



Comprehensive Operational Analysis of Bee-Line Shuttles

Executive Summary

Submitted to
Westchester County Department of Transportation

Submitted by
AECOM USA, Inc.

Subconsultant
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June 2010

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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

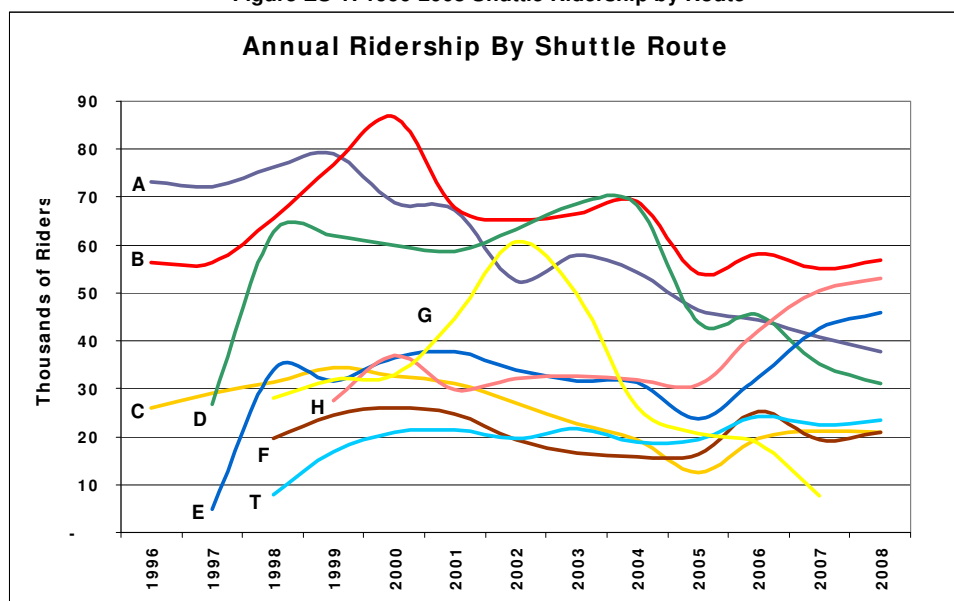
The Westchester County Department of Transportation provided the following brief history of the shuttle system in the Request for Proposals (RFP) for this study:

- 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.

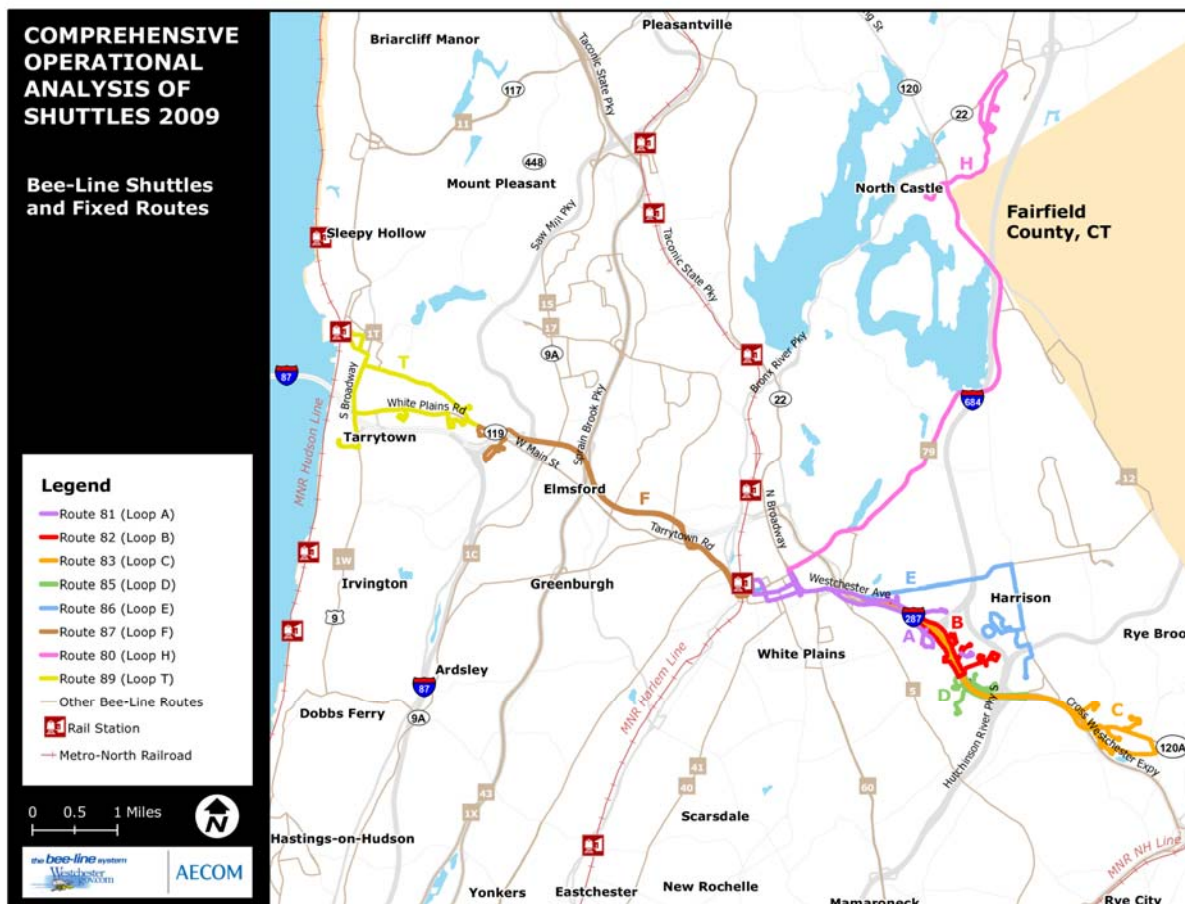
Figure ES-1: 1996-2008 Shuttle Ridership by Route



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

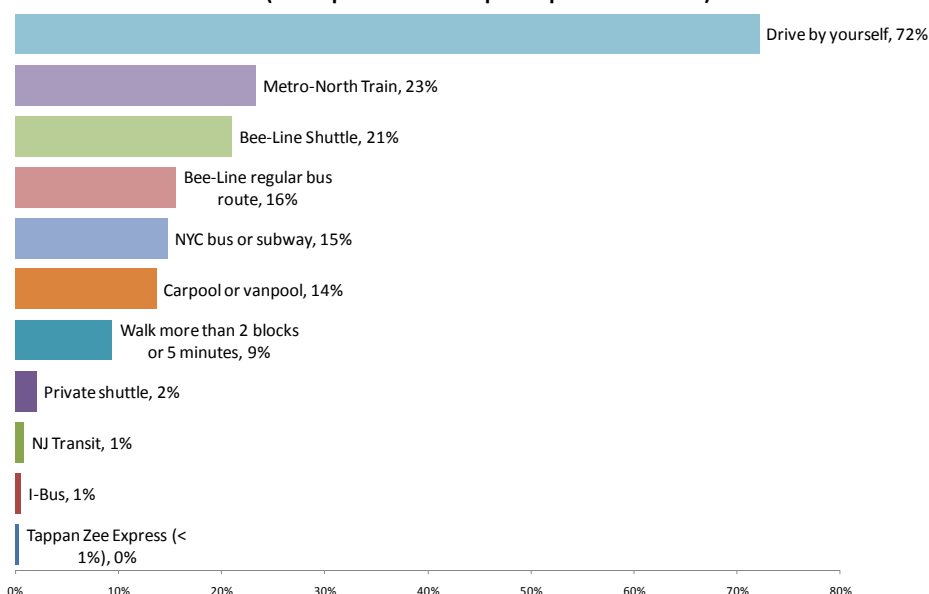
Public participation represents a critical foundation for service planning and an important component of the evaluation of existing services during the early phases of a study. A series of stakeholder interviews was conducted with employers in the study area to solicit feedback pertaining to commuting 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.

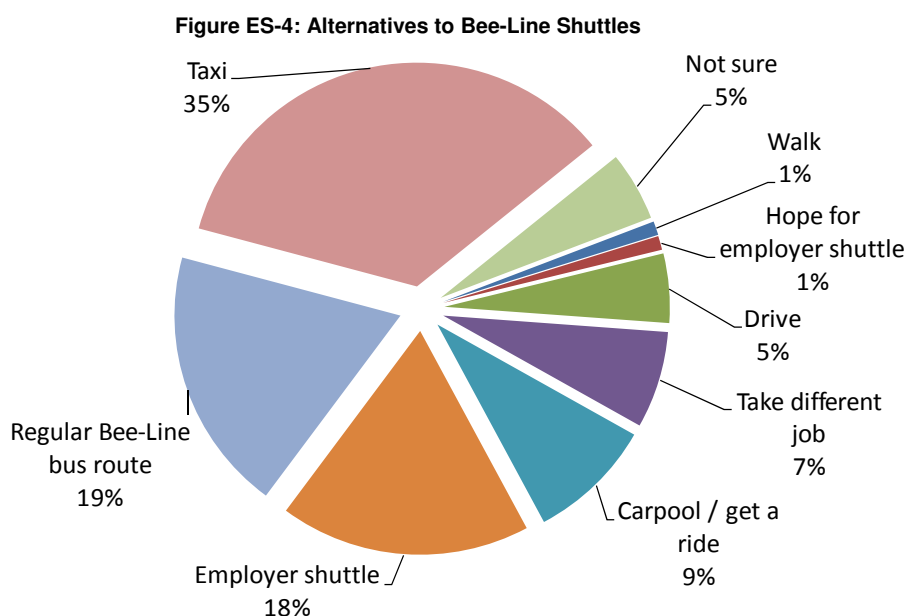
This survey was not intended to be a random sample survey. Rather, it provided an opportunity for employees in the office parks in the study area to provide information on their commuting choices, which in turn offered input into the development of shuttle service recommendations. Respondents were asked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



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

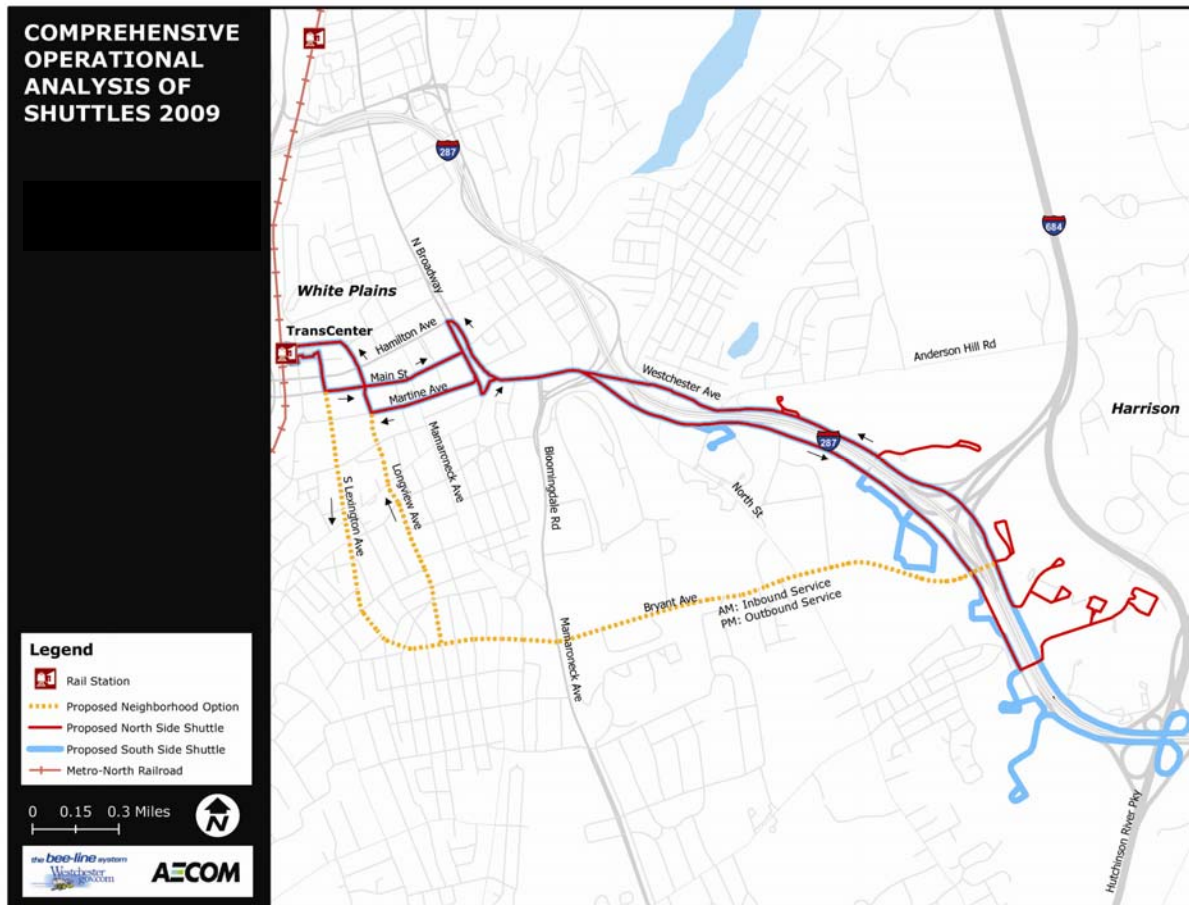
For each recommended service change (or group of changes), summaries were provided for anticipated operating and cost impacts. To develop a reasonable evaluation of these impacts, ridership estimates are not included in these estimates. It is not anticipated that ridership would change significantly 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.

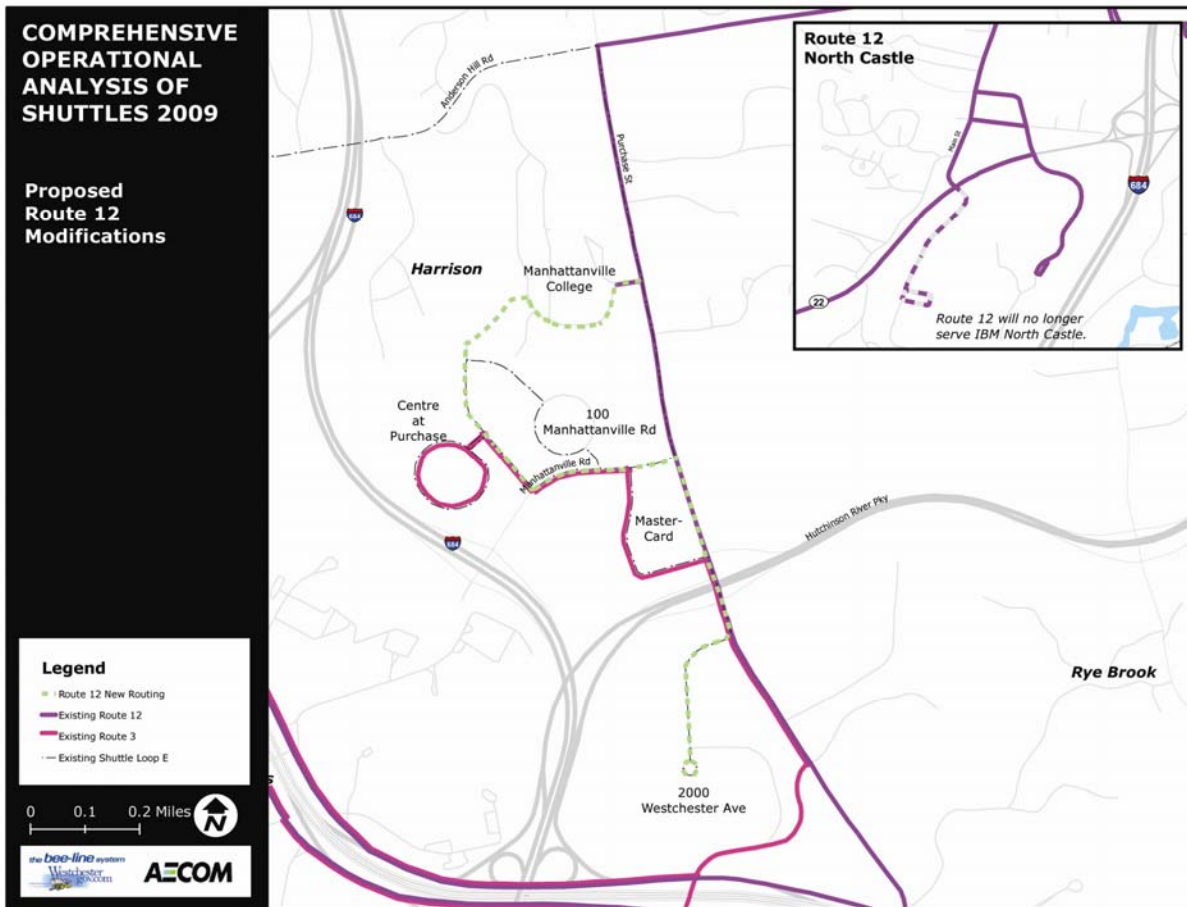
Figure ES-5: North Side and South Side Loops with Neighborhood Option



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.

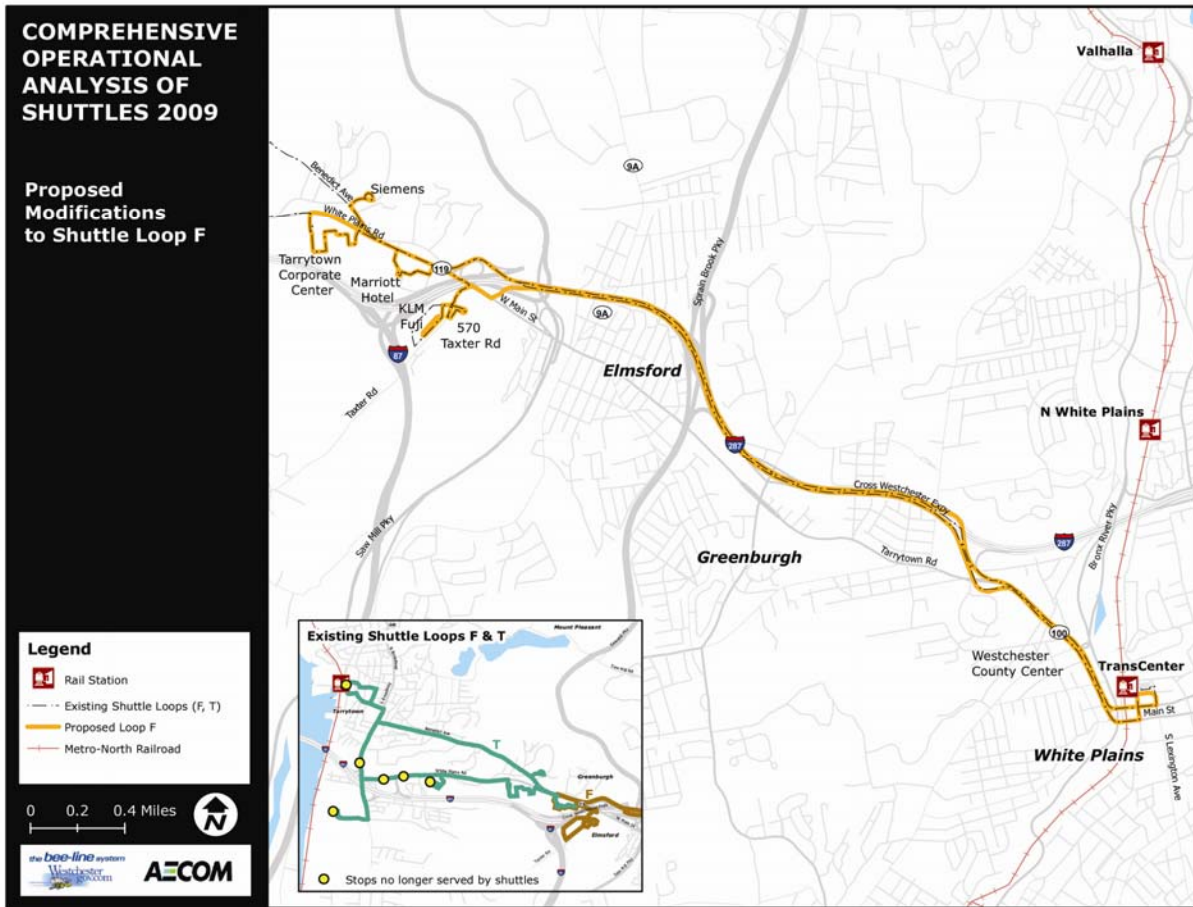
In the afternoons, vehicles would leave White Plains via the neighborhood routing (South Lexington Avenue to Bryant Avenue), dropping off any riders returning home from the railroad station and TransCenter, before picking up shuttle customers at employment sites and carrying them back to White Plains.

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

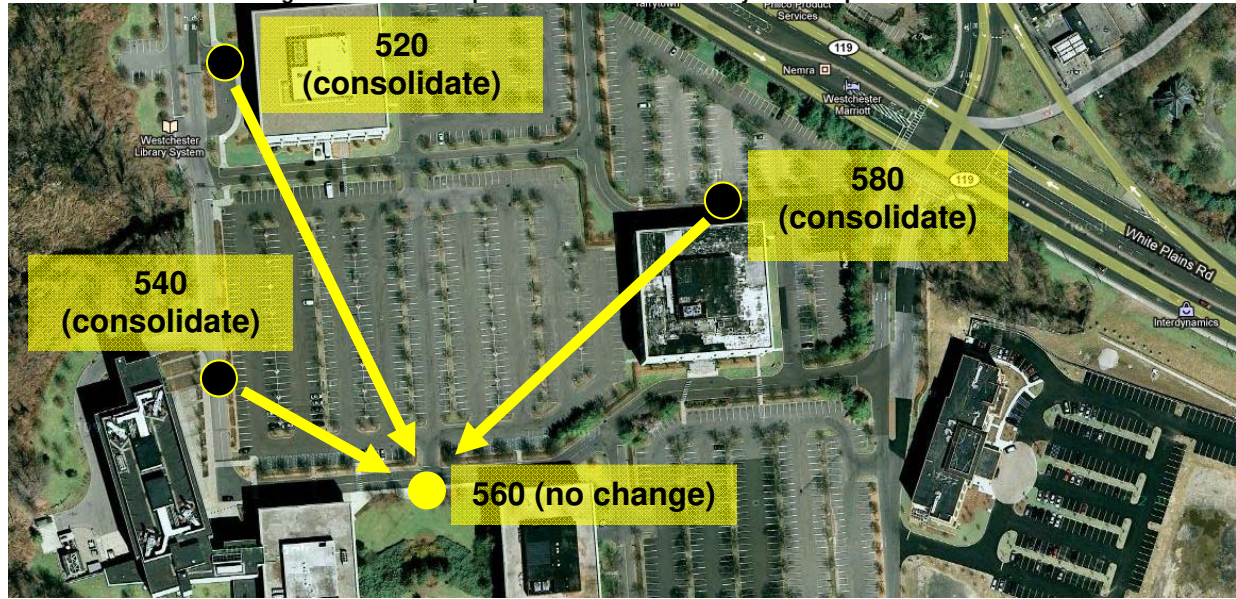


Image: Google Maps

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.

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