Northern Tier Passenger Rail Study

Public Workshop

January 11, 2023

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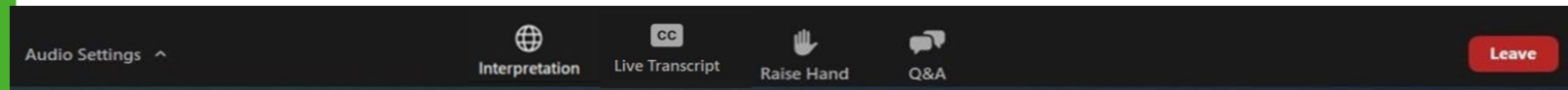

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Agenda

- **Study Process**
- **Presentations and Discussion**
  - Module 1: Alternatives Development Approach and Methods
  - Module 2: Evaluation of Phase 1 Alternatives
  - Module 3: Looking Ahead to Phase 2

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

MODULE 1

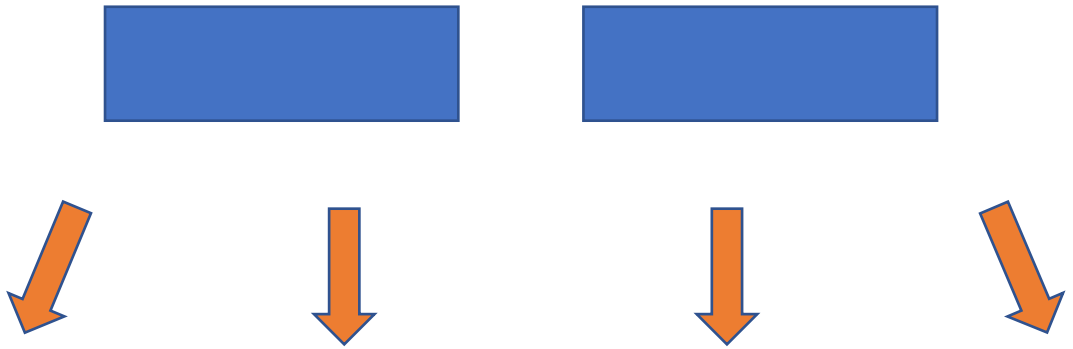
Alternatives Development Approach and Methods

Two-Phase Alternatives Development

Study will evaluate alternatives in two phases – Phase 1 will show how alternatives are shaped and evaluated to assist in developing Phase 2 alternatives

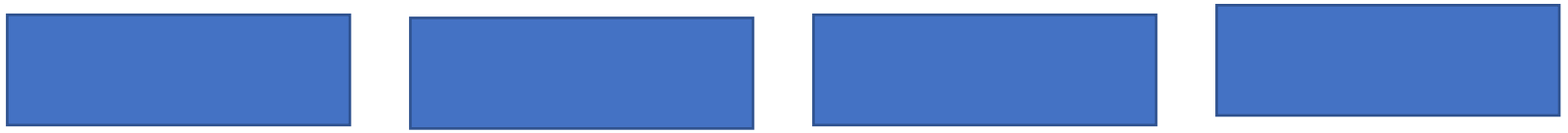
PHASE 1

Lower investment & higher investment



PHASE 2

Four additional alternatives



Phase 1 Service Alternatives

MODULE 1

Attribute	Lower Investment	Higher Investment
Service Type	One-seat ride from North Adams to Boston North Station	
Number of Stations	4 (North Adams, Greenfield, Fitchburg, Boston North Station)	
Frequency	5 trains daily (1 AM peak, 2 midday, 1 PM peak, 1 evening)	
Schedule Times	Schedule times selected for trip purposes; secondary bias toward connection with North-South Service at Greenfield	
Other uses of ROW	Assumes commuter schedules and freight trains	
Dwell Time at Stations	2 minutes	
Equipment Type	Diesel trains with Amfleet passenger cars and same consist as Valley Flyer	
MBTA Infrastructure	No modification to MBTA infrastructure	
Track Infrastructure Improvements	Limited to signal improvements (including PTC) and upgrade of Class 1 track at East Deerfield Yard; some trackage additions to support meet-pass locations; no change in superelevation on PAS corridor	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

Rail Simulations 101

Rail Traffic Controller (RTC) is the industry standard for simulating rail service to estimate train performance and trip times for each train.

STEP 1 The simulation model is coded using detailed inputs about track designs, train configurations, and their proposed schedules.

STEP 2 The RTC software "dispatches" the trains through the network. RTC will attempt to resolve any conflicts by delaying or rerouting a train.

STEP 3 The RTC software resolves all conflicts and produces detailed outputs on the systems performance.

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Rail Simulation Inputs

- Track Condition
  - FRA Track Class speed
  - Timetable speed restrictions
- Track Geometry
  - Grades
  - Curves
- Track Configuration
  - Single track mainline
  - Single track with passing siding
  - Double track mainline
- Train Schedules
  - Freight trains
  - Proposed passenger trains
- Signal Control System
  - Automatic blocks
  - Centralized traffic control
  - Positive train control (PTC)
- Grade Crossings
  - Average daily vehicle traffic
  - Type of crossing protection

Note: Inputs are based on currently available data and tools, and may be refined as additional information is available

Rail Simulation Outputs

- Animation of Train Movements
- Time-Distance Diagrams (Stringlines)
- Train Performance Calculator Profiles Displaying:
  - Elevations
  - Speed
  - Throttle
  - Brake settings
  - Cumulative distance
  - Run time
- Track Occupancy Chart
- Detailed Train Status
- Timetables
- Operating Statistics
  - At the individual train level
  - Or summarized by train type
  - Or at a system-wide level

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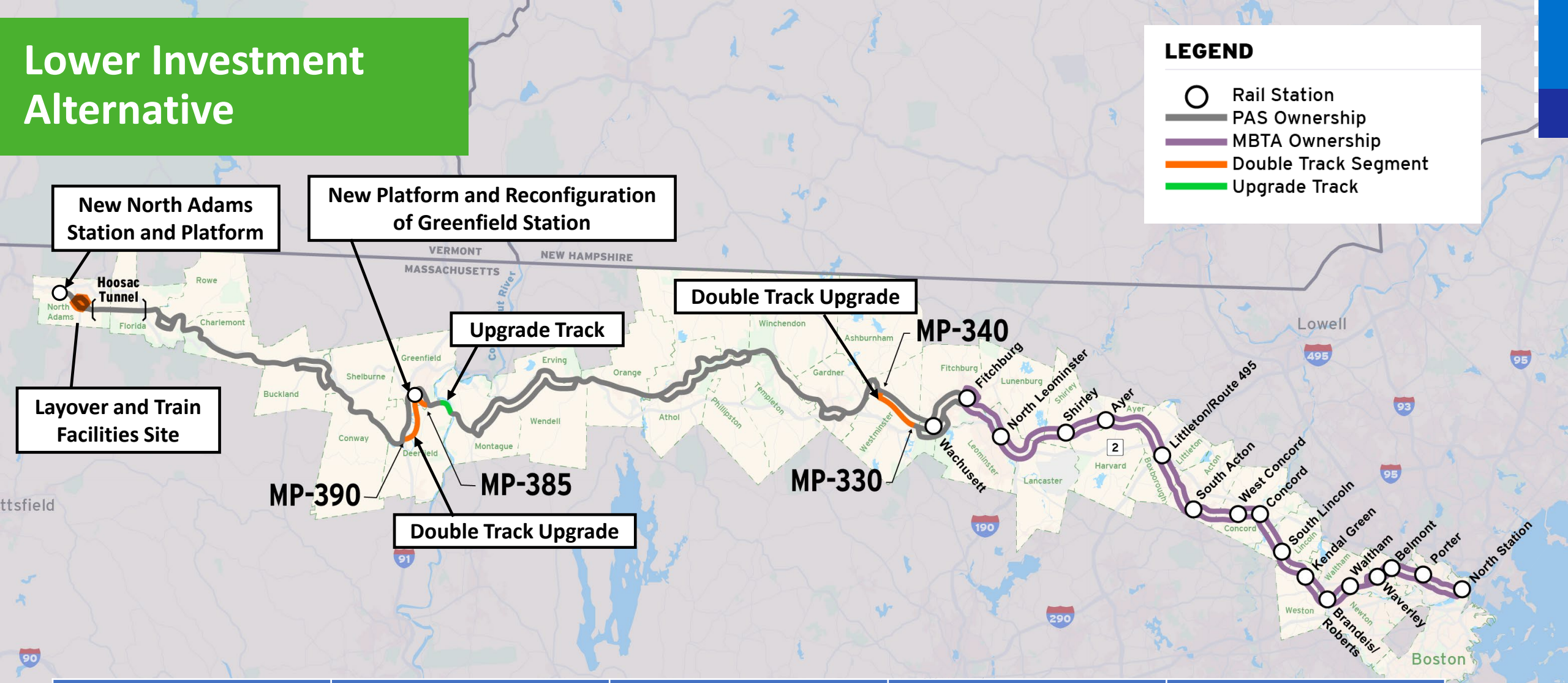
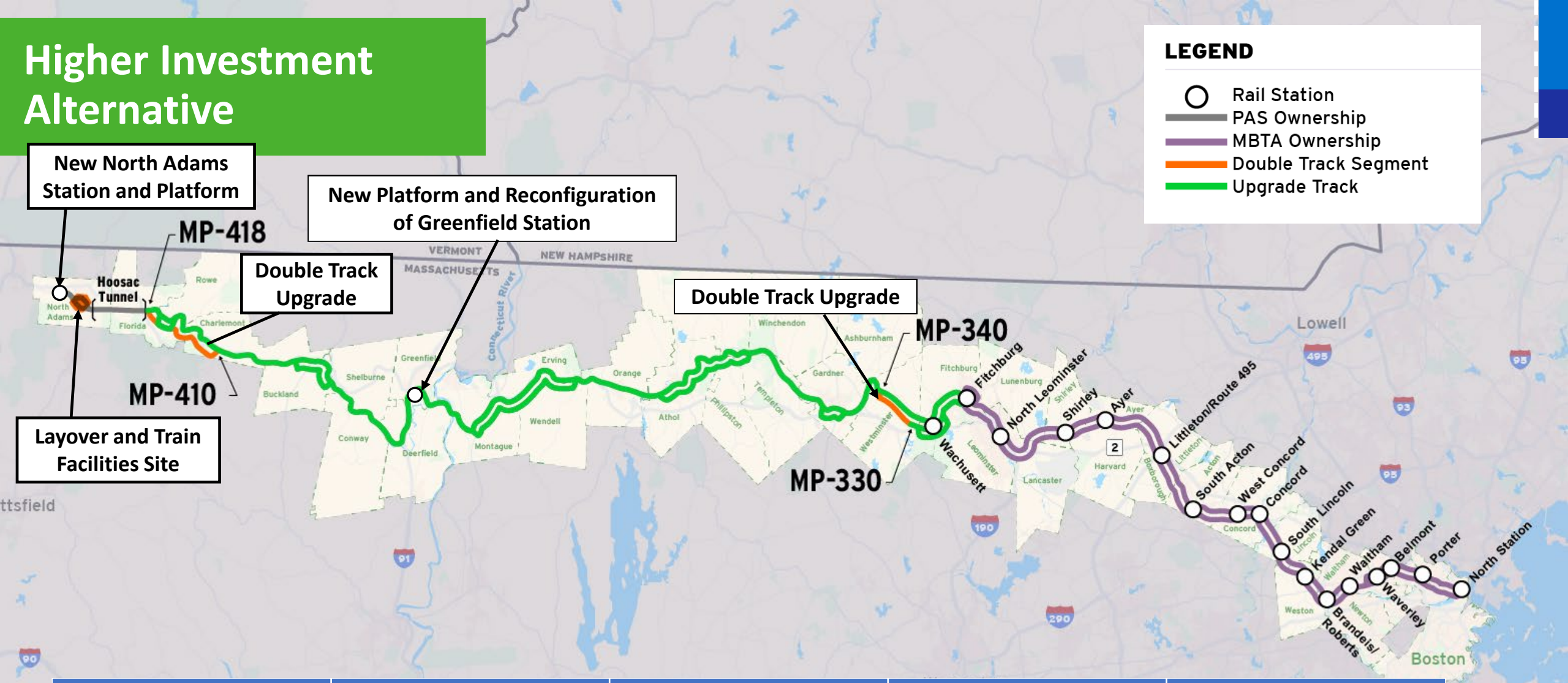
Lower Investment Alternative



Eastbound Run Times	North Adams	Greenfield	Fitchburg	Boston North Station
	0	1 hour 19 minutes	2 hours 53 minutes	3 hours 55 minutes

Westbound Run Times	Boston North Station	Fitchburg	Greenfield	North Adams
	0	1 hour	2 hour 35 minutes	3 hours 59 minutes

Higher Investment Alternative



Eastbound Run Times	North Adams	Greenfield	Fitchburg	Boston North Station
	0	47 minutes	1 hour 50 minutes	2 hours 48 minutes

Westbound Run Times	Boston North Station	Fitchburg	Greenfield	North Adams
	0	59 minutes	2 hours	2 hours 58 minutes

Poll Question 1

- What type of trip would you use the train for under the lower investment alternative?

- Work
- Visiting family and friends
- Day-trips
- Attending games, concerts, or events
- Extended vacations
- Other

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Poll Question 2

- What type of trip would you use the train for under the higher investment alternative?

- Work
- Visiting family and friends
- Day-trips
- Attending games, concerts, or events
- Extended vacations
- Other

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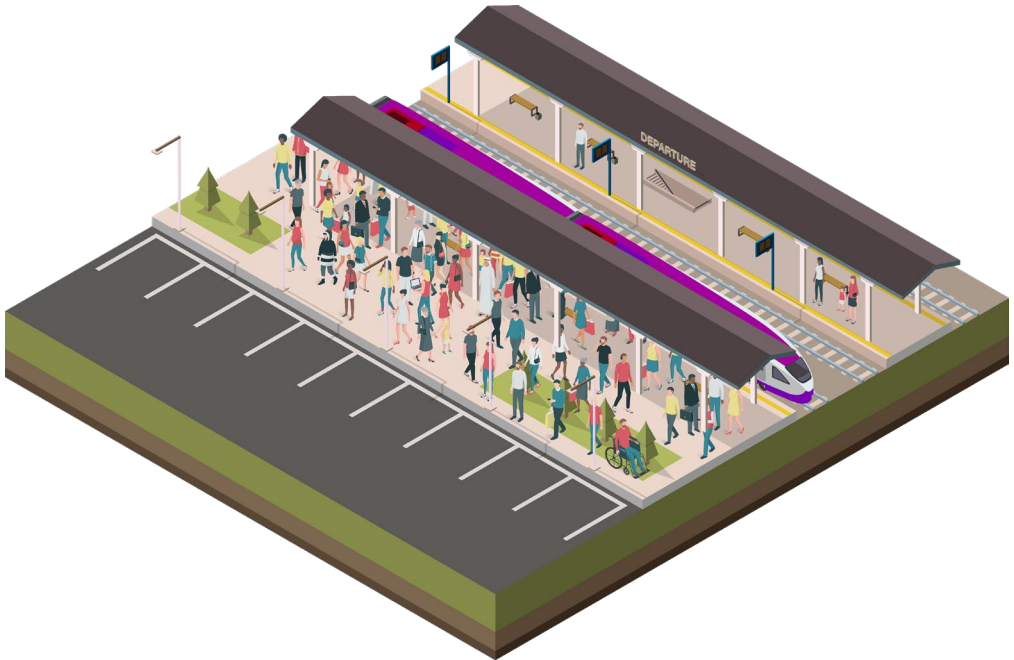
Ridership Estimation 101

- Understanding the potential ridership is one way to help weigh the benefits and costs of a new passenger rail service
- Estimating ridership requires data about where people currently travel
- Analytical tools and data inform us about travel markets – where, how and why people travel
- Analysis of travel markets builds estimates of potential new trips on rail and potential shifts from auto to rail
- Auto trips may move to rail for many reasons including:
  - Frequency of service
  - Overall travel time
- Pairing demographic information with ridership projections enables equity analysis of the impact of the rail project



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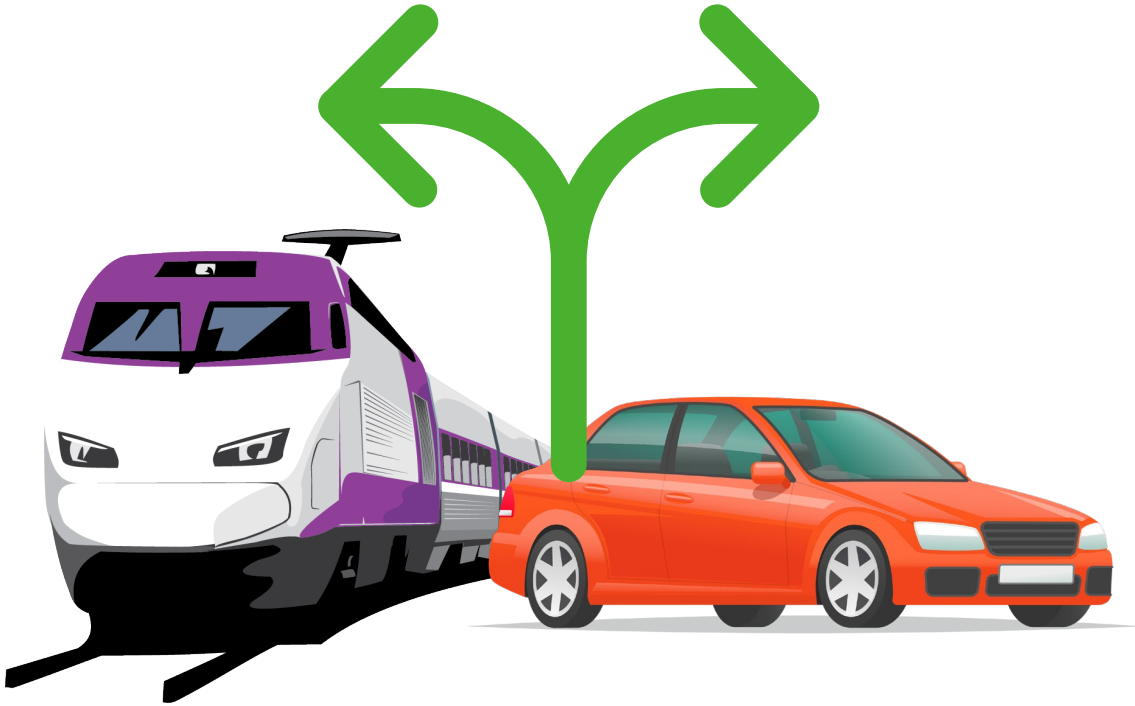
Defining the Overall Travel Market

- Travel market analysis for study based on *existing travel flows* which can be changed by service and policies

- Study analysis is a good approach for feasibility testing, with more detailed approach available as needed

- Discussion focuses on a range of estimates, because of less available detail about impact of change at this early stage



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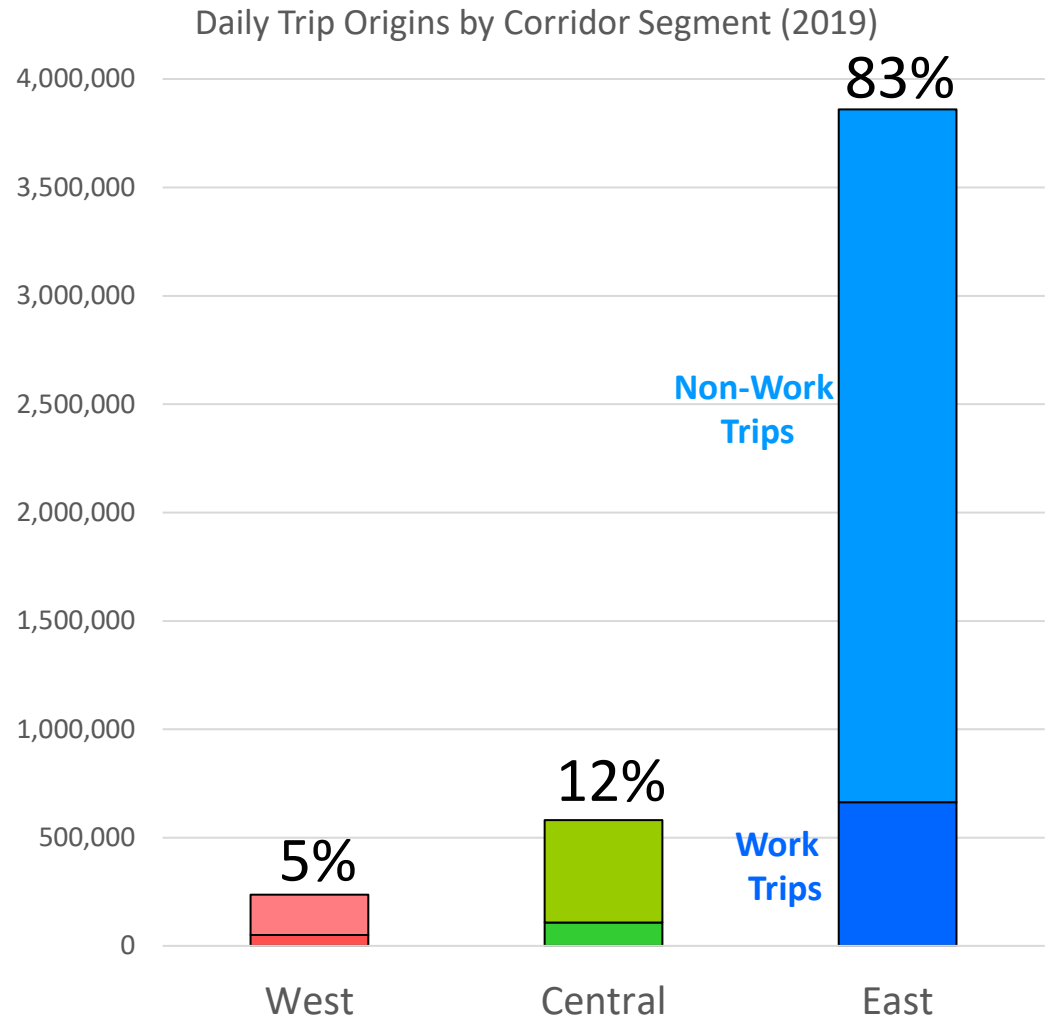
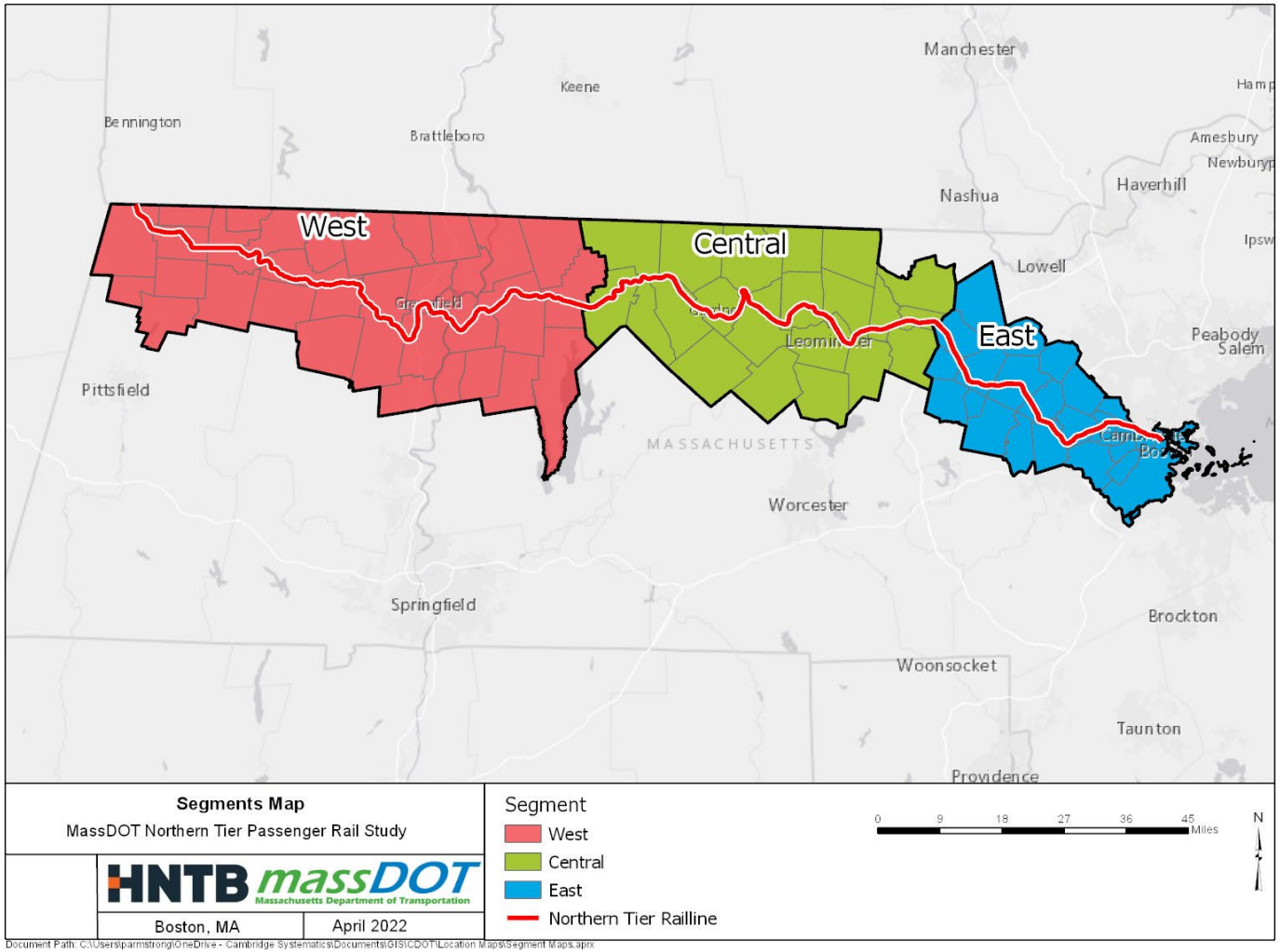
Overview of Data Sources

- **Streetlight Data Location-based Services (LBS) -** Anonymized location records from smart phones and navigation devices.
  - Streetlight Data has a 1-35% sample rate of the total travel market

- **American Community Survey (ACS) Journey to Work** – Census collected information on locations of household and workplaces
  - Based on five-year average of survey results between 2015-2019

Overview of Travel in the Corridor





Source: Streetlight Data, 2019

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

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Initial Ridership Estimation

Lower Investment Scenario Estimate

	North Adams	Greenfield	Fitchburg	Boston North Station
Annual Boardings	220 - 440	2,420-6,600	18,480-48,730	19,200-50,700
% of Travel Market	1.5-3.0%	4.9-13.4%	3.1-8.2%	

Higher Investment Scenario Estimate

	North Adams	Greenfield	Fitchburg	Boston North Station
Annual Boardings	1,430-4,180	7,370-20,350	21,120-55,330	27,200-72,600
% of Travel Market	9.7-28.2%	15.0-41.4%	3.6-9.4%	

Note: All estimates will be refined as part of the study process.

Ridership Estimation – Takeaways

- Baseline travel market decreases with distance along the corridor
- May be some increase for TD Garden, Red Sox, and other special events, but increase not as significant as other corridors with shorter trip times and established travel patterns
  - Little existing travel from corridor west of Fitchburg to test sample events
- Trip time has a large impact on ridership
- Changes in population and employment could impact these estimates

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Poll Question 3

- Who would benefit the most from the two service alternatives?

- Commuters
- Vacationers
- Zero-car households
- Environmental Justice communities
- Individuals in the western region
- Individuals in the central region
- Individuals in the eastern region

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Poll Question 4

- Who would not benefit from the two service alternatives?

- Commuters
- Vacationers
- Zero-car households
- Environmental Justice communities
- Individuals in the western region
- Individuals in the central region
- Individuals in the eastern region

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Cost Estimation 101

- 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

Estimating Total Project Cost

Cost Category	% Construction Costs	Sample Calculations
Construction	NA	$1,000,000
Engineering/Permitting	15%	$150,000
Right of Way	NA	Varies by alternative
Contingency at 0% Design	50%	$500,000
Total		$1,650,000

Note: Total Project Cost also will include escalation based on project schedule and vehicle costs.

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Construction Cost Estimation Example
End of Siding Interlocking

Material Costs	
Materials	$623,700
Misc. Materials (20%)	$124,740
Materials Handling & Delivery (12%)	$89,812
Materials Subtotal	**$838,252**
Labor Costs	
Foreperson @ 780 hrs	$93,600
Wireperson @ 3,170 hrs	$253,600
Electrical Foreperson @ 100 hrs	$12,000
Electrician @ 200 hrs	$16,000
Test Engineer @ 160 hrs	$28,000
Labor Subtotal	**$403,200**
Equipment Costs	
Supervisor Pick-up Truck @ 90 days	$27,000
Crew Pick-up Truck @ 90 days	$27,000
Backhoe @ 15 days	$5,250
Front Loader @10 days	$10,000
Boom Truck @ 35 days	$35,000
Equipment Subtotal	**$104,250**
Total Cost Estimate	**$1,345,702**

Brunswick, Maine, Google Earth

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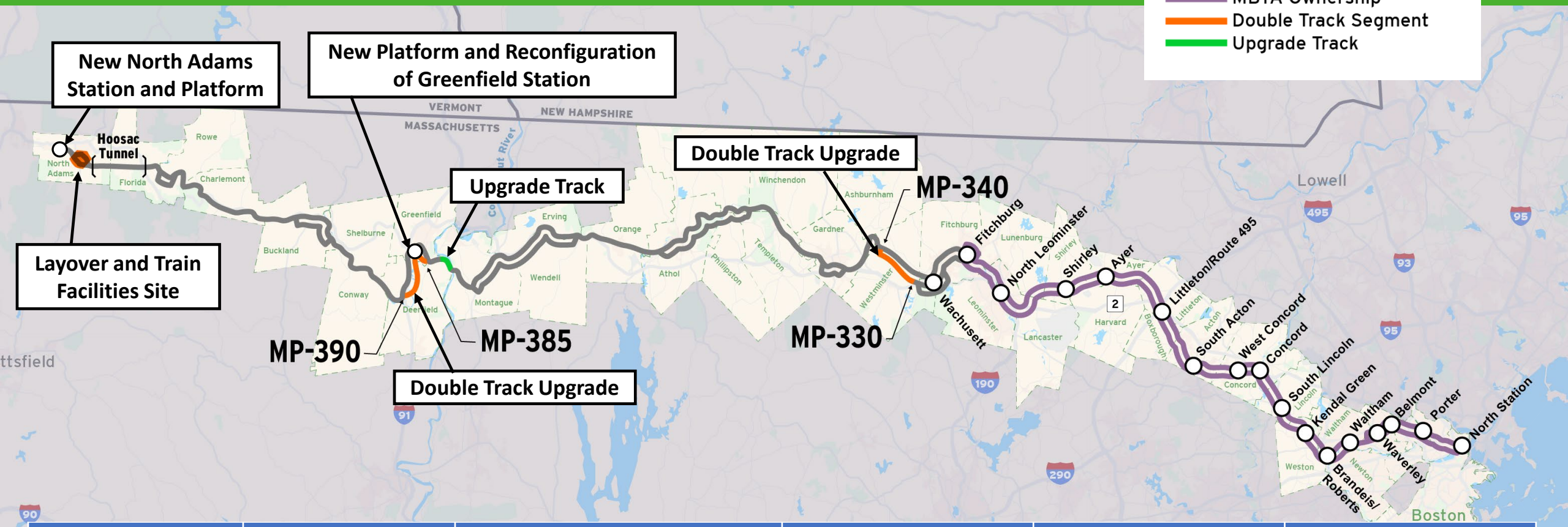
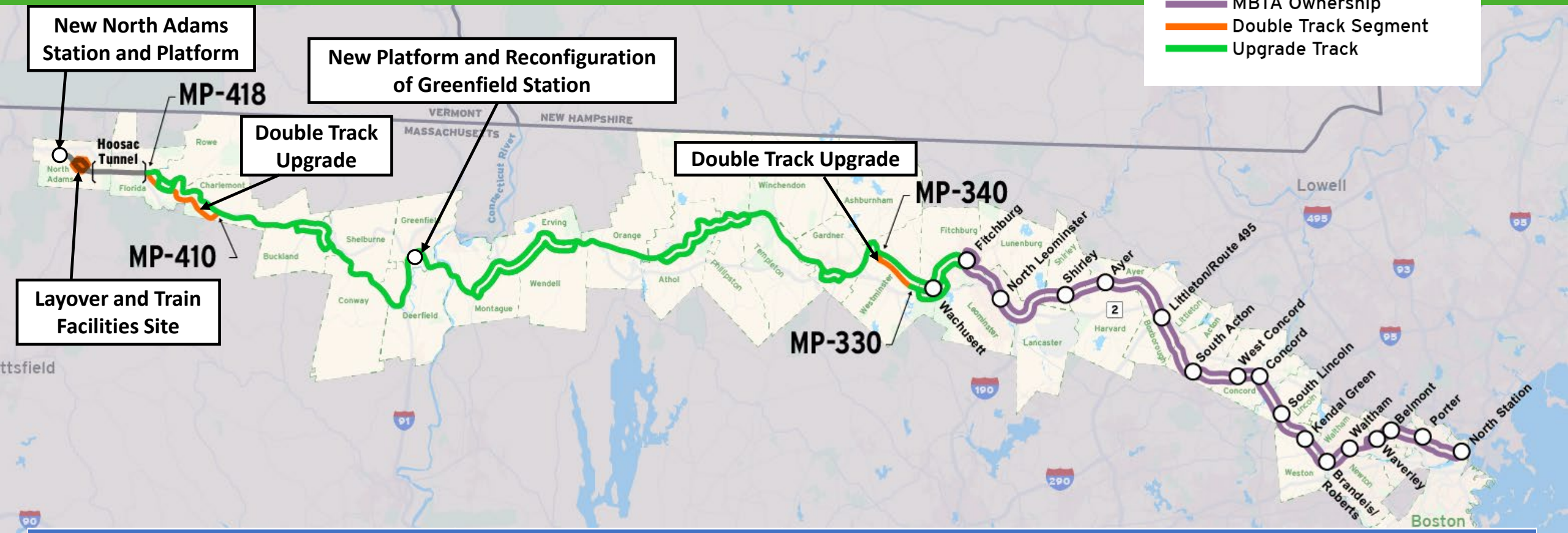
Initial Lower Investment Alternative Cost Estimation



Track Work	Bridges	Signals & Grade Xings	Stations & Layover	Rolling Stock	**Total**
$273,400,000	$450,220,000	$145,360,000	$44,540,000	$131,330,000	$1,044,850,000
26%	43%	14%	4%	13%	
Total project cost per mile = $7,358,100 (2027 Dollars)					

Initial Higher Investment Alternative Cost Estimation



Track Work	Bridges	Signals & Grade Xings	Stations & Layover	Rolling Stock	**Total**
$1,418,340,000	$450,220,000	$142,920,000	$44,540,000	$131,330,000	$2,187,350,000
65%	21%	7%	2%	6%	
Total project cost per mile = $15,403,875 (2027 Dollars)					

Total Project Cost Estimation – Takeaways

- Passenger rail needs are different from freight rail needs
  - This is reflected in the project costs
  - Example: Passenger service needs more reliable track and signal infrastructure to ensure predictable on-time-performance
- Introduction of passenger rail service requires significant investment, even for moderate improvements in speeds
- Extent of rail upgrades is a major differentiator
- Costs include contingencies at Pre-Feasibility stage
  - More detailed design provides more certainty in estimating; less or no design requires contingency budget for more realistic estimates

Summary of Initial Alternatives

MODULE 1

Attribute	Lower Investment	Higher Investment
Service Type	One-seat ride from North Adams to Boston North Station	
Number of Stations	4 (North Adams, Greenfield, Fitchburg, Boston North Station)	
Dep North Adams Dep North Station	6:32 am – 9:32 am – 12:32 pm – 3:32 pm – 6:32 pm 10:05 am – 1:05 pm – 4:05 pm – 7:05 pm – 10:05 pm	
Schedule Times	Schedule times selected for trip purposes; secondary bias toward connection with North-South Service at Greenfield	
Other uses of ROW	Assumes commuter schedules and freight trains	
Dwell Time at Stations	2 minutes	
Equipment Type	Diesel trains with Amfleet passenger cars and same consist as Valley Flyer	
MBTA Infrastructure	No modification to MBTA infrastructure	
Track Infrastructure Improvements	Limited to signal improvements (including PTC) and upgrade of Class 1 track at East Deerfield Yard; some trackage additions to support meet-pass locations; no change in superelevation on PAS corridor	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

Poll Question 5

- What would you change about the two service alternatives?

- Number of stations
- Cost
- Travel times
- Number of trains per day

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Poll Question 6

- What would you keep the same about the two service alternatives?

- Number of stations
- Cost
- Travel times
- Number of trains per day

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Q&A/Discussion

- What is one question you still have about rail simulations?
- What did you find most helpful in learning about the ridership estimation process?
- What did you find most helpful in learning about the construction cost estimation process?

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MODULE 1

Share Your Questions & Comments

- Submit your questions and comments using the Q&A button

- “Raise your hand” to be unmuted for verbal questions, (Alt + Y to raise your hand)

- 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 welcome and appreciated, however, we do request that you refrain from any disrespectful comments

MODULE 2

Evaluation of Phase 1 Alternatives

Study Goals

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

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MODULE 2

Evaluation of the Phase 1 Service Alternatives

What do we know?

- Station locations
- Frequency of service
- Span of service
- Travel times
- Estimated ridership
- Physical improvements needed

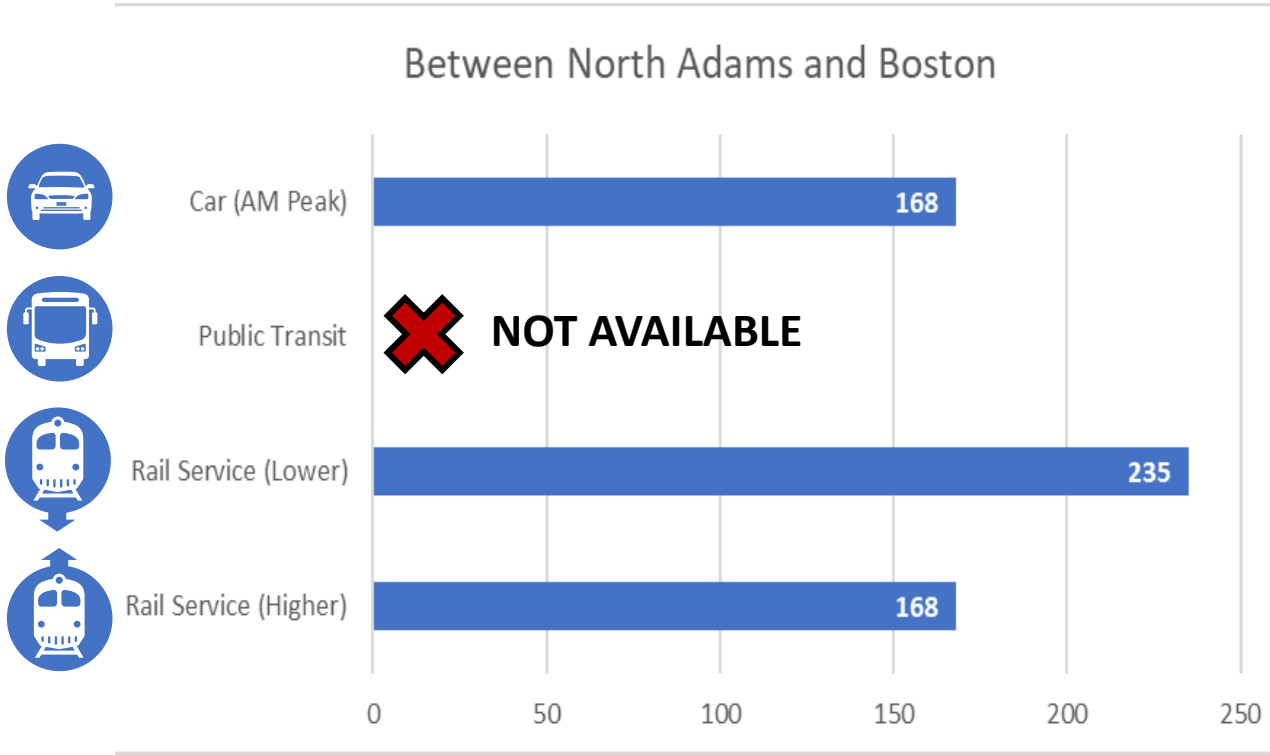
What can we measure?

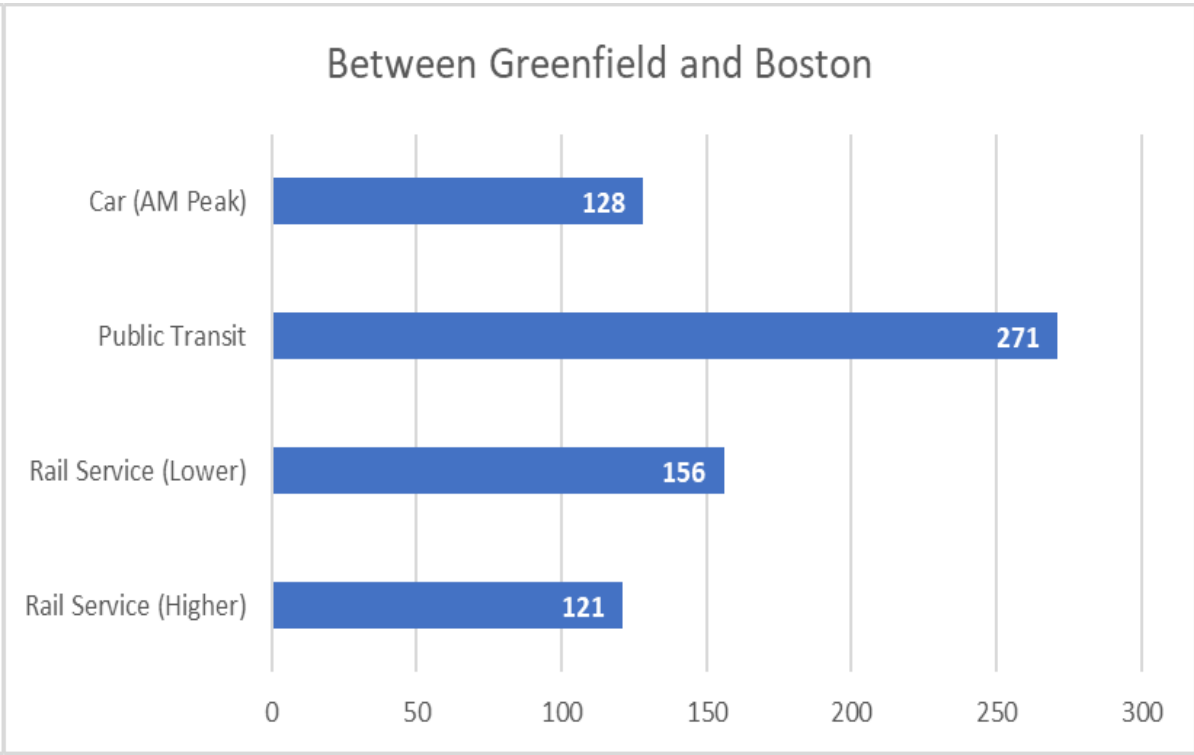
- Mobility and access improvements
- Economic impact
- Impacts on freight and MBTA commuter rail service
- Environmental and cultural impacts
- Social equity and fairness
- Cost effectiveness
- Safety

Evaluation of Mobility and Access

MODULE 2

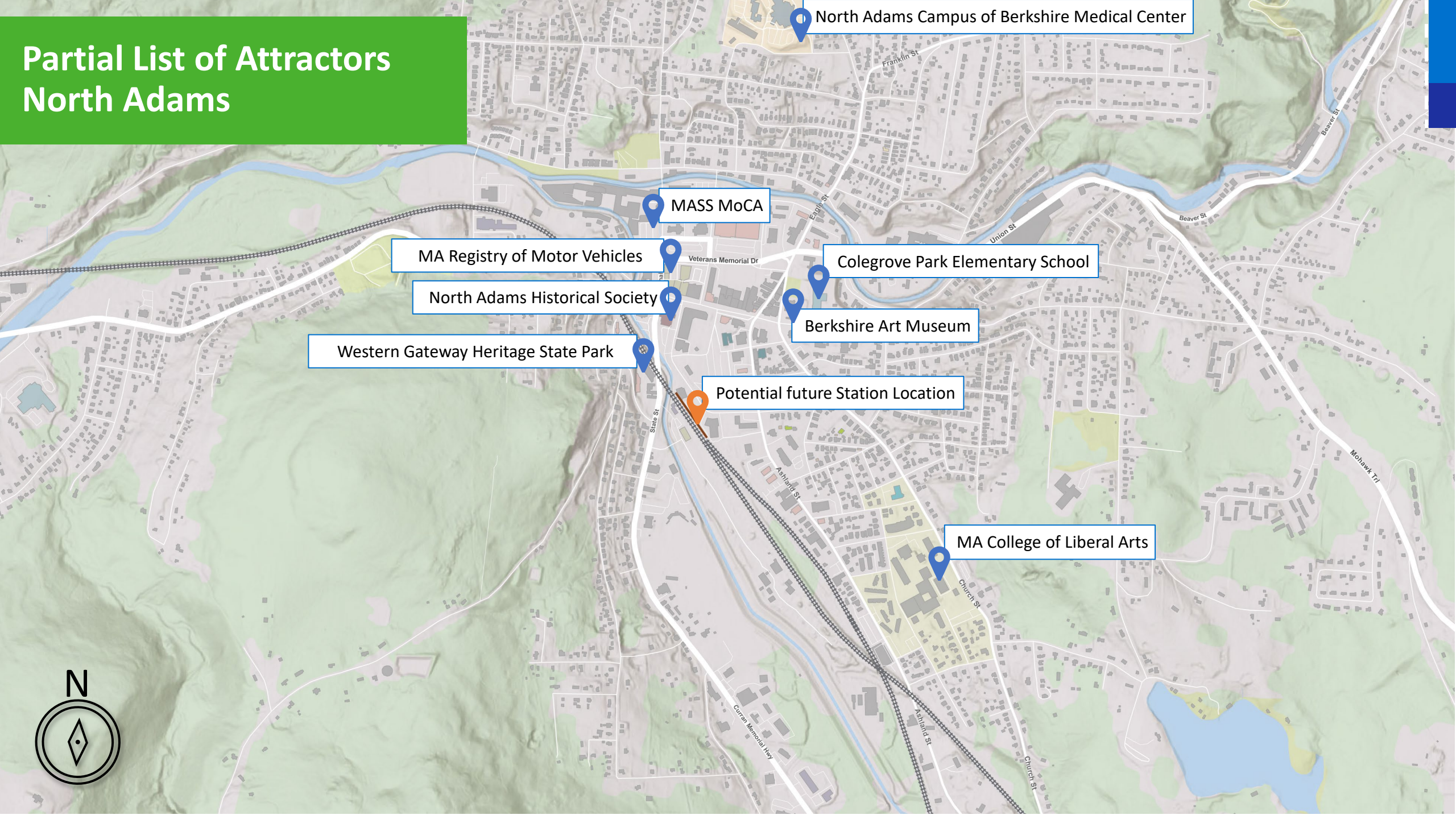
Travel Times By Mode:





- Need to consider the different trip making patterns, as well as issues and opportunities related to accessing local attractors

Partial List of Attractors
North Adams



Partial List of Attractors Greenfield

Partial List of Attractors Fitchburg

Partial List of Attractors
North Station

Evaluation of Economic Impact

Economic Impact: Direct, Indirect, and Induced

Potential Benefits to Individuals and Businesses

- Individuals could save by switching to rail travel
- May provide access to jobs in new regions/cities with potential for higher earnings
- Could create new jobs (construction, business relocation)
- May attract new residents to the region, who patronize businesses
- Potential increase in property values in communities hosting a train station

Potential Benefits to Towns and Cities

- Transit-Oriented Development (TOD) could lead to new housing, retail, and office space
- May increase local tax base
- Could preserve natural resources by reducing pressure for green field development

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Evaluation of Economic Impact

Estimated Transportation Cost Savings = auto trip costs + parking costs

	Lower Build	Higher Build
Estimated Auto Trip Cost Savings	$796,000 to $2,100,000	$1,292,000 to $3,485,000
Estimated Parking Savings	$452,000 to $1,193,000	$640,000 to $1,708,000
Total	**$1,248,000 to $3,293,000**	**$1,932,000 to $5,193,000**

Costs based on:

Average car occupancy = 1.7 (Federal Highway Administration estimate from 2018)

Auto mileage costs = $.585 per mile (as of 1/1/22 from General Services Administration)

Estimated cost of parking in Boston = $40 per day

Evaluation of Economic Impact

Calculating Primary Construction Impacts

Assumptions:

- 3 years of construction for low build, 4 years for high build
- Impact results are statewide
- 50% contingency applied to costs
- Design & permitting occur within MA
- Vehicle procurement occurs outside MA

Definition:
An **econometric model** specifies the statistical relationship between the various economic quantities pertaining to a particular economic phenomenon, in this case construction of transportation infrastructure.

Evaluation of Economic Impact

Estimated Primary Construction Impacts – Lower Build

	Year 1	Year 2	Year 3
Output (in $ Millions)	**424**	**440**	**447**
Income (in $ Millions)	**291**	**323**	**343**
Employment	**2,964**	**2,970**	**2,961**
Direct	1,580	1,559	1,540
Indirect	431	437	435
Induced	953	974	986

- Output - total value of goods/services/income that result from the construction work
- Income – derived from resultant sales and employment
- Employment - total of the three types of jobs created by the construction – direct (performing construction), indirect (supporting construction), and induced (developed as a result of the construction)

Evaluation of Economic Impact

Estimated Primary Construction Impacts – Higher Build

	Year 1	Year 2	Year 3	Year 4
Output (in $ Millions)	**714**	**742**	**754**	**746**
Income (in $ Millions)	**492**	**544**	**579**	**595**
Employment	**4,911**	**4,924**	**4,910**	**4,799**
Direct	2,578	2,544	2,512	2,482
Indirect	725	735	731	711
Induced	1,608	1,645	1,667	1,606

Evaluation of Economic Impact

MODULE 2

Example: Downeaster in MA, NH, and ME

ECONOMIC BENEFITS:

Pre-pandemic record ridership of ~60,000 trips in August 2019. Ridership in June 2022 was ~42,000 (88% of June 2019 levels).

Transit-Oriented Development in downtowns and city centers surrounding train stations. $100 million+ of TOD built in Downeaster communities in first seven years of service (through 2008).

Job creation attributed to direct construction and operation of rail service and due to more convenient commute.

Transportation cost savings by switching travel mode from automobile to train for individuals.

Visitor and tourist spending in downtown districts.

Note Differences between Northern Tier and Downeaster include
Downeaster hubs are larger
Downeaster service is mature

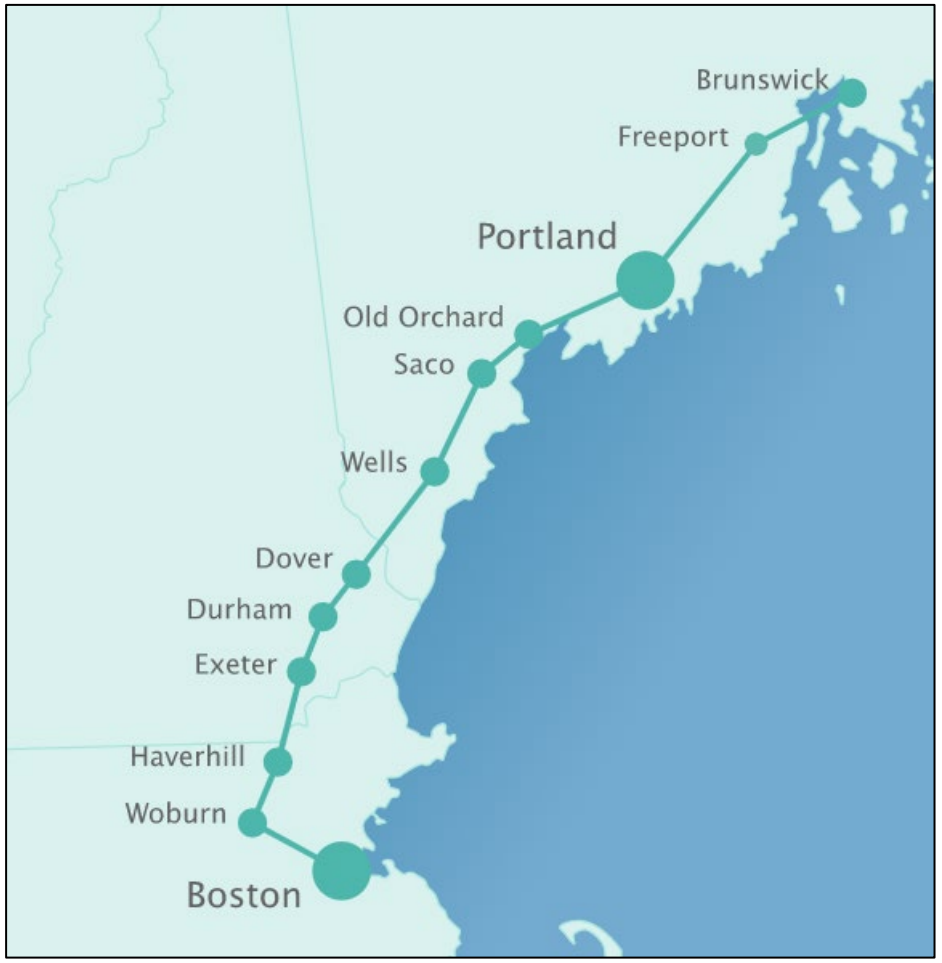


Image Source: Amtrak Downeaster

Sources: Downeaster Monthly Ridership History, https://www.nnepra.com/reports-stats/reports/

AMTRAK DOWNEASTER: Overview of Projected Economic Impacts, Center for Neighborhood Technology

Evaluation of Economic Impact

MODULE 2

Example: Hartford Line

ECONOMIC BENEFITS:

Transit-Oriented Development resulted in $430 million of investment, and construction/design of 1,400 housing units and 240,000 sq ft of commercial/office space one year after the start of service.

In Meriden, CT, TOD has resulted in $150 million of investment, ~300 apartments, 31,100 sq ft of retail, and a new 14-acre park.

Ridership averaged 51,000 trips per month in the first year of service. Throughout 2022, ridership is rebounding at ~70% of pre-pandemic ridership.

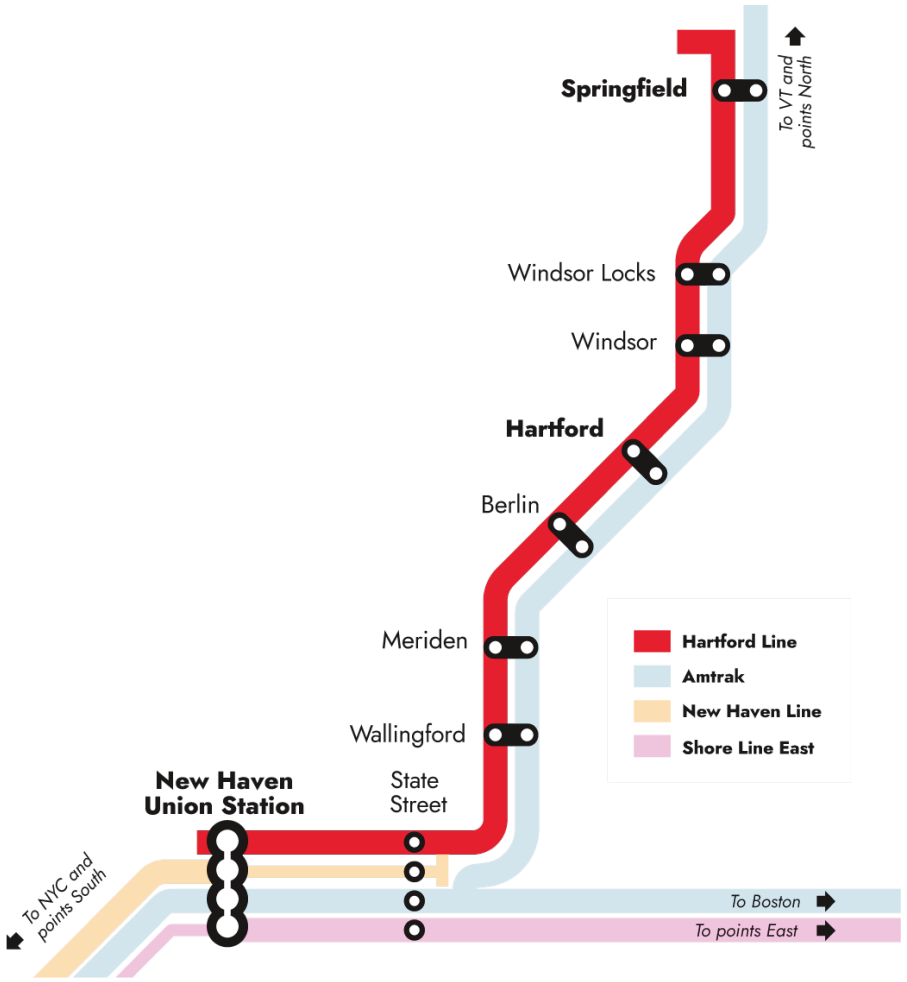


Image Source: CTRail

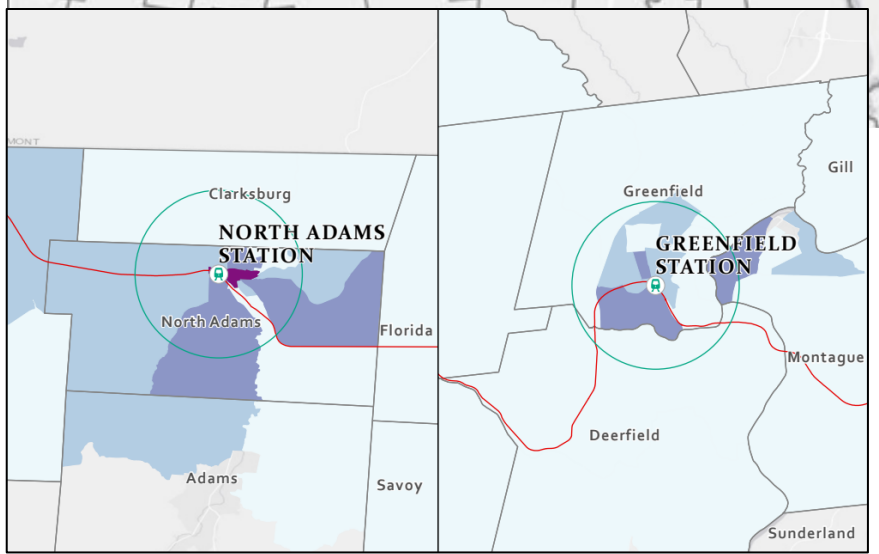
Sources: *Transit-Oriented Development Factsheet*, CTDOT

Hartford Line Year One Report, CTDOT

Evaluation of Social Equity and Fairness

MODULE 2

Access for Zero-Car Households:



Legend

- OTS Northern Tier Rail Line
- Category 3
- MA Towns (from Survey Points)
- Proposed Stations

Percentage of Zero-Car Households

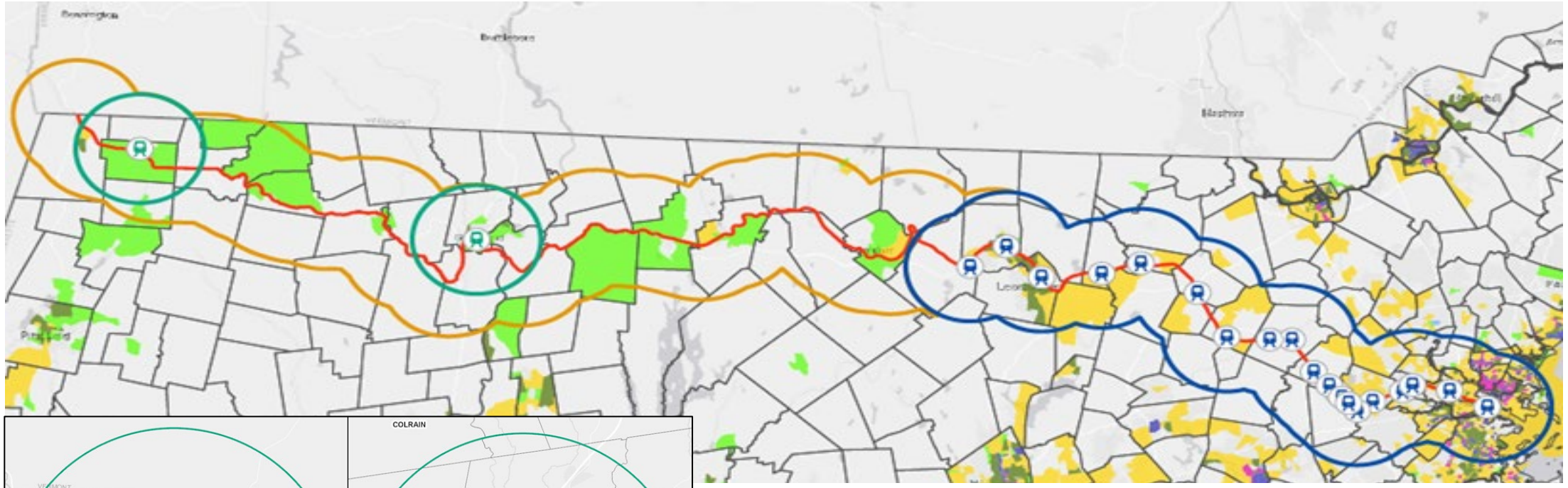
- ≤7.5%
- ≤19%
- ≤34.1%
- ≤54.2%
- ≤93.2%

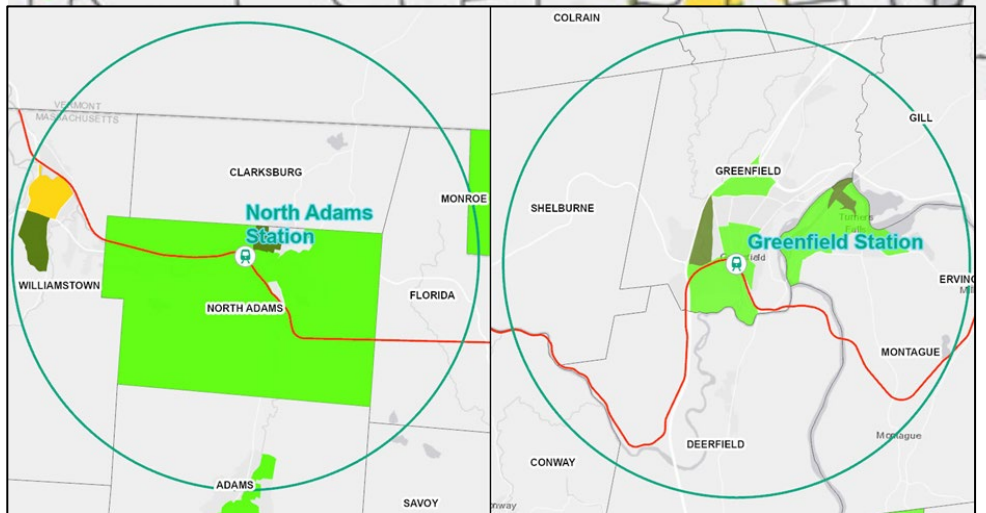
- Rail service may be a new travel option for zero-car households around Greenfield and North Adams

Evaluation of Social Equity and Fairness

MODULE 2

Access for Environmental Justice Communities:





Legend

- OTS Northern Tier Railline
- Category 1
- Category 2
- Category 3
- Fitchburg Stations
- Proposed Stations

EJ Criteria

- Minority
- Income
- English isolation
- Minority and Income
- Minority and English isolation
- Income and English isolation
- Minority, Income and English isolation

- Rail service may be a new travel option for Environmental Justice Communities around Greenfield and North Adams

Evaluation of Impacts on Rail Capacity

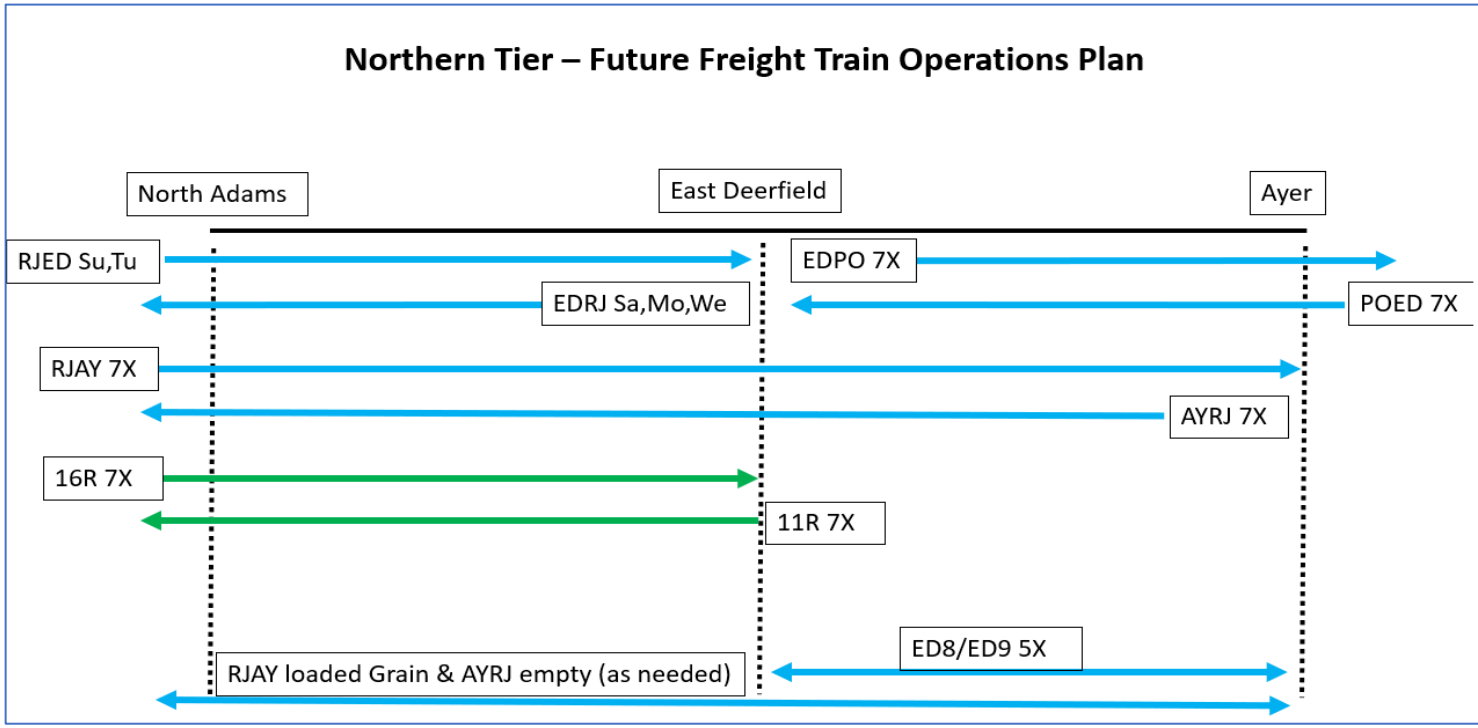
MODULE 2

Freight Operations

- RTC model calculated average freight train delay of about 10 minutes

Passenger Operations

- Northern Tier trains scheduled to run between the intervals of MBTA commuter rail trains
- Not expected to impact MBTA operations



Graphic shows the projected freight train movement between Ayer and North Adams

Freight trains whose origins and destinations are indicated in their names, e.g., RJED operates from Rotterdam Junction, NY to East Deerfield, MA.

Local trains that pickup cars from Northern Tier businesses and bring them to Deerfield Yard to be made up into trains.

Note: Assumptions based on currently available data and information which may change due to the Pan Am sale

Evaluation of Impacts on Environmental and Cultural Resources

MODULE 2

Environmental and Cultural Site Constraints could include:

- Wetlands and waterways
- FEMA designated floodplain
- Open space and recreational parklands
- State designated Areas of Critical Environmental Concern (ACEC)
- National Register listed Historic Districts and Properties
- Protected species habitat
- Residential, commercial and institutional land uses

Both alternatives limit improvements to existing Right-of-Way, minimizing potential impacts

Detailed evaluation of impacts to adjacent site constraints for both alternatives will occur as the conceptual design is advanced. Impacts will be avoided and/or minimized to the maximum extent practicable

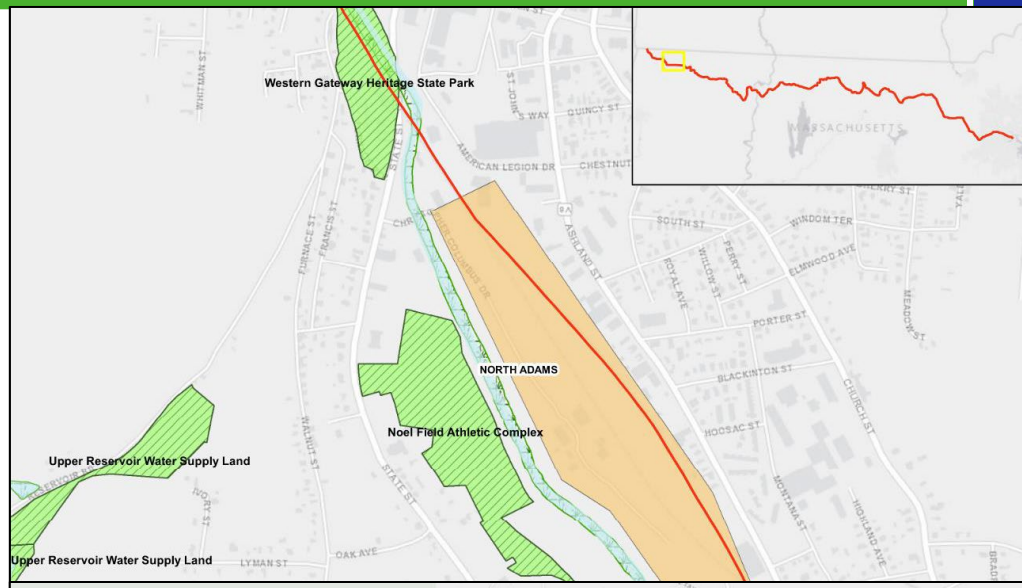
NORTHERN TIER PASSENGER RAIL

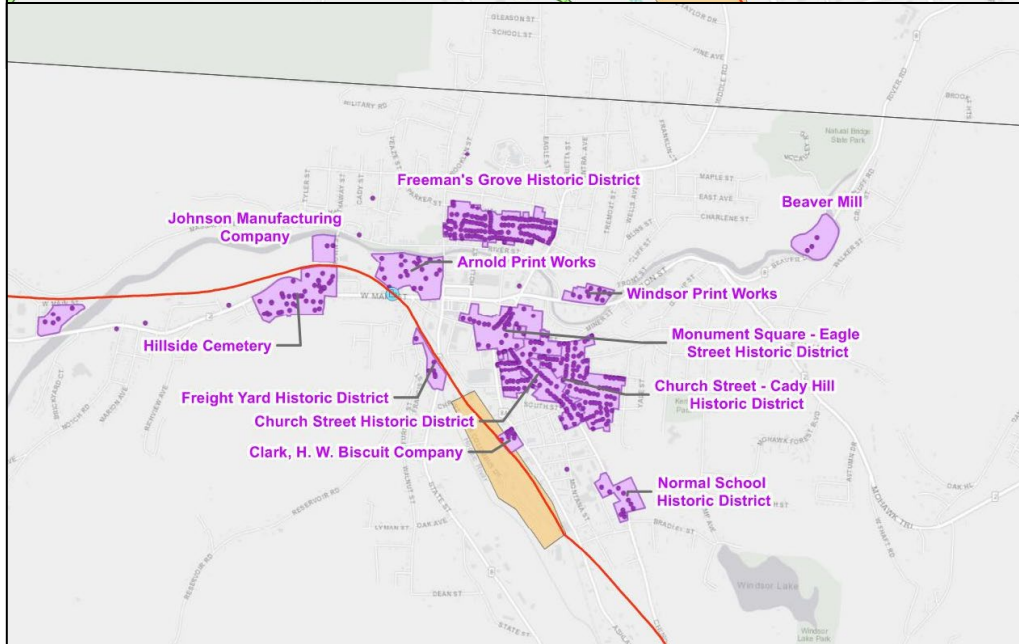
Evaluation of Impacts on Environmental and Cultural Resources

MODULE 2

Example: Potential Layover Facility in North Adams

- Outside existing right-of-way = more potential impacts
- Adjacent to the Hoosic River
- Outside of Cultural and Open Space areas





Evaluation of Cost Effectiveness

A Standard for Comparison Across Scenarios

- Cost per mile = Total Project Cost / Length of the Project
- Cost per rider = Total Project Cost / Total Number of Riders

Scenario	Lower Investment	Higher Investment	Sample Cost/Range
Cost per mile	$7,358,100	$15,403,875	$6,900,000 to $9,000,000
Cost per rider	$18,735-$49,472	$27,390-$73,107	$2,807

- Can also be compared to other projects, important for grant competitiveness
- Sample includes MBTA Projects, CTDOT Walk Bridge

NORTHERN TIER PASSENGER RAIL

Evaluation of Cost Effectiveness

Operating & Maintenance Costs

- Operating Cost per rider = Annual Operating Costs / Total Number of Riders

Scenario	Lower Investment	Higher Investment	Sample Cost/Range
Cost per rider	$215 to $568	$150 to $401	$15 to $50

- Estimated ridership is a factor in the cost difference
- Sample includes Pere Marquette (IL-WI), Downeaster (ME-MA), Vermonter (D.C.-VT)

NORTHERN TIER PASSENGER RAIL

Evaluation of Safety and Air Quality

Reducing Vehicle Miles Traveled (VMT)

- Fewer cars on the road could mean lower emissions of pollution and greenhouse gases
- A decrease in vehicular travel could lead to a disproportionately greater reduction in traffic congestion, and less idling could mean even fewer emissions
- Fewer cars and less congested roadways could mean fewer crashes

Scenario	Lower Investment	Higher Investment
Annual VMT Reduction	-2,313,821 to -6,105,127	-3,754,257 to -10,128,225
% of Route 2 VMT	0.10% to 0.27%	0.17% to 0.46%

NORTHERN TIER PASSENGER RAIL

How the First Two Alternatives Compare

How are they the same?	How are they different?
• Coverage area and populations served • Estimated environmental impacts • No passenger rail impacts	• Travel times and estimated ridership • Extent of economic impacts • Cost effectiveness • Freight rail impacts • VMT reduction

NORTHERN TIER PASSENGER RAIL

Phase 1 Service Alternatives

MODULE 2

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

Q&A/Discussion

- What aspects of the evaluation process are most important to you?
- Do you think either of these alternatives fully satisfies the project goals? Why or why not?
- Has reviewing the evaluation of these service alternatives changed your overall impression of them?
- What would you change about the two service alternatives?

MODULE 2

Share Your Questions & Comments

- Submit your questions and comments using the Q&A button

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MODULE 3

Looking Ahead to Phase 2

Welcome to the Northern Tier Bistro!

- Developing service alternatives is like building the menu for your own restaurant
- An influential food critic is coming to your restaurant, and we need to make sure we have a high quality, but varied menu ready for them
- We have our first two dishes but need to create four more!

Varied Ingredients for the Service Alternatives

Ingredient	Range of Options
Stations	• Increase or decrease number of stations • Locations could change
Coverage Area	• Limited to Massachusetts vs. extended into Vermont and New York
Service Structure	• Direct service to Boston vs. transfer to other services (e.g., MBTA Commuter Rail, Valley Flyer)
Frequency of Service	• Increase or decrease number of daily trains
Span of Service	• Full day service vs. commuter peak • Daily vs. seasonal
Travel Time Between Stations	• Existing freight train speeds to full high-speed rail (slow to very fast)
Physical Improvements	• Incremental State of Good Repair, full reconstruction in existing alignments, new alignments

Stations and Coverage Area

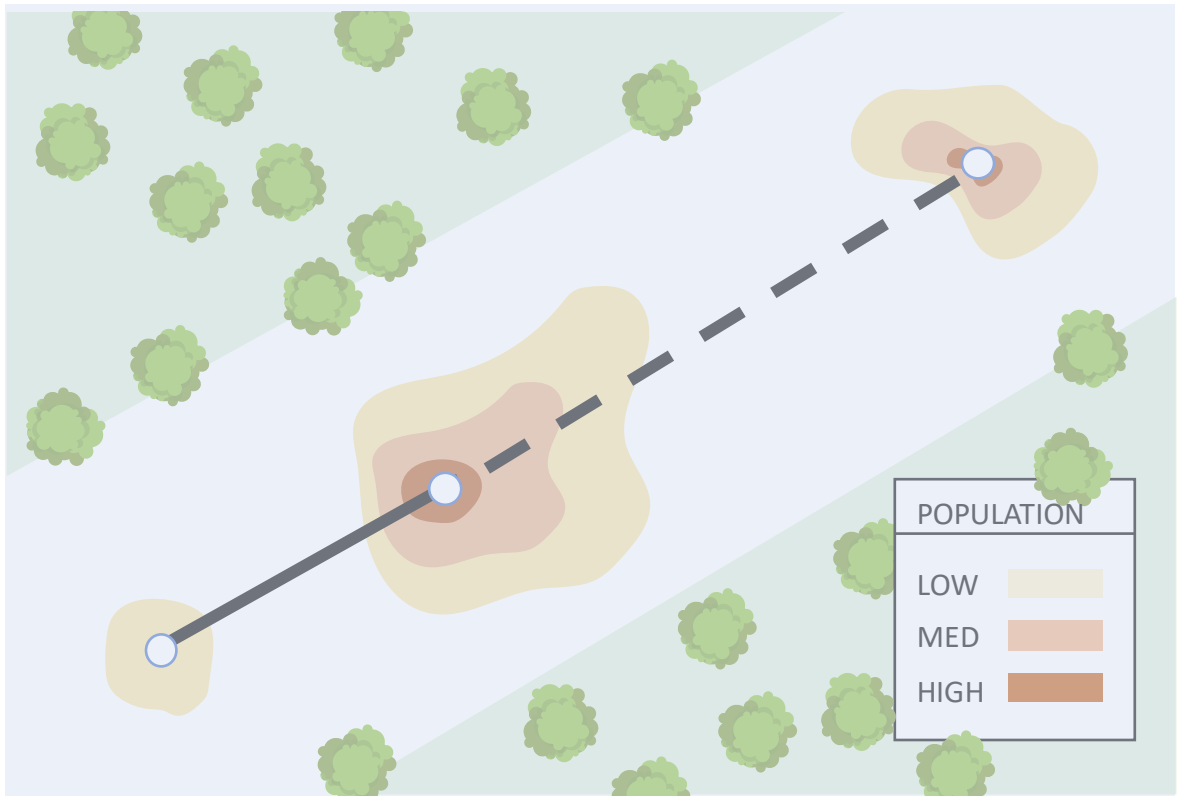
MODULE 3

POTENTIAL STOPS

OPTION **A** FEW STOPS

OPTION **B** SELECTIVE STOPS

OPTION **C** ALL STOPS



Stations and Coverage Area

Potential Alternatives for Phase 2

- An alternative that adds station stops at Orange, Gardner, Ayer, and Porter Square
- An alternative that adds station stops at Athol, Ayer, and Waltham

Other Options

- Station stops in Williamstown, Charlemont, Shelburne Falls, Miller's Falls, Erving, Baldwinville, North Leominster, and/or Littleton/Route 495
- Extension of service to Albany on existing lines via Schenectady
- Extension of service to Albany on new alignment via Cohoes/Troy

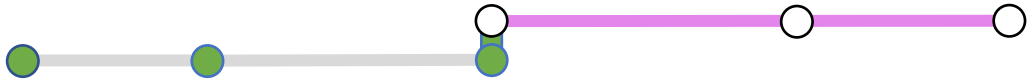
NORTHERN TIER PASSENGER RAIL

Service Structure, Frequency, and Span of Service

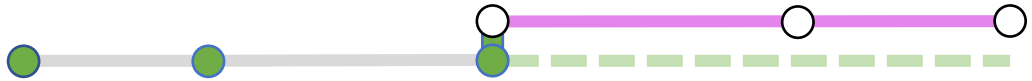
MODULE 3

OPTION **A** — DIRECT SERVICE

OPTION **B** — TRANSFER REQUIRED



OPTION **C** — TRANSFER REQUIRED WITH MIDDAY DIRECT SERVICE



OPTION **D** — BLENDED EXPRESS AND LOCAL SERVICES

FREQUENT				SELECTIVE		
S	M-F	S		S	M-F	S
	🚂		5AM			
	🚂		7AM		🚂	
🚂	🚂	🚂	9AM	🚂	🚂	🚂
🚂	🚂	🚂	11AM		🚂	
🚂	🚂	🚂	1PM	🚂	🚂	🚂
	🚂		3PM			
🚂	🚂	🚂	5PM		🚂	
🚂		🚂	7PM	🚂	🚂	🚂
🚂	🚂	🚂	9PM			
🚂		🚂	11PM		🚂	

Service Structure, Frequency, and Span of Service

Potential Alternatives for Phase 2

- An alternative that terminates Northern Tier service at Fitchburg, allowing transfers to MBTA Commuter Rail for trip to Boston North Station
- An alternative that provides seven daily trains

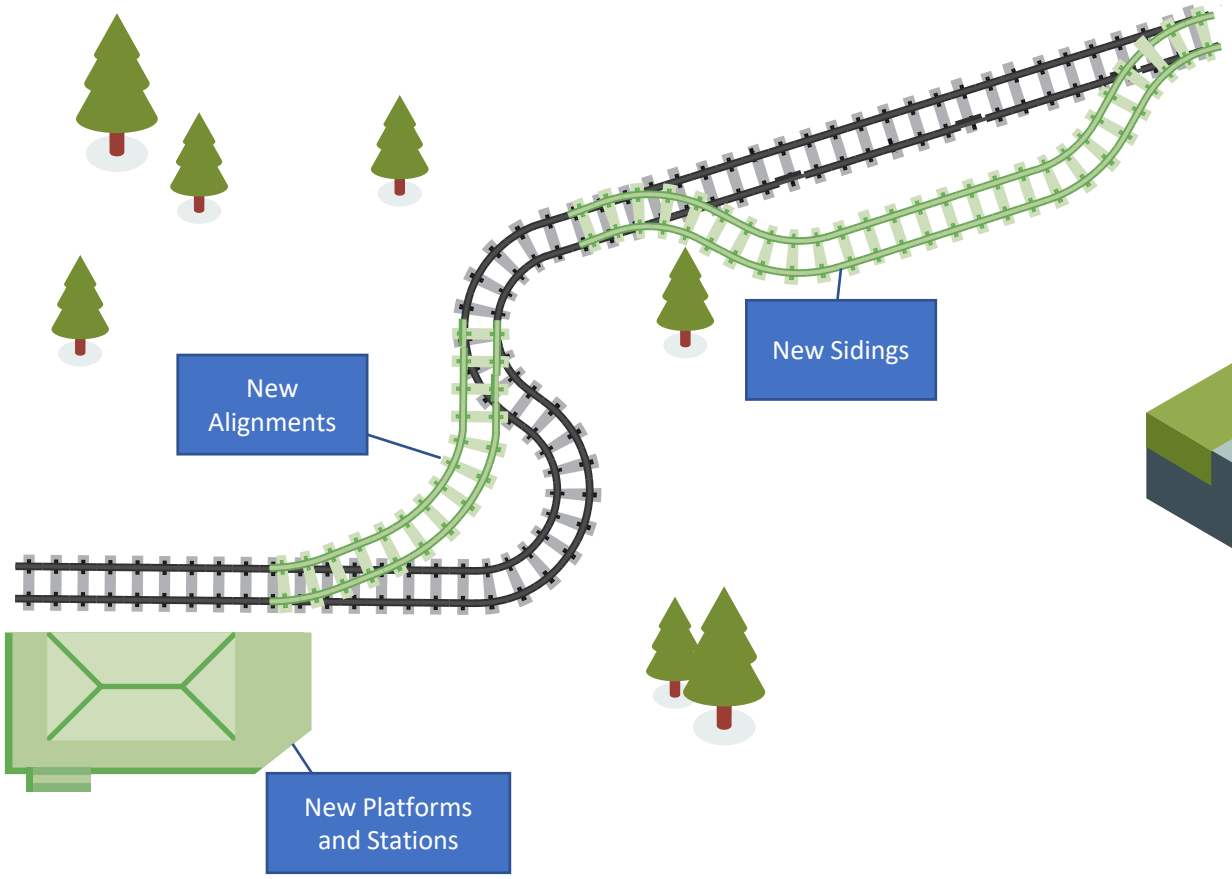
Other Options

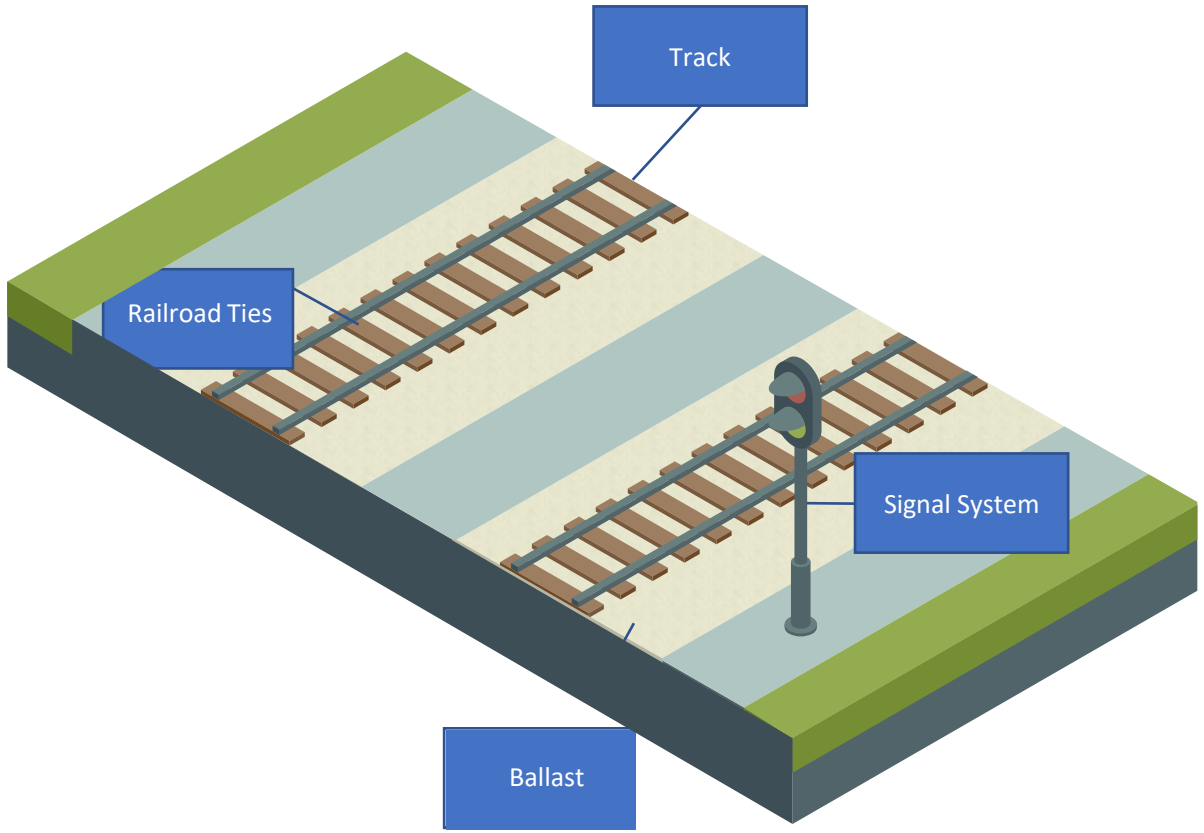
- Terminate Northern Tier service at an intermediate station between Fitchburg and Boston

NORTHERN TIER PASSENGER RAIL

Travel Time between Stations and Physical Improvements

MODULE 3





Travel Time between Stations and Physical Improvements

Potential Alternatives for Phase 2

- An alternative that electrifies the rail
- An alternative that constructs a new alignment between Gardner and Fitchburg

Other Options

- Double track the whole Northern Tier corridor line
- New alignment through Athol and Royalston

NORTHERN TIER PASSENGER RAIL

Q&A/Discussion

- How would you create your menu?
- What ingredients are most important to you?
- What ingredients are least important?
- Are there any other ingredients missing?

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Next Steps

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

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