Northern Tier Passenger Rail Study

Working Group Meeting #3

October 19, 2023
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Agenda

1 Study Overview
2 Public Workshop Review
3 Phase 2 Alternatives Development and Evaluation
4 Working Group Discussion
5 Public Comment
6 Next Steps
Study Overview

• Study initiated at the direction of the Massachusetts Legislature to conduct a feasibility study of rail access between the cities of North Adams and Boston

• Conceptual planning study to examine economic and environmental benefits, and identify all necessary improvements and any challenges
Study Process

1. Public Participation
   - Public Involvement Plan
2. Documenting Past Efforts
   - Data Collection
3. Market Analysis
   - Demographics, Land Use, Current and Projected Future Travel Patterns
4. Physical, Regulatory, and ROW Ownership
   - Opportunities and Constraints
5. Potential Service Plans and Alternatives
   - Develop Up to 6 Service Alternatives
6. Alternatives Evaluation and Cost Estimate
   - Ridership Analysis, Benefit-Cost Analysis
7. Development of Recommended Next Steps
   - Short-, and Long-Term Recommendations, Funding Opportunities, Draft and Final Report

The steps in **bold** represent the current stage of the study process.
Study Goals and Objectives

- **Goal: Support economic development along the Northern Tier corridor**
  - Improve connectivity and access to destinations (e.g., jobs and services, academic institutions, tourist attractions, etc.)
  - Support the advancement of relevant economic development-related policies, plans, and designations
  - Minimize impacts to freight rail operations

- **Goal: Promote transportation equity**
  - Increase mobility options between Western and Eastern Massachusetts
  - Improve connectivity and reliability
  - Enhance safety

- **Goal: Minimize impacts on public health and the environment from transportation**
  - Improve public health outcomes
  - Minimize air/noise pollution and greenhouse gas emissions
  - Minimize or avoid impacts to cultural or natural resources
Two-Phase Alternatives Development Process

**Phase 1 Alternatives**
- Lower Investment Alternative
- Higher Investment

**Public Feedback**

**Phase 2 Alternatives**
- Four Additional Service Alternatives
Phase 1 Service Alternatives Recap

<table>
<thead>
<tr>
<th>Common Attributes</th>
<th>Lower Investment &amp; Higher Investment Alternatives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service Type</td>
<td>One-seat ride from North Adams to Boston North Station</td>
</tr>
<tr>
<td>Number of Stations</td>
<td>4 (North Adams, Greenfield, Fitchburg, Boston North Station)</td>
</tr>
<tr>
<td>Frequency</td>
<td>5 trains daily (1 AM peak, 2 midday, 1 PM peak, 1 evening)</td>
</tr>
<tr>
<td>Schedule Times</td>
<td>Schedule times selected for trip purposes; secondary bias toward connection with North-South Service at Greenfield</td>
</tr>
<tr>
<td>Other uses of ROW</td>
<td>Assumes commuter schedules and freight trains</td>
</tr>
<tr>
<td>Dwell Time at Stations</td>
<td>2 minutes (Amtrak Scheduling Standard)</td>
</tr>
<tr>
<td>Equipment Type</td>
<td>Diesel trains with Amfleet passenger cars and same consist as Valley Flyer</td>
</tr>
<tr>
<td>MBTA Infrastructure</td>
<td>No modification to MBTA infrastructure</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Unique Attributes</th>
<th>Lower Investment</th>
<th>Higher Investment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Track Infrastructure</td>
<td>Limited to signal improvements (including PTC) and upgrade of Class 1 track at PAS East Deerfield Freight Yard; some trackage additions to support meet-pass locations; no change in superelevation on PAS corridor</td>
<td>More track rehabilitation and improvements to support superelevation and increase in track class to fully use capability of the train to match superelevation; some trackage additions to support meet-pass locations</td>
</tr>
</tbody>
</table>
# Phase 1 Service Alternatives – Initial Evaluation

<table>
<thead>
<tr>
<th>Evaluation Criteria</th>
<th>Lower Investment</th>
<th>Higher Investment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coverage Area and Populations Served</td>
<td>North Adams, Greenfield, Fitchburg and Boston North Station</td>
<td>North Adams, Greenfield, Fitchburg and Boston North Station</td>
</tr>
<tr>
<td>Environmental Impacts</td>
<td>Minimal potential environmental impacts</td>
<td>Minimal potential environmental impacts</td>
</tr>
<tr>
<td>Passenger Rail Impacts</td>
<td>Not expected to impact MBTA operations</td>
<td>Not expected to impact MBTA operations</td>
</tr>
<tr>
<td>Travel Times</td>
<td>3 hours 55 minutes eastbound</td>
<td>2 hours 48 minutes eastbound</td>
</tr>
<tr>
<td></td>
<td>3 hours 59 minutes westbound</td>
<td>2 hours 58 minutes westbound</td>
</tr>
<tr>
<td>Economic Impacts</td>
<td>$1,248,000 to $3,293,000 transportation cost savings</td>
<td>$1,932,000 to $5,193,000 transportation cost savings</td>
</tr>
<tr>
<td></td>
<td>2,964 construction jobs (year 1)</td>
<td>4,912 construction jobs (year 1)</td>
</tr>
<tr>
<td></td>
<td>$424,000,000 construction output (year 1)</td>
<td>$714,000,000 construction output (year 1)</td>
</tr>
<tr>
<td>Cost Effectiveness</td>
<td>$7,358,100 capital cost per mile</td>
<td>$15,403,875 capital cost per mile</td>
</tr>
<tr>
<td></td>
<td>$18,735 to $49,472 capital cost per rider</td>
<td>$27,390 to $73,107 capital cost per rider</td>
</tr>
<tr>
<td></td>
<td>$215 to $568 annual operating cost per rider</td>
<td>$150 to $401 annual operating cost per rider</td>
</tr>
<tr>
<td>Freight Rail Impacts</td>
<td>10 minutes of average freight delay estimated</td>
<td>10 minutes of average freight delay estimated</td>
</tr>
<tr>
<td>Annual VMT Reduction</td>
<td>-2,313,821 to -6,105,127</td>
<td>-3,754,257 to -10,128,225</td>
</tr>
</tbody>
</table>
Public Workshop Feedback – Phase 2 Alternatives

Consider additional stops (e.g., Shelburne Falls, Athol/Orange, Gardner, Porter Square)

Evaluate a connection to Albany

Consider seasonal attractors

Consider potential upgrades to support higher speeds
Public Workshop Feedback – Comments/Questions

Ridership Projections

Cost Estimation
Public Workshop Feedback – Clarifications: Ridership

Initial Ridership Estimation Process

Step 1
- Develop Model to Predict Ridership based on Observed MBTA and Streetlight Data
  Inputs include: MBTA Boardings, MBTA Commuter Rail Trains per Station, StreetLight Data LBS Trips from Station Catchment Areas to Boston

Step 2
- Estimate Downeaster Travel Time Elasticities (i.e., each additional minute of travel time reduces boardings by X%)
  Inputs include: Downeaster Trip Data and Travel Times to Boston

Step 3
- Apply MBTA Boarding Model to Estimate Corridor Boardings by Market and # of Trains
- Apply Downeaster Travel Time Elasticities to Adjust Boardings for Longer Travel Times
Public Workshop Feedback – Clarifications: Ridership

Updated Ridership Estimation Process

Step 1
• Develop Model to Predict Ridership based on Observed MBTA and Streetlight Data
  Inputs include: MBTA Boardings, MBTA Commuter Rail Trains per Station, Ratio of Transit to Auto Travel Time, StreetLight Data LBS Trips from Station Catchment Areas to Boston

Step 2
• Estimate Headway Elasticities (i.e., each additional trip increases boardings by X%)
  Inputs include: Peak period and daily passenger rail trips on the Northern Tier

Step 3
• Apply MBTA Boarding Model to Estimate Corridor Boardings by Market and # of Trains
  • Apply Rail vs. Auto Travel Time Elasticities to Adjust Boardings

Step 4
• Apply recent travel patterns for Intra-Corridor trips on the Downeaster to estimate non-Boston based travel along the Northern Tier Corridor
Public Workshop Feedback – Clarifications: Ridership

Overview of Travel Purpose in the Corridor

Daily Trip Origins by Corridor Segment (2019)

- 83% Non-Work Trips
- 12% Work Trips
- 5% Work Trips

Source: Streetlight Data, 2019

Segments Map
MasDOT Northern Tier Passenger Rail Study

West
Central
East

Source: Streetlight Data, 2019
Public Workshop Feedback – Clarifications: Ridership

Station Catchment Areas for LBS Trips

Stations in Phase A Alts

Effect of Added Stations
Public Workshop Feedback – Clarifications: Cost Estimation

• Cost estimation is the process of forecasting the cost of building an infrastructure project
  • Considers factors such as materials, location, equipment, and labor
  • Process depends upon level of design

• Northern Tier is at pre-design stage
  • Contingency costs account for unknown, but expected elements of the project

• Cost estimates are based on material, equipment, and labor costs from recent railroad construction projects in Massachusetts and surrounding states
Public Workshop Feedback – Clarifications: Cost Estimation

Cost Categories

- Construction
- Right-of-Way
- Civil System Contingency at 0% Design
- Vehicle Cost
- Escalation for Future Cost
- Engineering and Permitting
Public Workshop Feedback – Clarifications: Cost Estimation

- Costs of track components were refined
- The typical practice of recycling rail was incorporated
- Rolling stock estimates were updated with new assumptions on consists and recent rolling stock purchases
- Station estimates reflect accessible station features
Phase 2
Alternatives Development and Evaluation
Proposed Phase 2 Service Alternatives

• Based on input received on the two initial alternatives, four additional service alternatives are proposed:

  Alternative 3 – Electrified Service

  Alternative 4 – Full Local Service

  Alternative 5 – Albany Extension

  Alternative 6 – Northern Tier Rail Link
Proposed Phase 2 Service Alternatives
Alternative 3 – Electrified Service

Service Type
• 5 Trains/day
• All Stops

Stations
• North Adams
• Greenfield
• Athol
• Fitchburg
• Ayer
• Porter
• North Station

Proposed Improvements
• New double track in Charlemont
• Track upgraded to Class 3 and 4
• Overhead electrification
• Crossing renewals
• Bridge rehabilitation
• Signal replacement & Positive Train Control
• North Adams layover

Cost of electrification for the corridor west of the MBTA Fitchburg Line
### Proposed Phase 2 Service Alternatives

**Alternative 4 – Full Local Service**

- **Service Type**
  - 5 Trains/day
  - All Stops

- **Stations**
  - North Adams
  - Shelburne Falls
  - Greenfield
  - Athol
  - Gardner
  - Fitchburg
  - Porter
  - North Station

- **Proposed Improvements**
  - New double track in Buckland
  - Track upgraded to Class 3 and 4
  - Crossing renewals
  - Bridge rehabilitation
  - Signal replacement & Positive Train Control
  - North Adams layover

#### Track Work Budget

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
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</thead>
<tbody>
<tr>
<td>Track Work</td>
<td>$862,686,962</td>
</tr>
<tr>
<td>Bridges</td>
<td>$429,711,003</td>
</tr>
<tr>
<td>Signals &amp; Grade Xings</td>
<td>$141,368,789</td>
</tr>
<tr>
<td>Electrification</td>
<td>$0</td>
</tr>
<tr>
<td>Stations</td>
<td>$57,782,743</td>
</tr>
<tr>
<td>Layover</td>
<td>$15,969,632</td>
</tr>
<tr>
<td>Rolling Stock</td>
<td>$82,945,944</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$1,590,465,076</strong></td>
</tr>
</tbody>
</table>

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**Legend**
- Rail Station
- PAS Ownership
- MBTA Ownership
- Construct Track
- New Track & Upgrade Track

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*Note: This is a summary of the proposed phase 2 service alternatives for the Massachusetts Department of Transportation. For detailed information, please refer to the original document.*
Proposed Phase 2 Service Alternatives
Alternative 5 – Albany Extension

Service Type
• 5 Trains/day
• All Stops

Stations
• Albany (NY)
• Schenectady (NY)
• North Adams
• Greenfield
• Fitchburg
• Porter
• North Station

Proposed Improvements
• New double track: Charlemont, Stillwater (NY), Clifton Park (NY)
• Track upgraded to Class 3 and 4
• Crossing renewals
• Bridge rehabilitation
• Signal replacement & Positive Train Control
• Uses Albany layover

<table>
<thead>
<tr>
<th>Service Type</th>
<th>Stations</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 5 Trains/day</td>
<td>• Albany (NY)</td>
</tr>
<tr>
<td>• All Stops</td>
<td>• Schenectady (NY)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Track Work</th>
<th>Bridges</th>
<th>Signals &amp; Grade Xings</th>
<th>Electrification</th>
<th>Stations</th>
<th>Layover</th>
<th>Rolling Stock</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>$1,286,096,089</td>
<td>$429,711,003</td>
<td>$141,368,789</td>
<td>$0</td>
<td>$23,113,097</td>
<td>$0</td>
<td>$82,945,944</td>
<td>$1,963,234,923</td>
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</table>
Proposed Phase 2 Service Alternatives
Alternative 6 – Northern Tier Rail Link

Service Type
- 5 Trains/day
- Connection to MBTA System at Fitchburg

Stations
- North Adams
- Greenfield
- Athol
- Fitchburg (for connections to MBTA Commuter Rail)

Proposed Improvements
- Track upgraded to Class 3 and 4
- Rehabilitate siding in Fitchburg
- Crossing renewals
- Bridge rehabilitation
- Signal replacement & Positive Train Control
- North Adams layover

<table>
<thead>
<tr>
<th>Service Type</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rail Station</td>
<td>$1,557,714,406</td>
</tr>
<tr>
<td>PAS Ownership</td>
<td></td>
</tr>
<tr>
<td>MBTA Ownership</td>
<td></td>
</tr>
<tr>
<td>Construct Track</td>
<td></td>
</tr>
<tr>
<td>Upgrade Track</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Proposed Phase 2 Service Alternatives</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative 6 – Northern Tier Rail Link</td>
<td>$1,557,714,406</td>
</tr>
</tbody>
</table>

Legend:
- Rail Station
- PAS Ownership
- MBTA Ownership
- Construct Track
- Upgrade Track

<table>
<thead>
<tr>
<th>Track Work</th>
<th>Bridges</th>
<th>Signals &amp; Grade Xings</th>
<th>Electrification</th>
<th>Stations</th>
<th>Layover</th>
<th>Rolling Stock</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>$853,049,390</td>
<td>$429,711,003</td>
<td>$141,368,789</td>
<td>$0</td>
<td>$34,669,646</td>
<td>$15,969,632</td>
<td>$82,945,944</td>
<td>$1,557,714,406</td>
</tr>
</tbody>
</table>
## Proposed Phase 2 Service Alternatives

### Total Project Cost Comparisons

<table>
<thead>
<tr>
<th>Alternative or Project</th>
<th>Total Project Cost per Route Mile</th>
<th>Total Miles per Route</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative 1 – Lower Investment</td>
<td>$6,187,280</td>
<td>142</td>
</tr>
<tr>
<td>Alternative 2 – Higher Investment</td>
<td>$11,064,097</td>
<td>142</td>
</tr>
<tr>
<td>Alternative 3 – Electrified Service</td>
<td>$20,609,150</td>
<td>142</td>
</tr>
<tr>
<td>Alternative 4 – Full Local Service</td>
<td>$11,200,458</td>
<td>142</td>
</tr>
<tr>
<td>Alternative 5 – Albany Extension</td>
<td>$8,803,744</td>
<td>223</td>
</tr>
<tr>
<td>Alternative 6 – Northern Tier Rail Link</td>
<td>$10,969,819</td>
<td>142</td>
</tr>
<tr>
<td>Hartford Line</td>
<td>$18,946,651</td>
<td>62</td>
</tr>
<tr>
<td>South Coast Rail</td>
<td>$12,647,189</td>
<td>76</td>
</tr>
</tbody>
</table>
# Proposed Phase 2 Service Alternatives Evaluation

<table>
<thead>
<tr>
<th>Evaluation Criteria</th>
<th>Alt. 1 – Lower Investment</th>
<th>Alt. 2 - Higher Investment</th>
<th>Alt. 3 – Electrified Service</th>
<th>Alt. 4 - Full Local Service</th>
<th>Alt. 5 - Albany Extension</th>
<th>Alt 6. – Northern Tier Rail Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>5 Trains per day</td>
<td>5 Trains per day</td>
<td>5 Trains per day</td>
<td>5 Trains per day</td>
<td>5 Trains per day</td>
<td>5 Trains per day</td>
</tr>
<tr>
<td>Eastbound Travel Times North Adams to Boston</td>
<td>3 hours, 48 mins</td>
<td>2 hours, 48 mins</td>
<td>2 hours, 50 mins</td>
<td>2 hours, 59 mins</td>
<td>2 hours, 49 mins</td>
<td>3 hours, 22 mins</td>
</tr>
<tr>
<td>Greenfield to Boston</td>
<td>2 hours, 31 mins</td>
<td>2 hours, 0 mins</td>
<td>2 hours, 4 mins</td>
<td>2 hours, 8 mins</td>
<td>2 hours, 2 mins</td>
<td>2 hours, 34 mins</td>
</tr>
<tr>
<td>Maximum Speeds</td>
<td>60 mph (PAS), 80 mph (MBTA)</td>
<td>60 mph (PAS), 80 mph (MBTA)</td>
<td>60 mph (PAS), 80 mph (MBTA)</td>
<td>60 mph (PAS), 80 mph (MBTA)</td>
<td>60 mph (PAS), 80 mph (MBTA)</td>
<td>60 mph (PAS), 80 mph (MBTA)</td>
</tr>
<tr>
<td>Environmental Impacts</td>
<td>Minimal</td>
<td>Minimal</td>
<td>Minimal</td>
<td>Minimal</td>
<td>Minimal</td>
<td>Minimal</td>
</tr>
<tr>
<td>Passenger Rail Impacts</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Freight Rail Impacts</td>
<td>Minimal delay estimated</td>
<td>Minimal delay estimated</td>
<td>Minimal delay estimated</td>
<td>Minimal delay estimated</td>
<td>Delays west of North Adams TBD</td>
<td>Minimal delay estimated</td>
</tr>
<tr>
<td>Community/Safety Impacts Grade Crossings Impacted</td>
<td>69 crossings</td>
<td>69 crossings</td>
<td>69 crossings</td>
<td>69 crossings</td>
<td>119 crossings</td>
<td>69 crossings</td>
</tr>
</tbody>
</table>

*The average time travel by car between North Adams and Boston is 2 hours and 48 minutes, between Greenfield and Boston 2 hours and 8 minutes.

*Schedules were built with the goal to minimize conflicts with freight rail service and to create no conflict with MBTA service.*
## Proposed Phase 2 Service Alternatives Evaluation

### Comparison to Other Services

<table>
<thead>
<tr>
<th>Evaluation Criteria</th>
<th>Northern Tier Passenger Rail (MA-NY)</th>
<th>Pere Marquette (IL-IN-MI)</th>
<th>Piedmont (NC)</th>
<th>Downeaster (ME-NH-MA)</th>
<th>Vermonter (VT-MA-CT-NEC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>5 Trains per day</td>
<td>1 Train per day</td>
<td>3 Trains per day</td>
<td>5 Trains per day</td>
<td>1 Train per day</td>
</tr>
<tr>
<td>Distance</td>
<td>142 miles (Boston – North Adams)</td>
<td>176 miles</td>
<td>173 miles</td>
<td>145 miles</td>
<td>308 miles (St. Albans, VT – New Haven, CT)</td>
</tr>
<tr>
<td></td>
<td>223 miles (Boston – Albany, NY)</td>
<td></td>
<td></td>
<td></td>
<td>605 miles (St. Albans, VT – Washington DC)</td>
</tr>
<tr>
<td>Population of Service Area (within 25 miles)</td>
<td>6.7 million</td>
<td>6.5 million</td>
<td>4.9 million</td>
<td>5.1 million</td>
<td>33.8 million</td>
</tr>
<tr>
<td>Annual Ridership</td>
<td>3,900 - 304,200</td>
<td>96,500</td>
<td>211,000</td>
<td>550,000</td>
<td>98,000</td>
</tr>
</tbody>
</table>

Northern Tier operates over a shorter distance than the other services with comparable populations. Ridership estimates are comparable.
Phase Two Key Takeaways

• All alternatives estimated to provide connectivity, mobility, and choice

• All alternatives estimated to provide positive environmental and economic impacts

• Alternative 3 (Electrified Service) and Alternative 4 (Full Local Service) generate higher ridership levels and the measurements associated with them, including transportation cost savings and VMT reduction
# Summary of Proposed Alternatives

<table>
<thead>
<tr>
<th>Evaluation Criteria</th>
<th>Alt. 1 – Lower Investment</th>
<th>Alt. 2 - Higher Investment</th>
<th>Alt. 3 – Electrified Service</th>
<th>Alt 4. - Full Local Service</th>
<th>Alt. 5 - Albany Extension</th>
<th>Alt 6. – Northern Tier Rail Link</th>
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<tr>
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<td>60 mph (PAS), 80 mph (MBTA)</td>
<td>60 mph (PAS), 80 mph (MBTA)</td>
</tr>
<tr>
<td>Environmental Impacts</td>
<td>Minimal</td>
<td>Minimal</td>
<td>Minimal</td>
<td>Minimal</td>
<td>Minimal</td>
<td>Minimal</td>
</tr>
<tr>
<td>Passenger Rail Impacts</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Freight Rail Impacts</td>
<td>Minimal delay estimated</td>
<td>Minimal delay estimated</td>
<td>Minimal delay estimated</td>
<td>Minimal delay estimated</td>
<td>Delays west of North Adams</td>
<td>Minimal delay estimated</td>
</tr>
</tbody>
</table>
Working Group Discussion

• General comments or questions about the alternatives evaluation?

• What next steps would you recommend?
  • Which of these alternatives best address the goals and objectives of the study?
  • Are there additional items that could be further examined?
Equipment and landscape do not match, need new picture.
Questions and Answers

- “Raise your hand” to be unmuted for verbal questions
- Submit your questions and comments using the Q&A button
- Please state your name before your question
- Please share only 1 question or comment at a time, limited to 2 minutes, to allow others to participate
- To ask a question via phone, dial *9 and the moderator will call out the last 4-digits of your phone number and unmute your audio when it is your turn.

All questions and comments are subject to disclosure for public records. Please use these functions for project related business only.
Next Steps

Equipment and landscape do not match, need new picture.
Next Steps

1. Public Participation
2. Documenting Past Efforts
3. Market Analysis
4. Physical, Regulatory, and ROW Ownership
5. Potential Service Plans and Alternatives
6. Alternatives Evaluation and Cost Estimate
7. Development of Recommended Next Steps

- Public Involvement Plan
- Data Collection
- Demographics, Land Use, Current and Projected Future Travel Patterns
- Opportunities and Constraints
- Develop Up to 6 Service Alternatives
- Ridership Analysis, Benefit-Cost Analysis
- Short-, and Long-Term Recommendations, Funding Opportunities, Draft and Final Report
Learn More

Please visit the Study website to receive Study updates and to view past materials and meeting recordings:
https://www.mass.gov/northern-tier-passenger-rail-study

Please visit the PIMA website to submit your comments and questions:
https://tinyurl.com/NTPRS-COMMENTS