

Draft Lower Connecticut River Valley Regional Bus Ridership Study

Introduction

From April to July 2017, the Lower Connecticut River Valley Council of Governments (RiverCOG), in cooperation with Estuary Transit District (dba 9 Town Transit) and Middletown Transit District (dba MAT), conducted bus passenger counts for the 9 Town Transit and MAT bus systems. The purpose of the counts was to track bus ridership trends and to inform recommendations for changes in bus services. This study marks the first time bus passenger counts have been conducted for the region. This study presents bus passenger count data, analyzes ridership trends, and makes recommendations for improvements to bus operations.

Bus System Overview

The 9 Town Transit System

The 9 Town Transit (9TT) system is composed of four routes and an ADA Dial-A-Ride service (see Table 1). The 9 Town Transit system serves Chester, Clinton, Deep River, Essex, Haddam, Middletown, Old Lyme, Old Saybrook and Westbrook. The system also extends into neighboring regions and connects to East Lyme, Madison and New London. The 9 Town Transit routes operate as flex route services deviating up to 3/4 miles off the primary route. Two (Riverside and Shoreline) of the flex routes operate during the week and on Saturdays during the daytime hours. The other two routes (Mid-Shore and Southeast) operate during the daytime hours Monday through Friday.

A flex route, or deviated route, keeps to a regular hourly schedule, but vehicles can deviate from the route to pick up or drop off passengers from other locations along the way, when prearranged through dispatch. Beyond established bus stops, potential riders may flag down a bus at any point along the route where it is safe for the bus to stop. The 9 Town Transit fleet consists of 13 buses; all equipped with bicycle racks and are accessible to persons with disabilities. Transfers to connecting buses are issued free of charge.

Dial-A-Ride service is available within the municipalities of Chester, Clinton, Deep River, Durham, Essex, East Haddam, Haddam, Killingworth, Lyme, Old Lyme, Old Saybrook and Westbrook. Reservations are required one day in advance. Dial-A-Ride trips may also be made to limited portions of Middletown and Colchester, provided they start or end in one of the aforementioned twelve municipalities.

Route 81 Bus Route

9 Town Transit and River COG anticipated the need for a bus route along the Route 81 corridor between Madison and Middletown. This route has been part of the regional transportation plan since 2000. River COG's predecessors, CRERPA and Mid State RPA, identified the Route 81 bus route as a means of reducing traffic connection between their two regions. The Estuary Transit District applied for funding in April of 2015 and received notice of their award in April of 2017. Service is expected to begin in the summer of 2018. This bus route is much needed in an area with major traffic generators including Middlesex Hospital, State Superior Court, Middlesex Community College, Wesleyan University,

downtown Middletown, Clinton Crossing Premium Outlet Mall, two high schools, grocery stores and shopping centers. The Route 81 bus route will save an estimated 70 private automobile trips a day. In addition, this bus route will provide riders with more convenient and reliable service between Middletown and the Scranton Gazebo in Madison, a major transfer point for buses traveling to and from the New Haven area. Currently, riders from Middletown must transfer to the Shoreline bus at the Old Saybrook train station in order to reach the transfer point in Madison.

Middletown Area Transit

The Middletown Area Transit (MAT) system is composed of twelve fixed routes and an ADA Dial-A-Ride service (see Table 2). This system serves the city of Middletown and the nearby municipalities of Middlefield, East Hampton, Portland, Durham and parts of Cromwell and Meriden. Through the M-Link route, MAT provides direct service to the Amtrak and CTRail Station and the Westfield Shopping Mall in Meriden. Connections are available to Higganum, Chester, Essex, and Old Saybrook via 9 Town Transit. In addition, connections are available to Wethersfield, Rocky Hill, Hartford, and New Haven via CT Transit. Six of the fixed routes operate daily from Monday through Friday. Four routes operate both during the week and on Saturdays and three routes are Saturday only. Two of the routes operate in the evening, running from 7 to 11 p.m., and the Saturday routes are expanded or combined daytime weekday routes.

MTD also provides paratransit services for elderly and handicapped citizens. Curb-to-curb bus service is provided to eligible persons with disabilities in accordance to the ADA Act of 1990. Dial-a-ride service is provided for persons over sixty years of age in Durham, East Hampton, Middlefield, Middletown, and Portland. Appointments must be made one day in advance and the fare is \$2.00. All MTD vehicles are wheelchair accessible and have bicycle racks.

Proposed Changes to the E and M-link Routes

FedEx completed construction of a 500,000 square foot overnight package handling and distribution hub at the former Aetna site in the Westlake section of Middletown. As Westlake is currently served by the E route, MAT is currently determining how the E route can serve the Fedex hub while still arriving on time at the downtown terminal.

MAT has identified the need for the M-link route to pulse with the other MAT routes in Middletown and the New Haven Transit buses in Meriden. MAT has proposed to shorten the route in order to achieve this goal. As more than 25 percent of the route consists of highway mileage, there will be a public hearing regarding the proposed change in August of 2018.

Table 1. 9 Town Transit Bus Routes

Route Number	Bus Route Name	Days of Operation	Municipalities Served
1	Shoreline	Weekdays, Saturday	Clinton, Madison, Old Saybrook, Westbrook
2	Riverside	Weekdays, Saturday	Chester, Deep River, Essex, Old Saybrook
3	Southeast	Weekdays	East Lyme, New London, Old Lyme, Old Saybrook
4	Mid-Shore	Weekdays	Chester, Essex, Haddam, Middletown, Old Saybrook

Table 2. Middletown Area Transit Bus Routes

Route Number	Bus Route Name	Days of Operation	Municipalities Served
A	Saybrook Road	Weekdays	Middletown
B	Wesleyan Hills	Weekdays	Middletown
C	Washington Street	Weekdays	Middletown
D	Newfield Street	Weekdays	Cromwell, Middletown
E	Westlake Drive	Weekdays	Cromwell, Middletown
F	Portland-East Hampton	Weekdays, Saturdays	East Hampton, Middletown, Portland
H	South PM	Weekdays, Saturdays	Middletown
I	North PM	Weekdays, Saturdays	Cromwell, Middletown
M-Link	Middletown-Meriden	Weekdays, Saturdays	Meriden, Middletown
S-1	Expanded A Route	Saturdays	Middletown
S-2	Combined B & C Routes	Saturdays	Middletown
S-3	Combined D & E Routes	Saturdays	Cromwell, Middletown

INSERT MAPS OF ROUTES HERE

Methodology

The bus passenger counts were conducted using Ridecheck and SPRINT software created by Steadman Hill Consulting of Montpelier, Vermont. Ridecheck was used to conduct the bus passenger counts and was run on Samsung Galaxy Tab A tablet computers. SPRINT was used to create and manage bus count assignments for Ridecheck and to download and export bus passenger count data from the tablets. SPRINT was run on a River COG desktop computer and the data was saved to the River COG server.

The SPRINT software required a number of data tables: bus routes, bus stops, bus stop orders, bus route variations, distances between bus stops, driver shift assignments (paddles), and public timetables. Bus stop lists came from existing bus stop GIS data. Distances between bus stops were measured using GIS. Data entry was conducted by Steadman Hill Consulting and River COG staff. The bus passenger counts were conducted primarily by three temporary employees recruited for the job plus River COG staff members. Counters received classroom and on-bus training using the tablet and Ridecheck software.

Bus passenger count assignments were based on driver shifts. Whenever possible, counters were assigned to a driver for a driver's entire shift. (Towards the end of the project, individual uncounted bus runs were aggregated into assignments that contained counts on multiple routes, requiring the counter to transfer buses between bus runs.) All passengers were counted, including those not required to pay fares (infants and young children). Transit company employees and survey counters were not counted as passengers. Wheelchair boardings were also recorded by the Ridecheck program.

The data recorded by counters using the Ridecheck software included:

- Boardings and alightings at each bus stop
- Running count of the number of passengers on the bus (load)
- Arrival and departure time at each bus stop
- Start and end time of each run
- Arrival and departure time at time points
- Carryover "beginning of line" passengers at the start of the bus run
- Carryover "end of line" passengers at the end of the bus run
- Whether the driver announced bus stops at ADA required time point locations
- Whether a passenger in a wheelchair boarded at a particular stop
- Bus stop locations not in the bus stop list
- Notes about occurrences that affected the run, such as accidents or mechanical problems.

Bus passenger counts were conducted between April and July of 2017. All weekday and Saturday routes were counted. If a counter was unable to complete their shift, the missing segments were counted later. Counts were not conducted during holidays and extreme weather. Bus counts of runs with unusual occurrences such as accidents, mechanical problems, or counting software failures were recounted. In total, 247 unique bus runs (158 Middletown Area Transit and 89 9 Town Transit runs) were counted.

Ridership Data

On an average weekday in 2017, 9 Town Transit had 318 passenger trips on the fixed route bus system (see Table 3). Four routes were operated on weekdays from 6:20 am to 8:15 pm. The Shoreline route had the highest average ridership at 212 passenger trips per weekday. The Southeast and Mid-Shore routes had an average of 39 and 40 passenger trips on weekdays respectively. The Riverside route had the lightest use in the bus system with an average of 27 passenger trips per weekday. Average Saturday ridership was 131 passenger trips on two bus routes running from 7:20 am to 5:50 pm (see Table 3). The

Shoreline route had the highest average ridership for Saturday with 111 passenger trips. Route 2 Riverside had the lowest average ridership of only 20 passenger trips on Saturday. The Southeast and Mid-Shore routes did not operate on Saturday.

On an average weekday in 2017, Middletown Area Transit had 1,320 passenger trips on the fixed route bus system (see Table 4). Seven daytime routes were operated during the week beginning at 5:45 AM and ending at 6:50 PM. In addition, two nighttime routes were operated during the week beginning at 7:00 PM and ending at 11:00 PM. Route A (Saybrook Road) had the highest average ridership at 290 passenger trips per weekday. Other routes seeing an average of over 200 passenger trips per weekday were Route D (Newfield Street) and Route C (Washington Street) at 254 and 209 passenger trips per weekday, respectively. The M-Link route had an average of 163 passenger trips per weekday. Route E (Westlake Drive) had an average of 149 passenger trips per weekday. Route B (Wesleyan Hills) had an average of 126 passenger trips per weekday. Route F (Portland-East Hampton) had the lowest average ridership of all daytime routes at 59 passenger trips per weekday. The two nighttime routes had the lowest average ridership of all routes at 41 passengers trips per weeknight (Route I – North PM) and 32 passengers trips per weeknight (Route H – South PM).

On an average Saturday in 2017, MAT had 576 passenger trips on the fixed route bus system (see Table 4). Five daytime routes were operated on Saturday beginning at 8:00 AM and ending at 6:00 PM. In addition, two nighttime routes were operated on Saturday beginning at 6:00 PM and ending at 11:00 PM. Route S3 (Combined D and F routes) had the highest average ridership at 228 passenger trips per Saturday. Routes S1 and S2 (the other combined routes) had 91 and 80 passenger trips per Saturday, respectively. Other Saturday averages included Route I (68 passenger trips), M (62 passenger trips), H (32 passenger trips) and F (15 passenger trips).

Table 3. 9 Town Transit Average Passenger Trips Per Route

Route Number	Bus Route Name	Weekdays	Saturdays
1	Shoreline	212	111
2	Riverside	27	20
3	Southeast	39	N/A
4	Mid-Shore	40	N/A
All routes		318	131

Table 4. Middletown Area Transit Average Passenger Trips Per Route

Route Number	Bus Route Name	Weekdays	Saturdays
A	Saybrook Road	290	N/A
B	Wesleyan Hills	126	N/A
C	Washington Street	209	N/A
D	Newfield Street	254	N/A
E	Westlake Drive	149	N/A
F	Portland-East Hampton	59	15
H	South PM	32	32
I	North PM	41	68
M-Link	Middletown-Meriden	163	62
S-1	Expanded A Route	N/A	91
S-2	Combined B & C Routes	N/A	80
S-3	Combined D & E Routes	N/A	228
All routes		1,320	576

Route Performance Measures

Performance measures were calculated for each bus route. These measures allow for comparisons between routes by normalizing ridership by route length, hours of service, and number of round-trips. Once normalized, the relative efficiency of bus routes can be assessed.

Passengers per hour

The most heavily traveled route per hour of service in the 9 Town Transit system was the Shoreline route with 9.3 passengers per hour inbound (Scranton Gazebo to Old Saybrook Train Station) and 8.7 passengers per hour outbound (Old Saybrook Train Station to Scranton Gazebo) during the week and 5.9 passengers per hour inbound and 5.0 per hour outbound on Saturday (see Table 5). The Southeast route averaged 1.2 passengers per hour inbound (Old Saybrook Train Station to New London Train Station) and 2.5 passengers per hour outbound (New London Train Station to Old Saybrook Train Station) during the week. The Riverside route averaged 1.2 passengers per hour inbound (Chester Center to Saybrook Point) and 1.1 passengers per hour outbound (Saybrook Point to Chester Center) during the week and 1.8 passengers per hour inbound and 2.2 passengers per hour outbound on Saturday. The Mid-Shore route was the least traveled route per hour of service with 0.5 passengers per hour inbound (Middletown Bus Terminal to Old Saybrook Train Station) and 0.7 passengers per hour outbound (Old Saybrook Train Station to Middletown Bus Terminal).

The most heavily traveled route per hour of service in the MAT system during the regular week was Route A with an average of 22.7 passengers per hour (see Table 6). Other routes with an average of greater than 10 passengers per hour of service were Routes D (19.8 passengers per hour), C (16.2 passengers per hour), M (13.6 passengers per hour), E (12.1 passengers per hour) and I (10.5 passengers per hour). The least traveled route per hour of service in the MAT system was Route H (South PM) with

an average of 8.3 passengers per hour. Other routes with an average of less than 10 passengers per hour of service were Routes B (9.9 passengers per hour) and F (9.7 passengers per hour).

The most heavily traveled route per hour of service in the MAT system on Saturday was Route S3 with an average of 23.4 passengers per hour (see Table 6). Other Saturday daytime routes were more sparsely traveled: S1 (9.3 passengers per hour), M (7.2 passengers per hour), and F (4.3 passengers per hour). The starting departure time of Route S2 was not recorded. Based on the assumption the bus left the terminal on time, Route S2 had 8.2 passengers per hour. Route I was the most heavily traveled nighttime route with an average of 14.2 passengers per hour. The other nighttime route, Route H, had an average of 6.5 passengers per hour.

Table 5. 9 Town Transit Average Passengers Per Hour By Route

Route Number	Bus Route Name	Weekdays	Saturdays
1	Shoreline	9.3 inbound	5.9 inbound
		8.7 outbound	5.0 outbound
2	Riverside	1.2 inbound	1.8 inbound
		1.1 outbound	2.2 outbound
3	Southeast	9.3 inbound	N/A
		8.7 outbound	
4	Mid-Shore	9.3 inbound	N/A
		8.7 outbound	
All routes		6.5	3.6

Table 6. Middletown Area Average Passengers Per Hour By Route

Route Number	Bus Route Name	Weekdays	Saturdays
A	Saybrook Road	22.7	N/A
B	Wesleyan Hills	8.9	N/A
C	Washington Street	16.2	N/A
D	Newfield Street	19.8	N/A
E	Westlake Drive	12.1	N/A
F	Portland-East Hampton	9.7	4.3
H	South PM	8.3	6.5
I	North PM	10.5	14.2
M-Link	Middletown-Meriden	13.6	7.2
S-1	Expanded A Route	N/A	9.3
S-2	Combined B & C Routes	N/A	8.2
S-3	Combined D & E Routes	N/A	23.4
All routes		13.8	10.7

Passengers per mile

On a per mile basis, the Shoreline route was the most heavily travelled in the 9 Town Transit system, carrying 5.0 passengers per mile inbound and 5.1 passengers per mile outbound during the week and 2.9 passengers per mile inbound and 2.4 passengers per mile outbound on Saturday (see Table 7). The Riverside route carried 0.7 passengers per mile inbound and 0.6 passengers per mile outbound and 0.6 passengers per mile inbound and 0.7 passengers per mile outbound on Saturday. The Southeast route carried 0.3 passengers per mile inbound and 0.9 passengers per mile outbound. The Mid-Shore route carried 0.7 passengers per mile inbound and 0.4 passengers per mile outbound.

On a per mile basis, the weekday A route was the most heavily travelled in the MAT system, carrying 24.7 passengers per mile. The weekday C route carried 22.1 passengers per mile and the weekday D route carried 20.2 passengers per mile. The Saturday S3 route was the most heavily travelled in the MAT system on the weekend, carrying 10.6 passengers per mile. All other routes carried less than 10 passengers per mile. The least travelled routes in the MAT system were the Saturday inbound and outbound F routes which carried 0.1 and 0.3 passengers per mile respectively.

Table 7. 9 Town Transit Average Passengers Per Mile By Route

Route Number	Bus Route Name	Weekdays	Saturdays
1	Shoreline	5.0 inbound	2.9 inbound
		5.1 outbound	2.4 outbound
2	Riverside	0.7 inbound	0.6 inbound
		0.6 outbound	0.7 outbound
3	Southeast	0.3 inbound	N/A
		0.9 outbound	
4	Mid-Shore	0.7 inbound	N/A
		0.4 outbound	
All routes		1.4	1.8

Table 8. Middletown Area Average Passengers Per Mile By Route

Route Number	Bus Route Name	Weekdays	Saturdays
A	Saybrook Road	24.7	N/A
B	Wesleyan Hills	9.1	N/A
C	Washington Street	22.1	N/A
D	Newfield Street	20.2	N/A
E	Westlake Drive	12.1	N/A
F	Portland-East Hampton	0.9 inbound	0.1 inbound
		1.2 outbound	0.3 outbound
H	South PM	1.7	1.6
I	North PM	1.7	2.7
M-Link	Middletown-Meriden	5.1	2.2
S-1	Expanded A Route	N/A	7.9
S-2	Combined B & C Routes	N/A	4.5
S-3	Combined D & E Routes	N/A	10.6
All routes		7.1	3.8

Passengers per trip

On a round trip basis, the Shoreline route was the most heavily travelled averaging 19.3 passengers per round trip during the week and 15.9 passengers per round trip on Saturday (see Table 9). The Riverside route averaged 3.4 passengers per round trip during the week and 5.0 passengers per round trip on Saturday. The Southeast route averaged 8.7 passengers per round trip during the week. The Mid-Shore route averaged 5.7 passengers per round trip.

With the exception of Route F, all Middletown Area Transit bus routes were loops. All data recorded on these loops were classified as outbound. On an outbound basis, Route A was the most heavily travelled,

averaging 18.1 passengers per outbound trip during the week (see Table 10). Route B averaged 7.9 passengers per outbound trip during the week. Route C averaged 12.9 passengers per outbound trip during the week. Route D averaged 15.9 passengers per outbound trip during the week, Route E averaged 9.9 passengers per outbound trip during the week. Route H averaged 8.0 passengers per outbound trip during the week. Route I averaged 10.3 passengers per outbound trip during the week and the M-Link route averaged 14.8 passengers per outbound trip during the week. Route F averaged 14.8 passengers per *round* trip during the week.

On Saturday, MAT Route S3 was the most heavily travelled, averaging 16.3 passengers per outbound trip. Route H averaged 6.4 passengers per outbound trip on Saturday. Route H averaged 6.4 passengers per outbound trip on Saturday. Route I averaged 13.6 passengers per outbound trip on Saturday. The M-Link route averaged 15.5 passengers per outbound trip on Saturday. Route S1 averaged 9.1 passengers per outbound trip on Saturday. Route S2 averaged 8.0 passengers per outbound trip on Saturday. Route F averaged 7.5 passengers per *round* trip on Saturday.

Table 9. 9 Town Transit Average Passengers Per Trip By Route

Route Number	Bus Route Name	Weekdays	Saturdays
1	Shoreline	18.1	15.9
2	Riverside	3.4	5.0
3	Southeast	8.7	N/A
4	Mid-Shore	5.7	N/A
All routes		5.0	6.0

Table 10. Middletown Area Transit Average Passengers Per Trip By Route

Route Number	Bus Route Name	Weekdays	Saturdays
A	Saybrook Road	18.1	N/A
B	Wesleyan Hills	7.9	N/A
C	Washington Street	12.9	N/A
D	Newfield Street	15.9	N/A
E	Westlake Drive	9.9	N/A
F	Portland-East Hampton	14.8	7.5
H	South PM	8.0	6.4
I	North PM	10.3	13.6
M-Link	Middletown-Meriden	14.8	15.5
S-1	Expanded A Route	N/A	9.1
S-2	Combined B & C Routes	N/A	8.0
S-3	Combined D & E Routes	N/A	16.3
All routes		12.6	12.5

Peak Hours

Peak weekday ridership on the 9 Town Transit system is during the midday period ranging from 9:30 AM and 4 PM (see Table 11). On average, 184 people board buses during the midday peak. The second busiest time period was the AM peak between 7 AM and 9:30 AM when an average of 77 people boarded the buses. An average of 42 people boarded the buses during the PM peak (4 to 6 PM). Ridership is lowest during the early AM (before 7 AM) and evening (after 6 PM) hours when an average of 7 and 8 people respectively boarded the buses. Weekday peak hour charts for fixed route buses can be found in Appendix A. This study did not differentiate between time periods on Saturday.

Peak weekday ridership on the MAT system is during the midday period ranging from 9:15 AM to 4:40 PM (see Table 12). On average, 801 people board buses during the midday peak. The second busiest time period was the AM peak between 6 AM and 9:15 AM when an average of 282 people boarded the buses. An average of 190 people boarded the buses during the PM peak between 4:30 and 6:50 PM. An average of 43 people boarded buses in the evening (7 PM to 11 PM) and an average of 4 people boarded the buses in the early AM hours (before 6 AM). This study did not differentiate between time periods on Saturday.

Table 11. 9 Town Transit Boardings on Weekdays By Time Period

Time Period	Boardings
Early A.M. (before 7:00)	7
A.M. Peak (7:00-9:30)	77
Midday (9:30-4:00)	184
P.M. Peak (4:00-6:00)	42
Evening (after 6:00)	8
All Time Periods	318

Table 12. Middletown Area Transit Boardings on Weekdays By Time Period During the Week

Time Period	Boardings
Early A.M. (before 6:00)	4
A.M. Peak (6:00-9:15)	282
Midday (9:15-4:40)	801
P.M. Peak (4:30-6:50)	190
Evening (7:00-11:00)	43
All Time Periods	1,320

Route Run Times

On an average weekday roundtrip, 9 Town Transit bus routes spend less than 5 minutes laying over at the Old Saybrook Train Station or the end of the route. The actual layover time varies greatly by route and time of day, with the longest layovers in the early morning hours, when traffic is lightest, and the shortest layovers in the afternoon, when traffic is heaviest. Drivers can shorten or skip the layover in order to keep a bus run on time. The longest layover time was 10.6 minutes on the weekday Riverside inbound route during the early AM. The longest Saturday layover time was 5.9 minutes on the Riverside outbound route during the late AM.

MAT bus routes are scheduled to spend a certain amount of time laying over at the downtown bus terminal. The scheduled layover time is shorter in the AM hours becoming longer as the day progresses. The notable exceptions are the S3, H and I routes which have no scheduled layover time and Route F which has an hour and 30 minute layover at the downtown terminal. The actual layover time varies greatly by route and time of day, with the longest layovers in the early morning hours, when traffic is lightest, and the shortest layovers in the afternoon, when traffic is heaviest. Drivers can shorten or skip the layover in order to keep a bus run on time. The longest layover time during the week was 16.3 minutes on Route C during the early AM. The longest Saturday layover time was 13.5 minutes on Route S1 during the early PM.

On-time Performance

For the purposes of this study, departures and arrivals of more than five minutes ahead or behind schedule were considered to be early or late.

9 Town Transit

Many 9 Town Transit buses depart and arrive late during the week. There were a significant amount of late departures and arrivals on the Shoreline, Southeast and Mid-Shore routes. On the inbound Shoreline route, 23.1 percent of buses departed late and 54.5 percent of buses arrived late. On the outbound Shoreline route 15.4 percent of buses departed late and 46.1 percent of buses arrived late. On the inbound Southeast route 66.7 percent of buses departed late and 83.3 percent of buses arrived late. On the outbound Southeast route 66.7 percent of buses departed late and 50.0 percent of buses arrived late. On the inbound Mid-Shore route, 42.9 percent departed late and 50.0 percent of buses arrived late. On the outbound Mid-Shore route, 71.4 percent of buses departed late and 57.1 percent of buses arrived late. In comparison, the inbound Riverside route had no late arrivals or departures and the outbound Riverside route had no late departures and only 14.3 percent of buses arrived late. On Saturday, 28.6 percent of buses departed late on the inbound Shoreline route and 28.6 percent of buses arrived late on the outbound Shoreline route. On Saturday, 33.3 percent of buses departed late on the outbound Shoreline route and 33.3 percent of buses arrived late on the inbound Riverside route.

The majority of late arrivals on the Shoreline and Southeast routes were due to heavy traffic conditions whereas the lateness of other routes was largely due to deviations from the fixed route.

Early departures and arrivals on 9 Town Transit routes are less common during the week. There were a moderate amount of early departures and arrivals on the Shoreline, Riverside, Southeast and Mid-Shore routes. On the inbound Shoreline route 18.2 percent of buses arrived early. On the outbound Shoreline route 30.8 percent of buses arrived early. On the inbound Riverside route, 12.5 percent of buses departed early and 28.6 percent of buses arrived early. On the outbound Riverside route, 28.6 percent of buses arrived early. On the outbound Southeast route, 16.7 percent of buses arrived early. On the inbound Mid-Shore route 14.3 percent of buses departed early and 16.7 percent of buses arrived early.

Early departures and arrivals on 9 Town Transit routes were more common on Saturday. On the outbound Shoreline route, 71.4 percent of buses arrived early. On the inbound Riverside route, 66.7 percent departed early and 33.3 percent of buses arrived early. On the outbound Riverside route, 33.3 percent of buses departed and arrived early.

Aggregate data was examined to determine exactly how early or late buses were on average. During the week, 9 Town Transit routes departed on average 5:06 late and arrived on average 5:32 late. The Southeast route experienced the most significant delays, departing on average 7:16 late and arriving on average 12:42 late. On Saturday, 9 Town Transit routes departed on average 2:06 late and arrived on average 4:29 late.

Middletown Area Transit

The overwhelming majority of MAT buses depart late during the week. All buses departed late on Routes A, B, E, F, H, I and the M-Link. On the C and D routes, 93.8 percent of buses departed late. Late arrivals were less common during the week, although all buses arrived late on the M-Link route. The M-

link buses arrived an average of 11 minutes late. As late arrivals caused late departures, the M-link route was consistently late. Routes B and F also had a significant proportion of late arrivals at 75.0 percent of buses. Route B buses arrived at the downtown terminal an average of 3 minutes and 21 seconds late. Route F buses arrived an average of 1 minute and 40 seconds late. Often, the other buses waited for these late buses to arrive at the terminal which caused these buses to also depart late. This lateness sometimes compounded as Routes A (18.8 percent), D (37.5 percent), E (40.0 percent) and H (25.0 percent) also had a number of late arrivals. There were no late arrivals on the evening routes.

Early departures and arrivals on MAT routes are less common during the week. On Routes C and D, 6.2 percent of buses departed early. No other buses departed early during the week. All buses arrived early on the C route during the week. Other routes with a significant proportion of early arrivals during the week were Routes A (81.2 percent), H (75.0 percent), D (62.5 percent) and E (60.0 percent). On the B route, 25.0 percent of buses arrived early during the week.

Early departures and arrivals on MAT routes were less common on Saturday. On Routes F, I, M-Link and S1, all buses departed late. A significant proportion of buses departed late on Routes S3 (92.9 percent), S2 (88.9 percent) and H (80.0 percent) on Saturday. All buses arrived early on Route S1 and Route F outbound on Saturday. Other routes with a significant proportion of early arrivals on Saturday were S2 (80.0 percent), M-Link (75.0 percent), S3 (64.3 percent) and Route F inbound (50.0 percent). Only 20.0 percent of buses arrived early on Route I on Saturday.

During the week, MAT routes departed on average 2:46 late and arrived on average 0:20 early. The M-Link route experienced the most significant delays, departing on average 7:21 late and arriving on average 11 minutes late. On Saturday, MAT routes departed on average 3:42 late and arrived on average 2:19 early.

Bus Route Usage

The most heavily used portions of the 9 Town Transit system are the Route 1 and Route 154 corridors. The portion of Route 1 from the Old Saybrook train station to the Scranton Gazebo in Madison is the most used portion of the system. The portion of Route 1 from the Old Saybrook Train Station to the New London Train Station and the portion of Route 154 from Old Saybrook to Middletown are other major bus route trunks. These portions of the bus system are served by a number of routes. The most used portions of the bus system are those leading to major destinations such as supermarkets, train stations and malls which is where the majority of passengers board or alight.

The following figures show the relatively use (total passenger load) of portions of the 9 Town Transit bus system on an average weekday. Maps showing the total passenger loads for individual bus routes can be found in Appendix A.

The most heavily used portions of the MAT system are the Newfield Street and Washington Street corridors as well as Route 372 in Cromwell.

INSERT MAP OF TOTAL PASSENGER LOADS PER ROUTE HERE (WEEKDAY AND WEEKEND)

Bus Stop Usage

The most used bus stops in the 9 Town Transit system were along the Shoreline route. The Scranton Gazebo in Madison was the busiest stop and saw an average of 38 boardings and 18 alightings per weekday and 12 boardings and 9 alightings on Saturday. The Scranton Gazebo stop provides access to points west via CT Transit – New Haven and the majority of the passengers who used this stop commuted to and from outside the region. Other frequently used stops included the Old Saybrook Stop and Shop which saw an average of 20 boardings and 18 alightings per weekday and 28 boardings and 8 alightings on Saturday and the South Main Street/Route 1 stop in Westbrook which saw 19 boardings and 2 alightings per weekday and 11 boardings and 11 alightings on Saturday.

The Old Saybrook Train Station was also a busy stop as it is a designated stop on all 9 Town Transit routes. This stop saw an average of 23 boardings and 23 alightings per weekday and one boarding and one alighting on Saturday. Other busy end points included the New London Train Station which saw an average of 20 boardings and 6 alightings per weekday and the Middletown Transit Terminal in Middletown which saw an average of 15 boardings and 8 alightings per weekday.

The least frequently used stops on the Shoreline route were found along Route 1 between the Beach Donut in Clinton and Bellstone Avenue in Westbrook and between Westbrook Center and Elm Street in Old Saybrook. The majority of stops on the Riverside route saw an average of less than 5 boardings and alightings. Apart from the route end points, all stops on the Southeast and Mid-Shore routes saw an average of less than 5 boardings and alightings.

The most used bus stop on the MAT system is the Downtown Middletown Bus Terminal which saw an average of 426 boardings and 372 alightings during the week and 124 boardings and 111 alightings on Saturday. The Middletown Plaza bus stop was served by three routes during the week and three on Saturday and saw an average of 100 boardings and 109 alightings during the week and 43 boardings and 21 alightings on Saturday. Walmart was also a well-used stop with an average of 67 boardings and 45 alightings during the week and 51 boardings and 40 alightings on Saturday.

The busiest stop on the M-Link route aside from the Downtown Middletown Bus Terminal was the Meriden Railroad Station which saw an average of 38 boardings and 29 alightings during the week and 12 boardings and 11 alightings on Saturday. The busiest stop on the F Route aside from the Downtown Middletown Bus Terminal was Portland Convalescent with an average of 7 boardings and alightings during the week and one boarding and one alighting on Saturday.

In addition, there were well-used residential stops such as the Stonycrest Towers on Newfield Street (an average of 22 boardings and 22 alightings during the week and 10 boardings and 7 alightings on Saturday), Newfield Towers (an average of 9 boardings and 22 alightings during the week and 22 boardings and 5 alightings on Saturday) and Summer Hill Apartments (an average of 15 boardings and 14 alightings during the week and 5 boardings and 4 alightings on Saturday).

Table 13. Bus Stops With More Than 10 Boardings During The Week

	Boardings	Alightings
9 Town Transit		
Scranton Gazebo	38	18
Old Saybrook Train Station	23	23
Old Saybrook Stop and Shop	20	18
New London Train Station	20	6
Route 1 at S. Main – Westbrook	19	2
MAT Terminal	15	8
Middletown Area Transit		
MAT Terminal	426	372
Middletown Plaza	100	109
Walmart	67	45
Meriden Train Station	38	29
Stonycrest Towers	22	22
Summer Hill Apartments	15	14

Table 14. Bus Stops With More Than 10 Boardings On Saturday

	Boardings	Alightings
9 Town Transit		
Old Saybrook Stop and Shop	28	8
Scranton Gazebo	12	9
Route 1 at S. Main - Westbrook	11	11
Middletown Area Transit		
MAT Terminal		
Walmart	124	111
Middletown Plaza	51	40
Newfield Towers	43	21
Meriden Train Station	22	5
Stonycrest Towers	12	11

INSERT MAP OF BUSIEST BUS STOPS (WEEKDAY AND WEEKEND) HERE

Bus Route Capacity

The existing 9 Town Transit bus fleet could easily accommodate significantly more bus passengers. The 9 Town bus fleet in 2017 consisted of one 20-foot bus with a capacity of eight seated passengers and three wheelchairs, two 22-foot buses with a capacity of twelve seated passengers and two wheelchairs, six 22-foot buses with a capacity of fourteen seated passengers and two wheelchairs plus additional passengers as standees, three 25-foot buses with a capacity of twenty seated passengers and two wheelchairs plus additional passengers as standees, two 28-foot buses with a capacity of nineteen seated passengers and two wheelchairs plus additional passengers as standees, and two 30-foot buses with a capacity of twenty-four passengers and two wheelchairs plus additional passengers as standees.

The Shoreline Route was serviced by one 28-foot bus and two 30-foot buses. This was the busiest 9 Town Transit route with an average weekday maximum load of ten passengers. The average Saturday bus trip on the Shoreline Route had a maximum load of eight passengers and there was an average maximum load of six passengers on Sundays. None of the other bus routes were at capacity and crowding was not an issue.

The existing MAT bus fleet could easily accommodate more bus passengers. The buses run in 2017 included a 29-foot bus with a capacity of 28 seated passengers and ten standees and a 35-foot bus with a capacity of 31 seated passengers and ten standees. An average weekday bus trip had a maximum load of 21 passengers. The average Saturday bus trip had a maximum load of 15 passengers

None of the bus trips counted were at capacity and crowding was not an issue.

Qualitative Observations

Some general observations independent of the quantitative data were recorded. The majority of passengers use the 9 Town Transit system for commute to work during the week and to shopping destinations during the weekend. Vista Life Innovations is a vocational life skills center for adults with developmental disabilities located in Clinton. Many of the riders on the Shoreline route were Vista clients. In fact, Vista clients often formed the majority of riders on the Shoreline route during the midday hours. The majority of riders on the Riverside route were shoppers bound for the Old Saybrook Stop and Shop. Many passengers on all routes were regulars and on a first-name basis with the drivers.

Due to higher residential and commercial density, the MAT routes were used by commuters, shoppers, students and those travelling to medical appointments or social service agencies. Many passengers on Route A boarded and alighted at Connecticut Valley Hospital. Few passengers were using the stops at the medical centers along Saybrook Road. Many passengers on Route B boarded and alighted at the Department of Social Services field office or at apartment complexes such as Wilcox and Summerhill. Aside from Westlake Drive passengers traveling to and from the Cromwell Walmart, most passengers on Route E transferred to and from the C route at Middletown Plaza in order to travel between Downtown Middletown and Walmart. Because the C was almost always late to the transfer pulse point at Middletown Plaza, the E typically had very little time to spend at Walmart, which is the drivers'

bathroom/comfort layover stop. Several regular passengers who use wheelchairs live along West Lake and use the route.

Many passengers transferred to and from CT Transit Meriden and New Haven buses in Downtown Meriden. There was no way for the MAT driver to radio CT Transit drivers to alert them to connecting passengers. Many passengers missed close connections on multiple occasions. Also, while the M-Link is an excellent way for Meriden residents to get to the Cromwell Walmart, it is very difficult and time-consuming for them to get back to Meriden afterward, because of the loop. Route I is a well-utilized night bus loop, connecting Downtown Middletown with the Cromwell Walmart via a single-seat ride. This route is used by shoppers and workers alike. This route remained busy well into the evening, including on Saturdays. Route S-3 is a well-utilized Saturday route, following the same route as the nighttime Route I. Once an additional mid-day run was cut back, the buses became crowded and started routinely running behind-schedule.

Connecticut Statewide Bus Study

In February of 2018, the CT DOT released a statewide bus study that assessed travel needs and evaluated the performance of the state's fixed route bus systems. This study was an in-depth look at the state's eighteen (18) transit districts. The study determined existing socioeconomic and demographic conditions such as population density, the size and location of the state's elderly population, employment density, households in poverty, households without access to a vehicle, households with commuters that use transit, existing bus coverage, future population growth, and future employment growth. The study looked at overall ridership trends, the total number of routes, fleet size, total annual operating budget and fare. The study also analyzed the transit districts for service coverage, transit propensity, provision of service at major activity centers, stop spacing, bus stop amenities and bus information. The study assessed and ranked the statewide bus routes based on three key service guideline areas: transit propensity (to measure the effectiveness of network coverage), passenger trips per revenue hour (to evaluate operational efficiency of routes), and on-time performance (to assess overall route performance and identify routes which require modified running times). This approach provided an individual assessment of each route compared with other routes operated by that specific transit system, and other routes in the state. The statewide bus study also examined route productivity in terms of passenger trips per revenue mile, fare box/cost recovery and ratio of revenue miles to non-revenue miles. The study examined service delivery in terms of on-time performance, average time between failures and the average age of bus fleets.

Route data was requested and analyzed from the following sources. Information on schedules was obtained from public timetables as well as transit systems' internal run-cut and schedule information. Ridership information was collected from internal fare box and ride-check data, as well as public reports. Financial information was taken from financial audits, the National Transit Database, and data from transit systems. Service delivery information was derived from on-time performance reports.

The study determined that overall ridership had increased for most transit districts. Despite comprising only 2 percent of the state's total bus routes and 0.2 percent of the state's annual passenger trips, the

Draft Lower Connecticut River Valley Regional Bus Ridership Study

Estuary Transit District boardings increased by 127.4 percent from 2007 to 2014, the most of any transit system in the state. The Statewide Bus Study determined that the Riverside route was the poorest performing route of all rural bus routes analyzed in terms of passenger trips per revenue hour. This is keeping with the results of the River COG study.

From 2007 to 2014, MAT boardings increased by 46.8 percent, ranking 6th of the eighteen transit districts in terms of ridership growth. The Statewide Bus Study determined that the M-link route and Route F (Portland-East Hampton) were the poorest performing routes of all urban bus systems with less than 750,000 passengers in terms of passenger trips per revenue hour, ranking 21st and 22nd in the state. This is in keeping with the River COG study which has determined the F route has the lowest overall ridership of all MAT routes.

Global recommendations of the statewide bust study were to 1) expand usefulness & capabilities of transportation providers websites, 2) create a one-stop source for information and trip planning, 3) provide real-time bus arrival information, 4) explore the feasibility of consolidating bus operations under a single entity, 5) conduct a governance study, 6) create a single regional fare policy and adopt consistent smart card technology, 7) review transit connectivity/span of service to state and community institutions & major employers, and 8) create a statewide student transit discount policy.

On a route level, the statewide bus study recommended that 1) many bus routes require an examination of bus stop spacing, 2) all bus stops with 50 to 100 boardings should be considered for benches and all bus stops with 100+ boardings should be considered for shelters, 3) as numerous routes experienced low productivity a detailed ridership analysis is needed to identify and eliminate unproductive route segments, 4) bus systems with fare box recovery ratios below 25% need to decrease operating costs or increase ridership , 5) transportation providers with frequent vehicle failures need to identify patterns and/or adjust maintenance schedules, and 6) vehicles whose average age is over 2/3's of useful life should be considered for replacement or rehabilitation.

Recommendations

River COG has identified the Riverside route as having the lowest overall ridership in the 9 Town Transit system and recommends that this route be made more efficient while still serving the needs of the community. 9 Town Transit is currently exploring the possibility for on-demand service along the Riverside route. This on-demand service would replace the current flex route. In addition, as the segment of the route along Main Street to Saybrook Point is lightly traveled, 9 Town Transit is considering a possible seasonal trolley bus to Saybrook Point Inn and the beach communities.

While it is River COG's recommendation that the Shore Line East train station be better served by 9 Town's Shoreline route, the Clinton and Westbrook train stations do not currently have a designated bus stop. The new Clinton train station is in the design phase and some options include a designated stop for the 9 Town Transit buses, including for the new Route 81 bus.

Draft Lower Connecticut River Valley Regional Bus Ridership Study

In the MAT system, the M-link bus was frequently late due to the fact that the route loops through Westlake to arrive at the Cromwell Walmart, travels through Cromwell to Route 9 and then south to Middletown and the MAT terminal. With the opening of the Hartford Line commuter rail service, Meriden will likely see an increased need for transit connections to and from the train station. The M-link currently serves the Meriden train station and also connects with New Haven transit buses. River COG recommends that the M-link route become a direct route between Middletown and Meriden. MAT has proposed to have the M-link route cut so the bus will pulse with other routes in Meriden and Middletown.

While the F route was the poorest performing route in the MAT system, it provides a valuable service to East Hampton and Portland. These communities are not served by any other transit system. River COG does not recommend the elimination of this route. River COG recommends that this route be considered for on-demand service.

Also, as the campus of Middlesex Community College is closed on the weekends, it is River COG's recommendation that the short loop running down Reservoir Road on the S-2 route should be eliminated.

Appendix A

INSERT MAPS OF INDIVIDUAL ROUTES (PASSENGER LOADS AND BUS STOP USE, WEEKDAY AND WEEKEND FOR ALL ROUTES) HERE