Appendix K I-84 Danbury Transit Assessment Technical Report

I-84 Danbury PEL Study

Prepared for: The Connecticut Department of Transportation

August 2025

I-84 Danbury

CONCEPT STUDY 4:

TRANSIT ASSESSMENT STUDY

ENGINEERING WHITE PAPER

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1. Executive Summary

The I-84 Danbury Transit Assessment identifies transit options that would improve mobility in the I-84/Route 7 corridor near Danbury. The analysis considered a range of factors affecting traffic patterns using an eight-town study area, including Bethel, Brookfield, Danbury, New Milford, Newtown, Ridgefield, Southbury, and Wilton.

This assessment comprises a review of existing conditions and existing fixed-route services, an analysis of the worker flow and demand for transit service in the study area, and recommended service improvement options. Data sources used to analyze transit demand include (1) U.S. Census data, including the Longitudinal Employer-Household Dynamics (LEHD) online tool; (2) demographic and socioeconomic data and origin-destination (O/D) matrices from the Connecticut Department of Transportation (CTDOT) travel demand model; and (3) the results of traffic O/D analysis in the I-84 Danbury Project. The worker flow and trip O/D analysis showed that a significant portion of the trips in the study area are inter- and intra- town trips that may be served by a regional transit service supported by local transit options that provide access to major activity centers and allow for transfers to the existing transit systems.

The four bus transit options that potentially meet the transit market demand in the study area include:

(1) New Milford – Danbury Park-and-Ride - Norwalk Express Bus
(2) Southbury – Danbury Park-and-Ride - Brewster Rail Station Shuttle
(3) Danbury Circulator Shuttle
(4) Danbury Park-and-Ride/Express Connector (restructured Housatonic Area Rapid Transit (HARTransit) Route 1)

These transit options were assessed in terms of ridership, effect on traffic reduction, and potential environmental effects and impacts. As a high-level transit assessment, this analysis applied qualitative approaches and regression methods instead of a formal travel demand modeling process. Conceptual-level operating factors were defined to forecast ridership, estimate capital and operation and maintenance costs, and evaluate effects or impacts on traffic and other environmental factors. The analysis also considered assessments of railroad options in associated studies (e.g., the Maybrook Line rail shuttle service).

The key findings of this transit analysis include:

- New bus transit has the potential to serve regional travel needs;
- Bus transit improvement options complement each other to maximize their overall benefits;
- Transit service alone would have a limited effect on highway congestion; and
- Highway improvements would facilitate and enhance new bus transit service.

This high-level analysis provides a foundation for a comprehensive transit study, including a thorough mode choice analysis and detailed transit demand modeling process to fully assess ridership and effects of multi-modal scenarios.

2. Study Background

Interstate 84 (I-84), the primary east-west roadway in the study area, connects New York State to the west and Waterbury/Hartford to the east. Today, I-84 carries 20 times more traffic than it did at the time of its construction in the 1960s. As a result, during peak periods, I-84 operates at or above capacity and traffic volumes are forecast to continue to grow.

U.S. Route 7 (Route 7) is a major north-south highway traversing the length of the state. It starts at the Connecticut/Massachusetts state line in North Canaan and continues south to Norwalk. In Danbury, Route 7 merges with I-84 between exits 3 and 7.

The purpose of the I-84 Danbury Project is to reduce congestion and improve the mobility of people and goods along corridor between the Connecticut/New York state line and Interchange 8 in Danbury and along U.S. Route 7 between Exit 7 and Exit 11. Its goals are to:

- Increase highway capacity
- Improve highway access, safety, and operations
- Enhance mobility
- Connect city with regional destinations
- Improve multimodal connections, including
    - Commuter parking
    - Bicycle and pedestrian travel
    - Transit connections
- Improve local and regional commerce and freight mobility

2.1. I-84 Transit Danbury Assessment Objectives

The I-84 Danbury Transit Assessment was undertaken to identify alternate mobility options for the I-84 Danbury Project that could improve regional transit mobility, complement existing local transit services, and potentially mitigate traffic congestion. The objectives of the transit assessment align with the I-84 Danbury Project, aiming to improve mobility and increasing transportation options for the traveling public along the I-84 corridor near Danbury, and include:

- Improving transit mobility along the I-84 and Route 7 corridors
- Reducing vehicular congestion on I-84 and Route 7R
- Providing better access to employment centers for transit-dependent communities
- Complementing existing transit services
- Supporting economic development and TOD opportunities

The alternate mobility options developed under the I-84 Danbury Transit Assessment are not intended:

- To be limited to I-84 between Exits 1 and 8
- To focus solely on Manhattan-bound commuters
- To compete or replace existing transit services in Danbury

2.2. Transit Assessment Study Area

To consider regional mobility needs that affect the traffic patterns in the Danbury area, the study area for this analysis was defined by traffic patterns on the primary travel corridors I-84 and Route 7 (see the demand analysis in Section 4) as well as demographic and socioeconomic

conditions in the greater Danbury region, as shown in Figure 1. The study area encompasses an approximately 9.5-mile portion of the I-84 corridor in the vicinity of the New York State Line and Interchange 8. It also encompasses approximately 1.5-mile portions of U.S. Route 7 between Interchanges 7 and 9 (west portion) and between I-84 and Interchange 11 (east portion). Other key roadways within the study area include U.S. Route 6 (Mill Plain Road on the west), Route 37 (North Street), Route 39 (Main Street), Route 53 (Main Street), Route 805 (Federal Road), and Route 806 (Newtown Road). It contains eight towns: Danbury and Bethel along I-84 in the center, Newtown and Southbury along I-84 to the east, New Milford and Brookfield along Route 7 to the north, and Ridgefield and Wilton along Route 7 to the south.

There are very limited north-south or east-west corridors in the region, and adjacent roadways are primarily collector and local roads not designed for higher traffic volumes of traffic or fast trips between major residential and employment centers.

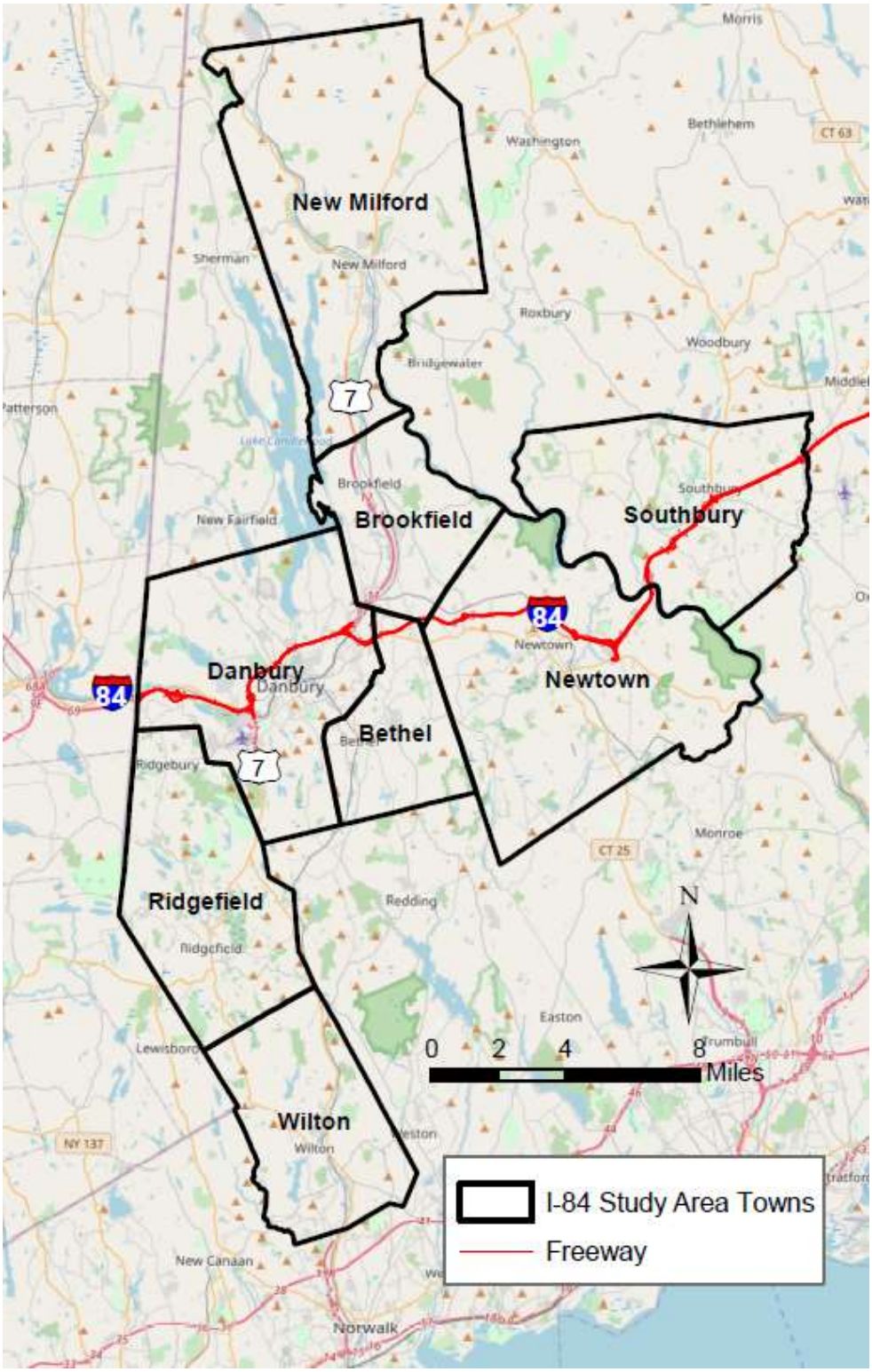


Figure 1: Transit Assessment Study Area

2.3. Study Area Existing Conditions

This section discusses the existing conditions in the study area and is broken into the following demographic areas:

- Population and Households
- Employment
- Automobile Ownership
- Environmental Justice Populations

2.3.1. Population and Households

In terms of population in the Transit Assessment Study Area, between 2016 and 2025, population is projected to increase modestly, with Wilton and Bethel on the lower side of the range with a four percent increase, to an eight percent increase for Newtown and New Milford, based on analysis completed using available data in 2021. In the long term, more robust population growth is anticipated, with increases of between 10 and 20 percent for nearly all of the towns by 2040. Population projections are displayed in Table 1.

Table 1. Population Projections for the Study Area

Town	2016	2025		2040	
	Total	Total	% Change	Total	% Change
Wilton	18,550	19,272	4%	20,445	10%
Bethel	19,048	19,736	4%	20,853	9%
Brookfield	17,096	18,050	6%	19,599	15%
Danbury	84,569	90,007	6%	98,848	17%
Newtown	29,082	31,333	8%	34,992	20%
Ridgefield	25,451	26,654	5%	28,609	12%
New Milford	29,712	32,035	8%	35,810	21%
Southbury	20,938	22,469	7%	24,957	19%

In terms of household size, similar trends are expected, modest growth in the near term ranging between five and ten percent for all towns. By 2040, the household size for all of the towns is projected to increase by 15 percent or more. As with the population estimates, Newtown and New Milford will experience the highest growth in household size with a 26 percent increase compared to 2016. Household projections are displayed in Table 2.

Table 2. Household Projection for the Study Area

Town	2016		2025			2040		
	Households	Household Size	Households	% Change	Household Size	Households	% Change	Household Size
Wilton	6,420	2.89	6,786	6%	2.84	7,393	15%	2.77
Bethel	7,191	2.65	7,562	5%	2.61	8,237	15%	2.53
Brookfield	6,455	2.65	6,913	7%	2.61	7,721	20%	2.54
Danbury	30,576	2.77	33,037	8%	2.72	37,418	22%	2.64
Newtown	10,109	2.88	11,077	10%	2.83	12,697	26%	2.76
Ridgefield	9,194	2.77	9,771	6%	2.73	10,809	18%	2.65
New Milford	11,375	2.61	12,474	10%	2.57	14,328	26%	2.5
Southbury	8,662	2.42	9,333	8%	2.41	10,488	21%	2.38

2.3.2. Population Density

Population density is highest in the Traffic Analysis Zones (TAZs) in the City of Danbury, with the TAZs south of I-84 ranging between 7,000 to 12,000 people per TAZ. (See Figure 2) The surrounding areas are less dense, reflecting their suburban character.

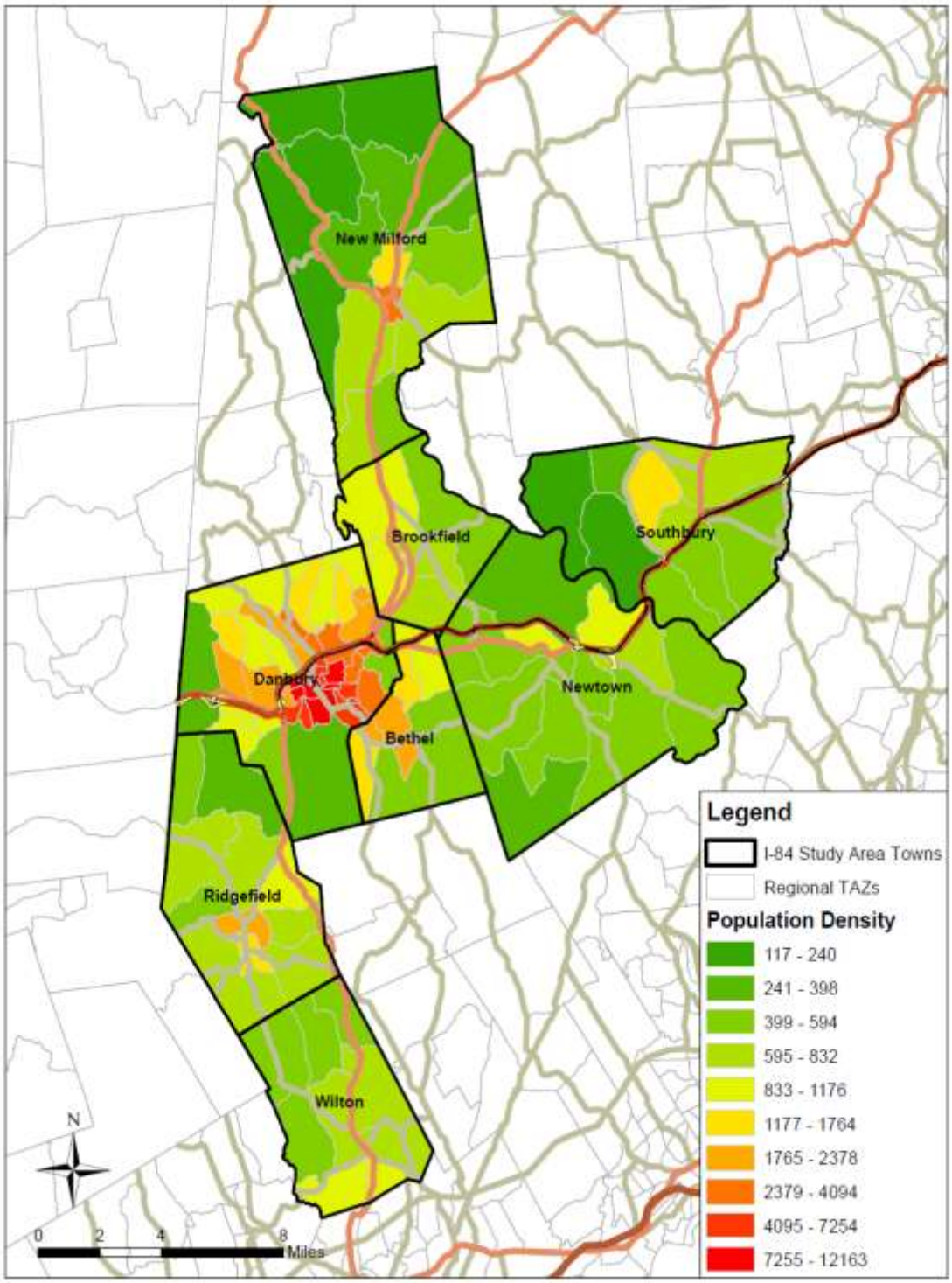


Figure 2. Population Density per TAZ in the Study Area

2.3.3. Employment

Employment in the study area is concentrated in Danbury, Wilton, and Ridgefield. (See Figure 3)

By 2025, the number of jobs in Brookfield, Southbury, Ridgefield, and Bethel are projected to see the greatest increase with growth ranging between seven and nine percent compared to 2016, based on analysis completed using available data in 2021. Projecting out to 2040, Brookfield is anticipated to have the most job growth (24%), followed by Southbury (22%), Ridgefield (21%), and Bethel (17%). Employment projections are displayed in Table 3.

These areas are connected by I-84 and Route 7 and new transit service has potential to better serve these employment centers.

Table 3. Employment Projection for Transit Market Area (2025 and 2040)

Town	2016 Employment			2025 Employment				2040 Employment			
	Retail	Non-Retail	Total	Retail	Non-Retail	Total	% change	Retail	Non-Retail	Total	% change
Wilton	1,306	9,221	10,527	1,318	9,394	10,712	2%	1,348	9,649	10,997	4%
Bethel	1,215	5,668	6,883	1,293	6,050	7,343	7%	1,413	6,639	8,052	17%
Brookfield	1,785	5,210	6,995	1,993	5,649	7,642	9%	2,259	6,382	8,641	24%
Danbury	9,590	32,104	41,694	9,865	33,126	42,991	3%	10,323	34,669	44,992	8%
Newtown	1,390	6,256	7,646	1,488	6,445	7,933	4%	1,584	6,789	8,373	10%
Ridgefield	2,337	8,151	10,488	2,587	8,775	11,362	8%	2,913	9,798	12,711	21%
New Milford	1,871	6,519	8,390	1,929	6,677	8,606	3%	2,006	6,932	8,938	7%
Southbury	1,197	7,916	9,113	1,294	8,605	9,899	9%	1,455	9,674	11,129	22%

2.3.4. Automobile Ownership

Automobile ownership levels are high in the study area. The percentage of zero-car households ranges between two percent in Newtown and Wilton to eight percent in Danbury.

Table 4. Auto Ownership in Transit Market Area

Geographic Area Name	Occupied housing units	No vehicle available	%	1 vehicle available	%	2 or more vehicles available	%
Bethel	7,164	344	5%	1,858	26%	4,962	69%
Brookfield	6,200	202	3%	1,413	23%	4,585	74%
Danbury	30,000	2,371	8%	10,552	35%	17,077	57%
Newtown	9,885	245	2%	2,038	21%	7,602	77%
Ridgefield	9,001	291	3%	2096	23%	6,614	73%
Wilton	6,090	152	2%	951	16%	4,987	82%
Southbury	7,966	452	6%	2698	34%	4,816	60%
Norwalk	34,187	2,317	7%	1,2144	36%	1,9726	58%
Redding	3,452	101	3%	727	21%	2,624	76%

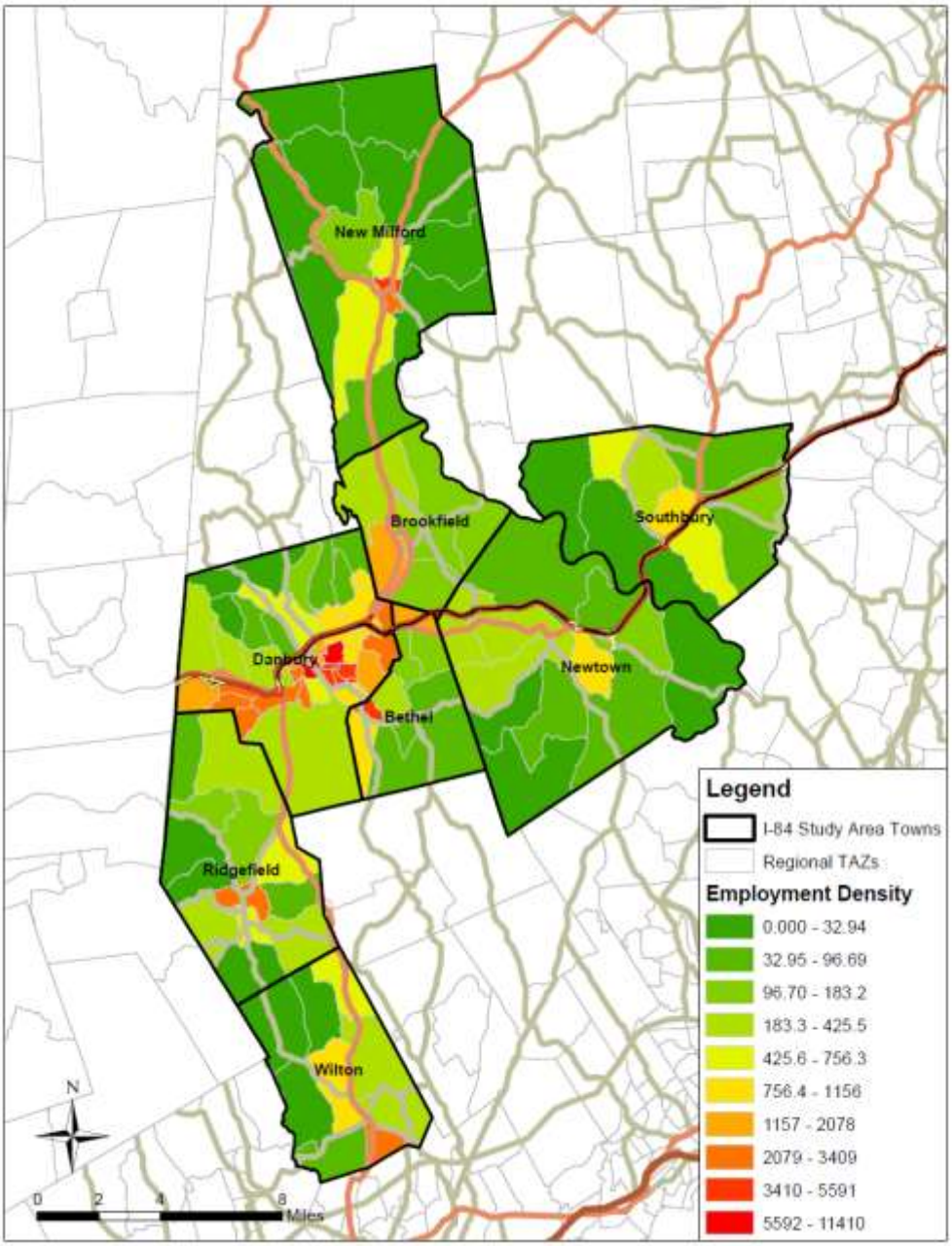


Figure 3. Employment Density per TAZ in the Study Area

2.3.5. Environmental Justice Populations

Environmental justice populations are concentrated around Danbury. As shown in Figure 4, these populations are served by the existing HARTransit bus system.

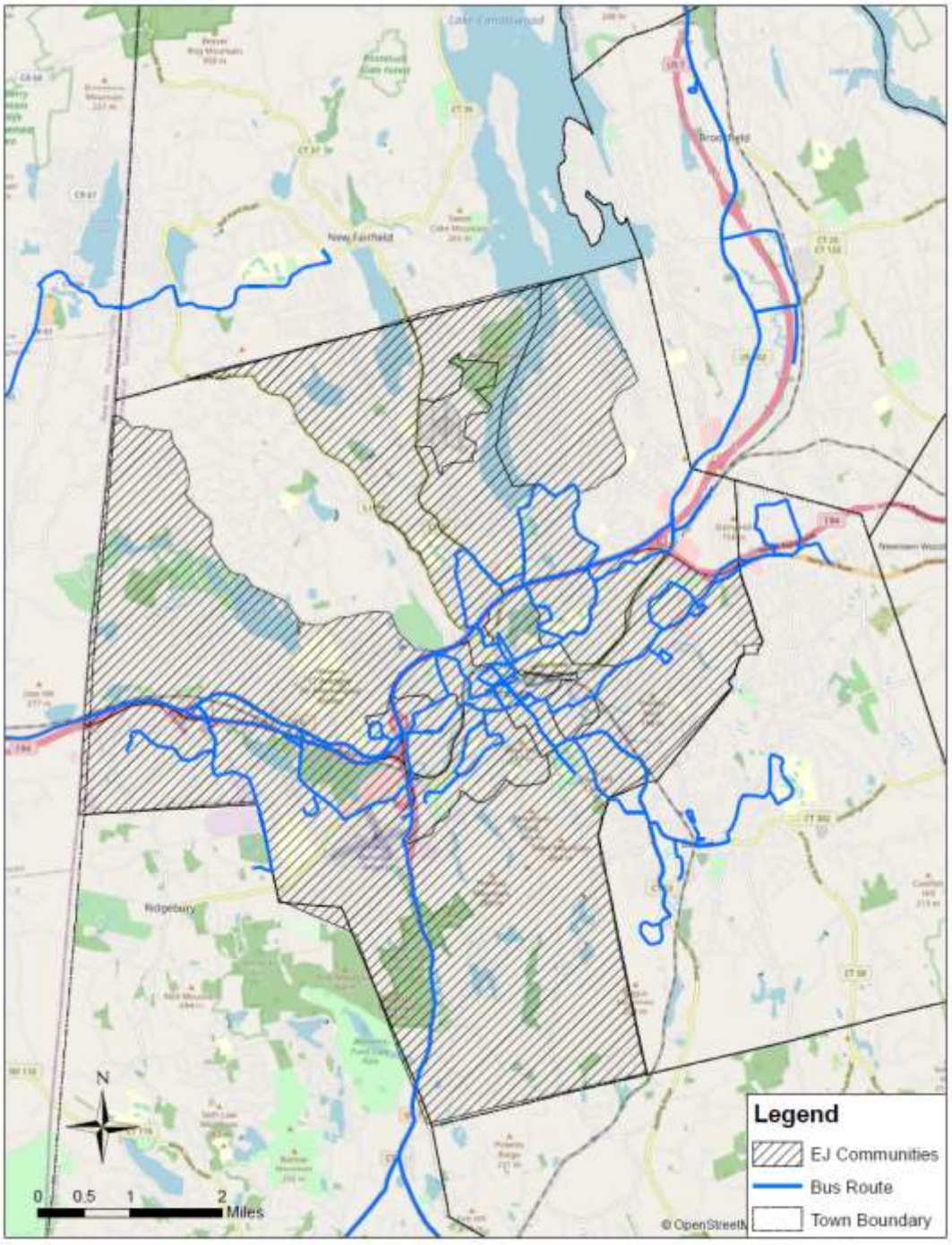


Figure 4. Environmental Justice Communities in Danbury

2.4. Roadway Network and Operations

The I-84 Danbury Project traffic analysis found that a significant number of motorists use I-84 instead of city streets for local trips. During the weekday AM peak period, over 50 percent of traffic makes local movements (between Route 7 and Route 7, I-84 and local streets, or between Route 7 and local streets) in both the eastbound and westbound directions. In the weekday PM peak period, the percentage of local trips is slightly lower but still significant, at 47 percent in the eastbound direction and 49 percent in the westbound direction. During the weekday off-peak period, 72 percent of eastbound traffic and 64 percent of westbound traffic uses I-84 for local trips.

On Route 7, there are more local trips than through trips throughout the day. Southbound traffic on Route 7 is generally oriented toward I-84 westbound, while eastbound traffic is generally oriented toward exits for local streets.

Since a large percentage of trips on I-84 and Route 7 are local trips, this transit assessment study is being undertaken to evaluate opportunities to increase access and mobility to both local and regional destinations.

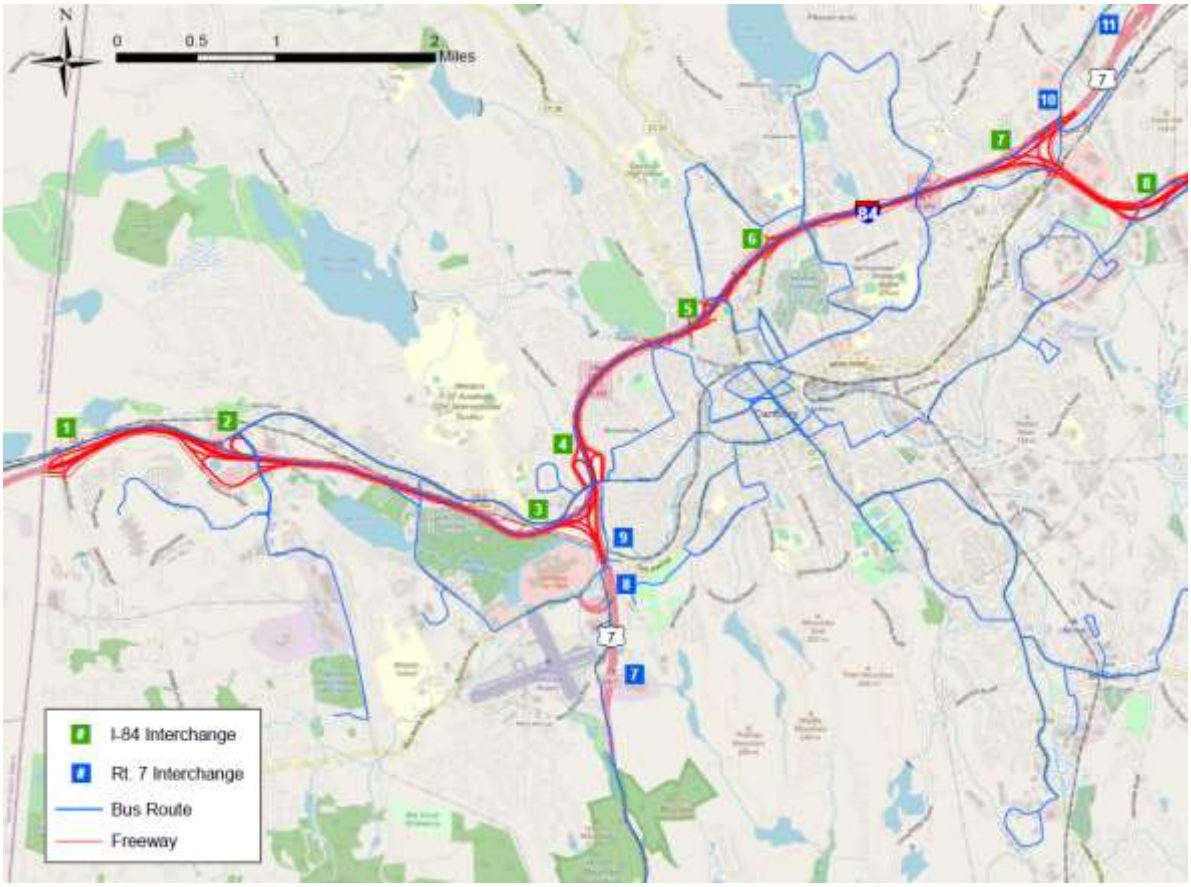


Figure 5. Road Network and Transit Routes in Danbury

2.5. Existing Transit Service

This section documents existing bus and commuter rail services provided in the study area.

2.5.1. Local Bus Service

Bus transit in the Danbury area is operated by Housatonic Area Regional Transit (HARTransit) (see system map in Figure 6). This system provides service on seven routes, some extending into neighboring towns like Bethel, Brookfield, and New Milford. The system also serves major employers, shopping centers, medical centers, schools, the downtown area, and elderly and low-income housing areas. Most major arterials within the city are well-served by the HARTransit fixed-route system. Each bus is equipped with two bike racks, encouraging multi-modal travel. Regular fares are $1.75., $1,40 for student (K-12) and $0.85 for Senior Citizens (65+). Ten-Ride and 30-Day passes are available.

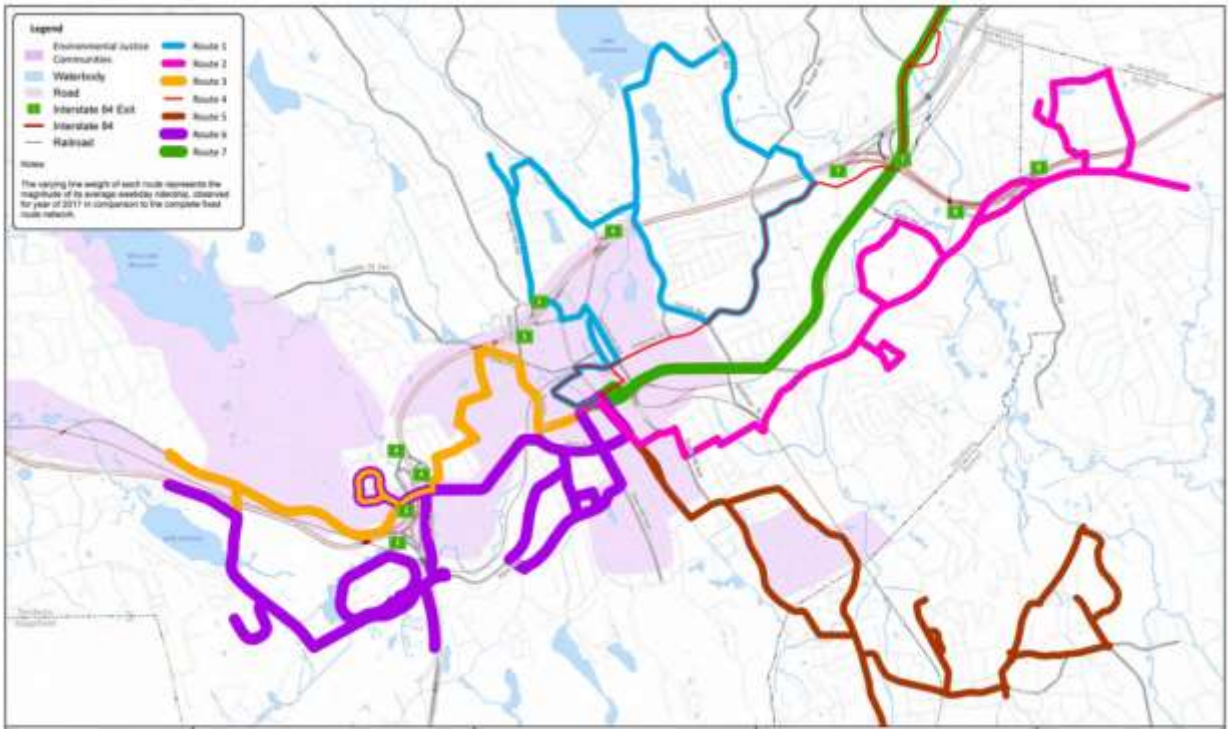


Figure 6. HARTransit System in Danbury

The HARTransit system is comprised of seven CityBus routes, three Shuttles, four Loop routes, and one regional bus route. The CityBus routes run every 30 minutes during peak hours and every 60 minutes off-peak. Hours of operation are generally Monday to Friday 6 AM – 6 PM, and Saturday 8 AM – 5 PM. Loop routes serve the Greater Danbury area and operate on weekday evenings from 6:30 PM to 10:30 PM, Saturdays from 5:30 PM – 10:30 PM, and Sundays from 9 AM to 7 PM. Shuttle routes provide fixed-route bus service for commuters to Metro-North Harlem Line train stations in Southeast, Katonah, and Brewster in New York State on weekdays only.

The central transfer point of the HARTransit system is its Pulse Point, or bus hub, in downtown Danbury. The Pulse Point is a linear transfer area along Kennedy Avenue. This hub's design is particularly important to operations because HARTransit operates a hub and spoke system wherein the bus routes all arrive at the hub at the same scheduled time in a "pulse" of activity to allow riders to easily transfer between different routes.

Free transfers are issued at the Pulse Point to passengers who wish to use a second HARTransit bus to reach their destination. To obtain a transfer, passengers must ask the driver as they board their first bus. Transfers are valid for immediate use as stamped. Connections and free transfers to neighboring bus systems can be made to the WHEELS system in Norwalk, the Westchester County BeeLine system in Katonah, NY, and the PART system in Brewster, NY.

Table 5: HARTransit Bus Routes

Route	Termini		Weekday Service Period			Weekend Service Period		
			Start	End	Headways	Start	End	Headways
1	Town Park	Downtown Danbury	6: 00 AM	6:00 PM	30 min (AM/PM peak) 60 min (midday)	8: 00 AM	5:00 PM	60 min (Saturday only)
2	Newtown Road	Stony Hill	6: 00 AM	6:00 PM	30 min (AM/PM peak) 60 min (midday)	8: 00 AM	5:00 PM	60 min (Saturday only)
3	Exit 2 Mill Plain Road	Downtown Danbury	6: 00 AM	6:30 PM	30 min (AM/PM peak) 60 min (midday)	8: 00 AM	5:00 PM	60 min (Saturday only)
4	Brookfield YMCA	Downtown Danbury	9:30 AM	3:00 PM	60 min	9: 00 AM	5:00 PM	60 min (Saturday only)
5	Reynolds Ridge in Bethel	Downtown Danbury	6: 00 AM	6:00 PM	30 min (AM/PM peak) 60 min (midday)	8: 00 AM	5:00 PM	60 min (Saturday only)
6	Jensen Park	Downtown Danbury	6: 00 AM	6:00 PM	30 min (AM/PM peak) 60 min (midday)	8: 00 AM	5:00 PM	60 min (Saturday only)
7	New Milford Medical Center	Downtown Danbury	6: 00 AM	7:30 PM	30 min (AM/PM peak) 60 min (midday)			60 min (Saturday only)
7 Link	Danbury	Norwalk	6:30 AM 3:30 PM	10:30 AM 6:00 PM	60 min (AM) 30 min (PM)	n/a	n/a	n/a
8 Loop	Danbury	Mill Plain Road	5:00 PM	10:30 PM	60 min	Sat: 5:00 PM Sun: 9:30 AM	Sat: 10:30 PM Sun: 7:00 PM	60 min Saturday and Sunday
9 Loop	New Milford	Route 7	5:30 PM	10:30 PM	60 min	Sat: 5:00 PM Sun: 9:00 AM	Sat: 10:30 PM Sun: 7:15 PM	60 min Saturday and Sunday
10 Loop	Hospital	Rose Hill	6:00 PM	11:00 PM	60 min	Sat: 5:00 PM Sun: 9:30 AM	Sat: 11:00 PM Sun: 7:15 PM	60 min Saturday and Sunday
17 Loop	Newtown Road	Bethel	6:00 PM	11:00 PM	60 min	Sat: 5:00 PM Sun: 9:30 AM	Sat: 11:00 PM Sun: 7:15 PM	60 min Saturday and Sunday
Shuttle	Danbury	Brewster	6:00 AM 5:20 PM	9:00 AM 9:15 PM	30 min (AM) 30 min (PM)	n/a	n/a	n/a
Shuttle	Ridgefield	Katonah	5:50 AM 5:20 PM	7:40 AM 8:50 PM	4 AM trips 30 min (PM)	n/a	n/a	n/a
Shuttle	New Fairfield	Southeast	5:30 AM 6:00 PM	7:20 AM 9:00 PM	30 min (AM) 30 min (PM)	n/a	n/a	n/a

The HARTransit shuttles serve local park-and-ride lots to encourage intermodal travel. The following park-and-rides are served:

Danbury – Brewster Shuttle

- I-84 Exit 1 park-and-ride
- I-84 Exit 2 park-and-ride
- Federal Road park-and-ride
- White Turkey park-and-ride

Ridgefield – Katonah Shuttle

- South Salem Municipal Lot park-and-ride (permit only)
- Prospect Ridge (Bark Park) park-and-ride
- Jessie Lee Memorial Church park-and-ride

New Fairfield – Southeast Shuttle

- New Fairfield Ball Pond Firehouse
- New Fairfield Company A Firehouse

Connections to other transit systems in the State are limited. As shown in Figure 7, the bus system in Danbury is oriented toward local travel with the HARTransit bus system and travel to Stamford and New York City via the Metro-North Danbury Branch. The Danbury area is relatively isolated within the regional transit network. This presents an opportunity to better serve regional travel needs.

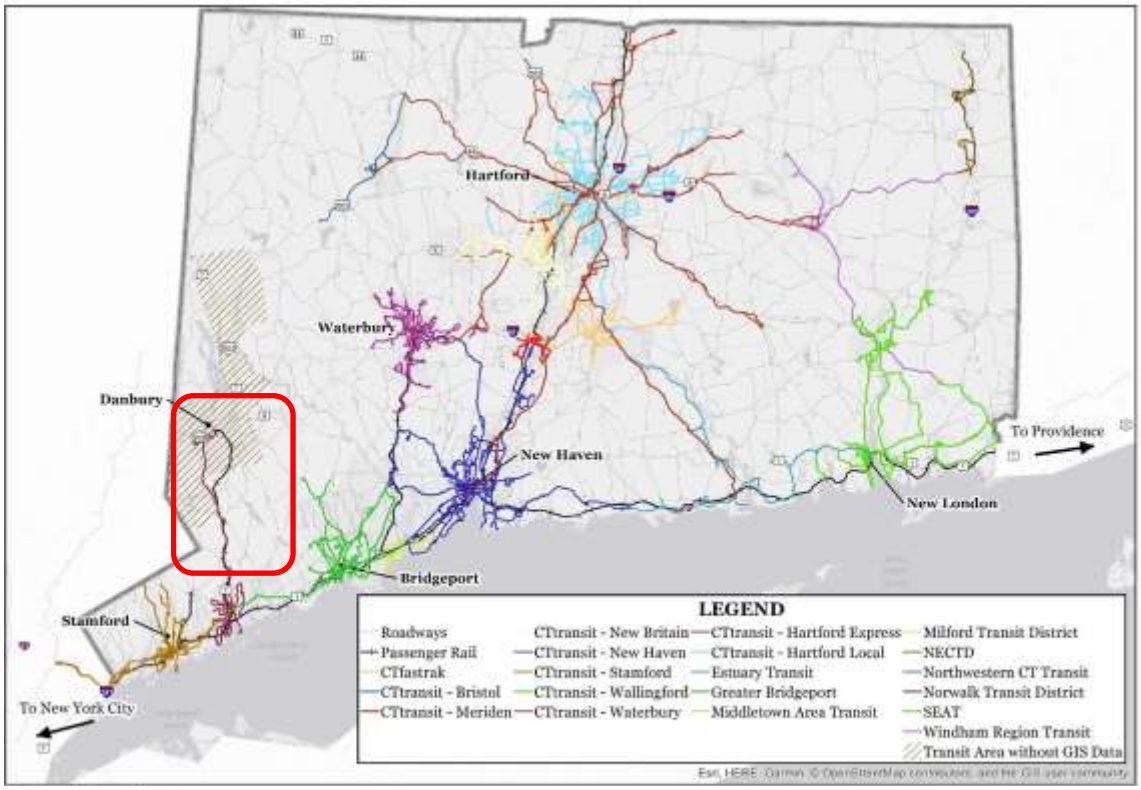


Figure 7. Transit Systems in Connecticut Showing an Isolated Danbury Area

2.5.2. Commuter Rail Service

Commuter rail service in the study area is available via Metro-North Railroad's Danbury Branch and Harlem Line. (See Figure 8)

The Danbury Branch runs between Danbury and South Norwalk, where the line connects to the New Haven Line, which continues to Grand Central Terminal in Manhattan. The line is not electrified, and diesel locomotives are used via push-pull operations. Currently, service on the Danbury Branch operates only on weekdays, with 14 trains in each direction.

The Harlem Line runs between southeast New York and Grand Central Terminal. The line is electrified. Residents in the study area tend to use this station for travel to Manhattan due to its more frequent service and shorter travel time compared to the Danbury Branch. Service is operated seven days per week. On weekdays, 36 trains are operated to Manhattan and 34 to Southeast.

Further details on these commuter rail lines are presented in Table 6, which also includes associated bus/shuttle services.

Table 6. Commuter Rail Service in the Danbury Area

Commuter Rail Service	Metro-North Danbury Branch	Metro-North Harlem Line
Peak Headway	45 mins	25 mins
Off-peak Headway	90 minutes	60 mins
Run time to Grand Central	130 mins	90 mins
Peak Fare	$17.75	$20
Parking Cost	$2	$1.50
Bus/Shuttle Service	HART 7-Link	HART Danbury-Brewster Shuttle
Service Type	Complementary	Connecting
Bus Headway	60 mins	25 mins
Bus Run Time	60 mins	28 mins
Bus Fare	$1.75	$1.75

Figure 8. Commuter Rail Options in the Danbury Area

3. Methodology

The analytical process was tailored to fit the goal of this transit assessment. The process started with developing an understanding of the study area existing conditions. Then, transit service options were developed including mode, route, and other service characteristics. Each option was then evaluated at a high level for its potential effects on traffic congestion, environment, infrastructure, and finance were assessed at a high level.

This process was guided by the following questions, framed to address the objectives of this transit assessment:

- On I-84 in Danbury, who comprises the "*local*" traffic? Who comprises the "*through*" traffic?
- How much commuter traffic is to/from/through the nearby towns?
- Are there dominant origin/destination flows?
    - What challenges do these travelers face?
- What new transit services could benefit them?
    - What issue/challenge would transit attempt to resolve?
- How many people are likely to use potential new transit services?
- What constraints must new transit address?
    - Traffic congestion on I-84, Route 7 and local roads, right-of-way, facilities

3.1. Transit Option Development Process

Transit options that best serve a designated area must be formulated based on prioritized needs, existing service, service gaps, and service availability. In this assessment, a transit demand analysis was conducted to identify the main patterns of worker flows in and between the towns.

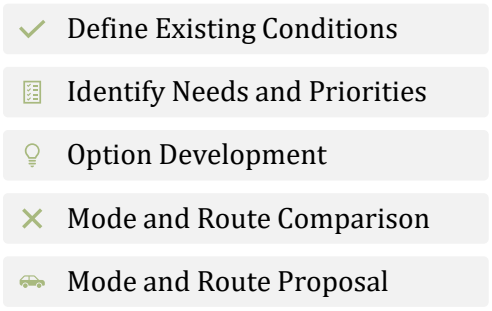


Figure 9. Transit Option Development Process

Existing conditions include current roadway transportation operations, traffic conditions, and transit services in this area. Operating agencies design and manage transit services to serve mobility needs in designated areas, which can leave gaps in regional connectivity. This assessment identifies where these gaps exists from a regional perspective.

Study area demographic characteristics were analyzed using U.S. Census data. Population density is a proxy for potential system usage or ridership level. Employment density represents the number of jobs per square mile, which accounts for a significant proportion of peak-period transit

ridership. The proportion of zero- and one-car households represents those with the greatest need for and likelihood to ride transit.

The second step of the transit analysis process analyzed mobility patterns and identified major travel flows and origin-destination pairs using two data sources. One was the Longitudinal Employer-Household Dynamics (LEHD) data produced by the Center of Economic Studies at the U.S. Census Bureau. This online data tool provides employment, earnings, and job flows at detailed levels of geography and industry and for different demographic groups. We used this tool to obtain worker flows from, to, and within the study area as a whole and each town individually. The second source was O/D trips from the CTDOT travel demand model, which include commuting trips and trips for other purposes. As observed from the localized O/D study on I-84 and Route 7, a major proportion of the peak-period traffic in the Danbury area is related to local origins and destinations. The demand model results validated this observation. Although this analysis may omit the through traffic, it may not have a significant impact for two reasons. First, the amount of through traffic is relatively small compared to traffic with local origins and destinations. Secondly, through traffic is very unlikely to be served by or shifted to any local or regional transit services.

After identifying the O/D flows, a qualitative analysis was used to identify major flows and their orientations. Based on the geographic relationships among origins and destinations, trips flows were categorized into four groups: (1) eastbound I-84 or northbound Route 7 trips; (2) westbound I-84 or southbound Route 7 trips; (3) intra-town trips; and (4) inter-town trips that only use local roads. Only groups (1), (2) and some of the group (3) trips (intra-Danbury) have the potential to use I-84 and Route 7 and cause congestion in the peak periods. The results of this analysis form the basis of the transit demand analysis in the following sections.

3.2. Identification of Transit Markets and Potential Modes and Routes

After finding the major O/D pairs and their potential routes, a transit market analysis was conducted. By consolidating major trip flows, a potential market for regional transit service, including inter-town or regional movements and local trips to major destinations such as rail stations and employment centers, emerged. Based on the lengths of potential routes, types of roadways, and traffic conditions, multiple bus service types were deemed appropriate for individual routes.

Longer routes along major corridors could use express bus or shuttle routes to achieve shorter run times. However, since an express service will streamline routing as much possible, the limited ability to provide convenient connections to existing transit service may limit its potential utilization. Therefore, it will be necessary to ensure that local transit improvements support any new proposed services. Potential local transit improvements may include adjustments to existing bus service to connect to the new express buses or adding new circulator shuttles to connect express routes to local destinations.

3.3. Approach for Transit Demand Analysis and High-Level Ridership Estimation

Forecasts of transit demand and ridership levels are necessary to understand the feasibility and potential effects of transit options in the study area. As discussed in Fixed-Route Transit Ridership Forecasting and Service Planning Methods (TCRP Synthesis 66), since an optimal

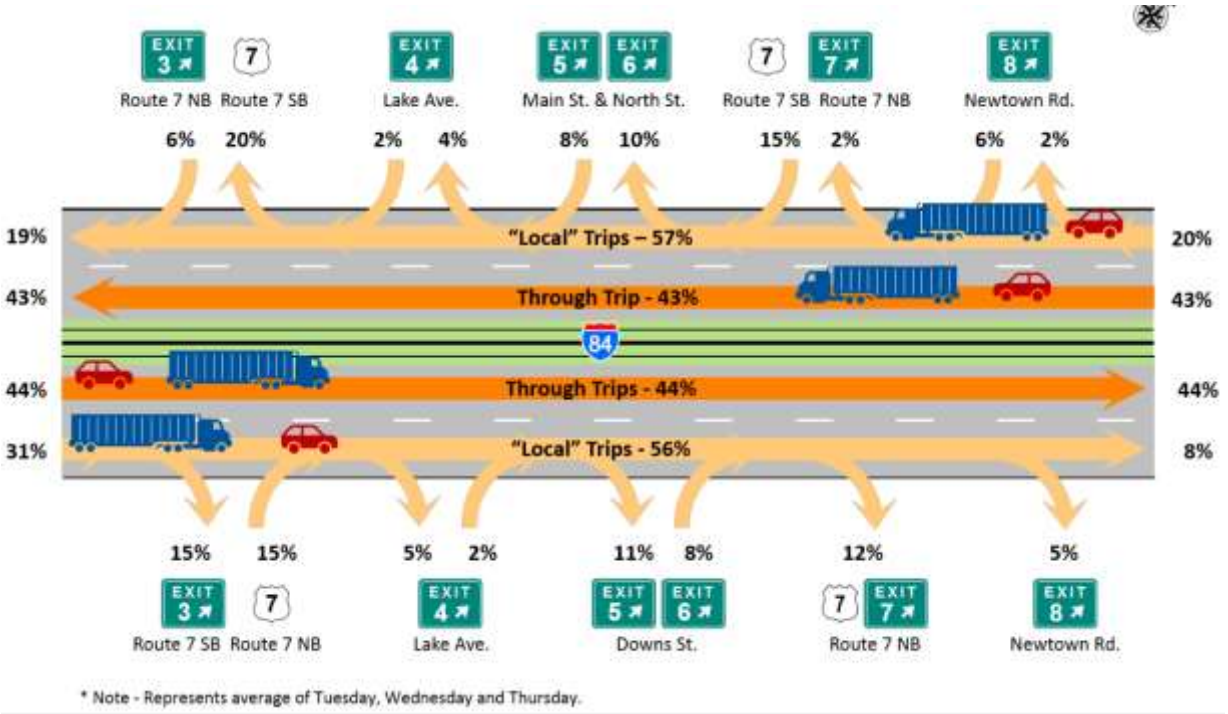
amount of data are usually not necessarily available for forecasting ridership, a variety of forecasting approaches are used by many public agencies. While formal travel demand modeling methods, including a four-step travel model or activity-based model, can provide detailed assessments of new and expanded services, simple and less formal approaches are often used in route-level and other small-scale service changes. Qualitative forecasting techniques relying on professional judgment and experience are widely used by transit agencies, especially to identify similar circumstances elsewhere in a transit system that can provide insights into likely ridership response.

The goal of this analysis was not to definitively forecast potential ridership of a detailed transit service proposal, but instead to provide a high-level estimate of ridership for conceptual service options using regression and qualitative forecasting approaches. A regression method based on population, non-retail employment, and retail employment conditions was used to estimate ridership for all potential new services. Model parameters are from Tri-County Metropolitan Transportation District of Oregon (TriMet, Portland, Oregon). Ridership estimates for the potential New Milford – Danbury Park-and-Ride - Norwalk Express Bus were based on previous studies on similar routes (e.g., Metro-North Danbury Line Extension study), the results of the CTDOT travel demand model and average transit use rate (e.g., 2.6% Connecticut average), and potential service capacity. Ridership estimates for a potential new Southbury-Danbury-Brewster Shuttle were based on the existing Danbury-Brewster shuttle service. Ridership estimates for the potential new Danbury Circulator Shuttle were based on TriMet's regression model for local routes and local retail and non-retail employment conditions in Danbury. The estimated ridership increase for the HARTransit Route 1 bus was based on existing ridership conditions and service elasticities. Without a comprehensive modeling process, professional judgement and analysis heuristics were applied in the whole process.

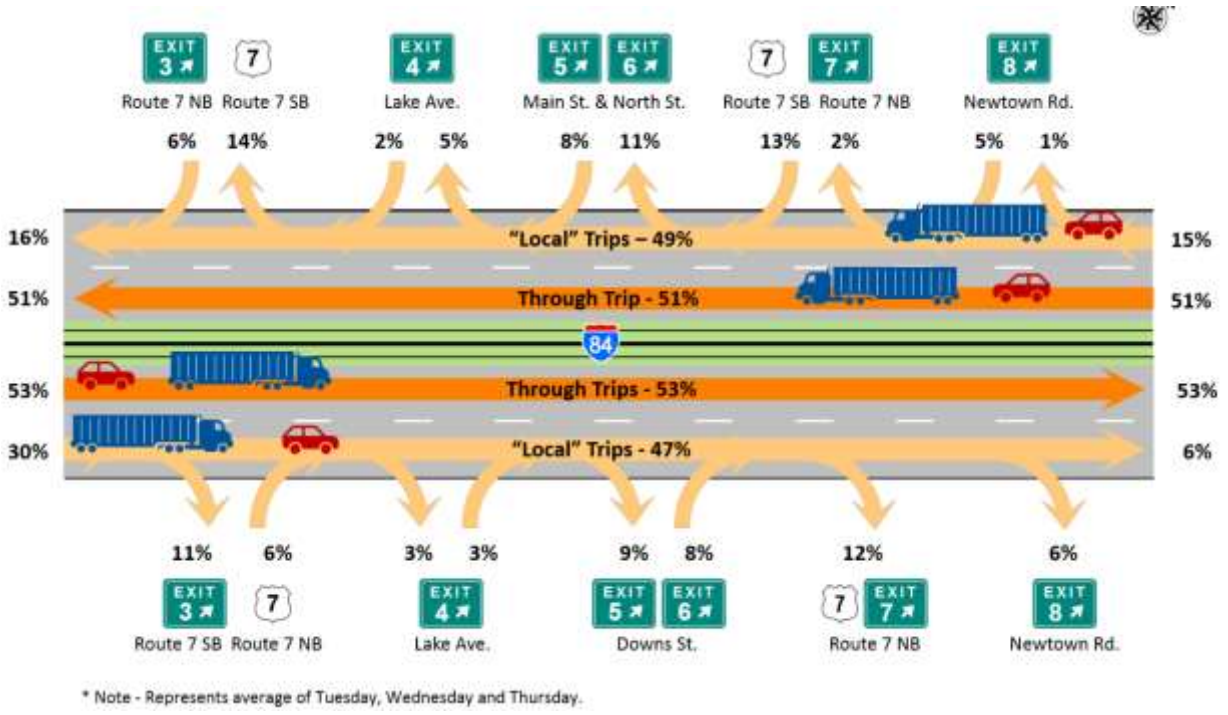
4. Transit Demand Analysis

4.1. Understanding Roadway Traffic O/D at Weekday Peak Periods

The traveling public in the study area near Danbury utilize I-84 and Route 7 as their primary options to access their destinations for work, study, and recreation. I-84 also serves as one of the key east-west corridors in New England, which attracts a significant amount of through traffic. In the traffic O/D study completed for the I-84 Danbury project, localized O/D patterns on I-84 and Route 7 in Danbury provided the base for identifying key trip patterns and potential transit service. As shown in Figure 10, a significant amount of traffic on I-84 in both peak periods comprised "local" trips, which begin or end (or both) at local destinations. Some of the "through" trips were actually "regional," as this part of I-84 is shared by both east-west and north-south inter-town travelers. Figure 11 shows the O/D patterns on Route 7, in which local trips dominated during both the AM and PM peak periods.

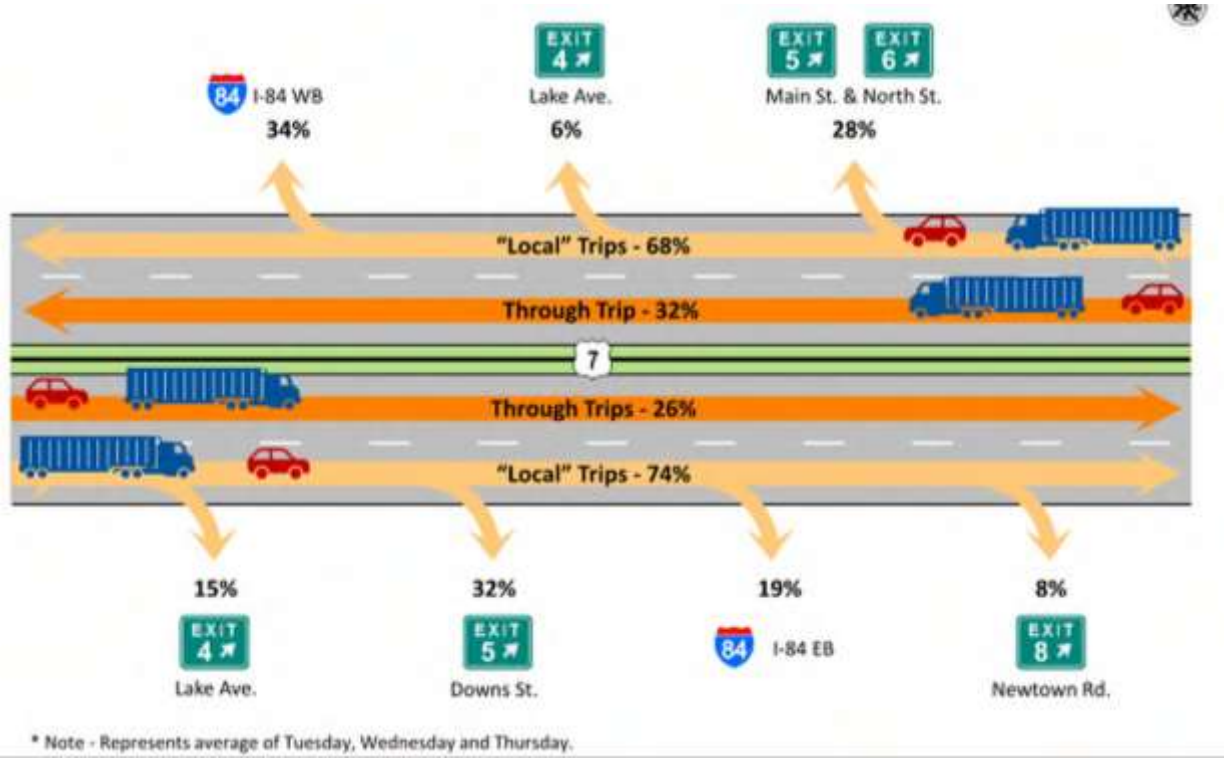


(a) AM Traffic O/D on I-84 during Weekday Peak Periods (2016)

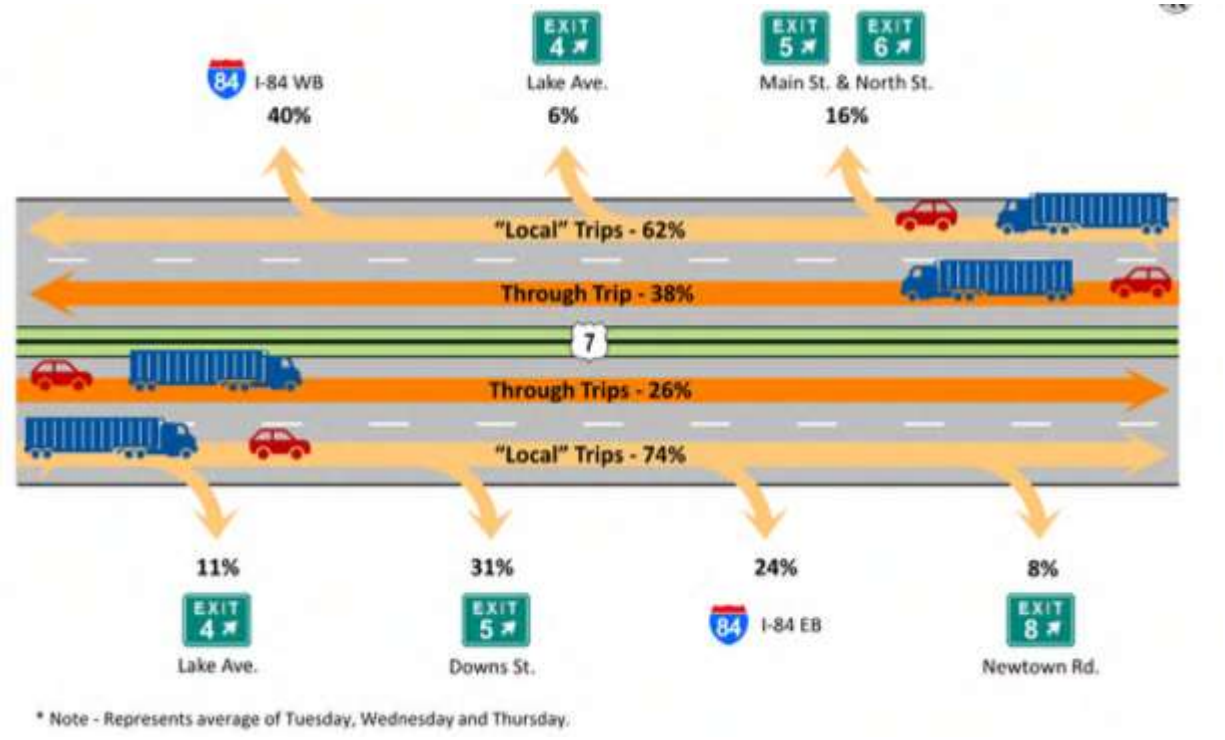


(b) PM Traffic O/D on I-84 during Weekday Peak Periods (2016)

Figure 10. Traffic O/D Patterns on I-84 at Danbury



(a) AM Traffic O/D on Route 7 during Weekday Peak Periods (2016)



(a) PM Traffic O/D on I-84 during Weekday Peak Periods (2016)

Figure 11. Traffic O/D Patterns on I-84 at Danbury

4.2. Flow of Workers Based on Census Data

As discussed in Section 3, the Longitudinal Employer-Household Dynamics (LEHD) online tool was used to identify the main flows of workers in the study area. The results of this analysis showed that 56,461 workers travel to the study area, while 58,720 workers leave the study area on a daily basis. Approximately 49,144 workers both live and work in the study area.

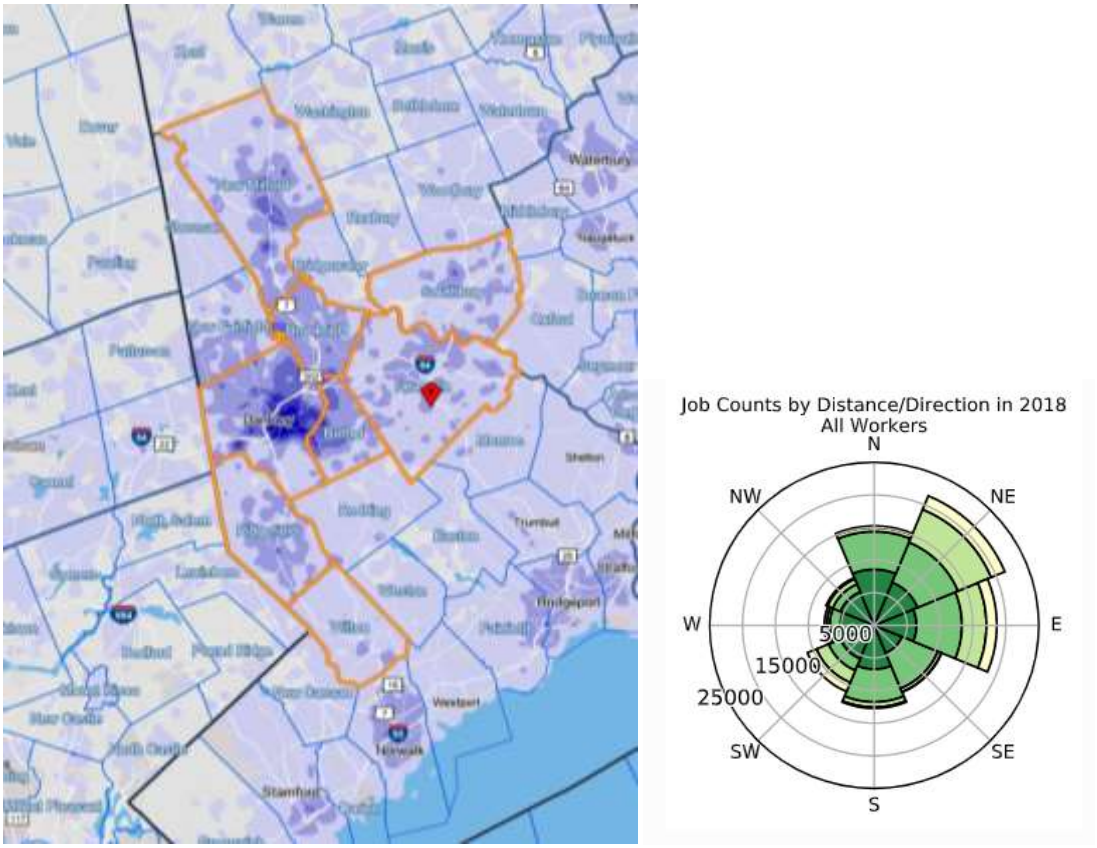


Figure 12. Inflow of Workers (U.S. Census Data)

The results of a more detailed analysis are shown in Figure 12 and Figure 13. Some observations include:

(1) A majority of workers both live and work in the study area ;

(2) Significant numbers of the workers travel to the study area from the north, east, and northeast;

(3) The City of Danbury is the primary destination for workers who live in or travel to the study area;

(4) A significant number of workers travel south and southwest.

A county-level analysis, as presented in The results of a more detailed analysis at sub-area level are included in Appendix 1 (Sub-Area Worker Flow).

Table 7, also shows that a majority of workers from the study area are employed in Fairfield County, while a small number of workers commute to destinations in Westchester or Manhattan. These results suggest that there is considerable inter-town travel demand, either to and from Danbury or passing through the town on I-84. Any new transit service should focus on meeting the mobility needs of the these travelers.

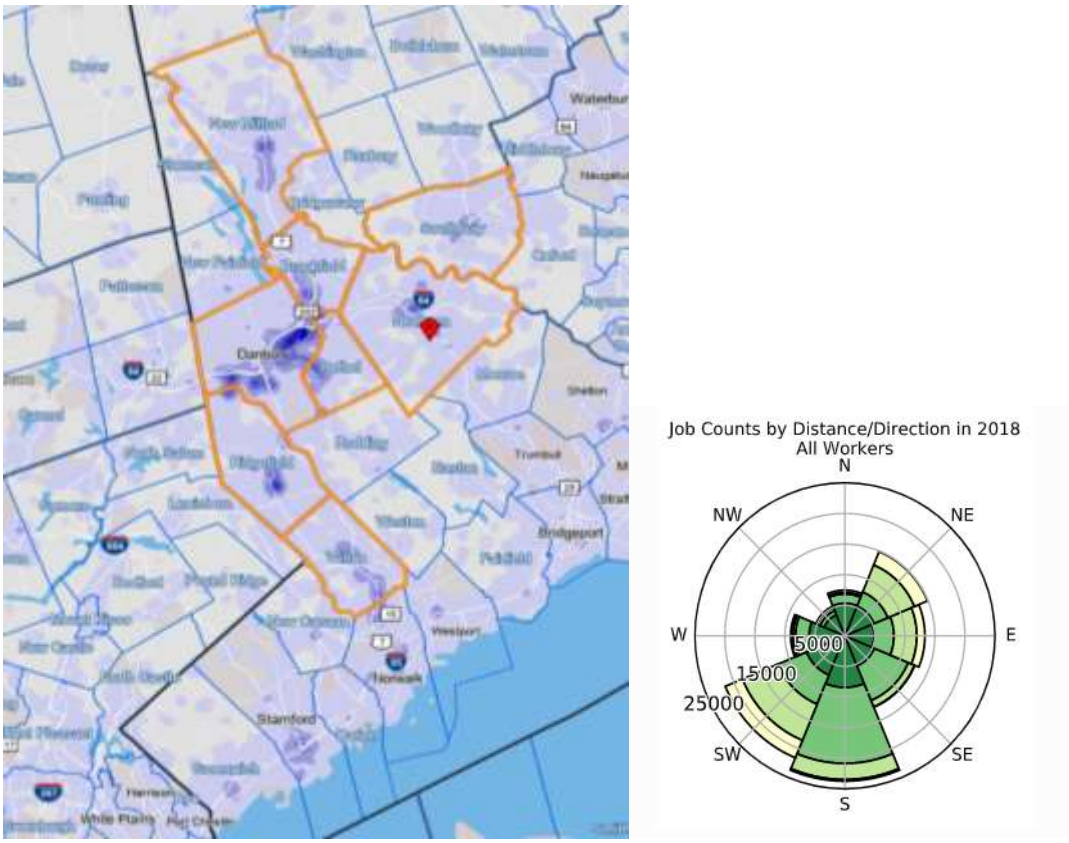


Figure 13. Outflow of Workers (U.S. Census Data)

The results of a more detailed analysis at sub-area level are included in Appendix 1 (Sub-Area Worker Flow).

Table 7. Study Area Workers by County of Employment (U.S. Census Data)

	2018	
	Count	Share
Fairfield County, CT	51,507	59.1%
New Haven County, CT	8,472	9.7%
Hartford County, CT	5,533	6.3%
Litchfield County, CT	5,446	6.2%
Westchester County, NY	4,807	5.5%
New York County, NY	2,867	3.3%
Putnam County, NY	1,553	1.8%
Dutchess County, NY	823	0.9%
New London County, CT	644	0.7%
Middlesex County, CT	523	0.6%
All Other Locations	5,033	5.8%

4.3. Trips to and from the Study Area Based on Travel Demand Model

The results of the CTDOT travel demand model present similar but more detailed O/D patterns in the study area. As shown in Table 8, up to 80 percent of total trips to and from the study area are inter- and intra- town trips.

As a comparison, the share of trips to and from New York State are much lower than inter- and intra- town trips. For instance, trips to and from Manhattan comprise less than one percent of travel in both the AM and PM peak periods. The numbers are so small that these trips are less likely to be the focus of future transit improvements in or near Danbury. Trips to and from Westchester County are the dominant origin/destination for New York trips. Westchester-bound commuters may prefer I-84/I-684 and north-south parkways in New York to Route 7/I-95. Some Westchester-bound commuters may prefer the Metro-North Harlem Line as a transit option if their destinations are close to rail stations. This result may provide a justification for improving shuttle bus service to Brewster or utilizing the Maybrook Branch to implement a rail shuttle service.

Table 8. Trips to/from the Study Area (Travel Demand Model Data)

	AM		PM	
Total Trips from Study Area	140,812	100%	276,421	100%
Inter- and Intra- town Trips	105,524	75%	222,065	80%
Trips to NY State	7,826	5.6%	8,237	3.0%
Trips to Westchester	4,055	2.9%	3,832	1.4%
Trips to Manhattan	744	0.5%	567	0.2%
Trips to Other Destinations	22,663	16.1%	41,720	15.1%
	AM		PM	
Total Trips to Study Area	141,738	100%	278,125	100%
Inter- and Intra- town Trips	105,524	74%	222,065	80%
Trips from NY State	4,326	3.1%	11,389	4.1%
Trips from Westchester	1,914	1.4%	5,675	2.0%
Trips from Manhattan	336	0.2%	876	0.3%
Trips from Other Destinations	29,638	20.9%	38,120	13.7%

Based on the results of the CTDOT travel demand model, town-level O/D patterns were collected and presented in Table 9 and

Table 10. As discussed in Section 3.1, these O/D pairs were categorized into four groups and color-coded in the tables. Some observations from these results include:

(1) Intra-town trips dominate traffic to and from the study area;

(2) The intra-town traffic in Danbury is significantly higher than in any other town. Since many drivers in Danbury use I-84 as a way to avoid local traffic, this intra-town traffic also contributes to the congestion on I-84 in Danbury;

(3) Inter-town traffic in the study area has a high potential to use I-84 and Route 7, which contributes to peak-period congestion;

(4) More trips use westbound and southbound I-84 and Route 7 in the morning peak period, which is consistent with observed traffic conditions;

(5) More trips use eastbound and northbound I-84 and Route 7 in the afternoon peak period, which is consistent with observed traffic conditions.

Table 9. O/D Patterns: AM Peak Period (Travel Demand Model Data)

AM Peak Period		Origins							
		Wilton	Ridgefield	Danbury	New Milford	Brookfield	Bethel	Newtown	Southbury
Destinations	**Wilton**	3,652	535	295	92	51	98	83	33
	Ridgefield	353	7,770	3,322	291	241	374	240	102
	Danbury	150	2,073	**29,095**	1,887	2,918	3,892	2,737	965
	New Milford	13	100	655	9,450	518	100	156	151
	Brookfield	28	239	2,397	1,173	3,701	417	648	294
	Bethel	22	194	2,599	286	426	3,508	690	206
	Newtown	11	95	792	201	385	566	6,329	591
	Southbury	12	68	436	316	257	115	685	5,445

15%	**15,677**		**AM WB/SB traffic using I-84 or Route 7 or both**
11%	**11,483**		**AM EB/NB traffic using I-84 or Route 7 or both**
65%	68,950		Intra-town Traffic
9%	9,415		Local Routes
	105,524		**Total**

Table 10. O-D Pattern: PM Peak Period (Travel Demand Model Data)

PM Peak Period		Origins							
		Wilton	Ridgefield	Danbury	New Milford	Brookfield	Bethel	Newtown	Southbury
Destinations	Wilton	7,798	800	395	44	61	53	36	19
	Ridgefield	951	17,586	4,080	264	506	396	218	95
	Danbury	481	6,104	**63,881**	1,110	5,108	6,354	2,999	845
	New Milford	235	697	2,533	21,267	1,812	425	289	383
	Brookfield	129	627	5,474	1,308	8,624	980	1,120	380
	Bethel	117	542	7,005	210	910	7,592	1,337	203
	Newtown	91	309	3,364	232	1,096	1,400	14,211	1,212
	Southbury	45	194	1,118	229	350	218	1,111	12,504

9%	**19,009**		**PM WB/SB traffic using I-84 or Route 7 or both**
14%	**30,765**		**PM EB/NB traffic using I-84 or Route 7 or both**
69%	153,462		Intra-town traffic
8%	18,829		Local
	222,065	**Total**	

5. Transit Market and Potential Solutions

After examining the major O/D pairs and their potential routes, a transit market analysis was conducted to identify major markets for transit use.

Figure 14 shows, the major trip flow patterns present a potential need for improved regional transit service. Using the morning peak period as an example, the following travel corridors are heavily used by commuters:

(1) New Milford – Danbury -Norwalk via Wilton;

(2) New Milford – Danbury - Brewster;

(3) Southbury – Danbury – Brewster;

(4) Southbury – Danbury – Norwalk.

Regional transit that serves these markets would have greater potential to attract riders. Express bus service would be appropriate to provide north-south inter-town connectivity. Other high-capacity modes, such as bus rapid transit (BRT), would be more feasible in areas with higher population density. Extension of the existing shuttle bus route along I-84 between Danbury and Brewster to Southbury would both improve access to the Metro-North Harlem Line rail station and serve east-west inter-town commuters. An express bus stop in Danbury providing transfer opportunities between these two services would make this transit option even more attractive.

Local transit improvements are necessary to increase access and interchange with existing transit service for commuters arriving at express bus stops near I-84 and then traveling to workplaces throughout Danbury. A new circulator shuttle in Danbury would enhance access to workplaces, educational institutions, and retail centers. It would also provide a transfer opportunity at the Metro-North Danbury Station, which may attract additional riders to/from existing Danbury Line service.

Since the proposed circulator shuttle may not provide direct connection to the existing HARTransit Pulse Point, a connection between the Pulse Point and the express services is recommended. The HARTransit Route 1 bus has two stops that are very close to Exits 5 and 6 and the potential locations of the express bus stop, which presents an opportunity to enable express bus riders to reach downtown Danbury and transfer to other HARTransit routes. Increasing the frequency of the HARTransit Route 1 bus during peak periods to add more capacity and reduce travel time would provide a direct link for express bus riders.

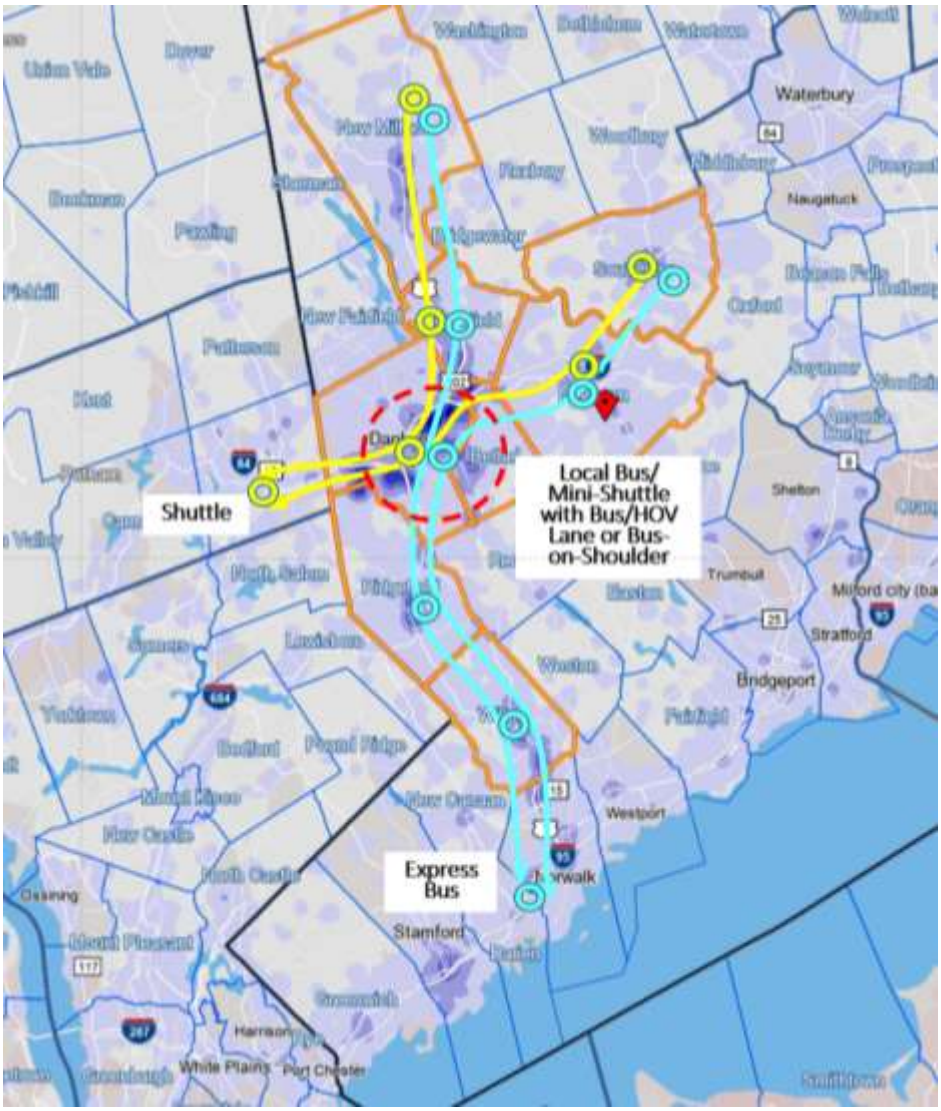


Figure 14. Major Transit Markets and Potential Mode and Routes in the Study Area

5.1. Potential Transit Improvement Options

5.1.1. Option 1: New Milford – Danbury P&R - Norwalk Express Bus

This option assumes a north-south regional peak express service between New Milford and Norwalk along Route 7. It would allow inter-town commuters to access major employment centers. The route would be approximately 37 miles long, with eight to 10 stops. An important stop would be located in Danbury near Exits 5 and 6, where commuters could transfer to other regional and local transit services as described below. In Danbury, the express bus route would run along I-84 and use these two exits to access the bus stop. Since this route would have to use local roads to return to I-84, congestion on local roads may potentially affect operations. Under normal traffic conditions, one-way run time would be approximately 80 minutes between the two termini. It is assumed that the service would run on a 20-minute headway. Highway improvements that reduce congestion on freeways and local roads, and traffic management measures that enable transit priority, could facilitate this option.

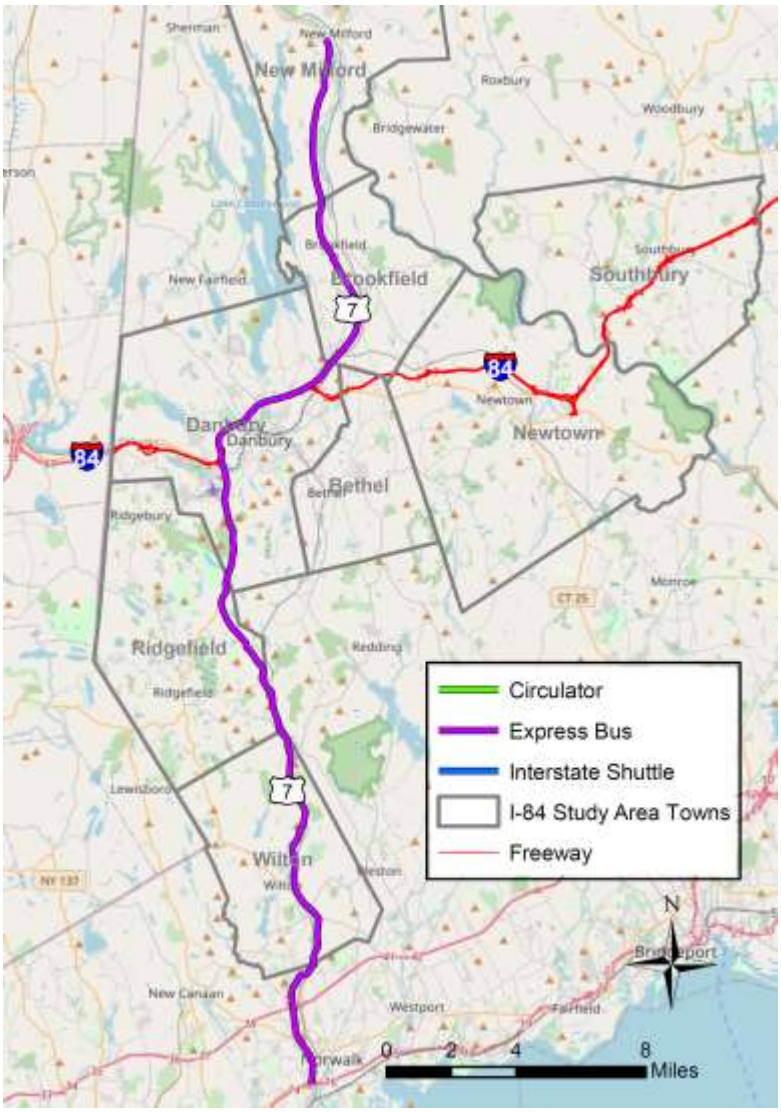


Figure 15. New Milford –Danbury Park-and-Ride - Norwalk Express Bus

This option would require the construction of multiple express bus stops along or close to I-84 and Route 7. Parking facilities would be necessary to allow park-and-ride (P&R) commuters at some locations. Existing park-and-rides at Exits 7 and 11 on Route 7 would be used. A new park-and-ride facility would be located near the express bus stop in Danbury. Based on the conceptual fleet size, number of new bus stops, and new parking spaces required for this service, it is estimated in 2021 that the total capital cost of this option would be approximately $22 million. The annual operating cost would be approximately $3.7 million.

Table 11. New Milford – Danbury P&R – Norwalk Express Bus Operating Characteristics

Service Characteristics	
Operating Strategy	Express Bus
Routing and its physical characteristics	Operates along Route 7, on I-84 side lanes (or the C-D roads in the C-D roadway options) in Danbury
Route Length	37 miles
Span of service	7 days week, morning, and afternoon peak periods
Service frequency	20 minutes in Peak Periods
Trip Time (one-way)	80 minutes
Vehicle Type/Capacity	Over-the-Road coach, 40 passengers
Peak Vehicles Required	9 buses
Spare Ratio (15% of peak vehicle requirement)	2 buses
Total Fleet Size	11 buses
Number of Stations/Stops	8 to 10
Potential Infrastructure Improvement	Bus stops, new park-and-ride facility in Danbury, Potential Bus-on-Shoulder on Route 7
Transit Connections	Southbury-Brewster Shuttle, Danbury Circulator, HART Route 1
Shop/Storage Facility Requirements	New storage facility needed
Annual Revenue Vehicle Miles	604,580
Annual Revenue Vehicle Hours	23,965

5.1.2. Option 2: Southbury – Danbury P&R – Brewster Rail Station Shuttle

This option assumes an east-west regional peak express service between Southbury and Brewster, NY along I-84. It would allow east-west inter-town commuters to access major employment centers and the Metro-North Harlem Line.

The route would be approximately 27 miles with five to six stops. This service would connect with other transit options at a bus stop in Danbury near Exits 5 and 6, where commuters would be able to transfer to other regional and local transit services. In Danbury, the shuttle service would run along I-84 and use these two exits to access the bus stop. Under normal traffic conditions, one-way run time would be approximately 40 minutes between the two termini. It is assumed that the service would run on a 25-minute headway. Since this route would have to use local roads to return to I-84, congestion on local roads may potentially affect operations. Highway improvements that reduce congestion on freeways and local roads, and traffic management measures that enable transit priority, could facilitate this option.

This option would require the construction of multiple express bus stops along or close to I-84 and Route 7. Parking facilities would be necessary to accommodate park-and-ride commuters at some locations. Existing park-and-ride lots at exits 2, 9, 11, and 14 on I-84 would be used.

Based on the conceptual fleet size, number of new bus stops, and new parking spaces required for this service, it is estimated in 2021 that the total capital cost would be approximately $10 million, with annual operating costs of approximately $2.5 million.

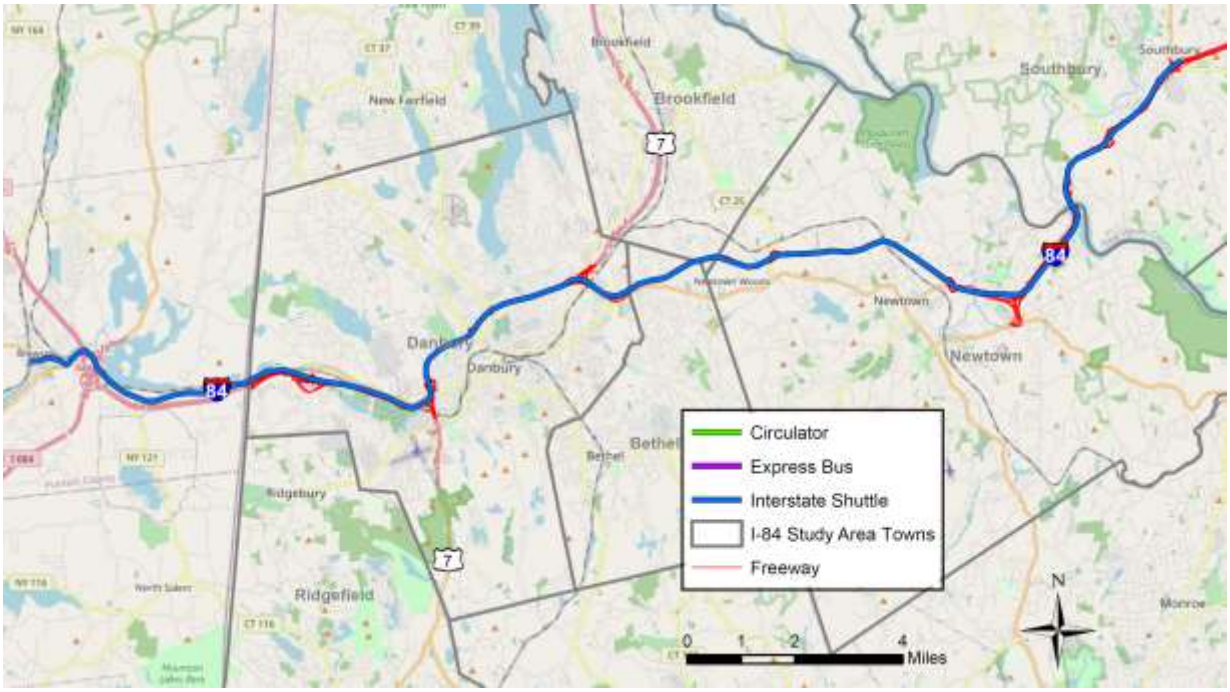


Figure 16. Southbury – Danbury Park-and-Ride – Brewster Rail Station Shuttle

Table 12. Southbury – Danbury P&R - Brewster Rail Station Shuttle Operating Characteristics

Service Characteristics	
Operating Strategy	Feeder Route
Routing and its physical characteristics	Operates on I-84 side lanes (or the C-D roads in the C-D roadway options)
Route Length	27 miles
Span of service	7 days week, morning, and afternoon peak periods
Service frequency	25 minutes Peak Period
Trip Time (one-way)	40 minutes
Vehicle Type/Capacity	35-foot transit bus, 35 passengers
Peak Vehicles Required	6 buses
Spare Ratio (15% of peak vehicle requirement)	1 bus
Total Fleet Size	7 buses
Number of Stations/Stops	5-6
Infrastructure Improvement	New P&R facility in Danbury
Transit Connections	New Milford-Norwalk Express Bus, Danbury Circulator, Hart Route 1
Shop/Storage Facility Requirements	New storage facility needed
Annual Revenue Vehicle Miles	413,640
Annual Revenue Vehicle Hours	21,273

5.1.3. Option 3: Danbury Circulator Shuttle

This option assumes an express circulator shuttle route in Danbury to provide regional bus/shuttle riders access to major trip attractors in the area, as shown in **Error! Reference source not found.**. This service would start at the new express bus stop; enter I-84 at Exit 5; exit at Exit 2 to Route 202; follow Kenosia Avenue, Backus Avenue, Park Avenue, West Avenue, White Street, Newtown Road, and Federal Road to run through the Danbury downtown area; and enter Exit 11 of Route 7 to get back to I-84 before exiting at Exit 6. The service would operate only in the morning and afternoon peak periods. Neither the route nor operating times would replace or compete with the three existing HARTransit loop routes, which operate only at night Monday to Saturday and all day on Sunday.

The route would be approximately 15 miles long, with 12 to 15 stops. This service would connect with other transit options at the bus stop in Danbury near Exits 5 and 6, where commuters would be able to transfer to other regional and local transit services. In Danbury, the circulator shuttle would provide transfers to HARTransit routes 1, 2, 3, and 6, and the Metro-North Danbury Line at Danbury rail station. Under normal traffic conditions, one-way running time would be

approximately 60 minutes between the two termini. It is assumed that the service will run on a 20-minute headway. Since this route would have to use many local roads, congestion on local roads would potentially affect operations. Highway improvements that reduce congestion on freeways and local roads, and traffic management measures that enable transit priority, could help facilitate this option.

This service would require the installation of new bus stops on local roads. No new parking facilities would be required. Based on the conceptual fleet size, number of new bus stops, and new parking spaces necessary for this service, it is estimated in 2021 that the total capital cost would be approximately $10 million, with annual operating costs of approximately $1.5 million.

Table 13. Danbury Circulator Shuttle Operating Characteristics

Service Characteristics	
Operating Strategy	Circulator Route
Routing and its physical characteristics	I-84, Route 202, Backus Avenue, Park Avenue, West Avenue, White Street, Newtown Road, and Federal Road
Route Length	15 miles
Span of service	7 days week, morning and afternoon peak periods
Service frequency	Traditional Service Plan: 20 minutes Peak Period
Trip Time (one-way)	60 minutes
Vehicle Type/Capacity	35-foot transit bus, 35 passengers
Peak Vehicles Required	9 buses
Spare Ratio (15% of peak vehicle requirement)	2 buses
Total Fleet Size	11 buses
Number of Stations/Stops	12 - 15
Infrastructure Improvement	Bus stops, new P&R facility in Danbury
Transit Connections	New Milford-Norwalk Express Bus, Southbury-Brewster Shuttle, HART routes 1, 2, 3, & 6
Shop/Storage Facility Requirements	New storage facility needed
Annual Revenue Vehicle Miles	245,100
Annual Revenue Vehicle Hours	23,965

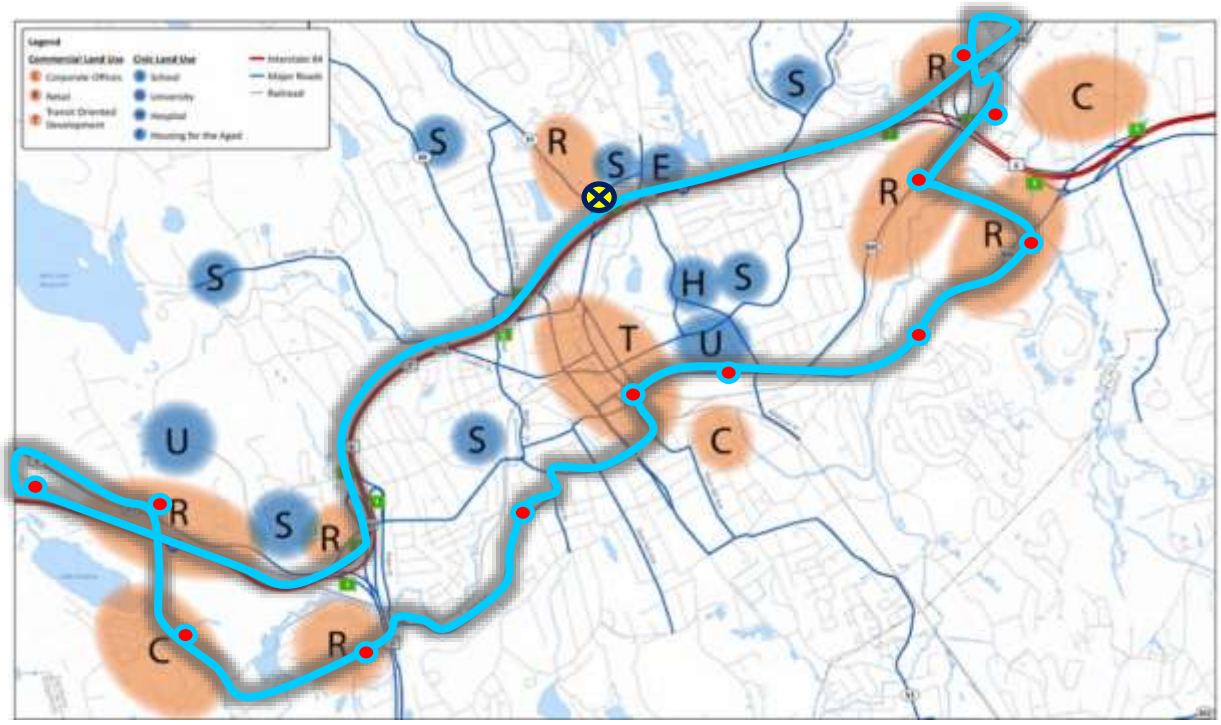


Figure 17. Danbury Circulator Shuttle

5.1.4. Option 4: Danbury P&R/Express Connector (HARTransit Route 1 Adjustment)

This option includes the following changes:

1. The addition of the Danbury P&R/Express Connector service to HARTransit Route 1
2. A minor route adjustment to HARTransit Route 1

Each potential change is summarized below:

Danbury P&R/Express Connector

The Danbury P&R/Express Connector would be a peak-only service following the existing HARTransit Route 1. It would operate between the Pulse Point in downtown Danbury and a new bus stop on North Street at Walnut Street, located near the potential new express bus stop at I-84 Exit 6. The location of this stop will allow bus riders to transfers between multiple routes: the Danbury P&R/Express Connector; the bus routes under Options 1, 2 and 3; and HARTransit Route 1 (See Figure 18). The Danbury P&R/Express Connector would travel south on Padanaram Road, turn right on Padanaram Avenue, turn left on North Street, stop on North Street at Walnut Street, continue northbound Padanaram Road and follow the existing inbound HARTransit Route 1 routing back to the Pulse Point.

For the Danbury P&R/Express Connector service, buses would operate every 30 minutes during peak periods, with departures from the Pulse Point approximately 15 minutes after each regular HARTransit Route 1 trip. The Danbury P&R/Express Connector route is six miles in length. Stops include the Pulse Point, Main Street-Golden Hill, North Street Shopping Center, and North Street/Walnut Street.

Under normal traffic conditions, round trip run time would be approximately 25 minutes. Since this route would use many local roads, local congestion could potentially affect operations. Roadway improvements that reduce congestion on local roads, and traffic management measures that enable transit priority, could be an added benefit for this option.

HARTransit Route 1 Adjustment

The existing HARTransit Route 1 would need to be adjusted to serve the new bus stop on North Street at Walnut Street.

Outbound buses traveling southbound on Padanaram Road would turn right on southbound Padanaram Avenue and turn left onto northbound North Street, stop at the new bus stop on North Street at Walnut Street, and turn right onto eastbound Hayestown Road, and resume the current outbound route serving Danbury Hospital, Sand Pit Medical Center, Saint Gregory Church, and Town Park.

Inbound buses traveling westbound on Hayestown Road would turn left on Rowan Street Extension, turn right on Walnut Street, then turn right on northbound North Street, stop at the new bus stop on North Street at Walnut Street , and resume the current route northbound on Padanaram Road to the Pulse Point.

Option 4 would require one new bus stop serving the Danbury P&R/Express Connector and the adjusted HARTransit Route 1, but no new parking facilities. Based on the conceptual fleet size required to provide this service, it is estimated in 2021 that the total capital cost approximately $2.2 million, with annual operating costs of approximately $220,000.

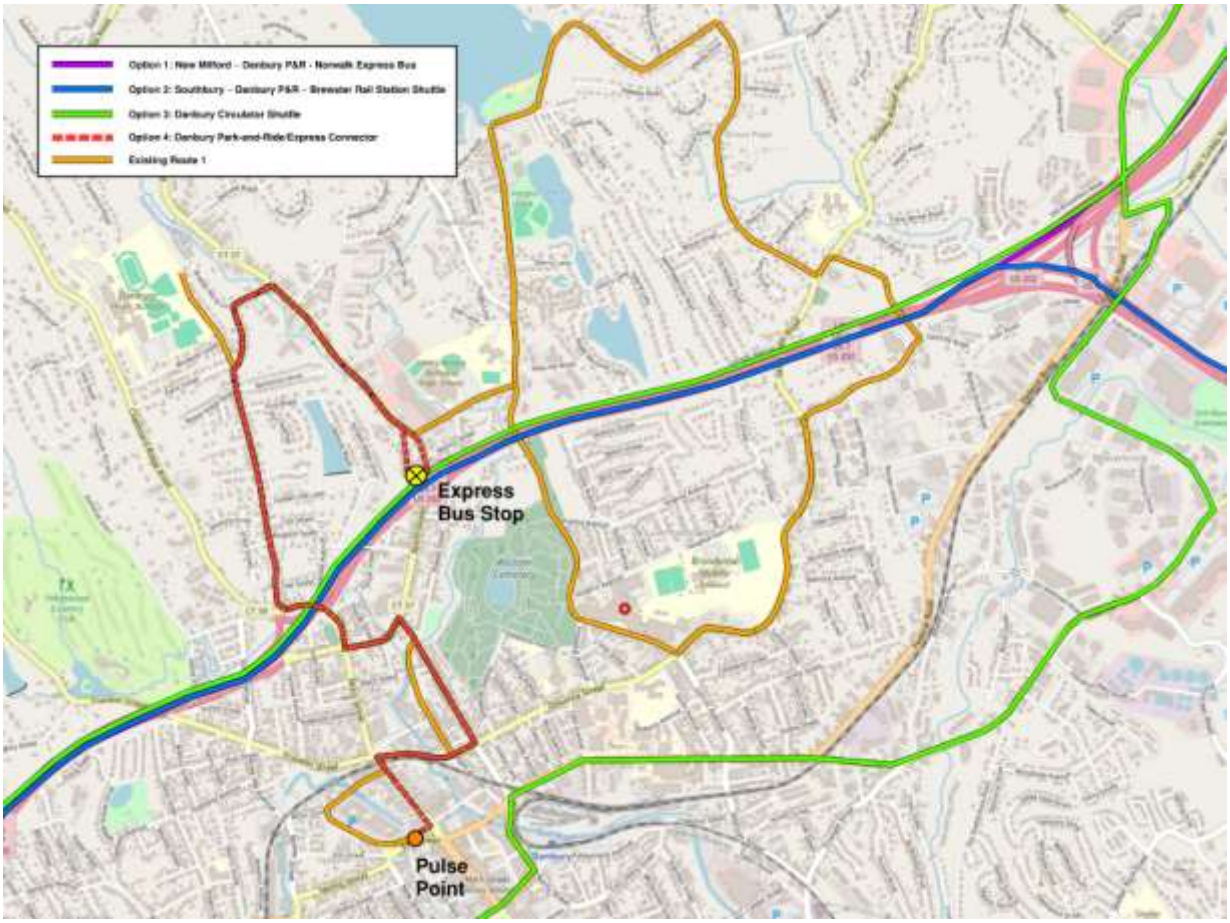


Figure 18. Danbury Park-and-Ride/Express Connector

Table 14. Danbury Park-and-Ride/Express Connector Operating Characteristics

Service Characteristics	
Operating Strategy	Operation adjustment of HART Route 1
Routing and its physical characteristics	Part of the Existing HARTransit Route 1
Route Length (miles)	3 miles
Span of service	Weekday, morning and afternoon peak periods only
Service frequency	30 minutes in Peak Periods
Trip Time (one-way)	12 minutes
Vehicle Type/Capacity	Existing HARTransit Bus
Peak Vehicles Required	1 bus
Spare Vehicles (15% of peak vehicle requirement)	1 bus
Total Fleet Size	2 buses
Number of Stations/Stops	4
Infrastructure Improvement	None
Transit Connections	New Milford-Norwalk Express Bus, Southbury-Brewster Shuttle, Danbury Circulator, and all Hart routes
Shop/Storage Facility Requirements	None
Annual Revenue Vehicle Miles	36,720
Annual Revenue Vehicle Hours	1,469

5.2. Integration with Highway Design Concepts

Congested conditions on freeways and local roads affect the efficiency and feasibility of proposed regional and local transit services. Highway improvements to I-84 and Route 7 that mitigate congestion would facilitate more reliable operations for potential express bus/shuttle and local services. The proposed transit options would need to be integrated with the highway design concepts in the I-84 Danbury Project.

In the "Lane Add – Mainline" concept, the new transit service would be able to run on the proposed additional travel lanes on eastbound and westbound I-84 to access exits 5 and 6, as shown in Figure 19. To return to the interstate, the express bus or shuttle would have to operate through a portion of the downtown area to reach the next on-ramp. A park-and-ride facility that is close to highway exits and the express bus stop may provide more reliable service for local commuters.

Figure 19. Transit Options Working with Highway Concept #1: Lane Add – Mainline

In the "Collector-Distributor Road" (C-D Road) concept shown in Figure 20, a regional service would operate on C-D roads in Danbury and access the express bus stop adjacent to the highway. In this concept, the express bus stop and park-and-ride facility would be located within space currently occupied by interstate ramps and close to an existing HARTransit Route 1 stop on Main Street.

Figure 20. Transit Options Working with Highway Concept # 2 – Collector-Distributor Road

Other potential measures, such as bus-on-shoulder and bus/high-occupancy vehicle (HOV) lanes, or a reversible lane on I-84 and/or Route 7, may increase transit speed and reliability but would require additional feasibility analysis.

5.3. Previous and Ongoing Rail Transit Options

In the past, there have been discussions regarding extending the Danbury Branch Line further north, from New Milford to Northwest Connecticut areas such as Kent and Salisbury, and even to Pittsfield, Massachusetts. Currently, this extension is not economically viable.

Figure 8 shows the potential extension of the rail service to New Milford.

5.4. Discussion of the Maybrook Line Feasibility Study

An ongoing study by Putnam County in collaboration with the City of Danbury is analyzing the feasibility of a rail shuttle (referred as Maybrook Line) between Danbury and Southeast station in Brewster. This option is also shown in Figure 8. The rail shuttle would use the existing railroad right-of-way owned by Housatonic Railroad Company in Connecticut and the Maybrook Trailway section in New York.

6. Assessment of Potential Transit Options

As described in Section 3, this transit analysis utilized a combination of qualitative analysis and regression methods to assess the potential ridership level of proposed transit options. This section describes the high-level ridership estimation methodology. The potential effects on traffic congestion, transportation systems, and environmental factors were also investigated.

6.1. High-Level Ridership Estimate Results

Peak period ridership was estimated based on available demographic data and the results of previous studies.

(1) Overall ridership level of all new transit services is estimated based on a general regression model (TriMet, Portland, Oregon):

*Ridership = 0.00984 * population - 0.004 * non - retail employment + 0.008 * retail employment*

Approximately 2,600 riders are projected to use the new regional and local transit service under all options in peak periods on a daily basis.

(2) New Milford –Danbury Park-and-Ride - Norwalk Express Bus:

Three qualitative methods were applied to forecast ridership for this option. Based on previous studies within this corridor, such as the Metro-North Danbury Line Extension study, it was estimated that the ridership may reach 1,400 riders per day, which is approximately 1/3 of expected ridership of the proposed commuter rail service enhancements between New Milford and Norwalk. Based on the CTDOT travel demand model results, a standard estimate ratio of 1-3% transit use of regional commuters (2.6% CT average) would result in 770 to 2,300 riders per day with an average of 1,500 daily riders. Based on the vehicle and service capacity of the proposed service option, the New Milford – Danbury Park-and-Ride - Norwalk Express Bus would be able to carry more than 1,200 riders per day.

A ballpark estimate of 1,400 riders per day was deemed reasonable for this new express service.

(3) Southbury – Danbury Park-and-Ride - Brewster Rail Station Shuttle:

The existing Danbury-Brewster Shuttle bus has a ridership of approximately 230 riders per day. With the proposed extension to Newtown and Southbury included in this option, this service would be able to attract commuters to both the Metro-North Harlem Line stations and to Danbury. A service elasticity analysis estimated that approximately 350 riders would use this service on a daily basis.

(4) Danbury Circulator Shuttle:

This proposed circulator shuttle has the potential to serve both residents and regional commuters. The projected number of transfers from express buses and shuttles was estimated based on the TriMet general regression model for local service:

*Employee Ridership = 0.01 * non-retail employment + 0.0135 * retail employment*

Based on retail and non-retail employment conditions in Danbury, approximately 500 employee riders were projected to use this service daily. Potential express bus trips to Danbury would serve between 500 and 640 passenger trips per day based on an analysis of the travel demand model results.

Since this service would provide a convenient connection between major retail and commercial centers as well as downtown Danbury and other civic destinations, it was estimated that approximately 150 weekday non-worker riders would use this service. Total ridership for the Danbury circulator shuttle is projected to be approximately 650 riders per day.

(5) Danbury Park-and-Ride/Express Connector (Enhanced Route 1):

Existing HARTransit Route 1 service carries approximately 220 riders per day. It was estimated that as many as 200 additional riders could be attracted to this route by increasing service frequencies during peak periods to access downtown Danbury or transfer to other HARTransit routes at the Pulse Point.

Because transit ridership and congestion both tend to increase with city size, density, and employment, any further analysis should account for these factors (by using simulation or multivariate regression of matched pair analysis of similar size cities) as more reliable data become available. It should also be noted that only services operating during peak periods were considered in this analysis. Off-peak services may attract more riders during midday periods, evenings, and weekends. Without a comprehensive transit demand modeling process, it would be difficult to estimate potential ridership changes and evaluate the feasibility of off-peak services. Further investigation of the costs and benefits of these options is recommended.

6.2. Constraints to Potential Transit Options

It is safe to assume that potential constraints in this region would affect the feasibility and effectiveness of the proposed transit options; therefore, each would require additional analysis. Congestion on I-84 between Exit 3 and Exit 8, and on Route 7, between Exit 7 and Exit 11, may significantly increase the projected run times of the regional express bus and shuttle option or make it difficult to maintain reliable, high-frequency headways during peak periods. Proposed freeway infrastructure improvements, such as adding lanes or collector-distributor roads, or management measures such as bus-on-shoulder or bus/high-occupancy vehicle (HOV) lanes, may be able to reduce congestion.

Congestion on local roads may affect the operational reliability of the proposed regional and local transit options, especially on North Street and Main Street in downtown Danbury. The proposed circulator shuttle may also experience delays on Lake Avenue, Park Avenue, West Street, White Street, and Federal Road. The value of traffic management measures that prioritize transit operations should be investigated.

6.3. Potential for Traffic Reduction on I-84 and Route 7

A high-level mode shift analysis was conducted to assess potential traffic reduction on I-84 and Route 7 with the introduction of new regional and local transit options. It should be noted that this is a qualitative analysis completed without the support of a comprehensive mode choice

model. The results should be viewed as order-of-magnitude estimates that could be further refined in a transit modeling process.

The projected ridership levels of the regional express bus and shuttle services show a potential shift from driving on I-84 to using transit. Approximately 1,750 daily car trips would be converted to bus riders in all peak periods, or 350 per peak hour in the peak direction with heavier traffic on I-84. At the congested segments of I-84, this would represent an approximately five-percent reduction in peak-hour traffic. Based on the traffic analysis, this change would not significantly improve the I-84 Level-of-Service (LOS).

On Route 7, the new service options have the potential to convert 1,450 car trips to transit trips in all peak periods, or 280 per peak hour in the direction with heavier traffic. This would represent an approximately seven- to nine-percent reduction in peak-hour traffic at congested segments, which would not significantly improve the LOS.

These results are not uncommon in the real world, as the ability of transit improvements to functionally contribute to reductions in highway congestion has been found to be very limited. Only high-quality transit that attracts discretionary travelers on congested urban corridors with certain deterrents to driving would be expected to significantly reduce congestion.

These results can be compared to the Maybrook rail shuttle analysis, which utilized the CTDOT travel demand model and conducted mode choice and station choice analyses. It was estimated that 152 auto trips would be converted to transit use during the AM peak period, or 60 during the AM peak hour. The Maybrook rail shuttle would operate between the Danbury Rail Station and a new station between Danbury and Brewster, with park-and-ride facilities and limited connectivity with other existing transit services. Its transit catchment area would be limited to a portion of Danbury much smaller than that of the HARTransit service area. The target population for the rail shuttle was expected to predominantly consist of New York-bound commuters, which is a small proportion of the traveling public in this region, as discussed in Section 4.3. The bus transit options proposed in this report would introduce multiple high-frequency services for a much larger catchment area and provide better connectivity between existing and proposed transit services. It is reasonable to expect that multiple proposed bus transit options, if implemented together, could shift many more auto trips to transit than the proposed Maybrook rail shuttle alone.

6.4. Compatibility with Existing Transit Services

Transfer opportunities between the proposed and existing transit services would be crucial to their successful implementation. Table 15 summarizes the potential intermodal transfer opportunities of the proposed transit scenarios.

Table 15. Transfer Opportunities between the New and Existing Transit Services

	New Transit Options	Existing Bus Transit	Existing Rail Transit
New Milford-Danbury-Norwalk Express Bus	All new options	HART Route 1 (Adjusted)	Metro-North South Norwalk Station
Southbury-Danbury-Brewster Shuttle	All new options	HART Route 1 (Adjusted)	Metro-North Harlem Line stations
Circulator Shuttle	All new options	HART routes 1, 2,3, and 6	Metro-North Danbury Station
HART Route 1 Service Adjustments	All new options	n/a	No

Other proposed commuter railroad improvements (e.g., the Danbury Branch Electrification and Extension and the Maybrook Rail Shuttle) may introduce new intermodal connectivity opportunities. The proposed bus transit services should be able to adapt to the expansion of the transit network by enhancing the connections between the Danbury express bus stop, the HARTransit Pulse Point, and the commuter rail stations.

6.5. Potential Environmental Effect and Impacts

The proposed transit scenarios could enhance mobility options and access for the traveling public in the study area, especially for zero- and one-car households and other transit-dependent populations. The significantly larger catchment area and high-frequency service model of the proposed scenarios would benefit more residents. The environmental justice communities in Danbury would have better access to employment opportunities in the region and improved connections to other local destinations.

The construction of new bus stops would not be expected to have any significant impact on local land use and communities. The development of park-and-ride facilities would have impacts on local land use, but potential to attract commuters from a much larger area. The optimal location, size, and configuration of proposed park-and-ride facilities would require further investigation.

As this transit assessment was undertaken at a conceptual level, no significant effort was expended on the evaluation of potential environmental effects and impacts on local land use and communities. Additional assessment would be necessary to accurately quantify the effects and potential impacts.

6.6. Order-of-Magnitude Capital and Operation and Maintenance Cost Estimates

An order-of-magnitude estimation of capital and operation and maintenance costs was conducted based on the results of a high-level transit service planning effort. The estimated capital costs are mainly based on fleet size, the number of bus stops, and the number of parking spaces required. The operating and maintenance costs are based on the annual revenue vehicle miles of each option and a unit cost of $5.97 per revenue vehicle mile, based on the most recent National Transit Data profile for HARTransit escalated to 2021 dollars.

The cost estimation results are summarized in

Table 16.

Table 16. Capital and Annual Operation and Maintenance Costs

	Fleet Size	# Bus Stop	# Parking Space	Capital Cost ($ million)	Annual Revenue Vehicle Miles	Operation and Maintenance Cost ($ million)
New Milford-Danbury-Norwalk Express Bus	11	10	300	**$22**	604,580	**$3.7**
Southbury-Danbury-Brewster Shuttle	5	6	120	**$10**	413,640	**$2.5**
Circulator Shuttle	8	15	0	**$10**	245,100	**$1.5**
HART Route 1 Service Adjustments	2	n/a	0	**$2.2**	36,720	**$0.22**

7. Assessment of the Maybrook Line Service

An assessment was conducted using the Connecticut Statewide model and its commuter rail station choice component to estimate ridership for the planned Maybrook rail shuttle from the Metro-North Danbury Station to Southeast Station on the Metro-North Harlem Line. A proposed new station located off Mill Plain Road was introduced in the model between Interchanges 2 and 3 on I-84. This section provides ridership estimates from the model.

7.1. Description of the Analysis

The ridership estimates were derived by running a scenario using the statewide model that reflects the implementation of service along the Maybrook Line between the existing Danbury Station, currently the terminus of the Metro-North Danbury Branch, and Southeast Station on the Metro-North Harlem Line. A new station was assumed between Danbury and Southeast, located off Mill Plain Road, between Interchanges 2 and 3 on I-84 in Danbury. The analysis focused on the a.m. peak period (6:00 to 9:00), with westbound service along the Maybrook line timed to arrive in Southeast shortly before each southbound train leaves Southeast toward New York City.

The estimates from the model run for this scenario were compared to a base scenario reflecting only existing rail service on the Danbury Branch and the Harlem Line, with no service on the Maybrook Line and no new station. All assumptions and model parameters were kept the same between the two scenarios, other than those related to the proposed Maybrook Line service and the new station. It should be noted that some assumptions were slightly revised from the official 2010 base year scenario for the statewide model for the purposes of the analysis; the base scenario results, therefore, should not be assumed to match those used in the statewide model for previous analyses.

Because the only official model inputs (socioeconomic data and transportation network assumptions) are for the 2010 base year, both the Base and the Maybrook scenarios were run for 2010. The estimates therefore do not reflect any growth since 2010. Danbury's population has increased by about five percent since 2010.

7.2. Relevant Assumptions in the Statewide Model

The following assumptions are coded into the statewide model network for the base scenario:

Brewster and Southeast Stations:

- A.M. peak headways on the Harlem Line are about 25 minutes.
- Average wait time is assumed to be 12.5 minutes.
- Train run time from Southeast to Grand Central Terminal in New York is 90 minutes (a few minutes shorter from Brewster).
- Parking cost for rail riders is $1.50 per day.
- Parking capacity is effectively unlimited.

Danbury Station:

- A.M. peak headways on the Danbury Branch are about 90 minutes.
- Average wait time is assumed to be 30 minutes.
- Train run time from Danbury to Grand Central Terminal in New York is 135 minutes.
- Parking cost for rail riders is $2.00 per day.
- Parking capacity is effectively unlimited.
- The maximum auto access time for most commuter rail stations in the model is six minutes (a value calibrated when the model was first developed). However, for certain stations, including terminal stations and Brewster Station on the Harlem Line, a 15- minute maximum auto access time is used.
- Auto access times from TAZs to stations were estimated from the model's highway network.

7.3. Relevant Assumptions in the Station and Mode Choice Elements

The main variables in the station choice model include rail in-vehicle time, wait time, auto access time, number of transfers, fare, parking cost at station, and parking capacity at station.

In the station choice model, auto access time is treated as much more onerous than rail in-vehicle time. This relationship was established during the calibration of the station choice model to reflect 2007 Metro-North survey results showing a strong preference among riders to use stations close to their homes. More remote stations may be chosen, especially when nearer stations have parking capacity constraints, higher parking costs, or poorer service, such as some trains not stopping at every station or requiring additional transfers.

The station choice model also discourages "backtracking," where a rider uses a station that is farther from the ultimate destination than the home location. This is to be consistent with the station choices observed in the Metro-North survey data. Backtracking can occur when the more remote station has a higher level of service (for example, a rider living southwest of Stamford might use that station to travel to New York City to take advantage of the superior level of service offered from Stamford). However, backtracking is generally not a viable choice for Connecticut riders using the Harlem Line or the Danbury Branch.

Model Operation

For both scenarios, the complete statewide model was run, including all steps (trip generation, trip distribution, mode choice, highway assignment, and transit assignment/station choice) with feedback loops. The key components producing different results between the scenarios are:

- Mode choice, where the increased level of transit service can induce some users of other modes to switch to commuter rail when the rail level of service is improved through the Maybrook service.

- Station choice, where the specific stations chosen for each origin-destination trip using commuter rail.

Note that transit assignment, where the specific routes used by transit in the statewide model are identified, is not run when the station choice model is used. However, we will know the number of boardings at each station from the station choice results.

7.4. Assumptions on the Maybrook Line Service

The following assumptions are related to differences between the base and new station scenarios:

- The Maybrook shuttle headway is 25 minutes, with an average wait time of 12.5 minutes.
- Rail travel time between Danbury Station and the new station is 10 minutes.
- Rail travel time between the new station and Southeast Station is 10 minutes.
- Fare on the Maybrook shuttle is 80 cents. However, because Danbury is an existing station within the Metro-North system, the fare could not be changed in the model without making changes to the model itself. This results in a fare of $1.45 on the Maybrook shuttle while boarding at Danbury.
- Parking is unlimited at the new station.
- All TAZs with auto access to Danbury Station or Brewster Station in the base scenario have auto access to the new station. In addition, any other TAZs that are within the six-minute maximum auto travel time of the new station have access to the new station.

7.5. Analysis Results

This section presents the results of the model runs for the two scenarios and the estimated differences in travel demand and rail ridership when the Maybrook shuttle and new station are introduced. As noted above, these runs reflect 2010 conditions.

Ridership Differences

The model estimates the following:

- A total of 152 riders would board at the new station.
- With the Maybrook Shuttle in place, the number of peak riders boarding at Danbury Station would increase by 56, to 238 from 182 in the base.
- With the Maybrook Shuttle in place, the number of peak riders from Connecticut driving to Brewster or Southeast Station would decrease by 152.
- The estimated total number of new commuter rail riders shifting from other modes is 56 (152 + 56 – 152).

In the base scenario, there is only one commuter rail path to any destination from any origin. So even though transit assignment is not performed after the station choice model is run, the number

of boardings at each station is known. Using the modeled boarding totals and the destinations of the trips from each TAZ, the rail segment volumes can be estimated.

The scenario with the Maybrook Shuttle introduces a unique situation in the Connecticut statewide model where there are two separate commuter rail paths from the same station (Danbury). The station choice model uses the best path from the station in determining the station choice utility functions. In the scenario with the Maybrook Shuttle, the path from Danbury Station to New York City using the Maybrook Shuttle and the Harlem Line is superior to the path using the Danbury Branch and the New Haven Main Line. So, the model's assumed path was the former. However, riders boarding at Danbury would have a choice of paths if the Maybrook Shuttle service were in operation.

A *very rough* off-model estimate of the percentage of riders boarding at Danbury that would choose each path can be computed by manually applying the station choice model's utility function to the two possible paths, simulating the paths as if they were from separate stations. This computation resulted in about 60 percent of the riders boarding at Danbury choosing the Maybrook Shuttle and 40 percent choosing the Danbury Branch. With 238 peak boardings at Danbury, this implies 143 using the Maybrook Shuttle and 95 using the Danbury Branch. Since there are 182 peak riders boarding at Danbury in the base scenario, this implies that nearly half of them would switch to the Maybrook Shuttle.

7.6. Rail Ridership Analysis Summary

The table below summarizes the analysis results regarding rail ridership.

	Base scenario	Maybrook Shuttle Scenario	Difference
Total peak rail riders from the Danbury area	449	522	73
Peak riders from the Danbury area driving directly to the Harlem Line	220	68	-152
Peak riders from the Danbury area using the Danbury Branch*	229	140	-89
Boardings at Danbury Station	182	238	56
Boardings at proposed new station	n/a	152	152
Estimated Maybrook Line ridership*	n/a	295	295

* - Uses off-model rough estimates as noted above.

Although the model does not perform highway assignment for the auto access portion of commuter rail trips, the traffic impacts on I-84 due to the can be roughly estimated as shown below. These represent the a.m. peak period (6:00 to 9:00).

- With a reduction of 152 rail commuters driving to the Harlem Line from the Danbury area, a reduction of about 150 vehicle trips could be expected on I-84 westbound at the Connecticut-New York state line. The model does not estimate vehicle occupancy for auto access trips to rail, but any carpooling that could reduce this number is expected to be minimal. It is also possible that some commuters use other roadways besides I-84 (such as U.S. 6/202, Mill Plain Road) to drive to the Harlem Line, reducing the number further.
- The reduction in westbound traffic on I-84 east of Exit 2 would be somewhat less, because:
    - Some of the 152 commuters switching from driving to the Harlem Line are from western Danbury and likely enter I-84 west at Interchange 2 or Interchange 1, and
    - Some of the commuters accessing the new station may use I-84 west to Interchange 2.
- There would be increases in traffic on Mill Plain Road from some of the 152 commuters driving to the new station (though many of them would likely use the proposed new collector/distributor roadways, which are not currently in the model's base year scenario).
- There would be some traffic increases in downtown Danbury due to the increase in commuters using Danbury Station.

8. Summary of Transit Analysis Findings

This regional assessment analyzed travel patterns across eight towns along I-84 and Route 7 to identify potential transit markets and evaluate ridership for both local and inter-town connections. An evaluation of the new transit options shows that their effects on reducing highway traffic would be limited. A summary of key findings on transit options is provided in Table 17.

The following conclusions can be drawn from this assessment:

- New bus transit service has potential to serve regional travel needs;
- Bus transit improvement options were developed to complement each other;
- Reductions in highway congestion from transit service alone would be limited; and
- Highway improvements could facilitate and enhance new bus transit service.

The goal of this analysis was not to definitively forecast potential ridership of a detailed transit service proposal, but instead to provide a high-level estimate of ridership for conceptual service options using regression and qualitative forecasting approaches. Without a mode choice model, the bus and rail transit options were studied individually. To thoroughly evaluate these options, a comprehensive transit analysis of multiple potential rail/bus combinations is recommended.

A detailed transit demand and mode choice analysis and modeling would be necessary to accurately define the potential benefits to regional travelers of the various combined rail and bus scenarios.

The next step to define a detailed transit system analyses would require a high-level fatal flaw analysis to screen out infeasible options. A comprehensive mode choice analysis and multi-modal transit demand model would refine ridership estimation and reveal effects on traffic and communities.

It is also recommended that a robust assessment of transit modes and routes be undertaken in the Danbury area as soon as possible. The following analyses would be added or revisited in such an assessment:

- Off-peak service plan
- Parking needs
- Conceptual design of infrastructure improvements
- Evaluation of mobility benefits of combined rail and bus options
- Quantify potential congestion relief
- Environmental justice community impacts
- Other environmental effects

Potential multi-modal scenarios that were identified in this study are listed in Appendix 2.

Table 17. Summary of Transit Analysis Findings on Transit Options

	New Milford-Danbury-Norwalk Express Bus	Southbury-Danbury-Brewster Shuttle	Danbury Circulator Shuttle	HART Route 1 Service Adjustments	Bus/Rail Options (Pending)
Potential Daily Ridership Level	1,400	350	650	200	TBD
Constraints to transit/ability to operate reliably	Congestion on I-84 and Route 7	Congestion on I-84	Congestion on I-84 and local roads	Congestion on local roads	TBD
Effects on/Benefits to I-84 and Route 7 operations	Reduction in vehicular traffic: ~350 on I-84, ~280 on Route 7 in a peak hour	Reduction in vehicular traffic: ~70 on I-84	Reduction in vehicular traffic	Reduction in vehicular traffic	Reduction in vehicular traffic: 152 per day on I-84
Compatibility with existing transportation systems and planned improvements	Transfer opportunities with HART Route 1	Transfer opportunities with HART Route 1	Provide access to major local O/Ds; Transfer opportunities with HART routes 1, 2, 3, and 6	Increasing service frequency in peak periods	Danbury Branch Electrification and Extension, Maybrook Rail Shuttle
Obvious Environmental Impacts	Bus stop and park-and-ride site development; better access to work for environmental justice communities	Bus stop and park-and-ride site development; better access to work for environmental justice communities	Bus stop and park-and-ride site development; better access to work for environmental justice communities	Higher service frequency for environmental justice communities	TBD
Capital / Operation and Maintenance Cost	$22 M / $3.7 M	$10 M / $2.5 M	$10 M / $1.5 M	$2.2 M /$0.22 M	TBD

9. Appendix

Appendix 1. Sub-area Worker Flow

Subarea #1: New Milford/Brookfield

Table 18. Job Destinations of Sub-area #1

Jobs Counts by County Subdivisions Where Workers are Employed		
	2018	
	Count	Share
Danbury town (Fairfield, CT)	3,582	20.8%
New Milford town (Litchfield, CT)	2,401	14.0%
Brookfield town (Fairfield, CT)	1,247	7.2%
Bethel town (Fairfield, CT)	591	3.4%
Ridgefield town (Fairfield, CT)	514	3.0%
Newtown town (Fairfield, CT)	411	2.4%
Manhattan borough (New York, NY)	351	2.0%
Stamford town (Fairfield, CT)	337	2.0%
Waterbury town (New Haven, CT)	274	1.6%
Norwalk town (Fairfield, CT)	273	1.6%
Hartford town (Hartford, CT)	271	1.6%
Washington town (Litchfield, CT)	212	1.2%
Southbury town (New Haven, CT)	188	1.1%

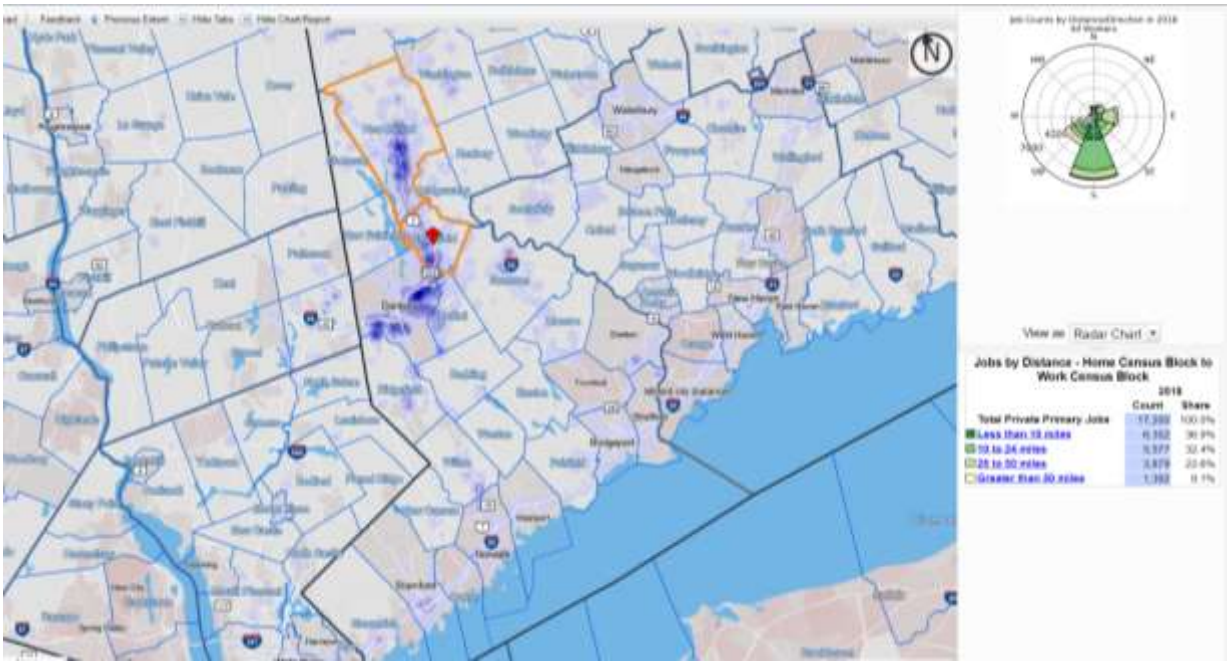


Figure 21. Job Destinations of Sub-area #1

Subarea #2: Danbury/Bethel

Table 19. Job Destinations of Sub-area #2

Jobs Counts by County Subdivisions Where Workers are Employed		
	2018	
	Count	Share
Danbury town (Fairfield, CT)	11,563	30.2%
Bethel town (Fairfield, CT)	2,286	6.0%
Ridgefield town (Fairfield, CT)	1,695	4.4%
Stamford town (Fairfield, CT)	1,472	3.8%
Brookfield town (Fairfield, CT)	1,289	3.4%
Norwalk town (Fairfield, CT)	1,227	3.2%
Newtown town (Fairfield, CT)	916	2.4%
Wilton town (Fairfield, CT)	891	2.3%
Manhattan borough (New York, NY)	822	2.1%
Southeast town (Putnam, NY)	809	2.1%
New Milford town (Litchfield, CT)	665	1.7%
Greenwich town (Fairfield, CT)	513	1.3%
Bridgeport town (Fairfield, CT)	498	1.3%
Shelton town (Fairfield, CT)	479	1.3%
Hartford town (Hartford, CT)	419	1.1%
Fairfield town (Fairfield, CT)	394	1.0%

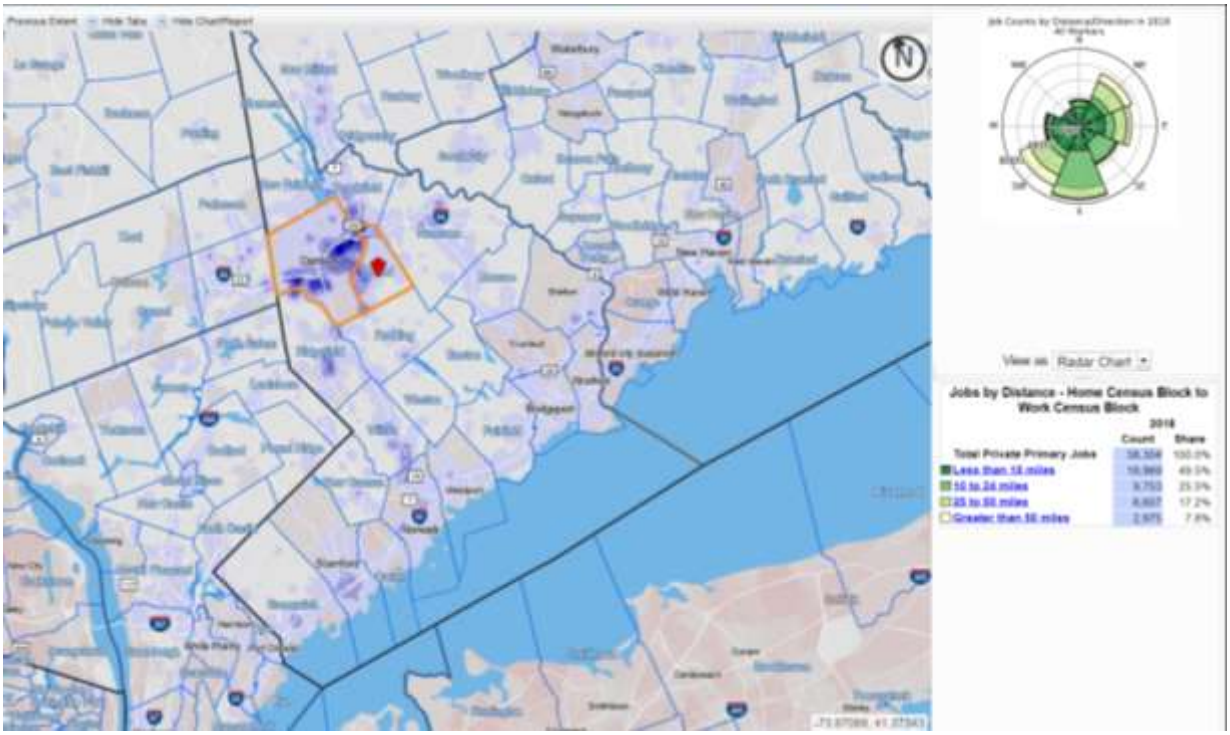


Figure 22. Job Destinations of Sub-area #2

Subarea #3: Ridgefield/Wilton

Table 20. Job Destinations of Sub-area #3

Jobs Counts by County Subdivisions Where Workers are Employed		
	2018	
	Count	Share
Stamford town (Fairfield, CT)	1,896	13.1%
Ridgefield town (Fairfield, CT)	1,494	10.3%
Manhattan borough (New York, NY)	1,331	9.2%
Norwalk town (Fairfield, CT)	1,273	8.8%
Wilton town (Fairfield, CT)	1,210	8.4%
Danbury town (Fairfield, CT)	714	4.9%
Greenwich town (Fairfield, CT)	422	2.9%
Westport town (Fairfield, CT)	369	2.5%
Fairfield town (Fairfield, CT)	239	1.6%
New Canaan town (Fairfield, CT)	239	1.6%
Bridgeport town (Fairfield, CT)	221	1.5%
Darien town (Fairfield, CT)	186	1.3%
Shelton town (Fairfield, CT)	184	1.3%
Hartford town (Hartford, CT)	147	1.0%

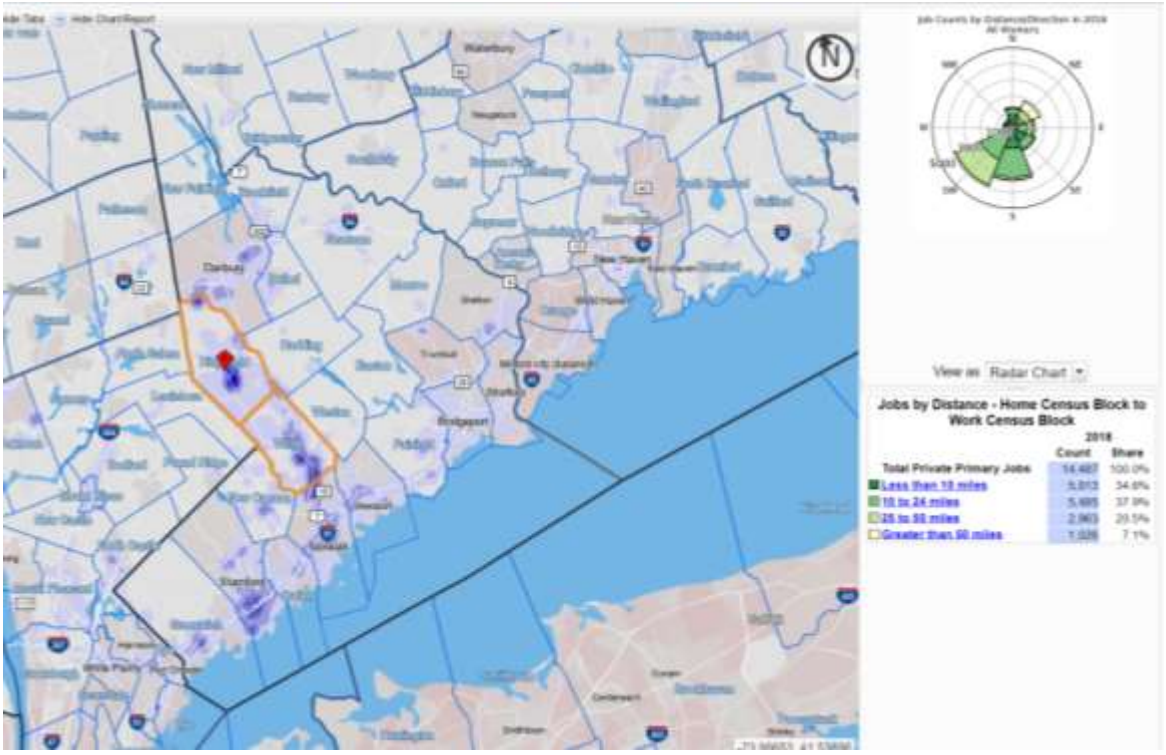


Figure 23. Job Destinations of Sub-area #3

Subarea #4: Newtown/Southbury

Table 21. Job Destinations of Sub-area #4

Jobs Counts by County Subdivisions Where Workers are Employed		
	2018	
	Count	Share
Danbury town (Fairfield, CT)	1,989	11.6%
Newtown town (Fairfield, CT)	1,443	8.4%
Southbury town (New Haven, CT)	920	5.3%
Stamford town (Fairfield, CT)	597	3.5%
Norwalk town (Fairfield, CT)	557	3.2%
Shelton town (Fairfield, CT)	552	3.2%
Waterbury town (New Haven, CT)	486	2.8%
Bridgeport town (Fairfield, CT)	472	2.7%
Bethel town (Fairfield, CT)	446	2.6%
Ridgefield town (Fairfield, CT)	405	2.4%
Brookfield town (Fairfield, CT)	384	2.2%
Hartford town (Hartford, CT)	370	2.1%
Manhattan borough (New York, NY)	363	2.1%
Stratford town (Fairfield, CT)	333	1.9%
Monroe town (Fairfield, CT)	310	1.8%
Fairfield town (Fairfield, CT)	304	1.8%
Wilton town (Fairfield, CT)	303	1.8%
New Haven town (New Haven, CT)	295	1.7%
Trumbull town (Fairfield, CT)	291	1.7%
New Milford town (Litchfield, CT)	249	1.4%

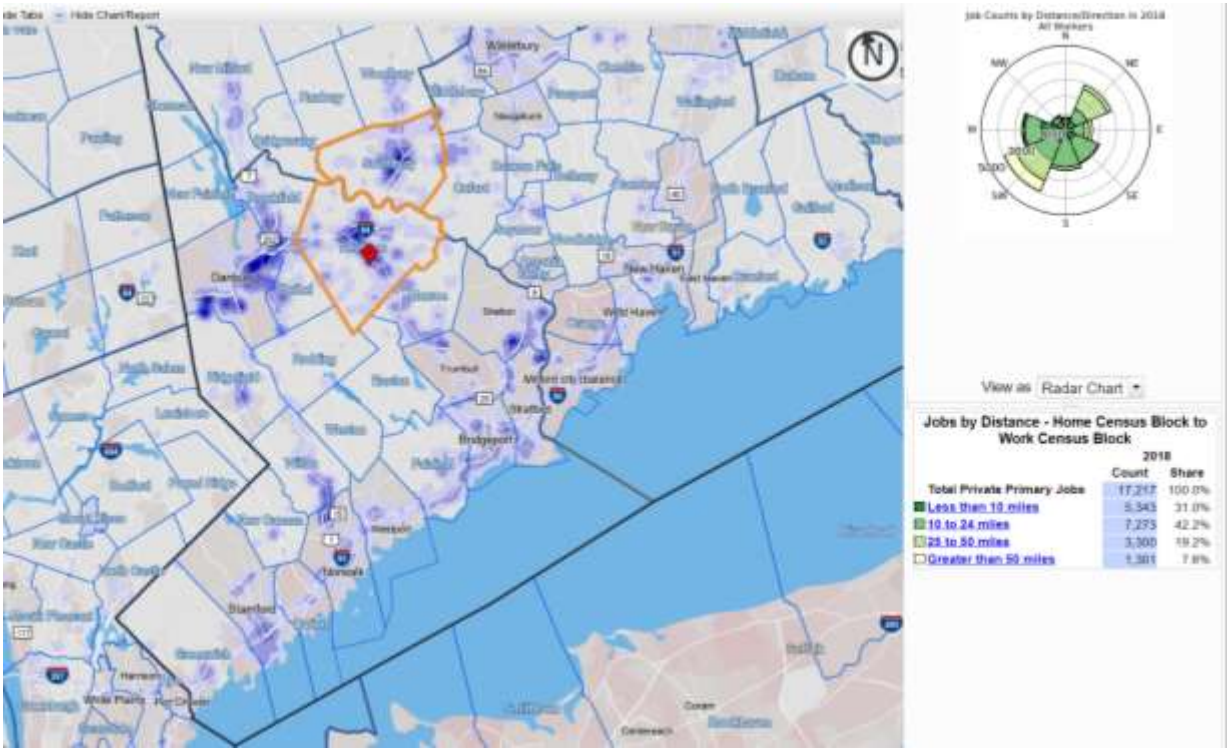


Figure 24. Job Destinations of Sub-area #4

Appendix 2. Potential Multi-Modal Scenarios

1. Potential Rail/Bus Solution #1, as shown in Figure 25, which combines the following options:
    - Existing Danbury Line Service and Potential Expansion
    - Maybrook Rail Shuttle Danbury (Pending outcome of Southeast-Danbury Rail Feasibility Study)
    - Express Bus #1: New Milford-Danbury-Norwalk
    - Express Bus #2: Southbury-Danbury-Norwalk
    - Circulator and connector in Danbury
2. Potential Rail/Bus Solution #2, as shown in Figure 26, which combines the following options:
    - Maybrook Rail Shuttle to Danbury and New Milford
    - Express Bus: Southbury-Danbury-Norwalk
    - Circulator and connector in Danbury
3. Potential Rail/Bus Solution #3, as shown in Figure 27, which Combines the following options:
    - Maybrook Rail Shuttle to Danbury
    - Danbury Branch Electrification and extension to New Milford
    - Express Bus: Southbury-Danbury-Norwalk
    - Circulator and connector in Danbury
4. Potential Rail/Bus Solution #4, as shown in Figure 28, which combines the following options:
    - Harlem Line – Maybrook Branch direct service between Danbury/New Milford and Grand Central
    - Express Bus: Southbury-Danbury-Norwalk
    - Circulator and connector in Danbury

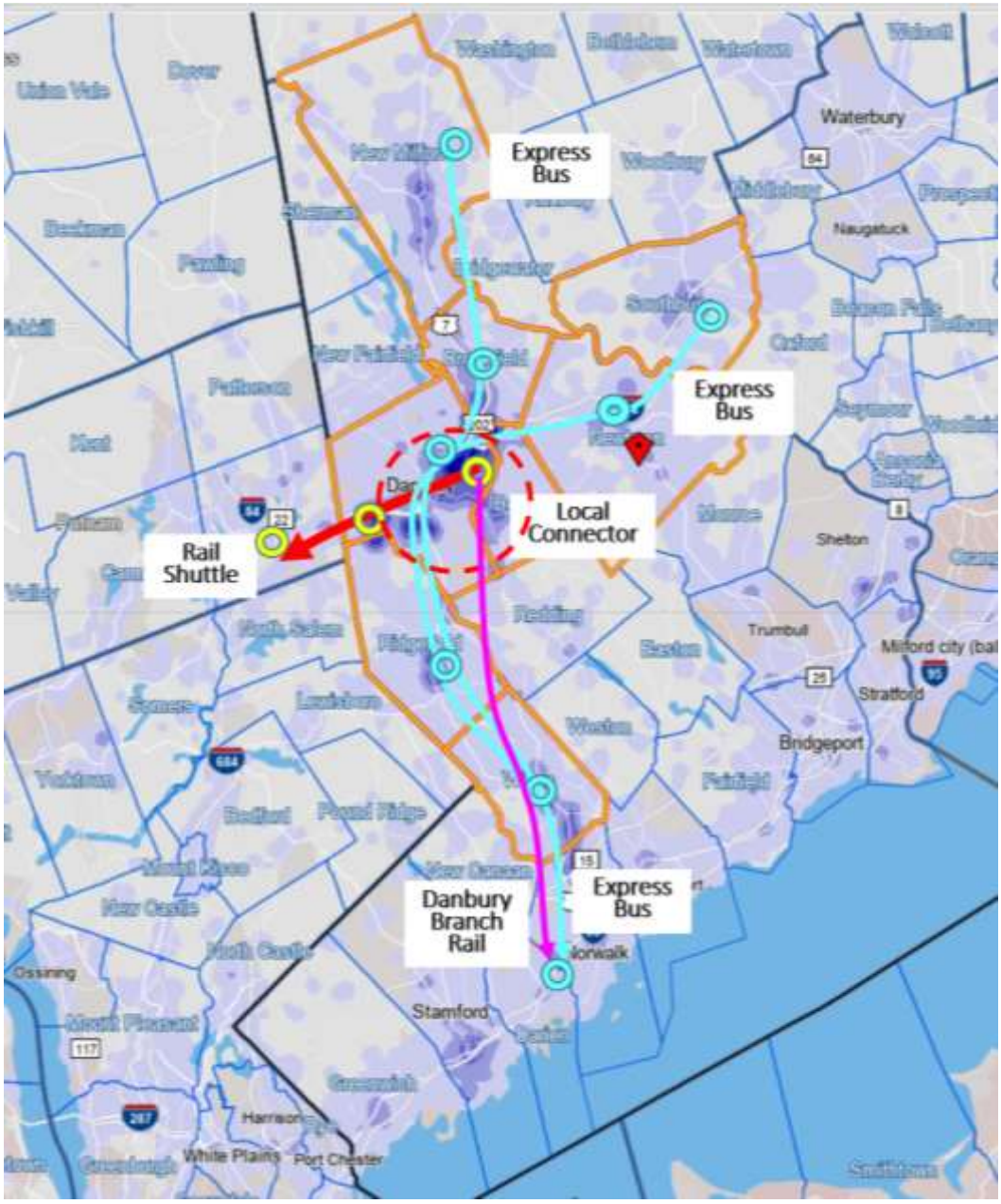


Figure 25. Potential Rail/Bus Scenario #1

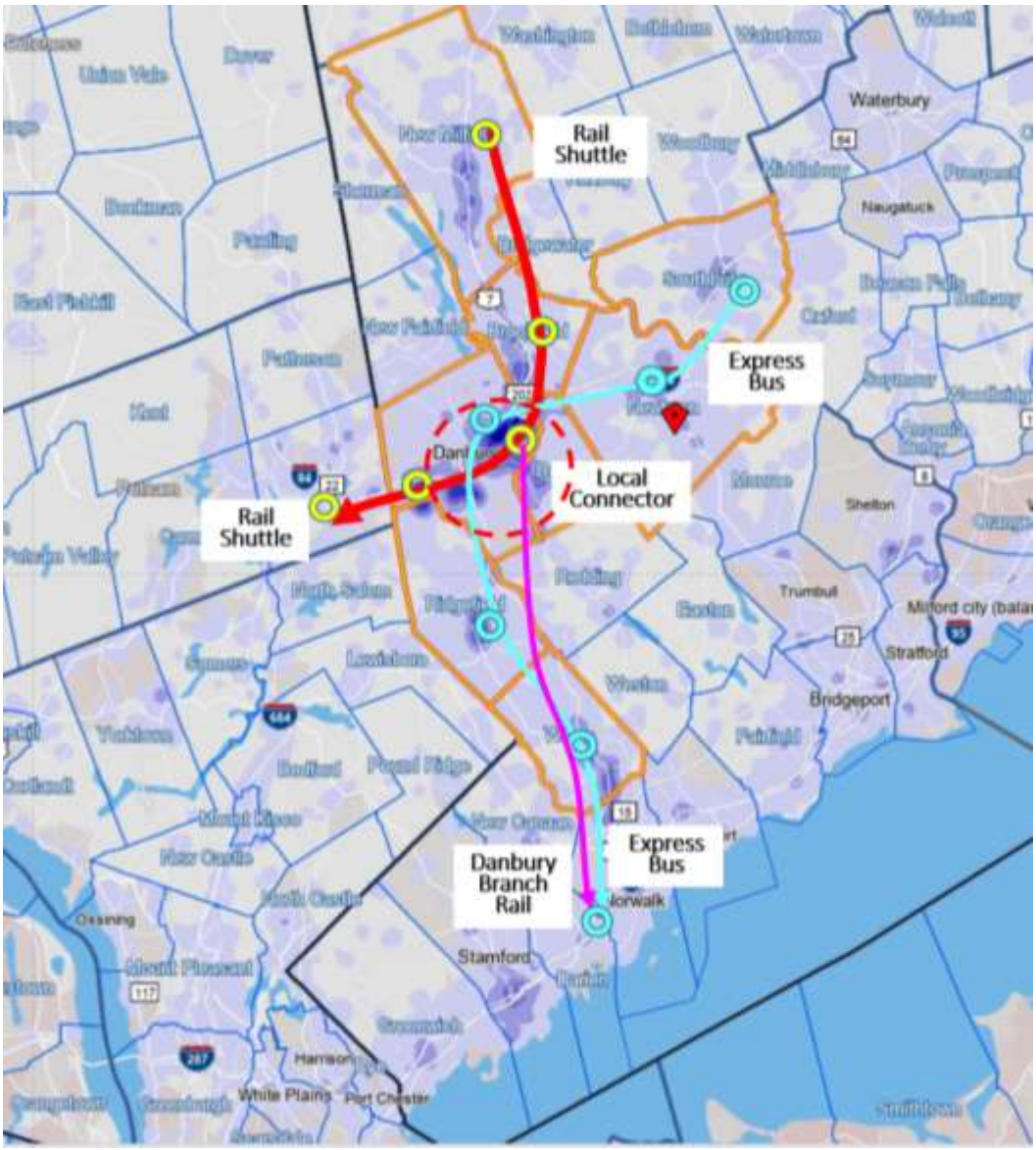


Figure 26. Potential Rail/Bus Scenario #2

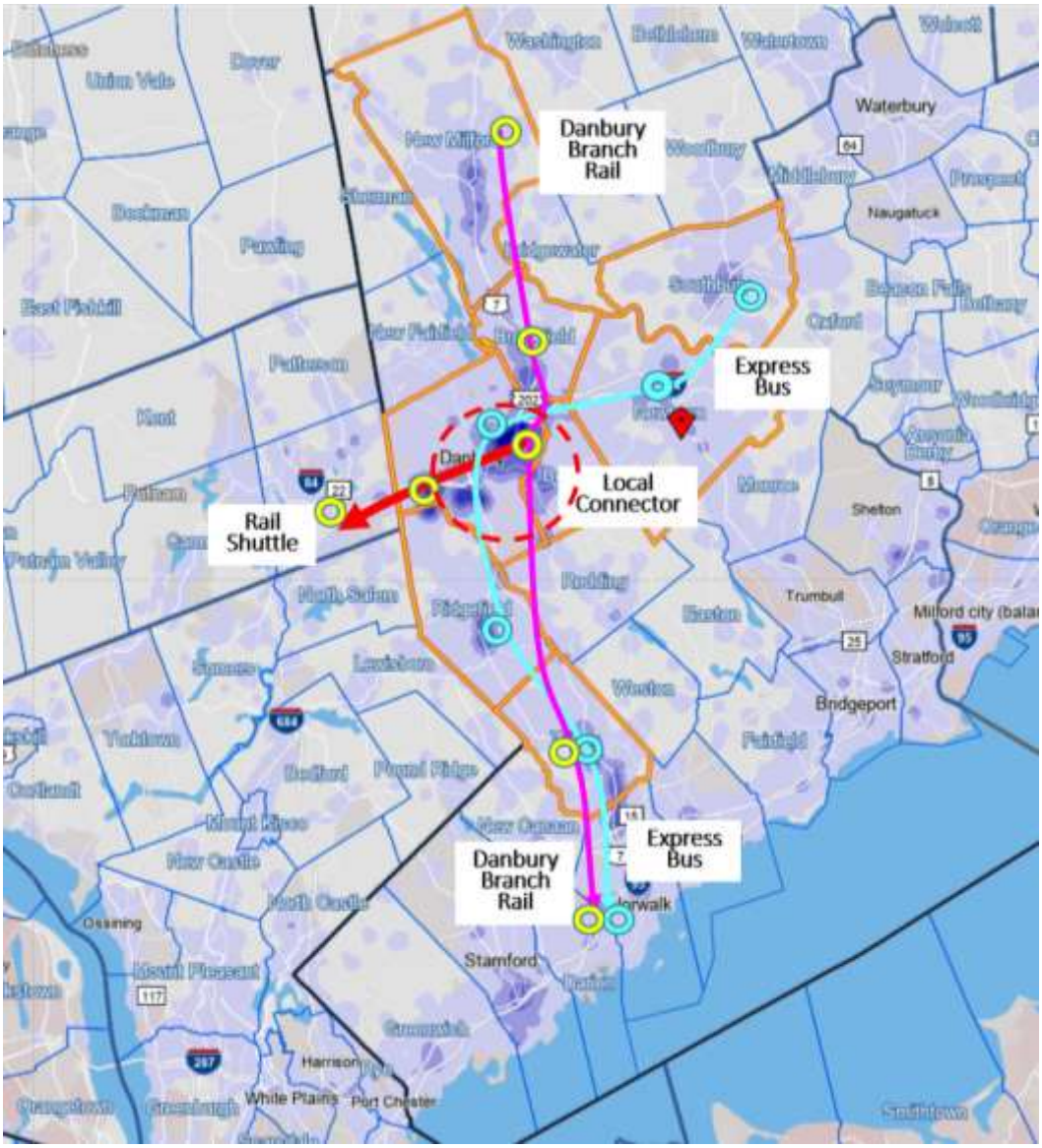


Figure 27. Potential Rail/Bus Scenario #3

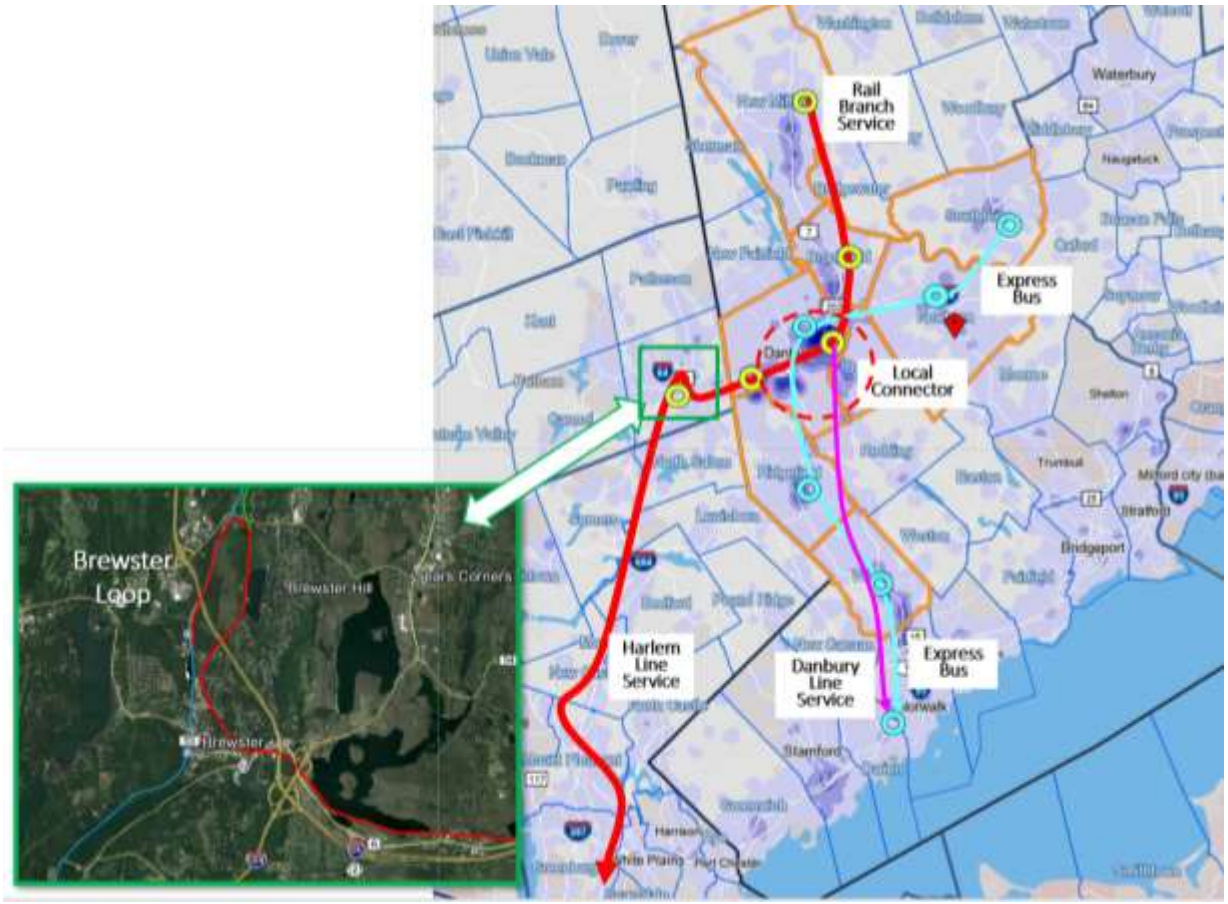


Figure 28. Potential Rail/Bus Scenario #4