Comprehensive Operational Analysis of Bee-Line Shuttles

Final Report

Submitted to
Westchester County Department of Transportation

Submitted by
AECOM USA, Inc.

Subconsultant
CJI Research Corporation

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16. Abstract

This study evaluates the eight shuttle routes operated by the Bee-Line System, which connect the White Plains and Tarrytown Metro-North Railroad Station with businesses and corporate parks primarily in the I-287 corridor in Westchester County. The study examines the productiveness of each route in terms of ridership, revenue and operating costs. As part of the study process, interviews with employers and an electronic survey of employees at businesses served by the Bee-Line shuttles were conducted.

The information gathered was used to develop recommendations for improving the Bee-Line shuttle services through reconfiguring or eliminating routes, looking for efficiencies where fixed route Bee-Line service overlaps with the shuttles, consolidating closely spaced stops, improving pedestrian access at corporate parks and enhancing public information regarding the shuttle services.

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Executive Summary

Study Introduction

In 2009 the Westchester County Department of Transportation (WCDOT) engaged the services of AECOM USA, Inc. and its subconsultant CJI Research Corporation to conduct a Comprehensive Operational Analysis (COA) of the county's Bee-Line shuttle services. The shuttles, part of Bee-Line bus public bus network in Westchester County, operate from the White Plains and Tarrytown rail stations on the Metro-North Railroad to suburban office developments and major employers in the I-287 and Route 120 (Purchase Street, King Street) corridors.

The purpose of this study was to evaluate the eight shuttle routes currently in operation, focusing on elements such as route productivity and cost efficiency in an effort to improve the overall operations of the shuttle routes. This Final Report includes the following sections:

1. Background and existing conditions
2. Evaluation of shuttle services
3. Employer outreach
4. Commuter survey
5. Route recommendations
6. Operations and access improvements
7. Public information

The COA was guided by WCDOT's study project manager, along with a steering committee including representation from WCDOT, MTA Metro-North Railroad, and the New York State Department of Transportation (NYSDOT). Public outreach included interviews with major employers in the study area and an online commuter survey. The study was completed in June 2010.

Existing Transit Services

Bee-Line Shuttles

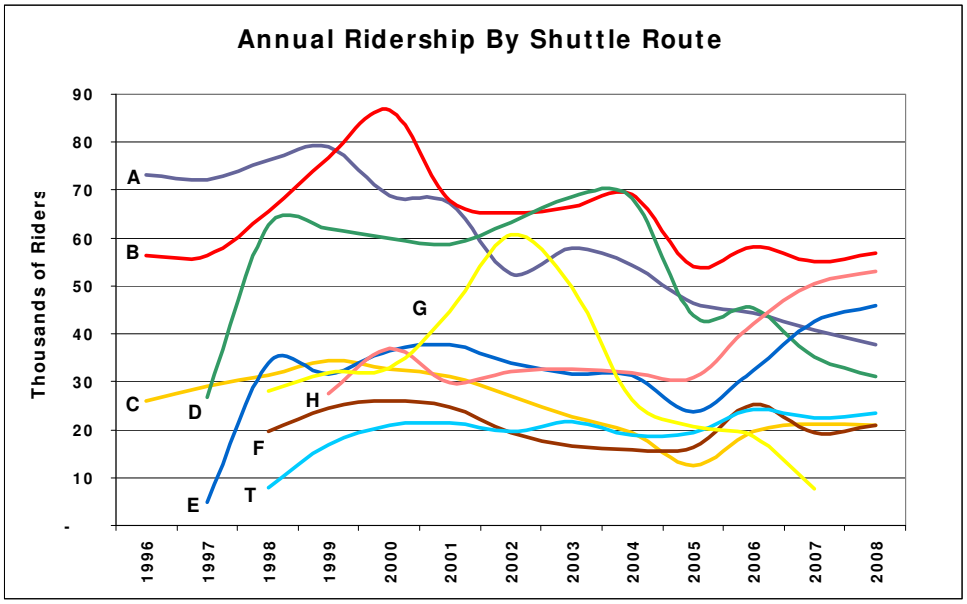
The Westchester County Department of Transportation provided the following brief history of the shuttle system in the Request for Proposals (RFP) for this study:

- Loops A and B began service in 1993 in response to the demand to link bus and rail passengers arriving in White Plains to corporate sites along the I-287 Corridor
- Loop C was launched in 1994 to serve additional employment sites in the I-287 corridor

- In 1997, Loops D and E were initiated in response to the New York State Department of Transportation's plans to undertake major construction work in the corridor, as a means to reduce vehicular volumes
- Loop G was also initiated in 1997, and operated from the North White Plains railroad station to the Westchester Medical Center, but was discontinued in February 2008 due to lack of ridership
- Loop T originates at the Tarrytown railroad station and serves corporate parks along White Plains Road (Route 119)
- Loop F was introduced in 1998 and operates from the White Plains railroad station west along White Plains Road
- Loop H was introduced in 1999, linking the White Plains railroad station with corporate parks in Armonk

On a route-by-route basis, some routes have had great fluctuation in ridership over the decade of operation and others have remained relatively consistent. Peak ridership on the shuttles occurred in the late 1990s and early 2000s. Ridership declined until 2005 before growing somewhat through 2006. As of 2008 reporting, Routes A and D had experienced a downward trend in ridership while Routes B, C, E, F, H, and T have shown an upward trend. Routes F and T were relatively consistent with low ridership throughout the period. Routes E and H experienced the highest rate of growth, with 2008 ridership figures highest in their respective histories.

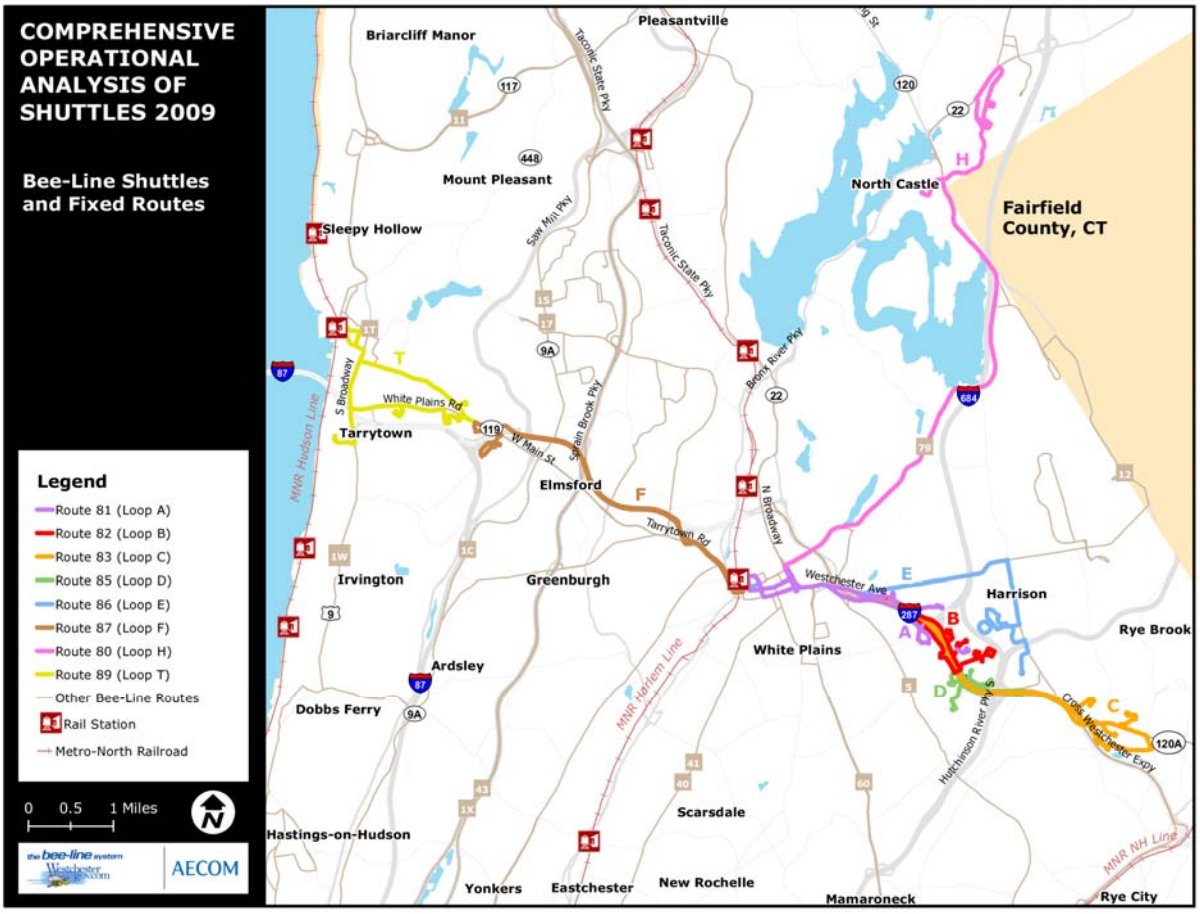
Figure ES-1: 1996-2008 Shuttle Ridership by Route



Source: WCDOT

Figure ES-2 provides a map of the shuttle system for 2009 from data provided by WCDOT.

Figure ES-2: Bee-Line Shuttle Route Network



Data Source: WCDOT

Shuttle Ridership and Cost Effectiveness

Total ridership on the shuttle routes is comparatively low. This is due to the unique nature of the routes as direct links from the White Plains TransCenter and rail station and the Tarrytown rail station to employers in the I-287 corridor. Shuttle trips distribute passengers who board in White Plains or Tarrytown at office locations but do not pick up new passengers en route. Vehicles then deadhead back to the stations to begin new trips.

The reverse occurs in the evening peak period as pick-ups are made at employers and vehicles operate directly to the rail stations, deadheading back to the employment areas for subsequent trips. This lack of mid-route turnover effectively limits ridership to the loads that board from rail and bus connections in White Plains and Tarrytown (note that some additional stops are made in downtown White Plains for peak shuttle direction boarding). Shuttles operate on weekdays only.

The average number of daily boardings per shuttle route is 142. The number of daily passenger trips on a given route ranges from 82 (Loops C, T) to 223 (Loop B), highlighting the wide variability in ridership to different employers. Assuming that the vast majority of shuttle passengers use the service both to and from their office sites, this translates into roughly 40-110 individual users per route on a daily basis.

Table ES-1: Bee-Line Shuttle Ridership

Shuttle Loop	Total Annual Riders	Service Weekdays	Daily Boardings
A	37,785	255	**148**
B	56,981	255	**223**
C	20,931	255	**82**
D	31,092	255	**122**
E	45,861	255	**180**
F	21,007	255	**82**
H	52,945	255	**208**
T	23,370	255	**92**
Total	**289,972**	**2,040**	**1,137**
Average			**142**

Ranking the shuttle routes against each other provides a snapshot of the relative strengths and weaknesses of each for the various cost effectiveness and productivity measures examined below. With 1 as the best score and 8 as the worst, the cumulative rankings for each route show Loop E to be the strongest performer of the shuttle routes and Loop C to be the weakest.

Table ES-2: Relative Ranking of Shuttle Routes

Shuttle Loop	Cost / Trip	Cost / Passenger	Subsidy / Passenger	Passengers / Hour	Passengers / Mile	Passengers / Trip	Farebox Recovery	Daily Ridership	Route Score	Overall Rank
E	1	1	1	2	4	4	1	3	17	**1**
B	3	3	3	3	1	2	3	1	19	**2**
H	8	2	2	1	3	1	2	2	21	**3**
A	2	4	4	4	2	3	4	4	27	**4**
T	6	5	5	7	6	5	5	6	45	**5**
D	5	6	6	6	7	6	7	5	48	**6**
F	4	7	7	5	5	8	6	7	49	**7**
C	7	8	8	8	8	7	8	8	62	**8**

Public Participation

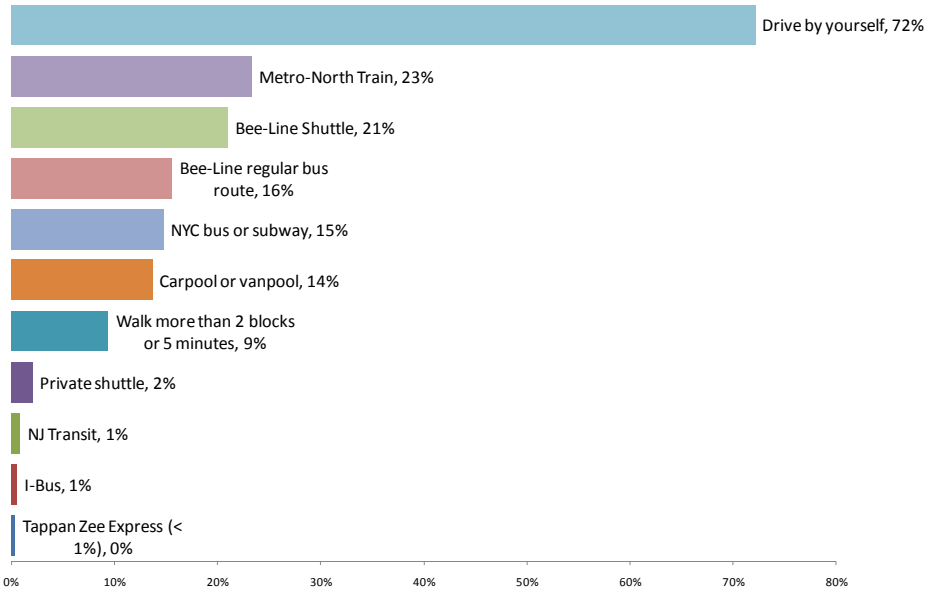
Public participation represents a critical foundation for service planning and an important component of the evaluation of existing services during the early phases of a study. A series of stakeholder interviews was conducted with employers in the study area to solicit feedback pertaining to commuting patterns of employees and use of the Bee-Line shuttle services. The purpose of these interviews was to solicit feedback from major employers currently served by the Bee-Line shuttles concerning quality of service, employee usage of Bee-Line, available alternatives such as private rail station shuttles, and employer support of transit services. Response rates ranged from 35 completed surveys at smaller work sites such as TAL International and Fordham University to nearly 300 responses at Swiss Re.

Commuter Survey

In conjunction with the stakeholder outreach conducted early in the study, a web-based e-survey was conducted among seven employers at sites served by Bee-Line shuttles, based upon employer willingness to take part in the survey effort. Those employers sent an emailed invitation to their employees requesting them to participate. A total of 671 employees participated, including 17 who responded to a paper copy printed in both English and Spanish.

This survey was not intended to be a random sample survey. Rather, it provided an opportunity for employees in the office parks in the study area to provide information on their commuting choices, which in turn offered input into the development of shuttle service recommendations. Respondents were asked to identify their travel modes for all or part of their commute to work.

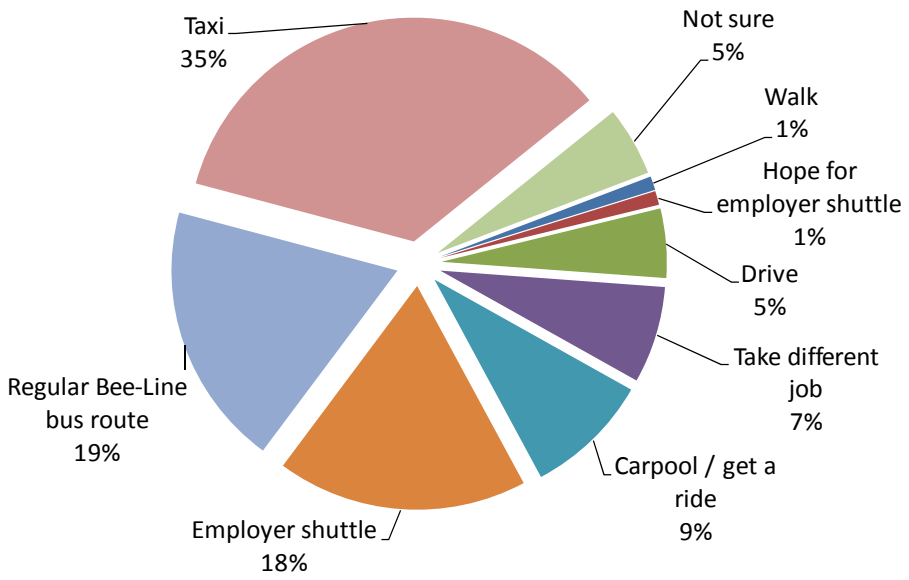
Figure ES-3: Usual Commuting Mode
Q11 Going *TO WORK* most workdays, which of the following do you use for all or *any part* of your commute?
(All respondents. Multiple responses allowed.)



Note that this does not mean that they use these exclusively, because many use some combination of these modes. It is for this reason that the sum of percentages in the chart exceeds 100%.

Of interest to this study was the question of what alternatives Bee-Line shuttle users may have at present (private shuttles, their own automobile, etc.) and whether or not they might consider other transit services such as Bee-Line fixed route buses in the study corridors. Perhaps interpreting the alternative scenarios as temporary, 35% indicated that they would get to work from the Metro-North station by taxi. Other options included Bee-Line fixed route service (e.g., Route 12), carpooling, driving themselves, or even looking for another job in a different location.

Figure ES-4: Alternatives to Bee-Line Shuttles



The two reasons most often cited as very important for choosing Bee-Line shuttles over regular route services were that the shuttle is more direct than a regular Bee-Line bus route (72%), and that the shuttle is faster (67%). A third factor is that the shuttle gets closer to the workplace, a reason cited by 65% as being very important.

Overall, the commuter survey provided confirmation of several key points. The commuting population at businesses served by the shuttles is largely one that drives to work, has a relatively high household income, and is dispersed fairly widely in the region. For these reasons, the percentage of respondents that uses Bee-Line, and the shuttle services in particular, is significant. These respondents rely more heavily on transit and represent both moderate and higher income workers commuting from New York City (where auto ownership is less tied to household income) and workers with generally lower incomes than those who typically commute by car.

Route and Service Recommendations

Following the review of shuttle route performance, input from the employer and commuter stakeholder groups, and discussion with WCDOT staff and the project steering committee, a number of service planning recommendations were developed to improve the operating efficiency of the Bee-Line shuttle program as a whole.

The route recommendations respond to four primary goals:

- Improve service efficiency and cost-effectiveness
- Maintain service coverage and frequency
- Consolidate services where opportunities exist
- Shift shuttle ridership to fixed route buses where feasible and reasonable

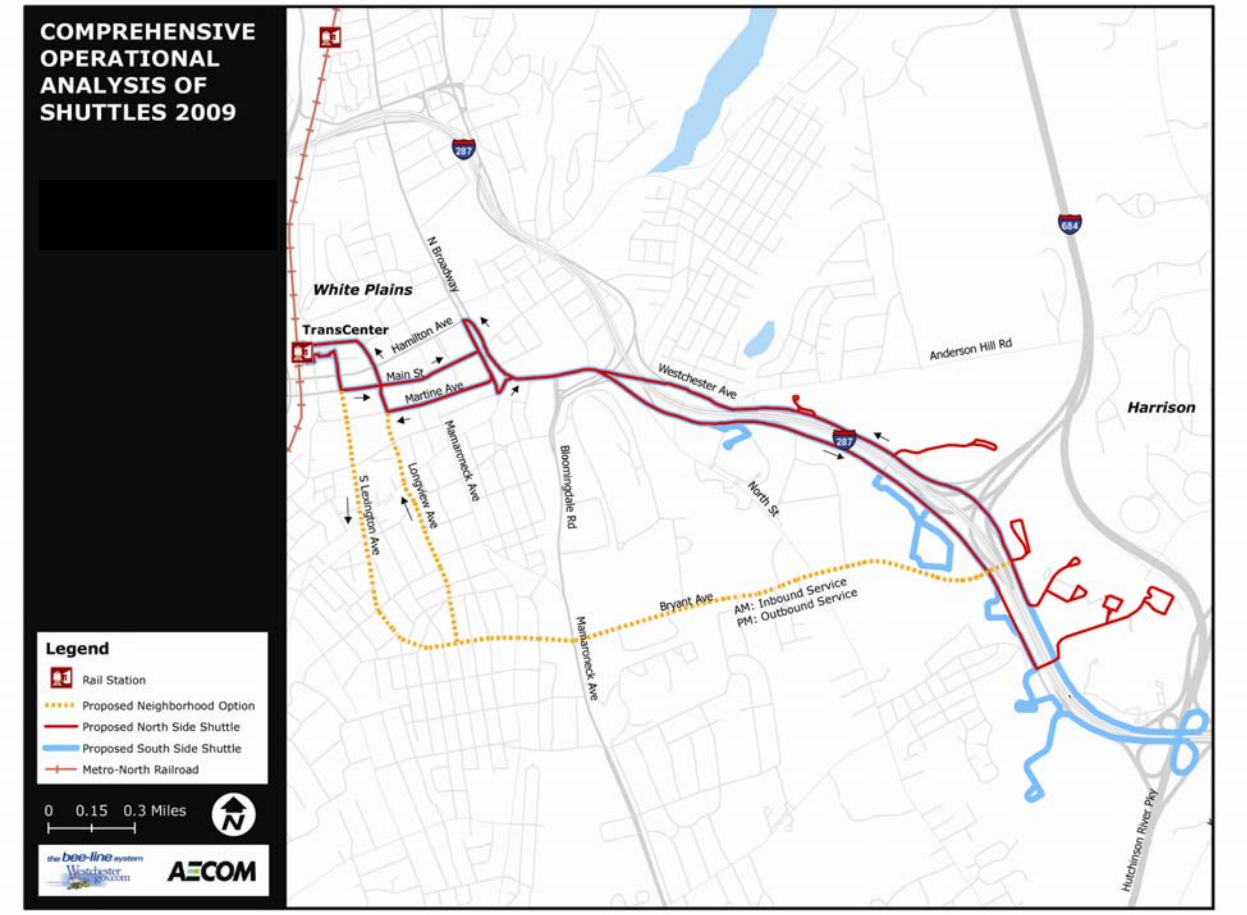
For each recommended service change (or group of changes), summaries were provided for anticipated operating and cost impacts. To develop a reasonable evaluation of these impacts, ridership estimates are not included in these estimates. It is not anticipated that ridership would change significantly enough to impact operating costs. For the most part, the changes maintain service coverage either through existing shuttle routes or through Bee-Line fixed routes. Thus, while some riders may choose other alternatives, the vast majority would still have a Bee-Line alternative even if shuttle services were eliminated.

The following recommendations for service changes were proposed:

1. Consolidation of three routes, Loops A, B, and D, into one south side and one north side loop in the Westchester Avenue corridor east of White Plains (Figure ES-5)
2. Inclusion of an option for peak direction (i.e., into White Plains in the morning) neighborhood service in conjunction with the north/south side loops
3. Modification (operation from Port Chester) or discontinuation of Loop C due to low ridership
4. Elimination of Loop E and incorporation into existing Route 12 service (Figure ES-6)
5. Elimination of Loop T and incorporation of selected stops into expanded Loop F service (Figure ES-7)

Maps of the primary proposed changes are presented on the following page.

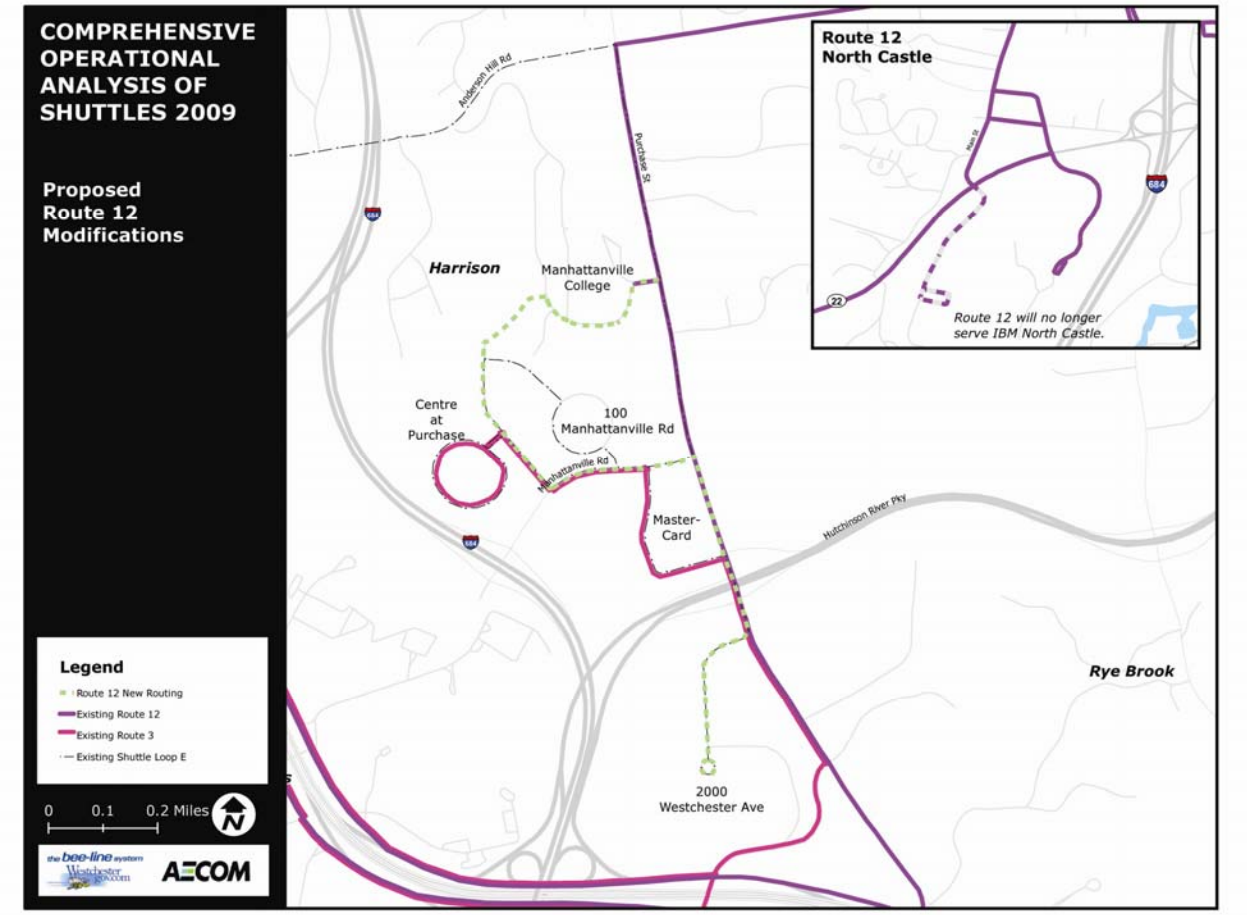
Figure ES-5: North Side and South Side Loops with Neighborhood Option



The north and side side shuttle loops proposed here are designed to operate in conjunction with one another, along with the neighborhood option. Outbound trips from White Plains in the morning would distribute passengers at employment sites on the north and south sides of Westchester Avenue, returning to White Plains via Bryant Avenue to offer residential neighborhoods transit access to the TransCenter and White Plains railroad station.

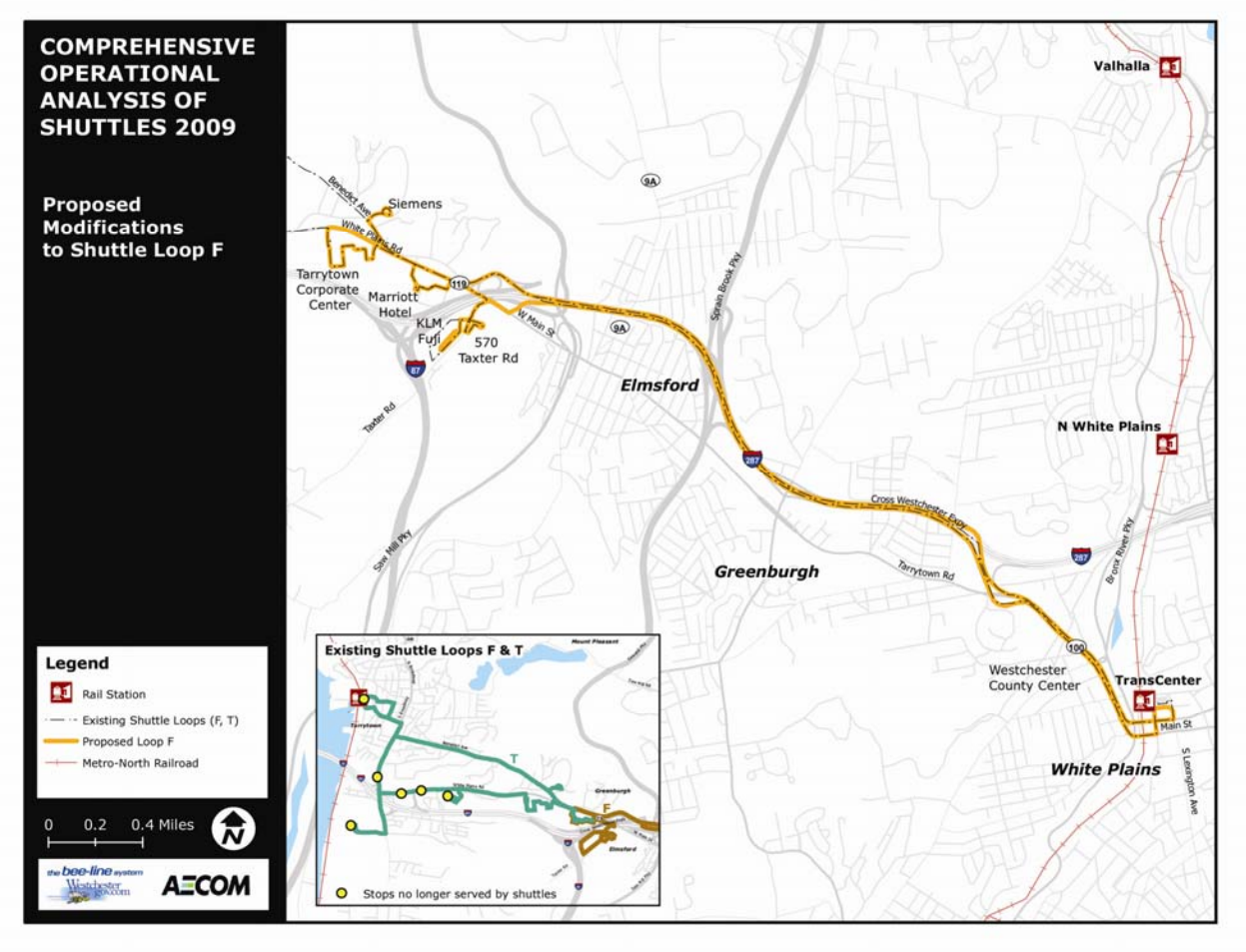
In the afternoons, vehicles would leave White Plains via the neighborhood routing (South Lexington Avenue to Bryant Avenue), dropping off any riders returning home from the railroad station and TransCenter, before picking up shuttle customers at employment sites and carrying them back to White Plains.

Figure ES-6: Proposed Modifications to Route 12 / Elimination of Loop E



The proposed change to the Route 12 service includes bi-directional deviations from Purchase Street through the 2000 Westchester Avenue, MasterCard, Manhattanville Road, and Manhattanville College complexes to serve stops currently situated on Loop E. As seen in the map inset above, Route 12 would no longer deviate in North Castle to serve the IBM facility on selected trips as it does now.

Figure ES-7: Proposed Modification to Loop F



Summary of Impacts

Overall, the route and service changes recommended for the shuttle program were designed to improve efficiency, reduce costs, and maximize the availability of compatible fixed route Bee-Line bus services wherever possible. The following table summarizes the anticipated impacts of the recommendations as a whole, based on the revenue hour/cost calculations used above.

The cost savings possible through implementation of the proposed recommendations would be substantial. The net changes shown for the shuttle network in Table ES-3 reflect the proposed elimination of Loop C. A separate option was also proposed to operate Loop C from Port Chester rather than White Plains. If Loop C is eliminated, the estimated savings would total $1,543,670 annually. If Loop C were to be operated from Port Chester, the net savings would nonetheless total $1,326,750.

Table ES-3: Summary Anticipated Operating Impacts

Route	Annual Revenue Hours	Annual Revenue Miles	Peak Vehicles	Annual Expense
Existing Services				
Loop A	3,605	27,299	2	$522,725
Loop B	4,516	36,331	3	$654,820
Loop C	2,762	38,456	2	$400,490
Loop D	3,738	38,962	2	$542,010
Loop E	3,373	42,858	2	$489,085
Loop F	2,500	22,998	2	$362,500
Loop H	2,927	40,632	3	$424,415
Loop T	3,081	27,400	2	$446,745
Subtotal	**26,502**	**274,936**	**18**	**$3,842,790**
Proposed Services				
North Side	4,488	49,368	3	$650,760
South Side	5,474	69,472	3	$793,730
Modification of Loop F	2,967	49,649	2	$430,215
Loop H	2,927	40,632	3	$424,415
Subtotal	**15,856**	**209,121**	**11**	**$2,299,120**
Net Change	**- 10,646**	**- 65,815**	**- 7**	**- $1,543,670**

Note: Proposed neighborhood option does not affect North Side/South Side operating costs

Operations and Access Improvements

In addition to the route planning recommendations outlined in Section 5, a number of operational improvements were identified to offer opportunities for faster travel times, reduced vehicle dwell time, and customer convenience. Primary areas of improvements pursued include:

- Bus stop consolidation within properties
- Turning movements and route alignments
- Pedestrian Access and Sidewalk Improvements
- Access to the White Plains railroad station
- Reverse peak shuttle boarding

The Bee-Line shuttle routes were designed to maximize customer convenience by providing direct connections from Metro-North Railroad stations to employment sites, many of which are situated in suburban office parks and set back from the main roadways. While front-door drop-offs and pick-ups are a convenience for customers, an excessive number of vehicle stops within individual office parks has resulted in inefficient operations, slower travel times, as well as the perception of an inefficient service making too many stops, too close together. The proposals point to opportunities for consolidating stops within corporate properties to keep shuttle vehicles moving and reduce unnecessary dwell time.

One such example is the consolidation of stops within the Tarrytown Corporate Center. Four bus stops should be consolidated into a single location at the existing 560 White Plains Road stop. This would not only reduce vehicle dwell time within the complex but would also allow for

a more direct exit to White Plains Road by eliminating travel through the middle of the large, central parking lot to access 580 White Plains Road. Walking distances from this single stop to any of the employers in this complex would not exceed 0.18 miles.

Figure ES-8: Bus stop consolidation in the Tarrytown Corporate Center

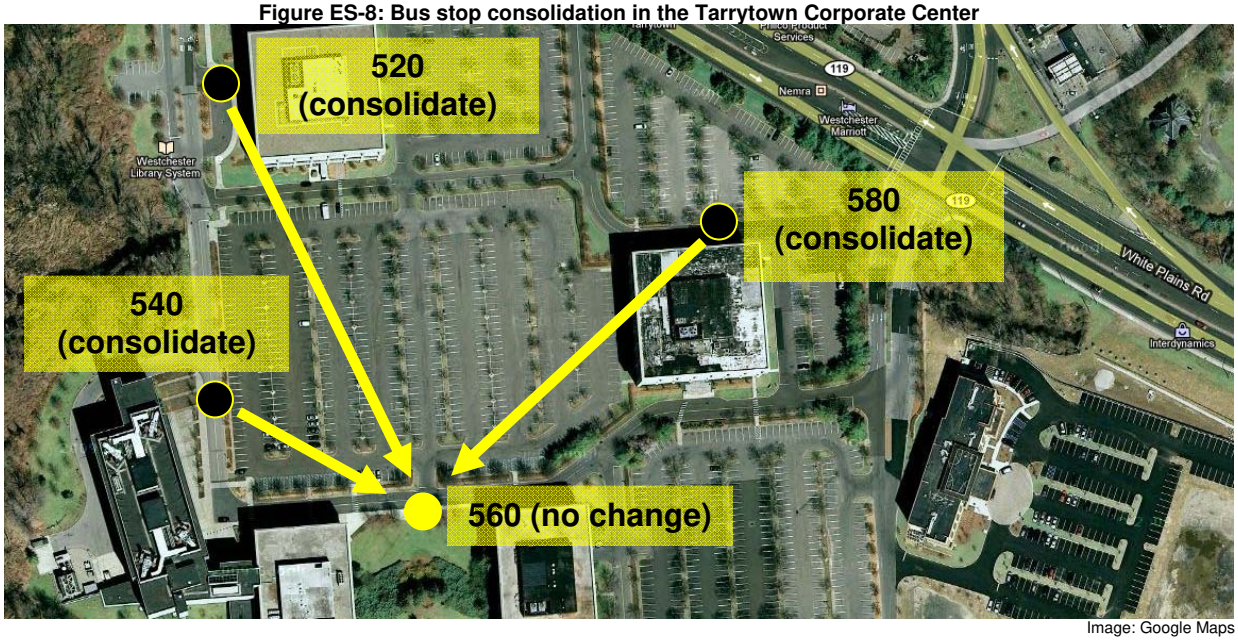


Image: Google Maps

Summary

The proposals developed throughout the course of the study focused on an overall improvement in the operations and cost-effectiveness of the Bee-Line shuttle network. The services have provided important linkages to commuters who wish or need to use public transportation to reach employment sites in the busy I-287 corridor, yet have struggled to remain viable relative to the overall Bee-Line bus network. Through a series of route consolidations, eliminations of services overlapping other Bee-Line routes, consolidation of bus stops and other policy and access improvements, this study provides WCDOT the opportunity to maintain service for the vast majority of shuttle customers while greatly reducing operating costs.

Introduction

In 2009 the Westchester County Department of Transportation (WCDOT) engaged the services of AECOM Transportation and its subconsultant CJI Research Corporation to conduct a Comprehensive Operational Analysis (COA) of the county's Bee-Line shuttle services. The shuttles, part of the Bee-Line public bus network in Westchester County, operate from the White Plains and Tarrytown rail stations on the Metro-North Railroad to suburban office developments and major employers in the I-287 and Route 120 (Purchase Street, King Street) corridors.

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Section 1 – Background and Existing Conditions

1.1 Existing Transit Services

This section provides a summary of existing transit services, public and private, in the COA study area, as well as additional employment and demographic information for the area. Detailed descriptions of these services can be found in Appendix 1, comprised of the study's first technical memorandum (*Technical Memorandum 1 – Baseline Conditions*).

The Westchester County Department of Transportation (WCDOT) provided the following brief history of the shuttle system in the Request for Proposals (RFP) for this study:

- Loops A and B began service in 1993 in response to the demand to link bus and rail passengers arriving in White Plains to corporate sites along the I-287 Corridor
- Loop C was launched in 1994 to serve additional employment sites in the corridor
- In 1997, Loops D and E were initiated in response to the New York State Department of Transportation's plans to undertake major construction work in the corridor, as a means to reduce vehicular volumes
- Loop G was initiated in 1997, and operated from the North White Plains railroad station to the Westchester Medical Center, but was discontinued in February 2008 due to lack of ridership
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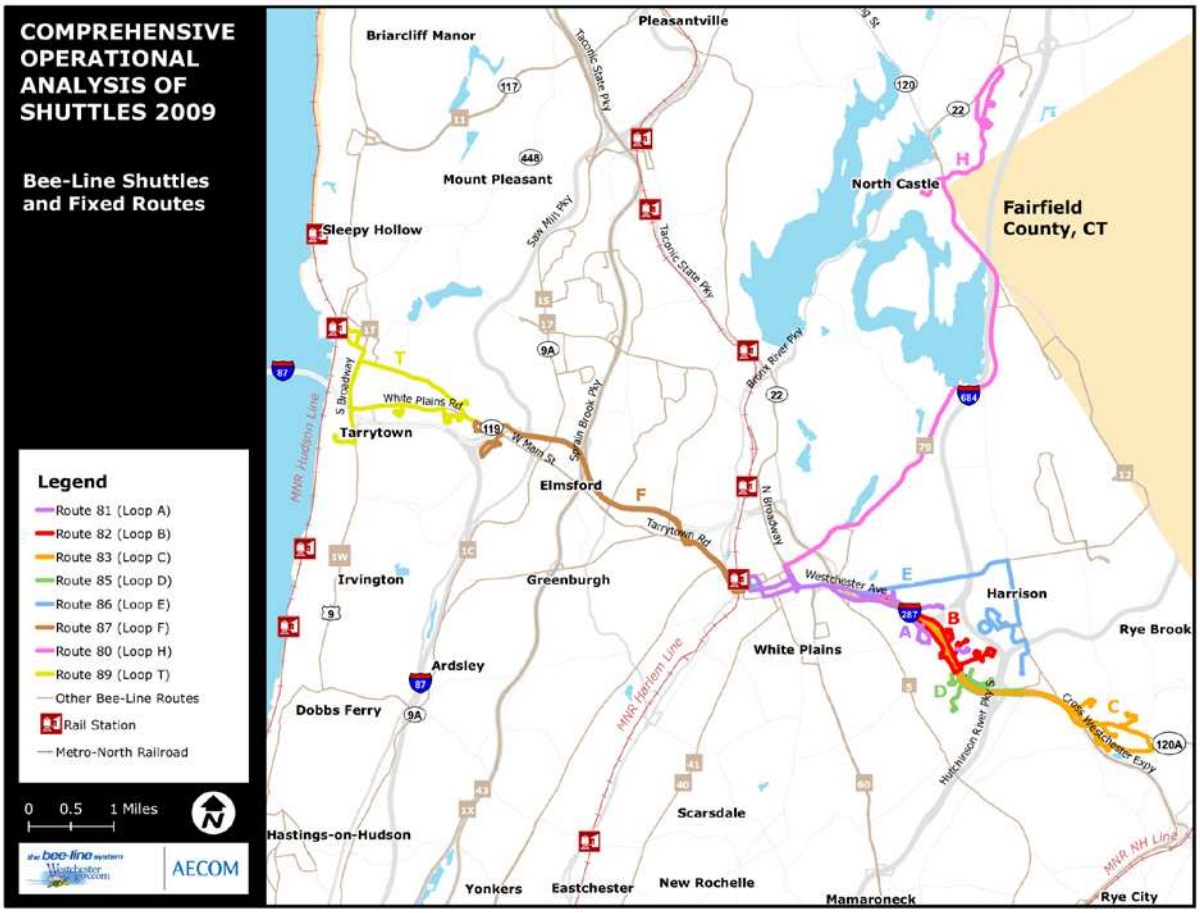
- Loop H was introduced in 1999, linking the White Plains railroad station with corporate parks in Armonk

Figure 1-1 on the following page provides a map of the shuttle system for 2009 from data provided by WCDOT.

Figure 1-1: Bee-Line Shuttle Route Network



Source: WCDOT

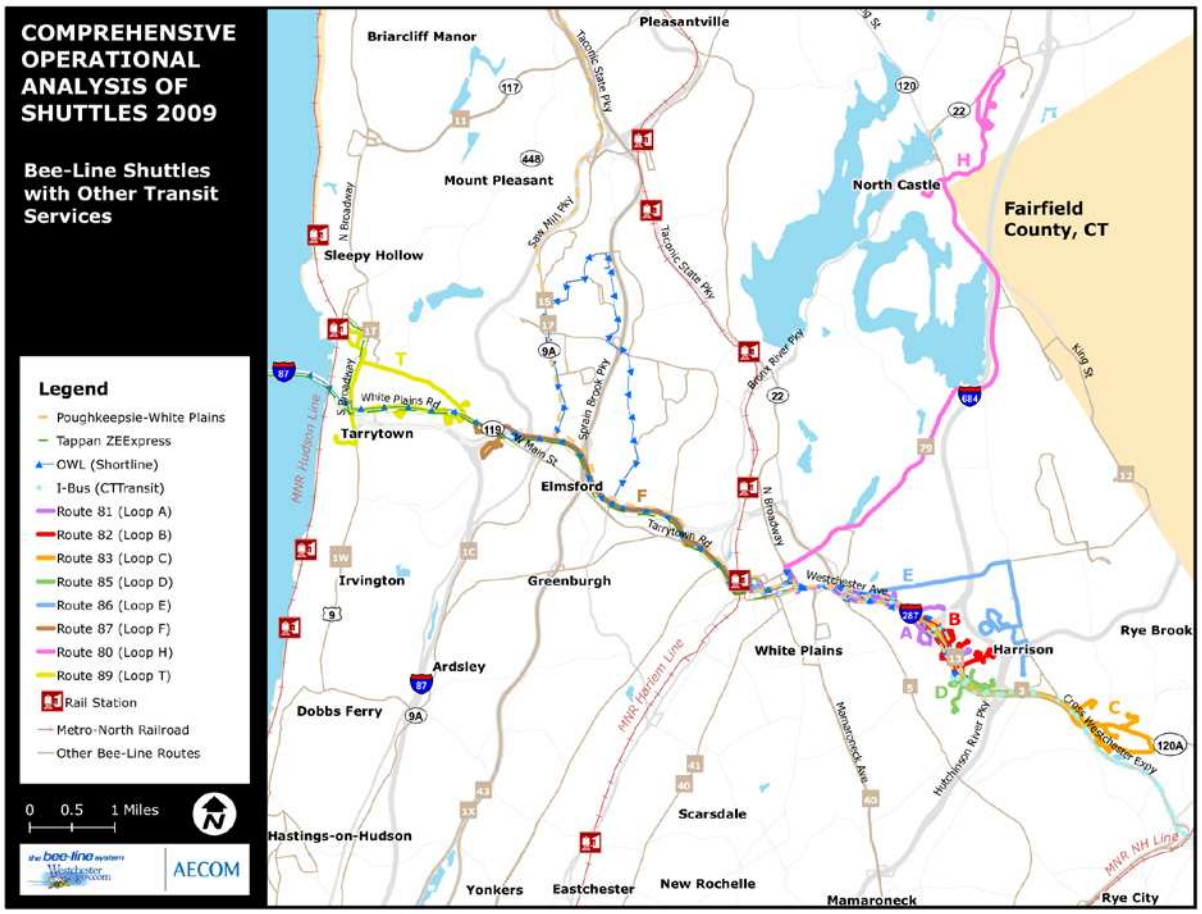
In the shuttle service area, the primary interstate roadways in the corridors are I-287 and I-87, linking White Plains, Port Chester, and Tarrytown. Local roadways of primary concern in the corridor are Westchester Ave (White Plains) and Tarrytown Rd (Tarrytown), both of which are designated Route 119 and run parallel to I-287.

Several transit operators provide service in the region. Within the study area, Bee-Line operates fixed route bus service and shuttle service, CTTransit operates the I-Bus Express interstate service, Coach USA/ShortLine operates the Orange-Westchester Link express bus service, Rockland County Department of Public Transportation operates the Tappan ZEExpress bus service, and Leprechaun Commuter Lines operates the Poughkeepsie-White Plains Express route. Transit service is also provided in the corridor by private van operators contracted by individual employers or property managers, and by taxis. The transportation system is first described as a whole and then is broken down by individual service provider.

The transit options in the White Plains-Tarrytown region are extensive. The map in Figure 1-2 provides an overview of the transportation network in the region along with the route structures

of the transit services. As shown on the map, Bee-Line fixed routes, I-Bus, OWL, Tappan ZEExpress, and Poughkeepsie-White Plains Express all operate along some of the same roadways as the Bee-Line shuttles. Following the descriptions of all of the different transit service in the region, the cumulative system is revisited with a discussion of ridership by system and for the region as a whole.

Figure 1-2: Cumulative System Overview



Source: Westchester County Department of Transportation, CTTransit, Leprechaun Lines, ShortLine/CoachUSA, Rockland County Department of Transportation

1.1.1 Bee-Line Shuttles

The Bee-Line shuttles operate from the White Plains and Tarrytown railroad stations along the I-287 corridor. In 2009, there were 8 shuttles in operation. Table 1-1 lists each shuttle route and the companies and areas that it serves. Shuttle G is also listed for historical comparison; this loop was discontinued in February of 2008 due to lack of ridership. Most shuttle routes start from the Metro-North Railroad stations and operate eastward. There is also some overlap between shuttle routes and a few companies/areas are served by more than one shuttle route.

Table 1-1: Bee-Line Shuttle Descriptions

Shuttle Route	Origin	Areas/Companies Served
80 LOOP H	White Plains Trans Center	MBIA, Swiss Re, IBM
81 LOOP A	White Plains Trans Center	701, 707,709,711,777,244 Westchester Ave, Harrison Court, Kaiser Permanente
82 LOOP B	White Plains Trans Center	Rockledge, 925, 1025 Westchester Ave, West. Corporate Park, Gannett Drive, US Postal Facility, 400,500 Westchester Ave, Fordham University
83 LOOP C	White Plains Trans Center	Philip Morris, Rye Town Hilton, 287 Bowman Ave, 2975, 2500, 2700 Westchester Ave
85 LOOP D	White Plains Trans Center	1101 Westchester Ave, COMBE, Nine West, 1133 Westchester Ave, Berkley College, US Tennis Association, Westchester Renaissance Hotel
86 LOOP E	White Plains Trans Center	100 Manhattanville Rd, Centre at Purchase, MasterCard
87 LOOP F	White Plains Trans Center	KLM, FUJI, 660 White Plains Rd, Marriott Hotel
*** 88 LOOP G**	North White Plains RR Station	Brunschwig and FILS, Westchester Medical Center
89 LOOP T	Tarrytown RR Station	120 White Plains Rd, 150 White Plains Rd, Talleyrand Office Park, Tarrytown Corp. Center, 660 White Plains Rd, Marriott Hotel, Siemens

* Discontinued February 2008

Source: WCDOT

Table 1-2 lists the span of operation and frequency of service for the shuttle routes. Shuttles operate during the morning and afternoon peak periods on weekdays only. Most routes operate from 6:35-10:15 AM and from 2:30-6:45 PM. Three routes (A, B, D) operate every 15 minutes while the others operate every 30 minutes.

Table 1-2: Bee-Line Shuttles Span and Frequency by Route

Route	Weekday	
	Span	Frequency
Loop A	6:35 AM - 10:16 AM, 2:23 PM - 6:48 PM	15 Minutes
Loop B	6:35 AM - 10:14 AM, 2:23 PM - 6:48 PM	15 Minutes
Loop C	6:35 AM - 10:14 AM, 2:54 PM - 6:48 PM	30 Minutes
Loop D	6:35 AM - 10:13 AM, 2:22 PM - 6:48 PM	15 Minutes
Loop E	6:35 AM - 10:12 AM, 2:58 PM - 6:48 PM	30 Minutes
Loop F	6:35 AM - 10:09 AM, 3:08 PM - 6:48 PM	30 Minutes
Loop H	6:35 AM - 10:20 AM, 2:53 PM - 6:48 PM	30 Minutes
Loop T	6:40 AM - 10:02 AM, 2:04 PM - 6:32 PM	30 Minutes

Source: Source: WCDOT

When the shuttle service began in the mid-1990s, the shuttles were considered a 'premium' service due to the 'door-to-door' nature, and thus, the fare was higher than the regular bus fare. At the time of creation of the shuttles, the fare was $2 whereas the fare for regular Bee-Line fixed route buses was less. However, with the participation in the MetroCard system, the fares were standardized, so the shuttle fare was set to the same as regular fixed route services. Effective June 2009, the fare for shuttle and fixed route services was raised to $2.25.

Table 1-3 below lists the operating expenses, revenue, and fleet requirements by shuttle route for 2004-2008. In 2008, expenses averaged $610,099 (up 20% since 2004) by route and revenue averaged $43,540 by route (down 34% since 2004). Further, in 2008, total expenses for all routes were $4.9 million and total revenue for all routes was $349,259. Operating expenses increase yearly as fuel costs fluctuate, wages increase, and other costs subject to inflation increase. Revenues are tied to ridership, which has fluctuated over the period, and have also decreased since the introduction of the MetroCard system.

In order to cover the gap between operating costs and revenues, the shuttles receive several other sources of funding. The operating deficit is made up through bus operating assistance (BOA), state aid, federal aid, and other WCDOT and MetroCard revenue.

Each shuttle loop requires two peak vehicles except Loops B and H, which require 3 vehicles. During the four-year period, Loops A and D were reduced from 3 vehicles to 2 (between 2007 and 2008) and Loop H was increased from two vehicles to three (between 2007 and 2008) to increase trip frequency. Loop G was reduced from two vehicles to one (between 2006 and 2007), then eliminated in early 2008.

Table 1-3: Bee-Line Shuttle Operating Statistics 2004-2008

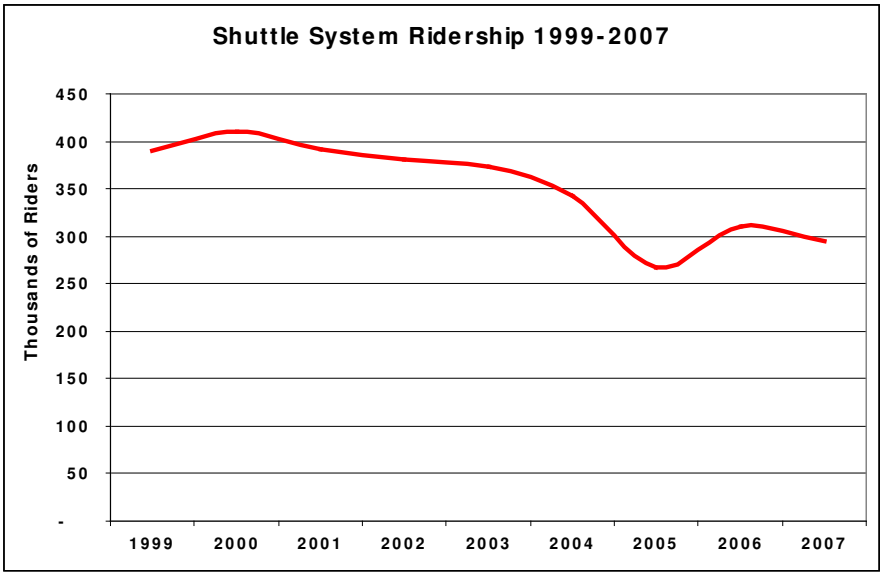
Total Expenses									
Year	**Loop H**	**LOOP A**	**LOOP B**	**LOOP C**	**LOOP D**	**LOOP E**	**LOOP F**	**LOOP G**	**LOOP T**
2008	$670,873	$610,138	$795,007	$573,525	$694,730	$569,570	$487,500	$33,540	$479,448
2007	$613,365	$627,271	$747,393	$535,244	$689,804	$521,748	$450,482	$248,055	$457,155
2006	$548,883	$639,100	$687,828	$486,066	$743,214	$476,822	$418,306	$381,468	$412,633
2005	$476,187	$513,669	$547,548	$448,317	$582,744	$362,699	$338,926	$367,722	$348,909
2004	$619,404	$663,529	$660,261	$486,983	$540,896	$389,604	$430,253	$406,900	$383,170
Net Route Revenue									
Year	**Loop H**	**LOOP A**	**LOOP B**	**LOOP C**	**LOOP D**	**LOOP E**	**LOOP F**	**LOOP G**	**LOOP T**
2008	$62,791	$44,388	$67,906	$25,395	$36,683	$55,966	$27,364	$940	$27,826
2007	$55,171	$40,749	$58,624	$22,237	$39,112	$45,634	$22,276	$7,814	$24,023
2006	$87,001	$100,970	$116,937	$37,113	$99,099	$65,094	$48,436	$21,143	$48,590
2005	$64,873	$93,991	$102,782	$24,842	$93,852	$46,992	$29,224	$14,425	$33,793
2004	$65,238	$104,359	$122,409	$36,297	$129,599	$52,636	$28,157	$17,043	$40,262
Peak Vehicles Required									
Year	**Loop H**	**LOOP A**	**LOOP B**	**LOOP C**	**LOOP D**	**LOOP E**	**LOOP F**	**LOOP G**	**LOOP T**
2008	3	2	3	2	2	2	2	0	2
2007	2	3	3	2	3	2	2	1	2
2006	2	3	3	2	3	2	2	2	2
2005	2	3	3	2	3	2	2	2	2
2004	2	3	3	2	3	2	2	2	2

Source: WCDOT

In 2008, total shuttle ridership was down by 6% from 2004, but has improved slightly since 2007. Figure 1-3 shows how overall shuttle system ridership has changed from 1999 to 2007

(the years in which all 9 shuttle route were operational). Overall, ridership is on a downward trend, but recently improving.

Figure 1-3: 1999-2007 Annual Shuttle System Ridership



Source: WCDOT

Table 1-4 lists annual shuttle ridership figures by route for 1996-2008.

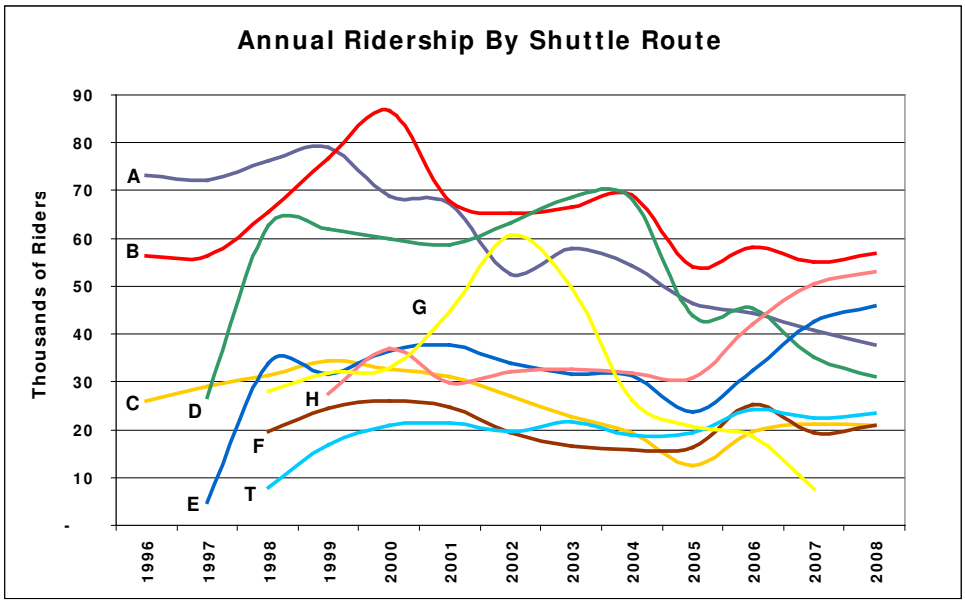
Table 1-4: 1996-2008 Annual Shuttle Ridership by Route

LOOP	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
A	73,287	72,174	76,205	79,129	68,934	67,215	52,624	57,849	54,183	46,288	44,377	40,920	37,785
B	56,264	56,381	65,495	76,783	86,596	67,865	65,204	66,467	69,056	54,021	58,047	55,176	56,981
C	26,015	29,130	31,480	34,367	32,511	31,182	27,072	22,690	19,419	12,590	19,534	21,114	20,931
D		26,728	62,726	62,076	60,034	58,554	63,261	68,592	68,269	43,818	45,316	35,283	31,092
E		4,797	33,841	31,531	36,533	37,859	33,951	31,637	31,355	23,816	32,471	42,543	45,861
F			19,530	24,500	26,041	24,838	19,322	16,498	15,851	16,413	25,216	19,252	21,007
H				27,464	36,845	29,741	32,208	32,591	31,897	30,766	42,128	50,564	52,945
T			8,003	16,906	20,820	21,378	19,524	21,678	18,825	19,326	24,157	22,452	23,370
G			28,172	31,985	32,912	44,541	60,766	49,815	26,187	20,606	18,599	7,754	
TOTAL	**155,566**	**191,946**	**326,345**	**390,342**	**410,180**	**391,667**	**381,424**	**373,898**	**342,638**	**267,644**	**309,845**	**295,058**	**289,972**

Source: WCDOT

On a route-by-route basis, some routes have had great fluctuation in ridership over the decade of operation and others have remained relatively consistent. Peak ridership on the shuttles occurred in the late 1990s and early 2000s. Ridership declined until 2005 before growing somewhat through 2006. As of 2008 reporting, Routes A and D had experienced a downward trend in ridership while Routes B, C, E, F, H, and T have shown an upward trend. Routes F and T were relatively consistent with low ridership throughout the period. Routes E and H experienced the highest rate of growth, with 2008 ridership figures highest in their respective histories.

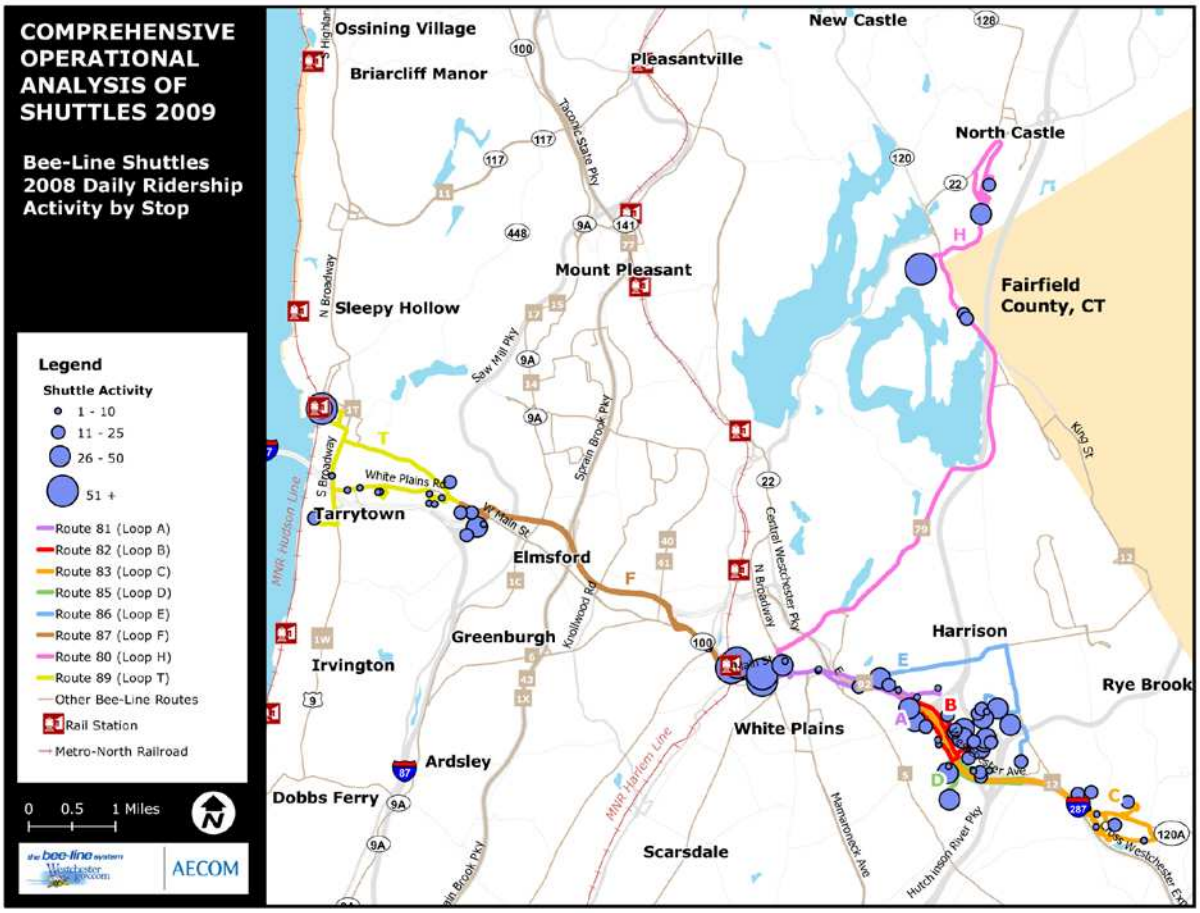
Figure 1-4: 1996-2008 Annual Shuttle Ridership by Route



Source: WCDOT

The maps on the following pages show current daily ridership activity by stop from the 2008 on/off counts conducted by the Westchester County Department of Transportation. Figure 1-5 is a map of ridership by stop for the whole shuttle system. Individual stop ridership is greatest at the White Plains TransCenter and railroad station and the Tarrytown Railroad Station, as these serve as the primary trip origins for shuttle riders. Among employment destinations, Swiss Re in North Castle, the Westchester Medical Group in Harrison, and the Galleria in White Plains rank among the busiest stops in the shuttle network. Concentrations of ridership are greatest in downtown White Plains, and along Westchester Avenue east of the city.

Figure 1-5: Bee-Line Shuttle System 2008 Daily Ridership Activity by Stop

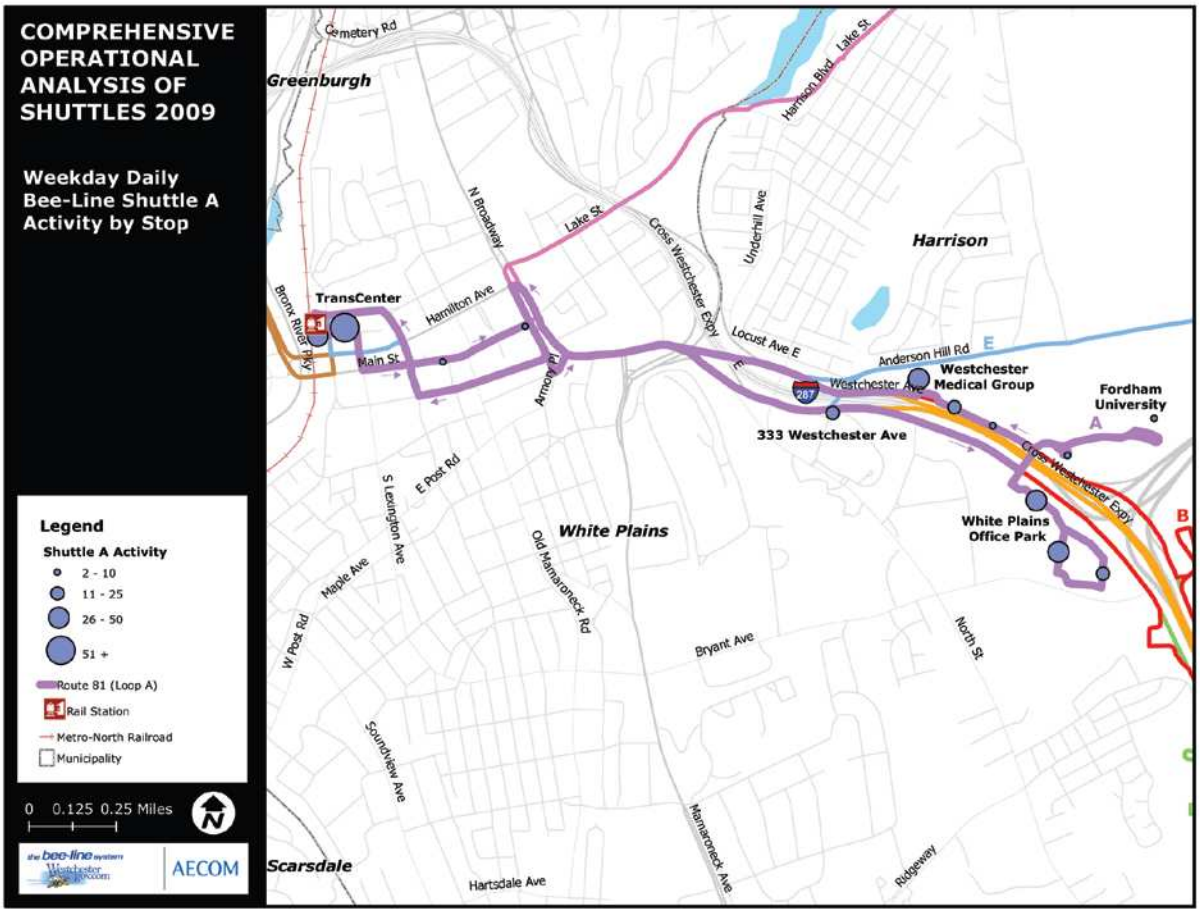


Source: WCDOT, On/Off Counts 2008

The following maps show daily ridership activity by stop for each individual shuttle route. Maps of morning versus afternoon peak ridership by stop for each shuttle route are shown in Appendix 1.

Figure 1-6 is a map of activity by stop for Shuttle A from 2008. Outside of downtown White Plains at the railroad station and TransCenter, activity is greatest at the White Plains Office Park and the Westchester Medical Group.

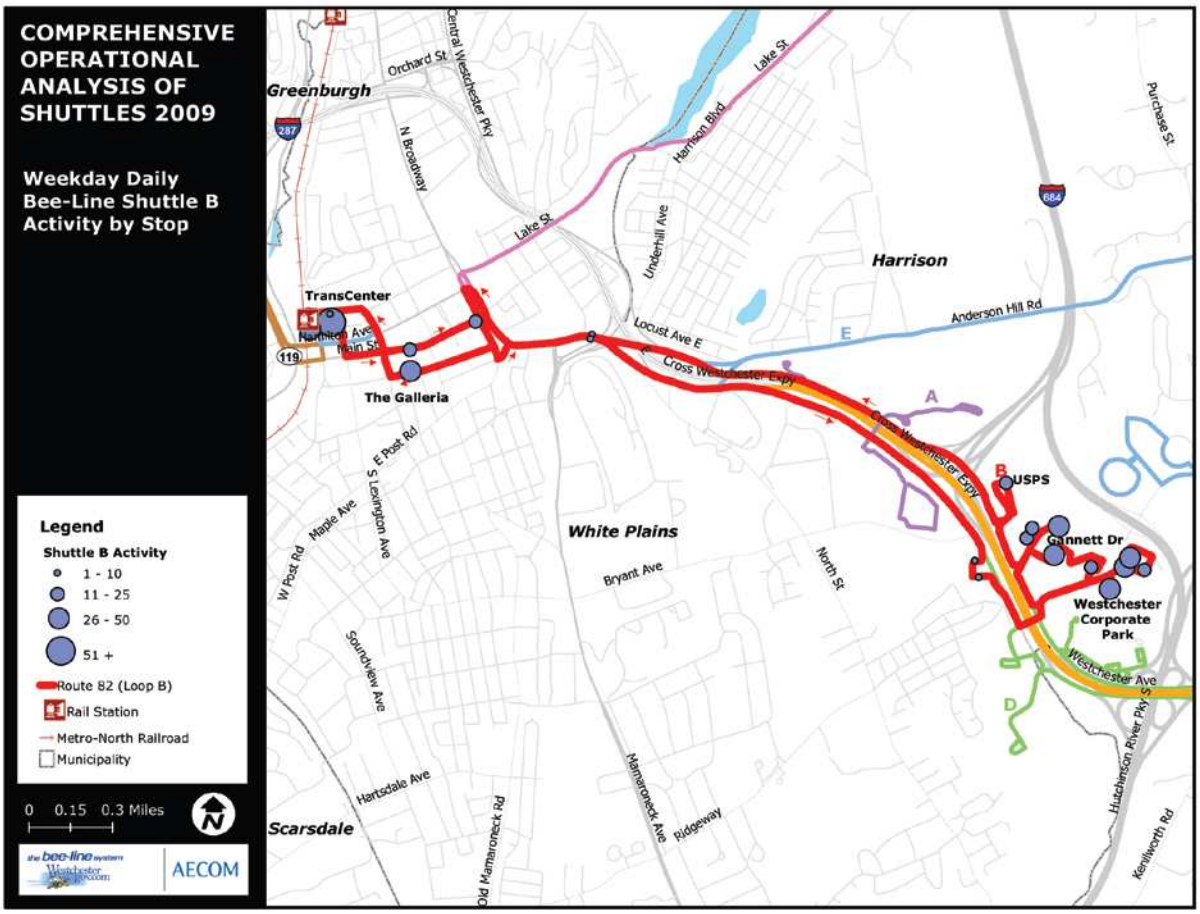
Figure 1-6: Shuttle A 2008 Daily Ridership Activity by Stop



Source: WCDOT, On/Off Counts 2008

Figure 1-7 depicts daily ridership for Shuttle Loop B. The ridership is greatest on this route along Gannett Drive and at the Westchester Corporate Park. This route focuses on stops at the corporate park and on the north side of I-287. Walk-on and transfer ridership from The Galleria in White Plains is also relatively significant and indicates walk-on and/or transfer activity outside of the TransCenter area.

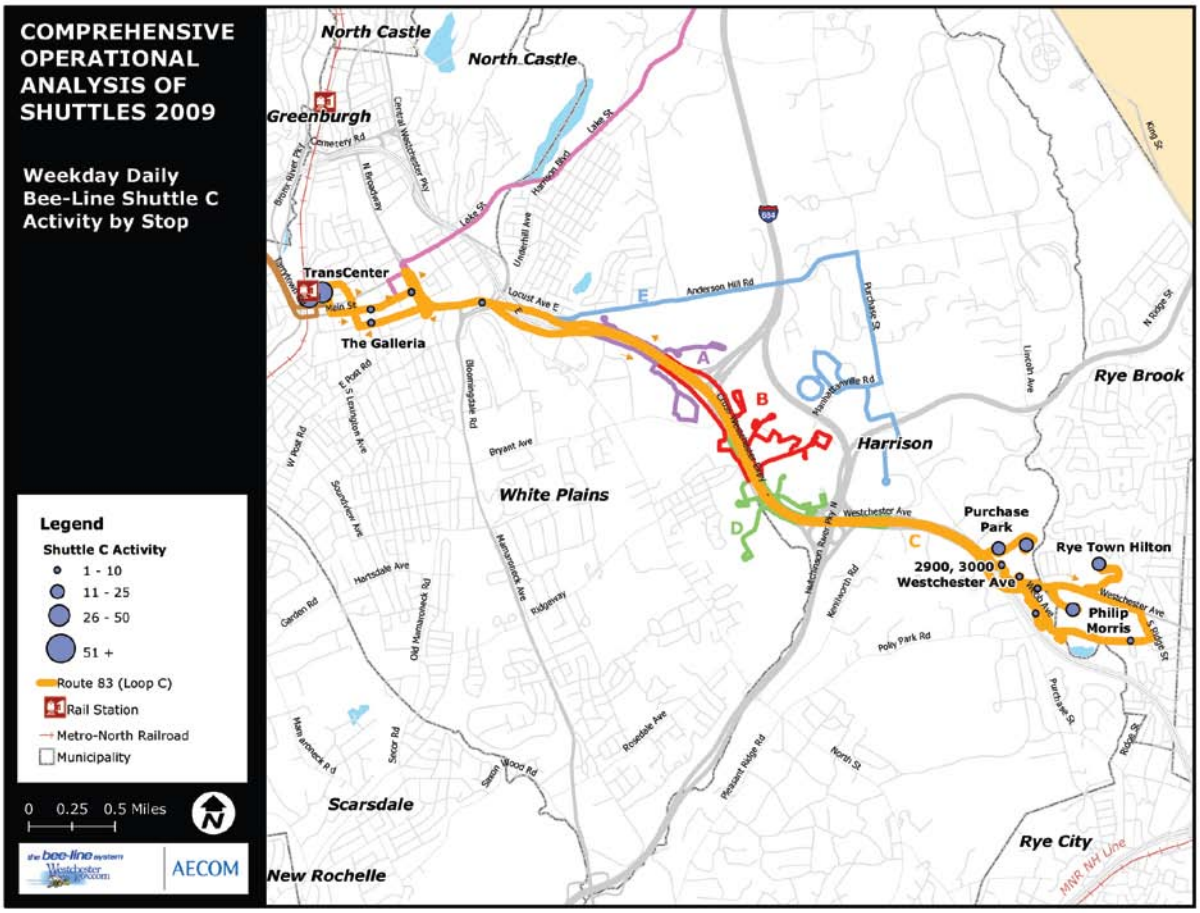
Figure 1-7: Shuttle B 2008 Daily Ridership Activity by Stop



Source: WCDOT, On/Off Counts 2008

On Shuttle Loop C, activity is at its highest at Philip Morris, Purchase Park, and the Rye Town Hilton. Overall, Loop C ridership is among the lowest in the shuttle network.

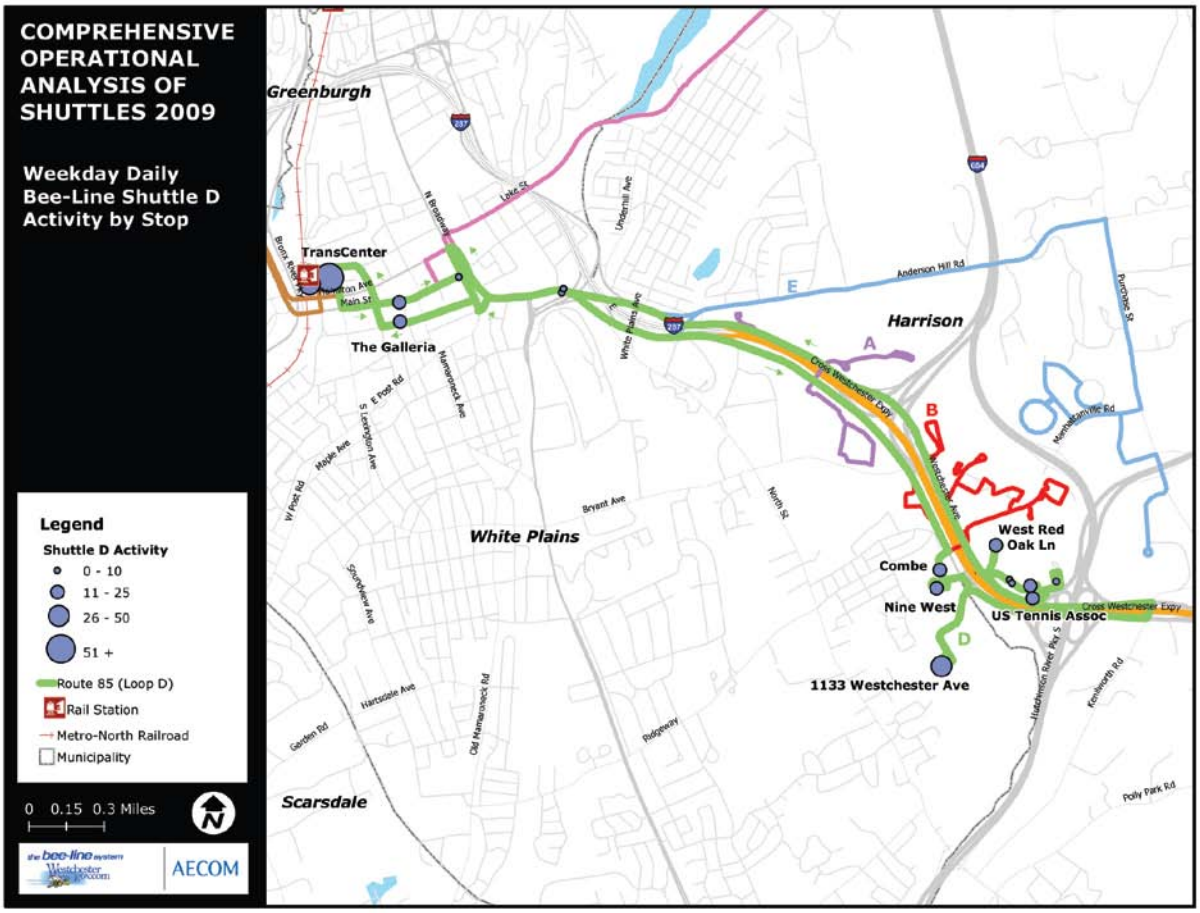
Figure 1-8: Shuttle C 2008 Daily Ridership Activity by Stop



Source: WCDOT, On/Off Counts 2008

Figure 1-9 shows that on Shuttle Loop D, ridership is greatest at 1133 Westchester Avenue (formerly IBM) but modest in the West Red Oak Lane area north of I-287.

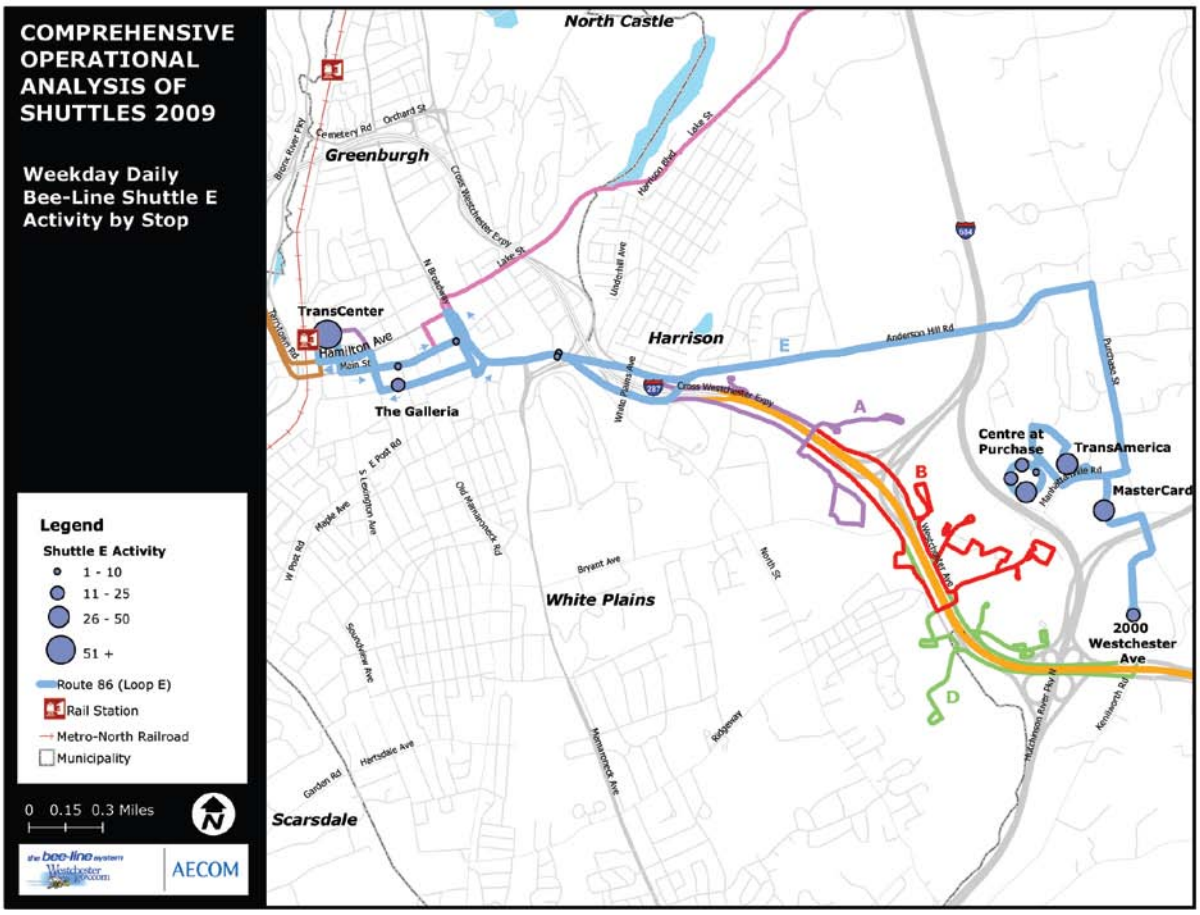
Figure 1-9: Shuttle D 2008 Daily Ridership Activity by Stop



Source: WCDOT, On/Off Counts 2008

Figure 1-10 is a map of Shuttle E ridership by stop. Ridership is greatest at the Centre at Purchase, TransAmerica, and MasterCard, all of which are located within close proximity of each other west of Purchase Street.

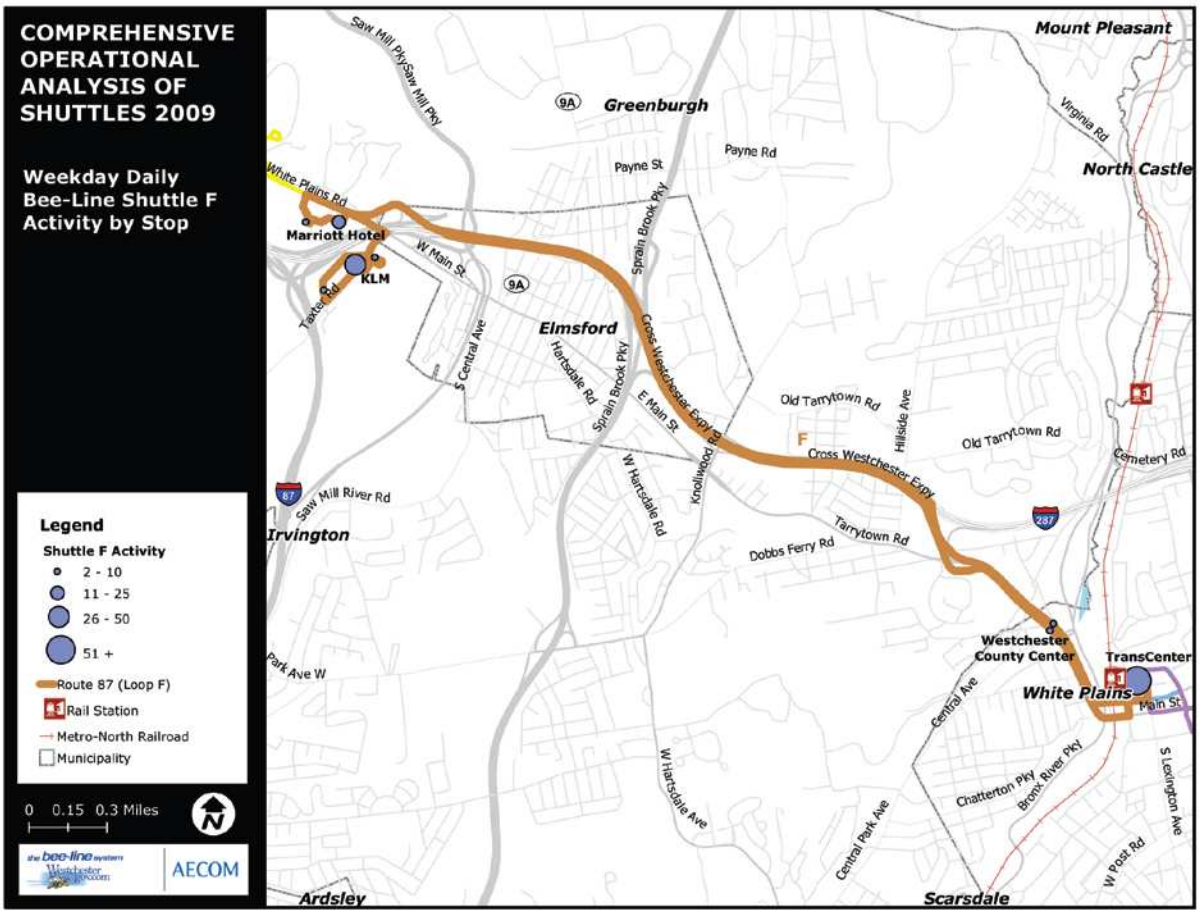
Figure 1-10: Shuttle E 2008 Daily Ridership Activity by Stop



Source: WCDOT, On/Off Counts 2008

As is shown in Figure 1-11, ridership on Shuttle Loop F, which operates west of White Plains, is greatest at KLM on Taxter Road in Elmsford. Other stops in this area, including the Marriott Hotel on Old White Plains Road, see limited daily activity.

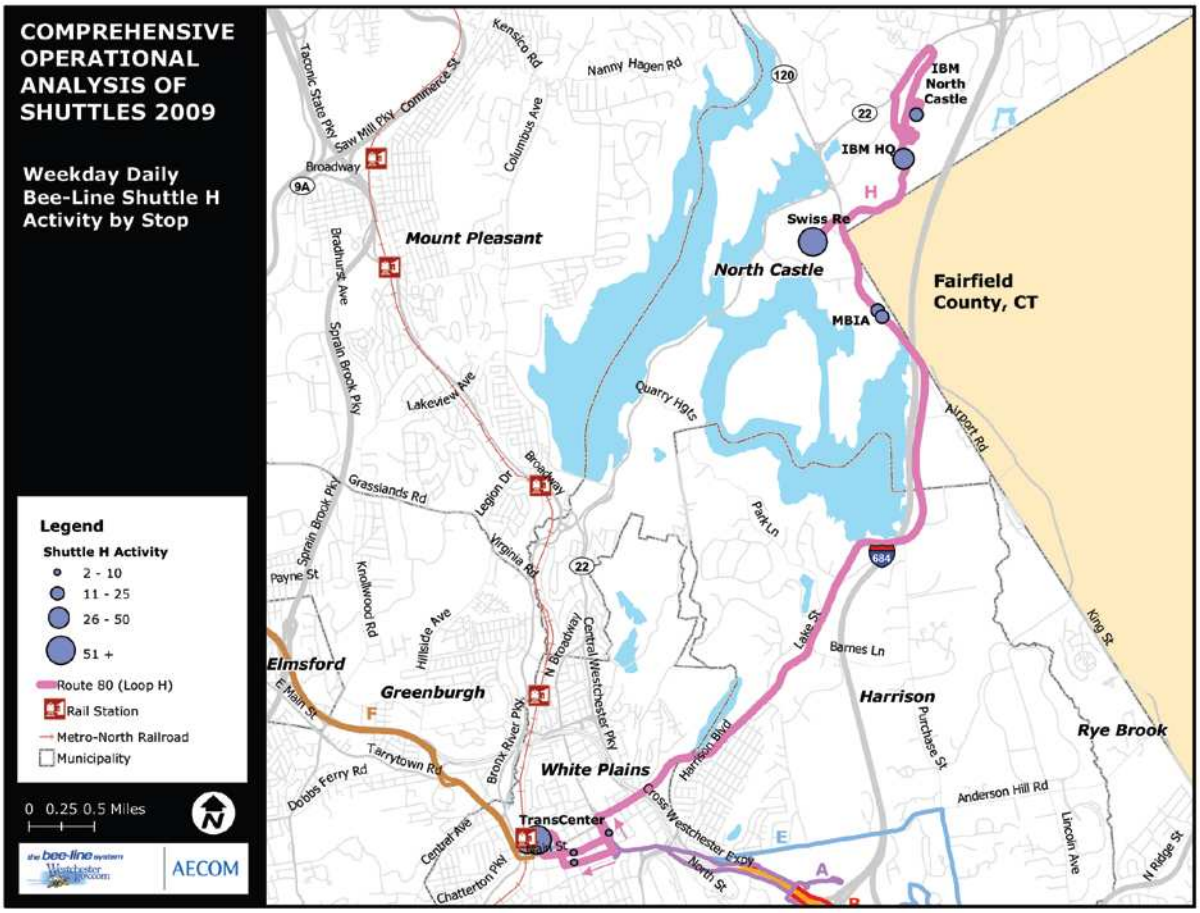
Figure 1-11: Shuttle F 2008 Daily Ridership Activity by Stop



Source: WCDOT, On/Off Counts 2008

Shuttle H operates north of White Plains to Armonk, as shown in Figure 1-12. Ridership is highest at Swiss Re in North Castle. MBIA and IBM each generate modest but steady shuttle ridership. IBM's corporate headquarters generates more daily shuttle usage than its North Castle facility.

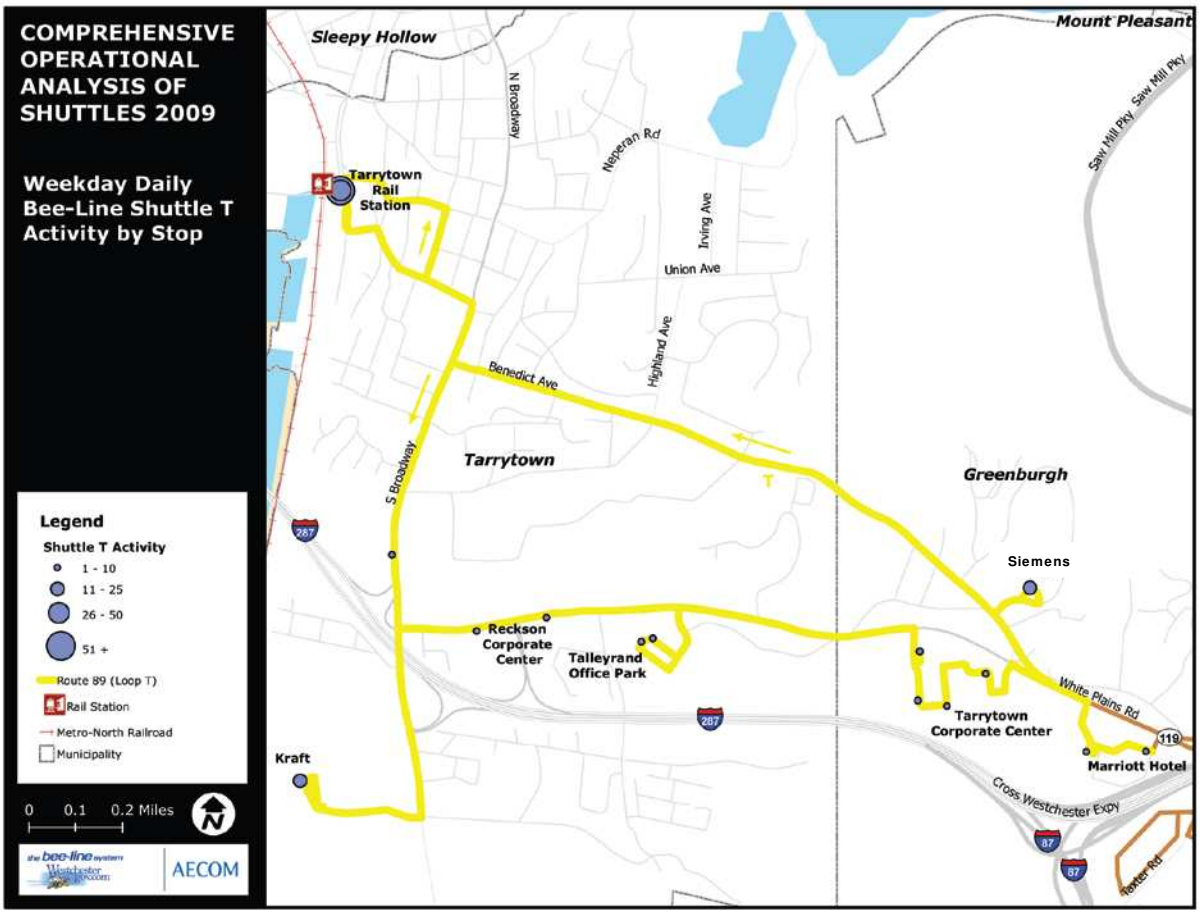
Figure 1-12: Shuttle H 2008 Daily Ridership Activity by Stop



Source: WCDOT, On/Off Counts 2008

As Figure 1-13 shows, Shuttle T operates in and around Tarrytown from the Tarrytown rail station. Ridership activity is low throughout the route. The two stops with the highest ridership are Siemens and Kraft, neither of which sees more than 25 boardings per day.

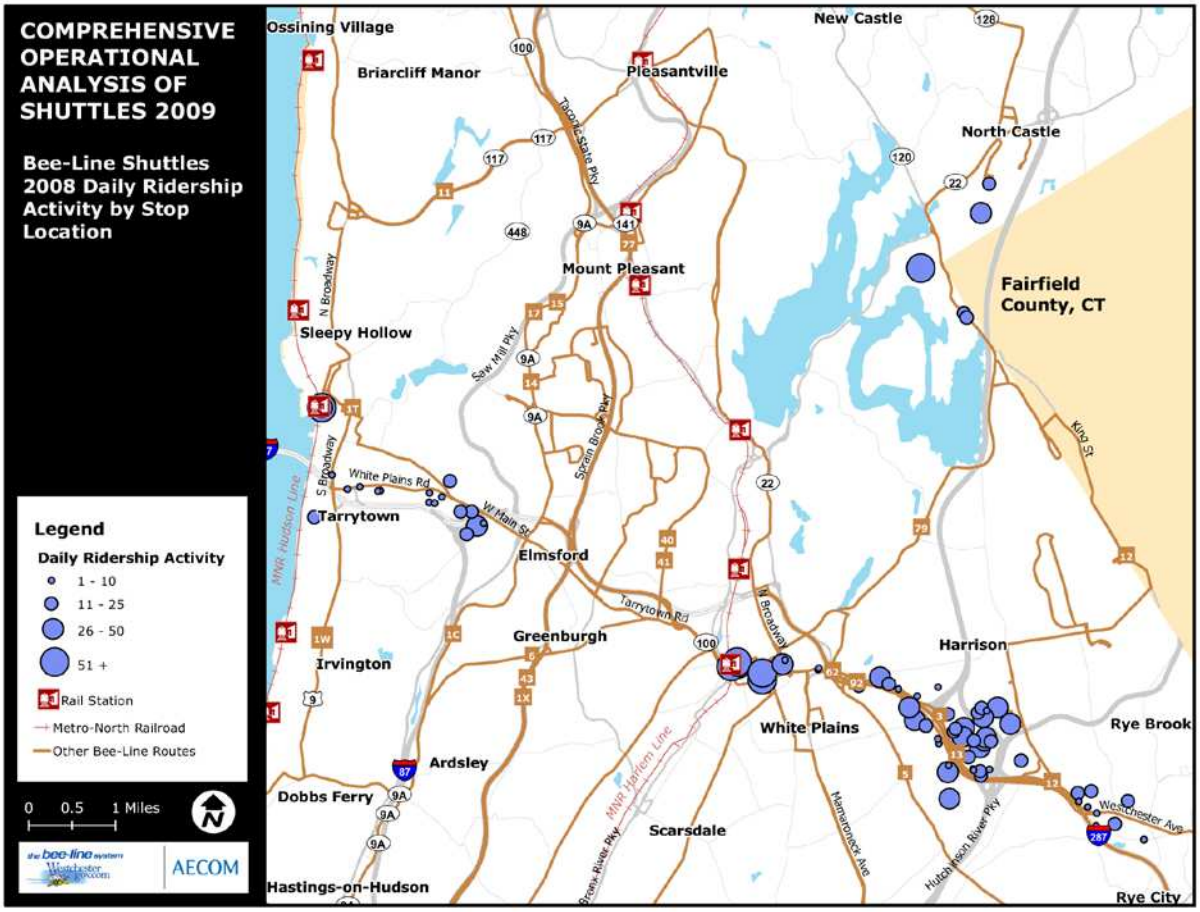
Figure 1-13: Shuttle T 2008 Daily Ridership Activity by Stop



Source: WCDOT, On/Off Counts 2008

The final figure in this section, Figure 1-14, is a map of shuttle system ridership with other Bee-Line fixed routes. The map does not show the shuttle routes themselves. The map shows where there is overlapping service in both the downtowns of Tarrytown and White Plains, but only little overlap in service at the corporate parks that are the main destinations for the shuttle service. Some offices are within walking distance of mainline fixed route buses while others are set back too far (more than one-quarter mile) to be considered served by Bee-Line (non-shuttle) routes.

Figure 1-14: 2008 Daily Shuttle Ridership Activity by Stop without Shuttle Route Structures



Source: WCDOT, On/Off Counts 2008

1.1.2 MTA Metro-North Railroad

MTA Metro-North Railroad provides commuter rail service from three stations in the study area to New York City on the Hudson and Harlem Lines. Stations in the study area are located in downtown White Plains (Harlem Line), North White Plains (Harlem Line), and Tarrytown (Hudson Line). Typical average travel times and frequencies between the stations and Grand Central Terminal in New York City are as follows:

Table 1-5: Weekday Train Travel Times and Frequencies from Grand Central Terminal

Station	Average Travel Time from Grand Central		Average Frequency from Grand Central	
	Express	Local	Peak	Off-Peak
White Plains	33 min	54 min	12 min	20 min
North White Plains	36 min	56 min	12 min	20 min
Tarrytown	35 min	54 min	20 min	30 min

Commuter rail service in the region is very frequent during the peak periods. Appendix 1 provides schedules for trains from North White Plains to White Plains to Grand Central Terminal (GCT) and Tarrytown to GCT in both the inbound and outbound directions. While most morning peak commuting occurs from the three study area stations inbound to New York City, the reverse commute market has grown considerably. This reverse commute ridership supports roughly 60% of the Bee-Line shuttle system ridership.

In 2007, Metro-North conducted a systemwide origin-destination survey where information was collected on boardings and alightings by station, origin and destination of trips to the street level, and mode of travel to stations, among many other variables. Table 1-6 shows daily inbound boardings for morning peak and off-peak periods for the three stations. White Plains Station attracts more than double the ridership of the North White Plains and Tarrytown Stations in the peak period, and approximately six times the ridership of the other stations during the off-peak.

Table 1-6: Weekday Inbound Metro-North Ridership by Station (2007)

Station	Line	Inbound AM Peak		Inbound Off-Peak	
		Boardings	Alightings	Boardings	Alightings
White Plains	Harlem	3,802	2,030	6,694	8,970
North White Plains	Harlem	1,465	238	1,007	2,027
Tarrytown	Hudson	1,746	182	1,155	2,882

Source: 2007 MTA/Metro-North Railroad Origin-Destination Survey, Resource Systems Group, Inc., October 24, 2008

During the Metro-North Spring 2007 on/off count exercise, information was collected on morning peak boardings and alightings on trains operating from North White Plains, White Plains and Tarrytown Stations in the inbound to New York City direction. Also, boardings and alightings were counted during the morning peak period for the reverse commute from New York City to the three study area stations.

For shuttle ridership, the outbound, reverse-peak ridership on Metro-North Railroad is most pertinent. The number of passengers alighting at White Plains on northbound (outbound) trains from GCT ranges from 71 on the 6:06 AM departure from GCT to 356 on the 8:20 AM departure, which would place riders in White Plains shortly before 9 AM. Ridership on these reverse-peak trains is consistently high; the number of passengers alighting at White Plains generally totals more than 200 per train on departures from GCT between 6:30 and 8:50 AM.

Additional data on Metro-North ridership and station activity can be found in Appendix 1.

1.1.3 Bee-Line Fixed Routes

Other Bee-Line fixed routes run along the same roadways as the shuttle routes for varying portions of the alignments. Some serve similar markets while others share alignments but are geared toward different trip types. Overlapping Bee-Line fixed routes include the following: 1, 3, 5, 6, 11, 12, 13, 14, 15, 17, 20/21, 27, 40, 41, 43, 60, 62, 77, 79 (Airlink), 92.

Table 1-7 lists each Bee-Line route along with where it operates, the span of service, the type of service, and the frequency of service. Half of the routes operate all day and half of the routes operate during peak periods only. Origins of routes are spread throughout the county and the Bronx, and most are destined for White Plains.

Table 1-7: Bee-Line Fixed Route Span of Service, Type of Service, and Peak Frequency

Route Number	Origin	Via	Destination	Weekday Span of Service	All Day or Peak Service	Peak Frequency of Service (minutes)
1CTWX	The Bronx	Tarrytown	White Plains	5:23 AM - 11:55 PM	All Day	60/20*
3	The Bronx	White Plains	Purchase	5:55 AM - 9:27 AM and 3:59 PM to 7:04 PM	Peak	10-15
5	Yonkers	White Plains	Harrison	5:45 AM - 10:48 PM	All Day	5-15
6	Yonkers	White Plains	Pleasantville	5:40 AM - 10:55 PM	All Day	15-30
11	Croton	Elmsford	White Plains	7:01 AM - 8:5 AM and 4:32 PM to 6:05 PM	Peak	40-60
12	Yorktown	Purchase	White Plains	6:25 AM - 7:54 PM	All Day	45-60
13	Ossining	Tarrytown/ White Plains	Port Chester	6:50 AM - 10:37 PM	All Day	30
14	Peekskill	Ossining	White Plains	5:45 AM - 11:52 PM	All Day	60
15	Peekskill	Yorktown	White Plains	6:10 AM - 7:09 PM	All Day	60-90
17	Cortlandt	Peekskill	White Plains	6:25 AM - 8:50 AM and 4:10 PM - 6:25 PM	Peak	35-40
20/21	Bedford Park	Yonkers	White Plains	5:00 AM - 1:54 AM	All Day	10-15
27	White Plains	Elmsford	Hawthorne (Skyline Dr)	6:10 AM - 9:12 AM and 3:31 PM - 6:38 PM	Peak	30
40	Mount Vernon	White Plains	Westchester Medical Center	5:10 AM - 12:10 AM	All Day	20
41	Mount Vernon	White Plains	Westchester Medical Center	6:50 AM - 9:01 AM and 3:00 PM - 6:22 PM	Peak	10-15
43	The Bronx	Mount Vernon	Westchester Medical Center	6:00 AM - 8:50 AM and 3:10 PM - 8:33 PM	Peak	60
60	The Bronx	New Rochelle	White Plains	5:35 AM - 10:52 PM	All Day	15-30
62	The Bronx	New Rochelle	White Plains	6:30 AM - 9:07 AM and 4:10 PM - 6:37 PM	Peak	15-30
77	Carmel	Yorktown	White Plains	5:46 AM - 8:40 AM and 4:20 PM - 7:42 PM	Peak	25
91/92	White Plains		Rye Playland	9:50 AM - 11:15 AM and 5:00 PM - 11:55 PM	Peak	60
Airlink	White Plains		Airport	6:37 AM - 9:59 PM	All Day	60

* Reflects range of frequencies for different route service patterns

Source: Bee-Line 2009 public timetables

1.1.4 Other Regional Providers

In the study area, four other transit operators provide express bus or interregional/interstate service to White Plains (four services) and Tarrytown (two services). In addition to Bee-Line, CTTransit, Leprechaun Lines, Coach USA/ShortLine, and Rockland County, NY provide transit services in the region. Connections between all of these systems are possible at the White Plains TransCenter among other complementary locations. Additionally, other private shuttles and taxis are also operating in the region, and these will be discussed as a whole following the larger regional providers. Maps and fare information for these services are included in Appendix 1.

I-Bus Express

The I-Bus Express between Stamford, Connecticut and White Plains is operated by CTTransit. The route makes limited stops and is designed to provide employment/commuting connections between the I-287 corridor, White Plains, and Connecticut.

Tappan ZEExpress

The Tappan ZEExpress route operates between Suffern, Spring Valley, Palisades Center, and Nyack (west of Tappan Zee Bridge) and Tarrytown and White Plains (east of Tappan Zee Bridge). The Tappan ZEExpress route is operated by the Rockland County Department of Transportation.

Poughkeepsie- White Plains Express

The Poughkeepsie-White Plains Express route, operated by Leprechaun Commuter Lines, serves Poughkeepsie, Wappingers Falls, Fishkill, Cold Spring, Garrison, Valhalla, and White Plains. One-way travel time is approximately two hours. In White Plains, the Poughkeepsie-White Plains service operates along the I-287 corridor and makes stops at many corporate parks also served by Bee-Line shuttle stops.

Orange-Westchester Link (OWL)

The Orange-Westchester Link (OWL), operated by Coach USA/ShortLine Bus, serves several destinations west of the Tappan Zee such as Suffern, Goshen and Monroe and serves White Plains and Tarrytown east of the Tappan Zee Bridge.

1.1.5 Private Shuttles

In October 2008, WCDOT conducted an inventory of private shuttles from the White Plains Railroad Station during the morning peak period. The observations revealed 74 shuttles carrying 614 passengers leaving the White Plains rail station and bound for destinations also

served by Bee-Line shuttles. This total ridership market on the private shuttles is comparable to the total daily ridership aboard Bee-Line's shuttle routes. Table 1-8 below lists the destinations of passengers using the private shuttle services along with the operators of the shuttles, number of daily shuttles and passenger counts by destination. The private shuttles operate during the morning peak period from approximately 6:30 AM to 9:45 AM.

Table 1-8: Destinations of Private Shuttle Passengers with Operators, Passenger Counts and Bee-Line Shuttle Comparison

Destination	Operator	Daily Shuttles	Passengers	Bee-Line Shuttle Loops	Daily Shuttle Activity
Morgan Stanley 2000 Westchester Avenue	Leros	11	115	E	22
360 Hamilton – Reckson	J and R	14	73	None	N/A
White Plains Plaza	Service Tours	7	56	A, B, C, D, E, H	32
Summit – Valhalla	The Summit	3	54	None	N/A
Blue Sky – 44 South Broadway	White Plains Bus; All Ways East	9	85	None	N/A
Starwood 1111 Westchester Avenue	All Star International	5	48	D	N/A
Pepsico	J and R	3	41	None	N/A
1133 Westchester Avenue	All Star International; RPW Group	6	38	D	28
NOKIA	Red Oak	3	34	B	N/A
MBIA – 113 King Street, Armonk	MBIA; J and R	4	29	H	27
333 Westchester Avenue	333 Westchester Ave	4	26	A	23
US Tennis Association	USTA	1	10	D	16
Wilson, Elsen – 3 Gannett Drive	Red Oak	2	4	B	27
Hyatt Hotel	Hyatt Summerfield	1	1	B	N/A
RPW Group	Red Oak	1	0	C	N/A
Total		**74**	**614**		**175**

N/A = Not Available

Section 2 – Evaluation of Shuttle Services

The Bee-Line shuttle services were evaluated for performance and cost-effectiveness, both individually and as a group, to help guide route planning recommendations. This evaluation represents a key component of the decision-making process, along with stakeholder and public outreach and discussions with WCDOT planning and operations staff. The data source for annual operating statistics was WCDOT's 2008 Bee-Line system summary. Daily and per-trip data came from the Fall 2008 Bee-Line Passenger Activity Survey.

2.1 Shuttle Route Performance

2.1.1 Ridership

Total ridership on the shuttle routes is comparatively low relative to the Bee-Line system as a whole. This is due to the unique nature of the routes as direct links from the White Plains TransCenter and rail station and the Tarrytown rail station to employers in the I-287 corridor. Shuttle trips distribute passengers who board in White Plains or Tarrytown at office locations but do not pick up new passengers en route. Vehicles then deadhead back to the stations to begin new trips.

The reverse occurs in the evening peak period as pick-ups are made at employment sites and vehicles operate directly to the rail stations, deadheading back to the employment areas for subsequent trips. This lack of mid-route turnover effectively limits ridership to the loads that board from rail and bus connections in White Plains and Tarrytown (note that some additional stops are made in downtown White Plains for peak shuttle direction boarding). Shuttles operate on weekdays only.

The average number of daily boardings per shuttle route is 142. The number of daily riders on a given route ranges from 82 (Loops C, T) to 223 (Loop B), highlighting the wide variability in ridership to different employers.

Table 2-1: Bee-Line Shuttle Ridership

Shuttle Loop	Total Annual Riders	Service Weekdays	Daily Boardings
A	37,785	255	**148**
B	56,981	255	**223**
C	20,931	255	**82**
D	31,092	255	**122**
E	45,861	255	**180**
F	21,007	255	**82**
H	52,945	255	**208**
T	23,370	255	**92**
Total	**289,972**	**2,040**	**1,137**
Average			**142**

2.1.2 Cost-Effectiveness

The gross operating expenses for the shuttle services are in line with the rest of the Bee-Line system, costing approximately $140/hour of service. In terms of overall cost-effectiveness, however, the shuttles do not perform as strongly as the system as a whole. The Bee-Line system average for farebox recovery (passenger fare revenue/operating costs) is 36.3%, whereas the shuttle routes together generate a farebox recovery of just 7.1% as a group; the most cost-effective route, Loop E, does not break a 10% recovery ratio. Even for specialized services such as rail shuttles, these recovery ratios are low.

On a cost per passenger trip basis, the shuttles range from $12.42 (Loop E) to $27.40 (Loop C), relative to a system average of just $3.55. The range of cost-effectiveness among the shuttle routes, while all relatively low compared to system-wide averages, highlights the need for targeted improvements and consolidations/streamlining of this group of services.

Table 2-2: Operating Cost per Vehicle Trip

Shuttle Loop	Total Annual Operating Cost	Total Annual Vehicle Trips	Cost/Trip
A	$610,138	5,819	**$104.85**
B	$795,007	7,084	**$112.23**
C	$573,525	4,048	**$141.68**
D	$694,730	5,566	**$124.82**
E	$569,570	7,084	**$80.40**
F	$487,500	4,301	**$113.35**
H	$670,873	4,301	**$155.98**
T	$479,448	3,795	**$126.34**
Total	**$4,880,791**	**41,998**	
Shuttle Average			**$116.21**
Bee-Line System Average			**$149.90**

Table 2-3: Operating Cost per Passenger Trip

Shuttle Loop	Total Annual Operating Cost	Total Annual Riders	Cost/Passenger
A	$610,138	37,785	**$16.15**
B	$795,007	56,981	**$13.95**
C	$573,525	20,931	**$27.40**
D	$694,730	31,092	**$22.34**
E	$569,570	45,861	**$12.42**
F	$487,500	21,007	**$23.21**
H	$670,873	52,945	**$12.67**
T	$479,448	23,370	**$20.52**
Total	**$4,880,791**	**289,972**	
Shuttle Average			**$16.83**
Bee-Line System Average			**$3.55**

Table 2-4: Operating Subsidy per Passenger Trip

Shuttle Loop	Total Annual Subsidy	Total Annual Riders	Subsidy/Passenger
A	$600,903	37,785	**$15.90**
B	$777,769	56,981	**$13.65**
C	$567,804	20,931	**$27.13**
D	$688,432	31,092	**$22.14**
E	$561,731	45,861	**$12.25**
F	$478,401	21,007	**$22.77**
H	$661,907	52,945	**$12.50**
T	$476,221	23,370	**$20.38**
Total	**$4,813,168**	**289,972**	
Shuttle Average			**$16.60**
Bee-Line System Average			**$3.03**

Table 2-5: Farebox Recovery Ratio

Shuttle Loop	Total Annual Revenue	Total Annual Cost	Recovery Ratio
A	$44,388	$610,138	**7.3%**
B	$67,906	$795,007	**8.5%**
C	$25,395	$573,525	**4.4%**
D	$36,683	$694,730	**5.3%**
E	$55,966	$569,570	**9.8%**
F	$27,364	$487,500	**5.6%**
H	$62,791	$670,873	**9.4%**
T	$27,826	$479,448	**5.8%**
Total	**$348,319**	**$4,880,791**	
Shuttle Average			**7.1%**
Bee-Line System Average			**36.3%**

2.1.3 Route Productivity

Measures of route productivity evaluate the ridership and passenger activity of each service relative to the amount of service operated and resources required. The most common measure is the ratio of passenger boardings to revenue hours of service, since labor costs generally reflect the greatest percentage of overall system costs and are measured in time. Operating mileage and distances for bus routes, while relevant, vary more due to the nature of roadways, the built environment, and relative levels of congestion in a region.

In this instance, the shuttle services operate a substantial portion of their routes in what is effectively an express mode, reaching employment sites directly and foregoing local trip turnover en route. Loop H presents the clearest case of a shuttle route with considerable mileage, connecting White Plains with major employers in Armonk, although its ridership is the second highest in the shuttle system. Conversely, Loop T's mileage is relatively low but so is its ridership.

Loops B, E, and H are generally the strongest of the shuttle routes. The combination of long route lengths and modest ridership lead to poor overall productivity for Loops C and D.

The disparity between specialized shuttle services and regular fixed route Bee-Line services can be seen in the trips per hour ratios. The shuttle services range from a low of 7.6 passengers per hour (Loops C and T) to a high of 18.1 (Loop H), while the overall Bee-Line system average is considerably higher at 43.3 passengers per hour. Finally, the low number of passengers per vehicle trip on the shuttle indicates that buses are rarely full and that the convenience of frequent trips meeting incoming trains at the Metro-North Railroad stations is outweighed by the comparatively poor performance of each trip. The following tables provide an overview of the relative performance of the shuttle routes in terms of service productivity.

Table 2-6: Passenger Trips per Revenue Hour

Shuttle Loop	Total Annual Riders	Total Revenue Hours	Passengers/Hour
A	37,785	3,605	**10.5**
B	56,981	4,516	**12.6**
C	20,931	2,762	**7.6**
D	31,092	3,738	**8.3**
E	45,861	3,373	**13.6**
F	21,007	2,500	**8.4**
H	52,945	2,927	**18.1**
T	23,370	3,081	**7.6**
Total	**289,972**	**26,502**	
Shuttle Average			**10.9**
Bee-Line System Average			**43.3**

Table 2-7: Passenger Trips per Revenue Mile

Shuttle Loop	Total Annual Riders	Total Revenue Miles	Passengers/Mile
A	37,785	27,299	**1.4**
B	56,981	36,331	**1.6**
C	20,931	38,456	**0.5**
D	31,092	38,962	**0.8**
E	45,861	42,858	**1.1**
F	21,007	22,998	**0.9**
H	52,945	40,632	**1.3**
T	23,370	27,400	**0.9**
Total	**289,972**	**274,936**	
Shuttle Average			**1.1**
Bee-Line System Average			**2.9**

Table 2-8: Passengers per Vehicle Trip

Shuttle Loop	Total Annual Riders	Total Vehicle Trips	Passengers/Trip
A	37,785	5,819	**6.5**
B	56,981	7,084	**8.0**
C	20,931	4,048	**5.2**
D	31,092	5,566	**5.6**
E	45,861	7,084	**6.5**
F	21,007	4,301	**4.9**
H	52,945	4,301	**12.3**
T	23,370	3,795	**6.2**
Total	**289,972**	**41,998**	
Shuttle Average			**6.9**
Bee-Line System Average			**42.2**

2.1.4 Shuttle Performance Ranking

Ranking the shuttle routes against each other provides a snapshot of the relative strengths and weaknesses of each for the various cost effectiveness and productivity measures examined above. With 1 as the best score and 8 as the worst, the cumulative rankings for each route show Loop E to be the strongest performer of the shuttle routes and Loop C to be the weakest.

Table 2-9: Relative Ranking of Shuttle Routes

Shuttle Loop	Cost / Trip	Cost / Passenger	Subsidy / Passenger	Passengers / Hour	Passengers / Mile	Passengers / Trip	Farebox Recovery	Daily Ridership	Route Score	Overall Rank
E	1	1	1	2	4	4	1	3	17	**1**
B	3	3	3	3	1	2	3	1	19	**2**
H	8	2	2	1	3	1	2	2	21	**3**
A	2	4	4	4	2	3	4	4	27	**4**
T	6	5	5	7	6	5	5	6	45	**5**
D	5	6	6	6	7	6	7	5	48	**6**
F	4	7	7	5	5	8	6	7	49	**7**
C	7	8	8	8	8	7	8	8	62	**8**

2.2 Ridership Profiles

The ridership and productivity of each shuttle route varies from trip to trip within the morning and evening periods. Generally speaking, the earliest and latest outbound trips in the morning are less used than the prime commuting hours. The 'shoulder' trips are always necessary to accommodate slight changes in commuters' schedules; however, when trips exhibit consistently low ridership, particularly to a targeted audience such as office commuters in the study area, they may point to possible operational savings when buses can be interlined or continue revenue service on another Bee-Line route.

The following charts show the ridership by trip for each shuttle loop in the morning period. Ridership numbers by trip were collected during the Fall 2008 Bee-Line Pass Activity Survey. Trips beginning around 8:30 AM show consistently higher ridership, presumably serving commuters who begin work at 9 AM on weekdays. Conversely, after 9-9:30 AM, ridership is uniformly low on all shuttle routes. As shown above in Section 2.1.3 (Route Productivity), average trip loads on the shuttle routes are below 10 passengers; only Loop H has an average of greater than 10 passengers per trip. The 8:35 AM trip on Loop H carries the highest number of passengers (32) of any in the shuttle network.

Figure 2-1: Loop A Morning Ridership by Trip

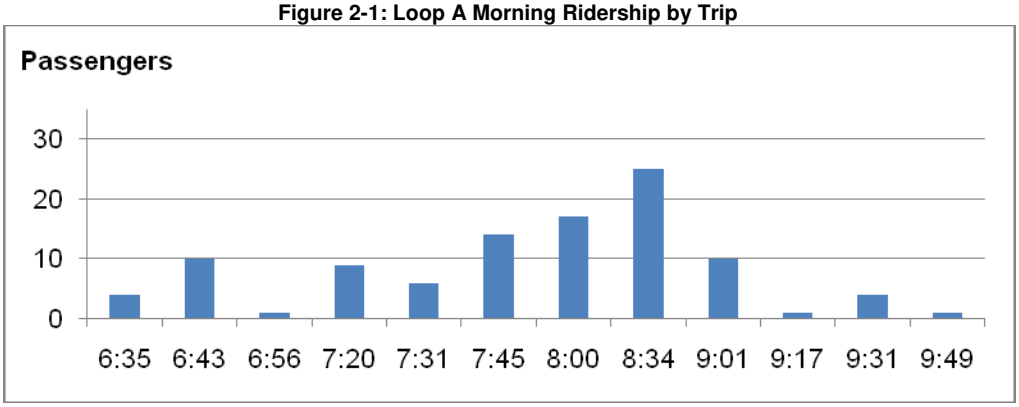


Figure 2-2: Loop B Morning Ridership by Trip

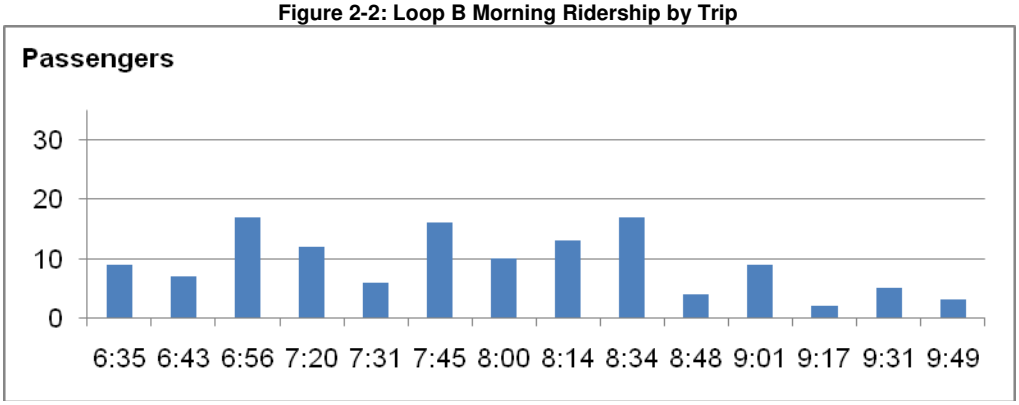


Figure 2-3: Loop C Morning Ridership by Trip

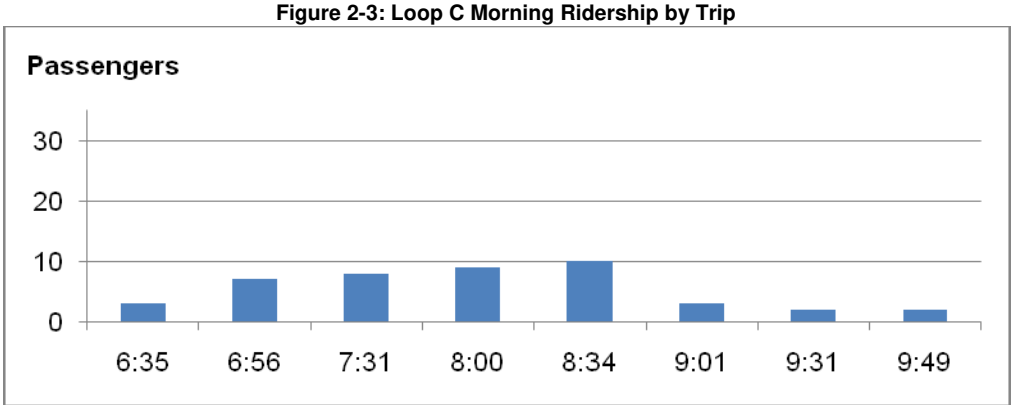


Figure 2-4: Loop D Morning Ridership by Trip

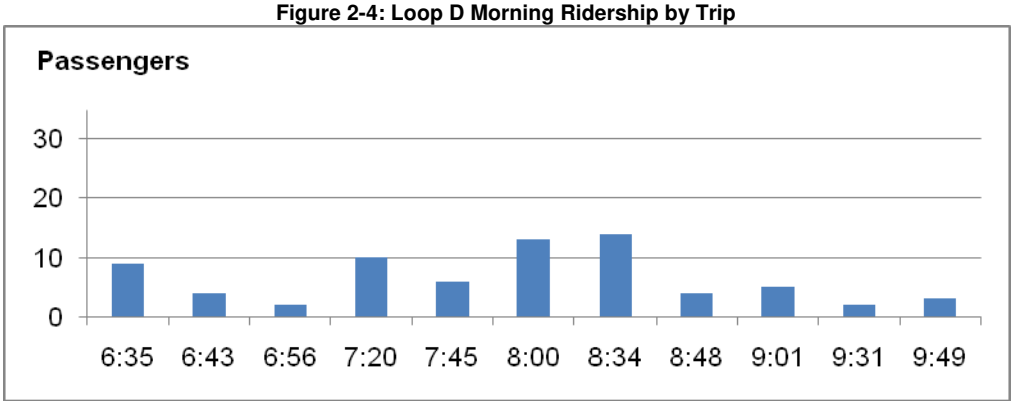


Figure 2-5: Loop E Morning Ridership by Trip

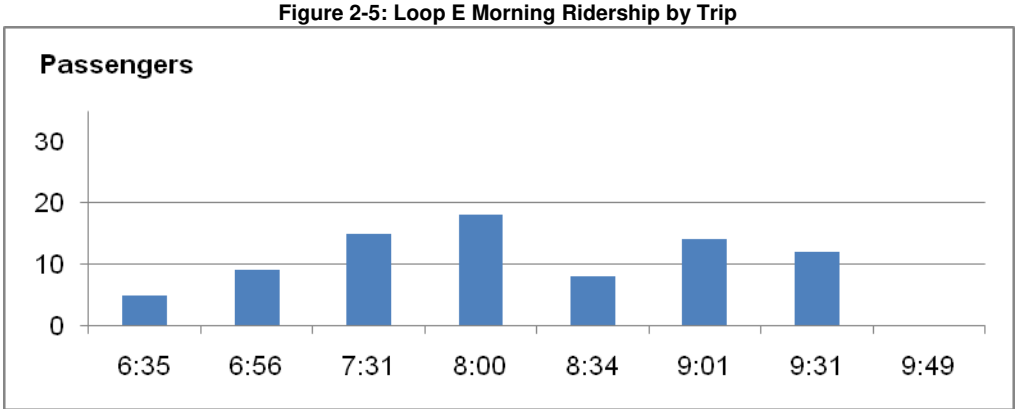


Figure 2-6: Loop F Morning Ridership by Trip

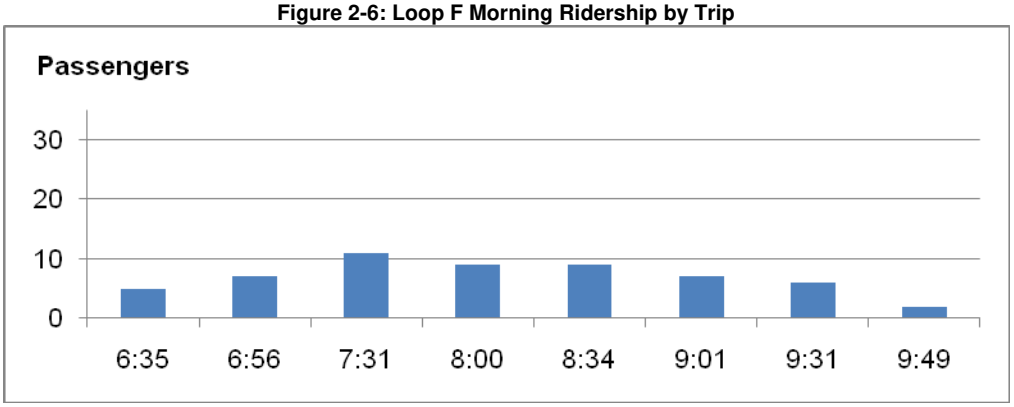


Figure 2-7: Loop H Morning Ridership by Trip

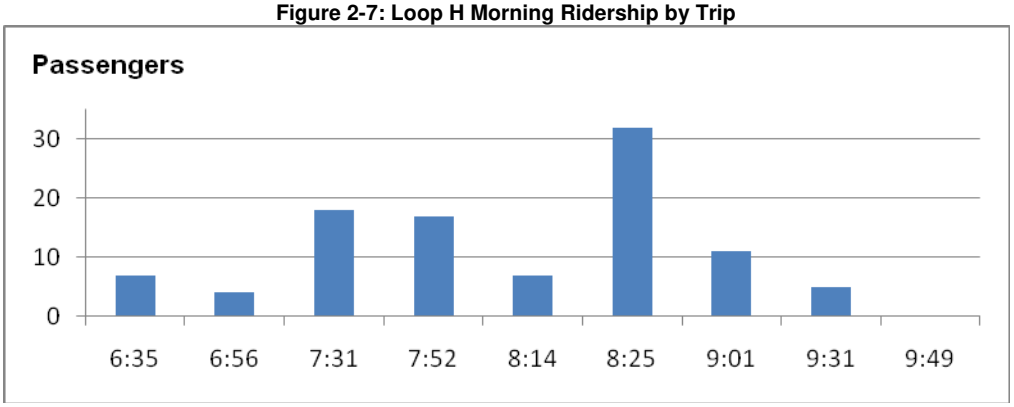
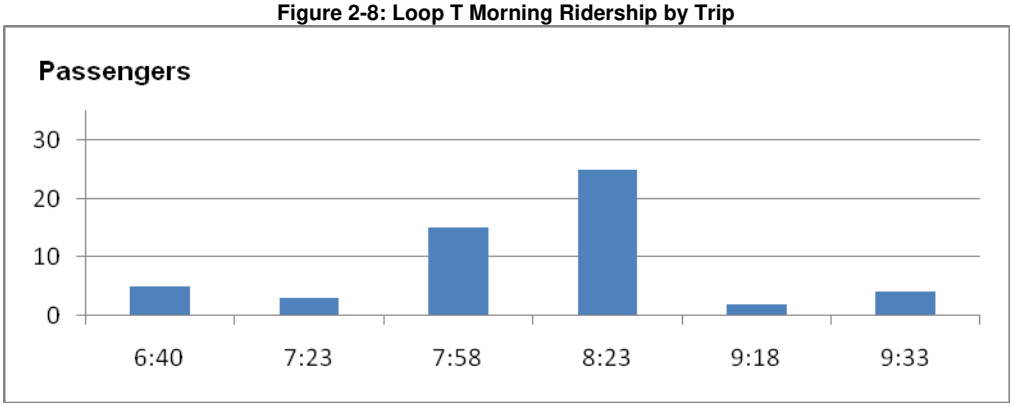


Figure 2-8: Loop T Morning Ridership by Trip



2.3 Overall Evaluation

The Bee-Line shuttle services provide a valuable link for commuters who work in the suburban office developments of the I-287 and Route 120 corridors. When office developments are set back from arterial roadways, the ability to serve these locations in a cost-effective manner with public transportation presents a challenge. Bee-Line responded to this challenge with the creation of the shuttle network; however, the operational constraints and costs of these services continues to lead to route performance that warrants additional consideration as funding transit throughout the county grows increasingly difficult.

On a daily basis, an average of 1,137 trips was taken on the eight shuttle routes. Recognizing the specific focus of these routes on employment sites, with a route design more akin to an express bus route than a local route (i.e., outbound trips from rail stations carry passenger loads for distribution at employment sites but do not pick up additional passengers along the way), the fact that these routes collectively carry roughly 550 individual customers each day is significant.

Nonetheless, opportunities exist to improve the cost-effectiveness of the shuttle program as a whole, through a combination of proposals designed to reduce duplication with existing fixed route services (e.g., Bee-Line Routes 3, 12, 13), improve running time within office developments, consolidate shuttle services, and eliminate the weakest performing services where ridership is consistently low. Specific recommendations were developed based on these operating statistics, the consultant team's observation of services in the field, as well as the stakeholder and public outreach summarized in subsequent sections of this report.

Each of these inputs must be considered, as no single indicator could drive the recommendations alone. For example, while Loop E exhibits the strongest overall performance, employers on this route could be easily served by two existing fixed route services. Conversely, Loop F is not as strong a performer, but minor modifications could improve its productivity while maintaining an important link west from White Plains. Understanding commuter needs and factors that influence route success, such as walking distance from bus stops and overall travel time, was important to putting the performance statistics in context. These considerations are discussed further in *Section 5 – Route Recommendations*.

Section 3 – Employer Outreach

Public participation represents a critical foundation for service planning and an important component of the evaluation of existing services during the early phases of a study. To this end, a series of stakeholder interviews was conducted with employers in the study area to solicit feedback pertaining to commuting patterns of employees and use of the Bee-Line shuttle services. The purpose of these interviews was to solicit feedback from major employers currently served by the Bee-Line shuttles concerning quality of service, employee usage of Bee-Line, available alternatives such as private rail station shuttles, and employer subsidy or support of transit services.

3.1 Employer Interviews

Employer interviews were conducted at the following companies. Employee commuter surveys were also administered; the response rates from participating employers are shown in the table below. The results of those surveys are discussed in *Section 4 – Commuter Survey* while the highlights of the employer interviews are presented in this section.

Table 3-1: Employer Interviews and Survey Participation

Employer	Bee-Line Shuttle	Survey Respondents	Percentage of Total Responses
Amalgamated Life Insurance Company	A	116	17.3%
Westchester Medical Group	A	N/A*	N/A
Fordham University (Westchester Campus)	A	35	5.2%
MasterCard	E	178	26.5%
TAL International	E	34	5.1%
Morgan Stanley	E	11	1.6%
IBM	H	N/A	N/A
Swiss Re	H	297	44.3%

* Employer did not participate in commuter survey

3.1.1 Amalgamated Life Insurance Company

Location: 333 Westchester Avenue
White Plains, NY 10604-2910

Date: June 10, 2009
Interviewee: Mr. John Dubil
Interviewers: Chris Henry (AECOM), Charles Sutter (Westchester County DOT)

Amalgamated Life's Westchester County office location on Westchester Avenue opened following its relocation from Manhattan. Currently, approximately 450 employees work at the Westchester County location. To facilitate a corporate relocation to the county, Amalgamated subsidized all commuting costs for those employees traveling from New York City; Metro-North rail tickets and even carpool expenses were offered by the company as an incentive to retain

employees. This effort is being phased out, as Amalgamated has seen employees relocate to the county or leave and be replaced by new employees who live closer to the office.

Following the company's relocation to the county, Amalgamated Life also provided its own privately-operated shuttle bus service between 333 Westchester Avenue and the White Plains rail station. This program has been eliminated; however, the office complex property manager at 333 Westchester Avenue continues to run a limited shuttle service of its own to the rail station. This service is available to all tenants including Amalgamated Life and is operated fare-free (funded through a fee in the property lease). The property's shuttle runs less frequently than Bee-Line's Loop A shuttle service. Amalgamated Life indicated that its employees often take whichever shuttle arrives first, i.e., convenience is the user's primary factor.

Amalgamated Life encourages public transit use by its employees by promoting vanpooling with the MetroPool program, participating in a pre-tax commuter expense programs and WCDOT's Smart Commute Program.

Comments on the Bee-Line shuttle services included the desire to see afternoon pick-ups on the Loop A use the upper level bus stop at the building site. Drop-offs are made here (at the office door) in the mornings but evening trips pick up passengers at a lower level stop at the edge of the main parking lot. Later evening shuttles may become desirable as Amalgamated Life adds a number of customer service positions to its Westchester office, operating on later shift times than the traditional office hours. The site may eventually move to become a 24-hour operation.

3.1.2 IBM

Location: New Orchard Road
Armonk, NY 10504

Date: June 10, 2009
Interviewee: Ms. Marge S. Sohr
Interviewers: Chris Henry (AECOM), Charles Sutter (Westchester County DOT)

IBM operates two facilities served by the Loop H shuttle in Armonk and North Castle. The corporate headquarters is used more by shuttle riders than the North Castle facility. The two locations are situated within a corporate campus development and connected via an internal roadway. The higher ridership at the corporate headquarters is likely due to employees of vendor companies who work on-site, such as graphic designers and miscellaneous support staff.

The facility operates without any set working hours; all corporate employees are permitted to take advantage of flex time and flexible schedules. Executive assistants, however, are more

likely to work on fixed schedules. The widespread use of flex hours does not encourage carpooling or transit use among employees who wish to arrive and leave on individual schedules. The company's efforts to promote transit use to the site include informing new employees and on-site vendors are informed through orientation that the Bee-Line services are available.

Most IBM employees also commute from Westchester County and points north (Dutchess, Putnam Counties) and are less likely to be able to take full advantage of Bee-Line shuttles and services oriented toward White Plains and rail stations.

Concerns have been raised from time to time about non-IBM employees entering the gated property while riding the Bee-Line buses to or from another destination.

3.1.3 MasterCard International

Location: 2000 Purchase Street
Purchase, NY 10577

Date: June 16, 2009
Interviewee: Mr. Richard Gunthner
Interviewers: Chris Henry (AECOM), Naomi Klein (Westchester County DOT)

MasterCard International's facility at 2000 Purchase Street is served by the Loop E shuttle service from White Plains. Ridership to this site is steady, with a slight increase in the summer months when interns (often based in New York City) work on-site. The company currently employs approximately 1,000 people at this location.

Until October 2008, MasterCard operated two of its own shuttles between the Metro-North Railroad station in Rye and the 2000 Purchase Street complex. Since that time, the company has encouraged employees to use the Bee-Line Loop E service; however, employees commuting via the New Haven Line to Rye have not had a shuttle option. The privately-run shuttles did not attract additional talent to the office and thus were not considered a priority investment.

Nonetheless, the company supports the use of transit and participates in pre-tax commuter benefit programs and MetroPool. Additionally, MasterCard has participated with WCDOT in the Smart Commute Program, including hosting the county at on-site job fairs. New employees, particularly those traveling from Manhattan, do raise transportation as an issue but MasterCard does not believe this significantly influences prospective employees. Mr. Gunthner indicated that a greater challenge was providing transit for employees commuting from points north in New York State and northeast in Connecticut.

Overall, MasterCard expressed a great interest in the need for transit and taking advantage of Bee-Line services, while recognizing the difficulties in funding such services and effectively providing options for commuters in suburban and rural parts of the region to commute to its suburban location.

3.1.4 TAL International

Location: 100 Manhattanville Road
Purchase, NY 10577

Date: June 19, 2009
Interviewee: Ms. Lynn McGinness
Interviewers: Chris Henry (AECOM), Naomi Klein (Westchester County DOT)

TAL International is a shipping company with approximately 75 employees at its Manhattanville Road site, also served by the Loop E shuttle. The company does not actively promote transit use and its representative was not aware of a significant number of transit users at the time of the interview. TAL has been at its current location for more than 15 years and considers the availability of parking to be an important issue when considering office locations (a move to White Plains was ruled out).

When recruiting new employees from New York City, TAL informs prospective employees of transportation options including the Loop E shuttle. Most employees at the site work conventional business hours (9-5) but flex time options are available. Employees to TAL typically live in Westchester County and points north. Relatively few commute from New York City or Long Island.

3.1.5 Westchester Medical Group

Location: 210 Westchester Avenue
White Plains, NY 10604

Date: June 10, 2009
Interviewee: Ms. Ann Facey
Interviewers: Chris Henry (AECOM), Charles Sutter (Westchester County DOT)

The Westchester Medical Group is located east of downtown White Plains in the Westchester Avenue corridor, served by the Loop A shuttle as well as Bee-Line's Route 12 bus. The location is a medical facility with a variety of doctors and services available within a single complex. Most employees at this location work standard business hours although some facilities operate until the early evening (7 PM). The Westchester Medical Group also operates a facility at 2700

Westchester Avenue in Purchase, New York, served by the Loop C shuttle. Corporate offices are expected to consolidate at the 2700 Westchester Avenue location.

No private shuttle services are provided at the 210 Westchester Avenue location; however, given the nature of medical offices and patient visits, clearly a number of visitors arrive by paratransit or other medical transportation options. The Loop A shuttle primarily brings commuting employees to the site.

As an employer, the Westchester Medical Group does not actively encourage transit use through pre-tax benefits or carpool programs although Bee-Line schedule information is available at times in the building lobby. Parking is available free to employees and visitors and valet parking is available given the space constraints of the lot.

The group's representative indicated during the interview that requests have been made for transportation to the Rye rail station. Additionally, later departure hours on the shuttle loop and the Route 12 bus would be helpful for some employees who are required to work on-site until after 7-8 PM.

3.1.6 Swiss Re America Holding Corporation

Location: 175 King Street
Armonk, NY 10504

Date: June 10, 2009
Interviewee: Ms. Patricia Lioi
Interviewers: Chris Henry (AECOM), Charles Sutter (Westchester County DOT)

Swiss Re, located in a suburban campus development in Armonk on the King Street (Route 120) corridor, is a company that places great importance on public transportation. When it relocated from Manhattan in 1999, the ability to reach the site without a private automobile was considered a priority, despite the remote location. Employee turnover has led to a gradual shift from a New York City-based work force to one based more in Westchester County and points north. Approximately 780 employees work on-site at Swiss Re as well as some 150 contractors.

That said, demand among Bee-Line customers to the Swiss Re site has been strong. The location is served by Loop H and in recent years Bee-Line has responded to ridership growth by operating larger vehicles to accommodate demand. Swiss Re also participates in pre-tax commuter benefit programs and encourages carpooling and the MetroPool program. The main reception desk makes Bee-Line schedule information available to employees. Other sustainability initiatives include employee bonuses for the purchase of a hybrid vehicle, energy-efficient appliances, etc.

The company remains supportive of the Bee-Line shuttle program as it does not wish to operate its own vehicles. Car services are made available to employees who work flex or later hours and are unable to take advantage of Loop H to return home from work.

Comments regarding Bee-Line services included some concern about punctuality and employees missing train connections in White Plains. Overall, Swiss Re expressed satisfaction with the service.

3.1.7 Fordham University (Westchester Campus)

Location: 400 Westchester Avenue
West Harrison, NY 10604

Date: June 10, 2009
Interviewee: Mr. Grant Grastorf
Interviewers: Chris Henry (AECOM), Naomi Klein (Westchester County DOT)

Fordham University operates a new satellite campus in Westchester County at 400 Westchester Avenue, served by the Loop A shuttle. This location, opened in August 2008, is a continuing education and graduate center and caters primarily to these student bodies with classes in the evenings and on Saturdays. Approximately 800 students take classes at the Westchester campus, supported by 75 faculty and staff.

Fordham has operated its own shuttles between campuses in the Bronx and Westchester County, although it has not provided shuttles to White Plains or other rail stations. Students and faculty/staff have been made aware of Bee-Line shuttle services from White Plains; however, the nature of night and weekend classes precludes shuttle usage by many of these commuters and most drive to the campus. Fordham charges $100 per year for staff and students to park on-site (this permit is good at all Fordham campuses). Janitorial staff at the campus generally work in the mornings and many use the shuttle or Route 12 bus to commute.

At the time of the interview, Fordham had not provided pre-tax commuter benefits or pursued carpool programs such as MetroPool. Nonetheless, the university is interested in encouraging transit use and exploring options to promote alternatives to driving for students and staff. The challenge remains the hours of operation and primary class times for students and faculty. The final evening classes begin at 9:30 PM and the campus building remains open until 11 PM.

3.1.8 Morgan Stanley

Location: 2000 Westchester Avenue
Purchase, NY 10577
(interview conducted at 1633 Broadway, New York, NY)

Date: June 3, 2009
Interviewee: Mr. Todd Wadzinski, Mr. Jose Vila II
Interviewers: Chris Henry (AECOM), Charles Sutter (Westchester County DOT)

Morgan Stanley maintains a large office at 2000 Westchester Avenue, currently served by the Loop E shuttle. Company representatives estimated that a substantial number of employees rely on public transportation and shuttle services, at least 30 of which are accounted for by Morgan Stanley's own shuttles from New York City.

While the company provides its own private shuttle services to employees, these are focused more on transferring workers from New York City offices to the Westchester County location rather than duplicating the rail station connections of the Bee-Line shuttles. Private shuttles were initially run to White Plains and Rye but have since been discontinued.

Morgan Stanley's private shuttles have been in operation since 2002. Employees do not pay a fare for use of the shuttles; rather, the calculated expense of shuttle operation is considered a benefit and is taxed. Other transit incentives include participation in pre-tax commuter benefit programs and provision of transit information to new employees. The private shuttles are considered an incentive to employees; long commutes from New York City have been an issue since the company's relocation.

Morgan Stanley attempted to coordinate shuttle activities with nearby employers such as MasterCard and PepsiCo but efforts to collectively fund and operate shuttles were unsuccessful. It has coordinated with Citi Bank and Smith Barney to increase shuttle service from New York City to Westchester County.

3.1.9 Commuter Survey Participation

Numerous other employers in the study area were contacted for similar interviews. Responses to these requests for interviews were not provided. Of the employers interviewed, all but IBM indicated a willingness to participate in an online commuter survey, summarized in the subsequent *Section 4 – Commuter Survey*.

Section 4 – Commuter Survey

In conjunction with the stakeholder outreach conducted early in the study, a web-based e-survey was conducted of employers at sites served by Bee-Line shuttles, based upon employer willingness to take part in the survey effort. Six participating employers sent an email invitation to their employees requesting them to take part. A total of 671 employees completed the survey, including 17 who responded to a paper copy printed in both English and Spanish.

This survey was not a comprehensive, random sample survey. It was intended to provide an opportunity for employees in the office parks in the study area to provide information on their commuting choices. Participation was based on employer interest and represented a subset of a specific market, i.e., suburban office employers in selected corridors served by the Bee-Line shuttle loops. The survey responses provided input into the shuttle service recommendations developed by the consultant in *Section 5 – Route Recommendations*.

It is not possible to know how representative the respondents are of the total population of commuters to/within Westchester County. However, this was a much more open opportunity for interested parties to participate than traditional public meetings would have offered and it can be assumed that interested persons would have been likely to participate. Furthermore, the target audience for this survey included all commuters, not only transit and shuttle users. The total response rate of commuters who received the survey is estimated at 28%. Given the ease of completing the survey, this approach is likely to have solicited a larger proportion of participation than would have been achieved through traditional public meetings.

The survey was designed to describe current commuting patterns of interested employees and how those patterns interact (or do not interact) with the shuttles. This would help confirm or refute service planning concepts, highlight commuting choices and patterns and the factors that inform those choices.

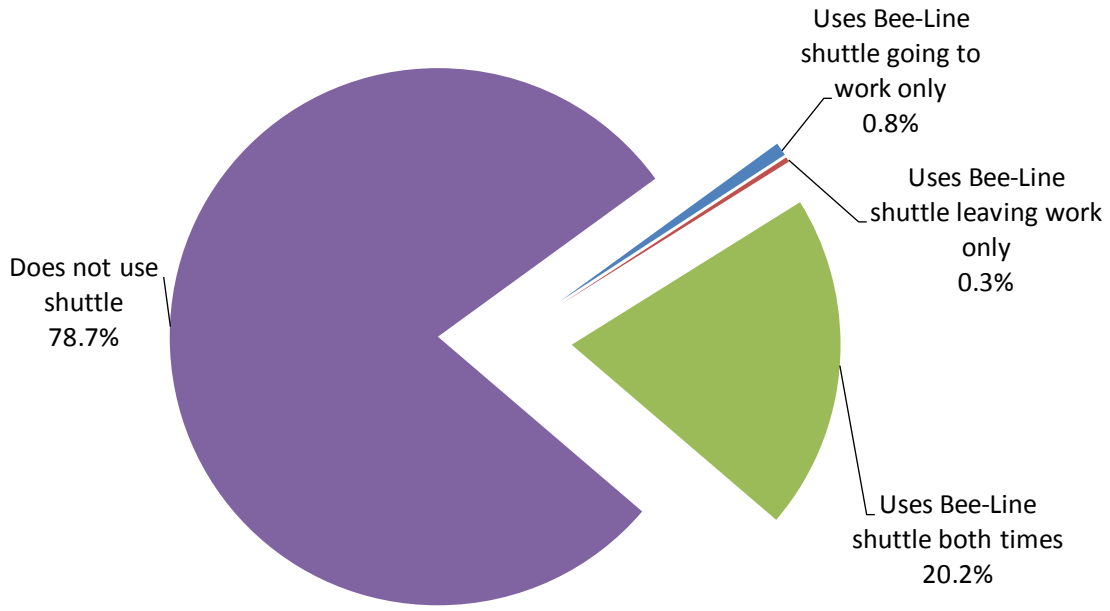
4.1 Survey Findings

The findings presented in this section provide highlights of the salient feedback received through the commuter survey. Additional detail on the survey and the full survey questionnaire are available in Appendix 2.

4.1.1 Use of Bee-Line Shuttles

Of all the respondents, 20.2% use the Bee-Line shuttles going both to and from work, while another 0.8% use it going to work only, and another 0.3% use it only when leaving work. Thus a total of 21.3% of the respondents use the shuttle at some point, while 78.7% commute without use of the shuttle.

Figure 4-1: Percentage of Respondents Using Shuttles

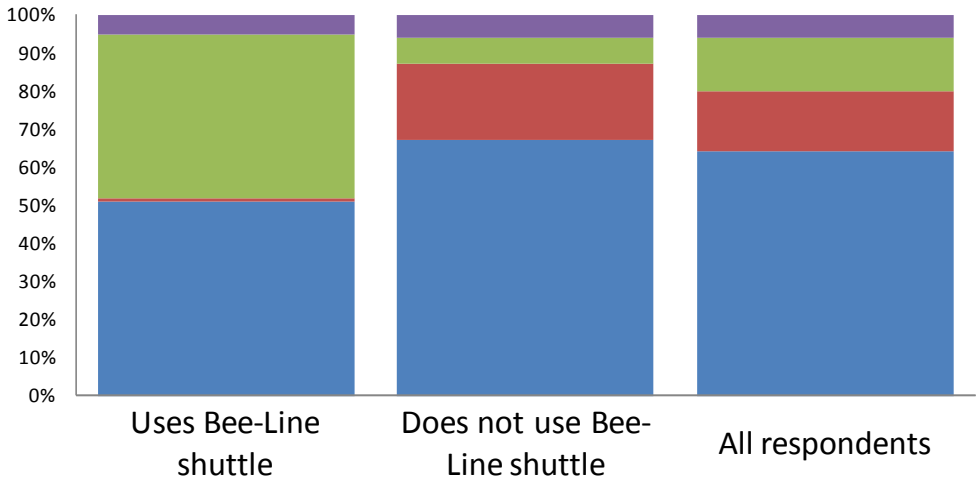


4.1.2 Where do Commuters Originate?

Most of the commuters (64%) originate in New York State outside of New York City. However, 14% originate in the city, bringing the New York total to 78%. An additional 16% originate in Connecticut, and 6% in New Jersey.

Among those who use the Bee-Line shuttles, trip origins in New York City are more prevalent (43%) than for those who do not use the shuttles (7%). While 74% of the responding commuters who do not use the shuttles originate in New York City or other parts of New York State, 94% of those who do use the shuttle originate in New York City or other parts of the state.

Figure 4-2: Where do Commuters Originate?



Q1 To get started, please tell us in which state you currently begin your commute?

	Uses Bee-Line shuttle	Does not use Bee-Line shuttle	All respondents
New Jersey	5%	6%	6%
New York City	43%	7%	14%
Connecticut	1%	20%	16%
New York - Other	51%	67%	64%

4.1.3 Where do Respondents Work?

The response rates were very mixed among the several participating employers. The largest response was from MasterCard employees (42%), and the next largest from SwissRe (34%), followed by Amalgamated Life-Insurance (14%). Of those respondents who use the Bee-Line shuttles, 41% work at MasterCard, but many work at either Amalgamated Life-Insurance (28%) or SwissRe (27%).

4.1.4 Awareness of Shuttle Service

Respondents who do not use the shuttle were asked whether (prior to the survey) they had known about the Bee-Line shuttle service. The overwhelming majority, 92%, indicated that they had known about it. Thus, the fact that they do not use the shuttle is not related to a lack of awareness.

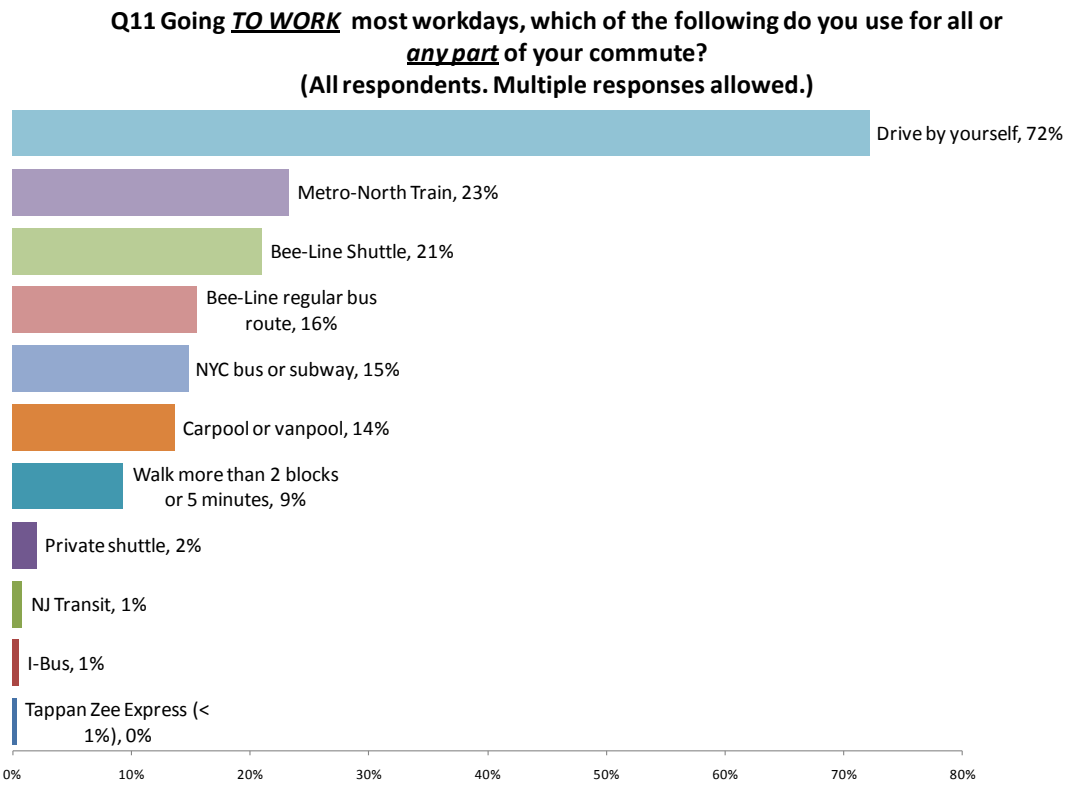
4.1.5 Usual Commuting Mode

Respondents were asked which commuting modes they use for all or part of their commute to work.

- Most, 72%, said they drive by themselves
- Another 23% indicated that they take the Metro-North train
- 21% take a Bee-Line shuttle
- 16% take the Bee-Line fixed route buses
- 15% take a New York City bus or subway
- 14% a carpool or vanpool
- Another 9% indicated they walk for more than two blocks or five minutes during their commute
- Finally 2% indicated they take New Jersey transit, the I-Bus, or the Tappan Zee express

Note that this does not mean that they use these exclusively, because many use some combination of these modes. For this reason the sum of percentages in the chart exceeds 100%.

Figure 4-3: Usual Commuting Mode

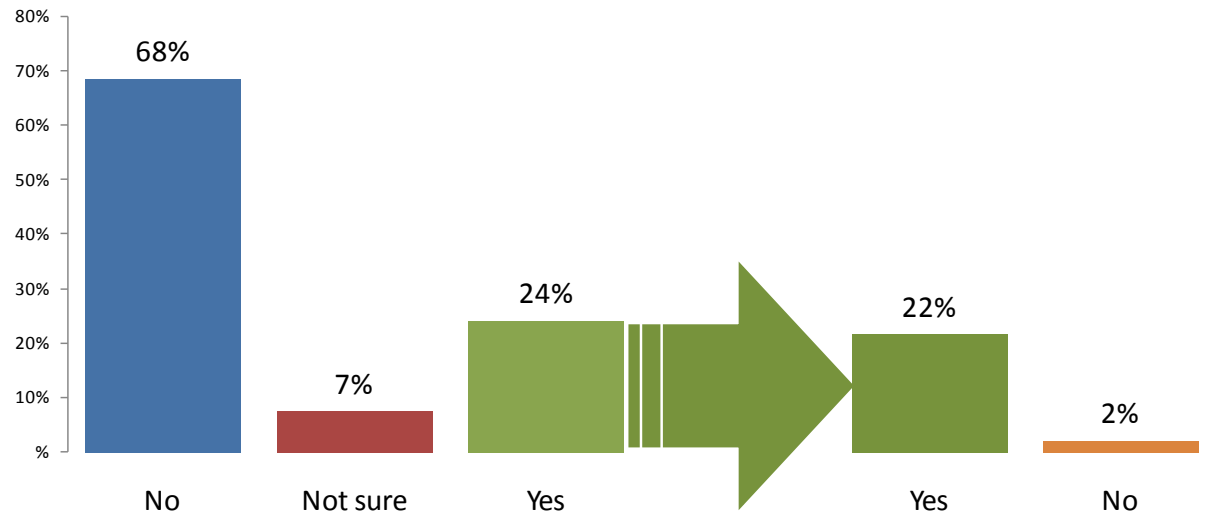


4.1.6 Alternatives to Bee-Line Shuttles

Besides the Bee-Line shuttles, there are also some private shuttles in operation in the study area. There are fewer private shuttles now than in the past, a point which was made in various comments by MasterCard employees in particular.

Respondents who use the shuttles were asked whether there were private shuttles provided by employers or others that might take them to work if there were no public transit shuttles. Most respondents (68%) said there were no such shuttles, but 24% indicated that there were. Of these, all but 2% of them (22%) indicated that they had used a private shuttle at some time during the previous thirty days. Note that of the employers that participated in the survey, only Amalgamated Life has a private shuttle available (through its property manager).

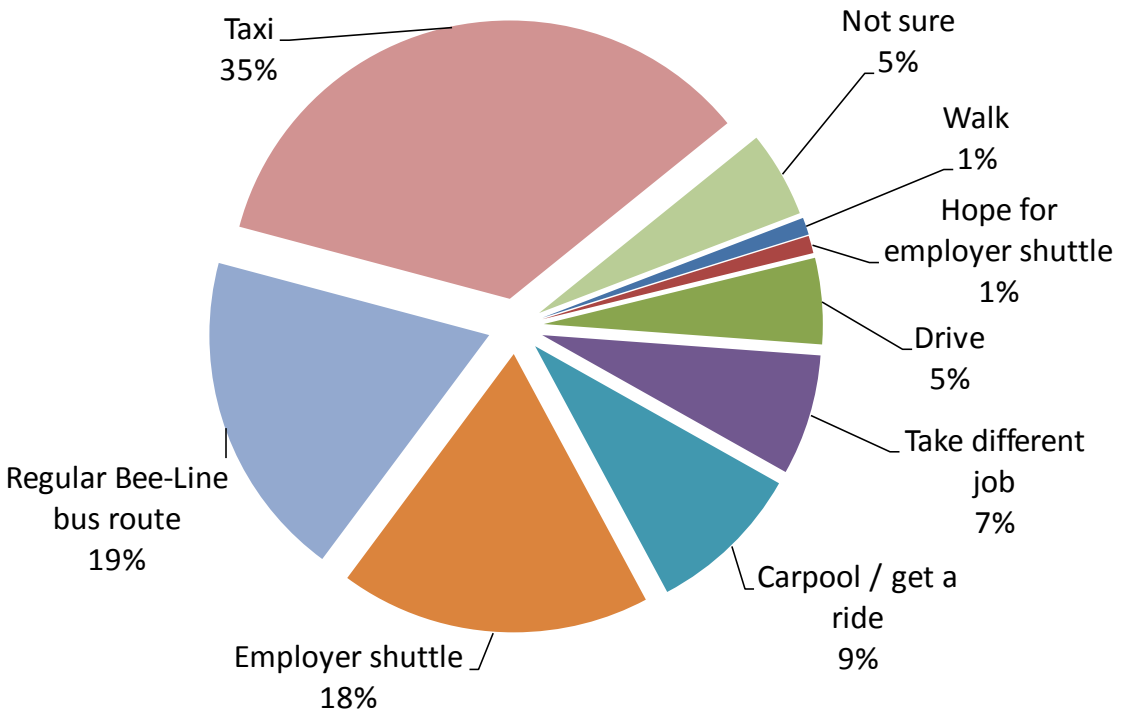
Figure 4-4: Alternatives to Bee-Line Shuttles (Bee-Line Shuttle Users Only)



Respondents who use the Bee-Line shuttles were asked to consider what they would do if there were no public transit shuttles operated by Bee-Line. Perhaps interpreting the situation as temporary, 35% indicated that they would get to work from the Metro-North station by taxi. Unless there is a unique form of multi-rider, low cost taxi service, this hardly seems like a long-term solution, and should probably be regarded as unrealistic. Several of the respondents' comments about alternatives indicated that they too saw the taxi both as the only alternative and as unrealistically costly (see Appendix 2).

Among the more realistic alternatives, 19% of current shuttle users indicated they would use a regular Bee-Line bus route, while 18% said they would use an employer shuttle. Some, 9%, said they would get a ride or carpool. A small number, 5% indicated they would drive all the way to work. Also, 7% felt that they would take another job in a different location.

Figure 4-5: Alternatives to Bee-Line Shuttles



4.1.7 Shuttle vs. Fixed Route Bus

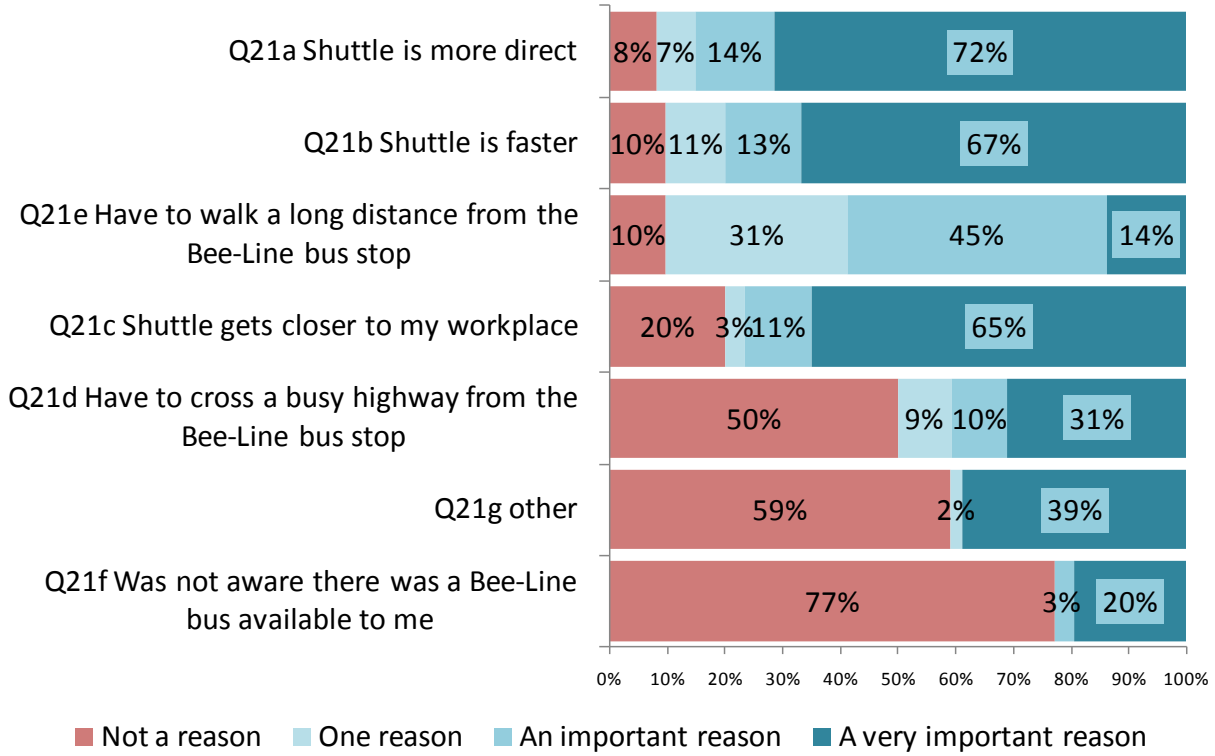
Respondents who use the shuttles were asked how important several reasons were for their using them rather than a regular Bee-Line bus. Figure 4-6 below indicates the levels of importance respondents gave for each of the reasons.

The two reasons most often cited as very important were that the shuttle is more direct than a regular Bee-Line bus route (72%), and that the shuttle is faster (67%). A third factor is that the shuttle gets closer to the workplace, a reason cited by 65% as being very important.

One interesting result was that while only 14% cited having to walk a long distance from the fixed route Bee-Line bus stop to work as very important, another 76% cited this as an important reason or one reason to use the shuttle instead of a regular Bee-Line route. In other words, this was not a compelling reason for most shuttle users but had some importance.

A smaller number, 31%, said it is very important that they would have to cross a busy highway from a Bee-Line bus stop. This is particularly relevant to the split nature of Westchester Avenue in the I-287 corridor east of White Plains, which may require long walks from one side of the highway to access buses traveling in the opposite direction from which customers arrived at work.

Figure 4-6: Reasons Users Choose Bee-Line Shuttles Over Regular Bus Routes



4.1.8 Ability and Willingness to Walk to Transit

In order to gauge the viability of shuttle customers using Bee-Line fixed routes proximate to their offices, all survey respondents were asked how many minutes it would take them to walk between their workplace and the nearest regular Bee-Line route stop (e.g., Route 12 on Westchester Avenue rather than Loop A). This issue was of concern to this study given the suburban, campus nature of many office developments in the study area and their setback from arterial roadways.

Of all respondents, roughly one-fourth (23%) indicated that it would take them less than five minutes, and another 26% between five and nine minutes. On the other hand, 31% said would take ten to twelve minutes, and 20% said thirteen minutes or more.

Figure 4-7: Time to Walk from Bee-Line [Fixed Route] Bus Stop to Workplace

Time to walk from Bee-Line stop to workplace

		Uses Bee-Line shuttle	Does not use Bee-Line shuttle	All respon-dents
How many minutes would it take you to walk between your workplace and the nearest regular Bee-Line route stop on a main street such as one of those in the examples (i.e. a regular Bee-Line bus – not a Bee-Line shuttle stop)?	Less than 5 min	15%	26%	23%
	5 to 9 min	24%	26%	26%
	10 to 12 min	34%	30%	31%
	13 or more	27%	18%	20%
How many minutes would you be willing to walk between your workplace and the nearest regular Bee-Line route stop on a main street such as one of those in the examples (i.e. a regular Bee-Line bus – not a Bee-Line shuttle stop)?	Less than 5 min	43%	25%	30%
	5 to 9 min	33%	46%	42%
	10 to 12 min	18%	25%	23%
	13 or more	7%	4%	5%

	Uses Bee-Line shuttle	Does not use Bee-Line shuttle	All respon-dents
	Mean	Mean	Mean
Q23 Minutes walking to work from Bee-Line stop	13.7	11.0	11.7
Q24 Minutes willing to walk to work from Bee-Line bus stop	7.5	8.2	8.0

Respondents were also asked how many minutes they would be willing to walk between a regular Bee-Line bus route stop and their workplace. Many commuters felt that they would be willing to walk less time than they expected the walk would actually to take. For example, while 20% felt that it would take thirteen minutes or more to walk to work, only 5% indicated they were willing to walk that long.

The contrast is particularly strong among those who currently use the Bee-Line shuttles. Among shuttle users, only 15% felt that the walk to work would take less than five minutes, but 43% said they would be willing to spend less than five minutes. Not surprisingly, customers prefer their door-to-door service on the shuttle routes.

We can also consider this in terms of the average number of minutes (the mean). The expectation overall was that it would take 11.7 minutes to walk from the Bee-Line bus route stop to work. However, respondents were willing to spend an average of only 8 minutes making that walk. Again, the contrast was greater among those who use the shuttles than among those who do not. Among the former, the expectation was that it would take 13.7 minutes to walk, but they would be willing to spend only 7.5 minutes.

4.1.9 Commuter Demographics

There are substantial demographic differences between those who use the Bee-Line shuttles and those who do not. First, of those who use the shuttles, 76% said they have no car available. Contrast this with only 6% of those who do not use a Bee-Line shuttle. Because so many of these shuttle-using employees reside in the greater New York area, the lack of an automobile is not necessarily an indication of low income, but may be a comment on the practicality of owning a vehicle in New York City.

On the other hand, shuttle users do report lower household incomes than non-users. Those who use the shuttles are more likely to report incomes of less than $100,000 for the household than those who do not use the shuttles. Conversely, while of the non-users, 55% indicated that their household incomes exceeded $125,000, only 38% of those who use the shuttles indicated that same upper level of income.

It is also true, however, that compared to many transit using populations (who, in the United States, tend to have very low incomes, with high percentages below $35,000 for the household) the shuttle users tend to have incomes above $35,000.

Figure 4-8: Commuter Demographics

Demographics of shuttle users and non-users

		Uses Bee-Line shuttle	Does not use Bee-Line shuttle	All respon-dents
Other transport options?	No car available	76%	6%	21%
	Shared availability	22%	87%	73%
	Car available	2%	7%	6%
Q34 Are you male or female?	Male	48%	44%	45%
	Female	52%	56%	55%
Q35 What is your total annual household income?	Less than $10,000	1%	1%	1%
	$10,000 to $14,999	%	%	%
	$15,000 to $19,999	%	%	%
	$20,000 to $24,999	1%	%	1%
	$25,000 to $34,999	6%	2%	3%
	$35,000 to $49,999	10%	5%	6%
	$50,000 to $74,999	22%	12%	14%
	$75,000 to $100,000	13%	11%	11%
	$100,000 to $125,000	9%	14%	13%
	More than $125,000	38%	55%	52%

4.1.10 Summary

Overall, the commuter survey provided confirmation of several key points. The commuting population at businesses served by the shuttles is largely one that drives to work, has a relatively high household income, and is dispersed fairly widely in the region. For these reasons, the percentage of respondents that uses Bee-Line, and the shuttle services in particular, is significant. These respondents rely more heavily on transit and represent both moderate and higher income workers commuting from New York City (where auto ownership is less tied to household income) and workers with generally lower incomes than those who typically commute by car.

Awareness of fixed route bus alternatives among Bee-Line shuttle users is relatively strong, even if the implications of walking distances from some offices to the mainline bus stops would indicate that these alternatives may not be feasible for all users. Proximity of shuttle bus stops to offices, short walking distances, and faster travel times (relative to fixed route buses) are all valued attributes of the Bee-Line shuttle services.

Section 5 – Route Recommendations

Following the review of shuttle route performance, input from the employer and commuter stakeholder groups, and discussion with WCDOT staff and the project steering committee, a number of service planning recommendations were developed to improve the operating efficiency of the Bee-Line shuttle program as a whole.

The route recommendations respond to four primary goals:

- Improve service efficiency and cost-effectiveness
- Maintain service coverage and frequency
- Consolidate services where opportunities exist
- Shift shuttle ridership to fixed route buses where feasible and reasonable

For each recommended service change (or group of changes), summaries were provided for anticipated operating and cost impacts. To develop a reasonable evaluation of these impacts, ridership estimates are not included in these estimates. It is not anticipated that ridership would change significantly enough to impact operating costs. For the most part, the changes maintain service coverage either through existing shuttle routes or through Bee-Line fixed routes. Thus, while some riders may choose other alternatives, the vast majority would still have a Bee-Line alternative even if shuttle services were eliminated.

Service frequencies for route consolidation such as the combination of Loops A, B and D described below or the incorporation of Loop T stops into Loop F assume the maximum level of service currently operated on any given route. For example, in the proposed south and north side loops for the Westchester Avenue corridor trip frequencies match Loop B, which currently has the most trips of the three routes in the corridor (west of the Hutchinson River Parkway).

5.1 Consolidation of Loops A, B, D

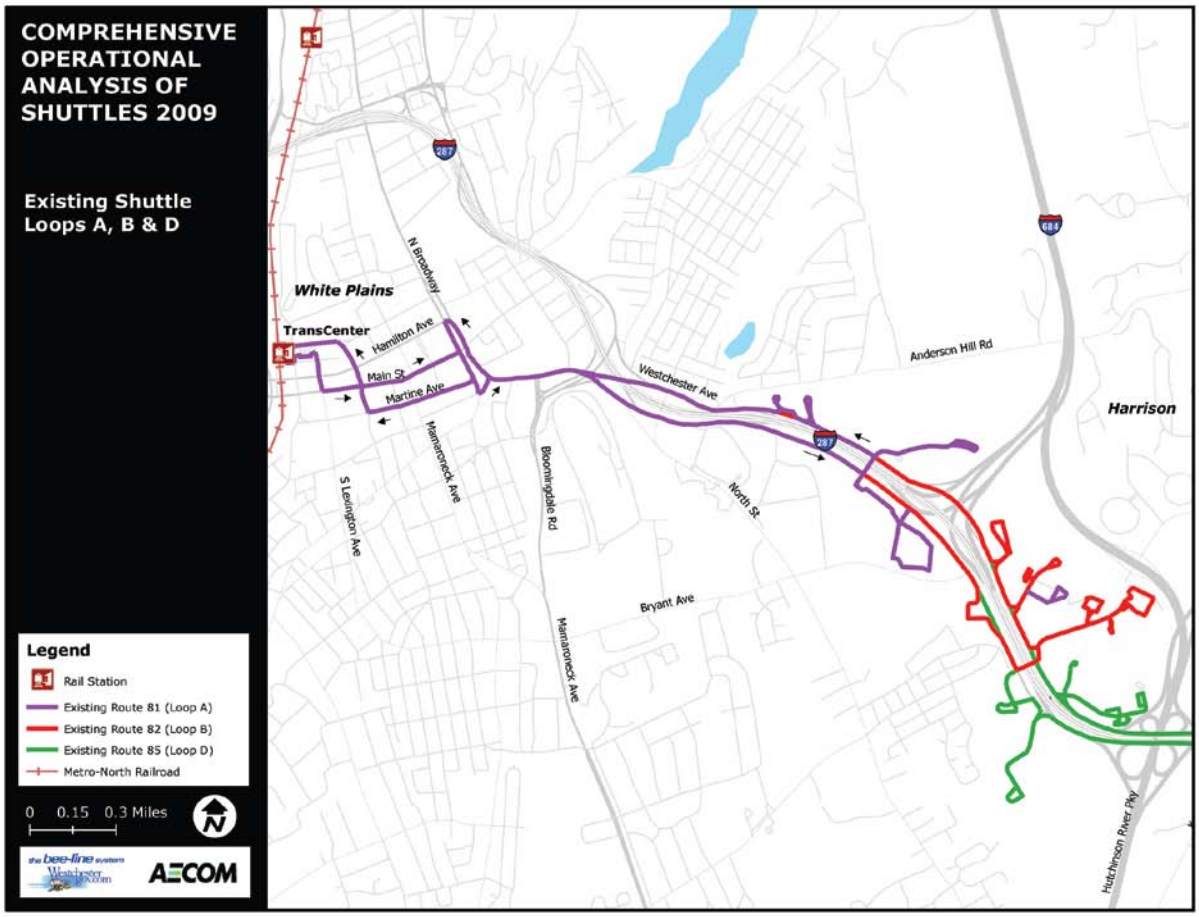
Four shuttle loops currently serve employers in the Westchester Avenue corridor east of White Plains: Loops A, B, C, and D. Three of these routes, Loops A, B, and D, can be consolidated into two routes, simplifying the service structure in the process. The two new routes, provisionally referred to as the north side and south side loops, will operate in conjunction with one another to maximize efficiency and vehicle utilization.

A primary constraint of the Westchester Avenue corridor, particularly when considering the availability of fixed route bus alternatives (Bee-Line Routes 3, 12), is the fact that Westchester Avenue operates as a service road for I-287 and thus is restricted to eastbound travel on the south side of the highway and westbound travel on the north side. Customers who may take a fixed route (non-shuttle) bus to their employer face the possibility of long, difficult walks to cross the highway for service in the opposite direction.

The consolidation of these three routes into two, one on the south side of I-287 and one serving the north side, will reduce vehicle requirements and provide a simpler service for current and future shuttle customers. Furthermore, an option for neighborhood service in White Plains for commuters going to the Metro-North Railroad station or the TransCenter will allow for potential ridership along what would otherwise be deadhead (non-revenue) service as shuttles return to the TransCenter from morning drop-offs in the Westchester Avenue corridor.

The existing route alignments for Loops A, B, and D are shown below in Figure 5-1.

Figure 5-1: Existing Shuttle Loops A, B, D



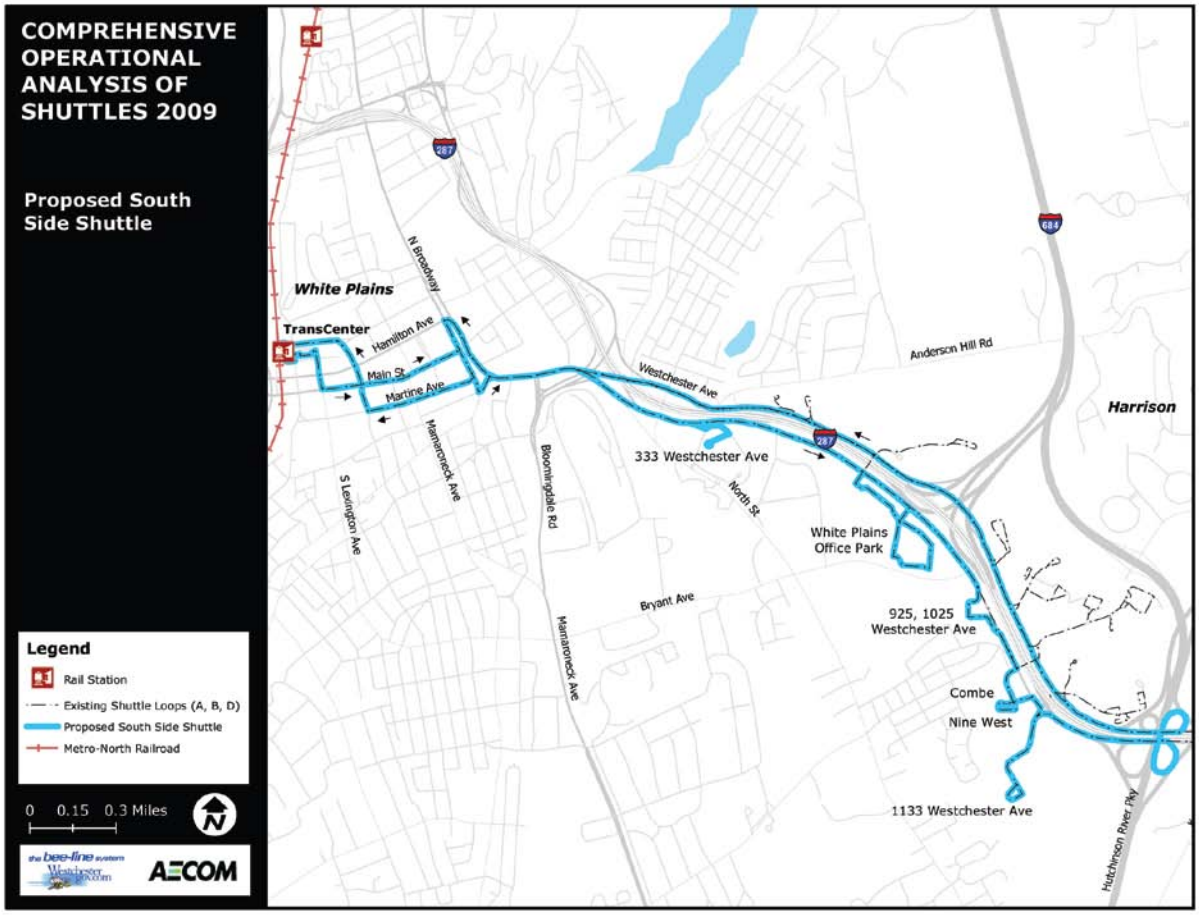
5.1.1 South Side Loop

The proposed south side loop will incorporate elements of Loops A, B, and D to serve all employers that currently have shuttle stops between downtown White Plains and the Hutchinson River Parkway. No employers are eliminated; however, some consolidation of individual bus stops within the properties is recommended to improve operational efficiency. These consolidations are discussed in greater detail in *Section 6 – Operations and Access Improvements*.

Destinations served on the south side of Westchester Avenue include:

- 333 Westchester Avenue (Amalgamated Life)
- 701 through 777 Westchester Avenue (White Plains Office Park)
- 925, 1025 Westchester Avenue
- 1101, 1129 Westchester Avenue (Combe, Nine West)
- 1133 Westchester Avenue

Figure 5-2: Proposed South Side Loop



This service would require three vehicles operating during the morning and evening peak periods, operated in conjunction with the north side loop defined below (which itself requires three vehicles), to maintain the same level of service currently available on Loops A, B, or D. The A, B, and D shuttles currently require seven peak vehicles (combined).

5.1.2 North Side Loop

The north side loop, as proposed, would serve all employment sites currently served by Loops A, B, and D on the north (westbound) side of Westchester Avenue, with the exception of businesses on West Red Oak Lane. This segment would be discontinued due to very low ridership. The north side loop would operate directly from the TransCenter to the Westchester Lane bridge over I-287 to begin dropping off morning (outbound) passengers at stops along Corporate Park Drive, Gannett Drive, Bryant Avenue (USPS facility), and remaining stops westbound on Westchester Avenue.

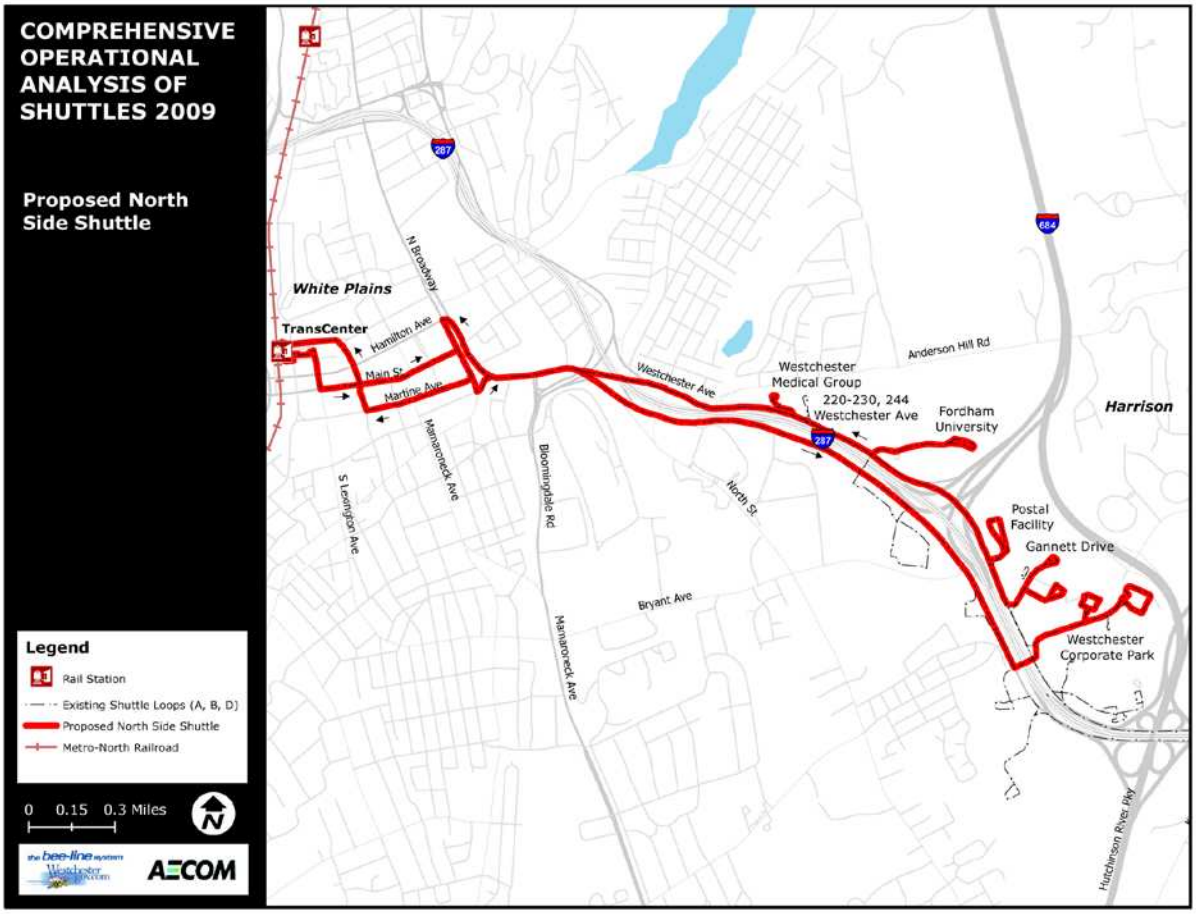
Travel times for customers on any of the existing Loop A, B, or D services would remain consistent, even if the amount of time on a vehicle might increase in the mornings or afternoons, i.e., the outbound morning trip may become several minutes longer since more stops could be made while the inbound evening trip would be shorter with fewer stops. The total time any customer would spend on a vehicle would remain similar to the current routes (up to approximately 30 minutes maximum one-way travel time for a customer).

Destinations served on the north side of Westchester Avenue include:

- 100 through 110 Corporate Park Drive (Westchester Corporate Park)
- 1 through 4 Gannett Drive
- 1000 Westchester Avenue (United States Postal Service)
- 400 Westchester Avenue (Fordham University)
- 244 Westchester Avenue
- 220 through 230 Westchester Avenue
- 210 Westchester Avenue (Westchester Medical Group)

The proposed route alignment for the north side loop is shown on the following page in Figure 5-3.

Figure 5-3: Proposed North Side Loop



5.1.3 White Plains Neighborhood Connection

A primary source of inefficiency in the Bee-Line shuttle routes is the considerable non-revenue service time and mileage included in each route. Given the nature of the shuttle network as a commuter service to employment destinations, and not a frequent-turnover local bus service, trips operate in revenue service outbound in the morning peak period and inbound in the afternoon/evening.

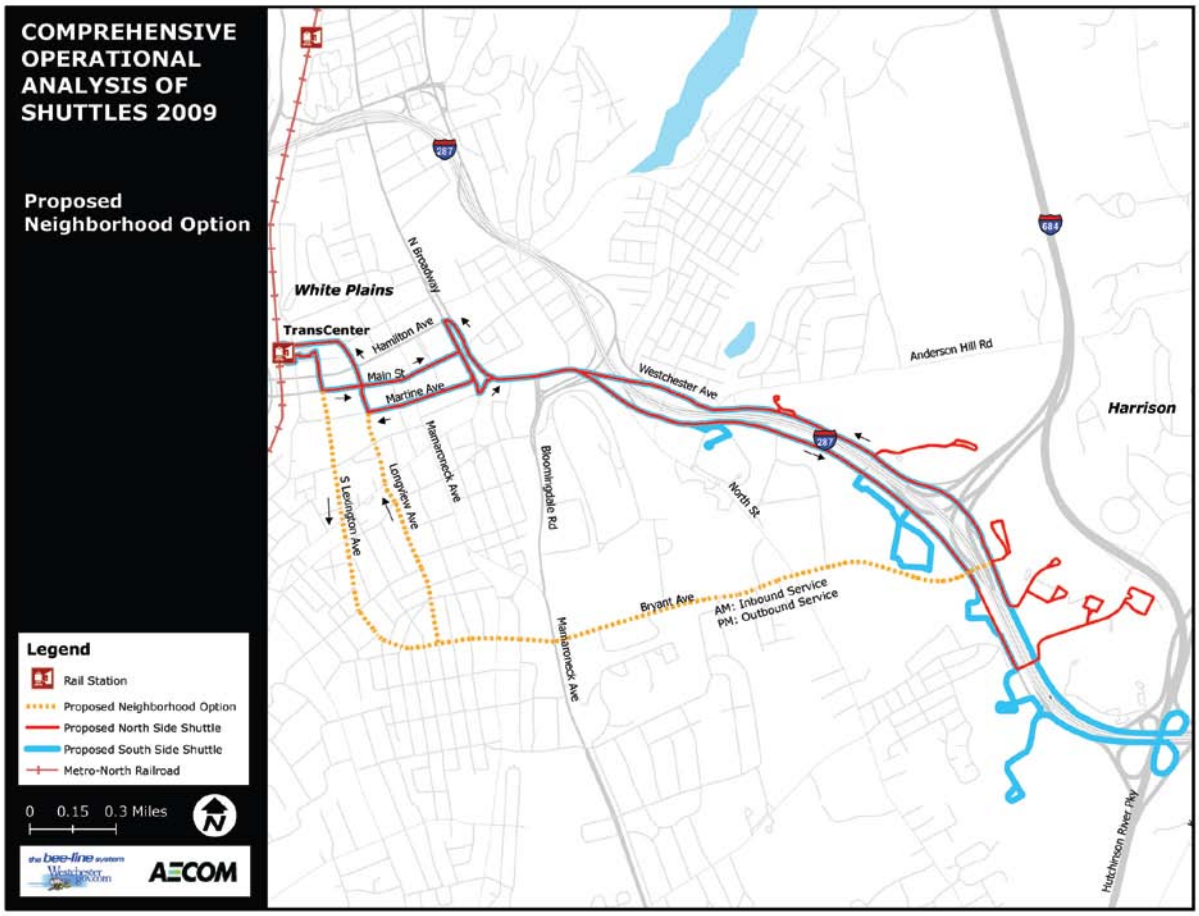
In conjunction with the proposed north and south side loops to replace existing Loops A, B, and D, the consultant team included an option for providing peak direction revenue service to the Metro-North Railroad station and White Plains TransCenter. This would be an opportunity to generate additional passenger activity and revenue during otherwise non-revenue service time. Metro-North Railroad's origin-destination survey data from 2007 shows a healthy amount of commuting activity from White Plains neighborhoods bordering downtown, including walking trips, carpooling, and other ride-sharing to the White Plains Metro-North railroad station. These represent candidates for a short transit trip as an alternative to short driving trips that may require costly parking resources including space, time, and expenses. Survey data can be found in Appendix 1. Most importantly, this option is not expected to increase travel times between White Plains and the Westchester Avenue corridor, thus avoiding any negative effects on operational costs, schedule adherence, or vehicle requirements. Lighter traffic and fewer turns along this alignment allow comparable running times to the traditional route from White Plains.

In the mornings, rather than returning directly (i.e., out of revenue service) to the TransCenter after dropping shuttle passengers at employment sites on the south side loop, the proposed neighborhood connection would provide peak direction travel options for residents in the south side of downtown White Plains along Longview Avenue. Vehicles would operate westbound on Bryant Avenue and northbound on Longview Avenue (continuing on Grove Street) before turning west on Water Street to access the railroad station and TransCenter.

In the afternoons, the neighborhood connection would leave the TransCenter via South Lexington Avenue in White Plains, turning east on Bryant Avenue and continuing to Westchester Avenue eastbound. This would allow drop-offs of passengers returning from the train or bus to White Plains. Upon crossing the Westchester Lane bridge over I-287, the vehicle would begin picking up passengers from the employment sites on Corporate Park Lane, Gannett Drive, and the remainder of the north side loop as described earlier.

To operate effectively and efficiently, this neighborhood option must be incorporated in the combined operation of the north and south side loops along Westchester Avenue. The deadhead time to and from White Plains that can be applied to neighborhood service exists in the peak directions (i.e., inbound to White Plains in the morning, outbound in the afternoon) whereas the primary direction of shuttle services are reverse commute from White Plains to the suburban office developments in the corridor.

Figure 5-4: Proposed Neighborhood Option (North Side and South Side Loops)



5.1.4 Anticipated Impacts

The north and south side loops would be operated in conjunction with one another, replacing the current Loop A, B, and D services. The anticipated impacts of this recommendation include an overall increase in revenue mileage but a decrease in revenue hours, vehicle requirements, and annual operating expense.

All annual operating costs included in this section are based on WCDOT's hourly service rate of $145 (the contract rate with operator Liberty Lines) multiplied by annual revenue hour totals. These figures are not intended to represent the exact cost of each route. Rather, they provide a consistent means with which existing and proposed services can be compared to gauge the annual net cost increase or decrease.

With the exception of West Red Oak Lane, the only segment fully eliminated from the north and south side services, ridership is expected to effectively remain constant through these changes. Some additional ridership would be gained through the peak direction neighborhood connection. However, for the purposes of comparative cost calculations, only the cost of

providing the service (i.e., revenue hours of service multiplied by the $145/hour rate) was evalulated. With overall ridership and revenues (and farebox recovery) well below Bee-Line system averages, the most useful evaluation of the proposed services is the net change in operating costs.

Table 5-1: Anticipated Operating Impacts (Consolidation of Loops A, B, D)

Route	Annual Revenue Hours	Annual Revenue Miles	Peak Vehicles	Annual Expense
Loop A (existing)	3,605	27,299	2	$522,725
Loop B (existing)	4,516	36,331	3	$654,820
Loop D (existing)	3,738	38,962	2	$542,010
Subtotal	**11,859**	**102,592**	**7**	**$1,719,555**
North Side	4,488	49,368	3	$650,760
South Side	5,474	69,472	3	$793,730
Subtotal	**9,962**	**118,840**	**6**	**$1,444,490**
Net Change	**- 1,897**	**+ 16,248**	**- 1**	**- $275,065**

Note: Proposed neighborhood option does not affect running times and operating costs for North Side/South Side loops

Furthermore, New York State DOT's representative on the project steering committee indicated that inclusion of the neighborhood option in the north side/south side proposal could allow the service to become eligible for Congestion Mitigation Air Quality (CMAQ) funding. By providing a new type of service within the existing shuttle framework, the new neighborhood connection may meet requirements for this federal level funding source, typically available in three-year grant periods, thereby lowering NYSDOT's contribution to the service subsidy and WCDOT's operating costs at the same time.

5.2 Modification or Discontinuation of Loop C

Two proposals were presented to address the inefficiencies inherent in the operation of Loop C. Given the long deadhead time and distance from White Plains to employment sites in the Westchester Avenue corridor east of Purchase Street, coupled with low to modest ridership at these sites, the route suffers from low productivity and cost-effectiveness.

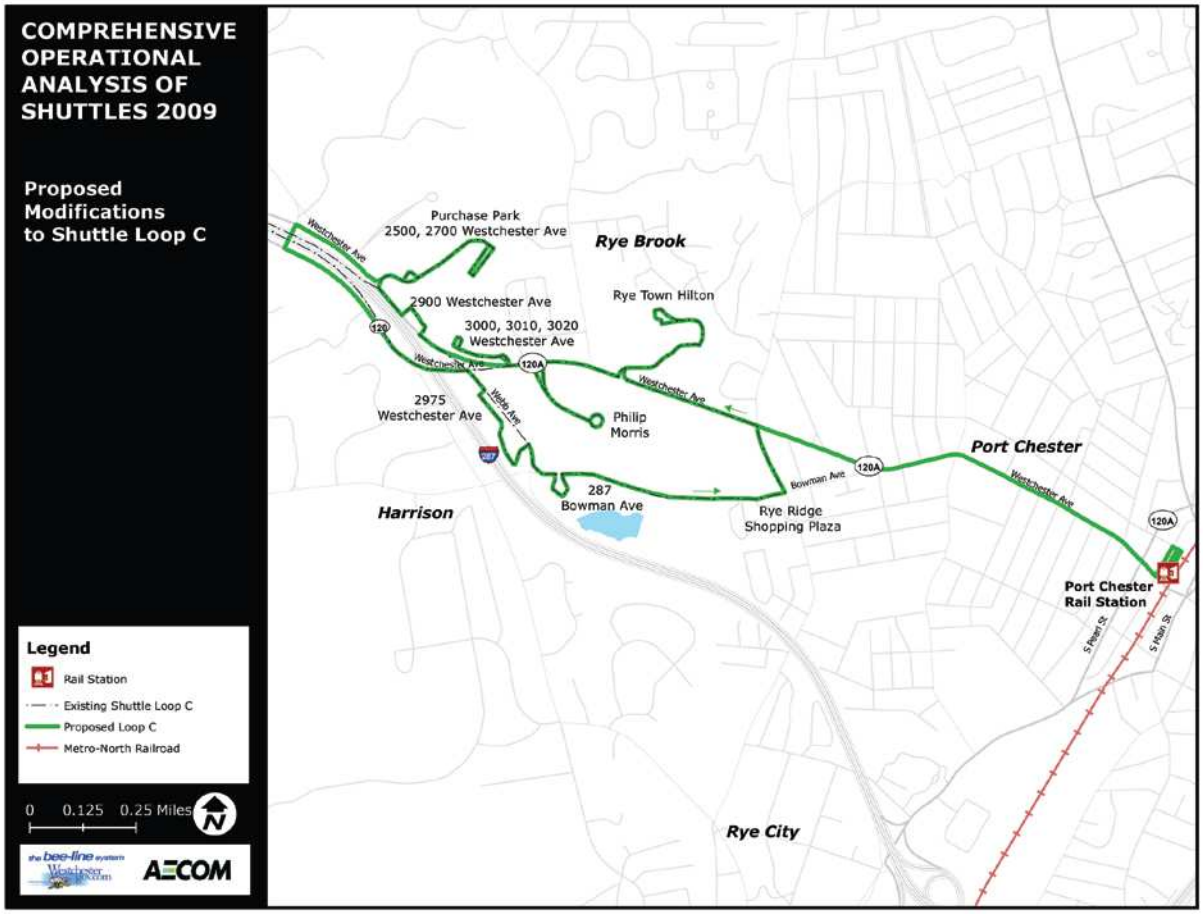
One proposal was to reconfigure the Loop C to operate from the Metro-North Railroad station in Port Chester rather than White Plains. This would offer access to the same employment sites (i.e., keeping the same fundamental route structure on Westchester Avenue and Bowman Avenue) while opening up the service to a new market via the Metro-North Railroad New Haven Line. This would allow commuters from Connecticut or points northeast to take advantage of the Bee-Line shuttle to reach employers such as Philip Morris, the Rye Town Hilton, and office parks such as Purchase Park on Westchester Avenue. Commuters from New York City would still have access via the New Haven Line instead of the Harlem Line on Metro-North.

This route reconfiguration would reduce the vehicle requirement to one bus while maintaining all of the employer connections currently served by Loop C.

There are some potential disadvantages of this service proposal. First, the potentially negative impact to current customers of moving the service to the New Haven Line in Port Chester would likely result in a decrease in ridership, at least initially. Second, the fare structure of the New Haven Line is higher than that on the Harlem Line, particularly when commuting from Connecticut into New York, thus the trip may be less financially viable to some commuters.

Travel times from Grand Central Terminal in New York City to Port Chester are slightly longer than that to White Plains (40-47 minutes to Port Chester vs. 33-47 minutes to White Plains), and train frequencies are not as high (21 minute average headway to Port Chester vs. 13 minute frequency to White Plains), although this travel time difference would be mitigated by the shorter trip times from the Port Chester railroad station to the majority of the employers on the modified Loop C. For example, travel time from the Port Chester railroad station to Philip Morris would decrease by approximately 5 minutes relative to the travel time from White Plains.

Figure 5-5: Proposed Loop C (Port Chester Option)



The alternate recommendation offered by the study team was the discontinuation of the Loop C service. It is among the lowest two performers along with Loop T and thus is not considered a viable service to operate given the low ridership and relatively high operating costs. The Bee-Line Route 13 bus provides an alternative to the Loop C shuttle along Westchester Avenue from the Port Chester railroad station to White Plains (and west to Tarrytown). Recognizing that some employment sites are set back from the roadway and thus require longer walks from bus stops, the Route 13 service is nonetheless a viable alternative for customers able to walk from the mainline route to their offices. Employers on Bowman Avenue are the only locations without a fixed route bus alternative.

5.2.1 Anticipated Impacts

The following two tables outline the anticipated impacts from proposed changes to the Loop C or elimination of the route entirely. From Port Chester, the reduced route length would lower costs substantially and reduce one peak vehicle. The costs shown reflect only the change in revenue hours, although some additional deadhead mileage would be required for the Loop C vehicle to reach its start/end in Port Chester. Effectively, this would shift a large percentage of what is now considered revenue time (when Loop C vehicles operate without passengers from the Westchester Avenue corridor to the White Plains rail station/TransCenter to deadhead time.

Table 5-2: Anticipated Operating Impacts (Operating Loop C From Port Chester)

Route	Annual Revenue Hours	Annual Revenue Miles	Peak Vehicles	Annual Expense
Loop C (existing)	2,762	38,456	2	$400,490
Loop C (Port Chester)	1,496	29,928	1	$216,920
Net Change	**-1,266**	**-8,528**	**- 1**	**- $183,570**

Eliminating Loop C altogether would provide a savings of $400,490 in operating expense. The loss of fare revenue generated on this route ($25,395) would be of less consequence than the significant savings in expense for what is the poorest performing of the shuttle routes.

Table 5-3: Anticipated Operating Impacts (Elimination of Loop C)

Route	Annual Revenue Hours	Annual Revenue Miles	Peak Vehicles	Annual Expense
Loop C (existing)	2,762	38,456	2	$400,490
Elimination of Loop C	0	0	0	$0
Net Change	**- 2,762**	**- 38,456**	**- 2**	**- $400,490**

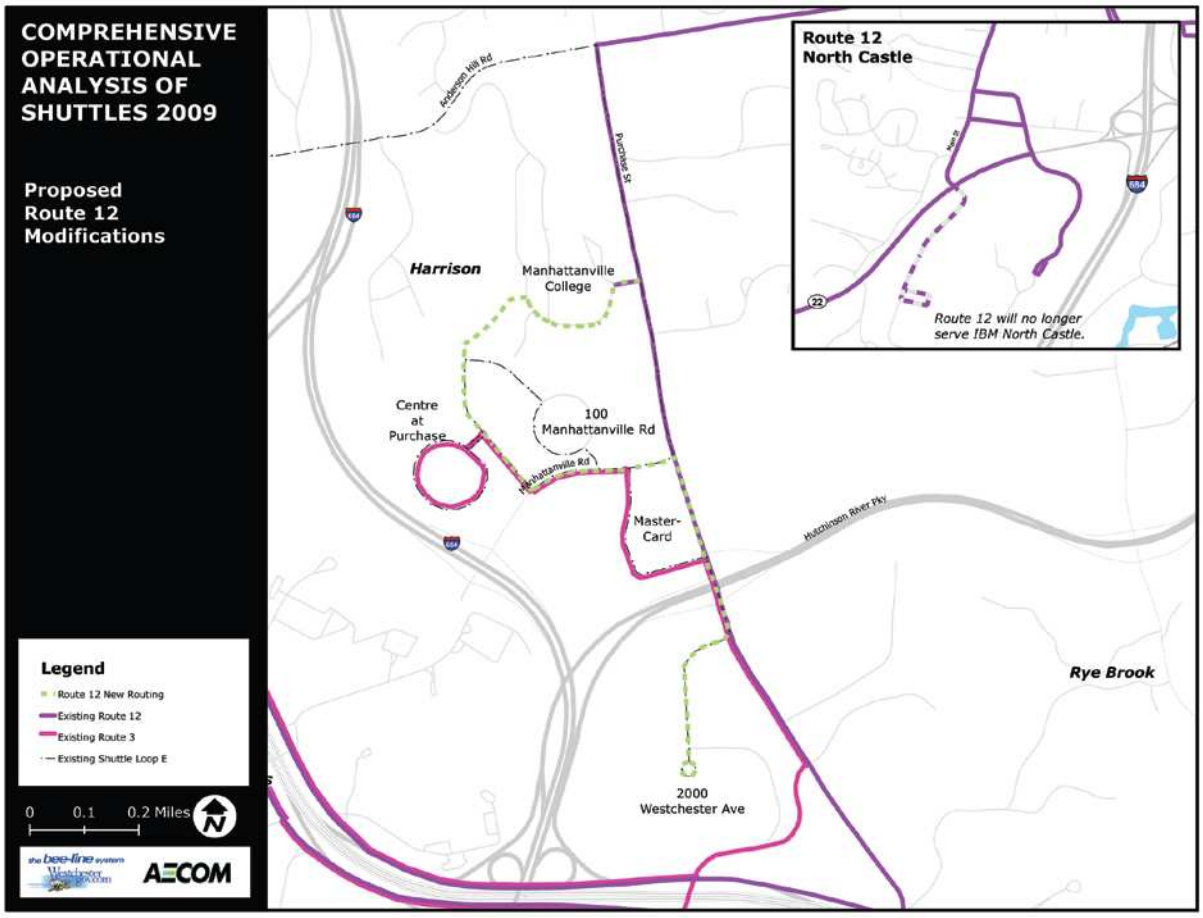
5.3 Discontinuation of Loop E

While the Loop E service is among the most productive of the Bee-Line shuttle services, the employment sites it serves are easily accessed from the existing Route 3 express service from The Bronx to White Plains and the Platinum Mile, as well as the Route 12 bus from White Plains to Yorktown. The Route 3 requires no modification, as it already provides direct service to the

Centre at Purchase and MasterCard. The Route 12 would be modified slightly to provide direct service into the Centre at Purchase and to the Morgan Stanley offices at 2000 Westchester Avenue. These two fixed route services combined provide service at ten minute frequencies or better during the morning and evening peak periods, while the Route 12 provides hourly service during the midday period.

An additional modification to the Route 12 would eliminate four trips daily in each direction serving IBM's North Castle facility off the regular route alignment. Ridership activity at this location is consistently low and does not warrant the deviation from regular service. The time savings of a few minutes for these deviations would mitigate additional running time required to directly serve the Centre at Purchase and 2000 Westchester Avenue. No additional vehicles would be required to maintain the current Route 12 schedule.

Figure 5-6: Proposed Modifications to Route 12 / Elimination of Loop E



5.3.1 Anticipated Impacts

Elimination of Loop E by incorporating its stops into a slightly modified Route 12 fixed route service would save two peak vehicles and 3,373 revenue hours of service annually. This

translates into an operating cost savings of $489,085. While it is reasonable to expect that some ridership might be lost due to the longer travel times required on the Route 12 relative to Loop E, current passengers would be afforded this alternative; no Loop E riders would be without service. Any fare revenue lost due to a drop in ridership would be insignificant relative to the operations cost savings.

Table 5-4: Anticipated Operating Impacts (Elimination of Loop E)

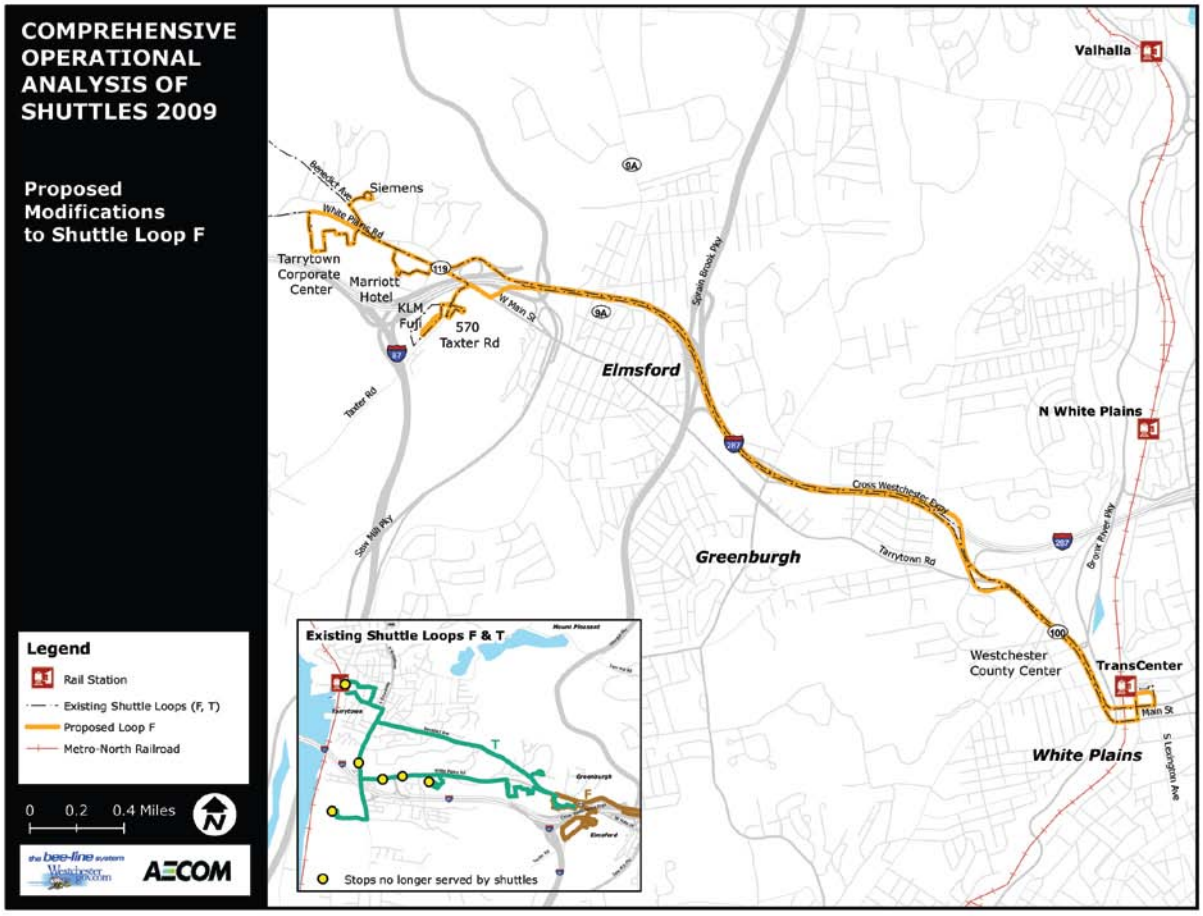
Route	Annual Revenue Hours	Annual Revenue Miles	Peak Vehicles	Annual Expense
Loop E (existing)	3,373	42,858	2	$489,085
Elimination of Loop E	0	0	0	$0
Net Change	**- 3,373**	**- 42,858**	**- 2**	**- $489,085**

5.4 Modification of Loop F

The proposed modifications to Loop F include extending the route westward a short distance to serve two sites that are currently served by the Loop T. The Siemens (formerly Bayer Diagnostics) site on Benedict Avenue and the Tarrytown Corporate Center on Westchester Avenue would be added to Loop F from White Plains in conjunction with the discontinuation of Loop T (discussed below). Both shuttle routes already served the Marriott Hotel on Westchester Avenue. To facilitate this routing, a current prohibition of left turns for vehicles exiting the main access road to Siemens onto Benedict Avenue must be modified to allow buses to make this turn. Buses turning right when exiting Siemens would require a substantially longer route and running time to return to White Plains Road.

This route extension for Loop F would not require additional vehicle resources and would improve the route's operational efficiency by adding the most productive stop from Loop T (Siemens) and the Tarrytown Corporate Center. Furthermore, the White Plains railroad station provides a higher level of service to commuters than the Tarrytown station, with more frequent train service and more bus connections at the TransCenter. Loop F will continue to serve the other employers on the route as it currently operates.

Figure 5-7: Proposed Modification to Loop F



5.4.1 Anticipated Impacts

The expansion of Loop F to include several stops currently served by Loop T would increase its revenue mileage, revenue hours, and thus operational costs. Importantly, the route can continue to operate with two peak vehicles. The cost increase on the Loop F would be offset by the cost savings of $446,745 achieved through the elimination of Loop T. These two recommendations were designed to be undertaken together. Thus, the net gain for expanding Loop F and eliminating Loop T is estimated to be a savings of $379,030 annually.

Table 5-5: Anticipated Operating Impacts (Modification of Loop F)

Route	Annual Revenue Hours	Annual Revenue Miles	Peak Vehicles	Annual Expense
Loop F (existing)	2,500	22,998	2	$362,500
Modification of Loop F	2,967	49,649	2	$430,215
Net Change	**+ 467**	**+ 26,651**	**--**	**+ $67,715**

5.5 Loop H

No modifications were proposed for the Loop H service from White Plains to Armonk.

5.6 Discontinuation of Loop T

Due to consistently low ridership, the Loop T was recommended for discontinuation. Nearly all stops on the route are currently served by the Route 1W or Route 13 buses with the exception of Siemens on Benedict Avenue, which would be included on the proposed expansion of Loop F, described above. The Kraft site on Broadway requires a longer walk from the bus stop on Route 1W; however, this walk is feasible for many employees and ridership activity at this stop indicates that many already reach Kraft via the 1W. Furthermore, selected trips on the fixed route buses could deviate to serve Kraft directly without a substantial time penalty.

5.6.1 Anticipated Impacts

As discussed above in Section 5.4.1, the elimination of Loop T was designed to work in concert with the proposed Loop F. On its own, the discontinuation of Loop T would provide $446,745 in annual operating savings. The annual net savings from this route elimination combined with the expansion of Loop F would be $379,030. Similar to the elimination of Loop E, the ridership currently on Loop T would be able to shift to existing Bee-Line fixed routes (e.g., 1W, 13); however, it is not unreasonable to expect that some customers would find other alternatives to the shuttle rather than fixed route bus services. Nonetheless, any revenue loss would be minimal.

Table 5-6: Anticipated Operating Impacts (Elimination of Loop T)

Route	Annual Revenue Hours	Annual Revenue Miles	Peak Vehicles	Annual Expense
Loop T (existing)	3,081	27,400	2	$446,745
Elimination of Loop E	0	0	0	$0
Net Change	**- 3,081**	**- 27,400**	**- 2**	**- $446,745**

5.7 Summary of Impacts

Overall, the route and service changes recommended for the shuttle program were designed to improve efficiency, reduce costs, and maximize the availability of compatible fixed route Bee-Line bus services wherever possible. The following table summarizes the anticipated impacts of the recommendations as a whole, based on the revenue hour/cost calculations used above.

The cost savings possible through implementation of the proposed recommendations would be substantial. The net changes shown for the shuttle network in Table 5-7 reflect the proposed elimination of Loop C. A separate option was described in Section 5.2.1 to operate Loop C from

Port Chester rather than White Plains. If Loop C is eliminated, the savings would total $1,543,670 annually. If Loop C were to be operated from Port Chester, the net savings would nonetheless total $1,326,750.

Table 5-7: Summary of Anticipated Operating Impacts

Route	Annual Revenue Hours	Annual Revenue Miles	Peak Vehicles	Annual Expense
Existing Services				
Loop A	3,605	27,299	2	$522,725
Loop B	4,516	36,331	3	$654,820
Loop C	2,762	38,456	2	$400,490
Loop D	3,738	38,962	2	$542,010
Loop E	3,373	42,858	2	$489,085
Loop F	2,500	22,998	2	$362,500
Loop H	2,927	40,632	3	$424,415
Loop T	3,081	27,400	2	$446,745
Subtotal	**26,502**	**274,936**	**18**	**$3,842,790**
Proposed Services				
North Side	4,488	49,368	3	650,760
South Side	5,474	69,472	3	793,730
Modification of Loop F	2,967	49,649	2	$430,215
Loop H	2,927	40,632	3	$424,415
Subtotal	**15,856**	**209,121**	**11**	**$2,299,120**
Net Change	**- 10,646**	**- 65,815**	**- 7**	**- $1,543,670**

Note: Proposed neighborhood option does not affect running times and operating costs for North Side/South Side loops

Section 6 – Operations and Access Improvements

In addition to the route planning recommendations outlined in Section 5, a number of operational improvements were identified to offer opportunities for faster travel times, reduced vehicle dwell time, and customer convenience. Primary areas of improvements pursued include:

- Bus stop consolidation within properties
- Turning movements and route alignments
- Pedestrian Access and Sidewalk Improvements
- Access to the White Plains railroad station
- Reverse peak shuttle boarding

6.1 Bus Stop Consolidation

The Bee-Line shuttle routes were designed to maximize customer convenience by providing direct connections from Metro-North Railroad stations to employment sites, many of which are situated in suburban office parks and set back from the main roadways. While front-door drop-offs and pick-ups are a convenience for customers, an excessive number of vehicle stops within individual office parks has resulted in inefficient operations, slower travel times, as well as the perception of an inefficient service making too many stops, too close together. The proposals described in this section point to opportunities for consolidating stops within corporate properties to keep shuttle vehicles moving and reduce unnecessary dwell time.

6.1.1 333 Westchester Avenue (proposed south side loop)

Three bus stops currently exist at the 333 Westchester Avenue site, one of which is used by the Bee-Line Route 12 bus, the other two by the Loop A shuttle. The two shuttle stops, one of which is situated at the lower parking level, the other at the upper level by the main building entrance to Amalgamated Life, can be consolidated into a single stop on the upper level.

Figure 6-1: Bus stop consolidation at 333 Westchester Avenue

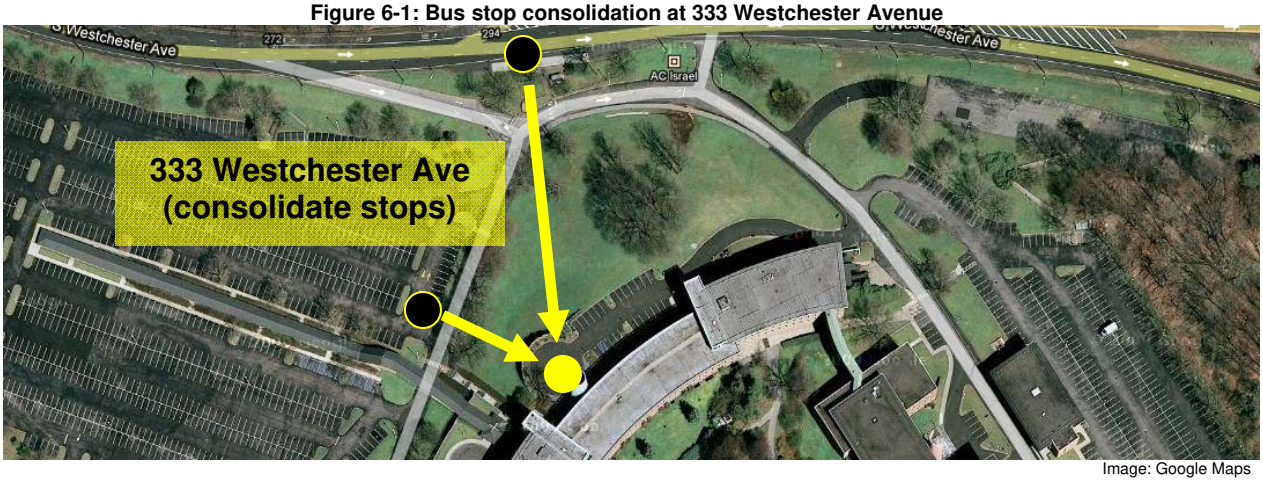


Image: Google Maps

6.1.2 777 Westchester Avenue (proposed south side loop)

The bus stop currently located on the east side (back side) of 777 Westchester Avenue should be relocated to the front of the building to eliminate unnecessary mileage and travel time for shuttle vehicles.

Figure 6-2: Bus stop relocation at 777 Westchester Avenue

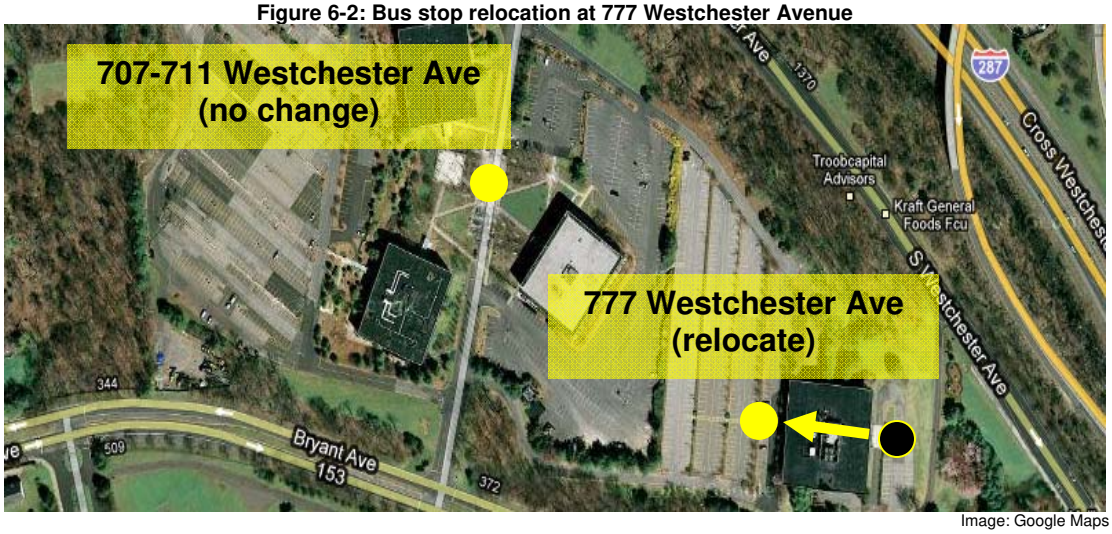


Image: Google Maps

6.1.3 103-105 Corporate Park Drive (proposed north side loop)

Bus stops for 103 and 105 Corporate Park Drive should be consolidated into a single, on-street stop, while the stop for 104 Corporate Park Drive should be relocated from the building property to the street to allow for faster vehicle circulation through this group of employers. Rather than pulling into individual parking lots to make stops as close as 100 feet to each other, the shuttle vehicle would serve all properties with stops on Corporate Park Drive to allow for a simple in and out operation within this complex.

Figure 6-3: Bus stop consolidation and relocation on Corporate Park Drive

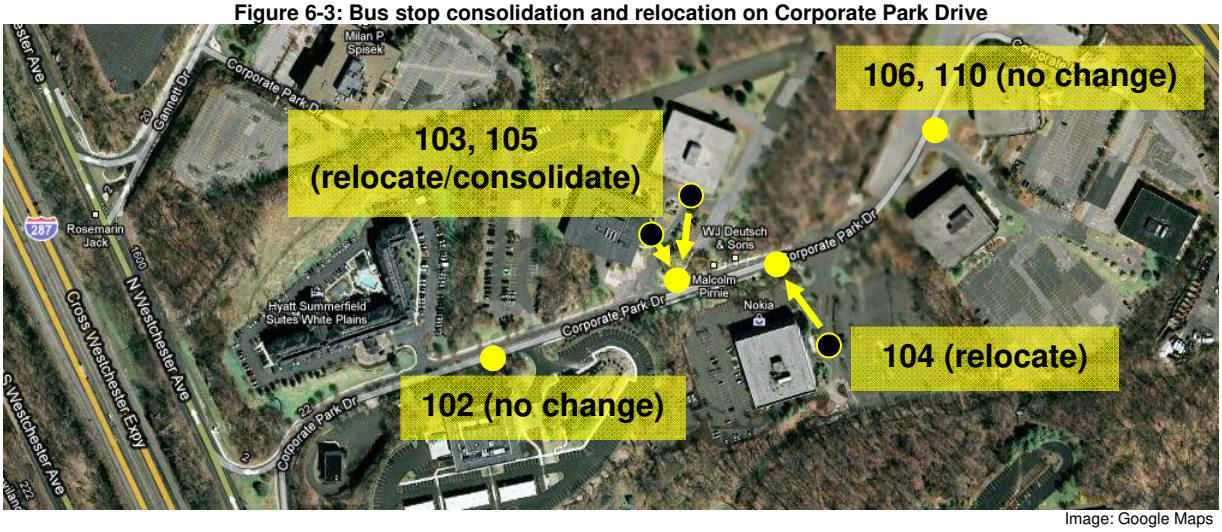


Image: Google Maps

6.1.4 2, 3, 5 Gannett Drive (proposed north side loop)

As with Corporate Park Drive, shuttle vehicles serving Gannett Drive off of Westchester Avenue travel into a corporate complex and back out, making several stops to serve individual employers and office buildings. In the past, a direct driveway connection between the Corporate Park Drive development and Gannett Drive existed, allowing Bee-Line to cut from one complex to the other without returning to Westchester Avenue. This saved a small amount of travel time and mileage, and explains why the bus stop for 3 Gannett Drive is on the east side (back side) of that building.

This driveway connection was later modified to be a one-way, eastbound connector, thus requiring Bee-Line to serve the two complexes individually. Since that change, however, the bus stop for 3 Gannett Drive has remained on the back side of the building, requiring additional time for vehicles to circulate through the parking lot and back out to Gannett Drive. At the same time, two stops exist at 2 and 4 Gannett Drive, despite those two buildings being situated adjacent to one another.

A proposal to streamline operations within the Gannett Drive complex included the consolidation of 2 and 4 Gannett Drive into a single bus stop on Gannett Drive (rather than within the building properties, as well as moving the 3 Gannett Drive stop onto the street. No change was proposed for the stop at 1 Gannett Drive.

Figure 6-4: Bus stop consolidation and relocation on Gannett Drive

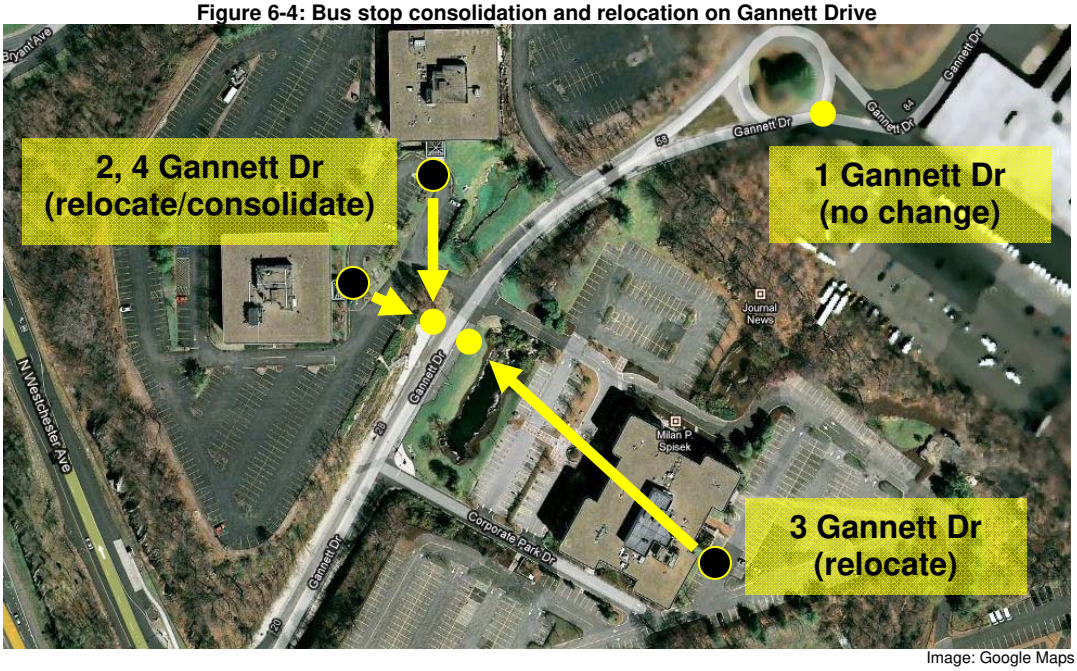


Image: Google Maps

6.1.5 Tarrytown Corporate Center (Proposed Loop F Expansion)

Four bus stops currently exist within the Tarrytown Corporate Center site on White Plains Road. These stops should be consolidated into a single location at the existing 560 White Plains Road stop. This would not only reduce excessive vehicle dwell time within the complex but would also allow for a more direct exit to White Plains Road by eliminating travel through the middle of the large, central parking lot to access 580 White Plains Road. The longest walking distance as a result of this consolidation would be no more than 0.18 miles from the single shuttle stop at 560 White Plains Road (walking around rather than through the parking lots).

Figure 6-5: Bus stop consolidation in the Tarrytown Corporate Center

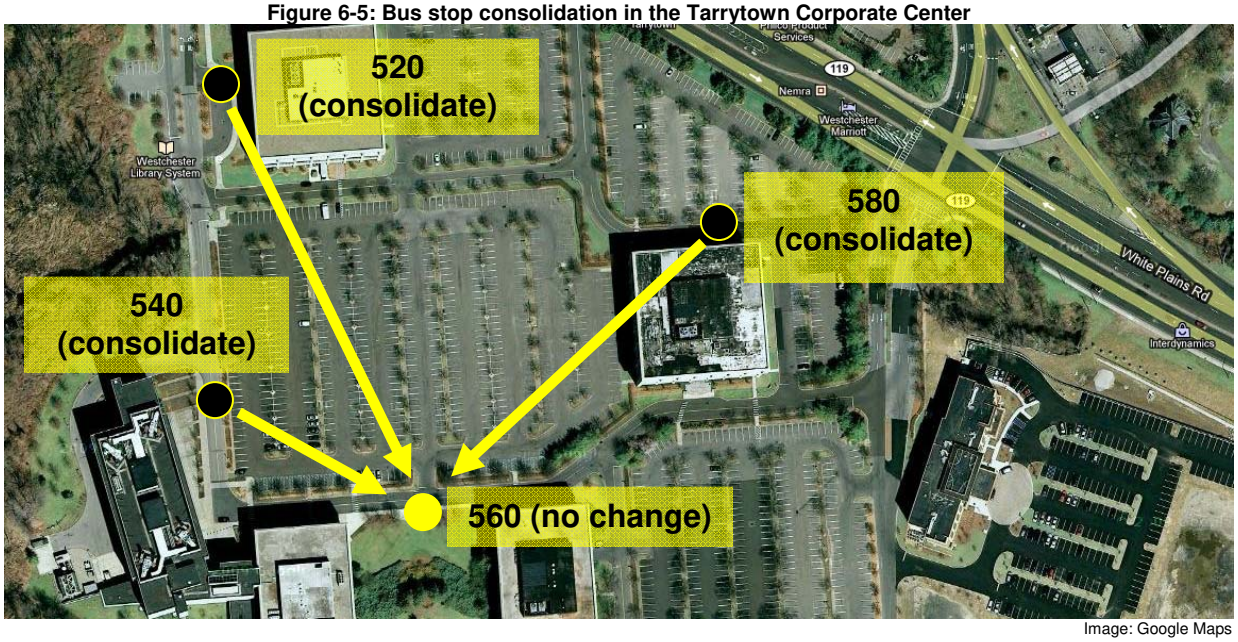


Image: Google Maps

6.1.6 Taxter Road (Loop F)

Minor modifications were proposed for the Taxter Road stops on the current Loop F service. The bus stop at 555 Taxter road should be moved to a lower parking level at the south side of the building. This relocation would reduce vehicle travel time by allowing Bee-Line shuttles to exit the building parking area to the south at Taxter Road rather than looping behind the buildings.

Furthermore, by exiting at the south end of the property, vehicles could enter the property at 570 Taxter Road in a manner such that the bus would arrive at the bus stop with the entry/exit doors at the building side. Currently, shuttles cross from 565 Taxter Road to 570 Taxter Road eastbound, leaving passengers to board and alight the vehicles opposite the building entrance and operators to loop south through the parking lot to exit on Taxter Road.

Figure 6-6: Bus stop relocation on Taxter Road

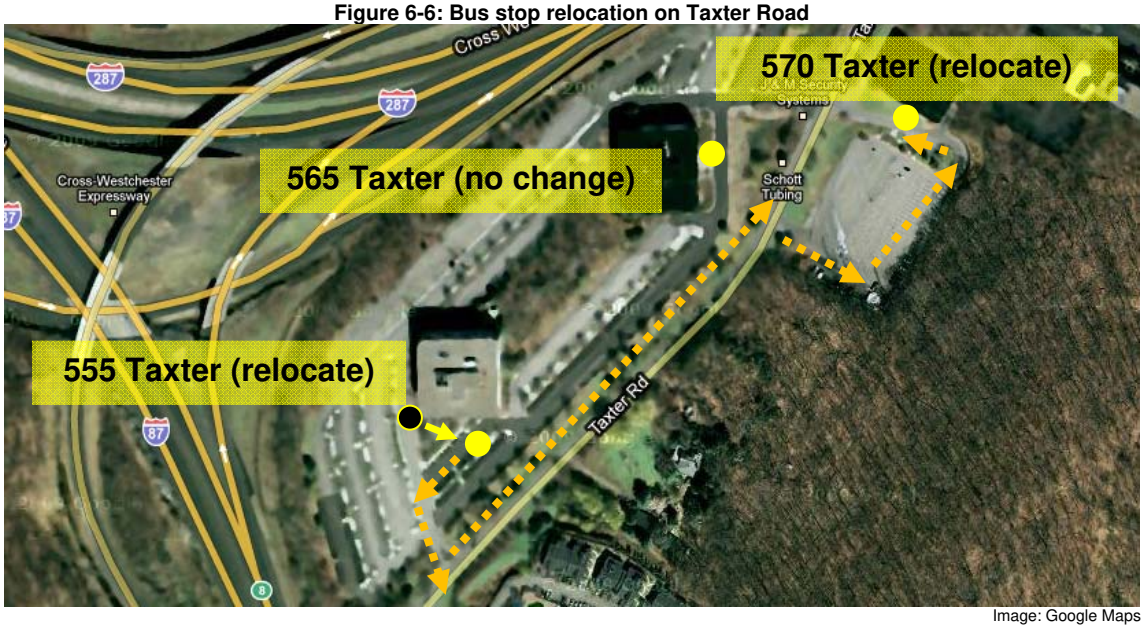


Image: Google Maps

6.2 Turning Movements and Route Alignments

6.2.1 Connection from Corporate Park Drive to Gannett Drive Properties

As mentioned above in section 6.1.4, a previously available connection between Corporate Park Drive and Gannett Drive no longer permits Bee-Line shuttles to travel directly between the two office complexes along Westchester Avenue. The roadway connector, which links the back of 103-105 Corporate Park Drive to 3 Gannett Drive, has been changed to a one-way restriction, eastbound.

It is strongly recommended that WCDOT pursue the reactivation of this little-used connection to permit Bee-Line shuttles to make the more direct link between the two office developments. This would save running time and mileage by avoiding a return to Westchester Avenue to access Gannett Drive as the shuttle serves employers on the north side of the I-287 corridor.

Figure 6-7: Site access improvements – Corporate Park Drive to Gannett Drive

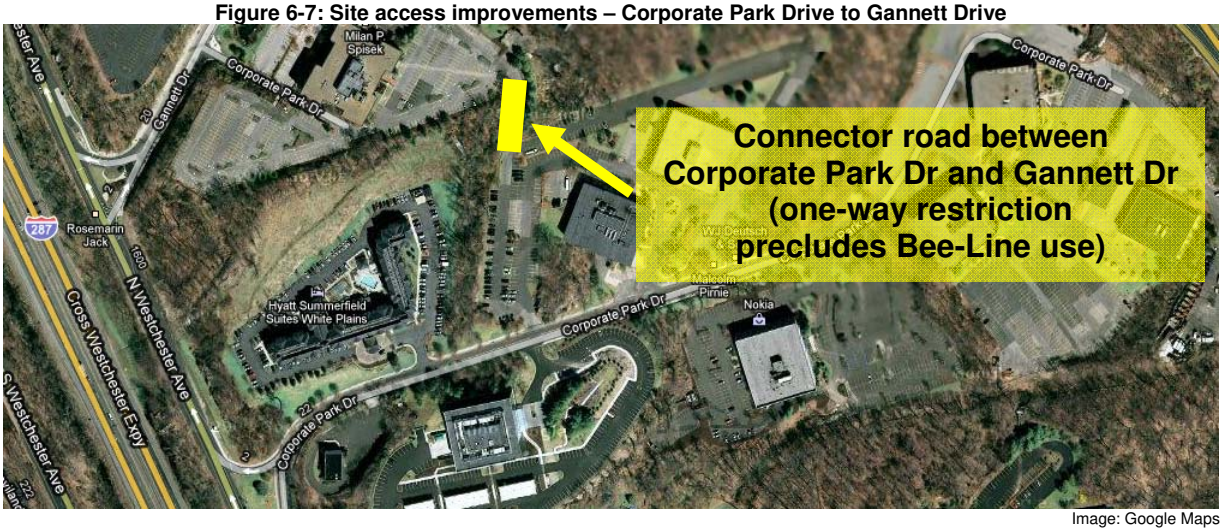


Image: Google Maps

6.2.2 Exit from Siemens Property (Proposed Loop F Expansion)

The proposed shift of the Siemens site bus stop from the current Loop T to the Loop F requires a left turn for Bee-Line vehicles exiting the facility on Benedict Avenue. Currently, Loop T vehicles turn right and return westbound to the Tarrytown rail station. However, a "no left turn" sign prevents vehicles exiting Siemens from making a more direct return to White Plains Road, which would be necessary for the Loop F shuttle vehicles.

This study recommends that this sign be amended to permit buses to make left turns. Visibility is sufficient to permit these turns safely, even if traffic on Benedict Road may occasionally require a short wait for this maneuver. By turning left from Siemens, Loop F vehicles would

return to White Plains Road where they would turn right (westbound) and then left into the Tarrytown Corporate Center to continue along the route.

An alternative turning scenario would involve Bee-Line shuttles exiting Siemens onto Benedict Avenue westbound then turning south through the Halston House apartment complex (where some inbound ridership to White Plains may be possible) and back east on Benedict Avenue. The more direct connection via Old White Plains Road is not possible due to difficult and unsafe left turns required to access eastbound White Plains Road.

Figure 6-8: Turning movements on Benedict Avenue

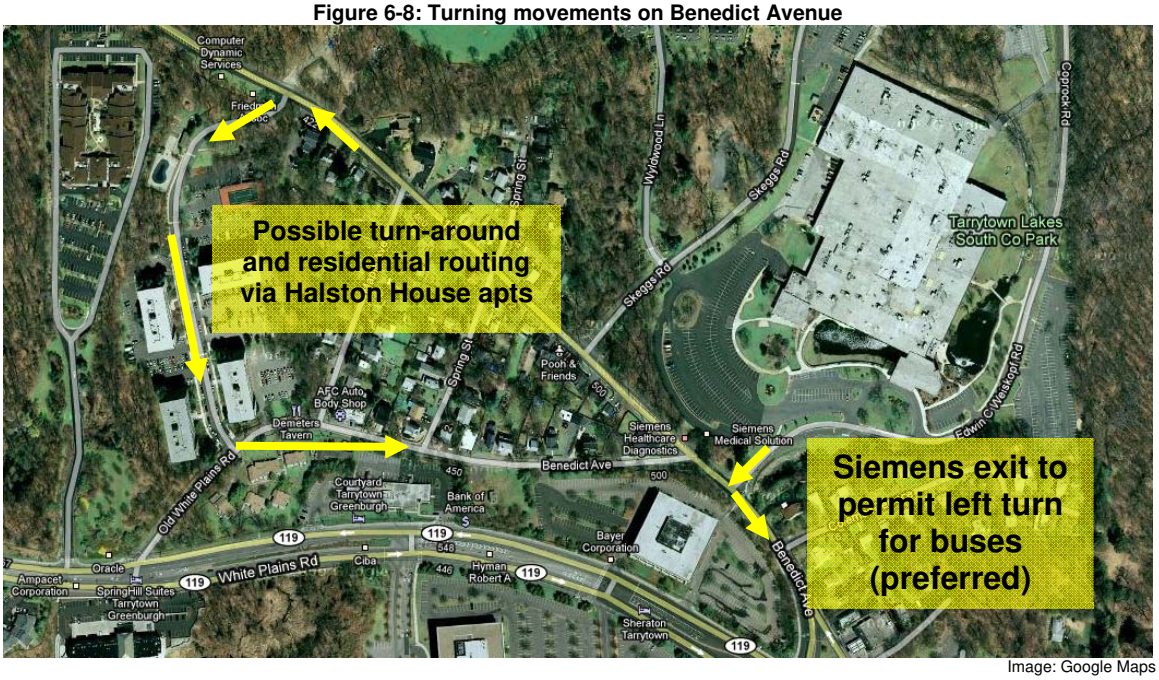


Image: Google Maps

6.3 Pedestrian Access and Sidewalk Improvements

As a matter of policy it is recommended that all office developments, particularly the suburban, "campus style" developments that are common in the I-287 and Route 120 corridors in Westchester County, provide fully functional pedestrian connections from major roadways to individual buildings within the properties. Numerous sites in the study area corridors are situated sufficiently far from the main roadways (e.g., Westchester Avenue, Purchase Street) that walking from a mainline bus stop to an employer's facility is an unattractive or even impossible task for commuters.

Foul weather, safety concerns, and physical disabilities may all be exacerbated by the lack of sidewalks and safe connections from existing bus stops on main roadways to employers located within office park developments. The difficulty of serving these suburban developments effectively with public transportation may be mitigated somewhat by improving pedestrian connections and encouraging walking wherever feasible.

6.4 White Plains Rail Station Access

The City of White Plains maintains the White Plains rail station, and thus controls access to the facility. At present, Bee-Line shuttle buses are not permitted to pick up passengers exiting the trains directly at the station exit, as they were upon initial creation of the shuttle program. Instead, all Bee-Line shuttle vehicles depart in the mornings from the White Plains TransCenter, which serves as the primary transfer location and hub for Bee-Line in White Plains.

While the benefits of transfer connectivity between other Bee-Line buses and the shuttle routes are clear, these services are nonetheless designed primarily for the rail market, with schedules timed to arriving and departing trains. To require shuttle customers to walk to waiting shuttles in the TransCenter rather than board the shuttles at the rail station curb creates an added inconvenience and time penalty. (Note that shuttles do deliver passengers to the southbound drop-off lane for easier access to the rail station in the afternoon period)

Meanwhile, the numerous private shuttle operations for local employers, hotels, and residential complexes are afforded direct access to the station for passenger boarding in the mornings. This favors private operators over the county's own transit system and also leads to additional congestion along with waiting taxis and private vehicles dropping off and picking up rail customers.

Recognizing that WCDOT does not have the authority to reinstate its shuttle pick-ups on the rail station property, and parking and vehicle idling space is constrained within the rail station site, it is nonetheless strongly recommended that the county work with the City of White Plains to afford Bee-Line shuttle vehicles priority access at the rail station.

6.5 Reverse Peak Shuttle Boardings

While the flow of passengers on shuttle services is very clear, leaving from White Plains and Tarrytown in the mornings and returning to the TransCenter and rail stations in the evenings, the possibility should nonetheless exist for customers to ride a shuttle vehicle in what would otherwise be deadhead operation. While vehicles drop passengers at employers in the morning period, a customer who is at a shuttle bus stop and ready to return to White Plains should be permitted to board and pay the fare to ride the vehicle directly to the TransCenter.

This type of ridership would be typically rare; however, as a question of policy, Bee-Line should permit these trips on a non-scheduled basis (i.e., only picking up passengers who are ready to board as others disembark, rather than meeting any scheduled time points). Furthermore, the consolidation of redundant shuttle stops as described earlier in this section would mitigate the expectation of customers awaiting shuttle pick-ups at less frequently used stops.

Section 7 – Public Information

Marketing and the provision of clear, easy-to-understand public schedule and fare information are absolutely vital to the success of transit services. Often the most significant barrier to use of bus services by the public, particularly occasional transit users, is a lack of understanding of the route, fare, or frequency of a service. Doubt about one's ability to complete a trip- or often the return trip- will typically lead to an exploration of alternatives over transit.

Bee-Line's public information and printed timetables are clear and simple to understand, including materials for the shuttle services. The creation of market-specific materials such as corridor timetables would further improve the level of customer service and awareness.

7.1 Corridor Timetables

In the Westchester Avenue and White Plains Road corridors, paralleling I-287, Bee-Line operates a number of bus services including the shuttle routes. East of White Plains, the Route 3 and 12 buses duplicate to some extent the services provided by Loops A, B, C, and D, albeit without the front-door service provided by the shuttle loops. West of White Plains, Routes 12 and 1W provide better alternatives to the Loop F and T services, given that White Plains Road does not present the challenge to pedestrians and transit users of being split on the north and south sides of I-287 as Westchester Avenue does.

Given this rich availability of transit service in one of the county's most vital corridors, more robust customer schedule information could serve to assist current commuters and attract new ones by highlighting alternatives to the shuttle services where they are viable. Indeed, many respondents to the commuter survey indicated that they would have no other bus option if their shuttle were to be discontinued, apparently unaware of the availability of an existing Bee-Line fixed route service.

A corridor timetable would, for example, show all buses departing the White Plains TransCenter and serving employers along the south side of Westchester Avenue east of the city. This would include the [proposed] south side shuttle trips and departures of the Route 3 and Route 12 buses, each in relation to arriving Metro-North trains. Additional description would clarify that the shuttle loops operate within the corporate parks to provide door-to-door service while the mainline Routes 3 and 12 remain on Westchester Avenue. If a customer feels capable and willing to walk the distance between the mainline route and his/her place of employment, knowing that the Route 3 and 12 buses could provide greater frequency for the commute in concert with the south side loop would provide additional incentive to take advantage of those services.

A sample template for a corridor timetable for Westchester Avenue (eastbound) is shown in Figure 8-1 on the following page.

Figure 7-1: Sample combined corridor timetable

Metro-North			Westchester Avenue Bus Service, Eastbound AM Peak (Route 3 Lane C, Route 12 Lane B, Shuttles Lane A)								
MNRR Leaves Grand Central	MNRR Leaves Southeast	MNRR Arrives White Plains RR Station	ROUTE	BUS Departs White Plains RR Station	Main Street and North Broadway	333 Westchester Avenue	STOP 4	STOP 5	STOP 6	STOP 7	STOP 8
5:40		6:30	3	6:36	6:41	6:44		6:52	6:56		7:01
	5:42	6:31	South	6:38	6:43	6:46	6:49	6:55		7:03	7:08
			12	6:39	6:44	6:47		6:55	6:59		7:04
	5:51	6:36	3	6:41	6:46	6:49		6:57	7:01		7:06
6:03		6:38	South	6:43	6:52	6:55	6:58	7:04		7:12	7:17
6:06		6:51	12	6:55	7:00	7:03		7:11	7:15		7:20
	6:01	6:54	3	6:59	7:04	7:07		7:15	7:19		7:24
			South	7:01	7:06	7:09	7:12	7:18		7:26	7:31
	6:20	7:13	3	7:17	7:22	7:25		7:33	7:37		7:42
6:26		7:16	South	7:22	7:27	7:30	7:33	7:40		7:48	7:56
			12	7:23	7:28	7:31		7:39	7:43		7:48
			3	7:27	7:32	7:35		7:43	7:47		7:52

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