5.0 Findings

The purpose of Phase I of the BMHSR Study is to perform an initial assessment of existing operations, infrastructure, and institutional issues to confirm that no fatal flaws exist for implementation of a high speed rail service and to develop ridership forecasts and evaluate if sufficient demand exists to warrant study of associated operational, engineering, and cost/revenue factors.

The following provides a summary of the findings associated with Phase I of the Study.

5.1 Current and Potential BMHSR Corridor Operations

Historic Services – Direct rail services between Boston and Montreal using the proposed route operated for approximately 110 years until the early 1960's. In the first half of the 20th Century, the Boston-Montreal services along this route ran using steam locomotives with two or three round trips per day, with one way trip times in the range of 10 to 12 hours. By 1961, a diesel propulsion service along this route was offered with one round trip per day making fewer stops, with a one-way trip time of 8 hours and 30 minutes.

Existing railway users and capacity for high speed services – The distance of the BMHSR Corridor is 329.4 miles. The density of current rail operations is greatest in locations approaching and including Boston and Montreal. Operations along the BMHSR Corridor are summarized below:

- In the Montreal area, it appears that Central Station (with 19 tracks) has sufficient platform capacity to host a high speed rail passenger service. Between Central Station and Cannon (6.2 miles) existing rail traffic along the route is fairly dense, presenting the potential for conflicts with the proposed high-speed service. Potential for conflicts would likely be greatest for northbound trains that may not always arrive on time for their scheduled slot on CN's Saint-Hyacinthe subdivision. However, since the total length of potentially congested track is relatively short (only 6 miles) and because it is in an area where curvature and switching moves will undoubtedly restrict speeds, the impacts on overall velocity for the high speed service could be manageable.

- South of Cannon, the density of railway activity on the proposed BMHSR Corridor to the U.S./Canadian border (44 miles) is more modest. With track and signal improvements to this currently unsignaled single track line, it would seem that capacity could be increased for high speed passenger trains to pass freight activity on this line segment.

- At the U.S./Canadian border, an institutional barrier might exist to hold all trains. Presently, all passenger trains are held standing at the U.S./Canadian border for Customs and Immigration inspection. Unless the mode of this inspection is shifted to provide for "inspection-in-motion", a severe time penalty for the high-speed service would be expected. The assumption for the study is that procedures will be established in the future that would eliminate the need for a BMHSR train to stop at the border.

- Between the U.S./Canadian border and White River Junction, (136 miles), the railway remains single track with no automatic block signals. It is maintained for 60 mph maximum speeds by passenger trains. With track and signal improvements, it would seem that capacity could be constructed for high speed passenger trains to pass freight activity on this line segment.

- Between Concord and Nashua (34 miles), the density of traffic along the route seldom exceeds four freight trains per day. The 50.9 mile segment of track from White River Junction to Boscawen is owned by the State of New Hampshire. The Claremont Concord Railroad operates three miles of the segment between White River Junction and West Lebanon. The remainder of the segment is unused. Track structures have been removed.

- In the 40 miles between Nashua and Boston's North Station, the density of rail traffic increases dramatically with more than 50 daily trains for some segments of the route. It has not been determined if this 40-mile segment has the capacity to handle eight to sixteen high speed trains per day in addition to its current traffic base, without additional trackage. Potential for conflicts between existing scheduled trains and the high speed service would probably be greatest for southbound trains that would not always arrive in their assigned schedule slots. Boston's North Station, with only ten tracks, does not appear to have sufficient platform capacity at this time to host a high speed rail service to Montreal without adding station trackage.

Required Infrastructure – None of the proposed route has track or signal infrastructure necessary for 110 mph operations. For speeds above 80 mph, substantial improvements to both the track and signal systems would be required for all trackage along the route. The specific analysis of operational and infrastructure improvements will be completed in subsequent phases of the study.

5.2 Potential Ridership

Potential Running Times for High Speed Rail Service – The project team used a Train Performance Calculator program to estimate the running times that could be achieved for the Boston-Montreal route using a range of modern rolling stock, fixed plant investment levels, and station stopping patterns. Three sets of service scenarios were used for the ridership forecasting analysis as shown in the Table 5.1 below.

Table 5.1 – Potential Service Scenarios

Service Scenario	Case 1. Lower Speed Local Service	Case 2. Mid Speed Limited Service	Case 3. Highest Speed Express Service
Maximum Allowable Speeds	Generally 60 mph with speeds up to 80 mph where currently allowed	110 mph with restrictions for existing horizontal curves	110 mph with no restrictions for existing horizontal curves
Intermediate Stops	12	8	6
Running Time	7:55	4:48	3:31
Service Velocity (Commercial Speed)	42 mph	68 mph	94 mph
Rolling Stock	One F59PH Locomotive and Six Coaches	One F59PH Locomotive and Six Coaches	One F59PH Locomotive and Six Coaches

Utilizing the three operating cases, ridership numbers have been generated for seven alternative scenarios. For each scenario, associated costs and travel time for comparative auto, air and bus service remained constant. Table 5.2 provides a summary of each scenario's projected ridership along with other pertinent service information such as trip time from Boston to Montreal. Details of each scenario are provided in Chapter 3.

Benefits

Ridership for each of the BMHSR alternative varies significantly depending on the service attributes. For example, the reduction of service levels on the mid speed scenario from six trains per day to two trains per day resulted in ridership levels dropping to less than 20% of the ridership for the six trains a day scenario. Furthermore, reduction in the fares from $0.26 per mile to $0.20 per mile resulted in an increase of ridership from 446,710 to 683,667. Interestingly, the increase in ridership at the lower fare actually resulted in a 24% increase in total passenger revenue. This provides the potential benefit of maximizing usage of a BMHSR at the lowest cost to the user and simultaneously maximizing revenues for operational support.

High speed rail supports a number of additional benefits to the BMSHR Corridor, particularly for existing rail services. The construction of HSR will result in improvements to the existing track and structure of the MBTA, Amtrak, VIA and Montreal passenger rail systems.

Provision of HSR will also enhance the need for and use of alternative transportation services. For example, the HSR in Boston would connect at North Station, a major hub for the MBTA. Passengers could use the MBTA's other transit modes to access or egress the HSR service. Similarly, HSR passengers will find improved connections with VIA and Montreal Commuter Rail services at the Lucien-L'Allier Station.

Table 5.2 – 2025 Summary Table of BMHSR Ridership

	Low Speed	Mid Speed	Mid Speed High Fare	Mid Speed Low Frequency	Mid Speed All Stations	Mid Speed Low Fare	High Speed
Annual Ridership							
Total Corridor	213,276	446,710	330,097	86,962	588,630	683,667	644,232
Boston-Montreal	13,469	129,508	84,428	27,143	129,508	221,227	200,564
Annual Passenger Revenue							
Total Corridor	$4,784,504	27,893,059	22,559,907	5,724,020	32,291,348	34,614,601	59,062,561
Boston-Montreal	$744,341	11,619,093	8,739,297	2,434,820	11,619,093	15,271,257	24,917,799
Cost per Passenger-Mile (fare)							
HSR (Varies by scenario)	$0.16	$0.26	**$0.30**	$0.26	$0.26	**$0.20**	$0.36
Round trips per day							
HSR (Varies by scenario)	4	6	6	**2**	6	6	8
Number of Stations	12	8	8	8	**12**	8	6
Boston to Montreal Total Trip Time – Vehicle and Terminal (hours: mins)							
HSR (Varies by scenario)	8:55	5:48	5:48	5:48	5:48*	5:48	4:31
Air (Same all scenarios)	3:20	3:20	3:20	3:20	3:20	3:20	3:20
Bus (Same all scenarios)	6:20	6:20	6:20	6:20	6:20	6:20	6:20
Auto (Same all scenarios)	5:52	5:52	5:52	5:52	5:52	5:52	5:52

* Travel trip time was not increased to test only the sensitivity of number of stations stops at this level of the analysis.

** Travel time for HSR service can vary depending on equipment choice. For this analysis, F-59 PH locomotive and Bombardier Bi-Level coach technologies were selected because they are widely used for the delivery of rail service in a multitude of passenger corridors throughout United States.

In addition to improved alternative transportation services, the completion of a high speed rail line between Boston and Montreal would result in a reduction in automobile traffic within the BMSHR Corridor. The number of vehicles and associated VMT would depend specifically on the service parameter associated with the service.

5.3 Government and Policy Issues

Planning, designing and constructing a high-speed passenger rail service in the BMHSR Corridor will require compliance with federal, state and local laws and regulations. Furthermore, the successful development of the service will also require development of consensus among a wide range of stakeholders.

This Study phase has identified the major statutory and regulatory environmental, safety and security requirements to be met. The preliminary assessment of the BMHSR Corridor suggests that implementation of a HSR service could meet these major requirements.

The BMHSR Corridor does contain natural and cultural resources that will need to be protected, both during construction and operations. However, by judicious use of the existing rail line, and with careful planning in coordination with local, state and federal agencies, the BMHSR Corridor offers viable potential for provision of passenger rail service without significant negative impacts to such resources.

5.4 National Trends in Passenger Rail

Currently there are indicators that suggest that passenger rail, and especially high-speed (and high quality) passenger rail service, will play an increasingly important role in the nation's transportation system.

Demand for transportation in North America continues to grow at exponential rates. Freight traffic demands are predicted to double by 2020; vehicle miles traveled ("VMT") will also increase significantly, thereby increasing demand for roadway capacity and maintenance. Business travel trends show no decline, and 60% of this travel involves air trips of less than 400 miles.

USDOT Secretary Norman Mineta is advocating for a strong role for states in the revitalization of passenger rail services. Members of Congress have filed a variety of proposals to provide funding for enhanced passenger rail. Regarding Amtrak, it is currently seeking U.S. government support for FY 2003 funding in the amount of $1.2B. Amtrak has identified this amount as the current level of funding. The Senate has concurred with that amount, but the House is supporting the Administration's recommendation of $900M.

As was described in Chapter 1, states throughout the United States and Canada are collaborating in regional approaches to passenger rail development. The twenty-two member "States for Passenger Rail Coalition" has organized to provide a forum to develop a unified approach to state and federal funding of passenger rail programs. Canada is seriously considering HSR service in the Windsor to Quebec corridor. This suggests that it is appropriate to continue planning and implementing rail projects that have sufficient public support.

5.5 Conclusion

Based on this initial assessment of existing operations, infrastructure, and institutional issues, and consideration of plausible alternative service scenarios, it is concluded that no fatal flaws exist for implementation of a high speed rail service in the BMHSR Corridor, Additionally, given the potential ridership of the BMHSR service, the further study of associated operational, engineering and cost/revenue factors is warranted.

The BMHSR Corridor would require substantial rail infrastructure improvements to support high speed rail service. However, the service is expected to be compatible with existing and future passenger and freight rail operations. Further, an initial assessment of environmental and institutional issues indicates that with appropriate planning and design, environmental and institutional considerations can be satisfied.

Sufficient potential ridership and fare revenue exists to warrant the implementation of Phase II of the Study for evaluation of the operating and capital costs, and associated benefits, of implementing a high speed rail service between Boston and Montreal.