



4,950 RIDERS

26 MONTLAKE BOULEVARD E / E SHELBY STREET



ISSUE

The existing northbound queue jump on Montlake Boulevard E at E Shelby Street was not functioning properly, possibly due to adjacent construction at the SR 520/Montlake Boulevard E interchange. Buses were waiting for the queue jump phase but were not receiving the "go" indication, resulting in transit delay.

IMPROVEMENTS MADE



The queue jump detection was repaired and the signals are functioning as intended. Buses are being granted the queue jump again, restoring the original benefits of the queue jump and reducing transit delay for buses using the queue jump.

PROJECT



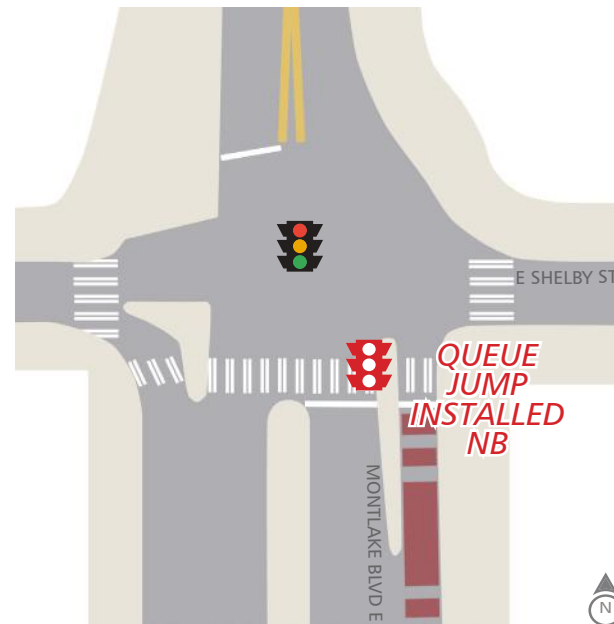
METRO ROUTES IMPACTED: **167, 255, 271, 542, 556**

PROJECT PARTNERS



ACKNOWLEDGEMENTS

Laura Wojcicki (SDOT)



TRANSIT BENEFITS

BUS DELAY IMPROVEMENTS



22 SEC

DELAY REDUCED PER BUS IN THE PM PEAK BETWEEN JANUARY 2021 AND MARCH 2021

ROUTE BENEFIT



20 BUSES/HR

DAILY PASSENGER BENEFIT (1 person icon = 1000 PERSONS)



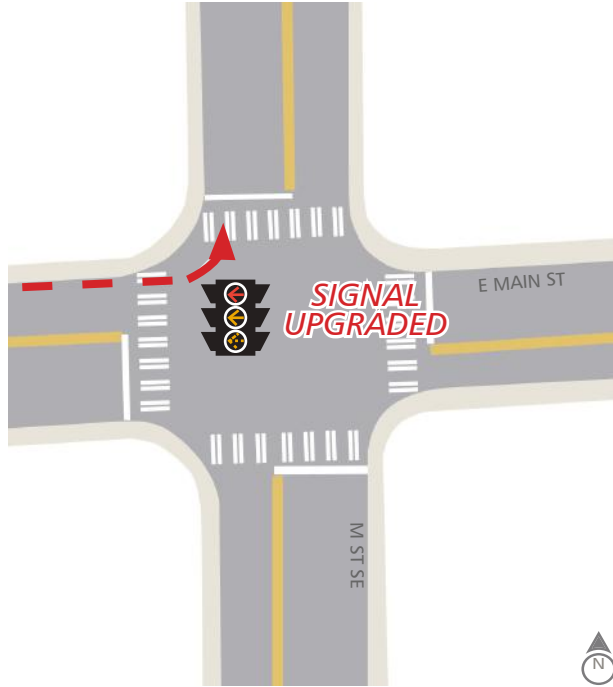
7,250 RIDERS



GRANT FUNDED
WSDOT REGIONAL MOBILITY GRANT



RESTRUCTURE
RKAAMP



E MAIN STREET / M STREET 27

ISSUE

Buses turning eastbound left from E Main Street to M Street were experiencing delay due to high left turn volumes controlled by protected left turn signals.

IMPROVEMENTS MADE



The eastbound left turn signal was replaced to include a flashing yellow arrow display, enabling protected-permissive operations. Buses and left-turning cars now have more time to make the turn each cycle. A new signal cabinet was needed to support the new signal operation.

PROJECT i



AUBURN

METRO ROUTES IMPACTED: **181**

PROJECT PARTNERS



ACKNOWLEDGEMENTS

Cecile Malik, Scott Nutter (Auburn)

BUS DELAY IMPROVEMENTS



26 SEC

DELAY REDUCED
ON AVERAGE
PER TRIP IN THE PM
PEAK BETWEEN APRIL
2021 AND JUNE 2021

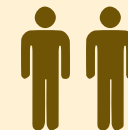
ROUTE BENEFIT



4 BUSES/HR

TRANSIT BENEFITS

DAILY PASSENGER BENEFIT (= 1000 PERSONS)



2,000 RIDERS