ES

Executive Summary

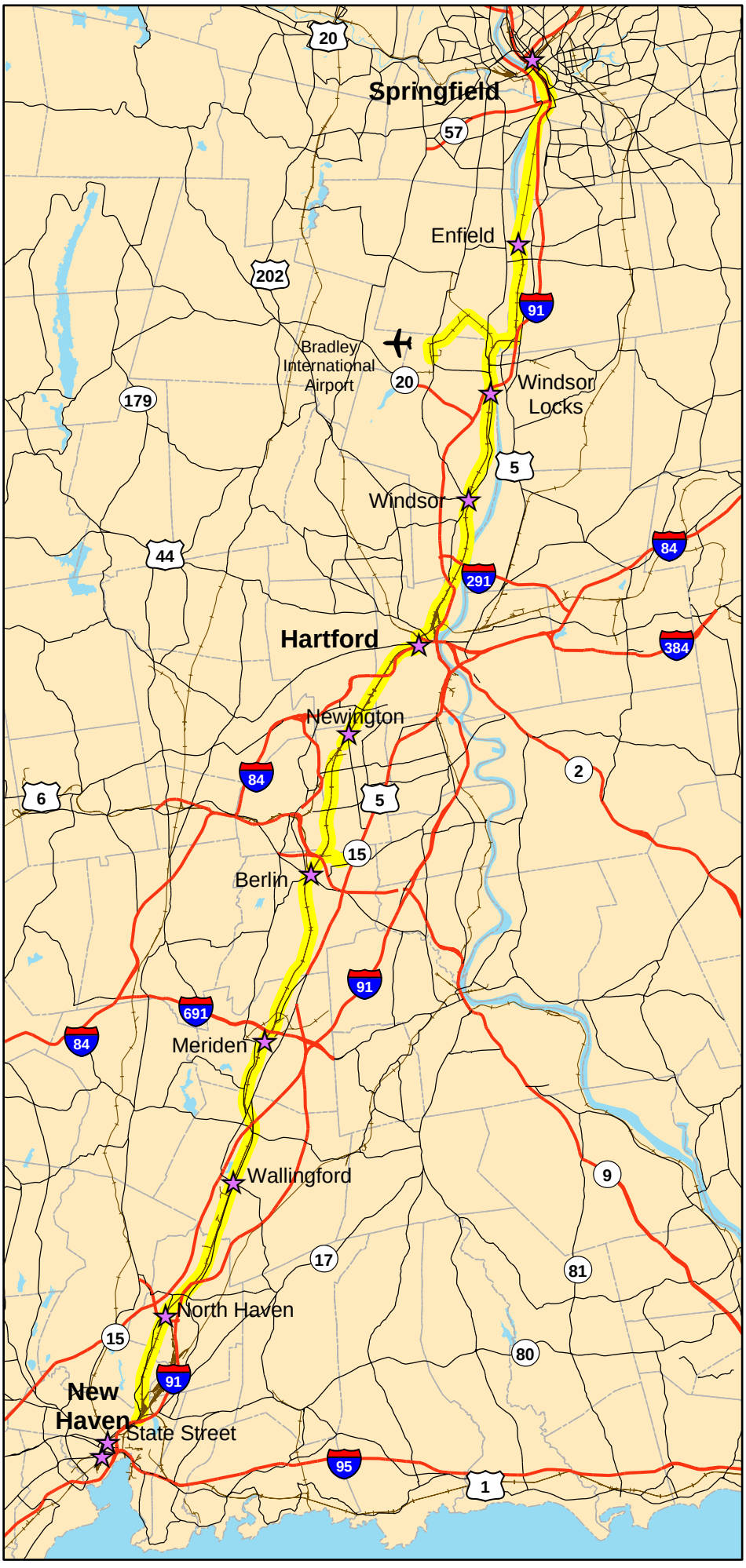
The Connecticut Department of Transportation (ConnDOT), with the support of the Transportation Strategy Board, is developing an implementation plan for commuter rail service between New Haven and Hartford, CT, and Springfield, MA. In addition to serving commuters traveling between the towns and cities along the corridor, the service could provide a connection to:

- Bradley International Airport
- Multiple links to Amtrak Intercity service
- Direct links to the existing Metro North and Shore Line East Commuter Rail in New Haven
- Links to the proposed New Britain – Hartford Busway.

This document is the executive summary of the final report for this study. The complete study report and associated technical documents can be obtained by contacting ConnDOT, Office of Intermodal Planning, 2800 Berlin Turnpike, P.O. Box 317546, Newington, CT 06131-7546.

The study area corridor is 62 miles of existing rail line, which is owned and operated by The National Railroad Passenger Corporation (Amtrak), beginning in New Haven at Union Station, continuing through several towns and the cities of Meriden and Hartford, and ending at Union Station in Springfield, Massachusetts. This rail corridor line is commonly referred to as the "Springfield Line." An existing freight spur line to Bradley Airport in Windsor Locks is also included in consideration of passenger connections to that facility. Figure ES-1 illustrates the study corridor location.

The only existing passenger rail service on the Springfield Line is a regional service operated by Amtrak. There are four freight carriers using the Springfield Line, including Connecticut Southern, Boston and Maine Corporation, CSX Transportation, and Providence and Worcester Railroad. In addition to the existing Amtrak service between stations in the corridor, connections to other Amtrak rail service areas is available in New Haven and Springfield. Connections with Metro North's New Haven Line and the Shore Line East commuter rail are also available from New Haven's Union Station and State Street Station.



Recommended Action Stations

New Haven - Hartford - Springfield
Commuter Rail Feasibility Study

Wilbur Smith Associates
ENGINEERS PLANNERS ECONOMISTS

Legend

- Rail Study Corridor
- Highways
- Major Roads
- Recommended Action Stations

N W E S

0 5 10 Miles

Figure ES-1

ES.1 Alternatives

As a first step in determining the alternatives to be evaluated for implementation of commuter rail along the Springfield Line, a "minimum" and "maximum" build were identified as the initial two base scenarios to be considered. Using the costs, ridership, and other analysis from the minimum and maximum build scenarios, four additional possible service implementation alternatives were created for consideration. The following section is a description of the minimum build, maximum build and each of the implementation service alternatives.

ES.1.1 Minimum and Maximum Build Scenarios

The initial vision of a minimum build scenario was to begin service with minimal capital investment. Therefore, an attempt was made to develop a bi-directional schedule with service every 30 minutes using only existing stations and no additional tracks. The initial vision of a maximum build scenario was to provide service that would attract the highest possible ridership. Therefore, a frequent 15 minute schedule, several additional stations and double track on the entire line were included in the scenario. The complete analysis of these two scenarios is available in a separate Alternatives Technical Report. Table ES-1 is a summary of the minimum and maximum build scenario service and results.

Table ES-1
Minimum and Maximum Build Commuter Rail Scenarios

	Min Build	Max Build
Scenario	No additional tracks	Double track entire line
Stations	Nine Existing with limited additional parking	Existing plus Seven New – all improved with high-level platforms, pedestrian crossing and buildings
Peak Hour Train Frequency	30 – 35 minute	15 minute
Off-Peak Service	No - Only Amtrak	Hourly Weekday plus Weekend
Estimated Daily Trips	1,767 (not including Amtrak)	4,983 (including Amtrak)
Capital Cost	$86 million	$558 million
Operating Cost	$7.1 million	$48.3 million
Operating Deficit	$6.2 million	$44.7 million
Per Passenger Subsidy	$13.81	$32.56

Upon evaluation of the minimum and maximum build scenarios, both were found to have a number of issues of concern. The minimum build schedule was found to be unreliable due to the high degree of schedule adherence necessary. Reliable bi-directional service can only be provided by double tracking at least some additional segments of the rail line. The maximum build was found to have a number of costly elements that may not be necessary for the initial implementation of commuter service, including 15 minute peak hour service frequency, weekend service, and a number of additional new stations.

ES.1.2 Implementation Alternatives

Using the costs, ridership, and other analysis from the minimum and maximum build scenarios, four implementation alternatives were derived with varying service plans. Other elements of the maximum build scenario were broken down into a menu of additional elements that can be added initially or in the future as funding or other benchmarks are in place. The following is a summary of each of the alternatives considered to be feasible for initial service implementation. The resulting service characteristics, ridership, costs and performance measures are summarized in Table ES-2.

All of these potential implementation alternatives include only existing stations on the line with existing low level platforms and at-grade pedestrian crossings. These alternatives include peak hour service only and a shuttle bus connection with Bradley Airport at Windsor Locks station. Enhancements such as high level platforms, new station locations and off-peak service can be added to any implementation alternative from the menu of additional options as described in the next section.

ES.1.3 Menu of Additional Options

The items in the following menu of additional options can be added initially or as funding or other benchmarks are in place. These items can be added to any implementation alternative with the cost and impacts shown below:

- Off-peak Service
  - $1.3 million per round-trip run (5 days per week)
  - Maximum build = 577 additional trips daily (using 8 added trains)
- Weekend Service
  - $550,000 per round-trip run (2 days per week)
  - Maximum Build = 1,964 additional trips daily (using 10 added trains)
- Rail Airport Connection (alternatives include shuttle bus connection)
  - Estimated $28 million capital cost
  - No appreciable ridership difference
- Full high level platforms at all stations
  - $3.85 million per station (cost based on SLE)
- Grade-separated pedestrian facilities at all stations
  - $3.85 million per station (cost based on SLE)

Table ES-2
Commuter Rail Implementation Alternatives Service Characteristics and Performance

Alternative	CT1	CT2	Bi-State1	Bi-State2
Service Area	Windsor Locks to New Haven	Windsor Locks to New Haven	Springfield to New Haven	Springfield to New Haven
Headways	30 minute peak hr one-directional service (SB AM, NB PM)	30 minute peak hr bi-directional service	30 minute peak hr bi-directional service	30 minute peak hr bi-directional service
Double Track	No new double track	Double track sections added where needed	Double track sections added where needed	Double track sections added where needed
Amtrak Schedule Adjustment	No adjustments to Amtrak schedule, but fares would be adjusted for commuter use	No adjustments to Amtrak schedule, but fares would be adjusted for commuter use	No adjustments to Amtrak schedule, but fares would be adjusted for commuter use	Amtrak schedule adjusted to accommodate ideal meet times in urban centers
One-way train trips	6	14	14	14
New track required	None	12.4 miles	15.6 miles	15.6 miles
Capital cost	$80.8 million	$121.4 million	$139.4 million	$139.4 million
Annual Operating cost	$3.0 million	$7.0 million	$8.8 million	$8.8 million
Annual Revenue	$368,000	$667,000	$869,000	$869,000
Annual Operating deficit	$2.6 million	$6.3 million	$7.9 million	$7.9 million
Projected Ridership (new daily trips)	872	1,485	1,767	1,767
Per passenger subsidy	$11.82	$16.71	$17.71	$17.71
Farebox recovery	12.3%	9.6%	9.9%	9.9%

- New or updated station buildings at all stations
  - $0.8 million per station (cost based on National experience)
- New Stations:
  - Enfield = estimated 210 daily trips
  - Newington = estimated 250 daily trips (with busway)
  - Wharton Brook = estimated 156 daily trips
  - North Haven = estimated 138 daily trips
  - Capital cost
  - $1.4 - $2.2 million per station for minimum (similar to existing stations)
  - $9.5 - $10.3 million per station for maximum (including high level platforms, grade separated pedestrian crossings, station buildings and expanded parking)

ES.2 Commuter Rail Service Implementation Plan

Upon review of the alternatives, the study team and the Steering Committee developed a recommended action plan for New Haven-Springfield initial and potentially future commuter rail service on the Springfield Line.

ES.2.1 Start-up Service Recommended Action

The start-up service recommended by the Steering Committee is based upon the Bi-State service option. This Start-up Service would include the following:

- Service would operate bi-directionally, Monday through Friday on a 30 minute peak hour schedule (at least 14 one-way trips).
- Service would be between New Haven and Springfield.
- A minimum of 18 miles of extended double track sections will be added to improve reliability and provide 30 minute headways meeting critical times in New Haven, Hartford and Springfield;
- Service would supplement existing Amtrak service on the corridor. Adjustments to Amtrak's schedule would be attempted when possible in conjunction with operating agreements with Amtrak.
- Along with the existing nine passenger stations being served along this corridor, three additional stations would be added at North Haven, Newington and Enfield.
- The existing Windsor Locks station would be enhanced to provide facilities to accommodate a waiting area and transfers between the train and the shuttle bus to Bradley Airport.
- Local bus service will be modified to provide appropriate service to the stations;
- All stations would have high level platforms and grade-separated pedestrian facilities, considered to be necessary from an operational standpoint.

The Start-up Service described includes three additional new stations and improvements to the existing station areas. The station locations for this scenario, which include those new stations not in use today (are *italicized* below), are shown in Figure ES-1.

- New Haven Union Station
- State Street Station
- *North Haven / Hamden Station (at Route 40 connector)*
- Wallingford Station
- Meriden Station
- Berlin Station
- *Newington Station (adjacent to New Britain Busway station)*
- Hartford Union Station
- Windsor Station
- Windsor Locks Station
- *Enfield Station (at Bigelow Commons in Thompsonville)*
- Springfield Union Station

All stations would include high-level platforms, pedestrian amenities with grade separated crossings, bicycle storage and racks, and any additional parking required to accommodate projected ridership.

The suggested 30-minute frequency schedule with stops at all stations demonstrates one potential plan for commuter rail stopping at each station along the line. During further development and refinement of this plan, consideration can be given to including express service directly from the New Haven Line to Hartford and Springfield. The average travel time from New Haven to Springfield, including all stops is 1 hour 30 minutes. If an express train were to operate with stops only in New Haven, Hartford and Springfield (eliminating intermediate stops), the average travel time would be reduced by approximately 15 minutes. However, with the limited stops, corresponding ridership may also be substantially reduced along the line. Further analysis would have to be conducted for such service.

ES.2.2 Commuter Rail Ridership Levels

The New Haven to Springfield commuter rail service has the ability to attract the following four different types of potential users:

1. Commuters accessing employment hubs in New Haven, Hartford and Springfield;
2. Intercity rail ridership to points off the corridor, specifically connections to the Amtrak service in New Haven and Springfield;
3. Users that would have access to Bradley International Airport (BDL); and
4. Off-peak non-commuter and weekend users.

The breakdown of total weekday year 2025 ridership for the Start-up Service is shown in Table ES-3.

Table ES-3
Components of Total Weekday Year 2025 Ridership

Commuters	2,208
Off-peak (non-commuter)	220
Total New Trips	**2,428**
Amtrak (not including Vermonter)	616
Total Trips	**3,044**

The ridership projections presented in Table ES-3 and financial estimates developed for this Start-up implementation plan are based upon a rigorous evaluation process and a customized application of ConnDOT's Statewide Travel Model. However, in response to a concern by some stakeholders that these ridership projections may be conservative, additional analysis was conducted to identify a potential high range of ridership for the service. The resulting high range in ridership is 5,000 daily trips. This higher range is anecdotal and so would be viewed as an optimistic figure. It should be noted that this recommended service is to initiate commuter rail along this corridor and that the opportunity remains to enhance the initial service (with additional scheduled trains and stations) as the demand warrants and funding allows.

ES.3 System Integration Plan

An integral part of the commuter rail service would be the integration with other freight service on the line, passenger rail service both on the line and connecting, and connecting bus services.

ES.3.1 Freight Integration

While the Springfield Line route is an important passenger corridor and can become more so with provision of frequent commuter service during peak travel times, freight service remains an important consideration. The freight service is provided by short line carriers, operating over the line under contractual agreements with Amtrak, which owns the route. The simulations of passenger and freight service confirmed that freight service would need to be operated at times other than the prime commuter hours. Building a commuter and intercity service pattern with frequent trains in each direction make it impractical to run slower freight trains during the period from about 5:30 AM to 9:00 AM, and again from about 3:00 PM to 7:00 PM.

ES.3.2 Transit Integration

New Haven-Springfield commuter rail is planned to connect with bus services provided by seven public transit operators (including different **CT**TRANSIT divisions), and with three other rail services. This can be accomplished by coordinating schedules, implementing joint fares, using rail stations as hubs for local bus services, and by combining marketing and information efforts.

Trips involving New Haven-Springfield commuter rail service and one or more connecting service will involve two or more transit operators. Ideally, regular riders would be able to use a single fare media on corridor rail service, and on all connecting transit services. These would include:

- New Haven – Hartford – Springfield commuter rail
- Amtrak service between New Haven and Springfield
- Pioneer Valley Transit Authority (PVTA) bus service
- **CT**TRANSIT bus service (Hartford, New Britain, Meriden, Wallingford, and New Haven divisions
- Greater New Haven Transit District Trolley
- Metro-North commuter rail
- Shore Line East commuter rail

The existing joint fare arrangements would also provide a framework for pass handling procedures, and for cost and revenue sharing. As long as New Haven-Springfield commuter rail service used the same fare collection practices as Shore Line East service, the same fare media could be used as on that service. Fare handling for the UniTicket option on connecting bus services would be the same as at present, where the pass is simply used as a flash pass. The financial agreements that have been developed for the UniRail and UniTicket programs would provide a framework from which to expand these programs within Connecticut and to Massachusetts services (New Haven - Hartford - Springfield rail and PVTA bus service in Massachusetts).

ES.4 Commuter Rail Start-up Service Capital and Operating Costs and Performance Measures

Capital costs for the recommended Start-up Service consist of five rail-related components: train set equipment (locomotives and cars), a maintenance facility for the equipment, parking and station costs, cost to double track portions of the line, and bridge costs. For this analysis, it is assumed that ConnDOT would require a minimum of 6 train sets, plus two spare locomotives, trailer coaches and cab coaches.

For the Start-up Service, the Springfield Line would essentially remain a single-track railroad with a bi-directional signaling / train control system and multiple controlled passing sidings similar to the existing configuration. However, five existing double track sections would require a minimum of approximately 18-miles of track extensions to provide additional double track on the Springfield Line to accommodate the increase in train movements without impacting planned service trip times. The recommended Start-up Service would require (at a minimum) the following major track changes:

- Extend existing double track from MP 7.3 (Cedar) to MP 11.0 (south of Wallingford) with a new interlocking at MP 11.0. This requires double track across the Quinnipiac River and differs from the Bi-State 1 Alternative.
- Extend existing double track from MP 20.6 (Quarry) through the industrial track to MP 22.5 with a new interlocking at MP 22.5.

- Extend existing double track from MP 28.2 to 31.1 (New), and from MP 33.4 (Wood) to MP 35.2 (Parkville) with a new interlockings at MP 28.2. Some track through Hartford may be redesignated as a running track instead of a passing track, however this issue requires further study and coordination with Amtrak operations staff.
- Extend existing double track from MP 38.9 (Fry) to MP 43.0 (Windsor) with a new interlocking at MP 38.9 (Fry).
- Extend existing double track from MP 51.5 (east side of Connecticut River) to MP 54.7 (Field) with a new interlocking at MP 51.5.

ES.4.1 Total Start-up Service Recommended Action Capital Costs

A summary of total capital costs for the Start-up commuter rail service appears in Table ES-4.

Table ES-4
Commuter Rail Start-up Service Recommended Action Capital Costs

Element		**Cost**
Train Equipment		$70,140,000
Maintenance facility		20,696,000
Stations		80,966,000
Double Track		33,235,000
Bridges		505,000
Amtrak Flagmen		2,500,000
Subtotal		**$208,042,000**
Contingency	40%	$83,217,000
Total		**$291,259,000**

Source: Wilbur Smith Associates, URS Corporation, Washington Group International

The cost estimate includes necessary train sets, spares, the maintenance facility, parking and station costs, double track costs, and bridge rehabilitation or replacement costs. Design, construction service (including Amtrak flagmen) and inspection costs have been applied to each individual estimate. The estimate also includes right-of-way and environmental cost allowances that may be associated with station and maintenance facility construction; however these costs will require refinement in the next phase of implementation. Therefore, to be conservative, a contingency of 40% has been used to reflect unforeseen costs, per Federal Transit Administration guidelines at this phase of implementation. The estimated total capital cost for the Start-up commuter rail service is $291.26 million.

ES.4.2 Commuter Rail Operating Costs

This analysis calculates annual operating costs by multiplying the Springfield Line service's projected annual train miles for its Start-up Service times a representative cost per train mile.

Using 8 round trips or 16 one way trips would generate 992 revenue train miles per weekday. Annual train miles are thus calculated: 992 train miles multiplied by 254 days produces 251,968 annual train miles, exclusive of any shop moves or deadheading for maintenance purposes.

A unit cost estimate of $40 per train mile has been applied, based upon Shore Line East commuter rail experience. Accordingly, an annual operating cost for the recommended Start-up rail service would be $10,079,000.

ES.4.3 Commuter Rail Revenue

Based on the fare structure and weekday ridership presented, revenue from the Start-up commuter rail service would be $4,400 per day. Using 254 days of weekday service per year, the annual revenue would be $1,117,600.

ES.4.4 Connector Bus Costs

Operating costs for connecting bus services would require an additional expenditure of approximately $3.8 million per year, and bus vehicle requirements would increase by 12, at a cost of $3.6 million (see Table ES-5).

Table ES-5
Projected Annual Operating Costs and Vehicle Requirements

	Increase in Operating Costs	Increase in Vehicle Requirements
CTTRANSIT-New Haven	$1,158,001	6
CTTRANSIT-Wallingford	$230,912	0
CTTRANSIT-Meriden	$624,448	0
CTTRANSIT-New Britain	$1,077	0
CTTRANSIT-Hartford	$1,736,323	6
CTTRANSIT Total	$3,750,761	12
Pioneer Valley Transit Authority	$6,101	0
Total	$3,756,863	12

Note: $2002, per year

Applying the 2004 CTTransit farebox recovery rates, the annual operating deficit for the connecting bus service, as a component of the commuter rail implementation plan, would be approximately $2,750,000.

ES.4.5 Cost Summary

A summary of the performance revenue calculations is shown in Table ES-6. Given the Start-up Service Recommended Action is projected to cost $10,078,000 to operate using conventional rolling stock with revenues at $1,117,600, the operating deficit would be

$8,960,000 annually. This is in addition to the capital costs of $291.26 million. Using a total of 4,215,384 passenger miles estimated by the ConnDOT model, the revenue per passenger mile was calculated to be $0.26, the fare box recovery was calculated to be 11.0% and the productivity was calculated to be 16.73. Productivity, a calculation of passenger miles per vehicle miles, is often used to determine the efficiency of the service.

Table ES-6
Commuter Rail Ridership, Costs, Revenue and Performance Measures

Total Weekday Trips	2,428
Annual Passenger Miles	4,215,384
Annual Revenue	$ 1,117,600
Annual Rail Operating Cost	$ 10,079,000
Annual Rail Operating Deficit	$ 8,960,400
Revenue per Passenger Mile	$0.26
Fare box Recovery	11.0%
Productivity (Passenger Miles per Vehicle Miles)	16.73

Connecting bus capital ($3.6 million) and annual operating costs ($3.8 million) would be in addition to the commuter rail capital and annual operating costs.

ES.5 Environmental Resource Review

A preliminary review of the potential environmental issues associated with the construction of the passenger stations and track has been completed. A detailed evaluation will be required to determine the social and environmental impacts and mitigation, in accordance with the National and Connecticut Environmental Policy Acts. Areas that must be addressed include floodplains, coastal boundaries, farmland soils, wetlands, stream channels, threatened or endangered species, historic structures and archeological sites. The addition of the double track sections would be within the existing railroad right-of-way and would not be expected to result in any significant adverse environmental impacts.

Potential 100-year floodplain impacts should be coordinated with the Connecticut Department of Environmental Protection (CTDEP) at New Haven State Street Station, Meriden Station, Newington Station, Windsor Station and Windsor Locks Station. New Haven State Street Station and North Haven Stations are located within the coastal boundary and are therefore subject to the Connecticut Coastal Management Act. At Berlin Station, proposed project activities on land with farmland soils require review by the Natural Resources Conservation Service.

Potential wetland impacts identified at Windsor Station and Windsor Locks Station should be further evaluated and if impacts cannot be avoided, construction of the stations would require an Inland Wetlands and Watercourses permit from the CTDEP and possibly a U.S. Army Corps of Engineers permit. Similarly, the CTDEP's Stream

Channel Encroachment Lines list indicates that encroachment lines exist along the entire stretch of the Connecticut River within Windsor Locks. The Future Wharton Brook Station, Windsor Locks Station, and Enfield Station sites fall within the Natural Diversity Database records; therefore coordination with CTDEP regarding the status and/or presence of any threatened, endangered, and/or special concern species would be necessary.

Plans near the historic Wallingford Railroad Station, potentially historic Berlin Railroad Station, historic property at 160 Willard Avenue in Newington, historic Union Station in Hartford, Broad Street Historic District in Windsor Locks, and potentially historic Connecticut Casket Company in Enfield will be coordinated with the State Historic Preservation Office. A Section 4(f) Evaluation, Section 106 documentation, and various mitigation activities may be necessary. Given the proximity of the Windsor and Windsor Locks Station sites to the Connecticut River, it is recommended that the sites be investigated by the State Archeologist as an archeologically sensitive area prior to any ground disturbance according to Section 106 Regulations of the Advisory Council on Historic Preservation.

ES.6 Implementation Next Steps

The purpose of this study is to develop an implementation plan for commuter rail service between New Haven, Connecticut and Springfield, Massachusetts. The next steps needed to pursue the recommended Start-up Service implementation plan would include:

1. **Develop a funding plan** – The funding and financing of the service are the most controversial issues remaining before implementation given the current Connecticut and federal fiscal situation. Section 8.2 in the Final Report presents the timeline required for future funding. Section 8.4 in the Final Report gives further information about federal funding options available.

2. **Complete the environmental process outlined in the Connecticut and National Environmental Policy Act** – This process must be undertaken by the State of Connecticut with Federal Transit Administration (FTA) guidance before service can begin. This is a key to obtaining any federal funding for the project as well. Further details about the environmental documentation likely required are available in Section 8.3 in the Final Report.
3. **Complete preliminary design** – This report gives conceptual station plans and double track section locations necessary for the development of cost estimates for future funding. The next stage in implementation of service will require refinements of these plans to the preliminary design level (10% design), including exact locations for station platforms, station parking, new track and maintenance facilities. This is typically done in conjunction with the environmental process.

4. **Make necessary refinements to the operating plan** – Based upon the results of the preliminary design and environmental process, refinements should be made to the overall operating plan outlined in this document.

5. **Execute operating agreements** – As the State of Connecticut does not currently own the track over which the service would operate, preliminary operating agreements with Amtrak, other commuter rail operators (as needed), freight operators, and transit operators should be executed early in the process to ensure buy-in for the service before capital funds are expended.

6. **Complete final design and property acquisition** – The final design of stations, double track sections, bridges and the maintenance facility should be undertaken simultaneously with the necessary acquisition of property for these facilities (anticipated to be required only for station parking and the maintenance facility).

7. **Procure rolling stock** – The decision as to the type of rolling stock that best fits this service will be a key aspect of the implementation. Section 8.6 in the Final Report gives guidelines on the positive and negative aspects of self-propelled rail car trains compared to traditional locomotive-hauled push-pull coach trains. The procurement of rolling stock for the service requires substantial turn-around time due to the fact that rail equipment is made to order.

8. **Hire an operator** – Although Amtrak currently owns the line between New Haven and Springfield, there are a number of possible operators for the future service. Section 8.5 in the Final Report discusses potential operators for the service in greater detail.

9. **Construct new facilities** – This involves the construction of station areas (including parking and platforms), new track segments (including track, interlockings, signals and bridges), and maintenance facilities.

10. **System testing** – As a final step to opening the system, final debugging modifications and improvements are made prior to start-up. This includes checks of the rolling stock, stations, track and signal improvements, and all other elements of the project to ensure all components are working correctly prior to commencement of revenue service.

ES.7 Future Full Build Scenario

The previous sections describe the elements of the Start-up Service Recommended Action for a New Haven to Springfield commuter rail service. In addition to these elements, a number of improvements may be considered for future enhanced service on the line as demand is demonstrated. These enhancements include elements that were not

deemed necessary for start-up service, double tracking the entire line and a station in the Wharton Brook area. Several comments were received in the public involvement phase of the study requesting that the cost of providing double track on the last segments of the New Haven to Springfield line be calculated and included in the Final Report. Therefore, additional future enhancements to the corridor may include:

- Double-track the remaining 20.6 miles of single track sections to improve reliability and allow service at least as frequent as every 15 minutes;
- Construct second high-level platforms and grade-separated pedestrian facilities at Wallingford, Berlin and Windsor Locks Stations. It is of note that these stations were on single-track segments in the start-up service and therefore only one platform and no grade-separated pedestrian facilities were necessary. With the additional double-tracking of the entire line, these elements would be necessary.
- Construct an additional station in the Wharton Brook area on the former Pratt and Whitney property as development takes place;
- Provide new commuter rail parking in the new Meriden parking structure to be constructed with downtown development plans in Meriden.

The additional costs associated with these future full-build elements appear in Table ES-7. The cost estimate includes additional parking and station costs, double track costs, and bridge rehabilitation or replacement costs. Design, construction service and inspection costs have been applied to each individual estimate. Amtrak flagmen will be required for construction within 25 feet of the rail line, including platforms, overhead structures, and double tracking segments. A contingency of 40% has been used to reflect unforeseen costs, per Federal Transit Administration guidelines at this phase of implementation. The estimated total additional capital costs for the future Full-build scenario are $96 million.

Table ES-7
Additional Full-build Capital Costs

Element		**Cost**
Stations		$26,020,000
Double Track		$30,159,000
Bridges		$10,005,000
Amtrak Flagmen		$2,500,000
Subtotal		**$68,684,000**
Contingency	40%	$27,474,000
Total		**$96,158,000**