

# ***ST2 Light Rail Service and Passenger Experience***

*Board of Directors  
10/26/23*



# *Why we are here*

## *What we've discussed with REO & SEC so far*

- April: Short term vehicle shortage challenges
- June: Long-term light rail fleet & storage challenges at end of ST3
- Sep/Oct: ST2 system crowding and mitigation strategies

## *Today's agenda*

- Bring full Board up to date
- Distinguish between issues and mitigation with current, ST2, and ST3 service
- Briefing only, no action required

# ***Recap: updated & new assumptions***

## ***Respond to evolving conditions & lessons learned***

### ***Running times***

- Slower operations in some areas requires additional run time throughout the entire light rail system

### ***Spare ratio***

- More fleet out of service for maintenance to support reliable service

### ***Fleet contingency***

- Needed for unpredictable maintenance and unknown future needs, such as accident repair, warranty work, retrofits/upgrades, further system slowing

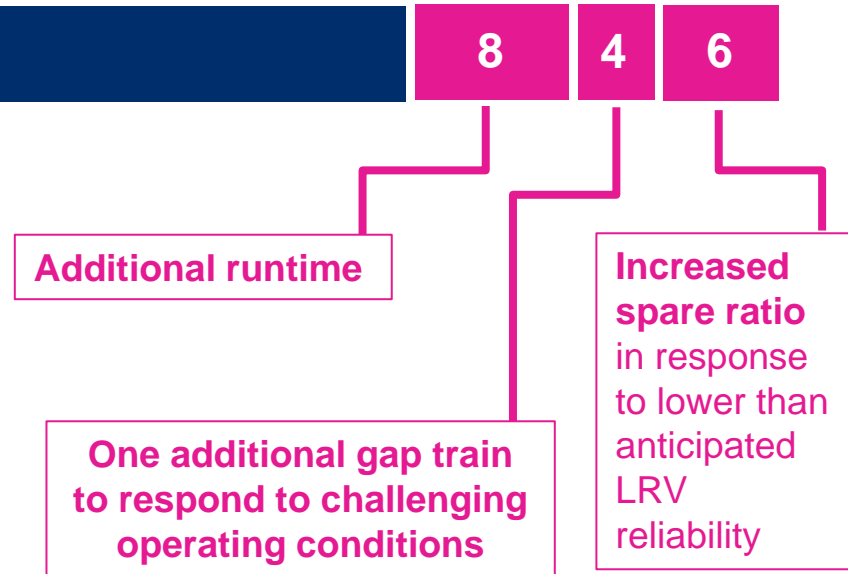
# Current fleet requirements: Northgate-Angle Lake

4 car trains, 8-minute peak service

Using 92 vehicles currently

**74 vehicles planned**

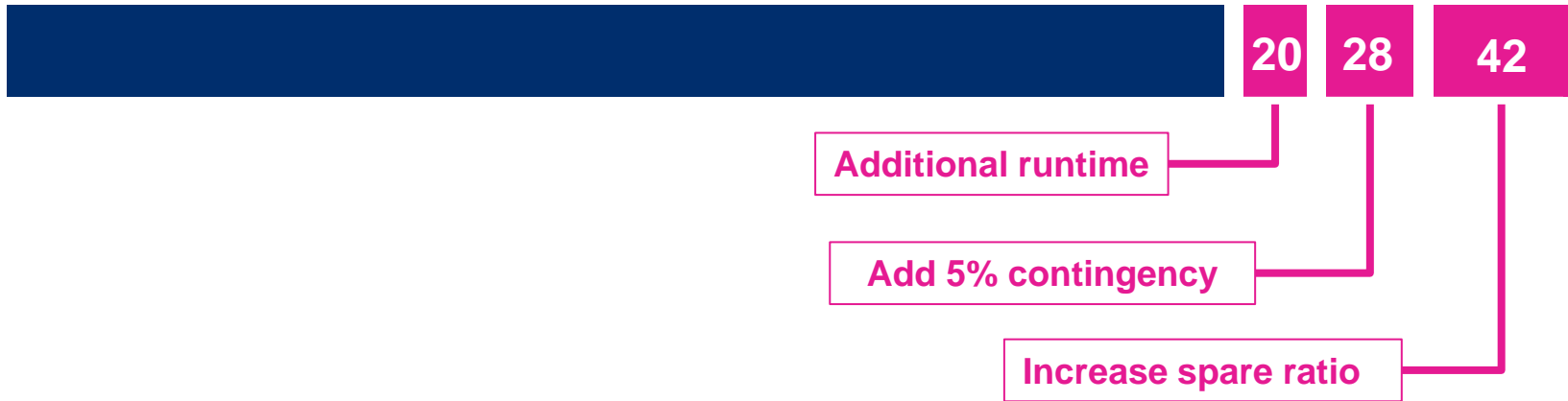
60 peak service  
4 for gap trains  
10 for 15% spare



# The big drivers of full ST3 system need

**460 vehicles assumed in agency finance plan**

**550 vehicles now needed to meet planned service levels**

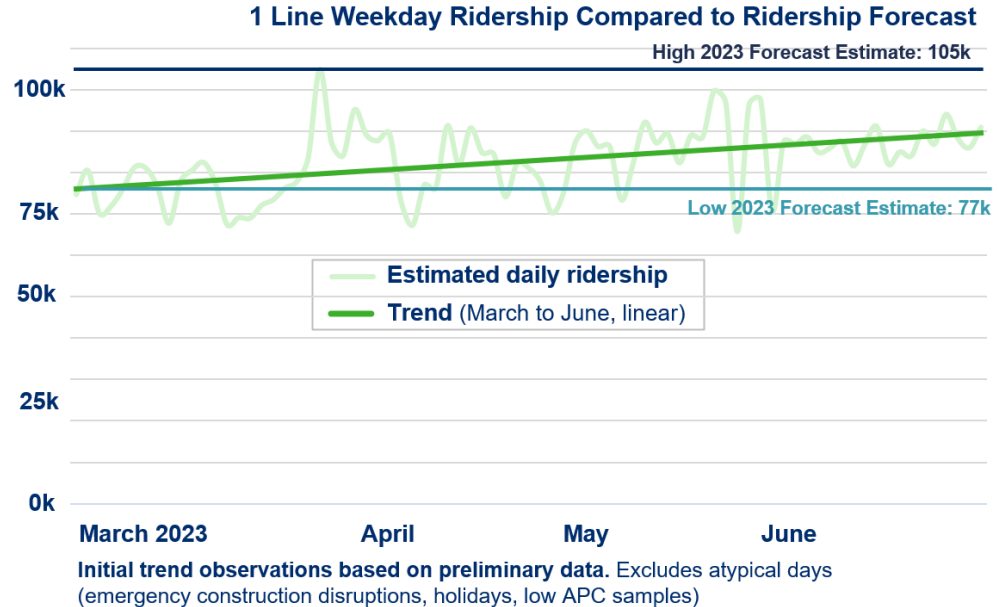


# *Implications for ST2 service levels*

- Light rail fleet is capped at 214 LRVs until early 2030s when more fleet and base capacity become available
- There are not enough LRVs to support originally planned service levels as the ST2 extensions are completed
- We committed to come back with impacts and options for the Board to consider, using the latest ridership estimates
- *Implications and strategies for the ST3 program are being developed and will be ready later in 2023*
- *We will identify when ST2-related decisions impact the ST3 program*

# Updated ridership forecasts

- Ridership estimates updated in late 2022, as a range
  - High estimate: trends towards pre-pandemic demand and patterns
  - Low estimate: assumes more working from home and recent changes in trip patterns continue
- Current Link ridership is trending toward high estimate
- There is day to day variability within the range



# *Key analysis questions*

- What service levels can be operated as ST2 extensions open?
- What will passenger loading/crowding conditions look like?
  - PM peak hour, when highest demand and service levels occur
- If there are projected overloads, are there mitigation options that could provide more capacity and alleviate crowding?



# How we think about crowding

- Link is designed as high capacity transit to efficiently carry large numbers of riders
- Service levels are designed & evaluated based on riders per LRV

One LRV carries up to **200** riders with about **74** seats and **~120** spaces for standing

Exact total varies based on how close riders stand, luggage, bikes, etc.



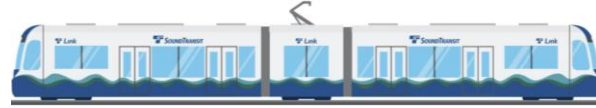
**4** car train can carry about **800** riders.

Total capacity determined by number of LRVs per train.

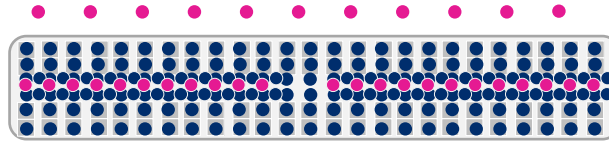
# How we think about crowding

At a car-level

● = one rider

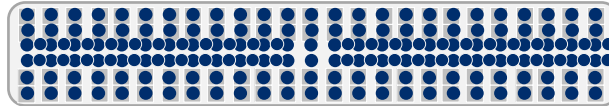


Very crowded, may not be room to board.



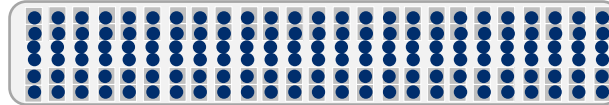
74 seats full + more than 120 riders standing

Challenges getting on and off.



74 seats full + 74 - 120 riders standing

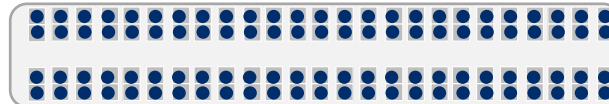
People standing, but you can still get on.



74 seats full + up to 74 riders standing

**Board adopted crowding standard**

Everyone has a seat.



Less than 74 seats full, few people standing

**2024**

***1 Line Angle Lake to Lynnwood***

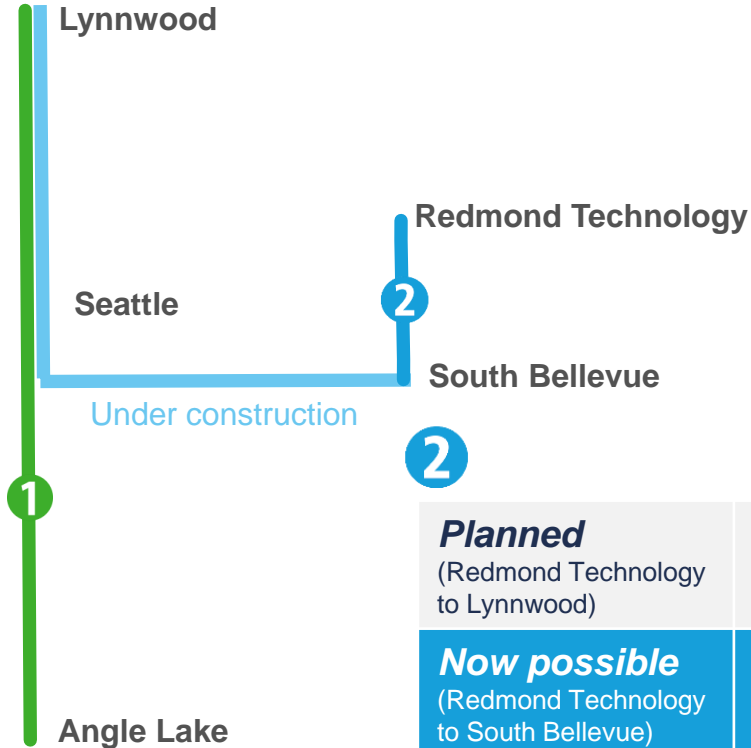
***2 Line Downtown Redmond to South Bellevue***

# 2024

## Peak service with available fleet

### 1 Lynnwood to Angle Lake

<i>Planned</i>	8 min	4 cars
<i>Now possible</i>	10 min	3-4 cars



<i>Planned</i> (Redmond Technology to Lynnwood)	8 min	4 cars
<i>Now possible</i> (Redmond Technology to South Bellevue)	10 min	2 cars

2024

# Northbound 1 Line crowding\*

Trains every 10 mins, 4 car trains

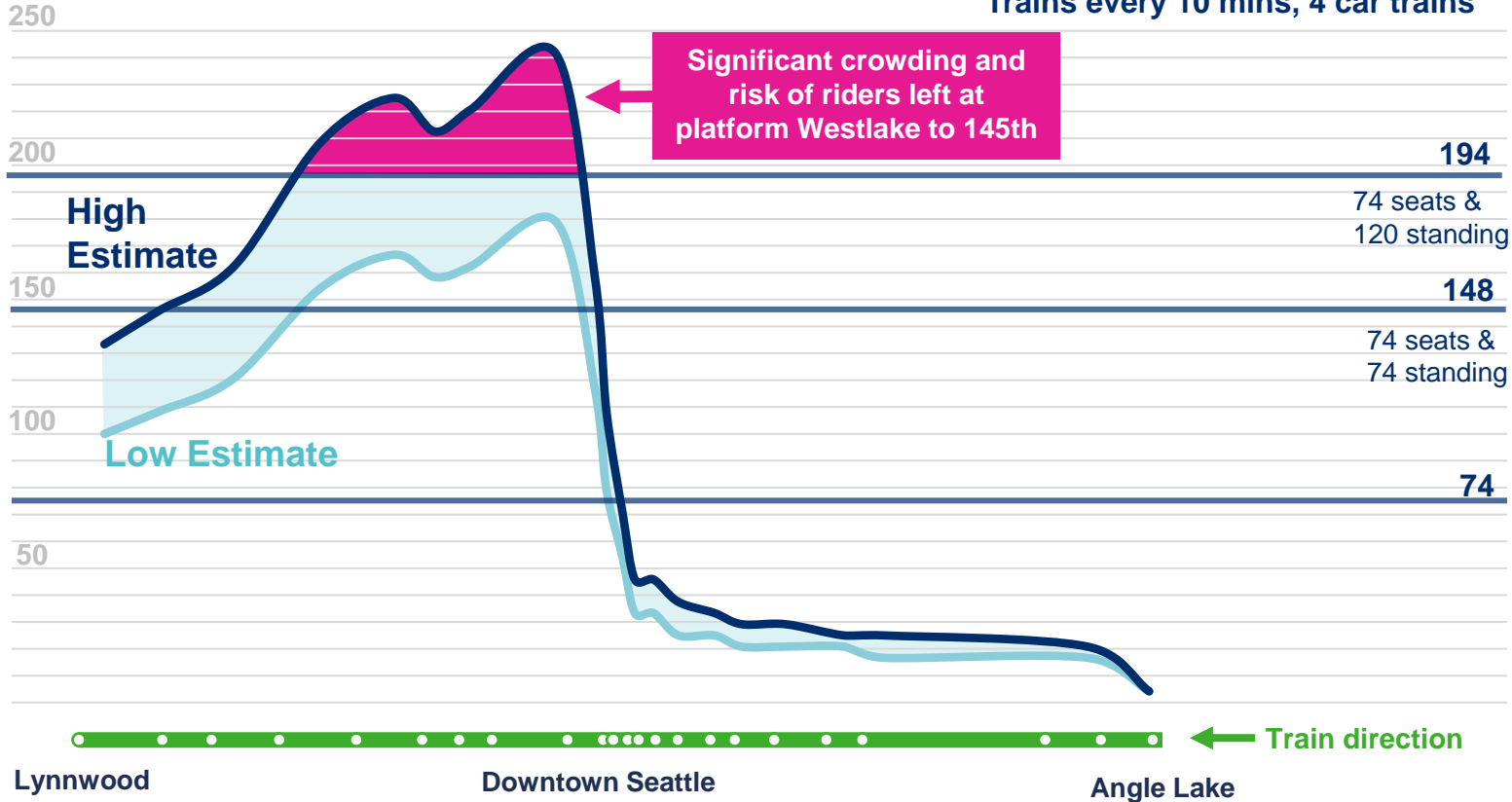
Very crowded, may not be room to board

Significant crowding and risk of riders left at platform Westlake to 145th

Challenges getting on and off

People standing but you can still get on

Everyone has a seat



2024

# Southbound 1 Line crowding\*

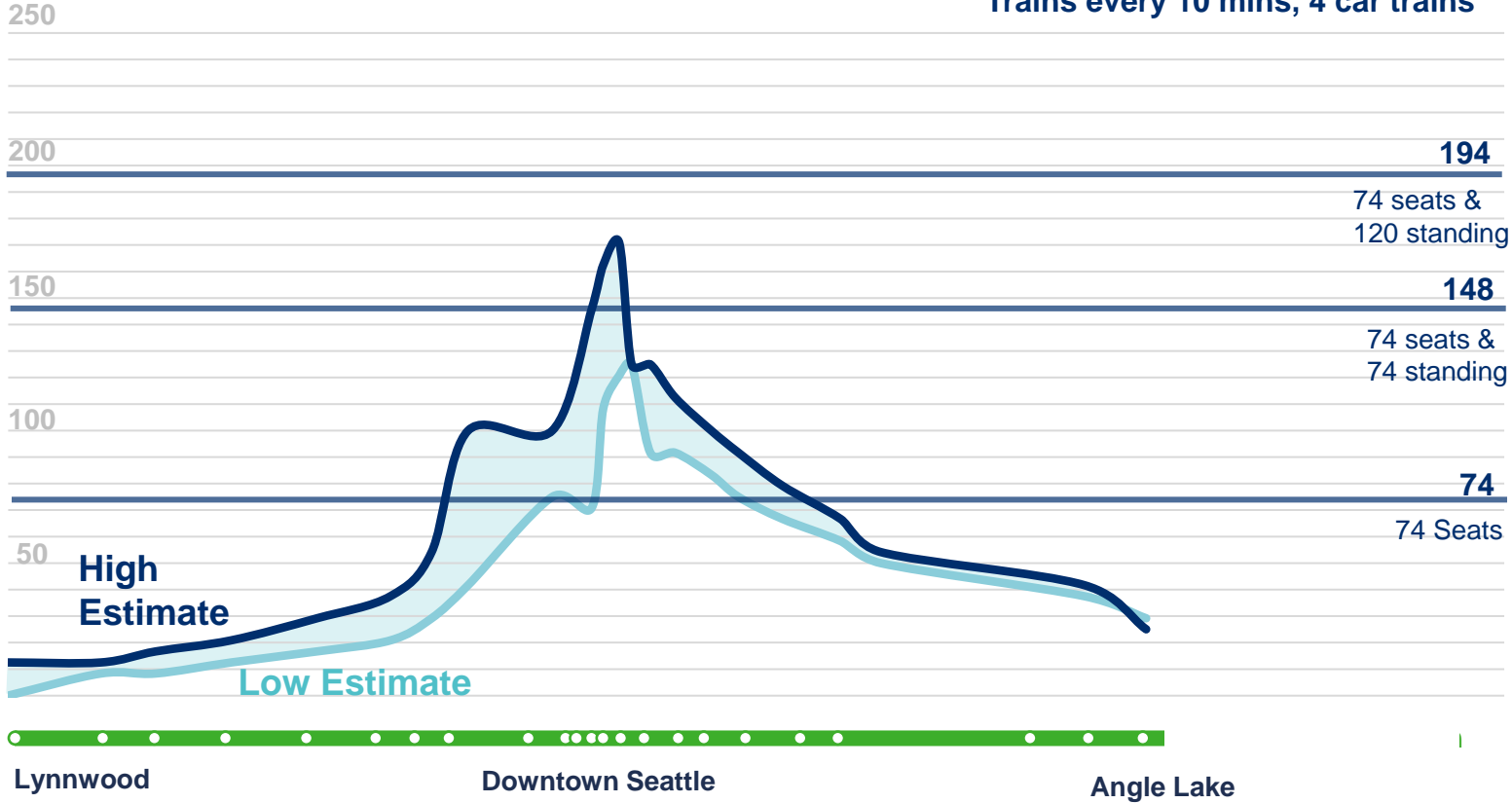
Trains every 10 mins, 4 car trains

Very crowded, may not be room to board

Challenges getting on and off

People standing but you can still get on

Everyone has a seat

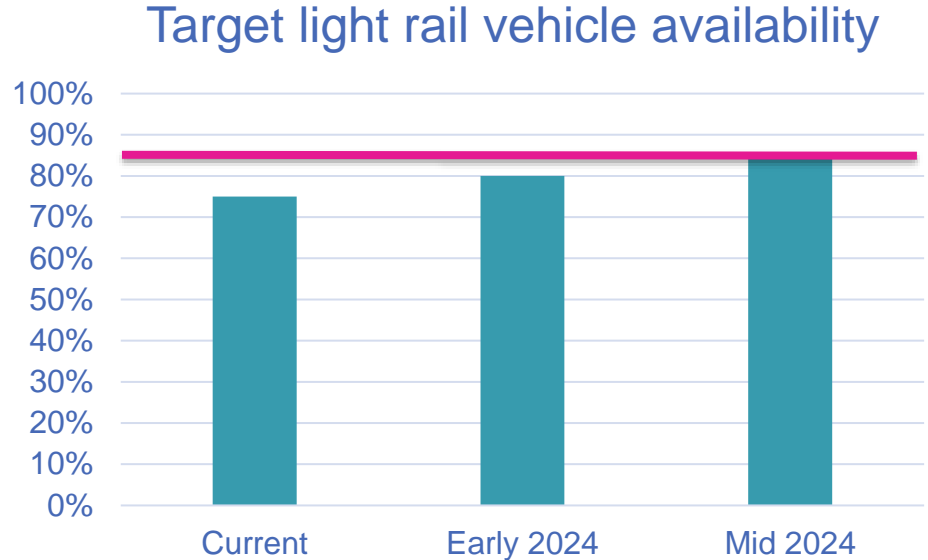


# *Mitigation Strategies for 2024*

# Strategy: Improve fleet availability

## Continue to put more Series 2 LRVs into service

- Series 2 (Siemens) fleet availability below 85% standard
- Working to fix warranty and preventative maintenance issues
- Target 80% everyday availability by Q1 2024, 85% by Q3 2024, ahead of Lynnwood Link opening





# Strategy: Augment Link with ST Express

- Temporarily postpone Lynnwood Link ST Express restructure
- Continue some service to downtown Seattle to provide additional capacity
- Range of options of how far north to operate parallel bus service
- Shorter route = more capacity, fewer direct destinations (Options 1-2)
- Longer route = more destination directly served, lower capacity (Options 3-4)
- **Further evaluation needed**



**2026**

***1 Line Lynnwood to Federal Way***

***2 Line Downtown Redmond to Lynnwood***

***ST2 light rail extensions complete***

# 2026

## Peak service with available fleet

1 & 2

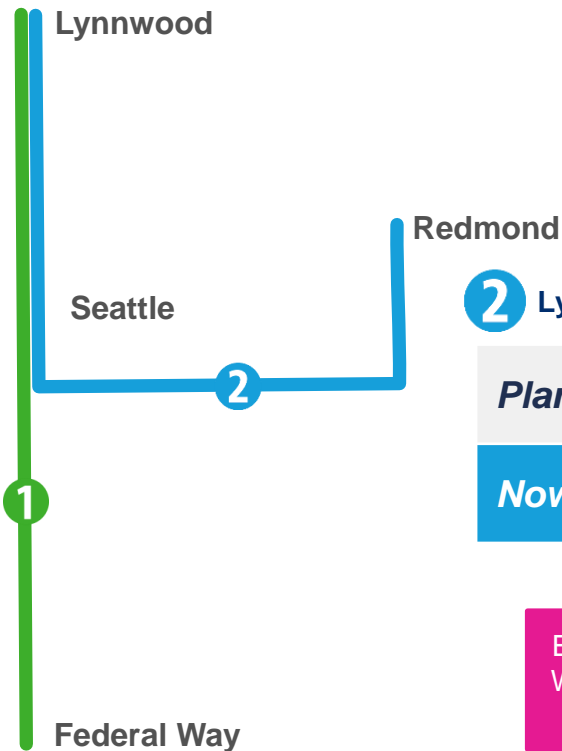
Combined service  
Lynnwood to IDS

<i>Planned</i>	4 min	4 cars
<i>Now possible</i>	5 min	3-4 cars

1

Lynnwood to Federal Way

<i>Planned</i>	8 min	4 cars
<i>Now possible</i>	10 min	4 cars



2

Lynnwood to Downtown Redmond

<i>Planned</i>	8 min	4 cars
<i>Now possible</i>	10 min	3 cars

Extending 1 Line to Federal Way requires limiting 2 Line to 3 car trains

2026

# Northbound 1 Line crowding\*

① Trains every 10 mins, 4 car trains

② Trains every 10 mins, 3 car trains

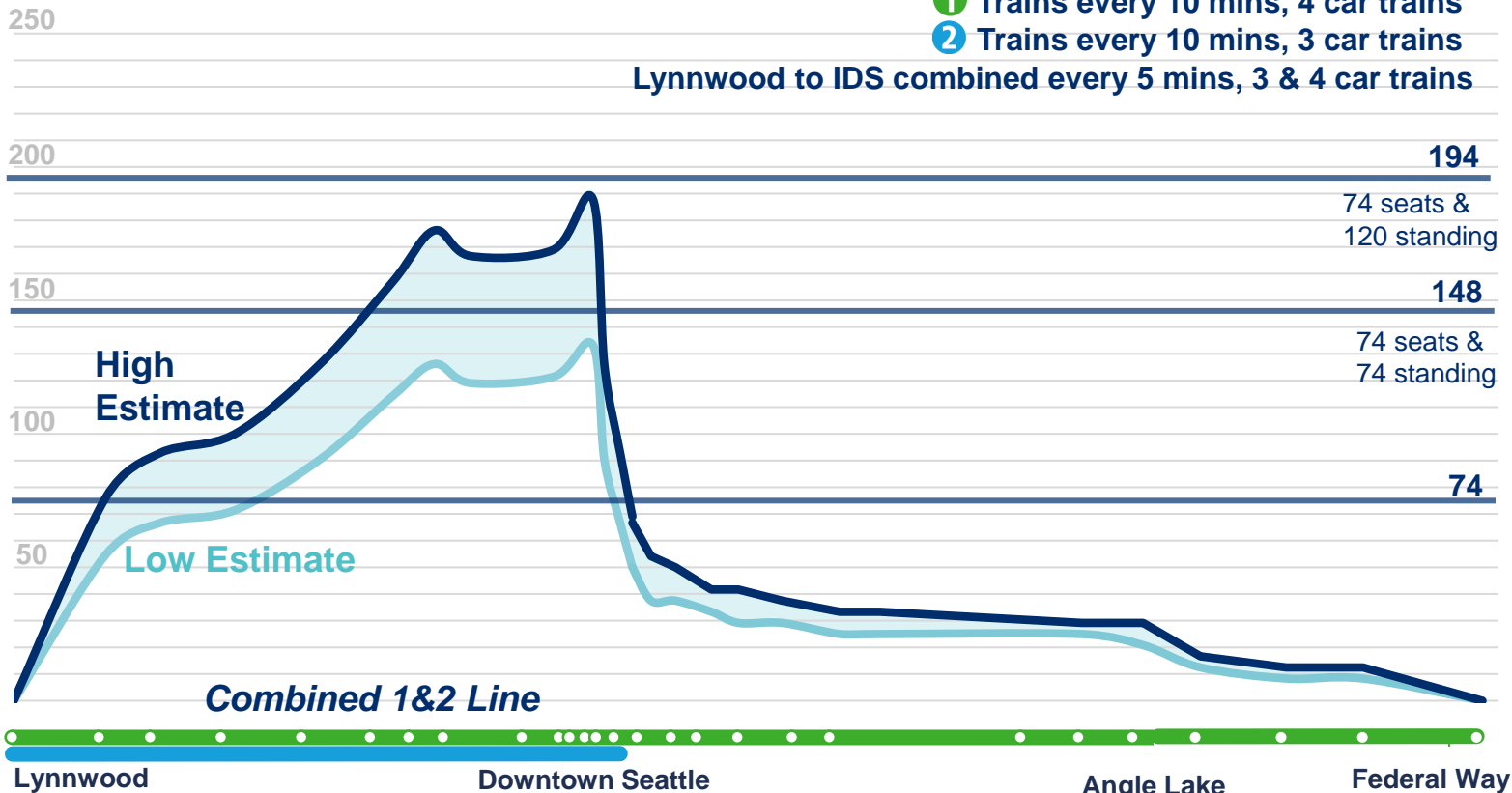
Lynnwood to IDS combined every 5 mins, 3 & 4 car trains

Very crowded, may not be room to board

Challenges getting on and off

People standing but you can still get on

Everyone has a seat



2026

# Southbound 1 Line crowding\*

① Trains every 10 mins, 4 car trains

② Trains every 10 mins, 3 car trains

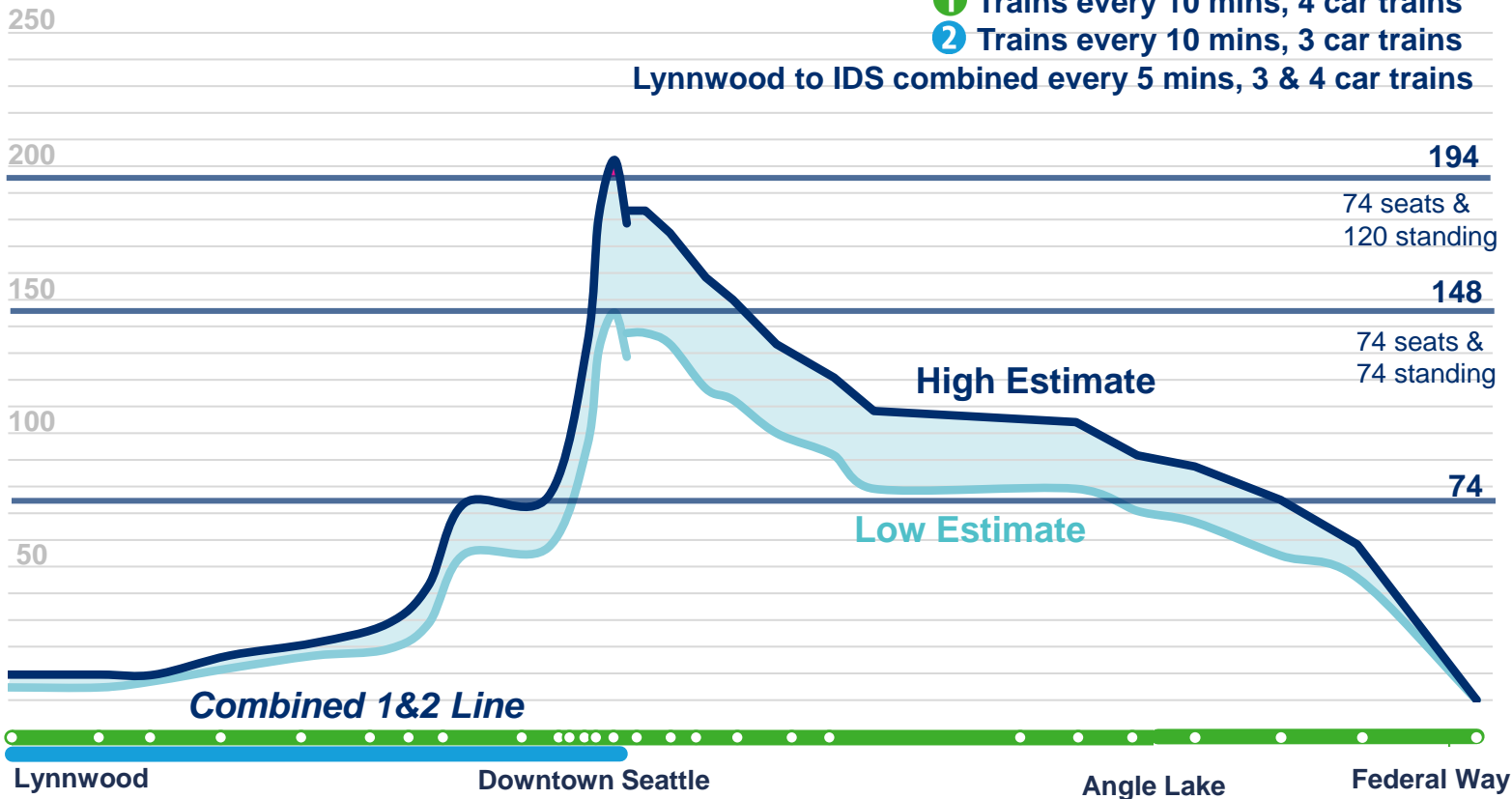
Lynnwood to IDS combined every 5 mins, 3 & 4 car trains

Very crowded, may not be room to board

Challenges getting on and off

People standing but you can still get on

Everyone has a seat



2026

# Eastbound 2 Line crowding\*

① Trains every 10 mins, 4 car trains

② Trains every 10 mins, 3 car trains

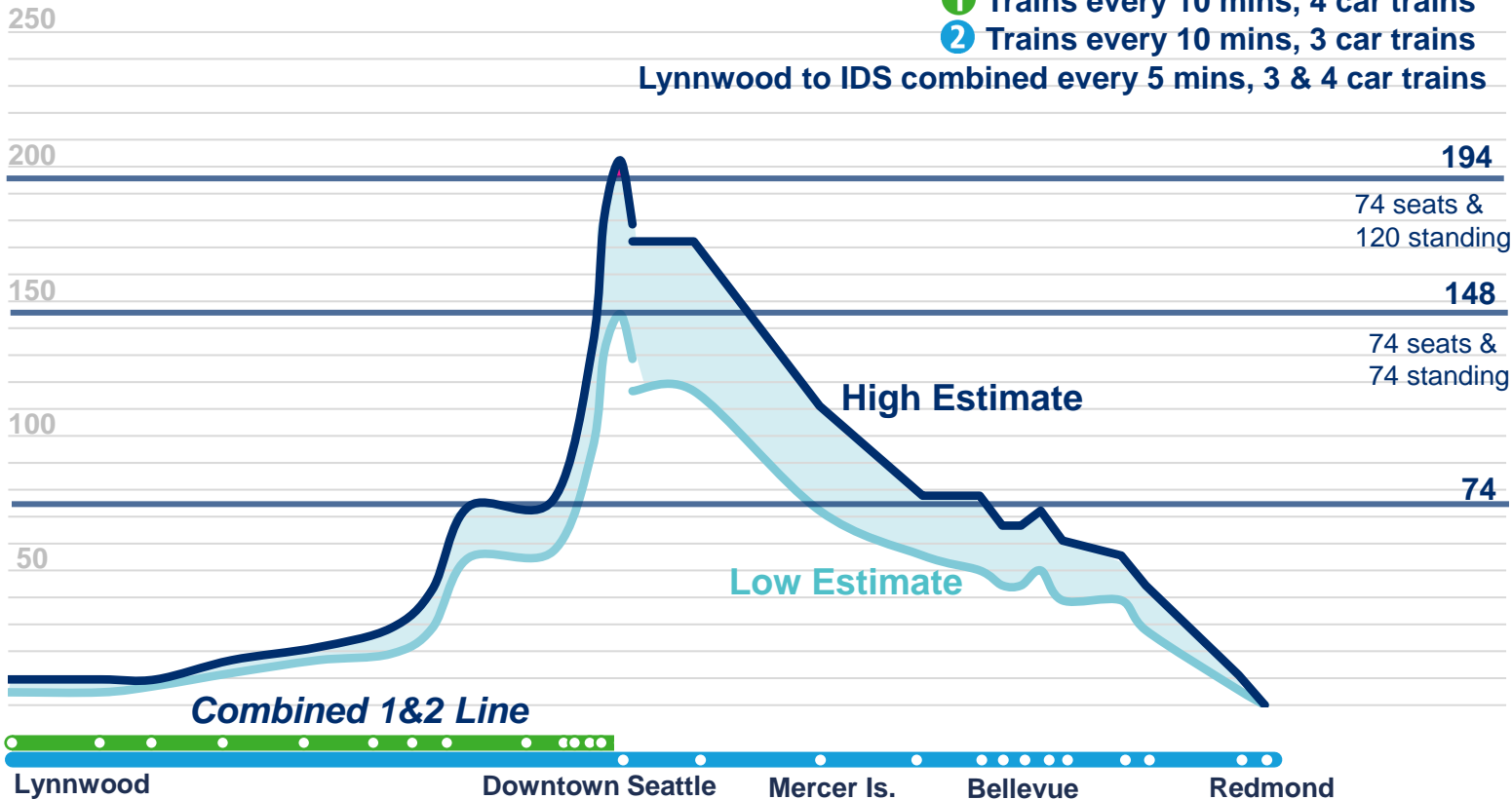
Lynnwood to IDS combined every 5 mins, 3 & 4 car trains

Very crowded, may not be room to board

Challenges getting on and off

People standing but you can still get on

Everyone has a seat



194

74 seats & 120 standing

148

74 seats & 74 standing

74

Train direction →

Combined 1&2 Line

Lynnwood

Downtown Seattle

Mercer Is.

Bellevue

Redmond

***Additional Mitigation  
Strategies for 2026 and  
Beyond***

# Strategy: Northgate peak turn-back service

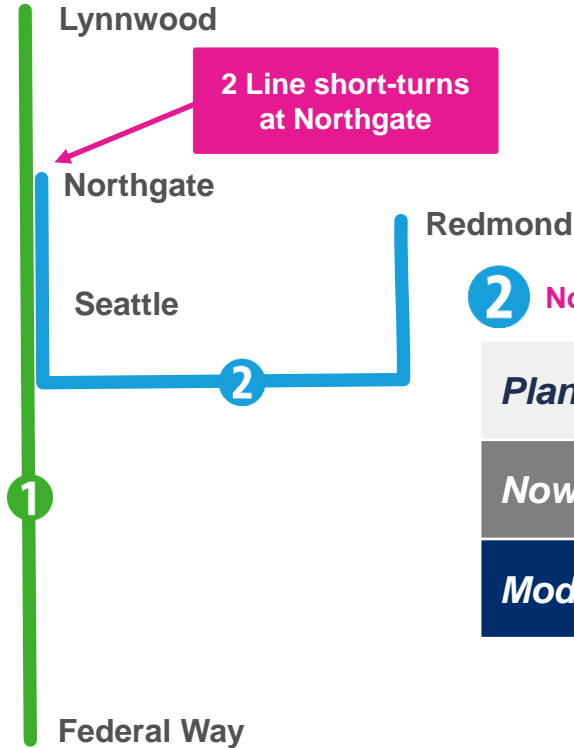
**1 & 2**

Combined service  
Northgate to IDS

<b>Planned</b>	4 min	4 cars
<b>Now possible</b>	5 min	3-4 cars
<b>Modified</b>	5 min	4 cars

**1** Lynnwood to Federal Way

<b>Planned</b>	8 min	4 cars
<b>Now possible</b>	10 min	4 cars
<b>Modified</b>	10 min	4 cars



**2** Northgate to Downtown Redmond

<b>Planned</b>	8 min	4 cars
<b>Now possible</b>	10 min	3 cars
<b>Modified</b>	10 min	4 cars



# Northgate turnback takeaways

Pros	Cons
Increases capacity by ~14% between Northgate and Chinatown International District by consistently providing 4-car trains on both the 1 & 2 Lines	Reduces peak service between Lynnwood & Northgate from 4 minutes to 8 minutes
Likely to address majority of average crowding above our standard, except for a short stretch in downtown Seattle	Train loads may be uneven as passengers pick their train, and some station platforms may get overcrowded
	Increases operational complexity and risk of system delays
	Requires additional operators to turn trains quickly
	Requires additional security officers to ensure passengers have disembarked short turning trains
	Eliminates use of Northgate pocket track for trains that need to come out of service

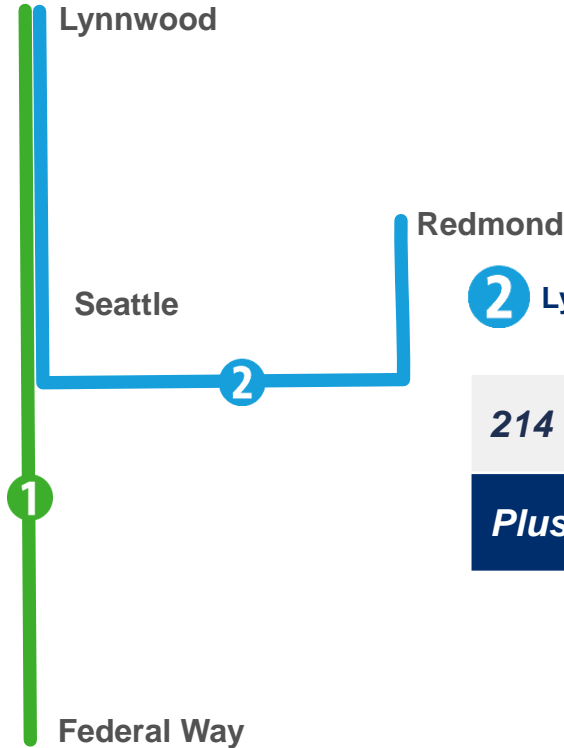
# Strategy: accelerate purchase of 10 LRVs

**1 & 2** Combined service  
Lynnwood to IDS

214 LRV fleet	4-5 min	3-4 cars
<b>Plus 10 LRV</b>	4-5 min	3-4 cars

**1** Lynnwood to Federal Way

214 LRV fleet	8-10 min	4 cars
<b>Plus 10 LRV</b>	8-10 min	4 cars



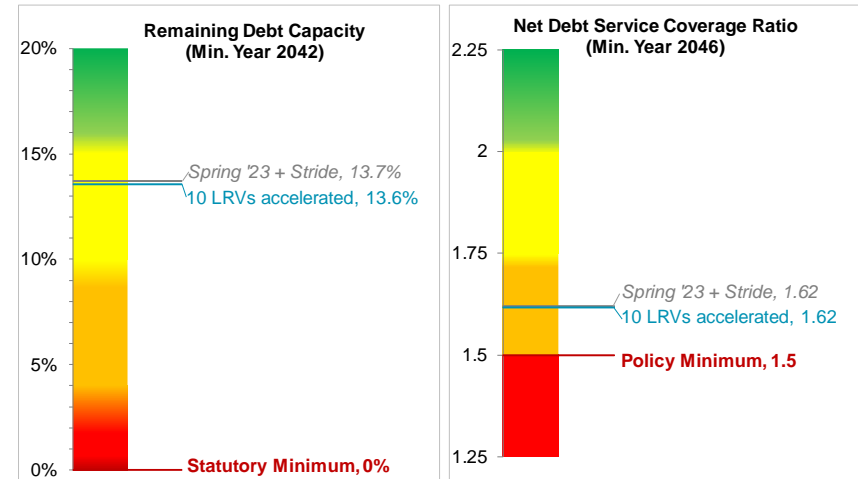
**2** Lynnwood to Downtown Redmond

214 LRV fleet	8-10 min	3 cars
<b>Plus 10 LRV</b>	8-10 min	3-4 cars

More 4 car trains  
on 2 Line

# Accelerated purchase of LRVs benefit

- Accelerates purchase of 10 LRVs from Series 3 to Series 2 – does not increase funded long-term fleet
- Increases fleet to 224 until Series 3 LRVs are available in the early 2030s
- Supports more 4-car trains
- Storage options being assessed
- Assumes lower cost / LRV than Series 3
- Results in a small decrease in financial capacity and coverage due to earlier spending
- Grant funding possible, but not assumed



PRELIMINARY

# ***ST2-related passenger experience actions***

## ***Already doing***

- Continue to improve fleet availability
- Analyze augmenting Link with ST Express capacity

## ***Action recommended***

- Consider accelerating purchase of 10 LRVs by amending the LRV Fleet Expansion project

## ***Action not recommended***

- Modify service to turn back peak period 2-Line trains at Northgate

# *Additional LRVs: why now?*

- Improves short term capacity without impacting long range fleet and OMF capacity decisions
- No new construction of track is required, maximizing use of existing operation and maintenance infrastructure
- Small window of opportunity to add cars to our Siemens order and get in the production queue for 2027 delivery
- Long lead times on materials and supplies to build additional cars
- Costs will continue to rise over time

# ***Next steps on LRV staff recommendation***

**If the Board is interested, we propose actions to:**

## ***1. Amend the LRV Fleet Expansion project baseline budget and schedule - November***

- Enables negotiation of change order with Siemens

## ***2. Approve two contract modifications – early 2024***

- To purchase 10 additional cars from Siemens, assuming successful negotiations
- To extend engineering and inspection oversight services with Hatch/LTK in support of the extended project duration

# *Next steps for ST3 system needs*

- 2023** • **December:** ST3 light rail service and passenger experience
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- 2024** • **February:** improving ST3 passenger experience + program affordability considerations
- **March:** seek Board direction about service and capital priorities
- Following Board direction: update long-range service plan, agency financial plan, rail fleet management plan, annual program review

*Thank you.*



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