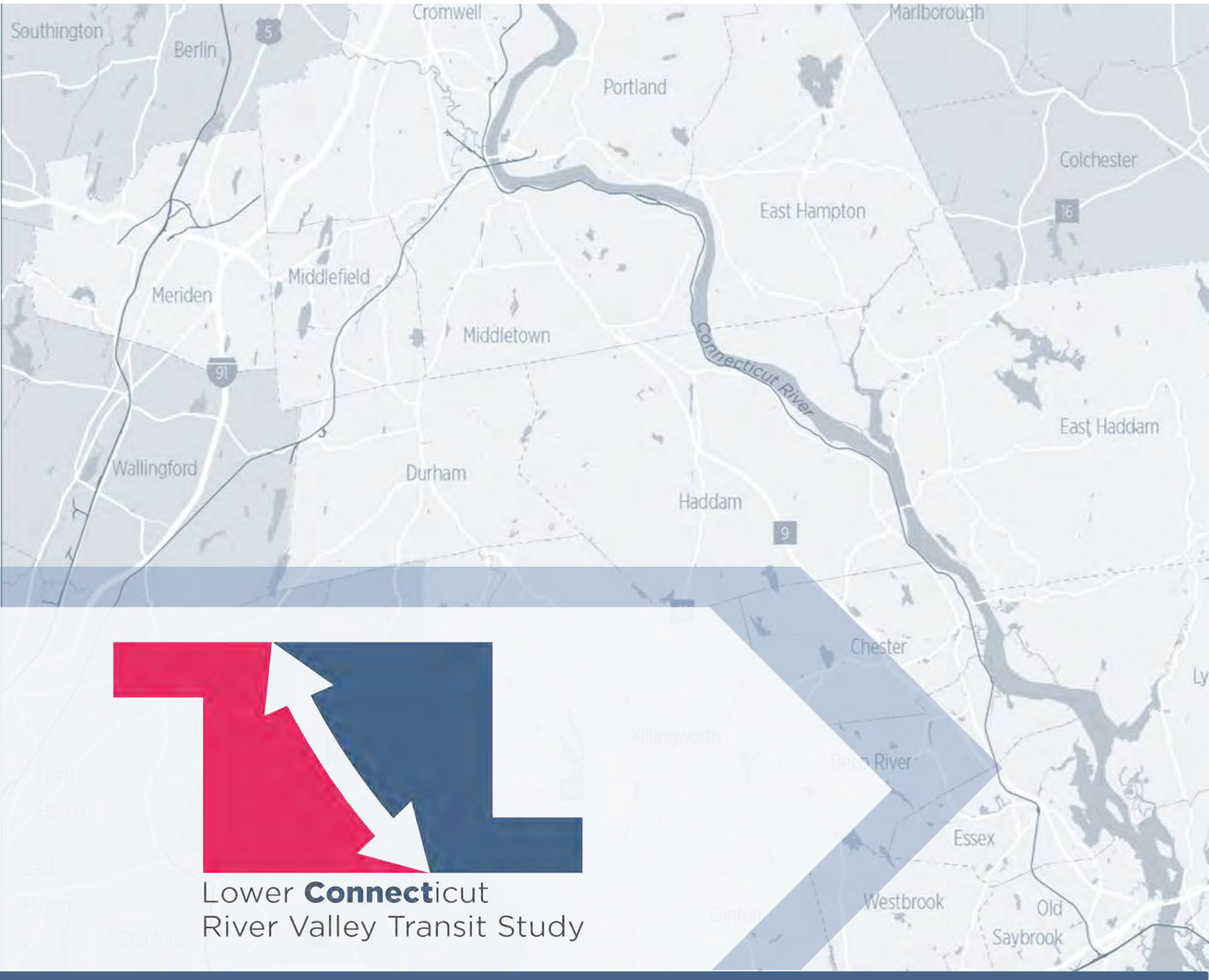
Lower Connecticut River Valley Transit Study

Service Improvement Report

November 30, 2020



Lower **Connecti**cut River Valley Transit Study

RiverCOG
Lower Connecticut River Valley Council of Governments

Connecticut Department of Transportation

Middletown Area Transit MAT

9 Town Transit

Nelson Nygaard

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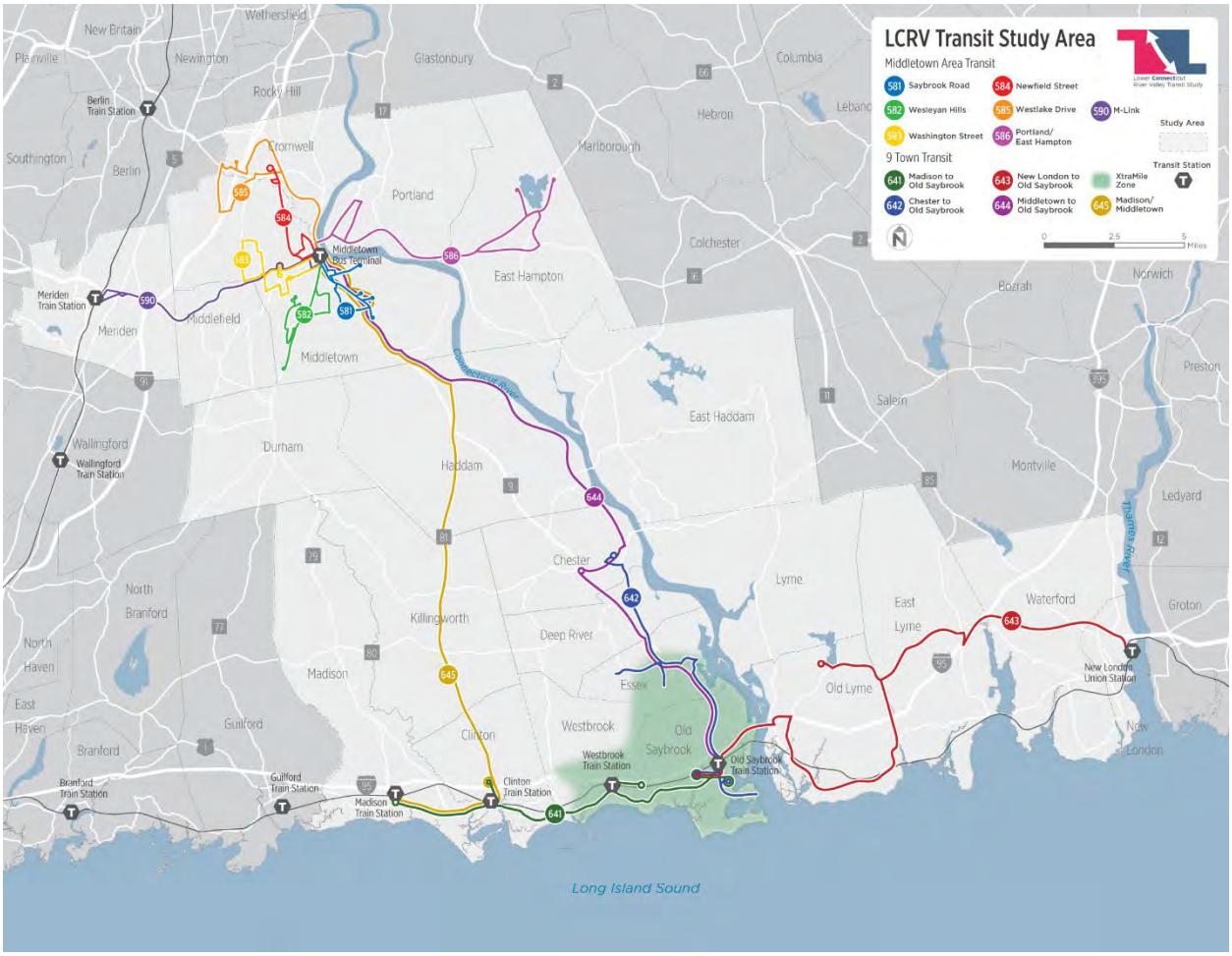
1 Introduction

The Lower Connecticut River Valley (LCRV) Transit Study has assessed the performance and delivery of transit in a 17-community region in south central Connecticut. Today, the region is primarily served by two local public transit districts: Middletown Transit District, known as Middletown Area Transit (MAT), operating in the northern part of the region centered around Middletown; and Estuary Transit District, known as 9 Town Transit (9 Town), serving a broader area to the south. The existing transit services are shown in Figure 1.

Figure 1 | Existing Middletown Area Transit and 9 Town Transit Routes



Three project goals were identified to capture desired service delivery and service performance results. These goals and corresponding objectives are shown in Figure 2.

Figure 2 | Project Goals and Objectives

GOAL 1: ACHIEVE EFFICIENCIES IN SERVICE DELIVERY
Consider the overall cost of service delivery
Use existing and planned assets efficiently
Provide opportunity and capacity for growth
GOAL 2: IMPLEMENT RECOMMENDATIONS
Identify a practical and implementable plan
Identify changes that have a high level of public and political support
GOAL 3: IMPROVE REGIONAL TRANSIT SERVICE
Better meet existing passenger needs
Attract new riders
Help people live independently
Offer equitable service

A separate companion document, the *LCRV Transit Study Final Report* (July 2020), evaluated transit facility and governance alternatives against Goals 1 and 2 above. The Report makes recommendations to more efficiently delivery regional transit service, including a proposed merger of the MAT and 9 Town districts.

This document evaluates opportunities for improving regional transit service to meet the objectives of Goal 3, enhancing and more efficiently delivering transit services within the region. This work included an analysis of existing transit services to understand regional travel flows, transit ridership on existing routes, socio-economic conditions, and potential transit demand. The results of this analysis are presented in the *LCRV Transit Study State of the System Report* (October 2019). Customer preferences and public input were also solicited over the course of the study to identify the potential improvements desired by current riders.

This document puts forth a menu of potential service improvements to be considered if and when funding becomes available.

2 Service Priorities Identified by Stakeholders

A variety of public outreach was conducted over the course of the project (see Figure 3) utilizing a variety of approaches. These included rider surveys, direct interactions at transit stops, a project website and other means for people across the region to identify unmet transit needs and to share ideas regarding potential improvements.

Figure 3 | Summary of Public Outreach Activities

Date	Outreach	Description/Results
Spring 2019	On Board Rider Survey	30% of daily MAT riders and 60% of daily 9 Town riders were surveyed about their travel needs and service priorities.
Summer 2019	Stakeholder Interviews	Interviews with representatives of 15 local organizations were held to learn how transit might better serve regional needs.
Summer 2019	Project Website	Launched in 2019 to provide a study overview, share project materials and collect comments.
Summer 2019	XtraMile Survey	24 early users of the on-demand XtraMile pilot were surveyed to learn how the Old Saybrook program is perceived.
Fall 2019	Pop-Up Events	5 information sessions were hosted by project staff at high ridership bus stops to share findings on the existing system and to solicit input on rider priorities.
Summer 2020	Website Survey	Service improvement ideas were posted to solicit input and comments. 79 responses were recorded.
Summer 2020	Cable TV Broadcasts	A study presentation was broadcast 12 times on 3 local access stations, describing proposed service ideas and soliciting comments.
Summer 2020	Facebook/ Facebook Live	Social media links to the summer 2020 survey and live presentations. MAT's Facebook had 228 hits; 9 Town had 97.

The public outreach effort with the largest number of participants was the 2019 On-Board Customer Survey. This survey tested rider preferences and priorities related to a series of potential service improvement tradeoffs. Outreach was conducted on transit vehicles in both the MAT and 9 Town systems. The strongest preferences voiced by stakeholders were:

MAT Riders

Add Sunday service (77%)

Add more Saturday service (69%)

Create more bus stops (65%)

Increase service frequency (60%)

9 Town Riders

Improve existing service* (68%)

Increase service frequency (67%)

Add Sunday service (66%)

**Improve service rather than add new services.*

Appendix A provides more detailed on the results of this survey and other stakeholder input identified during public outreach activities over the course of the study.

3 Potential Service Improvements

A detailed description and evaluation of existing transit services operating in the LCRV region was provided in the *LCRV Transit Study State of the System Report* (October 2019). This report reported on the operations and current performance of fixed-route and on-demand services (such as Dial-A-Ride and the XtraMile on-demand pilot service) operated by both MAT and 9 Town Transit. This report uses the findings of the *State of the System Report* to suggest a number of changes that would more effectively meet the demand for transit in the region.

Potential service changes were identified based on existing route performance, local transit market demand, public input and the need maintain overall operational efficiency. Potential changes considered included:

- Alignment Changes
- New Transit Services
- Changes to Service Spans
- Changes to Service Frequency and Pulses (i.e. Connections at Hubs)
- Other Changes to Enhance Overall Service Convenience & Efficiency

Potential Alignment Changes

Alignment changes were considered with the intent to make service faster and more direct. Many Middletown area routes underwent alignment changes in 2018 and 2019 to "eliminate loops" and make service operate bi-directionally. Many riders pointed to these past changes as positive improvements during the public outreach for this study. Additional alignment changes in both the Middletown and Shoreline area are proposed below and are shown visually in Appendix B.

Middletown Area Routes

581 (Former Route A)

- Streamline route to stay mainly on Saybrook Road and provide bidirectional service
- Turnaround at Connecticut Valley Hospital (CVH) instead of end of Silver Street
- Serve CVH, Stop & Shop, Veterans Home, Saybrook Medical Centers, Middlesex Community College, Summerhill Apartments
- Discontinue route segments on Millbrook Road and Randolph Road

582 (Former Route B)

- New bidirectional alignment along S. Main Street via Wesleyan Hills and Long Hill Road. Terminates at the Department of Social Services.
- Adjust alignment to make small deviation off S. Main Street via Lake, Birdsey, and Durant Streets to serve Senior Center
- Discontinue route segments on Russell Street, Ridge Road, and Randolph Road

583 (Former Route C)

- Buses routed via West Street bridge
- New bidirectional alignment along High Street, Church Street, Cross Street, Long Lane, West Street, and Washington Street
- Serve Wesleyan University, Long Lane and Santangelo Circle, West Street and Washington Street retail plazas
- Introduce service to New Meadow and Bayberry Crest Apartments, and terminate at Sagamore Hills Apartments
- Discontinue route segments on Ballfall Road, Congdon Street, Ridgewood Road, and Camp Street

584 (Former Route D)

- Operate bi-directional service through North End by adjusting inbound alignment: left on Liberty Street, right on Grand Street, left on High Street, right on N. Main Street, right on Stack Street, left on High Street, left on Spring Street, right on Main Street
- Simplify loop at north terminus (outbound: left onto West Street, left into Stop & Shop plaza, loop right onto West Street, left on Shunpike, left into ShopRite plaza)
- Introduce service to Meadow Brook, Skyview, and Cromwell Hills Apartments

585 (Former Route E)

OPTION 1: Bidirectional

- New bidirectional alignment along Route 9, Berlin Road, West Lake Drive, and Middle Street
- Serve Cromwell Commons shopping plaza on street, not by entering plaza

OPTION 2: Berlin Road Loop

- Discontinue highway segment by staying on Berlin Road
- Stay on Route 9 in and out of Downtown Middletown to improve speed

OPTION 3: Industrial Park Road

- Paired with Route 587 Crosstown (see Appendix B: Proposed Route Alignment Changes

- New bidirectional alignment along Route 9, Berlin Road, West Lake Drive, and Industrial Park Road
- Serve Cromwell Commons shopping plaza on street, not by entering plaza

586 (Former Route F)

- Bidirectional service through downtown Portland, based on current evening alignment: Main Street, right onto William Street, right onto High Street, left onto Route 66
- Terminate at Laurel Ridge
- Serve East Hampton Center, near intersection of Main Street and Route 196
- Discontinue route segments on North Main Street and Middletown Avenue

590 (Former M-Link)

- Bidirectional alignment along High Street to better serve Wesleyan University
- Make local stops along Washington Street in Middletown
- Serve retail plazas on Washington Street without entering plazas. Route 583 will continue to enter Middletown plaza to pick up and drop off riders
- Maintain same alignment for weekdays and weekends

Shoreline Area Routes

Route 641

- Modify alignment off of Route 81 to directly serve proposed Indian River Landing development in northbound direction prior to Clinton outlets
- Loop into Central Avenue to more directly serve Clinton Train Station
- Enter Stop & Shop Plaza in Clinton, but serve Shop Rite using stop on Route 1
- Discontinue service to Stop & Shop and Senior Center in Old Saybrook Center. XtraMile and/or new Route 640 will serve these local destinations.

Route 642

- Terminate route at Old Saybrook Station instead of Saybrook Point. XtraMile and/or new Route 640 will serve Old Saybrook Center destinations. (XtraMile is an on-demand service being piloted in the Old Saybrook/Essex/Centerbrook region that allows riders to use a mobile app or phone to call for a ride within 15-30 minutes.)
- Opportunity for transfer (not timed) to Route 644 at Chester Center
- Discontinue Ivoryton branch to improve speed and reliability on route
- This route will also be transitioned to operate as fixed route service, meaning the vehicle will not deviate from the route to pick up customers on demand.

Route 643

- Fully align to I-95 from Old Saybrook to New London to improve speed and reliability

- Discontinue service in Old Saybrook Center. XtraMile and/or new Route 640 will serve these local destinations
- Maintain stops at Old Lyme Marketplace, Park & Rides (Neck Road and 4 Mile River Road), Flanders/East Lyme (transfer opportunity to SEAT Route 3)
- Discontinue deviation to Rogers Lake/North Old Lyme
- This route will also be transitioned to operate as fixed route service, meaning the vehicle will not deviate from the route to pick up customers on demand.

Route 644

- Realign to use Route 9 through Haddam to improve speed and reliability
- Maintain stops at Essex and Chester Park & Rides, Chester Center, Higganum, and Middlesex Community College
- Discontinue route segment on Route 154 in Chester and Haddam
- This route will also be transitioned to operate as fixed route service, meaning the vehicle will not deviate from the route to pick up customers on demand.

Route 645

- Realign to use I-95 from Clinton to Madison to improve speed and reliability, and to avoid redundancy with Route 641
- Discontinue service to Clinton Train Station
- This route will also be transitioned to operate as fixed route service, meaning the vehicle will not deviate from the route to pick up customers on demand.

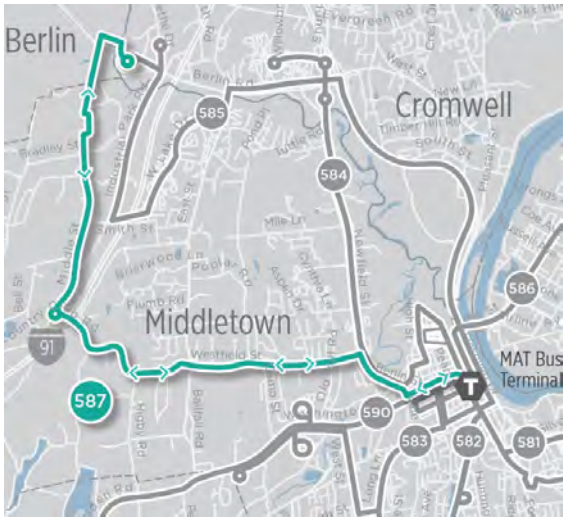
Potential New Services

Route 640 Old Saybrook Local

- Consolidate existing route segments in Old Saybrook Center as a new local circulator. This will allow Routes 641, 642, and 643 to terminate at Old Saybrook Station without needing to deviate to Old Saybrook Center
- Serve Old Saybrook Station, Stop & Shop, Senior Center, the Industrial Park on Mill Rock Road/Research Parkway, Maple Avenue, and Saybrook Point
- Run at 60-minute headways and meet Old Saybrook Station pulse, Monday through Saturday

Route 587 Crosstown

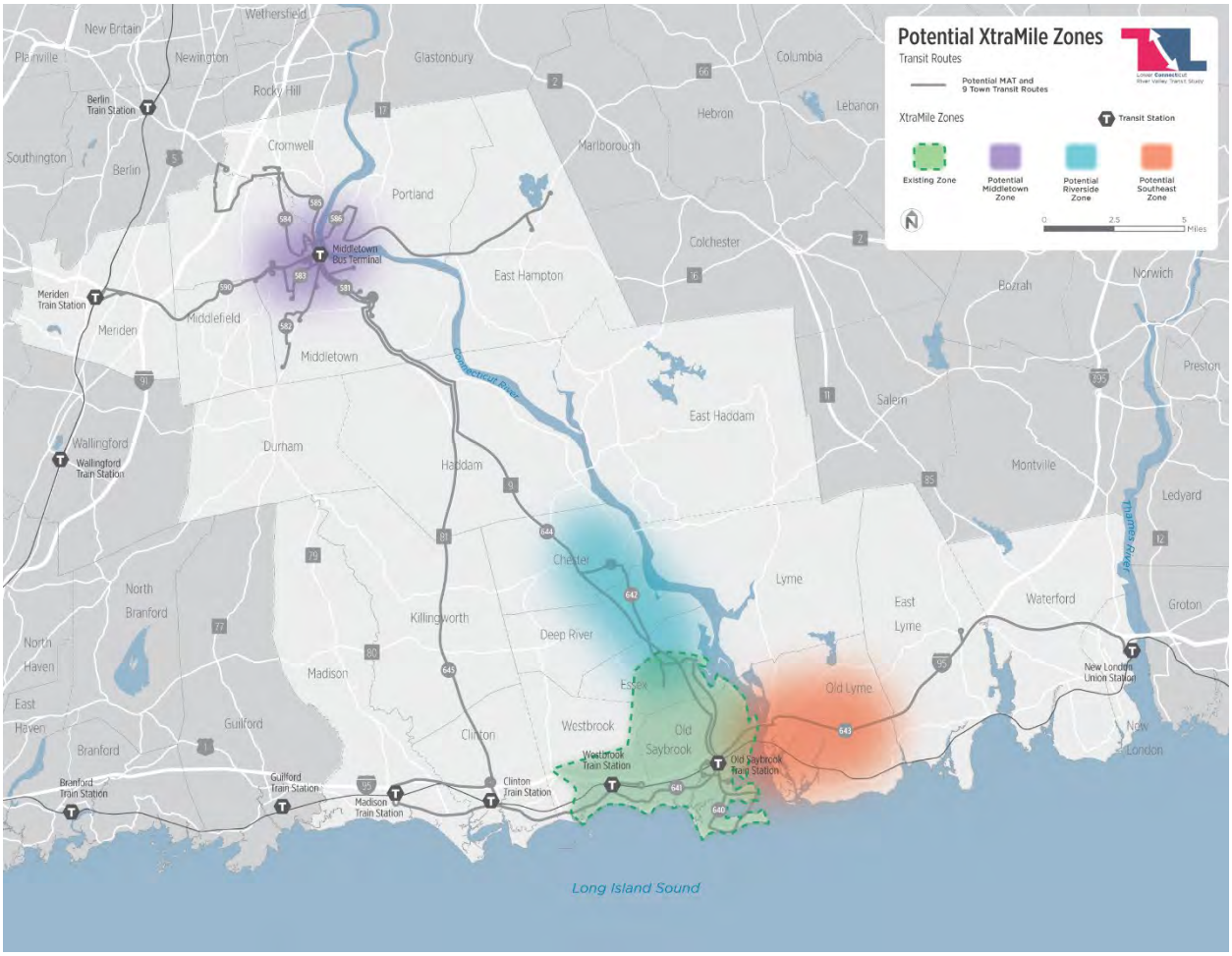
- Paired with Route 585 Industrial Park Road (see Appendix B: Proposed Route Alignment Changes
- Introduce service to connect Middletown with CT*transit* express routes operating on I-91, as well as the Cromwell Commons shopping center. Route 587 would operate via Berlin Street, Westfield Street, Country Club Road, and Middle Street
- Provides the opportunity to streamline Route 585 to bidirectionally serve West Lake Drive, Walmart, and Cromwell Commons shopping center
- Could be run as peak-only service or all day
- Transfer opportunities:
  - Route 585, at Walmart
  - CT*transit* Route 512 New Britain, at Walmart
  - CT*transit* Route 950 Hartford to New Haven, at Park & Ride



New XtraMile Zones

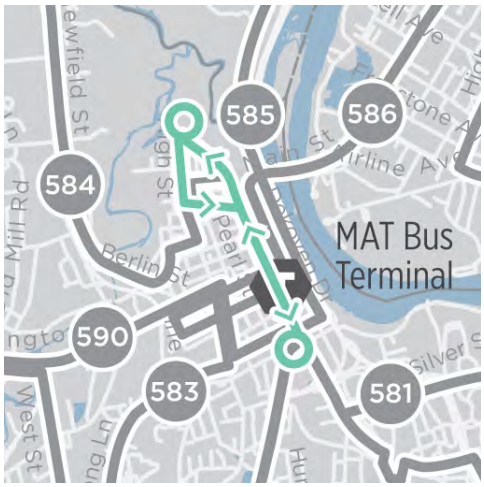
The 2019 survey of users of the Old Saybrook XtraMile pilot found this service attracted younger riders, many of whom were new to 9 Town Transit and had other transportation options available. These findings suggest that on-demand services like XtraMile may be effective in attracting new types of riders and "choice" riders to regional transit. Most indicated that they use both XtraMile and 9 Town's fixed-route services, and nearly half use Shore Line East's commuter rail service, indicating that the pilot service is being used as a complement (not replacement) of existing transit services. Capitalizing on the success of this pilot, three new possible areas have been identified as having the potential for XtraMile on-demand service:

- **Middletown/Wesleyan Zone:** Encompassing central Middletown with transit nodes at Washington Street Plaza, Wesleyan University, Downtown Middletown, and Downtown Portland. This zone would be aimed at enhancing crosstown service and would serve Main Street but not MAT's Passenger Terminal.
- **Riverside Zone:** Connecting portions of Chester, Deep River, and Essex with transit nodes at Chester Center, Deep River Center, Centerbrook, and Essex Village. Connections could be made with Routes 642 and 644.
- **Southeast Zone:** Connecting Old Lyme Shores and South Lyme with the Old Saybrook Station hub; and to New London via transfers at the I-95 Park & Ride.

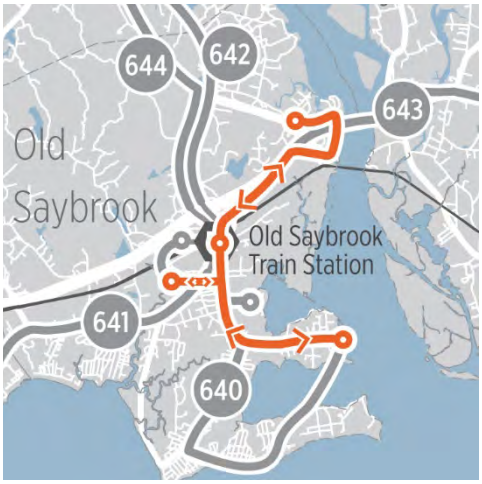


Shuttles

- **Downtown Middletown Shuttle:** The City of Middletown has proposed a downtown shuttle to connect downtown businesses with remote parking facilities at the Remington Rand building in the North End and with Middlesex Hospital and a potential second remote parking lot in the hospital vicinity.
  - Possible Alignment: Remington Rand, the follow N. Main, High, Main, Pleasant, and Crescent Streets to terminate at Middlesex Hospital.
  - Possible Service Span: 3 pm to 10 pm, Wednesday-Saturday



- **Old Saybrook Seasonal Shuttle:** Similar to the Clinton trolley, a seasonal shuttle service could be used to connect summer residents, transient marina visitors, and others to shopping, dining, and retail services such as supermarkets.
  - Possible Alignment: Saybrook Point, College Street, Elm Street, Old Saybrook Shopping Center, Train Station, Route 1, Ferry Road to terminate at Quality Inn Old Saybrook on Essex Road
  - Possible Service Span: Memorial Day to Labor Day, 12 pm to 9 pm, Thursday-Sunday



Potential Changes to Service Spans and Frequencies

Improvements to existing services were identified by current riders as one of the most desired system changes. Changes to make service faster, more frequent, and to operate for longer hours can make transit significantly more attractive and convenient.

Potential Changes to Service Span

Riders were asked to weigh in on the days or times of day that they would most like to see increases in service span. These priorities were used to develop a series of eight potential packages of service span increases as shown in Figure 4. Appendix C provides more specific detail by route.

Today, all routes in Middletown operate from 6 am to 7 pm on weekdays, and are combined to operate as two routes (581-583 and 584-585) between 7 pm and 11 pm. Saturday service is operated hourly between 8 am and 6 pm on Routes 581 and combined Routes 582-583 and 584-585. Less frequent Saturday service is operated every two hours on Routes 586 and 590, ending at 5 pm.

Today, all Shoreline routes and the XtraMile pilot begin weekday service between 6 and 7 am and end between 6:30 and 8 pm. Dial-A-Ride is offered weekdays between 6 am and 6 pm. Saturday service is offered on Route 641 (6:30 am to 8 pm), Route 642 (8:30 am to 3:30 pm), and the XtraMile pilot (7:30 am to 6 pm).

There is no local transit service offered on Sundays in the region today, with the exception of CT*transit* routes.

Each package of service span increases proposes an expansion of service hours for either the Middletown or Shoreline area routes. Five of these packages (#1, #4, #5, #6, #8) propose longer weekday evening hours and new Sunday service only on the highest ridership routes in each area or "key routes," namely Routes 581, 584, 585, 590 and 641. Route 644 is also considered a key route, as it is an important regional connector.

Improved Saturday service would include operating weekday alignments on all Middletown routes between 8 am and 6 pm (package #3), extending service on key Middletown routes beyond 6 pm until 11 pm (package #4), or operating on all Shoreline routes rather than just the 641 and 642. In Middletown, package #3 would involve a transition from special Saturday route alignments to operating regular weekday alignments on all routes, meaning that Routes 581 Expanded, 582-583, and 584-585 would be discontinued along with the Route 590 Saturday alignment serving Meriden Mall. Instead, all routes would operate on Saturdays using the same alignments as weekdays.

New Sunday service is considered for key routes in both Middletown and the Shoreline area. In Middletown (package #5), Sunday service would operate similar to Saturdays on Routes 581, 584, 585 and 590, but would not be introduced on Routes 582, 583 and 586. In the Shoreline area, Sunday service would be introduced only on Routes 641 and 644. Sunday service in the Shoreline area have a shorter span (9 am to 5 pm) than Middletown service (8 am to 6 pm).

Figure 4 | Service Span Increases Considered

Service Span Package	Routes Affected	Day Type	Service Span Improvement
Middletown Routes			
1	Key Routes (581, 584,585, 590)	Weekday Evening	Expand weekday evening service to all key routes, operating until 11 PM. Evening service on other routes would continue to operate.
2	All Routes	Weekday Evening	Expand weekday evening service to all Middletown routes, operating until 11 PM.
3	All Routes	Saturday	Saturday service on all Middletown routes from 8 AM to 6 PM
4	Key Routes (581, 584, 585, 590)	Saturday Evening	Saturday evening service on key routes, operating until 11 PM.
5	Key Routes (581, 584, 585, 590)	Sunday	Sunday service on key routes from 8 AM to 6 PM.
Shoreline Routes			
6	Key Routes (641 and 644)	Weekday Evening	Expand weekday service on key routes from 6 AM to 11 PM
7	All Routes (including Old Saybrook XtraMile)	Saturday	Saturday service on all routes from 9 AM to 5 PM. Route 641 would continue to operate 7 AM to 7 PM.
8	Key Routes (641 and 644)	Sunday	Sunday service on key routes from 9 AM to 5 PM.

Potential Changes to Service Frequency/Pulse Changes

Two changes are considered in terms of service frequency.

Adjustments to Weekday Service Frequency in Middletown

Today, all Middletown area routes operate on a 50-minute cycle, meeting or "pulsing" at the downtown passenger terminal at the same time. Operating service every 30 or 60 minutes would provide for more logical "clockface" scheduling, which would be easier for customers to

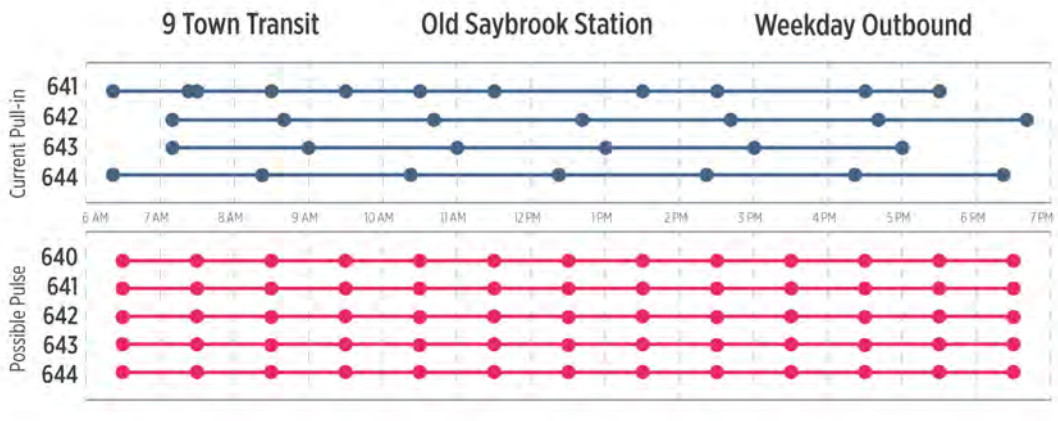
remember. Not all routes have demand for 30-minute service at this time, and some routes have been identified by riders as sometimes running late. For this reason, a switch to 60-minute service in Middletown should be considered as a method to improve overall reliability. Transitioning to a 30-minute frequency would be a large investment requiring more drivers, vehicles, and funding.

Introduce a Shoreline Area Pulse Point at Old Saybrook Train Station

Creating a system pulse point or "hub" in the Shoreline area would make transfers significantly faster and more convenient and would improve service in the southern part of the LCRV region. Realigning Shoreline-area service so that routes meet for a timed connection at Old Saybrook Station would allow passengers to easily transfer to other Shoreline routes, similar to the current pulse at the passenger terminal in Middletown. The presence of a central hub also highlights the visibility and presence of local transit and helps attract new riders to the system.

In order to have an hourly pulse, Shoreline routes meeting at Old Saybrook Station routes need to have complementary cycle times of 60 or 120 minutes. The changes needed to introduce these timed connections are depicted graphicly in Figure 5 and include:

Figure 5 | Current Bus Service at Old Saybrook Station Compared to Possible Timed Pulse



- Realign Routes 641, 642, 643, and 644 to follow the new alignments described previously, streamlining service to achieve necessary cycle times.
- Introduce Route 640 to serve local destinations in Old Saybrook, relieving Routes 641 and 642 from serving Stop & Shop and Old Saybrook Center and giving them the ability to meet the timed pulse point at the train station.
- Interline Route 640 with the realigned Route 642 which currently operates every two hours. By adding a second vehicle, both routes would operate on an hourly basis and meet every pulse.
- Deploy three vehicles on Route 641 all day (currently three vehicles are in use only during morning hours). Together with the introduction of Route 640 to serve local Old Saybrook destinations, this will allow Route 641 to operate hourly.

- Add a second vehicle to Routes 643 and 644 to increase their frequency to one-hour frequency to meet every pulse.

These changes would mean that Routes 640, 642, 641, 643, and 644 meet hourly at the station. Riders could make a single timed transfer to reach Old Saybrook Center, other Shoreline destinations, or to make regional connections to Middletown and New London.

Meeting Other System Pulses

Routes 641, 643, and 644 serve regional transfer points in Madison, New London, and Middletown, connecting with CT*transit*, SEAT and MAT services. Transitioning these routes to a 60-minute frequency would allow for *either* 641 and 643 to make timed connections in Madison and New London, *OR* 644 to make a timed connection in Middletown, but not both.

- CT*transit*: Route 201 serves the Scranton Gazebo in Madison, arriving on the hour from New Haven. Route 641 takes 90 minutes to travel between Old Saybrook and Madison, requiring it to leave on the half hour to meet CT*transit*. For example:
  - Route 641: Depart Old Saybrook at 9:30 am, arrive in Madison to connect with CT*transit* Route 201 to New Haven departing at 11:00 am
- Southeast Area Transit (SEAT): SEAT buses currently pulse on the hour at New London's Union Station. Realignment of Route 643 would allow it to pulse with SEAT, as it takes 30 minutes to reach New London from Old Saybrook, but it would require leaving Old Saybrook on the half-hour. For example:
  - Route 643: Depart Old Saybrook at 9:30 am, arrive in New London for 10:00 am SEAT pulse
- Middletown: A 60-minute pulse on the hour is proposed for the Middletown Bus Terminal. Route 644 could pulse with Middletown area routes, as it takes 1 hour to reach Middletown from Old Saybrook, but it would require leaving Old Saybrook on the hour. For example:
  - Route 644: Depart Old Saybrook at 10:00 am, arrive in Middletown for 11:00 am MAT pulse

The LCRV Transit Study Steering Committee recommends that an Old Saybrook pulse occur on the half hour, enabling Shoreline area routes to make timed connections with CT*transit* and SEAT in Madison and New London. Furthermore, due to limited capacity at the Middletown passenger terminal, there is not enough room to accommodate both the 644 and 645 as part of the hourly pulse. With an Old Saybrook pulse occurring on the half hour, Route 644 would arrive in Middletown on the half hour. If Route 645 (which would operate every two hours) also arrived in Middletown on the half hour, it would make it easy for customers to remember that Shoreline routes arrive at the time. It would also mean that 645 would meet the Madison pulse every other hour.

Systemwide Changes

Promote Transfer Opportunities with CT*transit*

CT*transit* provides connections from Middletown to Cromwell, Berlin, New Britain, Hartford, and Old Saybrook. Coordinating and promoting these existing transfer opportunities will benefit riders who must make longer regional connections (see Figure 6).

- CT*transit* does not enter the MAT Terminal for direct connections, but five MAT routes overlap with CT*transit* Route 55 Middletown/Hartford along Main Street in downtown Middletown. A clearly signed bus stop and/or shelter on Main Street would better highlight the availability of this connection.
- Route 581 also overlaps with CT*transit* Route 55 along Silver Street near Connecticut Valley Hospital (CVH), a key regional destination. CT*transit* is the more likely system to reduce bus stops along this redundant segment, with 581 continuing to make all local stops. Signage (or eventually real time information) at CVH should be considered to inform riders of all services available.
- Route 585 meets CT*transit* Route 512 New Britain/Bristol at the Cromwell Walmart, and Routes 584/585 meet CT*transit* Express Route 906 Hartford/Cromwell on Berlin Road. Signage, shelters and/or real time information could better highlight these connections.
- CT*transit* Express Route 950 Hartford/New Haven stops at the Country Club Road Park & Ride off I-91 in west Middletown. A new Route 587 would meet CT*transit* Route 950 at this Park & Ride, providing connections to both New Haven and Hartford. Route 587 would also meet CT*transit* Route 512 New Britain at Walmart
- CT*transit* Express Route 921 Hartford/Middletown/Old Saybrook serves Old Saybrook Train Station, increasing the importance of a regional pulse point in this location. It also stops at the Essex and Chester Park & Ride lots along Route 9, where connections with Routes 642 and 644 may be made, as well as a potential Riverside XtraMile zone.

Promote Transfer Opportunities with CT*rail*

Several public comments voiced over the course of the study expressed a desire for better connections with CT*rail*. The following proposed changes would improve bus/rail connections:

- Realigning Route 641 to more directly and safely serve Clinton Station by turning onto Central Avenue just north of the station.
- Creating an Old Saybrook Pulse at Old Saybrook station with the ability to make bus transfers to travel throughout the region.
- Increasing service spans on Route 590 serving Meriden Station and Shoreline area routes serving Shore Line East stations.

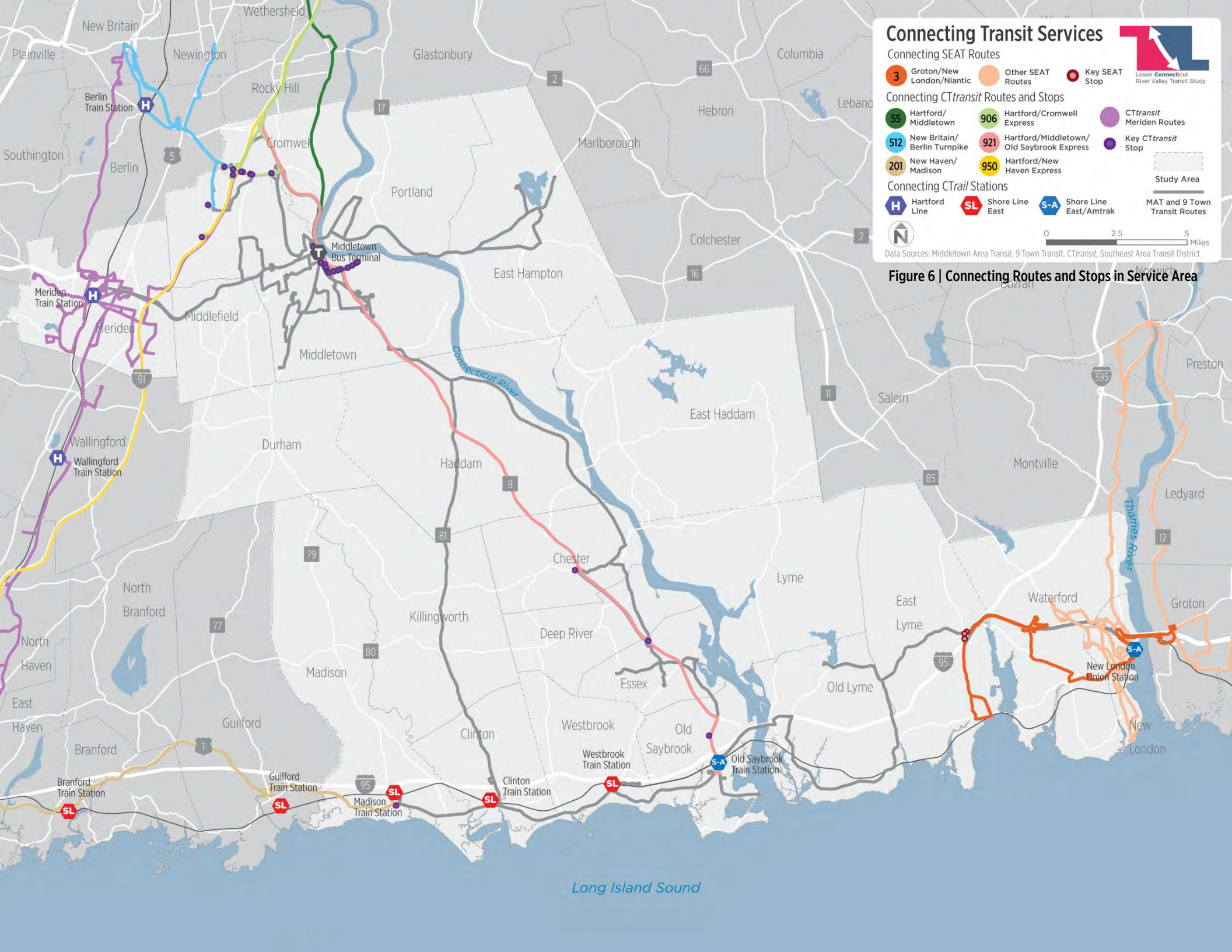


Figure 6 | Connecting Routes and Stops in Service Area

Capital Investments to Make Transit More Convenient

Several capital investment needs were identified in the *LCRV Final Report* (July 2020) as necessary actions to support and advance the final study recommendations to merge MAT and 9 Town Transit and deliver transit services on a regional basis. These included technology upgrades needed for integration but that would also enhance the customer experience:

- The use of Automated Vehicle Location (AVL) technology across the region in order to allow for real-time bus tracking and to share this information with customers
- Upgraded fare collection systems that would improve the convenience of transit and allow for regional fare integration

In addition to the technology investments above, the following additional capital investments would respond to public input and further enhance the transit experience.

Transition Away from Flag Stop Systems / Add More Designated Bus Stops

Today, much of the MAT system and most of the 9 Town system operate as flag stop systems, where passengers can flag down a bus at any location along a route. Adding more designated bus stops and shifting additional segments of the transit networks away from flag stops would have several benefits:

- **Marketing:** Signed bus stops are a cost-effective way to show where local buses stop and what destinations are served. Bus stops help non-users figure out the system and raise the visibility of the system throughout the community.
- **Speed and Reliability:** Eliminating flag stops creates a more predictable transit environment by controlling how frequently a bus stops, and is a cost-effective way to improve the speed, safety and reliability of service. While it may result in longer walks for some customers, all riders will experience faster and more reliable service.
- **Operational Safety:** Flag stops can create uncertainty for drivers and other challenges. Designated bus stops at safe and visible locations enhance customer safety by controlling where riders stand and cross streets. Fewer, predictable bus stops also reduce the chance of bus-automobile conflicts.

Middletown area routes are more urban in nature (with the possible exception of outer segments of Routes 582 and 586) and should be considered priorities for a transition to designated bus stops. Route 641 in the Shoreline area should also be considered a priority for fully transitioning to a designated stop system. Designated stops could be considered along other Shoreline route segments (e.g. in the Essex area, or at highway connection points on Routes 643 and 644), but flag stops may continue to be desirable in less developed areas.

Install More Bus Shelters with Seating

Several members of the public requested additional bus stop seating. It is recommended that bus shelters be installed at additional high ridership locations such as:

- The CT*transit* Route 55 stop on Main Street in downtown Middletown
- Near major developments such as the new mixed-use complexes planned for Route 66 in Portland and Route 81 in Clinton
- Newfield Towers and Stonycrest Towers in Middletown

- Washington Street & High Street near Wesleyan University in Middletown
- Washington Street at Middletown Plaza in Middletown
- Middlesex Hospital on South Main Street and Saybrook Road in Middletown
- US Route 1 by Shop Rite in Clinton
- Stops along Routes 643 and 644 (off State Highway 9 and I-95) where shelters would increase the visibility and availability of regional transit connections in these areas.

Consider Transit Signal Priority as Congestion Grows

Many transit systems around the country are installing Transit Signal Priority systems to give buses priority in congested areas. Transponders mounted on buses communicate with local traffic signals to extend green light phases when approaching an intersection. Although congestion in the LCRV region may not warrant the installation of such systems at this time, there are notable locations where the technology would help make transit faster and more reliable. These include:

- Route 585 along Berlin Road (Route 372) in Cromwell.
- Route 641 along Post Road (Route 1) in Old Saybrook, Westbrook, and Madison, particularly in summer months.

Regional Delivery of Dial-A-Ride and ADA Services

The coordination of scheduling for Dial-A-Ride (DAR) and ADA paratransit on a regional basis would be enabled by a potential merger of the MAT and 9 Town Transit systems, and would likely introduce efficiencies to the delivery of on-demand transit services.

Dial-A-Ride (DAR)

Today, 9 Town Transit offers curb-to-curb DAR services to individuals living within its member towns or in Durham, East Haddam, and Haddam (by special agreement with these towns). Individuals living in these communities can make a reservation to travel anywhere within the other communities, as well as to several key Middletown destinations.

MAT provides DAR services to a more limited population, serving only individuals over the age of 60 living in Middletown, Portland, East Hampton, Durham, and Middlefield.

Both districts require DAR reservations to be made on the prior day to accommodate the overnight scheduling of trips. If DAR were provided on a regional basis, this scheduling could more efficiently assign DAR resources across the region, better utilizing vehicle capacity, reducing redundancies and likely shortening customer wait times. This would require review and modification of eligibility requirements and other rules to make DAR services consistent across the region.

Complementary ADA Paratransit Service (ADA)

In accordance with federal law, complementary ADA paratransit trips must have origins and destinations within 3/4 of a mile of a fixed route, and take place with the same hours and days as fixed route services. Both MAT and 9 Town require advance reservations in order to schedule these on-demand services. In the MAT region, ADA services are offered within this ¾

buffer around all routes. In the 9 Town region, currently only one route (Route 641) operates as fixed. All other routes (642, 643, 644, 645) operate with deviations.

The service improvements contemplated above will involve increases in ADA service. The transition of Routes 642, 643, 644 and 645 to operate as fixed rather than with deviations that enabled the pick-up and drop-off of ADA customers combined with the discontinuation of certain route segments in member towns (Chester, Deep River, Essex and Old Lyme) will require an expansion of ADA capacity.

Potential increases in service span will require a corresponding increase in ADA service span. The costs of these ADA service expansions may be offset if the transit districts merge and are able to schedule and operate ADA service on a regional basis.

Improved Hub Infrastructure at Old Saybrook Train Station

The potential service improvements described earlier include alignment and frequency changes designed to create a timed connection point at Old Saybrook Train Station. This location has a bus shelter and sufficient berthing capacity to accommodate timed connections. However, as it becomes more of a focal point for Shoreline area transit, it would benefit from improved signage, additional seating and small indoor space for driver relief and supervisor use. An existing CTDOT-owned building at the site could potentially be considered for this latter use.

4 Evaluation

Estimated Operational Cost Impacts

The increases in revenue vehicle miles (RVM) and revenue vehicle hours (RVH) that would be associated with each change were calculated based on service speed, frequency and span. More detail on these assumptions is included in Appendix C.

The net increases in RVH associated with each potential service change were then used to estimate the potential impact on operating costs (the average cost per RVH includes the cost for drivers and other support staff). These costs are summarized in Figure 7 and are based on average FY20 costs ($60 per RVH for any route using a 40' bus and $50 per RVH for routes using smaller cutaway vehicles, including ADA and DAR services).

Results include:

- **Alignment Changes:** Realigning routes to be more direct would result in a small net decrease in overall RVH, but no significant reduction in driver time or cost. The benefits would be increased service reliability and reduced travel times. A corresponding small reduction in RVM would reduce maintenance and fuel costs, but also at a relatively insignificant level.

  Route realignment would lead to a discontinuation of service on the following fixed route segments which would have cost implications due to corresponding DAR and ADA increases:

  - **Old Lyme:** Boston Post Rd around Rogers Lake and Shore Rd in South Lyme would no longer be served by Route 643.
  - **Ivoryton:** Ivoryton Village in Essex would no longer be served by Route 642.
  - **Chester, Deep River and Haddam:** Route 644 used to travel via State Highway 154 between Chester Center and Higganum, but would be shifted to Highway 9.
  - **East Hampton:** The western and northeastern shores of Lake Pocotopaug along with Middletown Ave and segments of Main St would no longer be served by Route 586.

  In order to mitigate the conversion of Routes 642, 643, 644 and 645 to operate without deviation, as well as the discontinuation of service along certain route segments as a result of route realignment, it is proposed that two additional Dial-A-Ride (DAR) vehicles be deployed to increase capacity to accommodate these areas. Although further study is recommended to assess the need for additional DAR capacity, the costs in Figure 7 assume two new DAR vehicles would be put into service on weekdays and one on Saturday at a cost of $50/RVH or $275,000 annually.[1] If the transit districts pursue a regional merger as proposed, efficiencies gained through

[1] If a transit district merger is pursued, DAR service can be delivered regionally and spare vehicles used more efficiently, reducing this cost by about $125,000.

regional DAR scheduling will mean only one new vehicle is required and costs would drop to about $150,000 annually.

In addition, there would also be a need increase ADA capacity, particularly in the Shoreline area where the four routes mentioned above will no longer deviate to pick up passengers who are unable to access a bus stop. It is assumed that an additional ADA vehicle must be put into service on weekdays between 7 am and 5 pm to cover additional needs within member towns at a cost of about $130,000 annually. This will also provide capacity to make occasional cross-district trips under cooperative agreement with SEAT and CT*transit*.

- **Increases to Service Span:** all packages include an increase in RVH, with costs ranging from $3,000 annually (to operate Middletown area service on weekday routes) to $383,000 per year (to increase weekday service and ADA service on all Shoreline routes). Increased service spans would also necessitate a corresponding increase in ADA service spans at a cost of $50/hour per RVH. This would add another $13,000 to $65,000 annually to the cost of each package.

  Increased service spans would also require expanded ADA service. In Middletown, an additional ADA vehicle would be put into service if weekday or Saturday evening service were increased, or if Sunday service were introduced. In the Shoreline area, an additional ADA vehicle would be put into service if weekday evening service were increased, or if Sunday service were introduced.

  Introducing service on Sundays would also require at least one garage facility and additional shifts for support staff (e.g. Supervisor, Dispatcher, and Fueler/Cleaner). The Supervisor and Dispatcher positions would work a 12-hour day. A part-time Fueler/Cleaner would work a 4-hour day. A Mechanic would be on call. This additional staffing would add approximately $40,000 to annual operating costs. This cost is incorporated into to the cost of the Sunday service package for Middletown routes, but would also cover Shoreline routes. Drivers operating Sunday Shoreline services could operate out of either garage.

The estimated annual cost increases shown in Figure 7 do not include any costs for reprinting of schedules, public meetings, advertisements or other costs associated with proposed service changes.

Figure 7 | Operational Impacts

	Change in Weekly RVM	Change in Weekly RVH	Other factors	Increase in Annual Cost ($)	Additional Vehicles (Peak)	Increased ADA costs
All Alignment Changes	-2.4%	-1.6%	DAR capacity increased	$275,000[1]	2 for DAR[1]	$130,000
Service Span Improvements						
Weekday Eves – Key Middletown Routes	495	25 hrs.	Based on newly proposed realignments	$76,500	n/a	$65,000
Weekday Eves – All Middletown Routes	781	45 hrs.		$137,700	n/a	$65,000
Saturday Service – All Middletown Routes	20	1 hrs.		$3,000	n/a	n/a
Sat Eve Service – Key Middletown Routes	368	21 hrs.		$63,000	n/a	$13,000
Sunday Service – Key Middletown Routes	698	40 hrs.		$160,000[2]	n/a	$26,000
Expanded Weekdays– Key Shoreline Routes	2,580	143 hrs.	Based on newly proposed realignments	$388,000	n/a	$65,000
Saturday Service – All Shoreline Routes	2,211	112 hrs.		$284,000	n/a	$21,000
Sunday Service – Key Shoreline Routes	1,893	95 hrs.		$249,000[2]	n/a	$21,000
New Routes/Services						
Route 587 – Middletown Crosstown	1539	95	With 585 Industrial Park Road	$290,000	1	Minimal
Route 640 – Old Saybrook Local[3]	897	82	Interlined with 642; net change	$209,000	1	Minimal
XtraMile Zones	n/a	115	Cost per new zone	$293,000	2 per zone	n/a
Downtown Middletown Shuttle	103	28		$60,000	1	n/a
Old Saybrook Seasonal Shuttle	216	18		$30,000	1	n/a
Frequency Changes/Pulse Changes (based on newly proposed realignments)						
Route 641	1360	50	Runs 3 buses all day	$156,000	1	n/a
Route 642[3]	793	0[3]	Requires introduction of 640	$0[3]	0[3]	n/a
Route 643	1173	0	Can run hourly when realigned	$0	0	n/a
Route 644	1809	60	Additional vehicle added	$153,000	1	n/a

1. Expanding DAR service to mitigate impacts from route realignment may only require one vehicle if transit districts merge and service is delivered on a regional basis. This would reduce annual costs to about $150,000.
2. Cost of staffing a garage with a Supervisor, Dispatcher and PT Fueler (~$40,000 annually) included in the cost of Middletown Sunday Service, but also covers Shoreline Sunday Service.
3. A new Route 640 would be introduced as an interlined service with Route 642, thereby increasing Route 642 to hourly service. The cost of the required vehicle capacity for both segments is covered under Route 640.

- **New Services:** The cost of new services reflect the net change in service after alignment changes are put into place. Costs range from $200,000 to $300,000 annually per route considered.

  Route 587 would provide new service to Fed Ex in Middletown and a new connection with CT express bus services to Hartford.

  Route 640 would introduce a new segment of fixed route service on Old Saybrook Point and expand the eligible ADA corridor. However, any new ADA costs would be offset by the discontinuation of current DAR in this area. The cost to introduce Route 640 assumes it would be interlined with a realigned Route 642, with an additional vehicle serving both segments at hourly frequency.

  Any new on-demand XtraMile zone, operating 6 days a week, would cost about $293,000 annually.

- **Increases to Service Frequency**: Increases to service frequency in the Shoreline area would allow for timed connections at the Old Saybrook train station.

  The cost to increase frequency on Route 642 is included in the introduction of Route 640 above. Realignment of Route 643 would enable this service to operate hourly at no additional cost.

  Expanding Route 641 and Route 644 to hourly service requires adding a 3rd vehicle to Route 641 and a second vehicle to Route 644. Both actions would cost just over $150,000 annually.

  Transitioning Middletown area routes to an hourly pulse would be cost-neutral, with the exception of schedule printing and marketing materials to advertise the change.

- **Impact on peak pull out/Staffing Impacts:** Driver salaries are included in RVH costs. Certain improvements would also require an additional vehicle due to an increase in peak-pull out requirements. These costs are noted and included in capital costs below.

Estimated Capital Costs

Revenue Vehicle Fleet Assumptions

Increasing the frequency of service and introducing new services may require the purchase of additional transit vehicles. Other improvements, such as realigning routes or extending spans of service can largely be accommodated using the existing fixed-route fleet, but some expansion of Dial-A-Ride capacity may be needed to serve the few route segments where service is proposed to be discontinued. Adding new XtraMile zones could also help meet this demand.

It is assumed that increased service frequency on Route 641 and a new Route 587 would use larger 40' buses. Smaller "Cutaway" vehicles would be used for any expansion of other services (see

Figure 8). Trolleys similar to the replica vehicle used for the Clinton Seasonal Trolley service would be used for the Downtown Middletown shuttle or the Old Saybrook Seasonal Shuttle.

Increased frequency on Route 643 would be achieved through route realignment and no additional vehicle would be required.

Figure 8 | Increased Fleet Needs & Costs

	New 40' Buses	New Cutaways	New Trolleys	Vehicle Costs[1]
Route Realignment				
Dial-A-Ride Expansion[2]		2		$170,000
Increased Frequency – Old Saybrook Pulse				
Route 641	1			$500,000
Route 640/642[3]		1		$85,000
Route 644		1		$85,000
New Routes/Services				
Route 587	1			$500,000
XtraMile – Per Zone		2		$170,000
Downtown Middletown Shuttle			1	$580,000
Old Saybrook Seasonal Shuttle			1	$580,000

1. Per recent vehicle acquisitions at 9 Town Transit, new Fixed Route (Gillig) buses or trolleys are estimated to cost $500,000. Cutaways used for on-demand services are estimated at $85,000 each. Trolleys are retrofitted Gillig buses that cost an estimated $580,000.
2. If the proposed transit district merger moves forward, regional DAR scheduling would be more efficient and only 1 new DAR vehicle would be needed.
3. The additional vehicle shown would be part of a Route 640/642 interline, allowing both to operate on an hourly schedule.

Systemwide Improvements

Certain technology upgrades were identified in the *LCRV Transit Study Final Report* (July 2020) as needed to support a merger of the two districts and support the regional delivery of transit service. These included upgrades to ensure compatible fare collection, Automatic Vehicle Location systems, and other software across the region. These technology improvements would also enhance service and convenience for transit riders.

Additional capital investments specifically aimed at enhancing service and increasing customer convenience should also be considered. These include transitioning away from a flag stop system, particularly in the Middletown area; installing more bus stop signage, shelters, and seating; installing signing at connection points with CT*transit* and at Old Saybrook Station; and enhancing hub amenities at Old Saybrook train station (above and beyond currently programmed funds). The estimated capital costs for these systemwide improvements are shown in

Figure 9.

Figure 9 | Capital Costs for Systemwide Improvements

	Unit Costs	Units	Systemwide Costs
Bus Stops[1]	$150/sign	2,400	$360,000
Bus Shelters[2]	$15,000/shelter	15	$225,000
New Signage (connection points)	$500/sign	10	$5,000
Old Saybrook Hub Improvements[3]	$50,000	Lump Sum	$50,000

1. Assumes 6 signs per mile. Would require about 1,800 signs in the Middletown area (with signs on both sides of about 150 routes miles) and about 600 signs for certain segments in the Shoreline areas (assume both sides along 50 route miles). Costs include installation.
2. Assumes shelters above and beyond those currently programmed in agency capital plans. Costs include installation.
3. Hub improvements include a second shelter, potential modification of a small building for supervisor use, signage, and other amenities.

Estimated Ridership Impacts

The various service improvements were evaluated for their potential impact on ridership using a number of factors. First, where route alignment changes were proposed, baseline ridership was adjusted to account for routes that would serve different stops than today, as well as stops that would no longer be served. Second, ridership for each route was then factored up using standard industry elasticities to account for the conversion of MAT evening and Saturday routes into evening and Saturday service expansions of existing weekday routes.

Finally, building off this baseline, the ridership impact of each service improvement package was evaluated by considering the following factors:

- Faster, more direct service due to changes in route alignment
- Expanded hours and days of service
- Increased service frequency and pulse connections
- New types of service
- New areas served

All of the service improvement packages yielded a net increase in ridership, to varying degrees based on the analysis. These potential ridership increases reflect increased use of service by existing customers due to improved or newly available service, as well as new riders attracted to transit service that is more convenient and more widely available. Each service improvement package was then given a comparative rating of Low, Moderate, High, or Very High, as shown in Figure 10.

Figure 10 | Estimated Ridership Impacts of Potential Service Improvements

Service Improvement	Potential Ridership Impact
Alignment Changes	
All Alignment Changes	Very High
Service Span Improvements	
Weekday Evenings – Key Middletown Routes	Low
Weekday Evenings – All Middletown Routes	Moderate
Saturday Service – All Middletown Routes	Low
Saturday Evening Service – Key Middletown Routes	High
Sunday Service – Key Middletown Routes	Moderate
Expanded Weekdays– Key Shoreline Routes	Moderate
Saturday Service – All Shoreline Routes	Low
Sunday Service – Key Shoreline Routes	High
New Routes/Services	
Route 587 – Middletown Crosstown	Moderate
Route 640 – Old Saybrook Local	Low
Middletown XtraMile Zone	High
Riverside XtraMile Zone	Moderate
Southeast XtraMile Zone	Moderate
Frequency Changes/Pulse	
Old Saybrook Hourly Pulse/Frequency Changes	High

Potential Title VI Impacts

For this analysis, Title VI populations were defined using 2018 US Census data and considered to include:

- Older adults, or individuals age 65 and above
- Low-income households at or below the Census Poverty Threshold of $20,000
- Minorities, or non-White, non-Hispanic individuals
- Persons with disabilities, or individuals age 20 to 64 years with a disability

The potential route realignments were analyzed on a regional basis to estimate the potential impacts on populations of seniors, low-income households, minorities, and persons with disabilities. All other potential service improvements would introduce new services or increase spans of service, thereby having a positive impact on access to transportation for all populations.

Potential Title VI impacts were estimated within each census block group within 3/4 miles of existing or proposed transit routes.[2]

Figure 12 shows which block groups currently within 3/4 miles of existing routes would retain service or lose service based on the potential routes. As shown, there are block groups in East Hampton, Essex and Old Lyme that would lose fixed route service under route realignment. Of these, only the East Hampton block group has any notable Title VI population and only a one-mile segment would be discontinued.

Figure 11 shows the percentage of each Title VI population as a share of the total population within block groups surrounding the existing and potential service corridors. Along corridor segments areas where service would be discontinued, the shares of older adult, low-income, minority, and disability populations are within 1% of the population shares for existing service or are significantly less. Thus, no disparate impact would be realized from the proposed route realignments.

Figure 11 | Summary of Impacts to Title VI Populations Under Route Alignment Scenarios

	% Age 65+	% Low-Income	% Minority	% with Disability
Existing Service Area				
	18.8%	11.8%	24.2%	9.0%
Potential Service Area				
Areas that retained service	18.8%	12.2%	24.6%	9.3%
Areas that lost service	19.1%	5.5%	17.4%	4.6%
Disparate Impact?	**No**	**No**	**No**	**No**

Percentages based on Block Groups within 3/4 miles of transit alignments

Source: 2018 American Community Survey, 5-Year Estimates

[2] Block groups are the smallest census geography practical for this analysis. Due to the rural nature of parts of the LCRV region, many block groups are large and extend well beyond the 3/4-mile buffer and include populations living beyond reasonable walking distance from transit.

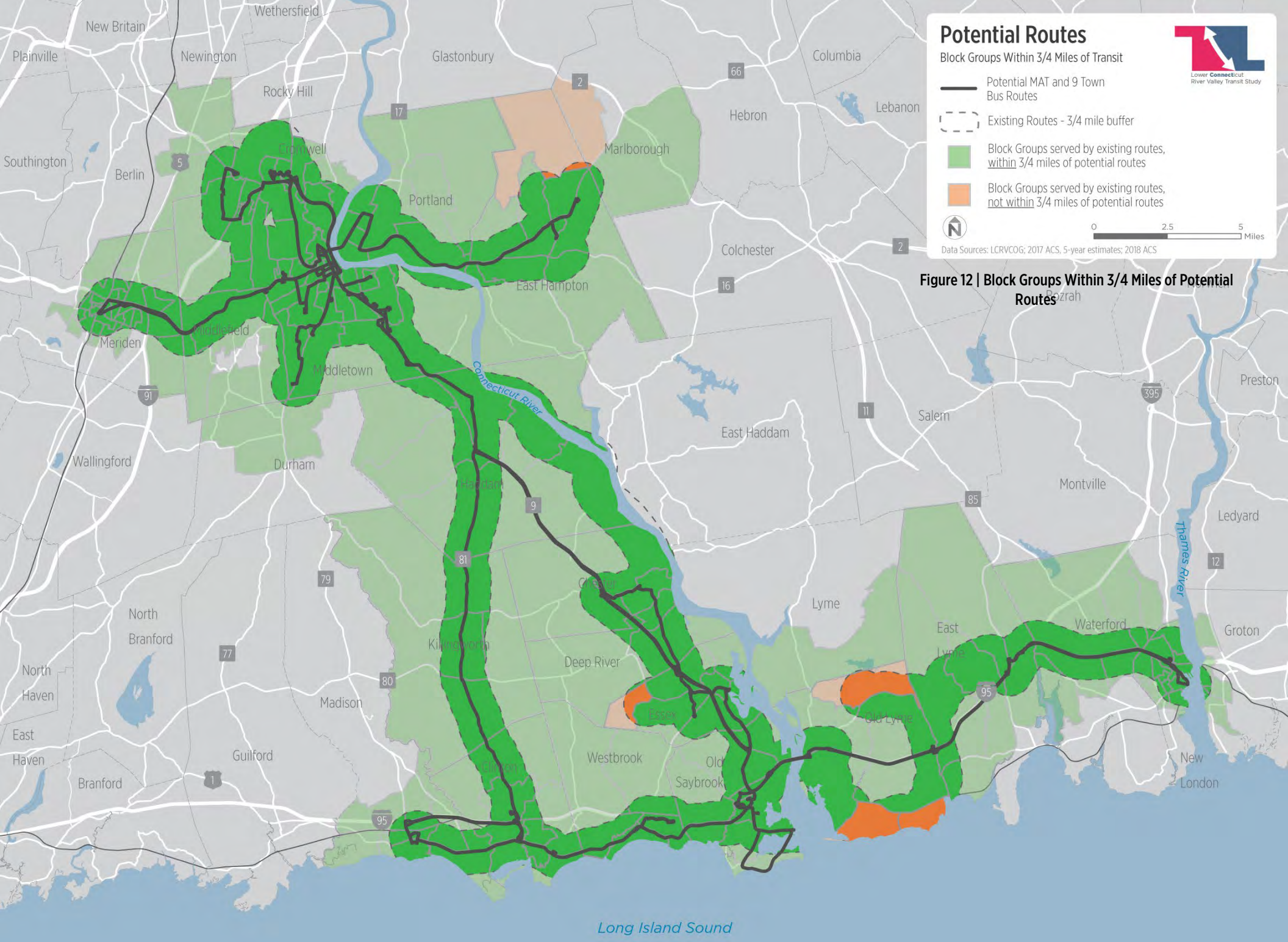


Figure 12 | Block Groups Within 3/4 Miles of Potential Routes

Evaluation Summary

Overall, certain improvements would do a better job of meeting the identified study goal of improving regional transit service.

Better Meet Existing Passenger Needs

Responses to study surveys and outreach indicated that improvements to existing services are more important to existing riders expanding services to new areas. Improvements ranked highest in these surveys included:

- Adding Sunday service
- Adding more Saturday service
- Improving service frequency

Offering more weekend service along the highest performing fixed routes (Routes 581, 584, 585, 590, 641, and 644) would best address these priorities, along with increased service frequency on Shoreline area routes (Routes 641 and 644).

The proposed realignment of routes would provide faster, more direct service, making transit more convenient for most riders. All alignment changes would reduce travel times between key destinations.

- Realignment of MAT routes would reduce travel times between:
  - Route 581: the MAT passenger terminal and Connecticut Valley Hospital (34 minutes faster) and the Saybrook Road Medical Center (11 minutes faster)
  - Route 582: to the Department of Social Services (5 minutes faster)
  - Route 583: to Washington St South Plaza (10 minutes faster)

  However, for passengers needing to transfer, the longer duration between "pulsed" connections at the passenger terminal could offset these savings.
- Realignment of 9 Town routes would reduce travel times between:
  - Route 642: Old Saybrook to Chester Center (18 minutes faster)
  - Route 643: Old Saybrook and New London (20 minutes faster)
- Increased service frequency in the Shoreline area would make service more convenient and reduce waiting times between buses. The proposed adjustment to an hourly pulse in the Middletown area would slightly reduce frequency, but would make schedules more intuitive, improve service reliability and would not affect wait times for passenger transfer at the terminal.

Route realignment and moving away from a "flag stop" system to designated bus stops would also improve the speed and reliability of service.

Attract New Riders

As discussed in the *LCRV State of the System/Existing Conditions Report* (October 2019), areas with highest transit propensity (or highest transit demand) in the region are Middletown and Old Saybrook. By introducing new routes and services, and by expanding service hours, many improvements would be accessible to more potential riders and likely result in increased ridership. The following improvements would better serve key ridership destinations:

- **Middletown Passenger Terminal:** Increases in service span across the Middletown area would improve access to downtown Middletown, with make it easier to make connections to Hartford, Old Saybrook and Meriden.
- **Old Saybrook Train Station:** Creating a coordinated pulse point with timed connections at the train station will serve as a focal point for Shoreline area transit services. , as well as increasing service frequency and adding more weekend service on Routes 641 and 644, would improve service to the station.
- **Middlesex Community College**: Identified as a key location by many stakeholders, improvements to Route 644 will offer faster, more frequent service from Old Saybrook with timed connections to other Shoreline destinations. Increased service span on Route 581 will improve late night service and attract more riders.
- **Wesleyan University**: Bi-directional service on Route 583 would improve service to Wesleyan. Also, as demonstrated by responses to a survey of XtraMile riders in Old Saybrook, a new Middletown XtraMile zone has the potential to attract younger, choice riders to transit.
- **West Lake Drive:** Potential bi-directional service on Route 585 along West Lake Drive would significantly improve service for the many residents in area apartments, providing better access to employment and shopping destinations.
- **New Portland developments:** More direct, bi-directional service on Route 586 would better serve two new planned developments: 1) a 250-unit, mixed-use development near the intersection of Routes 66 and 17; and, 2) the new Opticom headquarters further east on Route 66 in Portland.
- **Retail Plazas/Malls:** Optimized and realigned services to Middletown and Cromwell retail plazas via Routes 583, 584, and 585, as well as increased service spans, would improve access to these key destinations and attract new riders. Introducing Saturday service to Route 645 and Sunday service to Route 641 will improve weekend access to the Clinton and Westbrook outlets.
- **CT*rail* Stations**: Many riders expressed a desire for better intermodal connections. Increases in service frequency on Route 641 and Route 590 would offer better access to Old Saybrook, Westbrook, Clinton, Madison, and Meriden stations. In addition, proposed realignments to Route 641 would provide more direct access to Clinton station.
- **Old Saybrook Center:** Combined with the new 9 Town Transit pulse above, a new Route 640 would provide more frequent and direct access to Stop & Shop, Old Saybrook Senior Center, and Saybrook Point from all routes pulsing at Old Saybrook Station.

- **Old Saybrook Residential Neighborhoods:** Current service is focused mainly on the Old Saybrook commercial district. Route 640 would introduce fixed route service to residential neighborhoods south of the town center and on Saybrook Point.
- **Old Saybrook Industrial Park**: Identified as a destination in need of more service, the new Route 640 would offer service to this job center.
- **Old Saybrook Marinas:** An Old Saybrook Seasonal Shuttle would offer connections for tourists and transient marina visitors to reach local shopping, dining, and retail locations.
- **Essex/Chester:** Increased frequency on Route 642 and the elimination of deviations will make this service significantly faster and more convenient.
- **New Clinton development:** Increased service frequencies and more weekend service on Route 641 would better serve Indian River Crossing, a large mixed-use development on Route 81 in Clinton across from Clinton Crossing (also served by Route 645).
- **New London:** Realignments to Route 643 would increase the speed of regional connections between Old Saybrook and New London and allow passengers to make timed connections with SEAT bus services.

Destinations with the potential for decreased or loss of access include:

- **Old Lyme:** Boston Post Road around Rogers Lake and Shore Road in South Lyme would no longer be served by Route 643.
- **Ivoryton:** Ivoryton Village in Essex would no longer be served by Route 642.
- **East Hampton:** The western and northeastern shores of Lake Pocotopaug along with Middletown Avenue and segments of Main Street would no longer be served by Route 586.

The customer experience would be enhanced by improved "pulse" schedules in both districts, providing more convenient transfer opportunities for riders. In Middletown, the transition to an hourly pulse would make schedules more intuitive for riders. In the Shoreline area, the straightening of bus route alignments, consolidation of Old Saybrook Center destinations into Route 640, discontinuation of inefficient deviations, and transition to an hourly pulse will make service more reliable and easier for riders to understand and use.

Help People Live Independently

Increased service levels and new routes in areas where older residents and persons with disabilities live would have the greatest impact on helping people to live independently.

Today, 30,079 senior residents and 19,111 residents with disabilities live within range of fixed-route service. This proximity provides access to traditional MAT and 9 Town bus services, as well as ADA paratransit.

There would be some impact to seniors and individuals with disabilities as routes are realigned and Shoreline routes are transitioned to operate without deviations. Expanded Dial-A-Ride and ADA services, as well as new microtransit zones could help serve the few lower-ridership segments where fixed route service is proposed for discontinuation.

Offer Equitable Service

As described earlier and shown in Figure 11, the realignment of routes would not cause a disparate impact for older adult, low-income, or minority populations. Most would still be able to access a bus route. A Middletown microtransit zone and expanded Dial-A-Ride services would help serve those who might live along realigned routes.

5 Recommendations

Priority Improvements for Implementation

Based on public input, the evaluation of regional transit demand conducted in the *LCRV State of the System Report* (2019), and the evaluation results above, a number of the potential service improvements are recommended as priorities for implementation. These priorities would provide the greatest benefit to riders throughout the region in terms of offering faster and more direct service, increasing the overall hours of service offered (through longer services spans and new routes), and reflect rider priorities identified through public outreach.

These priorities include:

- **Fixed Route Alignment Changes** as recommended for all Middletown and Shoreline area routes to make service faster, more direct, more reliable, and more efficient. This would also involve an increase in Dial-A-Ride and ADA capacity to mitigate the impacts of realignment. If only certain alignment changes are pursued individually, additional Title VI assessments may be required.
- **Service Span Increases:** Adding Sunday service on key routes and expanding existing services on weekdays were ranked highly as priority improvements by existing riders. The following service span packages meet these needs while maximizing ridership achieved against the cost of service increases.
  - Weekday Evening – All Middletown Routes
  - Sunday Service – Key Middletown Routes
  - Expanded Weekday Hours – Key Shoreline Routes
  - Sunday Service – Key Shoreline Routes

  These increases will be accompanied by a corresponding increase in ADA service spans, with two extra ADA vehicles put into service across the region on weekday evenings and Sundays.
- **Increase in Service Frequency for Shoreline Routes:** The two top rider priorities voice in the Shoreline area were improving existing services and increasing service frequency. Limiting deviations and adding a vehicle to Route 641, the highest ridership route in the Shoreline area, is a top priority. Similar improvements to Routes 642 and 644 would enhance local mobility within Old Saybrook and Essex and greatly enhance connectivity to Middletown.
- **Introduction of an Old Saybrook Pulse:** Creating a timed connection point at Old Saybrook Station would require the introduction of Route 640 (interlined with Route 642) as well as increases in frequency to operate services on an hourly basis. This new "pulse point" would create a focal point for transit in the Shoreline area, highlight the availability of service, and make both local and regional transfers significantly more

convenient. With timed connections, trips between local and regional destinations (e.g. New London, and Madison) would become significantly faster and more convenient.

- **New XtraMile Zone in Middletown:** The Middletown area has the greatest levels of transit demand in the LCRV region. Building upon the success of the XtraMile on-demand pilot project in Old Saybrook, a new XtraMile zone in Middletown would help provide crosstown connections for those looking to travel between Wesleyan, Portland, retail plazas along Washington Street, and other high density activity centers without needing to transfer at the downtown passenger terminal.
- **Adjust Frequency of all Middletown Routes**: Adjusting Middletown area schedules from 50 to 60 minutes and moving to a "clock-face" schedule would make bus times easier to remember and would improve the reliability of service. As ridership increases, individual routes with high demand could be considered for increases to 30-minute frequency.
- **Transition Away from Flag Stops:** The Middletown area is a more densely developed part of the LCRV region with a higher concentration of transit service. This area should be a priority for introducing designated bus stops and moving all routes away from a flag stop system. In the Shoreline area, Routes 640 and 641 should be a priority for installing designated bus stop signage, along with more developed village areas along Route 642. Other routes are lower priority for bus stop signage.

Other Recommendations

- **Further Evaluate the Delivery of Dial-A-Ride (DAR) and ADA Services on a Regional Basis:** The *LCRV Transit Study Final Report* (July 2020) proposed a merger of the MAT and 9 Town transit districts and the future delivery of DAR and ADA services on a regional basis. This *Service Improvement Report* further recommends the delivery of these services on a regional basis, with some potential expansion to mitigate impacts from proposed route realignments. The impact of a transit district merger on DAR and ADA services needs further study to more specifically pinpoint vehicle and staffing requirements, and to develop consistent rules and eligibility requirements. With existing spare capacity in the smaller cutaway fleet and the ability to schedule pickups and dropoffs on a regional basis, it is possible that regional delivery can be enhanced without an increase in fleet or staff. The introduction of new XtraMile zones in the Riverside or Old Lyme area could also affect overall Dial-A-Ride demand. A future study to further evaluate how best to deliver these services is recommended.
- **Implement Service Guidelines:** If MAT and 9 Town continue to pursue agency integration and the delivery of service on a regional basis, the larger transit agency that emerges will have a greater capacity for ongoing service evaluation and planning. It is recommended that service be evaluated on an ongoing basis against established Service Standards and Guidelines approved by the Board of Directors. A draft set of standards is proposed in Appendix D.

At this time, it is not known when additional funding for transit service improvements in the Lower Connecticut River Valley might be identified, nor what levels of additional funding might become available.

Figure 13 | Summary of Costs & Benefits for Recommended Near Term Priorities

	Annual Operating Cost[1]	Capital Cost	Ridership Potential	Other Benefits/Considerations
Alignment Changes				
All Alignment Changes	$405,000	$170,00[3]	Very High	Better reliability, faster more direct service. Costs reflect expanded Dial-A-Ride and ADA coverage which would be about $150,000 less if transit districts merge and can deliver service on a regional basis.
Increased Service Span				
Weekday Eves – All Middletown Routes	$202,700	$0	Moderate	Ranked highly by existing riders.
Sunday Service – Key Middletown Routes	$186,000[2]	$0	Moderate	Ranked highly by existing riders.
Expanded Weekdays– Key Shoreline Routes	$453,000	$0	Moderate	Ranked highly by existing riders.
Sunday Service – Key Shoreline Routes	$270,000[2]	$0	High	Ranked highly by existing riders.
New Services				
Route 640 (interlined hourly with 642)	$209,000	$85,000	Low	Dedicated local service; enables Old Saybrook pulse point.
Middletown XtraMile Zone	$293,000	$170,000	High	Spare ratio may accommodate service without vehicle purchase.
Changes to Service Frequency				
Addt'l costs for Pulse at Old Saybrook Sta.	$309,000[3]	$585,000	High	Faster local and regional connections. More intuitive system.
Systemwide Improvements				
Transition from Flag Stops to Bus Stops	$0	$360,000	Moderate	Makes service faster and enhances safety.
TOTALS	**$2.33 M**	**$1.4 M**	*Regional service delivery would reduce vehicle purchase cost and ADA/DAR delivery cost.*	

1. Annual costs include the cost of expanding Dial-A-Ride and expanding ADA services. Regional service delivery will reduce these costs.
2. Cost of staffing a garage with a Supervisor, Dispatcher and PT Fueler (~$40,000 annually) included in the cost of Middletown Sunday Service. Not included in Shoreline Sunday Service.
3. Cost of Shoreline Pulse reflects cost to increase frequency on Routes 641 and 644. It would also require the introduction of Route 640 and the realignment of Route 643 which are costed separately above.

Appendix A: Summary of Public Comments

A variety of public outreach was conducted over the course of the project utilizing a variety of approaches. These included rider surveys, direct interactions at transit stops, a project website and other means for people across the region to identify unmet transit needs and to share ideas regarding potential improvements. (See Figure A1)

A summary of public comments and rider priorities is provided below.

Figure A1 | Summary of Public Outreach Activities

Date	Outreach	Description/Results
Spring 2019	On-Board Rider Survey	30% of daily MAT riders and 60% of daily 9 Town riders were surveyed about their travel needs and service priorities.
Summer 2019	Stakeholder Interviews	Interviews with representatives of 15 local organizations were held to learn how transit might better serve regional needs.
Summer 2019	Project Website	Launched in 2019 to provide a study overview, share project materials and collect comments.
Summer 2019	XtraMile Survey	24 early users of the on-demand XtraMile pilot were surveyed to learn how the Old Saybrook program is perceived.
Fall 2019	Pop-Up Events	5 information sessions were hosted by project staff at high ridership bus stops to share findings on the existing system and to solicit input on rider priorities.
Summer 2020	Website Survey	Service improvement ideas were posted to solicit input and comments. 79 responses were recorded.
Summer 2020	Cable TV Broadcasts	A study presentation was broadcast 12 times on 3 local access stations, describing proposed service ideas and soliciting comments.
Summer 2020	Facebook/ Facebook Live	Social media links to the summer 2020 survey and live presentations. MAT's Facebook had 228 hits; 9 Town had 97.

2019 On-Board Survey Results

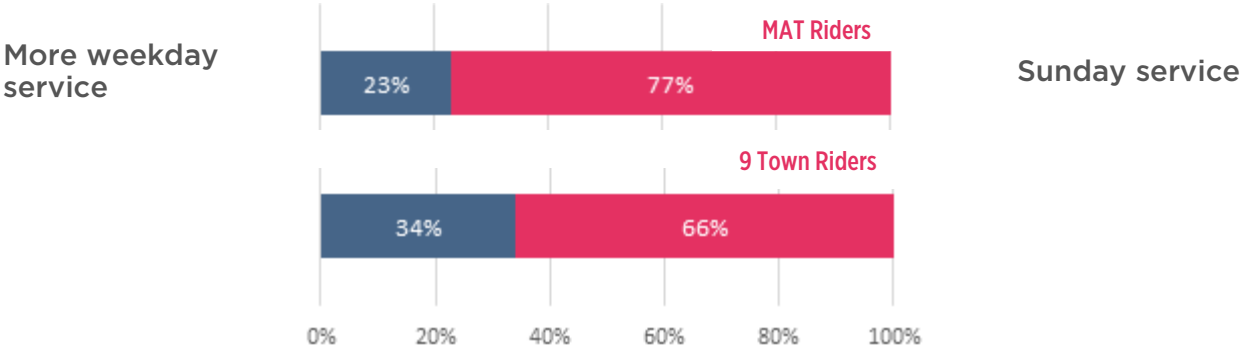
The 2019 surveys tested rider preferences related to a series of potential service improvements. The strongest preferences voiced by stakeholders were:

MAT Riders	9 Town Riders
Add Sunday service (77%)	Improve existing service* (68%)
Add more Saturday service (69%)	Increase service frequency (67%)
Create more bus stops (65%)	Add Sunday service (66%)
Increase service frequency (60%)	**Improve service rather than add new services*

The preferences voiced by riders in each system are shown in the charts below.

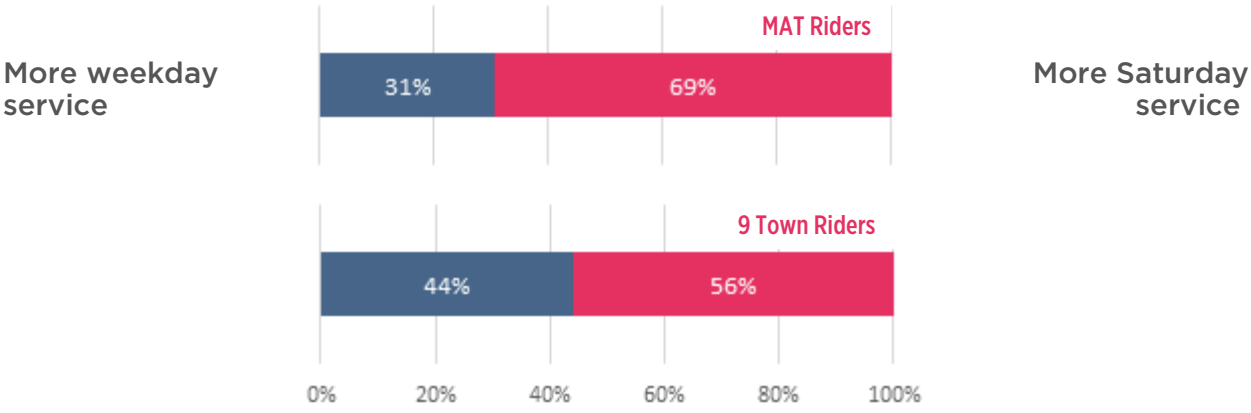
Introduce Sunday Service

Today, neither district operates on Sundays. An option to introduce Sunday service rather than more weekday service was the strongest preference expressed by MAT riders in the survey and the second strongest for 9 Town riders.



Add More Saturday Service

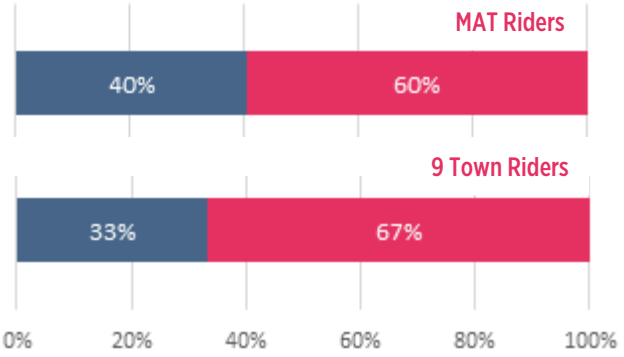
Both MAT and 9 Town respondents also indicated a strong preference to add more service on Saturdays rather than on weekdays.



Increase Service Frequency and Improve Existing Service

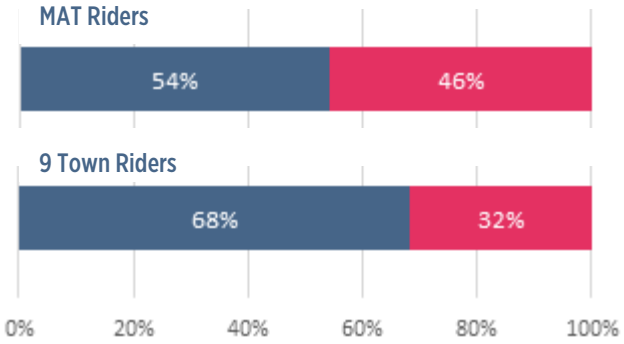
Respondents from both districts reported a preference for more service frequency and reliability rather than expanding coverage to serve new areas. This was the highest rated preference for 9 Town riders.

Buses going to more places but less frequently



Buses running more frequently but to fewer places

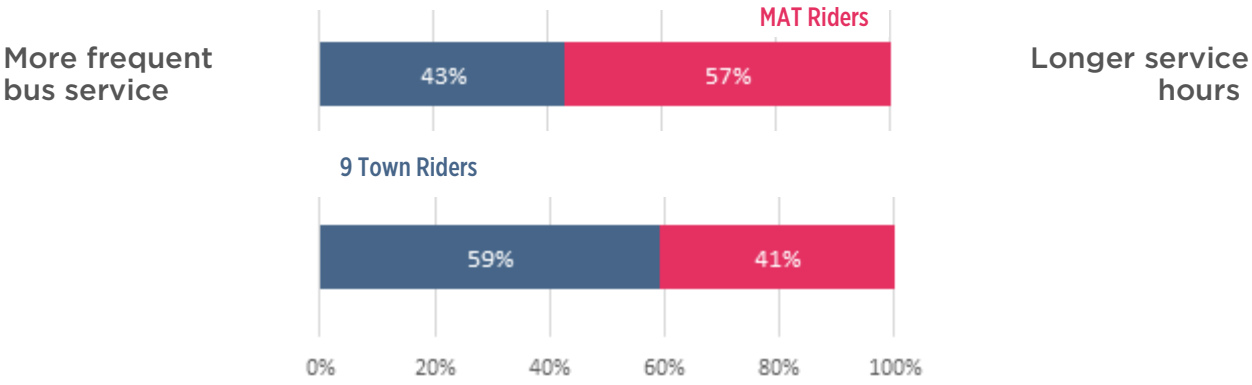
Improve existing service



Serve new areas

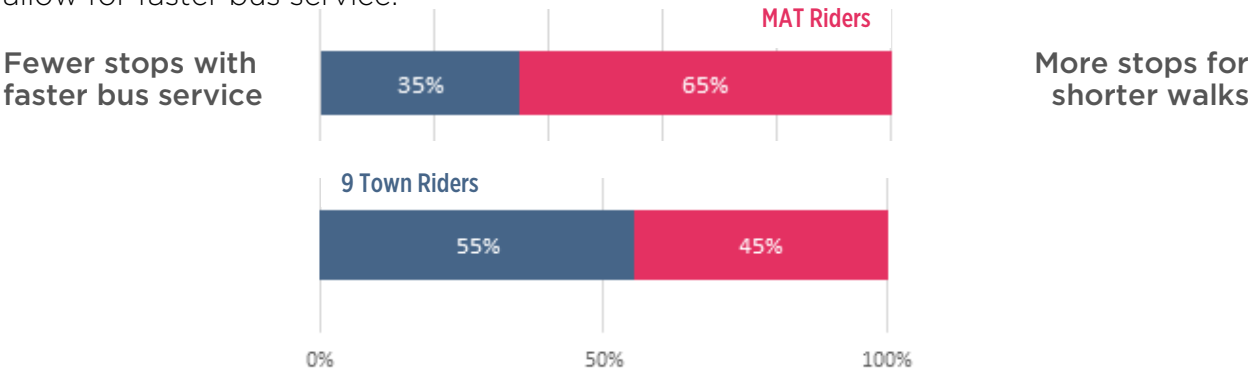
More Frequent Bus Service vs. Longer Service Hours

This is one of two questions on which transit riders in the Middletown and Shoreline areas had differing priorities. MAT riders indicated a preference for longer service hours, but 9 Town riders indicated a preference for more frequent bus service. This is likely due to the fact that all MAT routes operate at 50-minute frequency, but most 9 Town routes operate closer to two-hour frequency.



Fewer Stops (and Faster Service) vs. More Stops (but Shorter Walks)

Middletown area riders indicated a preference for adding bus stops to create shorter walks to access transit. Shoreline riders indicated a preference for fewer stops to allow for faster bus service.



Other Survey and Interview Results

Other public outreach efforts also encouraged riders to participate in similar trade-off exercises or asked about service improvement priorities. Although the participation rate in these later surveys was significantly lower than the May 2019 on-board surveys (with public outreach in 2020 particularly impacted by the COVID-19 pandemic), many of the comments echoed findings from earlier rounds of outreach. Key differences include:

- Middletown area riders responding to the 2020 online survey ranked the need for more weekday evening service higher than for weekend service.
- Shoreline area riders attending the September 2019 pop-up events voiced a slight preference for adding more weekday service over Sunday service (perhaps because the events only interacted with weekday riders).

- Interviews with stakeholder organizations in mid-2019 highlighted a need for better regional connections (between Old Saybrook and Middletown, and to New Haven and Hartford) and indicated steps should be taken to make transit simpler and more convenient to use.
- Participants in the XtraMile survey indicated high satisfaction with the free pilot program offering on-demand transit in Old Saybrook. Their priorities included:
  - Nearly three-quarters of respondents (74%) preferred expanding XtraMile service to Sunday rather than extending XtraMile weekday and Saturday hours.
  - XtraMile riders would rather add new zones (67%) or extend spans of service (63%) than add more vehicles to decrease wait times in the existing zone. This is not unexpected, given the relatively short wait times for the existing pilot service. Most respondents also indicated that they would be willing to pay a fare to continue this pilot service.

Comments on Specific Service Ideas

The online survey posted in the summer of 2020 offered the public an opportunity to comment on specific service improvement ideas. Comments included:

Alignment changes

- General support for realigning Middletown area routes to make service faster and more direct by eliminating loops and operating bi-directionally. However, several people who lived along segments of Routes 583, 584, 585 and 590 were service would be discontinued expressed disapproval.
- Route 581: A desire for more direct service to Middlesex Community College (MCC). Conversely, another rider would like to see 581 serve additional medical facilities along Saybrook Road which would make service to MCC less direct.
- Routes 581 and 583: A desire to streamline service to make it run faster and on-time.
- Route 586: Extend to serve new town hall and Lack Pocotopaug area.
- Route 590: Extend to more destinations in Meriden (outside MAT's service area).
- Route 643: Some support was voiced for operating New London more directly via I-95 or Route 1.
- Route 644: Even higher levels of support for operating mainly on State Highway 9 rather than 154 (although one Haddam rider expressed disapproval). There was also a request for a Deep River stop on this route.

Span and Frequency Improvements

- Top priorities for improving weekday evening service in the Middletown area were Routes 581, 584, 585 and 590.
- Increased service spans on Route 641 were most identified in the Shoreline area.

- Route 644 was highlighted for needing weekend service. Extending evening service until 9:30 pm would also help students attending night classes at Middlesex Community College.
- There was a request to extend Dial-a-Ride services to 5 pm.

New Service Ideas

- New XtraMile zones were identified as a top priority. Middletown area stakeholders expressed strong support for an on-demand service connecting Wesleyan with retail plazas, downtown Portland, and other locations. Shoreline area stakeholders preferred a new zone connecting Deep River and Essex with Old Saybrook Station.

Other Public Comments

- Introduce bus stops (rather than a flag system) and install seating at bus stops.
- Offer real time arrival information on when buses will arrive.
- Make it easier to find information about transit schedules and maps, including services for those with limited mobility options.
- Offer timed connections between buses in the Shoreline area and to rail services at Shore Line East and Meriden stations.
- Communicate and enforce clear policies regarding where passengers may be picked up and the window of time a transfer may be used once issued.
- Improve coordination with CT*transit*, routes (e.g. more seamless transfers and fare integration).
- Have CT*transit* buses enter the MAT terminal and offer long term parking for bus riders.
- Offer more service to Hartford and Central CT State University in New Britain.
- Serve all K-12 schools.
- Serve more areas off Route 1 along the Shoreline (no specific destinations were identified).

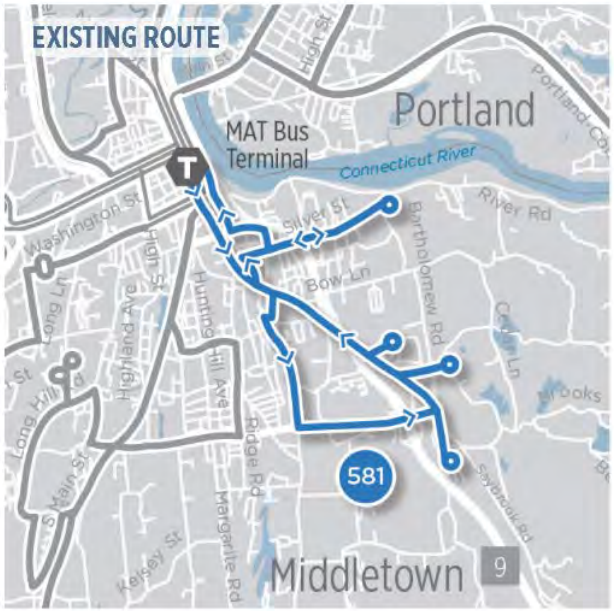
Appendix B: Proposed Route Alignment Changes and New Services

ROUTE 581: SAYBROOK ROAD

Middletown Area Transit Route 581 currently operates as a one-way counterclockwise loop, with all trips beginning and ending in Downtown Middletown at the MAT Terminal.

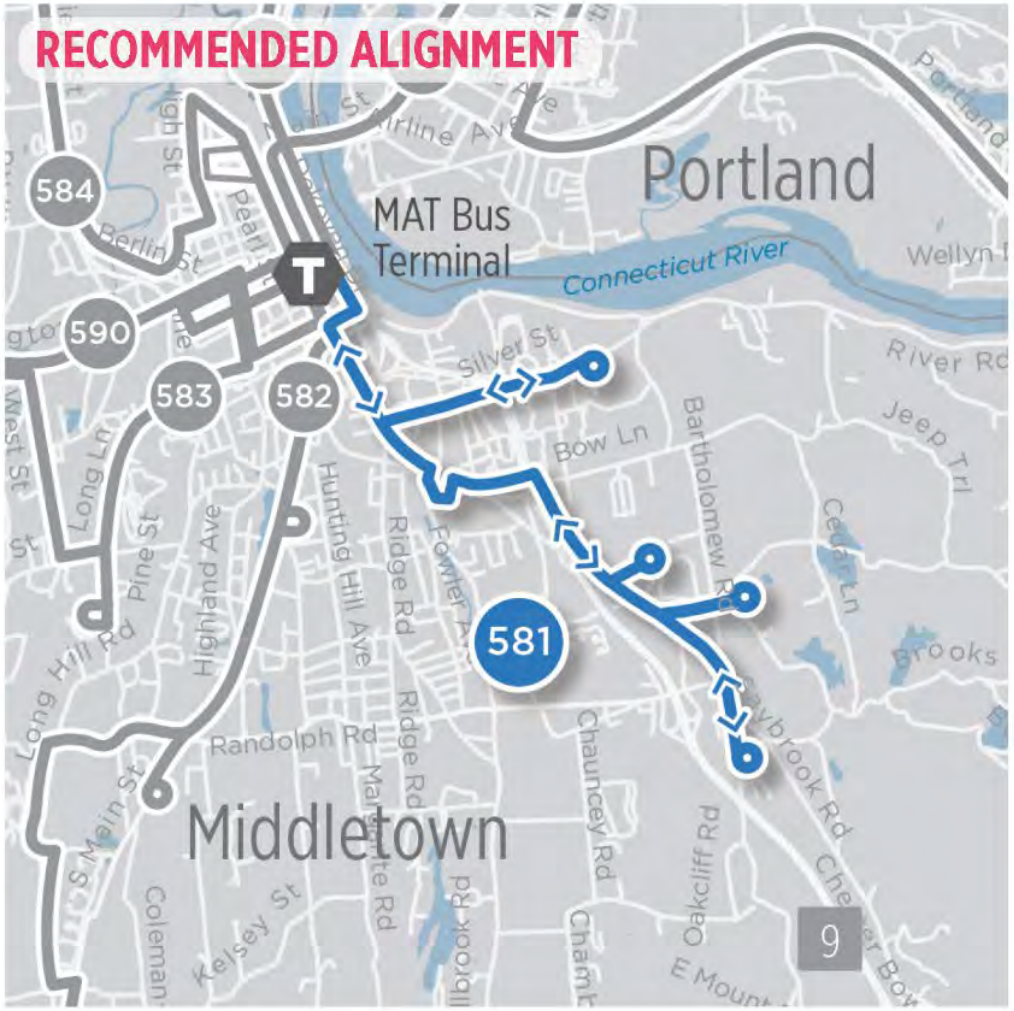
Lower Connecticut River Valley Transit Study

THE LCRV STUDY IS EVALUATING POSSIBLE ROUTE CHANGES TO MAKE SERVICE MORE EFFICIENT FOR RIDERS. HOW WOULD THE POTENTIAL CHANGE SHOWN BELOW IMPACT YOU?



RECOMMENDED IMPROVEMENTS

- Streamline route to stay mainly on Saybrook Road and provide same service in both inbound and outbound directions
- Turnaround at CVH instead of end of Silver Street
- Serve CVH, Stop & Shop, Veterans Home, Saybrook Medical Centers, Middlesex Community College, Summerhill Apartments
- Discontinue route segments on Millbrook Road and Randolph Road

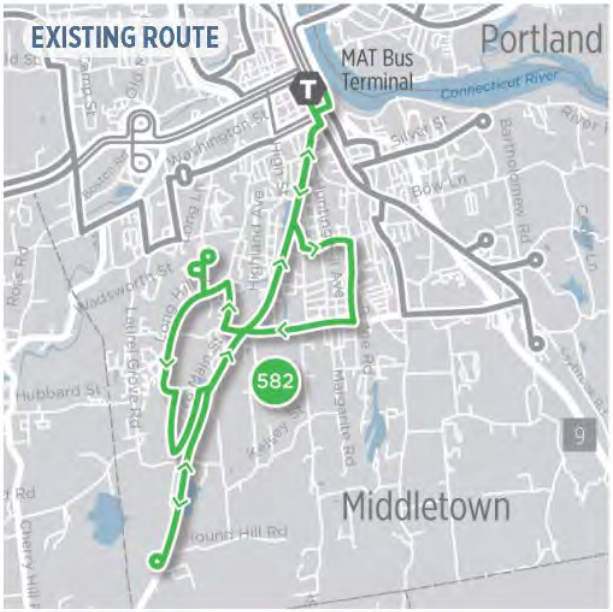


ROUTE 582: WESLEYAN HILLS

Middletown Area Transit Route 582 currently operates as a "figure-eight" series of loops, with all trips beginning and ending in Downtown Middletown at the MAT Terminal.

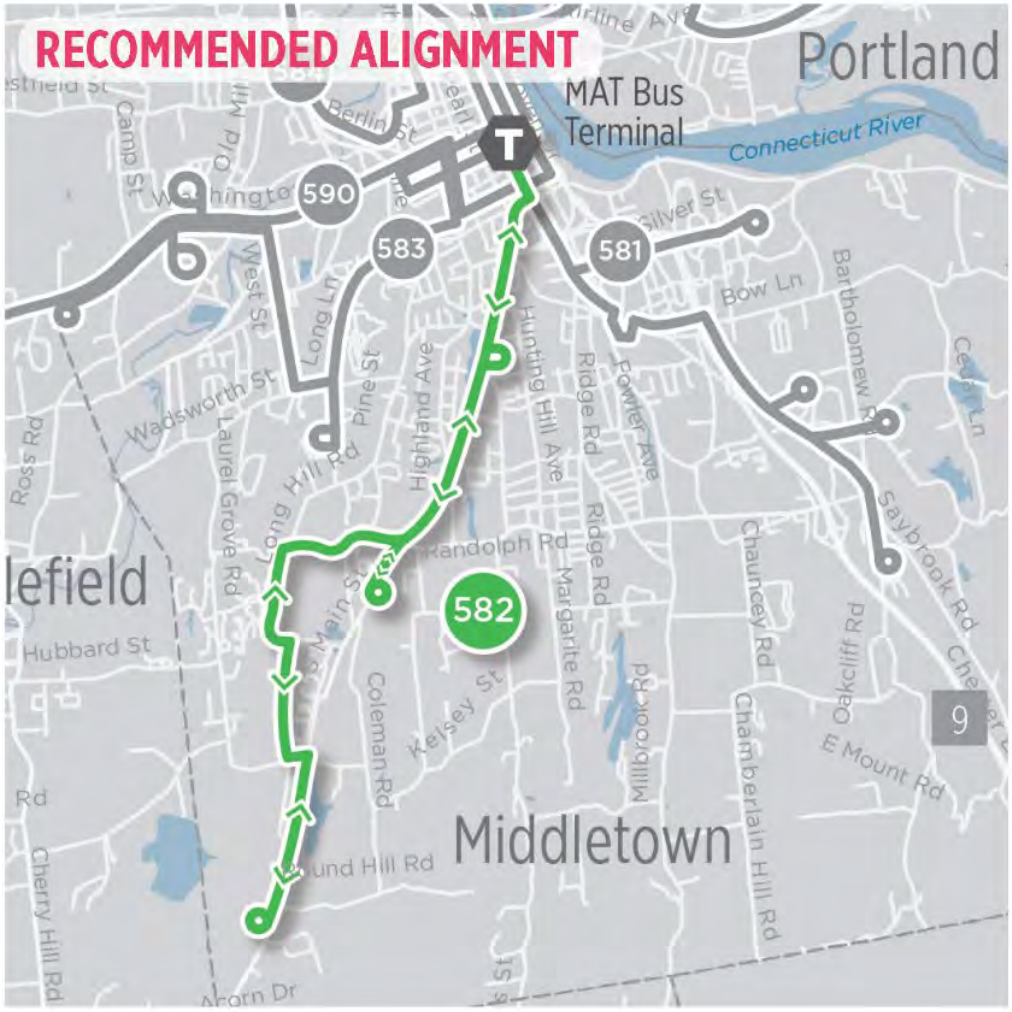
Lower Connecticut River Valley Transit Study

THE LCRV STUDY IS EVALUATING POSSIBLE ROUTE CHANGES TO MAKE SERVICE MORE EFFICIENT FOR RIDERS. HOW WOULD THE POTENTIAL CHANGE SHOWN BELOW IMPACT YOU?



RECOMMENDED IMPROVEMENTS

- New bidirectional alignment along South Main Street via Wesleyan Hills and Long Hill Road, terminating at the Department of Social Services
- Adjust alignment to make small deviation off South Main Street to serve Senior Center
- Discontinue route segments on Russell Street, Ridge Road, and Randolph Road

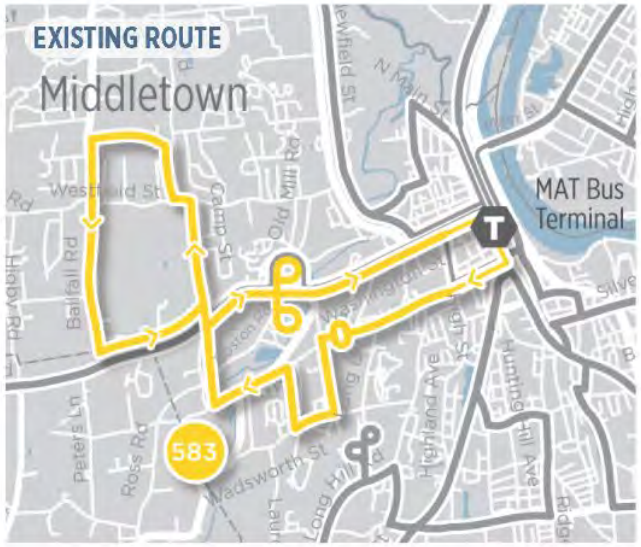


ROUTE 583: SAGAMORE HILLS

Middletown Area Transit Route 583 currently operates a large "figure-eight" loop, with all trips beginning and ending in Downtown Middletown at the MAT Terminal.

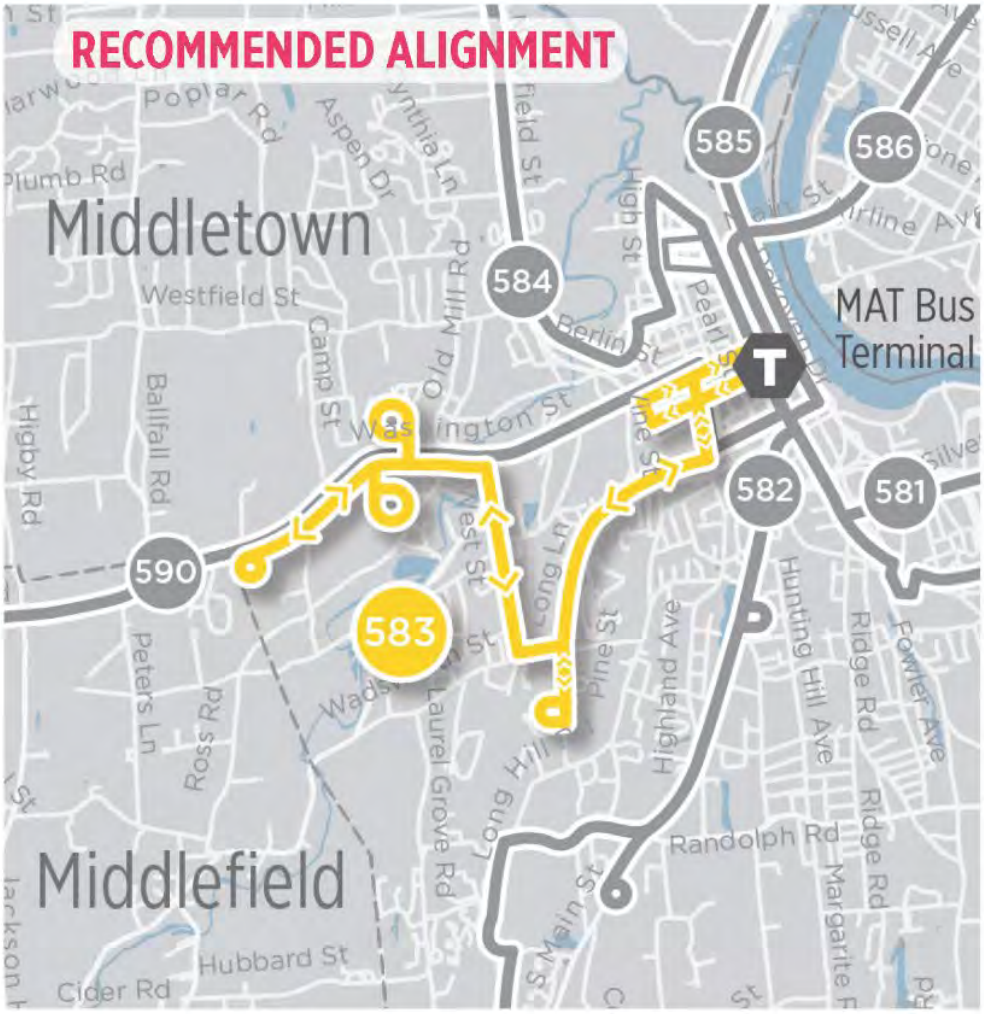
Lower Connecticut River Valley Transit Study

THE LCRV STUDY IS EVALUATING POSSIBLE ROUTE CHANGES TO MAKE SERVICE MORE EFFICIENT FOR RIDERS. HOW WOULD THE POTENTIAL CHANGE SHOWN BELOW IMPACT YOU?



RECOMMENDED IMPROVEMENTS

- New bidirectional alignment along High St, Church St, Cross St, Long Ln, West St, and Washington St
- Route serves Wesleyan University, Long Lane and Santangelo Circle, West Street, Washington Street plazas, and Sagamore Hills Apartments
- Introduce service to New Meadow and Bayberry Crest Apartments
- Discontinue route segments on Ballfall Road, Congdon Street, Ridgewood Road, and Camp Street

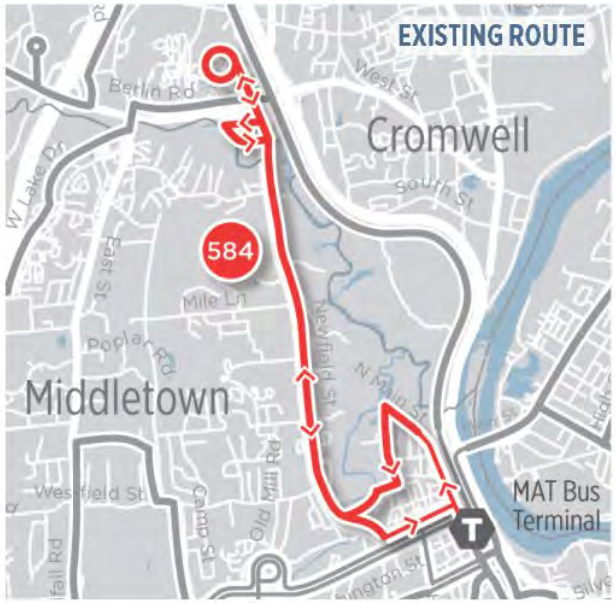


ROUTE 584: NEWFIELD STREET

Middletown Area Transit Route 584 currently operates a large one-way loop just north of Downtown Middletown and bidirectional service along Newfield Street. All trips between the MAT Terminal in Downtown Middletown and K-Mart Plaza/ShopRite in Cromwell.

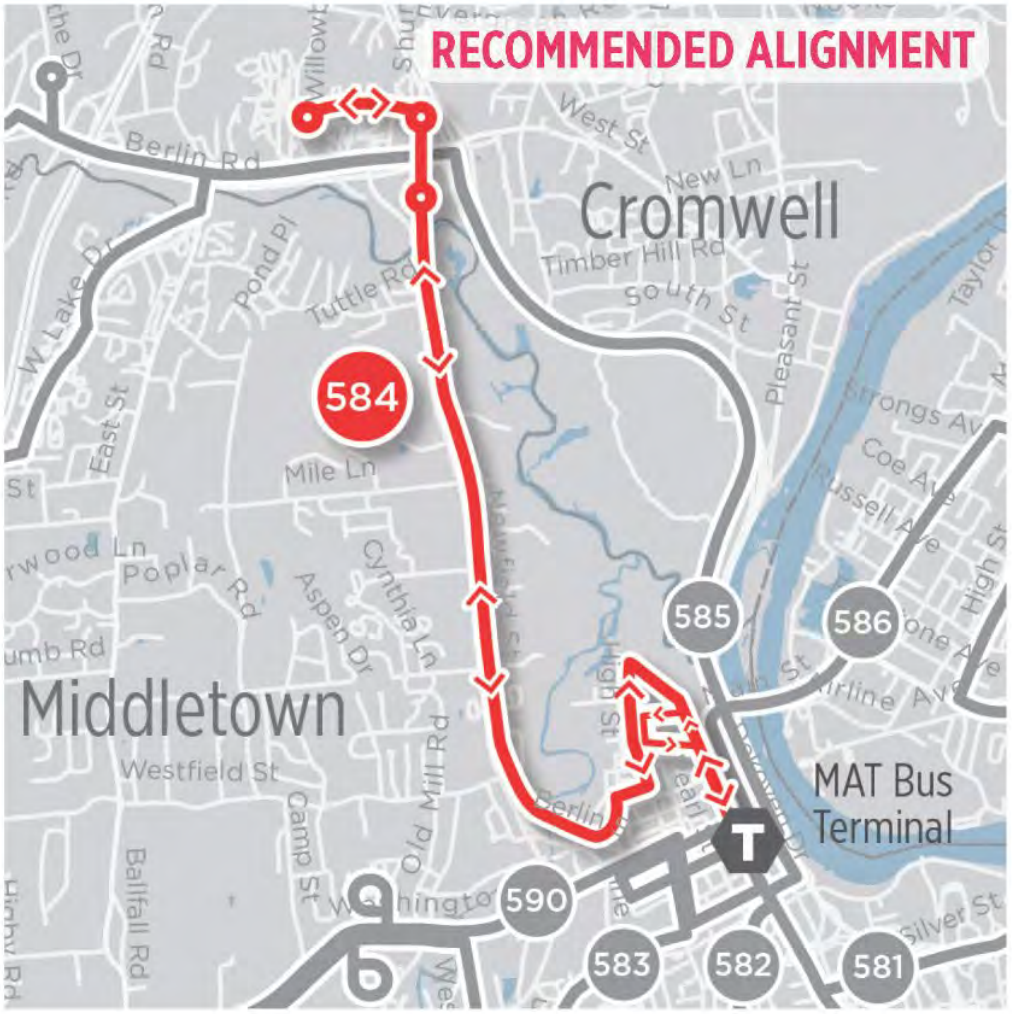
Lower Connecticut River Valley Transit Study

THE LCRV STUDY IS EVALUATING POSSIBLE ROUTE CHANGES TO MAKE SERVICE MORE EFFICIENT FOR RIDERS. HOW WOULD THE POTENTIAL CHANGE SHOWN BELOW IMPACT YOU?



RECOMMENDED IMPROVEMENTS

- Improved service through North End of Downtown (inbound: left onto Liberty St, right on Grand St, left on High St, right on N. Main St, right on Stack St, left on High St, left on Spring St, right on Main St)
- Simplified loop at north terminus
- Introduce service to Meadow Brook, Skyview, and Cromwell Hills Apartments

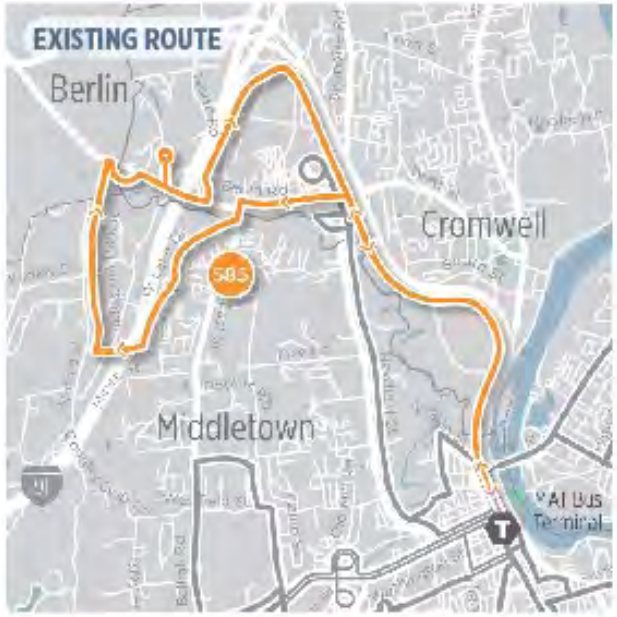


ROUTE 585: BIDIRECTIONAL

Middletown Area Transit Route 585 currently operates a large one-way loop through northern Middletown, with bidirectional non-stop service along CT 9. All trips begin and end at the MAT Terminal in Downtown Middletown.

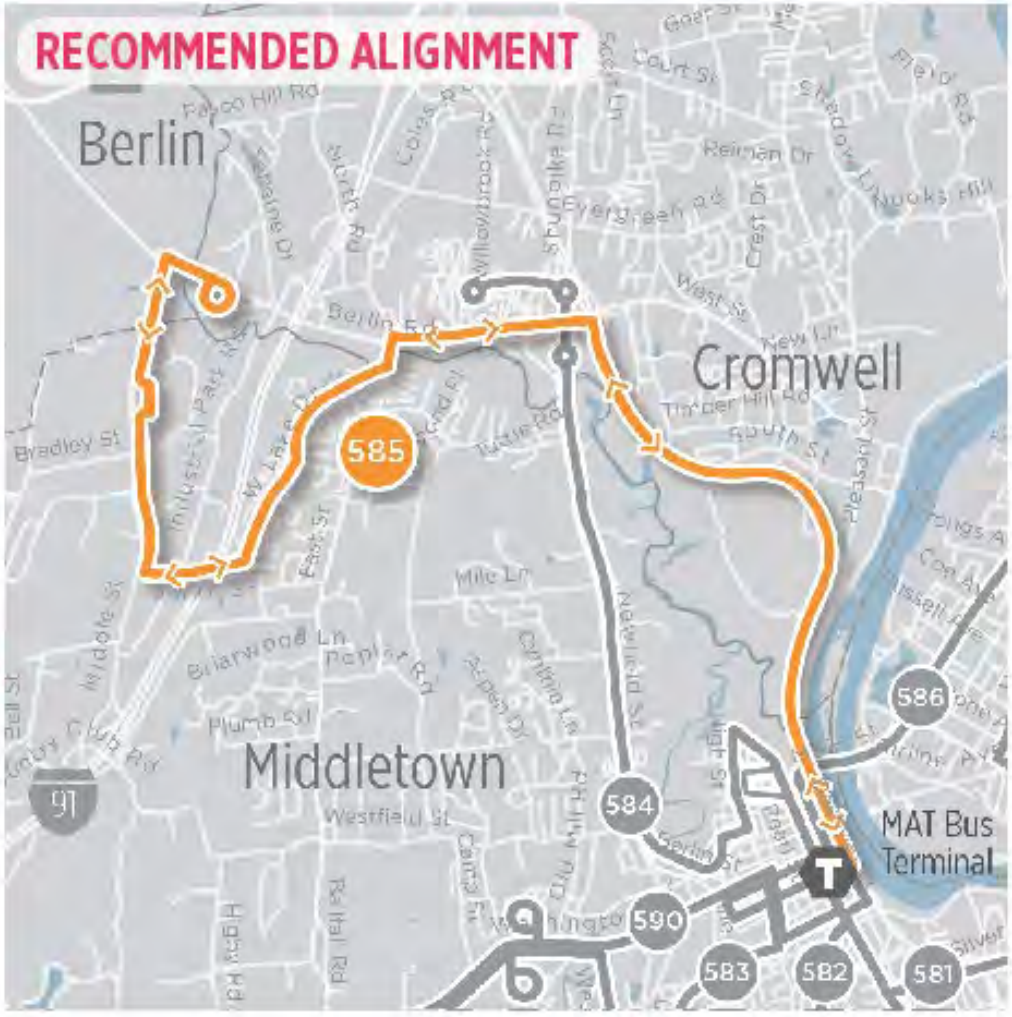
Lower Connecticut River Valley Transit Study

THE LCRV STUDY IS EVALUATING POSSIBLE ROUTE CHANGES TO MAKE SERVICE MORE EFFICIENT FOR RIDERS. HOW WOULD THE POTENTIAL CHANGE SHOWN BELOW IMPACT YOU?



RECOMMENDED IMPROVEMENTS

- New bidirectional alignment along Route 9, Berlin Rd, West Lake Dr, and Middle St
- Provide same service in both inbound and outbound directions
- Riders can connect to CT*transit* Route 512 to New Britain at Walmart
- Discontinue direct service to Cromwell Commons shopping plaza

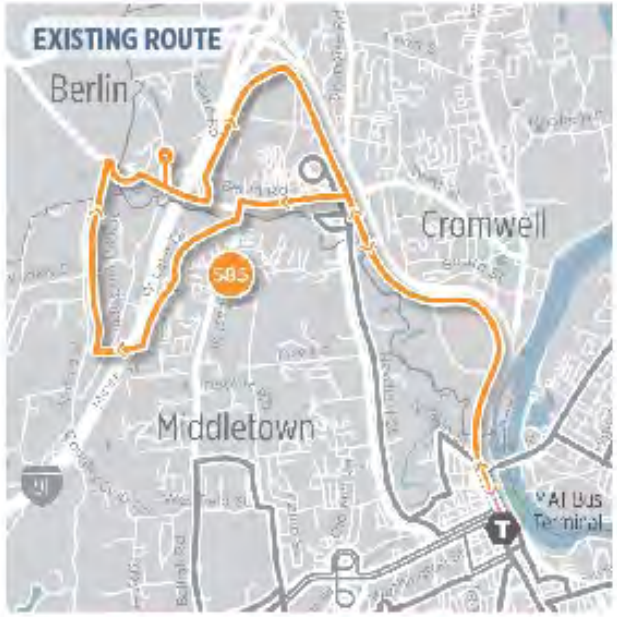


ROUTE 585: BERLIN ROAD LOOP

Middletown Area Transit Route 585 currently operates a large one-way loop through northern Middletown, with bidirectional non-stop service along CT 9. All trips begin and end at the MAT Terminal in Downtown Middletown.

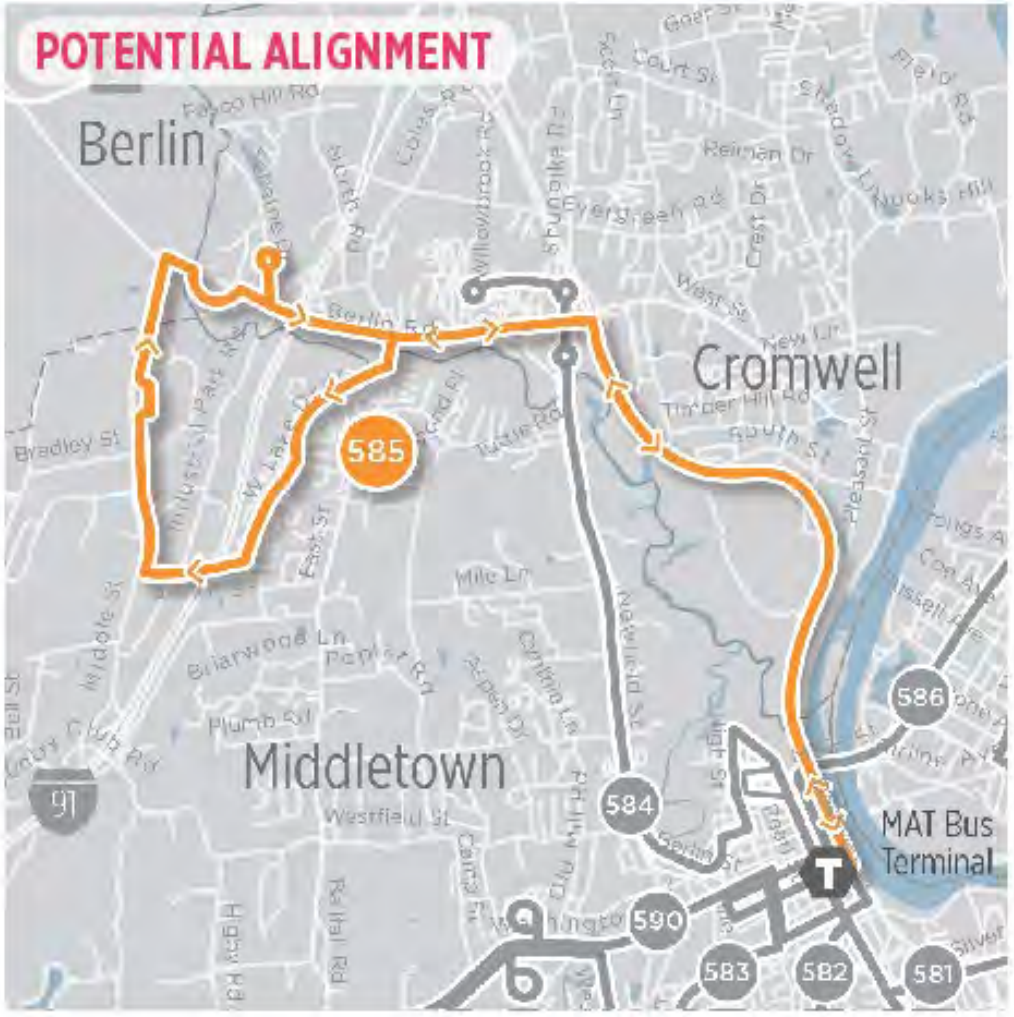
Lower Connecticut River Valley Transit Study

THE LCRV STUDY IS EVALUATING POSSIBLE ROUTE CHANGES TO MAKE SERVICE MORE EFFICIENT FOR RIDERS. HOW WOULD THE POTENTIAL CHANGE SHOWN BELOW IMPACT YOU?



POTENTIAL IMPROVEMENTS

- Discontinue highway segment by staying on Berlin Road. Use of Transit Signal Priority (TSP) may help keep buses on schedule through congestion and numerous traffic signals on Route 372
- Riders can connect to CT*transit* Route 512 to New Britain at Walmart and can now connect to Express Route 906 on Berlin Road
- Stay on Route 9 in and out of Downtown Middletown to improve speed

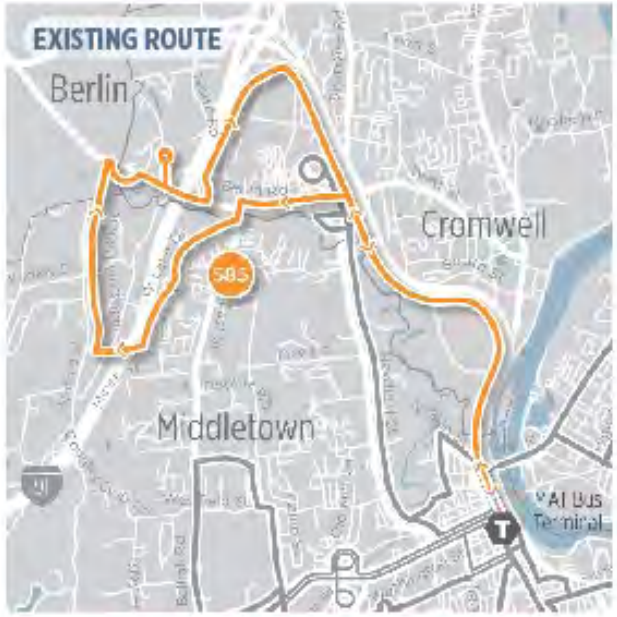


ROUTE 585: INDUSTRIAL PARK ROAD

Lower Connecticut River Valley Transit Study

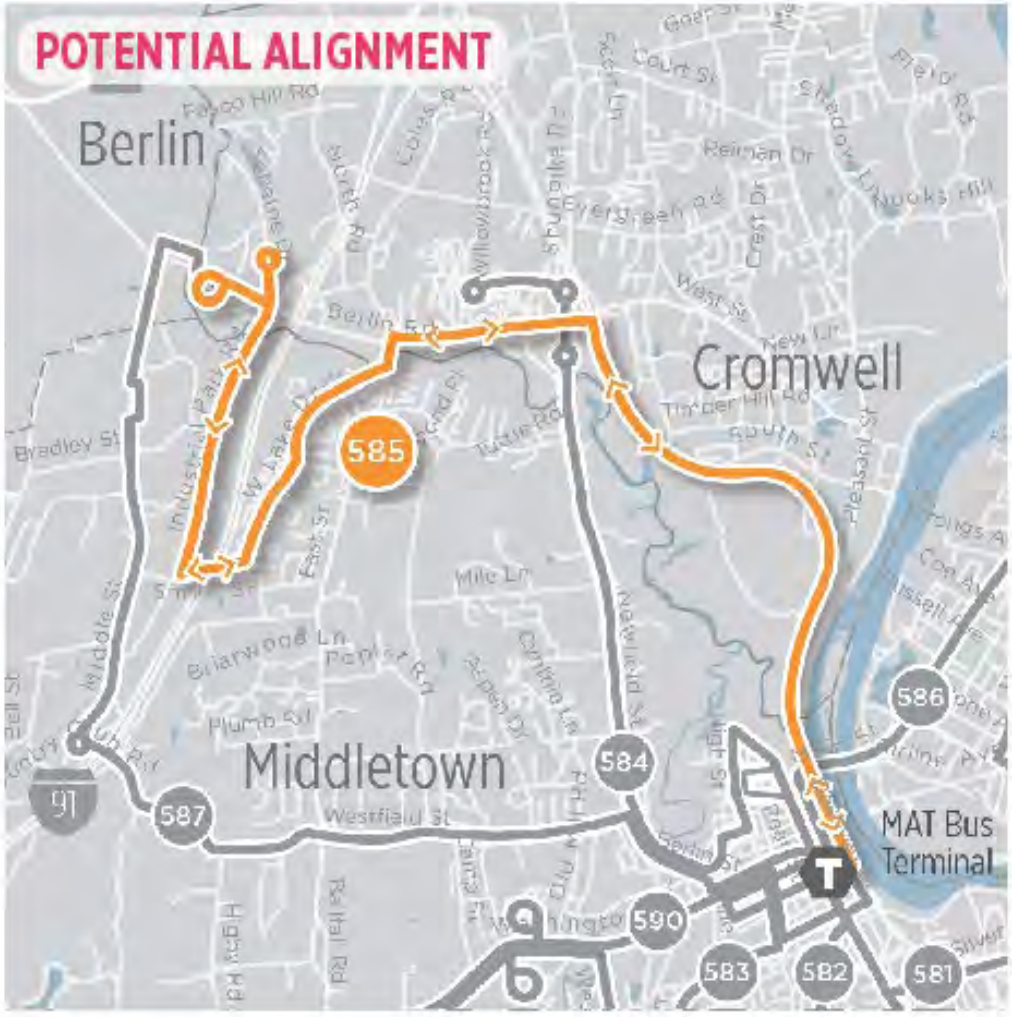
Middletown Area Transit Route 585 currently operates a large one-way loop through northern Middletown, with bidirectional non-stop service along CT 9. All trips begin and end at the MAT Terminal in Downtown Middletown.

THE LCRV STUDY IS EVALUATING POSSIBLE ROUTE CHANGES TO MAKE SERVICE MORE EFFICIENT FOR RIDERS. HOW WOULD THE POTENTIAL CHANGE SHOWN BELOW IMPACT YOU?



POTENTIAL IMPROVEMENTS

- Paired with Route 587 Crosstown
- New bidirectional alignment along Route 9, Berlin Rd, West Lake Dr, and Industrial Park Rd
- Provide same service in both inbound and outbound directions
- Riders can connect to MAT Route 587 and CT*transit* Route 512 to New Britain at Walmart
- Discontinue route segment on Middle Street. Route 587 will serve FedEx instead



ROUTE 586: PORTLAND/EAST HAMPTON

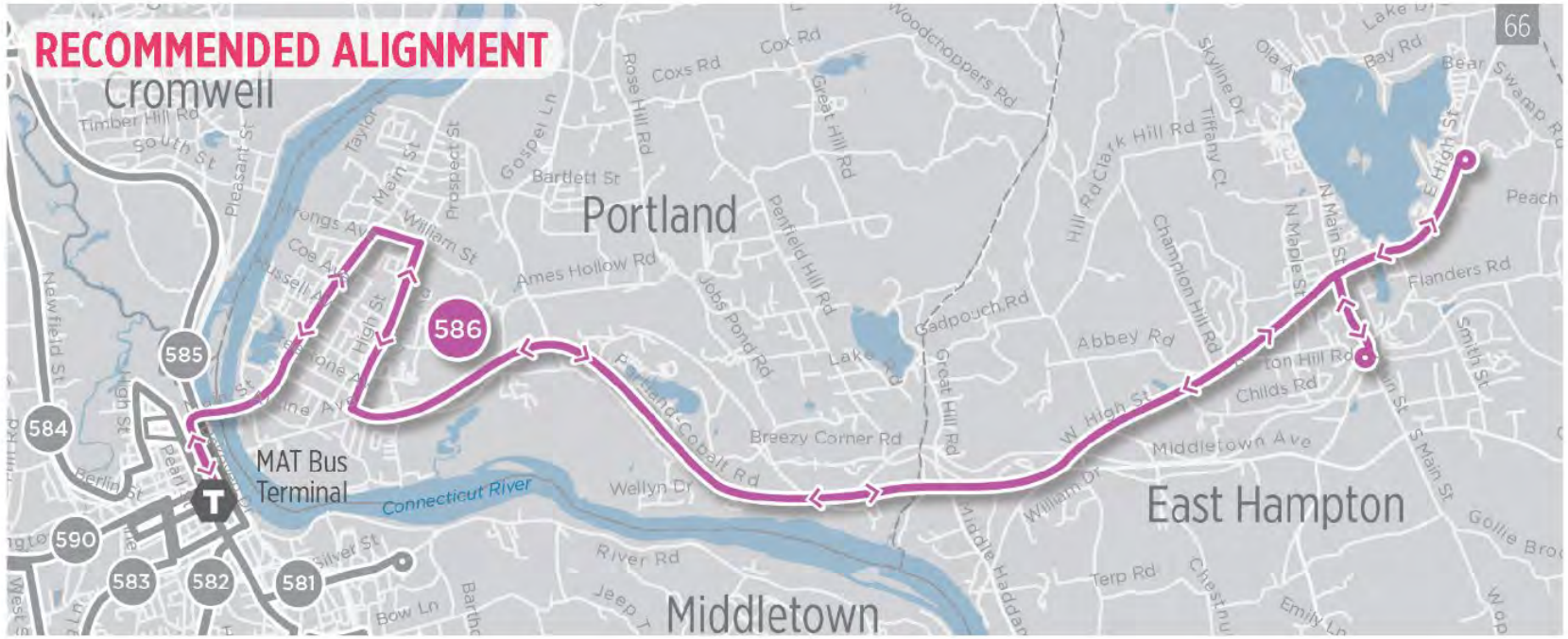
Lower Connecticut River Valley Transit Study

Middletown Area Transit Route 586 currently operates two large one-way loops (one through Portland and one through East Hampton), with bidirectional service along Portland-Cobalt Road. All trips begin and end at the MAT Terminal in Downtown Middletown.

THE LCRV STUDY IS EVALUATING POSSIBLE ROUTE CHANGES TO MAKE SERVICE MORE EFFICIENT FOR RIDERS. HOW WOULD THE POTENTIAL CHANGE SHOWN BELOW IMPACT YOU?

RECOMMENDED IMPROVEMENTS

- Bidirectional service through downtown Portland, based on current PM alignment: Main Street, right on William Street, right on High Street, left on Route 66
- Terminate at Laurel Ridge
- Serve East Hampton Center, near intersection of Main Street and Route 196
- Discontinue route segments on North Main St and Middletown Ave



ROUTE 587: CROSSTOWN

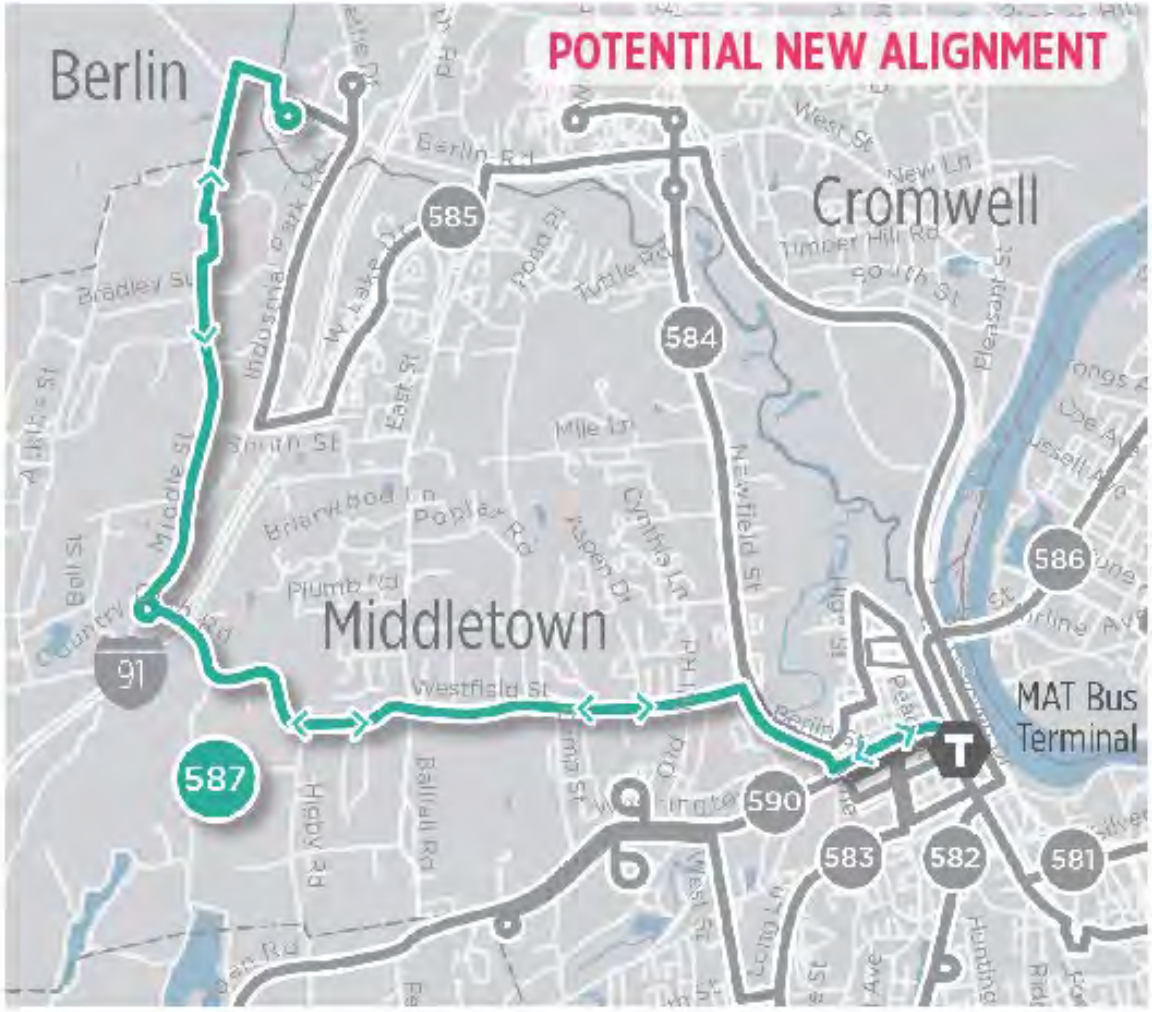
A potential new MAT route running from the Bus Terminal to Walmart in Cromwell. It would connect to existing MAT and CT*transit* routes while providing new service across Middletown.

Lower Connecticut River Valley Transit Study

THE LCRV STUDY IS EVALUATING POSSIBLE ROUTE CHANGES TO MAKE SERVICE MORE EFFICIENT FOR RIDERS. HOW WOULD THE POTENTIAL CHANGE SHOWN BELOW IMPACT YOU?

POTENTIAL NEW ROUTE

- Paired with 585 Industrial Park Road
- Introduce service to new area of Middletown community
- Allow Route 585 to bidirectionally serve West Lake Dr, Walmart, and Cromwell Commons shopping center
- Could be run as peak-only service or all day
- Transfer opportunities:
  - MAT Route 585, at Walmart
  - CT*transit* Route 512 New Britain, at Walmart
  - CT*transit* Route 950 Hartford to New Haven, at Park & Ride



ROUTE 590: MERIDEN

Middletown Area Transit Route 590 currently operates bidirectional between the MAT Terminal in Downtown Middletown and the Meriden Transit Center, primarily traveling non-stop via Route 66.

Lower Connecticut River Valley Transit Study

THE LCRV STUDY IS EVALUATING POSSIBLE ROUTE CHANGES TO MAKE SERVICE MORE EFFICIENT FOR RIDERS. HOW WOULD THE POTENTIAL CHANGE SHOWN BELOW IMPACT YOU?

RECOMMENDED IMPROVEMENTS

- Bidirectional alignment along High Street in Middletown to better serve Wesleyan University
- Make local stops along Washington Street in Middletown
- Discontinue deviation into Middletown Plaza. Route 583 will continue to serve Washington Street plaza
- Maintain same alignment for weekdays and weekends

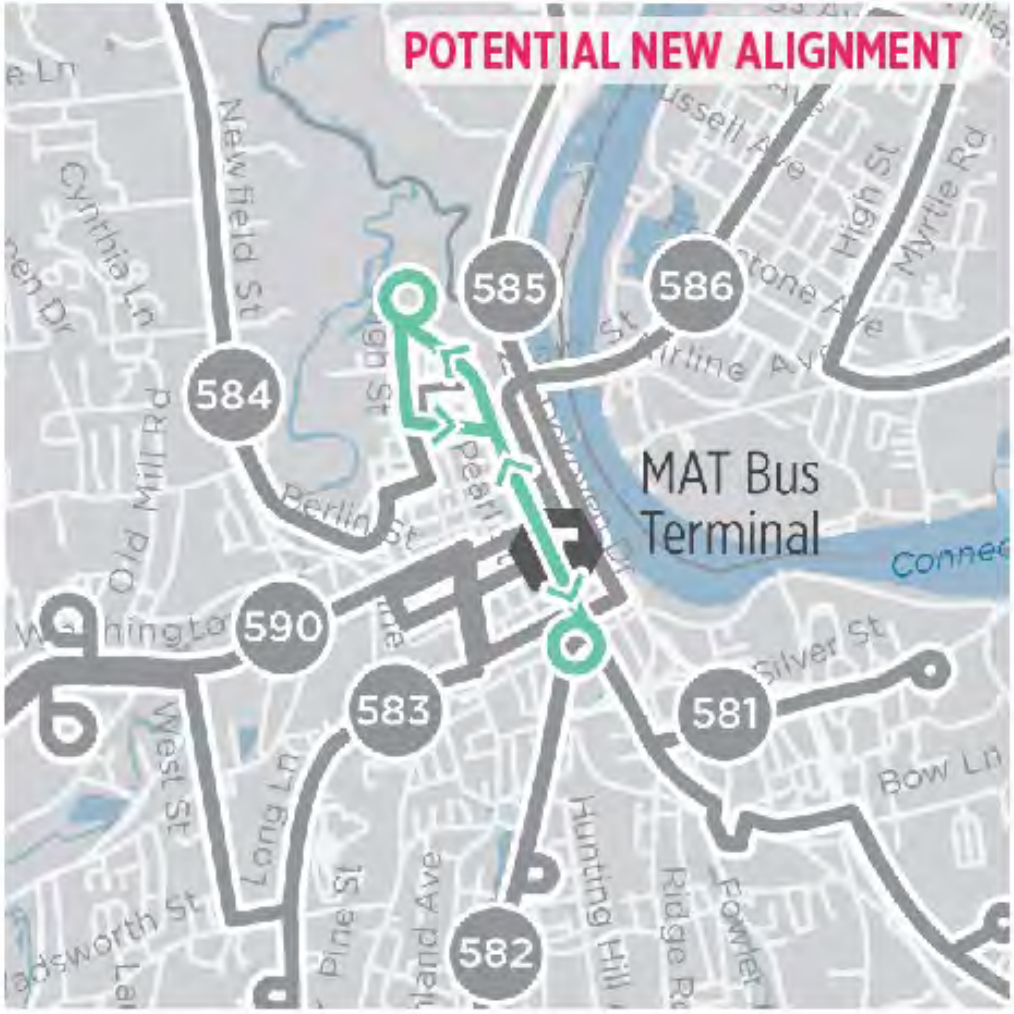
DOWNTOWN MIDDLETOWN SHUTTLE

Lower Connecticut River Valley Transit Study

The City of Middletown has proposed that a downtown parking shuttle be operated between parking facilities at the Remington Rand building in the North End and downtown businesses, operating south of downtown to Middlesex Hospital or possibly a second remote parking lot.

POTENTIAL NEW ROUTE

- Would connect remote parking facilities to downtown businesses
- Potential Alignment: Remington Rand, N Main St, High St, Main St, Pleasant St, Crescent St, terminate at Middlesex Hospital



ROUTE 640: OLD SAYBROOK LOCAL

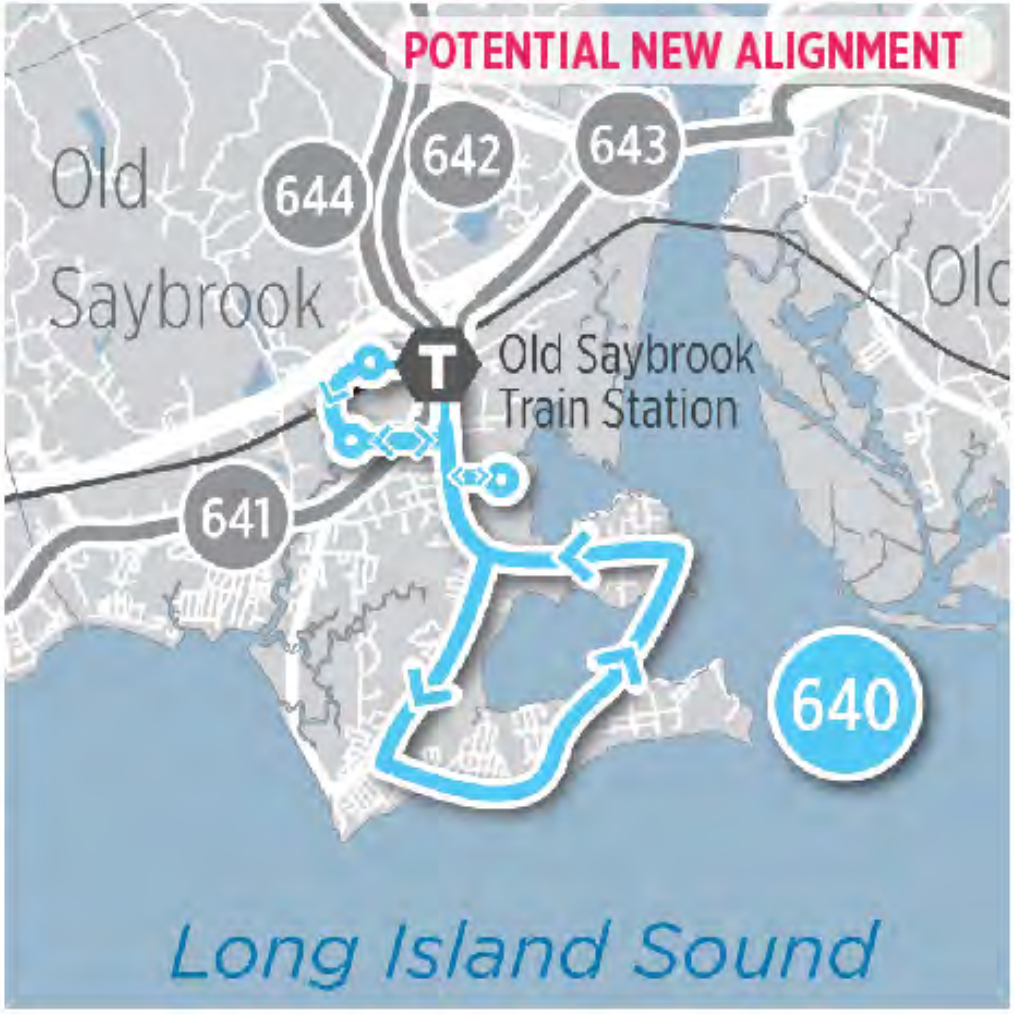
A potential new 9 Town Transit route running from the Old Saybrook Train Station to Saybrook Point. It would connect popular destinations in Old Saybrook Center with the South Cove.

Lower Connecticut River Valley Transit Study

THE LCRV STUDY IS EVALUATING POSSIBLE ROUTE CHANGES TO MAKE SERVICE MORE EFFICIENT FOR RIDERS. HOW WOULD THE POTENTIAL CHANGE SHOWN BELOW IMPACT YOU?

POTENTIAL NEW ROUTE

- Consolidate existing route segments in Old Saybrook Center as a new local circulator
- Serve Old Saybrook Station, the Industrial Park on Mill Rock Road/Research Pkwy, Stop & Shop, the Senior Center, Maple Ave, and Saybrook Point
- Allow Routes 641, 642, and 643 to terminate at Old Saybrook Station without needing to deviate downtown



ROUTE 641: OLD SAYBROOK/MADISON

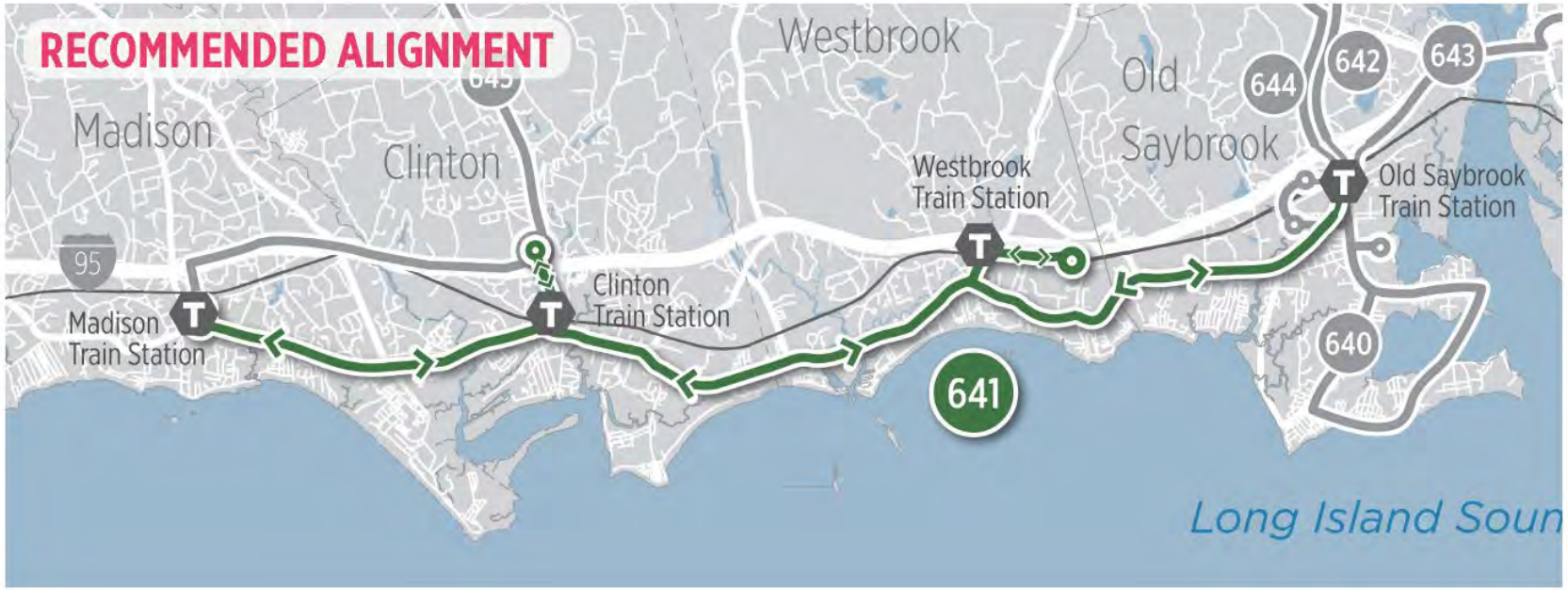
9 Town Transit Route 641 currently operates bidirectional service primarily along Route 1 between Old Saybrook Station and Madison Train Station. The route serves Westbrook Outlets and Clinton Crossing.

Lower Connecticut River Valley Transit Study

THE LCRV STUDY IS EVALUATING POSSIBLE ROUTE CHANGES TO MAKE SERVICE MORE EFFICIENT FOR RIDERS. HOW WOULD THE POTENTIAL CHANGE SHOWN BELOW IMPACT YOU?

RECOMMENDED IMPROVEMENTS

- Modified alignment to better serve Clinton Train Station
- Discontinue service in Old Saybrook Center. XtraMile or New Route 640 will serve Stop & Shop and Senior Center instead



ROUTE 642: OLD SAYBROOK/CHESTER

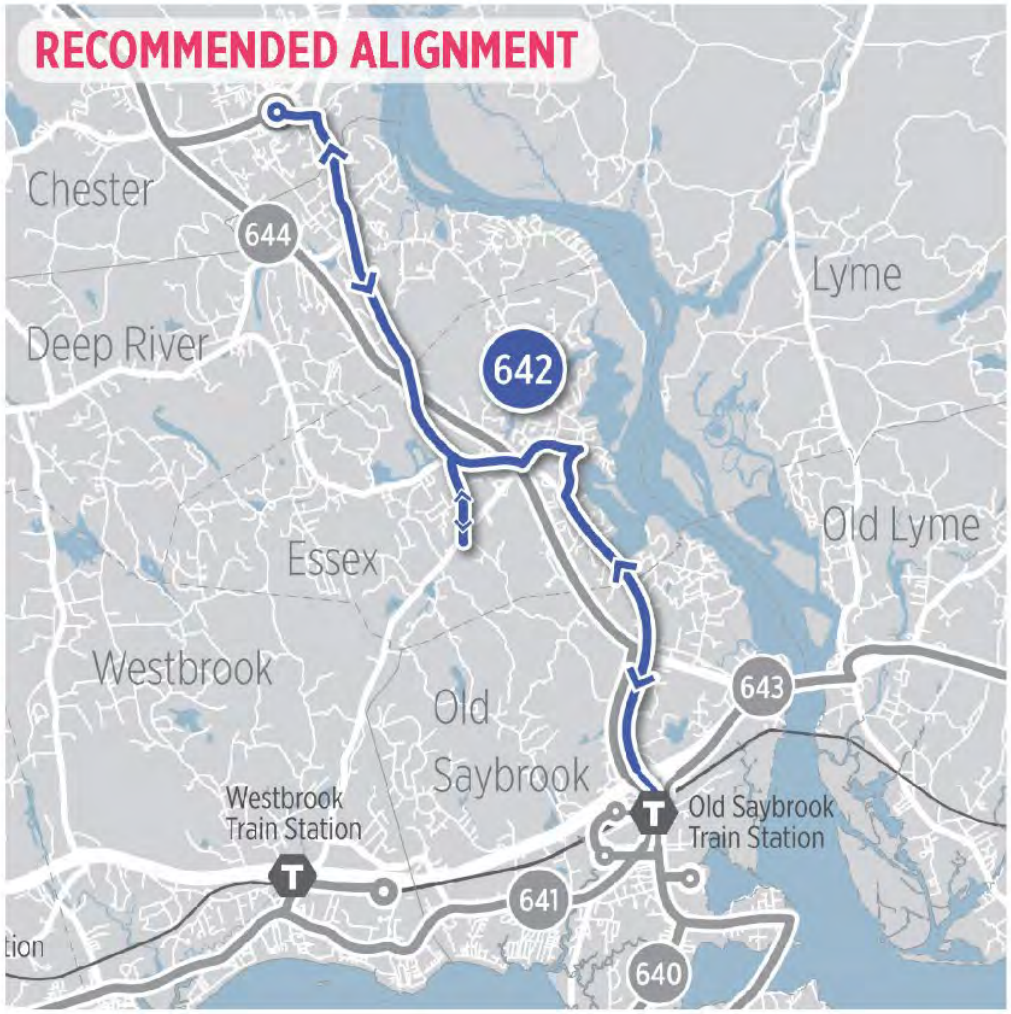
9 Town Transit Route 642 currently operates primarily along Route 154, between Old Saybrook Station and Chester Center. The route serves Old Saybrook, Essex, Deep River, and Chester.

Lower Connecticut River Valley Transit Study

THE LCRV STUDY IS EVALUATING POSSIBLE ROUTE CHANGES TO MAKE SERVICE MORE EFFICIENT FOR RIDERS. HOW WOULD THE POTENTIAL CHANGE SHOWN BELOW IMPACT YOU?

RECOMMENDED IMPROVEMENTS

- Terminate route at Old Saybrook Station instead of Saybrook Point
- Discontinue service in Old Saybrook Center. XtraMile or New Route 640 will serve instead
- Opportunity for transfer to Route 644 (not timed) at Chester Center
- Discontinue Ivoryton branch to improve speed and reliability on route

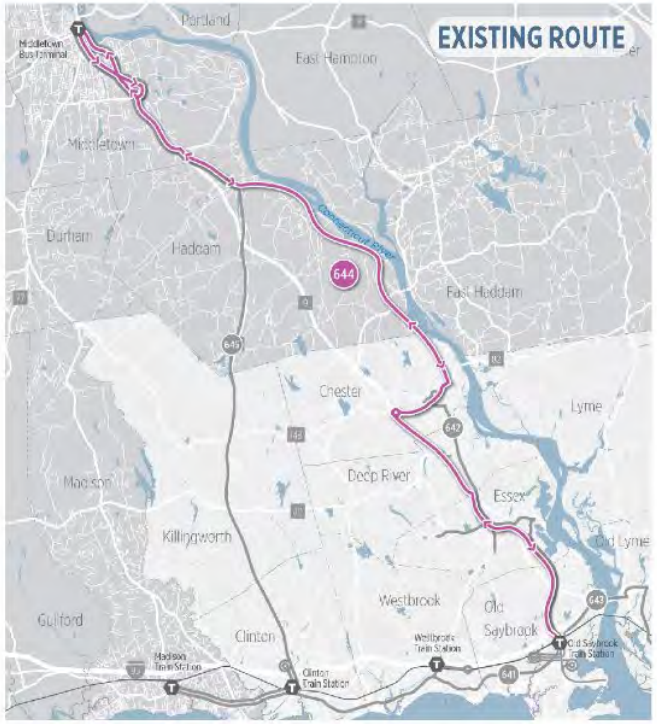


ROUTE 644: OLD SAYBROOK/MIDDLETOWN

9 Town Transit Route 644 currently operates bidirectional service primarily along Saybrook Road and Route 154. The route serves Old Saybrook, Essex, Deep River, Chester, Haddam, and Middletown.

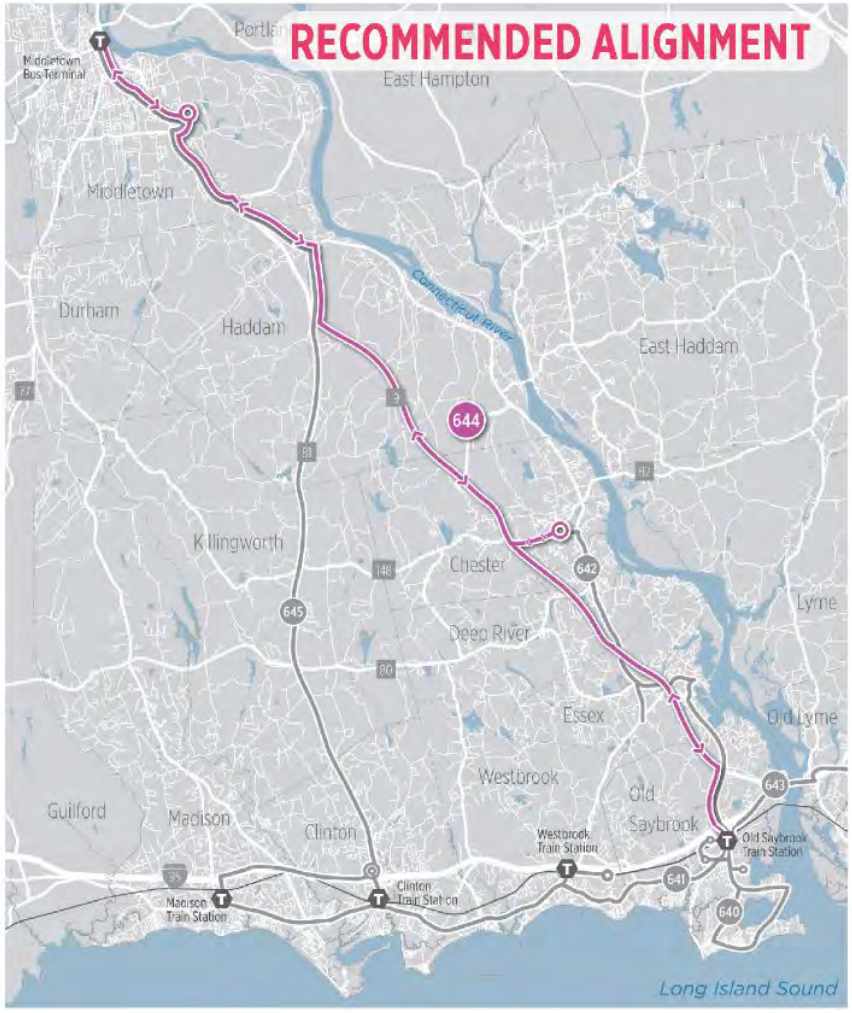
Lower Connecticut River Valley Transit Study

THE LCRV STUDY IS EVALUATING POSSIBLE ROUTE CHANGES TO MAKE SERVICE MORE EFFICIENT FOR RIDERS. HOW WOULD THE POTENTIAL CHANGE SHOWN BELOW IMPACT YOU?



RECOMMENDED IMPROVEMENTS

- Align with Route 9 through Haddam to improve speed and reliability
- Maintain stops at Essex and Chester Park & Rides, Chester Center, Higganum, and Middlesex Community College
- Discontinue route segment on Route 154 in Chester and Haddam

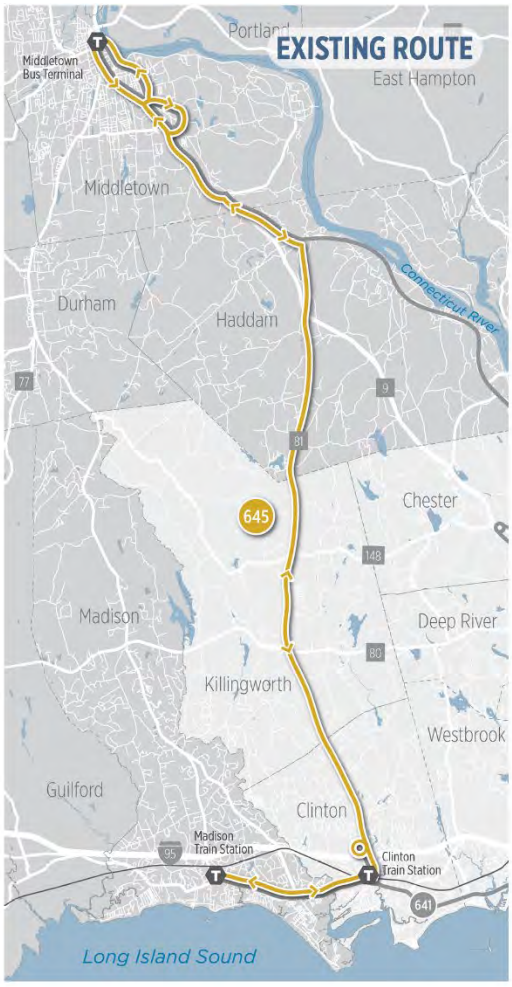


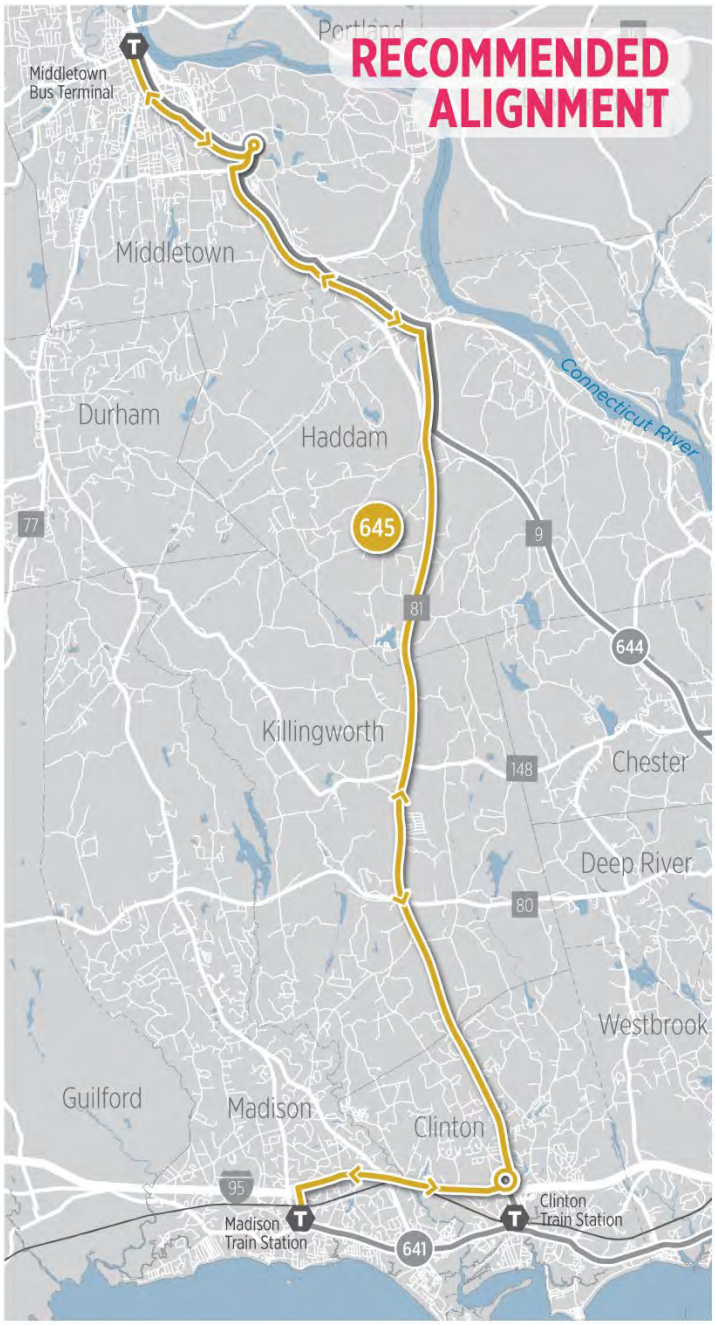
ROUTE 645: MADISON/MIDDLETOWN

9 Town Transit Route 645 currently operates bidirectional service primarily along Route 81. The route serves Madison, Clinton, Killingworth, Haddam, and Middletown.

Lower Connecticut River Valley Transit Study

THE LCRV STUDY IS EVALUATING POSSIBLE ROUTE CHANGES TO MAKE SERVICE MORE EFFICIENT FOR RIDERS. HOW WOULD THE POTENTIAL CHANGE SHOWN BELOW IMPACT YOU?





RECOMMENDED IMPROVEMENTS

- Align with I-95 from Clinton to Madison to improve speed and reliability
- Discontinue service to Clinton Train Station. Route 641 will continue to serve

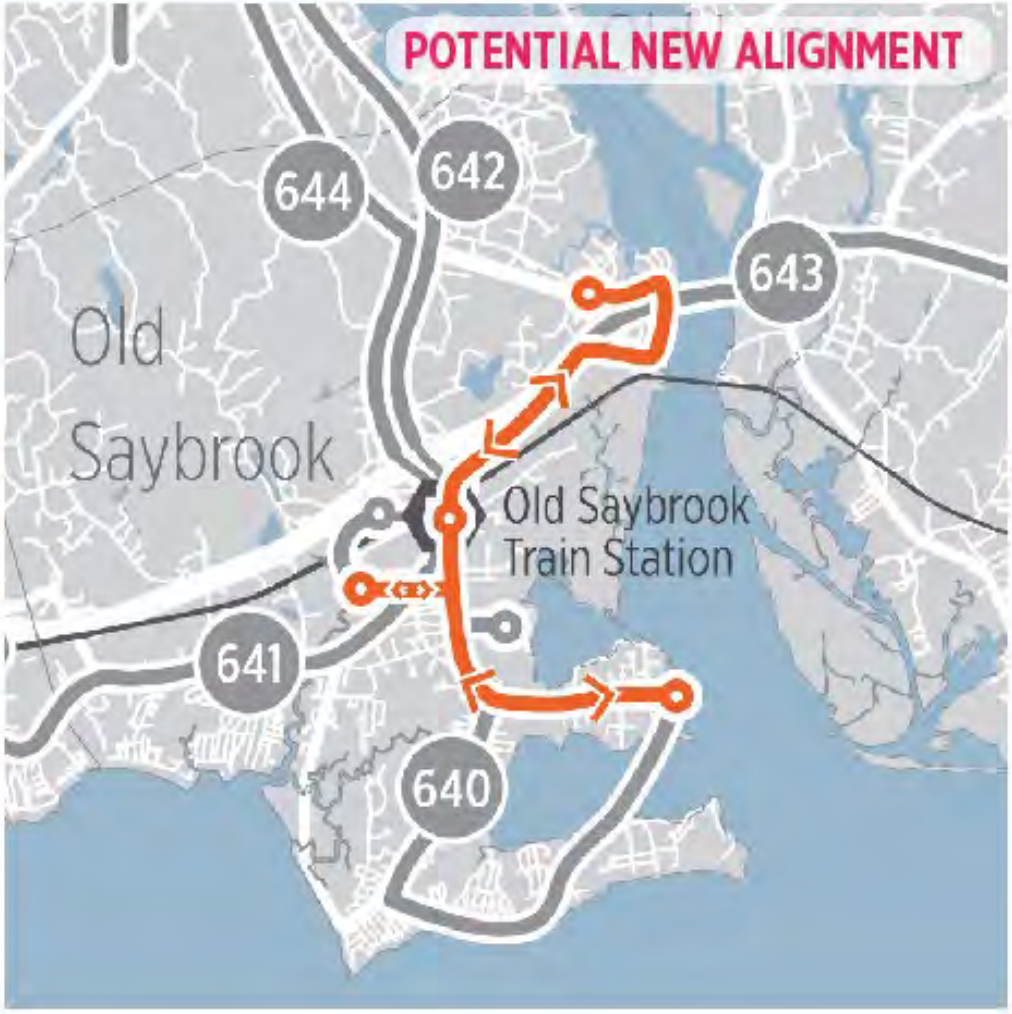
OLD SAYBROOK SEASONAL SHUTTLE

Lower Connecticut River Valley Transit Study

Similar to the Clinton trolley, a seasonal shuttle service could be used to connect summer visitors and others to shopping, dining and retail services such as supermarkets, and marinas along the Connecticut River.

POTENTIAL NEW ROUTE

- Potential Alignment: Saybrook Point, College St, Elm St, OS Shopping Center, OS Train Station, Route 1, Ferry Rd, Essex Rd, terminate at Quality Inn Old Saybrook



Appendix C: Operating Assumptions

Alignment Changes and New Routes

Figure C14 | Middletown Area Cycle Times

Route	Description	Avg Round Trip Miles	Avg Speed MPH	Run Time	Min Recovery	Min Cycle	Even Cycle	Actual Recovery	% Actual Recovery
581	Saybrook Rd - Bidirectional	14.9	17	0:52	0:05	0:57	1:00	0:07	12%
582	South Main St - Bidirectional	12.9	17	0:45	0:04	0:50	1:00	0:14	24%
583	Wesleyan and New Meadow	13.4	17	0:47	0:04	0:52	1:00	0:12	21%
584	Cromwell Hills - Bidirectional	14.8	17	0:52	0:05	0:57	1:00	0:07	13%
585	Berlin Rd Loop	17.3	20	0:51	0:05	0:57	1:00	0:08	14%
585	Route 9 - Bidirectional	20.3	23	0:52	0:05	0:58	1:00	0:07	12%
585	Industrial Park Rd (with 587)	19.6	22	0:53	0:05	0:58	1:00	0:06	11%
586	E. Hampton Center, Town Hall	28.6	32	0:53	0:05	0:58	1:00	0:06	11%
587	Westfield St, FedEx, Walmart	16.9	19	0:53	0:05	0:58	1:00	0:06	11%
590	Wesleyan and Washington St	19.8	22	0:54	0:05	0:59	1:00	0:06	10%
MT Shuttle	Downtown Middletown	3.7	17	0:13	0:01	0:14	0:20	0:06	35%

Figure C15 | Shoreline Area Cycle Times

Route	Description	Avg Round Trip Miles	Avg Speed MPH	Run Time	Min Recovery	Min Cycle	Even Cycle	Actual Recovery	% Actual Recovery
640	North and South Loops	11.50	17	0:40	0:04	0:44	1:00	0:19	32%
641	Westbrook, Clinton, Madison	39.20	17	2:18	0:13	2:32	3:00	0:41	23%
642	No Ivoryton	24.40	27	0:54	0:05	0:59	1:00	0:05	10%
643	Aligned to I-95	39.10	44	0:53	0:05	0:58	1:00	0:06	11%
644	Aligned to Route 9	60.30	35	1:43	0:10	1:53	2:00	0:16	14%
645	Madison via I-95	58.60	33	1:46	0:10	1:57	2:00	0:13	11%
OS Shuttle	Shopping and Marinas	12.0	17	0:42	0:04	0:46	1:00	0:17	29%

Cycle times do not reflect seasonal congestion

Service Span Packages

Figure C16 | Shoreline Area Service Span Packages

Route	Description	1 – Weekday Eve Key	2 – Weekday Eve All	3 – Saturday Eve Key	4 – Saturday All	5 – Sunday Key
581	Saybrook Rd - Bidirectional	WKD: 6 AM – 11 PM SAT: 8 AM – 6 PM SUN: Does not run	WKD: 6 AM – 11 PM SAT: 8 AM – 6 PM SUN: Does not run	WKD: 6 AM – 11 PM SAT: 8 AM – **11 PM** SUN: Does not run	WKD: 6 AM – 11 PM SAT: 8 AM – 6 PM SUN: Does not run	WKD: 6 AM – 11 PM SAT: 8 AM – 6 PM SUN: **8 AM – 6 PM**
582	South Main St - Bidirectional	WKD: 6 AM – 11 PM SAT: 8 AM – 6 PM SUN: Does not run	WKD: 6 AM – 11 PM SAT: 8 AM – 6 PM SUN: Does not run	WKD: 6 AM – 11 PM SAT: 8 AM – 6 PM SUN: Does not run	WKD: 6 AM – 11 PM SAT: 8 AM – 6 PM SUN: Does not run	WKD: 6 AM – 11 PM SAT: 8 AM – 6 PM SUN: Does not run
583	Wesleyan and New Meadow	WKD: 6 AM – 11 PM SAT: 8 AM – 6 PM SUN: Does not run	WKD: 6 AM – 11 PM SAT: 8 AM – 6 PM SUN: Does not run	WKD: 6 AM – 11 PM SAT: 8 AM – 6 PM SUN: Does not run	WKD: 6 AM – 11 PM SAT: 8 AM – 6 PM SUN: Does not run	WKD: 6 AM – 11 PM SAT: 8 AM – 6 PM SUN: Does not run
584	Cromwell Hills - Bidirectional	WKD: 6 AM – 11 PM SAT: 8 AM – 6 PM SUN: Does not run	WKD: 6 AM – 11 PM SAT: 8 AM – 6 PM SUN: Does not run	WKD: 6 AM – 11 PM SAT: 8 AM – **11 PM** SUN: Does not run	WKD: 6 AM – 11 PM SAT: 8 AM – 6 PM SUN: Does not run	WKD: 6 AM – 11 PM SAT: 8 AM – 6 PM SUN: **8 AM – 6 PM**
585	Berlin Rd Loop, Bidirectional, or Industrial Park Rd	WKD: 6 AM – 11 PM SAT: 8 AM – 6 PM SUN: Does not run	WKD: 6 AM – 11 PM SAT: 8 AM – 6 PM SUN: Does not run	WKD: 6 AM – 11 PM SAT: 8 AM – **11 PM** SUN: Does not run	WKD: 6 AM – 11 PM SAT: 8 AM – 6 PM SUN: Does not run	WKD: 6 AM – 11 PM SAT: 8 AM – 6 PM SUN: **8 AM – 6 PM**
586	E. Hampton Center, Town Hall	WKD: 6 AM – 6 PM SAT: 8 AM – 6 PM SUN: Does not run	WKD: 6 AM – **11 PM** SAT: 8 AM – 6 PM SUN: Does not run	WKD: 6 AM – 6 PM SAT: 8 AM – 6 PM SUN: Does not run	WKD: 6 AM – 6 PM SAT: 8 AM – 6 PM SUN: Does not run	WKD: 6 AM – 6 PM SAT: 8 AM – 6 PM SUN: Does not run
590	Wesleyan and Washington St	WKD: 6 AM – **11 PM** SAT: 8 AM – 5 PM SUN: Does not run	WKD: 6 AM – **11 PM** SAT: 8 AM – 5 PM SUN: Does not run	WKD: 6 AM – 6 PM SAT: 8 AM – **11 PM** SUN: Does not run	WKD: 6 AM – 6 PM SAT: 8 AM – **6 PM** SUN: Does not run	WKD: 6 AM – 6 PM SAT: 8 AM – 5 PM SUN: **8 AM – 6 PM**

Bold red indicates change from existing

Figure C17 | Shoreline Area Service Span Packages

Route	Description	6 – Weekday Eve Key	7 – Saturday All	8 – Sunday Key
641	Westbrook, Clinton, Madison	WKD: 6 AM – **11 PM** SAT: 7 AM – 7 PM SUN: Does not run	WKD: 6 AM – 7 PM SAT: 7 AM – 7 PM SUN: Does not run	WKD: 6 AM – 7 PM SAT: 7 AM – 7 PM SUN: **9 AM – 5 PM**
642	No Ivoryton	WKD: 6 AM – 8 PM SAT: 9 AM – 4 PM SUN: Does not run	WKD: 6 AM – 8 PM SAT: 9 AM – **5 PM** SUN: Does not run	WKD: 6 AM – 8 PM SAT: 9 AM – 4 PM SUN: Does not run
643	Aligned to I-95	WKD: 7 AM – 7 PM SAT: Does not run SUN: Does not run	WKD: 7 AM – 7 PM SAT: **9 AM – 5 PM** SUN: Does not run	WKD: 7 AM – 7 PM SAT: Does not run SUN: Does not run
644	Aligned to Route 9	WKD: **6 AM – 11 PM** SAT: Does not run SUN: Does not run	WKD: 7 AM – 8 PM SAT: **9 AM – 5 PM** SUN: Does not run	WKD: 7 AM – 8 PM SAT: Does not run SUN: **9 AM – 5 PM**
645	Madison via I-95	WKD: 7 AM – 7 PM SAT: Does not run SUN: Does not run	WKD: 7 AM – 7 PM SAT: **9 AM – 5 PM** SUN: Does not run	WKD: 7 AM – 7 PM SAT: Does not run SUN: Does not run

Bold red indicates change from existing

Appendix D: Service Guidelines

Transit providers must constantly consider where demand is greatest, where limited resources can and should be used, and which types of service would work best and be most appropriate in each area. This set of service guidelines helps defines how to:

- Determine where service should be provided
- Design service
- Determine appropriate service levels
- Ensure that service is productive

These service guidelines can be applied to range of service types within a region and are intended to bring clarity and consistency to the process of continually adjusting and improving transit services to meet varied and changing customer needs. In most cases, the service guidelines define minimum thresholds that must be met, and most services would exceed the minimum thresholds. However, the guidelines are also designed to—within limits—provide flexibility to respond to varied customer needs and community expectation in an accountable, equitable, and efficient manner.

Finally, it should be noted that adherence to these service guidelines is dependent upon resource availability, and in particular, funding availability. In the event of constrained resources, these guidelines can be followed closely as possible to achieve consistency as resources permit.

LCRV Area Transit Services

There are several different service types within the LCRV region. This "family of services" is designed to meet a wide array of travel needs and consist of the following types of routes

- Urban Local
- Rural Local
- Regional/Commuter
- Shuttle
- Seasonal
- On-Demand

Urban Local Routes

Urban Local routes are local routes that operate entirely or primarily in more densely populated areas. These routes provide no less frequent than hourly service throughout the day on weekdays and at least a minimum level of service on Saturdays and Sundays.

Urban Local routes provide fixed-route service, which means that they operate along a designated route and serve designated stops.

Rural Local Routes

Rural Local routes also operate along primary arterials, but in areas of less dense development patterns. They also typically are anchored at a transit hub, either in downtown or at the end of a frequent route. These routes offer relatively simple and direct service, with slightly closer stop spacing.

Rural Local routes can operate as either fixed-route service or deviated fixed-route service. Deviated fixed-route service operates primarily along a designated route, but, upon request, will deviate from the designated route to serve "off-route" locations.

Regional/Commuter Routes

Regional/Commuter routes provide longer-distance service connecting major activity centers across jurisdictions on weekdays and weekends. They have limited stops in low-density areas to provide fast travel times, and use freeways and expressways where appropriate. In urban areas, Regional routes have similar stop spacing as Local Routes. All Regional routes provide fixed-route service.

Shuttle Services

Shuttle services are designed to provide service for specific needs such as shopping and accesses to services, including social services or medical providers. Depending upon demand, these services may operate on only certain weekdays.

Shuttle routes can provide either fixed-route or deviated fixed-route service.

Seasonal Services

Seasonal service is appropriate in areas where there is sufficient demand for transit only during certain parts for the year, such as along the Connecticut Shoreline during the summer months. Seasonal routes provide fixed-route service in the same manner as Local routes, but as described, only operate during certain periods of the year.

On-Demand Services

Dial-A-Ride and XtraMile services (which are also known as On-Demand services) serve areas where it is difficult to provide fixed-route service because destinations are widely scattered. These routes provide service anywhere within a geographically limited zone, and pick up and drop off passengers anywhere within the zone, including connecting points with fixed-route bus service for travel outside the zone.

On-demand service offers curb-to-curb or door-to-door service upon request. Services are well suited for serving low-density areas and can be provided by a range of providers, from traditional transit agencies to app-based ride-hailing providers. On-demand service typically operates within a geographically limited area, and provides pick-up and drop-off services within a defined zone. On-demand service includes ADA paratransit service, which operates under specific FTA guidelines, serving individuals with disabilities and older adults. On-demand service also includes emerging mobility options such as ride-hailing companies.

Service Design Principles

Serving as many residents, workers, and visitors with limited resources involves many trade-offs as some service attributes that attract one type of rider will deter other riders. For example, meandering services designed to minimize walk distances are attractive to those who are not time-sensitive, but unattractive to those who are. The proposed LCRV family of services attempts to balance these competing demands to develop a network that meets the greatest public good. At the same time, however, there are also certain service design principles that will improve service for nearly all riders.

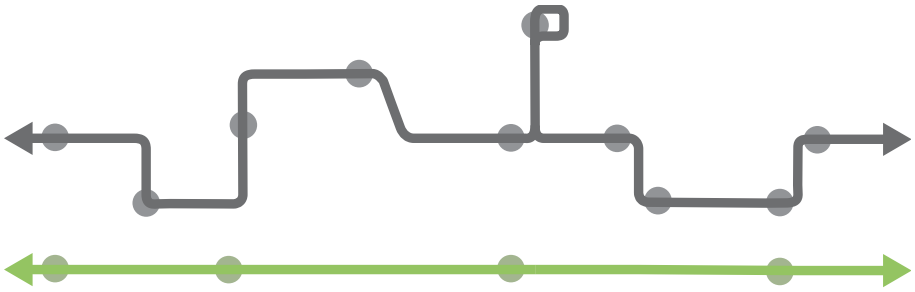
Service Should be Simple

To encourage people to use transit, transit service should be easy to understand. The way service is designed influences how easy it is for people to understand the transportation options available to take them where and when they want to go. Most of the guidelines in this section are aimed at making service intuitive, logical, and easy to understand.

Routes Should Operate Along a Direct Path

Passengers and potential passengers alike prefer faster, more direct transit services. In order to remain competitive with the automobile, special attention should be placed on designing routes to operate as directly as possible to maximize average speed for the bus and minimize travel time for passengers while maintaining access to service. Routes should not deviate from the most direct alignment unless there is a compelling reason to do so.

Most riders prefer straighter, more direct service than circuitous service

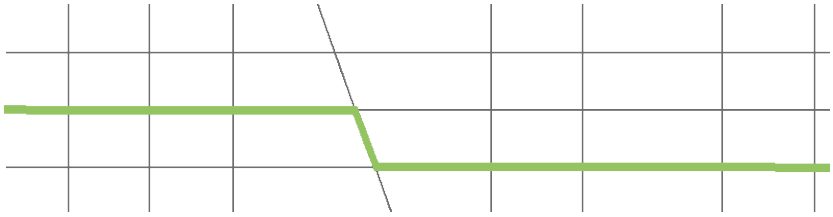


Route Deviations Should be Minimized

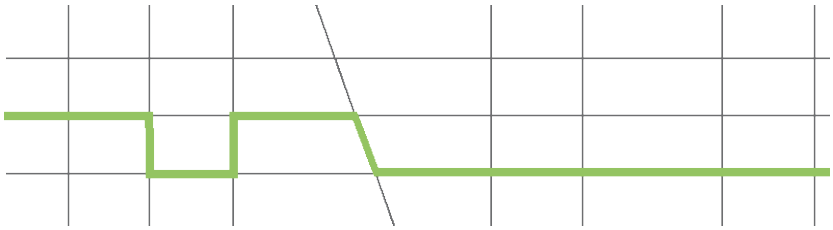
As described above, service should be as direct as possible. Consistent with this idea, the use of route deviations—traveling off the most direct route—should be minimized.

Serving different locations on different trips makes service complicated and inconveniences most riders

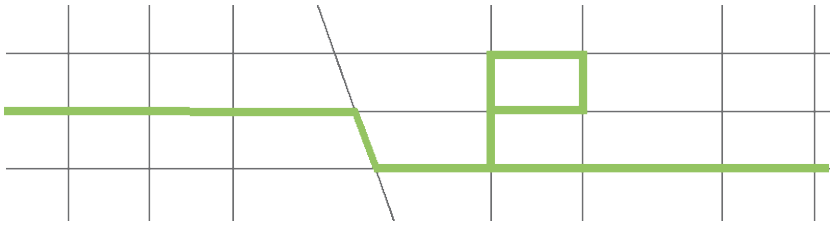
Main Route



8:43 AM Trip



2:23 PM Trip



There are, however, instances when the deviation of service off of the most direct route is appropriate, for example to avoid a bottleneck or to provide service to major shopping centers, employment sites, schools, etc. In these cases, the benefits of operating the route off of the main route must be weighed against the inconvenience caused to passengers already on board. Route deviations should be implemented only if:

- The deviation will result in an increase in overall route productivity.
- The number of new passengers that would be served is equal to or greater than 25% of the number of passengers who would be inconvenienced by the additional travel time on any particular deviated trip.
- The deviation would not interfere with the provision of regular service frequencies and/or the provision of coordinated service with other routes operating in the same corridor.

In most cases, where route deviations are provided, they should be provided on an all-day basis. Exceptions are during times when the sites that the route deviations serve have no activity—for example route deviations to shopping centers do not need to serve those locations early in the morning before employees start commuting to work.

Major Routes Should Operate Along Arterials

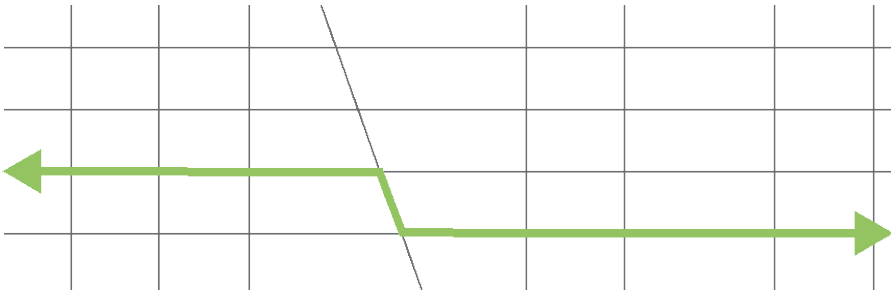
Major Urban Local and Regional routes should operate on major roadways and should avoid deviations to provide local circulation. Riders and potential transit users typically have a general knowledge of an area's arterial road system and use that knowledge for geographic points of reference. The operation of bus service along arterials makes transit service faster and easier for riders to understand and use.

Routes Should be Symmetrical

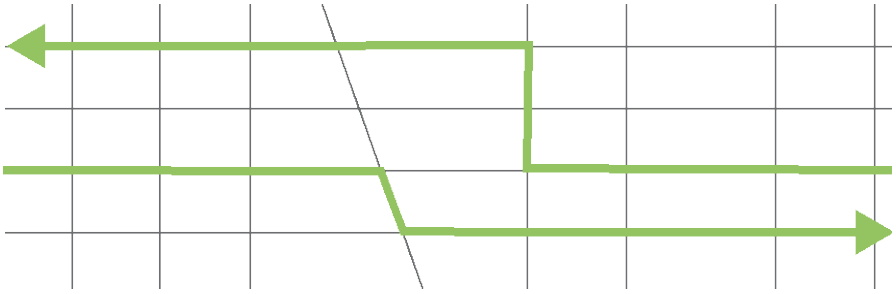
Routes should operate along the same alignment in both directions to make it easy for riders to know how to return to their trip origin location. For example, if a route follows 4th Street into downtown, it should use 4th Street on its outbound trip. Exceptions can be made in cases where such operation is not possible due to one-way streets or turn restrictions. In those cases, routes should be designed so that the opposite directions parallel each other as closely as possible.

Operating service along the same alignment in both directions makes it easier for riders to understand service and find their return trip

Symmetrical



Non-Symmetrical



Services Should be Well-Coordinated

Where routes connect, schedules should be coordinated to the greatest extent possible to minimize connection times for the predominant transfer flows.

Service Should Serve Well-Defined Markets

To make service easy to understand and to eliminate service duplication, service should be developed to serve well-defined markets. Ideally, major corridors should be served by only one route of each route type—for example, one Regional route and one Local route, and not by

multiple Regional routes and multiple Local routes. However, exceptions should be made when multiple routes should logically operate through the same corridor to unique destinations.

Service Should Operate with Consistent Schedules

Routes should be scheduled to operate at regular intervals (headways). People can easily remember repeating patterns but have difficulty remembering irregular ones. For example, routes that provide four trips an hour should depart from their terminals every 15 minutes. Limited exceptions can be made in cases where demand spikes during a short period in order to eliminate or reduce crowding on individual trips.

People can remember repeating patterns much more easily than non-repeating ones

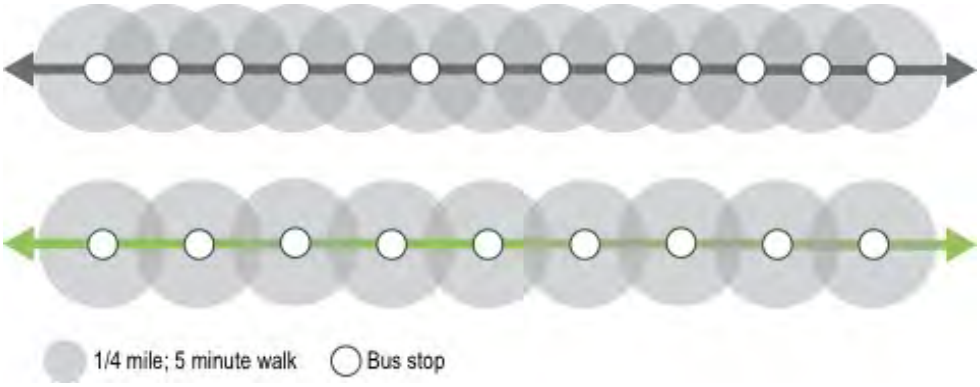
Departures with Inconsistent Headways: 8:03, 8:35, 9:07, 9:46, etc.

Departures with Clockface Headways: 8:00, 8:30, 9:00, 9:30, etc.

Stops Should be Spaced Appropriately

The distance between stops significantly impacts travel times. More closely spaced stops provide customers with more convenient access as they are likely to experience a shorter walk to the nearest bus stop. However, they also increase travel times and are the major reason that transit is slower than automobile travel (since each additional stop requires the bus to decelerate, come a complete stop, load and unload riders), and then accelerate and re-merge into traffic. Most riders want service that balances convenience and speed, and the number and location of stops is a key component of determining that balance.

Too many stops can make service unacceptably slow for many potential riders



The different types of transit services are tailored toward serving different types of trips and needs. In general, services designed to serve a broad cross-section of the population (for example, most local and commuter routes) should have fewer stops, while services that emphasize accessibility (for example, Shuttles) should have more frequent stops. Commuter routes are a special case in many of these routes travel for significant distances through undeveloped areas. In these cases, stops should be located based on specific demands rather than an average spacing.

Guidelines for minimum stop spacing (or maximum stops per mile) are shown in Table D1 Exceptions to these guidelines can and should be made in locations where walking conditions are poor (which is the case along many rural routes) or where there are other significant considerations.

Table D1 | Bus Stop Spacing Guidelines

	Urban Local	Rural Local	Regional/ Commuter	Shuttle	Seasonal	On Demand
Minimum Stop Spacing (feet)	1,200	800 with some flag stop areas allowed	1,300 (urban areas) 2,000 (outside of urban areas)	N/A	N/A	N/A
Maximum Stops per Mile	5	5-8	4 (urban areas) 1-2 (outside of urban areas)	N/A	N/A	N/A

Service Design Should Maximize Service

The distance and travel time of a route determine how efficiently a bus can operate. Service should be designed to maximize the time a vehicle is in service, and minimize the amount of time it is out-of-service. In other words, the length of the route and the time it takes to make each trip impacts how long of a layover is required at each end and how many buses are needed to provide the service. Often, it may be more efficient to extend a route to pick up a few more passengers and limit the amount of layover time.

Vehicle Types Should be Appropriate for Service

Depending upon the type of service provided, ridership ranges from very high to low, and travel times range from short to long. The types of vehicles used on different routes should reflect those differences. At the present time, there are three basic vehicle types used to provide transit service in the LCRV region. Both MAT and 9 Town use standard transit buses on urban and regional routes, and small "cutaway" vehicles on other local routes and for demand response services. A replica trolley is used for the Clinton Seasonal Trolley service.

Vehicle types are currently determined based largely on passenger volumes, while the trolley is a branded service using a vehicle type that is designed to attract out of town visitors.

Service Level Guidelines

Service level guidelines define when service should be provided and how often it should be provided. Four guidelines are used:

1. Service Coverage
2. Span of Service
3. Service Frequencies
4. On-Time Performance

The guidelines listed in this section are used to determine minimum or maximum acceptable levels by route type.

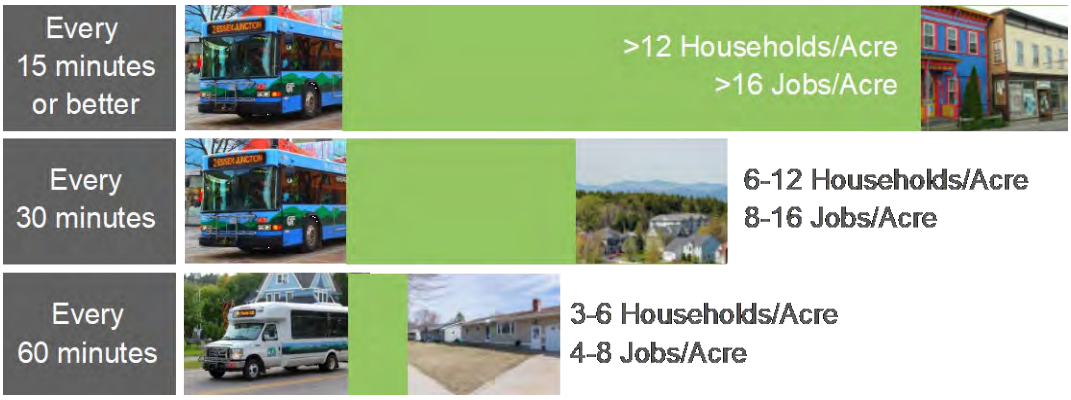
In combination with the Performance and Productivity Guidelines presented below, the Service Level Guidelines help to determine appropriate service levels for each route. On an ongoing basis, each bus service type should operate based on these service span guidelines and service frequency guidelines. If minimum productivity guidelines can be met, service spans may be expanded to earlier in the morning and later at night. In addition, service should be

added when ridership increases to levels that exceed maximum loading guidelines. Conversely, service should be evaluated and potentially reduced when ridership falls below the minimum productivity guidelines.

Service Coverage

Public transit is designed to be mass transportation rather than personalized transportation. As such, it is most effective in areas where sufficient numbers of people live and work in close proximity. The best indicators of whether there will be underlying demand for productive transit service are population and employment density, with at least three households per acre, 4 jobs per acre, or a combination thereof, necessary to support local fixed-route services (see Figure C1). GMT will endeavor to provide local service in all areas where population and employment densities exceed these thresholds.

Figure D1 | Transit Supportive Population and Employment Densities



Source: Composite data compiled by Nelson\Nygaard from various sources.

Other factors may also be considered. For example, socio-economic characteristics such as income levels, the number of households without automobiles or fewer automobiles than works, can increase or decrease underlying demand. These factors should also be considered when examining potential demand for service.

Minimum Span of Service

The number of hours per day when transit service is provided along a route, a segment of route, or between two locations plays a role in determining the attractiveness of transit service to potential users. Transit service must be available near the time a trip needs to be made in order for transit to be a travel option.

Passenger needs and financial resources are key considerations in setting weekday service spans, and in deciding which routes are operated on Saturdays and Sundays. Weekday routes should permit workers and students to make their morning start times, and should end late enough to provide return trips home for second shift workers. Service oriented to non-work travel can start later and end sooner. Sunday service may not be necessary on many routes.

The minimum service span guidelines define the minimum period of time that different types of service should operate. Minimum service span guidelines are presented in Table D2. Note that service can start earlier and end later if demand warrants, but the extra service would be subject to the minimum performance guidelines presented below. In addition, the guidelines

may not apply to some services on certain days, indicated by a "--". Service may still be provided on these days (to meet other guidelines, for example), though it would not be subject to minimum service span guidelines.

Table D2 | Minimum Span of Service Guidelines

	Urban Local	Rural Local	Regional/ Commuter	Shuttle	Seasonal	On-Demand
Weekdays						
Begin	6:00 AM	7:00 AM	6:00 AM	6:00 AM	8:00 AM	6:00 AM
End	8:00 PM	6:00 PM	7:00 PM	8:00 PM	8:00 PM	8:00 PM
Saturdays						
Begin	8:00 AM	*Saturday service as warranted, but not required*				
End	6:00 PM					
Sundays						
Begin	9:00 AM	*Sunday service as warranted, but not required*				
End	5:00 PM					

Note: The beginning span of service refers to the departure of the *first inbound trip, and the ending span of service refers to the departure time of the last peak direction trip.*

Minimum Service Frequency

Service frequency is the time interval between two vehicles traveling in the same direction on the same route. This has a significant impact on transit ridership. High frequency service is considered a key characteristic of attractive service. At the same time, frequency has a significant impact on operating costs, and vehicle and hour requirements increase with improvements in service frequency.

Because of the expense of high frequency service, transit service frequency is normally based upon existing or potential demand. This often translates into variations in service frequency throughout the day, with higher frequency during peak periods and less frequent service outside of peak hours.

In general, frequencies are established to provide enough vehicles past the maximum load point(s) on a route to accommodate the passenger volume and stay within recommended loading guidelines. Minimum service frequency guidelines are presented in Table D3. When a corridor is served by multiple routes, effective service frequencies in the corridor would be more frequent than those of individual routes.

Table D3 | Minimum Service Frequency Guidelines (Frequency in Minutes)

	Urban Local	Rural Local	Regional/ Commuter	Shuttle	Seasonal	On-Demand
Weekdays						
Early AM	60	–	–	–	–	–
AM Peak	60	120	120	60	60	–
Midday	60	120	120	60	60	–
PM Peak	60	120	120	60	60	–
Night	60	–	–	–	60	–
Saturdays						
All Day	60	Saturday service as warranted, but not required				–
Sundays						
All Day	60	Sunday service as warranted, but not required				–

Note: "--" *indicates that the guideline does not apply. The guidelines apply to services that are provided, and do not imply that all services will be provided at all times.*

Clockface service intervals (e.g. every 10, 12, 15, 20, 30 or 60 minutes) are easier for passengers to remember and can help facilitate better transfer connections between routes. Whenever possible, frequencies should be set at regular clockface intervals. However, there are two key exceptions:

1. Where individual trips must be adjusted away from clock-face intervals to meet shift times, work times, transfer connections, or other special circumstances
2. Where the desired frequency of service causes round trip recovery time to exceed 20% of the total round-trip vehicle time, leading to inefficient service

On-Time Performance

Fixed-route services should operate "on-time" within a window of zero minutes early to five minutes late. An exception to this definition is for a bus that arrives early at its final timepoint, as no passengers will be boarding there. The on-time performance considers the percentage of time that a route performs within this window. The percentage allowed for on-time performance for fixed-route service should not be less than 85 percent.

A demand-response vehicle may be considered "on time" within 15 minutes before or after the scheduled pickup and dropoff time. The percentage allowed for on-time performance for demand-response service should not be less than 90 percent.

Performance and Productivity Guidelines

In order to ensure that transit resources within the LCRV region are used effectively, all routes should achieve a minimum level of productivity and performance. The primary guideline recommended to assess productivity and cost-effectiveness is **passengers per revenue vehicle hour/trip.** This is a measure of how many passengers the vehicles on a route carry for each hour they are in service.

Passengers per Revenue Vehicle Hour/Trip

With limited exceptions, all service should attract a minimum level of ridership. For routes that experience a significant amount of ridership turnover along the route (all services except Commuter routes), this minimum level of ridership is expressed in terms of Passengers per Revenue Service Hour, or in simpler terms, the average number of passengers that a bus should serve for each hour it is in service. For Regional and Express/Commuter routes, which often travel for long distances with little ridership turnover, the minimum level of ridership is expressed in terms of Passengers per Bus Trip. These minimum productivity levels are presented in Table D4.

Table D4 | Minimum Productivity Levels (Passengers per Revenue Vehicle Hour or Trip)

	Urban Local	Rural Local	Regional/ Commuter	Shuttle	Seasonal	On-Demand
Measure:	Per Hour	Per Hour	Per Trip	Per Hour	Per Hour	Per Hour
Weekdays	15	6	10	6	15	4
Saturdays	10	6	10	6	15	4
Sundays	10	6	10	6	15	4

Application of Performance Guidelines

In cases where routes do not meet minimum performance guidelines, changes should be made to improve route performance. These changes can include a variety of measures, including reconfiguring the route alignment to attract more passengers, targeted marketing, eliminating particularly unproductive segments, and reducing service levels. If no changes can be identified that improve performance, steps may be taken to discontinue the route unless it serves a demonstrable critical need that is not served by other routes or services (including paratransit service).

In cases where service expansion is considered, ridership and productivity estimates should be developed that indicate that there is a reasonable certainty that the new service will meet the performance guidelines within 12 months of implementation.

Proposed LCRV Route Classifications

Urban Local Routes

581
582
583
584
585
640
641
642

Rural Local Routes

586
645

Regional/Commuter Routes

587
590
643
644

On-Demand Services

Dial-A-Ride
XtraMile

Shuttle Services

Middletown Shuttle

Seasonal Services

Clinton Seasonal Trolley
Old Saybrook Seasonal Trolley