

# GRAND JUNCTION TRANSIT STUDY

Cambridge Transit Advisory Committee  
November 2, 2023

- Study Background
  - Transit Mode & Equipment Options
  - Alignments & Frequency Options
  - Selected Alternatives
- Infrastructure Improvements
- Ridership Forecasting
- Questions



# STUDY BACKGROUND

TRANSIT MODE /  
EQUIPMENT

ROUTE AND TERMINI

CAMBRIDGE STATION  
LOCATIONS

FREQUENCY

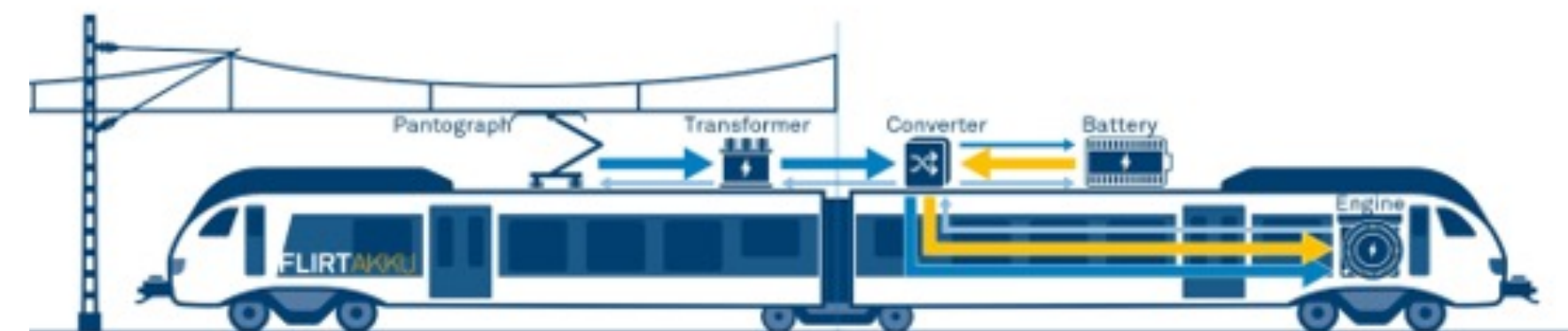
# Transit Mode & Equipment Options

## Types of Equipment: Urban Rail

- FRA Compliant
- Compatible with existing commuter rail, especially important for operations to North Station and further north (Chelsea, Everett, etc.)
- Shorter train length (than commuter rail) for urban setting
- Relatively lower noise and vibration
- Electrified Multiple Units – options:
  - All electric with catenary
  - Battery-electric (limited sections of catenary)



OPERATION UNDER CATENARY  
AND OPERATION IN BATTERY MODE WITHOUT CATENARY



# Routes / Alignments & Frequency Options

- For the Core Route, two sub-alternatives were tested: 15-min. or 17.5-min. frequencies
- Along the Core Route, frequencies of 20 minutes or greater are not competitive

ROUTE / ALIGNMENT	SOUTHERN TERMINUS	NORTHERN TERMINUS
Core	West Station	North Station
Extended	West Station	Lynn / Revere / Chelsea / Everett

ALTERNATIVE	CORE ROUTE FREQUENCY	EXTENDED ROUTE FREQUENCY
Alt. #1 – Core Only	15 / 17.5-min.	N/A
Alt. #2 – Core + Extended	15 / 17.5-min.	30-min.

# Selected Alternatives: "Core" & "Extended"

ALTERNATIVE	CORE ROUTE FREQUENCY	EXTENDED ROUTE FREQUENCY
Alt. #1 (a)	15-min.	N/A
Alt. #1 (b)	17.5-min.	N/A
Alt. #2 (a)	15-min.	30-min.
Alt. #2 (b)	17.5-min.	30-min.

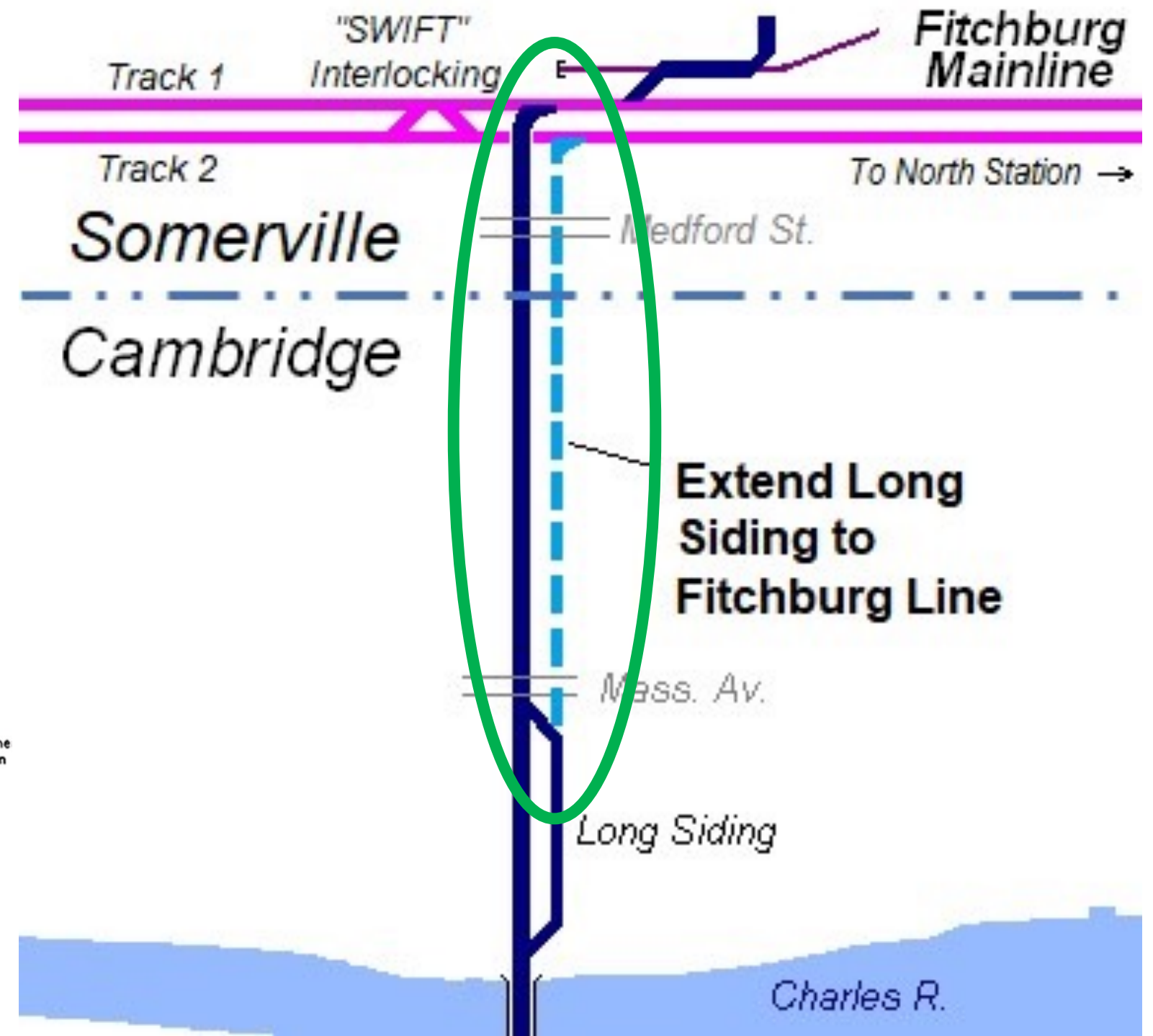
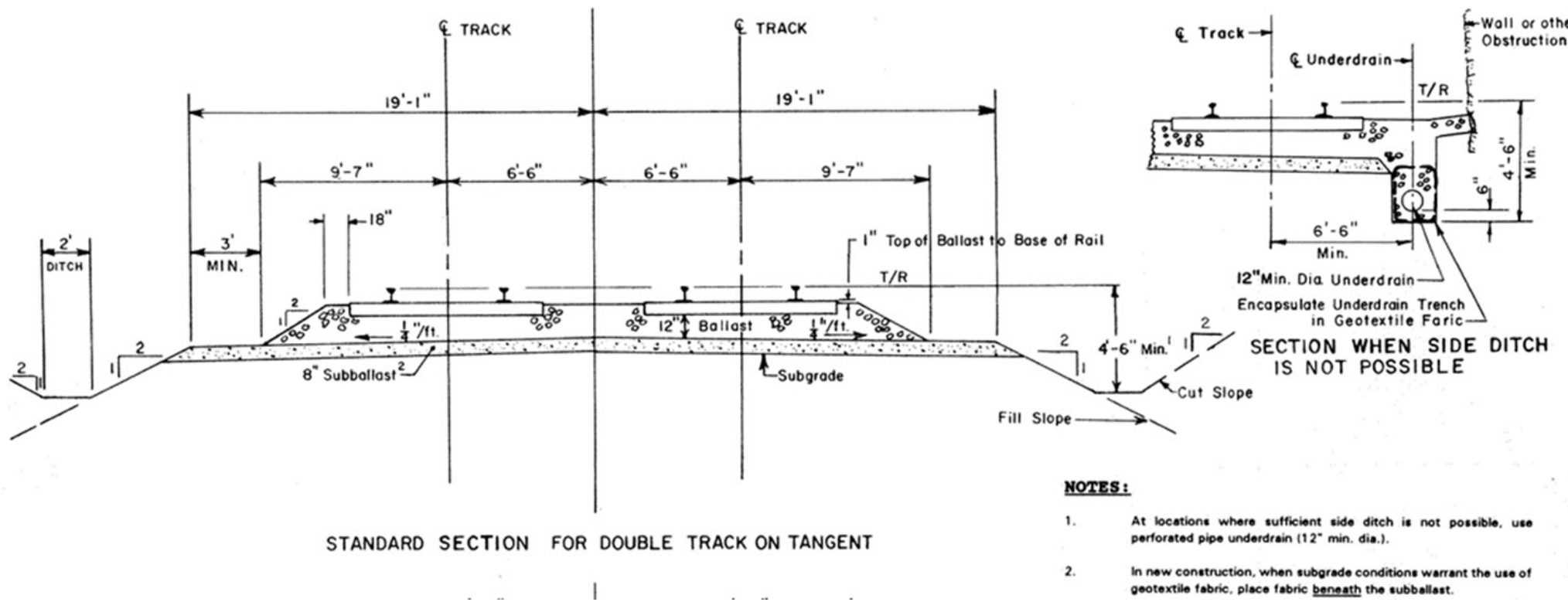


# INFRASTRUCTURE IMPROVEMENTS



# Double Tracking & Track Renewal

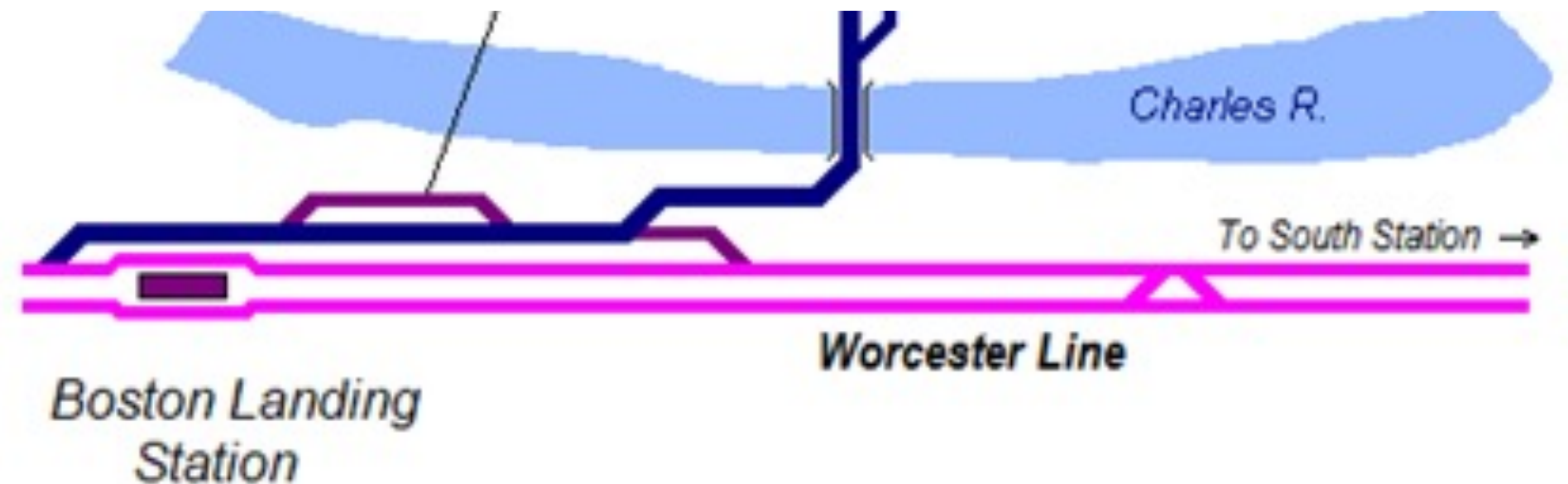
- Two-Track Is Feasible with Multi-Use Path
- Upgrades in Accordance with MBTA Track Standards
  - Replace rails with 136 lb CWR and new ties
  - Renew track ballast
  - Drainage improvements



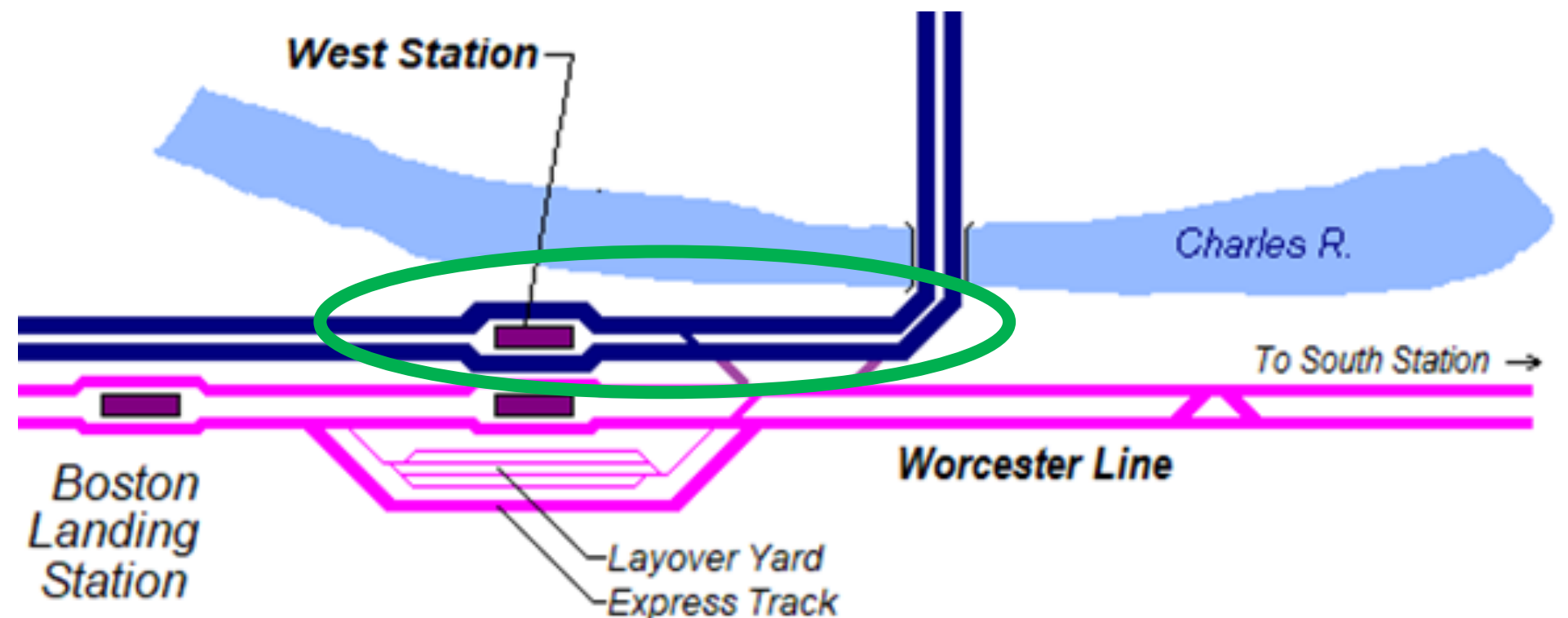
- Grand Jct. Track
- MBTA CR Ops
- MBTA Non-revenue Track

- Worcester Line
  - Existing single-track connection is indirect
  - Current MassDOT proposal for Allston Interchange includes West Station plus:
    - Two dedicated Grand Junctions tracks in/out of West Station serving center-island platform
    - Two Grand Junction tracks over the Charles River
- All improvements south of Memorial Drive assumed to come via MassDOT (by others)

**Existing Track Configuration – Beacon Park Yard to Charles River Crossing**



**Proposed Track Configuration – West Station to Charles River Crossing**

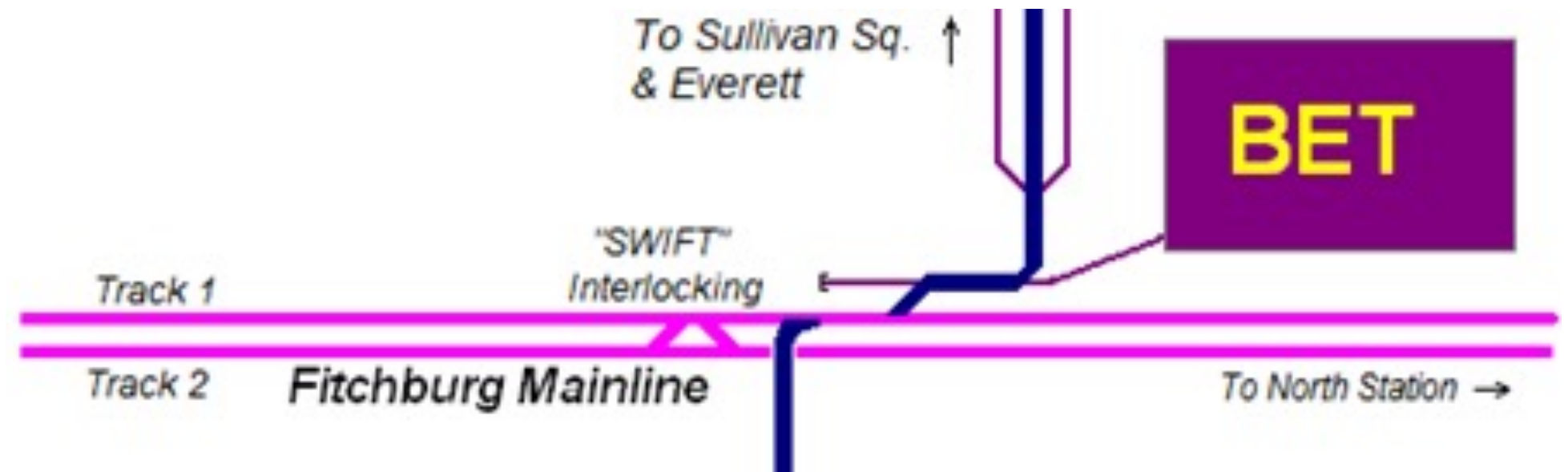


Track configuration based on current MassDOT project plans present to the public.

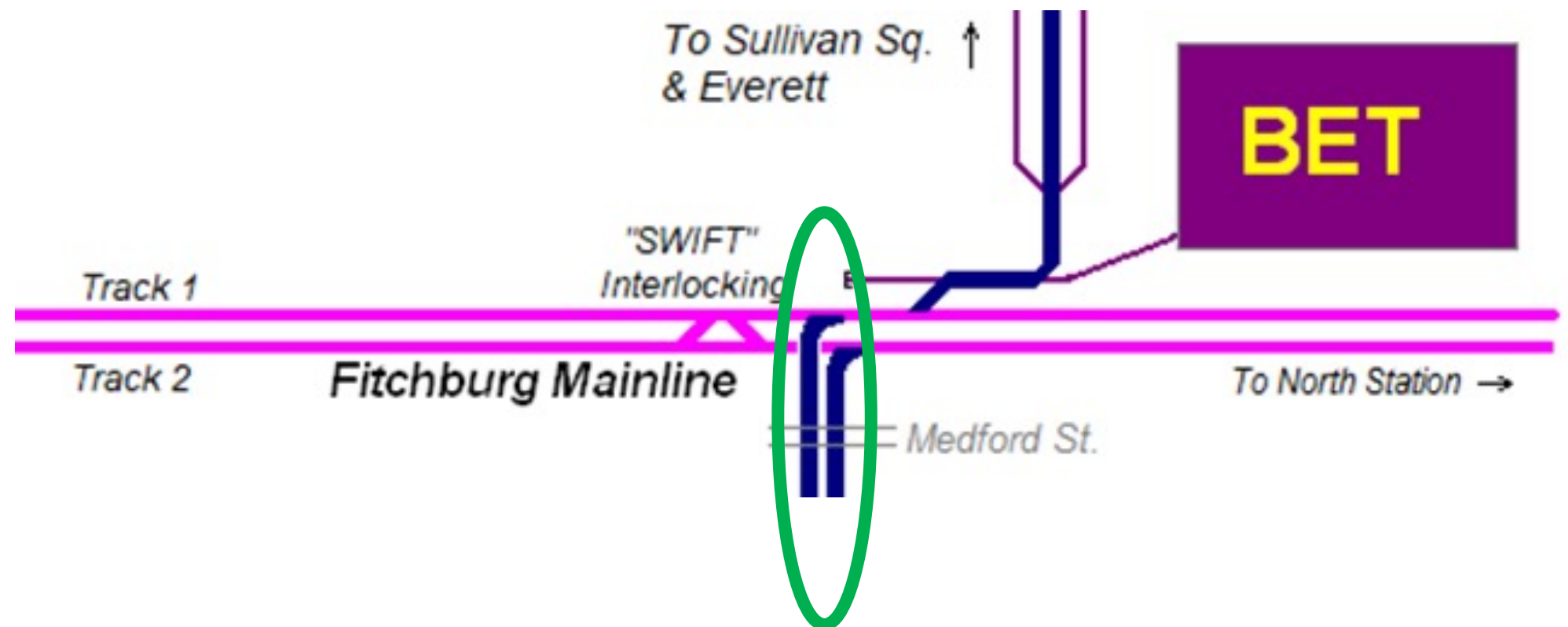
# Connections to Other Lines – Fitchburg Line

- Fitchburg Line
  - Existing single-track connection with Track 1 focused on access to BET and freight tracks to Everett and Chelsea
  - Proposed double-track connection:
    - Merge of 2 double-track passenger lines
    - Would require reconfiguring existing trackage from Medford St. to junction

**Existing Single-Track Connection to Track 1:**



**Proposed Double-Track Connection to Tracks 1 & 2:**



- Grand Jct. Track
- MBTA CR Ops
- MBTA Non-revenue Track

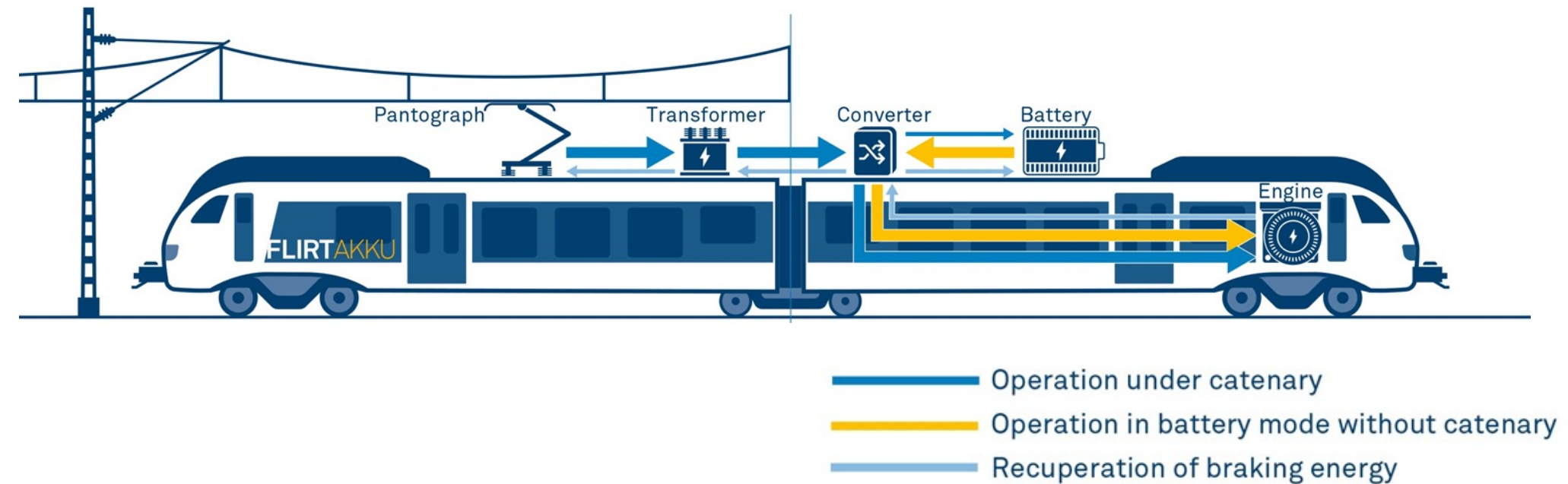
# Infra. Improvements – Signals

- Currently “Dark” – No Existing Signals
- New Signal Equipment
  - At key junctions
  - On-board the cab
  - Track circuits to relay train location
- Positive Train Control (PTC)





OPERATION UNDER CATENARY  
AND OPERATION IN BATTERY MODE WITHOUT CATENARY



## Full Electrification

- Overhead Contact System (OCS): poles and wires
- Power supply system

## Battery-Based Approaches

- Avoids the need for entire line to be electrified, reducing visual impact
- In-line with current MBTA Rail Vision
- Recharging either at terminal or en-route (but not along the Grand Junction)
- Typical range without charging: approximately 20 mi

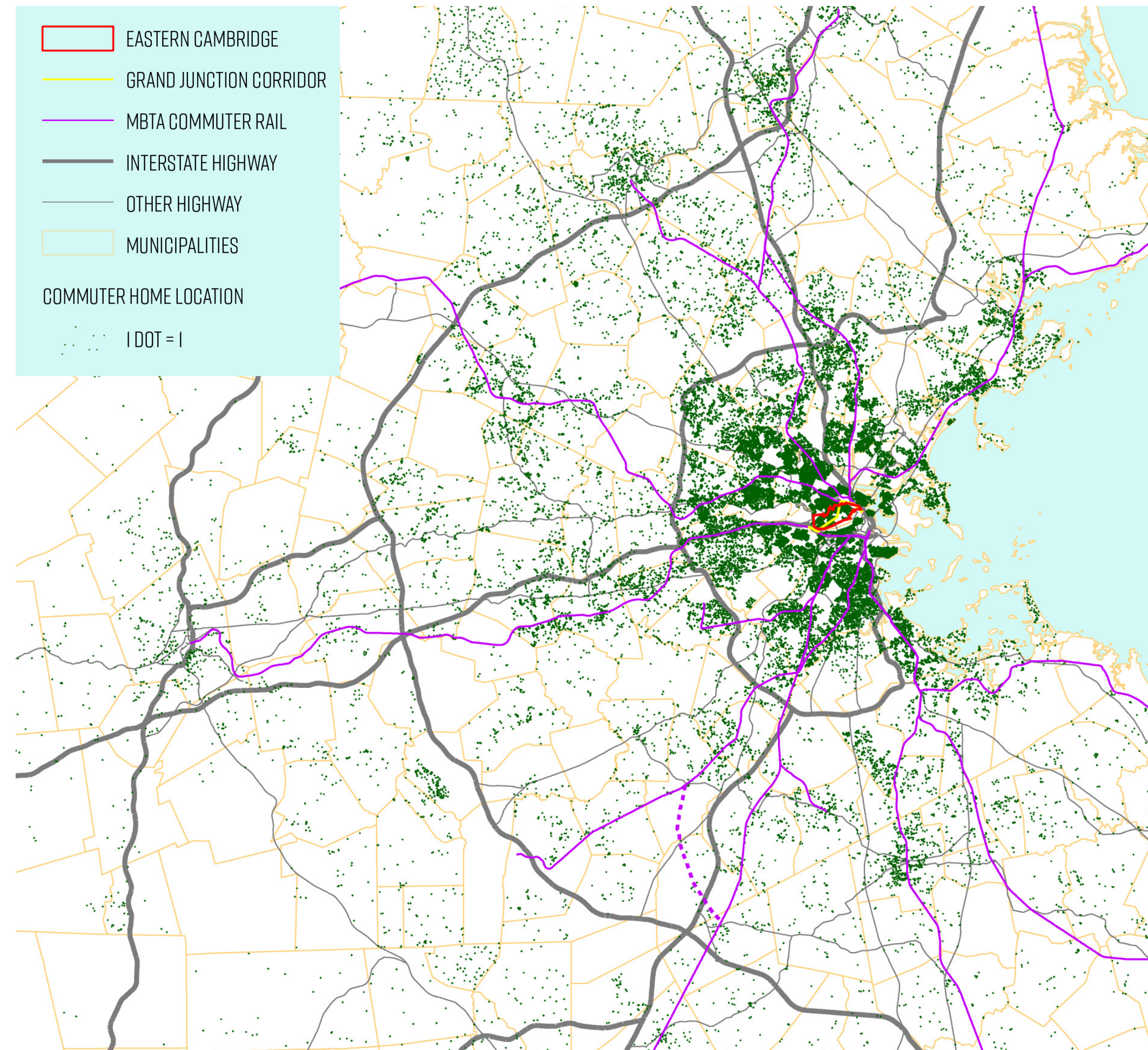
# Infra. Improvements – Grade Crossings

- Currently 4 of 6 Road Crossings Lack Gates
  - Gates would be needed at all crossings
- Controller Upgrades for Flasher/Gate Activation to Align with Higher Train Speeds
- Interconnection with Adjacent Traffic Signals prior to Line Completion:
  - Mass. Ave. with Vassar and Albany Streets
  - Main Street with Vassar/Galileo Way
  - Broadway with Galileo Way
  - Binney Street with Fulkerson Street
  - Cambridge Street with pedestrian light



# RIDERSHIP FORECASTING

- Census
  - 2019 journey to work data (LEHD)
- City of Cambridge's PTDM
  - Based on 2019 transit mode shares
- Accounting for Shifts in Transit Usage
  - Discounted 2019 transit usage by 30% to account for full-time work-from-home (based on 2022 PTDM results)

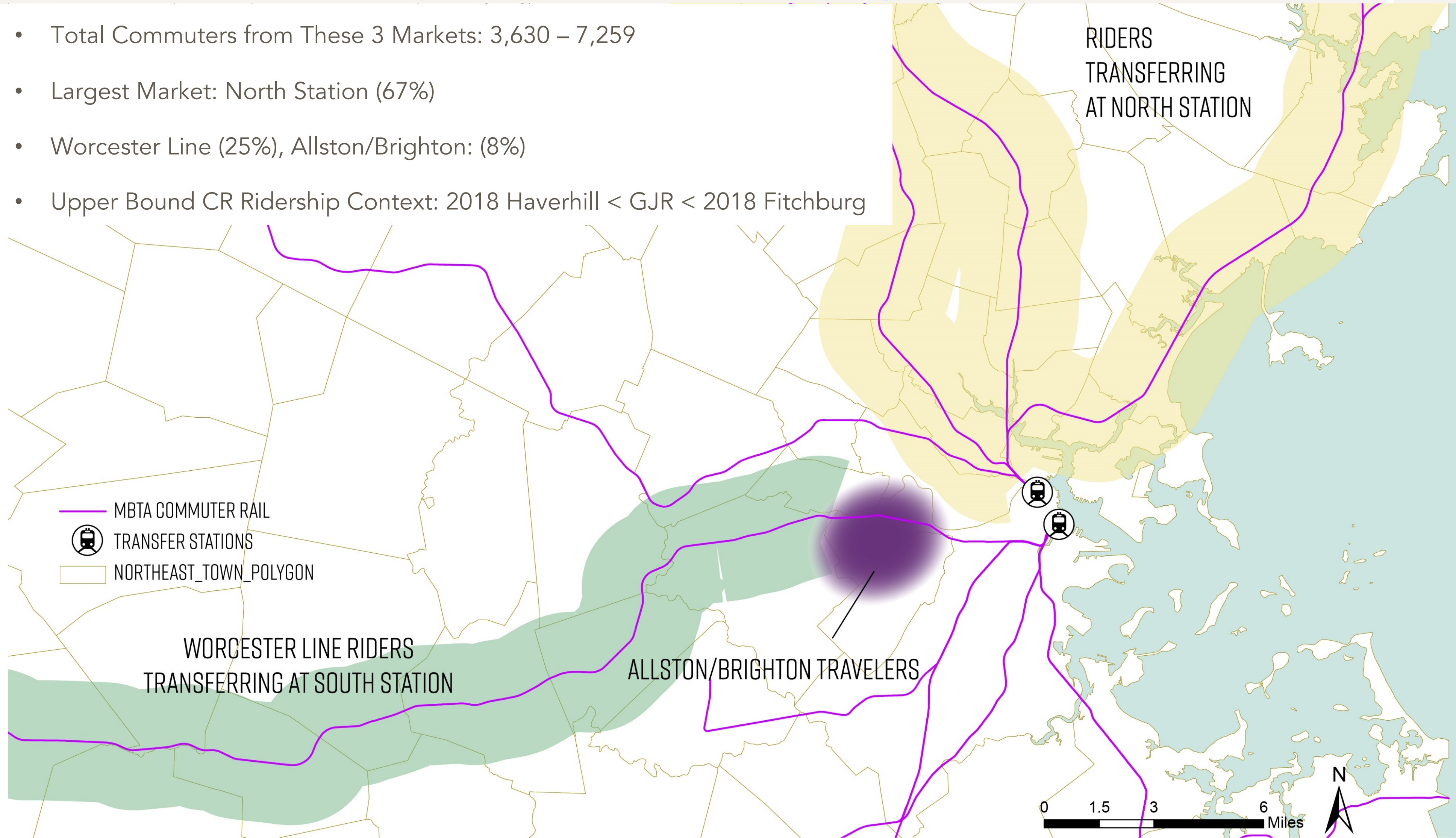


Eastern Cambridge Worker Origins from the Regional Boston Area – 2019 LEHD

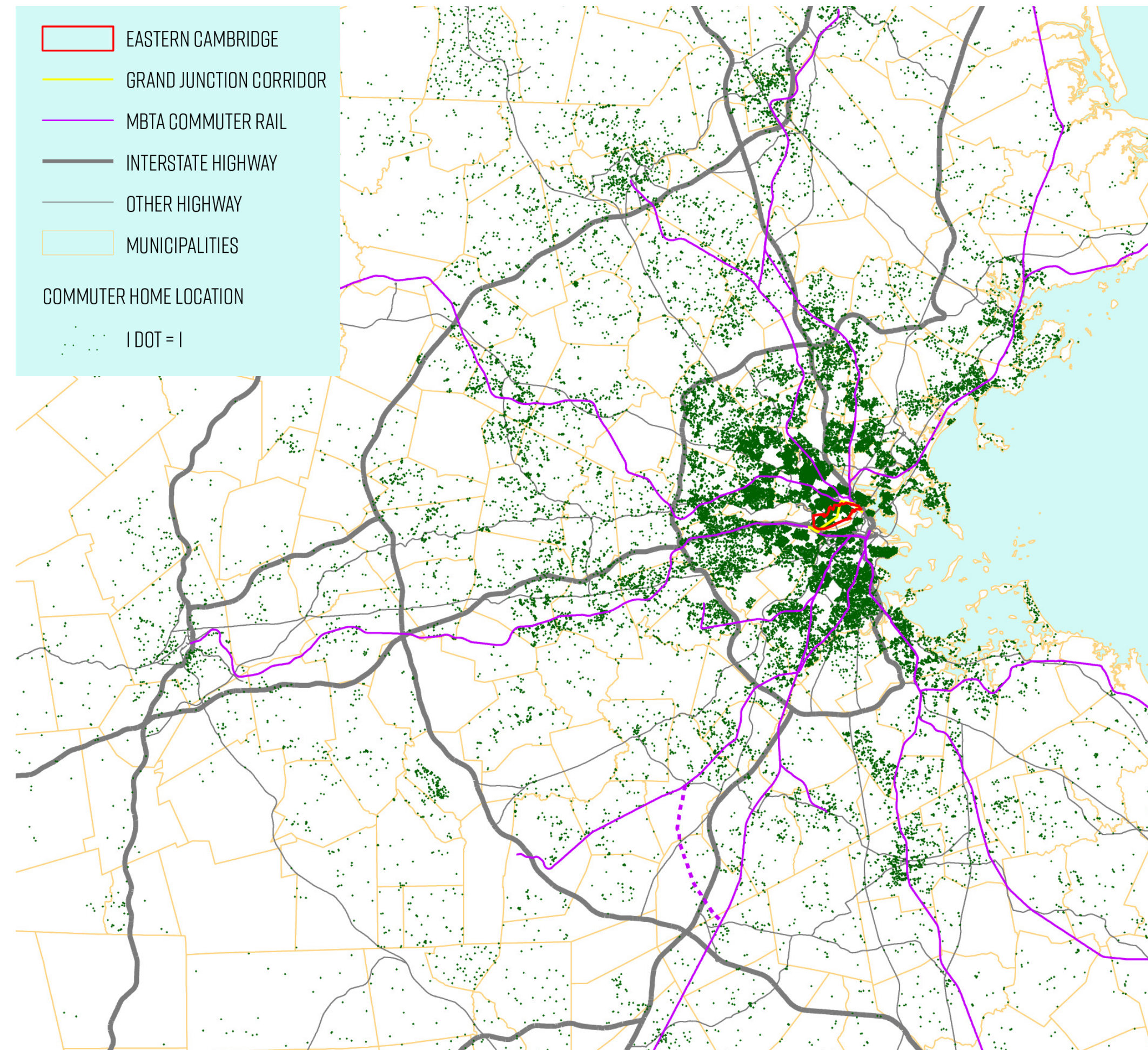


# Commuter Markets – Existing Transit

- Total Commuters from These 3 Markets: 3,630 – 7,259
- Largest Market: North Station (67%)
- Worcester Line (25%), Allston/Brighton: (8%)
- Upper Bound CR Ridership Context: 2018 Haverhill < GJR < 2018 Fitchburg



- Commuter Markets
  - Travel time comparison
  - Analogies
- Service Plan Assumptions
- Modal Shift and Growth
- Adoption Ranges



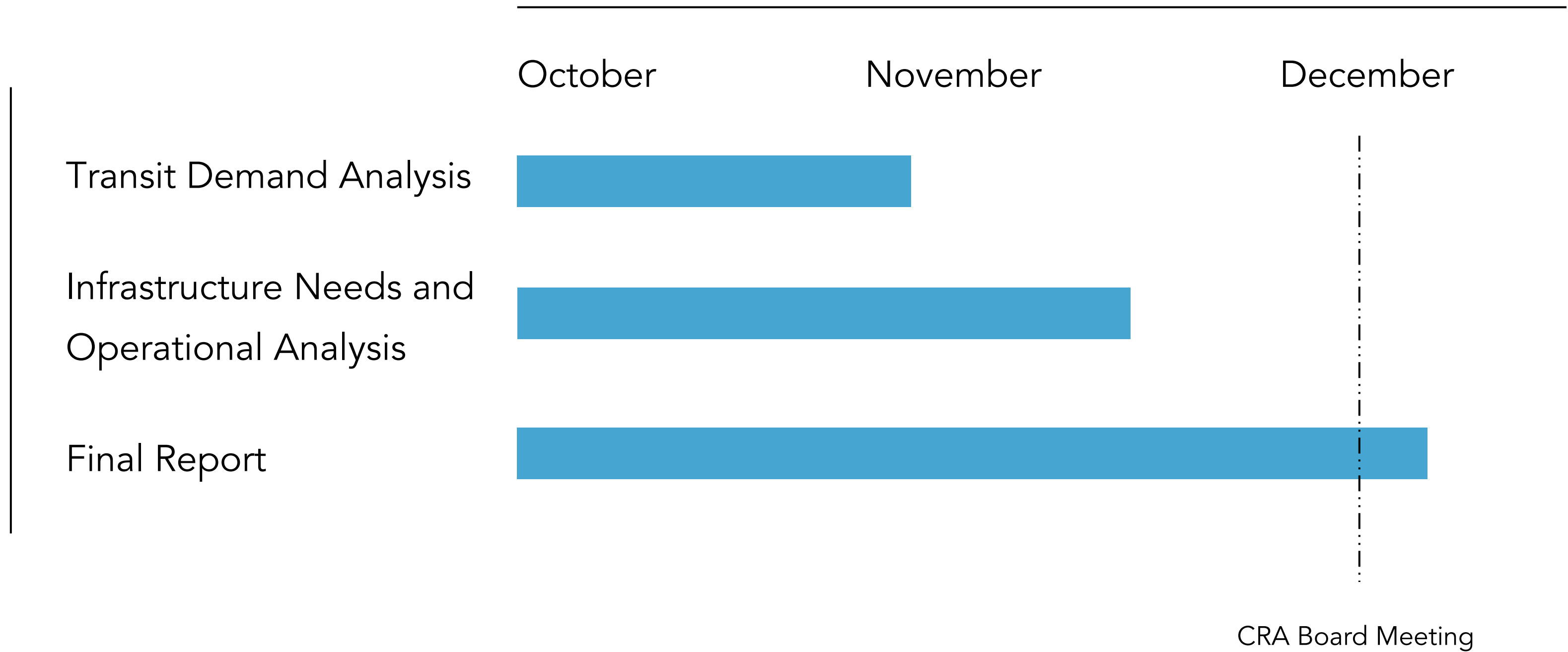
Eastern Cambridge Worker Origins from the Regional Boston Area – 2019 LEHD

## Travel time comparison

- In-Vehicle Time (IVTT)
- Considerations for Other Components
  - Access / Walk time – 1.6 x IVTT
  - Initial wait time – 1.1 x IVTT
  - Transfer wait time – 2.45 x IVTT
  - Transfer penalty – 8 minutes
- To/From a Single Point in Eastern Cambridge
- Range of Riders Due to % Shifting Transit  
(Upper & Lower Bound)

## Analogy

- Intra-Eastern Cambridge market
  - Estimated from recent records of U.S. streetcar systems (length < 3 miles)
- Additional approach to test Lynn / Revere / Chelsea / Everett market
  - Assume mode share to eastern Cambridge of communities with similar existing transit service – Quincy, Braintree



# THANK YOU & QUESTIONS

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