New England Railroad Club
November 1, 2018

Ryan D. Coholan
Chief Railroad Officer
MBTA/MassDOT
Topics for Discussion

• State of the System
  • Existing Conditions
  • Ridership
  • Fleet
  • Operations
  • Costs
• Challenges
• Opportunities
• Round the Room Discussion
Commuter Rail at a Glance

Commuter Rail Routes
- 5 North Side
- 9 South Side

Route Miles 388

Stations 138

Parking Spaces 39,246
- 12,174 North Side
- 27,072 South Side

Weekday Boardings 129,075

Annual Ridership 35 million

Revenue Fleet
- 90 Locomotives
- 420 Coaches

Maintenance Facilities 3

Layover/Storage Facilities 14

Overview of the System
Comparison to Other Services

- **Commuter Rail**
  - Weekday Ridership: 129,075
  - Route Miles: 388
  - Routes: 14
  - Communities Served: 175
  - One-Way Trips: 500
  - Stations: 138
  - Passenger Miles: 729,585,705

- **Red Line**
  - Weekday Ridership: 272,684
  - Route Miles: 21
  - Routes: 2
  - Communities Served: 7
  - One-Way Trips: 438
  - Stations: 22
  - Passenger Miles: 604,916,804 (combined)

- **Orange Line**
  - Weekday Ridership: 203,406
  - Route Miles: 11
  - Routes: 1
  - Communities Served: 8
  - One-Way Trips: 324
  - Stations: 19
  - Passenger Miles: 604,916,804 (combined)

- **Blue Line**
  - Weekday Ridership: 63,225
  - Route Miles: 6
  - Routes: 1
  - Communities Served: 4
  - One-Way Trips: 354
  - Stations: 12
  - Passenger Miles: 168,749,849

- **Green Line**
  - Weekday Ridership: 227,645
  - Route Miles: 23
  - Routes: 2
  - Communities Served: 8
  - One-Way Trips: 1,117
  - Stations: 13
  - Passenger Miles: 168,749,849

National Transit Database: 2013 Transit Profiles.
Overview of the System
Ownership and Agreements

MBTA owns the right of way used for existing passenger service within Massachusetts

Amtrak is the primary owner of the Northeast Corridor outside of Massachusetts

The extension of service to Wachusett Station operates over a segment of Pan Am track

Proposed extension of service beyond Forge Park would operate over CSX track
Overview of the System
Dispatching – North Side

MBTA controls dispatching on much, but not all, of the commuter rail network

Pan Am controls dispatching on segments of the Haverhill, Lowell, and Fitchburg Lines
Amtrak controls dispatching along the entire Northeast Corridor, at South Station, and over a small segment of the Dorchester Branch.

Mass Coastal controls dispatching along the Framingham Secondary, Middleborough Secondary, and Cape Main Line.
Maintenance and Layover Facilities

Maintenance Facilities

Existing MBTA Maintenance Facilities

- Commuter Rail Maintenance Facility (CRMF)
- South Side Service & Inspection
- Readville Interim Repair Facility
# Maintenance and Layover Facilities

## Overnight and Midday Layover Facilities – North Side

<table>
<thead>
<tr>
<th>Location</th>
<th>Consist Capacity</th>
<th>Sets Needed for Service</th>
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<td>Lowell</td>
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<tr>
<td>Fitchburg (Wachusett replaced Fitchburg in 2016)</td>
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Maintenance and Layover Facilities
Overnight and Midday Layover Facilities – South Side

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<td>Boston (Amtrak SHSY)</td>
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<td>2 (Fairmount)</td>
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<td>Boston (Amtrak Front Yard)</td>
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## Assets
### Systemwide Summary

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<td>Revenue Track Miles</td>
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<td>Non-Revenue Track Miles</td>
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<td>Hand Throw Switches</td>
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<td>Power Switches</td>
<td>221</td>
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Source: MBTA 2016 Engineering Track Charts
## Ridership
### Passenger Volume Flow

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<th>Line</th>
<th>Riders</th>
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<td>Newburyport/Rockport</td>
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<td>Haverhill</td>
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<td>Lowell</td>
<td>11,965</td>
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<td>Fitchburg</td>
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<td>North Side Typical Weekday Ridership</td>
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<td><strong>SOUTH SIDE TYPICAL WEEKDAY RIDERSHIP</strong></td>
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<tr>
<td>Framingham/Worcester</td>
<td>16,293</td>
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<td>Needham</td>
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<td>Franklin</td>
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<td>Providence/Stoughton</td>
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<tr>
<td>Fairmount</td>
<td>1,038</td>
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<td>Middleborough/Lakeville</td>
<td>7,182</td>
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<tr>
<td>Kingston/Plymouth</td>
<td>6,560</td>
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<tr>
<td>Greenbush</td>
<td>5,411</td>
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<tr>
<td>South Side Typical Weekday Ridership</td>
<td>82,401</td>
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<tr>
<td><strong>TOTAL TYPICAL WEEKDAY COMMUTER RAIL RIDERSHIP</strong></td>
<td>129,019</td>
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</table>

Source: MBTA, Ridership and Service Statistics, 2014. CTPS MBTA Commuter Rail Passenger Count Results, 2012
Commuter Rail Stations
Station Accessibility

143 total stations
(includes Foxboro, seasonal stations, and stations under construction)

51 fully accessible stations, including
2 stations under construction

57 partially accessible stations with “mini-high” platforms

34 stations not accessible

Back Bay is fully accessible, except for Worcester Line platform with “mini-high”
Parking is provided at 114 of the total 138 Commuter Rail stations. Of the 39,246 total commuter rail spaces, 25,977 are owned by the MBTA:

- 4,639 North Side
- 21,338 South Side

Parking is a revenue generator:

Daily rates between $4-$7 per day

There are 11 commuter rail zones (Zone 1a through Zone 10) with one-way fares between $2.10 and $11.50.

There are 14 stations\(^1\) in Zone 1a alone.

The Needham and Fairmount Lines are entirely within Zones 1 and 2.

The Providence Line is the only one extending beyond Zone 8, with one station (T.F. Green) in Zone 9 and one (Wickford Junction) in Zone 10.

\(^1\) Including North Station and South Station
Ridership
Performance facts

**Reliability**
Almost 2/3 of the commuter rail lines operated at 92% on-time performance or greater over the last 12 months.

**Coverage Area**
More than 60% (86) of all commuter rail stations are greater than a 30 minute travel time from North or South Station.

**Train Frequency**
Each weekday, commuter rail operates over 500 trains, of one-way distances between 10 and 63 miles.
Train Seating Capacity

Over the last year, MBTA operated over 140,000 trains. Less than 2,500 of them, or only 1.67%, were over capacity. That means that 98% of commuter rail trains had a seat for every passenger.
Ridership
Characteristics of High Ridership Stations

<table>
<thead>
<tr>
<th>Station</th>
<th>Ridership Count</th>
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<tbody>
<tr>
<td>Salem</td>
<td>2,389</td>
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<tr>
<td>Mansfield</td>
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<tr>
<td>Lowell</td>
<td>1,770</td>
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<tr>
<td>Beverly</td>
<td>1,681</td>
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<tr>
<td>Attleboro</td>
<td>1,665</td>
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<tr>
<td>Route 128</td>
<td>1,604</td>
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<tr>
<td>Anderson</td>
<td>1,502</td>
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<tr>
<td>Worcester</td>
<td>1,475</td>
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<tr>
<td>South Attleboro</td>
<td>1,462</td>
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<tr>
<td>Providence</td>
<td>1,341</td>
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More frequent service
Higher density land use and mix of uses
Located at the end of the line
Ample parking supply and highway access
Higher train speeds are allowed
Stations are fully or partially accessible

Source: MBTA Ridership Counts, April 2016 (select stations).
Ridership Counts

**CURRENT**

- **Manual Ridership Reports**
  - Ridership as reported by conductors
  - On-board only, no station-level breakdown
  - Conductors must multi-task; focus is on safety
  - No incentive to improve accuracy

- **Bi-Annual Peak Passenger Counts**
  - Platform counts at Boston terminals
  - Peak period only
  - On-board only, no station-level breakdown
  - Primary purpose is to determine equipment and staffing needs – not to collect accurate ridership

- **Comprehensive Count Audits**
  - Focused on capturing ridership at all stations
  - Expensive and time consuming
  - Last done in 2012
  - Conducted again by CTPS in 2018

**POTENTIAL**

- **Automated Passenger Counters**
  - On-board for each commuter rail coach
  - Pilot car is being tested now – successful
  - Wider rollout possible

- **Automated Fare Collection 2.0**
  - Pay with phone (no app), contactless credit card, Charlie2 issued card
  - No cash on-board vehicle
  - Readers added at all rail stations and on platforms at South Station, North Station / Back Bay
  - Automatically captures ridership from the tap made at each station (on, off)
Automated Passenger Counters (APC)

- Device detects and counts passengers moving in 4 different directions
  - Uses a camera and captures movement entering and exiting coaches
  - Can determine if a passenger is between coaches or left the train
  - Counts passengers in each coach and then totals up the entire train.

- Other features include:
  - Ambient temperature sensing
  - Onboard PA system recording, quality control
  - Real time GPS tracking
  - Accelerometer and vibration sensors measure ride quality and passenger comfort
  - Door sensors record number of doors open at stations

- APCs currently installed on 38 commuter rail coaches
- Keolis and MBTA now installing APCs on the entire coach fleet
• Keolis developed a new hand-held ticketing device for conductors to accept credit cards onboard trains, a frequent passenger request.

• CR historically had cash-only sales on board trains. Easy to use device with a card reader attached to the conductors’ existing iPhones combined with a small belt printer.

• Conductors started using the device in Feb. 2018, with full implementation completed in September.

• ~14% of sales are being made by card with steady increase month on month.
On-Time Performance
The Importance of Residual Delays

Residual Delays
One initial incident can create a ripple effect of delay, as several commuter rail trains are impacted downstream, and sometimes on multiple lines.

Within the Last 12 Months...
Residual delays comprised 30% of the number of incidents causing delay, compared to all other causes combined.
On Time Performance

On Time Performance (OTP) by Week

OTP (within 5 minutes)  OTP (within 10 minutes)  Passenger OTP
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</table>
Costs to Operate Commuter Rail

**FIXED PRICE**
$320M

**OTHER COSTS: $77M**

- SERVICES
  $47M
- FUEL
  $30M

* Costs rounded to nearest Million $

**TOTAL ANNUAL COST TO OPERATE COMMUTER RAIL = $397M**

- NTD-Reported Farebox Recovery 50%
- Farebox Recovery Considering Non-Operating Revenues 72%
Revenues from Commuter Rail

OPERATING REVENUES
$215M

NON-OPERATING REVENUES: $70M

- PARKING $17M
- ADVERTISING $6M
- RETAIL SPACE + OTHER LEASES $3M
- REAL ESTATE $12M
- REVENUE ASSESSMENTS (TOWNS WITH CR ONLY) $12M
- UTILITIES & TELECOMM $6M

TOTAL ANNUAL REVENUE GENERATED BY COMMUTER RAIL = $285M

* Rounded to nearest million/Annual Revenue Generated
Source: CTPS MBTA Revenue Report, Fiscal Year 2015.
Systemwide Challenges

Single track constraints and limited right-of-way

- Newburyport Line, between North Beverly and Newburyport
- Haverhill Line, between Reading and Andover
- Old Colony Main Line, between Boston and Braintree
- Worcester Line, adjacent to the Massachusetts Turnpike

Drawbridge rehabilitation/replacement

- Gloucester Draw- Ongoing
- Beverly Draw- Completed in 2017
- Saugus Draw- In design
- Draw 1 (North Station)- In design

Parking constraints

- 25 commuter rail stations are at or over parking capacity
Station accessibility

- 34 stations are not accessible
- Challenges with upgrading to fully accessible stations in corridors that require special freight clearances

Maintenance/layover facility capacity

- Overnight layover constraints on the North Side (Rockport, Bradford, Lowell, Fitchburg)
- Overnight layover constraints on the South Side (Worcester, Needham, Franklin, Stoughton)
- Midday layover constraint on the South Side

Coach capacity

- Of 420 coaches in the active fleet, 203 or approximately 50% are single-level

PTC construction

Source: FY 2016 – 2030 MBTA Commuter Rail Fleet Management Plan - DRAFT.
## Drawbridges

<table>
<thead>
<tr>
<th>Drawbridge</th>
<th>Condition</th>
<th>Replacement Cost</th>
<th>Year Built</th>
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<tbody>
<tr>
<td>Gloucester</td>
<td>Structurally Deficient – Replacement Underway</td>
<td>$60M</td>
<td>1911</td>
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<tr>
<td>Beverly</td>
<td>Structurally Deficient – Replaced 2017</td>
<td>$56M</td>
<td>1885</td>
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<tr>
<td>Saugus</td>
<td>Structurally Deficient – In Design</td>
<td>$60M</td>
<td>1911</td>
</tr>
<tr>
<td>Manchester</td>
<td>Structurally Adequate</td>
<td>N/A</td>
<td>1944</td>
</tr>
<tr>
<td>Tower A</td>
<td>Structurally Deficient – To Be Replaced</td>
<td>$121M</td>
<td>1931</td>
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Commuter Rail Vehicle Fleet
Statistics about the Vehicle Fleet

- **92** switching, MOW, and wreck response vehicles in support fleet
- **500** active locomotives and coaches in revenue fleet
- **Minimum target service life is 25 years**
- **240** revenue vehicles at/beyond 25-year service life
- **37** locomotives are beyond their 25-year service life, with another **13** approaching their 25-year service life within the next six years

<table>
<thead>
<tr>
<th>Coaches</th>
<th>Active</th>
<th>At/Beyond 25-Year Service Life</th>
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<tr>
<td>420</td>
<td>203</td>
<td>203</td>
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<tr>
<td>Locomotives</td>
<td>90</td>
<td>37</td>
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</table>

• Invest in existing locomotives
  ▪ Replace major components on 10 active locomotives (UTEX)
    • 2 year process
    • Focus on reliability improvements
  ▪ Rehab 10 active locomotives
    • Life extending – 10 to 15 years
    • Currently ongoing at Motive Power Industries in Boise, Idaho.
    • First unit expected back end of 2018.

• Possible procurement of new locomotives
  ▪ Will be addressed in Fleet Plan
  ▪ Typical 7 year procurement until final acceptance of fleet
Fleet Investments

Coaches

• Invest in existing coaches
  ▪ Kawasaki rebuild program
    • 118 coaches undergoing rebuild
    • Life extending – 10 to 15 years

• Possible procurement of new coaches
  ▪ Coach for coach replacement
    • Single levels replaced by bi-levels
Capital Needs
Infrastructure

**Structures**
- Draw 1/Tower A at North Station
- East Street Bridge
- Bacon Street Bridge

**Stations**
- Blue Hill Avenue Station- Open early 2019.
- Ruggles Station Platform Track 2
- Upgrades to Ballardvale and Andover Stations
- Design and plan for accessibility improvements at Winchester, Auburndale, Natick Center, Mansfield, South Attleboro Stations

**South Station Expansion**
- South Station is at capacity today
- Provides ability to grow on South Side
- Addresses need for midday layover

**South Coast Rail**
- Expands service to New Bedford/Fall River region

**Systemwide Track & Signal Upgrades**
- Replace jointed rail with CWR
- Restore double track
- Modernize signal system
Upcoming Projects in FY 2019

- Continuation of PTC installation, programming, and testing
- Installation of additional switch heaters for winter resiliency
- Franklin double track
- Study of third track from Framingham to Auburndale
- System-wide tie replacement – 51,000 ties
- Continue Worcester Line rail replacement
- Upgrade signal system between Framingham and Boston
- Continue station brightening program
- South Station pit lighting
- Stations at Natick Center and Wellesley Square in design
- Bridges at Bacon St in Wellesley and Intervale Rd in Weston being rebuilt
- Installation of “smart coach” devices
- Additional locomotive overhauls
QUESTIONS?

Ryan D. Coholan
Chief Railroad Officer
Massachusetts Bay Transportation Authority
One South Station, 2nd Floor, Boston, MA
617-222-6266
617-308-5106