Developing a Capacity Target - Part 3

Office of Transportation Planning

December 4, 2017

MBTA Strategic Plan

Capacity

"Modernize and increase the capacity of the system to accommodate increased ridership driven by population and job growth"

Ridership Target

"By the end of 2017, establish a target for the necessary capacity on the core system to meet increased ridership due to economic growth"

A goal or target will help inform - Capital Planning, Service Planning, Fare Policy

Review: Ridership - A Three Part Series

Part 1 - 10/23/17: Current Context

- Overview of FY15-FY17 ridership trends
- Key Takeaways
  - MBTA ridership and the needs of the region are changing. Similar to peer agencies, the MBTA is losing ridership off peak and on weekends but continues to gain during the peak on rapid transit.
  - While data does not yet confirm why, there are indications that ridership losses may be a result of competition from TNCs.

Review: Ridership - A Three Part Series

Part 2 - 11/06/17: Input for a ridership goal

- Policy considerations and changing role of competition
- Key Takeaways
  - While new services exist that are helping to meet the transportation needs of our customers, we believe the MBTA rapid transit system will continue to be the “backbone” of mobility as eastern Massachusetts’ economic vitality continues to add more jobs and residents.

FMCB Feedback at Nov 6 Meeting

- **MBTA should set a goal to increase its market share**
- **Focus should be on ensuring MBTA can meet future demand during peak periods**

  → This direction argues for a **Capacity Target** that estimates the amount of peak capacity necessary to meet future demand, with a goal of **increasing the MBTA's share of peak period trips**

  → This presentation does not focus on capacity outside of peak periods.

Part 3 Agenda

- Current Capacity / Demand
- Future Capacity / Demand
- FMCB Direction

NOTE: Today's presentation focuses only on the rapid transit system. We will seek additional direction from the board on how to address bus and commuter rail at the end of the presentation.

CURRENT CAPACITY AND DEMAND

How Should we Think About Capacity ?

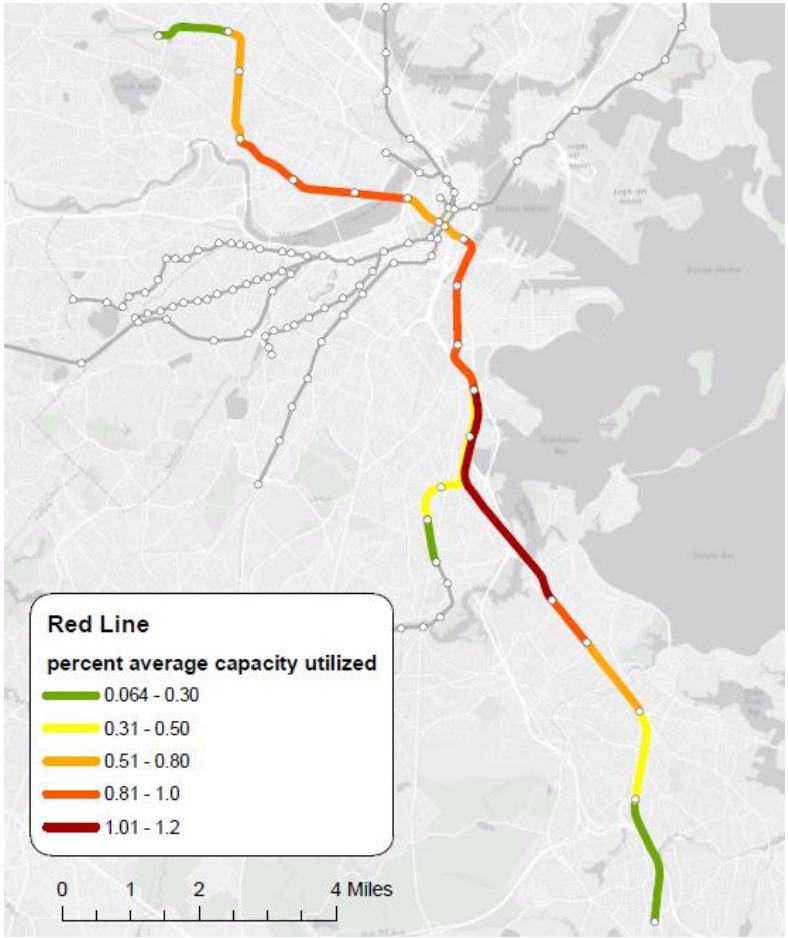
Capacity - the maximum number of passengers that can be carried past a single point on a fixed route, in a given period of time

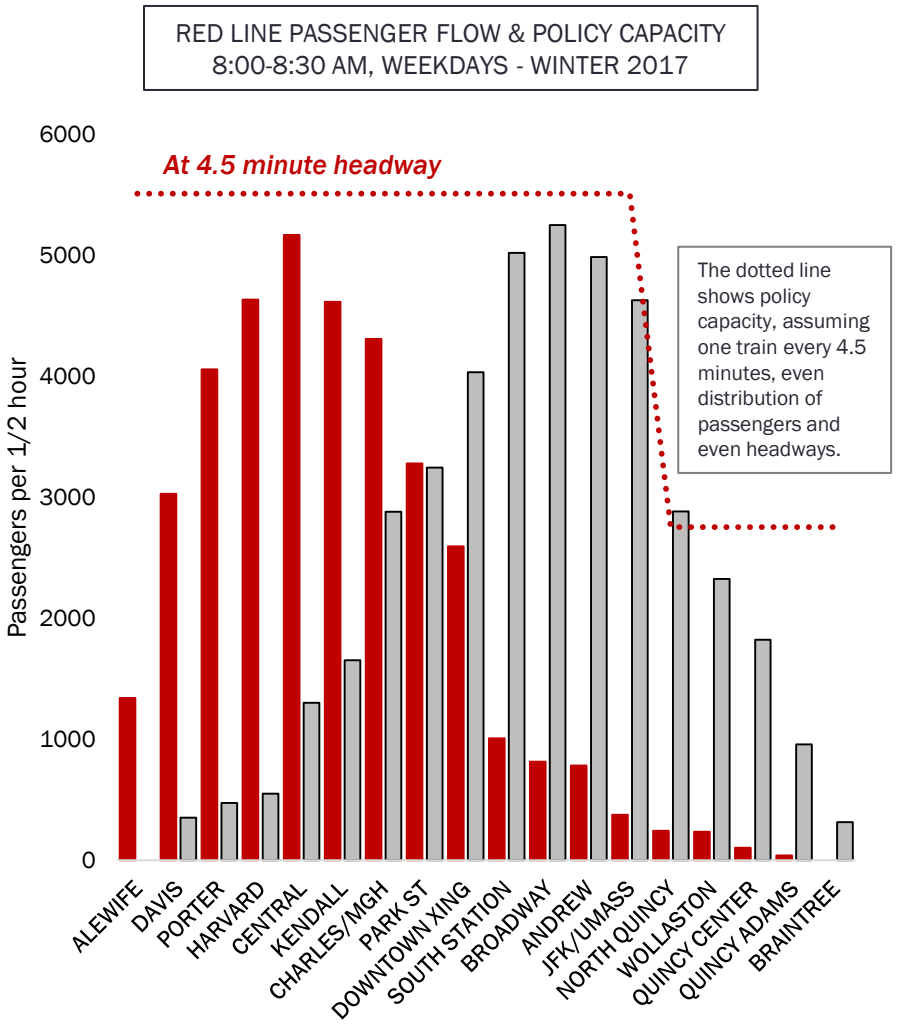
But there are different ways to define each of these elements of "capacity":

Questions for FMCB	Approach used in this deck
How should we define the maximum number of passengers?	100% of vehicle policy capacity (ranges from 230% to 271% of seated capacity – depending on vehicle)
What do we mean by a single point?	Peak load point (point on a line where the highest average passenger load is typically experienced)
What is a given period of time?	½ hour
Scheduled or actual?	Scheduled

Rapid Transit Peak Capacity

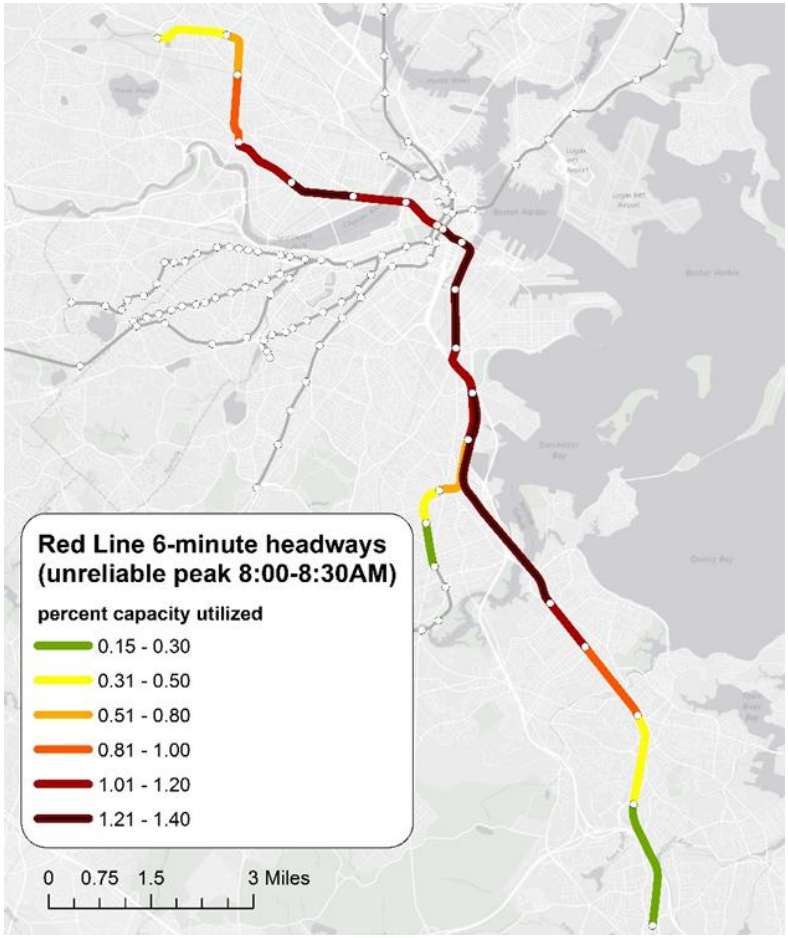
Red Line Schedule Met

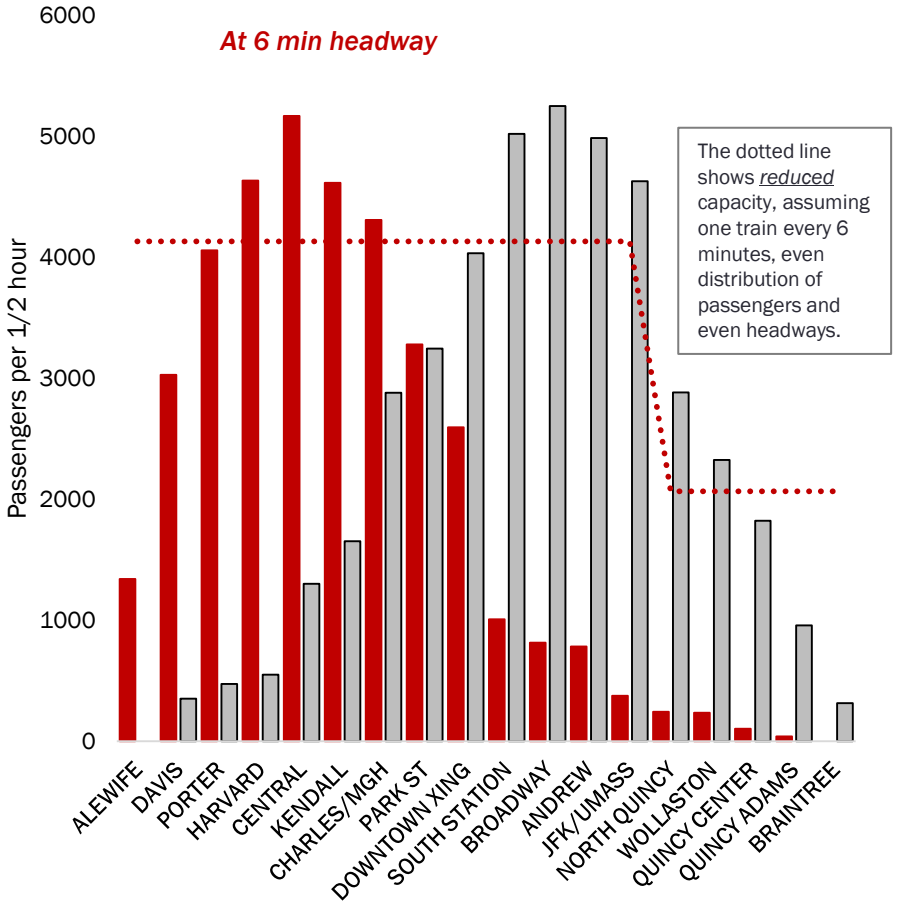




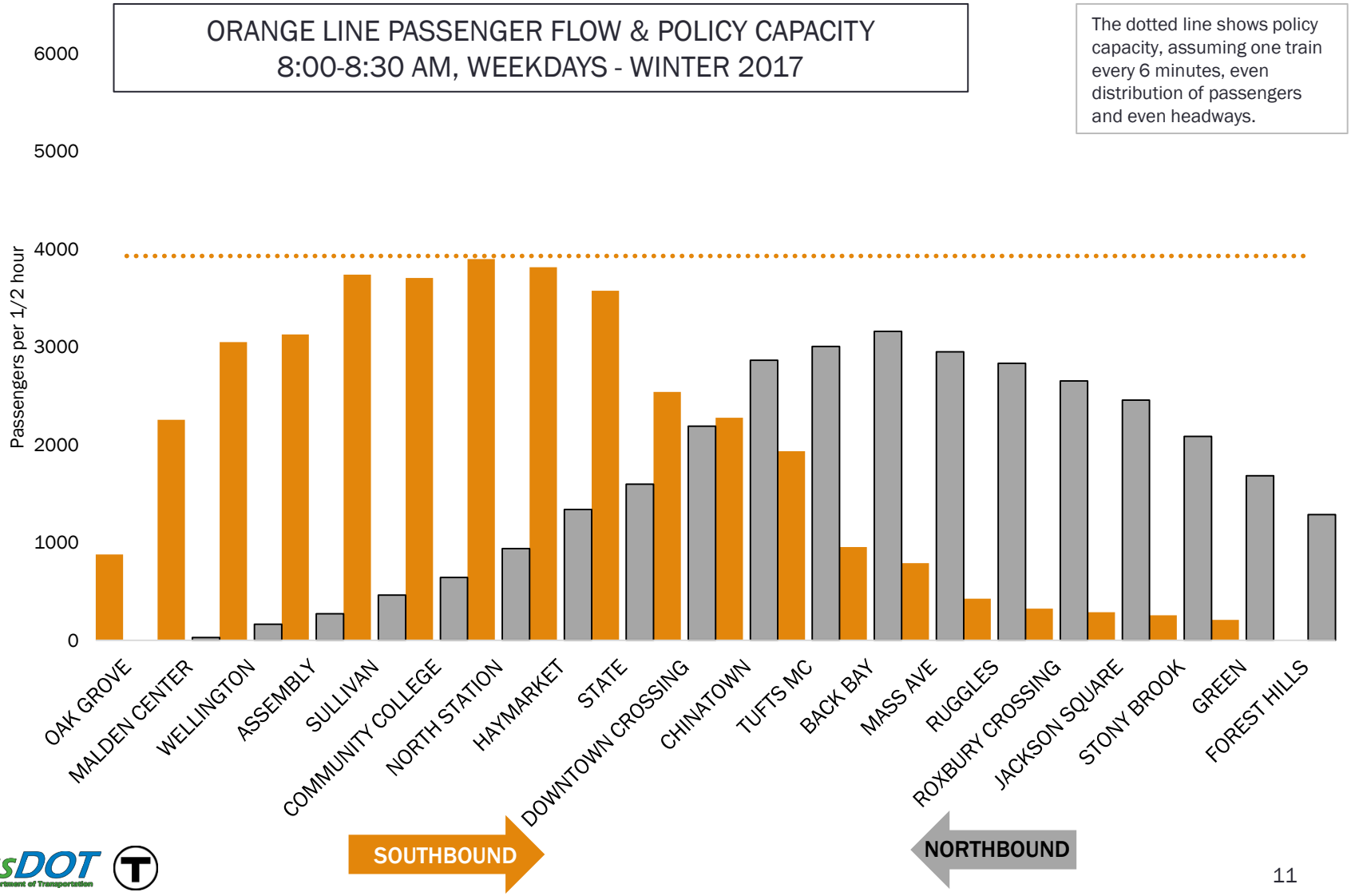
Rapid Transit Peak Capacity

Red Line Schedule **NOT** Met

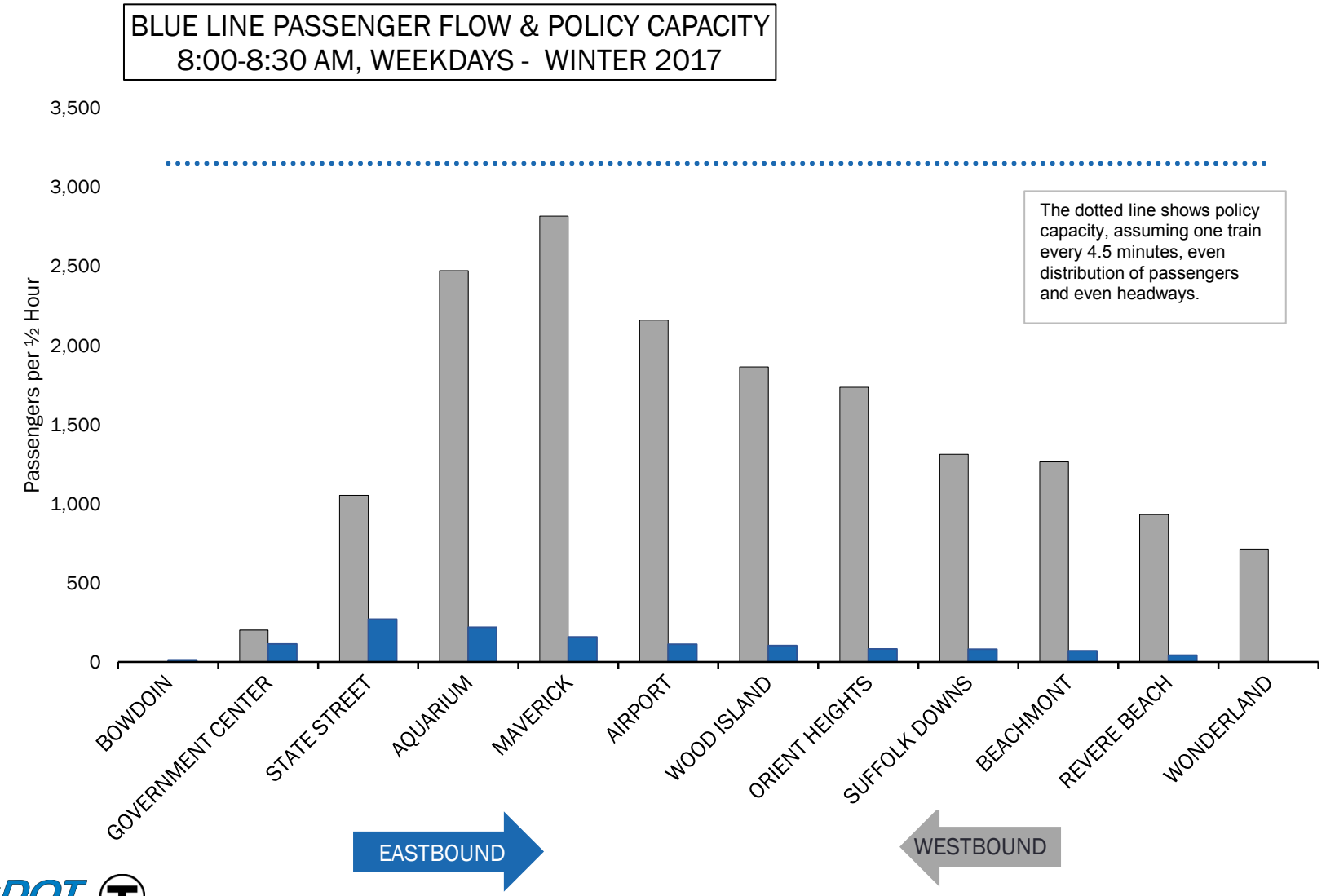




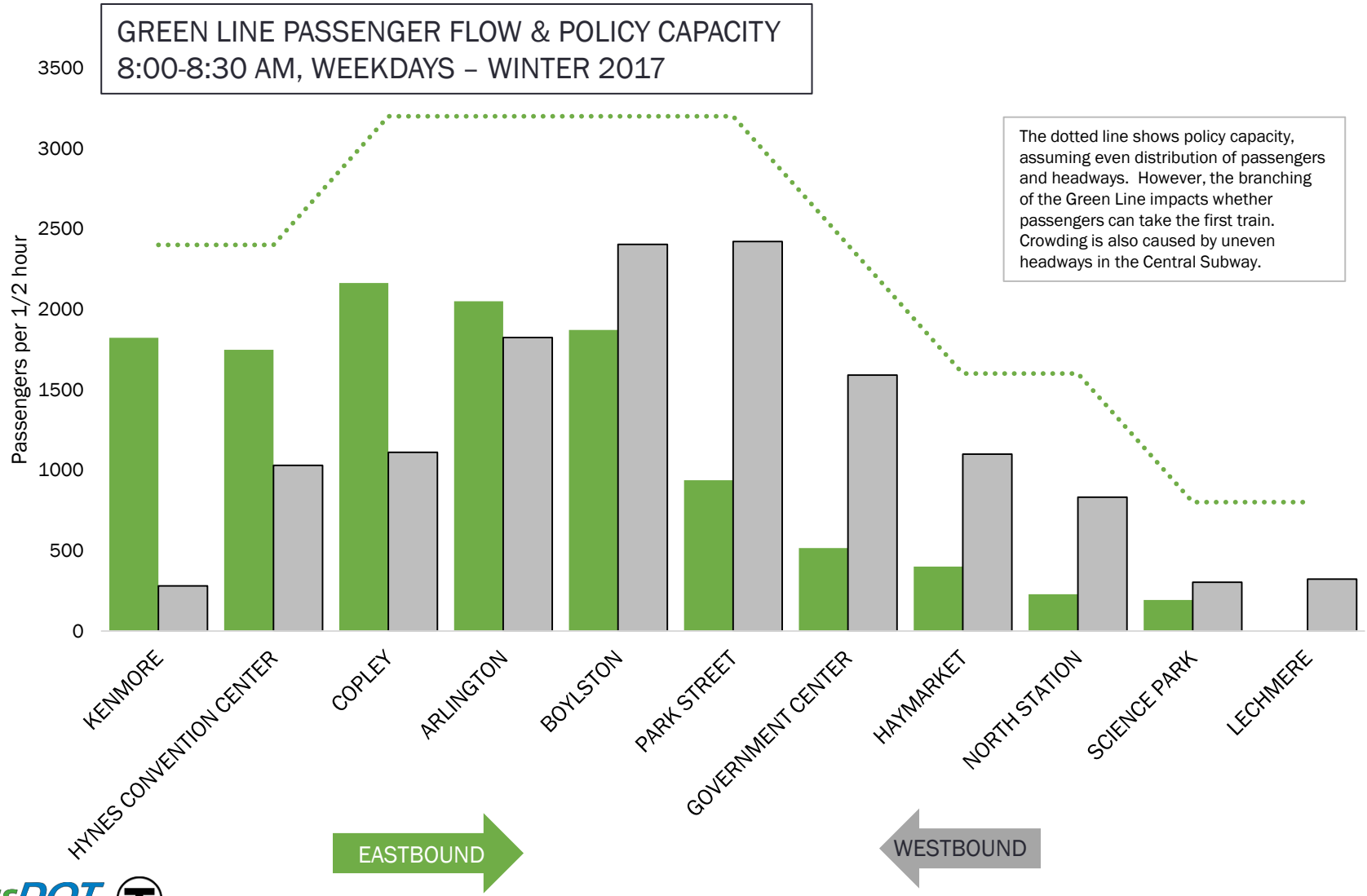
Orange Line Capacity and Demand



Blue Line Capacity and Demand



Green Line Capacity and Demand



FUTURE CAPACITY AND DEMAND

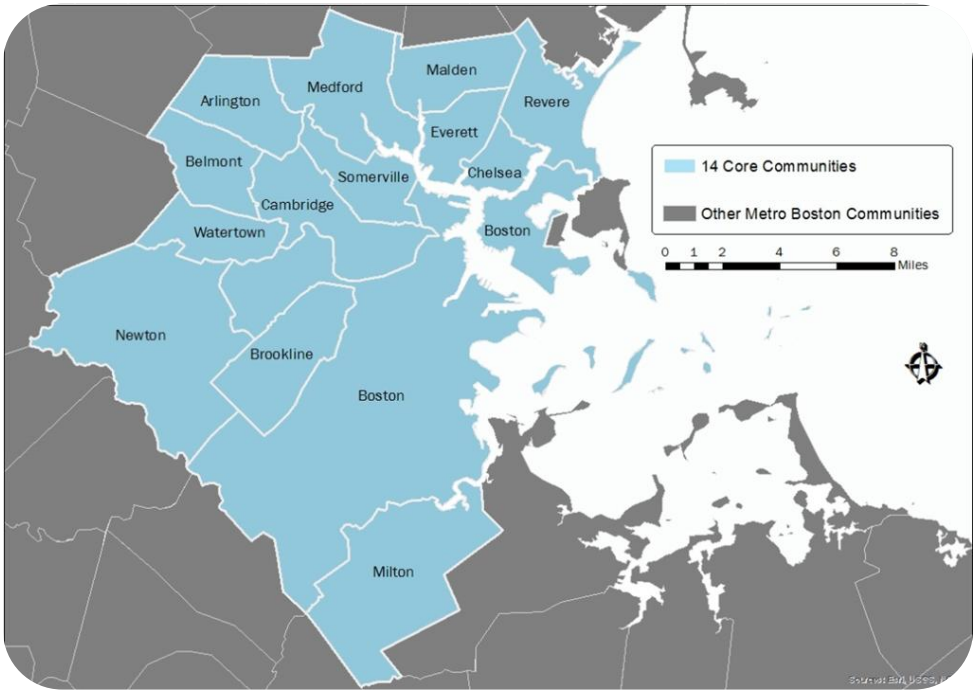
Factors that Impact Demand

- Service Delivery/Performance
- Population Growth
- Employment Growth
- Fare Structure and Level
- Cost of/Competition from Other Modes
- Shifting Demographics
- Land Use
- Local Policies for Streets
- Service Design
- Customer Amenities and Branding

Are there other factors that influence demand that we should be thinking about?

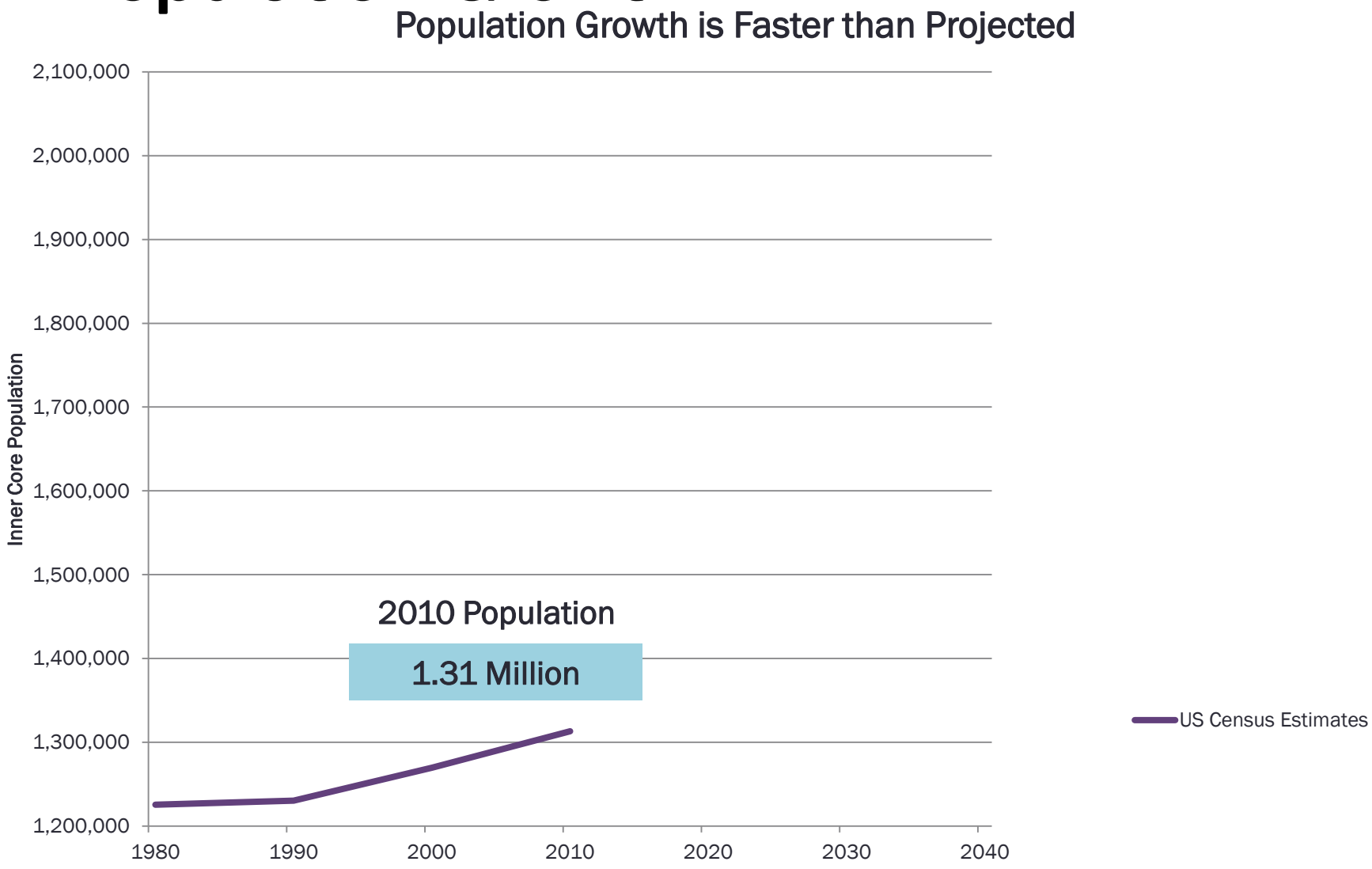
Factors that Impact Demand : Population In the Core

- Ridership has tracked with inner core population growth since 2000
- Rates of population growth not seen since prior to WWII suggest that this factor could put the greatest upward pressure on demand

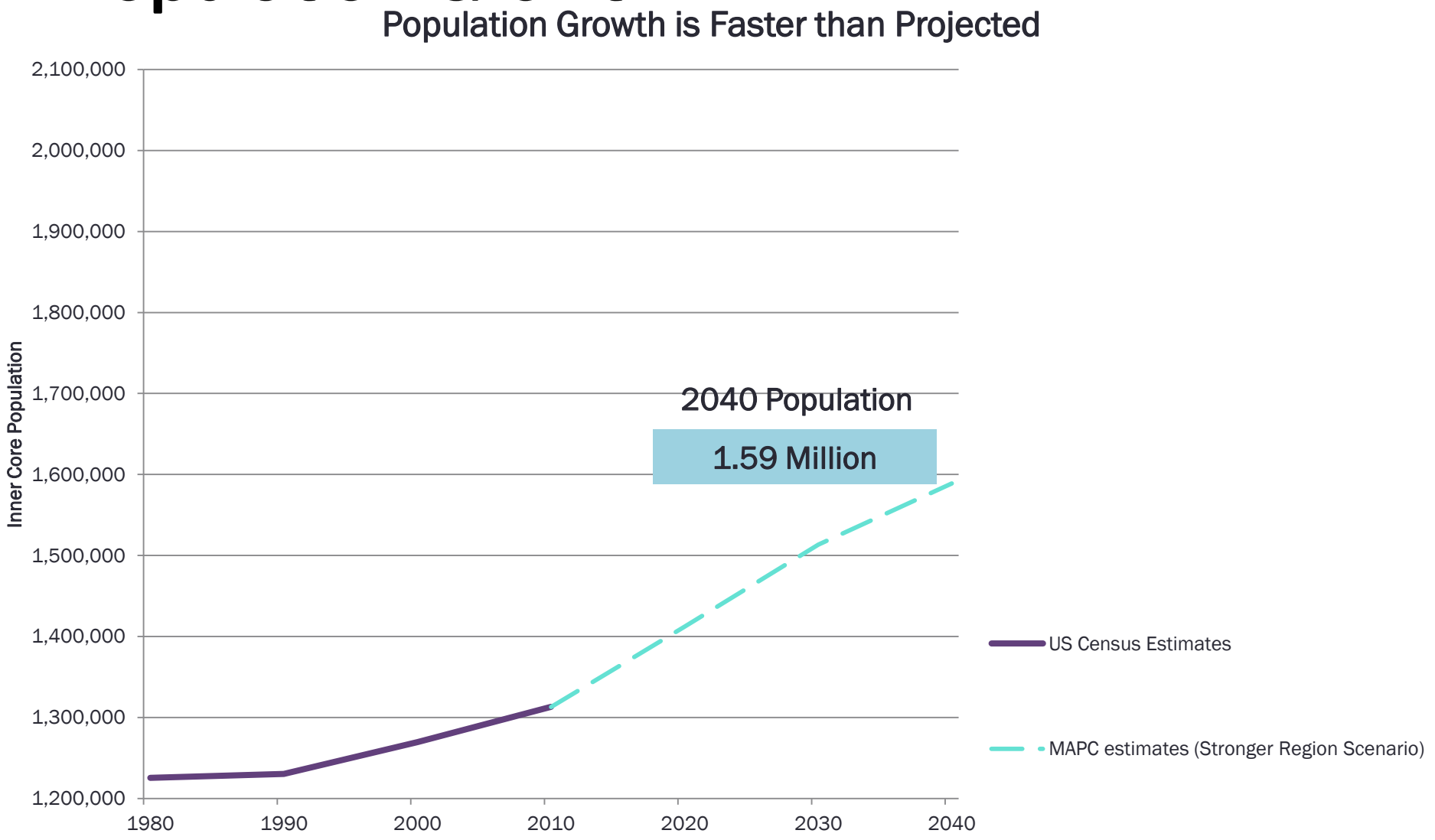


95% of MBTA bus and rapid transit ridership is in these 14 municipalities

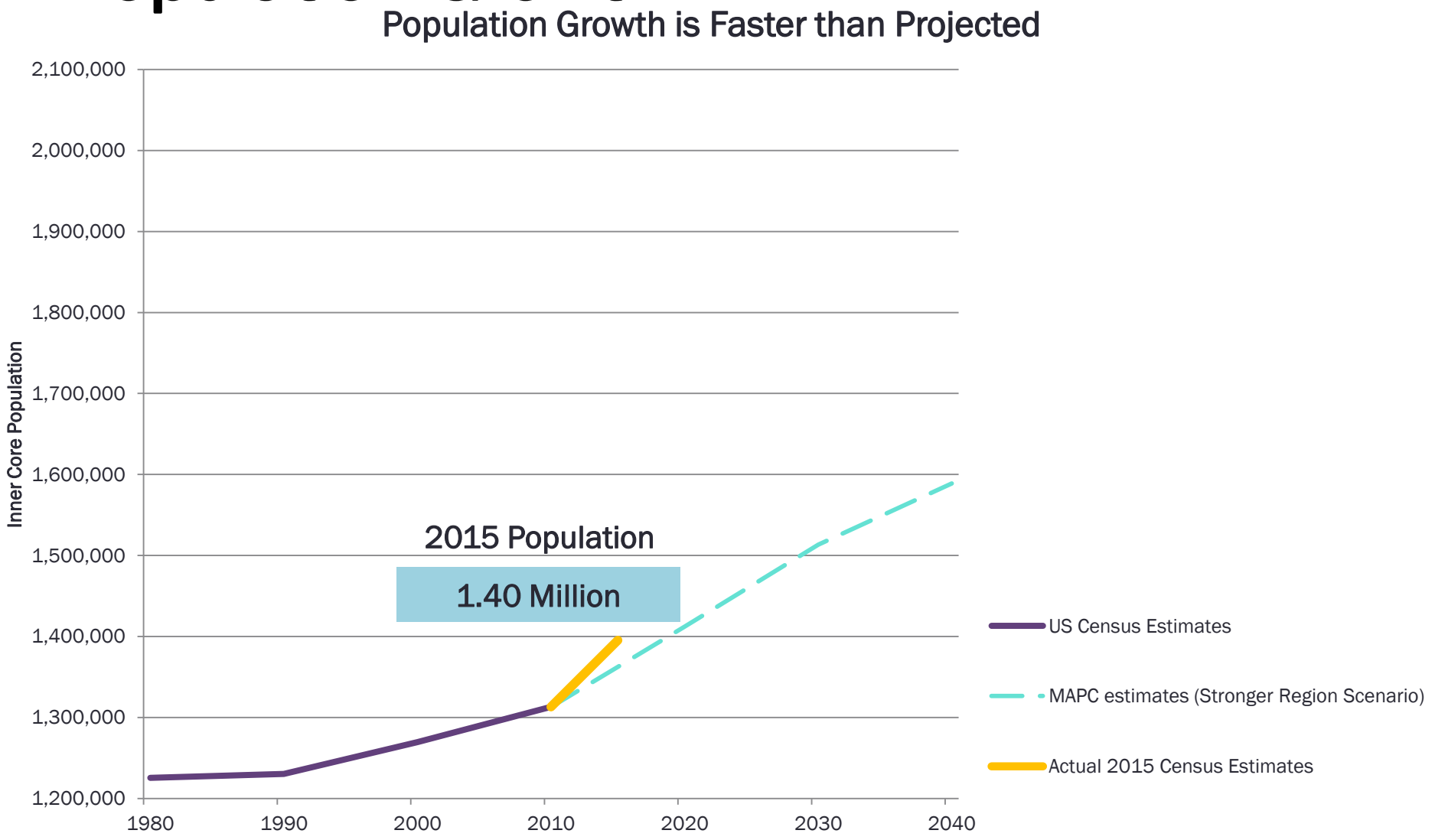
Population Growth



Population Growth

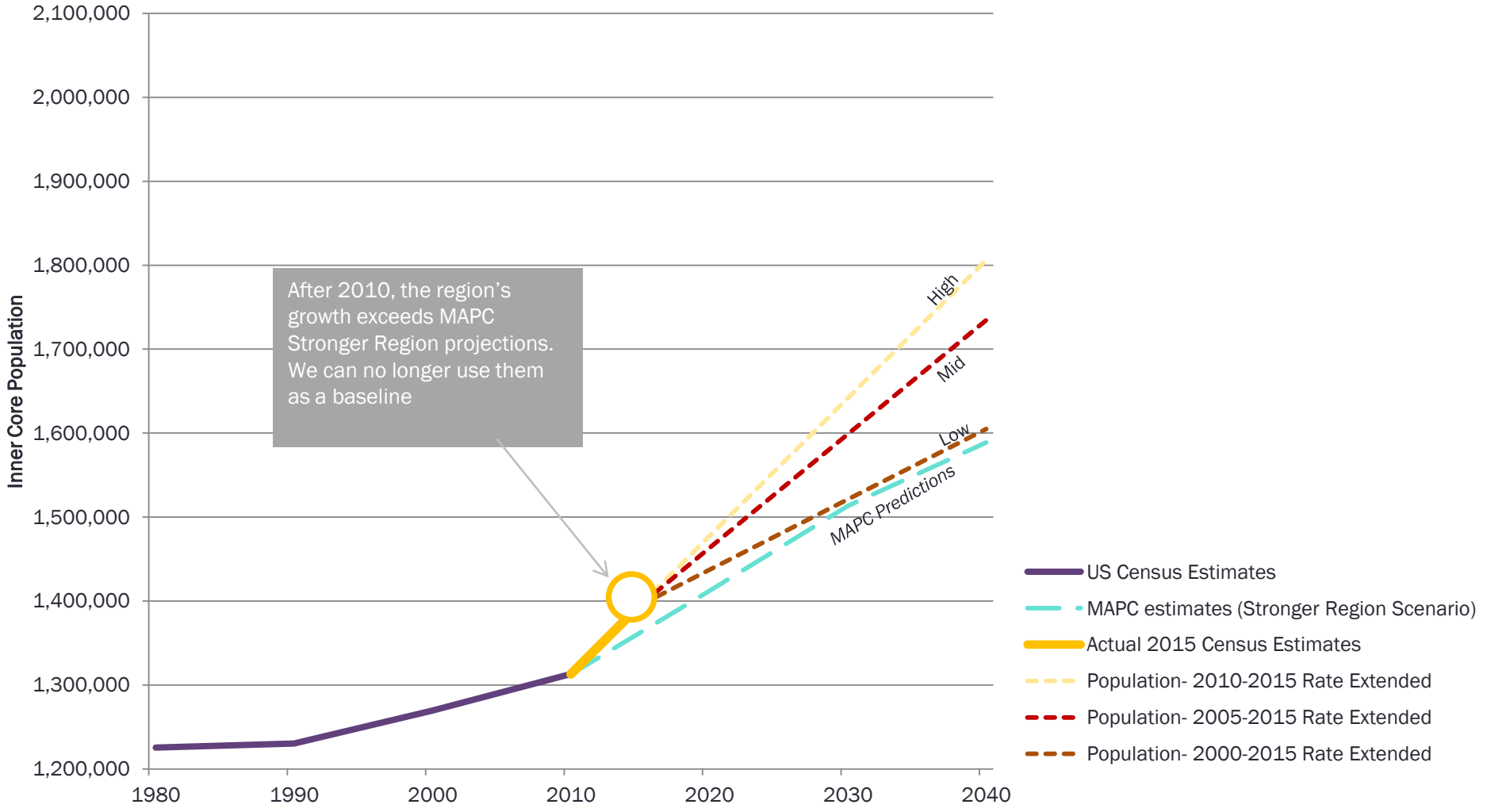


Population Growth

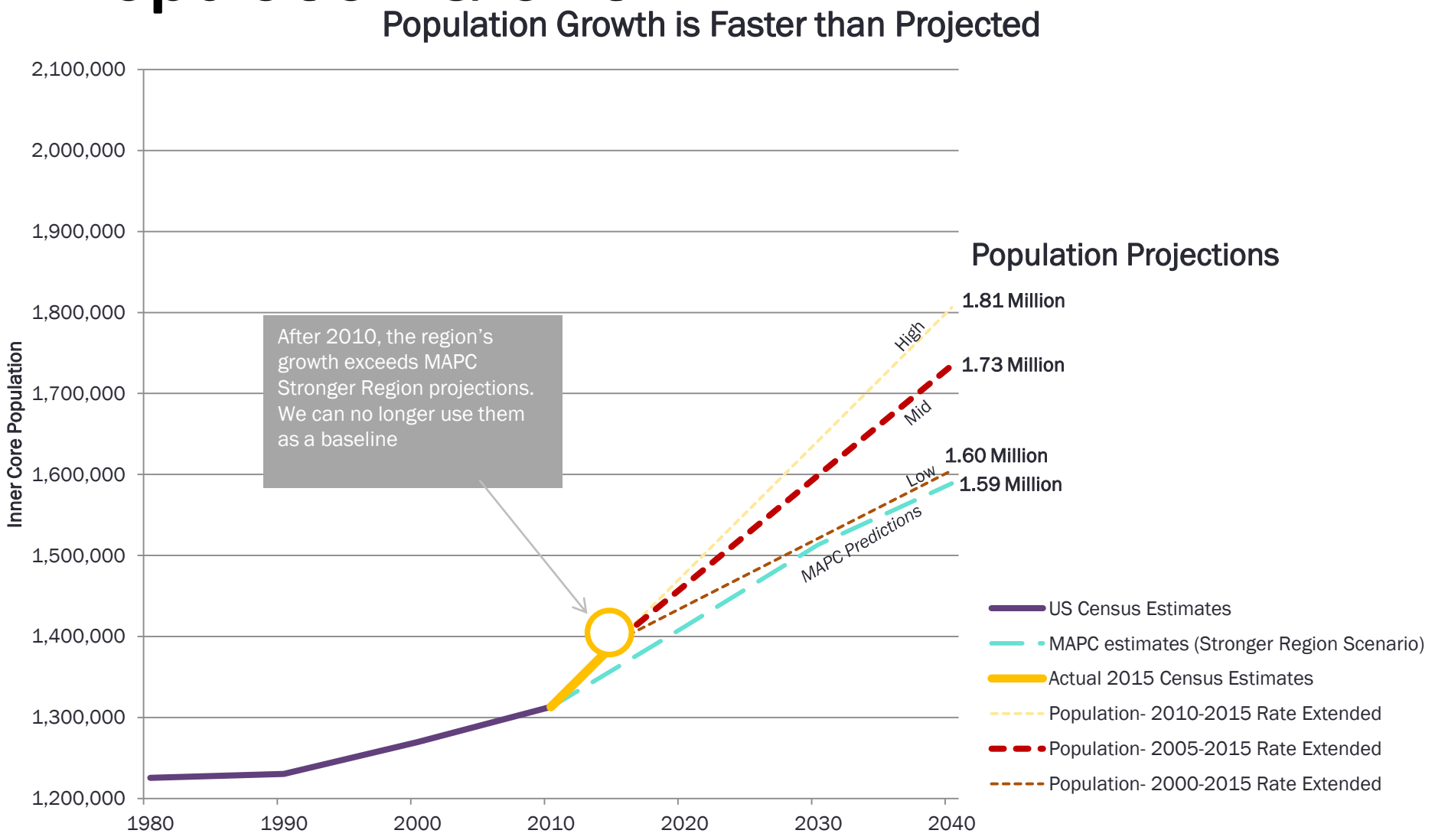


Population Growth

Population Growth is Faster than Projected



Population Growth



Translating Population Growth into Capacity: Key Assumption

Peak rapid transit demand will continue to track with inner core population growth if quality service is provided. Therefore, maintaining market share will require enough capacity to serve growth in demand consistent with assumed inner core population growth.

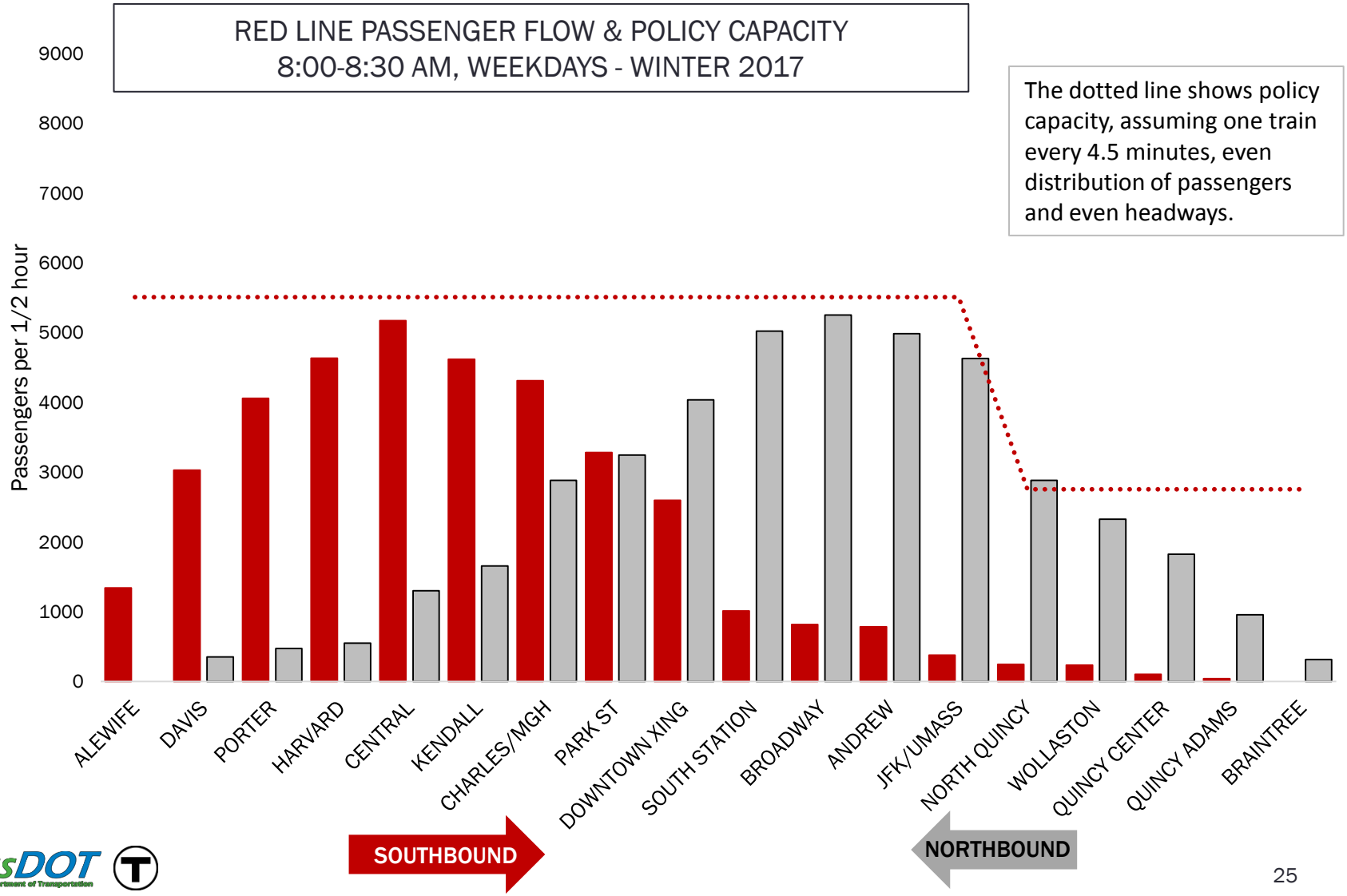
Future Capacity

	2017		2040	
	Capacity/ Half-Hour	Current Minimum Headways	Future Headways	Capacity Improvement
RL	5,511 At trunk	4.5 min	3 min	+50%
OL	3,930	6 min	4.5 min	+40%
BL	3,150	4.5 min	4.5 min	0%*
GL	1,600 to 3,200 In Central Subway	1.5 min to 3 min	1.5 min to 2 min	0% - 50%

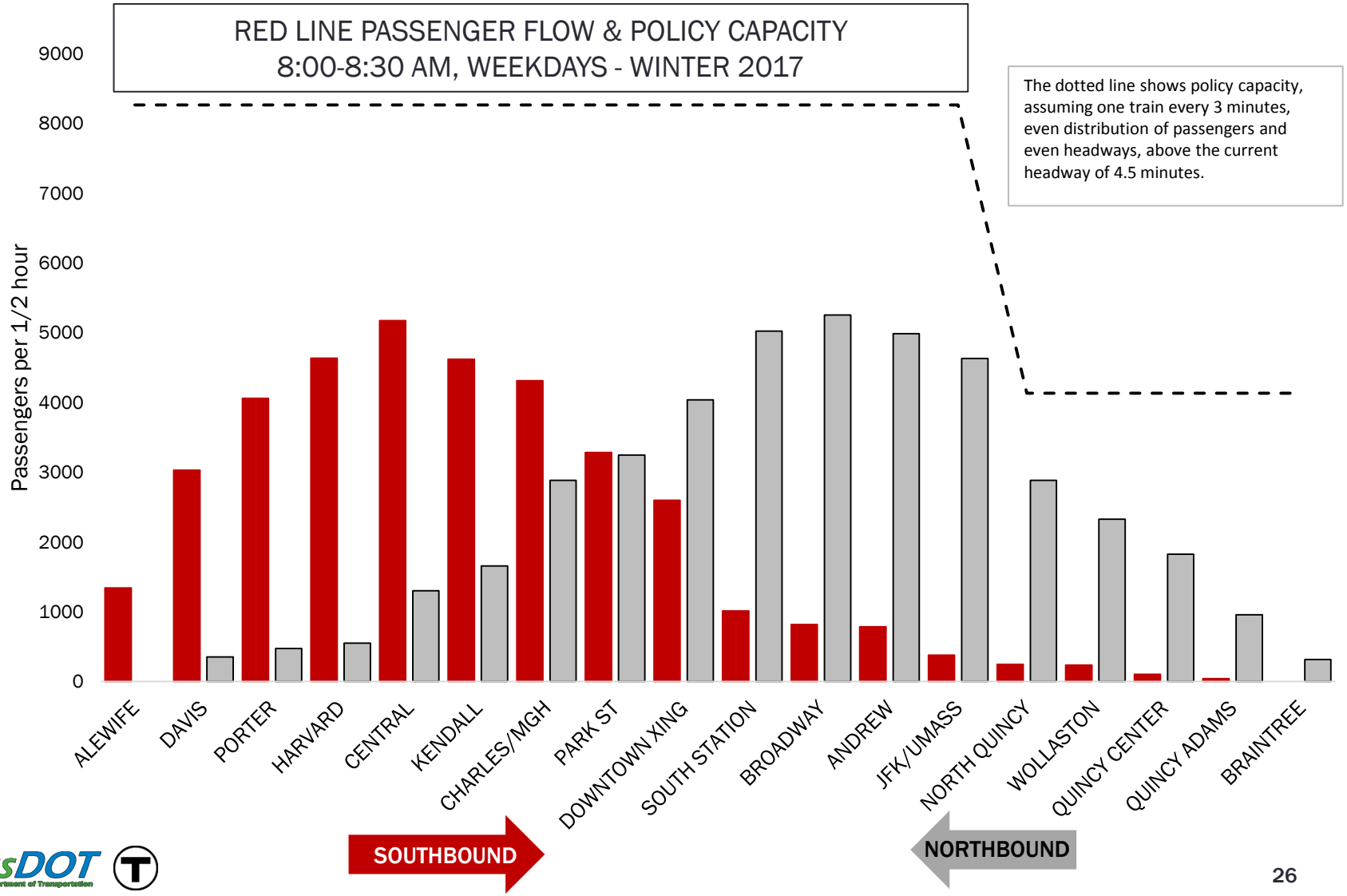
* Operational and other changes could increase capacity by up to 15%

RED LINE

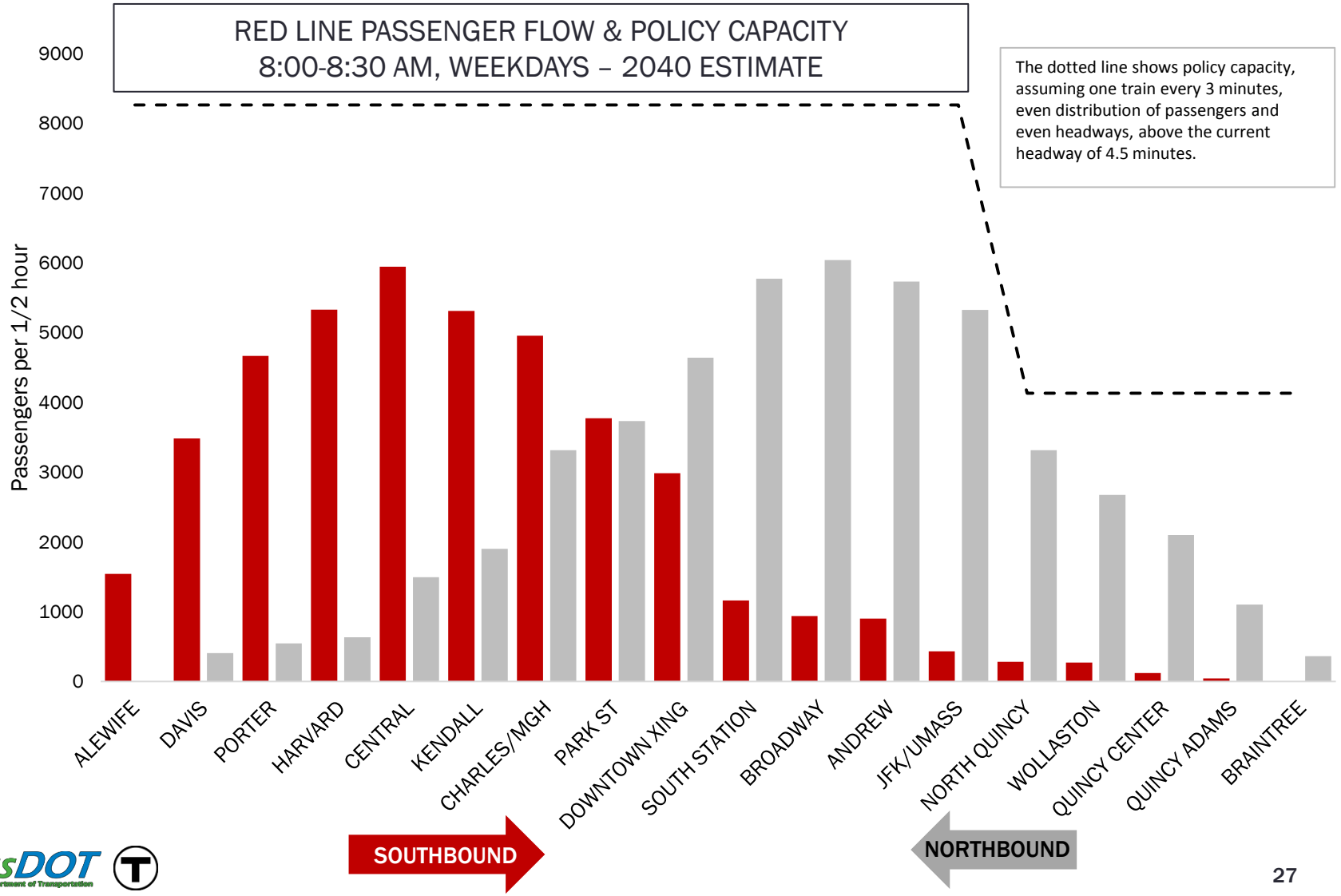
Red Line Capacity and Demand



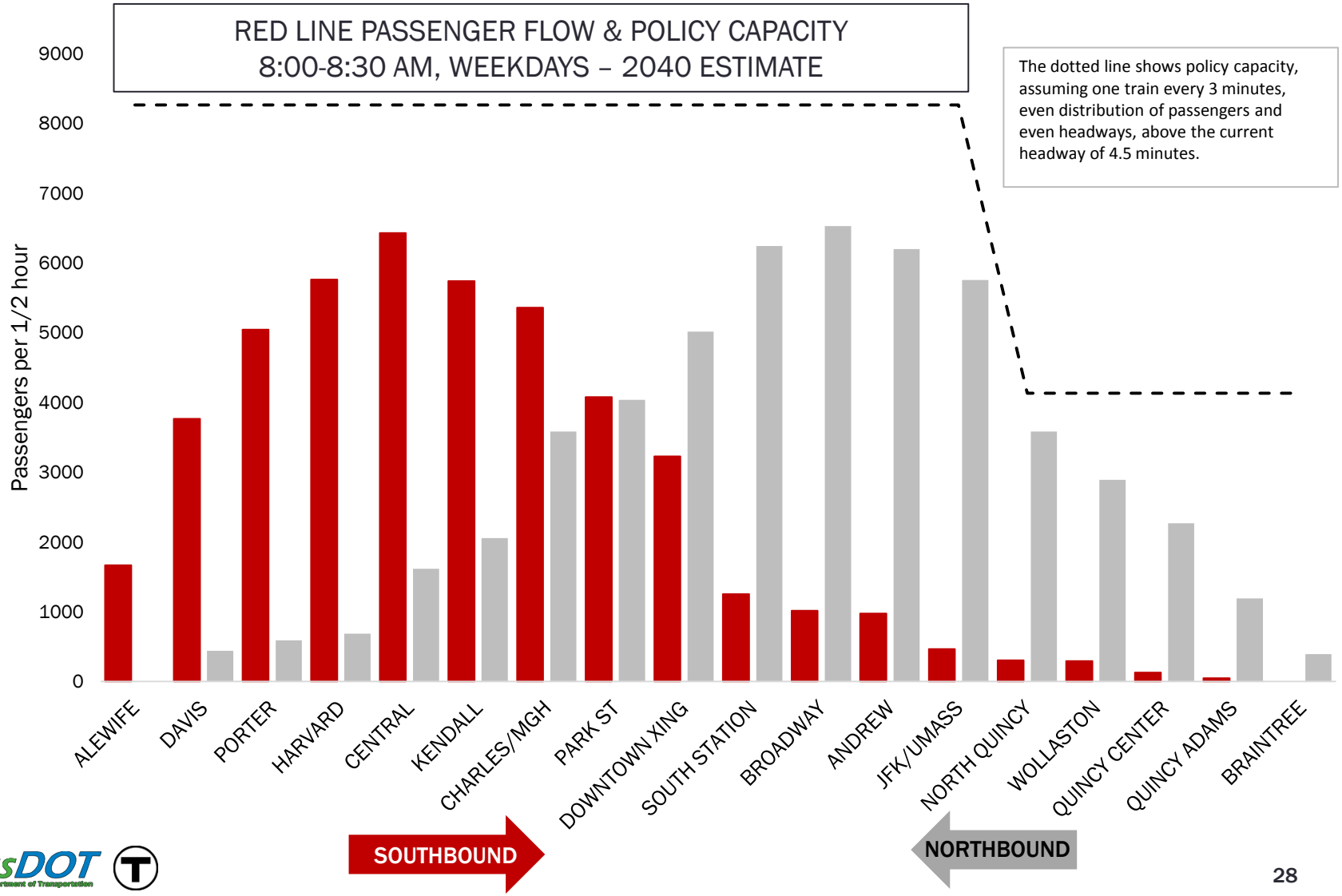
Red Line Capacity and Demand



Future Capacity and Demand: Red Line Low Growth

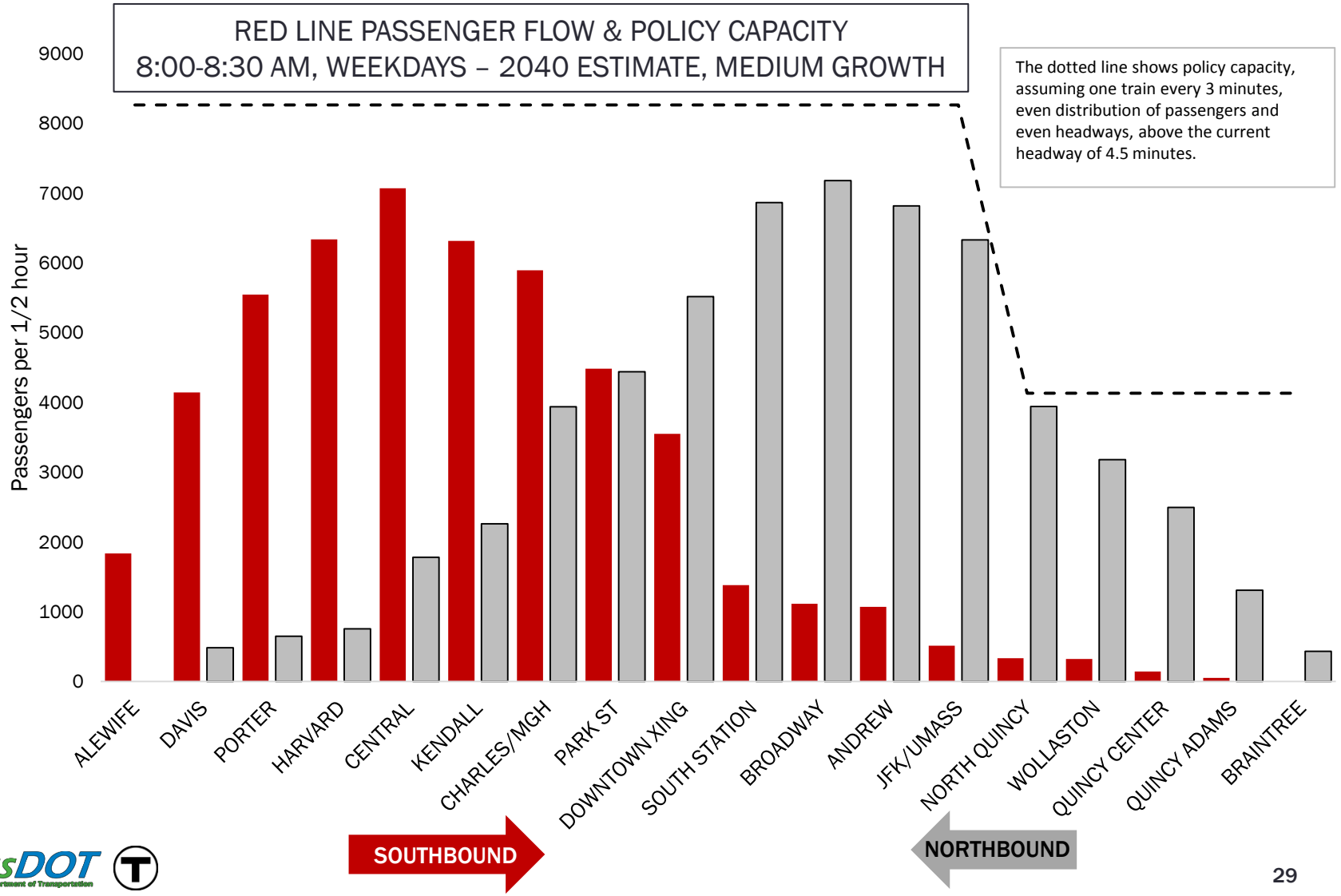


Future Capacity and Demand: Red Line Medium Growth



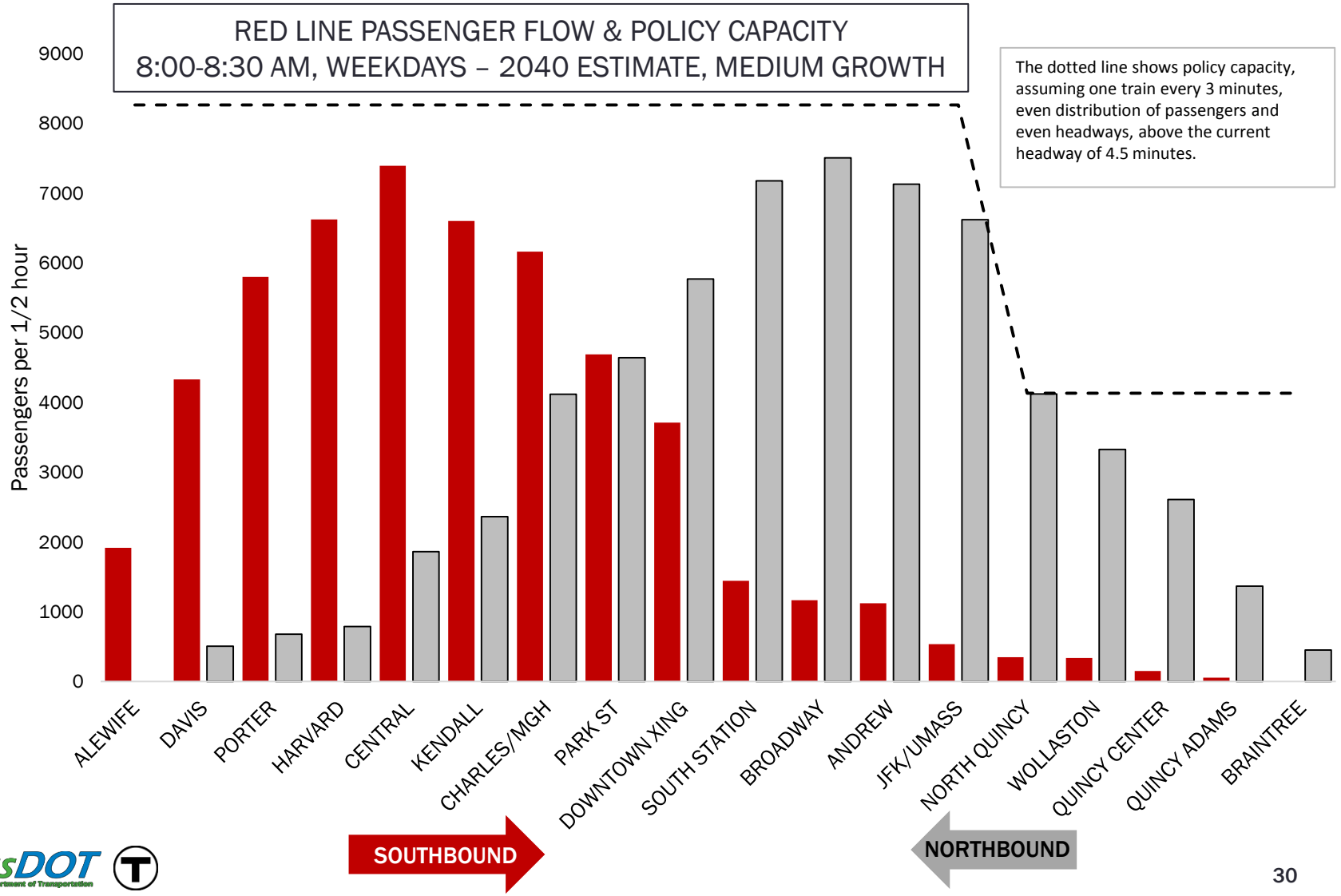
+10% Growth in 2040 Peak Ridership

Red Line



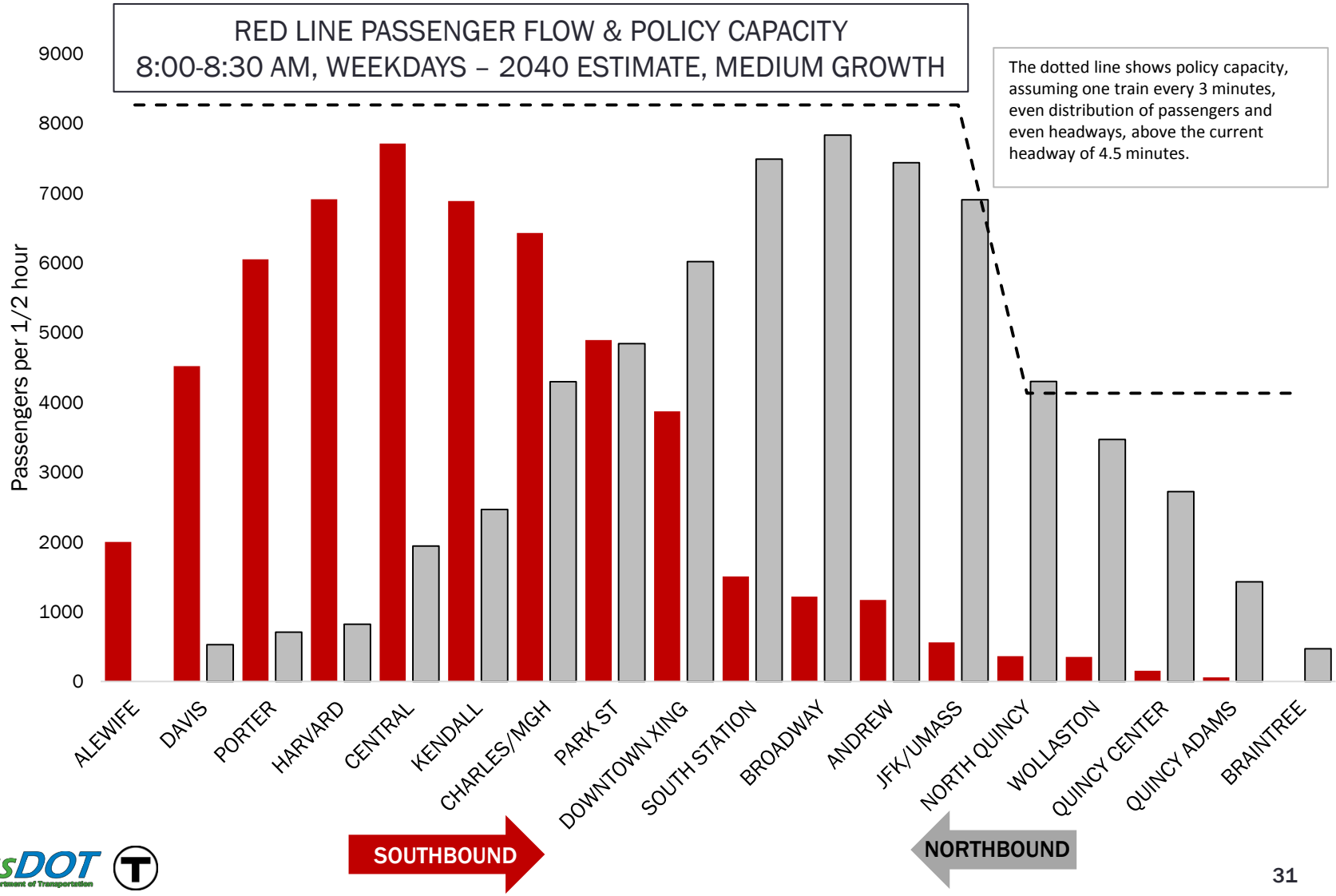
+15% Growth in 2040 Peak Ridership

Red Line



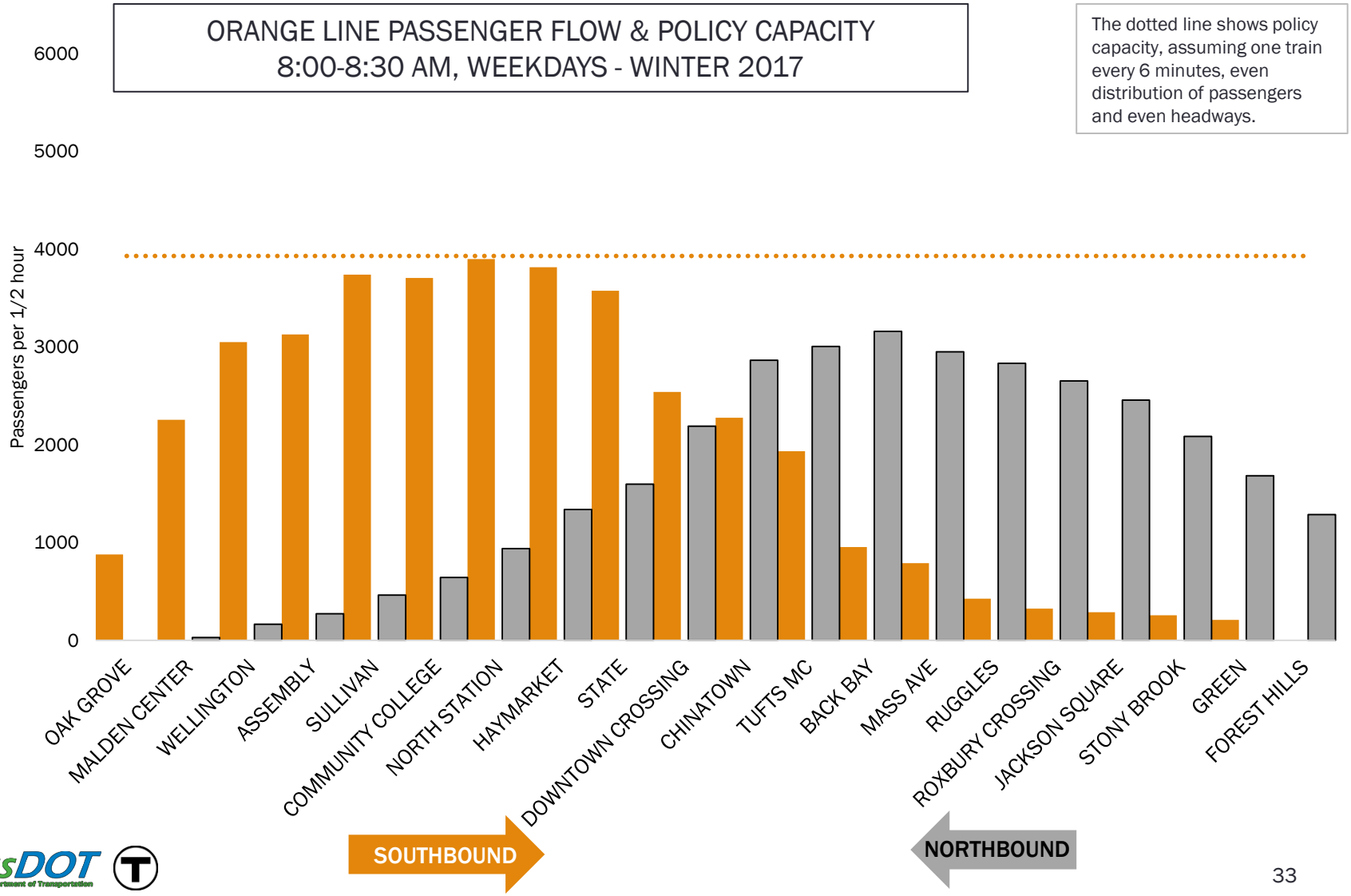
+20% Growth in 2040 Peak Ridership

Red Line



ORANGE LINE

Orange Line Capacity and Demand



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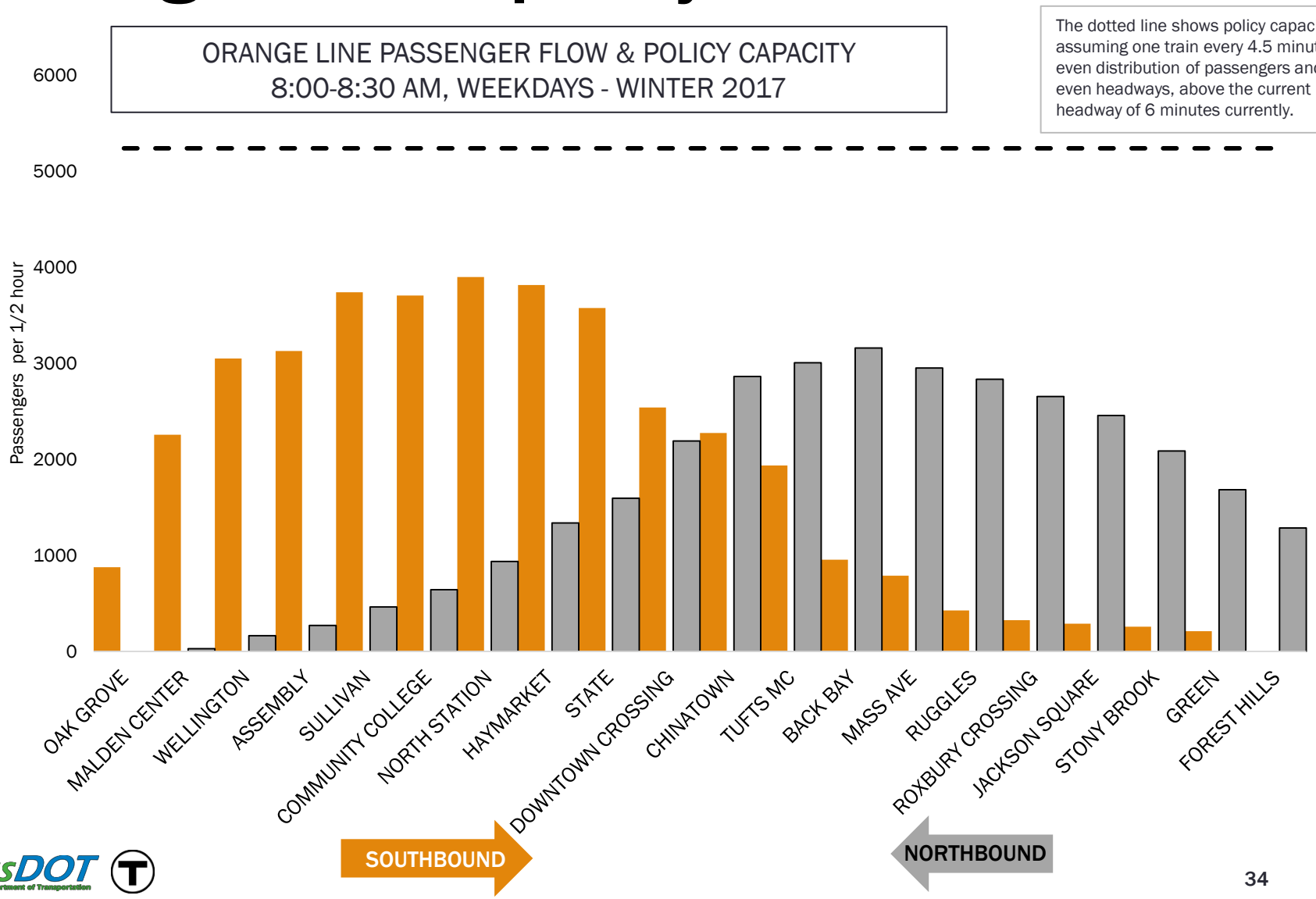
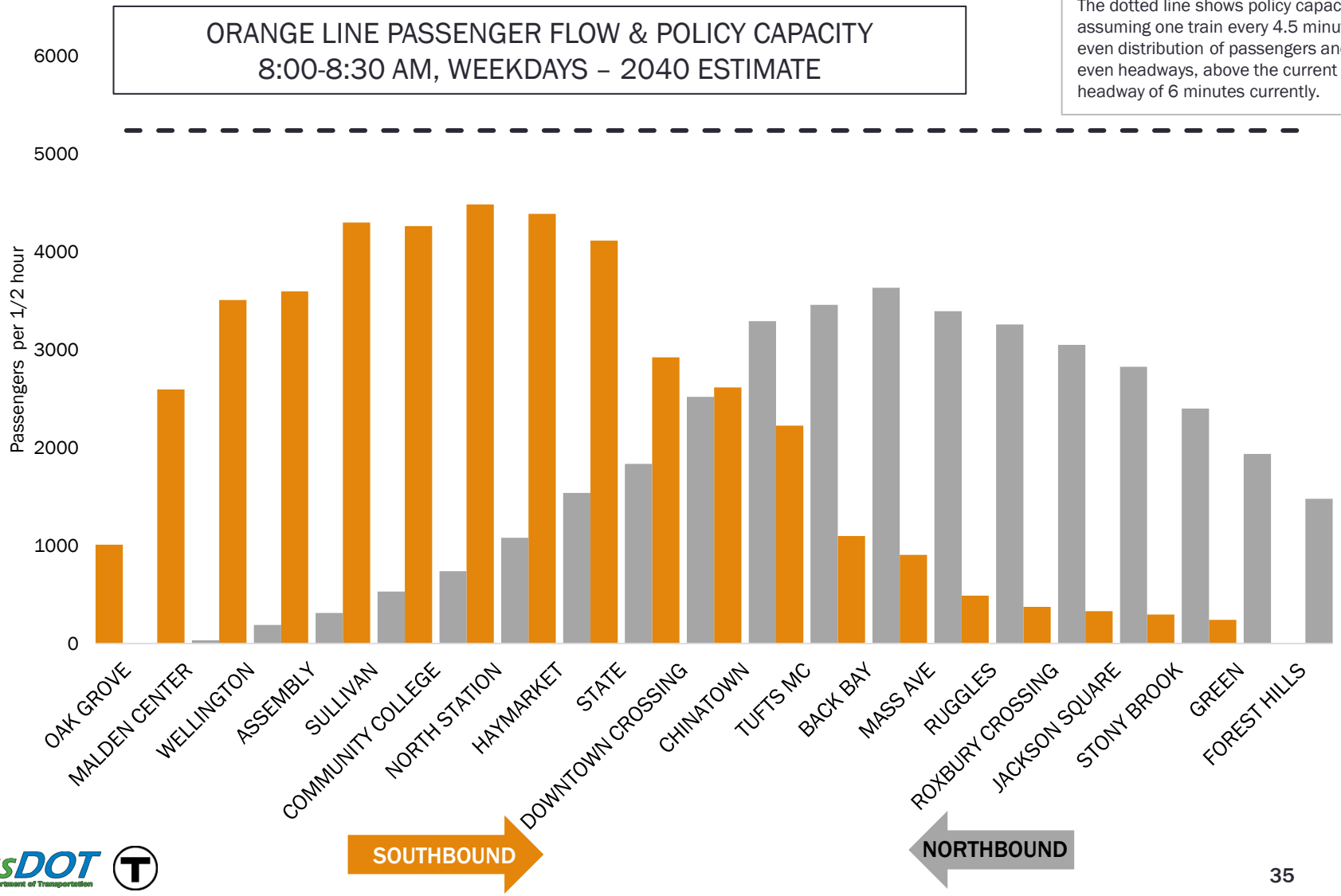
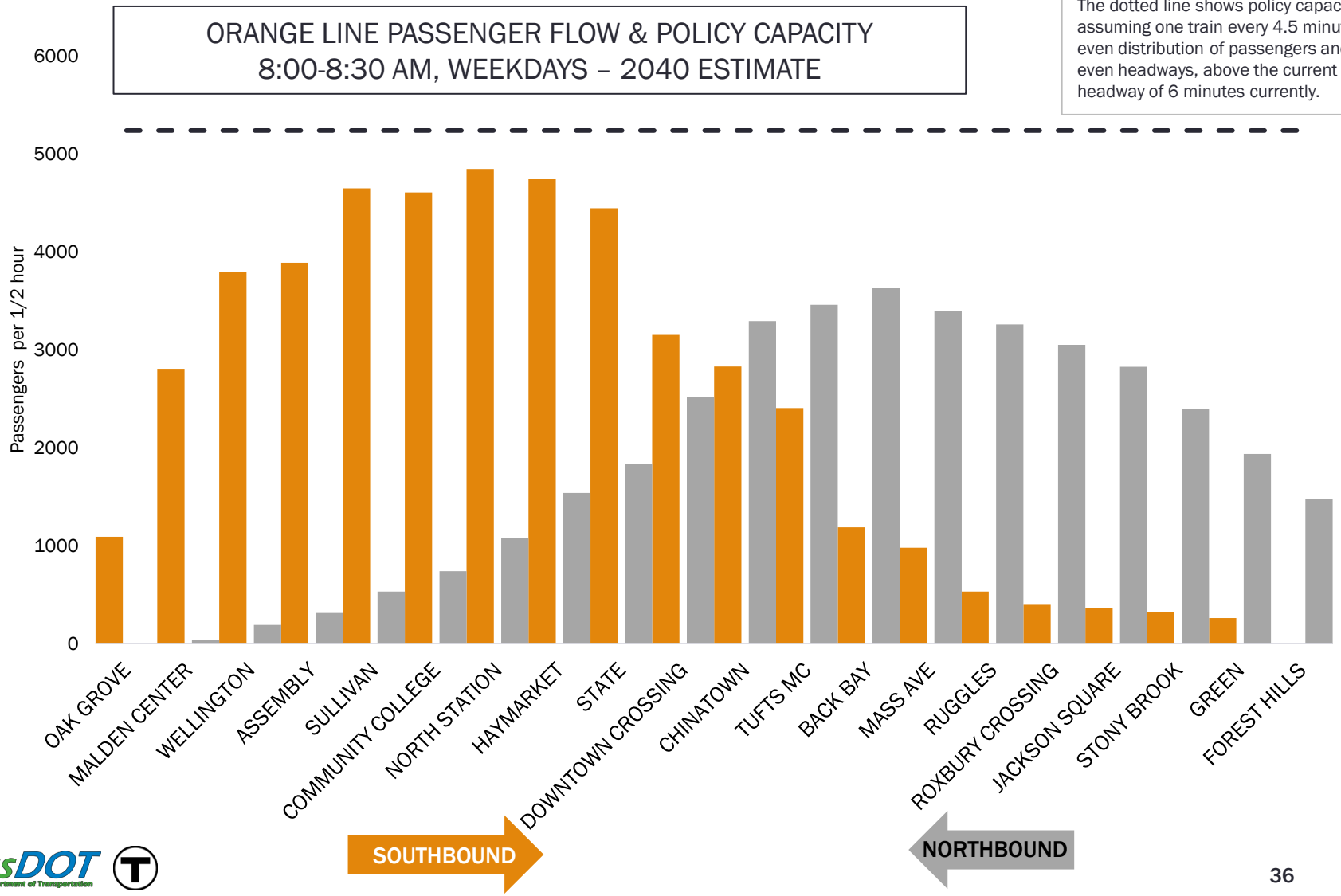


Future Capacity and Demand: Orange Line Low Growth



Future Capacity and Demand: Orange Line Medium Growth



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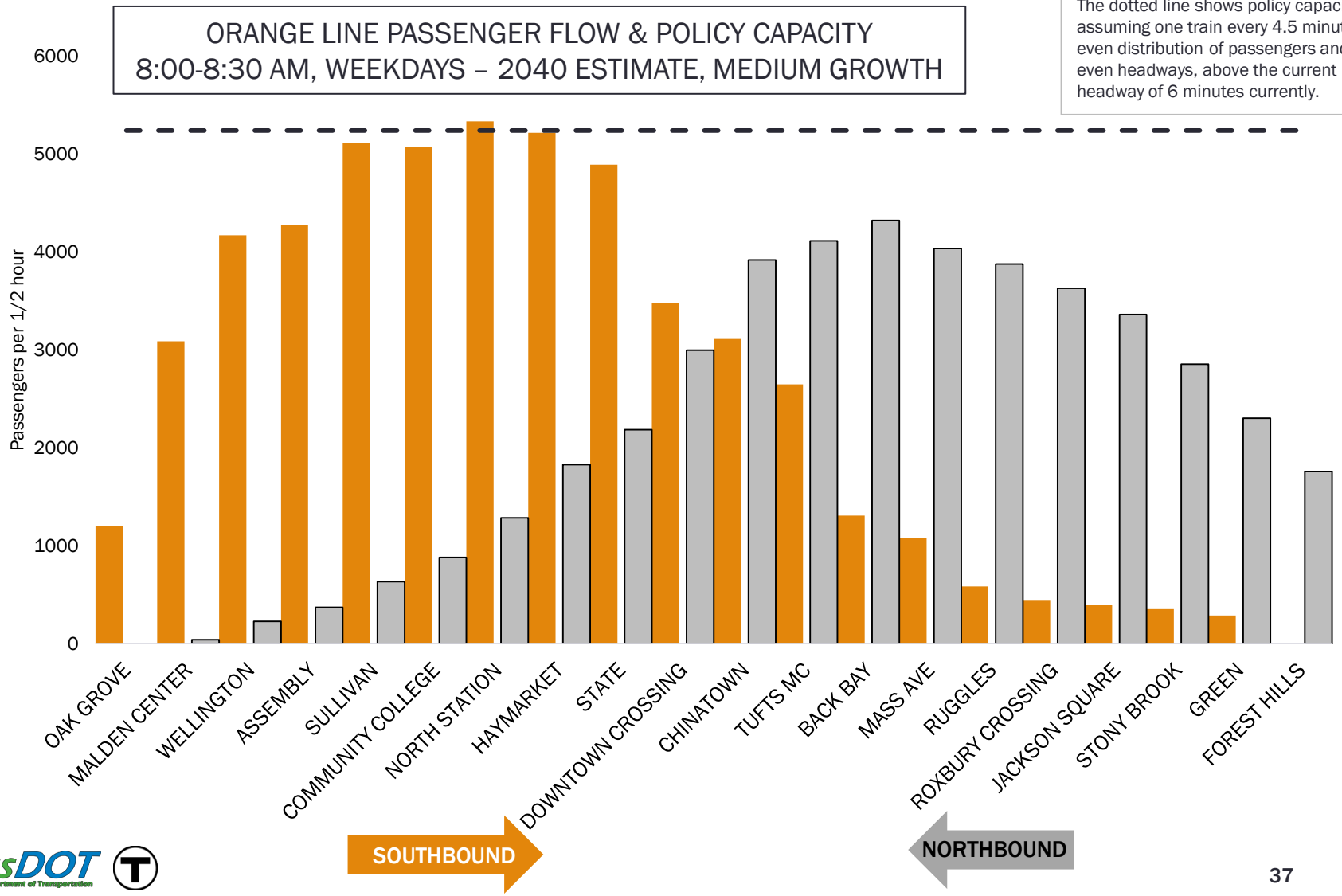

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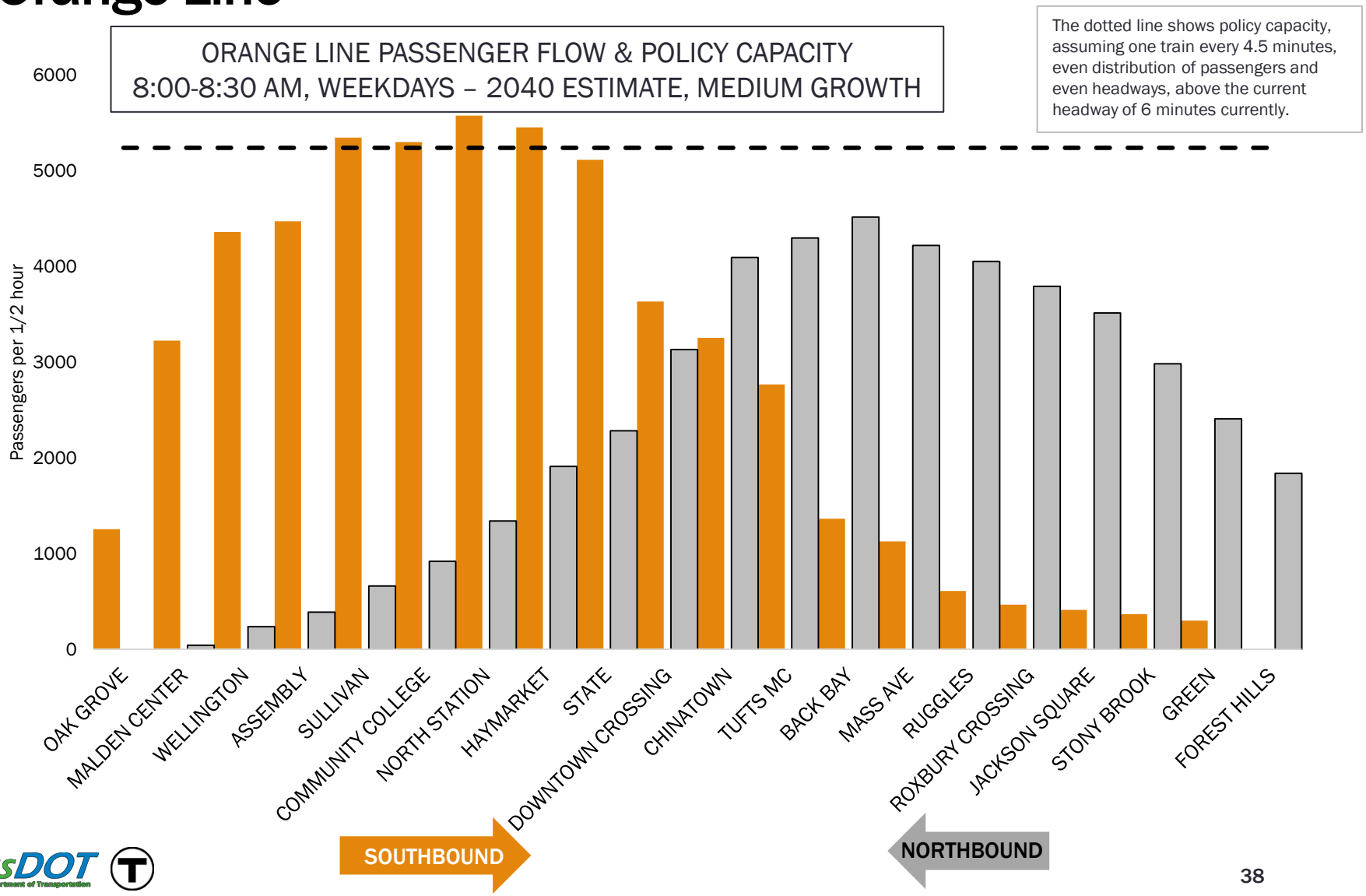

+20% Growth in 2040 Peak Ridership

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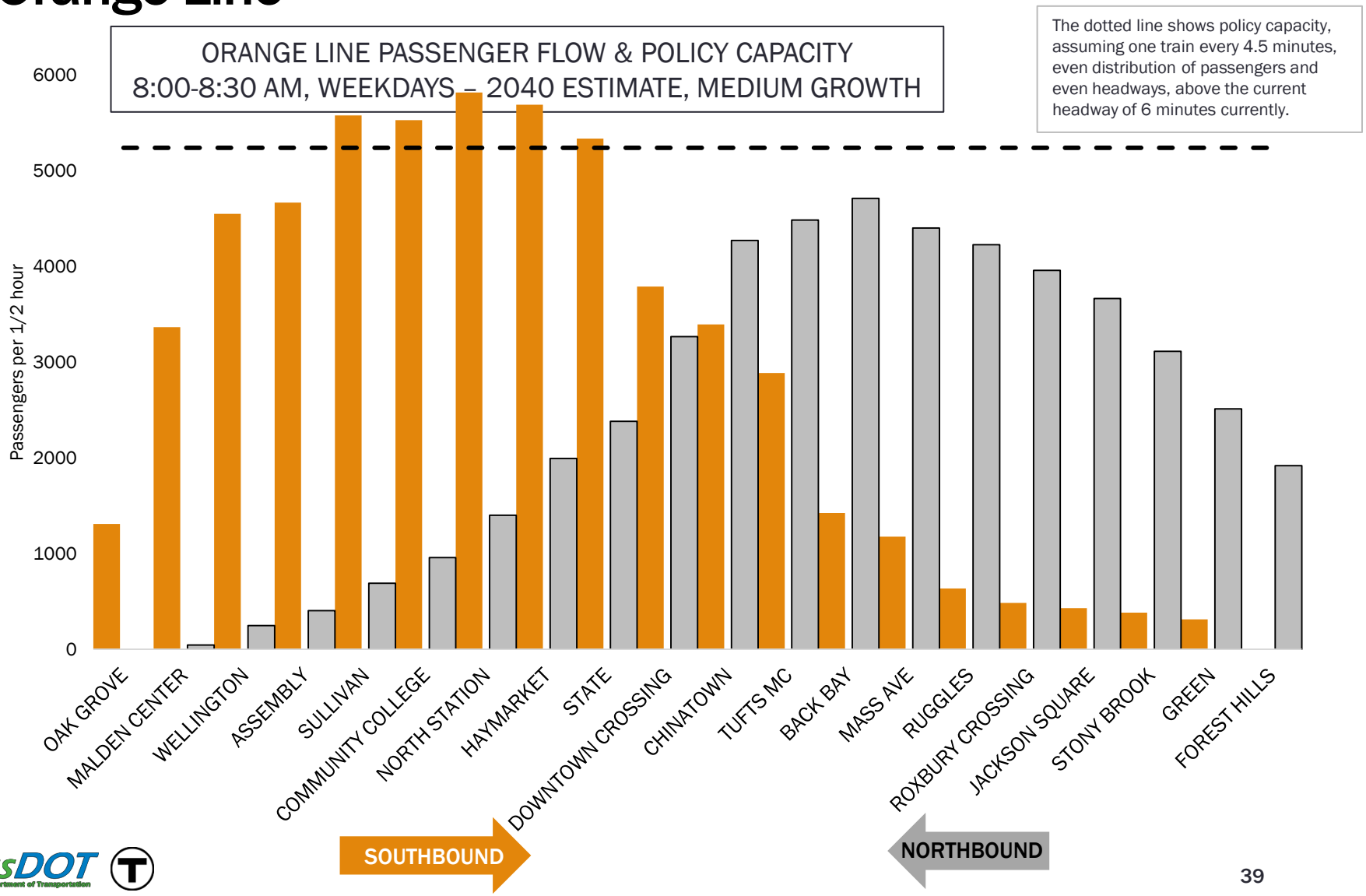
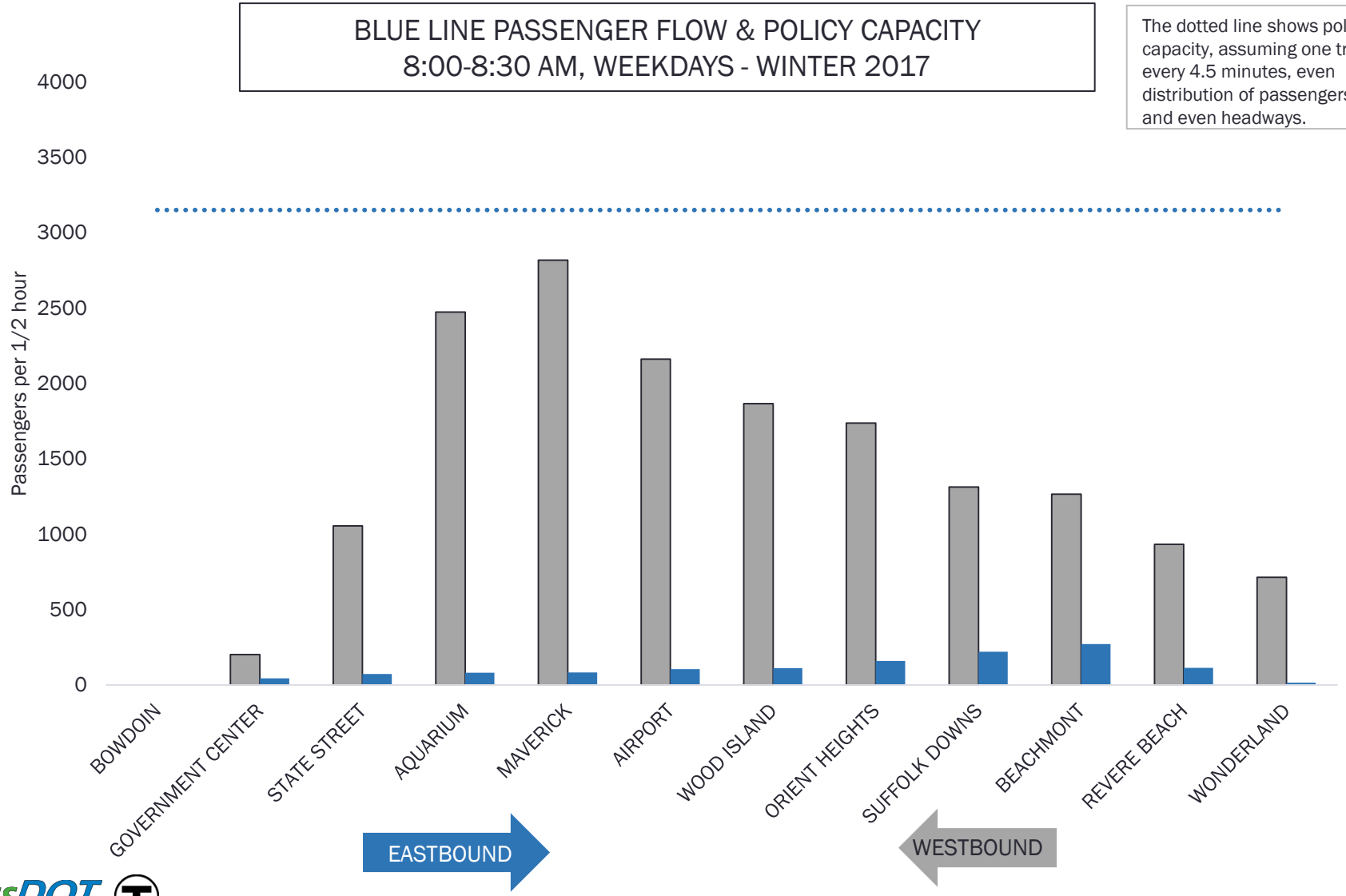


BLUE LINE

Blue Line Capacity and Demand



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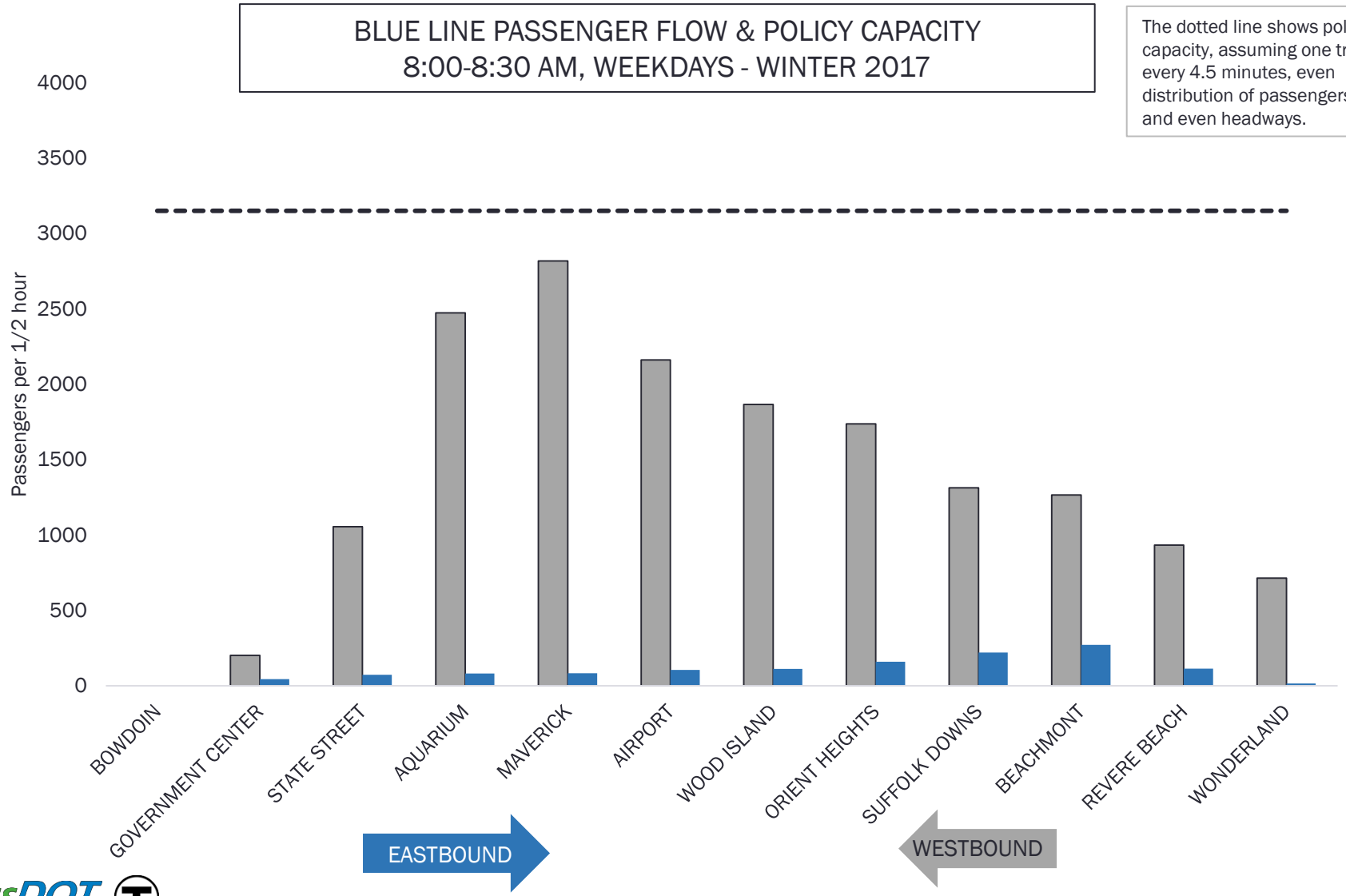

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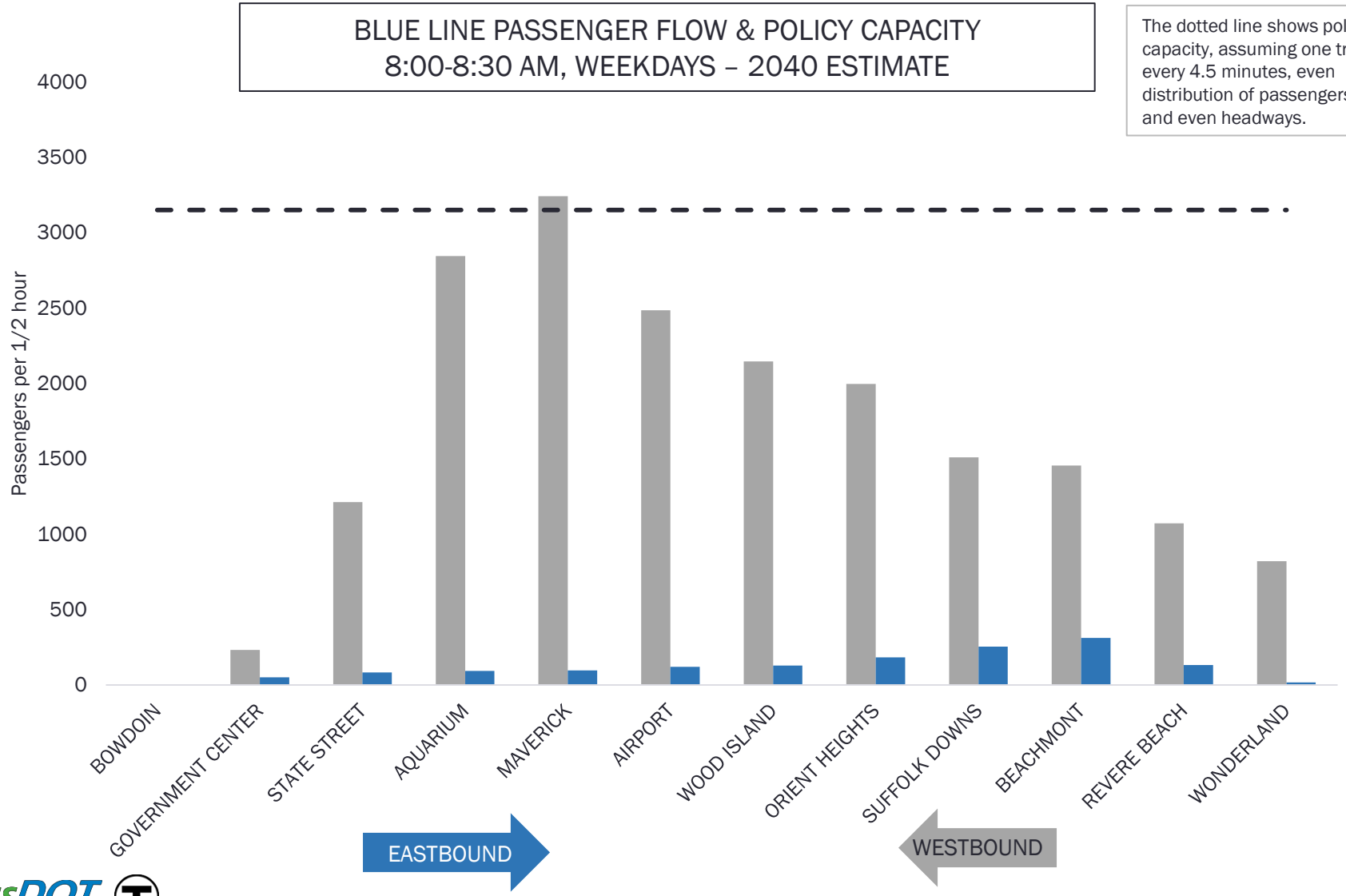

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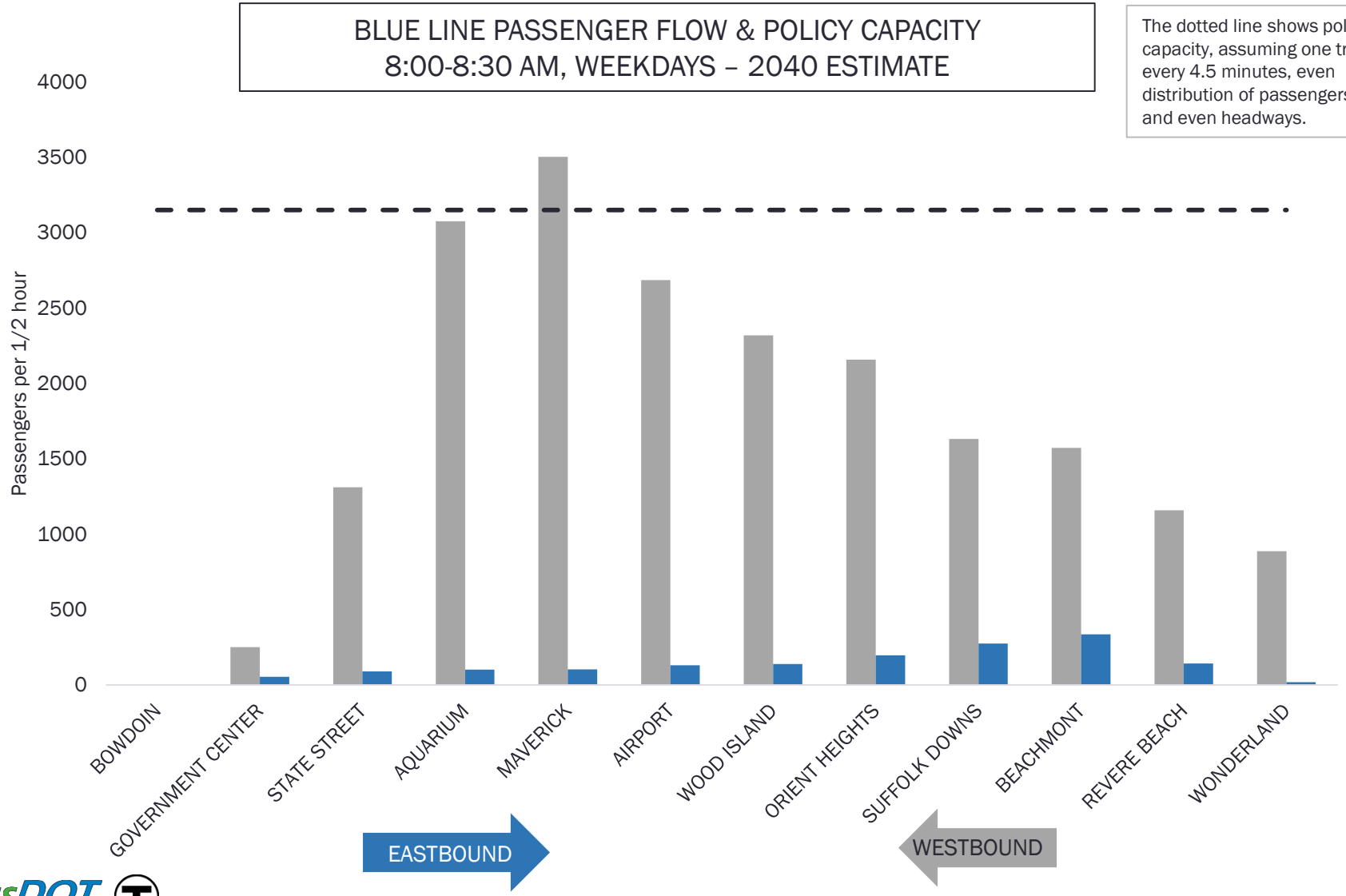
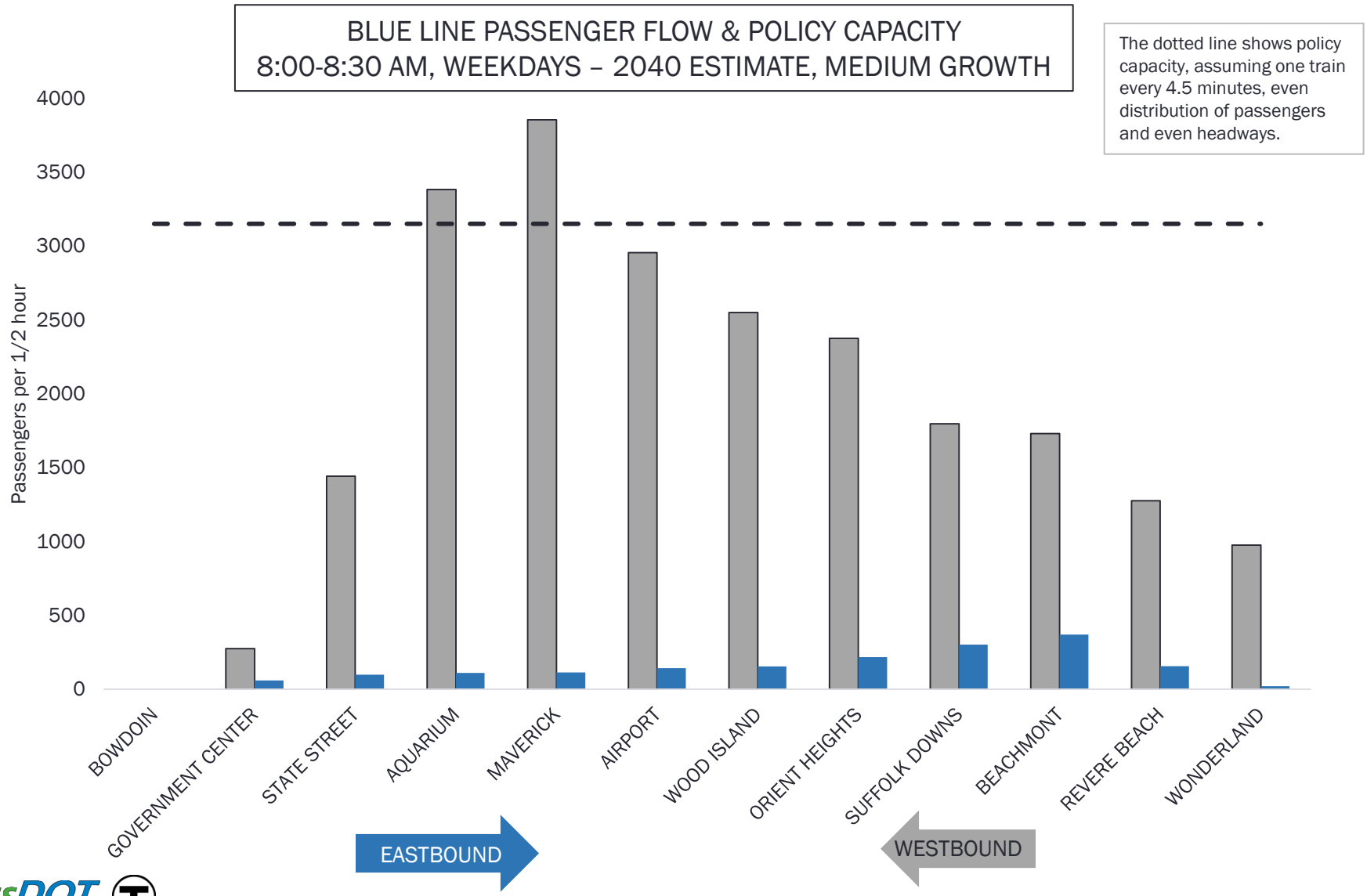


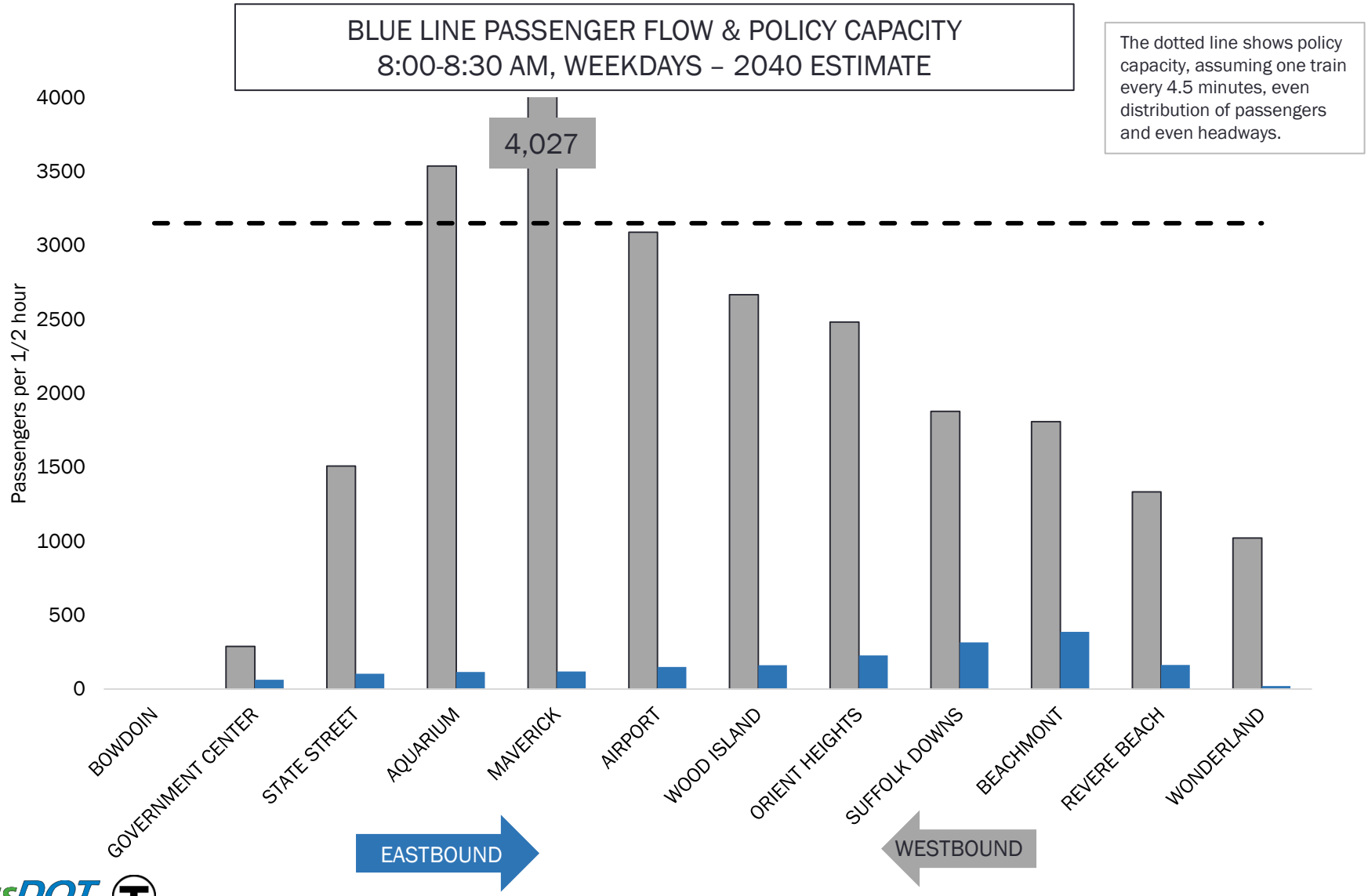
+10% Growth in 2040 Peak Ridership

Blue Line



+15% Growth in 2040 Peak Ridership

Blue Line



+20% Growth in 2040 Peak Ridership

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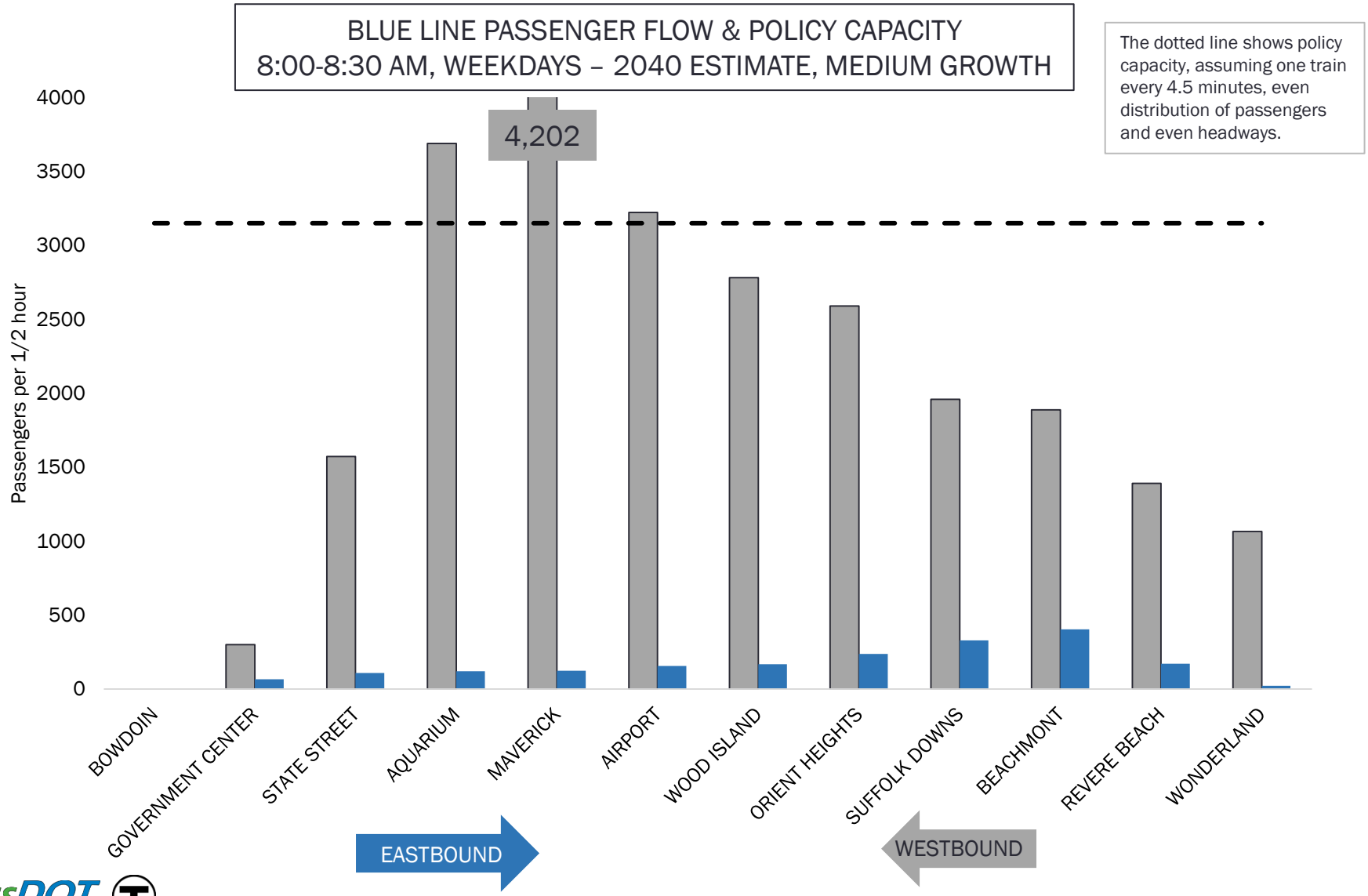

Translating Population Growth into Capacity: Caveats

- Population growth is only one driver of demand.
- The location of future development may result in even more demand along rapid transit lines. Large potential development sites along the north side of the Orange Line, the Braintree branch of the Red Line, and along the Blue Line could attract even higher rates of population growth than the inner core as a whole.
- Disruptive changes in technology and competition from other transportation options are likely to have effects that are difficult to predict.

How should we account for more of that growth occurring along rapid transit lines?

How Should a Capacity Target be Defined?

Questions for FMCB	Options
How should we define the maximum number of passengers?	80%, 90% or 100% of vehicle policy capacity? Seated capacity? Crush capacity?
What do we mean by a single point?	A single peak load point (aka Maverick to Aquarium)? A longer stretch of crowded conditions (Sullivan to State)
What is a given period of time?	Peak 15 minutes? Peak ½ hour? Peak hour?
Scheduled or actual?	Do we assume scheduled service in the future after fleet and signal investments?

Considerations for Evaluating Need for Capacity to Accommodate Greater Market Share

Blue Line

- Current inner core growth trends suggest Blue Line could be over capacity at the peak load point by 2040

- Ridership has been increasing faster on the Blue Line than on other lines (3% growth between FY16 and FY17)

- Communities in the Blue Line catchment area, including by bus connection (East Boston, Chelsea, Revere, Lynn) where development has lagged behind the rest of the region are seeing a surge in proposed development

Considerations for Evaluating Need for Capacity to Accommodate Greater Market Share

Red Line

- 50 percent increase in capacity appears to be sufficient to keep pace with current growth rates and increase market share on the Alewife to JFK/UMass trunk (assuming 3 minute headways)

- Service approaches capacity on Braintree branch, where major redevelopment opportunities in Quincy could push service over capacity

Considerations for Evaluating Need for Capacity to Accommodate Greater Market Share

Orange Line

- 33 percent increase in capacity allows Orange Line to stay just ahead of current growth trends for service north of Downtown Boston

- However, most stations north of Downtown are surrounded by acres of underutilized land which, if and when developed, could generate additional demand

- Communities north of Boston served by buses feeding the Orange Line (like Everett) have been growing faster than the region as a whole

Considerations for Evaluating Need for Capacity to Accommodate Greater Market Share

Green Line

- GLX project increases capacity between Lechmere and Government Center (improvements identified by ongoing Green Line Capacity study not included)

- However, uneven headways due to having four branches feed the Central Subway, and vehicle design associated with this unique service affect customer experience and perception of capacity

Questions for the FMCB

- Due to unique elements of bus and commuter rail demand and capacity this presentation has focused on rapid transit. Does the Board wish to engage on these two topics at a future meeting, or defer to recently initiated or upcoming processes (Service Plan, Network Redesign, Rail Vision)?

- Should a rapid transit capacity target be set at a systemwide level (# of passengers the MBTA can move into the system's core during the peak) or individually by line?

- What other information does the Board need in order to set a target by the end of December?