HARTransit

Public Bus Efficiency Study June 2020

Prepared for WestCOG by
Housatonic Area Regional Transit

Fixed Route Efficiency Study 2020

FINAL REPORT

June 2020

This document was prepared in cooperation with the Federal Transit Administration and the Connecticut Department of Transportation. The opinions, findings and conclusions expressed in this publication are those of the Western Connecticut Council of Governments and do not necessarily reflect the official views or policies of the Connecticut Department of Transportation or the US Department of Transportation.

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I. Introduction

Overview

The purpose of this public bus efficiency study of the Housatonic Area Regional Transit (HARTransit) system is to review individual route performance and determine how well each route functions as part of the entire system. Study goals include a review of operating efficiency and effectiveness of individual routes, and to identify corrective and remedial measures to improve bus services.

This study covers all of the fixed route services provided by HARTransit. The analysis of data includes comparisons to past years performance where appropriate. In 1992, HARTransit published the first planning study providing an in-depth analysis of its fixed route services in the Housatonic region, which began operations in 1983. Similar analyses were undertaken in 1994, 1997, 2005 and 2010.

Overall service levels did not change significantly since the 2010 analysis was completed. However, several operational changes were implemented. These are briefly described below:

- *Fare increases were implemented in FY 2014 raising the base fare to $1.50 from $1.25, and in FY 2018 raising the base fare to $1.75. A student UPASS program was instituted with Naugatuck Valley Community College in 2015, followed by a statewide UPASS signed on by Western CT State University in the fall of 2018.*

- *Year round CityCenter Trolley service in Danbury was eliminated in September 2013; a seasonal summer trolley route continues to operate.*

- *Norwalk Transit District (NTD) reduced its commitment and then finally withdrew from participation in the Danbury-Norwalk Route 7 Link in late 2017. Although HARTransit continues to provide its historical level of service, the overall structure of the route was significantly modified in FY 2017 and again in FY 2018.*

- *A new commuter service in the Reserve, a large parcel in western Danbury undergoing extensive redevelopment, was implemented in early FY 2019 with support from the Federal CMAQ program.*

Methodology

Ridership data summarized is as collected by HARTransit vehicle operators via GFI Odyssey electronic validating fareboxes augmented by manual counts.

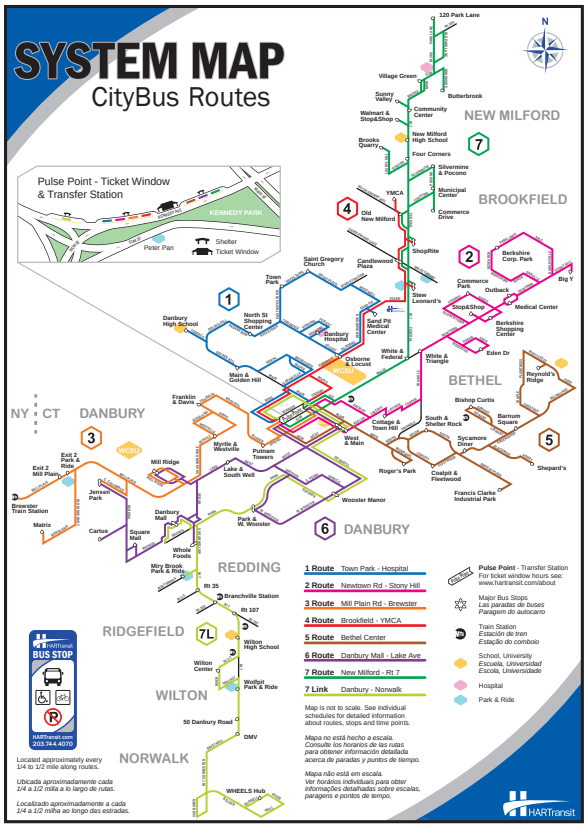
Schedule adherence data was obtained through US Fleet Tracker, an internet-based GPS tracking system that HARTransit uses to monitor vehicle location and history.

Monthly and annual system ridership data was summarized through review of monthly statistical reports prepared by HARTransit staff and published data through the Federal Transit Administration's (FTA) National Transit Database.

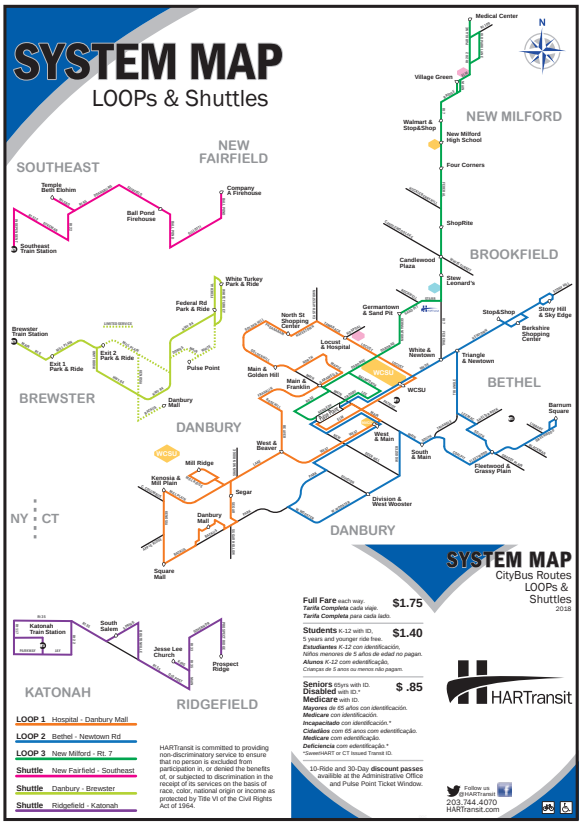
Passenger surveys in English and Spanish were distributed in November 2018 by HARTransit drivers on morning runs. Survey instruments were developed by report staff and reviewed by members of the HARTransit Advisory Committee (a volunteer advisory group) prior to implementation.

HARTransit contracted with TransLOC, a subsidiary of Ford smart mobility, to conduct an analysis of the potential for microtransit pilots in the greater Danbury.

All data was reviewed and analyzed by HARTransit staff.



CityBus bus service on weekdays and Saturdays in the Greater Danbury region.



LOOP bus service on evenings, Saturdays and Sundays in the Greater Danbury region.

II. Structure of Fixed Route System

CityBus Routes

The majority of HARTransit's urban fixed route services are provided to the four municipalities of Danbury, Bethel, Brookfield, and New Milford. The CityBus service is primarily radial in nature with seven routes extending outward from the central business district of Danbury. With the city being at the core of all seven routes, Danbury receives a higher service level than other municipalities.

Routes are structured to serve traffic generators such as major employers, shopping centers, medical centers, schools, the central business district and elderly and low-income housing areas. Most major arterials in the City of Danbury are served including Main Street, North Street, Padanaram Road, White Street, Federal Road, Newtown Road, South Street, Park Avenue, Lake Avenue, and Mill Plain Road.

The CityBus system operates in a pulse or timed-transfer mode, with all routes meeting at the Pulse Point (central bus station) in downtown Danbury at the same time at regular intervals Monday through Saturday.

This routing structure allows passengers to easily transfer from one route to another at the same place without long waits. Routes are interlined or paired together to allow a moderate proportion of passengers to travel from one route to another without physically switching buses.

Bus frequencies of every 60 minutes are provided on all routes Monday through Saturday, with 30-minute frequencies provided during the morning and afternoon peak periods (6:00am to 9:00am and 3:00pm to 6:00pm, Monday through Friday).

Departure times from the Pulse Point are scheduled on the hour throughout the day and additionally on the half hour during peak periods. The span of service ranges from approximately 6:00am to 6:00pm, Monday through Friday. Saturday span of service ranges from 8:00am to 5:30pm. No service is provided evenings, Sundays or on major holidays.

The CityBus routes are among the highest performing in the system. Total CityBus ridership average about 1,740 passengers per weekday and 954 per Saturday.

LOOP Services

Three LOOP bus routes are provided to the communities of Bethel, Brookfield, Danbury and New Milford.

The LOOP routes were conceived as a complement to the CityBus system by providing public transit to major employment and low income housing after the close of the service day. The three coordinated routes provide a scaled down version of the CityBus system, with hourly headways and a timed transfer at the HARTransit Pulse Point.

The routes are were developed through the former JobLinks jobs access collaborative (Danbury, Waterbury and Torrington) in the late 1990s and early 2000s, initially operated with federal funds and now supported through Connecticut Department of Transportation (CTDOT).

LOOP services are provided weeknights from 6:30 to 10:30pm, Saturdays 5:30 to 10:30pm and Sundays and Holidays (New Year's Day, Labor Day, Memorial Day, Independence Day and day after Thanksgiving), from 9am to 7pm

Together, the LOOP routes currently average 165 trips per weeknight, 149 trips per Saturday night, 393 trips per holiday and 412 passengers per Sunday.

Harlem Line Shuttles

Three shuttles provide weekday service from remote park-and-ride lots in Connecticut and New York to train stations on the northern segment of MTA Metro-North Railroad's Harlem Line. The shuttles are designed to meet morning southbound train departures and afternoon and evening northbound arrivals, primarily for commuters working in White Plains and New York City (limited reverse commutes are possible). Metro-North provides a guaranteed ride home program to shuttle users that purchase the combined rail-bus UniTicket. The three shuttles carry a combined average of 470 trips per weekday.

The Danbury-Brewster Shuttle provides connections to ten morning southbound trains departing between 5:55am and 9:16am and 13 northbound arrivals between 4:00pm and 9:10pm. Four morning arrivals and five evening departures allow for reverse commute trips. Passengers wishing to transfer to the Putnam Area Rapid Transit (PART) bus system from a HARTransit bus may do so at no charge in Brewster by presenting a HARTransit pass or transfer.

Between 9 and 11am, the 3 Mill Plain bus provides hourly service between the HARTransit Pulse Point and Brewster Station. While this bus service is not timed to rail arrivals and departures, it allows for off peak connections to the rail line and to the PART system. Trips to Brewster on the Mill Plain route were eliminated after 12 p.m. in FY 2018 due to problems with schedule adherence.

Buses stop at park and ride lots off I-84 Exits 2, 1 and 7 and continue west on Route 6 to the Village of Brewster. Flag stops are permitted between the New York State line and the train station. Several trips provide service to the HARTransit Pulse Point or the Danbury Fair Mall.

The Ridgefield-Katonah Shuttle meets seven morning southbound train departures from the Katonah Train Station between 6:20 and 8:30am and nine northbound evening arrivals between 4:54 and 8:24pm. One morning arrival and three evening departures provide some opportunity for reverse commutes. Passengers may transfer for free between the HARTransit and Bee-Line

(Westchester County) bus systems in Katonah by presenting a transfer from either system.

The first four trips on the route originate at the Jessie Lee Memorial Methodist Church on Main Street, Ridgefield. To help manage parking, the remainder of morning buses depart from the Ridgefield Bark Park lot on Prospect Ridge.

The shuttle follows Route 35 from Main Street westerly to New York State. In the Town of Lewisboro, NY, the shuttle makes a stop at the South Salem Municipal lot on Spring Street and continues on Route 35 to Route 22 to Katonah Station. Flag stops are permitted on this route in New York State.

The New Fairfield–Southeast Shuttle is operated by HARTransit between the Southeast Train Station and New Fairfield. Vehicles stop at park and ride lots in New Fairfield at Company A Firehouse on Ball Pond Road and Ball Pond Firehouse on Fairfield Drive. The route continues to New York via the Hamlet of Putnam Lake with a stop at Temple Beth Elohim in Brewster near Sears Corners, and then follows Route 312 to the Southeast Station.

HARTransit meets five southbound trains from Southeast between 6:13 and 7:51 a.m. and eight northbound trains between 5:47 and 8:47 p.m. No midday bus service is provided.

Commuter Routes

Two peak period weekday only commuter services are operated; the Danbury-Norwalk Route 7 Link and the Reserve Commuter Connection. The two services average a combined 70 trips per weekday. The Danbury-Norwalk Route 7 Link averages 60 trips per weekday, while the Reserve Commuter Connection averages 10 trips per weekday.

The Danbury-Norwalk Route 7 Link provides service to employment along the Route 7 corridor and the downtowns of Danbury and Norwalk weekdays. Buses originate and terminate at the HARTransit and WHEELS (Norwalk Transit District) main bus stations. Locations served include, Danbury Fair Mall, Branchville Station, Wilton Center, and Georgetown.
The 7 Link provides two morning (6:35 and 7:35am) and two afternoon (3:30 and 4:00pm) departures from the Pulse point to Norwalk. A third morning departure at 9:05 am travels as far south as Wilton Center, where riders may connect with Norwalk Transit's 4 Route for travel to points south. As with the shuttle services, riders may transfer for free between other systems' buses at the WHEELS Hub.

The Reserve Commuter Connection, A three year pilot funded through the federal CMAQ (Congestion Mitigation and Air Quality) program, provides half hour service in the morning and afternoon weekday peak to BELIMO Aircontrols (USA), Ann's Place, Hotel Zero Degrees, as well as condo complexes at Abbey Woods, Rivington and the Hills in the Reserve in western Danbury. The service is operated with small buses to provide flexibility in serving locations. A stop at the I-84 Exit 2 park and ride allows for transfers to other routes that run to the Brewster NY train station and provide connectivity throughout greater Danbury.

Vehicles

HARTransit operates a variety of equipment in its fixed route program, assigned depending on service needs. All vehicles are wheelchair accessible. Buses are purchased through the Federal Section 5307 program with CTDOT providing the 20% local match. Transit buses are replaced on a 12 year cycle; cutaways are replaced based on mileage every 7-10 years.

- *Heavy-duty transit buses, 35' in length, are used on CityBus routes and some Harlem Line Shuttle runs. With the recent retirement of 2003 model year Orion buses, the 35' fleet is uniformly comprised of Gillig manufactured vehicles.*
- *Two 35' transit buses are designated to operate the Danbury-Norwalk Route 7 Link. These buses have more comfortable interurban style seating, appropriate to a long-distance route.*
- *A single Gillig bus is finished as a "trolley" including a wood finish interior and simulated monitor roof.*
- *All transit buses are of the low floor type, with foldout ramps and kneeling features for ease of boarding passengers with mobility disabilities.*
- *All vehicles are equipped with trackers and camera systems.*
- *Light-duty Ford chassis cutaway buses in 14 or 20 passenger configurations operate on LOOP, shuttle and commuter routes. These smaller buses are used when passenger loading is lighter, or route geometry does not allow for full size equipment.*
- *Transit buses are equipped with diesel engines; cutaways are gasoline powered.*

Transit Vehicles used in HARTransit Fixed Route Service

Year	Make	Model	Type	Useful Life Benchmark	Useful life Remaining	Capacity (Seats/WC)	Vehicles
2006	Ford/Startrans	Senator	Cutaway	10	-2	23/2	1
2007	Ford/Startrans	Senator	Cutaway	10	-1	20/2	2
2007	Ford/Startrans	Senator	Cutaway	10	-1	14/2	2
2007	Gillig	G27B102N	Transit Bus	14	3	32/2	10
2013	Ford/Goshen	GCII	Cutaway	10	5	14/2	1
2013	Ford/Goshen	GCII	Cutaway	10	5	20/2	4
2014	Gillig	G27B102N4	Transit Bus	14	10	32/2	12
2014	Gillig	G27E102N2	Transit Bus	14	10	28/2	1
2017	Gillig	G27B102N4	Transit Bus	14	13	32/2	5

Drivers

All 65 HARTransit drivers hold a Commercial Driver's License (CDL) and are subject to FTA required drug and alcohol testing. Any of these individuals could potentially drive fixed route runs.

Service is not subcontracted – all drivers are employees of HARTransit. HARTransit drivers select their work assignments or "runs" by seniority as established by the current labor agreement (drivers and schedulers are members of Amalgamated Transit Union Local 1622).

Driver runs are selected at least annually and also when a given run changes by more than two hours per week, when a run moves from full-time to part time, or when a driver leaves the program. There are 29 full time and 11 part time driver runs exclusively assigned to the fixed route program. An additional 12 full time driver runs are made up of a combination of demand response and fixed route work.

HARTransit has other drivers that report daily for the purpose of filling work open due to illness, vacation or other absences. This work is assigned as per the union contract.

Maintenance/Operations Facility

In October 1992, HARTransit completed the purchase of its present bus maintenance/operations facility at 62 Federal Road in Danbury for approximately $1.9 million. In August 1996, the district began the rehabilitation and expansion of the facility to include covered indoor storage space for all vehicles, a bus wash, and office space sufficient to locate all HARTransit administrative staff under one roof (administrative offices were located on Newtown Road in Danbury).

The expansion and renovation of the facility was an $8.2 million project funded by the Federal Transit Administration (FTA) and the CTDOT. All HARTransit administrative offices were moved to the Federal Road facility in January of 1998.

Pulse Point

Construction of HARTransit's Downtown Danbury Pulse Point was completed in 1994. The Pulse Point is located on public right-of-way along Kennedy Avenue west of Main Street. The location serves as the hub of the fixed route bus system and is within a short walking distance (about one block) from the Central Business District and directly opposite the Peter Pan intercity bus terminal on Elm Street.

The facility includes a 450 square foot ticket sales building, a large canopied waiting area for passengers, shelters and benches, recessed bus loading bays for up to 10 buses, ornamental street lighting and iron fence, sidewalks, pedestrian cross-

walk, information displays, and landscaping.

No restrooms are provided for passengers. On street metered parking is available on Kennedy Avenue and the Bardo Garage structure is nearby at Library Place.

Bus Stop Signs

In 1993, HARTransit installed approximately 450 bus stop signs in Bethel, Brookfield, Danbury and New Milford. The signs were installed as part of a comprehensive effort to better manage passenger boarding and alighting activity on the fixed route system. This first generation of signs was replaced beginning in 2016.

Distance between stops is generally 1/8 mile but varies depending on street configuration and the degree of urbanization. Bus stop locations are subject to approval by the State Traffic Commission and municipal authorities.

Signs and posts often become damaged or removed in traffic accidents, during snow removal, by road construction activity or by vandals, necessitating an ongoing replacement program. Signs are trimmed in blue with blue lettering and display the HARTransit logo, information telephone number, "no parking" symbol, bicycle logo and disabled access symbol. Flag stops are in force in a few locations notably south of the Danbury Fair Mall on the 7 Link, and on Harlem Line Shuttle routes operating in New York.

Passenger Shelters

There are passenger shelters at 16 locations in addition to the Pulse Point. Shelters are typically aluminum framed structures with Plexiglas or perforated metal panels on three sides. Shelters installed in Bethel in 2017 are equipped with solar lighting.

HARTransit Shelter Locations

Stop Name	*Street*	*City*	*Install Date*	*Condition*
North Street Shopping Center	1 Padanaram Rd	Danbury	2019	Excellent
I-84 Exit 2 P&R Lot	114 Mill Plain Rd.	Danbury	2019	Excellent
Four Corners	820 Federal Rd.	Brookfield	2019	Excellent
New Milford Green	25 Main St.	New Milford	2019	Excellent
Exit 1 Park and Ride Lot	Mill Plain Rd.	Danbury	2019	Excellent
Sycamore	279-289 Greenwood Ave.	Bethel	2018	Excellent
Bethel Senior Center	1 School St.	Bethel	2017	Excellent
Reynolds Ridge	25 Reynolds Ridge	Bethel	2015	Good
Danbury Public Library	170 Main St.	Danbury	2013	Good
Federal Road P&R Lot	80 Federal Rd.	Danbury	2000	Fair
Brooks Quarry	3 Brooks Quarry Rd.	Brookfield	1995	Good
Glen Apartments	25 Memorial Drive	Danbury	1993	Good
Kimberly Place	19 Main St.	Danbury	1993	Fair
Crosby Manor	84 W Wooster St.	Danbury	1993	Fair
Wooster Manor	36 W Wooster St.	Danbury	1993	Good
Bishop Curtis Homes	28 Simeon Rd.	Bethel	1990	Fair

Fare Structure

The current fare structure was approved and implemented by the HARTransit Board of Directors in February 2018. A significant majority of bus systems in the state have the same base and cash fares, but pass structures and offerings vary by provider.

No tokens are used on the HARTransit system, except on the 7 Link at the WHEELS Hub, where Norwalk Transit District and Greater Bridgeport Regional Transit Authority (GoGBT) tokens are accepted as transfers.

Fare Payment Policy

Passengers are required to have the exact change to pay for cash fares, or to have valid pre-paid media to board buses. Drivers carry no cash or change; buses are equipped with secure fareboxes in which fares are deposited. Transfers are issued routinely at the HARTransit Pulse Point to allow for continuous travel between routes. There is no charge for transfers.

Transit buses are equipped with GFI Odyssey electronic validating fareboxes; ten-ride passes and 30 day passes use magnetic strip technology. Change cards are issued by the farebox for bills up to $5 that may be applied to future trips. Small buses used on LOOP routes are equipped with card readers, but do not have validating fareboxes.

HARTransit Fare Structure

Fare Class	*Cash Fare*	*Ten-Ride Passes*	*30 Day Unlimited Ride Pass*
Adult	$1.75	$15.75	$63.00
Student	$1.40	$12.60	$50.00
Senior/Disabled	$0.85	$7.65	$30.50

Pre-Paid Tickets and Passes

The ten ride pass option provides a ten percent discount off of cash fares and is the most popular pre-paid fare option. Approximately 254 ten-ride passes, accounting for 2540 trips, are sold each month.

A 30-day unlimited ride pass is available for those who travel frequently. A passenger traveling 40 times in a month using a 30-day pass will begin to save relative to the cash fare. Approximately 100 30-day passes, accounting for 500-600 trips, are sold each month.

Small buses used exclusively in shuttle services do not have any card reading capability. 30-day passes that are activated (activated passes have valid 30-day date ranges printed on the reverse) may be used as flash passes on these routes; older style ten-trip punch passes are available for purchase for riders of these services.

Individual ride tickets are sold to non-profit agencies to provide transportation to their clientele. No discounts are given for the purchase of these tickets. These tickets may be swiped or used as flash passes.

Passes are color coded based on fare class and pass type. Passes may be purchased at the HARTransit Pulse Point, operations facility (in person or via mail) or online through the HARTransit website.

Inter-system Fare Agreements

Several of the regional services operated by HARTransit provide connectivity with other transit systems. Free inter-system transfers are available between HARTransit and these operators as follows:

- *HARTransit has agreements with the New York counties of Westchester and Putnam to permit free transfers between systems at the Katonah and Brewster MTA Train Stations. Passengers may board using the other systems' transfers at these locations.*

- *Users of the 7 Link service may board with Norwalk Transit District fare media at the Norwalk Transit District's WHEELS hub. Free transfers to and from buses operated by GoGBT, Milford Transit District and CTtransit may also be made in Norwalk.*

HARTransit Intersystem transfer policies

System	*Transfer Point*	*Transfer/Fare Policy*
Bee-Line (Westchester DOT)	Katonah, NY	Passengers may use a transfer from either system to board
CTtransit	Norwalk	Passengers may use a transfer from either system to board.
GoGBT	Norwalk	Passengers may use a token, pass or transfer from either system to board
Milford Transit District	Norwalk	Passengers may use a transfer from either system to board
Norwalk Transit District	Norwalk	Passengers may use a token, pass or transfer from either system to board.
PART	Brewster, NY	Passengers may use a pass or transfer from either system to board

- *HARTransit honors the MTA Metro-North Railroad UniTicket, a pass which offers a single fare option to passengers that ride buses and MTA trains. UniTickets are sold by Metro-North for weekly or monthly travel and are accepted on all HARTransit fixed route services. As an added benefit, Metro-North provides a guaranteed ride home program for monthly UniTicket holders that use HARTransit shuttles to access their trains.*

- *The District participates in two UPASS programs that allow for unlimited rides for college students during the current semester. UPASSES as issued through the State of CT university program and those by Naugatuck Community College are accepted. Passes are provided through the universities to active students.*

- *TransitChek is accepted as payment for discount fare media. It is a federally approved tax-deductible program that allows employers to provide vouchers to cover the cost of commuting to work by public transit.*

III. Existing Conditions

Relevant Studies of the HARTransit Fixed Route System

Statewide Bus Study 2000

CTDOT selected a consulting team led by Urbitran Associates to develop a program of short- and long-term solutions to improve the efficiency of transit systems around the state. During the course of the study, state-owned urban transit operations, 21 express bus services and the active 17 transit districts were evaluated.

The state bus study recommended service expansion to remedy inconsistencies in the schedule, address overcrowding on the 6 Mall Route and provide service to new areas. These options rely on a greater investment in the system, however, in order to be implemented.

Fixed Route Efficiency Study 2005

This 2005 fixed route COA study recommended several system-wide actions as well as route specific changes.

- *Overall system-wide actions recommended included a focus on interregional services for short term expansion, improved monitoring of on-time performance, expanded use of small buses, and creation of special schedules for low ridership days. A modified Sunday schedule was implemented on the day after Thanksgiving in 2007 as an immediate result.*

- *Minor adjustments to routes 1-3, 5, 7, the Ridgefield-Katonah Shuttle and City Center Trolley were recommended.*

- *The 4 Brookfield Route was again examined with an eye to more extensive restructuring. It was decided to leave off any changes until the effect of the Route 7 widening and the creation of the Brookfield bypass on service to New Milford could be determined.*

Fixed Route Efficiency Study 2010

This 2010 fixed route COA study recommended several system-wide actions as well as route specific changes.

- *Overall system-wide actions recommended included improved on time performance, switching to smaller and lighter busses, consider changing fuel types, and improving marketing to appeal to Spanish speakers.*

- *Minor adjustments to routes 1, 2, 4, 5, 6, 7, the commuter Shuttles and City Center Trolley were recommended.*

Statewide Bus Study 2016

In 2015, Governor Malloy announced Let's GO CT, a vision and call to action for the future of the State's transportation system which recognized bus service as the foundation of Connecticut's transit system and called for a complete evaluation of the state's bus system.

Recommendations for the statewide bus system included proposals to create a more efficient and unified bus system. Specific recommendations for HARTransit were:

- *Improving on-time performance through installation of AVL on buses, replacement of the 12 year 35-foot buses, purchasing one or more diesel/electric or gasoline/electric hybrid buses to better understand the operational and financial impacts of this technology, and expanding its marketing efforts to reach the Spanish speaking population.*

Downtown Danbury Transit-Oriented Development Study 2018

The goal of the study was to provide a strategy to encourage transit-oriented development (TOD) around the Danbury Train Station. The transportation and infrastructure analyses in the Downtown Danbury TOD Study focused on the feasibility of co-location of the rail and bus transit service facilities. A priority of the TOD Study was to determine potential feasibility of an intermodal transportation center incorporating Metro-North Train service and HARTransit's Pulse Point.

A task force consisting of key stakeholders including representatives of city government, regional government, downtown organizations, transit agencies, and business and property owners took part in the study.

The study recommended the relocation of the HARTransit Pulse Point and intercity bus stop to a site adjacent to the Metro North Station on Patriot Drive.

Fixed Route Performance Comparisons

National Fixed Route Performance Comparison

Eight similar transit systems were selected nationally in order to contrast HARTransit and its service performance to others. The peer group was originally chosen by consultants for the CTDOT Statewide Bus System Study of 2000 as similar–sized systems serving approximately the same population size.

The group includes Montachusett (MA), Cape Cod (MA), Muskegon (MI), Rochester (MN), Missoula (MT), Manchester (NH), Berkshire (MA) and Westmoreland County (PA). The table updates the peer comparison as selected for the statewide study, using data from the 2017 National Transit Database report (the most recent available).

HARTransit compared well in the ridership category, having the third highest ridership total out of the systems selected for fiscal year 2017. The mean ridership of this peer group was 810,358. HARTransit reported a ridership of 717,686 for 2017, which is 11% below average. At 11.8 passengers per hour, HARTransit shows a productivity level 15% less than the mean of 13.94. System productivity within the peer group ranged between 6.5 (Cape Cod) and 31 (Missoula, MT) passengers per hour.

When comparing HARTransit to Rochester, MN, the transit system with the greatest overall ridership in the group, HARTransit had the lower annual operating cost by over $2 Million.

With respect to financial efficiency, actual dollar cost per service hour and mile, HARTransit had the fourth lowest cost per hour in 2017 at $86.67 and was six percent less than the group mean. Fitchburg, MA ($121.71) and Westmoreland County, PA ($119.77) had the highest per-hour costs. HARTransit reported the lowest cost per mile among the peer group at $5.08. Montachusett Regional Transit Authority in Fitchburg, MA ($8.39) and Missoula Urban Transportation District ($7.16) had the highest per-mile costs.

Finally, operating cost per passenger is a measure of cost effectiveness. In 2017, HARTransit provided transit service at a cost of $7.34 per passenger trip. This is five percent lower than the peer group mean. The highest cost per passenger reported among the peer group in 2017 was $11.73 for Westmoreland, and the lowest was $3.21 in Missoula, MT. HARTransit had the fourth lowest cost per passenger out of the peer group.

National Fixed Route System Peer Analysis

System	*Ridership*	*Operating Cost*	*Annual Hours*	*Cost/ pass.*	*Cost/ hour*	*Cost/mi.*	*Pass/hr.*	*Pass/mi.*
HARTransit	**717,686**	**$5,266,019**	**60,759**	**$7.34**	**$86.67**	**$5.08**	**11.8**	**0.7**
Fitchburg, MA	564,321	$5,225,758	42,936	$9.26	$121.71	$8.39	13.1	0.9
Cape Cod, MA	624,767	$6,491,646	96,814	$10.39	$67.05	$5.27	6.5	0.5
Muskegon, MI	528,635	$3,584,845	45,245	$6.78	$79.23	$5.40	11.7	0.8
Rochester, MN	1,837,990	$7,516,562	82,289	$4.09	$91.34	$6.30	22.3	1.5
Missoula, MT	1,558,262	$4,998,917	50,244	$3.21	$99.49	$7.16	31.0	2.2
Manchester, NH	448,196	$3,292,348	48,529	$7.35	$67.84	$6.19	9.2	0.8
Berkshire, MA	539,699	$5,055,427	55,705	$9.37	$90.75	$5.22	9.7	0.6
Westmoreland, PA	473,672	$5,558,358	46,408	$11.73	$119.77	$5.83	10.2	0.5
MEAN	810,358	$5,221,097	58,769	$7.72	$91.54	$6.09	13.94	0.94

Fixed Route Performance Comparison in the CT-NY Region

For comparison purposes locally, eight transit systems, seven in Connecticut and one in New York, were selected to contrast HARTransit's performance. These included the Greater Bridgeport, Waterbury, Norwalk, Middletown, Milford, Stamford, Norwich, and Putnam County, NY, transit systems.

Unlike the nationally selected group, there is a wide variety of service provision and regional population among the service areas. The Norwich bus system (Southeast Area Transit or SEAT) is most similar to HARTransit in this peer group. SEAT runs nearly the same number of vehicles in maximum service in a region of almost identical square mileage to HARTransit's, but with slightly more hours.

When compared to the CT-NY peer group, HARTransit reported below the mean for both ridership and productivity for fiscal year 2017. Note that three of the systems serve large urban areas and operate in cities far more densely populated than greater Danbury. At 60,759 hours, HARTransit provides 21.1% below the group mean of 76,972 annual service hours.

In general, a system's ridership and hourly costs increase and its operating speed decreases with the population of the city. More densely populated cities provide a larger ridership base and productivity, but urban travel is slower than suburban and rural travel. Driver wages and administrative salaries tend to be higher in larger transit systems.

HARTransit ranked the third lowest overall among regional peers for cost per hour ($86.67) and third lowest for cost per mile ($5.08) for the service efficiency category. Among the transit systems listed, cost per hour varied between $70.74 (Milford) to $111.05 (Waterbury).

Regional Fixed Route System Peer Analysis

System	*Ridership*	*Operating Cost*	*Annual Hours*	*Cost/pass.*	*Cost/ hour*	*Cost/mi.*	*Pass/hr.*	*Pass/mi.*
HARTransit	**717,686**	**$5,266,019**	**60,759**	**$7.34**	**$86.67**	**$5.08**	**11.8**	**0.7**
Bridgeport	5,477,783	$17,896,468	171,569	$3.27	$104.31	$9.34	31.9	2.9
Waterbury	2,354,364	$10,443,273 [1]	94,037	$4.44	$111.05	$8.69	25.0	2.0
Norwalk	1,479,804	$9,129,173	99,839	$6.17	$91.44	$9.04	14.8	1.5
Middletown	348,022	$2,161,434	23,984	$6.21	$90.12	$5.52	14.5	0.9
Milford	320,763	$1,448,346	20,473	$4.52	$70.74	$4.83	15.7	1.1
Stamford	2,954,460	$16,930,702	136,221	$5.73	$124.29	$11.40	21.7	2.0
Norwich	1,003,315	$6,002,705	64,053	$5.98	$93.71	$6.06	15.7	1.0
Putnam Co., NY	116,468	$1,855,604	21,814	$15.93	$85.06	$2.02	5.3	0.2
MEAN	1,641,407	$6,743,383	76,972	$6.62	$95.27	$6.89	17.38	1.37

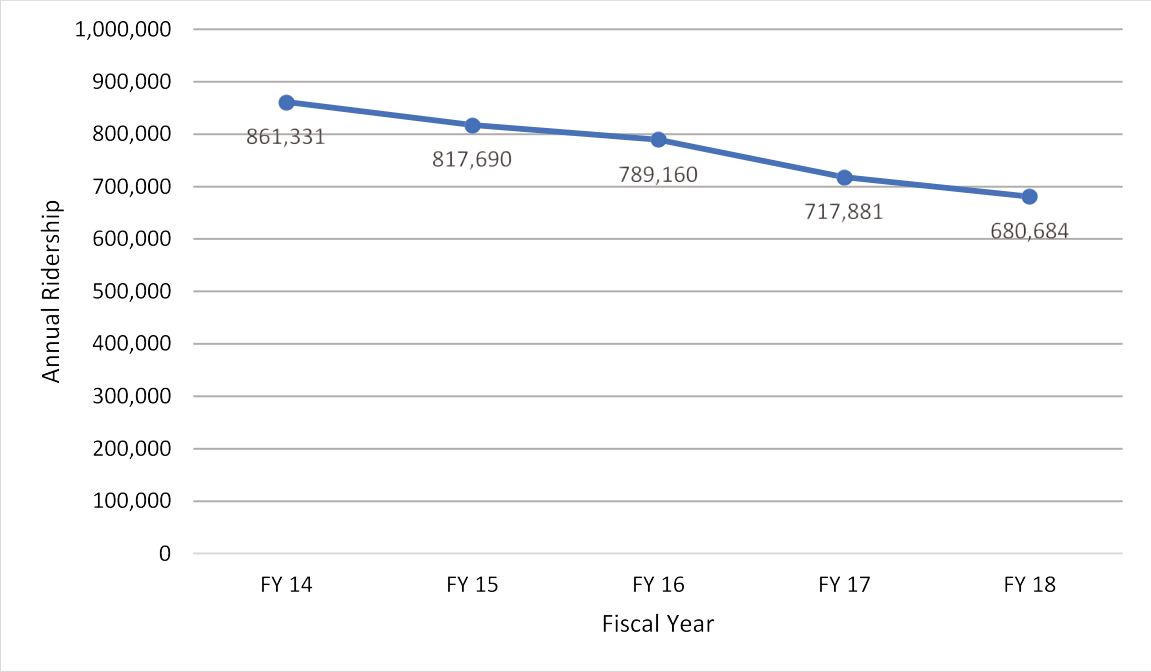
[1] *Includes data for a contract with another reporter.*

Total Annual Ridership

Annual Ridership on the HARTransit fixed route system decreased from over 860,000 trips in 2014 to roughly 681,000 trips in 2018. During that time there were no major service reductions, but fare increases were instituted in 2014 and 2018.

These ridership trends mirror those seen nationally for public transit. Various factors including lower gas prices and fare increases can impact transit ridership negatively. A recent academic report from the Transportation Research Board correlates the drop in transit ridership across the US with the rise of Transportation Network Companies such as Uber and Lyft.[1]

HARTransit Total Annual Fixed Route Ridership (FY 14 – FY 18)



System Productivity by Route

In FY 2004, HARTransit ran 56,274 hours of service weekdays and 5,550 on Saturdays. Service operated at 1,776 hours on Sunday and holidays. In FY 2017, 60,039 hours of service were operated during the weekday, 5,314 on Saturdays and 2,204 on Sundays and holidays. All of the service added in the past several years was confined to the peak travel period. New services do not have as great a ridership base as the well-established urban fixed route service, and while more opportunities for new and existing riders are created, overall productivity is reduced system wide.

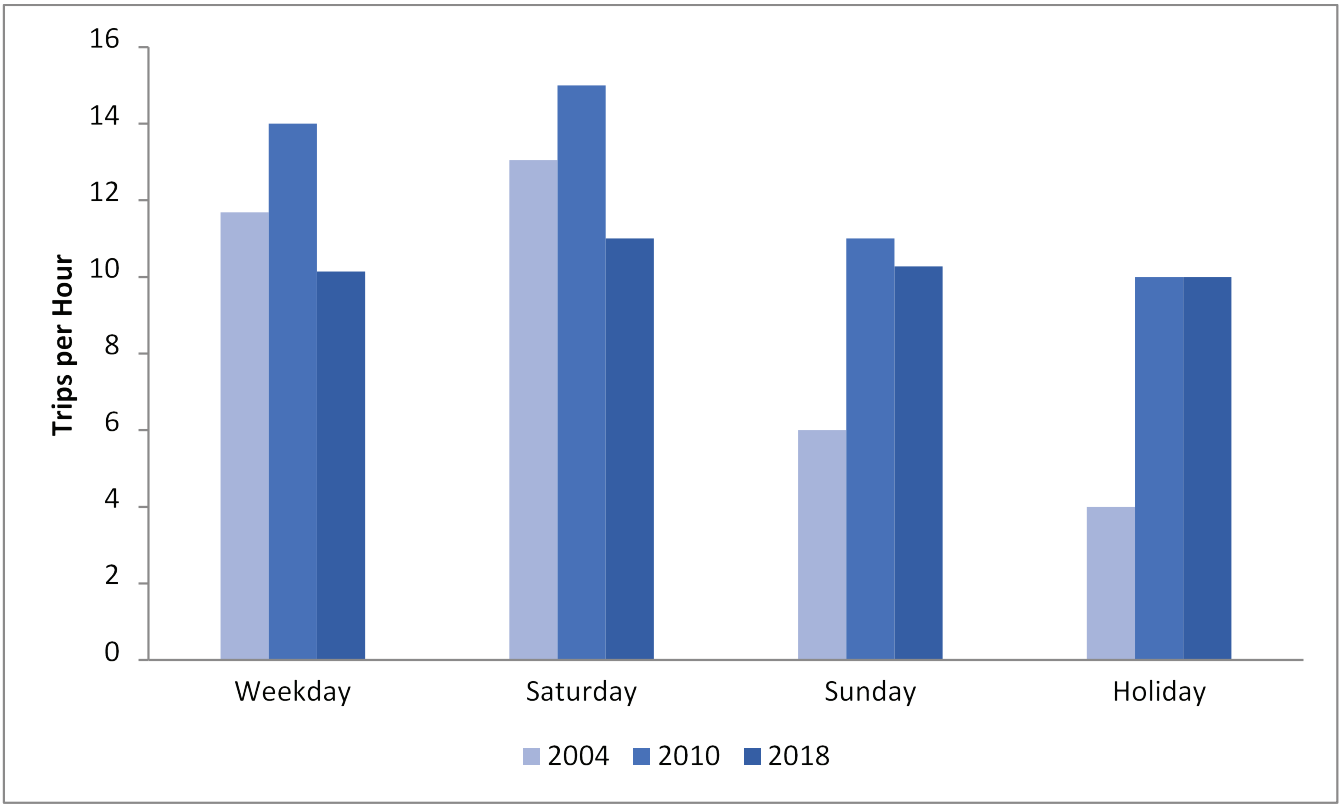
1 Graehler, Mucci and Erhardt, 2018. Understanding the Recent Transit Ridership Decline in Major US Cities: Service Cuts or Emerging Modes? TRB 2019 annual meeting

Peak period service additions also create split driver runs. While peak period buses cover the times of day most convenient to commuters, deadhead travel to and from the endpoints of the run is increased and hours available for revenue service are proportionally reduced.

Note also that loading on rail feeder shuttles is dramatically reduced in the reverse commute direction, which reduces overall system productivity; buses may be overfull in one direction but nearly empty on return trips.

Productivity mirrors the overall ridership trend. When comparing the two most recent studies, Weekday productivity decreased from 15 trips per hour in 2010 to ten trips per hour in 2018. Saturday productivity decreased from 15 trips per hour to 11, while Sunday productivity decreased slightly (11 trips per hour to 10 trips per hour) in 2018. Holiday productivity remained the same in 2018 from 2010.

HARTransit Fixed Route Productivity by Study Year

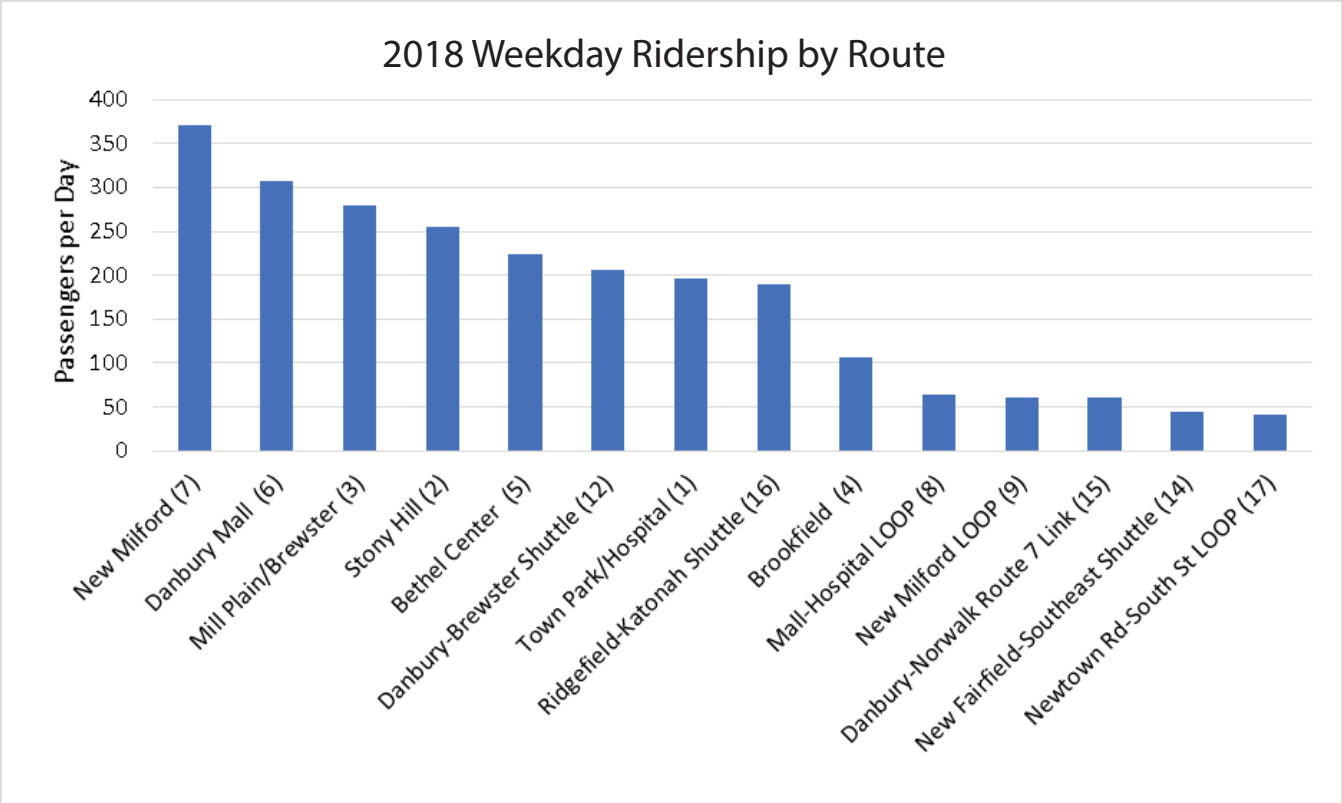


IV. Mean Ridership By Route

Weekday/Saturday

The 7 New Milford route carries the greatest number of daily passengers at an average of 372 trips per weekday and 218 trips per Saturday. The 6 Mall route ranked second, generating 308 trips per weekday.

The 2 Stony Hill Road route ranked third with 280 trips. The 4 Brookfield route on both weekdays and Saturdays was the lowest ranked CityBus service, carrying 106 per weekday and 54 per Saturday. Weekdays, two Harlem Line shuttle services transported more passengers than the 4 route, carrying 205 and 190 passengers respectively.



IV. Mean Ridership By Route

2018 Weekday Ridership by Route

Route	Daily Trips
New Milford (7)	372
Danbury Mall (6)	308
Mill Plain/Brewster (3)	280
Stony Hill (2)	255
Bethel Center (5)	224
Danbury-Brewster Shuttle (12)	205
Town Park/Hospital (1)	196
Ridgefield-Katonah Shuttle (16)	190
Brookfield (4)	106
Mall-Hospital LOOP (8)	64
New Milford LOOP (9)	61
Danbury-Norwalk Route 7 Link (15)	60
New Fairfield-Southeast Shuttle (14)	44
Newtown Rd-South St LOOP (17)	41

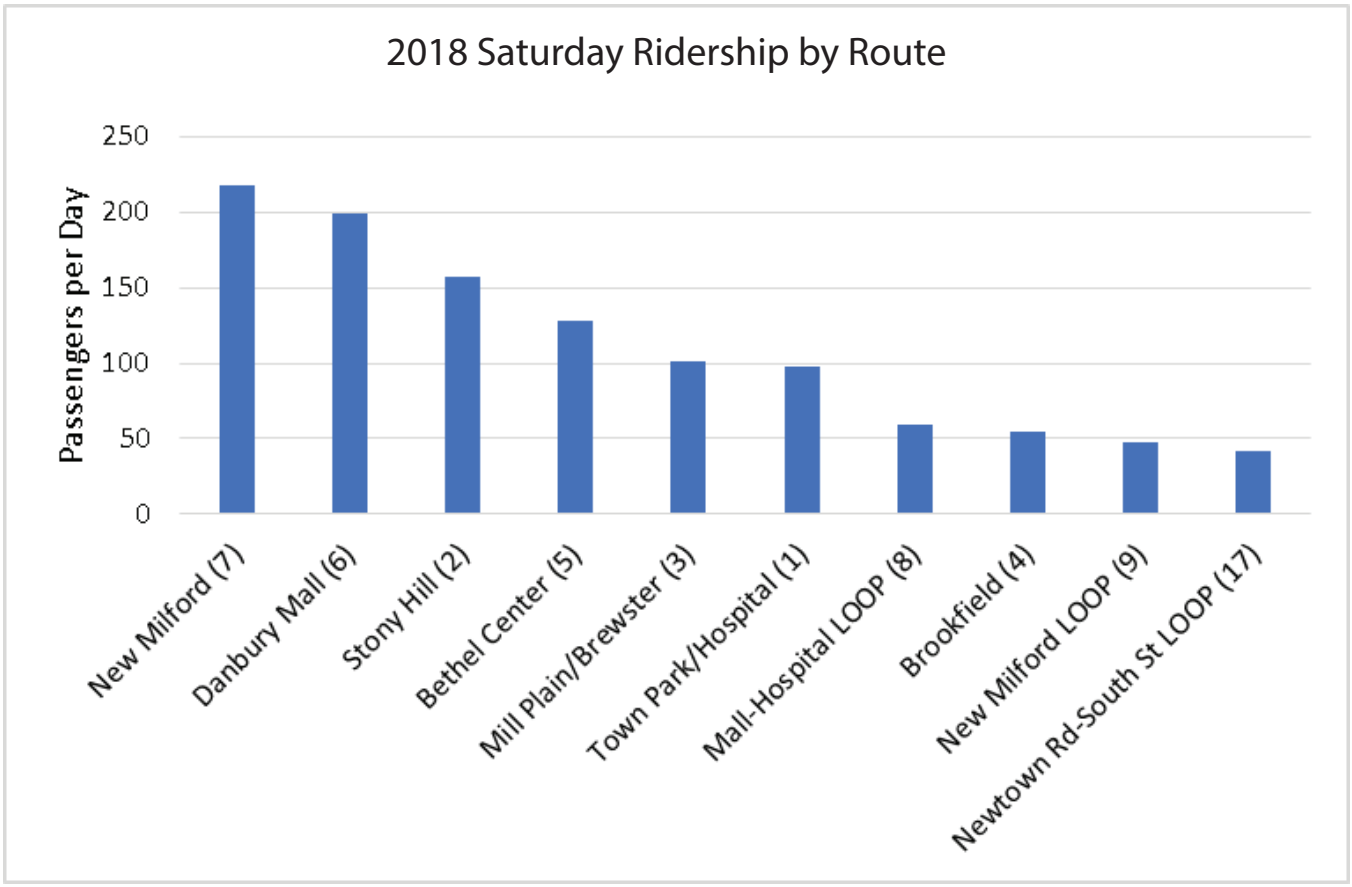
HARTransit's rail shuttle services have remained important. In spite of the fact that it is peak only and dramatically heavier in ridership the eastbound direction in the am commute and westbound in the pm, daily Danbury-Brewster service is now ranked sixth in terms of ridership by route.

2018 Saturday Ridership by Route

Route	Daily Trips
New Milford (7)	218
Danbury Mall (6)	199
Stony Hill (2)	157
Bethel Center (5)	128
Mill Plain/Brewster (3)	101
Town Park/Hospital (1)	98
Mall-Hospital LOOP (8)	59
Brookfield (4)	54
New Milford LOOP (9)	48
Newtown Rd-South St LOOP (17)	42

Saturday ridership follows a similar pattern, but with the 4 and 6 routes providing a greater proportion of total ridership than during the weekday.

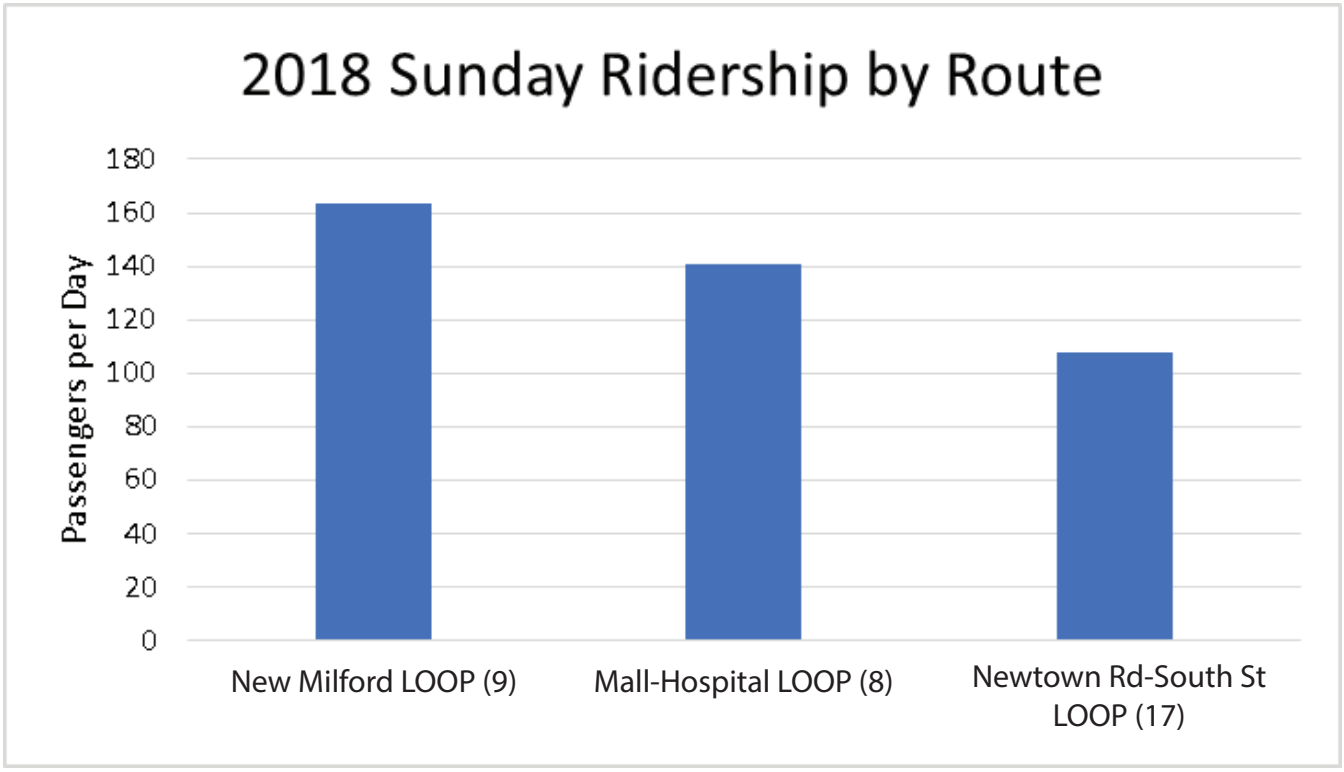
The lowest ridership services sampled on weekdays were the New Fairfield-Southeast Shuttle and the Newtown Rd Loop with 44 and 41 trips respectively.



Sundays and Holidays

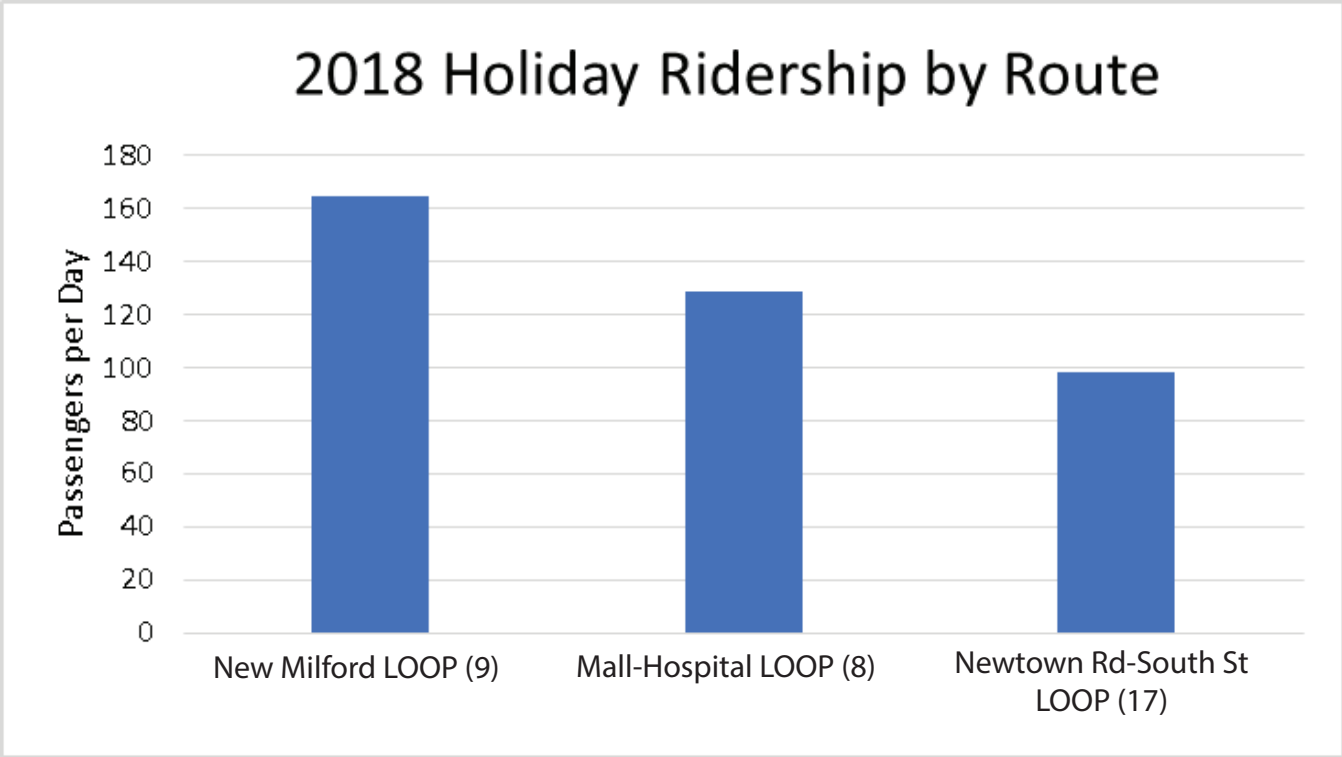
The three LOOP routes are the only fixed route services operating on Sundays and Holidays. Holiday service is operated on July 4, New Year's Day, Memorial Day and Labor Day. In terms of mean Sunday ridership, the New Milford LOOP ranked highest with 163 passengers, followed by the Mall Hospital LOOP at 141 and the Newtown South Street LOOP at 108.

Holiday ridership counts are similar and show the New Milford LOOP averaging 165 passengers, Mall-Hospital LOOP at 129 and Newtown Road-South Street at 98.



2018 Sunday Ridership by Route

Route	Daily Trips
New Milford LOOP (9)	163
Mall-Hospital LOOP (8)	141
Newtown Rd-South St LOOP (17)	108



2018 Holiday Ridership by Route

Route	Daily Trips
New Milford LOOP (9)	165
Mall-Hospital LOOP (8)	129
Newtown Rd-South St LOOP (17)	98

V. Complaints

There were 88 negative comments made by the public with regard to the fixed route system over the course of Fiscal Year 2018 (June 2017-July 2018). Complaints are recorded by HARTransit service development staff. This equates to rate of 0.0001 complaints per trip.

All complaints are investigated by operations staff by means of caller and driver interviews, examination of GPS data and review of on-board camera footage as needed. Of the 88 negative comments, 38% were found to be legitimate and required a personnel or operational action after investigation.

The most common form of complaints that required action are classified as "other" (29%). Most complaints classified as "other" deal with conflicts between passengers, or passengers and bus drivers. The second most common classification for verified complaints was "courtesy" (15%).

All Title VI complaints were resolved at the local level and did not rise beyond that to state or federal authorities.

VI. On Time Performance

On time performance directly affects the ability of a passenger to trip chain and make intermodal connections. Transit services that run early or late create disincentives for use and are unreliable for those seeking to make transfers to other services.

As a standard, HARTransit considers a bus running up to five minutes beyond the published schedule as on time (i.e., 0-5 minutes late).

Sampling process:

Schedule adherence data was collected by analyzing data from the US Fleet Tracker automatic vehicle location system. All HARTransit vehicles are equipped with GPS trackers that allow for review of vehicle location data and speed by time of day with a web-based tools and reports. A total of 100 time points were used to develop the on time performance discussion.

Sampling took place over multiple days during the course of the year. Time points were randomly chosen along routes at multiple times of day in both the inbound and outbound directions, over the entire service day.

As a group, 10% of trips sampled ran early, 9% ran late and 81% were on-time. There was significant variation in on-time performance by route with buses observed between 75 and 95% on-time. Early buses ran between 6 and 30% per route and late buses (more than 5 minute late) were observed on as few as none, to as many as 20% by route.

Harlem Line shuttles were not examined for schedule adherence. HARTransit operates the shuttles based on the arrival and departure of trains arriving from and traveling to New York City and on-time performance is significantly out of the district's control.

Buses are held for late trains for 5 minutes on any given train arrival and as much as 20 minutes on the last trip of each evening driver's run, if required. Further, in the interest of customer service, drivers are instructed to "load and go" and run early if a train arrives ahead of schedule. Operational experience showed passengers becoming frustrated with drivers adhering to schedule in these instances, and shuttle buses are very unlikely to pick up additional passengers other than rail patrons.

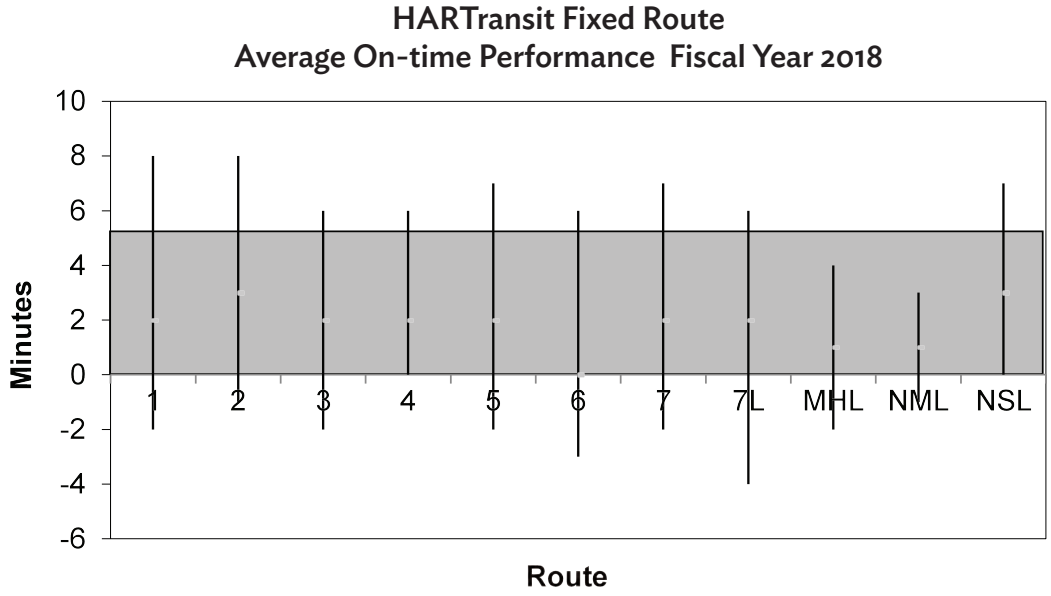
Morning bus arrivals allow for a minimum of 8 minutes before scheduled train departures. Actual travel time of buses that meet departing trains are closely monitored by HARTransit staff (riders on these routes are also extremely vocal) and adjusted as necessary. Missed connections for departing trains are extremely rare.

Fixed Route Schedule Adherence Sampling Fiscal Year 2018

Route	*Early*	*More than 5 Minutes Late*	*On Time*
HARTransit 1 Hospital	15%	10%	75%
HARTransit 2 Stony Hill	5%	15%	80%
HARTransit 3 Mill Plain/Brewster	10%	20%	70%
HARTransit 4 Brookfield	0%	10%	90%
HARTransit 5 Bethel Center	5%	10%	85%
HARTransit 6 Lake Ave,/ Fair Mall	20%	5%	75%
HARTransit 7 New Milford	10%	10%	75%
Danbury- Norwalk Route 7 LINK	15%	5%	80%
Mall – Hospital LOOP	20%	5%	75%
New Milford LOOP	5%	0%	95%
Newtown Rd. – South St. LOOP	0%	10%	90%
All routes	**10%**	**9%**	**81%**

The graph below describes average on-time performance as measured by route. The bars shown represent the standard deviation in on-time performance from that average point. The shaded area indicates the on-time range.

It should be noted that virtually all trips arrived and departed from the Pulse Point on time, whether or not they ran late or early elsewhere along a given route.



- *The New Milford LOOP shows the best overall schedule adherence, running an average of 95% on time, with 5% of trips running ahead of schedule.*

- *The 4 Brookfield and Newtown Road – South Street LOOP Routes both showed an on-time percentage of 90%, with no buses running early.*

- *The 6 Mall and Mall Hospital LOOP routes showed the greatest number of early buses (20%).*

- *The 3 Mill Plain Bus and 2 Stony Hill Routes had the greatest number of late buses (20 and 15%, respectively. The Mill Plain Route had the worst overall on-time performance (70% on time).*

Contributing factors in early and late buses

Congestion related delays are a major factor in schedule adherence for HARTransit buses, particularly on routes that show high percentages of both late and early buses.

Drivers often anticipate delays as they approach urban centers or areas of frequent congestion, and may deliberately depart early from the endpoint of the route in order to be on time at the Pulse Point and meet buses for transfers. Late buses occur with regularity in the afternoon peak period, between 2:30pm and 6:00pm.

Because the HARTransit system is transfer dependent, buses will routinely wait an additional 5 minutes to pull out from the Pulse Point, if required to allow for incoming transfers. Late drivers will call out transfers over the radio to ensure that their passengers can make connections to the next bus to complete their trip. While this is necessary, one late bus will then affect the on-time performance of many others.

Congestion related delays on I-84 due to accidents or volume often spill traffic onto city streets; the 2 Stony Hill and 3 Mill Plain routes are especially vulnerable here. According to the ongoing I-84 Danbury Project's Factsheet the most congested time periods in the I-84 corridor are between 7 and 9am and 3 and 6pm. There are, on average, one or more crashes on I-84 in Danbury each day.

On time performance has improved since the 2010 operational analysis, where data showed that 71% of buses were on time; 17% ran early and 9% ran late. The improvement in on-time performance may be in part due to the installation of GPS trackers on buses in 2011 (as recommended in the 2010 study), which has allowed for better monitoring and enforcement of schedule adherence.

VII. Survey

A one-page rider survey was distributed to passengers by drivers on Tuesday, December 10, 2018. The survey form was produced in English and Spanish with simple multiple-choice questions. Respondents were encouraged to write in service suggestions or provide comments. 476 surveys were completed with usable information; roughly 20-25% of peak ridership.

Demographics

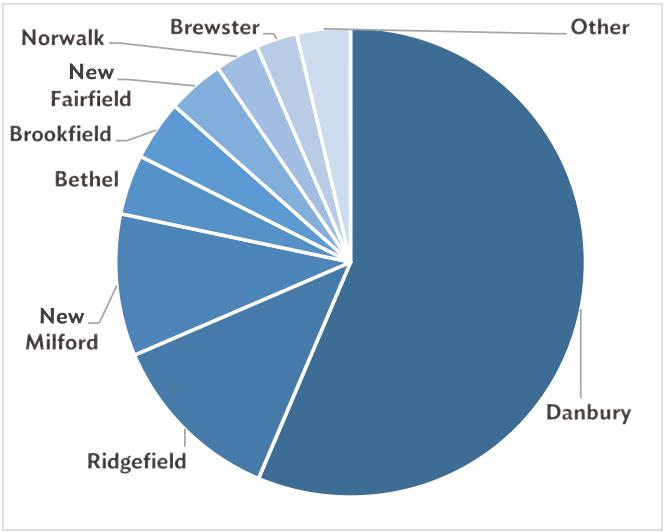
The majority of surveys returned were completed in English at 75.2%. The Spanish language survey was completed by 24.8% of those that responded.

When asked where they lived, 91% of those that answered indicated they were residents of Greater Danbury. The remaining respondents resided in other communities in Connecticut, mostly in the Southwest Region (6%), or in New York State (3%).

56.4% of riders specified that they live in Danbury. The next most selected area of residence was Ridgefield with 12.1% riders followed by New Milford with 9.8%. For riders that chose "other", Wilton was the most common origin at 1.3%.

The most common municipal destination was Danbury, with 43.3% of the ridership. New

Rider Residence by Municipality



Location of Residence	Percent of Riders
Danbury	56.4%
Ridgefield	12.1%
New Milford	9.8%
Bethel	4.1%
Brookfield	4.1%
New Fairfield	3.9%
Other	3.7%
Norwalk	3.0%
Brewster	2.8%

Milford was the next most common destination with 16.6% followed by Brewster with 15.8%. Among those riders who chose other, Norwalk was the most common destination at 1.5%.

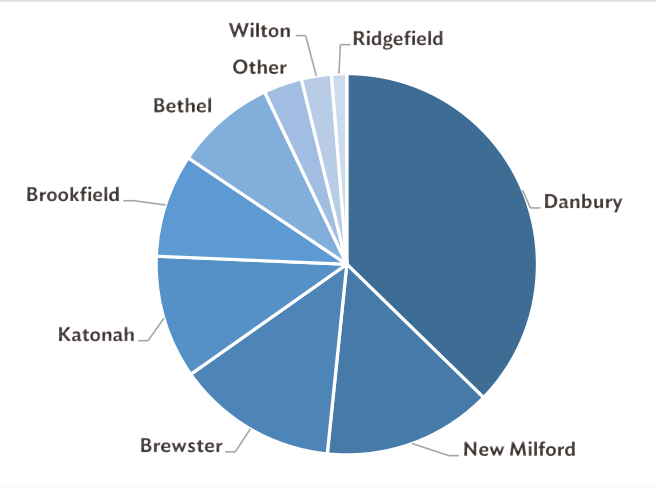
Passengers were asked in general terms, the reasons why they use the bus. According to respondents, commutation to employment was the most common overall reason for using the bus (58.8%), followed by shopping at (19.6%). Just under 6% of riders identified trips for entertainment purposes as a reason for using the bus.

Many riders indicated multiple purposes for using the service. Most of those that ride the bus for reasons not listed on the survey form wrote in that they use HARTransit for everything (2.1%).

As a follow up, passengers were asked what their number one most common final destination was when using the bus. Responses to this question were similar to the more general trip question but skewed more closely to the top three trip purposes.

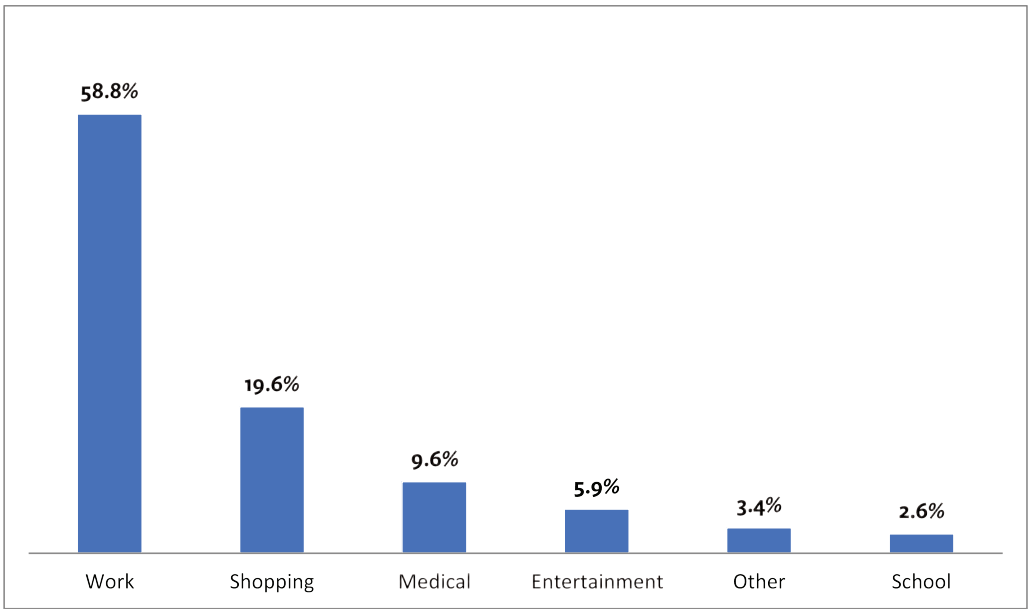
According to respondents, transportation to employment ranked first (61.9%), followed by shopping (20.6%) and medical (11.7%). While not major final destinations, those primarily using the service for to school ranked higher than entertainment (3.2% to 2.5% respectively).

Rider Destination by Municipality



Destination	Percent of Riders
Danbury	43.3%
New Milford	16.6%
Brewster	15.8%
Katonah	12.1%
Brookfield	10.1%
Bethel	9.9%
Other	3.8%
Wilton	2.9%
Ridgefield	1.5%

General Trip Purposes



Riders were then asked to write in the specific location they travel to the most when using the bus. Among those that responded to the question, the most common final destination was the Brewster train station with 29.2% of the total. The next most common final destination was Katonah train station with 20.6% of the responses followed by the Danbury Mall with 15.1%.

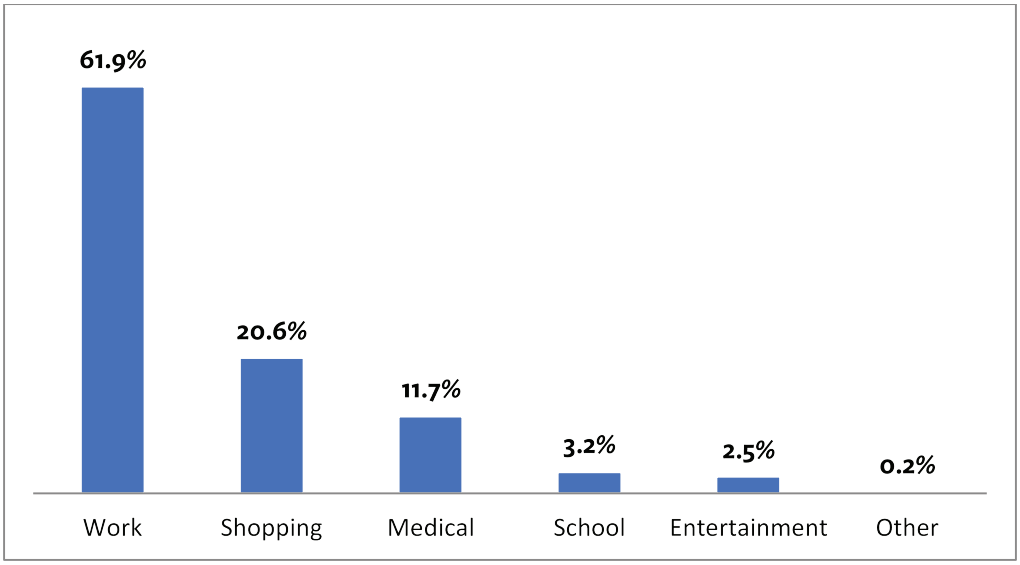
Other notable locations included the North Street Shopping Center in Ridgefield, the Danbury Square Mall, and New Milford.

Almost all respondents riding Harlem Line shuttle buses noted a Metro-North station as their final destination.

Final Destination Location

Most Common Final Destination	Share of Responses
Brewster Train Station	29.2%
Katonah Train Station	20.6%
Danbury Mall	15.1%
Southeast Train Station	11.6%
Walmart	9.0%
Downtown	5.4%
Danbury	4.3%

Most Common Final Destination



Passenger Satisfaction Ratings

Survey respondents rated the HARTransit system's performance for six characteristics using a scale of one through five, with five being excellent and one being poor.

Ratings were generally favorable, with all measures receiving good or excellent rankings of in the range of 80 to 90 percent. Dependability and overall satisfaction with HARTransit received the highest positive ratings, with both measures ranking over 90% good or excellent as well as the lowest in the "poor" range.

On-time performance ranked slightly lower, with 89.9% of ratings as good or excellent. This measure had the lowest ranking in the "no opinion" category.

Route maps (80.9%) and bus appearance (80.7%) received lower positive ratings than other measures. Route maps received the greatest number of responses in the "No Opinion" category (3.1%). Bus appearance received the most ratings in the "average" (13.8%) and "poor" (4.8%) categories.

Rider Perception of HARTransit Fixed Route Service

	Good/Excellent 4-5	*Average 3*	*Poor 2-1*	*No Opinion*
Dependability	90.5%	6.3%	2.0%	1.2%
On Time Performance	89.9%	7.4%	2.2%	0.5%
Bus Appearance	80.7%	13.8%	4.8%	0.7%
Route Maps	80.9%	11.9%	4.1%	3.1%
Customer Service	81.9%	12.8%	3.4%	1.9%
Overall Satisfaction	90.3%	7.4%	1.9%	0.5%

Comments

There were 178 written comments submitted on survey forms. More than half of the comments were positive statements about the HARTransit service or drivers (101 comments).

Representative comments included:

- "I love this service and depend on it to get to work. Thank you for continuing service"
- "I feel safe with good drivers each time on the bus thank you"
- "Gracias por sus servicios"
- "I ride HARTransit on a daily basis and the service and professionalism is above reproach"

There were ten negative comments made about the performance of HARTransit employees. There were seven comments made about the need to maintain low fares.

Other frequent comments included:

- Complaints about the cleanliness of busses (17 comments; primarily in regards to seat condition)
- Need for more frequent/later service on the entire system (14 comments)
- Suggestions for improved marketing/route maps (10 comments)
- Website, marketing, or social media suggestions (8 comments)

Staff comments and Recommendations

Report staff informally solicited comments from the HARTransit driver corps and front-line supervisors with regard to suggestions to improvements for the system. Discussions led to several recommendations on how to improve the fixed route system.

These ideas included:

- Provide video as well as in class training for high school students in Danbury
- Provide free passes for high school students for 4 years to encourage ridership
- Offer a larger variety of bus passes and discounted passes for low income riders
- Provide passes to local college students at a "youth rate" to promote public transit at an early age
- Create express bus routes
- Work to ensure there is efficient bus stop spacing on all routes
- Provide 30 minute or more frequent bus service throughout the day
- Connect to more park and ride lots, Metro-North lots as well as other recreation centers on the outskirts of towns.
- Coordinate efforts with Danbury city council in effort to receive financial support.

VIII. Conclusions & Recommendations

This section provides recommended options for improvements to the existing fixed route system. System-wide recommendations and route specific changes are identified.

System Status

Comparisons between bus systems remain favorable

When compared with 8 national peers as of 2018, HARTransit operated at a lower than average cost per hour, passenger and mile. HARTransit carried the third highest ridership among the peer group. In the Connecticut/New York area, systems operating in larger population centers carry a higher ridership than HARTransit, but HARTransit ranks at the lower end in terms of cost per hour and mile. HARTransit operates fewer service hours than average in this peer group.

Ridership

Riders rated the bus system highly, with dependability and overall satisfaction receiving positive ratings of better than 90%. Other measures including on time performance, bus appearance, customer service, and route maps and schedules received positive ratings in the range of 80 to 89%.

Riders are primarily using the service for employment, and significant numbers are Spanish speaking (almost 25% of respondents). The most common final destination for riders that responded was the Brewster Train Station.

Overall usage is down over the past three years, reflecting the overall national trend in public transit. In comparison to prior analyses' surveys, less riders responded use the service as a means of getting to work (84.5% in FY2010 and 58.8% in FY 2018) . Interregional service remained important despite only operating in peak periods.

Service Area and structure

With the addition of the New Fairfield-Southeast Shuttle, HARTransit now operates service in 11 Connecticut and 5 New York communities.

Most services added since the late 1990s are part time either in the morning and evening weekday peak period, or provide basic service after hours. While supplying service for common employment shift times, this has created service gaps.

Most new services operate with small body on chassis buses, while the core Urban Fixed Route continues to operate 35' transit coaches. Some routes use a mix of small and large buses. On occasion, capacity needs on small bus routes require use of larger equipment or operation of multiple buses to serve single trips.

Recommended Actions System-Wide

For several of the system-wide recommendations to be viable, there is a need for an overall discussion on transportation funding. While capital needs are more easily achieved long term, operating costs are rising and difficult to manage. Connecticut needs to address shortfalls in the Special Transportation Fund (STF), for any significant service expansions to be implemented in the future.

Motive Power

HARTransit vehicles are powered by conventional fossil fuels. The transit industry is moving in the direction of fully electric/battery powered vehicles with the major manufacturers (Gillig, New Flyer and NovaBus) and several newcomers, notably Proterra and BYD, offering electric buses.

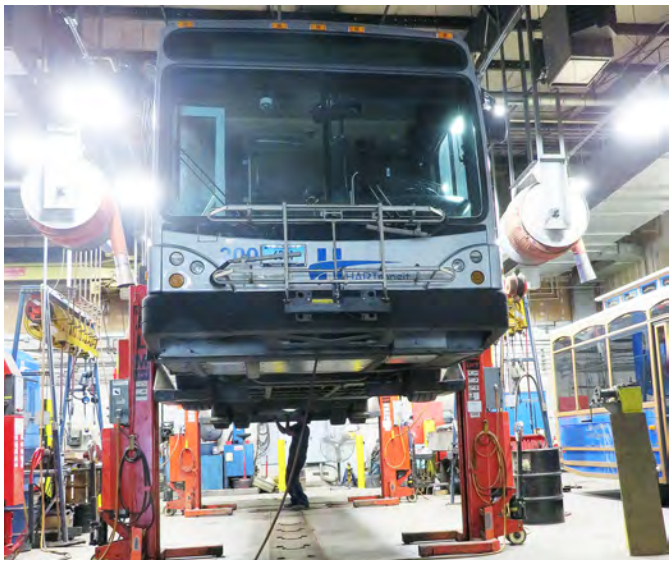
Electric vehicles require charging stations in the field, which can have high fixed costs to install. Power sources used by vehicles are subject to change over time. HARTransit should look to keep up with best practices in the industry as technology changes, in alignment with HARTransit's interests and available funds.

Pulse Point Relocation

The City of Danbury has unveiled a Transit Oriented Development plan. The TOD initiative is a plan for the city of Danbury to create a Transit Oriented Development in downtown Danbury near the Danbury train station.

A key element of the initiative is the co-location of HART's pulse point transfer station and the Danbury train station. HARTransit should coordinate with the City of Danbury on moving its TOD initiative forward and consider modernizing infrastructure, such as adding electric vehicle charging stations in a new pulse point.

Maintenance



While still in the 80% positive range, bus cleanliness scored lowest on the passenger surveys conducted in December 2018. In order to improve bus cleanliness, a thorough detailing of the bus fleet quarterly is recommended. Specifically, steam cleaning seats as suggested by HARTransit vehicle operators is recommended.

An enhanced infrastructure maintenance plan for shelter and sign maintenance should be developed. Current replacement and repairs are reactive, and the infrastructure would benefit from a more systematic approach.

Shift in layovers to Pulse Point

For efficiency and comfort purposes, HARTransit should aim to shift layover times in the schedule to the Pulse Point. Buses have layover times built in the schedule, when schedule adjustments are made, as much layover time as possible should be shifted to the pulse point for each route.

Increased Ridership

HARTransit has experienced a 21% decrease in ridership from FY14-FY18. Decreased ridership on public transit is a trend experienced nationally. Between 2016 and 2017, bus ridership decreased nationally by 4.2%. Two major transportation agencies, METRO (Houston) and Sound Transit (Seattle) were able to avoid the trend and maintain steady bus ridership . HARTransit should look to emulate their successful strategies in order to increase ridership.

An increase in frequency of service will likely result in an increase of ridership in the long term. This is due to three major benefits of frequency for customers: reduced wait times, easier connections and improved reliability. Based on a study of 13 transit agencies conducted by transportation consulting firm Jarrett Walker + Associates, higher frequency of service correlates with higher productivity (ridership per unit of cost). Increasing service frequency, however, may come at the cost of decreased coverage. The larger the area covered, the more that existing resources are spread thin and the more costly it becomes to run frequent service.

Diversity of needs should be considered, instead of the specialized needs of customers. Transit ridership tends to be high when it appeals to a wide variety of needs instead of the specific needs of a small group of passengers. In order to appeal to a diversity of needs, HARTransit should look to increase evening and weekend service. More service results in more options for riders, such as those who work late nights or weekends. The result is increased ridership at all times of the day, through attracting riders who would otherwise not be able to use the service.

One issue transportation agencies deal with is serving developments built at a distance from existing bus routes. It can be costly and time consuming for agencies to reroute existing

routes just to satisfy a new development. Transit Oriented Development (TOD), is the strategy of dense development near public transit. HARTransit should work with local municipalities and stakeholders to encourage development that is along existing bus routes.

There are four key aspects to focus on when designing routes. These focus areas include: serving areas that are dense, walkable, close in proximity and linear. A focus on these four aspects will lead to higher ridership, through more efficient routes and shorter ride times.

Increase in service of 15% (10,130 hours of service)

A 15% increase in funding would amount to approximately 10,130 annual hours of service or 39 hours per weekday.

In 2016 TransitCenter conducted a survey of over 3000 transit riders to determine their priorities when riding public transit. The report determined that the two most valued aspects of public transit were frequency and travel time.

In a like vein, the second most frequent comment from HARTransit survey respondents was the need for more frequent service and longer service hours on the existing system. With this in mind, HARTransit should extend 30-minute service into the midday period, instead of the hourly service it currently provides. In order to successfully implement an increase of frequency of this magnitude, HARTransit may need to cut a singular route.

An alternate option to avoid cutting a route would be modified 30-minute service in the midday. This could mean adding in the existing LOOP routes to the midday to bolster current daily service. Another area of expansion could address service gaps, in particular, inconsistent service provision on the 7 New Milford Route and service to and from Brewster, NY.

Additionally, the added funding could be used to extend weekend service. LOOP routed could run all day on Saturday, replacing the regular service. This would result in a longer span of service, but with limited routes.

An increase in funding and shift to 30-minute service also provides the opportunity for route adjustments. Routes can be restructured so that service to major trip generators becomes more direct with shorter headway times.

Decrease in Service of 15%.

HARTransit's fixed route funding formulas vary by route depending on the operational history of the service provision. The Metro-North shuttles, as an example, receive funding from New York State. Thus, due to the rigid nature of the funding structure at HARTransit, a shift in provision of service from a shuttle bus route to a city bus route would not be possible.

In this scenario it is assumed the 15% decrease in support would preserve the overall funding split so that reductions would be based on performance, rather than financial input. Thus, it does not consider potential impacts on HARTransit's current funding structure. There are several ways HARTransit could approach a decrease in funding.

HARTransit could cut underperforming routes. These routes based on current ridership data would be the 7 Norwalk Link and the 4 Brookfield route. The 7 Link is the least cost-effective route, with a farebox return ratio (percent of the operating cost covered by passenger fares) of 6%. HARTransit could also switch to all day LOOP routes on Saturdays. Currently, the CityBus operates until 5:00pm Saturday nights when the LOOP buses take over. A cost savings would be achieved by providing 3-4 LOOP routes instead of the 7 CityBus routes.

Fare Collection

HARTransit currently uses GFI Odyssey Fareboxes. The industry is moving in the direction of electronic fare collection. HARTransit should coordinate with CT DOT to modernize its fare collection methods, while considering potential equity issues that may arise. Various technology in mobile ticketing and electronic fare collection is being introduced nationally. New York City has successfully adopted OMNY, an electronic fare collection method which allows several methods of payment, such as Apple Pay, credit card mobile ticket and an OMNY card. Benefits of electronic fare collection include; minimizing delays through increased payment speeds, improved ability to analyze data and increased ridership through improved convenience for passengers.

Technology

HARTransit should look to modernize the technology information services it provides in coordination with CT DOT in order to keep continuity among regional transportation agencies. Demand for cell phone applications is growing as they become more popular among transit riders. Popular applications such as Google Maps, City-Mapper and Moovit serve the function of mapping out entire transit systems and helping riders plan their trips.

HARTransit should coordinate with various application providers, in order to create an accessible application for regional transit riders. HARTransit is in the process of creating a General Transit Feed Specification (GTFS). A GTFS feed is the first step in technology upgrades, as it allows a transit agencies system to be displayed in a format compatible with applications such as Google Maps. Once the feed is complete, HARTransit should coordinate with regional agencies to continue along the path of modernization by exploring technology such as Automatic Vehicle Location (AVL) and bus tracking applications.

Improved on time performance

On time performance is a major factor in maintaining steady ridership.

Bus stop spacing is a strategy that agencies are using to improve bus speeds. Stopping too frequently can dramatically increase travel time. HARTransit should ensure that stops are at least 1/5 of a mile apart when safety conditions allow and operational concerns are met.

HARTransit should coordinate with towns in the service area to promote the use of technology to enhance bus speeds. Dedicated bus lanes are often used to improve bus speeds. Similarly, transit signal priority has been used by agencies to improve on time performance. This is done by adjusting traffic signals to give transit vehicles priority at intersections.

Microtransit

Microtransit is a demand-response transportation service, based on a Transportation Network Company (TNC) model. Similar to Uber, microtransit combines modern technology with a curb to curb transportation service. Microtransit involves flexible routing and scheduling, limited to a specific geographic zone. There are no limitations on who is eligible for the service. HARTransit has signed a contract to run a six-month microtransit pilot with TransLoc; a Ford Mobility company.

TransLoc analyzed two potential catchment areas for proposed pilots.

Danbury Scenario

In Danbury, microtransit would replace the current 10 Reserve Route. The service zone will allow point to point rides in a 1.66 square mile area known as "the Reserve". Riders .could connect to existing fixed-route bus service at the Exit 2 park and ride.

Service Design

Service Days	Monday-Friday
Service hours	6:00am-6:00pm
Number of Vehicles	1-2

Passengers will be able to call for a bus to ride anywhere within the designated service zone. Service will run Monday-Friday 6:00am-6:00pm. HARTransit will be responsible for operating the new microtransit service. TransLoc's simulation predicted ridership peaks between 6:00am-8:00am.

Newtown Scenario

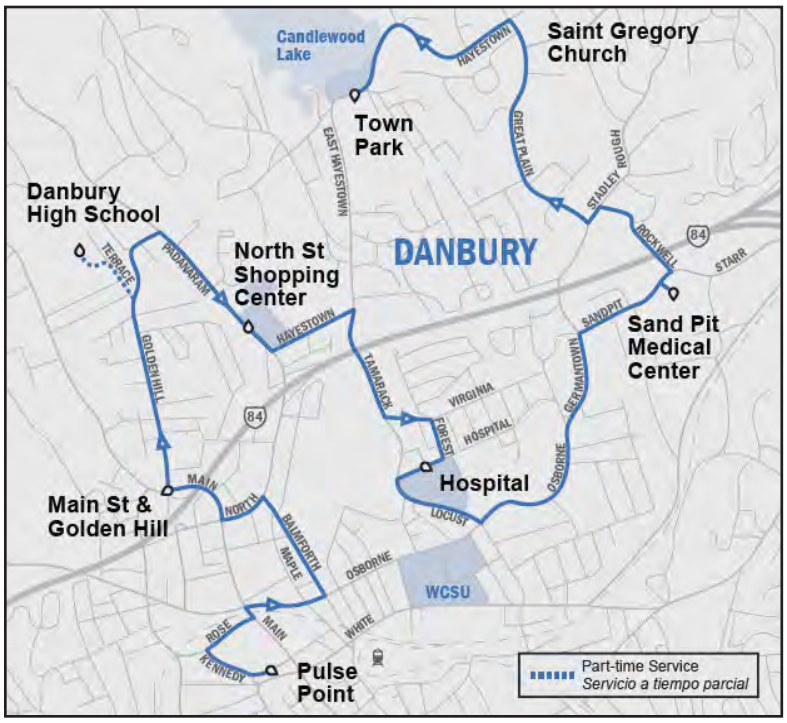
Microtransit would introduce new transit service to Newtown. The service zone will allow point to point rides in a 12.3 square mile zone within Newtown. Connection to the fixed-route bus system will likely be available at Stony Hill Road.

Service Design

Service Days	Tuesday-Thursday	Friday-Saturday
Service hours	11:00am-7:00pm	11:00am-10:00pm
Number of Vehicles	1-3	1-3

Passengers will be able to call for a bus to ride anywhere within the designated service zone. Service will run Tuesday-Thursday 11:00am-7:00pm and Friday-Saturday 11:00am-10:00pm. HARTransit will be responsible for operating the new microtransit service, in coordination with Newtown. TransLoc's simulation predicted ridership peaks between 9:00am-11:00am and 4:00-7:00pm.

1 Route



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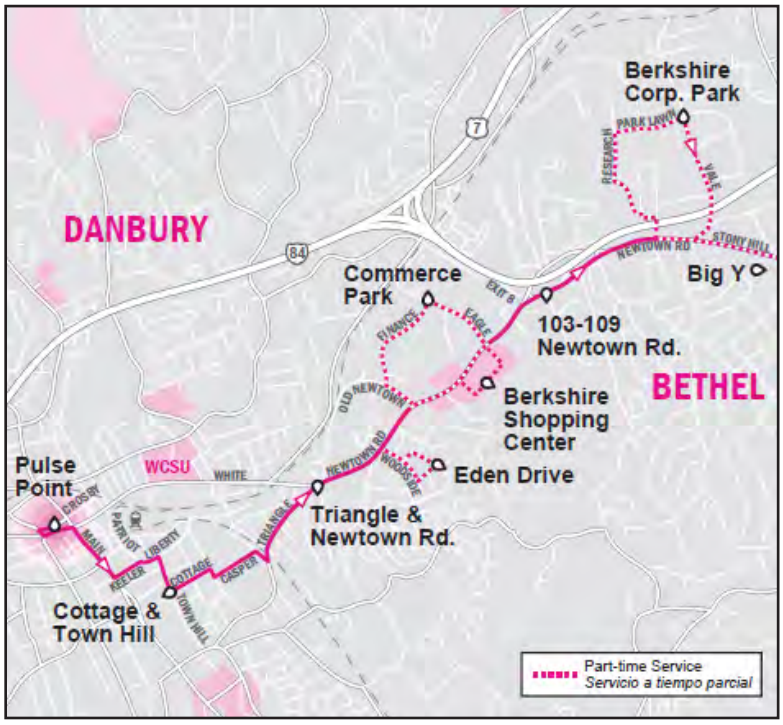

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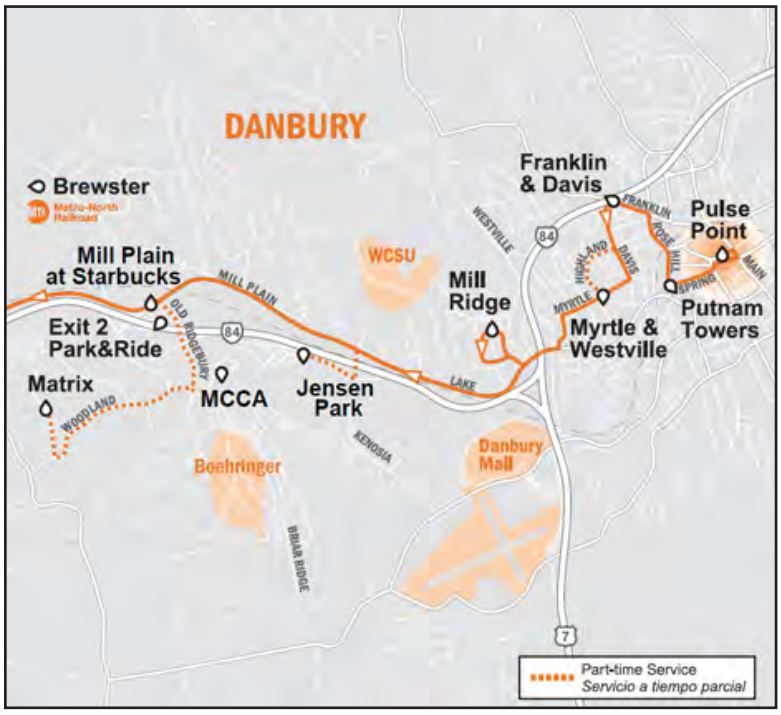

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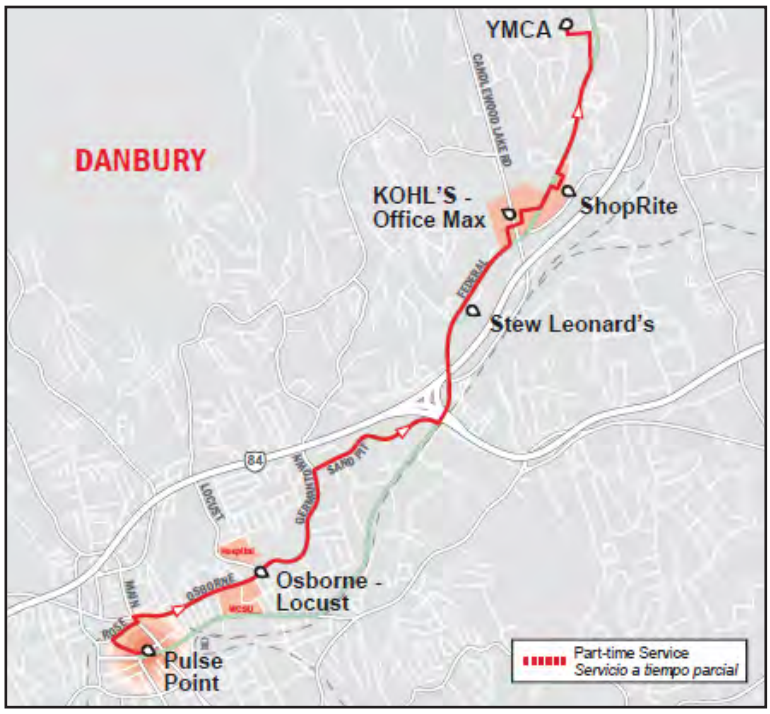

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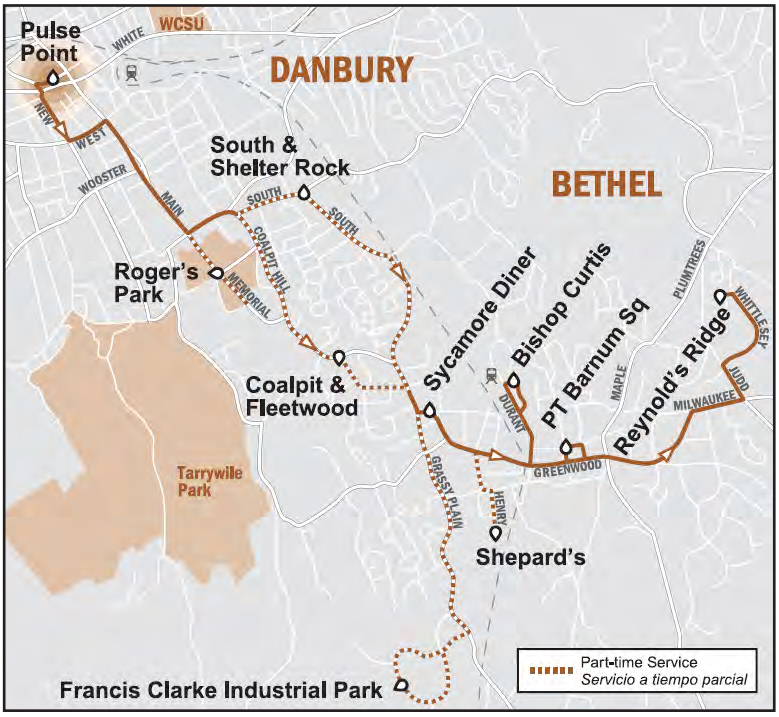

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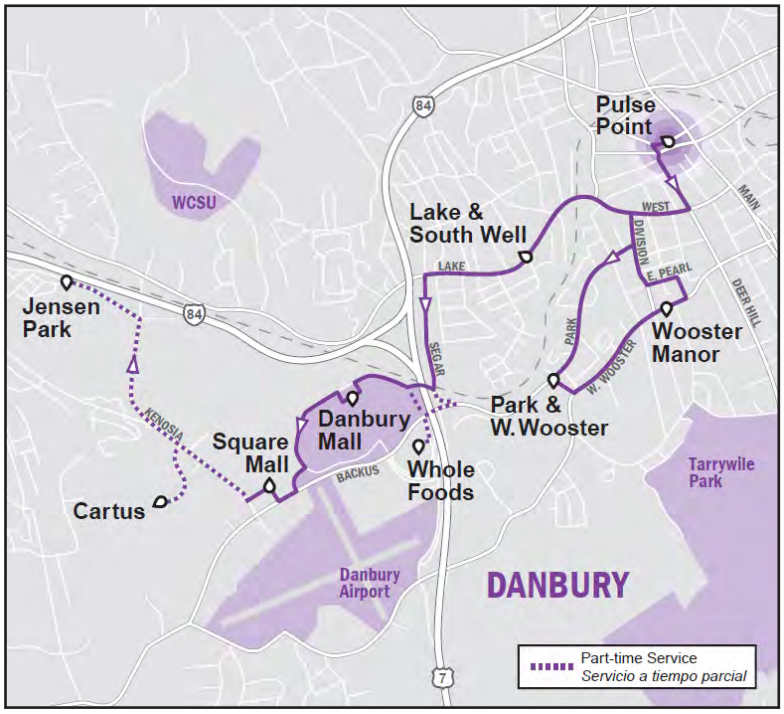

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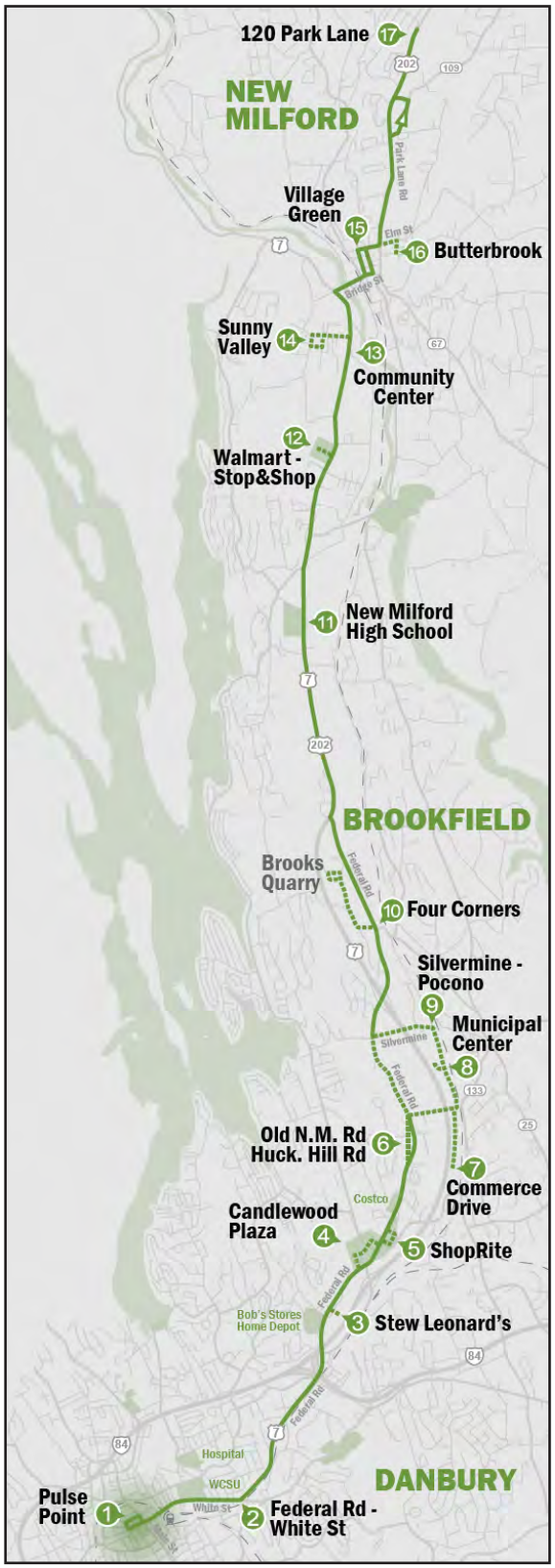
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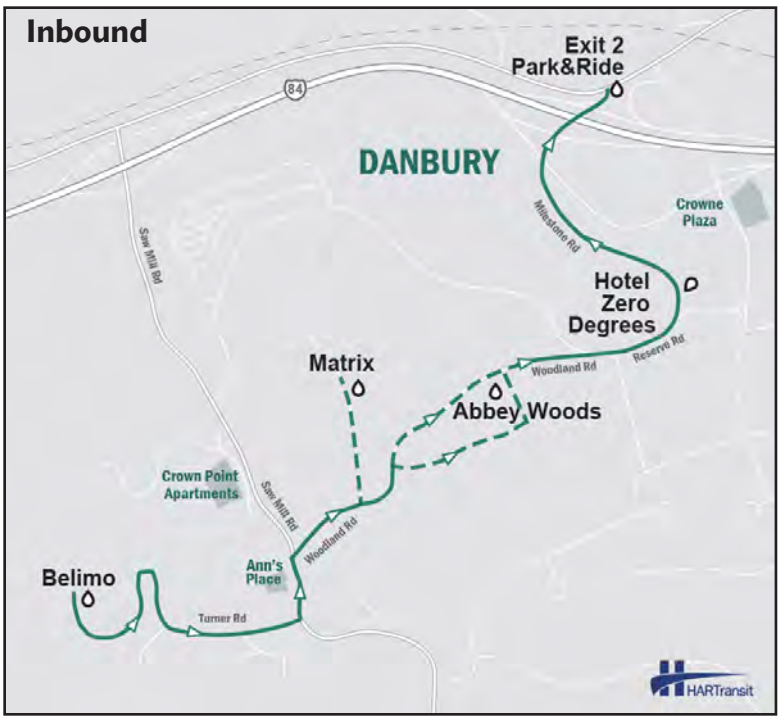
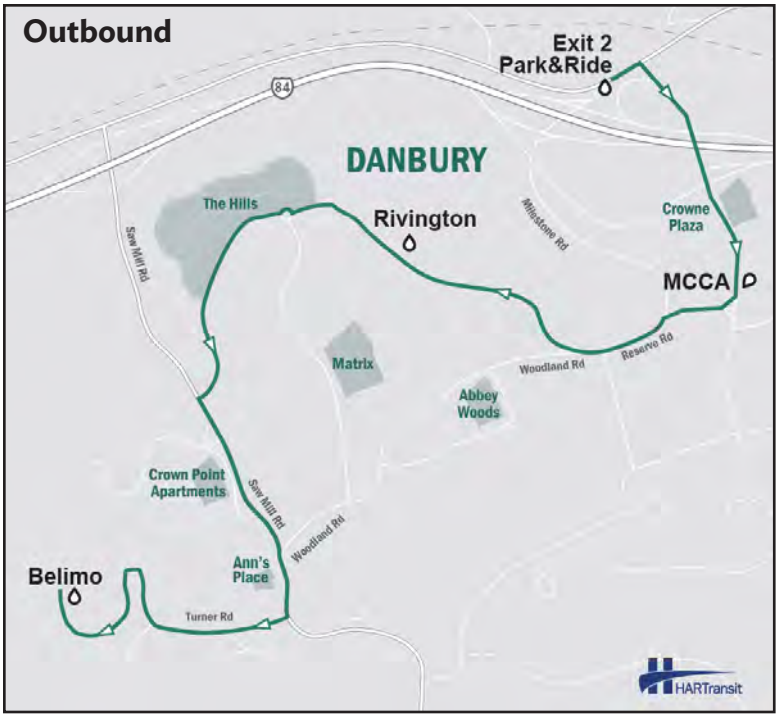
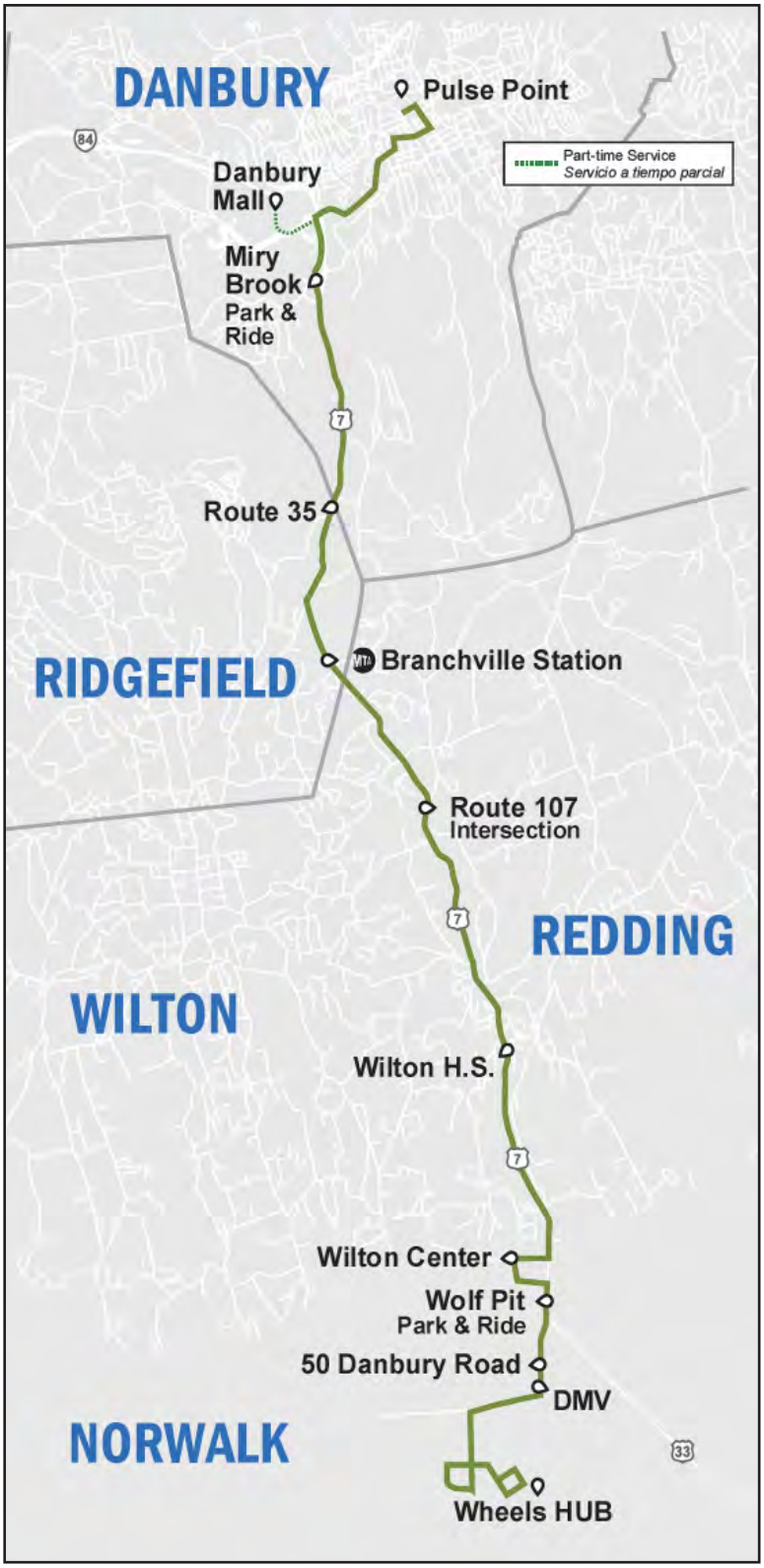
Village Green
Butterbrook
Sunny Valley
Community Center
Walmart - Stop&Shop
New Milford High School
BROOKFIELD
Brooks Quarry
Four Corners
Silvermine - Pocono
Municipal Center
Old N.M. Rd Huck. Hill Rd
Commerce Drive
Candlewood Plaza
ShopRite
Stew Leonard's
DANBURY
Pulse Point
Federal Rd - White St
Park Lane Rd
Elm St
Bridge St
Federal Rd
Silvermine
Costco
Bob's Stores Home Depot
Hospital
WCSU
White St

10 Route

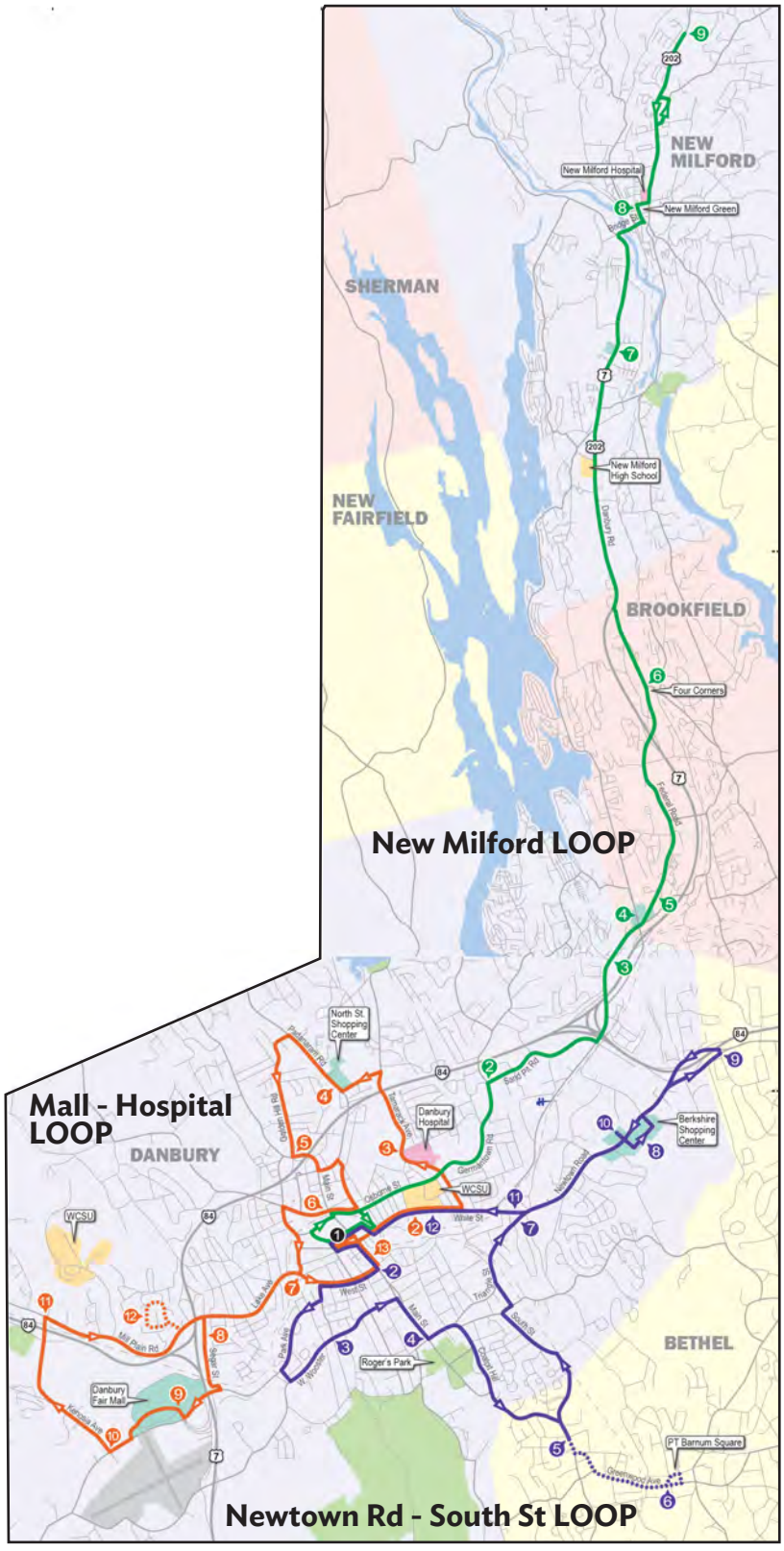

Inbound
Exit 2
Park&Ride
84
DANBURY
Crowne
Plaza
Milestone Rd
Saw Mill Rd
Hotel
Zero
Degrees
Reserve Rd
Woodland Rd
Matrix
Abbey Woods
Crown Point
Apartments
Saw Mill Rd
Woodland Rd
Belimo
Ann's
Place
Turner Rd
HARTransit


Outbound
Exit 2
Park&Ride
84
DANBURY
The Hills
Rivington
Milestone Rd
Crowne
Plaza
Saw Mill Rd
MCCA
Reserve Rd
Woodland Rd
Matrix
Abbey
Woods
Crown Point
Apartments
Saw Mill Rd
Woodland Rd
Belimo
Ann's
Place
Turner Rd
HARTransit

7 LINK Norwalk



LOOP Routes


NEW MILFORD
New Milford Hospital
New Milford Green
SHERMAN
NEW FAIRFIELD
New Milford High School
BROOKFIELD
Four Corners
New Milford LOOP
Mall - Hospital LOOP
DANBURY
North St. Shopping Center
Danbury Hospital
WCSU
Berkshire Shopping Center
Danbury Fair Mall
Roger's Park
BETHEL
PT Barnum Square
Newtown Rd - South St LOOP

Train Station Shuttles