King County METRO

RAPIDRIDE

K Line

Speed and Reliability Upgrade Report

Task 120

King County Metro Transit

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King County Metro Transit

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Acronyms and Abbreviations

AVL	Automatic Vehicle Location
BAT lane	Business access and transit lane
BKR	Bellevue-Kirkland-Redmond (travel model)
BRT	Bus rapid transit
EB	Eastbound
I-405 Stride	Sound Transit Interstate 405 Stride bus rapid transit service
K Line	RapidRide K Line
LPA	Locally preferred alternative
Metro	King County Metro Transit
NB	Northbound
QJ	Queue jump
ROW	Right-of-way
SB	Southbound
ST	Sound Transit
S&R	Speed and Reliability
TDM	Travel Demand Model
WB	Westbound
WSDOT	Washington State Department of Transportation

1 Introduction

1.1 RapidRide K Line Overview

The RapidRide K Line Project will provide frequent, fast, reliable, efficient, and environmentally friendly bus service between the cities of Kirkland and Bellevue in East King County, connecting Totem Lake, Downtown Kirkland, South Kirkland Park & Ride, Downtown Bellevue, Bellevue College, and the Eastgate Park & Ride. In addition to connecting these regional and local centers, K Line implementation would also provide key transit connections to other regional transportation systems, including Sound Transit's Link Light Rail and bus rapid transit (BRT) systems, and to regional trails such as Eastrail and the SR 520 Trail. Improvements will include an upgraded RapidRide bus fleet with increased transit service frequency, upgraded stops with additional passenger amenities, improved access to transit, and increased transit speed and reliability delivered through transit priority treatments, faster station boarding, more widely spaced stops, and signal upgrades.

The K Line will serve a 16-mile corridor between Totem Lake Transit Center in Kirkland and Eastgate Park & Ride in Bellevue following portions of existing bus routes: 239, 245, 250, 255, and 271.

1.2 Purpose of This Report

This Speed and Reliability Upgrade Report identifies potential investments in the roadway and operating environment to improve speed and reliability for future K Line service. The focus is on what modifications to the existing roadway and traffic control systems could improve transit speed and reliability for future K Line service while also meeting other key program needs. The modifications often include bus lanes, business access and transit (BAT) lanes, queue jumps, other lane treatments, or routing changes.

"Speed and reliability" refers to transit operations that ensure on-time performance, consistent headways, shorter and more consistent travel times, and reduced delays. Shorter and more consistent travel times benefit passengers by allowing for predictability of their trips and benefit the transit agency by improving scheduling and reducing the costs of operations. More predictable service and travel time will increase route ridership and rider experience.

The Speed and Reliability Upgrade Report will be used to develop a Locally Preferred Alternative (LPA) for the K Line, helping Metro to prioritize investments as part of a holistic, fiscally constrained project. It will also serve as a repository of concept ideas that might be implemented after the initial project opening when additional funds, including local grants, become available.

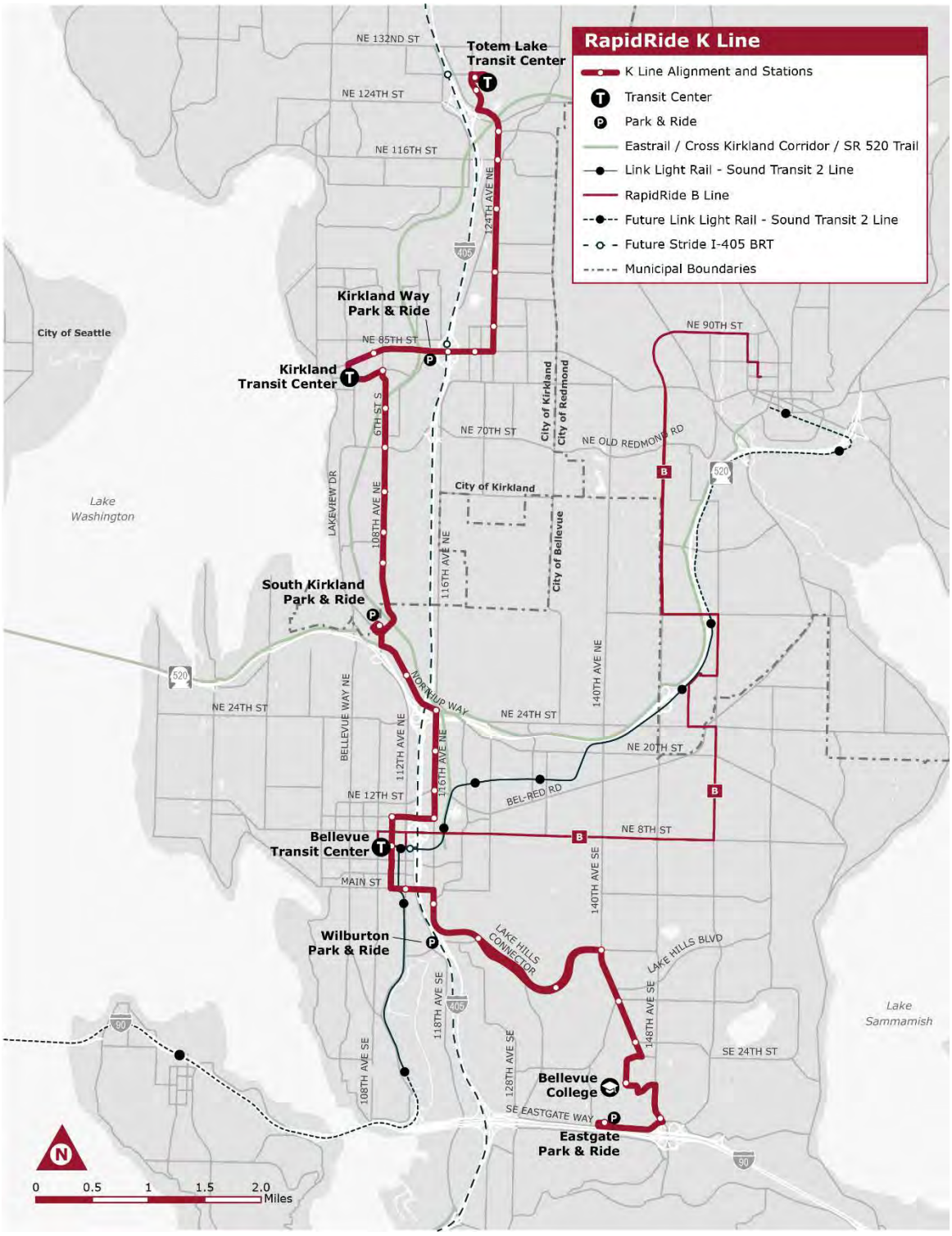
1.3 Study Corridor

The K Line study corridor is approximately 16 miles long and will serve the East King County cities of Kirkland and Bellevue in a north-to-south alignment (**Figure 1**). The K Line is designed to connect multiple nodes of demand and points of transfer to the regional transit system and other transportation services. The downtown cores of both cities will be served, providing excellent connections to other bus and light rail services at the Kirkland (bus only) and Bellevue (bus and light rail) Transit Centers. Three other regional bus transit centers are served by the line (Totem Lake, South Kirkland, and Eastgate) along with key connections to the planned Sound Transit Stride BRT at NE 85th St in Kirkland and the Bellevue Transit Center. Stride will be a highway running BRT service with two routes on the I-405 corridor from Lynnwood to Burien with an anticipated start of service in 2027/2028.

The K Line will generally run in parallel to the I-405 freeway, a heavily congested highway corridor that acts as a regional bypass for long-haul vehicle and truck trips traveling through the Puget Sound region and a key access route for people traveling to jobs and services in East King County. Tremendous land use changes and job growth in the three regionally-designated growth centers of Totem Lake, Greater Downtown Kirkland, and Bellevue, as well as rezoning in the NE 85th St corridor in Kirkland and the Wilburton area of Bellevue, continue to increase travel pressures in the corridor and worsen congestion.

Many people travel from residential neighborhoods along the alignment to jobs, education, and other services in Kirkland and Bellevue, as well as in Redmond and Seattle. The I-90 and SR-520 bridges serve as the two main connections for people in vehicles and on bus transit. East Link Light Rail (Sound Transit's 2 Line) will use the I-90 Bridge to provide frequent rail transit to Seattle by 2026. As a fully grade-separated service, this will provide a highly reliable travel option and create demand for transfers from bus to light rail. In advance of a connection to Seattle, the 2 Line is currently partially completed and open, operating between South Bellevue and Redmond Technology Station with trains every 10 min (5:30 am - 9:30 pm), 7 days per week. One purpose of the K Line will be to serve as a reliable feeder for people connecting to the light rail system in Downtown Bellevue.

Figure 1 K Line Study Corridor



1.4 Speed and Reliability Summary

After completion of transit planning efforts and partner agency engagement, **the project team is recommending 24 conceptual speed and reliability candidate improvements be considered for advancement into further stages of the K Line project**. The locations for these improvements are shown in **Figure 2**, and listed in **Figure 3**. The improvements include bus lanes, Business Access and Transit (BAT) lanes, queue jumps, and other channelization changes to provide benefits to transit operations along the route at locations which see significant transit service delay and operational challenges. The 24 standalone candidate improvements have been developed in partnership with local agency partners and evaluated in detail for implementation potential, including extensive traffic modeling efforts. The candidate improvements recommended for further consideration have passed an initial fatal flaw review.

Implementing the 24 candidate improvements, along with Transit Signal Priority implementation and station spacing following RapidRide standards is expected to provide a 26% reduction in roundtrip travel time in the PM peak in comparison to running local transit service on the same route without implementing the candidate improvements. The speed and reliability treatments are expected to reduce run time in the PM peak period by 12%, about half of the overall benefit. The overall RapidRide program goal is to implement service with a projected 15 to 30% travel time reduction, with a focus on delay reduction in high ridership areas. The travel time savings are discussed further in **Section 7.1.2**.

Preliminary cost estimates to implement the 24 candidate improvements is **$55.9 million in total delivery costs.** Cost estimates are discussed further in **Section 7.1.3**.

Figure 2 Map of Recommended Speed and Reliability Improvements

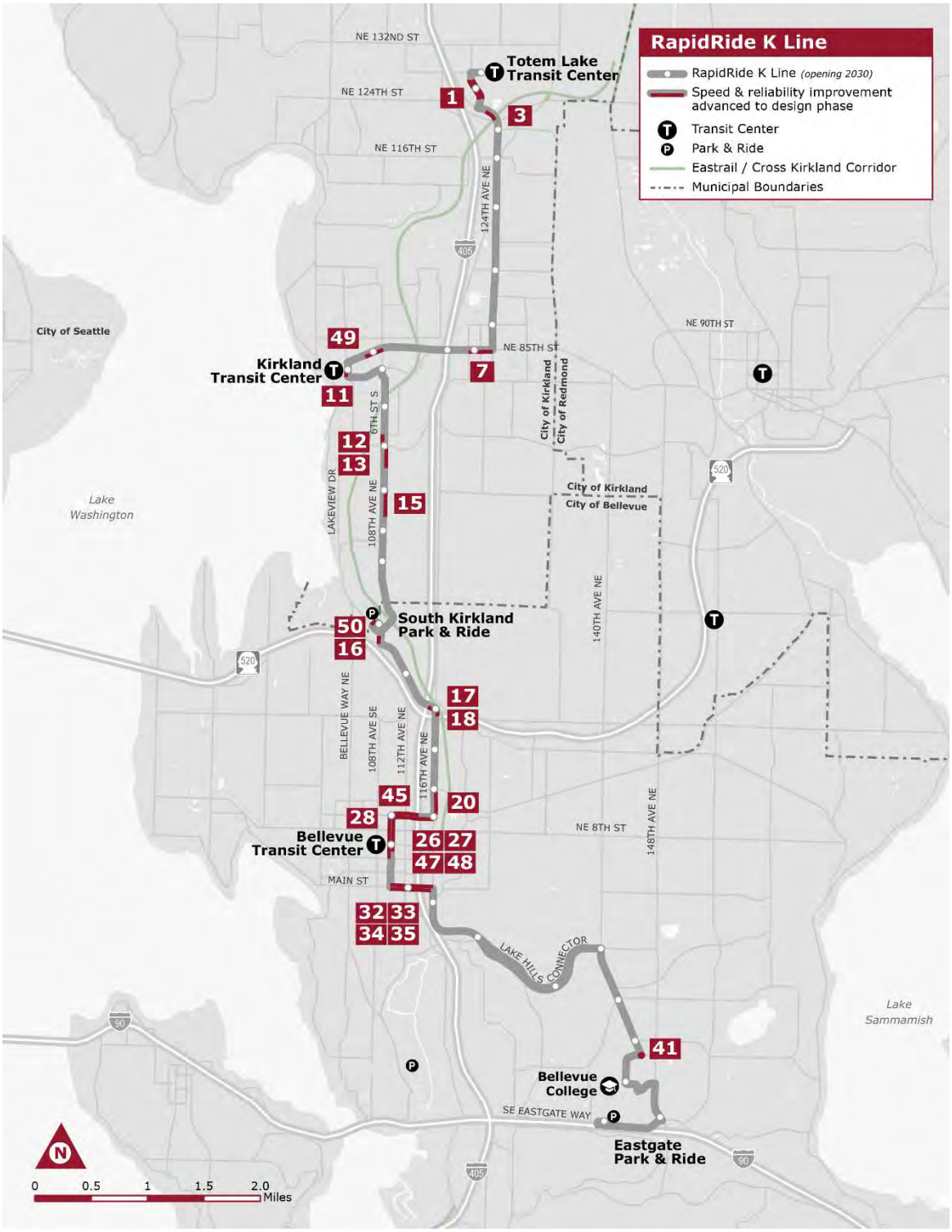


Figure 3 List of Recommended Speed and Reliability Improvements

ID	Location	Description
Kirkland		
1	120th Ave NE through Village at Totem Lake	Curbing adjustments
3	Totem Lake Blvd, SB at NE 124th St	Transit approach lane
7	NE 85th St, EB at 124th Ave NE	Signal coordination
11	3rd St, SB at Kirkland Ave	Bus-only left turn
12	6th St S, SB at NE 68th St	Right-turn-except-bus
13	108th Ave NE, NB from north of NE 62nd to 68th St	BAT lane
15	108th Ave NE, NB from NE 55th to 60th St	BAT lane
49	Central Way, EB from Peter Kirk Way to 6th St	BAT lane and queue jump
50	107th Ln NE	Widen for bus operations
Bellevue		
16	108th Ave NE, SB at Northup Way	Bus-only left-turn lane
17	Northup Way, EB at 116th Ave NE	Add right-turn lane
18	116th Ave NE, NB at Northup Way	Bus-only left-turn lane
20	116th Ave NE, NB from NE 10th to 12th St	BAT lane
26	NE 10th St, EB from 110th to 116th Ave NE	PM peak BAT lane
27	110th Ave NE, NB from NE 8th to 10th St	Convert parking to BAT lane
28	110th Ave NE, SB from NE 10th to 8th St	Convert parking to BAT lane
32	Main St, EB from 110th to 112th Ave NE	PM peak BAT lane
33	Main St, WB from 112th to 110th Ave NE	BAT lane
34	Main St, EB from 112th to 116th Ave NE	BAT lane
35	Main St, WB from 116th to 112th Ave NE	BAT lane
41	145th Pl SE, at Kelsey Creek Rd/24th St	Convert intersection to roundabout
45	NE 10th St, WB from SR-520 to 110th Ave NE	BAT lane
47	110th Ave NE, NB at NE 6th St	BAT lane with queue jump
48	110th Ave NE, SB from NE 6th to 4th St	BAT lane with queue jump

1.5 Report Overview

This report is comprised of nine chapters:

- Chapter 1: Introduction
- Chapter 2: Community Engagement
- Chapter 3: Local Jurisdictional Coordination
- Chapter 4: Identification of Potential Speed and Reliability Improvements
- Chapter 5: Transit Speed and Reliability Candidate Improvements
- Chapter 6: Traffic and Travel Time Analysis
- Chapter 7: Recommended Candidate Improvement Summary
- Chapter 8: Candidate Improvement Details and Designs
- Chapter 9: Next Steps

2 Community Engagement

Engagement with the people that live, work, shop, and recreate along the K Line corridor is critical in delivering a project that meets the needs and addresses the concerns of the community. King County Metro is executing an engagement plan focused on meaningful engagement opportunities, with a goal of meeting community priorities. Metro will conduct three phases of community engagement throughout the planning stage of the K Line project:

- **Phase 1:** Needs Assessment (completed 2020)
- **Phase 2:** Raising Awareness and Shaping the Project (completed 2024)
- **Phase 3:** Draft LPA Engagement (anticipated first quarter 2025)

Feedback received during Phases 1 and 2 will be incorporated into the draft LPA. Phase 3 will occur during the development of the LPA in the first quarter of 2025 and will influence the refinement and design of speed and reliability treatments along K Line.

2.1 Phase 1: Needs and Priorities Assessment (2019)

Between October and December 2019, Metro engaged the community to determine needs and priorities for the RapidRide K Line. The project team gathered feedback from community-based organizations, businesses, and community members on their travel patterns, how they use transit, and about the K Line alignment.

For an in-depth explanation of the Phase 1 community engagement approach and findings, please see the RapidRide K Line Community Engagement Summary (2020).

Some of the most common themes and concerns identified during Phase 1 as they relate to speed and reliability include the following:

- Two of the most highly ranked priorities of respondents included "Less time to get to where I want to go" and "Bus is there when I need it."
- Speed of travel is important to community members.
- Community members want to be certain the bus will be there when they need it.
- Most people expressed support for increased reliability and speed that RapidRide would provide.
- Some route 255 riders expressed concern that the faster, more reliable service promised by RapidRide would be negated by the additional time it would take them to transfer to light rail or other transit modes.

2.2 Phase 2: Raising Awareness and Shaping the Project

The K Line project was re-introduced to the public in Summer 2024 in a range of community engagement activities. The project team gathered input on station locations, priorities and

barriers to transit access, and overall investment priorities for faster and reliable service. For an in-depth explanation of the Phase 2 community engagement approach and findings, please see the RapidRide K Line Community Engagement Summary Report – Conceptual Phase (2024).

One of the key project decisions related to speed and reliability was selecting a routing path and station locations through Downtown Bellevue, one of the most congested segments of the corridor. As part of the planning work in 2019, several routing options were developed but it was determined that more input would be needed to make the final decision on Downtown Bellevue routing. As such, the Phase 2 engagement sought feedback on the Downtown Bellevue station locations and travel path, with two questions about station locations as shown in **Figure 4** and **Figure 5**. There were no questions directly related to speed and reliability for the Kirkland portion of the corridor.

Some of the most common outcomes of the Phase 2 engagement as they relate to speed and reliability include the following:

- When asked to rank the top five improvements (out of 12) that would lead to more transit use, 'buses that get to my destination faster' and 'buses that reliably show up on time' were identified as the first and fourth most common selection, with 69% and 57% of respondents, respectively, ranking these in the top 5.
- When asked to rank three improvements for K Line (fast and reliable transit, easy/safe to walk/roll/bike, and avoiding long-term impacts of parking/traffic), approximately half (49%) identified fast and reliable service as the most important improvement; more than the other two improvements.
- There was a stronger preference for an alignment through Downtown Bellevue along 110th Ave NE (with approximately half of respondents in support). The remaining half were nearly evenly split between an alignment along 108th Ave NE, and not having a preference. For the 73% of respondents who had a preference, 68% preferred 110th Ave NE. Of those who chose 110th Ave NE, nearly half said they would still ride K Line just as often regardless of the station location.
- For the alignment south of Downtown Bellevue (between Main St and 116th Ave SE, or 112th Ave SE and SE 8th St), there was almost an equal share who supported either option (30% and 34%, respectively), and a larger share (36%) who had no preference.

Figure 4 Proposed Station Options at the Bellevue Transit Center

Figure 5 Proposed Station Options South of Main St

3 Local Jurisdictional Coordination

K Line will provide service in the cities of Kirkland and Bellevue. These local jurisdictions have authority over the surface streets where K Line will operate and are critical partners for the implementation of speed and reliability investments. Coordination with municipal partners and other agencies (such as WSDOT) will continue through the K Line LPA development process, as well as in future design and construction phases of the project. Active and ongoing coordination between the K Line team and municipal partners helps to ensure the successful implementation of the K Line project.

The K Line project team has been coordinating on a technical basis with both the Cities of Kirkland and Bellevue since late 2019, including extensive candidate improvement refinement and vetting in 2024. Coordination was done primarily through virtual meetings and agency review of K Line produced technical materials. Although the coordination started as ad-hoc meetings for the project team to provide updates to – and seek feedback from – the jurisdictions, a standing monthly meeting was established in 2024 with each jurisdiction. Additional meetings were scheduled as necessary to collaborate in depth on specific topics.

The coordination with each jurisdiction involved discussions of traffic and travel time analysis methods, a review of analysis results, discussions of recommendations, and coordination on public outreach. These meetings were intended to discuss many aspects of K Line, including speed and reliability.

During the coordination, there was agreement to spend more time on a few areas of concern due to outstanding alignment choices and considerations of traffic impacts, or coordination with other jurisdictional efforts. These included Downtown Bellevue, routing through the Village at Totem Lake, and the design of K Line improvements related to stations and S&R at the intersection of 108th Ave NE/6th St S & NE 68th St. These topics and decisions related to them are described in more detail below.

3.1 Downtown Bellevue Routing

The recommended alignment of K Line through Downtown Bellevue is along 110th Ave NE via NE 10th Ave and Main St. This alignment was determined in the fall of 2024 based on a combination of community input, technical modeling efforts and local agency collaboration. The decision was made with the consultation and support of City of Bellevue staff.

The project team analyzed multiple alignments that would connect from NE 10th St and 110th Ave NE through Downtown Bellevue to Lake Hills Connector and SE 8th St. These alignments include two primary north-south alignments (108th Ave NE and 110th Ave NE) and two options to connect across I-405 (Main St and SE 8th St). These were paired together into five distinct alignment options.

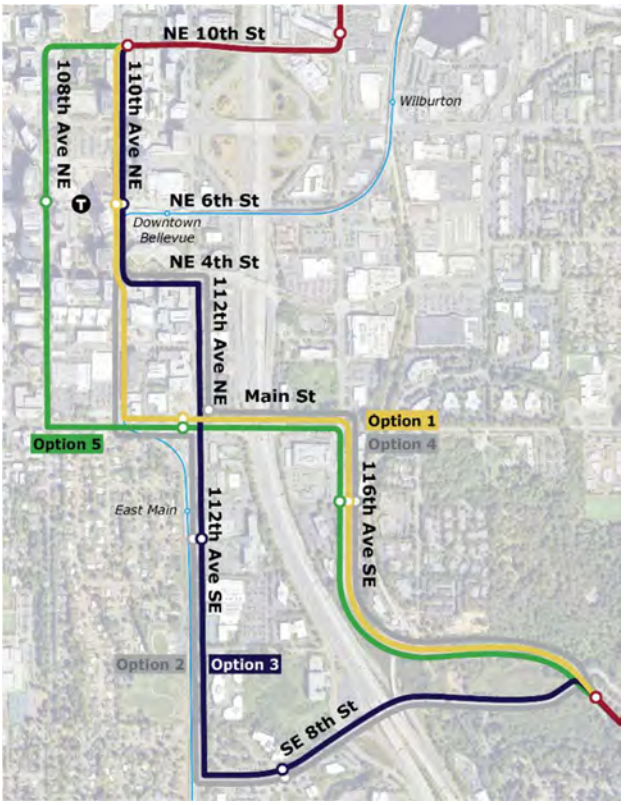
Early on, two alignment options were eliminated (Options 2 and 4). In keeping with BRT best practices, there was an interest in advancing alignments that were most direct (with the fewest turns) and to carry forward alignments that were most distinct from each other. The remaining three alignment options that were analyzed in more detail (Options 1, 3, and 5) are shown in **Figure 6** on the left side. The discarded alignments – Options 2 and 4 – are shown in gray.

Potential speed and reliability treatments were identified for these three remaining alignments through downtown. The project team evaluated the potential benefits to transit and impacts to traffic for the three options. The project team used this information, along with considerations about station placement, to recommend Option 1 (service along 110th Ave NE, Main St, and 116th Ave SE) as the K Line alignment through Downtown Bellevue. The alignment is shown in **Figure 6** on the right side.

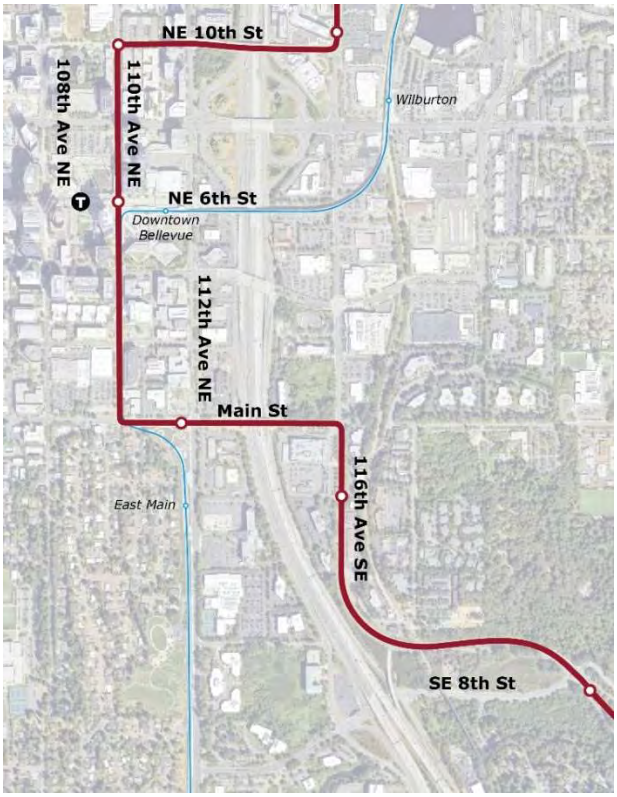
The alignment along 110th Ave NE was selected in part due to public input that indicated greater support for stations on 110th Ave NE versus 108th Ave NE. This alignment was also aligned with City of Bellevue project principles adopted in June 2024, and the 110th Ave NE alignment would allow for station placement closer to Link 2 Line's station and the future Stride stops. Additionally, this alignment would require fewer speed and reliability treatments on east-west roadways than an alignment via 108th Ave NE because it would turn off NE 10th St and Main St one block earlier. Fewer treatments on these east-west roadways would reduce impacts to vehicular access between I-405 and the many businesses in and near Bellevue Square Mall.

Figure 6 Downtown Bellevue Alignments

Alignment Options



Recommended Alignment



3.2 Totem Lake Routing

The recommended alignment in the Totem Lake area is through the Village at Totem Lake along 120th Ave NE (**Figure 7**). Compared to service along Totem Lake Boulevard, 120th Ave NE provides access to a thriving retail district, with both high density housing and a concentration of many uses. This alignment will serve more people and bring passengers to where they want to go.

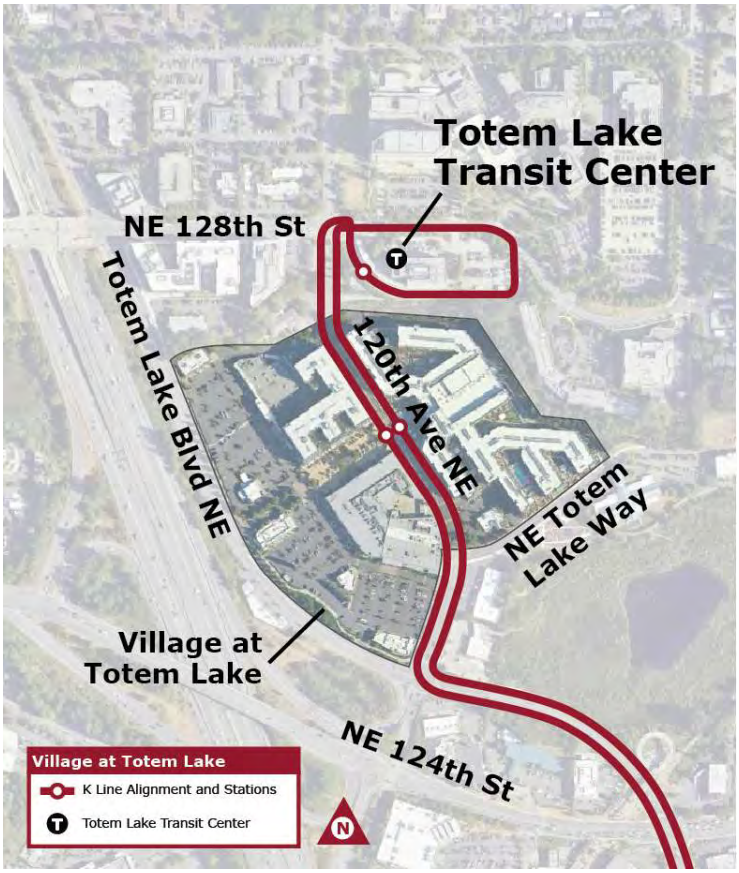
Since May 2023, King County Metro has not provided transit service along 120th Ave NE due to operational challenges related to "pinch points" within the travel way that need to be addressed to support future K Line service along 120th Ave NE. These pinch points occur due to narrow lanes along 120th Ave NE and parked vehicles overhanging into the travel way due to narrow parking stalls.

To make 120th Ave NE a viable corridor for transit service, physical modifications will be required to the roadway to remove the "pinch points." This may be achieved with widening of existing parking stalls, or revisions to parking stall geometrics such as new curbing to delineate the widths

of the stalls. The modifications are described in more detail as part of improvement #1 in other chapters of this report. Any changes along 120th Ave NE will require coordination between the City of Kirkland and CenterCal, which is the owner and operator of the Village at Totem Lake.

The City of Kirkland expressed support in implementing these modifications to bring two-way transit service back to 120th Ave NE, and to allow for K Line to operate along 120th Ave NE.

Figure 7 Recommended K Line Routing through Totem Lake Village



3.3 108th Ave NE/6th St S & NE 68th St

The project team is recommending BAT lanes in both directions along 108th Ave NE approaching NE 68th St. These improvements will support K Line speed and reliability and will be coordinated with the siting and design of stations at these locations.

To prioritize transit improvements along 108th Ave NE in advance of an LPA, the City of Kirkland moved forward with planning efforts for northbound BAT lanes that would extend from NE 55th Street (adjacent to Northwest University) to NE 60th Street [candidate improvement #15], and

from the Kirkland Seventh-Day Adventist Church (north of NE 62nd Street) to NE 68th Street [candidate improvement #13].

As the project team was further developing and refining speed and reliability candidate improvements, there was a recognition that more coordination was needed at the intersection with NE 68th St to evaluate options that would provide the most benefit to the K Line operations. The traffic analysis showed that both the northbound and southbound approaches to the NE 68th St intersection are congested and would benefit from speed and reliability investments. Therefore, additional design concepts were developed to accommodate a southbound BAT lane (from 9th Ave S to NE 68th St) or a southbound right-turn-except-bus lane at NE 68th Street [candidate improvement #12]. Adding BAT lanes in both directions would require additional widening beyond the widening assumed for the northbound design if implemented in isolation. The project team recognized that a coordinated design could strive to minimize widening while considering transit speed and reliability for both directions.

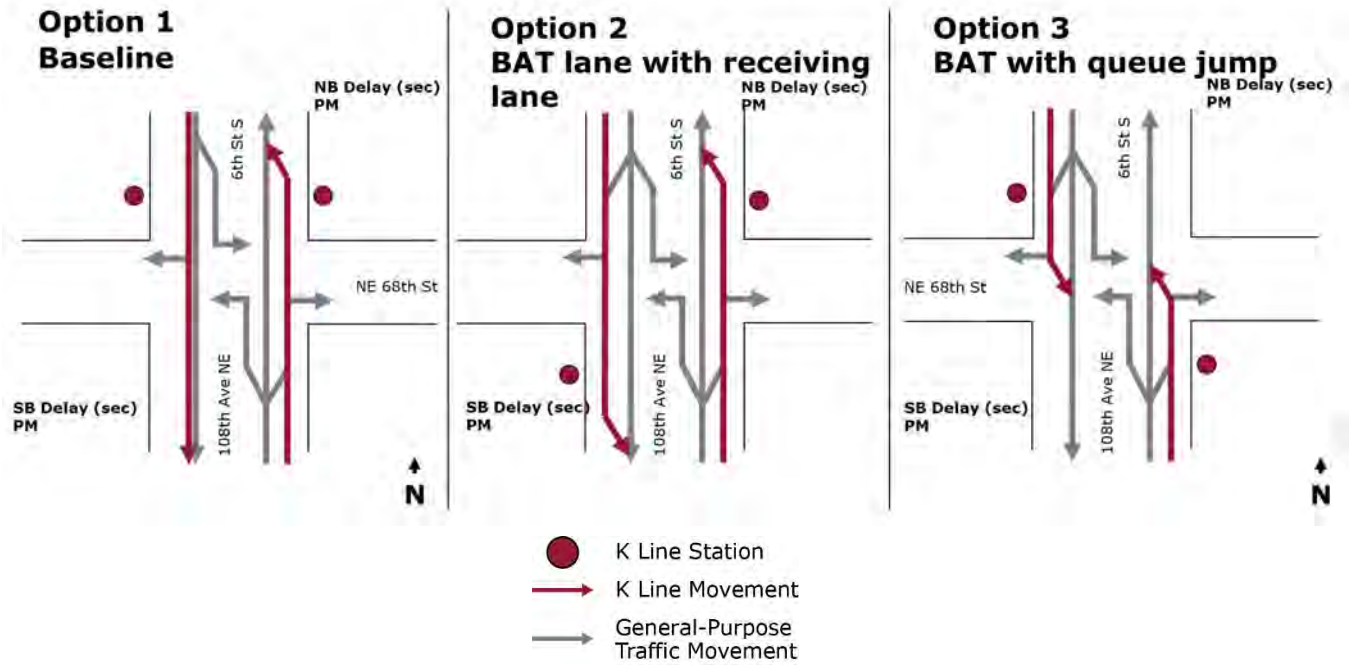
To inform the design options, the project team conducted traffic analysis for a few potential alternatives for transit treatments at this intersection. The alternatives were chosen to represent opportunities to limit widening and to think of other options for transit priority in this location. The three options in each direction are listed in **Figure 8** and shown schematically in **Figure 9**.

The other northbound improvement advanced by Kirkland on the approach to NE 60th St [candidate improvement #15] did not require any additional refinement or coordination with other potential improvements. It did not go through any additional analysis and is not discussed in detail in this section.

Figure 8 108th Ave NE at NE 68th St Improvement Options – Descriptions

Option	Northbound	Southbound
1 – Baseline	BAT lane with receiving lane; far-side station	No change. Same as existing (bus uses the shared through/right lane after serving a near-side station).
2 – Receiving lanes	BAT lane with receiving lane; far-side station	BAT lane with receiving lane; far-side station
3 – Queue jump	BAT lane with queue jump phase; near-side station	BAT lane with queue jump phase; near-side station

Figure 9 108th Ave NE at NE 68th St Improvement Options – Schematic Diagram



The analysis showed a northbound queue jump (option 3) would increase northbound general-purpose traffic delay (by approximately 32 seconds in the PM peak) because of less time in the signal cycle for traffic to proceed through the intersection. Transit would have a small benefit (nearly 4 seconds in the PM peak) over the current concept of a far-side receiving lane but not significant enough to outweigh the increased traffic impacts. A tradeoff of the increased general-purpose delay is the reduced impacts of widening, which would be smaller in scope than the option with the receiving lane (option 2). See **Figure 10** for the traffic analysis for the northbound direction.

In the southbound direction, the analysis indicated that Options 2 and 3 show a significant benefit to transit (savings of 50 seconds in the PM peak, and 110 seconds in the AM peak) and general-purpose traffic (savings of up to 67 seconds in the AM peak) from the existing configuration which has a single shared through/right lane. This benefit is achieved by moving all right-turning vehicles out of the through lane, and giving transit a lane shared with fewer vehicles. The impact of a queue jump signal phase for southbound (where buses would have their own green phase to move forward while through general-purpose vehicles are held on a red phase), relative to a receiving lane (where both buses and general-purpose traffic can proceed at the same time), would degrade conditions for general-purpose traffic (by up to 47 seconds in the AM peak) due to the additional time in the signal cycle for the queue jump. However, this change would not degrade it significantly enough to offset the benefits of the additional turn lane (i.e., the net change from existing conditions would still reduce general-purpose delay by nearly 20 seconds). See **Figure 11** for the traffic analysis for the southbound direction.

Overall, the options with a receiving lane in both directions performed better for traffic (and with good benefits to transit), and this option was advanced for further consideration in the design phase. Property impacts may require this improvement to be reduced in scope, and additional consideration for whether the impacts to traffic are worth the reduced property impacts. Regardless, the options with the receiving lane represent the greatest potential impact and cost and are carried forward at this stage of design for conservative planning purposes. The combination of improvements #12 and #13 are represented in the schematic diagram in **Figure 41** in **Chapter 8**.

Figure 10 NE 68th St Improvement Options – Northbound Traffic Analysis

Option	Description	Transit Delay (seconds)	GP Delay (seconds)	GP Queue (feet)
AM Peak				
1 – Baseline	BAT lane with receiving lane	26.9	31.4	284
2 – Receiving lanes	BAT lane with receiving lane	26.9	31.4	284
3 – Queue jump	BAT lane with queue jump phase	26.8	44.4	321
PM Peak				
1 – Baseline	BAT lane with receiving lane	48.2	78.1	508
2 – Receiving lanes	BAT lane with receiving lane	48.2	78.1	508
3 – Queue jump	BAT lane with queue jump phase	44.5	110.0	654

Figure 11 NE 68th St Improvement Options – Southbound Traffic Analysis

Option	Description	Transit Delay (seconds)	GP Delay (seconds)	GP Queue (feet)
AM Peak				
1 – Baseline	Existing conditions; no turn lane	129.8	129.8	763
2 – Receiving lanes	BAT lane with receiving lane; far-side station	20.7	63.1	601
3 – Queue jump	BAT lane with queue jump phase; near-side station	19.1	110.0	642
PM Peak				
1 – Baseline	Existing conditions; no turn lane	82.6	82.6	774
2 – Receiving lanes	BAT lane with receiving lane; far-side station	36.1	66.2	517
3 – Queue jump	BAT lane with queue jump phase; near-side station	32.4	81.8	629

4 Identification of Potential Speed and Reliability Improvements

The planning team utilized several methods to identify potential improvements and refine routing to deliver future K Line service which meets RapidRide service standards and has support for implementation by local agency partners. Methods included:

- Analytical evaluation of existing bus operational performance within the proposed K Line route
- Analytical evaluation of bus operational performance in a "Future Baseline" scenario that incorporated future traffic volume forecasts and assumed implementation of background improvements already planned by local jurisdictions
- Stakeholder input on points of delay within the corridor
- Interviews with existing transit operators for suggestions and subject matter input on points of delay, operational challenges, and potential solutions
- Jurisdictional authority collaboration

The project team summarized vehicle location (AVL) data from the routes that serve the K Line corridor from Fall 2022 to calculate the travel time variability between stops. These values can be expressed as 'bus delay' or 'passenger delay.' Bus delay is the variability experienced by individual buses regardless of passenger load, whereas passenger delay is the aggregate delay experienced by passengers. For example, a minute of bus delay with 10 passengers on board is equal to 10 minutes of passenger delay. **Figure 13** shows the passenger delay for the overall day. See **Appendix A – Transit Delay by Time of Day** for maps broken out by time of day.

The portions of the corridor with the highest levels of delay were areas of focus for the project team to identify potential speed and reliability treatments. However, pre-COVID traffic conditions, forecast future conditions, and segments with low on-time performance were also used to identify places for potential investment. Identifying places that may experience delay in the future, but where it does not exist today, allows for proactive identification of treatments to guarantee long-term reliability of K Line in the future, even as the region grows and traffic increases.

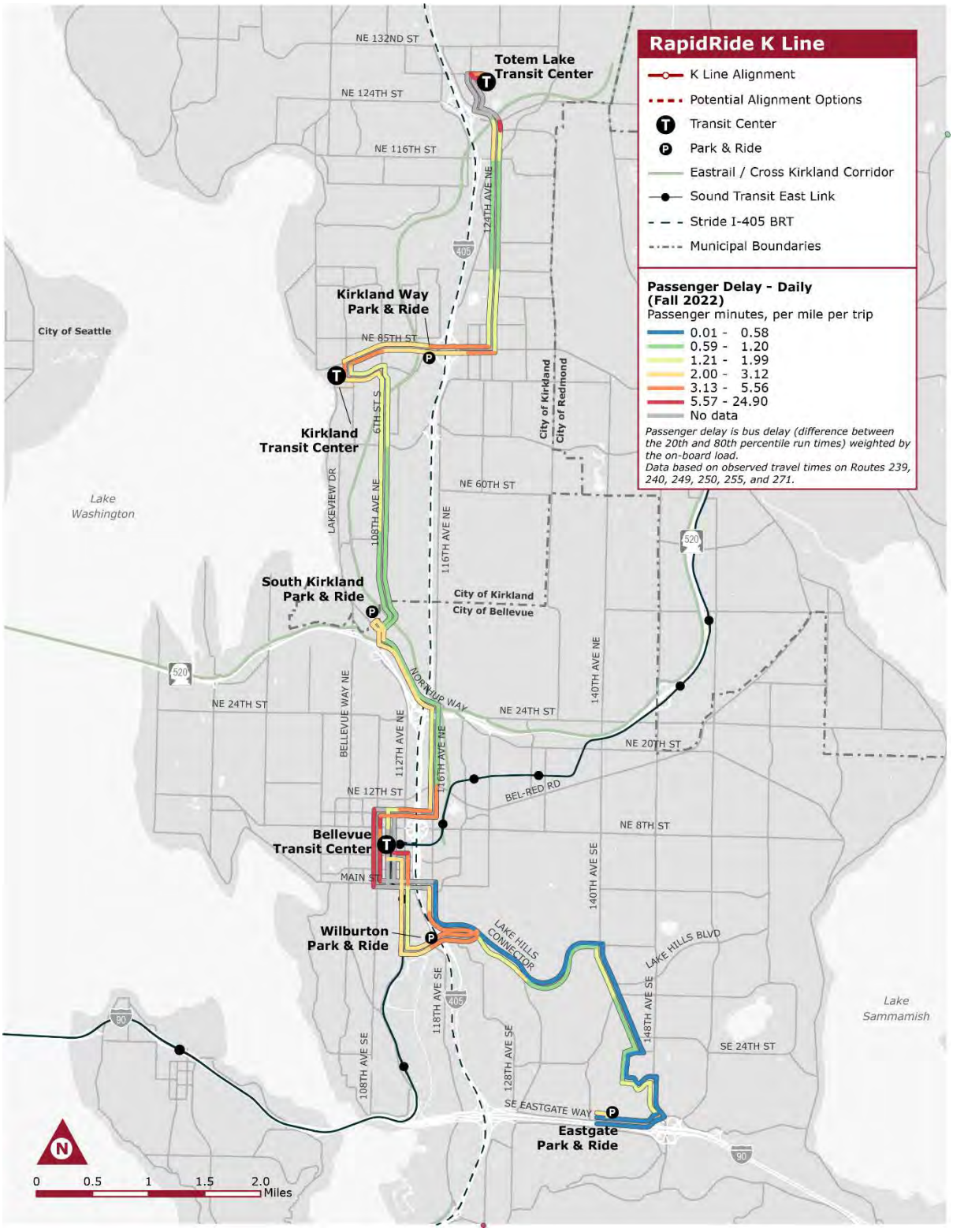
The project team looked at roadway details, such as lane channelization, curb-to-curb widths, right-of-way widths, traffic volumes, station placement, and other local characteristics to identify potential treatments at these areas, as well as other locations along the corridor. Potential treatments are listed below, and examples are shown in **Figure 12**.

- **Bus lane** – A lane for the exclusive use of buses, without general-purpose traffic.
- **Business Access and Transit (BAT) lane** – A lane for through buses, shared with general-purpose traffic that is accessing local destinations (i.e., turning into driveways) or turning onto intersecting streets.

- **Queue jump lane** – A lane used on the approach to an intersection that allows buses to skip a queue of general-purpose traffic, or a shared lane with turning vehicles on the approach to an intersection. Queue jump lanes may be paired with a bus signal that allows buses to proceed through the intersection ahead of the general-purpose traffic so the bus can access a general-purpose through lane on the far side of an intersection.
- **Transit signal priority (TSP)** – Signal adjustments to extend a green phase or shorten a red phase to reduce/eliminate the time spent by the bus waiting during a red phase. TSP will be coordinated among multiple signals, and will be able to estimate bus arrivals to manage signal progression.
- **Bus stop in lane** – Elimination of a bus pull-out, or the extension of a curb into the roadway, to keep a bus in the travel lane when serving a stop to pick up and/or drop off passengers.

Figure 12 Examples of Speed and Reliability Treatments

Figure 13 Fall 2022 Passenger Delay (Daily)



5 Transit Speed and Reliability Candidate Improvements

This chapter presents the speed and reliability candidate improvements evaluated by the K Line planning efforts.

5.1 Candidate Speed and Reliability Treatments

Figure 14 shows the locations along the corridor for all speed and reliability candidate improvements considered by the team for potential delivery through the overall K Line program.

The treatments are listed with details in **Figure 15**. These treatments represent the initial ideas and concepts, and many treatments dropped out in later stages, as is described later in this report. Some of the treatments contain multiple options, and each option is described in the list.

Figure 14 All Candidate Speed and Reliability Candidate Improvements

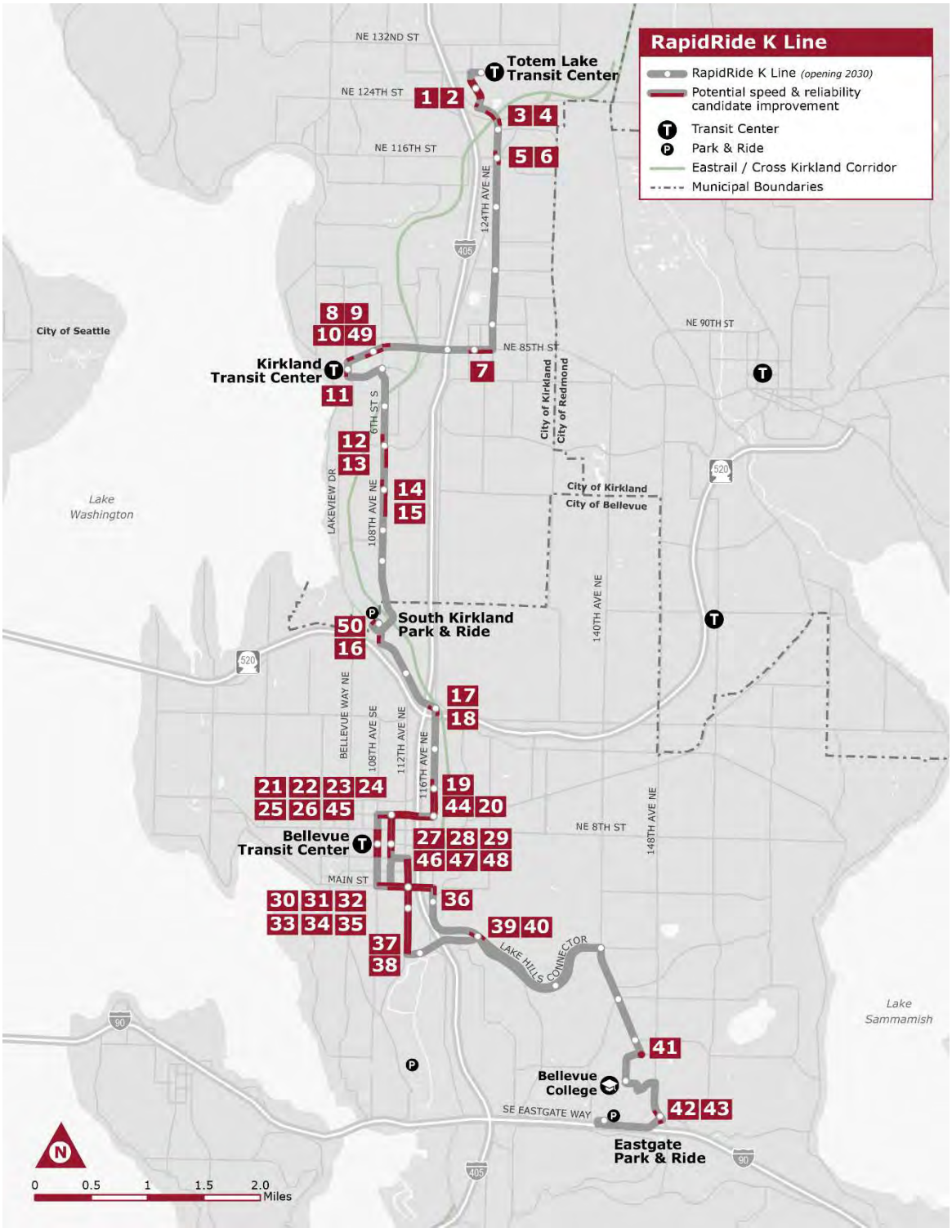


Figure 15 All Proposed Speed and Reliability Candidate Improvements

ID	Street	Location	Description
Kirkland			
1	120th Ave NE	Between Totem Lake Way and NE 128th St	Adjust curbing to reinforce where cars are meant to park, including adding vertical curbs at planters and pavement markings around curb bulb outs. Remove select parking spaces to allow for bus station operations. Without these improvements, this section of 120th Ave NE would not support bus operations, and the K Line would be required to take an alternate, more circuitous route that would add multiple minutes to the travel time. This improvement requires coordination between the City of Kirkland and CenterCal, the owner and operator of the Village at Totem Lake.
2	120th Ave NE	SB approach to Totem Lake Boulevard	Convert second SB left-turn lane into bus only left.
3	Totem Lake Blvd	SB approach to NE 124th St	Convert curb lane into bus-only approach lane. Consider widening to address narrow lane safety concerns.
4	124th Ave NE	NB approach to NE 124th St	**Option 4.1**: Add queue jump signal to right-turn lane to allow for a right-turn-except-bus. **Option 4.2**: Convert NB right through lane into NB bus only approach lane.
5	124th Ave NE	SB approach to NE 116th St	Convert SB through/right lane into SB right-turn-except-bus.
6	124th Ave NE	NB approach to NE 116th St	Convert through/right-turn lane into a right-turn-except-bus.

ID	Street	Location	Description
7	NE 85th St	EB approach to 124th Ave NE	**Option 7.1: Signal coordination.** Use a queue jump signal at 122nd Ave NE to hold through general-purpose traffic, allowing bus to cross lanes to get into left-turn lane at 124th Ave NE where left turn green will be active. **Option 7.2: Left turn from right lane.** Use a dedicated signal to allow bus to turn left from the right lane onto 124th Ave NE. **2A:** Widen to add two lanes (right-turn lane and a dedicated bus approach lane) **2B:** Widen to add one lane (right-turn lane), add bus approach lane by removing one left-turn lane and shifting lanes north **Option 7.3: Center-running bus lane.** Add EB bus lane in center with a center island platform.
8	NE 85th St	WB approach to 6th St	Add WB queue jump lane. Will require widening and QJ signal.
9	Central Way	EB approach to 6th St	Add EB QJ signal in right-turn lane. Consider lengthening turn lane.
10	Central Way	WB approach to 3rd St	Add transit-only left by converting existing left-turn lane to transit only left turn. Considered all-day or just during peak periods. **Option 10.1:** Maintain two WB general-purpose lanes. No general-purpose left-turn permitted. **Option 10.2:** Convert left general-purpose lane to a left-turn lane. Maintain only one WB through lane. Will require a bus-only phase.
11	3rd St	SB approach to Kirkland Ave	Convert left-turn lane to bus only. Right-turn lane becomes GP through and right only.
12	6th St S	SB approach to NE 68th St	Widen to add new SB right-turn except bus. **Option 12.1:** Add a far-side receiving lane with station. **Option 12.2:** Locate station on near side and add a queue jump signal to advance in front of traffic.

ID	Street	Location	Description
13	108th Ave NE	NB approach to NE 68th St (from north of NE 62nd St to NE 68th St)	Add NB queue jumps with widening from north of NE 62nd [Seventh-Day Adventist Church] to NE 68th St. Add NB queue jump and far-side receiving lane at NE 68th St with widening. (Design was advanced by the City of Kirkland while the K Line planning was paused.)
14	108th Ave NE	SB approach to NE 60th St	Add SB queue jump with roadway widening. Consider widening far-side for a receiving lane.
15	108th Ave NE	NB approach to NE 60th St (from NE 55th St to NE 60th St)	Add NB queue jumps with widening from NE 55th [Northwest University] to NE 60th St. Add NB queue jump at NE 60th St with widening and add traffic signal. (Design was advanced by the City of Kirkland while the K Line planning was paused.)
49	Central Way	EB from 3rd St to 6th St	Convert ~500 feet of parking between 3rd St and Peter Kirk Lane to a shared bus/bike lane. Project scope could also be extended to include converting right through lane between Peter Kirk and 6th St into a BAT lane. On-street parking and bike lane would remain, as would the right-turn lane at 6th St, which would be accessed by crossing over the bus lane. This would replace candidate improvement #9 at Central Way and 6th St.
50	107th Lane NE	NE 38th Pl to NE 37th Ct	Widen roadway to allow for two-way bus operations, and to accommodate WB right turn from NE 38th Pl onto 107th Ln NE.
Bellevue			
16	108th Ave NE	SB approach to Northup Way	Add SB left-turn queue jump **Option 16.1:** Add dedicated left-turn lane. Allow SB buses to share lane to access SR-520 on-ramp. **Option 16.2:** Add a dedicated bus left-turn from right lane. Allow SB buses accessing SR-520 on-ramp to also use lane.
17	Northup Way	EB approach to 116th Ave NE	Add EB right-turn lane with widening.

ID	Street	Location	Description
18	116th Ave NE	NB approach to Northup Way	Add NB left-turn queue jump **Option 18.1:** Include a dedicated receiving lane at station on Northup, by repurposing center left turn as WB through lane, and current through lane as bus stop zone. NB left turn for GP and buses occur at the same time. **Option 18.2:** Use special signal phasing to allow bus-only left turn without dedicated receiving lane. Use near-side platform by enlarging island and moving bicycles onto multi-use path shared with pedestrians.
19	116th Ave NE	SB approach to NE 12th St	Add SB transit approach lane. Convert second through lane.
20	116th Ave NE	NB from NE 10th St to NE 12th St	Add NB BAT lane. **Option 20.1:** Widen for third northbound lane. **Option 20.2:** Convert second lane to BAT lane. No widening. **Option 20.3**: Widen between NE 10th St and Felix Terry Swistak for a third lane (right-turn-except-bus). Convert one GP lane into a turn lane at Felix Terry Swistak. Convert right lane north of Felix Terry Swistak into a BAT lane. **Option 20.4:** Convert right lane to BAT lane starting north of Felix Terry Swistak. No widening.
21	NE 10th St	EB approach to 116th Ave NE	Convert second EB left-turn lane to bus only lane.
22	NE 10th St	WB approach to 112th Ave NE	Add WB queue jump in right-turn lane with a queue jump signal.
23	NE 10th St	WB approach to 110th Ave NE	**Downtown Bellevue Alignment 1 & 3:** Add a dedicated transit left-turn-from-right lane. **Downtown Bellevue Alignment 5:** Add WB queue jump in right-turn lane with a queue jump signal.
24	NE 10th St	WB approach to 108th Ave NE	Downtown Bellevue Alignment 5: Add dedicated transit left-turn-from-right through lane.

ID	Street	Location	Description
25	NE 10th St	EB from 108th Ave NE to 110th Ave NE	Downtown Bellevue Alignment 5: Add EB PM peak BAT lane by converting second through lane.
26	NE 10th St	EB from 110th Ave NE to 116th Ave NE.	Add EB PM peak BAT lane by converting second through lane to BAT lane.
27	110th Ave NE	NB from NE 6th St to NE 10th St	Downtown Bellevue Alignments 1 & 3: Allow through bus movement in NB right-turn lane at NE 8th St, and remove ~400 feet of parking (approximately 15 spaces) between NE 8th St and NE 10th St to add BAT lanes.
28	110th Ave NE	SB from NE 10th St to NE 6th St	Downtown Bellevue Alignments 1 & 3: Remove ~240 feet of parking (approximately 11 spaces) between NE 10th St and NE 8th St to add BAT lanes, allow through bus movement in SB right-turn lane at NE 8th St and NE 6th St, and convert shoulder space into BAT lane.
29	110th Ave NE	NB approach to NE 6th St	Downtown Bellevue Alignment 1: Add NB queue jump. Will require queue jump signal or receiving bus lane.
30	Main St	WB from 110th Ave to 108th Ave	Downtown Bellevue Alignment 5: Add WB BAT lane by converting right lane.
31	Main St	EB approach to 110th Ave NE	Downtown Bellevue Alignment 5: Add EB queue jump lane by converting second lane.
32	Main St	EB from 110th Ave to 112th Ave	Downtown Bellevue Alignments 1 & 5: Add EB PM peak BAT lane by converting right lane.
33	Main St	WB from 112th Ave to 110th Ave	Downtown Bellevue Alignments 1 & 5: Add WB BAT lane by converting right lane.
34	Main St	EB from 112th Ave to 116th Ave	Downtown Bellevue Alignments 1 & 5: Add EB bus lane by converting right lane.

ID	Street	Location	Description
35	Main St	WB from 116th Ave to 112th Ave	Downtown Bellevue Alignments 1 & 5: Add WB bus lane by converting right lane.
36	116th Ave SE	NB approach to Main St	Downtown Bellevue Alignments 1 & 5: Add second NB left-turn lane. **Option 36.1:** Repurpose left through lane to add second left turn. **Option 36.2:** Widen to add second left-turn lane.
37	112th Ave SE/NE	NB from NE 8th St to NE 4th St	Downtown Bellevue Alignment 3. **Option 37.1:** Widen to add NB BAT lane. **Option 37.2:** Convert existing right NB through lane to BAT lane.
38	112th Ave NE/SE	SB from NE 4th St to SE 8th St	Downtown Bellevue Alignment 3. **Option 38.1:** Widen to add SB BAT lane. **Option 38.2:** Convert existing right SB through lane to BAT lane.
39	Lake Hills Connector	EB approach to SE 8th St	Downtown Bellevue Alignments 1 & 5: Add queue jump.
40	Lake Hills Connector	WB approach to SE 8th St	Downtown Bellevue Alignments 1 & 5: Add queue jump.
41	145th Pl SE	Kelsey Creek Road & SE 24th St	Consider converting intersection to a roundabout (high build option) or making other changes to intersection to remove split phasing such as spot widening or turn restrictions (low build option).
42	148th Ave SE	SE approach to SE Eastgate Way	**Option 42.1:** Widen roadway to extend SB bus-only lane into right-turn lane. **Option 42.2:** Narrow median island and use extra space to shift lane for bus lane.
43	SE Eastgate Way	EB approach to 148th Ave SE	Add second EB left-turn lane by widening to the south.

ID	Street	Location	Description
44	116th Ave NE	SB from NE 12th St to NE 10th St	Add SB BAT lane. Convert second SB lane to BAT lane. No widening.
45	NE 10th St	WB from SR-520 on-ramp to 110th Ave NE	Convert curbside WB lane to BAT lane. **Option 45.1 (Downtown Bellevue Alignment 1)**: Ends at 112th Ave NE, with bus in right-turn lane. Use dedicated signal phase to advance across intersection and get into left lane for turn at 110th Ave NE. **Option 45.2 (Downtown Bellevue Alignments 1 & 5)**: Ends at 110th Ave NE. Use a left-turn-from-right lane (Alignment 1) or allow bus to proceed into planned station on farside of 110th Ave NE.
46	108th Ave NE	NB/SB between NE 4th St and NE 8th St	Downtown Bellevue Alignment 5. **Option 46.1**: Convert roadway to a bus-only zone from north of NE 4th St to south of NE 8th St. **Option 46.2**: Implement City of Bellevue concept to reinforce existing lanes and add double SB left turn at NE 4th St.
47	110th Ave NE	NB from City Hall driveway to NE 6th St	Downtown Bellevue Alignments 1 & 3. Replace ~70 feet of parking and buffer space with bus lane or extended turn lane. Use queue jump to proceed across NE 6th intersection into receiving lane.
48	110th Ave NE	SB from NE 6th St to NE 4th St	Downtown Bellevue Alignments 1 & 3. Convert second GP lane to BAT lane; convert turn lane to right-turn-except-bus. Add dedicated phase for bus to advance across intersection.

5.2 Changes from Roadmap Report

The list of candidate improvements presented in **Section 5.1** contains many improvements that were carried over from the K Line Roadmap Report. However, there have been some changes. **Figure 16** lists all the Tier 1 (high potential) candidate improvements that were identified in the Roadmap Report and recommended for further evaluation. The figure describes how the project was altered for this phase of the K Line project, or whether the improvement was removed from

further consideration. For improvements that are carried over into this report, the ID number used in this report is listed.

This list only describes the changes for improvements listed in the Roadmap Report, and does not identify any new projects that were added during this phase of the project.

Figure 16 Description of Changes to Candidate Improvements from Roadmap Report

Roadmap Report (Dec 2021) Tier 1 (High Potential) Projects	Changes for Upgrade Report	ID
Add transit signal priority.	Details and information on TSP have been moved into the Task 140 Communications and Technology Upgrade Report.	-
Improve signage and striping at NE 128th St & 120th Ave NE to prevent vehicles from stopping on "no stop" zone to improve reliability of buses exiting Totem Lake TC.	Project removed. Not considered significant for K Line implementation.	-
Convert second SB left-turn lane on 120th Ave NE on the approach to Totem Lake Blvd NE into a bus-only left-turn lane.	No changes.	2
Widen Totem Lake Blvd NE on SB approach to NE 124th St to add bus-only lane / queue jump.	No longer pursuing widening due to new pedestrian/bicycle bridge. Lane conversion is preferred; however, sliver widening may be needed to bring lane up to standard.	3
Convert NB right-turn lane on 124th Ave NE on approach to NE 124th St to queue jump.	This project remains as one of two options at this location. This option would use a queue jump signal. The other option is to convert the second through lane to a bus-only approach lane.	4
Convert SB right/through lane on 124th Ave NE on approach to NE 116th St to SB right turn only except for buses	No changes.	5
Widen 124th Ave NE at NE 116th St to add NB queue jump.	No longer pursuing widening due to recent widening in this location to add a second NB left-turn lane. Project now is to convert the through/right-turn lane into a right-turn-except bus.	6

Roadmap Report (Dec 2021) Tier 1 (High Potential) Projects	Changes for Upgrade Report	ID
Convert second EB left-turn lane on NE 85th St at 124th Ave NE to bus-only left-turn lane.	Project no longer being pursued. Replaced with three new options for NE 85th St between I-405 and 124th Ave NE.	7
Widen roadway to add third EB lane (as BAT lane) between 120th Ave NE and east of 122nd Ave NE.	Project no longer being pursued. Replaced with three new options for NE 85th St between I-405 and 124th Ave NE.	7
Add WB queue jump to NE 85th St on approach to 6th St.	No changes.	8
Extend EB right-turn lane on Central Way approaching 6th St to use as an EB queue jump.	This project remains as an EB queue jump signal. Considerations for lengthening of the turn lane remain.	9
Widen 6th St S to add SB right-turn lane on approach to NE 68th St with queue jump signal.	Project modified to include widening back to 9th Ave S for a BAT lane.	12
Widen 108th Ave NE to add NB bus-only lane from Seventh Day Adventist Church to NE 68th St.	Extended further south to NE 62nd St, to match plans by City of Kirkland. Assumed to operate as a BAT lane.	13
Add SB queue jump on 108th Ave NE at NE 60th St	No changes.	14
Add NB queue jump on 108th Ave NE at NE 60th St	Extended into longer facility from NE 55th St to NE 60th St to match plans by City of Kirkland. Assumed to operate as a BAT lane. New signal is assumed as part of project.	15
Add SB left-turn queue jump lane from 108th Ave NE to Northup Way.	This project remains as two options at this location. One option would add a transit only left-turn lane, and the other would add a left-turn-from-right lane.	16
Add EB right-turn lane on Northup Way onto 116th Ave NE.	No changes.	17

Roadmap Report (Dec 2021) Tier 1 (High Potential) Projects	Changes for Upgrade Report	ID
Add NB left turn queue jump from 116th Ave NE onto Northup Way.	This project remains as two options at this location. Both options would have a dedicated lane for the bus on the approach to Northup Way. One option would turn along with GP traffic onto Northup Way into its own dedicated receiving lane where the station is located. The second option would require a dedicated signal to turn into the single receiving lane (the station would be near side for this alternative).	18
Add SB queue jump on 116th Ave NE approaching NE 12th St.	Modified into a bus approach lane by converting the second through lane. Right-turn lane would remain as-is and no queue jump signal would be needed.	19
Add NB BAT lane on 116th Ave NE between NE 10th St and NE 12th St.	This project remains as several different options, ranging from full lane conversion to full widening, and a couple other iterations.	20
Convert second EB left-turn lane on NE 10th St at 116th Ave NE to bus-only left-turn lane.	No changes.	21
Add WB queue jump on NE 10th St approaching 112th Ave NE, in right lane.	Project removed. Replaced with WB bus only lane for Downtown Alignment 5 only.	22
Add WB queue jump on NE 10th St approaching 110th Ave NE, in right lane.	Project removed. Replaced with WB bus only lane for Downtown Alignment 5 only.	23
Add EB PM peak BAT lane on NE 10th St between 110th Ave NE and 112th Ave NE	Extended into longer BAT lane from 108th Ave NE to SR-520 on-ramp, with bus-only portion extending to 116th Ave NE.	25

Roadmap Report (Dec 2021) Tier 1 (High Potential) Projects	Changes for Upgrade Report	ID
Add BAT lane on 110th Ave NE in both directions between NE 6th St and NE 10th St by replacing on-street parking.	Project remains, but now split into two distinct projects for each direction. Additional detail added, specifying parking removal would only be between NE 8th St and NE 10th St, and through bus movement would be allowed in right-turn lane at NE 8th St in both directions, and SB at NE 6th St.	27, 28
Add NB queue jump on 110th Ave NE approaching NE 6th St.	Original project (29) removed, but later replaced by a longer version (47) extending further south from the mid-block crosswalk near City Hall to NE 6th St.	29, 47
Add queue jumps on Lake Hills Connector on the approach to SE 8th St in both directions.	No changes.	39, 40
Replace intersection of 145th Pl SE & SE 24th St with a roundabout.	Project remains, however other less-intensive treatments are being considered as alternatives to a roundabout.	41
Widen 148th Ave SE to extend SB bus-only lane into SB right-turn slip lane onto SE Eastgate Way.	Project removed. City of Bellevue has already advanced another city-led project that is widening the roadway.	-

5.3 Candidate Improvement Recommendations

All improvements carried forward for additional analysis were assessed based on the likelihood of providing a benefit to transit, while also having implementation support from local agencies. The team performed a screening process to remove candidate improvements which showed significant potential to increase delay to general-purpose traffic without comparable benefits to transit speed and reliability. Detailed traffic analysis is presented in **Chapter 6**. Other qualitative considerations like property impacts, parking impacts, and feasibility of implementation were also considered.

After completion of transit planning efforts and extensive community and partner agency engagement, the project team is recommending 24 standalone conceptual speed and reliability candidate improvements be considered for delivery as part of the overall K Line project. **Figure 17** shows these candidate improvements. **Figure 18** identifies the recommendation for each candidate improvement, and why they are or are not recommended for delivery by the K Line program.

Figure 17 Recommended Speed and Reliability Improvements

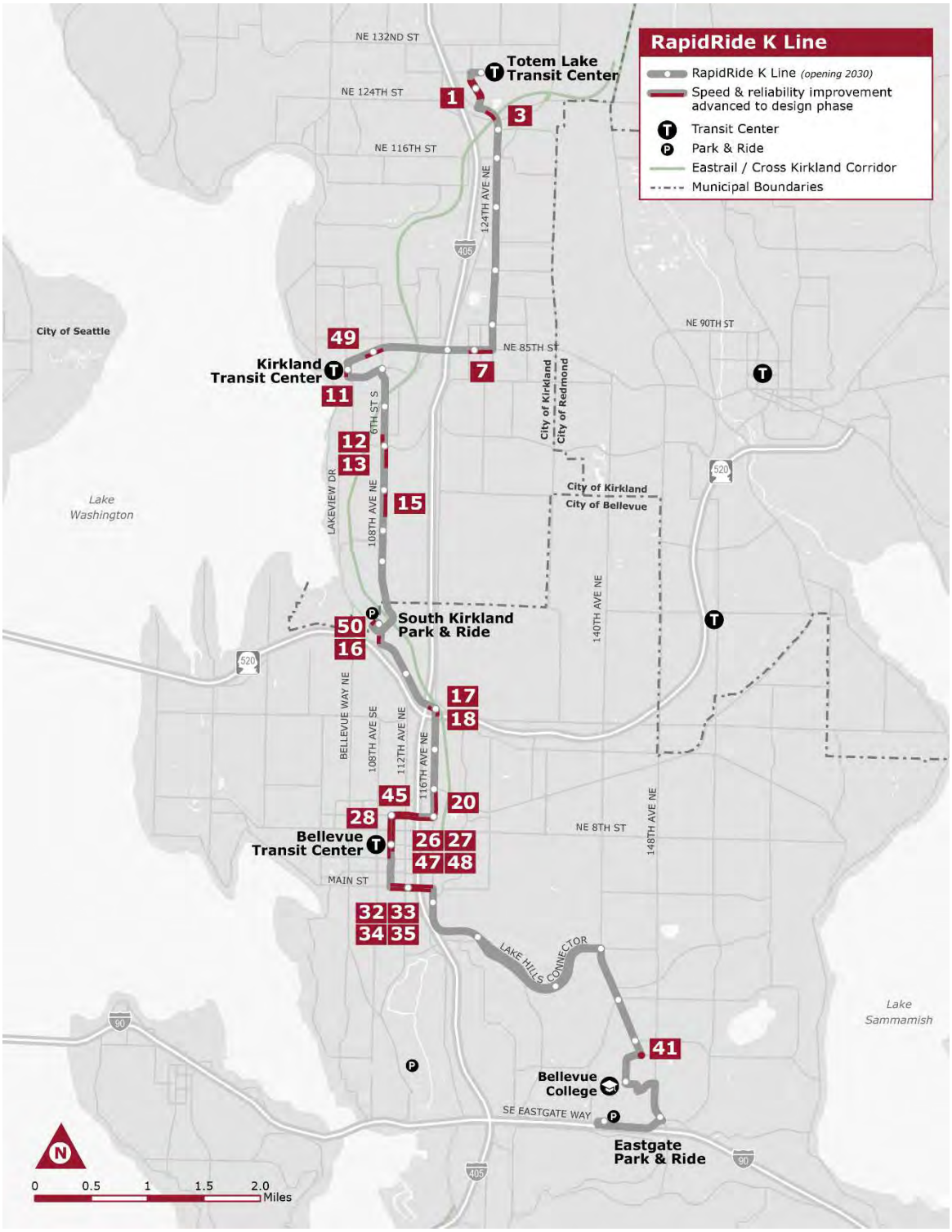


Figure 18 Candidate Improvement Recommendations

ID	Location	Description	Decision	Rationale / Notes
Kirkland				
1	120th Ave NE through Village at Totem Lake	Curbing adjustments to bring 120th Ave NE up to standards to support bus operations	✓ Advance to design	▪ Significant transit travel time savings of up to 130 sec per trip. ▪ Changes would allow for a more direct alignment through the Village at Totem Lake, rather than along Totem Lake Blvd.
2	120th Ave NE SB at Totem Lake Blvd	Transit approach lane	✗ Remove from consideration	▪ Converting a travel lane into a transit lane would result in a general purpose queue length that would block bus access to transit lane resulting in more delay for the bus.
3	Totem Lake Blvd SB at NE 124th St	Transit approach lane	✓ Advance to design	▪ Good transit travel time savings in the PM peak.
4	124th Ave NE NB at NE 124th St	Transit approach lane	✗ Remove from consideration	▪ Option 1: High right turn volumes and challenges with feasibility of separate bus phase. ▪ Option 2: Significant traffic impacts.
5	124th Ave NE SB at NE 116th St	Transit approach lane	✗ Remove from consideration	▪ Challenging to implement queue jumps with existing phasing and heavy turn volumes.
6	124th Ave NE NB at NE 116th St	Transit approach lane	✗ Remove from consideration	▪ Challenging to implement queue jumps with existing phasing and heavy turn volumes.

ID	Location	Description	Decision	Rationale / Notes
7	NE 85th St EB from 122nd Ave to 124th Ave NE	Signal coordination	✓ Advance Option 7.1 to design	▪ Option 1 provides the most benefit for the least cost and disruption. ▪ Options 2 and 3 were eliminated due to property impacts and high-level of civil work necessary.
8	NE 85th St WB at 6th St	Queue jump	✗ Remove from consideration	▪ Benefit to transit not significant enough to warrant investment.
9	Central Way EB at 6th St	Queue jump	✗ Remove from consideration	▪ Queue jump incorporated into #49.
10	Central Way WB at 3rd St	Bus-only left turn	✗ Remove from consideration	▪ Low delay and small benefit.
11	3rd St SB at Kirkland Ave	Bus-only left turn	✓ Advance to design	▪ Good transit travel time benefit in the AM peak.
12	6th St S SB from 9th St S to NE 68th St	BAT lane and right-turn-except-bus	✓ Advance to design	▪ Good transit travel time benefit.
13	108th Ave NE NB from north of NE 62nd St to NE 68th St	BAT lane	✓ Advance to design	▪ Good transit travel time benefit in the PM peak. ▪ City of Kirkland is pursuing project design.
14	108th Ave NE SB at NE 60th St	Queue jump	✗ Remove from consideration	▪ Low existing delay with low benefit and high cost.

ID	Location	Description	Decision	Rationale / Notes
15	108th Ave NE NB from NE 55th St to NE 60th St	BAT lane and new signal at NE 60th St	✓ Advance to design	▪ Good transit travel time benefit in the PM Peak. ▪ City of Kirkland is pursuing project design.
49	Central Way EB from Peter Kirk to 6th St	BAT lane and queue jump	✓ Advance to design	▪ Good transit travel time benefit, particularly in PM peak.
50	107th Ln NE	Widen for bus operations	✓ Advance to design	▪ Would provide travel time savings for the northbound route with a less circuitous option to serve the South Kirland Park and Ride. ▪ Would allow for stations to be separated by direction at the South Kirkland Park and Ride. ▪ Identified for additional analysis and design to be part of the next phase of project development.
Bellevue				
16	108th Ave NE SB at Northup Way	Bus-only left-turn lane	✓ Advance Option 16.2 to design	▪ Option 2 has good transit benefit with minimal impact to general-purpose traffic, and supports SR-520 buses. ▪ Option 1 was eliminated due to more extensive widening required, and no benefit for SR-520 buses. ▪ Option 3 was eliminated because it provides no benefit for transit or general-purpose traffic.
17	Northup Way EB at 116th Ave NE	Add right-turn lane	✓ Advance to design	▪ Good transit benefit, and supports heavy existing turn volumes.

ID	Location	Description	Decision	Rationale / Notes
18	116th Ave NE NB at Northup Way	Bus-only left-turn lane	✓ Advance Option 18.1 to design	▪ Option 1 provides good transit benefit primarily in PM. ▪ Option 2 eliminated because benefits in PM were less than those in Option 1.
19	116th Ave NE SB at NE 12th St	Transit approach lane	✗ Remove from consideration	▪ Significant traffic impacts. ▪ Traffic queue would block access of bus to the transit lane.
20	116th Ave NE NB from NE 10th St to NE 12th St	BAT lane	✓ Advance Option 20.4	▪ Option 4 would provide good benefits to transit with minor impacts to general-purpose traffic in the AM. ▪ Option 1 eliminated due to high cost and impacts to property. ▪ Option 2 eliminated due to significant impacts to traffic in the AM. ▪ Option 3 eliminated due to challenges with lane channelization.
21	NE 10th St EB at 116th Ave NE	Bus-only left-turn lane	✗ Remove from consideration	▪ Transit benefit not significant enough to warrant investment.
22	NE 10th St WB at 112th Ave NE	Queue jump	✗ Remove from consideration	▪ Replaced with #45 prior to traffic analysis.
23	NE 10th St WB at 110th Ave NE	Bus-only left turn	✗ Remove from consideration	▪ Replaced with #45 prior to traffic analysis.

ID	Location	Description	Decision	Rationale / Notes
24	NE 10th St WB at 108th Ave NE	Bus-only left turn	✗ Remove from consideration	▪ Removed prior to traffic analysis because project team assumed bus would use general-purpose turn lane instead of a dedicated lane.
25	NE 10th St EB from 108th Ave NE to 110th Ave NE	PM peak BAT lane	✗ Remove from consideration	▪ Removed due to Downtown Bellevue alignment selected for 110th Ave NE.
26	NE 10th St EB from 110th Ave NE to 116th Ave NE	PM peak BAT lane	✓ Advance to design	▪ Good transit travel time benefit in PM.
27	110th Ave NE NB from NE 6th St to NE 10th St	Convert parking to BAT lane; add right-turn-except-bus	✓ Advance to design	▪ Good transit travel time benefit in the AM. ▪ Minor increase in general-purpose traffic in the PM.
28	110th Ave NE SB from NE 10th St to NE 6th St	Convert parking to BAT lane; add right-turn-except-bus	✓ Advance to design	▪ Good benefit for transit, especially in PM peak. ▪ No negative impact to traffic.
29	110th Ave NE NB at NE 6th St	Queue jump	✗ Remove from consideration	▪ Eliminated early on prior to traffic analysis due to challenges with implementation. ▪ Similar to newly proposed #47.
30	Main St WB from 110th Ave to 108th Ave	BAT lane	✗ Remove from consideration	▪ Removed due to Downtown Bellevue alignment selected for 110th Ave NE.
31	Main St EB at 110th Ave	Queue jump lane	✗ Remove from consideration	▪ Removed due to Downtown Bellevue alignment selected for 110th Ave NE.

ID	Location	Description	Decision	Rationale / Notes
32	Main St EB from 110th Ave to 112th Ave	PM peak BAT lane	✓ Advance to design	▪ Good benefit for transit in PM peak.
33	Main St WB from 112th Ave to 110th Ave	BAT lane	✓ Advance to design	▪ Minor benefit to transit. ▪ Ensures long-term transit reliability.
34	Main St EB from 112th Ave to 116th Ave	BAT lane	✓ Advance to design	▪ Minor improvement for transit. ▪ No negative impact to traffic ▪ Ensures long-term transit reliability.
36	116th Ave NB at Main St	Add second left-turn lane	✗ Remove from consideration	▪ Limited benefit for transit. ▪ Significant traffic impacts in AM with Option 1.
37	112th Ave NB from SE 8th to NE 4th St	BAT lane with widening	✗ Remove from consideration	▪ 112th Ave alignment which was not preferred by the public outreach.
38	112th Ave SB from NE 4th to SE 8th St	BAT lane	✗ Remove from consideration	▪ 112th Ave alignment which was not preferred by the public outreach.
39	Lake Hills Connector EB at SE 8th St	Queue jump	✗ Remove from consideration	▪ Transit benefit not significant enough to warrant investment.
40	Lake Hills Connector WB at SE 8th St	Queue jump	✗ Remove from consideration	▪ Transit benefit not significant enough to warrant investment.
41	145th Pl SE At Kelsey Creek Rd/24th St	Convert intersection to roundabout	✓ Advance to design	▪ Analysis shows a good benefit to transit. ▪ Identified for additional analysis and design to be part of the next phase of project development.

ID	Location	Description	Decision	Rationale / Notes
42	148th Ave SE SB at SE Eastgate Way	Extend bus lane into right-turn lane	✗ Remove from consideration	▪ Bellevue is proceeding independently with a separate project to widen 148th Ave SE at Eastgate Way.
43	SE Eastgate Way EB at 148th Ave SE	Add second left-turn lane	✗ Remove from consideration	▪ Bellevue is proceeding independently with a project at this intersection that would make this second left-turn lane infeasible.
44	116th Ave NE SB from NE 12th St to NE 10th St	BAT lane	✗ Remove from consideration	▪ Significant traffic impacts in PM peak.
45	NE 10th St WB from SR-520 to 110th Ave NE	BAT lane	✓ Advance to design	▪ Good benefit to transit. ▪ Minor impact to traffic.
46	108th Ave NE NB/SB between NE 4th St and NE 8th St	BAT lanes	✗ Remove from consideration	▪ 108th Ave NE alignment which extends the impacts to general-purpose delay for east-west travel through Downtown Bellevue.

5.4 Additional Analysis Needed

An additional set of improvements were identified after the initial round of traffic analysis (or were recommended for alternative designs or that would significantly impact traffic and travel time outcomes). These improvements, which are listed in **Figure 19**, will undergo traffic analysis to understand impacts and benefits before they are recommended for inclusion in the K Line program.

Figure 19 Additional Candidate Improvements

ID	Location	Description	Rationale for Inclusion
Bellevue			
20	116th Ave NE NB from NE 10th St to NE 12th St	BAT lane	▪ Potential design adjustments needed to accommodate planned bicycle facilities and station placement (near/far side). ▪ New design may require a near-side station with queue jump in place of a far-side station with receiving lane.
35	Main St WB from 116th Ave to 112th Ave	BAT lane	▪ Identified for additional analysis and design to be part of the next phase of project development.
47	110th Ave NE NB at NE 6th St	BAT lane with queue jump	▪ Identified for additional analysis and design to be part of the next phase of project development.
48	110th Ave NE SB from NE 6th St to NE 4th St	BAT lane with queue jump	▪ Identified for additional analysis and design to be part of the next phase of project development.

6 Traffic and Travel Time Analysis

This section outlines the study intersections, traffic modeling tools, methods and assumptions used to perform the traffic analysis for existing, future baseline, and future improved conditions for the Speed and Reliability Upgrade Report.

6.1 Traffic Analysis

Traffic analyses were conducted for the year 2035 for the entire K Line corridor. Metro and City of Bellevue staff also collaborated to conduct 2044 modeling for the street network in Downtown Bellevue. The 2044 analysis in Downtown Bellevue was conducted to support the decision-making process for the Downtown Bellevue routing selection at the request of City of Bellevue staff.

A total of 95 intersections along K line corridor were included in the traffic model for the 2035 analysis. Refer to the list of study intersections in **Appendix B – Traffic Analysis**.

6.2 Methodology

The project team used Synchro 11 software for the traffic operational analysis. The team developed AM and PM peak hour existing condition models using the existing geometry and signal timing data collected from the operating jurisdictions. Initial traffic counts were conducted in September 2023, with counts for five additional intersections conducted in July 2024 for supplementary analysis within Downtown Kirkland.

To accurately reflect peak hour conditions along the project corridor, the study area was separated into four zones. The AM and PM peak hours were defined as the 60-minute period with the highest traffic volumes between 7:00 AM to 9:00 AM and 4:00 PM to 6:00 PM. Peak hours may vary between zones.

Baseline condition models were developed from the existing condition models using the forecasted traffic volumes for the analysis year (as outlined in **Section 6.2.1**) and known geometry or intersection control changes that will occur prior to the analysis year (as outlined in **Section 6.2.2**). There is no single bus line that K Line would replace. Therefore, this **baseline condition is a hypothetical scenario where a transit line operates along the entire K Line alignment from Totem Lake Transit Center to Eastgate Park and Ride as a local service**, without any infrastructure investments other than those already planned and funded separately. This line would use the existing local bus stops already in place along the corridor, with no changes to stop spacing.

Build condition models were developed from the baseline models incorporating the candidate transit improvements for the intersections. Both baseline and build condition model signal timings were optimized for the forecasted traffic volumes and applicable geometric and phasing

conditions. Optimization was conducted for individual zones (small group of signalized intersections) that have similar traffic conditions and similar natural cycle length.

6.2.1 Travel Demand Forecasting

The team projected volumes for year 2035 from the Bellevue-Kirkland-Redmond (BKR) travel demand model (TDM) link volumes obtained from the City of Bellevue in 2020 during the previous phase of the K Line study. Future volumes were post-processed in accordance with NCHRP[1] guidelines prior to being used for the traffic operational analysis.

The City of Bellevue provided turning movement volumes for intersections within Downtown Bellevue for year 2044. The volumes were post-processed from the BKR travel demand model, with separate volumes for each alignment option and baseline, based on candidate investments. Projected 2044 turning movement volumes for non-system intersections within Downtown Bellevue were developed by balancing volumes with adjacent system intersections.

6.2.2 Baseline Condition Assumptions

AM and PM models for the 2035 Baseline condition were updated from the existing conditions model and include background improvements planned within the study area. **Figure 20** lists background improvements included in the Baseline conditions model. These assumptions were identified by the local jurisdictions and King County Metro.

Figure 20 Assumed Background Improvements

Intersection	Improvement
108th Avenue NE & NE 60th Street	Changed to signalized from two-way stop controlled.
108th Avenue NE & NE 37th Court	Changed to signalized from one-way stop controlled.
107th Lane NE & NE 38th Place	Changed to all-way stop controlled from one-way stop controlled.
124th Avenue NE between NE 116th St and NE 124th St	Roadway upgraded to five-lane cross section, with bicycle phasing at NE 120th St and NE 124th St.
Lake Street & Kirkland Avenue	Pedestrian scramble phase added, channelization updated per City of Kirkland plans. Located off of corridor but included for network impacts.
Lake Street & Central Way	Eastbound right turn overlap implemented. Located off of corridor but included for network impacts.
NE 85th St & 114th Ave NE/Kirkland Way	Intersection converted to roundabout.

[1] National Cooperative Highway Research Program

Intersection	Improvement
NE 85th St & I-405	Interchange completely reconstructed into multi-layer interchange with roundabouts.
NE 85th St between I-405 and 122nd Ave NE	Roadway widened to three EB lanes.

6.2.3 Measures of Effectiveness (MOEs) and Travel Time Calculations

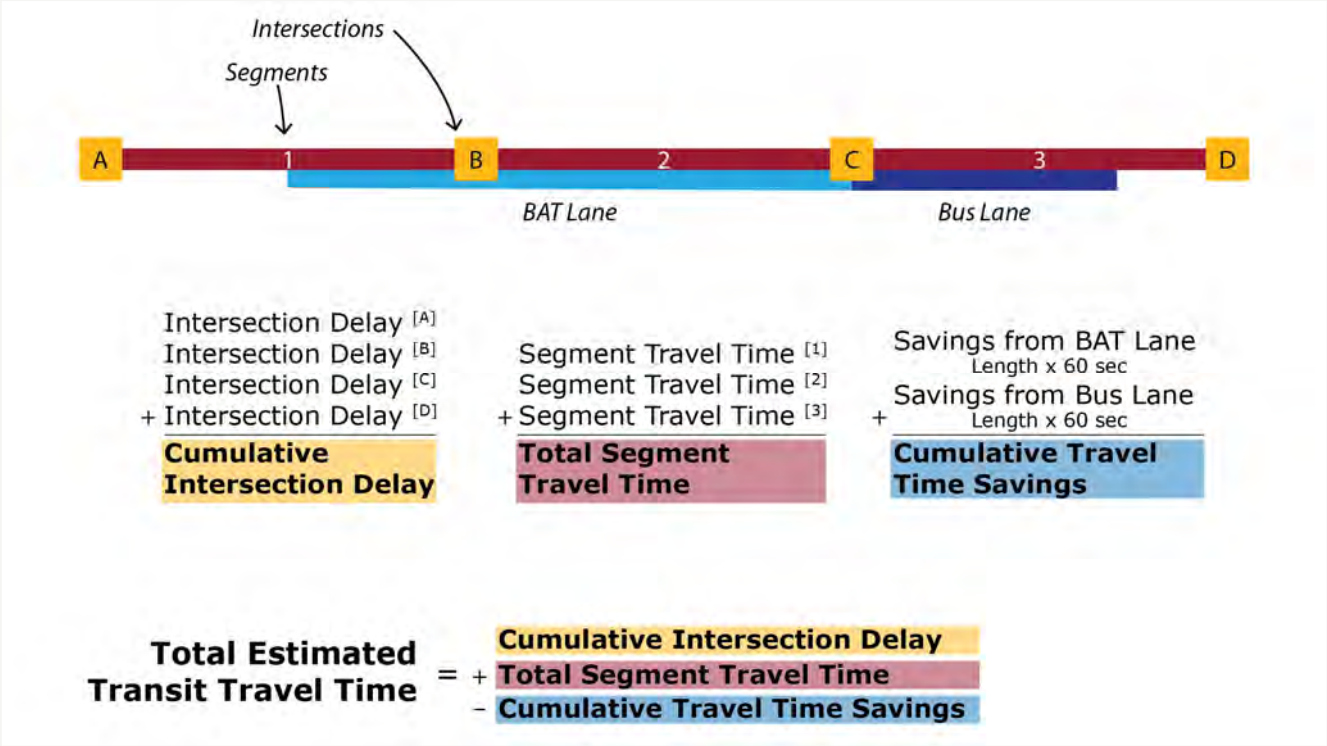
Intersection measures of effectiveness (MOEs) including delay and level of service (LOS) were output from Synchro 11 using HCM[2] 2000 methodology. Synchro 11 reporting was used to calculate 95th percentile queue lengths. The results, which are provided in **Appendix B – Traffic Analysis**, include the intersection delay, transit movement delay and travel times, corresponding general-purpose (GP) traffic delay, and 95th percentile queue lengths.

Travel times were calculated by adding the segment travel times and movement delay at each intersection along each corridor or route. Link travel times were calculated by dividing the Synchro link distance by the posted speed limit of the segment. A reduction factor of 0.8 was used for the link travel time to account for acceleration and deceleration conditions. Since the link travel time was calculated using the speed and distance formula prior to adding intersection delay, the calculated link travel time does not account for acceleration, deceleration, and intermediate driveway interference or interactions. The reduction factor increased the link travel time to account for those. The general-purpose travel time obtained from 2023 existing conditions analysis was compared to estimates of travel time from Google map directions to calibrate the reduction factor value.

To estimate the transit travel time savings of a BAT lane, link travel times were reduced by 60 seconds per mile of BAT lane. This is a typical planning-level estimate used by King County Metro for BAT lane investments throughout King County. A graphical representation of the travel time calculations is shown in **Figure 21**.

[2] Highway Capacity Manual

Figure 21 Example of Travel Time Calculation



6.3 Traffic Impacts and Transit Benefits

Traffic impacts were evaluated by calculating the change in delay between baseline and build conditions for movements associated with transit and general-purpose traffic. For S&R improvements which span multiple intersections, the cumulative difference in delay across all intersections is reported. The 2035 results are included in **Figure 22**. Several improvements will be analyzed in later phases. These improvements are listed separately in **Figure 23**.

The project team used the traffic impacts and transit benefits estimated by this analysis to recommend which S&R improvements advance to the next phase of the K Line project. These recommendations and rationale are described in **Section 5.3**.

Figure 22 Summary of 2035 Travel Time and Delay Change by Candidate Improvement

S&R Improvement ID	Intersection ID	Location	K Line Direction	Lane Group Direction	Segment Transit TT Change (sec)		Intersection Approach Transit Delay Change (sec)		Total Transit TT Change (sec)		Lane Group GP Delay Change (sec)	
					AM	PM	AM	PM	AM	PM	AM	PM
Kirkland												
1	-	120th Ave NE (NB) through Totem Lake Village	NB	-	-73.0	-130.0	-	-	-73.0	-130.0	-	-
1	-	120th Ave NE (SB) through Totem Lake Village	SB	-	-130.0	-123.0	-	-	-130.0	-123.0	-	-
2	2010	120th Ave NE at Totem Lake Blvd (SB)	SB	SBL	-	-	0.0	-27.7	0.0	-27.7	0.0	+99.7
3	2015	Totem Lake Blvd at NE 124th St (SB)	SB	SBR	-	-	-14.9	-80.9	-14.9	-80.9	+44.4	+18.9
4.1	2015	124th Ave NE at NE 124th St (NB)	NB	NBR	-	-	-18.0	-10.2	-18.0	-10.2	-11.3	+18.7
4.2	2015	124th Ave NE at NE 124th St (NB)	NB	NBR	-	-	-16.6	-26.5	-16.6	-26.5	+13.9	+148.1
5	2025	124th Ave NE at NE 116th St (SB)	SB	SBR	-	-	-9.6	-32.3	-9.6	-32.3	+13.9	-19.6
6	2025	124th Ave NE at NE 116th St (NB)	NB	NBR	-	-	+1.8	-26.6	+1.8	-26.6	+9.9	-22.8
7.1	2040, 2045	NE 85th St from 120th to 124th Ave NE	NB	EBR/EBL	-	-	+1.8	-26.6	+1.8	-26.6	+9.9	-22.8
7.2	2040, 2045	NE 85th St from 120th to 124th Ave NE	NB	EBR/EBL	-	-	32.6	124.0	32.6	124.0	+18.3	-8.1
7.3	2040, 2045	NE 85th St from 120th to 124th Ave NE	NB	EBR/EBL	-	-	10.2	-22.2	10.2	-22.2	+10.3	-19.9
8	2060	NE 85th St at 6th St (WB)	SB	WBR	-	-	-4.6	-8.0	-4.6	-8.0	+10.6	+6.3
9	2060	Central Way at 6th St (EB)	NB	EBTR	-	-	-0.9	-23.9	-0.9	-23.9	+21.4	+9.6
10.1	1365	Central Way at 3rd St (WB)	SB	WBL	-	-	2.8	-10.4	2.8	-10.4	+5.4	-6.5
10.2	1365	Central Way at 3rd St (WB)	SB	WBL	-	-	5.3	-11.7	5.3	-11.7	+1.2	-4.2
11	1370	3rd St at Kirkland Ave (SB)	SB	SBL	-	-	-45.5	-17.3	-45.5	-17.3	-51.3	-31.8
12	1385	6th St S at NE 68th St (SB)	SB	SBR	-6.1	-6.1	-67.8	-38.3	-73.9	-44.4	+9.3	+7.4
13	1385	108th Ave NE at NE 68th St (NB)	NB	e	-16.9	-16.9	-2.6	-14.3	-19.5	-31.2	+1.9	+15.6
14	9986	108th Ave NE at NE 60th St (SB)	SB	SBR	-	-	-12.9	-4.2	-12.9	-4.2	+2.6	+4.2
15	9986	108th Ave NE at NE 60th St (NB)	NB	NBR	-11.3	-11.3	-6.1	-19.9	-17.4	-31.2	+1.3	-3.8
49	2060, 2065, 2066, 2070	Central Way (EB) from Peter Kirk to 6th St	NB	EBT	-12.2	-12.2	+1.9	-38.0	-10.3	-50.2	+24.8	+15.2
50	1395	NE 38th Pl & 107th Ln NE	NB	-	-16.0	-18.0	-	-	-16.0	-18.0	-	-
Bellevue												
16.1	1405	108th Ave NE at Northup Way (SB)	SB	SBL	-	-	-28.7	-46.2	-28.7	-46.2	0.0	-8.4

S&R Improvement ID	Intersection ID	Location	K Line Direction	Lane Group Direction	Segment Transit TT Change (sec)		Intersection Approach Transit Delay Change (sec)		Total Transit TT Change (sec)		Lane Group GP Delay Change (sec)	
					AM	PM	AM	PM	AM	PM	AM	PM
16.2	1405	108th Ave NE at Northup Way (SB)	SB	SBL	-	-	-5.8	-13.2	-5.8	-13.2	-11.1	-3.7
16.3	1405	108th Ave NE at Northup Way (SB)	SB	SBL	-	-	7.9	-9.8	7.9	-9.8	-42.3	-37.0
17	1410	Northup Way at 116th Ave NE (EB)	SB	EBR	-	-	-34.5	-70.9	-34.5	-70.9	-17.3	-65.3
18.1	1410	116th Ave NE at Northup Way (NB)	NB	NBL	-	-	-8.3	-77.8	-8.3	-77.8	-9.9	-55.6
18.2	1410	116th Ave NE at Northup Way (NB)	NB	NBL	-	-	-20.2	-77.8	-20.2	-77.8	-19.6	-59.1
19	1415	116th Ave NE at NE 12th St (SB)	SB	SBR	-	-	0.0	-25.2	0.0	-25.2	+91.6	+185.1
20.1	1415, 1420	116th Ave NE (NB) from NE 10th to 12th St	NB	NBR	-14.8	-14.8	-128.9	-61.1	-143.7	-75.9	-127.6	-69.9
20.2	1415, 1420	116th Ave NE (NB) from NE 10th to 12th St	NB	NBR	-14.8	-14.8	-121.7	-66.8	-136.5	-81.6	+136.0	-53.0
20.3	1415, 1420	116th Ave NE (NB) from NE 10th to 12th St	NB	NBR	-14.8	-14.8	-124.5	-59.0	-139.3	-73.8	+27.2	-56.1
20.4	1415, 1420	116th Ave NE (NB) from NE 10th to 12th St	NB	NBRT	-11.8	-11.8	-135.2	-77.8	-147.0	-89.6	+46.7	-55.6
21	1425	NE 10th at 116th Ave NE (EB)	NB	EBL	-	-	-5.8	4.3	-5.8	+4.3	+2.9	+17.9
25	3015	NE 10th (EB) from 108th to 110th Ave NE	NB	NBR	-7.4	-7.4	4.8	-31.4	-2.6	-38.8	+49.5	+25.0
26	3008, 3009, 3010, 9991	NE 10th (EB) from 110th to 116th Ave NE	NB	EBTR/EBR/ EBT/WBR	-20.0	-20.0	-2.2	-33.3	-22.2	-53.3	+10.3	+6.6
27	1440, 3015, 9992	110th Ave NE (NB) from NE 6th to 10th St	NB	NBR/NBT	-15.9	-15.9	-60.1	-9.4	-76.0	-25.3	-11.1	-8.0
28	1440, 9992	110th Ave NE (SB) from NE 10th to 6th St	SB	SBR/SBT	-8.0	-8.0	-24.1	-199.4	-32.1	-207.4	+58.1	+30.3
30	3060	Main St (WB) from 110th to 108th Ave	NB	WBR	-7.8	-7.8	+6.3	-5.0	-1.5	-12.8	+2.8	-2.0
31	3065	Main St at 110th Ave (EB)	SB	SBTL	-	-	+0.7	-3.0	+0.7	-3.0	+2.5	+3.5
32	3070	Main St (EB) from 110th to 112th Ave	SB	EBR	-7.7	-7.7	-29.4	-105.1	-37.1	-112.8	-12.3	-4.8
33	3065	Main St (WB) from 112th to 110th Ave	NB	WBR	-7.7	-7.7	+1.7	+0.8	-6.0	-6.9	+1.7	+0.8
34	1475	Main St (EB) from 112th Ave to 116th Ave	SB	EBR	-14.8	-14.8	-5.6	+7.7	-20.3	-7.1	-5.5	+7.7
36.1	1475	116th Ave (NB) at Main St	NB	NBL	-	-	-3.7	-18.8	-3.7	-18.8	+55.3	+0.4
36.2	1475	116th Ave (NB) at Main St	NB	NBL	-	-	-3.8	-21.0	-3.8	-21.0	+1.8	+2.9

S&R Improvement ID	Intersection ID	Location	K Line Direction	Lane Group Direction	Segment Transit TT Change (sec)		Intersection Approach Transit Delay Change (sec)		Total Transit TT Change (sec)		Lane Group GP Delay Change (sec)	
					AM	PM	AM	PM	AM	PM	AM	PM
37.1	3055, 3070, 4000, 9996	112th Ave (NB) from SE 8th St to NE 4th St	NB	NBR	-50.7	-50.7	-24.1	-3.7	-74.8	-54.4	-4.2	+2.7
37.2	3055, 3070, 4000, 9996	112th Ave (NB) from SE 8th St to NE 4th St	NB	NBR	-50.7	-50.7	-37.2	-23.5	-87.9	-74.2	+34.4	+13.1
38.1	3055, 3070, 4000, 9996	112th Ave (SB) from NE 4th St to SE 8th St	SB	SBR	-50.7	-50.7	+3.1	-63.8	-47.6	-114.5	-4.3	-20.1
38.2	3055, 3070, 4000, 9996	112th Ave (SB) from NE 4th St to SE 8th St	SB	SBR	-50.7	-50.7	-3.0	-21.7	-53.7	-72.4	+7.4	+449.8
39	1490	Lake Hills Connector (EB) at SE 8th St	NB	NWR	-	-	-11.9	-0.2	-11.9	-0.2	+6.1	+6.5
40	1490	Lake Hills Connector (WB) at E 8th St	SB	SER	-	-	-25.4	-89.7	-25.4	-89.7	+12.0	+57.9
41	1515	145th Pl SE & Kelsey Creek Rd	NB	EBL	-	-	-22.8	-40.4	-22.8	-40.4	-22.8	-40.4
41	1515	145th Pl SE & Kelsey Creek Rd	SB	SBR	-	-	+6.0	+6.4	+6.0	+6.4	+2.0	+6.4
42	1519	148th Ave SE (SB) at SE Eastgate Way	SB	SBR	-	-	-33.0	-73.2	-33.0	-73.2	-33.0	-73.2
43	1519	SE Eastgate Way (EB) at 148th Ave SE	NB	EBL	-	-	-208.1	-67.8	-208.1	-67.8	-208.1	-67.8
44	1420, 1425	116th Ave NE (SB) from NE 12th to 10th St	SB	SBR	-14.8	-14.8	-1.1	+5.9	-15.9	-8.9	+79.2	+181.2
45	3010, 3015, 9991	NE 10th (WB) from SR-520 to 110th Ave NE	SB	WBT/WBL	-7.7	-7.7	+6.4	-3.4	-1.3	-11.1	+10.6	+18.5
46.1	3035, 3040	108th Ave NE (NB/SB) between NE 4th and 8th St	NB	NBT	-	-	-32.1	-56.3	-32.1	-56.3	-23.6	-68.7
46.1	3035, 3040	108th Ave NE (NB/SB) between NE 4th and 8th St	SB	SBT	-	-	-1.8	-8.7	-1.8	-8.7	-6.9	-17.7
46.2	3035, 3040	108th Ave NE (NB/SB) between NE 4th and 8th St	NB	NBT	-	-	-4.3	-59.1	-4.3	-59.1	-4.1	-59.6
46.2	3035, 3040	108th Ave NE (NB/SB) between NE 4th and 8th St	SB	SBT	-	-	+5.6	+25.3	+5.6	+25.3	+5.6	+25.4

Figure 23 Improvements with Outstanding Traffic Analysis

S&R Improvement ID	Intersection ID	Location	K Line Direction	Notes
Bellevue				
20.4	1415, 1420	116th Ave NE (NB) from NE 10th to 12th St	NB	Preliminary estimates included above. May change based on station placement.
35	3070	Main St (WB) from 116th to 112th Ave NE	NB	-
47	1445	110th Ave NE (NB) at NE 6th St	NB	-
48	1450	110th Ave NE (SB) at NE 4th St	SB	-

7 Recommended Improvements Summary

The project team is recommending 24 standalone conceptual speed and reliability improvements be considered for delivery as part of the overall K Line project. This chapter provides an overview of these speed and reliability improvements.

7.1.1 Summary of Recommended Improvements

The improvements are summarized in **Figure 24**, including the expected change to transit travel time, and the preliminary estimated cost. Additional details on the cost estimation methodology are described in **Section 7.1.3**.

Figure 24 Summary of Recommended Improvements

ID	Location	Description	Transit Travel Time Change (sec)		Cost
			AM	PM	
Kirkland					
1	120th Ave NE through Village at Totem Lake	Curbing adjustments	-73 [NB] -130 [SB]	-130 [NB] -123 [SB]	$400k
3	Totem Lake Blvd, SB at NE 124th St	SB transit approach lane	-14.9	-80.9	$200k
7.1	NE 85th St, EB at 124th Ave NE	Signal coordination for EB	+1.8	-26.6	$200k
11	3rd St, SB at Kirkland Ave	SB bus-only left turn	-45.5	-17.3	$200k
12	6th St S, SB at NE 68th St	SB right-turn-except-bus	-73.9	-44.4	$2.5M
13	108th Ave NE, NB from north of NE 62nd to 68th St	NB BAT lane	-19.5	-31.2	$3.4M
15	108th Ave NE, NB from NE 55th to 60th St	NB BAT lane and new signal at NE 60th St	-17.4	-31.2	$4.6M
49	Central Way, EB from 3rd to 6th St	EB BAT lane	-10.3	-50.2	$300k
50	107th Ln NE	Widen for bus operations	-16.0	-18.0	$300k

ID	Location	Description	Transit Travel Time Change (sec) AM	PM	Cost
Bellevue					
16.2	108th Ave NE, SB at Northup Way	SB bus-only left-turn lane	-5.8	-13.2	$1.6M
17	Northup Way, EB at 116th Ave NE	Add EB right-turn lane	-34.5	-70.9	$1.5M[3]
18.1	116th Ave NE, NB at Northup Way	NB Bus-only left-turn lane	-8.3	-77.8	$1.3M[3]
20.4	116th Ave NE, NB from NE 10th to 12th St	NB BAT lane	-147.0	-89.6	$1.4M
26	NE 10th St, EB from 110th to 116th Ave NE	EB PM peak BAT lane	-22.2	-53.3	$700k
27	110th Ave NE, NB from NE 8th to 10th St	Convert parking to NB BAT lane	-76.0	-25.3	$71k
28	110th Ave NE, SB from NE 10th to 8th St	Convert parking to SB BAT lane	-32.1	-207.4	$746k
32	Main St, EB from 110th to 112th Ave	EB PM peak BAT lane	-37.1	-112.8	$230k
33	Main St, WB from 112th to 110th Ave	WB BAT lane	-6.0	-6.9	$230k
34	Main St, EB from 112th to 116th Ave	EB BAT lane	-20.3	-7.1	$260k
35	Main St, WB from 116th to 112th Ave	WB BAT lane	-27.3	-21.3	$61k
41	145th Pl SE, at Kelsey Creek Rd/24th St	Convert intersection to roundabout	-22.8 [NB] +6.0 [SB]	-40.4 [NB] +6.4 [SB]	$3.5M
45	NE 10th St, WB from SR-520 to 110th Ave NE	WB BAT lane	-1.3	-11.1	$700k
47	110th Ave NE, NB at NE 6th St	NB BAT lane with queue jump	*[To be estimated in design phase]*		$206k

[3] If treatments 17 and 18.1 are implemented together, there would be a savings of approximately $1.0M.

ID	Location	Description	Transit Travel Time Change (sec) AM	PM	Cost
48	110th Ave NE, SB from NE 6th to 4th St	SB BAT lane with queue jump	*[To be estimated in design phase]*		$230k

7.1.2 Travel Time Summary

The estimated travel time for K Line includes the change from speed and reliability improvements and implementation of TSP (both of which reduce run time), as well as reductions in station dwell time through all-door boarding and wider stop spacing (i.e., stop consolidation). The travel time summaries by direction are shown in **Figure 25** (AM Peak) and **Figure 26** (PM Peak), and a breakdown of the savings by jurisdiction is shown in **Figure 27**. These estimates assume implementation of all recommended S&R improvements identified in **Figure 24**. During the design phase, improvements may get modified or eliminated and therefore this estimate could change and the travel time will need to be refined and confirmed during the final design phase.

Figure 25 Travel Time Summary (AM Peak; 2035)

Travel Time	Baseline[1]	K Line	Change	Percent Change
Northbound				
Run Time	69.5 min	58.6 min	-10.9 min	-15.7%
Dwell Time	13.2 min	7.6 min	-5.6 min	-42.5%
Total	**82.7 min**	**66.2 min**	**-16.5 min**	**-19.9%**
Southbound				
Run Time	67.0 min	57.2 min	-9.8 min	-14.7%
Dwell Time	16.8 min	7.6 min	-9.3 min	-55.0%
Total	**83.9 min**	**64.8 min**	**-19.1 min**	**-22.8%**
Roundtrip				
Run Time	136.5 min	115.8 min	-20.7 min	-15.2%
Dwell Time	30.0 min	15.2 min	-14.9 min	-49.5%
Total	**166.5 min**	**131.0 min**	**-35.6 min**	**-21.4%**

[1] The Baseline is a hypothetical scenario where a transit line operates along the entire K Line alignment from Totem Lake Transit Center to Eastgate Park and Ride as a local service.

Figure 26 Travel Time Summary (PM Peak; 2035)

Travel Time	Baseline[1]	K Line	Change	Percent Change
Northbound				
Run Time	72.5 min	58.8 min	-13.7 min	-18.8%
Dwell Time	16.2 min	7.6 min	-8.6 min	-53.2%
Total	**88.7 min**	**66.4 min**	**-22.3 min**	**-25.1%**
Southbound				
Run Time	77.9 min	62.7 min	-15.3 min	-19.6%
Dwell Time	18.5 min	7.6 min	-11.0 min	-59.1%
Total	**96.5 min**	**70.3 min**	**-26.2 min**	**-27.2%**
Roundtrip				
Run Time	150.4 min	121.5 min	-28.9 min	-19.2%
Dwell Time	34.7 min	15.2 min	-19.6 min	-56.3%
Total	**185.2 min**	**136.7 min**	**-48.5 min**	**-26.2%**

[1] The Baseline is a hypothetical scenario where a transit line operates along the entire K Line alignment from Totem Lake Transit Center to Eastgate Park and Ride as a local service.

Figure 27 Travel Time Benefit (2035)

Travel Time Savings Category	Bellevue	Kirkland	Total
AM Peak			
Capital improvements	-7.2	-6.6	-13.9
TSP	-4.0	-2.9	-6.8
Station spacing	-7.6	-7.3	-14.9
Total	**-18.8**	**-16.8**	**-35.6**

Travel Time Savings Category	Bellevue	Kirkland	Total
PM Peak			
Capital improvements	-12.2	-9.2	-21.4
TSP	-4.3	-3.2	-7.5
Station spacing	-9.2	-10.4	-19.6
Total	**-25.7**	**-22.8**	**-48.5**

Note: Values represent roundtrip travel time reduction, in minutes.

The change in dwell time due to stop consolidation was estimated by assuming a baseline dwell time of 20 seconds per station per trip. This number is intended as an average to represent all instances of a bus passing a stop, including times when there are many passengers, when there are few passengers, when the wheelchair ramp is deployed, and also times when the bus passes the stop without stopping due to no passengers getting on or off. To account for the variety of dwell time that is expected at stations with lower ridership, dwell times of 10, 15, and 20 seconds were assumed as an average dwell time per trip for low, moderate, and high ridership stations, respectively. The assumed dwell times per trip for each station are listed in **Figure 28**.

Figure 28 Assumed Dwell Times by Station

Station	Ridership Category	Average Dwell Time per Trip
Totem Lake TC	High	20 sec
120th Ave NE & Village at Totem Lake	Moderate	15 sec
124th Ave NE & NE 120th St	Low	10 sec
124th Ave NE & NE 116th St	Low	10 sec
124th Ave NE & NE 108th Pl	Low	10 sec
124th Ave NE & NE 100th St	Low	10 sec
124th Ave NE & NE 90th St	Low	10 sec
NE 85th St & 122nd Ave NE	Moderate	15 sec
NE 85th St & I-405	Moderate	15 sec
Central Way & 5th St	Moderate	15 sec
3rd St & Park Ln (Kirkland TC)	High	20 sec
6th St S & Kirkland Way	Low	10 sec
6th St S & 5th Ave S	Low	10 sec

Station	Ridership Category	Average Dwell Time per Trip
108th Ave NE & NE 68th St	Moderate	15 sec
108th Ave NE & NE 60th St	Low	10 sec
108th Ave NE & NE 53rd St	Low	10 sec
108th Ave NE & NE 47th St	Low	10 sec
South Kirkland Park & Ride	High	20 sec
Northup Way & NE 30th St	Low	10 sec
Northup Way & 116th Ave NE	Low	10 sec
116th Ave NE & NE 20th St	Low	10 sec
116th Ave NE & NE 12th St	Moderate	15 sec
116th Ave NE & NE 10th St	Moderate	15 sec
NE 10th St & 110th Ave NE	Moderate	15 sec
110th Ave NE & NE 6th St (Bellevue TC)	High	20 sec
Main St & 112th Ave	Moderate	15 sec
116th Ave SE & SE 1st St	Moderate	15 sec
Lake Hills Connector & SE 8th St	Low	10 sec
Lake Hills Connector & 134th Ave SE	Low	10 sec
140th Ave SE & Lake Hills Connector / SE 8th St	Low	10 sec
145th Pl SE & SE 16th St	Low	10 sec
145th Pl SE & SE 22nd St	Low	10 sec
Kelsey Creek Rd & Tyee River Rd	Moderate	15 sec
148th Ave SE & SE Eastgate Way	Low	10 sec
Eastgate Park & Ride	High	20 sec

The benefit of transit signal priority (TSP) was estimated as a reduction of 5% from the baseline run time, which is King County Metro's planning-level estimate of TSP benefits. For example, a baseline run time of 77.9 minutes in the southbound direction during the PM peak is likely to experience savings of approximately 3.9 minutes from TSP. Overall, TSP accounted for approximately 7.5 minutes of run time savings bi-directionally in the PM peak.

7.1.3 Cost Estimation

Planning level cost estimates were developed for the S&R improvements to prepare for funding evaluation during K Line LPA development and the FTA Small Starts Grant application process. The speed and reliability improvement planning level costs were developed using the order of magnitude item descriptions in the RapidRide Expansion Program (RREP) 2018 Corridor Capital Cost Estimate Guidelines (CCCEG). See **Figure 29** for the overall summary of costs. Individual costs are listed above in **Figure 24**.

Figure 29 Cost Summary

Category	Kirkland	Bellevue	Total
Construction Subtotal	$12,100,000	$12,734,000	$24,834,000
General/Soft Cost (50%)	$6,050,000	$6,367,000	$12,417,000
Contingency (40%)	$7,260,000	$7,640,400	$14,900,400
Risk Allocation (10%)	$1,815,000	$1,910,100	$3,725,100
Estimated Cost	**$27,225,000**	**$28,651,500**	**$55,876,500**

The costs were updated from the 2018 costs in the CCCEG to 2024 dollars. Due to inflation and market trends during the intervening years, a more detailed review was undertaken rather than applying a static escalation factor to the 2018 costs. Each item was broken down into its components based on the descriptions, then rolled back up into the order of magnitude items used for this planning level estimate. See **Appendix C – Cost Assumptions** for the detailed breakdown of costs per item.

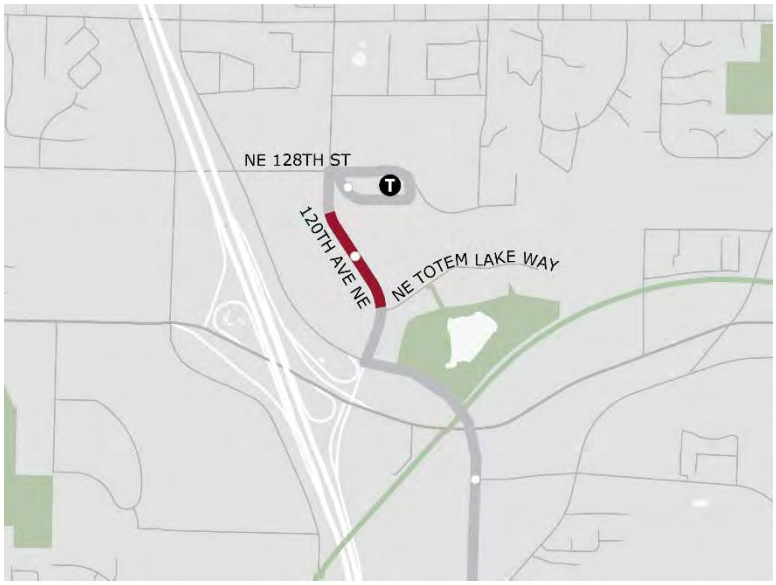
The design team selected unit cost estimates based on historic unit prices (analogous methods), using projects with similar tasks and scopes when possible. The RapidRide I Line, WSDOT Unit Bid Analysis, and recent costs from King County Metro were the primary sources for unit cost data.

In addition to the construction costs for the listed improvements, the estimates include general construction costs such as erosion control, traffic control, and mobilization. Also added in are General/Soft costs which include permitting, engineering design, construction management, and admin staff. Right-of-way acquisition costs were not evaluated at this time. As right-of-way procurement costs are unknown, a Contingencies & Risk Allocation item is added to cover those costs among other unknown costs. All of these additional general and soft costs and contingencies are included as percentages of the total cost.

8 Recommended Improvement Details and Designs

The following pages provide detailed descriptions of each improvement recommended to advance to further design. The summary of each candidate improvement provides the location, description, expected transit travel time benefits, and impacts to traffic. There are also preliminary design concepts that will be refined during the future design phases of project development if the improvement is advanced by King County Metro into final design.

Figure 30 Candidate Improvement 1 Summary

Improvement 1 – Curb changes along 120th Avenue NE	
Jurisdiction	Kirkland
Location	120th Avenue NE in the Village at Totem Lake. 
Details	▪ Adjust curbing to reinforce where cars are meant to park. This includes adding vertical curbs at planters and adding pavement markings (hatching) around curb bulb outs. ▪ Remove select parking spaces to allow for bus stop operations and prevent bus from blocking crosswalks

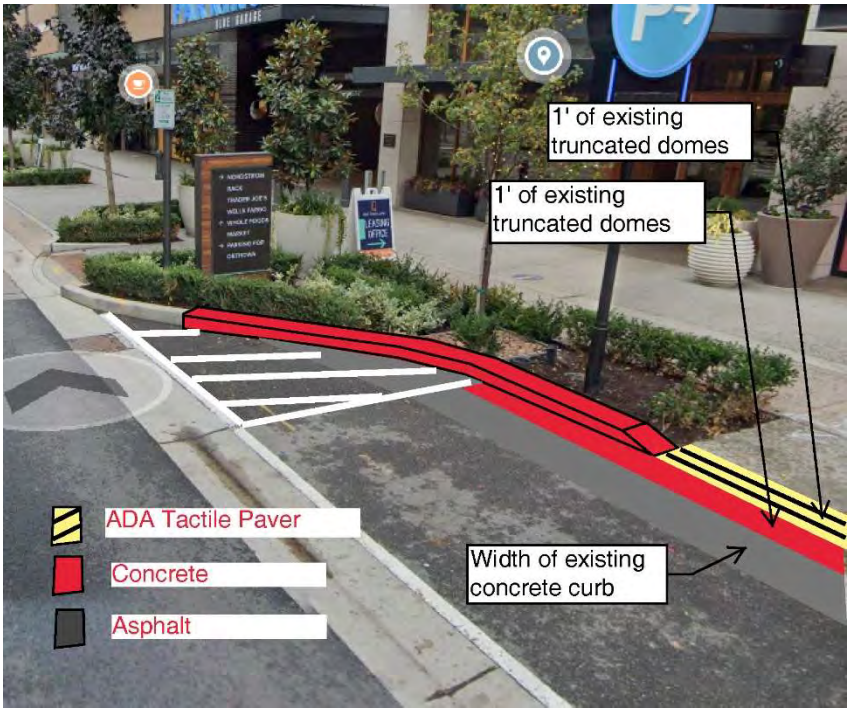
Benefits and Impacts

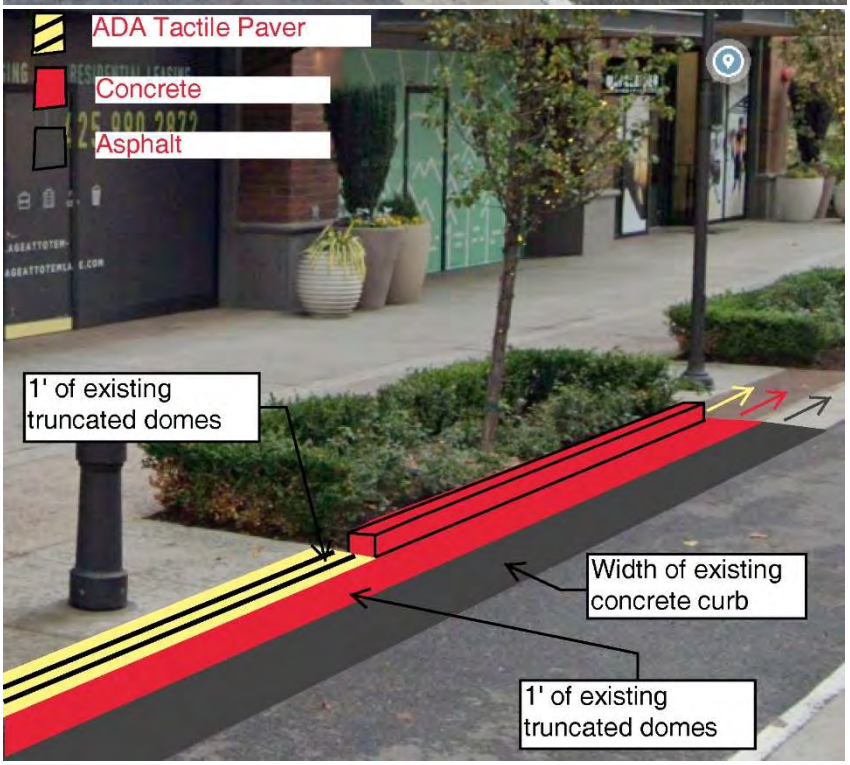
- Would allow buses to resume service to 120th Ave NE and avoid a detour of 1/5 miles northbound, and 4/5 miles southbound.
- Would ensure K Line access to a key destination, The Village at Totem Lake.

Time Period	Future Baseline	Future Build	Change	% Change
Transit travel time [Northbound]				
AM Peak	253 sec	180 sec	-73 sec	-28.9%
PM Peak	380 sec	250 sec	-130 sec	-34.2%
Transit travel time [Southbound]				
AM Peak	310 sec	180 sec	-130 sec	-41.9%
PM Peak	363 sec	240 sec	-123 sec	-33.9%

Figure 31 Candidate Improvement 1 Concept Design

Figure 32 Candidate Improvement 1 Conceptual Sketches

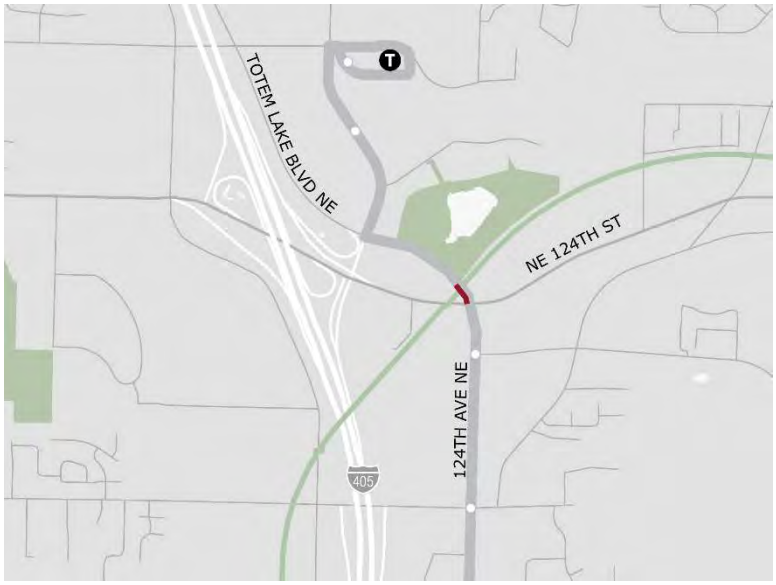




Source: City of Kirkland

Figure 33 Candidate Improvement 3 Summary

Improvement 3 – Bus-only SB approach lane at NE 124th Street	
Jurisdiction	Kirkland
Location	Totem Lake Boulevard, southbound approaching NE 124th Street



Details

- Convert curb lane into a bus-only approach lane.
- Would extend from southbound right-turn slip lane to NE 124th St
- May require widening of lane to address operational challenges of narrow lane. Could be accommodated through use of striped center median or through widening.

Benefits and Impacts (2035)

Time Period	Future Baseline	Future Build	Change	Percent Change
Transit delay				
AM Peak	46.4 sec	31.5 sec	-14.9 sec	-32.1%
PM Peak	179.2 sec	98.3 sec	-80.9 sec	-45.1%
General purpose delay (SBT)				
AM Peak	46.4 sec	90.8 sec	+44.4 sec	+95.7%
PM Peak	179.2 sec	198.1 sec	+18.9 sec	+10.5%

Figure 34 Candidate Improvement 3 Concept Design

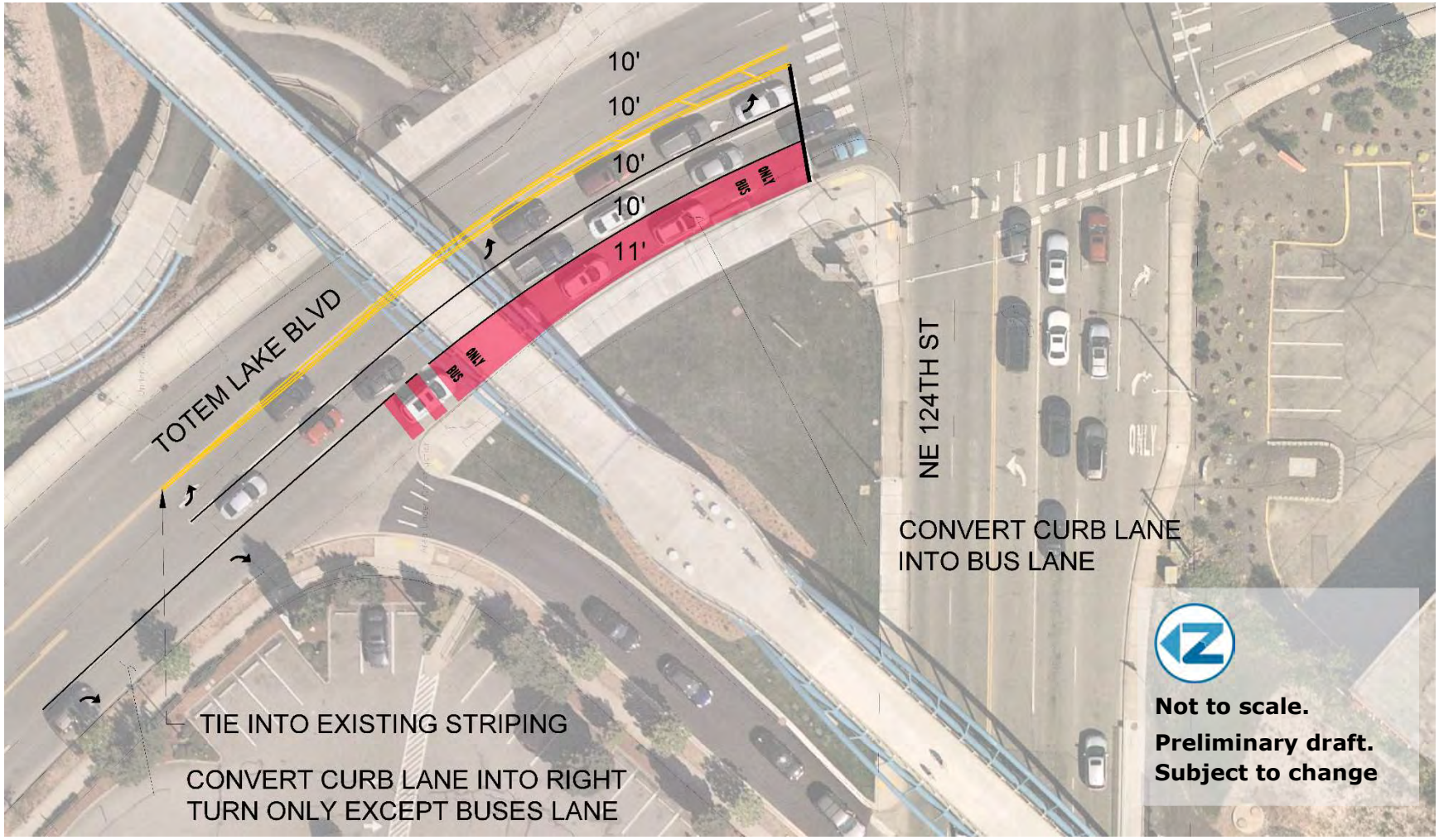
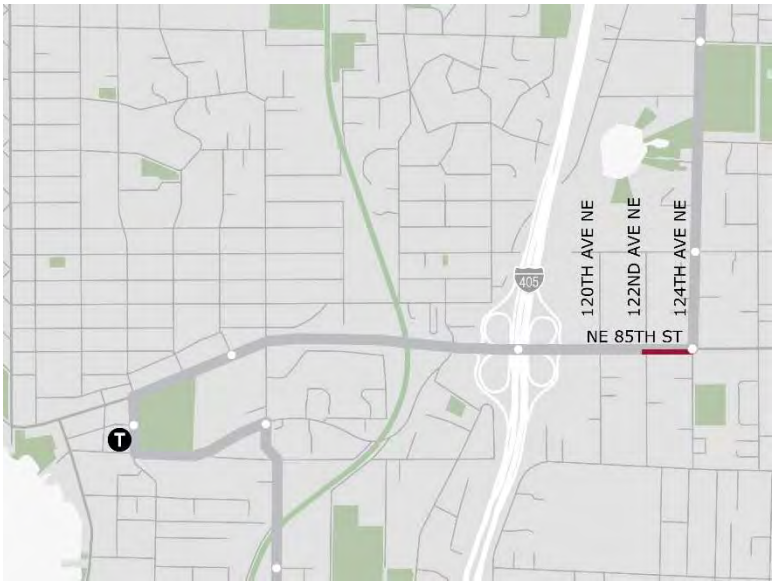


Figure 35 Candidate Improvement 7 Summary

Improvement 7 – Signal coordination on NE 85th Street	
Jurisdiction	Kirkland
Location	NE 85th Street, eastbound from 122nd Avenue NE to 124th Avenue NE



Details

- Implement signal changes at 122nd Avenue NE to allow bus to proceed through intersection during a dedicated signal phase (i.e., queue jump signal) and to move into left-turn lane approaching 124th Avenue NE.
- Approach to 122nd Avenue NE will be shared with right-turning vehicles. For an effective queue jump, right turning vehicles will need to be cleared ahead of transit phase, or to include a right turn phase along with the transit phase.
- Left turn phase will be green as buses approach intersection to facilitate left turn onto 124th Avenue NE.
- The NE 85th Street Station Area Plan envisions a future protected bike lane on this corridor. The design will need to consider the future implementation of those facilities and potential impacts on signal cycles.

Benefits and Impacts (2035)

Time Period	Future Baseline	Future Build	Change	Percent Change
Transit delay				
AM Peak	50.2 sec	52.0 sec	+1.8 sec	+3.6%
PM Peak	101.1 sec	74.5 sec	-26.6 sec	-26.3%
General purpose delay (EBT)				
AM Peak	50.2 sec	60.1 sec	+9.9 sec	+19.7%
PM Peak	101.1 sec	78.3 sec	-22.8 sec	-22.6%

Figure 36 Candidate Improvement 7 Concept Design

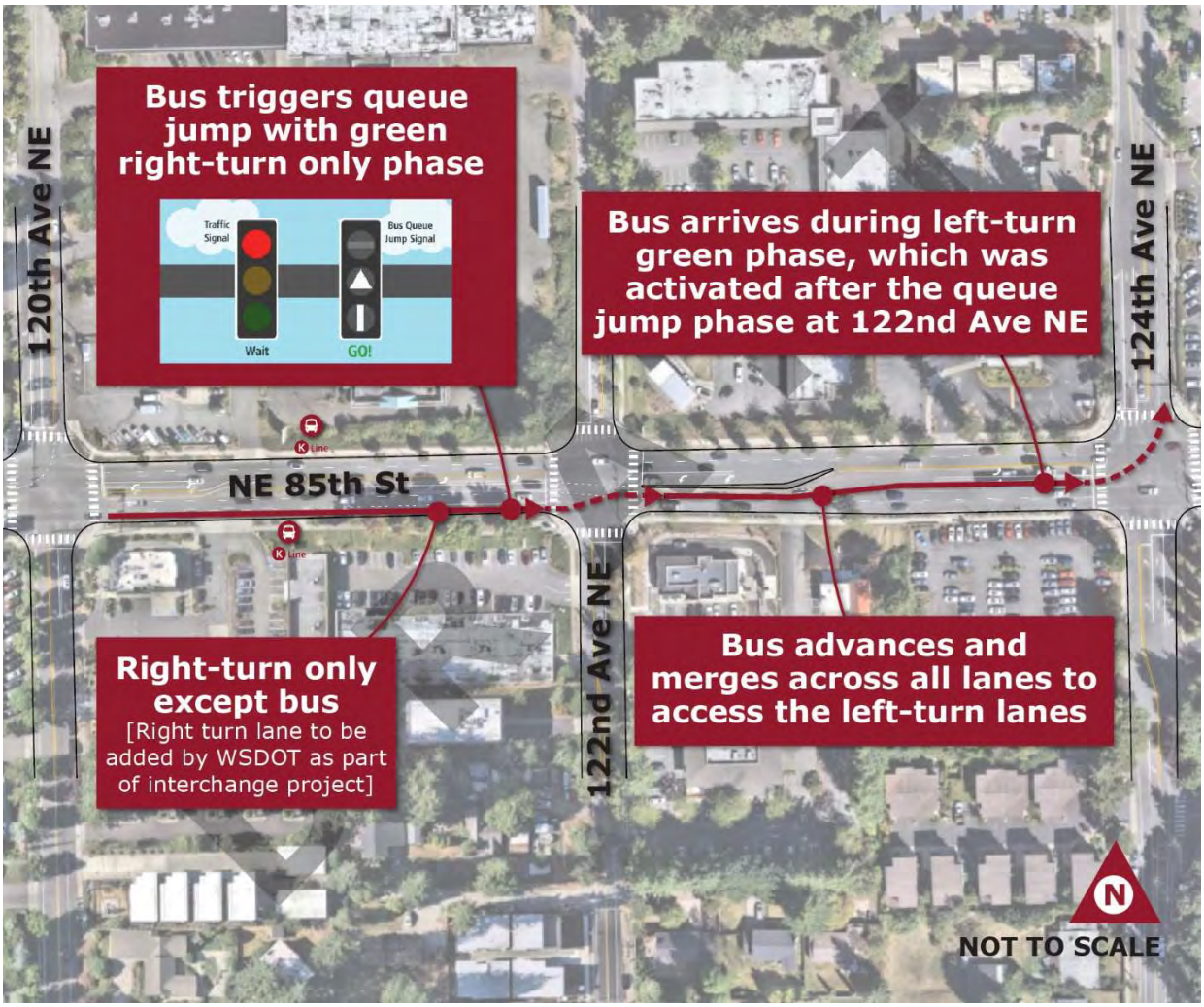
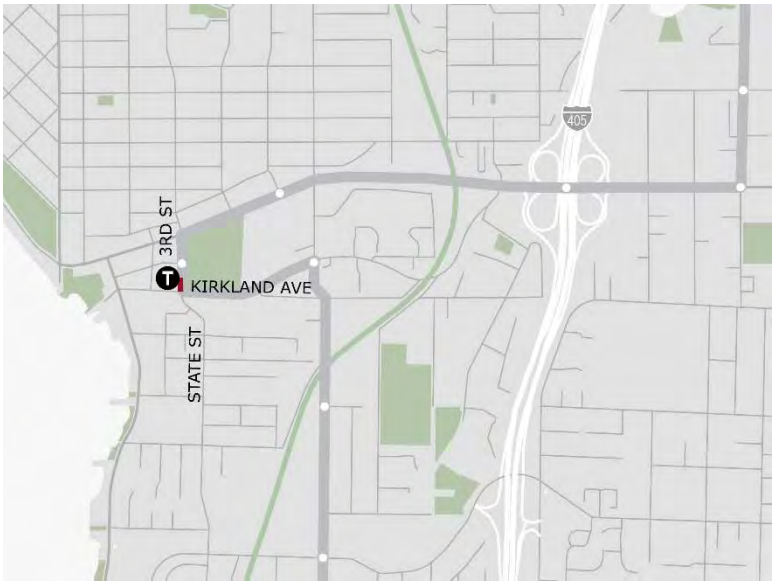


Figure 37 Candidate Improvement 11 Summary

Improvement 11 – Transit-only left-turn lane on 3rd Street at Kirkland Avenue	
Jurisdiction	Kirkland
Location	3rd Street, southbound approaching Kirkland Avenue



Details

- Convert left-turn lane into a bus-only left-turn lane during peak hours.
- See **Appendix D – Kirkland Avenue at 3rd Street Impact Report** for analysis and impacts of this improvement.

Benefits and Impacts (2035)

Time Period	Future Baseline	Future Build	Change	Percent Change
Transit delay				
AM Peak	79.7 sec	34.2 sec	-45.5 sec	-57.1%
PM Peak	57.1 sec	39.8 sec	-17.3 sec	-30.3%
General purpose delay (SBTR)				
AM Peak	79.7 sec	28.4 sec	-51.3 sec	-64.4%
PM Peak	57.1 sec	25.3 sec	-31.8 sec	-55.7%

Figure 38 Candidate Improvement 11 Concept Design

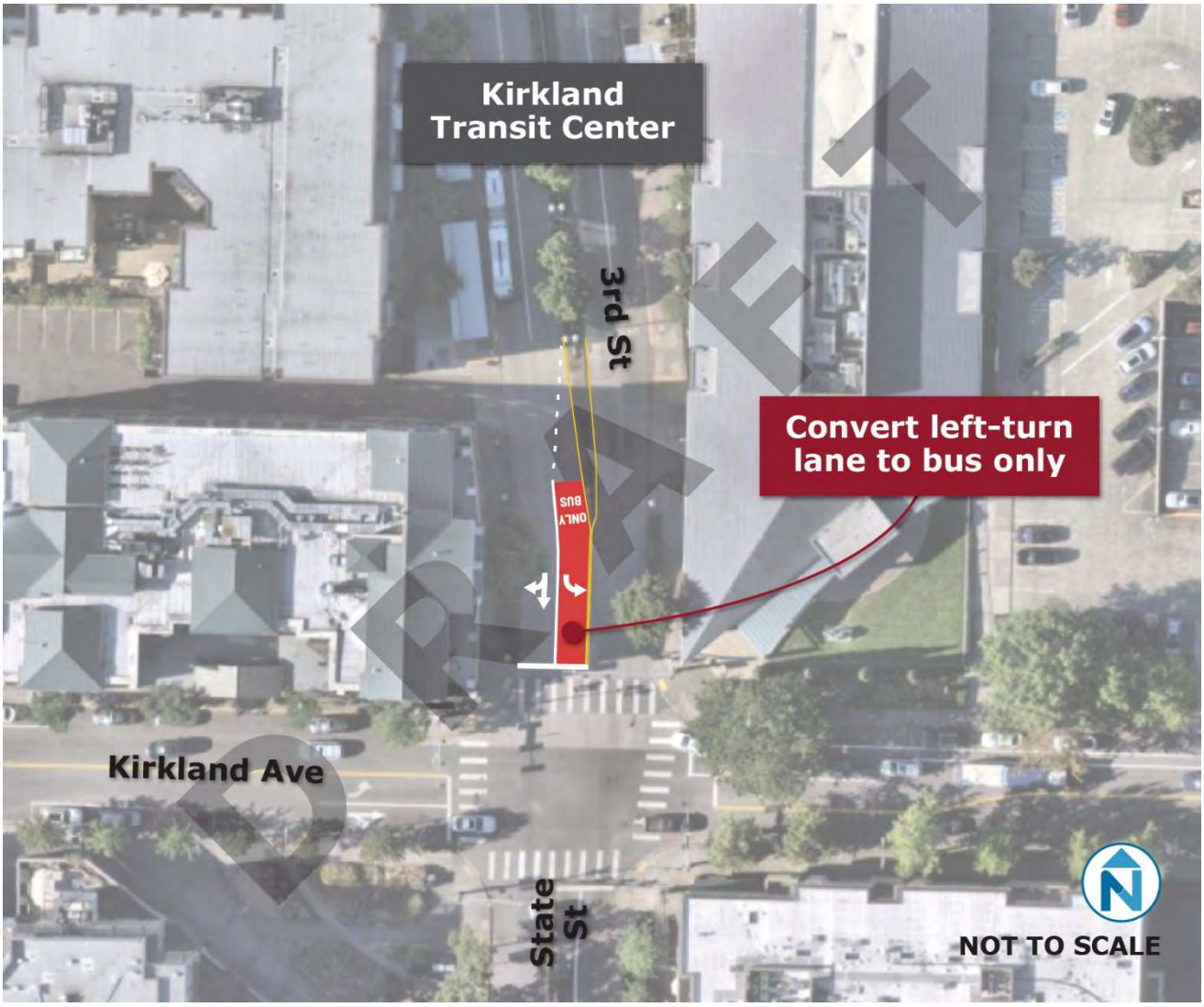
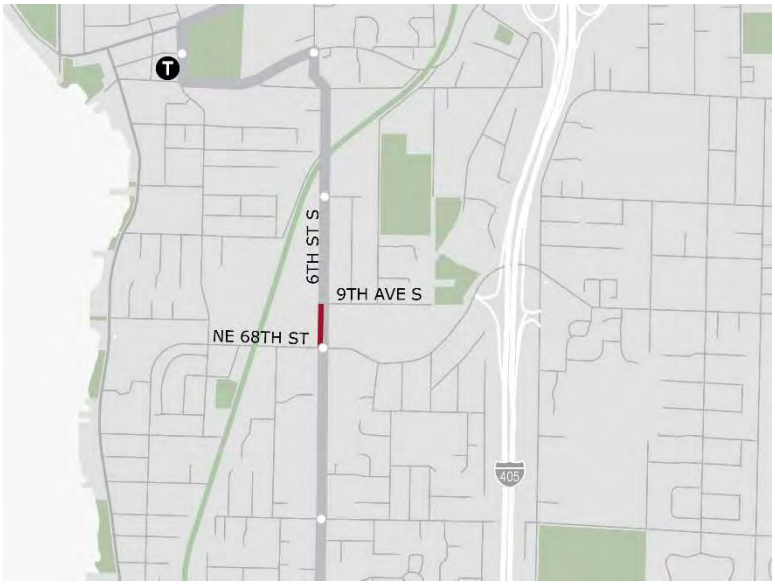


Figure 39 Candidate Improvement 12 Summary

Improvement 12 –BAT lane (9th Avenue S to NE 68th Street)	
Jurisdiction	Kirkland
Location	6th Street S, southbound approaching NE 68th Street



Details

- Add a new southbound BAT lane from 9th Avenue S to NE 68th Street.
- Evaluate impacts of a far-side receiving lane or queue jump.
- Conduct a cost-benefit analysis to determine best alternative for this location.

Benefits and Impacts (2035)

Time Period	Future Baseline	Future Build	Change	Percent Change
Transit delay				
AM Peak	87.6 sec	13.7 sec	-73.9 sec	-84.3%
PM Peak	70.2 sec	25.8 sec	-44.4 sec	-63.2%
General purpose delay (SBT)				
AM Peak	87.6 sec	96.9 sec	+9.3 sec	+10.6%
PM Peak	70.2 sec	77.6 sec	+7.4 sec	+10.5%

Figure 40 Candidate Improvement 13 Summary

Improvement 13 – BAT lane (north of NE 62nd Street to NE 68th Street)	
Jurisdiction	Kirkland
Location	108th Avenue NE, northbound from north of NE 62nd Street to NE 68th Street

Details

- Add a new northbound BAT lane from north of NE 62nd Street to NE 68th Street.
- Evaluate impacts of a far-side receiving lane or queue jump.
- Conduct a cost-benefit analysis to determine best alternative for this location.
- The City of Kirkland advanced this design while the K Line planning process was on pause.

Benefits and Impacts (2035)

Time Period	Future Baseline	Future Build	Change	Percent Change
Transit delay				
AM Peak	35.6 sec	16.1 sec	-19.5 sec	-54.8%
PM Peak	71.5 sec	40.3 sec	-31.2 sec	e
General purpose delay (NBT)				
AM Peak	35.6 sec	37.5 sec	+1.9 sec	+5.3%
PM Peak	71.5 sec	87.1 sec	+15.6 sec	+21.8%

Figure 41 Candidate Improvements 12 and 13 Concept at NE 68th Street

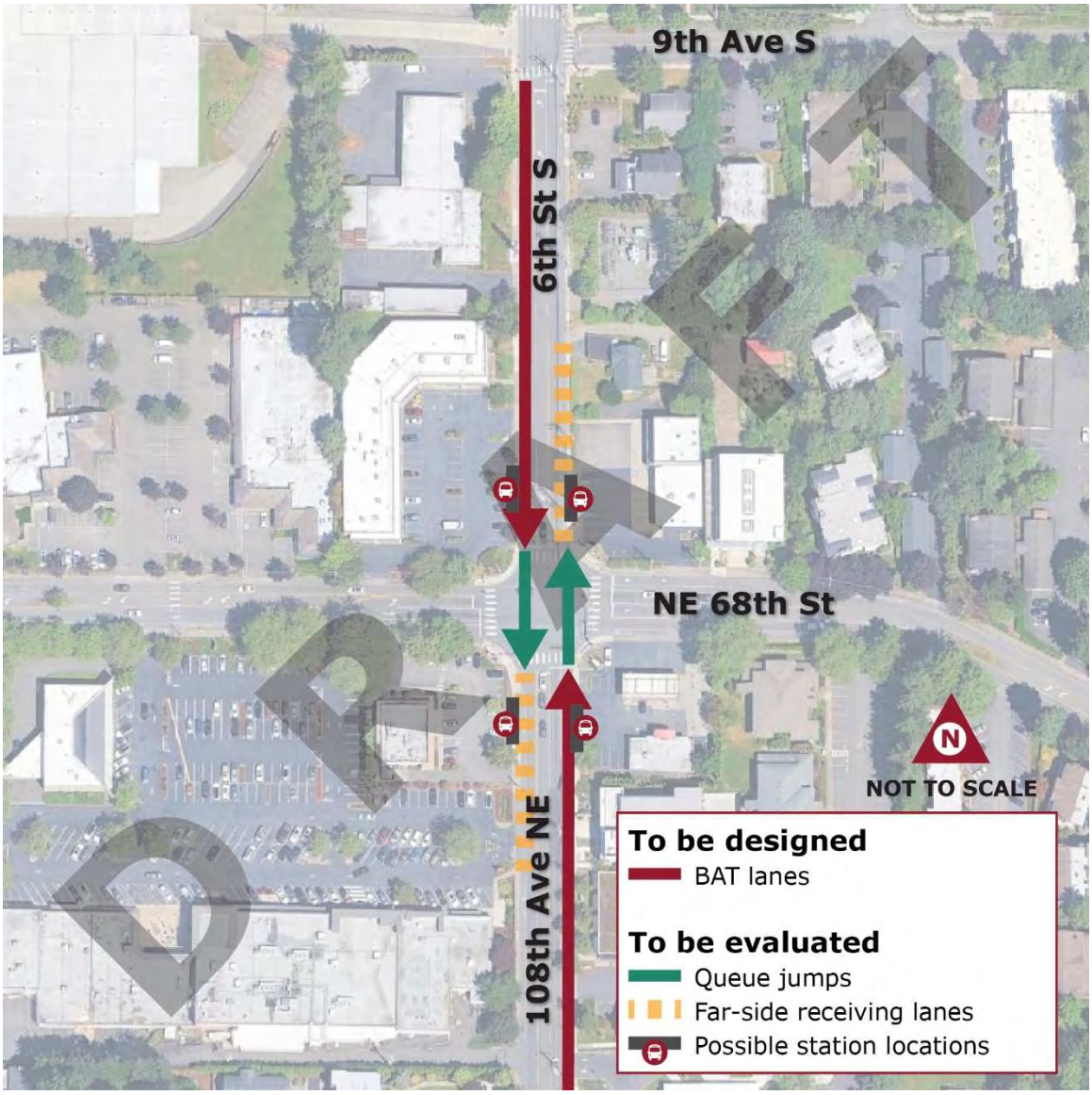


Figure 42 Candidate Improvement 15 Summary

Improvement 15 – BAT lane (NE 55th Street to NE 60th Street)	
Jurisdiction	Kirkland
Location	108th Avenue NE, northbound between NE 55th and NE 60th Streets

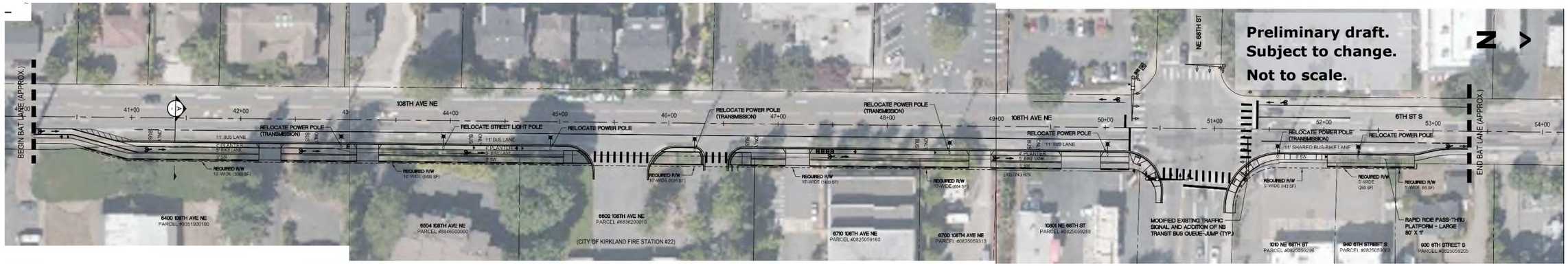
Details

- Widen roadway to add a new northbound BAT lane.
- Add new signal at NE 60th Street.
- The City of Kirkland advanced this design while the K Line planning process was on pause.

Benefits and Impacts (2035)

Time Period	Future Baseline	Future Build	Change	Percent Change
Transit delay				
AM Peak	12.1 sec	-5.3 sec	-17.4 sec	-144.1%
PM Peak	25.6 sec	-5.6 sec	-31.2 sec	-122.0%
General purpose delay (NBT)				
AM Peak	12.1 sec	13.4 sec	+1.3 sec	+10.7%
PM Peak	25.6 sec	21.8 sec	-3.8 sec	-14.8%

Figure 43 Candidate Improvement 13 Concept Design



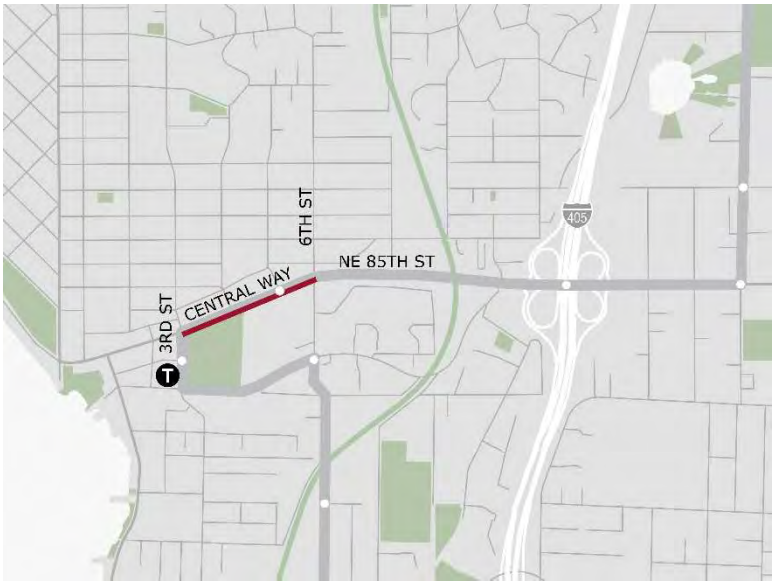
Source: City of Kirkland

Figure 44 Candidate Improvement 15 Concept Design

Source: City of Kirkland

Figure 45 Candidate Improvement 49 Summary

Improvement 49 – EB BAT Lane on Central Way from 3rd Street to 6th Street	
Jurisdiction	Kirkland
Location	Central Way, eastbound from 3rd Street to 6th Street



Details

- Convert parking between 3rd St and Peter Kirk Lane to a shared bus/bike lane.
- Project could be extended further east to 6th St to include converting right through lane into a BAT lane.
- This improvement would replace #9 at Central Way and 6th St
- Additional analysis and design concepts to be considered during the next phase of project development.

Benefits and Impacts

Time Period	Future Baseline	Future Build	Change	% Change
Transit delay				
AM Peak	45.7 sec	35.4 sec	-10.3 sec	-22.6%
PM Peak	76.1 sec	25.9 sec	-50.2 sec	-66.0%
General Purpose Delay				
AM Peak	45.7 sec	70.5 sec	+24.8 sec	+54.3%
PM Peak	76.1 sec	91.3 sec	+15.2 sec	+20.0%

Figure 46 Candidate Improvement 49 Concept Design

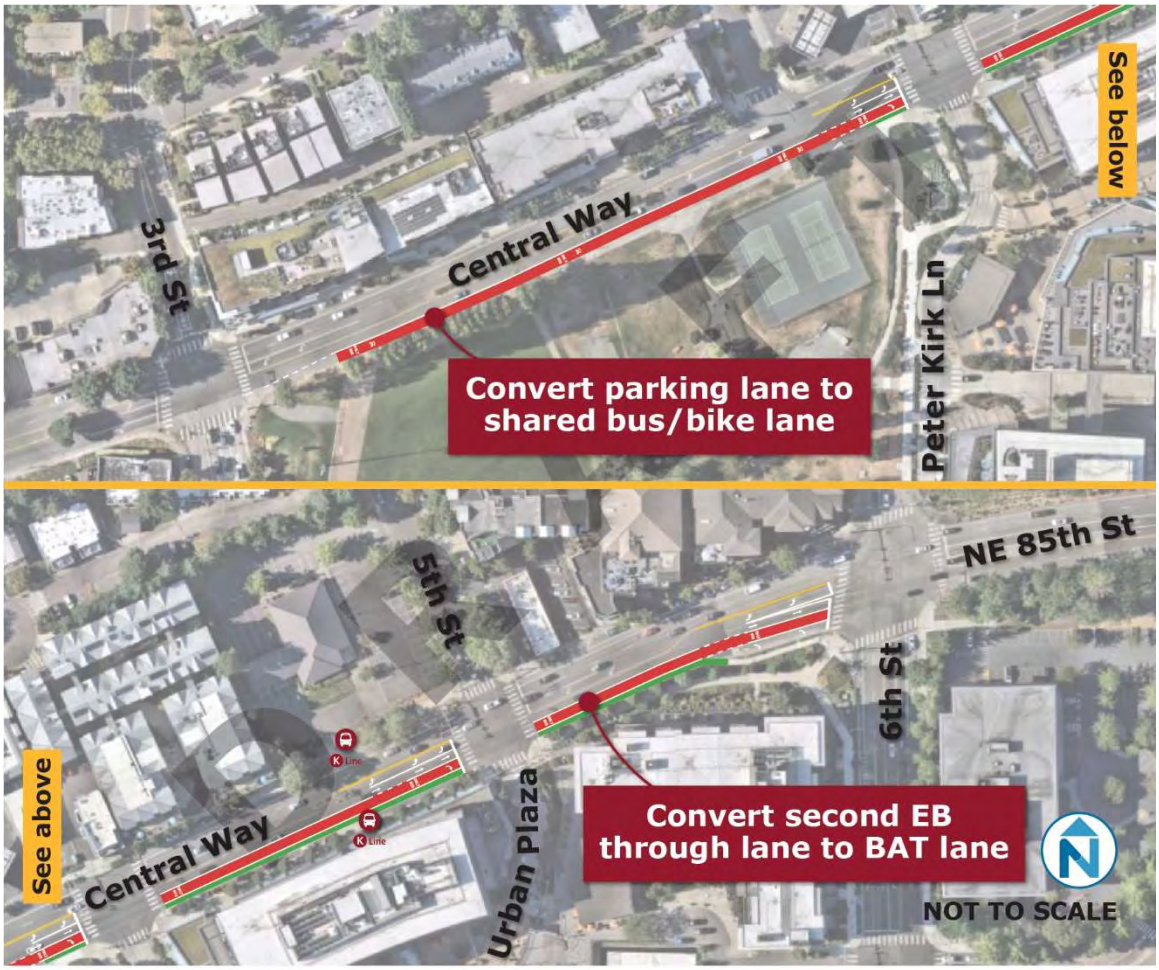
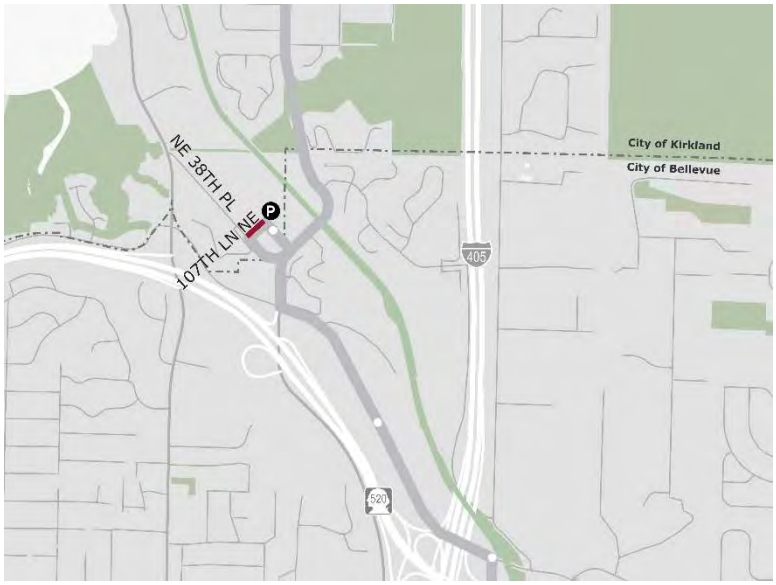


Figure 47 Candidate Improvement 50 Summary

Improvement 50 – NB BAT Lane on 107th Lane NE at South Kirkland Park and Ride	
Jurisdiction	Kirkland
Location	107th Lane NE, from NE 38th Place to NE 37th Court



Details

- 107th Lane NE is a private road owned by King County Metro.
- Widen roadway to allow for two-way bus operations through South Kirkland Park and Ride.
- Widening would permit northbound buses on NE 38th Place to make a right turn onto 107th Lane NE without crossing into oncoming lane.
- Additional analysis and design concepts to be considered during the next phase of project development.

Benefits and Impacts

Time Period	Future Baseline	Future Build	Change	% Change
Transit travel time [Northbound]				
AM Peak	129 sec	113 sec	-16 sec	-12.1%
PM Peak	134 sec	116 sec	-18 sec	-13.6%

Figure 48 Candidate Improvement 50 Concept Design

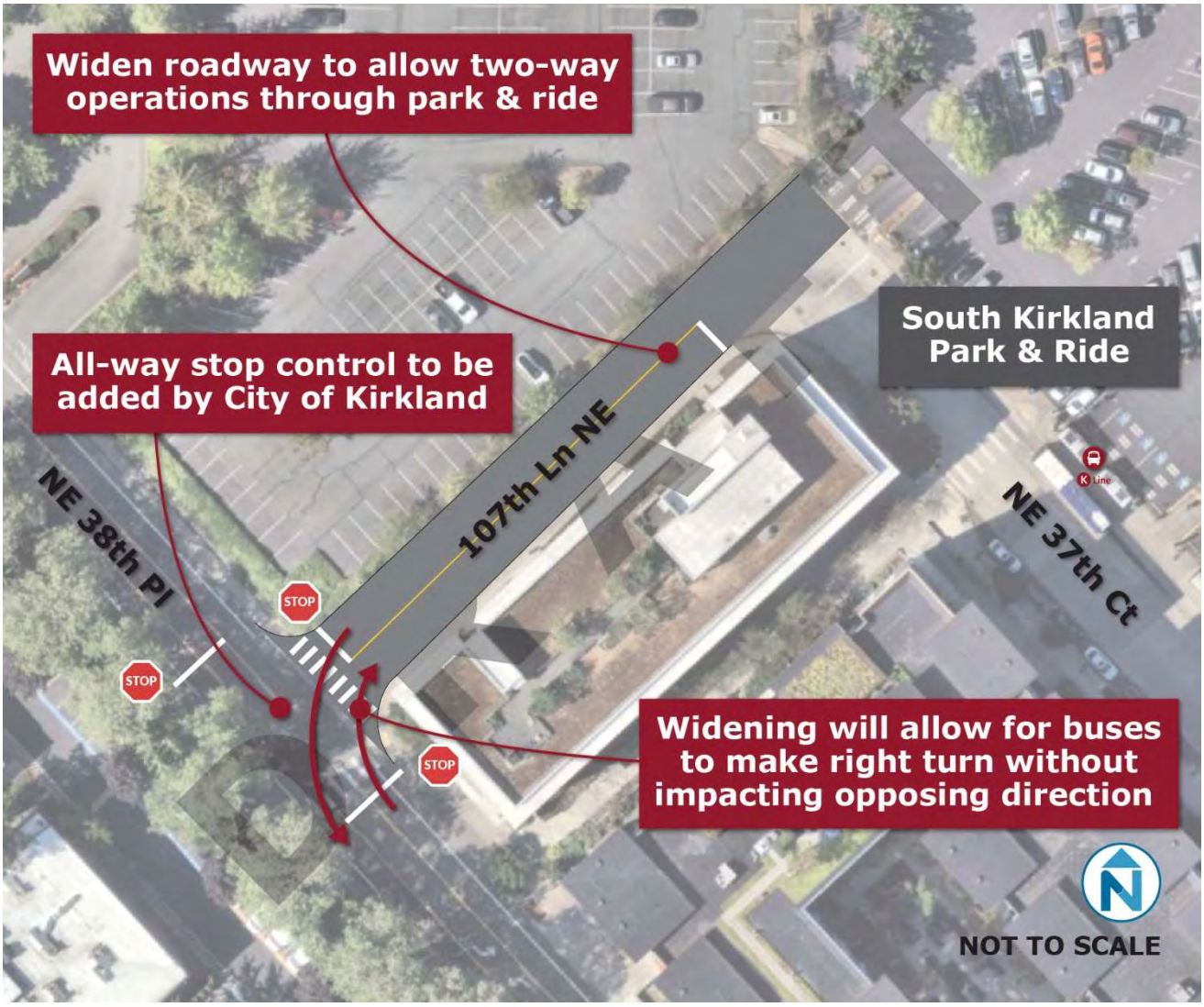
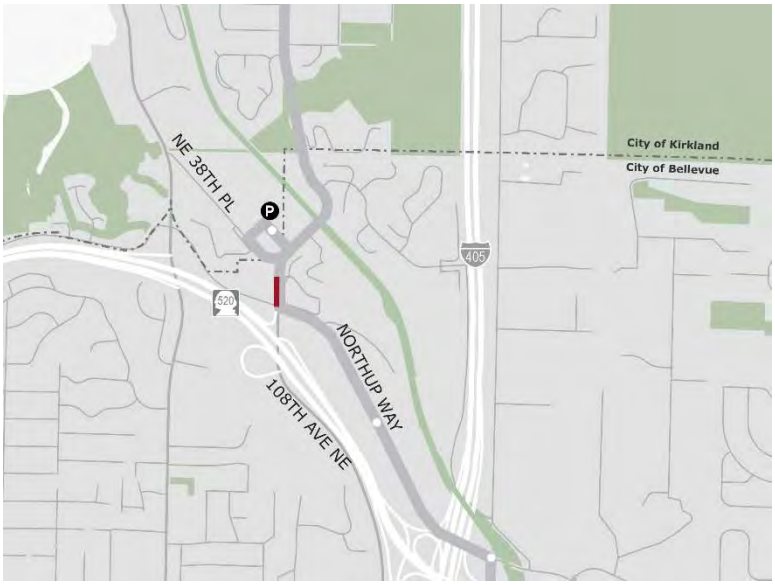


Figure 49 Candidate Improvement 16 Summary

Improvement 16 – SB Bus-only lane on 108th Avenue NE approaching Northrup Way

Jurisdiction	Bellevue
Location	108th Avenue NE, southbound at Northup Way



Details

- Widen roadway to add a new bus-only lane. Can be shared with bikes.
- Special signal phase will allow K Line buses to make left turn onto Northup Way, and for SR-520 buses to proceed through to SR-520.

Benefits and Impacts (2035)

Time Period	Future Baseline	Future Build	Change	Percent Change
Transit delay				
AM Peak	62.5 sec	56.7 sec	-5.8 sec	-9.3%
PM Peak	67.6 sec	54.4 sec	-13.2 sec	-19.5%
General purpose delay (SBT)				
AM Peak	62.5 sec	51.4 sec	-11.1 sec	-17.8%
PM Peak	67.6 sec	71.3 sec	+3.7 sec	+5.5%

Figure 50 Candidate Improvement 16 Concept Design

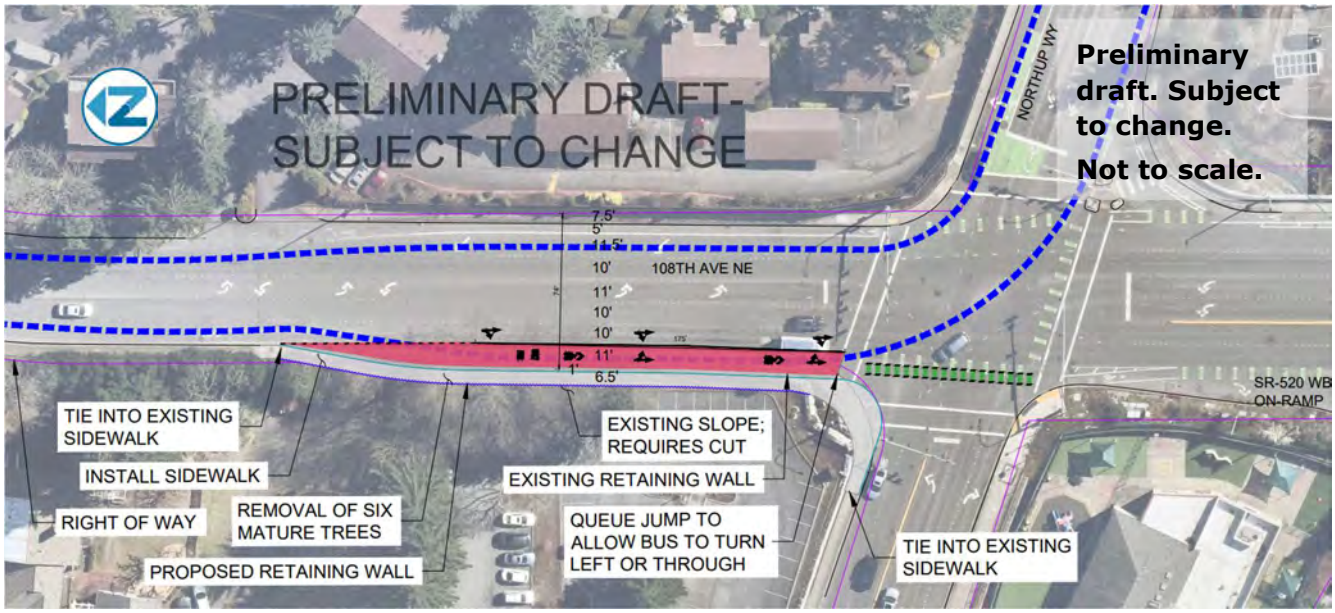
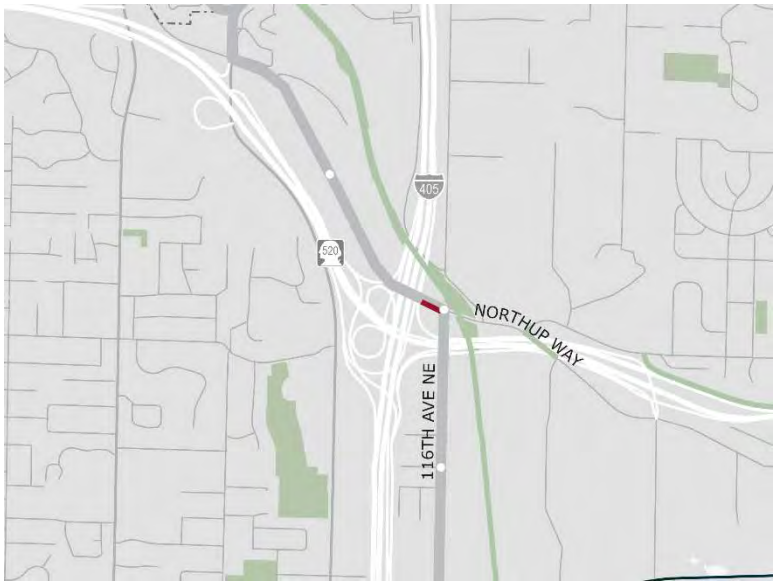


Figure 51 Candidate Improvement 17 Summary

Improvement 17 – Add right-turn lane from Northup Way to 116th Avenue NE	
Jurisdiction	Bellevue
Location	Northup Way, eastbound at 116th Avenue NE



Details

- Widen roadway to add a new right-turn lane that will be used by SB K Line buses turning from Northup Way to 116th Avenue NE.

Benefits and Impacts (2035)

Time Period	Future Baseline	Future Build	Change	Percent Change
Transit delay				
AM Peak	57.2 sec	22.7 sec	-34.5 sec	-60.3%
PM Peak	93.8 sec	22.9 sec	-70.9 sec	-75.6%
General purpose delay (EBT)				
AM Peak	57.2 sec	39.9 sec	-17.3 sec	-30.2%
PM Peak	93.8 sec	28.5 sec	-65.3 sec	-69.6%

Figure 52 Candidate Improvement 17 Concept Design

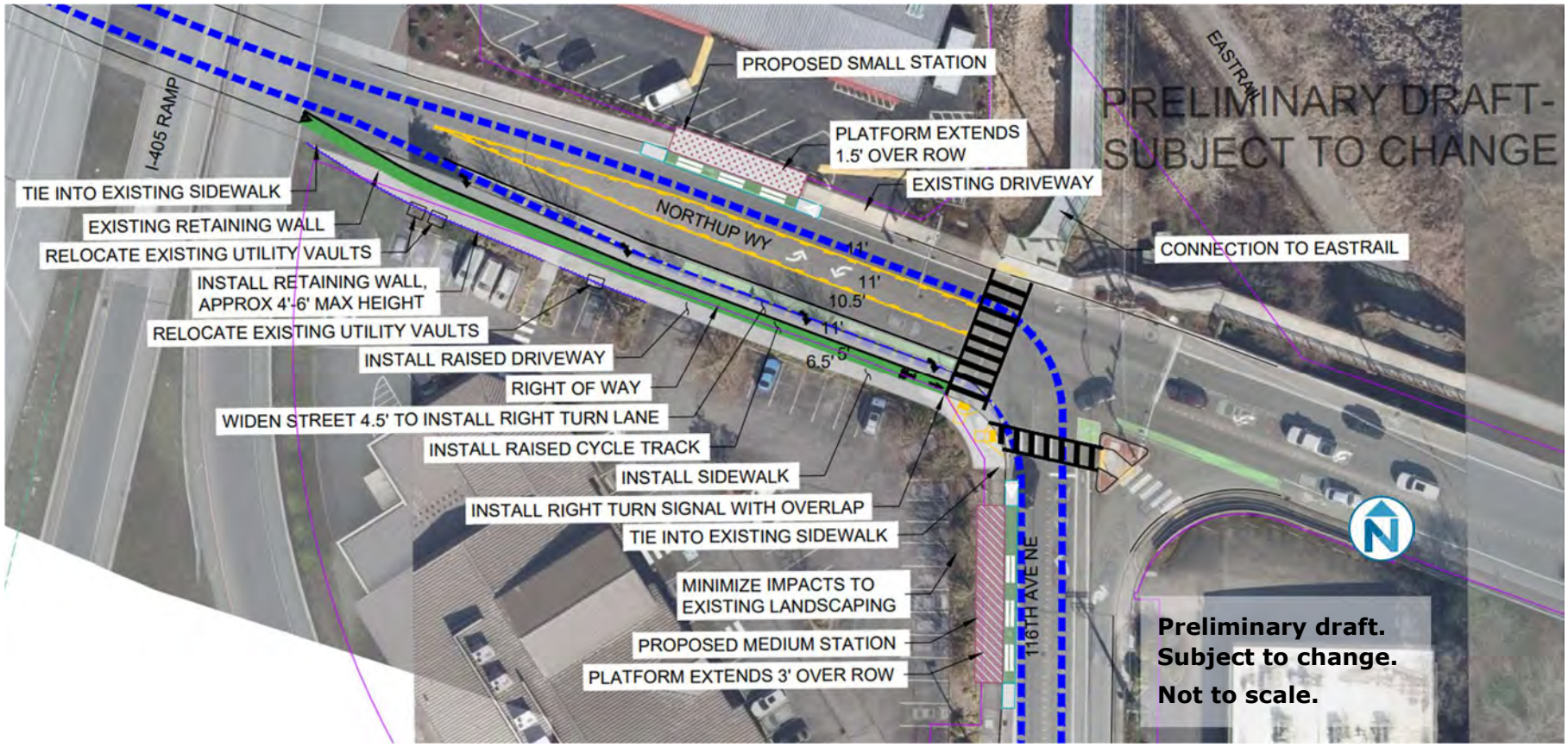
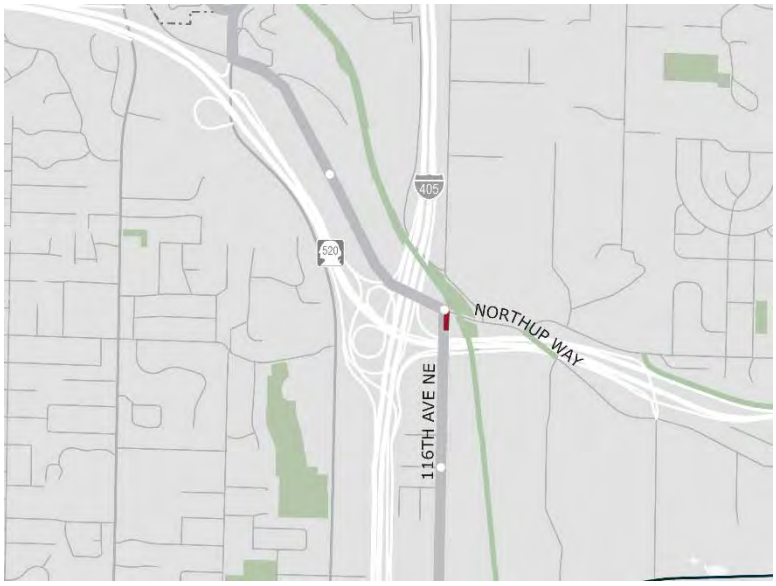


Figure 53 Candidate Improvement 18 Summary

Improvement 18 – NB Bus-only left-turn lane from 116th Avenue NE to Northup Way	
Jurisdiction	Bellevue
Location	116th Avenue NE, northbound at Northup Way



Details

- Reconfigure intersection to add a second northbound left-turn lane for buses only.
- Eliminate two-way left-turn lane on Northup Way to allow for a dedicated bus receiving lane.
- Allow general-purpose and bus left turn at the same time.

Benefits and Impacts (2035)

Time Period	Future Baseline	Future Build	Change	Percent Change
Transit delay				
AM Peak	81.9 sec	73.6 sec	-8.3 sec	-10.1%
PM Peak	111.0 sec	33.2 sec	-77.8 sec	-70.1%
General purpose delay (NBL)				
AM Peak	81.9 sec	72.0 sec	-9.9 sec	-12.1%
PM Peak	111.0 sec	55.4 sec	-55.6 sec	-50.1%

Figure 54 Candidate Improvement 18 Concept Design

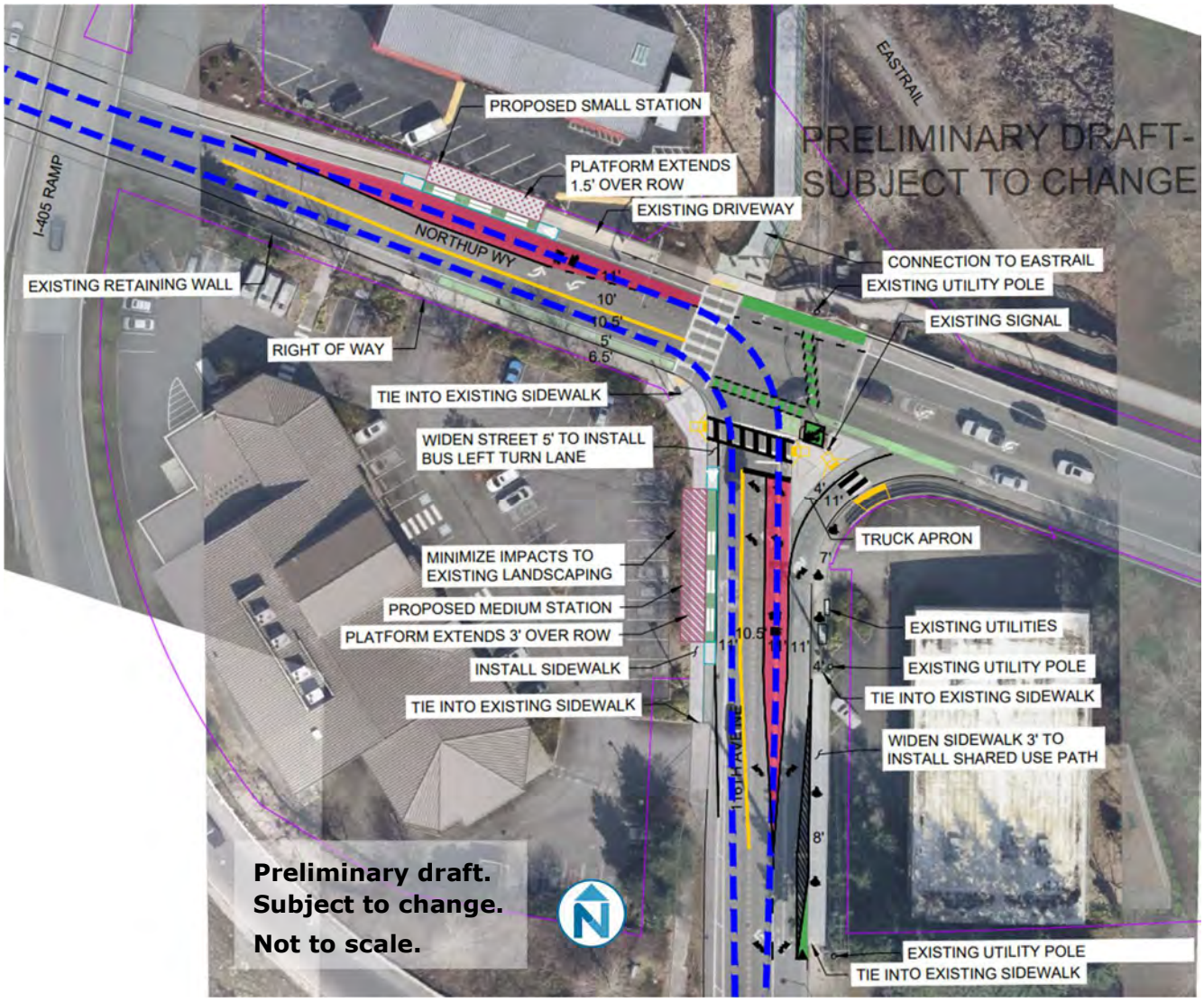


Figure 55 Candidate Improvement 17 and 18 Concept Design

[Concept design showing Improvements 17 and 18 implemented together].

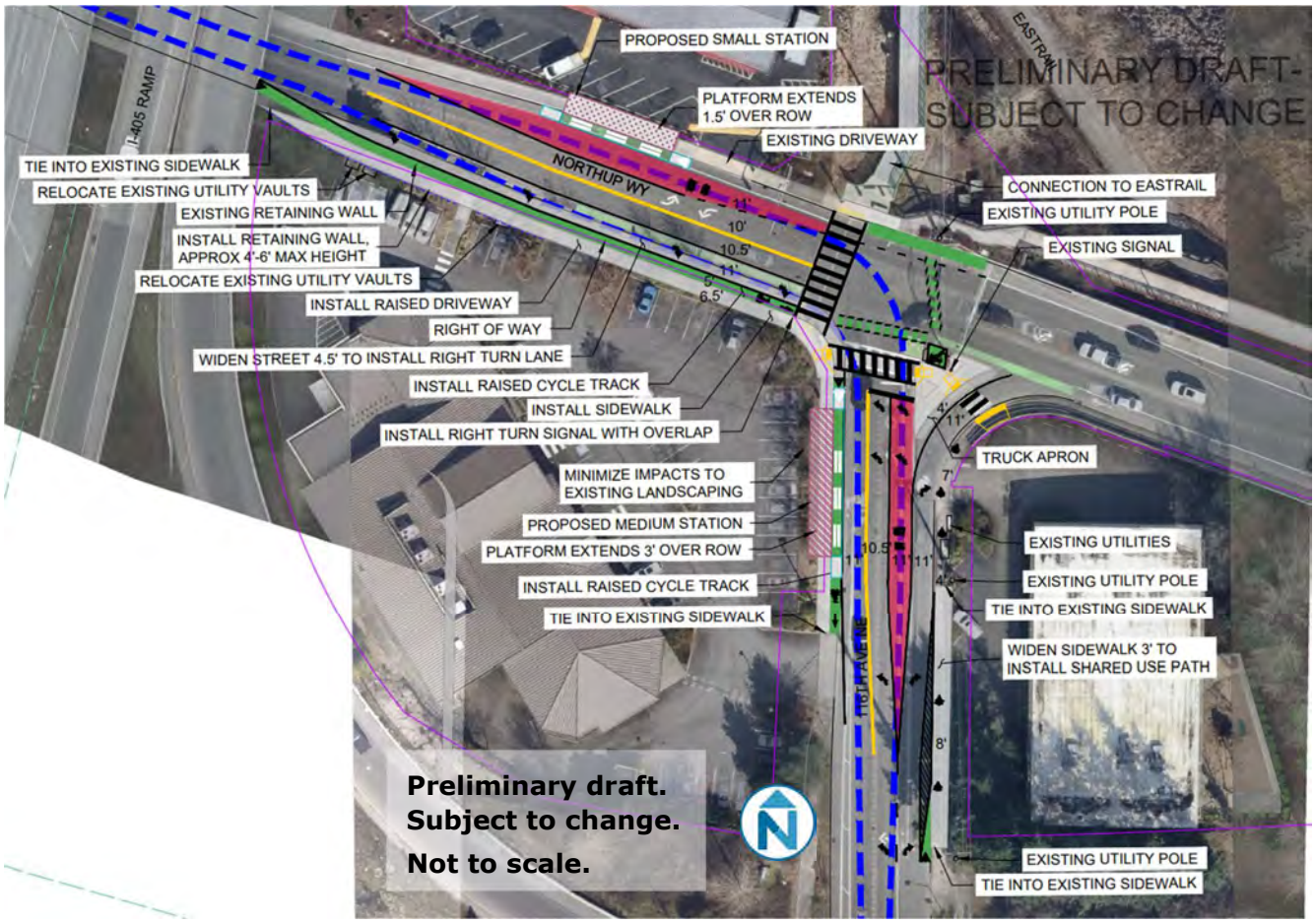


Figure 56 Candidate Improvement 20 Summary

Improvement 20 – NB BAT Lane on 116th Avenue NE	
Jurisdiction	Bellevue
Location	116th Avenue NE, northbound from NE 10th Street to 12th Street

Details

- Convert right through lane north of Felix Terry Swistak Drive into a BAT lane.
- Additional coordination needed for design of BAT lane at NE 12th St to consider future bicycle facilities and station placement.

Benefits and Impacts (2035)

Time Period	Future Baseline	Future Build	Change	Percent Change
Transit delay				
AM Peak	159.5 sec	12.5 sec	-147 sec	-92.2%
PM Peak	99.5 sec	43.0 sec	-56.5 sec	-56.8%
General purpose delay (NBT)				
AM Peak	159.5 sec	206.2 sec	+46.7 sec	+29.3%
PM Peak	99.5 sec	50.8 sec	-48.7 sec	-48.9%

Figure 57 Candidate Improvement 20 Concept Design

Figure 58 Candidate Improvement 26 Summary

Improvement 26 – EB PM Peak BAT Lane from 110th Avenue NE to 116th Avenue NE	
Jurisdiction	Bellevue
Location	NE 10th Street, eastbound from 110th Ave NE to 116th Avenue NE

Details

- Convert second through lane to a BAT lane.
- Would be in effect during PM peak only.

Benefits and Impacts (2035)

Time Period	Future Baseline	Future Build	Change	Percent Change
Transit delay				
AM Peak	20.1 sec	-2.1 sec	-22.2 sec	-110.4%
PM Peak	56.3 sec	3.0 sec	-53.3 sec	-94.7%
General purpose delay (WBT)				
AM Peak	20.1 sec	30.4 sec	+10.3 sec	+51.2%
PM Peak	56.3 sec	62.9 sec	+6.6 sec	+11.7%

Figure 59 Candidate Improvement 26 Concept Design

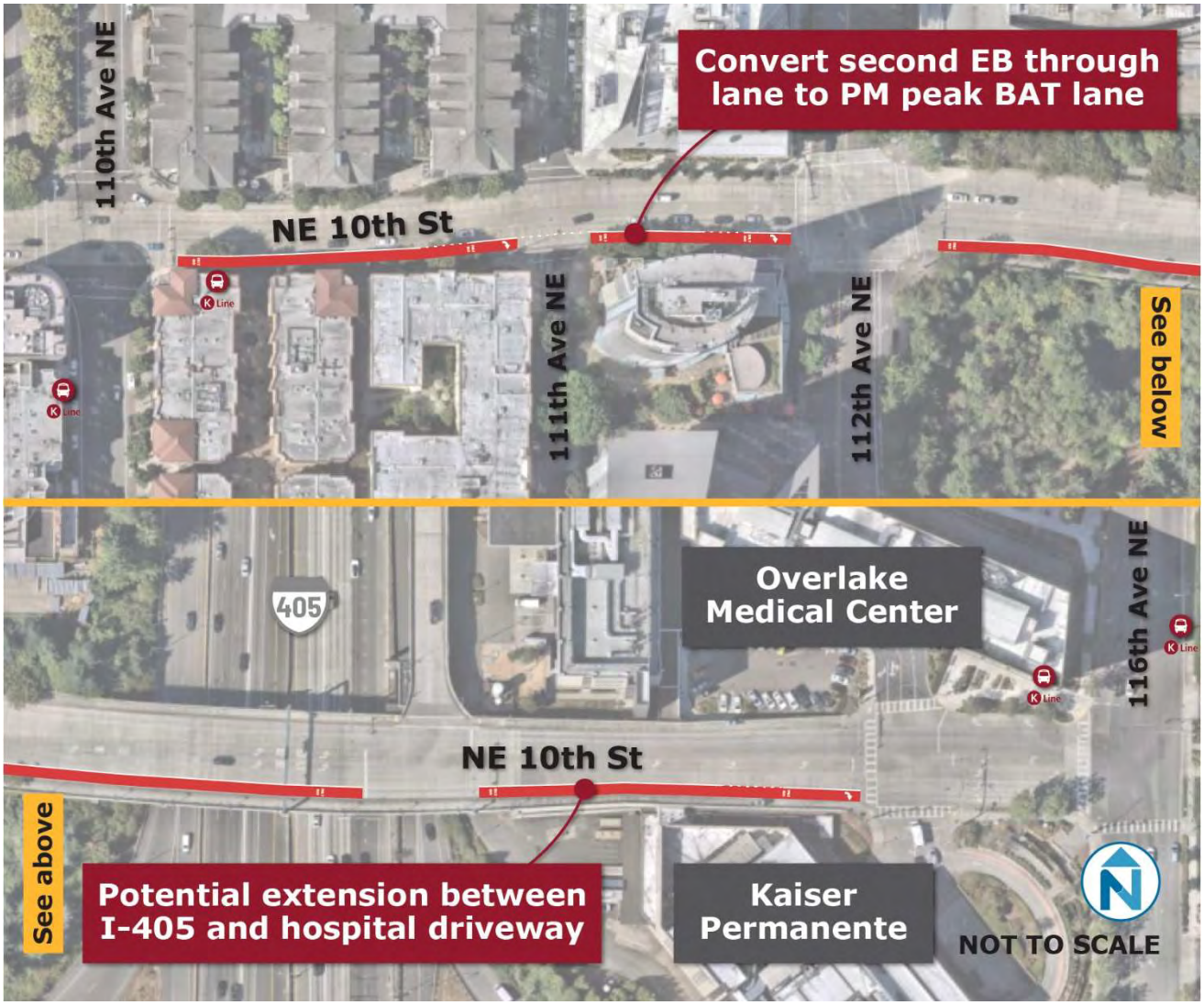


Figure 60 Candidate Improvement 27 Summary

Improvement 27 –NB BAT lane on 110th Avenue NE between NE 8th Street & NE 10th Street	
Jurisdiction	Bellevue
Location	110th Avenue NE, northbound from NE 8th Street to NE 10th Street

Details

- Remove 15 spaces of parking (~300') between NE 8th Street and NE 10th Street and convert to a BAT lane.
- Add a right-turn-except-bus at NE 8th Street.

Benefits and Impacts (2035)

Time Period	Future Baseline	Future Build	Change	Percent Change
Transit delay				
AM Peak	138.3 sec	62.3 sec	-76 sec	-54.9%
PM Peak	88.4 sec	63.1 sec	-25.3 sec	-28.6%
General purpose delay (NBT)				
AM Peak	138.3 sec	127.2 sec	-11.1 sec	-8.0%
PM Peak	88.4 sec	80.4 sec	-8 sec	-9.0%

Figure 61 Candidate Improvement 28 Summary

Improvement 28 – SB BAT Lane on 110th Avenue NE	
Jurisdiction	Bellevue
Location	110th Avenue NE, southbound from NE 10th Street to NE 8th Street

Details

- Remove 11 spaces of parking (~220') between NE 10th Street and NE 8th Street and convert to a BAT lane.
- From NE 8th Street to NE 6th Street, convert right through lane into a transit-approach lane.
- Install sidewalk on west side of 110th Ave NE between NE 8th St and NE 7th St.

Benefits and Impacts (2035)

Time Period	Future Baseline	Future Build	Change	Percent Change
Transit delay				
AM Peak	100.5 sec	68.4 sec	-32.1 sec	-32.0%
PM Peak	212.7 sec	31.9 sec	-180.8 sec	-85.0%
General purpose delay (SBT)				
AM Peak	100.5 sec	158.6 sec	+58.1 sec	+57.8%
PM Peak	212.7 sec	206.1 sec	-6.6 sec	-3.1%

Figure 62 Candidate Improvements 27 and 28 Concept Design

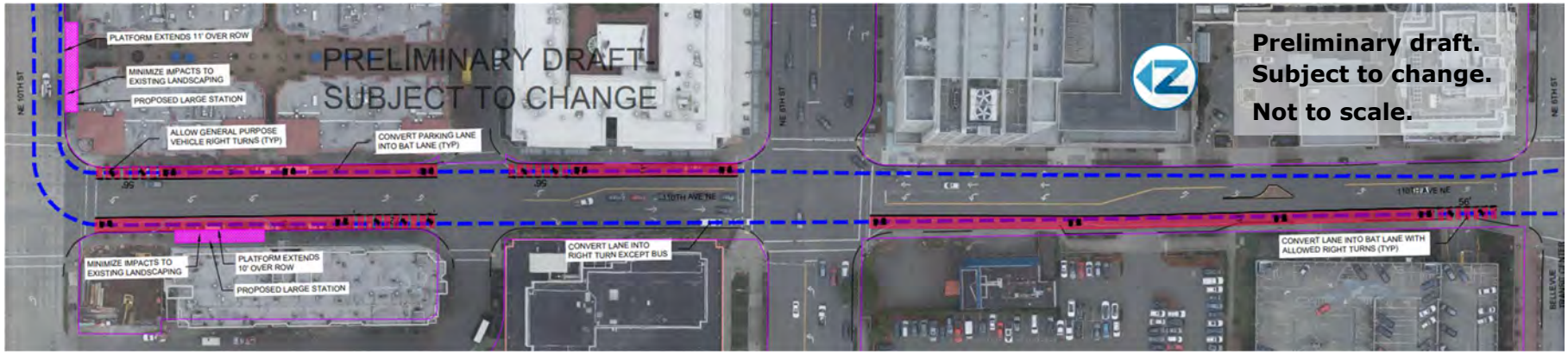


Figure 63 Candidate Improvement 32 Summary

Improvement 32 – EB BAT Lane on Main Street from 110th Avenue to 112th Avenue	
Jurisdiction	Bellevue
Location	Main Street, eastbound from 110th Avenue to 112th Avenue

Details

- Convert right EB through lane into a BAT lane.

Benefits and Impacts (2035)

Time Period	Future Baseline	Future Build	Change	Percent Change
Transit delay				
AM Peak	62.9 sec	25.8 sec	-37.1 sec	-59.0%
PM Peak	215.4 sec	102.6 sec	-112.8 sec	-52.4%
General purpose delay (EBT)				
AM Peak	62.9 sec	50.6 sec	-12.3 sec	-19.6%
PM Peak	215.4 sec	210.6 sec	-4.8 sec	-2.2%

Figure 64 Candidate Improvement 32 Concept Design

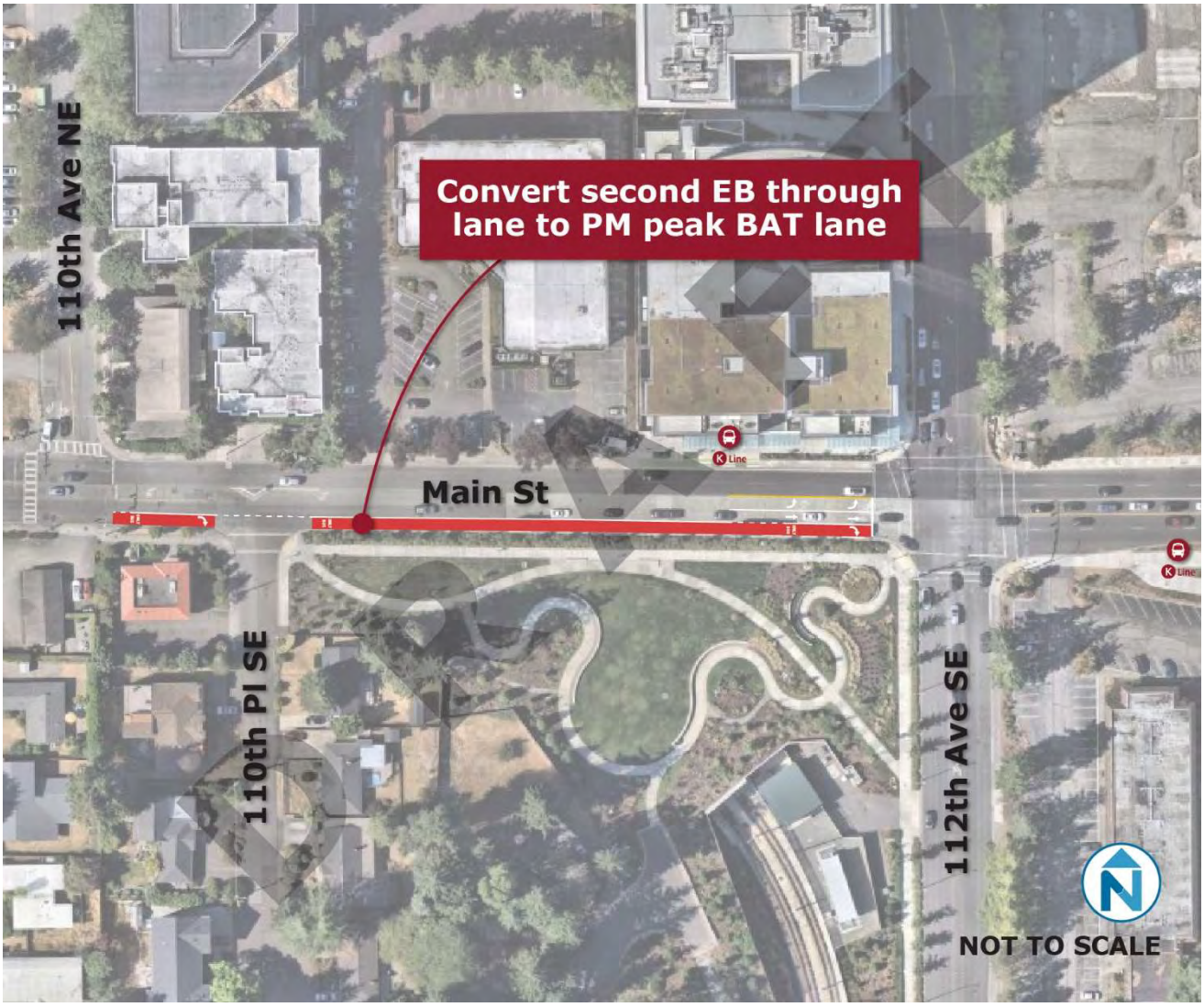


Figure 65 Candidate Improvement 33 Summary

Improvement 33 – WB BAT Lane on Main Street from 112th Avenue to 110th Avenue	
Jurisdiction	Bellevue
Location	Main Street, westbound from 112th Avenue to 110th Avenue

Details

- Convert right through lane to BAT lane.

Benefits and Impacts (2035)

Time Period	Future Baseline	Future Build	Change	Percent Change
Transit delay				
AM Peak	4.5 sec	-1.5 sec	-6 sec	-133.9%
PM Peak	8.6 sec	1.7 sec	-6.9 sec	-80.5%
General purpose delay (WBT)				
AM Peak	4.5 sec	6.2 sec	+1.7 sec	+37.8%
PM Peak	8.6 sec	9.4 sec	+0.8 sec	+9.3%

Figure 66 Candidate Improvement 33 Concept Design

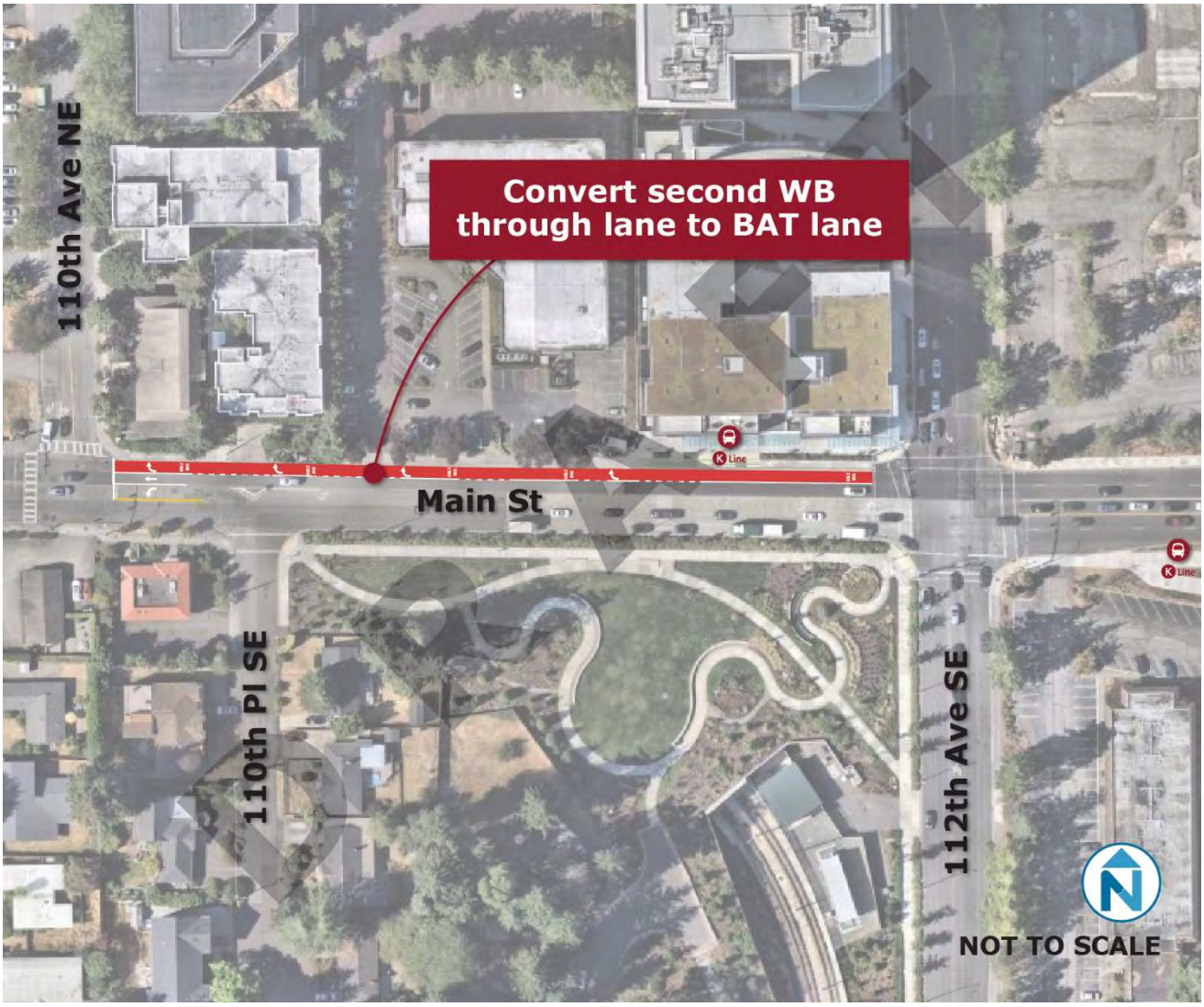


Figure 67 Candidate Improvement 34 Summary

Improvement 34 – EB BAT Lane on Main Street from 112th Avenue to 116th Avenue	
Jurisdiction	Bellevue
Location	Main Street, eastbound from 112th Avenue to 116th Avenue

Details

- Convert EB right through lane to BAT lane.

Benefits and Impacts (2035)

Time Period	Future Baseline	Future Build	Change	Percent Change
Transit delay				
AM Peak	27.3 sec	7.0 sec	-20.3 sec	-74.5%
PM Peak	90.0 sec	82.9 sec	-7.1 sec	-7.9%
General purpose delay (EBR)				
AM Peak	27.3 sec	21.8 sec	-5.5 sec	-20.1%
PM Peak	90.0 sec	97.7 sec	+7.7 sec	+8.6%

Figure 68 Candidate Improvement 34 Concept Design

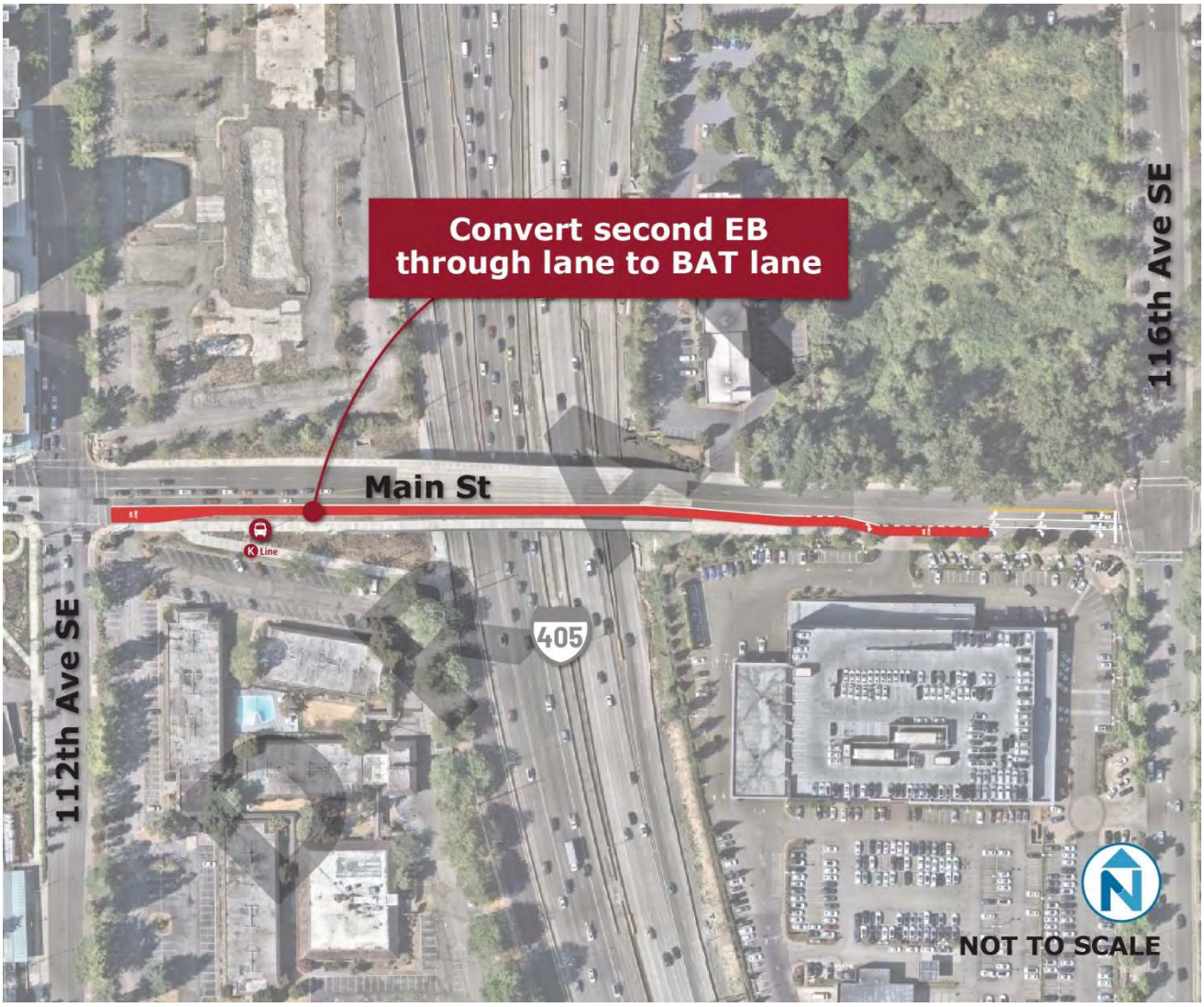


Figure 69 Candidate Improvement 35 Summary

Improvement 35 – WB BAT Lane on Main Street from 116th Avenue to 112th Avenue	
Jurisdiction	Bellevue
Location	Main Street, westbound from 116th Avenue to 112th Avenue

Details

- Convert WB right through lane to BAT lane.

Benefits and Impacts (2035)

Time Period	Future Baseline	Future Build	Change	Percent Change
Transit delay				
AM Peak	50.1 sec	22.8 sec	-27.3 sec	-54.5%
PM Peak	57.6 sec	36.3 sec	-21.3 sec	-37.0%
General purpose delay (WBT)				
AM Peak	50.1 sec	37.6 sec	-12.5 sec	-25.0%
PM Peak	57.6 sec	51.1 sec	-6.5 sec	-11.3%

Figure 70 Candidate Improvement 35 Concept Design

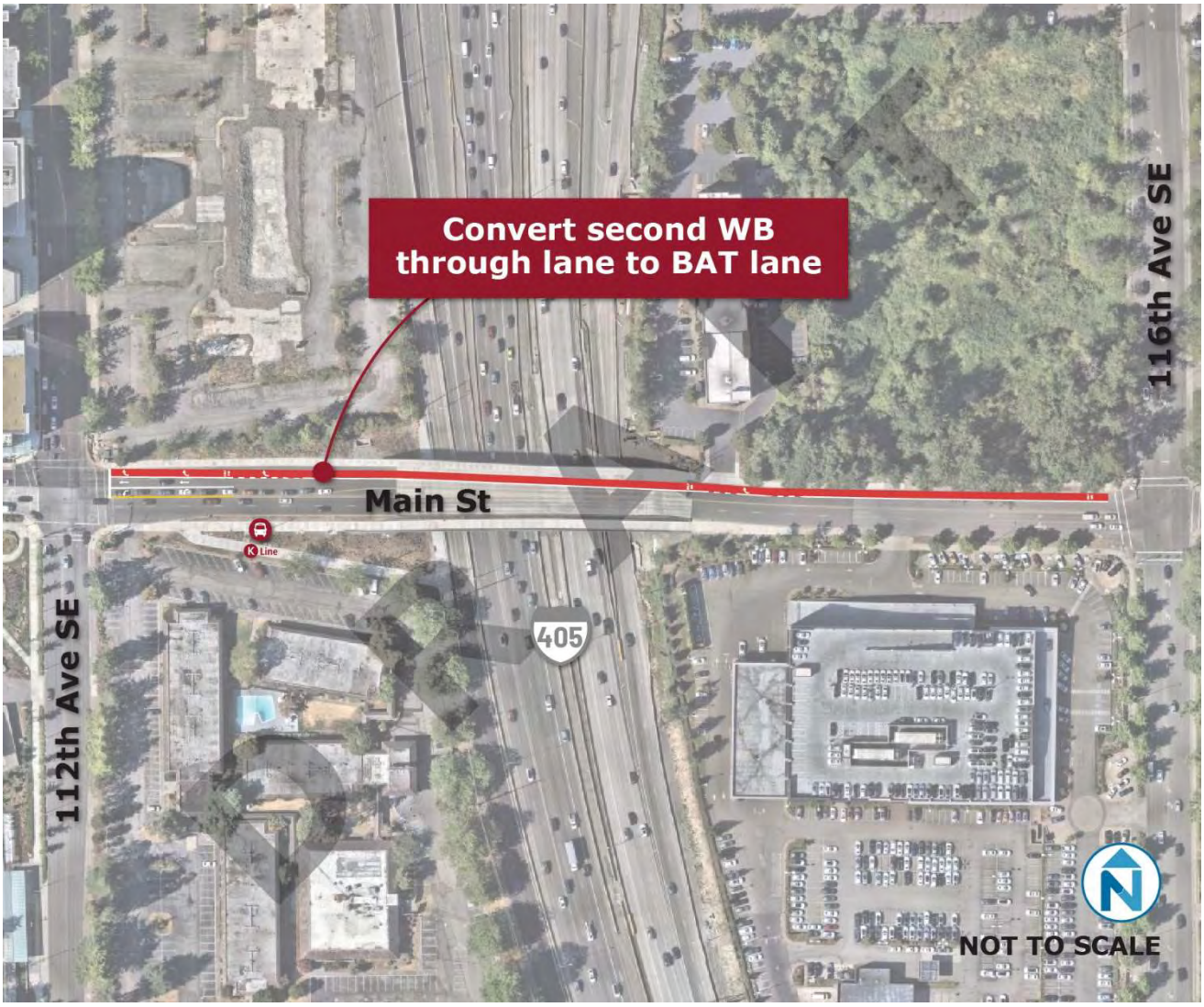
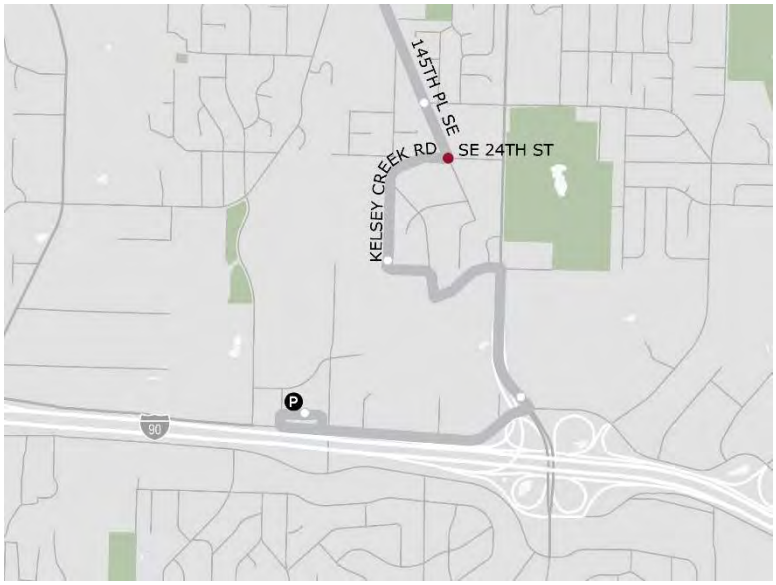


Figure 71 Candidate Improvement 41 Summary

Improvement 41 – Intersection Modifications at 145th Place SE & Kelsey Creek Road	
Jurisdiction	Bellevue
Location	145th Place SE at Kelsey Creek Road/SE 24th Street 
Details	▪ Consider converting intersection to a roundabout or making other changes to intersection to remove split phasing to allow for shorter cycle times. ▪ Other options may include spot widening or restricting left turns. ▪ Additional analysis and design concepts to be considered during the next phase of project development.

Benefits and Impacts (2035)

Time Period	Future Baseline	Future Build	Change	Percent Change
Transit delay (NB)				
AM Peak	25.4 sec	2.6 sec	-22.8 sec	-89.8%
PM Peak	45.0 sec	4.6 sec	-40.4 sec	-89.8%
Transit delay (SB)				
AM Peak	0.3 sec	6.3 sec	+6.0 sec	-
PM Peak	0.1 sec	6.5 sec	+6.4 sec	-
General purpose delay (NBL)				
AM Peak	25.4 sec	2.6 sec	-22.8 sec	-89.8%
PM Peak	45.0 sec	4.6 sec	-40.4 sec	-89.8%
General purpose delay (SBR)				
AM Peak	0.3 sec	2.3 sec	+2.0 sec	-
PM Peak	0.1 sec	6.5 sec	+6.4 sec	-

Figure 72 Candidate Improvement 45 Summary

Improvement 45 – WB BAT Lane on NE 10th Street between SR-520 on-ramp and 112th Avenue NE	
Jurisdiction	Bellevue
Location	NE 10th Street, westbound from SR-520 on-ramp to 112th Avenue NE

Details

- Convert right through lane to BAT lane from SR-520 on-ramp to 112th Avenue NE.

Benefits and Impacts (2035)

Time Period	Future Baseline	Future Build	Change	Percent Change
Transit delay				
AM Peak	19.4 sec	18.1 sec	-1.3 sec	-6.8%
PM Peak	31.5 sec	20.4 sec	-11.1 sec	-35.3%
General purpose delay (WBT)				
AM Peak	19.4 sec	30.0 sec	+10.6 sec	+54.6%
PM Peak	31.5 sec	50.0 sec	+18.5 sec	+58.7%

Figure 73 Candidate Improvement 45 Design Concept

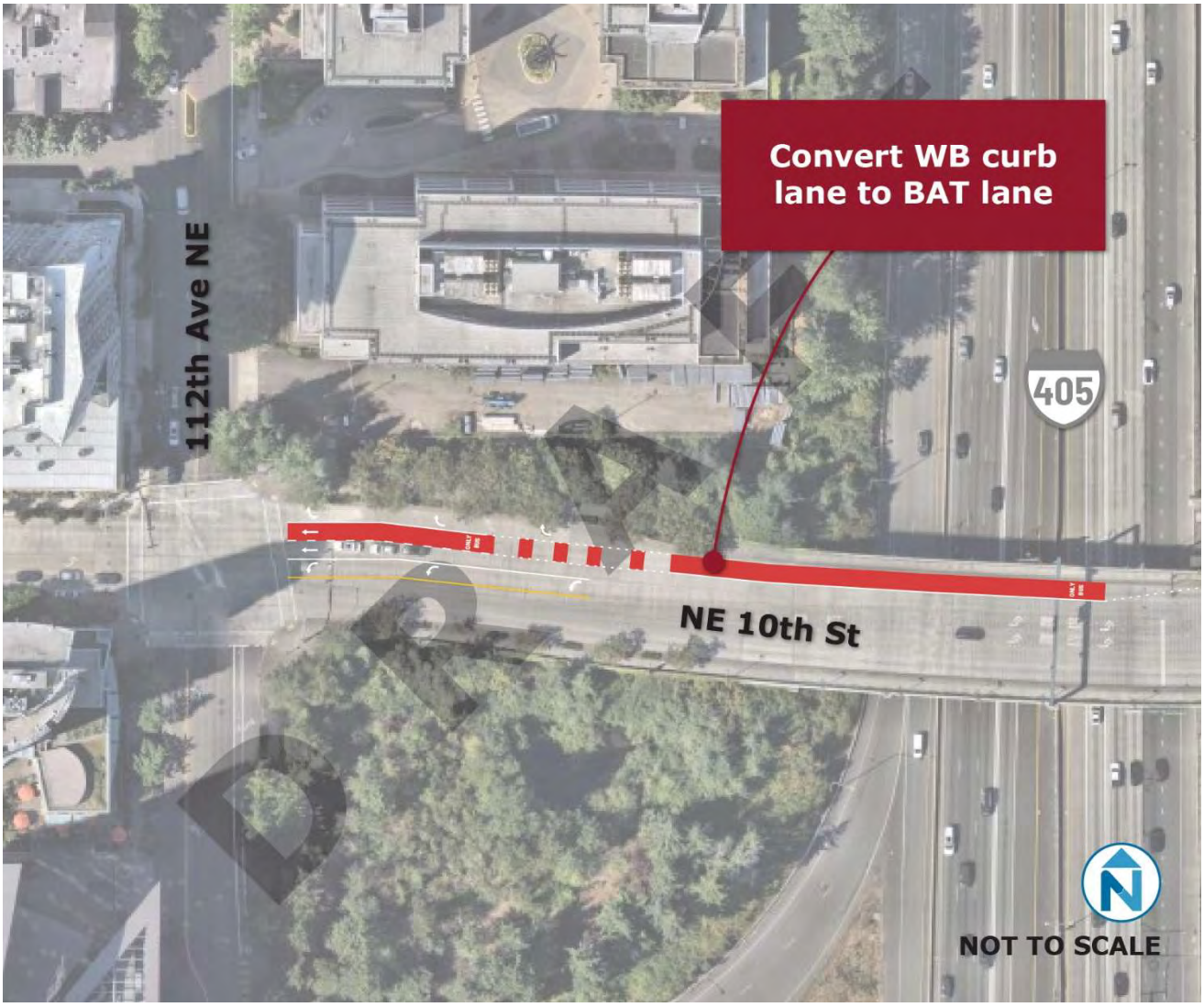


Figure 74 Candidate Improvement 47 Summary

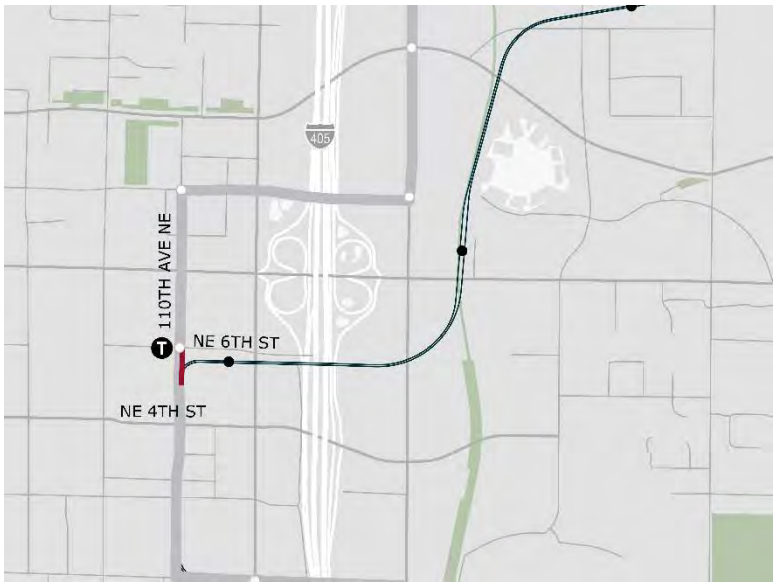
Improvement 47 – NB BAT Lane with Queue Jump Signal on 110th Avenue NE at NE 6th Street	
Jurisdiction	Bellevue
Location	110th Avenue NE, northbound at NE 6th Street 
Details	▪ Replace parking and buffer space with bus lane or extended turn lane. ▪ Use queue jump to proceed across NE 6th St intersection into receiving lane. ▪ Final design should be coordinated with the station design at this location.
Benefits and Impacts	*Traffic analysis to be conducted during design phase.*

Figure 75 Candidate Improvement 47 Concept Design

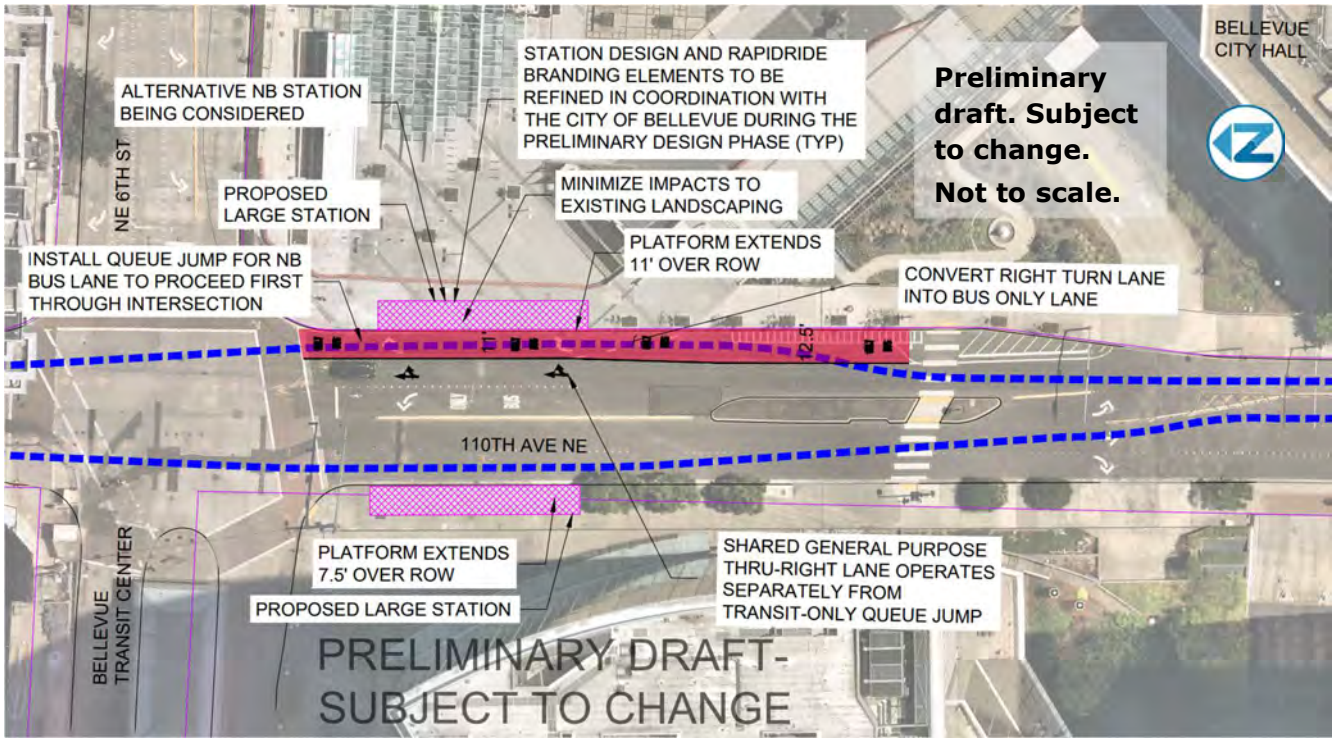


Figure 76 Candidate Improvement 48 Summary

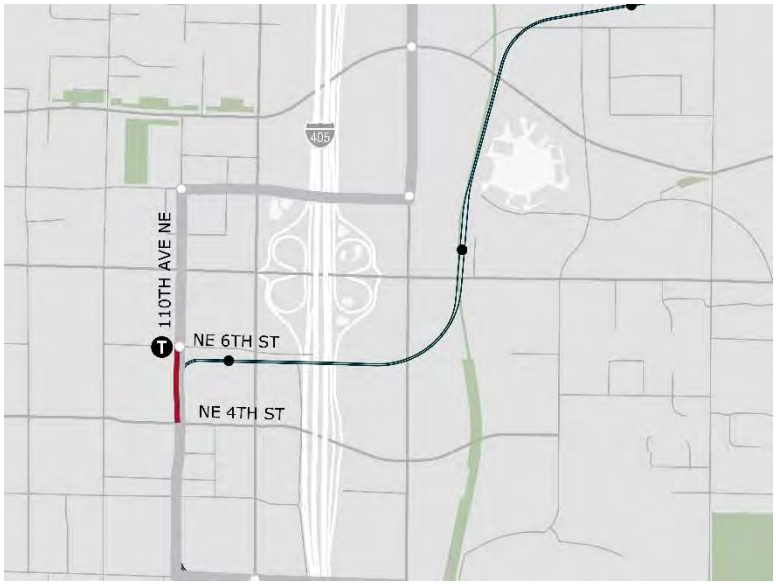
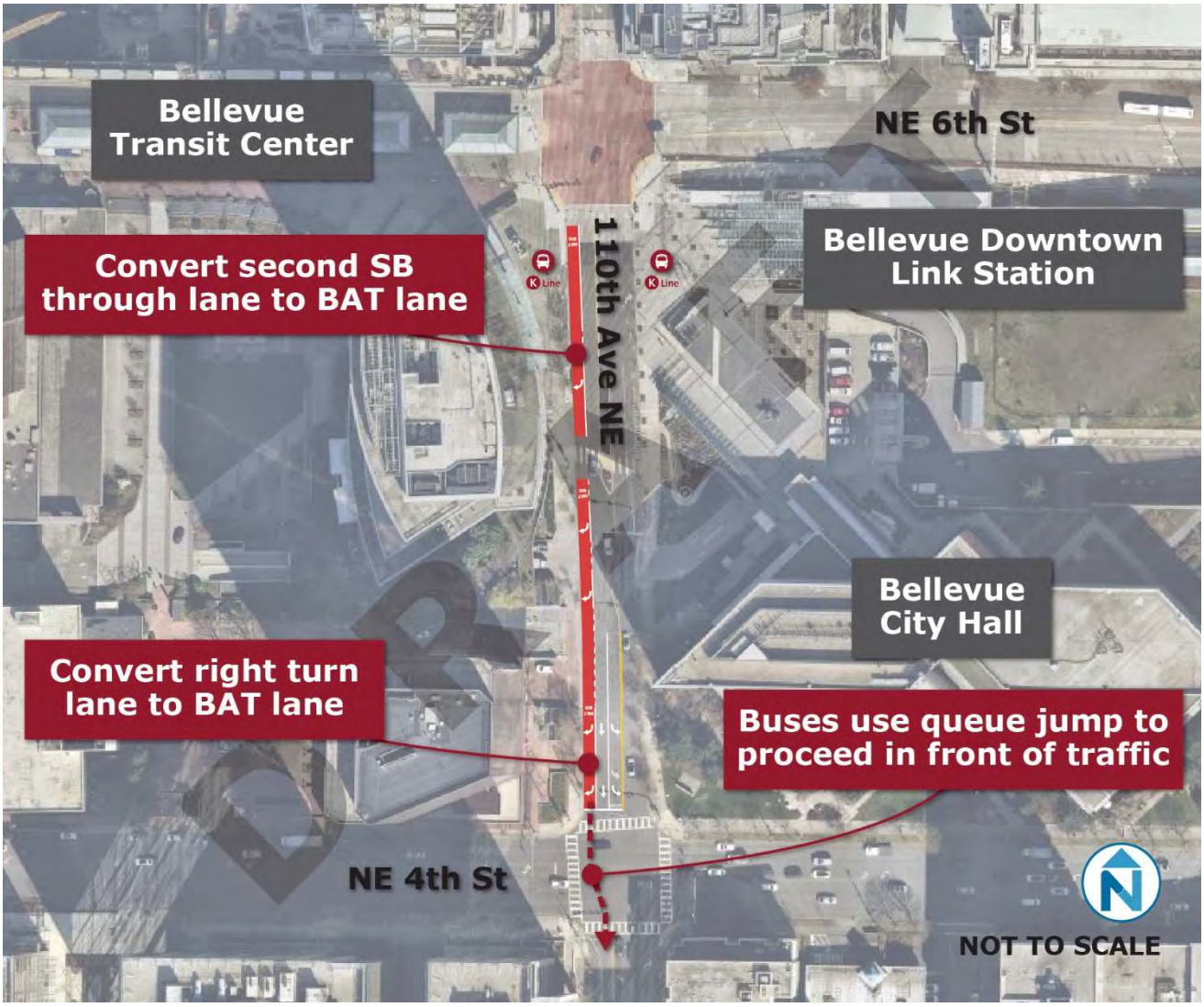
Improvement 48 – SB BAT Lane on 110th Avenue NE between NE 6th and NE 4th Streets	
Jurisdiction	Bellevue
Location	110th Avenue NE, southbound from NE 6th Street to NE 4th Street 
Details	▪ Convert right through lane to BAT lane. ▪ Convert right-turn lane at NE 4th Street to right-turn except bus, with a dedicated queue jump phase for the bus to advance across intersection.
Benefits and Impacts	*Traffic analysis to be conducted during design phase.*

Figure 77 Candidate Improvement 48 Concept Design



9 Next Steps

King County Metro will finalize K Line planning activities using public engagement findings, stakeholder guidance and the following planning upgrade reports to establish a holistic and comprehensive K Line project vision by selecting capital investments to move forward into final design.

- RapidRide K Line Speed and Reliability Upgrade Report
- RapidRide K Line Passenger Facility Upgrade Report
- RapidRide K Line Communications and Technology Upgrade Report
- RapidRide K Line access to transit Upgrade Report

King County Metro consider a wide range of factors including community values, engagement findings, equity, local agency implementation support, technical findings, available budget, and project grant funding competitiveness. This vision will be presented as the draft LPA and will be shared with the public and local agency partners through a community engagement process. Based on feedback, the draft LPA will be refined into a final LPA. King County Council is anticipated to formally adopt the LPA, completing planning activities on the project, after Kirkland and Bellevue have formally provided written support for the project vision. **Figure 78** displays the draft and final LPA development process.

As part of this process, a Corridor Planning and Upgrade Report, intended to serve as comprehensive vision of the planning stage of the project will be produced. The report will document work completed, project purpose and need, processes used, stakeholder engagement, implementation plan and outcomes reached.

The Corridor Planning and Upgrade Report process will involve reconciling the project budget across all capital elements of K Line, to verify alignment with the available budget. The report will outline the resulting investment strategy for the combined program of work and will provide an overview of the benefits within the corridor.

King County Metro will begin final design activities upon King County Council adoption of the LPA, with a goal of constructing capital improvements and implementing service of the RapidRide K line by 2030.

Figure 78 K Line Locally Preferred Alternative Process