



Lynnwood Link Extension

Interim Transit Ridership Forecast Results

Technical Memorandum



SOUND TRANSIT

401 South Jackson Street
Seattle, WA 98104-2826

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Acronyms and Abbreviations

DEIS draft environmental impact statement

I-5 Interstate 5

1 INTRODUCTION

1.1 Project Background

This memorandum presents a summary of the interim ridership forecasts for the DEIS Alternatives defined for the Lynnwood Link Extension. Detailed ridership forecasting methods and underlying assumptions regarding data input for the Central Puget Sound Regional Transit Authority (Sound Transit) model are provided in a separate report entitled *Transit Ridership Forecasting Interim Technical Report* (July 2012). Descriptions for the DEIS Alternatives are provided in a separate document entitled *Definition of Alternatives Technical Memorandum* (October 2012; Appendix to *Conceptual Design Report*). The Sound Transit updated model for base year (2011) was used to produce ridership forecasts for the following alternatives:

- No Build Alternative
- I-5 Light Rail Alternatives

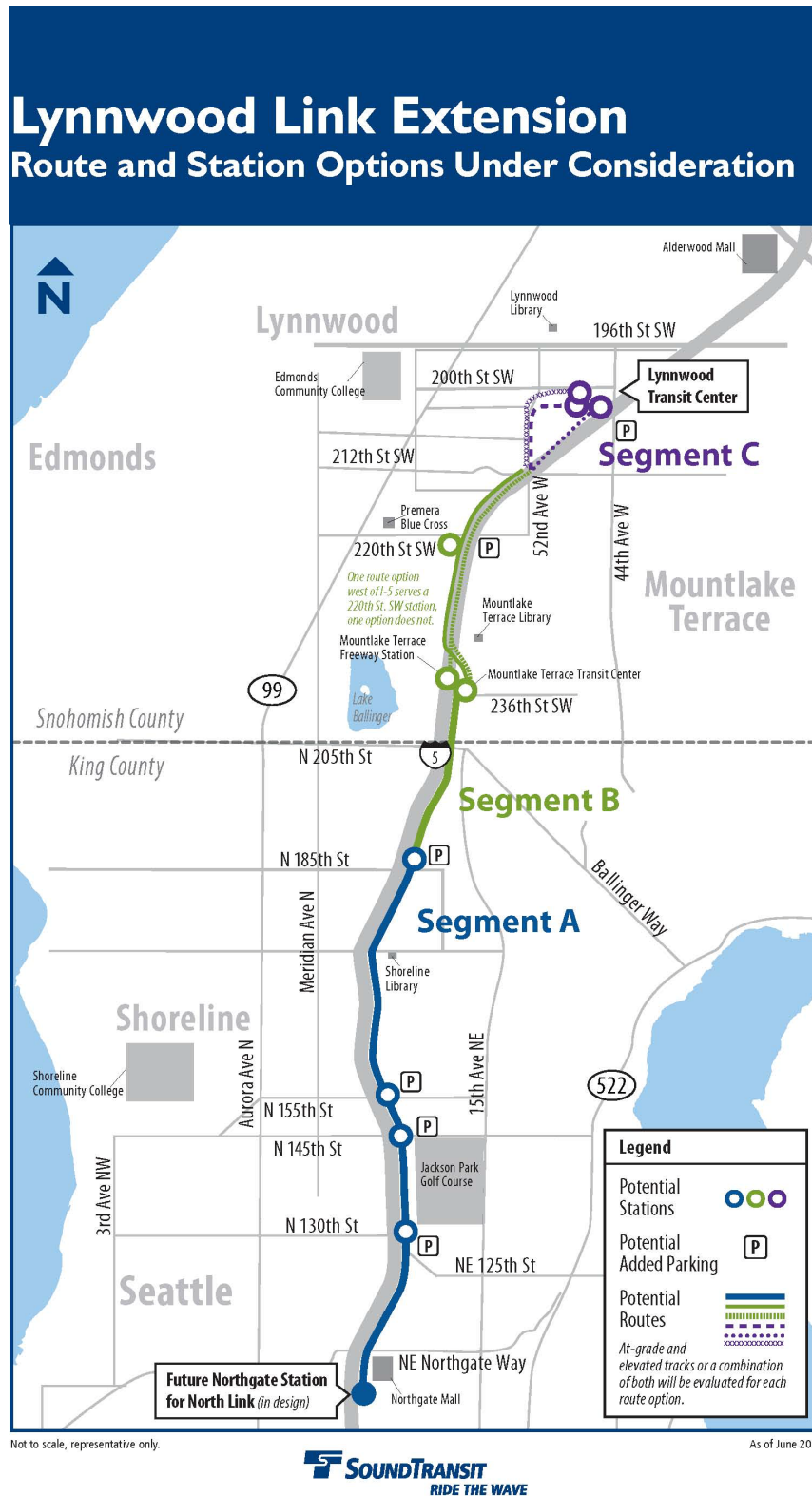
As shown in Figure 1-1, the project corridor has been divided into three segments for the purpose of conceptual design and environmental impact analysis:

- **Segment A: Seattle to Shoreline** (north of Northgate Link station to north side of NE 185th Street)
- **Segment B: Shoreline to Mountlake Terrace** (north side of NE 185th Street to 212th Street SW)
- **Segment C: Mountlake Terrace to Lynnwood** (212th Street SW to Lynnwood Transit Center)

Within each segment, multiple station location options are being considered in the DEIS comprising multiple segment alternatives. Six model runs were conducted to capture the range of ridership differences that could result from the various potential combinations of alternatives in Segments A and B. It was assumed that the differences among Segment C alternatives would not result in ridership differences that could be adequately reflected in the ST model.

Bus and rail operating assumptions associated with the No Build and I-5 light rail alternatives are provided in Attachment A. For more detail on the alternatives, see the *Definition of Alternatives Technical Memorandum*.

Figure 1-1. Lynnwood Link Extension Segments



2 RIDERSHIP FORECASTS

2.1 System Ridership Forecasts

Regional transit ridership forecasts for year 2035 are shown in Table 2-1 for the No Build and light rail alternatives. These estimates are for ridership within the Sound Transit district boundaries comprising the urbanized portions of Pierce, King, and Snohomish counties. As summarized in Table 2-1, the systemwide forecasts of average weekday linked transit trips across all model runs range between 583,000 (for No Build) and 606,000. The difference in linked transit trips for the build alternatives compared to the No Build Alternative is labeled “New Riders.”

Average weekday and annual project ridership forecasts specific to the project corridor (between Northgate and Lynnwood) are also summarized in Table 2-1 for the build alternatives. Average weekday project riders (inbound boardings plus outbound alightings) range from 67,200 to 70,200, with the highest daily project ridership forecast resulting from a combination of five stations. Peak-period transit passenger volumes north of Northgate are between 18,200 and 18,600.

Table 2-1 shows the annual forecasts of new riders compared to the No Build Alternative. The I-5 light rail alternatives result in approximately 7.1 million to 7.4 million annual new riders.

Table 2-1. Year 2035 Interim Systemwide Transit Ridership Forecasts

	No Build	Build (Representative) Model Runs				
Total Stations		4	5	5	5	6
Stations Included		N 145 th St N 185 th St MLT TC Lynnwood TC	N 130 th St N 155 th St N 185 th St MLT Fwy Lynnwood TC	N 130 th St N 145 th St N 185 th St MLT TC Lynnwood TC	N 145 th St N 185 th St MLT TC 220 th St SW Lynnwood TC	N 130 th St N 155 th St N 185 th St MLT TC 220 th St SW Lynnwood TC
Segment Combination		A1+B1+C1/C2/C3	A5+B4+C1/C2/C3	A10+B1+C1/C2/C3	A1+B2a+C1/C2/C3	A5+B2a+C1/C2/C3
Total Daily (24 hours) Transit Trips	583,000	606,000	605,000	606,000	606,000	606,000
Total Daily Transit Boardings	879,000	912,000	909,000	910,000	910,000	909,000
Daily Light Rail Boardings	255,000	290,000	289,000	290,000	290,000	290,000
Project Riders (Northgate–Lynnwood)						
Daily	NA	67,200	68,800	70,200	67,200	69,600
Annual	NA	21.2 million	21.7 million ¹	22.1 million ¹	21.2 million	21.9 million ¹
3-Hour PM Peak Light Rail Volume (northbound from Northgate)	NA	18,400	18,200	18,600	18,400	18,200
New Riders—Annual ²	NA	7.4 million	7.1 million	7.3 million	7.4 million	7.3 million

¹ For the alternatives with N 130th St Station, the increase of daily project riders in segment A is offset by a shift of 1,400 boardings from Northgate station, compared to alternatives without the N 130th St Station.

² Forecast of new riders is calculated relative to the No Build Alternative in this table. An annualization factor of 315 was assumed.

NA = not applicable

2.2 Light Rail Volumes

Year 2035 transit passenger volumes for the Lynnwood Link Extension and for the light rail system are shown in this section.

2.2.1 Lynnwood Link Extension

Year 2035 transit passenger volumes for the 3-hour PM peak period as well as average weekday ridership between Northgate and Lynnwood for the No Build and light rail alternatives are shown in Figure 2-1 through Figure 2-6. The maximum load segment for the Lynnwood Link Extension corridor is the segment just north of the Northgate Link Station for all build alternatives. Average weekday two-way transit passenger volumes between Northgate and NE 145th Street stations for the I-5 light rail alternatives range between 64,000 and 66,000 riders.

Figure 2-1. 2035 Interim PM Peak and Average Weekday Transit Passenger Volumes—No Build

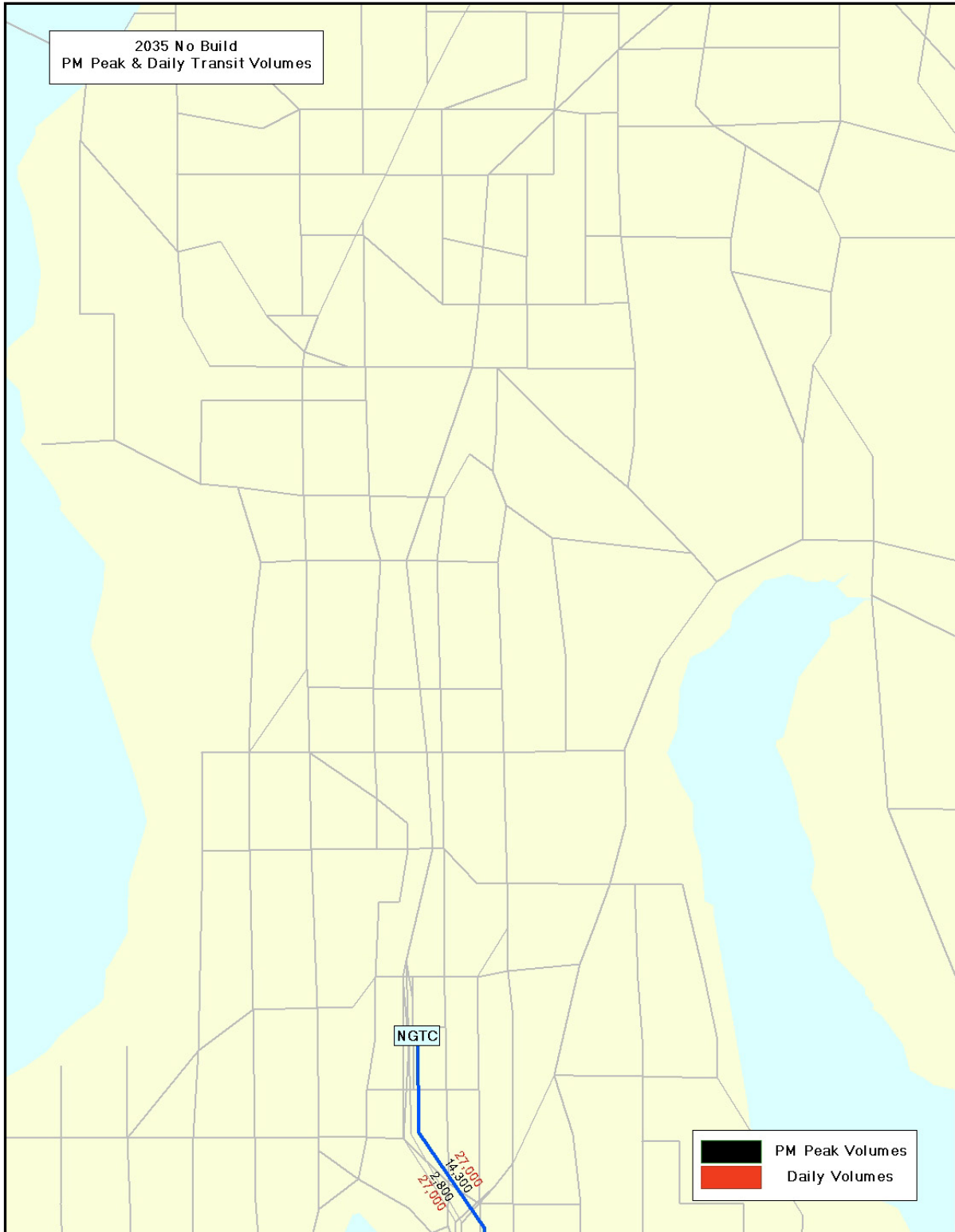


Figure 2-2. 2035 Interim PM Peak and Average Weekday Transit Passenger Volumes—Model Run 1



Figure 2-3. 2035 Interim PM Peak and Average Weekday Transit Passenger Volumes—Model Run 2

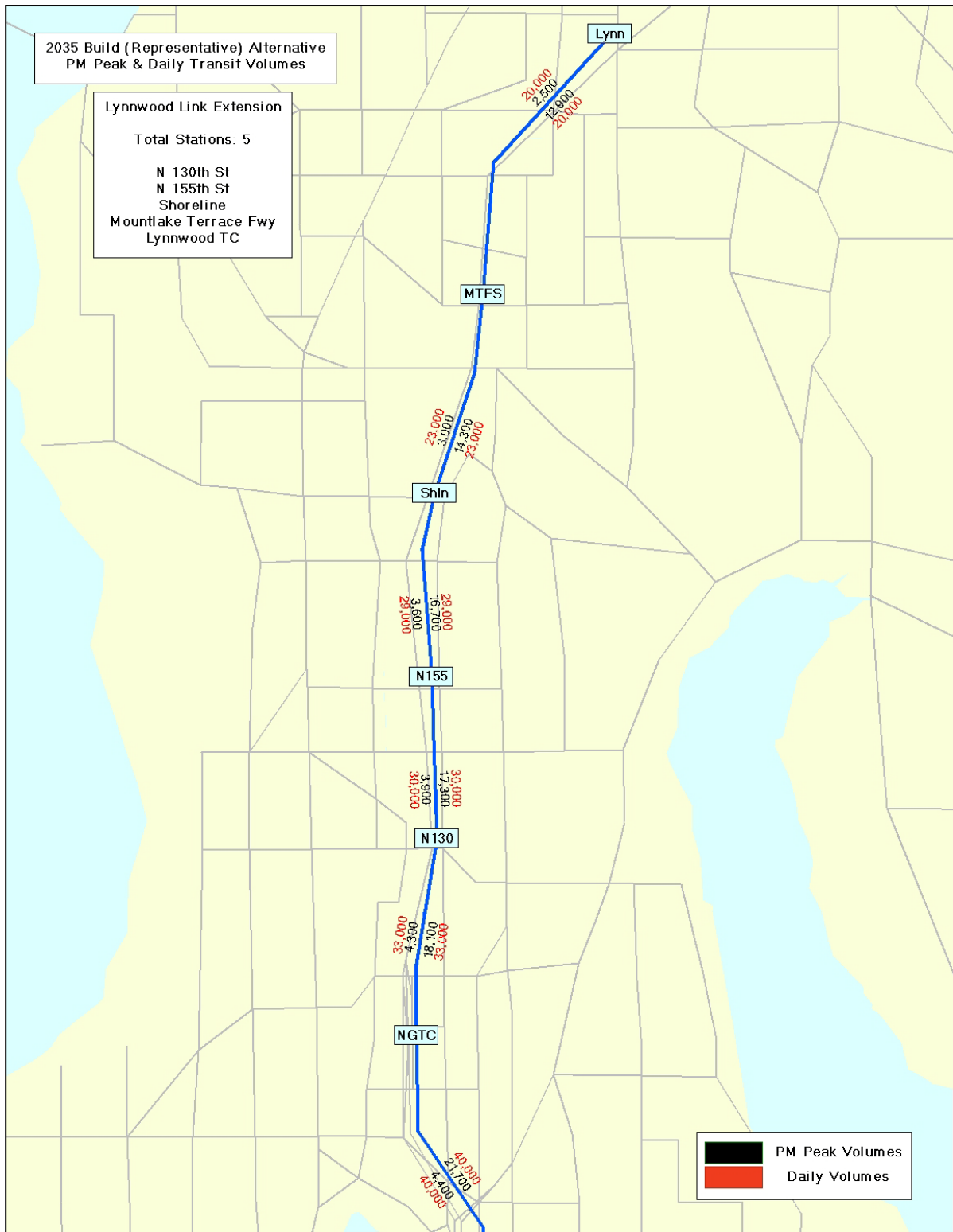


Figure 2-4. 2035 Interim PM Peak and Average Weekday Transit Passenger Volumes—Model Run 3

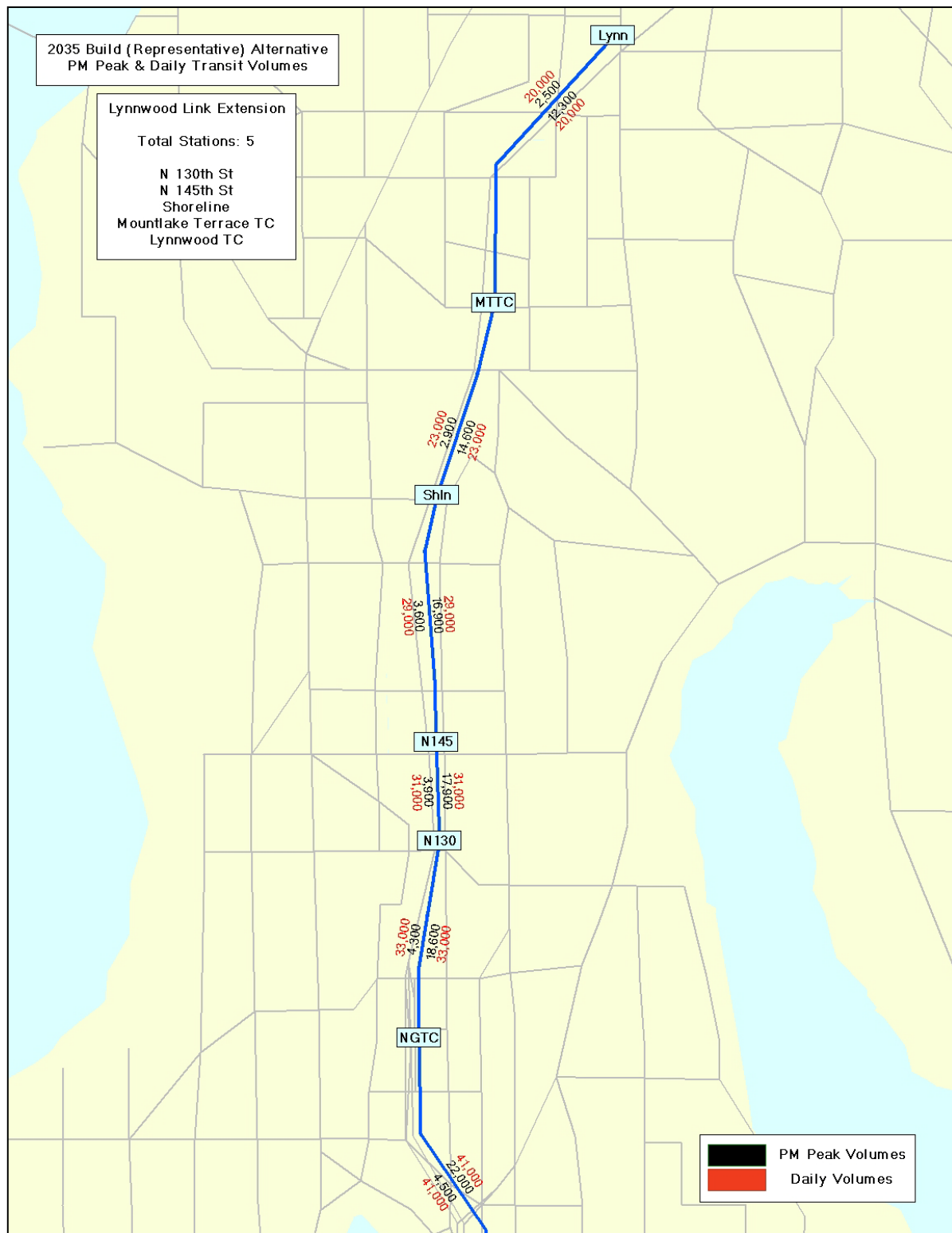


Figure 2-5. 2035 Interim PM Peak and Average Weekday Transit Passenger Volumes—Model Run 4

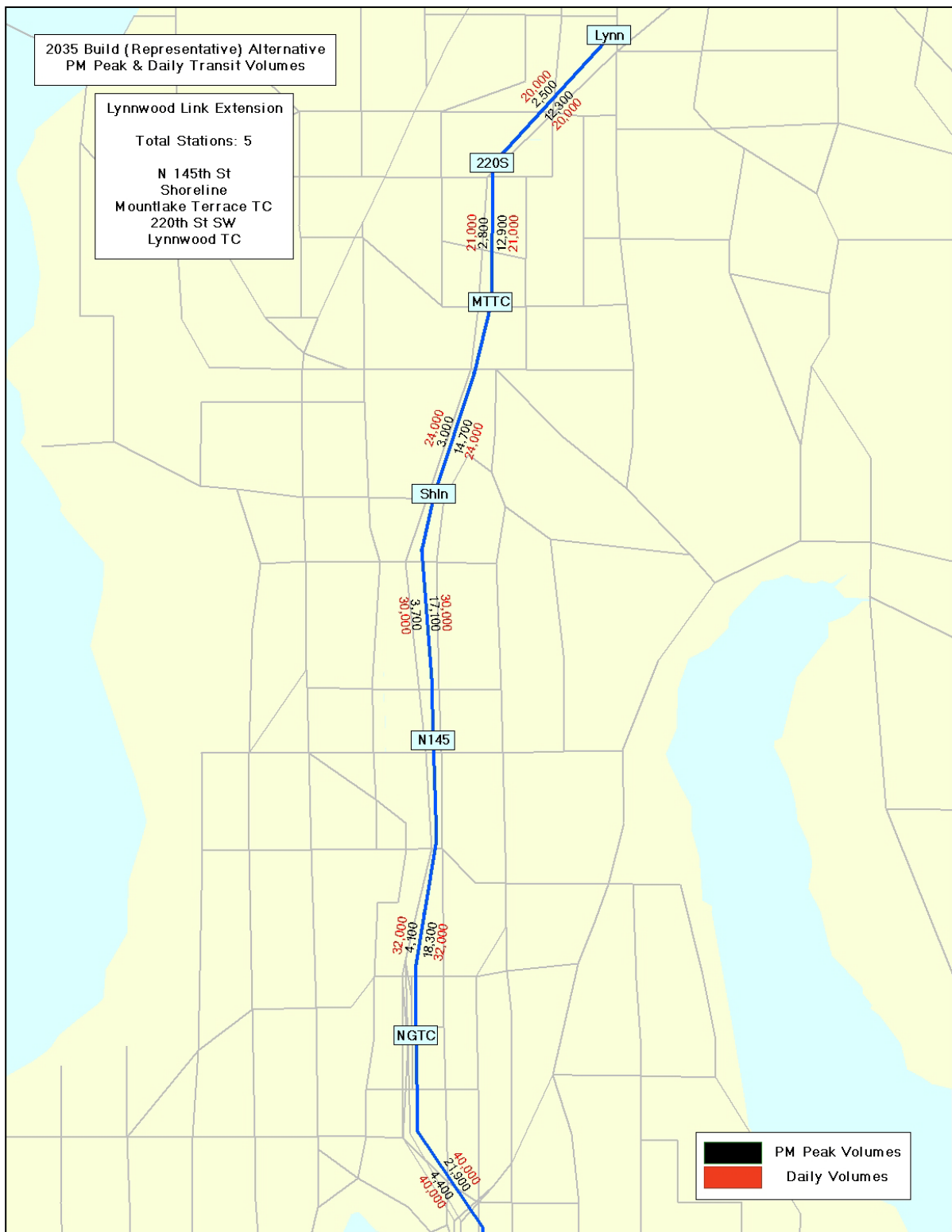
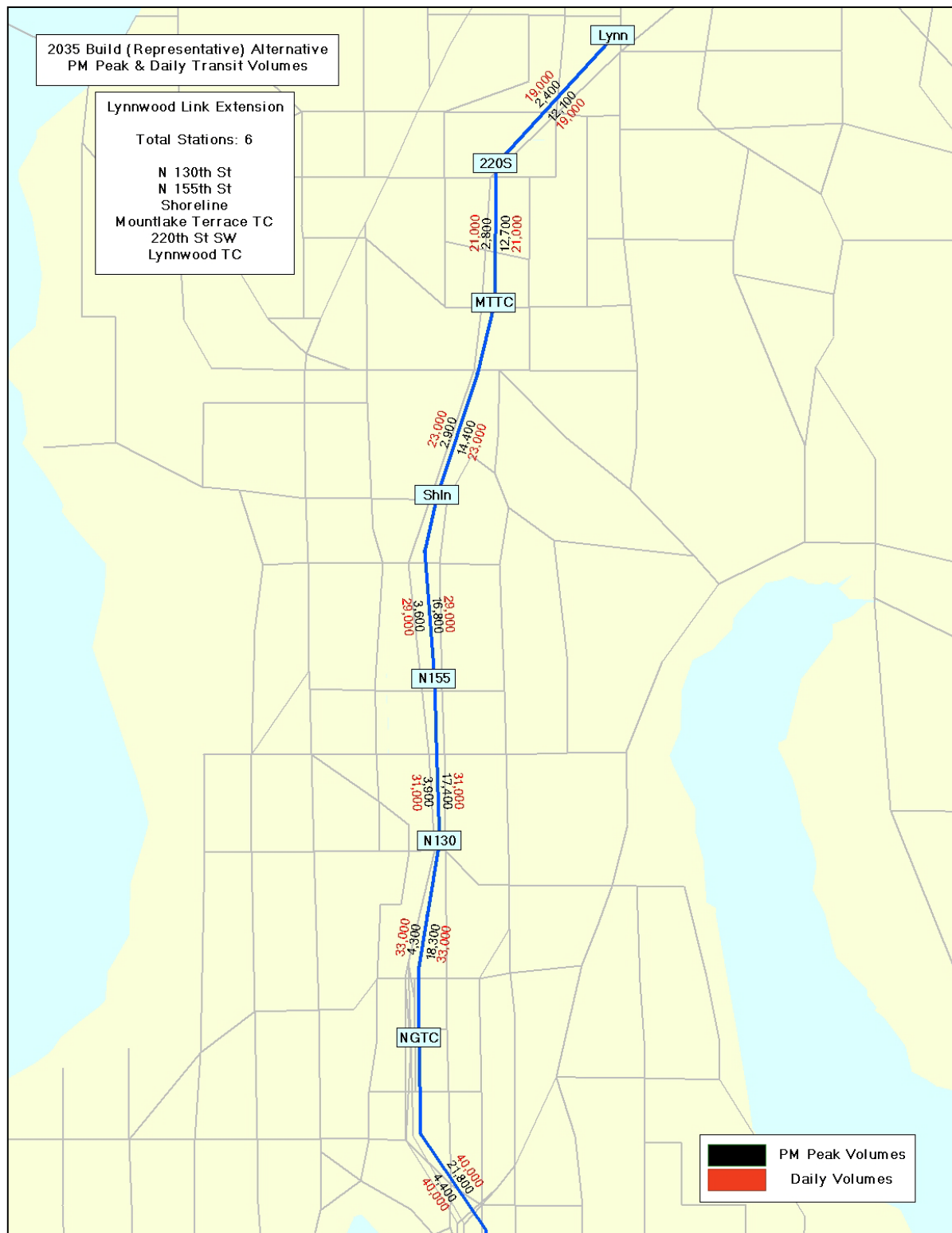


Figure 2-6. 2035 Interim PM Peak and Average Weekday Transit Passenger Volumes—Model Run 5



2.2.2 Light Rail System

Figure 2-7 provides the 2035 system-wide 3-hour PM peak period as well as average weekday Link passenger volumes from the first model run. Passenger volumes outside the Lynnwood Link Extension are similar to those shown in Figure 2-7 for all Lynnwood Link Extension alternatives.

The maximum PM-peak period volume for this system in 2035 occurs northbound from Westlake to Capitol Hill. This is a change from previous forecasts, in which the maximum PM-peak period volume had been southbound from Pioneer Square to International District Station. The change in the maximum load location is due to a new assumption by Community Transit that they would eliminate all of their express commuter bus routes between Snohomish County and Seattle when Link is extended to Lynnwood.

Figure 2-7. 2035 Interim PM Peak and Average Weekday Transit Passenger Volumes



Figure 2-7. 2035 Interim PM Peak and Average Weekday Transit Passenger Volumes (continued)



Figure 2-7. 2035 Interim PM Peak and Average Weekday Transit Passenger Volumes (continued)



Figure 2-7. 2035 Interim PM Peak and Average Weekday Transit Passenger Volumes (continued)



2.3 Daily Station Boardings

Average weekday boardings by station for the year 2035 are shown in Figure 2-8 through Figure 2-11. Figure 2-8 provides a schematic summary of station-level boardings across all possible station combinations. Figure 2-9 through Figure 2-11 indicate the range of boardings possible for each station similar to those shown in Figure 2-8, with annotation related to expected ridership trade-offs between different station combinations. Some key trade-offs include the following:

- For the Lynnwood Transit Center Station, adding the 220th Street Station and/or the 130th Street Station to the project corridor alignment results in a loss of 200 boardings for each station added.
- Adding a station at 220th Street results in a net project corridor ridership gain of 400 boardings.
- Moving the Mountlake Terrace station from the Transit Center into the freeway median results in a loss of 1,000 boardings at the station and for the corridor as well.
- Adding a third Segment A station results in a net gain of 1,800 boardings in the segment, which is somewhat offset by a loss of boardings at Northgate.
- For the alternatives with three stations in Segment A, moving the station from 145th to 155th results in a loss of 200 boardings for the segment.

Detailed descriptions of the segment alternatives referenced in the figures can be found in the *Definition of Alternatives Technical Memorandum*.

2.4 Build-out Sensitivity Test on Existing Conditions

A sensitivity test was performed to estimate what today's ridership would be on the future light rail system. In Attachment B, Table B-1 includes a comparison of average weekday transit ridership between 2011 existing and build. Transit passenger volumes for the year 2011 three-hour PM-peak period, as well as average weekday volumes, are shown on Figure B-1.

Figure 2-8. 2035 Interim Average Weekday Station Boardings—Summary

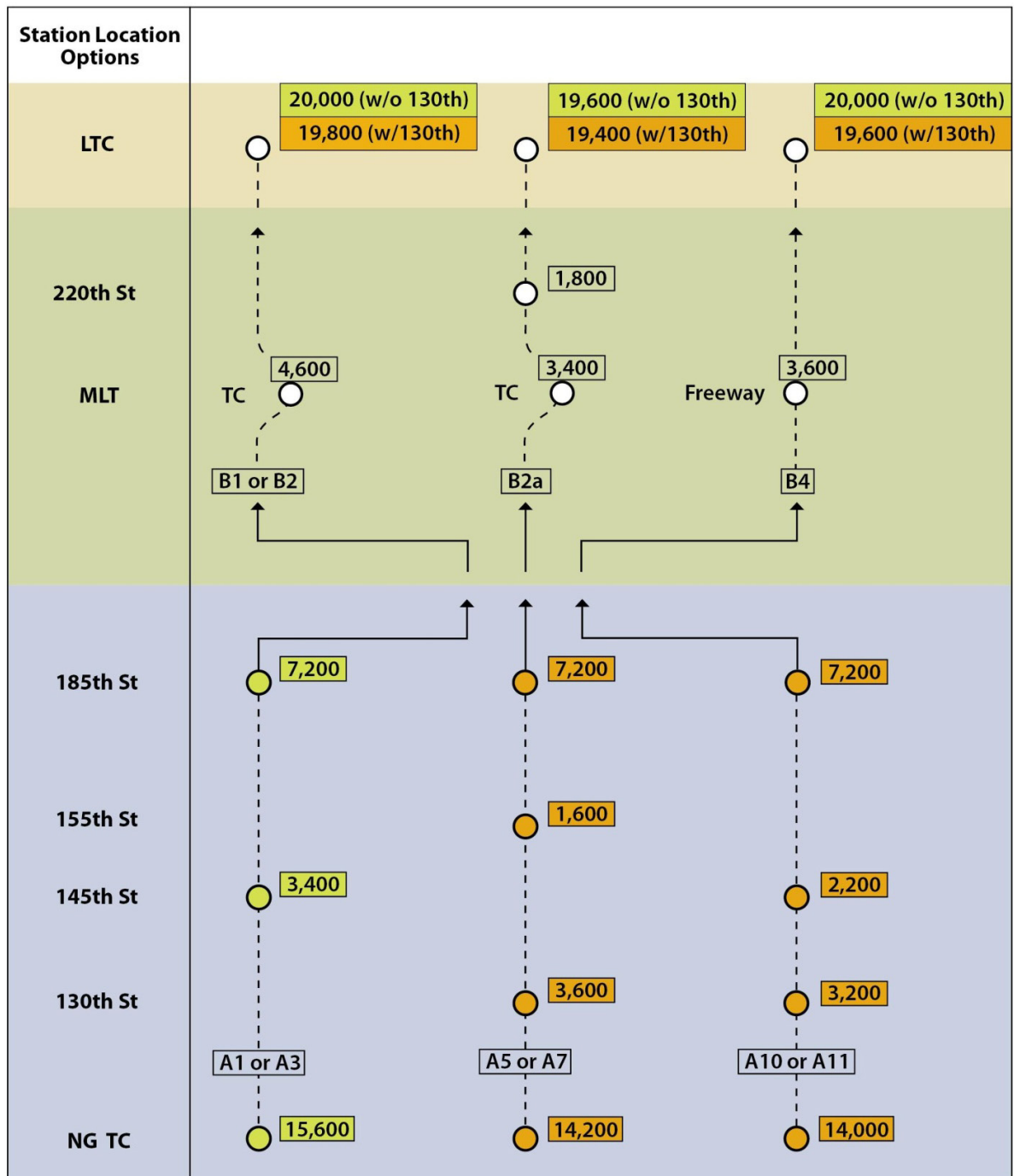


Figure 2-9. 2035 Interim Average Weekday Station Boardings—Northgate to N 145th St

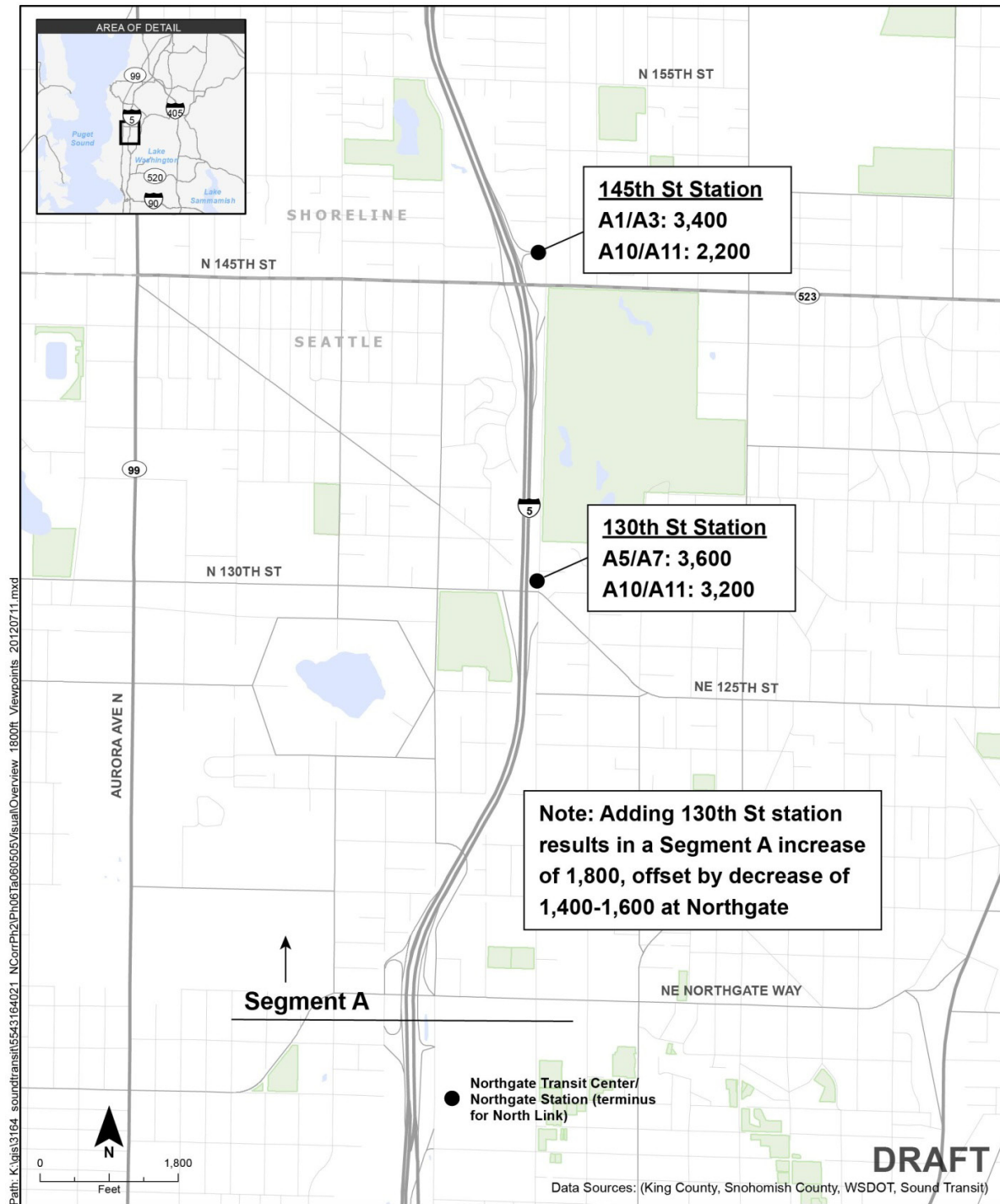


Figure 2-10. 2035 Interim Average Weekday Station Boardings—N 155th St to N 185th St

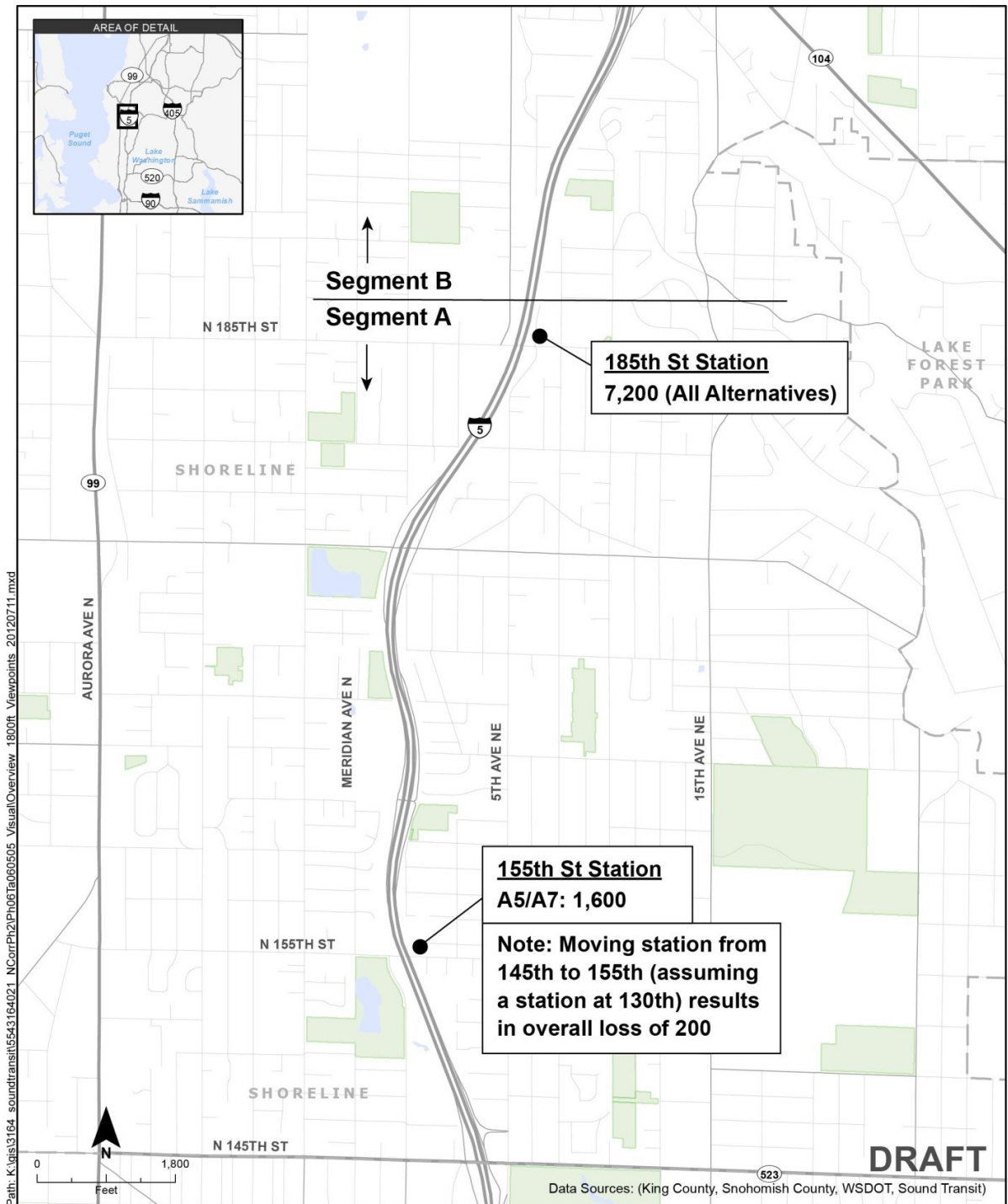
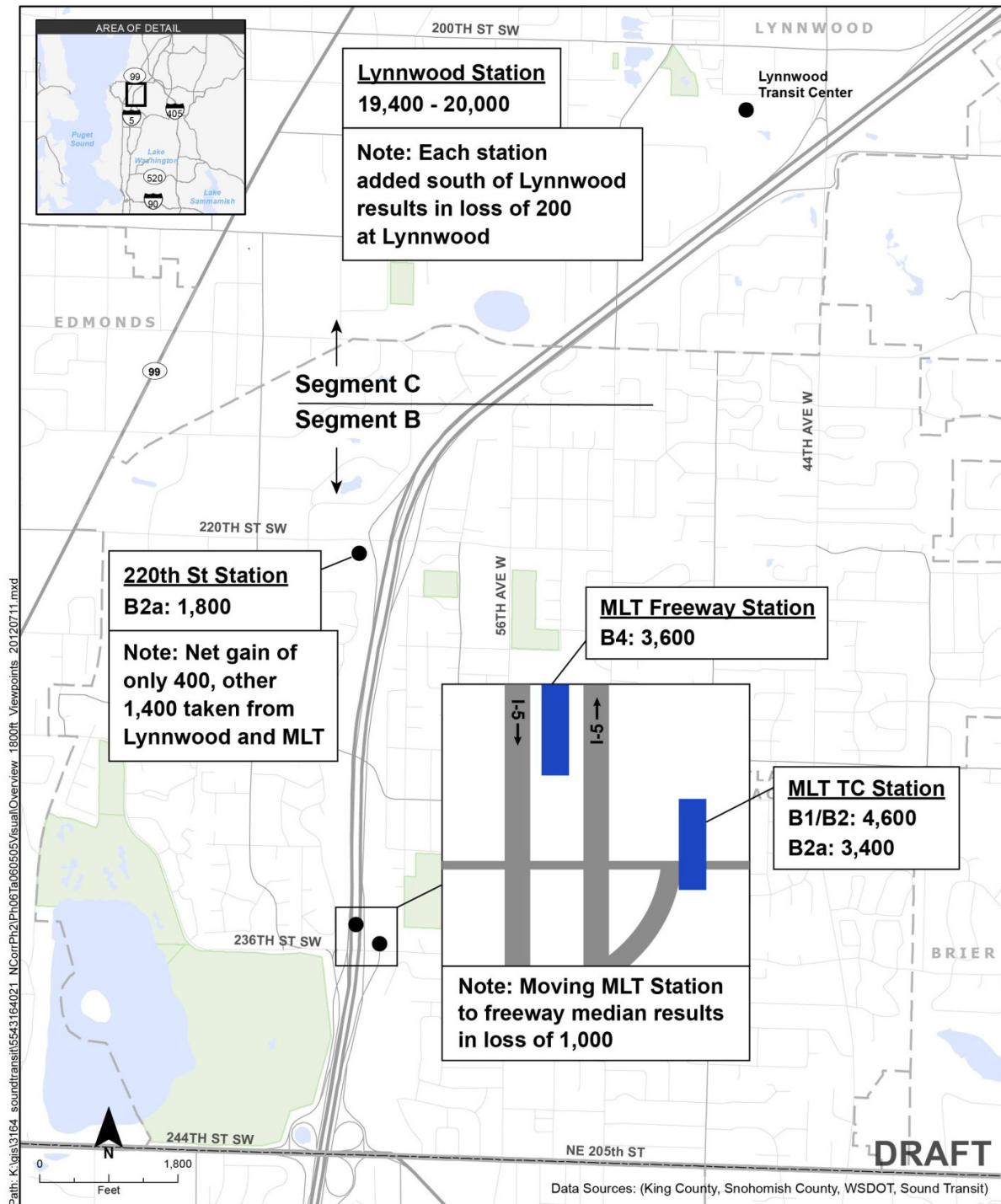


Figure 2-11. 2035 Interim Average Weekday Station Boardings—Mountlake Terrace to Lynnwood



Attachment A

Summary of Bus and Rail Operating Assumptions

ELEMENTS COMMON TO ALL ALTERNATIVES

The following assumptions and guiding principles were used in the development of the alternatives:

- Alternatives are defined for the design year 2035.
- Alternatives will serve as transit extensions to the Link light rail system that will end at Northgate when the current committed projects are completed by Sound Transit. As such, the alternatives address the Northgate-Lynnwood project area only; no improvements for the existing and committed regional transit system south of Northgate are identified.
- Build alternatives will focus on the same key travel markets and should provide similar accessibility (stations, parking, and access) and levels of service (time span and headways) to make them as comparable as possible.
- Community Transit and King County Metro bus service growth will be flat (except for a 0.5 percent per year increase for scheduled maintenance hours) between fall 2009 and 2035 due to service reductions caused by the 2008 to 2010 recession and slow recovery from that recession through 2035.

NO BUILD ALTERNATIVE

The No Build Alternative includes only those improvements committed and funded for implementation by the transportation providers in the region. These projects include the following:

- **Sound Transit:** The *Sound Move* and Sound Transit 2 (ST2) voter-approved projects will be completed including extensions of Link light rail to Kent/Des Moines to the south, Northgate to the north, and Overlake to the east. Service additions to Sound Transit Express Routes 510, 511, and 513 will be implemented.
- **King County Metro:** Bus services will be restructured around the light rail network at Northgate, RapidRide E Line on Aurora will be implemented, and all other transit services are assumed to stay at roughly their current levels through 2035. King County Metro revenues are assumed to improve by the design year 2035 enough to maintain existing service levels.
- **Community Transit:** *Swift* BRT service from the county line to Everett and other services will remain at their current levels through the design year 2035. While Community Transit faces near-term budget problems, revenues are assumed to recover by the design year 2035 to a level sufficient to maintain existing service levels.
- **City of Shoreline:** SR 99 improvements will be completed from NE 145th Street to the county line. This work involves widening the roadway to include a new curb-side business access transit (BAT) lane in each direction.
- **City of Seattle:** A northbound and southbound BAT lane will be completed on SR 99 from NE 65th Street to NE 145th Street.

Service Plan

This alternative assumes light rail extends north to Northgate only. The following is a summary of proposed bus service restructures for light rail at the Northgate Station. Proposed changes to King

County Metro routes at Northgate are based on conceptual plans developed by King County Metro. Service would be provided 20 hours per day, with peak headways of 4 minutes and off-peak headways of 5 to 15 minutes.

Modified and/or New Routes Serving Northgate Station

Community Transit's current philosophy is to focus on high-frequency service along transit-emphasis corridors within Snohomish County, with less productive connections from suburban neighborhoods to Seattle being replaced by local feeder service that connects to high-frequency commuter service.

When light rail is opened to Northgate, King County Metro plans the following changes to the existing bus network in the area:

- Local service routes north of Northgate will remain unchanged from today's service levels.
- Within most local corridors to Northgate from the south and east, current service is maintained.
- Route 41 (Lake City/Northgate to Seattle): Replaced by Link light rail.

E Line—Aurora RapidRide

The RapidRide E Line will connect Shoreline with downtown Seattle in 2013 (Figure A-1). It will replace the existing Route 358. Features of the E Line include enhanced stations, limited stops, BAT lanes, and transit signal priority—all of which will improve speed and reliability. The goal is for more frequent service than what is operated by Route 358 currently.

I-5 LIGHT RAIL ALTERNATIVE

The I-5 Light Rail Alternative advanced to the DEIS evaluation includes a range elevated and at-grade double-track rail line from Northgate to the Lynnwood Transit Center with four to six stations. The general scope of work includes:

- The alignment begins at the north end of the Link station tail tracks near Northgate Mall between 1st Avenue NE and the existing Northgate Transit Center. The route generally follows the east side of I-5 within the Washington State Department of Transportation (WSDOT) right-of-way north to the Mountlake Terrace Transit Center (I-5 at 236th Street SW). Continuing north from Mountlake Terrace, the alignment either crosses to the median or remains on the east side of I-5, and then to the west side of I-5 to the proposed terminus station at the Lynnwood Transit Center.
- New light rail stations with potential locations at N 130th Street, N 145th Street, N 155th Street, N 185th Street, Mountlake Terrace Transit Center (I-5 at 236th Street SW), 220th Street SW, and Lynnwood Transit Center.
- Additional park-and-ride capacity at selected stations, supplementing approximately 2,300 existing stalls along the alignment.
- Restructured bus services consistent with 2011 bus/light rail conceptual service integration work done by Sound Transit, Community Transit, and King County Metro for the Lynnwood Link Extension.

Service Plan

This section describes light rail operations, as well as changes to local, regional, and commuter bus routes operated by King County Metro, Sound Transit, and Community Transit.

Light Rail Operations

Light rail service would consist of operating up to four-car light rail trains serving stations potentially located at N 130th Street, N 145th Street, N 155th Street, N 185th Street, Mountlake Terrace Transit Center, 220th Street SW, and Lynnwood Transit Center. Service would be provided 20 hours per day, with peak headways of 4 minutes and off-peak headways of 5 to 15 minutes.

Local Bus Routes

No changes are proposed for Community Transit local routes except for minor adjustments to Route 112 to serve Mountlake Terrace Transit Center.

Local King County Metro routes in north King County would be adjusted to serve light rail. Existing routes would be modified to serve the new light rail stations at N 130th Street, N 145th Street, N 155th Street, N 185th Street, and Mountlake Terrace Transit Center.

Commuter and Regional Bus Routes

All Community Transit Snohomish County commuter routes to the University of Washington and downtown Seattle would be deleted with resources reallocated to supplement service to Lynnwood and Mountlake Terrace light rail stations. None of the existing 800 and 400 series routes from south Snohomish County would continue into King County.

The existing CT Swift BRT route between Everett and Aurora Village will be extended to the Shoreline Link station on N. 185th.

Sound Transit Regional Express routes 510 and 511 will be restructured to terminate at the Lynnwood Link station, where passengers can transfer to light rail.

King County Metro commuter routes connecting Shoreline with downtown Seattle and the University District would be replaced with modified routes that would provide connections to the light rail stations at Northgate, N 130th Street, N 145th Street, N 155th Street, and N 185th Street.

Attachment B

Build-out Sensitivity Test on Existing Conditions

Build-out Sensitivity Test on Existing Conditions

This section presents a special look at the proposed ST2 System Plan currently under development at ST and scheduled for completion by the end of 2023. Forecasts for this plan will be performed for the horizon year 2035 as part of the Lynnwood Link Extension DEIS. For this special sensitivity test, the known 2011 transit demand was entered directly in to the Stage 3 mode choice model and assignments, ignoring all growth forecasts and external inputs used in the Stage 1 (regional growth) and Stage 2 (highway times and costs) model stages.

This test effectively strips away all consideration of future time horizons in order to observe what today's ridership would be on the future system. Standard output tables have also been prepared and reviewed for reasonableness. Table B-1 includes a comparison of average weekday transit ridership between 2011 existing and build. Transit passenger volumes for the year 2011 three-hour PM-peak period, as well as average weekday volumes, are shown on Figure B-1. For the North Corridor segment currently in environmental analysis, the Lynnwood Link Extension, the average weekday two-way daily passenger volume between Northgate and NE 145th Street is 42,000. The PM-peak maximum load point for the Link system is southbound from Pioneer Square Station in the Downtown Seattle Transit Tunnel and is 15,400 for three hours, which is approximately 6,000 for the highest hour.

**Table B-1. Preliminary Average Weekday Transit Ridership Estimates,
2011 Existing and Build Comparison**

Description	2011 Existing	2011 Build-out
Total Daily (24 hours) Transit Trips	384,000	431,000
Total Daily Transit Boardings	534,000	671,000
Daily Light Rail Boardings	25,000	198,000
Daily Project Riders (Northgate–Lynnwood)	NA	44,000

Figure B-1. 2011 Sensitivity Test PM Peak and Daily Transit Passenger Volumes



Figure B-1. 2011 Sensitivity Test PM Peak and Daily Transit Passenger Volumes (continued)

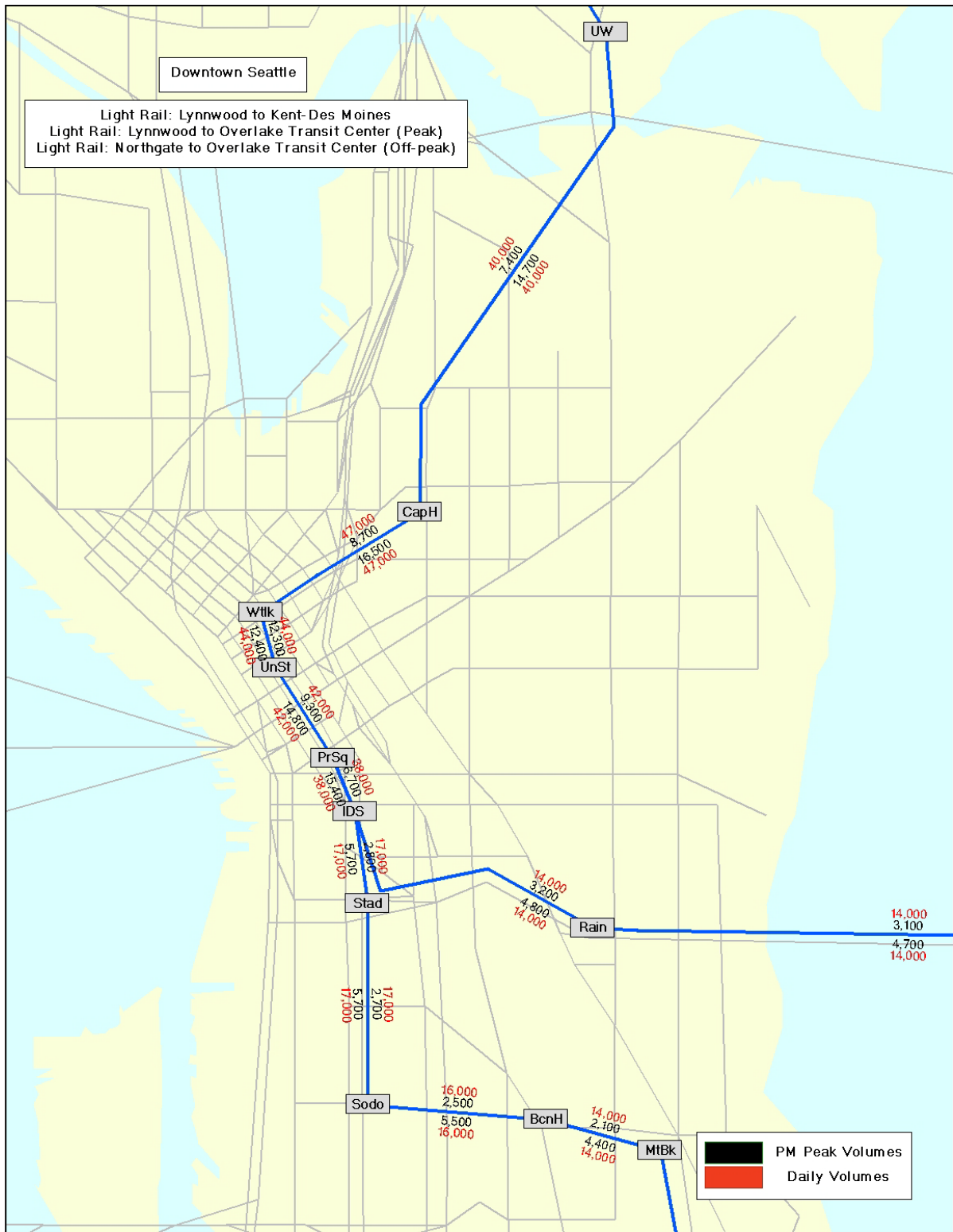


Figure B-1. 2011 Sensitivity Test PM Peak and Daily Transit Passenger Volumes (continued)

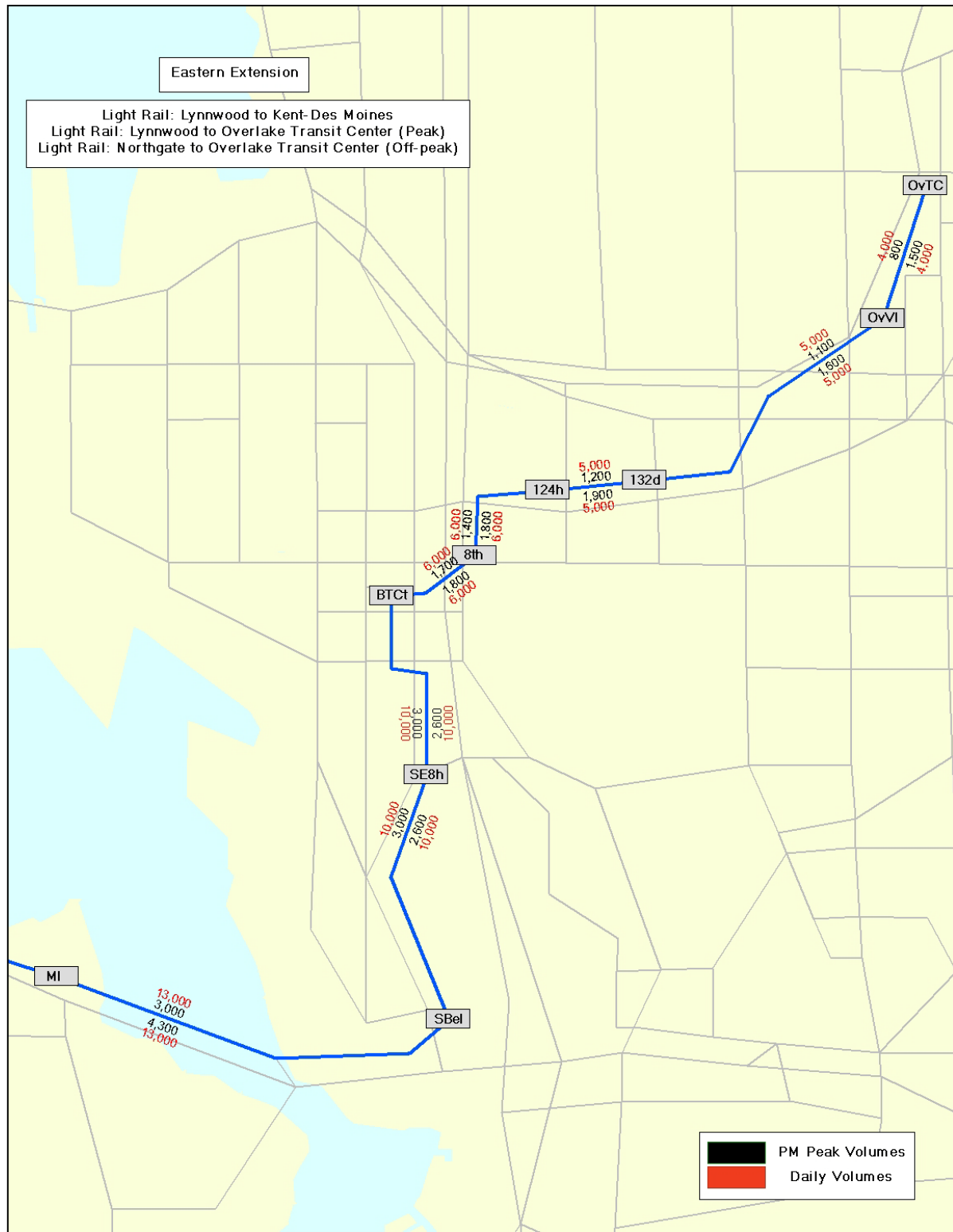


Figure B-1. 2011 Sensitivity Test PM Peak and Daily Transit Passenger Volumes (continued)



