

STAMFORD PRIVATE SHUTTLE STUDY

Final Report



Final Planning Document
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STAMFORD BUS AND SHUTTLE STUDY



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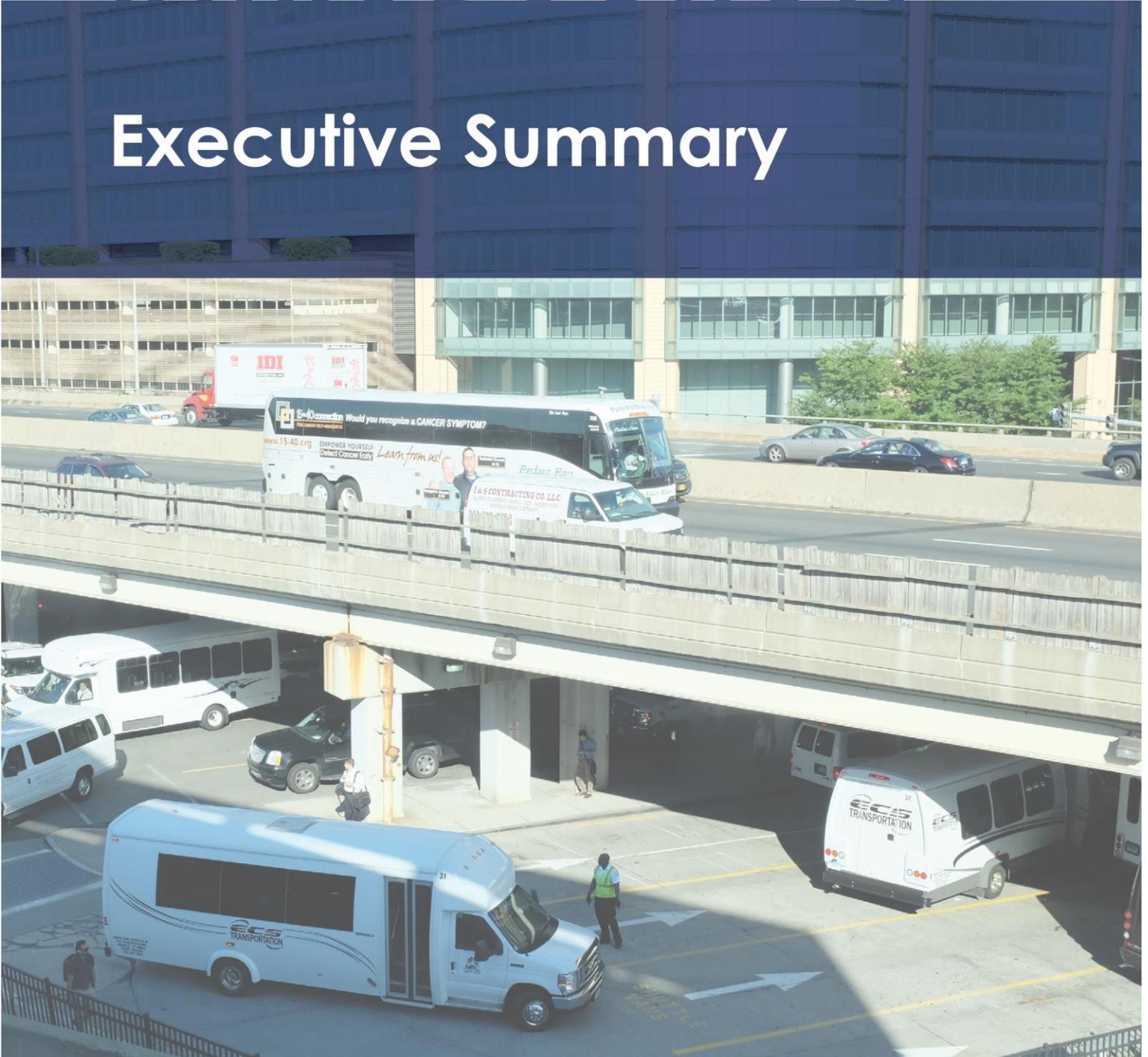


Subconsultants:



PRIVATE SHUTTLE STUDY INTRODUCTION

Executive Summary



WHY A BUS AND SHUTTLE STUDY IN STAMFORD?

The purpose of the Stamford Bus and Shuttle study was to complete a comprehensive evaluation of current CTTransit and private shuttle bus operations, focusing on the Stamford Transportation Center (STC). The shuttle study represented the first phase of the overall effort and included a detailed investigation of private shuttles and the impacts of shuttle services on network operations and traffic circulation in and around the STC.

The study was funded by the Connecticut Department of Transportation (CTDOT) and the United States Department of Transportation (USDOT). The study was administered by the Western Connecticut Council of Governments (WestCOG).

The shuttle study and this report focused on four key project elements:

- Chapter One: Stakeholder & Public Engagement
- Chapter Two: Existing Conditions
- Chapter Three: Opportunities
- Chapter Four: Evaluation & Recommendations



The shuttle boarding area at the Stamford Transportation Center is used by more than 3,000 riders every weekday morning.

STAKEHOLDER & PUBLIC ENGAGEMENT

The Stamford Bus and Shuttle Study included outreach to businesses, public sector stakeholders, and shuttle riders. Engagement with businesses included individual interviews with employers and property managers, briefings to Stamford's business leadership groups, and two larger meetings with the business community.

To coordinate with public sector stakeholders, the study team formed a Technical Committee (TC) with representatives from CTDOT, WestCOG, the City of Stamford, CTTransit, and Fusco Management Company (property manager for the STC). Last, shuttle riders shared their input through a pop-up event held at the STC in summer 2015. For stakeholders unable to attend meetings, they had opportunities to contact the project team via the project website (www.stamfordbusandshuttle.com).



Outreach with all three groups highlighted a need to address the congestion and safety concerns at the STC. Although all groups emphasized the importance of private shuttles to businesses, property owners, and area workers, the path to addressing these associated challenges was unclear. Some stakeholders do consider CTTtransit buses, walking, and bicycling as viable alternatives, but many are concerned by the added time delay. Businesses and property managers view shuttles as a critical means to attract talent and tenants, so any additional inconvenience is seen as a competitive disadvantage.

EXISTING CONDITIONS

Privately-funded shuttles are an important component of Stamford’s overall transportation network. As Stamford’s economy grows and attracts more people to live and work in Stamford, shuttles help complete the “last mile” between the STC and places of employment and residences. This amenity in turn helps Stamford’s ability to attract talented professionals and grow as an economic hub. Although most shuttles carry commuters to and from places of work, residential property owners, universities, and hotels also provide shuttles as an amenity for their employees, tenants, and customers. The vast majority of shuttle trips are two miles or less.

The number of businesses providing their own shuttle services has grown considerably in the past five years, along with total shuttle ridership citywide. The study team conducted field work and data collection in July 2015 and observed 425 AM peak vehicle departures from the STC, more than 60 individual shuttle destinations, and an estimated AM peak ridership of over 3,000 customers. This is approximately 700 more customers more than five years ago.

Figure 1 Growth in Shuttle Ridership

2010: Approximately **2,300** passenger trips during the morning rush



2015: Approximately **3,000** passenger trips during the morning rush

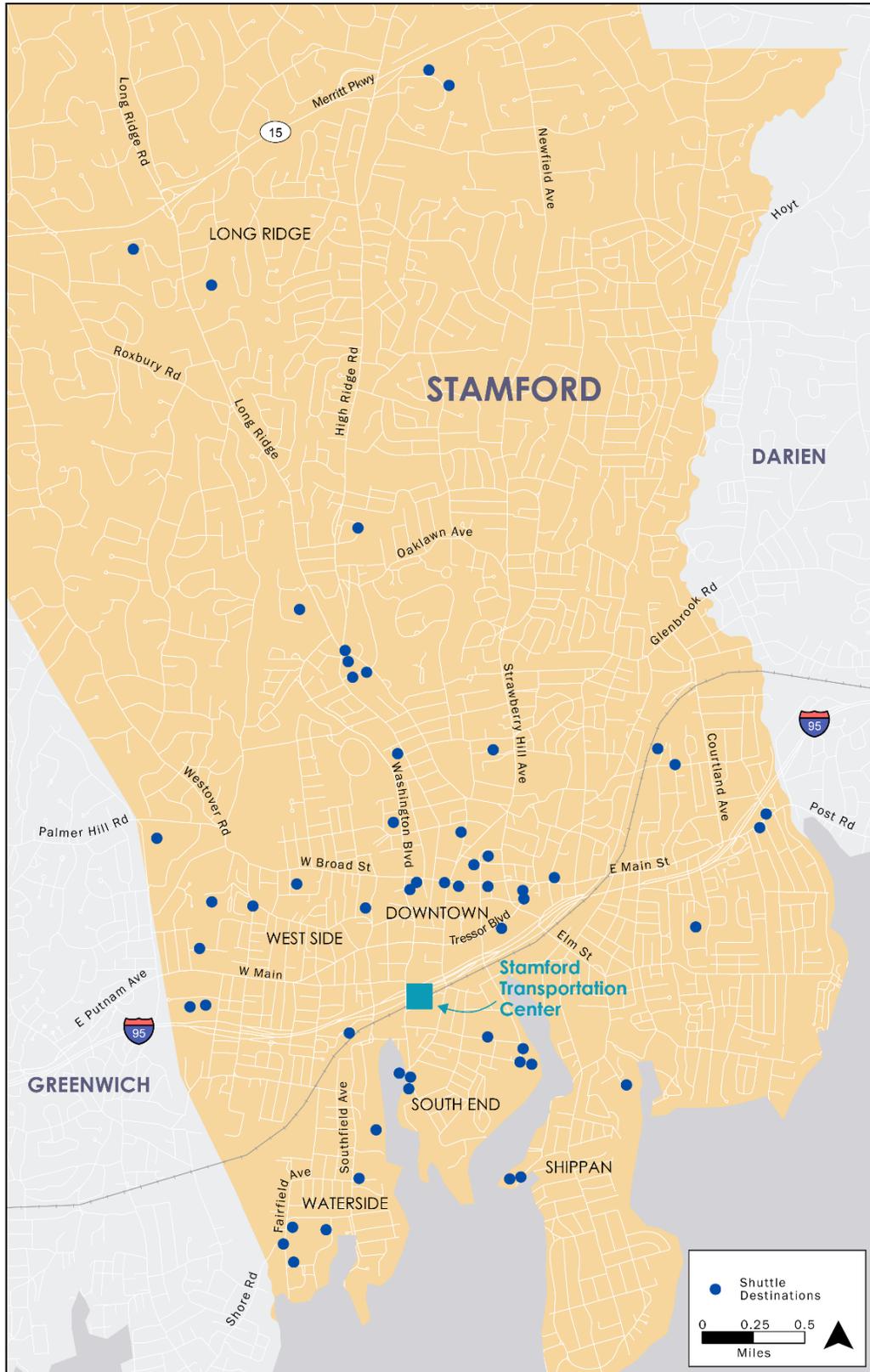


*Morning rush = 6:30 AM - 10:00 AM  = 100 shuttle riders

Although the growth of shuttles and riders may indicate a growing economy, additional shuttles present a challenge. Shuttle volumes contribute to congestion within an already constrained facility and on key roadways in the vicinity of the STC (e.g., North State Street, Washington Boulevard). General traffic affects the ability for shuttle operators to efficiently access and depart the STC; at the same time, the high volume of shuttle vehicles and circulation patterns contribute to conflicts and queuing on North State Street and impact CTTtransit’s bus access and egress from the STC. Moreover, the traffic within the STC has created unsafe conditions for riders, some of whom have to dart across two lanes of shuttles to board.



Figure 2 Shuttle Destinations in Stamford





OPPORTUNITIES

The continued growth in shuttle services has resulted in operational and safety concerns, as discussed in both the public outreach and existing conditions sections. Vehicle throughput, schedule reliability, passenger safety, and comfort are all compromised during the morning and afternoon peak periods. The study explored opportunities for addressing these challenges through the following focuses:

- **Facility.** Opportunities addressed in this focus relate to the physical constraints of the STC and surrounding streets.
- **Service.** Service opportunities consider adjustments to shuttle and CTTransit operations that would alleviate congestion and provide other mobility and safety benefits.
- **Administration.** Administration opportunities consider ways in which new or realigned approaches to administration could help the Stamford community overcome its current mobility challenges.

Figure 3 Shuttle Improvement Focuses



Together, these three approaches consider the full range of opportunities, each evaluated based on their ability to address study goals defined by the Technical Committee. The opportunities are organized by approach in the table below. These three focus areas are interrelated, and it is expected that maximum improvements will be realized with a combination of strategies from each.

Table 1 Summary of Opportunities

Facility Focus	Service Focus	Administration Focus
<ul style="list-style-type: none"> • Parking relocation • Mobility Concept: North State Street Transit Prioritization • Developing Off-site Staging Area for Shuttles • Improved Passenger Amenities 	<ul style="list-style-type: none"> • CTTransit Optimization: Circulator Option • CTTransit Optimization: Added Service Option • STC Operational Optimization for CTTransit Stops and Routes • Shuttle Consolidation Scenarios 	<ul style="list-style-type: none"> • TMAs or Business Consortium • Publicly-run System • Access Management • Status Quo

EVALUATION & RECOMMENDATIONS

The opportunities were considered in light of the project goals as identified by the Technical Committee (see callout box below). The evaluation process worked as an iterative, on-going discussion with the Technical Committee and the Stamford business community rather than a purely quantitative approach. The opportunities are categorized into four groups:



- **Implemented.** Business leaders stated they were willing to test out potential solutions and did not want to wait until the conclusion of the study to see changes made to the shuttle environment. In keeping with this suggestion, some recommendations developed in the study process were implemented before the final report was completed.
- **Recommended.** After analysis and conversations with key stakeholders, the study team recommends several opportunities to move forward with implementation. In doing so, these opportunities will address the project goals.
- **Needs further consideration.** Many of the opportunities would potentially address the project goals but need further study or discussion with key stakeholders. The strengths and drawbacks of these goals are detailed below.
- **Not recommended.** The study attempted to analyze the full range of opportunities for addressing the challenges facing the existing private shuttle study. Not all opportunities are feasible, desirable, or would address the prioritized list of project goals. For these opportunities, an explanation for why they are not recommended is provided below.

Prioritized Project Goals

- Improve traffic operations in and around Stamford Transportation Center (STC)
- Improve safety at the STC at the shuttle boarding area
- Reduce shuttle-related congestion at the STC
- Improve pedestrian and bicycle access to the STC
- Support economic development by leveraging benefits of transit
- Plan for transit interface at transit-oriented development (TOD)
- Increase transit mode share at the STC
- Implement travel demand management program to encourage transportation options
- Increase mobility within the City of Stamford
- Improve shuttle access to and from STC with respect to delay
- Improve rider experience on shuttles and CTTransit system
- Expand transit to underserved or growing areas

The shuttle study defined the pressing challenges associated with the existing shuttle service, identified the range of opportunities for addressing those challenges, and made recommendations. The stakeholder and public engagement process highlighted the most pressing issues and prioritized the study goals. With these in mind, the project team considered a range of opportunities from a facility, service, and administration perspective.

These opportunities were honed through an iterative process through coordination with the Technical Committee, business leaders, public agency representatives, and the study team. Through this process, one of the recommendations – the relocation of parking in the STC bus and shuttle areas to create additional space for CTTransit and private shuttle operations – was implemented in August 2016.

STAMFORD BUS AND SHUTTLE STUDY



Table 2 Study Recommendations

Opportunity	Status	Context	Key Players
Parking Relocation	Implemented	Facility	CTDOT, CTTransit
Shuttle consolidation scenarios	Recommended	Service	Stamford business community, City of Stamford, WestCOG, CTDOT
TMA or business consortium	Recommended	Administration	Stamford business community, City of Stamford
Mobility Concept: North State Street Transit Prioritization	Recommended	Facility	City of Stamford, CTDOT, CTTransit
Improved passenger amenities	Recommended	Facility	CTDOT, CTTransit
CTTransit optimization: Circulator	Recommended	Service	CTDOT

Inaction and maintaining the status quo will result in worsening traffic and safety conditions, which will lead to negative impacts on Stamford’s growing business community. The recommendations should be carried out through a collaborative effort involving WestCOG, the City of Stamford, CTDOT, and the Stamford business community. The newly formed steering committee will work to implement consolidated shuttle services and determine the purpose of a TMA or business consortium.

ACKNOWLEDGMENTS

This study represents a collaborative effort between WestCOG, CTDOT, the City of Stamford, CTTransit, and the consultant team, led by Fitzgerald & Halliday, Inc. of Hartford, Connecticut, and New York, New York.

Vital insights and outreach assistance were provided by the Stamford business community, including the Business Council of Fairfield County, Stamford Partnership, Stamford Downtown, and the Stamford Chamber of Commerce, along with each of the businesses that provided time and input during early interviews. Background information and operational assistance were provided by Fusco Property Management at the Stamford Transportation Center.

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PRIVATE SHUTTLE STUDY CHAPTER ONE

Stakeholder and Public Engagement





The Stamford Bus and Shuttle Study team’s approach to the private shuttle phase of the study included outreach to businesses, public sector stakeholders, and shuttle riders. Engagement with businesses included individual interviews with employers and property managers, briefings to Stamford’s business leadership groups, and two larger meetings with area businesses. To coordinate with public sector stakeholders, the study team formed a Technical Committee (TC) with representatives from the Connecticut Department of Transportation (CTDOT), the Western Connecticut Council of Governments (WestCOG), the City of Stamford, CTTransit, and Fusco Management Company (property manager for the Stamford Transportation Center). Last, shuttle riders shared their input through a pop-up event held at the Stamford Transportation Center (STC) in summer 2015. For stakeholders unable to attend meetings, they had opportunities to contact the project team via the project website (www.stamfordbusandshuttle.com).

Outreach with all three groups highlighted a need to address the congestion and safety concerns at the STC. Although all groups emphasized the importance of private shuttles to businesses, property owners, and area workers, the path to addressing these challenges is unclear. Some stakeholders do consider CTTransit buses, walking, and bicycling as viable alternatives, but many are concerned by the added time delay and many knew very little about CTTransit options. Businesses and property managers view shuttles as a critical means to attract talent and tenants, so any additional inconvenience is seen as a competitive disadvantage.

The results of the outreach efforts are summarized below. Additional information is available in Appendix A.

BUSINESS OUTREACH

The project team conducted 14 interviews with local employers and property managers to gain a better understanding of why they provide shuttle service and how they carry out these services. During these interviews, the employers and property managers identified hours, shuttle frequency, destinations served, and concerns related to the Stamford Transportation Center (STC).

The views toward shuttle service depended on whether the interviewee was an employer or a property manager. Employers consider door-to-door shuttle service as a key, basic operation necessary to attract talented employees. Shuttles are seen as invaluable tools for those who commute from New York City, as they are most likely to commute to Stamford by public transportation (i.e., commuter rail). Thus, annual operating cost to these businesses do not appear to be a significant factor.

Property managers see shuttle service as a key amenity to staying competitive in Stamford’s real estate market. When asked if CTTransit is a reasonable alternative to private shuttles, both employers and property managers stressed the need for direct service. They suggested public buses have slower travel times, less frequent service from the STC, and lack key amenities such as shelters and comfortable pedestrian connections. Most importantly, private shuttles offer free service on behalf of

The following employers and property managers participated in stakeholder interviews:

- Gen Re
- RFR Realty
- UCONN Stamford
- Building and Land Technology (BLT)
- Empire State Realty Trust
- Starwood Hotels
- Ernst & Young
- NBC Sports Group
- Deloitte
- City of Stamford Economic Development
- High Ridge Park
- Nestle
- Point 72
- Shippan Landing

Additional feedback options were available to the Stamford business community, including a short questionnaire.



the rider whereas CTTransit comes at a cost. As a key distinction with transit, most private shuttles only operate during the peak AM and PM commute periods. Businesses encourage walking, taxis, or ride-hailing services during off-peak periods.

Employers and property managers expressed concerns about the operations at the STC. Many described the operations as chaotic and hazardous for riders, many of whom frequently dart in front of shuttles to board. Congestion is another major challenge, and they described how congestion creates difficulty within the facility as well as on the surrounding local streets. Moreover, wayfinding within the facility is minimal. Many first-time users do not understand where to find shuttles within the facility, much less how to find their specific shuttle among the other vehicles queued for boarding.

The STC and shuttle service were not interviewees' only transportation concerns. They expressed concern about automobile traffic congestion as well as a need to improve pedestrian access, walking paths, and circulators within downtown Stamford.

Transportation to and from the STC is well-established, but mobility within Stamford by traditional public buses is generally not seen as a viable option by employers or property managers. Shuttles and their connections through the train station are seen as vital to increasing the Stamford labor shed and regional competitiveness. Without these connections, the City's labor shed would be considerably reduced.

Business Outreach – Major Themes

- Employers and property managers see shuttles as necessary to stay competitive for talent and tenants. Thus, they are not highly concerned about the price and responsibility of running their own shuttles.
- CTTransit is not viewed as a viable commuting option for this market.
- Sharing shuttle resources is of interest to some but not all.
- The walking environment in Stamford is often unpleasant, especially when crossing major streets.
- Operations and safety at the STC are highly unsatisfactory.

STUDY TECHNICAL COMMITTEE

A study Technical Committee (TC) was created with representation from the CTDOT, WestCOG, the City of Stamford, CTTransit, and Fusco Management Company. This committee provided feedback and direction on study concepts, deliverables, and was designed to address technical planning and operating details as well as serve as a resource to the consultant team.

TC members have an overall vision for the STC that is less congested, more welcoming, and better connected to all transportation modes than the existing facility. In their descriptions, some TC members focused on the physical design of the space. One attendee proposed a “welcoming, intuitive layout,” and another described their vision as a “vibrant multimodal transportation center.” A similar vision considered technological advancements and the “ability to expand for future capacity needs.” One attendee saw the need for improved parking services as well as expanded patron services and amenities. Another respondent hoped the construction of transit-oriented development (TOD) would spur additional improvements around the station, including roadway, pedestrian, and traffic signalization improvements.



In addition to developing a vision for the STC, TC members helped develop and prioritize overall project goals. The goals ranked from highest priority to lowest priority are as follows:

- Improve traffic operations in and around Stamford Transportation Center (STC)
- Improve safety at the STC at the shuttle boarding area
- Reduce shuttle-related congestion at the STC
- Improve pedestrian and bicycle access to the STC
- Support economic development by leveraging benefits of transit
- Plan for transit interface at transit-oriented development (TOD)
- Increase transit mode share at the STC
- Implement travel demand management program to encourage transportation options
- Increase mobility within the City of Stamford
- Improve shuttle access to and from STC with respect to delay
- Improve rider experience on shuttles and CTTransit system
- Expand transit to underserved or growing areas

These prioritized opportunities were measured against these goals in developing recommendations in the final chapter of this document.

SHUTTLE RIDER OUTREACH

Between 7:00 and 9:30 a.m. on July 22, 2015, Fitzgerald & Halliday (FHI) staff spoke with 63 commuters waiting for private shuttle buses at the STC. FHI asked respondents a variety of questions about commute patterns, mode choice, how transportation options affected their employment choice, and ideas for improving the STC.

Convenience and price were frequently cited as the reasons people liked taking the shuttles. Many of the commuters said driving is a feasible option for them, but traffic congestion makes transit and shuttles a more desirable option. When asked how they would reach their destination were the shuttle not available, many respondents could not think of another way. Many said they would walk to work, but people who had more than a twenty-minute walk to their place of employment said they would opt for taxis or ride-hailing services (e.g., Uber). CTTransit buses were an option for a handful of respondents, but most did not consider them an attractive alternative because of added commute time or limited comfort level with the local bus system.

Shuttle Rider Outreach – Major Themes

- Convenience and price are the primary reasons people ride the shuttles.
- Many respondents could not think of how they would get to work were shuttles not available, but walking, ride-hailing services (e.g., Uber), and CTTransit buses were mentioned as options for some.
- Most do not consider CTTransit buses a viable alternative to shuttles because of added commute time.
- Riders are concerned about visibility and safety in the shuttle boarding area.
- Suggestions for improving the STC include reorganizing the waiting zones based on the type/size of shuttles and adding amenities such as seating and screens announcing the arrivals of shuttles.



STAMFORD BUS AND SHUTTLE STUDY

Respondents seemed generally happy with the shuttle services, and most considered them an important perk for employment. In many cases, the shuttle affected the employment decisions of respondents. Yet, many respondents expressed concern about the shuttles crowding the station area. Loading shuttles frequently obscure views of shuttles in other lanes. Moreover, some respondents noted that they feel unsafe going to shuttles during peak commute times, especially when they have to cross more than one lane to reach their shuttle.

Respondents frequently acknowledged that the station area needed improvements because of the congestion and poor visibility. One respondent suggested a screen announcing the arrivals of different shuttles. Another suggested creating waiting area zones based on the type and size of the shuttles so that the riders knew where to look. A few other respondents suggested reducing the number of lanes because four lanes were too many to see all the shuttles. Other respondents mentioned the addition of station amenities, such as seating, a food/beverage cart, or a covering between the station exit and overpass.

PRIVATE SHUTTLE STUDY CHAPTER TWO

Existing Conditions

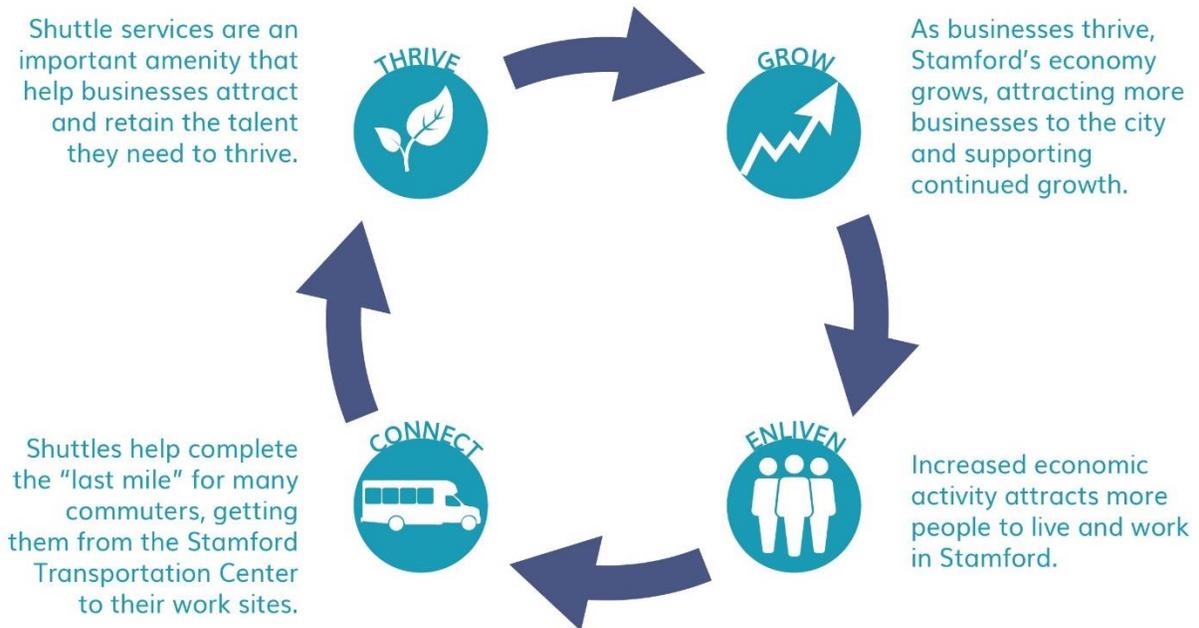


Building upon the stakeholder and public engagement, the Stamford Bus and Shuttle Study team developed an existing conditions report to help inform shuttle and transit service recommendations. The following sections summarize the findings related to private shuttle buses, CTTransit, other transportation services (e.g., taxis, ride-hailing services), and the STC itself. Included in the latter is a discussion of previous studies that have documented challenges and opportunities facing the STC.

PRIVATE SHUTTLES

Privately-funded shuttles are an important component of Stamford’s overall transportation network. As Stamford’s economy grows and attracts more people to live and work in Stamford, shuttles help complete the “last mile” between the STC and places of employment and residences. This amenity in turn helps Stamford’s ability to attract talented professionals and grow as an economic hub (Figure 4). Although most shuttles carry commuters to and from places of work, residential property owners, universities, and hotels also provide shuttles as an amenity for their employees, tenants, and customers.

Figure 4 Role of Private Shuttles in Stamford



The number of businesses providing their own shuttle services has grown considerably in the past five years, along with total shuttle ridership citywide. The study team conducted field work and data collection in July 2015 and observed 425 AM peak vehicle departures from the STC, more than 60 individual shuttle destinations, and an estimated AM peak ridership of over 3,000 customers. This is approximately 700 more customers than five years ago (Figure 5).



Figure 5 Growth in Private Shuttle Riders

2010: Approximately **2,300** passenger trips during the morning rush



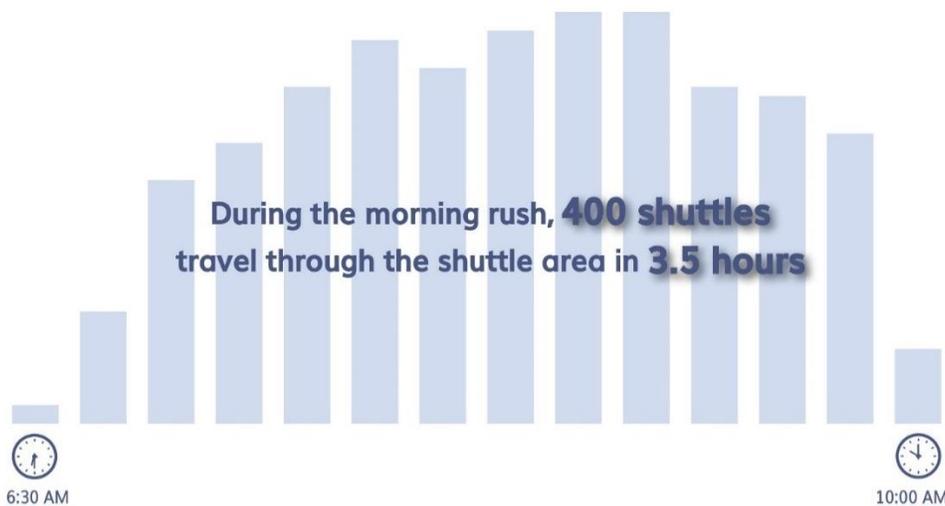
2015: Approximately **3,000** passenger trips during the morning rush



*Morning rush = 6:30 AM - 10:00 AM  = 100 shuttle riders

While the growth of shuttles and riders may indicate a growing economy, additional shuttles present a challenge. Shuttle volumes contribute to congestion within the facility and on key roadways in the vicinity of the STC (e.g., North State Street, Washington Boulevard). General traffic affects the ability for shuttle operators to efficiently access and depart the STC; at the same time, the high volume of shuttle vehicles and circulation patterns contribute to conflicts and queuing on North State Street and impact CTTransit’s bus access and egress from the STC. Moreover, the traffic within the STC has created unsafe conditions for riders, some of whom have to dart across two lanes of shuttles to board.

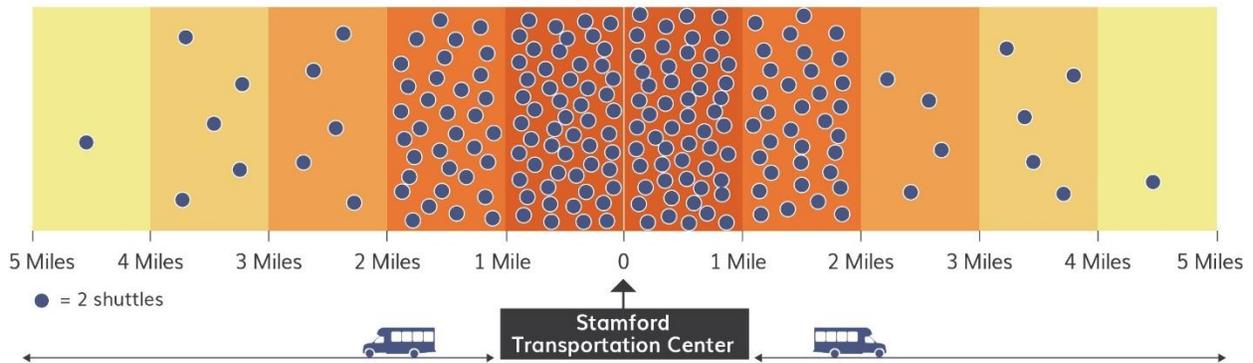
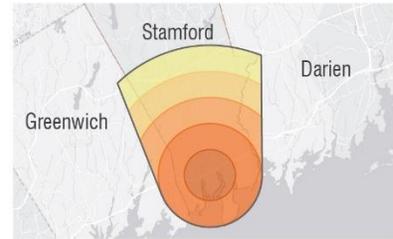
Figure 6 AM Peak Congestion at the STC



As noted by both businesses and riders, shuttles provide a convenient “last mile” link to key destinations, which vary in proximity to the STC. Shuttles serve businesses south of the Merritt Parkway, with clear concentrations in areas of denser development such as Downtown and the South End (see Figure 8). The vast majority of shuttle trips are two miles or less.

Figure 7 Shuttle Destinations' Distance from STC

Nearly **90%** of these shuttles are taking commuters to destinations within **1 - 2 miles** of the Stamford Transportation Center.



Shuttle service schedules vary by destination and each business' individual needs. However, most shuttles serve the STC in the morning and evening rush hours, and most operators time a certain number of trips to meet specific Metro-North Railroad train arrival times. Some destinations run shuttles continuously, focusing less on meeting specific trains and more on providing continuous, regular service.

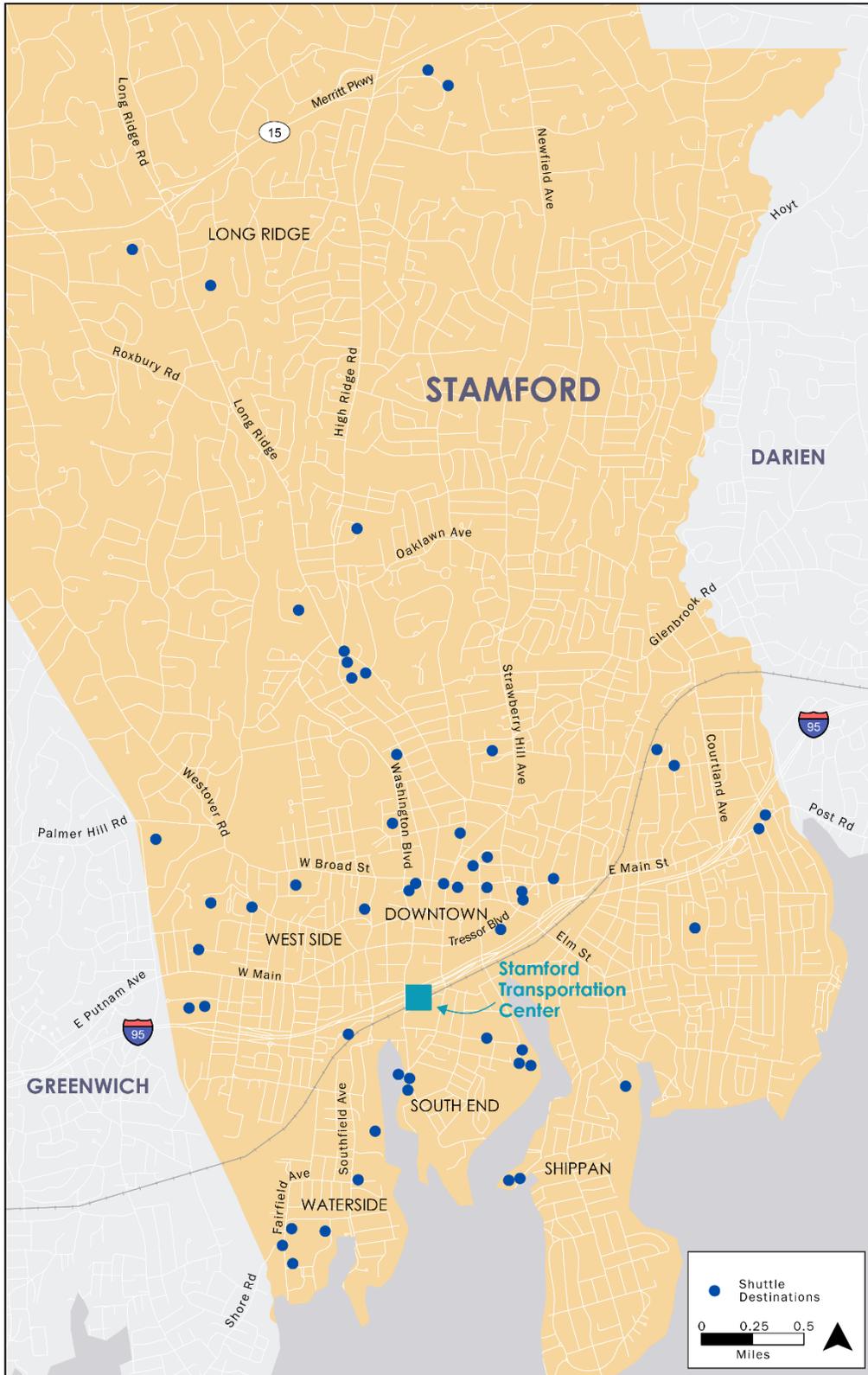
Middy shuttle service is minimal. Shuttle sponsors who participated in interviews as part of this study indicated that employees/tenants are responsible for their own transportation arrangements when rush hour shuttles are not running, although some properties do have sedans or SUVs available for limited, on-demand trips. Increasingly, businesses are looking to taxi/car services such as Uber to partner for on-demand transportation services during off-peak times.



Shuttles carry approximately 3,000 passengers to more than 60 destinations in Stamford. The STC shuttle boarding area is pictured above.



Figure 8 Shuttle Destinations in Stamford





The vehicle sizes range from 8- or 12- passenger vans to 32-passenger buses.

Vehicle sizes vary among shuttle providers, ranging from traditional eight-passenger vans to 32-passenger buses. Most vehicles are typical “cutaway” or “body on chassis” type shuttles, similar to airport shuttles. The shuttles have a variety of seating configurations for approximately 20 passengers.

Vehicle amenities and branding also vary by contract and operator. Some shuttle sponsors display their names and logos prominently, and some have signs for specific destinations placed in the shuttle windows to guide passengers. Others use unmarked vehicles (typically smaller vans). Very few shuttle sponsors own and operate their own vehicles; most prefer to outsource the capital, maintenance, and administrative responsibility to a contractor in favor of a simple operating agreement based on specific trip needs.

CTTRANSIT SERVICE

CTTransit’s Stamford Division serves the city of Stamford and also provides commuter service to surrounding cities (primarily White Plains, Greenwich, Port Chester, and Norwalk). The division operates 12 local fixed-route services and three commuter services, all of which serve the STC. The AM peak sees more than 1,100 boardings per hour, on average; shuttles see almost as many boardings during the same time period. A more detailed discussion of CTTransit service, performance, and route assessment will be provided in the transit phase of the study.

As noted in the stakeholder and public outreach section, both businesses and shuttle riders do not see CTTransit as a viable alternative to shuttles, despite the fact that most employers operating shuttles are located on existing CTTransit routes (Figure 9).

The reasons most riders and businesses said CTTransit was not an option is because of added cost and time. From the user perspective, shuttles are free whereas public buses require \$3.00 for an all-day pass and \$54.00 for a 31-day pass. As for added time, private shuttle riders would in fact face added in-vehicle time if they switch to CTTransit buses. In August 2016, the project team compared the in-vehicle time for shuttles with CTTransit buses using Google Maps. Most riders will see in-vehicle time increase by less than 10 minutes; riders headed to more distant locations or destinations not directly on a transit route may see increases of 15 minutes or more (Figure 10). This analysis, however, does not consider the time riders currently spend waiting for vehicles to arrive or waiting for vehicles to board. In some cases, CTTransit buses offer headways comparable or better than private shuttles, so the added in-vehicle time may not be significant. For most destinations, however, riders would experience some delay.

Figure 9 Existing CTTransit Bus Routes and Shuttle Destinations

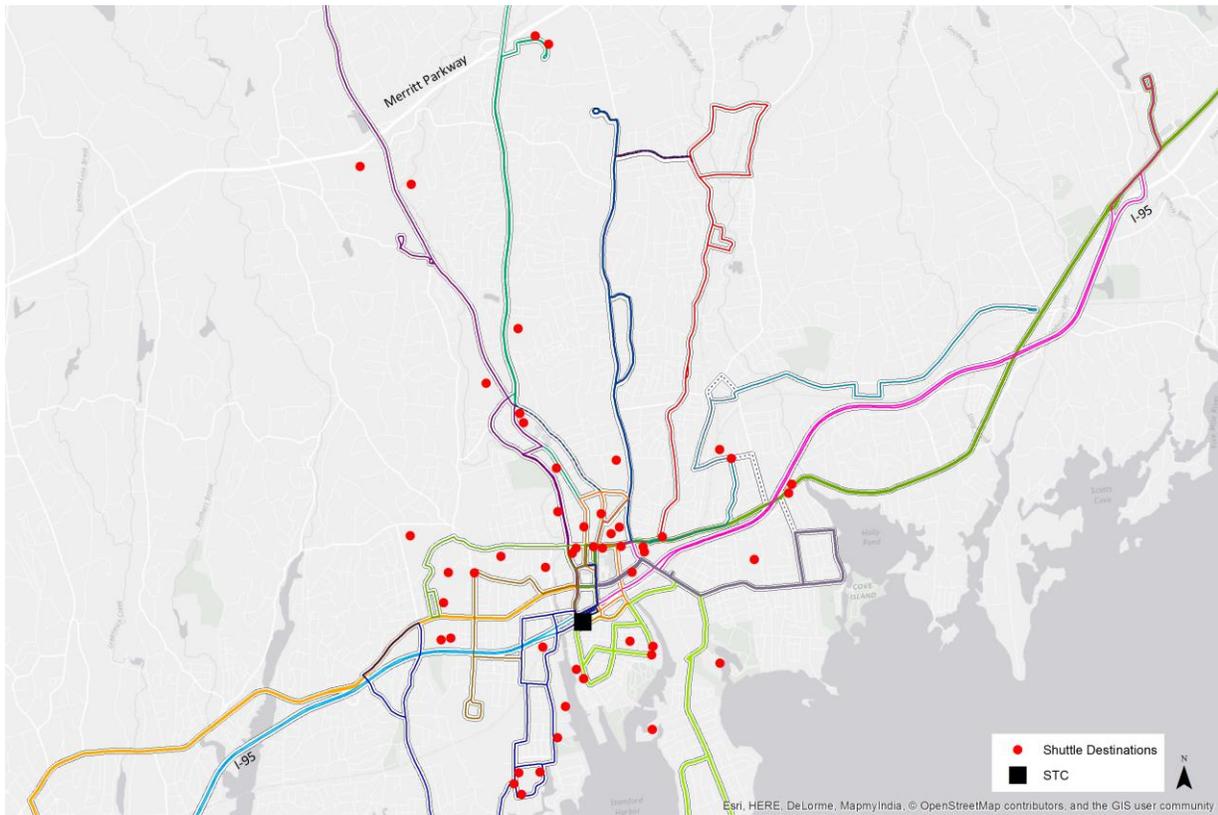
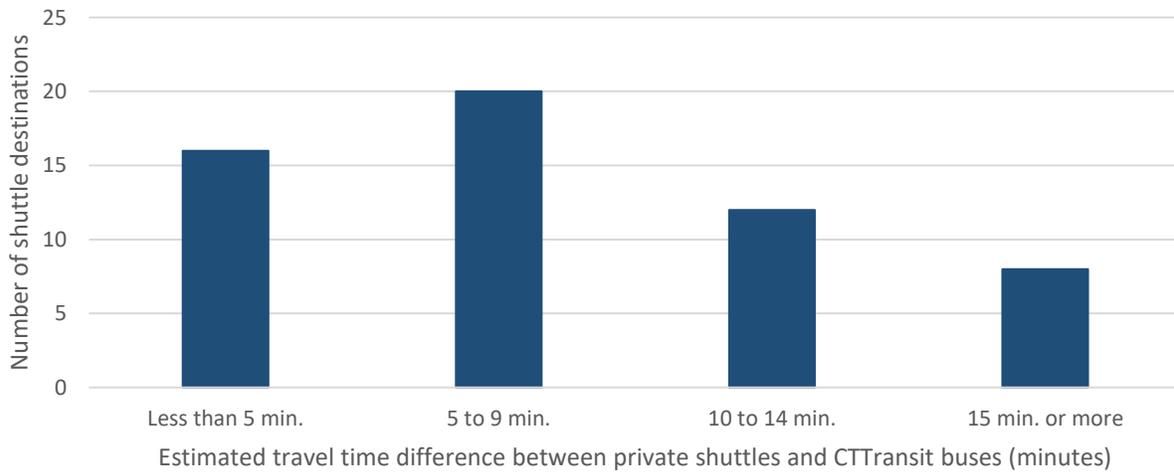


Figure 10 Number of Shuttle Destinations by Estimated Delay



SHUTTLE OPERATIONS & CONGESTION AT THE STC

Description of STC Shuttle Facility

The Stamford Transportation Center (STC) shuttle area is located under the I-95 overpass between North and South State Streets, abutting Washington Boulevard to the west. Access to the facility is available from North State Street or Washington Boulevard. Egress is possible only onto North State Street.

Vehicles circulate through the shuttle area in a counter-clockwise fashion, queuing in the western half (adjacent to Washington Boulevard) and turning to the passenger boarding area adjacent to the STC exit concourse. All shuttles exit onto North State Street. In the boarding area, the facility features four vehicle lanes, three of which are used for passenger boarding (i.e., inboard lanes in addition to the curb lane) while the fourth is to be kept clear for vehicle departures. Shuttles also idle on streets surrounding the STC to coordinate shuttle arrivals with Metro-North arrivals.



Shuttles circulate through the boarding area in a counter-clockwise fashion as shown in the image above.

As of July 2016, there were 16 car parking spaces within the shuttle area at the western-most edge, used primarily by MTA Police and STC staff. Additionally, the left-most lane in the western half of the shuttle area is often used for parallel parking by MTA Police, limiting the queuing space for shuttles before they turn toward the boarding area. In August 2016 and as a result of recommendations from this study for immediate actions, CTDOT removed the spaces from the shuttle boarding area to improve shuttle circulation (described further in Chapters 3 and 4).



Although the shuttle boarding area has an open-door policy, there are additional policy guidelines requesting shuttles to idle for no more than 10 minutes.

Shuttle Operating Policies and Procedures

Historically, CTDOT and Fusco Management Company (which manages the STC and other rail facilities) have offered an open-door policy to shuttle operators. Basic policies and procedures do exist for shuttle operators, updated most recently in January 2013.

- Shuttles are not allowed to be at the station for more than 10 minutes at a time
- Drivers are not to leave their buses
- Maximum speed of 3 mph in the shuttle area
- Buses must follow all direction of the station staff assigned to the shuttle bus area at all times, including being asked to “go around” if needed
- Property Management Office is to be informed of any additions, subtractions or changes in service or times immediately
- Buses are to be clearly marked where they are going
- No excessive use of horns
- Information for each shuttle company, including contact person, address, phone, fax and email is to be on file with the Property Management Office. If any of the information changes, the Property Management Office must be notified immediately.
- Buses/vans are to have lights on at all times while in the shuttle area

Enforcement of these policies and procedures varies. Fusco/STC staff in the shuttle area focus primarily on keeping shuttles moving in safe, efficient fashion during the peak hours. Ongoing enforcement of policies such as destination markings on shuttles is not a priority.



Review of Recent Studies

More than a dozen recent studies recommend improvements to the STC and the surrounding area. These studies address user experience, shuttle coordination, and the bicycle and pedestrian environment. This document reviews the major themes that emerged from these studies, drawing from the 2004 STC Multimodal Circulation Study and the 2010 STC Master Plan in particular.

Studies Considered

- STC Multimodal Circulation Study (2004)
- STC Master Plan (2010)
- Stamford Master Plan (2014)
- Connecticut Department of Transportation Statewide Bus System Study (2000)
- South Western Regional Planning Agency (SWRPA) Regional Plan of Conservation and Development (2006-2015)
- Coastal Connecticut Transportation Investment area (2000)
- Intrastate Passenger Commuter Ferry Study (2001)
- Congestion Mitigation Plan – Vision 2020 (2003) for SWRPA
- Stamford Downtown Parking, Traffic and Pedestrian Plan (2004)
- Greenwich Avenue Corridor Study (2005)
- Walkable Stamford (2008)
- Greenwich/Norwalk Bus Rapid Transit Study (2008)
- Towards a Livable Neighborhood (2010)
- Coastal Corridor Bus Study (2011)
- Stamford Neighborhood Traffic Calming (2011)
- Long Ridge/ High Ridge Corridor Study (2013)
- Stamford East Main Street Transit Node Feasibility Study (2013)
- Connecticut Transportation Survey (2013)

User Experience

Creating a comfortable, inviting, and intuitive STC has been addressed by multiple plans in the past 15 years. The most common recommendations include:

- **Wayfinding.** Nearly all studies examining the conditions at the STC recommend clearer wayfinding for transit users. Consistent signage directing transit riders to shuttles, buses, train platforms, and destinations beyond the STC may help reduce confusion among station users.
- **Lighting.** Better and higher intensity lighting, particularly at the bus and shuttle platforms, would enhance the users' feelings of security and provide a more inviting space.
- **Weather protection.** Studies have recommended windscreens and canopies at boarding areas to protect users from inclement weather.
- **Cleanliness.** Some studies suggest that more regular cleaning of the facility could promote the user experience. The STC Master Plan also proposes bird deterrents to prevent birds from roosting above the shuttle and bus boarding areas.
- **Amenities.** The boarding areas are crowded during the AM peak. Some studies suggest benches, particularly in conditioned or protected areas, could improve the boarding areas. Other studies recommend the use of technology; such as display screens or smart phone apps announcing shuttle arrivals.



Shuttle riders dart between idling vehicles to board their shuttle. The riders, operators, and other stakeholders consider this a safety hazard.

Other recommendations were not as universal. Artwork and sound attenuation measures were both mentioned, as well as policies to eliminate unnecessary idling in the boarding areas. The STC Multimodal Circulation Study also recommends finishing a ceiling under the I-95 overpass to improve the aesthetics of the waiting areas.

Shuttle Coordination

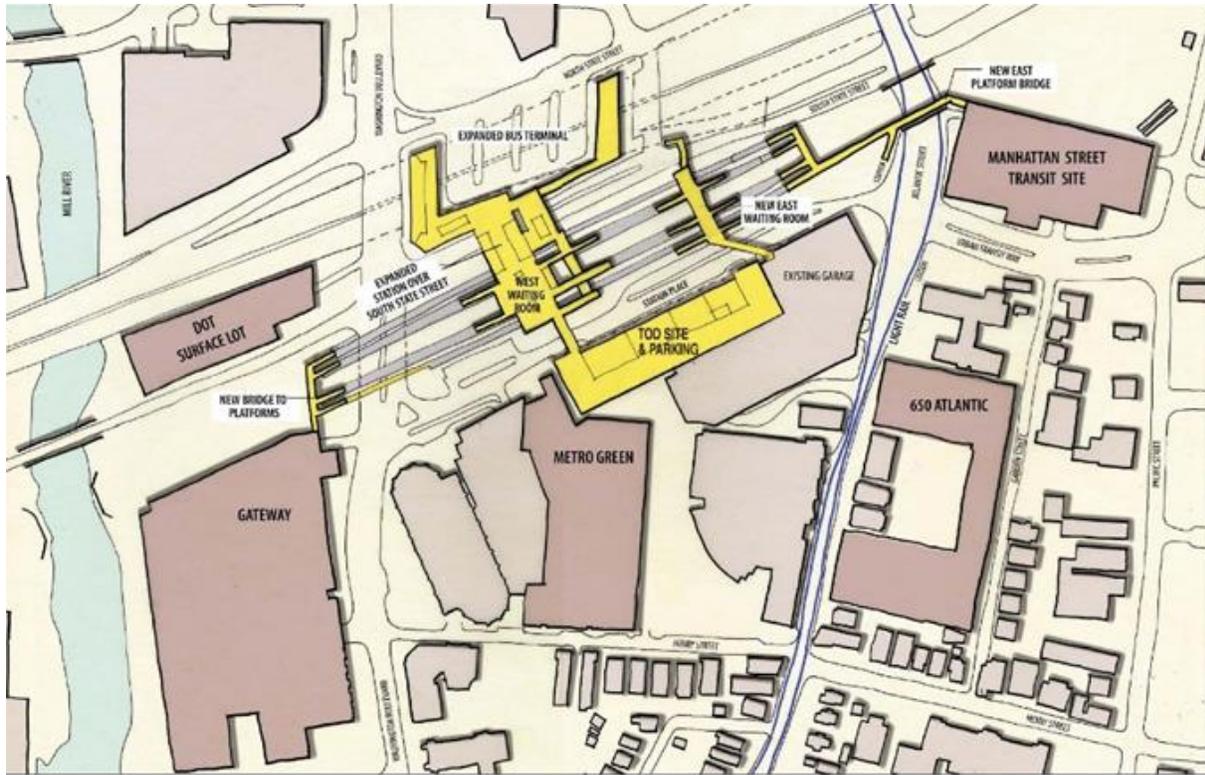
As one of Connecticut's largest transit hubs, the STC faces major challenges in coordinating the transit modes offered at the station. Studies have frequently cited the congested, confusing, and unsafe environment shuttle users face when boarding and alighting.

The STC Multimodal Circulation Study provides two strategies for managing the demand for space in the shuttle boarding area. The first strategy is requiring shuttle buses to register and be assigned a space for boarding. A posted directory would list the locations of each shuttle service, and wayfinding would guide shuttle riders to their boarding area. A second strategy is consolidating multiple shuttle services. Shuttle routes would make two or more stops rather than providing door-to-door service. This would reduce the congestion at the STC and ideally the operation costs as well.

The STC Master Plan also highlighted the importance of shuttle coordination. The plan suggests that shuttles board in different locations. For instance, shuttles serving destinations south of I-95 could board at a different location, and shuttles serving destinations north of I-95 could stay in the same location. The Plan suggests relocating parking from the shuttle and CTTransit boarding areas to other locations surrounding the STC (Figure 11). Enforcement of traffic laws in the station area (either through police enforcement or license plate recognition technology) is another suggestion for improving shuttle coordination.

The Stamford Bus and Shuttle Study is informed by each of these previous studies and endeavors to advance specific concepts without unnecessary duplication of effort.

Figure 11 Parking Recommendation (STC Master Plan, 2010)



Bicycle and Pedestrian Environment

The STC is a multimodal center, so numerous studies have considered the bicycle and pedestrian environment in addition to the transit opportunities. The STC Master Plan makes a couple recommendations related to bike parking at the STC. It suggests locating bike racks closer to the entrance points and investigating indoor space or covered space for bicycle storage.

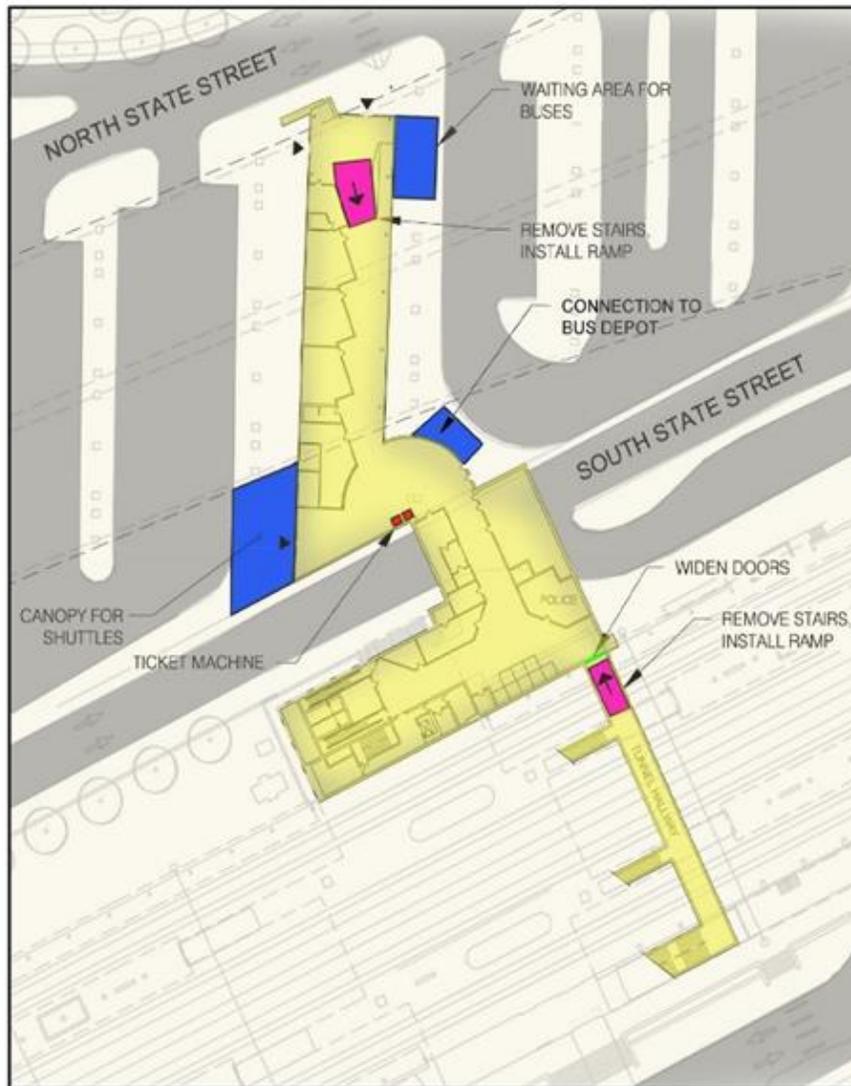
The pedestrian opportunities and challenges have received attention as well. The STC Master Plan recommends the following:

- Extend the existing east pedestrian bridge over South State Street
- Build a new pedestrian bridge spanning the tracks and South State Street to the surface parking lot
- Replace the doors at the north end of the tunnel to add capacity for passengers entering/exiting the trains (Figure 12) [*Note: this was accomplished in early 2016.*]
- Improve the streetscaping, lighting, and wayfinding along the pedestrian routes to the STC
- Construct a pedestrian refuge between North State Street and the I-95 entrance ramp
- Implement speed tables at crossing at Station Place and North and South State Streets.
- Widen the sidewalk on South State Street adjacent to Atlantic Street
- Provide a waiting area connected to the existing lower level passageway (Figure 12)

- Connect the rotunda in the lower level to the bus area (Figure 12)

The 2014 Stamford Master Plan does not recommend any new on-street bike infrastructure immediately surrounding the STC, but it does recommend underpass improvements and streetscape improvements on Tresser Boulevard and Atlantic Street nearby. It also recommends underpass improvements at Washington Boulevard and Atlantic Street.

Figure 12 Improvements to the STC Lower Level (STC Master Plan, 2010)



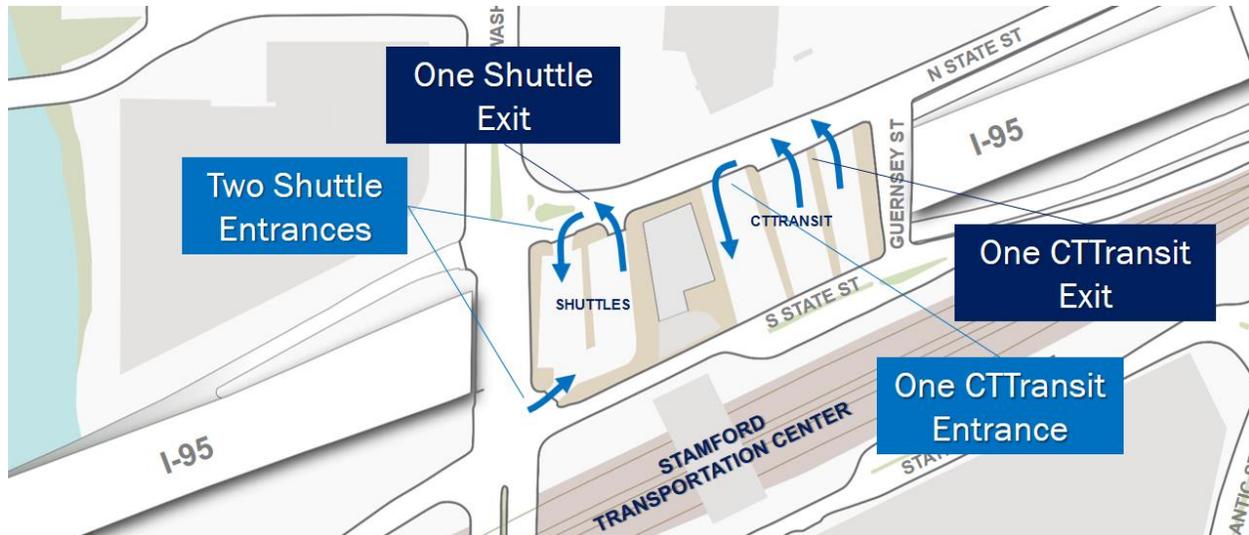
Shuttle Operational Issues

A number of operating challenges exist at the STC, related in large part to the rapid growth in private shuttle services and the physical constraints of the facility. These include:

- Limited access/egress for CTTransit and shuttles (Figure 13)
- Hazardous conditions for riders boarding, particularly for the two boarding lanes not adjacent to the curb

- Heavy traffic at I-95 ramps and the Washington Boulevard and Atlantic Street intersections with North and South State Streets
- Westbound vehicle queuing on North State Street
- Weaving of transit and shuttle vehicles on North State Street often causing temporary gridlock in the vicinity of the shuttle and bus facilities until queues can clear
- Limited pedestrian connections from rail platforms to shuttle and CTTransit areas
- Inadequate signage, information and wayfinding in and around the STC

Figure 13 Shuttle and CTTransit Access/Egress



Shuttle and CTTransit vehicles are impacted by queued traffic on North State Street preventing access to the STC, while at the same time, queued traffic makes transit vehicle egress difficult. This circular delay affects service reliability and exacerbates vehicular congestion within the STC.

Shuttle customers and operators cite safety concerns related to boarding vehicles via three of the four travel lanes adjacent to the STC concourse. Visibility is poor as customers look to find their shuttles and often dart into the travel lanes to avoid missing their trip. From an operational standpoint, shuttle egress is constrained as these four lanes narrow to just over one lane to exit onto North State Street.

OTHER TRANSPORTATION SERVICES

Residents, employees, and visitors in Stamford have a few other motorized options in addition to shuttles, trains, and CTTransit buses. These options include taxis, ride-hailing mobile applications (e.g., Uber), ride-sharing, and car rental.

Licensing, operation, and fares charged by taxis are regulated by State of Connecticut. People arriving to Stamford by train have easy access to taxis. Taxis are located in a dedicated space on Station Place, south of station platforms at the STC. There are seven taxis/limo services based out of Stamford, and an additional nine based out of Greenwich and Darien. For a complete list, see Appendix C.

Whereas Lyft was previously in operation in Connecticut, Uber (www.uber.com) is the only ride-hailing service currently operating in Stamford and southwest Connecticut. The service connects customers

with drivers to provide taxi-like transportation services via a mobile application. See Figure 14 to view coverage in Fairfield County as of fall 2015.

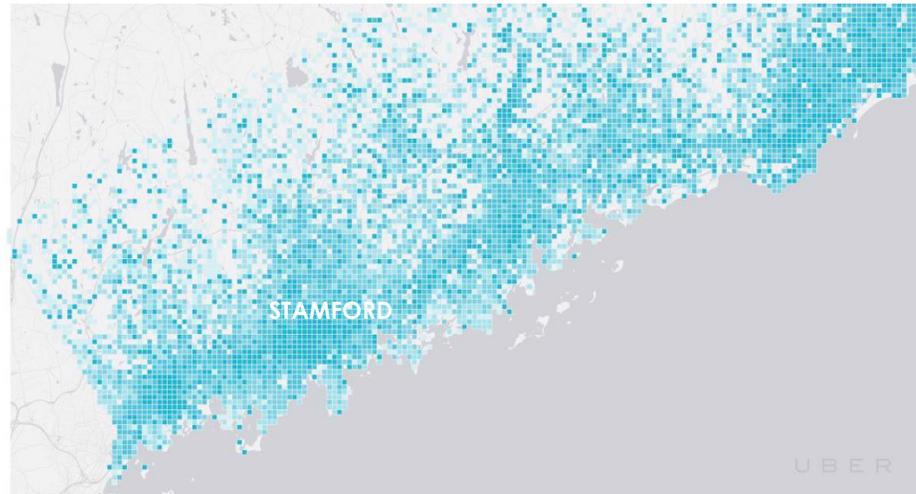
Figure 14 Wait Times for Uber Pick-up Service in Fairfield County (Fall 2015)

UBER OFFERS RELIABLE WAIT TIMES THROUGHOUT THE COUNTY

FAIRFIELD COUNTY, CONNECTICUT

The color of each square represents the average wait time for Uber pickups in that area.

- Under 3 minutes
- Under 5 minutes
- Under 7 minutes
- Under 9 minutes
- Over 9 minutes



Data from the Fairfield County and surrounding areas for the month of October 2015. Completed trips only.

Source: Uber

Uber does not have a designated pick-up or drop-off area at the STC, and drivers are not permitted to use the taxi queue on Station Place. Many Uber drivers park in the short-term parking spaces on the south side of Station Place as they coordinate with customers for pick-ups. Uber indicated in a meeting with the study team that a designated pick-up and drop-off location would make its operations more efficient and user-friendly at the STC.

Uber reports average wait times of 1 minute and 53 seconds for customers at the STC. Average trip lengths from the STC are less than four miles, but the majority of trips (65%) are less than two miles. The average fare for trips less than two miles is \$6.71.

Carpool World (www.carpoolworld.com) and Tripda (www.tripda.com) are two ride sharing services offered in Stamford. The STC includes two car rental services (Avis and Hertz). Additional car rental options are available throughout Stamford.

SUMMARY

This chapter identified existing conditions as they relate to private shuttle service at the STC. The findings confirm many of the results from the public outreach: private shuttles operate in a congested environment, which contribute to unsafe conditions for shuttle riders, CTTransit users, pedestrians, and people on bicycles. Moreover, the section delved into the concerns about CTTransit being an unreasonable alternative to private shuttles, confirming that added time and cost from the user perspective continue to be barriers for many shuttle riders.

The following section considers potential options for improving the environment for shuttle users, including physical changes to the STC, changes to CTTransit operations, and the creation of new administrative structures to address the concerns of businesses, property owners, and shuttle riders.

PRIVATE SHUTTLE STUDY CHAPTER THREE

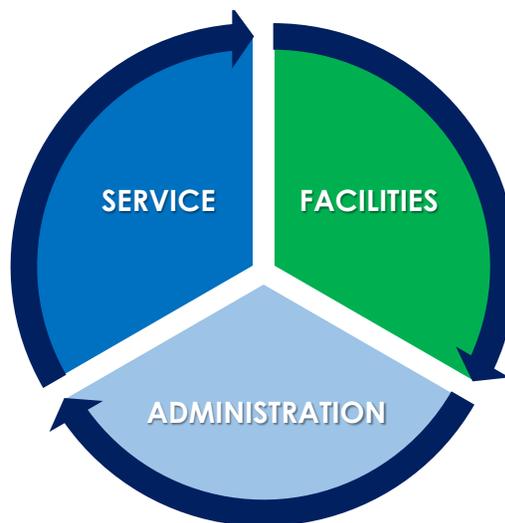
Opportunities



The continued growth in shuttle services has resulted in operational and safety concerns. Vehicle throughput, schedule reliability, passenger safety, and comfort are all compromised during the morning and afternoon peak periods. This chapter explores the opportunities for addressing these challenges through the following focus:

- **Facility.** Opportunities addressed in this focus relate to the physical improvements to the STC and surrounding streets.
- **Service.** Service opportunities consider adjustments to shuttle and CTTransit operations that would better manage vehicle demand and flow to reduce congestion and provide other mobility and safety benefits.
- **Administration.** Administration opportunities consider ways in which new or realigned approaches to shuttle bus administration could help the Stamford community overcome its current mobility challenges and implement and manage meaningful changes.

Figure 15 Shuttle Improvement Focuses



Together, these three approaches consider the full range of opportunities. In the following chapter, each of these opportunities will be evaluated based on their ability to address study goals defined by the Technical Committee. These three focus areas are interrelated, and it is expected that maximum improvements will be realized with a combination of strategies from each.

FACILITY FOCUS: THE STC & SURROUNDING STREETS

Physical constraints limit the ability to significantly change the operating pattern and available space, including the I-95 support pillars and bridge deck, proximity of access and egress points to the busy intersection of North State Street and Washington Boulevard, and the STC exit concourse separating the shuttle and CTTransit boarding areas. Regardless, there are opportunities to make incremental improvements to improve flow and safety at the STC with respect to shuttle and bus access and egress.

Short-term considerations to improve shuttle operations, as well as CTTransit and general traffic operations on North State Street, include:

- Relocation of all non-transit parking spaces within the shuttle and CTTransit areas to maximize transit vehicle queueing and travel space [*note: As a result of early recommendations from this study, CTDOT and CTTransit have implemented parking relocation recommendations at the STC. The 16 spaces in the shuttle boarding area have now freed up space for circulating shuttles, and the 13 spaces on Guernsey Street have now been changed to a CTTransit bus boarding area.*]
- Transit priority measures in the vicinity of the STC to improve shuttle and bus access/egress at the STC and improve overall traffic conditions
- Off-site locations for shuttle staging to reduce friction and congestion within the STC shuttle area during peak periods



STAMFORD BUS AND SHUTTLE STUDY

- Signal timing improvements at North State Street and Washington Boulevard to allow longer gaps in traffic and facilitate shuttle access and egress. [*note: The City of Stamford has implemented such a change with some positive results. The City is awaiting approval for three additional signal changes along Washington Boulevard at Station Place, South State Street, and Richmond Hill Avenue. The proposed revisions include revising the existing exclusive walk phase to a concurrent walk phase.*]
- Advancement of long-standing recommendations for improved passenger wayfinding, amenities, and schedule information in the STC and the shuttle area

Parking Relocation

When this study effort began, the STC shuttle and bus areas included three parking areas in the footprint under I-95: at the western edge of the shuttle area parallel to Washington Boulevard, at the western end of the CTTransit area, and on the west side of Guernsey Street. Uses for these spaces included STC tenant parking (nine spaces) and MTA police parking (16 spaces under agreement in shuttle area; additional 16 spaces signed for police but not fully used).

Previous planning efforts acknowledged the potential to use some of these spaces and the current congestion associated with shuttle and bus operations has underscores the need to prioritize transit uses in the facility. These parking areas could provide much-needed transit vehicle layover and queuing space, while the study team highlighted the Guernsey Street space in particular as a secondary passenger pick-up/drop-off lane for shuttles or CTTransit buses.

Potential Benefits

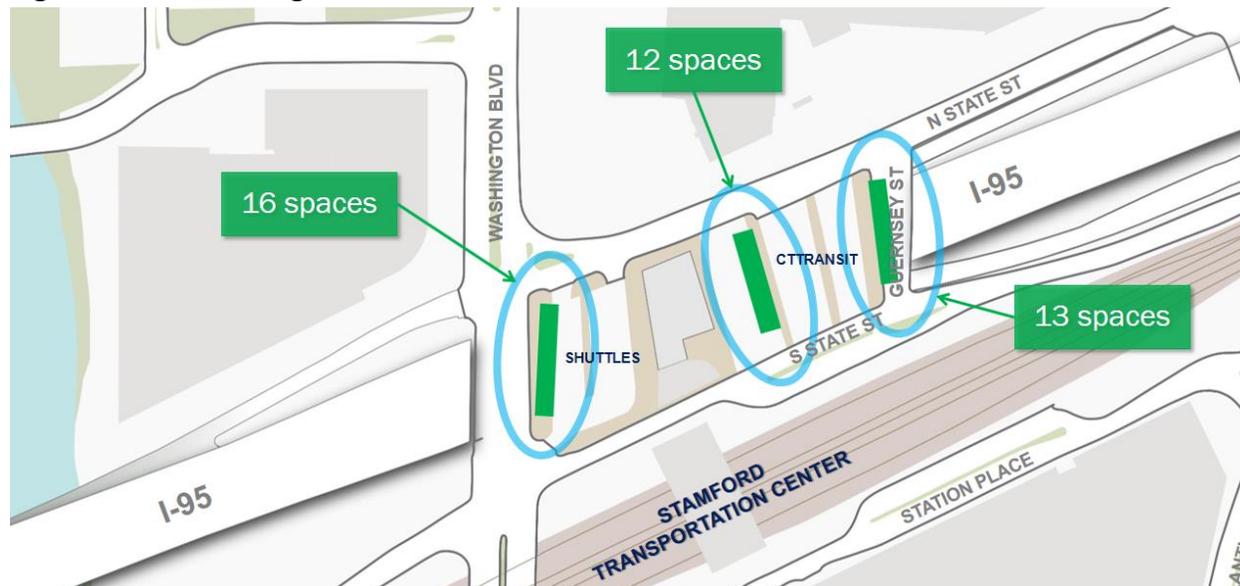
- Additional transit vehicle staging and/or layover space
- Reduced friction within shuttle and bus boarding areas
- Expanded shuttle/transit pick-up/drop off lane on Guernsey Street
- Reduction in the number of shuttle vehicles required to travel through the Washington Boulevard intersections

Implementation Considerations

- Parking tenant leases and options for relocation
- Coordination with MTA Police on official vehicle parking needs
- Shuttle need is greater for space on Guernsey Street
- CTTransit can better control a Guernsey Street pick-up/drop-off lane
- Enforcement, education, and policies needed to ensure safe, compliant operation

Throughout spring 2016, CTDOT convened transit and rail operations staff to assess the potential to make these recommended changes. A working group determined that CTTransit operations on Guernsey Street represented the most feasible re-use of the parking, and given constraints for bus operations within the existing CTTransit area, moving the MTA Police to that part of the facility would facilitate the overall transition. The parking would be removed from the shuttle area (Washington Street side) to make room for additional shuttle vehicle queuing.

Figure 16 Parking at the STC



Implementation plans for restriping, signage, parking relocation, and additional customer wayfinding were developed and enacted over the summer of 2016, with full implementation by August, in conjunction with planned CTTransit service changes.

On/Off Street Locations for STC Supporting Operations

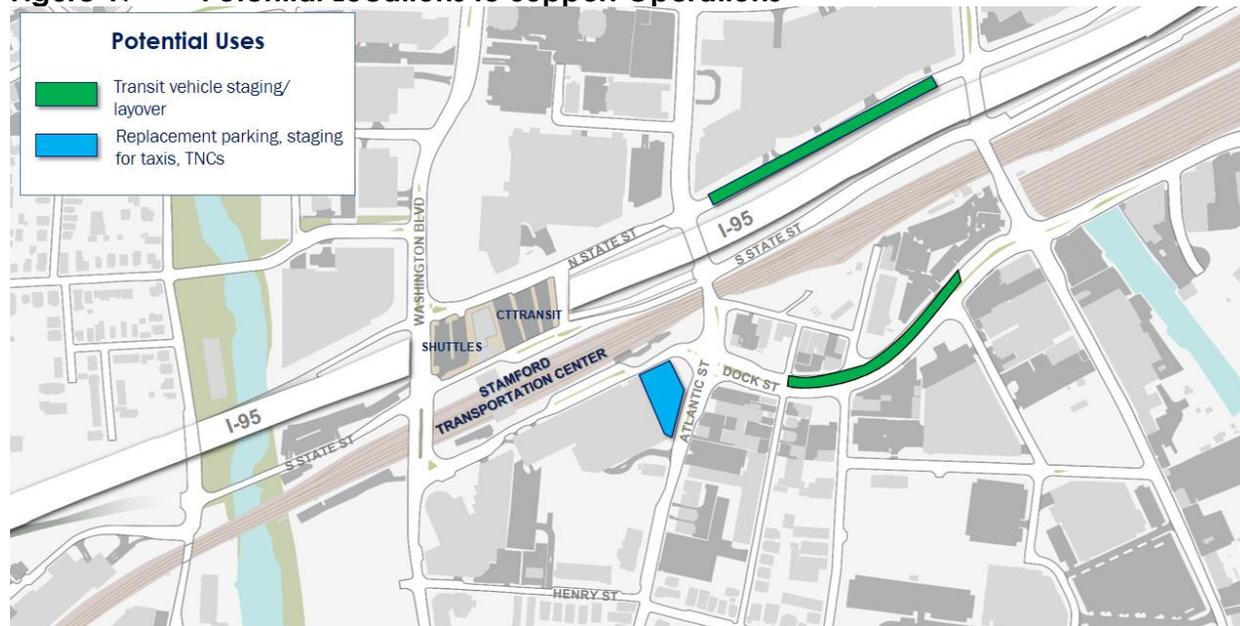
Given the central location of the STC within Stamford and its level of activity as a local and regional transportation hub, it would be beneficial to move certain operational support functions to the periphery so that uses that require close proximity to the station have the highest priority for that space. These functions could include:

- Transit vehicle staging/layover
- Replacement parking for vehicles currently parked within the shuttle and CTTransit areas
- Additional shuttle boarding; particularly for shuttles destined for locations south and east of the STC
- Staging or pick-up/drop-off for ride-hailing services (e.g., Uber)

Key locations that may be used for such purposes include the following and are illustrated below:

- North State Street east of Atlantic Street
- The eastern end of the CTDOT STC garage
- Dock Street (Stamford Urban Transitway)
- West curb of Atlantic Street between Tressor Boulevard and Federal Street
- South curb of Station Place adjacent to parking garage

Figure 17 Potential Locations to Support Operations



Mobility Concepts for Improved STC Access and Connectivity

Operational improvements at the STC should be supported by local facility enhancements aimed to improve the function of the STC operations, access to the STC, and connectivity between the STC and the city. These enhancements should be focused on the most effective way to maximize person movements (person trips) in order to influence mode choice, address congestion through both demand reduction and operational improvements for vehicles of all types, balance facility space, enhance safety, and recognize the need to balance the mobility needs for all modes of travel to, within, and through Stamford.

Signalization & Intersection Improvements

The existing pedestrian environment at the STC is challenging and unpleasant for people leaving the STC on foot. Although new crossing signals have improved conditions, many pedestrians have to cross either North State Street or Washington Boulevard to access their places of employment, residences, or other destinations. Congestion on these roads makes for poor visibility, and vehicles travel at hazardous speeds when traffic is free flowing. Crossing improvements, longer crossing times, and traffic calming will help address many of these challenges.

The City of Stamford has already begun addressing these challenges through the construction of raised intersections along North State Street at Washington Boulevard and Guernsey Street. Once completed in early 2017, the intersections will have wider ADA access ramps and raised crosswalks.

Another effort the City of Stamford is working on with CTDOT is a road safety audit conducted through the Community Connectivity Program. This audit will assess traffic safety concerns, sidewalks, signals, signs, and ADA accommodations surrounding STC and Washington Boulevard up to Tresser Boulevard.

The City is also awaiting approval for planned signal timing enhancements and changes on Washington Boulevard at Station Place, South State Street, North State Street, and Richmond Hill Avenue. These changes are considered in conjunction with reverting to a concurrent walk phase (rather than



exclusive) and installation of pedestrian islands. The City made minor modifications to the timing of signals on North State Street at Guernsey Street and Washington Boulevard to create a more pronounced gap in traffic. This change was designed to improve bus and shuttle access and egress at the STC. Results have been mixed and signal coordination in this area will continue to be evaluated, including as part of a city-wide study of signal optimization.

Finally, as part of a holistic look at improving pedestrian and vehicular safety in the Washington Boulevard corridor near the STC, the City has requested the closure of the Washington Boulevard entrance to the STC shuttle area. This closure would reduce conflicts and queuing at the intersection of Washington Boulevard and South State Street but should only be considered in conjunction with modifications to the functionality of North State Street between Atlantic Street and Washington Boulevard, described below.

Preliminary Concept: North State Street Transit Access Improvements

A conservative tally of transit ridership on CTTransit, shuttle bus ridership, pedestrian movements, and vehicle traffic counts¹ in the vicinity of the STC revealed that transit riders and pedestrians account for nearly 80% of person trips on North State Street (see Figure 18). At the same time, the current design of North State Street maintains an emphasis on general vehicle movements with a three-lane right-of-way, limited pedestrian crossings, and limited transit access/egress at the STC. The following concepts highlight opportunities to redesign North State Street in a way that better reflects the predominant trip types and passenger movements in the segment. These concepts for improved transit operations and pedestrian-focused design require further detailed study to maximize the benefits and minimize the impacts of repurposing this area and to better define the right balance between transit priority and traditional roadway function. The opportunities highlighted here include improved reliability and travel times for transit vehicles, and thus improved performance and the most efficient use of space for most users of this segment.

Transit Priority Access to the STC

High volumes of shuttle and CTTransit vehicles often create a de-facto left lane for transit during the peak periods as vehicles approach the STC from Atlantic Street. Formalizing a left, transit-only lane would further facilitate bus and shuttle access, by reducing queueing time approaching the STC, and also improving vehicle egress by restricting general traffic from the left lane.

Figure 19 illustrates a left, transit-only lane, which stretches from Atlantic Street to Washington Boulevard. Proper signage and lane markings would need to be implemented east of Atlantic Street notifying approaching vehicles of the lane restrictions on the blocks leading up to the STC.

¹ Sources: 2010 Stamford Transportation Center Master Plan (peak hour pedestrian counts), CTTransit (peak hour bus ridership at STC), Stamford Bus and Shuttle Study field data collection (shuttle ridership). Note that bus and shuttle vehicles were removed from traffic volumes on North State Street to accurately separate modes.

STAMFORD BUS AND SHUTTLE STUDY



Figure 18 Existing Peak Hour Utilization on North State Street

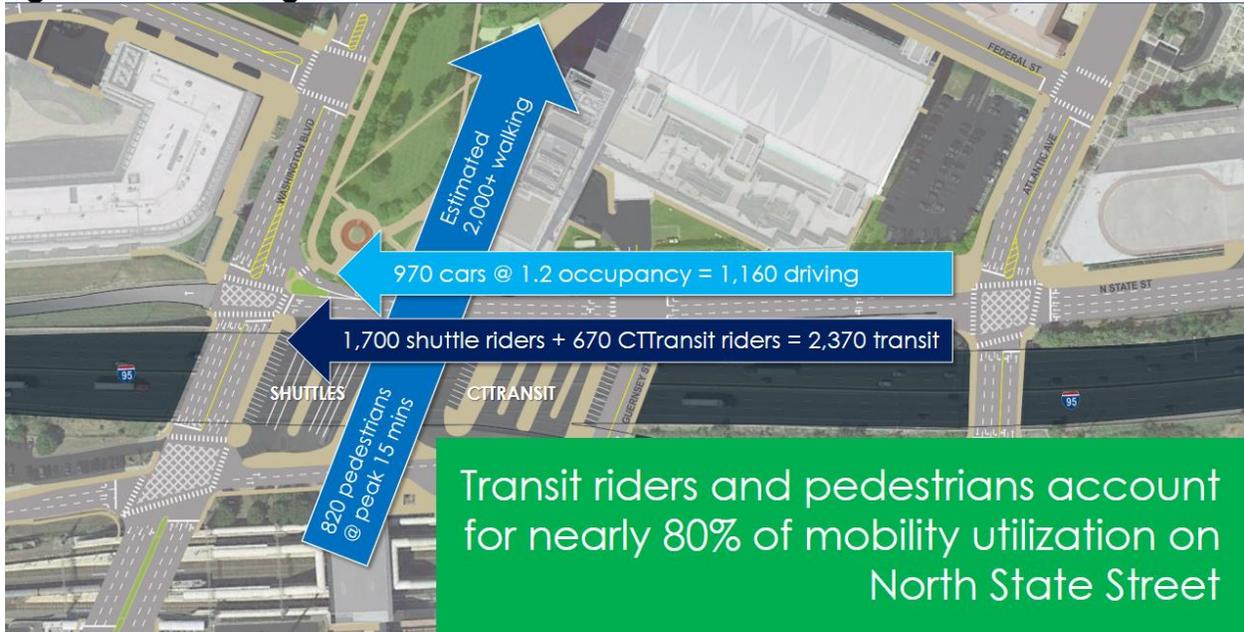


Figure 19 Concept: Transit-Only Lane on North State Street



Repurposed North State Street

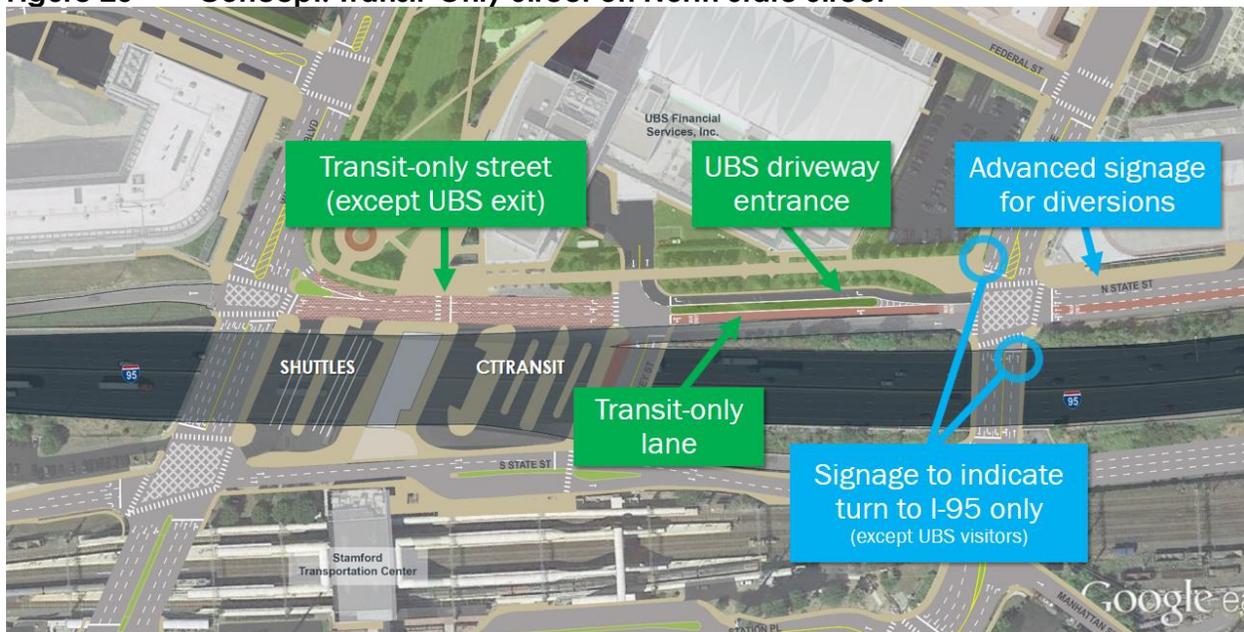
Expanding on this concept, a repurposed North State Street could further advance modal equity and set the stage for a better integration of the STC into the urban fabric of downtown Stamford. By creating a transit-only North State Street for the short block between Guernsey Street and Washington Boulevard, STC access and egress would focus almost entirely on pedestrian and transit movements. This idea begins to introduce the shared street concept and would minimize the barrier between the STC (and the South End) and downtown Stamford, created in large part by the railroad and I-95, along with North State Street.

General vehicular access to the westbound I-95 on-ramp at Atlantic Street is maintained in its current form, as well as access to the former UBS site (listed as 677 Washington Boulevard). The entrance to the complex garage is at North State Street and Guernsey Street and would be protected by a right-only turn movement from North State Street. Garage egress would occur via Guernsey Street, or possibly via the transit-only section of North State Street between Guernsey Street and Washington Boulevard.

Figure 21 illustrates how turning movements would be directed at the North State Street/Atlantic Street intersection. All existing movements would still be allowed at this intersection with the exception of through movements for general purpose traffic. Movements include:

- Left turns from North State Street onto Atlantic Avenue by any vehicle
- Through movements onto the I-95 SB on ramp by any vehicle
- Through movements remaining on North State Street by transit vehicles into transit priority area
- Through movements remaining on North State Street bound for UBS garage
- Right turns from North State Street onto Atlantic Boulevard

Figure 20 Concept: Transit-Only Street on North State Street



Implementation Considerations

These ideas represent preliminary approaches for further consideration to improving STC operations and integration with downtown Stamford. A number of issues need to be resolved, particularly concerning general traffic diversions and potential impacts to nearby intersections. Strong wayfinding and other enhancements to the roadway and intersection network will be necessary to support this idea, but it is also anticipated that driver will adjust to the circulation changes and demands will normalize over time to shift to other routes within the city's roadway network. Associated capital costs would be commensurate with pavement striping, signage, and short-term education and enforcement

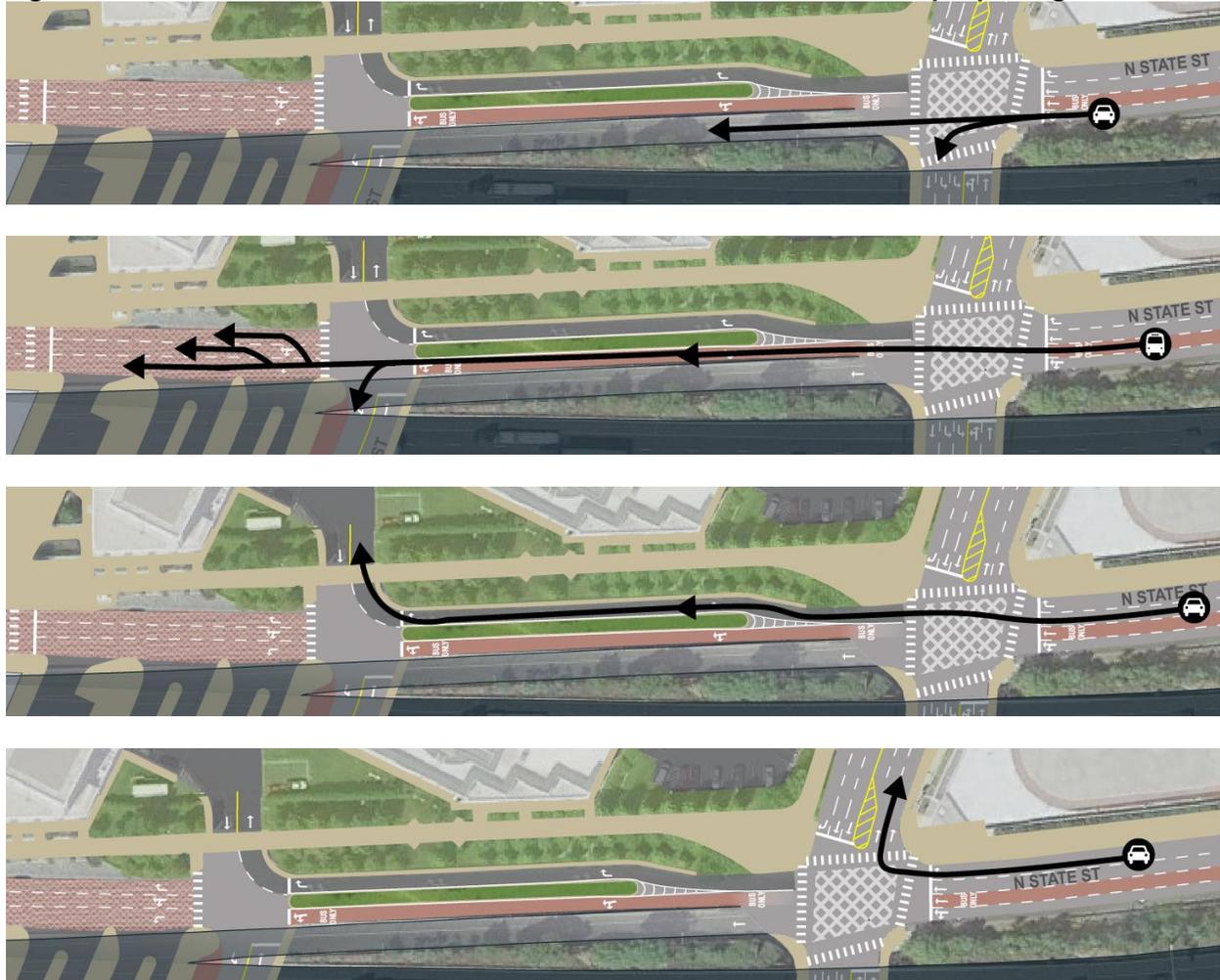
STAMFORD BUS AND SHUTTLE STUDY



to ensure proper operations and adjustment to new traffic patterns. A brief listing of benefits and issues to address are shown in Figure 22.

If some version of this concept moves forward, it will need to be carefully designed and coordinated with other planned projects in the city including the reconstruction of the Atlantic Street railroad bridge and plans to improve progression and traffic operations along the Washington Boulevard corridor. Some hybrid of these two concepts might be the best solution to balance the needs of all users with the goal to maximize flow of person trips, improve safety, and enhance the critical transit hub and gateway to Stamford.

Figure 21 Turn Movements Associated with North State Street Repurposing



The other, significant projects being undertaken in the vicinity of the STC, and their related impacts on traffic and diversions, actually present an opportunity amidst a difficult period of adjustment. Many travel patterns will be disrupted, Stamford residents and visitors will adapt to congestion and diversions associated with the projects, and as such, implementation of changes to North State Street could be done in such a way that they represent just one piece of a fluctuating area and part of a holistic resettling of traffic patterns as projects are completed. Furthermore, with the former UBS building currently empty, new patterns could be set in advance of the next major tenants, woven into the city's fabric with less impact than would be expected with tenants in already in place.



Figure 22 Benefits and Issues to Resolve for Repurposing North State Street



Transit-Priority Measures

To decrease congestion and improve efficiency around the station, transit priority measures should be explored in the vicinity of the STC. Earlier in this chapter, opportunities for transit prioritization were discussed for North State Street. These opportunities would primarily benefit the private shuttles. In addition to North State Street, every CTTransit route except the Stamford Connector travels along Washington Boulevard or Atlantic Street at some point, transit priority measures on these streets could result in substantial travel times savings, and potential headway decreases could be enjoyed system-wide.

Additionally, transit-priority signaling at intersections can further increase travel times savings for CTTransit and private shuttle operators. Transit priority signals would provide CTTransit buses and possibly private shuttles extended green lights or shortened red lights to prioritize their travel through designated intersections.

Other Mobility Concepts

Two proposals to improve shuttle vehicle flow through the STC were brought to Fusco, CTDOT, and the study team during the study. While not pursued, they were carefully evaluated and highlight the importance of an ongoing dialogue with those providing service on a daily basis.

The first recommendation was to have all shuttle vehicles enter the STC shuttle area from Washington Boulevard in order to create two parallel boarding areas under I-95. Under this scenario, formal boarding space could be increased and some rationalization could be brought to shuttle passage through the facility. However, this idea was not pursued further because of serious concerns relating to congestion and queuing of shuttle vehicles entering the already constrained Washington Boulevard entrance. Furthermore, shuttles now boarding from the west side of the shuttle facility would only be able to exit via a left turn on North State Street, even closer to the signalized intersection with Washington Boulevard. This would exacerbate queuing upon exit and would preclude shuttles from turning north on Washington Boulevard given the intersection design and current right turn lane on North State Street.



The second concept proposed, echoing many comments received throughout the study, would place selected shuttles on Station Place. The intent of the proposal- to allow shuttles serving the South End (and some other areas, e.g., Shippan Landing) a more efficient entry and exit without crossing the railroad tracks- is sound. However, space limitations on Station Place do not currently allow for safe and unencumbered shuttle operations. The plan would have removed several short-term parking spaces at the west end of the parking lane adjacent to the CTDOT parking garage in the eastbound direction. The study team, in fact, had considered using the entirety of this parking lane for shuttle boarding. At present, sidewalk space is far too narrow along the garage wall to accommodate massing crowds of shuttle customers, and placement of the boarding area at the west end of the parking lane would interfere with safe pedestrian crossings at the marked crosswalk on Station Place. Short-term parking is also limited as it is, and removal of drop-off spaces is likely to prove problematic. The concept of using Station Place for shuttle operations will remain a topic of discussion; however, it is not feasible in its current configuration to safely and equitably allow for only a limited number of shuttles to board at this location.

Passenger Amenities & STC Enhancements

As noted in the Stakeholder and Public Engagement chapter, Shuttle riders, businesses, and Technical Committee members provided multiple suggestions for improving the STC environment for passengers. Ideas mentioned include added wayfinding, a screen announcing arrivals, seating in the shuttle boarding area, an air conditioned/heated waiting area, and a food cart. Another idea is to open the windowed area on the northern side of the STC to provide more direct access to the CTRtransit boarding area from the train platforms. Some of these opportunities are documented among others in the STC Master Plan (2010). This document can be used to implement improvements to the STC.

SERVICE FOCUS: CONCEPTS FOR CTRTRANSIT & PRIVATE SHUTTLES

In addition to facility improvements to the STC and surrounding routes, there are opportunities for transit service enhancements that could support private shuttle operations or reduce shuttle congestion. This section considers optimizing existing CTRtransit operations to support shuttles, a publicly run shuttle system, and the consolidation of existing private shuttles. In Phase B of the Stamford Bus and Shuttle Study, the entire CTRtransit network will be evaluated in greater detail with additional recommendations to follow.

CTRtransit Optimization for STC Operations

Most shuttle riders and businesses that participated in the stakeholder and public engagement efforts for this study suggested that CTRtransit buses were not viable alternatives to private shuttles because of the added cost and time. This section considers ways in which those perceptions could be addressed through approaches such as complimentary off-peak service, new circulator services, transit priority measures, or improved transit access to the STC.

Complementary Off-Peak Service

New Circulator Option

With a few exceptions, private shuttles operate during the morning and evening peaks. During the midday, and potentially in the evening, shuttle passengers could be an important source of ridership for CTRtransit services to or from the STC. Once they arrive at their place of work on the shuttle they may have limited options for short, midday trips when shuttle service is not provided. CTRtransit could meet some of this demand by providing targeted transit service for fast, efficient, and user-friendly mobility within the core downtown.

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One such service is the fare-free trolley operated by Building and Land Technology (BLT) with the support of a Federal Transit Administration grant. Open to the public, the trolley service runs from BLT's Harbor Point mixed-use development in the South End (south of the STC) through downtown. It runs every 30 minutes between 7:00 a.m. and 11:00 p.m. to 14 stops, including the STC (via on-street stop on Washington Boulevard at Station Place). In a similar manner, a more frequent circulator option, devoted to Stamford's downtown core, would offer more convenient and attractive service to employees in the area.

Although CTTransit ridership per bus trip stays consistent throughout the day, midday service is generally less frequent across routes. On average, most routes experience a 35 percent drop in frequency between the morning peak and midday. From a headway perspective, this corresponds to a drop from three bus trips per hour (or 20-minute headways) to two bus trips per hour (or 30-minute headways). Some services stop operating in the evening around 7:00 P.M. (e.g., Route 331 High Ridge Road, while others (e.g., Route 341 Stamford/Norwalk) continue past 11:00 P.M. The Stamford Connector route is a peak period shuttle-like service and offers no service during the middle of the day.

One or a combination of circulator routes providing frequent service from employment locations to the STC and downtown could capture shuttle passengers desiring service during the midday (either to return home or to travel to downtown for shopping/other needs). The success of the circulator route would require:

1. Maximum travel time from any circulator stop back to the STC be comparable to average travel times experienced on private shuttles traveling to or from the STC
2. Service to as many employment destinations as possible while taking this time constraint into consideration
3. Frequent, direct service (e.g., target 10-minute headways)
4. Fare-free service such as CTTransit's Hartford dash Shuttle and New Haven Union Station Shuttle

By following these guidelines, a circulator route could complement private shuttle service by providing transportation options when private service can or does not. To meet the defined criteria, the design considerations for a circulator route are:

- System-wide average speed of Stamford buses (dwell time included): **12.5 mph**
- Average travel time on private shuttles to/from STC, taking congestion into consideration: **10 minutes**
- Distance covered in 10 minutes at 12.5 mph: **2 miles**
- Average customer wait time for a vehicle: 10 minutes or less

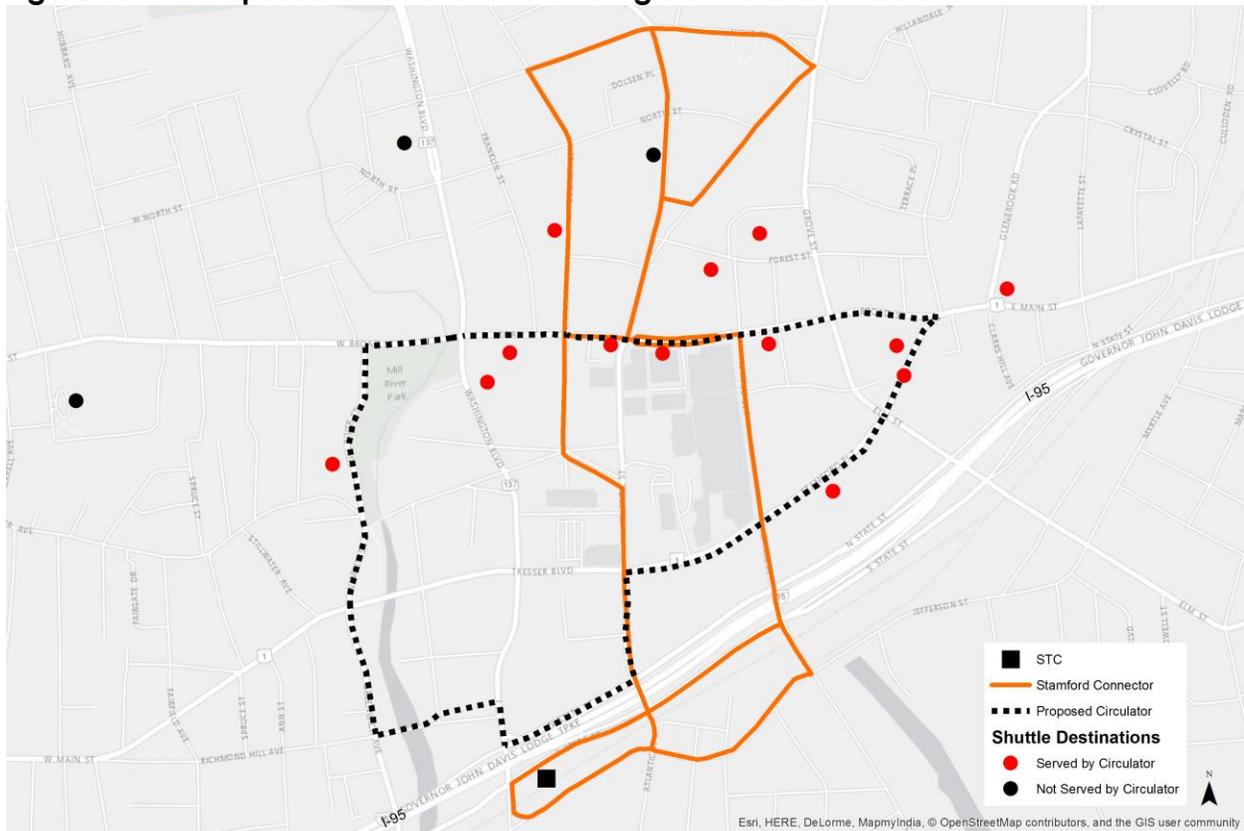
With the circulator running at CTTransit's system-wide average speed of 12.5 mph, the farthest any stop could be from the STC is two miles to ensure a 10-minute travel time.

With a circulator route around downtown Stamford (dashed line), 13 current private shuttle destinations would be served (shown in red). Travel time to the STC is less than 10 minutes from each of these points.

Total travel time along the proposed circulator route would be 16 minutes (STC to STC). Two vehicles would be sufficient to provide maximum 10-minute headways throughout the day, with maximum travel time from any stop serving a shuttle destination less than 10 minutes.

The proposed circulator route would also complement the Stamford Connector route, which ceases service during the midday but serves a similar area (Figure 23). The Stamford Connector currently requires two vehicles. These vehicles could be used for the proposed circulator since the Stamford Connector pauses operations during the midday and evening.

Figure 23 Proposed Circulator and Existing Stamford Connector



Added Service Option

A circulator route would provide frequent service during the mid-peak when most private shuttles are not in service and opportunities to facilitate short trips within downtown and to/from the STC. Although most shuttle destinations are served by existing CTTransit routes (see Figure 24), midday service levels, lengthy travel times and frequent stops may make these routes unattractive to private shuttle riders. Locations with the greatest reduction in CTTransit’s midday service are located away from the downtown, to the south and north. In particular, those areas to the southwest and northeast of the city center are most lacking in midday service (Figure 25). Travel times from these locations are long and headways increase substantially in mid-peak and off-peak periods.

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Figure 24 Bus Routes and Shuttle Destinations

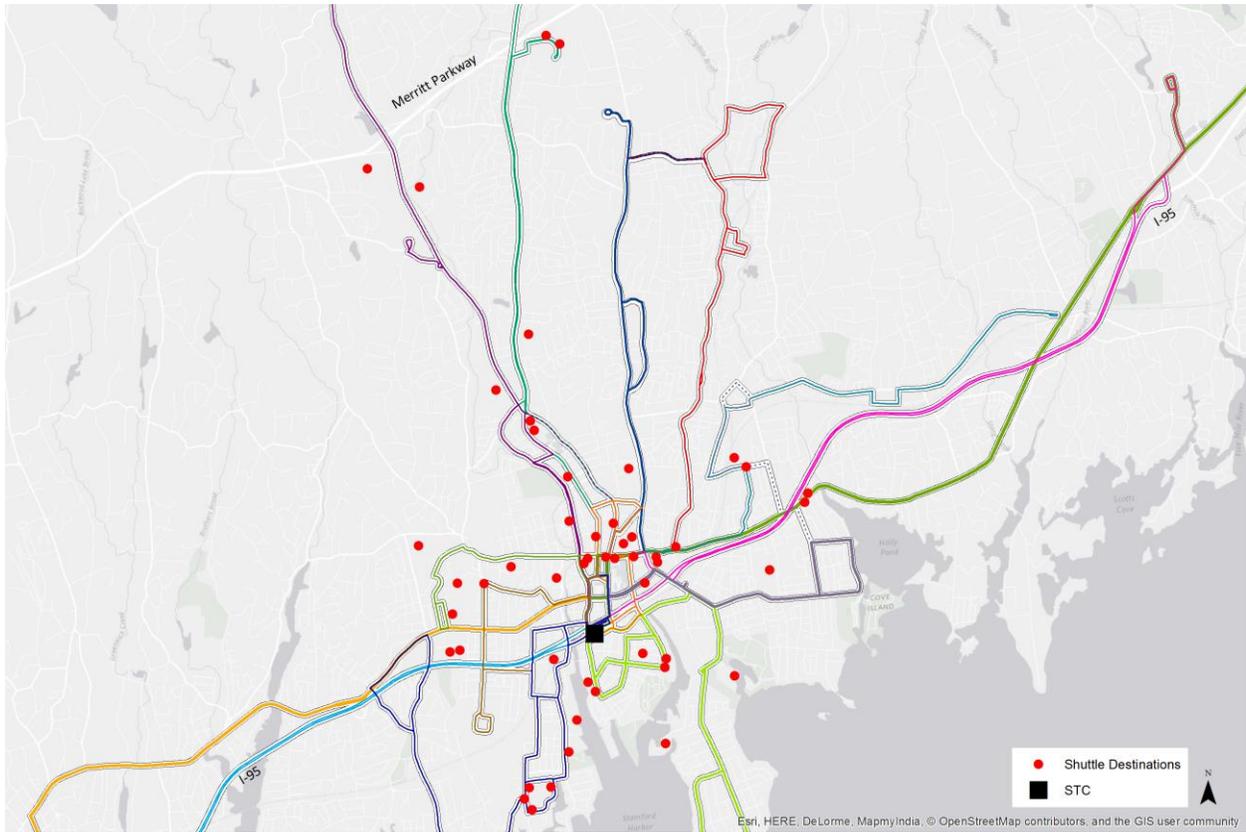
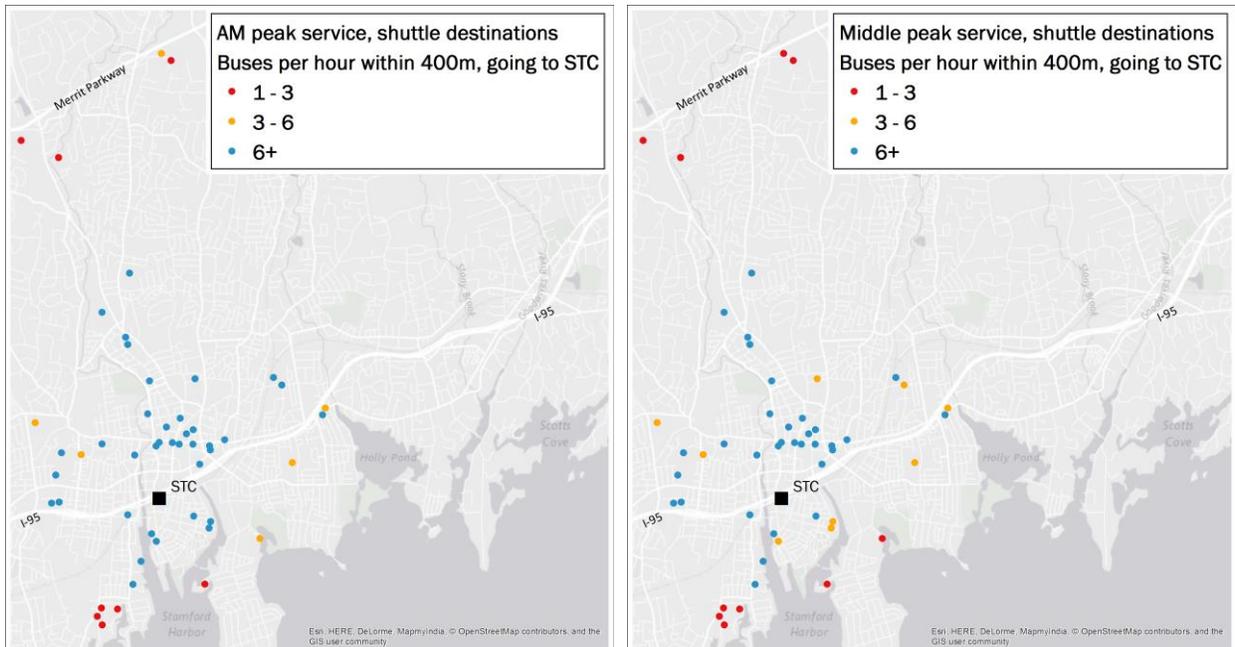


Figure 25 Service at Shuttle Destinations (AM Peak & Midday)





Increasing service to these areas would help address gaps in private shuttle services during the midday period. There are two options for increasing service: a first option where service is increased across all non-commuter routes and a second option where service is increased on short-haul routes.

- The first option has service increased across all non-commuter routes to peak levels. Decreasing headways to a level of service comparable to peak service would result in better service across the network. Average headways across the network in the mid-peak would change from 25 minutes to 15 minutes. To increase service to this level, all peak vehicle needs would be extended throughout the day. Vehicle running hours would increase from 246 to 306 (a 24 percent increase) during this time period.
- The second option has midday service increased on short-haul routes. Considering that most shuttle destinations are within the inner or outer zones, increasing service on just short-haul city service routes would benefit most shuttle riders.

The 22/24 (Greenwich & Fairfield Ave.) and 43 (Cove Rd.) see no loss in service between the peak and off-peak, leaving the 13 (West Broad St.), 33 (Strawberry Hill Ave.), and the Stamford Connector to be augmented. Bringing service along these routes to peak levels would result in an increase in running hours in the middle period from 246 to 264, a seven percent increase in vehicle hours.

STC Operational Optimization

Congestion in and around the STC complicates operations for the shuttles as well as CTTransit and general vehicular traffic. A combination of constricted and circuitous approaches to the STC is the result of the I-95 and Metro-North railway. Limited crossings of these barriers force the majority of private shuttles onto North State Street and Washington Boulevard for access to or egress from the station. Additionally, CTTransit buses primarily approach the station from Atlantic Street and continue north or south on Washington Boulevard. Congestion increases travel time along CTTransit and private shuttle routes, increases allowable headways for CTTransit, and effects on-time performance. To mitigate these issues, two high-level proposals have been formulated:

1. Implement transit-priority measures along Washington Boulevard and Atlantic Street.
2. Consolidate or relocate CTTransit stops within downtown Stamford.
3. Consolidate CTTransit Routes

Consolidation or Relocation of CTTransit Stops

The current STC facility for CTTransit buses is near or at capacity, with no proper space for vehicles to lay over or stage for service. Informal use is made of the east and west corners of the circulation lane along the south side of the facility, but this is less than ideal and restricts circulation. This also means that the current configuration has no flexibility to provide additional capacity for CTTransit buses or for shuttle operation, with the exception of the recently implemented bus bay on Guernsey Street.

Capacity could be created if fewer routes served the STC. There are currently 17 routes using the bus platforms inside the STC. Some of these have overlapping routings in the downtown area. Consequently, it may be possible for some of these routes to terminate elsewhere in the downtown without eliminating service from any street. However, such a change would require some passengers to transfer to reach the STC. Minimizing the negative effects of this requires analysis of the boarding/alighting patterns, which will be addressed in greater detail in Phase B of the Stamford Bus and Shuttle Study.



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In addition to the bus routes using the bus platforms in the STC, there is one route (the Stamford Connector) that uses a bus stop on South State Street, just south of the STC bus bays. This stop is located at the busy auto pick-up/drop-off (kiss and ride) area adjacent to track 5. This demonstrates that the STC can be served without using the bus platforms inside. As a result, the area around the STC was analyzed to identify potential areas for bus stops (or layover) that could be used instead of the bus platforms. Two locations were identified:

- The existing layover on South State Street currently used by Stamford Connector, which could potentially be used by additional routes
- A new bus bay on North State Street, opposite the existing platforms

The surrounding road configuration means a bus bay on North State Street and the existing layover on South State Street would be most useful for routes to and from the east, such routes 26 and 27. A bus bay on North State Street could also be used for layover by vehicles using the bus platform.

CTTransit Route Consolidation

There is little possibility to consolidate routes to optimize CTTransit's operations into and out of the STC. Routes travel to disparate locations yet they travel to or from the STC at some point. As a hub, eliminating some routes from running to the STC would complicate CTTransit's system for passengers. However, almost all routes (10 out of 15) circulate around downtown Stamford, stopping at the same or adjacent stops. Further study will identify opportunities to eliminate stops in close proximity. Doing so would offer modest improvement to route running times, allowing for buses to more quickly enter and leave the inner service area.

Shuttle Consolidation Scenarios

Objectives

The development of shuttle consolidation scenarios was based on several core objectives stemming from operational constraints at the STC, feedback from shuttle riders and the business community, and overall project goals. These objectives, vetted with the project Technical Committee, form the basis for evaluation criteria and metrics. They inform the assessment of viability of any scenarios under discussion for purposes of screening the large number of possible consolidation scenarios to allow for focus on the scenarios that best meet these objectives. Primary consolidation objectives include:

- Reduce vehicular congestion and improved operations at the STC
- Reduce activity and negative consequences related to privately-operated shuttle services
- Design services suitable for, and attractive to, the Stamford business community
- Design services suitable for, and attractive to, travelers to, from, and within Stamford
- Reduce overall operating costs and/or costs to individual businesses providing shuttles such that there is adequate incentive for private sector participation in a consolidated system

The first step in this analysis was to determine what level of consolidation was both feasible and beneficial to the overall objectives. Scenarios are intended to assess the degree to which consolidation of individually-operated shuttle services could alleviate congestion and operational challenges at the STC and in downtown Stamford, while avoiding negative impacts to Stamford businesses and commuters and other travelers to these locations. Key considerations include the Stamford business community's need to attract talented employees, the facilitation of access to and from business sites (primarily during the morning and evening commutes), and contributions to the overall economic health of Stamford and the region.

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The exercise determines the feasibility of shuttle service consolidation and the thresholds necessary to ensure that any such model is attractive to the businesses it would serve. The service scenarios, business groups, and operating approaches are illustrative and theoretical, yet based on Stamford-specific data inputs and transit planning principles. The approach that follows represents an illustration and does not yet represent a specific service plan for implementation. Such a service plan would be developed from the most promising scenarios and fine-tuned, then continually adjusted, based on the actual participation of providers in some type of consolidated system.

Scenario Development and Methodology

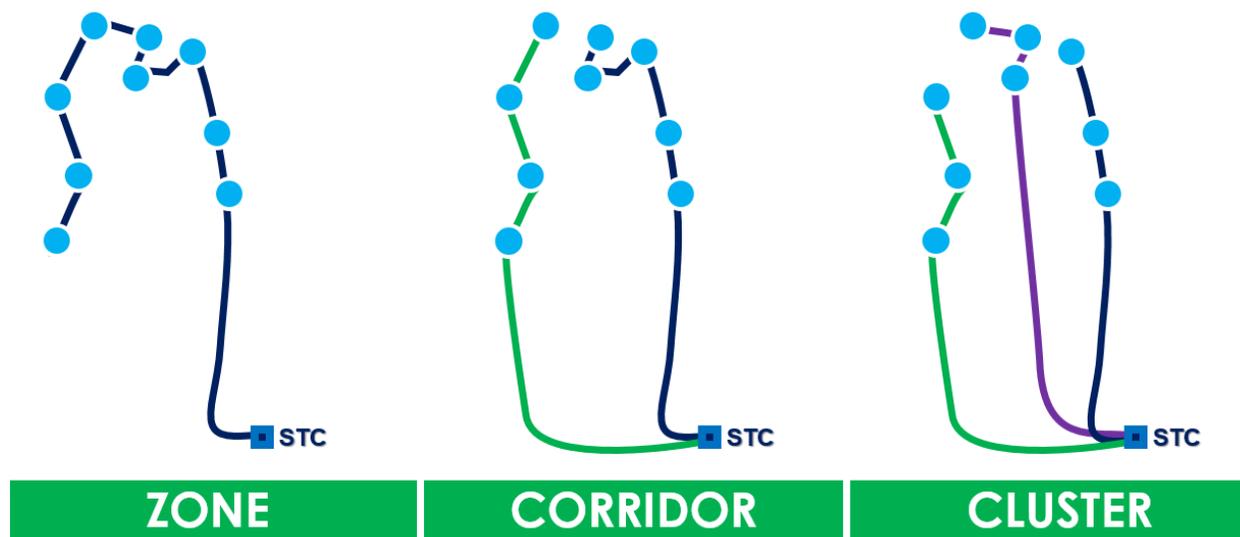
The shuttle service scenarios were developed to determine if a fully or partially consolidated shuttle service could shuttle volume at the STC while offering comparably attractive service at a reasonable cost to shuttle providers.

- **Full consolidation** is defined as the inclusion of all current shuttle providers, citywide.
- **Partial consolidation** is defined as any potential subsets of current shuttle providers, across the city or in specific geographic areas (e.g., Downtown, edge of downtown, suburban).

Three service planning approaches were developed to consider ways of reaching all existing shuttle destinations in Stamford and to assess the cost and service level impacts of the consolidated shuttle service options. The conceptual approaches are defined as follows:

- **Zone:** provides a single shuttle route for all employer destinations within a defined area. Most zones in Stamford have six to eight employer destinations.
- **Corridor:** provides more shuttle routes for more direct service to cover the same area as the zone approach. Under the corridor approach, the shuttle routes serve three to five employer destinations along any one route in most cases.
- **Cluster:** adds even more shuttle routes and even more direct service, typically serving two to four employer destinations.

Figure 26 Conceptual Approaches for Shuttle Service Scenarios





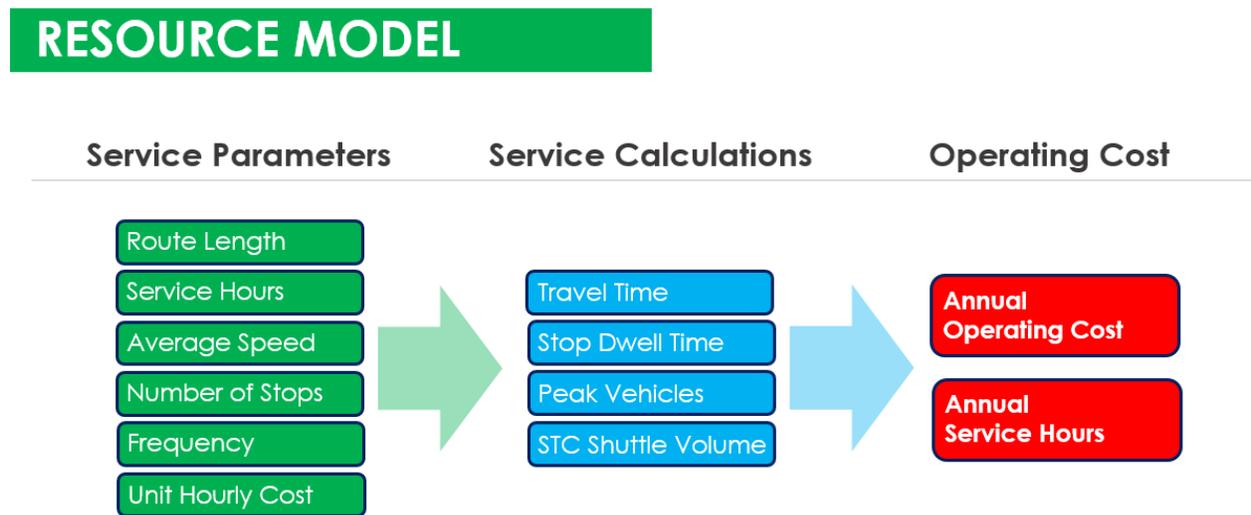
Because the zone approach results in the greatest reduction in shuttles, the cost for zone approach is the lowest when other factors such as vehicle frequency are held constant between approaches. The corridor approach requires more shuttles to cover the same area, so the cost increases. The additional routes added for the cluster approach make this scenario the most expensive in most cases, but it also offers the most appealing service from a customer perspective (i.e., directness and travel time).

Model Assumptions and Limitations

The study team developed a Shuttle Consolidation Model to test the wide variety of possible shuttle consolidation alternatives and to provide a mechanism to easily test the sensitivity of modifying certain variables such as: frequency, employers, routes, etc. The model will also be a useful tool for development of a “real and dynamic” service plan once the level of actual participation is determined and underway. For the initial feasibility and screening analysis, the model is a simplification of shuttle operations and is based upon a number of assumptions and limitations for the purposes of a first-cut analysis. For a more detailed explanation of limitations, see Appendix D.

The model involved the input of various service parameters and service calculations to determine annual operating costs and annual service hours. The service parameters, service calculations, and operating costs are shown in Figure 27. For a detailed explanation of each of these metrics, see Appendix D.

Figure 27 Components of the Shuttle Scenario Model



Consolidation Scenario Results

The results of the analysis suggest that full or partial consolidation of shuttle services could offer frequent service and reduced congestion at the STC. In many cases, services under consolidation scenarios would cost less than what employers pay for shuttles, particularly in areas of greater employment density such as Downtown.

Full Consolidation

The following figure presents a summary of results for a fully consolidated, citywide service. For 10-20 minute frequencies, the zone approach offers the greatest cost savings and reductions in AM vehicle departures, i.e., an estimated 93-186 shuttle departures relative to the 425 observed today. Although



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the corridor approach reduces morning vehicle departures for 10-20 minute frequencies, the cost rises above the existing cost estimates for 10 minute frequencies.

The model provides evidence that 15-20 minute frequencies may result in cost savings as well as reduced vehicle departures. The cluster approach yields similar results, although the cost savings for 15 minute frequencies are minimal. With 20 minute frequencies, the cluster approach is still a viable option. The business community would collectively see a reduction in shuttle costs from \$6.7 million to \$5.3 million, a 20 percent savings citywide, and the total number of shuttles departing the STC during the AM peak would be nearly halved from 425 to 232.

Table 3 Summary of Shuttle Service Scenarios

	Peak of Peak Frequency (Min.)	Zone	Corridor	Cluster	Existing
Citywide Total Cost	10	\$ 5,355,000	\$ 7,191,000	\$ 9,180,000	\$ 6,746,086
	15	\$ 3,978,000	\$ 5,355,000	\$ 6,579,000	
	20	\$ 3,060,000	\$ 4,284,000	\$ 5,355,000	
AM Peak Vehicle Departures	10	186	297	464	425
	15	124	198	309	
	20	93	149	232	

The other key factor is the convenience for passengers and, by extension, the attractiveness to businesses that currently run shuttles. Although the zone approach offers the greatest benefit from a cost and congestion perspective, customers would experience increased travel time as a result of additional stops and, for some, less direct vehicle routing. Examples of travel time impacts to specific areas are described below.

Partial Consolidation

In addition to full consolidation, the analysis considers the opportunities and constraints for subsets of the larger system (partial consolidation). Three areas of the city (Downtown, West Side, and Long Ridge) were examined as typologies to understand how the relationship between business location density and distance from the STC affect the potential for consolidating service. Note that the full consolidation analysis above estimated the cumulative, citywide cost of running all shuttles. The partial consolidation analysis estimates the cost per employer, a metric which better informs the decisions of individual businesses.

Downtown

There are currently eight shuttle destinations in Downtown, accounting for 99 shuttle departures from the STC during the AM peak period, each traveling directly to its destination. If all of these businesses opted in to a consolidated system, one shuttle would stop at each of these eight destinations for the zone approach. The corridor approach would offer two routes to cover the same eight destinations, thereby requiring fewer stops for shuttle riders, and the cluster approach offers four routes, so shuttle riders would only need to make at maximum one stop before their arrival.

The model considers the time difference between existing shuttle operations and the three approaches. Currently, shuttle riders traveling to Downtown destinations spend three to six minutes on the shuttle (once out of the STC). Under the zone approach, passengers riding to the last destination may spend up to 17 minutes in the shuttle under the zone approach. For the corridor approach, the

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maximum time in the shuttle would decrease to 13 minutes, and for the cluster approach the maximum time would be eight minutes. From the user perspective, the zone approach would be the least desirable and the cluster approach would be the most desirable.

Table 4 Summary of Shuttle Service Scenarios (Downtown)

	Peak of Peak Frequency (Min.)	Zone	Corridor	Cluster	Existing
Total Annual Cost/Employer	10	\$ 57,375	\$ 76,500	\$ 153,000	\$ 114,750
	15	\$ 38,250	\$ 57,375	\$ 76,500	
	20	\$ 38,250	\$ 38,250	\$ 76,500	
AM Peak Vehicle Departures	10	19	37	74	99
	15	12	25	50	
	20	9	19	37	

Because of the density of employers and the close proximity to the STC, businesses in Downtown have an array of options that reduce congestion at the STC and operating cost. For all frequencies and approaches, congestion at the STC would likely be reduced. In some cases, such as the zone and corridor approaches, the number of shuttles would be more than halved. The costs could also be greatly reduced. With the exception of 10 minute frequencies under the cluster approach, all cost estimates are much lower than the existing estimate of \$114,750 (annually) per employer. This existing estimate reflects the actual annual cost of shuttle operation provided to the study team by one business within this Downtown area. Although representative, it does not account for varied operating costs among other employers within the same area, although they are assumed to be comparable from a unit cost perspective.

West Side

Like Downtown, Stamford West Side has eight shuttle destinations. All existing shuttle providers would use a single shuttle route under the zone approach. Assuming all businesses opt in, three shuttle routes would serve the employers for the corridor approach and four shuttles for the cluster approach. Current shuttle riders traveling to destinations in the West Side spend three to 10 minutes riding the shuttle. The maximum time spent in the shuttle 22 minutes for zone, 11 minutes for corridor, and 11 minutes for cluster.

Table 5 Summary of Shuttle Service Scenarios (West Side)

	Peak of Peak Frequency (Min.)	Zone	Corridor	Cluster	Existing
Total Annual Cost/Employer	10	\$ 76,500	\$ 133,875	\$ 172,125	\$ 114,750
	15	\$ 57,375	\$ 95,625	\$ 114,750	
	20	\$ 38,250	\$ 76,500	\$ 95,625	
AM Peak Vehicle Departures	10	19	56	74	42
	15	12	37	50	
	20	9	28	37	

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The range of available options is more limited in the West Side relative to Downtown. There are currently 42 shuttle departures to the West Side during the AM peak, and any viable option should have fewer than 42 departures. Likewise, the total cost per employer should decrease. The remaining options include the zone approach (all frequencies), the corridor approach (15-20 minute frequencies), and the cluster approach (20 minute frequencies).

Long Ridge

The northernmost shuttle destinations are located just south of the Merritt Parkway. The zone approach provides one route for all four destinations. The corridor and cluster approaches each provide two routes covering the same area. Today, shuttle riders headed to one of these four employers spend 10 to 15 minutes in the shuttle. The maximum trip duration would increase to 24 minutes for the zone approach and 20 minutes for the corridor and cluster approaches.

Table 6 Summary of Shuttle Service Scenarios (Long Ridge)

	Peak of Peak Frequency (Min.)	Zone	Corridor	Cluster	Existing
Total Annual Cost/Employer	10	\$ 191,250	\$ 344,250	\$ 344,250	\$ 99,705
	15	\$ 153,000	\$ 229,500	\$ 229,500	
	20	\$ 114,750	\$ 191,250	\$ 191,250	
AM Peak Vehicle Departures	10	19	37	37	24
	15	12	25	25	
	20	9	19	19	

Although the zone approach and 20 minute frequencies would reduce the congestion at the STC, the costs are estimated to exceed the existing costs of providing shuttles to this area. The analysis indicates that this subarea would be less effectively served by any consolidation scenario, both in terms of costs and travel time, recognizing that an implementation plan would further optimize the operations approach.

Findings and Conclusions

The shuttle scenario model shows that a fully consolidated shuttle service could reduce businesses' operating cost and vehicle congestion at the STC. From a system-wide perspective, all scenario approaches with frequencies of 15 to 20 minutes could reduce cost and congestion. Even at a 10 minute frequencies, the zone approach would be viable, although likely less attractive to businesses. The following figure highlights what appears to be the most viable opportunities for full consolidation at the three test frequencies.



Figure 28 Full Consolidation Viability by Service Frequency



Potential to reduce system-wide operating costs



Potential to reduce vehicles at the STC

Similarly, viability exists within specific geographic typologies. The following figure highlights the benefits of centralized location and proximity to the STC, as the Downtown sub-area tests more favorably. In this case, frequencies are assumed at 15 minutes and the differing levels of viability are considered from a geographic perspective.

The analysis described here offers the conclusion that some levels of consolidation are viable to achieve goals of congestion relief at the STC and notable reductions in operating costs. It is highly unlikely that all current shuttle providers will be motivated to participate in a consolidated system, raising the importance of pursuing partial consolidation (either citywide or by focusing on geographic sub-areas).

Most importantly, this exercise provides a platform to gauge interest from the business community. As potential participants are identified, service plans can be further refined to optimize the operational approach. This exercise illustrates the overall viability of consolidation across different approaches, begins to narrow down on the most viable and beneficial approaches with respect to overall objectives, and sets the stage for more detailed service planning and organizational development to follow.

Figure 29 Partial Consolidation Viability (by Geographic Sub-Area)

SUB-AREA (15 Minute Frequency)		
DOWNTOWN	EDGE	SUBURBAN



Potential to reduce individual businesses' operating costs



Potential to reduce vehicles at the STC

ADMINISTRATION FOCUS: TRANSPORTATION MANAGEMENT ASSOCIATIONS, ACCESS MANAGEMENT & PUBLICLY-RUN SYSTEMS

The administrative focus of the study examined the operations of a potentially consolidated shuttle system and the regulations and policies for accessing the STC itself. Both privately run and publicly run consolidated systems were considered. Access changes at the STC were also explored. This section presents a summary of the administrative opportunities for shuttle operations and STC access. These options compliment the facility and service strategies previously presented.

Opportunities for system and station administration include:

- Transportation Management Association (TMA) – to assist in the oversight and running of a consolidated private shuttle system
- Publicly run shuttle system
- STC Access Management Policies

Transportation Management Associations

Transportation Management Associations (TMAs) are non-profit organizations that coordinate travel demand management efforts in a defined area, such as business improvement districts, parking districts, neighborhoods, or areas of high employment. The latter is the most common location for a TMA, though some TMAs center around a park or entertainment venue. TMAs aim to maximize the



efficiency of the transportation network through congestion management, parking management, and the promotion of alternatives to driving alone. As a byproduct of these efforts, TMAs may improve transportation access and reliability, as well as promote other goals of a municipality (e.g., reduce greenhouse gas emissions, bolster public health initiatives, and develop a strong sense of place). This section explores what TMAs can offer Stamford and considers common funding sources and organizational structures.

Services Offered

TMAs cater to the transportation needs of a defined area. The following services are offered by many but not all TMAs:

- **Information resource.** TMAs serve as information resource centers for employees commuting to the defined geographic area. The centers have route maps and transit schedules to help commuters considering opting for transit. These centers often sell discounted transit passes and provide useful resources for active transportation commuters.
- **Transportation coordination.** One of the most important roles of a TMA is to communicate transportation challenges to local, regional, and state agencies. From the agency perspective, TMAs serve as the point of contact with the business community on a range of infrastructure and programming topics. Example topics include parking management, car-sharing services, bicycle parking, active transportation infrastructure, and traffic operations.
- **Carpooling and vanpooling.** TMAs often coordinate carpool matching programs by providing services that connect commuters originating from similar locations. In some cases, TMAs may also operate vanpool services to make carpooling more cost effective for commuters coming from more distant locations.
- **Education and marketing campaigns.** Education and marketing campaigns are employed by TMAs to raise awareness of transportation options. Many TMAs lead individualized marketing campaigns, which send individualized information to employees based on their home address. TMAs also host community events, such as block parties or temporary street closures, to educate employees and residents on active transportation options. TMAs frequently work with local and state agencies on their campaigns to promote a consistent message.
- **Incentive programs.** Discounted transit passes, parking cash-outs, and bike commuter benefits (e.g., gift cards to bike shops) are sometimes coordinated through TMAs.

Funding Sources

TMAs throughout the country draw from a wide variety of sources. The most common source of revenue (though not necessarily the largest source) comes from member dues. Businesses make up the largest share of members, though government agencies, developers, nonprofits, and residents also pay membership dues in some cases. Membership is typically voluntary, and thus membership dues are not always a reliable funding source.²

State's also help fund TMAs, either through state gas tax revenue or from funding distributed by federal agencies. The New Jersey Department of Transportation, for instance, uses funding from the Congestion Mitigation and Air Quality Improvement (CMAQ), the Surface Transportation Program (STP),

² Ferguson, E. (2007) Transportation Management Associations: A Reappraisal. *Journal of Public Transportation*. 10(4). Retrieved 3/15/2016 at <http://scholarcommons.usf.edu/cgi/viewcontent.cgi?article=1255&context=jpt>

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or the Federal Transit Administration.³ State funding often requires a local match, paid by local or regional governments, special tax districts, or development fees.

Parking revenue provides a stable funding stream for many TMAs. For example, the Washington Park TMA in Portland, Oregon, funds TMA administration as well as a free shuttle bus and infrastructure improvements.⁴ Although the Washington Park TMA also receives local funding, the parking revenue generates about \$2 million, all of which is spent on improvements within the TMA boundaries.

Grants are another common funding stream for TMAs. As non-profits, TMAs may benefit from grants that government agencies may not be eligible for, such as some foundation grants. Moreover, TMAs can work with established programs, such as Safe Routes to School, to generate funding for education, infrastructure improvements, or programming.

Organizational Structure

TMAs are non-profits governed by a board of directors. They can operate independently or as part of a larger non-profit, such as chambers of commerce, developer associations, or business park associations. In some cases, public agencies oversee or take on the responsibilities of a TMA. Assuming the host organization's goals do not conflict with the goals for the TMA, a TMA can benefit from the host organization's established status in the community. Although TMAs operate under a non-profit status, many of the services carried out by TMAs originated in the public sector or from public-private partnerships.⁵

Staffing at TMAs can vary substantially depending on the organizational structure. At a minimum, two full time staff members (or the equivalent hours) are needed for a TMA. Many TMAs rely heavily on the use of employee transportation coordinators (ETCs), which are employees at businesses that serve as liaisons promoting the services of the TMA. ETCs serve as points of contact and coordinate the transit passes and other benefits at their place of employment.

TMAs are a solution for many communities, particularly communities with a strong business presence. Many of the functions of a TMA, however, can be carried out by existing government agencies, businesses, or civic groups. Yet, the formation of a separate non-profit has enabled many communities to navigate transportation challenges in ways that governing bodies or businesses could not. Regardless of the organizational structure, TMAs are most successful when the push to establish a TMA originates from the private sector rather than the public sector.

³ New Jersey Department of Transportation. (2014) Transportation Capital Program Fiscal year 2015. Retrieved 3/15/2016 at <http://www.state.nj.us/transportation/capital/tcp15/pdf/tcp15.pdf>

⁴ Oregon Department of Transportation. (2015) Oregon Transportation Options Plan. Retrieved 3/15/2016 at <https://www.oregon.gov/ODOT/TD/TP/Plans/TransportationOptionsPlan.pdf>

⁵ National Center for Transit Research. (2001) TMA Handbook: A Guide to Successful Transportation Management Associations. Retrieved 3/16/2016 at http://www.nctr.usf.edu/clearinghouse/pdf/tma_handbook_final.pdf

Case Study: 128 Business Council

The Massachusetts Route 128 corridor experienced expansive employment growth as a result of the success of its technology companies in the 1980s. In this highly congested quarter of the nation, a transportation management association (TMA) called the 128 Business Council was formed to ensure that the region would not choke on its own success. Below are key lessons.

- The initial push came from the business community: Business leaders secured funding for a transportation study, which concluded that increased traffic congestion would negatively impact economic opportunity in the region. As a result, business leaders identified an executive director, established a 501(c)(4), set salaries, and negotiated a contract for a 12 passenger van. Today, 128 Business Council continues to be member-driven with no oversight from state or local agencies.
- Shuttle services have grown in popularity: The 128 Business Council operates 12 33-passenger shuttles, a number that has doubled in the past five years. For most routes, ridership has grown substantially. On the most popular shuttle, annual ridership rose from about 50,000 in 2010 to more than 160,000 in 2015. In total, the shuttles carry about 200,000 passengers per year.
- Maintaining membership has not been a problem: Corporate membership in the shuttle program gradually grew in the 1990s but recently has exploded. The changing commuting and living preferences among Millennials is one explanation. As Millennials have entered the workforce, they have requested shuttle services. Businesses in turn see shuttles as a mechanism to maintain a competitive advantage.
- Nearly all funding comes from corporate membership dues: An estimated \$200,000 per year per shuttle is needed, and overhead can range from \$100k to \$250K per year depending on other programs. These figures don't include salaries.
- Local municipalities support the shuttles: Several municipalities have begun to require shuttle participation for newly constructed buildings. In 2001, the City of Needham encouraged properties on the corridor seeking new parking minimums or greater density to join 128 Business Council as a means of reducing travel demand.
- Shuttle trips are no more than 35 minutes: When planning for shuttle routes, 128 Business Council limits in-vehicle time to no more than 35 minutes.
- Amenities matter a lot to riders: For a low cost, shuttles can have on-board, high speed wi-fi so that passengers can start their work day when they board. GPS on buses is also an affordable amenity. Riders can check the location of their shuttle through an app or they can subscribe to a Twitter feed for delay notifications.
- TMAs do not own their own shuttles: The cost of insurance is huge, so like all TMAs in the Boston region, 128 Business Council contracts out all the services.

The experience of 128 Business Council demonstrates that communities similar in size to Stamford are capable of carrying out coordinated shuttle services. Current trends suggest that the benefits of 128 Business Council will compound as the growing region attracts new businesses and residents.



STAMFORD BUS AND SHUTTLE STUDY

The Stamford business community has shown its commitment to transportation and to growth of the local economy, particularly in the extensive provision of private shuttle services. A collective effort on behalf of the business community may yield dividends not only in improved operational efficiency of shuttles and reduced operating costs, but also in a stronger voice to advocate for transportation and infrastructure improvements in the city and region. Furthermore, a TMA can serve as a vehicle to deliver complementary projects in the city such as streetscape improvements, other mobility programs (e.g., ridesharing, bikeshare, etc.) marketing, and a host of commuting resources. A collaborative, cohesive transportation effort on the part of the business community will benefit all users through improved mobility, reduced congestion, and enhanced economic activity.

Publicly-Run System

Among the various options to address overall shuttle operations and management is consideration of a fully public system to serve current shuttle destinations. In effect, the CTTransit bus network does this, serving the vast majority of shuttle destinations on current bus routes. Understanding the last-mile nature of shuttle services and the premium placed on direct, frequent service by their sponsors, the possibility of CTDOT or another public entity operating shuttle services must be considered, assuming a service design in keeping with current, private shuttle operations and distinctive from the core CTTransit bus network.

Throughout the study process, in discussions with businesses, public agencies, and shuttle riders, it has been abundantly clear that a publicly-operated shuttle network would neither achieve desired results, nor could it be forced upon businesses or riders that prefer their own individual services.

Case Study: Westchester County DOT Bee-Line Shuttles

Since the early 1990s, the Westchester County Department of Transportation (DOT) has operated public shuttle services from the Metro-North stations in White Plains and Tarrytown to corporate destinations along the I-287 corridor. The services are express bus services where passengers may only board in White Plains or Tarrytown in the morning peak and at corporate sites in the evening peak. Without mid-route boardings, the ridership on these routes remains low relative to other transit services offered in the county. At the time of a June 2010 study, there were 142 average daily boardings per shuttle route. Considering riders of shuttles typically board the shuttle twice per day, there were roughly 72 users per shuttle on average.

Westchester County DOT continues to operate its shuttle-type services as a matter of policy; however, these services are generally not competitive with privately run corporate shuttles and some employers continue to operate their own shuttles from the White Plains railroad station. Concerns among employers in the I-287 corridor echo those heard in Stamford, notably that ensuring quick, efficient commuting connections from the railroad station to work sites is part of a broader competitive strategy to attract and maintain talent. Public service options have value but will not necessarily supplant private shuttles.



Case Study: San Francisco Municipal Transportation Agency

The Silicon Valley tech boom has resulted in significant housing pressures for the thousands of technology workers throughout the region. Ensuring that these workers can get to their jobs has proven challenging because many employers are based in suburban corporate campuses removed from transit. In response to these challenges, private employers established shuttle services. According to the Metropolitan Transportation Commission's 2016 Bay Area Shuttle Census, the use of shuttles has grown rapidly: from 473 vehicles in 2012 to 765 in 2016. The growth of shuttles has proven challenging to the public transit system in the city. In many cases, private shuttles are using public bus stops as their boarding areas, which has led to congestion for both services.

The city is currently running trials to determine how these two systems – public and private – can coexist and augment each other. Before August 2014, the City did not regulate private shuttles. Shuttles loaded and unloaded passengers in a variety of zones, including white loading zones, red Muni zones, and other vacant curbside space. When curbside space was unavailable, shuttles often would load or unload passengers in the street. The lack of rules for where and when loading and unloading were permitted resulted in confusion for shuttle operators and neighborhood residents, inconsistent enforcement, and real and perceived conflicts with other transportation modes.

The San Francisco Municipal Transportation Agency (SFMTA) began an 18-month pilot project in January 2014 to test a limited network of shared Muni and commuter shuttle stops. Shuttle service providers had to apply and pay for a permit to use the network. The pilot program allowed commuter shuttles with permits from the SFMTA to use a limited number of Muni bus stops for a fee of \$3.55 per stop (which also provided approximately \$3.5 million to administer the program).

This pilot aimed to minimize impacts of commuter shuttles on public transportation and on other forms of private transport while supporting the beneficial operations of these shuttles. The pilot addresses commuter shuttles that operate within San Francisco and between San Francisco and jobs in other cities. The pilot term was August 2014 through January 2016.

The first evaluation report was made available on October 6, 2015.¹ In summary, the report found:

- About 8,500 people ride a permitted shuttle round-trip each day.
- Shuttles make an average of nearly 3,000 stop-events every weekday. A stop-event is every time a shuttle stops at a zone with the intention of loading or unloading passengers.
- 45% of shuttle riders do not own cars, and 45% of those who do not own cars cited shuttles as the “main reason” they did not own a car.
- 47% of shuttle riders said they would drive alone to work if a shuttle were not available.
- Shuttles remove nearly 4.3 million vehicle miles traveled from the region's streets each month.

Although San Francisco's transportation environment differs from Stamford's, the results of this study provide evidence that corporate shuttles provide a desirable alternative to driving alone as a commute choice. Moreover, the study shows ways in which a more regulated shuttle system can create better coordination with existing transit services.



STAMFORD BUS AND SHUTTLE STUDY

STC Access Management

Some degree of selective control over which shuttle operators use the STC may ultimately be necessary to improve operations and reduce congestion. Ideally, STC access management approaches would be supportive of facility improvements and an administrative approach to reducing and managing vehicular demand at the facility. Several iterations of an STC access management approach are considered:

- **Facility user fees.** Any shuttle operator that wishes to directly access the STC will pay a user fee. These fees would be in turn used to fund facility improvements and/or operational support staff (e.g., additional traffic control personnel). Varied pricing structures could be developed to address frequency of services, priority access, or other incentives.
- **Physical access limitations.** A gated system, similar in nature to the keycard-activated taxi queue on Station Place, would limit access to the STC to operators that participate in either a coordinated system or pay access fees.

It is imperative that any STC access management be considered part of an incentive program. While fees or other limitations may be placed on what is currently an open-to-all facility, it must be clear to participants that revenues generated are directed toward continued improvement of the facility itself and provide tangible benefits to day to day operations.

Status Quo

As in any planning effort, consideration must be given to the status quo and the implications of making no changes at all. Given the severe operating challenges highlighted thus far, and the recognition that transit ridership and shuttle activity have increased and are likely to increase in the coming years, the current situation is clearly not sustainable. The impacts of STC congestion, particularly in the shuttle area, spread beyond the facility and affect local roadway operations. Furthermore, the inability to efficiently and reliably transport shuttle riders directly affects the businesses that sponsor these shuttles, and most of all the riders themselves who rely on last mile connections to and from the STC as a core component of their travel.

SUMMARY

This chapter organized opportunities for improving the shuttle system into three focuses: facility, service, and administration. Within each of these focuses is a range of options that could help address the issues raised by stakeholders and the public. The table below outlines each of the opportunities.

Table 7 Summary of Opportunities

Facility Approaches	Service Approaches	Administration Approaches
<ul style="list-style-type: none"> • Parking relocation • Mobility Concept: North State Street Transit Prioritization • Developing Off-site Staging Area for Shuttles • Improved Passenger Amenities 	<ul style="list-style-type: none"> • CTTransit Optimization: Circulator Option • CTTransit Optimization: Added Service Option • STC Operational Optimization for CTTransit Stops and Routes • Shuttle Consolidation Scenarios 	<ul style="list-style-type: none"> • TMAs or Business Consortium • Publicly-run System • Access Management • Status Quo

STAMFORD BUS AND SHUTTLE STUDY



The following chapter considers these opportunities and evaluates them based on the list of project goals identified by the Technical Committee.

PRIVATE SHUTTLE STUDY CHAPTER FOUR

Evaluation & Recommendations





The previous section outlined the range of opportunities using facility, service, and administration focuses to address the need to improve shuttle operations. In this section, the opportunities are considered in light of the project goals as identified by the Technical Committee (see callout box below). The evaluation process worked as an iterative, on-going discussion with the Technical Committee and the Stamford business community rather than a linear quantitative approach. The opportunities are categorized into four groups:

- **Implemented.** At the start of the study, there was a strong desire to implement some immediate improvements and not wait until the conclusion of the study to see changes made to the shuttle environment. As such, some recommendations developed early in the study process were implemented before this final report was completed.
- **Recommended.** After analysis and conversations with key stakeholders, the study team recommends several opportunities to move forward with implementation. In doing so, these opportunities will address the project goals.
- **Needs further consideration.** Many of the opportunities would potentially address the project goals but need further study or discussion with key stakeholders. The strengths and drawbacks of these goals are detailed below.
- **Not recommended.** The study attempted to analyze the full range of opportunities for addressing the challenges facing the existing private shuttle situation. Not all opportunities are feasible, desirable, or would address the prioritized list of project goals. For these opportunities, an explanation for why they are not recommended is provided below.

Prioritized Project Goals

- Improve traffic operations in and around Stamford Transportation Center (STC)
- Improve safety at the STC at the shuttle boarding area
- Reduce shuttle-related congestion at the STC
- Improve pedestrian and bicycle access to the STC
- Support economic development by leveraging benefits of transit
- Plan for transit interface at transit-oriented development (TOD)
- Increase transit mode share at the STC
- Implement travel demand management program to encourage transportation options
- Increase mobility within the City of Stamford
- Improve shuttle access to and from STC with respect to delay
- Improve rider experience on shuttles and CTTransit system
- Expand transit to underserved or growing areas

Source: Study Technical Committee

RECOMMENDATIONS: FACILITY OPPORTUNITIES

Many of the concerns raised from the stakeholder and public outreach centered around the STC layout. A complete redesign of the STC has been considered by recent studies, so this study did not attempt to replicate those efforts. However, a consideration of traffic flow in the shuttle boarding area, CTTransit boarding area, and the surrounding streets was studied in detail.

Four main concepts were considered as opportunities for the STC: the relocation of parking, transit priority measures on North State Street, passenger amenity improvements, and developing off-site staging areas for shuttles (Table 8).

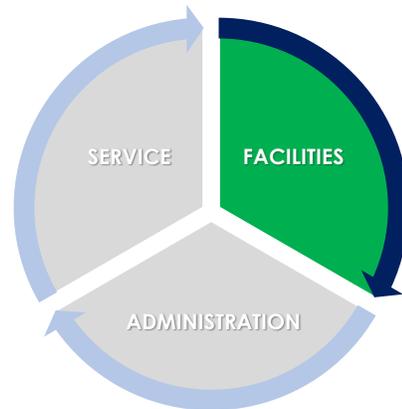


Table 8 Recommendations: Facility Opportunities

Opportunity	Status	Relevant Goals	Key Players
Parking Relocation	Implemented	<ul style="list-style-type: none"> • Improve traffic operations in and around the STC • Improve safety at the STC at the shuttle boarding area • Reduce shuttle-related congestion at the STC • Improve shuttle access to and from STC with respect to delay • Improve rider experience on shuttles and CTTransit system 	CTDOT, CTTransit
Mobility Concept: North State Street Transit Prioritization	Recommended	<ul style="list-style-type: none"> • Improve traffic operations in and around STC • Reduce shuttle-related congestion at the STC • Increase mobility within the City of Stamford • Improve bicycle and pedestrian access to the STC • Improve shuttle access to and from STC with respect to delay 	City of Stamford, CTDOT, CTTransit
Improved passenger amenities	Recommended	<ul style="list-style-type: none"> • Improve rider experience on shuttles and CTTransit system 	CTDOT, CTTransit
Developing off-site staging area for shuttles	Needs further consideration	<ul style="list-style-type: none"> • Improve traffic operations in and around STC • Reduce shuttle-related congestion at the STC • Increase mobility within the City of Stamford • Improve shuttle access to and from STC with Respect to delay 	CTDOT, Stamford property managers, City of Stamford

STAMFORD BUS AND SHUTTLE STUDY



Implemented

Relocation of Parking

One of the study recommendations was implemented before the study conclusion. Effective August 1, 2016, the 16 police parking spaces within the shuttle boarding zone were vacated as well as the 13 tenant spaces on Guernsey Street. Affected tenants made arrangements for parking at nearby garages

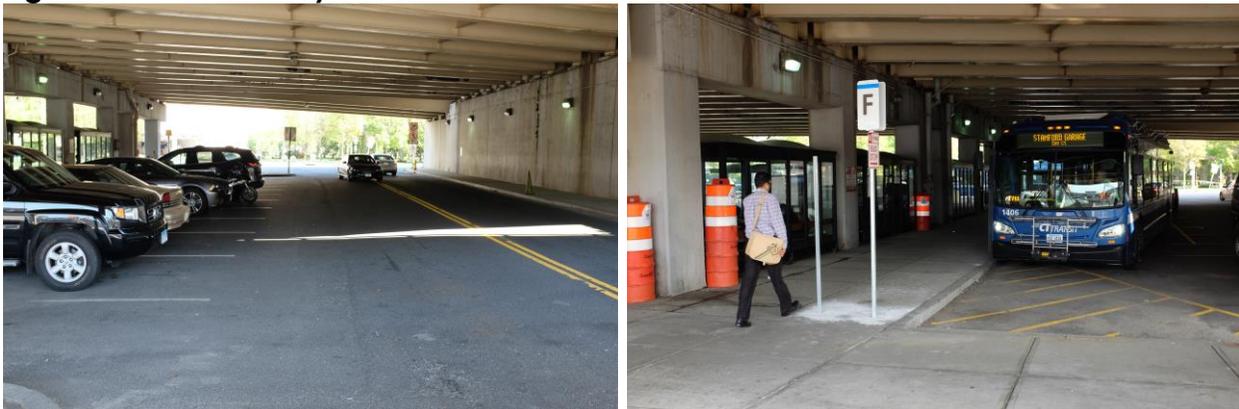
Figure 30 Shuttle Boarding Area Parking Before & After



Figure 31 CTTransit Parking Area (Middle Section) Before & After



Figure 32 Guernsey Street Before & After





or at the South State Street parking lot. The Metropolitan Transportation Authority (MTA) police cruisers moved into the central parking area alongside a couple spaces for CTTransit. The areas were re-striped and re-signed, CTTransit alerted riders of the boarding changes and developed a signage and striping plan.

The result of these changes is an additional boarding platform for CTTransit riders and additional capacity for shuttles circulating in the CTTransit area. Initial, anecdotal reports have suggested that the added capacity in the shuttle area has improved the circulation of the boarding area and to some extent mitigated the shuttle queuing on North State Street. Queuing on North State Street remains a challenge during times of peak congestion.

Recommended

Mobility Concept: North State Street Transit Prioritization

Redesigning North State Street to better reflect the modes of those who use the street the most is a key recommendation. In the previous chapter, several opportunities were presented: transit priority signalization, transit priority access to the STC, and a repurposed North State Street.

As demonstrated in the Opportunities chapter, more people ride shuttles, ride CTTransit, or walk on North State Street than use private vehicles. Yet, the street prioritizes private vehicle use. Considering North State Street is a critical corridor for shuttles and CTTransit buses, two options were presented to rebalance the street in favor of the most prevalent trips being made.

By creating a transit-only lane, shuttles and buses would have more room to enter and exit the STC. This lane would improve, though not eliminate, congestion associated with queuing of transit vehicles approaching and exiting the STC.

A second, more robust approach, would eliminate general traffic from North State Street between Atlantic Street and Washington Boulevard (with the exception of deliveries headed to the former UBS building) maximizing the use of this critical segment and improve the efficiency of people movement to and through the area. Shuttles and CTTransit buses could take advantage of less congested access as well as much-needed queuing and staging space to improve timing and flow of vehicles through the STC.

Vehicle staging space is critical, as the constrained shuttle area does not facilitate numerous operators dwelling and waiting for passengers at the same time, and with limited curb space adjacent to the STC building exits. Transforming this segment of North State Street would effectively create an extension of the STC bus and shuttle areas by allowing more flexible access and egress at the facility and reducing the friction within the limited footprints of the current boarding areas.

Finally, a full repurposing of this segment of North State Street is strongly recommended in conjunction with any consideration of closure of the existing Washington Boulevard entrance to the STC shuttle area. Significant shuttle traffic would be rerouted via South State Street and Guernsey Street to access the STC in the event of such a closure, heightening the need for additional queuing space and reduced general traffic on North State Street, as all transit traffic would now enter from the same direction.

A strong urban design component could effectively extend the operating footprint of the STC while better integrating the station facility into the downtown street fabric, with related opportunities to improve the pedestrian and bicycling realm around the STC.

STAMFORD BUS AND SHUTTLE STUDY

Improved Passenger Amenities

Passenger Amenities fall outside the scope of this plan because they have been addressed in other recent plans, but throughout the stakeholder and public engagement process stakeholders emphasized the important role amenities. Businesses in particular emphasized the importance of addressing the goals laid out in the STC Master Plan (2010). This study fully endorses a holistic set of improvements to customer wayfinding, information and amenities.

Needs Further Consideration

Off-site Locations for Shuttle Staging

The constraints of the current STC footprint prompted an assessment of possible off-site locations for supporting transit activities, e.g., shuttle or bus staging, parking relocation, etc. CTDOT requested a list of off-site locations, and the study team and WestCOG came up with a preliminary list of locations. This assessment included on-street locations such as Dock Street (for vehicle staging) and off-street locations for shuttle operations. Off-street locations were predominantly privately-held properties, which ultimately did not present themselves as viable options for meaningful relocation of shuttle operations. While discussions were held with one property owner and indicated possible use of specific parcels for taxi staging or other functions, these options were ultimately deemed insufficient and incompatible with CTDOT-controlled facility approaches such as the parking relocation within the shuttle and bus areas. Informal shuttle and bus staging on local streets will likely continue, ad hoc, as permitted by local police and the city.

RECOMMENDATIONS: SERVICE OPPORTUNITIES

The previous chapter includes a discussion of several service opportunities, including shuttle consolidation scenarios, CTTransit optimization to support existing shuttle service, and STC operational optimization. This section recommends services approaches based on their anticipated ability to accomplish study goals. Note that CTTransit optimization included two approaches: a midday circulator and added midday service. These opportunities were evaluated separately.

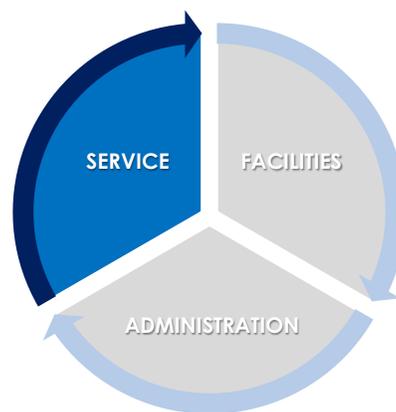


Table 9 Recommendations: Service Opportunities

Opportunity	Status	Relevant Goals	Key Players
Shuttle consolidation scenarios	Recommended	<ul style="list-style-type: none"> Improve traffic operations in and around STC Improve safety at the STC at the shuttle boarding area Reduce shuttle-related congestion at the STC Improve shuttle access to and from STC with respect to delay 	Stamford business community, City of Stamford, WestCOG, CTDOT



STAMFORD BUS AND SHUTTLE STUDY

		<ul style="list-style-type: none"> • Improve rider experience on shuttles and CTTransit system 	
CTTransit optimization: Circulator	Recommended	<ul style="list-style-type: none"> • Support economic development by leveraging benefits of transit 	CTDOT
CTTransit optimization: Added Service	Needs further consideration	<ul style="list-style-type: none"> • Support economic development by leveraging benefits of transit 	CTDOT
STC Operational Optimization for CTTransit Stops and Routes	Needs further consideration	<ul style="list-style-type: none"> • Improve traffic operations in and around STC 	City of Stamford

Recommended

Shuttle Consolidation Scenarios

Addressing shuttle congestion and the safety and traffic operations challenges associated with it were the Technical Committee’s highest priorities. Sharing shuttle resources among neighboring businesses and/or property managers is one of the most effective ways to reduce the number of vehicles operating at the STC. The analysis conducted during this study provided evidence that a consolidated shuttle service could reduce the number of shuttles at the STC while providing 20-minute frequencies or better. Although some shuttle riders may face slightly more in-vehicle time, more frequent service could reduce the amount of time they spend waiting for their shuttles to arrive at the STC, and thus overall travel time.

The areas that would benefit from shared shuttle resources the most are those with the highest density of employers, such as Downtown Stamford, Waterside, Stamford West Side, or the South End. As a result of a summer 2016 meeting with leaders from the business community, CTDOT, the City of Stamford, and WestCOG, the City of Stamford agreed to help coordinate a steering committee to explore potential options.

The steering committee’s primary purpose will be to consider shared shuttle resources, particularly in the areas of Stamford with the highest density of employers and property managers who currently operate shuttles. The model developed for this study along with relevant case studies will help guide the steering committee as it considers potential options. Although the model provides estimates for the number of shuttles needed and costs, the steering committee will work through many of the model’s limitations. For instance, the model estimates the number of shuttles needed to serve a handful of neighboring destinations, but it does not consider the feasibility of those destinations operating a shared shuttle. The destinations could be a mixture of hotels, businesses, and residential properties with unique transportation needs. The steering committee will consider ways to address these needs while working to achieve the study goals. Business participation will drive specific planning and operating parameters.

As a sample exercise, Downtown Stamford has great potential to reduce shuttle congestion while offering frequent trips at a lower cost to employers. Figure 33 displays how the seven destinations currently served by shuttles could be served by a single route; Figure 34 illustrates how these same destinations could be served by two routes. From the rider perspective, the second option would be preferred because the shuttle would make fewer stops before reaching their destination. However, the first option would result in greater cost savings and shuttle demand reduction.

STAMFORD BUS AND SHUTTLE STUDY

The destinations currently served by shuttles in Downtown Stamford offer frequencies ranging from five to 60 minutes during the AM peak (7:30 to 9:30 a.m.). To support these frequencies, employers and property managers operate at least 12 shuttle vehicles, which depart the STC a total of 86 times from 6:30 to 9:30 a.m. The estimated total cost of providing these services is just under \$1.4 million annually.

A consolidated shuttle service, on the other hand could greatly reduce both the costs and shuttle congestion, even at 10 minute frequencies. As shown in Table 10, the overall cost of providing shuttles under either consolidated sample approach is more than halved relative to estimates for existing service. Much of this cost decrease comes from the reduction in the number of vehicles needed for consolidated service. Moreover, total shuttle departures from the STC decrease from 86 to 34 for the sample service with one route and to 68 for the sample service with two routes.

Outside of Downtown Stamford, the results of the analysis show benefits, though the greater distance from the STC and the lower density of businesses complicate the picture. Figure 35 shows a sample consolidated service in the Waterside neighborhood, southwest of Downtown Stamford. Figure 36 shows a two routes covering the same six businesses and residential properties.

Today, about 44 morning shuttle departures head to Waterside destinations, and at least eight vehicles are required to operate these trips. Most shuttle destinations in Waterside offer frequencies higher than 20 minutes, and the combined total annual cost of these services is just over \$700,000. A consolidated shuttle service with 10-minute frequency may help achieve goals (Table 11). The two-route option, however, would increase the number of shuttle departures from the existing 44 to 68, so this option should not be considered. Yet, a single route serving all six destinations would see reductions in both departures and costs. At 20-minute frequencies, a two-route option becomes viable, and would still offer more frequent service than existing services (Table 12).

Figure 33 SAMPLE Consolidated Shuttle Services in Downtown Stamford (One Route)

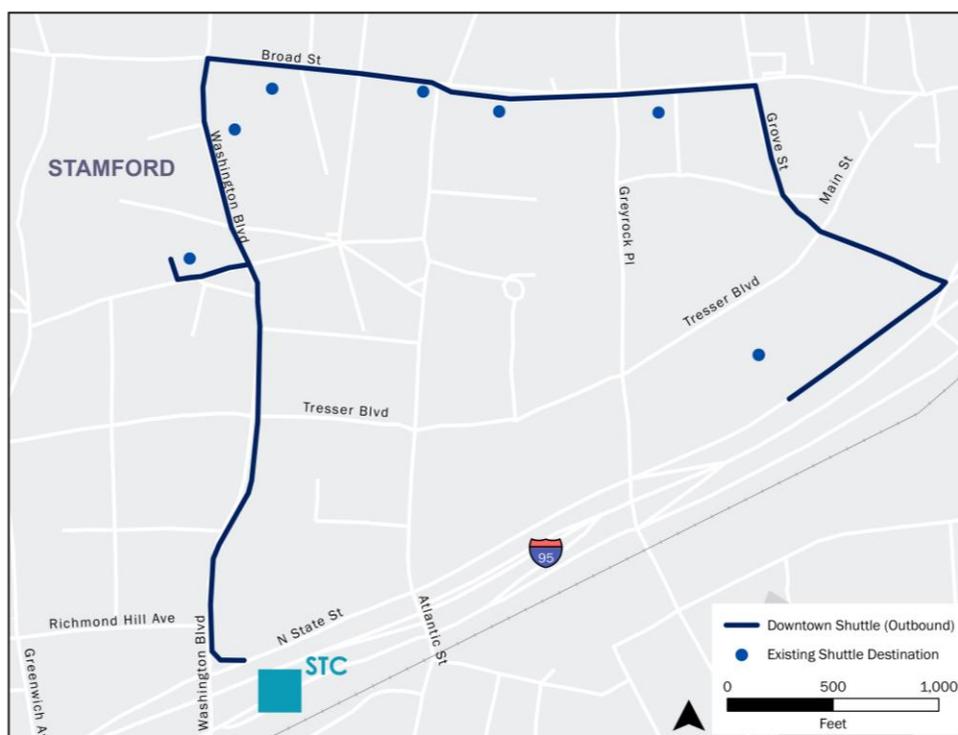


Figure 34 SAMPLE Consolidated Shuttle Service in Downtown Stamford (Two Route)

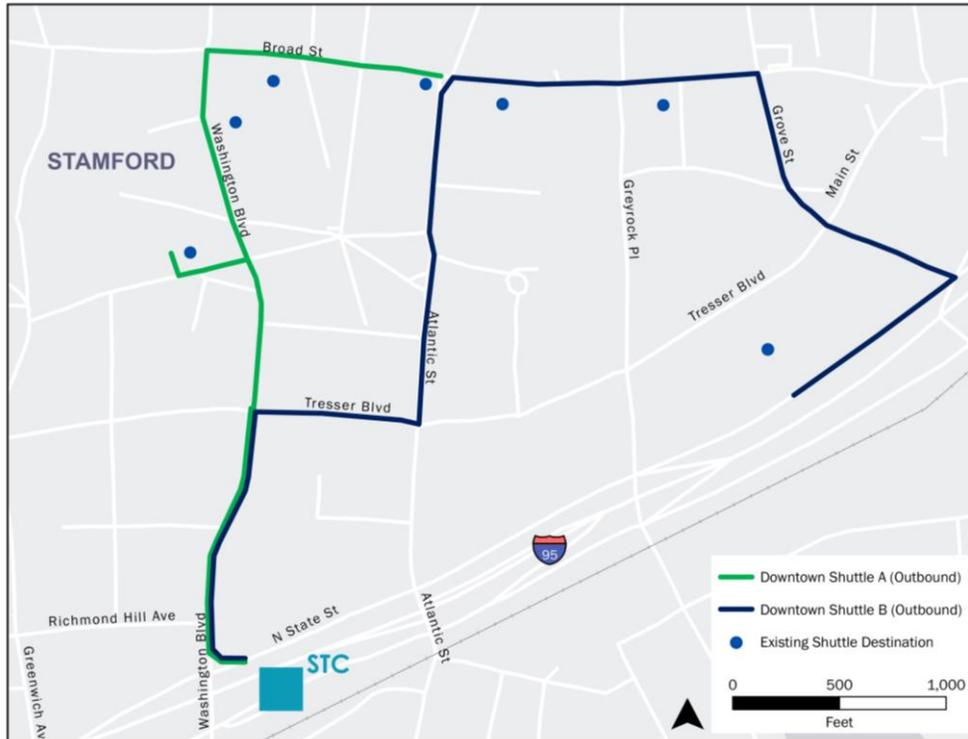


Table 10 Existing & Sample Downtown Shuttle Route Options (10 Minute Frequencies)

Option	Estimated Cost	AM Shuttle Trips	Vehicles Needed
Existing	\$1.39 million	86	12
Downtown Shuttle (1 Route)	\$459,000	34	3
Downtown Shuttle (2 Routes)	\$612,000	68	4

Table 11 Existing & Sample Waterside Shuttle Route Options (10 minute Frequencies)

Option	Estimated Cost	AM Shuttle Trips	Vehicles Needed
Existing	\$703,000	44	8
Downtown Shuttle (1 Route)	\$612,000	34	4
Downtown Shuttle (2 Routes)	\$918,000	68	6

Table 12 Existing & Sample Waterside Shuttle Route Options (20 Minute Frequencies)

Option	Estimated Cost	AM Shuttle Trips	Vehicles Needed
Existing	\$703,000	44	8
Downtown Shuttle (1 Route)	\$306,000	17	1
Downtown Shuttle (2 Routes)	\$459,000	34	3



Figure 35 SAMPLE Consolidated Shuttle Service in Waterside (One Route)



Figure 36 SAMPLE Consolidated Shuttle Services in Waterside (Two Routes)



By reducing shuttle departures from the STC, a consolidated shuttle service would help address the goal to reduce congestion and improve traffic operations in and around the STC. As a result, safety would improve from increased visibility. Most shuttle riders would have decreased wait times when waiting for their shuttles, thereby improving their experience and perhaps allaying concerns about the longer time spent in vehicles reaching destinations. The steering committee will continue to fine tune shuttle routes, determine program participation, and consider other challenges associated with consolidated service.

CTTransit Optimization: Midday Circulator

Among the CTTransit Optimization opportunities discussed in the previous chapter, the midday circulator is the most promising approach to positioning CTTransit buses to support the local business community. A midday service could address many commuters' challenge of reaching the STC during the midday. Moreover, a midday service could capture people looking to run errands or eat out during the lunch hour. This service will also complement the existing Stamford Connector route, which does not operate during the midday but also serves the downtown, using the same two buses already allocated.



Needs Further Consideration

CTTransit Optimization: Added Service

Increasing service system-wide during the midday, even if just on specific routes, may lead to many of the economic benefits discussed with the midday circulator. The increased frequencies may also be enough to sway potential shuttle riders and their businesses to opt for transit rather than private shuttles. This approach will be evaluated further in the next phase of this study and may be considered as a potential supporting option by the steering committee. Yet, this option is not a short-term pathway for addressing shuttle concerns. It needs further consideration and vetting by CTDOT, CTTransit and other stakeholders.

STC Operational Optimization

Further consideration should be given to transit signal priority or transit-only lanes, particularly on Washington Boulevard and Atlantic Street. Moreover, the consolidation and relocation of transit stops as well as potential route consolidation of CTTransit buses departing the STC will be considered in the transit phase of the study. CTTransit may wish to pursue these opportunities further to determine if any changes would reduce the number of buses leaving the STC during the AM or PM peaks. These changes may help address the study goal to reduce congestion around the STC and improve traffic operations.

RECOMMENDATIONS: ADMINISTRATION OPPORTUNITIES

The administration opportunities considered the ways in which oversight from a new or existing organization could help accomplish the study goals. In the opportunities chapter, the range of options included STC access management, a publicly-run shuttle service, and the creation of a TMA or business consortium. Of these, only the latter is recommended. Additionally, the status quo (i.e., continuing under the ad-hoc, privately run system) is examined to weigh each alternative.

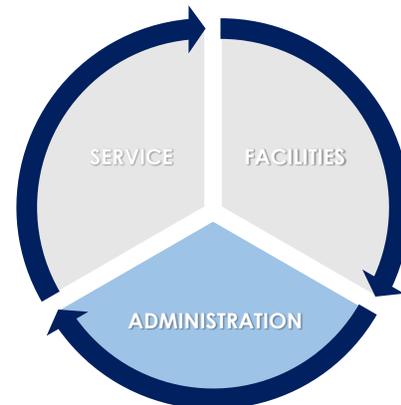


Table 13 Recommendations: Administration Opportunities

Opportunity	Status	Relevant Goals	Key Players
TMA or business consortium	Recommended	<ul style="list-style-type: none"> Improve shuttle access to and from STC with respect to delay Improve traffic operations in and around STC Improve safety at the STC at the shuttle boarding area Reduce shuttle-related congestion at the STC Support economic development by leveraging benefits of transit Reduce business community's shuttle operating costs 	Stamford business community, City of Stamford

STAMFORD BUS AND SHUTTLE STUDY



		<ul style="list-style-type: none"> • Implement travel demand management program to encourage transportation options • Increase mobility within the City of Stamford • Improve rider experience on shuttles and at the STC 	
STC Access Management	Needs further consideration (Pursue only as needed to address core operating concerns at STC)	<ul style="list-style-type: none"> • Improve traffic operations in and around STC • Improve safety at the STC at the shuttle boarding area • Reduce shuttle-related congestion at the STC • Implement travel demand management program to encourage transportation options • Increase mobility within the City of Stamford • Improve shuttle access to and from STC with respect to delay 	CTDOT
Publicly-run system	Not recommended	<ul style="list-style-type: none"> • Improve traffic operations in and around STC • Improve safety at the STC at the shuttle boarding area • Reduce shuttle-related congestion at the STC • Increase mobility within the City of Stamford • Improve shuttle access to and from STC with respect to delay 	CTDOT
Status Quo	Not recommended	-	-

Recommended

TMA or Business Consortium

A TMA, business consortium, or other administrative organization has multiple benefits that support the goals of the study. The central role of this organization, particularly as its initial mission, would be to coordinate and administer shared shuttle resources among businesses. The role of this group, however, could also expand to implement travel demand management programs or advocate on behalf of the business community for amenities to improve the shuttle rider experience. At the very least, this group will work to better traffic operations, reduce shuttle congestion, and improve safety at the STC. The remaining goals addressed will largely depend on the priorities of the steering committee and the identification of local champions to advance the TMA or consortium’s formation and operation.

Further Consideration

STC Access Management

Regulatory policies to manage access to the STC warrant further consideration by CTDOT. Potential options include shuttle access fees, priority access, or restricting access only to businesses who opt into consolidated shuttle services. Limiting access to the STC is not a desired outcome of this effort; however, an appropriate mix of incentives and disincentives to overall shuttle service efficiency may



require access-focused solutions. The administrative costs associated with collecting these fees and/or enforcing the policies should be examined for each option.

Not Recommended

Publicly-Run System

Meetings with the City of Stamford, CTDOT, WestCOG, and the Stamford business community have demonstrated a strong opposition to a publicly-run corporate system in Stamford. Moreover, case studies, such as White Plains, New York, have suggested that publicly-run shuttles are often supplemented by more direct private shuttles. Without regulatory efforts to bar private shuttle use in Stamford, which is strongly discouraged, the ability for publicly-run shuttles to reduce congestion at the STC would be limited. Therefore, a publicly-run system should not be considered further at this time. Resources for CTTransit service are best allocated to system improvements and expansion for the city and region as a whole, with consideration for how the CTTransit service can complement the shuttle services.

Status Quo

The stakeholder and public outreach process has confirmed the need to take action. The hazardous, chaotic, and inefficient conditions in which the STC currently operates have raised concerns from the business community, shuttle riders, and public agencies. Perhaps more concerning than the existing conditions are the conditions that would occur if a handful of new businesses added their shuttles to the existing system. The business community and the City of Stamford continue to encourage and plan for the growth of businesses in the region, and the private shuttles play a critical role in supporting economic development. By addressing the challenges with the current shuttle system, the greater Stamford community helps create an attractive and welcoming place for future businesses.

CONCLUSION

The shuttle phase of the Stamford Bus and Shuttle Study defined the pressing challenges associated with the existing shuttle operations, identified the range of opportunities for addressing those challenges, and made recommendations. The stakeholder and public engagement process highlighted the most pressing issues and prioritized the study goals. With these in mind, the project team considered a range of opportunities from a facility, service, and administration perspective.

These opportunities were honed and eliminated through an iterative process through coordination with the Technical Committee, business leaders, public agency representatives, and the study team. Through this process, one of the recommendations – the relocation of parking in the STC to create additional space for CTTransit and private shuttle operations – was implemented before this report was completed. The final list of recommendations includes:





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- Establish an entity such as a TMA or business consortium to administer a consolidated shuttle system beginning with the formation of a Steering Committee comprised of City representatives and private businesses
- Implement shuttle consolidation
- Pursue transit priority measures through the redesign of North State Street between Atlantic Street and Washington Boulevard
- Improve passenger amenities as recommended in the 2010 STC Master Plan
- Reallocate Stamford Connector buses for a midday circulator

Inaction and maintaining the status quo will result in worsening traffic and safety conditions, which will lead to negative impacts on Stamford's growing business community. The recommendations should be carried out through a collaborative effort involving WestCOG, the City of Stamford, CTDOT, and the Stamford business community. The newly formed steering committee will work to implement consolidated shuttle services and determine the purpose of a TMA or business consortium.

PRIVATE SHUTTLE STUDY APPENDICES





STAMFORD BUS AND SHUTTLE STUDY

APPENDIX A: STAKEHOLDER & PUBLIC ENGAGEMENT MATERIALS

Employer Outreach

The project team interviewed employers and property managers who currently operate shuttle services to better understand:

- Reasons for operating the shuttle
- Hours and level of service
- Destinations served
- Stamford Transportation Center (STC) operational concerns
- Description of ridership
- Stamford as a business location
- Other transportation options
- Whether joint or shared operations would be feasible and/or desirable

To inform Phase A, the team conducted fourteen interviews with the following stakeholders:

- Gen Re
- RFR Realty
- UCONN Stamford
- Empire State Realty Trust
- Starwood Hotels
- Ernst & Young
- NBC Sports Group
- Deloitte
- City of Stamford Economic Development
- High Ridge Park
- Nestle
- Point 72
- Shippan Landing
- Building and Land Technology (BLT)

Additional feedback mechanisms were made available to the Stamford business community, including a short questionnaire and an open invitation to contact the study team with feedback. Participation in study interviews was voluntary on the part of local businesses.

The following sections explore the feedback received and provide some insights, priorities, and improvement options for shuttle operations and administration.

Reason for Shuttle Operation

Most institutions have been operating their shuttles for many years, often on the order of 10 to 20 years. The institutions that participated in interviews provided different reasons for operating shuttles. Many of these differences were principally based on whether the interviewee was an employer or a building landlord. Employers located outside of walkable range (approximately a 10-minute threshold) from the STC appear to consider door-to-door shuttle options as a key, basic operation. Not having a door-to-door shuttle option is seen as a competitive disadvantage, and therefore annual operating costs to each business do not appear to be a significant factor.

Landlords identified shuttle service as a key amenity, and one that must be provided in order to remain competitive in the Stamford market. Interviewees noted that commuters' prime goal is to get to their place of employment as quickly and painlessly as possible. As such, a shuttle is a competitive differentiator (or must-have amenity) in attracting tenants. This fact has critical applications for any discussion of consolidation of shuttle service as any such discussion will both have competitive implications and also may impact travel times for commuters between the STC and their destination.



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The need for a direct, door-to-door trip was stressed in conversations about using CTTransit. Despite CTTransit serving almost every current shuttle destination in the city, multiple factors discourage use. Interviewees mentioned factors such as slow travel time, less frequent service from the STC, lack of comfortable pedestrian connections, lack of shelters, and – lastly, but importantly – the fact that shuttles are free and CTTransit has a cost. Whereas many businesses recognized that they could subsidize or pay entirely for employees’ or tenants’ commuting costs on CTTransit, this option was not seen as an attractive alternative to funding their own shuttles.

Likewise, employers see shuttle service as critical to recruiting key talent, especially as traffic congestion and unreliable travel times on I-95 have become less tolerable. Commutes from both Connecticut and New York City are possible by commuter rail service. However, point-to-point connections (e.g., shuttles) between the STC and company locations in the City of Stamford enhance individual employers’ opportunities to attract and retain talent. Interestingly, this is not limited to any one kind of employee but spans the full range.

Stamford's proximity to the Hartford and New York City markets make it a key intermediate point, ideal for many activities and businesses. However, Stamford’s location also means many people come to the city via commuter rail, which requires immediate and convenient transportation to their final destination (the last mile connection).

Interviewees also noted that the cost of housing in Fairfield County is high, and employees may need to live at a greater distance to find affordable options. As a result, the shuttle, coupled with rail service, allows commuters to come from a wider geographic area to reach jobs in Stamford.

Hours and Frequency of Operation

Most operators only operate shuttles during the morning and evening peak periods, with little service in place during the day itself. Companies and landlords alike noted that they continually adjust shuttles as train schedules and staff preferences shift.

In most cases, businesses either encourage walking or using taxis during non-peak times. Some employers have provided Uber information in orientation materials. Other businesses provide on-call cars for midday trips. A limited number of others provide limited shuttle service to downtown and shopping destinations at midday.

Destinations Served

Destinations served by the shuttles are limited. Their purpose is primarily to move commuters from the STC to their points of employment and back again. Likewise, residential building operators who run shuttles do so to move residents from apartments to the STC. However, there are few exceptions. In a small number of cases, the operator’s shuttle also stops at downtown locations to permit shopping and lunch trips.

Operational Concerns at STC

Operators, employers, and others have expressed concern about operations at the STC itself. Interviewees described the operations as chaotic and hazardous for riders, many of whom frequently dart in front of shuttles to board.

Congestion is another major challenge, especially during morning and afternoon peaks. Shuttles attempt to align arrivals with the train schedule, creating congestion at the STC with all shuttles



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attempting to use the facility at the same time. This creates difficulty within the facility, as well as on the surrounding local streets.

Moreover, wayfinding within the facility is minimal. Many first-time users do not understand where to find shuttles within the facility, much less to their specific shuttle among the other vehicles queued for boarding. In addition to wayfinding signage within the facility, signage outside of the facility is a challenge. Random vehicles such as personal automobiles occasionally venture into the facility and cause considerable confusion. Likewise, interviewees noted that enforcement of stated operating procedures (e.g., no-drop-off zones) is limited. This has ramifications for local traffic and safety.

Operators suggested multiple ideas for improving operations at the STC. These included the observation that CTTransit bays at the facility appear to be underutilized and that some of these might become multi-purposed for shuttle use. Operators located south of I-95 and the rail line noted that their shuttles should not have to go to the north side of I-95. Establishing a south side pick-up and drop-off zone, such as on Station Place near the existing taxi queue, may be helpful in managing overall volume at the STC.

Some operators also suggested technology-based solutions for some problems at the STC. These included mobile apps for shuttle operators that are reliable and provide better predictability in meeting shuttles. Numerous shuttle operators already have these apps in place, although reliability and accuracy vary. Real-time information and messaging at the STC itself could also improve waiting for customers queuing for shuttles in a more orderly fashion. Such information could include indications of train delays, shuttle arrivals, boarding times, and locations.

Description of Ridership and Points of Origin

Shuttle riders are primarily commuters arriving from elsewhere in Connecticut and New York City. There is a broad mix of people using commuter rail and the shuttles, including a wide range of income groups. People from outside of the city use shuttles primarily to go from the train station to their places of employment. Some Stamford residents take a shuttle from their home to the STC and board a second shuttle from there. Other residents walk to the STC to board a shuttle to their employer.

Shuttles are seen by employers as an invaluable tool for those who come from New York City, as they are most likely to commute to Stamford by public transportation (i.e., commuter rail). Likewise, rail commuters coming from elsewhere in Connecticut are less inclined to arrive by car due to traffic and congestion on I-95. These commuters rely on the shuttle as the last mile connection between the train station and their place of employment.

Workforce Implications of Stamford Location

Shuttles and their connections through the train station are seen as vital to increasing the Stamford labor shed. Without these connections, the city's labor shed (and that available to local employers) would be considerably reduced. The distance one can reasonably travel without commuter rail and some form of connector service has shrunk as traffic and congestion have increased throughout the region. Employers noted that their employees have chosen their places of employment due to how this fits with their life situation. Many employees would be hard-pressed to change their mode of transportation.



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Other Transportation Options

While shuttles, shuttle operations, and the STC were the main topics of conversation, other transportation options were discussed. Automobile traffic is certainly in the top three topics for all parties. In particular, interviewees noted that they are aware of plans that the City has for addressing congestion and bottlenecks. However, they also suggested that the City does not have the money to execute on these plans.

When asked what priorities for future improvements, several suggested pedestrian access, walking paths, and circulators. Pedestrian access was seen as highly desirable. Walking around the STC and other downtown areas is viewed as unsafe, and the environment is considered hostile. Several employers proposed a walking path, an enhancement that residential developers may also support.

Despite comments regarding the desirability of point-to-point transportation, several interviewees noted that circulators could be helpful, particularly for mid-day trips. This would allow for stops at the Bedford Street restaurants and malls, and it may also generally improve economic opportunities for downtown.

Generally, transportation to and from the STC is well-established, but mobility within Stamford by transit is not seen as a viable option. Some residential shuttles currently run to the STC. Interviewees noted that Stamford residents using apartment shuttles to travel to the STC and then use an employer shuttle to their place of work. In other words, privately operated transportation is addressing the perceived failures of public transportation.

Summary

In summary, interviewees noted the following:

- Landlords and employers are not balking at the price and responsibility of running their own shuttles. Instead, they are complaining about traffic and operations, particularly at the STC, and how that impacts their own efforts.
- CTTransit is not viewed as an attractive or viable commuting option. Schedules and routes may suggest otherwise, but this perspective is almost unanimous.
- Sharing shuttle resources is of interest to some but not all. Where shuttle providers tend to agree is that they do not want to see a degradation of existing service.
- Employers are not necessarily encouraging their employees to ride shuttles; rather, they provide the service to accommodate those who are inclined to use it. That is to say, parking policy is not tied to shuttle/transit goals.
- Walking is often an alternative to short-distance shuttles, but the walking environment in Stamford is often unpleasant and time-consuming, especially when crossing major streets.
- Shuttle operations are highly visible, i.e., employees complain when service suffers or when shuttle drivers are unsafe.
- Operations and safety at the STC are highly unsatisfactory, both for riders and for shuttle operators.

Study Technical Committee

A study Technical Committee was created with representation from the Connecticut Department of Transportation (CTDOT), the City of Stamford, CTTransit, and Fusco Management Company (property manager for the Stamford Transportation Center). This committee provides feedback and direction on study concepts, deliverables, and is designed to address technical planning and operating details as well as serve as a resource to the consultant team.



STAMFORD BUS AND SHUTTLE STUDY

Technical Committee members include:

- Anna Bergeron (CTDOT)
- Mike Sanders (CTDOT)
- Lisa Rivers (CTDOT)
- Colleen Kissane (CTDOT)
- Roxane Fromson (CTDOT)
- Molly Parsons (CTDOT)
- Craig Bordiere (CTDOT)
- Josh Benson (City of Stamford)
- Mani Poola (City of Stamford)
- Thomas Madden (City of Stamford)
- Robin Stein (City of Stamford)
- Phil Fry (CTTransit)
- David Lee (CTTransit)
- Jason Falcetta (Fusco)
- Sue Prosi (WestCOG)
- Brian McLaughlin (CTTransit)
- Richard Andreski (CTDOT)

Resources for the Technical Committee include:

- Kate Rattan (CTDOT)
- Kevin Tedesco (CTDOT)
- Vera Karukonda (City of Stamford)
- Gary Sojka (CTDOT)

Technical Committee Meeting #1

October 21, 2015

10:00 AM – 12:00

Location

Western Connecticut Council of Governments (WestCOG)

Stamford Government Center – 3rd Floor

888 Washington Boulevard, Stamford CT 06901

Agenda

- Introductions
- Study update – scope, organization and work to date
- Shuttle services – summary of existing conditions and findings to date
- CTTransit – summary of existing conditions and findings to date
- Stamford Transportation Center (STC) – summary of existing conditions and preliminary improvement ideas
- Case studies
- Next Steps

Presentation Summary

Susan VanBenschoten (FHI) welcomed attendees and reviewed the agenda, study organization, and study progress. She encouraged the attendees to keep an open mind about opportunities for transportation in Stamford. Chris Henry (FHI) described current conditions of the private shuttle operators based upon observations and interviews. He explained the business and customer perspective and described the Stamford Transportation Center (STC) customer experience. Chris Steele (Investment Consulting Associates, a sub-consultant) elaborated on the business perspective,



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and Michael Ahillen (FHI) offered anecdotes from the pop-up outreach at the STC. Dennis Fletcher (Steer Davies Gleave, a sub-consultant) provided an overview of the CTTransit system in Stamford.

Mr. Henry continued with a discussion of existing traffic conditions at the STC, and Drew Draper (FHI) explained some of the traffic operations that have contributed to congestion. Mr. Henry and Ms. VanBenschoten presented preliminary ideas for improving the traffic flow at the STC, as well as other improvements to improve the customer experience and reduce shuttle congestion. The team also identified case studies of other North American cities facing challenges similar to Stamford's that will be considered in this study

Discussion Points

The consultant team led a discussion, primarily focused on shuttle operations and the congestion and operational challenges at the STC. The bullets below summarize the major points of discussion.

Phase A – Private Shuttle Study

- An access fee structure could allow shuttle operators who pay more get priority access to the STC.
- CTDOT has received a specific request for drivers to exit the vehicle while idling to verify that all patrons in the vehicle were using a seatbelt. This raises concerns about added shuttle vehicle dwell at the STC.
- The relative lack of regulation of private shuttles is identified by some as problematic.
- The history of shuttle operations at the STC is traced to a legacy that began in the 1980s when the City of Stamford offered a shuttle for businesses. Businesses have wanted a solution to operational concerns for 25 years but have not been willing to give up their individualized transportation in the past.
- During project interviews, businesses have not expressed complaints about the cost of the shuttles or having to operate the shuttles.
- Business concerns about mixing employees on common shuttles were raised. At least one employer mentioned this as a challenge during interviews. A participant pointed out that employees are sharing a train until they get to Stamford, so sharing a shuttle may not make a difference.
- The project team will look at transportation management associations (TMAs) as a potential option for organizing and managing private shuttles.

Phase B – Broader Urban Transit Study

- CTTransit has not had a comprehensive operational analysis in a long time.
- Buses should be “right-sized” based on occupancy. Occupancy data for bus routes should be presented in a GIS map.

Stamford Transportation Center (STC)

- The proposed transit-oriented development (TOD) could change the recommendations dramatically. The project team will integrate the planning for the TOD as best as possible. In the absence of specific TOD information, the study process will serve to inform the TOD and STC projects with programmatic and other considerations for the facility and surrounding area.
- Aesthetics are an important component of the STC.
- Any changes to the STC and environs should not negatively impact the bicycle and pedestrian environment.



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- Businesses are less concerned about the financial constraints and want to know what can be done to address the congestion at the STC.
- Financial support from the business community for improvements at the STC would facilitate improvements.

Discussion Points

Survey of Study Goals, Vision and Ideas for Improvement

The Stamford Bus and Shuttle Study Technical Committee (TC) completed a questionnaire that will develop study goals, priorities, a vision for the STC and shuttle and bus services, and identify specific improvements. All twelve attendees completed the questionnaire.

The survey results are discussed in greater detail below.

Prioritization of Goals

TC members assigned low, medium, and high priority to each of ten goals. The goal priorities set by the TC attendees in priority order from highest to lowest are:

1. Improve traffic operations in and around the STC
2. Improve safety at the STC at the shuttle boarding area
3. Reduce shuttle-related congestion at the STC
4. Improve pedestrian and bicycle access to the STC
5. Increase transit mode share at the STC
6. Improve rider experience on shuttles and CTTransit system
7. Plan for transit interface at transit-oriented development (TOD)
8. Support economic development by leveraging benefits of transit
9. Implement travel demand management program to encourage transportation options
10. Expand transit to underserved neighborhoods

The activity blended broader transportation goals for Stamford with STC-specific goals. Participants' priorities focused largely on specific goals pertaining to the STC.

Vision for the STC

TC members have an overall vision for the STC that is less congested, more welcoming, and better connected to all transportation modes than the existing STC. In their descriptions, some TC members focused on the physical design of the space. One attendee proposed a “welcoming, intuitive layout,” and another described their vision as a “vibrant multimodal transportation center.” A similar vision considered technological advancements and the “ability to expand for future capacity needs.” One attendee saw the need for improved parking services as well as expanded patron services and amenities. Another respondent hoped the construction of transit-oriented development (TOD) would spur additional improvements around the station, including roadway, pedestrian, and traffic signalization improvements.

Other attendees focused more on the outcomes of an improved STC. Less congestion, the elimination of redundant routes, fuller shuttles, and a shift of users from shuttles to transit were included in some responses.

Specific Ideas for Improving the STC

The ideas for improving the STC ranged from physical improvements to better transit and shuttle coordination. Suggested physical improvements included:



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- bus/ shuttle shelters
- expanded bike parking
- better lighting
- wayfinding
- additional bus platform
- wider exits
- less parking
- cleaner waiting areas
- enhanced bike and pedestrian routes

With respect to better transit and shuttle coordination, two attendees recommended providing a person to direct patrons to their shuttles, similar to taxi starters at airports. Another attendee mentioned the need for “seamless transfer to buses.”

Next Steps

Ms. VanBenschoten outlined the next steps, which include: outstanding data requests, feedback on preliminary concepts, new ideas, a TC meeting before the December holidays, and a meeting to report back to business community.

Technical Committee Meeting #2

December 15, 2015

10:00 a.m. – 2:00 p.m.

Location

Western Connecticut Council of Governments (WestCOG)

Stamford Government Center – 3rd Floor

888 Washington Boulevard, Stamford CT 06901

Agenda

- Introductions
- Study update
- Study purpose
- Study guiding principles
- Goals and objectives
- Break/working lunch
- Discussion of shuttle scenarios
- Next steps

Presentation Overview

After introductions, Susan VanBenschoten (FHI) welcomed attendees and reviewed the agenda, problem statement, and study objectives. She reminded the meeting participants of the differing perspectives and reviewed the study’s four guiding principles. Ms. VanBenschoten and Mr. Michael Ahillen (FHI) described the goals, objectives and results of the engagement activity undertaken at the first Technical Committee (TC) meeting on October 21, 2015.

The first engagement activity of the second TC meeting was to set priorities from four perspectives: Stamford commuters; employers/property managers; residents; and, visitors. TC members identified the five highest transportation priorities for each perspective.



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The second engagement activity was to establish priorities for the 12 project goals. Each TC member was given 12 dots to assign to priority goals TC members from CTDOT, CTTransit, and Fusco posted blue dots; employees of the City of Stamford and WestCOG posted green dots. The results of the engagement activities are summarized in following sections.

An important component of the study scope is development of shuttle scenarios that will be presented to the business community for input and acceptance. The proposed shuttle scenarios are organized by FHI into three dimensions: service; facilities; and, regulatory. Chris Henry (FHI) summarized the range of available options for each of the dimensions. Mr. Henry then described three service planning approaches ranging from full shuttle consolidation to partial consolidation and ad hoc partnerships and the resource model the project team had developed. The model considers how service parameters affect operating costs and congestion at the Stamford Transportation Center (STC). Mr. Henry concluded the presentation with a discussion of next steps and thanked the TC for their participation.

Discussion Points

The consultant team led discussions throughout the presentation. The bullets below summarize the major points of the discussion.

Goals and Objectives

- There is agreement on the need to improve traffic operations.
- Uber has marketed on-demand services to businesses. Ride-hailing services could be an off-peak solution for businesses needing to move people, but the services will not replace shuttles. There currently is no designated area for these services to drop off, and the lack of regulation of ride-hailing services has frustrated cab companies.
- There is agreement that the current configuration of the STC is at capacity and the ability to effectively accommodate current multi-modal users and forecast demand is a concern.
- STC accessibility should consider changing demographics and demand; aging population; persons with disabilities; travelers with luggage; millennials without cars; increased bicycle and pedestrian use; and ride-hailing services.

Shuttle Scenario Development Considerations

The TC members raised a number of considerations regarding shuttle scenarios and approaching businesses. First, one member noted the need to consider hours of operation when facilitating coordination among independent businesses. When asked about entry requirements for shuttles entering the loading area, Jason Falcetta (Fusco) said there were none. He said there have been attempts to limit the size of vehicles, but there is no mechanism to prevent them from entering the facility. Another TC member suggested developing rules and charging for premium location or providing a benefit for consolidation was mentioned. There was another suggestion of a fee schedule that provides a reduced fee for more distant boarding areas.

Other TC members made comments about reaching out to shuttle riders. One recommended giving commuters a paper survey to fill out rather than an e-survey because of the historically higher response rate for paper surveys. The e-survey should include explicit questions about what the commuters are willing to tolerate (additional stops, longer travel times, etc.).

The conversation concluded with a suggestion that the project team approach UCONN first. As shuttle owners, UCONN should have a financial incentive to participate in consolidation or use CTTransit (CT State Universities have U-Pass).



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Engagement Activity Summary

Goals Exercise

The TC divided into four groups to consider the transportation priorities of Stamford commuters, employers/property managers, residents, and visitors. After the small group discussions, each group reported back.

- *Stamford Commuter.* This groups said that quick and safe access, reliable travel time, information availability (e.g., smart phone apps for rail, bus, and car parking), intuitive navigation, and improved automobile and pedestrian flow were the highest priorities.
- *Employer or Property Managers.* This group explained the importance of direct service from the employment center to the STC and back. They noted the need for a direct, convenient link between the train platform and the shuttle boarding area. They also said reduced congestion, safer shuttle boarding areas, and improved functionality at the STC were priorities.
- *Stamford Resident.* This group noted that Stamford residents have a diversity of opinions about transportation and that older residents have differing viewpoints from young adults. They considered these opinions and expressed a need for abundant commuter parking, minimum traffic congestion, and easy access to the STC (via Uber and shuttles as well as bicycle and pedestrian access).
- *Visitor to Stamford.* This group underscored the need for improved wayfinding in town and at the STC, including a map of the neighborhood and audio/visual announcements. Other priorities included walkability, convenient parking, and more accessible information. Marketing that emphasized the ease of using transit was also mentioned.

Goal Priority Setting Exercise

TC members placed twelve dots on their priority. More than one dot could be placed on a goal, and new goals could be added. The goals and the number of dots are as follows:

- Improve traffic operations in and around Stamford Transportation Center (STC) – 32
- Improve safety at the STC at the shuttle boarding area – 18
- Reduce shuttle-related congestion at the STC – 18
- Improve pedestrian and bicycle access to the STC – 15
- Support economic development by leveraging benefits of transit – 15
- Plan for transit interface at transit-oriented development (TOD) – 13
- Increase transit mode share at the STC – 13
- Implement travel demand management program to encourage transportation options – 9
- Increase mobility within the City of Stamford – 7
- Improve shuttle access to and from STC with respect to delay – 7
- Improve rider experience on shuttles and CTTransit system – 5
- Expand transit to underserved or growing areas – 4

A 13th goal was added for seniors and functional needs.

Next Steps

Next steps include:

- Developing a follow-up email asking for feedback



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- Following up with Mr. Sanders regarding the wordsmithing of the survey.
- Pursue partnerships with Google to incorporate the Stamford bus network in Google Maps
- Develop a “wish list” for STC that could help inform the TOD (blank slate discussion; what would ideal facility look like?)

Meeting Attendees

- Michael Sanders, CTDOT
- Anna Bergeron, CTDOT
- Roxane Fromson, CTDOT
- Molly Parsons, CTDOT
- Sara Radacsi, CTDOT
- Joshua Benson, City of Stamford
- Robin Stein, City of Stamford
- Thomas Madden, City of Stamford
- Norman Cole, City of Stamford
- David Lee, CTTransit
- Brian McLaughlin, CTTransit
- Jason Falcetta, Fusco
- Sue Prosi, WestCOG
- Susan VanBenschoten, FHI
- Chris Henry, FHI
- Michael Ahillen, FHI

Other Outreach to Support the Shuttle Study

Pop-Up Public Meeting

Between 7:00 and 9:30 a.m. on July 22, 2015, Fitzgerald & Halliday (FHI) staff spoke with 63 commuters waiting for private shuttle buses at the Stamford Transportation Center (STC). FHI asked commuters the following questions:

- Where are you commuting from and where is your work site?
- If this shuttle didn't exist, how would you get to work?
- Did you know this shuttle existed when you started working for this employer?
- Did the availability of shuttle service influence your decision to work at this location?
- What time do you normally catch this shuttle in the morning?
- How do you get to/from work during off-peak hours?
- Does your employer offer emergency rides home (or to the STC)?
- What improvements would you like to see at the STC shuttle boarding area?

For shuttle riders from residential developments, FHI asked the following questions:

- Where are you coming from and where are you commuting/traveling to?
- Did you know about the shuttle service before moving to your current home?
- If the shuttle didn't exist, how would you get from home to the STC?
- Was the shuttle an important factor in deciding to live where you do?

Because of the limited time frames for asking the respondents questions, not all respondents could provide answers to all questions.

Origins and Destinations

Sixteen respondents stated their origin was New York City, and these commuters were concentrated in the latter half of the survey time frame. Commuters also came from other cities in Connecticut, including New Haven, Bridgeport, Milford, and Norwalk. Three commuters said they live near the STC and walked to the station to ride a shuttle.



Destinations of respondents were primarily places of employment. Destinations with three or more respondents included Starwood Hotels, Synchrony, and 1600 Summer Street. Other destinations included Cummings, Deloitte, Stamford Plaza, Gartner, Washington Boulevard, NBC Sports, Landmark Square, High Ridge Road, Comcast, First Stamford Place, Phillips Summer, Ennead, WestCOG, Harbor Point, and the Who Wants to Be a Millionaire studio.

Alternative Transportation

Convenience and price were frequently cited as the reasons people liked taking the shuttles. Many of the commuters said driving is a feasible option for them, but traffic congestion makes transit and shuttles a more desirable option.

When asked how they would reach their destination were the shuttle not available, many respondents could not think of another way. Many said they would walk to work, but people who had more than a twenty-minute walk to their place of employment said they would opt for taxis or ride-hailing services (e.g., Uber).

CTTransit buses were an option for a handful of respondents, but most did not consider them an attractive alternative because of added commute time or limited comfort level with the local bus system.

Influence of Shuttles on Employment

Respondents seemed generally happy with the shuttle services, and most considered them an important perk for employment. In many cases, the shuttle affected the employment decisions of respondents. Of the 23 respondents who answered the question, 17 stated shuttle service was critical to accepting the job offer. Only six respondents said the shuttle did not play a role in determining the employment outcome.

One shuttle user said that she did not like the policy that prevented more than one shuttle from any business in the STC at the same time. She said not all employees can fit onto the same shuttle and sometimes she begins her day arguing with her colleagues over seats. If she does not secure a seat on the shuttle, she has to wait for the next shuttle, which can take additional time. Other respondents mentioned that the traffic controllers do not provide much help, and some wished for a transportation service with more consistent arrivals.

Emergency Rides Home

Emergency rides home are not perks provided by most employers. Only one respondent stated that her employer offers emergency rides home. Other respondents said their company offered shuttles midday, but the shuttles often need to be called. Taxis and ride-hailing services were suggested as the alternate ways people would reach the STC midday.

Challenges and Opportunities at the STC

Many respondents expressed concern about the shuttles crowding the station area. Loading shuttles frequently obscure views of shuttles in other lanes. Moreover, some respondents noted that they feel unsafe going to shuttles during peak commute times, especially when they have to cross more than one lane to reach their shuttle. One respondent said that he made his commute earlier because it's too chaotic during the peak commute hour.

Respondents frequently acknowledged that the station area needed improvements because of the congestion and poor visibility. One respondent suggested a screen announcing the arrivals of



different shuttles. Another suggested creating waiting area zones based on the type and size of the shuttles so that the riders knew where to look. A few other respondents suggested reducing the number of lanes because four lanes were too many to see all the shuttles.

Other respondents mentioned the addition of station amenities. Respondents said seating would be helpful. Another suggested covering the area between the station exit and the overpass so that passengers would not get wet when it rained. A food and beverage cart was another amenity that was mentioned.

Website

FHI developed a project website (<http://stamfordbusandshuttle.com>) so the public and key stakeholder groups can stay informed and provide input on project updates and news. The website has been designed to incorporate the overall project branding and to ensure users are able to navigate the contents clearly and quickly. The content includes the following tabs:

- Home page
 - General introduction to the project with an emphasis on how it relates to the City of Stamford
 - Recent project material, such as an infographic and a video that illustrate existing conditions for the shuttle system (Figure 38), are also accessible via the homepage
- About
 - Includes a description of the project purpose, project approach, and the project team
- Public Involvement
 - Includes information on how the public can get involved to provide input as well as information about the outreach efforts that have occurred thus far
 - Includes a questionnaire for shuttle providers to download and complete
- Project Resources
 - Includes listing and links for transportation resources specific to the City of Stamford
- Project Activities
 - Includes a list of the tasks and activities that are ongoing or that have been accomplished thus far
- Contact
 - Includes an opportunity to sign up for the project's mailing list and contact information for general project inquiries
- Log in
 - A password protected section of the website has been incorporated for potential future use.

FHI will continue to update the website as the project proceeds.

Figure 37 Stamford Bus and Shuttle Study Homepage

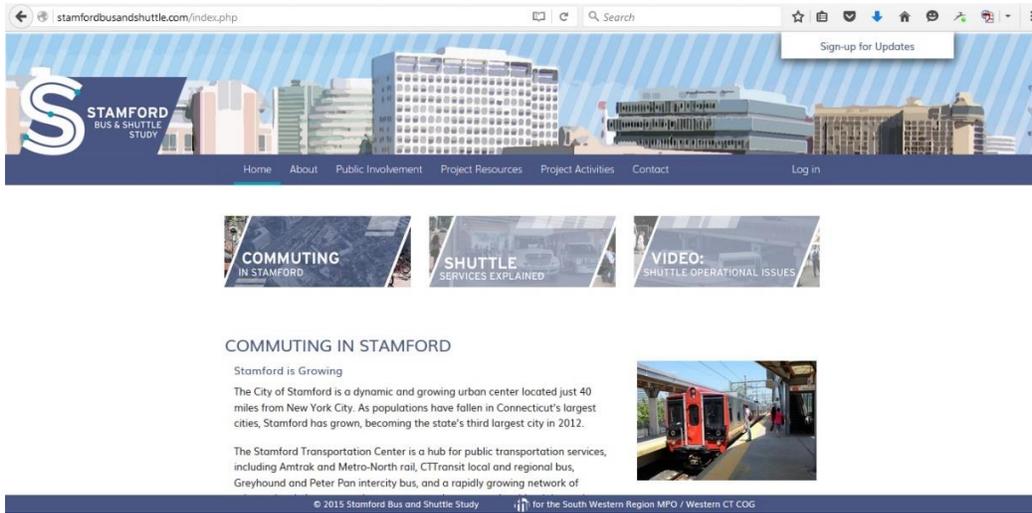


Figure 38 Video of Shuttle Operational Issues





APPENDIX B: SHUTTLE DESTINATIONS

The following shuttle destinations were identified from field observation at the STC in July 2015:

- 1 Atlantic
- 100 Washington Boulevard
- 1600 Summer Street
- 700-850 Harbor Square
- 88 Hamilton Americas
- 9 West
- 1351 & Tully Center
- 1055 & 1010 Washington Boulevard
- 1700 Limo Solutions
- Affinion Group
- Ashford Express (3001 Stamford Square)
- Avalon Apartments at Grenbrook Place
- BLT Stamford Landing
- Canterbury Green
- Carolee Jewelry
- The Classic Condo
- Clearwater
- Commons Park
- Cytec
- Daymon Worldwide
- Deloitte
- Edgehill
- Empire State Realty Trust
- Freepoint
- Gartner
- GE 1, 2 & 3
- GenRe
- Glenview House
- Hampton Inn
- Harbor Square
- High Ridge Road
- Holiday Inn Express
- Millionaire
- NBC Sports
- Nestle
- Point 72
- Primetime Global
- Reckson-Landmark Square
- Sheraton
- Shippan Landing
- Soundview Plaza
- Southview Plaza
- Stamford Hospital
- Stamford Landing
- Stamford Plaza
- Starwood Hotels
- Synchrony
- TGM Anchor Point
- Trump Parc
- Tully Center
- Washington Boulevard
- Wescott Shuttle
- WWE
- XL Seaview
- Yale & Towne



APPENDIX C: OTHER TRANSPORTATION SERVICES

Shuttles, trains, and CTTransit buses are key components to the overall transportation network. Residents, employees, and visitors in Stamford have a few other motorized options. This section outlines the taxis and ride-hailing services currently offered in Stamford.

Taxis and Livery Services

Licensing, operation, and fares charged by taxis are regulated by State of Connecticut. People arriving to Stamford by train have easy access to taxis. Taxis are located in a dedicated space on Station Place, south of station platforms at the STC. As shown in Table 14, there are seven taxis/limo services based out of Stamford, and an additional nine based out of Greenwich and Darien.

Table 14 Taxi Companies in Stamford

#	Taxi Company	Address	Phone
1	Stamford Taxi	80 Harvard Ave Stamford, CT 06902	(203) 325-2611
2	USA Taxi and Limo	1069 E Main St Stamford, CT 06902	(203) 667-8926
3	Eveready Transportation	130 Lenox Ave Stamford, CT 06906	(203) 967-3633
4	Stamford Yellow Cab	130 Lenox Ave Ste 32 Stamford, CT 06906	(203) 967-3633
5	Independent Taxi	1253 High Ridge Rd Stamford, CT 06903	(203) 968-6800
6	All Quest Limousine	Serving Stamford & Surrounding Area	(203) 570-1111
7	Five Diamond Limousine SVC	20 Wallace St Stamford, CT 06902	(203) 975-8581
7 total taxis based out of Stamford			
8	Greenwich Taxi, Inc.	1 Greenwich Plaza Greenwich, CT 06830	(203) 869-6000
9	Lloyd's Taxi of Darien	33 West Ave Darien, CT 06820	(203) 655-0190
10	Eveready Cab of Greenwich	1 Squab Ln Darien, CT 06820	(203) 869-1700
11	Standard Taxi	781 North St Greenwich, CT 06831	(203) 629-9700
12	Darien Taxi	Darien Train Station Darien, CT 06820	(203) 655-2266
13	A-1 Cab	1 Squab Ln Darien, CT 06820	(203) 655-0016

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14	Synergy Limousine	Serving Greenwich and the Surrounding Area	(203) 987-8000
15	You-Ride-I-Drive	903 King St Greenwich, CT 06831	(212) 470-8002
16	Federici Vito Bill PC	49 Lake Ave Greenwich, CT 06830	(203) 661-5555
16 total taxis based out of Stamford, Darien, and Greenwich			

Ride-Hailing Mobile Applications and Ride-Sharing Services

Ride-Hailing Mobile Applications (Transportation Networking Companies)

Whereas Lyft was previously in operation in Connecticut, Uber (www.uber.com) is the only ride-hailing service currently operating in Stamford and southwest Connecticut. The service connects customers with drivers to provide taxi-like transportation services via a mobile application.

Uber has considerable coverage in Fairfield County and reports the following operating statistics (as of fall 2015):

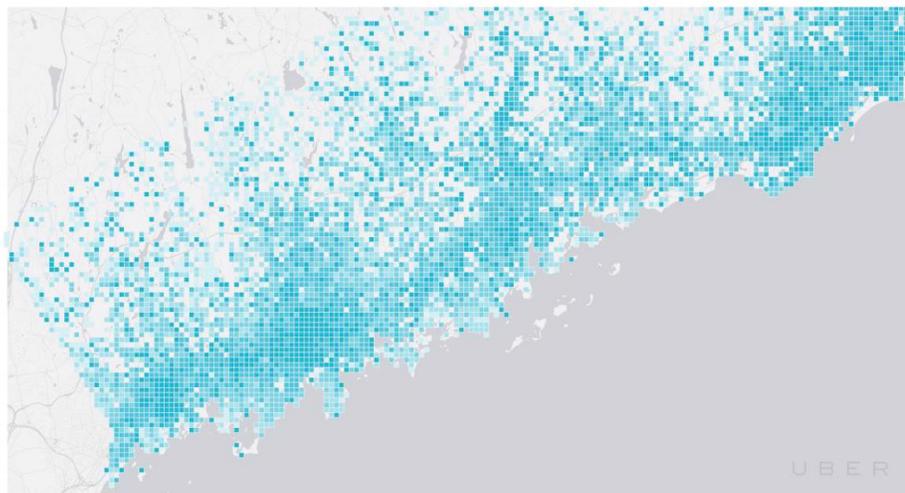
Figure 39 Wait Times fo Uber Pick-up Service in Fairfield County

UBER OFFERS RELIABLE WAIT TIMES THROUGHOUT THE COUNTY

FAIRFIELD COUNTY, CONNECTICUT

The color of each square represents the average wait time for Uber pickups in that area.

- Under 3 minutes
- Under 5 minutes
- Under 7 minutes
- Under 9 minutes
- Over 9 minutes



Data from the Fairfield County and surrounding areas for the month of October 2015. Completed trips only.

UBER

Source: Uber

Uber does not have a designated pick-up or drop-off area at the STC, and drivers are not permitted to use the taxi queue on Station Place. Many Uber drivers park in the short-term parking spaces on the south side of Station Place as they coordinate with customers for pick-ups. Uber indicated in a meeting with the study team that a designated pick-up and drop-off location would make its operations more efficient and user-friendly at the STC.

Uber reports average wait times of 1 minute and 53 seconds for customers at the STC. Average trip lengths from the STC are less than four miles, but the majority of trips (65%) are less than two miles. The average fare for trips less than two miles is \$6.71.



Other Ride Sharing Services

Carpool World (www.carpoolworld.com) and Tripda (www.tripda.com) are two ride sharing services offered in Stamford.

Car Rental

Two car rental services are located on-site at the STC:

- Avis Car Rental (1 Station Place)
- Hertz Rent a Car (1 Station Place)

Additionally, a number of car rental options exist throughout Stamford, including:

- Enterprise Rent-A-Car (745 East Main Street)
- Toyota of Stamford Rent a Car (59 Myrtle Avenue)
- Budget Car Rental (197 N. State Street)
- Alamo Rent a Car (700 East Main Street)
- Enterprise Rent-A-Car (2701 Summer Street)
- National Car Rental (700 East Main Street Sheraton)
- Dollar Rent a Car (Hampton Inn)

APPENDIX D: SCENARIO METHODOLOGY

Shuttle Consolidation Scenarios

Objectives

The development of shuttle consolidation scenarios was based on several core objectives stemming from operational constraints at the STC, feedback from shuttle riders and the business community, and overall project goals. These objectives, vetted with the project Technical Committee, form the basis for evaluation criteria and metrics. They inform the assessment of viability of any scenarios under discussion for purposes of screening the large number of possible consolidation scenarios to allow for focus on the scenarios that best meet these objectives. Primary consolidation objectives include:

- Reduce vehicular congestion and improved operations at the STC
- Reduce activity and negative consequences related to privately-operated shuttle services
- Design services suitable for, and attractive to, the Stamford business community
- Design services suitable for, and attractive to, travelers to, from, and within Stamford
- Reduce overall operating costs and/or costs to individual businesses providing shuttles such that there is adequate incentive for private sector participation in a consolidated system

The first step in this analysis was to determine what level of consolidation was both feasible and beneficial to the overall objectives. Scenarios are intended to assess the degree to which consolidation of individually-operated shuttle services could alleviate congestion and operational challenges at the STC and in downtown Stamford, while avoiding negative impacts to Stamford businesses and commuters and other travelers to these locations. Key considerations include the Stamford business community's need to attract talented employees, the facilitation of access to and from business sites (primarily during the morning and evening commutes), and contributions to the overall economic health of Stamford and the region.

The exercise determines the feasibility of shuttle service consolidation and the thresholds necessary to ensure that any such model is attractive to the businesses it would serve. The service scenarios, business groups, and operating approaches are illustrative and theoretical, yet based on Stamford-specific data inputs and transit planning principles. The approach that follows represents an illustration and does not yet represent a specific service plan for implementation. Such a service plan would be developed from the most promising scenarios and fine-tuned, then continually adjusted, based on the actual participation of providers in some type of consolidated system.

Scenario Development and Methodology

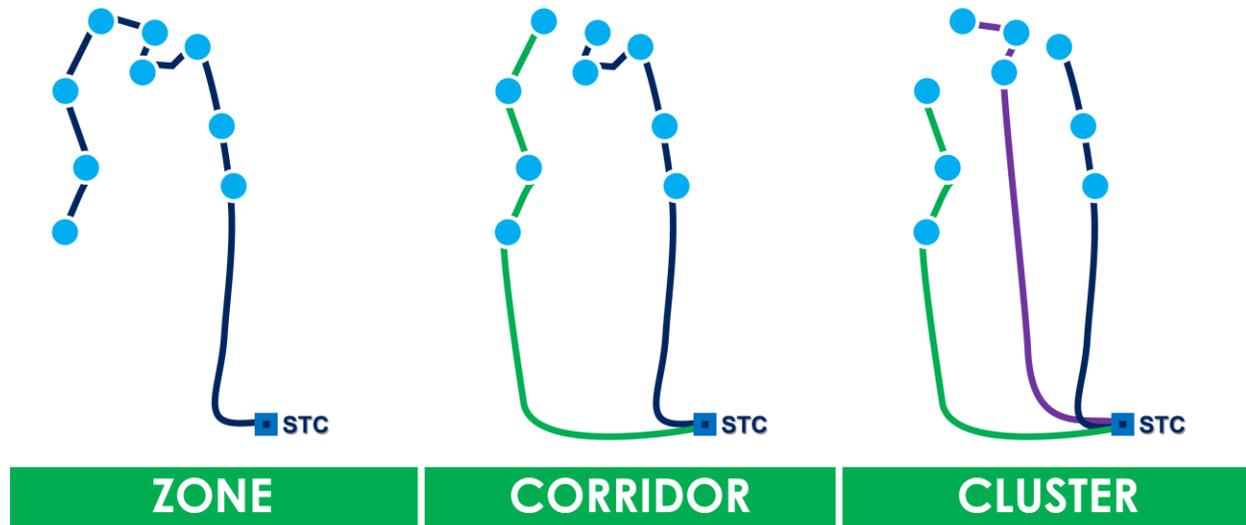
The shuttle service scenarios were developed to determine if a fully or partially consolidated shuttle service could improve safety and reduce vehicle congestion at the STC while offering comparably attractive service at a reasonable cost to shuttle providers.

- **Full consolidation** is defined as the inclusion of all current shuttle providers, citywide.
- **Partial consolidation** is defined as any potential subsets of current shuttle providers, across the city or in specific geographic areas (e.g., Downtown, edge of downtown, suburban).

Three service planning approaches were developed to consider ways of reaching all existing shuttle destinations in Stamford and to assess the cost and service level impacts of the consolidated shuttle service options. The conceptual approaches are defined as follows:

- **Zone:** provides a single shuttle route for all employer destinations within a defined area. Most zones in Stamford have six to eight employer destinations.
- **Corridor:** provides more shuttle routes for more direct service to cover the same area as the zone approach. Under the corridor approach, the shuttle routes serve three to five employer destinations along any one route in most cases.
- **Cluster:** adds even more shuttle routes and even more direct service, typically serving two to four employer destinations.

Figure 40 Conceptual Approaches for Shuttles Service Scenarios



Because the zone approach results in the greatest reduction in shuttles, the cost for zone approach is the lowest when other factors such as vehicle frequency are held constant between approaches. The corridor approach requires more shuttles to cover the same area, so the cost increases. The additional routes added for the cluster approach make this scenario the most expensive in most cases, but it also offers the most appealing service from a customer perspective (i.e., directness and travel time).

Model Assumptions and Limitations

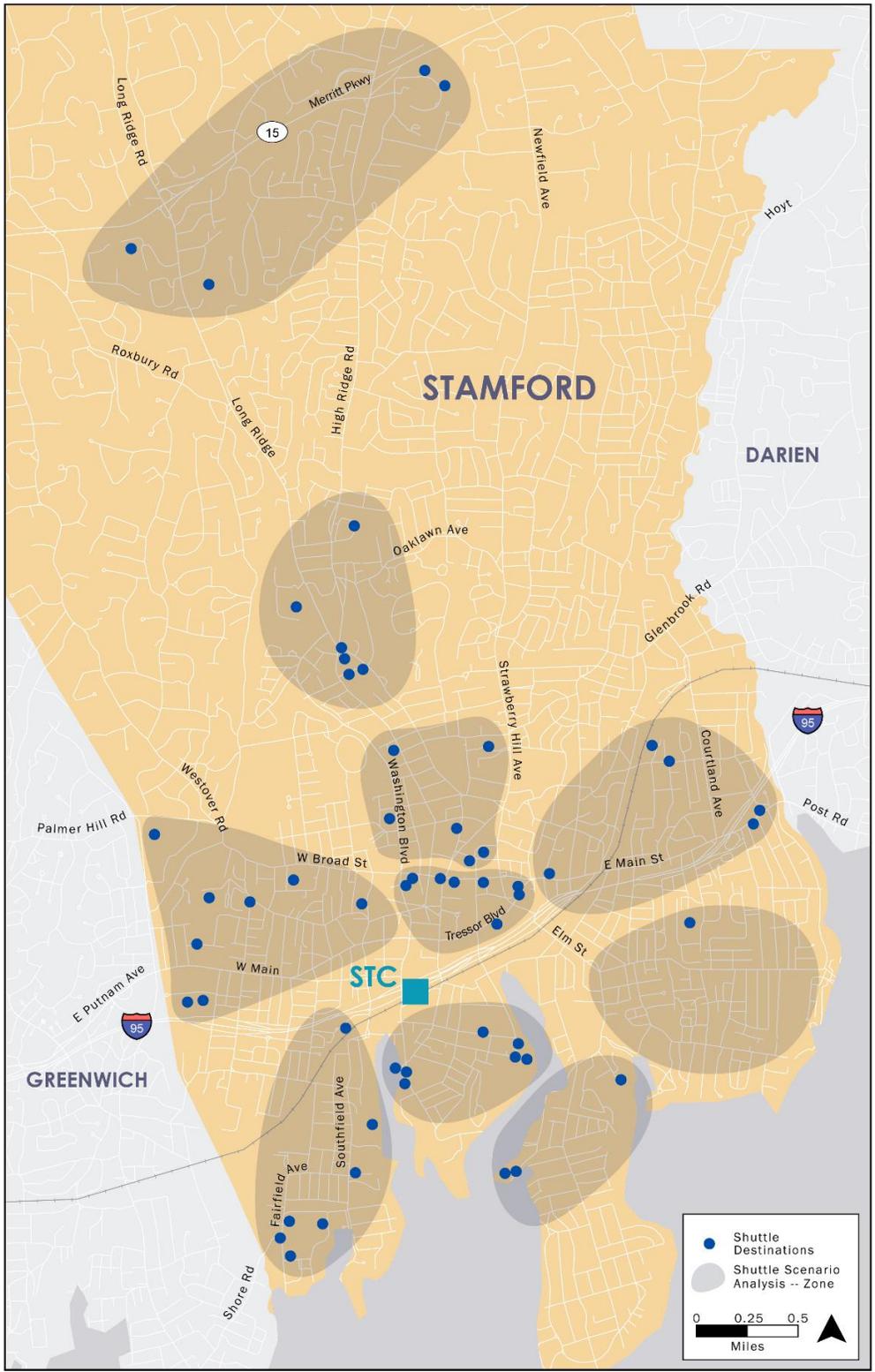
The study team developed a Shuttle Consolidation Model to test the wide variety of possible shuttle consolidation alternatives and to provide a mechanism to easily test the sensitivity of modifying certain variables such as: frequency, employers, routes, etc. The model will also be a useful tool for development of a “real and dynamic” service plan once the level of actual participation is determined.

For the initial feasibility and screening analysis, the model is a simplification of shuttle operations and is based upon a number of assumptions and limitations for the purposes of a first-cut analysis. The model does not differentiate between types of shuttle providers; employers, commercial properties, residential properties, educational facilities, and hotels all offer shuttles. The needs of these shuttle providers may differ and could affect hours of operation, headways, and other operational concerns. In addition, the model does not account for the arrival of trains at the STC. Today, shuttles are typically scheduled to meet specific train arrival or departure times. The model assumes that shuttles would depart at defined times to be convenient, reliable, and expand options for shuttle users at the STC.

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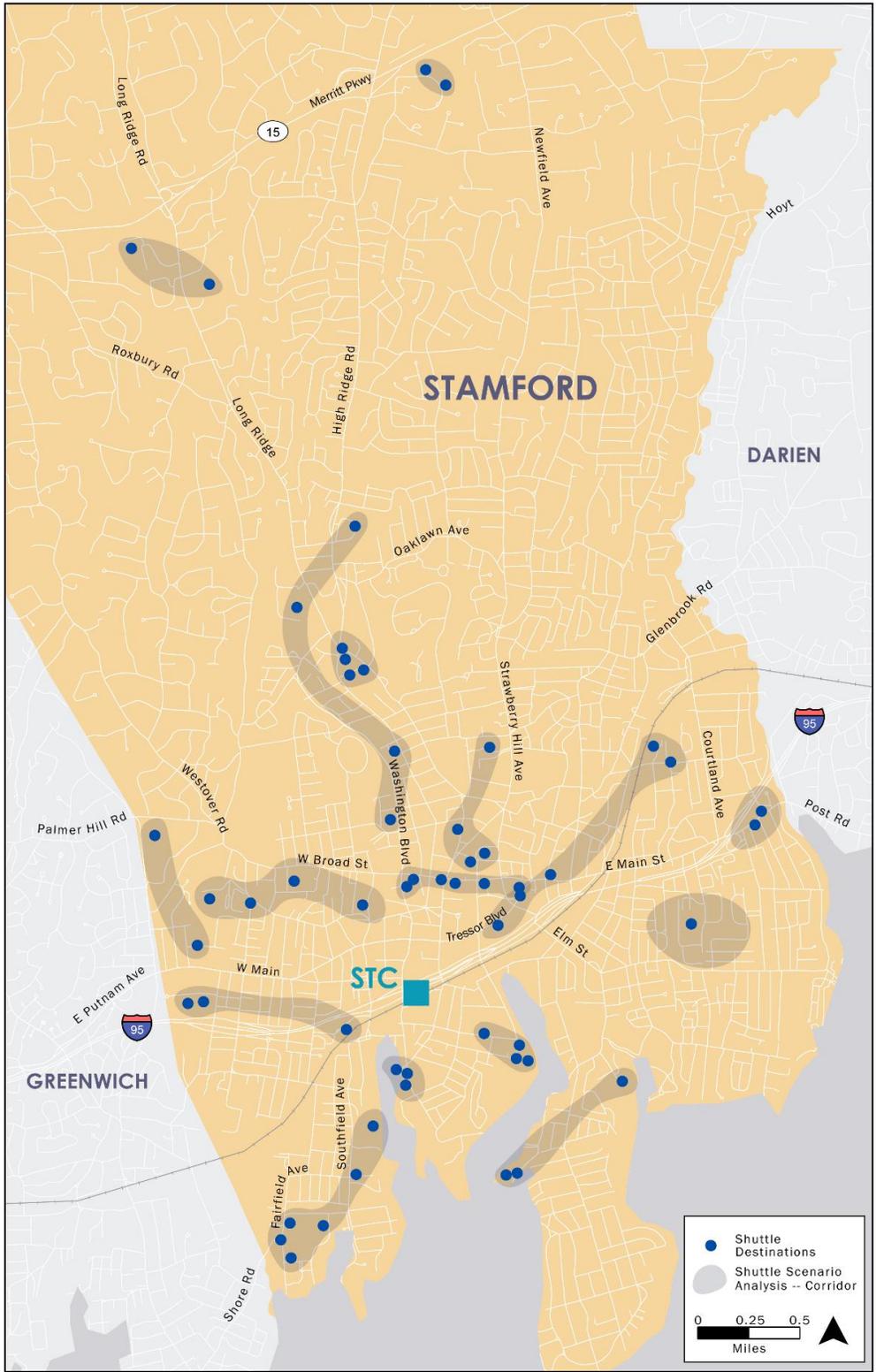
Figure 41 Shuttle Scenario -- Zone Approach



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Figure 42 Shuttle Scenario -- Corridor Approach



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Figure 43 Shuttle Scenario - Cluster Approach

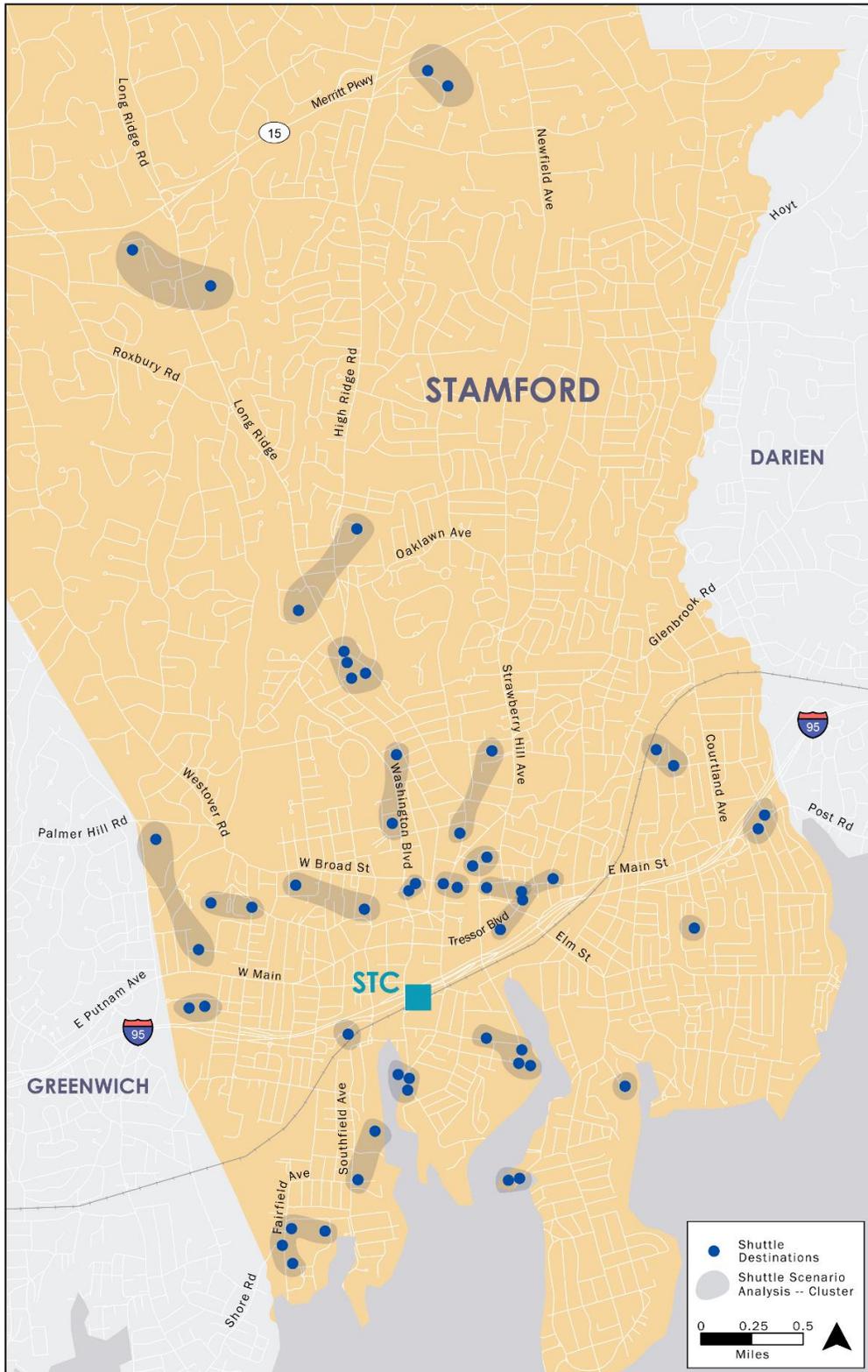
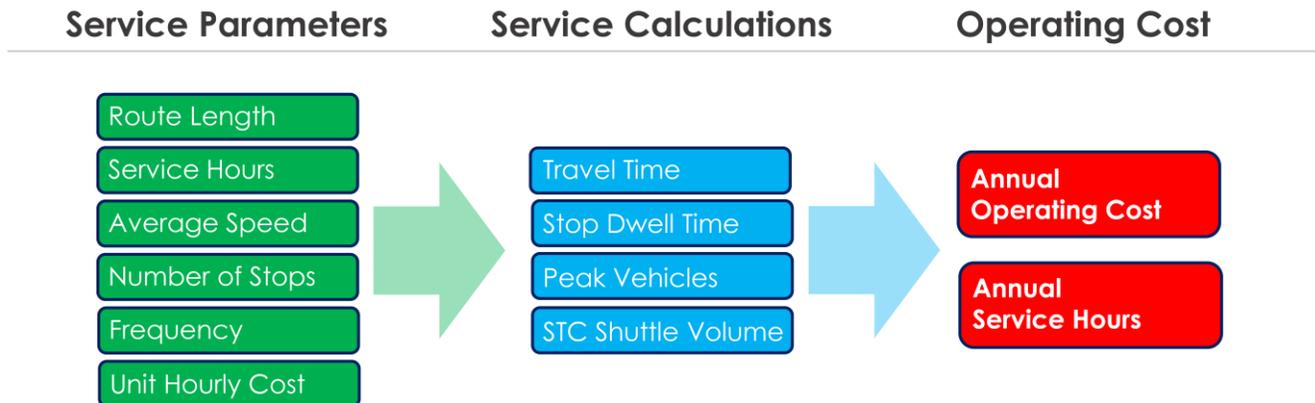


Figure 44 Components of the Shuttle Scenario Model



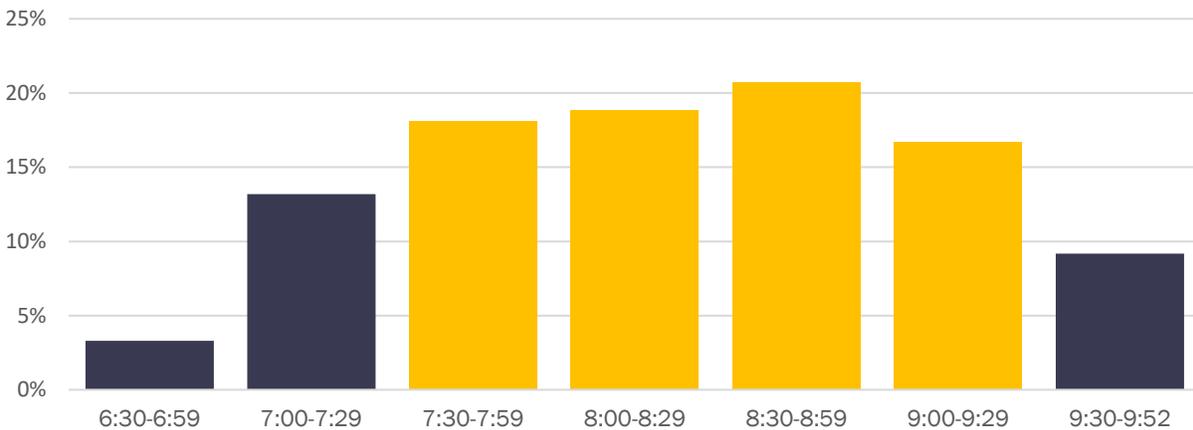
Shuttle Service Parameters

The preliminary shuttle scenario model considers the following service parameters:

- **Route Length.** The inbound and outbound route lengths were measured using Google Earth. The shuttle was assumed to take the most direct route to the final destination.
- **Service Hours.** Current shuttle providers typically offer service only during the morning and afternoon peak for roughly eight hours a day. The model assumes eight hours on weekdays with no weekend service.
- **Average Speed.** Average speed data were collected during the AM peak on Wednesday, February 3, 2016 using Google Maps to consider a typical day's traffic and travel speeds. The speed was calculated by taking the distance and duration of the trip, the latter of which considers how the actual travel times are affected by morning congestion. From these data, miles per hour was calculated for all zone, corridor, and cluster routes.
- **Number of Stops.** The stops (employer destinations) are grouped together based on their geographic locations. The number of stops for a route depend on the scenario, with zone having the most stops followed by corridor, then cluster.
- **Unit Hourly Cost.** The cost of \$75 per hour per vehicle is assumed for all scenarios. To be conservative and account for cost increases in the coming years, this figure is a high estimate of the average unit hourly cost paid to shuttle contractors by employers today.
- **Frequency.** The frequency is the desired headway of the shuttles. The model considers two measures of frequency:
 - Average Frequency. The frequency stays the same across all service hours.
 - Peak of Peak Frequency. The purpose of this metric was to gain a more accurate representation of existing shuttle departure patterns. Few shuttles depart before 7:00 a.m. currently, so it would not make sense for the shuttles to have the same frequency before 7:00 a.m. as after. The model mirrors the existing pattern of shuttle departures, as observed during the study team's July 2015 data collection, with a few modifications. For the analysis, the frequency remains the same during the peak of peak hours and decreases during the shoulder periods (highlights the peak of peak periods in yellow.) For each proposed peak of peak frequency, the three shoulder periods were calculated relative to the 7:30-7:59 base period. For instance, the 7:00-7:29 period has about 73% of the departures as 7:30-7:59. If there are three departures during the 7:30-7:59 period (10 minute headways), the 7:00-7:29 period would have just over two departures, on average ($3.00 * 0.73 = 2.19$).



Figure 45 Percent of Total AM Peak Departures from STC by Time Period (July 2015)



Service Calculations

Service calculations included the following:

- **Travel Time.** The travel time was calculated by taking the trip length (miles) and dividing it by the average speed (mph).
- **Stop Dwell Time.** The dwell time was assumed to be one minute per stop.
- **Peak Vehicles.** This metric illustrates how many vehicles would be needed to sustain the service frequency. To calculate the peak vehicles, the cycle time (which includes inbound and outbound time as well as stop dwell time) was divided by the frequency. The result was then rounded up to the nearest whole number.
- **STC Shuttle Volume.** The average number of shuttle departures at the STC throughout the day and for the AM peak was calculated by taking the hourly frequency and multiplying it by the weekday service hours. Peak of peak vehicle volumes are also possible.

Operating Cost

The results of the service calculations determined the operating costs in terms of dollars and service hours.

- **Annual Service Hours.** The annual service hours are the sum of the annual weekday, Saturday, and Sunday service hours. For the existing analysis, only weekday service hours are assumed. The model, however, can be updated to include weekend service hours as well.
- **Annual Operating Costs.** To calculate annual operating costs, the annual service hours were multiplied by the hourly unit operating cost (as noted above, assumed to be \$75 per hour) and the peak vehicles. The results for each of the zones/corridors/clusters were summarized for grand totals.

The model informs various components of shuttle scenario options, most notably cost, frequency, and vehicle congestion at the STC, summarized in the Findings below. Additional analysis was conducted to consider the potential impacts on travel times. The intent was to compare current travel times to the maximum amount of time a rider might spend for each of the proposed scenario approaches. To conduct this analysis, the travel times were collected for each existing shuttle destination using Google Maps from 9:00 a.m. to 9:20 a.m. on Monday, February 8, 2016. The results were then compared with an estimated travel time from the STC to the end point of each of the proposed services (zone, corridor, and cluster).



The trip duration analysis has two important considerations. First, the analysis does not consider the trip durations of shuttle riders alighting at intermittent stops (employers located between the final stop and the STC). The maximum trip duration metric should be viewed as a worst case scenario for trip length. Second, the analysis does not consider the amount of time shuttle riders currently wait for their shuttle at the STC. Ideally, consolidated shuttle service would be more frequent, reducing the time riders spend waiting. With these considerations in mind, the trip duration analysis provides insight into one more important factor when weighing the outcomes of the model.

Consolidation Scenario Results

The results of the analysis suggest that full or partial consolidation of shuttle services could offer frequent service and reduced congestion at the STC. In many cases, services under consolidation scenarios would cost less than what employers pay for shuttles, particularly in areas of greater employment density such as Downtown.

Full Consolidation

The following figure presents a summary of results for a fully consolidated, citywide service. For 10-20 minute frequencies, the zone approach offers the greatest cost savings and reductions in AM vehicle departures, i.e., an estimated 93-186 shuttle departures relative to the 425 observed today. Although the corridor approach reduces morning vehicle departures for 10-20 minute frequencies, the cost rises above the existing cost estimates for 10 minute frequencies.

The model provides evidence that 15-20 minute frequencies may result in cost savings as well as reduced vehicle departures. The cluster approach yields similar results, although the cost savings for 15 minute frequencies are minimal. With 20 minute frequencies, the cluster approach is still a viable option. The business community would collectively see a reduction in shuttle costs from \$6.7 million to \$5.3 million, a 20 percent savings citywide, and the total number of shuttles departing the STC during the AM peak would be nearly halved from 425 to 232.

Table 15 Summary of Shuttle Service Scenarios

	PEAK OF PEAK FREQUENCY (MIN.)	ZONE	CORRIDOR	CLUSTER	EXISTING
CITYWIDE	10	\$ 5,355,000	\$ 7,191,000	\$ 9,180,000	
TOTAL	15	\$ 3,978,000	\$ 5,355,000	\$ 6,579,000	\$ 6,746,086
ANNUAL COST	20	\$ 3,060,000	\$ 4,284,000	\$ 5,355,000	
AM PEAK	10	186	297	464	
VEHICLE	15	124	198	309	425
DEPARTURES	20	93	149	232	

The other key factor is the convenience for passengers and, by extension, the attractiveness to businesses that currently run shuttles. Although the zone approach offers the greatest benefit from a cost and congestion perspective, customers would experience increased travel time as a result of additional stops and, for some, less direct vehicle routing. Examples of travel time impacts to specific areas are described below.

Partial Consolidation

In addition to full consolidation, the analysis considers the opportunities and constraints for subsets of the larger system (partial consolidation). Three areas of the city (Downtown, West Side, and Long Ridge) were examined as typologies to understand how the relationship between business location

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density and distance from the STC affect the potential for consolidating service. Note that the full consolidation analysis above estimated the cumulative, citywide cost of running all shuttles. The partial consolidation analysis estimates the cost per employer, a metric which better informs the decisions of individual businesses.

Downtown

There are currently eight shuttle destinations in Downtown, accounting for 99 shuttle departures from the STC during the AM peak period, each traveling directly to its destination. If all of these businesses opted in to a consolidated system, one shuttle would stop at each of these destinations for the zone approach. The corridor approach would offer two routes to cover the same eight destinations, thereby requiring fewer stops for shuttle riders, and the cluster approach offers four routes, so shuttle riders would only need to make at maximum one stop before their arrival.

The model considers the time difference between existing shuttle operations and the three approaches. Currently, shuttle riders traveling to Downtown destinations spend three to six minutes on the shuttle (once out of the STC). Under the zone approach, passengers riding to the last destination may spend up to 17 minutes in the shuttle under the zone approach. For the corridor approach, the maximum time in the shuttle would increase to 13 minutes, and for the cluster approach the maximum time would increase only to eight minutes. From the user perspective, the zone approach would be the least desirable and the cluster approach would be the most desirable.

Table 16 Summary of Shuttle Service Scenarios (Downtown)

	PEAK OF PEAK FREQUENCY (MIN.)	ZONE	CORRIDOR	CLUSTER	EXISTING
TOTAL ANNUAL COST/EMPLOYER	10	\$ 57,375	\$ 76,500	\$ 153,000	
	15	\$ 38,250	\$ 57,375	\$ 76,500	\$ 114,750
	20	\$ 38,250	\$ 38,250	\$ 76,500	
AM PEAK VEHICLE DEPARTURES	10	19	37	74	
	15	12	25	50	99
	20	9	19	37	

Because of the density of employers and the close proximity to the STC, businesses in Downtown have an array of options that reduce congestion at the STC and operating cost. For all frequencies and approaches, congestion at the STC would likely be reduced. In some cases, such as the zone and corridor approaches, the number of shuttles would be more than halved. The costs could also be greatly reduced. With the exception of 10 minute frequencies under the cluster approach, all cost estimates are much lower than the existing estimate of \$114,750 (annually) per employer. This existing estimate reflects the actual annual cost of shuttle operation provided to the study team by one business within this Downtown area. Although representative, it does not account for varied operating costs among other employers within the same area, although they are assumed to be comparable from a unit cost perspective.

West Side

Like Downtown, Stamford West Side has eight shuttle destinations. All existing shuttle providers would use a single shuttle route under the zone approach. Assuming all businesses opt in, three shuttle routes would serve the employers for the corridor approach and four shuttles for the cluster approach. Current shuttle riders traveling to destinations in the West Side spend three to 10 minutes

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riding the shuttle. The maximum time spent in the shuttle 22 minutes for zone, 11 minutes for corridor, and 11 minutes for cluster.

Table 17 Summary of Shuttle Service Scenarios (West Side)

	PEAK OF PEAK FREQUENCY (MIN.)	ZONE	CORRIDOR	CLUSTER	EXISTING
TOTAL ANNUAL COST/EMPLOYER	10	\$ 76,500	\$ 133,875	\$ 172,125	
	15	\$ 57,375	\$ 95,625	\$ 114,750	\$ 114,750
	20	\$ 38,250	\$ 76,500	\$ 95,625	
AM PEAK VEHICLE DEPARTURES	10	19	56	74	
	15	12	37	50	42
	20	9	28	37	

The range of available options is more limited in the West Side relative to Downtown. There are currently 42 shuttle departures to the West Side during the AM peak, and any viable option should have fewer than 42 departures. Likewise, the total cost per employer should decrease. The remaining options include the zone approach (all frequencies), the corridor approach (15-20 minute frequencies), and the cluster approach (20 minute frequencies).

Long Ridge

The northernmost shuttle destinations are located just south of the Merritt Parkway. The zone approach provides one route for all four destinations. The corridor and cluster approaches each provide two routes covering the same area. Today, shuttle riders headed to one of these four employers spend 10 to 15 minutes in the shuttle. The maximum trip duration would increase to 24 minutes for the zone approach and 20 minutes for the corridor and cluster approaches.

Table 18 Summary of Shuttle Service Scenarios (Long Ridge)

	PEAK OF PEAK FREQUENCY (MIN.)	ZONE	CORRIDOR	CLUSTER	EXISTING
TOTAL ANNUAL COST/EMPLOYER	10	\$ 191,250	\$ 344,250	\$ 344,250	
	15	\$ 153,000	\$ 229,500	\$ 229,500	\$ 99,705
	20	\$ 114,750	\$ 191,250	\$ 191,250	
AM PEAK VEHICLE DEPARTURES	10	19	37	37	
	15	12	25	25	24
	20	9	19	19	

Although the zone approach and 20 minute frequencies would reduce the congestion at the STC, the costs are estimated to exceed the existing costs of providing shuttles to this area. The analysis indicates that this subarea would be less effectively served by any consolidation scenario, both in terms of costs and travel time, recognizing that an implementation plan would further optimize the operations approach.

Findings and Conclusions

The shuttle scenario model shows that a fully consolidated shuttle service could reduce businesses' operating cost and vehicle congestion at the STC. From a system-wide perspective, all scenario

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approaches with frequencies of 15 to 20 minutes could reduce cost and congestion. Even at a 10 minute frequencies, the zone approach would be viable, although likely less attractive to businesses. The following figure highlights what appears to be the most viable opportunities for full consolidation at the three test frequencies.

Table 19 Full Consolidation Viability by Service Frequency

CITY-WIDE		
10 Minutes	15 Minutes	20 Minutes



Potential to reduce system-wide operating costs



Potential to reduce vehicles at the STC

Similarly, viability exists within specific geographic typologies. The following figure highlights the benefits of centralized location and proximity to the STC, as the Downtown sub-area tests more favorably. In this case, frequencies are assumed at 15 minutes and the differing levels of viability are considered from a geographic perspective.

Table 20 Partial Consolidation Viability (by Geographic Sub-Area)

SUB-AREA (15 Minute Frequency)		
DOWNTOWN	EDGE	SUBURBAN
Zone	Zone	Zone
Corridor	Corridor	Corridor
Cluster	Cluster	Cluster



Potential to reduce individual businesses' operating costs



Potential to reduce vehicles at the STC

The analysis described here offers the conclusion that some levels of consolidation are viable to achieve goals of congestion relief at the STC and notable reductions in operating costs. It is highly unlikely that all current shuttle providers will be motivated to participate in a consolidated system, raising the importance of pursuing partial consolidation (either citywide or by focusing on geographic sub-areas).

Most importantly, this exercise provides a platform to gauge interest from the business community. As potential participants are identified, service plans can be further refined to optimize the operational approach. This exercise illustrates the overall viability of consolidation across different approaches, begins to narrow down on the most viable and beneficial approaches with respect to overall objectives, and sets the stage for more detailed service planning and organizational development to follow.