ROUTE 110 ALTERNATIVES ANALYSIS

Final Report | October 2015

TOWN OF BABYLON
SUFFOLK CO., N.Y.

PARSONS BRINCKERHOFF

ACKNOWLEDGEMENTS

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RICH SCHAFFER
SUPERVISOR

October 2015

A MESSAGE FROM TOWN OF BABYLON SUPERVISOR RICH SCHAFFER

It gives me great pleasure to present to you the Final Report for the Route 110 Alternatives Analysis. With this document in your hands, we are one step closer to realizing our dream of a premium north-south transit system along the Route 110 corridor, designed to improve mobility and access to jobs and housing for all of our residents. The following pages detail the findings of a multi-year study to determine the best transportation alternative to address the existing and future congestion that constrains our travels through Amityville, North Amityville, East Farmingdale, Melville, and Huntington.

A north-south BRT system along Route 110—from the LIRR Amityville station to the Walt Whitman Shops—has the potential to be a driving force strengthening the Route 110 corridor as Long Island's "High Tech Main Street". It will help to create new jobs, retain existing jobs, provide a range of housing options for all members of our community, and improve access to employment, housing, and entertainment in other parts of Long Island. The BRT system will allow residents and commuters to rely less on their cars, pay less in gas, and shorten their commutes.

The study was guided by the goals of our 2010 BRT Feasibility Study, Suffolk County's Connect Long Island plan, and the County's 2015 Suffolk County BRT Study and was completed in partnership with the County. For the past few years, we have been working alongside the Village of Amityville and the Town of Huntington to develop economic development, infrastructural, and transportation strategies that will benefit us all. A new BRT service along Route 110 may be one of the most important and far reaching projects ever contemplated by the Town and its benefits will be felt far beyond our borders. I am confident that it has the potential of reshaping the entire Route 110 corridor and spark job creation and help reverse the "brain drain" in western Suffolk County, while meeting our goals of sustainable development, reduced carbon emissions, and a path to prosperity for all.

I would like to voice the Town's thanks to both the Federal Transit Administration and New York State Department of Transportation in serving as the sponsors and partners in this effort. I would also like to thank all of the consulting team members who helped create this study. A very heartfelt thanks has to be given to the agencies, organizations, and individuals that served on the technical advisory committee who guided the study, as well the general public's participation at two public meetings. The opinions of local property owners, civic groups, and constituents are of the utmost importance to ensure that this process and project achieves all that we know that it can. I can assure you that as we continue to refine the project, the stakeholders and public will be an integral part of that process.

As you review this document, you will see that a new BRT system along Route 110 will play a key role in elevating the Town of Babylon and Suffolk County as a center of economic development and ingenuity. I look forward to working with you all to make this vision a reality.

Sincerely,

Rich Schaffer, Supervisor
Town of Babylon

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EXECUTIVE SUMMARY

STUDY OVERVIEW

The Route 110 Corridor ("the Corridor")—located in the Towns of Babylon and Huntington in Suffolk County, New York, and running from Route 27A (Montauk Highway) in the Village of Amityville to Halesite in the Town of Huntington—is one of the key economic engines on Long Island. Also known as Long Island's "High Tech Main Street," the Route 110 Corridor employs approximately 10% of the Island's workforce and is home to corporate headquarters, major technology firms, educational institutions, research facilities, and retail centers. However, the Corridor's future success is currently at risk as traffic volumes and congestion continue to increase, sprawling auto-centered development patterns become less attractive to employers and residents, and competition from other business centers and corridors in the region continues to grow.

As envisioned in Suffolk County Executive Steven Bellone's *Connect Long Island* plan, the introduction of a premium transit service to the Route 110 Corridor will:

- Provide an attractive transit option to employers, residents, and visitors
- Assist in mitigating increases in traffic congestion associated with future development
- Improve environmental conditions and quality of life
- Support and stimulate smart growth and sustainable economic development
- Complement the potential reopening of the Long Island Rail Road (LIRR) Republic Station and a major mixed-use redevelopment near the intersection of Route 110 and Conklin Street in East Farmingdale

The Route 110 Alternatives Analysis (AA) provides the process (**Figure ES 2**) and framework for advancing the Route 110 component of the *Connect Long Island* plan by evaluating a range of route and modal alternatives for a new, high-quality transit service. The grand vision for Route 110 features a multi-modal, pedestrian-friendly Corridor anchored by transit-oriented development (TOD).

The outcome of the AA was the selection of a Locally Preferred Alternative (LPA) to advance to Project Development and National Environmental Policy Act (NEPA) review with the Federal Transit Administration (FTA). The LPA comprises a 10.5-mile bus rapid transit (BRT) trunk route between the LIRR Amityville Station and the Walt Whitman Shops, complemented by off-Corridor shuttle bus feeder routes that will be finalized in Project Development following this AA (**Figure ES 1**).

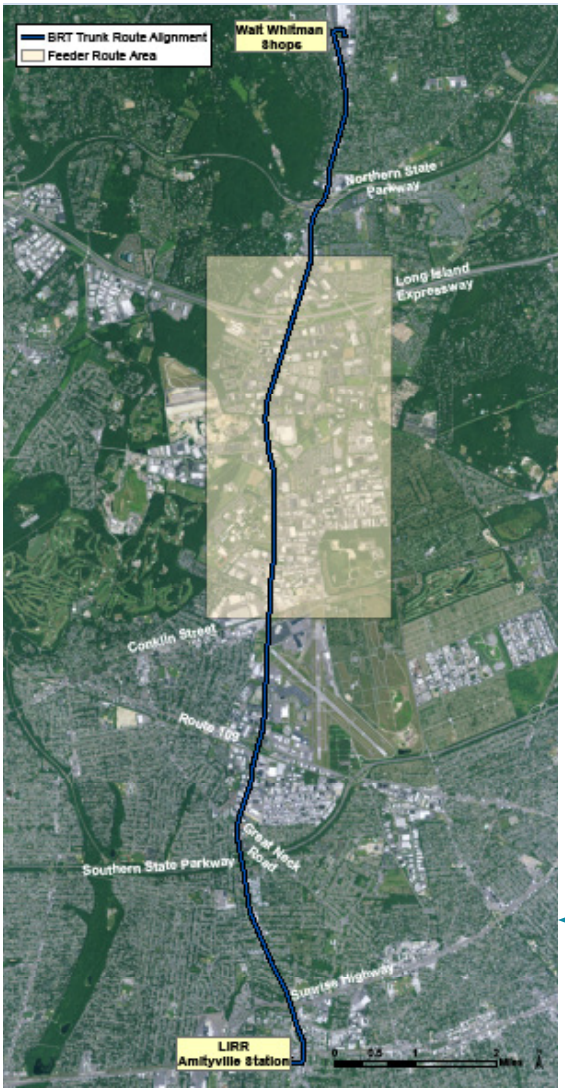


FIGURE ES 1
source: ESRI basemaps, Parsons Brinckerhoff (2015)

STUDY PROCESS

ANALYZE EXISTING CONDITIONS
Spring 2014

IDENTIFY ISSUES AND OPPORTUNITIES
Fall 2014

DEVELOP PURPOSE AND NEED, DEFINE GOALS AND OBJECTIVES
Fall 2014

CONDUCT ALTERNATIVES DEVELOPMENT AND SCREENING
Fall 2014 - Spring 2015

SELECT LPA
Summer 2015

PUBLIC OUTREACH & STAKEHOLDER ENGAGEMENT

PUBLIC MEETINGS:
DECEMBER 15, 2014
APRIL 27, 2015

TECHNICAL ADVISORY COMMITTEE (TAC) MEETINGS/WEBINARS:
DECEMBER 15, 2014
APRIL 1, 2015
JULY 1, 2015

FIGURE ES 2
source: Parsons Brinckerhoff (2014-2015)

The stakeholder and public engagement effort enabled the project team to identify and address concerns early in the planning process, inform interested groups and individuals about project status, and get feedback at key milestones.

STUDY AREA AND EXISTING CONDITIONS

The study area for the Route 110 AA includes the areas directly affected by the potential construction and operation of transit improvements (**Figure ES 3**). The study area is defined to encompass the portion of the Route 110 Corridor where trip generators and attractors are most concentrated and where the existing right-of-way could best accommodate the introduction of a new premium transit service. The study area also includes areas to the east and west of Route 110 to capture major activity centers that are beyond a reasonable walking distance from the Corridor.

The Route 110 AA included an assessment of existing conditions in the study area, which featured an evaluation of:

» socioeconomic and demographic indicators

» land use and zoning

» active development projects

» population and employment trends

» transit service

» traffic conditions

» roadway characteristics and safety

» pedestrian and bicycle accommodations

» travel trends

The existing conditions assessment provided the background data to support the premise that the introduction of a premium transit service along Route 110—with seamless "last-mile" connections to nearby major activity centers—will result in a wide range of mutually-supportive outcomes for Suffolk County and the surrounding region.

NO-BUILD ALTERNATIVE

A No-Build Alternative was defined to include the existing and committed transportation facilities and services expected to exist in the future horizon year (2040), including LIRR Double Track, East Side Access, and construction of the planned LIRR Republic Station. The No-Build Alternative served as a baseline for comparing the anticipated environmental, transportation, social, and economic benefits and impacts of the project alternatives. This alternative will get carried through to the environmental phase after the AA.

STUDY AREA

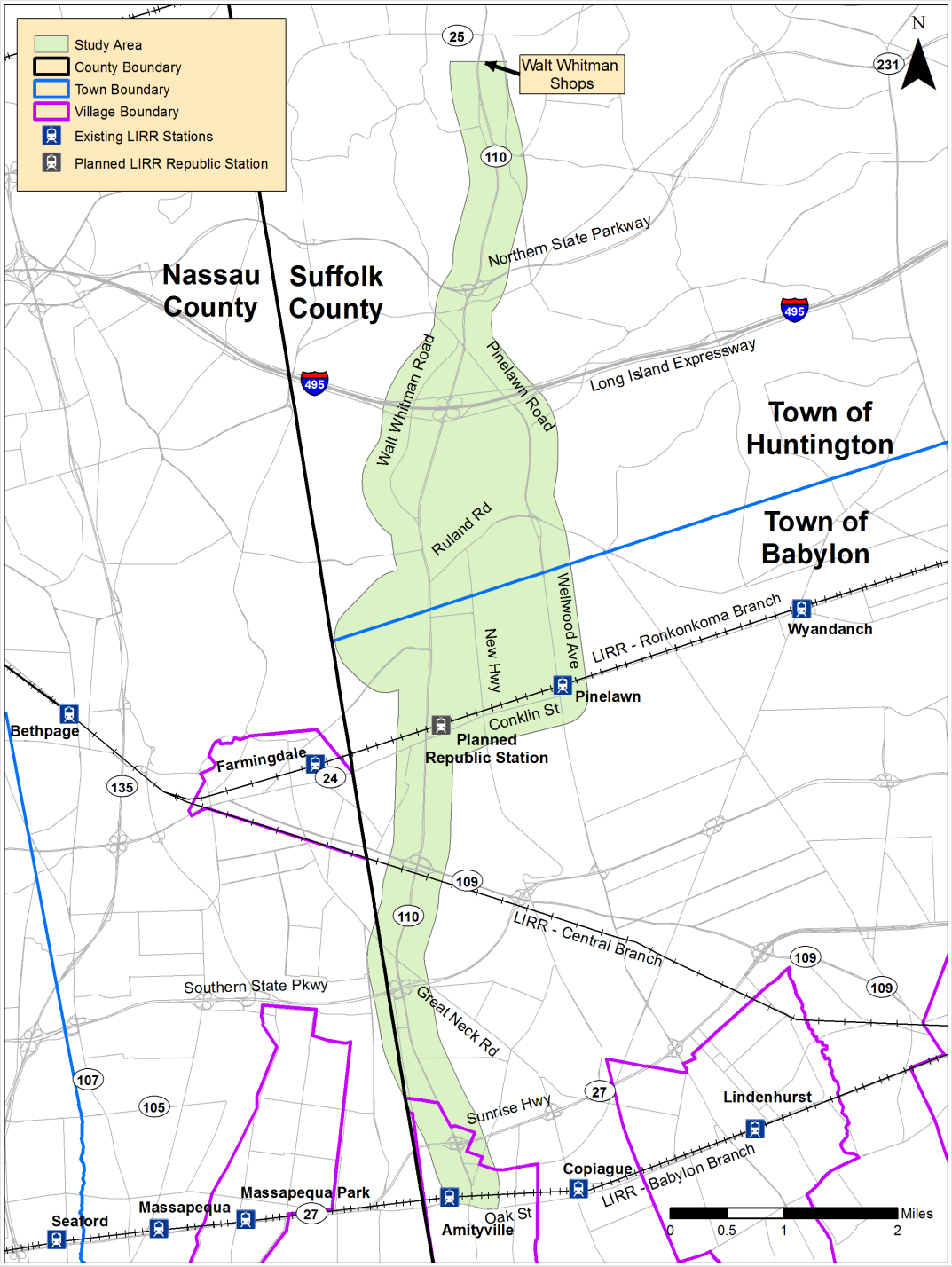


FIGURE ES 3
Source: NYS GIS Program Office, Parsons Brinckerhoff (2015)

The approximately 10.5-mile stretch of the Route 110 Corridor in the study area is located between Oak Street in the Village of Amityville at the southern end and the Walt Whitman Shops in the Town of Huntington at the northern end.

ISSUES AND OPPORTUNITIES, PURPOSE AND NEED, GOALS AND OBJECTIVES

The identification of existing and future issues and opportunities facing the study area served as the basis for establishing the Purpose and Need.

Transportation issues within the study area include:

» Constrained travel choices

» Inadequate multi-modal connectivity

» Existing and projected future traffic congestion

» Long travel times by bus (disincentive for transit use)

» Auto-centric land use and building development patterns

» Limited walkability and bicycle accommodations

Key transportation opportunities include:

» Large employers as a source of existing/potential future transit ridership

» Relatively high existing bus ridership, and opportunities to integrate with multiple service providers, including Suffolk County Transit, Nassau Inter County Express (NICE), and Huntington Area Rapid Transit (HART)

» Multiple branches of the LIRR crossed by the study area

» Multiple travel markets to be served

» Potential reopening of LIRR Republic Station and East Farmingdale master development

» LIRR East Side Access, Double Track, and Third Track projects

A well-crafted Purpose and Need was critical to achieving a successful AA, as it served as a roadmap to clearly define why the project was necessary and what the project intended to accomplish.

PURPOSE AND NEED

The purpose of the Route 110 AA is to plan a transit service that:

» Improves north-south mobility

» Increases transit access to and from employment and other activity centers

» Enhances multi-modal connectivity with the LIRR and existing bus service

» Promotes increased transit use

» Supports TOD along Route 110 and in the study area

The Purpose and Need provided a foundation for the development of project goals and objectives as well as the subsequent identification of evaluation criteria and measures that were used to screen alternatives. The following four goals for the project were tied directly to the Purpose and Need, and specific objectives were defined for each broad goal:

GOAL 1 IMPROVE MOBILITY AND CONNECTIVITY

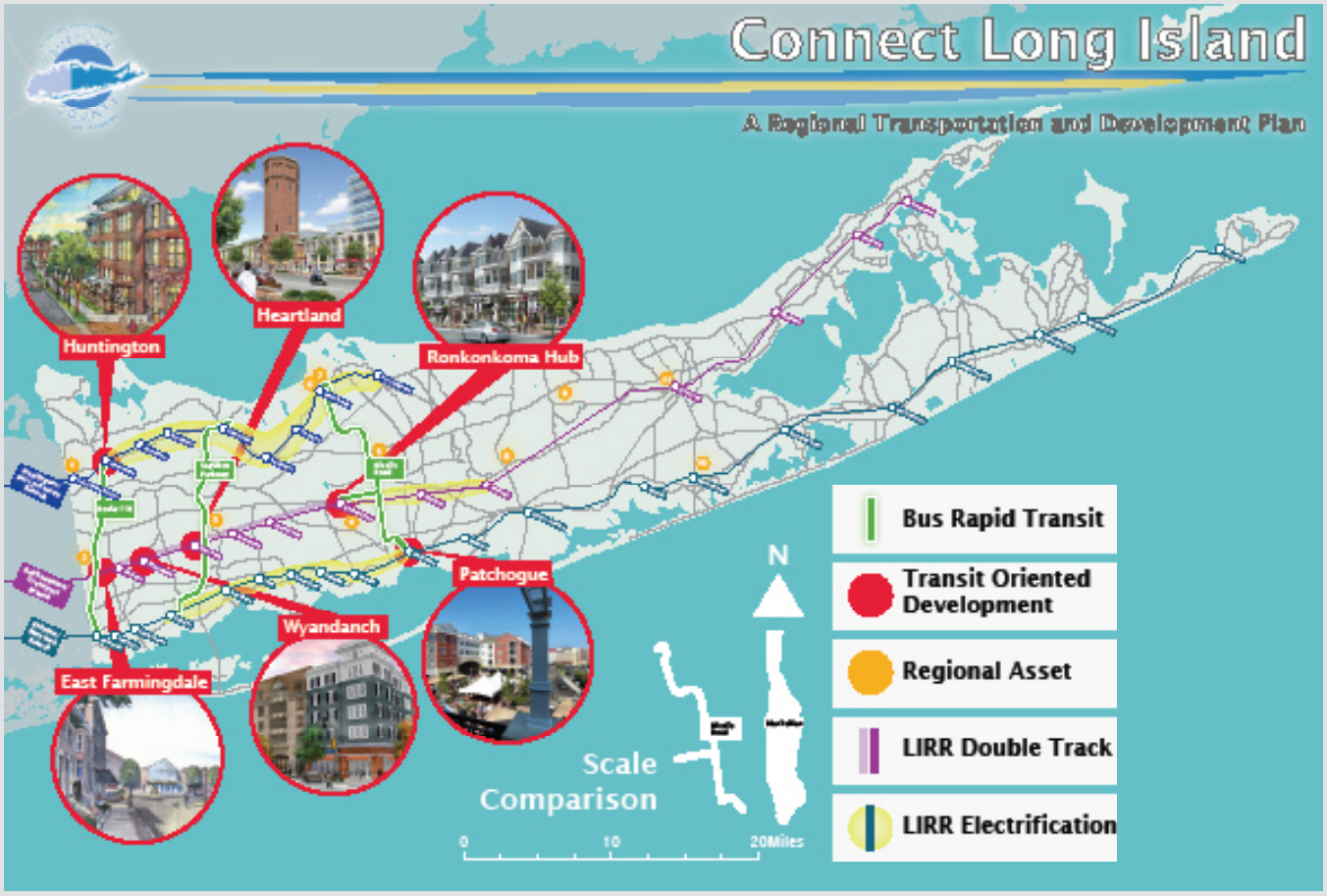
GOAL 2 ENHANCE ECONOMIC COMPETITIVENESS AND PROMOTE ECONOMIC GROWTH

GOAL 3 MAXIMIZE COST AND OPERATIONAL EFFECTIVENESS

GOAL 4 MINIMIZE ADVERSE ENVIRONMENTAL IMPACTS

The Route 110 AA provides the framework for creating a robust multi-modal transit network that enhances connectivity with existing local bus and commuter rail service (**Figure ES 4**)

Source: *Route 110 BRT Study* (2010)



An integrated approach to land use policy and transportation improvements can ensure sustainable economic growth
FIGURE ES 4

Source: Suffolk County (2015)

ALTERNATIVES DEVELOPMENT & SCREENING

The alternatives development process started with the definition of a number of alignment concepts that were subsequently paired with transit modes. The alternatives under consideration were narrowed down in multiple tiers of screening (**Figure ES 5**) to identify the most feasible and promising alternatives that best achieved the project goals and objectives.

Based on the results of the Long List Screening, two mode-specific alignment concepts were advanced for further development and evaluation as the Short List Alternatives:

Alternative D: BRT trunk route along Route 110 with circular feeder routes

Alternative E: BRT trunk route along Route 110 with transit center nodes and connecting feeder routes

Alternatives D and E share the same trunk route alignment and service characteristics, differing only with respect to the feeder routes that would complement the trunk route by providing service off Route 110 (**Figure ES 6**).

The results of the Short List Screening demonstrated that both Alternatives D and E would achieve the project goals and objectives, and neither alternative emerged as the unequivocal best option. Each alternative performed marginally better than the other alternative in at least one category of evaluation (i.e., multi-modal connectivity and economic development potential for Alternative E, and cost for Alternative D), but the considerable similarities between the two alternatives overshadowed the slight differences.

Moving forward, the LPA will include the BRT trunk route and feeder routes that will be finalized during Project Development.

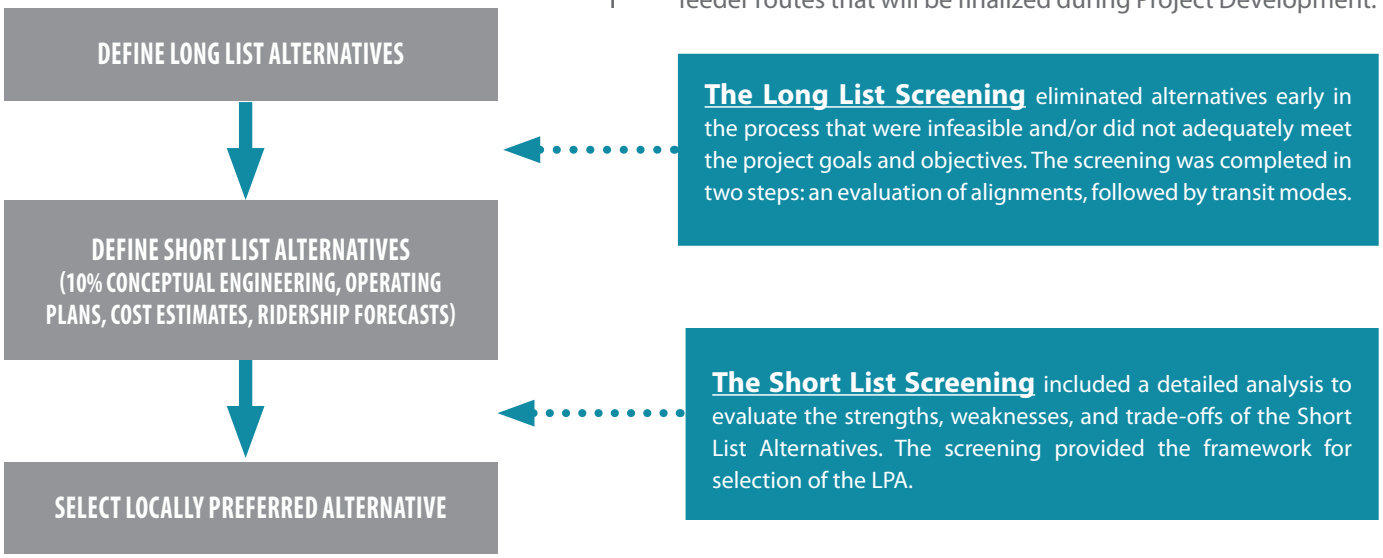


FIGURE ES 5

Source: Parsons Brinckerhoff (2015)

ALTERNATIVE D & E FEEDER ROUTE COMPARISON

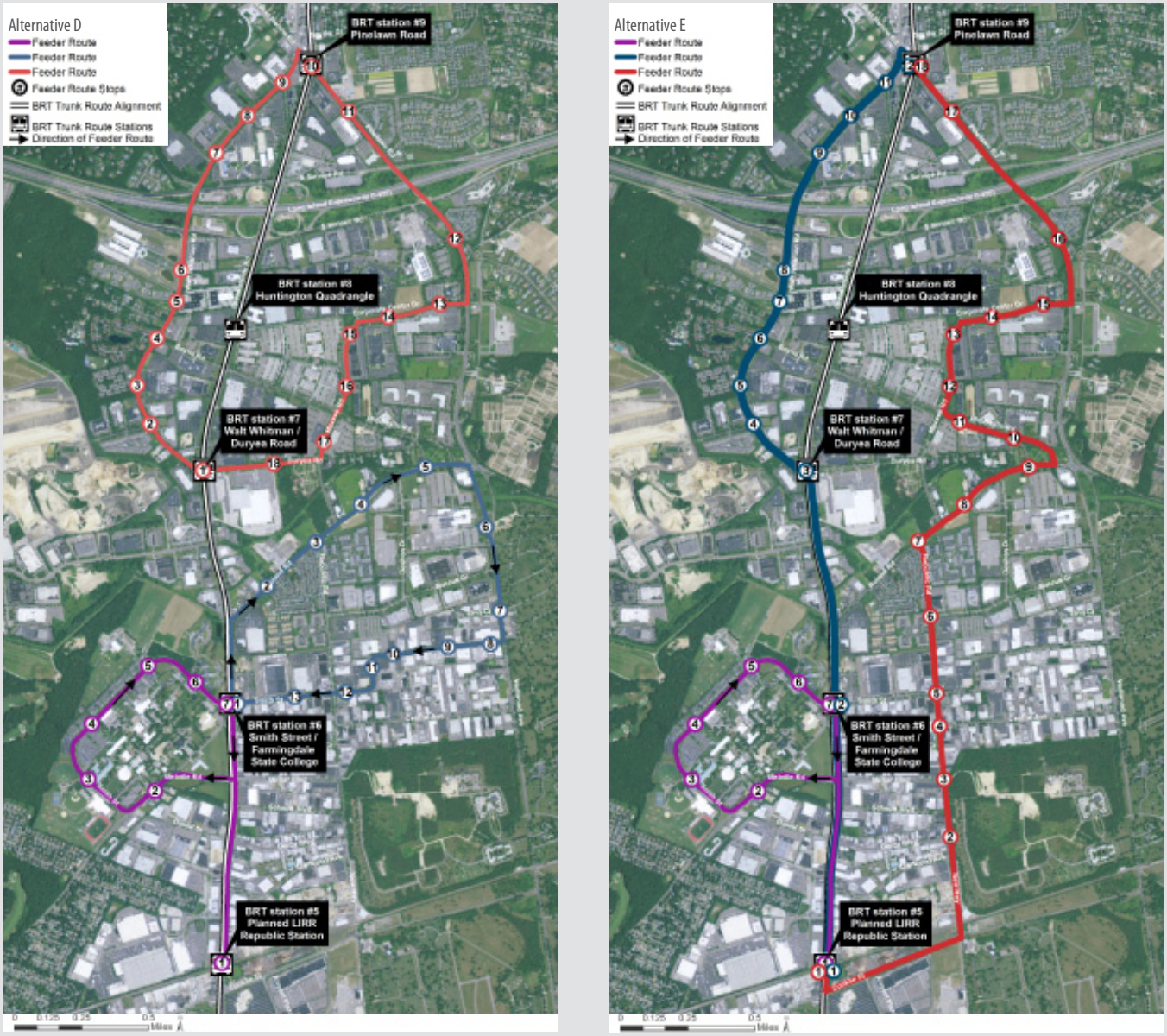


FIGURE ES 6

Source: ESRI basemaps, Parsons Brinckerhoff, Nelson\Nygaard (2015)

For both alternatives, the feeder routes cover a service area from Conklin Street in the south to Pinelawn Road/Route 110 in the north within the project study area. This service area was defined to comprise the area with the largest concentration of activity centers off the main spine of the Route 110 Corridor that would likely derive the greatest benefit from improved transit service.

Based on the results of the Short List Screening, it was decided that the feeder routes will be finalized during Project Development that will follow this AA, including consideration for mixing and matching feeder routes from the two alternatives.

LOCALLY PREFERRED ALTERNATIVE (LPA)

10.5 MILE BRT TRUNK ROUTE BETWEEN LIRR AMITYVILLE STATION AND WALT WHITMAN SHOPS (**FIGURE ES 8**)

11 STATIONS (AVERAGE 0.9 MILES BETWEEN STATIONS)

$28.0 CAPITAL COST (2015 MILLION $)

$3.5 ANNUAL OPERATING AND MAINTENANCE (O&M) COST (2015 MILLION $)

3,820 WEEKDAY BRT BOARDINGS (1,490 NEW TRANSIT BOARDINGS, COMPARED TO NO-BUILD CONDITION)

- Overlay to existing Suffolk County Transit S1 route, with faster, more frequent service and longer hours of operation (**Table ES 1**)
- Multi-modal connectivity: LIRR, Suffolk County Transit, HART, NICE, Republic Airport
- Premium transit service (**Figure ES 7** & **Figure ES 9**), with additional BRT elements to be considered in the future (i.e., off-board fare collection, level boarding, and pedestrian improvements at station-area intersections)
- To be complemented by off-Corridor feeder routes that will be finalized in Project Development

SAMPLE PERSPECTIVE OF PROPOSED ROUTE 110 BRT STATION

FIGURE ES 7
source: B Thayer Associates (2015)

PROPOSED BRT ALIGNMENT & FEEDER ROUTE AREA

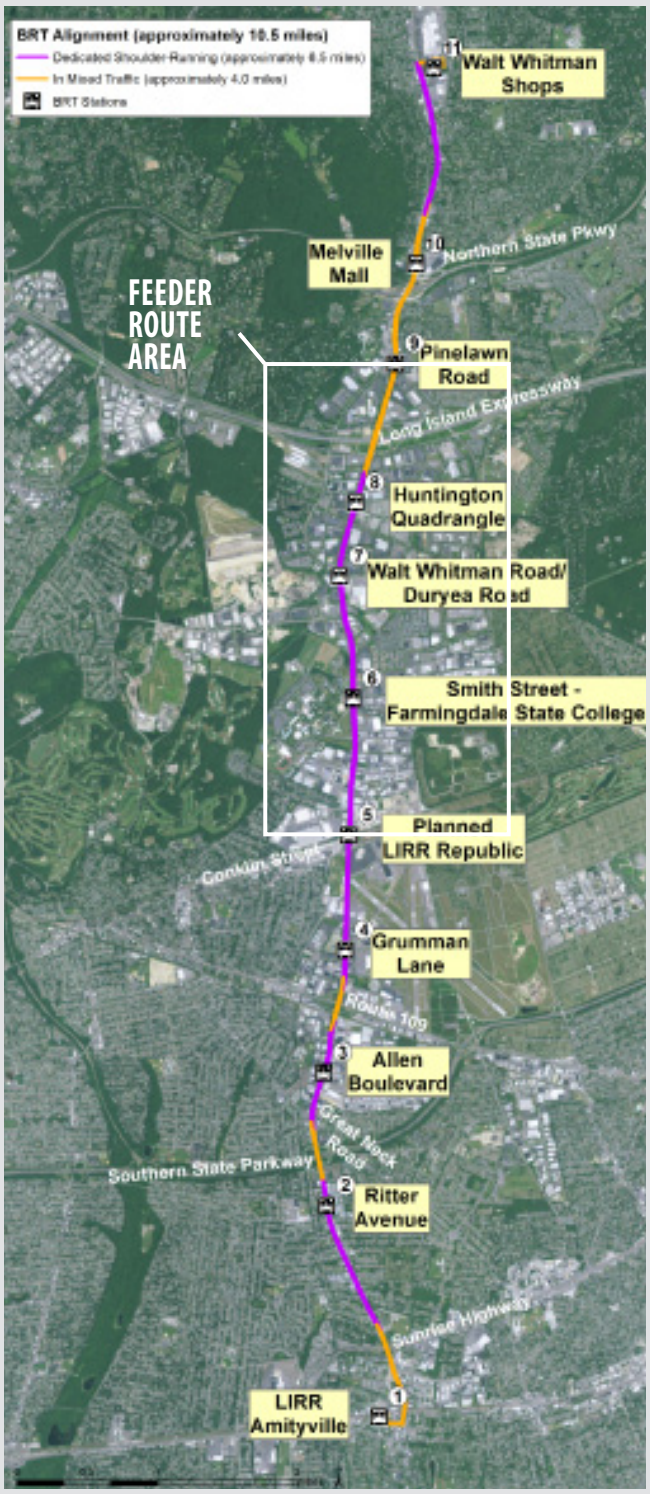


FIGURE ES 8
source: ESRI basemaps, Parsons Brinckerhoff (2015)

PROPOSED BRT OPERATIONS

SPAN OF SERVICE	Monday-Thursday	5:30am - 10:00pm
	Friday-Saturday	5:30am - 12:00am
	Sunday	6:00am - 10:00pm
SERVICE FREQUENCY	Weekday Peak	Every 10 minutes
	Weekday Off-Peak	Every 15 minutes
	Weekends	Every 20 minutes
FLEET REQUIREMENT	Peak Period, including 20% spare	9 BRT vehicles
TRAVEL TIME & AVERAGE SPEED (BETWEEN LIRR AMITYVILLE STATION & WALT WHITMAN SHOPS, AM PEAK PERIOD)	Northbound	26 minutes (24.2 mph)
	Southbound	20 minutes (31.5 mph)

TABLE ES 1
Source: Parsons Brinckerhoff, Nelson\Nygaard (2015)

ELEMENTS OF PROPOSED ROUTE 110 BRT

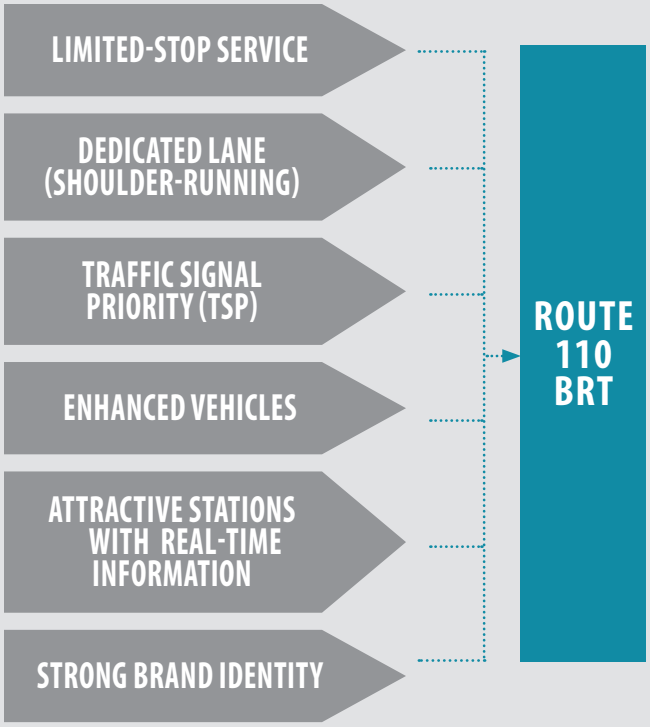


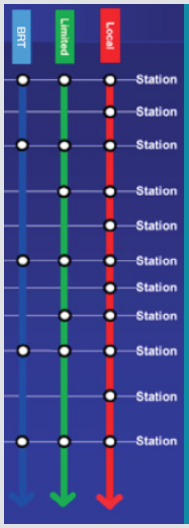
FIGURE ES 9
source: Parsons Brinckerhoff (2015)

ELEMENTS OF ROUTE 110 BRT - CURRENTLY PROPOSED

BRT is a term applied to public transportation systems using a series of systematic, integrated improvements to provide faster, more efficient service than an ordinary bus line. A number of BRT elements distinguish the premium service from ordinary bus service.

The elements of BRT that are currently proposed for Route 110 are summarized in **Figure ES 10**. The combination of limited-stop service, shoulder-running, and TSP is projected to result in significant time savings and faster operating speeds for BRT as compared to the existing local bus service, thereby making travel by BRT competitive with travel by automobile.

BRT ELEMENTS CURRENTLY PROPOSED FOR ROUTE 110

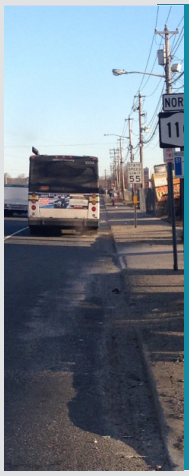


LIMITED-STOP SERVICE

One of the ways to improve travel time for transit users is to limit the number of stops. Whereas the existing Suffolk County Transit S1 route makes 40 stops (with an average distance of approximately 0.25 miles between each stop) from the LIRR Amityville Station to the Walt Whitman Shops, the proposed BRT service would only make 11 stops (with an average distance of 0.9 miles between each stop). It is anticipated that the Suffolk County Transit S1 route would continue to provide local service, and that BRT would provide more frequent service with fewer stops.

ENHANCED VEHICLES

The proposed BRT service would operate using low-floor, 35-foot-long, hybrid diesel-electric vehicles with aesthetic enhancements to brand and differentiate BRT as a premium service. The vehicle enhancements may include paint schemes, styling options, and interior amenities. The use of low-floor vehicles would reduce the time for passenger boarding and alighting, and the vehicles would be equipped with emitters to activate TSP at signalized intersections.

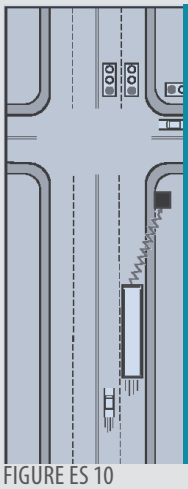


DEDICATED LANE (SHOULDER-RUNNING)

Dedicated BRT shoulder-running would enable BRT vehicles to bypass traffic congestion along Route 110, resulting in travel time savings for passengers. About 6.5 miles of the 10.5-mile trunk route can accommodate BRT shoulder-running (with two queue jumps where the proposed transition from shoulder-running to mixed traffic occurs at signalized intersections). Along other roadway segments, BRT would operate in mixed traffic with other vehicles.

ATTRACTIVE STATIONS WITH REAL-TIME INFORMATION

Stations function as the gateway for service. Each BRT station is proposed to include the following elements: an enhanced shelter; comfortable seating; way finding signage; bicycle racks; tinted concrete to highlight the waiting area; and trees and landscaping. Additionally, each station is proposed to include variable message signage, consisting of an electronic message board offering real-time information to alert riders of arriving BRT vehicles.



TRAFFIC SIGNAL PRIORITY (TSP)

Another way in which BRT results in travel time savings and faster service is through the use of TSP, which limits the waiting time at red lights. TSP can be achieved at signalized intersections through an extension of green time to allow the BRT vehicles to pass the intersection before the signal turns red, or through an earlier start of green time to allow the BRT vehicles to avoid the red light. The BRT trunk route currently includes 44 signalized intersections, and TSP is proposed at each intersection.

STRONG BRAND IDENTITY

All of the individual elements contribute to the brand identity of BRT as a premium service. In addition to serving the needs of passengers without access to an automobile, a key objective is to attract choice riders to BRT who would otherwise drive. It is anticipated that the Route 110 BRT branding identity will be coordinated with Suffolk County's system-wide BRT branding and strategic marketing campaign.

FIGURE ES 10
source: MTA New York City Transit, New York City Department of Transportation, TCRP Report 118, ITDP, Streetsblog, Trans4M, Urbanindy, Flickr, Parsons Brinckerhoff (2015)

ELEMENTS OF ROUTE 110 BRT - LONGER TERM

The *Connect Long Island* plan envisions the introduction of a premium transit service that transforms the way residents, workers, and visitors think about traveling to, from, and along Route 110. As noted in the 2009 FTA report, *Characteristics of Bus Rapid Transit for Decision-Making,* "BRT shows great promise for replicating many of the image attributes that attract choice riders to rail." Therefore, the longer-term plan for BRT on Route 110 includes, among other things, significant station-area enhancements to further bolster the image of BRT and attract more choice riders. These enhancements include off-board fare collection, level boarding, and pedestrian improvements at station-area intersections (**Figure ES 11**). These BRT elements are not currently included in the cost estimates for the LPA, but they can be pursued in the future to fulfill the longer-term plan for BRT along Route 110.

PROPOSED LONGER-TERM BRT ELEMENTS FOR ROUTE 110

OFF-BOARD FARE COLLECTION

As ridership demand grows, and as dwell times at the BRT stations increase due to greater numbers of boarding passengers, off-board fare collection could help improve travel time for riders. Off-board fare collection would reduce dwell times by enabling boarding at both the front and rear doors, accomplished through a proof-of-payment system whereby riders purchase tickets before boarding, and personnel would randomly inspect passengers' tickets to enforce the system. Implementation of off-board fare collection would require the provision of ticket vending machines at each BRT station and the necessary hardware and software.

LEVEL BOARDING

Implementation of level boarding could result in travel time savings by reducing the time for passenger boarding and alighting at BRT stations. Specifically, level boarding would eliminate the gaps between the station-area sidewalk and the vehicle floor, which enables faster boarding and alighting for all passengers, including the disabled and elderly. Level boarding could require a combination of low-floor BRT vehicles, raised curb, and precision vehicle docking to eliminate the horizontal gap between the station and vehicle. As an alternative to level boarding, near-level boarding could be implemented without precision docking, which could still reduce the time required for boarding and alighting (thus reducing dwell time and overall travel time) by decreasing the gaps between the station and vehicle.

PEDESTRIAN IMPROVEMENTS AT STATION-AREA INTERSECTIONS

An attractive and safe pedestrian environment is a key element of a multi-modal transportation network. As such, targeted pedestrian improvements could further enhance the image of BRT, increase pedestrian safety, and help transform Route 110 into a pedestrian-friendly Corridor as a model for Complete Streets. These improvements could include: enhanced crosswalks (e.g., bricks with white lines on the border to increase visibility); Accessible Pedestrian Signals (APS) with audible walk indications/chirping for the visually impaired; pedestrian push buttons; sidewalk improvements as necessary to ensure that ramps are ADA accessible with tactile warning strips; and mid-block pedestrian refuge islands to improve safety (if feasible given the roadway geometry). NYSDOT is beginning work on a pedestrian safety project along Route 110 that will involve a range of intersection-specific improvements, and ongoing coordination with NYSDOT will be an important next step to promote integration of BRT with targeted pedestrian improvements.

FIGURE ES 11
source: MTA New York City Transit; Context Sensitive Solutions; Star Tribune (2013)

NEXT STEPS AND CONCLUSION

The purpose of the Route 110 AA was to define and evaluate a range of route and modal alternatives for transit investment in the study area to arrive at a recommendation for an LPA that would best address the project goals and objectives. Through a multi-tiered screening process, the AA resulted in the identification of a BRT trunk route along Route 110, and the detailed evaluation of two alternative sets of off-Corridor feeder routes to complement the trunk route.

The results of the multi-tiered screening process demonstrated that both Short List Alternatives D and E would best achieve the project goals and objectives with a combination of BRT trunk route service and shuttle bus feeder route service. Since neither alternative emerged as the definitive superior option, it was determined that the feeder routes would be finalized during Project Development that will follow this AA.

Project Development is a required step in the federal process to be eligible for the FTA Small Starts discretionary grant program (**Figure ES 12**), which is the recommended federal funding option to be pursued for this project. In conjunction with the final planning and selection of the LPA, Project Development will also include environmental review, documentation of local financial commitment, Preliminary Engineering and Final Design, and ongoing agency coordination and stakeholder/public engagement.

The AA has set the stage for implementation of a fast, frequent, and high-quality BRT service along Route 110 to improve north-south mobility along this traditionally auto-oriented Corridor, complemented with shuttle bus feeder routes to provide last-mile connectivity to and from off-Corridor activity centers.

The guiding principle of this AA was that sustainable economic development requires close coordination and integration of transportation improvements with land use policy, consistent with the fundamental tenet of the *Connect Long Island* plan. This AA complements other ongoing local and regional initiatives to transform the land use character and transportation network of the study area, which can collectively enhance the long-term potential of Route 110, Long Island's "High Tech Main Street."

SMALL STARTS PROCESS

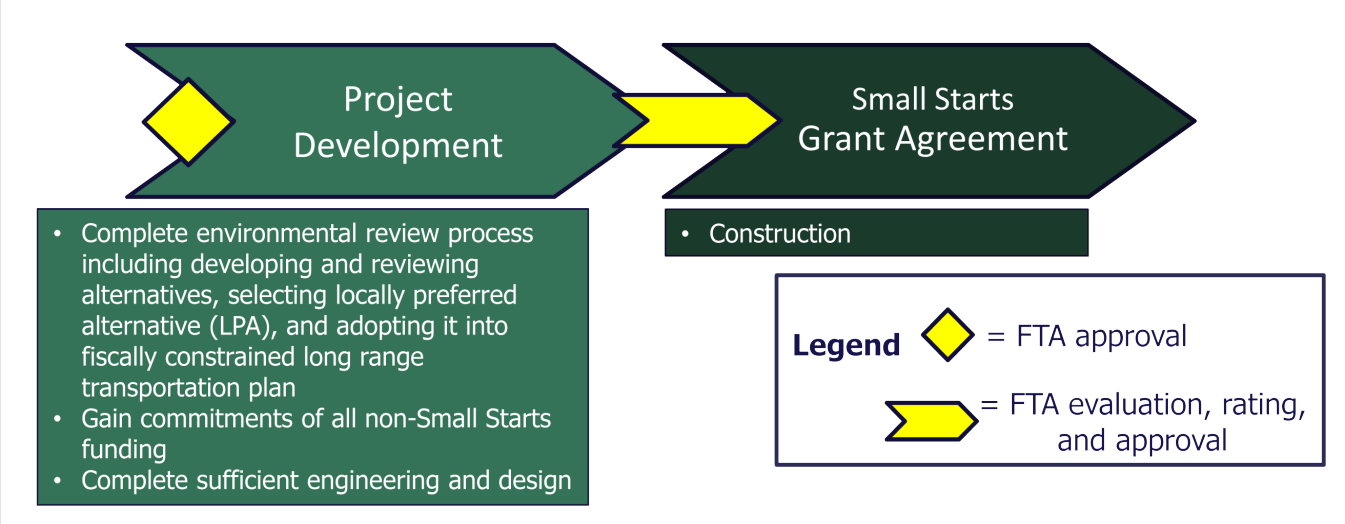


FIGURE ES 12
source: FTA (2015)

It is anticipated that the proposed project will be advanced in the Project Development process, leading to selection of an LPA to be submitted to the FTA for evaluation, rating, and consideration for approval of a Small Starts Grant Agreement (SSGA). The combination of federal funding with state, local, and/or project-specific funding can provide the necessary resources to move from plan to implementation for this transformative project that has the potential to result in far-reaching benefits for Suffolk County and the surrounding region.

The Route 110 AA addresses the interrelated transportation, land use, and economic development challenges facing Route 110 due to 60 years of development built around the automobile

Source: Parsons Brinckerhoff (2015)

1 INTRODUCTION

The Route 110 Corridor (the "Corridor")—located in the Towns of Babylon and Huntington in Suffolk County, New York, and running from Route 27A (Montauk Highway) in the Village of Amityville to Halesite in the Town of Huntington—is one of the key economic engines on Long Island. Also known as Long Island's "High Tech Main Street," the Corridor employs approximately 10% of the Island's workforce and is home to corporate headquarters, major technology firms, educational institutions, research facilities, and retail centers. However, the Corridor's future is currently at risk as traffic volumes, congestion, and roadway safety concerns continue to increase, sprawling auto-centered development patterns become less attractive to employers and residents, and competition from other business centers and corridors in the region continues to grow.

The introduction of a premium transit service to Route 110 will provide an attractive transportation option to employers, residents, and visitors, assist in mitigating increases in traffic congestion associated with future development, and improve environmental conditions and quality of life. It will also effectively support and stimulate smart growth, sustainable economic development, and Complete Streets within the Corridor.

The purpose of the Route 110 Alternatives Analysis (AA) was to evaluate alternatives that address the existing and future transportation needs in the Corridor, manage congestion, maximize environmental benefits, and enhance the Corridor's economic competitiveness by increasing mobility options. The AA builds upon previous and ongoing studies and identifies a Locally Preferred Alternative (LPA) to advance to Project Development and National Environmental Policy Act (NEPA) review with the Federal Transit Administration (FTA). Good planning practice dictates the importance of looking at reasonable modal and alignment alternatives in a transportation corridor to ensure that the public and decision-makers have an appropriate level of information necessary to identify and select a solution to address the aforementioned problems and opportunities.

As such, a focused Route 110 AA was conducted, based upon the following:

» A firm understanding of the transportation purpose, need, problems, and opportunities in the Corridor

» The establishment of clear goals and objectives to be achieved by the transportation improvements in the Corridor

» The definition of various technologies and operating plans designed to address Corridor problems, goals, and objectives

» The evaluation of alternatives against multiple measures—including financial feasibility of the grantee/operator/sponsor (in this case the grantee was the Town of Babylon)

The AA process (**Figure 1**) has resulted in a local decision that is well informed, demonstrates strong consensus, and is less vulnerable to delays or public scrutiny in the planning and implementation process.

ROUTE 110 AA STUDY PROCESS

ANALYZE EXISTING CONDITIONS
Spring 2014

IDENTIFY ISSUES AND OPPORTUNITIES
Fall 2014

DEVELOP PURPOSE AND NEED, DEFINE GOALS AND OBJECTIVES
Fall 2014

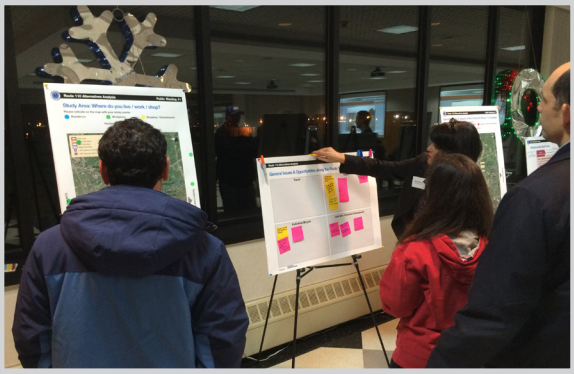
CONDUCT ALTERNATIVES DEVELOPMENT AND SCREENING
Fall 2014 - Spring 2015

SELECT LPA
Summer 2015

PUBLIC OUTREACH & STAKEHOLDER ENGAGEMENT

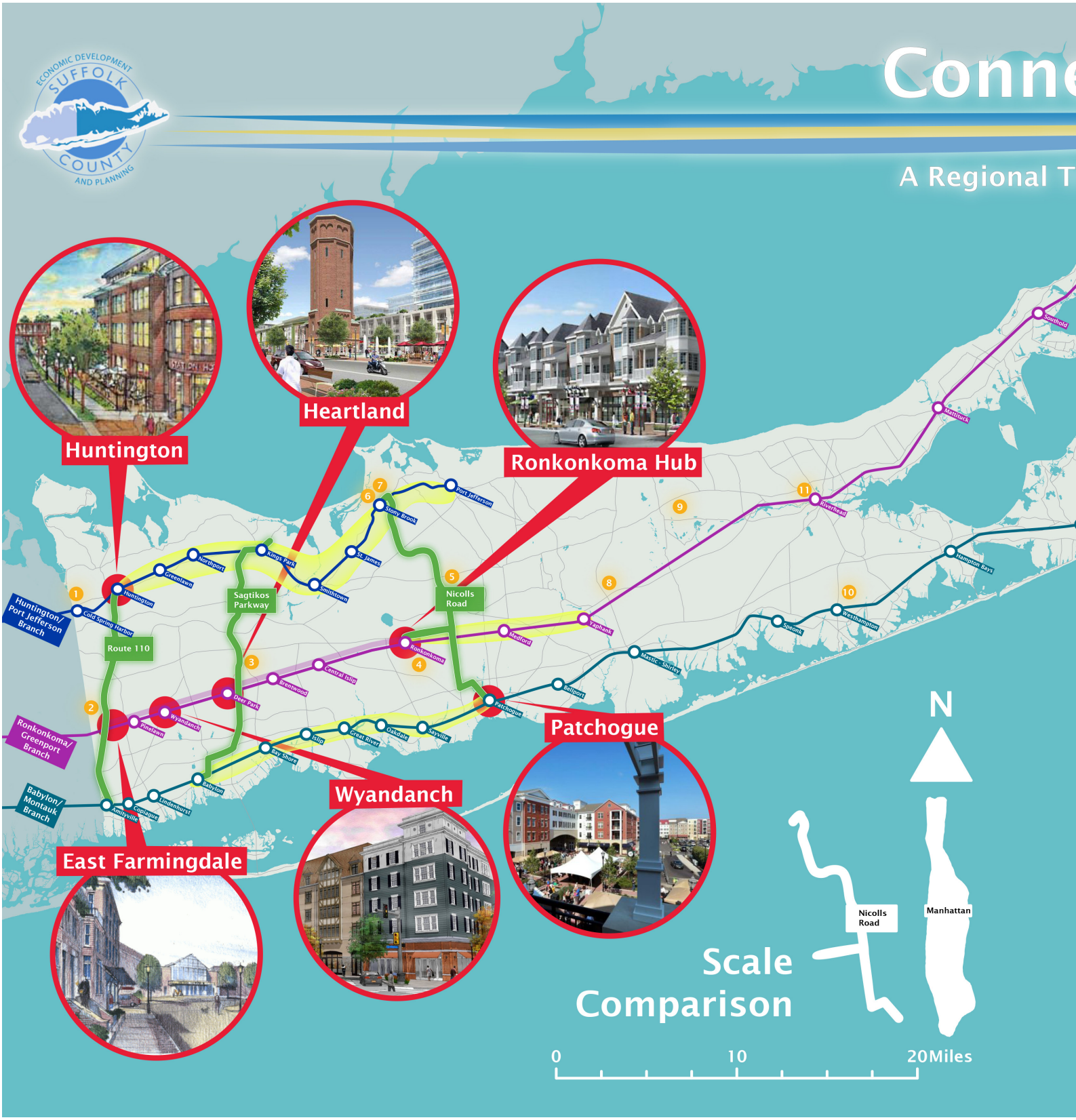
PUBLIC MEETINGS:
DECEMBER 15, 2014
APRIL 27, 2015

TECHNICAL ADVISORY COMMITTEE (TAC) MEETINGS/ WEBINARS:
DECEMBER 15, 2014
APRIL 1, 2015
JULY 1, 2015



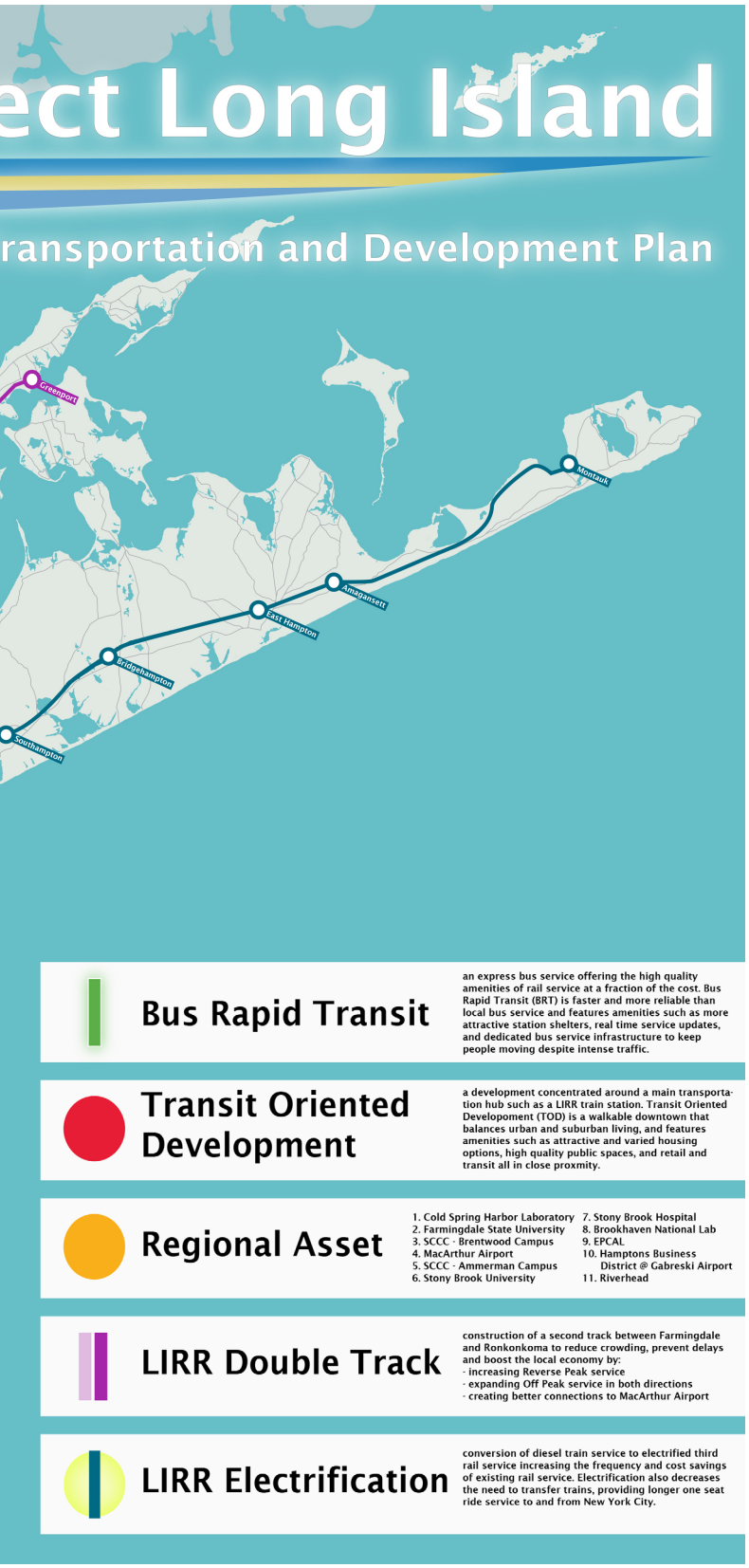
The stakeholder and public engagement effort took place throughout the study process, which enabled the project team to identify and address concerns early in the planning process, inform interested groups and individuals about project status, and get feedback at key milestones.

FIGURE 1: Study Process
source: Parsons Brinckerhoff (2014-2015)



The *Connect Long Island* plan calls for an integrated approach to land use policy and transportation improvements to ensure long-term, sustainable economic growth

Source: Suffolk County (2015)



2 BACKGROUND/ RELATED PROJECTS

One of the principal goals of Suffolk County Executive Steven Bellone's *Connect Long Island* plan is to expand north-south transit options to provide enhanced connections between the robust east-west network of the Long Island Rail Road (LIRR) and major development hubs, regional job centers, and educational and research assets. An overarching theme of the plan is the need for integrating land use policy and transportation improvements to drive economic sustainability and growth in the region. As envisioned in the plan, the introduction of a premium transit service along Route 110 in the Towns of Babylon and Huntington—with seamless "last-mile" connections to nearby major activity centers—will result in a wide range of mutually-supportive outcomes for Suffolk County and the surrounding region.

The Route 110 AA complements the *Nicolls Road AA*, a parallel and ongoing effort to improve north-south transit options in the Towns of Islip and Brookhaven. These projects are crucial immediate next steps towards achieving a transit-oriented future for Long Island.

Additionally, a number of other previous and ongoing initiatives set the stage for the Route 110 AA by providing background data to inform the development and evaluation of alternatives. These local and regional efforts include—but are not limited to—the following:

» 2010 *Route 110 Bus Rapid Transit (BRT) Study*
» 2010 *Long Island Regional Planning Council (LIRPC) Sustainable Strategies for Long Island 2035*
» 2010 *East Farmingdale Vision Plan (East Farmingdale Downtown Center)*
» 2011 *East Farmingdale Center, Babylon, NY: A Transit-Oriented Redevelopment Plan*
» 2011 Long Island Regional Economic Development Council (LIREDC) *Strategic Economic Development Plan for Nassau and Suffolk Counties*
» 2013 New York Metropolitan Transportation Council (NYMTC) *Plan 2040 Regional Transportation Plan (RTP)*
» 2014 *Suffolk County BRT Feasibility Study*
» 2015 *Suffolk County Comprehensive Master Plan 2035*
» Ongoing East Farmingdale master development and related planning studies
» Ongoing planning for the LIRR Republic Station
» Ongoing Town of Huntington *Melville Employment Center Plan*
» Ongoing Village of Amityville Downtown Revitalization process
» Ongoing Suffolk County/Regional Plan Association (RPA) design guidelines for Route 110
» Ongoing New York State Department of Transportation (NYSDOT) Route 110 Reconstruction and Bridge Projects, and Route 110 Pedestrian Safety and Operational Improvements Project

The Route 110 AA builds upon the analyses of BRT feasibility put forth in the 2010 *Route 110 BRT Study* and the 2014 *Suffolk County BRT Feasibility Study*. The 2010 *Route 110 BRT Study* was commissioned by the Town of Babylon—in partnership with the Town of Huntington and the LIRR—to examine the feasibility and benefits of implementing a new BRT service that would complement the planned LIRR Republic Station and a major mixed-use redevelopment near the intersection of Route 110 and Conklin Street in East Farmingdale. (Refer to page 7.)

In 2014, the Suffolk County Department of Economic Development and Planning oversaw the completion of the *Suffolk County BRT Feasibility Study*, which identified Route 110 (in addition to Nicolls Roads and the Sagtikos Parkway) as a critical north-south corridor that should be prioritized for implementation of BRT. The 2014 *Suffolk County BRT Feasibility Study* concluded that implementation of BRT, in conjunction with the appropriate land use and zoning policies, could transform travel along the priority corridors, and reap enormous economic benefits similar to other BRT systems throughout the United States.

The Route 110 AA builds upon the 2010 *Route 110 BRT Study* and the 2014 *Suffolk County BRT Feasibility Study*
Source: *Route 110 BRT Study* (2010), *Suffolk County BRT Feasibility Study* (2014)

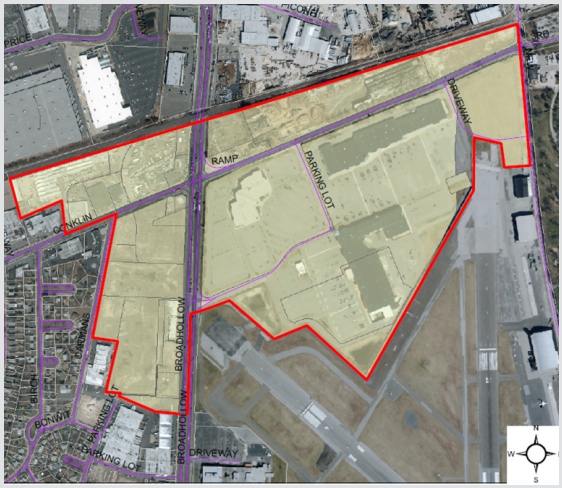
The Task 1 Technical Memorandum (Appendix A) included detailed summaries and a comprehensive inventory of the previous and ongoing planning efforts that complement the Route 110 AA.

EAST FARMINGDALE MASTER DEVELOPMENT AND THE PLANNED LIRR REPUBLIC STATION

In conjunction with the planned LIRR Republic Station, the redevelopment of approximately 136 acres at the intersection of Conklin Street and Route 110 has been a major focus of the Town of Babylon and the East Farmingdale community for over a decade. The East Farmingdale site currently consists of a variety of uses, including a large strip shopping center, several industrial uses, and vacant land, and it is proposed to be transformed into a walkable center for the community, with an active blend of retail, residential, and entertainment options reoriented around pedestrian access.

In 2013, the Town of Babylon issued a Request for Qualifications (RFQ) for a master developer to implement the major mixed-use redevelopment at the East Farmingdale site (**Figure 2**). Additionally, through grants from Empire State Development (ESD) and the New York State Energy Research and Development Authority (NYSERDA), the Town is concurrently advancing an East Farmingdale Downtown Planning Project and the preparation of a community-driven and market-responsive Preliminary Site Plan, Regulating Plan, and Form-Based Code to facilitate the master development effort.

Furthermore, the Town continues to work with the Metropolitan Transportation Authority (MTA) and LIRR to advance the planning of the LIRR Republic Station, which would complement the East Farmingdale redevelopment. The proposed 2015-2019 MTA Capital Program includes the environmental review and design of the LIRR Republic Station, with construction anticipated to be included in a future capital program. As documented in the *East Farmingdale Vision Plan*, it is envisioned that the LIRR Republic Station would function as a multi-modal transportation center with seamless connections to a new premium transit service along Route 110, which was the subject of this AA.



The East Farmingdale master development will be strategically located to complement the planned reopening of LIRR Republic Station

FIGURE 2: East Farmingdale Master Development Site
Source: Panoramio , Town of Babylon (2013)

RESIDENTIAL DEVELOPMENTS

Country Pointe at Melville

Millennium Hills

Avalon Court

MAJOR EMPLOYERS

Nikon

Canon

Huntington Quadrangle

Henry Schein

Estee Lauder


Bank of America

In addition to Route 110, the study area includes areas to the east and west of the Corridor to capture major employers, residential developments, and other activity centers

Source: Newsday, We're Group, Parsons Brinckerhoff (2015)

The Villas

Newsday

Corporate Center Drive

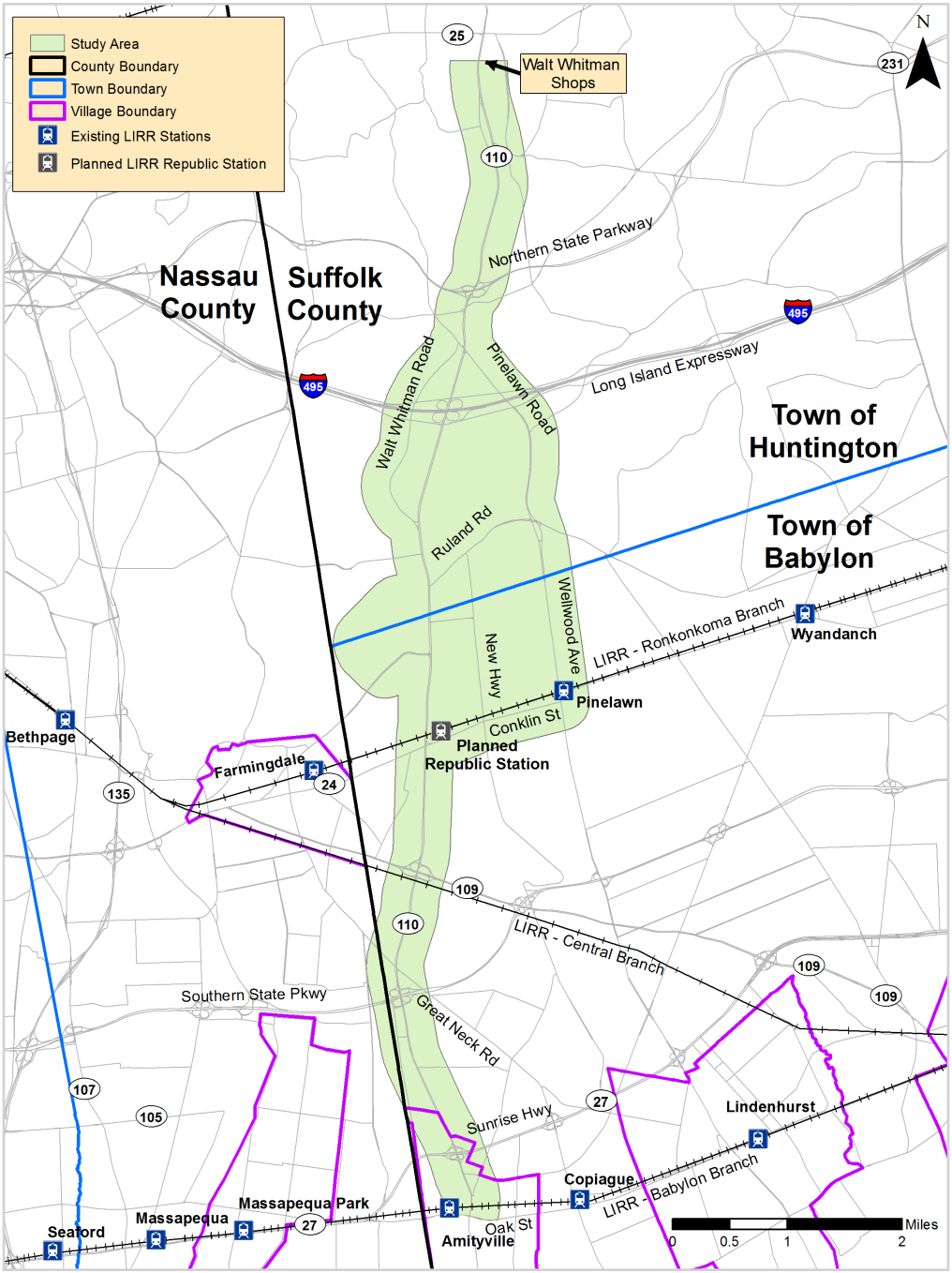
3 STUDY AREA

The study area for the Route 110 AA (**Figure 3**) includes the areas directly affected by the potential construction and operation of transit improvements. The study area encompasses the portion of Route 110 where trip generators and attractors are most concentrated and where the existing right-of-way (ROW) could best accommodate the introduction of a new premium transit service. Specifically, the approximately 10.5-mile stretch of the Corridor in the study area is located between Oak Street in the Village of Amityville at the southern end and the Walt Whitman Shops in the Town of Huntington at the northern end.

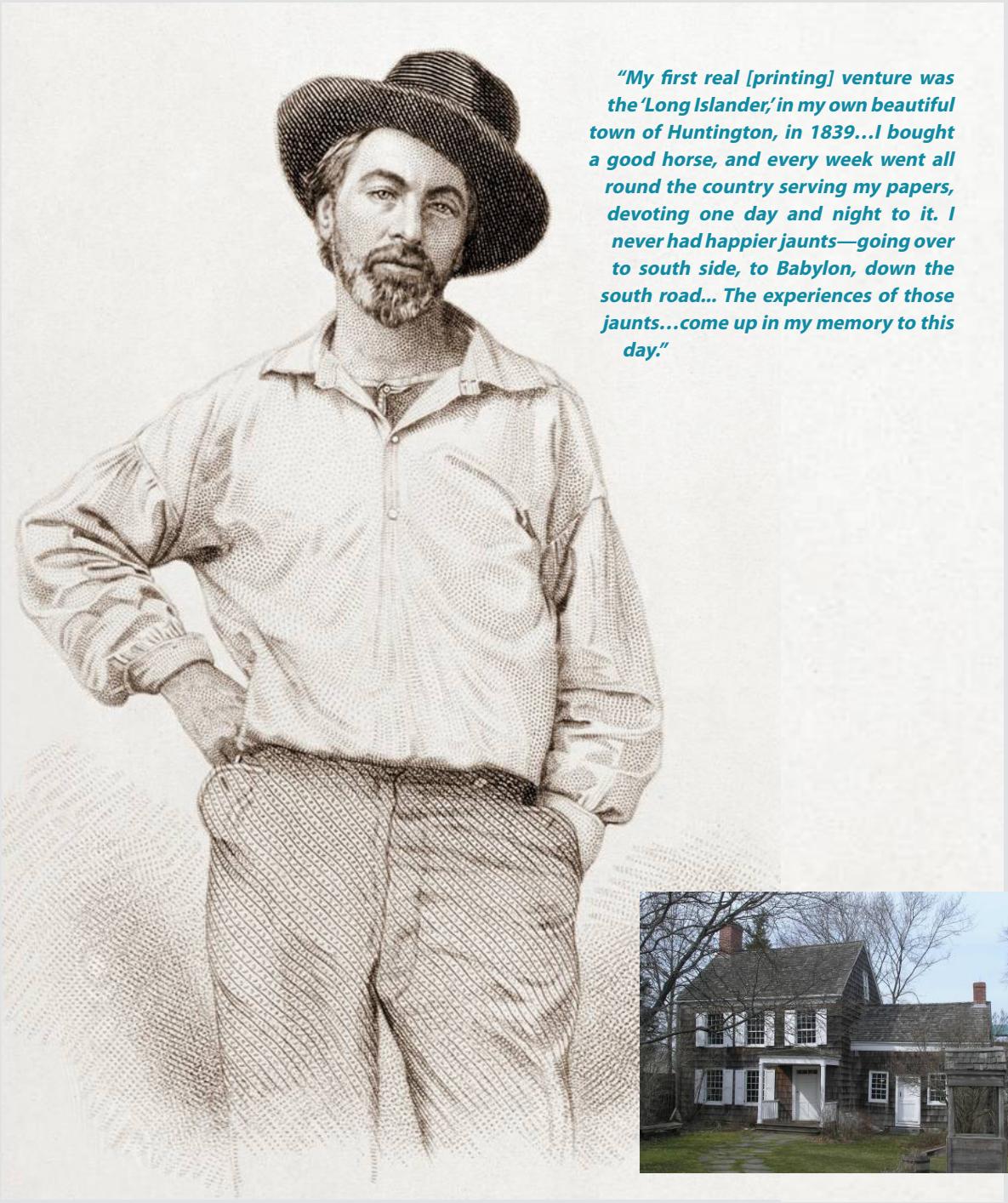
The study area also includes areas to the east and west of Route 110 to capture major activity centers that are beyond a reasonable walking distance from the Corridor. The study area extends east as far as Wellwood Avenue in the East Farmingdale portion of the Town of Babylon (at Conklin Street), and continues north to the intersection of Pinelawn Road and Route 110 in the Melville portion of the Town of Huntington. The study area extends west as far Walt Whitman Road in Melville and also includes the Farmingdale State College campus.

FIGURE 3: Route 110 AA Study Area Boundaries

Source: NYS GIS Program Office, Parsons Brinckerhoff (2014)



BIRTHPLACE OF WALT WHITMAN: NOTEWORTHY HISTORIC SITE WITHIN THE STUDY AREA

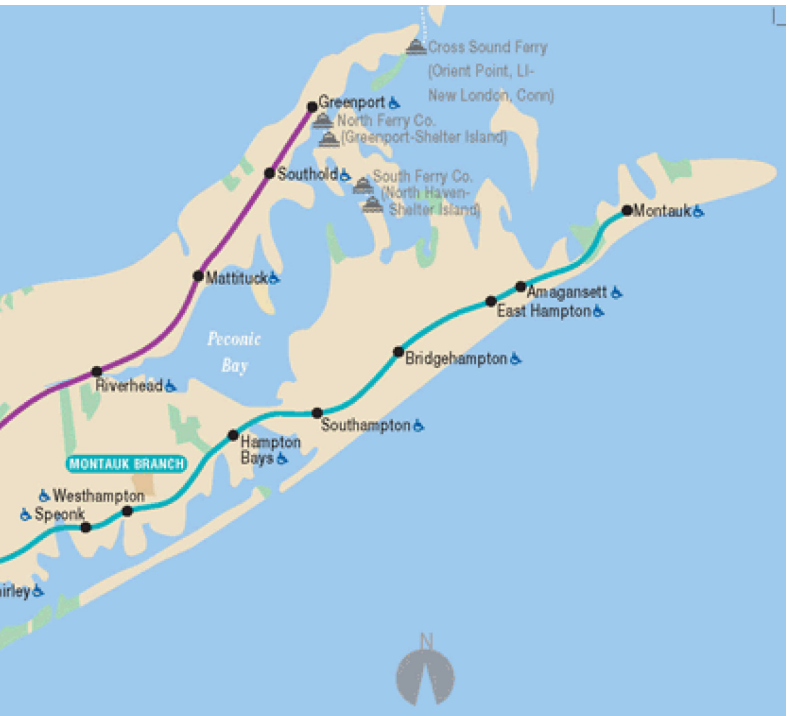


"My first real [printing] venture was the 'Long Islander,' in my own beautiful town of Huntington, in 1839…I bought a good horse, and every week went all round the country serving my papers, devoting one day and night to it. I never had happier jaunts—going over to south side, to Babylon, down the south road... The experiences of those jaunts…come up in my memory to this day."

Source: *Specimen Days* (1882), www.waltwhitman.org, *Leaves of Grass* (1856)

Route 110 is a strategic north-south Corridor on Long Island that is crossed by multiple branches of the LIRR

Source: LIRR, Parsons Brinckerhoff (2015)



4 EXISTING AND FUTURE CONDITIONS

The following discussion presents an overview of existing and future conditions within the study area, which set the framework for the problem statement, Purpose and Need, and alternatives development process. Additional details are included in Appendices B and C.

The following section features an evaluation of:

» Socioeconomic and demographic indicators

» Land use and zoning

» Active development projects

» Population and employment trends

» Transit service

» Traffic conditions

» Roadway characteristics and safety

» Pedestrian and bicycle accommodations

» Travel trends

Much of the data included in this section—including land use and transportation data—were summarized at the scale of the study area and guided the subsequent definition, screening, and evaluation of transit alternatives in the planning process. Other data were summarized at a broader geographic scale to inform a more regional definition of the Corridor and to capture a wider potential ridership shed/travel market. For instance, socioeconomic and demographic data were summarized for an area encompassing a two-mile buffer around the portion of Route 110 within the study area (hereafter, the "Route 110 area"). Furthermore, origin and destination data to and from the Route 110 area were summarized for the 28-county region, which is consistent with the region as modeled by NYMTC, the metropolitan planning organization for the New York metropolitan area. The result of this work was a comprehensive definition of the Corridor that included a combination of data sources aggregated at different geographic scales.

4.1 SOCIOECONOMIC AND DEMOGRAPHIC PROFILE

A socioeconomic and demographic profile of the Route 110 area was prepared by compiling data from the 2010 Census and 2008-2012 American Community Survey (ACS) 5-Year Estimates provided by the United States Census Bureau. The 2008-2012 ACS 5-Year Estimates reflect the most up-to-date data at the time the socioeconomic and demographic profile was prepared for this AA. The 2009-2013 ACS 5-Year Estimates were subsequently released by the United State Census Bureau.

All census tracts with 50% or more of their area within the Route 110 area were included in the analysis (**Figure 5**). This area encompasses a total of 38 census tracts, located in both Suffolk and Nassau Counties. The data were aggregated from the census tract level to create a profile for the Route 110 area.

Key socioeconomic and demographic indicators for the Route 110 area are summarized below.

» The percentage of Long Island's employment in the Route 110 area (10%, or approximately 119,000 jobs) is greater than the percentage of Long Island's population in the same area (7%, or approximately 190,000 residents), which indicates that the area is an important employment destination in the region.

» The 20-34 year-old age cohort constitutes the second smallest age cohort in the Route 110 area, comprising only approximately 18% of the total population. This is comparable to the respective percentages in Suffolk and Nassau Counties overall, which could reflect the "brain drain" caused by the exodus of young people off Long Island to work and live in other areas, both in and outside of the metropolitan region. (Refer to sidebar.)

» Similar to Suffolk and Nassau Counties, one-unit detached housing is the predominant housing type in the Route 110 area, accounting for more than 75% of the total housing stock. This is indicative of the low-density residential development pattern that defines much of Long Island, although there are several multi-family housing developments in the vicinity of Route 110.

THE BRAIN DRAIN ON LONG ISLAND

The concept of the brain drain refers to the decline of the age cohort that generally comprises college students and emerging professionals. The brain drain on Long Island was first identified by the Long Island Index in 2004 in its report, *Setting Goals, Measuring Progress for the Long Island Region*, which noted that the 20% decline in this key age cohort on Long Island between 1990 and 2000 was five times the national average. The brain drain remains a pressing issue, highlighted again in the 2015 Long Island Index report, *Long Island's Future: Economic Implications of Today's Choices* (**Figure 4**).

The brain drain continues to be a pressing problem facing Long Island

FIGURE 4: Ages 25-34 Cohort as Percent of Total Long Island Population (1970-2010)
Source: Long Island Index (2004, 2015)

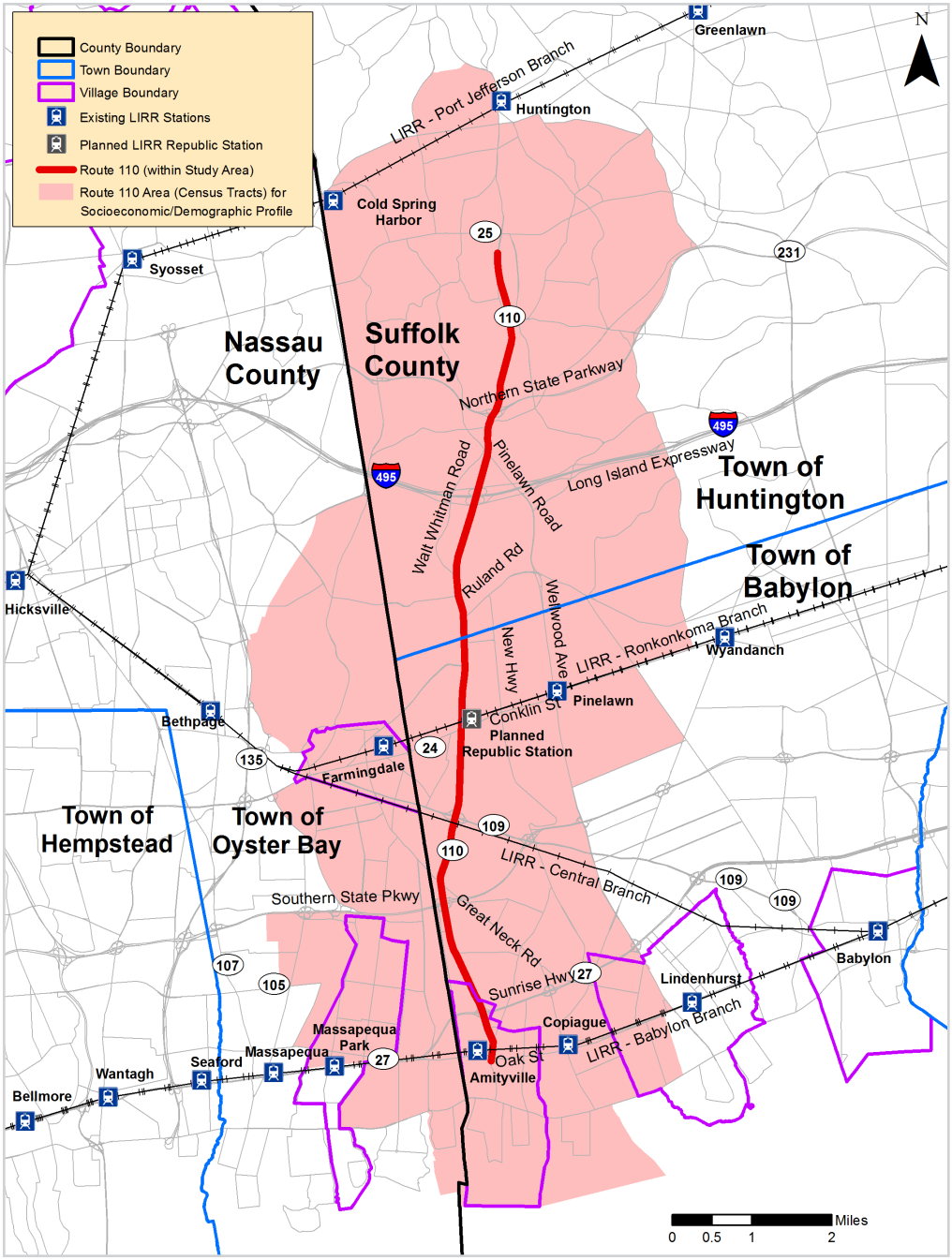


FIGURE 5: Route 110 Area for Socioeconomic and Demographic Profile

Source: NYS GIS Program Office, US Census 2010, Parsons Brinckerhoff (2015)

» Approximately three out of every four workers who live in the Route 110 area drive alone to their place of work, and only about one in every 10 workers uses public transportation as their means of transportation to work (**Figure 6**), although this is approximately twice the national average. This statistic parallels the respective percentage Island-wide, and could reflect both the dominant auto-oriented development pattern on Long Island, as well as the need for enhanced transit access to and from major origins and destinations.

» More than three out of every four workers who live in the Route 110 area have more than one vehicle available, and only approximately 3% have no vehicle available. In addition to possibly reflecting personal preference regarding automobile ownership, this statistic could support the premise that the sprawling development pattern in the Route 110 area (and on Long Island in general) encourages reliance on the automobile. There is also a small but important transit-dependent population—defined as persons who do not own a car—whose travel needs should be equitably met by the existing and future transportation system.

» There is significant variation in commuting time among workers who live in the Route 110 area, ranging from less than 30 minutes to more than one hour. This is likely due in part to the geographic distribution of workplaces throughout the metropolitan area.

Overall, the socioeconomic and demographic profile of the Route 110 area underscores some of the principal challenges this AA sought to address, namely to improve transit access, promote transit use, and provide the transportation framework to enable transit-oriented development (TOD).

4.2 LAND USE AND ZONING

Travel within, to, and from the study area ("the travel market") is informed by the area's land use composition and the presence of major activity centers. As shown in **Figure 7**, there are a wide variety of land uses in the study area, and while there is limited residential development, Route 110 is predominantly defined by a mix of commercial and industrial uses. This is also reflected in the zoning designations along the Corridor, as the Route 110 frontage is primarily zoned commercial and industrial, with residential zoning primarily beginning off the main spine of the Corridor.

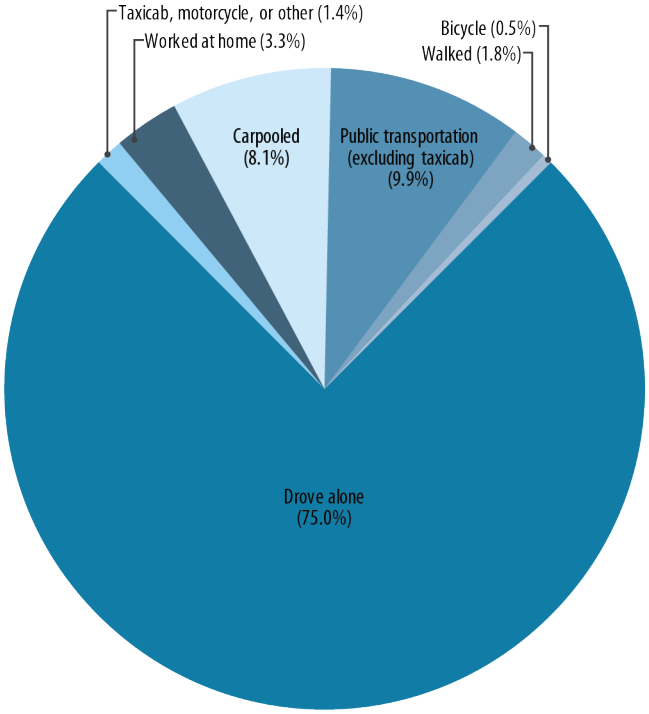


FIGURE 6: Means of Transportation to Work for Workers Who Live in the Route 110 Area

Source: 2008-2012 American Community Survey 5-Year Estimates S0801, Parsons Brinckerhoff (2014)

The land use character of the study area is best defined using geographic boundaries, as the hamlets and villages that run through the approximately 10.5-mile Corridor have different development patterns and mix of uses. The following discussion highlights the major origins and destinations within the study area from north to south.

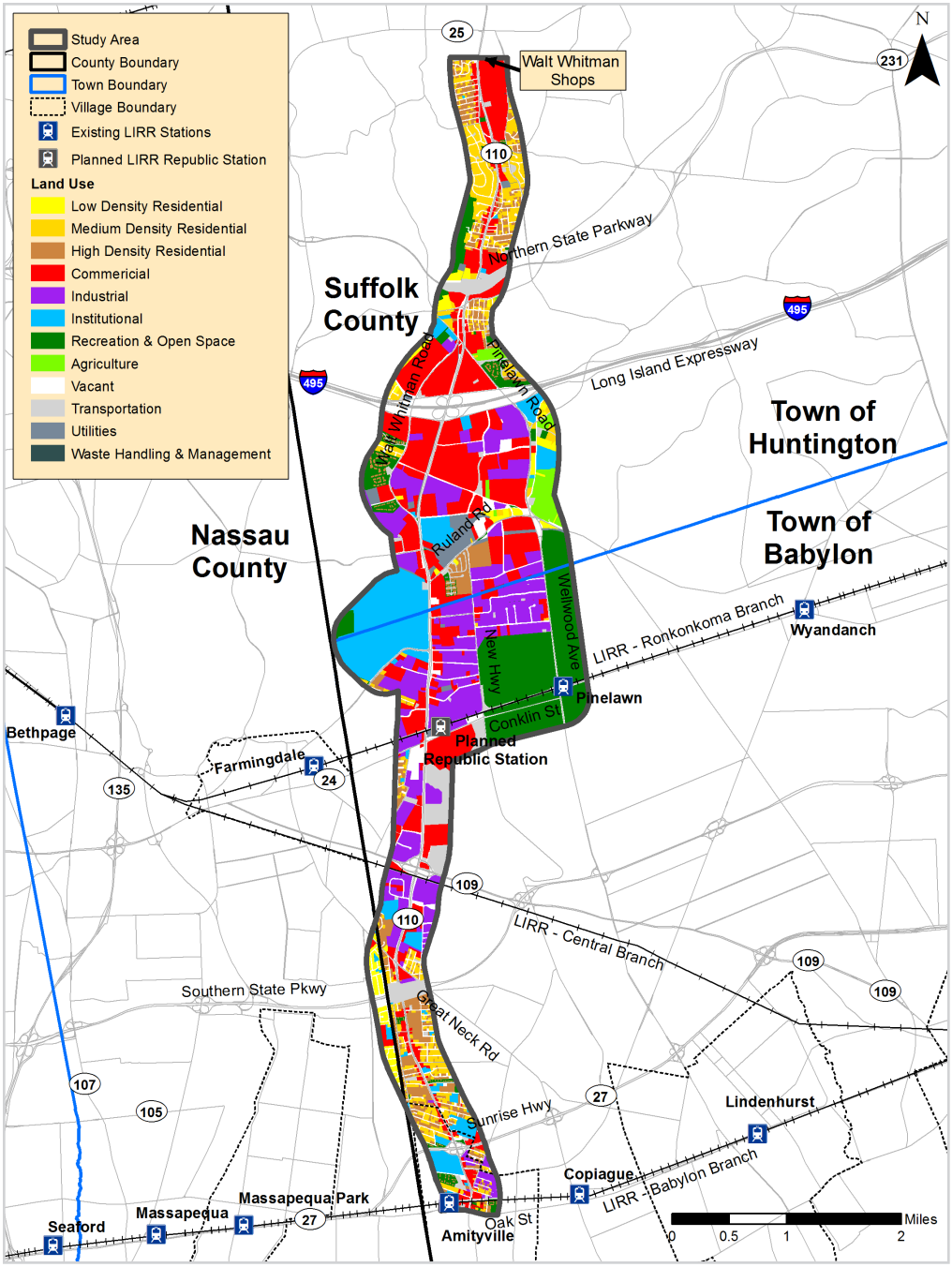
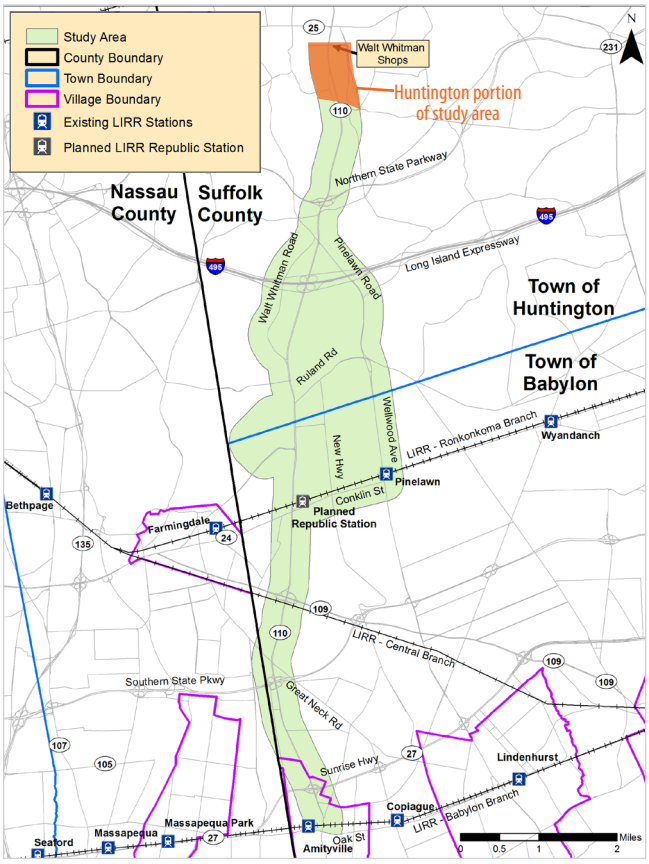


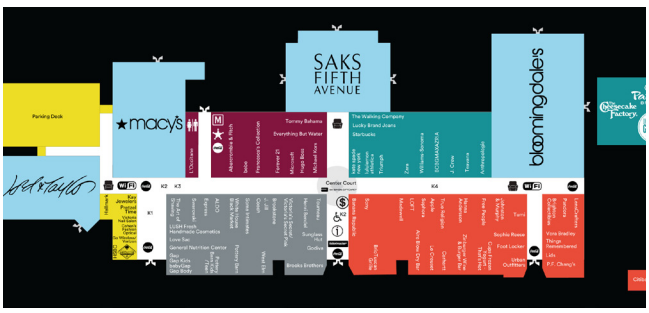
FIGURE 7: Study Area Land Use

Source: NYS GIS Program Office, Parsons Brinckerhoff, Suffolk County, Nassau County GIS Database (2014)

HUNTINGTON (**FIGURE 8**): WALT WHITMAN SHOPS TO SCHWAB ROAD (0.6 MILES)

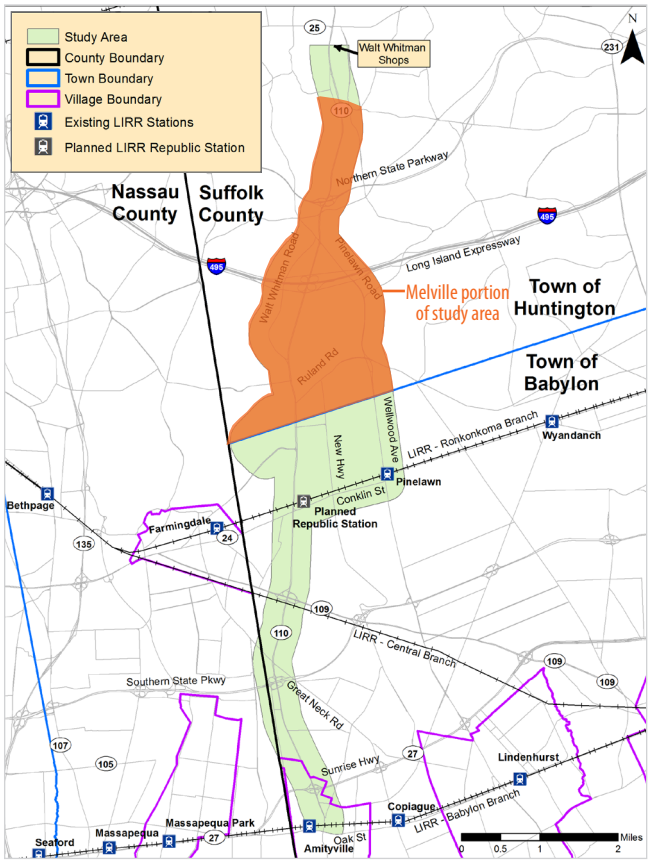
Along the northern section of the study area, the land use character is largely a combination of commercial with some limited single-family residential, with additional residential development located along the side streets. The northern edge of the study area is anchored by the Walt Whitman Shops, which serves as the major trip attractor in this portion of the Corridor. In November 2013, the Walt Whitman Shops opened its 70,000 square foot expansion, which included the addition of more than 30 new retailers.





The Walt Whitman Shops is a major retail center within the Huntington portion of the study area

FIGURE 8: Huntington Portion of the Study Area
Source: NYS GIS Program Office, Parsons Brinckerhoff, Simon Property Group (2015)



Canon USA and Huntington Quadrangle are two of the many employment centers within the Melville portion of the study area

FIGURE 9: Melville Portion of the Study Area
Source: NYS GIS Program Office, Parsons Brinckerhoff, Canon, We're Group (2014)

MELVILLE (**FIGURE 9**): SCHWAB ROAD TO THE TOWN OF HUNTINGTON/TOWN OF BABYLON BOUNDARY, JUST NORTH OF SMITH STREET (4.2 MILES)

As discussed in greater detail in Section 4.4, the commercial core of the study area is located within Melville in the Town of Huntington. The Melville area has a number of large suburban office buildings and office parks, exemplified by the Huntington Quadrangle. Located on approximately 67 acres about a half-mile south of the Long Island Expressway (LIE), the three office complexes that encompass the Huntington Quadrangle collectively include more than 1.1 million square feet of office space.

Additionally, several headquarters for large companies are located in Melville, including Nikon and Capital One, and in 2013, Canon USA opened its new headquarters on Walt Whitman Road across near Exit 49 of the LIE. Other major destinations within Melville include the Broad Hollow Bioscience Park, Newsday, Estee Lauder, the United States Post Office distribution center, the Hilton Long Island/ Huntington, the Melville Marriott, the Melville Mall, and a number of office buildings within and near the Huntington Quadrangle, as well as along Pinelawn Road north of the LIE.

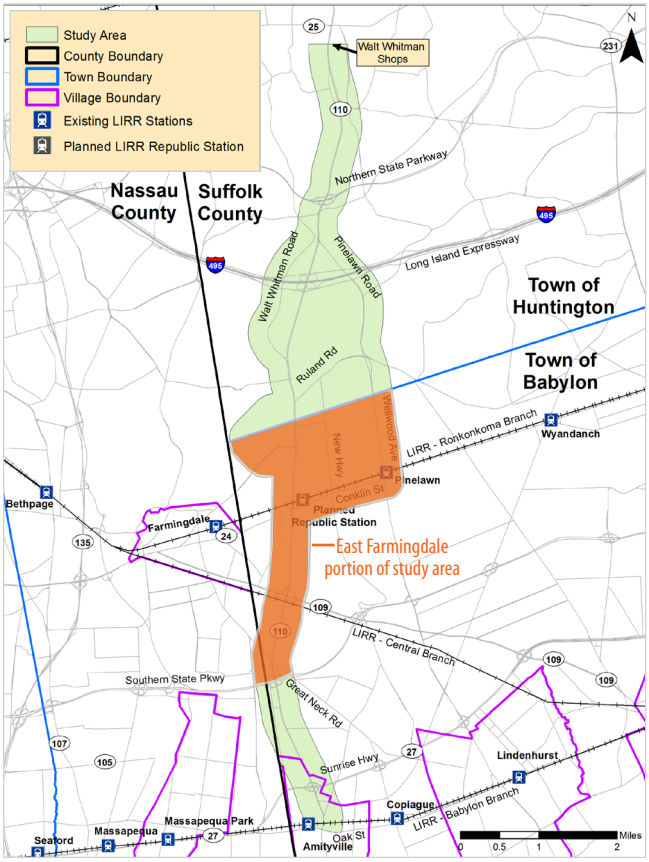
While best known as an employment center, Melville is also home to a number of multi-family residential developments, including the Coves at Melville, the Villas, and Northgate located off Walt Whitman Road to the west of Route 110, as well as Country Pointe in Melville and Avalon Court located off Ruland Road to the east of Route 110.

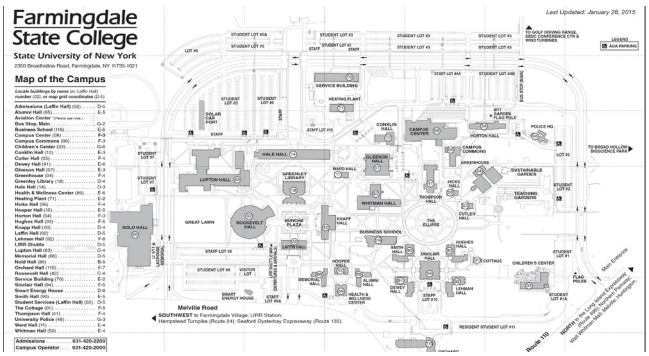
Many of these major origins and destinations to the east and west of Route 110 are located beyond a reasonable walking distance from the main spine of the Corridor, and generally lack transit access. Therefore, travel choices are constrained to and from these trip generators and attractors, and this constitutes one of the principal problems addressed by this AA.

EAST FARMINGDALE (**FIGURE 10**): TOWN OF HUNTINGTON/TOWN OF BABYLON BOUNDARY TO THE SOUTHERN STATE PARKWAY (3.4 MILES)

South of Melville is the hamlet of East Farmingdale in the Town of Babylon. This portion of the Corridor includes a number of different land uses, including retail (a combination of strip commercial and national-chain large-format stores), hotels, offices/light industrial uses, institutional uses, and the 526-acre general aviation Republic Airport. There are also a number of vacant parcels on the east side of Route 110 that were related to the former LIRR Republic Station and Fairchild Engine & Manufacturing Company. Several of these vacant parcels are included in the East Farmingdale master development site.

Overall, major destinations in this portion of the Corridor include the Republic Plaza and Airport Plaza shopping centers, Courtyard Marriott, Molloy College and the Adventureland amusement park on the east side of Route 110, and Farmingdale State College on the west side of Route 110.

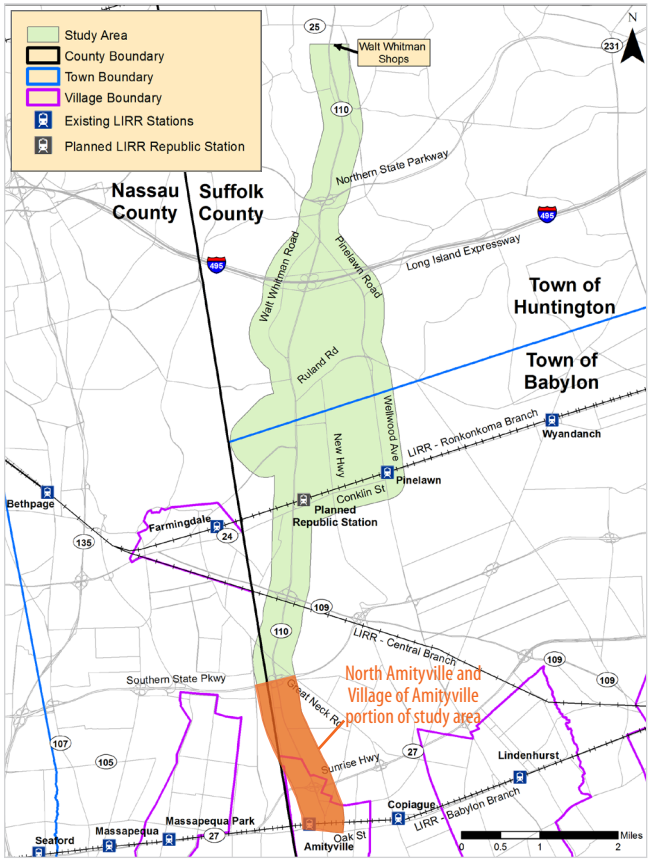




Farmingdale State College and Republic Airport are two large activity centers within the East Farmingdale portion of the study area

FIGURE 10: East Farmingdale Portion of the Study Area

Source: NYS GIS Program Office, Parsons Brinckerhoff, Farmingdale State College, NYSDOT (2015)



Multi-family housing in North Amityville complements the local downtown in the Village of Amityville near the southern end of the study area

FIGURE 11: North Amityville/Village of Amityville Portion of the Study Area
Source: Parsons Brinckerhoff , Heatherwood (2014)

NORTH AMITYVILLE AND VILLAGE OF AMITYVILLE (**FIGURE 11**): SOUTHERN STATE PARKWAY TO OAK STREET (2.1 MILES)

The southern end of the Corridor contains a mix of uses, primarily comprising single- and multi-family residential (including mobile homes) and strip commercial uses. Additionally, north and south of Sunrise Highway are two large institutional uses: 1) the Edmund W Miles Middle School north of Sunrise Highway on the east side of Route 110, and 2) the now vacant Brunswick Hospital and associated building and parking areas. The major existing trip generator and attractor in this southern portion of the Corridor is the LIRR Amityville Station.

In sum, Route 110 and the surrounding study area include a number of significant activity centers that contribute to travel demand within, to, and from this regionally significant corridor.

4.3 ACTIVE DEVELOPMENT PROJECTS IN THE STUDY AREA

In addition to the existing land uses within the study area, there are a number of active development projects that will inform the future travel market. As shown in **Table 1** and **Figure 12**, projects that are approved or under construction in the study area include multi-family housing complexes, retail centers, and other commercial uses. There are also active development projects in close proximity to the study area, such as the Wyandanch Rising mixed-use development (about two miles east of the study area) and the Parkway Properties residential development (about one mile west of the study area).

Additionally, several businesses will be opening or relocating to existing/refurbished buildings within the study area, such as in downtown Amityville.

There are also a number of potential development projects that are in different stages of the planning and approval process. This includes—but is not limited to—the aforementioned East Farmingdale master development project near the intersection of Route 110 and Conklin Street, as well as a number of other potential future projects in the Village of Amityville, the Town of Babylon, and the Town of Huntington.

Furthermore, the 2014 NYSDOT Request for Information (RFI) for Operational Services at Republic Airport identified that the airport "has space for development or redevelopment in a number of areas, both airside (contiguous with the airfield) and landside (non-contiguous properties)."

All of these active projects and potential future developments can result in increased travel demand within, to, and from the study area.

Highland Green is one of several active development projects within the study area

Source: Long Islander News, Huntington Patch (2015)

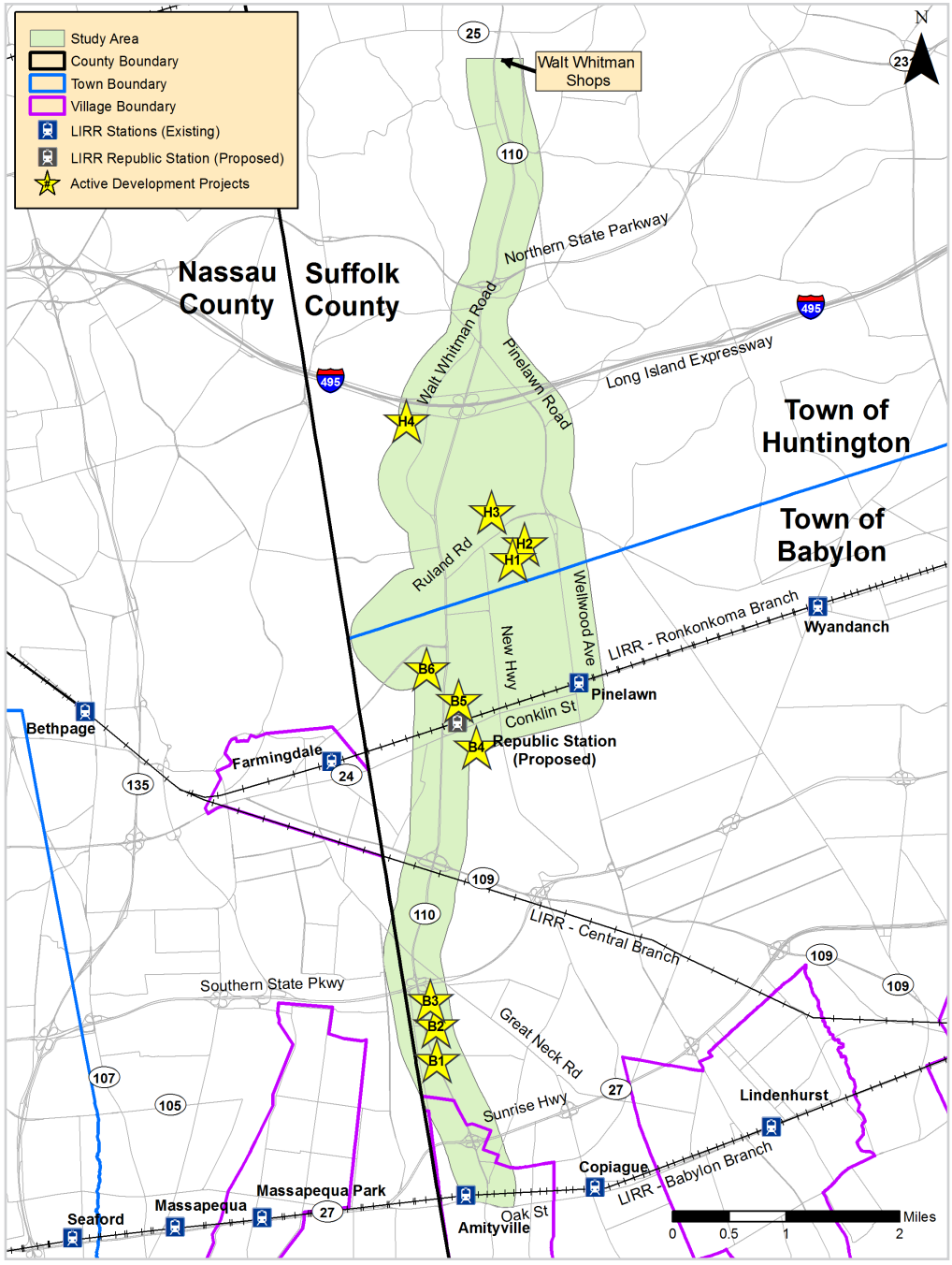
MAP ID	MUNICIPALITY	PROJECT NAME	ADDRESS	ACREAGE	PROGRAM
B1	Town of Babylon	Pollo Campero	725 North Broadway (southeast corner of Nathalie Avenue and Broadway)	0.47 Acres	2,107 square foot, 34-seat fast food drive-thru restaurant
B2	Town of Babylon	Greybarn	East of Route 110; south, west, and north of Brefni Street, Geraldine Avenue, and Nathalie Avenue, respectively	20.26 Acres	3-story mixed-use building containing 500 residential units (213 1-bedroom, 287 2-bedroom) and 39,621 square feet of retail
B3	Town of Babylon	7-11	751 North Broadway (southeast corner of Broadway and Brefni Street)	0.42 Acres	2,959 square foot 7-11 store
B4	Town of Babylon	Stew Leonard's	Part of Airport Plaza	--	Stew Leonard's store
B5	Town of Babylon	1278 Route 110	1637 Broad Hollow Road	1.85 Acres	10,000 square foot commercial building (possibly a restaurant); 112 parking spaces (28 landbanked)
B6	Town of Babylon	Lexus	2040-2100 Broad Hollow Road (southwest corner of Route 110 and Daniel Street)	3.3 Acres	Renovation of existing building and construction of three additions to create a 48,050 square foot automobile dealership, with service center and car wash
H1	Town of Huntington	The Club at Melville	West side of Deshon Drive; south of Ruland Road	13 Acres	261 senior residential units for-sale; income restricted, 2-bedroom
H2	Town of Huntington	BAPS Temple	West side of Deshon Drive; south of Ruland Road	5 Acres	48,000 square foot house of worship
H3	Town of Huntington	Highland Green	North side of Ruland Road east of Maxess Road	8.21 Acres	118 affordable rental units
H4	Town of Huntington	Canon Americas Phase II	Southwest corner of LIE South Service Road & Walt Whitman Road	52.17 Acres	194,688 square foot office

TABLE 1: Active Development Projects in the Study Area

Source: Town of Babylon, Town of Huntington (2015)

FIGURE 12: Active Development Projects in the Study Area

Source: NYS GIS Program Office, Town of Babylon, Town of Huntington, Parsons Brinckerhoff (2015)



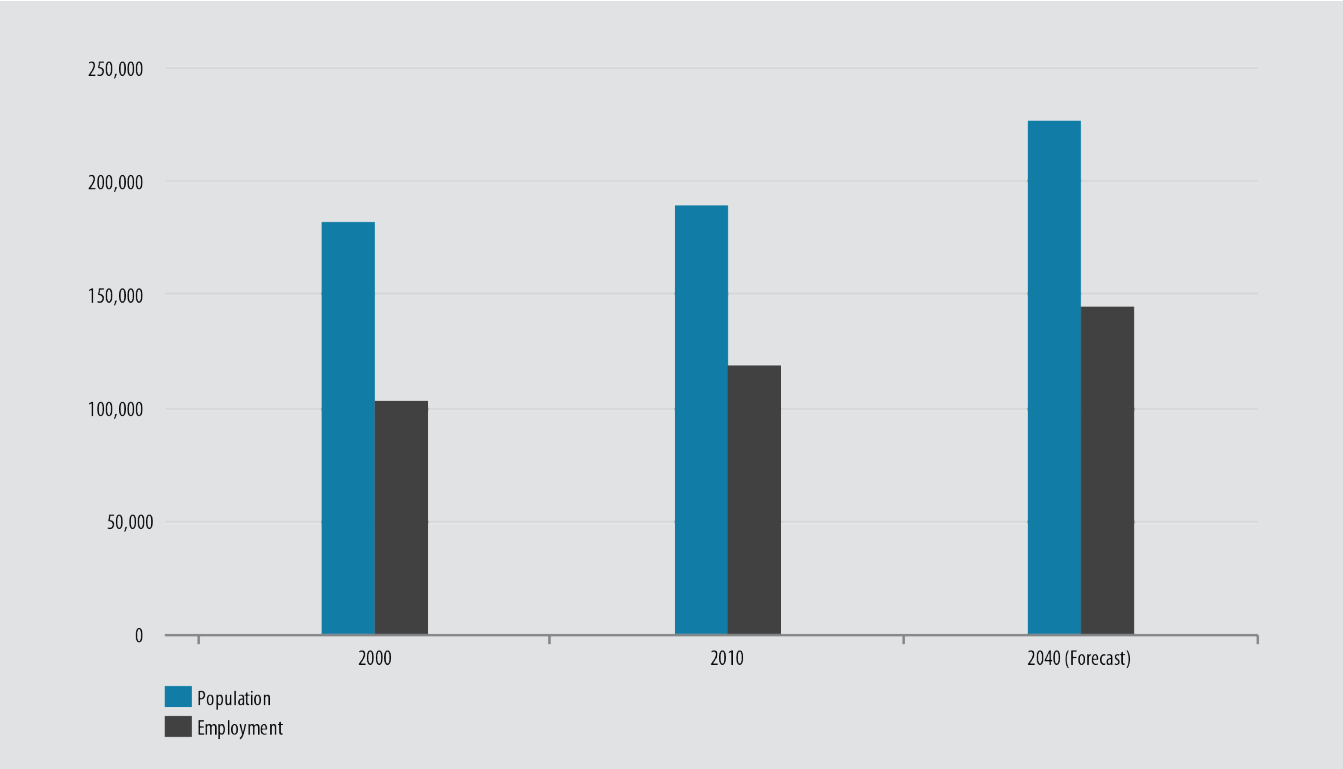


FIGURE 13: Population and Employment in the Route 110 Area (2000, 2010, and 2040 Forecast)

Source: 2006-2010 Census Transportation Planning Package (CTPP) American Community Survey 5-Year Estimates Table A202100, 2000 CTPP P2-004, 2010 and 2000 US Census Summary File 1 DP-1, working set of 2010 – 2040 socioeconomic and demographic (SED) data for the New York BPM 2010 Update project, Parsons Brinckerhoff (2014)

4.4 POPULATION AND EMPLOYMENT TRENDS

An assessment of recent and projected future population and employment trends offered insight into the potential travel markets for the transit improvements proposed in this AA. Historical data was compiled from the United States Census and ACS, and future forecasts were prepared using a working set of 2010–2040 socioeconomic and demographic data for the New York Best Practice Model (BPM) 2010 Update project. The BPM is the travel demand forecasting model for the New York metropolitan area, developed by NYMTC for 28 counties in New York, New Jersey, and Connecticut.

As shown in **Figure 13**, the population within the Route 110 area increased by approximately 7,500 (4.0%) between 2000 and 2010, to a total of nearly 190,000 people. The population is projected to increase by approximately 37,000 (19.5%) between 2010 and 2040, to a total of approximately 227,000.

Despite the recession in the latter half of the past decade, the Route 110 area experienced an increase of more than 15,500 jobs (13.1%) between 2000 and 2010, to a total of nearly 119,000 jobs (**Figure 13**). Employment within the Route 110 area is projected to increase by approximately 26,000 jobs (21.8%) between 2010 and 2040, to a total of approximately 145,000 jobs.

Route 110 is a major employment corridor on Long Island, and an understanding of the distribution of employment along and near it shed light on some of the key destinations to be served by the existing and future transportation system. Employment data was compiled by zip code for the communities along the Corridor—Amityville (11701), Farmingdale (11735), Melville (11747), Huntington (11743), and Huntington Station (11746)—by the Town of Babylon through ReferenceUSA, a service of Infogroup that is a provider of business and consumer research.

A wide range of employment sectors are represented in the communities along the Corridor (**Figure 14**). As a reflection of the many significant retail centers in the area (including Walt Whitman Shops, Melville Mall, Airport Plaza, and others), the retail trade accounts for the largest single employment sector in the communities along the Corridor,

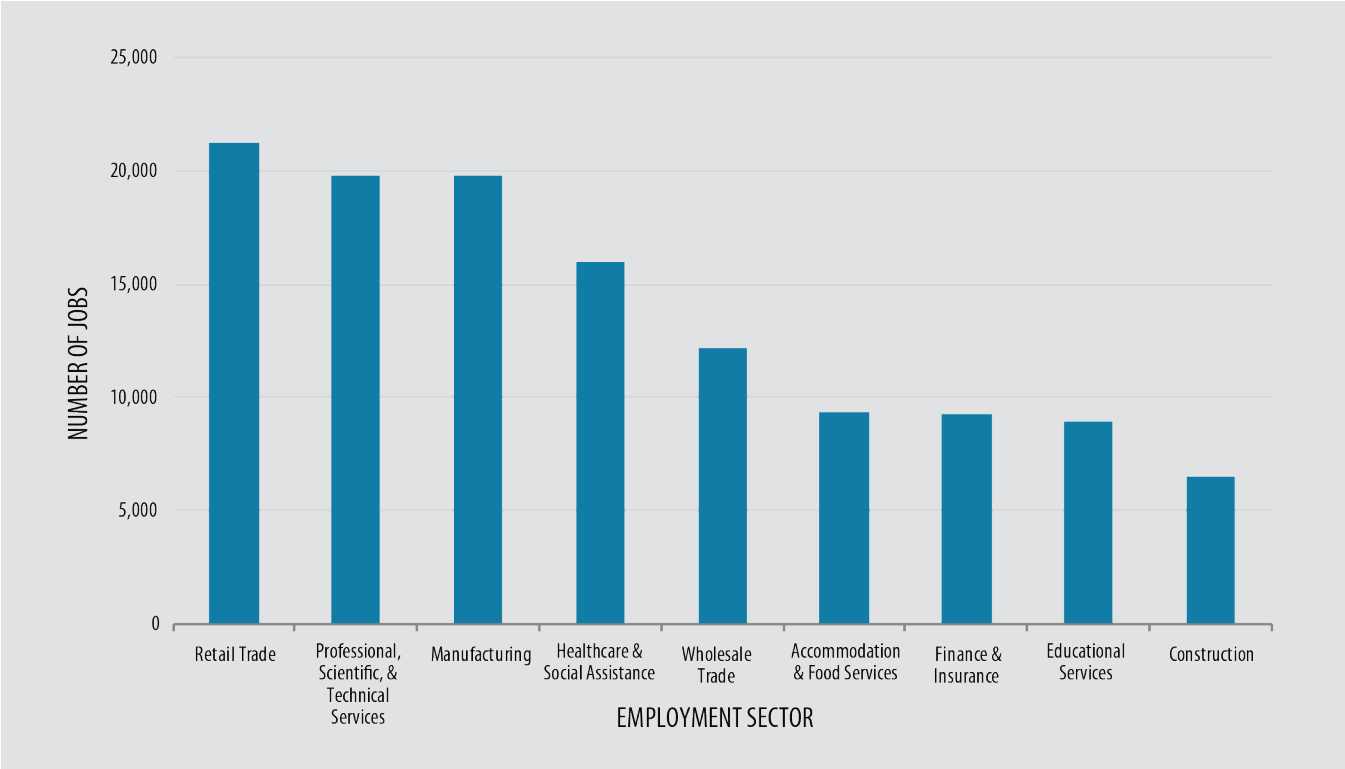


FIGURE 14: Prominent Employment Sectors in the Communities along Route 110
Source: ReferenceUSA, Town of Babylon, Parsons Brinckerhoff (2014)

comprising more than 21,000 jobs. The second largest employment sector is professional, scientific, and technical services, with nearly 20,000 jobs, which is indicative of the strong office market and burgeoning innovation economy in the area. Other large employment sectors in the area include manufacturing (approximately 20,000 jobs), health care and social assistance (approximately 16,000 jobs), and wholesale trade (approximately 12,000 jobs).

Much of the existing employment—as well as the projected future employment growth—along and surrounding Route 110 is located within Melville in the Town of Huntington. Many buildings with significant numbers of employees in Melville are located off the main spine of the Corridor, including in the office parks between Route 110 and Pinelawn Road, some of which are beyond a convenient walking distance from Route 110. One of the key purposes of this AA is to increase transit access to these major off-Corridor destinations.

4.5 EXISTING TRANSIT SERVICE

As shown in **Figure 15**, many existing bus routes provide service along or cross Route 110 and the study area, including routes operated/managed by Suffolk County Transit, Nassau Inter County Express (NICE), and Huntington Area Rapid Transit (HART). The portion of Route 110 within the study area also crosses three branches of the LIRR. The following sections present an overview of the different transit services offered within the study area.

4.5.1 SUFFOLK COUNTY TRANSIT

A number of existing Suffolk County Transit bus routes serve the study area and offer connections to other bus routes, as well as the LIRR. The S1 route serves the length of the Corridor, from the LIRR Amityville Station in the south to Halesite in the Town of Huntington in the north, located north of the study area boundaries. The S1 route has the highest weekday ridership (2,781) of all Suffolk County Transit bus routes, as well as the second highest Saturday ridership (1,140), based on data collected in 2013. Annual ridership on the S1 in 2013 exceeded 626,000.

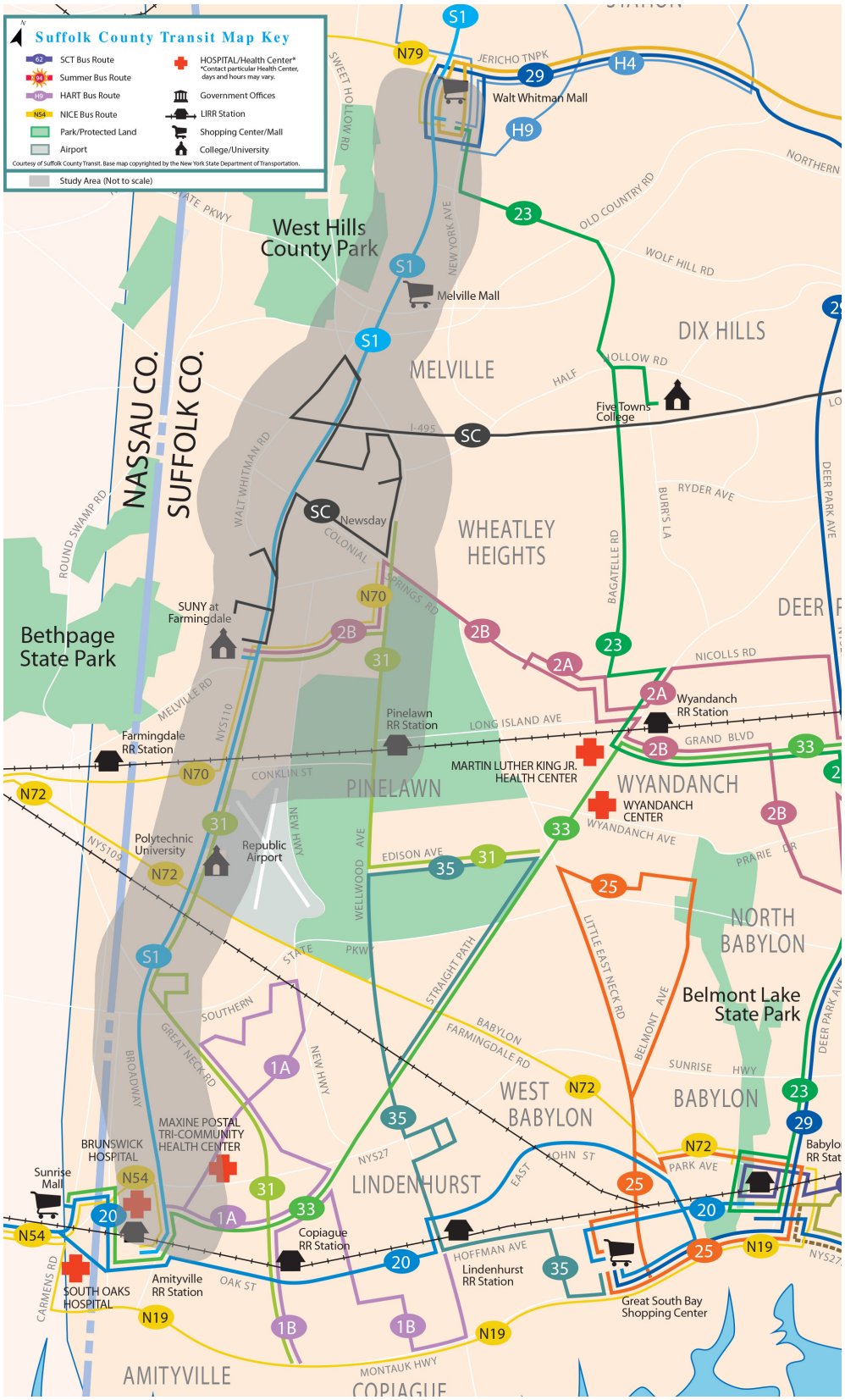


FIGURE 15: Existing Transit Service in the Study Area

Source: Suffolk County Transit, Parsons Brinckerhoff (2015)

The existing Suffolk County Transit S1 local bus route runs the full length of Route 110 within the study area, terminating in the south at the LIRR Amityville Station

Source: *Route 110 BRT Study* (2010)

Weekday service on the S1 route is offered for 16 hours each day, with 15 minute peak period frequencies and 30 minute off-peak frequencies. Hourly weekend service is offered for 12 hours each day. According to the current Suffolk County Transit schedules, the travel time on the S1 from the LIRR Amityville Station to the Walt Whitman Shops is 45 minutes for most trips during the day, and the travel time in the reverse direction is 35 minutes for most trips.

In addition to the S1, several other Suffolk County Transit routes provide service within, to, and from the study area. Many of these routes converge at or near the LIRR Amityville Station and/or the Walt Whitman Shops at the southern and northern termini of the study area, respectively.

There are limited transit options within the Melville portion of the study area to the east and west of Route 110. The Suffolk Clipper serves employment centers in Melville in addition to LIE Park & Ride lots and the Hauppauge Industrial Park further east in Suffolk County, but the routing is circuitous and the service is infrequent, with only three or four one-directional runs in the morning and evening peak periods.

According to a 2007 Suffolk County Transit Ridecheck Plus ridership survey, three of the 20 busiest Suffolk County Transit stops (by number of weekday daily boardings) are located within the study area. Two of these three stops are located near the southern boundary of the study area in Amityville, namely the LIRR Amityville Station (269 daily weekday boardings) and Oak Street/ Broadway (136 daily weekday boardings). The busiest of the three stops is the Walt Whitman Shops at the northern boundary of the study area, which has 656 daily weekday boardings. **Figure 16** shows the average weekday total of boardings and alightings for each of the Suffolk County Transit stops within the study area from the 2007 data, combined for all Suffolk County Transit routes.

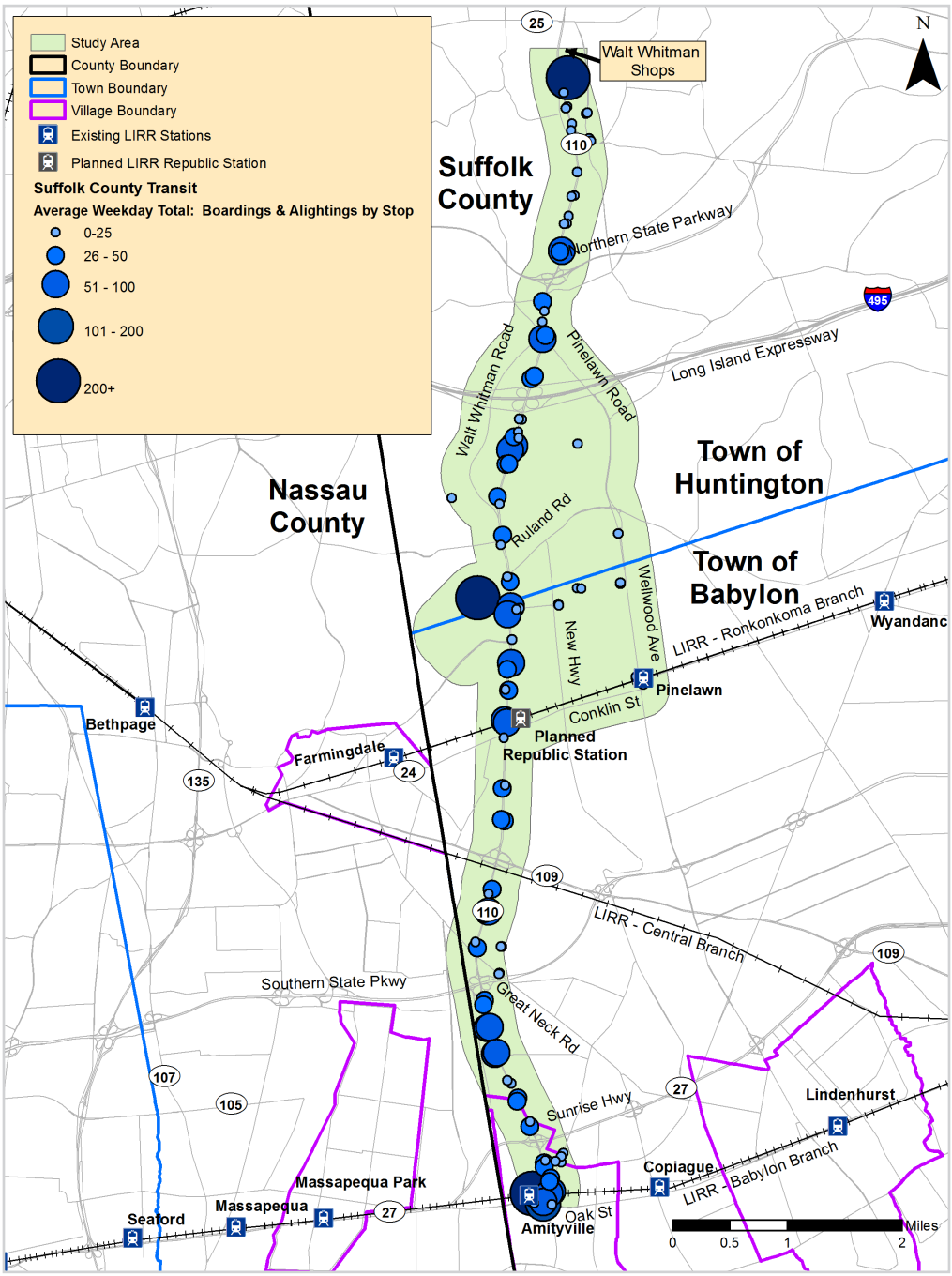


FIGURE 16: Suffolk County Transit Average Weekday Total Boardings and Alightings by Stop (2007)

Source: NYS GIS Program Office, Suffolk County Transit, Parsons Brinckerhoff (2015)

4.5.2 OTHER LOCAL AND REGIONAL BUS SERVICES

In addition to Suffolk County Transit, the Town of Huntington's HART system and Nassau County's NICE system both provide local fixed-route bus services within, to, and from the study area. Three of the four existing HART bus routes provide service to and from the northern portion of the study area, with connections to other destinations in the Town of Huntington. The H20, H30, and H40 routes all serve the Walt Whitman Shops, with the routes diverging to provide service to other destinations in the Town in Huntington to the north and east. Similarly, a number of NICE bus routes provide connections between the study area (specifically, in Amityville, near Farmingdale State College, and at Walt Whitman Shops) and points west in Nassau County.

In addition to the fixed-route bus transit services provided by Suffolk County Transit, HART, and NICE, these agencies also provide curb-to-curb paratransit services within Suffolk County, the Town of Huntington, and Nassau County, respectively. Paratransit service is available to individuals with disabilities who meet the eligibility requirements of the Americans with Disabilities Act of 1990 (ADA).

Furthermore, 7 Bus is a private, for-profit bus operator that provides commuter bus service between Melville (Park & Ride Lot at LIE Exit 49) and the east side of Manhattan (Lexington Avenue and Third Avenue between 40th Street and 59th Street). 7 Bus provides service for the New York City-bound commuter, as well as those commuting on Long Island, including to Route 110.

All of these complementary bus services provide the framework for a robust intra-Island transit network, bolstered by the east-west LIRR.

4.5.3 LONG ISLAND RAIL ROAD (LIRR)

The LIRR provides commuter rail service to and from the study area between points east and west on Long Island and New York City. Route 110 is a strategic north-south corridor on Long Island in part because it is crossed by multiple branches of the LIRR, as follows:

» The heavily used Babylon Branch along the South Shore of Long Island has an important station at Amityville.

» The Main Line (also shown as the Ronkonkoma Branch in LIRR timetables) is served by a station at Farmingdale,

The Town of Huntington's HART system and Nassau County's NICE system both complement Suffolk County Transit by providing local bus service within, to, and from the study area
Source: Parsons Brinckerhoff (2014)

The LIRR supplements local bus service by providing regional commuter rail service to and from the study area
Source: SubwayNut (2013)

approximately one mile west of Route 110. The former Republic Station was located just east of Route 110, and the LIRR is planning to move forward with the environmental review and design of a new LIRR Republic Station.

» The Central Branch connects the Main Line (between Bethpage and Farmingdale) and Babylon Branch and parallels Route 109. Currently, there are no stations on this branch.

North of the study area, the Port Jefferson Branch also crosses Route 110, and the LIRR Huntington Station is located just off Route 110, approximately two miles north of the Walt Whitman Shops. The Suffolk County Transit S1 route and the HART H10 and H20 routes provide a connection between the study area (at Walt Whitman Shops) and the LIRR Huntington Station.

During the weekday morning peak-commute period, approximately 700 LIRR customers board at the LIRR Amityville Station and about 1,000 customers board at the LIRR Farmingdale Station, based on the 2013 LIRR Origin & Destination Study. During the same peak commute period, about 200 customers exit the train at the LIRR Amityville Station and more than 400 customers exit the train at the LIRR Farmingdale Station. The average weekday total boardings and alightings is approximately 2,600 at Amityville and 3,800 at Farmingdale.

To Amityville from points west, the LIRR travel time from Penn Station varies from approximately 55 to 65 minutes, and the travel time from Jamaica varies from approximately 30 to 40 minutes. To Amityville from points east, the travel time from Babylon is approximately 10 minutes, and a transfer is required at Babylon from points further east.

To Farmingdale from points west, the LIRR travel time from Penn Station varies from approximately 50 to 55 minutes, and the travel time from Jamaica is approximately 35 minutes. To Farmingdale from points east, the travel time from Ronkonkoma varies from approximately 25 to 30 minutes, and a transfer is required at Ronkonkoma from points further east.

One of the crucial underpinnings of this AA is that improved multi-modal connectivity with the LIRR and existing bus service can promote equitable and sustainable economic growth without adding more cars to the road.

4.6 TRAFFIC CONDITIONS

Route 110 is one of the primary north-south corridors in Suffolk County and includes a number of major trip generators and attractors, resulting in significant travel demand on the roadway. As such, recurring traffic congestion on Route 110 is widely acknowledged as an existing problem, and it is projected to get worse over time.

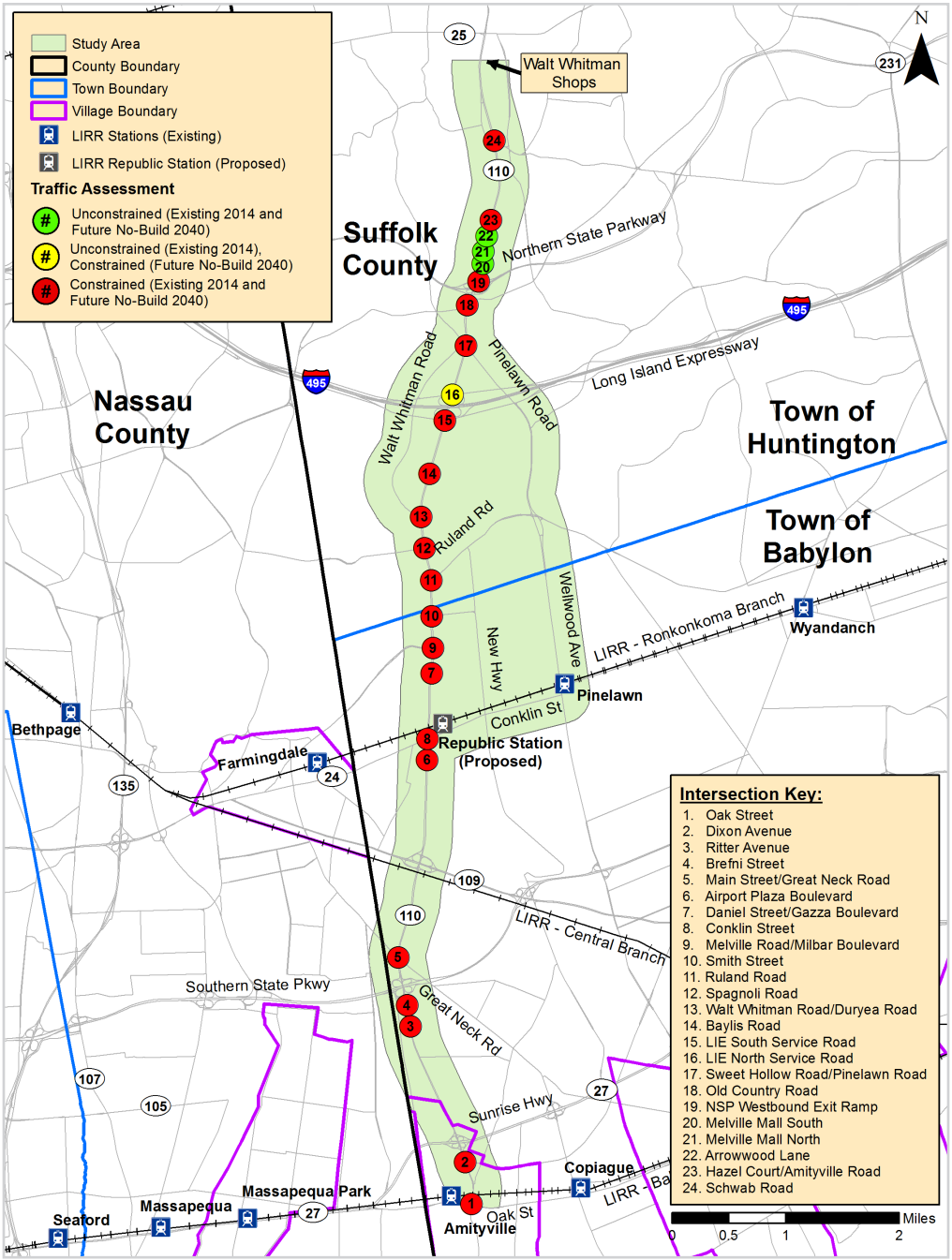
This was substantiated by the traffic analysis completed for the AA, which evaluated traffic conditions for the weekday PM hour (5:00 pm – 6:00 pm) for 24 signalized intersections as a representative sample of intersections along Route 110 between Oak Street and the Walt Whitman Shops. Based on an assessment of Volume to Capacity Ratio (v/c) and Level of Service (LOS), which are typical indicators of traffic congestion, the traffic analysis demonstrated that 20 of the 24 studied intersections (i.e., all studied intersections except the LIE North Service Road, the southern and northern entrances to Melville Mall, and Arrowwood Lane) are presently operating with constrained traffic conditions (**Figure 17**). Such intersections operate at or near capacity and regularly experience lengthy delays during the peak period. Furthermore, an additional intersection (i.e., the LIE North Service Road) is projected to be constrained in the future (2040), reflecting forecasted traffic growth rates.

It is envisioned that a new premium transit service along Route 110 would not only enhance the experience for current transit users, but also attract "choice (or discretionary) riders" (i.e., those who own an automobile), thereby helping to limit future increases in traffic congestion.

FIGURE 17: Summary of Route 110 Traffic Assessment

Source: NYS GIS Program Office, Traffic Databank, Parsons Brinckerhoff (2015)

Note: Constrained intersections operate at or near capacity and regularly experience lengthy delays during the peak period



4.7 ROADWAY CHARACTERISTICS

The roadway characteristics of Route 110 vary along different segments of the Corridor. While the southern end of the Corridor—between Oak Street and Albany Avenue in the Village of Amityville—has one northbound and one southbound lane, which increases to two travel lanes in each direction from Albany Avenue to the Southern State Parkway, much of the Corridor has three northbound and three southbound lanes. Additionally, an ongoing NYSDOT project on Route 110 between the LIE and Arrowwood Lane in Melville—complementing the Northern State Parkway and LIE Interchange improvements project—is adding a third travel lane in each direction along this stretch of the Corridor where there were previously two lanes in each direction.

Along most roadway segments on Route 110, the northbound and southbound travel directions are divided by either a raised or painted median that ranges in width up to approximately 40 feet. Excluding the raised/painted median, the road width at a typical non-intersection location is generally 25-50 feet in both the northbound and southbound directions of Route 110, depending on the number of lanes.

While the roadway characteristics of Route 110 vary at different points within the study area, much of the Corridor has three travel lanes in each direction

Source: Parsons Brinckerhoff (2014)

4.8 ROADWAY SAFETY

For motorists, pedestrians/cyclists, and transit users alike, roadway safety is a significant issue on Route 110.

As discussed in a 2007 Newsday article ("Rating Long Island's Most Dangerous Roads"), and based on crash data from 2004 and 2005, the most dangerous location along all of the State-owned roadways on Long Island was a 0.3-mile segment of Route 110 just north of the Southern State Parkway (to Main Street), which had 68 accidents with injuries and two fatalities in the two years. The article indicated that NYSDOT attributed the high accident number to the extreme congestion at the convergence of the roadways.

Further north along Route 110, roadway safety was analyzed as part of the NYSDOT Northern State Parkway and LIE Interchange improvements project. Cluster areas of accidents were identified in the project's Final Design Report/Environmental Assessment, including the LIE North and South Service Roads in the vicinity of Route 110. In fact, near the Route 110/LIE interchange, the reported accident rate was four times higher than the New York State average. Accidents included a combination of rear end and right angle crashes, as well as crashes resulting from overtaking other vehicles on the road. High traffic volumes, turning vehicles, and signal timing issues were identified as probable causes for the accidents.

In 2015, the Tri-State Transportation Campaign completed an analysis of the National Highway Traffic Safety Administration's Fatality Analysis Reporting System to identify the most dangerous roads in the tri-state region—excluding interstates, highways, and other roads where pedestrians are prohibited—based on number of pedestrian fatalities between 2011 and 2013. According to the analysis ("The Region's Most Dangerous Roads for Walking"), Route 110 ranked as the second most dangerous road in Suffolk County (second only to Jericho Turnpike, Route 25), with a total of nine pedestrian fatalities between 2011 and 2013 (**Figure 18**).

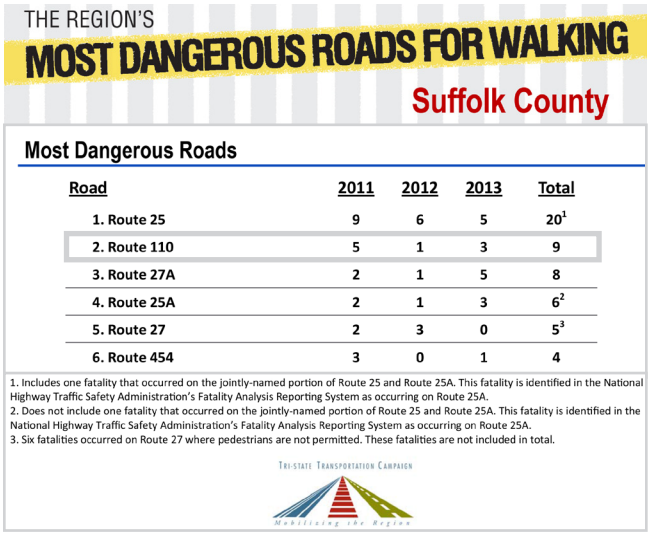


FIGURE 18: Most Dangerous Roads for Walking in Suffolk County
Source: Tri-State Transportation Campaign (2015)

4.9 PEDESTRIAN AND BICYCLE ACCOMMODATIONS

The majority of Route 110 within the study area has sidewalks on both sides of the street, providing infrastructure for pedestrians along the Corridor, although the sidewalks do not have a consistent width. The east side of Route 110 provides sidewalks for most of the length of the Corridor, while there are stretches on the west side of the street with no sidewalks. There are also segments with breaks in the sidewalks on individual blocks from one lot to the next, as well as instances in which individual lots have partial sidewalks. Therefore, the Corridor does not provide a continuous pedestrian network, which limits the walkability along and within the Corridor. Furthermore, pedestrian crossings are limited within the study area and, in those locations where there are pedestrian crossings, the roadway widths present a perceived barrier to a comfortable pedestrian environment. The need for enhanced pedestrian safety along Route 110 was a common theme raised by the public during the open houses and public meetings in this AA (see Section 7.3).

However, there is an ongoing NYSDOT safety and mobility improvement project on Route 110 between the LIE and Arrowwood Lane to improve pedestrian infrastructure along this portion of the Corridor in Melville. As discussed in the Final Design Report/Environmental Assessment, the NYSDOT project will provide continuous sidewalks on both sides of Route 110, completing gaps where there are no sidewalks. Additionally, a forthcoming NYSDOT project will include crosswalks, signal work, fencing and intelligent transportation systems (ITS) equipment to improve pedestrian crossings on Route 110 between Route 27A in Amityville and Young Hill Road in Huntington.

Similar to the pedestrian environment along the Corridor, there are limitations with regards to utilizing a bicycle. There are no designated bicycle lanes along Route 110 or within the study area. As discussed in the aforementioned Final Design Report/Environmental Assessment for the NYSDOT project on Route 110, "provisions for bicyclists are offered in the form of continuous shoulders" on Route 110. Additionally, according to the NYSDOT Long Island Bikeways and Trailways map, there are a number of unsigned connecting routes within the study area, as well as a Class 3 on-road bicycle route (i.e., on-road signed route without a striped lane) along Conklin Street in the study area.

Overall, conditions are not ideal for pedestrians and bicyclists, as Route 110 is primarily an automobile-oriented Corridor.

Sidewalks along Route 110 provide infrastructure for pedestrians, but the Corridor remains primarily oriented to serving needs of automobiles.
Source: Parsons Brinckerhoff (2015)

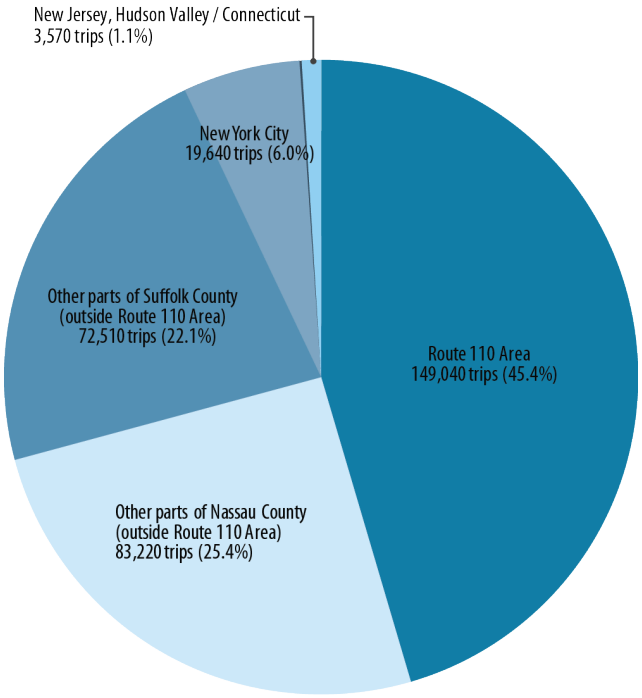


FIGURE 19: Daily Work Trips Destined for the Route 110 Area, by Origin (Total ≈ 327,980 Daily Trips)

Source: 2010/2011 NYMTC RHTS, survey responses weighted and factored using Geographic Positioning Systems (GPS), Parsons Brinckerhoff (2014)

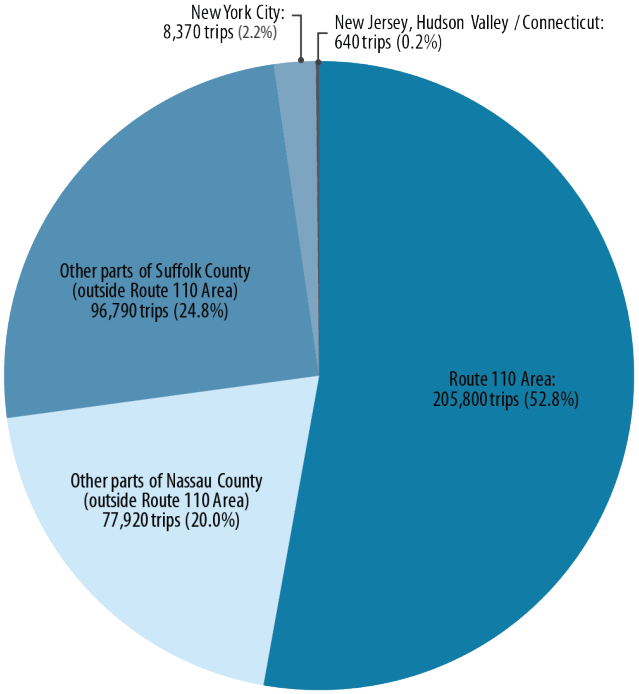


FIGURE 20: Daily Non-Work Trips Destined for the Route 110 Area, by Origin (Total ≈ 389,520 Daily Trips)

Source: 2010/2011 NYMTC RHTS, survey responses weighted and factored using GPS, Parsons Brinckerhoff (2014)

4.10 TRAVEL TRENDS

To summarize the existing travel market, tabulations of trips were compiled from NYMTC's Regional Household Travel Survey (RHTS), a study conducted from Fall 2010 through Fall 2011 that collected daily travel data from households across 28 counties in New York, New Jersey and Connecticut. According to NYMTC, the RHTS "provides key travel statistics for the region to help in the planning of future transportation investments."

Data were aggregated for the census tracts within the Route 110 area, consistent with the socioeconomic and demographic profile. Using a complex weighting/expansion procedure, the travel market analysis that was completed during this AA summarized daily work and non-work trips within, to, and from the Route 110 area. The travel market analysis methodology, findings, and data were presented in the Task 3 Technical Memorandum (Appendix C).

The travel market analysis demonstrated that both work and non-work trips destined for the Route 110 area have primarily local origins on Long Island (approximately 92.9% and 97.7%, respectively) (**Figure 19** and **Figure 20**), which highlights the importance of intra-Island travel in the regional travel market. There is significantly less travel to the Route 110 area from elsewhere in the region in terms of both absolute number of trips and percentage of overall trips. Additionally, approximately half of the daily work and non-work trips destined for the Route 110 area also originate in the area, which is another indication of the importance of north-south mobility on Long Island. The fact that there are more daily non-work trips destined for the Route 110 area (approximately 389,520 trips) than daily work trips destined for the Route 110 area (approximately 327,980 trips) underscores the role of Route 110 and the surrounding area as not just a place of employment, but as a place of shopping and leisure as well.

In sum, the travel market analysis demonstrated that the Route 110 area is a major destination in the tri-state metropolitan area. Moreover, travel is projected to increase within, to, and from the Route 110 area in the future, reflecting expected growth in the area and based on socioeconomic and demographic forecasts.

Transit users along Route 110 endure significant travel time delays due to recurring traffic congestion, which is projected to get worse over time
Source: Parsons Brinckerhoff (2015)

5 ISSUES AND OPPORTUNITIES, PURPOSE AND NEED

The identification of existing and future issues and opportunities facing the study area served as the basis for establishing the Purpose and Need, which was documented in the Task 4 Technical Memorandum (Appendix D). A well-crafted Purpose and Need was critical to achieving a successful AA, as it served as a roadmap to clearly define the rationale and intended outcome of the project.

The Purpose and Need provided a foundation for the development of project goals and objectives as well as the subsequent identification of evaluation criteria and measures that were used to screen alternatives. The process of outlining the Purpose and Need played a crucial role in setting the context for the AA, and was further informed by input from stakeholders and the general public. (Refer to Section 7.)

5.1 ISSUES AND OPPORTUNITIES

Key issues and opportunities facing Route 110 and the study area are outlined below.

5.1.1 ISSUES

The commercial success and quality of life of the study area is at risk due to a number of problems:

» **Travel choices are constrained** because major trip generators located off the main spine of Route 110 lack direct, convenient transit access.

» **Multi-modal connectivity is lacking** because existing bus routes offer limited service between the LIRR and destinations in the study area, and where there are multi-modal connections, they are neither timed nor guaranteed.

» **Existing traffic congestion** on Route 110 contributes to travel delays and travel time unreliability.

» **Future traffic congestion** will likely be exacerbated by projected increases in population and employment, in addition to planned and proposed developments along Route 110, thereby putting a strain on the transportation network.

» **Existing bus travel times are not competitive** with automobile travel times in the study area, especially during peak periods, which is a disincentive for automobile owners to use transit.

» **TOD opportunities are lacking** in the study area due to the inadequacy of the existing north-south transit system, an automobile-oriented culture, and the suburban zoning and land use patterns in the Corridor.

» **Walkability and bicycling are constrained** in the study area due to safety issues, inconsistent availability and width of sidewalks, lack of bicycle lanes, and existing auto-centric development patterns.

5.1.2 OPPORTUNITIES

Despite these problems, there are a number of factors that are supportive of improved transit service in the study area, including:

» Multiple studies have been completed that document the **feasibility and potential benefits of transit improvements on Route 110** (i.e., the 2010 *Route 110 BRT Study* and the 2014 *Suffolk County BRT Feasibility Study*).

» Route 110 is **one of the key employment hubs on Long Island**, and the area within a two-mile radius of the Corridor accounts for approximately 10% of the Island's workforce.

» Several **large employers** are located either directly along or just off Route 110, and therefore serve as a major source of existing and potential future transit ridership.

» There is **relatively high existing bus ridership** on Route 110 on various service providers, and the study area is crossed by **multiple branches of the LIRR**, which offers opportunities to create multi-modal connectivity.

» There are **multiple travel markets** that can be served in the study area, including work trips during the morning and evening peak periods, non-work trips

Traffic congestion limits mobility along Route 110
Source: Parsons Brinckerhoff (2015)

Route 110 boasts high existing bus ridership
Source: Parsons Brinckerhoff (2015)

by employees during the lunch hour, and non-work trips made by shoppers, visitors, university students, and other non-workers during both peak and off-peak periods. Additionally, there are projected increases in daily work and non-work trips within, to, and from the Route 110 area. One particular travel market of interest is the reverse commute market, and specifically those traveling east to the Route 110 area from eastern Queens and Nassau County.

» The **planned LIRR Republic Station** could create a new multi-modal transit center along Route 110 and serve as an anchor for the planned East Farmingdale redevelopment at the intersection of Route 110 and Conklin Street.

» The **planned East Farmingdale redevelopment** will include a public-private partnership to revitalize the center of Route 110. A master developer will work with the Town of Babylon, the community, and its selected consultants to study, plan, and redevelop East Farmingdale, through, among other initiatives, a new form-based code for the area.

» The **LIRR East Side Access project**, with a scheduled completion date of 2022, will connect the LIRR to Grand Central Terminal. This will increase capacity and provide faster access for many LIRR passengers to their destinations, thereby promoting economic development across the region and supporting existing employment centers, including along Route 110.

» The **LIRR Double Track project**, with a scheduled completion date of 2018, will allow the LIRR to increase off-peak train frequency from hourly to half-hourly service. The improved service and reliability along the LIRR Ronkonkoma Branch will support enhanced connectivity and intra-Island travel, which can benefit Route 110 as a regional employment hub.

» The **LIRR Third Track project**, which is not currently proceeding (due to a number of obstacles, including community opposition and lack of available funding), would add an additional track to an approximately 9.8-mile segment of the LIRR Main Line between Floral Park and Hicksville. In addition to improving reliability system-wide along the LIRR, the project would achieve the full benefits of East Side Access by increasing capacity for reverse peak and intra-Island service.

» **Planned, proposed, and ongoing development projects** in the vicinity of Route 110 can provide sources for additional transit ridership and the ability to evolve the Corridor through transit-oriented design principles.

» There could be **opportunities to partner with developers, property owners, and major employers** to provide enhanced and more direct transit service in the study area.

» The Town of Huntington is preparing a ***Melville Employment Center Plan***, one element of which is to provide enhanced transit service, which can strengthen Melville's position as an employment hub. Other pertinent objectives of this effort—which will result in an integrated land use, circulation, and infrastructure plan—are to enable new mixed-use hamlet centers, address traffic congestion, and improve pedestrian/bicycle connectivity.

» The **ongoing and future NYSDOT projects** on Route 110 will enhance pedestrian infrastructure as well as result in operational and safety improvements along the roadway.

» **Other ongoing local and regional initiatives** seek to broadly improve the character of Route 110 and indicate the momentum and ongoing focus on planning for the future of the Corridor. For instance, the Town of Babylon and Suffolk County are working with RPA to create design guidelines for future developments along Route 110 to improve walkability. Additionally, the ongoing Village of Amityville Downtown Revitalization effort will strive to make the portion of Route 110 within the Village more pedestrian-friendly. Furthermore, NYMTC recently planned a parking management workshop for East Farmingdale, which took place in Spring 2015.

5.2 PURPOSE AND NEED

The purpose of the Route 110 AA is to:

» **Improve north-south mobility** because travel time on Route 110 suffers due to existing traffic congestion, which is projected to increase in the future.

» **Increase transit access to and from employment and other activity centers** because the existing bus and rail network offers inadequate service to major trip attractors.

» **Enhance multi-modal connectivity with the LIRR and existing bus service** because direct connections are currently limited and lack coordination.

» **Promote increased transit use** and access to transit use by attracting choice riders because automobile dependence contributes to traffic congestion, harms the local and global environment, and reinforces unsustainable land use patterns.

» **Support TOD along Route 110 and in the study area** because existing automobile-centric development patterns are not easily served by public transit.

The Route 110 AA addresses the following needs:

» **Provide direct, convenient transit access**. Major trip attractors within the study area are not limited to destinations along the main spine of the Corridor. Improved transit service is needed to effectively provide the last-mile connection for workers, residents, and visitors to destinations located off Route 110, in addition to enhancing transit access along the Corridor.

» **Enhance connectivity with the LIRR**. Improved north-south transit service is needed to complement the east-west network of the LIRR. Transit improvements along Route 110—in coordination with existing bus service—can leverage the Corridor's strategic location as a major north-south artery on Long Island by linking multiple branches of the LIRR and providing enhanced transit service between LIRR stations and employment and other activity centers.

» **Increase transportation system capacity.** Additional transportation system capacity is needed to address existing and projected future congestion that will likely result from regional population and employment growth as well as future development along and near Route 110.

» **Serve multiple travel markets**. In addition to the morning and evening peak periods, Route 110 experiences a midday peak during the lunch hour for employees along the Corridor. Additionally, non-work trips made by shoppers and visitors to the area during both peak and off-peak periods, as well as trips made by university students and other non-workers, also contribute to the travel market. There is a need for transit improvements to address these multiple travel markets.

» **Serve the transit-dependent population**. By definition, transit-dependent persons do not own a car. Transit improvements within the study area are needed to equitably address the existing and future travel needs of this population.

- **Provide the transportation framework to enable TOD**. Improved transit service on Route 110, when coordinated with effective land use planning and zoning, can provide a transportation spine to anchor development around a series of transit nodes, consistent with the *Connect Long Island* plan and other local and regional planning efforts.

- **Promote sustainable economic growth and vitality**. There is a need to affirm and enhance the long-term economic competitiveness of Route 110 to retain and attract employers and employees as well as support future development projects. Transit improvements in the study area can contribute to job creation and retention and also create opportunities for TOD.

- **Reduce travel time for transit users**. Mobility for transit users within the study area is constrained by existing traffic congestion, which contributes to travel delays especially during peak periods. Enhanced transit service in the study area, possibly including priority treatment and limited-stop service, can improve mobility, reduce overall travel time, and increase travel time reliability for transit users.

- **Maximize cost effectiveness and efficiency of transit investments and operations**. The need for transit improvements must be balanced with a careful consideration of costs for implementation, including both capital and operating costs.

- **Expand travel options to attract choice riders and improve quality of life and environmental conditions**. There is a need to create additional travel choices to supplement local bus service and provide a transportation alternative to the automobile. Transit improvements within the study area can serve as an incentive for automobile owners to use transit for their travel needs, which can result in increased overall transit ridership and reduced automobile usage. In conjunction with a shift in development patterns to encourage TOD, transit improvements are necessary to improve quality of life and reduce harm to the local and global environment, thereby promoting sustainability and smart growth.

- **Improve safety**. Route 110 is a dangerous roadway both for vehicles and pedestrians/bicyclists, and according to the 2010 Town of Babylon Sustainable Complete Streets Policy, the Town shall view all transportation improvements as opportunities to improve safety—in addition to access and mobility—for all users of the roadway, independent of mode. All modes of travel are similarly considered by the Suffolk County Department of Public Works and NYSDOT in their respective roadway projects, consistent with the Suffolk County Complete Streets Policy and New York Complete Street Act, respectively. Transit improvements can help to address safety concerns along the Corridor.

- **Improve the image of transit**. In order to attract choice riders, transit improvements must be branded in such a way to raise the profile of transit service. An effective branding strategy is needed to make transit more visible in the study area and to highlight the benefits of new, high-quality service to existing and potential customers.

5.3 GOALS AND OBJECTIVES

The following four goals and objectives for the project were tied directly to the Purpose and Need. The goals were broad and the objectives were specific, which collectively informed the development of the evaluation criteria that were subsequently used in the screening process. (Refer to Section 6.1)

GOAL 1: IMPROVE MOBILITY AND CONNECTIVITY

OBJECTIVES:

- Provide frequent, high-quality transit service to employment and other activity centers on Route 110
- Establish "last-mile" connectivity to destinations located off the main spine of Route 110
- Provide more transportation choices for workers, residents, shoppers, and visitors
- Increase transit ridership
- Enhance the customer experience and improve the image of transit
- Provide enhanced transit service for workers, residents, visitors, and shoppers who do not own an automobile (i.e., transit-dependent persons)
- Improve travel time for transit users within the study area
- Improve safety for all roadway users
- Increase transportation system capacity to accommodate future growth and assist in mitigating future increases in traffic congestion
- Increase regional public transit access to the study area from surrounding municipalities and counties
- Provide seamless multi-modal connections
- Establish convenient pedestrian access to employment and other activity centers, and improve walkability overall

GOAL 2: ENHANCE ECONOMIC COMPETITIVENESS AND PROMOTE ECONOMIC GROWTH

OBJECTIVES:

- Encourage a shift in land use patterns to promote TOD, sustainability, and smart growth
- Support ongoing and planned development projects
- Create multi-modal transit hubs as anchors for future development
- Retain and attract employers and employees
- Advance the goals of local and regional plans, including *Connect Long Island*

GOAL 3: MAXIMIZE COST AND OPERATIONAL EFFECTIVENESS

OBJECTIVES:

- Implement cost-effective transit improvements within a reasonable construction timeframe and with capital and operations/maintenance costs that are consistent with realistically anticipated available funding
- Make use of existing and planned transportation system services and capacity
- Be compatible with existing and planned transit operations and infrastructure in the study area
- Avoid conflicts with existing and planned infrastructure during construction and operation
- Enable opportunities to pursue phased implementation to align with available funding
- Enable the use of innovative sources of project financing and alternative project delivery approaches

GOAL 4: MINIMIZE ADVERSE ENVIRONMENTAL IMPACTS

OBJECTIVES:

- Reduce automobile usage and air emissions
- Implement transit improvements that are constructible and operable without adversely affecting the natural and built environment
- Implement sustainable transit technologies

The planned LIRR Republic Station will create new opportunities to enhance multi-modal connectivity along Route 110.
Source: Arrt's Arrchives (2015)

From a cost and operational standpoint, BRT emerged from the multi-tiered screening process in this AA as the preferred mode for a new premium transit service along Route 110

Source: B Thayer Associates (2015)

6 ALTERNATIVES DEVELOPMENT

While the Town of Babylon and Suffolk County previously studied the feasibility and potential benefits of a specific mode (i.e., BRT) in the 2010 *Route 110 BRT Study* and the 2014 *Suffolk County BRT Feasibility Study*, respectively, it was important to take a step back and assess a broad range of alternative transportation solutions to address the identified problems in the study area. As such, the alternatives development process started with the definition of a number of alignment concepts that were subsequently paired with transit modes. This process was documented in the Task 5 Technical Memorandum (Appendix E).

The alternatives under consideration were narrowed down in multiple tiers of screening to identify the most feasible and promising alternatives that best achieved the project goals and objectives. While the selection of an LPA is one possible outcome of an AA, it is not mandatory, and indeed it is possible to conclude the AA with multiple alternatives under consideration for further refinement in the Project Development process.

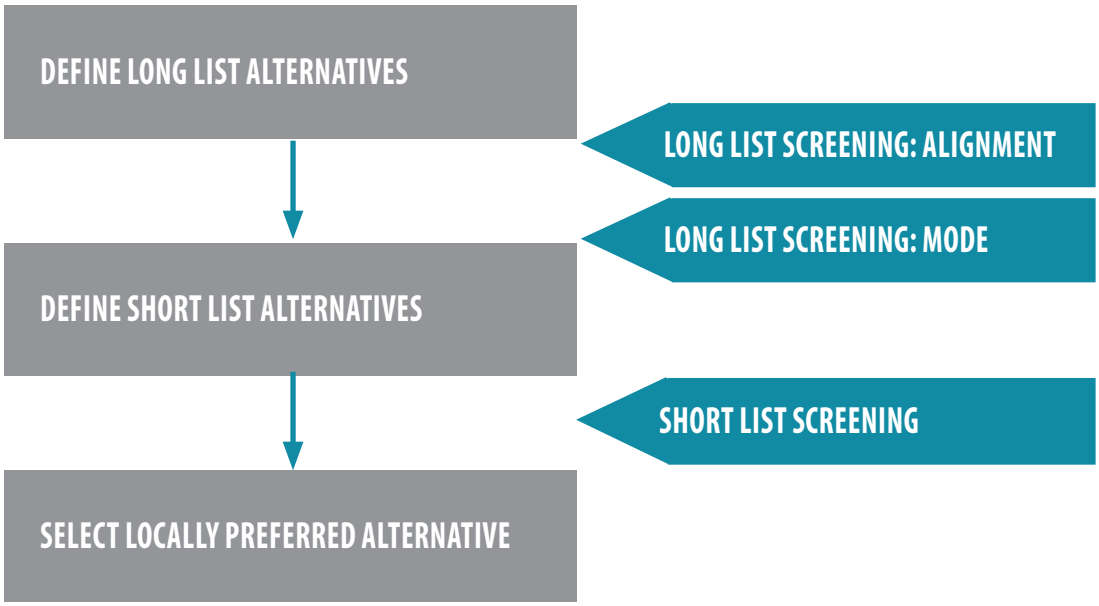


FIGURE 21: Alternative Evaluation Process
Source: Parsons Brinckerhoff (2015)

6.1 SCREENING METHODOLOGY AND EVALUATION CRITERIA

The Route 110 AA consisted of a multi-tiered screening process to evaluate a wide range of route and modal alternatives that address the Purpose and Need of the project (**Figure 21**).

» The **Long List Screening** eliminated alternatives early in the process that were infeasible and/or did not adequately meet the project goals and objectives. The screening of the Long List Alternatives was completed in two steps: an evaluation of alignments, followed by transit modes.

» The **Short List Screening** provided a detailed analysis to evaluate the strengths, weaknesses, and trade-offs of the remaining Short List Alternatives, which were developed through the preparation of operating plans in conjunction with conceptual engineering along Route 110. This screening provided the framework for recommending alternative(s) to advance to Project Development.

The project goals and objectives provided the foundation for the evaluation process. As shown in **Table 2**, the evaluation criteria that were used in the multi-tiered screening process were directly linked to the project goals and objectives.

Evaluation

In each tier of the screening process, evaluation measures were developed for the respective criteria. Several criteria were carried over and applied in multiple tiers of the screening process, and the evaluation measures were defined at a greater level of detail in each tier, as necessary.

Each successive screening included an increasingly quantitative evaluation as additional details were defined for the remaining alternatives. Whereas the Long List Screening was primarily a qualitative evaluation based on the basic attributes of the respective alternatives, the Short List Screening combined qualitative and quantitative evaluation measures to enable a more detailed comparison of the Short List Alternatives.

Scoring

In each tier of the screening process, each alternative was assigned a score for its relative performance against each criterion (5 was best, 1 was worst). The results of the screening were tabulated, and an overall evaluation score was computed for each alternative. Alternatives with the lowest overall evaluation scores were eliminated from further advancement in the screening process.

The screening methodology for each tier of the screening process is described in the following sections.

OBJECTIVES	EVALUATION CRITERIA
GOAL 1: IMPROVE MOBILITY AND CONNECTIVITY	
Provide frequent, high-quality transit service to employment and other activity centers on Route 110	• Increases transit service frequency (reduces headways) along Route 110
Establish last-mile connectivity to destinations located off the main spine of Route 110	• Increases transit service to employment and other activity centers located off the main spine of Route 110
Provide more transportation choices for workers, residents, shoppers, and visitors	• Increases transit service frequency and access to major destinations throughout the study area
Increase transit ridership	• Optimizes station spacing to maximize ridership potential
	• Maximizes number of automobile trips diverted to transit (net new transit riders)
	• Increases overall transit ridership in the study area
Enhance the customer experience and improve the image of transit	• Provides passenger amenities such as modern station stops, passenger information, and enhanced, comfortable vehicles
Provide enhanced transit service for workers, residents, visitors, and shoppers who do not own an automobile (i.e., transit-dependent persons)	• Increases transit service to the transit-dependent population
Improve travel time for transit users within the study area	• Reduces travel time for transit users within the study area
Improve safety for all roadway users	• Reduces fatalities/injuries
Increase transportation system capacity to accommodate future growth and assist in mitigating future increases in traffic congestion	• Increases transportation system capacity
Increase regional public transit access to the study area from surrounding municipalities and counties	• Increases connectivity to the existing and planned LIRR network
	• Increases transit market share of trips into and out of the study area
Provide seamless multi-modal connections	• Increases connectivity between LIRR stations and major destinations in the study area without requiring intermediate transfers
Establish convenient pedestrian access to employment and other activity centers, and improve walkability overall	• Improves pedestrian access to employment and other activity centers by providing sidewalks, walkways, and/or other pedestrian infrastructure to connect stations with nearby destinations
GOAL 2: ENHANCE ECONOMIC COMPETITIVENESS AND PROMOTE ECONOMIC GROWTH	
Encourage a shift in land use patterns to promote TOD, sustainability, and smart growth	• Supports a shift to mixed-use and transit-supportive development
	• Maximizes size of the residential population within ½-mile of proposed station locations
	• Maximizes acreage of land available for new development or redevelopment at transit-supportive densities within ½-mile of proposed station locations
Support ongoing and planned development projects	• Provides enhanced transit service to the sites of ongoing and planned development projects
Create multi-modal transit hubs as anchors for future development	• Creates opportunities to establish multi-modal transit centers as anchors for TOD
Retain and attract employers and employees	• Maximizes number of jobs within ½-mile of proposed station locations
Advance the goals of local and regional plans, including *Connect Long Island*	• Maximizes consistency with local and regional plans

TABLE 2: Goals, Objectives, and Evaluation Criteria

Source: Parsons Brinckerhoff (2015)

TABLE 2 CONTINUED: Goals, Objectives, and Evaluation Criteria
Source: Parsons Brinckerhoff (2015)

OBJECTIVES	EVALUATION CRITERIA
GOAL 3: MAXIMIZE COST AND OPERATIONAL EFFECTIVENESS	
Implement cost-effective transit improvements within a reasonable construction timeframe and with capital and operations/maintenance costs that are consistent with realistically anticipated available funding	• Tailors transit service frequency to meet demand
	• Offers physical and service attributes that are appropriate for study area land use and density
	• Minimizes level of construction complexity
	• Minimizes construction timeframe
	• Minimizes estimated capital cost
	• Minimizes estimated net annual operating and maintenance costs
	• Maximizes projected farebox recovery ratio
	• Minimizes cost per trip
Make use of existing and planned transportation system services and capacity	• Maximizes use of existing transportation ROW
	• Minimizes number of property takings required
	• Minimizes physical and/or operational constraints for implementation in the study area
Be compatible with existing and planned transit operations and infrastructure in the study area	• Maximizes compatibility with existing and planned transit operations and infrastructure in the study area
Avoid conflicts with existing and planned infrastructure during construction and operation	• Minimizes conflicts with existing and planned infrastructure during construction and operation
Enable opportunities to pursue phased implementation to align with available funding	• Maximizes potential for phased implementation
Enable the use of innovative sources of project financing and alternative project delivery approaches	• Maximizes potential for using innovative project financing sources and project delivery approaches
GOAL 4: MINIMIZE ADVERSE ENVIRONMENTAL IMPACTS	
Reduce automobile usage and air emissions	• Reduces vehicle miles traveled (VMT)
	• Reduces air quality emissions
	• Reduces Greenhouse Gas emissions
	• Reduces energy use
Implement transit improvements that are constructible and operable without adversely affecting the natural and built environment	• Minimizes potential adverse impacts to the natural and built environment
	• Minimizes potential for displacement of residents and businesses
Implement sustainable transit technologies	• Uses sustainable transit technologies

6.2 LONG LIST ALTERNATIVES AND SCREENING

The Long List Alternatives encompassed a range of potentially feasible conceptual transit alternatives (alignments and modes) that addressed the Purpose and Need, and goals and objectives, of this AA. The Long List Screening evaluated the Long List Alternatives based on qualitative evaluation criteria that best utilized the data available at an early stage of the AA. Rather than limit the Long List Screening to identification of fatal flaws, each Long List Alternative was evaluated against all of the pertinent evaluation criteria at that stage of analysis to enable a comprehensive comparison of the relative strengths and weaknesses of the respective alternatives.

The Long List Screening reduced the number of alternatives under consideration using a two-step process. The screening first assessed at a high level the ability of each Long List Alternative alignment to meet the project goals and objectives, and subsequently evaluated the reasonableness of different transit modes, with operational and fiscal viability as a primary consideration. Any Long List Alternative alignments that either failed to adequately meet or only partially met the project goals and objectives, based on an evaluation using the screening criteria in **Table 2**, were eliminated from consideration. The remaining alternative alignments were paired with each of the transit modes under consideration—BRT, streetcar, light rail transit (LRT), automated guideway transit (AGT), commuter rail, and subway—and a second Long List Screening was conducted to evaluate these mode-specific alternatives.

The Task 8 Technical Memorandum (Appendix F) presented the Long List Alternatives and the detailed results of the two-step Long List Screening, which are summarized in the following sections.

6.2.1 LONG LIST ALTERNATIVE ALIGNMENTS

DEFINITION OF ALTERNATIVES

The initial definition of the Long List Alternatives included a No-Build Alternative, an Enhanced Bus Alternative, and several alignment alternatives, which were subsequently paired with modes following the first step of the Long List Screening (**Table 3**).

No-Build Alternative

A No-Build Alternative was defined to include the existing and committed transportation facilities and services expected to exist in the future horizon year (2040), including LIRR Double Track, East Side Access, and construction of the planned LIRR Republic Station.

Although the planned LIRR Republic Station is not currently included in the fiscally-constrained portion of NYMTC's *Plan 2040* RTP, it is anticipated that this project will be included in a future update of the RTP. Additionally, the environmental review and design of the LIRR Republic Station is included in the MTA's proposed 2015-2019 Capital Program, with construction anticipated to be included in a future capital program. For these reasons, the planned LIRR Republic Station is included in the No-Build Alternative.

Even though it was anticipated that the LPA would be operational before 2040 (note that the specific timeframe for implementation would depend on the specific mode and alignment, as well as available funding options), 2040 was used as the Build year in this study as it corresponded to the horizon year for NYMTC's *Plan 2040* RTP. The No-Build Alternative served as a baseline for comparing the anticipated environmental, transportation, social, and economic benefits and impacts of the project alternatives. The No Build Alternative will get carried through to the environmental phase after the AA.

Enhanced Bus Alternative (Long List Alternative A)

An Enhanced Bus Alternative was defined to comprise a lower-cost alternative that would be more limited in scope than the other Build alternatives. Whereas the other Build alternatives would add a new transit service to supplement existing bus service, the Enhanced Bus Alternative would be limited to improvements to speed travel time (while still making all scheduled stops) along the existing Suffolk County Transit S1 route. Therefore, unlike the other Build alternatives, the Enhanced Bus Alternative would simply improve the existing Suffolk County Transit S1 route, rather than introduce a new service as an overlay to the S1 route.

TABLE 3: Long List Alternatives

Source: Parsons Brinckerhoff (2014-2015)

ALTERNATIVE LETTER	ALTERNATIVE NAME	DESCRIPTION
	No-Build Alternative	• The existing and committed transportation facilities and services expected to exist in the future horizon year (2040)
A	Enhanced bus service along Route 110	• Existing bus service along Route 110 between LIRR Amityville Station and Walt Whitman Shops, with transit priority treatments at select locations • Treatments may include traffic signal prioritization and intersection-specific queue jumps to improve existing bus service • The only mode-specific alternative (i.e., bus) in this initial definition of the Long List Alternatives; all other alternatives specify an alignment concept, independent of mode, which were subsequently paired with modes after the first step in the Long List Screening
B	Trunk route along Route 110 only	• Trunk route along Route 110 between LIRR Amityville Station and Walt Whitman Shops • Serves destinations along Route 110, but does not provide a connection to destinations located off Route 110
C	Trunk route along Route 110 with additional routes that divert off Route 110	• Trunk route along Route 110 between LIRR Amityville Station and Walt Whitman Shops, with up to three additional routes to serve destinations located off Route 110 • One route remains entirely on Route 110, and up to three routes split off the central portion of Route 110 (near the intersection of Route 110 and Conklin Street) to serve employment and other activity centers to the east and west
D	Trunk route along Route 110 with circular feeder routes	• Trunk route along Route 110 between LIRR Amityville Station and Walt Whitman Shops, with up to four timed, coordinated feeder routes circulating from transfer stations on Route 110 to serve destinations located off Route 110
E	Trunk route along Route 110 with transit center nodes and connecting feeder routes	• Trunk route along Route 110 between LIRR Amityville Station and Walt Whitman Shops, with up to three timed, coordinated feeder routes circulating from two new transit centers on Route 110 to serve destinations located off Route 110 • Passengers can transfer at one of two transit centers (the planned LIRR Republic Station and the intersection of Route 110 and Pinelawn Road) to access connecting feeder routes, or they can transfer at select stations on Route 110 that are jointly served by both the trunk route and feeder routes

Alignment Alternatives (Long List Alternatives B – E)

The initial definition of the Long List Alternatives identified potential alignment concepts, independent of mode, which are shown schematically in **Figure 22** through **Figure 25** and generally correspond to those identified in the 2010 *Route 110 BRT Study*. It was assumed that the planned LIRR Republic Station will be operational in the future horizon year (2040). Going forward, interim service to the LIRR Farmingdale Station will treated as a phasing option for implementation of the alternatives until the planned LIRR Republic Station is operational.

The alignment concepts for the Long List Alternatives covered the area between the LIRR Amityville Station and the Walt Whitman Shops in Huntington. The specific routing and service characteristics of the alignment concepts were defined following the Long List Screening for the alternatives that remained under consideration.

SCREENING RESULTS

The first step of the Long List Screening included a rating assigned to each Long List Alternative alignment for its relative performance against each criterion. An overall evaluation score was computed for each alternative.

Based on the tabulated results, Long List Alternatives A (Enhanced Bus Alternative), B (trunk route along Route 110 only), and Long List Alternative C (trunk route along Route 110 with additional routes that divert off Route 110) were eliminated from consideration. Long List Alternatives D (trunk route along Route 110 with circular feeder routes) and E (trunk route along Route 110 with transit center nodes and connecting feeder routes) were advanced to the second step of the Long List Screening, in which the remaining alignments were paired with transit modes for another round of evaluation. Additionally, the No-Build Alternative was automatically advanced in the evaluation process. The Short List Screening subsequently included consideration of the No-Build Alternative as the baseline against which the benefits and impacts of the Build alternatives were evaluated.

Long List Alternatives A (Enhanced Bus Alternative) and B (trunk route along Route 110 only) were both eliminated from consideration because these alternatives would not improve transit service off Route 110, thereby failing to achieve a primary objective to establish last-mile connectivity to employment, residential, and other destinations located off the main spine of Route 110 that are beyond a reasonable walking distance.

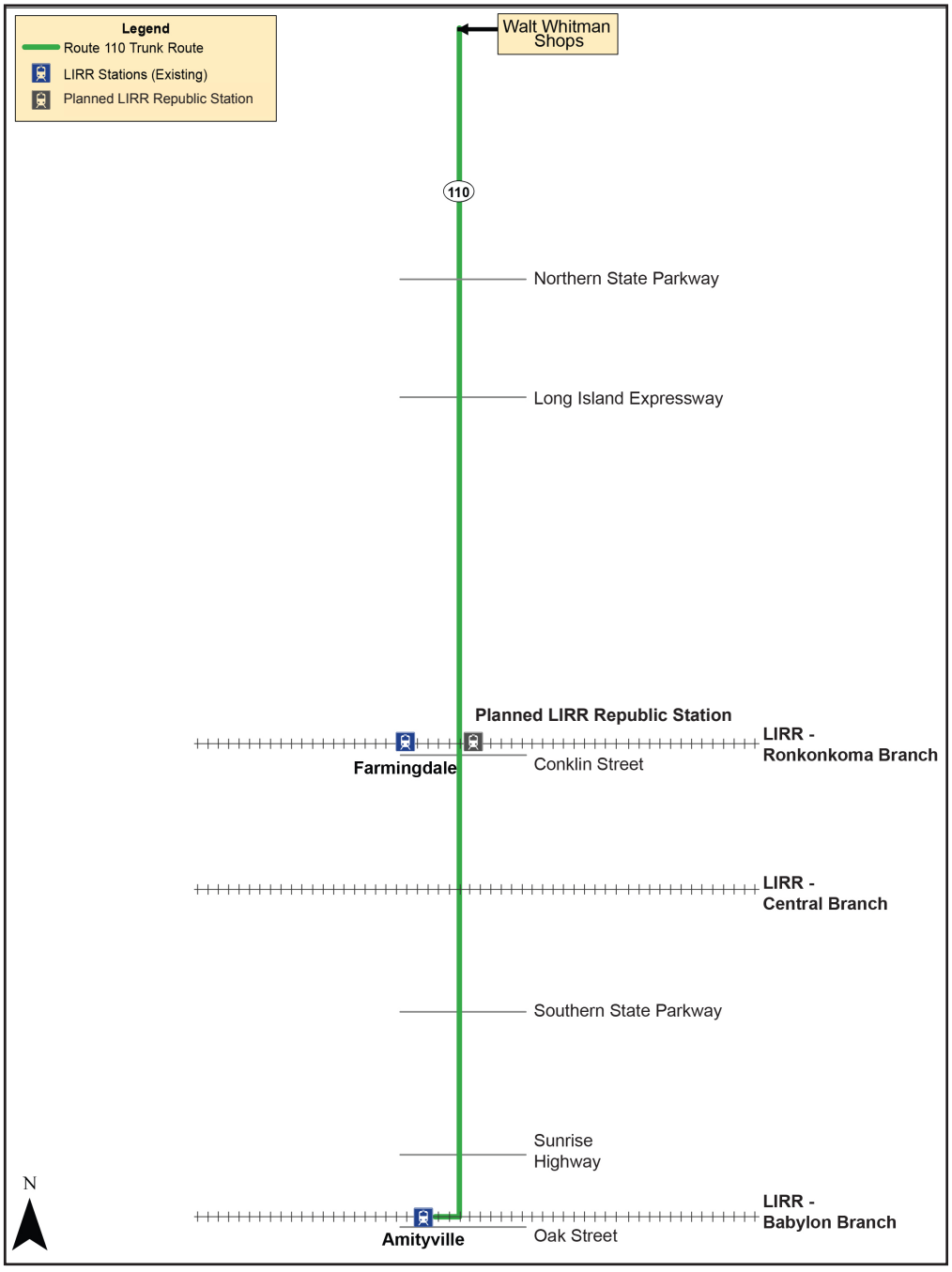
Furthermore, Long List Alternative C (trunk route along Route 110 with additional routes that divert off Route 110) was eliminated from consideration because it would fail to maximize cost and operational effectiveness. Specifically, the need to provide trunk route service off Route 110 with this concept would result in a dilution of transit frequency in the central portion of Route 110 (compared to the other alternatives) as well as operational inefficiencies because off-Corridor destinations would more appropriately be served by smaller sized feeder vehicles and services.

Long List Alternatives D (trunk route along Route 110 with circular feeder routes) and E (trunk route along Route 110 with transit center nodes and connecting feeder routes) would both adequately meet the project goals and objectives and were therefore advanced in the screening process for further development and evaluation. Both alternatives would provide trunk route service on Route 110, while also providing feeder route service off Route 110. The two alternatives would effectively tailor the service frequency to meet demand, as trunk route service would be limited to Route 110, where demand is most concentrated, and feeder route service would provide needed connections to off-Corridor destinations at appropriately-timed intervals.

FIGURE 22: Long List Alternative B

Source: Parsons Brinckerhoff (2014)

Note: schematic representation; not drawn to scale



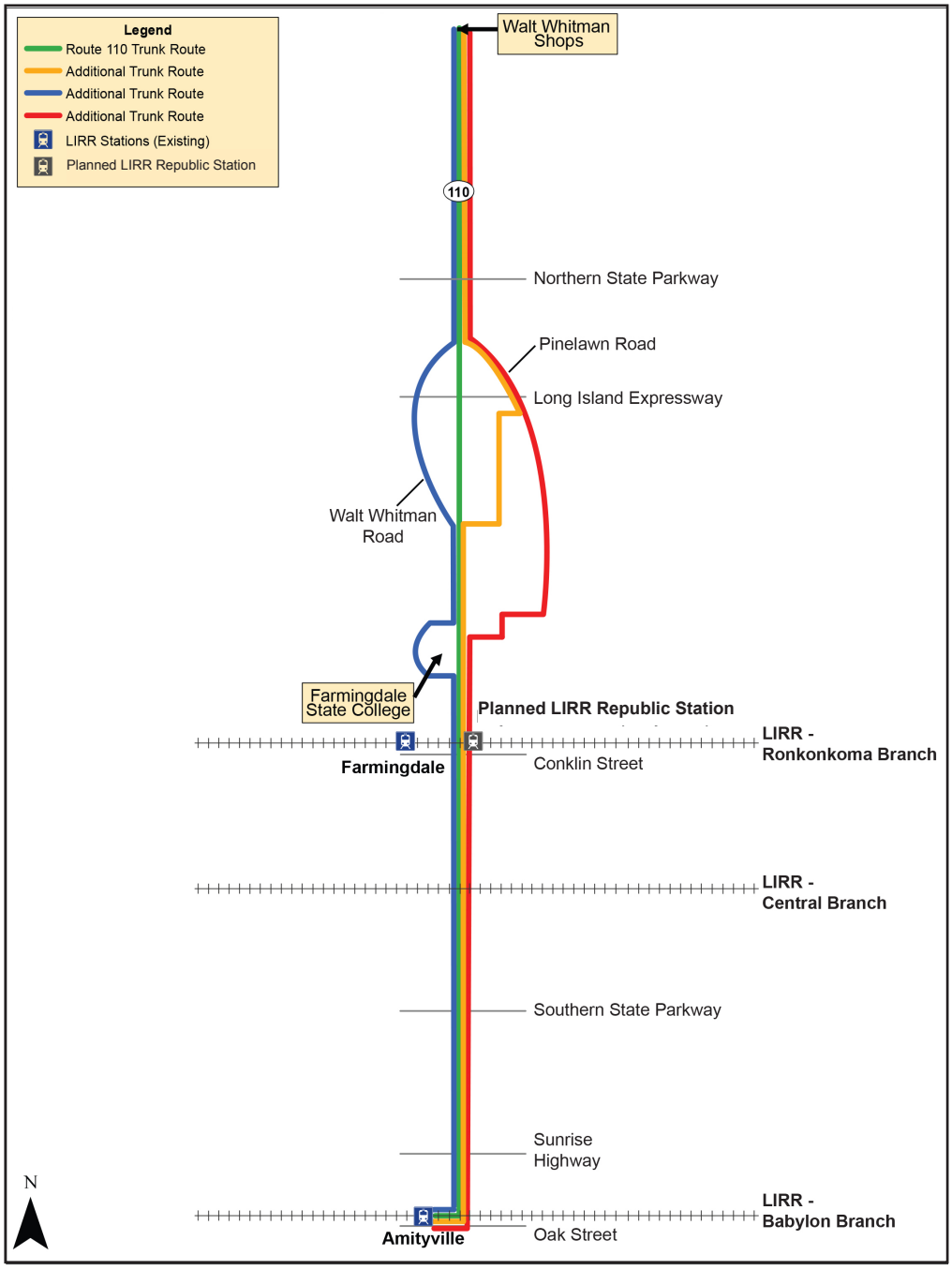


FIGURE 23: Long List Alternative C

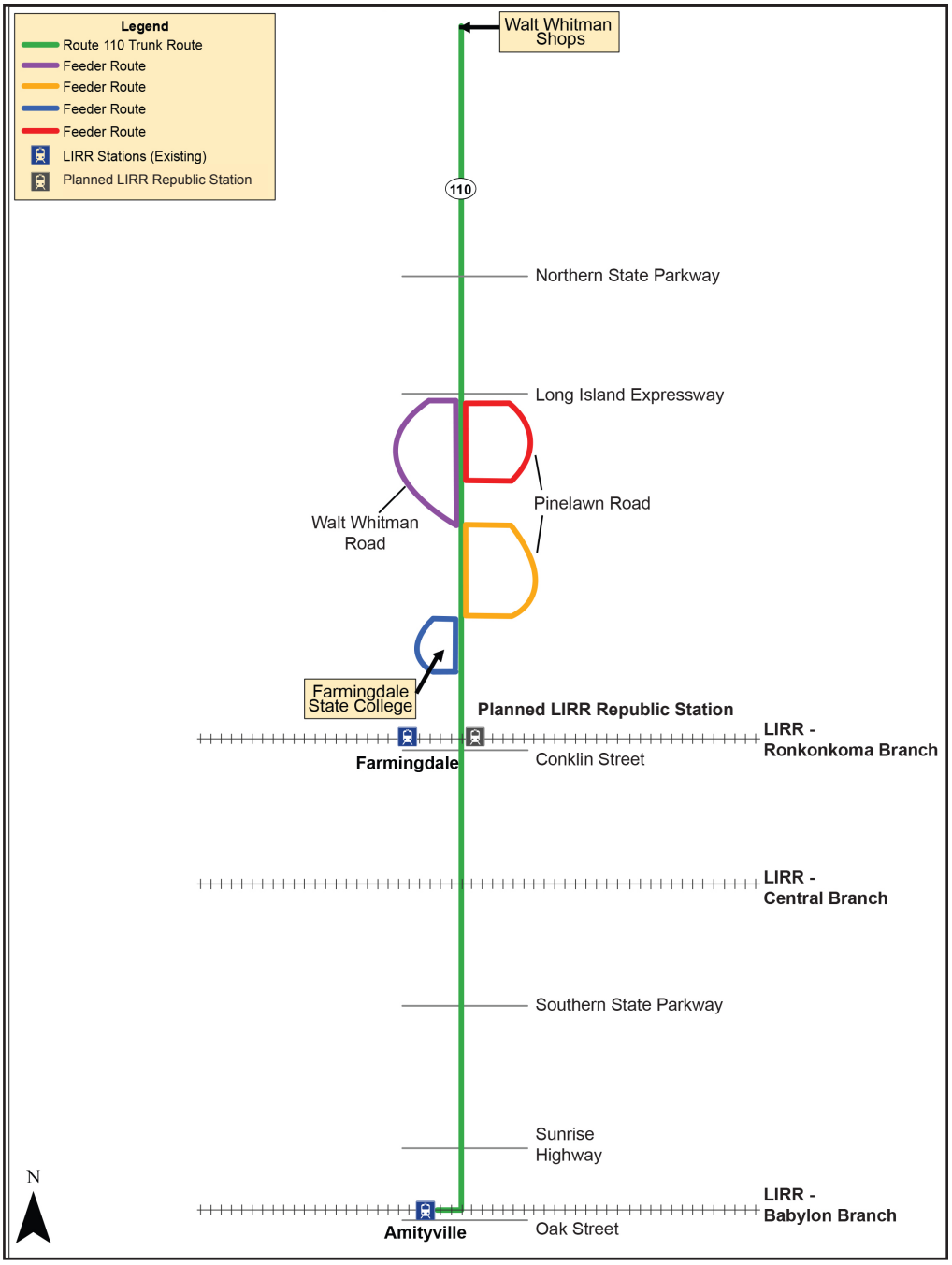
Source: Parsons Brinckerhoff (2014)

Note: schematic representation; not drawn to scale

FIGURE 24: Long List Alternative D

Source: Parsons Brinckerhoff (2014)

Note: schematic representation; not drawn to scale



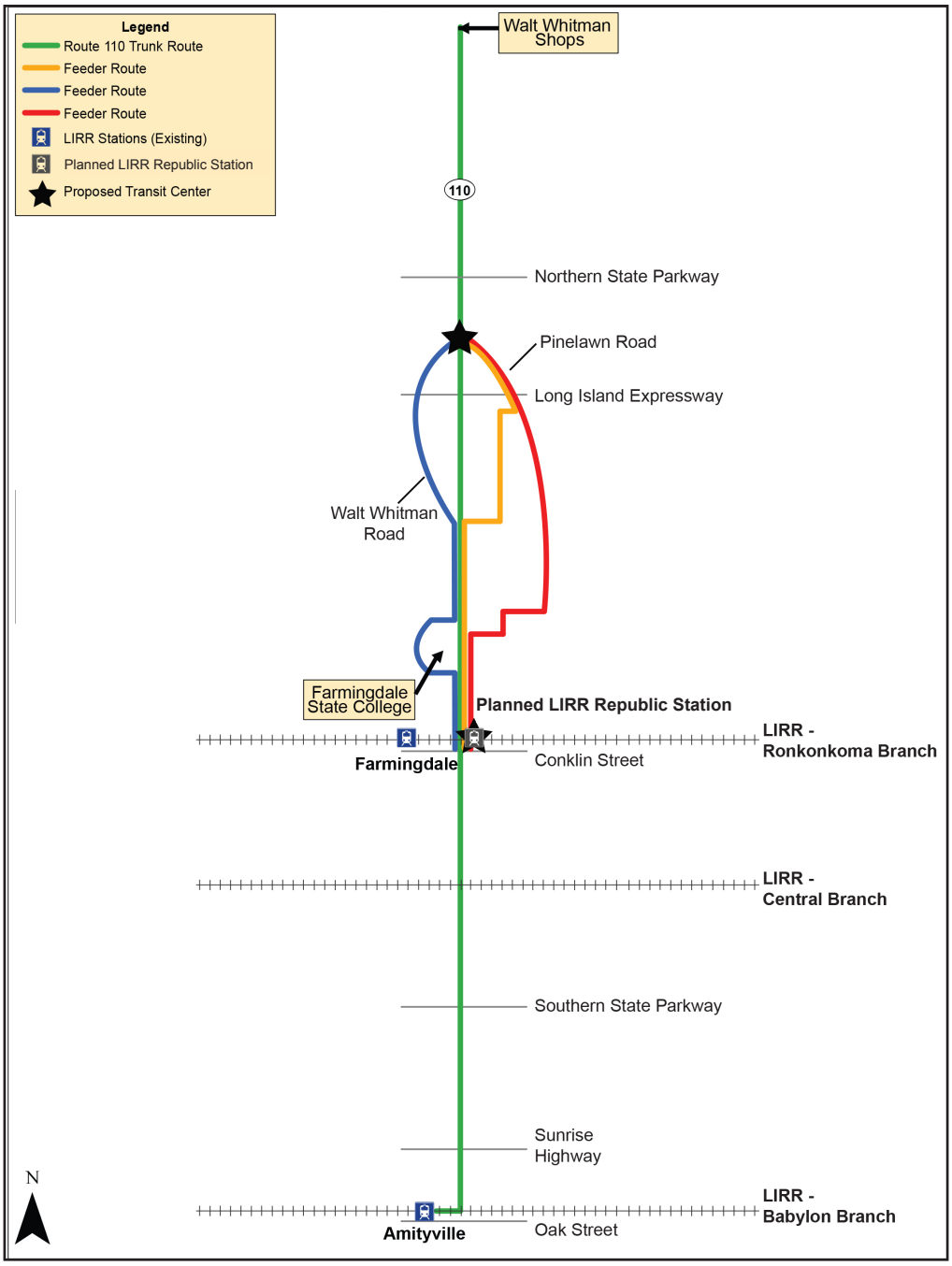


FIGURE 25: Long List Alternative E

Source: Parsons Brinckerhoff (2014)

Note: schematic representation; not drawn to scale

6.2.2 LONG LIST ALTERNATIVE TRANSIT MODES

DEFINITION OF ALTERNATIVES

Following the initial Long List Screening of the alignment alternatives, the remaining alternatives were paired with each of the following transit modes, and a second Long List Screening was conducted to evaluate the mode-specific alternatives. Other modes, such as High Speed Rail (HSR) and Maglev, were not considered in this AA because they were deemed infeasible and/or inappropriate for a relatively short, suburban corridor such as Route 110.

BRT

As discussed in the 2010 *Route 110 BRT Study*, BRT is a term applied to public transportation systems using a series of systematic, integrated improvements to provide faster, more efficient service than an ordinary bus line. Elements of BRT that distinguish the premium service from ordinary bus service can include—but are not limited to—specialized vehicles and stations, limited-stop service, traffic priority (e.g., exclusive bus lanes, queue jumps, and/or traffic signal priority), enhanced customer information, branding, and alternative methods for fare collection. Different BRT systems offer different combinations of these elements. Two examples in New York include Select Bus Service (SBS) in New York City and BusPlus in Albany.

BRT can operate either entirely or partially along a dedicated running way, meaning that a BRT system offers the flexibility for transit vehicles to operate on the existing roadway in mixed traffic. Similar to the conventional bus, BRT vehicles do not operate on tracks and do not require electrical infrastructure to be powered, thereby offering flexibility from a routing perspective as well.

It was assumed that the BRT alternatives for Route 110 would provide limited-stop service as an overlay to the existing bus network. It was not anticipated that the Suffolk County Transit S1 service would be replaced or service reduced. Whereas the Suffolk County Transit S1 service would continue to provide local service, BRT would provide more frequent service with fewer stops.

BRT

New York City: Select Bus Service

City of Albany, New York: BusPlus

Source: NYCDOT, MTA, New York City Transit, Metro-Magazine, CDTA (2012)

Streetcar

City of Portland, Oregon: Portland Streetcar

City of Seattle, Washington: Seattle Streetcar

Source: Travel Portland, DGuides (2015)

Streetcar

Streetcars are transit vehicles that operate on tracks (i.e., a fixed-guideway), often along existing streets, at-grade. Streetcars can operate in either a dedicated running way or in mixed traffic, but the routing is fixed because the vehicles must remain on the tracks and within reach of the electrical infrastructure—typically an overhead catenary system—that powers the vehicles. Examples of streetcar systems in the United States include those in Portland, Oregon, and Seattle, Washington.

LRT

New Jersey: Hudson-Bergen Light Rail

Maryland: BWI Marshall Airport Light Rail

Source: Maryland Transit Administration, Flickr, NJ Transit (2006)

Light Rail Transit (LRT)

Similar to the streetcar, LRT comprises a fixed-guideway transit system that operates on tracks. LRT vehicles are typically designed to enable travel in existing standard roadway lanes, and therefore can operate either in a dedicated running way or in mixed traffic, at-grade. The streetcar and LRT modes are comparable, although LRT vehicles generally have larger capacity, operate at higher speeds, and make fewer stops at greater distances. Most LRT systems—including the Hudson-Bergen Light Rail in New Jersey and the Baltimore Light Rail in Maryland—include overhead catenary lines to provide power to the vehicles, although some systems (e.g., the River Line in New Jersey) use self-propelled diesel-powered rail vehicles.

AGT

London, England: Ultra Global PRT

New York City: AirTrain JFK

Source: Ultra Global PRT, Londonist, NY Times, Airtrain JFK (2011)

Automated Guideway Transit (AGT)

AGT comprises a fixed-guideway transit system that operates with automated (driverless) vehicles. One form of AGT is personal rapid transit (PRT), which features small multi-passenger electric vehicles, often referred to as people movers or pods. Trips on PRT can be individually programmed by passengers between defined origins and destinations. Examples of PRT systems include the Ultra PRT in London's Heathrow Airport, which connects passengers between the short-term parking lots and terminal, and the Morgantown PRT system, which serves multiple campuses of West Virginia University. Other forms of AGT include larger vehicles that operate on rail, such as the AirTrain JFK that provides service to, from, and around John F. Kennedy (JFK) International Airport.

Heavy Rail - Commuter Rail

Long Island, New York: LIRR

Long Island, New York: LIRR

Source: Newsday, LIRR, NYCSubway.org (2002)

Heavy Rail - Commuter Rail

Commuter rail comprises a fixed-guideway transit system that operates on tracks with either an at-grade or grade-separated alignment, using high-capacity trains of multiple cars. A unique aspect of the commuter rail alternatives would be a physical connection to the existing and planned LIRR network, powered by an electric third rail or diesel locomotive. Specifically, the commuter rail alternatives would make a physical connection to the LIRR network at the existing LIRR Amityville Station and the planned LIRR Republic Station, thereby enabling passengers to continue traveling along the Babylon Branch or Ronkonkoma Branch of the LIRR, respectively, without transferring between modes.

Heavy Rail - Subway

New York City: Subway

New York City: Subway

Source: Scientific American, MTA New York City Transit, NYCSubway.org (2009)

Heavy Rail - Subway

Similar to commuter rail, the subway comprises a fixed-guideway transit system that operates on tracks with a grade-separated alignment, using high-capacity trains of multiple cars. Whereas commuter rail would operate either at-grade or above-grade and would provide a physical connection to the LIRR, the subway alternatives would be located below ground level, under the existing roadway. Additionally, the subway mode is generally characterized by a higher frequency of service, with shorter distances between stations, than commuter rail. A local example of this mode is the subway in New York City, although large stretches of the transit system outside Manhattan are elevated.

SCREENING RESULTS

Long List Alternatives D and E were paired with the transit modes under consideration—BRT, streetcar, LRT, AGT, commuter rail, and subway—for the second round of evaluation. Due to the nature of the alignments, the evaluation of mode was focused on the trunk route (i.e., Route 110 only). It was assumed that the mode for the feeder routes would be a shuttle bus because of the nature and anticipated demand for such off-Corridor service.

The Long List Alternatives for this second step of the Long List Screening are listed in **Table 4**.

ALIGNMENT	MODE
ALTERNATIVE D: TRUNK ROUTE ALONG ROUTE 110 WITH CIRCULAR FEEDER ROUTES	**D1**: BRT
	D2: Streetcar
	D3: LRT
	D4: AGT
	D5: Commuter rail
	D6: Subway
ALTERNATIVE E: TRUNK ROUTE ALONG ROUTE 110 WITH TRANSIT CENTER NODES AND CONNECTING FEEDER ROUTES	**E1**: BRT
	E2: Streetcar
	E3: LRT
	E4: AGT
	E5: Commuter rail
	E6: Subway

TABLE 4: Mode-Specific Long List Alternatives

Source: Parsons Brinckerhoff (2015)

A rating was assigned to each mode-specific alternative for its relative performance against each criterion, and an overall evaluation score was computed for each alternative.

Based on the tabulated results, the streetcar, LRT, AGT, commuter rail, and subway alternatives (Long List Alternatives D2 and E2, D3 and E3, D4, and E4, D5 and E5, and D6 and E6, respectively) were eliminated from consideration because these alternatives failed to achieve the goal of maximizing cost and operational effectiveness. As a result, only the BRT alternatives (Long List Alternatives D1 and E1) were advanced in the screening process.

With the exception of the BRT alternatives, all of the other modal alternatives would fail to offer physical and service attributes that are appropriate for the study area land use and density. The infrastructure and operational attributes of streetcar, LRT, AGT, commuter rail, and subway are not conducive to providing a flexible distribution service to meet demand along and near Route 110. The non-BRT alternatives would all operate on a fixed guideway, lacking the flexibility to modify service based on changes in the Corridor.

Although Route 110 is a major commercial hub, and the Corridor and surrounding area collectively comprise approximately 10% of Long Island's workforce, the area does not offer the potential to capture sufficient ridership to justify the needed capital investment and ongoing operating and maintenance costs of the non-BRT transit modes. The streetcar, LRT, AGT, commuter rail, and subway alternatives would be appropriate in a more urban environment where compact, high-density land uses could provide consistently high levels of ridership and there is less need for flexibility.

From a cost and operational standpoint, BRT emerged as the preferred mode for a new premium transit service along Route 110. The BRT alternatives are more compatible with the land use composition, development density, and character of the study area than the other transit modes that were under consideration. BRT offers the needed flexibility to easily accommodate route and service modifications over time, and also is conducive to phased implementation as demand warrants and as funding becomes available.

Implementation of BRT would not require construction of a fixed guideway, and the operational and maintenance needs of BRT could largely be met using existing ROW, thereby minimizing potential property takings. Furthermore, BRT would be compatible with the existing bus transit network in the study area, which would facilitate integration with existing transit operations.

Additionally, several local and regional plans explicitly call for BRT as a feasible and/or desirable modal option on Route 110, including the *Connect Long Island* plan; the *Route 110 BRT Study* (**Figure 26**); the *Suffolk County BRT Feasibility Study*; the *MTA Twenty-Year Capital Needs Assessment 2015-2034*; and the NYMTC *Plan 2040* RTP.

In sum, the second step of the Long List Screening resulted in the two BRT alternatives (D1 and E1, hereafter D and E) scoring the highest and being advanced in the screening process for further development and evaluation, while the other modal alternatives were eliminated from consideration primarily because of their failure to achieve the goal of maximizing cost and operational effectiveness.

6.3 SHORT LIST ALTERNATIVES AND SCREENING

The two Short List Alternatives were developed in greater detail, which included operations, engineering, cost, and ridership analyses. Alternatives D and E share the same BRT trunk route alignment and service characteristics, differing only with respect to the feeder routes that would provide service off Route 110. The Short List Alternatives development process started with detailed planning of the BRT trunk route, followed by the feeder routes for the two alternatives. The Short List Screening was then conducted to evaluate the strengths, weaknesses, and trade-offs of the Short List Alternatives, which provided the framework for making recommendations to advance to Project Development.

FIGURE 26: Schematic Representation of BRT from the 2010 *Route 110 BRT Study*
Source: *Route 110 BRT Study* (2010)

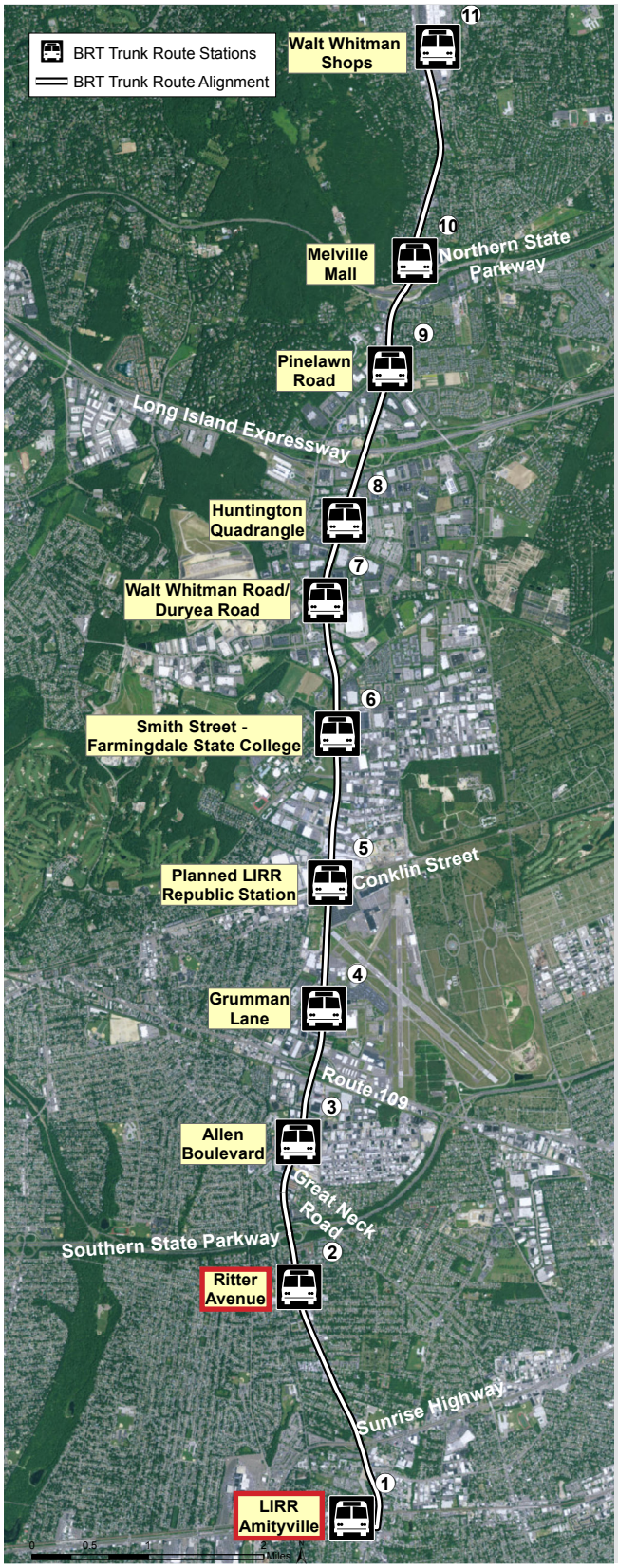
6.3.1 ROUTE 110 BRT TRUNK ROUTE

IDENTIFICATION OF BRT TRUNK ROUTE STATION LOCATIONS

The first step in defining the BRT trunk service was to select station locations. As shown in **Figure 27**, the proposed BRT service includes the following 11 station locations (from south to north) within the study area and primarily along Route 110:

1. LIRR Amityville Station
2. Route 110 at Ritter Avenue
3. Route 110 at Allen Boulevard
4. Route 110 at Grumman Lane
5. Route 110 at the planned LIRR Republic Station
6. Route 110 at Smith Street – Farmingdale State College
7. Route 110 at Walt Whitman Road/Duryea Road
8. Route 110 at Huntington Quadrangle
9. Route 110 at Pinelawn Road
10. Route 110 at Melville Mall
11. Walt Whitman Shops

With the exception of the southern and northern termini (i.e., LIRR Amityville Station and Walt Whitman Shops, respectively), which would each have one proposed station located slightly off-Route 110, the remaining nine stations would all include one northbound and one southbound station along the east and west sides of Route 110, respectively. **Figure 27** shows the specific location of each proposed BRT station, and also includes a profile of key information about each station, such as activity centers served and transfer opportunities to other transit services.



(1) LIRR AMITYVILLE STATION

STATION LOCATION

» Northbound/Southbound: Parking lot on the south side of the LIRR tracks in front of the station building
  » Proposed relocation of existing Suffolk County Transit stop, currently located on the north side of the LIRR tracks

ACTIVITY CENTERS SERVED

» LIRR Amityville Station
» Downtown Amityville

TRANSFER OPPORTUNITIES

» LIRR (Babylon Branch)
» Suffolk County Transit (S1, S20 (on Oak Street), S33, 1A)
» NICE Bus (N54, N55)

(2) RITTER AVENUE

STATION LOCATIONS

» Northbound: East side of Route 110, north of Ritter Avenue
  » Proposed relocation of existing northbound Suffolk County Transit stop, currently located on the south side of the intersection
» Southbound: West side of Route 110, south of Ritter Avenue at location of existing southbound Suffolk County Transit stop

ACTIVITY CENTERS SERVED

» Planned Greybarn development
» North Amityville residential areas
» Carmans Plaza shopping center (west of Route 110, accessible via Ritter Avenue)

TRANSFER OPPORTUNITIES

» Suffolk County Transit (S1)
» NICE Bus (N71 (on Carmans Road))

FIGURE 27: Proposed Route 110 BRT Station Profiles
Source: ESRI basemaps, Suffolk County Transit, Parsons Brinckerhoff (2015)

EXISTING SUFFOLK COUNTY TRANSIT RIDERSHIP (2007, NORTHBOUND AND SOUTHBOUND)

270 TOTAL WEEKDAY BOARDINGS

PROJECTED BRT RIDERSHIP (2040, NORTHBOUND AND SOUTHBOUND)

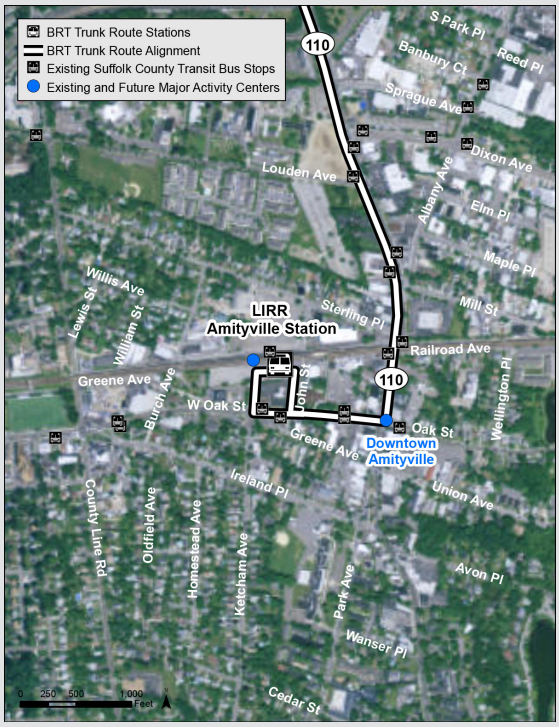
715 ALTERNATIVE D
TOTAL WEEKDAY BOARDINGS

645 ALTERNATIVE E
TOTAL WEEKDAY BOARDINGS

DISTANCE FROM PREVIOUS/NEXT BRT STATION (TO THE SOUTH/NORTH)

N/A (SOUTHERN TERMINUS)

1.9 MILES (TO THE NORTH)



EXISTING SUFFOLK COUNTY TRANSIT RIDERSHIP (2007, NORTHBOUND AND SOUTHBOUND)

75 TOTAL WEEKDAY BOARDINGS

PROJECTED BRT RIDERSHIP (2040, NORTHBOUND AND SOUTHBOUND)

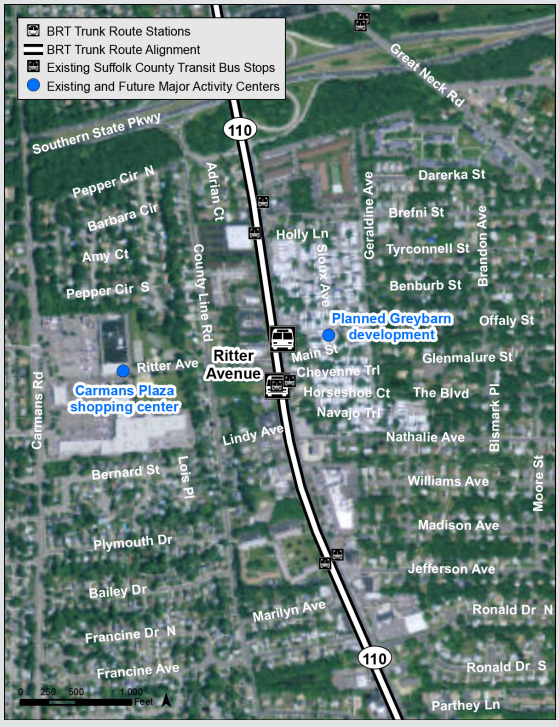
170 ALTERNATIVE D
TOTAL WEEKDAY BOARDINGS

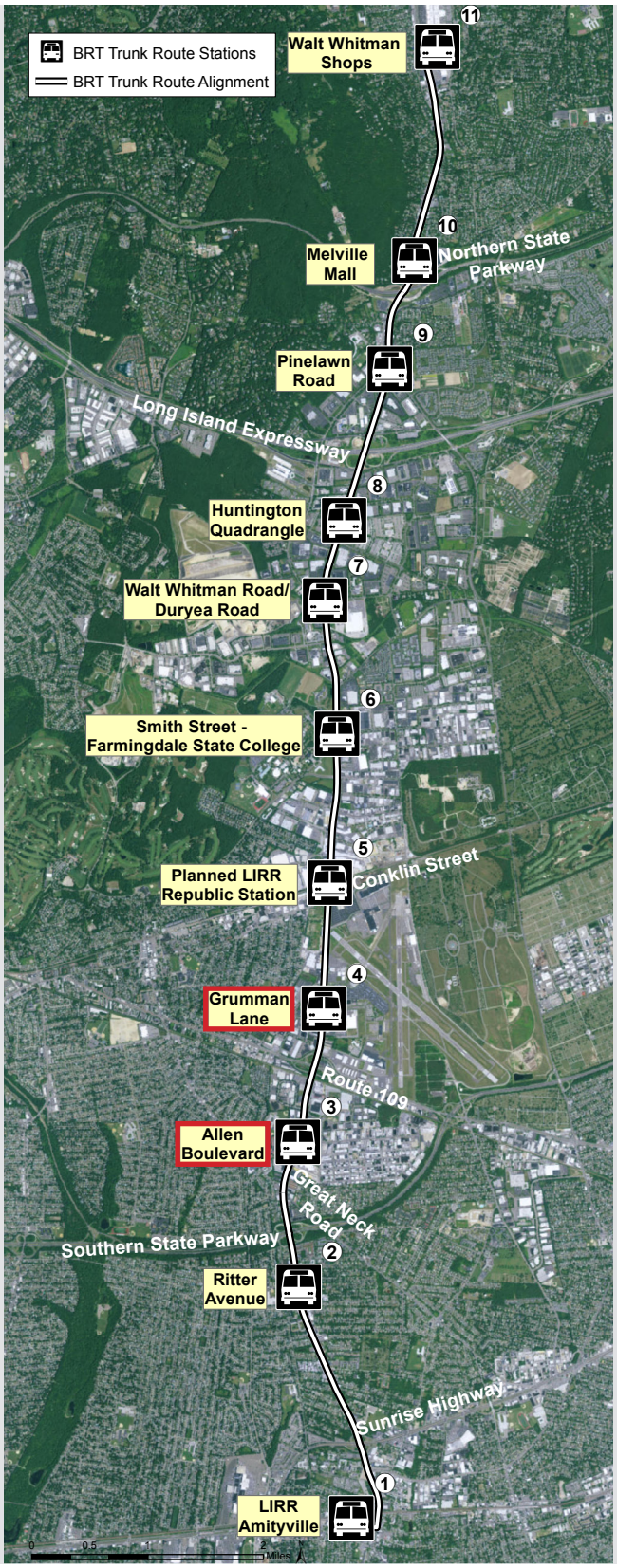
160 ALTERNATIVE E
TOTAL WEEKDAY BOARDINGS

DISTANCE FROM PREVIOUS/NEXT BRT STATION (TO THE SOUTH/NORTH)

1.9 MILES (TO THE SOUTH)

1.0 MILES (TO THE NORTH)





(3) ALLEN BOULEVARD

STATION LOCATIONS

» Northbound: East side of Route 110, north of Allen Boulevard at location of existing northbound Suffolk County Transit stop
» Southbound: West side of Route 110, north of Allen Boulevard at location of existing northbound Suffolk County Transit stop

ACTIVITY CENTERS SERVED

» Miscellaneous employment destinations and residential areas

TRANSFER OPPORTUNITIES

» Suffolk County Transit (S1, S31)

(4) GRUMMAN LANE

STATION LOCATIONS

» Northbound: East side of Route 110, north of Grumman Lane
  » Proposed relocation of existing northbound Suffolk County Transit stop, currently located on the south side of the intersection
» Southbound: West side of Route 110, south of Grumman Lane
  » Proposed relocation of existing southbound Suffolk County Transit stop, currently located approximately 50 feet further south

ACTIVITY CENTERS SERVED

» Republic Plaza shopping center
» Republic Airport
» Marriott Courtyard
» Molloy College at Republic Airport
» Aviation Center at Farmingdale State College
» Miscellaneous employment destinations

TRANSFER OPPORTUNITIES

» Suffolk County Transit (S1, S31)
» NICE Bus (N72)

FIGURE 27 CONTINUED: Proposed Route 110 BRT Station Profiles
Source: ESRI basemaps, Suffolk County Transit, Parsons Brinckerhoff (2015)

EXISTING SUFFOLK COUNTY TRANSIT RIDERSHIP (2007, NORTHBOUND AND SOUTHBOUND)

45 TOTAL WEEKDAY BOARDINGS

PROJECTED BRT RIDERSHIP (2040, NORTHBOUND AND SOUTHBOUND)

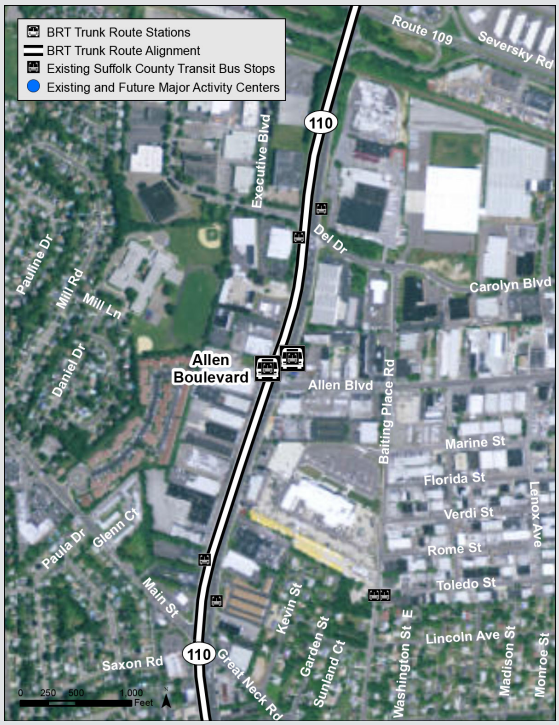
205 ALTERNATIVE D
TOTAL WEEKDAY BOARDINGS

200 ALTERNATIVE E
TOTAL WEEKDAY BOARDINGS

DISTANCE FROM PREVIOUS/NEXT BRT STATION (TO THE SOUTH/NORTH)

1.0 MILES (TO THE SOUTH)

0.9 MILES (TO THE NORTH)



EXISTING SUFFOLK COUNTY TRANSIT RIDERSHIP (2007, NORTHBOUND AND SOUTHBOUND)

25 TOTAL WEEKDAY BOARDINGS

PROJECTED BRT RIDERSHIP (2040, NORTHBOUND AND SOUTHBOUND)

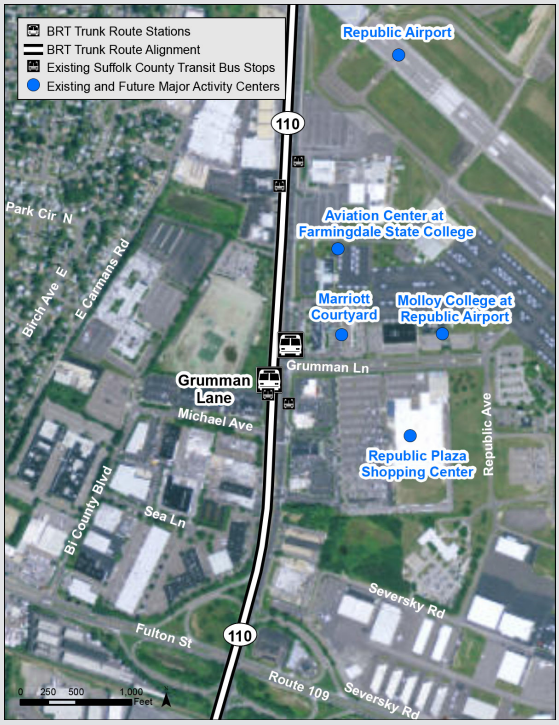
45 ALTERNATIVE D
TOTAL WEEKDAY BOARDINGS

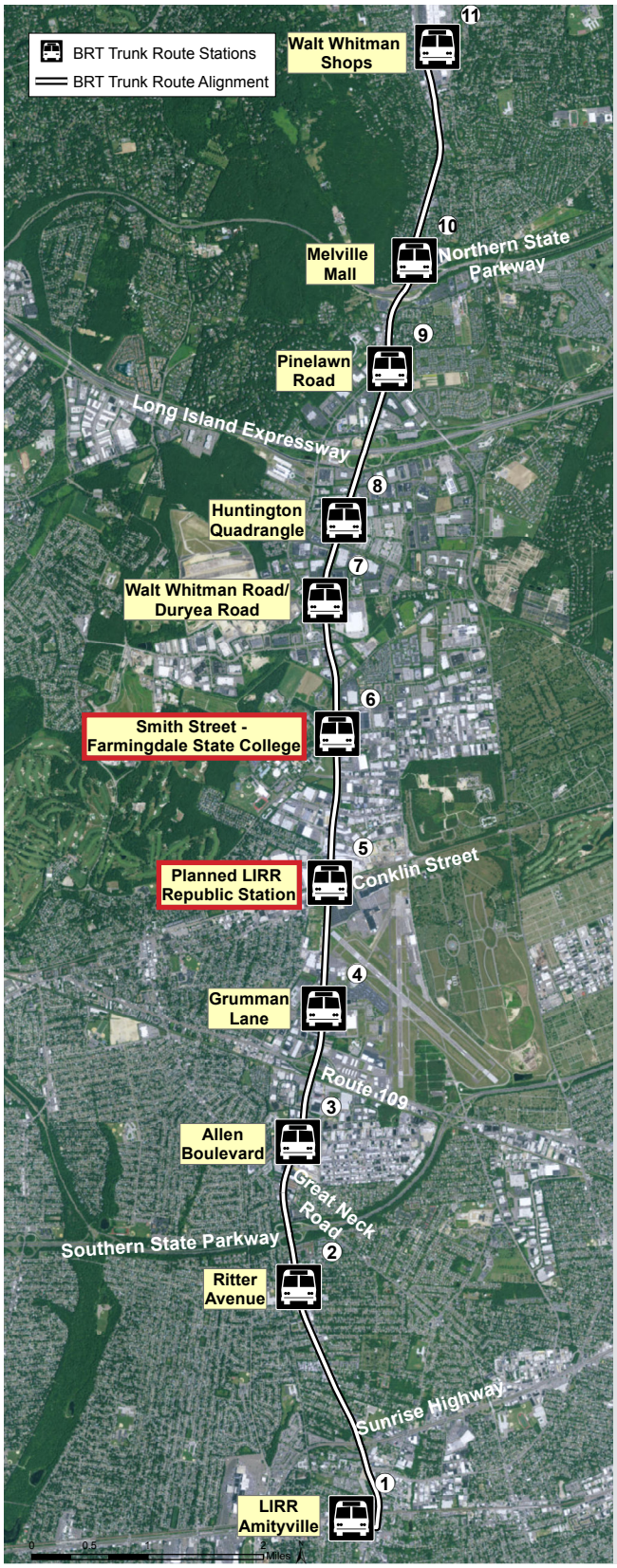
45 ALTERNATIVE E
TOTAL WEEKDAY BOARDINGS

DISTANCE FROM PREVIOUS/NEXT BRT STATION (TO THE SOUTH/NORTH)

0.9 MILES (TO THE SOUTH)

0.8 MILES (TO THE NORTH)





(5) PLANNED LIRR REPUBLIC STATION

STATION LOCATIONS

- Northbound: East side of Route 110, south of LIRR trestle at location of existing northbound Suffolk County Transit stop
- Southbound: West side of Route 110, north of LIRR trestle at location of existing southbound Suffolk County Transit stop

ACTIVITY CENTERS SERVED

- Planned LIRR Republic Station
- Planned East Farmingdale master development
- Airport Plaza shopping center
- Miscellaneous employment destinations

TRANSFER OPPORTUNITIES

- LIRR (Main Line / Ronkonkoma Branch)
- Suffolk County Transit (S1, S31)
- NICE Bus (N70, N72)
- Proposed Feeder Routes
  - Alternative D: Farmingdale State College
  - Alternative E: Farmingdale State College; Walt Whitman Road; New Highway/Pinelawn Road

(6) SMITH STREET – FARMINGDALE STATE COLLEGE

STATION LOCATIONS

- Northbound: East side of Route 110, north of Smith Street at location of existing northbound Suffolk County Transit stop
- Southbound: West side of Route 110, south of Dr. Frank A Cipriani Drive at location of existing southbound Suffolk County Transit stop

ACTIVITY CENTERS SERVED

- Farmingdale State College
- Broad Hollow Bioscience Park
- Willow Park Center (Target)
- Adventureland
- UPS Customer Center
- Costco
- Miscellaneous employment destinations

TRANSFER OPPORTUNITIES

- Suffolk County Transit (S1, S31, 2B, Suffolk Clipper)
- NICE Bus (N70)
- Proposed Feeder Routes
  - Alternative D: Farmingdale State College; Ruland Road/Smith Street
  - Alternative E: Farmingdale State College; Walt Whitman Road

FIGURE 27 CONTINUED: Proposed Route 110 BRT Station Profiles

Source: ESRI basemaps, Suffolk County Transit, Parsons Brinckerhoff (2015)

EXISTING SUFFOLK COUNTY TRANSIT RIDERSHIP (2007, NORTHBOUND AND SOUTHBOUND)

80 TOTAL WEEKDAY BOARDINGS

PROJECTED BRT RIDERSHIP (2040, NORTHBOUND AND SOUTHBOUND)

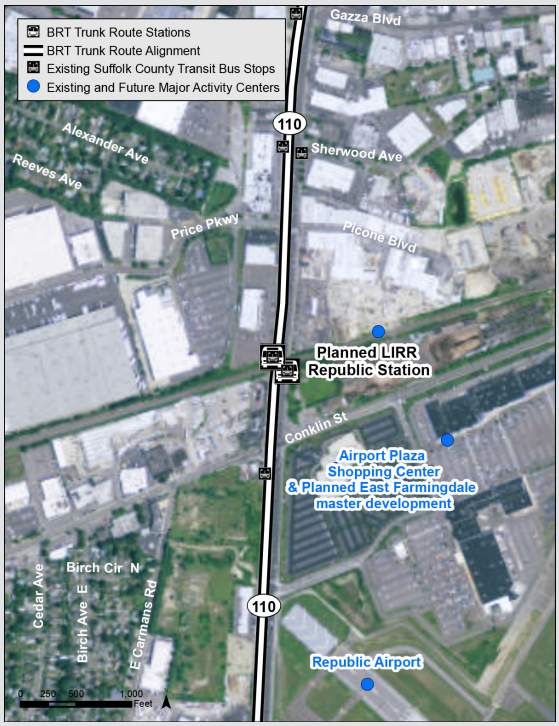
1,025 ALTERNATIVE D
TOTAL WEEKDAY BOARDINGS

725 ALTERNATIVE E
TOTAL WEEKDAY BOARDINGS

DISTANCE FROM PREVIOUS/NEXT BRT STATION (TO THE SOUTH/NORTH)

0.8 MILES (TO THE SOUTH)

1.0 MILES (TO THE NORTH)



EXISTING SUFFOLK COUNTY TRANSIT RIDERSHIP (2007, NORTHBOUND AND SOUTHBOUND)

65 TOTAL WEEKDAY BOARDINGS

PROJECTED BRT RIDERSHIP (2040, NORTHBOUND AND SOUTHBOUND)

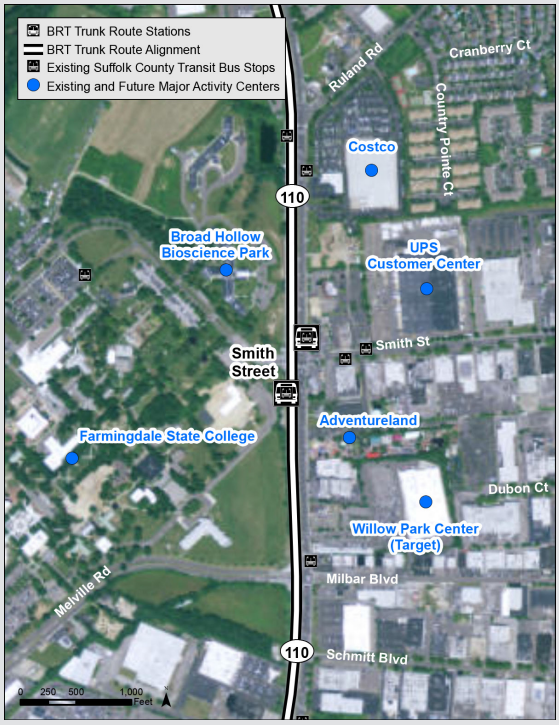
145 ALTERNATIVE D
TOTAL WEEKDAY BOARDINGS

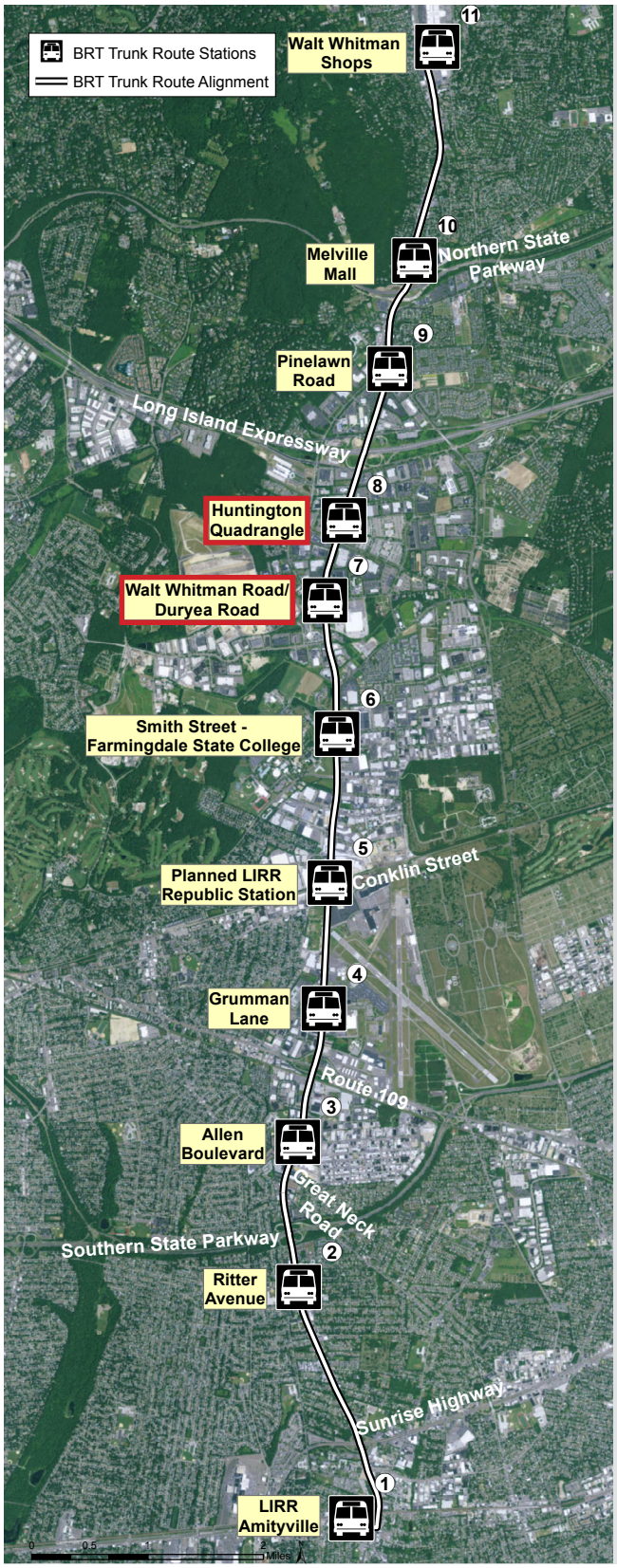
95 ALTERNATIVE E
TOTAL WEEKDAY BOARDINGS

DISTANCE FROM PREVIOUS/NEXT BRT STATION (TO THE SOUTH/NORTH)

1.0 MILES (TO THE SOUTH)

0.9 MILES (TO THE NORTH)





(7) WALT WHITMAN/DURYEA ROAD

STATION LOCATIONS

- Northbound: East side of Route 110, north of Duryea Road at location of existing northbound Suffolk County Transit stop
- Southbound: West side of Route 110, south of Walt Whitman Road within grass triangle
  - Proposed relocation of existing southbound Suffolk County Transit stop, currently located on the north side of the intersection

ACTIVITY CENTERS SERVED

- USPS Mid-Island Processing Center
- Hilton Long Island/Huntington
- Miscellaneous employment destinations and residential areas

TRANSFER OPPORTUNITIES

- Suffolk County Transit (S1, Suffolk Clipper)
- Proposed Feeder Routes
  - Alternative D: Walt Whitman Road/Pinelawn Road
  - Alternative E: Walt Whitman Road

(8) HUNTINGTON QUADRANGLE

STATION LOCATIONS

- Northbound: East side of Route 110, north of Huntington Quadrangle
  - Proposed relocation of existing northbound Suffolk County Transit stop, currently located approximately 100 feet south
- Southbound: West side of Route 110, south of Huntington Quadrangle at location of existing southbound Suffolk County Transit stop

ACTIVITY CENTERS SERVED

- Huntington Quadrangle
- Miscellaneous employment destinations

TRANSFER OPPORTUNITIES

- Suffolk County Transit (S1, Suffolk Clipper)

FIGURE 27 CONTINUED: Proposed Route 110 BRT Station Profiles

Source: ESRI basemaps, Suffolk County Transit, Parsons Brinckerhoff (2015)

EXISTING SUFFOLK COUNTY TRANSIT RIDERSHIP (2007, NORTHBOUND AND SOUTHBOUND)

30 TOTAL WEEKDAY BOARDINGS

PROJECTED BRT RIDERSHIP (2040, NORTHBOUND AND SOUTHBOUND)

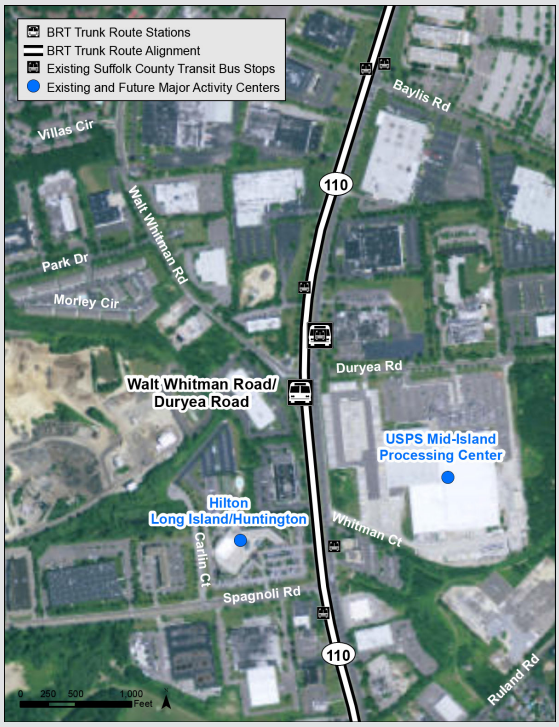
290 ALTERNATIVE D
TOTAL WEEKDAY BOARDINGS

170 ALTERNATIVE E
TOTAL WEEKDAY BOARDINGS

DISTANCE FROM PREVIOUS/NEXT BRT STATION (TO THE SOUTH/NORTH)

0.9 MILES
(TO THE SOUTH)

0.5 MILES
(TO THE NORTH)



EXISTING SUFFOLK COUNTY TRANSIT RIDERSHIP (2007, NORTHBOUND AND SOUTHBOUND)

75 TOTAL WEEKDAY BOARDINGS

PROJECTED BRT RIDERSHIP (2040, NORTHBOUND AND SOUTHBOUND)

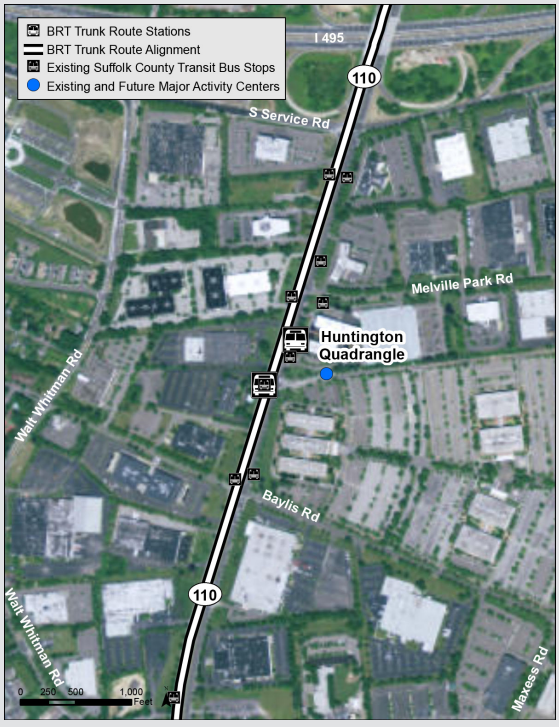
230 ALTERNATIVE D
TOTAL WEEKDAY BOARDINGS

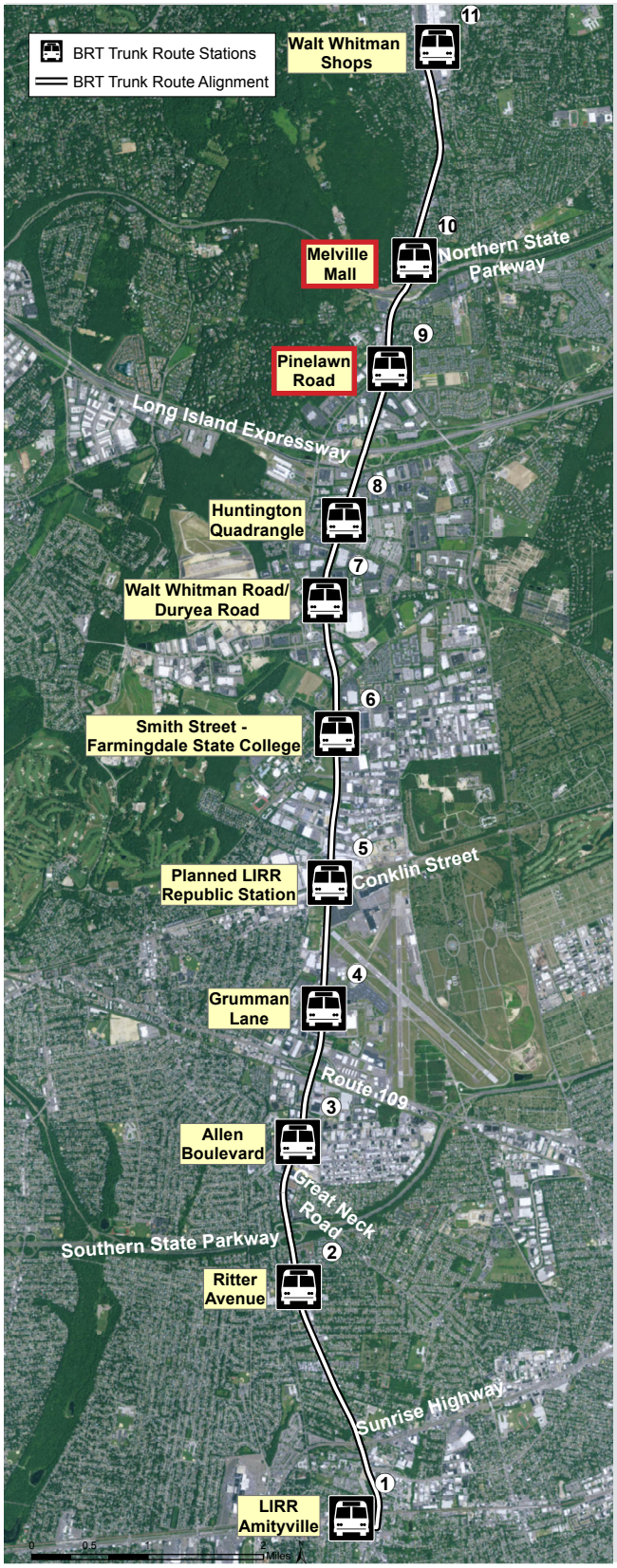
145 ALTERNATIVE E
TOTAL WEEKDAY BOARDINGS

DISTANCE FROM PREVIOUS/NEXT BRT STATION (TO THE SOUTH/NORTH)

0.5 MILES
(TO THE SOUTH)

1.1 MILES
(TO THE NORTH)





(9) PINELAWN ROAD

STATION LOCATIONS

- Northbound: East side of Route 110, north of Pinelawn Road at location of existing northbound Suffolk County Transit stop
- Southbound:
  - Alternative D: West side of Route 110, south of Sweet Hollow Road at location of existing southbound Suffolk County Transit stop
  - Alternative E: West side of Route 110, north of Sweet Hollow Road to facilitate transfers to/from feeder routes
    - Proposed relocation of existing northbound Suffolk County Transit stop, currently located north of Snyder Street

ACTIVITY CENTERS SERVED

- Nikon
- Capital One
- Melville Marriott
- Miscellaneous employment destinations

TRANSFER OPPORTUNITIES

- Suffolk County Transit (S1, Suffolk Clipper)
- Proposed Feeder Routes
  - Alternative D: Walt Whitman Road/Pinelawn Road
  - Alternative E: Walt Whitman Road; New Highway/Pinelawn Road

(10) MELVILLE MALL

STATION LOCATIONS

- Northbound: East side of Route 110, north of Melville Mall main entrance at location of existing Suffolk County Transit stop
- Southbound: West side of Route 110, south of Melville Mall main entrance
  - Proposed relocation of existing southbound Suffolk County Transit stop, currently located on the north side of the intersection

ACTIVITY CENTERS SERVED

- Melville Mall
- Miscellaneous employment destinations and residential areas

TRANSFER OPPORTUNITIES

- Suffolk County Transit (S1)

FIGURE 27 CONTINUED: Proposed Route 110 BRT Station Profiles

Source: ESRI basemaps, Suffolk County Transit, Parsons Brinckerhoff (2015)

EXISTING SUFFOLK COUNTY TRANSIT RIDERSHIP (2007, NORTHBOUND AND SOUTHBOUND)

45 TOTAL WEEKDAY BOARDINGS

PROJECTED BRT RIDERSHIP (2040, NORTHBOUND AND SOUTHBOUND)

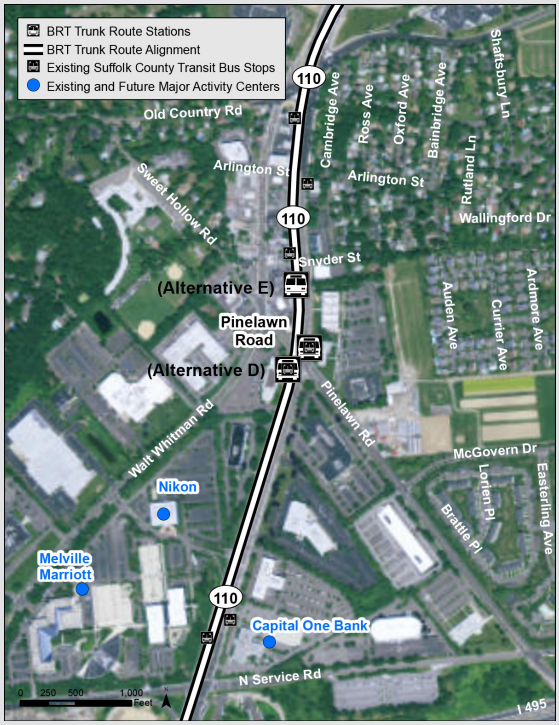
290 ALTERNATIVE D
TOTAL WEEKDAY BOARDINGS

170 ALTERNATIVE E
TOTAL WEEKDAY BOARDINGS

DISTANCE FROM PREVIOUS/NEXT BRT STATION (TO THE SOUTH/NORTH)

1.1 MILES (TO THE SOUTH)

0.7 MILES (TO THE NORTH)



EXISTING SUFFOLK COUNTY TRANSIT RIDERSHIP (2007, NORTHBOUND AND SOUTHBOUND)

45 TOTAL WEEKDAY BOARDINGS

PROJECTED BRT RIDERSHIP (2040, NORTHBOUND AND SOUTHBOUND)

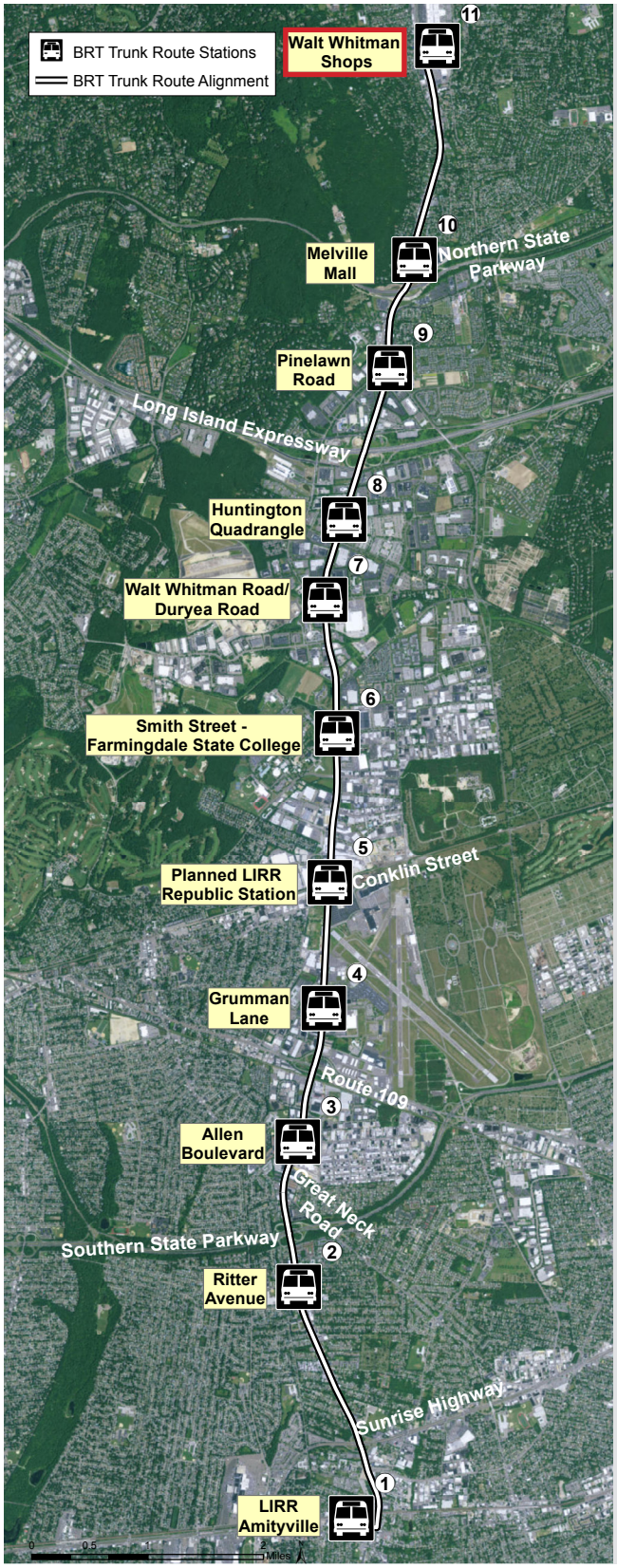
340 ALTERNATIVE D
TOTAL WEEKDAY BOARDINGS

325 ALTERNATIVE E
TOTAL WEEKDAY BOARDINGS

DISTANCE FROM PREVIOUS/NEXT BRT STATION (TO THE SOUTH/NORTH)

0.7 MILES (TO THE SOUTH)

1.7 MILES (TO THE NORTH)



(11) WALT WHITMAN SHOPS

STATION LOCATION

» Northbound/Southbound: Parking lot on the south side of the Walt Whitman Shops at the location of the existing Suffolk County Transit/HART/NICE stop

ACTIVITY CENTERS SERVED

» Walt Whitman Shops
» Miscellaneous employment destinations and residential areas

TRANSFER OPPORTUNITIES

» Suffolk County Transit (S1, S23 S29, S54)
» NICE (N79)
» HART (H20, H30, H40)

FIGURE 27 CONTINUED: Proposed Route 110 BRT Station Profiles
Source: ESRI basemaps, Suffolk County Transit, Parsons Brinckerhoff (2015)

EXISTING SUFFOLK COUNTY TRANSIT RIDERSHIP (2007, NORTHBOUND AND SOUTHBOUND)

485 TOTAL WEEKDAY BOARDINGS

PROJECTED BRT RIDERSHIP (2040, NORTHBOUND AND SOUTHBOUND)

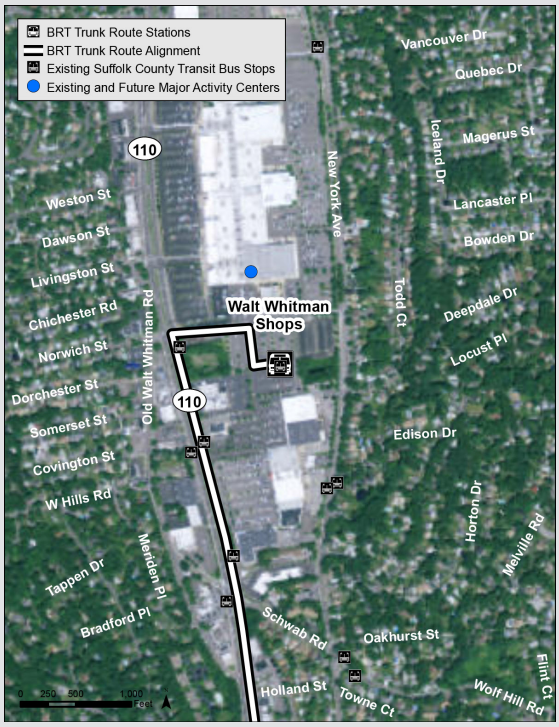
455 ALTERNATIVE D
TOTAL WEEKDAY BOARDINGS

455 ALTERNATIVE E
TOTAL WEEKDAY BOARDINGS

DISTANCE FROM PREVIOUS/NEXT BRT STATION (TO THE SOUTH/NORTH)

1.7 MILES
(TO THE SOUTH)

N/A (NORTHERN
TERMINUS)



Several factors informed the selection of BRT station locations:

» **Serve existing and future activity centers to maximize ridership potential**

One of the fundamental objectives of this AA is to provide frequent, high-quality transit service to employment and other activity centers on Route 110. As such, the process of selecting BRT station locations on Route 110 was guided by an assessment of existing and future activity centers along the Corridor that could provide a source of potential BRT ridership.

The ridership and economic development potential of ongoing and planned development projects can best be realized by co-locating and integrating BRT stations with development sites. The proposed BRT stations at Ritter Avenue and the planned LIRR Republic Station are notable examples of this integrated transportation and development strategy, as the BRT stations would support the ongoing Greybarn mixed-use development and the future East Farmingdale master development, respectively. (Refer to sidebar.)

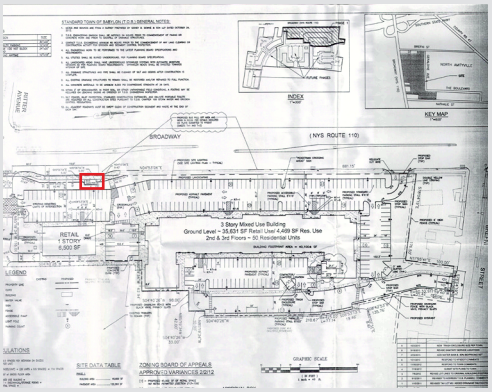
To maximize ridership potential, it is ideal to serve a combination of origins and destinations. Although Route 110 is primarily an employment Corridor with significant regional destinations, there are also a number of trip origins along and near the Corridor, including residential developments in Amityville, North Amityville, East Farmingdale, Melville, and Huntington. Therefore, the process of selecting BRT station locations sought to find a balance of serving both origins and destinations.

GREYBARN CASE STUDY: THE INTEGRATION OF TRANSPORTATION AND DEVELOPMENT ALONG ROUTE 110

A key tenet of the *Connect Long Island* plan is the need to adopt an integrated approach to transportation improvements and land use policy. Local municipalities with land use jurisdiction can maximize the benefits of development proposals by promoting integration with regional transportation investments.

The Greybarn mixed-use development, currently under construction in North Amityville within the Town of Babylon, is a noteworthy example of proactive integration of transportation and land use planning. Indeed, the site layout plan for Phase 1 shows that the mixed-use development on the east side of Route 110 will incorporate a BRT station (labeled "bus shelter") just north of Ritter Avenue (**Figure 28**).

Rather than accommodate BRT as an afterthought, Greybarn was conceived as a transit-supportive development. The mix of residential and retail uses located in close proximity to a proposed BRT station will help to attract choice riders who might otherwise travel by automobile.



The planned Greybarn development incorporates transit accommodations into the site layout

FIGURE 28: Greybarn Site Layout Plan (Phase 1)
Source: Town of Babylon, Bowne AE&T Group (2010)

A PARTNERSHIP FOR ECONOMIC DEVELOPMENT: BRT NAMING RIGHTS AND MARKETING

The Healthline is the Greater Cleveland Regional Transit Authority's (RTA) flagship BRT route that provides frequent and fast service along the Euclid Avenue corridor, and it is regularly cited as a model for how BRT can promote economic development. According to a 2013 analysis of transit corridors in North America completed by the Institute for Transportation and Development Policy (ITDP), "Cleveland emerges as a clear best practice," as approximately $5 million per mile of transit investment catalyzed $5.8 billion in economic development.

The HealthLine got its name through a partnership between two of the city's largest employers that are located along the corridor and benefit from the BRT service (i.e., the Cleveland Clinic and University Hospitals of Cleveland). The two employers entered into an agreement with RTA in 2008 to purchase the naming rights for the BRT route for $6.5 million, which helped to fund implementation of the BRT service and provide an impetus for the ensuing economic development. As demonstrated by the HealthLine, a naming rights partnership is one example of how public sector investment in a premium transit service can leverage private sector investment to promote economic development.

The HealthLine in Cleveland, Ohio has been cited as a national model for economic development catalyzed by public investment in BRT
Source: Transportation Issues Daily (2012)

» **Promote economic development along Route 110**

The process of identifying BRT station locations was informed by not only an assessment of existing activity centers and planned development projects, but also a consideration of future development potential. Route 110 is facing interrelated transportation, land use, and economic development challenges due to 60 years of development built around the automobile, and a major cornerstone of the *Connect Long Island* plan is the principle that the economy cannot grow by adding more cars to the roadway. The proposed BRT stations could serve as anchors for mixed-use and transit-supportive development, thereby leading a shift away from auto-centric development patterns.

The ongoing planning efforts that complement the Route 110 AA—including, but not limited to, the East Farmingdale Downtown Center planning, the Village of Amityville Downtown Revitalization process, the Suffolk County/RPA design guidelines for Route 110, and the Town of Huntington Melville Employment Center Plan—could all lead to new development or redevelopment at transit-supportive densities within walking distance of the proposed BRT stations.

Additionally, one of the fundamental indicators of economic competitiveness is the ability to retain and attract employers and employees. Therefore, BRT stations are proposed at locations of concentrated employment to maximize the number of jobs within walking distance. For instance, the proposed Huntington Quadrangle and Pinelawn Road BRT stations are located in close proximity to large employers. The introduction of BRT as a new premium transit service could be actively promoted by major employers as an employee benefit, and could also be promoted by property owners as a sales marketing tool to attract tenants. Additionally, effective marketing of a BRT service can be a win-win for the transit agency and the activity centers along the Corridor, as demonstrated by the HealthLine in Cleveland, Ohio. (Refer to sidebar.)

An historical photo from 1910 shows an early form of multi-modal connectivity in Amityville. In the future, implementation of BRT to complement the LIRR and existing local bus services can maximize transfer opportunities between different transit options in the study area.
Source: Town of Babylon, Office of Historic Services (2015)

» **Optimize distance between stations**

Another principal objective is to improve travel time for transit users within the study area. One of the ways to achieve this is to limit the number of stops. Therefore, BRT along Route 110 is proposed to offer limited-stop service to supplement the local service provided by the existing Suffolk County Transit S1 route.

Whereas the Suffolk County Transit S1 route makes 40 stops between the LIRR Amityville Station and the Walt Whitman Shops, with an average distance of approximately 0.25 miles between each stop, the proposed BRT would make fewer stops spaced farther apart to improve travel time and enhance the customer experience for this premium service. The distance between proposed BRT stations ranges from 0.5 miles (between Walt Whitman Road/Duryea Road and Huntington Quadrangle) to 1.9 miles (between LIRR Amityville Station and Ritter Avenue), with an average distance of 0.9 miles.

» **Maximize transfer opportunities**

There are multiple bus transit service providers along Route 110 (i.e., Suffolk County Transit, NICE, and HART), and the selection process for BRT station locations sought to maximize transfer opportunities between the different services. Another type of multi-modal connection is between the proposed BRT service and the LIRR. BRT stations are proposed at both the LIRR Amityville Station and the planned LIRR Republic Station, which would not only increase multi-modal connectivity, but also increase regional public transit access to the study area from surrounding municipalities and counties.

The selection of the BRT station locations was also informed by the feeder route connection. An iterative process ensured seamless connections between the BRT and feeder route services, which was an important consideration in establishing last-mile connectivity to destinations located off the main spine of Route 110.

» **Minimize physical constraints for implementation**

If the existing transportation ROW is insufficient to accommodate a BRT station at a particular location, an easement or property taking could be required to address this physical constraint, which would add to the overall capital cost, have potential greater impact on the environment, and potentially complicate the implementation process. Therefore, it is proposed that, in most cases, the BRT stations would be located at the sites of the existing Suffolk County Transit bus stops, thereby eliminating the need for easements or property takings and maximizing cost effectiveness. The co-location of BRT stations and Suffolk County Transit bus stops would also effectively maximize connectivity of the BRT and local bus services.

In eight instances, the BRT stations are proposed at locations that differ from existing Suffolk County Transit local S1 bus stops, and it is further proposed that the existing local bus stops would be relocated to the sites of the BRT stations (**Figure 27**). The rationale is specific to each station location. For example, the location of the proposed northbound Huntington Quadrangle BRT station is approximately 100 feet north of the existing Suffolk County Transit local bus stop to prevent obstructing sight lines for existing right turns from the office buildings, and it is proposed that the existing local bus stop be moved to this location to similarly improve safety.

Other instances in which the locations of the proposed BRT stations would differ from existing Suffolk County Transit local bus stops are justified from the perspective of maximizing operational effectiveness of the BRT vehicles. As discussed in the Transit Cooperative Research Program (TCRP) Report 188 (*Bus Rapid Transit Practitioners Guide*), the travel time benefits of traffic signal priority (TSP) are maximized when BRT stations are located on the far side of signalized intersections because BRT vehicles would not need to stop in advance of the intersection to pick up or drop off passengers. Therefore, in most instances in which the existing Suffolk County Transit local bus stops are located on the near side of signalized intersections (e.g., the northbound stop at Grumman Lane, the southbound stop at Walt Whitman Road/ Duryea Road, and the southbound stop at Melville Mall), the BRT stations are proposed on the far side of the intersection to maximize the effectiveness of TSP. In these cases, it is also proposed that the existing local bus stops would be relocated to the sites of the BRT stations.

There are two proposed exceptions to the general rule of locating BRT stations on the far side of signalized intersections: (1) at the southbound Allen Boulevard station in order to avoid encroachment into private parking lots on the far side of the intersection associated with multiple retail uses that have frequent curb cuts; and (2) at the southbound Pinelawn Road station (Alternative E only) in order to provide a seamless transfer between the BRT trunk route and feeder routes at the proposed transit center.

10% CONCEPTUAL ENGINEERING FOR BRT TRUNK ROUTE

The conceptual engineering effort included the preparation of representative BRT station plans, as well as alignment plans that depict the proposed routing and physical attributes of the trunk route. These plans identify the alignment (i.e., dedicated BRT vs. mixed traffic), station areas, traffic signals proposed for priority treatment, and standard signage and pavement markings. The plans were prepared at a 10% level of engineering, which provided enough detail to estimate order-of-magnitude capital costs and identify potential geometric design constraints for implementation. Subsequent work in Project Development that will follow this AA will include more detailed Preliminary Engineering and Final Design for the proposed project, as discussed in Section 9.

The following discussion presents an overview of the conceptual engineering effort, and Appendix G includes the alignment plans, typical sections, and additional details.

BRT Stations

Stations function as the gateway for service and play a critical role in branding BRT as a premium transit option that can attract choice riders in addition to serving the needs of passengers without access to an automobile. The station planning effort in this AA proposed a number of passenger amenities that could effectively distinguish BRT from local bus service without significantly adding to the estimated costs for implementation, as discussed below. However, regardless of this assumption for the AA, it is important to note that the longer-term plan for BRT along Route 110 includes significant station-area passenger amenities and enhancements to the pedestrian experience

to reinforce the image of BRT as a premium transit service. (Refer to page 79.)

Each BRT station is proposed to include the following elements:

» **Shelter** – Each shelter would consist of glass panels along the back and illuminated side advertisement panels along the sides, with a decorative roof and interior seating. Art could also be integrated into the shelters. A front, centrally located glass panel would create two entrances/exits, and the rest of the shelter would be covered to provide shade and protection from the elements. Two different shelter sizes are proposed for the BRT trunk route: (1) a typical shelter measuring 5 feet by 12 feet with one interior bench, which would match the size of existing Suffolk County Transit shelters along Route 110; and (2) a large shelter measuring 10 feet by 24 feet with four interior benches. The typical shelter is proposed at all station locations with the exception of the LIRR Amityville Station, the planned LIRR Republic Station, and Walt Whitman Shops, which would each include large shelters to accommodate the higher ridership projected at these stations.

» **Seating** – Each shelter would include interior seating as an amenity for passengers waiting to board BRT. The typical shelters would include one interior bench, and the large shelters would include four interior benches, with each bench accommodating three people.

» **Variable Message Signage (VMS)** – Each shelter would include VMS, consisting of an electronic message board offering real-time information to alert riders of arriving BRT vehicles and potential delays. The proposed unit measures 5 feet by 1.5 feet and would accommodate two lines of movable text, programmed via computers in a remote location and powered through electric utility lines within or adjacent to the shelter. The VMS is proposed to be located on the back interior wall of each shelter, which would enable people both inside and outside the shelter to view the messages.

» **Way Finding Signage** – Each shelter would include way finding signage to orient passengers to the surrounding area and display BRT route maps, schedules, and fare information. The way finding panel would be located in the station area outside the shelter.

» **Bicycle Racks** – Bicycle racks are proposed at each BRT station to facilitate and encourage multi-modal trips, both to and from the station area. Each BRT station would include six bicycle racks (three on each side of the shelter), and each bicycle rack would accommodate two bicycles. Station design in Project Development can also consider the use of enclosed bicycle racks ("bikelids"), which provide additional protection and security for bicycle storage.

» **Trash Receptacles** – Each station area is proposed to include at least one trash receptacle, and the design would be coordinated with the shelter and other station amenities.

» **Trees and Landscaping** – Where possible, trees and other landscaping are proposed at BRT stations. The intent is for trees to grow and provide additional shade in the future to complement the shelter. Planting beds are proposed to promote stormwater mitigation and enhance the aesthetics of the station areas.

» **Tinted Concrete** – The sidewalk in front of each shelter is proposed to include tinted concrete to highlight the waiting area and further brand the BRT system.

All BRT passengers begin and end their trips as pedestrians, and thus it is important for adequate pedestrian accommodations to be in place to facilitate crossing Route 110. To maximize cost effectiveness, pedestrian improvements are only currently proposed at those station-specific intersections along Route 110 where sufficient pedestrian infrastructure does not currently exist and is not anticipated without this project. However, as noted earlier, the longer-term plan for BRT along Route 110 includes additional improvements to pedestrian and bicycle infrastructure.

The conceptual engineering effort identified three station locations that would require upgrades to pedestrian infrastructure to ensure that BRT riders would be able to safely cross Route 110, as shown in **Figure 29** and discussed below.

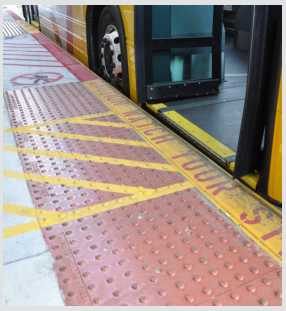
» **Planned LIRR Republic Station (Station 5)** – The northbound and southbound BRT stations are proposed to be located at the sites of the existing Suffolk County Transit bus stops on both sides of the train trestle that spans Route 110, half a block north of Conklin Street. To create a seamless transfer from BRT to LIRR (and vice versa) at the planned Republic Station, it should be possible to cross Route 110 midblock at this station location. It is anticipated that the design

LONGER-TERM ELEMENTS FOR ROUTE 110 BRT

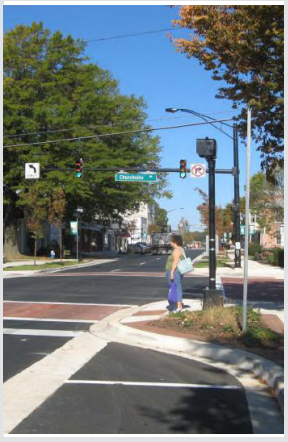
The *Connect Long Island* plan envisions the introduction of a premium transit service that transforms the way residents, workers, and visitors think about traveling to, from, and along Route 110. As noted in the 2009 FTA report, *Characteristics of Bus Rapid Transit for Decision-Making*, "BRT shows great promise for replicating many of the image attributes that attract choice riders to rail."

Therefore, the longer-term plan for BRT on Route 110 includes, among other things, significant station-area enhancements to further bolster the image of BRT and attract more choice riders. These enhancements include off-board fare collection, level boarding, and pedestrian improvements at station-area intersections. The cost estimates for the proposed project include these additional enhancements as options that could be pursued in the future to fulfill this longer-term plan. (Refer to Section 6.3.4)

Off-Board Fare Collection – As ridership demand grows, and as dwell times at the BRT stations increase due to greater numbers of boarding passengers, off-board fare collection could help improve travel time for riders. Off-board fare collection would reduce dwell times by enabling boarding at both the front and rear doors, accomplished through a proof-of-payment system whereby riders purchase tickets before boarding, and personnel would randomly inspect passengers' tickets to enforce the system. Implementation of off-board fare collection would require the provision of ticket vending machines at each BRT station and the necessary hardware and software.



Level Boarding – Implementation of level boarding could result in travel time savings by reducing the time for passenger boarding and alighting at BRT stations. Specifically, level boarding would eliminate the gaps between the station-area sidewalk and the vehicle floor, which enables faster boarding and alighting for all passengers, including the disabled and elderly. Level boarding could require a combination of low-floor BRT vehicles, raised curb, and precision vehicle docking to eliminate the horizontal gap between the station and vehicle. As an alternative to level boarding, near-level boarding could be implemented without precision docking, which could still reduce the time required for boarding and alighting (thus reducing dwell time and overall travel time) by decreasing the gaps between the station and vehicle.



Pedestrian Improvements at Station-Area Intersections – An attractive and safe pedestrian environment is a key element of a multi-modal transportation network. As such, targeted pedestrian improvements could further enhance the image of BRT, increase pedestrian safety, and help transform Route 110 into a pedestrian-friendly Corridor as a model for Complete Streets. These improvements could include: enhanced crosswalks (e.g., bricks with white lines on the border to increase visibility); Accessible Pedestrian Signals (APS) with audible walk indications/chirping for the visually impaired; pedestrian push buttons; sidewalk improvements as necessary to ensure that ramps are ADA accessible with tactile warning strips; and mid-block pedestrian refuge islands to improve safety (if feasible given the roadway geometry). NYSDOT is beginning work on a pedestrian safety project along Route 110 that will involve a range of intersection-specific improvements, and ongoing coordination with NYSDOT will be an important next step to promote integration of BRT with targeted pedestrian improvements.

Source: MTA New York City Transit, Context Sensitive Solutions, Star Tribune (2013)

of the LIRR Republic Station—coordinated with the East Farmingdale master development—will include elevated platforms that extend over Route 110, thereby connecting the LIRR station to both the northbound and southbound BRT stations and facilitating multi-modal connectivity and pedestrian safety. (The capital cost estimate for the proposed project does not include the cost of these elevated platforms, as it is assumed that this cost will be included in the design of the LIRR Republic Station.)

» **Walt Whitman/Duryea Road (Station 7)** – The southbound BRT station is proposed to be located on the west side of Route 110 within the grass triangle just south of Walt Whitman Road. The station as proposed would include sidewalk and crosswalk connections to ensure pedestrian safety for crossing Walt Whitman Road and Route 110 at this location.

» **Huntington Quadrangle (Station 8)** – There is a paved, raised median separating northbound and southbound traffic on Route 110 in the vicinity of Huntington Quadrangle. The southbound BRT station as proposed would include crosswalks and curb ramps connecting this station on the west side of Route 110 with the Huntington Quadrangle complex on the east side of Route 110.

Overall, each BRT station would include the elements listed above, provide accommodations for pedestrians to safely cross Route 110, and adhere to ADA guidelines.

Figure 30 and **Figure 31** include a sample perspective and elevation, respectively, of a large proposed BRT station. The specific design, materials, and color scheme of the proposed stations will be refined in Project Development. At the time of the completion of this Final Report, Suffolk County was reviewing proposals for branding and a strategic marketing campaign for the overall Suffolk County BRT system. It is anticipated that the Route 110 BRT station design will be a component of this forthcoming campaign to promote BRT as a new premium County-wide transit service.

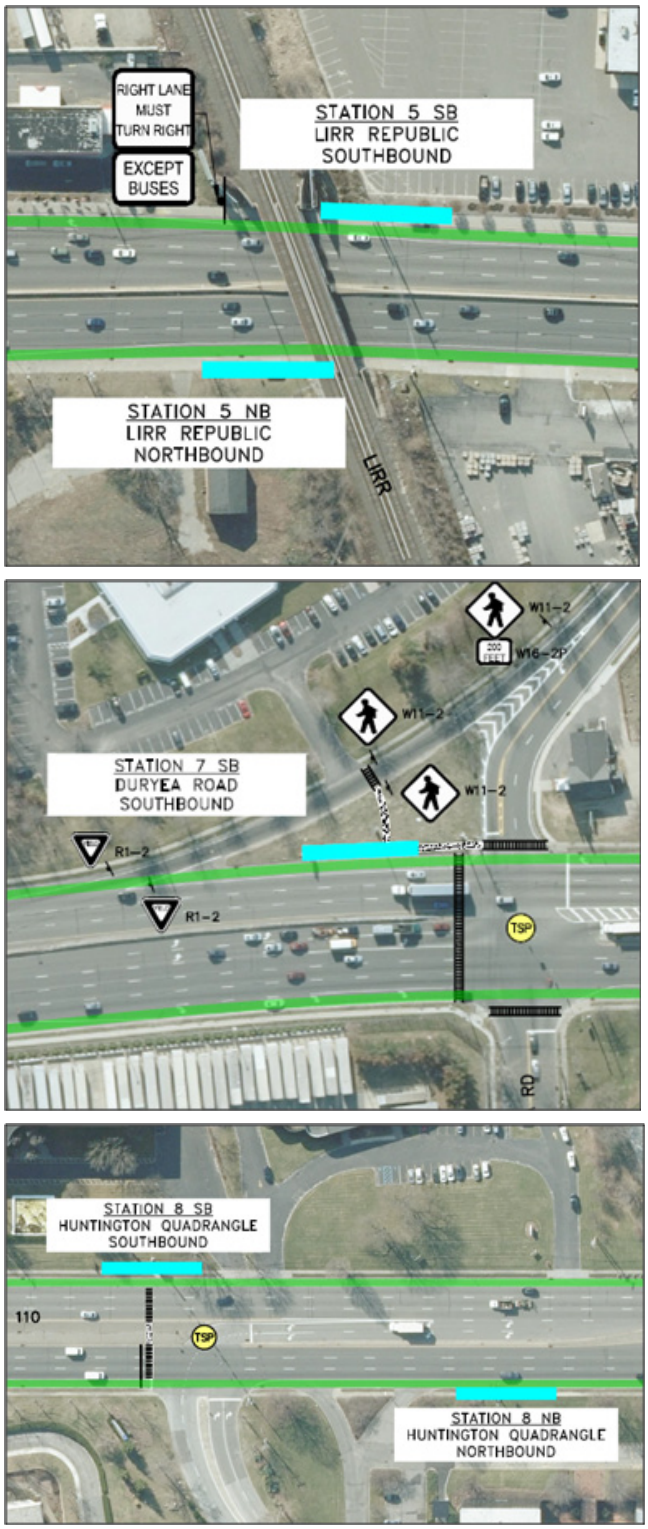


FIGURE 29: Locations of Proposed BRT Station-Specific Upgrades to Pedestrian Infrastructure
Source: Cameron Engineering (2015)

FIGURE 30: Sample Perspective of Large Proposed BRT Station

Source: B Thayer Associates (2015)

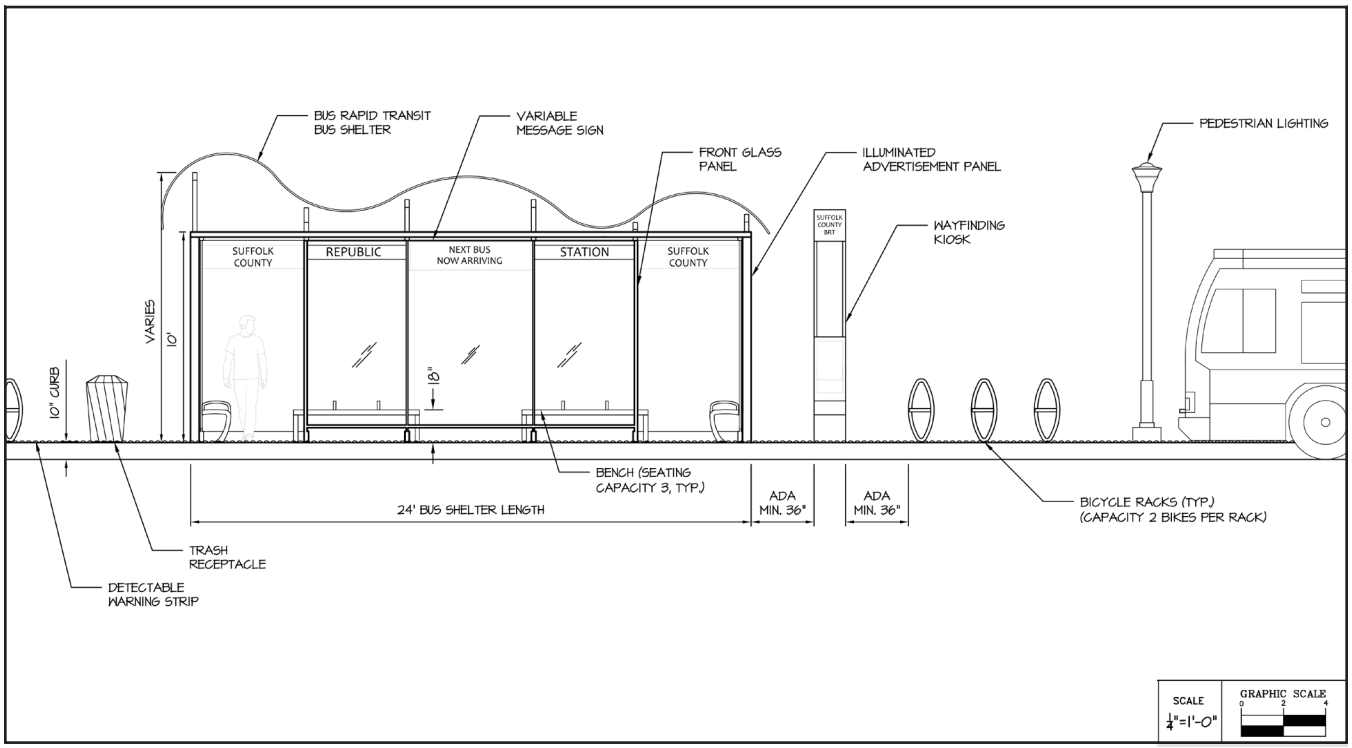


FIGURE 31: Sample Elevation of Large Proposed BRT Station

Source: B Thayer Associates (2015)

BRT Alignment

The 10% conceptual engineering effort defined the physical infrastructure components for the proposed BRT trunk route to a level of detail sufficient for:

» Identifying the lengths of dedicated BRT and mixed traffic alignment segments, for use in travel time forecasting and ridership modeling

» Identifying and minimizing potential ROW or utility conflicts

» Estimating capital costs

One of the elements of BRT that can distinguish this premium service from traditional bus service is the use of a dedicated BRT lane to improve travel time. Several segments of Route 110 with a wide existing shoulder can accommodate a dedicated BRT lane, which would enable BRT vehicles to bypass traffic congestion on the adjacent general purpose lanes.

Given the broader, long-term plan for the BRT service, and as discussed in Appendix G, the conceptual engineering effort also evaluated the feasibility of a median-running BRT alignment (as opposed to shoulder-running) on Route 110. Due to a combination of physical constraints, cost, and traffic operations considerations, it was determined that median-running is not practical along Route 110, and that shoulder-running would be proposed where feasible.

The following guidelines informed the process of identifying the locations along the trunk route that potentially can accommodate conversion of the existing shoulder into a dedicated BRT lane:

» A dedicated BRT lane would have 11-foot minimum lane widths.

» A general purpose lane would not be taken to accommodate a dedicated BRT lane.

» A dedicated BRT lane would only be proposed in areas with either a wide enough shoulder that could be repurposed into a travel lane, or an exclusive right turn lane that could reasonably be shared with through-moving BRT vehicles.

« One exception to the above guideline is that a dedicated BRT lane would not be proposed at this time within the approximately 1.7-mile segment of Route 110 between the LIE South Service Road and Arrowwood Lane, where the NYSDOT Route 110 Reconstruction and Bridge Projects are ongoing. This assumption was applied during the AA, but shoulder-running may be considered along this segment in coordination with NYSDOT during Project Development.

» In locations where existing shoulders are less than 11 feet wide, the shoulders would be widened to 11 feet, where feasible, via the following changes to the adjacent travel way (such as at Ritter Avenue and between Baylis Road and the LIE):

« Narrow the adjacent travel lane(s) from 12 feet to 11 feet, via restriping;
« Narrow the adjacent approach's left turn storage lane to 10 feet, via restriping; and/or
« Reduce the width of the Route 110 median, via physical construction.

» The potential loss of on-street parking informed the process of identifying BRT shoulder-running alignment segments.

« For instance, local businesses in downtown Amityville rely on the availability of on-street parking to attract patrons, which is vital to the vibrancy of the downtown. Therefore, the loss of highly utilized on-street parking would be significant in downtown Amityville, and thus the taking of on-street parking to accommodate shoulder-running was not proposed near the southern terminus of the trunk route.
« Overall, the conceptual engineering effort sought to maximize the shoulder-running segments of the BRT trunk route to achieve the objective of reducing travel time for transit users along Route 110. Appendix G includes a preliminary parking assessment that was performed during the AA to examine the potential adverse impacts that could result from restricting on-street parking through the proposed repurposing of the shoulder into a dedicated BRT lane along segments of Route 110. The assessment included field work to document on-street parking regulations and an inventory of peak period utilization of available on-street parking along those segments of Route 110 that are proposed for BRT shoulder-running. The preliminary assessment concluded that the proposed project could result in the loss of 22 on-street parking spaces, which is

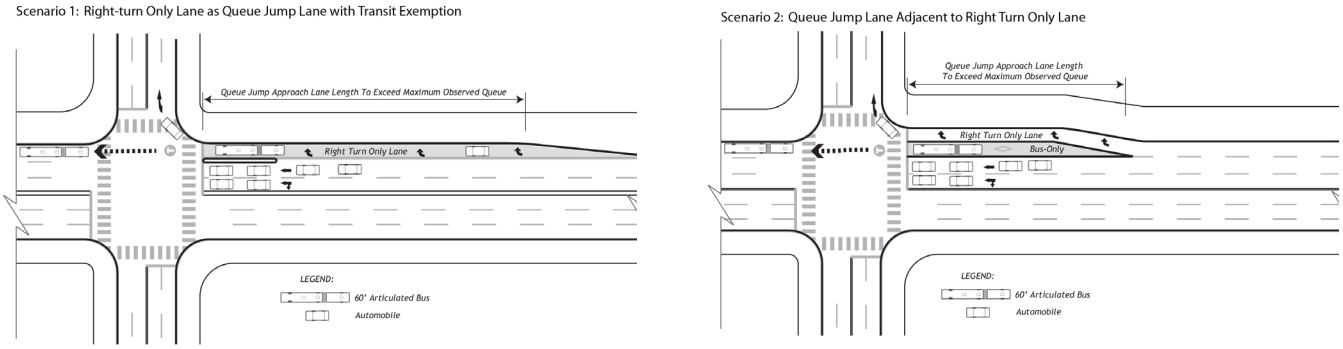


FIGURE 32: Schematic Queue Jump Intersection Modifications
Source: VTA Transit (2007)

relatively small considering the full BRT trunk route exceeds 10 miles in length.

The goal in defining and applying these guidelines was to maximize the overall length of the BRT shoulder-running alignment segments while avoiding closely-spaced transitions between shoulder-running and mixed traffic operations. The guidelines can be revisited and modified as necessary during Project Development that will follow this AA.

Based on these guidelines, the conceptual engineering work demonstrated that on the approximately 10.5-mile trunk route (including short segments off Route 110 near the northern and southern termini of the route), approximately 6.7 miles northbound and 6.5 miles southbound can accommodate BRT shoulder-running. Along other roadway segments, BRT would operate in mixed traffic with other vehicles.

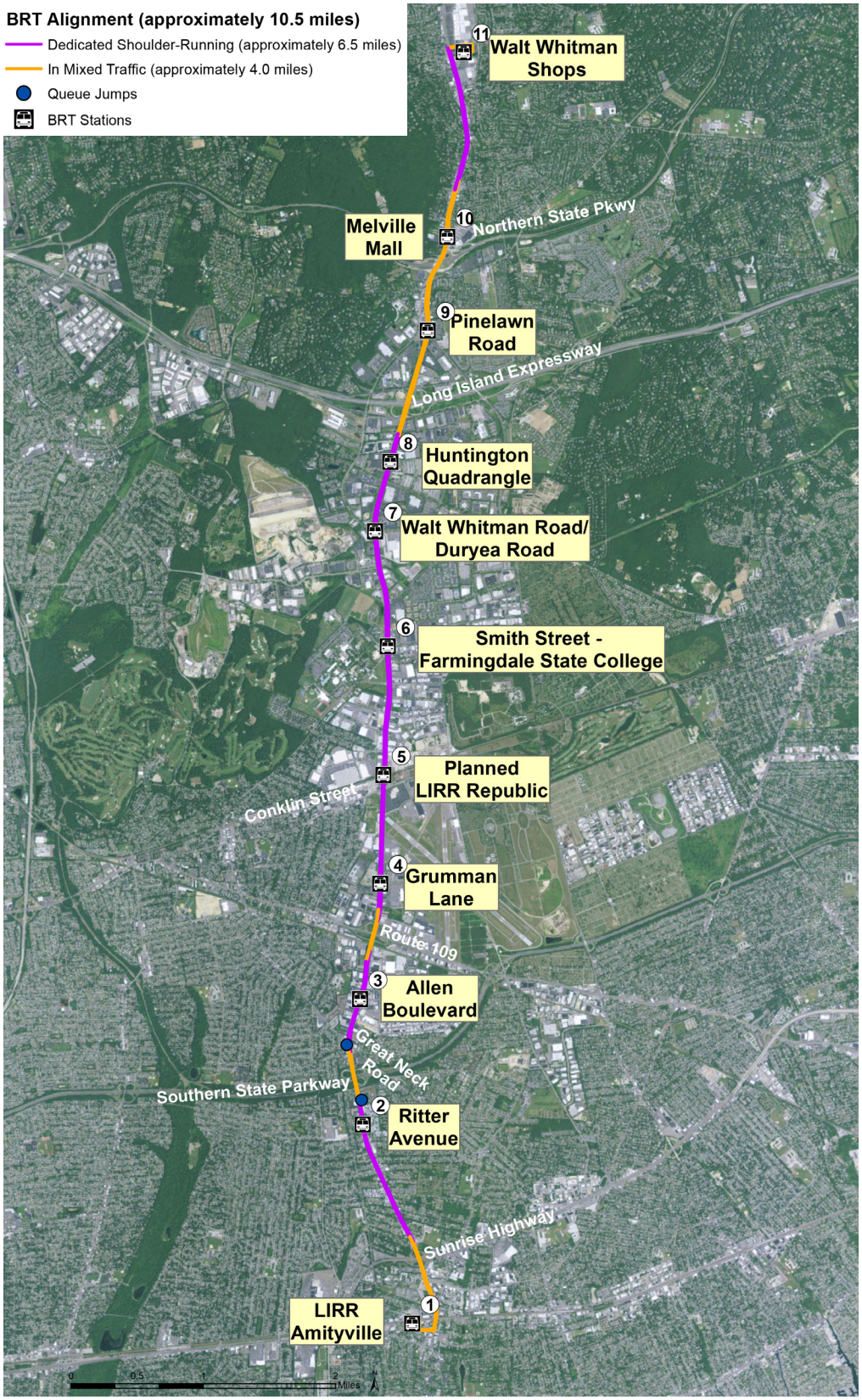
At two locations along the Route 110 BRT trunk route where the proposed transition from shoulder-running to mixed traffic occurs at signalized intersections (i.e., northbound at Brefni Street and southbound at Main Street/Great Neck Road), queue jumps are proposed to enable BRT vehicles to get a head start and merge into the general purpose lane. Queue jumps are intersection modifications to provide preferential treatment for BRT vehicles to move before the other vehicles on the same approach (**Figure 32**).

One low-cost option to achieve a queue jump, which is proposed at the northbound intersection of Route 110 and Brefni Street, is to shift back the stop lines for the other through lanes. This intersection modification would allow BRT vehicles that arrive at a red light to get ahead of the other vehicles once the light turns green, without requiring signal modifications. However, at major intersections that experience regular congestion on each approach, such as the intersection of Route 110 and Main Street/Great Neck Road, this option may not be feasible from a traffic operational standpoint. In such cases, queue jump implementation would require an additional signal face to provide an early green light for BRT vehicles to get ahead of other traffic.

The proposed alignment segments for dedicated BRT shoulder-running and mixed traffic operation are shown in **Figure 33** and listed in **Table 5** and **Table 6** for the northbound and southbound directions, respectively.

FIGURE 33: Proposed BRT Shoulder-Running and Mixed Traffic Alignment Segments

Source: ESRI basemaps, Parsons Brinckerhoff, Cameron Engineering (2015)



SEGMENT (SOUTH TO NORTH)	DISTANCE (NEAREST 0.1 MILES)	DEDICATED BRT SHOULDER-RUNNING	MIXED TRAFFIC
LIRR Amityville Station parking lot, Oak Street, and Route 110: BRT station at LIRR Amityville Station to 100 feet south of Division Street	1.0 miles	--	√
Route 110: 100 feet south of Division Street to Brefni Street	1.2 miles	√	--
Route 110: Brefni Street to 200 feet south of Great Neck Road/Main Street	0.4 miles	--	√
Route 110: 200 feet south of Great Neck Road/Main Street to 200 feet south of Route 109 eastbound entrance ramp	0.8 miles	√	--
Route 110: 200 feet south of Route 109 eastbound entrance ramp to 100 feet north of Route 109 westbound exit ramp	0.2 miles	--	√
Route 110: 100 feet north of Route 109 westbound exit ramp to 400 feet north of Melville Park Road	3.7 miles	√	--
Route 110: 400 feet north of Melville Park Road to 100 feet south of Croton Street	2.0 miles	--	√
Route 110: 100 feet south of Croton Street to Norwich Street entrance of Walt Whitman Shops	1.0 miles	√	--
Route 110 and Walt Whitman Shops parking lot: Norwich Street entrance of Walt Whitman Shops to BRT station at Walt Whitman Shops	0.2 miles	--	√
Total mileage	10.5 miles	6.7 miles	3.8 miles

TABLE 5: Proposed Northbound BRT Shoulder-Running and Mixed Traffic Alignment Segments

Source: Cameron Engineering, Parsons Brinckerhoff (2015)

SEGMENT (NORTH TO SOUTH)	DISTANCE (NEAREST 0.1 MILES)	DEDICATED BRT SHOULDER-RUNNING	MIXED TRAFFIC
Walt Whitman Shops parking lot and Route 110: BRT station at Walt Whitman Shops to Norwich Street entrance of Walt Whitman Shops	0.3 miles	--	√
Route 110: Norwich Street entrance of Walt Whitman Shops to 100 feet north of Yarmouth Street	1.1 miles	√	--
Route 110: 100 feet north of Yarmouth Street to 400 feet north of Melville Park Road	1.9 miles	--	√
Route 110: 400 feet north of Melville Park Road to 300 feet north of Route 109 westbound entrance ramp	3.6 miles	√	--
Route 110: 300 feet north of Route 109 westbound entrance ramp to 300 feet north of Executive Boulevard	0.4 miles	--	√
Route 110: 300 feet north of Executive Boulevard to Great Neck Road/ Main Street	0.7 miles	√	--
Route 110: Great Neck Road/Main Street to Brefni Street	0.4 miles	--	√
Route 110: Brefni Street to 300 feet north of Washington Avenue	1.1 miles	√	--
Route 110: 300 feet north of Washington Avenue to BRT station at LIRR Amityville Station	1.0 miles	--	√
Total mileage	10.5 miles	6.5 miles	4.0 miles

TABLE 6: Proposed Southbound BRT Shoulder-Running and Mixed Traffic Alignment Segments

Source: Cameron Engineering, Parsons Brinckerhoff (2015)

FIGURE 34: Sample BRT Lane Colored Pavement Treatment
Source: Cameron Engineering (2015)

The dedicated BRT shoulder-running segments are proposed to include the following design features:

» Colored pavement, "BRT Only," and symbolic pavement markings to visually distinguish the BRT lane from the remaining general purpose lanes (**Figure 34**). The intent would be to raise visibility of BRT and help brand the new system as a rapid transit service, as well as discourage other drivers from inadvertently crossing into the dedicated BRT lane.

» Signage to restrict on-street parking where it is not currently restricted.

» Signage to indicate "Right Lane BRT Only and Right Turns" at those intersections where the proposed BRT lane would share the exclusive right turn lane.

» Other signage to reinforce the dedicated use of the shoulder as a BRT lane, including "No Stopping Any Time" at regular intervals along the trunk route. However, the shoulder would continue to serve as an emergency access and breakdown lane for other traffic.

Implementation of shoulder-running along the proposed segments would require the redesign of several raised channelized islands at signalized intersections along the trunk route. Specifically, existing channelized islands at the following five intersections along Route 110 would need to be redesigned and reduced in size to accommodate BRT shoulder-running:

» Northbound Route 110 at Allen Boulevard

» Northbound Route 110 at Del Drive

» Southbound Route 110 at Milbar Boulevard/Melville Road

» Southbound Route 110 at Smith Street/Farmingdale State College

» Southbound Route 110 at Schwab Road

The necessary redesign of these islands would include changing the area and layout of the island, including relocating pedestrian signal poles. The conceptual engineering effort included schematic layouts (Appendix G) to confirm at this preliminary stage that the reduced-

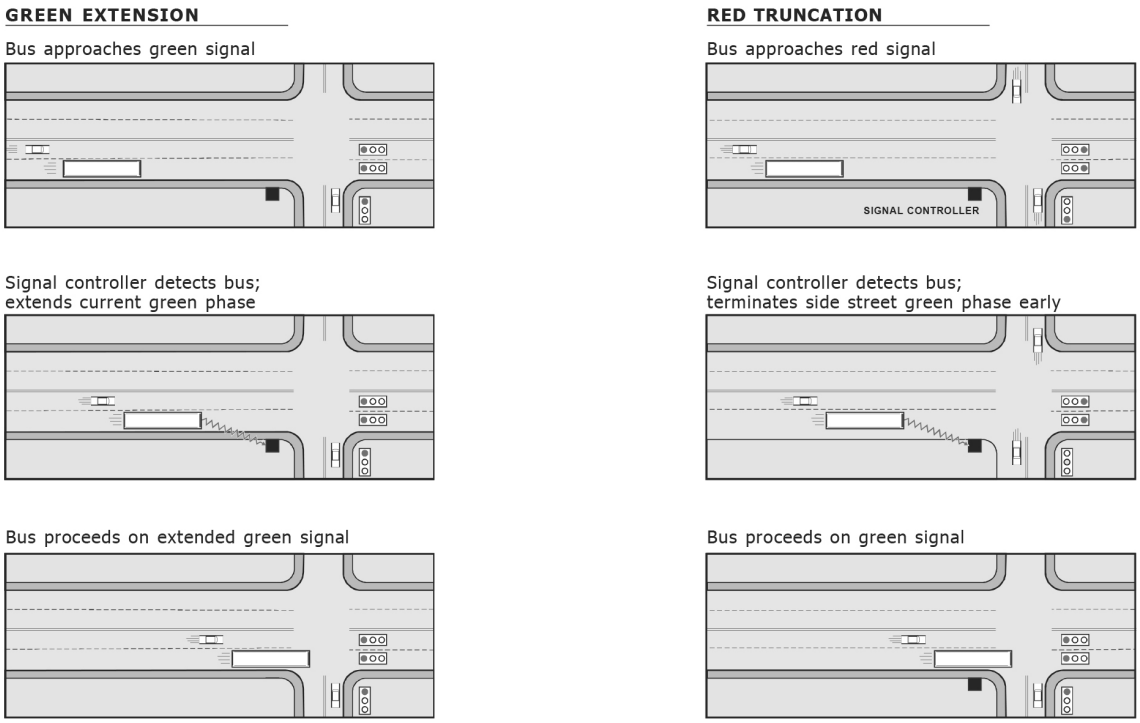


FIGURE 35: Schematic Representation of TSP
Source: TCRP Report 118 (2007)

size islands would be at least 100 square feet in area, as required to satisfy New York State highway design standards (per the NYSDOT Highway Design Manual). The proposed shoulder-running segments would avoid other utility conflicts along the trunk route.

In addition to shoulder-running, another way in which BRT results in travel time savings and faster service is through the use of TSP, which limits the waiting time at red lights. TSP can be achieved at signalized intersections through an extension of green time to allow the BRT vehicles to pass the intersection before the signal turns red, or through an earlier start of green time (red truncation) to allow the BRT vehicles to avoid the red light (**Figure 35**).

Many existing traffic signals on Route 110 already have emergency pre-emption known as "Opticom" detection, which changes an approach to a green light or maintains the green light for longer periods of time to accommodate an approaching emergency vehicle. To facilitate TSP, it is proposed that mobile transmitters would be provided on each BRT vehicle, which would communicate directly with individual traffic signal controllers as the vehicle approaches each signalized intersection.

Based on preliminary input from NYSDOT, all existing signal controllers along the BRT trunk route utilize up-to-date software, and it would not be necessary to replace the controllers to accept communication/pre-emption equipment. The BRT trunk route currently includes 44 signalized intersections, and TSP is proposed at each intersection, as shown on the alignment plans in Appendix G.

As part of the NYSDOT Route 110 Pedestrian Safety and Operational Improvements project, the following three additional intersections along Route 110 that are currently unsignalized will be converted to signalized intersections: Railroad Avenue in the Village of Amityville; Lindy Avenue/ Nathalie Avenue in North Amityville; and Amityville Road North in South Huntington. TSP can be considered at these intersections during Project Development that will follow this AA.

The 10% engineering in this AA will be refined in Project Development through Preliminary Engineering and Final Design, which are discussed in Section 9.

OPERATING PLAN FOR BRT TRUNK ROUTE SERVICE

After selecting the BRT station locations and determining the shoulder-running and mixed traffic alignment segments along the trunk route, the next step was to define an operating plan for the BRT trunk route service (Appendix H).

The operating plan was guided by the following service policy assumptions:

» **Span of service** – what hours will the service run?

  « Monday – Thursday: 5:30am – 10:00pm
  « Friday & Saturday: 5:30am – 12:00am
  « Sunday & Holiday: 6:00am – 10:00pm

» **Service frequency** – how often will the service run?

  « Weekdays: every 10 minutes during peak periods, and every 15 minutes during off-peak periods

    « Morning peak: 6:00am – 9:00am
    « Evening peak: 3:30pm – 6:30pm

  « Weekends & Holidays: every 20 minutes

As shown in **Table 7** and **Table 8**, the BRT trunk route is proposed to offer longer hours of service and more frequent service than the existing Suffolk County Transit S1 route. This service policy would help to brand BRT as a distinct, premium transit service compared to the existing local bus service.

The 35-foot-long, hybrid diesel-electric BRT vehicles that are proposed to serve the trunk route are consistent with the size of the typical existing Suffolk County Transit fixed-route bus fleet. At this time, it is assumed that the vehicles would include standard fare collection equipment that would integrate with existing Suffolk County Transit operations, and it is assumed that the BRT fare would be equivalent to the Suffolk County Transit fare. Aesthetic enhancements to the vehicles, potentially including paint schemes, styling options, and interior amenities, would help to brand and differentiate BRT as a premium service. The vehicles would be equipped with emitters that communicate directly with individual traffic signal controllers to activate TSP at signalized intersections. Additionally, the use of low-floor vehicles would enable future implementation of level boarding to reduce the time for passenger boarding and alighting at BRT stations.

SPAN OF SERVICE (NUMBER OF HOURS/DAY) ROUNDED TO THE NEAREST WHOLE NUMBER				
ROUTE	MONDAY – THURSDAY	FRIDAY	SATURDAY	SUNDAY & HOLIDAY
Existing Suffolk County Transit S1 Route	16 hours	16 hours	12 hours	12 hours[1]
Proposed Route 110 BRT Trunk Route	17 hours	19 hours	19 hours	16 hours

TABLE 7: Span of Service Comparison between Existing Suffolk County Transit S1 Route and Proposed Route 110 BRT Trunk Route

Source: Suffolk County Transit, Parsons Brinckerhoff, Nelson\Nygaard (2015)
[1] No service during observed holidays.

SERVICE FREQUENCY			
ROUTE	WEEKDAY PEAK	WEEKDAY OFF-PEAK	WEEKENDS
Existing Suffolk County Transit S1 Route	Every 15 minutes	Every 30 minutes	Every 60 minutes
Proposed Route 110 BRT Trunk Route	Every 10 minutes	Every 15 minutes	Every 20 minutes

TABLE 8: Service Frequency Comparison between Existing Suffolk County Transit S1 Route and Proposed Route 110 BRT Trunk Route

Source: Suffolk County Transit, Parsons Brinckerhoff, Nelson\Nygaard (2015)

Specifically, if combined with a raised curb, the use of low-floor vehicles would decrease the gap between the station-area sidewalk and the vehicle floor, thereby enabling faster boarding and alighting for all passengers, including the disabled and elderly.

The base operating speed of the proposed BRT service was estimated for the morning and evening peak periods, as well as off-peak periods, based on travel time runs conducted on a typical Tuesday, Wednesday, or Thursday. Midday (11:30am – 1:30pm) was used as a proxy for off-peak periods. For each roadway segment during each time period and in each direction (i.e., northbound and southbound), travel speed was calculated by dividing the intersection-to-intersection distance by observed travel time. Multiple travel time runs were conducted for each time period, and an average travel speed by roadway segment was calculated for each time period. When extrapolating from this data to plan the proposed

BRT service, a dwell time of 30 seconds per BRT station was assumed, which is consistent with typical industry standards.

After calculating the base operating speed of the proposed BRT service, the following assumptions regarding time savings were applied based on guidance from the Transit Cooperative Research Program (TCRP) Report 118, B*us Rapid Transit Practitioner's Guide* (Exhibits 5-5 and 5-8):

» TSP would result in travel time savings of five seconds per intersection for each signalized intersection in which TSP is activated. To be conservative, while TSP is proposed for all existing signalized intersections along the BRT trunk route, it was assumed that TSP would be activated at 50% of intersections during any given run. At the other 50% of intersections during any given run, it was assumed that the light would already be green, and thus the BRT vehicles would not need to activate TSP.

» Shoulder-running would result in travel time savings of 36 seconds per mile. This time savings would only be applied along those portions of the BRT trunk route that are proposed for shoulder-running.

In addition to TSP and shoulder-running, another element of the proposed BRT trunk route that would result in travel time savings is limited-stop service. Whereas the existing Suffolk County Transit S1 route makes 40 stops from the LIRR Amityville Station to the Walt Whitman Shops, the proposed BRT service would only make 11 stops. To make each stop, the transit vehicle must decelerate and subsequently wait for passengers to board and alight. Therefore, passengers on the BRT service would benefit from time savings due to fewer overall stops.

The combination of TSP, shoulder-running, and limited-stop service is projected to result in significant time savings and faster operating speeds for BRT as compared to the existing local bus service, thereby making travel by BRT competitive with travel by automobile. Travel time and average speed by mode between the LIRR Amityville Station and Walt Whitman Shops in both directions during the morning peak period is summarized in **Table 9**. BRT is projected to save 15-20 minutes compared to the existing Suffolk County Transit S1 service, as well as one minute compared to travel by automobile.

Travel time savings and faster operating speeds would reinforce the image of BRT as a premium service. The ability of BRT to bypass traffic congestion through the use of TSP and shoulder-running—complemented by limited-stop service that would reduce overall dwell time and the number of instances of decelerating to make stops—would distinguish BRT from the local bus service and help to attract choice riders, in addition to providing improved service for the transit-dependent population.

	NORTHBOUND		SOUTHBOUND	
MODE	TRAVEL TIME	AVERAGE SPEED	TRAVEL TIME	AVERAGE SPEED
Existing Suffolk County Transit S1 Service[1]	45 minutes	14.0 mph	35 minutes	18.0 mph
Automobile (Field-Verified)[2]	27 minutes	23.3 mph	21 minutes	30.0 mph
BRT (Projected)[3]	**26 minutes**	**24.2 mph**	**20 minutes**	**31.5 mph**

TABLE 9: Travel Time and Average Speed between LIRR Amityville Station and Walt Whitman Shops – Comparison by Mode during the Morning Peak Period

Sources: [1] Suffolk County Transit; [2] Traffic Databank; [3] Parsons Brinckerhoff and Nelson\Nygaard (2015)

6.3.2 FEEDER ROUTES

IDENTIFICATION OF FEEDER ROUTE ALIGNMENTS AND STATION LOCATIONS

The principal objective of the feeder routes is to provide the last-mile connection between Route 110 and activity centers located beyond a reasonable walking distance from the Corridor. After defining the BRT trunk route, the next step in developing the Short List Alternatives was to specify the feeder route and station locations for the two Short List Alternatives. Whereas the proposed BRT trunk route is the same for the two Short List Alternatives, the feeder routes that would complement the BRT service differ among the two alternatives.

As originally defined for the Long List Alternatives, Alternative D would feature the BRT trunk route along Route 110 with circular feeder routes, and Alternative E would feature the BRT trunk route along Route 110 with transit center nodes and connecting feeder routes.

As shown in **Figure 36** and **Figure 37**, respectively, Alternatives D and E are proposed to include the following feeder routes:

» **Alternative D Feeder Routes**

« **D1 – Farmingdale State College**

This circular feeder route would serve Farmingdale State College and Broad Hollow Bioscience Park with one-way service that runs clockwise through the college campus, entering at Melville Road and exiting at Smith Street. There are seven total proposed station locations, two of which would be co-located with BRT stations along Route 110 (i.e., the planned LIRR Republic Station and Smith Street).

« **D2 – Ruland Road/Smith Street**

This circular feeder route would serve residential communities within walking distance of Ruland Road (i.e., Country Pointe in Melville and Avalon Court), as well as multiple entrances to Newsday and various employers along Pinelawn Road and Smith Street to the east of Route 110. The one-way (clockwise) route would include 13 stations, one of which would be co-located with a BRT station along Route 110 (i.e., Smith Street).

« **D3 – Walt Whitman/Pinelawn Road**

This circular feeder route would serve a variety of origins and destinations to the west and east of Route 110. Specifically, the route would serve a combination of residential communities within walking distance of Walt Whitman Road (i.e., the Coves at Melville, the Villas, Northgate, and Millennium Hills), several large employers (e.g., Canon, Nikon, and Estee Lauder), the back side of the Huntington Quadrangle office complex on Maxess Road, and other activity centers (e.g., Melville Marriott on Walt Whitman Road and employers on Corporate Center Drive). The proposed route would provide two-way service (both clockwise and counter-clockwise), with 18 station locations in each direction. Transfers between the feeder route and the BRT trunk route would be available at Walt Whitman/Duryea Road and Pinelawn Road.

» **Alternative E Feeder Routes**

« **E1 – Farmingdale State College**

This circular feeder route would be the same as feeder route D1 above.

« **E2 – Walt Whitman Road**

This feeder route—anchored by transit center nodes at the planned LIRR Republic Station and Pinelawn Road—would serve the residential communities, major employers, and other activity centers within walking distance of Walt Whitman Road to the west of Route 110, similar to the western portion of feeder route D3. The proposed route would provide two-way service (northbound and southbound), with 12 station locations in each direction. Three of the station locations would be co-located with BRT stations along Route 110 (i.e., the planned LIRR Republic Station, Smith Street, and Pinelawn Road), and an additional transfer would be available at Walt Whitman/Duryea Road.

« **E3 – New Highway/Pinelawn Road**

Similar to feeder route E2, this feeder route would be anchored by transit center nodes at the planned LIRR Republic Station and Pinelawn Road. The route would serve a combination of residential communities, major employers, and other activity centers to the east of Route 110, including along New Highway/Republic Road, Ruland Road, Old Baylis Road, Maxess Road, Corporate Center Drive, and Pinelawn Road. The proposed route would provide two-way service (northbound and southbound), with 18 station locations in each direction. Two of the station locations would be co-located with BRT stations along Route 110 (i.e., the planned LIRR Republic Station and Pinelawn Road).

The proposed feeder route alignments and station locations were defined for each of the alternatives based on the following process:

» **Define the feeder route service area**

The proposed feeder routes for the two Short List Alternatives cover a service area that includes portions of East Farmingdale in the Town of Babylon and Melville in the Town of Huntington, and specifically from Conklin Street in the south to Pinelawn Road/Route 110 in the north within the project study area. Consistent with the study area boundaries, the feeder route service area extends east as far as Wellwood Avenue in East Farmingdale, and west as far Walt Whitman Road in Melville, also including the Farmingdale State College campus.

This service area was defined to comprise the area with the largest concentration of activity centers off the main spine of Route 110 that would likely derive the greatest benefit from improved transit service. The existing bus and rail network offers inadequate service to major trip generators and attractors in this area. Therefore, feeder route service to complement the proposed BRT trunk route service could effectively fill a gap in existing transit service and provide more transportation choices for workers, residents, and visitors in this area.

» **Identify major origins and destinations beyond a reasonable walking distance from Route 110**

After defining the feeder route service area, the next step was to identify key activity centers in this area that warrant improved transit service given their distance from Route 110. A number of significant employers are located along the outer edges of this service area, including the Nikon and Canon USA headquarters along Walt Whitman Road to the west of Route 110, as well as Newsday and Estee Lauder along Pinelawn Road to the east of Route 110. Feeder route service could provide the last-mile connection for workers to access these major destinations.

Furthermore, feeder service to the back of Huntington Quadrangle on Maxess Road could complement the BRT trunk route service to the front of the office complexes along Route 110. The provision of direct, convenient transit access to the Huntington Quadrangle, as well as other employment and activity centers, could help to attract choice riders who would otherwise drive.

Additionally, the feeder route service area also includes a number of residential communities that could benefit from improved transit service. As noted in the discussion of the BRT trunk route, it is ideal to serve a combination of origins and destinations to achieve the objective of maximizing ridership potential. Therefore, feeder route service to such residential communities as the Coves at Melville, the Villas, and Northgate off Walt Whitman Road to the west of Route 110, as well as Country Pointe in Melville and Avalon Court off Ruland Road to the east of Route 110, could effectively complement the service to major employers and other destinations.

» **Determine potential transfer points**

One fundamental purpose of this AA is to enhance multi-modal connectivity because direct connections between different transit services are currently limited and lack coordination. As such, the process of determining the feeder route alignments and station locations was informed by the objective to provide seamless multi-modal connections, thereby improving the customer experience and helping to attract choice riders.

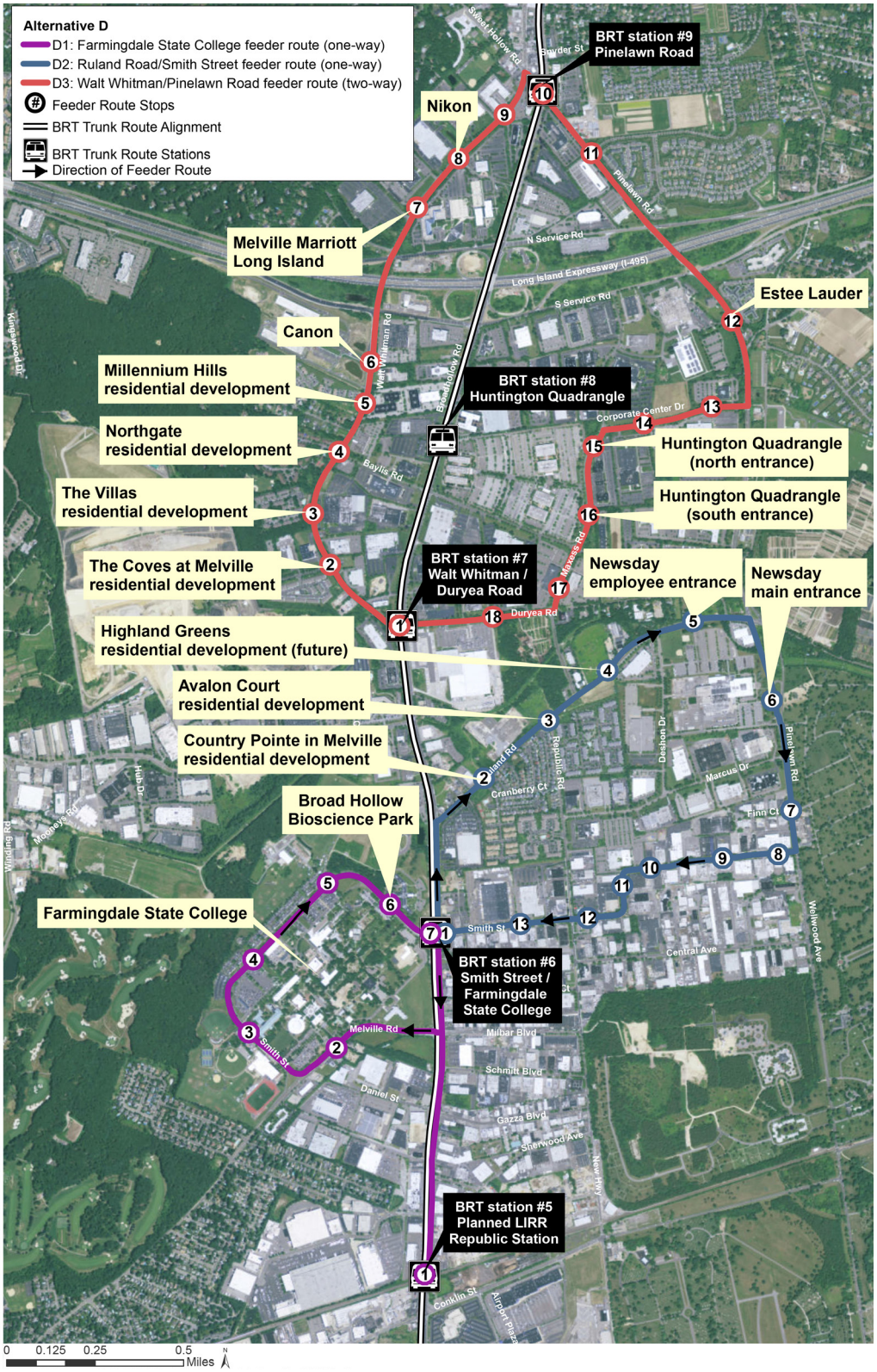
After the proposed BRT stations were finalized, the feeder route alignments were determined in part through identifying logical transfer points. For both Alternatives D and E, convenient transfers between the proposed BRT trunk and feeder routes—in addition to the existing local bus service—would be offered at the following locations along Route 110:

« Planned LIRR Republic Station
« Smith Street – Farmingdale State College
« Walt Whitman/Duryea Road
« Pinelawn Road

All of these locations would facilitate seamless transfers between BRT trunk route service along Route 110 and feeder route service to the east and west of Route 110. Additionally, the planned LIRR Republic Station would offer the unique opportunity to increase regional public transit access to the study area from surrounding municipalities and counties, with convenient connections to both BRT trunk and feeder route service.

FIGURE 36: Proposed Feeder Routes for Alternative D

Source: ESRI basemaps, Parsons Brinckerhoff, Nelson\Nygaard (2015)



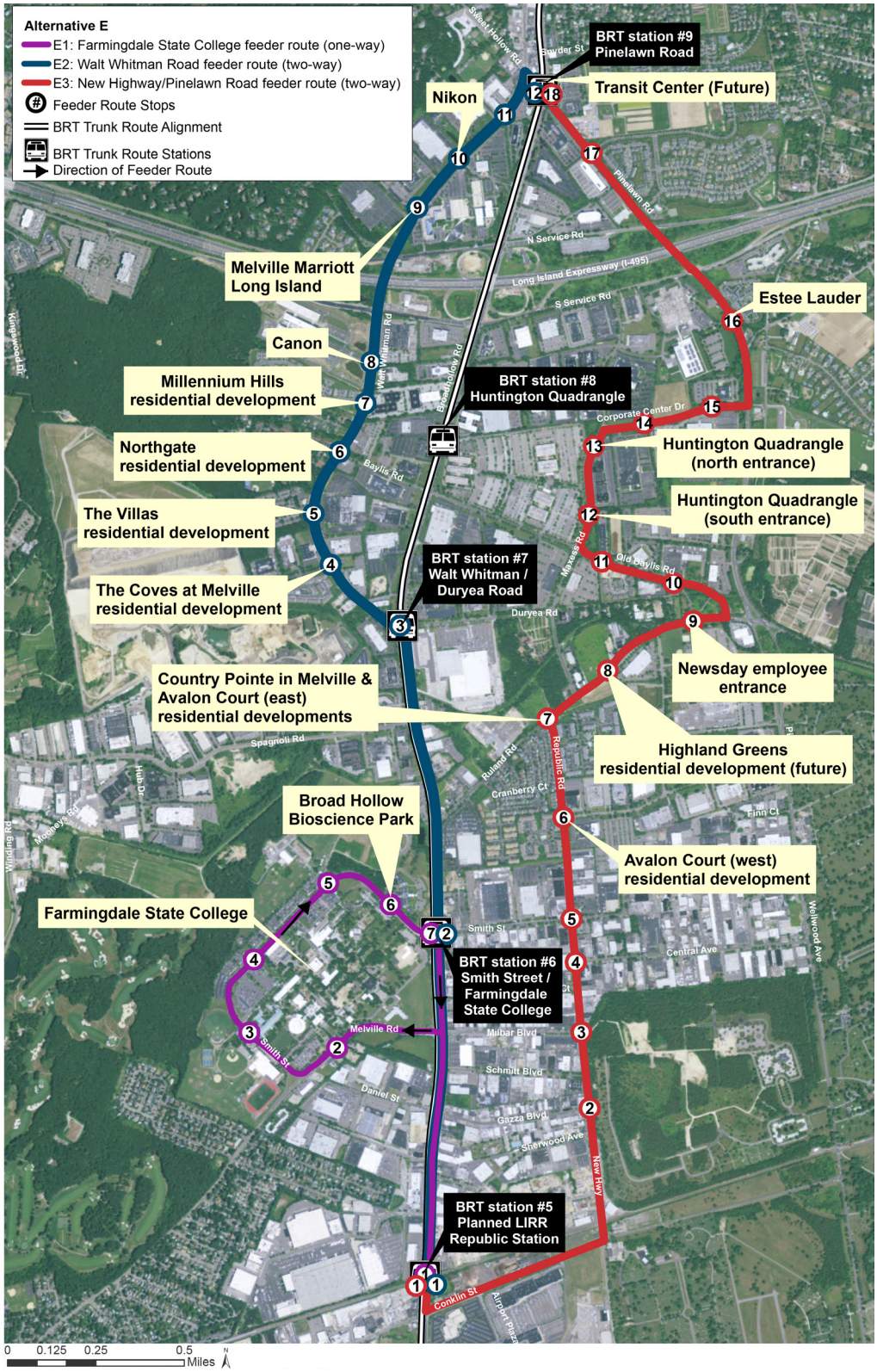


FIGURE 37: Proposed Feeder Routes for Alternative E

Source: ESRI basemaps, Parsons Brinckerhoff, Nelson\Nygaard (2015)

» **Minimize duplicative service**

The process of determining the feeder route alignments sought to minimize overlaps between different feeder routes, while maximizing coverage of the overall network. The feeder routes were not planned in isolation, and instead were viewed as components of the regional transit system that could effectively fill gaps in existing service offerings.

Therefore, to the extent practical, the objective was to minimize multiple feeder routes that would provide duplicative service. However, several proposed feeder routes would overlap for minimal distances along Route 110 to create transfer opportunities with the BRT trunk route, and also to benefit from the travel time savings made possible through TSP and shoulder-running along Route 110.

It was also important to propose feeder routes for Alternatives D and E that would be different enough to facilitate a comparison and evaluation of the two Short List Alternatives. As such, with the exception of the Farmingdale State College feeder route, which is the same for the two alternatives, the other feeder routes that comprise Alternatives D and E have different alignments and combinations of station locations.

» **Simplify and optimize transit operations**

Operational considerations guided the upfront process of determining the alignments of the feeder routes. The operational effectiveness of a transit service is informed in part by the simplicity and directness of the routing, which depends in part on traffic operations and roadway geometry. For instance, to simplify operations for the proposed feeder route services, one-way roads in the study area were avoided when planning two-way feeder routes. Therefore, the LIE North and South Service Roads—which are one-way running westbound and eastbound, respectively—were not considered as options for two-way feeder route service, but this can be further explored during Project Development.

Additionally, the decision to propose one-way service for some feeder routes, and two-way service for others, was guided by operational considerations. Two of the three feeder routes for Alternative E are proposed to offer two-way service (**Figure 37**), while one of the three feeder routes for Alternative D is proposed to offer two-way service (**Figure 36**), with the other routes proposed to offer one-way service. Travel time between the proposed feeder route stations and the proposed BRT stations, reflecting both the distance from Route 110 and also the direction of service, was a key determinant in the process of deciding whether feeder routes would offer one-way or two-way service.

Another guideline that informed the process of determining the feeder route alignments was to avoid using private roads or public roads that cut through private properties. However, the 2010 *Route 110 BRT Study* suggested that it could be possible to create "transit shortcuts" by establishing agreements with adjacent property owners to link their parking lots. The AA process identified the potential application of the transit shortcuts concept to the two Short List Alternatives, which can be revisited during Project Development. (Refer to page 95.)

OPERATING PLANS FOR FEEDER ROUTE SERVICE

To maximize connectivity between the BRT and feeder route services, operating plans for the feeder routes were developed that were guided by the same service policy assumptions that were applied for the BRT trunk route. In this early stage of service planning, the frequency and span of service were assumed to be the same for the feeder routes and the BRT trunk route in order to maximize ridership potential by providing timed connections for all trips. During subsequent stages of service planning, different service policy assumptions for the feeder routes could be explored to reduce projected operating expenses.

The approximately 24-foot-long shuttle bus vehicles that are proposed to serve the feeder routes are comparable in size to the existing Suffolk County Transit paratransit bus fleet. The vehicles would include standard fare collection equipment to integrate with existing Suffolk County Transit operations, and, at this point in the process, it is assumed that the feeder route fare would be equivalent to the Suffolk County Transit fare, although other fare options could be explored in Project Development. Aesthetic enhancements to the shuttle bus vehicles would help to brand the feeder routes as complementary to the BRT trunk route service.

The operating speeds of the proposed feeder route services were estimated based on travel time runs conducted on a typical Tuesday, Wednesday, or Thursday. For each feeder route, the travel time runs simulated the proposed service, which included making stops at 50% of the proposed

FEEDER ROUTE "TRANSIT SHORTCUTS"

Transit shortcuts within parking lots could enable the feeder route vehicles to travel in a more direct path between major employment centers than if the vehicles had to remain on public roads, potentially resulting in travel time savings. Additionally, routing the feeder routes through parking lots that often bisect adjacent buildings could potentially expand the catchment area for the feeder route service. Furthermore, the transit shortcuts concept could facilitate locating feeder route stations behind office buildings, thereby offering additional convenience for employees who often enter through the back door closest to the parking lot. The transit shortcuts could also create opportunities for potential funding and financing partnerships with property owners and major employers, such as through branding and sponsorship.

As shown in **Figure 38** through **Figure 41**, and as discussed in Appendix H, four potential feeder route transit shortcuts were identified in the AA. These and other potential transit shortcuts could be further explored during Project Development.

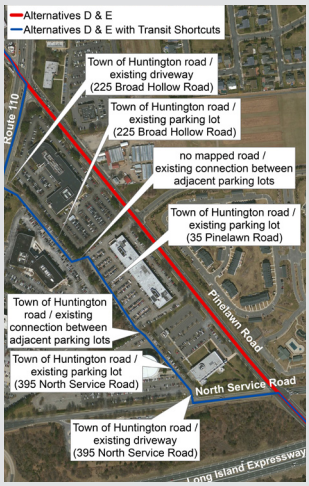


FIGURE 38: Potential Transit Shortcut between the LIE and the Route 110/Pinelawn Road intersection
Source: ESRI basemaps, Parsons Brinckerhoff (2015)

FIGURE 40: Potential Transit Shortcut within the Huntington Quadrangle
Source: ESRI basemaps, Parsons Brinckerhoff (2015)

FIGURE 39: Potential Transit Shortcut between Maxess Road and Pinelawn Road
Source: ESRI basemaps, Parsons Brinckerhoff (2015)

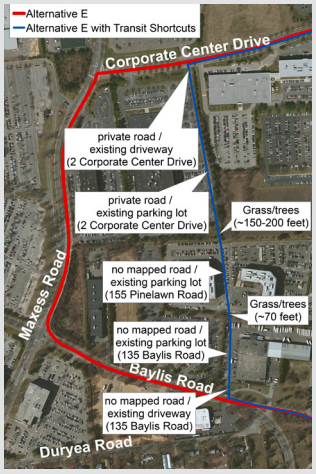


FIGURE 41: Potential Transit Shortcut between Baylis Road and Corporate Center Drive
Source: ESRI basemaps, Parsons Brinckerhoff (2015)

ALTERNATIVE	FEEDER ROUTE	DISTANCE	DIRECTION	TRAVEL TIME (PROJECTED)	AVERAGE SPEED
Alternative D	D1: Farmingdale State College	3.2 miles	One-way (clockwise)	11 minutes	17.5 mph
	D2: Ruland Road/Smith Street	3.2 miles	One-way (clockwise)	11 minutes	17.5 mph
	D3: Walt Whitman/Pinelawn Road	4.4 miles	Clockwise	17 minutes	15.5 mph
			Counter-clockwise	18 minutes	14.7 mph
Alternative E	E1: Farmingdale State College	3.2 miles	One-way (clockwise)	11 minutes	17.5 mph
	E2: Walt Whitman Road	3.8 miles	Northbound	15 minutes	15.2 mph
			Southbound	13 minutes	17.5 mph
	E3: New Highway/Pinelawn Road	5.1 miles	Northbound	21 minutes	14.6 mph
			Southbound	20 minutes	15.3 mph

TABLE 10: Feeder Route Distances, Travel Times, and Average Speeds during the Morning Peak Period

Sources: Parsons Brinckerhoff, Nelson\Nygaard (2015)

station locations and dwelling for 20 seconds at each station stop to simulate passenger boarding and alighting. The 20-second dwell time at each stop was based on the premise that boarding and alighting at each stop would require less time than for the stations along the trunk route because of lower projected ridership demand for the feeder routes.

The distance, projected travel time, and associated average speed from the first stop to the last stop during the morning peak period is summarized in **Table 10** for each of the feeder routes in each direction (if applicable). Feeder routes D1 and E1 (Farmingdale State College), as well as feeder route D2 (Ruland Road/Smith Street), have the shortest distance and projected travel time (3.2 miles and 11 minutes, respectively), as well as the highest average speed (17.5 mph). Feeder route E3 (New Highway/Pinelawn Road) has the greatest distance between the first and last stops (5.1 miles), and the northbound direction has the highest projected travel time and lowest average speed (21 minutes and 14.6 mph, respectively).

6.3.3 RIDERSHIP FORECAST

OVERVIEW AND METHODOLOGY

Ridership forecasting was a critical component of the AA process, as it informed the evaluation of the Short List Alternatives. The ridership forecasting effort was conducted using the FTA's Simplified Trips-on-Project Software (STOPS) model (Version 1.5, released May 2015), which is explicitly referenced in the FTA New and Small Starts Evaluation and Rating Process Final Policy Guidance as a tool that can significantly streamline generation of ridership estimates and vehicle-miles traveled data for use in the evaluation of alternatives. Once calibrated, STOPS utilized demographic forecasts from NYMTC to represent expected changes in population and employment and generate ridership estimates for transit use in the future with and without the BRT and feeder route services for the Short List Alternatives (Appendix I).

The STOPS model used the following information as inputs to the ridership forecast:

» NYMTC forecasts of population and employment by Transportation Analysis Zone (TAZ) for 2000, 2014, and 2040

» Year 2000 work trip-making by all persons using all modes of transportation obtained from the 2000 CTPP Journey-to-Work flows

» Highway travel times obtained from the NYMTC regional forecasting model

» Transit schedule data provided by Suffolk County Transit, NICE, and LIRR in General Transit Feed Specification (GTFS) format, supplemented by hand-coded representations of HART service

» Year 2000 transit mode shares from the Census Journey-to-Work

» Transit boardings by station, stop, and route for Suffolk County Transit

The ridership forecasting effort incorporated the following assumptions regarding future transit service in 2040:

» All existing bus services will continue to operate without any service modifications

» The planned LIRR Republic Station will be operational

» LIRR East Side Access, Double Track, and Third Track projects will be complete

» Service frequency to LIRR Republic Station will include 20-minute peak headways (peak period, peak direction) and 30-minute reverse peak and off-peak headways

Assumptions regarding LIRR service in 2040 are based on preliminary discussions with the LIRR during the AA process. The assumptions can be revisited and revised as necessary during Project Development that will follow the AA.

The STOPS model was used to estimate transit ridership for the following scenarios:

» **2014 Existing** – 2014 estimates of population and employment, as well as current transit schedules for the LIRR, Suffolk County Transit, NICE, and HART.

» **2040 No-Build** – 2040 estimates of population and employment, as well as transit schedules reflecting the assumptions listed above. This scenario served as a baseline for comparing the anticipated ridership of the Short List Alternatives.

» **2040 Alternative D** – 2040 estimates of population and employment, the 2040 No-Build transit schedules reflecting the assumptions listed above, and additional service representing the BRT trunk route and Alternative D feeder routes.

» **2040 Alternative E** – 2040 estimates of population and employment, the 2040 No-Build transit schedules reflecting the assumptions listed above, and additional service representing the BRT trunk route and Alternative E feeder routes.

The current year for this analysis was 2014, based on the commencement of the AA project in 2014 and the availability of data obtained from Suffolk County Transit and NYMTC. In addition to estimating ridership for the Short List Alternatives in the horizon year (2040), the STOPS model also generated ridership forecasts for the two alternatives for the current year (Appendix I).

RIDERSHIP FORECASTING RESULTS

The results of the ridership forecast are presented as number of weekday boardings by scenario (rounded to the nearest five boardings) in **Table 11** through **Table 14**. The number of weekday boardings can be interpreted as the number of people who board any given route or service, often referred to as "unlinked trips" when summed over the entire transit network. Since unlinked trips represent the total number of boardings, a trip that includes one transfer would be counted as two boardings or two unlinked trips (i.e., one for the first vehicle that was boarded and another for the transfer). The output of the STOPS model also included a forecast of "linked trips," which count just the original boarding for all trips that connect home, work, and other origins or destinations (Appendix I).

Table 11 presents an overview of the ridership forecast results for each of the scenarios, including a summary of the number of weekday boardings for the proposed BRT service, the proposed feeder route service, and existing Suffolk County Transit routes that operate within the study area. Compared to the 2014 Existing and 2040 No-Build scenarios, the 2040 Alternative D and 2040 Alternative E scenarios add the proposed BRT route—which is the same for both alternatives—as well as the respective feeder routes for each alternative.

Key ridership statistics include the following:

» The 2040 No-Build scenario attracts 4,660 weekday boardings on the Suffolk County Transit S1 route, a nearly 70% increase over the 2014 Existing scenario. This growth is a result of increases of corridor population and employment and transit ridership increases associated with improvements to LIRR service and increases in highway travel times between Route 110 and New York City.

TABLE 11: SummarizedRidership Forecast (Weekday Boardings, by Scenario)

Source: RSG, Parsons Brinckerhoff (2015)

ROUTE	2014 EXISTING (STOPS CALIBRATED ESTIMATE)	2040 NO-BUILD	2040 ALTERNATIVE D	2040 ALTERNATIVE E
Proposed BRT	--	--	3,910	3,135
Proposed Feeder Routes (Combined)	--	--	685	1,520
Subtotal, Proposed BRT and Feeder Routes (Combined)	--	--	4,595	4,655
Suffolk County Transit S1 Route	2,785	4,660	2,405	2,325
Total, All Routes	2,785	4,660	7,000	6,980

TABLE 12: BRT Station Ridership Forecast (Weekday Boardings, by Scenario)

Source: RSG, Parsons Brinckerhoff (2015)

Note: Refer to Figure 27 for a comparison to existing Suffolk County Transit ridership.

BRT STATION	2040 ALTERNATIVE D	2040 ALTERNATIVE E
LIRR Amityville Station	715	645
Ritter Avenue	170	160
Allen Boulevard	205	200
Grumman Lane	45	45
Planned LIRR Republic Station	1,025	725
Smith Street – Farmingdale State College	145	95
Walt Whitman Road/Duryea Road	290	170
Huntington Quadrangle	230	145
Pinelawn Road	290	170
Melville Mall	340	325
Walt Whitman Shops	455	455
Total, All BRT Stations	3,910	3,135

TABLE 13: FeederRouteRidership Forecast (Weekday Boardings, by Scenario)

Source: RSG, Parsons Brinckerhoff (2015)

FEEDER ROUTE	2040 ALTERNATIVE D	2040 ALTERNATIVE E
D1: Farmingdale State College	285	--
D2: Ruland Road/Smith Street	50	--
D3: Walt Whitman/Pinelawn Road	350	--
E1: Farmingdale State College	--	240
E2: Walt Whitman Road	--	885
E3: New Highway/Pinelawn Road	--	395
Total, All Feeder Routes	685	1,520

TABLE 14: Ridership Forecast – Number of Transfers (Weekday Boardings, by Scenario)

Source: RSG, Parsons Brinckerhoff (2015)

BOARDINGS	2040 ALTERNATIVE D	2040 ALTERNATIVE E
Initial boardings on BRT and feeder routes (combined)	2,395	2,525
Transfers from LIRR and existing bus services (combined)	1,910	2,060
Transfers between BRT and feeder routes (combined)	290	70
Total, All Boardings	4,595	4,655

» Alternative D and Alternative E both attract a total of approximately 4,600–4,700 weekday boardings on the proposed BRT and feeder routes (combined), in addition to approximately 2,300–2,400 weekday boardings on the Suffolk County Transit S1 route. The total ridership of all routes combined (i.e., BRT, feeder routes, and S1) is approximately 7,000 weekday boardings for both Alternative D and Alternative E, an increase of approximately 2,300 (nearly 50%) compared to total ridership in the No-Build scenario. The source of BRT and feeder route ridership is a combination of approximately 2,300 existing Suffolk Country Transit riders shifting to the new service, as well as approximately 2,300 new transit users who previously used another mode of transportation. Therefore, the overall increase in transit ridership is comparable for the two Short List Alternatives.

» Alternative D attracts approximately 800 more BRT boardings than Alternative E, but Alternative E attracts approximately 800 more feeder route boardings than Alternative D. This outcome is logical because of the routing of the respective feeder routes for each alternative, and specifically the connectivity to the planned LIRR Republic Station. The Alternative E feeder routes offer direct connections between the planned LIRR Republic Station and activity centers to the east and west of Route 110. The Alternative D feeder routes—with the exception of the Farmingdale State College feeder route, which is the same for both alternatives—require a transfer to/from BRT to connect passengers with the planned LIRR Republic Station. Therefore, the Alternative E feeder routes attract more passengers than the Alternative D feeder routes, and the BRT trunk route attracts more passengers with Alternative D than Alternative E.

Table 12 summarizes the number of projected weekday BRT boardings at each of the 11 proposed stations. The BRT stations that serve connections to/from the LIRR are projected to have the highest ridership in both Alternative D and E. The planned LIRR Republic Station attracts the greatest number of weekday boardings for both alternatives, followed by the LIRR Amityville Station. The fact that projected BRT ridership is lower at the planned LIRR Republic Station for Alternative E does not mean that this alternative is less attractive for this market. Instead, riders transferring from the LIRR at the planned Republic Station are more likely to board one of the Alternative E feeder routes that provide a direct connection from this location to the activity centers east and west of Route 110. After the two LIRR stations, the BRT station with the next highest projected ridership is the Walt Whitman Shops, which offers convenient connections from multiple service providers, including Suffolk County Transit, NICE, and HART. For all BRT stations combined, Alternative D is projected to attract approximately 3,900 weekday boardings, or approximately 800 more weekday boardings than Alternative E.

The results of the ridership forecast for the respective feeder routes of Alternatives D and E are presented in **Table 13**. The highest ridership is projected for feeder route E2 (Walt Whitman Road), with 885 weekday boardings, whereas the lowest ridership is projected for feeder route D2 (Ruland Road/Smith Street), with approximately 50 weekday boardings. For all feeder routes combined, Alternative E is projected to attract approximately 1,500 weekday boardings, or approximately 800 more weekday boardings than Alternative D.

Alternatives D and E differ slightly with respect to the projected number of transfers between different transit services. As shown in **Table 14**, Alternative E is projected to have about 150 additional weekday transfers from the LIRR and existing bus services to either the BRT or feeder routes, whereas Alternative D is projected to have about 200 additional weekday transfers directly between the BRT and feeder routes. This projected outcome is consistent with expectations, given the different alignments of the feeder routes among the two alternatives. For instance, more transfers from the LIRR are anticipated with Alternative E because of the enhanced multi-modal connectivity offered with this alternative. Additionally, more transfers between the BRT and feeder routes are anticipated with Alternative D because the feeder routes circulate from BRT stations along Route 110 to serve off-Corridor activity centers. Despite the slight difference in the breakdown of transfers among the two alternatives, both Alternatives D and E are projected to have approximately 4,600–4,700 total weekday boardings.

Overall, the ridership forecast demonstrated that both Alternatives D and E would increase transit ridership in the study area by approximately 2,300 weekday boardings. Additionally, ongoing and future TOD opportunities within the study area could add to the potential ridership base of the BRT and feeder routes.

6.3.4 ORDER-OF-MAGNITUDE COST ESTIMATES

Based on the 10% conceptual engineering and operations planning efforts, order-of-magnitude capital and O&M cost estimates were prepared for the two Short List Alternatives. The preliminary cost estimates that were prepared during the AA will be refined as appropriate in Project Development, reflecting the continuous nature of the cost estimating process.

As shown in **Table 15**, the total order-of-magnitude capital costs for Alternatives D and E are approximately $34.9 million and $35.8 million, respectively, and the annual O&M costs for the two alternatives are approximately $5.4 million and $5.9 million, respectively. Appendices G and H include a detailed discussion of the methodology and inputs used in estimating the costs during the AA, and the following summary presents a high-level overview of the methodology and results.

CAPITAL COST

Order-of-magnitude capital cost estimates were prepared for the two Short List Alternatives using current unit pricing (2015 dollars). The costs were estimated according to the FTA's Standard Cost Categories (SCC), which offer a consistent format for the reporting of capital costs. The SCCs include several items related to construction (i.e., guideway, stations, support facilities, sitework and special conditions, and systems), as well as ROW costs, vehicle costs, soft costs/professional services (calculated as 35% of the construction subtotal), and a 40% contingency. Consistent with FTA Project and Construction Management Guidelines (2003), contingency is highest at this conceptual level of design because of the high degree of uncertainty in order-of-magnitude capital cost estimates.

The total order-of-magnitude capital cost for each of the Short List Alternatives was calculated as the sum of associated costs for the BRT trunk route and the respective feeder routes. The order-of-magnitude capital cost estimate for the BRT trunk route—which is the same for the two Short List Alternatives—is approximately $28.0 million. As shown in **Table 16**, this total cost includes approximately $9.8 million in construction costs and $6.8 million in vehicle costs, with the balance covering soft costs/professional services and contingencies. It is assumed that the BRT trunk route would not require any property acquisition or easements. Additionally, based on preliminary discussions with Suffolk County Transit, it is assumed that existing maintenance and storage facilities can accommodate the required BRT vehicles. As a supplement to **Table 16**, an order-of-magnitude capital cost estimate was also prepared for the longer-term BRT elements of off-board fare collection, level boarding, and pedestrian improvements at station-area intersections (**Table 18**).

The capital cost estimates for Alternatives D and E are presented in **Table 17**. The overall cost includes the approximately $28.0 million capital cost of the BRT trunk route, as well as the capital costs of the feeder routes. The capital cost of Alternative E (approximately $35.8 million) is approximately $0.9 million higher than the capital cost of Alternative D (approximately $34.9 million), due to differences in the vehicle requirements and number of stations for the two Short List Alternatives. Unlike the BRT trunk route stations, which will primarily be co-located with existing Suffolk County Transit stops, most of the feeder route stations will be located where there is currently no bus stop. Therefore, to be conservative, it is assumed that the feeder route stations would require easements to accommodate the shelters. Based on preliminary discussions with Suffolk County Transit, it is assumed that existing maintenance and storage facilities can accommodate the required feeder buses for either alternative.

TABLE 15: Summary of Order-of-Magnitude Capital and O&M Cost Estimates for Short List Alternatives

Source: Suffolk County, Parsons Brinckerhoff, Cameron Engineering, Nelson\Nygaard (2015)

Note: Refer to Table 16 through Table 19 for detailed cost estimates.

ROUTE	CAPITAL COST ESTIMATE (MILLION 2015$)		ANNUAL O&M COST ESTIMATE (MILLION 2015$)	
	ALTERNATIVE D	ALTERNATIVE E	ALTERNATIVE D	ALTERNATIVE E
Subtotal, Feeder Routes	$6.92	$7.81	$1.90	$2.45
Subtotal, BRT Trunk Route	$27.97	$27.97	$3.46	$3.46
Total, BRT and Feeder Routes	$34.89	$35.78	$5.36	$5.91

FTA SCC ITEM	TOTAL COST (2015$)
Guideway [Roadway improvements including pavement replacement/painting, signage and striping and work zone traffic control]	$6,110,000
Stations [Shelters, lighting, communications, sidewalk improvements, bike racks, landscaping, signage]	$2,800,000
Support Facilities[1] [Maintenance and Storage Yard]	$0
Sitework and Special Conditions [Median island improvements and pavement replacement]	$280,000
Systems [Signals improvements and TSP]	$610,000
Construction Subtotal	$9,800,000
Right-of Way (ROW)[2] [Property Acquisition/Easements]	$0
Vehicles [9 BRT vehicles]	$6,750,000
Subtotal (Construction + ROW + Vehicles)	$16,550,000
Soft Costs/Professional Services	$3,430,000
Contingency	$7,990,000
Total (2015$)	$27,970,000

TABLE 16: Order-of-Magnitude Capital Cost Estimate for BRT Trunk Route

Source: Suffolk County, Cameron Engineering, Parsons Brinckerhoff (2015)
[1] Estimated capital cost of $0 because based on preliminary discussions with Suffolk County Transit, it is assumed that existing maintenance and storage facilities can accommodate the required BRT vehicles.
[2] Estimated capital cost of $0 because based on the conceptual engineering effort, it is assumed that the BRT trunk route would not require any property acquisition or easements.

TABLE 17: Order-of-Magnitude Capital Cost Estimate for Short List Alternatives

Source: Suffolk County, Cameron Engineering, Parsons Brinckerhoff (2015)

FTA SCC ITEM	TOTAL COST (2015$)	
	ALTERNATIVE D	ALTERNATIVE E
Stations [Shelters, lighting, communications, sidewalk improvements, bike racks, landscaping, signage]	$2,530,000	$2,630,000
Construction Subtotal	$2,530,000	$2,630,000
ROW [Property Acquisition/Easements]	$270,000	$280,000
Vehicles	$1,250,000	$1,750,000
Subtotal (Construction + ROW + Vehicles)	$4,050,000	$4,660,000
Soft Costs/Professional Services	$890,000	$920,000
Contingency	$1,980,000	$2,230,000
Subtotal, Feeder Routes (2015$)	$6,920,000	$7,810,000
Subtotal, BRT Trunk Route (2015$)	$27,970,000	$27,970,000
Total (2015$)	$34,890,000	$35,780,000

For both the BRT trunk route and the feeder routes, the fleet requirement was calculated as cycle time divided by headway during the peak period, rounded up, with 20% spares. Based on this calculation, nine BRT vehicles are required for the trunk route, and either 10 shuttle buses (Alternative D) or 14 shuttle buses (Alternative E) are required for the feeder routes, which differ for the two alternatives.

For both alternatives, it is currently assumed that half of the feeder route station locations would include a shelter because the feeder routes would not warrant a shelter at every stop based on projected ridership. During Project Development, this assumption can be revisited, and the specific station locations that would include a shelter can be identified.

ORDER-OF-MAGNITUDE CAPITAL COST ESTIMATE FOR LONGER-TERM BRT ELEMENTS

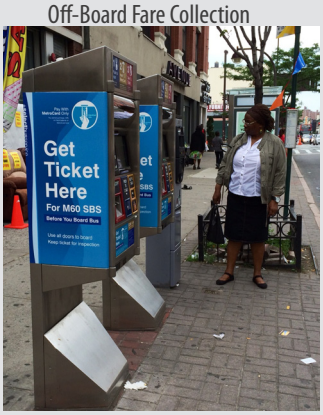
ELEMENT	TOTAL (2015$)
Level boarding and pedestrian improvements at station-area intersections[1]	$1,870,000
Off-board fare collection[2]	
Ticket vending machines	$2,600,000
Station hardware / software	$275,000
Garage hardware / software	$50,000
Central hardware / software	$300,000
Subtotal (2015$)	$5,095,000
Soft Costs/Professional Services	$1,780,000
Contingency	$2,750,000
Total (2015$)	$9,625,000

TABLE 18: Order-of-Magnitude Capital Cost Estimate for Longer-Term BRT Elements

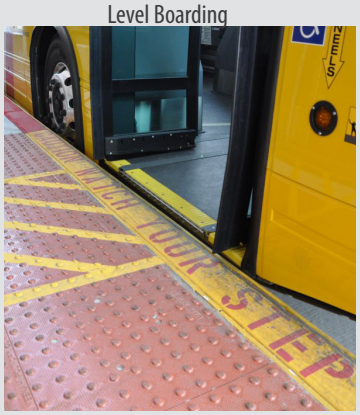
[1] Source: Parsons Brinckerhoff (2015); unit cost for level boarding excludes precision docking
[2] Source: FTA, *Characteristics of Bus Rapid Transit for Decision-Making* (2009)

The order-of-magnitude capital cost estimate for the longer-term BRT elements—which are the same for the two Short List Alternatives—is approximately $9.6 million (**Table 18**). This total cost includes approximately $5.1 million for off-board fare collection, level boarding, and pedestrian improvements at station-area intersections, with the balance covering soft costs/professional services and contingencies. The approximately $9.6 million capital cost for these longer-term BRT elements would be in addition to the approximately $28.0 million capital cost for the other elements of the BRT trunk route (**Table 16**).

Off-Board Fare Collection



Level Boarding



Station-Area Pedestrian Improvements

Source: MTA New York City Transit, Context Sensitive Solutions, Star Tribune (2013)

OPERATING AND MAINTENANCE (O&M) COST

Order-of-magnitude O&M cost estimates were prepared for the two Short List Alternatives, including the BRT trunk route and the respective feeder routes. Consistent with existing Suffolk County Transit operating contracts, the O&M cost estimates for the Short List Alternatives were prepared based on a vehicle revenue mile unit cost. For each route, vehicle revenue miles were calculated using a number of inputs, including—but not limited to—service frequency, cycle time (i.e., round-trip running time and layover), hours of operation, and round-trip route miles.

The annual O&M cost was calculated as the number of annual vehicle revenue miles multiplied by the following costs per revenue mile, as advised by Suffolk County Transit:

» $5.97363 per revenue mile for the BRT trunk route, consistent with the rate for the Suffolk County Transit fixed-route bus operation on Route 110.

» $3.73929 per revenue mile for each feeder route, consistent with the rate for the Suffolk County Transit paratransit operation, as the shuttle buses proposed for the feeder routes would be comparable in size to paratransit vehicles.

The annual vehicle revenue miles and associated order-of-magnitude annual O&M cost estimates for the Short List Alternatives are presented in **Table 19**. The overall cost includes the approximately $3.5 million annual O&M cost of the BRT trunk route, as well as the annual O&M costs of the feeder routes. The annual O&M cost of Alternative E (approximately $5.9 million) is approximately $500,000 higher than the annual O&M cost of Alternative D (approximately $5.4 million), due to differences in the annual vehicle revenue miles associated with the respective feeder routes. The least costly feeder route to operate and maintain is D2 (Ruland Road/Smith Street), at less than $400,000 per year, while the most costly feeder route to operate and maintain is E3 (New Highway/ Pinelawn Road), at nearly $1.1 million per year.

For both alternatives, **Table 19** also shows annual revenue and the associated farebox recovery ratio, which is defined as the proportion of O&M costs covered by fare revenue. Based on the results of the ridership forecast and the assumption that the fare and transfer fee for the BRT trunk route and feeder routes would be consistent with existing Suffolk County Transit policy, both Alternatives D and E would generate approximately $630,000 per year, which translates to an approximately 11–12% farebox recovery ratio. The BRT trunk route alone, without any feeder routes, would have an approximately 14% farebox recovery ratio.

Farebox recovery ratio is an important financial indicator as it offers insight into the subsidy required to fund the annual O&M cost of the proposed project. Other potential funding sources that can supplement fare revenue are discussed in Section 8.

TABLE 19: Order-of-Magnitude Annual O&M Cost Estimates for the Short List Alternatives

Source: Suffolk County Transit, Nelson\Nygaard, Parsons Brinckerhoff (2015)

ROUTE	ANNUAL VEHICLE REVENUE MILES		TOTAL ANNUAL O&M COST (2015$)	
	ALTERNATIVE D	ALTERNATIVE E	ALTERNATIVE D	ALTERNATIVE E
D1 Feeder Route: Farmingdale State College	129,730	--	$485,000	--
D2 Feeder Route: Ruland Road/Smith Street	99,750	--	$373,000	--
D3 Feeder Route: Walt Whitman/Pinelawn Road	279,070	--	$1,044,000	--
E1 Feeder Route: Farmingdale State College	--	129,730	--	$485,000
E2 Feeder Route: Walt Whitman Road	--	233,220	--	$872,000
E3 Feeder Route: New Highway / Pinelawn Road	--	293,190	--	$1,096,000
Subtotal, Feeder Routes	508,550	656,140	$1,902,000	$2,453,000
Subtotal, BRT Trunk Route	578,660	578,660	$3,457,000	$3,457,000
Total, All Routes	1,087,210	1,234,800	$5,359,000	$5,910,000
Annual Revenue (2015$)			$627,000	$634,000
Farebox Recovery Ratio			11.7%	10.7%

6.3.5 SHORT LIST SCREENING RESULTS

The purpose of the Short List Screening was to evaluate the Short List Alternatives to inform selection of an LPA. The operating plans, conceptual engineering, order-of-magnitude cost estimates, and ridership forecasts provided quantitative data to inform a detailed evaluation of the Short List Alternatives.

The project goals and objectives provided the framework for the evaluation of the Short List Alternatives, and the results of the Short List Screening indicated that both Alternatives D and E would achieve the project goals and objectives. While there are differences between the two Short List Alternatives, the similarities far outweigh the differences.

For instance, although Alternative E would offer additional multi-modal connectivity and more promising opportunities for TOD because of the common termination points of the feeder routes, both Short List Alternatives would improve mobility and connectivity and also drive sustainable economic growth in the study area. Additionally, although Alternative D has marginally lower capital and O&M costs, the costs are comparable between the two alternatives, and both Alternatives D and E would offer cost effective and operationally efficient solutions to the identified transportation problems in the study area. Moreover, environmental considerations are not likely to be differentiators between the two alternatives, as both Alternatives D and E are anticipated to result in comparable environmental benefits while avoiding adverse environmental impacts.

The discussion below includes the evaluation of the Short List Alternatives with respect to their ability to achieve each of the overarching project goals. The evaluation is summarized in **Table 20**.

PROJECT GOAL	BOTH ALTERNATIVES D AND E	ALTERNATIVE D ONLY	ALTERNATIVE E ONLY
Goal 1: Improve Mobility and Connectivity	• Vastly improve mobility and connectivity compared to the No-Build condition by achieving a number of key objectives, including—but not limited to—: - Increasing transit frequency - Improving access to major activity centers throughout the study area - Providing travel time savings and passenger amenities to attract choice riders - Increasing overall transit ridership	--	• Provides more seamless multi-modal connections by eliminating the need for intermediate transfers at the planned LIRR Republic Station
Goal 2: Enhance Economic Competitiveness and Promote Economic Growth	• Successfully enhance economic competitiveness and promote economic growth by: - Supporting ongoing and planned development projects - Encouraging a shift in land use patterns to promote TOD - Contributing to job retention and creation - Advancing the integrated transportation and development strategy of the *Connect Long Island* plan	--	• Provides the most promising opportunities to establish multi-modal transit centers as anchors for TOD because of the coordinated termination points for the feeder routes
Goal 3: Maximize Cost and Operational Effectiveness	• Include cost effective and operationally efficient transit modes (BRT and shuttle bus) that: - Do not require a fixed guideway - Have operational requirements that are comparable to existing bus service, which would minimize the level of construction complexity, the construction timeframe, and the cost of implementation - Present opportunities for phased implementation and the use of innovative sources of project financing	• Includes marginally (<5%) lower capital costs due to minor differences in the feeder route vehicle requirements and number of stations • Includes marginally (approximately 10%) lower O&M costs due to differences in the annual vehicle revenue miles	--
Goal 4: Minimize Adverse Environmental Impacts	• Offer comparable environmental benefits by generating approximately the same number of net new transit riders • Minimize environmental impacts due to the lack of physical constraints for implementation	--	--

TABLE 20: Summary of Short List Screening Results

Source: Parsons Brinckerhoff (2015)

GOAL 1: IMPROVE MOBILITY AND CONNECTIVITY

Since Alternatives D and E share the same BRT trunk route, including the alignment, station locations, and service characteristics, the two alternatives would both achieve the fundamental objective to provide frequent, high-quality transit service to activity centers on Route 110. Compared to the existing Suffolk County Transit S1 route, the BRT trunk route that is proposed for both Alternatives D and E would reduce headways and thereby offer increased transit service frequency along Route 110. The proposed BRT trunk route would provide more frequent service than the S1 route during the weekday peak period (i.e., every 10 minutes as opposed to every 15 minutes), weekday off-peak period (i.e., every 15 minutes as opposed to every 30 minutes), and on weekends (i.e., every 20 minutes as opposed to every 60 minutes).

Alternatives D and E include the same BRT trunk route stations with all of the same passenger amenities, including enhanced shelters and real-time information. The BRT stations, which are common to both alternatives, are appropriately spaced to maximize ridership potential (with an average distance of 0.9 miles between stations, compared to an average distance of approximately 0.25 miles between existing Suffolk County Transit stops on Route 110), and the station locations effectively capture existing and future activity centers.

Both Alternatives D and E would result in the same travel time savings for transit users along Route 110. The two Short List Alternatives would both benefit from TSP, limited-stop service, and shoulder-running along the same segments of Route 110, thereby increasing operating speed for BRT as compared to the existing local bus service and making travel by BRT competitive with travel by automobile.

Both alternatives would include the same upgrades to pedestrian infrastructure at three station locations (i.e., the planned LIRR Republic Station, Walt Whitman/ Duryea Road, and Huntington Quadrangle) to ensure that BRT riders would be able to safely cross Route 110. Furthermore, all of the long-term BRT elements are common to both alternatives, including off-board fare collection, level boarding, and targeted pedestrian improvements at additional station-area intersections to improve pedestrian access. Both alternatives would share all of these elements that reinforce the image of BRT as a premium service.

Although the feeder routes that would complement the BRT trunk route differ among the two alternatives, both sets of feeder routes would provide transit service and improve access to activity centers located off the main spine of Route 110. The proposed feeder routes for both alternatives would serve major origins and destinations beyond a reasonable walking distance from Route 110, including residential developments and significant employers along the outer edges of the study area.

However, one noteworthy difference between the two alternatives is the extent to which they increase connectivity between the LIRR (notably, at the planned LIRR Republic Station) and major activity centers in the study area without requiring intermediate transfers. Both alternatives would provide a one-seat ride between the planned LIRR Republic Station and activity centers along Route 110 (via the BRT trunk route), as well as Farmingdale State College and the Broad Hollow Bioscience Park (via a feeder route). However, only the Alternative E feeder routes would directly connect the planned LIRR Republic Station and other activity centers to the east and west of Route 110, as Alternative D would require passengers to first transfer from the LIRR to BRT before boarding a feeder route shuttle bus to access their final destination. (The same transfer would be also required in the reverse direction for Alternative D, as passengers would be required to transfer from a feeder route shuttle bus to BRT in order to access the planned LIRR Republic Station.)

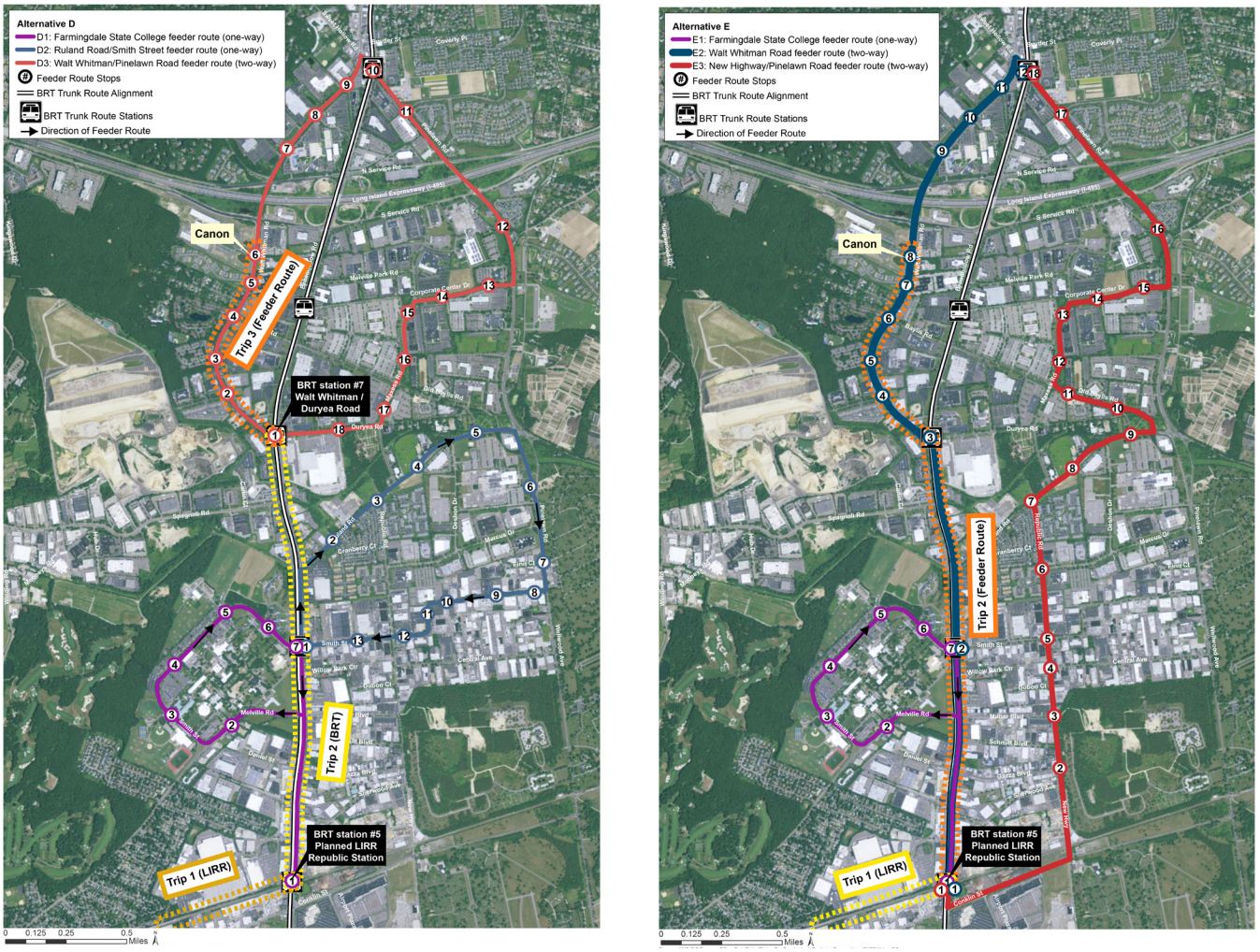


FIGURE 42: Example of Intermediate Transfer Required under Alternative D Compared to Direct Connection under Alternative E
Source: ESRI basemaps, Parsons Brinckerhoff (2015)

As shown in **Figure 42**, one example of the intermediate transfer that would be required under Alternative D is for workers who reverse commute from New York City or Nassau County to Canon's office complex along Walt Whitman Road. Under Alternative D, a Canon employee who lives west of Route 110 would take the LIRR to Republic Station, ride BRT to Walt Whitman/Duryea Road, and then transfer to the Walt Whitman/Pinelawn Road feeder route to access Canon. Under Alternative E, the same employee would be able to take the LIRR to Republic Station and board the Walt Whitman Road feeder route that would provide a direct connection to Canon, eliminating the intermediate transfer to BRT. Trips between Republic Station and activity centers to the east of Route 110—such as Estee Lauder and Newsday—would similarly require an intermediate transfer under Alternative D, whereas the New Highway/Pinelawn Road feeder route under Alternative E would offer a one-seat ride.

Nevertheless, both Alternatives D and E would result in approximately the same increase in overall transit ridership (i.e., approximately 2,300 new weekday boardings, compared to the No-Build condition), which is one of the principal objectives of this project. For both alternatives, this net increase in overall transit ridership is attributable to new transit users who previously used another mode of transportation. Therefore, the two alternatives would result in comparable increases in transit ridership by attracting

new transit trips within the study area, which could assist in mitigating future increases in traffic congestion.

Overall, both alternatives would improve north-south mobility and increase transit access to major activity centers throughout the study area, thereby improving transit service for the transit-dependent population and also helping to attract choice riders by expanding transportation options for workers, residents, students, shoppers, and visitors.

Goal 2: Enhance Economic Competitiveness and Promote Economic Growth

Under both alternatives, ongoing and planned development projects would benefit from the BRT trunk route. For instance, the full economic development potential of the ongoing Greybarn development in North Amityville and the future East Farmingdale master development can effectively be realized by co-locating BRT stations with the development sites. This integrated transportation and development strategy—which is closely aligned with the *Connect Long Island* plan and the local planning efforts in the Towns of Babylon and Huntington and the Village of Amityville—is common to both alternatives.

Additionally, although Alternatives D and E include different feeder routes, both sets of feeder routes would provide enhanced transit service to the sites of active development projects off the main spine of Route 110. For example, feeder routes in both alternatives would serve the future Highland Green residential development near the intersection of Ruland Road and Maxess Road to the east of Route 110, as well as the second phase of the Canon office complex near the intersection of Walt Whitman Road and the LIE South Service Road to the west of Route 110.

Furthermore, both alternatives include BRT and feeder route stations at locations of concentrated employment, which can help to retain and attract both employers and employees to the study area. The introduction of BRT along Route 110 and complementary feeder route service to provide the last-mile connection for workers to access off-Corridor employment centers can help to preserve and enhance the position of the study area as a major employment hub in the region. The two alternatives would generally serve the same major employers, and thus they offer similar benefits regarding job retention and creation.

Another objective related to economic growth is to create multi-modal transit hubs as anchors for future development, and although the opportunities with Alternative E are potentially the most promising, both Alternatives D and E would achieve this key objective. The BRT station locations are the same for both alternatives, and the selection process for the station locations sought to maximize TOD potential in part by maximizing transfer opportunities between the wide range of transit service offerings in the study area, including the LIRR, Suffolk County Transit, NICE, and HART.

One unique feature of Alternative E is that the planned LIRR Republic Station and the intersection of Route 110 and Pinelawn Road would serve as termination points for coordinated feeder routes to serve off-Corridor destinations, which could bolster the TOD potential at these locations. Nevertheless, both alternatives could support a shift in land use patterns to promote TOD within the study area. The feeder routes under both alternatives could link TODs along the trunk route to employment centers along the outer edges of the study area, and could also create additional opportunities for off-Corridor development or redevelopment at transit-supportive densities.

Above all, both alternatives would overwhelmingly support the dominant theme in the *Connect Long Island* plan, namely that the integration of transportation improvements and land use policy can drive sustainable economic growth in the region.

Goal 3: Maximize Cost and Operational Effectiveness

From an operational standpoint, both alternatives would provide trunk route service on Route 110, while also providing feeder route service off Route 110, effectively tailoring the service to meet demand. As currently proposed, both alternatives would include trunk route service using 35-foot-long BRT vehicles along Route 110, where demand is most concentrated. Both alternatives would also include feeder route service using smaller, 24-foot-long shuttle bus vehicles to provide needed connections to off-Corridor destinations at appropriately-timed intervals.

The BRT trunk route and shuttle bus feeder routes associated with both alternatives would be compatible with the existing transit operations in the study area. Existing bus facilities and shops could be used for storage and maintenance of the BRT and shuttle bus vehicles in both alternatives, thereby eliminating the cost of ancillary support facilities. Although the two alternatives would require roadway improvements on Route 110 to create a

dedicated BRT lane along the existing shoulder, including pavement replacement and painting, signage, and striping, both alternatives would not require construction of a fixed guideway, and there are few physical or operational constraints for implementation. With the exception of limited easements along the feeder routes at the proposed station locations, both alternatives would not require property takings, and the existing transportation ROW would be sufficient for implementation.

During the early stages of this AA, a potential property taking was considered for Alternative E near the intersection of Route 110 and Pinelawn Road, arising from the perceived need for a transit center for the feeder routes that would terminate at this location. This would have added to the capital cost of Alternative E due to costs associated with property acquisition and site development. However, based on further design refinement and the extent of the ridership projections, a standalone transit center was deemed not necessary for the foreseeable future, and it was decided that a typical shelter along Route 110 near the intersection with Pinelawn Road would suffice at this location.

Overall, the estimated order-of-magnitude capital and O&M costs for the two alternatives are comparable, and thus cost is not a differentiating factor between the two alternatives. Due to minor differences in the feeder route vehicle requirements and number of stations for the two alternatives, the capital cost of Alternative E (approximately $35.8 million) is approximately $0.9 million higher than the capital cost of Alternative D (approximately $34.9 million). This is equivalent to less than a 5% differential in the capital cost of the two alternatives. On a cost-per-mile basis, the difference is even more marginal (i.e., approximately $3.4 million per mile for Alternative E, and approximately $3.3 million per mile for Alternative D).

Due to differences between the two alternatives in the annual vehicle revenue miles associated with the respective feeder routes, the annual O&M cost of Alternative E (approximately $5.9 million) is approximately $0.5 million higher than the annual O&M cost of Alternative D (approximately $5.4 million). This is equivalent to an approximately 10% differential in the O&M cost of the two alternatives. Additionally, since the two alternatives are projected to have approximately the same ridership, both alternatives would generate approximately the same farebox revenue to help offset the subsidy required to fund the annual O&M cost.

Both Alternatives D and E have great potential for phased implementation. Since a fixed guideway is not needed for the trunk route or feeder routes, service modifications and/or route extensions could be rolled out without significant capital investment. Therefore, both alternatives are very conducive to phased implementation as demand warrants and as funding becomes available.

Furthermore, both alternatives could create opportunities to use innovative sources of project financing and alternative project delivery approaches. A range of project-specific funding sources could be explored for both alternatives, potentially including tax increment financing (TIF), special assessments, developer contributions, sponsorship and naming rights, joint development, and development impact fees. Additionally, for both alternatives, innovative project delivery approaches—potentially including design-build and design-build-operate-maintain—could be explored to expedite implementation and reduce risk.

Overall, both Alternatives D and E would achieve the goal of maximizing cost and operational effectiveness.

Goal 4: Minimize Adverse Environmental Impacts

One of the principal environmental objectives of this study is to reduce automobile usage, specifically by diverting current and future automobile trips to transit. Both Alternatives D and E would generate approximately 2,300 net new transit riders, and thus it is anticipated that the two alternatives would result in comparable reductions in VMT, air quality emissions, and Greenhouse Gas emissions, which are key environmental indicators. The environmental review that will follow this AA will quantify the environmental benefits of the proposed project.

Furthermore, it is unlikely that implementation of either Alternative D or E would result in adverse impacts to the natural and/or built environment. For both alternatives, there are few physical constraints for implementation. Most of the proposed BRT stations are located at the sites of existing Suffolk County Transit bus stops, and it is anticipated that property acquisition would be limited to easements for station access along the feeder routes, thereby avoiding the potential displacement of residents or businesses within the study area. While there would likely be an increase in impervious surfaces related to the larger BRT station areas (compared to the areas around existing Suffolk County Transit shelters) and the feeder route station areas, it is anticipated that the increase would be insignificant.

Given the similarities between the two alternatives, potential environmental constraints across the range of environmental impact categories are likely to be the comparable and minimal for the two alternatives. This will be verified and documented in the environmental review that will follow this AA.

6.4 RECOMMENDATIONS FOR PROJECT DEVELOPMENT: LOCALLY PREFERRED ALTERNATIVE (LPA)

The purpose of the multi-tiered screening process in this AA was to narrow the alternatives under consideration, which would inform the selection of an LPA. The Long List Screening eliminated several alignment concepts and transit modes that did not adequately meet the project goals and objectives, and the Short List Screening provided a detailed evaluation of the two remaining alternatives.

While the selection of an LPA is one possible outcome of an AA, it is not mandatory, and in fact completion of an AA is no longer a required step in the transportation planning process. According to the current federal process, one of the steps in Project Development—which will follow this AA—is to complete the NEPA environmental review, including developing and reviewing alternatives and selecting an LPA. As noted in the FTA's Capital Investment Program Frequently Asked Questions:

> *"Project sponsors may still conduct a stand-alone AA separate from the NEPA review if they wish. This may ultimately streamline the environmental review process because the results of prior planning work evaluating alternatives may be incorporated into the NEPA review."*

Therefore, this AA has effectively set the stage for a more efficient and streamlined environmental review process by developing, screening, and evaluating a wide range of alternatives.

Although the multi-tiered screening process provided the framework for selection of an LPA, the results of the Short List Screening demonstrated that both Alternatives D and E would achieve the project goals and objectives, and neither alternative emerged as the unequivocal best option. Each alternative performed marginally better than the other alternative in at least one category of evaluation (i.e., multi-modal connectivity and economic development potential for Alternative E, and capital and O&M costs for Alternative D), but the considerable similarities between the two alternatives overshadowed the slight differences.

Moving forward, a number of factors could inform the decision regarding whether Alternative D or E—or a hybrid of the two—best meets the project goals and objectives. These factors could include—but are not limited to—final recommendations from the Town of Huntington Melville Employment Center Plan, site design of the planned LIRR Republic Station and East Farmingdale master development, and other development proposals that may arise in the future. Other factors that can be explored in Project Development are discussed in Section 9.

Although the two Short List Alternatives differ with respect to the feeder routes that would provide transit access to activity centers located off the main spine of Route 110, both alternatives share the same BRT trunk route along Route 110. Therefore, the BRT trunk route—as defined in this AA for both alternatives—will comprise one element of the LPA, and the feeder routes will be finalized during Project Development, including consideration for mixing and matching feeder routes from the two alternatives.

Figure 43 presents summary details about the BRT trunk route element of the LPA. In conjunction with ongoing stakeholder and public input, the technical analyses in Project Development will guide selection of the feeder routes that—together with the BRT trunk route—will comprise the LPA.

TRUNK ROUTE ELEMENT OF LPA

BRT MODE

10.5 MILES IN BOTH DIRECTIONS (BETWEEN LIRR AMITYVILLE STATION & WALT WHITMAN SHOPS)

11 NUMBER OF STATIONS

PROPOSED BRT ELEMENTS:

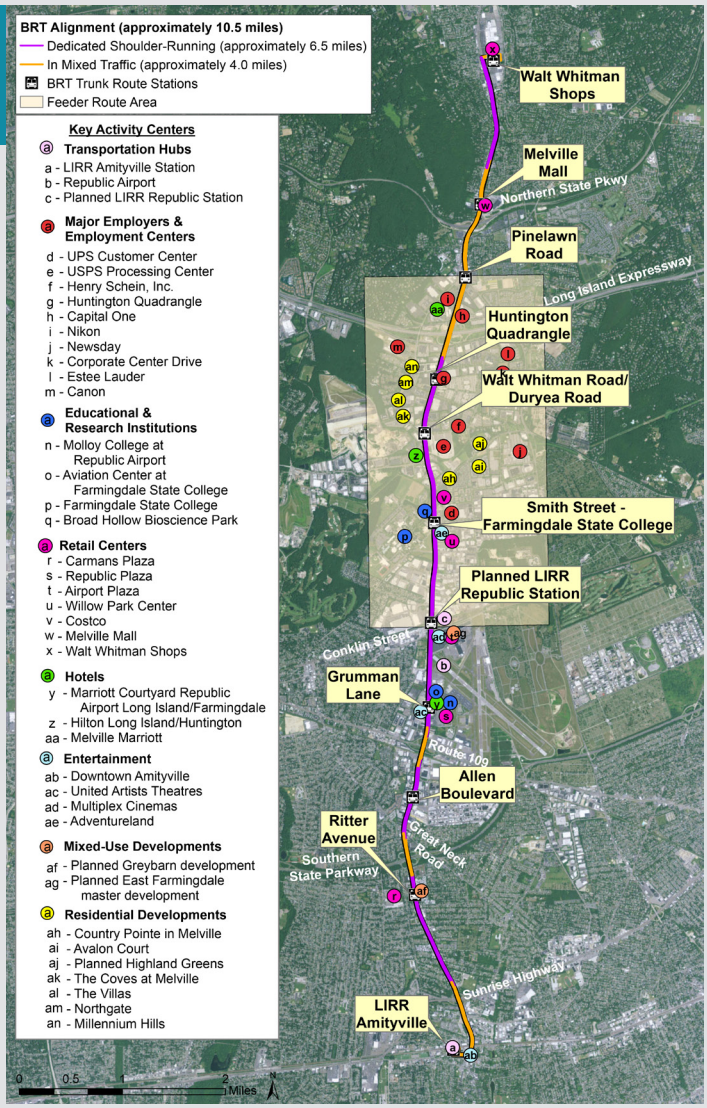
- **Shoulder-running** for approximately 6.5 miles with colored pavement, symbolic pavement markings, and signage; mixed traffic operation for approximately 4 miles
- **Queue jumps** at two locations (northbound at the intersection of Route 110 and Brefni Street, and southbound at the intersection of Route 110 and Main Street/Great Neck Road)
- **TSP** at 44 signalized intersections
- **Limited-stop service** as an overlay to existing Suffolk County Transit service
- **Station-area passenger amenities**, including enhanced shelters with seating, real-time information, way finding signage, bicycle racks, tinted concrete, trees and landscaping
- **Aesthetically enhanced** 35-foot-long, hybrid-style, low-floor vehicles with interior amenities and TSP emitters
- **Branding** (to be coordinated with Suffolk County's system-wide branding and strategic marketing campaign)
- **Additional long-term elements**: off-board fare collection, level boarding, and enhanced station-area intersections

ORDER-OF-MAGNITUDE COST ESTIMATES (2015$):

- Capital Cost: $28.0 million
- Annual O&M Cost: $3.5 million

MULTI-MODAL CONNECTIVITY

- LIRR: Amityville Station (Babylon Branch) and planned LIRR Republic Station (Ronkonkoma Branch/Main Line)
- Suffolk County Transit: S1, S20, S23, S29, S31, S33, S54, 1A, 2B, Clipper
- HART: H20, H30, H40
- NICE: N54, N55, N70, N71, N72, N79
- Republic Airport



BRT Trunk Route Alignment, Stations, and Major Activity Centers Served

Perspective of Typical Proposed BRT Station

Source: B Thayer Associates

FIGURE 43: BRT Trunk Route Element of LPA

Source: ESRI basemaps, Suffolk County Transit, Parsons Brinckerhoff , B Thayer Associates, Cameron Engineering, Nelson\Nygaard, RSG (2015)

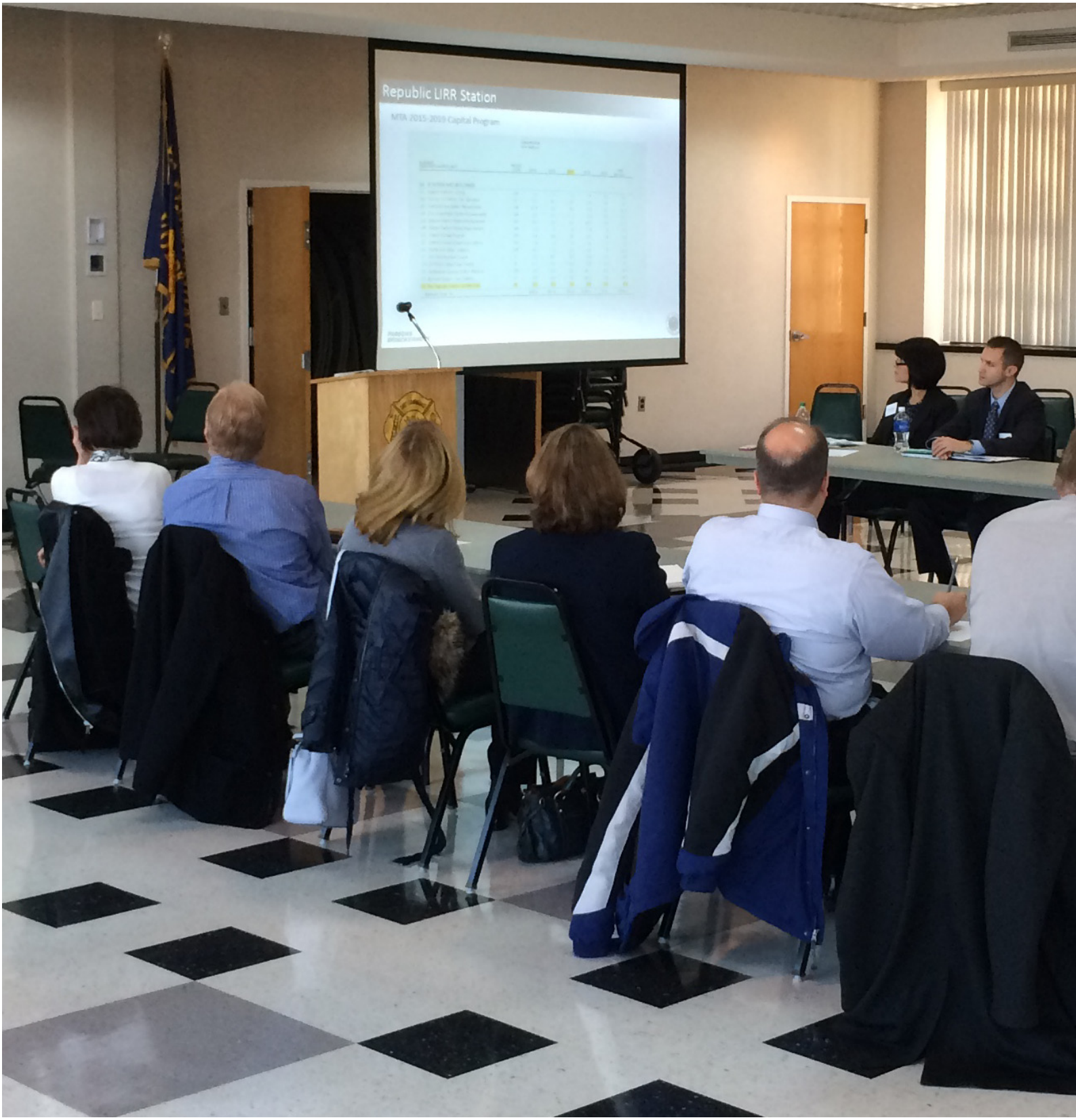
STATION NUMBER (SOUTH TO NORTH)	STATION NAME	STATION LOCATION	DISTANCE FROM PREVIOUS STATION	PROJECTED BRT TRUNK ROUTE RIDERSHIP (WEEKDAY BOARDINGS)[1]
1	LIRR Amityville Station	LIRR Amityville Station parking lot/station building, south of the LIRR tracks near Ketcham Avenue, west of Route 110	N/A	710
2	Ritter Avenue	Route 110 at Ritter Avenue	1.9 miles	170
3	Allen Boulevard	Route 110 at Allen Boulevard	1.0 miles	210
4	Grumman Lane	Route 110 at Grumman Lane	0.9 miles	45
5	Planned LIRR Republic Station	Route 110 at LIRR trestle, between Conklin Street and Price Parkway/Picone Boulevard	0.8 miles	920
6	Smith Street – Farmingdale State College	Route 110 at Smith Street	1.0 miles	185
7	Walt Whitman Road/Duryea Road	Route 110 at Walt Whitman Road/Duryea Road	0.9 miles	280
8	Huntington Quadrangle	Route 110 at Huntington Quadrangle	0.5 miles	255
9	Pinelawn Road	Route 110 at Pinelawn Road	1.1 miles	230
10	Melville Mall	Route 110 at entrance to Melville Mall, between Northern State Parkway and Fletcher Place	0.7 miles	350
11	Walt Whitman Shops	Parking lot on the south side of the Walt Whitman Shops at the location of the existing bus shelters, east of Route 110 near the Norwich Street entrance to Walt Whitman Shops	1.7 miles	465
		Total, All Stations	10.5 miles (0.9 miles average distance between stations)	3,820 (1,490 net increase in transit boardings from No-Build condition)

BRT Trunk Route Station Locations, Distances, and Projected Ridership

[1]Based on a ridership forecast for the BRT trunk route only with no feeder routes

BRT Trunk Route Operating Statistics

SPAN OF SERVICE	Monday – Thursday	5:30am – 10:00pm
	Friday – Saturday	5:30am – 12:00am
	Sunday	6:00am – 10:00pm
SERVICE FREQUENCY	Weekday Peak	Every 10 minutes
	Weekday Off-Peak	Every 15 minutes
	Weekends	Every 20 minutes
FLEET REQUIREMENT	Peak period, including 20% spare	9 BRT vehicles
TRAVEL TIME AND AVERAGE SPEED (BETWEEN LIRR AMITYVILLE STATION AND WALT WHITMAN SHOPS, AM PEAK PERIOD)	Northbound	26 minutes (24.2 mph)
	Southbound	20 minutes (31.5 mph)



Subject matter expertise and local knowledge from the Technical Advisory Committee (TAC) and general public guided the AA process and informed the development and screening of alternatives

Source: Parsons Brinckerhoff (2014)

7 PUBLIC OUTREACH AND STAKEHOLDER ENGAGEMENT

7.1 OVERVIEW

Stakeholder and public engagement was a critical component of the Route 110 AA. The development and evaluation of alternatives was informed by proactive outreach that contributed subject matter expertise and local knowledge to the study process. The stakeholder and public engagement effort enabled the project team to identify and address concerns early in the planning process, inform interested groups and individuals about project status, and get feedback at key milestones. The Town of Babylon Office of Downtown Revitalization, as sponsor of the AA, played a central role in the coordination and outreach process.

As documented in Appendix J, the goals of the stakeholder and public outreach effort were to:

» Engage stakeholders and the public in helping to define the issues and opportunities along the Corridor early on in the process

» Provide accurate information to the public about existing conditions, issues, and options for transit improvements

» Involve a broad, inclusive, and representative set of stakeholders, organizations, and residents from throughout the study area as a basis for informed decisions

» Offer convenient and varied avenues for stakeholders and the public to learn about and participate in the AA

» Develop alternatives that reflect public priorities for improved transit service and economic development

» Promote open and transparent discussion of alternatives and their potential impacts

» Provide timely responses to public and stakeholder concerns about alternatives, the planning process, and decision-making

Stakeholder and public engagement will be an ongoing process that continues to evolve and spark new and sustained interest as the project advances toward implementation. The stakeholder and public meetings held during the Route 110 AA are summarized in **Table 21**. Future engagement is discussed in Section 7.4 below.

7.2 TECHNICAL ADVISORY COMMITTEE (TAC)

The TAC was defined to comprise subject matter experts from local and regional agencies with transportation and/or land use regulatory authority. Route 110 is a State-owned roadway that includes several regional transit systems and that runs through multiple municipalities with local land use jurisdiction. As such, a wide range of stakeholders played an important role in the AA process.

Specifically, the following agencies and organizations (listed alphabetically) were invited to participate on the TAC, supplementing the Town of Babylon Office of Downtown Revitalization as project sponsor:

- 511 Rideshare
- Farmingdale State College
- FTA
- LIRR
- Melville Chamber of Commerce
- Nassau County Department of Public Works
- NICE
- North Amityville Implementation Committee
- NYMTC
- NYSDOT
- RPA
- Suffolk County Department of Economic Development and Planning
- Suffolk County Department of Public Works
- Suffolk County Transit
- Town of Babylon Department of Planning and Development
- Town of Babylon Industrial Development Agency (IDA)
- Town of Huntington, HART
- Town of Huntington Planning and Environment Department
- Transit Solutions
- Tri-State Transportation Campaign
- Village of Amityville
- Village of Amityville, Downtown Revitalization Committee

MEETING NAME	MEETING DATE
TAC Meeting #1	December 15, 2014
Public Meeting #1	December 15, 2014
TAC Meeting/Webinar #2	April 1, 2015
Public Meeting #2	April 27, 2015
TAC Meeting/Webinar #3	July 1, 2015

TABLE 21: Stakeholder and Public Meetings during the Route 110 Alternative Analysis

Source: Parsons Brinckerhoff (2015)

The presentations and meeting minutes from the TAC and public meetings are included in Appendix K.

Three TAC meetings—on December 15, 2014; April 1, 2015; and July 1, 2015—were held during the AA, and two of the meetings offered attendees the option of participating remotely via webinar. The meetings were convened at key milestones in the study so the Town of Babylon and the project team could provide an update and get feedback on the AA, including project status and next steps. Each meeting included an interactive question and answer session with the attendees. The project team prepared detailed meeting minutes to document the discussion at each meeting, summarized below.

The first TAC meeting on December 15, 2014 featured an update on East Farmingdale initiatives by the Town of Babylon, followed by an overview of the Route 110 AA process by the project team. At that stage of the study, the project team presented the project background, problems and opportunities, Purpose and Need, goals and objectives, and alternative evaluation process, concluding with the results of the Long List Screening and a discussion of next steps. Comments and questions from TAC members focused on the elements of BRT, land use and zoning along Route 110, future development opportunities (most notably the East Farmingdale master development), the timeline for the planned LIRR Republic Station, data collection, funding and financing options for transit improvements, and considerations for BRT and feeder route service planning.

During the second TAC meeting on April 1, 2015, the Town of Babylon and the project team summarized the discussion from the first TAC meeting and offered an update on work completed to date. The presentation highlighted the BRT trunk route alignment and station locations, the elements

of BRT under consideration for Route 110 (i.e., limited-stop service, shoulder-running, and TSP), the distinguishing features of Alternatives D and E, and the operating plan and assumptions for both the BRT trunk route and feeder routes. Comments and questions from TAC members covered a wide range of topics, including—but not limited to—vehicle and ROW considerations for BRT on Route 110, parking, Complete Streets, pedestrian safety, frequency and span of BRT and feeder route service, travel times, and ridership forecasts.

The third TAC meeting was held on July 1, 2015, and featured a presentation by the Town of Babylon and the project team about the outcome of the AA and next steps in the federal process. Between the second and third TAC meetings/webinars, the project team continued the evaluation of Alternatives D and E by preparing capital and O&M cost estimates, developing ridership forecasts, and conducting the Short List Screening. The presentation and discussion during the TAC meeting summarized the findings of the evaluation, and outlined the Project Development process that will follow the AA.

In addition to hosting the meetings specifically for the TAC, the Town of Babylon and the project team encouraged the TAC to attend the public meetings to gain additional insight and remain active in the planning process.

7.3 PUBLIC OUTREACH

A robust but focused public outreach process facilitated the collection of meaningful, substantive input to inform the development and evaluation of transit alternatives that best address the Purpose and Need and goals and objectives of the Route 110 AA.

During this study, there were two public meetings—on December 15, 2014, and April 27, 2015—that were both hosted at the East Farmingdale Fire Department, just west of Route 110 on Conklin Street. Both meetings offered opportunities to share information on the study and obtain input on study elements to improve the planning process and integrity of findings. Each meeting included a presentation complemented by an open house with educational and interactive boards staffed by the Town of Babylon and the project team. Additionally, comment cards were available as another avenue for meeting attendees to provide input to the project. The presentations from each of the meetings are posted on the Town of Babylon website, and the project team prepared detailed meeting minutes to document the discussion at each meeting, summarized below.

Public meeting attendees identified issues and opportunities facing Route 110 during the interactive open house on December 15, 2014
Source: Parsons Brinckerhoff (2014)

The first public meeting was held on December 15, 2014, directly following the first TAC meeting. The purpose of this public meeting was for the Town of Babylon to provide an update on East Farmingdale initiatives, and for the project team to provide an overview of—and get feedback on—the ongoing Route 110 AA, including project status and next steps. The presentation covered the same material from the first TAC meeting. During the open house, the project team asked attendees to identify where they live/work/shop in the study area, and to offer input on challenges and opportunities along Route 110. Comments and questions during the meeting covered a range of topics, including traffic congestion, parking supply, pedestrian/bicycle infrastructure and safety, the need for cost-effective transit improvements, the future of the Suffolk County Transit S1 route, the East Farmingdale master development, the reopening of LIRR Republic Station, and opportunities for regional collaboration and coordination.

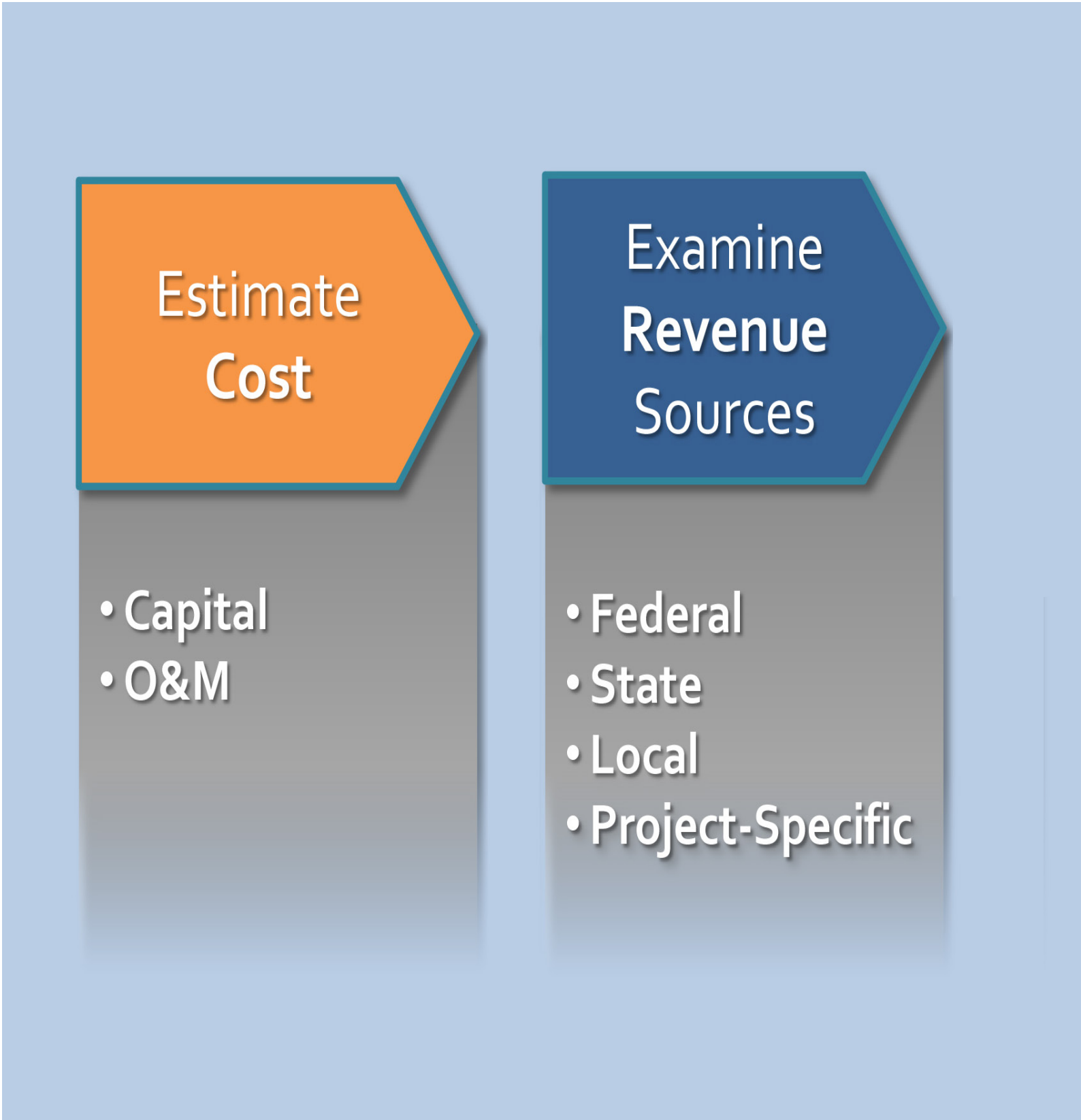
The second public meeting was held on April 27, 2015. After summarizing the presentation and input received during the first public meeting, the Town of Babylon and the project team updated attendees on work completed to date and provided an overview of next steps in the study. The presentation covered similar material from the second TAC meeting, and the open house included

boards that showed the study area, the AA study process, the elements of BRT, the proposed BRT stations on Route 110, the proposed shoulder-running segments on Route 110, and the two Short List Alternatives. Comments and questions focused on similar issues as those raised during the first public meeting, as well as additional topics, such as the potential effect of shoulder-running on right turns, on-street parking, and curbside access; future development and ridership demand; fare collection; and TSP. The meeting concluded with the project team noting that while this would be the final public meeting for the AA, the public outreach process would continue in the subsequent steps of the project, and there would be additional opportunities to provide input.

7.4 NEXT STEPS

As the stakeholder and public engagement effort continues during Project Development and subsequent steps in the implementation process, additional goals can be defined for outreach and coordination. For instance, it could be worthwhile to engage a range of stakeholders, including property owners, who may be in a position to help fund or sponsor elements of the proposed BRT trunk route and/or feeder route services. Additionally, outreach to major commercial property owners, educational institutions, and economic and commercial organizations in the study area can help to build a network of advocates to provide a source of BRT ridership.

Town of Babylon Deputy Supervisor Antonio Martinez welcomed attendees at the first public meeting on December 15, 2014
Source: Parsons Brinckerhoff (2014)



The financial planning process in the AA included a preliminary assessment of a wide range of funding options (including federal, state, local, and project-specific sources) to cover the estimated capital and O&M costs of the proposed project

Source: Parsons Brinckerhoff (2014)

8 FINANCIAL PLAN

The AA process included a preliminary assessment of potential federal, state, local, and project-specific funding sources to address the estimated capital and O&M costs for the proposed project. As discussed previously, the feeder routes will be finalized in Project Development because the Short List Screening did not result in a preferred feeder option (i.e., since both Alternatives D and E would achieve the project goals and objectives). Therefore, for purposes of this AA, the financial plan focused on securing the necessary funding for implementation of the BRT trunk route only. Additionally, the financial plan was based on the elements of the BRT trunk route as proposed in this AA, excluding the below-the-line costs of the longer-term BRT elements (i.e., off-board fare collection, level boarding, and enhanced station-area intersections). The financial plan will be revisited as the LPA is finalized in Project Development.

The order-of-magnitude capital cost of the BRT trunk route is approximately $28.0 million, and the order-of-magnitude annual O&M cost is approximately $3.5 million. The preliminary financial assessment in this AA concluded that a significant portion of the project's capital cost may be funded through federal funds; the local financial commitment (remaining capital costs) and annual O&M costs are proposed to be addressed using a combination of existing state and local transit funding programs, other potential state and local transit funding programs, and/or project-specific funding sources.

The following discussion presents an overview of the recommended funding options. The full financial plan (Appendix L) includes additional details about other potential funding sources. Overall, the financial plan provides a foundation for identifying and securing commitments of specific funding sources for implementation of the proposed project.

8.1 FEDERAL FUNDING

The financial plan includes consideration of a range of potential federal sources that could fund a portion of the estimated $28.0 million capital cost of the BRT trunk route. Federal funding programs that are discussed in the financial plan include the FTA's New/Small Starts program, the Transportation Investment Generating Economic Recovery (TIGER) program, and several federal grant programs that provide funding to the state and region on a formula basis (e.g., the Surface Transportation Program (STP), the Congestion Mitigation and Air Quality (CMAQ) Improvement Program, Section 5307 Urbanized Area Formula Funds, and Section 5339 Bus and Bus Facilities Grants).

The recommended federal funding option is the FTA's Small Starts program. Small Starts is a discretionary grant program administered by the FTA that provides federal grants to major transit capital investments. The Small Starts program provides support for eligible projects less than $250 million in cost that are seeking less than $75 million in federal grants. Upon FTA approval, successful Small Starts projects receive an expedited grant agreement called a Section 5309 Small Starts Grant Agreement (SSGA). To be eligible for an SSGA, Small Starts projects must complete the Project Development process, which is proposed as a key next step following this AA.

The Route 110 project is well-suited for the Small Starts grant program compared to other federal funding options for the following reasons:

- A Small Starts grant provides the largest likely percentage of federal funding.
- A Small Starts grant is a predictable funding source.
- A Small Starts grant would not compete with existing federal formula funding in the region.
- Multiple similar BRT projects in the nation have been well-positioned and successfully received Small Starts grants.
- The Small Starts program is significantly less competitive than the TIGER program, which is another discretionary federal grant program.

Typically, projects may not combine federal discretionary grant funding from the Small Starts and TIGER programs. Given the close alignment of the proposed Route 110 project with Small Starts program requirements, and the greater certainty associated with Small Starts funding, the project sponsor is advised to focus on securing a Small Starts grant rather than a TIGER grant. In consultation with NYMTC, the project sponsor could also pursue federal formula funds to complement Small Starts (as long as the total federal share is less than 80% of the project cost), although existing funds are committed to other priorities in the region.

By statute, the maximum federal grant for a Small Starts project is 80% of the capital cost of the project, but most applicants are anticipated to receive a grant of approximately 50% of the capital cost of the project. Under that assumption and given current capital cost estimates for the proposed Route 110 project, a successful Small Starts grant matched at 50% would provide approximately $14.0 million in capital funding for the project. The remaining $14.0 million in capital costs and $3.5 in annual O&M costs would require additional state, local, and/or project-specific funding, which is summarized in the following section.

8.2 LOCAL FINANCIAL COMMITMENT

A wide range of state, local, and project-specific funding sources were evaluated in the financial planning process to cover the balance of the capital costs (i.e., those that would not be covered by anticipated federal sources) and the annual O&M costs of the proposed project. Each potential funding source was evaluated according to a number of factors. (Refer to sidebar on page 121.)

Based on the assessment of these factors, nine funding options were determined to have the strongest potential to provide the local financial commitment for the proposed project. The nine funding options include a range of existing state and local transit funding program, other potential state and local transit funding programs, and project-specific funding sources.

A summary of each funding source and justification with respect to the evaluation factors is described below.

Existing State and Local Transit Funding Programs

- **Suffolk County General Funds**
  - Suffolk County general funds have a good likelihood to support capital and O&M costs if funding for the project can compete with other County budget priorities. As an integral component of the *Connect Long Island* plan, this project is closely aligned with

currently budgeted projects that use Suffolk County general funds. This funding source generally keeps pace with inflation, and the County has legal authority and an existing mechanism for collection. The funding source has neutral equity implications, as it is primarily composed of real property taxes, which are progressive, and local sales and use taxes, which are regressive. General funds have moderate, generally predictable revenue potential, as well as a strong nexus with beneficiaries of the proposed project, as funds are provided by Suffolk County tax payers.

Other Potential State and Local Transit Funding Programs

» **New York State/LIREDC CFA Grant**

« The New York State/LIREDC offers grants through the CFA to fund projects of regional significance. The 2011 LIREDC *Strategic Economic Development Plan for the Long Island Region* calls for developing multi-modal transit options on north-south corridors, and further acknowledges the potential for BRT implementation on Route 110. Therefore, the proposed project may be competitive for grants through the CFA grant program.

« As discussed on the program website, the CFA effectively serves as a "single entry point…to access multiple state funding sources." One of the many funding sources available through the CFA is the NYSERDA Cleaner, Greener Communities Program. Suffolk County received a $1.5 million NYSERDA grant for a BRT demonstration corridor in 2013, which may increase the likelihood of the Route 110 project being competitive for grant funding through the program in the future.

« Part of an annual grant program, a CFA grant generally keeps pace with inflation, is stable and predictable, and has the potential to fund a moderate portion of the project's capital cost. Funded by New York State, CFA grants are directly related to the beneficiaries of the project. There is legal authority to apply a CFA grant to the proposed project. CFA grants are already being administered and would be low cost to apply to the proposed project. The funding source has neutral equity implications. If selected for a CFA grant, there would likely be strong political support to use the grant for the project because the funding source does not take away from existing committed and local sources for transit.

FACTORS FOR EVALUATING FUNDING OPTIONS TO DEMONSTRATE LOCAL FINANCIAL COMMITMENT

Revenue Potential: The estimated amount of revenue the funding source may yield for the project.

Keep Pace with Inflation: The extent to which the funding source keeps pace or is correlated with general price inflation.

Equity: The proportionate impact of the funding source across income levels (progressive, neutral, or regressive), with consideration of discretionary participation by income level. (Progressive means that the tax or fee burden increases with income level; regressive means that the tax or fee places a larger burden on lower income populations.)

Nexus with Beneficiaries: The extent to which the funding source relates to the beneficiaries of the project.

Stability / Predictability: The annual volatility and reliability of the funding source.

Legal: The legal authority required to implement the tax or fee, with consideration of potential obstacles to overcome.

Administration: Administrative and collection costs to implement the funding source, with consideration of whether the tax or fee is already being collected, would require the creation of a costly new mechanism, and/or would involve many dispersed points of collection.

Political Support: The overall political palpability of the funding source, with consideration of the likely political support for using the funding source for the project.

» **Property Tax**

« Property taxes are commonly used to support transportation projects. Property taxes have strong revenue potential, are progressive, and are currently being collected and administered in Suffolk County. Property tax revenue generally keeps pace with inflation and can be stable depending on real estate market trends. Property taxes are paid by property owners in Suffolk County, representing some relation to the beneficiaries of the proposed project. However, there is currently no legal authority to increase property taxes, and political support to do so is likely limited, given that existing property taxes are already some of the highest in the nation.

» **Parking Fees**

« Parking fees on surrounding facilities may be implemented to create a dependable revenue stream for capital and/or O&M costs of the proposed project. Parking fees may also increase transit ridership in the area by increasing the cost of driving and encouraging property owners to manage supply through pricing policies. Parking fees could be added to existing and future parking supplies both within and immediately adjacent to the project ROW.

« Parking fees generally keep pace with inflation, are generally stable and predictable, and are currently being collected and administered. Parking fees have moderate revenue potential and a neutral impact across all income levels. However, there is currently no legal authority to increase parking fees. The extent of likely political support for increasing parking fees as a funding source for the proposed project depends on the type and structure of the parking fee increase. Generally, there is limited support to increase parking fees. This approach would require buy-in from major employers and property owners in the area. If this funding source were to be pursued, a market analysis should be conducted to develop a district-wide parking strategy and determine the optimal pricing policy to coordinate pricing of on- and off-street parking.

Project-Specific Funding Sources

» **Fare Revenue**

« Fare revenue will likely account for a share of the project's annual O&M costs. Fares are paid as a user fee by the riders of the transit service, the direct beneficiaries of the project. Charging fares is generally expected on a new transit service. There is likely strong political support to use fare revenue as one of the project funding sources. There is legal authority to charge fares, and fares are currently being administered and collected for other transit services in Suffolk County. The source has moderate revenue potential, can sometimes keep pace with inflation depending on agency fare policies, and can fluctuate with economic conditions. However, fares are regressive, placing a larger burden on low income riders.

» **Tax Increment Finance (TIF)**

« TIF involves the creation of a special district to raise revenue for public improvements by capturing a portion of the anticipated increase in assessed value generated by private-sector development. The tax base is frozen at predevelopment levels, and all or a portion of property tax revenues derived from increases in assessed values (i.e., the tax increment) are applied to a special fund created to retire bonds originally issued for development of the district.

« Property taxes (the most common tax used for TIF) are progressive and are currently being collected and administered. TIF revenue is directly generated from a defined district near the project ROW, having direct relation to the beneficiaries of the project. TIF revenue has moderate revenue potential, generally keeps pace with inflation, and can be stable and predictable depending on real estate market trends. Compared to a Countywide property tax increase, TIF has the potential to foster support from benefiting property owners along the project ROW. There is also legal authority to create a TIF district for the project. In general, TIF in New York State has been limited, but recent legislative changes have broadened the revenue generation potential of TIF districts. An alternative approach that is common in New York State is a Payment in Lieu of Taxes (PILOT) Increment Financing, which provides more revenue and is easier to borrow against than standard TIF applications.

» **Special Assessment**

« Special assessment districts are areas in which an additional property tax is applied to parcels of land that receive a special benefit from one or more public improvements funded by the special tax.

« Special assessments have the potential to fund a portion of the capital and/or O&M costs of the proposed project. This funding source is typically applied for a 20- to 30-year period and generates a consistent revenue stream. A special assessment would be progressive and could be administered via existing property tax collections. Special assessment revenue is directly generated from a defined district near the project ROW, having direct relation to the beneficiaries of the project. There is also legal authority to create a special assessment district for the project. This funding source has moderate revenue potential, generally keeps pace with inflation, and can be stable and predictable depending on real estate market trends. Although political support for a special assessment is limited, there may be greater political support for instituting a special assessment along the project ROW compared to a Countywide property tax increase, as is the case with TIF.

» **Developer Contributions**

« Developers often provide in-kind or monetary contributions to facilitate construction of infrastructure that would result in a positive impact on property values. Often these contributions are negotiated to reflect the benefit the developer derives from the project. If funding is negotiated, project sponsors often request the money during the early portion of the debt service period. This enables the project sponsor to better leverage other funding sources.

« Developer contributions could potentially fund a significant portion of the proposed project's capital and/or O&M costs, depending on the negotiated amounts. Developer contributions are progressive and directly related to the beneficiaries of the project. Suffolk County has legal authority to use developer contributions for the project and administrative costs would be relatively low. There is likely moderate political support to use developer contributions for the project. However, developer contributions do not keep pace with inflation and are generally not stable or predictable.

» **Joint Development**

« Joint development is a partnership between a public entity and a private developer created to develop certain assets. According to FTA guidance, the development and the property must have a physical and a functional relationship. Joint development can occur when an agency owns land that can be leased to the developer for a long period of time. This will enable the developer to build on the land with a low risk of losing the capital investment. In exchange, rents are paid to the agency, creating a revenue stream that can be bonded against to support the development of a transit improvement.

« Joint development could potentially fund a portion of the capital and/or O&M costs for the proposed project. Joint development is progressive, directly related to the beneficiaries of the project, and generally stable and predictable. Suffolk County has legal authority to use joint development for the project and administrative costs would be relatively low. There is likely moderate political support to use joint development to fund the project. Joint development projects must be appropriately structured to keep pace with inflation.

8.3 FUNDING NEXT STEPS

The funding recommendations in this Final Report reflect findings from an initial review of potential funding options for the proposed project. A comprehensive review of each funding option, including revenue projections, is necessary to develop detailed funding recommendations. These recommendations would be applied to develop a detailed financial plan for implementation of the proposed project, informed by capital and O&M cost estimates.

The project sponsor is advised to secure the commitment of state, local, and/or project-specific funds in order to demonstrate local financial commitment and compete for federal Small Starts funding. The ultimate goal is to ensure a financially sustainable path for implementation, including infrastructure maintenance and continuing operations.

It is anticipated that the proposed project will be advanced in the Project Development process, which is the key next step toward implementation of a premium, limited-stop BRT service along Route 110 to complement the existing Suffolk County Transit local S1 service.

Source: Parsons Brinckerhoff (2014)

9 NEXT STEPS AND CONCLUSION

The purpose of the Route 110 AA was to define and evaluate a range of route and modal alternatives for transit investment in the study area to arrive at a recommendation for an LPA that would best address the project Purpose and Need and goals and objectives. Through a multi-tiered screening process, the AA resulted in the identification of a BRT trunk route along Route 110 and the detailed evaluation of two alternative sets of off-Corridor feeder routes to complement the trunk route.

The results of the multi-tiered screening process demonstrated that both Short List Alternatives D and E would best achieve the project goals and objectives with a combination of BRT trunk route service and shuttle bus feeder route service. Since neither alternative emerged as the definitive superior option, it was determined that the feeder routes would be finalized during the Project Development process that will follow this AA.

9.1 PROJECT DEVELOPMENT: A PATH TOWARDS IMPLEMENTATION

Project Development is a required step in the federal process to be eligible for the FTA Small Starts discretionary grant program (**Figure 44**), which is the recommended federal funding option to be pursued for this project. Following this AA, the next step in the federal process is to request entry into Project Development. Elements of the request to enter Project Development include—but are not limited to—a discussion of the proposed project and alternatives under consideration, a cost estimate for the proposed project, and the anticipated timeline, cost, and identified funding sources to complete Project Development.

In conjunction with the final planning and selection of the LPA, Project Development will also include environmental review, documentation of local financial commitment, Preliminary Engineering and Final Design, and ongoing agency coordination and stakeholder/public engagement.

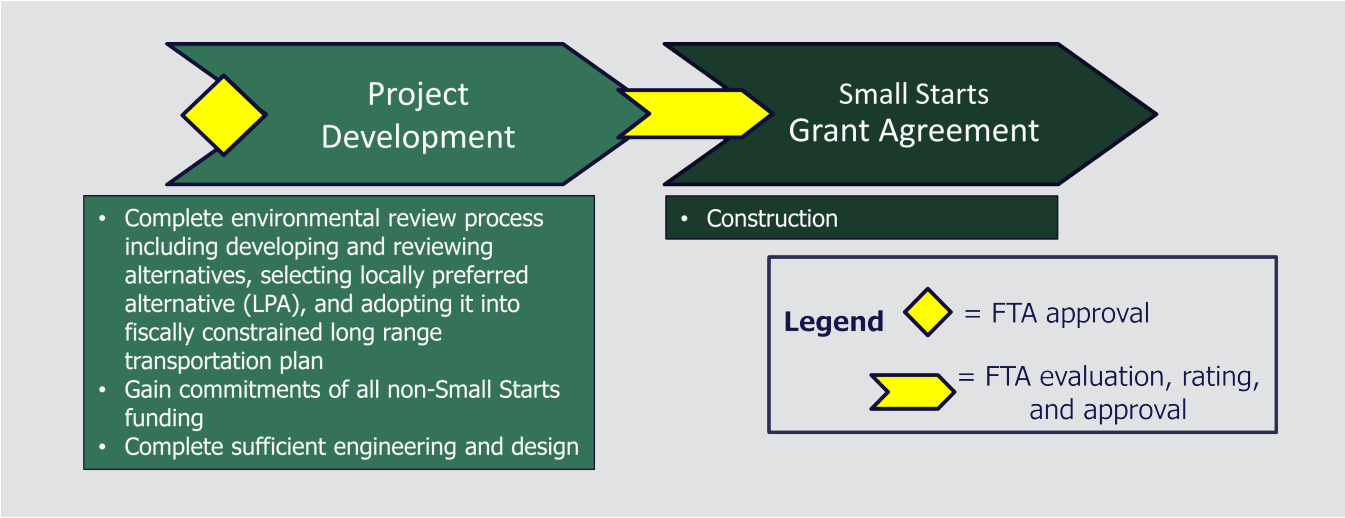


FIGURE 44: FTA Small Starts Process
Source: FTA (2015)

9.2 FINAL PLANNING AND SELECTION OF THE LPA

One component of Project Development is selection of the LPA. The detailed evaluation of Alternatives D and E in this AA provided the background data to support a focused analysis in Project Development. This will lead to identification of the feeder route(s) to complement the BRT trunk route, which will collectively comprise the LPA.

As summarized in **Table 22**, a number of concepts can be explored in Project Development, leading to selection of an LPA. For instance, although the Short List Alternatives were presented in this AA as discrete options to facilitate an evaluation in the Short List Screening, it is important to preserve the opportunity to mix and match different feeder routes from the alternatives in defining the LPA. The LPA could either be one of the Short List Alternatives or a combination thereof, as a hybrid between the two alternatives could prove to be the option that best achieves the project goals and objectives.

Other options presented in **Table 22** include—but are not limited to—modifications to the routing and service plans of the feeder routes, refinement of the shoulder-running segments of the BRT trunk route alignment, changes to the underlying transit network, and identification of an initial operating segment (IOS). The list is not intended to be exhaustive, and additional concepts can be explored as necessary to define an LPA that best meets the project goals and objectives. The selection of the LPA in Project Development will also be informed by the evolving land use pattern and transportation network in the study area. At the time of the completion of this Final Report, a number of complementary initiatives were underway that could result in changes to the development character and/or transportation conditions in the study area. Specifically, the following projects could catalyze transit-oriented and pedestrian-friendly development in the study area:

» The planned reopening of the LIRR Republic Station;
» The East Farmingdale master development and related planning studies;
» The Town of Huntington Melville Employment Center Plan;
» The Village of Amityville Downtown Revitalization process;
» The Suffolk County/RPA Route 110 design guidelines; and
» The NYSDOT Pedestrian Safety and Operational Improvements project.

Coordination with all of these efforts will complement the technical analyses in Project Development.

POTENTIAL PROJECT DEVELOPMENT CONCEPT	DESCRIPTION
Mix and match feeder routes from Alternatives D and E	• Consider an alternative that includes feeder routes D1/E1 (Farmingdale State College), D3 (Walt Whitman/Pinelawn Road), and E3 (New Highway/Pinelawn Road)
Combine individual feeder routes from Alternatives D and/or E	• Consider combining feeder route D1 (Farmingdale State College) and D2 (Ruland Road/Smith Street) • Consider combining feeder routes E2 (Walt Whitman Road) and E3 (New Highway/Pinelawn Road)
Re-route feeder routes by using one-way roads for two-way service	• Consider contra-flow lanes on the LIE Service Roads
Coordinate with study area employers and property owners to explore potential partnerships and/or modifications to feeder routes	• Consider corporate sponsorships and other opportunities for employers to financially support implementation of the feeder routes (including vehicles and stations), informed by information about employee commuting patterns • Consider re-routing feeder routes by using transit shortcuts (i.e., using private roads or public roads that cut through private properties by establishing agreements with adjacent property owners to link their parking lots) • Consider offering front- and/or back-door service to provide direct access to major employers (e.g., Canon)
Revisit the transit center concept near the intersection of Route 110 and Pinelawn Road	• If warranted by ridership demand, consider property acquisition and site development for a stand-alone feeder route transit center to complement the BRT trunk route station on Route 110
Modify the feeder route service area	• Consider proposing feeder routes to serve off-Corridor activity centers that are located south of Conklin Street and/or north of Pinelawn Road (i.e., outside the feeder route service area as defined in this AA)
Modify service policy and/or fare policy assumptions for the trunk and/or feeder routes	• Consider proposing service policies (i.e., frequency and span of service) for the feeder routes that differ from the service policies for the BRT trunk route • Consider proposing different service policies for different feeder routes • Consider proposing demand-responsive feeder routes instead of fixed-route service • Consider proposing different fares and/or transfer fees for the BRT trunk route and/or feeder routes compared to existing Suffolk County Transit fare policy
Re-route BRT trunk route at the southern and/or northern termini	• Consider using Sterling Place in the southbound direction to avoid the tight turning radius at Oak Street • Consider circulating within the Walt Whitman Shops parking lot to provide an additional stop on the north side of the buildings
Extend BRT trunk route at the southern and/or northern termini	• Consider extending the BRT trunk route from the LIRR Amityville Station to the Westfield Sunrise Mall • Consider extending the BRT trunk route from the Walt Whitman Shops to the LIRR Huntington Station
Revisit the guidelines for defining the BRT trunk route alignment	• In collaboration with NYSDOT, consider proposing shoulder-running where feasible along the approximately 1.7-mile segment of Route 110 between the LIE South Service Road and Arrowwood Lane (i.e., the location of the NYSDOT Route 110 Reconstruction and Bridge Projects) • Consider further analyzing the feasibility of a median-running BRT alignment
Revisit the intersections proposed for TSP (in conjunction with detailed traffic analysis and modeling to understand potential impacts)	• In collaboration with NYSDOT, consider proposing TSP at the three currently unsignalized intersections on Route 110 that will be converted to signalized intersections (i.e., Railroad Avenue, Lindy Avenue/ Nathalie Avenue, and Amityville Road North) as part of the NYSDOT Route 110 Pedestrian Safety and Operational Improvements Project • Consider proposing TSP at only some (instead of all) of the signalized intersections along the BRT trunk route
Modify the assumptions for the underlying transit service in the horizon year	• In collaboration with Suffolk County, consider proposing modifications to the existing S1 service • In collaboration with the LIRR, consider refining the assumptions for future service at the planned Republic Station
Recommend an IOS or an initial phase of implementation to align with available funding and as warranted by demand	• Consider proposing a portion of the BRT trunk route as an IOS • Consider proposing the BRT trunk route—either alone or with a sub-set of the feeder routes—as an initial operating phase, with potential interim service to the LIRR Farmingdale Station until Republic Station is built and operational • Consider proposing for near-term implementation any/all of the BRT elements that are presented in this AA as part of the longer-term plan (i.e., off-board fare collection, level boarding, and enhanced station-area intersections)

TABLE 22: Potential Concepts for Consideration in Project Development

Source: Parsons Brinckerhoff (2015)

9.3 ENVIRONMENTAL REVIEW AND ASSOCIATED STUDIES

The environmental review for the proposed project will include separate findings for the federal NEPA process and the State Environmental Quality Review (SEQR) process. It is assumed that the FTA and Suffolk County would serve as the Lead Agencies for NEPA and SEQR, respectively. It is currently anticipated that the proposed project will qualify for a Categorical Exclusion (CE) under NEPA and a Negative Declaration under SEQR, meaning that the project will not result in significant adverse environmental impacts and that an Environmental Impact Statement (EIS) will not be required. This will be verified in Project Development through completion of the FTA Region 2 CE Worksheet and either the Short or Long SEQR Environmental Assessment Form (EAF), supplemented as necessary by discrete environmental analyses.

One environmental impact category that warrants additional analysis is traffic, as it will be necessary to confirm the feasibility of TSP from a traffic operational standpoint. As currently proposed, the project calls for implementation of TSP at all signalized intersections along the trunk route, which could potentially result in traffic impacts along the intersecting cross streets. At each signalized intersection, TSP would be achieved through an extension of green time or an earlier start of green time to minimize wait time for BRT vehicles at red lights along the trunk route, which would result in longer red time along the cross streets. Therefore, a traffic analysis should be completed to determine the optimal balance between reducing travel time for BRT along the trunk route and maintaining acceptable levels of service for traffic flow along the cross streets.

Additionally, while this AA applied assumptions regarding time savings for TSP and shoulder-running based on guidance from TCRP Report 118, a traffic study for the proposed project could calculate Corridor-specific time savings based on traffic conditions along the trunk route. It is recommended that the first step in a traffic study include optimizing the traffic signals for enhanced progression of BRT vehicles along the trunk route, followed by performing micro-simulation modeling (perhaps using AIMSUN software) to quantify the benefits, identify any potential impacts, and suggest mitigation measures if applicable.

Additionally, a parking study could complement a traffic study by analyzing potential impacts to on-street parking that could result from implementation of shoulder-running along the trunk route. As currently proposed, the project calls for restricting on-street parking along segments of Route 110 through the proposed repurposing of the shoulder into a dedicated BRT lane, which would reduce the inventory of on-street parking. This AA included a preliminary parking assessment, and it is recommended that a detailed parking study be completed to conclusively determine whether the proposed project would result in any adverse impacts to on-street parking, including consideration of the availability of off-street parking to mitigate the loss of on-street parking. Such a parking study could build upon the recent (May 2015) NYMTC-sponsored parking management workshop in the East Farmingdale community.

Other discrete environmental analyses may also be warranted to supplement the CE Worksheet and EAF for other environmental impact categories, such as environmental justice, air quality, cultural and natural resources (archaeological, historic, park and recreational lands, etc.), noise and vibration, hazardous materials, construction impacts, cumulative and indirect impacts, and property acquisition. The CE Worksheet and EAF will inform the need for these and/or other discrete environmental analyses.

9.4 DOCUMENTING LOCAL FINANCIAL COMMITMENT

The financial plan in this AA included an initial review of potential funding options, as well as a preliminary recommendation regarding the most promising funding options for the proposed project. The crucial next steps in the financial planning process are to forecast the specific revenue-generating potential of each funding option and to determine the complete package of funding sources that will enable implementation of the proposed project. The commitment of state, local, and/or project-specific funding sources to demonstrate local financial commitment is a key requirement for competing for federal Small Starts funding. Phased implementation could be explored in Project Development, which could enable implementation of discrete segments of the full project as funding becomes available. The documentation of local financial commitment must also show the budget for completing Preliminary Engineering and Final Design.

9.5 PRELIMINARY ENGINEERING AND FINAL DESIGN

This AA included the preparation of alignment plans and station plans at a 10% level of engineering (Appendix G),

which generally depicted the elements of the proposed project in enough detail to estimate order-of-magnitude capital costs and identify potential geometric design constraints. The Preliminary Engineering in Project Development will entail site-specific topographic and ROW survey and basemapping as necessary to complete approximately 30% engineering for all capital components of the proposed project, including—but not limited to—roadway improvements (such as pavement replacement/painting, signage, striping), stations and the associated passenger amenities, pedestrian infrastructure, and utility relocation.

Following completion of Preliminary Engineering, the Final Design in Project Development will entail the production of all plans and specifications necessary for construction, showing dimensions, elevations, sections, and other details as applicable (e.g., construction phasing and sequencing). This will include coordination across a range of disciplines, potentially including planning, traffic/civil/structural/mechanical/electrical engineering, and architecture for all applicable capital components of the proposed project.

9.6 AGENCY COORDINATION AND STAKEHOLDER/PUBLIC ENGAGEMENT

As indicated in **Figure 44**, one step of the Project Development process is to adopt the LPA into the fiscally constrained long-range transportation plan. This will require an action by NYMTC based upon a recommendation from Suffolk County to include the proposed project in the fiscally constrained portion of the *Plan 2040* RTP. Coordination with NYMTC will also be necessary for inclusion of the proposed project in the medium-range Transportation Improvement Program (TIP) and the Transportation Conformity Determination, which includes a regional mobile source emissions analysis that documents compliance with the Clean Air Act Amendments of 1990. This should be complemented by ongoing coordination with the TAC, including adoption/approval of the LPA by individual agencies or governmental bodies as necessary.

In addition to agency coordination, one overarching element of Project Development will be ongoing stakeholder and public engagement. Building upon the efforts from this AA, ongoing outreach to a wide range of stakeholder groups (e.g., property owners, major employers, chambers of commerce, and civic groups) and the general public (e.g., residents, employees, students, shoppers, and visitors) will be important to build support and a base of ridership for the proposed project.

9.7 CONCLUSION

This Final Report has documented the process and outcome of the Route 110 AA. From identifying problems and opportunities and developing the Purpose and Need, to defining and screening a range of alternatives to achieve the project goals and objectives, this AA provides the framework for a transit-oriented future along Route 110 and in the broader study area. The AA sets the stage for implementation of a fast, frequent, and high-quality BRT service along Route 110 to improve north-south mobility along this traditionally auto-oriented Corridor, complemented with shuttle bus feeder routes to provide last-mile connectivity to and from off-Corridor activity centers.

The guiding principle of this AA was that sustainable economic development requires close coordination and integration of transportation improvements with land use policy, consistent with the fundamental tenet of the *Connect Long Island* plan. This AA complements other ongoing local and regional initiatives to transform the land use character and transportation network of the study area, which can collectively enhance the long-term potential of Route 110, Long Island's "High Tech Main Street."

It is anticipated that the proposed project will be advanced in the Project Development process, leading to selection of an LPA to be submitted to the FTA for evaluation, rating, and consideration for approval of an SSGA. The combination of federal funding with state, local, and/or project-specific funding can provide the necessary resources to move from plan to implementation for this transformative project that has the potential to result in far-reaching benefits for Suffolk County and the surrounding region.

FOR MORE INFORMATION

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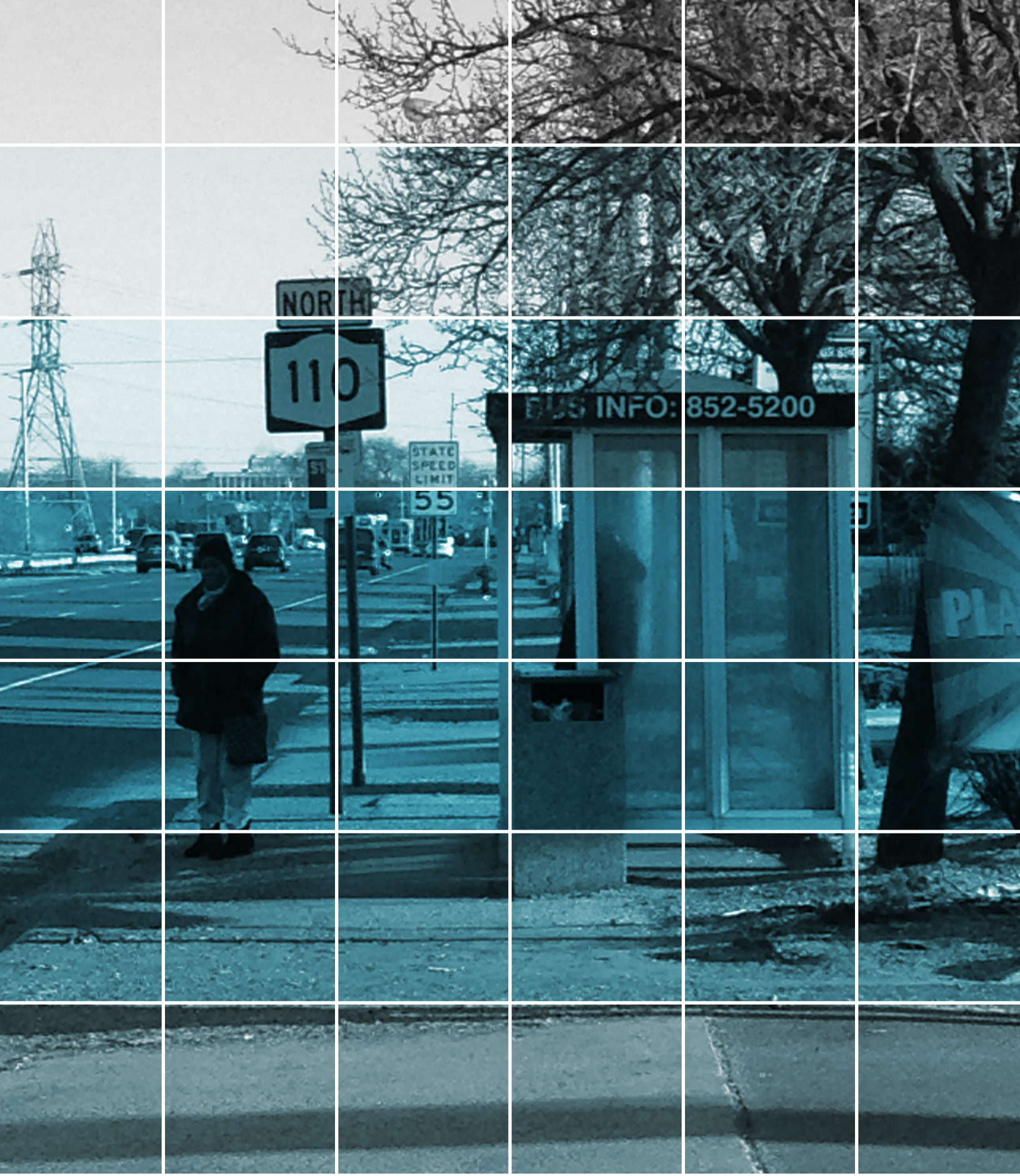
APPENDICES



ROUTE 110 ALTERNATIVES ANALYSIS