THE I-81 CHALLENGE

Syracuse Transit System Analysis

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This report has been prepared for the New York State Department of Transportation by:

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In coordination with:

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I. Introduction

The Syracuse Transit System Analysis (STSA) presents a summary of the methodology, evaluation, and recommendations that were developed for the transit system in the Syracuse metropolitan area. The recommendations included in this document will provide a public transit system plan that can be used as a basis for CENTRO to pursue state and federal funding sources for transit improvements. The study has been conducted with funding from the New York State Department of Transportation (NYSDOT) through *The I-81 Challenge* study, with coordination from CENTRO, the Syracuse Metropolitan Transportation Council (SMTC), and through public outreach via *The I-81 Challenge* public participation plan and Study Advisory Committee (SAC). The recommendations included in this system analysis are based on a combination of technical analyses (alternatives evaluation, regional modeling), public survey of current transit riders and non-riders/former riders, meetings with key community representatives, and *The I-81 Challenge* public workshops.

The STSA is intended to serve as a long-range vision that is consistent with the overall vision of the I-81 corridor being developed as part of *The I-81 Challenge*. The STSA will present a series of short-term, mid-term, and long-term recommendations detailing how the Syracuse metropolitan area's transit system could be structured to meet identified needs in a cost-effective manner. The analyses and recommendations provided in this report are intended to be incorporated into the overall *I-81 Challenge* study and subsequent phases, as well as in other regional planning documents, including SMTC's Long Range Transportation Plan, and the comprehensive plans of the City of Syracuse, Onondaga County, and surrounding municipalities.

The goal of the STSA is to develop a strategy to assist the Syracuse metropolitan area in achieving a balanced transportation system that supports economic growth, improves quality of life, and supports the vision of the communities that it serves. Objectives of the STSA include:

- Reducing congestion within the City, particularly along corridors adjacent to I-81 and I-690;
- Facilitating sustainable economic development within the City, including the planned development in University Hill;
- Reducing parking demand in Downtown and on University Hill;
- Examining the feasibility of increasing the frequency and number of hours per day that buses operate;
- Improving connectivity and integration of Downtown with University Hill;
- Increasing transportation options for young, elderly, disabled, and low-income populations;
- Decreasing noise and air pollution generated from traffic; and,
- Improving transit travel times on commuter routes to be more competitive with private vehicle travel time.

II. Transit System Needs

Transit system needs were identified through an assessment of ridership, infrastructure, and usability, utilizing a combination of field data collection, public meetings and surveys, and the review of existing reports and studies. Based on these results of the assessment, the following list of transit system needs was developed:

1. Improve operations for core ridership that meets existing needs as well as retains riders.
2. Attract new ridership, particularly suburban/commuter ridership, to reduce roadway congestion and parking demand in Downtown and on University Hill.
3. Improve the visibility and usability of the system for all riders.
4. Utilize transit to improve connectivity between key locations in the Syracuse metropolitan area and provide for economic development opportunities.

III. Transit System Vision

The STSA will present concepts that leverage existing areas of high transit use in order to establish the basis for "transit enhancement corridors". The corridors contain higher-frequency, highly visible transit services with improved rider amenities and shorter travel times that serve both urban and suburban areas. The higher-frequency, expanded services would improve the usability for existing users while offering amenities and service styles that would attract new riders, particularly commuters. Establishing formal transit services along the enhancement corridors would also support the development of specialized land use policies in the study area, which would support higher-density, transit-oriented, and pedestrian-friendly designs. These features would enhance the transit corridors, increase ridership, improve quality of life, and grow the economy of the region.

IV. Identification of Transit Enhancement Corridors

In order to address the identified needs and meet the goals and objectives of the STSA, it was necessary to evaluate improvements along "transit enhancement corridors". A transit enhancement corridor is defined as a general alignment of one or more major travel routes within the Syracuse metropolitan area that is selected for the purposes of evaluating transit enhancements. Corridors may have one or more existing bus routes, of which some or all of the routes may be consolidated into a new service as part of the proposed enhancements. In addition, corridors may consist of a combination of roadway and rail infrastructure.

A literature review was conducted to identify community factors that affect transit mode share in order to provide additional measures to select the transit enhancement corridors. Community factors that were utilized in the STSA include existing ridership; population and employment density; vehicle ownership; home-based work trip production and attraction densities; average commute time; transit mode share; household income; and, master plans, regional plans, and planned development. The methodology and results of identification of the corridors is provided in more detail in **Section 3.0** of the report. Based on the assessment of the factors, the following transit enhancement corridors were selected (**FIGURE E.1**):

- East Syracuse – OCC via South Avenue and James Street
- University Hill – Destiny and RTC via Solar Street
- North Syracuse/Cicero – South Salina via US 11/I-81
- Northside – Western Lights via Butternut Street/Grant Avenue and Onondaga Street
- Camillus – Fayetteville via Genesee Street/Erie Boulevard (NY 5 and NY 92)
- Great Northern Mall – Downtown/University Hill via Liverpool (CR 57)

V. Transit Enhancement Strategies

Three transit enhancement strategies were developed to evaluate various levels of transit enhancements on the identified corridors. The purpose of the enhancement strategies is to provide general alignments that can be used for the analysis of the application of various levels of transit. Each strategy offers a different level of improvements for the transit system, from enhancements to the basic bus service (low investment) to fixed guide-way (high investment) improvements. Service objectives are established for each of the strategies, and features that would meet the system needs and vision are proposed. The proposed enhancement strategies are described in detail in **Section 4.0** of the report. The routes, stops, and hubs shown as part of each of the enhancement strategies are for analysis purposes and represent a general alignment only. They do not indicate final alignments. A detailed alternatives analysis would be required to outline the exact routes, stop locations, hubs, and a detailed examination of costs and benefits before implementation.

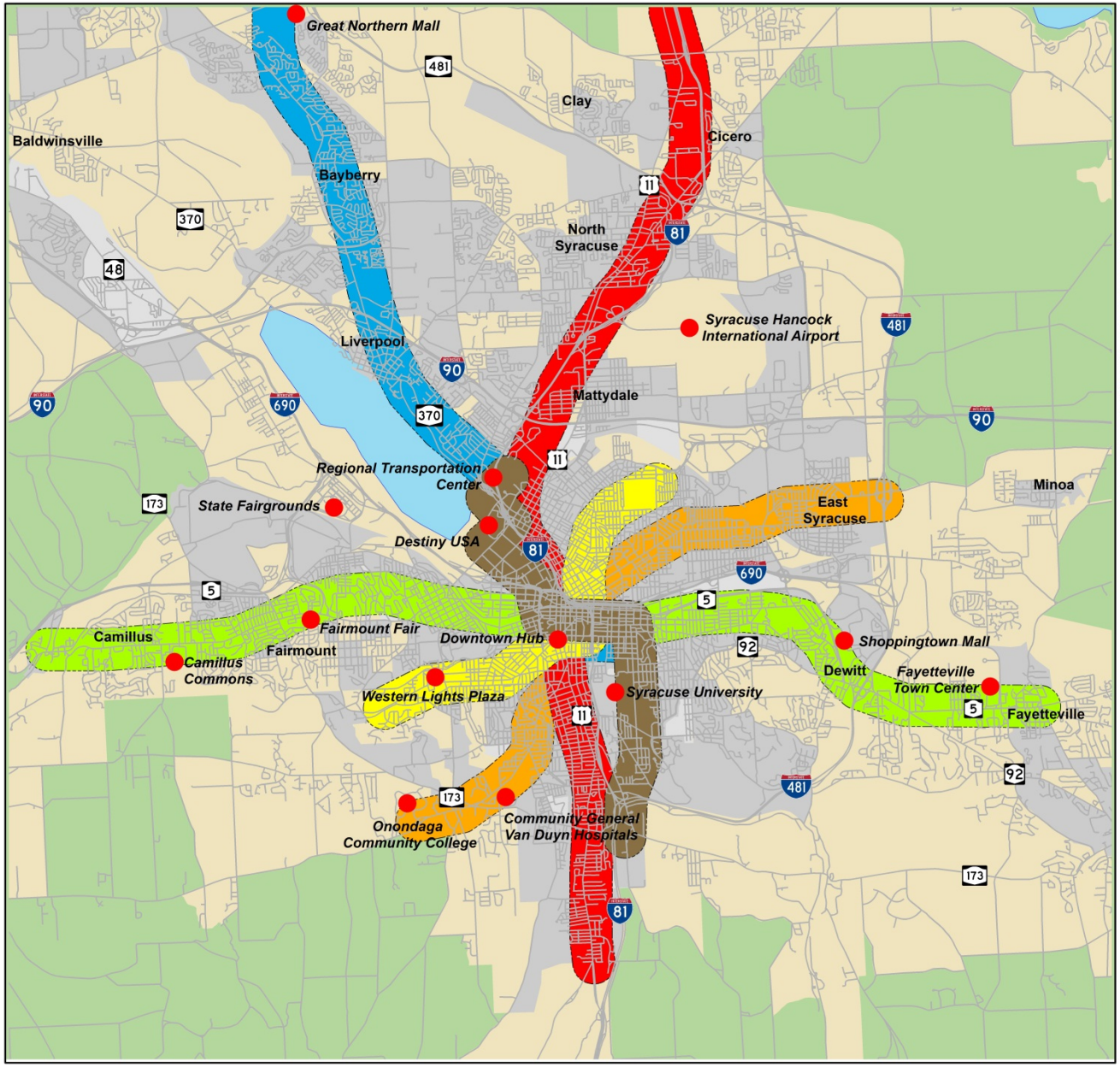


FIGURE E.1
Selected Transit Improvement Corridors

Legend

- University Hill - RTC
- Northside - Western Lights
- Camillus - Fayetteville
- North Syracuse - South Salina
- East Syracuse - OCC
- Great Norther Mall - Downtown
- Transit Supportive Areas*
- Urban Area
- Roads
- Community Destinations

*Transit Supportive Areas are traffic analysis zones or census tracts with the following demographics:
Pop and Employ Density > 4,500 JPPM
Avg HH Income < $34,560
%HH 0 or 1 Veh > 50%
Transit Mode Share > 5%

Data Source:

SMTC Travel Demand Model Version 3.023

0 1.5 3 Miles

Strategy 1: Base Build (Low Investment)

The purpose of the Base Build strategy is to identify enhancements that would maximize the level of service on a core group of routes to enhance efficiency by consolidating routes and optimizing basic bus service on high-use corridors. It is considered a Base Build strategy because it would provide an improved system that could be included in each of the subsequent strategies. The strategy centers on the establishment of trunk routes along the transit enhancement corridors, which would be oriented around a dual hub system in the urban core formed by the existing Downtown Syracuse Transit Hub and a proposed hub on University Hill (see **Section 4.1**). The trunk routes would consolidate parallel routes and deviations to form continuous corridors that would allow CENTRO to provide more-frequent bus service, as well as permit easy-to-understand corridor-branding schemes. Establishing the dual hub system would also provide one seat rides to University Hill on all trunk routes, and provide enhanced and more-frequent connections between Downtown and University Hill.

In addition to the trunk route structure, the Base Build strategy also provides guidance for new bus stop signs, shelters, and park-and-ride facilities. The guidance is focused on reducing transit travel time, providing more information for riders, improving operations for existing riders, and enhancing the transit infrastructure to make the system more attractive to new users.

Strategy 2: BRT (Moderate Investment)

Strategy 2 includes the enhancements proposed in the Base Build strategy, but expands upon them by introducing bus rapid transit (BRT) routes. BRT systems differ from basic bus service in that their facilities, vehicles, and operating structures are more like light rail transit (LRT). BRT is considered a lower-cost and more flexible alternative to rail transit, with similar travel time and ridership-generating benefits as LRT when supported with facilities such as separate transit-ways, bus-only lanes, queue-jumpers, consolidated high-quality stops, corridor branding, transit signal priority/preemption, frequent service and modern vehicles.

In general, the routes follow the alignment of the trunk routes, but have some minor adjustments to enhance links between BRT-supportive regions of the study area, and to provide better connections to major destinations (see **Section 4.2**). All of the BRT routes, with the exception of the US 11 BRT, pass through the Downtown Syracuse Transit Hub and proposed University Hill Hub, providing one-seat access to both locations. In addition to the proposed BRT alignments, this strategy also provides guidance for service features such as vehicles, bus stops, headways, and operating hours. The guidance is focused on reducing transit travel time, establishing branded corridors, establishing a sense of place and permanence within the community, supporting economic growth, and attracting new users.

Strategy 3: LRT (High Investment)

Strategy 3 includes the enhancements proposed in the Base Build strategy, but expands upon them by introducing light rail transit (LRT) to some of the transit enhancement corridors. LRT combines the qualities of a BRT system with the qualities of commuter rail by providing a higher-intensity service that has wider appeal, on a system that can be more easily integrated into an existing transportation network. LRT vehicles can operate on existing rail lines or roadways, allowing the service to get closer to major destinations, and they incorporate bus-like features such as only stopping at stations when a stop is requested.

LRT requires a higher population and employment density than basic bus service or BRT; therefore, the proposed LRT service focuses on high-density, mixed-use corridors within the Syracuse metropolitan area. The proposed LRT routes would consist of a loop connecting Downtown and University Hill, as well as route extensions to Destiny USA and other major destinations within the City (see **Section 4.3**). The loop would provide frequent transit service between destinations in Downtown and University Hill, and would serve several redevelopment areas. The Downtown – University Hill loop could also be supported by an extension option. The extensions are intended to provide additional origins and destinations along mixed-use corridors within higher density sections of the Syracuse Metropolitan area, and would likely increase the viability of the Downtown – University Hill loop.

In addition to the proposed LRT alignments, this strategy also provides guidance for service features such as vehicles, LRT stations, headways, and operating hours. The guidance is focused on minimizing travel time, supporting economic growth, enhancing connections between Downtown, University Hill, and mixed-use corridors, establishing a sense of place and permanence within communities, enhancing services for existing riders, and attracting new riders.

Strategy 4: Commuter Rail (High Investment)

Strategy 4 was considered in the preliminary stages of the STSA in order to evaluate the potential for heavy commuter rail in the Syracuse Metropolitan Area. Commuter rail is typically applied in metropolitan areas in order to connect suburban residential areas with an urban core. However, due to the relatively low peak period congestion, ample, low-cost parking within the urban core, low densities, and lack of existing rail facilities in residential communities, commuter rail was not progressed in the STSA. Commuter rail is not considered a sustainable transit service that could be applied in the Syracuse metropolitan area at this time (see **Section 4.4**).

VI. Evaluation of Enhancement Strategies

Each corridor under the transit enhancement strategies was evaluated utilizing measures that are largely based on FTA's evaluation criteria for the New Starts/Small Starts program, as detailed in the Final New Starts and Small Starts policy guidance (August 2013). The FTA New Starts/Small Starts evaluation criteria is intended to be utilized for transit projects that are further along in the development process than the general corridors presented in the STSA. As such, the FTA criteria were slightly modified to account for the higher-level nature of this study. Specifically, the STSA only utilizes the project justification rating criteria, and excludes the local financial commitment criteria (**TABLE E.1**). Therefore, the results of the evaluation are intended for use as a guide to assist decision makers in determining which corridors/strategies are most likely to be eligible for FTA funding, as well as which corridors/strategies are likely to be most sustainable.

Additional study-specific evaluation measures that are not directly linked to FTA funding criteria are also introduced to highlight each enhancement strategy's ability to meet existing and future system needs. In categories where study-specific measures are used, each measure is weighted equally and the average score across all measures will be used as the final score for the category. The evaluation criteria and methodology are described in detail in **Section 5.0** of the report.

TABLE E.1: STSA Criteria Weights

Category	Weight
Mobility Improvements	25%
Economic Development	25%
Cost Effectiveness	25%
Land Use	12.5%
Environmental Benefits	12.5%

After the scores were computed for each category, each corridor and associated enhancement was ranked based on an average weighted score to provide a prioritized list of potential transit enhancements to be progressed into future corridor-specific analyses that would be needed for funding and implementation. **TABLE E.2** shows the top ten ranked corridors and associated strategies. The results of the evaluation show that the Destiny USA/RTC to Syracuse University corridor under the Base Build Strategy ranked the highest overall. However, the most notable corridor is the James Street/South Avenue corridor, which is ranked number two through four under each of the enhancement strategies. In addition to corridors that would operate within the City of Syracuse, the results of the evaluation show potential for implementing Strategy 1 on many of the enhancement corridors, including an express commuter bus service on I-81. Furthermore, while not specifically called out in the evaluation results, the

construction of a second transit hub on University Hill was determined to be critical to the success of the enhancements.

TABLE E.2: Corridor Rankings

Rank	Corridor	Strategy	Weighted Average Score	FTA Corridor Average Rating
1	Destiny USA/RTC to Syracuse University	1: Base Build	3.71	Medium-High
2	James St/South Ave: OCC to East Syracuse	1: Base Build	3.21	Medium
3	East Syracuse – OCC	2: BRT	3.15	Medium
4	James Street	3: LRT	3.05	Medium
5	I-81 Express: Central Square to Downtown/Univ Hill	1: Base Build	3.01	Medium
6	Salina Street	3: LRT	2.91	Medium
7	Solar Street Extension	3: LRT	2.91	Medium
8	Genesee St/Erie Blvd: Camillus to Fayetteville	1: Base Build	2.85	Medium
9	Butternut St/Onondaga St: Northside to Western Lights	1: Base Build	2.83	Medium
10	US 11: North Syracuse to South Salina	1: Base Build	2.82	Medium

The results of the evaluation show that there is potential to advance several corridors for further study and application for FTA funding. Corridors ranking Medium or higher could qualify for FTA funding. Stakeholders within the Syracuse metropolitan area should consider addressing low-scoring criteria in order to increase the corridor ratings and improve the chances of receiving funding. During the evaluation process, multiple regional and corridor needs were identified that, if addressed, could increase the overall ranking of a corridor. These needs are primarily related to land use and zoning, and include:

- Establishment/update of Growth Management plans for all municipalities along the transit enhancement corridors.
- Development of transit-supportive land use policies for all municipalities along the corridors.
- Development of regulations and financial incentives to promote transit-oriented development along the corridors.
- Prioritizing/incentivizing transit-oriented development on redevelopment sites along the corridors.
- Development of affordable housing plans for all municipalities along the corridors.
- Dis-incentivizing single occupancy vehicle trips to Downtown and University Hill by reducing parking capacity through redevelopment and/or increase parking fees.

VII. Recommendations for Transit Enhancements

Based on the results of the evaluation, several corridors and strategies could be advanced for further study and implementation. The recommendations are as follows:

- Pursue higher-intensity transit services along the Destiny/RTC to Syracuse University and James Street/South Avenue corridors.
- Begin a commuter-based express bus service along I-81 from Central Square to Downtown/University Hill that utilizes park-and-ride facilities at interchanges.
- Construct a new transit hub on University Hill and construct transit-supportive infrastructure within the urban core to support the dual hub system (bus lanes, signal priority, etc.).
- Implement Strategy 1 (Base Build) on the following selected routes:
    - Destiny USA/RTC to Syracuse University
    - James Street/South Avenue: OCC to East Syracuse
    - Butternut Street/Onondaga Street: Northside to Western Lights
    - Genesee Street/Erie Boulevard: Camillus to Fayetteville
    - US 11: North Syracuse to South Salina

It is not recommended that CENTRO pursue any of the other proposed enhancements (those that ranked eleven or below) at this time. However, these enhancements could be re-evaluated in the future once the above recommendations have been implemented. It is possible that improved transit services on the corridors recommended above could result in the potential to upgrade additional corridors to BRT or LRT. Additional information regarding the above recommendations is provided in **Section 6.1** of the report.

VIII. Recommendations for Policy Enhancements

The recommended transit enhancements should not be implemented without the development and implementation of transit-supportive policies. Implementation of transit-supportive policies could potentially enhance the transit oriented travel market, which may provide additional ridership benefits to the transit enhancement strategies, beyond what was estimated in the STSA. The region must actively engage in a transit-supportive planning process to provide a sustainable environment for the implementation of the transit enhancement strategies, particularly for higher-intensity transit enhancements. Multiple stakeholders, including the public, CENTRO, SMTC, municipalities, Onondaga County, and NYSDOT must work together to develop transit-supportive land use, zoning, housing, and parking policies that address the needs identified during the evaluation. Without transit-supportive policies, FTA funding will be difficult to acquire, and the long-term sustainability of the transit enhancement strategies may be jeopardized.

A variety of plans and policies were considered that could address the transit-supportive policy needs identified during the evaluation phase of the project, including growth management/sustainability plans, land use/zoning policies, parking policies, and transportation demand management. Guidance and recommendations for the implementation of these plans and policies is provided in detail in **Section 6.2** of the report. A summary of the recommendations is provided below.

A. Growth Management

- Incorporate the recommendations of the STSA into municipal and county Growth Management, Sustainability, or Comprehensive Plans.
- Incorporate the recommendations of the STSA into SMTC's Long Range Transportation Plan.
- Engage residents and businesses along the recommended enhancement corridors to assist with the implementation of the transit and policy recommendations.

B. Land Use/Zoning

- Develop TOD zoning overlays along the recommended transit enhancement corridors that promote higher-density, mixed-use, pedestrian/bicycle-friendly development with lower parking requirements. The TOD zoning overlays should include the City of Syracuse, as well as other municipalities along the recommended corridors.
- Consider the implementation of tax incentives for TODs, particularly development that occurs within designated redevelopment areas.
- Provide additional incentives for developers that include affordable housing units in the TOD design.

C. Parking Policies

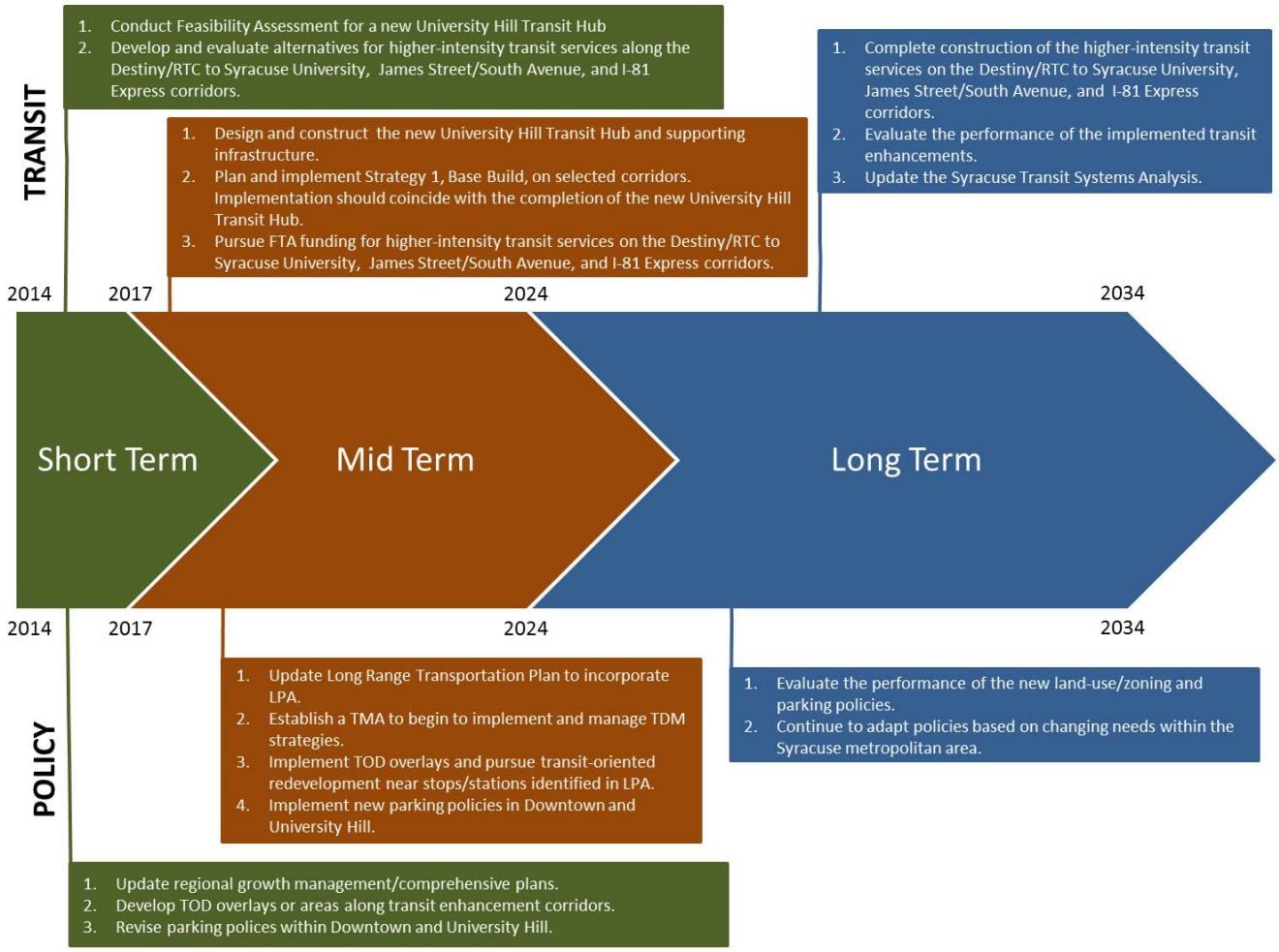
- Implement a parking tax (7% to 8%) on surface parking lots and garages within Downtown and University Hill, and apply the revenue gained to funding alternative transportation modes (transit, pedestrian, and bicycle).
- Reduce the parking requirements in the zoning code for all zoning districts within Downtown and University Hill, or incorporate new parking requirements within a new TOD overlay that covers Downtown and University Hill.
- Restrict the amount of new parking facilities that can be constructed within Downtown and University Hill until a targeted employee-to-parking ration is met. It is recommended that this targeted ration be less than 0.3 parking spaces per employee. This ratio would correspond to a "Medium" rating under FTA's New Starts/Small Starts land use evaluation criterion.

D. Transportation Demand Management

- Form a transportation management association (TMA) upon the implementation of the recommended transit enhancement strategies. The TMA would be a non-profit organization dedicated to the management and promotion of TDM strategies, including guaranteed ride home, carpool matching, carsharing, bikesharing, employee/public outreach, and forming partnerships with area employers and institutions.

IX. Implementation Strategy

Implementing the recommended policies and transit enhancements identified above will be a gradual process that will occur over the next twenty years. The following implementation plan sets short-term (0-3 years), mid-term (3-10 years), and long-term (10-20 years) objectives that will help to guide decision makers in allocating resources to accomplish the tasks that will be necessary for the implementation of the recommendations (**FIGURE E.2**).



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CHAPTER 1 – Introduction

This document presents a summary of the methodology, evaluation, and recommendations of a transit system analysis for the Syracuse metropolitan area. The recommendations included in this document will provide a public transit system plan that can be used as a basis for CENTRO to pursue state and federal funding sources for transit improvements. The study has been conducted with funding from the New York State Department of Transportation (NYSDOT) through *The I-81 Challenge* study, with coordination from CENTRO, the Syracuse Metropolitan Transportation Council (SMTC), and through public outreach via *The I-81 Challenge* public participation plan and Study Advisory Committee (SAC). The recommendations included in this system analysis are based on a combination of technical analyses (alternatives evaluation, regional modeling), public survey of current transit riders and non-riders/former riders, meetings with key community representatives, and *The I-81 Challenge* public workshops.

The Syracuse Transit System Analysis (STSA) is intended to serve as a long-range vision that is consistent with the overall vision of the I-81 corridor being developed as part of *The I-81 Challenge*. The STSA will present a series of short-term, mid-term, and long-term recommendations detailing how the Syracuse metropolitan area's transit system could be structured to meet identified needs in a cost-effective manner. The analyses and recommendations provided in this report are intended to be incorporated into the overall *I-81 Challenge* study, as well as in other regional planning documents, including SMTC's Long Range Transportation Plan, and the comprehensive plans of the City of Syracuse, Onondaga County, and surrounding municipalities.

The objective of the STSA is to develop a strategy to assist the Syracuse metropolitan area in achieving a balanced transportation system that supports economic growth, improves quality of life, and supports the vision of the communities that it serves. The recommendations presented in the report are targeted to attract new ridership to the system by improving the overall attractiveness of the transit system, as well as retain existing ridership by addressing existing needs. By reducing transit travel times to make transit more comparable to private vehicles, expanding operating hours and frequency, branding services, improving ease of use through increased rider information, and enhancing connections between key areas of the City and region, more riders will likely try and continue using the transit system.

The recommendations and implementation plan included in this study could have a much larger impact on the region than just better and more attractive transit services. An increase in transit ridership could lead to a modal shift that would reduce peak hour vehicle trips, reduce the need for parking in Downtown and on University Hill, and support smart economic growth, which will also support the vision of the overall *I-81 Challenge* project. In addition, smart economic growth along transit corridors would improve overall quality of life, improve the walkability of the City and region, and lead to new economic opportunities for area residents. Therefore, upon incorporation of the STSA into the regional transportation plan and local master plans, CENTRO should begin a formal alternatives analysis for selected corridors identified in the implementation plan. Formal alternatives analyses would outline detailed features of the recommended services including routes, frequencies, and station locations, among other items, that will be necessary to pursue the various state and federal funding sources.

1.1 Project Background

Interstate 81 (I-81) through Central New York was built in the 1950's and 1960's. At that time, the federal government was building interstate highways in almost every state across the Country. The early designs for I-81, particularly through downtown Syracuse, were controversial. In the end, however, the decision was made to build I-81 in its current location, and by the late 1960's, I-81 was completed through Onondaga County. I-81 and the other interstates (I-90, I-690, I-481), constructed around the same time, quickly became important roadways within the region for regional, national, and international travel. The completion of the freeways was a factor that further increased the suburbanization of the Syracuse metropolitan area by providing a higher-speed direct connection between the suburbs and downtown Syracuse and its hospitals, schools and universities. Today, the Greater Syracuse Economic Growth Council reports that five of the region's ten largest employers are located next to I-81.

I-81 serves an important role on both national and regional levels. The highway and its many major bridges are now nearing the end of their useful service life, which is typically approximately 50 years. Of particular concern is the one-mile raised roadway section, or Viaduct, within the City of Syracuse and the adjacent I-81/I-690 interchange, which has over 11,000 feet of major bridge structures. This area through downtown and the City has a combination of design deficiencies, crash issues, and isolated traffic congestion.

The New York State Department of Transportation and the Syracuse Metropolitan Transportation Council (SMTC) began *The I-81 Challenge* in the fall of 2009. The purpose of *The I-81 Challenge* is to collect data and identify the condition of the region's transportation system and the environment in which it operates, focusing mainly on I-81; and, to identify potential solutions that are appropriate for detailed evaluation. *The I-81 Challenge* presents a significant opportunity to re-evaluate the needs and desires of those who use I-81 and live or work in the area, and to formulate a vision and a plan that will best serve the community's goals for the future. One critical component to formulating a vision for the I-81 corridor is to incorporate the needs of all users of the transportation system.

The freeway network in the Syracuse metropolitan area is relatively extensive when compared to other major US metropolitan areas, offering quick and convenient connections to the majority of the communities in the metropolitan area. The extensive nature of the freeway system is the primary reason why residents of the Syracuse area call it the "20-minute city", meaning that drivers can get to most parts of the metropolitan area at any time of day within 20 minutes. The ease of access, and the relatively low amount of peak hour congestion, has led to a car-centric culture in which public transit cannot compete with the convenience of personal vehicles, even during peak traffic periods. This has led to the marginalization of the transit system by the public, where the majority of riders are transit-dependent (low income, elderly, disabled, and students). The marginalization of the transit system has resulted in a series of service revisions and cutbacks that negatively affect the mobility of the core transit-dependent ridership, further reduce frequency, and increase travel times.

Providing transportation options prolongs the useful life of the entire transportation system and increases the accessibility for all users, not just those who are financially or physically able to operate a vehicle. Public transit, car/van pooling, and transportation demand management strategies serve multiple sectors of the community. The STSA will address those sectors by identifying potential enhancements to the existing service, new routes, and enhancements to commuter services, to attract additional riders destined for major employment centers such as Downtown and University Hill.

Increasing ridership to Downtown and University Hill would reduce peak hour congestion and parking demand. As more-attractive transit options are introduced, parking demand would decrease, resulting in the opportunity for redevelopment of the City into a more-livable, pedestrian-friendly environment with mixed land uses. Economic and community development would then improve opportunities for the transit-dependent sector of the community.

The I-81 Challenge presents a unique opportunity to evaluate and improve the future of the transportation system in the Syracuse metropolitan area for all modes and users, not just for vehicular traffic. Therefore, it was determined by the project sponsors that a transit system analysis that would provide a strategic vision for the transit system would be valuable to the overall *I-81 Challenge* project. The transit system analysis presented in this document provides the evaluation, recommendations, and implementation plan for the future of the transit system.

1.2 STSA Purpose and Objectives

The purpose of the STSA is to develop a long-range vision for the transit system in the Syracuse metropolitan area to assist in achieving a balanced transportation system that supports economic growth, improves quality of life, and supports the vision of the communities that it serves. The STSA will present a series of short-term, mid-term, and long-term recommendations for enhancements on key corridors within the metropolitan area. The study will be conducted in a manner that will provide the basis for CENTRO and SMTC to conduct the additional analyses needed to pursue federal and state funding, such as the Federal Transit Authority (FTA) New Starts or Small Starts programs. The systems analysis will also evaluate various types of enhancements for a particular corridor, based on the ability of each type of enhancement to meet the FTA evaluation criteria.

Objectives of the STSA include:

- Reducing congestion within the City, particularly along corridors adjacent to I-81 and I-690;
- Facilitating sustainable economic development within the City, including the planned development in University Hill;
- Reducing parking demand in Downtown and on University Hill;
- Examining the feasibility of increasing the frequency and number of hours per day that buses operate;
- Improving connectivity and integration of Downtown with University Hill;
- Increasing transportation options for young, elderly, disabled, and low-income populations;
- Decreasing noise and air pollution generated from traffic; and,
- Improving transit travel times on commuter routes to be more competitive with vehicle travel time.

The analyses and recommendations provided in this report are targeted to attract new ridership to the system by improving the overall attractiveness of the transit system, as well as retain current ridership by addressing existing needs. The STSA is intended to be incorporated into the overall *I-81 Challenge*

study, as well as in other regional planning documents, including SMTC's Long Range Transportation Plan, and the master plans of the City of Syracuse and surrounding municipalities.

It should be noted that the STSA does not evaluate on-demand (para-transit) services. While it is recognized that these services are critical for the mobility of all transportation system users, the focus of the STSA is on larger-scale service enhancements that would increase transit ridership, meet the above objectives, and be eligible for funding sources like New Starts or Small Starts.

1.3 Methodology

The STSA is a comprehensive report that consists of three main components: identification of existing and future needs; development of concept alternatives; and, the evaluation and prioritization of enhancements.

1.3.1 Identification of Existing and Future Needs

In order to develop and evaluate enhancement concepts, it was necessary to identify existing and future needs. These needs were identified through a combination of field data collection, public outreach, and the review of existing reports and studies. The Needs Analysis is included in **Section 2.0**.

1.3.1.1 Field Data Collection

In order to establish baseline operating conditions for the transit system, boarding and alighting counts and an infrastructure assessment (bus stops, shelters, rider information, etc.) were conducted in April 2010. Boarding and alighting data was necessary to analyze the transit system to identify ridership trends, deficiencies, and identify the need for additional or restructured transit services. Assessing the physical conditions and transit infrastructure was also necessary to identify typical bus stop treatments, service and bus stop deficiencies, and potential rider issues.

CENTRO was contacted to obtain boarding and alighting data for several bus routes; however, the data was several years old and did no longer of use. Therefore, it was determined that new counts would be necessary. With the cooperation of CENTRO, a data collection program, consisting of approximately one third of the routes in the system, was established that would provide a "snapshot" of system operations. The system was divided into three types of operations: urban routes, suburban routes, and University Hill routes. Data collection was evenly spread across the three types of routes in order to provide a balanced measurement of the transit system. In addition, routes were selected that served a wider variety of locations in order to assess the transit trip generation from various towns, communities, employment centers, and retail centers.

The field infrastructure assessment included traveling various bus routes selected for the boarding and alighting data collection and observing the location and condition of items such as bus stop signs, bus shelters, pedestrian connections to/from bus stops, information available at the bus stops, and on-board information. In addition, the condition, accessibility, and usability of the Syracuse Common Center were assessed. However, it should be noted that since the initial data collection, a new transit hub was completed at the corner of South Salina Street and East Adams Street and the Common Center was closed.

Further information regarding the procedure and results of the field data collection is presented in **Section 2.0**.

1.3.1.2 Public Outreach

Public outreach is a critical building block for any transit-planning project, and it is especially crucial when seeking Federal Transit Administration (FTA) funding, such as New Starts and Small Starts. Public feedback must be received at multiple points throughout the planning process to identify transit system needs, identify factors that would enhance or encourage future transit use, and provide feedback on proposed improvements. Public outreach was obtained utilizing two methods: public information sessions and public surveys.

Transit information was presented at all of *The I-81 Challenge* public information sessions. Sections of the meetings were devoted to presenting information regarding the transit system such as existing conditions, potential future enhancements, case studies, and recommendations. Meeting attendees were invited to ask questions to personnel stationed in the transit sections, as well as to comment using post-it notes on designated "comment boards". Public information session materials were also provided online for approximately one month following the public meetings. Online viewers could submit comments via comment forms on the project website. All comments received at the public meetings and online were recorded, categorized, and summarized in order to be included in the STSA.

In addition to the public information sessions, public surveys were distributed to meeting attendees as they exited the transit section of the May 9th, 2012 public information session. Individuals reviewing the public information session materials on *The I-81 Challenge* website could also complete the survey online. Two separate surveys were provided: one for non-riders/former riders, and one for current riders. A "current rider" was considered to be anyone that had used the CENTRO system within the last three months (as of May 9, 2012). A "non-rider" was considered to be anyone that had never used the CENTRO system, and a "former rider" was considered to be anyone that had utilized the CENTRO system on a regular basis in the past, but had not done so within the last three months.

Following the release of the survey results, it was determined that it would be necessary to conduct additional rider surveys in order to meet the public outreach objective and obtain useable feedback from current riders. A secondary public survey/outreach effort was conducted at the new Downtown Syracuse Transit Hub in order to obtain more rider feedback. The surveys were revised to consolidate similar questions, correct issues identified with the original survey, and to eliminate unnecessary questions, in order to shorten the survey and make it manageable for people to complete while waiting at the hub. The revised surveys were distributed at the Transit Hub on Thursday, October 11, 2012.

Further information regarding the procedure and results of the public outreach is presented in **Section 2.4**.

1.3.1.3 Review of Existing Reports and Studies

The final component of the data collection effort included the review of existing plans and studies with components relevant to the future of the public transportation system in the Syracuse metropolitan area. These studies were particularly useful to determine future developments and improvements planned within the study area, as well as visions for future land use, density, and infrastructure within the metropolitan area. The following is a list of the plans and studies reviewed to support the development of the STSA.

- Syracuse Comprehensive Plan 2025 (2005)
- The Coordinated Public Transit Human Services Transportation Plan for the Syracuse Metropolitan Planning Area (2008)
- Rail/Truck/Transit Planning, 2002 – 2003 UPWP Summary Report (2003)
- City of Syracuse Lane Use Plan 2025 (2009)
- University Hill Transportation Study (2006)
- University Hill Transportation Study Phase II (2009)
- Carrier Site Access Transportation Study (2009)
- CuseCar – Community Car-Share Program: Car Sharing Lessons Learned (2011)
- Downtown Syracuse Parking Study Final Report (2008)
- Rethinking I-81 (2009)
- Onondaga County Settlement Plan, the Regional Plan and Pilot Projects (2001)
- Bicycle and Pedestrian Plan, Final Report (2005)
- 2010 Development Guide for Onondaga County (1998)
- Central New York Regional Transportation Authority (CENTRO) Transit Park-and-Ride Study (2011)
- Regional Mobility Action Plan, Final Report (1999)
- Long Range Transportation Plan (LRTP) 2011 Update (2011)
- Transportation Improvement Program (TIP) (2012)
- Downtown Syracuse Transportation Demand Management Study (2011)
- University Hill Park-and-Ride Feasibility Study (2010)
- Central New York Rail Corridor Inventory (2003)
- Syracuse Bicycle and Pedestrian Plan (2012)

1.3.1.4 Identification of Existing and Future Needs

Following the field data collection, initial public outreach and surveys, and the review of existing studies, a prioritized list of existing and future needs was developed. The prioritization was primarily based on the field data and the feedback obtained from the public information sessions and surveys. The results of the review of the existing reports and studies was applied to the prioritization of the needs based on factors such as planned infrastructure improvements, development, land use, and project timelines, among others.

1.3.2 Development of Concept Alternatives

Following the data collection phase of the study, concept alternatives were developed to address the needs identified in the first phase of the study. The development of the concepts consisted of two components: selection of a transit corridor to analyze, and selection of levels of enhancements that could be implemented on each transit corridor. For the purposes of this study, a transit corridor refers to a general transit path (for example, Downtown to Camillus), which may consist of multiple roadways and/or existing bus routes.

The purpose of analyzing urban transit corridors is to improve service for the core ridership, generate new ridership, link popular origins and destinations within Syracuse, and provide the potential for economic development within the City. Improving transit within Downtown and University Hill could also increase ridership, and reduce single occupancy vehicle trips and congestion within the core of the City. The purpose of identifying and assessing commuter system enhancements is to increase peak hour commuter ridership to Downtown and University Hill. Providing commuters with improved services with greater amenities may increase peak hour commuter ridership, reduce peak hour congestion on the region's arterials and freeways, and reduce parking demand.

Three enhancement strategies were assessed for each of the identified corridors, ranging from low capital investment (Base Build) to high capital investment (LRT/Streetcar). Each alternative strategy is discussed in detail in **Section 4.0**. The Base Build (low-investment) alternative consolidates existing bus routes along major corridors and includes enhancements such as:

- Infrastructure enhancements (bus lanes, queue jumpers, signal priority, etc.);
- Corridor branding;
- Increased frequency and expanded operating hours;
- New transit hubs at the Regional Transportation Center, University Hill, and Shoppingtown Mall;
- New express routes;
- An airport shuttle service;
- New and enhanced park-and-ride facilities; and,
- Enhanced rider amenities.

Strategy 2: BRT (moderate investment) expands upon features associated with the Base Build by introducing BRT along selected corridors. Improvements associated with Strategy 2 include:

- Increased frequency and operating hours;
- Modern low-floor buses with enhanced rider amenities;
- Corridor branding;
- Limited stops at new bus stations; and,
- Infrastructure enhancements (bus lanes, queue jumpers, bus pull-outs, signal priority, bus shelters, etc.).

Strategy 3 (high investment) incorporates more intensive improvements such as fixed-guideway light rail transit (LRT) or streetcars in the Downtown core. Improvements associated with Strategy 3 include:

- A Downtown – University Hill LRT route with extensions along existing high-ridership corridors;
- Increased frequency and operating hours;
- Modern low-floor vehicles with enhanced rider amenities;
- Corridor branding;
- LRT level platforms at all stations; and,
- Infrastructure enhancements (transit lanes, signal priority/preemption, etc.).

A final strategy was explored that would incorporate heavy commuter rail on existing rail lines. However, based on an assessment of the conditions needed to support heavy commuter rail, Strategy 4 was not progressed for further analysis. See **Section 4.4** for further information on this strategy.

1.3.3 Evaluation of Alternatives and Prioritization of Improvements

1.3.3.1 Evaluation Measures

The selected enhancement strategies were evaluated on several measures, which were largely based on FTA criteria for New Starts and Small Starts funding and public/stakeholder feedback. Utilizing the FTA criteria is critical for evaluating the enhancements because they provide “real-world” measures that can identify projects that have an increased chance of implementation. Large-scale enhancements such as BRT or LRT are difficult to finance for most transit operators. Therefore, FTA capital funding is a critical component to the implementation of any large-scale transit enhancement. Projects that are likely to receive funding from the New Starts or Small Starts programs must rank high in order to be competitive with the many other projects across the country that apply for funding each year.

The evaluation measures utilized in the STSA are intended to be a method for comparing the costs and benefits associated with each transit enhancement strategy and subsequently each corridor. Some measures are quantifiable, while others are qualitative. It should also be noted that not all costs and

benefits could be readily measured. For example, the completion of a new BRT route through a neighborhood or community that had previously been in decline may spur future redevelopment and economic growth. The economic growth potential is a measure that cannot immediately be quantified for this study, but may be addressed qualitatively.

The evaluation measures can be divided into several categories: mobility (quantitative); economic development effects (qualitative); environmental benefits (quantitative); cost effectiveness (quantitative); and, land use (quantitative and qualitative). The evaluation measures that fall under each category are as follows:

Mobility:

- Estimated Annual Trips (FTA Measure)
- Number of Major Activity Centers Served

Economic Development Effects:

- Growth Management Plans (FTA Measure)
- Transit-Supportive Corridor Policies (FTA Measure)
- Tools to Implement Land Use Policies (FTA Measure)
- Performance of Land Use Policies (FTA Measure)
- Potential Impact of Transit Project on Regional Land Use (FTA Measure)
- Plans for Affordable Housing in Corridor (FTA Measure)
- Strategic Area Connectivity

Environmental Benefits:

- Change in Air Quality, Safety, and Land Use (FTA Measure)

Cost Effectiveness:

- Annualized Capital and Operating Cost Per Trip (FTA Measure)

Land Use:

- Existing Corridor and Station Area Character (FTA Measure)
- Employment Served(FTA Measure)
- Population Density (FTA Measure)

- Existing Pedestrian Facilities(FTA Measure)
- Affordable Housing Served (FTA Measure)

These evaluation measures will be discussed in detail in **Section 5.0**.

Data for qualitative measures were obtained from discussions with stakeholders and review of existing reports and studies. Data for quantitative performance measures were obtained from GIS data provided by SMTC, including demographics and census data, and the Syracuse Regional Transportation Planning model.

1.3.3.2 Strategy Scoring and Ranking

In order to compare each enhancement strategy, an evaluation matrix was developed that incorporated a weighted scoring system to quantify each of the evaluation criteria and rank the various corridors and associated enhancements. The weighted scoring system is based on the FTA evaluation methodology, and provides a score for each corridor based on the criteria weights below:

Category	Weight
Mobility Improvements	25%
Economic Development	25%
Cost Effectiveness	25%
Land Use	12.5%
Environmental Benefits	12.5%

Scores are provided for commuter and urban improvements together so that the corridors with the most potential are addressed first in order to provide a foundation for future enhancements along other corridors. A detailed description of each measure and its corresponding weight is contained in **Section 5.3**.

In addition to ranking the corridors and associated enhancement strategies, the evaluation matrix was also utilized to identify criteria in which the enhancement strategies received low ratings. Low ratings (less than Medium) were primarily found under criteria that deal with land use, zoning, and parking. A list of needs was developed based on these low-scoring criteria, in order to identify opportunities for policy makers within the Syracuse metropolitan area to enhance the transit environment within the region (see **Section 5.5.2**).

1.3.3.3 Recommendations and Implementation

Finally, the evaluation matrix was utilized to develop a list of recommended transit enhancement projects that could be progressed by CENTRO or SMTC. In addition, guidance and recommendations for improving low-scoring criteria were developed. An implementation plan was then prepared to provide short-term (0-3 years), mid-term (3-10 years), and long-term (10-20 years) objectives for the implementation of transit enhancements, as well as transit-supportive policies.

CHAPTER 2 – Existing Conditions Assessment

CENTRO, a subsidiary of the Central New York Regional Transportation Authority (CNYRTA), provides fixed route and call-a-bus (para-transit) bus services to Syracuse and Onondaga County as well as other metropolitan areas in Central New York. In fiscal year 2011, the CENTRO transit system served approximately 10.9 million riders. For the purpose of the STSA, the analysis will examine the existing bus system in the Syracuse metropolitan area with its 97 fixed routes. As noted previously, Call-A-Bus (para-transit) services will not be examined in this study. However, accessibility will be considered as part of any corridor improvement evaluated in this document.

CENTRO currently operates 97 fixed bus routes in Syracuse and Onondaga County, operating in a series of base routes and deviation routes. A base route is the general path of a series of deviation routes, which typically operate along major corridors. A deviation route along a base route provides a service extension that typically serves a particular destination such as a residential development, suburban employment center, or shopping area, and is labeled with a number (one through five) followed by the base route number. For example, Route 210 and 310 are deviations of base route 10.

Deviation routes account for 63 of the 97 fixed bus routes in the CENTRO Syracuse/Onondaga County system. The frequency of bus service is independent of whether the particular route is a base route or deviation route, and depending on the demand for service along a particular route, a base route or deviation route may have little to no frequency. Deviation routes typically serve a large portion of a base route; therefore, in many cases, the base route may have limited service itself.

In addition to the deviation routes, CENTRO also provides peak period express service along some of its routes that provide direct service to/from Downtown Syracuse. The express services typically operate from park-and-rides, shopping areas, and residential developments and utilize area expressways, when available, to bypass the local road network and reduce travel time.

In addition to the 97 fixed bus routes, CENTRO operates a free shuttle along the Connective Corridor, a two-mile long corridor connecting cultural destinations across the city from University Hill to Downtown and Armory Square. The shuttle is free for all passengers and operates approximately every half-hour between 7:30 AM and 3:00 AM Monday through Friday and every hour between 8:00 AM and 3:00 AM on weekends. The shuttle operates on a reduced schedule during the summer.

Finally, CENTRO also operates eleven bus routes, including the Connective Corridor, to Syracuse University. University buses are free for students and faculty with a valid ID and connect to various on-campus locations, as well as off-campus destinations such as the Regional Transportation Center, downtown Syracuse, and Destiny USA. The Syracuse University routes operate on a modified schedule when school is not in session.

2.1 System Operation

The routes operate on a hub and spoke system with the majority of the routes traveling to the Downtown Syracuse Transit Hub at the corner of Adams Street and South Salina Street. As such, the service operates on a pulse system where most of the buses arrive and depart the Downtown Syracuse Transit Hub at the same time. Most routes act as spokes from the terminal, providing connection between downtown Syracuse and residential areas, suburban employment centers, and shopping

centers. However, some linkages are made between different numbered routes to provide one-seat rides through the Downtown Syracuse Transit Hub. For example, routes 46 and 48 from Liverpool are linked with route 40 to Syracuse University. This allows a rider boarding in Liverpool to travel through the Downtown Syracuse Transit Hub to Syracuse University without changing buses.

CENTRO previously operated several suburb-to-suburb routes in an attempt to accommodate riders that needed to travel between suburban locations. The routes prevented riders from needing to enter the City, transfer buses at the Downtown Syracuse Transit Hub, and travel out to their ultimate destination. However, due to low ridership, all suburb-to-suburb routes were terminated by March 2010.

The new Downtown Syracuse Transit Hub was recently completed in October 2012. It replaced the "Common Center" which consisted of a series of bus shelters at the intersection of Fayette Street and Salina Street. The new bus terminal consists of covered platforms that provide for easier interconnection between routes. In addition, a heated building with an information booth, ticket machines, restrooms, and benches is provided on the south side of the site. The transit system's pulse operation is better facilitated at the new terminal.

In addition to the Syracuse Downtown Transit Hub, CENTRO operates from the William F. Walsh Regional Transportation Center (RTC). The RTC is Central New York's one-stop transportation center providing regional service to other cities. The RTC is home to train and bus services provided by Amtrak, Greyhound, and Trailways.

Fares for the bus system are collected by zones, and zones are defined by distance traveled. The majority of destinations within the Syracuse/Onondaga system are within Zone 1. The base fare for Zone 1 is $2.00, and each additional zone results in a fare increase of $1.00. CENTRO offers a variety of payment methods including:

- On-Board Cash Collection
- 10-Ride Pass
- 7-Day Unlimited Ride Pass
- 30-Day Unlimited Ride Pass

Passes are available for purchase at CENTRO offices, the downtown terminal, the RTC, various retail outlets, through the mail, or online.

2.2 Ridership

The first step in the evaluation process was to collect boarding and alighting data (ridership). Ridership data is critical to understanding how the system is used, to identify capacity deficiencies, and to identify opportunities for new routes, route consolidation, or route modification/closure. The following section will discuss the methodology and results for the boarding and alighting data collection.

2.2.1 Data Collection Methodology

CENTRO was originally contacted in early 2010 to obtain boarding and alighting data, by stop, for several bus routes. However, it was determined that the available data was several years old and no longer valid, and that new counts would be necessary. With the cooperation of CENTRO, a data collection program, consisting of approximately one-third of the routes in the system, was established to provide a "snapshot" of system operations.

The objective of the data collection program was to provide stop-by-stop boarding and alighting data to identify ridership patterns and system deficiencies that will help to guide the analysis of the enhancement strategies. Enhancements that may be analyzed include minor route adjustments, scheduling changes, and consolidation, bus rapid transit (BRT), light rail (LRT), or trolley service, among others. Therefore, the existing bus routes were divided into three categories:

Urban Routes – provide all day service to destinations within Syracuse or the immediate metropolitan area. These routes serve areas that may be most suited for more-frequent bus, trolley, or LRT service.

Suburban Routes – provide service to suburban locations that is typically oriented around the AM and PM peak commuting periods. These routes serve areas that may be most suited for commuter BRT or express bus service.

University Hill Routes – provide service to and from the University Hill area. These routes serve areas that may be suited for both commuter and local system improvements.

In order to identify which routes should be included in the data collection program, CENTRO provided factored average hourly ridership data by route for September and October 2009 and stop-by-stop data, most of which was collected in 2007, just prior to the increase in gas prices. The 2007 stop-by-stop data was reviewed to identify routes with higher than average hourly ridership data, and provide a recent summary of general route activity. CENTRO defines system standards for factored average hourly ridership that help to provide a measure with which to evaluate the performance of a route. The standard is 33 persons per hour for urban routes, and 20 persons per hour for suburban routes.

Routes with ridership at or exceeding the standard were considered for the data collection program in order to identify ridership patterns. Routes with ridership lower than the standard were not included. Enhancements including route changes, schedule adjustments, or consolidation may be considered for these routes.

The routes were evaluated to ensure that the snapshot of the system provided a balance between urban, suburban, and University Hill routes, and to ensure that the data collection was distributed evenly over the entire system. The resulting routes that were selected for data collection are shown in **TABLE 2.1** and **FIGURE 2.1**.

The on-board boarding and alighting data was collected Tuesday, April 6 through Thursday, April 8, 2010 to capture typical weekday operations. Urban routes were scheduled for all-day data collection from 7:00 AM to 6:00 PM with a focus on inbound trips during the morning peak period (7:00 AM to 9:00 AM), circulating trips (inbound and outbound) during the midday peak period (11:00 AM to 2:00 PM), and outbound trips during the evening peak period (4:00 PM to 6:00 PM). Suburban routes were scheduled for peak-period data collection during the morning (7:00 AM to 9:00 AM) and evening (4:00 PM to 6:00 PM) perk periods. For routes that only operated during the peak hours, it was assumed that

they carry commuters, and therefore the inbound ridership would roughly equal the outbound ridership. Additional data, including data for routes that were missed during the first data collection period, was collected on Tuesday, April 13, 2010, and Wednesday, April 14, 2010. CENTRO provided data collection sheets that listed each stop along each route.

In addition to collecting boarding and alighting data, data collectors were also asked to observe and comment on issues regarding accessibility, ease of use, rider information, and other user-related items.

TABLE 2.1: Routes Selected for Data Collection in STSA

Base Route No.	Dev. Rte No.	Deviation Route Name	Route Type	Threshold (pph)	Factored Hourly Ridership (pph)	Comments
10	110	S. Salina	Urban	33	48.94	
	210	S. Salina/Bernardine	Urban			
	310	S. Salina/Valley	Urban			
	410(X)	Nedrow Express	Suburban	-	-	Selected to compare local vs. express ridership.
	510	Tully	Suburban	20	9.46	Selected to provide data for a long-distance commuter route.
16	116	N. Salina – 7th North	Urban	33	36.51	
	216	N. Salina – Electronics Pkwy	Urban			
23	123	E. Syracuse/ Wal-Mart	Urban	33	43.01	
26	226	South Ave – OCC	Urban	33	55.08	
	326	South Ave – High Acres	Urban			
36	136(X)	Camillus Express	Suburban	20	31.73	Selected to compare local vs. express ridership.
	236	Auburn-Camillus-Syracuse	Suburban			
40	240	Syracuse – Nob Hill	University	33	36.18	
46	146(X)	Liverpool – CR 57 – Casual Ests Express	Suburban	20	18.63	Selected to compare local vs. express ridership.
48	248	Liverpool/Morgan/ Great Northern Mall	Suburban	20	20.56	
50	-	Carousel Via I-81	Urban	33	37.93	
54	254	Midland-Valley	Urban	33	39.24	
62	262	Manlius – E. Genesee	Suburban	20	13.74	Selected to compare local vs. express ridership.
	262X	Manlius Express	Suburban			

TABLE 2.1 Continued: Routes Selected for Data Collection in STSA

Base Route No.	Dev. Rte No.	Deviation Route Name	Route Type	Threshold (pph)	Factored Hourly Ridership (pph)	Comments
64	264	W. Onondaga/ Western Lights	Urban	33	40.58	
68	168	E. Fayette/Erie/ Shoppingtown	Urban	33	42.96	
74	374	Solvay – Avery – Elm Hill Plaza	Urban	33	31.32	Selected due to proximity to threshold.
76	176	E. Genesee – Salt Springs – Shoppingtown	Urban	33	47.19	
80	180	Grant Blvd – Taft – Dunlap	Urban	33	34.22	
82	282	Baldwinsville (Radisson)	Suburban	20	10.96	Provides additional suburban coverage needed for study.
84	184	Mattydale – Allen Rd	Suburban	20	18.05	Provides additional suburban coverage needed for study.
88	88X	N. Syracuse Express	Suburban	20	14.72	Selected to compare local vs. express ridership.
323	323X	E. Syracuse – Minoa Express	Suburban	20	11.58	Provides additional suburban coverage needed for study.
443/ 543	-	Connective Corridor Shuttle	University	-	-	

FIGURE 2.1
Bus Routes Selected for Data Collection

Legend
Bus Routes

23	240
50	248
76	254
88	262
110	262X
116	264
123	282
136	310
136X	323X
146	326
168	374
176	410
180	410X
184	430
210	443
216	510
226	543
236	

City of Syracuse
Urban Area
Community Destinations

Miles
0 1 2

2.2.2 Data Collection Results

Following the data collection program, the data were summarized into peak period ridership and daily ridership. Overall ridership trends were consistent with the 2007 boarding and alighting counts as well as the factored average hourly ridership data. The routes that had higher than average ridership in previous data collection efforts continued to be the routes with higher than average ridership during the data collection periods.

In order to understand the system operation, it was important to summarize the overall ridership trends rather than that of each individual route. Therefore, ArcGIS was used to visualize passenger loads during the peak and midday off-peak periods. A color structure was utilized with light blue designating route segments with low passenger loads, and dark blue designating route segments with high passenger loads (**FIGURES 2.2** and **2.3**).

2.2.2.1 Urban Peak Ridership

The urban peak ridership, shown in **FIGURE 2.2**, shows average ridership on major urban routes, including those operating to and from Syracuse University, LeMoyne College, and Onondaga Community College. Based on the results of the data collection, these routes tend to experience the highest sustained ridership, even during traditional off-peak periods. This trend in ridership was anticipated given that these routes tend to serve the majority of the transit-dependent markets (low income, elderly, students, etc.) within the Syracuse metropolitan area. These types of users typically require access to transit services throughout the day to get to appointments, work, or school because of varying daytime schedules.

All of the routes experience spikes in passenger loads as they approach the Downtown Syracuse Transit Hub. It should be noted that at the time the ridership data was collected, the Downtown Syracuse Transit Hub was located at the intersection of Salina and Fayette Streets ("Common Center"). This type of ridership peaking can be expected in a hub and spoke system in which passengers are typically destined for the hub, rather than destinations along an individual route. Average passenger loads decrease significantly beyond three miles from the hub. However, several routes such as 123 (James Street/East Syracuse), 240 (Syracuse University), and 226 (South Avenue/OCC) experience a relatively high passenger load further from the Downtown Syracuse Transit Hub.

There are several routes with segments that experience utilization greater than 75%, including 226 (South Avenue/OCC), 240 (Syracuse University), 123 (James Street/East Syracuse), 180 (Grant Boulevard), and 110-310 (South Salina Street). In addition, several routes experience buses with standing room only, including 123 (James Street/East Syracuse), 240 (Syracuse University), and 226 (South Avenue/OCC), and 180 (Grant Boulevard). These highly utilized routes with sustained ridership during peak and off-peak periods highlight corridors that may be suitable for features such as BRT, LRT, streetcars, or other high-frequency transit improvements.

2.2.2.2 Suburban/Commuter Ridership

Unlike the urban routes, the suburban/commuter bus routes experience lower passenger loads. Overall, the suburban/commuter routes had lower average passenger loads and were more heavily influenced by the effect of commuters. Large portions of the suburban routes have segments with passenger loads

between 10 and 19 people per bus during peak periods. These routes typically provide service oriented around peak periods, with less frequent service off-peak.

FIGURE 2.3 illustrates the passenger loads on the various suburban/commuter routes, and can be used to visualize existing ridership trends and identify corridors with higher than average ridership. Based on the results of the data collection, the most utilized routes include those to the north and west, including Liverpool, Camillus, North Syracuse, and East Syracuse. In addition, the Fayetteville express route (262X) experienced a high average peak ridership. These routes experience 10 – 19 passengers per bus outside of the Syracuse City line and indicate the potential for corridor improvements to enhance the existing transit system and attract new riders.

In addition to identifying highly utilized corridors, the mapping also shows two notable ridership trends. First, the data suggests that park-and-rides have little influence over ridership on the majority of the routes. The ridership thresholds on most routes do not change at park-and-ride locations, with the exception of Liverpool (Route 146) and Camillus (Route 136/236). Second, the majority of routes experience extremely low ridership outside of 7 miles from Downtown. This was anticipated, as routes often serve specific residential communities or shopping areas as they travel further away from the City.

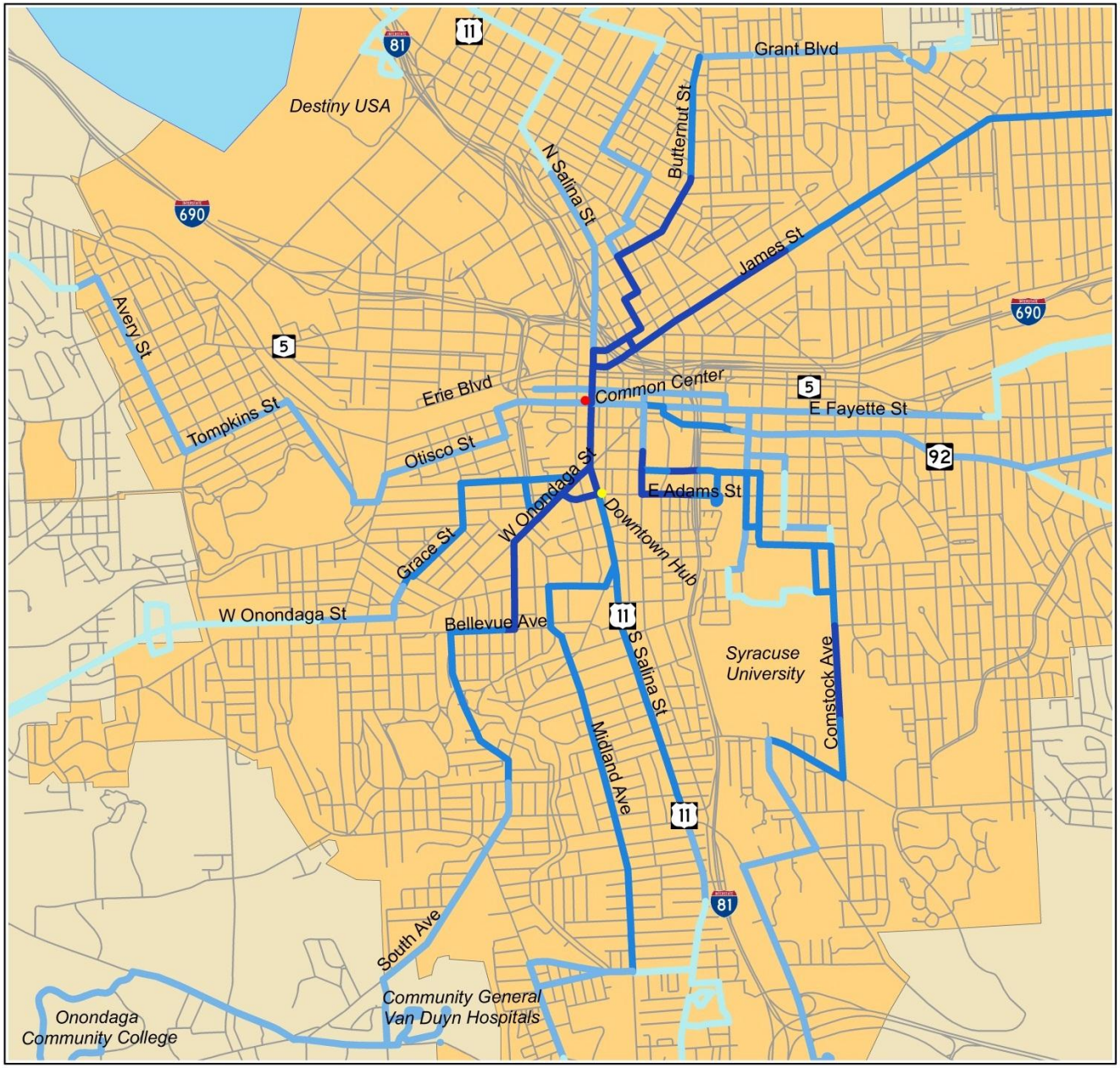


FIGURE 2.2
Urban Peak Ridership

Legend

Average Number of Riders Per Trip (% of Seats Occupied*)

- 1 - 9 (1% - 24%)
- 10 - 19 (25% - 49%)
- 20 - 29 (50% - 74%)
- 30 - 39 (75% - 100%)
- 40 - 49 (Standing Room Only)
- City of Syracuse

* Assumes average of 40 seats per bus.

Data Source:

This map summarizes the results of multiple boarding and alighting surveys conducted in April 2010 on selected routes. Routes were selected to provide a representative snapshot of the existing transit system. Data was not collected for all CENTRO routes.

0 0.25 0.5 Miles

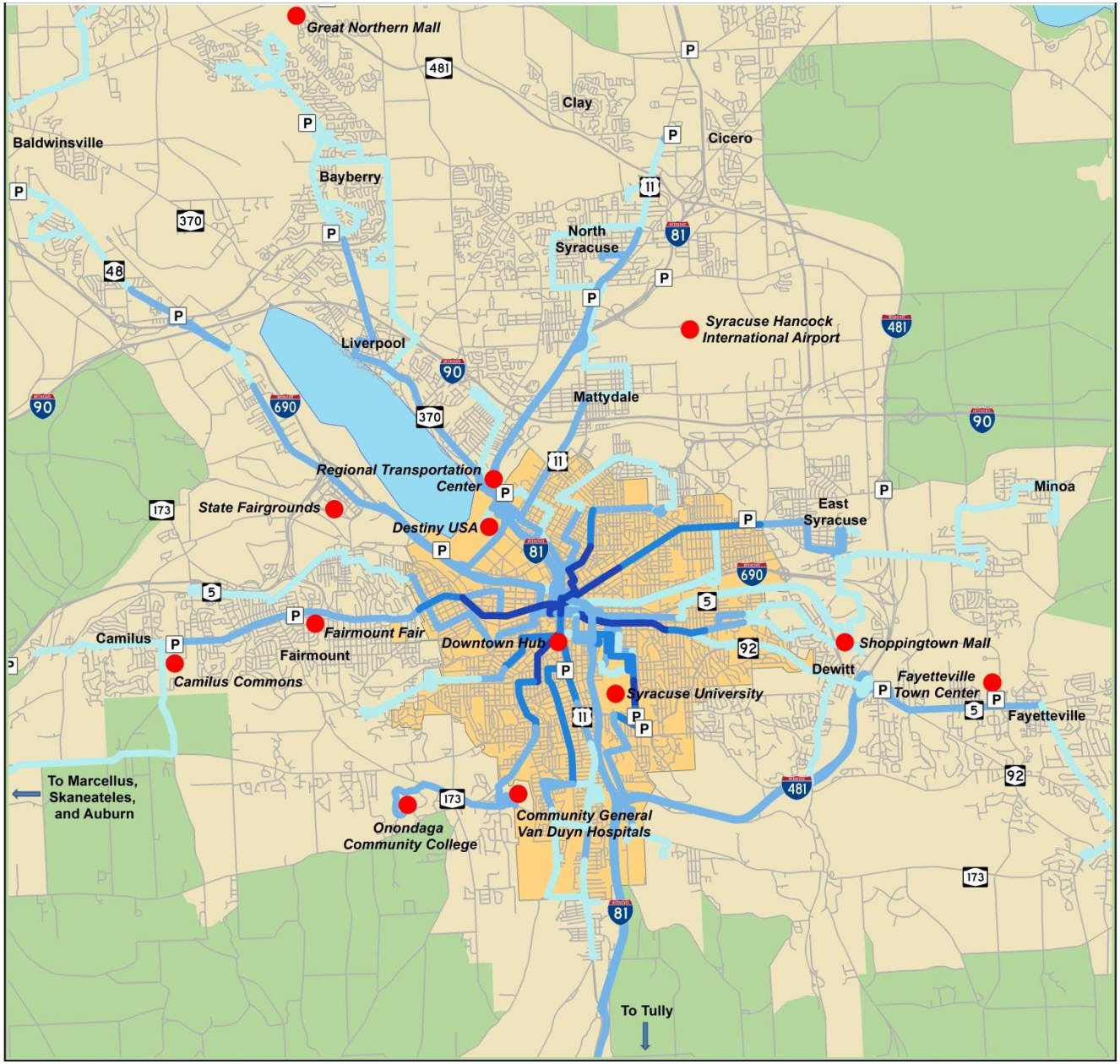


FIGURE 2.3
Suburban Peak Ridership

Legend

Average Number of Riders Per Trip (% of Seats Occupied*)

- 1 - 9 (1% - 24%)
- 10 - 19 (25% - 49%)
- 20 - 29 (50% - 74%)
- 30 - 39 (75% - 100%)
- 40 - 50 (Standing Room Only)

- City of Syracuse
- Urban Area
- Park-N-Ride
- Community Destinations

* Assumes average of 40 seats per bus.

Data Source:

This map summarizes the results of multiple boarding and alighting surveys conducted in April 2010 on selected routes. Routes were selected to provide a representative snapshot of the existing transit system. Data was not collected for all CENTRO routes.

0 1 2 Miles

2.2.2.3 Ridership Conclusions

Based on the data analysis, several conclusions can be drawn. The core ridership within the transit system is made up of transit-dependent markets, such as densely populated and low-income neighborhoods, students, and the elderly, resulting in higher than average passenger loads that are sustained for a greater portion of the day. These types of riders need access to transit at various times of the day to get to work, appointments, and school, and therefore, could support larger-scale improvements to the transit system as well as increased frequency. Urban corridors that could be incorporated into the transit system analysis include:

- James Street
- Salina Street
- Syracuse University/Comstock Avenue
- Butternut Street/Grant Avenue
- South Avenue/OCC

Average passenger loads remain at less than twenty people per bus on the suburban/commuter routes, and park-and-rides seem to have little impact on overall passenger loads. Based on the ridership data, there is potential to eliminate or reduce the length of suburban/commuter routes, particularly segments that pass through specific residential developments. Suburban/commuter corridors with routes that currently experience higher than average ridership that could be progressed to the transit systems analysis include:

- US 11/I-81: Nedrow – Cicero
- Liverpool/CR 57: Liverpool/Bayberry – Downtown/University Hill
- Genesee Street (NY 5/NY 92): Camillus – Fayetteville

2.3 Infrastructure/Usability

The transit system infrastructure in the Syracuse metropolitan area consists of four main components: transit vehicles (buses), bus stops, park-and-rides, and rail stations (currently closed). Each of the components influences how existing and potential users view the transit system, in particular the desirability to use the system. Therefore, an assessment of the existing infrastructure as well as its usability was conducted in order to identify and evaluate existing transit features (bus stops, shelters, park-and-rides, etc.), assess the usability of the system, and identify deficiencies. The results of the assessment were used to identify additional transit system needs, as well as opportunities for improvements. Improving the infrastructure and usability of the transit system is one strategy to increase ridership from markets, such as commuters, that would be new to the system.

2.3.1 Assessment Methodology

The assessment of the system infrastructure and usability was conducted through observations made during the boarding and alighting data collection (April 2010) and review of existing mapping, reports, and studies.

Boarding and alighting data collectors were asked to observe and comment on issues regarding accessibility, ease of use, rider information, and other user-related items. Since the majority of the data collectors had never utilized the transit system prior to the data collection, they provided an excellent first impression of the system including valuable feedback regarding difficulties that could potentially discourage or confuse new riders. Data collectors provided written comments on the data collection sheets that were utilized for the ridership data.

In addition to the field observations, GIS data showing the locations of all bus stops, shelters, and Park-and-Rides were utilized to assess location and accessibility. Previous studies, such as the *Regional Mobility Action Plan* (1999) and the *Central New York Regional Transportation Authority Transit Park-and-Ride Study* (2011) were also consulted for additional existing information regarding transit system infrastructure.

2.3.2 Assessment Results

2.3.2.1 Transit Vehicles

In general, the transit vehicles were observed to be in fair condition, clean, and well maintained. Rider amenities, such as on-board Wi-Fi, are planned for implementation across the system over the next five years, which may increase the attractiveness of the system as a whole. One vehicle-related issue that was noted during the data collection was related to the changeable message signs, which display route information.

CENTRO buses are equipped with a changeable message sign that displays the route and the destination. In general, many of the routes that were selected for data collection terminated at the Downtown Syracuse Transit Hub; however, some would continue from the transit hub to another destination along a different route. In these cases, the route number and destination that would be displayed on the inbound route would be that of the subsequent outbound route. For example, if Route 176 from Shoppingtown to Downtown then continued as Route 110 to Valley Plaza, a passenger waiting at the first stop along Route 176 headed to Downtown would see a bus that displayed “110 Valley Plaza” rather than “176 Fayette and Salina “. This practice was confusing for the data collection team and resulted in missed buses. Therefore, it is anticipated that this would also be an issue for first-time riders.

2.3.2.2 Bus Stops

Most bus routes in the CENTRO system have bus stops at almost every cross street along local routes. Typical bus stop treatment consists of a blue sign (**FIGURE 2.4**). However, the signs do not include any information regarding the route(s) that stop at the location. This can be confusing for first-time riders, or riders unfamiliar with a particular route, especially if there are multiple routes or deviations that may stop at the same location. More information on the bus stop sign would make the system more user-friendly.

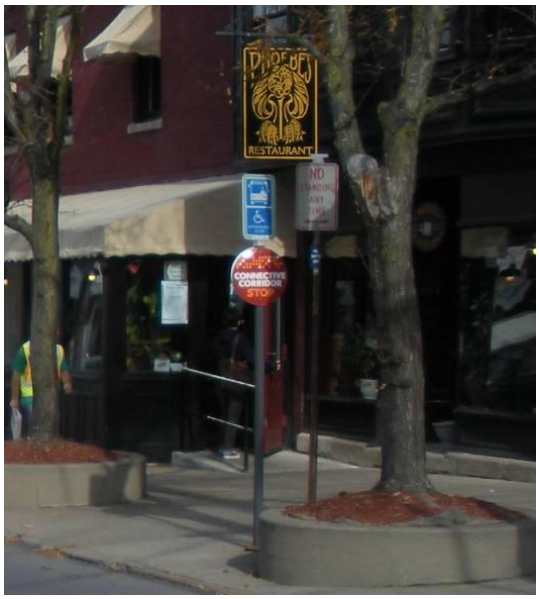


FIGURE 2.4: Typical Bus Stop Treatment

CENTRO also maintains 125 bus shelters within the study area, typically located at major stops along a route, such as park-and-rides or shopping areas. The majority of the bus shelters contain posted bus schedules and a bench. There were no deficiencies observed with the bus shelters. However, there may be an opportunity to improve shelters at major stops, such as park-and-rides, by providing heat during the winter or real-time bus arrival information.

2.3.2.3 Park-and-Rides

CENTRO currently lists 14 park-and-ride locations on its website that are within the Syracuse metropolitan area. Free parking is provided at these locations, and amenities typically include a bus shelter with a posted schedule. The majority of the lots (12) are shared lots, typically located in underutilized sections of parking at retail/shopping centers.

The *Central New York Regional Transportation Authority Transit Park-and-Ride Study Final Report* (2011) assessed existing park-and-ride lots within Onondaga County, including those not operated by CENTRO, and provided recommendations for new park-and-ride locations. This study was provided by CENTRO for review in conjunction with field observations of existing park-and-ride facilities, in order to identify existing usage, needs and opportunities.

Based on the results of the data collection conducted for the 2011 study, overall park-and-ride utilization at CENTRO designated lots is relatively low (less than 50% utilized), with the exception of the Tully Nice 'n Easy (59%) and the Kathan Road (55%) lots (**TABLE 2.2**). The "other lots" identified in the study are much more utilized (greater than 70%); however, these lots appear to be used for longer range travel on I-81 or I-90, and are not served by transit. The findings of this report are consistent with the findings of the ridership data that show that park-and-ride activity does not play a significant role in transit ridership.

TABLE 2.2: Park-and-Ride Utilization, September 2010
(Source: Central New York Regional Transportation Authority Transit Park-and-Ride Study (2011))

Park-and-Ride	Number of Spaces	Number of Occupied Spaces	Utilization
CENTRO Lots			
Tully Nice 'n Easy*	29	17	59%
Tully United Community Church	30	1	3%
Wegmans Plaza, Dewitt*	48	14	29%
Fayetteville Towne Center*	40	7	18%
Kathan Road & I-81, Brewerton	31	17	55%
Wegmans Plaza, Cicero*	74	21	28%
Great Northern Mall*	30	3	10%
Seneca Mall*	120	0	0%
Wegmans Plaza, Clay*	41	16	39%
Tri-County Mall*	20	8	40%
Fairmont Fair*	37	13	35%
Camillus Commons*	15	7	47%
Mill St & W Main Street, Elbridge	12	1	8%
Other Lots			
US 11 & I-81, Nedrow	11	11	100%
I-90 & I-481	108	104	96%
NY 31 & I-81	30	22	73%
I-90 & I-690	53	36	68%

*Shared-use lots. Judgment was used to estimate the number of vehicles utilizing the lot for Park-and-Ride activities at these locations.

The 2011 study also assessed park-and-ride activity by corridor. The two commuter parking lots along the Thruway were excluded in this analysis. Based on the findings of the corridor assessment, the I-81 corridor, both north and south of Syracuse, has the highest total usage and utilization rate (**TABLE 2.3**). However, the corridor utilization rates are still less than 50% of the existing supply.

TABLE 2.3: Park-and-Ride Utilization by Corridor, September 2010
(Source: Central New York Regional Transportation Authority Transit Park-and-Ride Study (2011))

Corridor	Total Number of Spaces	Total Usage	Utilization
I-81/US 11 South	70	29	41%
I-81/US 11 North	135	60	44%
NY 5/92 East	132	27	20%
NY 5/92 West	64	21	33%
CR 57/481 North	191	19	10%
I-690 West	20	8	40%

In addition to assessing the utilization, the 2011 study included site observations at each facility. The site visits evaluated access, internal and external signage, transit infrastructure (bus shelters/stops), and transit services. Site visits were also conducted at some CENTRO locations as part of the infrastructure data collection effort conducted for the STSA. Based on the data from the 2011 study as well as assessments conducted for the STSA, several issues were identified.

The existing park-and-ride system is largely a patchwork of parking facilities within underutilized parking lots. The lack of guide signs on the roadway network indicating the location of some lots, limited visibility from adjacent roadways, inconvenient locations, and limited transit services, make existing facilities unattractive to commuters.

In addition, limited funding has led to a system based on locations that were capital and operating cost free, such as commercial/retail parking lots. Little has been done to proactively plan and coordinate the implementation of the lots. There are several corridors in the study area with multiple park-and-ride facilities located in close proximity to each other, while other corridors have little or no facilities. In addition, previous efforts have been centered on locating park-and-ride lots as close to "origins" as possible. This leads to facilities that are only convenient to a small number of commuters, and are not supportive of express commuter bus service.

Successful park-and-ride systems focus on locating facilities in a manner that maximizes convenience for commuters, are visible and well signed from the local roadway network, and support express bus service. The majority of the existing park-and-ride facilities in the study area are located in underutilized portions of retail/commercial parking lots, which are located along arterials. These types of locations are not typically supportive for commuter use because they are not visible from the roadway network, are not easily accessible from the entire catchment area, and do not support higher-speed transit routes (unless located along an arterial BRT or LRT line).

Successful park-and-rides in other metropolitan areas are typically located adjacent to freeway interchanges, and are spaced to allow for express transit services, as well as to maximize the utilization of each facility. Locating facilities adjacent to freeway interchanges makes them more visible and easily accessible to commuters, and allow transit vehicles to access them quickly and efficiently. Proper

spacing (minimum three to five miles between lots) also maximizes utilization of each facility while accommodating an express bus service with limited stops.

2.3.2.4 OnTrack Commuter Rail

The OnTrack system was a commuter rail service in the Syracuse metropolitan area that utilized existing freight rail right-of-way (ROW). Service began in 1994 between Syracuse University and Destiny USA, with a stop at Armory Square. At its opening, the service provided ten daily trips, seven days a week. The service required at least 500 riders per day to be sustainable, but at its height received only 75. In 2005, service was cut back to Saturdays only, providing connection to Syracuse University for sporting events, and in 2007, the service was discontinued.

Several significant issues plagued the OnTrack system. One of the most significant issues was the lack of "origin" stations in residential areas. All stations, with the exception of the Colvin Street station, were "destination" stations in non-residential areas. This issue was directly related to the physical infrastructure, which utilized existing freight rail lines that did not pass through residential areas. With no convenient way to access the system from the residential sections of the Syracuse metropolitan area, the service could not provide an adequate commuter transportation mode. Furthermore, OnTrack did not operate during the AM peak period, further reducing the likelihood of it becoming a major commuter system.

Financing was approved in 2004 to complete a bridge that would extend the OnTrack system to the RTC, Regional Market, and NBT Bank Stadium. The extension was anticipated to generate additional ridership, particularly to and from the RTC. However, the project was delayed and eventually terminated by construction problems. Finally, a large entertainment complex proposed for the area of Destiny USA was anticipated to generate a significant increase in ridership. However, project delays set back the construction of the complex, and the OnTrack system closed before its completion.

While the OnTrack system is no longer in operation, it is included in the STSA because the infrastructure could potentially be reutilized as part of a LRT or streetcar system. Platforms are currently in place at the Syracuse University, Armory Square, and Destiny USA stops, as well as at the proposed new stations at the RTC and NBT Bank Stadium. However, in order to overcome the significant issues of the previous OnTrack system, any utilization of the existing rail infrastructure would be part of a larger LRT or streetcar system that would deviate from existing rail lines in order to provide improved access to residential areas.

2.3.3 Summary of Infrastructure/Usability Assessment Findings

Based on the assessment of the existing transit infrastructure and usability of the system, the following needs were identified that should be considered in the identification and evaluation of transit enhancements:

- Provide route information on bus stop signs (bus route number, schedule, etc.).
- Revise policy for displaying route numbers on buses to show actual route, and not final destination route. Route displays should be changed as buses approach the Downtown Syracuse Transit Hub.

- Consider corridor branding for major routes to improve usability for new riders.
- Provide on-board user amenities such as Wi-Fi, real-time bus information, etc.
- Provide bus shelters at all major stops and park-and-rides.
- Provide adequate signing along major routes to highlight the location of park-and-rides and/or rail stations.
- Improve accessibility to park-and-rides by locating new facilities near freeway interchanges and providing express bus services.
- Locate BRT, LRT, or streetcar stations along corridors that mix residential (origin) and retail/office (destination) uses.
- Consolidate/eliminate deviation routes to reduce the complexity of the system.

2.4 Public Feedback

The final component of the assessment of existing conditions included obtaining public feedback regarding the transit system from riders and non-riders. Public outreach is a critical building block for any transit-planning project, and is especially crucial when seeking Federal Transit Administration (FTA) funding, such as New Starts and Small Starts. Public feedback must be received at multiple points throughout the planning process to identify transit system needs, identify factors that would enhance or encourage future transit use, and provide feedback on proposed enhancement strategies. Public involvement for the transit systems analysis was initiated during the second *I-81 Challenge* public meeting, held on Wednesday, May 9, 2012. A section of the meeting was devoted to presenting data regarding the existing transit system and displaying case studies that provided an overview of various potential enhancements. Meeting attendees could comment on the items that were presented by using sticky notes, or by completing a survey that was distributed to all meeting attendees as they left the transit section.

Detailed documentation of the results of the public comment component of the STSA is contained in the *Syracuse Transit System Analysis Public Survey Results* (November 2012) document located in **APPENDIX A**.

2.4.1 Comment Boards Methodology

There were four comment boards spread throughout the transit section of the public information session. The first comment board was located after the displays containing information regarding the existing transit system from Technical Memorandum #1 (I-81 Corridor Study – Existing Conditions). The comment board prompted meeting attendees to list needs or issues they had for the existing transit system. The second comment board was located after the displays containing information regarding potential transit enhancements. This comment board prompted meeting attendees to comment on the information from the displays and/or to list what amenities or improvements they would like to see within the metropolitan area. The third comment board was located following the Bus Rapid Transit (BRT) displays, and asked attendees to list what they liked or did not like about BRT. Similarly, the fourth

comment board was located after the Light Rail Transit (LRT) displays, and asked attendees to list their likes and dislikes regarding LRT.

Additional public outreach was conducted at the third *I-81 Challenge* public information session on May 21, 2013. Similar to the previous public meeting, a section of the meeting was devoted to presenting transit information. Maps of the proposed transit enhancement corridors, as well as descriptions of the enhancement strategies were provided for public comment. Meeting attendees could comment utilizing sticky notes, or by filling out a general comment form.

Sticky notes and pens were provided at each board location. After the completion of the information session, the notes were removed and collected by SMTC. Comments were also collected during the online component of the public meetings. All comments were summarized by SMTC and provided to Stantec.

2.4.2 Survey Methodology

Paper surveys were distributed to meeting attendees as they exited the transit section of the May 9 public information session. This was done to ensure that meeting attendees observed the displays containing existing condition information and potential improvements, and be better prepared to answer specific survey questions. Online surveys were also collected for a one-month period following the public information session.

Two separate surveys were provided: one for non-riders/former riders, and one for current riders. A "current rider" was considered to be anyone that had used the CENTRO system within the last three months (as of May 9, 2012). A "non-rider" was considered to be anyone that had never used the CENTRO system, and a "former rider" was considered to be anyone that had utilized the CENTRO system on a regular basis in the past, but had not done so within the last three months. SMTC personnel were present to assist meeting attendees in determining which survey would apply to them. Descriptions of each survey were also provided on the project website during the duration of the online version of the public information session.

The non-rider/former rider survey consisted of seventeen (17) questions, of which, thirteen were multiple-choice style, where respondents could choose one or more answers to each question. Seven of the seventeen questions, including some of the multiple-choice questions, contained open-ended response areas. In particular, Question 17 provided a space for respondents to comment or elaborate on transit needs, improvements, or other items that they felt were important. Questions 1 through 8 were designed to obtain basic demographic information including, age, race, income, car ownership, and occupation. Questions 9 through 13 obtained information regarding past transit use (for former riders), as well as reasons why the respondent does not utilize the transit system today. Finally, Questions 14 through 16 were utilized to determine what enhancements or other factors would increase the likelihood that the respondent would consider using the transit system.

The rider survey was slightly longer than the non-rider/former rider survey, with 23 questions. Sixteen of the 23 questions were multiple-choice style, in a similar format to the non-rider/former rider survey. There were twelve open-ended questions. Similar to the non-rider/former rider survey, Questions 1 through 9 were designed to obtain basic demographic information including, age, race, income, car ownership, occupation, and length of time using transit. Questions 10 through 16 asked respondents

how they utilize the transit system, including types of trips, common destinations, transfers, frequency of transit use, and how they get to/from the transit stops. Finally, Questions 17 through 23 obtained information from respondents regarding their satisfaction with the existing transit service, features that are most important to them, and improvements that would enhance their transit use.

After the completion of the online component of the public information session, Stantec personnel compiled the results of the survey utilizing an Excel file. Each survey was assigned a number, and the answers for each individual survey were entered into the file. This was important, as it will allow for the review of individual surveys if the need arises in the future. The results of each survey question were then plotted for visualization and reporting. Responses to open-ended questions were summarized and categorized into themes before being displayed on charts or graphs. It should be noted that the graphs and charts prepared for the non-rider/former rider survey show the distribution of answers for each question for non-rider and former rider respondents separately (**APPENDIX A**).

2.4.3 Revised Rider Survey

A total of 55 rider surveys were completed, of which, 40 were completed during the public information session, and 15 were completed online. Upon review of the survey results, it was determined that the rider survey appeared to provide an unbalanced representation of the existing transit ridership. Even though the public information session was advertised on CENTRO buses and through various news media, and transit riders were provided with free vouchers to use the system to get to and from the public meeting, transit rider turnout was low.

The unbalanced nature of the survey results was evident in the demographic results as well as in the response to some questions. For example, when asked for reasons why they use transit (Question 10), the respondents most commonly responded that it is “better for the environment”, “more convenient than driving”, and “less stressful than driving”. In addition, over 40% of rider respondents stated that they use the transit system once per month or less, on average. These factors demonstrate that the original rider survey did not reach the average transit rider in the Syracuse metropolitan area.

Following the release of the survey results, it was determined that it would be necessary to conduct additional rider surveys in order to meet the public outreach objective of obtaining useable feedback from current riders that can be applied to the systems analysis. A secondary public survey/outreach effort was planned at the new Downtown Syracuse Transit Hub. The surveys were revised to consolidate similar questions, correct issues identified with the original survey, and to eliminate unnecessary questions, in order to shorten the survey and make it manageable for people to complete while waiting at the hub. The revised surveys were distributed at the Transit Hub on Thursday, October 11, 2012 between 7:30 AM and 6:00 PM. Respondents were asked to complete the survey onsite prior to boarding their bus. Mail-in and online options were not provided.

2.4.4 Summary of Public Feedback Findings

The results of the comment boards and surveys provided valuable insight into how the public perceives the transit system and what improvements may increase transit use. A detailed analysis of the results is contained in the *Syracuse Transit System Analysis Public Survey Results* (November 2012) document located in **APPENDIX A**. The results of the survey will be utilized in the identification and evaluation of

potential corridors. The results will also support future analyses of the improvements, identified in the Systems Analysis document, that are required to obtain FTA New Starts or Small Starts funding.

Based on the results of the comment boards and survey, a prioritized list of needs/enhancements that will be carried into the Transit Systems Analysis was developed (**TABLE 2.4**). The results of the comment board responses also provided crucial feedback that can be applied to the Transit System Analysis. The majority of both rider and non-rider/former rider respondents were in favor of transit enhancements, such as increased frequency, reduced travel time, and real-time information. Respondents favored both BRT (for its flexibility and ease of implementation), and LRT (for its aesthetic and economic benefits); however, both were seen as expensive. Some respondents also expressed concern regarding the feasibility and practicality of large-scale enhancements in the Syracuse metropolitan area. In particular, current land use patterns, suburbanization, convenience of a car, and public perception of the transit system may make it difficult to justify larger-scale improvements. Overall, respondents appear to be looking for a balanced and practical approach to enhancing the transit system.

TABLE 2.4: Prioritization of Needs from Public Surveys
(Source: *Syracuse Transit System Analysis Public Survey Results (2012)*)

Need/Enhancement	Priority
Increase frequency and hours of operation.	1
Reduce transit travel time to be more comparable with vehicles.	2
Improve on-time performance.	3
Provide direct connections between major regional destinations.	4
Provide more real-time system information (online, by phone, at bus stops).	5
Improve safety and public perception of the transit system.	6
Provide more suburban commuter options.	7
Maintain an affordable fare.	8

2.5 Existing Conditions Assessment Conclusions

2.5.1 Needs

Each of the existing condition analysis components discussed previously provided valuable feedback as to the operation of the system as well as the needs of the users. Based on the existing condition information collected for the STSA, it was concluded that the transit system in the Syracuse metropolitan area primarily serves transit-dependent communities, including low-income residents, the elderly, and students. These types of users need access to transit throughout the day to get to work, school, or appointments, rather than just during the AM and PM peak periods, as would be required for a commuter-based system. Furthermore, suburban/commuter activity is relatively low. This can be seen in the relatively low utilization of the CENTRO park-and-rides, as well as comments from non-riders. Non-riders view the transit system as undesirable, and that it cannot compete with the convenience of a personal vehicle due to relatively cheap and ample parking, and short commute times.

However, the STSA presents an opportunity to change the perception and utilization of the transit system. This could be accomplished by providing transit enhancements that maximize potential ridership by combining the needs of existing users while increasing opportunities to expand the ridership base to commuters. Increasing the potential ridership base for a particular corridor or route will allow for more intensive improvements (increased frequency, hours of operation, BRT, LRT, or streetcars, etc.), which in turn would make the transit system more accessible and attractive for new riders.

Based on these results, the following list of transit system needs that will be carried into the identification and evaluation of transit improvements was developed:

1. Improve operations for core ridership that meets existing needs as well as retains riders.
    a. Increase frequency and hours of operation on highly utilized routes and routes that serve employment centers.
    b. Maintain an affordable fare.
    c. Improve on-time performance.
    d. Provide higher intensity improvements to meet demand on highly utilized corridors, such as James Street, Salina Street, Syracuse University, Butternut Street/Grant Avenue, and South Avenue/OCC.
    e. Improve system flexibility to meet changes in demand.
2. Attract new ridership, particularly suburban/commuter ridership to reduce roadway congestion and parking demand in Downtown and on University Hill.
    a. Reduce transit travel time to be more comparable with vehicles.
    b. Improve rider amenities (Wi-Fi, comfortable seating for commuter routes, etc.).
    c. Improve safety and public perception of the public transit system.
    d. Improve accessibility to park-and-rides by locating new facilities near freeway interchanges and providing express bus services.
3. Improve the visibility and usability of the system for all riders.
    a. Provide real-time transit information (online, by phone, at bus stops, etc.).
    b. Provide route information on bus stop signs.
    c. Revise policies for bus information displays.
    d. Adjust the route naming convention to develop single, continuous routes that pass through the Downtown Syracuse Transit Hub.

e. Replace route numbers with corridor branding on highly utilized corridors.

f. Provide adequate signing along major routes to highlight the location of park-and-rides and/or rail stations.

4. Utilize transit to improve connectivity between key locations in the Syracuse metropolitan area and provide for economic development opportunities.

   a. Provide direct connections between major regional destinations.

   b. Provide additional/more-frequent connections between Downtown and University Hill.

   c. Encourage local municipalities to implement transit-friendly land use and zoning policies to encourage transit-oriented design.

   d. Locate high-intensity transit services along corridors that mix residential, retail, and office uses.

In addition to the needs identified above, the existing conditions analysis yielded urban and suburban/commuter corridors that could be considered in the identification and evaluation of transit enhancements. The corridors include:

Urban

- James Street
- Salina Street
- Syracuse University/Comstock Avenue
- Butternut Street/Grant Avenue
- South Avenue/OCC

Suburban/Commuter

- US 11/I-81: Nedrow – Cicero
- Liverpool/CR 57: Liverpool/Bayberry – Downtown/University Hill
- Genesee Street (NY 5/NY 92): Camillus – Fayetteville

2.5.2 System Vision

Finally, a system vision and guiding principles were developed that will be used to direct the selection of transit analysis corridors and the evaluation of transit enhancements. The overall system vision is based on a combination of factors including the STSA goals and objectives, existing and future anticipated needs, and previous studies.

The results of the existing conditions assessment provided valuable insight into how the public views the transit system and what they would like to see in the future. The majority of existing riders are pleased with the destinations that are served by the current routes; however, the frequency and operating hours of the system provides challenges for some users. The majority of non-riders noted that the vehicle-oriented nature of the Syracuse metropolitan area (low parking costs, relatively low levels of peak period congestion, preference for driving), and limited flexibility of the existing transit system (infrequent operations, and slow travel times) are the primary roadblocks to transit use. Non-riders listed factors such as high gas prices, employer incentives, increasing parking fees, increased congestion, and more one-seat ride options, as the top five triggers that may increase transit use. Improvements that formalize transit connections, such as LRT or BRT, as well as decreased travel times were also listed as potential measures that may generate new ridership.

Like many other cities in the United States, Syracuse has experienced a shift of the employment base from the Central Business District (CBD) to the suburbs. However, there has been little success in providing greater mode share for suburb-to-suburb commuters. Capital and operating costs of transit systems that serve these types of areas are cost prohibitive because of the orientation of travelers and the relatively low-density of their origins and destinations. Traditional transit systems that are oriented to high-density CBDs are “many to one” systems, meaning that there may be many origins, but only one or two destinations (**FIGURE 2.5**). However, a suburb-to-suburb system would operate as a “many-to-many” system, meaning that many origins have many different destinations (**FIGURE 2.6**).

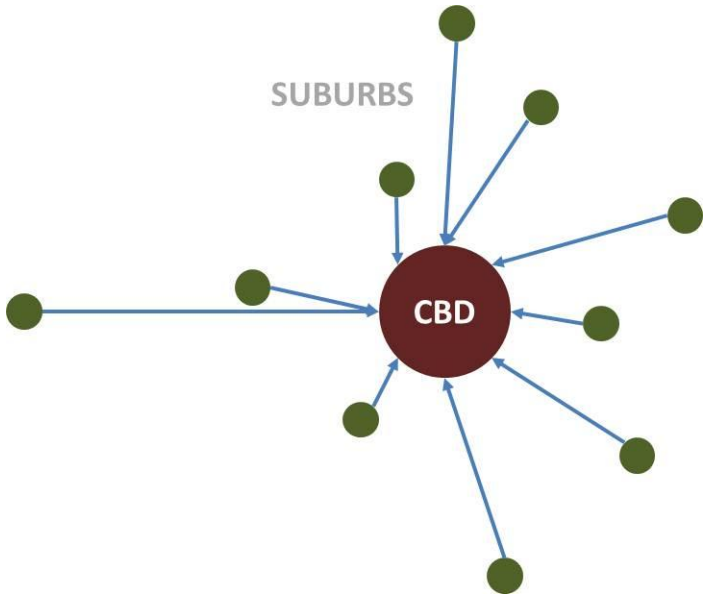


FIGURE 2.5: Many-To-One Transit System

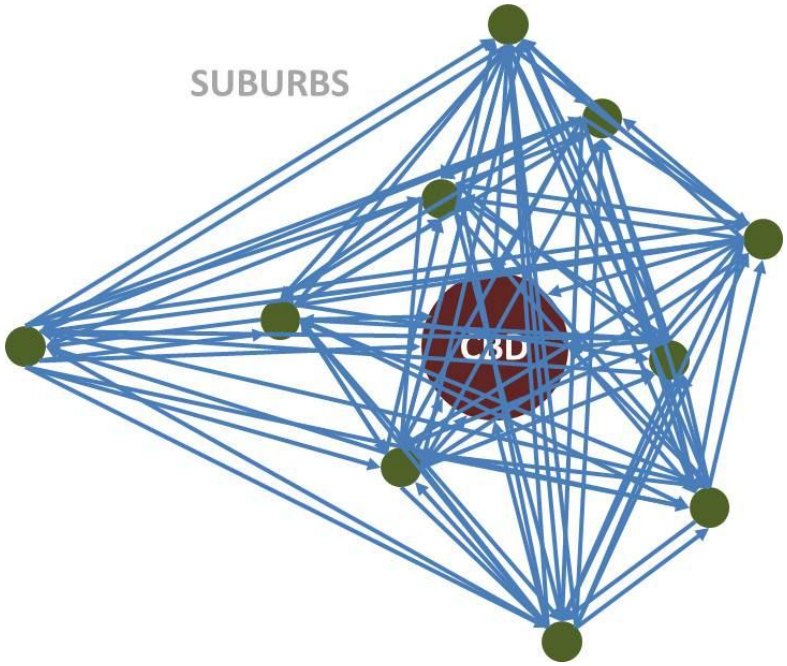


FIGURE 2.6: Many-to-Many Transit System

Given the current transit climate in the Syracuse metropolitan area, the STSA will not focus on large-scale service expansions to the suburban areas, as has been recommended in other studies. These types of routes require multiple seat rides and would not be able to compete with personal vehicle travel times. Furthermore, unless a significant increase in the density of suburban origins or destinations is achieved, suburb-to-suburb transit systems cannot effectively compete with personal vehicle commuting. This was shown in CENTRO's attempts to provide suburb-to-suburb routes, as recommended in the *Regional Mobility Action Plan* in the late 1990's, all of which had to be cancelled due to low ridership.

Instead of focusing on the suburbs, the STSA will develop concepts that leverage existing areas of high transit use in order to establish the basis for "transit enhancement corridors". The corridors would contain higher-frequency, highly visible transit services with improved rider amenities and shorter travel times that serve both urban and suburban areas. The higher-frequency and expanded services would improve the usability for existing users, while offering amenities and service styles that would attract new riders, particularly commuters. Establishing formal transit services along the enhancement corridors would also support the development of specialized land use policies in the study area, which would support higher-density, transit-oriented, and pedestrian-friendly designs. These features would enhance the corridor, increase ridership, improve quality of life, support the recent return to the city by young professionals, and grow the economy of the region.

In order to achieve the vision of the transit system, several guiding principles will be applied to the identification of the transit enhancement corridors. These principles state that a selected transit enhancement corridor should:

- **Be scalable.** Selected enhancement corridors should support the analysis of at least one of the higher-intensive transit alternatives, such as BRT, LRT, or streetcars.

- **Be continuous.** Effort should be made to link routes of similar types, or along similar corridors, in order to reduce transfers and support simplified corridor branding. In this scenario, the Downtown Syracuse Transit Hub would serve as an intermediary point along the corridor. For example, a transit corridor that would operate along US 11/I-81, north of the city, should be combined with a transit corridor on US 11/I-81, south of the city.

- **Provide the potential for future economic development.** Transit enhancement corridors should be located along corridors that combine developed areas with areas that could support new or infill development. The developed areas would provide a base to support the transit enhancements during initial implementation, and redevelopment areas would provide the potential for ridership growth. Preference should be given to corridors that could support mixed-use, transit-oriented developments.

- **Connect as many major destinations as possible.** Transit enhancement corridors should provide connection to the greatest amount of major destinations as possible. Small deviations from major travel routes may be required in order to meet this principle. Major destinations include employment centers, high-density residential, cultural resources, colleges and universities, transportation hubs, and major retail sites, among others.

- **Be located along mixed-use corridors.** Transit enhancement corridors should provide services to retail, office, industrial, and residential land uses along its length. This would support increased frequencies and operating hours that would allow the system to be more flexible, attracting more riders.

- **Support varying demographics.** Transit enhancement corridors should also support a variety of demographics in order to be able to generate a wider ridership base that could support expanded, more-frequent, and flexible operations. Combining services to support AM and PM peak period commuter demand with off-peak demand from transit-dependent communities would provide for a more-frequent service that could be sustained throughout the day. Serving off-peak demands would also make the system more flexible for commuters, which in-turn could attract additional commuter ridership.

CHAPTER 3 – Identification of Analysis Corridors

The scope of the STSA includes the identification and evaluation of enhancements for the system that address the needs that were identified in the Existing Conditions analysis, as well as the goals and objectives of the STSA. In order to address the needs and meet the goals and objectives, it was necessary to evaluate enhancements along "analysis corridors". For the purposes of the STSA, an analysis corridor is defined as a general alignment of one or more major travel routes within the Syracuse metropolitan area that is selected for the purposes of evaluating transit enhancements. For example, a north-south analysis corridor could consist of the existing US 11/I-81 corridor between North Syracuse and the southern portion of the City.

Analysis corridors may also have one or more existing bus routes, of which some or all of the routes may be consolidated into a new service as part of the proposed enhancements. In addition, analysis corridors may also consist of a combination of roadway and rail infrastructure. This section of the STSA document details the methodology and findings of the analysis corridor selection process.

3.1 Transit Enhancement Corridor Selection

Several evaluation measures were utilized in order to identify potential analysis corridors, or "transit enhancement corridors" as they will be referred to in the STSA, including existing conditions data, demographics of census tracts and transportation analysis zones (TAZs), FTA funding criteria, master plans, regional and local plans, and planned developments. These factors were combined in order to select transit enhancement corridors that may serve existing areas with a high degree of transit use, or areas that have the potential to generate new, or additional, ridership.

3.1.1 Existing Conditions Data

The existing conditions data (see **Section 2.0**), was utilized to identify areas with existing high ridership, as well as potential areas for new or expanded services based on public feedback. **FIGURE 3.1** shows the existing peak ridership of the routes studied in the STSA Existing Conditions assessment. Based on the ridership trends, several corridors are easily identifiable based on the ridership of corresponding routes along these corridors:

- James Street: East Syracuse to Downtown
- Syracuse University/University Hill
- South Avenue: OCC to Downtown
- W Genesee Street (NY 5): Camillus to Downtown
- Erie Boulevard (NY 5)/ E Genesee Street (NY 92): Fayetteville to Downtown
- US 11/I-81 (Including Midland Avenue): North Syracuse to South Salina
- Onondaga Street: Western Lights Plaza to Downtown

- Liverpool/CR 57: Bayberry/Liverpool to Downtown
- Butternut Street/Grant Avenue: Shop City to Downtown

3.1.2 Demographics

Stantec obtained Geographic Information System (GIS) files from the SMTC Travel Demand Model (Version 3.023) which contained demographic and travel data for each traffic traffic analysis zone (TAZ) within the Syracuse metropolitan area. A TAZ is a special area delineated by state or local transportation planning officials for tabulating traffic-related data, including demographics, journey-to-work, and place-of-work statistics. Census 2010 data was also utilized for additional demographic data that was not provided in the TAZ file. However, census data was provided by census tract, rather than TAZ.

Several factors were considered when identifying sections of the study area that have transit-supportive qualities. Transit Cooperative Research Program (TCRP) Report 16, *Transit and the Urban Form* (1996), contains a summary of available research on the impact of urban form and transit ridership. According to the study, many factors related to urban form can influence transit ridership patterns when combined. However, when breaking urban form into its base components, density (residential and employment) and compactness of an urban area have the dominant influence on transit ridership (Parsons, Brinkerhoff, Quade & Douglas, Inc. et al. 1996). The more dense or compact a particular urban area, the higher the demand for transit services. Even in low-density residential areas, higher-intensity transit service ridership can be significantly impacted by the density of a CBD. For example, for a 25-mile light rail line surrounded by low-density residential development, an increase in downtown employment from 50,000 to 300,000 corresponded to an increase in daily boardings from 18,000 to 85,000 per day (Parsons, Brinkerhoff, Quade & Douglas, Inc. et al. 1996).

In addition to ridership, the mix of land uses and urban design features of transit corridors contributes to the attractiveness of transit services (Parsons, Brinkerhoff, Quade & Douglas, Inc. et al. 1996). In employment centers, the mix of land uses contributes to overall transit patronage, while in residential areas, pedestrian accessibility is more important. Finally, urban form plays an important role in transit ridership as well. CBDs have traditionally provided the greatest mode share for transit. This is due in part to the density and land use mix of CBDs, but also the traditional form of transit systems in the United States, which are typically designed to transport commuters from the suburbs to the CBD. A study conducted in San Francisco showed that employee transit mode share decreased from 58% to 3% once a company relocated from the CBD to a suburban campus (Parsons, Brinkerhoff, Quade & Douglas, Inc. et al. 1996).

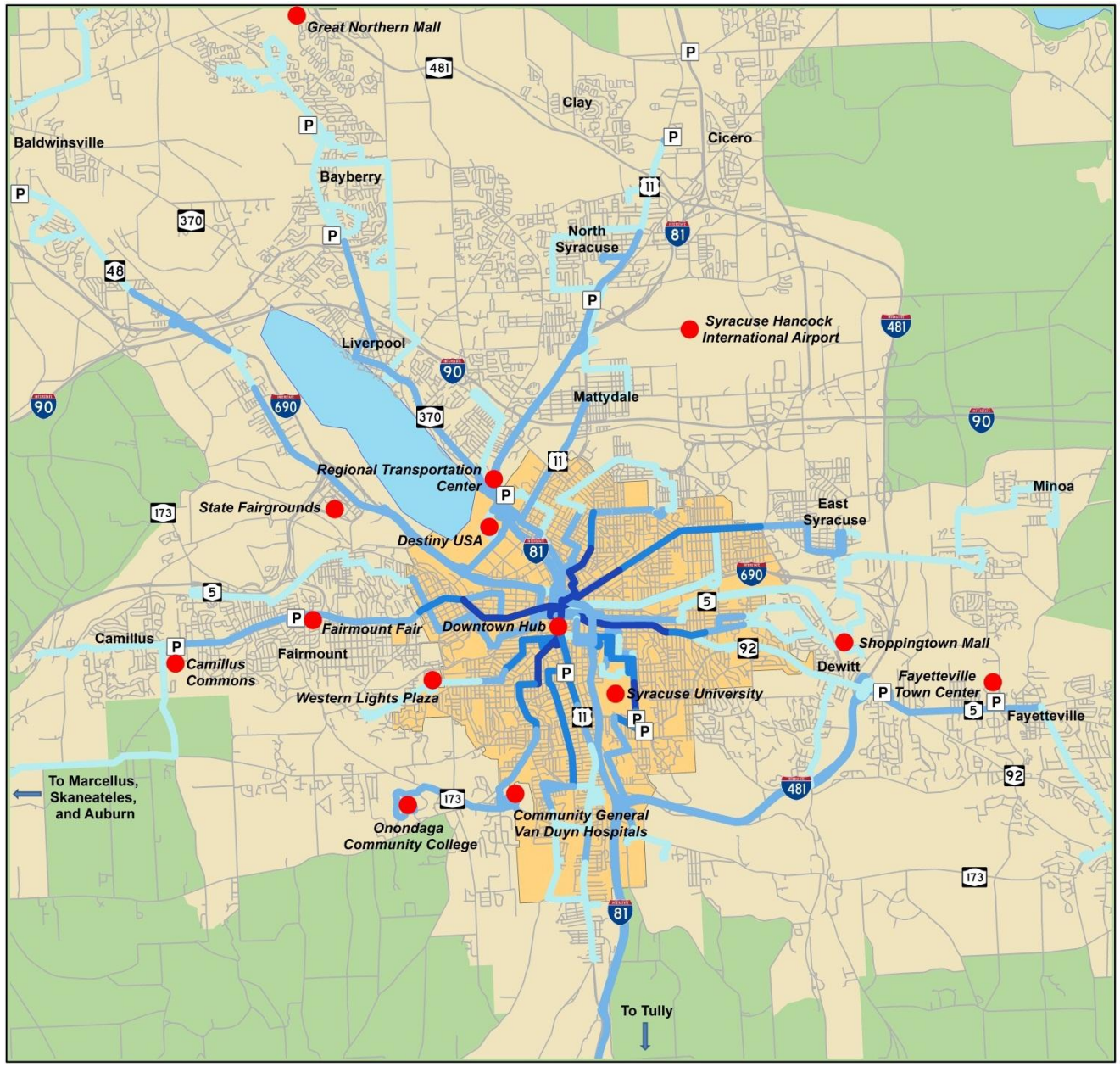


FIGURE 3.1
Peak Ridership Systemwide

Legend

Average Number of Riders Per Trip (% of Seats Occupied*)

- 1 - 9 (1% - 24%)
- 10 - 19 (25% - 49%)
- 20 - 29 (50% - 74%)
- 30 - 39 (75% - 100%)
- 40 - 50 (Standing Room Only)

- City of Syracuse
- Urban Area
- P Park-and-Ride
- Community Destinations

* Assumes average of 40 seats per bus.

Data Source:

SMTC

Results of multiple boarding and alighting surveys conducted in April 2010 on selected routes. Routes were selected to provide a representative snapshot of the existing transit system. Data was not collected for all CENTRO routes.

0 1 2 Miles

3.1.2.1 Population and Employment Density

A number of studies have been conducted to identify thresholds to provide planners with an estimate of the potential for transit to operate in certain environments. Three commonly referenced studies include the Institute of Transportation Engineers (ITE) (1989), Messenger and Ewing (1996), and Guerra and Cervero (2010). All three studies utilized data on existing transit systems to develop thresholds to guide transit planning processes.

ITE (1989) utilized US transit data to evaluate minimum residential and employment density thresholds for various types of transit, from low-frequency bus to LRT. Based on the research conducted in that study, the following density thresholds were identified:

- 1 Bus/Hour: 4 – 6 Dwelling Units Per Acre, 5 – 8 Million Square Feet of Commercial/Office
- 1 Bus/30 Minutes: 7 – 8 Dwelling Units Per Acre, 8 – 20 Million Square Feet of Commercial/Office
- LRT: 9 Dwelling Units Per Acre, 35 – 50 Million Square Feet of Commercial/Office

Messenger and Ewing (1996) utilized methods that allowed them to consider interrelationships between socio-demographic, land use, and transit factors. The study identified residential density thresholds for basic bus service, premium bus service (BRT), and rail service at 7, 15, and 20-30 units per acre, respectively.

A more recent study conducted by the University of California Transportation Center identified minimum density thresholds needed in order for LRT and commuter rail to generate enough ridership to justify the capital costs. Similar to the ITE and Ewing studies, the University of California Study examined data from existing transit systems to develop the thresholds. The thresholds were found to be approximately 14 jobs and persons per gross acre for LRT, and 27 jobs and persons per gross acre for heavy commuter rail (Guerra and Cervero, 2010). The study also found that light-rail might be more cost-effective than heavy rail for densities up to 28 jobs and persons per gross acre.

Based on the information contained in the existing studies, thresholds for basic bus service, BRT, LRT, and heavy rail were establish (**TABLE 3.1**). The various thresholds were converted to jobs and persons per square mile (JPPM) in order to provide a consistent measure for each type of transit mode.

TABLE 3.1: Density Thresholds for Transit Utilized in STSA

Service Type	Threshold (JPPM)*
Basic Bus Service	4,500
Bus Rapid Transit	6,500
Light Rail Transit	9,000
Heavy Commuter Rail	17,000

*JPPM – Jobs and persons per square mile.

FIGURE 3.2 shows the combined jobs and persons per square mile (JPPM) for each TAZ within the study area broken down by the density thresholds for basic transit, BRT, LRT, and heavy rail. The combination of population and employment density seen in the map yielded several potential transit enhancement corridors. Within the urban core of the city, corridors such as Syracuse University, Onondaga St/Western Lights, South Ave/OCC, Butternut St/Grant Ave, James St, and Salina St/Midland Ave would serve the greatest number of TAZs with transit-supportive densities. Regionally, corridors such as US 11/I-81 (north-south axis), NY 5 (east-west axis), and Liverpool/CR 57 (northwest axis) would serve higher-density suburban corridors which could support enhanced transit services.

Despite being based upon US transit data, TCRP Report 16, *Transit and the Urban Form*, cautions planners and policymakers against using density as the sole indicator of the feasibility of transit. Corridor-specific factors such as household characteristics (income, vehicle ownership, etc.), land use, and pedestrian activity should also be examined when determining transit feasibility. As such, the STSA examines other factors in identifying the transit enhancement corridors.

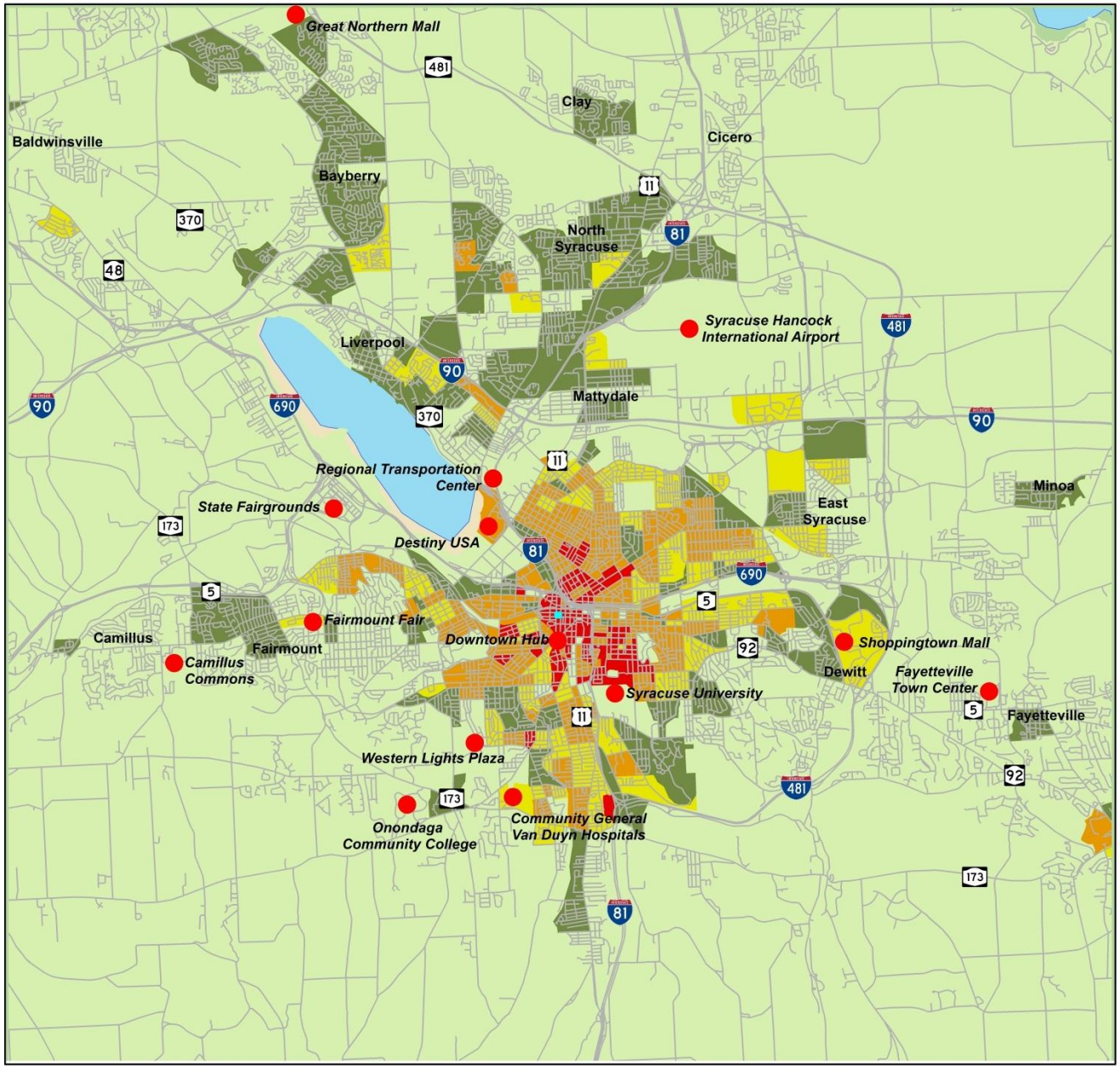


FIGURE 3.2
Jobs and Persons Per Mile (JPPM)

Legend

JPPM

- 0 - 4500
- 4501 - 6500
- 6501 - 9000
- 9001 - 17000
- > 17000

Roads

Community Destinations

Data Source:

SMTC Travel Demand Model Version 3.023

0 1.5 3 Miles

3.1.2.2 Percentage of Households with Access to One or Fewer Vehicles

TAZs with a high percentage of households with one or zero vehicles may indicate demand for transit services. Furthermore, this factor is utilized as part of FTA's methodology to estimate mobility improvements associated with a particular transit project. A study conducted for San Francisco's BART system found that the number of vehicles available per person as well as the type of parking at their place of employment had a significant impact on the probability of utilizing transit (Cervero 1993). **FIGURE 3.3** shows a chart of probability of utilizing transit versus available cars based on vehicle ownership, parking fees, and the availability of transit subsidies. While the thresholds for transit are likely much lower in the Syracuse metropolitan area than San Francisco, the number of available vehicles per person is still an important factor to identifying zones with the potential to generate transit ridership.

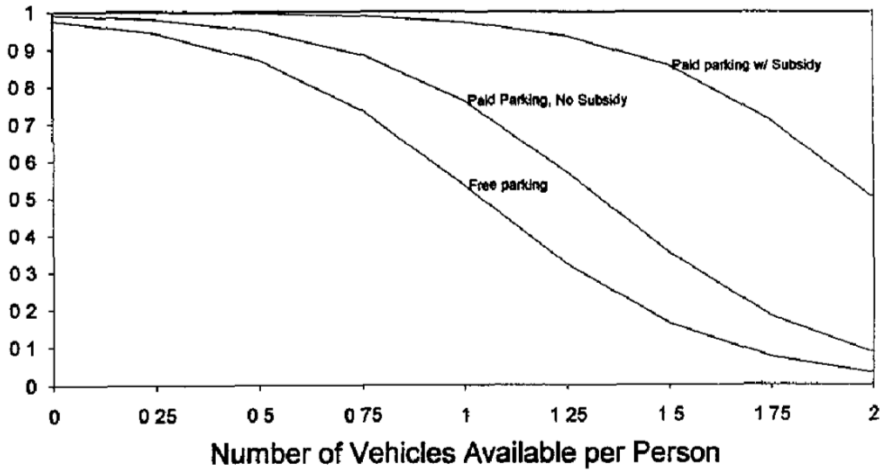


FIGURE 3.3: Probability of Transit Use vs. Number of Vehicles Available (Cervero 1993)

FIGURE 3.4 maps the percentage of households with access to one or zero vehicles by TAZ overlaid by existing transit use. Based on the results of the mapping, there are a significant number of TAZs within the City of Syracuse in which 76% - 100% of the households have access to one or zero vehicles. This is likely one of the most significant factors behind the high transit ridership within the urban core. There are also several TAZs in suburban areas that have 50% or more households with limited access to a vehicle. These areas include North Syracuse, Fayetteville, East Syracuse, Dewitt, Liverpool, Bayberry, Camillus, and Fayetteville. However, there seems to be a lesser correlation between transit passenger loads and vehicle ownership than is seen within the urban core. These suburban areas could be targeted for improved transit service to attract unmet transportation needs.

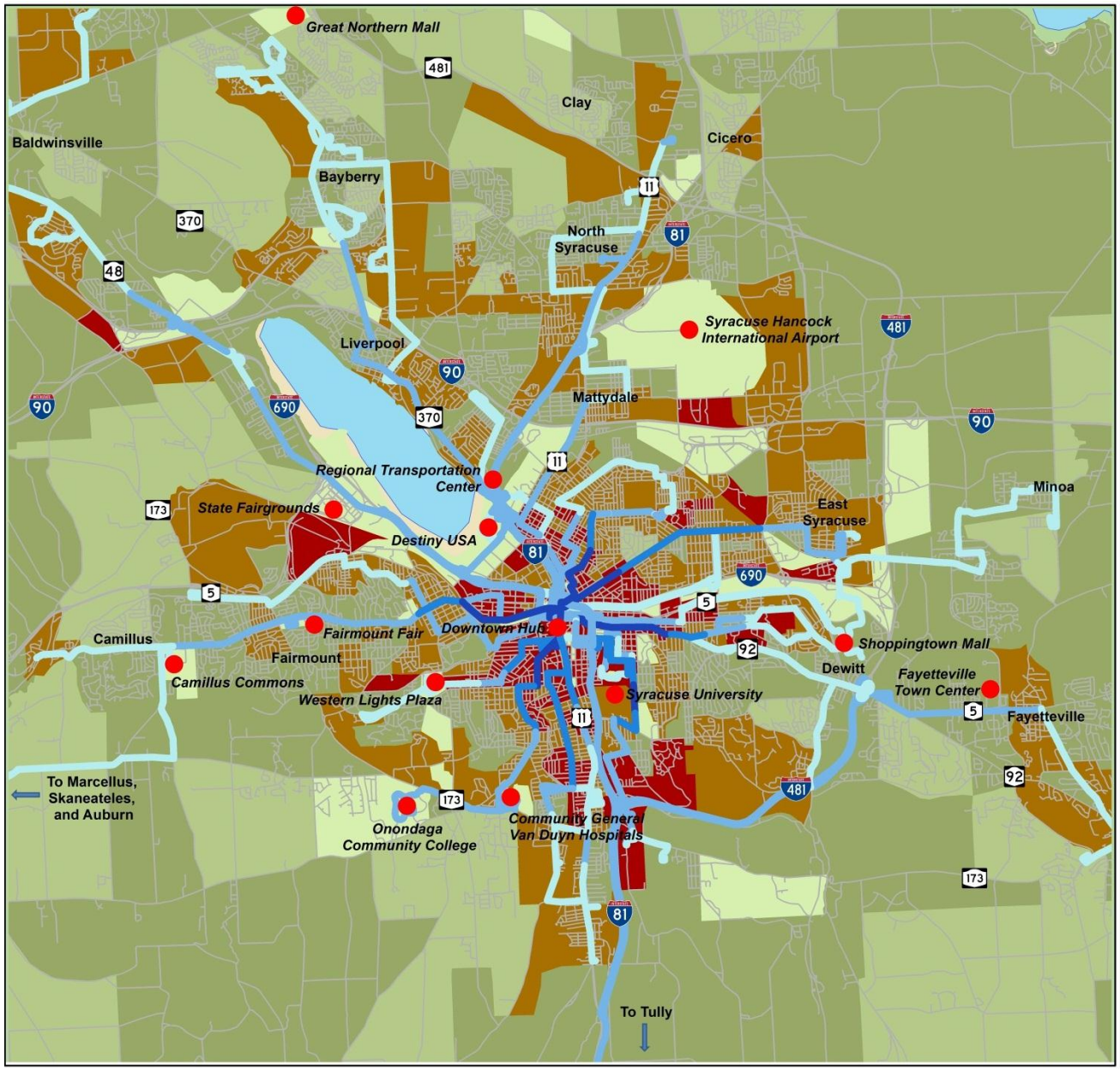


FIGURE 3.4
Percentage of Households with 0 or 1 Vehicles

Legend

Average Number of Riders Per Trip (% of Seats Occupied*)

- 1 - 9 (1% - 24%)
- 10 - 19 (25% - 49%)
- 20 - 29 (50% - 74%)
- 30 - 39 (75% - 100%)
- 40 - 50 (Standing Room Only)

Percentage of Households

- 1% - 10%
- 11% - 25%
- 26% - 50%
- 51% - 75%
- 76% - 100%

- Roads
- Community Destinations

Data Source:

SMTC Travel Demand Model Version 3.023

Results of multiple boarding and alighting surveys conducted in April 2010 on selected routes. Routes were selected to provide a representative snapshot of the existing transit system. Data was not collected for all CENTRO routes.

0 1.5 3 Miles

3.1.2.3 Home-Based Work Trip Production and Attraction Densities

Home-based work trip production density is a secondary factor of population density that links population with employment. It can be used to identify corridors with a higher-density of commuter trips that could be targeted for commuter-oriented transit services. Areas that experience a high density of work trip productions may not be identified as easily through population density alone.

FIGURE 3.5 shows the work trip production density by TAZ. The University Hill area has the most TAZs with trip production densities of 5,000 trips per square mile or higher. In addition, the South Avenue/OCC and Onondaga St/Western Lights corridors also serve relatively dense production areas. Several regional travel axes can also be identified. I-81/US 11 provides a north-south axis, which would serve the higher trip production areas of Cicero, North Syracuse, Mattydale, and the Washington Square neighborhood, as well as southern sections of the City. The NY 5 (Genesee Street/Erie Boulevard) corridor provides an east-west axis connecting Camillus and Fairmount to Fayetteville through the center of Downtown. The northwest axis of County Route 57 provides connections to the higher density production areas of Liverpool and Bayberry. Finally, the James Street corridor provides a northeast corridor that would serve the northeast section of the City, East Syracuse and Minoa.

Work trip production density provides a scalable measure of the number of trips destined for a particular TAZ, and may indicate corridors that would serve a high number of employees (or commuters) within a concentrated area.

FIGURE 3.6 show work trip attraction density by TAZ. Unlike work trip production density, fewer potential transit enhancement corridors can be identified. As can be expected, Downtown and University Hill have the highest densities of work trip attractions, with several TAZs with attraction densities of greater than 20,000 trips per square mile. Portions of the James Street corridor close to Downtown also have a high trip attraction density. Other than those areas, there are very few TAZs with a high-density of trip attractions. The US 11/I-81 corridor would serve approximately 11 TAZs, outside the City, with densities of 2,500 – 10,000 attractions per square mile. The majority of these TAZs are associated with retail sites such as shopping centers and Destiny USA. Similarly, shopping centers along NY 5, including Shoppingtown Mall and Fairmount Fair attract a relatively higher density of work trips.

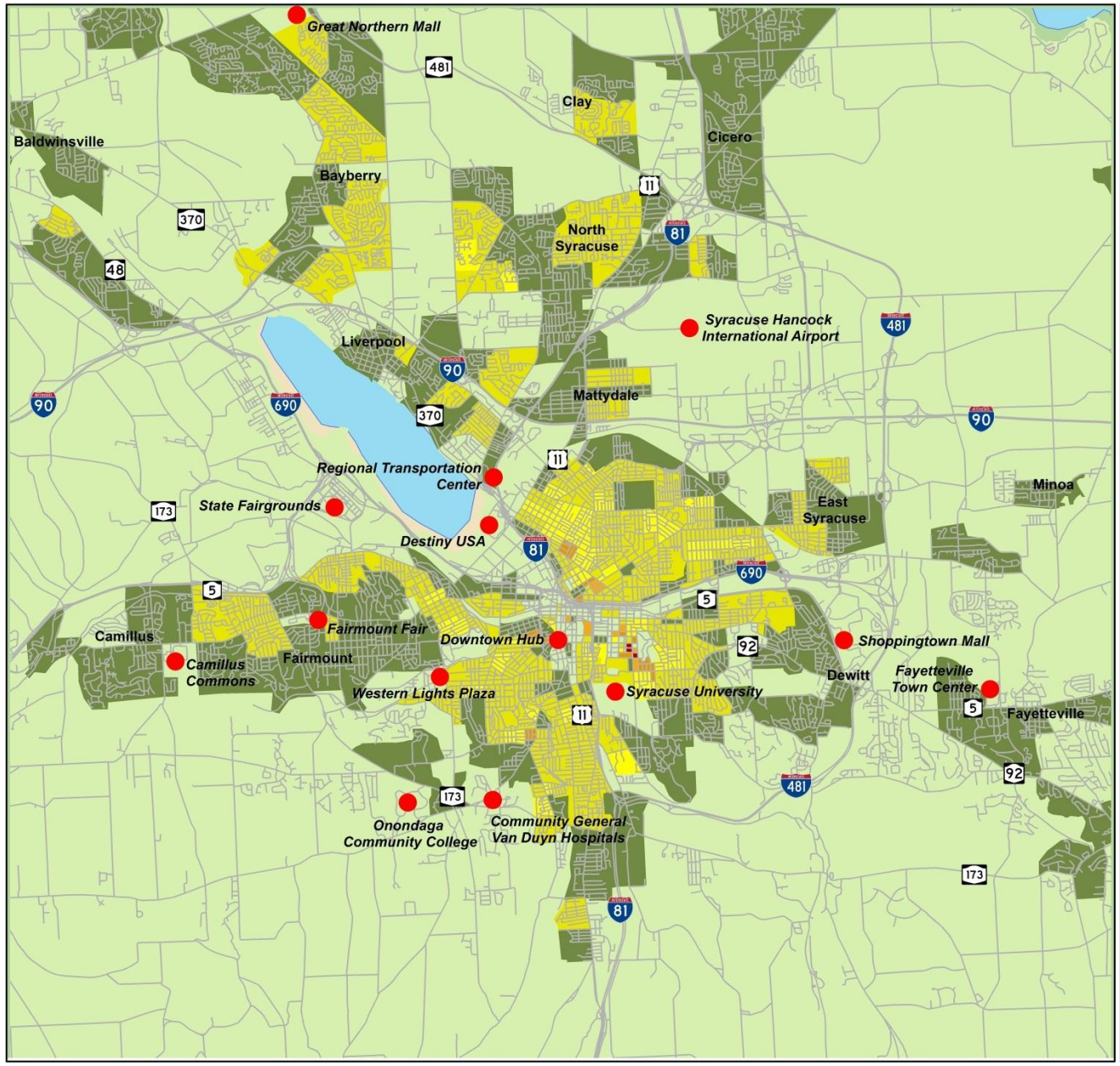


FIGURE 3.5
Work Trip Production Density by TAZ

Legend
Work Trip Productions per Square Mile

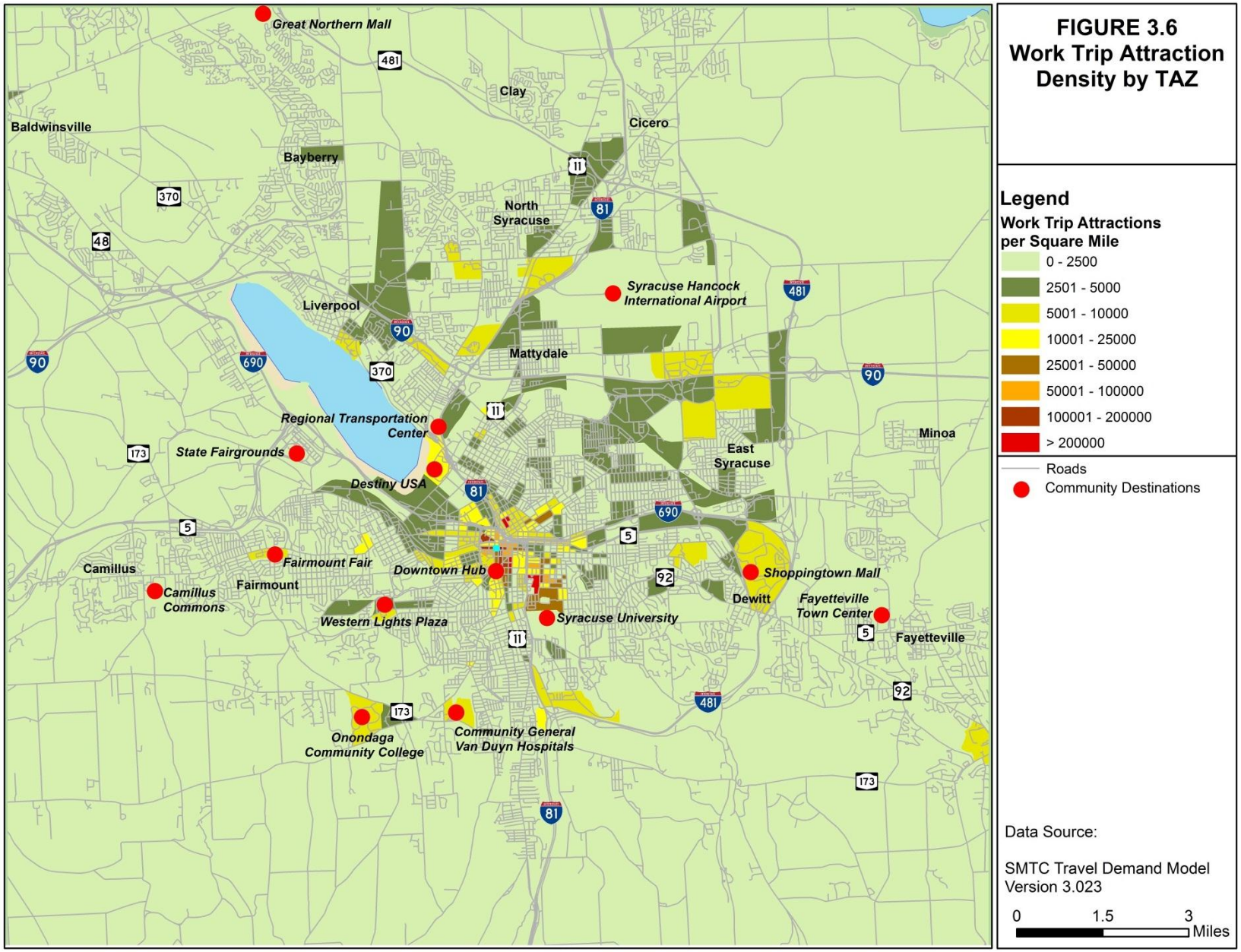
- 0 - 1000
- 1001 - 2500
- 2501 - 5000
- 5001 - 7500
- 7501 - 10000
- 10001 - 15000
- 15001 - 25000
- > 25000

Roads
Community Destinations

Data Source:

SMTC Travel Demand Model Version 3.023

0 1.5 3 Miles


Great Northern Mall
Baldwinsville
Bayberry
Clay
Cicero
North Syracuse
Liverpool
Syracuse Hancock International Airport
Mattydale
Regional Transportation Center
State Fairgrounds
Destiny USA
Minoa
East Syracuse
Camillus
Fairmount Fair
Fairmount
Camillus Commons
Downtown Hub
Western Lights Plaza
Syracuse University
Shoppingtown Mall
Dewitt
Fayetteville Town Center
Fayetteville
Onondaga Community College
Community General Van Duyn Hospitals
FIGURE 3.6
Work Trip Attraction Density by TAZ
Legend
Work Trip Attractions per Square Mile
0 - 2500
2501 - 5000
5001 - 10000
10001 - 25000
25001 - 50000
50001 - 100000
100001 - 200000
> 200000
Roads
Community Destinations
Data Source:
SMTC Travel Demand Model Version 3.023
0
1.5
3
Miles

3.1.2.4 Average Commute Time

Average commute time data was provided by census tract for the study area. This factor was utilized to identify specific corridors that experience a high commute time, relative to the entire study area, which may also indicate areas of congestion. **FIGURE 3.7** shows the average commute time of each census tract within the study area. Census tracts that are in close proximity to major freeways tend to have lower average travel times farther away from Downtown than those adjacent to arterials. For example, Liverpool is located along an arterial, is only 5.14 miles from Downtown, and has an average commute time of 21 minutes. However, Cicero, which is located along I-81 and US 11 and is approximately 10 miles from Downtown, has an average commute time of only 19 minutes. This shows that vehicle travel time is extremely efficient along major freeways, even during peak periods, which is consistent with the relatively low peak hour congestion observed on the region's freeways.

No additional potential transit corridors were identified through the commute time data. However, several tracts within the urban core experience commute times greater than 15 minutes. The relatively high commute times could be a result of general congestion of roadways within the City.

3.1.2.5 Transit Mode Share

Transit mode share can indicate areas that are currently transit-supportive which could help establish a basis for transit enhancements that could attract new users. **FIGURE 3.8** shows transit modal share by census tract along with the peak ridership data collected during the boarding and alighting counts. As was expected, the highest transit shares occurred within the City of Syracuse, where the modal split ranged from less than one percent to over 26%, with an average share of 8%. The existing peak ridership for the routes studied as part of the STSA was overlaid to evaluate the correlation between peak ridership and transit mode share. Based on mapping, the ridership trends tend to align with transit mode share, with the exception of Fayetteville and East Syracuse that have a higher ridership but low transit share, and the Bayberry area that has a very low ridership but a census tract with a high transit mode share. The variations in the Bayberry area may indicate that the peak ridership for routes in that area does not follow traditional peaks, and was not accounted for in the data.

Based on the transit mode share data, the following potential corridors were identified:

- James Street: Eastwood to Downtown
- Syracuse University/University Hill
- South Avenue: Onondaga Community College to Downtown
- W Genesee Street (NY 5): Camillus to Downtown
- Erie Boulevard (NY 5)/E Genesee Street (NY 92): Dewitt to Downtown
- US 11/I-81 (Including Midland Avenue): North Salina to South Salina

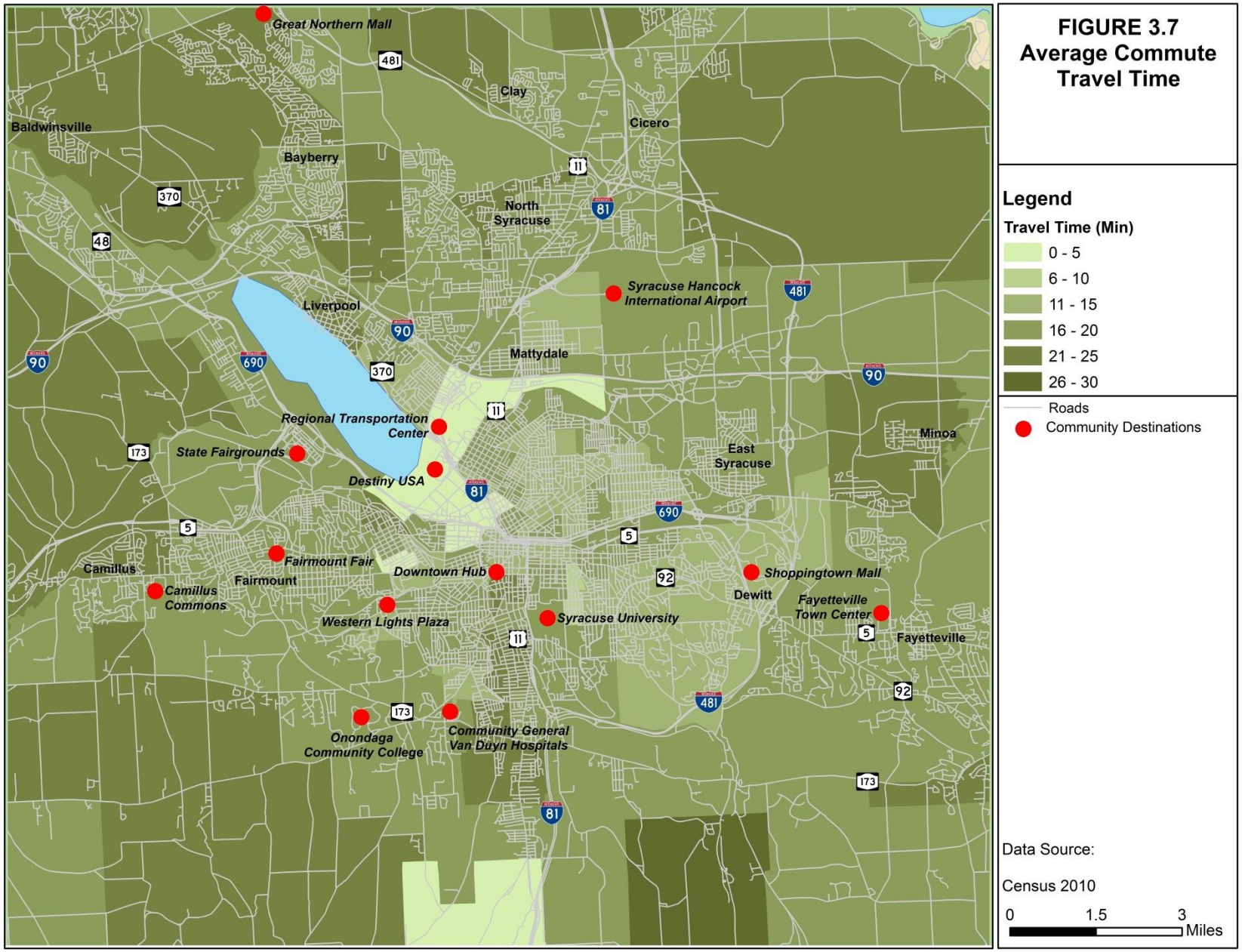


FIGURE 3.7
Average Commute Travel Time

Legend

Travel Time (Min)

- 0 - 5
- 6 - 10
- 11 - 15
- 16 - 20
- 21 - 25
- 26 - 30

Roads

Community Destinations

Data Source:

Census 2010

0 1.5 3 Miles

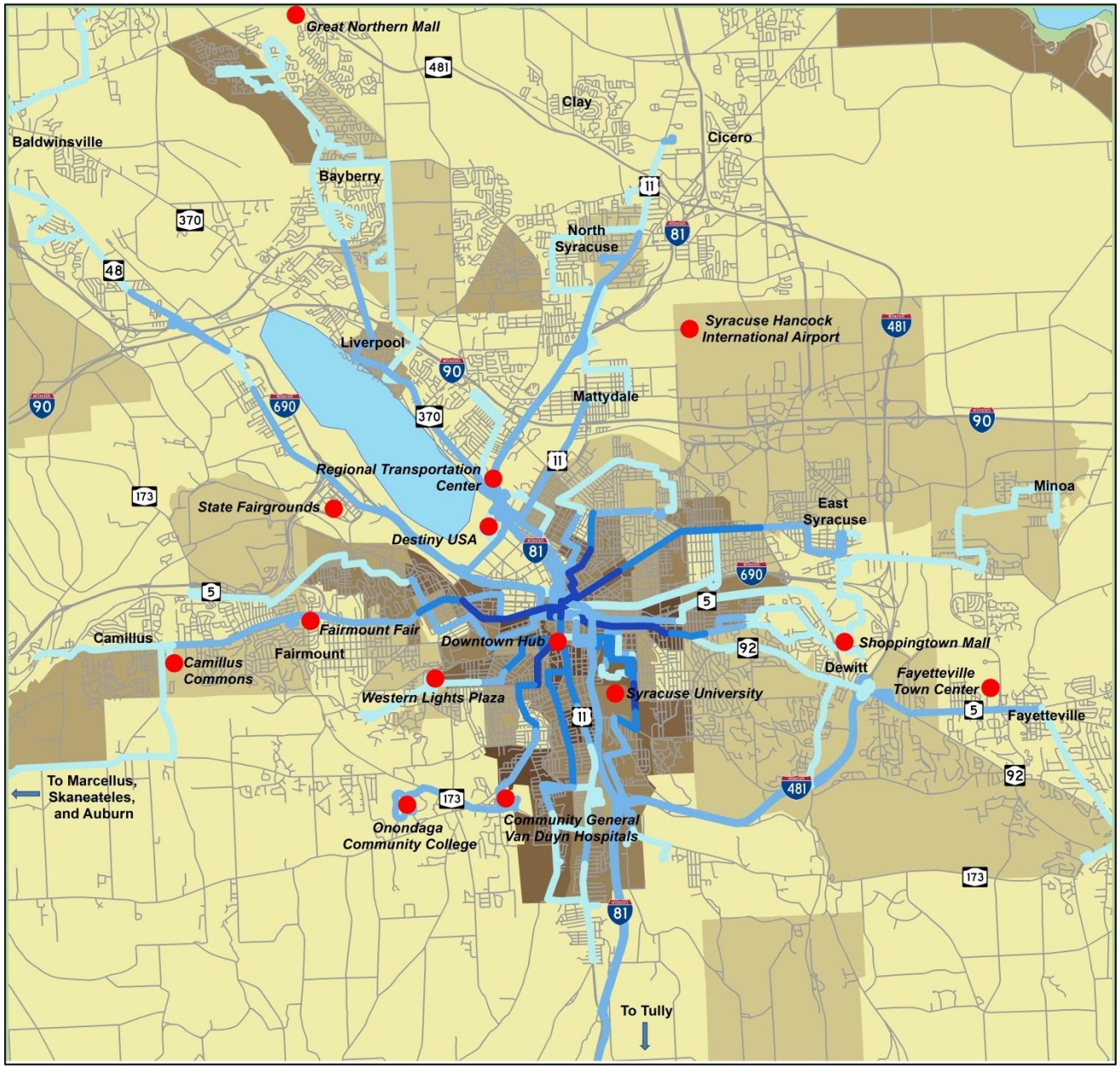


FIGURE 3.8
Percentage of Commuters Utilizing Transit

Legend

Average Number of Riders Per Trip (% of Seats Occupied*)

- 1 - 9 (1% - 24%)
- 10 - 19 (25% - 49%)
- 20 - 29 (50% - 74%)
- 30 - 39 (75% - 100%)
- 40 - 50 (Standing Room Only)

Transit Modal Split

- 0 - 1%
- 1% - 2.5%
- 2.5% - 5%
- 5% - 10%
- 10% - 15%
- > 15%

- Roads
- Community Destinations

Data Source:

Census 2010

Results of multiple boarding and alighting surveys conducted in April 2010 on selected routes. Routes were selected to provide a representative snapshot of the existing transit system. Data was not collected for all CENTRO routes.

0 1.5 3 Miles

- Onondaga Street: Western Lights Plaza to Downtown
- CR 57: Bayberry/Liverpool to Downtown
- Butternut Street/Grant Avenue: Shop City to Downtown

3.1.2.6 Household Income

Low-income residents typically require transit to commute to work and get to appointments, and it is critical that they have access to adequate transit services. This is especially true in the Syracuse metropolitan area where low-income residents, including students and the elderly, make up the majority of the ridership base.

By definition, a low-income family (household) is one with an average annual income of less than 150% of the poverty line. Given the 2012 poverty line of $23,040 per year for a family of four, a low-income household would have a family that has a total annual income of $34,560 or less. **FIGURE 3.9** shows tracts that are considered low-income. The majority of tracts within the City of Syracuse fall within the threshold. In addition, the Onondaga Nation territory and a tract just south of Baldwinsville, fall under the low-income threshold. Based on the distribution of low-income households, the following corridors were identified:

- US 11/I-81 (including Midland Ave): Onondaga Nation Territory to I-90
- University Hill/Syracuse University (including Euclid Ave, Comstock Ave, and Skytop)
- Genesee Street (NY 5/NY 92): Solvay to Seeley Road
- Butternut Street/Grant Avenue
- James Street: Eastwood to Downtown
- Onondaga Street: Western Lights Plaza to Downtown
- South Ave/Valley Drive: Southern City boundary to Downtown
- I-690/State Fair Boulevard: Baldwinsville to Downtown

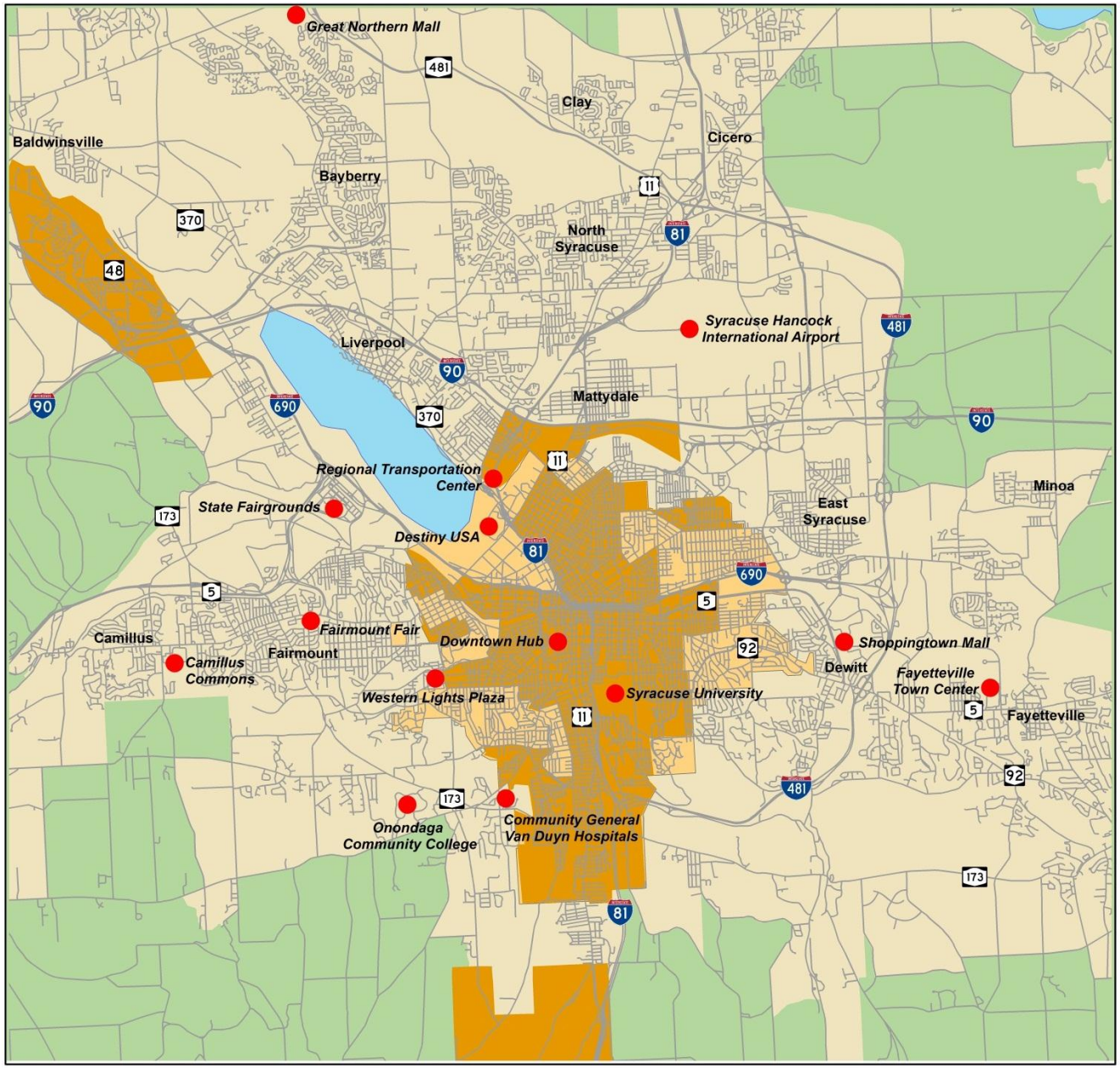


FIGURE 3.9
Low-Income Census Tracts

Legend
- Low Income Tracts
- Urban Area
- City of Syracuse
- Roads
- Community Destinations

Data Source:

Census 2010

0 1.5 3 Miles

3.1.3 Master Plans, Regional Plans, Planned Development Areas

Following the identification of transit-supportive corridors utilizing demographic and existing conditions data, previous studies, development plans, long-range plans, and master plans were reviewed to identify planned improvements or development trends that may affect potential transit enhancement corridors. Specific information regarding roadway or rail projects, proposed moderate-to-high-density developments, redevelopment zones, and existing or proposed transit-oriented developments was utilized to modify corridors as necessary. Four studies, which had a significant impact on the selection of the enhancement corridors, are summarized below.

3.1.3.1 Regional Mobility Action Plan (1999)

The most recent regional transit system plan developed for CENTRO was the Regional Mobility Action Plan (ReMAP), conducted in 1999 by MultiSystems. The FTA-funded study included an extensive analysis of route performance and cost effectiveness, identified service needs, and developed short-term and long-term recommendations. Major recommendations from the ReMAP report included providing different types of services in the urban, suburban, and rural areas, supporting transit through land use decisions, and converting the existing hub and spoke system to a multi-hub system supported by local circulator bus routes.

Based on the preliminary analysis of the transit system and the feedback from riders and non-riders, it would appear that the recommended multi-hub system is not appropriate for the transit environment in the Syracuse metropolitan area. The primary premise behind a multi-hub system is that riders would utilize local circulator routes to travel to a hub where they then would board a trunk line to get to their destination (which may also require transfer at a third hub). Based on the public feedback, travel time and ease of use is a significant factor in the decision to utilize transit. While a multi-hub system may work in larger metropolitan areas, Syracuse is referred to as the 20-minute city and overall commute times are relatively low when compared to other metropolitan areas. The transit travel time associated with a multi-hub system would not be competitive with vehicle travel times.

In addition to transit travel time, the number of transfers can have a significant impact on ridership. A study conducted by the Transportation Association of Canada (1982) determined that the number of transfers and the quality of each transfer reduces ridership. The study found that transfers requiring less than 5 minutes of wait time corresponded to a 15 to 20% reduction in demand, while transfers requiring 5 to 10 minutes corresponded to a 25 to 30% reduction in demand. Given the existing travel patterns, congestion, and public opinions of the transit system in the Syracuse metropolitan area, it is our opinion that a multi-hub system is not appropriate for the transit system.

3.1.3.2 University Hill Park-and-Ride Feasibility Study (Final Report, February 2010)

University Hill contains many of the region's main employers, including major educational and healthcare institutions. Commissioned by SMTC, the *University Hill Park-and-Ride Feasibility Study* recognized the significant development potential of University Hill and recommended the development of an integrated parking strategy. This parking strategy would include shared parking, wrapped parking, remote parking and centralized parking management. By having a remote parking facility available to University Hill institutions, existing surface parking lots on the Hill could be redeveloped and congestion on the University Hill roadway network would be reduced. The remote location would promote environmentally friendly modes of transportation to get to University Hill institutions including

carpooling, walking, and transit. Using a shuttle system to transport University Hill employees from remote parking locations, such as suburban park-and-ride facilities, to University Hill could be used as an alternative to ride alone commutes.

The study made short-term and long-term recommendations. Short-term recommendations could be implemented within a year and can be done with minimal capital costs. These suggestions include direct transit service from the Fayetteville/DeWitt Park-and-Ride, modifications to existing CENTRO service at the Liverpool Park-and-Ride, direct service from the Camillus Park-and-Ride, and the establishment of a park-and-ride at NBT Bank Stadium with direct transit service to University Hill. Long-term recommendations include the construction of a park-and-ride facility within walking distance of the Hill. The Kennedy Square Site, at the intersection of East Water Street and South Crouse Avenue, is a 12-minute walk from the center of University Hill, is currently served by CENTRO, is located two blocks from the Connective Corridor and could support a retail wrapped, 5-floor parking structure, capable of accommodating a total of 2,600 parking spaces.

3.1.3.3 Syracuse Comprehensive Plan 2025 and 2040 (January 2005 and January 2013)

The City of Syracuse prepared the *Syracuse Comprehensive Plan 2025* in 2005 to manage future growth and development through policies intended to improve public health, safety, and general welfare. The plan emphasizes that it should be treated as a guide for the future, not a strict plan to follow. It includes measures to improve neighborhoods within the city by encouraging pedestrian-friendly features, retaining temporary residents, such as students, into long-term members of the community, and encouraging mixed-use developments in downtown residential areas.

In order to more-effectively address plans for different areas of the city, five strategic areas of the city were identified and can be seen in **FIGURE 3.10**. The plan calls for improved parking facility locations with improved public transportation in the Downtown Area. The Lakefront Strategic Area, along the shores of Onondaga Lake, has grown as a destination for retail and entertainment. A premier tourism resort is envisioned for the lakefront in the future. University Hill is the center of education and health care in the City of Syracuse. A continuous pedestrian network connecting the higher education institutions with medical complexes and civic spaces has been proposed for this region of the City. Due to the topography and mostly vacant land surrounding the Interchange Strategic Area, it has been suggested that this region could host light industrial manufacturing and/or a business/research park. Currently, the Erie Boulevard Strategic Area (east of State Street) is occupied by large, vacant buildings and parcels which once served as a heavy industrial corridor. In the future, this region could be transformed into a commercial corridor with restaurants and retail opportunities while better connecting East Syracuse neighborhoods with Downtown and University Hill.

The City has recently updated the Comprehensive Plan (*City of Syracuse Comprehensive Plan 2040*). The revised plan addresses many of the same overall goals and objectives as the 2025 plan. However, it refocuses future planning efforts to emphasize the unique character of individual neighborhoods within the City, and recommends right-sizing development and infrastructure to fit within existing communities. The plan also contains several recommendations for improving open space, planning for complete streets, and implementing improvements to bicycle and pedestrian infrastructure.

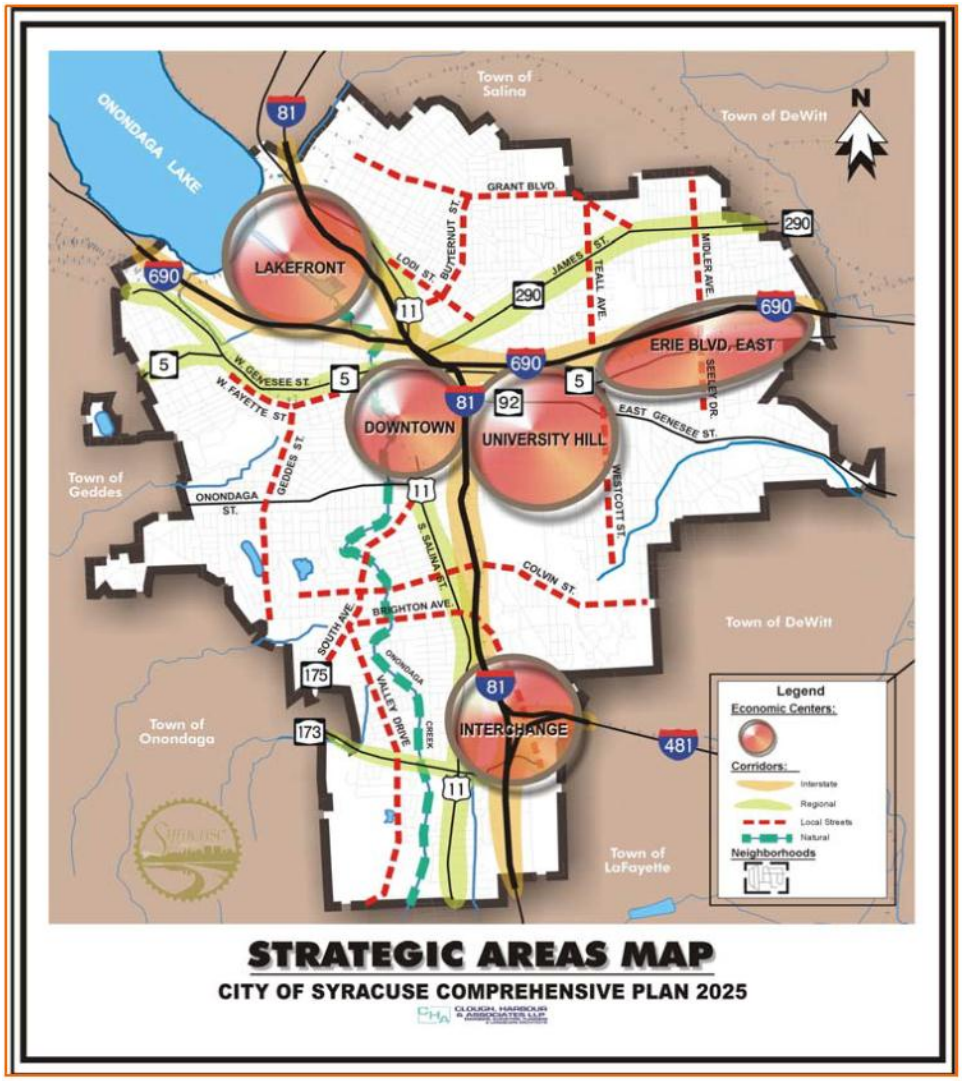


FIGURE 3.10: Syracuse Comprehensive Plan Strategic Areas

3.1.3.4 Downtown Syracuse Transportation Demand Management Study (2011)

A Downtown Syracuse transportation demand management (TDM) study was conducted under the direction of the Syracuse Metropolitan Transportation Council (SMTC), in coordination with UrbanTrans North America and IBI Group in 2011. The purpose of this study was to develop TDM strategies and programs for the City of Syracuse to encourage greater use of sustainable modes of transportation and trip decision making. TDM programs are implemented by non-profit transportation management associations (TMAs). While a TMA was not found to be feasible for Syracuse, due to a lack of resources and a champion, the study recommended a less formal transportation stakeholders' organization (TSO). The TSO would be capable of implementing some TDM strategies and lay the foundation for a TMA.

Through multiple surveys and meetings with employers, employees and stakeholders within the Downtown Syracuse study area (see **FIGURE 3.11**), it was clear that future parking demand and the use of more sustainable modes of transportation were the greatest concerns. Therefore, the study recommended a TSO that could accomplish goals such as coordinating with NYSDOT on the use of its carpool matching website; develop online clearinghouse for transportation information; create a

guaranteed ride home program; identify and promote carshare opportunities; advocate for transportation systems improvements; coordinate with Syracuse University and other major employers interested in TDM programs; and, develop a bike parking system. The study also identified potential trigger points for when the TSO should consider transitioning to a TMA. These trigger points include parking shortages, pressure from employers and developers, major transportation system changes, and the identification of a champion. This study also reviewed successful TMAs in cities similar to Syracuse and used that information to suggest potential TDM programs that would increase transit use, reduce ride-alone vehicle commutes, and reduce parking demand.

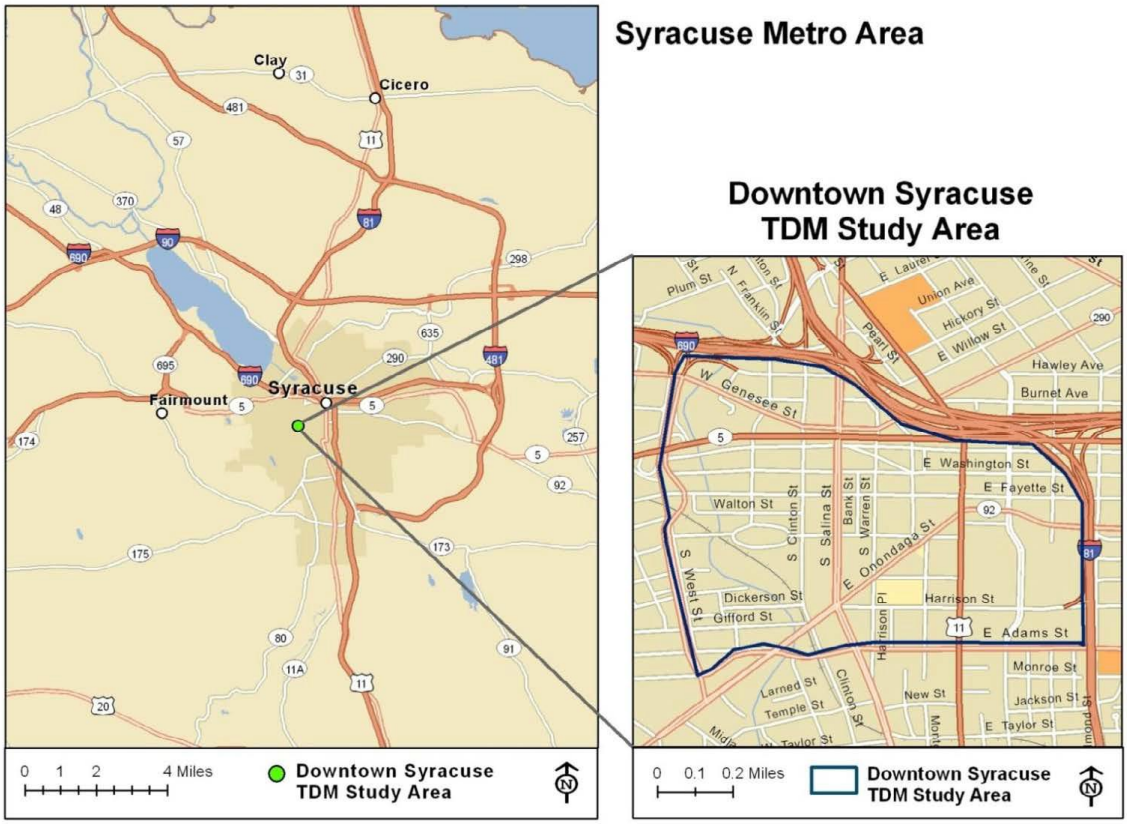


FIGURE 3.11: Downtown Syracuse TDM Area (2011)

3.1.3.5 Summary of Findings

Based on the studies that were reviewed for the STSA (see **Section 1.3.1.3**), including the four described above, it was determined that the selected corridors and transit enhancements should meet the following principles:

- Provide one-seat rides from suburban residential areas to University Hill.
- Reduce parking demand in Downtown and on University Hill.
- Provide transit services to the redevelopment areas.
- Support alternative modes of transportation, such as bicycling and carshare.

3.2 Final Corridor Selection

The final step of the selection process was to compare the findings of the existing conditions, demographic analysis, and analysis of previous studies and plans, to the guiding principles discussed in **Section 2.5.2**, in order to select the transit enhancement corridors that will be forwarded to the evaluation process.

Based on the assessments and recommendations above, the following transit enhancement corridors have been selected, and are shown in **FIGURE 3.12**:

- East Syracuse – OCC via South Avenue and James Street
- University Hill – Destiny and RTC via Solar Street
- North Syracuse/Cicero – South Salina via US 11/I-81
- Northside – Western Lights via Butternut Street/Grant Avenue and Onondaga Street
- Camillus – Fayetteville via Genesee Street/Erie Boulevard (NY 5 and NY 92)
- Great Northern Mall – Downtown/University Hill via Liverpool (CR 57)

It should be noted that these suggested corridors are not intended to be the final alignment of any transit enhancement project. These corridors will serve only as a guide to evaluate the transit enhancement alternatives. The final alignment of any new or relocated transit route will have to be addressed in a separate alternatives analysis.

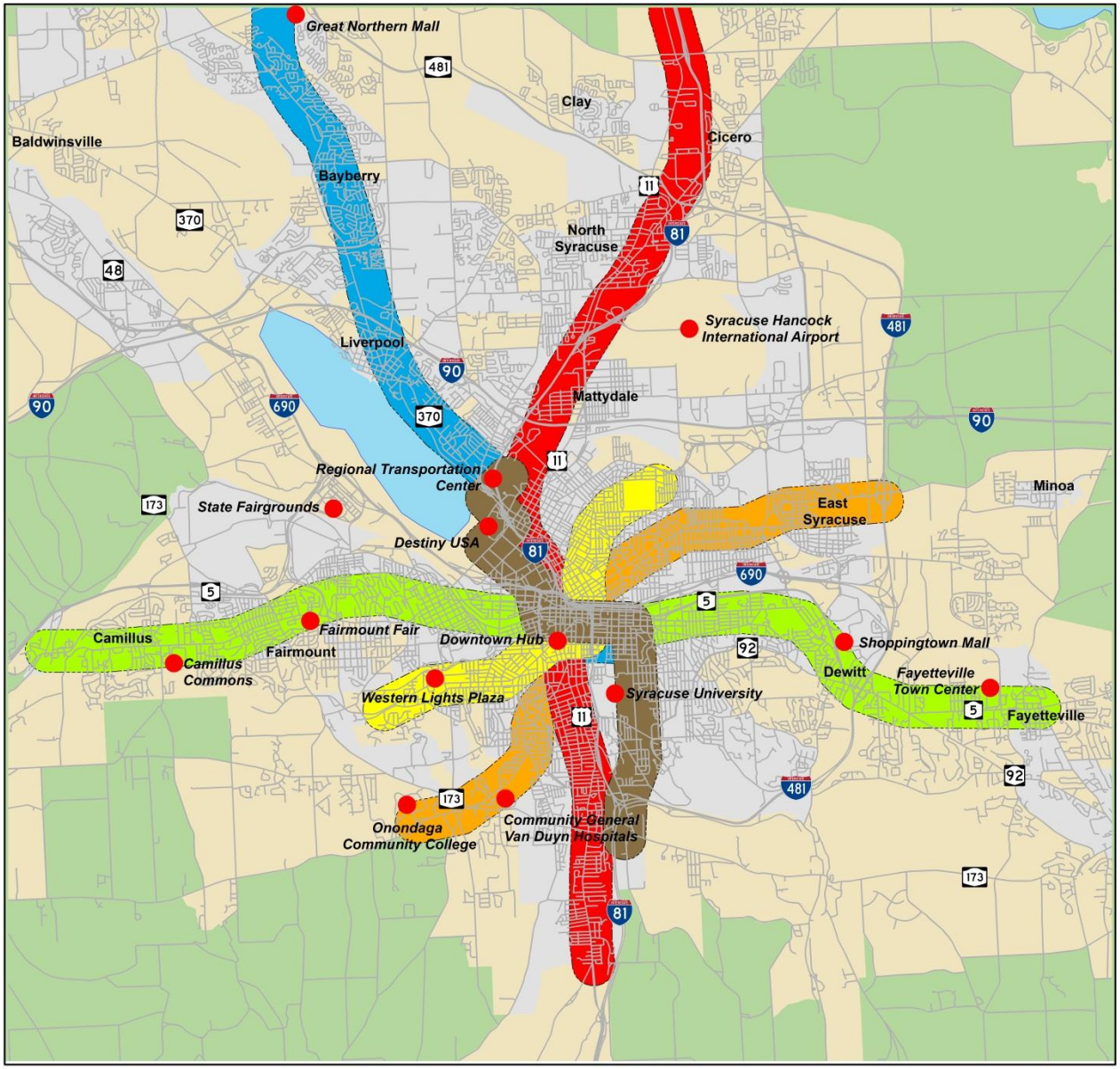


FIGURE 3.12
Selected Transit Improvement Corridors

Legend

- University Hill - RTC
- Northside - Western Lights
- Camillus - Fayetteville
- North Syracuse - South Salina
- East Syracuse - OCC
- Great Norther Mall - Downtown
- Transit Supportive Areas*
- Urban Area
- Roads
- Community Destinations

*Transit Supportive Areas are TAZs or census tracts with the following demographics:
Pop and Employ Density > 4,500 JPPM
Avg HH Income < $34,560
%HH 0 or 1 Veh > 50%
Transit Mode Share > 5%

Data Source:

SMTC Travel Demand Model Version 3.023

0 1.5 3 Miles

CHAPTER 4 – Transit Enhancement Strategies

This section documents the process used to develop transit enhancement strategies that could be implemented on the transit enhancement corridors. Each strategy offers a different level of improvements for the transit system, from the Base Build (low investment) to high-intensity (fixed-guideway) enhancements. The development of the strategies is based on the Existing Conditions assessment, demographic assessment, public feedback, and input from CENTRO and SMTC. Service objectives are established for each of the strategies, and features that would meet the system needs and vision are proposed. Transit-supportive land use, zoning, parking, and transportation policies are not included with the individual strategies because they would be beneficial to all strategies. Therefore, these items will be discussed in **Section 6.0**.

The purpose of the enhancement strategies is to provide general alignments and features that can be used for the analysis of the application of various levels of transit. Therefore, the routes, stops, and hubs shown as part of each of the enhancement strategies are for analysis purposes and represent a general alignment only, and do not indicate final alignments. A detailed alternatives analysis would be required to outline the exact routes, stop locations, and hubs before implementation.

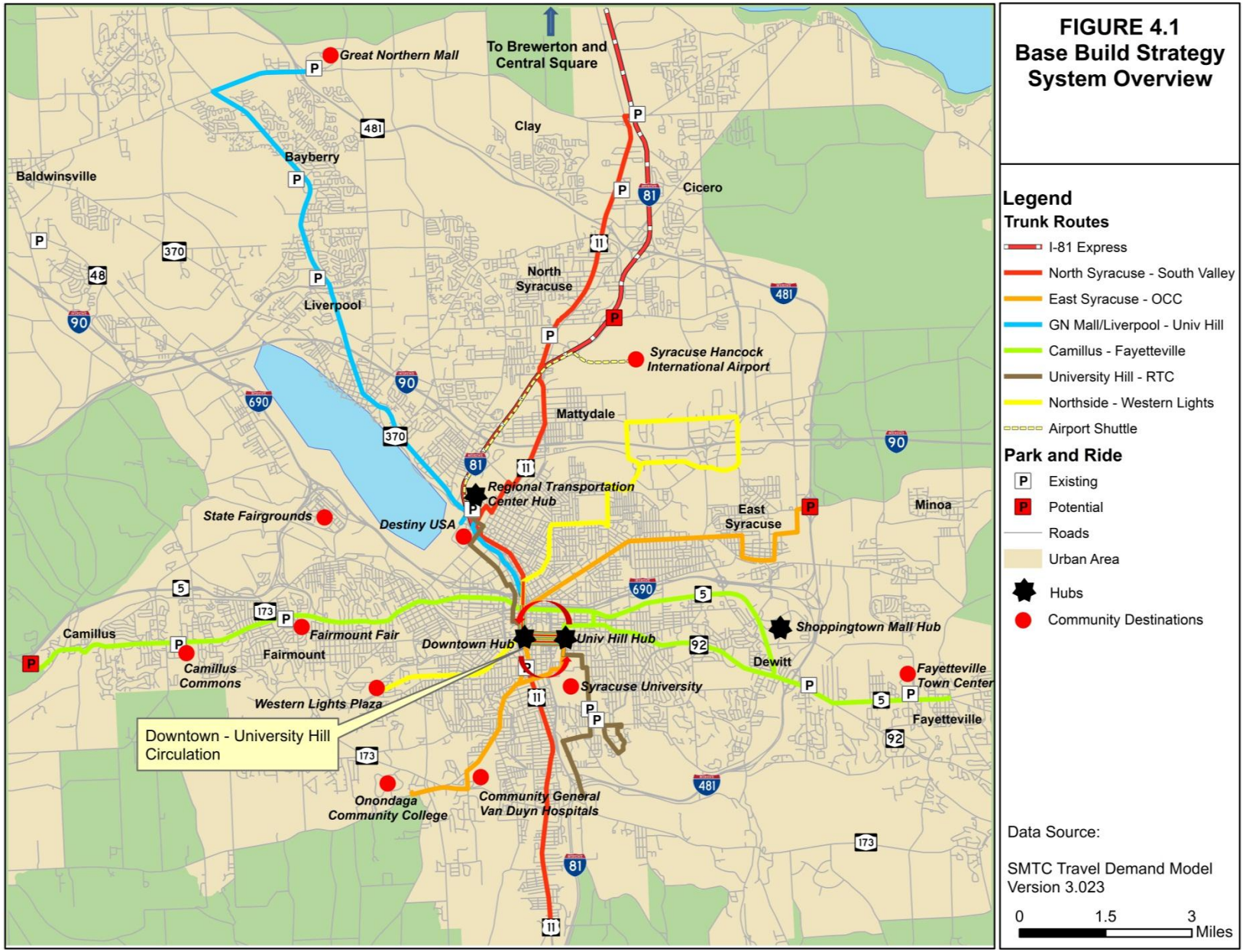
4.1 Strategy 1: Base Build

The purpose of the Base Build strategy is to identify enhancements that would maximize the level of service on a core group of trunk routes to enhance efficiency (consolidate routes) and optimize high-use corridors. It is considered a Base Build strategy because it would provide an improved base system that would be expanded upon in each of the subsequent strategies. The Base Build strategy alone does not entail the construction of a major transit facility, such as a rail line or other dedicated transit facility, but includes investment in additional/upgraded buses, upgraded transfer facilities, short-distance bus lanes or queue jumpers, and transit signal priority that would enhance system performance.

4.1.1 Base Build Strategy Overview

The Base Build strategy consists of system-wide enhancements that restructure existing resources to improve the usability of the system, reduce transit travel times, decrease headways, and provide greater flexibility for users. **FIGURE 4.1** provides an overview of the enhancements associated with this strategy. The strategy centers on the establishment of trunk routes along the transit enhancement corridors. The trunk routes would consolidate parallel routes and deviations to form continuous corridors that would allow CENTRO to provide more-frequent bus service. In addition, the consolidated route structure would reduce the number of individually numbered routes and permit easy to understand corridor-branding schemes.

In addition to the trunk route structure, the Base Build strategy also provides guidance for new bus stop signs, shelters, and park-and-ride facilities. The guidance is focused on reducing transit travel time, providing more information for riders, and enhancing the transit infrastructure to make the system more attractive to new users. New hubs are also introduced to facilitate transfers between trunk routes and numbered routes outside of the Downtown Syracuse Transit Hub.


To Brewerton and Central Square
Great Northern Mall
Clay
Bayberry
Baldwinsville
Cicero
North Syracuse
Liverpool
Syracuse Hancock International Airport
Mattydale
Regional Transportation Center Hub
State Fairgrounds
Destiny USA
East Syracuse
Minoa
Camillus
Fairmount Fair
Fairmount
Camillus Commons
Downtown Hub
Univ Hill Hub
Shoppingtown Mall Hub
Dewitt
Fayetteville Town Center
Fayetteville
Western Lights Plaza
Syracuse University
Downtown - University Hill Circulation
Onondaga Community College
Community General Van Duyn Hospitals
FIGURE 4.1
Base Build Strategy System Overview
Legend
Trunk Routes
I-81 Express
North Syracuse - South Valley
East Syracuse - OCC
GN Mall/Liverpool - Univ Hill
Camillus - Fayetteville
University Hill - RTC
Northside - Western Lights
Airport Shuttle
Park and Ride
Existing
Potential
Roads
Urban Area
Hubs
Community Destinations
Data Source:
SMTC Travel Demand Model Version 3.023
0
1.5
3
Miles

The following are service objectives for the Base Build Strategy:

- Provide direct connections between major origins (residential) and destinations (employment, shopping/retail, cultural, and educational).
- Enhance the usability of the system by increasing rider information and reducing the number of individually numbered routes.
- Reduce transit travel time by 20%.
- Reduce weekday peak-period headways to 15 – 20 minutes, and off-peak headways to 30 minutes.
- Expand operating hours on nights and weekends along the transit enhancement corridors.
- Provide greater system flexibility for commuters by implementing additional peak period express routes.

4.1.2 Revised Route Structure

The primary component of the Base Build strategy is the consolidation of the existing bus system along the transit enhancement corridors to form trunk routes. The proposed trunk routes would combine existing resources by reducing the number of individually numbered routes/deviations along the transit enhancement corridors. Deviations would be folded into trunk routes where possible, particularly in the suburbs where deviations to specific neighborhoods and commercial developments generate low ridership. In addition, the trunk routes would serve the full length of a transit enhancement corridor, whereas the existing system has multiple deviations that stop at various intermediate points along a corridor. The Base Build strategy would revise this policy by having buses that operate continuously along the entire corridor, passing through, but not ending at the Downtown Syracuse Transit Hub.

The proposed consolidated trunk route system could help to reduce travel times by eliminating deviations that take the route off the major roadway to serve specific neighborhoods or developments. It could also reduce the number of transfers some riders need to make in order to travel between major destinations by improving linkages. Furthermore, the reduction in numbered routes would improve the usability of the system by simplifying the route structure.

However, as discussed earlier in the report, multi-seat rides within the study area are unfavorable. Therefore, the trunk route system would not serve as a multi-hub system where local shuttles feed the trunk routes, except in some dense sections of the urban core where a feeder service would be more appropriate, such as University Hill. Instead, any deviations that remain would travel along the trunk route for as long as possible before deviating. Other routes that are not associated with a specific transit enhancement corridor would remain as numbered routes.

For the purposes of evaluation, the following trunk routes were established (**FIGURE 4.1**):

- US 11 (North Syracuse to South Salina): Red Line
- I-81 (Central Square to Downtown/University Hill): Red Express (peak period service to/from I-81 park-and-rides)
- Liverpool/CR 57 (Great Northern Mall/Liverpool to Downtown/University Hill): Blue Line
- Genesee Street/Erie Boulevard (NY 5 and NY 92) (Camillus to Fayetteville): Green Line
- James Street/South Avenue (OCC to East Syracuse): Orange Line
- Butternut Street/Grant Boulevard/Onondaga Street (Northside to Western Lights): Yellow Line
- University Hill/Syracuse University to RTC via Solar Street: Brown Line (Connective Corridor)

TABLE 4.1 presents a summary of the existing bus routes that could be consolidated to form the trunk routes listed above. Based on the strategy shown in the table, it is estimated that the existing 97-numbered route system could be reduced to a 30- to 35-route system. However, it should be noted that the trunk routes shown in **FIGURE 4.1** and summarized in **TABLE 4.1** represent a general operating scheme and not specific details on what roadways should be selected and what existing routes should be dissolved into the trunk routes. If it was determined that the Base Build strategy should advance, a more-detailed analysis would be conducted to select the final route combinations.

TABLE 4.1: Potential Composition of Trunk Routes

Trunk Route	Color	Existing Bus Routes Folded into Trunk Route	Deviations Eliminated	Notes
US 11: North Syracuse to South Salina	Red	Trunk Route (A): 84, 184, 88, 188, 288, 10, 110, 210, 310, 410 Trunk Route Deviation (B): 54, 154, 254	-84/184: Mattydale Florida Road Extension -184: North Syracuse Loop -388/288: Lakeshore Road Peak Hour Extension -88, 188, 288, 388 Wegmans and Wal-Mart Extensions (stay on street).	-510 to Tully would remain as an independent route.

TABLE 4.1 Continued: Potential Composition of Trunk Routes

Trunk Route	Color	Existing Bus Routes Folded into Trunk Route	Deviations Eliminated	Notes
I-81: Central Square to Downtown/Univ Hill (Peak Periods Only)	Red Exp	Trunk Route (A): 388	-	
Liverpool/CR 57: Great Northern Mall to Downtown/Univ Hill	Blue	Trunk Route (A): 46, 146, 246 Trunk Route Deviation (B): 48, 148, 248,	-146: Blackberry Road Loop -248: Wetzel Road/Orion Path Loop -146: Casual Estates and Willow Stream Loops	-Consider terminating 246 at the Great Northern Mall and transfer passengers to the trunk route to continue into Syracuse.
Destiny USA/RTC to Syracuse University via Solar St	Brown	Trunk Route (A): 50, 150, 550, 40, 140, 240		-340 would remain as an independent route. -Potential to combine this route with I-81 Express Route north of RTC.
Genesee Street/Erie Boulevard (NY 5 and NY 92): Camillus to Fayetteville	Green	Trunk Route (A): 36, 136, 68, 168, 62, 162, 262 Trunk Route Deviation (B): 130, 230, 330, 530, 76, 176		-Consider elimination of Manlius extension. -Consider replacing 76/176 with shuttle loop between Shoppingtown Mall and University Hill Hub. -262X and 362X remain as independent routes. -Trunk Route B would operate to/from Univ Hill hub via Euclid Ave and Westcott St.

TABLE 4.1 Continued: Potential Composition of Trunk Routes

Trunk Route	Color	Existing Bus Routes Folded into Trunk Route	Deviations Eliminated	Notes
James Street/South Ave: OCC to East Syracuse	Orange	Trunk Route (A): 26, 126, 226, 326, 28, 128, 23, 20, 123, 323 Trunk Route (B): 21, 121 Trunk Route (C): 22,122	-28/128 Valley Road Link	-120 would remain as an independent route.
Butternut/ Onondaga: Northside to Western Lights	Yellow	Trunk Route (A): 66, 166, 64, 164, 80, 180, 152		

4.1.2.1 Airport Service

Providing transit service to the Syracuse Hancock International Airport was identified as a potential need during the *I-81 Challenge* public meeting in 2012. CENTRO had previously provided airport service, but had to cancel it due to low ridership. Challenges to providing transit service to the airport include the ample, convenient, low-cost parking located directly across from the terminal, and relatively low passenger volume. The lower passenger volumes and varying arrival and departure schedules would also make it difficult to provide a service that is convenient for all airport users. The location of the airport terminal would require too much time off-route for the airport to be a regular stop on one of the trunk routes. Finally, Airport employees work under a variety of shift schedules, making mass transit service expensive and ineffective.

The Base Build strategy incorporates several enhancements to the transit system that could make transit service to the airport more feasible for CENTRO and more attractive for airport patrons and employees. The increase in frequency of buses along the trunk lines would provide more convenient and flexible access to stops close to the airport, such as the RTC and the Airport Plaza park-and-ride. The Base Build system could also support a shuttle service that would connect the airport terminal to the RTC. The RTC would be a convenient location to pick up and discharge airport passengers because of its access to the local and regional transit network, and its proximity to the airport. The average round trip travel time for the shuttle would be approximately 25 minutes. Therefore, the shuttle could easily line up with the 30-minute headways along the trunk lines that would be provided during the midday period, and would not require excessive waiting times during the peak period 15-minute headways.

An alternative to providing a regular shuttle service that is on a constant loop is to provide an on-demand service, which could reduce operating costs by limiting constant looping of a shuttle during times of low passenger activity. In this scenario, the shuttle bus would be staged at the RTC or the airport. Passengers wishing to utilize the service could activate a beacon that sends a message to the

driver that there are passengers waiting for pick-up. An online or call-in service could also be used to alert the driver prior to the passenger's arrival at the airport or RTC bus stops.

4.1.2.2 Stop Spacing

In addition to combining routes, increasing the spacing between bus stops is also recommended as part of the trunk route system associated with the Base Build strategy. While the exact stop locations along trunk routes are not recommended as part of the STSA (these would be discussed in a formal alternatives analysis), it is recommended that the minimum bus stop spacing be increased from 0.10 miles to 0.20 miles in urban areas, 0.25 – 0.5 miles in suburban/low density areas, and greater than one mile for express routes.

4.1.2.3 System Operation

The following operating hours and headways are recommended for the trunk routes:

- Peak Period Headway (6:00 AM – 9:30 AM and 3:00 PM – 7:00 PM): 15 – 20 Minutes
- Weekday Midday Headway (9:30 AM – 3:00 PM): 30 Minutes
- Weekday Evening Headway: 30 – 60 Minutes
- Saturday Headway: 30 Minutes
- Sunday and Holiday Headway: 1 Hour

In addition to providing increased service frequency along the trunk routes, consideration should also be given to establishing peak period express routes along the trunk lines. **FIGURE 4.1** specifically identifies the north section of I-81 as a potential express bus service, but each of the trunk lines could support an express commuter service. Express commuter services should operate during the peak periods (6:30 AM – 9:00 AM) and (3:30 PM – 7:00 PM) with headways of approximately 30 minutes. The express buses, even when on the local roadway network, should utilize a minimum stop spacing of one per mile in order to reduce travel time. Express bus stops should include park-and-rides, major employment centers, and major residential complexes. Longer distances between stops may be appropriate in low-density areas.

4.1.2.4 Corridor Branding

Corridor branding is also a key component to the Base Build strategy. Utilizing a color, neighborhood name, or other naming scheme provides a sense of place for the branded routes, and often leads to unique bus stop and/or streetscape features that can define a community. Furthermore, they enhance the usability of a system by making it easier to understand general alignment and destinations of specific routes. The Connective Corridor route is an example of a branded corridor in the City of Syracuse that is easily identifiable. Other large cities, such as New York and Washington DC utilize corridor branding with colors, allowing users to become familiar with the system quickly.

A color-based system would be easily integrated with the trunk route system associated with the Base Build strategy because it would provide flexibility for deviations. The trunk routes could be designated by a color, while any associated deviation could be represented by a letter, similar to the system utilized

on the New York City subway. Utilizing a color system and letter branding scheme on the trunk routes, and allowing other routes not associated with a trunk route to maintain a route number, would make the branding system more feasible. For example, the Liverpool/CR 57 trunk line (shown in blue on **FIGURE 4.1**), would be designated by a blue circle with a number or letter inside (see **FIGURE 4.2**). A potential deviation of this trunk route would follow the path of route 148 on Morgan Road. This route would be designated with the same blue circle, but with a different letter inside that designates the deviation (**FIGURE 4.2**).

FIGURE 4.2: Sample Branding of a Trunk Route and Deviation

The corridor branding would also be expanded to the bus stops and shelters along the corridor. Bus stop signs would contain the corridor brand, indicating the trunk line as well as any deviations or other routes that may also stop at the location. Bus shelters would also have a colored feature to indicate the trunk line as well as a posted schedule for each of the buses that stop at that location. Distinctive shelter designs could be considered for each trunk line. Additional details regarding bus stop signs and shelters will be discussed in **Section 4.1.3.4**.

The final component to the corridor branding is the on-board displays. A color-based system of corridor branding would make it easier to utilize the same fleet of buses across all routes, rather than having to acquire new buses that are specific to a particular corridor. The buses could display the color circle and major destination all on a single line of display, which could be changed with the touch of a button to indicate another trunk route if needed. However, this would likely require that all bus displays on the front and sides of the buses be upgraded to a full-color digital display.

In addition to new displays, the current policy of indicating the ultimate destination on the displays should be revised. Even buses that are along continuous routes that only pass through the Downtown Syracuse Transit Hub should indicate Downtown/University Hill while traveling inbound, and then change to the final destination on the route only as the bus approaches the Downtown Syracuse Transit Hub. For example, a bus traveling southbound on the US 11/I-81 trunk route (shown in red on **FIGURE 4.1**), would be designated as “Downtown-Univ Hill” even though the bus would then continue south to South Valley. As the bus approaches the Downtown Syracuse Transit Hub, the display would be revised to indicate “South Valley”. This could reduce rider confusion, particularly for those boarding in suburban locations.

4.1.3 Infrastructure Enhancements

The Base Build strategy also provides recommendations for the implementation of transit infrastructure enhancements, such as bus only lanes, queue jumpers, signal priority, corridor branding, bus stops, and bus shelters, among other items. These recommendations should be carried into the higher-intensity transit strategies, where feasible.

4.1.3.1 Transit Priority Enhancements

The Base Build strategy introduces "transit priority enhancements", in order to support the service objectives of the trunk route system, such as reduced transit travel times, and increased headways. The transit priority enhancements could consist of bus-only lanes, queue jumpers, and/or transit signal priority, designed to expedite transit travel through congested areas. Transit signal priority could be implemented along each trunk route within the City of Syracuse and at select congested intersections outside of the City. Bus-only lanes would be applied along selected corridors within the urban, more-congested areas of the City (see **FIGURE 4.3**), while queue jumpers could be considered at intersections in suburban areas that experience high traffic volumes. Further detailed analysis of the treatments would have to be conducted before implementation.

It is critical that the transit priority enhancements be considered early in the implementation process so that they can be incorporated into state, county, and municipal plans. It is unlikely that all of the enhancements could be implemented at one time. Instead, the enhancements would be constructed over time and could be incorporated into state, county, and local roadway projects. Therefore, it is necessary that the agencies are made aware of the enhancements, and agree to fund them, to ensure that roadway projects on those corridors include the identified transit-friendly features.

4.1.3.2 Hubs

The use of hubs is another key component to the Base Build strategy (see **FIGURE 4.1**). The new route structure would be complimented through the establishment of a new transit hub on University Hill, and enhancing the existing hubs at the Regional Transportation Center (RTC) and Shoppingtown Mall. As discussed in previous sections, a multi-hub system with local feeder routes is not recommended for the transit system in the Syracuse metropolitan area. Therefore, the purpose of the recommended hubs is to better facilitate transfers between routes and improve access to major destinations.

A University Hill hub was previously recommended as part of the *University Hill Transportation Study* (2011) to enhance transit access and improve the integration of Downtown and the Hill, the two major activity centers in the region. The Base Build strategy incorporates the proposed University Hill hub, at the intersection of East Adams Street and Irving Avenue/Crouse Avenue, as a primary hub that is directly linked to the Downtown Syracuse Transit Hub. The new hub would result in a revised pattern for buses; all buses originating from areas to the east of I-81 and south of I-690 would stop at the University Hill hub first and then continue to the Downtown Syracuse Transit Hub. Buses originating from the remaining areas of the region would stop at the Downtown Syracuse Transit Hub first, and then continue to the University Hill hub. Not only would this reduce the number of transfers, which could lead to an increase in ridership, it would increase the frequency of buses that connect University Hill to Downtown.

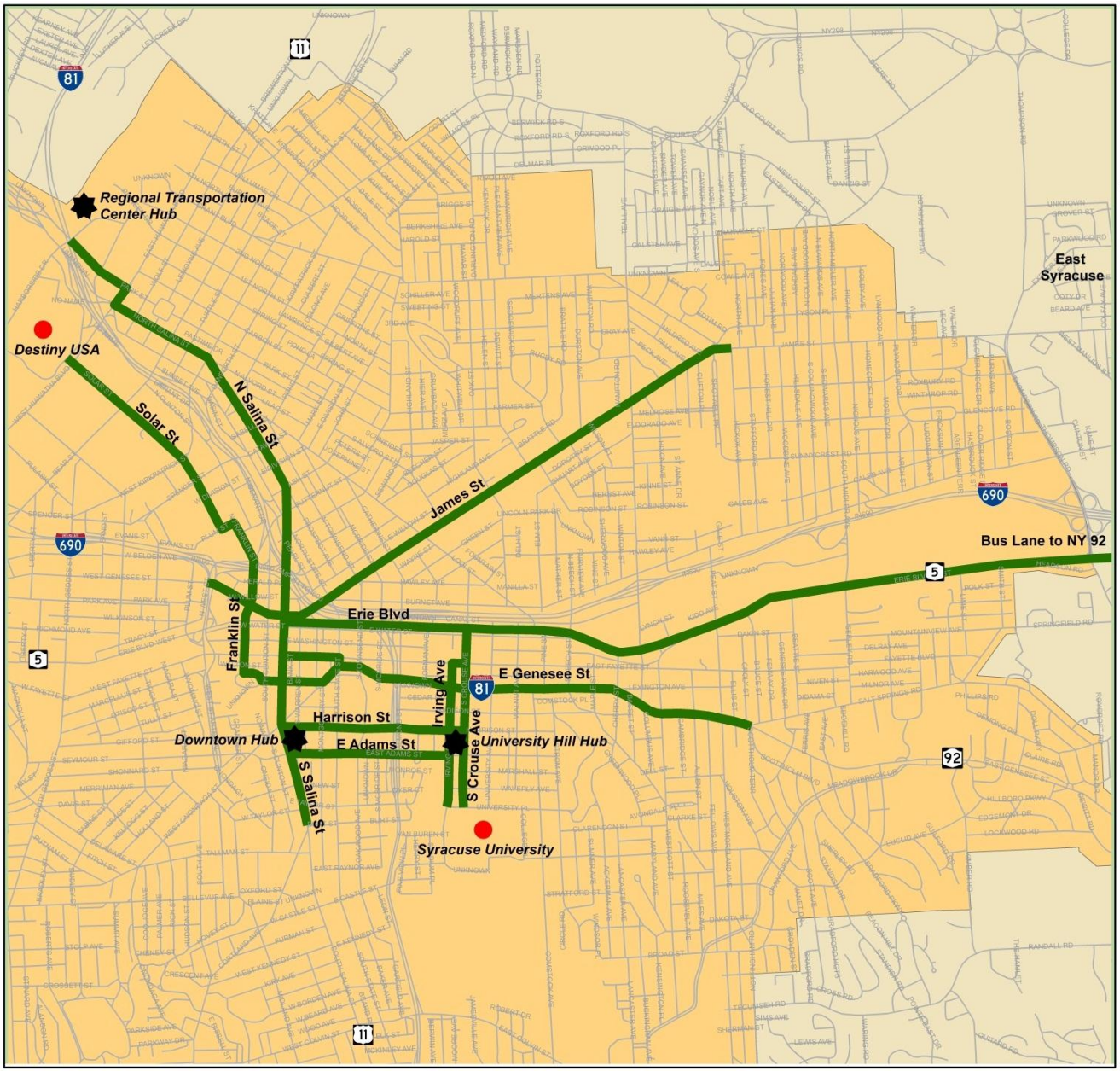


FIGURE 4.3
Base Build Strategy
Bus-Only Lanes

Legend
- Bus Lanes
- Roads
- Urban Area
- City of Syracuse
- Hubs

Data Source:

SMTC

0 0.25 0.5 Miles

The existing pulse system, which is designed to make transfers between routes easier, could still be maintained, by scheduling all buses to arrive at the Downtown Syracuse Transit Hub at the same time, regardless of whether a particular route stops at the University Hill hub first. However, the trunk route system would result in fewer transfers and an increase in frequency, which may reduce the need for the pulse system, especially during peak periods. The trunk route system would also decrease the number of individual routes/deviations, making the two-hub system feasible.

The RTC and Shoppingtown Mall locations are proposed as secondary hubs that are designed to provide enhanced transfer locations outside of the Downtown and University Hill hubs. These secondary hubs would provide transfers between major trunk routes, as well as remaining numbered routes, without requiring that passengers travel to the Downtown Syracuse Transit Hub to transfer buses.

The RTC is an existing hub for Amtrak and regional bus services, such as Greyhound, and is currently served by several local bus routes. Utilizing the RTC as a secondary hub would enhance connections to the regional transportation services, and would eliminate the need for passengers on one northern bus route to travel to the Downtown Syracuse Transit Hub in order to access another northern bus route. All the northern bus routes, with the exception of commuter express buses, would stop at the RTC. This may require the need to evaluate new or improved ramps from I-81 and NY 370 in order to facilitate an efficient connection to those roadways.

Finally, formalizing the Shoppingtown Mall as a transit hub would facilitate better circulation along routes in the eastern portion of the study area. The mall is currently served by nine bus routes, including routes serving East Syracuse, and LeMoyne College. The proposed trunk route system would reduce the number of individual routes serving the mall, but would maintain, and could enhance, the frequency of service. Furthermore, the existing connections to LeMoyne College and East Syracuse would remain, providing a link to other trunk routes.

4.1.3.3 Park-and-Rides

The Base Build strategy utilizes park-and-rides on trunk routes to collect riders from low-density locations and concentrate boarding at one location, and to provide stop locations for express commuter services. Park-and-rides would also facilitate the removal of deviation routes that serve specific low-density subdivisions or communities that generate very little ridership, and could be used to transfer riders from the local bus routes to the regional routes, such as those destined for Oswego, Auburn, and Skaneateles. The Base Build strategy incorporates general guidelines for enhancing existing facilities, and constructing new facilities.

An inventory of the existing park-and-ride facilities is discussed in **Section 2.3.2.3**. Based on the assessment conducted for the facilities, it was noted that many facilities are under capacity due to a variety of potential reasons including inconvenient access, lack of signing, and poor bus service. The park-and-ride system could be enhanced by:

- Improving signing on the local roadway network that clearly informs and directs drivers to the park-and-ride location;
- Planning the location of new park-and-ride facilities to be easily accessible by commuters and express transit vehicles, preferably at freeway interchanges, with spacing (minimum 3 to 5 miles) that maximizes utilization and facilitates express transit services.

- Enhancing the designation of the sections of a parking lot that are designated for the park-and-ride by using features such as way finding on the site, parking signs, and colored pavement markings;

- Increasing the visibility of the park-and-ride facilities from the roadway by placing the bus shelter along the roadway, or adjacent to the roadway within the parking lot, and utilizing a larger bus shelter with larger signs;

- Providing amenities such as heated shelters, newspapers, advanced ticket vending, Wi-Fi, etc.; and,

- Establishing peak period express routes that serve the park-and-ride facilities.

FIGURES 4.4 and **4.5** show an example of a park-and-ride in Seattle, Washington that applies most of these principles on an arterial roadway. The park-and-ride facility is located along a major travel corridor that contains approach signing to the park-and-ride facility, directing commuters to the entrance. In addition, the shelter is located directly on the roadway and a bus pullout is provided, making the transit services highly visible to drivers (**FIGURE 4.4**). Finally, the shelter has a distinctive design and is located on an attractive pedestrian platform, making the service appear more formal and appealing (**FIGURE 4.5**).

FIGURE 4.4: Bus Shelter and Bus Pull-Out Located on the Major Roadway (Source: Bing.com/maps)

FIGURE 4.5: Distinctive Shelter and Pedestrian Platform Visible from the Street (Source: Sound Transit)

New park-and-ride facilities may also be warranted on specific routes to serve as terminals for the trunk routes in suburban locations, or to collect additional potential commuter ridership from adjacent low-density areas along a route. **FIGURE 4.1** shows the location of existing and potential new park-and-ride facilities within the study area that would be associated with the Base Build strategy. It should be noted that the proposed park-and-ride facilities are shown as general locations, and do not identify a specific parcel that could be utilized as a park-and-ride. A more detailed analysis of potential locations within the area of the proposed facilities would have to be conducted prior to implementation. However, each of the proposed locations should follow the principles discussed above.

Express bus services, particularly those that utilize freeways, require additional features to make park-and-ride facilities convenient for both vehicles and buses. Features of park-and-ride facilities with express bus service would include:

- Convenient access for drivers from the freeway and local roadway network;
- Advanced and way finding signs along the freeway and the local roadway network, informing drivers of the lot, and directing them to it;
- Convenient access for transit from the freeway, reducing off-route time; and,
- Amenities such as heated shelters, Wi-Fi, newspaper vending, ticket vending, etc.

Diamond interchanges provide the best access for transit because they allow buses to utilize the ramps to pick-up and drop-off passengers, without having to travel on the local roadway network. **FIGURE 4.6** provides a base model on how the above principles could be applied to a freeway park-and-ride at a diamond interchange. The example utilizes the existing NY 31 Park-and-Ride with recommendations for enhancements that could be applied to any commuter park-and-ride facility at an interchange.

The primary components of the facility are bus pull-outs on the northbound and southbound ramps. They would allow buses to exit the freeway to pick-up or discharge passengers without having to

circulate on the local roadway network. Bus pull-outs on ramps can save up to five minutes in circulation travel time at an interchange, depending on traffic volumes. Each of the pull-outs would have a pedestrian platform as well as a shelter.

In the example shown in **FIGURE 4.6**, the northbound bus pull-out and shelter is located adjacent to the park-and-ride facility. Existing sidewalks under the I-81 overpass would provide a connection to a new sidewalk along the southbound ramp that connects to the bus shelter. Improvements to the existing pedestrian facilities, such as pedestrian-level lighting, way finding to direct pedestrians to the appropriate platforms, and pedestrian countdown signal heads at signalized crossings, could enhance the pedestrian experience. Furthermore, this park-and-ride facility has limited parking capacity. Improvements to the facility would likely include the expansion of the parking lot.

In addition to the basic infrastructure improvements needed to facilitate the freeway commuter park-and-ride facility, **FIGURE 4.6** shows a new access point for the NY 31 Park-and-Ride. In order to address the access issues identified in previous studies, a new entrance could be constructed off the local roadway, providing direct access to the signalized intersection. This type of access enhancement could be made at any existing or potential park-and-ride facility.

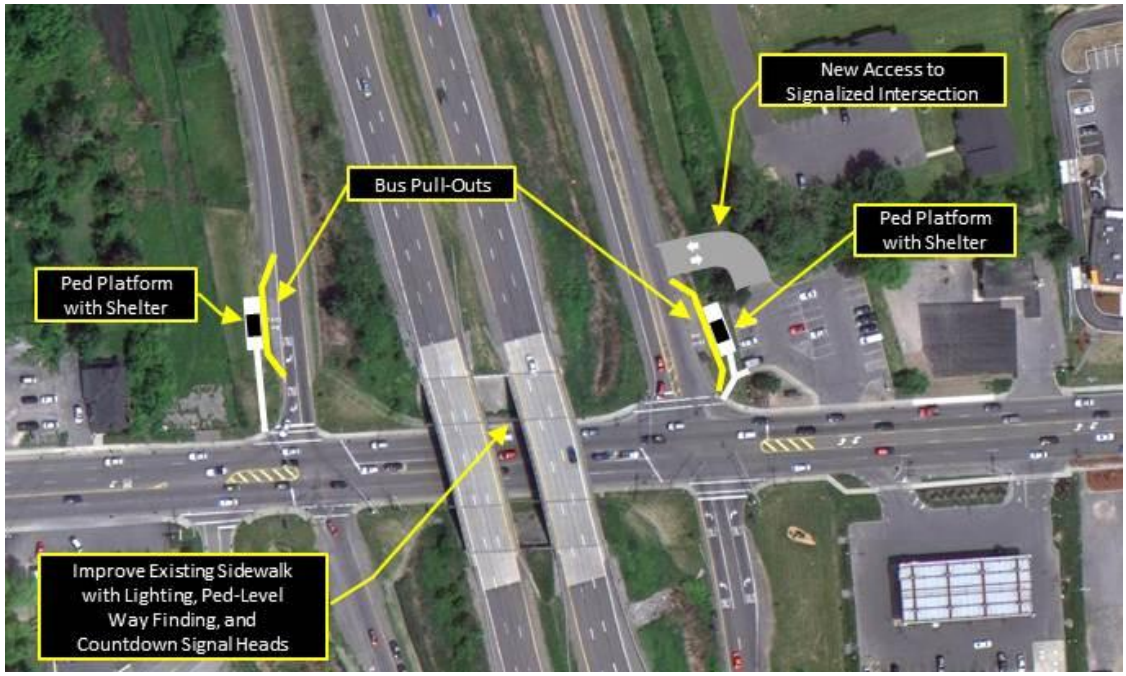


FIGURE 4.6: NY 31 Interchange Park-and-Ride Enhancement Model

4.1.3.4 Transit, Pedestrian, and Bicycle Infrastructure

One of the major issues identified during the field observations, was the difficulty in identifying what buses stop at each bus stop location. The Base Build strategy recommends a new bus stop sign format that could be applied along each bus route, including the trunk routes. The recommended features of the new sign format include:

- CENTRO logo;

- Corridor logos and/or route numbers;
- Direction of travel of the route, including a major destination; and,
- Additional attachments, such as a text-in or call-in number for real-time transit information.

FIGURE 4.7 contains an example bus stop sign that could be applied in Syracuse. The example sign represents a bus stop that is served by three bus routes: a trunk route, a trunk route deviation, and a numbered route. The trunk route and trunk route deviation are shown by the color brand and letter, while the numbered route is indicated by the number only. All of the routes are shown with a direction and major destination. Additional features (not shown), such as route schedules, or a call-in or text-in number for real-time bus arrival information, could be added to the sign utilizing separate panels.

A similar branding system is recommended for bus shelters. Bus shelters that are placed along the trunk lines should be branded with the corridor color, as well as an indication of the routes that stop at the shelter. In addition, shelters should contain posted schedules for each route that stops at that location.

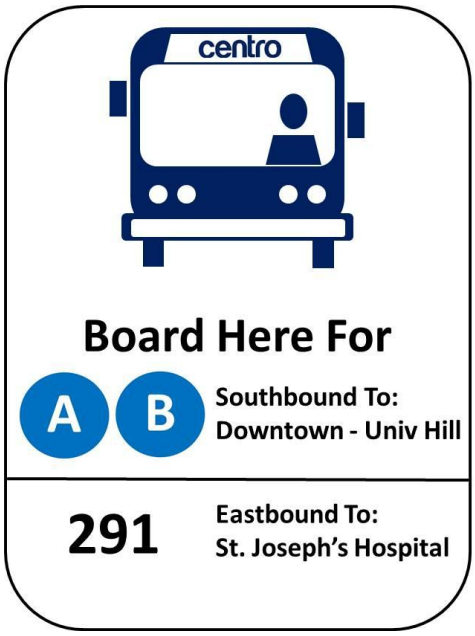


FIGURE 4.7: Example Bus Stop Sign with Corridor Branding

In addition to new bus stop signs and bus shelters, enhancements to pedestrian and bicycle infrastructure are needed in order to support the trunk route system. The trunk routes would no longer support deviations within local residential communities or shopping centers. Therefore, it is critical that the bus stops are connected to residential areas, shopping centers, or other destinations by sidewalks or multi-use paths. Crosswalks would also be required to connect stops on both sides of the streets to subdivisions, shopping centers, or other destinations. Connecting bus stops on the major roadway with the front of stores in shopping centers is a critical component to eliminating deviations. Shopping centers would require clear, demarcated pathways through the parking lot area to the roadway. In addition, while many bus stops in urban areas are located on sidewalks that go right up to the street, bus stops in suburban areas often require users to stand in grassy or muddy areas. Therefore, in addition

to ensuring sidewalk connections to the bus stops, consideration should be given to providing small concrete platforms to provide an area for people to wait for the bus.

In addition to sidewalks, bike lockers and/or racks could be considered at some locations. Bus shelters are good candidates for features such as bike racks or lockers. Shelters are highly visible and require more space than bus stop signs; therefore, there is sometimes room for bike racks or lockers next to shelters. Bike racks or lockers in residential areas could provide encouragement for transit use by providing another level of intermodal connectivity.

4.1.4 Summary of Strategy 1 Enhancements

Strategy 1, Base Build, restructures the existing bus system in order to develop trunk routes. The trunk routes would result in faster travel times, shorter headways, and an easier to understand system. **TABLES 4.2** and **4.3** present a summary of the routes and operating characteristics of the Base Build strategy.

TABLE 4.2: Potential Trunk Routes

Route Name	Route Length (miles)	Route Start	Route End	Major Locations/Areas Served
North Syracuse – South Salina	16.0	NY 31 Park-and-Ride	South Salina	• NY 31 Park-and-Ride • Cicero • Clay • Wegmans Park-and-Ride • North Syracuse • Airport Park-and-Ride • RTC • Destiny USA • Downtown Syracuse Transit Hub • South Salina
I-81 Express	15.0	Central Square/NY 49	University Hill Transit Hub	• NY 49 Park-and-Ride (Proposed) • Brewerton Park-and-Ride • NY 31 Park-and-Ride • Taft Road Park-and-Ride (Proposed) • Downtown Syracuse Transit Hub • University Hill Transit Hub
Great Northern Mall/Liverpool – University Hill	14.5	Great Northern Mall	University Hill Transit Hub	• Great Northern Mall Park-and-Ride • Seneca Mall Park-and-Ride • Liverpool • Destiny USA • RTC • Downtown Syracuse Transit Hub • University Hill Transit Hub

TABLE 4.2 Continued: Potential Trunk Routes

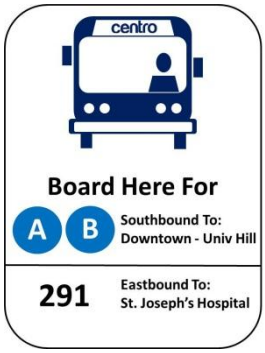
Route Name	Route Length (miles)	Route Start	Route End	Major Locations/Areas Served
Northside – Western Lights	14.5	Western Lights Plaza	Carrier Circle	• Western Lights Plaza • Downtown Syracuse Transit Hub • University Hill Transit Hub • Shop City • Carrier Circle
East Syracuse – OCC	12.5	East Syracuse	OCC	• East Syracuse Park-and-Ride (Proposed) • East Syracuse • Eastwood • James Street • Downtown Syracuse Transit Hub • University Hill Transit Hub • Community General/Van Duyn Hospitals • OCC
Camillus – Fayetteville	19.0	Camillus	Fayetteville	• Camillus Commons Park-and-Ride • Township 5 Park-and-Ride (Future)* • Fairmount Fair Park-and-Ride • Solvay • Downtown Syracuse Transit Hub • University Hill Transit Hub • Erie Boulevard Shopping Centers • LeMoyne College • Shoppingtown Mall • Wegmans Park-and-Ride • Fayetteville Towne Center
University Hill – RTC**	7.0	Nob Hill	RTC	• Nob Hill • Skytop • Syracuse University • University Hill Transit Hub • Downtown Syracuse Transit Hub • Armory Square • Franklin Square • Lakefront Redevelopment Area • Destiny USA • RTC
Airport Shuttle	5.0	Syracuse Airport	RTC	• Syracuse International Airport • Airport Park-and-Ride • RTC

*Potential for an express route that serves the Camillus Commons Park-and-Ride and Township 5 Park-and-Ride before running express to Downtown and University Hill via NY 5/I-690.

** Opportunity to link University Hill-RTC route with I-81 Express route with off-peak service to Destiny USA and the Lakefront.

TABLE 4.3: Base Build Strategy Features

Feature	Description
Vehicle Type	• Existing CENTRO Buses
Travel-Way	• Urban Core: Bus Lanes and Signal Priority • Outside of Urban Core: Queue Jumpers and Signal Priority at Congested Intersections, Bus Pull-Outs

Stop Design	• Color-Based Corridor Branding
	• Improved Pedestrian and Bicycle Connections
	• New Bus Stop Signs:
	  ○ Direction of Travel
	  ○ Designation of Bus Routes
	• Bus Shelters:
	  ○ Corridor Branding
	  ○ Posted Schedules
	  ○ Benches
	  ○ Bicycle Racks
	 

Park-and-Ride	• Enhance Existing Locations
	• New Locations:
	  ○ NY 5 Bypass - Camillus
	  ○ Taft Road – North Syracuse
	  ○ I-481 – East Syracuse
	  ○ NY 49 – Central Square
	• Guidelines:
	  ○ Enhanced Way Finding
	  ○ Adjacent to Freeway Interchanges (where feasible)
	  ○ Efficient Access for Transit
	  ○ Bus Stops on Roadway
	  ○ Highly-Visible Bus Shelters
	  ○ User Amenities (heated shelters, newspaper vending, Wi-Fi, etc.).
	 
	Source: Sound Transit

Station Spacing	• Local Service Minimum: 0.2 Mile • Express Service Minimum: 1.0 Mile
Operating Headways	• 6:00 AM – 9:30 AM and 3:00 PM – 7:00 PM: 20 Minutes • 9:30 AM – 3:00 PM: 30 Minutes • Weekdays after 7:00 PM: 30 – 60 Minutes • Saturday: 30 Minutes • Sunday and Holidays: 1 Hour
Operating Hours	• Monday – Friday: Extend Service to 2:00 AM • Sundays and Holidays: Maintain Existing Operating Hours

4.2 Strategy 2: BRT

Strategy 2 includes expands upon the components of the Base Build Strategy by introducing bus rapid transit (BRT) service on some of the trunk routes. BRT would provide a higher-intensity service along key corridors within the study area, enhancing transit access to major destinations and supporting economic development along the corridors.

BRT systems differ from basic bus service in their facilities, vehicles, and operating structures. BRT facilities can include separate transit-ways, bus-only lanes, queue-jumpers, consolidated stops, corridor branding, and transit signal priority/preemption, among other enhancements. The vehicles are often sleeker than standard buses and can offer amenities such as low-floor boarding and next stop displays inside the passenger area. Other features of BRT systems include:

- Frequent, high-capacity service with wait times of 15 minutes or less during peak periods;
- High-quality vehicles that are easy to board, quiet, and comfortable to ride;
- Off-board fare collection;
- Corridor branding, ample user information, and marketing programs;
- High-quality stops; and,
- Longer spacing between stops.

BRT is considered a lower-cost alternative to rail transit, and can have similar travel time and ridership-generating benefits if supported with transit-ways, bus lanes, and/or signal priority/preemption. BRT systems are also more flexible because route adjustments can be made as needed, and the service can be implemented faster. Additional infrastructure, such as rails, is not needed for BRT systems and bus-only lanes can be applied with simple pavement restriping. Despite not being considered as "permanent" as LRT, BRT projects across the country continue to demonstrate that BRT can spur economic growth in the areas that it serves.

BRT has been gaining popularity in the United States as cities look to implement higher-intensity transit services at a lower cost. BRT systems have been applied in a variety of cities, from larger cities such as Los Angeles, to smaller cities like Eugene, Oregon. They have a proven track record of generating new ridership and supporting economic development. **TABLE 4.4** contains the project cost and economic development impact of BRT in mid-sized cities in the United States. In the majority of locations, implementation of the BRT service resulted in an increase in ridership, as well as return on investment from economic development. The exception, Las Vegas' MAX system, did not experience a significant boost in economic development. This was mostly due to the system route, which passes through established suburban residential communities that had limited redevelopment potential.

TABLE 4.4: BRT Cost vs. Ridership and Economic Development in Mid-Sized US Cities (Source: Florida Department of Transportation, GAO, FTA)

System	City Population (2010)	Length (Miles)	Total Capital Costs (Millions)	Change in Ridership [1]	Economic Development[2]
Syracuse, NY	145,151	-	-	-	?
Livermore, CA: The Rapid	151,253	16.0	$13	20%	$120 Million
Eugene, OR: EmX Phase 1	156,185	4.0	$25	80%	$250 Million
Albany/Schenectady, NY: BusPlus	163,991[3]	17.0	$34	15%	N/A
Cleveland, OH: Euclid Avenue (Healthline)	396,815	7.0	$200	50%	$4.3 Billion
Kansas City, MO: Troost MAX	459,787	13.0	$30	10%	< $100 Million[4]
Las Vegas, NV: MAX	583,756	7.5	$20	40%	$500,000

1. Change in ridership when compared to previous bus service.
2. Existing and planned development.
3. Total population of Albany and Schenectady.
4. Exact development impact is unknown – assumed to be less than $100 million

4.2.1 Potential Application of BRT in Syracuse

4.2.1.1 Policy Guidance

TCRP Report 118, *Bus Rapid Transit Practitioner's Guide*, was sponsored by the FTA to provide guidance to transportation professionals on how to identify and assess costs and impacts of various features that make a BRT system. The report also provides suggested thresholds for considering BRT, as well as guiding principles for planning, design, and operation.

When identifying the potential for a BRT route or system in a metropolitan area, TCRP Report 118 suggests that the following thresholds be considered:

- One or more strong anchors, such as a city center, and a large tributary area. Urbanized area population should exceed 750,000, and CBD employment should be at least 50,000. However, a large university or other outlying major activity center may support a BRT route or system.

- The system or route should be able to support headways of at least 8 to 10 minutes during the peak periods, and not more than 12 to 15 minutes during off-peak periods.

- There should be at least one BRT and local bus per traffic signal cycle where buses operate in a dedicated arterial street transit lane.

The report also recommends that BRT systems focus on at least one major activity center, preferably with limited and/or expensive parking. Most BRT lines will radiate from the city center, but cross-town BRT lines may be appropriate for large urban areas. Finally, ridership potential should be sufficient to support frequent all-day service.

According to the 2010 Census, the Syracuse metropolitan area has a population of approximately 662,577, which is less than the recommended 750,000. However, employment in Downtown Syracuse and in the University Hill area would exceed the recommended employment threshold. The concentrated nature of the CBD would support a spoke and hub BRT system, particularly if supportive parking and land use policies are employed. Furthermore, Syracuse University, LeMoyne College, and Onondaga Community College support large student bodies that often rely on transit services.

In addition to the thresholds for considering BRT in an urban area, TCRP Report 118 also provides guiding principles for BRT planning, design, and development:

- BRT should be developed as a permanently integrated system of facilities, services, and amenities.
- The BRT system should provide the attributes of a rail system to the extent possible.
- Key features of BRT systems should not be eliminated in order to save time or money.
- BRT should be accompanied by transit-friendly policies such as transit oriented-development, adequate parking supply at suburban park-and-ride locations, complementary parking policies and fees in the CBD, and transit-supportive land use and zoning policies.
- BRT should be rapid and operate on separate ROW (transit-way or transit lanes), or on free-flowing streets. Wide station spacing is desirable, except within the CBD. Features such as transit signal priority, queue jumps/bypass lanes, and transit lanes are desirable.
- BRT systems should be capable of phased development. For example, a BRT system could grow from queue jumpers implemented in an initial phase, to transit lanes implemented in a later phase.
- BRT systems should be reasonable in cost to the community, urban travelers, and the transit agency. Investments should be balanced with present and future ridership.
- BRT systems should maximize person flow with the minimum net total person delay.
- Streets and corridors with existing long, heavily-traveled bus routes are good candidates for BRT. BRT will typically involve restructuring existing bus routes.
- System design and operation should enhance the presence, permanence, and identity of a BRT service. BRT must be more than just express service along a bus lane.

- BRT should have a consistent, appealing image that conveys the system as rapid and easy-to-use.

- BRT systems must be customized based on the unique features of an urban area.

4.2.1.2 BRT Systems in Similar Mid-Sized Cities

While BRT has been shown to contribute to economic development in most applications in mid-sized cities, it is critical that the characteristics of these systems be understood before implementing a BRT system in the City of Syracuse. The BRT systems in **TABLE 4.4** vary in length from short circulator services to longer-distance routes that connect major activity centers, and vary in features from median transit-ways to queue jumpers. Evaluating the applications of the various BRT systems will assist in understanding how it might be applied in the Syracuse metropolitan area.

The BusPlus system in the Albany/Schenectady metropolitan area is an example of how BRT was implemented locally and in a similar-sized metropolitan area. The populations of the Syracuse and Albany/Schenectady metropolitan areas are largely the same, and both areas have seen similar trends in population growth over the past 20 years. Furthermore, all three cities have seen an increase in population due to the urbanization of young professionals.

The 17-mile BusPlus system was applied on a corridor that is unique to the Albany/Schenectady area and different from any potential application in the City of Syracuse. Opened in 2011, the system provides higher-intensity transit service along the NY 5 corridor between the CBDs of Albany and Schenectady. It was intended to provide improved connections between the two cities, as well as improving transit services within the suburban communities along the NY 5 corridor. Potential applications of BRT in the Syracuse metropolitan area will likely be different from those in the Albany/Schenectady area as there is not a secondary major activity center in the Syracuse metropolitan outside of the Downtown/University Hill core. Furthermore, the BusPlus route was born out of the *NY 5 Land Use and Transportation Study*, which was intended to address the challenges along the NY 5 corridor between the cities of Albany and Schenectady. Unlike the STSA, which evaluates multiple corridors, the NY 5 study focused on a single corridor. The study evaluated BRT and LRT as potential transit modes to support improved travel along the corridor as well as the future land use plans.

Despite the differences in the environment of the two metropolitan areas, the BusPlus corridor provides a good example of how to apply BRT on a corridor with a variety of uses. The *NY 5 Land Use and Transportation Study* evaluated BRT and LRT for potential application along the NY 5 corridor, and ultimately recommended BRT because of its lower cost and flexibility to meet the varying needs of the corridor. This is a critical point as the potential BRT applications in the Syracuse metropolitan area would likely require a similar level of flexibility. In addition, the BusPlus system utilizes key BRT features such as branded stations and transit vehicles, queue jumpers, transit signal priority, and bus arrival information. The BusPlus system also uses increased stop spacing to minimize travel time along the corridor.

Cleveland, Ohio provides a comparative example of a BRT system in a city that has similar land use patterns and challenges to Syracuse. Like the City of Syracuse, Cleveland has experienced a significant decrease in population since the 1950's until recently, when certain demographics, including young professionals, began to return to the City. Similar to Syracuse, Cleveland has been transformed from an industrial base to a healthcare and educational center.

The Euclid Avenue corridor project in Cleveland is a prime example of the successful application of BRT principles along a blighted corridor. The corridor was once the gateway to, and Main Street of, Cleveland, but the declining population led to significant vacancies along the corridor. The 9.4-mile BRT line, named the "Healthline" after a sponsorship from a local hospital, utilizes a combination of a center-median travel-way and outside bus lanes, with signal priority and formal bus stations with platforms. The system connects two of Cleveland's largest employment centers, the Downtown and University Circle, as well as other community resources.

The Euclid Avenue project has resulted in significant redevelopment along the corridor, including residential, office, and retail/restaurants. As a result, the $200 million BRT project has triggered approximately $4.3 billion of completed and planned development along the corridor.

In addition to the type of services provided, the types of infrastructure and vehicles vary from system to system. The variations in infrastructure and vehicles likely have an impact on the ridership and economic development impacts of each system. For example, Cleveland's Healthline, Eugene's EmX, and Las Vegas' MAX systems saw the greatest increase in ridership of the systems in **TABLE 4.4**. These systems are also the only ones to incorporate dedicated median transit-ways with larger, rail-like stations and level boarding platforms. The systems also utilize off-board fare collection to reduce dwell times at stations. In addition, these systems also applied larger, articulated, low-floor vehicles that resemble modern LRT vehicles and have larger passenger circulation areas and increased passenger capacities. The enhanced infrastructure and vehicles improve rider experience, reduces travel time, and makes the system feel more permanent and rail-like. These factors likely improve the perception of the system among developers and the public.

Conversely, the Rapid system in Livermore, CA only utilizes queue jumpers and signal priority with a typical bus stop design, and a more-standard bus vehicle. Despite the system's 15-minute headways, the impact on ridership was less than the systems that utilized higher-quality infrastructure improvements. Kansas City's MAX system also had limited benefits to overall ridership and economic development. This system utilizes higher quality, visible shelters (**FIGURE 4.8**), but applies bus lanes only on small sections of some routes, and has not experienced the same level of policy support as the other systems.

FIGURE 4.8: Kansas City MAX Bus Station (Source: netdensity.net)

4.2.1.3 STSA Guidance

The implementation of BRT in Syracuse requires the consideration of a variety of factors during the planning process. The examination of BRT systems in mid-sized cities revealed that factors such as travel-way, stations, vehicles, and transit-supportive land-use and parking policies can affect potential ridership and economic development. Higher quality features result in higher ridership and more economic development. However, these features require more ROW and investment.

In addition to vehicles, service type, and infrastructure, BRT systems typically require a higher-density of population and jobs than basic bus services. The majority of the routes discussed above serve higher-density areas. Based on the data presented in **TABLE 3.1**, the minimum recommended population and employment density for BRT service is 6,500 jobs and persons per square mile. Therefore, it was necessary to determine those TAZs that would be considered BRT-supportive (**FIGURE 4.9**).

Based on population and employment density data, fewer TAZs could support BRT service than basic bus service. This decrease in supportive TAZs is particularly evident in suburban areas, with the majority of the BRT-supportive TAZs located within the City of Syracuse. However, despite the lower densities in the suburban areas, the higher density areas within the City could provide a base to extend BRT into suburban areas along the transit enhancement corridors. BRT service in the lower-density suburbs would be characterized by longer stop spacing and the use of park-and-rides to concentrate passenger boarding and alighting.

It should also be noted that **FIGURE 4.9** does not show BRT supportive TAZs in the South Campus/Skytop area of the City, even though these areas have a significant student population and highly utilized bus routes. This exclusion is likely because TAZ data is largely based on census data, which does not account for temporary student residents. The South Campus/Skytop area is considered BRT-supportive in the STSA.

In order to provide the optimal environment for generating ridership and supporting economic growth, the BRT system should meet the following service objectives, which are based on operating characteristics of similar systems:

- Provide direct connections between major origins (residential) and destinations (employment, shopping/retail, cultural, and educational).
- Provide higher-intensity transit services to redevelopment areas identified in the Syracuse 2025 Master Plan.
- Enhance transit services for commuters by establishing frequent peak hour transit service with travel times that are more comparable to private vehicles.
- Utilize longer station spacing to limit the number of stops.
- Coordinate with local municipalities to develop transit-supportive land use and parking policies (see **Section 6.0**).
- Employ high-quality infrastructure improvements such as bus lanes, transit-ways, signal priority, larger, branded bus stops, and larger, modern vehicles.
- Reduce transit travel time by 30% along the BRT routes.
- Reduce weekday peak-period headways to 10 minutes, and off-peak headways to 15 - 20 minutes.
- Minimum hours of operation (after-hours transit services would be provided by basic bus):
    - Monday – Friday: 6:00 AM and 10:00 PM
    - Saturday: 9:00 AM and 10:00 PM
    - Sundays and Holidays: 10:00 AM and 8:00 PM

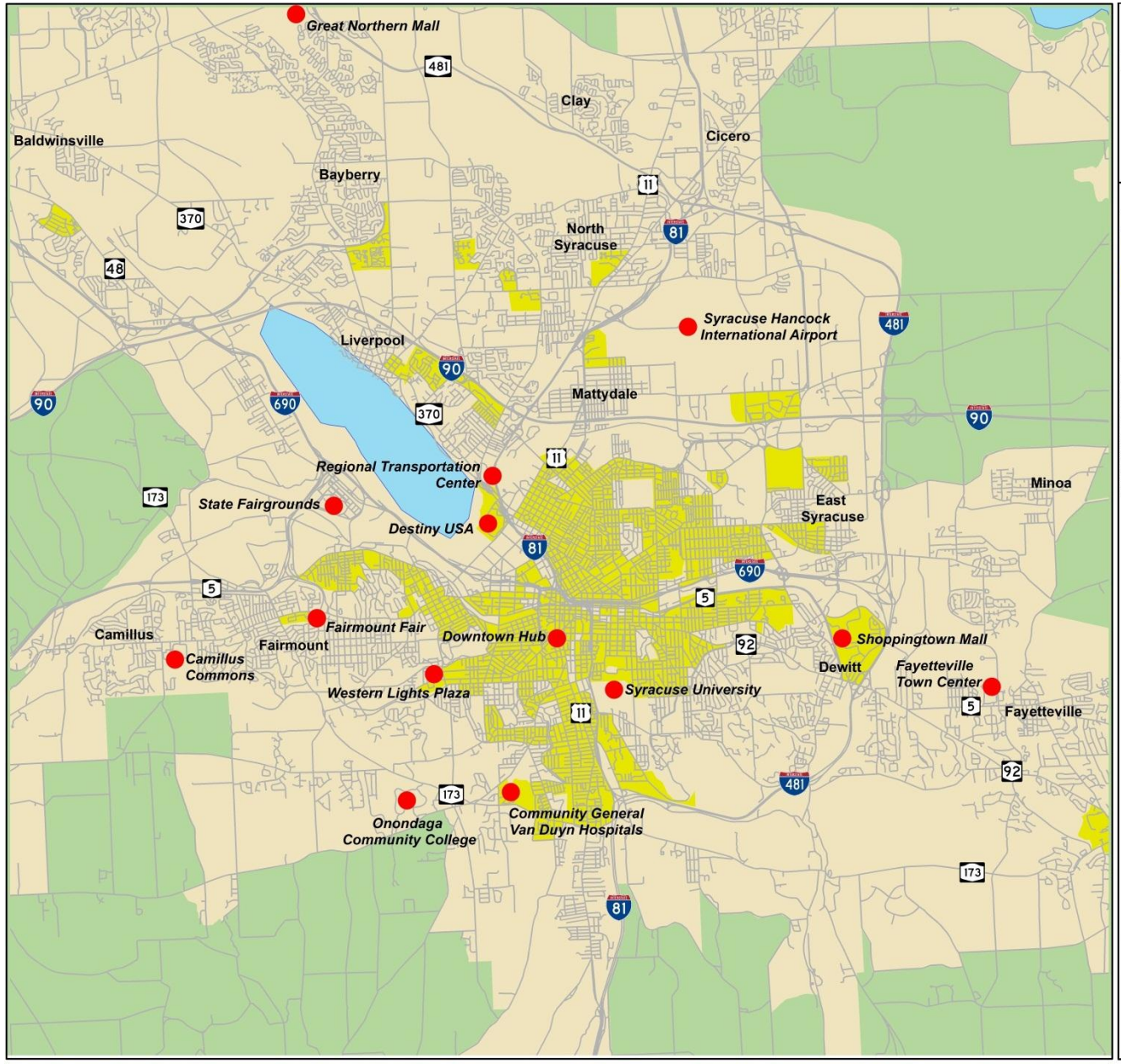


FIGURE 4.9
BRT-Supportive TAZs

Legend

- Urban Area
- BRT Supportive TAZ
- Roads
- Community Destinations

*JPPM (Jobs and Persons Per Square Mile) is the summaztion of the population density and employment density for each TAZ. A density greater than or equal to 6,500 JPPM was assumed to be the minimum threshold for BRT based on the literature review.

Data Source:

SMTC Travel Demand Model Version 3.023

0 1.5 3 Miles

4.2.2 Potential BRT Routes

The potential BRT routes identified in Strategy 2 are based on population and employment density, the location of major destinations and redevelopment areas, and existing and projected needs (**FIGURE 4.10**). In general, the proposed BRT follow the alignment of the trunk routes, but have some minor adjustments to enhance links between BRT-supportive regions of the study area, and to provide better connections to major destinations. All of the BRT routes, with the exception of the US 11 BRT, pass through the Downtown Syracuse Transit Hub and proposed University Hill hub, providing one-seat access for both hubs. In addition, the majority of the potential BRT routes utilize the local roadway network, rather than the freeway network, in order to provide access to a wider variety of destinations, support higher mid-day frequencies, and meet the needs of the transit-dependent communities within the study area. Routing the BRT service on local arterials would also provide the opportunity for economic development.

Additional route information is provided below. However, it should be noted that the routes suggested in this section were developed for analysis purposes and represent general alignments not final routes. Final routes would be selected in a future alternatives analysis.

US 11 Local/I-81 Express (FIGURE 4.11A)

The US 11 BRT route would follow the general alignment of the US 11 trunk route identified in the Base Build strategy, and would provide a north-south corridor through the study area. The proposed 13-mile BRT route would operate between the South Salina section of the City to the south, and the Wegmans Park-and-Ride facility in Cicero, to the north. This alignment would provide a higher-intensity connection along a corridor that has some of the highest urban and suburban ridership. It would connect higher-density, transit-dependent areas in the southern section of the City, with the Downtown Syracuse Transit Hub, Destiny USA, the RTC, destinations along the Salina Street corridor, and the suburban retail/service employment areas along the US 11 corridor. It would also provide the base ridership to support a higher-intensity commuter service between the northern sections of the study area, including North Syracuse, Cicero, Clay, and Downtown.

The BRT corridor also has an I-81 express option similar to the express option presented in the Base Build. It would serve existing and proposed park-and-rides at interchange locations along the northern section of I-81. It should be noted that the I-81 express option would stop at the Downtown Syracuse Transit Hub as well as the proposed University Hill hub.

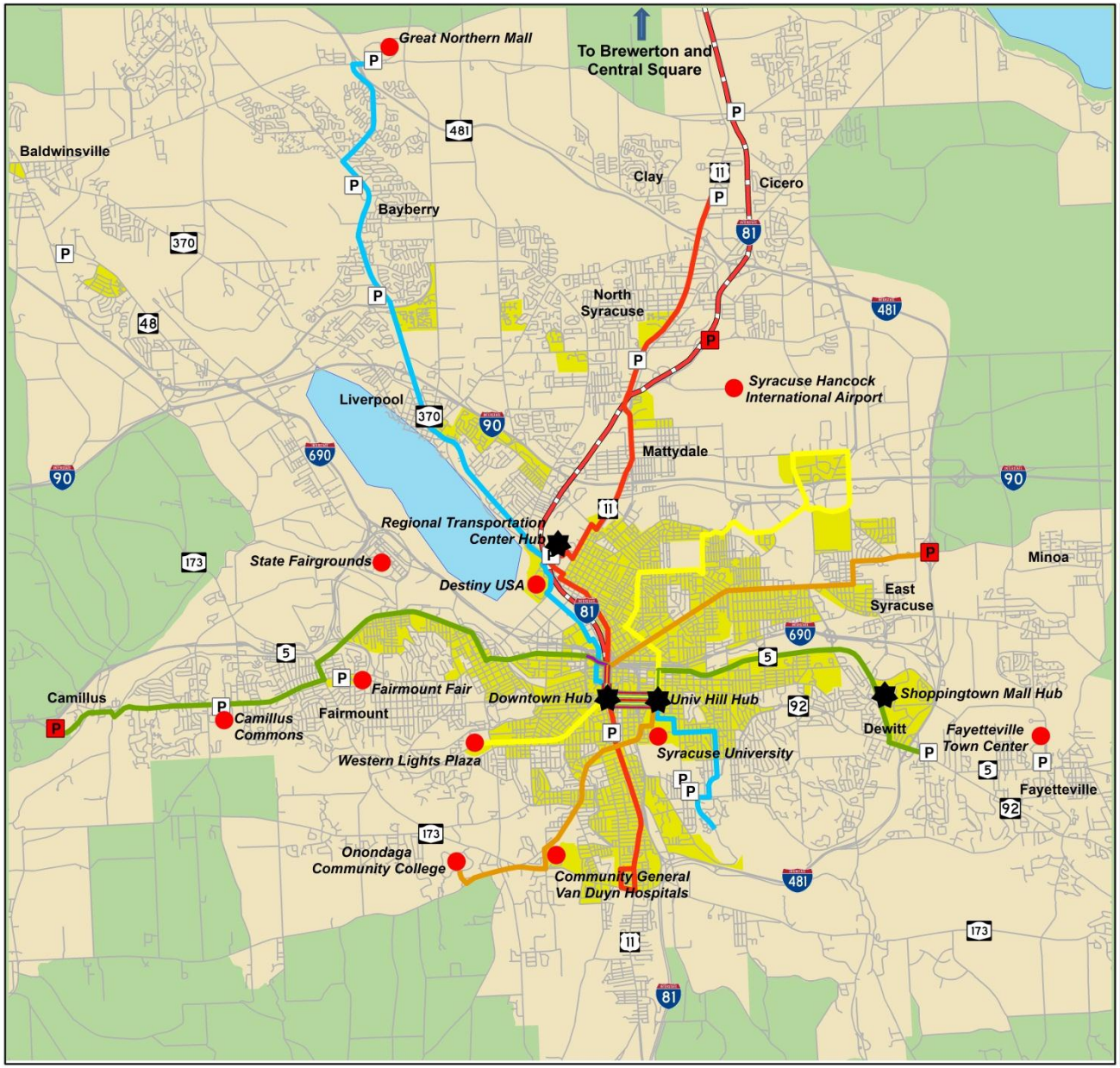


FIGURE 4.10
Potential BRT Corridors

Legend

BRT Corridors
- Camillus - Dewitt
- Cicero/Clay - South Salina
- East Syracuse - OCC
- Great Norther Mall - Skytop
- I-81 Express
- Western Lights - Carrier Circle

Park and Ride
- P Existing
- P Potential
- BRT Supportive TAZ
- Urban Area
- Roads
- Community Destinations

Data Source:

SMTC Travel Demand Model Version 3.023

0 1.5 3 Miles

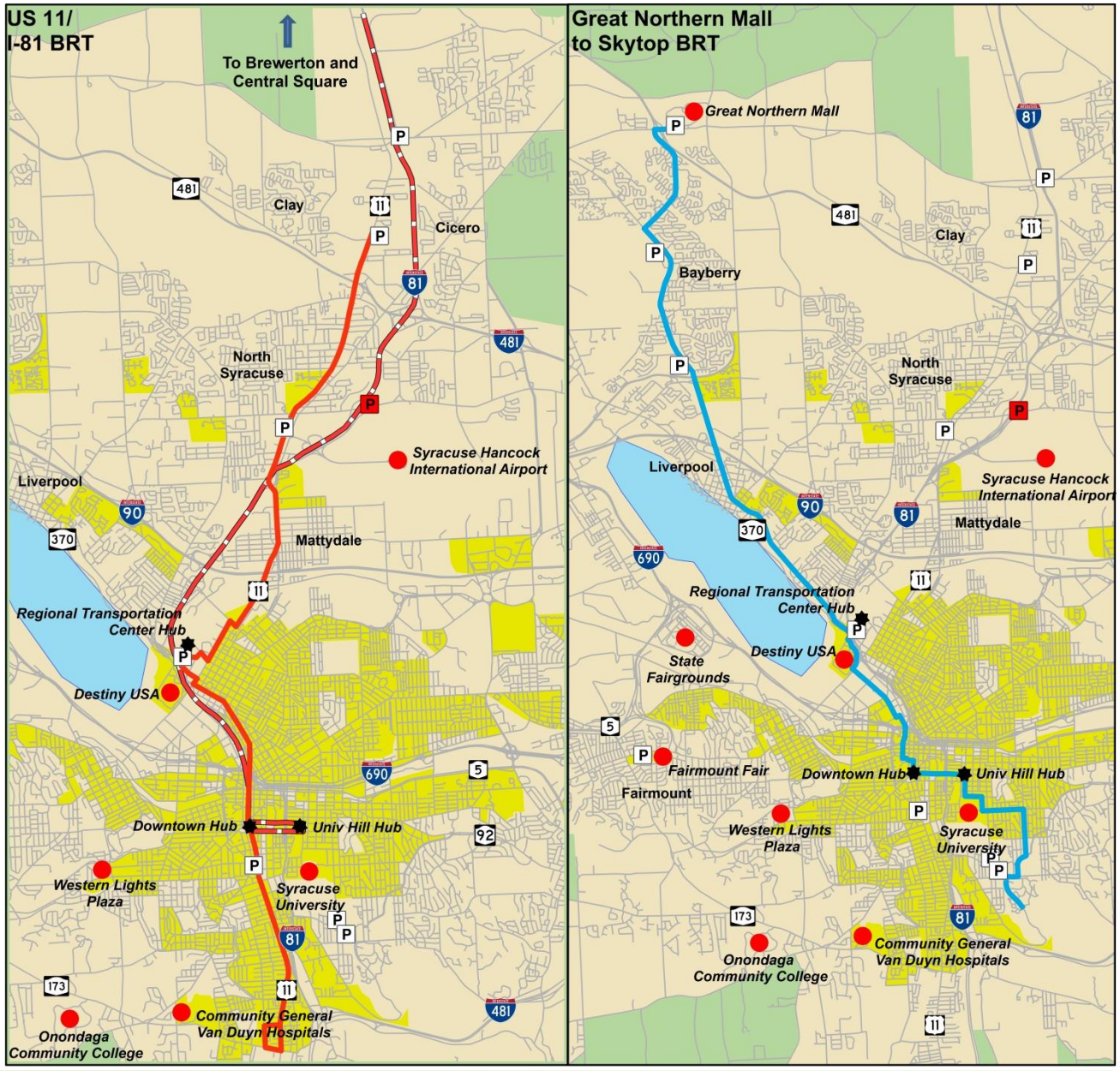


FIGURE 4.11A
Potential BRT Corridors

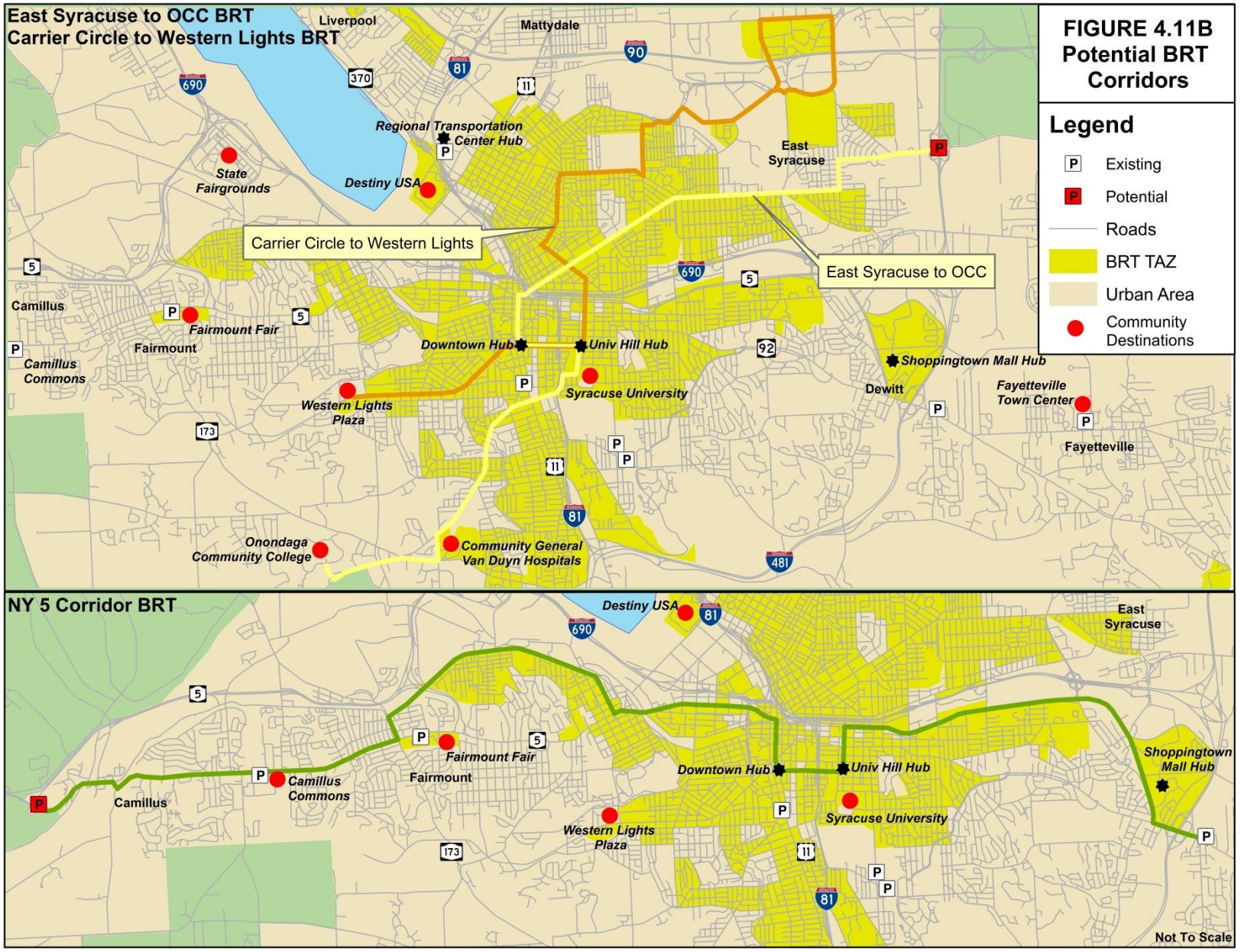
Legend

- P Existing
- P Potential
- Roads
- BRT TAZ
- Urban Area
- Community Destinations

Data Source:

SMTC Travel Demand Model
Version 3.023

Not To Scale


East Syracuse to OCC BRT
Carrier Circle to Western Lights BRT
Liverpool
Mattydale
Regional Transportation Center Hub
State Fairgrounds
Destiny USA
Carrier Circle to Western Lights
East Syracuse to OCC
East Syracuse
Camillus
Fairmount Fair
Fairmount
Camillus Commons
Downtown Hub
Univ Hill Hub
Syracuse University
Western Lights Plaza
Shoppingtown Mall Hub
Dewitt
Fayetteville Town Center
Fayetteville
Onondaga Community College
Community General Van Duyn Hospitals
NY 5 Corridor BRT
Destiny USA
East Syracuse
Camillus
Camillus Commons
Fairmount Fair
Fairmount
Downtown Hub
Univ Hill Hub
Shoppingtown Mall Hub
Syracuse University
Western Lights Plaza
Not To Scale
FIGURE 4.11B
Potential BRT Corridors
Legend
Existing
Potential
Roads
BRT TAZ
Urban Area
Community Destinations

Syracuse University/Liverpool (FIGURE 4.11A)

The 17.5-mile Syracuse University/Liverpool route would combine two trunk routes that were identified in the Base Build strategy. The purpose of combining these routes was to eliminate redundancy between the Downtown Syracuse Transit Hub and Destiny USA/RTC, and to provide a base for a suburban BRT service to the north and west of Liverpool. According to the mapping, the areas along CR 57 are lower-density and do not meet the BRT density threshold. However, the Liverpool/CR 57 corridor is a major commuter route connecting suburban residential areas with Downtown and University Hill. Therefore, the higher-density components of the Syracuse University/Solar Street trunk route could be combined with the Liverpool/CR 57 trunk route to provide a BRT route that connects major destinations such as Syracuse University, University Hill, Downtown, Armory Square, Franklin Square, Destiny USA, the RTC, and downtown Liverpool, as well as connecting commuters to Downtown and University Hill. This route would also support the Lakefront and University Hill redevelopment areas.

Unlike the US 11 BRT route, the Syracuse University/Liverpool route would utilize multiple corridors. The route would run between the Great Northern Mall Park-and-Ride, to the north, and Skytop to the south. It would primarily utilize CR 57 and Old Liverpool Road on the northern leg of the route. South of Destiny USA, the route would utilize Solar Street and Franklin Street to pass through the Lakefront, Franklin Square, and Armory Square areas of the City. The route is also the only proposed BRT route that would access Syracuse University's campus directly via University Place and College Place. From the University, the route would then utilize Euclid Avenue and Westcott Street to serve higher-density, transit-dependent residential areas that are mostly populated by students.

Given that this route passes through a substantial area of low-density residential north of Liverpool, consideration could be given to establishing the service in phases. Phase 1 of the implementation could provide BRT service between Skytop and Liverpool. The extension of the BRT service to the Great Northern Mall could be provided in Phase 2, if warranted.

East Syracuse to Onondaga Community College (FIGURE 4.11B)

The East Syracuse to Onondaga Community College (OCC) route combines two of the heaviest-utilized transit corridors in the region, James Street and South Avenue. It was identified in Strategy 2 as a potential BRT route because it would provide higher-intensity transit services along existing routes with high demand. The route would also provide a single connection between major medical facilities within the City including St. Joseph's Hospital (via connection), University Hospital, Crouse Hospital, Syracuse VA Medical Center, Community General Hospital, and Van Duyn Hospital, and would provide a direct route between Syracuse University and Onondaga Community College.

The 12-mile route follows the general path of the East Syracuse to OCC trunk route shown in the Base Build strategy, but contains a slight deviation that utilizes Irving Avenue and Castle Street to connect to the University Hill medical facilities and Syracuse University with Community General and OCC. The eastern terminus of the proposed route would be located at a new park-and-ride facility that would be constructed at the I-481/Kirkville Road interchange in East Syracuse. This facility would collect commuters from lower density residential areas to the north, south, and east. The western terminus should be OCC.

Similar to the Syracuse University/Liverpool BRT route, the East Syracuse to OCC route would not utilize a single corridor; rather, it would use a variety of roadways to connect all the major components above.

The route would primarily utilize James Street to Salina Street on the east leg of the corridor, providing connections to the Downtown Syracuse Transit Hub. It would then follow E Adams Street (Harrison Street for westbound buses) to the University Hill hub, and then use Irving Avenue and Castle Street to connect to South Avenue. Transfers to the US 11 BRT corridor would be available at the intersection of E Castle Street and S Salina Street.

Western Lights to Carrier Circle (FIGURE 4.11B)

The 12-mile Western Lights to Carrier Circle Route would provide a BRT connection through high-density sections of the City, including the Westside and Northside. The route would combine the heavily utilized Western Lights and Butternut Street/Grand Avenue corridors into one continuous BRT route that would include major destinations such as the Downtown Syracuse Transit Hub, University Hill Hub, and Shop City. The higher-density areas that the route would pass through also provide a base ridership that could support an extension to the Carrier Circle area. Providing higher-intensity transit services to the Carrier Circle would serve existing employment and could support proposed redevelopment within the Carrier Circle area.

The route would run between Western Lights Plaza, to the west, and Carrier Circle to the northeast. It would primarily utilize Onondaga Street between the Plaza and the Downtown Syracuse Transit Hub. It would then connect to the University Hill hub utilizing E Adams Street (Harrison Street for westbound buses) before turning north along Crouse Avenue to Lodi Street. The BRT route would then cross the East Syracuse to OCC BRT route at James Street. This intersection could serve as a minor hub between the two BRT routes. Finally, the route would utilize Butternut Street to Grant Avenue to Teall Avenue before continuing to the Carrier Circle area.

Genesee Street/Erie Boulevard (NY 5) Camillus to Fayetteville (FIGURE 4.11B)

The Genesee Street/Erie Boulevard (NY 5) route would provide a 17-mile, east-west corridor through the City, connecting suburban communities such as Camillus, Fairmount, Solvay, Dewitt, and Fayetteville with Downtown and University Hill. This route follows a similar path to the NY 5/NY 92 trunk route shown in the Base Build strategy. However, a slight deviation is provided to the north of the Genesee Street corridor through Solvay, utilizing Erie Boulevard and Milton Avenue to serve more BRT-supportive tracts. The western end of the route would terminate at a potential new park-and-ride facility at the NY 5 interchange in Camillus, while the eastern end of the route would terminate at the existing Wegmans Park-and-Ride in Fayetteville. Both park-and-ride locations would collect commuters from low-density residential areas outside of the BRT corridor.

In addition to connecting the suburban areas to the urban core, a BRT route along Genesee Street and Erie Boulevard would provide a higher-intensity connection from the City to retail sites such as Camillus Commons, Fairmount Fair, Erie Boulevard commercial area, and Shoppingtown Mall. It would also support the proposed redevelopment of the Erie Boulevard East section of the City, one of the five redevelopment areas specified in the Syracuse master plan.

Similar to the Great Northern Mall route, the Genesee Street/Erie Boulevard corridor route passes through a substantial area of lower-density suburban residential west of Fairmount Fair. Therefore, consideration could be given to establishing the BRT service between Fayetteville and Fairmount before extending the service to Camillus.

4.2.3 BRT Stops

Stop Location

A critical component to any BRT system is the location and spacing of BRT stops. BRT stops can come in many different configurations including median platforms and curbside platforms at near-side, far-side, or mid-block locations. Curbside stops are the most common type of stops for bus transit. They are the easiest to implement because they typically utilize space that is already available, and impacts on the roadway during construction of a bus stop are typically minimal. Curbside stops are also more flexible than median stops because they can accommodate standard buses, as well as BRT vehicles. However, curbside stops would require one stop on each side of the roadway, to serve both directions of a bus route, and could require the removal of on-street parking along the length of the platform. Curbside stops may also lead to conflicts between buses, bicycles, and right-turning vehicles.

Median stops are located in the center of the roadway, and are typically implemented on BRT systems that have median bus lanes. Median stops increase the visibility and presence of the transit services along a typical corridor, and make the BRT system feel more rail-like. In addition, one median platform can serve both directions, and the stops do not require the removal of parking, or result in the blockage of building frontage, which can be a concern of business owners. However, median bus stops require a wide area to accommodate the platform and median bus lanes, and therefore, are typically greater in cost. They require unique signal systems with transit signal heads and additional transit-only phases to avoid conflicts with left-turning vehicles. Median stops would also require transit vehicles with left-side doors (median stops would not be serviceable by standard buses), and pedestrians would have to cross the street to access the bus stop.

In addition to determining if stops should be in the median or curbside, the location of the stop, in relation to the intersection, must be determined. Near-side stops are useful where a bus must make a right-turn after a stop, or where there is limited property available for a far-side stop. They can also be used as a queue jumper if transit signal priority is employed because a bus stopped at the station can trigger the signal priority while waiting. However, near-side stops do not perform as well at congested intersections where there are bus routes without bus lanes. A bus approaching a congested intersection may experience several delays including, stopping in congested traffic in approach to the intersection, stopping at the near-side bus stop, and then having to wait for an additional cycle before proceeding through the intersection. In addition, near-side bus stops can result in conflicts with right-turning vehicles. They are also considered to be less pedestrian-friendly because they encourage passengers to cross in front of the bus.

Far-side stops offer significant travel time benefits, particularly along corridors with bus lanes and transit signal priority. They avoid the conflicts with right-turning vehicles, and encourage pedestrians to cross behind the bus. Signal delay would be reduced for approaching buses because a bus could pass through the intersection on green before stopping to pick up or discharge passengers, and buses could use gaps in traffic caused by the signal to reenter a travel lane. However, far-side bus stops typically require more ROW, particularly along heavily-utilized transit corridors where the platform would have to accommodate multiple buses to avoid having buses queue into an intersection. In addition, far-side bus stops work best with bus lanes or bus pull-outs because they remove the buses from the traffic flow, reducing the likelihood that a stopped bus would cause vehicles to queue into the intersection.

Mid-block stops are the least common type of bus stops and are typically only applied at large mid-block trip generators. Mid-block stops are less-influenced by traffic signals, and there is the potential to use areas around the mid-block crossing for bus staging/storing on heavily utilized corridors. However, mid-block stops are not as accessible by pedestrians as stops located at existing intersections. Unless a mid-block crossing is provided, pedestrians would have to walk to an adjacent intersection to cross the street or may jaywalk, especially where distances between intersections is long.

Curbside bus stops would be preferable for implementation in the City of Syracuse. They would support standard bus vehicles, making the system more flexible, and would not require the use of bus-only lanes. In addition, they would be easier to implement and would not require substantial roadway construction. It is recommended that far-side bus stops with bus lanes or pull-outs be utilized at all locations, where feasible. Where far-side bus stops are not possible, due to ROW or geometric constraints, near-side bus stops should be used. While transit signal priority is recommended for the entire length of the BRT corridors, it would be required at near-side bus stops in order to enhance transit travel times and reduce vehicle conflicts.

Stop Spacing

In addition to bus stop location, bus stop spacing is a critical factor in BRT system design. According to the America Public Transportation Association (APTA) Recommended Practice: *Bus Rapid Transit Service Design*, bus stop spacing is typically established during the planning process for the individual route based on existing and anticipated land uses, location of intersecting transit lines, maximum acceptable walking distances, parallel services, and speed and service objectives for the BRT service. Recommended maximum walking distances are between 0.25 and 0.33 miles, or a five- to ten-minute walk. However, walking distanced may be increased for higher-intensity and faster services such as BRT or LRT. The APTA suggests that a shorter spacing be used in higher density locations, while using longer spacing in less-dense areas. In addition, retaining parallel “local” bus services on BRT lines could allow CENTRO to provide longer distances between stops on a BRT route.

TABLE 4.5 presents average spacing between BRT stops on various systems. Average spacing varies from 0.20 miles on Cleveland’s Healthline to 3.28 miles on Halifax’s MetroLink line. Longer station spacing may be more appropriate on corridors which are designed to connect major activity centers, or that operate on a designated transit-way. For example, the recently completed BusPlus system connecting the downtowns of Schenectady and Albany is intended to provide enhanced connections between the two cities. The system consists of 18 stops along a 17-mile corridor with short bus stop spacing within the urban areas, and longer spacing in-between the two cities. However, Cleveland’s Healthline, which is intended to enhance circulation within the city, has relatively short stop spacing.

TABLE 4.5: Distances between BRT Stations on Existing Routes
(Source: APTA Recommended Practice: *Bus Rapid Transit Service Design, 2010*)

System	Shortest (mi)	Longest (mi)	Average (mi)
Cleveland, OH: Euclid Avenue (Healthline)	0.13	0.50	0.20
Boston, MA: Silver Line	0.10	1.90	0.32
Eugene, OR: EmX	0.24	0.98	0.42
Las Vegas, NV: MAX	0.25	1.00	0.50
Los Angeles, CA: Metro Rapid	0.25	1.00	0.70
Halifax, NS: MetroLink	0.45	7.70	3.28

The proposed BRT routes associated with Strategy 2 would likely require a combination of spacing strategies because they serve higher-density areas within the City, similar to the Cleveland Healthline, but also extend outwards to the lower density suburbs like Halifax's Metro Link. Therefore, in order to meet the travel time objectives identified for Strategy 2, spacing within the higher-density, urban areas of the City of Syracuse should be between 0.25 and 0.33 miles. Spacing in higher-density suburban areas should be between 0.5 and 0.75 miles, and spacing in lower-density suburban areas should be greater than 0.75 miles. **TABLE 4.6** provides recommended stop spacing for each segment of the BRT routes.

TABLE 4.6: Recommended Distances between BRT Stops by Route

Route	Segment	Stop Spacing (mi)
US 11	Northern Terminus (Wegmans) to Bear Road	1.0
	Bear Road to RTC	0.5 – 0.75
	RTC to Downtown Syracuse Transit Hub	0.25 – 0.33
	Downtown Syracuse Transit Hub to Southern Terminus	0.5
I-81 Express	Northern Terminus to Downtown and University Hill Hubs	3.0 – 5.0
Syracuse University/Liverpool	Northern Terminus (Great Northern Mall) to I-90	1.0 – 2.0
	I-90 to RTC/Destiny USA	0.5 – 0.75
	RTC/Destiny USA to Skytop	0.25 – 0.33
Carrier Circle to Western Lights	Western Terminus (Western Lights Plaza) to Arterial Road	0.25 – 0.33
	Arterial Road – Carrier Circle Loop	As Needed In Front of Employment Centers

TABLE 4.6 Continued: Recommended Distances between BRT Stops by Route

Route	Segment	Stop Spacing (mi)
East Syracuse to OCC	OCC to Glenwood Avenue	0.5 – 0.75
	Glenwood Avenue to E Castle Street	0.25 – 0.33
	E Castle Street to University Hill Hub	0.5
	University Hill Hub to Thompson Road (Proposed Park-and-Ride)	0.25 – 0.33
	Thompson Road to Eastern Terminus (Proposed Park-and-Ride)	0.5
Genesee Street/ Erie Boulevard (NY 5)	Western Terminus (Proposed Park-and-Ride) to Onondaga Road	1.0 – 2.0 Park-and-Ride/ Entrances to Major Subdivisions Only
	Onondaga Road to West Street	0.5
	West Street to University Hill Hub	0.25 – 0.33
	University Hill Hub to Erie Boulevard	0.25 – 0.33
	Crouse Avenue to Eastern Terminus (Wegmans)	0.5 – 0.75

Stop Design

BRT stop design is also a critical component to the operation of a BRT system because it contributes to the usability, visibility, and attractiveness of the system. BRT stops usually consist of a branded bus shelter with rider amenities such as benches, bike racks, a larger sign identifying the stop location, posted schedules, and real-time bus arrival information. Other amenities such as Wi-Fi, newspaper and beverage vending, and off-board fare collection machines can be employed at major stops. Having a BRT system with branded shelters increases the visibility and attractiveness of the system by all users. The larger shelters with signs are easier to spot for people wishing to find a BRT stop, and shelters with user amenities make the system feel more rail-like and easier to use.

Albany's BusPlus system employs several features described above. The system uses a standard bus stop design that incorporates a branded bus shelter, and a large sign identifying the stop (**FIGURE 4.12**). The shelter is made of recycled material and is designed to provide passengers with protection from the harsh winter weather that is experienced in the region. In addition, some of the stops incorporate real-time bus information, which informs waiting passengers on the approximate arrival time of the next bus on the route (**FIGURE 4.13**).

It is recommended that any BRT route deployed in the Syracuse metropolitan area follow a similar design as the BusPlus system. Shelters should be used at each stop along the BRT line, and should include the corridor brand, easily identifiable signs, benches, and a bus schedule for each route that stops at the location. Bus stops with higher utilization should incorporate additional features such as displays with real-time bus arrival information, bike racks, newspaper/beverage vending, and off-board fare collection.

These types of bus stops are likely to be easier to implement in the urban locations, where sidewalks and curbing area already provided. However, in suburban locations where sidewalks and curbing are not available, construction of the BRT stops must be accompanied by the construction of pedestrian/bike facilities so that the stops can be accessed safely, and are attractive to potential users. Therefore, the BRT stops in suburban locations may have a higher capital cost than those in established urban areas.

FIGURE 4.12: BusPlus Shelter
(Source: inhabitat.com)

FIGURE 4.13: Informational Display in BusPlus Shelter
(Source: TimesUnion.com)

4.2.4 BRT Vehicles

According to the National Bus Rapid Transit Institute, the design of BRT stops, terminals, and vehicles affect community and customer perception of the entire system. While reliability and travel time are important measures for retaining riders, the visuals and aesthetics of the system provide a first impression that could affect a potential new rider's decision to use the transit system. The design of the BRT vehicle not only provides a visual perception of the quality of the BRT system, but also can contribute to a reduction in travel time and improved rider comfort.

The interior configuration of a BRT vehicle is one of the most important factors in travel time and rider comfort. Unlike standard buses, BRT vehicles typically have wider aisles, as well as wider circulating areas around doors that are achieved by employing a mix of parallel and perpendicular seating, with grab bars for standing passengers (**FIGURES 4.14 and 4.15**). Wider circulating areas within the BRT vehicles can help to reduce boarding and alighting times, which can directly affect overall travel time, and can accommodate wheelchairs, baby strollers, and bicycles, meeting the needs of all users. In addition, wider aisles can also accommodate more standing passengers. On BRT routes that serve short-distance trips, the amount of circulating space may be more critical than the number of seats.

In addition to the interior configuration of the vehicle, rider amenities within the vehicle may also help to improve rider perception. Digital displays indicating the next stop, along with route maps within the vehicle can help the system feel more rail-like and make the system easier to understand for novice riders. Other amenities, such as TVs or Wi-Fi, can also increase the attractiveness of the system. These features are particularly important for attracting commuters.

FIGURE 4.14: Passengers Boarding and Alighting a Las Vegas MAX Low-Floor Vehicle (Source: tstc.org)

FIGURE 4.15: BRT Vehicle Interior (Source: mdot.maryland.gov)

Overall travel time is also influenced by the configuration of doors. Most standard local buses have a single door at the front of the bus, which can increase travel time because passengers that are boarding must wait for passengers to discharge. However, most BRT vehicles utilize a multi-door system, and in heavy passenger areas, articulated buses may have up to three doors. The BRT system proposed for Syracuse would not require the articulated buses dictated; two-door buses would be appropriate. Having the use of two doors would still reduce dwell time at stops with passengers boarding at the front of the bus and alighting through the secondary door.

Finally, the floor height of the vehicle can affect the visual aesthetics and appeal of the BRT system as well as influence travel time. Many BRT systems across North America utilize 100% low-floor buses, meaning that the floor of the bus would line up with the curb/platform height. By eliminating stairs to enter the bus, passengers can enter and exit the vehicles quickly (**FIGURE 4.14**). It also streamlines boarding for people in wheelchairs, or with baby strollers or bicycles. Low-floor vehicles can also make the system more rail-like, which can be more attractive for some users. However, low-floor buses typically have less seating space because wheel wells and other mechanical components protrude into the interior of the buses.

Based on the assessment of the features above, it is recommended that low-floor vehicles be deployed on the proposed BRT routes. While articulated buses are not likely to be necessary, each of the vehicles should have at least two doors to facilitate efficient boarding and alighting. Wider circulating areas around the doors should also be considered to facilitate improved passenger circulation. The BRT vehicles should also be branded to reflect the corridor that they serve, and provide other passenger amenities such as Wi-Fi, next stop announcements, and displays.

4.2.5 Transit Priority Corridors

In order to support a higher frequency of service and to achieve the service objective of reducing transit travel time by at least 30% on the BRT routes, transit priority corridors are recommended. A transit priority corridor is defined as a roadway that has been identified to provide BRT-supportive features such as bus lanes, queue jumpers, transit signal priority or preemption, or bus pull-outs. In addition to providing transit-supportive infrastructure, the transit priority corridors could be used to establish unique land use policies that encourage higher-density, transit-oriented development along the BRT routes. It is essential that the transit priority corridors be adopted by state, county, the City of Syracuse and other local agencies early in the planning process in order to facilitate the implementation of the proposed enhancements, and to incorporate the enhancements into planned roadway projects.

Strategy 2 incorporates and expands upon the bus only lanes that were identified in the Base Build strategy through the establishment of the transit priority corridors that would follow the alignment of the BRT routes. Because the BRT routes pass through a variety of communities with varying densities, the level of enhancements could vary by segment of each BRT route. **TABLE 4.7** provides an overview of recommended transit enhancements that could be considered for each corridor, by segment, based on traffic volumes and roadway geometry.

TABLE 4.7: Transit Priority Corridor Treatments

Route	Segment	Enhancements
US 11	Northern Terminus (Wegmans) to Bear Road	Queue Jumpers, Signal Priority, Bus Pull-Outs
	Bear Road to RTC	Bus Lanes (use shoulders or restripe existing pavement), Signal Priority
	RTC to Downtown Syracuse Transit Hub	Bus Lanes (restripe existing pavement), Signal Priority
	Downtown Syracuse Transit Hub to Castle Street	Bus Lanes (restripe existing pavement), Signal Priority
	Castle Street to Southern Terminus	Queue Jumpers, Signal Priority, Bus Pull-Outs
I-81 Express	Northern Terminus to Downtown and University Hill Hubs	Signal Priority at Interchanges
Syracuse University/Liverpool	Northern Terminus (Great Northern Mall) to Oswego Road	Signal Priority, Bus Pull-Outs
	Oswego Road to 3rd Street (Liverpool)	Queue Jumpers, Signal Priority, Bus Pull-Outs
	3rd Street (Liverpool) to Skytop Campus	Bus Lanes (use shoulders/ restripe existing pavement), Signal Priority
Syracuse University/Liverpool	Skytop to Southern Terminus	Signal Priority, Bus Pull-Outs
Carrier Circle to Western Lights	Western Terminus (Western Lights Plaza) to Arterial Road	Bus Lanes (restripe existing pavement), Signal Priority
	Arterial Road – Carrier Circle Loop	Queue Jumpers, Signal Priority, Bus Pull-Outs
East Syracuse to OCC	OCC to Glenwood Avenue	Queue Jumpers, Signal Priority, Bus Pull-Outs
	Glenwood Avenue to W Manlius Street (East Syracuse)	Bus Lanes (restripe existing pavement), Signal Priority
	W Manlius Street to Eastern Terminus (Proposed Park-and-Ride)	Signal Priority, Bus Pull-Outs

TABLE 4.7 Continued: Transit Priority Corridor Treatments

Route	Segment	Enhancements
Genesee Street/Erie Boulevard (NY 5)	Western Terminus (Proposed Park-and-Ride) to Milton Avenue	Queue Jumpers, Signal Priority, Bus Pull-Outs
	Milton Avenue to Shoppingtown Mall	Bus Lanes (restripe existing pavement), Signal Priority
	Shoppingtown Mall to Eastern Terminus (Wegmans)	Signal Priority, Bus Pull-Outs

4.2.6 BRT Operation

The final component to Strategy 2 is increasing the frequency and operating hours of the BRT routes. The following minimum operating hours and headways recommended for the BRT routes:

- Peak Period Headway (6:00 AM – 9:30 AM and 3:00 PM – 7:00 PM): 10 Minutes
- Weekday Midday and Early Evening Headway (9:30 AM – 3:00 PM and 7:00 PM – 9:00 PM): 15 - 20 Minutes
- Weekday Evening Headway: 20 Minutes
- Saturday Headways: 20 Minutes
- Sunday and Holiday Headway: 30 Minutes

Because the BRT services are higher-intensity and are intended to serve a higher ridership, the operating hours of the BRT routes should initially be restricted as there is unlikely to be a high demand during late nights on weekdays and early mornings and late nights on weekends. Therefore, the following operating hours should be considered:

- 6:00 AM and 10:00 PM on Monday – Friday
- 9:00 AM and 10:00 PM on Saturdays
- 9:00 AM and 8:00 PM on Sundays and Holidays

Local bus service could be provided along the BRT routes during the overnight hours, where needed.

If the BRT strategy is selected to advance to an alternatives analysis on some or all of the corridors, a more detailed examination of operating hours and headways would be required. One of the FTA criteria for New Starts and Small Starts funding is the applicant's financial ability to sustain the operating costs of a proposed project. Therefore, careful consideration of operating hours and headways would have to be conducted for each corridor that advances into the alternatives analysis phase to ensure that a sustainable operating scheme is developed.

4.2.7 Summary of Strategy 2 Enhancements

Strategy 2 expands upon the features of the Base Build Strategy by incorporating BRT on select corridors. See **Section 4.1** for a summary of enhancements associated with the Base Build. **TABLES 4.8** and **4.9**, below, provides a summary of routes and operating characteristics of the BRT routes associated with Strategy 2.

TABLE 4.8: Potential BRT Routes

Route Name	Route Length (miles)	Route Start	Route End	Major Locations/Areas Served
US 11 Local	13.0	Wegmans Park-and-Ride (Cicero/Clay)	South Salina	• Wegmans Park-and-Ride (Cicero/Clay) • North Syracuse • Airport Park-and-Ride • RTC • Destiny USA • Downtown Syracuse Transit Hub • University Hill Transit Hub • South Salina
I-81 Express	15.0	Brewerton Park-and-Ride	University Hill Transit Hub	• Brewerton Park-and-Ride • NY 31 Park-and-Ride • Taft Road Park-and-Ride (Proposed) • Downtown Syracuse Transit Hub • University Hill Transit Hub
Western Lights – Carrier Circle	12.0	East Syracuse Park-and-Ride (Proposed)	OCC	• Western Lights Plaza • Downtown Syracuse Transit Hub • University Hill Transit Hub • Shop City • Carrier Circle
Genesee Street/Erie Boulevard (NY 5) Corridor	17.0	Camillus Park-and-Ride (Proposed)	Wegmans Park-and-Ride (Fayetteville)	• Camillus Commons • Fairmount Fair • Solvay • Downtown Syracuse Transit Hub • University Hill Transit Hub • Erie Boulevard Shopping Centers • Shoppingtown Mall • Wegmans Park-and-Ride
East Syracuse – OCC	12.0	East Syracuse Park-and-Ride (Proposed)	OCC	• East Syracuse • Eastwood • James Street • Downtown Syracuse Transit Hub • University Hill Transit Hub • Syracuse University • Community General/Van Duyn Hospitals • OCC

TABLE 4.8 Continued: Potential BRT Routes

Route Name	Route Length (miles)	Route Start	Route End	Major Locations/Areas Served
Syracuse University/ Liverpool	17.5	Great Northern Mall	Skytop	• Great Northern Mall • Bayberry • Seneca Mall • Liverpool • Destiny USA • RTC • Lakefront Redevelopment Area • Franklin Square • Armory Square • Downtown Syracuse Transit Hub • University Hill Transit Hub • Syracuse University • Skytop

TABLE 4.9: Strategy 2: BRT System Features

Feature	Description
Vehicle Type	• New Low-Floor BRT Buses  Source: edmonton.ca
Travel-Way	• Urban Core: Bus Lanes and Signal Priority • Outside of Urban Core: Bus Lanes, Queue Jumpers, Signal Priority, and Bus Pull-Outs
Stop Design	• Branded Shelter • Large Sign • Benches • Bicycle Racks • Posted Schedule and Real-Time Arrival Information • Raised Platform (Heavily-Utilized Stops) • Off-Board Fare Collection (Optional)  Source: inhabitat.com
Station Location	• Preferred: Curbside, Far-Side with Bus Only Lane or Bus Pull-Out • Accepted: Curbside, Near-Side if Far-Side Cannot Be Provided
Station Spacing	• Syracuse City/Business Districts: 0.25 – 0.33 Mile • Higher-Density Suburbs: 0.5 – 0.75 Mile • Low-Density Suburbs: 1.0 – 2.0 Miles • Express Routes: >2.0 Miles
Operating Headways	• 6:00 AM – 9:30 AM and 3:00 PM – 7:00 PM: 10 Minutes • 9:30 AM – 3:00 PM and 7:00 PM – 9:00 PM: 15 - 20 Minutes • Weekday Evenings, Weekends, and Holidays: 20 - 30 Minutes
Operating Hours	• Monday – Friday: 6:00 AM – 10:00 PM • Saturday: 9:00 AM – 10:00 PM • Sundays and Holidays: 9:00 AM – 8:00 PM

4.3 Strategy 3: LRT

Strategy 3 expands upon the features of the Base Build Strategy by introducing light rail transit (LRT) to some of the transit enhancement corridors. Similar to the BRT routes, the LRT routes would provide a higher-intensity service along key corridors within the study area, enhancing transit access to major destinations and supporting economic development along the corridors. In addition, the LRT routes could eliminate or reduce bus service on some of the trunk lines identified in the Base Build strategy.

LRT combines the qualities of a BRT system with the qualities of heavy commuter rail by providing a higher-intensity service that has wider appeal, on a system that can be more easily integrated into an existing transportation network. LRT vehicles can operate on existing rail lines or roadways, allowing the service to get closer to major destinations, and they incorporate bus-like features such as only stopping at stations when a stop is requested.

LRT is often considered more permanent and attractive than BRT, but is less flexible and more costly to implement. LRT systems can be two to five times more expensive than a similar BRT system. It requires significantly higher investments in infrastructure including new or rehabilitated rails, overhead catenary lines, larger stations, transit signal preemption, and specialized vehicles. The fixed nature of LRT service also makes it more difficult to adjust the system in order to meet changing demands. However, despite LRT being more costly to implement and less flexible, it has been shown to contribute to significant economic growth, particularly in urbanized areas. LRT vehicles also have more capacity and a longer life span than BRT vehicles (25 years vs. 12 years), and can run as single units or as a group, depending on fluctuations in demand. Furthermore, LRT is seen as more attractive than bus service by the public, and has been proven to generate more new ridership than BRT.

LRT and streetcars have been gaining in popularity in the United States over the past 20 years with some cities reactivating abandoned streetcar lines. LRT and streetcars have been applied in a variety of sizes of cities from larger cities such as San Francisco and Phoenix, to smaller cities such as Little Rock, Arkansas. They have the proven track record of generating a significant amount of economic development, returns that far exceed the cost of the system, even in smaller cities. **TABLE 4.10** contains the cost and economic development impact of LRT/streetcar lines in mid-sized cities in the US.

The data shows that LRT projects can have a significant return on investment in terms of economic development. The return on investment for the projects listed in the table ranges from 250% in Tacoma, Washington, to 4,112% in Portland, Oregon. However, the numbers do not reflect other benefits of LRT such as office building occupancy, community cohesiveness, and reductions in traffic congestion. For example, the LRT system in Portland, Oregon resulted in significant re-occupation of Downtown office buildings to a point where Downtown vacancy rates were less than the vacancy rates of offices in the suburbs.

While the return on investment was high, ridership varied with each system. The systems in Kenosha, WI and Little Rock, AR had the lowest average daily boardings (300 and 340, respectively). This is likely due to their function as a circulator and tourist attraction. Both systems experience higher ridership on weekends and during fair weather months. The systems in Tacoma and Portland experienced the highest average daily boardings of the systems in **TABLE 4.10**. These systems provide service in higher-density urban cores, and experience the highest number of boardings on weekdays. While Syracuse is

closer to Little Rock and Kenosha in population, the type of LRT service that would likely be implemented in Syracuse would be more similar to Portland and Tacoma.

TABLE 4.10: LRT Cost vs. Economic Development in Mid-Sized US Cities (Sources: Hamilton Light Rail Initiative, Light Rail Now.org, American Public Transportation Association)

City	City Population	Length (Miles)	Total Capital Costs (Millions)	2012 Average Daily Boardings	Economic Development
Kenosha, WI	90,000	2	$6	300	$150 Million
Syracuse, NY	145,151	-	-	-	?
Little Rock, AR	193,524	2.5	$20	340	$200 Million
Tacoma, WA	198,397	1.6	$80	3,168	$200 Million
Buffalo, NY	261,025	6.4	$1,300	19,900	$91 Million
Tampa, FL	346,037	2.3	$56	840	$1 Billion
Portland, OR	593,820	4.8	$55	11,500	$2.3 Billion

4.3.1 Potential Application of LRT in Syracuse

4.3.1.1 Policy Guidance

Several organizations including the FTA, America Public Transportation Association, and some transit operators provide guidance on the types of environments in which LRT is likely to be successful. The Santa Clara Valley Transit Authority (VTA) is an example of a transit operator who conducted extensive research to develop LRT implementation guidance. While all organizations have some minor differences in implementation guidance, the following requisites of LRT are common:

- Extensive coordination with local jurisdictions is required on an ongoing basis to develop land use and other supporting policies along LRT corridors. Examples of policies include transit-oriented development zoning overlays, land use plans to promote higher densities and mixed-use developments, and the establishment of transit oriented design guidelines.
- A high density of resident and commercial development. LRT can be considered in lower density suburbs if there is a strong transit ridership destined for an urban core.
- Supportive parking policies that discourage people from driving, such as increased parking fees and/or reduction of parking supply.
- Station area plans (land-use, development guidelines, etc.).
- Pedestrian and bicycle enhancements.
- Appropriately designed and sized parking facilities at suburban stations.

- High-quality mixed use developments along an LRT corridor that create origin-destination pairs, support existing transit use, and encourage transit-oriented development.

- Design guidelines that give priority to LRT including restricting turning movements to minimize LRT vehicle conflicts, transit signal priority, large branded stations at all LRT stops, modern low-floor vehicles to limit dwell time at stations, transit lanes, etc.

- Stations that are located within walking distance of major trip origins and/or destinations, are in areas with the potential for densification, are ADA compliment, and are located at intervals that support efficient operation and reduce passenger delays.

These recommendations, along with lessons learned from the application of LRT in cities of similar size and type as Syracuse should be considered when applying LRT in the Syracuse metropolitan area.

4.3.1.2 LRT Systems in Similar Mid-Sized Cities

While LRT in mid-sized cities has been shown to contribute to economic development, it is critical that the characteristics of these systems be understood before implementing a LRT system in the City of Syracuse. The LRT systems in **TABLE 4.10** are relatively short in length and facilitate circulation within the most active and dense areas of the cities in terms of employment and cultural resources. For example, the Kenosha, WI streetcar route loops through the downtown Kenosha, connecting major locations such as a METRA heavy rail station (with commuter service to/from Chicago), the county courthouse, convention center, downtown shopping, waterfront parks, and museums. In addition to facilitating circulation within an area, some of the systems are also used to connect two or more major activity centers. For example, the Tacoma, WA LRT system connects the central business district to the commuter rail station, facilitating circulation within the downtown area, as well as providing the last mile connection from the commuter rail station to the employment center. The majority of the systems do not provide commuter-type services to lower-density suburban locations.

In addition to the type of services provided, the types of vehicles utilized on these systems vary from those applied in larger cities. Kenosha, Little Rock, and Tampa operate single-unit streetcars that reflect historic streetcar designs (**FIGURE 4.16**). Portland and Tacoma utilize a single-unit, modern car with articulation that is low-floor and can accommodate more passengers (**FIGURE 4.17**). There are advantages and disadvantages to each style of vehicle. Both types of vehicles are effective on a street network because they have tighter turning radii and are able to turn within the space available at most intersections. The historic streetcars are likely to become a tourist attraction as well as a means of transportation, but are not low-floor and would require special accommodations for ADA passengers or people with strollers or bicycles, resulting in higher dwell times at stations. The modern articulated LRT vehicles are typically low-floor with multiple doors that can support faster boarding and alighting. In addition, they have some of the same principles as the recommended BRT vehicles, such as wider aisles for passenger circulation. While not likely to generate tourism, the modern LRT vehicles are considered more practical for every-day use.

Buffalo Metro Rail provides a good case study of the implementation of LRT in a City that has experienced similar population and growth trends as Syracuse. The City of Buffalo has experienced a steady decline in population from 580,000 in 1950 to 261,000 in 2010. At the time of its opening in 1984, it was believed that the Metro Rail line would slow the decline in population and lead to new

economic development along the Main Street corridor between Downtown and the University of Buffalo. However, the economic development goals were not reached until recently.

FIGURE 4.16: Tampa Streetcar (Source: lightrailnow.org)

FIGURE 4.17: Portland LRT Vehicle (Source: lightrailnow.org)

The 6.4-miles Metro Rail line provides high-intensity transit service between Downtown and the University of Buffalo campus. Approximately 1.2 miles of the corridor is on the surface, in a dedicated

transit mall on Main Street in Downtown Buffalo. Originally, the transit mall was closed to vehicular traffic, but has recently been reopened for vehicular traffic. This section has six closely spaced stations with low-level platforms. The remaining 5.2 miles of the system is below ground and operates as a high-speed underground subway. This section has eight stations that are further apart, as is typical in many subway systems across the Country.

The Metro Rail system suffered from significant issues including cost overruns, lack of transit-supportive policies, and alignment issues. The 6.4-mile Metro Rail line was completed in 1984 after several project delays and cost overruns. By the time it was completed the line cost $585 million (approximately $1.3 billion in 2012 dollars). The delays and high cost of the system were primarily due to the large portion of the system that is underground. The completion of the transit mall, which closed Main Street to vehicular traffic through Downtown Buffalo, coincided with the decentralization of the retail market. As such, the transit mall was blamed for the significant reduction in patronage of Downtown businesses.

Similar to Syracuse's OnTrack system, Buffalo's Metro Rail was referred to as the "train to nowhere" because it primarily served destinations, and there was limited availability for parking at stations for suburban commuters. In addition, the system suffered from a lack of transit-supportive policies in the City. For much of the system's life, zoning policies within the City promoted car-oriented, lower-density development.

However, despite these initial challenges, the system is beginning to fulfill its intended purpose. Recent growth in the education and health care markets has led to a revitalization of Buffalo's economy. The growth has been largely centered on the Metro Rail line because it provides the higher-intensity transit services needed to attract and support the new growth. A large medical campus is planned along the corridor, on the north side of Downtown, that will result in the employment of 17,500 people, and over $91 million of primarily residential development. In addition to the planned economic growth, the City of Buffalo has revised its land use policies along the corridor to promote high-density development, as well as purposefully restricting the amount of parking available at new developments, including the new medical campuses. Furthermore, the NFTA, operator of the Metro Rail line, is looking at the potential expansion of the system to serve an offsite commuter parking facility for employees of the medical campus, as well as an extension of the line to Auburn.

4.3.1.3 STSA Guidance

The principles and lessons learned from the LRT systems in **TABLE 4.10** should be applied to any LRT system that is implemented in Syracuse. Syracuse is very similar to many of the cities in that it has a dense, established urban core, as well as a secondary activity center at University Hill. In addition, Syracuse's urban core has multiple opportunities for economic development within a relatively contained area. **FIGURE 4.18** shows TAZs within the study area that meet the LRT density threshold of 9,000 jobs and persons per square mile. Based on the results of the mapping, the LRT-supportive areas of the city are primarily located within the urban core, in the areas of Downtown, University Hill, Near Northeast, Eastwood, and Near Westside. There are only a few TAZs located outside the urban core that would have the density to support LRT. Therefore, the primary focus of the LRT system should be providing service within the densest areas of the City that would generate the highest ridership and provide the most opportunity for economic growth. The focus on the urban core is also consistent with the implementation of streetcar/LRT routes in similar-sized cities.

It should be noted that no suburban LRT service is included in the enhancement strategy. Low residential densities, lack of available ROW, relatively low levels of peak hour congestion, and the expansive nature of suburban development, would make it difficult of identify a suburban corridor that would provide the necessary components needed to support LRT. It is recommended that the focus be on evaluating LRT within the supportive areas. If LRT is implemented successfully within the supportive areas, an examination of LRT service to the lower-density suburbs could be explored in the future.

In order to provide the optimal environment for generating ridership and supporting economic growth, the LRT service should meet the following service objectives, which are based on the operating characteristics of similar systems, and lessons learned:

- Enhance circulation between major destinations within the City, such as Downtown and University Hill.
- Provide high intensity transit services to redevelopment areas identified in the Syracuse 2025 Master Plan.
- Provide service along corridors that meet density thresholds and that currently serve a mix of trip origins (residential) and destinations (office, retail, institutions, etc.).
- Coordinate with local municipalities to develop transit-supportive land use and parking policies (see **Section 6.0**).
- Provide transit priority treatments (transit lanes, signal priority, etc.).
- Utilize vehicles and station designs that minimize dwell time at stations by providing level boarding.
- Provide 10-minute peak period headways, 15- to 20-minute midday headways, and 30-minute evening and weekend headways.
- Minimum hours of operation (after-hours transit services would be provide by bus):
    - Monday through Friday: 6:00 AM – 11:00 PM
    - Saturday: 7:00 AM – 11:00 PM
    - Sunday and Holidays: 8:00 AM – 9:00 PM
- Minimize travel time to achieve 5-minute miles.
- Maintain minimum station spacing of 0.25 miles within the urban core and 0.5 miles outside the core.

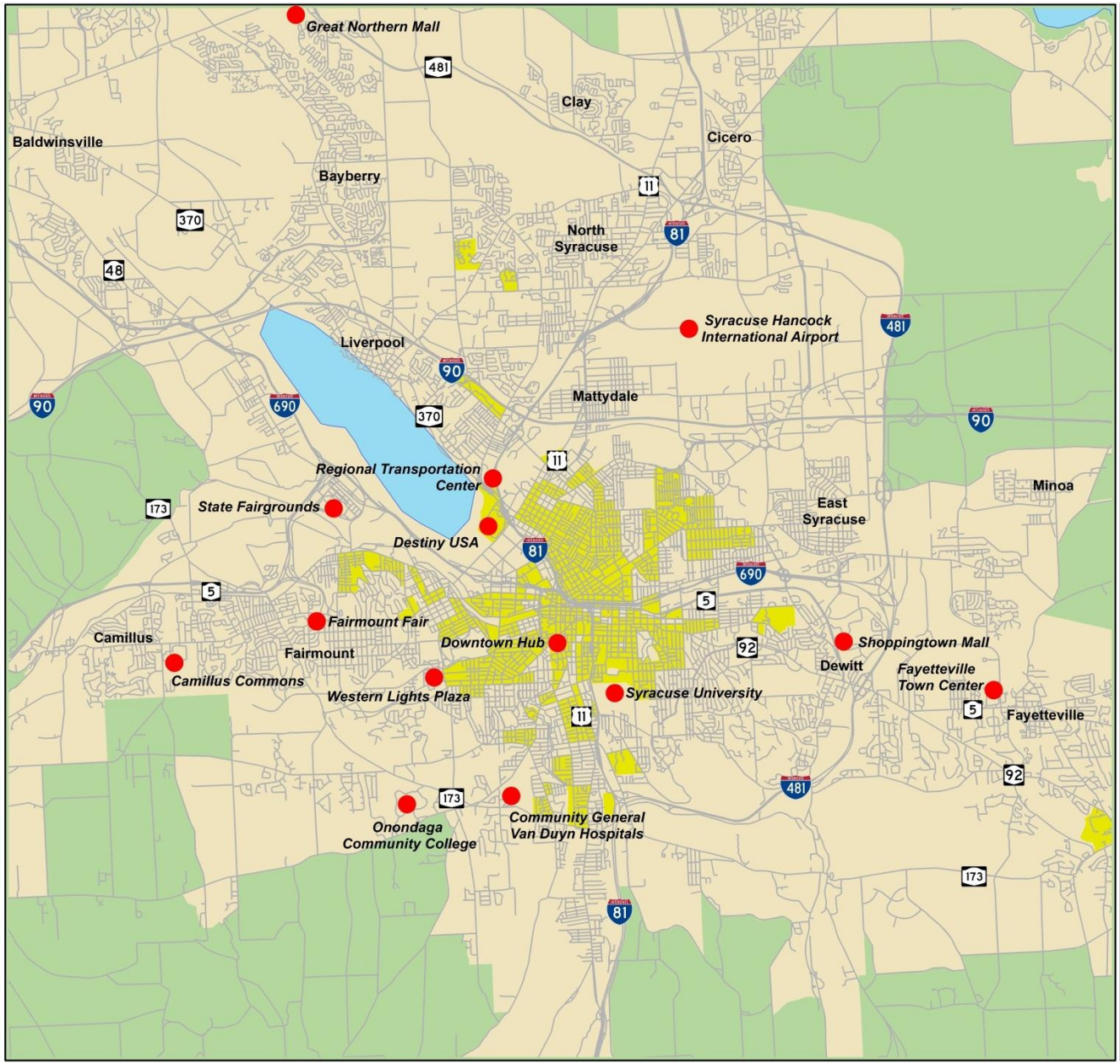


FIGURE 4.18
LRT Supportive TAZs

Legend

- Urban Area
- LRT Supportive TAZ
- Roads
- Community Destinations

*JPPM (Jobs and Persons Per Square Mile) is the summaztion of the population density and employment density for each TAZ. A density greater than or equal to 9,000 JPPM was assumed to be the minimum threshold for LRT based on the literature review.

Data Source:

SMTC Travel Demand Model Version 3.023

0 1.5 3 Miles

4.3.2 Potential LRT Routes

Four potential LRT routes were identified that would serve the LRT-supportive TAZs in the study area, enhance circulation between Downtown and University Hill, serve major destinations, and provide transit services to redevelopment areas (**FIGURE 4.19**). The potential routes shown in the figure consist of a loop between Downtown and University Hill, with four potential supplemental routes serving other high-density sections of the City. The loop would serve as a base that would support the extension of LRT service to other areas of the City, including James Street, Washington Square, Franklin Square, and Destiny USA. Potential station locations are also shown in **FIGURE 4.19** as a guide for analysis. A detailed analysis would be required in order to identify final station locations if a LRT system was pursued. A description of each potential route is provided below.

Downtown – University Hill Loop

The four-mile Downtown – University Hill Loop, shown in red on **FIGURE 4.19**, would provide a circulator service that would connect major origin and destinations within Downtown and University Hill, including the Downtown Syracuse Transit Hub, and Syracuse University. The loop is shown as a one-way service; however, two-way service could be considered to reduce travel time between Syracuse University and Downtown if the Salina Street, Destiny USA, or James Street extensions are not implemented. The figure also shows that the route path utilizes various roadways, particularly in the University Hill area. The route path is based on two main factors, topography, and the mix of origin and destinations within the Downtown and University Hill areas.

Topography is a major concern with any rail system because the lower-friction rails make it difficult for rail vehicles to climb or descend steep grades. Grade is a potential issue for LRT routes in Syracuse, particularly routes that serve University Hill. The path of the LRT route shown in **FIGURE 4.19** accounts for some of these topographic issues. For example, E Adams Street has a significant grade between Almond Street and Irving Avenue. Therefore, the path of the LRT route was directed to use Harrison Street, which provides a gradual incline. Similarly, the proposed route deviates from Comstock Avenue north of Waverly Avenue in order to avoid the significant grades along that roadway.

Mixing origins and destinations is critical to the success of any rail system. The proposed loop was laid out in an effort to provide the best mix of origins and destinations within the Downtown and University Hill areas. For example, the route travels along Genesee Street, rather than returning along Harrison Street, in order to provide service to the University Hill redevelopment area.

Average station spacing along the loop would be approximately 0.25 miles. This station spacing is appropriate for this area given the higher-density of major origins and destinations. Potential station locations are described in **TABLE 4.11**.

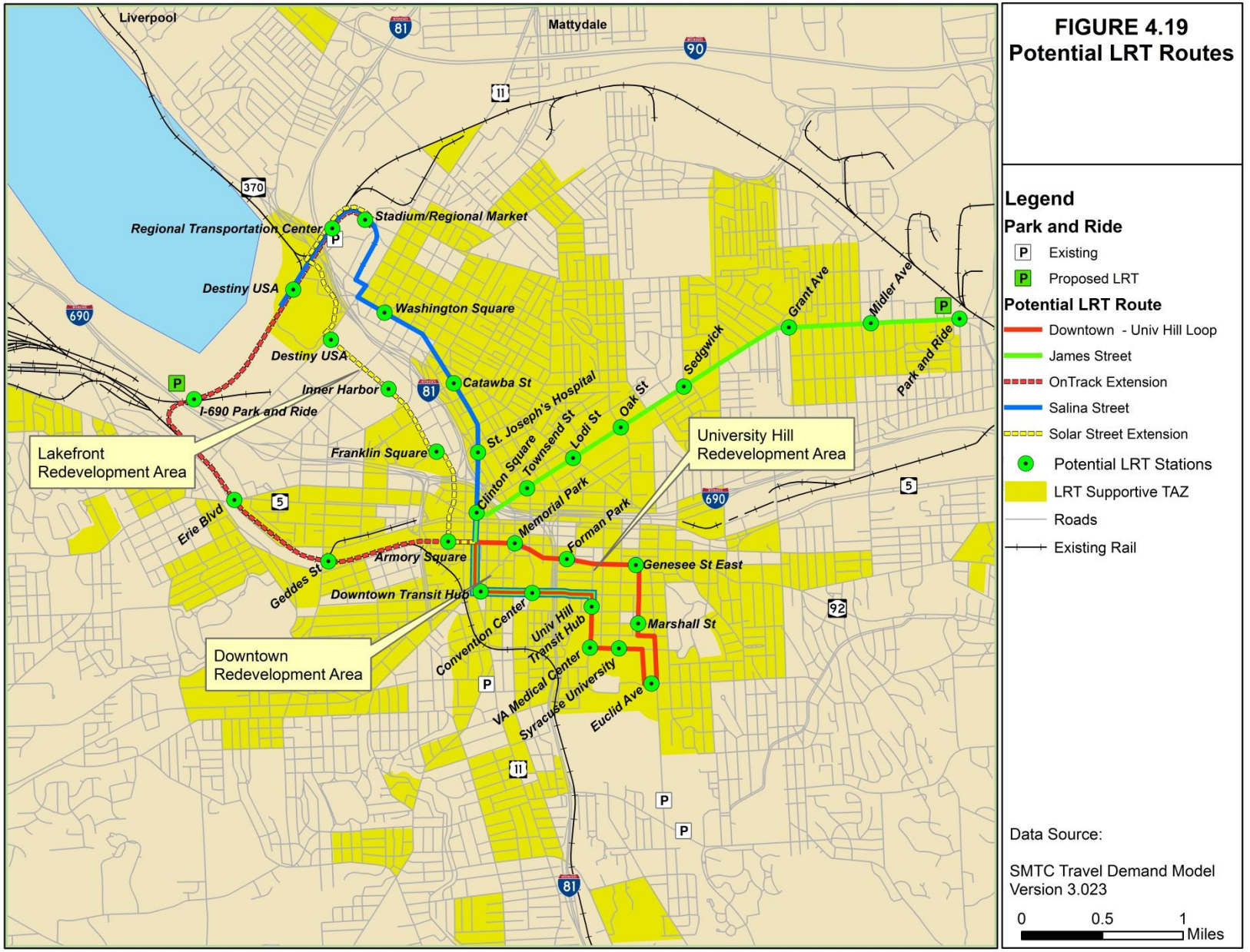

Liverpool
Mattydale
Regional Transportation Center
Stadium/Regional Market
Destiny USA
Washington Square
Destiny USA
Inner Harbor
Catabwa St
I-690 Park and Ride
Lakefront Redevelopment Area
Franklin Square
St. Joseph's Hospital
Clinton Square
Townsend St
Lodi St
Oak St
Sedgwick
Grant Ave
Midler Ave
Park and Ride
University Hill Redevelopment Area
Erie Blvd
Memorial Park
Forman Park
Armory Square
Genesee St East
Geddes St
Downtown Transit Hub
Univ Hill Transit Hub
Marshall St
Convention Center
Downtown Redevelopment Area
VA Medical Center
Syracuse University
Euclid Ave
FIGURE 4.19
Potential LRT Routes
Legend
Park and Ride
Existing
Proposed LRT
Potential LRT Route
Downtown - Univ Hill Loop
James Street
OnTrack Extension
Salina Street
Solar Street Extension
Potential LRT Stations
LRT Supportive TAZ
Roads
Existing Rail
Data Source:
SMTC Travel Demand Model
Version 3.023
0
0.5
1
Miles

TABLE 4.11: Potential Loop LRT Stations

Station	Station Type
Downtown Syracuse Transit Hub	Origin – Passenger Transfers from Buses Destination – Passenger Transfers to Buses
Convention Center	Origin – Geneva Tower, Jefferson Tower Destination – Convention Center, War Memorial, Everson Museum of Art
University Hill Transit Hub*	Origin – Passenger Transfers from Buses Destination – Passenger Transfers to Buses, Hospitals, Crouse Avenue Retail
VA Medical Center	Destination – VA Medical Center, Crouse Hospital, Marley Education Center
Syracuse University	Destination – SU Center Campus, Carrier Dome, Transfer to SU Bus Routes
Euclid Avenue	Origin – Residential Areas Along Euclid Avenue Destination – South Side of SU Campus
Marshall Street	Origin – SU Residence Halls Destination – Marshall Street Retail, SU Facilities, Sheraton
Genesee Street East*	Origin – Residential Communities
Forman Park*	Destination – Crowne Plaza, Genesee Street Retail/Restaurants
Memorial Park	Destination – Offices

*Denotes station that would serve University Hill Redevelopment Area

Extensions to Destiny USA

Two options to extend the Downtown – University Hill Loop to the area of Destiny USA are shown in **FIGURE 4.19**. Both extensions would also serve the entire length of the loop. The extension to Destiny USA would make the LRT more viable by enhancing connections between major attractions within Syracuse. Both extension options would be a two-way service that would begin/end in the area of Armory Square before joining the one-way base loop. **TABLE 4.12** identifies the station locations for each of the options.

The 4.25-mile OnTrack option (dashed red line) would travel along Fayette Street before joining the existing rail line that was formerly used by the OnTrack system. The purpose of this alignment is to utilize the existing rail infrastructure, including the existing rail stations at Destiny USA, the RTC, and NBT Bank Stadium, to reduce costs and construction impacts on the local roadway network. The route would be separated from roadway traffic for much of its length. It would also provide the opportunity to add new origin stations at residential areas off Geddes Street and Erie Boulevard. However, this option would result in a circuitous route between Destiny USA and Downtown/University Hill, and would not serve the Lakefront Development District.

In addition to providing access to Destiny USA, the RTC, and NBT Bank Stadium, the OnTrack extension would also provide the potential for a new park-and-ride facility off I-690. The potential I-690 Park-and-Ride facility could utilize the existing ramps at Hiawatha Boulevard to provide access to an alternative

parking location for commuters that would typically drive into Downtown or University Hill. The facility could also be utilized as a satellite parking facility for the University Hill Hospitals and could support the redevelopment of Downtown and University Hill by reducing parking demand at these locations.

The 3.3-mile Solar Street option (dashed yellow line) would utilize the roadway network instead of the former OnTrack ROW. The purpose of this alignment is to serve Franklin Square, a recently redeveloped mixed-use area, and to propel development in the Lakefront Redevelopment Area. The Lakefront Redevelopment Area is poised to be a significant redevelopment opportunity due to its waterfront location, ample vacant sites, and proximity to Downtown and Destiny USA. However, improved transportation connections are needed in order to enhance access to Downtown and University Hill. An LRT route could provide the impetus for a high-density mixed-use development that would bridge the gap between Destiny USA and Downtown, and take advantage of the parks that have been constructed around the inner harbor area.

This route option would provide a more-direct link between Destiny USA and Downtown than the former OnTrack alignment. However, this alignment would require more investment in new infrastructure, and would not provide an opportunity for a new park-and-ride facility along I-690.

TABLE 4.12: Potential Destiny USA Extension LRT Stations

Option	Station	Station Type
Solar Street Extension	Armory Square	Origin – Residential Condos/Lofts Destination – Museum of Science and Technology, Restaurants, Retail, Office
	Franklin Square	Origin –Residential Condos/Lofts Destination – Office
	Inner Harbor	Potential Origin and Destination Stop
	Destiny USA	Destination – Destiny USA
	RTC	Origin – Passenger Transfers from Bus/Rail Destination – Passenger Transfers to Bus/Rail
	NBT Bank Stadium	Destination – NBT Bank Stadium, Regional Market
OnTrack Extension	Armory Square	Origin – Residential Condos/Lofts Destination – Museum of Science and Technology, Restaurants, Retail, Office
	Geddes Street	Origin – Residential
	Erie Boulevard	Origin – Residential
	I-690 Park-and-Ride	Origin – Commuters
	Destiny USA	Destination – Destiny USA
	RTC	Origin – Passenger Transfers from Bus/Rail Destination – Passenger Transfers to Bus/Rail
	NBT Bank Stadium	Destination – NBT Bank Stadium, Regional Market

Salina Street Route

The 4.25-mile Salina Street route, shown in blue in **FIGURE 4.19**, would provide higher-intensity transit service along a corridor that currently experiences higher than average passenger loads. The route would utilize Salina Street to Hiawatha Boulevard where it would then enter the existing railroad ROW and access the stations at NBT Bank Stadium, RTC, and Destiny USA. The route would serve important destinations such as St. Joseph's Hospital, Little Italy, the RTC and Destiny USA, and could support the revitalization of the Washington Square neighborhood. In addition, the route would travel along the Downtown – University Hill Loop track between Fayette Street and the University Hill Transit Hub. This overlap would provide passengers with a one-seat ride to University Hill. **TABLE 4.13** identifies the potential station locations.

TABLE 4.13: Potential Salina Street LRT Stations

Station	Station Type
University Hill Transit Hub	Origin – Passenger Transfers from Buses Destination – Passenger Transfers to Buses, Hospitals, Crouse Avenue Retail
Downtown Syracuse Transit Hub	Origin – Passenger Transfers from Buses Destination – Passenger Transfers to Buses
Clinton Square	Destination – Offices Origin – Downtown Residential
St. Joseph's Hospital	Destination – St. Joseph's Medical Center, Little Italy
Catawba Street	Origin – Residential Destination – Retail/Office
Washington Square	Origin – Residential
NBT Bank Stadium	Destination – NBT Bank Stadium, Regional Market
Regional Transportation Center	Origin – Passenger Transfers from Bus/Rail Destination – Passenger Transfers to Bus/Rail
Destiny USA	Destination – Destiny USA

James Street Route

The 4.5-mile James Street route, shown in green in **FIGURE 4.19**, would provide higher-intensity transit service along the corridor that currently experiences the highest passenger loads of the existing bus routes. The corridor currently has a wide variety of land uses, including office, condos/apartments, single-family homes, retail, and restaurants. The proposed route would operate along the James Street corridor between Salina Street and Thompson Road serving the Near Northeast, Sedgwick, Lincoln Park, and Eastwood sections of the City. The route would enhance access to the higher-density sections of the corridor near Downtown, as well as providing additional development opportunities in the Eastwood business district. Similar to the Salina Street route, the James Street route would also provide service to the Downtown and University Hill Transit Hubs.

The alignment also presents the opportunity to construct a park-and-ride facility at the end of the route, which could collect commuters from East Syracuse, Minoa, and other locations to the east of Eastwood.

The route would also enhance the viability of the Downtown – University Hill Loop by providing transit access to a large variety of residential neighborhoods (low-income, middle-class, and high-income). **TABLE 4.14** identifies the potential station locations.

TABLE 4.14: Potential James Street LRT Stations

Stop	Stop Type
University Hill Transit Hub	Origin – Passenger Transfers from Buses Destination – Passenger Transfers to Buses, Hospitals, Crouse Avenue Retail
Downtown Syracuse Transit Hub	Origin – Passenger Transfers from Buses Destination – Passenger Transfers to Buses
Clinton Square	Destination – Offices Origin – Downtown Residential
Townsend Street	Origin – Residential Destination – Offices, St. Joseph's Hospital
Lodi Street	Origin – Residential Destination – Offices
Oak Street	Origin – Residential Destination – Offices
Sedgwick	Origin – Residential
Grant Avenue	Origin – Residential Destination – Eastwood Business District
Midler Avenue	Origin – Residential Destination – Eastwood Business District
Park-and-Ride	Origin – Residential, Commuters from Park-and-Ride

4.3.3 LRT Vehicles

A variety of LRT vehicles could be applied in Syracuse, from historic streetcars, to single-unit modern LRT vehicles, to multi-car trains. The proposed LRT routes would require a vehicle that can accommodate lower passenger loads with short headways, can handle the tight turning radii present on dense urban streets, and can meet the LRT service objectives. Multi-car trains are typically applied in larger cities with higher passenger loads. While they can accommodate short headways, they require larger stations, and cannot be accommodated as easily within dense urban areas due to their larger turning radius. Furthermore, multi-car trains typically require dedicated travel-ways and cannot travel in regular vehicle lanes like streetcars or single-unit vehicles. Therefore, multi-car LRT vehicles would not be appropriate for application in Syracuse.

Historic streetcars and modern single-unit (articulated) vehicles have smaller passenger capacities and work best on short routes where standing during peak passenger loads would be acceptable. They are more flexible than multi-car trains in that they require shorter platform lengths at stations and can navigate tighter turning radii. Historic streetcars are often considered more aesthetically pleasing than

modern vehicles and can sometimes become tourist attractions themselves. However, they can have lower passenger capacities than modern LRT vehicles, and are high-floor, which can result in longer dwell times at stations.

It is recommended that consideration be given to employing modern low-floor, articulated, single-unit LRT vehicles in Syracuse (see **FIGURE 4.17**). Modern LRT vehicles would be more practical for application in Syracuse because they would facilitate more efficient passenger boarding and circulation than historic streetcars. They typically have larger on-board passenger circulation areas, and can accommodate more passengers than the historic streetcars because they use articulation, which allows them to be larger but still navigate tight turning radii. Multiple doors and low floors permit shorter dwell times at stations. Furthermore, the low floors also improve access for people in wheelchairs, or passengers with strollers or bicycles, allowing them to board faster and more easily.

It is also recommended that electric LRT vehicles be applied in Syracuse. Electric LRT vehicles are more common in the United States; only a few systems utilize diesel-powered vehicles. Despite the need to provide overhead catenary lines to supply electric power to LRT vehicles, they are considered to be quieter than diesel vehicles, and do not produce vehicle emissions.

4.3.4 LRT Travel-Way

Unlike the transit priority corridors recommended as part of Strategies 1 and 2, the travel-way for LRT requires the consideration of additional factors because it is more permanent (fixed rails), and cannot simply be restriped if changes are required. The majority of the routes presented in **FIGURE 4.19**, with the exception of the OnTrack Extension, utilize the existing roadway network instead of separate transit-ways. The recommended modern, single-unit LRT vehicles are flexible in that they can operate on separate transit-ways, in dedicated transit-only lanes, or in general travel lanes.

Consideration should be given to providing LRT-only lanes for any LRT application in Syracuse. Dedicated lanes would separate the LRT vehicles from the general traffic flow, resulting in less impedance to the transit vehicles, and faster travel times, particularly during the AM and PM peak periods. Dedicated lanes are important on congested roadways, such as Salina Street, Harrison Street, Irving Avenue, and James Street, which experience high peak period traffic volumes. In addition, dedicated lanes would be required for any contra-flow transit lanes, such as the one that would be required for the Downtown – University Hill Loop route along Harrison Street. In many cases, the LRT lanes could be combined with bus-only lanes along particular corridors to create transit-only lanes, which could be used by buses and LRT vehicles.

Dedicated transit lanes would require the conversion of an existing travel lane or parking lane. The conversion of a travel lane or parking lane to a transit-only lane can sometimes be a controversial topic. The loss of a travel lane would result in a decrease in roadway capacity and could lead to an increase in delay for vehicles, particularly during the AM and PM peak periods. Conversely, the loss of a parking lane could affect residents or businesses along a particular corridor. Small business owners are often the most vocal about reductions in on street parking because of the potential impacts it may have on the ability for customers to access their businesses.

Several measures could be employed to minimize the impact of a dedicated transit lane on roadway capacity or parking. On roadways with lower traffic volumes and limited space, the LRT vehicle could operate in a general travel lane. However, it should be noted that while LRT vehicles could operate in a

general travel lane, it would negate any transit advantage during congested periods, such as before and after an event at the Carrier Dome. LRT routes could also be routed along a lower-volume, secondary street that parallels a major arterial in order to reduce the potential impacts to vehicles and parking on the major corridor.

Consideration could also be given to utilizing existing shoulders or other available areas for the LRT rails, where possible. For example, the James Street route could utilize the larger building setbacks between Townsend Street and Grant Avenue to construct the rails in the grass areas between the curb and the sidewalk (see **FIGURE 4.20**). Similarly, a portion of the Downtown – University Hill loop could briefly utilize a portion the park area that is between Walnut Avenue and Walnut Place. It may be possible to imbed the rail directly into the grass at these locations to reduce impervious cover and to make the rail line more aesthetically pleasing (**FIGURE 4.21**).

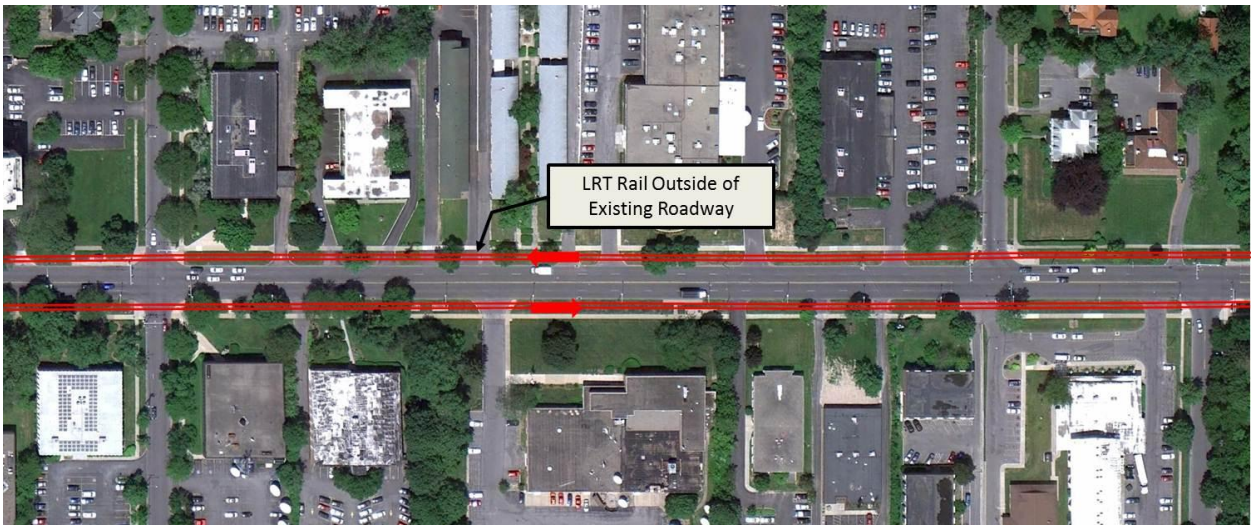


FIGURE 4.20: Potential LRT Rail Position on James Street

A LRT route could also employ the use of short single-track sections through areas where double track would be difficult to accommodate. A single track in the median or on one side of the roadway could be utilized to reduce impacts to parking in business districts (**FIGURE 4.22**). For example, the existing two-way left-turn lane on Salina Street in the Little Italy neighborhood could be utilized for a single LRT track in order to reduce impacts to parking. Similarly, an existing striped median on James Street in Eastwood could be used for a single track through the business district in order to maintain on-street parking (**FIGURE 4.23**).

FIGURE 4.21: Streetcar Track in Grass in Kenosha, WI (Source: lightrailnow.org)

FIGURE 4.22: Light Rail in Median through a Business District

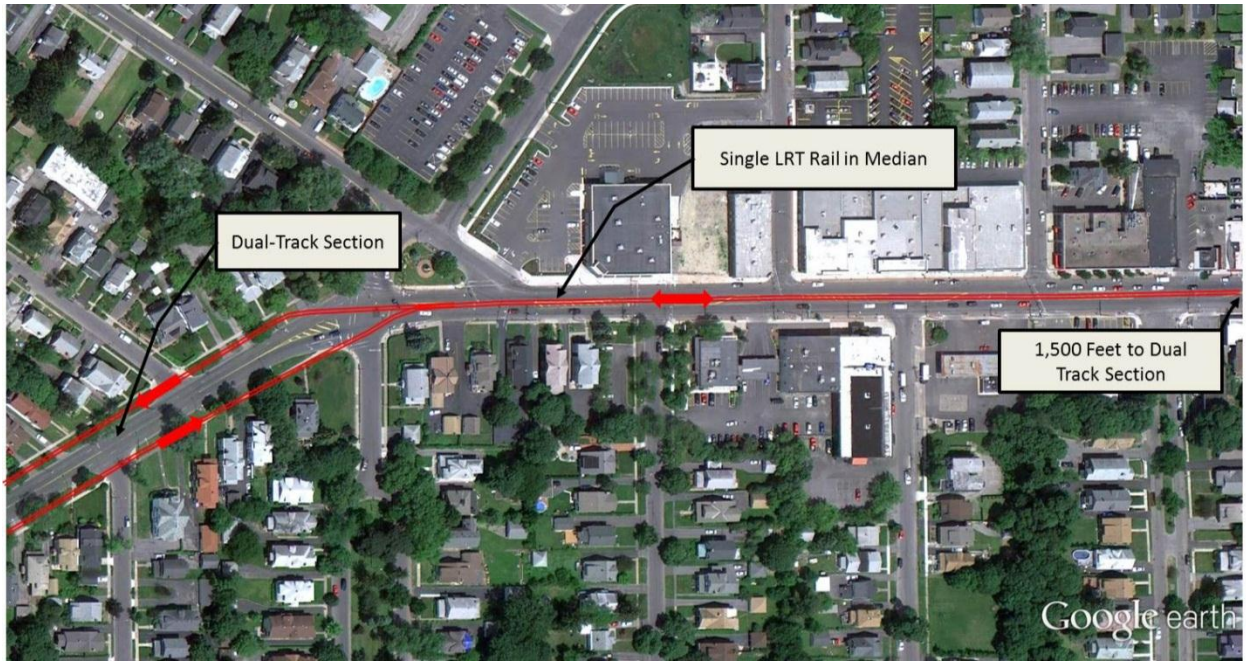


FIGURE 4.23: Potential LRT Rail in Median on James Street

In addition to the transit-only lanes, it is recommended that signals along LRT corridors be upgraded to provide transit signal priority. Transit signal priority would be more appropriate when the LRT route is on a major corridor where the majority of the green time is likely already assigned to the major street. Signal priority would allow the transit vehicle to extend the green time on a particular approach, or alert the signal to provide a transit-only phase at the beginning of a cycle. Transit signal preemption would only be appropriate at congested intersections, or where the LRT vehicle may be approaching an intersection from a side street. Preemption interrupts a cycle to provide a green indication for the approaching LRT vehicle. Therefore, it can have a significant impact on the operation of an intersection and should be used in special cases only.

4.3.5 LRT Stations

Station Design

LRT station design is a critical component to the operation of a LRT system in Syracuse because it contributes to the usability and efficiency of the system. LRT stations in Syracuse should employ a station design that is similar to the BRT stops discussed in **Section 4.2.3**. Station features would include branded shelters, benches, bike racks, highly visible signs denoting stop location, posted schedules, and real-time train arrival information. Off-board fare collection can also be incorporated into LRT station design in order to reduce dwell times at stations by eliminating cash payments upon boarding.

Passenger platforms can also have an impact on dwell time at stations, as well as accessibility of the system to people with disabilities. LRT stations require platforms that are long enough to provide access to and from each door of the vehicle, and many modern LRT stations use platforms that are level with the floor of the LRT vehicle. Both features make it easier to enter and exit the vehicle, reducing dwell times at stations. Platforms that are level with the vehicle floor also provide seamless entry and exit for

people with disabilities or passengers with strollers or bicycles. These LRT station features should be applied to any application of LRT in Syracuse in order to increase the efficiency of the system.

FIGURE 4.24 provides an example application of these features at a LRT station in Portland, Oregon. The figure shows a platform that is long enough to accommodate both doors on the LRT vehicle, and is higher than the adjacent sidewalk in order to be level with the floor of the LRT vehicle. Stairs/ramps can be provided to bring passengers up from the sidewalk. In addition, the station is constructed on a bulb-out because the LRT line is in a travel lane, on the inside of a parking lane. Constructing a bulb-out is easier, and requires less space than deviating the rail to meet an existing curb. The bulb-out also provides the opportunity for a raised platform without affecting the existing sidewalk.

LRT stations should also be supported by pedestrian and bicycle infrastructure. Where sidewalks and crosswalks are not available, construction of the LRT stations must be accompanied by the construction of pedestrian/bicycle facilities so that the stations can be accessed safely, and are attractive to potential users.

FIGURE 4.24: Example LRT Station Platform in Portland, Oregon (Source: djcoregon.com)

Station Location

LRT station location factors are similar to those for BRT stops (see **Section 4.2.3**). Pedestrian accessibility, station design, and intersection configuration are key factors in determining the optimal LRT station location. Similar to the BRT stops, it is preferable to locate LRT platforms close to existing intersections so that pedestrians can utilize existing crosswalks to access the station. However, because of the longer platform, LRT stations may need to be set back farther from the intersection than a BRT stop in order to provide room for right-turn movements. **FIGURE 4.24** shows an example of a platform that is set back from the intersection to accommodate a right-turn.

Like BRT stops, LRT stations can be near-side, far-side, or midblock. Midblock stations are only recommended where there is a significant passenger generator at a midblock location, such as the entrance to a convention center or stadium. In all other locations, a near-side or far-side station would be preferred. Near-side and far-side LRT stations have similar advantages and disadvantages for LRT operation as they do for BRT operation. However, an LRT vehicle may require longer platforms and cannot use pull-outs as easily as a BRT vehicle. Therefore, the configuration of an LRT route has a greater impact on station location.

For LRT routes that operate within an existing travel lane, such as the example shown in **FIGURE 4.24**, a near-side stop may be more appropriate than a far-side stop. Far-side stations may result in vehicles queuing into the intersection behind a stopped LRT vehicle. Since near-side stations can result in additional delays to the LRT vehicle, and could result in conflicts with right-turning vehicles, far-side stations should be considered where LRT vehicles operate in a dedicated transit lane where there is no potential for vehicles to queue into the intersection behind a stopped LRT vehicle. In this situation, far-side stations would reduce conflicts with right-turning vehicles, and reduce delay to the LRT vehicle, allowing it to pass through an intersection before stopping. Furthermore, far-side stations encourage pedestrians to cross behind the vehicle.

Station Spacing

LRT station spacing is dependent upon several factors including service type, density, and land use. Shorter station spacing (0.25 – 0.33 miles) is usually applied on LRT systems that pass through high-density locations, or where the LRT service is intended to provide a circulator streetcar type of service (**FIGURE 4.25**). The majority of the systems presented in **TABLE 4.10** are short-distance circulator services meant to connect destinations within an urban center. As a result, the average spacing on these systems is 0.25 – 0.33 miles. This shorter-spacing would be appropriate for the proposed Downtown – University Hill loop, which is intended to circulate passengers between these areas.

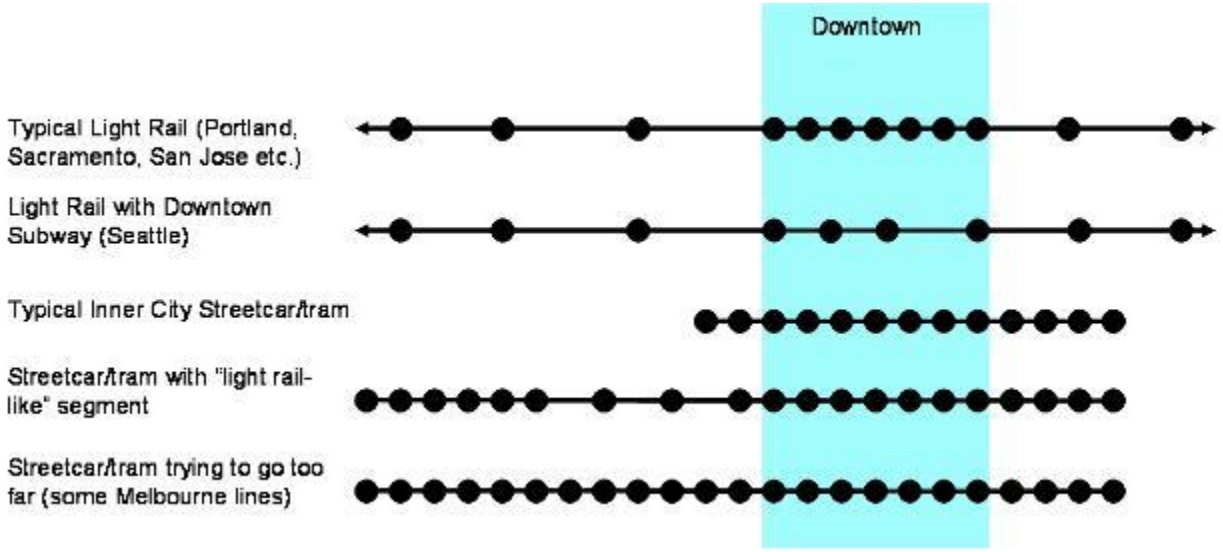


FIGURE 4.25: LRT Types and Station Spacing (Source: www.humantransit.org)

Moderate station spacing (0.5 – 1.0 mile) would be appropriate on routes that extend outside of the downtown core, but are still located within relatively dense urban areas. The proposed extensions to Destiny USA and the James Street and Salina Street routes would fall under this category. Shorter station

spacing is used as the route approaches denser areas of the Downtown core, but station spacing is increased as the routes pass through lower-density residential areas.

Longer station spacing (> 1 mile), is typically applied on longer regional routes, such as a commuter LRT route, or a route that connects two or more major activity centers. Longer station spacing would be appropriate on routes that connect suburban locations with the Downtown, where the primary focus is minimizing travel time for commuters.

4.3.6 Summary of Strategy 3 Enhancements

Strategy 3 expands upon the features of the Base Build Strategy by incorporating LRT on select corridors. See **Section 4.1** for a summary of enhancements associated with the Base Build. **TABLES 4.15** and **4.16** present a summary of the routes and operating characteristics of the LRT routes associated with Strategy 3.

TABLE 4.15: Potential LRT Routes

Route Name	Route Length (miles)	Route Start	Route End	Major Locations/Areas Served
Downtown – University Hill Base Loop	4.0	Downtown Syracuse Transit Hub	Downtown Syracuse Transit Hub	• Downtown Syracuse Transit Hub • Downtown Redevelopment Area • University Hill Hospitals • University Hill Transit Hub • Syracuse University • University Hill Redevelopment Area
OnTrack Extension*	4.25	NBT Bank Stadium/ Regional Market	Downtown (Base Loop)	• NBT Bank Stadium • Regional Market • RTC • Destiny USA • I-690 Park-and-Ride (Proposed) • Armory Square • Base Loop
Solar Street Extension*	3.3	NBT Bank Stadium/ Regional Market	Downtown (Base Loop)	• NBT Bank Stadium • Regional Market • RTC • Destiny USA • Lakefront Redevelopment Area • Franklin Square • Armory Square • Base Loop
Salina Street Route	4.25	Destiny USA	University Hill Transit Hub	• Destiny USA • RTC • NBT Bank Stadium • Regional Market • Washington Square • Little Italy • St. Joseph's Hospital • Downtown Syracuse Transit Hub • University Hill Transit Hub
James Street Route	4.5	Eastwood Park-and-Ride (proposed)	Downtown (Base Loop)	• Eastwood Park-and-Ride (Proposed) • Eastwood Business District • Sedgwick • Near Northeast • Downtown Syracuse Transit Hub • University Hill Transit Hub

*Extensions would also serve the complete Downtown – University Hill Loop. Route lengths are in addition to the Downtown – University Hill Base Loop.

TABLE 4.16: Strategy 3: LRT System Features

Feature	Description
Vehicle Type	• Modern Design • Single-Unit with Articulation • Low-Floor  Source: lightrail.nl
Propulsion	• Electric with Overhead Catenary
Travel-Way	• Preferred: Dedicated Transit Lanes • Accepted: Rail in Travel Lane
Station Design	• Branded Shelter • Benches • Bicycle Racks • Posted Schedule and Real-Time Arrival Information • Raised Platform • Off-Board Fare Collection (Optional)  Source: futureplans.jtafla.com
Station Location	• Near-side if LRT in travel lane. • Far-side if LRT in dedicated transit lane.
Station Spacing	• Downtown Core/Business Districts: 0.25 – 0.33 Mile • Syracuse City: 0.5 – 1.0 Mile • Suburban: > 1.0 Mile
Operating Headways	• 6:00 AM – 9:30 AM and 3:00 PM – 7:00 PM: 10 Minutes • 9:30 AM – 3:00 PM and 7:00 PM – 9:00 PM: 15 - 20 Minutes • Weekday Evenings, Weekends, and Holidays: 20 - 30 Minutes
Operating Hours	• Monday – Friday: 6:00 AM – 11:00 PM • Saturday: 7:00 AM – 11:00 PM • Sundays and Holidays: 8:00 AM – 9:00 PM

4.4 Strategy 4: Commuter Rail

Strategy 4 was considered in the preliminary stages of the STSA in order to evaluate the potential for heavy commuter rail in the Syracuse metropolitan area. Commuter rail is typically applied in metropolitan areas in order to connect suburban residential areas with an urban core. It is often seen as more attractive than commuter bus service, and can accommodate more passengers than a standard bus, BRT vehicle, or LRT vehicle. Commuter rail also operates at higher speeds than LRT vehicles, requiring its own dedicated tracks separate from the roadway, and priority at all roadway crossings. Due the higher operating speeds and passenger capacities, commuter rail stations are typically further apart than LRT or BRT stations (at least 3 miles), and are typically larger to accommodate park-and-ride activity. This provides for a transit system that is based on centralizing boarding at a few locations that are sometimes further away from origin locations, in order to optimize capacity and transit operations (speed, number of stops, travel time, etc.).

Most commuter rail systems in the US utilize existing railroad ROW. Not only does this allow the system to utilize existing rail infrastructure, it eliminates the need to acquire new ROW to construct new rail, which is difficult in densely populated areas. Using existing ROW can also make the cost of implementing commuter rail more comparable to new LRT systems. However, the cost of the rail stations are often a significant portion of the infrastructure costs associated with commuter rail because they have large platforms, and often require additional space for parking lots and station buildings. Commuter rail systems are also considered less flexible than LRT. Since commuter trains cannot travel on the local roadway network like LRT vehicles, they typically require additional transit services to get riders from a central rail station to other destinations within an urban core. For example, a central train station in Armory Square would have to be supported by additional transit services to connect areas in the urban core, such as University Hill, that would not be considered within walking distance of the train station.

Due to the higher passenger capacities, commuter rail requires a higher density of population and employment to support the frequencies necessary to make the system viable. According to the research summarized in **TABLE 3.1**, a density of 17,000 jobs and persons per square mile is considered the minimum threshold for a commuter rail system. Commuter rail supportive densities are constrained to a limited number of TAZs within the study area (**FIGURE 4.26**). The Downtown and University Hill contain the majority of the commuter rail supportive TAZs, which was anticipated. However, the number of commuter rail supportive TAZs is considerably lower outside of the Downtown core.

Studies have shown that lower-density suburban locations could support commuter rail, but other factors, such as the accessibility of the major activity centers, peak period congestion, and parking within the activity centers, must be considered. Given that any potential commuter rail service would likely use the existing rail lines in the study area, a commuter rail service in Syracuse would serve Downtown relatively effectively, but limit the effectiveness of the service for University Hill. The OnTrack system utilized a station adjacent to the Carrier Dome, which was more than half a mile away from the major employers on University Hill. Any future commuter rail service would likely have to rely on the same station in order to provide service to University Hill, diminishing the attractiveness of the service to University Hill employees.

The relatively low peak period congestion, coupled with ample, low-cost parking within Downtown and University Hill is an issue for any commuter transit service in the Syracuse metropolitan area. Not only does this require that a commuter transit system have travel times that are comparable to vehicle travel times, it also requires low-cost fares, and frequent headways to increase the flexibility of the system for

the users. However, reducing rail headways is difficult in areas with lower population densities, particularly those where peak period congestion is not a factor for transit utilization. Providing long headways would diminish the attractiveness of the system, but providing short headways would result in low passenger loads.

The suburbanized nature of the study area was another issue that was quickly identified during the initial phases of the STSA. Syracuse's suburban residential areas are evenly spread to the west, northwest, north, and east of the City. Therefore, it was difficult to identify an individual rail corridor that would be capable of generating enough potential riders to support a commuter rail service. This issue is further exacerbated by the low peak period traffic volumes and ample parking within the urban core, which provides significant competition for commuter transit service. Furthermore, a commuter rail service would not serve many of the low-income, transit-dependent communities within the study area, which could have generated additional ridership to make the system more sustainable.

Finally, the accessibility of the rail lines relative to residential areas is also an issue within the study area. The OnTrack system highlighted the need to serve residential areas. However, the majority of the existing rail lines pass through industrial areas, rather than residential communities. For example, the rail line that runs to the north of the City, passing through Liverpool, is contained within an industrial corridor where the nearest residential property is over one-half mile from the rail line. This puts any potential rail station outside of walking distance from the residential area and would likely result in potential riders driving and parking at the station. Combined with the other factors discussed above, the limited accessibility from residential areas would likely diminish potential ridership.

Based on the assessment of the factors within the study area, including low densities, accessibility, and competition from private vehicles, **Strategy 4, commuter rail, was not progressed in the STSA**. Commuter rail is not considered a sustainable transit service that could be applied in the Syracuse metropolitan area at this time.

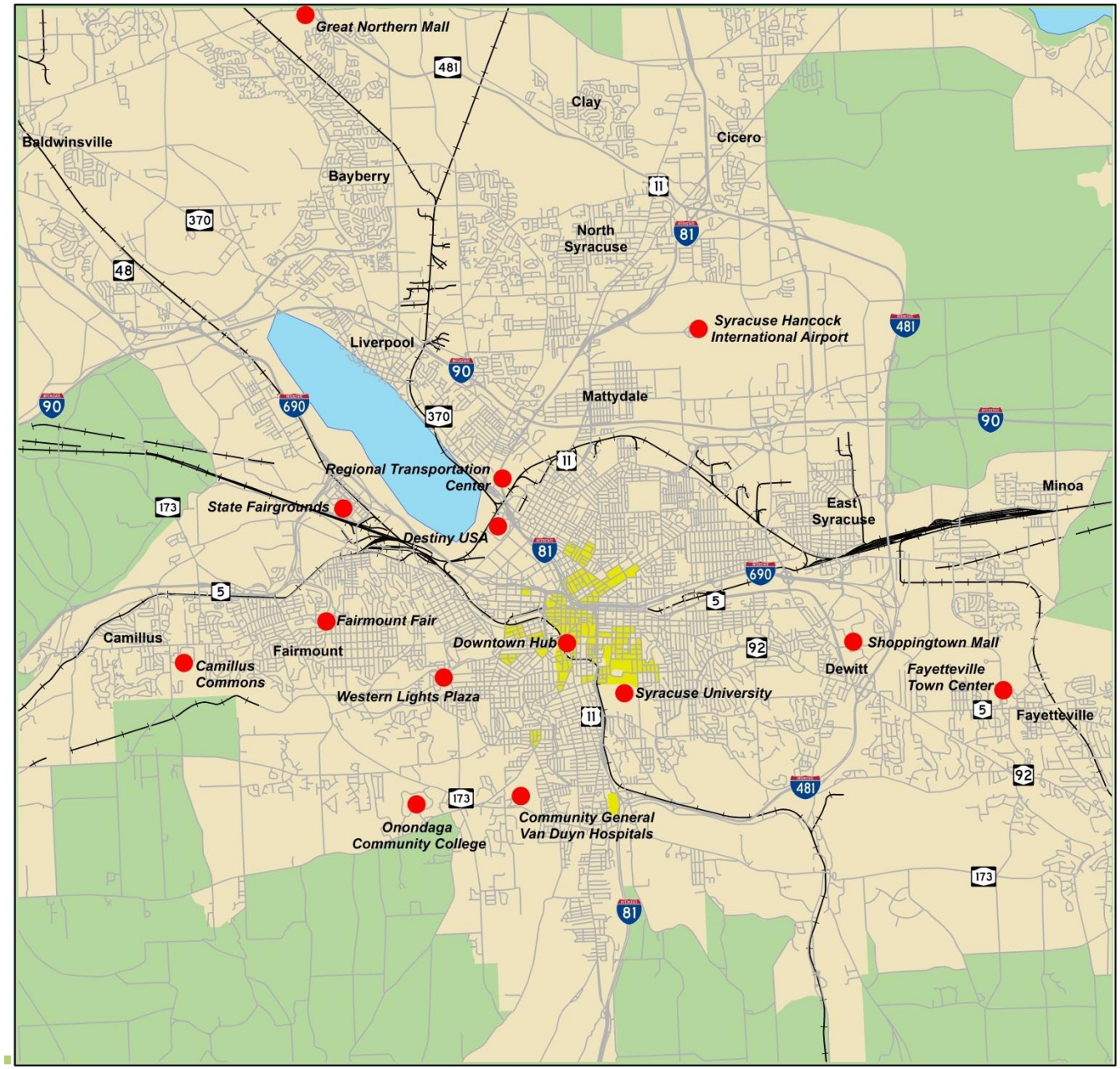


FIGURE 4.26
Commuter Rail Supportive TAZs

Legend

- Urban Area
- Supportive TAZ > 17,000 JPPM
- Roads
- Existing Rail
- Community Destinations

*JPPM (Jobs and Persons Per Square Mile) is the summaztion of the population density and employment density for each TAZ. A density greater than or equal to 17,000 JPPM was assumed to be the minimum threshold for Heavy Rail based on the literature review.

Data Source:

SMTC Travel Demand Model Version 3.023

0 1.5 3 Miles

CHAPTER 5 – Strategy Evaluation

This section documents the process used to evaluate the transit enhancement strategies identified in **Chapter 4**. The evaluation measures for this analysis are largely based on FTA's evaluation criteria for the New Starts/Small Starts program as detailed in the Final New Starts and Small Starts policy guidance (August 2013), but also includes additional qualitative measures specific to Syracuse. The STSA is a planning effort, and therefore, the criteria will serve as a general guide for the evaluation of the enhancements. Evaluation of the proposed enhancement alternatives based on FTA criteria is critical for the STSA because FTA funding would be required to implement the higher-intensity transit services such as BRT or LRT.

5.1 FTA New Starts, Small Starts, Very Small Starts Programs

FTA provides various funding sources through its Section 5309 Capital Investment Grant Program. Each type of funding is designed for different types of transit projects from fixed-guideway rail and BRT, to enhancements to basic bus systems.

5.1.1 New Starts

New Starts funding is intended for the most substantial transit projects. Eligible projects must consist of new fixed-guideway systems, or extensions to existing fixed-guideway systems. Projects can include commuter rail, LRT, heavy rail, streetcars, BRT, or ferries. It should be noted that FTA provides additional criteria for New Starts BRT projects. Fixed-guideway BRT projects that are eligible for New Starts funding must also:

- Operate in a separate ROW for the majority of the route;
- Represent substantial investment in a single route in a defined corridor; and,
- Include defined stations, transit signal priority, and short-headway bi-directional services for a substantial part of weekdays and weekend days.

The total project cost for a New Starts-eligible project must be greater than $250 million, with a federal share greater than $75 million.

New Starts projects must undergo a three-step process that consists of project development, engineering, and a full-funded grant agreement (construction) (see **FIGURE 5.1**). The alternatives analysis phase that was part of the New Starts Program under SAFETEA-LU has been eliminated in the most recent iteration of the program under Moving Ahead for Progress in the 21st Century (MAP-21). Instead, FTA now relies on the review of alternatives performed during the metropolitan planning and environmental review process, which is completed during the Project Development phase. However, FTA supports locally funded alternatives analyses because they can streamline the Project Development phase, and can assist agencies in identifying a locally preferred alternative prior to conducting an extensive environmental review.

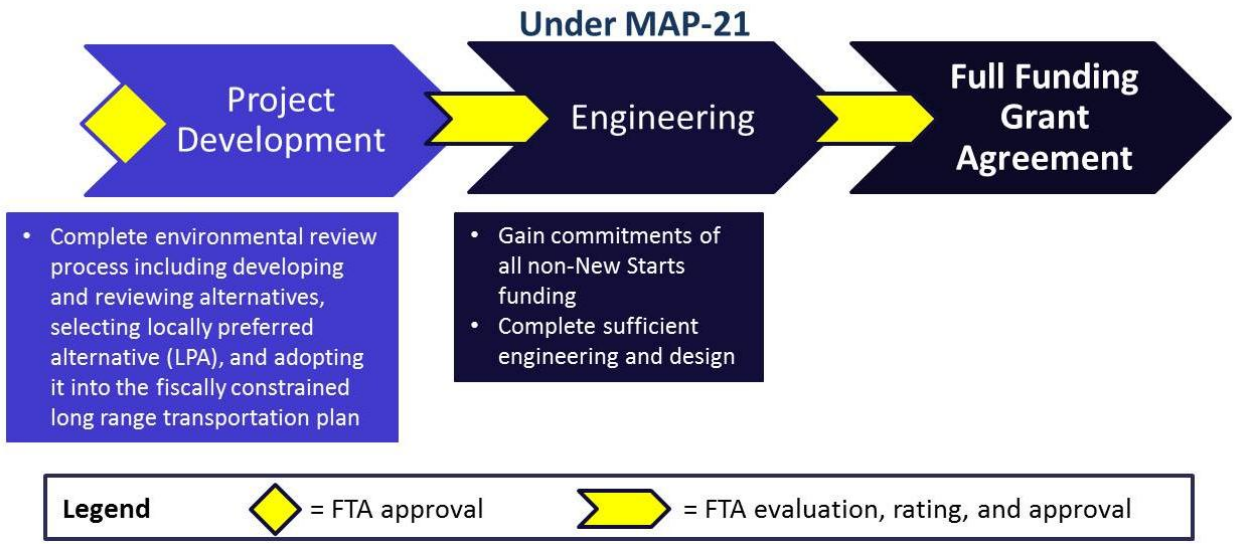


Figure 5.1: New Starts Project Development Process (Source: FTA)

FTA evaluates New Starts projects after each phase of the project development process. The evaluation is conducted by assessing the proposed project against several evaluation criteria. The criteria and their weights are as follows:

- Project Justification Rating (50%)
  - Environmental Benefits (16.66%)
  - Mobility Improvements (16.66%)
  - Congestion Relief (16.66%)
  - Cost Effectiveness (16.66%)
  - Economic Development (16.66%)
  - Land Use (16.66%)
- Local Financial Commitment (50%)
  - Current Capital and Operating Condition (25%)
  - Commitment of Capital and Operating Funds (25%)
  - Reasonableness of Estimates and Financial Capacity (50%)

The project is first evaluated by FTA following the Project Development phase. Projects that receive a rating of "Medium" or higher are typically eligible to continue to the Engineering phase. Following the completion of the Engineering phase, FTA re-evaluates the project based on the same evaluation criteria. However, it should be noted that the evaluation thresholds for some criteria, particularly the Economic Development criterion, require an increased level of detail for the evaluation that follows the Engineering phase.

5.1.2 Small Starts

The Small Starts program was developed to streamline the funding process for lower-cost transit projects. In order to qualify for Small Starts, the project cost must be less than $250 million, with no more than $75 million in requested Section 5309 Capital Investment Grant funding. The project must also operate on a fixed guideway for at least 50% of the project length in the peak period, and/or be a corridor-based bus project with the following minimum elements:

- Substantial Transit Stations
- Transit Signal Priority
- Low Floor/Level Boarding Vehicles
- Special Branding of the Service
- Frequent Service (10 minute peak/15 minute off-peak)
- Service Offered at Least 14 Hours Per Day

It is likely that all of the BRT routes associated with Strategy 2 and LRT routes associated with Strategy 3 would meet the minimum project requirements for Small Starts.

Small Starts projects undergo a similar evaluation process as New Starts projects. The Small Starts project development process utilizes the same evaluation criteria as New Starts (see **Section 5.1.1**). However, Small Starts projects are expedited by combining the Project Development phase with the Engineering phase (**FIGURE 5.2**). The combined phase still requires a complete environmental review, selection of a locally preferred alternative (LPA), and the adoption of the LPA in a fiscally constrained long range transportation plan. It also allows the project sponsor to obtain all local funding and complete engineering and design in the same phase.

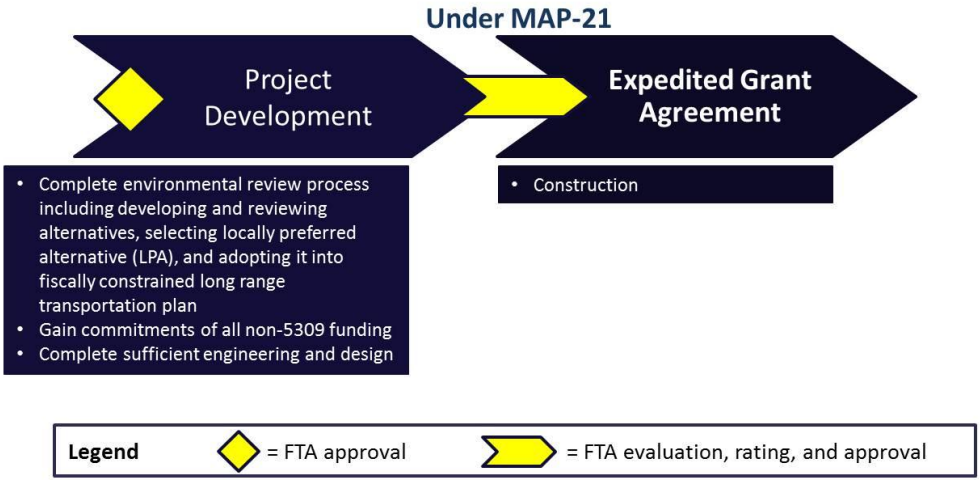


Figure 5.2: Small Starts Project Development Process (Source: FTA)

5.1.3 Very Small Starts

The Very Small Starts program was developed by FTA to further streamline the evaluation and rating process for simple, low-risk projects. Very Small Starts is not specified in MAP-21. FTA has expressed interested in continuing some form of the Very Small Starts program, but no specific guidance has been issued to date. As such, the STSA will not consider Very Small Starts criteria in the evaluation of the transit enhancement strategies. However, some form of Very Small Starts may be available when the proposed transit enhancement strategies are closer to implementation. Therefore, a list of the requirements for the Very Small Starts program under SAFETEA-LU is provided in the list below for reference.

In order to qualify for the Very Small Starts process under SAFETEA-LU, a project must have been a bus, rail, or ferry project with the following features:

- Transit Stations
- Signal Priority/Pre-emption
- Low Floor/Level Boarding Vehicles
- Special Branding of the Service
- Frequent Service (10 minute peak/15 minute off-peak)
- Service Offered at Least 14 Hours Per Day
- Existing Corridor Ridership > 3,000/day
- Less than $50 Million Total Cost
- Less than $3 Million Per Mile (excluding vehicles)

5.2 Evaluation Methodology

Each corridor and transit enhancement strategy will be evaluated on specified performance measures, many of which are based on FTA's New Starts/Small Starts evaluation methodology. FTA uses a weighted scoring system based on a "project justification rating" and "local financial commitment" in order to evaluate transit projects. The project justification rating evaluates a proposed project based on the anticipated impacts of the project on the environment, mobility, cost/benefit, economic development, and land use, while local financial commitment assesses the ability for the applicant to implement and operate the proposed transit enhancements.

The FTA then utilizes a "Low to High" rating system (**TABLE 5.1**) to score each category. A "low" rating would receive a score of 1, while a "high" rating would receive a score of 5.

TABLE 5.1: Rating System Scoring

Rating	Score
High	5
Medium - High	4
Medium	3
Medium - Low	2
Low	1

The FTA then applies a weight to each category. The weights are as follows:

- Project Justification Rating (50%)
  - Environmental Benefits (16.66%)
  - Mobility Improvements (16.66%)
  - Congestion Relief (16.66%)
  - Cost Effectiveness (16.66%)
  - Economic Development (16.66%)
  - Land Use (16.66%)
- Local Financial Commitment (50%)
  - Current Capital and Operating Condition (25%)
  - Commitment of Capital and Operating Funds (25%)
  - Reasonableness of Estimates and Financial Capacity (50%)

Some measures established in the FTA policy guidance cannot be computed as part of the STSA. The FTA evaluation methodology is intended to rank projects that are in the final stages of development, while the STSA is a planning study focusing on multiple potential enhancements. Therefore, local financial commitment will not be utilized in this evaluation; instead, the evaluation will focus solely on the project justification rating.

A revised rating system will be applied in the STSA that focuses on the project justification criteria (**TABLE 5.2**). The revised system is largely based on feedback from stakeholders and the public, as well as data collected in the Existing Conditions assessment phase of the STSA. The Existing Conditions assessment resulted in needs that were mostly associated with mobility and economic development. Land use and environmental needs tended to be ranked lower among the public and other stakeholders. Cost effectiveness was also identified as a concern, particularly with non-riders, who wanted to ensure that the transit enhancements were scalable to the City and the demand. Therefore, the revised scoring system utilizes a higher weight for mobility (25%), economic development (25%), and cost effectiveness (25%). Land use and environmental benefits each received a weight of 12.5%. The FTA currently does not have a process for evaluating the Congestion Relief category. FTA guidance states that this category will automatically receive a Medium rating; therefore, this category will be excluded from the STSA.

TABLE 5.2: STSA Criteria Weights

Category	Weight
Mobility Improvements	25%
Economic Development	25%
Cost Effectiveness	25%
Land Use	12.5%
Environmental Benefits	12.5%

The STSA is a planning study that evaluates multiple potential corridors and enhancements, thus it is not possible to compute the data needed for some of the project justification categories. In these cases, a substitute value will be utilized to provide a similar quantitative or qualitative measure.

Additional study-specific evaluation measures that are not directly linked to FTA funding criteria are also introduced to highlight each enhancement strategy's ability to meet existing and future system needs. In categories where study-specific measures are used, each measure is weighted equally and the average score across all measures will be used as the final score for the category. For example, the Economic Development category may include scoring for FTA criteria as well as an additional score for a Syracuse related factor, such as ability to serve redevelopment areas identified in the master plan.

After the scores are computed for each category, each corridor and associated enhancement will be ranked based on an average weighted score to provide a prioritized list of potential transit enhancements to be progressed into future corridor-specific analyses that would be needed for funding and implementation.

5.3 Evaluation Criteria

This section will present a brief description for each project justification category, as well as the performance measures used to score the enhancement strategies.

5.3.1 Mobility Improvements

This project justification category evaluates the impact of each transit enhancement strategy on the overall mobility of the study area, particularly for low-income and transit-dependent communities. The evaluation of each corridor and enhancement strategy in the STSA will consist of the FTA evaluation method, as well as an additional study-specific measure.

5.3.1.1 FTA Measure

The FTA mobility improvement performance measure is based on the number of linked trips generated by the proposed improvement. The rating for this criterion is based on the total number of linked trips using the proposed project, with extra weight given to trips that would be made by transit dependent persons (**TABLE 5.3**). Linked trips include all trips made on the project whether or not the rider boards or alights on the project corridor or elsewhere in the transit system. The mobility improvements measure is calculated by doubling the number of annual trips made by transit dependent persons and adding that

to the number of annual trips made by non-transit dependent persons. Ridership source data can consist of current year inputs, horizon year inputs (using FTA-approved forecasting data), or a 50/50 weighted combination of both.

The number of linked transit trips can be estimated utilizing the FTA-developed simplified national model, which uses census data and ridership experience on existing fixed guideway systems, or the local travel model of the project sponsor. The FTA simplified national model was not yet available at the time of this study; therefore, the Syracuse Regional Model was utilized to estimate the number of linked transit trips.

TABLE 5.3: FTA Mobility Improvement Thresholds

Rating	Estimated Annual Trips (Trips by Non-Transit Dependent Persons plus Trips by Transit Dependent Persons Multiplied by 2)
High	> 30 Million
Medium - High	15 Million – 29.9 Million
Medium	5 Million – 14.9 Million
Medium - Low	2.5 Million – 4.9 Million
Low	< 2.5 Million

5.3.1.2 Study-Specific Measures

A study-specific measure, "One-Seat Rides to Major Destinations" was developed to address the need for improved connectivity within the Syracuse metropolitan areas, which was identified during the public outreach. Many existing riders and non-riders expressed the desire to have additional direct connections between popular destinations. The rating for this criterion is based on the number of major destinations within the Syracuse metropolitan area that are served by each corridor via a one-seat ride (**TABLE 5.4**). The following major destinations have been identified for this criterion:

- Camillus Commons
- Fairmount Fair
- Western Lights Plaza
- Syracuse Transit Hub
- Onondaga Community College
- Community General Hospital
- Van Duyn Hospital
- Syracuse University
- University Hill Hospitals
- Franklin Square
- Armory Square
- Destiny USA
- Regional Transportation Center
- Shoppingtown Mall

- Fayetteville Town Center
- Great Northern Mall
- Syracuse International Airport
- State Fairgrounds
- Eastwood
- Little Italy

TABLE 5.4: STSA One-Seat Rides to Major Destinations Thresholds

Rating	Number of Major Destinations Served along Corridor
High	5 or more
Medium - High	4
Medium	3
Medium - Low	2
Low	1

5.3.2 Economic Development Effects

This project justification category evaluates the extent to which each transit enhancement strategy is likely to spur future transit-supportive development. The evaluation of each corridor and enhancement strategy in the STSA will consist of the FTA evaluation method, as well as a study-specific measure to relate the corridors with the five strategic areas identified in the Syracuse Comprehensive Plan.

5.3.2.1 FTA Measure

This category consists of a qualitative examination of local plans and policies to support economic development proximate to each of the enhancement corridors. FTA evaluates all transit-supportive plans and policies, including plans to preserve and/or increase the supply of affordable housing units along a particular corridor. Additional qualitative analysis may be included by the project sponsor to consider the extent to which a proposed project would produce changes in development patterns around the transit investment. Consideration is given to existing economic conditions along a corridor, and how transit enhancements would improve those conditions. Available land within station areas must be considered to ensure that there is available land for development or redevelopment.

Studies and policies that will be consulted for the assessment of economic development effects include:

- Transit-Supportive Plans and Policies
    - Growth Management
    - Transit-Supportive Corridors
    - Supportive Zoning Regulations Near Transit Stations
    - Tools to Implement Land Use Policies

- Performance and Impacts of Policies:
    - Performance of Land Use Policies
    - Potential Impact of Transit Project on Regional Land Use
- Plans and Policies on Affordable Housing
    - Inclusionary Zoning or Density Bonuses
    - Employer Assisted Housing Policies
    - Voluntary or Mandatory Inclusionary Housing Policies
    - Rent Controls
    - Zoning to Promote Diversity
    - Affordability Covenants
- Financial Incentives to Support Affordable Housing
    - Low Income Tax Credits
    - Affordable Housing Subsidies
    - Local Tax Abatements
    - Mortgage Assistance
    - Local or Regional Affordable Housing Trust Funds
    - Targeted Tax Increment Financing

FTA provides different thresholds for engineering and full-funded grant agreements. The engineering thresholds are intended to evaluate projects that are earlier in the New Starts/Small Starts process and are awaiting approval from FTA to enter the engineering phase. Therefore, the criteria are less specific. Full-funded grant agreement criteria are more stringent because they are applied to projects in the final phase of the New Starts/Small Starts process. Given that the STSA is a planning study, the corridors and transit enhancements will be evaluated based on the less-specific engineering criteria. **TABLE 5.5** details the thresholds used in FTA's ranking system.

Despite the engineering criteria being less specific, the thresholds that follow are still oriented to projects that are farther along in the FTA funding process, where a specific corridor has been identified and details, such as station location and mode type, have been vetted. In order to evaluate the high-level concepts associated with the STSA, existing plans and policies along each corridor will be reviewed to determine how well current strategies and policies would address the criteria. Additional credit will be given to corridors that pass through established redevelopment areas, higher-density sections of the metropolitan area, mixed-use areas, and important employment or cultural centers. In addition to

providing a preliminary ranking, policy needs will be identified in this phase of the evaluation. These needs will then be addressed in **Section 6.0**.

5.3.2.2 Study-Specific Measures

A study-specific measure was developed to provide an additional criterion in which to evaluate each corridor and enhancement strategy based on the number of strategic development areas served. The strategic areas, identified in the Syracuse Comprehensive Plan, include:

- I-81/I-481 Interchange (South)
- Downtown
- University Hill
- Erie Boulevard East
- Lakefront Development District

The rating thresholds for this measure are outlined in **TABLE 5.6**. Similar to the FTA criteria for this project justification category, this study-specific measure will be evaluated qualitatively.

TABLE 5.5: FTA Economic Development Effect Thresholds

Rating	Criteria
Growth Management (Does not apply to Small Starts)	
High	Adopted and enforceable growth management and land conservation policies are in place throughout the region. Existing and planned densities, along with market trends in the region and corridor are strongly compatible with transit.
Medium	Significant progress has been made toward implementing growth management and land conservation policies. Strong policies may be adopted in some jurisdictions but not others, or only moderately enforceable policies may be adopted region wide. Existing and/or planned densities and market trends are moderately compatible with transit.
Low	Limited consideration has been given to implementing growth management and land conservation policies; adopted policies may be weak and apply to only a limited area. Existing and or planned densities and market trends are minimally or not supportive of transit.
Transit-Supportive Corridor Policies	
High	Conceptual plans for the corridor and station areas have been developed. Discussions have been undertaken with local jurisdictions about revising comprehensive plans. Development patterns proposed in conceptual plans for station areas (or in existing comprehensive plans and institutional master plans throughout the corridor) are strongly supportive of a major transit investment.
Medium	Conceptual plans for the corridor and station areas are being developed. Discussions have been undertaken with local jurisdictions about revising comprehensive plans. Development patterns proposed in conceptual plans for station areas (or in existing comprehensive plans and institutional master plans throughout the corridor) are at least moderately supportive of a major transit investment.
Low	Limited progress to date has been made toward developing station area conceptual plans or working with local jurisdictions to revise comprehensive plans. Existing station land uses identified in local comprehensive plans are marginally or not transit-supportive.
Tools to Implement Transit-Supportive Plans and Policies	
High	Transit agencies and/or regional agencies are working proactively with local jurisdictions, developers, and the public to promote transit-supportive land use planning and station area development. Local agencies are making recommendations for effective regulatory and financial incentives to promote transit-oriented development. Capital improvement programs are being developed that support station area land use plans and leverage the Federal investment in the proposed major transit corridor.
Medium	Transit agencies and/or regional agencies have conducted some outreach to promote transit-supportive land use planning and station area development. Agencies are investigating regulatory and financial incentives to promote transit-oriented development. Capital improvements are being identified that support station area land use plans and leverage the Federal investment in the proposed major transit corridor.
Low	Limited effort has been made to reach out to jurisdictions, developers, or the public to promote transit-supportive land use planning; to identify regulatory and financial incentives to promote development; or to identify capital improvements.

TABLE 5.5 Continued: FTA Economic Development Effect Thresholds

Rating	Criteria
Performance of Transit-Supportive Plans and Policies	
High	Transit-supportive housing and employment development is occurring in the corridor. Significant amounts of transit-supportive development have occurred in other, existing transit corridors and station areas within the region.
Medium	Station locations have not been established with finality, and therefore, development would not be expected. Moderate amounts of transit-supportive housing and employment development have occurred in other, existing transit corridors and station areas in the region.
Low	Other existing transit corridors and station areas in the region lack significant examples of transit-supportive housing and employment development.
Potential Impact of Transit Project on Regional Land Use	
High	A significant amount of land in station areas is available for new development or redevelopment at transit-supportive densities. Local plans, policies, and development programs, as well as real estate market conditions, strongly support such development.
Medium	A moderate amount of land in station areas is available for new development or redevelopment at transit-supportive densities. Local plans, policies, and development programs, as well as real estate market conditions, moderately support such development.
Low	Only a modest amount of land in station areas is available for new development or redevelopment. Local plans, policies, and development programs, as well as real estate market conditions, marginally support new development in station areas.
Plans and Policies to Maintain or Increase Affordable Housing in Corridor	
High	Plans and policies are in place in most of the jurisdictions covered by the project corridor that identify and address the current and prospective housing affordability needs along the corridor. The plans outline a strategy to preserve existing affordable housing (both legally binding affordability restricted housing and market-rate affordable housing). The plans also explicitly address the housing affordability and quality needs of very and extremely low-income households. Financial commitments are secured, and developers are actively working in the corridor to secure development sites and/or maintain affordability levels in existing housing units.
Medium	Plans and policies are being prepared in most of the jurisdictions covered by the project corridor that identify and address the current and prospective housing affordability needs along the corridor. The plans outline a strategy to preserve existing affordable housing (both legally binding affordability restricted housing and market-rate affordable housing). The plans also explicitly address the housing affordability and quality needs of very and extremely low-income households. Some financing commitments have been identified and secured, and developers are starting to working gin the corridor to secure development sites and/or maintain affordability levels in existing housing units.
Low	Plans and policies are not in place that identify and address the specific housing affordability needs along the corridor. Financing commitments and/or other sources of funding have not been identified and secured to preserve and/or build new affordable housing consistent with adopted plans. There is little or no affordable housing development activity in the corridor.

TABLE 5.6 STSA Strategic Area Connectivity Thresholds

Rating	Criteria
High	The proposed corridor/enhancement would provide a one-seat connection between three or more strategic areas. The corridor would also connect these strategic areas with other major origin/destination locations within the metropolitan area via one-seat rides.
Medium	The proposed corridor/enhancement would provide a one-seat connection between two strategic areas. The corridor would also connect these strategic areas with other major origin/destination locations within the metropolitan area via one-seat rides only.
Low	The proposed corridor/enhancement would serve one, or zero, strategic areas. The corridor would have limited connections to other major origins/destinations within the Syracuse metropolitan area.

5.3.3 Environmental Benefits

This project justification category evaluates the direct and indirect benefits of the proposed corridors and associated enhancements on human health, safety, energy, and air quality. The evaluation of each corridor and enhancement strategy in the STSA will consist of the FTA evaluation method only. No study specific measure was developed for this project justification category.

5.3.3.1 FTA Measure

FTA evaluates environmental benefits of proposed projects based on the dollar value of anticipated direct and indirect benefits to human health, safety, energy, and air quality, compared to the overall cost of the project for New Starts. The benefits of proposed projects are compared to the Federal share of the project, rather than the total project cost, for Small Starts. Benefits are computed by calculating the change in vehicle miles traveled (VMT) resulting from the implementation of the proposed project. Change in VMT must be calculated for both automobile and transit modes.

FTA-established factors are used to convert the incremental change in VMT to change in air quality, safety, and energy use. The incremental changes are then monetized using FTA-established monetization factors for each benefit category. Finally, the monetized value of all benefits are summed and divided by the same annualized capital and operating costs of a project as used in the cost effectiveness measure for New Starts projects. The resulting ratio is multiplied by 100 and expressed as a percentage. For Small Starts projects, the sum of the monetized benefits is divided by the Federal share of the project cost, and is expressed as a percentage. **TABLE 5.7** provides the environmental benefit thresholds.

The STSA is a planning study and will not address Federal share of the proposed projects. Therefore, the environmental benefits of all three transit enhancement strategies will be calculated based on the total project cost and not the federal share, regardless of whether the proposed enhancements on a particular corridor would be eligible for New Starts or Small Starts funding.

TABLE 5.7: FTA Environmental Benefit Thresholds

Rating	Range
High	> 10%
Medium - High	5 to 10%
Medium	0 to 5%
Medium - Low	0 to -10%
Low	< -10%

5.3.4 Cost Effectiveness

This project justification category evaluates the cost effectiveness of each corridor and associated transit enhancement strategy. Cost effectiveness is a measure of benefit to cost based on the annualized and operating cost per trip. The evaluation of each corridor and enhancement strategy in the STSA will consist of the FTA evaluation method only. No study specific measure was developed for this project justification category.

5.3.4.1 FTA Measure

The FTA defines cost effectiveness as the annual capital and operating cost per trip for New Starts projects. For Small Starts projects, cost effectiveness is measured by the annualized federal share of the project per trip on the project. For New Starts projects, the capital costs of scope elements considered "enrichments" can be reduced or removed from the calculation. An "enrichment" is defined as an improvement to the transit project that is desired by the project sponsor, but is non-integral to the planned functioning of the project, and whose benefits are not captured in whole by the criteria. For example, "enrichments" may include:

- Artwork, Landscaping, and Bicycle and Pedestrian Improvements
- Sustainable Building Design Features
- Alternative Energy Vehicles
- Joint Development

Annualized capital costs for New Starts projects are taken directly from the FTA Standardized Cost Categories (SCC) spreadsheet. Capital costs are expressed in current year's dollar value, and the SCC spreadsheet will convert the cost of individual scope items into their equivalent annual costs based on their economic lifetimes and a discount rate. Operating and maintenance costs are taken directly from the operation and maintenance cost models of current and proposed transit facilities and services. Small Starts annualized Federal share is calculated in the same manner as New Starts projects.

The STSA is a planning study; therefore, the cost estimates cannot be as detailed as what is intended needed to utilize the FTA SCC spreadsheets. Order of magnitude capital cost estimates will be prepared for each corridor under each of the enhancement strategies using an average cost per mile based on the

cost of similar systems in other locations in the United States. Operating and maintenance costs will be estimated through data collected for similar systems as well as the operating and maintenance costs of the existing transit system. These costs will be annualized in a manner similar to the FTA method.

The FTA also defines trips on the project as the number of linked trips using the project. Trips can be calculated with a regional model or with FTA's simplified national model. The STSA will utilize the ridership projections obtained from the Syracuse Regional Model that are also used for the Mobility Improvements criterion.

The STSA will use the same thresholds as are applied for FTA New Starts evaluations. **TABLE 5.8**, below, provides those thresholds.

TABLE 5.8: FTA Cost Effectiveness Thresholds

Rating	Annualized Capital and Operating Cost Per Trip
High	< $4.00
Medium – High	$4.00 - $5.99
Medium	$6.00 - $9.99
Medium – Low	$10.00 - $14.99
Low	> $15.00

5.3.5 Land Use

This project justification category evaluates existing land use and affordable housing along a particular corridor. It examines factors such as population and employment density, parking fees, available parking per employee, affordable housing, and pedestrian accessibility within the area of proposed stations. Because the STSA does not identify transit stations for the Base Build or BRT strategies, this category will consider factors along each corridor as a whole. The evaluation of each corridor and enhancement strategy in the STSA will consist of the FTA evaluation method only. No study specific measure was developed for this project justification category.

5.3.5.1 FTA Measure

The land use measure for New Starts and Small Starts consists of the examination of existing land use and affordable housing along a corridor. Factors that are considered by the FTA include:

- Existing corridor and station area development;
- Existing corridor and station area character;
- Existing station area pedestrian facilities, including access for persons with disabilities;
- Existing corridor and station area parking supply; and,

- Existing "legally binding affordability restricted" housing in the corridor and station areas. A legally binding affordability restriction is a lien, deed of trust, or other legal instrument attached to a property that restricts the cost of housing units to be affordable to households at specified income levels for a defined period of time.

The land use evaluation thresholds are intended for individual projects that are further along in the alternative analysis process, and where station locations and a final route have been selected. Because stations have not yet been identified as part of the Base Build and BRT enhancement strategies, and are informally presented in the LRT strategy, the evaluation of land use in the STSA will consider the above items on a corridor-wide basis only. No station-specific analysis will be provided.

The FTA evaluation is primarily based on quantitative measures, including station area population densities (STSA will use average corridor population density), total employment served by the project, share of "legally binding affordability restricted" housing, and parking supply. Pedestrian accessibility is rated on a qualitative basis. **TABLES 5.9 5.10**, and **5.11** provide the ranking thresholds for land use, legally binding affordability restricted housing share, and pedestrian accessibility, respectively. **TABLES 5.9** and **5.10** are consistent with FTA guidance; however, even though FTA discusses pedestrian accessibility, it does not provide pedestrian thresholds. Therefore, **TABLE 5.11** was developed specifically for the STSA.

TABLE 5.9: FTA Land Use Evaluation Thresholds

Rating	Employment Served By System[1]	Average Population Density (persons/sq mile)[2]	CBD Typical Parking Cost Per Day[3]	CBD Spaces Per Employee[3]
High	> 220,000	> 15,000	> $16	< 0.2
Medium - High	140,000 – 219,999	9,600 – 15,000	$12 - $16	0.2 – 0.3
Medium	70,000 – 139,999	5,760 – 9,599	$8 - $12	0.3 – 0.4
Medium - Low	40,000 – 69,999	2,561 – 5,759	$4 - $8	0.4 – 0.5
Low	< 40,000	< 2,560	< $4	> 0.5

1. Employment Served is estimated by the sum of the employment of each TAZ within 0.25 mile of a basic bus or BRT corridor, and 0.5 mile of a LRT corridor.
2. Average Population Density is estimated by taking the average density of each TAZ within 0.25 mile of a basic bus or BRT corridor, and 0.5 mile of a LRT corridor.
3. CBD is assumed to include Downtown and University Hill.

TABLE 5.10: FTA Legally Binding Affordability Restricted Housing Thresholds

Rating	Ratio of Corridor Share Compared to Region Share
High	> 2.50
Medium - High	2.25 – 2.49
Medium	1.50 – 2.24
Medium - Low	1.10 – 1.49
Low	< 1.10

TABLE 5.11: STSA Pedestrian Accessibility Thresholds

Rating	Characteristic
High	Well-maintained pedestrian facilities are provided on both sides of a corridor, as well as to/from intersecting streets, for the entire length of the proposed transit corridor. Facilities are generally eight feet wide, and include ADA accessible features (curb ramps, accessible push buttons), marked crosswalks, pedestrian push buttons, and count down signal heads at all intersections along the corridor.
Medium - High	Well-maintained, pedestrian facilities are provided on both sides of the corridor, as well as to and from intersecting streets, for more than 75% of the proposed transit corridor. Facilities are generally five to eight feet wide, and include ADA accessible features (curb ramps, accessible push buttons), marked crosswalks, pedestrian push buttons, and count down signal heads at more than half of the intersections along the corridor
Medium	Pedestrian facilities are provided on at least one side of the corridor, as well as to/from intersecting streets, for more than half of length of the proposed transit corridor. The facilities are less than five feet wide and/or are in moderate condition. Features such as curb ramps, marked crosswalks, and pedestrian signals are provided at less than half of the intersections along the corridor.
Medium – Low	Pedestrian facilities are provided on at least one side of the corridor, as well as to/from intersecting streets for less than half the length of the proposed transit corridor. The facilities are less than five feet wide and/or are in poor condition. Features such as curb ramps, marked crosswalks, and pedestrian signals are provided at less than 25% of the intersections along the corridor.
Low	Pedestrian facilities are provided on at least one side of the corridor for less than 25% the length of the proposed transit corridor. Pedestrian facilities connecting the corridor to adjacent uses are sparse. Features such as curb ramps, marked crosswalks, and pedestrian signals are provided at less than 25% of the intersections along the corridor.

5.4 Evaluation Results

A variety of sources was utilized to obtain data for the evaluation criteria identified and described in **Section 5.3**. These sources included CENTRO vehicle miles traveled (VMT) and cost data, the SMTC Regional Model, FTA evaluation tools and resources, regional housing authority data and reports,

municipal master plans, GIS-based demographic information, Syracuse-Onondaga County Planning Agency reports and plans, other reports previously identified in this report (see **References**), among other sources. This section summarizes the results of the evaluation. A detailed breakdown of the data within each criterion can be found in **APPENDIX C**.

It is important to note that this evaluation is a preliminary comparison of the transit enhancement strategies intended to provide guidance for future transit investments. Additional evaluation through a formal alternatives analysis process would be required for specific corridors prior to pursuing FTA funding or implementation.

5.4.1 Mobility Improvements

5.4.1.1 Estimated Annual Trips (FTA Measure)

The FTA Mobility Improvements threshold evaluates the estimated number of annual trips generated by a particular project, placing additional weight on trips made by transit dependent persons. FTA's simplified national model was not available at the time of the evaluation. Therefore, in order to estimate the number of annual trips generated by the proposed transit enhancement strategies, SMTC and their consultant, RSG, provided modeling support via the Syracuse Regional Travel Demand Model (model). The model is a macroscopic planning tool intended to assist SMTC with regional land use and transportation planning tasks. It estimates the movement of people and vehicles across the City of Syracuse, Onondaga County, and portions of Madison and Oswego Counties, during an average fall weekday.

The model is based on a four-step modeling process: trip generation, trip distribution, mode choice, and vehicle assignment. Land use and transportation network information is entered into the model, and the model is then calibrated based on field data collection and other measures. During a model run, person trips are generated from each transportation analysis zone (TAZ) based on the land use information. Person trips are then organized based on their origin and destination, and then are split between travel mode (e.g. auto, bus). Finally, the trips are assigned to the roadway network based on the best-identified route between a particular origin and destination.

In order to estimate the number of transit trips that would be generated by the proposed transit enhancements, Stantec provided SMTC and RSG with information regarding each corridor under each strategy, including:

- Route alignment;
- Stop location (stop locations for Strategies 1 and 2 were developed based on the spacing guidelines provided under each strategy); and,
- Peak and off-peak operating headways.

The model was then run for each enhancement strategy. It should be noted that a 10-minute bias was applied to the model in Strategy 2 (BRT) and Strategy 3 (LRT) to simulate an increase in "choice" riders, which would result from BRT and LRT being perceived as more attractive than basic bus service. The following outputs were provided:

- Daily transit trips system wide for the No Build, Strategy 1, Strategy 2, and Strategy 3 conditions;
- Daily transit boarding system wide for the No Build, Strategy 1, Strategy 2, and Strategy 3 conditions;
- Automobile vehicle miles traveled (VMT) system wide for the No Build, Strategy 1, Strategy 2, and Strategy 3 conditions; and,
- Daily transit trips for each corridor for the three enhancement strategies.

It is important to note that, while the model contains mode split between auto and transit, it has not been developed for detailed transit ridership projections. The model was calibrated based on overall system ridership, but not specific corridors. Therefore, it is critical that these initial model results be considered at a planning level. Consideration should be given to the magnitude of the difference between the enhancement strategies, rather than the actual numbers themselves. A detailed transit modeling effort must be conducted prior to implementing any of the strategies, particularly if CENTRO wishes to apply for FTA funding. Consideration should be given to utilizing FTA's simplified national model for future modeling efforts. Therefore, it should be noted that the ridership estimates might change during future modeling efforts.

Furthermore, as the potential transit enhancements recommended by the STSA are refined in future studies, there will be an opportunity to conduct a more detailed analysis of land use along selected corridors. Enhancements, such as BRT or LRT, may lead to transit-oriented development, which may lead to additional ridership beyond what is predicted in this study.

TABLE 5.12 provides a summary comparison of the system-wide ridership projections between the No Build condition and each of the enhancement strategies. The system-wide ridership projections include trips generated by the new/adjusted routes associated with each transit enhancement strategy, as well as existing bus routes that would not be impacted by the enhancements, and would continue to operate. Based on the results shown in the table, Strategy 2 (BRT) would result in the largest increase in daily transit trips (40.1%) and daily transit boardings (29.5%). Strategy 3 (LRT) would provide the second highest increase in daily transit trips (17.8%) and daily transit boardings (14.2%).

TABLE 5.12: System-Wide Trip and Boarding Projections

Performance Measure	No Build	Strategy 1: Base Build	Strategy 2: BRT	Strategy 3: LRT
Daily Transit Trips	22,780	24,620	31,910	26,840
% Change	-	8.1%	40.1%	17.8%
Daily Transit Boardings	31,330	31,250	40,570	35,770
% Change	-	-0.3%	29.5%	14.2%

The modeling data was utilized to provide the FTA Mobility Improvement ranking for each corridor under each transit enhancement strategy (**TABLE 5.13**). Two adjustments were made to the modeling data to make it compatible with the FTA criteria. First, data obtained from a recently completed CENTRO survey was utilized to estimate the number of transit trips that would be made by transit dependent persons because the model was unable to distinguish between transit trips made by transit dependent and non-transit dependent persons. Based on the data contained in the survey, it was estimated that approximately 80% of transit trips within the study area are currently made by transit dependent persons. For the purposes of this study, it was assumed that this percentage would remain the same for each of the transit enhancement strategies. Once the total number of trips was calculated (number of trips made by non transit dependent persons + 2 x number of trips by transit dependent persons), an annualization factor of 300 was applied to estimate the net annual transit trips from the total daily trips provided by the model.

TABLE 5.13: FTA Mobility Improvement Threshold

Strategy	Corridor	Estimated Daily Trips*	Estimated Annual Trips*	Rating
1: Base Build	US 11: North Syracuse to South Salina	5,400	1,620,000	Low: 1
	I-81 Express: Central Square to Downtown/Univ Hill	3,294	988,200	Low: 1
	Liverpool/CR 57: Great Northern Mall to Downtown/Univ Hill	5,868	1,760,400	Low: 1
	Destiny USA/RTC to Syracuse University	3,618	1,085,400	Low: 1
	Genesee St/Erie Blvd: Camillus to Fayetteville	6,480	1,944,000	Low: 1
	James St/South Ave: OCC to East Syracuse	7,596	2,278,800	Low: 1
	Butternut St/Onondaga St: Northside to Western Lights	6,066	1,819,800	Low: 1
2: BRT	US 11 Local	6,696	2,008,800	Low: 1
	I-81 Express	2,340	702,000	Low: 1
	Western Lights – Carrier Circle	7,254	2,176,200	Low: 1
	Genesee St/Erie Blvd (NY 5) Corridor	8,676	2,602,800	Medium-Low: 2
	East Syracuse – OCC	11,376	3,412,800	Medium-Low: 2
	Syracuse University/Liverpool	9,792	2,937,600	Medium-Low: 2
3: LRT	Base Loop	2,142	642,600	Low: 1
	Solar Street Extension**	648	194,400	Low: 1
	OnTrack Extension**	1,368	410,400	Low: 1
	Salina Street	810	243,000	Low: 1
	James Street	4,392	1,317,600	Low: 1

*Estimated Trips = (Trips by Transit Dependents x 2) + (Trips by Non Transit Dependents)

**Extensions require the Base Loop. Therefore, the potential transit trips generated by the extension should be considered along with the potential transit trips generated by the Base Loop.

It should be noted that the metrics utilized in the simplified national model are similar to those used in the Syracuse Regional Travel Demand Model. For example, both models utilize TAZ data, as well as information regarding stop locations, service type, headways, and operating hours. Despite the similarities, it is likely that differences in the way each model utilizes those metrics to estimate ridership may result in a difference in the ridership projections. However, it is unlikely that those differences would affect the overall corridor ratings.

Based on the transit ridership projections for each transit enhancement corridor shown in **TABLE 5.13**, Strategy 2 (BRT) would produce the largest number of transit trips on each corridor. However, the projected ridership would still fall in the two lowest FTA rating categories (Low and Medium-Low). The results also show that LRT would generate the lowest number of trips per corridor. However, the poor performance of the LRT options can be attributed to several factors. First, the LRT routes are shorter and serve a smaller area than the BRT routes. Secondly, recently announced development plans for the Inner Harbor area have not been added to the model. Finally, specific route features such as the new park-and-ride facilities along the OnTrack and James Street options are not included in the model.

5.4.1.2 One Seat Rides to Major Destinations (Study Specific Measure)

The number of major destinations served by one-seat riders was determined by identifying the location of the major destinations listed in **Section 5.3.1.2**. It was assumed that a major destination was "served" by a particular corridor if it fell within 0.25 miles of a bus or BRT route, or 0.5 miles of an LRT route.

TABLE 5.14 summarizes the results of the evaluation of one-seat rides to major destinations. The results show that the majority of routes received a Medium-High to High rating. All of the bus and BRT routes would serve the Downtown Syracuse Transit Hub, and the proposed University Hill Transit Hub, which would also include Syracuse University and the University Hill Hospitals. Therefore, when considering the results of this measure, it should be noted that three of the major destinations served on each corridor are common amongst all alternatives.

5.4.1.3 Mobility Improvements Category Score

As discussed in **Section 5.2**, the FTA and study-specific measures will be weighted equally when computing the category score. **TABLE 5.15** provides the final category scores for each corridor under each strategy.

TABLE 5.14: Study-Specific Measure: One Seat Rides to Major Destinations

Strategy	Corridor	Number of Major Destinations Served	Rating
1: Base Build	US 11: North Syracuse to South Salina	6	High: 5
	I-81 Express: Central Square to Downtown/Univ Hill	4	Medium-High: 4
	Liverpool/CR 57: Great Northern Mall to Downtown/Univ Hill	6	High: 5
	Destiny USA/RTC to Syracuse University	7	High: 5
	Genesee St/Erie Blvd: Camillus to Fayetteville	8	High: 5
	James St/South Ave: OCC to East Syracuse	7	High: 5
	Butternut St/Onondaga St: Northside to Western Lights	4	Medium-High: 4
2: BRT	US 11 Local	6	High: 5
	I-81 Express	4	Medium-High: 4
	Western Lights – Carrier Circle	4	Medium-High: 4
	Genesee St/Erie Blvd (NY 5) Corridor	6	High: 5
	East Syracuse – OCC	8	High: 5
	Syracuse University/Liverpool	8	High: 5
3: LRT	Base Loop	4	Medium-High: 4
	Solar Street Extension	5	High: 5
	OnTrack Extension	3	Medium: 3
	Salina Street	6	High: 5
	James Street	5	High: 5

TABLE 5.15: Final Mobility Improvements Score

Strategy	Corridor	Average Score	Final Rating
1: Base Build	US 11: North Syracuse to South Salina	3.0	Medium: 3
	I-81 Express: Central Square to Downtown/Univ Hill	2.5	Medium: 3
	Liverpool/CR 57: Great Northern Mall to Downtown/Univ Hill	3.0	Medium: 3
	Destiny USA/RTC to Syracuse University	3.0	Medium: 3
	Genesee St/Erie Blvd: Camillus to Fayetteville	3.0	Medium: 3
	James St/South Ave: OCC to East Syracuse	3.0	Medium: 3
	Butternut St/Onondaga St: Northside to Western Lights	2.5	Medium: 3
2: BRT	US 11 Local	3.0	Medium: 3
	I-81 Express	2.5	Medium: 3
	Western Lights – Carrier Circle	2.5	Medium: 3
	Genesee St/Erie Blvd (NY 5) Corridor	3.0	Medium: 3
	East Syracuse – OCC	3.5	Medium-High: 4
	Syracuse University/Liverpool	3.5	Medium-High: 4
3: LRT	Base Loop	2.5	Medium: 3
	Solar Street Extension	3.0	Medium: 3
	OnTrack Extension	2.0	Medium-Low: 2
	Salina Street	3.0	Medium: 3
	James Street	3.0	Medium: 3

5.4.2 Economic Development Effects

5.4.2.1 FTA Measures

The FTA Economic Development Effects criterion utilizes a variety of qualitative measures to determine if the necessary land use, transportation, and housing policies are in place to support the transit investment. In order to develop rankings for each corridor under this criterion, Stantec utilized a variety of resources including municipal master plans, growth management plans, and land use plans, as well as SOCPA reports. The following section describes the evaluation of each measure used in the FTA evaluation of economic development impacts (see **TABLE 5.16** for a summary of the evaluation results).

Growth Management, Transit-Supportive Corridor Policies, Performance of Land Use Policies, and Plans and Policies to Maintain or Increase Affordable Housing

These measures were evaluated utilizing reports and plans provided by SOCPA. The planning agency seeks to provide and promote effective planning services for the County, City, towns, and villages. One such service is to periodically develop policies and plans that are intended to guide cities, towns, and villages towards the most efficient use of land and other resources. In conjunction with these documents, SOCPA encourages each municipality to create or revise their own policies and plans that supplement, augment, and/or refine the agency's guidance. Although a few towns and the City have done so, the majority of the towns and villages have not.

Since many of the corridors pass through multiple municipalities, it was necessary to produce an average weight for the corridor based on the proportion of each corridor that passes through each municipality/policy rating. In order to compute the average score, municipalities were first assigned a rating of High, Medium, or Low based on the presence and strength of their policies and plans for each measure. If no policies or plans were present for that measure, a rating of Low was automatically assigned. These ratings were then applied to segments of each corridor that ran through the municipality (e.g., if the Town of Camillus received a Medium rating for Transit-Supportive Corridor Policies, any segment of any corridor that ran through Camillus received the same rating). After applying ratings to all segments of each corridor, a weighted average was taken over the entire length of the corridor to determine its overall rating.

Given that this document provides an initial planning analysis of potential transit enhancements, major transit-supportive land use policies have not been developed within the region to support the proposed enhancement strategies. Therefore, the majority of the corridors received a Low or Medium rating in most of these measures. The corridors that primarily serve the City of Syracuse scored higher as existing land use and zoning policies within the City tend to be more transit-supportive than those in suburban municipalities.

Tools to Implement Land Use Policies

This measure was difficult to evaluate because it focuses on regional efforts to secure capital improvements, regulatory incentives, and financial incentives for transit-oriented development within the station areas. Given that the STSA is a preliminary planning study, station locations/areas have not been established with finality. Therefore, the High rating was excluded from this measure. Corridors were then assigned a Low or Medium rating based on the proportion of each corridor that passes through areas that currently have zoning policies that support higher-density levels of development. As such, the majority of the corridors received a Low rating, with the exception of the LRT corridors, which

received Medium ratings because they pass through the densest and most transit-supportive sections of Syracuse.

Potential Impacts of Transit Project on Regional Land Use

SOCPA is currently developing a Sustainable Development Plan that will guide Onondaga County as a whole in future land development. The policies presented in the Plan are based on the results of a Scenario Modeling Exercise that was performed to illustrate the effects of two different potential development patterns. As part of the exercise, potential redevelopment parcels were identified and plotted on a map.

In the evaluation of this FTA criterion, this map was used to determine how many acres of potentially redevelopable land are available along each corridor. The total number of acres was divided by the length of the corridor (in miles) to yield a ratio for comparison and rating purposes. A higher ratio corresponds to the availability of more redevelopable land along a corridor. Overall, most corridors serve areas with a significant amount of redevelopment potential, resulting in many corridors that would score Medium or High across all three strategies. However, it should be noted that this measure is based solely on the amount of potentially redevelopable parcels, and does not take into account empirical data that suggests BRT and LRT may attract more transit-oriented development than basic bus service. Therefore, the scores were modified to provide a bias for BRT and LRT. As such, all scores for BRT (Strategy 2) and LRT (Strategy 3) were increased by one rating level.

5.4.2.2 Study-Specific Measure: Strategic Area Connectivity Thresholds

This study-specific measure was included in the evaluation in order to account for corridors that pass through and connect one or more strategic areas that were identified in the City of Syracuse Master Plan. The criterion was evaluated by determining the number of strategic areas located along each corridor. **TABLE 5.17** provides the results of the evaluation. Based on the results, all corridors received a Medium or High rating likely because most of the corridors pass through the Downtown and University Hill strategic areas. The US 11 route in Strategy 1 and Strategy 2 was the only corridor to provide connectivity to four of the five strategic areas.

5.4.2.3 Economic Development Category Score

As discussed in **Section 5.2**, the FTA and study-specific measures will be weighted equally when computing the category score. **TABLE 5.18** provides the final category scores for each corridor under each strategy.

TABLE 5.16: FTA Economic Development Effects

Strategy	Corridor	Growth Management	Transit-Supportive Corridor	Tools to Implement Land Use Polices	Performance of Land Use Policies	Potential Impact of Transit Project on Regional Land Use	Plans and Policies to Maintain or Increase Affordable Housing
1: Base Build	US 11: North Syracuse to South Salina	1	3	1	1	3	3
	I-81 Express: Central Square to Downtown/Univ Hill	1	1	1	1	3	1
	Liverpool/CR 57: Great Northern Mall to Downtown/Univ Hill	1	3	1	1	3	3
	Destiny USA/RTC to Syracuse University	3	5	1	3	5	5
	Genesee St/Erie Blvd: Camillus to Fayetteville	3	3	1	1	3	3
	James St/South Ave: OCC to East Syracuse	3	5	1	3	3	3
	Butternut St/Onondaga St: Northside to Western Lights	3	3	1	1	1	3
2: BRT	US 11 Local	3	3	1	3	5	3
	I-81 Express	1	1	1	1	5	1
	Western Lights – Carrier Circle	3	5	1	1	5	3
	Genesee St/Erie Blvd (NY 5) Corridor	3	3	1	1	5	3
	East Syracuse – OCC	3	5	1	3	5	3
	Syracuse University/Liverpool	3	5	1	1	3	3
3: LRT	Base Loop	3	5	3	3	5	5
	Solar Street Extension	3	5	3	3	5	5
	OnTrack Extension	3	5	3	3	5	5
	Salina Street	3	5	3	3	5	5
	James Street	3	5	3	3	5	5

1: Low, 2: Medium-Low, 3: Medium, 4: Medium-High, 5: High

TABLE 5.17: Study-Specific Measure: Strategic Area Connectivity

Strategy	Corridor	Number of Strategic Areas Served	Rating
1: Base Build	US 11: North Syracuse to South Salina	4	High: 5
	I-81 Express: Central Square to Downtown/Univ Hill	3	High: 5
	Liverpool/CR 57: Great Northern Mall to Downtown/Univ Hill	3	High: 5
	Destiny USA/RTC to Syracuse University	4	High: 5
	Genesee St/Erie Blvd: Camillus to Fayetteville	3	High: 5
	James St/South Ave: OCC to East Syracuse	2	Medium: 3
	Butternut St/Onondaga St: Northside to Western Lights	2	Medium: 3
2: BRT	US 11 Local	4	High: 5
	I-81 Express	3	High: 5
	Western Lights – Carrier Circle	2	Medium: 3
	Genesee St/Erie Blvd (NY 5) Corridor	3	High: 5
	East Syracuse – OCC	2	Medium: 3
	Syracuse University/Liverpool	3	High: 5
3: LRT	Base Loop	2	Medium: 3
	Solar Street Extension	3	High: 5
	OnTrack Extension	3	High: 5
	Salina Street	3	High: 5
	James Street	2	Medium: 3

TABLE 5.18: Final Economic Development Score

Strategy	Corridor	Average Score	Final Rating
1: Base Build	US 11: North Syracuse to South Salina	2.1	Medium-Low: 2
	I-81 Express: Central Square to Downtown/Univ Hill	1.6	Medium-Low: 2
	Liverpool/CR 57: Great Northern Mall to Downtown/Univ Hill	2.1	Medium-Low: 2
	Destiny USA/RTC to Syracuse University	3.6	Medium-High: 4
	Genesee St/Erie Blvd: Camillus to Fayetteville	2.4	Medium-Low: 2
	James St/South Ave: OCC to East Syracuse	2.7	Medium: 3
	Butternut St/Onondaga St: Northside to Western Lights	2.1	Medium-Low: 2
2: BRT	US 11 Local	3.3	Medium: 3
	I-81 Express	1.9	Medium-Low: 2
	Western Lights – Carrier Circle	2.7	Medium: 3
	Genesee St/Erie Blvd (NY 5) Corridor	2.7	Medium: 3
	East Syracuse – OCC	3.0	Medium: 3
	Syracuse University/Liverpool	2.4	Medium-Low: 2
3: LRT	Base Loop	3.9	Medium-High: 4
	Solar Street Extension	4.1	Medium-High: 4
	OnTrack Extension	4.1	Medium-High: 4
	Salina Street	4.1	Medium-High: 4
	James Street	3.9	Medium-High: 4

5.4.3 Environmental Benefits

FTA evaluates environmental benefits of proposed projects based on the dollar value of anticipated direct and indirect benefits to human health, safety, energy, and air quality, compared to the overall cost of the project. The benefits were computed by calculating the change in annual vehicle miles traveled (VMT) resulting from the implementation of the proposed project. Change in VMT was calculated for both automobile and transit modes.

In a typical FTA New Starts or Small Starts analysis, the change in automobile VMT would be calculated for a specific project corridor. However, given the large number of corridors across the three enhancement strategies that are evaluated in the STSA, it was not possible to obtain the change in automobile VMT for each corridor. Instead, the regional model was utilized to estimate automobile VMT for each strategy as a whole. Therefore, each corridor was assigned the rating that was computed for the strategy in which it falls.

The FTA New Starts worksheet was used to compute the rating for this project justification category. Daily automobile VMT was obtained from the model for the No Build condition, as well as for each of the strategies (**TABLE 5.19**). Based on the modeling results, Strategy 2 (BRT) would result in the largest decrease in regional VMT: approximately 10,000,000 vehicle miles per year. Strategies 1 (Base Build) and 2 (LRT) would result in a reduction of 3,237,000 and 5,316,000 vehicle miles per year, respectively.

TABLE 5.19: System-Wide Annual Automobile and Transit VMT Projections

Performance Measure	No Build	Strategy 1: Base Build	Strategy 2: BRT	Strategy 3: LRT
Automobile VMT	3,648,066,000	3,644,829,000	3,638,001,000	3,642,750,000
Transit VMT (Total)	2,661,304	3,482,434	3,990,981	3,698,775
Diesel VMT	612,100	0	0	0
CNG VMT	1,889,526	3,203,840	3,671,703	2,749,742
Hybrid VMT	159,678	278,595	319,279	239,108
Light Rail (Electric) VMT	0	0	0	748,270

Unlike automobile VMT, existing and proposed transit VMT had to be computed manually. CENTRO provided data that was used to compute transit VMT under existing operating conditions for an average week. This weekly value was multiplied by 52 to obtain annual VMT. Annual VMT was then broken down into VMT by fuel type (diesel, compressed natural gas [CNG], or hybrid), utilizing fleet information provided by CENTRO (**TABLE 5.19**). Transit VMT for each of the strategies was computed by calculating the number of weekday peak, weekday off-peak, Saturday, and Sunday transit vehicles that would be required each hour to maintain the operational headways specified under each strategy. The number of peak, off-peak, Saturday, and Sunday vehicles was then multiplied by the route length and number of hours that the corridor would be in operation each day to estimate weekly transit VMT.

Similar to the existing condition transit VMT calculation, the weekly transit VMT under each strategy was multiplied by 52 to estimate annual VMT. The annual VMT was then broken down by vehicle fuel

type (**TABLE 5.19**). It was assumed that any additional buses that would need to be purchased for Strategies 1 or 2 would be CNG, while the light rail vehicles would be electric. It should be noted that Strategy 1 (Base Build) would require fewer vehicles than are in the existing fleet because, while the frequency of service is increased in Strategy 1, the consolidation of multiple routes would reduce the number of peak hour buses needed. Therefore, it was assumed that the diesel fleet would be reduced before reducing the number of CNG or hybrid buses. Similarly, it was determined that the basic bus routes that remain as part of Strategies 2 and 3 could be served by existing CNG and hybrid buses, thus totally eliminating the need for diesel.

Existing and proposed annual automobile VMT, annual transit VMT (by vehicle fuel type), estimated annual ridership (**Section 5.4.1.1**), and project cost (**Section 5.4.4**) was entered into the FTA spreadsheet to obtain the Environmental Benefit rating (see **TABLE 5.20**). The results of the analysis show that all three strategies would result in a Medium rating. Strategy 2 (BRT) would result in the greatest benefit, with a benefit/cost ratio of 1.5%.

TABLE 5.20: FTA Environmental Benefit Ratings

Strategy	Corridor	Benefit/Cost Ratio	Rating
1: Base Build	System-Wide (All Corridors)	0.4%	Medium: 3
2: BRT	System-Wide (All Corridors)	1.5%	Medium: 3
3: LRT	System-Wide (All Corridors)	0.3%	Medium: 3

5.4.4 Cost Effectiveness

This project justification category evaluates the cost effectiveness of each corridor under each transit enhancement strategy. Cost effectiveness is a measure of benefit to cost based on the annualized and operating cost per trip. FTA New Starts and Small Starts criteria require a detailed cost estimate of a proposed corridor, which includes all capital and operational costs. Given that the STSA is a planning-level study, it was not possible to provide detailed cost estimates. Therefore, capital and operating cost estimates were prepared utilizing flat rate costs per mile estimated from other similarly sized systems in the United States.

5.4.4.1 Strategy 1: Base Build

Capital costs for each corridor under Strategy 1 were computed utilizing a combination of a length-based rate as well as additional costs associated with site-specific features, such as park-and-ride facilities and the new University Hill Transit Hub. First, the length of each corridor was multiplied by a flat rate of $50,000 per mile. This rate covers general corridor-wide enhancements such as upgraded shelters, new bus stop signs, bus lanes, queue jumpers, and transit signal priority. Next, the capital cost per mile was added to capital costs associated with site-specific improvements. These specific costs include the new University Hill Transit Hub, the cost of which was based on the new Downtown Syracuse Transit Hub ($20 million) divided evenly over all seven corridors, new park-and-ride facilities (assume 100 spaces at $5,500 per space), and upgrades to existing park-and-ride (assume $500,000 per facility). It has been previously determined (**Section 5.4.3**) that the number of buses required to operate under strategy would be less than the existing fleet. Therefore, no new buses were required. Finally, a 20%

contingency was applied to the capital expenditures, and the total capital cost was annualized over an assumed design life of 20 years.

CENTRO provided an annual operating cost estimate of $12.28 per vehicle-mile for the existing system. Given the similarities between the existing bus service and the service that would be provided under the Base Build condition, the rate of $12.28 per vehicle-mile was applied to this strategy.

Finally, the annualized capital cost was added to the annual operating cost to develop a total annualized cost for each corridor (**TABLE 5.21**). The total annualized cost was then divided by the estimated number of annual transit trips to develop a cost per trip. Based on the results of the evaluation (**TABLE 5.21**), costs per trip range from $3.53 to $7.49. The highest ranked corridors under Strategy 1 are the Destiny USA/RTC to Syracuse University and I-81 Express routes. This is due to their low total annualized cost. The results also show that the longest corridors, such as US 11 or Genesee/Erie, do not generate enough ridership to offset the additional cost of the route, despite their broader coverage area.

5.4.4.2 Strategy 2: BRT

Capital costs for each corridor under Strategy 2 were computed utilizing a similar method as Strategy 1. A flat rate of $7 million per mile was computed by averaging the capital cost per mile of each of the similar BRT systems identified in **Section 4.2**. This rate accounts for general corridor-wide enhancements such as improved bus stops, bus lanes, queue jumpers, transit signal priority, and new vehicles. Similar to Strategy 1, additional costs for site-specific improvements such as the new transit hub and park-and-ride facilities were added to the cost per mile. A 20% contingency was applied to the capital expenditures, and the total capital cost was annualized over an assumed design life of 20 years.

An annual operating cost of $16.25 per vehicle-mile was determined by evaluating the operating cost of other BRT systems in the United States. The annualized capital cost was added to the annual operating cost to develop a total annualized cost for each corridor (**TABLE 5.21**). The total annualized cost was then divided by the estimated number of annual transit trips to develop a cost per trip. Based on the results of the evaluation (**TABLE 5.21**), costs per trip were significantly higher than Strategy 1, ranging from $7.27 per trip to $28.94 per trip. This indicates that the additional ridership generated by the BRT service is not enough to offset the significantly higher annualized capital and operating costs associated with the strategy.

5.4.4.3 Strategy 3: LRT

Capital costs for each corridor under Strategy 3 were computed utilizing a similar method as Strategies 1 and 2. A flat rate of $19.5 million per mile was computed by averaging the capital cost per mile of each of the similar LRT systems identified in **Section 4.3**. This rate accounts for general corridor-wide enhancements such as stations, rail infrastructure, transit signal priority, and new vehicles. Similar to Strategy 1, additional costs for site-specific improvements such as the new transit hub and park-and-ride facilities were added to the cost per mile. A 20% contingency was applied to the capital expenditures, and the total capital cost was annualized over an assumed design life of 20 years.

An annual operating cost of $20 per vehicle-mile was determined by evaluating the operating cost of other LRT systems in the United States. The annualized capital cost was added to the annual operating cost to develop a total annualized cost for each corridor (**TABLE 5.21**). The total annualized cost was then divided by the estimated number of annual transit trips to develop a cost per trip. Based on the

results of the evaluation (**TABLE 5.21**), costs per trip were higher than Strategies 1 or 2, ranging from $10.42 per trip to $52.09 per trip.

The James Street extension is the only corridor that would have a cost per trip similar to that of the BRT corridors. Other corridors, including the Downtown-University Hill Loop have a significantly higher cost per trip. This is likely due to several factors. First, the capital and operating costs per mile are much higher than basic bus service or BRT. Secondly, the ridership projections were calculated for each extension option in isolation, without consideration of new park-and-ride facilities, or the interaction of other LRT routes. Therefore, it is likely that overall ridership would be slightly higher than projected. Additional and more-detailed modeling should be undertaken if LRT is determined to be feasible based on the results from the other evaluation criteria.

TABLE 5.21: Cost Effectiveness Rating

Strategy	Corridor	Total Annualized Cost	Cost Per Trip	Rating
1: Base Build	US 11: North Syracuse to South Salina	$6,736,535	$7.49	Medium: 3
	I-81 Express: Central Square to Downtown/Univ Hill	$1,955,649	$3.56	High: 5
	Liverpool/CR 57: Great Northern Mall to Downtown/Univ Hill	$5,965,763	$6.10	Medium: 3
	Destiny USA/RTC to Syracuse University	$2,130,139	$3.53	High: 5
	Genesee St/Erie Blvd: Camillus to Fayetteville	$7,929,208	$7.34	Medium: 3
	James St/South Ave: OCC to East Syracuse	$5,136,491	$4.06	Medium-High: 4
	Butternut St/Onondaga St: Northside to Western Lights	$5,875,763	$5.81	Medium-High: 4
2: BRT	US 11 Local	$14,052,540	$12.59	Medium-Low: 2
	I-81 Express	$11,286,125	$28.94	Low: 1
	Western Lights – Carrier Circle	$13,752,530	$11.38	Medium-Low: 2
	Genesee St/Erie Blvd (NY 5) Corridor	$18,407,860	$12.73	Medium-Low: 2
	East Syracuse – OCC	$13,785,530	$7.27	Medium: 3
	Syracuse University/Liverpool	$19,492,181	$11.94	Medium-Low: 2
3: LRT	Base Loop	$7,564,842	$21.19	Low: 1
	Solar Street Extension	$5,066,923	$46.92	Low: 1
	OnTrack Extension	$7,097,619	$31.13	Low: 1
	Salina Street	$7,031,619	$52.09	Low: 1
	James Street	$7,625,241	$10.42	Medium-Low: 2

5.4.5 Land Use

This project justification category evaluates existing land use and affordable housing along a particular corridor. It examines factors such as population and employment density, parking fees, available parking per employee, affordable housing, and pedestrian accessibility within the area of proposed stations. Because the STSA does not identify transit stations for the Base Build or BRT strategies, this category considered these factors along each corridor as a whole.

5.4.5.1 Land Use Evaluation

The FTA Land Use thresholds rate the employment served by a particular corridor, the average population density along the corridor, and central business district (CBD) parking capacity and fees. For the purposes of the STSA, employment served along each corridor was calculated by determining the number of employees that work within 0.25 miles of a basic bus or BRT corridor, and within 0.5 miles of an LRT corridor, utilizing TAZ data in GIS. A distance of 0.5 miles was utilized for all three strategies within the CBD, which was assumed to be Downtown and University Hill. Similarly, population density along each corridor was calculated in the same manner. Existing parking information, including number of spaces and cost, was obtained from the Downtown Syracuse Parking Study (Syracuse Industrial Development Agency, 2008) and the University Hill Park and Ride Feasibility Study (C&S Companies, et al., 2010). The number of parking spaces in Downtown and University Hill was summed and then divided by the total employment in the two areas to develop a ratio of parking spaces per employee.

The results of the land use evaluation are shown in **TABLE 5.22**. Based on the results, all corridors received a rating of Medium-Low, with exception of the Salina Street extension (LRT), which received a rating of Medium. While most of the corridors have moderate to high employment served and population densities, the ratings for CBD parking costs and CBD spaces per employee pull down the overall Land Use Evaluation score. Reducing the amount of parking in Downtown and University Hill, and/or increasing parking costs, could help to raise the average rating for all of the corridors.

5.4.5.2 Affordable Housing

The FTA Affordable Housing threshold rates the share of affordable housing on a corridor compared to the overall region share. In order to compute the share, the total number of housing units along each corridor and within the study area was determined utilizing TAZ data. In order to determine the number of affordable housing units within these areas, the following resources were utilized to determine the location and number of units associated with each affordable housing complex:

- National Housing Preservation Database (preservationdatabase.org)
- Onondaga County Department of Aging and Youth (ongov.net)
- Syracuse Housing Authority (syracusehousing.org)
- Two Plus Four Management, Inc. (2plus4mgt.com)

TABLE 5.22: Land Use Evaluation

Strategy	Corridor	Employment Served	Average Pop Density	CBD Parking Cost Per Day	CBD Spaces Per Employee	Average Score	Average Rating
1: Base Build	US 11: North Syracuse to South Salina	73,363	5,359	$4-8	0.52	2.0	Medium-Low: 2
	I-81 Express: Central Square to Downtown/Univ Hill	72,480	9,451	$4-8	0.52	2.3	Medium-Low: 2
	Liverpool/CR 57: Great Northern Mall to Downtown/Univ Hill	86,258	6,319	$4-8	0.52	2.3	Medium-Low: 2
	Destiny USA/RTC to Syracuse University	82,284	9,197	$4-8	0.52	2.3	Medium-Low: 2
	Genesee St/Erie Blvd: Camillus to Fayetteville	101,276	6,061	$4-8	0.52	2.3	Medium-Low: 2
	James St/South Ave: OCC to East Syracuse	86,101	7,862	$4-8	0.52	2.3	Medium-Low: 2
	Butternut St/Onondaga St: Northside to Western Lights	73,467	6,719	$4-8	0.52	2.3	Medium-Low: 2
2: BRT	US 11 Local	81,820	6,234	$4-8	0.52	2.3	Medium-Low: 2
	I-81 Express	72,480	9,451	$4-8	0.52	2.3	Medium-Low: 2
	Western Lights – Carrier Circle	83,707	9,299	$4-8	0.52	2.3	Medium-Low: 2
	Genesee St/Erie Blvd (NY 5) Corridor	96,383	6,743	$4-8	0.52	2.3	Medium-Low: 2
	East Syracuse – OCC	86,296	7,933	$4-8	0.52	2.3	Medium-Low: 2
	Syracuse University/Liverpool	90,824	7,866	$4-8	0.52	2.3	Medium-Low: 2
3: LRT	Base Loop	66,179	10,960	$4-8	0.52	2.3	Medium-Low: 2
	Solar Street Extension	115,041	9,054	$4-8	0.52	2.3	Medium-Low: 2
	OnTrack Extension	120,370	8,938	$4-8	0.52	2.3	Medium-Low: 2
	Salina Street	109,322	9,767	$4-8	0.52	2.5	Medium: 3
	James Street	114,609	9,483	$4-8	0.52	2.3	Medium-Low: 2

- Christopher Community, Inc. (christopher-community.org)
- Longley-Jones Management Co. (longley-jones.com)
- Housing Visions (housingvisions.org)
- U.S. Department of Housing and Urban Development (hud.gov)
- New York State Homes and Community Renewal (nyschr.org)

A detailed list was prepared that compiled data on every affordable housing unit and development in Onondaga County from the sources listed above. After the location of each property was plotted on a map, the total number of affordable housing units within 0.5 mile of each corridor was calculated (**TABLE 5.23**). Based on the results of the evaluation, the majority of the corridors under the Base Build and BRT strategies received a Medium rating, while the LRT routes received a High rating. This is likely due to the relatively short LRT corridors, and the fact that these routes lie within dense areas of the City, serving many affordable housing neighborhoods.

5.4.5.3 Pedestrian Accessibility

The Pedestrian Accessibility thresholds rate the amount and degree of pedestrian facilities provided along a corridor. This criterion was evaluated utilizing information contained in the Onondaga County Sustainable Development Plan. As part of the Onondaga County Sustainable Development Plan planning process, Character Areas were identified that delineate areas of common identity and qualities, including, but not limited to: urban core, employment center, regional shopping, and neighborhoods. A Character Area map was developed to illustrate the County's existing settlement pattern and distribution of built and natural resources.

This map was utilized for the evaluation of the Pedestrian Accessibility threshold criteria. Using a similar weighted average method applied for the Economic Development thresholds, each Character Area was assigned a rating based on the likelihood of the presence of existing pedestrian facilities, including access for persons with disabilities. The same rating was assigned to segments of each corridor that ran through that Character Area. After applying ratings to all segments of each corridor, a weighted average was taken over the entire length of the corridor to determine its overall rating (**TABLE 5.24**).

The results of the evaluation show that the majority of the Base Build and BRT corridors received a rating of Medium Low to Medium. This is likely due to the proportions of the routes that pass through lower-density suburban communities within the study area, many of which have limited pedestrian facilities. The LRT routes received ratings of Medium-High to High given that the majority of each corridor is located within the urban core, which is characterized by a higher level of pedestrian amenities.

5.4.5.4 Final Land Use Rating

Each of the above measures was weighted equally when computing the average score for the Land Use category. **TABLE 5.25** provides the final category scores for each corridor under each strategy.

TABLE 5.23: Affordable Housing Share

Strategy	Corridor	Ratio of Corridor Share to Region Share	Rating
1: Base Build	US 11: North Syracuse to South Salina	1.8	Medium: 3
	I-81 Express: Central Square to Downtown/Univ Hill	2.0	Medium: 3
	Liverpool/CR 57: Great Northern Mall to Downtown/Univ Hill	1.7	Medium: 3
	Destiny USA/RTC to Syracuse University	2.4	Medium-High: 4
	Genesee St/Erie Blvd: Camillus to Fayetteville	1.5	Medium: 3
	James St/South Ave: OCC to East Syracuse	1.7	Medium: 3
	Butternut St/Onondaga St: Northside to Western Lights	2.2	Medium: 3
2: BRT	US 11 Local	1.9	Medium: 3
	I-81 Express	2.0	Medium: 3
	Western Lights – Carrier Circle	2.0	Medium: 3
	Genesee St/Erie Blvd (NY 5) Corridor	1.8	Medium: 3
	East Syracuse – OCC	1.7	Medium: 3
	Syracuse University/Liverpool	1.6	Medium: 3
3: LRT	Base Loop	2.9	High: 5
	Solar Street Extension	6.0	High: 5
	OnTrack Extension	4.1	High: 5
	Salina Street	5.1	High: 5
	James Street	3.3	High: 5

TABLE 5.24: Pedestrian Accessibility

Strategy	Corridor	Weighted Average Score	Rating
1: Base Build	US 11: North Syracuse to South Salina	2.5	Medium: 3
	I-81 Express: Central Square to Downtown/Univ Hill	1.7	Medium-Low: 2
	Liverpool/CR 57: Great Northern Mall to Downtown/Univ Hill	1.9	Medium-Low: 2
	Destiny USA/RTC to Syracuse University	3.3	Medium: 3
	Genesee St/Erie Blvd: Camillus to Fayetteville	2.0	Medium-Low: 2
	James St/South Ave: OCC to East Syracuse	2.8	Medium: 3
	Butternut St/Onondaga St: Northside to Western Lights	2.3	Medium-Low: 2
2: BRT	US 11 Local	2.8	Medium: 3
	I-81 Express	1.7	Medium-Low: 2
	Western Lights – Carrier Circle	2.4	Medium-Low: 2
	Genesee St/Erie Blvd (NY 5) Corridor	2.2	Medium-Low: 2
	East Syracuse – OCC	2.8	Medium: 3
	Syracuse University/Liverpool	2.3	Medium-Low: 2
3: LRT	Base Loop	4.9	High: 5
	Solar Street Extension	4.6	High: 5
	OnTrack Extension	3.1	Medium: 3
	Salina Street	3.7	Medium-High: 4
	James Street	3.6	Medium-High: 4

TABLE 5.25: Final Land Use Rating

Strategy	Corridor	Average Score	Final Rating
1: Base Build	US 11: North Syracuse to South Salina	2.7	Medium: 3
	I-81 Express: Central Square to Downtown/Univ Hill	2.3	Medium-Low: 2
	Liverpool/CR 57: Great Northern Mall to Downtown/Univ Hill	2.3	Medium-Low: 2
	Destiny USA/RTC to Syracuse University	3.0	Medium: 3
	Genesee St/Erie Blvd: Camillus to Fayetteville	2.3	Medium-Low: 2
	James St/South Ave: OCC to East Syracuse	2.7	Medium: 3
	Butternut St/Onondaga St: Northside to Western Lights	2.3	Medium-Low: 2
2: BRT	US 11 Local	2.7	Medium: 3
	I-81 Express	2.3	Medium-Low: 2
	Western Lights – Carrier Circle	2.3	Medium-Low: 2
	Genesee St/Erie Blvd (NY 5) Corridor	2.3	Medium-Low: 2
	East Syracuse – OCC	2.7	Medium: 3
	Syracuse University/Liverpool	2.3	Medium-Low: 2
3: LRT	Base Loop	4.0	Medium-High: 4
	Solar Street Extension	4.0	Medium-High: 4
	OnTrack Extension	3.3	Medium: 3
	Salina Street	4.0	Medium-High: 4
	James Street	3.7	Medium-High: 4

5.5 Evaluation Results

5.5.1 Final Corridor Ratings

In order to complete the FTA-based evaluation of the corridors, a final score and rating was computed utilizing the category weights specified in **Section 5.2**. The corridors were then ranked based on the weighted average score as shown in **TABLE 5.26**. Again, it should be noted that, while the STSA utilizes an evaluation methodology based on guidance provided in FTA's New Starts and Small Starts program, additional more-detailed analyses would be required for many of these categories in order to satisfy the FTA criteria to the fullest extent possible. The ratings below are only meant to provide a guide for decision makers to prioritize further analysis of the corridors and enhancements that would provide the most improvement in the performance of the transit system, as well as those that would be most likely to receive FTA funding.

The final results of the evaluation show that the Destiny USA/RTC to Syracuse University corridor under the Base Build Strategy ranked the highest overall, and is the only corridor ranked Medium-High. This corridor would serve the highest density sections of the City, and would connect multiple redevelopment areas. In addition, it would serve a significant transit-dependent population, including low-income, the elderly, and students. The most notable corridor is the James Street/South Avenue corridor, which is ranked number two through four under each of the enhancement strategies. This shows that there is potential for a higher-intensity BRT or LRT service along this corridor. Furthermore, the Salina Street and Solar Street LRT extensions also appear high in the rankings at numbers six and seven, respectively.

In addition to improving connections within the City of Syracuse, the results of the evaluation show potential for implementing Strategy 1 on many of the enhancement corridors, including an express commuter bus service on I-81 that would serve multiple park-and-ride facilities between Central Square and Downtown/University Hill. Furthermore, while not specifically called out in the evaluation results, the construction of a second transit hub on University Hill is key to the success of the enhancements. If the secondary hub was not constructed, it is likely that many of the rankings shown in **TABLE 5.26** would drop.

Recommendations and an implementation strategy, based on the evaluation results, will be presented in **Chapter 6**.

TABLE 5.26: Final Corridor Ratings

Ranking	Corridor	Strategy	Weighted Average Score	Corridor Average Rating
1	Destiny USA/RTC to Syracuse University	1: Base Build	3.71	Medium-High: 4
2	James St/South Ave: OCC to East Syracuse	1: Base Build	3.21	Medium: 3
3	East Syracuse – OCC	2: BRT	3.15	Medium: 3
4	James Street	3: LRT	3.05	Medium: 3
5	I-81 Express: Central Square to Downtown/Univ Hill	1: Base Build	3.01	Medium: 3
6	Salina Street	3: LRT	2.91	Medium: 3
7	Solar Street Extension	3: LRT	2.91	Medium: 3
8	Genesee St/Erie Blvd: Camillus to Fayetteville	1: Base Build	2.85	Medium: 3
9	Butternut St/Onondaga St: Northside to Western Lights	1: Base Build	2.83	Medium: 3
10	US 11: North Syracuse to South Salina	1: Base Build	2.82	Medium: 3
11	Genesee St/Erie Blvd (NY 5) Corridor	2: BRT	2.79	Medium: 3
12	US 11 Local	2: BRT	2.78	Medium: 3
13	Liverpool/CR 57: Great Northern Mall to Downtown/Univ Hill	1: Base Build	2.77	Medium: 3
14	Syracuse University/Liverpool	2: BRT	2.72	Medium: 3
15	Downtown-University Hill Loop	3: LRT	2.71	Medium: 3
16	OnTrack Extension	3: LRT	2.58	Medium: 3
17	Western Lights – Carrier Circle	2: BRT	2.54	Medium: 3
18	I-81 Express	2: BRT	2.08	Medium-Low: 2

5.5.2 Needs

The results of the evaluation show that there is potential to advance several corridors for further study and application for FTA funding. Corridors ranking Medium or higher could qualify for FTA funding. However, CENTRO and other stakeholders within the Syracuse metropolitan area should consider addressing low-scoring criteria in order to increase the corridor ratings and improve the chances of receiving funding.

It is unlikely that ridership projections could be significantly improved for these options because they are based on regional travel patterns. However, during the evaluation process, multiple regional and corridor needs were identified that, if addressed, could increase the overall ranking of a corridor. These needs are primarily related to land use and zoning, and include:

- Establishment of Growth Management plans for all municipalities along the transit enhancement corridors.
- Development of transit-supportive land use policies for all municipalities along the transit enhancement corridors.
- Development of regulations and financial incentives to promote transit-oriented development along the transit enhancement corridors.
- Prioritizing/incentivizing transit-oriented development on redevelopment sites along the transit enhancement corridors.
- Development of affordable housing plans for all municipalities along the transit enhancement corridors.
- Dis-incentivizing single occupancy vehicle trips to Downtown and University Hill by reducing parking capacity through redevelopment and/or increase parking fees.

All of these needs could be addressed by regulatory agencies, including municipalities, within the study area, to proactively plan for the future transit enhancements and increase the ratings for the Economic Development and Land Use criteria. Guidance for addressing these needs will be discussed further in **Chapter 6**.

CHAPTER 6 – Recommendations and Implementation

The ranking system used in **Chapter 5** is intended to be used as a guide to estimate the corridors that would be best suited for various levels of transit enhancements. However, the STSA and its rankings alone should not be considered as a final transit planning effort before implementation. The region must actively engage in a transit-supportive planning process to provide a sustainable environment for the implementation of the transit enhancement strategies, particularly for higher-intensity transit enhancements. Multiple stakeholders, including the public, CENTRO, SMTC, municipalities, Onondaga County, and NYSDOT must work together to develop transit-supportive land use, zoning, housing, and parking policies. Without transit-supportive policies, FTA funding will be difficult to acquire, and the long-term sustainability of the transit enhancement strategies may be jeopardized.

This section will present recommendations for the transit enhancement strategies, and will identify and recommend land use/zoning, parking, and transportation policy options that could be considered to address the needs identified in **Section 5.5.2**. Finally, an implementation timeline will be developed that will provide short-, mid- and long-term objectives for the implementation of the recommended transit enhancement strategies, as well as the recommended policies.

6.1 Recommendations for Transit Enhancements

Based on the results of the evaluation, several corridors and strategies should be advanced for further study and implementation. The recommendations are provided below. It should be noted that the order in which they are presented below does not indicate order of importance, or in what order they should be implemented. Refer to **Section 6.3** for an implementation strategy.

A. Implement Strategy 1 (Base Build) on Selected Routes

Strategy 1, Base Build, provides a variety of enhancements that represent a lower-level investment in the transit system. The majority of the enhancements, such as route consolidation, expanded operating hours, decreased headways, and improved signs and amenities, are relatively low cost and can be implemented by the agency with little additional analysis. The evaluation shows that these enhancements would improve overall transit service along the corridors, limit the need for transfers, enhance mobility, and potentially increase ridership. Six of the top ten ranked enhancements/corridors fall within Strategy 1. Therefore, it is recommended that Strategy 1 be implemented on the following corridors:

- Destiny USA/RTC to Syracuse University
- James Street/South Avenue: OCC to East Syracuse
- Butternut Street/Onondaga Street: Northside to Western Lights
- Genesee Street/Erie Boulevard: Camillus to Fayetteville
- US 11: North Syracuse to South Salina

B. Construct a New Transit Hub on University Hill and Supporting Infrastructure

It is also recommended that a new transit hub be constructed on University Hill, and that all bus routes that currently serve the Downtown Syracuse Transit Hub be modified to also serve the new University Hill hub. This recommendation would require the implementation of bus-only lanes and transit signal priority between the two hubs to facilitate connectivity and minimize transit travel time. The dual-hub system is essential to each of the strategies identified in this document and is critical to improving transit access to the major employers on University Hill. It would improve access to the University Hill area by significantly reducing the number of transfers needed to access University Hill, and would make University Hill a one-seat ride on most routes. Furthermore, requiring buses to serve both hubs would improve circulation between Downtown and University Hill by significantly increasing the number and frequency of buses traveling between the two locations.

Unlike the implementation of Strategy 1 on selected routes, construction of a new University Hill hub will be more costly, and will require additional study to identify the optimal location for the hub. It is recommended that the new hub be relocated from its current location on College Place, to a more centralized location in the area of Adams and Harrison Streets. While the location of the current hub provides optimal service for the University, it falls outside of a reasonable walking distance for many of the large employers, including the hospitals. A new transit hub in the Adams/Harrison Street area would maintain access to the University and improve access to the hospitals, while supporting expansion of Syracuse University and other infill development on the north side of University Hill.

In order to accommodate the increase in bus service associated with Strategy 1, bus lanes and transit signal priority are recommended for the transit corridors that fall within Downtown and University Hill. At a minimum, bus lanes and signal priority should be installed on the east-west streets that will connect the Downtown Syracuse Transit Hub with the new University Hill Transit Hub. However, effort should be made to also install bus lanes and signal priority on the roadways identified in **FIGURE 4.3**. The proposed bus lanes would be installed by restriping an existing travel lane, or removing a parking lane. This low-cost bus lane solution would help to facilitate the increased bus activity along the streets within the urban core that will result from the expanded operating hours and decreased headways. It would also make transit more visible within the City.

C. Begin a Commuter-Based Service Along I-81 from Central Square to Downtown/University Hill

The implementation of an I-81 Express service between Central Square and Downtown/University Hill is the fifth highest ranked service, but the third highest ranked corridor considering that the James Street/South Avenue corridor occupies ranks two through four. Given the significant population within suburban communities along I-81, north of the City, there is potential for a commuter service that is centered on park-and-rides at interchanges along I-81. Providing a commuter service will require additional study to identify the optimal location of park-and-rides, as well as opportunities to enhance existing park-and-ride facilities along the corridor. It is recommended that the park-and-ride guidelines, presented in **Section 4.1.3.3**, be considered when planning and designing the facilities.

D. Pursue Higher-Intensity Transit Services along the Destiny/RTC to Syracuse University and James Street/South Avenue Corridors

As stated earlier, the Destiny/RTC to Syracuse University Corridor (Base Build) and the James Street/South Avenue corridor (Base Build, BRT, LRT) were the top four ranked corridors/enhancements. In addition, it should be noted that a portion of the alignment of the Destiny/RTC to Syracuse University corridor would also fall on the Salina and Solar Street Extensions, which ranked sixth and seventh. Therefore, the Destiny-Syracuse University and James Street/South Avenue corridors, under the various enhancement strategies, represent six of the top ten ranked enhancements.

The results of the evaluation show that these corridors would provide the best opportunity to implement and sustain higher-intensity transit services, such as BRT or LRT. Furthermore, they would likely have the best chance of obtaining FTA New Start or Small Starts funding, particularly if the City of Syracuse is proactive and addresses the policy changes that are needed to support transit investments. Therefore, it is recommended that CENTRO proceed with an alternatives analysis that will be utilized to pursue FTA funding (see **Section 6.3**).

It is not recommended that CENTRO pursue any enhancements ranked eleven or below at this time. The evaluation of these enhancements shows that they would result in fewer benefits to the transit system, and would be less likely to obtain FTA funding. However, these enhancements could be re-evaluated in the future once the above recommendations have been implemented. It is possible that improved transit services on the corridors recommended above could result in the potential to upgrade additional corridors to BRT or LRT.

6.2 Transit-Supportive Policy Guidance and Recommendations

The development of transit-supportive policies is critical to improving the likelihood of obtaining FTA New Starts or Small Starts funding for the various projects, as well as sustaining higher-intensity enhancements, such as BRT or LRT. Transit-supportive policies have the potential to enhance the transit oriented travel market, which could provide additional ridership benefits to the enhancement strategies, beyond what was estimated in this study. All regional stakeholders must work together to address transit-supportive policy needs to create a cohesive transit environment within the Syracuse metropolitan area. However, a significant challenge to the development and implementation of transit-supportive policies is balancing transit needs with the needs of businesses, employees, and residents that occupy areas around the transit corridors. This section will present a variety of policies that could be considered in the Syracuse area, and provides recommendations for their implementation.

6.2.1 Growth Management Plans

Growth Management plans provide decision makers with guidelines and tools to ensure that population and economic growth is conducted in a way that maximizes the use of available resources, infrastructure, and services, as well as providing the foundation for the expansion of infrastructure and resources to keep pace with growth. Growth Management plans can sometimes be referred to as “Comprehensive Plans” or “Sustainability Plans”. In general, these types of plans outline a municipality or county’s vision for the future, and translates that vision into policies, programs, and public investments. While transportation policies only make up a portion of a Growth Management plan, it is

critical that all municipalities, as well as Onondaga County, begin to develop their own Growth Management plans, or update existing plans, to account for future transit investment.

6.2.1.1 City of Syracuse

The *City of Syracuse Comprehensive Plan 2040* identifies the need to promote a right-sized transportation network, and calls for an investigation of the transit system to identify opportunities for enhanced transit service. In addition, the plan calls for an overhaul of the City's zoning ordinance to develop regulations that are consistent with the character of the communities it is located within. As part of the overhaul, the plan calls for preserving open space, promoting transit-oriented development, and protecting historic buildings and designed landscapes. Finally, the plan identifies the need to explore sustainable modes of mass transit, as well as the need for coordinating parking among private property owners and business improvement districts.

In addition to the long-range vision provided in the Syracuse Comprehensive Plan, the City of Syracuse also engages neighborhoods through the Tomorrow's Neighborhoods Today (TNT) program. The City's eight major neighborhoods are responsible for the development and maintenance of 5-year plans that include a comprehensive vision for the diverse neighborhoods, 5-year goals and objectives, prioritized action plans, resource requests, budgets, recommendations, and timelines for completion. The plans also act as advisory documents for the Syracuse Comprehensive Plan. Most of the plans address community issues such as open space, economic development, and residential vacancies. However, few address transit needs.

In order to provide a sustainable environment for the transit enhancements, particularly the BRT and LRT options, transit must be integrated into the City's Comprehensive Plan, as well as local neighborhood plans. Therefore, the following recommendations should be considered by the City:

- Incorporate the recommendations of the STSA into the next Comprehensive Plan update and establish land use/zoning and infrastructure goals that support the transit enhancement strategies (see TOD zoning guidance in **Section 6.2.2**).

- Incorporate the recommendations of the STSA into SMTC's Long Range Transportation Plan. The Plan should utilize a "transit first" policy. Stakeholders should explore ways to address transportation problems with alternative transportation modes before looking to auto-centered improvements, such as roadway widening.

- Reach out to the City's eight neighborhoods to discuss how the findings of the STSA may affect their community. Encourage them to incorporate the proposed transit enhancements into their 5-year plans by setting goals for transit-oriented development, infrastructure, and streetscaping improvements along transit enhancement corridors.

- Work with the neighborhoods to establish transit committees that will serve as liaisons between the CENTRO and the public on future transit projects and studies.

- Engage the neighborhoods when developing corridor branding and streetscaping for the transit enhancement corridors.

6.2.1.2 Onondaga County and its Municipalities

Onondaga County is currently updating its *Sustainable Development Plan* with a focus on settlement patterns that will provide for future growth that is sustainable and takes advantage of existing resources. The Sustainability Plan will supersede the *2010 Development Guide* and the *Framework for Growth in Onondaga County*, which were both prepared in 1998. Similar to the City of Syracuse, Onondaga County recognizes that the current regional trends in development are straining the region's resources, often requiring a substantial amount of new infrastructure, while leaving established areas underutilized and vacant. Therefore, the *Sustainable Development Plan* will focus on encouraging infill development. The transit enhancement corridors recommended in the STSA could provide additional guidance for the Plan by providing areas in which to focus higher-density transit-oriented development.

In addition to the Sustainability Plan, the *Onondaga County Settlement Plan* (2001) encourages the municipalities of Onondaga County to improve quality of life through a renewed focus on neighborhoods. The plan consists of regional and local pilot projects. The Regional Plan provides a countywide framework that can be utilized by municipalities to make smart growth decisions. It includes a focus on growth within existing urban centers, a plan to maintain open space, and a series of transportation policies that support alternative transportation modes. Specifically, the plan calls for a better balance between modes, reducing on-site parking along transit corridors, and a reinforcing the neighborhood structure around transit stops.

In addition to the Regional Plan, eight pilot projects were completed to represent solutions for a variety of problems that face municipalities within the County. They provide an example for other municipalities to follow when addressing these problems. The pilot projects include a municipal settlement plan, urban neighborhood improvement plan, brownfield redevelopment plan, village retrofit (changing the character of highways that lie within communities from a throughput focus to a community focus), plans to retrofit defunct malls and shopping centers, and plans for developing around existing villages and hamlets. Each of the plans focus on traditional neighborhood-style development patterns, which reduce vehicle trips, and promote walking, bicycling, and transit.

Based on the review of the above-mentioned reports, it is evident that Onondaga County is committed to sustainable growth throughout the County, and has provided the tools and guidance for municipalities to develop their own Growth Management plans, as well as guidance to address specific issues, such as blighted retail sites and brownfields. The STSA provides an excellent opportunity to focus the recommendations of these plans and policies along the transit enhancement corridors. As such, the County and its municipalities should consider the following recommendations:

- Incorporate the transit enhancement corridors and strategies from the STSA into the County's Sustainable Development Plan by encouraging transit-oriented infill development (see **Section 6.2.2**).

- Engage local municipalities in the future planning and implementation of transit improvements along the enhancement corridors.

- Encourage local municipalities to update existing municipal plans to incorporate the transit enhancement corridors.

- Engage residents of municipalities that live near the transit enhancement corridors when conducting future transit studies. Establish transit committees within these communities to serve as liaisons between CENTRO and the neighborhoods/municipalities.

6.2.2 Land Use/Zoning

One of the most significant needs identified in **Section 5.5.2** is the development of transit-supportive land use/zoning policies along the transit enhancement corridors. Land use elements of transit-oriented development (TOD) include mixed-uses, higher-density, and effective parking management.

6.2.2.1 Mixed-Use Development

The first key element of successful TOD is the appropriate mix of compatible land uses. The organization of the areas surrounding a transit center or station should be characterized by a balanced combination of residential, commercial, community, public, and open spaces, with two or more of these uses often found within the footprint of the same building. A common example is a residential high-rise building with retail and restaurants at ground level. However, the flexibility exists for any mix of uses to be developed as long as it meets the standards set by the TOD zoning requirements.

Mixed-use development helps TODs cater to the daily activities of the transit user, as well as the daily activities of the residents and employees of the community. They create a sense of place by providing a vibrant mix of uses that increase the probability that residents and transients of the community will access the variety of products and services by transit, walking, or cycling, instead of by auto. Fewer automobiles on the road results in less demand for parking, an improvement in air quality, and a more pleasant walking and bicycling environment.

In addition to quality-of-life benefits, mixed-use development offers economic benefits and advantages to both transit agencies and developers. Thriving development leads to increased street activity throughout the day, increasing transit ridership during peak and off-peak hours. Constant transit demand balances bi-directional flow, optimizes capacity, and may justify better service in the future. Belzer and Autler (2002) state that, by developing an area with a mix of uses, developers may have more flexibility when responding to market demands and may have greater protection against market volatility. In addition, it may be easier for some developers to finance smaller increments of different development products than one large single use, particularly in areas with market uncertainty, because the project risk is spread among a wider variety of lenders and investors. For example, mixing residential with retail can result in the creation of potential customers for that retail.

6.2.2.2 Higher-Density Development

Mixed-use development attracts not only more retail customers that travel to shop via transit, but also more potential residents that desire the convenience of living and working near transit. TODs can meet this demand by developing a mix of housing and commercial space at higher densities. Successful TODs have the highest densities located as close to the transit center or station as possible with a gradual transition to lower-density uses. This strategic concentration of residences, businesses, and other activity places allows customers to perform numerous daily activities within a short walk of transit services.

Because the sizes of TOD communities vary greatly from villages to large cities, “higher-density development” is a relative term. When planning this type of development, the town of Danbury,

Connecticut offers the general guideline that the density should be greater than the community average. According to Bernick and Cervero (1997), the minimum residential density should be 15 housing units per acre for an urban TOD with a mix of housing types, including single-family houses, duplexes, multi-family housing, townhomes, condominiums, and apartments. In large cities, however, this standard may not be sufficient: high-rise apartment buildings in TOD-designated areas may require more than 50 units per acre. Standards for commercial spaces rely on floor area ratios (FAR). TODs that are more successful will have minimum FAR values of one and maximum FAR values that are appropriate to the community.

Methods that may be employed to meet established TOD density requirements include compact development, infill development, and increases in building heights. It is also noted in a TCRP Research Results Digest (October 2002 – Number 52) that some "landowners can trade unused development rights to other parcels in return for income, allowing densities to be stacked up higher near transit stations than they would be otherwise." The transfer of development rights has been used for TOD projects in New York City, Toronto, Portland, and Raleigh.

6.2.2.3 TOD Parking

Under traditional zoning codes, mixed-use and higher-density developments would require a substantial amount of parking. However, providing too much parking within a TOD, particularly for retail and office uses, can discourage transit use. Effective parking management must be a component of any TOD. Governing bodies should be sure to carefully evaluate parking requirements associated with TOD zones and develop requirements that support transit. Effective parking management strategies include:

- Less Parking: Minimum parking requirements for new development can be reduced or eliminated altogether. Redevelopment can occur on existing surface lots without replacing all of the lost spaces.

- Fee- or Time-Based Parking: Free, unlimited parking encourages driving and increases parking demand. Establishing parking fees for retail and office uses can assist in reducing parking demand.

- Alternative Parking Design: Traditionally, parking is located in front of a building and is not pedestrian-friendly. With TOD, parking should be located in the rear of a building, or have building frontages that wrap around the lot. This creates a more attractive sidewalk and road frontage.

6.2.2.4 Zoning Policies

Zoning policies that support the land use characteristics of successful TODs, mentioned above, are translated into zoning ordinances in the implementation phase of transit-oriented development. Traditional zoning ordinances dictate requirements for lot sizes, uses, parking, setbacks, gross floor area coverage, and building height. TOD-specific zoning can establish maximum parking requirements instead of minimum parking requirements, require parking and showers for cyclists (as seen in Atlanta's Lindbergh Station District), reduce lot size, and decrease setbacks in order to encourage zero-lot-line development.

A. TOD-Specific Zones

According to TCRP Report 102 *Transit-Oriented Development in the United States: Experiences, Challenges, and Prospects* zoning implementation methods that support TOD are rezoning, designating new transit zones, and placing overlays. Transit zones specify permissible land uses throughout the whole zone that meet aforementioned land use requirements. Overlays are placed over base zones to modify their regulations, and are a less complex way to gain more effective land-use control. Numerous U.S. cities and towns including San Diego, Portland, San Antonio, Durham, NC, and Bayonne, NJ have promoted mixed-use development by introducing overlay zones.

B. TOD-Supportive Zoning Policies

Communities that have successful transit-oriented development have also introduced different types of zoning initiatives that encourage developers to meet mixed-use and higher-density goals through a system of rewards. These initiatives include:

- Incentive Zoning: Developers are allowed to build more densely than current zoning may allow provided they also include community improvements within their projects. This is also known as a density bonus. In Seattle, incentive-zoning policies allow developers to build above existing base zoning as long as the additional square footage includes a certain percentage of affordable housing units. If developers do not meet this requirement, they are assessed an additional fee that is paid directly into the city's affordable housing fund.

- Performance Zoning: Local agencies and planning boards may set planning goals and performance criteria for a TOD. In return for developers meeting the criteria, they are allowed to mix several uses on the same site. In the Bedford, NH US Route 3 Corridor Performance Zoning District, performance standards are used to improve aesthetics by specifying appropriate development densities while permitting a wide range of uses.

- As-of-Right Zoning: Developments that meet transit-supportive zoning regulations as set forth by the local planning agency are allowed to build as-of-right, without special permits and/or variances. This type of zoning is typical even of non-TOD zones in communities throughout the country – if a project meets all requirements such as parking, setbacks, and lot coverage, it is permitted.

- Inclusionary Zoning: Inclusionary zoning permits developers to construct bigger projects in exchange for including a certain number of affordable housing units. As of 2013, 2,700 affordable housing units have been built under this type of policy in New York City.

- Interim Zoning: Interim zoning is used to freeze specific types of development in certain areas while local planning boards revise, create, adopt, or address existing and/or proposed zoning ordinances. In the process of planning and constructing the Westside LRT in Portland, OR, interim zoning was used to prohibit auto-oriented uses within a ½-mile of stations. In addition, the interim zoning policy set density and parking requirements. Although not used to reward developers initially, this strategy may result in future policies that do.

6.2.2.5 Taxation Policies

Tax incentives established by federal, state, and local tax policies can be used to help finance and spur construction of TOD projects. On the local level, communities can offer tax abatements to developers, sell tax-exempt bonds, or create a tax-increment financing (TIF) district. Other programs at the state and federal levels also offer incentives for specific aspects of a project, such as the inclusion of affordable/low-income housing or investments in a low-income community.

A. Tax Abatement

Also known as property tax relief, tax abatements have been used for both residential and commercial purposes in TODs. For example, in 1996, Minnesota gave a 12-15% tax break to commercial and industrial businesses that chose to locate within ¼ mile of a high-frequency rail or bus station. Typically, tax abatements last over a number of years and can either defer the developer's taxes or gradually phase them in.

B. Tax-Exempt Bonds

A popular way to raise immediate funds for TOD is bond floating. Because repayment is guaranteed through specific municipal tax revenues, the bonds are tax-exempt. However, the federal government places restrictions on the number of bonds that can be generated through private activities. This restriction also applies to IRS Rule 63-20 and Revenue Proclamation 82-26, which enables private investors to issue bonds through a recognized nonprofit corporation. As a result, states and local municipalities are cautious about deciding which competing projects receive funds from bond sales.

C. TIF Districting

Tax-increment financing (TIF) districts are frequently used to finance TOD through the initial sale of bonds, both tax- and non-tax-exempt. These districts then set a base-year tax level for development, and as property values increase over time, the tax revenue generated above the base-year amount is set aside for use only within the district. The additional revenue is used for maintenance or improvements to other projects and services, as well as the repayment of bonds. This ensures long-term investment by developers and a successful redevelopment zone around the station area.

Since tax-increment financing is not limited to transit-oriented development areas, municipalities can also establish other zoning and districting policies that complement TIF to meet their various TOD goals. In Pennsylvania, where state law dictates that TIF districts are limited to no more than one-tenth of a municipality's total land value, the city of Pittsburgh developed a transit revitalization investment district (TRID) that focuses on smart community planning. Pittsburgh's significant efforts to link transit and land use has resulted in one of the highest transit mode shares in the US (18%). In Seattle's Puget Sound Region, planners can designate a local improvement district (LID) that does not set a base-year tax level and instead assesses a special property tax on benefitted properties.

D. Mixed Funding Sources

Developers and other TOD investors can also take advantage of tax incentives at the state and federal levels of government to obtain additional project financing. In Cleveland, Ohio, the success of the Euclid Avenue BRT Corridor was due to the variety of funding sources, including the Federal Historic

Preservation Tax Incentives program, New Markets Tax Credits, and Low-Income Housing Tax Credit program, programs that are all managed at the federal level.

Transit corridors that run through a Department of Housing and Urban Development (HUD)-designated empowerment zone (EZ) or enterprise community (EC) are able to qualify for grants and tax credits. Development in these areas, usually found in depressed inner-city neighborhoods, can receive special consideration for additional types of federal funding as well. In San Diego, a shopping center near a trolley stop was constructed with EC funds; the same occurred in Buffalo and Baltimore around light rail stations.

6.2.2.6 TOD Examples

The following examples showcase different aspects of TOD land use and zoning policies, utilized in communities around the nation, that could be applied in Syracuse.

A. LYNX Blue Line (Charlotte, NC)

In 2007, the Charlotte Area Transit System (CATS) opened the LYNX Blue Line, a 9.6-mile LRT service that runs from I-485 at South Boulevard to uptown Charlotte. The line is located in a "designated transit corridor" that is zoned to support transit-oriented development. During the planning phase, the local government established TOD regulations and a pedestrian overlay zone, and promoted new and infill high-density development and redevelopment along the corridor. In particular, The South End, a historic Charlotte neighborhood, has integrated mixed-use, higher-density, and effective parking management in new development by putting active uses on the first floor and locating parking in the rear of the development. Zoning regulations include specifics on building heights, shorter setbacks, and street walls.

B. Canton Junction (Canton, MA)

In 2000, after years of decline, the town of Canton adopted the "Canton Center Economic Opportunity District Bylaw" to revitalize its downtown and create a transit-oriented community around its commuter rail station. The bylaw rezoned the downtown by combining three distinct zones that were not TOD-supportive and changed the regulations to encourage TOD by creating an overlay zone. The new regulations increased allowable densities, supported mixed-use development, and permitted shared parking strategies to manage parking demand. The bylaw also includes provisions to permit special uses through a performance zoning initiative.

C. Orenco Station (Hillsboro, OR)

In 1998, when TriMet Westside extended its MAX Light Rail service through Hillsboro, Oregon, the neighborhood of Orenco Station was planned as a pedestrian-friendly urban town center. Within a ½-mile of the station, Hillsboro's zoning ordinance identifies four different areas that comprise a Station Community, incorporating commercial, residential, conservation, and industrial land uses. The town center contains mixed-use retail, limited on-street parking with lots tucked behind buildings, a variety of housing that is affordable and market-price, and a residential density of 16 units per acre. Today, plans exist for a new "platform district" which will create a four-acre park, a public plaza, add three buildings, and revise TriMet service and park & rides in the vicinity of the station.

6.2.2.7 Recommendations for Syracuse and the Region

The identification of the transit enhancement corridors in the STSA presents an opportunity to apply many of the TOD measures described in this section within the City of Syracuse, as well as other municipalities that lie along the corridors. Specifically, the City of Syracuse should work with land use experts, SMTC, CENTRO, and the public to develop a TOD zoning overlay for sections of the City that lie within ¼ to ½ mile of the transit enhancement corridors. When developing the TOD overlay, consideration should be given to the TOD guidance provided in the above sections. TOD overlay requirements within Downtown and University Hill should specify higher-density mixed uses that include residential, office, retail, and institutional, with lower parking requirements, and incentives for providing affordable housing. TOD overlay requirements in other sections of the City could utilize lower density requirements and could exclude requirements for office uses, but should maintain a similar effort to reduced parking and incorporate affordable housing. The City should also explore implementing tax incentives for TODs within the City, particularly within designated redevelopment areas.

Outside of the City, municipalities should also consider implementing TOD overlays along portions of the transit enhancement corridors. While stop location and service type is unknown at this time, municipalities can begin to plan for future transit enhancements along the corridors by implementing smart zoning policies in the short term. Municipalities can start by developing preliminary TOD overlay requirements that encourage mixed uses, lower parking requirements, and require buildings to be placed along the roadway with parking behind. They can also identify preferred locations for transit stops and adjust the TOD requirements in the station areas to focus on providing a mix of densities. Higher densities and mixed uses should surround a transit stop, with lower-density residential in the periphery. In addition, TOD zoning overlays should include requirements for pedestrian and bicycle facilities, and offer zoning and/or tax incentives for meeting affordable housing requirements.

6.2.3 Central Business District Parking Policies

The overabundance of parking within Downtown and University Hill is a significant hurdle to enhancing transit, particularly transit service geared towards commuters. The general public perception of parking within the City is there is not enough and/or that it is too expensive. However, in reality, parking is plentiful and low-cost, when compared to other similar-sized metropolitan areas. The results of the evaluation of the transit enhancement strategies show that there are approximately 0.52 parking spaces per employee within Downtown and University Hill. This equates to a “Low” rating under the FTA criteria. In order to provide a sustainable environment for transit within Downtown and University Hill, the City must consider a variety of parking policies to reduce the amount of new parking constructed within these areas, as well as ways to discourage parking within existing facilities and incentivize transit use.

However, given the car-centric nature of the Syracuse metropolitan area, a revision in parking policies must be considered in conjunction with potential social and economic effects. Any changes to parking policies must be coordinated with enhancements to the transit system and vice versa. For example, a significant increase in parking fees without transit enhancements could result in some businesses moving from Downtown or University Hill to suburban office parks where parking is typically free and plentiful.

6.2.3.1 Parking Taxes

Parking taxes are the primary methods used by municipalities to increase parking costs across the board. Municipalities utilize parking taxes as a way to recoup the costs of city services from commuters, discourage single-vehicle occupancy trips, and raise revenue for transportation/transit infrastructure. The Center for Regional Analysis at George Mason University conducted an inventory of cities in the US that have implemented parking taxes. The resulting study, *Parking Taxes in U.S. Cities* (2004), found that more than 49 cities across the US implement parking taxes. Cities of all sizes implement parking taxes, from Brookpark, Ohio (population: 21,218) to New York City (population: 8,008,278). Furthermore, it is likely that many more cities impose a tax on parking than were identified in the study. Some cities implement fees in the form of a sales tax; therefore, the tax on parking was not readily identifiable.

Based on the data contained within the study, most parking tax rates were found to be within the 7% to 12% range. The weighted average tax rate was determined to be 11.1%. Pittsburgh, Pennsylvania had the highest tax rate (50%), while Phoenix, Arizona had the lowest (1.9%). When looking more closely at cities of similar size as Syracuse (population between 100,000 and 200,000), the average parking tax was 7.75% (**TABLE 6.1**). Berkeley, California had the highest tax rate (10%), while Stamford and Hartford, Connecticut had the lowest (6%).

TABLE 6.1: Parking Tax Rates for Cities with a Population between 100,000 and 200,000*

City	Population	Parking Tax Rate
Berkeley, CA	102,743	10.0%
Chattanooga, TN	155,554	9.25%
Hartford, CT	121,578	6.0%
Jackson, MS	184,256	7.0%
Knoxville, TN	173,890	9.25%
Little Rock, AR	183,133	6.63%
San Antonio, TX	144,646	7.88%
Stamford, CT	117,083	6.0%
	AVERAGE	**7.75%**

*Data Source: *Parking Taxes in U.S. Cities,* George Mason University, 2004.

There are various methods to applying parking taxes. The most common method is to apply the tax as a percentage of the daily or monthly parking fee. In this instance, the parking tax is applied in a similar manner as a sales tax. However, this type of tax may disproportionately affect daily parking more than monthly parking because monthly parking rates are typically applied at a lower equivalent cost per day than daily parking fees. Therefore, a person paying a daily parking fee every day for a month could pay more in parking taxes than a person with a monthly pass for the same period. When implementing this type of tax, some cities apply the same rate at all parking facilities, while others, like Chicago, implement

a tiered structure where parking in downtown facilities is taxed at a higher rate than facilities in outlying areas.

Another method of applying a parking tax is to apply a flat tax per space. This method is far less common within the surveyed cities, but can be used to apply a more balanced tax rate between daily and monthly parking spaces. In some instances, a combination of a flat tax and a percentage tax is employed. The City of Baltimore applies a flat tax of $15 per monthly contract space (as of July 2003), while utilizing a 12% rate on daily parking (George Mason University, 2004).

Finally, some smaller municipalities have implemented a minimum per-hour or per-month rate. This is sometimes done in areas where the majority of parking is government owned, or where market forces have led to very low parking fees.

In addition to taxes applied to the parking activity itself, it is also possible to increase parking fees through a revision to how property taxes are applied to parking facilities. In many cities, a lower property tax rate is applied to parking facilities than would be applied to a building on the same parcel. This is particularly true for surface parking lots, which are taxed at the same rate as vacant lots in many US cities. This practice is especially detrimental to urban development in older, rust belt cities like Syracuse, where parking lots have taken over urban cores. With a lower tax rate and limited demand for redevelopment, vacant or underperforming buildings are torn down to make room for parking. Furthermore, applying a lower tax rate to parking facilities does not allow a municipality to account for the impact they have on city services, particularly the roadway infrastructure.

6.2.3.2 Parking Policy

Municipalities often set parking requirements for specific types of development based on their size, and in many cases, these requirements lead to an overabundance of parking that promotes and incentivizes vehicle trips over alternative modes of transportation. Therefore, a municipality can have a direct impact on the amount of parking constructed within a certain area by modifying these requirements.

Many large cities across the US already implement restrictions on the amount of parking that can be constructed within the urban core. For example, Manhattan has imposed parking maximums within its core to reduce the number of parking spots developers can create. The City of Buffalo is currently experiencing a boom in the healthcare and education industries, much of which is focused on the north side of the City, along the Metro rail line. Traditionally, this area has been zoned for lower-density, auto-friendly uses. However, recent changes to the zoning policies within the City have refocused development along this section of the corridor. The City is now focusing on higher-density, transit-oriented development that is centered on Metro stops. In addition to the higher density, residential parking requirements have been reduced, and the amount of parking constructed for office, medical, and institutional uses, has been restricted in an effort to promote transit use along the Metro rail corridor.

6.2.3.3 Changing the Parking Landscape in Downtown and University Hill

The abundance of parking within Downtown and University Hill is a direct result of, as well as a contributor to, the region's auto-dependency, and shift away from transit. Supporting enhanced transit options will require that the City reconsider multiple aspects of parking: from the amount of parking

that is required for development within the Downtown and University Hill to dis-incentivizing parking through additional fees.

Much of Downtown lies within the Central Business District (CBD) zoning area, which is characterized by higher-density mixed-use development. Parking lots and parking garages are permitted uses within the CBD zones. While there are not specific parking requirements, it should be noted that the maximum permitted structural coverage within the CBD is 70%, but the maximum permitted parking coverage is 100%, which could potentially incentivize parking uses.

Most parcels within University Hill fall within the Planned Institutional District (PID), Residential District Class B (RB), or Local Business District Class A (BA). Districts RB and BA utilize general parking requirements established for the City as a whole under Part C Section 3 of the zoning code. The PID district has specific parking requirements; however, the amount of spaces required for each land use within the PID is similar to that of the general requirements established in Part C Section 3. The special parking requirements associated with the PID district primarily dictate the maximum distance parking can be provided from the building it is intended to serve. Given the amount of existing and planned growth within the University Hill area, there is an opportunity to consider revising the parking policies to reduce the requirements, and promote transit use.

Based on the assessment of parking taxes and policies across the US, as well as a review of current parking requirements within zones inside Downtown and University Hill, the City of Syracuse should consider the following recommendations:

- Implement a parking tax (7% to 8%) on surface parking lots and parking garages within Downtown and University Hill, and apply the revenue gained to funding alternative transportation modes (transit, pedestrian, and bicycle).

- Reduce the amount of parking required in the zoning code for all zoning districts that lie within Downtown and University Hill, or incorporate new parking requirements within a new TOD overlay (see **Section 6.2.2**) that covers Downtown and University Hill.

- Restrict the amount of new parking facilities that can be constructed within Downtown and University Hill until a targeted employee-to-parking ratio is met. It is recommended that this targeted ratio be less than 0.3 parking spaces per employee. This ratio would correspond to a "Medium" rating under FTA's New Starts/Small Starts land use evaluation criterion.

6.2.4 Transportation Demand Management Policies and Programs

Transportation demand management (TDM) is a general term for strategies that reduce demand on the transportation network, specifically from single-occupancy vehicles, or that redistribute the demand over time. Promoting alternative transportation modes, such as transit, walking, and bicycling, is a significant component of most transportation demand management plans. SMTC completed a study in 2011 entitled *Downtown Syracuse Transportation Demand Management Study*. The study recommended the formation of a transportation stakeholders' organization (TSO) that would promote the implementation of recommended TDM strategies. The TSO would be comprised of regional stakeholders, and would meet on a regular basis to advance the TDM strategies within each of the stakeholders' organizations, as well as employers and the public. The ultimate goal of the TSO is to establish the foundation for a formal transportation management association (TMA). A TMA is typically

a non-profit organization with staff that is dedicated to managing the TDM programs. **TABLE 6.2** summarizes the responsibilities of a TSO compared to a TMA concerning the TDM strategies recommended in the *Downtown Syracuse Transportation Demand Management Study*.

While a TSO is good preliminary organization that can be used to advance the TDM strategies, it will have limited resources and would likely not be as effective as a TMA. A TMA would be a dedicated non-profit organization with employees that manage and promote the TDM strategies on a daily basis. TMA employees also work more closely with employers and have more resources to conduct employee/public outreach, and directly manage programs such as guaranteed ride home, carsharing, and carpool matching. Therefore, it is recommended that regional stakeholders pursue the establishment of a TMA agency to actively promote and manage the TDM strategies, identified in the *Downtown Syracuse Transportation Demand Management Study,* upon implementation of the recommended transit enhancement strategies.

TABLE 6.2: Responsibilities of a TSO and TMA in Syracuse
(Source: *Downtown Syracuse Transportation Demand Management Study*, 2011)

TSO	TMA
Coordinate with NYSDOT to use its carpool website.	Hire or assign a TDM specialist.
Develop an online clearinghouse for transportation information.	Develop a TDM marketing plan and materials.
Create a guaranteed ride home program.	Conduct employer outreach.
Identify and promote carshare opportunities.	Assist companies with alternative work arrangements,
Advocate for transportation system improvements.	Conduct specialized marketing campaigns and challenges.
Coordinate with the university and major employers interested in TDM programs.	Provide personalized commuter plans for relocating businesses.
Develop a bike parking system.	Conduct individualized marketing campaigns.

6.3 Implementation Plan

Implementing the recommended policies and transit enhancements identified above will be a gradual process that will occur over the next twenty years. The following implementation plan sets short-term (0-3 years), mid-term (3-10 years), and long-term (10-20 years) objectives that will help to guide decision makers in allocating resources to accomplish the tasks that will be necessary for the implementation of the recommendations (**FIGURE 6.1**).

6.3.1 Short-Term (0-3 Years)

The following short-term transit objectives are recommended:

A. **Conduct a feasibility assessment for a new transit hub on University Hill and supporting infrastructure.** Identify potential locations for a new hub on University Hill and assess their feasibility from an access and operational standpoint (see **Section 6.1 Recommendation B**). Develop a concept plan for the recommended location. In addition, develop concept plans for transit-supportive infrastructure (bus lanes, signal priority, etc.) within the City of Syracuse that

will improve access to the Downtown Syracuse Transit Hub and the new University Hill Transit Hub, as well as facilitate the increased transit traffic that would occur between the two hubs (see **FIGURE 4.1**).

B. **Develop and evaluate alternatives for higher-intensity transit services along the Destiny/RTC to Syracuse University, James Street/South Avenue, and I-81 Express corridors.** Engage the FTA and begin the pursuit of New Starts/Small Starts funding for higher-intensity transit service (enhanced bus/commuter express bus, BRT, LRT, etc.) on the following corridors (see **Section 6.1 Recommendations C** and **D**):

- I-81 Express: Central Square to Downtown/University Hill
- Destiny/RTC to Downtown/Syracuse University
- James Street/South Avenue: East Syracuse to Onondaga Community College

It is recommended that the above corridors be analyzed as a single project to provide opportunities for variations on alignments (for example, consideration could be given to a corridor that goes from Destiny/RTC to Downtown/East Syracuse), as well as to leverage the combined ridership of all three corridors when applying for FTA funding. In addition, consideration could be given to incorporating the new University Hill Transit Hub within this process.

The revised New Starts/Small Starts process under MAP-21 no longer requires a formal alternatives analysis as part of the application process. However, it is recommended that an alternatives analysis be conducted to bridge the gap between the recommendations of the STSA and the first stage of the FTA funding process, which consists of NEPA documentation. An alternatives analysis with a public outreach component will allow CENTRO to work with stakeholders to further narrow the number of corridors for consideration and identify a locally preferred alternative (LPA), which is required as part of the NEPA process, without engaging in a more-expensive Environmental Impact Statement (EIS).

In addition, an alternatives analysis will assist CENTRO in determining the level of support for higher-intensity transit services within the Syracuse metropolitan area. Support from the public, local, and state governments is critical in obtaining the local funding match that is necessary for FTA funding, as well as supporting the long-term viability of the project. The selection of the LPA will also help to determine if the project is eligible for New Starts or Small Starts (see **Section 5.1**). Furthermore, the documentation and public outreach components of an alternatives analysis would provide the foundation for a future EIS, with many components being directly applicable to the requirements of the NEPA process.

The following short-term policy objectives are recommended:

C. **Update regional growth management/comprehensive plans.** The City of Syracuse, Onondaga County, and other municipalities that lie along the transit enhancement corridors should update their growth management plans to incorporate the corridors. The plans should provide guidance and recommendations regarding supportive land use, zoning, parking, and infrastructure policies that could be implemented along the corridors (see **Section 6.2.1**).

D. **Conduct a planning study to develop TOD overlays for areas along the transit enhancement corridors.** The City of Syracuse, Onondaga County, and other municipalities that lie along the transit enhancement corridors should work together to develop TOD overlays that will support future transit investments. The potential for an enhanced transit oriented travel market, associated with substantial transit oriented infill development may provide significant additional ridership benefits to the transit enhancements, beyond what was estimated in the STSA. Specific attention should be paid to developing TOD overlays that address FTA New Starts/Small Starts evaluation criteria, particularly along the corridors that are recommended for higher-intensity transit services. TOD overlays should consider the guidance and recommendations provided in **Section 6.2.2**. Consideration could be given to varying the requirements within the TOD overlay to reflect the adjacent community. For example, a TOD overlay in Downtown Syracuse could have requirements for higher densities, reduced parking, and a larger mix of uses, than a TOD overlay in a suburban community.

E. **Revise parking policies within Downtown and University Hill.** The City of Syracuse should re-evaluate parking policies within Downtown and University Hill (see **Section 6.2.3**). Parking requirements should be reduced, and a maximum parking-to-employee ratio should be developed. The City could also consider implementing a parking tax to discourage single-occupancy vehicle commuting, as well as to help fund the recommended transit enhancements. Finally, the City could consider a temporary moratorium on the construction of new surface parking or parking garages until the revised parking policies are implemented.

6.3.2 Mid-Term (3-10 Years)

The following mid-term transit objectives are recommended:

A. **Design and construct the new University Hill Transit Hub and supporting infrastructure.** Design and construct the new University Hill Transit Hub, bus-only lanes, signal priority, and other features identified during the feasibility assessment (Short-Term A). Reconfigure the existing bus routes so that all bus routes that serve the Downtown Syracuse Transit Hub also serve the new University Hill Transit Hub.

B. **Plan and implement Strategy 1, Base Build, on selected corridors.** During the design and construction phase of the new University Hill Transit Hub, plan the implementation of Strategy 1 on the following corridors (see **Section 6.1 Recommendation A**):

- Destiny USA/RTC to Syracuse University
- James Street/South Avenue: OCC to East Syracuse
- Butternut Street/Onondaga Street: Northside to Western Lights
- Genesee Street/Erie Boulevard: Camillus to Fayetteville
- US 11: North Syracuse to South Salina

Some public outreach would be required to educate users on the changes and to receive feedback on alignments, corridor branding, and operations. Implementation of Strategy 1

should coincide with the completion of the University Hill Transit Hub and supporting infrastructure.

C. **Pursue FTA funding for higher-intensity transit services on the Destiny/RTC to Syracuse University, James Street/South Avenue, and I-81 Express corridors.** If warranted based on the results of the alternatives analysis (Short-Term B), complete the Project Development phase of the FTA New Starts/Small Starts process. The Project Development phase consists of a complete environmental review (NEPA), selection of a LPA, and the adoption of the LPA into a fiscally constrained long range transportation plan. The selection of an LPA will have been addressed in the short-term objectives (Short-Term B). FTA requires that the Project Development phase be completed within two years. Once accepted by FTA, CENTRO should proceed with engineering and obtaining a fully funded grant agreement.

The following mid-term policy objectives are recommended:

D. **Update Long Range Transportation Plan to incorporate LPA.** The LPA determined by the alternatives analysis must be incorporated by SMTC into a fiscally constrained long range transportation plan. This is required in the FTA New Starts and Small Starts project development process.

E. **Establish a transportation management agency (TMA) to begin to implement and manage the recommended TDM strategies.** Regional stakeholders should form a transportation management agency (TMA) to manage TDM programs (see **Section 6.2.4**), conduct commuter programs, and establish cooperative relationships with employers in Downtown and University Hill. The TMA should be implemented in conjunction with the implementation of the recommended transit enhancement strategies.

F. **Implement TOD overlays and pursue transit-oriented redevelopment near stops/stations identified in the LPA.** Implement the TOD overlays along the transit enhancements corridors (Short-Term D). Pursue developers for transit-oriented redevelopment projects at stop/station locations identified in the LPA for the Destiny/RTC to Syracuse University and James Street/South Avenue corridors (Short-Term B). Identification of developers will assist in the application for FTA funding, as well as contribute to the long-term sustainability of the higher-intensity transit services.

G. **Implement the new Downtown/University Hill parking policies.** The City of Syracuse should finalize and implement the revised Downtown/University Hill parking policies (Short-Term E). Consider implementation of any parking taxes with the completion of the University Hill Transit Hub and/or higher-intensity transit services.

6.3.3 Long-Term (10 - 20 Years)

The following long-term transit objectives are recommended:

A. **Complete construction of the higher-intensity transit services on the Destiny/RTC to Syracuse University, James Street/South Avenue, and I-81 Express corridors.** Complete construction of the LPA and begin service.

B. **Evaluate the performance of the implemented transit enhancements.** Evaluate the performance of implemented transit enhancement strategies. Document the results of the evaluation and determine if adjustments are required. Develop a "Before and After" report for submission to FTA.

C. **Update the Syracuse Transit Systems Analysis.** Update the STSA to reflect the implemented transit enhancements, and identify and rank opportunities for additional transit enhancements. The STSA should be updated at least every 15 to 20 years.

The following long-term policy objectives are recommended:

D. **Evaluate the performance of the new land-use/zoning and parking policies.** Evaluate the performance of implemented land-use/zoning (TOD overlays) and parking policies. Document the results of the evaluation and determine if adjustments are required.

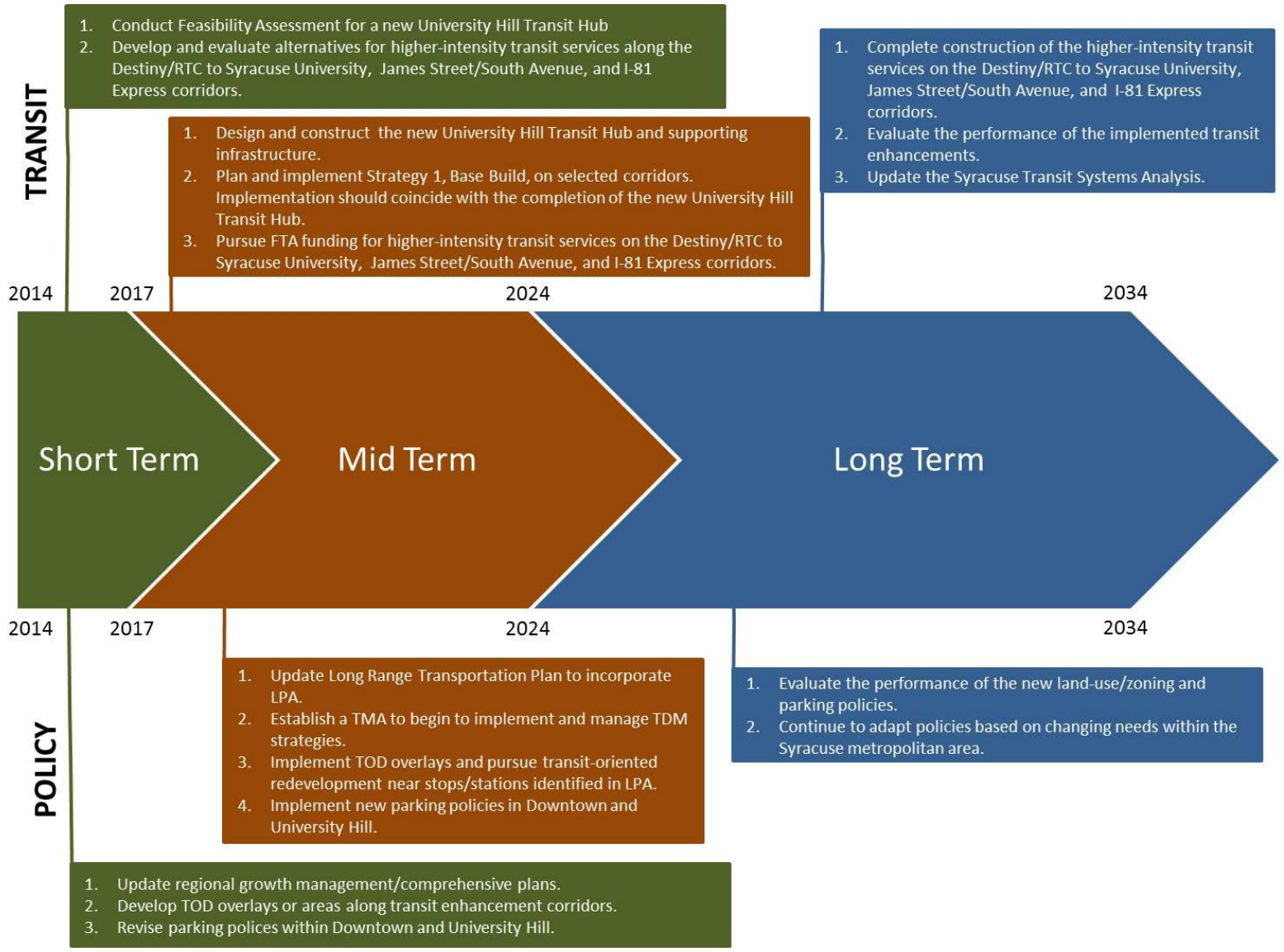


FIGURE 6.1: Implementation Strategy

THE I-81 CHALLENGE

Syracuse Transit System Analysis

APPENDIX A: Public Survey Results

DATE:

January 2014

PREPARED FOR:

New York State Department of Transportation

NYS Department of Transportation

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CHAPTER 1 – Introduction

The I-81 Challenge presents an opportunity to evaluate and improve the future of the transportation system in the Syracuse metropolitan area for all modes and users. Therefore, as part of *The I-81 Challenge* project, Stantec was tasked with conducting a transit system analysis for the Syracuse metropolitan area. The purpose of the transit system analysis component of *The I-81 Challenge* Study is to identify key corridors for potential improvements and establish a project justification for the improvements that would allow CENTRO to pursue FTA Small Starts or Very Small Starts funding. The transit system analysis will evaluate improvements that address a wide variety of transportation system, land-use, and parking needs that were identified through various studies including *Tech Memorandum #1: Physical Conditions Analysis*, completed by Stantec as part of *The I-81 Challenge* project, and SMTC's *University Hill Transportation Study*, among others. These needs include:

- Reducing congestion within the City, particularly along corridors adjacent to I-81 and I-690;
- Facilitating sustainable economic development within the City, including the planned development in University Hill;
- Reducing parking demand in Downtown and on University Hill;
- Examining the feasibility of increasing the frequency and number of hours per day that buses run to Downtown and University Hill;
- Improving connectivity and integration of Downtown with University Hill;
- Increasing transportation options for young, elderly, disabled, and low-income populations;
- Decreasing noise and air pollution generated from traffic; and,
- Improving transit travel times for commuters to be more competitive with vehicle travel time.

Multiple sources of data and information will be utilized to develop a list of needs and functional requirements for the transit system, identify potential corridors for improvements, and evaluate various improvement options in the transit systems analysis. Boarding and alighting data was collected on various routes in 2010, and previous studies have been reviewed to develop the list of needs shown above. Public feedback is another critical source of information that will be used throughout the transit analysis process.

Public outreach is a critical building block for any transit planning project, and is especially crucial when seeking Federal Transit Administration (FTA) funding, such as New Starts, Small Starts, and Very Small Starts. Public feedback must be received at multiple points throughout the planning process to identify transit system needs, identify factors that would enhance or encourage future transit use, and provide feedback on proposed improvements. Public involvement for the transit systems analysis was initiated during the second *I-81 Challenge* public meeting, held on Wednesday, May 9, 2012. A section of the meeting was devoted to

presenting data regarding the existing transit system and displaying case studies that provided an overview of various potential improvements. Meeting attendees could comment on the items that were presented by using sticky notes, or by completing a survey that was distributed to all meeting attendees as they left the transit section.

The results of the surveys and comments received during this initial round of public participation will serve as one of the building blocks to the transit systems analysis, and will be utilized throughout the analysis process. The results will be used to assist in identifying needs, determining areas for transit enhancements, and evaluating enhancement options. In addition, it is anticipated that the results of the transit systems analysis will be used to support a future alternatives analysis, which will then be used to apply for FTA funding. Documentation of public outreach is required for most FTA grants. Therefore, the results of the public comment and survey, along with future public outreach, will also be utilized to fulfill this requirement.

This document details the methodology and results of the comments and surveys associated with the transit component of the public information session. Conclusions obtained from both sources will also be highlighted.

1.1 Public Comment Methodology

As discussed above, meeting attendees could provide feedback regarding the existing transit system and potential future improvements through two main methods: sticky notes on comment boards, and a survey. Comments and surveys were collected during the public information session on Wednesday, May 9, 2012, as well as online through the *I-81 Challenge* website, which was available for a one-month period after the May 9th session.

1.1.1 Comment Boards Methodology

There were a total of four comment boards spread throughout the transit section of the public information session. The first comment board was located after the displays containing information regarding the existing transit system from Tech Memo 1. The comment board prompted meeting attendees to list needs or issues they had for the existing transit system. The second comment board was located after the displays containing information regarding potential transit enhancements. This comment board prompted meeting attendees to comment on the information from the displays and/or to list what amenities or improvements they would like to see within the metropolitan area. The third comment board was located following the Bus Rapid Transit (BRT) displays, and asked attendees to list what they liked or did not like about BRT. Similarly, the fourth comment board was located after the Light Rail Transit (LRT) displays, and asked attendees to list their likes and dislikes regarding LRT.

Sticky notes and pens were provided at each board location. After the completion of the information session, the notes were removed and collected by SMTC. Comments were also

collected during the online component of the public meeting. All comments were summarized by SMTC and provided to Stantec.

1.1.2 Survey Methodology

Paper surveys were distributed to meeting attendees as they exited the transit section of the May 9th public information session. This was done to ensure that meeting attendees observed the displays containing existing condition information and potential improvements, and be better prepared to answer specific survey questions. Online surveys were also collected for a one-month period following the public information session.

Two separate surveys were provided: one for non-riders/former riders, and one for current riders. A "current rider" was considered to be anyone that had used the CENTRO system within the last three months (as of May 9, 2012). A "non-rider" was considered to be anyone that had never used the CENTRO system, and a "former rider" was considered to be anyone that had utilized the CENTRO system on a regular basis in the past, but had not done so within the last three months. SMTC personnel were present to assist meeting attendees in determining which survey would apply to them. Descriptions of each survey were also provided on the project website during the duration of the online version of the public information session.

The non-rider/former rider survey consisted of seventeen (17) questions, of which, thirteen were multiple-choice style, where respondents could choose one or more answers to each question. Seven of the seventeen questions, including some of the multiple-choice questions, contained open-ended response areas. In particular, Question 17 provided a space for respondents to comment or elaborate on transit needs, improvements, or other items that they felt were important. Questions 1 through 8 were designed to obtain basic demographic information including, age, race, income, car ownership, and occupation. Questions 9 through 13 obtained information regarding past transit use (for former riders), as well as reasons why the respondent does not utilize the transit system today. Finally, Questions 14 through 16 were utilized to determine what improvements or other factors would increase the likelihood that the respondent would consider using the transit system.

The rider survey was slightly longer than the non-rider/former rider survey, with a total of 23 questions. Sixteen of the 23 questions were multiple-choice style, in a similar format to the non-rider/former rider survey. There were twelve open-ended questions. Similar to the non-rider/former rider survey, Questions 1 through 9 were designed to obtain basic demographic information including, age, race, income, car ownership, occupation, and length of time using transit. Questions 10 through 16 asked respondents how they utilize the transit system, including types of trips, common destinations, transfers, frequency of transit use, and how they get to/from the transit stops. Finally, Questions 17 through 23 obtained information from respondents regarding their satisfaction with the existing transit

service, what features are most important to them, and what improvements would enhance their transit use.

After the completion of the online component of the public information session, Stantec personnel compiled the results of the survey utilizing an Excel file. Each survey was assigned a number, and the answers for each individual survey were entered into the file. This was important, as it would allow for the review of individual surveys if the need arose in the future. The results of each survey question were then plotted for visualization and reporting. Responses to open-ended questions were summarized and categorized into themes before being displayed on charts or graphs. It should be noted that the graphs and charts prepared for the non-rider/former rider survey show the distribution of answers for each question for non-rider and former rider respondents separately.

1.1.3 Revised Rider Survey

A total of 55 rider surveys were completed, of which, 40 were completed during the public information session, and 15 were completed online. Upon review of the survey results it was determined that the rider survey appeared to provide a very unbalanced representation of the existing transit ridership. Even though the public information session was advertised on CENTRO buses and through various news media, and transit riders were provided with free vouchers to use the system to get to and from the public meeting, transit rider turnout was low.

The unbalanced nature of the survey results was evident in the demographic results as well as in the response to some questions. For example, when asked for reasons why they use transit (Question 10), the respondents most commonly responded that it is “better for the environment”, “more convenient than driving”, and “less stressful than driving”. In addition, over 40% of rider respondents stated that they use the transit system once per month or less, on average. These factors demonstrate that the original rider survey did not reach the average transit rider in the Syracuse metropolitan area.

Following the release of the survey results, it was determined that it would be necessary to conduct additional rider surveys in order to meet the public outreach objective of obtaining useable feedback from current riders that can be applied to the systems analysis. A secondary public survey/outreach effort was planned at the new Downtown Syracuse transit hub. The surveys were revised to consolidate similar questions, correct issues identified with the original survey, and to eliminate unnecessary questions, in order to shorten the survey and make it manageable for people to complete while waiting at the hub. The revised surveys were distributed at the transit hub on Thursday, October 11, 2012 between 7:30 AM and 6:00 PM. Respondents were asked to complete the survey onsite prior to boarding their bus. A mail-in or online options were not provided.

CHAPTER 2 – Comment Board Results

As discussed in the previous section, public information session attendees were provided with sticky notes that could be used to provide feedback at four comment board locations within the transit section. In addition, participants viewing the online version of the public information session could also submit comments directly through the website. SMTC provided Stantec with the comment responses, and an analysis of the responses was conducted. This section will summarize the results of the comment board analysis.

2.1 Transit Needs and Enhancements

2.1.1 Needs

A wide variety of transit system needs were identified by meeting attendees. The most commonly-identified needs include:

- Increased suburban transit options – this includes providing suburb-to-suburb connections, as well as increasing the frequency and operating hours of the entire system;
- Reduced transit travel time through bus stop consolidation and more express bus options;
- Alternative fuels for buses;
- Improved safety at bus stops and on-board;
- Reduced bus fares and free fares for City of Syracuse residents;
- Better connections to other modes of transportation (park-and-rides, airport, and train station), and key destinations (shopping, University Hill, etc.); and,
- Improved on-call transit services.

2.1.2 Concerns

In addition to transit system needs, several meeting attendees expressed concern for transit as a whole in the City of Syracuse. In particular, concern was expressed over the practicality of large-scale transit enhancements due to several factors, including:

- Travel time and convenience advantages of a car;
- Low population density;
- Low ridership on many of the existing routes;
- Local climate; and,
- Current land use.

Other attendees stated that there is a negative perception/stigma associated with the bus system that will be difficult to overcome. In order to increase transit ridership, CENTRO

would have to improve the public image of the system, including improving safety. In addition, concern was expressed over the cost and maintenance requirements for the transit system. It was suggested that CENTRO update the bus system by utilizing smaller buses for routes with a lower ridership.

2.1.3 Desired Transit Service Enhancements

Many of the comments collected during the public information session and online listed a variety of desired transit service enhancements that may help to increase transit use and improve user experience. These enhancements include:

- Rail/light rail service (potential revival and expansion of the OnTrack service);
- Direct connections between key regional destinations;
- Reduced travel time through transit signal priority and consolidated bus stops;
- Bus pull-offs at key stops;
- A monorail system;
- Smaller buses for low-ridership routes;
- Increased frequency and extended service hours; and,
- Improved service to/from Eastwood, along the James and Geddes Street Corridor, to/from Lemoyne and Onondaga Community College, and to/from Downtown Syracuse.

2.2 Transit Amenities

Several comments were collected that dealt specifically with transit amenities that would enhance or increase transit use. These amenities include:

- Better information regarding bus schedules and arrivals (real-time bus tracking, arrival information at major stops, better education, real-time information online or by phone, and better notification of schedule changes and delays);
- Route maps at bus stops;
- Improving and increasing the number and locations of bus shelters;
- On-board wireless internet;
- Better payment options (swipe cards or online payment);
- Improved lighting at bus stops;
- Public restrooms at key stops;
- Bicycle racks at stops and on buses and bus stops at major trail heads;
- Enhanced ADA accessibility; and,
- On-board entertainment.

2.3 Bus Rapid Transit (BRT)

Attendees were also asked to provide their comments regarding BRT. The table below compares common likes and dislikes expressed on the comment boards.

BRT Likes and Dislikes

Likes	Dislikes
More affordable than LRT	More expensive than a typical bus route
Flexible and easier/faster to implement	Not feasible in most areas within current right-of-way (ROW)
Reduces congestion	High maintenance costs
Faster travel time	Maintains dependency on fossil fuels
Environmentally friendly	Cannot be supported with existing population densities
Routes are easy to understand	Less-attractive than light rail/not aesthetically pleasing
More feasible than light rail, and if successful could be upgraded to light rail in the future	Buses would be too slow
Promotes economic development along routes	

In addition to likes and dislikes, some comments dealt directly with potential routes for a BRT system. Recommended routes include:

- Erie Boulevard;
- Salina Street; and,
- Suburban connections.

2.4 Light Rail Transit (LRT)

Attendees were also asked to provide their comments regarding LRT. The table below compares common likes and dislikes expressed on the comment boards.

LRT Likes and Dislikes

Likes	Dislikes
More attractive than buses	Expensive
Promotes economic development along routes	Transit demand could not support LRT/unrealistic solution
Historic/aesthetic value	Inflexible routes
Faster travel time	Not appropriate for weather conditions in Syracuse
Environmentally friendly – reduces fossil fuel consumption	Possible negative impacts on local traffic safety and congestion
Routes are easy to understand	
Can utilize existing rail infrastructure	
Has a proven track record of economic benefits	

Similar to the BRT comment boards, meeting attendees recommended routes and destinations for LRT implementation. These routes and destinations include:

LRT Destinations

- Downtown
- Syracuse University
- Hospitals
- Carousel Mall
- Carrier Dome
- Transportation Center
- Airport
- Ball Park
- Regional Market
- Jamesville Beach
- Eastern Suburb

LRT Routes

- I-81
- I-690
- Salina Street
- Erie Boulevard
- Euclid Avenue
- Genesee Street
- Crouse Avenue
- James Street
- West Onondaga
- South Avenue
- Grant/Butternut Street

2.5 Comment Board Conclusions

The comment boards provided public information session attendees and online participants with the opportunity to provide feedback regarding the existing transit system, as well as future improvements/enhancements. Meeting attendees provided valuable feedback regarding enhancements and amenities that they would like to see. Overall, providing more user information, including real-time arrivals, wireless internet, improving connections between key destinations, improving travel time, increasing operational hours and frequency, and improving safety were among the most common comments received. In general, there is favor for both BRT and LRT options; however, LRT is seen as more attractive.

The majority of comments were positive toward transit improvements; however, there were a number of comments that expressed concern over the practicality and viability of transit in the Syracuse metropolitan area, particularly large-scale improvements such as BRT or LRT.

CHAPTER 3 – Survey Results

A total of 500 rider and non-rider surveys were collected, of which 46 were completed online, 183 were completed at the public meeting, and 271 were completed in the secondary collection effort at the Downtown transit hub. This represents a response rate of 43% for surveys distributed at the public information session on May 9th, and a response rate of 18% for those who viewed the online version of the information session. This section will present the results of each survey.

3.1 Non-Rider/Former Rider Survey Results

A total of 174 non-rider and former rider surveys were completed. Of the 174 surveys, 31 were completed online. 124 respondents indicated that they were 'non-riders' and had never used the CENTRO transit bus system. 50 respondents indicated that they were 'former riders', meaning they do not currently use transit, but had in the past. The results were divided into two categories: non-rider and former rider.

3.1.1 Assessment of Results

Prior to analyzing the results of any survey, it is necessary to assess the results and determine if there are any limitations. Therefore, Stantec reviewed the results of the survey, particularly the demographics of the respondents, to assess how the results of the survey should be used. In general, the demographic results show a strong correlation to the demographics of the public information session attendees. The majority of the respondents were older (45 to 65), made at least $50,000 per year, and had white-collar occupations, which represents the anticipated "average" non-transit user in the Syracuse metropolitan area. However, several limitations were noted.

The distribution of age of respondents was skewed heavily to an older demographic. This was to be expected, based on the typical public information session attendee; however, it is possible that non-riders in a younger demographic may prioritize transit system needs and improvements differently. In addition, over 90% of the respondents were white, and minority representation in this survey was very limited. Reaching out to potential respondents of varying ages and races may help to balance the results of the survey. However, despite the limitations, it is our opinion that the results of this survey would provide a valuable insight into reasons why respondents are not using transit, and potential measures that may increase transit use.

3.1.2 Summary of Results

Question 1: Home Address

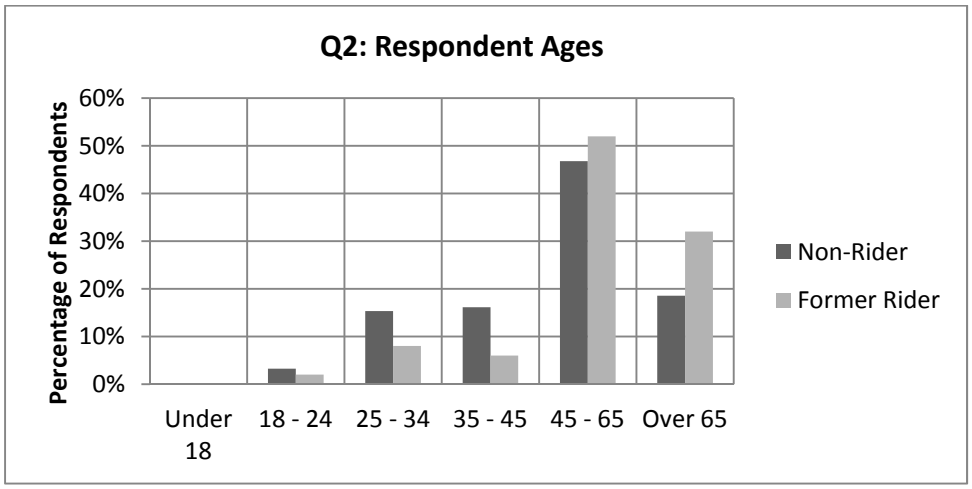
Most non-rider and former rider respondents live in the City of Syracuse, but a substantial portion of respondents are spread among other areas in the region. A total of 67 respondents live in Syracuse, with the remaining persons originating in the cities shown below.

Q1: Location of Residence

City	No. of Respondents	Percentage
Syracuse	67	54%
Other	16	13%
Dewitt	7	6%
Liverpool	5	4%
N. Syracuse	4	3%
Manlius	4	3%
E. Syracuse	2	2%
Cazenovia	3	2%
Camillus	2	2%
Fayetteville	2	2%
Lafayette	2	2%
Baldwinsville	3	2%
Tully	2	2%
Marcellus	2	2%
Jamesville	1	1%
Clay	1	1%

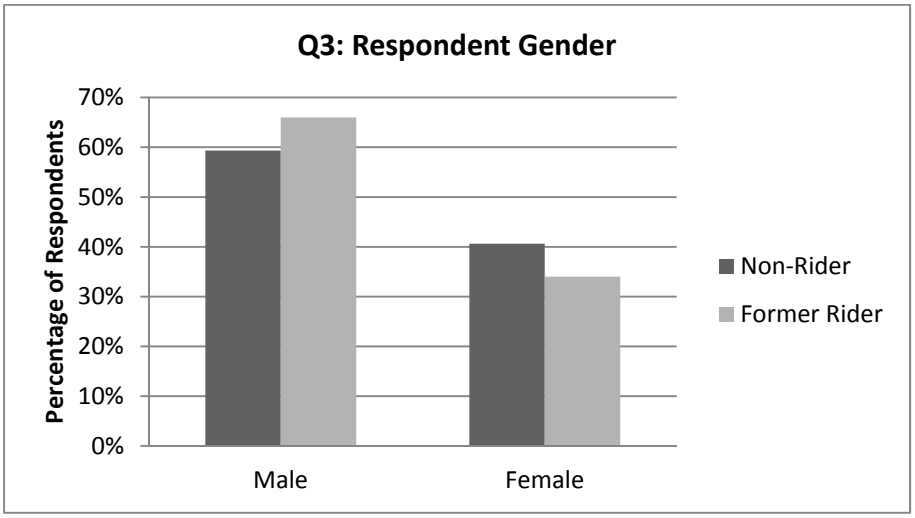
Question 2: What is your age?

The majority of non-rider (47%) and former rider (52%) respondents were between the ages of 45 and 65. This corresponds to the median age of those who attended the public meeting. The remaining non-rider respondents' ages were split almost evenly between the ages of 25 and 45, and over 65. Only four of the non-rider respondents were between the ages of 18 and 24, and none were under 18 years old. The majority (32%) of the remaining former rider respondents were over the age of 65.



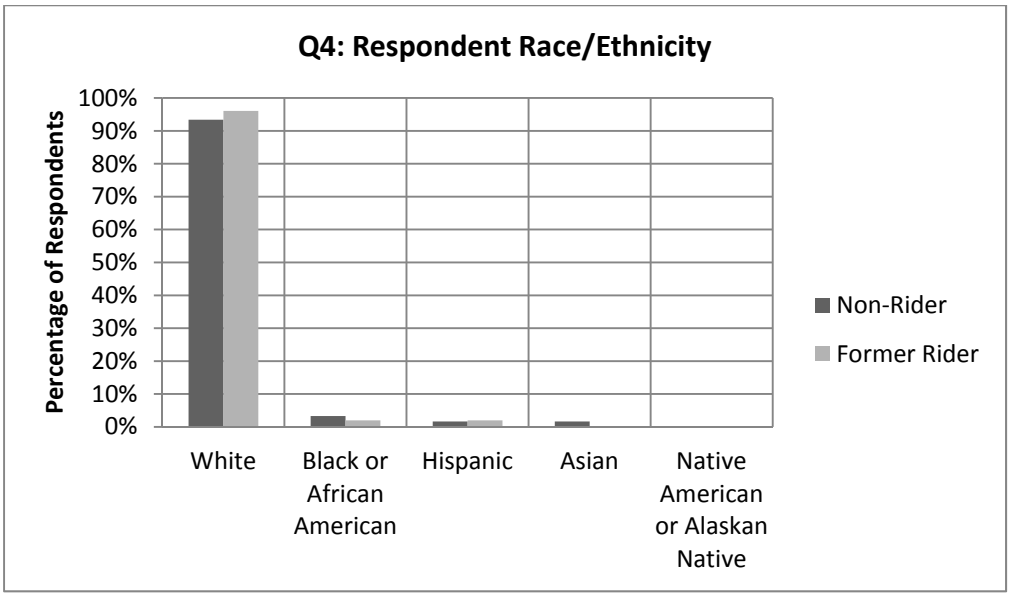
Question 3: Gender

There were more male non-rider and former rider respondents than there were female. Approximately 59% and 66% of non-rider and former rider respondents were male, respectively.



Question 4: Race/Ethnicity

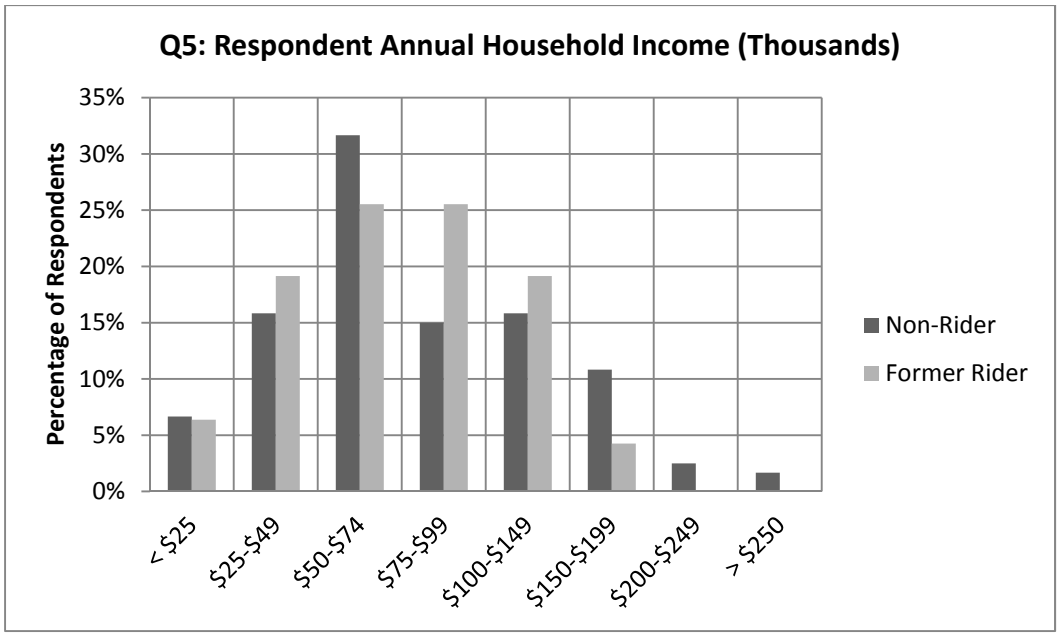
The majority (an average of 95%) of respondents in both categories were Caucasian. Five respondents were Black, three were Hispanic, and two were Asian.



Question 5: What is your annual household income?

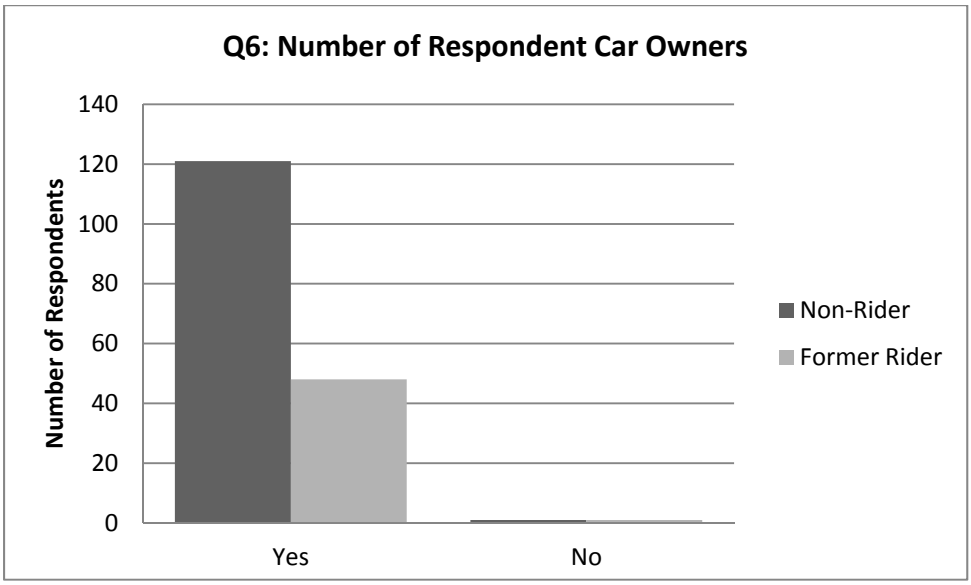
The largest portion (32%) of non-rider respondents make between $50 and $74 thousand per year. This amount is about 15% higher than the rest of the income responses, with approximately 15% of respondents making between $25 and $49 thousand, $75 and $99 thousand, and $100 and $149 thousand. Less than 5% of non-rider respondents make greater than $200 thousand.

The former rider respondent income has a more even distribution, with 52% of respondents making $50 to $74 thousand or $75 to $99 thousand (split evenly, 26% each). 32% of former rider respondents make either $25 to $49 thousand or $100 to $149 thousand (again, split evenly at 16% each). Less than 10% of former riders make less than $25 thousand or $150 to $199 thousand. In general, non-rider respondent household income is greater.



Question 6: Do you own a car?

Almost all non-rider and former rider respondents reported having access to a vehicle. Only one respondent from each category reported not having access.



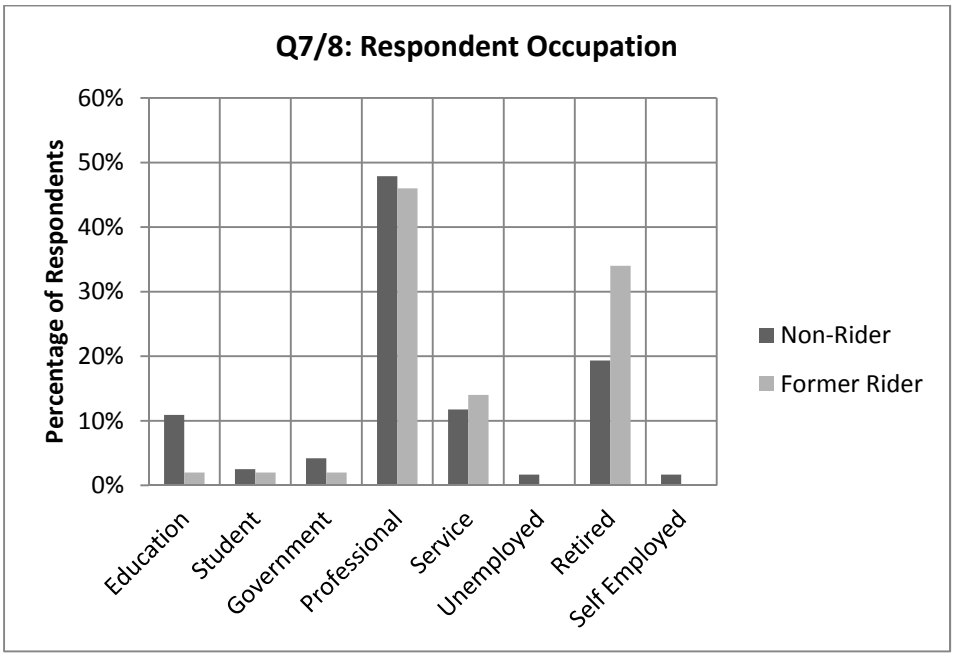
Question 7/8: What is your occupation?

This question was open-ended and allowed respondents to list their exact occupation. The respondents were then divided into eight categories for comparison purposes. The descriptions of these categories are as follows:

1. *Education*: respondent who works at a school or university
2. *Student*: respondent who attends school or a university
3. *Government*: respondent who works for the federal, state, local government, or any other public agency
4. *Professional*: 'white-collar' worker (lawyer, doctor, accountant, etc.)
5. *Service*: 'blue-collar' worker (retail, restaurant, hotel service; etc.)
6. *Unemployed*: respondents who are currently out of work
7. *Retired*: respondents who have retired from working
8. *Self-Employed*: respondents who own their own business

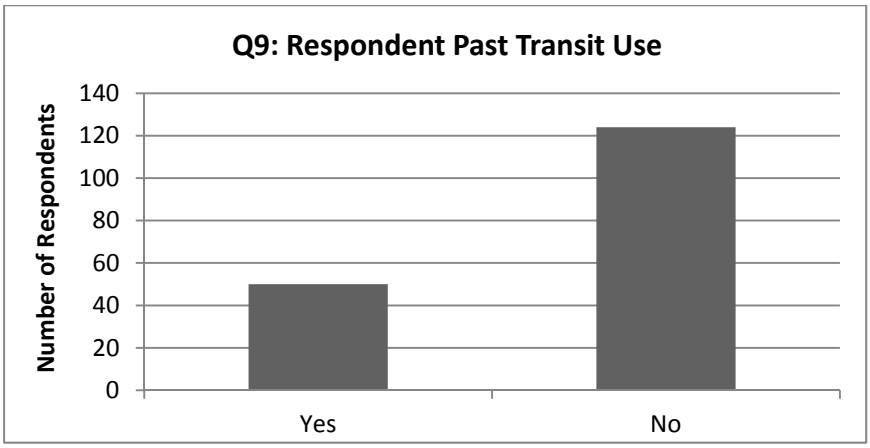
Most former rider respondents were Professionals (46%), Service workers (14%) or Retired (34%), with small percentages being in the Education, Student, or Government field. No former riders were unemployed or self-employed.

About half (48%) of the non-rider respondents were Professionals. There was a very large gap between the number of those who are Professionals and those who are not. 11% of non-rider respondents worked in Education, 12% worked in Service, and 19% were retired. Less than 5% of non-rider respondents fell into the Student, Government, Unemployed or Self-employed category. The occupational distribution chart is shown below.



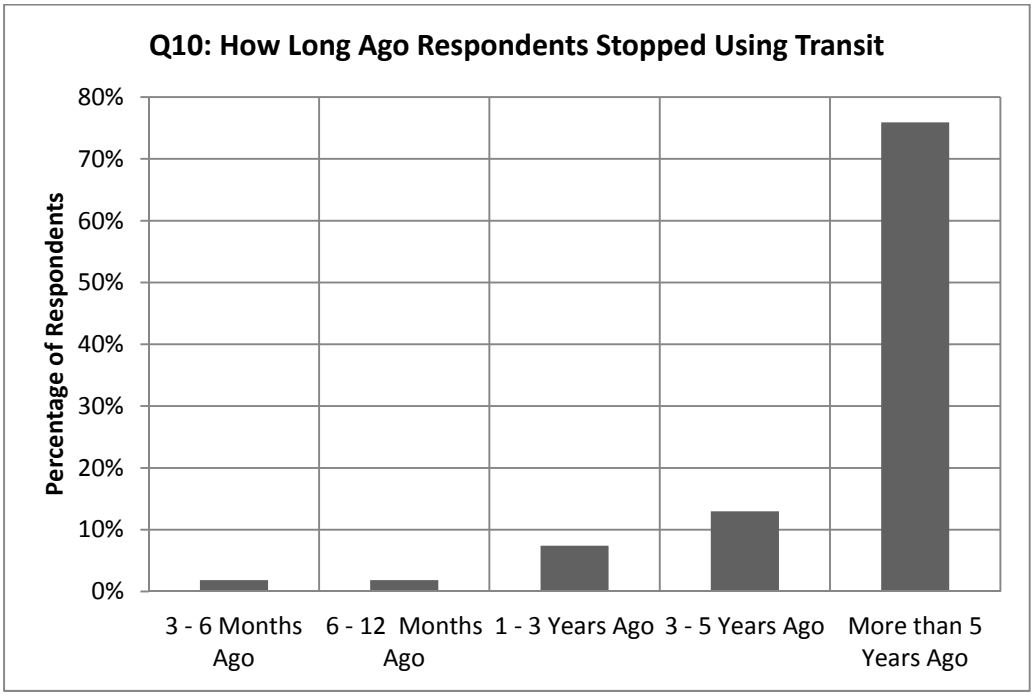
Question 9: Have you ever used the CENTRO transit system in the Syracuse metropolitan area on a regular basis?

Former riders, or those who had once used transit on a regular basis, accounted for about 30% of respondents. The remaining 70% had never used the CENTRO transit system.



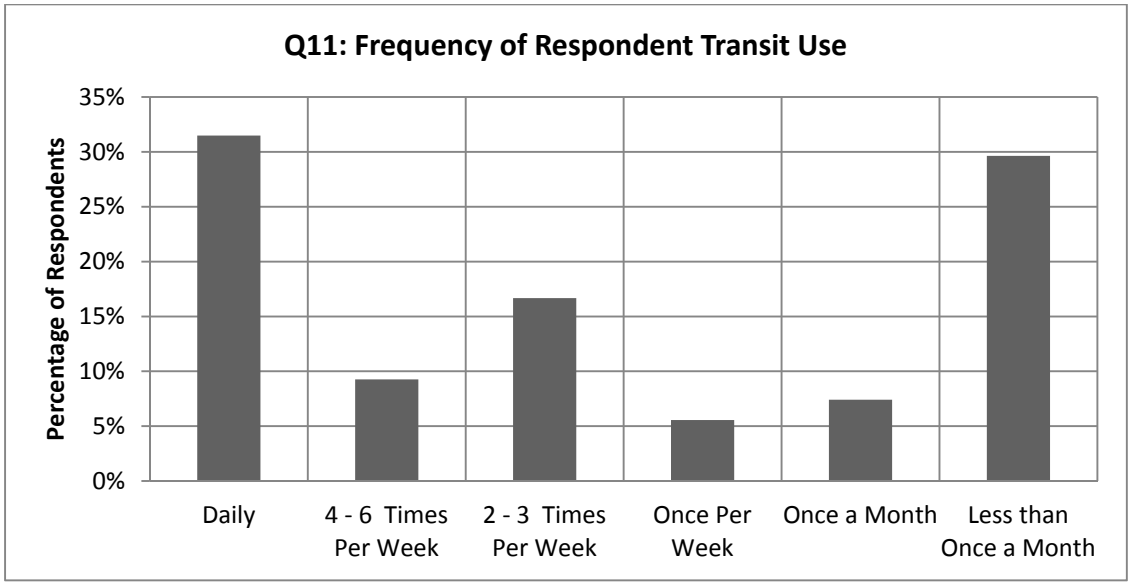
Question 10: How long ago did you stop using transit?

The majority (76%) of former riders stopped using transit more than five years ago. The remaining respondents stopped using transit more recently. The results are shown below.



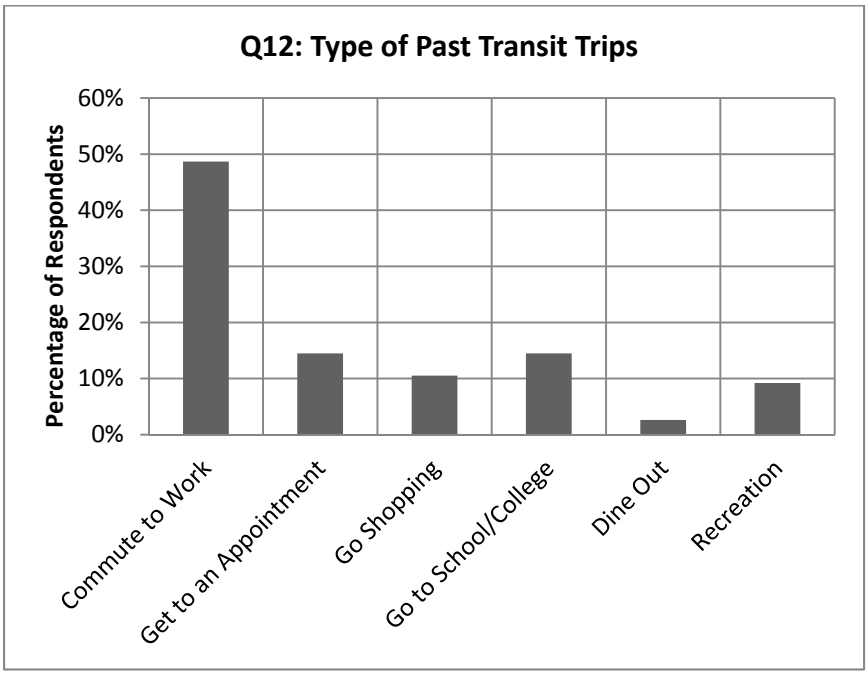
Question 11: How often did you use transit?

Of the 54 former riders that responded to Question 11, the majority were frequent riders, with 31% riding daily, 9% riding 4 to 6 times per week, and 17% riding 2 to 3 times per week. 30% of former rider respondents rode the bus less than once a month. The remaining percentages of respondent answers are shown below.



Question 12: What types of trips did you take while using transit?

The former riders were asked what types of trips they took using transit. About half of the respondents took the CENTRO bus system to work, with the remaining spread almost evenly between going to an appointment (14%), shopping (11%), to school (14%), and recreation (9%). Only two respondents reported using transit to dine out. The distribution of types of transit trips is shown below.



Question 13: What are some reasons why you do not use transit in Syracuse?

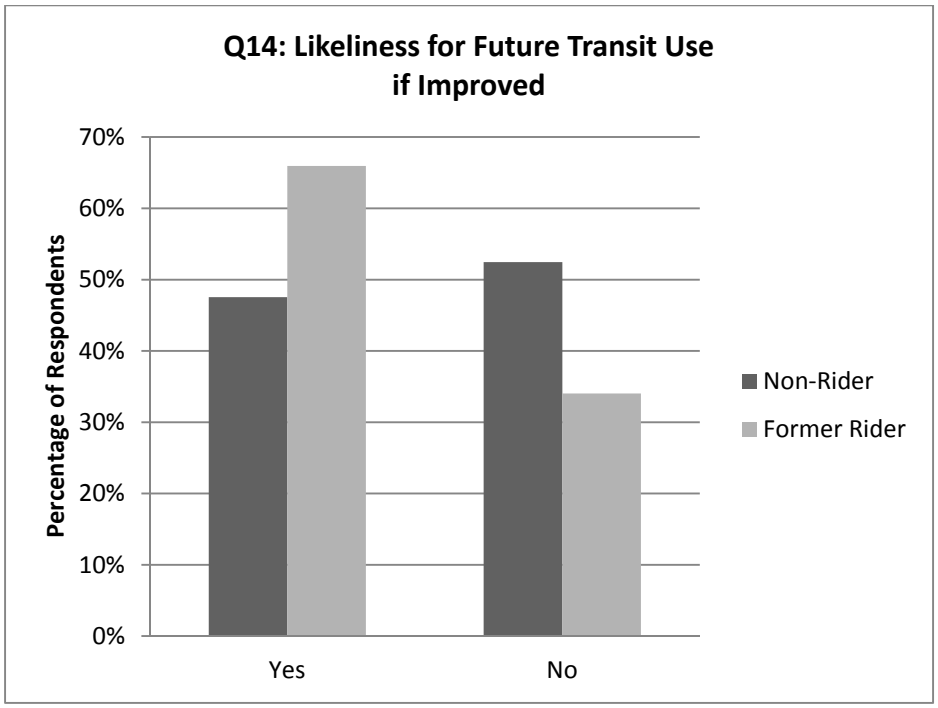
Respondents were asked to explain why they do not, or no longer, use transit. Results varied, but the highest percentage, 23% of non-riders and 20% of former riders, do not use transit because they have access to a vehicle and/or prefer driving. Other common reasons include free parking at their destination, the bus is not frequent enough and takes too long, the bus stop is too far away, and the need to have access to a vehicle during the day. The complete list of reasons for not using transit is listed below.

Q13: Respondent Reasons for Not Using Transit

Reason for Not Riding	Non-Rider	Former Rider
Have access to vehicle/prefer driving	23%	20%
Parking is free	11%	11%
Not frequent enough	11%	16%
Need access to vehicle during the day	11%	7%
Takes too long	10%	8%
Bus stop too far away	7%	10%
Hours too limited	7%	7%
Must transfer buses	7%	5%
Route changed or discontinued	1%	2%
Bus not reliable	3%	3%
Unsafe at bus stop/on bus	3%	3%
Bus fare is too expensive	2%	0%
Prefer walking	1%	2%
Use bicycle instead	1%	1%
Confusing	1%	1%
Destination not in bus route	2%	2%
Easier to use car	1%	1%
Not comfortable	0%	2%

Question 14: Are you likely to consider using transit if improvements were made?

Former riders were more likely than non-riders to consider using transit in the future. 66% of former riders would consider riding the bus again if improvements were made, and only 48% of non-riders would consider using transit.



Question 15: What three measures would make you most likely to consider using transit?

The largest factor that would influence transit use was an increase in bus frequency and/or expanding service hours, with 15% of non-riders and 19% of former-riders responding that they would consider using CENTRO if this improvement was made. The remaining top five measures that could increase transit use in non-riders and former riders (respectively) are: providing additional route options (12% and 12%), providing light rail transit (11% and 11%), improving connections from the suburbs to the City of Syracuse (12% and 9%), and decreasing travel times (12% and 7%). Other factors that could play a role in increased transit use are shown below.

Q15: Improvements that may Increase Transit Use

Improvement	Non-Rider	Former Rider
Increase frequency/expand hours	15%	19%
Make additional route options	12%	12%
Provide Light Rail Transit	11%	11%
Improve connections to the City	12%	9%
Decrease travel times	12%	7%
Provide Bus Rapid Transit	7%	8%
Improve rider information	5%	6%
Improve security	6%	4%
Improve on-time performance	4%	6%
Decrease price of transit fare	4%	6%
Improve rider amenities	4%	6%
Provide access to carshare	2%	7%
Connection from suburbs to University Hill	5%	1%

Question 16: Would any of the following factors increase the likelihood that you would consider using transit?

The main factor that would attract respondents to using transit was an increase in gas prices to an average of $6/gallon. 25% of non-riders and 30% of former riders would be more likely use transit if this increase occurred. Increased parking fees are of a greater concern to former riders than to non-riders, with 22% of former riders being more likely to use transit if parking fees increased, and only 10% of non-riders. Non-riders were more likely to consider transit if employers provided incentives than former riders. The distribution of the remaining factors is shown below.

Q16: Factors that May Increase Transit Use

Factors	Non-Rider	Former Rider
Gas prices increase to $6	25%	30%
Employers provide incentives	24%	16%
Parking fees increase	10%	22%
Congestion increases	14%	12%
No transfers	6%	0%
More frequent	5%	4%
Light Rail	5%	0%
Less travel time	2%	4%
Expand Service	2%	4%
Improved rider amenities	2%	4%
Improved bicyclist amenities	2%	2%
Nicer Drivers	1%	2%
Shorter wait times	2%	0%
Improved safety	1%	0%

Question 17: Please use the space below to tell us any additional needs or improvements you feel we should consider during the transit systems analysis that would make you more likely to consider transit in the future.

This question provided an area for respondents to discuss the transit system in an open-ended format. Because this question specifically asked for needs or improvements, the results were summarized into various categories and combined with the other questions that dealt specifically with needs and enhancements, such as Questions 13, 15, and 16.

3.2 Current Rider Survey Results

As discussed in Section 1.1.3, 55 rider surveys were completed during the original public outreach conducted at *the I-81 Challenge* public information session. A rider was categorized as someone who had used the CENTRO system within the last three months. A revised survey was distributed on October 11, 2012 to riders at the Downtown Syracuse transit hub in order to obtain more feedback from regular users of the system. This effort resulted in an additional 271 surveys completed.

3.2.1 Assessment of Results

Similar to the methodology of the non-rider/former rider survey, a general assessment of the demographic results of the current rider survey was conducted prior to summarizing the results. Overall, the results of the rider survey appear to be more representative of regular transit users in the Syracuse metropolitan area than the original survey, collected during the public information session. The percentage of White and Black/African American respondents were evenly split at approximately 40% each. The majority of respondents were under the age of 45, had no access to a vehicle, and made less than $25,000 per year. Further discussion of the results of the questions will be provided in the sections below.

Respondents were asked to complete the survey while waiting at the transit hub. However, some respondents were unable to complete the survey before their bus arrived, or did not answer all questions for other reasons. As a result, only 164 of the 271 surveys had all questions completed. The incomplete surveys were processed, and responses to the completed questions were incorporated into the survey results summary. Therefore, some questions may have more total responses than others.

In addition, two issues were identified during the distribution of the surveys. First, men were more reluctant to complete the survey than women. This is reflected in the demographic results that show that more than 70% of the respondents were women. It is unclear why there was a lower response rate from men than women, but the survey collectors noted that the majority of potential male respondents declined the survey. Finally, there was confusion regarding the address fields on the survey. Respondents were asked to input their home zip code on Question 1 and their work address in Question 9. Due to the format of the survey these two questions appeared next to each other (in separate columns). This led to some respondents inputting their home street address in Question 9, rather than their work address. However, despite the limitations, it is our opinion that the results of this survey provide valuable feedback from regular users of the transit system.

3.2.2 Summary of Results

Question 1: What is your home zipcode?

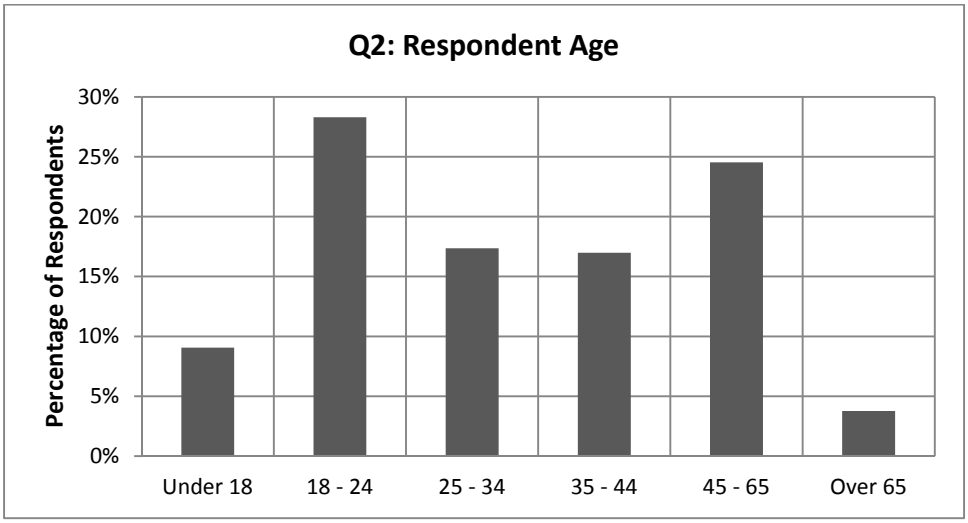
The majority of the rider respondents live in the City of Syracuse, with a small portion of commuters spread among the suburban towns in the region. A total of 210 respondents live in Syracuse, with the remaining persons originating in the cities shown below.

Q1: Locations of Residence

City	No. of Respondents	Percentage
Syracuse	210	82%
Solvay	12	5%
East Syracuse	7	3%
Liverpool	6	2%
North Syracuse	5	2%
Camillus	3	1%
DeWitt	3	1%
Manlius	3	1%
Oswego	2	1%
Other	6	2%

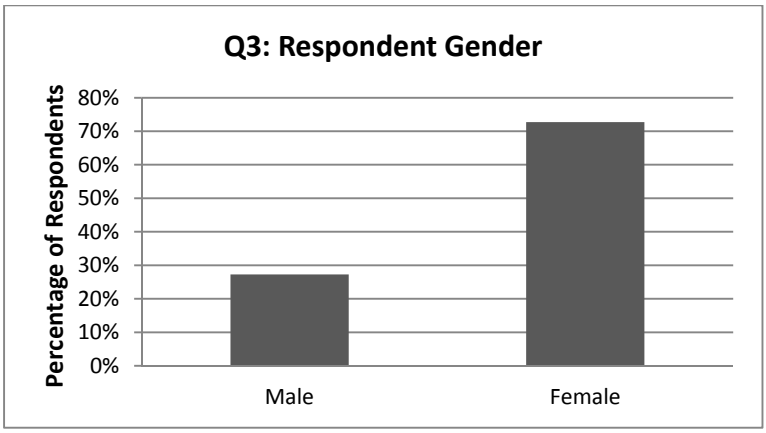
Question 2: What is your age?

The two highest age groups of rider respondents were 18-24 (28%) and 45-65 (25%). The two age groups between these ranges, 25-34 and 35-44, both comprised 17% of those who were surveyed.



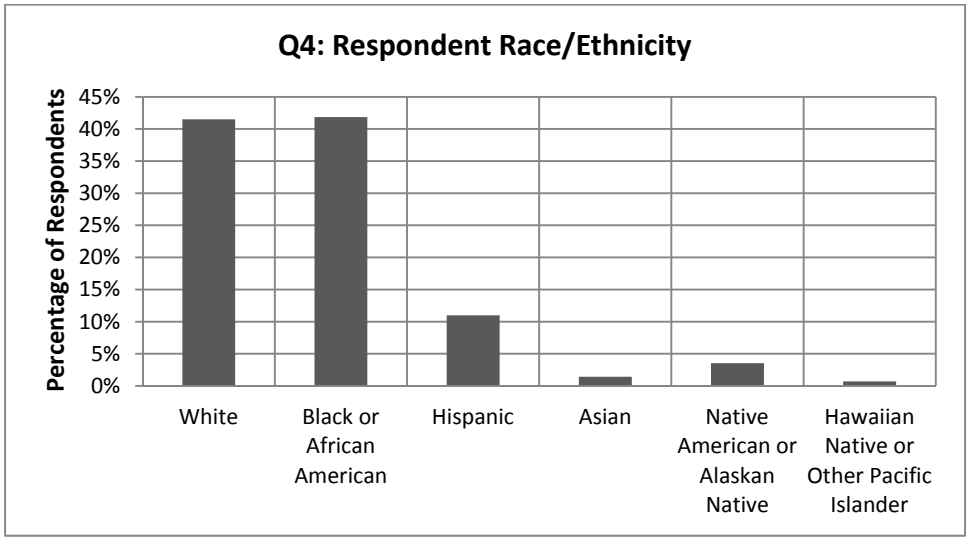
Question 3: Gender

There were more female rider respondents than there were male. Approximately 73% rider respondents were female. It was noted by the survey collection team that men were more likely to decline the survey than women.



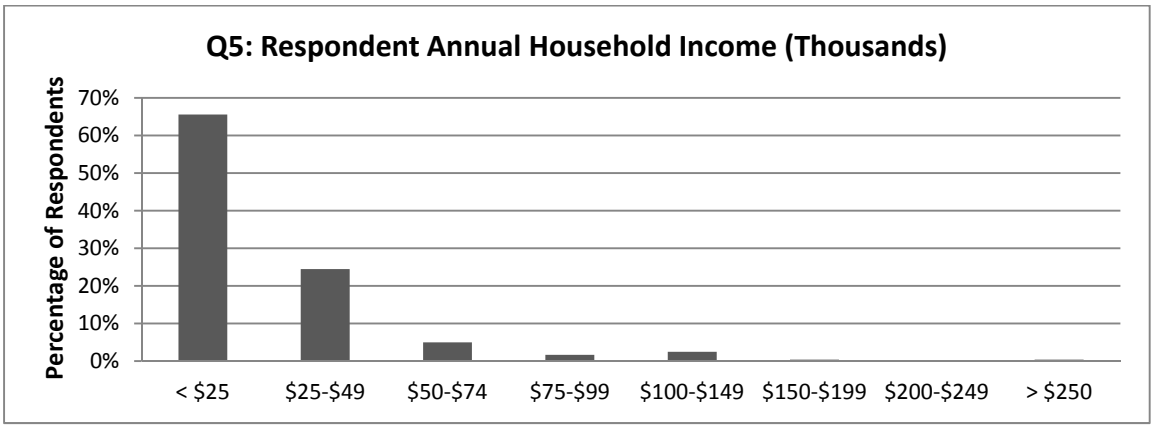
Question 4: Race/Ethnicity

The two most common respondents were Black or African American (42%) and Caucasian (41%).



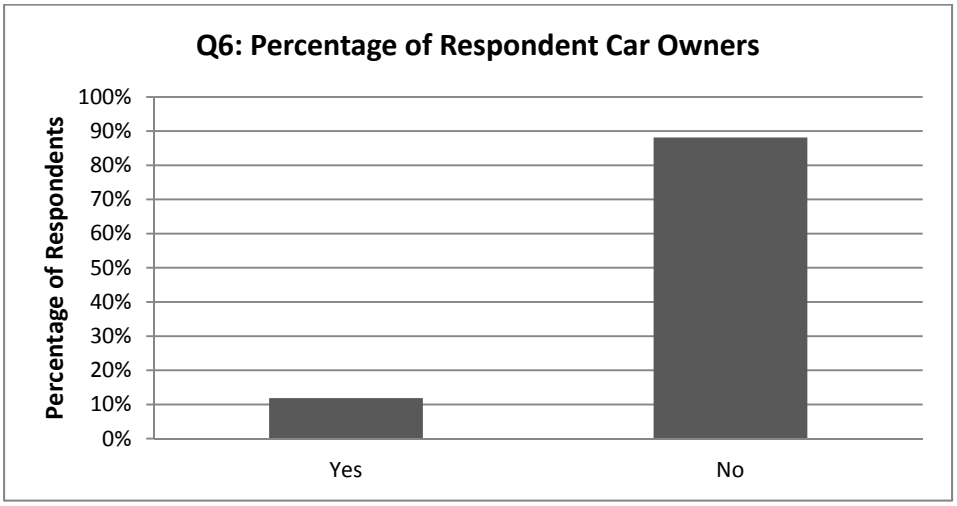
Question 5: What is your annual household income?

Approximately one-third (66%) of the respondents were near or below the US poverty threshold, with a household income of less than $25,000 per year. 24% of the respondents landed in the $25,000 to $49,999 per year household income range. 5% of the respondents were from a household that earned $50,000 to $74,999 per year. Higher earners comprised another 5% percent of the respondents.



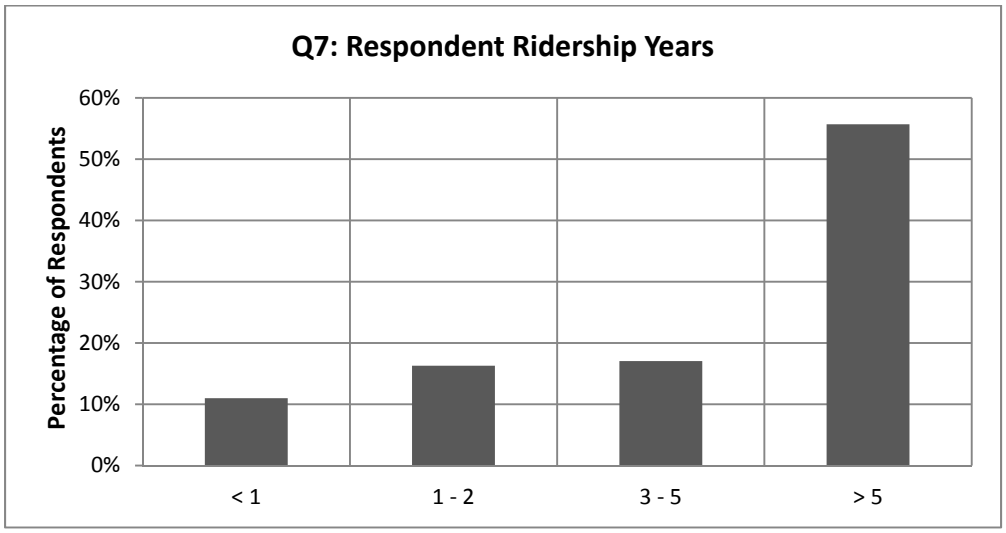
Question 6: Do you own a car?

Only 12% of rider respondents reported having access to a vehicle. The vast majority reported not having access.



Question 7: How long have you been riding transit in Syracuse?

Over half of the current rider respondents have been using the CENTRO bus system for more than five years. About one-third of users have been riding between one and two years. The remaining respondents have either been riding for 3-5 years (11%), or less than one year (4%).

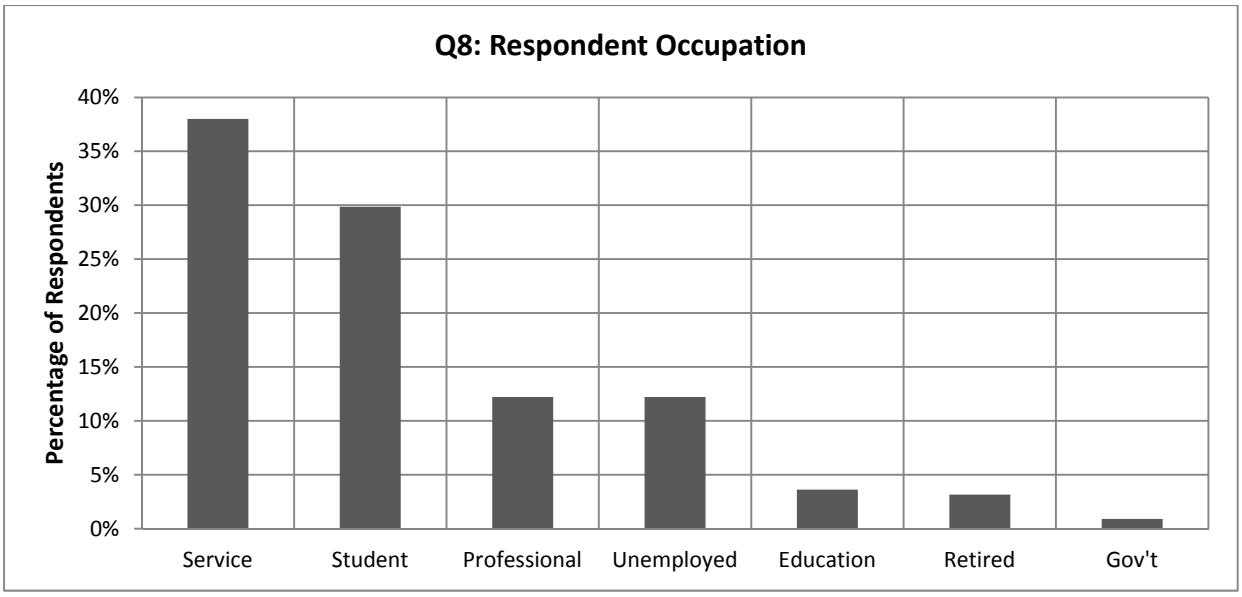


Question 8: What is your occupation?

This question was open-ended and allowed respondents to list their exact occupation. The respondents were then divided into eight categories for comparison purposes. The descriptions of these categories are as follows:

1. *Education*: respondent who works at a school or university
2. *Student*: respondent who attends school or a university
3. *Government*: respondent who works for the federal, state, local government, or any other public agency
4. *Professional*: 'white-collar' worker (lawyer, doctor, accountant, etc.)
5. *Service*: 'blue-collar' worker (retail, restaurant, hotel service; etc.)
6. *Unemployed*: respondents who are currently out of work
7. *Retired*: respondents who have retired from working
8. *Self-Employed*: respondents who own their own business

Most rider respondents were Service (38%), Student (30%), Professional (12%), or Unemployed (12%), with small percentages being in the Education, Retired, or Government field. The occupational distribution chart is shown below.



Question 9: Work Address

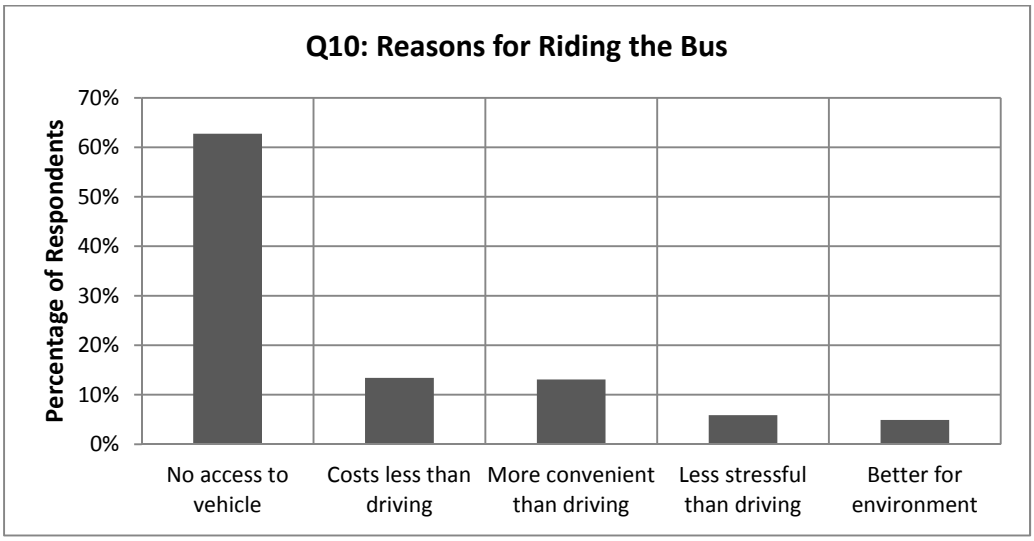
Riders were also asked where their place of employment was located. A total of 125 respondents (84%) identified their city of employment as Syracuse. The suburban communities of Camillus, Liverpool, and East Syracuse each comprised 3% of the respondent's places of employment.

Q9: Locations of Employment

City	No. of Respondents	Percentage
Syracuse	125	84%
Camillus	5	3%
Liverpool	5	3%
East Syracuse	4	3%
Manlius	2	1%
Auburn	1	1%
Brewerton	1	1%
Cicero	1	1%
DeWitt	1	1%
Fulton	1	1%
Jamesville	1	1%
North Syracuse	1	1%

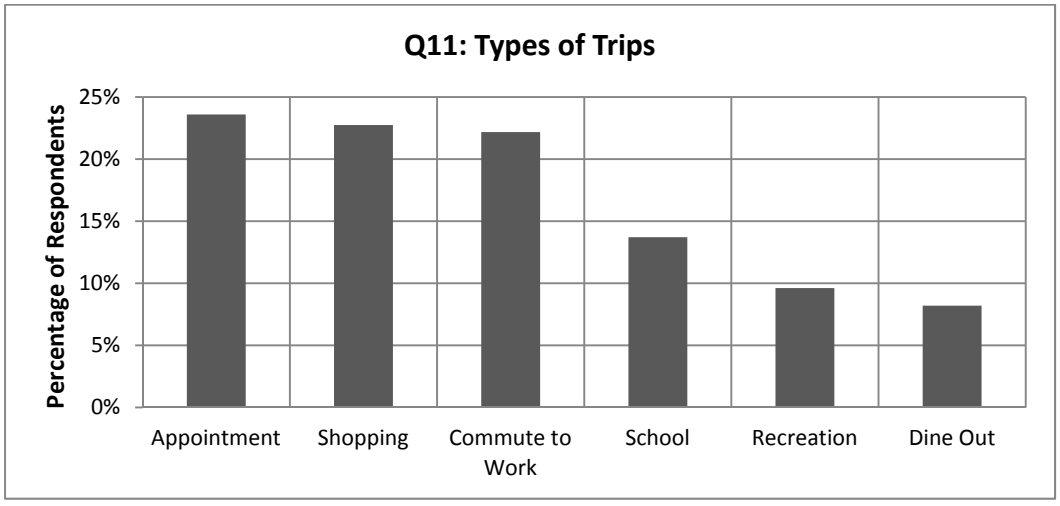
Question 10: What is the primary reason you use transit?

Respondents were asked for the primary reason that they use transit. Since 88% of respondents do not own a car, it is no surprise that the biggest reason for transit is the lack of access to a vehicle (63%). Other reasons included "costs less than driving" (13%), "more convenient than driving" (13%), and "less stressful than driving" (6%). "Better for the environment" received 5%.



Question 11: What types of trips do you take using transit?

Most respondents use transit to travel to an appointment (24%), a place to shop (23%), or their workplace (22%). 14% of respondents use transit to go school, and less than 10% use the bus to go to recreational activities or to dine out.



Question 12: Please list the three destinations you travel to most using transit.

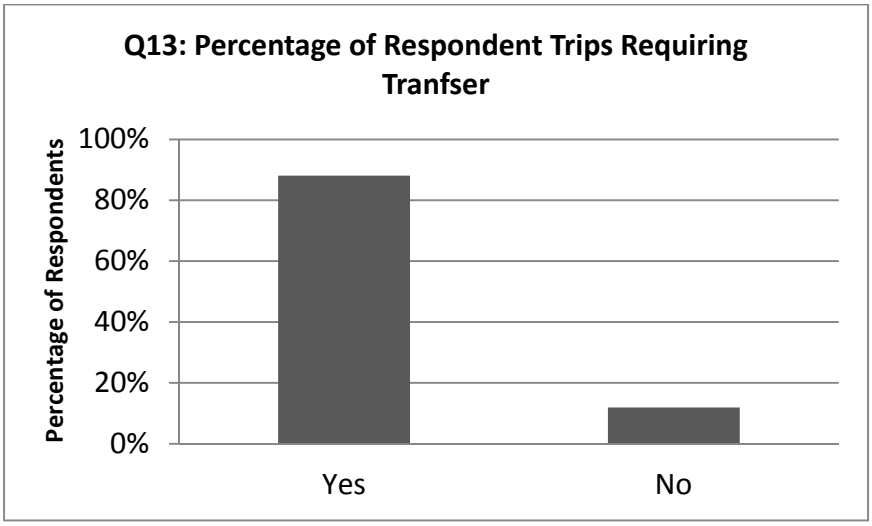
The number one destination for transit users were shopping locations (24%). Destiny USA, formerly known as Carousel Mall, was cited as the most popular of these shopping locations. "Work" and "School" were the second (19%) and third (11%) most popular destinations for transit users, as these mostly represent daily trips. Trips to hospitals, clinics, and disability workshops comprised 7% of the destinations. Since responses were extremely varied, 28% fell under the designation "Other." Destinations, both by type and geographical location, are shown below.

Q12: Transit User Destination

Destination	Percentage
Shopping	24%
Work	19%
School	11%
Medical Care	7%
Downtown	7%
Appointment	2%
Friends	1%
Family	1%
Other	28%

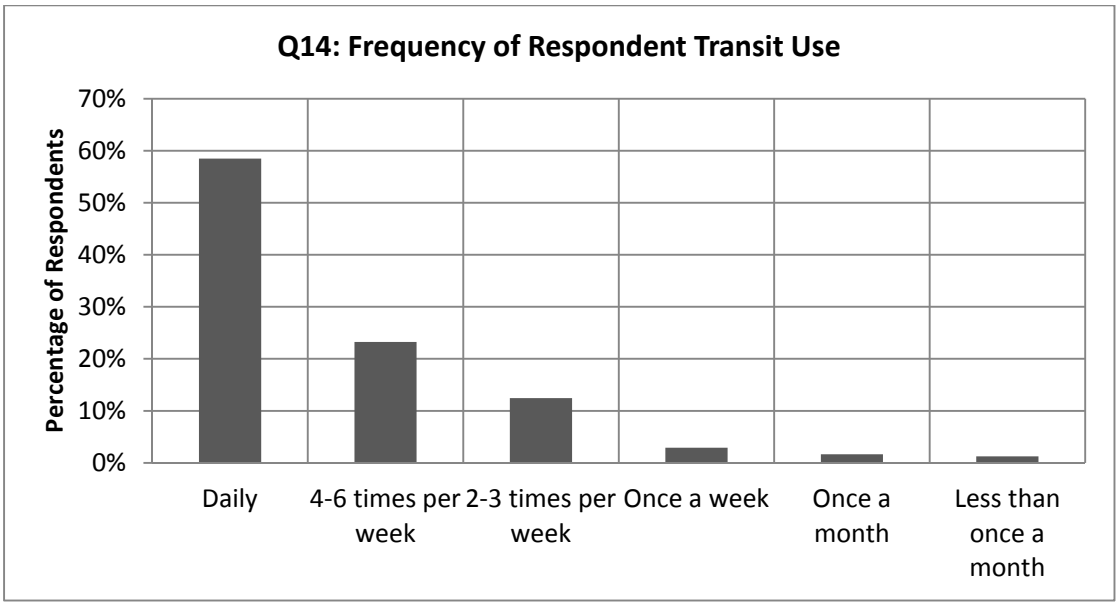
Question 13: Do the trips you listed above typically require you to transfer to another bus to get to your final destination?

Most riders reported having to transfer buses to get to their final destination. 88% of riders transfer, and the remaining 12% do not transfer.



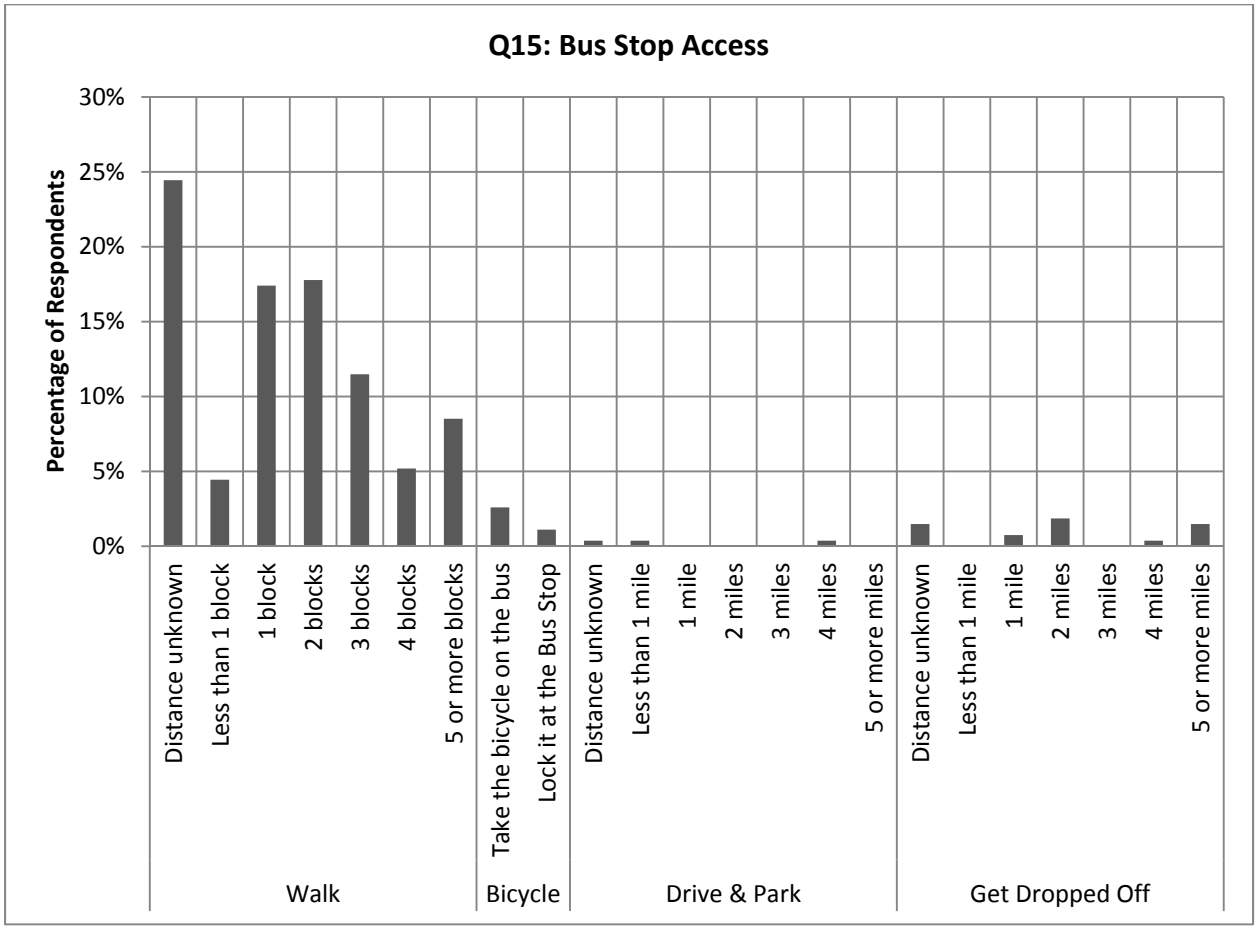
Question 14: How often do you use transit?

The majority of current rider respondents use the CENTRO bus system daily (59%). 23% of riders use the bus 4-6 times per week, 12% use the bus 2-3 times per week, and 6% use the bus once per week or occasionally. The distribution of rider frequency is shown below.



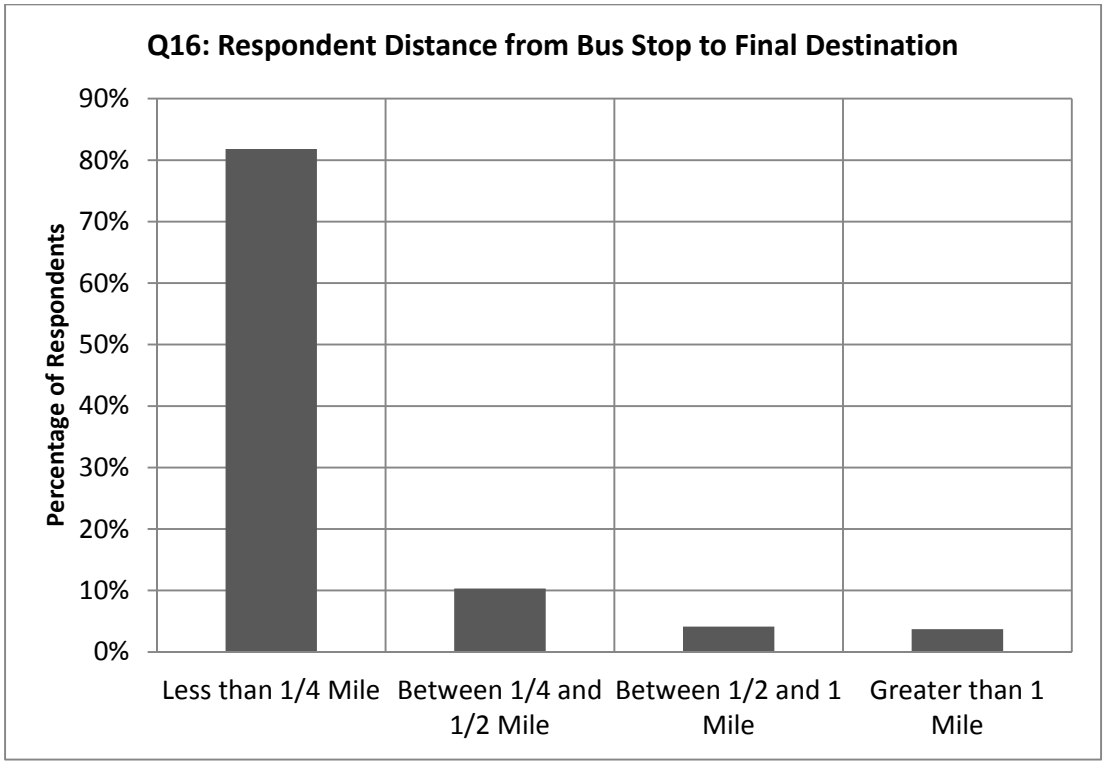
Question 15: How do you typically get to the bus stop?

Almost all of the respondents (89%) walk to the bus stop. The rest of the respondents either bike to the bus stop (4%), drive and park at bus stop (1%), or get dropped off at the bus stop (6%). Respondents that noted walking distance to bus stops often indicated that their walk was either one block (17%) or two blocks (18%).



Question 16: How far do you usually have to walk from the bus stop to your final destination?

Most of the rider respondents (82%) walk less than ¼ mile after getting off the bus to get to their final destination. 10% of respondents walk between ¼ and ½ mile. Less than 10% have to travel farther to reach their final destination. The results are shown below.



Question 17: Check the three service features that are most important to you.

Rider respondents reported that the two most important service features are on-time buses (26%) and frequent service (14%). Affordable bus fare and short travel time are also important service features (11% each) to respondents. The distribution is shown below.

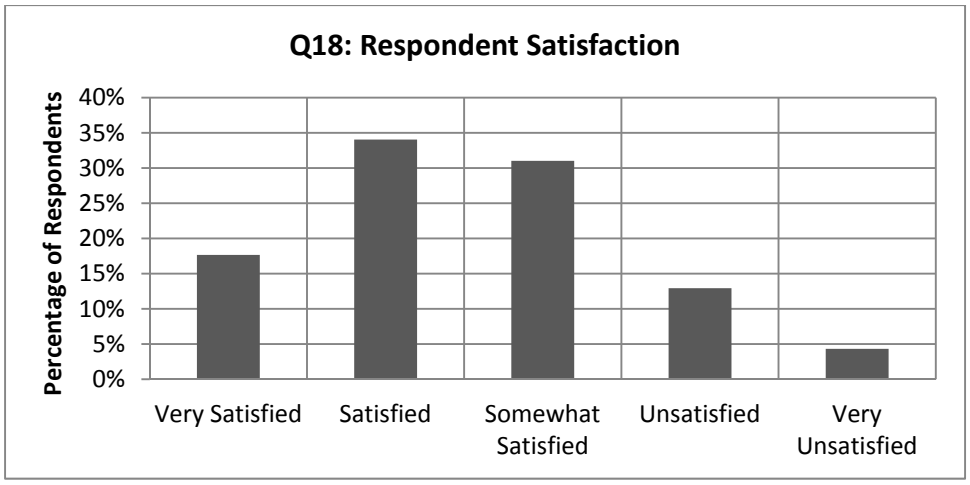
Q17: Important Service Features

Important Service Features	Percentage
Buses are on-time	26%
Frequent service	14%
Affordable bus fare	11%
Short travel time	11%
Cleanliness	10%
Convenient connections and transfers	8%
Passenger safety and security	7%
Courteous and helpful operators	7%
Easy access to bus stops	6%
Adequate seating	5%
ADA features	1%

Question 18: How satisfied are you with the current transit system?

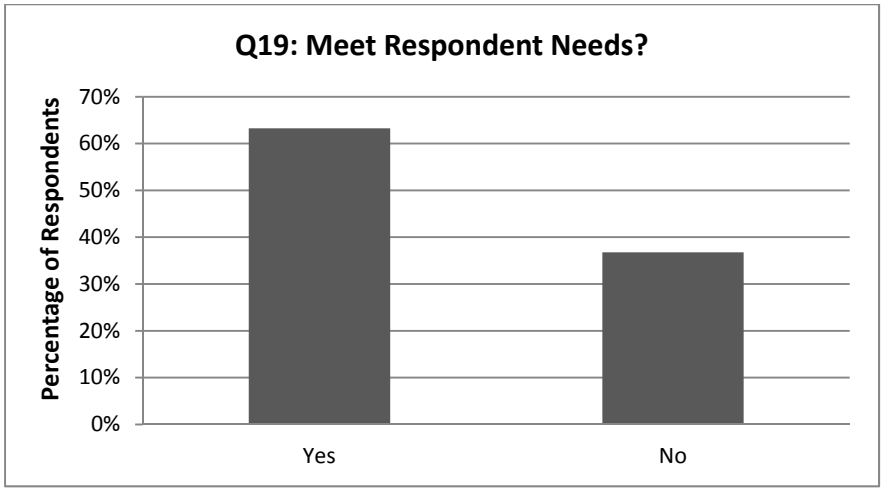
Approximately 1/3 of riders responded that they were satisfied with the current CENTRO transit system, and another 1/3 of riders were somewhat satisfied. The remaining respondents were very satisfied (18%), unsatisfied (13%), or very unsatisfied (4%). Some of the reasons respondents stated that they were unsatisfied or very unsatisfied include:

- The buses are not frequent enough;
- Buses are often late;
- Downtown transfers were difficult to make and often unpredictable;
- Not enough buses were running during evenings and weekends;
- Buses were crowded; and,
- Bus drivers were rude.



Question 19: Do you feel that the current routes and schedule meet your mobility needs?

Almost two-thirds (63%) of riders reported that the CENTRO transit system met their mobility needs, and 37% reported that the bus routes and schedules were not frequent or flexible enough to meet their needs.



Question 20: Select the three (3) improvements that you feel would most enhance your transit use.

About one-third (33%) of respondents felt that an increase in bus frequency and/or hours of operation would enhance their transit experience. Spot improvements to existing bus routes (21%), shortening travel time (13%) and improving connectivity within city (11%) were all factors that would enhance, and possibly increase, transit use.

Q20: Improvements to Enhance Transit Use

Improvement Options to Enhance Transit Use	Percentage
Increase frequency and/or operation hours of existing bus routes	33%
Spot improvements (amenities) to existing bus routes	21%
Shorten travel time between downtown Syracuse and the suburbs	13%
Improve connectivity within city	11%
Reduce number of transfers that I need to make	10%
Implement Bus Rapid Transit (BRT)	7%
Implement Light Rail (LRT)	4%
Implement circulatory streetcars	3%

Question 21: If unsatisfied with the current transit system or if you feel that the current transit system does not meet your current mobility needs, tell us how we could improve the current transit system.

The above was an open-ended question that was asked to all respondents. Although all responses were different, they all fell under the following categories of suggested improvements:

Q21: Open-Ended Response Comments/Suggestions

Comment/Suggestion	Percentage
On-time bus service	15%
Easier bus transfers	14%
Increase bus service frequency	13%
Revise bus schedules	9%
More seating for buses and bus stops	8%
Provide shelters with heating	8%
Clean buses and bus stops (alt. fuels and no smoking)	7%
PR training for bus drivers and staff	7%
Increase evening bus service	5%
Lower bus fare	5%
Increase weekend and holiday service	3%
Bus service for the disabled	2%
Add bus routes	1%
Increase police presence	1%
Maintain current bus schedule	1%
Provide wifi and bus schedule app	1%

The three most often recommended improvements from respondents were on-time operation of the buses (15%), which included buses both leaving too early and arriving too late; scheduling easier bus transfers (14%), since numerous respondents stated that they waited too long or missed their connecting bus at the downtown hub; and increasing bus frequency (13%).

3.3 Survey Conclusions

3.3.1 Non-Riders and Former Riders

The primary reason why non-riders and former rider respondents do not currently use the CENTRO transit system is that they have access to a vehicle and prefer driving. In addition, many respondents listed free parking and the long transit travel times as reasons why they do not use transit. These responses point directly to several factors within the Syracuse metropolitan area that point to a "car-centric" culture that consists of relatively low-cost parking in the downtown core, suburbanization of many businesses, and very short peak periods of congestion (compared to other cities where transit ridership is higher). These three factors play a significant role in mode choice. In cities where transit ridership is much higher, parking is typically much more expensive than in the City of Syracuse, and congestion is such that transit travel times are comparable, or sometimes even faster than, vehicle travel time. Furthermore, a higher ridership typically allows the transit agency to operate more frequently and for longer hours.

It is unlikely that these factors will improve to support transit use without significant land use changes in the Syracuse metropolitan area that increases density for both commercial and residential uses. An increase in density would also likely result in an increase in congestion, and an increase in parking fees as competition for parking increases, making transit a more comparable option.

Another significant factor for non-riders/former riders is that they need access to a vehicle while at work. This is a common concern for commuters in many cities who have jobs that require them to travel to meetings or other locations throughout the day. Some cities have implemented services such as carsharing (Zipcar, Philly Carshare, etc.), or guaranteed ride programs to provide commuters with an option of a vehicle during the day if needed. An analysis of the feasibility of a carshare program should be incorporated into any transit improvement evaluation that is designed to increase suburban ridership.

In terms of increasing transit use among non-riders and former riders, approximately 48% of the non-rider respondents and 66% of former rider respondents stated that they would likely consider using transit if improvements were made to the current system. The largest factors that may increase transit use in this group include: increased frequency and expanded service hours, adding route options and decreased travel times. Implementing Light Rail Transit and Bus Rapid Transit were also popular among respondents.

Outside factors may also increase the likelihood that non-riders and former riders would consider using transit. The most noted factor was an increase in gas price to an average of $6 per gallon. Non-riders were more likely (24%) than former riders (16%) to use transit if employers provided incentives, while former riders were more likely (22%) than non-riders (10%) to use the bus if parking fees increase. Both groups agreed (13% average) that they may use transit if congestion on the roadway increases.

3.2.2 Current Riders

As previously noted, the original survey did not capture the useable results to most rider questions because the average rider was not represented at the public information session, or the online workshop. Therefore, the survey was revised and redistributed at the Downtown Syracuse transit hub on October 11, 2012, between 7:30 am and 6:00 PM. The revised survey results were more representative of the average transit rider in the City of Syracuse. In particular, the majority of the revised survey respondents stated that they use transit because they do not have access to a car, rather than the "better for the environment" response that was the given in the original rider survey. Furthermore, the revised survey distributed at the transit hub also has a wider age and race distribution, and had more daily users than the original survey.

Similar to the responses that were given on the non-rider/former rider survey, the revised rider survey responses speak to the car-centric culture of the region which results in a system that primarily serves the increasingly transit-dependent communities within the city. Only 12% of the respondents had access to a vehicle, and many respondents noted, anecdotally, that they are only using transit because they have no other option. If they were to gain access to a vehicle, they would be unlikely to continue to use the transit system. These factors continue to fuel a negative perception of the transit system, even amongst people that have to use it on a daily basis.

The results of the rider survey also speak to the demand on the system itself. Approximately 38% of the respondents are employed in the service industry and 30% were students. These two groups make up a significant percentage of the transit users and have unique needs when compared to typical suburb to downtown commuters. People employed in the service industry typically have varying schedules, including evenings and weekends, that require access to transportation services throughout the day. Students also typically have a more varied schedule that requires them to access the transit system during off-peak times, such as mid-day and late evening. Furthermore, service sector employees, particularly in retail and food service require reverse commutes, meaning that they travel from the City outwards to locations in the suburbs.

Based on the free response sections of the surveys, the needs of some of service sector employees and student riders are not being met in an efficient manner. Over 25% of respondents listed "buses are on time" as their primary service need. The current pulse system means that all buses are scheduled to arrive and depart at transit hub at the same time. This provides for convenient transfers as long as the buses are on schedule. However, one of the most common complaints given is that buses are often late, resulting in riders who miss their transfers and have to wait between 30 minutes and one hour for another bus. Another common issue noted in the surveys is that in order to ensure that they arrive on time to work, some riders must take buses that drop them off at work or school one to three hours ahead of their scheduled shift or class.

When asked what improvements they would like to see, one-third of the respondents said increased frequency and operating hours on existing bus routes. This is consistent with the overall responses from the rider survey which points to the need to accommodate varying work schedules and needs of the typical transit rider. Other top responses included spot improvements to existing routes (21%), easier and more reliable transfers (14%), improved on-bus and bus stop amenities (16%), and shorter travel times between downtown and the suburbs (13%). Interestingly, less than 15% of the respondents listed BRT, LRT, or streetcars as improvements that would enhance their transit use. Overall, it appears that the majority of riders are looking for enhancements to their existing services to better meet their needs, rather than larger-scale improvements.

CHAPTER 4 – Conclusions and Recommendations

The results of the comment boards and surveys provided valuable insight into how the public perceives the transit system and what enhancements/improvements may increase transit use. The results of the survey will be utilized in the Syracuse Transit Systems Analysis report to provide a measure in which to develop conceptual improvement alternatives for the transit system. The results will also support future alternatives analyses of improvements identified in the Systems Analysis document required to obtain FTA New Starts, Small Starts, or Very Small Starts funding.

Based on the results of the comment boards and survey, the following prioritized list of needs/enhancements that will be carried into the Transit Systems Analysis was developed:

Need/Enhancement	Priority
Increase frequency and hours of operation.	1
Reduce transit travel time to be more comparable with vehicles.	2
Improve on-time performance.	3
Provide direct connections between major regional destinations.	4
Provide more real-time system information (online, by phone, at bus stops).	5
Improve safety and public perception of the transit system.	6
Provide more suburban commuter options.	7
Maintain an affordable fare.	8

The results of the comment board responses also provided crucial feedback that can be applied to the Transit System Analysis. The majority of both rider and non-rider/former rider respondents were in favor of transit enhancements, such as increased frequency, reduced travel time, and real-time information. Respondents favored both BRT (for its flexibility and ease of implementation), and LRT (for its aesthetic and economic benefits); however, both were seen as expensive. Some respondents also expressed concern regarding the feasibility and practicality of large-scale enhancements in the Syracuse metropolitan area. In particular, current land use patterns, suburbanization, convenience of a car, and public perception of the transit system may make it difficult to justify larger-scale improvements. Overall, respondents appear to be looking for a balanced and practical approach to enhancing the transit system.

THE I-81 CHALLENGE

TRANSIT RIDER SURVEY

Please answer the questions on this survey if you have used the CENTRO bus system within the last three (3) months. Your feedback is crucial to conducting the transit system analysis. The results of the survey will be kept confidential.

SECTION A. Tell us about your yourself:

1. Home Address (used for generating points of origin only):

Address

City State Zip Code

2. What is your age?

- ○ Under 18
- ○ 18 - 24
- ○ 25 - 34
- ○ 35 - 45
- ○ 45 - 65
- ○ Over 65

3. Gender

- ○ Male
- ○ Female

4. Race/Ethnicity

- ○ White
- ○ Black or African American
- ○ Hispanic
- ○ Asian
- ○ Native American or Alaskan Native
- ○ Hawaiian Native or Other Pacific Islander

5. What is your annual household income?

Note: This information is only used to make sure we have received a representative sample of the greater Syracuse population.

- ○ Less than $25,000
- ○ $25,000 - $49,999
- ○ $50,000 - $74,999
- ○ $75,000 - $99,999
- ○ $100,000 - $149,999
- ○ $150,000 - $199,999
- ○ $200,000 - $249,999
- ○ Greater than $250,000

6. Do you own a car?

- ○ Yes
- ○ No

7. How long have you been riding transit in Syracuse?

- ○ Less than one year
- ○ 1 - 2 Years
- ○ 3 - 5 Years
- ○ More than 5 years

8. What is your occupation?

9. Work Address (used for generating points of destination only):

Address

City State Zip Code

10. What are the reasons you use the transit system? (Check all that apply)

- ☐ It is more convenient than driving.
- ☐ I do not own or have access to a car.
- ☐ It is better for the environment.
- ☐ It costs less than driving.
- ☐ It is less stressful than driving on the congested roads.
- ☐ Other (Please Specify):

CONTINUED ON REVERSE

SECTION B. Tell us how you use the transit system:

11. What types of trips do you take using transit? (Check all that apply)

- ☐ Commute To Work
- ☐ Get to an Appointment
- ☐ Go Shopping
- ☐ Go to School/College
- ☐ Dine Out
- ☐ Recreation
- ☐ Other (Please Specify): _____

12. Please list the three (3) destinations that you travel to the most using transit (address or landmark):

1. _____
2. _____
3. _____

13. Do the trips you listed above typically require you to transfer to another bus to get to your final destination?

- ○ Yes
- ○ No

14. How often do you use transit?

- ○ Daily
- ○ 4-6 Times per Week
- ○ 2-3 Times Per Week
- ○ Once Per Week
- ○ Once a Month
- ○ Less than Once a Month

15. How do you typically get to the bus stop?

- ○ Walk — About How Many Blocks? _____
- ○ Bicycle — Do You (Select One) ○ Take the Bicycle on the Bus ○ Lock it at the Bus Stop
- ○ Drive and Park — How far do you drive? _____ Miles; Where do you park? _____
- ○ Get Dropped Off — How far do you travel? _____ Miles

16. How far do you usually have to walk from the bus stop to your final destination?

- ○ Less than 1/4 Mile (A Few Blocks)
- ○ Between 1/4 and 1/2 Mile
- ○ Between 1/2 and 1 Mile
- ○ Greater than 1 Mile

CONTINUED ON NEXT PAGE

SECTION C. Tell us what is important to you:

17. Check the three (3) service features that are most important to you.

- ☐ Buses are on-time
- ☐ Frequent service
- ☐ Short travel time
- ☐ Passenger safety and security
- ☐ Adequate seating
- ☐ Cleanliness
- ☐ Convenient connections and transfers
- ☐ Affordable bus fare
- ☐ Easy access to bus stops
- ☐ ADA features (bus lifts, voice announcements, etc.)
- ☐ Courteous and helpful operators
- ☐ Other (Please Specify):

18. How satisfied are you with the current transit system?

- ○ Very Satisfied
- ○ Satisfied
- ○ Somewhat Satisfied
- ○ Unsatisfied
- ○ Very Unsatisfied

19. If you answered "unsatisfied" or "very unsatisfied" tell us why:

20. Do you feel that the current routes and schedule meet your mobility needs?

- ○ Yes
- ○ No

21. If you answered "no", tell us how we could improve the service to better meet your needs.

22. Out of the improvement options presented today, which three (3) do you feel would most enhance your transit use?

- ☐ Spot improvements to existing bus routes.
- ☐ Increase frequency and/or operating hours of existing bus routes.
- ☐ Shorten travel time between downtown Syracuse and the suburbs.
- ☐ Reduce the number of transfers I need to make.
- ☐ Implement Bus Rapid Transit (BRT)
- ☐ Implement Light Rail (LRT)
- ☐ Implement Circulator Streetcars
- ☐ Other (Please Specify):

23. Please use the space below to tell us any additional needs or improvements you feel we should consider during the transit systems analysis.

THE I-81 CHALLENGE

NON-RIDER AND FORMER RIDER SURVEY

Please answer the questions on this survey if you have never used the CENTRO bus system, or if you have used it in the past on a regular basis, but stopped. Your feedback is crucial to conducting the transit system analysis. The results of the survey will be kept confidential.

1. Home Address (used for generating points of origin only):

Address

City State Zip Code

2. What is your age?

- ○ Under 18
- ○ 18 - 24
- ○ 25 - 34
- ○ 35 - 45
- ○ 45 - 65
- ○ Over 65

3. Gender

- ○ Male
- ○ Female

4. Race/Ethnicity

- ○ White
- ○ Black or African-American
- ○ Hispanic
- ○ Asian
- ○ Native American or Alaskan Native
- ○ Hawaiian Native or Other Pacific Islander

5. What is your annual household income?

Note: This information is only used to make sure we have a representative sample of the greater Syracuse population.

- ○ Less than $25,000
- ○ $25,000 - $49,999
- ○ $50,000 - $74,999
- ○ $75,000 - $99,999
- ○ $100,000 - $149,999
- ○ $150,000 - $199,999
- ○ $200,000 - $249,999
- ○ Greater than $250,000

6. Do you own a car?

- ○ Yes
- ○ No

7. What is your occupation?

8. Work Address (used for generating points of destination only):

Address

City State Zip Code

9. Have you ever used the CENTRO transit system in the Syracuse metropolitan area on a regular basis?

- ○ Yes (Proceed to Question 10)
- ○ No (Proceed to Question 13)

10. How long ago did you stop using transit?

- ○ 3 - 6 Months Ago
- ○ 6 - 12 Months Ago
- ○ 1 - 3 Years Ago
- ○ 3 - 5 Years Ago
- ○ More than 5 Years Ago

11. How often did you use transit?

- ○ Daily
- ○ 2-3 Times Per Week
- ○ Once a Month
- ○ 4-6 Times per Week
- ○ Once Per Week
- ○ Less than Once a Month

12. What types of trips did you take using transit? (Check all that apply)

- ☐ Commute To Work
- ☐ Get to an Appointment
- ☐ Go Shopping
- ☐ Go to School/College
- ☐ Dine Out
- ☐ Recreation
- ☐ Other (Please Specify):

CONTINUED ON REVERSE

13. What are some reasons why you do not use transit in Syracuse? (Check all that apply)

- ☐ I have access to a vehicle and prefer driving.
- ☐ Parking at my place of employment is free or inexpensive.
- ☐ The route I used in the past was changed or discontinued.
- ☐ The bus is not reliable (i.e. does not arrive on time).
- ☐ The bus takes too long to get to my destination.
- ☐ The service is not frequent enough to meet my needs.
- ☐ The hours of operation are too limited.
- ☐ I have to transfer buses to get to my final destination.
- ☐ The bus stop is too far away from my home or destination.
- ☐ I feel unsafe at the bus stop and/or on the bus.
- ☐ Bus fare is too expensive.
- ☐ I have a job that requires me to have access to a vehicle during the day.
- ☐ Other (Please Specify):

14. Are you likely to consider using transit if improvements were made?

- ○ Yes (Proceed to Question 15)
- ○ No (Proceed to Question 16)

15. What three (3) measures would make you <u>most likely</u> to consider using transit?

- ☐ Provide additional route options.
- ☐ Improve security at hubs and on board buses.
- ☐ Improve on-time performance.
- ☐ Increase the frequency of the service/expand hours of operation.
- ☐ Reduce transit travel times.
- ☐ Reduce the price of a transit fare.
- ☐ Improve connections to other areas of the City.
- ☐ Provide direct connection from the suburbs to University Hill.
- ☐ Improve rider amenities at bus stops and on-board.
- ☐ Improve rider information online and at bus stops.
- ☐ Provide higher-intensity bus rapid transit routes.
- ☐ Provide higher-intensity light rail routes.
- ☐ Provide access to a vehicle during the day to get to meetings or other appointments (carsharing).
- ☐ Other (See Question 17)

16. Would any of the following factors increase the likelihood that you would consider transit? (Check all that apply)

- ☐ Gas prices increase significantly.
  What price per gallon would prompt you to consider transit? $
- ☐ Parking fees in downtown or University Hill increase.
- ☐ Congestion on my route to work or school increases.
- ☐ Employers provide incentives to employees who use transit. (i.e. reduced-price transit passes, car-sharing membership, pre-tax transit pass programs)

17. Please use the space below to tell us any additional needs or improvements you feel we should consider during the transit systems analysis that would make you more likely to consider transit in the future.

THE I-81 CHALLENGE

TRANSIT RIDER SURVEY

Please answer the questions on this survey if you have used the CENTRO bus system within the last three (3) months. Your feedback is crucial to conducting the transit system analysis. The results of the survey will be kept confidential.

SECTION A. Tell us about your yourself:

1. What is your home zip code?

Zip Code

2. What is your age?

- ○ Under 18
- ○ 18 - 24
- ○ 25 - 34
- ○ 35 - 45
- ○ 45 - 65
- ○ Over 65

3. Gender

- ○ Male
- ○ Female

4. Race/Ethnicity

- ○ White
- ○ Black or African American
- ○ Hispanic
- ○ Asian
- ○ Native American or Alaskan Native
- ○ Hawaiian Native or Other Pacific Islander

5. What is your annual household income?

- ○ Less than $25,000
- ○ $25,000 - $49,999
- ○ $50,000 - $74,999
- ○ $75,000 - $99,999
- ○ $100,000 - $149,999
- ○ $150,000 - $199,999
- ○ $200,000 - $249,999
- ○ Greater than $250,000

6. Do you own a car?

- ○ Yes
- ○ No

7. How long have you been riding transit in Syracuse?

- ○ Less than one year
- ○ 1 - 2 Years
- ○ 3 - 5 Years
- ○ More than 5 years

8. What is your occupation?

9. Work Address

Address

City State Zip Code

10. What is the primary reason you use transit?

- ☐ It is more convenient than driving.
- ☐ I do not own or have access to a car.
- ☐ It is better for the environment.
- ☐ It costs less than driving.
- ☐ It is less stressful than driving on the congested roads.
- ☐ Other (Please Specify):

SECTION B. Tell us how you use the transit system:

11. What types of trips do you take using transit? (Check all that apply)

- ☐ Commute To Work
- ☐ Get to an Appointment
- ☐ Go Shopping
- ☐ Go to School/College
- ☐ Dine Out
- ☐ Recreation
- ☐ Other (Please Specify):

12. Please list the three (3) destinations that you travel to the most using transit (address or landmark):

1.
2.
3.

13. Do the trips you listed above typically require you to transfer to another bus to get to your final destination?

- ○ Yes
- ○ No

CONTINUED ON REVERSE

14. How often do you use transit?

- ○ Daily
- ○ 4-6 Times per Week
- ○ 2-3 Times Per Week
- ○ Once Per Week
- ○ Once a Month
- ○ Less than Once a Month

15. How do you typically get to the bus stop?

- ○ Walk — About How Many Blocks? ____
- ○ Bicycle — Do You (Select One): ○ Take the Bicycle on the Bus ○ Lock it at the Bus Stop
- ○ Drive and Park — How far do you drive? ____ Miles; Where do you park? ____
- ○ Get Dropped Off — How far do you travel? ____ Miles

16. How far do you usually have to walk from the bus stop to your final destination?

- ○ Less than 1/4 Mile (A Few Blocks)
- ○ Between 1/4 and 1/2 Mile
- ○ Between 1/2 and 1 Mile
- ○ Greater than 1 Mile

SECTION C. Tell us what is important to you:

17. Check the three (3) service features that are most important to you.

- ☐ Buses are on-time
- ☐ Frequent service
- ☐ Short travel time
- ☐ Passenger safety and security
- ☐ Adequate seating
- ☐ Cleanliness
- ☐ Convenient connections and transfers
- ☐ Affordable bus fare
- ☐ Easy access to bus stops
- ☐ ADA features (bus lifts, voice announcements, etc.)
- ☐ Courteous and helpful operators
- ☐ Other (Please Specify): ____

18. How satisfied are you with the current transit system?

- ○ Very Satisfied
- ○ Unsatisfied
- ○ Satisfied
- ○ Very Unsatisfied
- ○ Somewhat Satisfied

19. Do you feel that the current routes and schedule meet your mobility needs?

- ○ Yes
- ○ No

20. Select the three (3) improvements that you feel would most enhance your transit use.

- ☐ Improve rider amenities (shelters, Wi-Fi, real-time traveler info, etc).
- ☐ Increase frequency and/or operating hours of existing bus routes.
- ☐ Shorten travel time between downtown Syracuse and the suburbs.
- ☐ Reduce the number of transfers I need to make.
- ☐ Implement Bus Rapid Transit (BRT) (bus lanes, signal priority, consolidated stops, real-time traveler info, etc.)
- ☐ Implement Light Rail (LRT)
- ☐ Implement Circulator Streetcars
- ☐ Improve connectivity within the City of Syracuse (for example, between Downtown and Univ Hill).
- ☐ Other (Please Specify): ____

21. Please use the space below to provide additional feedback regarding the transit system. If you answered "Unsatisfied" to Question 18, or "No" to Question 19, use the space below to tell us how we could improve the transit system.

THE I-81 CHALLENGE

Syracuse Transit System Analysis

APPENDIX B: References

DATE:

January 2014

PREPARED FOR:

New York State Department of Transportation

NYS Department of Transportation

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THE I-81 CHALLENGE

Syracuse Transit System Analysis

APPENDIX C: Evaluation Data

DATE:

January 2014

PREPARED FOR:

New York State Department of Transportation

NYS Department of Transportation

Strategy 1:
Base Build
Evaluation Data

MOBILITY IMPROVEMENTS

FTA Measure: Estimated Annual Trips

Route	Base Daily Trips (From Model)	Transit Dependent Trips (0.8 x Model Trips)	Estimated Daily FTA Trips	Estimated Annual FTA Trips	Rating
US 11: North Syracuse to South Valley	3,000	2,400	5,400	1,620,000	Low
I-81 Express: Central Square to Downtown/Univ Hill	1,830	1,464	3,294	988,200	Low
Liverpool/CR 57: Great Northern Mall to Downtown/Univ Hill	3,260	2,608	5,868	1,760,400	Low
Butternut St/Onondaga St: Northside to Western Lights	3,370	2,696	6,066	1,819,800	Low
James St/South Ave: OCC to East Syracuse	4,220	3,376	7,596	2,278,800	Low
Genesee St/Erie Blvd: Camillus to Fayetteville	3,600	2,880	6,480	1,944,000	Low
Destiny USA/RTC to Syracuse University	2,010	1,608	3,618	1,085,400	Low
TOTAL	21,290	17,032	38,322	11,496,600	Medium

Study-Specific Measure: One-Seat Rides to Major Destinations

Route	Number of Major Destinations	Rating
US 11: North Syracuse to South Valley	6	High
I-81 Express: Central Square to Downtown/Univ Hill	4	Medium-High
Liverpool/CR 57: Great Northern Mall to Downtown/Univ Hill	6	High
Butternut St/Onondaga St: Northside to Western Lights	4	Medium-High
James St/South Ave: OCC to East Syracuse	7	High
Genesee St/Erie Blvd: Camillus to Fayetteville	8	High
Destiny USA/RTC to Syracuse University	7	High

ECONOMIC DEVELOPMENT

FTA Measure: Economic Development Effect Thresholds

Growth Management

Route	Rating	Rating Score	Segment Length (mi)	Percent	Weighted Score	Weighted Average Score	Final Rating
US 11: North Syracuse to South Valley	High	3	0.0	0%	0.00	1.46	Low
	Medium	2	7.4	46%	0.93		
	Low	1	8.6	54%	0.54		
I-81 Express: Central Square to Downtown/Univ Hill	High	3	0.0	0%	0.00	1.23	Low
	Medium	2	3.4	23%	0.45		
	Low	1	11.6	77%	0.77		
Liverpool/CR 57: Great Northern Mall to Downtown/Univ Hill	High	3	0.0	0%	0.00	1.26	Low
	Medium	2	3.8	26%	0.52		
	Low	1	10.7	74%	0.74		
Butternut St/Onondaga St: Northside to Western Lights	High	3	0.0	0%	0.00	1.89	Medium
	Medium	2	12.9	89%	1.78		
	Low	1	1.6	11%	0.11		
James St/South Ave: OCC to East Syracuse	High	3	0.0	0%	0.00	1.90	Medium
	Medium	2	11.1	89%	1.78		
	Low	1	1.5	12%	0.12		
Genesee St/Erie Blvd: Camillus to Fayetteville	High	3	0.0	0%	0.00	1.80	Medium
	Medium	2	15.4	81%	1.62		
	Low	1	3.4	18%	0.18		
Destiny USA/RTC to Syracuse University	High	3	0.0	0%	0.00	2.00	Medium
	Medium	2	7.0	100%	2.00		
	Low	1	0.0	0%	0.00		

Transit-Supportive Corridor Policies

Route	Rating	Rating Score	Segment Length (mi)	Percent	Weighted Score	Weighted Average Score	Final Rating
US 11: North Syracuse to South Valley	High	3	7.4	46%	1.39	1.93	Medium
	Medium	2	0.0	0%	0.00		
	Low	1	8.6	54%	0.54		
I-81 Express: Central Square to Downtown/Univ Hill	High	3	3.4	23%	0.68	1.45	Low
	Medium	2	0.0	0%	0.00		
	Low	1	11.6	77%	0.77		
Liverpool/CR 57: Great Northern Mall to Downtown/Univ Hill	High	3	3.8	26%	0.79	1.52	Medium
	Medium	2	0.0	0%	0.00		
	Low	1	10.7	74%	0.74		
Butternut St/Onondaga St: Northside to Western Lights	High	3	6.5	45%	1.34	2.34	Medium
	Medium	2	6.4	44%	0.88		
	Low	1	1.6	11%	0.11		
James St/South Ave: OCC to East Syracuse	High	3	7.6	61%	1.82	2.48	High
	Medium	2	3.3	26%	0.53		
	Low	1	1.6	13%	0.13		
Genesee St/Erie Blvd: Camillus to Fayetteville	High	3	8.4	44%	1.33	2.28	Medium
	Medium	2	7.6	40%	0.80		
	Low	1	3.0	16%	0.16		
Destiny USA/RTC to Syracuse University	High	3	7.0	100%	3.00	3.00	High
	Medium	2	0.0	0%	0.00		
	Low	1	0.0	0%	0.00		

Tools to Implement Land Use Policies

Route	Rating
US 11: North Syracuse to South Valley	Low
I-81 Express: Central Square to Downtown/Univ Hill	Low
Liverpool/CR 57: Great Northern Mall to Downtown/Univ Hill	Low
Butternut St/Onondaga St: Northside to Western Lights	Low
James St/South Ave: OCC to East Syracuse	Low
Genesee St/Erie Blvd: Camillus to Fayetteville	Low
Destiny USA/RTC to Syracuse University	Low

Performance of Land Use Policies

Route	Rating	Rating Score	Segment Length (mi)	Percent	Weighted Score	Weighted Average Score	Final Rating
US 11: North Syracuse to South Valley	High	3	0.0	0%	0.00	1.46	Low
	Medium	2	7.4	46%	0.93		
	Low	1	8.6	54%	0.54		
I-81 Express: Central Square to Downtown/Univ Hill	High	3	0.0	0%	0.00	1.23	Low
	Medium	2	3.4	23%	0.45		
	Low	1	11.6	77%	0.77		
Liverpool/CR 57: Great Northern Mall to Downtown/Univ Hill	High	3	0.0	0%	0.00	1.26	Low
	Medium	2	3.8	26%	0.52		
	Low	1	10.7	74%	0.74		
Butternut St/Onondaga St: Northside to Western Lights	High	3	0.0	0%	0.00	1.45	Low
	Medium	2	6.5	45%	0.90		
	Low	1	8.0	55%	0.55		
James St/South Ave: OCC to East Syracuse	High	3	0.0	0%	0.00	1.61	Medium
	Medium	2	7.6	61%	1.22		
	Low	1	4.9	39%	0.39		
Genesee St/Erie Blvd: Camillus to Fayetteville	High	3	0.0	0%	0.00	1.44	Low
	Medium	2	8.4	44%	0.88		
	Low	1	10.6	56%	0.56		
Destiny USA/RTC to Syracuse University	High	3	0.0	0%	0.00	2.00	Medium
	Medium	2	7.0	100%	2.00		
	Low	1	0.0	0%	0.00		

Potential Impact of Transit Project on Regional Land Use

Route	Developable Land Available (ac)	Route Length (mi)	Ratio (ac/mi)	Rating
US 11: North Syracuse to South Valley	4387.0	16.0	274.2	Medium
I-81 Express: Central Square to Downtown/Univ Hill	3084.7	15.0	205.6	Medium
Liverpool/CR 57: Great Northern Mall to Downtown/Univ Hill	2419.3	14.5	166.8	Medium
Butternut St/Onondaga St: Northside to Western Lights	1565.4	14.5	108.0	Low
James St/South Ave: OCC to East Syracuse	2043.8	12.5	163.5	Medium
Genesee St/Erie Blvd: Camillus to Fayetteville	4283.6	19.0	225.5	Medium
Destiny USA/RTC to Syracuse University	3699.4	7.0	528.5	High

Plans and Policies to Maintain or Increase Affordable Housing

Route	Rating	Rating Score	Segment Length (mi)	Percent	Weighted Score	Weighted Average Score	Final Rating
US 11: North Syracuse to South Valley	High	3	7.4	46%	1.39	1.93	Medium
	Medium	2	0.0	0%	0.00		
	Low	1	8.6	54%	0.54		
I-81 Express: Central Square to Downtown/Univ Hill	High	3	3.4	23%	0.68	1.45	Low
	Medium	2	0.0	0%	0.00		
	Low	1	11.6	77%	0.77		
Liverpool/CR 57: Great Northern Mall to Downtown/Univ Hill	High	3	3.8	26%	0.79	1.52	Medium
	Medium	2	0.0	0%	0.00		
	Low	1	10.7	74%	0.74		
Butternut St/Onondaga St: Northside to Western Lights	High	3	6.5	45%	1.34	1.90	Medium
	Medium	2	0.0	0%	0.00		
	Low	1	8.0	55%	0.55		
James St/South Ave: OCC to East Syracuse	High	3	7.6	61%	1.82	2.22	Medium
	Medium	2	0.0	0%	0.00		
	Low	1	4.9	39%	0.39		
Genesee St/Erie Blvd: Camillus to Fayetteville	High	3	8.4	44%	1.33	1.88	Medium
	Medium	2	0.0	0%	0.00		
	Low	1	10.6	56%	0.56		
Destiny USA/RTC to Syracuse University	High	3	7.0	100%	3.00	3.00	High
	Medium	2	0.0	0%	0.00		
	Low	1	0.0	0%	0.00		

Study Specific Measure: Strategic Area Connectivity Thresholds

Route	# of Strategic Areas Served	Rating
US 11: North Syracuse to South Valley	4	High
I-81 Express: Central Square to Downtown/Univ Hill	3	High
Liverpool/CR 57: Great Northern Mall to Downtown/Univ Hill	3	High
Butternut St/Onondaga St: Northside to Western Lights	2	Medium
James St/South Ave: OCC to East Syracuse	2	Medium
Genesee St/Erie Blvd: Camillus to Fayetteville	3	High
Destiny USA/RTC to Syracuse University	4	High

ENVIRONMENTAL BENEFITS

Route	Environmental Benefit	Annualized Project Cost	Benefit/Cost Ratio	Rating
US 11: North Syracuse to South Valley	$192,110	$44,688,787	0.4%	Medium
I-81 Express: Central Square to Downtown/Univ Hill	$192,110	$44,688,787	0.4%	Medium
Liverpool/CR 57: Great Northern Mall to Downtown/Univ Hill	$192,110	$44,688,787	0.4%	Medium
Butternut St/Onondaga St: Northside to Western Lights	$192,110	$44,688,787	0.4%	Medium
James St/South Ave: OCC to East Syracuse	$192,110	$44,688,787	0.4%	Medium
Genesee St/Erie Blvd: Camillus to Fayetteville	$192,110	$44,688,787	0.4%	Medium
Destiny USA/RTC to Syracuse University	$192,110	$44,688,787	0.4%	Medium

COST EFFECTIVENESS

Route	Route Length (mi)	Capital Cost ($/mi)	Additional Capital Expenses	Total Capital Cost	Annualized Capital Cost (Assume 20 Year, 20% Contingency)	Annual Operating Costs ($12.28/ vehicle-mile)	Total Annualized Cost	Cost Per Trip	Rating
US 11: North Syracuse to South Valley	16.0	$50,000	$4,357,142	$5,157,142	$309,429	$6,427,106	$6,736,535	$ 7.49	Medium
I-81 Express: Central Square to Downtown/Univ Hill	15.0	$50,000	$3,907,142	$4,657,142	$279,429	$1,676,220	$1,955,649	$ 3.56	High
Liverpool/CR 57: Great Northern Mall to Downtown/Univ Hill	14.5	$50,000	$4,357,142	$5,082,142	$304,929	$5,660,834	$5,965,763	$ 6.10	Medium
Butternut St/Onondaga St: Northside to Western Lights	14.5	$50,000	$2,857,142	$3,582,142	$214,929	$5,660,834	$5,875,763	$ 5.81	Medium-High
James St/South Ave: OCC to East Syracuse	12.5	$50,000	$3,407,142	$4,032,142	$241,929	$4,894,562	$5,136,491	$ 4.06	Medium-High
Genesee St/Erie Blvd: Camillus to Fayetteville	19.0	$50,000	$5,407,142	$6,357,142	$381,429	$7,547,779	$7,929,208	$ 7.34	Medium
Destiny USA/RTC to Syracuse University	7.0	$50,000	$2,857,142	$3,207,142	$192,429	$1,937,710	$2,130,139	$ 3.53	High
TOTAL	98.5	$350,000	$27,149,994	$32,074,994	$1,924,500	$33,805,045	$35,729,545	$ 5.59	Medium-High

LAND USE

Land Use Evaluation Thresholds

Route	Employment Served by System	Rating Score	Average Population Density	Rating Score	CBD Typical Parking Cost per Day	Rating Score	CBD Spaces per Employee	Rating Score	Average Rating Score	Average Rating
US 11: North Syracuse to South Valley	73,363	3	5,359	2	$4 - $8	2	0.52	1	2.00	Medium-Low
I-81 Express: Central Square to Downtown/Univ Hill	72,480	3	9,451	3	$4 - $8	2	0.52	1	2.25	Medium-Low
Liverpool/CR 57: Great Northern Mall to Downtown/Univ Hill	86,258	3	6,319	3	$4 - $8	2	0.52	1	2.25	Medium-Low
Butternut St/Onondaga St: Northside to Western Lights	73,467	3	6,719	3	$4 - $8	2	0.52	1	2.25	Medium-Low
James St/South Ave: OCC to East Syracuse	86,101	3	7,862	3	$4 - $8	2	0.52	1	2.25	Medium-Low
Genesee St/Erie Blvd: Camillus to Fayetteville	101,276	3	6,061	3	$4 - $8	2	0.52	1	2.25	Medium-Low
Destiny USA/RTC to Syracuse University	82,284	3	9,197	3	$4 - $8	2	0.52	1	2.25	Medium-Low

Notes: Utilized 0.25 mile walking distance buffer to determine average pop density and employment served. A 0.5 mile walking distance was utilized to determine employment served in CBD.
I-81 Express was analyzed by determining the population density within 3 miles of each park and ride. Employment served = Downtown and Univ Hill only.
The Airport Shuttle route was ignored because it does not fit within the parameters of the analysis of the other routes.

Affordable Housing

Route	Corridor Housing Units	Corridor Affordable Housing Units	Corridor Share	Study Area Housing Units	Study Area Affordable Housing Units	Study Area Share	Corridor to Study Area Ratio	Rating
US 11: North Syracuse to South Valley	41,555	4,152	0.10	198,626	11,129	0.06	1.78	Medium
I-81 Express: Central Square to Downtown/Univ Hill	30,622	3,483	0.11	198,626	11,129	0.06	2.03	Medium
Liverpool/CR 57: Great Northern Mall to Downtown/Univ Hill	34,916	3,274	0.09	198,626	11,129	0.06	1.67	Medium
Butternut St/Onondaga St: Northside to Western Lights	31,188	3,790	0.12	198,626	11,129	0.06	2.17	Medium
James St/South Ave: OCC to East Syracuse	42,215	4,092	0.10	198,626	11,129	0.06	1.73	Medium
Genesee St/Erie Blvd: Camillus to Fayetteville	55,205	4,633	0.08	198,626	11,129	0.06	1.50	Medium
Destiny USA/RTC to Syracuse University	31,958	4,341	0.14	198,626	11,129	0.06	2.42	Medium-High

Pedestrian Accessibility Thresholds

Route	Rating	Rating Score	Segment Length (mi)	Percent	Weighted Score	Weighted Average Score	Average Rating
US 11: North Syracuse to South Valley	High	5	1.7	11%	0.53	2.53	Medium
	Medium-High	4	0.0	0%	0.00		
	Medium	3	8.8	55%	1.65		
	Medium-Low	2	0.0	0%	0.00		
	Low	1	5.5	34%	0.34		
I-81 Express: Central Square to Downtown/Univ Hill	High	5	1.5	10%	0.50	1.68	Medium-Low
	Medium-High	4	0.0	0%	0.00		
	Medium	3	2.1	14%	0.42		
	Medium-Low	2	0.0	0%	0.00		
	Low	1	11.4	76%	0.76		
Liverpool/CR 57: Great Northern Mall to Downtown/Univ Hill	High	5	2.0	14%	0.69	1.86	Medium-Low
	Medium-High	4	0.0	0%	0.00		
	Medium	3	2.2	15%	0.46		
	Medium-Low	2	0.0	0%	0.00		
	Low	1	10.3	71%	0.71		
Butternut St/Onondaga St: Northside to Western Lights	High	5	1.5	10%	0.52	2.31	Medium-Low
	Medium-High	4	0.0	0%	0.00		
	Medium	3	6.5	45%	1.34		
	Medium-Low	2	0.0	0%	0.00		
	Low	1	6.5	45%	0.45		
James St/South Ave: OCC to East Syracuse	High	5	2.1	17%	0.84	2.84	Medium
	Medium-High	4	0.0	0%	0.00		
	Medium	3	7.3	58%	1.75		
	Medium-Low	2	0.0	0%	0.00		
	Low	1	3.1	25%	0.25		
Genesee St/Erie Blvd: Camillus to Fayetteville	High	5	2.3	12%	0.61	2.07	Medium-Low
	Medium-High	4	0.0	0%	0.00		
	Medium	3	5.6	29%	0.88		
	Medium-Low	2	0.0	0%	0.00		
	Low	1	11.1	58%	0.58		
Destiny USA/RTC to Syracuse University	High	5	3.0	43%	2.14	3.34	Medium
	Medium-High	4	0.0	0%	0.00		
	Medium	3	2.2	31%	0.94		
	Medium-Low	2	0.0	0%	0.00		
	Low	1	1.8	26%	0.26		

Strategy 2:
BRT
Evaluation Data

MOBILITY IMPROVEMENTS

FTA Measure: Estimated Annual Trips

Route	Base Daily Trips (From Model)	Transit Dependent Trips (0.8 x Model Trips)	Estimated Daily FTA Trips	Estimated Annual FTA Trips	Rating
US 11 Local	3,720	2,976	6,696	2,008,800	Low
I-81 Express	1,300	1,040	2,340	702,000	Low
Western Lights to Carrier Circle	4,030	3,224	7,254	2,176,200	Low
Genesee Street/Erie Boulevard (NY 5) Corridor	4,820	3,856	8,676	2,602,800	Medium-Low
East Syracuse to OCC	6,320	5,056	11,376	3,412,800	Medium-Low
Syracuse University/Liverpool	5,440	4,352	9,792	2,937,600	Medium-Low
TOTAL	25,630	20,504	46,134	13,840,200	Medium

Study-Specific Measure: One-Seat Rides to Major Destinations

Route	Number of Major Destinations	Rating
US 11 Local	6	High
I-81 Express	4	Medium-High
Western Lights to Carrier Circle	4	Medium-High
Genesee Street/Erie Boulevard (NY 5) Corridor	6	High
East Syracuse to OCC	8	High
Syracuse University/Liverpool	8	High

ECONOMIC DEVELOPMENT

FTA Measure: Economic Development Effect Thresholds

Growth Management

Route	Rating	Rating Score	Segment Length (mi)	Percent	Weighted Score	Weighted Average Score	Final Rating
US 11 Local	High	3	0.0	0%	0.00	1.69	Medium
	Medium	2	9.0	69%	1.38		
	Low	1	4.0	31%	0.31		
I-81 Express	High	3	0.0	0%	0.00	1.25	Low
	Medium	2	3.7	25%	0.49		
	Low	1	11.3	75%	0.75		
Western Lights to Carrier Circle	High	3	0.0	0%	0.00	1.90	Medium
	Medium	2	10.8	90%	1.80		
	Low	1	1.2	10%	0.10		
Genesee Street/Erie Boulevard (NY 5) Corridor	High	3	0.0	0%	0.00	1.91	Medium
	Medium	2	15.4	91%	1.81		
	Low	1	1.6	9%	0.09		
East Syracuse to OCC	High	3	0.0	0%	0.00	1.82	Medium
	Medium	2	9.8	82%	1.63		
	Low	1	2.2	18%	0.18		
Syracuse University/Liverpool	High	3	0.0	0%	0.00	1.76	Medium
	Medium	2	13.3	76%	1.52		
	Low	1	4.2	24%	0.24		

Transit-Supportive Corridor Policies

Route	Rating	Rating Score	Segment Length (mi)	Percent	Weighted Score	Weighted Average Score	Final Rating
US 11 Local	High	3	7.5	58%	1.73	2.15	Medium
	Medium	2	0.0	0%	0.00		
	Low	1	5.5	42%	0.42		
I-81 Express	High	3	3.3	22%	0.66	1.44	Low
	Medium	2	0.0	0%	0.00		
	Low	1	11.7	78%	0.78		
Western Lights to Carrier Circle	High	3	10.8	90%	2.70	2.80	High
	Medium	2	0.0	0%	0.00		
	Low	1	1.2	10%	0.10		
Genesee Street/Erie Boulevard (NY 5) Corridor	High	3	9.6	56%	1.69	2.47	Medium
	Medium	2	5.8	34%	0.68		
	Low	1	1.6	9%	0.09		
East Syracuse to OCC	High	3	9.8	82%	2.45	2.63	High
	Medium	2	0.0	0%	0.00		
	Low	1	2.2	18%	0.18		
Syracuse University/Liverpool	High	3	7.8	45%	1.34	1.89	Medium
	Medium	2	0.0	0%	0.00		
	Low	1	9.7	55%	0.55		

Tools to Implement Land Use Policies

Route	Rating
US 11	Low
I-81 Express	Low
Western Lights to Carrier Circle	Low
Genesee Street/Erie Boulevard (NY 5) Corridor	Low
East Syracuse to OCC	Low
Syracuse University/Liverpool	Low

Performance of Land Use Policies

Route	Rating	Rating Score	Segment Length (mi)	Percent	Weighted Score	Weighted Average Score	Final Rating
US 11 Local	High	3	0.0	0%	0.00	1.58	Medium
	Medium	2	7.5	58%	1.15		
	Low	1	5.5	42%	0.42		
I-81 Express	High	3	0.0	0%	0.00	1.22	Low
	Medium	2	3.3	22%	0.44		
	Low	1	11.7	78%	0.78		
Western Lights to Carrier Circle	High	3	0.0	0%	0.00	1.49	Low
	Medium	2	5.9	49%	0.98		
	Low	1	6.1	51%	0.51		
Genesee Street/Erie Boulevard (NY 5) Corridor	High	3	0.0	0%	0.00	1.42	Low
	Medium	2	7.1	42%	0.84		
	Low	1	9.9	58%	0.58		
East Syracuse to OCC	High	3	0.0	0%	0.00	1.60	Medium
	Medium	2	7.2	60%	1.20		
	Low	1	4.8	40%	0.40		
Syracuse University/Liverpool	High	3	0.0	0%	0.00	1.45	Low
	Medium	2	7.8	45%	0.89		
	Low	1	9.7	55%	0.55		

Potential Impact of Transit Project on Regional Land Use

Route	Developable Land Available (ac)	Route Length (mi)	Ratio (ac/mi)	Rating	Adjusted Rating
US 11	4,315.65	13.0	331.97	High	High
I-81 Express	2,931.58	15.0	195.44	Medium	High
Western Lights to Carrier Circle	1,985.09	12.0	165.42	Medium	High
Genesee Street/Erie Boulevard (NY 5) Corridor	3,349.50	17.0	197.03	Medium	High
East Syracuse to OCC	2,043.78	12.0	170.31	Medium	High
Syracuse University/Liverpool	2,614.21	17.5	149.38	Low	Medium

Plans and Policies to Maintain or Increase Affordable Housing

Route	Rating	Rating Score	Segment Length (mi)	Percent	Weighted Score	Weighted Average Score	Final Rating
US 11 Local	High	3	7.5	58%	1.73	2.15	Medium
	Medium	2	0.0	0%	0.00		
	Low	1	5.5	42%	0.42		
I-81 Express	High	3	3.3	22%	0.66	1.44	Low
	Medium	2	0.0	0%	0.00		
	Low	1	11.7	78%	0.78		
Western Lights to Carrier Circle	High	3	5.9	49%	1.48	1.98	Medium
	Medium	2	0.0	0%	0.00		
	Low	1	6.1	51%	0.51		
Genesee Street/Erie Boulevard (NY 5) Corridor	High	3	7.1	42%	1.25	1.84	Medium
	Medium	2	0.0	0%	0.00		
	Low	1	9.9	58%	0.58		
East Syracuse to OCC	High	3	7.2	60%	1.80	2.20	Medium
	Medium	2	0.0	0%	0.00		
	Low	1	4.8	40%	0.40		
Syracuse University/Liverpool	High	3	7.8	45%	1.34	1.89	Medium
	Medium	2	0.0	0%	0.00		
	Low	1	9.7	55%	0.55		

Study-Specific Measure: Strategic Area Connectivity Thresholds

Route	# of Strategic Areas Served	Rating
US 11	4	High
I-81 Express	3	High
Western Lights to Carrier Circle	2	Medium
Genesee Street/Erie Boulevard (NY 5) Corridor	3	High
East Syracuse to OCC	2	Medium
Syracuse University/Liverpool	3	High

ENVIRONMENTAL BENEFITS

Route	Environmental Benefit	Annualized Project Cost	Benefit/Cost Ratio	Rating
US 11	$1,452,003	$99,736,008	1.5%	Medium
I-81 Express	$1,452,003	$99,736,008	1.5%	Medium
Western Lights to Carrier Circle	$1,452,003	$99,736,008	1.5%	Medium
Genesee Street/Erie Boulevard (NY 5) Corridor	$1,452,003	$99,736,008	1.5%	Medium
East Syracuse to OCC	$1,452,003	$99,736,008	1.5%	Medium
Syracuse University/Liverpool	$1,452,003	$99,736,008	1.5%	Medium

COST EFFECTIVENESS

Route	Route Length (mi)	Capital Cost ($/mi)	Additional Capital Expenses	Total Capital Cost	Annualized Capital Cost (Assume 20 Year, 20% Contingency)	Annual Operating Costs ($16.25/ vehicle-mile)	Total Annualized Cost	Cost Per Trip	Rating
US 11	13.0	$7,000,000	$3,333,333	$94,333,333	$5,660,000	$8,392,540	$14,052,540	$ 12.59	Medium-Low
I-81 Express	15.0	$7,000,000	$3,883,333	$108,883,333	$6,533,000	$4,753,125	$11,286,125	$ 28.94	Low
Western Lights to Carrier Circle	12.0	$7,000,000	$3,333,333	$87,333,333	$5,240,000	$8,512,530	$13,752,530	$ 11.38	Medium-Low
Genesee Street/Erie Boulevard (NY 5) Corridor	17.0	$7,000,000	$4,883,333	$123,883,333	$7,433,000	$10,974,860	$18,407,860	$ 12.73	Medium-Low
East Syracuse to OCC	12.0	$7,000,000	$3,883,333	$87,883,333	$5,273,000	$8,512,530	$13,785,530	$ 7.27	Medium
Syracuse University/Liverpool	17.5	$7,000,000	$4,833,333	$127,333,333	$7,640,000	$11,852,181	$19,492,181	$ 11.94	Medium-Low
TOTAL	86.5	$42,000,000	$24,149,998	$629,649,998	$37,779,000	$52,997,766	$90,776,766	$ 11.81	Medium-Low

LAND USE

Land Use Evaluation Thresholds

Route	Employment Served by System	Rating Score	Average Population Density	Rating Score	CBD Typical Parking Cost per Day	Rating Score	CBD Spaces per Employee	Rating Score	Average Rating Score	Average Rating
US 11	81,280	3	6,234	3	$4 - $8	2	0.52	1	2.25	Medium-Low
I-81 Express	72,480	3	9,451	3	$4 - $8	2	0.52	1	2.25	Medium-Low
Western Lights to Carrier Circle	83,707	3	9,299	3	$4 - $8	2	0.52	1	2.25	Medium-Low
Genesee Street/Erie Boulevard (NY 5) Corridor	96,383	3	6,743	3	$4 - $8	2	0.52	1	2.25	Medium-Low
East Syracuse to OCC	86,296	3	7,933	3	$4 - $8	2	0.52	1	2.25	Medium-Low
Syracuse University/Liverpool	90,824	3	7,866	3	$4 - $8	2	0.52	1	2.25	Medium-Low

Notes: Utilized 0.25 mile walking distance buffer to determine average pop density and employment served. A 0.5 mile walking distance was utilized to determine employment served in the CBD.
I-81 Express was analyzed by determining the population density within 3 miles of each park and ride. Employment served = Downtown and Univ Hill only.

Affordable Housing

Route	Corridor Housing Units	Corridor Affordable Housing Units	Corridor Share	Study Area Housing Units	Study Area Affordable Housing Units	Study Area Share	Corridor to Study Area Ratio	Rating
US 11	39,302	4,307	0.11	198,626	11,129	0.06	1.96	Medium
I-81 Express	30,622	3,513	0.11	198,626	11,129	0.06	2.05	Medium
Western Lights to Carrier Circle	38,818	4,311	0.11	198,626	11,129	0.06	1.98	Medium
Genesee Street/Erie Boulevard (NY 5) Corridor	46,224	4,578	0.10	198,626	11,129	0.06	1.77	Medium
East Syracuse to OCC	42,703	3,948	0.09	198,626	11,129	0.06	1.65	Medium
Syracuse University/Liverpool	40,748	3,583	0.09	198,626	11,129	0.06	1.57	Medium

Pedestrian Accessibility Thresholds

Route	Rating	Rating Score	Segment Length (mi)	Percent	Weighted Score	Weighted Average Score	Average Rating
US 11	High	5	1.8	14%	0.69	2.80	Medium
	Medium-High	4	0.0	0%	0.00		
	Medium	3	8.1	62%	1.87		
	Medium-Low	2	0.0	0%	0.00		
	Low	1	3.1	24%	0.24		
I-81 Express	High	5	1.8	12%	0.60	1.71	Medium-Low
	Medium-High	4	0.0	0%	0.00		
	Medium	3	1.7	11%	0.34		
	Medium-Low	2	0.0	0%	0.00		
	Low	1	11.5	77%	0.77		
Western Lights - Carrier Circle	High	5	1.3	11%	0.54	2.40	Medium-Low
	Medium-High	4	0.0	0%	0.00		
	Medium	3	5.8	48%	1.45		
	Medium-Low	2	0.0	0%	0.00		
	Low	1	4.9	41%	0.41		
Genesee Street/Erie Boulevard (NY 5) Corridor	High	5	2.1	12%	0.62	2.22	Medium-Low
	Medium-High	4	0.0	0%	0.00		
	Medium	3	6.2	36%	1.09		
	Medium-Low	2	0.0	0%	0.00		
	Low	1	8.7	51%	0.51		
East Syracuse - OCC	High	5	2.2	18%	0.92	2.77	Medium
	Medium-High	4	0.0	0%	0.00		
	Medium	3	6.2	52%	1.55		
	Medium-Low	2	0.0	0%	0.00		
	Low	1	3.6	30%	0.30		
Syracuse University/Liverpool	High	5	4.6	26%	1.31	2.34	Medium-Low
	Medium-High	4	0.0	0%	0.00		
	Medium	3	2.5	14%	0.43		
	Medium-Low	2	0.0	0%	0.00		
	Low	1	10.4	59%	0.59		

Strategy 3:
LRT
Evaluation Data

MOBILITY IMPROVEMENTS

FTA Measure: Estimated Annual Trips

Route	Base Daily Trips (From Model)	Transit Dependent Trips (0.8 x Model Trips)	Estimated Daily FTA Trips	Estimated Annual FTA Trips	Rating
Downtown-University Hill Loop	1,190	952	2,142	642,600	Low
James St Option	2,440	1,952	4,392	1,317,600	Low
OnTrack Option	760	608	1,368	410,400	Low
Salina St Option	450	360	810	243,000	Low
Solar St Option	360	288	648	194,400	Low
TOTAL	5,200	4,160	9,360	2,808,000	Low

Study-Specific Measure: One-Seat Rides to Major Destinations

Route	Number of Major Destinations	Rating
Downtown-University Hill Loop	4	Medium-High
James St Option	5	High
OnTrack Option	3	Medium
Salina St Option	6	High
Solar St Option	5	High

ECONOMIC DEVELOPMENT

FTA Measure: Economic Development Effect Thresholds

Growth Management

Route	Rating	Rating Score	Segment Length (mi)	Percent	Weighted Score	Weighted Average Score	Final Rating
Downtown-University Hill Loop	High	3	0.0	0%	0.00	2.00	Medium
	Medium	2	4.0	100%	2.00		
	Low	1	0.0	0%	0.00		
James St Option	High	3	0.0	0%	0.00	2.00	Medium
	Medium	2	4.5	100%	2.00		
	Low	1	0.0	0%	0.00		
OnTrack Option	High	3	0.0	0%	0.00	2.00	Medium
	Medium	2	4.3	100%	2.00		
	Low	1	0.0	0%	0.00		
Salina St Option	High	3	0.0	0%	0.00	2.00	Medium
	Medium	2	4.3	100%	2.00		
	Low	1	0.0	0%	0.00		
Solar St Option	High	3	0.0	0%	0.00	2.00	Medium
	Medium	2	3.3	100%	2.00		
	Low	1	0.0	0%	0.00		

Transit-Supportive Corridor Policies

Route	Rating	Rating Score	Segment Length (mi)	Percent	Weighted Score	Weighted Average Score	Final Rating
Downtown-University Hill Loop	High	3	4.0	100%	3.00	3.00	High
	Medium	2	0.0	0%	0.00		
	Low	1	0.0	0%	0.00		
James St Option	High	3	4.5	100%	3.00	3.00	High
	Medium	2	0.0	0%	0.00		
	Low	1	0.0	0%	0.00		
OnTrack Option	High	3	4.3	100%	3.00	3.00	High
	Medium	2	0.0	0%	0.00		
	Low	1	0.0	0%	0.00		
Salina St Option	High	3	4.3	100%	3.00	3.00	High
	Medium	2	0.0	0%	0.00		
	Low	1	0.0	0%	0.00		
Solar St Option	High	3	3.3	100%	3.00	3.00	High
	Medium	2	0.0	0%	0.00		
	Low	1	0.0	0%	0.00		

Tools to Implement Land Use Policies

Route	Rating
Downtown-University Hill Loop	Medium
James St Option	Medium
OnTrack Option	Medium
Salina St Option	Medium
Solar St Option	Medium

Performance of Land Use Policies

Route	Rating	Rating Score	Segment Length (mi)	Percent	Weighted Score	Weighted Average Score	Final Rating
Downtown-University Hill Loop	High	3	0.0	0%	0.00	2.00	Medium
	Medium	2	4.0	100%	2.00		
	Low	1	0.0	0%	0.00		
James St Option	High	3	0.0	0%	0.00	2.00	Medium
	Medium	2	4.5	100%	2.00		
	Low	1	0.0	0%	0.00		
OnTrack Option	High	3	0.0	0%	0.00	2.00	Medium
	Medium	2	4.3	100%	2.00		
	Low	1	0.0	0%	0.00		
Salina St Option	High	3	0.0	0%	0.00	2.00	Medium
	Medium	2	4.3	100%	2.00		
	Low	1	0.0	0%	0.00		
Solar St Option	High	3	0.0	0%	0.00	2.00	Medium
	Medium	2	3.3	100%	2.00		
	Low	1	0.0	0%	0.00		

Potential Impact of Transit Project on Regional Land Use

Route	Developable Land Available (ac)	Route Length (mi)	Ratio (ac/mi)	Rating
Downtown-University Hill Loop	1,279.7	4.0	319.9	High
James St Option	1,823.7	4.5	405.3	High
OnTrack Option	3,312.3	4.3	770.3	High
Salina St Option	2,343.8	4.3	545.1	High
Solar St Option	2,299.1	3.3	696.7	High

Plans and Policies to Maintain or Increase Affordable Housing

Route	Rating	Rating Score	Segment Length (mi)	Percent	Weighted Score	Weighted Average Score	Final Rating
Downtown-University Hill Loop	High	3	4.0	100%	3.00	3.00	High
	Medium	2	0.0	0%	0.00		
	Low	1	0.0	0%	0.00		
James St Option	High	3	4.5	100%	3.00	3.00	High
	Medium	2	0.0	0%	0.00		
	Low	1	0.0	0%	0.00		
OnTrack Option	High	3	4.3	100%	3.00	3.00	High
	Medium	2	0.0	0%	0.00		
	Low	1	0.0	0%	0.00		
Salina St Option	High	3	4.3	100%	3.00	3.00	High
	Medium	2	0.0	0%	0.00		
	Low	1	0.0	0%	0.00		
Solar St Option	High	3	3.3	100%	3.00	3.00	High
	Medium	2	0.0	0%	0.00		
	Low	1	0.0	0%	0.00		

Study-Specific Measure: Strategic Area Connectivity Thresholds

Route	# of Strategic Areas Served	Rating
Downtown-University Hill Loop	2	Medium
James St Option	2	Medium
OnTrack Option	3	High
Salina St Option	3	High
Solar St Option	3	High

ENVIRONMENTAL BENEFITS

Route	Environmental Benefit	Annualized Project Cost	Benefit/Cost Ratio	Rating
Downtown-University Hill Loop	$106,120	$34,386,244	0.3%	Medium
James St Option	$106,120	$34,386,244	0.3%	Medium
OnTrack Option	$106,120	$34,386,244	0.3%	Medium
Salina St Option	$106,120	$34,386,244	0.3%	Medium
Solar St Option	$106,120	$34,386,244	0.3%	Medium

COST EFFECTIVENESS

Route	Route Length (mi)	Capital Cost ($/mi)	Additional Capital Expenses	Total Capital Cost	Annualized Capital Cost (Assume 20 Year, 20% Contingency)	Annual Operating Costs ($20/ vehicle-mile)	Total Annualized Cost	Cost Per Trip	Rating
Downtown-University Hill Loop	4.0	$19,500,000	$20,000,000	$98,000,000	$5,880,000	$1,684,842	$7,564,842	$ 21.19	Low
James St Option	4.5	$19,500,000	$1,100,000	$88,850,000	$5,331,000	$2,294,241	$7,625,241	$ 10.42	Medium-Low
OnTrack Option	4.3	$19,500,000	$1,100,000	$84,950,000	$5,097,000	$2,000,619	$7,097,619	$ 31.13	Low
Salina St Option	4.3	$19,500,000	$0	$83,850,000	$5,031,000	$2,000,619	$7,031,619	$ 52.09	Low
Solar St Option	3.3	$19,500,000	$0	$64,350,000	$3,861,000	$1,205,923	$5,066,923	$ 46.92	Low
TOTAL	20.4	$97,500,000	$22,200,000	$420,000,000	$25,200,000	$9,186,244	$34,386,244	$ 22.04	Low

LAND USE

Land Use Evaluation Thresholds

Route	Employment Served by System	Rating Score	Average Population Density	Rating Score	CBD Typical Parking Cost per Day	Rating Score	CBD Spaces per Employee	Rating Score	Average Rating Score	Average Rating
Downtown-University Hill Loop	66,179	2	10,960	4	$4 - $8	2	0.52	1	2.25	Medium-Low
James St Option	114,609	3	9,483	3	$4 - $8	2	0.52	1	2.25	Medium-Low
OnTrack Option	120,370	3	8,938	3	$4 - $8	2	0.52	1	2.25	Medium-Low
Salina St Option	109,322	3	9,767	4	$4 - $8	2	0.52	1	2.5	Medium
Solar St Option	115,041	3	9,054	3	$4 - $8	2	0.52	1	2.25	Medium-Low

Notes: Utilized 0.5 mile walking distance buffer to determine average pop density and employment served.
Option routes = Average pop density between option routes and base loop, Employement = option route + base loop

Affordable Housing

Route	Corridor Housing Units	Corridor Affordable Housing Units	Corridor Share	Study Area Housing Units	Study Area Affordable Housing Units	Study Area Share	Corridor to Study Area Ratio	Rating
Downtown-University Hill Loop	17,579	2,859	0.16	198,626	11,129	0.06	2.90	High
James St Option	19,320	3,578	0.19	198,626	11,129	0.06	3.31	High
OnTrack Option	11,984	2,735	0.23	198,626	11,129	0.06	4.07	High
Salina St Option	10,537	3,034	0.29	198,626	11,129	0.06	5.14	High
Solar St Option	8,800	2,974	0.34	198,626	11,129	0.06	6.03	High

Pedestrian Accessibility Thresholds

Route	Rating	Rating Score	Segment Length (mi)	Percent	Weighted Score	Weighted Average Score	Average Rating
Downtown-Univ Hill Loop	High	5	3.7	93%	4.63	4.85	High
	Medium-High	4	0.0	0%	0.00		
	Medium	3	0.3	8%	0.23		
	Medium-Low	2	0.0	0%	0.00		
	Low	1	0.0	0%	0.00		
James Street Option	High	5	1.4	31%	1.56	3.62	Medium-High
	Medium-High	4	0.0	0%	0.00		
	Medium	3	3.1	69%	2.07		
	Medium-Low	2	0.0	0%	0.00		
	Low	1	0.0	0%	0.00		
OnTrack Option	High	5	1.4	33%	1.63	3.05	Medium
	Medium-High	4	0.0	0%	0.00		
	Medium	3	1.6	37%	1.12		
	Medium-Low	2	0.0	0%	0.00		
	Low	1	1.3	30%	0.30		
Salina Street Option	High	5	2.1	49%	2.44	3.74	Medium-High
	Medium-High	4	0.0	0%	0.00		
	Medium	3	1.7	40%	1.19		
	Medium-Low	2	0.0	0%	0.00		
	Low	1	0.5	12%	0.12		
Solar Street Option	High	5	3.0	91%	4.55	4.64	High
	Medium-High	4	0.0	0%	0.00		
	Medium	3	0.0	0%	0.00		
	Medium-Low	2	0.0	0%	0.00		
	Low	1	0.3	9%	0.09		

STRATEGY 1: BASE BUILD

Corridor	Mobility Improvements		Category Score	Economic Development							Category Score	Environmental Benefits	Cost Effectiveness	Land Use			Category Score	Weighted Average Score	Corridor Average Rating	Enhancement Rating
	Estimated Annual Trips	One Seat Rides to Major Destinations		Growth Management	Transit-Supportive Corridor Policies	Tools to Implement Land Use Policies	Performance of Land Use Policies	Potential Impact of Transit Project on Regional Land Use	Plans and Policies to Maintain or Increase Affordable Housing	Strategic Area Connectivity Thresholds				Land Use Evaluation Thresholds	Affordable Housing	Pedestrian Accessibility Thresholds				
US 11: North Syracuse to South Valley	1	5	3.00	1	3	1	1	3	3	5	2.43	3	3	2	3	3	2.67	2.82	Medium	3.03 Medium
I-81 Express: Central Square to Downtown/Univ Hill	1	4	2.50	1	1	1	1	3	1	5	1.86	3	5	2	3	2	2.33	3.01	Medium	
Liverpool/CR 57: Great Northern Mall to Downtown/Univ Hill	1	5	3.00	1	3	1	1	3	3	5	2.43	3	3	2	3	2	2.33	2.77	Medium	
Butternut St/Onondaga St: Northside to Western Lights	1	4	2.50	3	3	1	1	1	3	3	2.14	3	4	2	3	2	2.33	2.83	Medium	
James St/South Ave: OCC to East Syracuse	1	5	3.00	3	5	1	3	3	3	3	3.00	3	4	2	3	3	2.67	3.21	Medium	
Genesee St/Erie Blvd: Camillus to Fayetteville	1	5	3.00	3	3	1	1	3	3	5	2.71	3	3	2	3	2	2.33	2.85	Medium	
Destiny USA/RTC to Syracuse University	1	5	3.00	3	5	1	3	5	5	5	3.86	3	5	2	4	3	3.00	3.71	Medium-High	

STRATEGY 2: BRT

Corridor	Mobility Improvements		Category Score	Economic Development							Category Score	Environmental Benefits	Cost Effectiveness	Land Use			Category Score	Weighted Average Score	Corridor Average Rating	Enhancement Rating
	Estimated Annual Trips	One Seat Rides to Major Destinations		Growth Management	Transit-Supportive Corridor Policies	Tools to Implement Land Use Policies	Performance of Land Use Policies	Potential Impact of Transit Project on Regional Land Use	Plans and Policies to Maintain or Increase Affordable Housing	Strategic Area Connectivity Thresholds				Land Use Evaluation Thresholds	Affordable Housing	Pedestrian Accessibility Thresholds				
US 11 Local	1	5	3.00	3	3	1	3	5	3	5	3.29	3	2	2	3	3	2.67	2.78	Medium	2.68 Medium
I-81 Express	1	4	2.50	1	1	1	1	5	1	5	2.14	3	1	2	3	2	2.33	2.08	Medium-Low	
Western Lights-Carrier Circle	1	4	2.50	3	5	1	1	5	3	3	3.00	3	2	2	3	2	2.33	2.54	Medium	
Genesee Street/Erie Boulevard (NY 5) Corridor	2	5	3.50	3	3	1	1	5	3	5	3.00	3	2	2	3	2	2.33	2.79	Medium	
East Syracuse-OCC	2	5	3.50	3	5	1	3	5	3	3	3.29	3	3	2	3	3	2.67	3.15	Medium	
Syracuse University/Liverpool	2	5	3.50	3	3	1	1	3	3	5	2.71	3	2	2	3	2	2.33	2.72	Medium	

STRATEGY 3: LRT

Corridor	Mobility Improvements		Category Average Score	Economic Development							Category Average Score	Environmental Benefits	Cost Effectiveness	Land Use			Category Average Score	Weighted Average Score	Corridor Average Rating	Enhancement Rating
	Estimated Annual Trips	One Seat Rides to Major Destinations		Growth Management	Transit-Supportive Corridor Policies	Tools to Implement Land Use Policies	Performance of Land Use Policies	Potential Impact of Transit Project on Regional Land Use	Plans and Policies to Maintain or Increase Affordable Housing	Strategic Area Connectivity Thresholds				Land Use Evaluation Thresholds	Affordable Housing	Pedestrian Accessibility Thresholds				
Downtown-University Hill Loop	1	4	2.50	3	5	3	3	5	5	3	3.86	3	1	2	5	5	4.00	2.71	Medium	2.83 Medium
James Street Option	1	5	3.00	3	5	3	3	5	5	3	3.86	3	2	2	5	4	3.67	3.05	Medium	
OnTrack Option	1	3	2.00	3	5	3	3	5	5	5	4.14	3	1	2	5	3	3.33	2.58	Medium	
Salina Street Option	1	5	3.00	3	5	3	3	5	5	5	4.14	3	1	3	5	4	4.00	2.91	Medium	
Solar Street Option	1	5	3.00	3	5	3	3	5	5	5	4.14	3	1	2	5	5	4.00	2.91	Medium	