Eastern Connecticut Corridor Rail and Transit Feasibility Study (ECRTS)

Appendix J: Rail Service Plan

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1 Rail Service Plan Overview

As part of the Eastern Connecticut Corridor Rail and Transit Feasibility Study (ECRTS), this Rail Service Plan addresses the railroad service operations on the corridors identified in the **Preliminary Feasibility Assessment (Appendix H)**, which draws from the **Corridor Capacity Analysis and Service Framework (Appendix E)**, **Thames River Corridor Assessment (Appendix D)**, and **Potential Station Sites (Appendix F)** technical reports. The Rail Service Plan builds from these reports and presents preliminary findings regarding projected schedule of service, future equipment needs, system requirements, and high-level capital and operating cost estimates. It also provides ridership, revenue, and Greenhouse Gas (GHG) reduction projections for the identified rail service options. The Rail Service Plan, in conjunction with the ECRTS **Transit Service Plan (Appendix I)**, uses the existing conditions information to identify opportunities to ensure that the region has a local bus transit and commuter rail network that aligns with both present and future regional travel demand[1]. These reports are part of a larger effort to determine the viability of potential future rail and bus transit improvements in the study area, the first step in a data-driven decision-making process. Though short- and long-term strategies to advance commuter rail service improvements in southeastern Connecticut are presented, they are preliminary findings. Further steps would be needed to advance the project's development, including additional studies such as bridge inspection and loading ratings, grade crossing inspections, utility coordination, and positive train control feasibility as examples. Coordination and discussions would also need to take place with the Federal Railroad Administration to identify the funding needed to complete these studies along with planning permitting, and design. All next steps are currently unfunded.

This plan includes specific rail service and infrastructure modifications that are associated with high estimated costs and increased levels of coordination between CTDOT, Amtrak, Genesee and Wyoming (GWI), and others. As such, it is anticipated that strategies outlined in the Rail Service Plan would not be implemented in the near term; for modeling purposes, it is assumed that rail service along the NEC and Thames River Corridor could be realized in 2035. The Transit Service Plan, however, is more feasible to implement in the near term because the mobility strategies are less resource-intensive than the Rail Service Plan; therefore, the short-term strategies to improve bus transit service levels are modeled to begin in 2028. As with its bus transit service counterpart, this Rail Service Plan presents strategies for improving efficiency and enhancing mobility within and beyond the southeastern Connecticut region, assuming structural and financial support for implementation, which have not been committed by CTDOT or the State Legislature.

1.1 Preliminary Feasibility Assessment Outcomes

While all the alignments analyzed during the ECRTS Preliminary Feasibility Assessment were determined to be technically feasible, several critical constraints exist that would restrict SLE service frequency and expansion. Specifically, the movable bridge over the Thames River is a significant constraint. Only one additional train per hour could operate in each direction across the Thames River to/from New London Union Station at all times of the day due to existing operation restrictions monitored by the US Coast Guard and the current and anticipated Amtrak activity across the bridge.

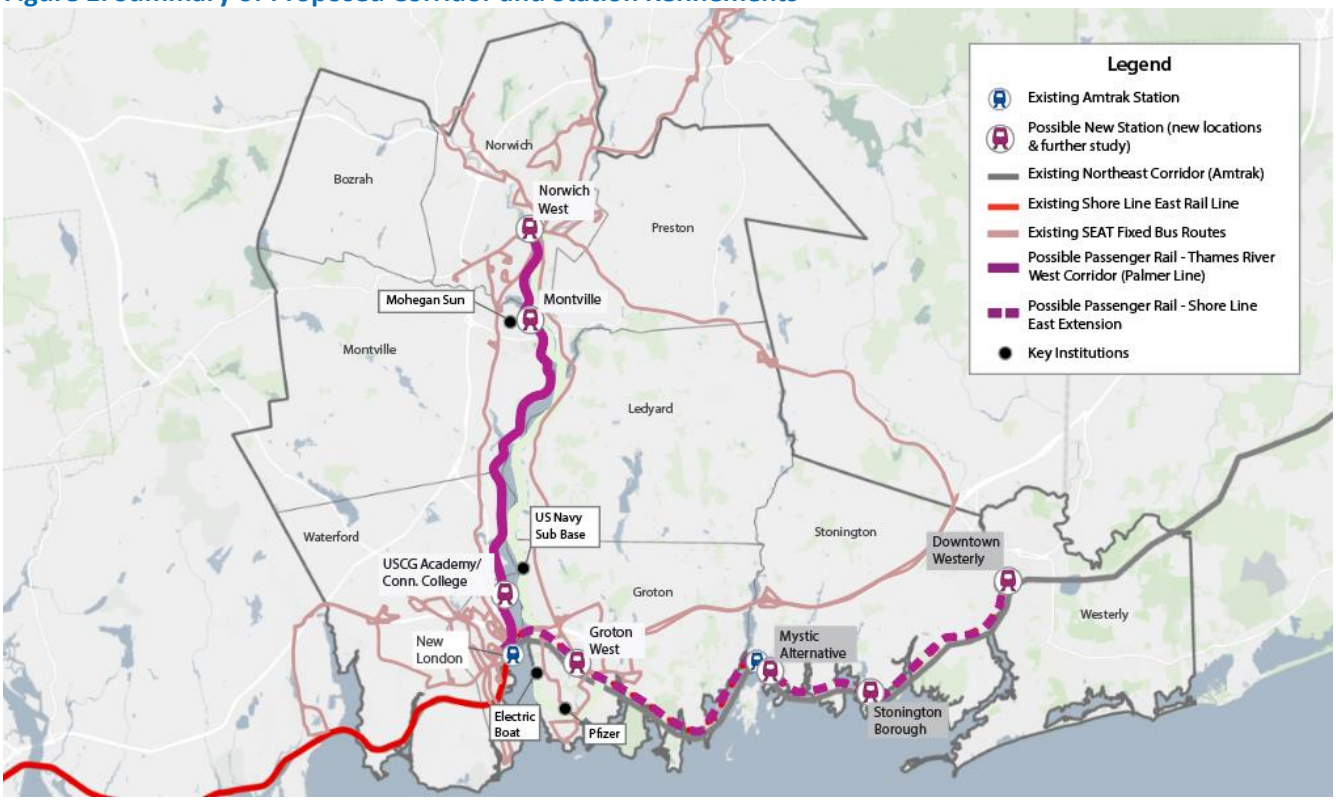
Operations on either the Norwich Branch or the Groton Secondary on the east side of the Thames River would eliminate the possibility of the SLE extension along the NEC due to conflicts with existing and proposed Amtrak service traveling over the bridge. Operations through the Groton Naval Submarine Base are also significantly impacted by security requirements. For a passenger rail alignment option to move forward in each corridor, the preferred solutions are the NEC/Shore Line East (SLE) extension on the NEC and the Palmer Line on the west side

[1] While the public outreach component of this study did demonstrate an appetite for intercity passenger rail connecting to locations outside of the region, such as Hartford and TF Green International Airport in Providence, RI, it is beyond the scope of this study. Amtrak's 2023 New Haven to Providence Market Study details the travel behavior and demand for intercity rail between the two locations.

of the Thames River. The analysis for the Rail Service Plan will therefore include both of these alignments, with stops at the following stations (Figure 1):

- NEC from New London, CT to Westerly, RI
  - New London (existing)
  - Groton West (new)
  - Mystic Alternative (station relocation/new)[2]
  - Stonington Borough (new)
  - Westerly (existing)
- Palmer Line from New London to Norwich
  - New London (existing)
  - United States Coast Guard Academy (USCGA) / Connecticut College (new)
  - Montville/Mohegan Sun (new)
  - Norwich West/Norwich Intermodal Center (new)

Figure 1. Summary of Proposed Corridor and Station Refinements



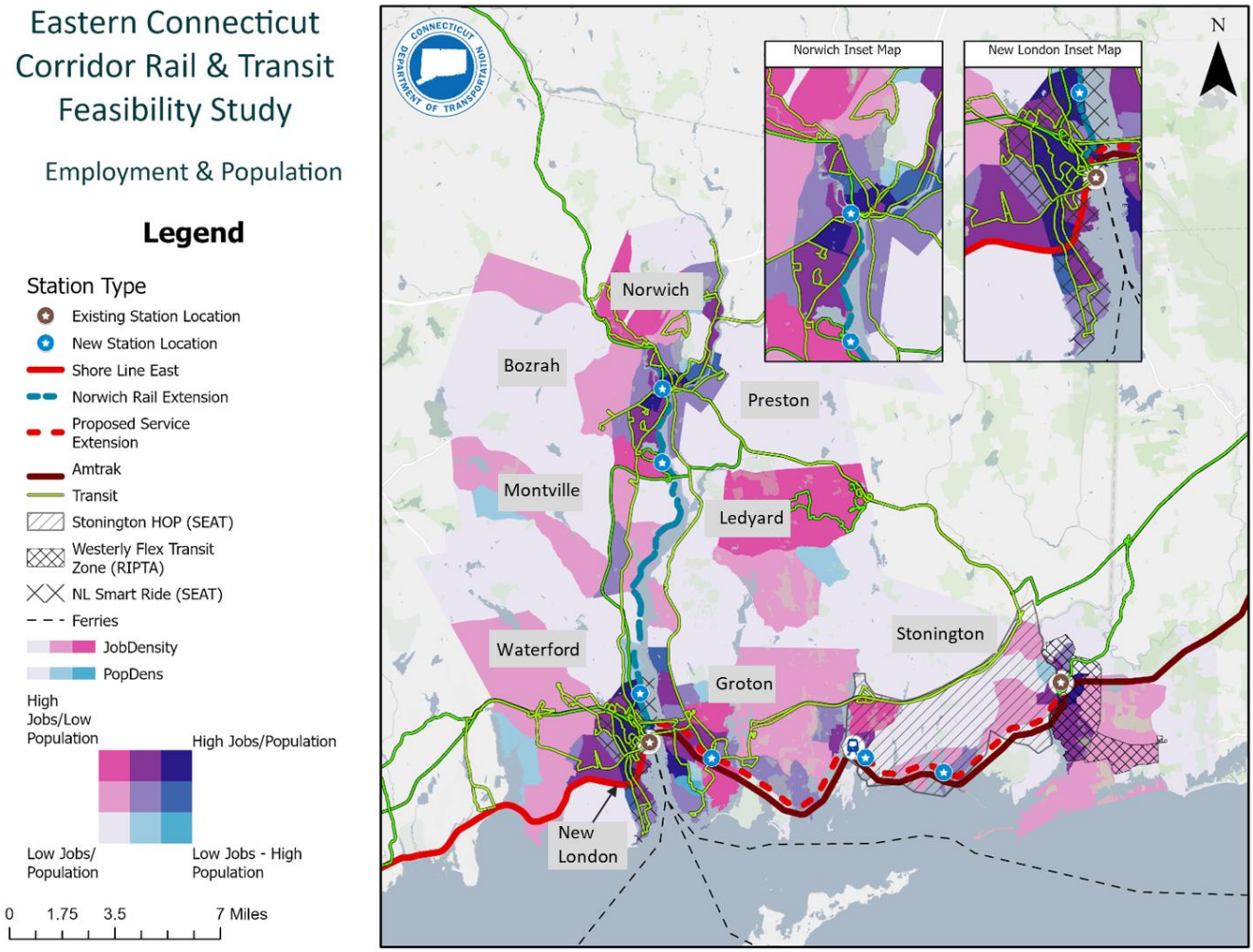
Additional development of fixed route and demand response bus service options will also play a role in improving regional and local mobility and expanding multimodal connections. These improvements are especially significant where the market for bus transit is shown to be strong yet not rising to the level appropriate for investment in rail. Industry guidelines suggest 15 to 30 combined jobs and people per acre as the minimum level of density to support frequent and cost-effective rail service.[3] Three census tracts in New London, one in Groton's downtown core, and one in Norwich meet this guideline and abut several of the proposed passenger rail stations.

[2] The curvature at the existing Mystic Station prevents the platform from being reconstructed to accommodate high-level boarding required by the SLE's M-8 trains, thus requiring a new station to be sited. The Mystic Alternative site is located on a straighter section of track and can be built to include high-level boarding.

[3] Guerra, Erick, and Robert Cervero. *Cost of a Ride: The Effects of Densities on Fixed-Guideway Transit Ridership and Capital Costs,* 2010 ; Translink, Transit-Oriented Communities: A Literature Review on the Relationship between Built Environment and Transit Ridership, 2010.

The remainder of the region is less densely settled with regards to population and employment, indicating that bus would be a better candidate for public transportation service in those areas (Figure 2). This market analysis and series of bus improvement strategies are included in the **Transit Service Plan (Appendix I)**.

Figure 2. Study Area Population and Job Density Map



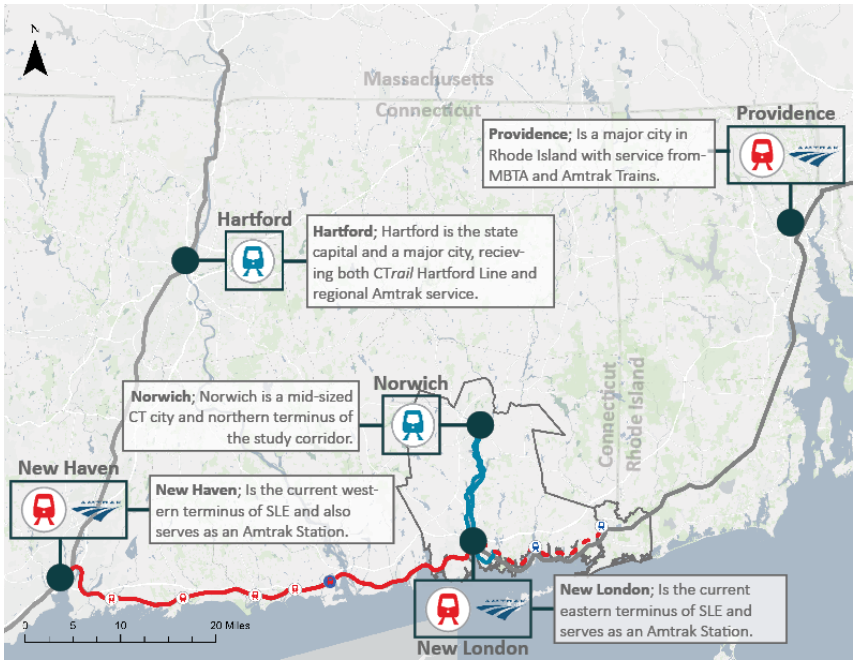
2 Existing Rail Service on the Study Area Corridors

Within the ECRTS Study Area, passenger rail service is provided along the Amtrak-owned two-track rail connecting the New London, Mystic, and Westerly stations via the NEC. Through its subsidiary New England Central Railroad, GWI owns and operates limited freight service on the Palmer Line, which runs along the west side of the Thames River.

2.1 Passenger Rail Service

Passenger rail service in southeast Connecticut is integrated into the NEC, which connects Boston and New York via Rhode Island and Connecticut (Figure 3). The SLE commuter rail service operates on the NEC in Connecticut and provides commuter service between New London and New Haven, with 23 trains every weekday and 16 trains on weekend days. Amtrak provides intercity passenger rail on its Acela and Northeast Regional trains and serves Boston, New York City, and further south to Washington, D.C. and Virginia. Amtrak service provides 19 daily round trips on weekdays, 13 on Saturdays, and 20 on Sundays[4] between the New Haven and the Rhode Island state line segment of the NEC Within the Study Area, New London Union Station offers easy connections between Amtrak, SLE, intercity and local buses, and ferries, and connects to Foxwoods Casino Resort in Ledyard on an Amtrak Thruway bus from New London. Connecting services at New Haven include service on the CT*rail* Hartford Line north to Hartford and Springfield, Massachusetts, as well as on the Metropolitan Transportation Authority (MTA) Metro-North Railroad New Haven Line traveling southwest to Bridgeport, Stamford, and Grand Central Terminal in New York City.

Figure 3. Regional Major Cities and Rail Access



Recent Amtrak train equipment procurements will enable Amtrak to increase service levels to a planned hourly frequency for both its Acela and Regional services. Evaluation of service options included the planned level of Amtrak services, not current level of service (

Table 1).

SLE service reductions are anticipated in the Fall 2023 that could impact the current frequency of service to this area as well as the current timetables.

Table 1. Study Area Existing Passenger Rail Service Overview (NEC and Connections)

Operator	Type of Service	Routes	Service Span and Frequency	Service Area
CT*rail*	Commuter rail	Shore Line East	• Mon-Fri, 5am-12:05am – EB: 5 trips in am/ 6 trips in pm – WB: 5 trips in am/ 7 trips in pm • Sat/Sun, 5:10am-11:50pm – EB: 4 trips in am/ 4 trips in pm – WB: 3 trips in am/ 5 trips in pm	New Haven – New London

[4] Please note that some trips are cross-branded as Amtrak regional and Shore Line East services.

Operator	Type of Service	Routes	Service Span and Frequency	Service Area
Amtrak	Intercity passenger rail	Northeast Regional Train and Acela Express	• Mon-Fri – NB: 7 trips departing in am/ 2 trips departing in pm – SB: 5 trips departing in am/ 5 trips departing in pm • Sat – NB: 7 trips departing in am / 1 trip departing in pm – SB: 4 trips departing in am/ 4 trips departing in pm • Sun – NB: 7 trips departing in am/ 2 trips departing in pm – SB: 4 trips departing in am/ 7 trips departing in pm	Richmond, VA – Boston, MA (Stops at: New Haven, Old Saybrook, New London, Mystic, Westerly; not all trains stop at Mystic or Westerly)

2.2 Freight Rail Service

On the western banks of the Thames, the Palmer Line hosts limited freight operations (between one and two trains per day) that meet market demand and do not operate on fixed schedules. The track passes through New London, Waterford, Montville, and Norwich, adjacent to Bozrah. Freight service could include local trains serving the east side of the Thames River to Norwich and points north, local service to locations along the Groton Secondary (Pfizer/Electric Boat), as well as the operation of unit aggregate stone trains from Palmers Cove on the NEC to Long Island. Freight service between Palmers Cove and Westerly operates on an infrequent basis.

2.3 Ridership

In 2021, Amtrak restored service to 80% of pre-pandemic levels to meet the needs of customers.[5] It is important to note that 2021 year-end ridership on Amtrak's Northeast Regional trains was 67% of pre-pandemic levels and Acela ridership only recovered to 45% of pre-pandemic levels. As of May 2023, SLE ridership has only recovered to approximately 31.1% of pre-pandemic levels, averaged over the year prior.[6]

3 Corridor Capacity Overview

As part of the Preliminary Feasibility Study phase of ECTRS, a Corridor Capacity Analysis was completed[7], which was the first step in determining whether the southeastern Connecticut rail corridors could accommodate the addition of new rail service. A summary of the Corridor Capacity Analysis for the NEC from New London to Westerly and the Thames River Corridor is outlined below. These details inform the Rail Service Plan and its baseline assumptions.

[5] http://nec-commission.com/app/uploads/2022/03/NEC-Annual-Report-FY21.pdf
[6] CTDOT. 2023.
Connecticut Department of Transportation. ECRTS Preliminary Feasibility Assessment Appendix E: Corridor Capacity Analysis and Service Framework. February 2023.

3.1 NEC

The NEC between New London and Westerly operates as a two-track system, which allows train operations in both directions and provides much greater capacity than single-track operations. However, capacity is limited by varying speed profiles, varying train stopping patterns, and, crucially, moveable bridge operations.

Figure 4. Groton Moveable Bridge

The most restrictive constraint along the corridor is the moveable bridge over the Thames River, approximately 1.3 miles east of New London Union Station (Figure 4). Each time the bridge is closed to rail traffic, many actions occur: signals are set to "Stop," derails are opened, the movable portion of the bridge is unlocked, the bridge is raised, vessels pass through the bridge, and the closing process takes place in the reverse order of opening. These actions all consume time and can create significant impediments to both rail and marine traffic. Conformance with US Coast Guard regulations regarding vessel waiting times is also an important factor that affects the line's capacity in the study territory.

3.2 Palmer Line

The Palmer Line hosts limited freight operations that run to meet market demand and do not operate on fixed schedules. Notwithstanding the absence of a specific freight schedule, G&W's service delivery is carefully planned and is assumed unable to tolerate lengthy delays waiting for passenger trains to clear the line. As such, improvements to the corridor focus on facilitating joint freight and passenger rail operations. Because the Palmer Line is a single-track system, three controlled passing sidings able to hold a freight or passenger train between New London and Norwich were identified to support the passenger operation and maintain timed deliveries and consistent freight operations. These locations are as follows:

- A controlled siding in the immediate New London area to accept trains passing clear of the NEC tracks without interference to freight operations. A longer controlled lead track approaching the New London Yard port facilities is also necessary to hold freight trains clear of the main track when accessing the yard and port facilities.
- A mid-line-controlled passing siding for passenger or freight operations allowing trains to pass at a location determined necessary to achieve the established frequency goals.
- A controlled passing siding or double track approaching Norwich Transit Center to enable holding of passenger train equipment clear of the main track while waiting for their next assignment.

4 Existing and Proposed Station Locations

Following preliminary feasibility assessment, potential station sites for the alternative routing options were identified. These potential station locations were further analyzed in **Conceptual Station Site Locations (Appendix K)**. This technical memorandum evaluated the six station locations focusing on a half-mile or one-mile radius around each, to assess the viability of potential future stations at each. This section summarizes the existing and proposed station locations used to inform the Rail Service Plan.

4.1 NEC

The SLE extension on the NEC includes two existing stations, New London, CT and Westerly, RI, that could be integrated into any future rail service expansion. Having identified these terminus points for the SLE extension, the Preliminary Feasibility Assessment assessed the location for infill stations or intermediate stations in the **Potential Station Sites (Appendix F)** technical report. The analysis of potential infill station locations identified the following locations as most feasible along the NEC (Figure 5):

- Groton West
- Mystic Alternative
- Stonington Borough/Downtown Stonington

Figure 5. NEC Station Locations

Station location characteristics were evaluated, assessing site constraints, regulatory conditions, and operational feasibility (Table 2).

Table 2. NEC/SLE Station Characteristics[8]

Potential Station Location	Regulatory				Site Constraints			Operational Feasibility
	Existing Land Use	Zoning	Env. Justice	Distressed Municipality Designation	Parcel Ownership	ROW Constraints	Topography Constraints	
Groton West	Car Wash	Neighborhood Commercial	None Present	2021	Private	Minimal	Moderate	Minimal Challenges
Mystic Alternative	Antique Store	General Commercial	None Present	Not Designated	Private	Moderate	Moderate	Minimal Challenges
Downtown Stonington	Community Center	Development Area	None Present	Not Designated	Public	Moderate	Moderate	Minimal Challenges

All four locations have considerably different rail infrastructure characteristics. The Groton West location is a new station in 3-track territory. The Mystic Alternative location is a relocated station in 2-track territory. The Downtown Stonington station is a new station location in 2-track territory. The Westerly station could use the existing station in 2-track territory.

[8] All site characteristics can be found in Preliminary Feasibility Assessment Potential Station Sites document.

4.2 Palmer Line

Part of the goal of improving regional connectivity is upgrading the Palmer Line to establish passenger rail service between New London and Norwich, including stops at USCGA/Connecticut College, Montville (Mohegan Sun), and Norwich Transportation Center. The New London location could remain at the existing station, all the others are new and could be located along the single-track Palmer Line (Figure 6).

Each of the three proposed stations have unique transportation and development opportunities. Station location characteristics were evaluated to assess site constraints, regulatory conditions, and operational feasibility (Table 3).

Figure 6. Palmer Line Stations

Table 3. Thames River West/Palmer Line Station Characteristics[9]

Potential Station Location	Regulatory				Site Constraints			Operational Feasibility
	Existing Land Use	Zoning	Env. Justice	Distressed Municipality Designation	Parcel Ownership	ROW Constraints	Topography Constraints	
Norwich West	Vacant	General Commercial	None Present	2021	Public	Moderate	Moderate	Moderate Challenges
Montville	Vacant	Commercial	None Present	2021	Public	Minimal	Moderate	Minimal Challenges
USCGA	Parking	Institutional	None Present	2021	Public	Minimal	Minimal	Minimal Challenges
Conn. College								

5 Infrastructure Assessment

The New Haven Line (NHL) Capacity and Speed Analysis, conducted between 2017 and 2021, is a detailed assessment of the infrastructure, service, and fleet needs of the NHL as well as an overview of the branch lines (New Canaan, Danbury, and Waterbury). The report sets the stage for follow-on work that examines the complete rail network in Connecticut. Some of the findings of the NHL Capacity and Speed Analysis inform the ECRTS including:

- Capacity and speed are constrained by legacy infrastructure

[9] All site characteristics can be found in Preliminary Feasibility Assessment Potential Station Sites document.

- Track geometry and slow orders contribute to reduced speeds
- State of good repair and normal replacement standards impact speed
- Selected rolling stock technology can limit capacity
- Service and infrastructure can be optimized to improve trip times

Building on the findings of the NHL Capacity and Speed Analysis, a visual field inspection was conducted for the ECRTS along the NEC and Palmer Line to assess the existing conditions of infrastructure (Table 4). This section presents a summary of the field inspection results that can be found in **Thames River Corridor Assessment (Appendix D)**, part of the Preliminary Feasibility Assessment. The results are broken up by asset category and further summarized by corridor.

Table 4. Infrastructure Characteristics of the NEC/SLE and Palmer Line

Characteristics	NEC/SLE	Thames River West / Palmer Line
Track Miles	~ 19	13.60
# of Structures	2	24
# of At-Grade Crossings	2	22

5.1 Track Infrastructure

Track is defined as the composition of all components that support longitudinal movement of rail vehicles. The three main components of a track are the steel rails, the ties, and the ballast/subbase. This assessment also includes interlockings and sidings.

5.1.1 NEC

The SLE extension could operate between New London, CT and Westerly, RI on the existing NEC two-track system. The tracks are electrified with a 27.5 kilovolts (kv) alternating current (AC) constant tension catenary system with independent catenary support poles. Each track is equipped with a bidirectional, multi-code cab-signal signal system optimized to support high speed service and not dense commuter operations. All tracks are equipped with Amtrak's Advanced Civil Speed Enforcement System (ACSES) for complete positive train control (PTC) compliance. A third NEC track (Track 4) located in Groton between MP124 and MP128 could need a complete upgrade to support the SLE extension, including electrification. This upgrade is required to host eastbound trains making a stop at the Groton West station as there is insufficient room to construct a platform adjacent to the normal eastbound track (Track 2). The upgrade could include the connecting switches at either end. Due to the many curves present, this section is among the slowest in the entire Boston to Washington corridor. With that being said, the track infrastructure along the NEC is in good condition and generally meets FRA Class 8 standards[10].

5.1.2 Palmer Line

The Palmer Line spans 13.6 miles of track. Spot checks during visual inspection found steel rail of 100/115RE pound (lb)[11] at all locations. Assuming the total length of the Palmer Line is comprised of 100/115RE steel rail, the entire corridor could need to be upgraded to support heavier axle load requirements at faster speeds, where generally the use of 132/133 lb steel rail or better is preferred.

[10] Railroad track quality is categorized by the FRA's Track Class standards, ranging from Class 1 to Class 9. Each class of track determines construction specifications, which dictate speed limits (increasing with Class level) and the ability to operate passenger trains. Source: US Track Classification Quick Reference: US Track Class Regulations per 49 CFR § 213, 49 CFR § 213. http://www.jgmes.com/webstart/library/table_fra_track.htm

[11] Rail sections in the United States are generally referred to by their weight per yard. Larger rail designs were developed to better accommodate higher speeds and heavier trains.

Figure 7. Wooden Ties with Severe Rotting

At all spot check locations, steel rail was supported by wooden ties. Although some ties appeared to be in good/fair condition, most locations were served by wooden ties with severe longitudinal cracking or severe rotting. Others were buried, indicating poor drainage (Figure 7). Damaged ties should be replaced to meet FRA Class 4 standards. Optimally, a complete replacement with concrete ties could support the best passenger rail ride conditions.

Manual throw switches for sidings were located at two of the spot check locations along the Palmer Line, although more are likely present throughout the entirety of the corridor. The Rail Service Plan for this study assumes the rail infrastructure can meet FRA Class 4 standards and could require a new signal system with controlled passing sidings, electric locked industrial sidings, and PTC.

5.2 Structures

Structures are classified into two main asset classes: Undergrade Structure (UG bridge), or Overhead Structure (OH bridge). A UG bridge is any feature the railroad bed crosses over, while an OH bridge is any structure that passes over the railroad right of way. All UG bridges must be able to support both dead and live loads of future passenger rail service and supporting infrastructure. OH bridges only need to support live and dead loads of the infrastructure they support, yet may pose a concern to vertical clearance of proposed train service.

5.2.1 NEC

As mentioned earlier, the most restrictive constraint along the NEC is the moveable bridge over the Thames River. There is also a second moveable bridge on the corridor that spans the Mystic River, 10 miles east of New London. Each time one of these bridges is closed to rail traffic, many actions occur that consume time and can create significant impediments to both rail and marine traffic.

5.2.2 Palmer Line

Visual inspection of the Palmer Line found 22 UG structures, including 7 timber trestles, 2 thru girder, 2 culvert, 1 ballasted deck, 6 I-beam, and 4 open deck bridges. Passenger service is not preferred to run on timber trestle bridges due to its flammable properties, tendency to rot from moisture, susceptibility to termite damage, and frequent speed restrictions. It is recommended that the 7 identified timber trestle bridges could be replaced. OH structures were not found to have clearance or condition issues, with the exception of an abandoned bridge at Riverside Park that necessitates removal.

Figure 8. I-Beam Bridge (Top Left), Open Deck Bridge (Top Right), Thru Girder (Bottom Left), Timber Trestle (Bottom Right)

5.3 Grade Crossings

Grade crossings are composed of crossing surfaces and warning/control devices. It is assumed that CTDOT could undertake its customary diagnostics analysis of each crossing and subsequently specify the crossing technology to be installed. It could be reasonable to assume all

crossings could be, at the minimum, equipped with active warning devices and receive upgraded running surfaces.

5.3.1 NEC

Grade crossing technology on the NEC is governed by a federal statute unique to the NEC that includes quad gates, intrusion detection, and pedestrian management systems. There are two grade crossings in Mystic and Stonington that contribute to restricted speeds due to conformity with the statutory requirements. Amtrak has applied for federal grants to begin eliminating the crossings with grade-separation structures.

5.3.2 Palmer Line

Visual inspection of the Palmer Line revealed 24 grade crossings – four crossings were constructed with rubber panels, eight with asphalt, two with pre-cast concrete, three that were unpaved, and seven that were of an unknown material. The Palmer Line's grade crossings are mostly in poor condition, with numerous crossing surfaces having severe issues.

Grade crossings for passenger rail generally should be fully signalized with bells, uni-directional traffic flow gates, and flashers. The inspection team identified varied levels of protection at all grade crossings. Twenty-one grade crossings lacked flashers, bells, gates, or a combination of these features. As a result, nearly all grade crossings could likely have to be upgraded.

6 Rail Service Schedule Options

With the SLE extension and the Palmer Line deemed feasible for passenger rail service, the next step in the process is to identify potential rail service schedules or timetables for each corridor. The existing passenger rail and freight service schedules need to be accounted for and not adversely impacted by the proposed rail service plans for ECRTS. Funding for implementing these schedule options and the infrastructure to support service has not been committed.

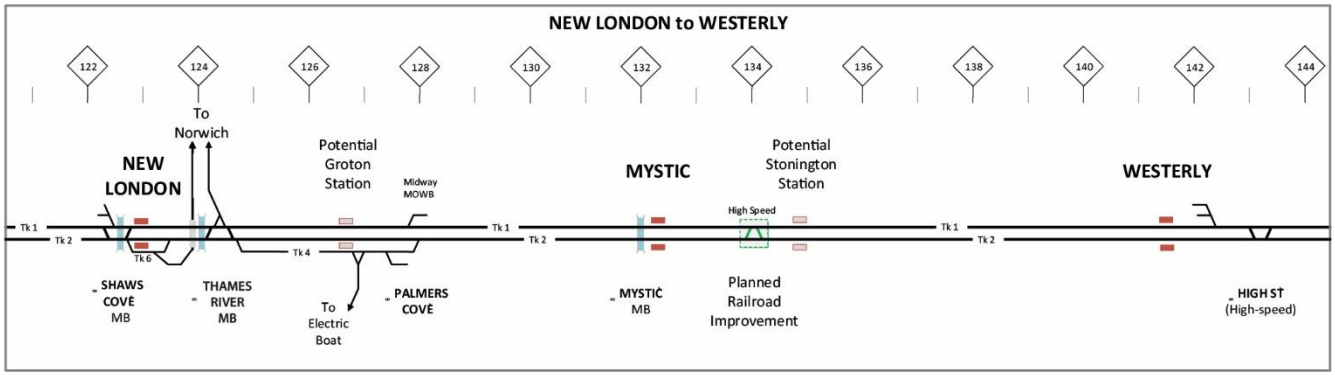
6.1 NEC

The Preliminary Feasibility Assessment Report concluded that the NEC could accommodate one train per hour in each direction for the SLE Extension across all times of the day. To accommodate this service, the following assumptions were made for Eastern CT trains:

- Sufficient off-main track, turn-around, and storage facilities could be provided
- Running time would be 25 to 29 minutes
- All trains would stop at all the station locations (local service)
- Any additional trains would impact the movable bridge opening time requirements and Amtrak, Metro-North, and MBTA scheduling

To determine which rail service schedule could be the best for this corridor, the service plan analysis considered two options, an extension of the SLE's current schedule and trainset(s) to Westerly from New Haven through New London or a shuttle that could run only between New London and Westerly. The diagram in Figure 9 shows the NEC Territory for the SLE extension and includes relevant features that must be considered in the service plan.

Figure 9. NEC Territory for SLE Extension



6.1.1 SLE Extension to Westerly, RI (Option 1)

The schedule assumptions for the SLE extension to Westerly, Rhode Island include:

- Spring 2023 Amtrak NEC schedule
- Spring 2023 overall SLE service frequencies
- Specific SLE schedules revised to support extensions to Westerly
- One Stamford round trip restored
- New stations at Stonington, Groton West, relocated station at Mystic and new westbound platform at Madison
- Use of CTDOT Electric Multiple Unit (EMU) Kawasaki M8s equipment
- CTDOT equipment and train crews based at New Haven for 4 M8 trainsets
- Construction of a "turning track" at High Street Interlocking to allow the eastbound train to wait between assignments and reverse direction off the main NEC tracks.

With these assumptions, the Monday through Friday service for the SLE Extension could include 12 trips a day between New London and Westerly, RI in both the northbound and southbound directions. The trip time between the two could be 24 minutes and 22 minutes, respectively. Although the analysis aimed to maintain the total number of SLE trains and continue to service the current peak period service patterns, it was infeasible given the SLE's extension to Westerly, RI. As such, the analysis resulted in a completely new operating plan with new schedule timings between New London and New Haven. The new plan also includes restoring one morning and evening extension to Stamford, Connecticut.

Exhibit A includes the weekday public schedule format for all the trains stopping in the Study Area.

6.1.2 SLE Shuttle between New London and Westerly, RI (Option 2)

The schedule assumptions for the SLE Shuttle between New London and Westerly, RI include:

- Shuttle train schedules are established around connections at New London with SLE or Amtrak trains as their primary criteria versus serving only a New London market.
- Runs with a single 4-car M8 train set that is swapped out with a similar SLE trainset once per day to send it to New Haven for servicing.
- The train is stored overnight at New Haven to meet FRA 24 hr. inspections and will be positioned each day through a combined non-revenue move with another trainset.
- Two train crews per day from New London. The first covers the AM trains and the second the PM trains.
- New stations at Stonington, Groton West, and new westbound platform at Madison

- Same set of improvements at Westerly / High Street Interlocking as found in Option 1

With these assumptions, the Monday through Friday service for the SLE Shuttle between New London and Westerly, RI could include 8 trips a day in the southbound direction and 7 trips a day in the northbound direction. The trip time between the two could be 22 minutes in either direction. Unlike the SLE Extension service plan, the SLE Shuttle service plan results in less frequent stops at the extension stations due to the over 40-mile roundtrip distance between New London and Westerly, as well as the additional time needed to "turn the train" at either end. This precludes establishing an hourly or more frequent service pattern. Ninety minutes is the approximate minimum cycle time required, assuming the connecting trains run on schedule throughout the day. Although this does not happen on a consistent basis, it is possible to match the same number of frequencies as the SLE Extension by adding another trainset and two additional train crews each day to the SLE Shuttle service. The additional trainset, however, could make operations more challenging at New London due to space constraints. Another option might be a hybrid schedule that extends some SLE trains to Westerly during the peak times while off peak SLE trains continues to originate/terminate at New London. This type of hybrid service plan could be consistent with operations found on the Danbury Line and as proposed for the Waterbury Line. This could provide additional service in a cost-effective manner.

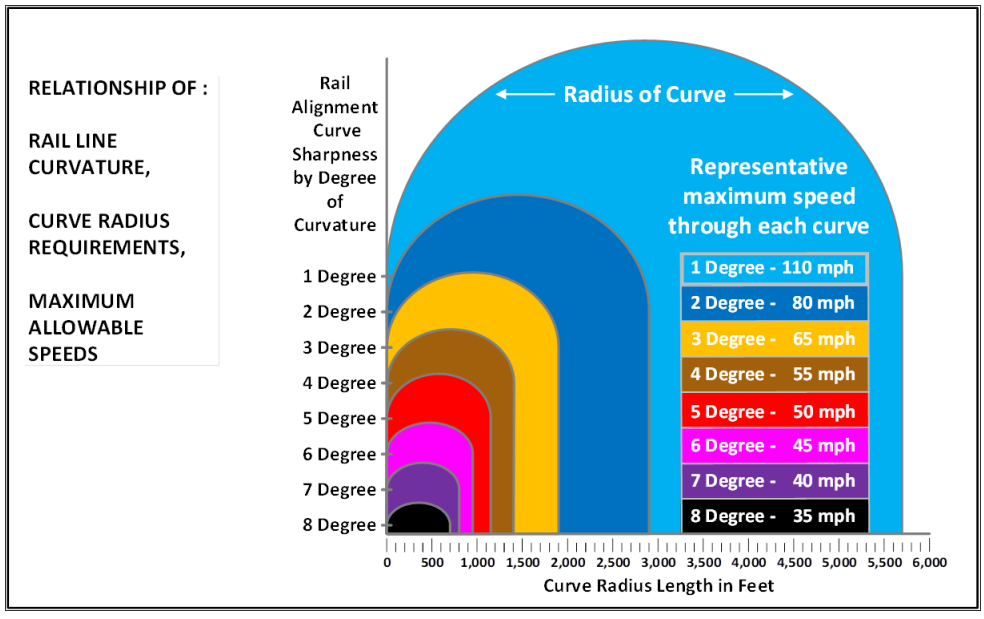
Exhibit A includes the weekday public schedule format for all the trains stopping in the Study Area.

6.2 Palmer Line

Since there is no passenger service currently on the Palmer Line, the first step in the service plan development was to establish an estimate of the train travel times between New London and Norwich. The calculations used to forecast the trip time take into consideration the Palmer Line's track alignment, curvature and other limitations. The Palmer Line follows the pathway of the Thames River with its twists and turns, which impacts the amount of straight track and limits the speeds achievable within this corridor. Figure 10 shows the relationship between the rail line curvature, curve radius, and the maximum allowable speeds for rail service planning purposes. In the 13-mile corridor for the Palmer Line, there are many sharp curves; proportionally, more of the track is located on a curve than straight track.

Based on this analysis, the trip time between New London and Norwich is 42 minutes utilizing the current approved track speeds. However, with track improvements that allow for increased speeds detailed in **Thames River Corridor Assessment (Appendix D)**, the travel time can be reduced to 28 minutes, saving 14 minutes between the two directions. The options below assume that substantial track improvements are implemented, and the trip time of 28 minutes can be achieved.

Figure 10. NEC Territory for SLE Extension



Other aspects of the Palmer Line's existing infrastructure also impact the service plan, notably that the line is single-track. For passenger rail to be feasible, at least one controlled mid-point passing siding is necessary; a second passing siding at New

London and controlled station track at Norwich is also recommended. The sidings and associated signal control systems are included as estimated capital costs, discussed later in Summary and Recommendations: Capital Costs.

To determine which rail service schedule could be the best for this corridor, the analysis considered three options: extending the current SLE service to Norwich; operating a shuttle between New London and Norwich; or a hybrid service plan comprised of those two options.

Exhibit A includes the travel time and speed projections for the Palmer Line between New London and Norwich.

6.2.1 SLE Extension to Norwich (Option 3)

The SLE Extension to Norwich could provide a one-seat ride from passengers from Norwich, Montville, and the USCGA/Connecticut College to all of the SLE stations. The schedule assumptions for the SLE Extension to Norwich include:

- Spring 2023 Amtrak NEC schedule
- Spring 2023 SLE schedule - no changes New London to New Haven except to assume Madison Station westbound platform is in service
- All New London to Norwich trains are new service
- New stations at USCGA/Connecticut College and Montville
- Assumes use of potential CTDOT Dual Mode equipment
- CTDOT equipment and train crews based at New Haven
- Capacity improvements described in the “Corridor Capacity Overview” chapter
- Infrastructure improvements described in the “Infrastructure Assessment” chapter

With these assumptions, the Monday through Friday service for the SLE extension between New London and Norwich could include 12 trips a day in both the southbound and northbound directions. The trip time could be 27 minutes in either direction. The analysis tried to keep the total number of SLE trains the same as well as continuing to service the current peak period service patterns. However, this analysis resulted in a completely new operating plan which is necessary to support extending the SLE to Norwich. The new plan also includes one morning and evening extension to Stamford, Connecticut.

Exhibit A includes the weekday public schedule format for all the trains stopping in the Study Area.

6.2.2 Palmer Line Shuttle between New London and Norwich (Option 4)

The schedule assumptions for the SLE shuttle service between New London and Norwich include:

- Spring 2023 Amtrak NEC schedule
- Spring 2023 SLE schedule - no changes New London to New Haven except to assume Madison Station westbound platform is in service
- All New London to Norwich trains are new service
- New stations at USCGA/Connecticut College and Montville
- Assumes use of potential CTDOT Dual Mode equipment
- Capacity improvements described in the “Corridor Capacity Overview” chapter
- Infrastructure improvements described in the “Infrastructure Assessment” chapter
- Two CTDOT train crews based at New London
- CTDOT equipment and all other train crews based at New Haven

With these assumptions, the Monday through Friday shuttle service between New London and Norwich could include 8 trips per day in the southbound direction and 7 trips per day in the northbound directions. The trip

time could be 27 minutes in either direction. This service plan provides limited travel options between Norwich and New London during both peak periods (Table 5). This option does not achieve service that provides reasonable travel options between New London and Norwich during both peak periods. Due to the distance and curvature of the single-track line between the two stations, one shuttle trainset cannot cycle between the two points quickly enough to provide frequent service. For this reason, the Palmer Line Shuttle was eliminated from further consideration, and subsequent analyses do not include this option.

Table 5. Palmer Line Shuttle Peak Period Frequency

Time Period	Southbound	Northbound
6:00-9:00AM	7:38 Norwich to New London departure	6:35 New London to Norwich departure 8:20 New London to Norwich departure
4:00-7:00PM	5:33 Norwich to New London departure	4:45 New London to Norwich departure 6:31 New London to Norwich departure

Exhibit A includes the weekday public schedule format for all the trains stopping in the Study Area.

6.2.3 Palmer Line Hybrid between New London and Norwich (Option 5)

The schedule assumptions for the Palmer Line shuttle and SLE trip extension hybrid service plan between New London and Norwich include:

- Spring 2023 Amtrak NEC schedule
- Spring 2023 SLE schedule - no changes New London to New Haven except to assume Madison Station westbound platform is in service
- All New London - Norwich shuttle trains are new service
- New stations at USCGA/Connecticut College and Montville
- Assumes use of potential CTDOT Dual Mode equipment
- Two CTDOT train crews based at New London
- CTDOT equipment and all other train crews based at New Haven
- Capacity improvements described in the “Corridor Capacity Overview” chapter
- Infrastructure improvements described in the “Infrastructure Assessment” chapter

With these assumptions, the Monday through Friday service for the hybrid option between New London and Norwich could include 10 trips per day in the southbound direction and 8 trips per day in the northbound direction. The service plan includes 15 shuttles between New London and Norwich and the extension of 3 SLE trains. The trip time could be 27 minutes in either direction.

By originating one morning peak SLE train at Norwich and extending one afternoon peak SLE train to Norwich, hourly service between the two points can be achieved during peak periods. However, extending service on the SLE trains requires suboptimal adjustments to other trains; one reverse peak direction train in both the AM and PM peak periods must be cancelled. To reach Norwich in time to run the peak direction train, the equipment must depart New Haven much earlier than it could otherwise.

Exhibit A includes the weekday public schedule format for all the trains stopping in the Study Area.

Table 6 provides an overview of the service plan for each option.

Table 6. Rail Service Options

Option	Description	Frequency	Trip Time	Operations
1	SLE Extension	12 roundtrips/day (M-F)	NB: 24 mins SB: 22 mins	New operating plan with new schedule timings between New London and New Haven; 1 morning and 1 evening extension to Stamford restored
2	SLE Shuttle	7 NB and 8 SB trips/day (M-F)	22 mins (NB and SB)	Minimum 90-min required cycle time (roundtrip travel time plus time to "turn the train" at either end precludes hourly service)
3	SLE Extension to Norwich	12 roundtrips/day (M-F)	27 mins (NB and SB)	New operating plan; 1 morning and 1 evening extension to Stamford included
4	Palmer Line Shuttle	7 NB and 8 SB trips/day (M-F)	27 mins (NB and SB)	Limited travel options during both peak periods due to distance and infrastructure limitations; option eliminated from further consideration
5	Palmer Line Extension/ Shuttle Hybrid	8 NB and 10 SB trips/day (M-F)	27 mins (NB and SB)	15 trips are shuttles and 3 trips are SLE extension runs; 1 reverse-peak direction train in both the AM and PM must be cancelled to achieve hourly peak service

6.3 Ridership Forecast, VMT Reduction, and GHG Abatement

To further evaluate the rail service plan schedules, 2035 ridership projections were forecasted for the options on the NEC Corridor and the Palmer Line. An interregional travel demand model was utilized for the projections. The model is an adapted version of the NEC FUTURE model. The ridership projections were the result of a multi-step process that included the following:

- First is the Total Demand Model, which models total interregional travel volume by origin-destination (OD) pair on a zonal basis.
- Second is the Mode Choice Model, which predicts the share of intercity passenger travelers expected to use each of the available intercity travel modes using a nested logit specification.
- In addition, both the Total Demand and Mode Choice models are split into three trip purposes (with separate model specifications for each): Business, Non-Business, and Commute. Ridership can be summarized by purpose depending on the need of the project. For this project, all-purpose trips were summarized as the total travel demand.

The model included auto, air, intercity bus, express rail, corridor rail, and regional rail modes of travel. For rail demand, such as the service enhancements identified in this project, the model uses a utility model which examines the access/egress travel times, total travel times, daily frequencies, the presence of integrated bus transit service, and bus transit factor terms to determine the best rail path for each zone pair (OD pair). Lastly, the model included updated demographics by using the 2035 projected population, employment, and income data. Each option's ridership projection used the timetables in **Exhibit A: Options 1-5 Train Schedules**.

Once the ridership projections were calculated, the vehicle miles traveled (VMT) reduction could also be determined. To determine the VMT reduction, the VMT had to be calculated. The VMT is the total of the automobile trips multiplied by the distance between the OD pairs from the ridership analysis. The VMT reduction shows how much the total VMT is lowered by introducing rail service in each of the options as measured against the No-Build scenario.

The emissions reductions from each scenario represent the reduction in VMT with the switch to rail transportation. Reduced vehicle emissions are calculated from Argonne National Lab's Alternative Fuel Life-Cycle Environmental and Economic Transportation (AFLEET) Tool with the vehicles modeled as passenger cars that run on gasoline. The AFLEET model includes emissions from the entire well-to-wheel process, including extraction, refining, storage, transportation, and usage in a vehicle. This well-to-wheel analysis thoroughly evaluates the emissions avoided from the entire chain of reducing VMT. The emissions themselves are split into greenhouse gas emissions and criteria pollutants. Greenhouse gases trap heat in the atmosphere and include emissions of carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O), and results are shown in short tons.

6.3.1 NEC

The VMT reduction for the NEC Corridor options is positively impacted by the highway network in this corridor. Automobile travel utilizes Interstate 95, Route 1, and Route 184 which run parallel to the NEC. By establishing commuter rail service in this area, there will be a new mode of travel available for those who could like to utilize rail to and from their destination. As a result, the ridership projection for Option 1: SLE Extension to Westerly is 159,300 new riders for 2035 (annual boardings and alightings). These new riders equate to a VMT reduction of 25,886,000 miles annually, equal to just over 1,000 trips around the world. By shifting modes from automobile travel to rail travel, these new riders also reduce greenhouse gas emissions by 9,853 short tons per year. The ridership projection for Option 2: SLE Shuttle between New London and Westerly is 127,900 new riders in 2035. The VMT reduction for Option 2 is 25,139,000 miles, resulting in 9,569 short tons of greenhouse gas abatement.

6.3.2 Palmer Line

The 2035 ridership projection for Option 3: SLE Extension to Norwich is 162,800 new riders. This ridership reflects a VMT reduction of 25,836,000 miles and a 9,834 short ton greenhouse gas reduction. For Option 5: Palmer Line Hybrid between New London and Norwich the ridership projections are 126,400 new riders with a VMT reduction of 25,019,400 miles. The resulting greenhouse gas emission reduction is 9,523 short tons. Like the NEC Corridor, the Palmer Line also parallels automobile arteries like Interstate 395 and Route 32. The Palmer Line ridership introduces new markets to rail service as it could be the first introduction of passenger rail to this corridor.

7 Implementation of Rail Service Options

To determine the feasibility of implementing passenger rail service on the NEC and Palmer Line Corridors, service support, systems, and equipment needs must be analyzed. This analysis along with other capital projects will assist in determining the costs estimated with implementing potential rail service. Beyond the preliminary findings of this report, further steps would be needed to advance the project's development, including additional study, planning, permitting, design, and funding.

7.1 Service Support, System, and Equipment Needs Analysis

An assessment of Equipment and System Needs was performed to determine what additional resources are needed to implement the four schedule options, described above, using the rail service timetables published in **Exhibit A: Options 1-5 Train Schedules** as a baseline. This included looking at aspects of service support such as compatible train equipment, deadheading, crew requirements, yard storage space needs, maintenance facilities, and written agreements/coordination.

7.1.1 NEC

7.1.1.1 SLE Extension to Westerly, RI (Option 1)

In this scenario, many SLE trains that currently terminate at New London Union Station could extend their runs to the Westerly Train Station in Rhode Island. Figure 11 illustrates the equipment assigned to each of the four trainsets used for service. The general assessment found the advantages and disadvantages listed in Table 7 for Option 1 in terms of system and equipment needs for the service.

Figure 11. Option 1 Equipment Assessment

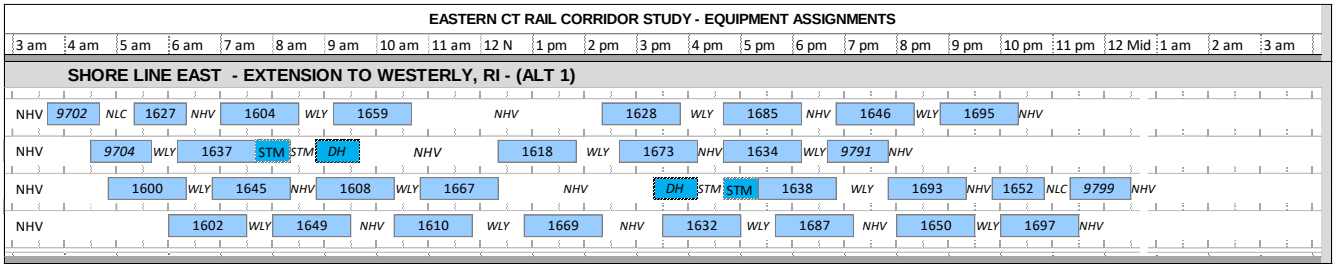


Table 7. Option 1 System and Equipment Advantages and Disadvantages

Advantages	Disadvantages
Eliminates Transfer/Layover Requirements at New London	Adds 40 miles to each round trip. Adds additional train movements over 2 movable bridges increasing reliability risk.
No Additional Deadhead Runs Required compared to current SLE schedule	99% increase in Unit Miles/Hours
1 Additional Train Sets/Cars Required compared to current SLE schedule	Potential Schedule Conflicts Around Moveable Bridge and Service East of Groton
No Yard Space Required nor additional Maintenance Facilities	Schedule Extension might impact Fatigue Models for Crew on Existing Runs
Minimal Modifications to amend existing SLE Operating and Access Agreement	Construction of electrified turnback/layover track in Rhode Island-State of CT investments out-of-state.
	Coordination with RIDOT Required for Cost Sharing and Westerly Station Access
	Low Level Platforms only in Mystic and Westerly
	2 Additional Crew Required compared to current SLE schedule

Option 1 provides the most straight-forward opportunity to begin to phase in additional commuter rail service in eastern Connecticut and Rhode Island with limited additional operating and capital costs. By virtue of expanding existing SLE runs from New London to Westerly, the only additional strain on the existing system could be more unit miles/hours for service between New London and Westerly and a lengthening of crew assignments bringing them closer to Hours-of-Service limitations.

The initial screening shows that there could be moderate resources required to implement this service based on present day conditions. No additional layover requirements are required at New London as a result of trains moving through, which eliminates transfers and/or the need of layover space to turn around train sets at that location.

Currently, there is no electrified layover track in Westerly resulting in trains having to travel approximately 1.6 miles east of Westerly to clear the High Street interlocking, in order to turn signal traffic to come west. Otherwise, trains could have to layover at Westerly Station on the NEC, which may be unacceptable to Amtrak due to safety and scheduling reasons. Thus, the layover track must be electrified and possibly interlocked and signaled for safer and expedited train movements in and out of the siding. Additionally, Westerly station currently has a low-level platform could require construction of a high-level platform to accommodate the M8's high-level boarding and alighting design.

Assuming the layover track at Westerly is electrified, only minor additional space could be needed to store trains there. No additional maintenance facilities for servicing of train sets at New Haven Rail Yard is required. Although there are proposed new stations along the corridor, the current service can operate independent of these stations being installed between Westerly and New London,. Currently Mystic station, like Westerly station, is also only equipped with low-level platforms, and consideration should be given to providing high-level platforms for compliance with the Americans with Disabilities Act (ADA).

Regarding agreements, the SLE operating agreement would have to be amended and an access agreement would have to be reached with Amtrak to operate over the additional miles of track. An agreement with the Rhode Island Department of Transportation (RIDOT) would also have to be negotiated on cost sharing for access to Westerly Train Station with CT*rail* operations providing train service to Rhode Island residents. However, since the New London to Westerly corridor operates on the same operating rules to the existing SLE, training for crews would be focused on qualifying over the physical territory. Additionally, the Thames River Moveable Bridge remains open throughout the day and only closes when trains pass through. The bridge is controlled by the US Coast Guard, and the introduction of additional runs could require coordination that could impact scheduling of this extended service.

7.1.1.2 SLE Shuttle between New London and Westerly, RI (Option 2)

In this scenario, the proposed service could operate with Electric Multiple Unit (EMU) M8s as an independent shuttle service from the SLE service. In this model, two train sets (Trains 1 and 2) could continue to operate the base SLE schedule, while two other train sets (Trains 3 and 4) could interline or continue to operate the base SLE schedule and the segment between New London and Westerly, establishing an equipment rotation through New Haven. Train Set 3 could serve the base SLE schedule in the morning, and layover in New London midday before serving 8 afternoon trips, mostly between New London and Westerly. Train Set 4 could operate in reverse of Train Set 3, operating 7 morning trips between New London and Westerly, returning to New Haven for layover, servicing, and to swap crews out, and running a base SLE schedule in the afternoon between New Haven and New London. This train could return to New Haven at the conclusion of its day's assignments. Figure 12 illustrates the equipment assigned to each of the trainsets used for service. The general assessment found the advantages and disadvantages listed in Table 8 for Option 2.

Figure 12. Option 2 Equipment Assessment

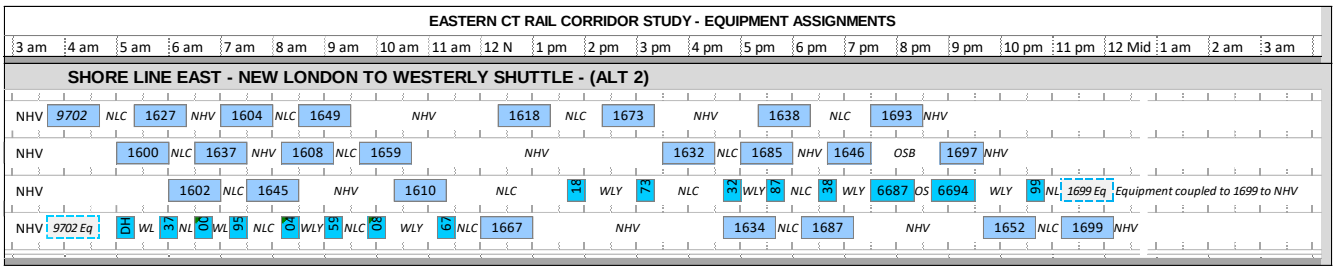


Table 8. Option 2 System and Equipment Advantages and Disadvantages

Advantages	Disadvantages
Reduced increment in Unit Miles compared to Alt #1 – 27% increment vs. Base Service	Turning on NEC track or congested Track 6 at NLS
Manages expansion of train crew resources through establishment of New London crew base	Single shuttle consist cannot provide optimal connections to all trains at NLS
Can Utilize either Diesel/Dual Mode Push/Pull Locomotives or M8s	Isolated crew base could be hard to maintain needed staff levels
Provides reliable source of seats for local market	Need to rotate shuttle equipment through New Haven to receive FRA-required 24-hr certification
	Necessary running times help contribute to sub optimal schedule connections
	Yard Space near New London Required
	Low Level Platforms only in Mystic and Westerly

Like Option 1, Option 2 provides the opportunity to begin to phase in additional new commuter rail service in eastern Connecticut and Rhode Island with lower estimated operating costs compared to Option 1. This option has an advantage over Option 1 in the ability to provide more flexibility with scheduling service between New London and Westerly, particularly in scheduling around Amtrak's existing Northeast Regional and Acela service and the Thames River Moveable Bridge. Similar to Option 1, this option would require that the SLE operating agreement be amended, and an access agreement would have to be reached with Amtrak to operate over the additional miles of track. An agreement with RIDOT would also have to be negotiated.

The main challenge with Option 2 is the less optimal connections, travel times, and arrival times to key markets due to operating as a shuttle and not a direct extension. There are also major challenges with turning on the NEC, particularly at Westerly, with no identifiable siding to turn EMU equipment. The current model assumes that vehicles can also layover at New London and Westerly, with no return to New Haven. However, layovers at New London could have to be on the NEC track, which Amtrak could likely not accept, thereby requiring a layover facility to be developed. While there is a layover track in Westerly, it could have to be electrified to use M8's in this option.

This scenario is also further complicated by the need to efficiently move the shuttle equipment to New Haven for servicing and inspections by certified employees on a 24-hour cycle to remain in compliance with FRA regulations. To properly accommodate laying over and servicing equipment, yard space should be developed at an intermediate location between New London and Westerly.

7.1.2 Palmer Line

7.1.2.1 SLE Extension to Norwich, CT (Option 3)

In this scenario, the majority of SLE trains that currently terminate at New London Station could extend their runs to the proposed Norwich Station across from the Norwich Transportation Center via the Palmer Line. Figure 13 illustrates the equipment needs for each trainset used for service. The general assessment found the advantages and disadvantages listed in Table 9 for Option 3.

Figure 13. Palmer Line

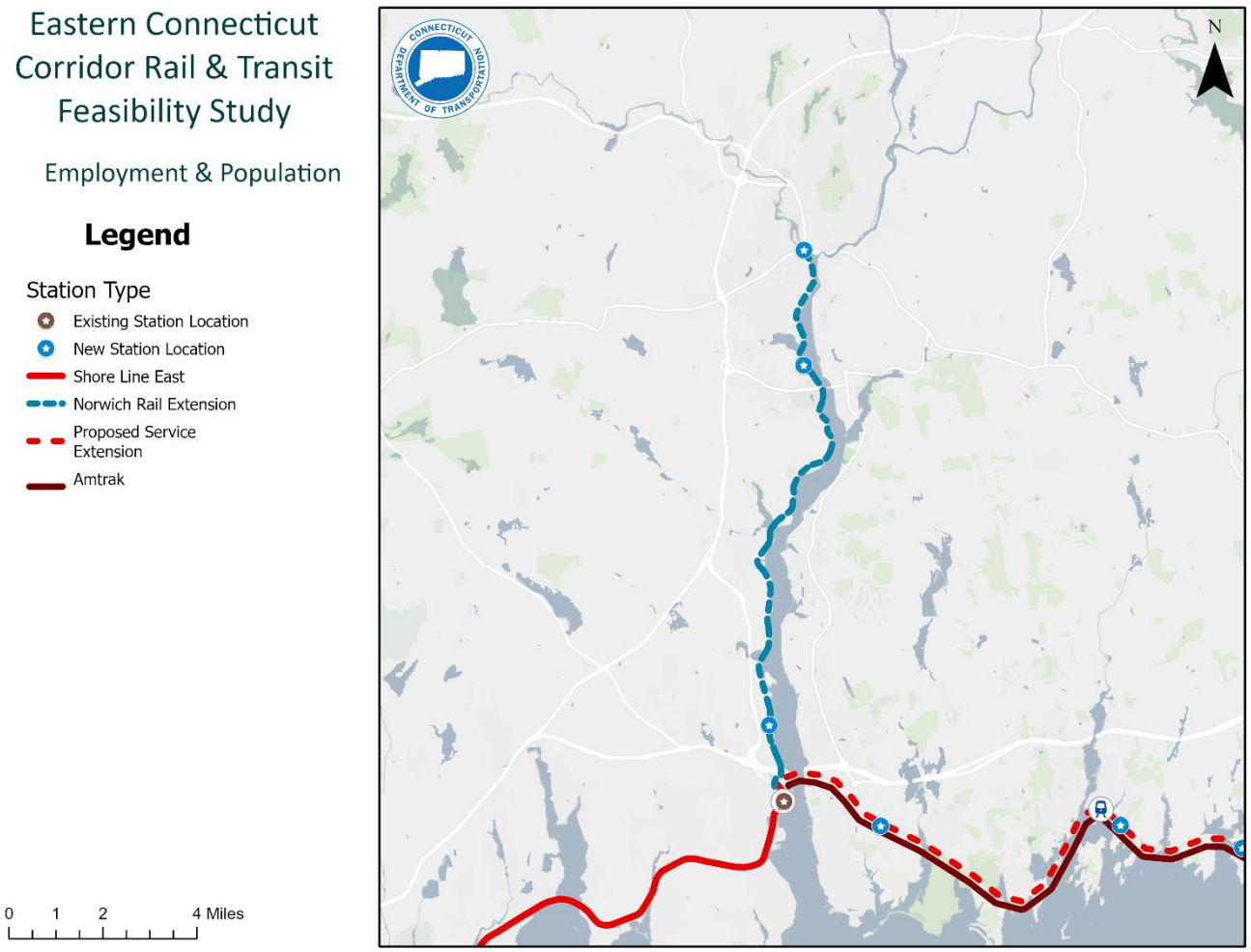


Figure 14. Option 3 Equipment Assessment

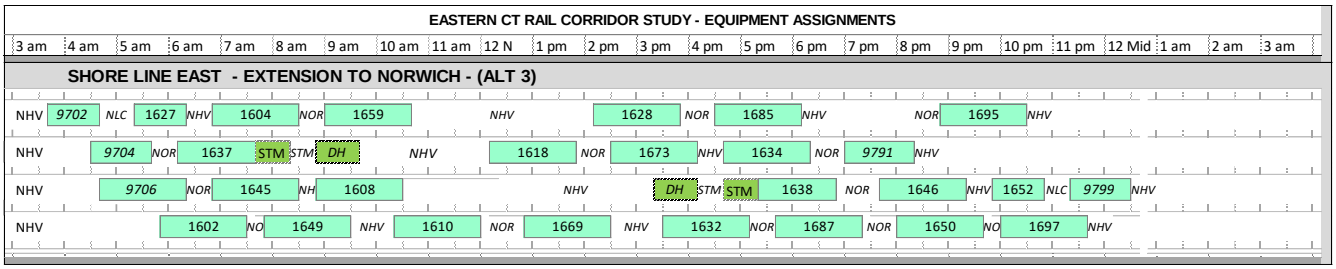


Table 9. Option 3 System and Equipment Advantages and Disadvantages

Advantages	Disadvantages
Eliminates Transfer/Layover Requirements at New London	Adds 26 miles to each round trip. Adds multiple train movements over 13 miles of single-track increasing reliability risk. Turning on Palmer Line / New London
Keeps majority of SLE frequencies intact – provides enhanced SLE service in midday and evenings.	Requires Capital Upgrades to Norwich Branch, including Passenger Stations. 106% increase in Unit Mile / Hours compared to Base

Advantages	Disadvantages
Moderate increase in train crew requirements.	Longer extended runs might impact Fatigue Models for Crews
Only One additional Train Set/Cars required	Requires all SLE trains to run Dual Mode Equipment
No additional Yard Space required nor additional Maintenance Facilities	Construction and use of three passing sidings on Palmer Line. Coordinating movements with existing freight operation. Development of operating and access agreements for operation over G&W line.
Cycling all Trainsets in for servicing (Running revenue service back to New Haven)	Dual Mode Sets to Run on SLE Corridor
No Moveable Bridge Impacts	Qualify Crews for Palmer Line Territory

Option 3 could provide a convenient, all-day service from Norwich to New London and SLE stations. It offers an enhanced service plan on the SLE in the midday and evening periods. It requires conversion of all SLE equipment to operate with Dual Mode locomotives and push-pull coaches and cab cars. In addition, because the line is an active freight line, the passenger service would require coordinating movements with G&W to ensure that freight movements do not interfere with passenger train movements or vice-versa.

As discussed in the existing conditions, any proposed service cannot operate without addressing the required capital needs as documented for the Palmer Line, including a comprehensive upgrading of the track infrastructure, construction of three passing sidings, bridges, and communication and train control systems including Positive Train Control. In addition, since there are no existing passenger stations along the Palmer Line, stations would have to be fully built out before introducing passenger service along this line. The three operational passing sidings could be located at the Norwich Terminal, at the Uncasville area for a mid-route passing siding , and just north of New London to support turning with minimal disruption to NEC rail traffic and Palmer Line traffic. Improvements to the tracks leading into G&W's yard / port facilities at New London could be incorporated into the passing siding project at New London.

While there are many challenges associated with getting this service to operate, there are some systemwide benefits to this service proposal. Similar to Option 1, the establishment of service passing through New London eliminates transfers and layover requirements at New London, which currently has two tracks on the NEC and Track 6 that leads to the Palmer Line. By virtue of not operating east of the Thames River, there is no schedule coordination required with Amtrak for operations after New London station, although there could be passenger connection issues with southbound Amtrak trains at New London if trains are running out of schedule on the Palmer Line (an inherent problem for any connecting service).

Access, performance, and compensatory agreements will need to be entered into between CTDOT and G&W for passenger train operations on the Norwich to New London section of the Palmer Line. G&W has significant experience with passenger train operations on other lines in its national network. It is assumed similarly structured agreements can be reached for operations between Norwich and New London.

7.1.2.2 Palmer Line Hybrid between New London and Norwich, CT (Option 5)

In this scenario, the proposed extension could operate as a hybrid approach consisting of a limited number of through trips from New Haven to Norwich complemented by a New London to Norwich shuttle service coordinated with SLE trains. Like Option 3, all train sets could be converted to Dual Mode equipment to support operations on the Palmer Line and for operational flexibility. Two train sets could continue to operate the base SLE schedule. The other two train sets could operate in a combined Shore Line / Palmer Line service as: a) a New Haven to New London SLE train, b) a through train past New London to Norwich, or c) a New London to Norwich shuttle service. As with Option 2, the shuttle equipment could be moved and coupled to another train between

New Haven and New London at the very beginning and very end of each day which is not recommended and could require yard space.

The resultant service could achieve the peak period peak direction service and frequency goals established for the study, yet with a less extended and more reliable operation. Additionally, Option 5 results in only a small increment in Unit Miles / Unit Hours and has substantial estimated operating cost savings.

Figure 15 illustrates the equipment assigned to each trainset used for service. The general assessment found the Advantages and Disadvantages listed in Table 10 for Option 5.

Figure 15. Option 5 Equipment Assignments

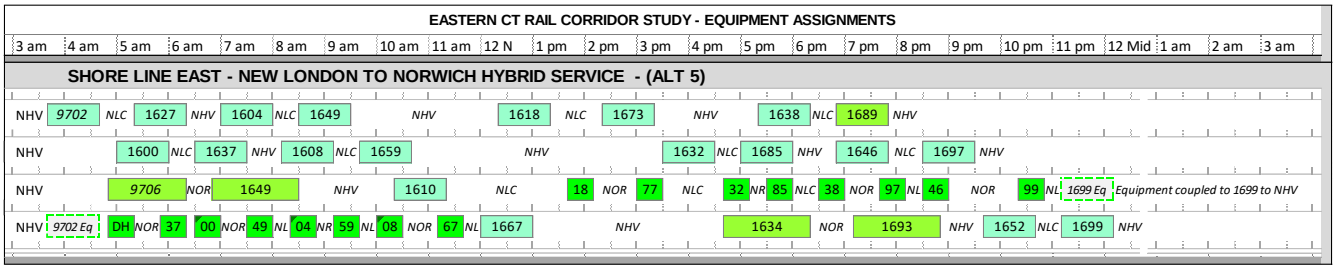


Table 10. Option 5 System and Equipment Advantages and Disadvantages

Advantages	Disadvantages
Track 6 - for Layover Space (Servicing if Apron Installed)	Turning on Palmer Line for extended through and shuttle trains. Coordination of freight and passenger train movements NLS-NOR
Less schedule reliability risk for New London to New Haven SLE service	More schedule reliability risk with missed passenger connections at New London. Sub-optimal schedule connections due to shuttle operation.
Cycling of all trainsets for servicing and certified inspections at New Haven	Dual Mode sets on SLE Corridor. Cycling of shuttle trainsets requires less common practice of coupling two trains together.
Hybrid concept provides operating efficiencies with only moderate impact to current SLE service. 26% increase in Unit Miles / Unit Hours vs. Base	Eliminates one reverse peak direction roundtrip (converted to deadhead)
Small crew base at New London provides maximum shuttle train coverage within Hours-of-Service regulations	Isolated crew base location could provide staffing difficulties with New Haven Extra Board
No Moveable Bridge Impacts	Qualify Crews for Palmer Line Territory
	Requires Capital Upgrades to Norwich Branch, including Passenger Stations.
	Construction and use of three passing sidings on Palmer Line. Coordinating movements with existing freight operation. Development of operating and access agreements for operation over G&W line.

Option 5 provides service flexibility, estimated greater reliability compared to a straight SLE extension to Norwich and can accomplish it with lower estimated costs. Because only two through round trips are scheduled, Option 5 has less complexity in coordinating operations north and south of New London. Similar to Option 3, the service

requires the completion of all outlined capital improvements required for the corridor, including the identified passenger stations and the passing sidings.

A challenge identified in Option 5 not seen in Option 3 is the layover requirements at both New London and Norwich stations. As mentioned in Option 2, laying over in these locations is technically feasible, however trains do need servicing and it is standard practice to service and clean cars every three to four round trips, which is in line with the proposed shuttle run schedule operated by trainsets 3 and 4.

Efforts could be taken to support servicing, although this is not ideal due to G&W's freight operations on this track. One example could be infrastructure investments like aprons on Track 6 at New London station. Ongoing coordination would be required between passenger and freight service to prevent conflicting operations. These challenges could be mitigated by introducing a yard space at an intermediate location between New London and Norwich.

As with Option 3, coordination of train movements with G&W between New London and Norwich stations will be a critical element to running a successful service. Daily cycling of the shuttle train equipment through the New Haven maintenance base and staffing a small crew base at New London could pose challenges, but both are believed to be feasible.

7.2 Summary and Strategy Overview

There are unique advantages and disadvantages for each proposed schedule option regarding equipment needs, system needs, layover/servicing, and evaluation of deadhead versus yard space. These findings are preliminary in nature and would require funding, additional study, design, and permitting to pursue.

7.2.1 NEC Summary

Table 11 summarizes the NEC Options for side-by-side comparison.

Table 11. NEC Options System and Equipment Summary

	Option 1	Option 2
Equipment Compatibility	EMU or Push Pull 1 Additional Trainset	EMU or Push Pull 1 Additional Trainset
Additional Crew Needs	Yes 2 Additional Crews	Yes 4 Additional Crews
Layover Locations	Westerly / New Haven	Westerly / New London / New Haven
Servicing	New Haven	New Haven
Deadhead vs Yard Space	Deadhead	Yardspace
Proposed Maintenance Facilities (MOE/MOW)	NHRY	NHRY
Major System Start Up Requirements	New / Relocated stations, Electrify Layover Track, Access Agreements (Amtrak/RIDOT), Crew / Supervisory Qualifications	New / Relocated stations, Electrify Layover Tracks, NLS Crew Base Facilities, Access Agreements (Amtrak/RIDOT), Crew / Supervisory Qualifications

The general assessment found that the M8s currently used for SLE service could continue to be used in Options 1 or 2. All options require one additional trainset and either two or four additional train crews to meet the proposed weekday schedules. These were considered reasonable increments to extend the services.

All options continue to rely on the large maintenance base at New Haven for rail equipment servicing and inspections. All train crews are assumed to be based out of New Haven as well, except for a very small proposed crew base at New London to staff the shuttles (one AM crew, one PM crew). With some moderate changes to the proposed schedules, this small base can be eliminated if the shuttle crews are based at New Haven. While only developed at a conceptual level, the train crew assignments were designed to conform with federally specified Hours-of-Service regulations. More detailed analysis beyond the scope of this study is required to fully establish their acceptability. Lastly, while not tested, a hybrid option between New London and Westerly may offer some of the same service and cost benefits found with the New London to Norwich Option 5. Further studies would be required to consider it for more detailed analysis.

Regarding major system start up requirements, Options 1 and 2 have fewer capital and administrative requirements than Options 3 and 5, mainly only requiring construction of a turning track at Westerly (High Street Interlocking), amending the current SLE operating agreements with Amtrak to use track between New London and Westerly, and entering into agreements with RIDOT for cost sharing. Crews are already familiar with the NEC Operating Rules and could only need to extend their physical characteristic qualifications to operate along the extended territory. Most of CTDOT's vehicle fleet, including the M8s have gone through acceptance testing on the corridor due to operating the current SLE service.

It should be noted that this service can be implemented with or without the proposed station locations at Stonington, Mystic, and Groton being built, as the line is already functional with the Northeast Regional and Acela making stops at New London, the existing Mystic station, and Westerly.

7.2.2 Palmer Line Summary

Table 12 summarizes the Palmer Line Options for side-by-side comparison.

Table 12. Palmer Line Options System and Equipment Summary

	Option 3	Option 5
Equipment Compatibility	Push Pull Only 1 Additional Trainset	Push Pull Only 1 Additional Trainset
Additional Crew Needs	Yes 2 Additional Crews	Yes 4 Additional Crews
Layover Locations	Norwich / New Haven	Norwich / New London / New Haven
Servicing	New Haven	New Haven
Deadhead vs Yard Space	Deadhead	Either
Proposed Maintenance Facilities (MOE/MOW)	NHRY	NHRY
Major System Start Up Requirements	Comprehensive Corridor Upgrades, Access Agreements (G&W), Crew / Supervisor Qualifications	Comprehensive Corridor Upgrades, NLS Crew Base Facilities, Access Agreements (G&W), Crew / Supervisory Qualification of Territory

The general assessment found that Options 3 and 5 with service to Norwich could require Diesel or Dual Mode Locomotives (preferred). When assessing crew needs, it was determined that Option 3 could require two additional crews, and Option 5 could require four additional crews due to trains not being able to return to New Haven. These were considered reasonable increments to extend the services.

As discussed, all options continue to rely on the large maintenance base at New Haven for rail equipment servicing and inspections, and all train crews are assumed to be based out of New Haven, except for a small proposed crew base at New London to staff the shuttles (one AM crew, one PM crew).

Options 3 and 5 with service to Norwich require the completion of all the prescribed capital upgrades noted in the plan to safely operate passenger rail. This includes all infrastructure upgrades, construction of new stations, and freight coordination. Crews would need to be fully qualified on G&W operating rules and all physical characteristics to operate on the territory.

7.2.3 Yard Requirements and Estimated Cost Analysis

Considerations of yard space for this rail plan require both a cost/benefit analysis and a needs assessment to understand what parameters are to be considered in identifying requirements for location and design. At this time, no potential yard space has been formally identified nor committed to in the proposed service area. It is expected that for any service on either the Palmer Line or the Westerly expansion, an ideal yard location is somewhere between New London and Westerly, preferably closer to New London.

The annual estimated cost of deadheading the existing SLE service is approximately $2 million per year when taking into consideration fuel/propulsion, labor, and indirect equipment maintenance costs from approximately 40,000 deadhead miles per year. Options 1 and 3 could require two additional crew sets, while Options 2 and 5 could likely require four additional crew sets to support the proposed model during weekday service. A new crew set could likely be an additional 3-hour shift for two individuals, which translates to an estimated additional $300,000 a year.

Given these values, a yard space could in effect be able to provide a net estimated operating savings of approximately $3 million annually when factoring in any additional deadhead costs from the new service, compared to an estimated $75 Million of capital expenditures for an additional yard space, depending on design parameters[12]. Assuming these parameters, the financial breakeven point is approximately 25 years.

The analysis found that in Options 1 and 3, an additional yard either in New London, near Norwich, or near Westerly was not necessary, assuming the layover track in Westerly is electrified. This could be necessary since all trains in both options return to New Haven multiple times a day, and the New Haven Rail Yard currently has the capacity to support servicing these vehicles in between return and departing trips out of New Haven.

Amtrak also currently has a Maintenance of Way (MOW) facility in Groton that services the entire corridor from New Haven to Westerly, and an additional Maintenance of Equipment (MOE) facility may not provide any cost benefit compared to utilizing the current facilities in New Haven. If service were to operate along the Palmer Line, MOW could be part of the access agreement with G&W.

In Option 2, a secondary yard space could likely be required, as there is no current electrified layover track in New London and trainsets could have to layover on the NEC track to support this model. Amtrak as the Right of Way (ROW) owner could likely be unfavorable towards this NEC layover for safety reasons.

Option 5 could potentially be feasible without a secondary yard, as the model assumes passing sidings are already in place both at the Norwich Terminal and just north of New London. However, if a yard space were to be developed near New London station, layovers at New London could instead occur in that proposed yard space.

Given the proposed schedules and servicing requirements, trains in both Options 2 and 5 should be able to operate the proposed scheduled runs without needing servicing in the middle of scheduled blocks. However, the introduction of a yard space in the proposed service area could support mid-block train cleaning/servicing if needed to offer more flexibility in servicing requirements.

[12] STV Estimate, 2023.

7.2.4 Most Viable Options

There are clear options that are most viable for each of the corridors based on the preliminary service schedules developed, the combined forecasted ridership increase, VMT reduction, and GHG abatement, and system and equipment needs. The most viable options identified are Option 1: SLE Extension to Westerly, RI and Option 5: Palmer Line Hybrid between New London and Norwich. Each most viable option has clear benefits as a proposed long term public transportation solution in the region.

7.2.4.1 Option 1: SLE Extension to Westerly, RI

The SLE Extension to Westerly, Rhode Island is the most viable option because it reduces the issue of congestion and train storage needs in New London. While only one extension of the SLE service (to Westerly or to Norwich) can be proposed, the extension to Westerly will provide the most benefit to the train passenger by maintaining the SLE service frequency and drawing greater ridership throughout the peak and non-peak hours. This extension allows service to remain on the Northeast Corridor, makes a seamless extension to Westerly. To implement the full service, the infrastructure needs discussed in the next section would have to be addressed at the existing and future stations.

7.2.4.2 Option 5: Palmer Line Hybrid between New London and Norwich

With the SLE Extension to Westerly, the hybrid service schedule between New London and Norwich is the most viable option for the Palmer Line. Even though all options are challenged by the infrastructure needs and geometry of the corridor, this option achieved the most uniform hourly service between New London and Norwich in both peak periods.

7.2.5 Implementation Phases

Based on the suggested service plans the following phased-in approach to implementation may be the most feasible strategy. This type of phased service implementation has been successful in the start-up of the *CTrail* branded Shore Line East and Hartford Line services, and it is a cost-effective method that optimizes use of required capital funds.

7.2.5.1 Phase One (Short Term)

Phase One could entail extending the existing SLE M8 service to Westerly following the Option 1 service plan. No additional equipment could be needed, and the trains could continue to be stored and serviced in New Haven. However, the storage track at Westerly requires electrification prior to service implementation. The existing Mystic Station could continue to be used as an intermediate stop between New London and Westerly. This phase could operate using Option 1 while the proposed new station sites are acquired and built.

The proposed stations along this corridor should construct parking and install an appropriately sized high-level platform, based on the current four-car M8 train configuration (approximately 300 feet). Capital costs for this phase could be limited to the stations and electrifying the track at the Westerly Station. Amendments to the SLE operating and access agreement with Amtrak and the implementation of agreements with RIDOT addressing cost sharing and using Westerly station could also be required in phase one.

7.2.5.2 Phase Two (Mid Term)

Phase Two could involve upgrading the tracks, building the required passing sidings on the Palmer Line, and purchasing the new station sites between New London and Norwich. The stations sites should include both parking and platforms to support boarding locomotive hauled coaches. Service could be a shuttle service between Norwich and New London with diesel-hauled equipment out of New Haven, utilizing the Option 4

approach, with service connecting with SLE trains at New London. Trains could layover at the new passing siding locations at both the Norwich and New London terminals. Agreements would be needed for access to the freight line and for an operator.

7.2.5.3 Phase Three (Long Term)

Phase Three could be implemented when dual mode locomotives become available and accepted to operate on the Palmer Line to support running through trains between New Haven and Norwich, utilizing the Option 3 approach. At this time, it could be optimal to consider developing a yard space in the New London area. Once the yard is developed, service along the Westerly extension could revert to a shuttle utilizing Option 2 if desired.

7.3 Estimated Capital and Operating Costs

The implementation of ECRTS and rail improvements will incur capital expenses and additional annual expenses resulting from infrastructure upgrades, equipment and system procurement needs, and greater operating costs to cover extended trips. The increase in both capital and operating expenses can be incurred in phases, as previously laid out in the phased implementation plan. These improvements are currently unfunded.

Generally, federal funding for rail is provided in two forms: federal apportionments and federal grants, which include loans and loan guarantees. The Federal Transit Administration (FTA) and the administers annual formula grants to public transportation agencies nationwide. FTA and Federal Railroad Administration also administer discretionary grants, which are awarded to recipients based on eligibility and merit. These funds support regional, state and local public transportation systems.

CT*rail* receives funding through Connecticut's Special Transportation Fund (STF). The STF is a state-appropriated fund that finances most of the state capital and operating dollars that CTDOT receives each year. The predominant source of STF revenues comes from state motor fuel taxes, including gas tax, diesel tax, motor carrier tax, and the petroleum products gross earnings tax. Other STF revenues include general sales and use taxes, motor vehicle sales taxes and receipts, licenses, permits and fees, interest income, and other sources. The STF funds state transportation programs that receive revenues from transportation-related taxes, fees, and revenues, as well as from the proceeds of STO Bonds. The STF pays the debt service cost for state bonds issued as a means of providing funds for the state's share of transportation projects; supports a small program of Pay-As-You-Go activities; and finances the capital projects, operations, and services of CTDOT.

Another federal funding mechanism, the Bipartisan Infrastructure Law, was signed into law by President Biden on November 15, 2021. By authorizing $1.2 trillion in total funding over 10 years (including $550 billion in new spending during FY 2021-FY 2025), it constitutes a substantial investment in intermodal transportation and other core infrastructure in the United States. Of the $550 billion in new spending, $284 billion is dedicated to improving the surface transportation network[13], including $103.5 billion dedicated to public transit (bus and rail) projects[14].

[13] McKinsey and Company. 2021. "The US Bipartisan Infrastructure Law: Breaking it down." November 12, 2021. https://www.mckinsey.com/industries/public-sector/our-insights/the-us-bipartisan-infrastructure-law-breaking-it-down

[14] FTA. U.S. Department of Transportation Announces Key Priorities, Funding for Public Transportation Under the Bipartisan Infrastructure Law. 2021. U.S. Department of Transportation Announces Key Priorities, Funding for Public Transportation Under the Bipartisan Infrastructure Law | FTA (dot.gov)

7.3.1 Estimated Capital Improvements Cost

Significant infrastructure improvements, including the addition of six new stations, would be required to support the service outlined in Options 1 and 5.

7.3.1.1 NEC

The NEC already hosts passenger rail service along the corridor, so the capital improvements needed to extend SLE to Westerly, RI are minimal as compared to establishing passenger rail service along the Palmer Line. Capital improvements needed for service extension along the NEC are outlined in Table 13. The preliminary cost estimate for this capital investment is $243 million (2023 dollars). Additional detail regarding capital expenditures can be found in **Exhibit B: Exhibit B: Capital** Costs for **Most Viable Options**.

Table 13. Capital Cost Estimate for SLE Extension along the NEC[15]

Component	Description	Quantity	Unit	Unit Price Estimate (M)	Total Price Estimate (M)
New Stations	Groton West, Mystic Alternative, Stonington Borough	3	EA	$52.0	$156.0
High-Level Boarding Platforms	Westerly Station, Madison Station	2	EA	$16.0	$32.0
Electrifying Storage Rail	Westerly Station – assumes poles are needed	1	EA	$2.8	$2.8
Upgrading Track	Groton, MP124 to MP128, includes electrification	1	EA	$33.9	$33.9
Turning Track	High St. Interlocking	1	EA	$0.4	$0.4
M8 Trainset	4-Car	1	EA	$18.1	$18.1
				Total Cost:	**$243.2**

7.3.1.2 Palmer Line

The Palmer Line currently operates limited freight service and requires extensive capital investment to establish passenger service on this rail line. The major capital improvements required are:

- Upgrading the running rails from 100/115RE to 132, 133, or 136,
- Upgrading railroad ties to concrete,
- Checking ballast/sub-ballast for drainage deficiencies,
- Upgrading Passive Grade Crossing Systems to Active with appropriate protection systems in place,
- Installing Positive Train Control,
- Installing passing siding for passenger trains at New London off the NEC and clear of all yard operations,
- Installing Long Lead Track or Double Track approaching the New London Yard port facilities and/or other industrial sides as needed,
- Installing mid-point passing track between New London and Norwich,

[15] This is a static cost estimate. If this strategy moves forward updated cost estimates will be needed that take into account current market conditions.

- Installing passing siding at Norwich for freight trains, north of the passenger station, or double track approaching the Norwich passenger station,
- Constructing three passenger rail stations (Connecticut College/US Coast Guard Academy, Mohegan Sun, and Norwich Intermodal Center),
- Constructing yard space, and
- Procuring an additional 4-car trainset.

As shown in Table 14, the preliminary cost estimate for the capital upgrades needed on the Palmer Line is $636 million (2023 dollars) to operate as FRA Class 4. Additional detail regarding capital expenditures can be found in **Exhibit B: Exhibit B: Capital** Costs for **Most Viable Options**.

Table 14. Capital Costs Estimate for Passenger Rail Service along the Palmer Line[16]

Component	Description	Quantity	Unit	Unit Price Estimate (M)	Total Price Estimate (M)
Corridor Improvements	Ballast, Structures, ROW, Track, Grade Crossings, PTC	1	EA	$388.7	$388.7
New Stations	Connecticut College/US Coast Guard Academy, Mohegan Sun, Norwich Intermodal Center	3	EA	$52.0	$156.0
Yard Space	New London	1	EA	$75.0	$75.0
Trainset	GP40 Diesel	1	EA	$16.0	$16.0
				Total Cost:	**$635.7**

7.3.2 Operating Cost Estimate

Extending passenger rail service along the NEC and Palmer Line incurs additional operating costs beyond current SLE operations (Table 15). Implementing Option 1 increases operating costs by an estimated $104,000 per weekday, approximately doubling the current operating expenses. In comparison, Option 5 results in modest operating cost increases – an additional estimated $28,000 per weekday.

Table 15. Estimated Operating Costs for Preferred Options[17]

Option	Description	Cost per Train Mile*	Train Miles Per Weekday	Cost per Weekday (2023 dollars)	Annualized Cost for Weekdays (2023 dollars Rounded)
Baseline	SLE Schedule (as of June 2023)	$98	1,114	$109,000	$26,200,000
Option 1	Extension to Westerly, RI	$98	2,176	$213,000	$51,200,000
Option 5	New London to Norwich Hybrid Service	$98/$124	1,074/260	$137,000	$33,000,000

**$98 per Train Mile along Shore Line / $124 per Train Mile along Norwich Branch*

[16] This is a static cost estimate. If this strategy moves forward updated cost estimates will be needed that take into account current market conditions.
[17] This is a static cost estimate. If this strategy moves forward updated cost estimates will be needed that take into account current market conditions.

The estimated operating expense was determined by identifying an expense per train mile, and then multiplying by the number of forecasted train miles per service day to determine an operating cost per weekday. It was identified that the cost to operate Shore Line East is currently about $98 per train mile and was assumed that any service operating along the NEC to Westerly could continue to cost around that same threshold.

In regard to the Norwich Branch, it was determined that the territory is most reflective of service provided along the Waterbury Branch operated by Metro North Railroad, which is a single-track territory utilizing Diesel Train equipment. The operating expense per train mile for the Waterbury Branch is currently about $124 per train mile, and thus it is assumed that the cost to operate service on the Norwich Branch could be approximately the same.

In both Options 3 and 5, only a portion of the service could occur along the Norwich Branch, and the remainder occurs along the NEC. Therefore, the forecasted operating expense per day is a composite of the number of train miles along the NEC at $98 per mile, in addition to the number of train miles along the Norwich Branch at $124 per mile.

7.4 Forecasted Revenue

The most viable options – extending SLE service to Westerly along the NEC and using a hybrid shuttle-extension along the Thames River Corridor Palmer Line– result in a collective 285,700 new trips and $2.42M in additional Year of Expenditure (YOE) revenue for 2035. Revenue was forecasted using existing SLE fare tables and anticipated ridership growth, described below.

The SLE's proposed Fall 2023 fare increase for one-way tickets was used to forecast the additional revenue associated with the implementation of Option 1. Because SLE service currently terminates in New London, existing fare tables do not include the proposed Groton West, Mystic (Alternative), Downtown Stonington, and Westerly stations. In the existing fare structure, the length of a trip corresponds to the cost of a ticket. The distance-to-fare ratio was used to estimate the fares for travel to the proposed stations from existing stations along the SLE, assuming a one-way ticket. The average fare ($7.50) was then multiplied by the additional ridership modeled in Option 1 to determine the revenue forecast. The revenue forecast for 2035 – the estimated year of passenger rail implementation – is presented in YOE dollars, which include an annual inflation of three percent.

A similar method was used to forecast the additional revenue associated with passenger rail service implementation on the Palmer Line. A minimum base fare of $3.50 was used to establish the cost of trips relative to distance from station to station, with a maximum fare of $5.00. Average fare of travel between stations on the Palmer Line ($4.00) was multiplied by anticipated ridership to determine the revenue forecast for 2035, which is presented in YOE dollars.

Fare tables for Option 1 and Option 5 are included in **Exhibit C: Revenue Forecasting Fare Tables**.

8 Connections to Transit Service Plan

The Rail Service Plan and the Transit Service Plan work in tandem to address additional connections between points of orientation and destinations. The routing and schedule strategies to improve mobility detailed in the Transit Service Plan were developed with the goal of extending the regional public transportation network by facilitating transfers between rail and bus services. To prevent the duplication of services and to serve newly opened stations, these strategies include schedule and route modifications for the short- and the long-term. Short-term strategies, which could be implemented by or before 2028, can enhance mobility regardless of potential passenger rail implementation. Long-term strategies, assumed to be implemented in 2035 for modeling purposes, are geared towards enhancing connections in tandem with implementing passenger rail service. Additionally, all bus routes are recommended to have schedules that ensure favorable bus-rail connections. Table 16 highlights features from the Transit Service Plan that coordinate with the strategies outlined in this rail service plan.

Table 16. Bus and Passenger Rail Coordination

Bus Route	Route Alignment	Rail Connection	Coordination with Passenger Rail Changes
Route 1	• Local route operates on Old Norwich Rd and Route 32 between New London and Norwich • New Express route bypasses Old Norwich Rd and follows Route 32 with 7 total stops	SLE extension at New London Union Station and Palmer Line	• Pre-rail: local and express routes offset their departures to create 30-minute service frequency • Post-rail: express route is terminated; local route departure times are offset with rail service to continue 30-minute service frequency between both modes
Route 32 (Mystic)	• Seasonal shuttle providing service between the Mystic Aquarium and Mystic rail station	SLE extension at Mystic Station	• Pre-rail: route travels south down Denison Ave to terminate at the current Mystic Station (2 Roosevelt Ave) • Post-rail: route travels south down Broadway Ave and turns left onto Williams Ave to terminate at the new Mystic Station (Masons Island Rd); service levels remain the same
Route 2/ Route 85	• Route 2 service between Norwich and Groton Square via US Navy Sub. Base • Route 85 service between Groton Square and UConn Avery Point via Electric Boat	SLE extension at Groton West and Palmer Line at Norwich	• Provides service to the future Groton West passenger rail station on Poquonnock Road • Interlined service with Route 2 connects the future Groton West station to Norwich

9 Transit Oriented Development Opportunities

Transit Oriented Development involves creating a mixed-use built environment that concentrates residential employment and leisure locations in manners that prioritize active transportation or public transportation use over the need to drive a personal vehicle. This largely occurs through property development and there are a variety of economic opportunities that are associated with additional rail service including:

- The Study Area is expected to add an additional 2,000 units in the next 3 to 5 years. Many of these multifamily units will be in potential station locations.
- Investment in Rail related construction to provide new service and infrastructure in these corridors is estimated to create up to 4,500 jobs and $860 million in sales (2023 Dollars) as well as $340 million in earnings (2023 Dollars).
- Norwich has more parcels with old buildings that are susceptible to change, while Montville has more vacant parcels within 2 miles of proposed stations. Similarly, New London has more parcels with old buildings that are susceptible to change, while Groton and Stonington have more vacant parcels within 2 miles of proposed stations.

10 Conclusion

The ECRTS Rail Service Plan outlines options for expanding rail in southeastern Connecticut to increase rail access for communities along the NEC between New London and Westerly and those along the Palmer Line between New London and Norwich. In conjunction with the Transit Service Plan, this Rail Service Plan identifies opportunities to enhance the transportation network, improve mobility within and beyond the Study Area, and address both the present and future regional travel demand. Advancing rail expansion in these corridors will face several substantial challenges, including high costs, significant infrastructure upgrades, and increased levels of coordination required between CTDOT, Amtrak, GWI, and others. It is feasible to adopt a phased implementation approach, beginning by evaluating the effectiveness of, securing funding for, and implementing the short-term strategies for improving mobility outlined in the Transit Service Plan, namely the infrastructure and service enhancements. The next stages for heightening connectivity within southeastern Connecticut could include expanding passenger rail service along the NEC and Palmer Line, which necessitates additional study, environmental review, and funding securement. The model assumes the outlined rail service recommendations may be realized along the NEC and Thames River Corridor in the longer term, in 2035, to ensure track and station infrastructure needs are addressed. Implementation of the preferred rail service options in this report could result in:

- An extension of SLE commuter rail services on the NEC eastward from New London to Westerly, RI, stopping at three newly constructed intermediate stations: Groton West, Mystic Alternative, and Downtown Stonington.
- A hybrid system connecting New London and Norwich on the Palmer Line, consisting of a hybrid approach with a shuttle between the two transportation nodes and an SLE extension northward from New London to Norwich. In addition to stopping at the newly constructed intermodal hub in Norwich, this route could also serve two intermediate stations: US Coast Guard Academy/Connecticut College and Mohegan Sun.
- Significantly improved trip times from 42 minutes to 28 minutes on the Palmer Line as a result of the required track infrastructure upgrades.

Exhibit A: Options 1-5 Train Schedules

Option 1 - Northbound

WEEKDAY PUBLIC SCHEDULE WITH SHORELINE EAST TRAINS EXTENDED TO WESTERLY - EASTERN CONNECTICUT RAIL CORRIDOR STUDY																												
EASTBOUND TO WESTERLY		TRAIN	A66	CD1600	CD1602	CD1604	A190	CD1608	CD1610	CD1618	A172	A86	CD1628	CD1632	A174	CD1634	A176	CD1638	CD1646	A184	A94	CD1650	A178	CD1652
STATION		MILE	Daily	M-F	M-F	M-F	M-F	M-F	M-F	M-F	M-F	M-F	M-F	M-F	M-F	M-F	M-F	M-F	M-F	M-F	M-F	M-F	M-F	M-F
New Haven	**Ar.**	**72.3**	S 4.26A				S 8.38A				S 12.44P	S 2.08P	**NEW**		S 3.42P		S 5.12P			S 7.01P	S 7.25P		S 9.40P	
	DP.	**72.3**	S 4.43A	R 5:00 A	R 6:05 A	R 7:05 A	S 8.41A	R 8:50 A	R 10:20 A	R 12:15 P	S 12.46P	S 2.10P	2:15 P	R 3:28 P	S 3.44P	R 4:40 P	S 5.15P	R 5:18 P	R 6:46 P	S 7.03P	S 7.27P	R 7:55 P	S 9.42P	R 9:45 P
State Street Sta. CT		72.8	- - -	- - -	- - -	L *7:07 A*	- - -	S *8:52 A*	S *10:22 A*	S *12:17 P*	- - -	- - -	S *2:17 P*	S *3:30 P*	- - -	S *4:42 P*	- - -	S *5:20 P*	S *6:48 P*	- - -	- - -	S *7:57 P*	- - -	S *9:47 P*
Branford Station (SLE)		81.4	- - -	- - -	- - -	*7:19 A*	- - -	L *9:04 A*	L *10:34 A*	L *12:29 P*	- - -	- - -	L *2:29 P*	L *3:42 P*	- - -	L *4:54 P*	- - -	L *5:32 P*	L *7:00 P*	- - -	- - -	L *8:09 P*	- - -	L *9:59 P*
Guilford Station (SLE)		88.8	- - -	L 5:19 A	L 6:24 A	L 7:27 A	- - -	L 9:14 A	L 10:44 A	L 12:39 P	- - -	- - -	L 2:39 P	L 3:52 P	- - -	L 5:04 P	- - -	L 5:42 P	L 7:10 P	- - -	- - -	L 8:19 P	- - -	L 10:09 P
Madison, CT (SLE)		92.8	- - -	L 5:23 A	L 6:28 A	L 7:31 A	- - -	L 9:18 A	L 10:48 A	L 12:43 P	- - -	- - -	L 2:43 P	L 3:56 P	- - -	L 5:08 P	- - -	L 5:46 P	L 7:14 P	- - -	- - -	L 8:23 P	- - -	L 10:13 P
Clinton, CT (SLE)		96.8	- - -	L 5:27 A	L 6:32 A	L 7:35 A	- - -	L 9:23 A	L 10:53 A	L 12:48 P	- - -	- - -	L 2:48 P	L 4:01 P	- - -	L 5:13 P	- - -	L 5:51 P	L 7:19 P	- - -	- - -	L 8:28 P	- - -	L 10:18 P
Westbrook, Ct (SLE)		101.2	- - -	L 5:32 A	L 6:37 A	L 7:40 A	- - -	L 9:28 A	L 10:58 A	L 12:53 P	- - -	- - -	L 2:53 P	L 4:06 P	- - -	L 5:18 P	- - -	L 5:56 P	L 7:24 P	- - -	- - -	L 8:33 P	- - -	L 10:23 P
Old Saybrook	**DP.**	**105.1**	S 5.15A	L 5:37 A	L 6:43 A	L 7:46 A	S 9.11A	L 9:33 A	L 11:03 A	L 12:58 P	S 1.15P	- - -	L 3:07 P	L 4:18 P	S 4.15P	L 5:24 P	S 5.45P	L 6:02 P	L 7:36 P	- - -	S 7.56P	L 8:39 P	S 10.12P	L 10:29 P
New London	**DP.**	**122.9**	S 5.35A	L 6:00 A	L 7:06 A	L 8:09 A	S 9.31A	L 9:56 A	L 11:26 A	L 1:21 P	S 1.35P	S 2.55P	L 3:30 P	L 4:41 P	S 4.35P	L 5:47 P	S6.06P	L 6:25 P	L 7:59 P	- - -	S 8.14P	L 9:02 P	S10.32P	*10:50 P*
Groton West (New)		126.1	- - -	L *6:05 A*	L *7:11 A*	L *8:14 A*	- - -	L *10:01 A*	L *11:31 A*	L *1:26 P*	- - -	- - -	L *3:35 P*	L *4:46 P*	- - -	L *5:52 P*	- - -	L *6:30 P*	L *8:04 P*	- - -	- - -	L *9:07 P*	- - -	
Mystic		**132.3**	S 5.49A	L *6:12 A*	L *7:18 A*	L *8:21 A*	S 9.43A	L *10:08 A*	L *11:38 A*	L *1:33 P*	- - -	- - -	L *3:42 P*	L *4:53 P*	- - -	L *5:59 P*	- - -	L *6:37 P*	L *8:11 P*	S 8.03P	- - -	L *9:14 P*	S 10.44P	
Stonington Borough (New)		**135.8**	- - -	L *6:16 A*	L *7:22 A*	L *8:25 A*	- - -	L *10:12 A*	L *11:42 A*	L *1:37 P*	- - -	- - -	L *3:46 P*	L *4:57 P*	- - -	L *6:03 P*	- - -	L *6:41 P*	L *8:15 P*	- - -	- - -	L *9:18 P*	- - -	
Westerly		**141.2**	S 6.01A	L *6:22 A*	L *7:28 A*	L *8:31 A*	S 9.53A	L *10:18 A*	L *11:48 A*	L *1:43 P*	1.53P	3.12P	L *3:52 P*	L *5:03 P*	S 4.56P	L *6:09 P*	S 6.26P	L *6:47 P*	L *8:21 P*	S 8.13P	8.32P	L *9:24 P*	S 10.54P	
Kingston RI		**158.1**	S 6.18A				S 10.08A				S 2.07P	S 3.26P			S 5.12P		S* 6.42P			- - -	- - -		- - -	
PROVIDENCE	**DP.**	**185.1**	S 6.56A				S* 10.30A				S* 2.29P	S* 3.48P			S* 5.33P		S* 7.05P			S* 8.46P	S* 9.11P		S* 11.32P	
Route 128		**217.3**	D 7.36A				D 10.56A				D 3.03P	D 4.18P			D 6.09P		D 7.44P			D 9.16P	D 9.44P		D 12.00P	
Back Bay		**227.6**	D 7.54A				D 11.06A				D 3.14P	D 4.29P			D 6.25P		D 7.55P			D 9.30P	D 9.56P		D 12.11A	
Boston		**228.7**	A 7.58A				A 11.10A				A 3.18P	A 4.38P			A 6.30P		A 8.02P			A 9.36P	A 10.02P		A 12.15A	
AMTRAK TRAINS NOT STOPPING IN SLE TERRITORY, MBTA, RIDOT, HARTFORD LINE, NEW HAVEN LINE TRAINS NOT SHOWN																								

Option 1 – Southbound

WEEKDAY PUBLIC SCHEDULE WITH SHORELINE EAST TRAINS EXTENDED TO WESTERLY - EASTERN CONNECTICUT RAIL CORRIDOR STUDY																																
WESTBOUND TO NEW HAVEN		TRAIN	CD1627		CD1637		CD1645		A95	CD1649		A171	CD1659		A93	CD1665		A85	A173	CD1669		CD1673		A137	A175	CD1685		CD1687		CD1693		A179	CD1695		CD1697		A67	A65
STATION		MILE	M-F		M-F		M-F		M-F	M-F		M-F	M-F		M-F	M-F		M-F	M-F	M-F		M-F		M-F	M-F	M-F		M-F		M-F		M-F	M-F		M-F		Sun-Thu	FrSa
Boston		**228.7**							S 6.10A			S 8.15A			S 9.20A			S 10.20A	S 11.10A					S 1.50P	S 3.20P						S 6.45P					S 9.30P	S 9.30P
Back Bay		**227.6**							S 6.15A			S 8.21A			S 9.26A			S 10.26A	S 11.16A					S 1.56P	S 3.26P						S 6.51P					S 9.36P	S 9.36P
Route 128		**217.3**							S 6.25A			S 8.31A			S 9.36A			S 10.37A	S 11.27A					S 2.07P	S 3.37P						S 7.01P					S 9.50P	S 9.50P
PROVIDENCE		**185.1**							S 6.50A			S 8.55A			S 10.01A			S 11.01A	S 11.51A					S* 2.39P	S 4.01P						S 7.25P					S 10.22P	S 10.22P
Kingston RI		**158.1**							S 7.11A			S 9.15A			S 10.22A			- - -	S 12.11P					S 3.00P	S 4.22P						S 7.45P					S 10.48P	S 10.48P
Westerly		**141.2**			R 6:11 A		R 6:56 A		S 7.25A	R 8:00 A		- - -	R 9:14 A		S 10.36A	R 10:53 A		- - -	- - -	R 12:58 P		R 2:53 P		S 3.15P	- - -	R 4:41 P		R 5:41 P		R 7:25 P		- - -	R 8:55 P		R 10:05 P		S 11.05P	S 11.05P
Stonington Borough (New)		**135.8**			S 6:17 A		S 7:02 A		- - -	S 8:06 A		- - -	S 9:20 A		- - -	S 10:59 A		- - -	- - -	S 1:04 P		S 2:59 P		- - -	- - -	S 4:47 P		S 5:47 P		S 7:31 P		- - -	S 9:01 P		S 10:11 P		- - -	- - -
Mystic		**132.3**			S 6:22 A		S 7:07 A		- - -	S 8:11 A		- - -	S 9:25 A		S 10.46A	S 11:04 A		- - -	- - -	S 1:09 P		S 3:04 P		S 3.25P	S 4.44P	S 4:52 P		S 5:52 P		S 7:36 P		- - -	S 9:06 P		S 10:16 P		S 11.17P	S 11.17P
Groton West (New)		126.1			S 6:29 A		S 7:14 A		- - -	S 8:18 A		- - -	S 9:32 A		- - -	S 11:11 A		- - -	- - -	S 1:16 P		S 3:11 P		- - -	- - -	S 4:59 P		S 5:59 P		S 7:43 P		- - -	S 9:13 P		S 10:23 P		- - -	- - -
New London	**DP.**	**122.9**	R 5:20 A		S 6:34 A		S 7:24 A		S 7.45A	S 8:24 A		S 9.48A	S 9:38 A		S 11.02A	S 11:17 A		- - -	S 12.43P	S 1:22 P		S 3:17 P		S 3.38P	S 4.57P	S 5:05 P		S 6:05 P		S 7:49 P		S 8.17P	S 9:19 P		S 10:29 P		S 11.31P	S 11.31P
Old Saybrook	**DP.**	**105.1**	R 5:42 A		S 6:56 A		S 7:46 A		S 8.04A	S 8:50 A		- - -	S 10:06 A		S 11.21A	S 11:38 A		S 12.08P	- - -	S 1:50 P		S 3:39 P		S 3.58P	S 5.15P	S 5:26 P		S 6:26 P		S 8:10 P		S 8.36P	S 9:40 P		S 10:50 P		H 11.53P	S 11.53P
Westbrook, Ct (SLE)		101.2	S 5:47 A		S 7:01 A		S 7:51 A		- - -	S 8:55 A		- - -	S 10:11 A		- - -	S 11:43 A		- - -	- - -	S 1:55 P		S 3:44 P		- - -	- - -	S 5:31 P		S 6:31 P		S 8:15 P		- - -	S 9:45 P		S 10:55 P		- - -	- - -
Clinton, CT (SLE)		96.8	S 5:52 A		S 7:06 A		S 7:56 A		- - -	S 9:00 A		- - -	S 10:16 A		- - -	S 11:48 A		- - -	- - -	S 2:00 P		S 3:49 P		- - -	- - -	S 5:36 P		S 6:36 P		S 8:20 P		- - -	S 9:50 P		S 11:00 P		- - -	- - -
Madison, CT (SLE)		92.8	S 5:57 A		S 7:11 A		S 8:01 A		- - -	S 9:05 A		- - -	S 10:21 A		- - -	S 11:53 A		- - -	- - -	S 2:05 P		S 3:54 P		- - -	- - -	S 5:41 P		S 6:41 P		S 8:25 P		- - -	S 9:55 P		S 11:05 P		- - -	- - -
Guilford Station (SLE)		88.8	S 6:03 A		S 7:16 A		S 8:06 A		- - -	S 9:11 A		- - -	S 10:26 A		- - -	S 11:58 A		- - -	- - -	S 2:10 P		S 3:59 P		- - -	- - -	S 5:46 P		S 6:46 P		S 8:30 P		- - -	S 10:00 P		S 11:10 P		- - -	- - -
Branford Station (SLE)		81.4	S 6:11 A		S 7:24 A		S 8:14 A		- - -	S 9:19 A		- - -	S 10:34 A		- - -	S 12:06 P		- - -	- - -	S 2:18 P		S 4:07 P		- - -	- - -	S 5:54 P		S 6:54 P		S 8:38 P		- - -	S 10:08 P		S 11:18 P		- - -	- - -
State Street Sta. CT		72.8	S 6:23 A		S 7:36 A		S 8:26 A		- - -	S 9:31 A		- - -	S 10:46 A		- - -	S 12:18 P		- - -	- - -	S 2:30 P		S 4:19 P		- - -	- - -	S 6:06 P		S 7:06 P		S 8:50 P		- - -	S 10:20 P		S 11:30 P		- - -	- - -
New Haven	**Ar.**	**72.3**	A 6:25 A		7:39 A		A 8:30 A		S 8.41A	A 9:34 A		S 10.38A	A 10:49 A		S 11.54A	A 12:21 P		S 12.40P	S 1.33P	A 2:33 P		A 4:22 P		S 4.28P	S 5.43P	A 6:09 P		A 7:09 P		A 8:53 P		S 9.08P	A 10:23 P		A 11:33 P		12.30A	12.30A
	DP.				S 7:42 A				S 8.43A			S 10.40A			S 11.58A			S 12.42P	S 1.35P					S 4.31P	S 5.45P						S 9.10P					H 12.55A	H 12.55A
AMTRAK TRAINS NOT STOPPING IN SLE TERRITORY, MBTA, RIDOT, HARTFORD LINE, NEW HAVEN LINE TRAINS NOT SHOWN																																

Option 2 – Northbound

WEEKDAY PUBLIC SCHEDULE FOR ALTERNATIVE 2 - NEW LONDON TO WESTERLY SHUTTLE - EASTERN CONNECTICUT RAIL CORRIDOR STUDY																																			
EASTBOUND TO WESTERLY		TRAIN	A66	CD1600	CD6600	CD1602	CD1604	CD6604	CD1608	A190	CD6608	CD1610	CD1618	A172	CD6618	A86	CD1632	CD6632	A174	CD1634	A176	CD1638	CD6638	CD1646	A184	A94	CD6694	A178	CD1652
STATION		Alt.	Daily	BL, A 2	A 2	BL, A 2	BL, A 2	A 2	BL, A 2	M-F	A 2	BL, A 2	BL, A 2	M-F	A 2	M-F	BL, A 2	A 2	M-F	BL, A 2	M-F	BL, A 2	A 2	BL, A 2	M-F	M-F	A 2	M-F	BL, A 2
New Haven	**Ar.**	**72.3**	S 4.26A		---			---		S 8.38A	---			S 12.44P	---	S 2.08P		---	S 3.42P		S 5.12P		---		S 7.01P	S 7.25P	---	S 9.40P	
	DP.	**72.3**	S 4.43A	R 5:00 A	---	R 6:05 A	R 7:05 A	---	R 8:15 A	S 8.41A	---	R 10:20 A	R 12:20 P	S 12.46P	---	S 2.10P	R 3:28 P	---	S 3.44P	R 4:40 P	S 5.15P	R 5:18 P	---	R 6:46 P	S 7.03P	S 7.27P	---	S 9.42P	R 9:45 P
State Street Sta. CT		72.8	---	---	---	---	L *7:07 A*	---	S *8:17 A*	---	---	S *10:22 A*	S *12:22 P*	---	---	---	S *3:30 P*	---	---	S *4:42 P*	---	S *5:20 P*	---	S *6:48 P*	---	---	---	---	S *9:47 P*
Branford Station (SLE)		81.4	---	---	---	---	*7:19 A*	---	L *8:29 A*	Cross-	---	L *10:34 A*	L *12:34 P*	Cross-	---	---	L *3:42 P*	---	---	L *4:54 P*	---	L *5:32 P*	---	L *7:00 P*	---	Cross-	---	---	L *9:59 P*
Guilford Station (SLE)		88.8	---	L 5:19 A	---	L 6:24 A	L 7:27 A	---	L 8:39 A	honors	---	L 10:44 A	L 12:44 P	honors	---	---	L 3:52 P	---	---	L 5:04 P	---	L 5:42 P	---	L 7:10 P	---	honors	---	---	L 10:09 P
Madison, CT (SLE)		92.8	---	L 5:23 A	---	L 6:28 A	L 7:31 A	---	L 8:43 A	SLE	---	L 10:48 A	L 12:48 P	SLE	---	---	L 3:56 P	---	---	L 5:08 P	---	L 5:46 P	---	L 7:14 P	---	SLE	---	---	L 10:13 P
Clinton, CT (SLE)		96.8	---	L 5:27 A	---	L 6:32 A	L 7:35 A	---	L 8:48 A	tickets	---	L 10:53 A	L 12:53 P	tickets	---	---	L 4:01 P	---	---	L 5:13 P	---	L 5:51 P	---	L 7:19 P	---	tickets	---	---	L 10:18 P
Westbrook, Ct (SLE)		101.2	---	L 5:32 A	---	L 6:37 A	L 7:40 A	---	L 8:53 A	---	---	L 10:58 A	L 12:58 P	---	---	---	L 4:06 P	---	---	L 5:18 P	---	L 5:56 P	---	L 7:24 P	---	---	---	---	L 10:23 P
Old Saybrook	**Ar.**	**105.1**	S 5.15A	5:36 A	---	6:41 A	7:44 A	---	8:57 A	---	---	11:02 A	1:02 P	---	---	---	4:10 P	---	---	5:22 P	---	6:00 P	---	7:28 P	---	---	Transfer	---	10:27 P
	DP.	**105.1**	S 5.15A	L 5:37 A	---	L 6:43 A	L 7:46 A	---	L 8:58 A	S 9.11A	---	L 11:08 A	L 1:03 P	S 1.15P	---	---	L 4:18 P	---	S 4.15P	L 5:24 P	S 5.45P	L 6:02 P	---	---	---	S 7.56P	L 8:40 P	S 10.12P	L 10:29 P
New London	**Ar.**	**122.9**	5.34A	A 6:00 A	Transfer	A 7:06 A	A 8:09 A	Transfer	A 9:23 A	S 9.31A	Transfer	A 11:29 A	A 1:25 P	S 1.35P	Transfer	S* 2.55P	A 4:40 P	Transfer	S 4.35P	A 5:46 P	S 6.06P	A 6:24 P	Transfer	---	---	S 8.14P	9:02 P	S 10.32P	*10:50 P*
	DP.	**122.9**	S 5.35A	---	L 6:30 A	---	---	L 8:15 A	---		L 9:50 A		---		L 1:43 P		---	L 4:45 P		---		---	L 6:31 P	---			L 9:04 P		---
Groton West (New)		126.1	---	---	L *6:35 A*	---	---	L *8:20 A*	---	---	L *9:55 A*	---	---	---	L *1:48 P*	---	---	L *4:50 P*	---	---	---	---	L *6:36 P*	---	---	---	L *9:09 P*	---	---
Mystic		**132.3**	S 5.49A	---	L *6:42 A*	---	---	L *8:27 A*	---	S 9.43A	L *10:02 A*	---	---	---	L *1:55 P*	---	---	L *4:57 P*	---	---	---	---	L *6:43 P*	---	S 8.03P	---	L *9:16 P*	S 10.44P	---
Stonington Borough (New)		**135.8**	---	---	L *6:46 A*	---	---	L *8:31 A*	---	---	L *10:06 A*	---	---	---	L *1:59 P*	---	---	L *5:01 P*	---	---	---	---	L *6:47 P*	---	---	---	L *9:20 P*	---	---
Westerly		**141.2**	S 6.01A	---	L *6:52 A*	---	---	L *8:37 A*	---	S 9.53A	L *10:12 A*	---	---	---	L *2:05 P*	---	---	L *5:07 P*	S 4.56P	---	S 6.26P	---	L *6:53 P*	---	S 8.13P	---	L *9:26 P*	S 10.54P	---
Kingston RI		**158.1**	S 6.18A	---	---	---	---	---	---	S 10.08A	---	---	---	S 2.07P	---	S 3.26P	---	---	S 5.12P	---	S* 6.42P	---	---	---	---	---	---	---	---
PROVIDENCE	**Ar.**	**185.1**	S 6.45A	---	---	---	---	---	---	10.28A	---	---	---	2.27P	---	3.45P	---	---	5.31P	---	7.02P	---	---	---	8.43P	9.08P	---	11.29P	---
	DP.	**185.1**	S 6.56A	---	---	---	---	---	---	S* 10.30A	---	---	---	S* 2.29P	---	S* 3.48P	---	---	S* 5.33P	---	S* 7.05P	---	---	---	S* 8.46P	S* 9.11P	---	S* 11.32P	---
Route 128		**217.3**	D 7.36A	---	---	---	---	---	---	D 10.56A	---	---	---	D 3.03P	---	D 4.18P	---	---	D 6.09P	---	D 7.44P	---	---	---	D 9.16P	D 9.44P	---	D 12.00P	---
Back Bay		**227.6**	D 7.54A	---	---	---	---	---	---	D 11.06A	---	---	---	D 3.14P	---	D 4.29P	---	---	D 6.25P	---	D 7.55P	---	---	---	D 9.30P	D 9.56P	---	D 12.11A	---
Boston		**228.7**	A 7.58A	---	---	---	---	---	---	A 11.10A	---	---	---	A 3.18P	---	A 4.38P	---	---	A 6.30P	---	A 8.02P	---	---	---	A 9.36P	A 10.02P	---	A 12.15A	---
MBTA, RIDOT, HARTFORD LINE, NEW HAVEN LINE TRAINS NOT SHOWN																													

Option 2 – Southbound

WEEKDAY PUBLIC SCHEDULE FOR ALTERNATIVE 2 - NEW LONDON TO WESTERLY SHUTTLE - EASTERN CONNECTICUT RAIL CORRIDOR STUDY																																			
WESTBOUND TO NEW HAVEN		TRAIN	CD1627	CD6637	CD1637	CD1645	CD6695	A95	CD1649	A171	CD6659	CD1659	A93	A85	CD6667	CD1667	A173	CD1673	CD6673	A137	A175	CD1685	CD6687	CD1687	CD1693	A179	CD6697	CD1697	CD6699	CD1699	A67	A65
STATION		ALT.	BL, A 1,2	A 2	BL, A2	BL, A 2	A 2	M-F	BL, A 2	M-F	A 2	BL, A 2	M-F	M-F	A 2	BL, A 2	M-F	BL, A 2	A 2	M-F	M-F	BL, A 2	A 2	BL, A 2	BL, A 2	M-F	A 2	BL, A 2	A 2	BL, A 2	Sun-Thu	FrSa
Boston		**228.7**	---	---	---	---	---	6.10A	---	S 8.15A	---	---	S 9.20A	S 10.20A	---	---	S 11.10A	---	---	S 1.50P	S 3.20P	---	---	---	---	6.45P	---	---	---	---	S 9.30P	S 9.30P
Back Bay		**227.6**	---	---	---	---	---	S 6.15A	---	S 8.21A	---	---	S 9.26A	S 10.26A	---	---	S 11.16A	---	---	S 1.56P	S 3.26P	---	---	---	---	S 6.51P	---	---	---	---	S 9.36P	S 9.36P
Route 128		**217.3**	---	---	---	---	---	S 6.25A	---	S 8.31A	---	---	S 9.36A	S 10.37A	---	---	S 11.27A	---	---	S 2.07P	S 3.37P	---	---	---	---	S 7.01P	---	---	---	---	S 9.50P	S 9.50P
PROVIDENCE		**185.1**	---	---	---	---	---	S 6.48A	---	S 8.54A	---	---	S 9.58A	S 10.59A	---	---	S 11.49A	---	---	2.31P	S 3.59P	---	---	---	---	S 7.23P	---	---	---	---	S 10.19P	S 10.19P
PROVIDENCE		**185.1**	---	---	---	---	---	S 6.50A	---	S 8.55A	---	---	S 10.01A	S 11.01A	---	---	S 11.51A	---	---	S* 2.39P	S 4.01P	---	---	---	---	S 7.25P	---	---	---	---	S 10.22P	S 10.22P
Kingston RI		**158.1**	---	---	---	---	---	S 7.11A	---	S 9.15A	---	---	S 10.22A	---	---	---	S 12.11P	---	---	S 3.00P	S 4.22P	---	---	---	---	S 7.45P	---	---	---	---	S 10.48P	S 10.48P
Westerly		**141.2**	---	R 5:53 A	---	---	R 7:15 A	S 7.25A	---	---	R 9:08 A	---	S 10.36A	---	R 11:15 A	---	---	---	R 3:08 P	S 3.15P	---	---	R 5:35 P	---	---	---	R 7:35 P	---	R 10:28 P	---	S 11.05P	S 11.05P
Stonington Borough (New)		**135.8**	---	S 5:59 A	---	---	S 7:21 A	---	---	---	S 9:14 A	---	---	---	S 11:21 A	---	---	---	S 3:14 P	---	---	---	S 5:41 P	---	---	---	S 7:41 P	---	S 10:34 P	---	---	---
Mystic		**132.3**	---	S 6:04 A	---	---	S 7:26 A	---	---	---	S 9:19 A	---	S 10.46A	---	S 11:26 A	---	---	---	S 3:19 P	S 3.25P	S 4.44P	---	S 5:46 P	---	---	---	S 7:46 P	---	S 10:39 P	---	S 11.17P	S 11.17P
Groton West (New)		126.1	---	S 6:11 A	---	---	S 7:33 A	---	---	---	S 9:26 A	---	---	---	S 11:33 A	---	---	---	S 3:26 P	---	---	---	S 5:53 P	---	---	---	S 7:53 P	---	S 10:46 P	---	---	---
New London	**Ar.**	**122.9**	---	6:15 A	---	---	7:37 A	7.44A	---	S 9.47A	9:30 A	---	S 11.01A	---	11:37 A	---	S 12.42P	---	3:30 P	S 3.37P	S 4.56P	---	5:57 P	---	---	S 8.16P	7:57 P	---	10:50 P	---	S 11.30P	S 11.30P
	DP.	**122.9**	R 5:20 A	Transfer	S 6:30 A	S 7:24 A	Transfer	S 7.45A	S 8:24 A	S 9.48A	Transfer	S 9:38 A	S 11.02A	---	Transfer	S 11:55 A	S 12.43P	S 2:17 P	Transfer	S 3.38P	S 4.57P	S 5:05 P	Transfer	S 6:05 P	S 7:30 P	S 8.17P	S 7:59 P	---	Transfer	S 11:05 P	S 11.31P	S 11.31P
Old Saybrook	**Ar.**	**105.1**	5:39 A	---	6:49 A	7:43 A	---	S 8.04A	8:45 A	---	---	10:00 A	S 11.21A	S 12.08P	---	12:14 P	---	2:36 P	---	S 3.58P	S 5.15P	5:24 P	---	6:24 P	7:49 P	S 8.36P	A 8:18 P	---	---	11:24 P	11.53P	11.53P
	DP.	**105.1**	R 5:42 A	---	S 6:52 A	S 7:46 A	---	S 8.04A	S 8:50 A	---	---	S 10:06 A	S 11.21A	S 12.08P	---	S 12:16 P	---	S 2:44 P	---	S 3.58P	S 5.15P	S 5:26 P	---	S 6:26 P	S 7:51 P	S 8.36P	Transfer	S 8:50 P	---	S 11:26 P	11.53P	11.53P
Westbrook, Ct (SLE)		101.2	S 5:47 A	---	S 6:57 A	S 7:51 A	---	---	S 8:55 A	---	---	S 10:11 A	---	---	---	S 12:21 P	---	S 2:49 P	---	---	---	S 5:31 P	---	S 6:31 P	S 7:56 P	---	---	S 8:55 P	---	S 11:31 P	---	---
Clinton, CT (SLE)		96.8	S 5:52 A	---	S 7:02 A	S 7:56 A	---	Cross-	S 9:00 A	---	---	S 10:16 A	---	---	---	S 12:26 P	---	S 2:54 P	---	Cross-	---	S 5:36 P	---	S 6:36 P	S 8:01 P	---	---	S 9:00 P	---	S 11:36 P	---	---
Madison, CT (SLE)		92.8	S 5:57 A	---	S 7:07 A	S 8:01 A	---	honors	S 9:05 A	---	---	S 10:21 A	---	---	---	S 12:31 P	---	S 2:59 P	---	honors	---	S 5:41 P	---	S 6:41 P	S 8:06 P	---	---	S 9:05 P	---	S 11:41 P	---	---
Guilford Station (SLE)		88.8	S 6:03 A	---	S 7:12 A	S 8:06 A	---	SLE	S 9:11 A	---	---	S 10:26 A	---	---	---	S 12:36 P	---	S 3:04 P	---	SLE	---	S 5:46 P	---	S 6:46 P	S 8:11 P	---	---	S 9:10 P	---	S 11:46 P	---	---
Branford Station (SLE)		81.4	S 6:11 A	---	S 7:20 A	S 8:14 A	---	tickets	S 9:19 A	---	---	S 10:34 A	---	---	---	S 12:44 P	---	S 3:12 P	---	tickets	---	S 5:54 P	---	S 6:54 P	S 8:19 P	---	---	S 9:18 P	---	---	---	---
State Street Sta. CT		72.8	S 6:23 A	---	S 7:32 A	S 8:26 A	---	---	S 9:31 A	---	---	S 10:46 A	---	---	---	S 12:56 P	---	S 3:24 P	---	---	---	S 6:06 P	---	S 7:06 P	S 8:31 P	---	---	S 9:30 P	---	---	---	---
New Haven	**Ar.**	**72.3**	A 6:25 A	---	7:35 A	A 8:30 A	---	S 8.41A	A 9:34 A	S 10.38A	---	A 10:49 A	S 11.54A	S 12.40P	---	A 12:59 P	S 1.33P	A 3:27 P	---	S 4.28P	S 5.43P	A 6:09 P	---	A 7:09 P	A 8:34 P	S 9.08P	---	A 9:33 P	---	A *12:08 A*	12.30A	12.30A
	DP.			---	---		---	S 8.43A		S 10.40A	---		S 11.58A	S 12.42P	---		S 1.35P			S 4.31P	S 5.45P					S 9.10P				---	12.55A	12.55A
MBTA, RIDOT, HARTFORD LINE, NEW HAVEN LINE TRAINS NOT SHOWN																																			

Option 3 – Northbound

WEEKDAY PUBLIC SCHEDULE WITH SHORELINE EAST TRAINS EXTENDED TO NORWICH - ALTERNATIVE-3 - EASTERN CONNECTICUT RAIL CORRIDOR STUDY																												
EASTBOUND TO NORWICH		TRAIN	A66	CD1600	CD1602	CD1604	A190	CD1608	CD1610	CD1618	A172	A86	CD1628	CD1632	A174	CD1634	A176	CD1638	CD1646	A184	A94	CD1650	A178	CD1652
STATION		Alt.	Daily	A 3	A 3	A 3	M-F	A 3	A 3	A 3	M-F	M-F	A 3	A 3	M-F	A 3	M-F	A 3	A 3	M-F	M-F	A 3	M-F	BL A 1,2,3
New Haven	**Ar.**	**72.3**	S 4.26A	5' E	10' E	13' E	S 8.38A	35' L			S 12.44P	S 2.08P	NEW		S 3.42P		S 5.12P	5:12 P		S 7.01P	S 7.25P	NEW	S 9.40P	
	DP.	**72.3**	S 4.43A	R 4:55 A	R 5:55 A	R 6:53 A	S 8.41A	R 8:50 A	R 10:20 A	R 12:15 P	S 12.46P	S 2.10P	2:15 P	R 3:28 P	S 3.44P	R 4:40 P	S 5.15P	S 5:18 P	R 6:46 P	S 7.03P	S 7.27P	R 7:55 P	S 9.42P	R 9:45 P
State Street Sta. CT		72.8	---	---	---	L *6:55 A*	---	S *8:52 A*	S *10:22 A*	S *12:17 P*	---	---	S *2:17 P*	S *3:30 P*	---	S *4:42 P*	---	S *5:20 P*	S *6:48 P*	---	---	S *7:57 P*	---	S *9:47 P*
Branford Station (SLE)		81.4	---	---	---	*7:07 A*	---	L *9:04 A*	L *10:34 A*	L *12:29 P*	---	---	L *2:29 P*	L *3:42 P*	---	L *4:54 P*	---	L *5:32 P*	L *7:00 P*	---	---	L *8:09 P*	---	L *9:59 P*
Guilford Station (SLE)		88.8	---	L 5:14 A	L 6:14 A	L 7:15 A	---	L 9:14 A	L 10:44 A	L 12:39 P	---	---	L 2:39 P	L 3:52 P	---	L 5:04 P	---	L 5:42 P	L 7:10 P	---	---	L 8:19 P	---	L 10:09 P
Madison, CT (SLE)		92.8	---	L 5:18 A	L 6:18 A	L 7:19 A	---	L 9:18 A	L 10:48 A	L 12:43 P	---	---	L 2:43 P	L 3:56 P	---	L 5:08 P	---	L 5:46 P	L 7:14 P	---	---	L 8:23 P	---	L 10:13 P
Clinton, CT (SLE)		96.8	---	L 5:22 A	L 6:22 A	L 7:23 A	---	L 9:23 A	L 10:53 A	L 12:48 P	---	---	L 2:48 P	L 4:01 P	---	L 5:13 P	---	L 5:51 P	L 7:19 P	---	---	L 8:28 P	---	L 10:18 P
Westbrook, Ct (SLE)		101.2	---	L 5:27 A	L 6:27 A	L 7:28 A	---	L 9:28 A	L 10:58 A	L 12:53 P	---	---	L 2:53 P	L 4:06 P	---	L 5:18 P	---	L 5:56 P	L 7:24 P	---	---	L 8:33 P	---	L 10:23 P
Old Saybrook	**Ar.**	**105.1**	S 5.15A	5:31 A	6:31 A	7:32 A	S 9.11A	9:32 A	11:02 A	12:57 P	S 1.15P	2.36P	2:57 P	4:10 P	S 4.15P	5:22 P	S 5.45P	6:00 P	7:28 P	7.34P	S 7.56P	8:37 P	S 10.12P	10:27 P
	DP.	**105.1**	S 5.15A	L 5:32 A	L 6:33 A	L 7:34 A	S 9.11A	L 9:33 A	L 11:08 A	L 12:58 P	S 1.15P	2.36P	L 3:07 P	L 4:18 P	S 4.15P	L 5:24 P	S 5.45P	L 6:02 P	L 7:36 P	7.34P	S 7.56P	L 8:39 P	S 10.12P	L 10:29 P
New London	**Ar.**	**122.9**	5.34A	*5:53 A*	*6:54 A*	*7:55 A*	S 9.31A	*9:54 A*	*11:29 A*	*1:19 P*	S 1.35P	S 2.55P	*3:28 P*	*4:39 P*	S 4.35P	*5:45 P*	S 6.06P	*6:23 P*	*7:57 P*	7.51P	S 8.14P	*9:00 P*	S 10.32P	*10:50 P*
	DP.	**122.9**	S 5.35A	L 5:57 A	L 6:56 A	S 7:57 A		S 9:56 A	S 11:31 A	S 1:21 P			S 3:30 P	S 4:41 P		S 5:47 P		S 6:25 P	S 7:59 P			S 9:02 P		---
Conn College (New)		**2.0**		S 6:03 A	S 7:02 A	S 8:03 A		S 10:02 A	S 11:37 A	S 1:27 P			S 3:36 P	S 4:47 P		S 5:53 P		S 6:31 P	S 8:05 P			S 9:08 P		
Montville (New)		**10.0**		S 6:21 A	S 7:20 A	S 8:21 A		S 10:16 A	S 11:51 A	S 1:41 P			S 3:50 P	S 5:01 P		S 6:07 P		S 6:45 P	S 8:19 P			S 9:22 P		
Norwich (New)	**Ar.**	**13.0**		S 6:28 A	S 7:27 A	S 8:28 A		S 10:23 A	S 11:58 A	S 1:48 P			S 3:57 P	S 5:08 P		S 6:14 P		S 6:52 P	S 8:26 P			S 9:29 P		
Mystic		**132.3**	S 5.49A	---	---	---	S 9.43A	---	---	---	1.45P	3.06P	---	---	4.46P	---	6.16P	---	---	S 8.03P	8.25P	---	S 10.44P	---
Westerly		**141.2**	S 6.01A	---	---	---	S 9.53A	---	---	---	1.53P	3.12P	---	---	S 4.56P	---	S 6.26P	---	---	S 8.13P	8.32P	---	S 10.54P	---
Kingston RI		**158.1**	S 6.18A	---	---	---	S 10.08A	---	---	---	S 2.07P	S 3.26P	---	---	S 5.12P	---	S* 6.42P	---	---	---	---	---	---	---
PROVIDENCE	**Ar.**	**185.1**	S 6.45A	---	---	---	10.28A	---	---	---	2.27P	3.45P	---	---	5.31P	---	7.02P	---	---	8.43P	9.08P	---	11.29P	---
	DP.	**185.1**	S 6.56A	---	---	---	S* 10.30A	---	---	---	S* 2.29P	S* 3.48P	---	---	S* 5.33P	---	S* 7.05P	---	---	S* 8.46P	S* 9.11P	---	S* 11.32P	---
Route 128		**217.3**	D 7.36A	---	---	---	D 10.56A	---	---	---	D 3.03P	D 4.18P	---	---	D 6.09P	---	D 7.44P	---	---	D 9.16P	D 9.44P	---	D 12.00P	---
Back Bay		**227.6**	D 7.54A	---	---	---	D 11.06A	---	---	---	D 3.14P	D 4.29P	---	---	D 6.25P	---	D 7.55P	---	---	D 9.30P	D 9.56P	---	D 12.11A	---
Boston	**Ar.**	**228.7**	A 7.58A	---	---	---	A 11.10A	---	---	---	A 3.18P	A 4.38P	---	---	A 6.30P	---	A 8.02P	---	---	A 9.36P	A 10.02P	---	A 12.15A	---
MBTA, RIDOT, HARTFORD LINE, NEW HAVEN LINE TRAINS NOT SHOWN																							Prepared by WSP:ajg	6/29/2023

Option 3 – Southbound

WEEKDAY PUBLIC SCHEDULE WITH SHORELINE EAST TRAINS EXTENDED TO NORWICH - ALTERNATIVE 3 - EASTERN CONNECTICUT RAIL CORRIDOR STUDY																															
WESTBOUND TO NEW HAVEN		TRAIN	CD1627		CD1637		CD1645		A95	CD1649		A171	CD1659		A93	CD1665		A85	A173	CD1669		CD1673		A137	A175	CD1685		CD1687		CD1693		A179	CD1695		CD1697		A67	A65
STATION		MILE	BL, A 1,2,3		A 3		A 3		M-F	A 3		M-F	A 3		M-F	A 3		M-F	M-F	A 3		A 3		M-F	M-F	A 3		A 3		A 3		M-F	A 3		A 3		Sun-Thu	FrSa
Boston	**DP.**	**228.7**	---		---		---		6.10A	---		S 8.15A	---		S 9.20A	---		S 10.20A	S 11.10A	---		---		S 1.50P	S 3.20P	---		---		---		6.45P	---		---		S 9.30P	S 9.30P
Back Bay		**227.6**	---		---		---		S 6.15A	---		S 8.21A	---		S 9.26A	---		S 10.26A	S 11.16A	---		---		S 1.56P	S 3.26P	---		---		---		S 6.51P	---		---		S 9.36P	S 9.36P
Route 128		**217.3**	---		---		---		S 6.25A	---		S 8.31A	---		S 9.36A	---		S 10.37A	S 11.27A	---		---		S 2.07P	S 3.37P	---		---		---		S 7.01P	---		---		S 9.50P	S 9.50P
PROVIDENCE	**Ar.**	**185.1**	---		---		---		S 6.48A	---		S 8.54A	---		S 9.58A	---		S 10.59A	S 11.49A	---		---		2.31P	S 3.59P	---		---		---		S 7.23P	---		---		S 10.19P	S 10.19P
PROVIDENCE	**DP.**	**185.1**	---		---		---		S 6.50A	---		S 8.55A	---		S 10.01A	---		S 11.01A	S 11.51A	---		---		S* 2.39P	S 4.01P	---		---		---		S 7.25P	---		---		S 10.22P	S 10.22P
Kingston RI		**158.1**	---		---		---		S 7.11A	---		S 9.15A	---		S 10.22A	---		---	S 12.11P	---		---		S 3.00P	S 4.22P	---		---		---		S 7.45P	---		---		S 10.48P	S 10.48P
Westerly		**141.2**	---		---		---		S 7.25A	---		---	---		S 10.36A	---		---	---	---		---		S 3.15P	---	---		---		---		---	---		---		S 11.05P	S 11.05P
Mystic		**132.3**	---		---		---		---	---		---	---		S 10.46A	---		---	---	---		---		S 3.25P	S 4.44P	---		---		---		---	---		---		S 11.17P	S 11.17P
Norwich (New)	**DP.**	**13.0**			S 5:58 A		S 6:56 A			S 7:56 A			S 9:10 A			S 10:49 A				S 12:54 P		S 2:49 P				S 4:36 P		S 5:41 P		S 7:21 P			S 8:51 P		S 10:01 P			
Montville (New)		**10.0**			S 6:04 A		S 7:02 A			S 8:02 A			S 9:16 A			S 10:55 A				S 1:00 P		S 2:55 P				S 4:42 P		S 5:47 P		S 7:27 P			S 8:57 P		S 10:07 P			
Conn College (New)		**2.0**			S 6:17 A		S 7:15 A			S 8:15 A			S 9:29 A			S 11:08 A				S 1:13 P		S 3:08 P				S 4:59 P		S 6:04 P		S 7:40 P			S 9:10 P		S 10:20 P			
New London	**Ar.**	**122.9**	---		*6:25 A*		*7:23 A*		7.44A	*8:23 A*		S 9.47A	*9:37 A*		S 11.01A	*11:16 A*		---	S 12.42P	*1:21 P*		*3:16 P*		S 3.37P	S 4.56P	*5:07 P*		*6:12 P*		*7:48 P*		S 8.16P	*9:18 P*		*10:28 P*		S 11.30P	S 11.30P
	DP.	**122.9**	R 5:20 A		S 6:30 A		S 7:24 A		S 7.45A	S 8:24 A		S 9.48A	S 9:38 A		S 11.02A	S 11:17 A		---	S 12.43P	S 1:22 P		S 3:17 P		S 3.38P	S 4.57P	S 5:08 P		S 6:13 P		S 7:49 P		S 8.17P	S 9:19 P		S 10:29 P		S 11.31P	S 11.31P
Old Saybrook	**Ar.**	**105.1**	5:39 A		6:49 A		7:43 A		S 8.04A	8:45 A		---	10:00 A		S 11.21A	11:36 A		S 12.08P	---	1:42 P		3:37 P		S 3.58P	S 5.15P	5:27 P		6:32 P		8:08 P		S 8.36P	9:38 P		10:48 P		H 11.53P	S 11.53P
	DP.	**105.1**	R 5:42 A		S 6:52 A		S 7:46 A		S 8.04A	S 8:50 A		---	S 10:06 A		S 11.21A	S 11:38 A		S 12.08P	---	S 1:50 P		S 3:39 P		S 3.58P	S 5.15P	S 5:29 P		S 6:34 P		S 8:10 P		S 8.36P	S 9:40 P		S 10:50 P		H 11.53P	S 11.53P
Westbrook, Ct (SLE)		101.2	S 5:47 A		S 6:57 A		S 7:51 A		---	S 8:55 A		---	S 10:11 A		---	S 11:43 A		---	---	S 1:55 P		S 3:44 P		---	---	S 5:34 P		S 6:39 P		S 8:15 P		---	S 9:45 P		S 10:55 P		---	---
Clinton, CT (SLE)		96.8	S 5:52 A		S 7:02 A		S 7:56 A		---	S 9:00 A		---	S 10:16 A		---	S 11:48 A		---	---	S 2:00 P		S 3:49 P		---	---	S 5:39 P		S 6:44 P		S 8:20 P		---	S 9:50 P		S 11:00 P		---	---
Madison, CT (SLE)		92.8	S 5:57 A		S 7:07 A		S 8:01 A		---	S 9:05 A		---	S 10:21 A		---	S 11:53 A		---	---	S 2:05 P		S 3:54 P		---	---	S 5:44 P		S 6:49 P		S 8:25 P		---	S 9:55 P		S 11:05 P		---	---
Guilford Station (SLE)		88.8	S 6:03 A		S 7:12 A		S 8:06 A		---	S 9:11 A		---	S 10:26 A		---	S 11:58 A		---	---	S 2:10 P		S 3:59 P		---	---	S 5:49 P		S 6:54 P		S 8:30 P		---	S 10:00 P		S 11:10 P		---	---
Branford Station (SLE)		81.4	S 6:11 A		S 7:20 A		S 8:14 A		---	S 9:19 A		---	S 10:34 A		---	S 12:06 P		---	---	S 2:18 P		S 4:07 P		---	---	S 5:57 P		S 7:02 P		S 8:38 P		---	S 10:08 P		S 11:18 P		---	---
State Street Sta. CT		72.8	S 6:23 A		S 7:32 A		S 8:26 A		---	S 9:31 A		---	S 10:46 A		---	S 12:18 P		---	---	S 2:30 P		S 4:19 P		---	---	S 6:09 P		S 7:14 P		S 8:50 P		---	S 10:20 P		S 11:30 P		---	---
New Haven	**Ar.**	**72.3**	A 6:25 A		7:35 A		A 8:30 A		S 8.41A	A 9:34 A		S 10.38A	A 10:49 A		S 11.54A	A 12:21 P		S 12.40P	S 1.33P	A 2:33 P		A 4:22 P		S 4.28P	S 5.43P	A 6:12 P		A 7:17 P		A 8:53 P		S 9.08P	A 10:23 P		A 11:33 P		12.30A	12.30A
	DP.				S 7:38 A				S 8.43A			S 10.40A			S 11.58A			S 12.42P	S 1.35P					S 4.31P	S 5.45P						S 9.10P					H 12.55A	H 12.55A
MBTA, RIDOT, HARTFORD LINE, NEW HAVEN LINE TRAINS NOT SHOWN																															Prepared by WSP:ajg			6/29/2023			

Option 4 – Northbound

WEEKDAY PUBLIC SCHEDULE WITH NEW LONDON TO NORWICH SHUTTLE - ALTERNATIVE 4 - EASTERN CONNECTICUT RAIL CORRIDOR STUDY																																		
EASTBOUND TO WESTERLY		TRAIN	A66	CD1600	CD5600	CD1602	CD1604	CD5604	CD1608	A190	CD5608	CD1610	CD1618	A172	CD5618	A86	A174	CD1632	CD5632	CD1634	A176	CD1638	CD5638	CD1646	A184	A94	CD5646	A178	CD1652
STATION		Alt.	Daily	BL, A 2,4	A 4	BL, A 2,4	BL, A 2,4	A 4	BL, A 2,4	M-F	A 4	BL, A 2,4	BL, A 2,4	M-F	A 4	M-F	M-F	BL, A 2,4	A 4	BL, A 2,4	M-F	BL, A 2,4	A 4	A 4	M-F	M-F	A 4	M-F	BL A 1-4
New Haven	**Ar.**	**72.3**	S 4.26A		---			---		S 8.38A	---			S 12.44P	---	S 2.08P	S 3.42P		---		S 5.12P		---		S 7.01P	S 7.25P	---	S 9.40P	
	DP.	**72.3**	S 4.43A	R 5:00 A	---	R 6:05 A	R 7:05 A	---	R 8:15 A	S 8.41A	---	R 10:20 A	R 12:20 P	S 12.46P	---	S 2.10P	S 3.44P	R 3:28 P	---	R 4:40 P	S 5.15P	R 5:18 P	---	R 6:46 P	S 7.03P	S 7.27P	---	S 9.42P	R 9:45 P
State Street Sta. CT		72.8	---	---	---	---	L *7:07 A*	---	S *8:17 A*	---	---	S *10:22 A*	S *12:22 P*	---	---	---	---	S *3:30 P*	---	S *4:42 P*	---	S *5:20 P*	---	S *6:48 P*	---	---	---	---	S *9:47 P*
Branford Station (SLE)		81.4	---	---	---	---	L *7:19 A*	---	L *8:29 A*	---	---	L *10:34 A*	L *12:34 P*	---	---	---	---	L *3:42 P*	---	L *4:54 P*	---	L *5:32 P*	---	L *6:58 P*	---	---	---	---	L *9:59 P*
Guilford Station (SLE)		88.8	---	L 5:19 A	---	L 6:24 A	L 7:27 A	---	L 8:39 A	---	---	L 10:44 A	L 12:44 P	---	---	---	---	L 3:52 P	---	L 5:04 P	---	L 5:42 P	---	L 7:06 P	---	---	---	---	L 10:09 P
Madison, CT (SLE)		92.8	---	L 5:23 A	---	L 6:28 A	L 7:31 A	---	L 8:43 A	---	---	L 10:48 A	L 12:48 P	---	---	---	---	L 3:56 P	---	L 5:08 P	---	L 5:46 P	---	L 7:11 P	---	---	---	---	L 10:13 P
Clinton, CT (SLE)		96.8	---	L 5:27 A	---	L 6:32 A	L 7:35 A	---	L 8:48 A	---	---	L 10:53 A	L 12:53 P	---	---	---	---	L 4:01 P	---	L 5:13 P	---	L 5:51 P	---	L 7:16 P	---	---	---	---	L 10:18 P
Westbrook, Ct (SLE)		101.2	---	L 5:32 A	---	L 6:37 A	L 7:40 A	---	L 8:53 A	---	---	L 10:58 A	L 12:58 P	---	---	---	---	L 4:06 P	---	L 5:18 P	---	L 5:56 P	---	L 7:21 P	---	---	---	---	L 10:23 P
Old Saybrook	**Ar.**	**105.1**	S 5.15A	5:36 A	---	6:41 A	7:44 A	---	8:57 A	S 9.11A	---	11:02 A	1:02 P	S 1.15P	---	2.36P	S 4.15P	4:10 P	---	5:22 P	S 5.45P	6:00 P	---	7:27 P	7.34P	S 7.56P	---	S 10.12P	10:27 P
	DP.	**105.1**	S 5.15A	L 5:37 A	---	L 6:43 A	L 7:46 A	---	L 8:58 A	S 9.11A	---	L 11:08 A	L 1:03 P	S 1.15P	---	2.36P	S 4.15P	L 4:18 P	---	L 5:24 P	S 5.45P	L 6:02 P	---	L 7:36 P	7.34P	S 7.56P	---	S 10.12P	L 10:29 P
New London	**Ar.**	**122.9**	5.34A	A 6:00 A	Transfer	A 7:06 A	A 8:09 A	Transfer	A 9:23 A	S 9.31A	Transfer	A 11:29 A	A 1:25 P	S 1.35P	Transfer	S* 2.55P	S 4.35P	A 4:40 P	Transfer	A 5:46 P	S 6.06P	A 6:24 P	Transfer	A 7:58 P	7.51P	S 8.14P	Transfer	S 10.32P	A *10:50 P*
	DP.	**122.9**	S 5.35A	---	L 6:35 A	---	---	L 8:20 A	---	---	L 9:50 A	---	---	---	L 1:43 P	---	---	---	L 4:45 P	---	---	---	L 6:31 P	---	---	---	L 8:25 P	---	---
Conn College (New)		**2.0**		---	S 6:41 A		---	S 8:26 A	---	---	S 9:56 A	---	---	---	S 1:49 P	---	---	---	S 4:51 P	---	---	---	S 6:37 P	---	---	---	S 8:31 P	---	---
Montville (New)		**10.0**		---	S 6:55 A		---	S 8:40 A	---	---	S 10:10 A	---	---	---	S 2:03 P	---	---	---	S 5:05 P	---	---	---	S 6:51 P	---	---	---	S 8:45 P	---	---
Norwich (New)	**Ar.**	**13.0**		---	S 7:02 A		---	S 8:47 A	---	---	S 10:17 A	---	---	---	S 2:10 P	---	---	---	S 5:12 P	---	---	---	S 6:58 P	---	---	---	S 8:52 P	---	---
Mystic		**132.3**	S 5.49A	---	---	---	---	---	---	S 9.43A	---	---	---	1.45P	---	3.06P	4.46P	---	---	---	6.16P	---	---	---	S 8.03P	8.25P	---	S 10.44P	---
Westerly		**141.2**	S 6.01A	---	---	---	---	---	---	S 9.53A	---	---	---	1.53P	---	3.12P	S 4.56P	---	---	---	S 6.26P	---	---	---	S 8.13P	8.32P	---	S 10.54P	---
Kingston RI		**158.1**	S 6.18A	---	---	---	---	---	---	S 10.08A	---	---	---	S 2.07P	---	S 3.26P	S 5.12P	---	---	---	S* 6.42P	---	---	---	---	---	---	---	---
PROVIDENCE	**Ar.**	**185.1**	S 6.45A	---	---	---	---	---	---	10.28A	---	---	---	2.27P	---	3.45P	5.31P	---	---	---	7.02P	---	---	---	8.43P	9.08P	---	11.29P	---
	DP.	**185.1**	S 6.56A	---	---	---	---	---	---	S* 10.30A	---	---	---	S* 2.29P	---	S* 3.48P	S* 5.33P	---	---	---	S* 7.05P	---	---	---	S* 8.46P	S* 9.11P	---	S* 11.32P	---
Route 128		**217.3**	D 7.36A	---	---	---	---	---	---	D 10.56A	---	---	---	D 3.03P	---	D 4.18P	D 6.09P	---	---	---	D 7.44P	---	---	---	D 9.16P	D 9.44P	---	D 12.00P	---
Back Bay		**227.6**	D 7.54A	---	---	---	---	---	---	D 11.06A	---	---	---	D 3.14P	---	D 4.29P	D 6.25P	---	---	---	D 7.55P	---	---	---	D 9.30P	D 9.56P	---	D 12.11A	---
Boston		**228.7**	A 7.58A	---	---	---	---	---	---	A 11.10A	---	---	---	A 3.18P	---	A 4.38P	A 6.30P	---	---	---	A 8.02P	---	---	---	A 9.36P	A 10.02P	---	A 12.15A	---
MBTA, RIDOT, HARTFORD LINE, NEW HAVEN LINE TRAINS NOT SHOWN																													

Option 4 – Southbound

WEEKDAY PUBLIC SCHEDULE WITH NEW LONDON TO NORWICH SHUTTLE - ALTERNATIVE 4 - EASTERN CONNECTICUT RAIL CORRIDOR STUDY																																		
WESTBOUND TO NEW HAVEN		TRAIN	CD1627	CD5637	CD1637	CD1645	A95	CD5649	CD1649	A171	CD5659	CD1659	A93	A85	CD5667	CD1667	A173	CD1673	CD5677	A137	A175	CD1685	CD5685	CD1687	CD1693	A179	CD5697	CD1693	CD5697	CD1699	A67	A65
STATION		MILE	BL, A 1-4	A 4	BL, A 2,4	BL, A 2,4	M-F	A 4	BL, A 2,4	M-F	A 4	BL, A 2,4	M-F	M-F	A 4	BL, A 2,4	M-F	BL, A 2,4	A 4	M-F	M-F	BL, A 2,4	A 4	BL, A 2,4	BL, A 2,4	M-F	A 4	A 4	A 4	BL, A 2,4	Sun-Thu	FrSa
Boston		**228.7**	---	---	---	---	6.10A	---	---	S 8.15A	---	---	S 9.20A	S 10.20A	---	---	S 11.10A	---	---	S 1.50P	S 3.20P	---	---	---	---	6.45P	---	---	---	---	S 9.30P	S 9.30P
Back Bay		**227.6**	---	---	---	---	S 6.15A	---	---	S 8.21A	---	---	S 9.26A	S 10.26A	---	---	S 11.16A	---	---	S 1.56P	S 3.26P	---	---	---	---	S 6.51P	---	---	---	---	S 9.36P	S 9.36P
Route 128		**217.3**	---	---	---	---	S 6.25A	---	---	S 8.31A	---	---	S 9.36A	S 10.37A	---	---	S 11.27A	---	---	S 2.07P	S 3.37P	---	---	---	---	S 7.01P	---	---	---	---	S 9.50P	S 9.50P
PROVIDENCE		**185.1**	---	---	---	---	S 6.48A	---	---	S 8.54A	---	---	S 9.58A	S 10.59A	---	---	S 11.49A	---	---	2.31P	S 3.59P	---	---	---	---	S 7.23P	---	---	---	---	S 10.19P	S 10.19P
PROVIDENCE		**185.1**	---	---	---	---	S 6.50A	---	---	S 8.55A	---	---	S 10.01A	S 11.01A	---	---	S 11.51A	---	---	S* 2.39P	S 4.01P	---	---	---	---	S 7.25P	---	---	---	---	S 10.22P	S 10.22P
Kingston RI		**158.1**	---	---	---	---	S 7.11A	---	---	S 9.15A	---	---	S 10.22A	---	---	---	S 12.11P	---	---	S 3.00P	S 4.22P	---	---	---	---	S 7.45P	---	---	---	---	S 10.48P	S 10.48P
Westerly		**141.2**	---	---	---	---	S 7.25A	---	---	---	---	---	S 10.36A	---	---	---	---	---	---	S 3.15P	---	---	---	---	---	---	---	---	---	---	S 11.05P	S 11.05P
Mystic		**132.3**	---	---	---	---	---	---	---	---	---	---	S 10.46A	---	---	---	---	---	---	S 3.25P	S 4.44P	---	---	---	---	---	---	---	---	---	S 11.17P	S 11.17P
Norwich (New)		**13.0**	---	S 5:53 A	---	---	---	S 7:38 A	---	---	S 9:06 A	---	---	---	S 11:18 A	---	---	---	S 3:05 P	---	---	---	S 5:33 P	---	---	---	S 7:38 P	---	S 10:28 P	---	---	---
Montville (New)		**10.0**	---	S 5:59 A	---	---	---	S 7:44 A	---	---	S 9:12 A	---	---	---	S 11:24 A	---	---	---	S 3:11 P	---	---	---	S 5:39 P	---	---	---	S 7:44 P	---	S 10:34 P	---	---	---
Conn College (New)		**2.0**	---	S 6:12 A	---	---	---	S 7:57 A	---	---	S 9:25 A	---	---	---	S 11:37 A	---	---	---	S 3:24 P	---	---	---	S 5:52 P	---	---	---	S 7:57 P	---	S 10:47 P	---	---	---
New London	**Ar.**	**122.9**	---	*6:20 A*	---	---	*7:44*	*8:05 A*	---	S 9.47A	*9:33 A*	---	S 11.01A	---	*11:45 A*	---	S 12.42P	---	*3:32 P*	*3:37 P*	S 4.56P	---	*6:00 P*	---	---	S 8.16P	*8:05 P*	---	*10:55 P*	---	S 11.30P	S 11.30P
	DP.	**122.9**	R 5:20 A	Transfer	S 6:30 A	S 7:24 A	S 7.45A	Transfer	S 8:24 A	S 9.48A	Transfer	S 9:38 A	S 11.02A	---	Transfer	S 11:55 A	S 12.43P	S 2:17 P	Transfer	S 3.38P	S 4.57P	S 5:05 P	Transfer	S 6:05 P	S 7:30 P	S 8.17P	Transfer	S 8:30 P	Transfer	S 11:05 P	S 11.31P	S 11.31P
Old Saybrook	**Ar.**	**105.1**	5:39 A	---	6:49 A	7:43 A	S 8.04A	---	8:45 A	---	---	10:00 A	S 11.21A	S 12.08P	---	12:14 P	---	2:36 P	---	S 3.58P	S 5.15P	5:24 P	---	6:24 P	7:49 P	S 8.36P	---	8:49 P	---	11:24 P	H 11.53P	S 11.53P
	DP.	**105.1**	R 5:42 A	---	S 6:52 A	S 7:46 A	S 8.04A	---	S 8:50 A	---	---	S 10:06 A	S 11.21A	S 12.08P	---	S 12:16 P	---	S 2:44 P	---	S 3.58P	S 5.15P	S 5:26 P	---	S 6:26 P	S 7:51 P	S 8.36P	---	S 8:50 P	---	S 11:26 P	H 11.53P	S 11.53P
Westbrook, Ct (SLE)		101.2	S 5:47 A	---	S 6:57 A	S 7:51 A	---	---	S 8:55 A	---	---	S 10:11 A	---	---	---	S 12:21 P	---	S 2:49 P	---	---	---	S 5:31 P	---	S 6:31 P	S 7:56 P	---	---	S 8:55 P	---	S 11:31 P	---	---
Clinton, CT (SLE)		96.8	S 5:52 A	---	S 7:02 A	S 7:56 A	---	---	S 9:00 A	---	---	S 10:16 A	---	---	---	S 12:26 P	---	S 2:54 P	---	---	---	S 5:36 P	---	S 6:36 P	S 8:01 P	---	---	S 9:00 P	---	S 11:36 P	---	---
Madison, CT (SLE)		92.8	S 5:57 A	---	S 7:07 A	S 8:01 A	---	---	S 9:05 A	---	---	S 10:21 A	---	---	---	S 12:31 P	---	S 2:59 P	---	---	---	S 5:41 P	---	S 6:41 P	S 8:06 P	---	---	S 9:05 P	---	S 11:41 P	---	---
Guilford Station (SLE)		88.8	S 6:03 A	---	S 7:12 A	S 8:06 A	---	---	S 9:11 A	---	---	S 10:26 A	---	---	---	S 12:36 P	---	S 3:04 P	---	---	---	S 5:46 P	---	S 6:46 P	S 8:11 P	---	---	S 9:10 P	---	S 11:46 P	---	---
Branford Station (SLE)		81.4	S 6:11 A	---	S 7:20 A	S 8:14 A	---	---	S 9:19 A	---	---	S 10:34 A	---	---	---	S 12:44 P	---	S 3:12 P	---	---	---	S 5:54 P	---	S 6:54 P	S 8:19 P	---	---	S 9:18 P	---	---	---	---
State Street Sta. CT		72.8	S 6:23 A	---	S 7:32 A	S 8:26 A	---	---	S 9:31 A	---	---	S 10:46 A	---	---	---	S 12:56 P	---	S 3:24 P	---	---	---	S 6:06 P	---	S 7:06 P	S 8:31 P	---	---	S 9:30 P	---	---	---	---
New Haven	**Ar.**	**72.3**	A 6:25 A	---	7:35 A	A 8:30 A	S 8.41A	---	A 9:34 A	S 10.38A	---	A 10:49 A	S 11.54A	S 12.40P	---	A 12:59 P	S 1.33P	A 3:27 P	---	S 4.28P	S 5.43P	A 6:09 P	---	A 7:09 P	A 8:34 P	S 9.08P	---	A 9:33 P	---	A *12:08 A*	12.30A	12.30A
	DP.			---	S 7:38 A		S 8.43A	---		S 10.40A	---		S 11.58A	S 12.42P	---		S 1.35P		---	S 4.31P	S 5.45P		---			S 9.10P	---		---		H 12.55A	H 12.55A
MBTA, RIDOT, HARTFORD LINE, NEW HAVEN LINE TRAINS NOT SHOWN																																		

Option 5 – Northbound

WEEKDAY PUBLIC SCHEDULE WITH NEW LONDON TO NORWICH HYBRID SERVICE - ALTERNATIVE 5 - EASTERN CONNECTICUT RAIL CORRIDOR STUDY																																
EASTBOUND TO WESTERLY		TRAIN	A66	CD1600	CD5600	CD1604	CD5604	CD1608	A190	CD5608	CD1610	CD1618	A172	CD5618	A86	A174	CD1632	CD5632	CD1634	A176	CD1638	CD5638	CD1646	A184	A94	CD5646	A178	CD1652
STATION		Alt.	Daily	BL, A 2,4,5	A 4,5	BL, A 2,4,5	A 4,5	BL, A 2,4,5	M-F	A 4,5	BL, A 2,4,5	BL, A 2,4,5	M-F	A 4,5	M-F	M-F	BL, A 2,4	A 4,5	A 3,5	M-F	BL, A 2,4	A 4,5	A 4,5	M-F	M-F	A 4,5	M-F	BL A 1-5
New Haven	**Ar.**	**72.3**	S 4.26A		---		---		S 8.38A	---			S 12.44P	---	S 2.08P	S 3.42P		---		S 5.12P		---		S 7.01P	S 7.25P	---	S 9.40P	
	DP.	**72.3**	S 4.43A	R 5:00 A	---	R 7:05 A	---	R 8:15 A	S 8.41A	---	R 10:20 A	R 12:20 P	S 12.46P	---	S 2.10P	S 3.44P	R 3:28 P	---	R 4:40 P	S 5.15P	R 5:18 P	---	R 6:46 P	S 7.03P	S 7.27P	---	S 9.42P	R 9:45 P
State Street Sta. CT		72.8	---	---	---	L *7:07 A*	---	S *8:17 A*	---	---	S *10:22 A*	S *12:22 P*	---	---	---	---	S *3:30 P*	---	S *4:42 P*	---	S *5:20 P*	---	S *6:48 P*	---	---	---	---	S *9:47 P*
Branford Station (SLE)		81.4	---	---	---	*7:19 A*	---	L *8:29 A*	---	---	L *10:34 A*	L *12:34 P*	---	---	---	---	L *3:42 P*	---	L *4:54 P*	---	L *5:32 P*	---	L *6:58 P*	---	---	---	---	L *9:59 P*
Guilford Station (SLE)		88.8	---	L 5:19 A	---	L 7:27 A	---	L 8:39 A	---	---	L 10:44 A	L 12:44 P	---	---	---	---	L 3:52 P	---	L 5:04 P	---	L 5:42 P	---	L 7:06 P	---	---	---	---	L 10:09 P
Madison, CT (SLE)		92.8	---	L 5:23 A	---	L 7:31 A	---	L 8:43 A	---	---	L 10:48 A	L 12:48 P	---	---	---	---	L 3:56 P	---	L 5:08 P	---	L 5:46 P	---	L 7:11 P	---	---	---	---	L 10:13 P
Clinton, CT (SLE)		96.8	---	L 5:27 A	---	L 7:35 A	---	L 8:48 A	---	---	L 10:53 A	L 12:53 P	---	---	---	---	L 4:01 P	---	L 5:13 P	---	L 5:51 P	---	L 7:16 P	---	---	---	---	L 10:18 P
Westbrook, Ct (SLE)		101.2	---	L 5:32 A	---	L 7:40 A	---	L 8:53 A	---	---	L 10:58 A	L 12:58 P	---	---	---	---	L 4:06 P	---	L 5:18 P	---	L 5:56 P	---	L 7:21 P	---	---	---	---	L 10:23 P
Old Saybrook	**Ar.**	**105.1**	S 5.15A	5:36 A	---	7:44 A	---	8:57 A	S 9.11A	---	11:02 A	1:02 P	S 1.15P	---	2.36P	S 4.15P	4:10 P	---	5:22 P	S 5.45P	6:00 P	---	7:27 P	7.34P	S 7.56P	---	S 10.12P	10:27 P
	DP.	**105.1**	S 5.15A	L 5:37 A	---	L 7:46 A	---	L 8:58 A	S 9.11A	---	L 11:08 A	L 1:03 P	S 1.15P	---	2.36P	S 4.15P	L 4:18 P	---	L 5:24 P	S 5.45P	L 6:02 P	---	L 7:36 P	7.34P	S 7.56P	---	S 10.12P	L 10:29 P
New London	**Ar.**	**122.9**	5.34A	A 6:00 A	Transfer	A 8:09 A	Transfer	A 9:23 A	S 9.31A	Transfer	A 11:29 A	A 1:25 P	S 1.35P	Transfer	S* 2.55P	S 4.35P	A 4:40 P	Transfer	*5:45 P*	S 6.06P	A 6:24 P	Transfer	A 7:58 P	7.51P	S 8.14P	Transfer	S 10.32P	A *10:50 P*
	DP.	**122.9**	S 5.35A	---	L 6:35 A	---	L 8:20 A	---	---	L 9:50 A	Equip Swap	---	---	L 1:43 P	---	---	---	L 4:45 P	S 5:47 P	---	---	L 6:31 P	---	---	---	L 8:25 P	---	---
Conn College (New)		**2.0**	---	---	S 6:41 A	---	S 8:26 A	---	---	S 9:56 A	---	---	---	S 1:49 P	---	---	---	S 4:51 P	S 5:53 P	---	---	S 6:37 P	---	---	---	S 8:31 P	---	---
Montville (New)		**10.0**	---	---	S 6:55 A	---	S 8:40 A	---	---	S 10:10 A	---	---	---	S 2:03 P	---	---	---	S 5:05 P	S 6:07 P	---	---	S 6:51 P	---	---	---	S 8:45 P	---	---
Norwich (New)	**Ar.**	**13.0**	---	---	S 7:02 A	---	S 8:47 A	---	---	S 10:17 A	---	---	---	S 2:10 P	---	---	---	S 5:12 P	S 6:14 P	---	---	S 6:58 P	---	---	---	S 8:52 P	---	---
Mystic		**132.3**	S 5.49A	---	---	---	---	---	S 9.43A	---	---	---	---	---	---	---	---	---	---	---	---	---	---	S 8.03P	---	---	S 10.44P	---
Westerly		**141.2**	S 6.01A	---	---	---	---	---	S 9.53A	---	---	---	---	---	---	S 4.56P	---	---	---	S 6.26P	---	---	---	S 8.13P	---	---	S 10.54P	---
Kingston RI		**158.1**	S 6.18A	---	---	---	---	---	S 10.08A	---	---	---	S 2.07P	---	S 3.26P	S 5.12P	---	---	---	S* 6.42P	---	---	---	---	---	---	---	---
PROVIDENCE	**Ar.**	**185.1**	S 6.45A	---	---	---	---	---	10.28A	---	---	---	2.27P	---	3.45P	5.31P	---	---	---	7.02P	---	---	---	8.43P	9.08P	---	11.29P	---
	DP.	**185.1**	S 6.56A	---	---	---	---	---	S* 10.30A	---	---	---	S* 2.29P	---	S* 3.48P	S* 5.33P	---	---	---	S* 7.05P	---	---	---	S* 8.46P	S* 9.11P	---	S* 11.32P	---
Route 128		**217.3**	D 7.36A	---	---	---	---	---	D 10.56A	---	---	---	D 3.03P	---	D 4.18P	D 6.09P	---	---	---	D 7.44P	---	---	---	D 9.16P	D 9.44P	---	D 12.00P	---
Back Bay		**227.6**	D 7.54A	---	---	---	---	---	D 11.06A	---	---	---	D 3.14P	---	D 4.29P	D 6.25P	---	---	---	D 7.55P	---	---	---	D 9.30P	D 9.56P	---	D 12.11A	---
Boston		**228.7**	A 7.58A	---	---	---	---	---	A 11.10A	---	---	---	A 3.18P	---	A 4.38P	A 6.30P	---	---	---	A 8.02P	---	---	---	A 9.36P	A 10.02P	---	A 12.15A	---
MBTA, RIDOT, HARTFORD LINE, NEW HAVEN LINE TRAINS NOT SHOWN																												

Option 5 - Southbound

WEEKDAY PUBLIC SCHEDULE WITH NEW LONDON TO NORWICH HYBRID SERVICE - ALTERNATIVE 5 - EASTERN CONNECTICUT RAIL CORRIDOR STUDY																																
WESTBOUND TO NEW HAVEN		TRAIN	CD1627	CD5637	CD1637	CD1645	A95	CD5649	CD1649	A171	CD5659	CD1659	A93	A85	CD5667	CD1667	A173	CD1673	CD5677	A137	A175	CD1685	CD5689	CD1689	1693	A179	CD5697	CD1697	5699	CD1699	A67	A65
STATION		MILE	BL, A 1-5	A 4,5	BL, A 2,4,5	A 3,5	M-F	A 4,5	BL, A 2,4,5	M-F	A 4,5	BL, A 2,4,5	M-F	M-F	A 4,5	BL, A 2,4,5	M-F	BL, A 2,4,5	A 4,5	M-F	M-F	BL, A 2,4,5	A 5	A 5	A 5	M-F	A 5	A 5	A 5	BL, A 2,4,5	Sun-Thu	FrSa
Boston		**228.7**		---	---	---	6.10A	---	---	S 8.15A	---	---	S 9.20A	S 10.20A	---	---	S 11.10A	---	---	S 1.50P	S 3.20P	---	---	---	---	6.45P	---	---	---	---	S 9.30P	S 9.30P
Back Bay		**227.6**	---	---	---	---	S 6.15A	---	---	S 8.21A	---	---	S 9.26A	S 10.26A	---	---	S 11.16A	---	---	S 1.56P	S 3.26P	---	---	---	---	S 6.51P	---	---	---	---	S 9.36P	S 9.36P
Route 128		**217.3**	---	---	---	---	S 6.25A	---	---	S 8.31A	---	---	S 9.36A	S 10.37A	---	---	S 11.27A	---	---	S 2.07P	S 3.37P	---	---	---	---	S 7.01P	---	---	---	---	S 9.50P	S 9.50P
PROVIDENCE		**185.1**	---	---	---	---	S 6.48A	---	---	S 8.54A	---	---	S 9.58A	S 10.59A	---	---	S 11.49A	---	---	2.31P	S 3.59P	---	---	---	---	S 7.23P	---	---	---	---	S 10.19P	S 10.19P
PROVIDENCE		**185.1**	---	---	---	---	S 6.50A	---	---	S 8.55A	---	---	S 10.01A	S 11.01A	---	---	S 11.51A	---	---	S* 2.39P	S 4.01P	---	---	---	---	S 7.25P	---	---	---	---	S 10.22P	S 10.22P
Kingston RI		**158.1**	---	---	---	---	S 7.11A	---	---	S 9.15A	---	---	S 10.22A	---	---	---	S 12.11P	---	---	S 3.00P	S 4.22P	---	---	---	---	S 7.45P	---	---	---	---	S 10.48P	S 10.48P
Westerly		**141.2**	---	---	---	---	S 7.25A	---	---	---	---	---	S 10.36A	---	---	---	---	---	---	S 3.15P	---	---	---	---	---	---	---	---	---	---	S 11.05P	S 11.05P
Mystic		**132.3**	---	---	---	---	---	---	---	---	---	---	S 10.46A	---	---	---	---	---	---	S 3.25P	S 4.44P	---	---	---	---	---	---	---	---	---	S 11.17P	S 11.17P
Norwich (New)		**13.0**	---	S 5:53 A	---	S 6:56 A	---	S 7:38 A	---	---	S 9:06 A	---	---	---	S 11:18 A	---	---	---	S 3:05 P	---	---	---	S 5:43 P	---	S 7:13 P	---	S 7:48 P	---	S 10:28 P	---	---	---
Montville (New)		**10.0**	---	S 5:59 A	---	S 7:02 A	---	S 7:44 A	---	---	S 9:12 A	---	---	---	S 11:24 A	---	---	---	S 3:11 P	---	---	---	S 5:49 P	---	S 7:19 P	---	S 7:54 P	---	S 10:34 P	---	---	---
Conn College (New)		**2.0**	---	S 6:12 A	---	S 7:15 A	---	S 7:57 A	---	---	S 9:25 A	---	---	---	S 11:37 A	---	---	---	S 3:24 P	---	---	---	S 6:07 P	---	S 7:36 P	---	S 8:07 P	---	S 10:47 P	---	---	---
New London	**Ar.**	**122.9**	---	*6:20 A*	---	*7:23 A*	*7:44*	*8:05 A*	---	S 9.47A	*9:33 A*	---	S 11.01A	---	*11:45 A*	---	S 12.42P	---	*3:32 P*	*3:37 P*	S 4.56P	---	*6:15 P*	---	*7:44 P*	S 8.16P	*8:15 P*	---	*10:55 P*	---	S 11.30P	S 11.30P
	DP.	**122.9**	R 5:20 A	Transfer	S 6:30 A	S 7:24 A	S 7.45A	Transfer	S 8:24 A	S 9.48A	Transfer	S 9:38 A	S 11.02A	---	Transfer	S 11:55 A	S 12.43P	S 2:17 P	Transfer	S 3.38P	S 4.57P	S 5:05 P	Transfer	S 6:45 P	S 7:45 P	S 8.17P	Transfer	S 8:30 P	Transfer	S 11:05 P	S 11.31P	S 11.31P
Old Saybrook	**Ar.**	**105.1**	5:39 A	---	6:49 A	7:43 A	S 8.04A	---	8:45 A	---	---	10:00 A	S 11.21A	S 12.08P	---	12:14 P	---	2:36 P	---	S 3.58P	S 5.15P	5:24 P	---	7:04 P	8:04 P	S 8.36P	---	8:49 P	---	11:24 P	H 11.53P	S 11.53P
	DP.	**105.1**	R 5:42 A	---	S 6:52 A	S 7:46 A	S 8.04A	---	S 8:50 A	---	---	S 10:06 A	S 11.21A	S 12.08P	---	S 12:16 P	---	S 2:44 P	---	S 3.58P	S 5.15P	S 5:26 P	---	S 7:06 P	S 8:06 P	S 8.36P	---	S 8:50 P	---	S 11:26 P	H 11.53P	S 11.53P
Westbrook, Ct (SLE)		101.2	S 5:47 A	---	S 6:57 A	S 7:51 A	---	---	S 8:55 A	---	---	S 10:11 A	---	---	---	S 12:21 P	---	S 2:49 P	---	---	---	S 5:31 P	---	S 7:11 P	S 8:11 P	---	---	S 8:55 P	---	S 11:31 P	---	---
Clinton, CT (SLE)		96.8	S 5:52 A	---	S 7:02 A	S 7:56 A	---	---	S 9:00 A	---	---	S 10:16 A	---	---	---	S 12:26 P	---	S 2:54 P	---	---	---	S 5:36 P	---	S 7:16 P	S 8:16 P	---	---	S 9:00 P	---	S 11:36 P	---	---
Madison, CT (SLE)		92.8	S 5:57 A	---	S 7:07 A	S 8:01 A	---	---	S 9:05 A	---	---	S 10:21 A	---	---	---	S 12:31 P	---	S 2:59 P	---	---	---	S 5:41 P	---	S 7:21 P	S 8:21 P	---	---	S 9:05 P	---	S 11:41 P	---	---
Guilford Station (SLE)		88.8	S 6:03 A	---	S 7:12 A	S 8:06 A	---	---	S 9:11 A	---	---	S 10:26 A	---	---	---	S 12:36 P	---	S 3:04 P	---	---	---	S 5:46 P	---	S 7:26 P	S 8:26 P	---	---	S 9:10 P	---	S 11:46 P	---	---
Branford Station (SLE)		81.4	S 6:11 A	---	S 7:20 A	S 8:14 A	---	---	S 9:19 A	---	---	S 10:34 A	---	---	---	S 12:44 P	---	S 3:12 P	---	---	---	S 5:54 P	---	S 7:34 P	S 8:34 P	---	---	S 9:18 P	---	---	---	---
State Street Sta. CT		72.8	S 6:23 A	---	S 7:32 A	S 8:26 A	---	---	S 9:31 A	---	---	S 10:46 A	---	---	---	S 12:56 P	---	S 3:24 P	---	---	---	S 6:06 P	---	S 7:46 P	S 8:46 P	---	---	S 9:30 P	---	---	---	---
New Haven	**Ar.**	**72.3**	A 6:25 A	---	7:35 A	A 8:30 A	S 8.41A	---	A 9:34 A	S 10.38A	---	A 10:49 A	S 11.54A	S 12.40P	---	A 12:59 P	S 1.33P	A 3:27 P	---	S 4.28P	S 5.43P	A 6:09 P	---	A 7:49 P	A 8:49 P	S 9.08P	---	A 9:33 P	---	A *12:08 A*	12.30A	12.30A
	DP.		---	---	S 7:38 A		S 8.43A	---	---	S 10.40A	---	---	S 11.58A	S 12.42P	---	---	S 1.35P	---	---	S 4.31P	S 5.45P	---	---	---	---	S 9.10P	---	---	---	---	H 12.55A	H 12.55A
MBTA, RIDOT, HARTFORD LINE, NEW HAVEN LINE TRAINS NOT SHOWN																																

Exhibit B: Capital Costs for Most Viable Options

Option 1:

Stations

Component	Variable	Minimum Cost (2023 dollars)	Maximum Cost (2023 dollars)
Passenger platforms	400’ to 800’ long	$14,500,000	$17,500,000
Canopies/shelters	2,000 to 4,000 sf	$1,000,000	$3,000,000
Foundations	Mini-piles, CIP	$1,500,000	$3,000,000
Accessible walkways/ramps	4 locations from grade to platforms	$250,000	$500,000
Stairways	4 locations from grade to platforms	$250,000	$500,000
Station signage	MBTA standards, ADA	$500,000	$1,000,000
Lighting & emergency power	MBTA requirements	$1,500,000	$3,000,000
Communications systems	VMS, PAT, Public Address	$750,000	$1,500,000
CCTV	Coverage on platforms and access	$300,000	$600,000
Track & signal modifications	Adjustments or replacements	$500,000	$3,000,000
Sitework	Earthwork, drainage, utilities, etc.	$10,000,000	$14,000,000
Amenities	Bike racks, benches, fence, railings	$1,000,000	$2,000,000
Contingencies	25%	$8,000,000	$14,000,000
		Avg. Cost	**$52,000,000**
		Avg. Cost (2035 dollars)	**$75,000,000**

Source: AECOM Analysis, 2023.

High-Level Boarding Platforms

Component	Variable	Minimum Cost	Maximum Cost
Passenger platforms	400’ to 800’ long	$14,500,000	$17,500,000
		Avg. Cost (2023 dollars)	**$16,000,000**
		Avg. Cost (2035 dollars)	**$23,000,000**

Source: AECOM Analysis, 2023.

Electrifying Storage Rail at Westerly Station

Component	Quantity	Unit	Unit Price (2023 dollars)	Total Price (2023 dollars)
Overhead catenary	1800	LF	$350	$630,000
Cantilever assemblies	8	EA	$5,000	$40,000
Down guys	2	EA	$6,000	$12,000
Soil anchor	2	EA	$35,000	$70,000
Catenary section insulator	1	EA	$12,000	$12,000
Manual disconnect switch	1	EA	$20,000	$20,000
Catenary cantilever column and foundation	8	EA	$40,000	$320,000
Catenary dead-end pole/foundation	1	EA	$45,000	$45,000
4/0 static wire	1600	LF	$15	$24,000
Electric lock	1	EA	$50,000	$50,000
			Construction Estimate Total	$1,223,000
			Design (12%), Construction Management (15%), Owner Oversight (10%), Railroad Force Account (35%) Subtotal	$2,103,560
			Contingency (35%)	$736,246
			Total Cost	**$2,839,806**
			Total Cost Estimate (2035 dollars)	**$4,000,000**

Source: AECOM Analysis, 2023.

MP124 to MP128 Track Upgrade

Component	Quantity	Unit	Unit Price (2023 dollars)	Total Price (2023 dollars)
New track	21,120	LF	$440	$9,292,800
Electrification (no poles)	1	LS	$23,941,376	$23,941,376
Switches	2	EA	$351,500	$703,000
			Total Cost	**$33,937,176**
			Total Cost Estimate (2035 dollars)	**$48,000,000**

Source: AECOM Analysis, 2023. Nashua-Manchester 40818 (Capital Corridor): Capital Costs Summary, 2023.

High St. Interlocking Turn Track

Component	Quantity	Unit	Unit Price	Total Price
Turnout	1	LS	$357,000	$357,000
			Total Cost (2023 dollars)	**$357,000**
			Total Cost Estimate (2035 dollars)	**$509,000**

Source: Nashua-Manchester 40818 (Capital Corridor): Capital Costs Summary, 2023.

4-Car M8 Trainset

Component	Quantity	Unit	Unit Price	Total Price
M8 Trainset Car	4	EA	$4,516,986	$18,067,872
			Total Cost (2023 dollars)	**$18,067,872**
			Total Cost Estimate (2035 dollars)	**$26,000**

Source: Press Release: Gov. Malloy Continues Investment in Rail Through Purchase of 25 Additional M-8 Cars for New Haven Line, 2011. https://portal.ct.gov/Malloy-Archive/Press-Room/Press-Releases/2011/07-2011/Governor-Malloy-Continues-Investment-in-Rail-Through-Purchase-of-25-Additional-M8-Cars-for-New-Haven. Inflated to 2023 dollars.

Option 5

Corridor Construction Costs

Component	Total Price (2023 dollars)
Subtotal civil/sitework (ballast & structures)	$58,500,000
Subtotal minor item allowance (25% of civil/sitework)	$14,600,000
Subtotal lump sum items	$34,400,000
Design contingency (20% civil/sitework, minor item, lump sum)	$21,500,000
Subtotal ROW fencing	$2,148,800
Subtotal additional items (track, grade crossings, PTC)	$71,100,000
Subtotal contingencies/utilities/incidentals	$74,000,000
Subtotal escalation	$112,500,000
Total Cost	**$388,748,800**
Total Cost Estimate (2035 dollars)	**$554,000,000**

Source: Thames River Corridor Assessment, AECOM, 2023. Nashua-Manchester 40818 (Capital Corridor): Capital Costs Summary, 2023.

Stations

Component	Variable	Minimum Cost (2023 dollars)	Maximum Cost (2023 dollars)
Passenger platforms	400' to 800' long	$14,500,000	$17,500,000
Canopies/shelters	2,000 to 4,000 sf	$1,000,000	$3,000,000
Foundations	Mini-piles, CIP	$1,500,000	$3,000,000
Accessible walkways/ramps	4 locations from grade to platforms	$250,000	$500,000
Stairways	4 locations from grade to platforms	$250,000	$500,000
Station signage	MBTA standards, ADA	$500,000	$1,000,000
Lighting & emergency power	MBTA requirements	$1,500,000	$3,000,000
Communications systems	VMS, PAT, Public Address	$750,000	$1,500,000
CCTV	Coverage on platforms and access	$300,000	$600,000
Track & signal modifications	Adjustments or replacements	$500,000	$3,000,000
Sitework	Earthwork, drainage, utilities, etc.	$10,000,000	$14,000,000
Amenities	Bike racks, benches, fence, railings	$1,000,000	$2,000,000
Contingencies	25%	$8,000	$14,000,000
		Avg. Cost	**$52,000,000**
		Avg. Cost (2035 dollars)	**$75,000,000**

Source: AECOM Analysis, 2023.

New London Yard Space

Component	Quantity	Unit	Total Price
Yard space	1	LS	$75,000,000
		Total Cost (2023 dollars)	**$75,000,000**
		Total Cost (2035 dollars)	**$107,000,000**

Source: STV Estimates, 2023.

Trainset

Component	Total Price
GP40 Diesel Locomotive	$16,000,000
	Total Cost (2023 dollars) **$16,000,000**
	Total Cost (2035 dollars) **$23,000,000**

Source: 2022-2025 Public Transportation Transit Asset Management Plan, CTDOT, 2022. https://portal.ct.gov/-/media/DOT/documents/dptransportation/PTAMP/CTDOT-PT-TAMP-2022-Final.pdf

Exhibit C: Revenue Forecasting Fare Tables

Shore Line East Proposed Fare Table 2023, Expanded to Include New Passenger Rail Service

	New Haven	Branford	Guilford	Madison	Clinton	Westbrook	Old Saybrook	New London	Groton West	Mystic	Stonington Borough
Branford	$3.50										
Guilford	$4.50	$3.50									
Madison	$5.25	$3.50	$3.50								
Clinton	$6.00	$4.75	$4.75	$4.75							
Westbrook	$7.75	$4.75	$4.75	$4.75	$3.50						
Old Saybrook	$7.50	$4.75	$4.75	$4.75	$3.50	$3.50					
New London	$10.75	$7.50	$7.50	$7.50	$4.75	$4.75	$4.75				
Groton West	$11.50	$8.25	$8.25	$8.25	$5.50	$5.50	$5.50	$3.50			
Mystic	$12.25	$9.00	$9.00	$9.00	$6.25	$6.25	$6.25	$4.25	$3.50		
Stonington Borough	$13.00	$9.75	$9.75	$9.75	$7.00	$7.00	$7.00	$5.00	$4.25	$3.50	
Westerly	$13.75	$10.50	$10.50	$10.50	$7.75	$7.75	$7.75	$5.75	$5.00	$4.25	$3.50

Light grey denotes existing fare between stations, dark grey denotes proposed station fares. Average Fare: $7.50 for a one-way ticket to proposed stations.

Palmer Line Estimated Fare

	New London	Conn. College/US Coast Guard Academy	Mohegan Sun
Conn. College/ US Coast Guard Academy	$3.50		
Mohegan Sun	$4.25	$3.50	
Norwich	$5.00	$3.25	$3.50

Average Fare: $4.00 for a one-way ticket to proposed station