5. Key Findings

The East-West Passenger Rail Study began the conceptual planning process by evaluating many of the elements that are expected to form the basis of providing passenger rail service across the 151-mile corridor between Pittsfield and Boston. These elements included analysis of the physical characteristics of the route, representative services delivered by the train operations, and potential ridership and travel characteristics. While the Study began by considering a wide range of alternatives and developed six in some detail, this final report has focused on three alternatives, the selection of which reflected guidance from the Advisory Committee. Those three Final Alternatives were analyzed in greater detail.

Key findings from that analysis include:

- A reduction in travel times by as much as one hour over currently feasible times could be possible with new investment in the rail infrastructure between Pittsfield and Boston.
- Those travel time reductions reflect an increasingly higher level of investment made in new infrastructure.
- The potential total travel time from Pittsfield to Boston ranges from an average of 3 hours and 9 minutes to 2 hours and 49 minutes, while the total travel time between Springfield and Boston could be between 1 hour and 57 minutes and 1 hour and 37 minutes.
- Commuter, business, and recreational travel markets are present to varying degrees along the corridor. The study did not examine the possible long-term impacts of the COVID-19 pandemic on travel patterns or demographics.
- On average, roughly 62% of the estimated ridership is expected to be trips between Springfield and Boston.
- East-West train service can operate compatibly with MBTA Worcester/Framingham Line service when the currently planned infrastructure improvements between Worcester and Boston are in place. Fully discussed in Chapter 2, these improvements include completed or ongoing projects (e.g., Worcester Line Positive Train Control Upgrades) and some that have been assumed for the purpose of analysis but for which funding has not yet been identified (e.g., South Station Expansion).
- Passenger rail and CSX operations within an enhanced shared- track environment would require careful coordination of services and clear operational criteria, as well as an agreement with CSX as owner of the line west of Worcester.
- Passenger rail service operated between Springfield and Worcester over an independent alignment adjacent to CSX track(s) appears to be feasible, could eliminate most of the interference between the two types of operations (passenger and freight) in this segment, and could reduce travel time in the segment by 10 minutes. However, building this independent alignment to adhere to CSX requirements for passenger service on their right-of-way adds significant cost and complexity. The estimated capital cost of complying with CSX design criteria is approximately $1.5 billion. Additional alignment improvements that are expected to save an additional 10 minutes are projected to cost $765.4 million.
- Development of an independent passenger alignment adjacent to CSX track(s) between Springfield and Pittsfield was not found to be feasible due to its topography and large areas of environmentally protected lands. An enhanced shared track is the only option identified for this portion of the corridor.
- Each alternative offers a set of positive (Pro) and negative (Con) attributes that must be considered to make an informed decision on the overall benefits provided by the alternative. The principal pros and cons of each of the final Alternatives are described in section 5.1.

5.1. Key Trade-offs Among Final Alternatives

This section discusses trade-offs among the Final Alternatives based on the following factors:

- Travel Times / Speeds;
- Passenger / Freight Interference;
- Capital Cost;
- Land Impacts; and
- Grade-Crossing Impacts.

A more detailed description of the pros and cons of each option follows the summary shown in Table 5-1 below.

Table 5-1 – Pros and Cons of Final Alternatives

ALTERNATIVE	3	4	4/5 HYBRID
PROS	• Convenient and comfortable travel • Lowest capital cost • Fewest land impacts • Fewer grade-crossing impacts	• Convenient and comfortable travel • Reduced travel times / faster speeds • Higher ridership • Reduced passenger / freight interference	• Convenient and comfortable travel • Lowest travel times / fastest speeds • Highest ridership • Reduced passenger / freight interference • Fewer grade-crossing impacts
CONS	• Longest travel times / slowest speeds • Lowest ridership • Greatest passenger / freight interference	• Higher capital cost • Greater land impacts • Higher grade-crossing impacts	• Highest capital cost • Greatest land impacts

Alternative 3

Alternative 3 could provide direct passenger rail service between Pittsfield and Boston along a shared track / shared CSX and MBTA corridor. Up to 7 new round trips were evaluated.

- **Pros**
  - **Convenient and comfortable travel:** With up to seven additional round trips each day, service would be more frequent than service currently operating between Pittsfield and Boston. To the extent that capacity is available east of Worcester as a result of the assumed expansion of South Station, peak hour service could be provided in addition to off-peak service. This combination is expected to presumably appeal to the mixture of trip purposes assumed for the corridor – business trips, commuting, and recreation. Given the total travel time, it is assumed that intercity coaches (or equivalent) could be used. These coaches offer a higher degree of comfort than typical commuter equipment, featuring wider and more comfortable seating, and other amenities.
  - **Lowest capital cost:** Infrastructure investments in Alternative 3 would be focused on restoring double track where single track sections exist today, making track and signal system upgrades to the existing tracks in the balance of the route, and construction of new maintenance and station facilities where needed.
  - **Fewest land impacts:** Infrastructure improvements in Alternative 3 are expected to be primarily confined to the existing CSX right-of-way on the existing fills or cuts. Moderate land impacts are anticipated, especially at watercourses, to accommodate structures built to new engineering standards. Moderate impacts at the planned Chester and Palmer stations are also anticipated.

- **Fewer grade-crossing impacts:** Grade crossings present safety concerns for rail since conflicts with cars and/or pedestrians cannot be totally eliminated – only warned against and made less likely. However, compared to the other alternatives, the probability of grade crossing incidents is reduced by the slower speeds and lower train frequencies projected for Alternative 3.

- **Cons**
  - **Longest travel times / slowest speeds:** Operations within the existing shared-track environment must conform to CSX freight design criteria with slower maximum curve and average speeds (51 mph Springfield-Worcester). The average scheduled travel time for Alternative 3 between Pittsfield and Boston is expected to be 3 hours and 9 minutes; between Springfield and Boston it is expected to be 1 hour and 57 minutes. West of Worcester, the Springfield to Worcester segment could operate at an average speed of approximately 50 mph, and the Pittsfield to Springfield segment could operate at an average speed of 44 mph.
  - **Lowest ridership:** Ridership forecasts for all three Final Alternatives are based on the demographic profiles used by the federally recognized Metropolitan Planning Organizations for all transportation projects, combined with the projections derived from the two proxy rail services. Train operations are the key variable affecting ridership differences between the Final Alternatives. Forecasted ridership for Final Alternative 3 is the lowest among the three Final Alternatives. The longer travel times dampen ridership demand, although passengers would be able to work and move about on-board so the service could still have some competitive advantages.
  - **Greatest passenger / freight interference:** In Alternative 3 CSX and East-West trains operate in a shared-track environment for 105 miles between Pittsfield and Worcester. This would require operational cooperation between CSX and the passenger service along the entire route. The substantial volume of freight traffic, differential in operating profiles (speeds/unscheduled operations) and required switching operations all increase the probability of delays, adversely impacting reliability, due to train-to-train conflicts.

Alternative 4

Alternative 4 could provide direct passenger rail service between Pittsfield and Springfield along a shared track in the CSX corridor, along an independent passenger track between Springfield and Worcester, and along a shared track/shared MBTA corridor between Worcester and Boston. Up to 9 new round trips were evaluated.

- **Pros**
  - **Convenient and comfortable travel:** With up to nine additional round trips each day, service in Alternative 4 would be more frequent. To the extent that capacity is available east of Worcester as a result of the assumed expansion of South Station, peak hour service could be provided in addition to off-peak service. This combination is expected to presumably appeal to the mixture of trip purposes assumed for the corridor – business trips, commuting, and recreation. Given the total travel time, it is assumed that intercity coaches (or equivalent) could be used. These coaches offer a higher degree of comfort than typical commuter equipment.
  - **Reduced travel times / faster speeds:** Travel time to Boston in Alternative 4 could be reduced by approximately 10 minutes compared to Alternative 3 – trips from Springfield to Boston could take 1 hour and 47 minutes and trips to Boston could take 2 hours and 59 minutes from Pittsfield. Operations within the Pittsfield to Springfield section would have to conform to freight design limitations with safety concerns dictating slower maximum speeds and slower speeds through curves.

However, operations along the parallel independent passenger track between Springfield and Worcester could achieve higher maximum speeds, curve speeds, and average speeds (60 mph Springfield-Worcester).

- **Higher ridership:** Forecasted ridership is higher in Alternative 4 compared to Alternative 3 – up to 25% higher across the corridor. The reduced travel times increase forecasted demand, particularly between Springfield and Boston.
- **Reduced passenger / freight interference:** Alternative 4 provides for CSX and East-West trains to operate in a shared-track environment for 51 miles only between Pittsfield and Springfield; a 51% reduction in shared-track operations compared to Alternative 3. The probability of delay (and consequential schedule unreliability) due to train-to-train conflicts is assumed to be reduced proportionately.

- **Cons**
  - **Higher capital cost:** The new independent passenger track between Springfield and Worcester in Alternative 4 adds substantial additional capital costs (estimated at $1.5 billion). This expenditure would be needed to meet CSX's criteria for a shared corridor and higher speeds. Infrastructure investment would also include the construction of new maintenance and station facilities where needed.
  - **Greater land impacts:** Infrastructure improvements in Alternative 4 could remain mainly confined to the existing CSX Right of Way between Pittsfield and Springfield. However, the new independent passenger track between Springfield and Worcester would incur greater land impacts where its construction extends beyond the limits of the present alignment of the right-of-way. Moderate impacts are expected to remain with the planned Chester and Palmer stations.
  - **Higher grade-crossing impacts:** The faster speeds in the Springfield to Worcester section increase the risk of grade crossing incidents.

Hybrid Alternative 4/5

Hybrid Alternative 4/5 could provide direct passenger rail service between Pittsfield and Springfield along a shared track in the CSX corridor, along an independent passenger track with high-speed short cuts between Springfield and Worcester, and along a shared track/ shared MBTA corridor between Worcester and Boston. Up to 9 new round trips were evaluated.

- **Pros**
  - **Convenient and comfortable travel:** With up to nine additional round trips each day, service from Alternative 4/5 could be more frequent. To the extent that capacity is available east of Worcester as a result of the assumed expansion of South Station, peak hour service could be provided in addition to off-peak service. This combination would presumably appeal to the mixture of trip purposes assumed for the corridor – business trips, commuting, and recreation. Given the total travel time, it is assumed that intercity coaches (or equivalent) would be used. This is expected to offer a higher degree of comfort than typical commuter equipment.
  - **Lowest travel times / fastest speeds:** This alternative provides the fastest speed and lowest overall travel time of the Final Alternatives. All three Final Alternatives have the same constraints, improvements, and speed for the Pittsfield – Springfield segment. However, between Springfield and Worcester Final Alternative 4/5 could provide a parallel, independent, and higher-speed rail line with several strategic realignments to further straighten curves and increase speeds, to an average of 74 mph. This could result in a travel time savings of 20 minutes compared to Alternative 3 and 10 minutes compared to Alternative 4, providing the fastest overall option.
  - **Highest ridership:** Forecasted ridership is the greatest of the three alternatives, up to 11% more than Alternative 4.

The substantially reduced travel times notably increased forecasted demand.

- **Reduced passenger / freight interference:** As with Alternative 4, passenger trains in Alternative 4/5 could operate on a separate track between Springfield and Worcester, thus reducing the likelihood of freight/passenger operating conflicts and increasing reliability. The probability of delay due to train-to-train conflicts is reduced proportionately, as is the case with Alternative 4. However, as with Alternative 3 and Alternative 4, CSX and East-West trains would operate in a shared track environment for 51 miles between Pittsfield and Springfield.
- **Fewer grade-crossing impacts**: Alternative 4/5 calls for consolidating three at-grade crossings in the Town of Wilbraham into two overhead bridges (i.e., vehicles travel above the railroad, which would remain at- grade). This could reduce the probability of at-grade crossing incidents in an area with two industrial parcels that feature parking lots for heavy vehicles adjacent to the railroad.

- **Cons**
  - **Highest capital cost:** The new independent passenger track plus high-speed short cuts between Springfield and Worcester would require the largest capital investment cost--approximately an additional $1.5 billion to adhere to CSX design criteria. The additional short cuts in Alternative 4/5 could save approximately 10 minutes in travel time beyond Alternative 4. Additional alignment improvements are projected to cost $765.4 million. Infrastructure investment is expected to also include the construction of new maintenance and station facilities where needed.
  - **Greatest land impacts:** Infrastructure improvements in Alternative 4/5 could remain largely confined to the existing CSX right-of-way between Pittsfield and Springfield. However, construction of the new independent passenger track plus high-speed short cuts between Springfield and Worcester would mean going outside the existing right-of-way, resulting in the greatest land impacts. Moderate impacts are anticipated to remain with the planned Chester and Palmer stations.

This study has framed three potentially viable Alternatives that could advance one or more of the goals established for passenger rail service between Pittsfield and Boston. The study's Key Findings and Trade-Offs provide a reasonable basis for assessing the pros and cons of each Alternative, particularly the ridership benefits and the capital costs of different project elements.

MassDOT acknowledges the preference of several Advisory Committee members to prioritize the 4/5 hybrid alternative, but at this stage MassDOT recommends keeping Alternatives 3 and 4 under consideration, as additional information may be worth considering before the focus is narrowed to one alternative. Moreover, the necessary next steps outlined in the following Chapter do not require the selection of one alternative.

There is additional work to be done to fully complete the conceptual planning stage for East-West rail service. This work includes discussions with CSX about its requirement for complete separation of the passenger operations from its own tracks, the development of a governance structure for passenger rail outside the MBTA service area, and a more detailed study of economic and community benefits and impacts. These tasks and others could advance opportunities for turning East-West Passenger rail from a subject of study to a project that can be designed, permitted, funded, built, and operated.