VOLUME II

Drive ELECTRIC Florida

Getting Southeast Florida Plug-in Ready

Volume II: US-1 Corridor Pilot Project

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Disclaimers

This document sets forth one or more suggested approaches to the deployment of electric vehicles and electric vehicle supply equipment and has been prepared by the South Florida Regional Planning Council, Southeast Florida Clean Cities Coalition, Florida Power & Light Company, and The Curtis Group, in conjunction with various other state, local, and private entities and individuals (collectively, the "Parties"). The Parties reserve the right to make changes to this document at any time without prior notice to any party. THE INFORMATION CONTAINED HEREIN IS PROVIDED "AS IS" AND THE PARTIES MAKE NO REPRESENTATIONS AND OFFER NO WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THOSE OF MERCHANTIBILITY AND FITNESS FOR A PARTICULAR PURPOSE, AS TO (I) THE ACCURACY OF THE INFORMATION CONTAINED HEREIN; (II) THE SUITABILITY OF THIS DOCUMENT FOR ITS INTENDED PURPOSE; (III) THE INTELLECTUAL OR OTHER PROPERTY RIGHTS OF ANY PERSON OR PARTY IN; OR (III) THE MERCHANTABILITY, SAFETY, OR FITNESS FOR PURPOSE OF ANY INFORMATION, PRODUCT OR PROCESS DISCLOSED, DESCRIBED, OR RECOMMENDED IN THIS DOCUMENT. NONE OF THE PARTIES ASSUMES ANY LIABILITY OF ANY KIND ARISING IN ANY WAY OUT THE USE BY A THIRD PARTY OF ANY INFORMATION, PRODUCT OR PROCESS DISCLOSED, DESCRIBED OR RECOMMENDED IN THIS DOCUMENT, OR ANY LIABILITY ARISING OUT OF RELIANCE BY A THIRD PARTY UPON ANY INFORMATION, STATEMENT, OR RECOMMENDATIONS CONTAINED IN THIS DOCUMENT.

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Glossary

Alternating Current (AC)	A type of electric power commonly found in households or businesses where the electric charge constantly and cyclically reverses directions.
Alternative Fuel	As defined by the Energy Policy Act (EPAct) of 1992, the following fuels are defined as alternative fuels: pure methanol, ethanol, and other alcohols; blends of 85 percent or more of alcohol with gasoline; natural gas and liquid fuels domestically produced from natural gas; liquefied petroleum gas (propane); coal-derived liquid fuels; hydrogen; electricity; pure biodiesel (B100); fuels, other than alcohol, derived from biological materials; and P-Series fuels.
Alternative Fuel Vehicle (AFV)	A vehicle that runs on any form of alternative fuel; whether it is electricity, solar energy, ethanol, biodiesel, etc.
Alternative Transportation Modes	A means of transportation other than the most prevalent one. Generally understood as a means of transportation other than private vehicles, including bus or rail transit, bicycles, other non-motorized means, and walking, but may also include telecommuting, low speed vehicles, and car sharing.
Amperage	The strength of an electrical current measured in amperes (amps).
Automatic Start/Shutoff	An engine that automatically shuts off when the vehicle comes to a stop and restarts when the driver accelerates so energy isn't wasted during idling.
Battery Electric Vehicle (BEV)	Any vehicle that operates exclusively on electric power from the grid, stored in the vehicles' batteries.
Bus Rapid Transit (BRT)	Bus transit that uses a variety of technologies and systems improvements to increase the speed and efficiency of bus service, and may include dedicated right-of-way (busways), traffic operations system changes (signal priority, queue jumpers, etc.), infrastructure improvements such as raised boarding platforms, and new vehicle technologies.
Carpooling	Shared simultaneous use of a common vehicle for a specific purpose or trip by a driver and one or more other riders, with the vehicle owned and maintained either by an individual, managing organization, or third party business unit.
Carsharing	Same as car sharing – commonly and recently accepted portmanteau for car sharing.
Car Sharing Member	Person that is prequalified to use/rent the vehicles of a car sharing program. Members may be common owners in cooperative form of organization, or the prequalified customers of a commercial operator.
Car Sharing Model	Distinguishable organization of car sharing supply, management, and product characteristics to meet the needs of single or multiple market components and demand criteria. A car sharing program may use one, or more than one model.
Car Sharing Operator	Car sharing vehicles, assets and management organization that serves a group of members in one or multiple regions and markets. The organization may be managed for profit, as a not for profit, or as an autonomous cooperative. Car Sharing Operator may be abbreviated as CSO.
Car Sharing Program	Car sharing vehicle, assets, management and members that are part of a car sharing business unit that is specific to a region and organization.
Charging Station	Device that safely transfers electricity to a plug-in electric vehicle
Direct current (DC)	A type of electric power commonly found in batteries and solar cells where the electricity charge flows in one direction.
DC Fast Charging	A direct-current charging that uses a 480-volt connection to provide 50kW to PEV batteries. It provides a full charge in less than 30 minutes, enabling charging along heavy traffic corridors and at public charging stations. The DC fast charging connector has not yet been standardized. Most DC fast chargers today are using the CHAdeMO connector, produced in Japan. However, in May 2012 the International Society of Automotive Engineers (SAE) designated a new plug design as the standard for American and European models.
Electric Motor Assist	Technology whereby the electric motor provides additional power to the engine during acceleration, passing, and hill climbing, and uses a smaller, more efficient energy conversion unit (engine).
Electric Motor Drive	Technology whereby the electric motor alone provides power for lower-speed driving.
Electric Networked Vehicle (EN-V)	A 2-seat electric car concept that can be driven normally or operated autonomously. In autonomous mode they can detect and avoid obstacles while driving, park themselves, and

	respond when called by phone. Prototypes have been made by GM and Sedgway, Inc.
Electric Vehicle (PEV)	A vehicle comparable to the conventional gasoline-fueled vehicle, except that refueling is done through electricity and stored in a battery instead of a tank. Power is then transmitted to the wheels via an electric motor, rather than a traditional internal combustion engine.
Electric Vehicle Supply Equipment (EVSE)	Device that safely transfers electricity to a plug-in electric vehicle. An EVSE is a charging station that specifically complies with Article 625 of the National Electric Code.
Extended-Range Electric Vehicle (E-REV)	An electric vehicle with a relatively large battery (e.g., 16–27 kWh) capable of relatively long all-electric ranges (e.g., 40–60 miles) and with a back-up source of power such as gasoline or E85 ethanol.
First and Last Mile (also just "Last Mile")	A term borrowed from the telecommunications industry used in urban transportation to refer to the first or last leg of a transit trip which is usually made by another mode. The first or last leg, usually short compared to the transit leg, represents one of the greatest barriers to increased transit use. From the transit provider standpoint, the first and last mile is also the most expensive and inefficient to attempt to serve with mass transit systems.
Free Floating	Alternate description of the 1-way car sharing model in which members may use cars on a 1-way basis as long as the beginning and end point are within the "home area."
GPS	Global Position System: satellite-based navigation system that provides location and time information anywhere on Earth.
Greenhouse Gas Emissions (GHG)	Emissions that contain gas that absorb or emit radiation in the infrared range, and are contributors to the greenhouse gas effect, and therefore contribute to global warming. The primary greenhouse gases in the atmosphere are carbon dioxide, methane, nitrous oxide, and fluorinated gases. In the United States, vehicular transportation produced 27% of the nation's GHG (source US Dept. of Energy)
Grid	Refers to the electric grid, a network for delivering electric power from supplier sources to consumers.
Heavy Duty Motor Vehicles	A vehicle over 10,000 lbs. gross vehicle weight rating (GVWR).
Home Area	Used specifically for the 1-way fee floating car sharing model, the home area is the area where cars may be picked up and dropped off by members at any legal public parking location. Outside of the home area, the member must continue to rent the vehicles when parked, and return it to a home area location to complete the rental.
Hub	Same as pod – see Pod.
Hybrid Electric Vehicle (HEV)	Vehicles that combine conventional internal combustion engine (ICE) propulsion system with an electric propulsion system. An HEV does not receive energy from the grid and does not have plugs for recharging.
Instantaneous Demand	The maximum electric demand at the instant of greatest load.
Intelligent Transportation Systems (ITS)	Advanced system approaches in which communications and information technologies are used to enhance the efficiency of transportation systems.
Internal Combustion Engine (ICE)	Propulsion systems that burn gasoline, ethanol, propane, compressed natural gas, diesel oil, or other fossil fuels for energy in a closed system. Most vehicles on the road today are propelled by ICE.
Kilowatt (kW)	A unit of electric power or consumption equal to 1,000 watts
Kilowatt-Hour (kWh)	A unit of electric energy equivalent to 1,000 watts for a duration of 1 hour. It is a common billing unit for electric energy.
Level 1 Charging	Standard 120 volts AC (VAC) branch circuit, which is the lowest common voltage level found in both residential and commercial buildings. Typical voltage ratings can be from 110 to 120 volts AC. Typical amp ratings for these receptacles are 15 or 20 amps.
Level 2 Charging	Typically described as the "primary" and "preferred" method for the EVSE for both private and publicly available facilities. Level 2 specifies a single-phase branch circuit with typical voltage ratings from 220 to 240 volts AC.
Level 3 Charging	A charging type that is still in development but is expected to provide a faster AC charging option at public stations. It would operate at a higher voltage and current than Level 2 EVSE. Level 3 charging is expected to deliver a full charge in less than 30 minutes.

Light Duty Motor Vehicle	A passenger car or light duty truck at or under 8,500 lbs.
Lithium ion (Li-ion)	A rechargeable battery technology that uses the mineral lithium as a catalyst against various other materials to store and then deliver electrical energy.
Low Speed Electric Vehicle (LSEV)	Same as Neighborhood Electric Vehicle (NEV), but may also be used to include very low speed, off-road electric vehicles, such as Sedgeways, or electric hybrid bicycles.
Medium Duty Motor Vehicle	A motor vehicle between 8,500 lbs. and 10,000 lbs.
Natural Gravitation	Self- organizing phenomenon used for the free-floating, 1-way car sharing model that describes the effect that car sharing members tend to end trips and park vehicles in areas that have a higher probability of reuse by the next member.
Neighborhood Electric Vehicle (NEV)	Vehicles that have a maximum speed of 25 mph and maximum loaded weight of 3,000 pounds. They are legally limited to roads with posted speed limits up to 45 mph. They are classified as low speed vehicles by the US Department of Transportation. May also be referred to as Low Speed Electric Vehicles (LSEV).
Nickel Metal Hydride (NiMH)	A rechargeable battery technology that uses the mineral nickel and a hydrogen-storing alloy to store and then deliver electrical energy.
On-Board Diagnostic Data (OBD)	Standardized system in all vehicles for self-diagnostic and reporting capability. Relevant to car sharing operations, when tied to communication systems a vehicles OBD system is used to autonomously report its rental readiness including fuel level.
Peer to Peer	Operational model of car sharing in which the car sharing operator provides only the network and intangible resources (such as liability insurance) to manage and coordinate transactions among car providers and car users.
Photovoltaic (PV)	Method of generating electricity by converting solar radiation to direct current electricity using semiconductors
Placement	Managed location of individual vehicles or a pod of vehicles in a car sharing program.
Plug-in Hybrid Electric Vehicle (PHEV)	A hybrid vehicle that runs on an internal combustion engine with batteries that can be recharged by plugging into an external electric power source. They have larger batteries than traditional hybrid vehicles (e.g., 5–22 kWh), allowing for a longer all-electric range. Because they have hybrid engines, they effectively have an unlimited driving range.
Pod	Referring to car sharing, a pod is accepted terminology to describe the placement of a small group of vehicles by a CSO in a specific location as part of a car sharing program. The term "hub" may also be used. The term is not used for the free-floating, 1-way car sharing operational model.
Private Charging Stations	Charging stations located on private property and available only to specified vehicle owners or specified vehicles.
Publicly Accessible Charging Stations	A charging station that is available to the wider public (which could be located on public or private property or operated by a public or private firm).
Public Charging Station	A station installed or operated by a public or private entity, whether publicly available or not.
Regenerative Braking	Technology whereby energy normally lost during coasting and braking is converted into electricity and stored in the battery.
Ride Sharing	Same as car- pooling.
Radio Frequency Identification (RFID)	Wireless use of radio frequency to transfer data at relatively short distances. Used by some car sharing operators to provide vehicle access and communications with member's smart phone.
Sciography Study	Study of the projection of shadows. Relevant to solar integration with EVSE installations, a detailed study of shadows cast by nearby objects to determine shade pattern that reduce the solar system's effectiveness.
Shared Car	Same as Car Sharing Vehicle: Motorized vehicle that is available to car sharing program members. The vehicle may be any light-duty passenger vehicle legal for licensing as a highway motor vehicle or neighborhood electric vehicle (NEV), but not to include shared bicycles, Sedgeways, or other very low speed electric vehicles.
Station Car	Motorized vehicle that is available specifically as part of a station car program. A station car program is specific model of shared car program that manages both a regular commuter user

	market and a day user market, with the focal point of transfer between the two user classes at a transit station.
Vehicle Miles Traveled (VMT)	An estimate of the aggregate total number of vehicular miles driven in a geographic jurisdiction. It is a transportation metric often used to measure benefits of alternative modes and transportation programs in terms of reducing congestion and correlated environmental benefits.
Voltage (V)	A measure of electric potential, which is the condition that causes electric energy to flow; measured in volts.
Zero emissions vehicle (ZEV)	Vehicle that does not produce any "tailpipe" emissions. While no emissions are produced from the vehicle itself, emission created by the process to create the energy that the ZEV uses are considered separately. A BEV or PEV are examples of ZEV.

Acronyms

AC – Alternating Current	ITS – Intelligent Transportation Systems
ADA – Americans with Disabilities Act	HEV – Hybrid-Electric Vehicle
AFV – Alternative Fuel Vehicle	LEED – Leadership in Energy and Environmental Design
BEV – Battery Electric Vehicle	NEC – National Electrical Code
BRT – Bus Rapid Transit	NFPA – National Fire Protection Association
CSO – Car Sharing Operator	OBD – On Board Diagnostic Data
DOE – Department of Energy	PEV – Plug-in Electric Vehicle
DOT – US Department of Transportation	PHEV – Plug-in Hybrid Electric Vehicle
EN-V – Electric Networked Vehicle	PTP – Peer-To-Peer
PEV – Electric Vehicle	RTZ – Rapid Transit Zone
EVSE – Electric Vehicle Supply Equipment	SFRPC – South Florida Regional Planning Council
FAC – Florida Accessibility Code	USGBC – U.S. Green Building Council
FGBC – Florida Green Building Coalition	ZEV – Zero Emission Vehicle
FPL – Florida Power & Light	

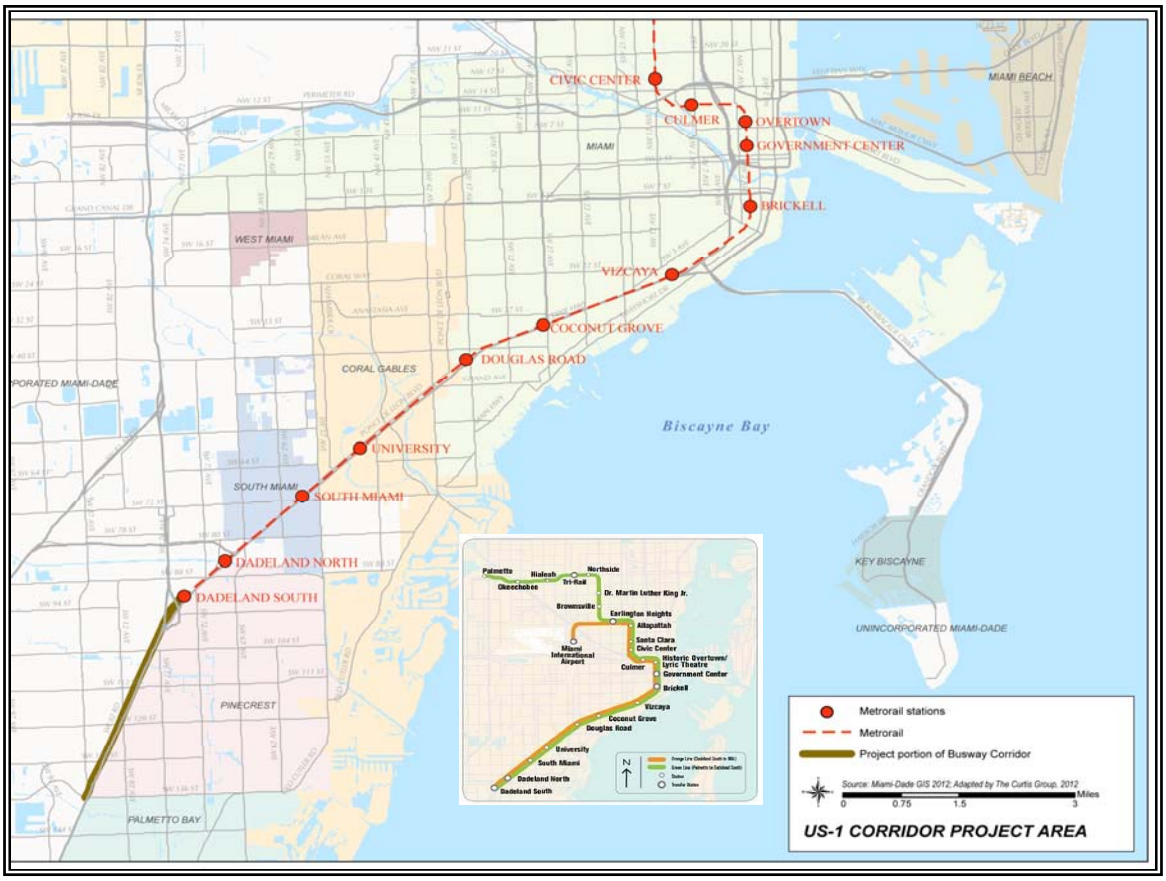
II-1. Executive Summary

II-1.A. Project Concept

The Miami-Dade US-1 Clean Transportation Corridor Project (US-1 Corridor Project) is part of the Southeast Florida Electric Vehicle and Infrastructure Alliance ("the Alliance"), a public/private partnership brought together under a $500,000 Clean Cities Community Readiness and Planning for Electric Vehicles and Charging Infrastructure Grant (DE-EE0005561) awarded by the U.S. Department of Energy (DOE). The US-1 Corridor Project planning effort aims to prepare the local community for successful deployment of plug-in electric drive vehicles (PEVs) and infrastructure, thereby supporting the goal of putting 1 million electric vehicles on the road in the US by 2015. It includes the necessary master plan elements to deploy charging infrastructure and vehicles for an electric transportation corridor in this populous and diverse area.

The planning has involved developing a master plan for a future demonstration project designed to accelerate the large-scale adoption of clean transportation technologies, specifically plug-in electric vehicles (PEV) and electric vehicle supply equipment (EVSE), in a major metropolitan area in the southeastern United States. Plans for the US-1 Corridor Project capitalize on, and extend, the area's existing mass transit footprint. It intends to expose approximately 50,000 Metrorail commuters per day to self-service rental/car-share and vehicle charging opportunities. The project has been designed to explore whether low-cost commuter access to electric vehicles and charging infrastructure – through a car-sharing program along the US-1 mass-transit corridor – can accelerate the mainstream adoption of these technologies and/or create incentives for increased use of regional transit services. Planning has incorporated smart grid functionality to leverage DOE's current investment in the Region, thereby supporting data collection of PEV and EVSE usage and growth. In addition, planning has identified opportunities to integrate renewable solar generation to support sustainability goals. The future demonstration project has been designed to serve as a test project for the Region to validate its planning assumptions, criteria, and new processes and policies, and outcomes of the regional planning effort discussed in Volume I.

Figure II-1.1
Miami-Dade US-1 Corridor Project Area



II-1.B. Project Results

The planning resulted in a determination that a viable car sharing program that includes PEVs located at the various Metrorail stations could be established along the US-1 Corridor Project Area.

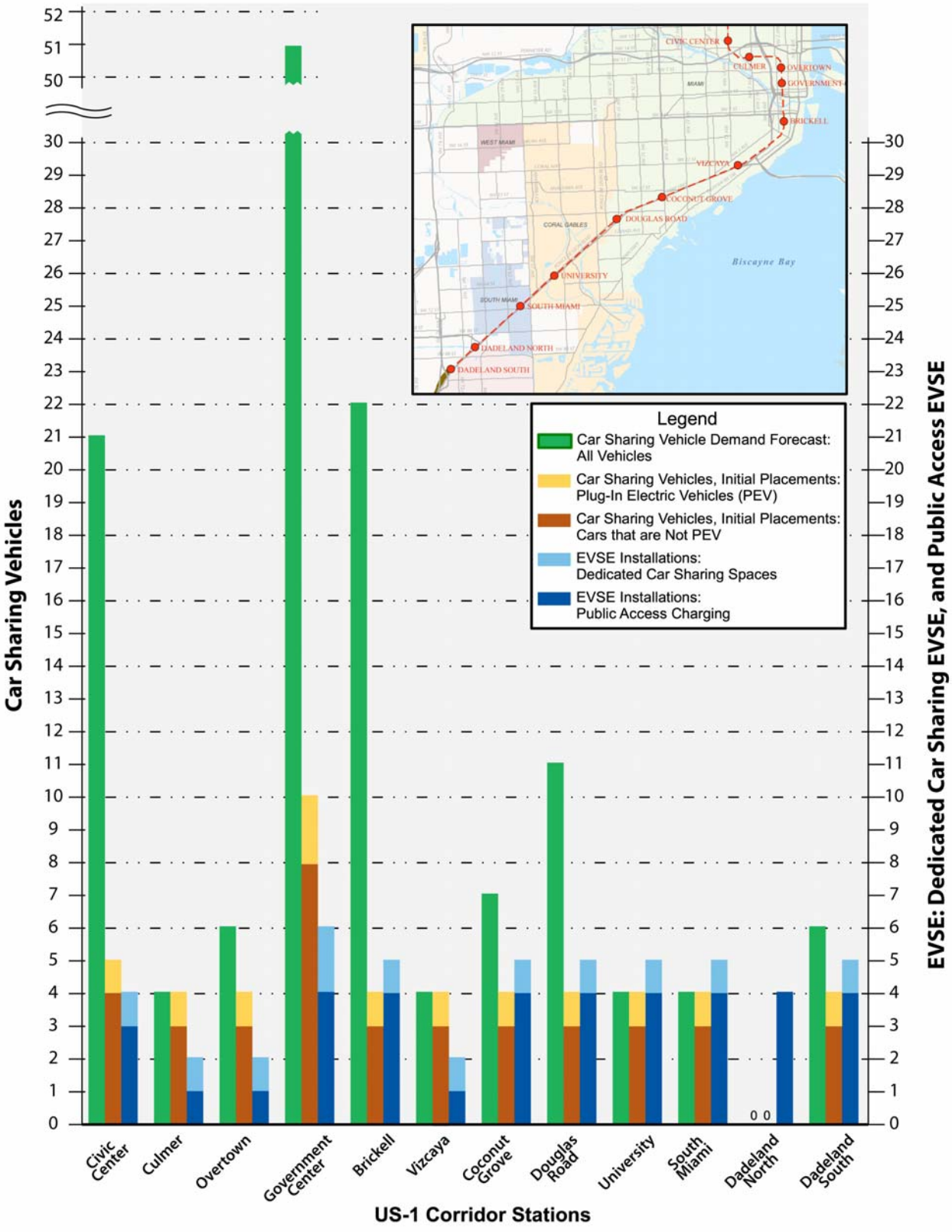
A market forecast was developed to identify potential demand for car sharing vehicles at the US-1 Corridor Metrorail stations, primarily from transit riders and residents within walking distance. The forecast indicates demand for approximately 140 total car share vehicles for the network of 12 Metrorail stations within the Project Area. Based on the project-specific methodology developed with industry input, approximately 15% - 20% of these are recommended to be PEV. An initial placement 50 vehicles is recommended among the 12 Metrorail stations along the corridor until the market demand can be established, as shown in **Table II-1.1**. To support the placement of the car sharing PEVs, installation of 12 dedicated EVSE are proposed at the respective stations.

An estimate was also developed for the number of public access EVSE for each station, based on a methodology that used factors for electric vehicle early adopters and concepts of locating EVSE near destination locations (see **Table II-1.1**).

Table II-1.1 Metrorail Station Car Sharing Vehicles (Total and PEV/EVSE) and Public EVSE						
Station	Car Sharing				Public EVSE	
	Total Vehicles per Station		PEV/EVSE per Station			
	Forecast	Initial Phase	Forecast	Initial Phase	Forecast	Initial Phase
Civic Center	21	4	3	1	4	1
Culmer	4	4	1	1	1	1
Overtown	6	4	1	1	1	1
Government Center	51	10	8-10	2	4	2
Brickell	22	4	3-4	1	4	1
Vizcaya	4	4	1	1	1	1
Coconut Grove	7	4	1-2	1	4	1
Douglas Road	11	4	2	1	4	1
University	4	4	1	1	4	1
South Miami	4	4	1	1	4	1
Dadeland North	0	0	0	0	4	0
Dadeland South	6	4	1-2	1	4	1
Total for Corridor	**140**	**50**	**23-28**	**12**	**39**	**12**

Figure II-1.2 illustrates the results for the twelve corridor stations, including the car sharing vehicle forecast, number of vehicles for initial placement, proportion of vehicles that would be PEV, number of dedicated EVSE for the car sharing program, and the number of public access EVSE.

Figure II-1.2
US-1 Corridor Car Sharing Vehicles and EVSE at Metrorail Stations: Summary of Results



II-1.B.1. Permitting

One of the persistent stumbling blocks to EVSE deployment is the local government permitting process. The US-1 Corridor Project team addressed this potential obstacle head-on and engaged industry experts and key stakeholders in a collaborative process of data gathering, analysis and solution selection. The result of this collaboration was the creation of a streamlined model EVSE permit process requiring fewer documents, a potentially reduced application fee, and an expedited review process.

The solution was based, in part, on the concept large-scale home builder's use where the local government permitting department reviews and creates a master file containing drawing and specifications for each home model. When the model of home is submitted for building permit it simply references the master file in the permit. Additional drawing and specifications are not required because they are on file with the permitting department and the review process is expedited.

This same idea was applied to EVSE. The various EVSE models would go through a pre-approval process. A master file containing drawings and specifications for each model of EVSE would be created and reside in the permitting departments files. When the contractor submits a building permit to install EVSE the master file for that particular model is referenced in the permit application. The permit then proceeds through the expedited review process without the need for additional paper work.

Section II-21. discusses the collaboration and the resulting model EVSE permitting process. Appendix C-5 in Volume I contains a draft permit application local governments may consider for use in their permitting departments.

II-1.B.2. Master Plan Summary

The master plans for each of the 12 station areas are the culmination of the planning process and incorporate the best practices learned through that process. These best practices were applied to each station site to meet the needs of the key stakeholders and users through a car share program to give commuters and travelers access to PEVs and EVSE and, provide public access to EVSE installed at strategic locations.

A significant amount of data was analyzed for each of the 12 station areas. An overview of this data is outlined below. Detailed descriptions of the data and analysis are presented in each of the 12 stations master plans found in **Sections II-7. – II-19.**

- **Geography:** Describes the urban fabric of the station area. Details include jurisdiction, land use types, proximity to other Metrorail stations, and its walkability from surrounding uses. For example, walkability in an urban area is measured in the number of roadway intersections per quarter-mile – the higher the number of intersections, the greater the walkability. Government Center station area has the most intersections per quarter-mile with 119; while the Dadeland North station area is considered is the least walkable with 19 intersections per quarter-mile.
- **Resident Demographics:** Data from the 2010 US Census and American Community Survey was used to analyze the resident demographics. This section presents analysis for population, population over the age of 18, number of households, residential density per acre, number of employed residents and the percentage of workforce over the age of 18 for each station area. Of the corridor station areas, Culmer is one of the least populated station areas with approximately 4,000 residents, while Brickell is one of the most populated station areas with over 14,000 residents.
- **Employment:** Employment information for each station area was determined using the Longitudinal Employer-Household Dynamics program, which is part of the Center for Economic

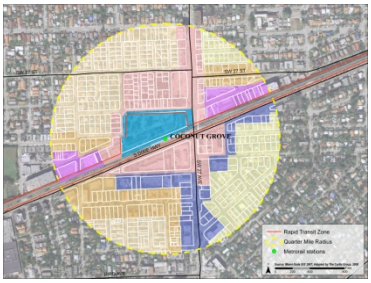
Studies at the U.S. Census Bureau. Information is analyzed for the major work sectors, number of employees for each sector, and the percentage of employment for that sector. Again, Culmer has the little employment with 58 employees and Government Center has the highest number of employees with over 35,000 workers.

- **Major Destinations:** All the major destinations within and proximate to the station areas are presented in this section. These destinations include shopping malls, theaters, museums, concert halls, hospitals, and sporting arenas. For example, Government Center station is located in an area with a significant number and variety of destinations; while Dadeland North destinations are focused on two nearby retail developments.
- **Metrorail Station:** This section describes the Metrorail station facilities including: park-and-ride; car pool areas; and, pick up/drop-off areas for car pool passengers. Information on connecting transit buses including route numbers and paths are also included. Based on information provided by Miami-Dade Transit Authority, average weekday station boardings, station parking capacity and parking utilization are also provided.
- **Car Sharing Demand:** This section summarizes the car sharing demand analysis inputs to predict potential car sharing demand for each Metrorail station. The inputs population, demographics, auto ownership, and travel mode to work or travel mode Metrorail station.
- **Car Sharing Vehicles and Car Sharing EV:** Based on market assessment, this section summarizes the number of vehicles and electric vehicles forecast for each Metrorail station car sharing program. See **Figure II-4.5**, for a summary of these results.
- **Existing Car Sharing Programs:** Car sharing program that are available at each Metrorail station, including any future deployment plans for the area, are discussed in this section. For example, Car 2 Go is operating within the City of Miami and the University of Miami has ZipCar on both the Coral Gables campus at University station and at its medical campus at Civic Center station.
- **EVSE Requirements:** This section discusses the analysis for each Metrorail station based on the methodology detailed in **Section II-5.**, and the EVSE determination for that location. Various market indicators and the potential for early adopters are also analyzed.
- **Project Siting:** Through the master planning process siting criteria were developed, applied and tested at each potential location. These criteria were organized from the large, regional scale to the neighborhood area to the site specific scale. For example, regional criteria guided the project to locate the proposed car share pods and EVSE within a highly urbanized, mixed-use transportation corridor. Neighborhood scale siting criteria focused on locations where significant numbers of transit riders change transportation modes and, where proximity to public parking, preferably a parking garage, could be found.
- **Site Design:** Each Metrorail station was analyzed based on: walk up potential; visibility and lighting; electric panel proximity and capacity availability; parking space ownership and capacity availability; and, minimization of disturbance to existing facilities. Co-locating solar infrastructure was also analyzed and only those locations with the best potential were identified. An example of the site planning process is illustrated in **Figure II-1.3**.

The master planning also identified opportunities to integrate solar photovoltaic (PV) at the car sharing locations. As discussed in the respective station master plans, three Metrorail stations were identified as having favorable conditions to co-locate solar PV and electric vehicle service equipment (EVSE).

Planning also considered the use of advanced metering infrastructure (AMI) and "smart" EVSE technologies to support a proposed data collection program, which is described in **Section II-5.C** of this report. Integration of AMI technology with smart EVSE units will allow the project to monitor and collect key grid impact measures, such as peak (kW) demand and total energy usage (kWh).

Figure II-1.3
Site Planning Elements



Land Use

Ownership

Parking

Example of Site Plan

Example of PEV and EVSE

II-1.B.3. Preliminary Assessment of Opportunities to use Electric Vehicle Technologies in Miami-Dade Busway

Planning for the US-1 Corridor Project focuses primarily on the deployment of an electric vehicle car sharing program and associated infrastructure along the Metrorail section of US-1. The Metrorail heavy rail system is electric and service terminates at Dadeland South. Consequently, the US-1 Corridor Project planning effort included a brief assessment of alternatives for extending electric vehicle commuting along the South Dade Busway Corridor, from Dadeland South to Howard Drive (SW 136th Street), a distance of 3.1 miles from the Dadeland South Metrorail Station. The assessment identified three leading approaches for extending the use of electric vehicles along mass transit corridor. Note: these are not alternatives, but complementary approaches. All three may be pursued, as each represents a different transit market, different jurisdictions that would act as lead agencies, and different scales of vehicles:

1. Battery-electric transit vehicle Bus Rapid Transit (BRT) along select Busway routes

2. Local government transit electric vehicles for community circulator transit services

3. PEV station car program located at Dadeland North and Dadeland South Metrorail stations.

II-2. Introduction

II-2.A. Background

II-2.A.1. Miami-Dade US-1 Corridor (Project Area)

The US-1 Corridor Project Area extends from the north at the Civic Center Metrorail Station (a major government and medical employment center in the county), south through the Downtown Miami and Brickell Central Business Districts (CBD), then continues south along South Dixie Highway through the southern terminus of Metrorail at Dadeland South (another major employment center), and ends at the intersection of South Dixie Highway and Howard Drive (SW 136th Street). The US-1 Corridor includes a 12.5-mile segment of Metrorail with 12 stations, and a 3.1-mile segment of the South Dade Busway that includes 7 Bus Rapid Transit (BRT) stations. As illustrated in **Figure II-2.1**, the 16-mile Corridor extends through 5 local government jurisdictions: unincorporated Miami-Dade County; City of Miami, City of Coral Gables, City of South Miami, and the Village of Pinecrest.

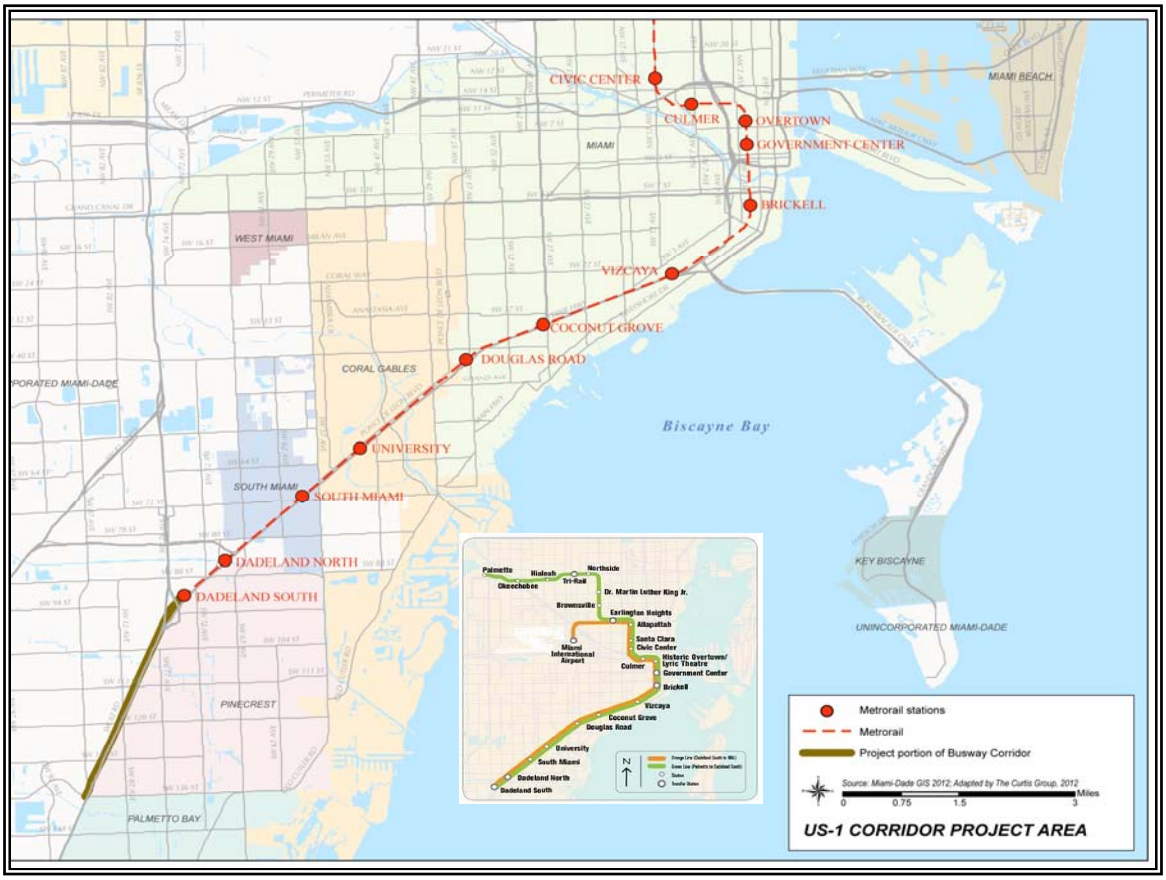
II-2.A.2. Metrorail System

The US-1 Corridor Project Area includes the south segment of the Metrorail heavy rail rapid transit system in Miami-Dade County which is operated by Miami Dade Transit (MDT). MDT is a departmental agency of Miami-Dade County, and is governed by the Miami-Dade County Office of the Mayor.

In the 2011-2012 fiscal year, the Metrorail system had 18,706,102 boardings for an average annual daily ridership on the entire system of 51,110 per day, and average weekday ridership of 64,086. The higher weekday ridership indicates that utilization is primarily for home-to-work commuting trips.

The 12 Metrorail stations that are part of the US-1 Corridor account for 77% of the system's utilization with 39,520 average annual daily boardings and 49,897 average weekday boardings. This is the most highly utilized segment in the Metrorail system, with a similar pattern of weekday commuter usage. The US-1 Corridor Project will provide these commuters with a hands-on experience with EV car-share and EV charging opportunities.

Figure II-2.1
Miami-Dade US-1 Corridor Project Area



II-2.B. Project Approach

The strength of the planning approach was that the unique needs of the Region have been met through the direct involvement of stakeholders representing the area's governments and private organizations. To complement local knowledge of stakeholders, the planning effort tapped into the industry expertise of its partners who are also involved in local car share programs, to leverage industry experience with local knowledge to develop the corridor plan. While the Region has many unique characteristics, the team analyzed best lessons from other PEV/EVSE plans and implementation experience from elsewhere in the country and applied them to the US-1 Corridor Project.

II-2.B.1. Benchmarking and Outreach

A national benchmarking and outreach effort, consisting of a substantial literature review, interviews with experts, business leaders, and government staff was conducted to obtain the best and most up-to-date information regarding EVSE deployment, PEV community readiness, car sharing programs and community deployments (locations, saturation, partnering,), business models, and battery-electric bus transit technologies. The effort yielded substantial and timely information that was used to develop important details of the US-1 Corridor Project plan.

The need for outreach was driven by the relatively rapid development of the technologies and business models being considered (e.g. adoption of car sharing as a mobility alternative, adoption of PEV by the public, provision of public-access charging stations, and new technologies in fast-charge battery electric bus transit vehicles). Each of these innovations was characterized by on-going experimentation, evolution and innovation. While there was substantial documentation of these innovations, some of the most useful information and insights were recent and not well documented either by comparisons, or case studies. As such, the planning process for the US-1 Corridor Project addressed the dynamism of this situation by drawing on different discovery efforts, with a heavy reliance on outreach.

II-2.B.2. Project Team

The US-1 Corridor Project team expertise included the areas of: alternative fuel supply and electric vehicle charging; electric distribution, smart grid capabilities, and solar installations; transportation planning; transit planning; land use analysis; land development; comprehensive planning; and, land development regulations.

Florida Power & Light Company (FPL): As a principal subsidiary of NextEra Energy, Inc., FPL is the largest electric utility in Florida and one of the largest rate-regulated utilities in the US. FPL has one of the lowest emissions profiles nationwide; making EVs powered by FPL's electricity an even cleaner solution than in many other parts of the country. FPL professionals provided project management, analysis of consumer electric vehicle programs and marketing, as well as knowledge and experience in solar and smart grid integration.

The Curtis Group: The Curtis Group is a comprehensive development planning firm located in South Miami with local land use knowledge and expertise, with experience addressing regulatory, environmental and transportation planning and policy issues as they relate to urban development and redevelopment. The firm's strength lies in its strategic approach to planning and policy. The Curtis Group provided urban planning and transportation expertise, along with a working knowledge and established relationships in the local project area.

Hertz: Operating from approximately 8,500 locations in 146 countries worldwide, the Hertz Corporation is the world's largest airport general use car rental brand. In 2008, Hertz launched Hertz on Demand its global car sharing service which offers PEV as part of their local PEV initiative. Hertz on Demand provided car sharing market and operational information, as well as PEV and EVSE deployment insight.

South Florida Regional Planning Council (Council): The Council is a multipurpose agency that identifies long-term challenges and opportunities facing Southeast Florida, and serves as the administrative host for the Florida Gold Coast Clean Cities Coalition. The Council has a team of professionals that span areas of expertise from alternative fuel technology to land use planning. Council staff facilitated stakeholder outreach and involvement for the US-1 Corridor Project.

Miami-Dade County (MDC): The Regulatory and Economic Resources Department (RERD) incorporates permitting, environmental and regulatory affairs, as well as planning and sustainability initiatives. RERD provided invaluable interdepartmental coordination, guidance through the permitting and regulatory policies and procedures.

II-2.B.3. Stakeholder Involvement

The US-1 Corridor Project planning effort benefited from considerable support and engagement from stakeholders. These included local government officials and agency staff; as well as providers of PEVs, EVSE, and battery-electric transit buses; operators of car sharing programs, and public EVSE networks. Without this involvement and support, the results described in this report would not have been achieved.

II-3. Car Sharing (Benchmarking)

II-3.A. Overview

Car sharing describes a range of short-term, urban car rental programs in which vehicles are dispersed in unstaffed, public locations for use by prequalified mobility consumers with little or no reservation lead time. The vehicles may belong to a co-op form of organization, to the program of a non-profit, non-government organization, or the vehicles may be fleet assets of a commercial vendor for which users are prequalified customers.

These services are designed to meet various mobility needs of people in urban areas and can thereby enhance the range, utility, and market share for other urban, alternative transportation modes. Having emerged from initial US market experimentation a decade ago and more recently undergone significant growth and diversification, car sharing is now established in many markets as a sustainable, unsubsidized transportation business model for private sector participants. As it creates new mobility networks, car sharing should continue to grow and play a large role in the advancement of sustainable transportation system and technological innovations to meet increasing urban demands.

Car sharing operational characteristics are complementary to increasing the deployment of a range of new sustaining transportation technologies including hybrid-electric vehicles (HEV), plug-in electric vehicles (PEV), intelligent transportation systems (ITS), electric networked vehicle (EN-V) systems, bus rapid transit (BRT), and increased use of urban and suburban rail transit. While car sharing supports accelerated adoption of sustainable urban transportation technologies, it in turn is made possible by wide-spread adoption of mobile personal and in-car communications, GPS, and the ability for car sharing operators to network to their vehicles' on board diagnostic data (OBD) link connectors to report vehicle availability status in real time.

II-3.B. Growth Trends

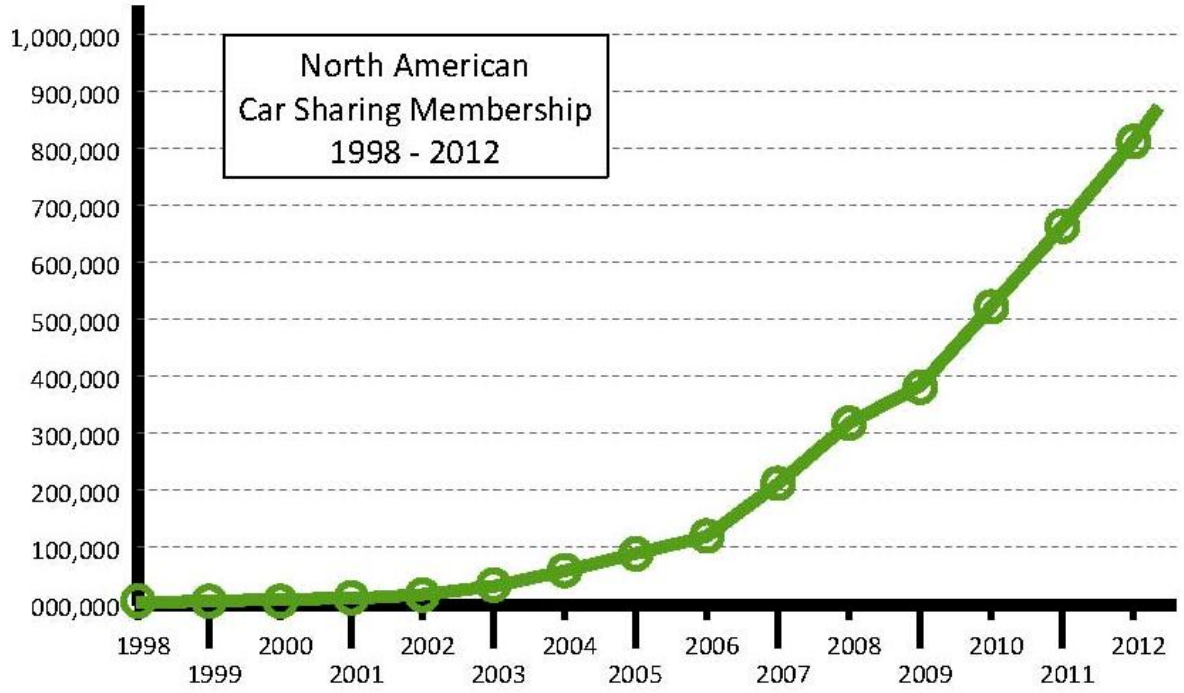
Car sharing has its roots in numerous short-lived programs starting as far back as 1948, when a car share program was organized as part of a housing cooperative in Zurich, Switzerland. Through the early 80s, other limited car sharing programs were operated in France, Holland, Britain, and Sweden. In the US, the Mobility Enterprise program was run by Purdue University researchers from 1983 to1986, and in San Francisco, the Short-Term Auto Rental Service (STAR) pilot program operated from 1983 to 1985.

In their current form, car sharing programs began in 1987 in Switzerland and a year later in Berlin, Germany; however, it was not until 1994 when a car sharing program was introduced in a North American city: Communauto in Quebec City. Four years later in 1998, Car Share Portland, the first large-scale US program began in Portland, Oregon. In 2000, Car Share Portland became Flex Car, a public-private partnership with King County Metro in the Seattle area. Also during 2000, Zip Car was founded in Cambridge, Massachusetts, and would grow to become the largest US car sharing operator today. Zip Car merged with Flexcar in 2007, became a public company in April 2011, and as of January 2013, has become part of the Avis rental car company. The growth trend of the car sharing market is further underscored by the entrance of Hertz On Demand, a unit of Hertz, which is the 2nd largest car rental operator. During this time, many private companies, community-based organizations, and public-private partnerships began national and regional car

sharing programs. Some were short lived and are now closed, others were absorbed by larger companies, and in other locations more regional programs are in the planning stages.

In 2000, when the first national car sharing program began in North America, growth in car sharing membership jumped by 265% from 2000 to 2001. In the years following, as North American car sharing morphed from its initial market entry phase to the growth and market diversification phase, it expanded to new geographic markets while established geographic markets continued to grow. As the car sharing business entered a commercial mainstream phase since approximately 2007, annual membership has continued to grow at an average of 41% per year. As of January 1, 2012, there are over 810,000 car sharing members in North America, utilizing over 12,300 vehicles. Of those, 32 car sharing programs are operating in the US, providing over 9,800 vehicles for use by approximately 719,000 members.

Figure II-3.1
North American Car Sharing Membership Growth



Sources: Shaheen, Susan A.; Cohen, Adam P.; Chung, Melissa S. North American Car Sharing, A Ten Year Retrospective; in TRB 09-3688, Transportation Research Board; Washington DC; 2009; Shaheen, Susan A.; Cohen, Adam P.; Carsharing.net; 2012.

Table II-3.1 Current American Car Sharing Operators and Programs - 2012				
Car Sharing Operator	**Organization Form**	**Founded**	**Service Area Markets**	**Programs**
National:				
Avis On Location (Avis)	business to consumer for profit	2011	National	See Note 1
Car 2 Go (Daimler AG)	business to consumer for profit	2008	National	5
Hertz On Demand (Hertz)	business to consumer for profit	2008	National	15
U Car Share (U Haul)	business to consumer for profit	2009	National	30
We Car (Enterprise)	business to consumer for profit	2009	National	100
Zip Car	business to consumer for profit	2000	National	135
Regional:				
Ashland Car Share	not for profit	2007	Ashland, OR	1
Austin Car Share	not for profit	2007	Austin, TX	1
Buffalo Car Share	not for profit	2007	Buffalo, NY	1
Car Share Vermont	not for profit	2008	Burlington, VT	1
City Car Share	not for profit	2001	San Francisco Bay Area, CA	1
Community Car Share	not for profit	2006	Bellingham, WA	1
Corner Car	PPP, City of Hoboken & Hertz	2010	Hoboken, NJ	1
Cuse Car	not for profit	2008	Syracuse, NY	1
Dancing Rabbit Vehicle Co-Op	Eco-community co-op, community covenant prohibits personal cars	2004	Dancing Rabbit (Rutledge), MO	1
eGo Carshare formerly Boulder Car Share	not for profit	1998	Denver, Boulder, CO	2
Fun Ride	business to consumer for profit	2008	San Luis Obispo County, CA	1
Hour Car	not for profit	2005	Minneapolis, MN	1
I-Go	not for profit	2002	Chicago, IL	1
iCar	business to consumer for profit	2010	Boston, MA	1
Ithaca Car Share	not for profit	2006	Ithaca, NY	1
LAX Car Share	business to consumer for profit	2010	Los Angeles, CA	1
Mint Cars-On-Demand	business to consumer for profit	2008	New York, NY; Boston, MA	2
Occasional Car	business to consumer for profit	2009	Denver, CO	1
Philly Car Share	Started as not for profit. Sold to BtC4P Enterprise in 2011	2002	Philadelphia, PA	1
Roaring Fork Valley Vehicles	business to consumer for profit	n.a.	Aspen, CO	1
Scoot	Kitsap Transit program	2009	Kitsap Co., WA	1
Timecar	business to consumer for profit	2010	Oklahoma City, OK	1
Regional – In Planning:				

Table II-3.1 Current American Car Sharing Operators and Programs - 2012				
Car Sharing Operator	**Organization Form**	**Founded**	**Service Area Markets**	**Programs**
Ann Arbor Community Car	not applicable		Ann Arbor, MI	1
Oak Cliff Car Share	not applicable		Dallas, TX	1
Lane Car Share	not applicable		Eugene, OR	1
Santa Barbara Car Share	not applicable		Santa Barbara, CA	1
Ride Share Delaware	not applicable		Wilmington, DE	1
Peer To Peer				
Relay Rides	business to consumer for profit	2010	Nat'l Peer To Peer	n.a.
Getaround	business to consumer for profit	2009	SFBA, CA; San Diego, CA; Austin, TX; Portland, OR	n.a.
Spride Share pilot program to manage PTP per Cal. Legislation AB 1871	Partnership w City Car Share	2011 pilot	Los Angeles, CA	1
Note 1: Avis On Location uses its regular rental locations and corporate campuses for a program initially designed to primarily meet the needs of corporate accounts. The January 2013 announcement for Avis to purchase Zip Car is not complete as of finalization of this table.				

II-3.C. Transit Integration Trends

Car sharing is a mobility mode that facilitates short-duration, occasional, urban trips. As a distinct urban transportation mode, it is best suited to accommodating very diverse, low-density (few people per vehicle) trips with high geographic dispersion in the urban area (doorstep to doorstep). Urban mass transit systems are best suited for the opposite characteristics: accommodating systematic and regular patterns of travel in high density vehicles, with low geographic dispersion. These characteristics create a highly complementary potential between car sharing and transit systems, as car sharing can be used to accommodate the "first and last mile" for transit system users. In a similar way to other networks, when transit systems try to move away from trunk line services and accommodate service in low density low utilization areas, the whole system suffers. Therefore, it should be expected that the growth of car sharing has and continues to be accompanied by transit integration.

Historically, integration of car sharing programs with regional transit services and properties has been in one of five forms:

1. co-location of car sharing at transit stations (usually rail, both urban and commuter systems)
2. transit fare ticketing and car sharing program discounts
3. transit monthly pass and car sharing program billing integration
4. station car programs
5. "first and last mile" programs to extend transit service areas

Table II-3.2 summarizes current known car sharing programs that have integrated with local or regional transit systems in one of these ways

Table II-3.2 Current US Car Sharing Program Transit Integration			
Metropolitan Area	**Car Sharing Program**	**Transit Property**	**Type of Integration**
Atlanta, GA	Zip Car*	Metro Atlanta Regional Transit Authority	Parking spaces provided at transit stations
Baltimore, MD	Zip Car	Maryland Transit Administration	Parking spaces provided at transit stations
Chicago, IL	I-Go	Chicago Transit Authority, Metra (commuter railroad)	1) PPP for transit pass / car sharing billing. 2) Parking spaces provided at stations.
Chicago, IL	Zip Car*	Chicago Transit Authority, Metra (commuter railroad)	Parking spaces provided at transit stations
Irvine, CA	ZEV NET	Cal Trans (commuter railroad)	Station car program in coordination with Cal Trans, Toyota, and the National Fuel Cell Research Center
Kitsap County, WA	Scoot	Kitsap County Transit	"last mile" program managed by transit agency for bus passengers to run errands from bus stop transfer
New York, NY	Zip Car	Metropolitan Transit Authority	Parking spaces provided at transit stations
Newark, NJ	Zip Car	New Jersey Transit	Parking spaces provided at transit stations
Philadelphia, PA	Philly Car Share(PCS)	Southeast Pennsylvania Transit Authority	1) Regional rail or subway/elevated rail fare discount (transit fare free to reach PCS car at one of 40 transit station pods. 2) Parking spaces provided at stations.
Portland, OR	Zip Car*	Tri-Met	Parking spaces provided at transit stations
San Francisco Bay Area, CA	Zip Car*	Bay Area Rapid Transit (BART)	Parking spaces provided at transit stations
San Francisco Bay Area, CA	City Car Share	Bay Area Rapid Transit (BART)	Parking spaces provided at transit stations
Seattle, WA	Zip Car*	King Co Metro	Parking spaces provided at transit stations
Washington DC	Zip Car*	Washington Area Mass Transit	Parking spaces provided at transit stations

** Integration with transit property started with Flex Car before merger with Zip Car in 2007.*

II-3.D. Benefits of Car Sharing

Car sharing produces both private benefits for member participants, as well as public benefits to transportation systems, the environment, government efficiency, and local economies. These benefits are summarized in the following two sections.

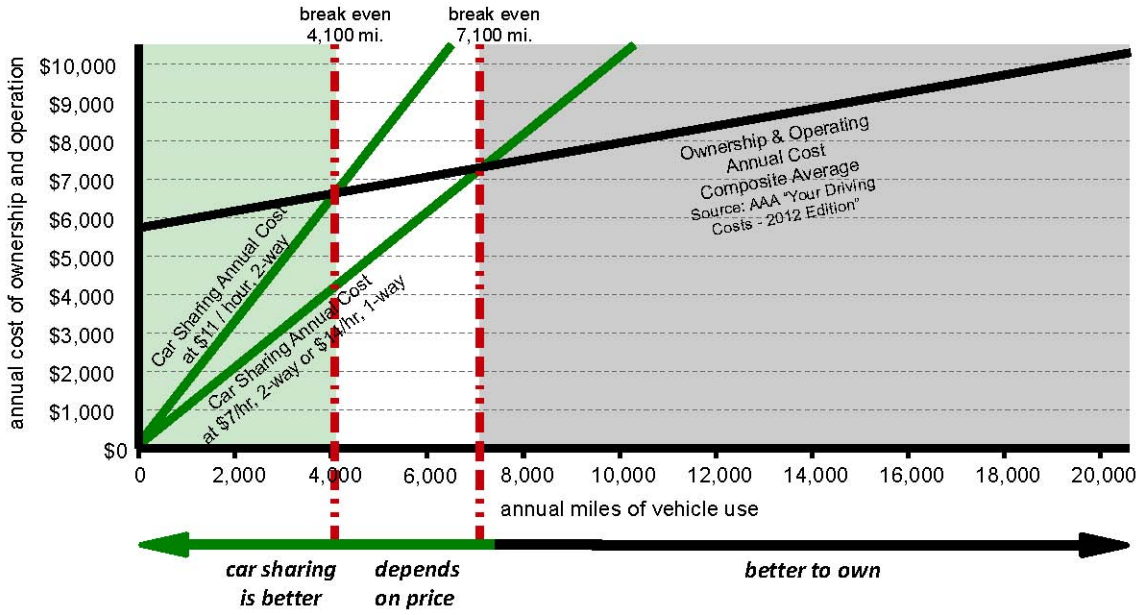
II-3.D.1. Private Consumer Benefit

A number of factors help determine the benefit that a private mobility consumer derives from car sharing, including:

- available household vehicles;
- vehicular ownership term commitments;
- reasons for owning a particular personal vehicle;
- vehicular usage; and
- mix of trip patterns.

Figure II-3.2 shows a break-even analysis for annual costs versus annual mileage for a privately owned composite sedan versus use of car sharing without auto ownership.

Figure II-3.2
Car Sharing Versus Private Auto Ownership for Average Sedan: Break-Even Analysis



**Analysis uses driving cost averages for a composite vehicle (average of 15 popular small, medium, and large sedans, all gasoline fueled) that is annually published by the American Automobile Association in its report, Your Driving Costs – 2012 Edition.*

***To convert car sharing hourly costs to cost per mile, an average of 7 miles per hour is used for round trip usage programs which includes parked time at a destination. For urban use of 1-way, free-floating car sharing in which destination down time is not included, the average speed is 14 mph.*

****Analysis based on national averages for a composite sedan. Individual ranges will vary by location, vehicle choices, fluctuations in fuel costs, and other factors subject to change.*

II-3.D.2. Public Benefits

Car sharing programs also benefit the public sector in terms of transportation impacts, environmental benefits, government benefits, and benefits to regional economies. Public benefits, similar to the economics term "public good", are benefits that are produced from car sharing that are not direct benefits for the member or car sharing operator. **Table II-3.3** lists the public benefits of car sharing by general category, and how well each of the benefit potentials aligns with each car sharing operational model.

Table II-3.3
Car Sharing Public Benefits and Applicability to Operational Models

		2- Way Return	1-Way Free Floating	Fleet	Station Car
Transportation Benefits					
Reduced Vehicles in Transportation Network	Each car sharing vehicle removes 4.6 to 20.0 cars from the road in the long term. 15% - 32% sold personal vehicles 25% - 71% avoided vehicle purchase	✓	✓	✓	✓
Fewer Miles Driven	Residential car sharing households reduce VMT by 44% on average	✓	✓		✓
Increased Use of Alternate Modes	12% - 54% walk more often 13% - 54% use transit more often 10% bicycle more often	✓	✓		
Environmental Benefits					
Reduced Greenhouse Gas Emissions	Average reduction per car sharing household is 0.84 tons per year (VMT reductions only)	✓	✓	✓	✓
Reduced Parking Requirements	Potential to reduce parking supply with secondary impact on travel mode choice and increased potential pervious area	✓	✓	✓	✓
Clean Fuels Utilization	Car sharing provides a supportive business and operational model for alternative fuel vehicle deployment	✓	✓	✓	✓
Government Benefits					
Reduce Fleet Costs	Governments can reduce fleet costs by reducing /or eliminating owned fleets and use car sharing for employee trips			✓	
Improve Transit Efficiency	Car sharing can be used to reduce low productivity segments (bus)	✓	✓		✓
Increase Transit Revenue	Car sharing members adds additional transit riders and trips	✓	✓		✓

Table II-3.3 Car Sharing Public Benefits and Applicability to Operational Models					
		2- Way Return	1-Way Free Floating	Fleet	Station Car
Incentivize Sustainable Development	Car sharing can be used to reduce new development parking requirements and can offer an additional tenant amenity	✓		✓	
Economic Benefits					
Increased Local Spending & Investment	Car sharing household / institutional transportation savings may be spent or invested locally with multiplier effects.	✓	✓	✓	✓

II-3.E. Why Car Sharing for PEV Adoption – Bridging the Gap toward All Electric Mobility

II-3.E.1. Reducing Barriers to PEV Adoption

A key objective of the DOEs Clean Cities Community Readiness and Planning for Electric Vehicles and Charging Infrastructure Grant (DE-EE0005561) is to prepare communities for electric vehicle deployment by reducing barriers for early adopters to purchase or lease electric vehicles, and to prepare the communities for greater EVSE deployment. Identified barriers for earlier adopters include:

1. **Purchase Cost:** the cost of an electric vehicle compared to a vehicle of the same manufacturer in the same size/chassis category and with similar options and features is priced at a premium of approximately $15,000 to $20,000, before federal tax credits. There is a similar premium for current extended range hybrids with more than 13 kwh of battery storage. The purchase cost barrier is changing as the premium for battery electric power becomes lower. This is already in evidence by the recent introduction of the 3rd generation, 2013 Smart Fortwo ED, and several other new PEV model, as well as the recent price drop for the 2013 model year Nissan Leaf. [1]

2. **Depreciation and Maintenance Costs:** approximate depreciation and maintenance costs, such as consumable replacements (oil, tires, etc.) and approximate usage between major cost overhauls are well understood by automotive consumers. Electric vehicles are new products in the mainstream market, and compounded by the uncertainties associated with phase out of the federal tax incentive,

[1] Based on comparison of 2011 Nissan Leaf to the Nissan Versa and Sentra models and 2011 Chevrolet Volt compared to the Chevrolet Cruze. As of September 2012, PEV from Ford and Toyota are not yet available and prices are not known. The Coda has no direct current model comparison. The 2013 Smart ED with a price difference of $10,000 above a similarly equipped gasoline model is taking orders, but not available for delivery. Price premiums are before applying up to $7,500 federal tax credit authorized by the American Clean Energy and Security Act of 2009 (ACES).The ACES tax credit is for $2,500 for any qualifying PEV, plus an additional $417 for each kwh over 4 kwh, to a maximum of $7,500. The program will phase out after the sale of 200,000 PEV by each manufacturer.

the depreciation for PEV is not well known to consumers. Furthermore, life cycles for batteries, electronics, and motors are not well understood by many consumers.

3. **Obsolescence:** Typical of many new product introductions, many consumers would rather wait to commit, expecting that after an initial few years technological improvements will be introduced that make earlier models obsolete. This exacerbates the issue of depreciation uncertainty.

4. **Fuel Cost:** The cost of PEV recharging in comparison to a consumer's fuel cost is not well known by the mainstream of consumers.

5. **Range Anxiety:** From an operating standpoint, this is a major barrier to adoption PEV that have no on-board independent generating capacity or the ability to switch to another energy source, such as with hybrids. While manufacturers have designed range performance to meet the daily requirements for most urban daily commutes, there is still consumer anxiety regarding not having sufficient energy to accomplish additional trips, or prematurely running out of energy due to weather/temperature conditions, traffic conditions, highway travel, etc.

6. **Recharging Convenience:** The primary point of recharging for PEVs is intended to be at home. The primary and ideal time for recharging at home is at night when most PEV users are not traveling, and there is more unused grid capacity than during the day. For long range destination trips, additional public EVSE are needed at destination locations, as well as fast charge facilities along major thoroughfares and highways.

7. **Product Experience:** Consumer adoption of new products depends on experience, whether it is at the point of sale or by experience through friends or family. The low number of PEV on the road, in driveways, or otherwise available to try out, is also a barrier to early adoption.

The US-1 Corridor Demonstration Project planning for a self-sustaining PEV car sharing, transit-linked pilot program is designed to address several of the barriers to PEV adoption.

Table	II-3.4
Car Sharing Impacts to PEV Adoption Barriers	

lists the barriers to PEV adoption that are addressed by car sharing and whether the impacts are short term or long term.

- **Short Term (ST):** PEV car sharing puts more PEV on the road and; supporting the President's challenge to put 1-million PEV on the road by 2015.
- **Long Term (LT):** PEV adoption is evaluated for both the impacts of car sharing and environmental impacts of PEV adoption. Among the major benefits of car sharing are to reduce the number of total vehicles in the network, reduce VMT, and increase alternative transportation modal share. PEV car sharing adds the potential to increase PEV ownership as members try out PEVs, and the leveraging of more EVSE in public locations.

Table II-3.4 Car Sharing Impacts to PEV Adoption Barriers					
Electric Vehicle Adoption Barrier	**Car Sharing Model**				**Description**
	2-Way	**1-Way**	**Fleet**	**Station Car**	
Key: ST = Short Term, LT = Long Term					
Purchase Cost	LT	LT	LT	LT	PEV car sharing programs allow consumers to directly use PEV only for the trips that they need personal transportation for and in which all PEV fixed costs are converted to variable per-hour costs. PEV barriers of higher purchase cost, uncertain depreciation, and uncertain maintenance cost are not experienced by a car sharing member.
Depreciation Cost	LT	LT	LT	LT	
Maintenance Cost	LT	LT	LT	LT	
Obsolescence	LT	LT	LT	LT	PEV car sharing programs require no commitment by the consumer to PEV ownership, and risks associated with obsolescence are mitigated.
Fuel Cost Uncertainty				ST	Except for some station car programs, fuel and energy costs are part of the hourly cost; therefore, the consumer does not gain experience in the comparative costs among fuels and electric energy; however, in station car programs, members do.
Range Anxiety	ST	ST	ST	ST	Car sharing provides the opportunity for consumers to use a PEV only for trips that they are comfortable with; thereby allowing them to gain PEV range experience with their own trip patterns, weather conditions, and traffic conditions.
Recharging Convenience	ST LT	ST LT	ST LT	ST LT	For 2-way car sharing models, PEV car sharing allows vehicles to be "refueled" at the pod location, removing the necessity that a user may need to refuel a conventional car and be re-compensated by the SCO for their inconvenience. In this way, car sharing benefits from PEV use. By placing additional EVSE and additional demand in the area for off-site EVSE, the "chicken and egg" problem is mitigated. The placement of neighborhood and commercial district EVSE in visible locations along with car sharing placements is important to gaining critical mass of EVSE and allaying consumer range anxieties.
Product Experience	ST	ST	ST	ST	PEV car sharing provides convenient real-world product experience for consumers with their own trip patterns, weather conditions, and traffic conditions.
PEV on the Road	ST	ST	ST	ST	Every additional car sharing PEV is an additional PEV in the transportation network.

II-3.E.2. Operational Models

While five operational models are defined by differences, in general, car sharing services have these characteristics in common:

1. **Short-term rentals to members:** All car sharing programs have a basic rate by the hour or ½ hour. Some CSOs feature even shorter billable units of time: ¼-hour, and by the minute. Most programs also feature a day rate and different rates for weekends.
2. **Neighborhood-based vehicles:** Vehicles are located in publicly accessible parking lots or reserved on-street locations called 'pods'; are strategically located in or proximate to neighborhoods, employment centers, and commercial districts. Pods are also located on university campuses, military bases, or other institutions that have concentrations of residents with low personal vehicle availability. The pod's vehicle mix (type and model) is designed to appeal to the needs of service area market.
3. **Streamlined reservations:** Reservations are made by the CSO website, CSO smart phone apps, or by phone. If needed at all, they can be made with very short lead time. The streamlining of reservations is made possible by pre-qualifying members for credit, driving privileges, and insurance risk.
4. **Personalized vehicle access:** Members access vehicles with electronic membership cards or key fobs and a windshield mounted card reader. The reader also provides the linkage for centralized and automated administration of the system, member status, and billing.
5. **Inclusive service package:** to provide appealing pricing, current car sharing programs universally include fuel costs*, insurance, and roadside assistance. Most programs include mileages up to a daily limit (usually 150 to 200 miles). Some programs also include additional amenities such as an on-board GPS navigation system, concierge service, and/or pre-paid on-street parking. Many programs also include differential pricing plans based monthly usage, institutional affiliations, or student status.

   * When reserving a vehicle, fuel level information for each vehicle is provided. Members are responsible to refuel the vehicle when remaining fuel is below a certain level with a CSO provided gas card inside the vehicle. Some programs reward the member for the inconvenience of refueling with free usage time or other benefits.

CSO supply responses can be distinguished by five identifiable car sharing supply models: 1) Pod Based 2-Way Car-Sharing; 2) Free Floating 1-Way Car Sharing; 3) Institutional Fleet Programs; 4) Station Cars; and 5) Peer-To-Peer. Some of the operational models respond to distinct market components, while some are designed to respond to multiple market components. Certain features of car sharing are nearly universal in their application among the programs.

2-Way, Return Car Sharing

Two-way car sharing has been and continues to be the dominant car sharing supply model. One or more vehicles are placed in a "pod" at a publicly accessible location for use by car sharing members that belong to the program. A program typically has many pods, with each being located based on residential density or commercial land use intensity, the availability of space, and other CSO-proprietary operational and market criteria. The pod must be placed within comfortable walking distance of the market that it is intended to serve. The salient feature of this 2-way model is that the user must return the vehicle to the pod, and usage charges are accrued until return of the vehicle. Even down time while the vehicle is parked at the user's destination is charged.

The 2-way pod model includes placements at specialized markets as well general public locations, including:

1. **Residential neighborhoods:** target market is nearby residential neighborhood(s)
2. **Residential multifamily units:** target market is building or planned development
3. **Commercial districts:** target markets are employees, commercial patrons, and adjacent residential neighborhood(s). If the commercial district includes transit stations, the pods may also augment transit trips by completing "the last mile."
4. **College campuses:** target markets are on-campus resident students; an ideal market of early adopters, with occasional and flexible off-campus travel needs and low private vehicle availability.
5. **Military installations:** target market is on-base active duty personnel with some characteristics similar to on-campus students.
6. **Hotels:** target markets are business and leisure visitors
7. **Airports:** target markets are business and leisure visitors but with an early intercept point, and designed as a limited one-way service to facilitate flight changes between multiple airports in the same region, or business day trips.

1-Way, Free Floating Car Sharing

One-way car sharing is a recent operational model innovation; with deployment aggressively under expansion by the chief international CSO (Car 2 Go) that uses it. Vehicles are placed throughout a defined "home area", typically in high visibility, on-street locations. Members of the program rent the nearest vehicle nearest vehicle to their current location, and usage time and charges can be stopped at any destination within the home area. From destinations outside of the home area, the user must return the vehicle to any location within the home area. Cars are initially and periodically placed as part of system maintenance; however, the sequence of available locations are based on usage by consumers. The term, "natural gravitation" is used by the CSO using this model to describe a geographic self-organizing phenomenon that the model achieves with sufficient utilization and vehicle density. While vehicles are initially placed by the CSO in a dispersed pattern along busy corridors and high density districts where parking is available, after use the vehicles may be left for overnight periods on neighborhood streets. Natural gravitation suggests that these neighborhoods have a higher probability of residents that are members whom will re-use and move the vehicles to destinations that are appealing to the aggregate membership.

Institutional Fleet Programs

As car sharing resources become more available in regional markets, large businesses and government agencies have adopted car sharing as a tool to better meet internal cost and efficiency goals, while also enhancing social responsibility objectives and environmental sustainability goals. In some cases, government participation has been used to enhance initial program viability in new markets by providing a base minimum utilization for a CSO's local fleet, and vehicle fleet. Employer and fleet programs work by guaranteeing a minimum weekday day use level for the program, while off-peak weekday and weekend use markets can grow for the residential markets. In turn, the institutional users often realize substantial cost savings by cutting capital and maintenance costs associated with underutilized fleet vehicles as they phase them out.

Station Cars

In the same way as the fleet programs, station cars double-up on utilization by addressing two distinct markets. Station car programs are a systems mobility approach that manages linkage of "first and last mile" personal mobility needs with high density transit modes. The share transfer point for this car sharing approach is always a transit station, a property typically managed by a public agency. Given this, US station car programs have been linked to alternative fuel vehicles, and more recently PEV with recharging capacity at reserved station parking spaces. Station car models have also been successfully used with bicycles and low speed electric vehicles.

There are two ways that a station car program may operate:

1. A member of the program arrives at the transit station in the morning, and uses a station car to complete her trip to work. At the work location, the station car is available as a car sharing vehicle to short term day users either through an employment center-based 2-way pod model, or through a fleet model. All short trips must be coordinated to assure availability at the end of the day for commuter members who reuse a station car to return to the transit station.
2. An assigned commuter member of the program arrives at the transit station in the morning with the station car, and uses transit to complete the trip to work, the location of which is within walking distance of the destination transit station. At the origin transit station, the station car is available for short term day uses with the station location as the pod. Both stations are co-located within walking distance of centers of employment and day commerce: a condition which should be typical for many high density transit stations, especially heavy rail systems. At the end of the work day, day uses are complete, and the station car is available again for the commuter to go home when she arrives at the station. Typically, the commuter user is an assigned program member with a longer-term commitment.

The advantages of station cars are higher utilization for the shared vehicles, increased mode share for the transit system, the ability to integrate payments with transit passes, and reduced station area parking demand. Station cars require greater levels of management and coordination by a CSO, government partnering, possible partnering by major employers, and the inclusion of additional programs such as guaranteed ride home.

Peer-To-Peer Car Sharing

Peer-To-Peer (PTP) car sharing programs do not own or maintain vehicles. Members variously can be users or suppliers of vehicles, or both. Member-owners own, store and maintain personal vehicles that they make available for car sharing user members. The PTP CSOs, utilizing principals of collaborative consumption (similar concepts as EBay or Craigslist), provide only network and intangible resources to manage and coordinate the PTP transactions and provide uniform insurance coverage. Pricing, schedules, pick-up and drop-off locations, refueling, and other conditions are set by during individual transactions via the PTP network.

Although PTP models promise to become major components of car sharing, for the purposes of this assessment PTP car sharing models are not further considered as there are no identifiable infrastructure or programmatic considerations of relevance to the Clean Cities' Community Readiness and Planning for Plug-In Electric Vehicles and Charging Infrastructure.

Table II-3.5 Car Sharing Operational Models				
	2- Way Return	**1-Way Free Floating**	**Institutional Fleet Program**	**Station Car**
Geography				
Base Usage Area	Region	Home Area Region	Region	Region
Placement Location	1) Neighborhood 2) Condominium 3) Business District 4) College 5) Military Base 6) Hotel	Any on-street location in the Home Area	Business or Government Agency	Transit Station
Trip Type	Round Trip (RT)	One-Way	Round Trip	Day User: RT Commuter: 2 one way trips
Reservations				
Consumer Locates Car By:	1) CSO website live map or smart phone app 2) Sight			
Minimum Reservation Time	1) Instant access if vehicle is available – most but not all 2) Vehicle may be reserved a short time in advance (0 to 30			
Network Communications	1) Member card reader on windshield 2) In-car communications screen for member information 3) GPS navigation system for vehicle tracking 4) vehicle OBD to report readiness status 5) RFID			
Rates				
Fixed Consumer Costs	1) Application fee 2) Membership	Annual membership	Minimum usage by institution	Monthly fee for: 1) commuter 2) employer 3) day user by hr.
Minimum Billable Usage	½ Hour	Minute	Hour	Monthly
Base Rate	$5 - $15 / hour	$14 / hour	By contract	By contract
Included Services				
Mileage	Most	Yes	Yes	Yes
Fuel Cost	Yes	Yes	Yes	Yes
Insurance	Yes	Yes	Yes	Yes
Roadside Assistance	Yes	Yes	Yes	Yes

Table II-3.5 Car Sharing Operational Models				
	2- Way Return	**1-Way Free Floating**	**Institutional Fleet Program**	**Station Car**
GPS Navigation System	Some	Yes	Yes	Yes
Public Parking Cost (at destination)	No	Yes	No	No
In Car Concierge Service	Some	No	No	No
Fleet Mix (current programs)				
Gasoline, Ethanol, or Diesel	Yes	Yes	Yes	No
Hybrid-Electric	Yes	No	Yes	No
Plug-In Hybrid-Electric	Some Markets	No		No
Battery Electric	Some Markets	1 program		1 program

II-4. PEV and EVSE Requirements

II-4.A. Methodology

In order to describe the proposed PEV car sharing program at the twelve Metrorail stations included in the project area, two key questions need to be addressed:

- How many car sharing electric vehicles should be placed at each Metrorail station?
- How many EVSE should be co-located at those stations to 1) support the car sharing operation and 2) support broader PEV adoption and increase transit use?

The methodology described below uses existing available data to identify geographic, demographic, auto ownership, and travel characteristics for station area residents and Metrorail commuters along the US-1 Corridor that would support residential and transit-linked car sharing programs. Based on the characteristics, car sharing demand is calculated, and the vehicles needed to meet the demand are estimated. Using car sharing industry input, a lower number of vehicles for initial placement is determined, and the number of PEV that would be part of the car sharing program is estimated. Dedicated EVSE at a 1 to 1 ratio are planned to support the car sharing PEV. As the installation of the dedicated EVSE require that other electric supply infrastructure be built, economies of scale can be used to leverage the installation of public access EVSE co-located with the car sharing dedicated EVSE. A number of public access EVSE for initial installation at the station was estimated using geographic and demographic data for the station areas to identify major long-duration destinations within walking distance for day use, and potential early PEV adopters from multifamily dwelling residential populations that may not have access to home charging. The process consists of 8 steps.

1. **Market Analysis:** Based on the review of other car sharing programs, deployment of plug-in electric vehicles for use in a car sharing program would initially require that the PEV be part of a larger fleet that includes conventionally powered vehicles. This assures that the CSO can provide a viable product mix, while consumer membership is not impacted by PEV barriers and the largest possible base is maintained for people to "test drive" PEVs on the road in South Florida. The market analysis step estimates relative car sharing demand among the 12 Metrorail stations (from Civic Center to Dadeland South) and their station areas based on 11 variables of geographic, demographic, auto ownership and travel behavior characteristics that are correlated to car sharing membership. The demand correlations are based on a regression analysis using market analysis survey data of car sharing program members in large US cities that was conducted in 2005 and included in Transit Cooperative Research Report 108 - Car-Sharing: Where and How It Succeeds, published by the Transportation Research Board, Washington DC, and authored by Adam Millard-Ball, Gail Murray, Jessica ter Schure, Christine Fox, and Jon Burkhardt. In each case, two distinct markets are addressed: 1) the residential market that is within walking distance of the station entrance; and 2) the transit-linked demand from existing Metrorail riders that use each station. For the residential component of demand, station area is defined as a ¼-mile radius around the Metrorail station entrance; however, the use of block group census data has required that approximations to the area are made that result in station areas of ¼ to ½ mile equivalent radii. The station area characteristics data source is the 2010 Census and American Community Survey. For the transit-linked component of demand, the data sources are Miami-Dade Transit Technical Reports for ridership data, and demographic, travel and attitudinal data from on-board Metrorail surveys taken in 2006 and 2009. The demand values that result from this step are relative indicators of membership among the station area.

The detailed description of the Market Analysis methodology, regression correlations, and limitations is provided in **Appendix II-4.A**.

2. **Car Sharing Vehicles:** The Market Analysis of Step 1 provides an estimate of relative car sharing demand for membership each Metrorail station area and station transit users. This step interprets the demand values to make a recommendation for the number of vehicles to initially place at each station. While the market analysis step suggests a number of car sharing members for each station, this interpretation suggests a level of precision in absolute terms that should not be used because the market demand values are comparable from station to station, but may not be comparable between the residential and transit-linked markets. As a point of reference to estimate the future potential for the car sharing programs in each station area, the market demand values have been interpreted and factored based on industry practice for a total number of cars that could be placed as the US-1 Corridor car sharing market grows. For new markets, car sharing industry practice for 2-way return programs use a phased implementation approach, in which an initial limited number of vehicles are placed at locations within a market based on market analysis, CSO business objectives, and the availability of space. Membership and utilization rates by location are monitored, users are surveyed, and additional specific models of vehicles are placed at specific locations as the program grows. Among the larger programs, an initial pod placement would be a maximum of 10 vehicles, and a minimum of 2 to 4 depending on the CSO. For the US-1 Corridor, the car sharing demand values for each station are also factored based on a maximum number of 10 vehicles for the station of highest demand. For stations that had demand values that translated to between 1 and 4 vehicles, a 4-vehicle placement is recommended. Where the demand values factor to less than 1 vehicle, the station is recommended for placements at a later phase after the US-1 Corridor car sharing market grows.

3. **Existing Car Sharing Programs:** When this plan began, there was one CSO with a car sharing program along the US-1 Corridor. As of December 2012, there are two additional CSO operating car sharing programs along parts of the US-1 Corridor. This step identifies existing car sharing programs at the stations or in the station areas that may also meet car sharing demand, and are therefore deducted from the number of car sharing vehicles recommended. In cases where an existing car sharing program meets all or most of the demand at a station (University Station), a process to work with the CSO toward deploying PEV as part of their vehicle fleet is suggested.

4. **Car Sharing Electric Vehicle Split:** The net number of car sharing vehicles for each station placement is used to recommend the number of plug-in electric vehicles that would be located as part of each station car sharing program. Among CSOs that are currently deploying PEV in a 2-way operational model, typically between 5% and 15% of the program's entire fleet are PEV models. It should be noted that deployment of electric vehicles has only recently begun in a few cities, and this range of PEV fleet composition will likely grow as members adapt to PEV use. For this analysis, it is recommended that 15% of the US-1 Corridor fleet be PEV, with results varying from 15% to 25% for each station, depending on the number of vehicles recommended for initial placement. The higher proportion is used to assure that each station have at least 1 PEV as part of its initial car sharing placement (accounts for indivisibility of small numbers: for example, 1 PEV among 4 car sharing vehicles at a station is 25%).

5. **Car Sharing EVSE:** Based on the number of car sharing PEV recommended for each Metrorail station, the number of EVSE dedicated to the car sharing program PEV at each station is recommended. The number of EVSE is on a 1 to 1 ratio with the number of car sharing PEV.

6. **Public Use EVSE:** The co-location of highly visible public EVSE along with EVSE that are dedicated to car sharing programs provides infrastructure at long-term parking locations for transit linked trips. At stations that are co-located at employment centers, the public EVSE may also provide daytime charging for employees. At station areas with a high proportion of multi-family dwellings, public EVSE at the stations may also be useful to PEV early adopters that do not have access to an EVSE in their condominium or apartment. In each instance, co-located public EVSE reduce barriers to PEV adoption. The estimate for the number of public access EVSE is based on an empirical methodology that applies a decision model logic to factors that indicate early adopters for PEV ownership and concepts of locating EVSE at destination locations with relatively long term parking duration, such as employment centers, regional draw shopping and entertainments centers, and cultural centers. Factors include: the location of a major non-employment destination within walking distance of the station or EVSE; employment density within the station area; the proportion of households multi-unit dwellings combined with the proportion of households with annual incomes over $100,000; and the number of Metrorail riders at each station that use a car to access Metrorail for a home-based-work commute trip and have household incomes over $80,000.

7. **Existing EVSE:** This step identifies EVSE that are already located at a station. The number and location of EVSE, and whether upgrading is necessary are identified. Where existing EVSE are meet the same standards as the EVSE recommended, the existing EVSE are deducted from the total recommended EVSE. Where the existing EVSE are below the standards of recommended EVSE recommended (such as simple grounded outlets at spaces that require a user to use their own plug), then the existing charging spaces remain dedicated and are used for the program, but the outlets must be upgraded.

8. **Net Total EVSE Recommended:** The final number of EVSE recommended is the sum of car sharing program EVSE and public EVSE, less existing EVSE.

The steps listed above have been performed for each station and station area. The detailed output tables of the analysis are contained in **Appendix II-4.B**. The summary outputs for each station are provided in **Section 0**, Station Area Analysis.

II-4.B. Station Area Analysis

II-4.B.1. US-1 Metrorail Corridor - Overview

The US-1 corridor is the south segment of the Miami Metrorail heavy rail rapid transit system in Miami-Dade County Florida. Metrorail is operated by Miami-Dade Transit (MDT) which is a departmental agency of Miami-Dade County, governed by the Miami-Dade County Office of the Mayor. Metrorail began service in 1984 from Dadeland South to Overtown. By 1985, the north leg was complete with service to the Okeechobee Station, and in 1989, transfers to Amtrak and TriRail were made possible by the opening of the 79th Street Station. Since that time, Metrorail expanded to the Palmetto Station in 2003 and to the Miami Central Station (airport) in 2012. In total, there are now 23 stations on 24.4 miles of predominantly elevated track.

The Metrorail US-1 Corridor that is the subject of this plan includes the segment from the Civic Center Station, south. It includes 12.5 miles of track and 12 stations spaced an average of 1.1 miles apart. The stations are listed below, with the travel time for each one to the Miami CBD at Government Center.

Civic Center	6 min.	Culmer	4 min.
Overtown	2 min.	Government Center	0 min.
Brickell	<1 min.	Vizcaya	4 min.
Coconut Grove	7 min.	Douglas Road	9 min.
University	12 min.	South Miami	14 min.
Dadeland North	16 min.	Dadeland South	18 min.

Metrorail service along the US-1 is provided by two lines:

- The Orange Line which runs from Dadeland South along the US-1 Corridor, and after the Civic Center, continues west to terminate at the Miami Central Station. There, it links directly to the Miami Intermodal Center, Tri-Rail commuter rail service, the Amtrak Silver Meteor and Silver Star, and to Miami International Airport via the MIA Mover.
- The Green Line which also runs from Dadeland South along the US-1 Corridor, and after the Civic Center, continues west to the Earlington Heights Station, then north and west through Hialeah and North Dade to terminate at the Palmetto Station, with direct transit connections to Tri-Rail and Amtrak at the 79th Street Station.

Between the two lines, service along the US-1 Corridor is provided by 6 car trains in peak hours and 4-car trains in off-peak hours, with peak service every 5 minutes, off-peak service at 7 minute headways, and weekend and night service at 15 to 30 minute intervals. The service span is from 5 am to midnight, 7 days per week. Inter-station average speeds range from 10 to 40 mph.

Figure II-4.1
US-1 Corridor & Metrorail System

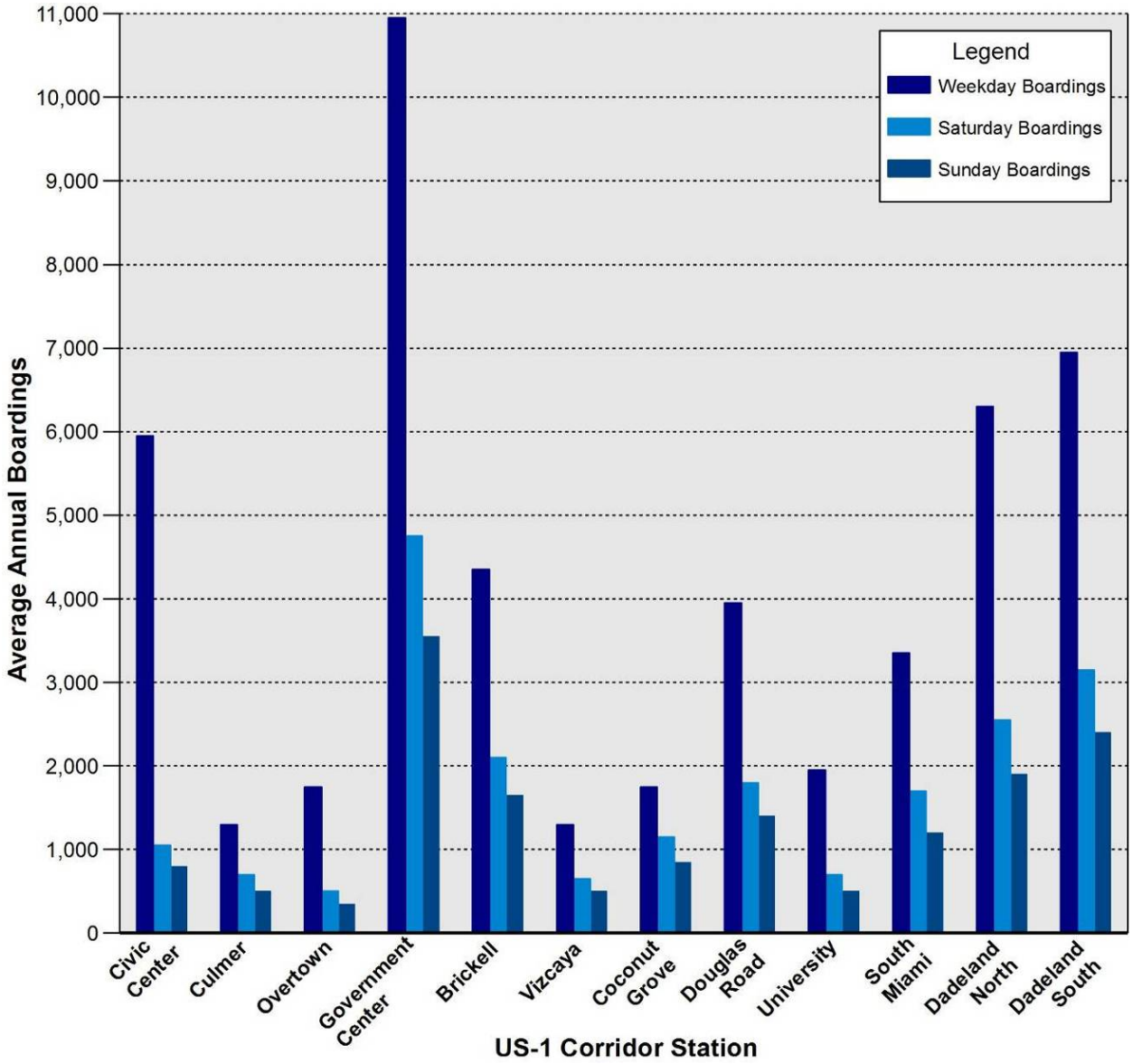
For the last fiscal year (October 2011 through September 2012), there were 18,706,102 boardings for an average annual daily ridership on the entire system of 51,110 per day (average of 7-day week). Metrorail primarily serves traditional commuter needs, with average weekday ridership at 64,086 (average of weekdays only). While Metrorail ridership is currently increasing at about 2% from the year before, the Miami Central Station that opened on July 28, 2012 is expected to significantly increase usage of the system by airport travelers and commuters. From the central and west areas of the County two months after opening, the average daily boardings at the Miami Central Station (Sept., 2012) are 1,190, but are expected to increase to between 7,000 and 8,000 per day[2] The 12 stations that make up the US-1 Corridor serve 77% of the system, with 39,520 boardings per day. As for the system, the US-1 Corridor Metrorail stations also primarily serve traditional commuter needs, with average weekday ridership of 49,897; higher than the average for 7 days. The increase in ridership along the US-1 Corridor from last year is also 2%, but not evenly distributed among the stations. The greatest increases are at the Overtown (+18%), Culmer (+10%) and Brickell (+9%) stations. During the same period, utilization at the Douglas Road and Civic Center stations decreased by 8% and 2%, respectively.[3]

[2] Andrade, Sasha. New Metrorail Service to MIA. Post Newsweek, Local10.com. April 30, 2012

[3] Ridership Technical Report(s); Miami-Dade County Transit Office of Performance Management, Miami, Florida; October, 2010 through September 2012 (24 monthly reports).

Current station utilization along the US-1 Corridor averages 3,293 average annual weekday boardings, but also varies greatly among the individual stations in the Corridor: from the low of 1,290 weekday boardings at the Culmer Station; to a maximum of 10,957 weekday boardings at the Government Center Station. The Government Center Station by itself represents 22% of the Corridor's utilization. **Figure II-4.2** graphically illustrates the relative contribution of each station to the Corridor Metrorail utilization for weekday, Saturday, and Sunday travel, for the year from October 2011 through September 2012. The stations with the highest utilization are primarily commuter stations for which weekday boardings are far greater than for Saturdays and Sundays. Many of the lower utilized stations have a more even distribution of use through the week.

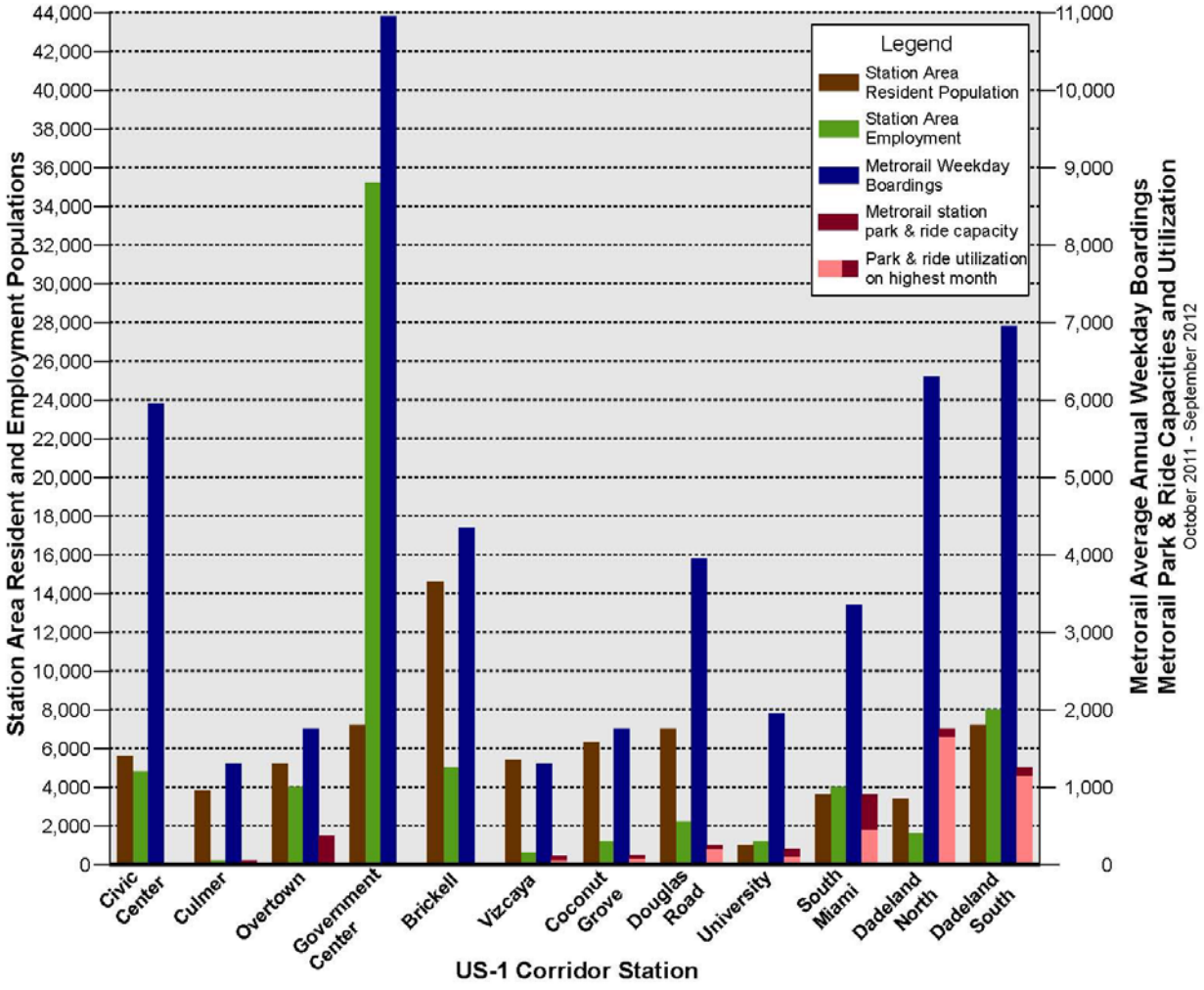
Figure II-4.2
US-1 Corridor Station Utilization
October 2011 through September 2012



Source: Miami-Dade Transit Ridership Reports. October 2011 through September 2012.

The large variation in station utilization among the individual stations is dependent on station area development, transit connections, park-and-ride facility capacities, and location with respect to highways for park-and-rides connections. At stations where utilization is very high, the station areas are typically major employment centers, transit connection locations for major employment centers (such as Douglas Road to Coral Gables), and end-of the line park-and ride centers with quick access to the expressway network (Dadeland North and Dadeland South). **Figure II-4.3** illustrates the relationships for each station's average annual weekday boardings, park-and-ride volumes, station area residential population, and station area employment.

Figure II-4.3
US-1 Corridor Station Utilization, Station Area Residents, and Station Area Employment



Sources: Miami-Dade Transit Ridership Reports. October 2011 through September 2012; 2010 Census data

The data that is used for **Figure II-4.3** is provided in **Table II-4.1**.

Table II-4.1
US-1 Corridor Basis Values:
Station Area Populations, Employment, Station Parking, and Station Boardings

	Station Area Population	Station Area Employment	Parking Capacity	Parking Utilization (max. month)	Metrorail Weekday Boardings	Metrorail Saturday Boardings	Metrorail Sunday Boardings
Civic Center	5,539	4,782	0	-	5,943	1,076	815
Culmer	3,823	58	10	data not available	1,290	706	518
Overtown	5,182	3,938	588	data not available	1,735	485	378
Government Ctr.	7,242	35,255	0	-	10,957	4,778	3,546
Brickell	14,255	5,001	0	-	4,326	2,081	1,644
Vizcaya	5,489	485	62	66%	1,312	645	481
Coconut Grove	6,210	1,073	107	52%	1,854	1,142	860
Douglas Road	6,913	2,177	212	85%	3,973	1,826	1,399
University	919	1,144	210	52%	1,977	685	503
South Miami	3,696	3,977	893	50%	311	1,721	1,202
Dadeland North	3,592	1,486	1,774	90%	6,284	2,567	1,893
Dadeland South	7,125	7,973	1,235	91%	6,934	3,122	2,407
Corridor Total	**69,985**	**67,349**	**5,091**	**61%**	**46,896**	**20,834**	**15,646**

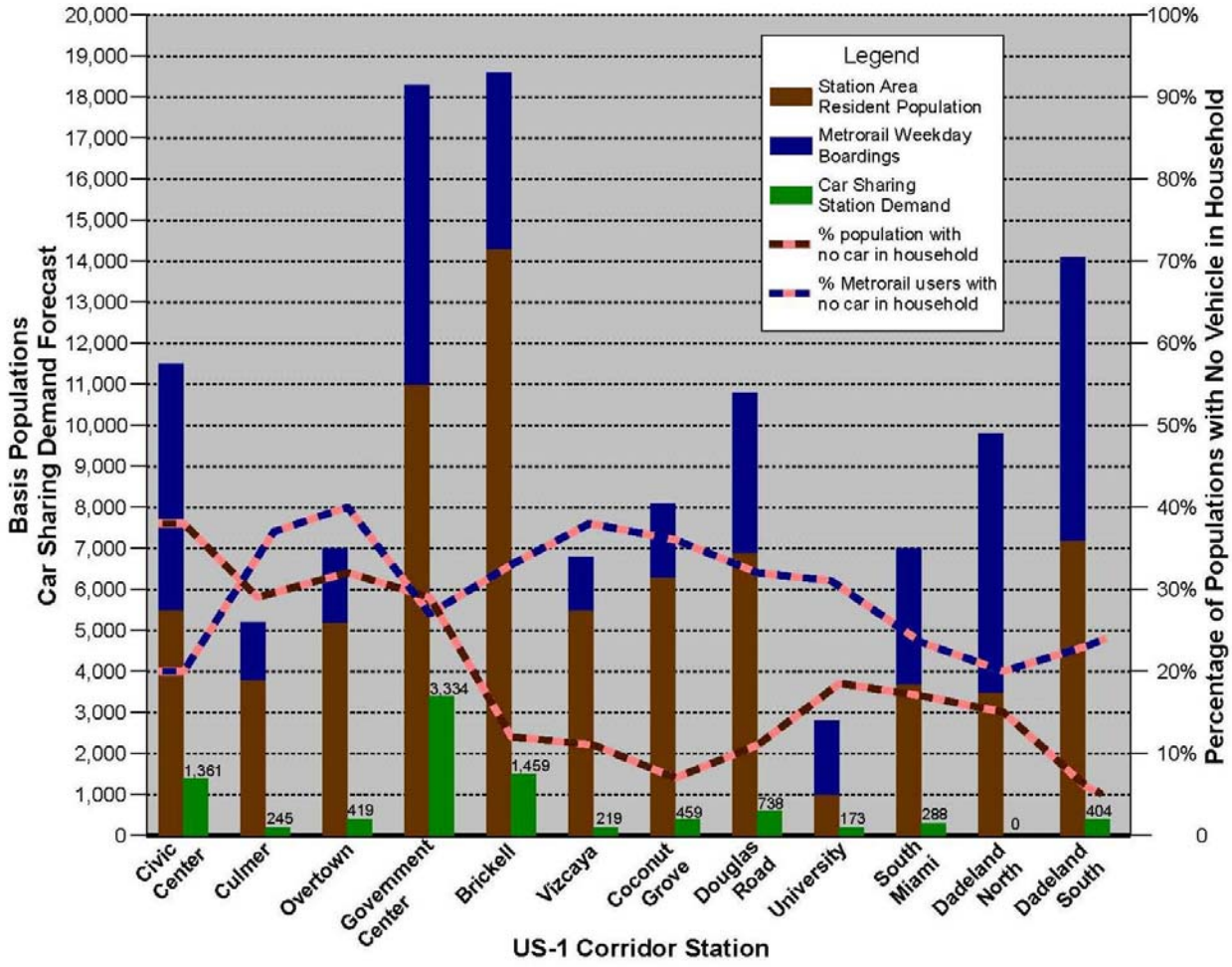
Sources: US Census 2010, American Community Survey, and Miami-Dade Transit Ridership Reports. October 2011 through September 2012; 2010 Census data

II-4.B.2. Methodology Results

The sections that follow provide the summary of results of the demand methodology as applied to each station. The demand for car sharing is dependent on factors that include: station ridership (boardings and alighting), station area population, and station area employment. Other factors being equal, the higher the density of employment and population within the station area, the greater the expected demand for car sharing. Similarly, the greater the number of transit riders using the station, the greater the expected demand for car sharing.

The raw factors are further influenced by the characteristics of these potential populations. Eleven demographic variables are used that describe characteristics of: household size and composition; vehicles ownership; and mode of travel for home-based work commutes. To illustrate the influence of these characteristics by example, **Figure II-4.4** illustrates the impact of one of the eleven characteristics, auto ownership, on car sharing demand for each station.

Figure II-4.4
US-1 Corridor Station Car Sharing Demand
Population, Station Utilization, and Effect of Auto Ownership by Basis Populations



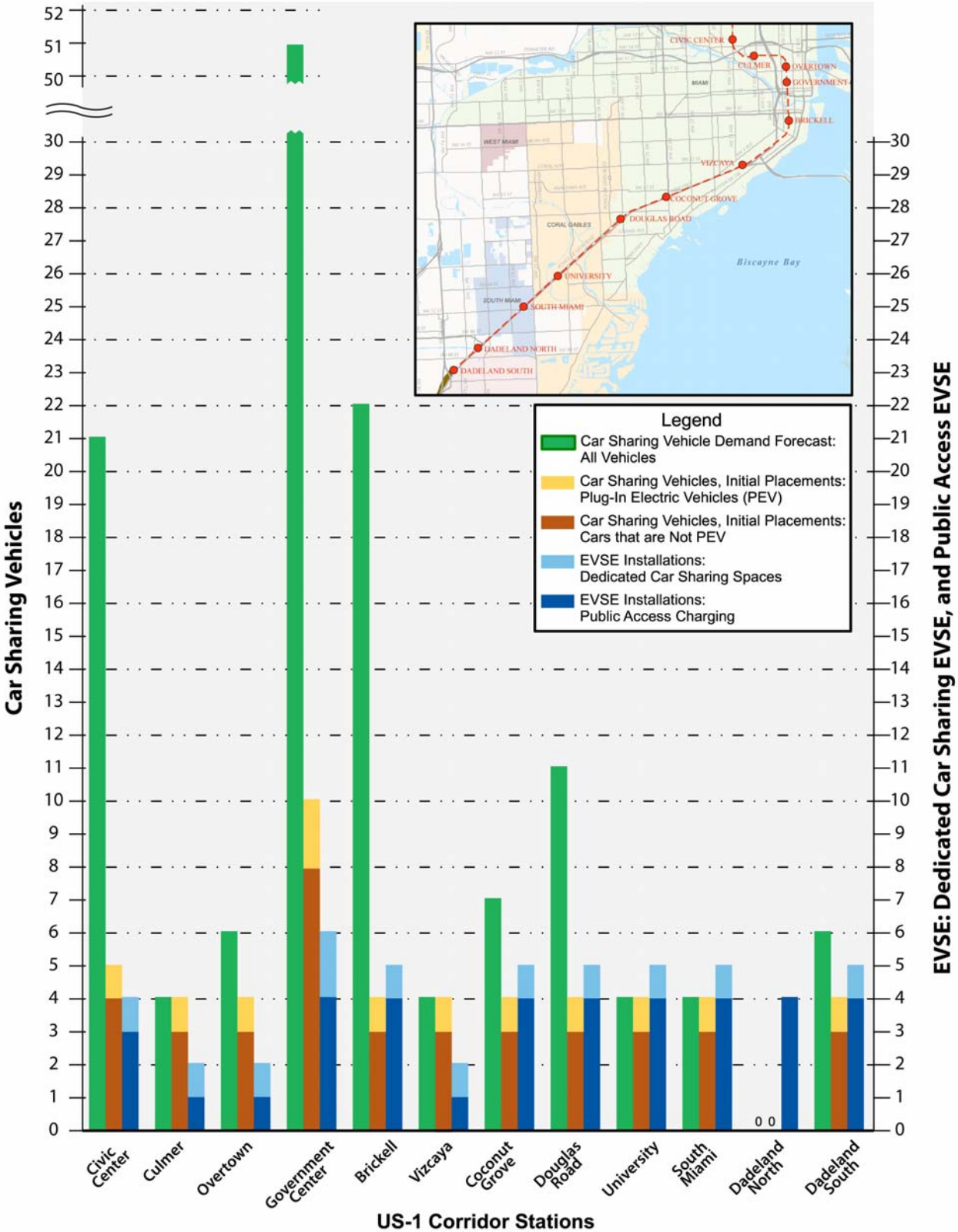
The calculated station-based demand for car sharing membership is compared to station area populations and station boardings, and is also compared to auto ownership patterns for these populations. Auto ownership has a negative correlation to the demand for car sharing membership. Conversely, households with no vehicle have a strong positive predictive relationship to the demand for a person in the household to join as a car sharing member. The stacked brown (station area population) and blue (station weekday boardings) bars illustrate the sum of the basis, or the total population that can create a demand for car sharing membership. Based on populations only, all of the green bars that represent the demand for car sharing membership for each station should be proportional to the stacked blue and brown bars, but they are not. For example, Government Center and Brickell have almost the same combined basis population (Government Center = 18,199; Brickell = 18,581); however, the car sharing demand at Government Center is 3,334 versus 1,459 at Brickell: over double. The reason for this is the effect of the eleven variables. In this case, it can be seen that the percentage of the population that live in a household with no car in the Government Center station area is almost 2½ times that in Brickell. This characteristic in combination with the others increases demand disproportionately to the basis populations and accounts for much of the variation for the car sharing demand among the different stations. In the case presented here, the proportion of households without a car varies in an expected way among station areas, verifying the link between auto ownership and income levels, urbanization (density, fine street grid, etc.), and the presence of student populations. The auto ownership characteristic among Metrorail riders is, as expected, not as sensitive since for many it is not their home station.

Based on the methodologies described, the demand for car sharing, initial placement of car sharing vehicles and car sharing PEV, dedicated EVSE, and public EVSE have been assessed for the 12 Metrorail stations. **Table II-4.2** lists, and **Figure II-4.5** illustrates the summary results for the 12 Metrorail stations of the US-1 Corridor.

Table II-4.2
US-1 Corridor Car Sharing and EVSE Requirement Results

Station	Demand		Vehicles			EVSE	
	Residential Demand	Transit Linked Demand	Total	Initial Placement (all veh.)	Initial Placement PEV	Car Sharing Program	Public Use
Civic Center	330	1,031	21	4	1	1	4
Culmer	0	245	4	4	1	1	1
Overtown	59	360	6	4	1	1	1
Government Center	1,824	1,510	51	10	2	2	4
Brickell	381	1,078	22	4	1	1	4
Vizcaya	0	219	4	4	1	1	1
Coconut Grove	0	459	7	4	1	1	4
Douglas Road	0	738	12	4	1	1	4
University	0	173	4	4	1	1	4
South Miami	0	288	4	4	1	1	4
Dadeland North	0	0	0	0	0	0	4
Dadeland South	0	404	6	4	1	1	4
Total for Corridor	**2,594**	**6,505**	**140**	**50**	**12**	**12**	**39**

Figure II-4.5
US-1 Corridor Station Car Sharing Demand, Vehicles, and EVSE Requirements



II-5. Potential System Integration Opportunities

II-5.A. Solar Integration

The planning also considered opportunities for integrating solar photovoltaic (PV) at the car sharing locations. A total of three Metrorail stations were identified as having favorable conditions to co-locate solar PV and electric vehicle service equipment (EVSE). The stations could be outfitted with PV panels mounted on either carports or building roofs. Both carport and roof top solar systems would be designed such that, if there are no cars being charged, any electricity that is generated is fed back to the grid or building for other uses.

Determining the best location for photovoltaic panels include the following considerations:

1. **Unobstructed overhead area:** Areas that receive a lot of sun with limited or no shade from nearby structures or landscaping will assure a continued source of sun energy.
2. **Southeast exposure:** In North America, the sun has a southern path. Orienting photovoltaic panels to face the southeast direction will capture sunlight effectively and with better performance, versus facing direct south.
3. **Wind and height:** A roof top system needs to consider wind and height factors. Wind load factor increases as building height increases, which may make it unsuitable beyond certain heights. Solar panels may come loose and become potentially hazardous, especially during hurricane season.
4. **Available grid interconnection:** Solar PV is to be grid-connected, which decouples sizing of panels from EVSE requirements, allowing optimal utilization of both solar generation and EVSE equipment. Having the solar PV connected to the grid allows the energy produced by the panels to be used when available, regardless of whether an electric vehicle is connected to the EVSE and demanding power. This maximizes utilization of the solar PV generation. When a vehicle is connected to the EVSE and demanding power, the co-located solar PV, when available, provides local power to the EVSE with higher efficiency than other grid sources because of lower line losses.
5. **Sciography:** A detailed sciography study is also recommended be completed to best locate a solar system on site. Using available zoning information for maximum heights allowed for surrounding land uses will help determine any future shade issues which may make the system less effective.

A preliminary assessment of the above criteria suggest that Metrorail garages, which are on average 12 stories high, are not be candidates for a photovoltaic system. However, a photovoltaic carport system is better suited and can be designed utilizing existing open surface parking lots. As discussed in the respective station master plans, the Metrorail stations that meet these criteria were: Culmer Station, Vizcaya Station, and Coconut Grove Station.

Sizing of the solar panel configuration was driven primarily by available space and unobstructed panel areas vs. kW rating of the EVSE. This is because the solar PV is to be grid-connected, which decouples sizing of panels from EVSE requirements, allowing optimal utilization of both solar generation and EVSE equipment. A solar panel generates an average of 265 watts, and measures approximately 3'x5'. Based on these specifications, each charger will require approximately 27 solar panels measuring approximately 400 square feet. Using this as a guideline, solar carports can be designed to cover a minimum of two spaces (9'x18' per parking space), with a dual charger between both spaces. The identified stations have a minimum EVSE requirement of 2 spaces.

II-5.B. Smart Grid Integration

Integrating Smart Grid technology is also possible for this project. Florida Power & Light Company (FPL) has completed the Energy Smart Florida (ESF) Project under the DOE's Smart Grid Investment Grant (SGIG) Program. ESF is a comprehensive project to advance Smart Grid functionalities through end-to-end integration and crosscutting automation of FPL's grid. Among other things, ESF has impacted FPL's customers through investments such as 4.5 million advanced digital meters (AMI).

For this project, use of advanced meter infrastructure technology will support the proposed data collection program. Integration of AMI technology with smart EVSE units will allow the project to monitor and collect key grid impact measures, such as peak (kW) demand and total energy usage (kWh).

The master planning also considered the use of advanced metering infrastructure (AMI) technology to support a proposed data collection program. Integration of AMI technology with smart EVSE units will allow the project to collect data for analysis of the logistics of the program (how many vehicles, how many charging stations, where vehicles are needed, where they go, etc.)

II-5.C. Data Collection and Consumer Survey Programs

The objectives of the data collection and consumer survey programs are to collect PEV and EVSE usage data and consumer impressions for the US-1 Corridor Project to better understand program demand, usage patterns, and customer satisfaction in order to support decision-making about future program expansion.

Metrics will be a key component of this pilot project that will allow analysis of the overall potential. When the charging stations are used, how much they are used, how the vehicles are used, and customers' impressions will all help determine the program's potential. In order to measure these metrics, three main data collection components are necessary:

1. Electric/Electric Vehicle Service Equipment (EVSE) Usage
2. Vehicle Usage
3. Customer impressions

II-5.C.1. Electric/EVSE Usage

Electric vehicles require a connection to an electric source in order to re-charge their batteries. Charging is done directly from the electric grid. While off-grid charging is theoretically possible using solar/wind power or a generator, there are currently no economically feasible ways for this type of charging. Due to safety concerns – for the person charging, the vehicle, and the circuit – vehicle charging is accomplished via electrical vehicle service equipment (EVSE) also known as a charging station.

There are two main types of EVSEs: networked and non-networked. Non-networked EVSEs are essentially an extension cord that provides limited communication between the vehicle and the electricity source. Networked EVSEs, also known as 'smart' EVSEs, have many capabilities in addition to the vehicle-to-grid communications. Smart EVSEs provide data showing when, how long, and how much a vehicle is charged. They also have additional capabilities for monitoring if the charging station is in use, scheduling charging, reserving a charging station, and identifying who charged.

For purposes of this program, it is necessary to understand both the usage of the charging station and demands on the grid from vehicle charging. The EVSEs in each location will have a common AMI (Advanced Meter Infrastructure) meter that will provide hourly data showing the usage and load drawn from the grid. It will also allow for analysis of the impacts on the transformer.

A networked EVSE is recommended for this project to communicate individual charging data and allow for logistical control of the charging stations. Two types of data will be collected from the charging stations: electrical usage (time stamp when vehicle was plugged in and times stamp of charge start, amount of charge in kWh, and the charge rate in kW) and logistical data (who plugged in, car that was plugged in, reserved vs. opportunity, etc.). These data can be paired up with AMI data to understand both the usage of the EVSE as well as any potential grid impacts due to this type of commercial charging.

A key data measure to understand program effectiveness of this pilot will be the EVSE utilization rate – a derived value based on start/end time of charge and power events.

II-5.C.2. Vehicle Usage

Electric vehicles provide telematics that give driving statistics. These telematics will allow analysis of how far vehicles drive, where they drive, how often they are used, etc. Telematics analysis will show optimum number of cars, best locations, where charging stations need to be, and how many charging stations are necessary.

Again, a key data measure for determining program effectiveness will be the PEV utilization rate. Basic data to be collected to determine vehicle utilization rates and other key analytics include:

- Vehicle type
- Vehicle kW rating (of charger)
- Miles driven
- Time of departure
- Time of return

II-5.C.3. Customer Impressions

The final data component is for research regarding customer impressions. Getting information directly from the customers will provide insight into how the customers liked, or didn't like, the program, in addition to identifying what components worked well and what didn't. The research can be further divided into two types: quantitative and qualitative research. The quantitative research will involve surveys which can be conducted online, via paper/comment cards, or over the phone. Survey research will indicate demographics and will provide a basis of forecasting various components of the program. The qualitative research would involve one-on-one interviews or small focus groups where customer reactions can be probed. While the qualitative research will not provide statistically significant results, it will allow for insights into the customer behavior that is not possible through quantitative means.

II-5.C.4. Summary

These three components taken together will allow for a full program analysis, as each provides information component not available in the others. Developing these components early on in the project implementation process will be important to ensuring the key learning's from the pilot are captured and available for decision-making about future program direction.

II-6. Permitting

II-6.A. Background

To ease the deployment of charging stations there is a need to streamline EVSE installation, permitting and inspection. To address this need, the Project Team engaged key stakeholders to form the Permitting Technical Review Committee (PTRC). The goal of the PTRC was is to create a streamlined EVSE permit process requiring fewer documents to be submitted, a reduced application fee, and an expedited review process. The analysis and recommendations that follow in this section was undertaken with the input and guidance of many stakeholders who participated in the PTRG. Members of the PTRG who participated in shaping this section without formally endorsing the recommendations include those professionals in the table below.

Permitting Technical Review Group

Name		Organization
Tom	Marko	Miami-Dade County, Permitting, Environment & Regulatory Affairs
Stuart	Bazerman	Miami-Dade County, Permitting, Environment & Regulatory Affairs
Flavio	Gomez	Miami-Dade County, Permitting, Environment & Regulatory Affairs
Michael	Goolsby	Miami-Dade County, Permitting, Environment & Regulatory Affairs
Mike	Lugo	Miami-Dade County, Permitting, Environment & Regulatory Affairs
Oriol	Haage	Miami-Dade County, Permitting, Environment & Regulatory Affairs
Vladimir	Markoski	Miami-Dade County, Permitting, Environment & Regulatory Affairs
Lorenzo	Agemho	Palm Beach County, Planning Director
Andy	Kinard	CarCharging, President
Suzanne	Tamargo	CarCharging, Director of Marketing & Public Relations

Several meetings and interim telephone conversations were held with the members of the PTRG. An initial project introduction and general issues meeting was conducted. This was followed by an EVSE permit dry-run meeting in which the technical requirements for EVSE and various parking scenarios for PEV were reviewed by the PTRG. Key issues identified in the EVSE permit dry-run meeting were:

1. For all new EVSE, conduct an analysis of the capacity of the existing service to support the proposed electrical load. If service or equipment upgrades are required, calculations and specification need to be included in the application.

2. A pre-approval meeting for any EVSE project is recommended. If existing service and facilities have capacity for the proposed EVSE, the pre-approval meeting will not require an electrical review.

3. Design of EVSE should be detailed in the application, including whether the equipment will be installed as overhead, underground or from an existing building. Details on whether the installation would require a foundation, including depth and height would need to be included in the application.

4. Application drawing should include site plan, location of EVSE, ADA compliance, equipment specifications, and any other pertinent information needed to make a determination. For example, if the charger requires mechanical ventilation, a mechanical plan would need to be provided.

5. Parking space assignment for EVs would be regulated by existing zoning standards, and would need to be approved by the Zoning Department prior to approval of the permitting.

6. All spaces would need to comply with Florida Accessibility Code.

7. All signage would be regulated by the zoning code.

8. For solar integration with EVSE, a photovoltaic permit would be needed. This would be processed separately through the County's solar permitting process.

II-6.B. Permitting Process for EVSE

The PTRG also examined the current permit review process and made suggestions for a refined EVSE review process.

Currently, an EVSE application would be filed under a general residential or general commercial category, depending on proposed end user. The general category requires review by all departments. As interest in EVs increase, and a larger volume of EVSE applications are processed, a special electrical category could potentially be developed. This category would have limited departmental review, and would consequentially have lesser impact fees. A sample Application for Installation of Electric Vehicle Charging Equipment is included in Volume I.

II-6.B.1. Potential Future Permitting Process for EVSE

The County current permit process requires submittal of completed Permit Application identifying the Building Permit Category as 01 (Commercial) or Category 02 (Residential). These two categories are considered general categories and are used for permits that don't fall into any specific sub-category and for which there is not enough volume to create a dedicated application category.

All general permit applications will be reviewed by the following County departments:

- Building
- Zoning
- Public Works
- Structural
- Mechanical
- Electrical
- Plumbing
- Impact Fees
- Fire
- Water and Sewer
- DERM
- Concurrency

A fee is associated with each reviewing department, and is included with other administrative fees when the application is initially submitted.

Developing a streamlined and expedited permitting application process for EVSE would encourage greater PEV adoption. Such a permitting process necessitates pre-approval of the equipment to be installed. Pre-approval requires submittal of a typical set of drawings and specifications of the EVSE, a completed application, and check for the review fee. Once submitted, all the County departments review the drawings and specifications, make comments and request changes (if needed), and approve a master document for the particular EVSE submitted.

Approval of the master document establishes a refined review process and fee for future permit applications for the pre-approved EVSE. The refined review process will identify County departments which need not review subsequent applications for the specific EVSE type and departments which will review future permit applications for a given EVSE type. Following pre-approval the County may create a separate Building Permit Category depending on the expected permitting volume for the EVSE. Once the equipment is pre-approved the applicant would submit an application referencing the master approval, pay the revised application fee and wait for the application to move through the streamlined review process.

Pre-approval will likely establish that departments which do not need to review any EVSE permits include:

- Mechanical
- Plumbing
- Impact Fees
- Water and Sewer
- DERM
- Concurrency

It is likely permit applications for single-family residential would only require review by:

- Building
- Structural
- Electrical

Multi-family residential and commercial would likely be reviewed by:

- Building
- Zoning
- Public Works
- Structural
- Electrical
- Fire

II-7. Project Specific Siting Criteria

This section discusses siting criteria derived from research and benchmarking undertaken to develop this master plan. These criteria are presented to help guide others who may be considering a similar project. The scope of the criteria range from regional to neighborhood to site specific attributes to consider when siting a car share program that includes PEV and EVSE.

This section presents the range of criteria - from regional to site layout – that forms the framework for the plan.

II-7.A. Regional Siting

Criteria used to select the US-1 Corridor as the study area for this future demonstration project are as follows:

- Encompasses a dense-urban core with a thorough mix of land uses;
- Proximate to significant potential markets including residents, major attractors (businesses, government, universities, conference centers, etc.), and visitors (tourist, business, medical, etc.)
- Served by rail mass transit with stations approximately 1-mile apart;
- Visible and available to 55,000 daily Metrorail riders and to vehicle passengers in over 100,000 daily vehicles on US-1.

II-7.B. Local Siting

Criteria used to select the Metrorail stations as the potential locations for the car share pods include:

- Location where 55,000 daily Metrorail passengers change modes of transportation;
- Opportunity to enhance transit ridership by providing a vehicle for the user to complete the trip;
- Dedicated public parking garages and/or surface lots with capacity to host the pods;
- Limited number of public entities control the parking facilities.

II-7.C. Vehicle and EVSE Quantity

Criteria used to establish the number of car share and PEV vehicles per station include:

- Household characteristics, such as, number of 1-person household, households with children, rental households;
- Number of vehicles per household;
- Transportation mode to work including drive alone, carpool, transit, walk;
- Neighborhood geographic characteristics, such as, housing units and intersections per acre.

II-7.D. Site Design

Criteria used to locate the EVSE and associated parking spaces are presented below.

- Proximity to existing electrical panels is an important factor in locating EVSE in parking areas. The length of the circuit run and the number of stalls will have a significant impact on the cost. Ideally, parking should be as close as possible to an existing electrical panel with power capacity.
- Minimize disturbance to existing facilities and infrastructure as the amount and complexity of the installation and surface repairs affects cost. Cutting, trenching, and drilling to add new conduit for an PEV charging station can be expensive.
- Lighting is an important consideration in siting EVSE in public areas. Adequate lighting is needed for safety and convenience. Lighting should be sufficient to easily read associated signs, instructions, or controls on the EVSE and provide sufficient lighting around the vehicle for all possible PEV inlet locations.
- Vandalism and personal safety at PEV charging sites vary according to site characteristics. Places with these issues can be evaluated according to quality of existing night lighting, activity areas, and lines of sight – all of which correlate with reduced crime. Charging stations sited in areas perceived as safe will likely receive more utilization.

II-7.E. Solar PEV Charging Station Siting Criteria

The needed access to sunlight will guide the siting choices for combined charging station/solar panel installations. Both existing and future planned structures and landscaping that might obstruct access to sunlight should be analyzed to ensure access throughout the year. For solar panels and carports, unobstructed overhead area, southeast exposure, wind load factors, building heights, and available grid interconnection which decouples sizing of panels from EVSE requirements, and allows for optimal utilization of both solar generation and EVSE equipment are important criteria and assure a continued source of energy. Determining the best location for photovoltaic panels should include the following considerations:

Unobstructed overhead area: Areas that receive a lot of sun with limited or no shade from nearby structures or landscaping will assure a continued source of sun energy.

Southeast exposure: Orienting photovoltaic panels to face the southeast direction will capture sunlight effectively and with better performance, versus facing direct south.

Available grid interconnection: Solar PV is to be grid-connected, which decouples sizing of panels from EVSE requirements, allowing optimal utilization of both solar generation and EVSE equipment. Having the solar PV connected to the grid allows the energy produced by the panels to be used when available, regardless of whether an electric vehicle is connected to the EVSE and demanding power. This maximizes utilization of the solar PV generation. When a vehicle is connected to the EVSE and demanding power, the co-located solar PV, when available, provides local power to the EVSE with higher efficiency than other grid sources because of lower line losses.

Wind and height: A roof top system needs to consider wind and height factors. Wind load factor increases as building height increases, which may make it unsuitable beyond certain heights. Solar panels may come loose and become potentially hazardous, especially during hurricane season.

A preliminary assessment of the above criteria suggest that Metrorail garages, which are on average 12 stories high, may not be the best candidates for a photovoltaic system. However, a photovoltaic carport system is better suited and can be designed utilizing existing open surface parking lots. Metrorail stations that meet these criteria are Culmer Station, Vizcaya Station, and Coconut Grove Station.

II-8. Station Master Plan

The following section presents and discusses the master plans for each of the 12 station areas. The results of the car sharing demand assessments and EVSE requirements analysis for each US-1 Corridor Station presented in the previous sections are applied to each of the 12 station areas and form the basis for each station master plan. Starting from the north and continuing to the south, each station master plan is presented separately using a standard format, as follows:

- Geography
- Resident Demographics
- Employment
- Major Destinations
- Metrorail Station
- Car Sharing Demand
- Car Sharing Vehicles and Car Sharing PEV
- Existing Car Sharing Programs
- EVSE Requirements
- Project Siting

II-9. Civic Center Station Master Plan

II-9.A. Geography

The Civic Center Station Area includes 396 acres that are located 1.2 miles from downtown Miami, along the Metrorail alignment. It is in a highly urbanized area of Miami-Dade County with high intensity institutional uses and a low to medium density residential area to the west. The street grid includes 24 intersections within the ¼-mile radius. Intersections per square mile is an indicator of walkability of the area (see **Appendix II-4.A** for discussion of market variables). By comparison the downtown Miami Government Center station area street grid has 119 intersections within its ¼-mile radius station area.

II-9.B. Resident Demographics

The demographic analysis of the station area used census tract 3004, block groups 1 and 2; and tract 3001, block group 1 of the US Census 2010 and American Community Survey. The predominantly residential tract group to the southeast was not included in the Civic Center area because most of this area is cut off from having good pedestrian connectivity to the station by berms of the elevated Dolphin Expressway (SR 836). This area is included as part of the Corridor analysis in the Culmer Station area.

Station Area Population:	5,539	(8% of corridor total)
Station Area Population over 18	4,819	
Station Area Households	1,192	
Residential Density (DU/Ac.)	5.4	
Employed Resident Workforce	2,235	(46% of persons over 18)

II-9.C. Employment

The station area is a major employment center for the County, with a total of 4,782 workers. The station area employment is predominantly made up of the following industry sectors:

Health Care and Social Assistance	3,211 employees	67% of employment
Public Administration	845 employees	18% of employment
Public Services (excluding public administration)	345 employees	7% of employment
Accommodation and Food Services	177 employees	4% of employment

Major employers include:

Jackson Memorial Hospital
Cedars Medical Center
Veteran's Hospital
Miami-Dade County Justice Building and Courts
University of Miami School of Medicine
Palmer Eye Institute
Miami-Dade County Health Department

Figure II-9.1
Map of Metrorail Line showing Civic Center Station Location

Figure II-9.2
Aerial View of Civic Center Station with Quarter-Mile Radius and Block Group Boundaries

II-9.D. Major Destinations

The Civic Center Metrorail Station, along with the Culmer Station is the closest Metrorail Station to the recently opened (March 5, 2012) Marlin's Park Stadium. The 37,400-seat baseball stadium is less than one mile from the Civic Center Metrorail Station

II-9.E. Civic Center Metrorail Station

The Civic Center Metrorail Station is elevated above the intersection of NW 12th Avenue and NW 15th Street in the City of Miami. The Civic Center Station does not include a County-owned park-and-ride facility. Miami-Dade Transit (MDT) Metrorail service is provided by the Green Line and the Orange Line. Connecting bus service is available by five MDT bus routes.

Route 12	north to 79th Street and south to Mercy Hospital and Vizcaya
Route 32	north to North Dade and south to the Omni Area
Route 95X	express commuter service to the Golden Glades Park-and-Ride in North Dade
Route M	east to Miami Beach, and the Mount Sinai Medical Center

The Civic Center Station is among the better utilized stations in the Corridor. The average annual weekday station utilization for the year from October 2011 through September 2012 is:

Average Weekday Station Boardings	5,943	(12% of Corridor total)
Station Parking Capacity	0	
Metrorail Parking Utilization	N.A.	

II-9.F. Car Sharing Demand

Table II-9.1 summarizes the car sharing market analysis inputs to predict potential car sharing demand for the Civic Center Station.

Table II-9.1
Civic Center Station Car Sharing Demand Assessment

	Correlation	Station Area Residents	Station Weekday Passenger Boardings
Basis			
Area Population and Station Utilization	-	5,539	5,943
Demographics			
1-Person Households	Positive	63%	12%
Households with Children	Negative	45%	data not available
Rental Households	Positive	94%	data not available
Auto Ownership			
Household with No Vehicle	Positive	38%	20%
Household with 1 Vehicle	Positive	53%	29%
Average Number of Vehicles per Household	Negative	0.72	1.21
Travel Mode to Work or Travel Mode to Metrorail Station			
Drive Alone	Negative	60%	3%
Car Pool	Negative	13%	1%
Transit	Positive	10%	6%
Bike	Negative	0%	0%
Walk	Positive	13%	89%
Car Sharing Demand			
Car Sharing Demand		330	1,031

II-9.G. Car Sharing Vehicles and Car Sharing PEV

The market assessment results have been used to determine the number of vehicles and electric vehicles that are forecast for the Civic Center Station car sharing program, with the results summarized in **Table II-9.2**.

Table II-9.2
Civic Center Station Car Sharing Vehicles

	Vehicles / PEV
Car Sharing Demand	1,361
Car Sharing Vehicles: Total	21
Car Sharing Vehicles: Initial Placement – All Fuels	**4**
Proportion of PEV Car Sharing Vehicles	25%
Car Sharing Plug-In Electric Vehicles at Station	**1**

II-9.H. Existing Car Sharing Programs

The University of Miami which owns medical facilities in the Civic Center Station Area has an existing agreement with Zip Car for a car sharing program at its main campus in Coral Gables; however, Zip Car and the University do not have a car sharing program at the Medical Center. There are no known plans at this time for Zip Car to place a car sharing program at this location, but Zip Car does have experience with car sharing PEV, as it has PEV deployed as part of its fleet in the San Francisco Bay Area.

On July 28th 2012, Car 2 Go deployed an initial fleet of 240 vehicles for its car share program in Miami. The Car 2 Go business model uses a free floating, one-way rental fleet within a home area that encompasses the Civic Center Station Area. At this time, the Car 2 Go Miami fleet is comprised of gasoline SmartFor2 cars. Car 2 Go does not currently have plans to deploy PEV as part of its fleet in the Miami market; however, the company has experience deploying PEV on a large scale as it has in the San Diego Car 2 Go program in 2011.

In October, 2012, South Florida Commuter Services (SFCS) with We Car commenced a car sharing program with a vehicle placed in the Civic Center Station area at NW 14th Street between SW 12th and SW 13th Avenues. The SFCS / We Car program is part of the SFCS 826/836 Incentive Program (highway reconstruction traffic mitigation program) to offer car pool, van pool, and transit commuters discounted car sharing access for day time use at their work locations.

II-9.I. EVSE Requirements

Based on this analysis, an initial implementation of a car sharing program at the Civic Center Station would require 5 spaces for the car sharing program. Of these, 1 would be with an EVSE dedicated for a car sharing PEV. Each dedicated car sharing EVSE will have co-located EVSE for public use, based on an empirical methodology that applies decision model logic to factors that indicate early adopters for PEV ownership and

concepts of locating EVSE at destination locations. The maximum number of public EVSE is capped at 4 EVSE for the purposes of the station area site plans. This recognizes that other EVSE may be installed within the quarter mile radius of the station area. The result of the public access EVSE estimate is summarized in **Table II-9.3**.

Table II-9.3
Civic Center Station Public Access EVSE

Indicator		EVSE		
		Day Use	Night Use	Total
Major Non-Work Destination	Yes	4		4
Employment	4,782			
Transit Riders that Use a Car to Metrorail for a Work Commute Trip and have $80,000+ Household Income	1	0		0
Multi-Unit Dwellings	2,195 93%		0	0
Household Incomes of $100,000 or More	46 2%			
Final Total (rounded up to make total dedicated and public EVSE an even number for efficient siamese installation in 90-degree parking spaces)				**4**

At the Civic Center Station, there are no existing parking facilities that are owned or managed by MDT. Parking capacity for the car sharing program will either be in the City of Miami right-of-way, or by agreement at an appropriately located off-street site. **Table II-9.4** summarizes the final total EVSE requirements.

Table II-9.4
Civic Center Station EVSE Requirements

	EVSE
Car Sharing Program Plug-In Electric Vehicles	1
Dedicated Car Sharing EVSE	1
Public Access EVSE	4
Dedicated and Public EVSE Required	5
Existing EVSE	0
Total Net EVSE Required	**5**

II-9.J. Civic Center Metrorail Station Zoning

The Civic Center Metrorail Station falls within the Miami-Dade Rapid Transit Zone (RTZ), while the surrounding area is located in the Health District and is within the jurisdiction of the City of Miami. There is no County parking associated with the station, and the only public parking available are in the parking garages and lots near the station. The closest and most convenient parking location is the Jackson Memorial Hospital public parking garage located at the southeast corner of NW 16 Street and NW 11 Avenue, and within walking distance of the Civic Center station. Uses allowed within the City of Miami are governed by the Miami 21 Code, and the parking garage falls within the Civic Institution – Health District Zone. While PEV, EVSE and car share are not listed as permitted uses, these uses are appropriate and compatible with the intent of the document. All proposed PEV, EVSE and car share will require approval from the City of Miami Department of Planning of Zoning.

II-9.K. Project Siting

The site for the car share pod and accompanying EVs will be located within the Jackson Memorial Hospital public parking garage near the Civic Center Metrorail Station, as identified in **Figure II-9.3** and **Figure II-9.4**. The location of parking was determined based on the following criteria:

1. **Walk up potential:** The identified parking spaces are located in an area with high foot traffic, making it convenient to both Metrorail users and surrounding employees and visitors of the Health District.

2. **Proximity to station entrance:** The identified location is within walking distance to, and is approximately 500' feet from, the Civic Center Metrorail station.

3. **Visibility:** The identified parking spaces are located in a well lit, landscaped and highly visible area, with close access from the station entrance.

4. **Electric panel availability:** A site reconnaissance was conducted by an electrician on December 19, 2012 to determine electric panel availability and improvements needed for the proposed EVSE. The identified spaces are located two floors above of the electric vault that serves the Jackson Memorial Hospital. For this location, there are no breakers available for Level 2 chargers. Therefore, a new electrical panel and electric conduit connecting the panel to the EVSE will be required.

5. **Parking space ownership:** The identified spaces are owned by the Jackson Memorial Health Trust.

6. **Number of spaces that match demand forecast:** There are available spaces to meet the demand forecast identified in **Section II-9.I.** of this document.

Figure II-9.3
Civic Center Station Project Siting Map

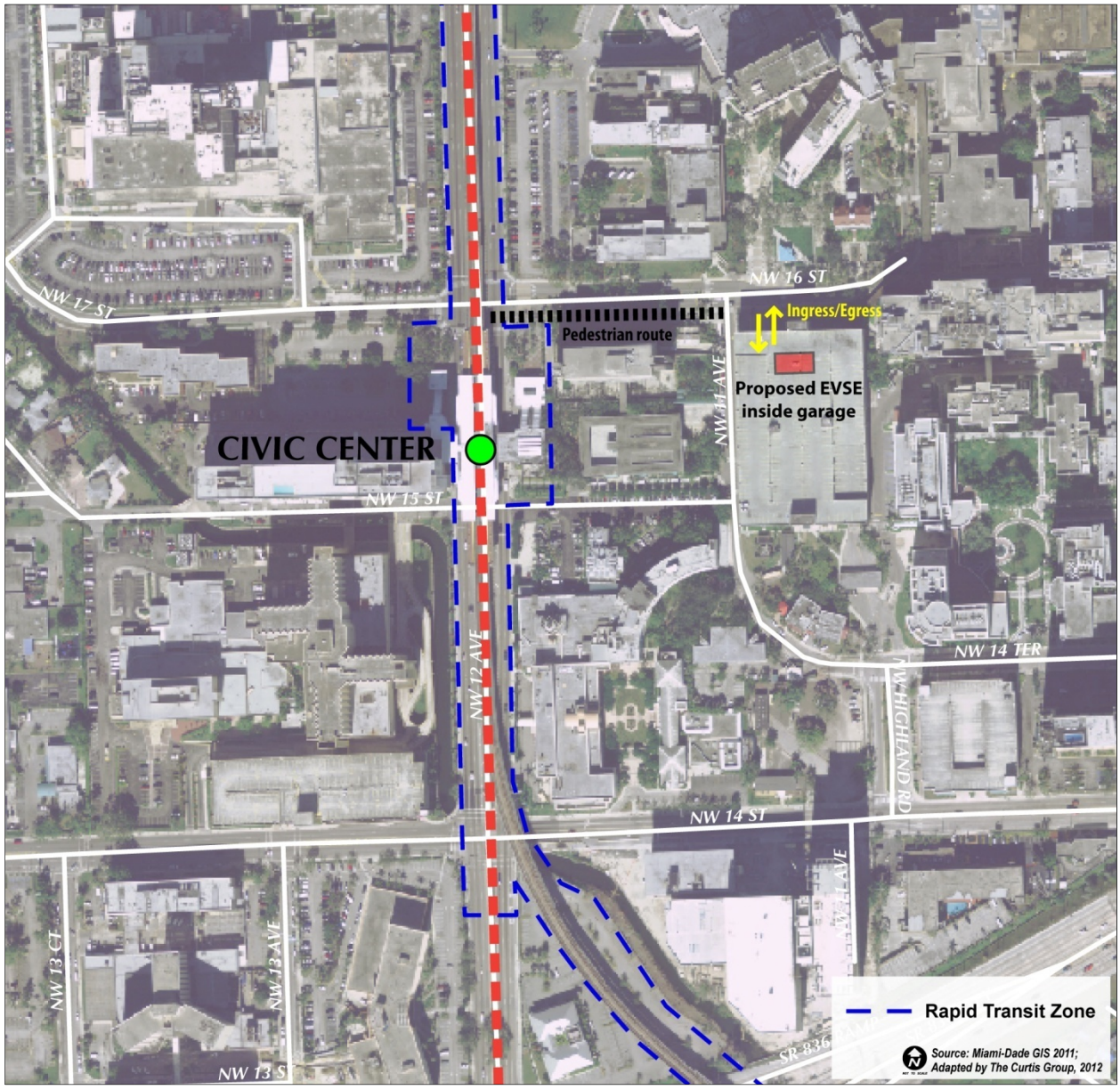


Figure II-9.4
Civic Center Station Project Siting Photos

Proposed location at Jackson Memorial Hospital parking garage

Walk up potential to Civic Center Station

II-10. Culmer Station Master Plan

II-10.A. Geography

The Culmer Station Area includes 300 acres that is located just northwest from downtown Miami, just to the northeast of the Spring Garden neighborhood, and at the southwest edge of Overtown. It is two stops and 1.2 miles from the Government Center Station in downtown Miami. It is in a highly urbanized area of Miami-Dade County with a mix of single family homes, medium and medium-high density multifamily dwellings, particularly toward the west near the Miami River. Booker T Washington High School is located to the north of the station, and some commercial uses line both sides of NW 7th Avenue, especially north of the station. To the south of the station along NW 7th Avenue are boat yards and businesses related to marine industries. The area is somewhat isolated by the large, elevated interchange of I-95 and the Dolphin Expressway (SR-836) to its north and east, with the Miami River and Spring Garden Canal running diagonally to the southwest of the area. The street grid includes 39 intersections within the ¼-mile radius from the station mile which is an indicator of walkability of the area (see **Appendix II-4.A** for discussion of market variables). By comparison, the downtown Miami Government Center station area street grid has 119 intersections within its ¼-mile radius.

II-10.B. Resident Demographics

The demographic analysis of the station area used census tract 3001, block groups 2 and 3; tract 3400, block group 4; and tract 3601, block group 2 of the US Census 2010 and American Community Survey. The station area is one of the less populated station areas that were evaluated for the US-1 Corridor.

Station Area Population:	3,832	(5% of corridor total)
Station Area Population over 18	2,906	
Station Area Households	1,596	
Residential Density (DU/Ac.)	6.3	
Employed Resident Workforce	1,336	(46% of persons over 18)

II-10.C. Employment

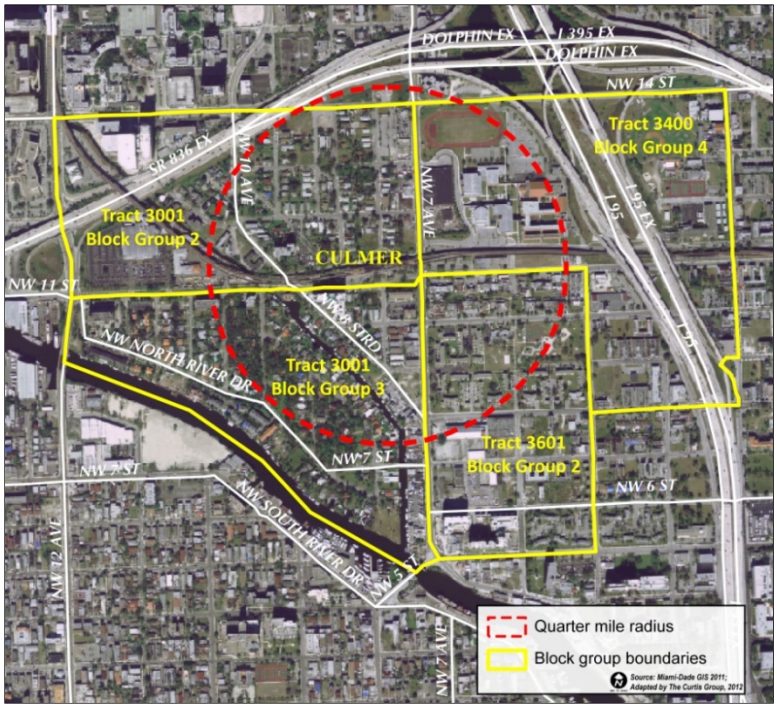
The station area has little employment activity with only 58 employees. Of these most permanent jobs are in small retail (31%) with 36% in construction, as measured at the time of the census. It is possible that there are additional temporary trade workers in the area, particularly related to marine industries along the Miami River and Spring Garden Canal. There are no major employers or other concentrations of employment.

II-10.D. Major Destinations

The Culmer Metrorail Station, along with the Civic Center Station is the closest Metrorail Station to the recently opened (March 5, 2012) Marlin's Park Stadium. The 37,400-seat baseball stadium is approximately one mile from the Civic Center Metrorail Station.

Figure II-10.1
Map of Metrorail Line showing Culmer Station Location

Figure II-10.2
Aerial View of Culmer Station with Quarter-Mile Radius and Block Group Boundaries



II-10.E. Culmer Metrorail Station

The Culmer Metrorail Station is located along NW 11th Street, just west of NW 7th Avenue in the City of Miami. The Station includes a small park-and-ride facility with a 10-space capacity, as well as a drop off / pick-up area for car pool passengers. Miami-Dade Transit (MDT) Metrorail service is provided by the Green Line and the Orange Line. Connecting bus service is available by three MDT bus routes.

Route 77	north to Miami Gardens Drive (NW 187th St) and south to Government Center
Route 277	NW 7th Avenue MAX north to NW 187th Street and south to Government Center
Route 211	Overtown Circulator throughout Overtown and Culmer neighborhoods

The Culmer Station is among the lowest utilized of the stations in the Corridor. The average annual weekday station utilization for the year from October 2011 through September 2012 is:

Average Weekday Station Boardings	1,290	(3% of Corridor total)
Station Parking Capacity	10	
Metrorail Parking Utilization	data not available	

II-10.F. Car Sharing Demand

Table II-10.1 summarizes the car sharing market analysis inputs to predict potential car sharing demand for the Culmer Station.

Table II-10.1
Culmer Station Car Sharing Demand Assessment

	Correlation	Station Area Residents	Station Weekday Passenger Boardings
Basis			
Area Population and Station Utilization	-	3,832	300
Demographics			
1-Person Households	Positive	34%	11%
Households with Children	Negative	70%	data not available
Rental Households	Positive	75%	data not available
Auto Ownership			
Household with No Vehicle	Positive	29%	37%
Household with 1 Vehicle	Positive	56%	25%
Average Number of Vehicles per Household	Negative	0.91	1.34
Travel Mode to Work or Travel Mode to Metrorail Station			
Drive Alone	Negative	61%	4%
Car Pool	Negative	6%	8%
Transit	Positive	23%	38%
Bike	Negative	1%	1%
Walk	Positive	3%	44%
Car Sharing Demand			
Car Sharing Demand		0	245

II-10.G. Culmer Car Sharing Vehicles and Car Sharing PEV

The market assessment results have been used to determine the number of vehicles and electric vehicles that are forecast for the Culmer Station car sharing program, with the results summarized in **Table II-10.2**.

Table II-10.2
Culmer Station Car Sharing Vehicles

	Vehicles / PEV
Car Sharing Demand	101
Car Sharing Vehicles: Total	4
Car Sharing Vehicles: Initial Placement – All Fuels	4
Proportion of PEV Car Sharing Vehicles	25%
Car Sharing Plug-In Electric Vehicles at Station	**1**

II-10.H. Existing Car Sharing Programs

On July 28th 2012, Car 2 Go deployed an initial fleet of 240 vehicles for its car share program in Miami. The Car 2 Go business model uses a free floating, one-way rental fleet within a home area that encompasses the Culmer Station Area. At this time, the Car 2 Go Miami fleet is comprised of gasoline SmartFor2 cars. Car 2 Go does not currently have plans to deploy PEV as part of its fleet in the Miami market; however, the company has experience deploying PEV on a large scale as it has in the San Diego Car 2 Go program in 2011.

II-10.I. EVSE Requirements

Based on this analysis, an initial implementation of a car sharing program at the Culmer Station would require 4 spaces for the car sharing program. Of these, 1 would be with an EVSE dedicated for a car sharing PEV. Each dedicated car sharing EVSE will have co-located EVSE for public use, based on an empirical methodology that applies decision model logic to factors that indicate early adopters for PEV ownership and concepts of locating EVSE at destination locations. The maximum number of public EVSE is capped at 4 EVSE for the purposes of the station area site plans. This recognizes that other EVSE may be installed within the quarter mile radius of the station area. The result of the public access EVSE estimate is summarized in **Table II-10.3.**

Table II-10.3 Culmer Station Public Access EVSE				
Indicator		**EVSE**		
		Day Use	**Night Use**	**Total**
Major Non-Work Destination	No	0		0
Employment	58			
Transit Riders that Use a Car to Metrorail for a Work Commute Trip and have $80,000+ Household Income	0	0		0
Multi-Unit Dwellings	1,528 77%		0	0
Household Incomes of $100,000 or More	160 10%			
Minimum Co-Located EVSE at 1 to 1 Ratio with Car Sharing Dedicated EVSE				1
Final Total (rounded up to make total dedicated and public EVSE an even number for efficient siamese installation in 90-degree parking spaces)				**1**

Culmer Station, there are 10 existing parking spaces that are part of the station. There is no utilization data for these spaces; however, field visits on weekdays suggest that occupancy is in the range of 3 to 5 vehicles. The unused spaces can provide sufficient capacity for the car sharing and EVSE programs. **Table II-10.4** summarizes the total EVSE requirements.

Table II-10.4 Culmer Station EVSE Requirements	
	EVSE
Car Sharing Program Plug-In Electric Vehicles	1
Dedicated Car Sharing EVSE	1
Public Access EVSE	1
Dedicated and Public EVSE Required	2
Existing EVSE	0
Total Net EVSE Required	**2**

II-10.J. Culmer Metrorail Station Zoning

The Culmer Metrorail Station falls within the Miami-Dade Rapid Transit Zone (RTZ). Uses allowed within the RTZ are defined in the Miami-Dade County Code of Ordinances Chapter 33C Fixed-Guideway Rapid Transit System – Development Zone. PEV, EVSE and car share are not listed as permitted uses within this chapter of the Code, but these uses are appropriate and compatible with the operation of the Rapid Transit System and the convenience of its ridership, thereby satisfying the intent and purpose of this Chapter. Therefore, all proposed PEV, EVSE and car share will be considered as an as-of-right use within the RTZ. Although the Culmer Metrorail Station is located within the City of Miami limits, all uses, including those proposed, within the RTZ are under the jurisdiction of Miami-Dade County and will require approval from the Miami-Dade Department of Planning of Zoning.

II-10.K. Project Siting

Project siting for EVs will be located in the Culmer Metrorail Station surface parking lot identified in **Figure II-10.3** and **Figure II-10.4**. Location of parking was determined based on the following criteria:

1. **Walk up potential:** The identified parking spaces are located in an area with high foot traffic, making it convenient to both Metrorail users and surrounding residential neighborhood.

2. **Proximity to station entrance:** The identified parking spaces are located approximately 100 feet in front of the stairway leading to the Metrorail station.

3. **Visibility:** The identified parking spaces are located in a well lit, landscaped and highly visible area, with direct access from the station entrance.

4. **Electric panel availability:** A site reconnaissance was conducted by an electrician on December 12, 2012 to determine electric panel availability and improvements needed. The identified spaces are located in front of the electric vault that serves the Metrorail station. For this location, there are two breakers available for Level 2 chargers. The installation of new conduit will be required connecting the electric vault to the identified PEV spaces. This installation will require approximately 100 feet of trenching through landscaped area, concrete plaza and an asphalt bus drop-off area.

5. **Parking space ownership:** The identified spaces are owned by Miami-Dade County which will help facilitate the permitting process.

6. **Number of parking spaces to meet demand forecast:** There are available spaces to meet the demand forecast identified in **Section II-10.I**. of this document.

7. **Unobstructed overhead area and southeast exposure:** This station is one of the three stations identified for solar integration.

Figure II-10.3
Culmer Station Project Siting Map

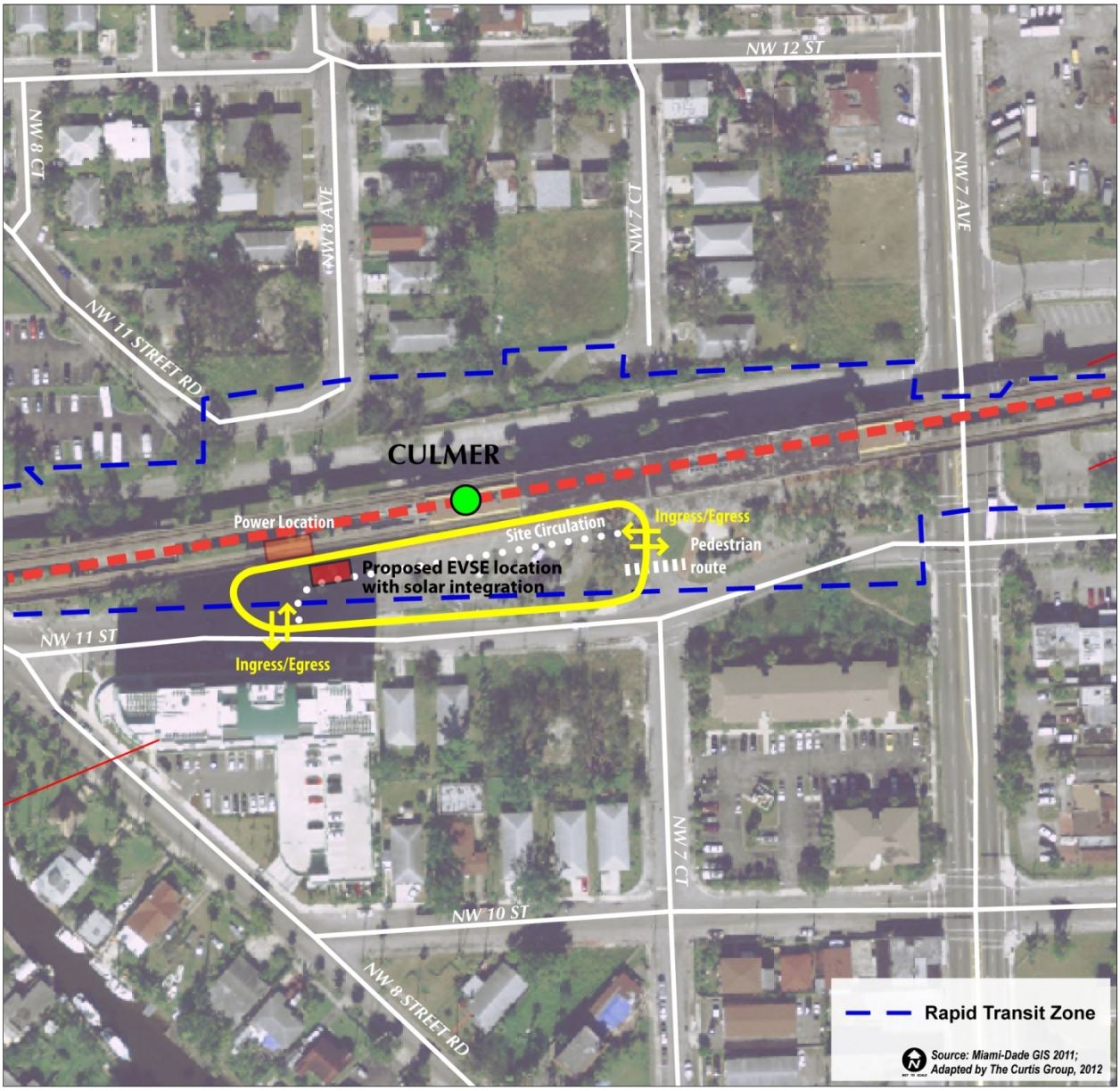


Figure II-10.4
Culmer Station Project Siting Photos

Proposed location

Visibility and walk up potential

II-11. Overtown Station Master Plan

II-11.A. Geography

The Overtown Station Area includes 231 acres that is located at the north edge (0.3 miles) of the downtown Miami central business district (CBD), and is a part of the City of Miami's Overtown / Park West Community Redevelopment Area. It is in a highly urbanized area with a mix of medium and high-density apartments and condominiums, offices, institutional and commercial uses. Most of the commercial uses are located to the east of NW 1st Avenue, and the highest density residential development is at the east edge of the area along Biscayne Boulevard. West on NW 1st Avenue, are mostly medium density apartments and some civic uses. The density and population of the area is lower than expected because of the very high proportion of new vacant residential units at the time of the census as well as large areas of underutilized land. The street 52 intersections within the ¼-mile radius from the station which is an indicator of walkability of the area (see **Appendix II-4.A** for discussion of market variables)

II-11.B. Resident Demographics

The demographic analysis of the station area used census tract 3702, block groups 1, 2, 4, and 6; and tract 3400, block groups 1, 2, and 3 of the US Census 2010 and American Community Survey. The station area is in the middle range of station area populations along the US-1 Corridor.

Station Area Population:	5,182	(7% of corridor total)
Station Area Population over 18	4,341	
Station Area Households	2,365	
Residential Density (DU/Ac.)	14.7	
Employed Resident Workforce	2,234	(51% of persons over 18)

II-11.C. Employment

The station area is a significant employment center for the County, with a total of 3,938 workers. The station area employment is predominantly made up of the following industry sectors:

Public Administration	1,952 employees	50% of employment
Finance and Insurance	898 employees	23% of employment
Accommodation and Food Services	1635 employees	16% of employment

Major employers includes Miami-Dade County, housing employees at the Overtown Transit Village.

II-11.D. Major Destinations

Major destinations include:

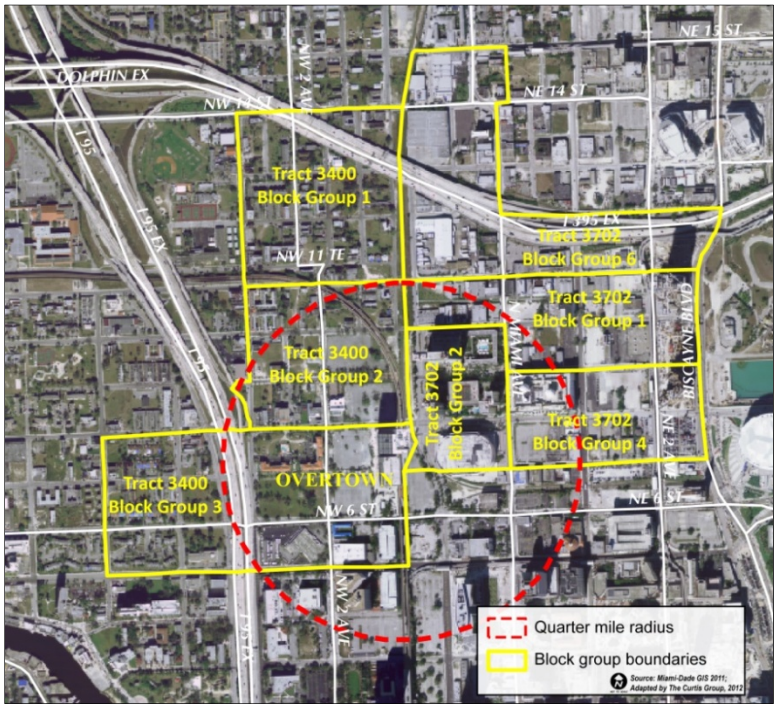
Historic Lyric Theater

Miami Children's Museum (under construction

American Airlines Arena (19,100 seats)

Figure II-11.1
Map of Metrorail Line showing Overtown Station Location

Figure II-11.2
Aerial View of Overtown Station with Quarter-Mile Radius and Block Group Boundaries



II-11.E. Overtown Metrorail Station

The Overtown Metrorail Station is located along NW 1st Avenue at NW 7th Street. It is co-located with the Overtown Transit Village government offices in the City of Miami. The Overtown Transit Village includes a 588- space parking garage with direct access to the station platform, but not a drop-off area for the Metrorail station. The garage includes six Level-1 electrical outlets on the 2nd level ramp along the north wall.

Miami-Dade Transit (MDT) Metrorail service is provided by the Green Line and the Orange Line. Connecting bus service is available by four MDT bus routes.

Route 2	north to the 163rd Street Mall and south to Government Center
Route 7	west to Dolphin Mall via NW 7th Street and south to Government Center
Route 95X	express commuter service to the Golden Glades Park-and-Ride in North Dade
Route 243	Seaport Connection to seaport

The Overtown Station is among the lower utilized stations in the Corridor. The average annual weekday station utilization for the year from October 2011 through September 2012 is:

Average Weekday Station Boardings	1,735	(3% of Corridor total)
Station Parking Capacity	588	
Metrorail Parking Utilization	data not available	

II-11.F. Car Sharing Demand

Table II-11.1 summarizes the car sharing market analysis inputs to predict potential car sharing demand for the Overtown Station.

Table II-11.1
Overtown Station Car Sharing Demand Assessment

	Correlation	Station Area Residents	Station Weekday Passenger Boardings
Basis			
Area Population and Station Utilization	-	5,182	1,735
Demographics			
1-Person Households	Positive	34%	14%
Households with Children	Negative	70%	data not available
Rental Households	Positive	87%	data not available
Auto Ownership			
Household with No Vehicle	Positive	32%	40%
Household with 1 Vehicle	Positive	49%	26%
Average Number of Vehicles per Household	Negative	0.88	1.11
Travel Mode to Work or Travel Mode to Metrorail Station			
Drive Alone	Negative	55%	0%
Car Pool	Negative	8%	6%
Transit	Positive	18%	27%
Bike	Negative	2%	8%
Walk	Positive	10%	53%
Car Sharing Demand			
Car Sharing Demand		59	360

II-11.G. Car Sharing Vehicles and Car Sharing PEV

The demand assessment results have been used to determine the number of vehicles and electric vehicles that are forecast for the Overtown Station car sharing program, with the results summarized in **Table II-11.2**.

Table II-11.2
Overtown Station Car Sharing Vehicles

	Vehicles / PEV
Car Sharing Demand	419
Car Sharing Vehicles: Total	4
Car Sharing Vehicles: Initial Placement – All Fuels	4
Proportion of PEV Car Sharing Vehicles	25%
Car Sharing Plug-In Electric Vehicles at Station	**1**

II-11.H. Existing Car Sharing Programs

On July 28th 2012, Car 2 Go deployed an initial fleet of 240 vehicles for its car share program in Miami. The Car 2 Go business model uses a free floating, one-way rental fleet within a home area that encompasses the Overtown Station Area. At this time, the Car 2 Go Miami fleet is comprised of gasoline SmartFor2 cars. Car 2 Go does not currently have plans to deploy PEV as part of its fleet in the Miami market; however, the company has experience deploying PEV on a large scale as it has in the San Diego Car 2 Go program in 2011.

II-11.I. EVSE Requirements

Based on this analysis, an initial implementation of a car sharing program at the Overtown Station would require 4 spaces for the car sharing program. Of these, 1 would be with an EVSE dedicated for a car sharing PEV. Each dedicated car sharing EVSE will have co-located EVSE for public use, based on an empirical methodology that applies decision model logic to factors that indicate early adopters for PEV ownership and concepts of locating EVSE at destination locations. The maximum number of public EVSE is capped at 4 EVSE for the purposes of the station area site plans. This recognizes that other EVSE may be installed within the quarter mile radius of the station area. The result of the public access EVSE estimate is summarized in **Table II-11.3**.

Table II-11.3 Overtown Station Public Access EVSE				
Indicator		**EVSE**		
		Day Use	**Night Use**	**Total**
Major Non-Work Destination	No	0		0
Employment	3,938			
Transit Riders that Use a Car to Metrorail for a Work Commute Trip and have $80,000+ Household Income	0	0		0
Multi-Unit Dwellings	2,860 97%		0	0
Household Incomes of $100,000 or More	183 8%			
Minimum Co-Located EVSE at 1 to 1 Ratio with Car Sharing Dedicated EVSE				1
Final Total (rounded up to make total dedicated and public EVSE an even number for efficient siamese installation in 90-degree parking spaces)				**1**

The parking facility of the co-located Overtown Transit Village contains 588 parking spaces that can be used for office workers or visitors, and Overtown Station Metrorail riders. There is no utilization data for these spaces; however, there are more than enough exiting EVSE (6) to accommodate the demand for this program. The six Level-I EVSE are currently underutilized by office employees and visitors. **Table II-11.4** summarizes the total EVSE requirements for Overtown Station.

Table II-11.4 Overtown Station EVSE Requirements	
	EVSE
Car Sharing Program Plug-In Electric Vehicles	1
Dedicated Car Sharing EVSE	1
Public Access EVSE	1
Dedicated and Public EVSE Required	2
Existing EVSE	6
Total Net EVSE Required	**upgrade existing PEV**

II-11.J. Overtown Metrorail Station Zoning

The Overtown Metrorail Station falls within the Miami-Dade Rapid Transit Zone (RTZ). Uses allowed within the RTZ are defined in the Miami-Dade County Code of Ordinances Chapter 33C Fixed-Guideway Rapid Transit System – Development Zone. PEV, EVSE and car share are not listed as permitted uses within this chapter of the Code, but these uses are appropriate and compatible with the operation of the Rapid Transit System and the convenience of its ridership, thereby satisfying the intent and purpose of this Chapter. Therefore, all proposed PEV, EVSE and car share will be considered as an as-of-right use within the RTZ. Although the Overtown Metrorail Station is located within the City of Miami limits, all uses, including those proposed, within the RTZ are under the jurisdiction of Miami-Dade County and will require approval from the Miami-Dade Department of Planning of Zoning.

II-11.K. Project Siting

Project siting for EVs will be located in the Overtown Metrorail Station garage and in the surface parking lots on the west side of the Overtown Transit Village building, identified in **Figure II-11.3** and **Figure II-11.4**. The parking spaces identified in the surface parking lots will be solar powered in addition. Location of parking was determined based on the following criteria:

1. **Walk up potential:** The identified parking spaces are located in an area with high foot traffic, making it convenient to Metrorail users, visitors and employees of the Overtown Transit Village, as well as residents and businesses of the surrounding area.

2. **Visibility:** The identified parking spaces are located in well lit, and highly visible areas.

3. **Electric panel availability:** A site reconnaissance was conducted by an electrician on December 19, 2012 to determine electric panel availability and improvements needed. The identified spaces in the garage are existing EVSE enabled spaces, and can be upgraded from the existing six Level 1 chargers to three Level 2 chargers. The identified spaces in the surface parking lot are located close to an electric panel with two breakers available for Level 2 chargers, and will require minimal improvements to install EVSE.

4. **Parking space ownership:** The identified spaces in the garage are owned by Miami-Dade County, and the identified spaces in the surface lot are owned by the City of Miami.

5. **Number of parking spaces:** There are enough spaces available to fulfill the demand forecast identified in **Section II-11.I**. of this document; with the potential of converting surrounding regular parking spaces to EVSE spaces, as demand increases.

Figure II-11.3
Overtown Station Project Siting Map

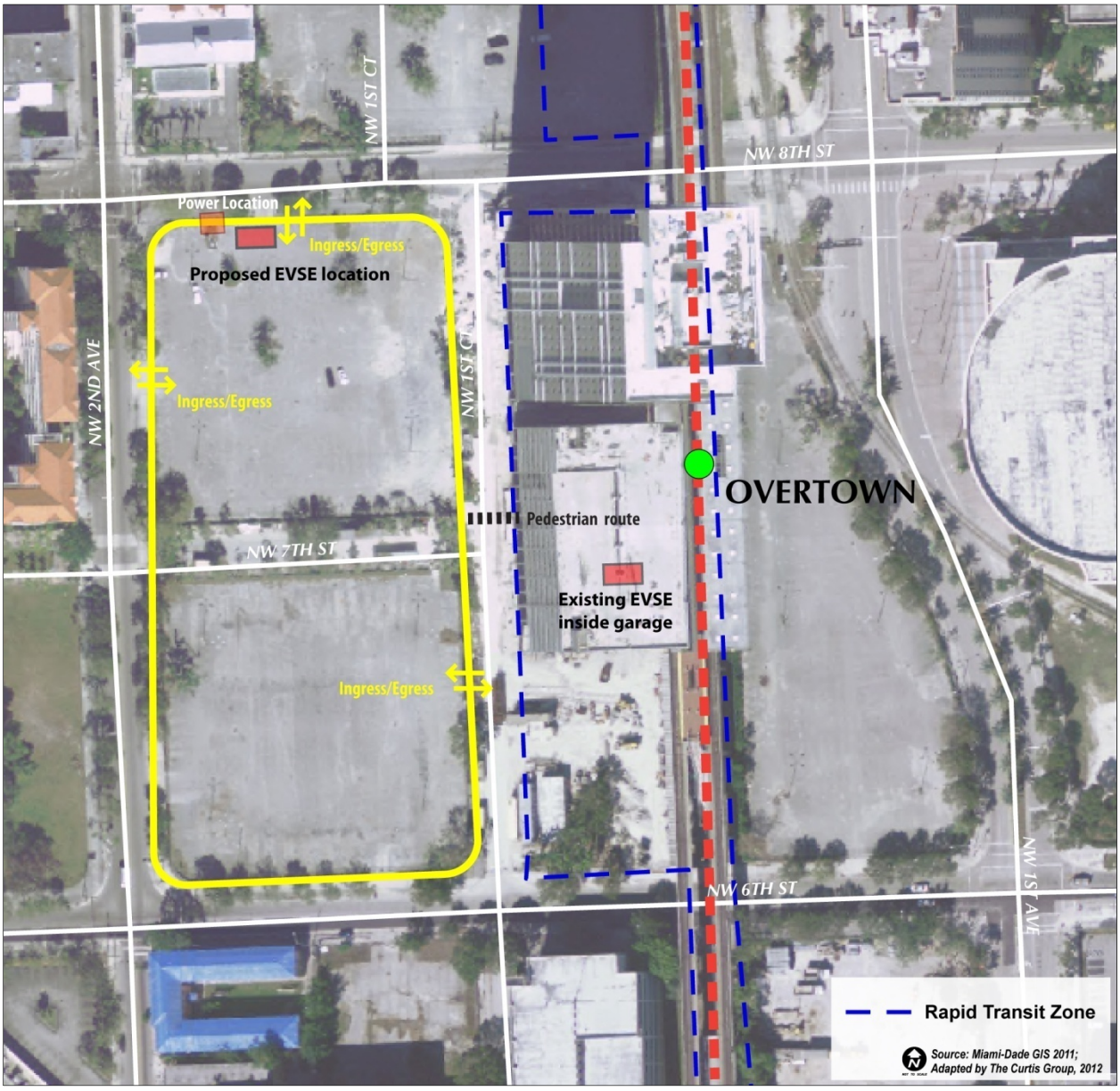


Figure II-11.4
Overtown Station Photos

Entrance to Overtown Transit Village parking garage

Existing EVSE

II-12. Government Center Station Master Plan

II-12.A. Geography

The Government Center Station Area is the downtown Miami central business district (CBD), and includes 389 acres of highly urbanized land in Miami-Dade County with a mix of high-density offices, institutional, commercial, and residential uses. At the time of the 2010 census, some of the newer high rise residential towers may not have been fully occupied. The street grid has 119 intersections within a ¼-mile radius around the station platform. For the purposes of this assessment, the Government Center Station area has been defined by the Miami River to the west and south, the Overtown Station Area to the north, and east to Biscayne Bay. Walking mobility in the station area is further enhanced by Metro Mover. Metro Mover is an automatically guided people mover train that runs at 90 second (peak) to 3 minute intervals (inner loop), is free of charge, and serves approximately 32,000 daily riders.

II-12.B. Resident Demographics

The demographic analysis of the station area used block group 1 of census tracts 3601, 3603, 3604, 3605, 3606, and 3607 of the US Census 2010 and American Community Survey. The station area has one of the higher populations among the stations along the US-1 Corridor.

Station Area Population:	7,242	(10% of corridor total)
Station Area Population over 18	6,759	
Station Area Households	3,520	
Residential Density (DU/Ac.)	11.4	
Employed Resident Workforce	3,276	(48% of persons over 18)

II-12.C. Employment

The station area is one of the largest major employment center in the County and the largest along the Corridor, with a total of 35,255 workers. The station area employment is predominantly made up of the following industry sectors:

Public Administration	30,041 employees	85% of employment
Professional, Scientific, and Technical Services	1,323 employees	4% of employment
Retail and Trade	597 employees	2% of employment
Finance and Insurance	575 employees	2% of employment

Major employers include:

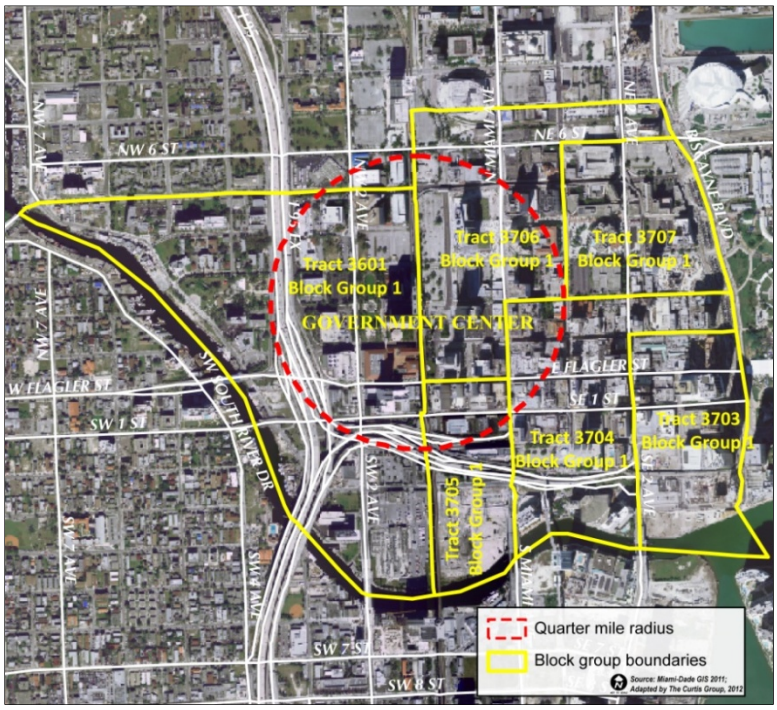
Miami-Dade County

Miami-Dade Court House

Federal Courts

Figure II-12.1
Map of Metrorail Line showing Government Center Station Location

Figure II-12.2
Aerial View of Govt. Center Station with Quarter-Mile Radius and Block Group Boundaries



II-12.D. Major Destinations

This area, contains numerous major destinations, and is a major destination for local employees, daily commerce, local tourism, business travelers, and tourists. Some of the major attractions with close proximity include:

American Airlines Arena
Port of Miami
Miami-Dade County Cultural Center
Little Havana (to the west of downtown Miami)
Bayside Market
US Federal Courts
Miami-Dade College Wolfson Campus

II-12.E. Government Center Metrorail Station

The Government Center Metrorail Station is located in the City of Miami along NW 1st Avenue at NW 2nd Street, co-located with the Stephen P. Clark Government Center. The Government Center Station does not include a County-owned park-and-ride facility; however, the County does own and operate a garage at SW 2nd Avenue that serves the library and museums, a second at NW 2nd Street.; and, a third parking garage at 220 NW 3rd Street. All are 1-block walks from the station, with the SW 2nd Avenue garage accessible by covered, elevated walkways. Just east of the station, there are surface parking lots that are owned by the Florida East Coast Railway, and there are many off-street parking facilities in the area owned by either the City of Miami or private operators.

Miami-Dade Transit (MDT) Metrorail service is provided by the Green Line and the Orange Line. Connecting bus service is available by twenty MDT bus routes.

Route 2	north to the 163rd Street Mall via NW 2nd Avenue and North Miami Avenue
Route 3	north to Aventura and the 163rd Street Mall via Biscayne Boulevard
Route 7	west to Dolphin Mall via NW 7th Street
Route 9	north to Aventura via NE 2nd Avenue
Route 11	west to Florida International University (FIU) via Flagler Street
Route 21	northwest to Northside Station via NW 12th Avenue
Route 24	southwest to Westchester via Coral Way
Route 51	Flagler MAX, limited stop service west to FIU and SW 137th Av. via Flagler Street
Route 77	north to Miami Gardens Drive (NW 187th St) via NW 7th Avenue
Route 93	Biscayne MAX, limited stop service north to Aventura via Biscayne Boulevard
Route 95X	express commuter service from Golden Glades Park-and-Ride in North Dade
Route C	northeast to Mount Sinai Hospital via Washington Avenue and Collins Avenue
Route S	northeast to Aventura Mall via Miami Beach / A1A
Route 120	Beach MAX, limited stop service along A1A to Aventura Mall
Route 195	Dade Broward Express, express commuter service to Fort Lauderdale
Route 207	Little Havana Connection via SW 7th Street and SW 1st Street
Route 208	Little Havana Connection via SW 8th Street and Flagler Street
Route 246	Night Owl, overnight service north to Civic Center and the 163rd Street Mall
Route 277	NW 7th Avenue MAX, limited stop service north to NW 187th Street
Route 500	Midnight Owl, overnight service along US-1 to Dadeland South

The Government Center Station is the most highly utilized station in the Corridor. The average annual weekday station utilization for the year from October 2011 through September 2012 is:

Average Weekday Station Boardings	10,957	(22% of Corridor total)
Station Parking Capacity	0	
Metrorail Parking Utilization	N.A	

II-12.F. Car Sharing Demand

Table II-12.1 summarizes the car sharing demand analysis inputs to predict potential car sharing membership for the Government Center Station.

Table II-12.1
Government Center Station Car Sharing Demand Assessment

	Correlation	Station Area Residents	Station Weekday Passenger Boardings
Basis			
Area Population and Station Utilization	-	7,242	10,957
Demographics			
1-Person Households	Positive	39%	12%
Households with Children	Negative	8%	data not available
Rental Households	Positive	95%	data not available
Auto Ownership			
Household with No Vehicle	Positive	29%	27%
Household with 1 Vehicle	Positive	57%	26%
Average Number of Vehicles per Household	Negative	0.85	1.48
Travel Mode to Work or Travel Mode to Metrorail Station			
Drive Alone	Negative	60%	3%
Car Pool	Negative	8%	1%
Transit	Positive	11%	54%
Bike	Negative	0%	1%
Walk	Positive	15%	40%
Car Sharing Demand			
Car Sharing Demand		1,824	1,510

II-12.G. Car Sharing Vehicles and Car Sharing PEV

The market assessment results have been used to determine the number of vehicles and electric vehicles that are forecast for the Government Center Station car sharing program, with the results summarized in **Table II-12.2**.

Table II-12.2
Government Center Station Car Sharing Vehicles

	Vehicles / PEV
Car Sharing Demand	3,334
Car Sharing Vehicles: Total	51
Car Sharing Vehicles: Initial Placement – All Fuels	10
Proportion of PEV Car Sharing Vehicles	20%
Car Sharing Plug-In Electric Vehicles at Station	**2**

II-12.H. Existing Car Sharing Programs

On July 28th 2012, Car 2 Go deployed an initial fleet of 240 vehicles for its car share program in Miami. The Car 2 Go business model uses a free floating, one-way rental fleet within a home area that encompasses the Government Center Station Area. At this time, the Car 2 Go Miami fleet is comprised of gasoline SmartFor2 cars. Car 2 Go does not currently have plans to deploy PEV as part of its fleet in the Miami market; however, the company has experience deploying PEV on a large scale as it has in the San Diego Car 2 Go program in 2011.

II-12.I. EVSE Requirements

Based on this analysis, an initial implementation of a car sharing program at the Government Center Station would require 4 spaces for the car sharing program. Of these, 1 would be with an EVSE dedicated for a car sharing PEV. Each dedicated car sharing EVSE will have co-located EVSE for public use, based on an empirical methodology that applies decision model logic to factors that indicate early adopters for PEV ownership and concepts of locating EVSE at destination locations. The maximum number of public EVSE is capped at 4 EVSE for the purposes of the station area site plans. This recognizes that other EVSE may be installed within the quarter mile radius of the station area. The result of the public access EVSE estimate is summarized in **Table II-12.3.**

Table II-12.3 Government Center Station Public Access EVSE				
Indicator		**EVSE**		
		Day Use	**Night Use**	**Total**
Major Non-Work Destination	Yes	4		4
Employment	32,255			
Transit Riders that Use a Car to Metrorail for a Work Commute Trip and have $80,000+ Household Income	2	0		0
Multi-Unit Dwellings	3,085 98%		0	0
Household Incomes of $100,000 or More	295 8%			
Intermediate Total				4
Minimum Co-Located EVSE at 1 to 1 Ratio with Car Sharing Dedicated EVSE				Not applicable
Final Total (rounded up to make total dedicated and public EVSE an even number for efficient siamese installation in 90-degree parking spaces)				**4**

There are no County-operated parking facilities directly at the Government Center Station; however, there are two county-owned garages within one block of the station. Parking capacity for the car sharing program may at one of the nearby County-operated garages, or in the City of Miami right-of-way. **Table II-12.4** summarizes the total EVSE requirements.

Table II-12.4 Government Center Station EVSE Requirements	
	EVSE
Car Sharing Program Plug-In Electric Vehicles	2
Dedicated Car Sharing EVSE	2
Public Access EVSE	4
Dedicated and Public EVSE Required	6
Existing EVSE	0
Total Net EVSE Required	**6**

II-12.J. Government Center Metrorail Station Zoning

The Government Center Metrorail Station falls within the Miami-Dade Rapid Transit Zone (RTZ), while the surrounding area is located within the jurisdiction of the City of Miami. There is no County parking associated with the station, and the only public parking available is in the parking garages and lots near the station. The closest and most convenient parking garage is the West Lot Garage located at NW 3 Street and NW 2 Avenue, and within walking distance of the Government Center Metrorail Station. Uses allowed within the City of Miami are governed by the Miami 21 Code, and the parking garage falls within the Civic Institution Zone. While PEV, EVSE and car share are not listed as permitted uses, these uses are appropriate and compatible with the intent of the document. All proposed PEV, EVSE and car share will require approval from the City of Miami Department of Planning of Zoning.

II-12.K. Project Siting

Project siting for EVs will be located at the West Lot Garage near the Government Center Metrorail Station, as identified in **Figure II-12.3** and **Figure II-12.4**. Location of parking was determined based on the following criteria:

1. **Walk up potential:** The identified parking spaces are located in an area with high foot traffic, making it convenient to Metrorail users, visitors and employees of the Government Center, Miami Art Museum, Miami-Dade Public Library as well as other businesses from the surrounding neighborhood.

2. **Visibility:** The identified parking spaces are located in a well lit and highly visible area of the West Lot parking garage.

3. **Electric panel availability:** A site reconnaissance was conducted by an electrician on December 19, 2012 to determine electric panel availability and improvements needed. For the West Lot Garage, the identified spaces are located in close proximity to the electric vault. There are no breakers available for Level 2 chargers, and will require a transformer panel and conduit through the walls.

4. **Parking space ownership:** The identified spaces are owned by Miami-Dade County, thus making the permitting process easier.

5. **Number of spaces:** There are enough spaces available that match the demand forecast identified in **Section II-12.I**. of this document, with the potential of converting surrounding regular parking spaces to EVSE spaces, as demand increases.

Figure II-12.3
Government Center Station Project Siting Map

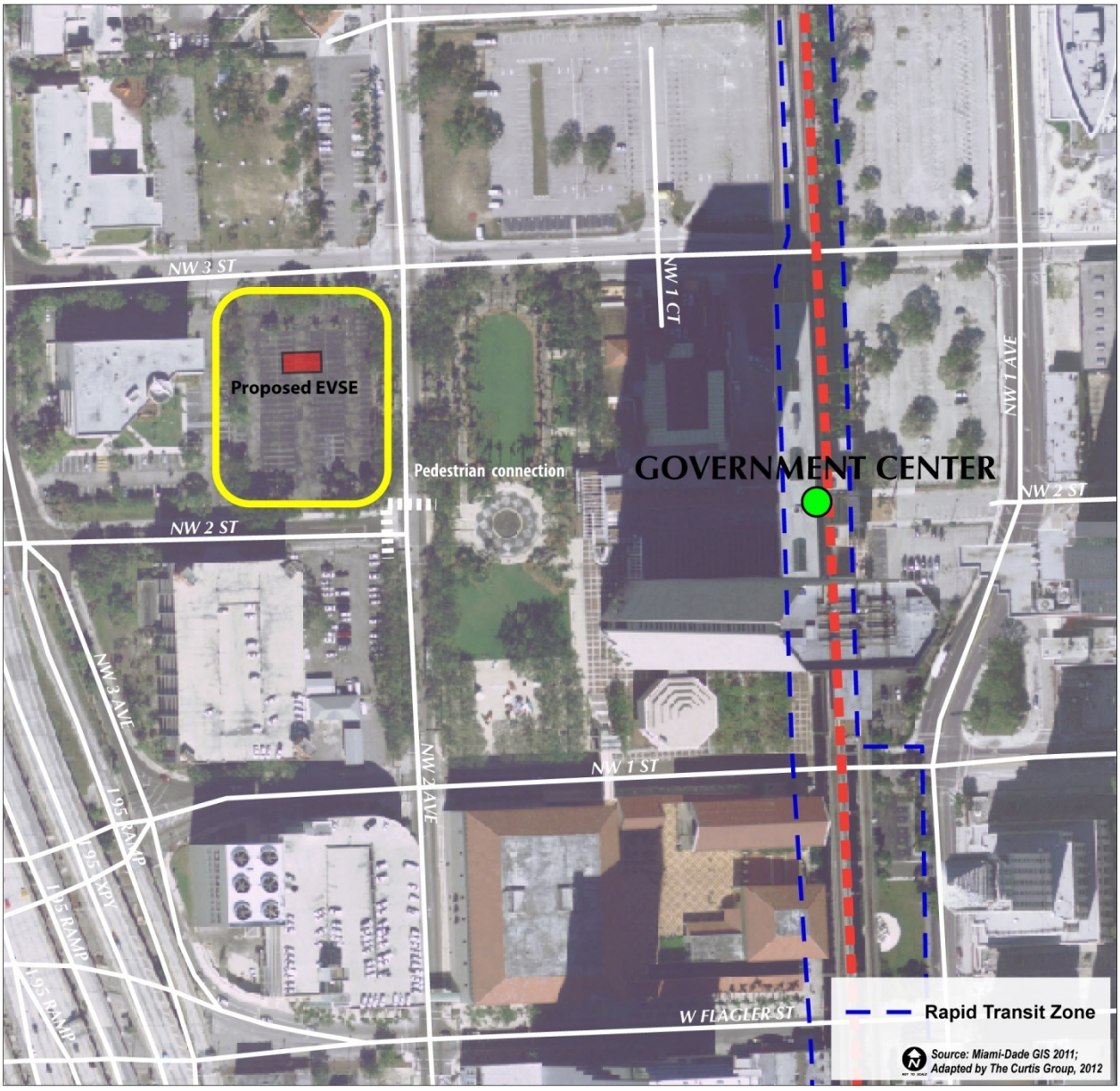


Figure II-12.4
Government Center Station Photos

Proposed location at West Lot Garage

Close proximity to electric panels

II-13. Brickell Station Master Plan

II-13.A. Geography

The Brickell Station Area includes 396 acres in the City of Miami that are located 0.8 miles from the Government Center Station in downtown Miami. It is in a highly urbanized area of Miami-Dade County with high-intensity commercial and residential uses on its east side, and a mix of low to medium density and high-density mixed use area on the west side. It includes: the City's Financial District comprised of office high-rises on both sides of Brickell Avenue; residential condominium towers in the southeast of the area; Mary Brickell Village that is comprised of high-density mixed use buildings with residential or office uses and ground floor retail uses; and the Brickell West District which is a medium-density mix of offices, commercial, and residential uses. In addition, Brickell Citi Center a 3-block high-density retail, office and condominium mixed use that is under construction will add over 800 residential units, 300 hotel rooms and approximately 1.5-million square feet of commercial space in the near future. Like Government Center Station Area, the Brickell Station Area is very walkable with 33 intersections in its ¼-mile radius, and with walkability enhanced by the south leg of the Metromover.

II-13.B. Resident Demographics

The demographic analysis of the station area used census tracts and block groups: 6602-1 6602-2, 6602-5, 6602-6, 6602-7, 6702-1, 6702-5, 6702-6, 6702-7, 6702-8, 6709-1, 6711-1, 6713-1, 6713-2, and 6714-1 of the US Census 2010 and American Community Survey. It is the most highly populated station area among the station areas along the US-1 Corridor.

Station Area Population:	14,255	(20% of corridor total)
Station Area Population over 18	12,946	
Station Area Households	8,329	
Residential Density (DU/Ac.)	38.6	
Employed Resident Workforce	8,961	(69% of persons over 18)

II-13.C. Employment

The station area is a major employment center for the County, with a total of 5,001 workers. The station area employment is predominantly made up of the following industry sectors:

Accommodation and Food Service	1,338 employees	27% of employment
Finance and Insurance	787 employees	16% of employment
Professional, Scientific, and Technical Services	727 employees	15% of employment
Construction	556 employees	11% of employment
Retail Trade	439 employees	9% of employment

The area as a whole is a major employment center by aggregation of numerous high-rise office buildings and retail commercial establishments.

Figure II-13.1
Map of Metrorail Line showing Brickell Station Location

Figure II-13.2
Aerial View of Brickell Station with Quarter-Mile Radius and Block Group Boundaries

II-13.D. Major Destinations

This area, contains numerous major destinations, and is a major center for local employees, daily commerce, local tourism, business travelers, and tourists. Some of the major attractions include:

Mary Brickell Village Miami Tequesta Circle Brickell Key

II-13.E. Brickell Metrorail Station

The Brickell Metrorail Station is elevated above the intersection of SW 1st Avenue and SW 10th Street in the City of Miami. The Brickell Station does not include a County-owned park-and-ride facility. Miami-Dade Transit (MDT) Metrorail service is provided by the Green Line and the Orange Line. Connecting bus service is available by six MDT bus routes.

Route 6	north to NW 29th Street / NW 17th Avenue and south to Coconut Grove
Route 8	northeast to Miami-Dade College, Wolfson Campus, and west to Florida International University via Coral Way and SW 8th Street
Route B	east to Key Biscayne
Route 208	Little Havana Connection via SW 7th Street and SW 1st Street
Route 208	Little Havana Connection via SW 8th Street and Flagler Street
Route 500	Midnight Owl - overnight service along US-1 from Government Center to Dadeland South

The Brickell Station is among the more highly utilized stations in the Corridor. The average annual weekday station utilization for the year from October 2011 through September 2012 are:

Average Weekday Station Boardings	4,326 (9% of Corridor total)
Station Parking Capacity	0
Metrorail Parking Utilization	N.A.

II-13.F. Car Sharing Demand

Table II-13.1 summarizes the car sharing demand analysis inputs for the Brickell Station area.

Table II-13.1
Brickell Station Car Sharing Demand Assessment

	Correlation	Station Area Residents	Station Weekday Passenger Boardings
Basis			
Area Population and Station Utilization	-	14,255	4,326
Demographics			
1-Person Households	Positive	29%	11%
Households with Children	Negative	17%	data not available
Rental Households	Positive	69%	data not available
Auto Ownership			
Household with No Vehicle	Positive	12%	33%
Household with 1 Vehicle	Positive	60%	27%
Average Number of Vehicles per Household	Negative	1.17	1.24
Travel Mode to Work or Travel Mode to Metrorail Station			
Drive Alone	Negative	69%	< 1%
Car Pool	Negative	5%	3%
Transit	Positive	9%	48%
Bike	Negative	0%	1%
Walk	Positive	9%	47%
Car Sharing Demand			
Car Sharing Demand		381	1,078

II-13.G. Car Sharing Vehicles and Car Sharing PEV

The market assessment results have been used to determine the number of vehicles and electric vehicles that are forecast for the Brickell Station car sharing program, with the results summarized in **Table II-13.2**.

Table II-13.2
Brickell Station Car Sharing Vehicles

	Vehicles / PEV
Car Sharing Demand	1,459
Car Sharing Vehicles: Total	22
Car Sharing Vehicles: Initial Placement – All Fuels	4
Proportion of PEV Car Sharing Vehicles	25%
Car Sharing Plug-In Electric Vehicles at Station	**1**

II-13.H. Existing Car Sharing Programs

On July 28th 2012, Car 2 Go deployed an initial fleet of 240 vehicles for its car share program in Miami. The Car 2 Go business model uses a free floating, one-way rental fleet within a home area that encompasses the Brickell Station Area. At this time, the Car 2 Go Miami fleet is comprised of gasoline SmartFor2 cars. Car 2 Go does not currently have plans to deploy PEV as part of its fleet in the Miami market; however, the company has experience deploying PEV on a large scale as it has in the San Diego Car 2 Go program in 2011.

In October, 2012, South Florida Commuter Services (SFCS) with We Car commenced a car sharing program with a vehicle placed in the Brickell Station area along Brickell Bay Drive between SW 12th Street and SW 13th Street. The SFCS / We Car program is part of the SFCS 826/836 Incentive Program (highway reconstruction traffic mitigation program) to offer car pool, van pool, and transit commuters discounted car sharing access for day time use at their work locations.

II-13.I. EVSE Requirements

Based on this analysis, an initial implementation of a car sharing program at the Brickell Station would require 4 spaces for the car sharing program. Of these, 1 would be with an EVSE dedicated for a car sharing PEV. Each dedicated car sharing EVSE will have co-located EVSE for public use, based on an empirical methodology that applies decision model logic to factors that indicate early adopters for PEV ownership and concepts of locating EVSE at destination locations. The maximum number of public EVSE is capped at 4 EVSE for the purposes of the station area site plans. This recognizes that other EVSE may be installed within the quarter mile radius of the station area. The result of the public access EVSE estimate is summarized in **Table II-13.3.**

Table II-13.3 Brickell Station Public Access EVSE				
Indicator		**EVSE**		
		Day Use	**Night Use**	**Total**
Major Non-Work Destination	Yes	4		4
Employment	5,001			
Transit Riders that Use a Car to Metrorail for a Work Commute Trip and have $80,000+ Household Income	1	0		0
Multi-Unit Dwellings	7,754 98%		0	0
Household Incomes of $100,000 or More	1,922 23%			
Final Total (rounded up to make total dedicated and public EVSE an even number for efficient siamese installation in 90-degree parking spaces)				**4**

At the Brickell Station, there are no existing parking facilities that are owned or managed by MDT. Parking capacity for the car sharing program will either be in the City of Miami right-of-way, or by agreement at an appropriately located off-street site. Use of parking spaces within the City right-of-way must be coordinated with the City of Miami Parking Authority. **Table II-13.4** summarizes the total EVSE requirements.

Table II-13.4 Brickell Station EVSE Requirements	
	EVSE
Car Sharing Program Plug-In Electric Vehicles	1
Dedicated Car Sharing EVSE	1
Public Access EVSE	4
Dedicated and Public EVSE Required	5
Existing EVSE	0
Total Net EVSE Required	**5**

II-13.J. Brickell Metrorail Station Zoning

The Brickell Metrorail Station falls within the Miami-Dade Rapid Transit Zone (RTZ). Uses allowed within the RTZ are defined in the Miami-Dade County Code of Ordinances Chapter 33C Fixed-Guideway Rapid Transit System – Development Zone. PEV, EVSE and car share are not listed as permitted uses within this chapter of the Code, but these uses are appropriate and compatible with the operation of the Rapid Transit System and the convenience of its ridership, thereby satisfying the intent and purpose of this Chapter. Therefore, all proposed PEV, EVSE and car share will be considered as an as-of-right use within the RTZ. Although the Brickell Metrorail Station is located within the City of Miami limits, all uses, including those proposed, within the RTZ are under the jurisdiction of Miami-Dade County and will require approval from the Miami-Dade Department of Planning of Zoning.

II-13.K. Project Siting

Project siting for EVs will be located on-street on both the east and west side of the Brickell Metrorail Station between SW 8 Street and SW 11 Street, as identified in **Figure II-13.3** and **Figure II-13.4**. Location of parking was determined based on the following criteria:

1. **Walk up potential:** The identified parking spaces are located in an area with high foot traffic, making it convenient to Metrorail users, visitors, residents and businesses of Mary Brickell Village and the surrounding neighborhood.

2. **Visibility:** The identified parking spaces are located in a well lit and highly visible area of the Brickell Metrorail station.

3. **Electric panel availability:** A site reconnaissance was conducted by an electrician on December 19, 2012 to determine electric panel availability and improvements needed. For the Brickell Metrorail station the identified spaces are located in close proximity to electric poles on the east side of the Metrorail station, and to the electric vault that serves the Metrorail station on the west side. For this location, there are no breakers available for Level 2 chargers, and a transformer panel and conduit will be required. Use of an electric pole transformer may also be considered; but additional study will need to be made by an electrical engineer to determine how this may be accomplished.

4. **Parking space ownership:** The identified spaces are public parking spaces under the jurisdiction of the City of Miami.

5. **Number of spaces:** There are spaces available that match the demand forecast identified in **Section II-13.I**. of this document.

Figure II-13.3
Brickell Station Project Siting Map

Figure II-13.4
Brickell Station Photos

High visibility and walk up potential from station

On street parking spaces across station entrance

II-14. Vizcaya Station Master Plan

II-14.A. Geography

The Vizcaya Station Area includes 650 acres in the City of Miami that are located 2.3 miles from the Government Center Station in downtown Miami. It is at the edge of the Brickell Area CBD, and comprised of older bedroom communities. The area includes part of four Miami neighborhoods: The Roads, Coconut Grove, Shenandoah, and Silver Bluff. The area is predominantly a mix of single family homes and low-density multifamily buildings, with the primary commercial corridor for these neighborhoods along Coral Way. The street grid has of 34 intersections within the ¼-mileto downtown Miami Government Center station area street grid which has 196 intersections per square mile.

The Metrorail alignment and US-1 are at the edge between the north area of Coconut Grove, the Roads, and Silver Bluff. At this location US-1 is a transition from the end of I-95, and there are no commercial uses along it. Pedestrian access from the station across the high volumes of high speed traffic on US-1 is provided by an overpass the leads from the station to the Miami Science Museum in Coconut Grove.

II-14.B. Resident Demographics

The demographic analysis of the station area used census tracts and block groups: 6900-1, 6504-2, 6601-1, 6702-2, and 6802-3 of the US Census 2010 and American Community Survey. It is among the less populated station areas along the US-1 Corridor.

Station Area Population:	5,489	(8% of corridor total)
Station Area Population over 18	4,527	
Station Area Households	2,413	
Residential Density (DU/Ac.)	4.0	
Employed Resident Workforce	3,202	(71% of persons over 18)

II-14.C. Employment

The station area is primarily a bedroom community, with some small retail, office, and institutional uses along Coral Way. Because of this, there are only 485 employees in the station area. The station area employment is predominantly made up of the following industry sectors:

Public Services (excluding Public Administration)	202 employees	42% of employment
Professional, Scientific, and Technical Services	97 employees	20% of employment
Arts, Entertainment, and Recreation	63 employees	13% of employment
Health Care and Social Assistance	48 employees	10% of employment

II-14.D. Major Destinations

This area includes two major tourist destinations:

Miami Museum of Science

Vizcaya Museum and Gardens

Figure II-14.1
Map of Metrorail Line showing Vizcaya Station Location

Figure II-14.2
Aerial View of Vizcaya Station with Quarter-Mile Radius and Block Group Boundaries

II-14.E. Vizcaya Metrorail Station

The Vizcaya Metrorail Station is located near the intersection of SW 1st Avenue and 32nd Road in the City of Miami. The Station has an on-site County-owned park-and-ride facility that includes a passenger drop-off area and bus transfer bays.

Miami-Dade Transit (MDT) Metrorail service is provided by the Green Line and the Orange Line. Connecting bus service is available by four MDT bus routes.

Route 12	north to Northside Station via NW 12th Av, and south to Mercy Hospital in Coconut Grove
Route 17	north to Liberty City, Opa Locka, and Carol City via NW 17th and NW 22nd Avenue
Route 24	north to Government Center, and west to Westchester via Coral Way
Route 500	Midnight Owl - overnight service along US-1 from Government Center to Dadeland South

The Vizcaya Station is one of the less utilized stations along the US-1 Corridor. The average annual weekday station utilization for the year from October 2011 through September 2012 are:

Average Weekday Station Boardings	1,312	(3% of Corridor total)
Station Parking Capacity	91	
Metrorail Parking Utilization	62%	

II-14.F. Car Sharing Demand

Table II-14.1 summarizes the car sharing market analysis inputs to predict demand for the Vizcaya Station.

Table II-14.1
Vizcaya Station Car Sharing Demand Assessment

	Correlation	Station Area Residents	Station Weekday Passenger Boardings
Basis			
Area Population or Station Utilization	-	5,489	1,312
Demographics			
1-Person Households	Positive	33%	12%
Households with Children	Negative	35%	data not available
Rental Households	Positive	44%	data not available
Auto Ownership			
Household with No Vehicle	Positive	11%	38%
Household with 1 Vehicle	Positive	39%	22%
Average Number of Vehicles per Household	Negative	1.55	1.33
Travel Mode to Work or Travel Mode to Metrorail Station			
Drive Alone	Negative	80%	5%
Car Pool	Negative	9%	5%
Transit	Positive	4%	49%
Bike	Negative	0%	1%
Walk	Positive	2%	39%
Car Sharing Demand			
Car Sharing Demand		0	219

II-14.G. Car Sharing Vehicles and Car Sharing PEV

The market assessment results have been used to determine the number of vehicles and electric vehicles that are forecast for the Vizcaya Station car sharing program, with the results summarized in **Table II-14.2**.

Table II-14.2
Vizcaya Station Car Sharing Vehicles

	Vehicles / PEV
Car Sharing Demand	219
Car Sharing Vehicles: Total	1
Car Sharing Vehicles: Initial Placement – All Fuels	**4**
Proportion of PEV Car Sharing Vehicles	25%
Car Sharing Plug-In Electric Vehicles at Station	**1**

II-14.H. Existing Car Sharing Programs

On July 28th 2012, Car 2 Go deployed an initial fleet of 240 vehicles for its car share program in Miami. The Car 2 Go business model uses a free floating, one-way rental fleet within a home area that encompasses the Vizcaya Station Area. At this time, the Car 2 Go Miami fleet is comprised of gasoline SmartFor2 cars. Car 2 Go does not currently have plans to deploy PEV as part of its fleet in the Miami market; however, the company has experience deploying PEV on a large scale as it has in the San Diego Car 2 Go program in 2011.

II-14.I. EVSE Requirements

Based on this analysis, an initial implementation of a car sharing program at the Vizcaya Station would require 4 spaces for the car sharing program. Of these, 1 would be with an EVSE dedicated for a car sharing PEV. Each dedicated car sharing EVSE will have co-located EVSE for public use, based on a one-to-one methodology. To verify the potential for public EVSE, the characteristics of PEV early adopters among station area apartment / condo residents, daytime employees, and transit park-and-ride commuters has been assessed. These market indicators on the Vizcaya Station area are summarized in**Table II-14.3**. The indicators show good potential among station area employees and residents, but it should be noted that the area has relatively few employees, and that multifamily dwellers are much lower as the Corridor moves away from the central business district. The maximum number of public EVSE is capped at 4 EVSE for the purposes of the station area site plans. This recognizes that other EVSE may be installed within the quarter mile radius of the station area.

Table II-14.3 Vizcaya Station Public Access EVSE				
Indicator		**EVSE**		
		Day Use	**Night Use**	**Total**
Major Non-Work Destination	No	0		0
Employment	485			
Transit Riders that Use a Car to Metrorail for a Work Commute Trip and have $80,000+ Household Income	0	0		0
Multi-Unit Dwellings	1,124 37%		0	0
Household Incomes of $100,000 or More	664 27%			
Final Total (rounded up to make total dedicated and public EVSE an even number for efficient siamese installation in 90-degree parking spaces)				**2**

The Vizcaya Station includes an on-site open park-and-ride lot containing 91 spaces. The annual average utilization rate for the last year was 62%, with a maximum monthly occupancy of 68% providing sufficient capacity of 29 parking spaces for the car sharing program and EVSE needs. **Table II-14.4** summarizes the final EVSE requirements.

Table II-14.4 Vizcaya Station EVSE Requirements	
	EVSE
Car Sharing Program Plug-In Electric Vehicles	1
Dedicated Car Sharing EVSE	1
Public Access EVSE	1
Dedicated and Public EVSE Required	2
Existing EVSE	0
Total Net EVSE Required	**2**

II-14.J. Vizcaya Metrorail Station Zoning

The Vizcaya Metrorail Station falls within the Miami-Dade Rapid Transit Zone (RTZ). Uses allowed within the RTZ are defined in the Miami-Dade County Code of Ordinances Chapter 33C Fixed-Guideway Rapid Transit System – Development Zone. PEV, EVSE and car share are not listed as permitted uses within this chapter of the Code, but these uses are appropriate and compatible with the operation of the Rapid Transit System and the convenience of its ridership, thereby satisfying the intent and purpose of this Chapter. Therefore, all proposed PEV, EVSE and car share will be considered as an as-of-right use within the RTZ. Although the Vizcaya Metrorail Station is located within the City of Miami limits, all uses, including those proposed, within the RTZ are under the jurisdiction of Miami-Dade County and will require approval from the Miami-Dade Department of Planning of Zoning.

II-14.K. Project Siting

Project siting for EVs will be located in the Vizcaya Metrorail Station surface parking lot identified in **Figure II-14.3** and **Figure II-14.4**. Location of parking was determined based on the following criteria:

1. **Walk up potential:** The identified parking spaces are located in an area with high foot traffic, making it convenient to Metrorail users, visitors to Vizcaya and the Science Museum, as well as residents and businesses from the surrounding neighborhood.

2. **Visibility:** The identified parking spaces are located in a well lit and highly visible area of the Vizcaya Metrorail parking lot.

3. **Electric panel availability:** A site reconnaissance was conducted by an electrician on December 12, 2012 to determine electric panel availability and improvements needed. For this location, there are three breakers available for Level 2 chargers. For the identified spaces, new conduit will be requited with approximately 100 feet of trenching through landscaped area, concrete plaza and asphalt bus drop drive area in addition to 350 feet of trenching through landscaped area and asphalt or placed along guideway for a total of 450 feet.

4. **Parking space ownership:** The identified spaces are owned by Miami-Dade County, thus making the permitting process easier.

5. **Number of parking spaces:** There are spaces available that match the demand forecast identified in **Section II-14.I.** of this document, with the potential of converting surrounding regular parking spaces to EVSE spaces as demand increases.

6. **Unobstructed overhead area and southeast exposure:** This station is one of the three stations identified for solar integration.

Figure II-14.3
Vizcaya Metrorail Station Project Siting Map

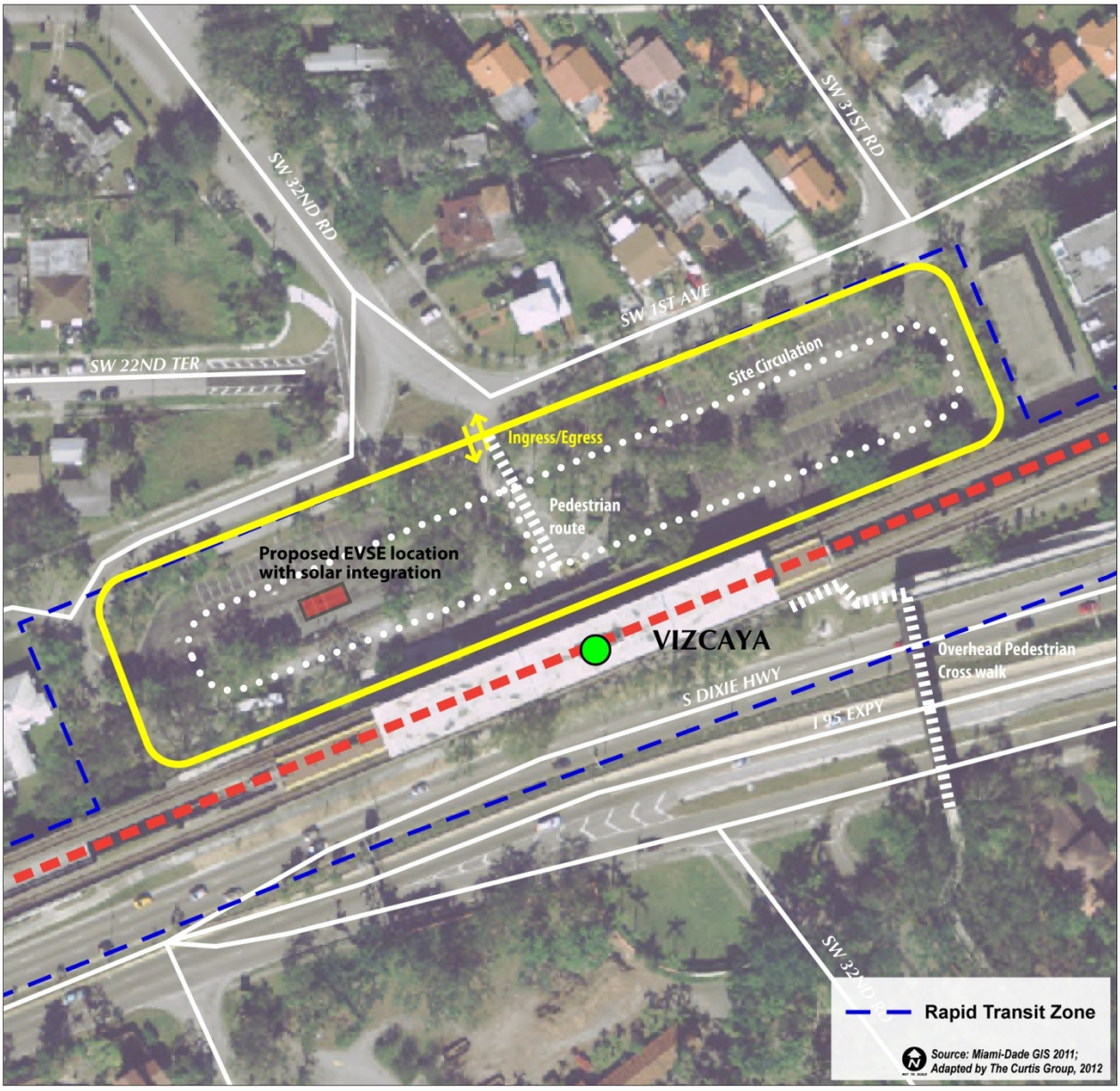


Figure II-14.4
Vizcaya Metrorail Station photos

Proposed location

Electric vault shown on the right side of photograph

II-15. Coconut Grove Station Master Plan

II-15.A. Geography

The Coconut Grove Station Area includes 406 acres in the City of Miami that are located 4.2 miles from the Government Center Station in downtown Miami. Located at the crossroads of US-1 and SW 27th Avenue, it is located at a commercial four corners that serves the needs of the Coconut Grove neighborhood to the south and the Silver Bluff and Shenandoah neighborhoods to the north. Beyond the commercial corridors, the area is predominantly a mix of single family homes and low-density multifamily buildings. The street grid includes 45 intersections within the ¼-mile radius compared to downtown Miami Government Center station area street grid which has 119 intersections per square mile.

The Metrorail alignment and US-1 are at the edge between the central area of Coconut Grove and the Silver Bluff neighborhood. At this location, US-1 begins to have commercial uses along the southeast side with the northwest side occupied by the elevated Metrorail alignment, and the East Coast Greenway and bike path below it. The intersection of US-1 and SW 27th Avenue has very high vehicular traffic volumes from all four approaches with many turning movements. Signal operations leave little protected pedestrian crossing time to cross US-1, and pedestrian access from the station south to Coconut Grove is very difficult. There is only one at-grade crosswalk across US-1, but no pedestrian overpass across US-1.

II-15.B. Resident Demographics

The demographic analysis of the station area used census tracts and block groups: 6801-2, 6900-2, 7002-1, and 7104-1 of the US Census 2010 and American Community Survey. It is among the more populated station areas along the US-1 Corridor.

Station Area Population:	6,210	(9% of corridor total)
Station Area Population over 18	5,248	
Station Area Households	2,792	
Residential Density (DU/Ac.)	7.8	
Employed Resident Workforce	3,763	(72% of persons over 18)

II-15.C. Employment

The station area is mostly a bedroom community, with some commercial uses along US-1, SW 27th Avenue, and SW 1st Avenue. There are 1,073 employees in the station area. The station area employment is predominantly made up of the following industry sectors:

Professional, Scientific, and Technical Services	408 employees	38% of employment
Retail Trade	186 employees	17% of employment
Accommodation and Food Service	184 employees	17% of employment
Health Care and Social Assistance	60 employees	6% of employment

The area is not a major employment center along the US-1 Corridor.

Figure II-15.1
Map of Metrorail Line showing Coconut Grove Station Location

Figure II-15.2
Aerial View of Coconut Grove Station with Quarter-Mile Radius and Block Group Boundaries

II-15.D. Major Destinations

The actual station area does not include any major destinations; however, the station provides the closest Metrorail access to Coconut Grove (1 mile south) which includes several major tourist destinations:

Coco Walk
Dinner Key
Coconut Grove Playhouse
The Barnacle Historic Park
several hotels
The Streets of Mayfair
Miami City Hall
Miami Bayshore Park
Peacock Park
several large schools

II-15.E. Coconut Grove Metrorail Station

The Coconut Grove Metrorail Station is located at the intersection of SW 27th Avenue and US-1 in the City of Miami. The Station has an on-site, County-owned park-and-ride facility that includes a passenger drop-off area and bus transfer bays.

Miami-Dade Transit (MDT) Metrorail service is provided by the Green Line and the Orange Line. Connecting bus service is available by five MDT bus routes.

Route 6 north to Little Havana, Brickell, downtown Miami, Government Center, Miami-Dade College Wolfson Campus, and NW 19th Avenue and NW 12th Street in the Allapattah neighborhood of Miami

Route 22	north to Golden Glades and the 163rd Street Mall via NW 22nd Avenue
Route 27	north to Calder Race Course via NW 27th Avenue
Route 249	Coconut Grove Circulator, service through Coconut Grove and Dinner Key from Douglas Station to Coconut Grove Station, via Grand Avenue and Aviation Avenue
Route 500	Midnight Owl - overnight service along US-1 from Government Center to Dadeland South

The Coconut Grove Station is one of the less utilized stations along the US-1 Corridor. The average annual weekday station utilization for the year from October 2011 through September 2012 are:

Average Weekday Station Boardings	1,854	(4% of Corridor total)
Station Parking Capacity	204	
Metrorail Parking Utilization	52%	

II-15.F. Car Sharing Demand

Table II-15.1 summarizes the car sharing demand analysis inputs to predict potential car sharing demand for the Coconut Grove Station.

Table II-15.1
Coconut Grove Station Car Sharing Demand Assessment

	Correlation	Station Area Residents	Station Weekday Passenger Boardings
Basis			
Area Population or Station Utilization	-	6,210	1,854
Demographics			
1-Person Households	Positive	39%	14%
Households with Children	Negative	48%	data not available
Rental Households	Positive	51%	data not available
Auto Ownership			
Household with No Vehicle	Positive	7%	36%
Household with 1 Vehicle	Positive	53%	30%
Average Number of Vehicles per Household	Negative	1.45	1.10
Travel Mode to Work or Travel Mode to Metrorail Station			
Drive Alone	Negative	71%	11%
Car Pool	Negative	11%	5%
Transit	Positive	7%	28%
Bike	Negative	0%	7%
Walk	Positive	5%	46%
Car Sharing Demand			
Car Sharing Demand		0	459

II-15.G. Coconut Grove Car Sharing Vehicles and Car Sharing PEV

The market assessment results have been used to determine the number of vehicles and electric vehicles that are forecast for the Coconut Grove Station car sharing program, with the results summarized in **Table II-15.2**.

Table II-15.2
Coconut Grove Station Car Sharing Vehicles

	Vehicles / PEV
Car Sharing Demand	459
Car Sharing Vehicles: Total	1
Car Sharing Vehicles: Initial Placement – All Fuels	**4**
Proportion of PEV Car Sharing Vehicles	25%
Car Sharing Plug-In Electric Vehicles at Station	**1**

II-15.H. Existing Car Sharing Programs

On July 28th 2012, Car 2 Go deployed an initial fleet of 240 vehicles for its car share program in Miami. The Car 2 Go business model uses a free floating, one-way rental fleet within a home area that encompasses the Coconut Grove Station Area. At this time, the Car 2 Go Miami fleet is comprised of gasoline SmartFor2 cars. Car 2 Go does not currently have plans to deploy PEV as part of its fleet in the Miami market; however, the company has experience deploying PEV on a large scale as it has in the San Diego Car 2 Go program in 2011.

II-15.I. EVSE Requirements

Based on this analysis, an initial implementation of a car sharing program at the Coconut Grove Station would require 4 spaces for the car sharing program. Of these, 1 would be with an EVSE dedicated for a car sharing PEV. Each dedicated car sharing EVSE will have co-located EVSE for public use, based on an empirical methodology that applies decision model logic to factors that indicate early adopters for PEV ownership and concepts of locating EVSE at destination locations. The maximum number of public EVSE is capped at 4 EVSE for the purposes of the station area site plans. This recognizes that other EVSE may be installed within the quarter mile radius of the station area. The result of the public access EVSE estimate is summarized in **Table II-15.3.**

Table II-15.3 Coconut Grove Station Public Access EVSE				
Indicator		**EVSE**		
		Day Use	**Night Use**	**Total**
Major Non-Work Destination	No	0		0
Employment	1,073			
Transit Riders that Use a Car to Metrorail for a Work Commute Trip and have $80,000+ Household Income	2	0		0
Multi-Unit Dwellings	1,274 41%		4	4
Household Incomes of $100,000 or More	588 21%			
Final Total (rounded up to make total dedicated and public EVSE an even number for efficient siamese installation in 90-degree parking spaces)				**4**

The Coconut Grove Station includes an on-site open park-and-ride lot with 204 spaces. The annual average utilization rate for the last year was 47%, with a maximum monthly occupancy of 52% providing sufficient capacity of 97 parking spaces for the car sharing program and EVSE needs. **Table II-15.4** summarizes the total EVSE requirements.

Table II-15.4 Coconut Grove Station EVSE Requirements	
	EVSE
Car Sharing Program Plug-In Electric Vehicles	1
Dedicated Car Sharing EVSE	1
Public Access EVSE	4
Dedicated and Public EVSE Required	5
Existing EVSE	0
Total Net EVSE Required	**5**

II-15.J. Coconut Grove Metrorail Station Zoning

The Coconut Grove Metrorail Station falls within the Miami-Dade Rapid Transit Zone (RTZ). Uses allowed within the RTZ are defined in the Miami-Dade County Code of Ordinances Chapter 33C Fixed-Guideway Rapid Transit System – Development Zone. PEV, EVSE and car share are not listed as permitted uses within this chapter of the Code, but these uses are appropriate and compatible with the operation of the Rapid Transit System and the convenience of its ridership, thereby satisfying the intent and purpose of this Chapter. Therefore, all proposed PEV, EVSE and car share will be considered as an as-of-right use within the RTZ. Although the Coconut Grove Metrorail Station is located within the City of Miami limits, all uses, including those proposed, within the RTZ are under the jurisdiction of Miami-Dade County and will require approval from the Miami-Dade Department of Planning of Zoning.

II-15.K. Project Siting

Project siting for EVs will be located in the Coconut Grove Metrorail surface parking lot identified in **Figure II-15.3** and **Figure II-15.4**, and will be solar powered in addition Location of parking was determined based on the following criteria:

1. **Walk up potential:** The identified parking spaces are located in an area with high foot traffic, making it convenient to both Metrorail and residents and businesses from the surrounding neighborhood.

2. **Visibility:** The identified parking spaces are located in a well lit and highly visible area of the Coconut Grove Metrorail parking lot.

3. **Electric panel availability:** A site reconnaissance was conducted by an electrician on December 12, 2012 to determine electric panel availability and improvements needed. For this location, there are three breakers available for Level 2 chargers. For the identified spaces, new conduit will be requited with approximately 200 feet of trenching through landscaped area, concrete plaza and asphalt bus drop drive area in addition to 250 feet of trenching through landscaped area and asphalt or placed along guideway for a total of 450 feet..

4. **Parking space ownership:** The identified spaces are owned by Miami-Dade County, thus making the permitting process easier.

5. **Number of spaces:** There are spaces available that match the demand forecast identified in **Section II-15.I**. of this document, with the potential of converting surrounding regular parking spaces to EVSE spaces as demand increases.

6. **Unobstructed overhead area and southeast exposure:** This station is one of the three stations identified for solar integration.

Figure II-15.3
Coconut Grove Station Project Siting Map

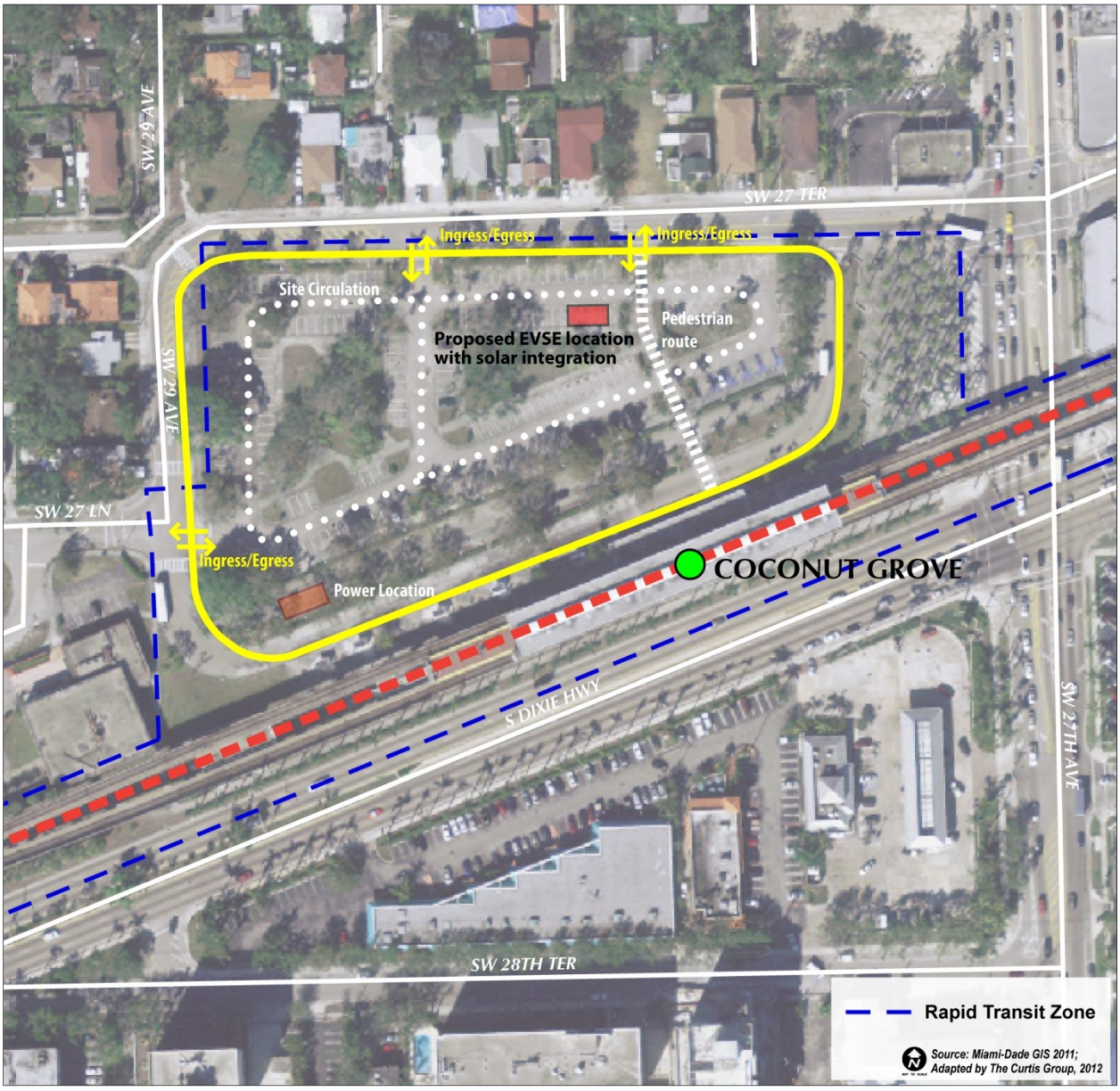


Figure II-15.4
Coconut Grove Station Project Siting Photos

Proposed location

High visibility and walk up potential

II-16. Douglas Road Station Master Plan

II-16.A. Geography

The Douglas Road Station Area includes 669 acres that are partially in the City of Miami and partially in the City of Coral Gables. The Douglas Road Station is located 5.3 miles from the Government Center Station in downtown Miami at the crossroads of US-1 and Douglas Road (SW 37th Avenue). The station is located in the City of Miami at a commercial four corners that serves the needs of the Coconut Grove neighborhood to the south, the Silver Bluff neighborhood to its east, and Coral Gables to the north and west. Beyond the commercial corridors, the area is predominantly a mix of single family homes and low-density multifamily buildings; however, the more intense mixed use development at the Village of Merrick Park in Coral Gables is also part of the station area. The street grid in this station area includes 44 intersections.

The Metrorail alignment and US-1 are at the edge between the south area of Coconut Grove, the Silver Bluff neighborhood to the northwest, and the City of Coral Gables to the northwest and west. Commercial uses line the southeast side of US-1 while the northwest side is where the elevated Metrorail alignment and East Coast Greenway and bike path are. The intersection of US-1 and Douglas Road has very high volumes from all four approaches with many turning movements; however, pedestrian access from the station south to Coconut Grove is facilitated by a pedestrian overpass across US-1 at this location.

II-16.B. Resident Demographics

The demographic analysis of the station area used census tracts and block groups: 7002-3, 7101-1, 7101-2, 7200-4, and 7400-2 of the US Census 2010 and American Community Survey. It is among the more populated station areas along the US-1 Corridor.

Station Area Population:	6,913	(10% of corridor total)
Station Area Population over 18	5,581	
Station Area Households	2,704	
Residential Density (DU/Ac.)	4.6	
Employed Resident Workforce	3,266	(59% of persons over 18)

II-16.C. Employment

The station area is partly a bedroom community, and partly a mixed use district along Douglas Road, US-1, and in the Village of Merrick Park area. There are 2,177 employees in the station area. The station area employment is predominantly made up of the following industry sectors:

Health Care and Social Assistance	673 employees	31% of employment
Finance and Insurance	421 employees	19% of employment
Retail Trade	385 employees	18% of employment
Real Estate and Rental Leasing	307 employees	14% of employment

The area is a significant employment center along the US-1 Corridor.

Figure II-16.1
Map of Metrorail Line showing Douglas Road Station Location

Figure II-16.2
Aerial View of Douglas Road Station with Quarter-Mile Radius and Block Group Boundaries

II-16.D. Major Destinations

The major destinations for this station are the Village of Merrick Park, Bird Avenue commercial uses, and the West Grove neighborhood. The station provides the closest Metrorail access to Miracle Mile and the central business district of the City of Coral Gables (1.2 miles north) which is easily accessed by frequent bus service on the Coral Gables Trolley. The station is 1.1 miles from Cocowalk via Grand Avenue, and access is provided via the Coconut Grove Circulator.

Destinations within the station area include:

Village of Merrick Park
West Grove (part of Coconut Grove)

Destinations outside of the station area in Coral Gables and Coconut Grove include:

Cocowalk and the Streets of Mayfair
Dinner Key
Coconut Grove Playhouse
The Barnacle Historic Park
Miracle Mile (Coral Gables)
Miami City Hall
Miami Bayshore Park
Peacock Park

II-16.E. Douglas Road Metrorail Station

The Douglas Road Metrorail Station is located at the intersection of Douglas Road (SW 37th Av.) and US-1 in the City of Miami and about 0.15 miles from the border with the City of Coral Gables. The station has an on-site County-owned park-and-ride facility that includes a passenger drop-off area and bus transfer bays.

Miami-Dade Transit (MDT) Metrorail service is provided by the Green Line and the Orange Line. Connecting bus service is available by seven MDT bus routes and one bus route operated by Coral Gables.

Route 37	southwest to the South Miami Station, north to Hialeah via Douglas Road
Route 40	west along Bird Road (SW 40th Street) to SW 8th Street and SW 132nd Avenue (weekdays) and to Bird Road and SW 152nd Avenue
Route 42	north to Miami International Airport, the City of Opa Locka, and the City of Miami Springs via LeJeune Road (SW/NW 42nd Avenue)
Route 48	southwest to University Station, northeast to Mercy Hospital and Brickell Station via Bay Shore Drive in Coconut Grove
Route 136	south along Old Cutler Road, west to Kendall-Tamiami Airport and the Immigration and Naturalization office at SW 147th Avenue
Route 249	Coconut Grove Circulator, service through Coconut Grove and Dinner Key from Douglas Station to Coconut Grove Station, via Grand Avenue and Aviation Avenue
Route 500	Midnight Owl - overnight service along US-1 from Government Center to Dadeland South
Coral Gables Trolley	free service along Ponce de Leon Boulevard from the station to the Villages at Merrick Park, Miracle Mile, and up to Flagler Street and Little Havana.

The Douglas Road Station utilization is near the middle range among the stations of the US-1 Corridor. The average annual weekday station utilization for the year from October 2011 through September 2012 is:

Average Weekday Station Boardings	3,973	(8% of Corridor total)
Station Parking Capacity	226	
Metrorail Parking Utilization	85%	

II-16.F. Car Sharing Demand

Table II-16.1 summarizes the car sharing market analysis inputs to predict potential car sharing demand for the Douglas Road Station.

Table II-16.1
Douglas Road Station Car Sharing Demand Assessment

	Correlation	Station Area Residents	Station Weekday Passenger Boardings
Basis			
Area Population or Station Utilization	-	6,913	3,973
Demographics			
1-Person Households	Positive	27%	10%
Households with Children	Negative	68%	data not available
Rental Households	Positive	51%	data not available
Auto Ownership			
Household with No Vehicle	Positive	11%	32%
Household with 1 Vehicle	Positive	39%	29%
Average Number of Vehicles per Household	Negative	1.48	1.21
Travel Mode to Work or Travel Mode to Metrorail Station			
Drive Alone	Negative	70%	6%
Car Pool	Negative	9%	8%
Transit	Positive	5%	47%
Bike	Negative	0%	2%
Walk	Positive	4%	29%
Car Sharing Demand			
Car Sharing Demand		0	738

II-16.G. Car Sharing Vehicles and Car Sharing PEV

The market assessment results have been used to determine the number of vehicles and electric vehicles that are forecast for the Douglas Road Station car sharing program, with the results summarized in **Table II-16.2**.

Table II-16.2
Douglas Road Station Car Sharing Vehicles

	Vehicles / PEV
Car Sharing Demand	738
Car Sharing Vehicles: Total	2
Car Sharing Vehicles: Initial Placement – All Fuels	**4**
Proportion of PEV Car Sharing Vehicles	25%
Car Sharing Plug-In Electric Vehicles at Station	**1**

II-16.H. Existing Car Sharing Programs

There are no existing car sharing programs that are available at the Douglas Road Station; however, the home area for the Car 2 Go car sharing program includes the area just east of Douglas Road (SW 37th Avenue). The Car 2 Go program first deployed on July 28th 2012 in Miami uses a 240-vehicle fleet of free floating, one-way rentals within a home area. At this time, the Car 2 Go Miami fleet is comprised of gasoline SmartFor2 cars. Car 2 Go does not currently have plans to deploy PEV as part of its fleet in the Miami market; however, the company has experience deploying PEV on a large scale as it has in the San Diego Car 2 Go program in 2011.

II-16.I. EVSE Requirements

Based on this analysis, an initial implementation of a car sharing program at the Douglas Road Station would require 4 spaces for the car sharing program. Of these, 1 would be with an EVSE dedicated for a car sharing PEV. Each dedicated car sharing EVSE will have co-located EVSE for public use, based on an empirical methodology that applies decision model logic to factors that indicate early adopters for PEV ownership and concepts of locating EVSE at destination locations. The maximum number of public EVSE is capped at 4 EVSE for the purposes of the station area site plans. This recognizes that other EVSE may be installed within the quarter mile radius of the station area. The result of the public access EVSE estimate is summarized in Table **II-16.3**.

Table II-16.3 Douglas Road Station Public Access EVSE				
Indicator		**EVSE**		
		Day Use	**Night Use**	**Total**
Major Non-Work Destination	Yes	4		4
Employment	2,177			
Transit Riders that Use a Car to Metrorail for a Work Commute Trip and have $80,000+ Household Income	2	0		0
Multi-Unit Dwellings	690 22%		0	0
Household Incomes of $100,000 or More	396 15%			
Final Total (rounded up to make total dedicated and public EVSE an even number for efficient siamese installation in 90-degree parking spaces)				**4**

The Douglas Road Station includes an on-site open park-and-ride lot with 226 spaces. The annual average utilization rate for the last year was 85%, with a maximum monthly occupancy of 94%. There is sufficient capacity among the 14 available parking spaces for the car sharing program and EVSE needs. **Table II-16.4** summarizes the total EVSE requirements.

Table II-16.4 Douglas Road Station EVSE Requirements	
	EVSE
Car Sharing Program Plug-In Electric Vehicles	1
Dedicated Car Sharing EVSE	1
Public Access EVSE	4
Dedicated and Public EVSE Required	5
Existing EVSE	0
Total Net EVSE Required	**5**

II-16.J. Douglas Road Metrorail Station Zoning

The Douglas Road Metrorail Station falls within the Miami-Dade Rapid Transit Zone (RTZ). Uses allowed within the RTZ are defined in the Miami-Dade County Code of Ordinances Chapter 33C Fixed-Guideway Rapid Transit System – Development Zone. PEV, EVSE and car share are not listed as permitted uses within this chapter of the Code, but these uses are appropriate and compatible with the operation of the Rapid Transit System and the convenience of its ridership, thereby satisfying the intent and purpose of this Chapter. Therefore, all proposed PEV, EVSE and car share will be considered as an as-of-right use within the RTZ. Although the Douglas Road Metrorail Station is located within the City of Miami limits, all uses, including those proposed, within the RTZ are under the jurisdiction of Miami-Dade County and will require approval from the Miami-Dade Department of Planning of Zoning.

II-16.K. Project Siting

Project siting for EVs will be located in the Douglas Road surface parking lot identified in **Figure II-16.3** and **Figure II-16.4**. Location of parking was determined based on the following criteria:

1. **Walk up potential:** The identified parking spaces are located in an area with high foot traffic, making it convenient to Metrorail users, Miami-Dade WASD employees and visitors, and residents and businesses from the surrounding neighborhood.

2. **Visibility:** The identified parking spaces are located in a well lit and highly visible area of the Douglas Road Metrorail station.

3. **Electric panel availability:** A site reconnaissance was conducted by an electrician on December 12, 2012 to determine electric panel availability and improvements needed. The identified spaces are located across from the electric vault, and separated by a sidewalk making it most cost-effective to install EVSE. For this location, there are six breakers available for Level 2 chargers. For the identified spaces, new conduit will be requited with approximately 100 feet of trenching through landscaped area and concrete plaza.

4. **Parking space ownership:** The identified spaces are owned by Miami-Dade County, making the permitting process easier.

5. **Number of spaces:** There are spaces available that match the demand forecast identified in **Section II-16.I**. of this document, with the potential of converting regular parking spaces to EVSE spaces as demand increases.

Figure II-16.3
Douglas Road Station Project Siting Map

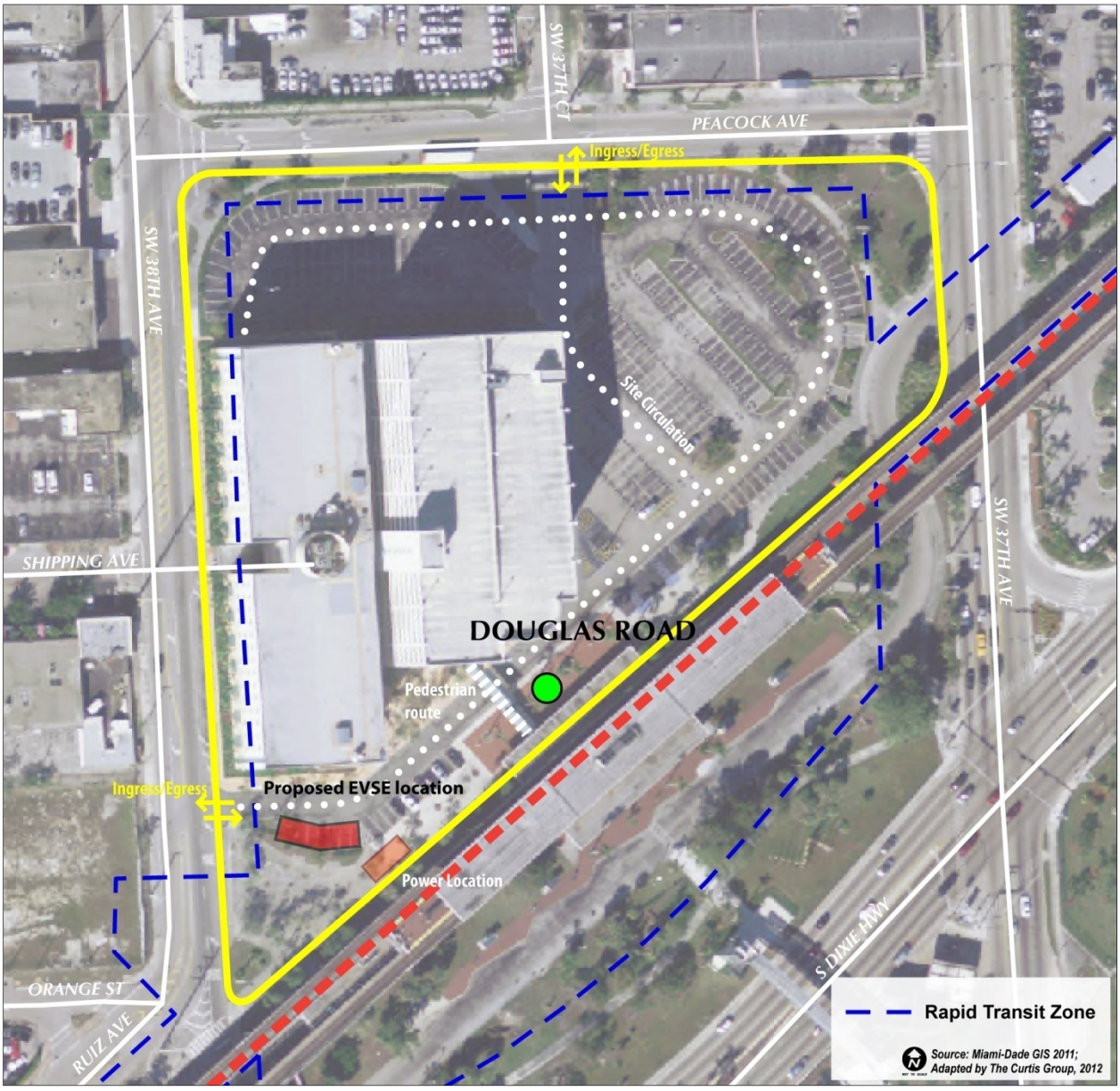


Figure II-16.4
Douglas Road Station Project Siting Photos

Proposed location

High visibility and walk up potential

II-17. University Station Master Plan

II-17.A. Geography

The University Station Area includes 130 acres in the City of Coral Gables. The University Station is located 7.1 miles from the Government Center Station in downtown Miami. The station location primarily serves the University of Miami as a destination, and a residential area. Unlike most other stations in the US-1 Corridor, the University Station is focused on the residents, employees, and day visitors of a single major use. Pedestrian access from the station south to the commercial establishments along the southeast side of US-1 is facilitated by a crosswalk directly located at the station. There are 30 intersections in the ¼-mile radius around the station

II-17.B. Resident Demographics

The demographic analysis of the station area used census tracts and block groups: 7503-1 and 9803-2 of the US Census 2010 and American Community Survey. The residential data is not usable because the census data does not include University student residents. The University approximately 15,500 students, of which about 4,500 live on campus. Only 919 residents on the south side of US-1 are in the census data.

II-17.C. Employment

The census data shows 1,144 employees in the station area, predominantly in the sectors of: health care and social assistance (28%), accommodation and food service (21%), finance and insurance (15%), and retail trade (9%). As with the resident population data, only the businesses on the southeast side of US-1 are captured by this data. The University of Miami has more than 13,000 faculty and staff. Of these approximately 3,000 are academic staff. The area is a significant employment center along the US-1 Corridor; however, the employment demographic data from the census is incomplete and not usable.

II-17.D. Major Destinations

The major destination for this station is the University of Miami campus. Within the campus, destinations of interest to the general public include:

Bank United Center (8,000 seat arena)
Lowe Art Museum
Health South Doctors Hospital
Gusman Concert Hall (600 seats)

Figure II-17.1
Map of Metrorail Line showing University Station Location

Figure II-17.2
Aerial View of University Station with Quarter-Mile Radius and Block Group Boundaries

II-17.E. University Metrorail Station

The University Metrorail Station is located along Ponce de Leon Boulevard adjacent to the intersection at the intersection US-1 and Mariposa Court in the City of Coral Gables. The station has an on-site park-and-ride facility alongside and underneath the Metrorail alignment.

Miami-Dade Transit (MDT) Metrorail service is provided by the Green Line and the Orange Line. Connecting bus service is available by three MDT bus routes and the University of Miami Hurricane shuttles:

Route 48	southwest to University Station, northeast to Mercy Hospital and Brickell Station via Bay Shore Drive in Coconut Grove
Route 56	northwest through Coral Gables to the Miami Children's Hospital at SW 62nd Avenue, and west along Miller Road (SW 52nd Street) to SW 162nd Avenue, and at peak hours to the Miami-Dade College Kendall Campus at Kendall Drive (SW 88th Street) and SW 107th Avenue
Route 500	Midnight Owl - overnight service along US-1 from Government Center to Dadeland South

Hurricanes Shuttle – operated by the University of Miami

The University Station is among the lower utilized stations of the US-1 Corridor. The average annual weekday station utilization for the year from October 2011 through September 2012 are:

Average Weekday Station Boardings	1,977	(4% of Corridor total)
Station Parking Capacity	401	
Metrorail Parking Utilization	46%	

II-17.F. Car Sharing Demand

Table II-17.1 summarizes the car sharing market analysis inputs to predict potential car sharing demand for the University Station.

The residential component of this demand analysis only includes residents that are not on the University of Miami campus. Census data does not on-campus include student residents. Further, there is an on-campus CSO that meets the demand of the campus residents and day time populations.

Table II-17.1
University Station Car Sharing Demand Assessment

	Correlation	Station Area Residents	Station Weekday Passenger Boardings
Basis			
Area Population and Station Utilization	-	919	1,977
Demographics			
1-Person Households	Positive	37%	11%
Households with Children	Negative	58%	data not available
Rental Households	Positive	31%	data not available
Auto Ownership			
Household with No Vehicle	Positive	18%	31%
Household with 1 Vehicle	Positive	32%	23%
Average Number of Vehicles per Household	Negative	1.34	1.52
Travel Mode to Work or Travel Mode to Metrorail Station			
Drive Alone	Negative	66%	3%
Car Pool	Negative	4%	3%
Transit	Positive	5%	18%
Bike	Negative	0%	2%
Walk	Positive	25%	51%
Car Sharing Demand			
Car Sharing Demand		0	173

II-17.G. Car Sharing Vehicles and Car Sharing PEV

The market assessment results have been used to determine the number of vehicles and electric vehicles that are forecast for the University, with the results summarized in **Table II-17.2.**

Table II-17.2
University Station Car Sharing Vehicles

	Vehicles / PEV
Car Sharing Demand	173
Car Sharing Vehicles: Total	1
Car Sharing Vehicles: Initial Placement – All Fuels	**4**
Proportion of PEV Car Sharing Vehicles	25%
Car Sharing Plug-In Electric Vehicles at Station	**1**

II-17.H. EVSE Requirements

Based on this analysis, an initial implementation of a car sharing program at the Douglas Road Station would require 4 spaces for the car sharing program. Of these, 1 would be with an EVSE dedicated for a car sharing PEV. Each dedicated car sharing EVSE will have co-located EVSE for public use, based on an empirical methodology that applies decision model logic to factors that indicate early adopters for PEV ownership and concepts of locating EVSE at destination locations. The maximum number of public EVSE is capped at 4 EVSE for the purposes of the station area site plans. This recognizes that other EVSE may be installed within the quarter mile radius of the station area. The result of the public access EVSE estimate is summarized in **Table II-17.3.**

The residential, employment, and potential PEV adopter analysis for the University Station does not include campus populations, and because of this the demand assessment is very low, even though there are 15 car sharing vehicles in use on campus. The recommendation for the University Station should include working with the CSO that currently has vehicles on campus well as other potential CSOs toward deployment of car sharing PEV and EVSE at the station in coordination with demand for the on and off campus populations.

Table II-17.3 University Station Public Access EVSE				
Indicator		**EVSE**		
		Day Use	**Night Use**	**Total**
Major Non-Work Destination	No	0		0
Employment	1,144			
Transit Riders that Use a Car to Metrorail for a Work Commute Trip and have $80,000+ Household Income	3	0		0
Multi-Unit Dwellings	243 59%		4	4
Household Incomes of $100,000 or More	178 45%			
Final Total (rounded up to make total dedicated and public EVSE an even number for efficient siamese installation in 90-degree parking spaces)				**4**

The University Station includes an on-site open park-and-ride lot of 401 spaces. The annual average utilization rate for the last year was 46%, with a maximum monthly occupancy of 52%. There is sufficient capacity among the 191 available parking spaces for the car sharing program and EVSE needs. **Table II-17.4** summarizes the total EVSE requirements.

Table II-17.4 University Station EVSE Requirements	
	EVSE
Car Sharing Program Plug-In Electric Vehicles	1
Dedicated Car Sharing EVSE	1
Public Access EVSE	4
Dedicated and Public EVSE Required	5
Existing EVSE	0
Total Net EVSE Required	**5**

II-17.I. University Metrorail Station Zoning

The University Metrorail Station falls within the Miami-Dade Rapid Transit Zone (RTZ). Uses allowed within the RTZ are defined in the Miami-Dade County Code of Ordinances Chapter 33C Fixed-Guideway Rapid Transit System – Development Zone. PEV, EVSE and car share are not listed as permitted uses within this chapter of the Code, but these uses are appropriate and compatible with the operation of the Rapid Transit System and the convenience of its ridership, thereby satisfying the intent and purpose of this Chapter. Therefore, all proposed PEV, EVSE and car share will be considered as an as-of-right use within the RTZ. Although the University Metrorail Station is located within the City of Coral Gables limits, all uses, including those proposed, within the RTZ are under the jurisdiction of Miami-Dade County and will require approval from the Miami-Dade Department of Planning of Zoning.

II-17.J. Project Siting

Project siting for EVs will be located in the University Metrorail surface parking lot identified in **Figure II-17.3** and **Figure II-17.4**. Location of parking was determined based on the following criteria:

1. **Walk up potential:** The identified parking spaces are located in an area with high foot traffic, making it convenient to both Metrorail and surrounding users.

2. **Visibility:** The identified parking spaces are located in a well lit and highly visible area, with direct access from Ponce de Leon Boulevard.

3. **Electric panel proximity:** A site reconnaissance was conducted by an electrician on December 12, 2012 to determine electric panel availability and improvements needed. The identified spaces are located close to the electric vault that serves the Metrorail station. For this location, there are three breakers available for Level 2 chargers. For the identified spaces, new conduit will be required with trenching through landscaped area and a 12-foot asphalt drive.
4. **Parking space ownership:** The identified spaces are owned by Miami-Dade County, making the permitting process easier.

5. **Number of spaces:** There are spaces available that match the demand forecast identified in **Section 0**. of this document, with the potential of converting regular parking spaces to EVSE spaces as demand increases.

Figure II-17.3
University Station Project Siting Map

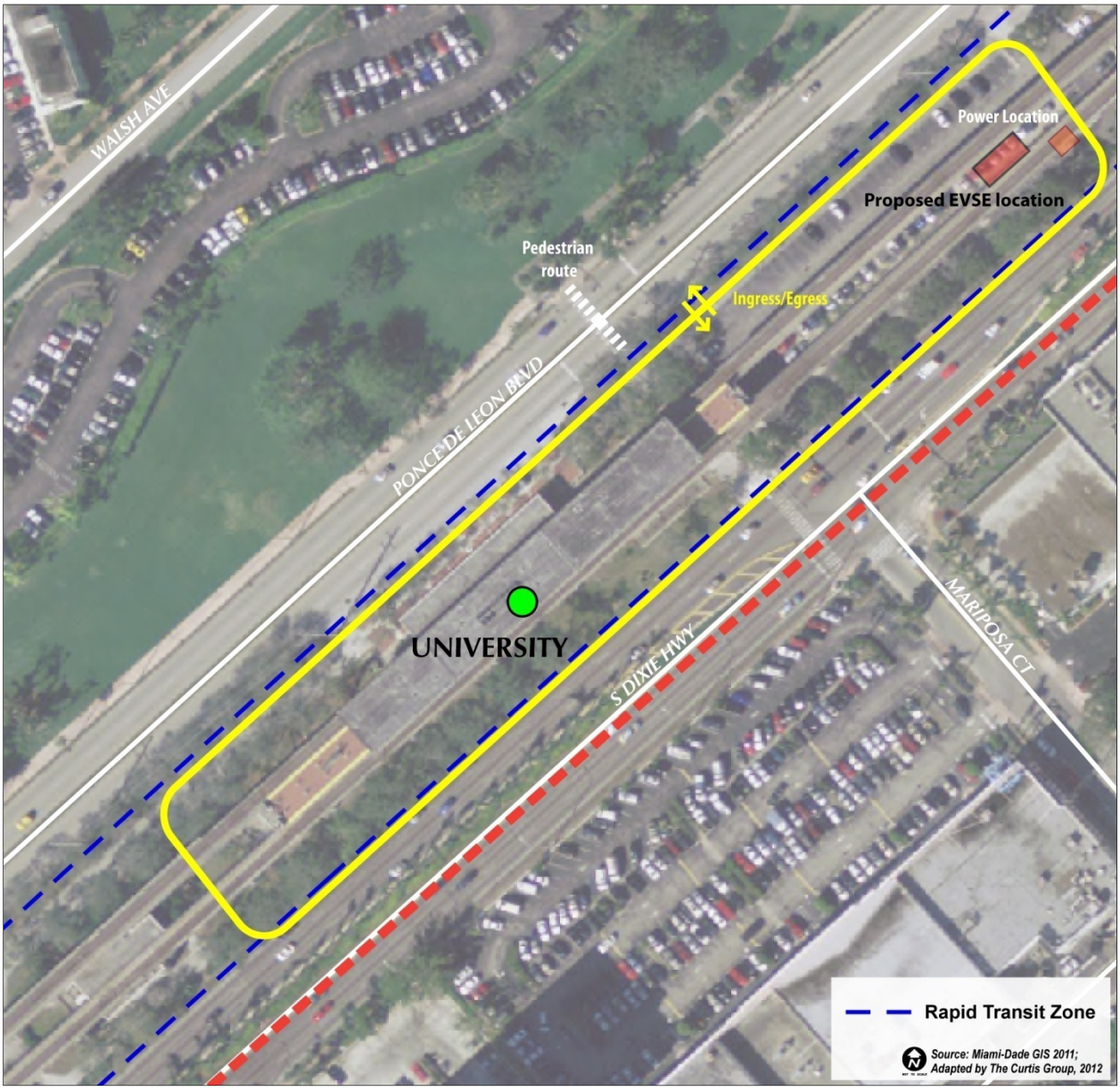


Figure II-17.4
University Station Project Siting Photos

Proposed location under guideway and close to electric vault

Electric availability for additions and upgrade

II-18. South Miami Station Master Plan

II-18.A. Geography

The South Miami Station Area includes 323 acres that are within the City of South Miami. The station is located 8.1 miles from the Government Center Station in downtown Miami at the crossroads of US-1 and Sunset Drive (SW 72nd Street), and is 2 blocks southwest of Red Road (SW 57th Avenue). The station is located across US-1 from the mixed-use South Miami CBD, which as a district is a major destination similar to Coconut Grove. The street grid in this area has 52 intersections within the ¼-mile walking distance radius. The intersection of US-1 and Sunset Drive has very high traffic volumes from all four approaches with many vehicular traffic turning movements. Pedestrian access from the station to the South Miami CBD is facilitated by at-grade crosswalks.

II-18.B. Resident Demographics

The demographic analysis of the station area used census tracts and block groups 7603-1, and 7604-1 of the US Census 2010 and American Community Survey. It is among the less populated station areas along the US-1 Corridor.

Station Area Population:	3,696	(5% of corridor total)
Station Area Population over 18	3,072	
Station Area Households	1,727	
Residential Density (DU/Ac.)	6.1	
Employed Resident Workforce	1,652	(54% of persons over 18)

II-18.C. Employment

The station area is a mixed-use district that serves more suburban surrounding neighborhoods with both local retail, offices, as well as destination retail and entertainment establishments. There are 3,977 employees in the station area, predominantly made up of the following industry sectors:

Accommodation and Food Service	984 employees	25% of employment
Retail Trade	639 employees	16% of employment
Public Services (excluding Public Administration)	532 employees	13% of employment
Health Care and Social Assistance	506 employees	13% of employment

The area is a significant employment center along the US-1 Corridor.

II-18.D. Major Destinations

The major destinations for the South Miami Station area are:

South Miami downtown district	The Shops at Sunset Place
South Miami Hospital	Baptist Health South Florida

Figure II-18.1
Map of Metrorail Line showing South Miami Station Location

Figure II-18.2
Aerial View of South Miami Station with Quarter-Mile Radius and Block Group Boundaries

II-18.E. South Miami Metrorail Station

The South Miami Metrorail Station is located at the intersection of Sunset Place (SW 72nd Street) and US-1. The station has an on-site park-and-ride facility that includes a passenger drop-off area and bus transfer bays.

Miami-Dade Transit (MDT) Metrorail service is provided by the Green Line and the Orange Line. Connecting bus service is available by four MDT bus routes.

Route 37	southwest to the South Miami Station, north to Hialeah via Douglas Road
Route 57	south to Jackson South Hospital at Coral Reef Drive (SW 152nd Street and SW 92nd Avenue), and north to Miami Central Station at Miami International Airport.
Route 72	west to Miller Square (at SW 137th Avenue) and Kendal Lakes or Westlakes Plaza and West Kendall Transit Terminal / Park-and-Ride Lot at SW 162nd Avenue
Route 500	Midnight Owl - overnight service along US-1 from Government Center to Dadeland South

The South Miami Station utilization is near the middle range among the stations of the US-1 Corridor. The average annual weekday station utilization for the year from October 2011 through September 2012 are:

Average Weekday Station Boardings	3,311	(7% of Corridor total)
Station Parking Capacity	1,774	
Metrorail Parking Utilization	43%	

II-18.F. Car Sharing Demand

Table II-18.1 summarizes the car sharing market analysis inputs to predict potential car sharing demand for the South Miami Station.

Table II-18.1
South Miami Station Car Sharing Demand Assessment

	Correlation	Station Area Residents	Station Weekday Passenger Boardings
Basis			
Area Population and Station Utilization	-	3,696	3,311
Demographics			
1-Person Households	Positive	36%	8%
Households with Children	Negative	34%	data not available
Rental Households	Positive	59%	data not available
Auto Ownership			
Household with No Vehicle	Positive	17%	24%
Household with 1 Vehicle	Positive	45%	28%
Average Number of Vehicles per Household	Negative	1.29	1.53
Travel Mode to Work or Travel Mode to Metrorail Station			
Drive Alone	Negative	76%	39%
Car Pool	Negative	3%	9%
Transit	Positive	11%	9%
Bike	Negative	7%	1%
Walk	Positive	2%	29%
Car Sharing Demand			
Car Sharing Demand		0	288

II-18.G. Car Sharing Vehicle and Car Sharing PEV

The market assessment results have been used to determine the number of vehicles and electric vehicles that are forecast for the South Miami Station car sharing program, with the results summarized in **Table II-18.2**.

Table II-18.2
South Miami Station Car Sharing Vehicles

	Vehicles / PEV
Car Sharing Demand	288
Car Sharing Vehicles: Total	1
Car Sharing Vehicles: Initial Placement – All Fuels	**4**
Proportion of PEV Car Sharing Vehicles	25%
Car Sharing Plug-In Electric Vehicles at Station	**1**

II-18.H. Existing Car Sharing Programs

There are no existing car sharing programs that are available at the South Miami Station or in the station area.

II-18.I. EVSE Requirements

Based on this analysis, an initial implementation of a car sharing program at the South Miami Station would require 4 spaces for the car sharing program. Of these, 1 would be with an EVSE dedicated for a car sharing PEV. Each dedicated car sharing EVSE will have co-located EVSE for public use, based on an empirical methodology that applies decision model logic to factors that indicate early adopters for PEV ownership and concepts of locating EVSE at destination locations. The maximum number of public EVSE is capped at 4 EVSE for the purposes of the station area site plans. This recognizes that other EVSE may be installed within the quarter mile radius of the station area. The result of the public access EVSE estimate is summarized in **Table II-18.3.**

Table II-18.3 South Miami Station Public Access EVSE				
Indicator		**EVSE**		
		Day Use	**Night Use**	**Total**
Major Non-Work Destination	Yes	4		4
Employment	3,977			
Transit Riders that Use a Car to Metrorail for a Work Commute Trip and have $80,000+ Household Income	18	2		2
Multi-Unit Dwellings	1,145 69%		0	0
Household Incomes of $100,000 or More	183 11%			
Final Total (rounded up to make total dedicated and public EVSE an even number for efficient siamese installation in 90-degree parking spaces)				**4**

The South Miami Station includes an on-site 5-level park-and-ride garage containing 1,774 spaces. The annual average utilization rate for the last year was 43%, with a maximum monthly occupancy of 50%. There is sufficient capacity among the 881 available parking spaces for the car sharing program and EVSE needs. **Table II-18.4** summarizes the final EVSE requirements.

Table II-18.4 South Miami Station EVSE Requirements	
	EVSE
Car Sharing Program Plug-In Electric Vehicles	1
Dedicated Car Sharing EVSE	1
Public Access EVSE	4
Dedicated and Public EVSE Required	5
Existing EVSE	0
Total Net EVSE Required	**5**

II-18.J. South Miami Metrorail Station Zoning

The South Miami Metrorail Station falls within the Miami-Dade Rapid Transit Zone (RTZ). Uses allowed within the RTZ are defined in the Miami-Dade County Code of Ordinances Chapter 33C Fixed-Guideway Rapid Transit System – Development Zone. PEV, EVSE and car share are not listed as permitted uses within this chapter of the Code, but these uses are appropriate and compatible with the operation of the Rapid Transit System and the convenience of its ridership, thereby satisfying the intent and purpose of this Chapter. Therefore, all proposed PEV, EVSE and car share will be considered as an as-of-right use within the RTZ. Although the South Miami Metrorail Station is located within the City of South Miami limits, all uses, including those proposed, within the RTZ are under the jurisdiction of Miami-Dade County and will require approval from the Miami-Dade Department of Planning of Zoning.

II-18.K. Project Siting

Project siting for EVs will be located in the South Miami Metrorail parking garage as identified in **Figure II-18.3** and **Figure II-18.4**. Location of parking was determined based on the following criteria:

1. **Walk up potential:** The identified parking spaces are located in an area with high foot traffic, making it convenient to both Metrorail and surrounding users.

2. **Visibility:** The identified parking spaces are located in a well lit and highly visible area of the South Miami Metrorail garage.

3. **Electric panel availability:** A site reconnaissance was conducted by an electrician on December 12, 2012 to determine electric panel availability and improvements needed. The identified spaces are located close to the electric vault that serves the Metrorail station. For this location, there are two breakers available for Level 2 chargers. For the identified spaces, new conduit will be required.

4. **Parking space ownership:** The identified spaces are owned by Miami-Dade County, making the permitting process easier.

5. **Number of spaces:** There are spaces available that match the demand forecast identified in **Section II-18.I**. of this document, with the potential of converting regular parking spaces to EVSE spaces as demand increases.

Figure II-18.3
South Miami Station Project Siting Map

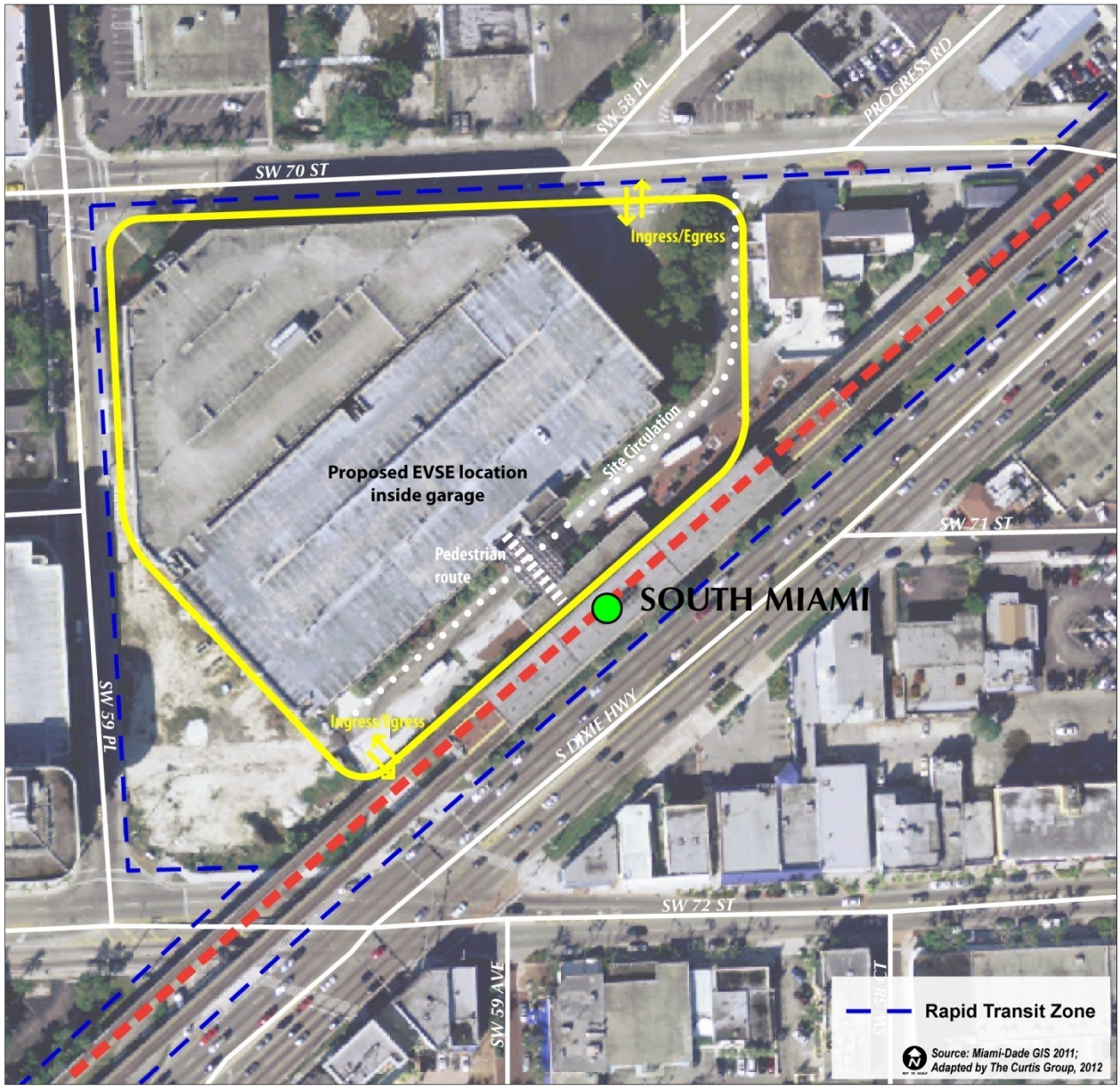
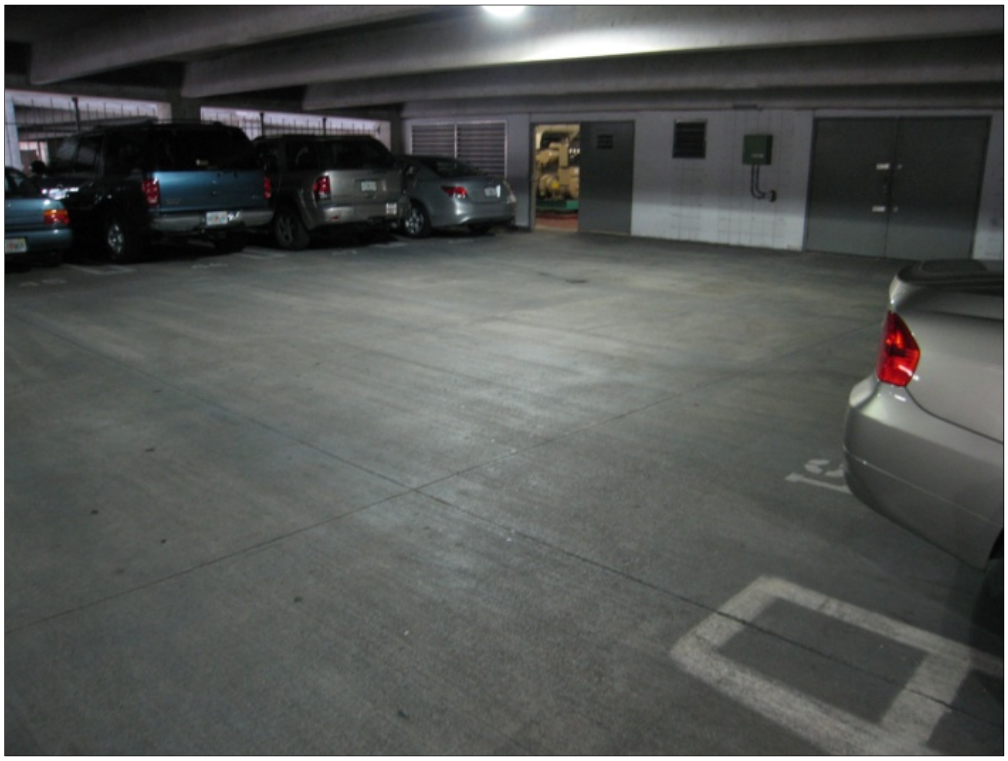


Figure II-18.4
South Miami Station Project Siting Photos



Proposed EVSE spaces are located close to the electric vault

Electric panel availability for additions and upgrade

II-19. Dadeland North Station Master Plan

II-19.A. Geography

The Dadeland North Station Area includes 259 acres that are in unincorporated Miami-Dade County. The station is located 9.6 miles from the Government Center Station at the intersection of US-1 and SW 83rd Street. Its location is also close to Dadeland Mall, and is just south of the intersection between the termination of the Snapper Creek Expressway and US-1, making easy access and egress from the Expressway coming from southwest. The potential for park-and-ride and carpooling commuters is facilitated by the 1,974-space, 9-level park-and-ride garage located at the station.

The Metrorail station is co-located with "Dadeland Station", a private multi-level retail development. To the southeast across US-1 from the station is the Village of Pinecrest, which is a low-density bedroom community. To the north are Dadeland Station and single-family residential areas of the City of South Miami, and to the south and west are the back parking areas of Dadeland Mall. There are 19 intersections in the ¼-mile walking radius, affirming that the area is not very walkable and has low pedestrian connectivity.

II-19.B. Resident Demographics

The demographic analysis of the station area used census tracts and block groups 7604-4, 7704-1and 7704-3 of the US Census 2010 and American Community Survey. It is among the less populated station areas along the US-1 Corridor.

Station Area Population:	3,592	(5% of corridor total)
Station Area Population over 18	2,995	
Station Area Households	1,697	
Residential Density (DU/Ac.)	7.5	
Employed Resident Workforce	1,946	(65% of persons over 18)

II-19.C. Employment

The station area is primarily a commercial district with residential uses at the periphery that serves the surrounding neighborhoods of the Kendall area suburbs. Along the US-1 Corridor, this area is a significant employment center with 1,486 employees, predominantly made up of two industry sectors:

Retail Trade	880 employees	59% of employment
Accommodation and Food Service	254 employees	17% of employment

II-19.D. Major Destinations

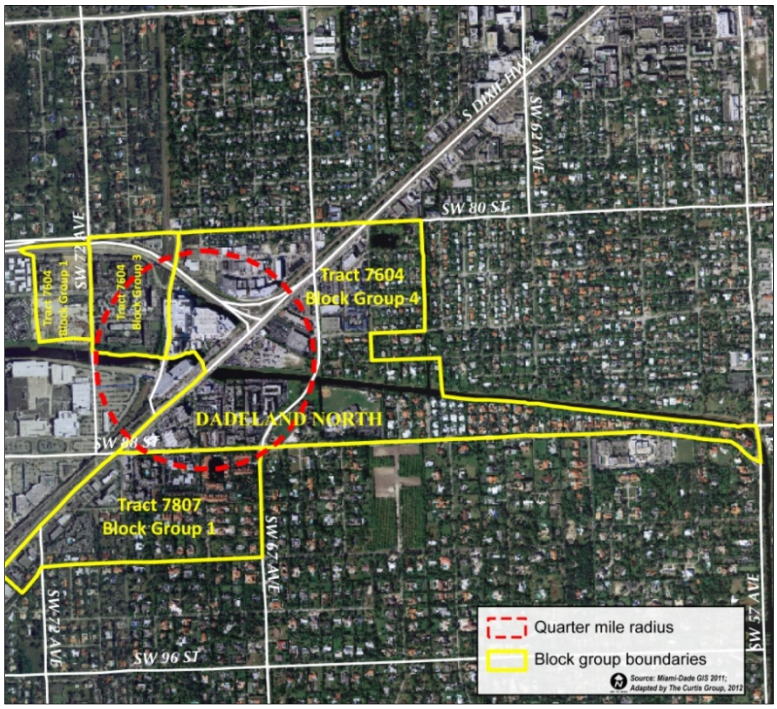
The major destinations for the Dadeland North Station area are:

Dadeland Station

Dadeland Mall

Figure II-19.1
Map of Metrorail Line showing Dadeland North Station Location

Figure II-19.2
Aerial View of Dadeland North Station with Quarter-Mile Radius and Block Group Boundaries



II-19.E. Dadeland North Metrorail Station

The Dadeland North Metrorail Station is located at the intersection of SW 83rd Street and US-1, and is just south of the termination of the Snapper Creek Expressway into US-1. The station has an on-site park-and-ride facility that includes a passenger drop-off area and bus transfer bays.

Miami-Dade Transit (MDT) Metrorail service is provided by the Green Line and the Orange Line. Connecting bus service is available by nine MDT bus routes.

Route 52	south to Southland Mall, South Dade Government Center, and South Miami-Dade Health Center in the Goulds via the Busway
Route 87	north to Mall of the Americas and Palmetto Station via Galloway Road (SW/NW 87th Avenue)
Route 88	Kendall Lakes and West Kendall Transit Terminal / Park-and-Ride lot at SW 162nd Street via Kendall Drive (SW 88th Street)
Route 104	Miami-Dade College Kendall Campus, Hammocks Town Center, and West Kendall Transit Terminal / Park-and-Ride lot at SW 162nd Street via Killian Drive (SW 104th Street) and Kendall Drive (SW 88th Street)
Route 204	Killian KAT, limited stops to Hammocks Town Center, and West Kendall Transit Terminal / Park-and-Ride lot at SW 162nd Street via (SW 104th Street) and Kendall Drive (SW 88th Street)
Route 272	Sunset KAT, limited stops to West Lakes Shopping Center and West Kendall Transit Terminal/Park-and-Ride lot at SW 162nd St. via Sunset Drive (SW 72nd St.)
Route 288	Kendall Cruiser, limited stops West Kendall Transit Terminal / Park-and-Ride lot at SW 162nd Street via Kendall Drive (SW 88th Street)
Route 500	Midnight Owl - overnight service along US-1 from Government Center to Dadeland South

The Dadeland North Station utilization is the third highest in the US-1 Corridor. The average annual weekday station utilization for the year from October 2011 through September 2012 are:

Average Weekday Station Boardings	6,284	(7% of Corridor total)
Station Parking Capacity	1,974	
Metrorail Parking Utilization	84%	

II-19.F. Car Sharing Demand

Table II-19.1 summarizes the car sharing market analysis inputs to predict potential car sharing demand for the Dadeland North Station.

Table II-19.1
Dadeland North Station Car Sharing Demand Assessment

	Correlation	Station Area Residents	Station Weekday Passenger Boardings
Basis			
Area Population and Station Utilization	-	3,592	6,284
Demographics			
1-Person Households	Positive	27%	7%
Households with Children	Negative	50%	data not available
Rental Households	Positive	73%	data not available
Auto Ownership			
Household with No Vehicle	Positive	15%	20%
Household with 1 Vehicle	Positive	49%	25%
Average Number of Vehicles per Household	Negative	1.25	1.72
Travel Mode to Work or Travel Mode to Metrorail Station			
Drive Alone	Negative	64%	40%
Car Pool	Negative	5%	8%
Transit	Positive	17%	31%
Bike	Negative	0%	1%
Walk	Positive	9%	16%
Car Sharing Demand			
Car Sharing Demand		0	0

II-19.G. Car Sharing Vehicle and Car Sharing PEV

The market assessment results have been used to determine the number of vehicles and electric vehicles that are forecast for the Dadeland North Station car sharing program, with the results summarized in **Table II-19.2**.

In addition to the recommendation for the car sharing program as described, the end stations of Dadeland North and Dadeland South, a station car program is recommended for development at each of these stations. The station car program that is recommended is more fully described in **Section II-21.D**. The station car

program may be managed by a CSO, a government unit, or a car pooling management service such as South Florida Commuter Services. At this level of planning, it is not possible to forecast the potential number of participants, but spaces for station car EVSE participants should be reserved. In the case of Dadeland North, existing EVSE are available for this program.

Table II-19.2
Dadeland North Station Car Sharing Vehicles

	Vehicles / PEV
Car Sharing Demand	0
Car Sharing Vehicles: Total	0
Car Sharing Vehicles: Initial Placement – All Fuels	0
Proportion of PEV Car Sharing Vehicles	-
Car Sharing Plug-In Electric Vehicles at Station	**0**
Additional PEV for Station Car Program (See Sec. 6-19.D)	TBD

II-19.H. Existing Car Sharing Programs

There are no existing car sharing programs that are available at the Dadeland North Station or in the station area. At the ground floor of the parking structure for Dadeland Station, there is an existing conventional service-counter rental car operation (Avis).

II-19.I. EVSE Requirements

Based on this analysis, an initial implementation of a car sharing program at the Dadeland North Station would not require any spaces for a car sharing program at this time. Throughout the program, dedicated car sharing EVSE are used to leverage co-located public access EVSE. In the case of Dadeland North, public access EVSE are evaluated without a car sharing program because the station is a very large and well utilized park and ride facility for Metrorail, and because 10 spaces are already dedicated for PEV recharging. As for other stations, estimation of EVSE for public use is based on an empirical methodology that applies decision model logic to factors that indicate early adopters for PEV ownership and concepts of locating EVSE at destination locations. The maximum number of public EVSE is capped at 4 EVSE for the purposes of the station area site plans. This recognizes that other EVSE may be installed within the quarter mile radius of the station area. The result of the public access EVSE estimate is summarized in **Table II-19.3.**

Table II-19.3 Dadeland North Station Public Access EVSE				
Indicator		**EVSE**		
		Day Use	**Night Use**	**Total**
Major Non-Work Destination	No	0		0
Employment	1,486			
Transit Riders that Use a Car to Metrorail for a Work Commute Trip and have $80,000+ Household Income	32	4		4
Multi-Unit Dwellings	1,781 94%		0	0
Household Incomes of $100,000 or More	267 11%			
Final Total (rounded up to make total dedicated and public EVSE an even number for efficient siamese installation in 90-degree parking spaces)				**4**

The Dadeland North Station includes an on-site 9-level park-and-ride garage that contains 1,974 spaces. The annual average utilization rate for the last year was 84%, with a maximum monthly occupancy of 90%. There is sufficient capacity among the 200 available parking spaces for the car sharing program and EVSE needs. **Table II-19.4** summarizes the total EVSE requirements. Within the garage, there are 10 existing Level-1 EVSE located on the 2nd level.

Table II-19.4 Dadeland North Station EVSE Requirements	
	EVSE
Car Sharing Program Plug-In Electric Vehicles	0
Dedicated Car Sharing EVSE	0
Public Access EVSE	4
Dedicated and Public EVSE Required	4
Existing EVSE	10 (need to be upgraded)
Total Net EVSE Required	**0**

II-19.J. Dadeland North Metrorail Station Zoning

The Dadeland North Metrorail Station falls within the Miami-Dade Rapid Transit Zone (RTZ). Uses allowed within the RTZ are defined in the Miami-Dade County Code of Ordinances Chapter 33C Fixed-Guideway Rapid Transit System – Development Zone. PEV, EVSE and car share are not listed as permitted uses within this chapter of the Code, but these uses are appropriate and compatible with the operation of the Rapid Transit System and the convenience of its ridership, thereby satisfying the intent and purpose of this Chapter. Therefore, all proposed PEV, EVSE and car share will be considered as an as-of-right use within the RTZ. All uses, including those proposed, within the RTZ are under the jurisdiction of Miami-Dade County and will require approval from the Miami-Dade Department of Planning of Zoning.

II-19.K. Project Siting

Project siting for EVs is located in the Dadeland North Metrorail parking garage as identified in **Figure II-19.3** and **Figure II-19.4**. A site reconnaissance was conducted by an electrician on December 12, 2012 to determine electric panel availability and improvements needed. For this location, there are ten breakers available for Level 2 chargers. Ten existing Level 2 chargers are located within the garage; but need to be upgraded to the Level 2 J1772 EVSE. As demand and interest in EVs and EVSE increases, there is electric capacity and parking space available at this location. Improvements that can be made are better regulatory and wayfinding signage placed near the pedestrian and vehicular entrances to the station.

Figure II-19.3
Dadeland North Station Project Siting Map

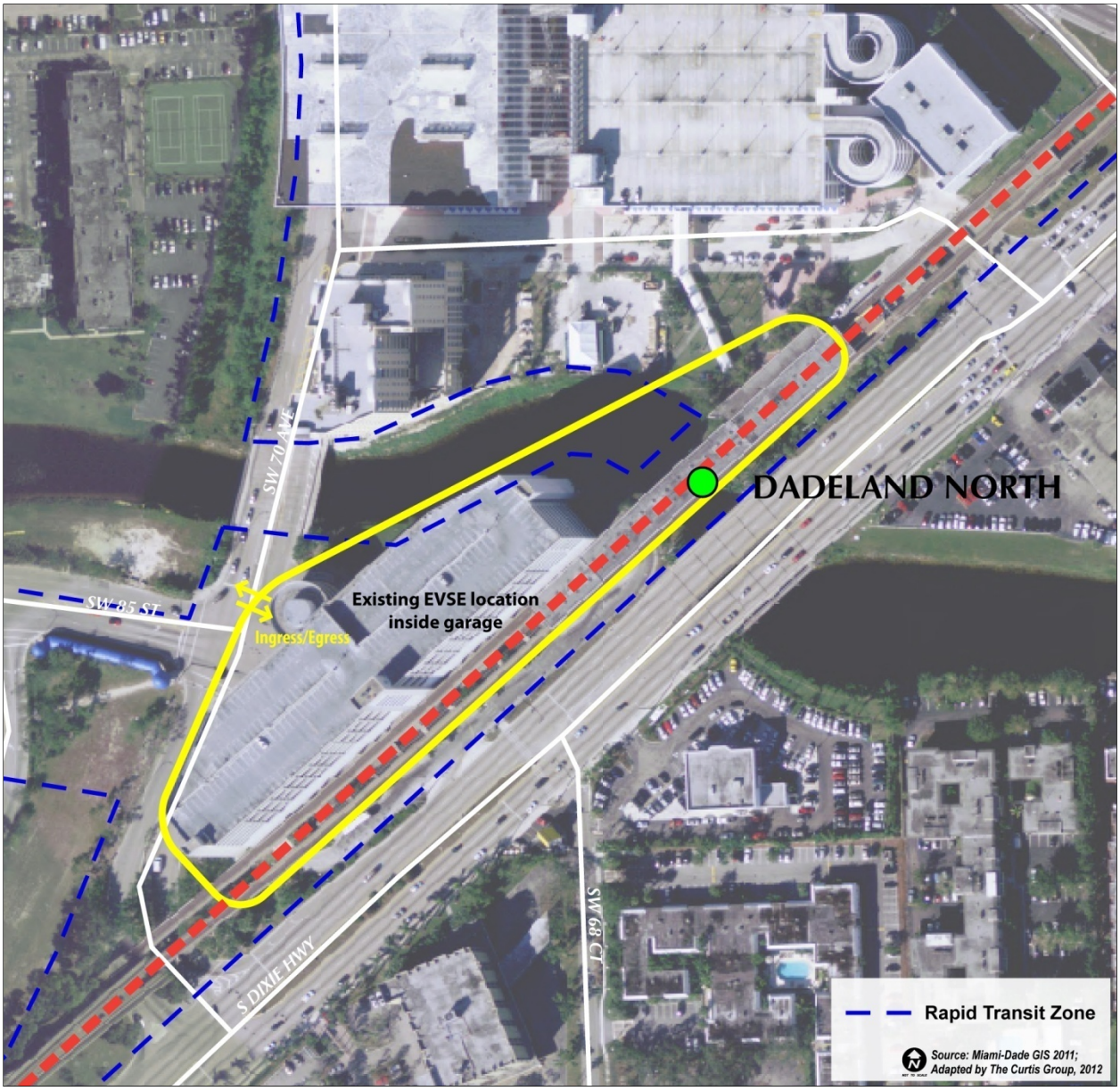


Figure II-19.4
Dadeland North Station Project Siting Photos

Existing EVSE

Electric panel availability for additions and upgrades

II-20. Dadeland South Station Master Plan

II-20.A. Geography

The Dadeland South Station Area includes 786 acres in unincorporated Miami-Dade County. The station is located at the intersection of US-1 and Dadeland Boulevard, 10.2 miles from the Government Center Station. Its location is just north of the intersection between the termination of the Palmetto Expressway and US-1, situating it for good access and egress from the expressway. The potential for park-and-ride commuters is facilitated by the 1,356-space, 10-level garage located at the station and accessed from Datran Drive.

The downtown Dadeland mixed use development includes the Datran office towers and the Marriot Hotel, and several seven and eight story residential condominiums with ground floor retail, offices, as well as conventionally planned retail centers along Kendall Drive (SW 88th Street). Further north across Kendall Drive is the Dadeland Mall with 1,488,000 square feet of retail area. To the southeast is the Village of Pinecrest, a low density bedroom community. The street grid for the ¼-mile walking radius around the station includes 45 intersections.

II-20.B. Resident Demographics

The demographic analysis of the station area used census tracts and block groups 7804-1, 7804-4, 7804-5, 7807-1 and 7807-2 of the US Census 2010 and American Community Survey. It is among the more populated station areas along the US-1 Corridor.

Station Area Population:	7,125	(10% of corridor total)
Station Area Population over 18	5,907	
Station Area Households	3,385	
Residential Density (DU/Ac.)	5.3	
Employed Resident Workforce	3,586	(61% of persons over 18)

II-20.C. Employment

The station area is a dense mixed use and commercial district that serves the surrounding neighborhoods of the Kendall area suburbs and the Village of Pinecrest. The Dadeland South area is a major employment center Corridor with 7,973 employees in the station area, predominantly in the following industry sectors:

Professional, Scientific, and Technical Services	2,314 employees	29% of employment
Retail Trade	1,256 employees	16% of employment
Finance and Insurance	1,121 employees	14% of employment
Administration & Support, Waste Mgt. & Remediation	770 employees	10% of employment

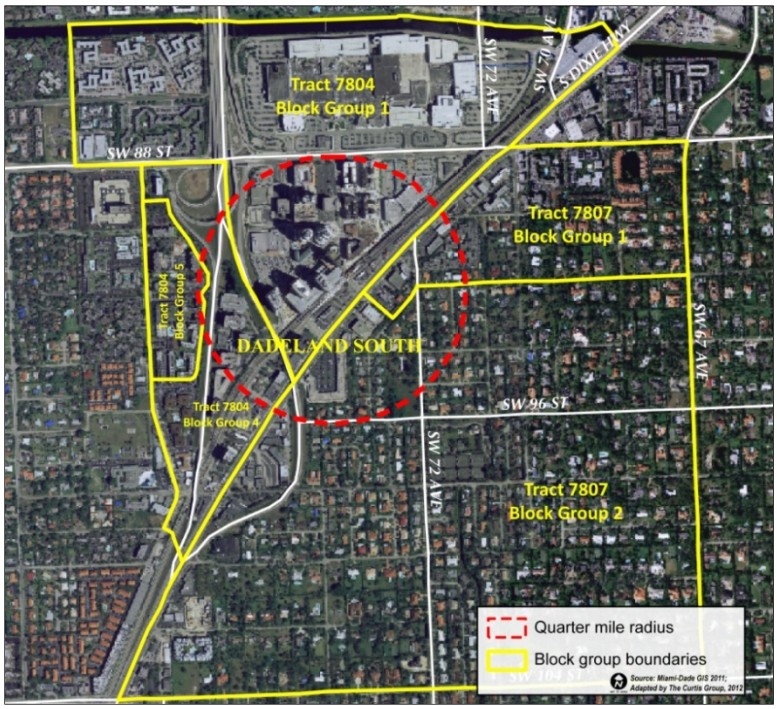
II-20.D. Major Destinations

The major destinations for the Dadeland South Station area are:

Dadeland Mall Datran Towers Downtown Dadeland

Figure II-20.1
Map of Metrorail Line showing Dadeland South Station Location

Figure II-20.2
Aerial View of Dadeland South Station with Quarter-Mile Radius and Block Group Boundaries



II-20.E. Dadeland South Metrorail Station

The Dadeland South Metrorail Station is the southern terminus of the Metrorail system. It is located at the intersection of SW 83rd Street and US-1, and is just north of the termination of the Palmetto Expressway into US-1. The station has an on-site park-and-ride facility that includes a passenger drop-off area and bus transfer bays.

Miami-Dade Transit (MDT) Metrorail service is provided by the Green Line and the Orange Line. Connecting bus service is available by ten MDT bus routes. Of these routes, six use the South Dade Busway which begins at Dadeland South and continues 19½ miles to the City of Homestead.

Route 31	Busway Local, (all stops) Southland Mall, and South Dade Government Center on SE 211th Street via the South Dade Busway
Route 34	Busway Flyer, no stops until Coral Reef Drive (SW 152nd Street), to Florida City via the South Dade Busway
Route 38	Busway MAX, limited stops to Florida City via the South Dade Busway
Route 52	south to Southland Mall, South Dade Government Center, and South Miami-Dade Health Center in the Goulds via the South Dade Busway
Route 73	north to Miami Lakes via Ludlum Road (SW/NW 67th Avenue) and Milam Dairy Road (NW 72nd Avenue)
Route 88	Kendall Lakes and West Kendall Transit Terminal / Park-and-Ride lot at SW 162nd Street via Kendall Drive (SW 88th Street)
Route 136	west to the Tamiami Airport and the Immigration and Naturalization Office at SW 147th Av. and SW 120th St., northeast to the Douglas Road Station via Old Cutler Rd
Route 252	Coral Reef MAX, limited stops south on the South Dade Busway and west on Coral Reef Drive (SW 152nd Street) to Country Walk
Route 287	Saga Bay MAX, limited stops on the South Dade Busway, then south on Galloway Road (SW 87th Avenue) to Perrine, Saga Bay, and the South Dade Health Center on SW 216th Street
Route 500	Midnight Owl - overnight service along US-1 from Government Center to Dadeland South

The Dadeland South Station utilization is the second highest in the US-1 Corridor. The average annual weekday station utilization for the year from October 2011 through September 2012 are:

Average Weekday Station Boardings	6,934	(14% of Corridor total)
Station Parking Capacity	1,356	
Metrorail Parking Utilization	80%	

II-20.F. Car Sharing Demand

Table II-20.1 summarizes the car sharing market analysis inputs to predict potential car demand for the Dadeland South Station.

Table II-20.1
Dadeland South Station Car Sharing Demand Assessment

	Correlation	Station Area Residents	Station Weekday Passenger Boardings
Basis			
Area Population or Station Utilization	-	7,125	6,934
Demographics			
1-Person Households	Positive	29%	9%
Households with Children	Negative	31%	data not available
Rental Households	Positive	51%	data not available
Auto Ownership			
Household with No Vehicle	Positive	6%	23%
Household with 1 Vehicle	Positive	49%	28%
Average Number of Vehicles per Household	Negative	1.49	1.55
Travel Mode to Work or Travel Mode to Metrorail Station			
Drive Alone	Negative	76%	30%
Car Pool	Negative	7%	9%
Transit	Positive	9%	37%
Bike	Negative	0%	1%
Walk	Positive	4%	21%
Car Sharing Demand			
Car Sharing Demand		0	404

II-20.G. Car Sharing Vehicle and Car Sharing PEV

The market assessment results have been used to determine the number of vehicles and electric vehicles that are forecast for the Dadeland South Station car sharing program, with the results summarized in Table II-20.2.

In addition to the recommendation for the car sharing program as described, the end stations of Dadeland North and Dadeland South, a station car program is recommended for development at each of these stations. The station car program that is recommended is more fully described in **Section II-21.D**. The station car program may be managed by a CSO, a government unit, or a car pooling management service such as South Florida Commuter Services. At this level of planning, it is not possible to forecast the potential number of participants, but spaces for station car EVSE participants should be reserved. In the case of Dadeland North, existing EVSE are available for this program.

Table II-20.2
Dadeland South Station Car Sharing Vehicles

	Vehicles / PEV
Car Sharing Demand	404
Car Sharing Vehicles: Total	1
Car Sharing Vehicles: Initial Placement – All Fuels	4
Proportion of PEV Car Sharing Vehicles	25%
Car Sharing Program PEV	**1**
Additional PEV for Station Car Program (See Sec. 6-19.D)	TBD

II-20.H. Existing Car Sharing Programs

There are no existing car sharing programs that are available at the Dadeland South Station or in the station area.

II-20.I. EVSE Requirements

Based on this analysis, an initial implementation of a car sharing program at the Dadeland South Station would require 4 spaces for the car sharing program. Of these, 1 would be with an EVSE dedicated for a car sharing PEV. Each dedicated car sharing EVSE will have co-located EVSE for public use, based on an empirical methodology that applies decision model logic to factors that indicate early adopters for PEV ownership and concepts of locating EVSE at destination locations. The maximum number of public EVSE is capped at 4 EVSE for the purposes of the station area site plans. This recognizes that other EVSE may be installed within the quarter mile radius of the station area. The result of the public access EVSE estimate is summarized in **Table II-20.3**.

Table II-20.3 Dadeland South Station Public Access EVSE				
Indicator		**EVSE**		
		Day Use	**Night Use**	**Total**
Major Non-Work Destination	Yes	4		4
Employment	7,973			
Transit Riders that Use a Car to Metrorail for a Work Commute Trip and have $80,000+ Household Income	18	2		2
Multi-Unit Dwellings	3,128 84%		4	4
Household Incomes of $100,000 or More	667 20%			
Final Total (rounded up to make total dedicated and public EVSE an even number for efficient siamese installation in 90-degree parking spaces)				**4**

The Dadeland South Station has on-site 10-level park-and-ride garage with 1,356 spaces. The annual average utilization rate for the last year was 80%, with a maximum monthly occupancy of 91%. There is sufficient capacity among the 121 available parking spaces for the car sharing program and EVSE needs. **Table II-20.4** summarizes the total EVSE requirements.

Table II-20.4 Dadeland South Station EVSE Requirements	
	EVSE
Car Sharing Program Plug-In Electric Vehicles	1
Dedicated Car Sharing EVSE	1
Public Access EVSE	4
Dedicated and Public EVSE Required	5
Existing EVSE	0
Total Net EVSE Required	**5**

II-20.J. Dadeland South Metrorail Station Zoning

The Dadeland South Metrorail Station falls within the Miami-Dade Rapid Transit Zone (RTZ). Uses allowed within the RTZ are defined in the Miami-Dade County Code of Ordinances Chapter 33C Fixed-Guideway Rapid Transit System – Development Zone. PEV, EVSE and car share are not listed as permitted uses within this chapter of the Code, but these uses are appropriate and compatible with the operation of the Rapid Transit System and the convenience of its ridership, thereby satisfying the intent and purpose of this Chapter. Therefore, all proposed PEV, EVSE and car share will be considered as an as-of-right use within the RTZ. All uses, including those proposed, within the RTZ are under the jurisdiction of Miami-Dade County and will require approval from the Miami-Dade Department of Planning of Zoning.

II-20.K. Project Siting

Project siting for EVs will be located in the Dadeland South Metrorail surface lot parking area as identified in **Figure II-20.3** and **Figure II-20.4**. Location of parking was determined based on the following criteria:

1. **Walk up potential:** The identified parking spaces are located in an area with high foot traffic, making it convenient to both Metrorail and surrounding users.

2. **Proximity to station entrance:** The identified parking spaces are located approximately 50 feet in front of the stairway leading to the Metrorail station.

3. **Visibility:** The identified parking spaces are located in a well lit, landscaped and highly visible area, with direct access from Dadeland Boulevard.

4. **Electric panel availability:** A site reconnaissance was conducted by an electrician on December 12, 2012 to determine electric panel availability and improvements needed. The identified spaces are located in front of the electric vault that serves the Metrorail station. For this location, there are two breakers available for Level 2 chargers. For the identified spaces, new conduit will be required.

5. **Parking space ownership:** The identified spaces are owned by Miami-Dade County, making the permitting process easier.

6. **Number of spaces that match demand forecast:** There are four spaces available that match the demand forecast identified in **Section II-20.I**. of this document.

Figure II-20.3
Dadeland South Station Project Siting Map

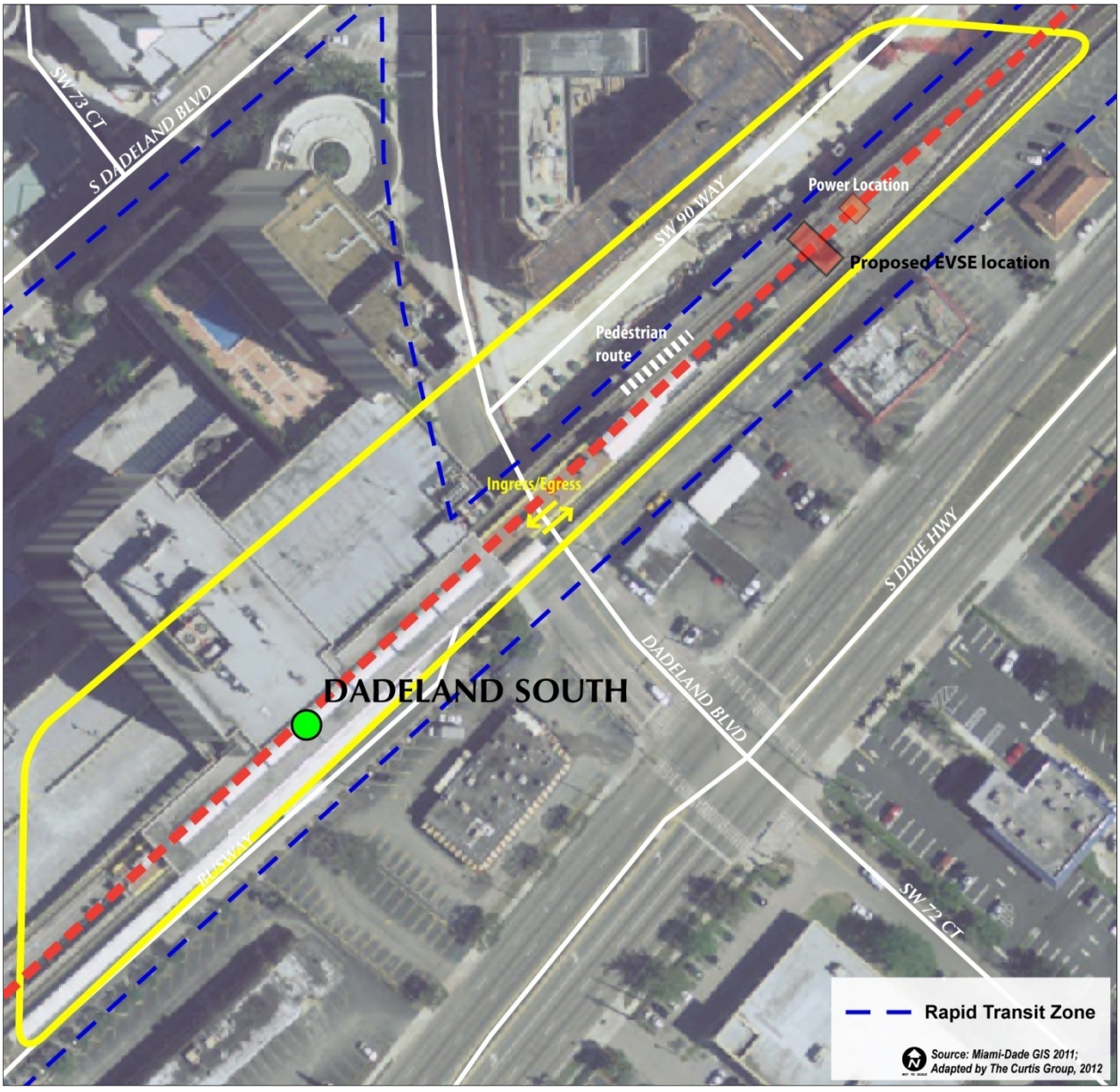


Figure II-20.4
Dadeland South Station Project Siting Photos

Proposed Location

High visibility and walk up potential

II-21. Assessment of Opportunities to Extend Use of Electric Vehicles to Mass Transit System

Planning for the US-1 Corridor Project focuses primarily on the deployment of an electric vehicle car sharing program and associated infrastructure along the Metrorail section of US-1. The Metrorail heavy rail system is electric and service terminates at Dadeland South. Consequently, the US-1 Corridor Project planning effort included a brief assessment of alternatives for extending electric vehicle commuting along the South Dade Busway Corridor, from Dadeland South to Howard Drive (SW 136th Street), a distance of 3.1 miles from the Dadeland South Metrorail Station. Note: given the existing transit bus route structure along this stretch, the assessment necessarily considered the entire Busway, from the Dadeland South Station to the SW 344th Street in Florida City, a distance of approximately 19½ miles to the southwest.

The assessment identified three leading approaches for extending the use of electric vehicles along mass transit corridor. Note: these are not alternatives, but complementary approaches. All three may be pursued, as each represents a different transit market, different jurisdictions that would act as lead agencies, and different scales of vehicles:

- PEV Bus Rapid Transit (Section II-8.B)
- Local Government Transit PEV (Section II-8.C)
- PEV Station Car Program (Section II-8.D)

II-21.A. South Dade Busway - Background

The South Dade Busway continues mass transit service along the US-1 Corridor from the Dadeland South Metrorail Station to the City of Homestead with a bus-rapid transit (BRT) system that includes dedicated right-of-way and signal modifications at intersections. The first segment of the South Dade Busway opened for service on February 2, 1997 to provide service in the 8.3 miles of exclusive transit right-of-way from Dadeland South Station to the SW 112th Avenue Station. On April 24, 2005, the first 5-mile extension of the Busway to SW 264th Street in Naranja opened. Two years later on December 16, 2007 the final segment extended the Busway another 6.5 miles to Florida City. Using the express service, it is now possible to travel by transit from Florida City to the Dadeland South Station in less than 40 minutes.

The South Dade Busway Corridor includes 28 stops in each direction along its 19.5 mile length. Each station has an illuminated, sheltered waiting area with up-to-date transit information, seating, bike racks, and other amenities. Stations are on both sides of the Busway, with pedestrian connections to US-1 and a multi-use path in the greenway between the Busway and US-1. Among the stations, there are six park-and-ride lots located at SW 152nd Street, SW 168th Street, SW 112th Avenue, SW 244th Street, SW 296th Street, and SW 344th Street (planning) Most of the stops are along the exclusive right-of-way that is north of SW 312th Street. South of this location the Busway Corridor continues in mixed traffic along SW 312th Street, Krome Avenue (SW 177th Avenue), and SW 344th Street to its termination. **Table II-21.1** lists the stops and their characteristics.

Figure II-21.1
South Dade Busway and Metrorail US-1 Corridor

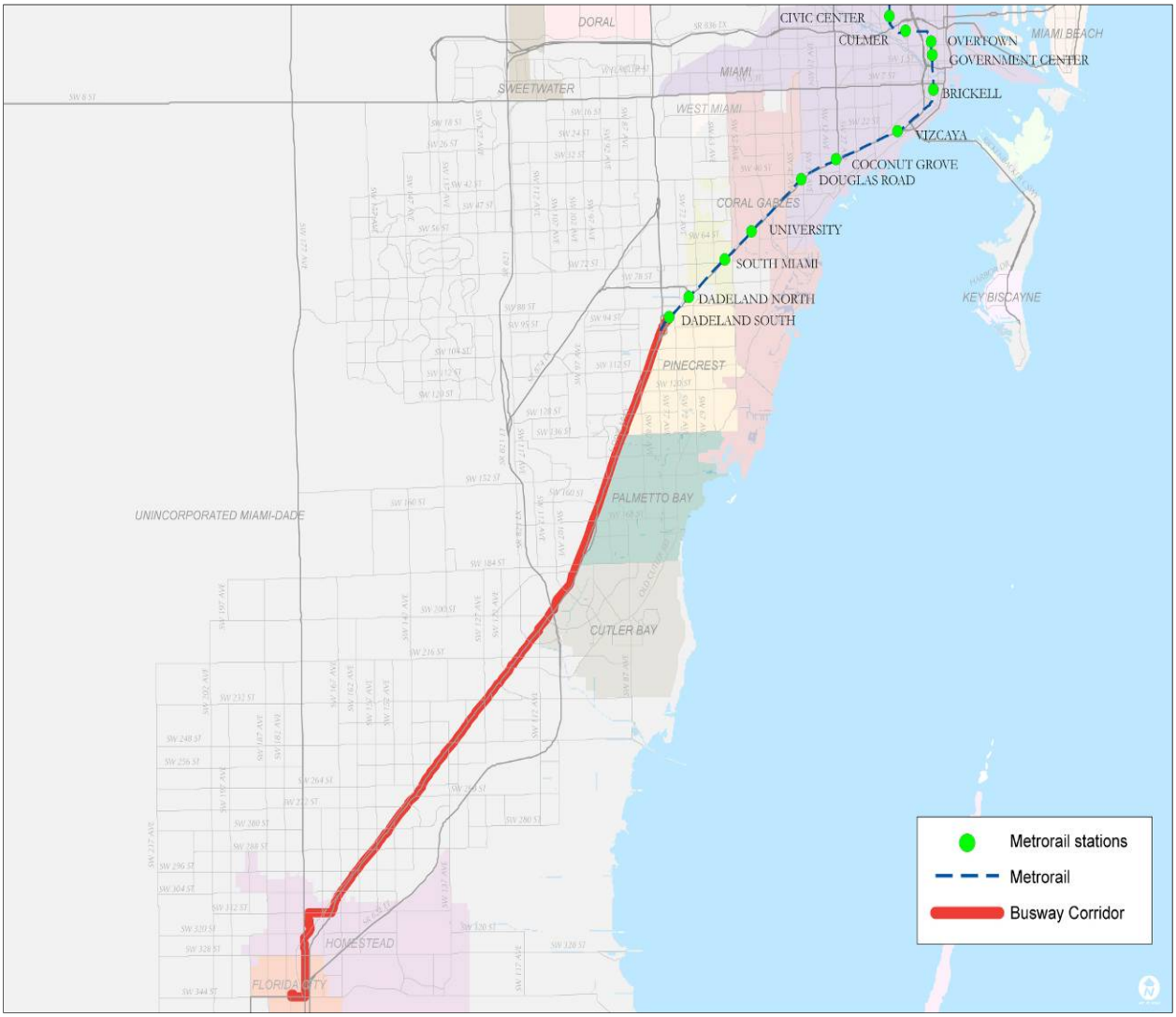
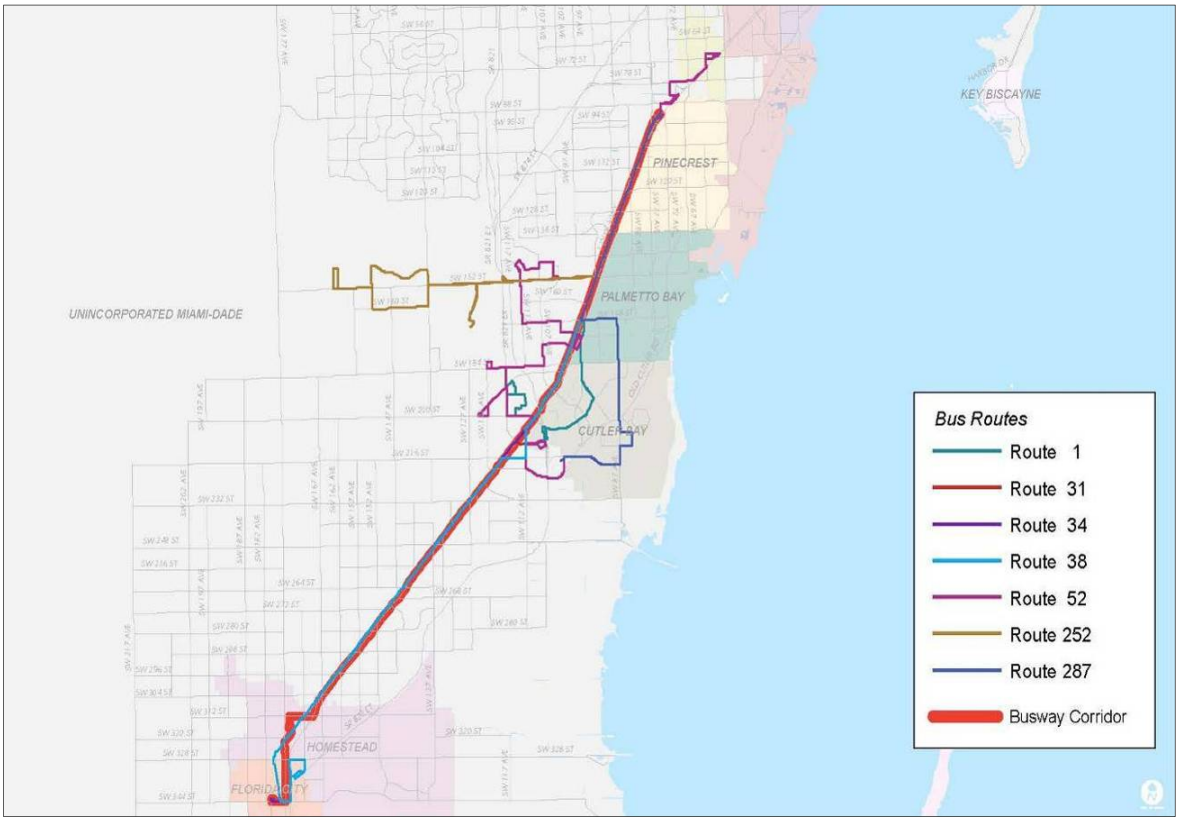


Table II-21.1 South Dade Busway Corridor Stops					
Stop	**Dist.**	**Community**	**Major Attraction**	**Right-of-Way**	**Park & Ride**
Dadeland South	0.0	Downtown Kendall, Dadeland	Dadeland	Busway	
SW 104th Street	1.0	Pinecrest, East Kendall , Howard		Busway	
SW 117th Street	0.8	Pinecrest, East Kendall , Howard		Busway	
SW 124th Street	0.6	Pinecrest, Howard		Busway	
SW 128th Street	0.3	Pinecrest, Richmond Heights		Busway	
SW 136th Street	0.5	Pinecrest, Palmetto Estates	The Falls Mall	Busway	
SW 144th Street	0.7	Palmetto Bay, Palmetto Estates		Busway	
SW 152nd Street	0.6	Palmetto Bay, Palmetto Estates	Metro Zoo	Busway	yes
SW 160th Street	0.7	Palmetto Bay, Palmetto Estates		Busway	
SW 168th Street	0.4	Palmetto Bay, Perrine		Busway	yes
SW 173rd Street	0.4	Palmetto Bay, Perrine		Busway	
West Indigo Street	0.5	Palmetto Bay, Perrine		Busway	
SW 184th Street	0.4	Cutler Bay, Perrine		Busway	
Marlin Road	0.6	Cutler Bay, Perrine		Busway	
SW 200th Street	0.8	Cutler Bay, Perrine	Southland Mall	Busway	
SW 112th Avenue	0.4	Cutler Bat, Goulds	S. Dade Gov. Ctr.	Busway	yes
SW 216th Street	0.9	Cutler Bay, Goulds		Busway	
SW 220th Street	0.3	Cutler Bay, Goulds		Busway	
SW 232nd Street	1.4	Cutler Bay, Goulds		Busway	
SW 244th Street	1.1	Princeton		Busway	yes
SW 264th Street	1.6	Naranja, Redlands		Busway	
SW 272nd Street	0.7	Naranja, Redlands		Busway	
SW 280th Street	0.7	Leisure City		Busway	
SW 296th Street	1.3	Leisure City		Busway	yes
SW 312th Street	1.4	Homestead	MDCC South	Busway	
Historic Homestead	0.5	Homestead	Homestead	Busway	yes
SW 324th Street	0.5	Homestead		Busway	
SW 328th Street	0.4	Florida City		Krome Av.	
SW 344th Street	0.5	Florida City		SW 344th St.	

There are seven MDT-operated routes that use the Busway. Three of these are routes that run along the entire length of the Busway. Three others are run along northern segments of the Busway and then run southeast or west to complete their routes off the Busway. The other (Route 35) is a South Dade route that uses the Busway only for a short segment of its route.

Route 31	Busway Local, (all stops) Southland Mall, and South Dade Government Center on SE 211th Street via the South Dade Busway
Route 34	Busway Flyer, no stops until Coral Reef Drive (SW 152nd Street), to Florida City via the South Dade Busway
Route 35	from the Miami-Dade College Kendall Campus through Perrine, then the Busway from SW 184th Street to SAW 186th Street, to the Southland Mall along US-1, then along the South Dade Busway from SW 216th Street to SW 264th Street, then through Naranja and Homestead to Florida City.
Route 38	Busway MAX, limited stops to Florida City via the South Dade Busway
Route 52	south from Dadeland North Station to Southland Mall, South Dade Government Center, and South Miami-Dade Health Center in the Goulds via the South Dade Busway to SW 152nd Street
Route 252	Coral Reef MAX, limited stops south on the South Dade Busway and west on Coral Reef Drive (SW 152nd Street) to Country Walk
Route 287	Saga Bay MAX, limited stops on the South Dade Busway, then south on Galloway Road (SW 87th Av.) to Perrine, Saga Bay, and the South Dade Health Center on SW 216th Street.

Figure II-21.2
South Dade Busway MDT Bus Routes



In June 2006, The South Link Study was completed by the Miami-Dade MPO to engage the communities in South Dade and identify transportation alternatives for the South Link Corridor (Busway Corridor) to address seven goals that were identified in the study:

- Improve corridor mobility
- Improve citizen access to employment
- Improve corridor safety and improve operating efficiencies
- Reduce auto dependency
- Accommodate future population growth in south Miami-Dade by providing the citizens of south Miami-Dade with high quality and cost-effective transit service
- Modify development patterns in the corridor to support transit
- Develop a plan for incremental increase of transit infrastructure

The development and evaluation of alternatives to address these goals followed the general approach described by the Federal Transit Administration's (FTA) Procedures and Technical Guidance for major investment planning and project development for fixed guideway transit systems. The build alternatives were evaluated against the no-build alternative and a Transportation System Management (TSM) alternative to compare user benefits and cost effectiveness. The seven alternatives are briefly summarized in **Table II-21.2**.

Table II-21.2
South Link Alternatives

Alternative		Capacity (seated/crush)	Headway (time between arrivals)	Ridership Increase	Transfer to CBD Miami	Auto Conflict Points	Capital Cost ($-million/mi.)	Operating Cost ($-million/mi.)
No Build	Continue existing planned plus additional programmed bus service (approx 300 buses per day)	1,400 / 2,065	6 min.	0	1	45	None	$6.44
Transportation System Mgt. (TSM)	Continue fixed route bus service, and provide more park-and-ride facilities; signal prioritization, etc.	1,400 / 2,065	5 min.	-	1	45	Low	$6.44
Light Rail Transit (LRT)	At-grade light rail system from SW 104th Street to Florida City, with ½ mile station spacing (19.5 mi.)	3,215 / 7,630	3¾ min.	8,950	1	45	$20.50	$15.94
Extend Metrorail to Southland Mall	Extend Metrorail elevated guide-way to Southland Mall (8 mi.) with BRT service to Florida City (11.5mi.)	3,280 / 10,000	5 min.	3,790	None	25	$81.40	$8.59 / $6.44
Extend Metrorail to Florida City	Extend Metrorail elevated Guideway to Florida City (19.5 mi.)	3,280 / 10,000	5½ min	7,930	None	0	$81.40	$6.59
Enhanced Bus Rapid Transit	Extend Metrorail to SW 104th St., and provide TSM and some flyovers to decrease travel time	2,165 / 4,000	5 min.	8,000	1	33	$81.40 / $7.20	$8.59 / $6.44
Diesel Multiple Unit (DMU)	diesel-powered train that pulls up to 2 standard commuter coaches; at grade with TSM	1,804 / 3,000	5½ min	3,350	1	100	$15.50	$6.44 / $11.56

Source: South Link – South Miami-Dade Transit Corridor Alternative Analysis; The Corradino Group for Miami-Dade County Metropolitan Planning Organization (MPO), Miami, Florida; 2006.

Among the seven alternatives, only three would further the objective to extend electric vehicle commuting along the South Dade Busway Corridor, and these all included rail extensions: Light Rail Transit (LRT) Extend Metrorail to Southland Mall, Extend Metrorail to Florida City, and Enhanced Bus Rapid Transit with Metrorail Extension to SW 104th Street. The capital cost of the rail alternatives ranges from $128-million to over $1.5-billion, and none are funded at this time for further study or design.

Complementary to the efforts of the South Link Study, this plan identifies three approaches to utilize advances in electric transit vehicle technology that make it possible to realize effective application of battery electric buses along the Busway, using the existing route and schedule structure. They could provide flexible electric mass transit that can respond to changes in a dynamic community, at orders-of-magnitude lower capital commitment than for electric rail alternatives.

II-21.B. South Dade Busway - Electric Vehicle Bus Rapid Transit

The concept presented here is to convert components of the MDT fleet to PEV transit buses and provide the necessary charging infrastructure along the Busway to initiate implementation of EVBRT transit enhancements for the South Dade Busway with goals to improve transit operational efficiency, reduce greenhouse gas emissions, and increase transit utilization. While this proposal aligns with both the longer-term plans expressed by the BRT Alternative of the South Link Study and the MDX managed lanes proposal, this proposal is intended for implementation in the near term with Busway infrastructure in its existing configuration. Managed lane flyovers, additional TSM strategies, increased park-and-ride capacities, and other improvements would enhance the efficiency of Busway EVBRT, these improvements are not necessary for to initiate PEV deployment on the Busway.

An PEV transit bus as referred to in this section is specifically an autonomous electric bus that uses on-board stored electricity (battery or other capacitance device) for propulsion. Not included are PEV transit buses that require substantial fixed infrastructure, including: trolleybuses that are powered by overhead electric wires, or Online Electric Vehicle (OLEV) buses that take electricity using electromagnetic induction from buried electric cables in the street. The salient difference is that OLEV and trolleybuses are fixed guideway transit, whereas PEV transit buses are not and can therefore range away from the Busway as needed.

II-21.B.1. Benefits and Barriers

There are benefits and barriers to converting buses that are currently powered by diesel fuel and diesel hybrid power units. These benefits have been identified by government testing, local pilot programs, and real-world experience with PEV transit buses by US transit properties.

Benefits:

1. **Environmental - Emissions:** A battery electric transit bus is a zero point emission vehicle, while diesel buses emit greenhouse gases (GHG). One battery electric bus in replacement of a diesel bus can reduce GHG emission by as much as 15 tons per year, depending on the fuel mix used to produce electricity.
2. **Environmental - Noise:** The noise from an PEV transit bus from the outside at the curb ranges between 57 and 60 dBA (about the same level as conversational speech), while a diesel bus produces between 69 and 74 dBA (about the same as a home vacuum cleaner) for the same location.
3. **Operational Cost - Fuel Cost:** Actual fuel cost varies greatly depending on duty cycles, roadway

conditions, and the transit agency's contract price for diesel fuel. Assuming a cost of $3.50 per gallon of diesel and 3.5 mpg, the cost of fuel for a diesel is in the range of $1.00 per mile. A full size PEV transit bus uses 1.5 to 2.5 kWh per mile. Assuming a cost of $0.10 per kWh for electricity, the fuel cost per mile of the PEV transit bus is in the range of $0.20 per mile

4. **Operational Cost - Deadhead Time:** Level 3 charging, especially by overhead inductive type EVSE, allows easy and safe "refueling" on route. If it is possible from the standpoint of space, security, and labor management to store, clean the interior, and collect cash boxes of PEV transit buses on route, then deadhead trips to bus depots can be reduced to only those for periodic exterior cleaning, maintenance, and unscheduled repairs.
5. **Fuel Price Stability:** Historically, electricity prices are less volatile in the short term and have increased far less over the long term that petroleum or natural gas fuels.
6. **Public Perception:** The use of quiet, clean PEV transit buses helps to foster a more positive perception of transit operations by both transit users and the general public, especially where there are demonstrated cost savings if the higher capital costs are amortized.

Barriers:

1. **Capital Costs - Bus:** Full size diesel buses of the type used by MDT cost in the range of $400,000, with equivalent CNG fueled buses at approximately $550,000, and equivalent hybrids in the range $550,000 to $620,000. A full size PEV transit buses costs in the range of $850,000, significantly more expensive than the other fuel/power alternatives.
2. **Capital Costs - Charging Infrastructure:** Diesel fueling infrastructure is already in place, so there in no additional fueling infrastructure cost for diesel or hybrid diesel-electric buses. CNG refueling stations cost in the range of $200,000 per unit. Level 3, overhead inductive EVSE cost approximately $300,000 per unit, and require space along the route.
3. **Operating Cost - Batteries:** While the fuel cost of the PEV transit bus is 20% or less than that for conventional diesels, PEV transit bus batteries have of life of about 10,000 cycles. For a bus running a 16 hour service span, 365 days per year, and recharging 8 times per day, this equates to a 3 1/2 year life span for the batteries. This replacement cost, when amortized on a per mile basis reduces some of the fuel cost advantage.
4. **Mixed Fleet Maintenance:** The introduction of PEV transit buses into an existing fleet requires training for maintenance personnel and some new maintenance equipment. As a barrier, the impact of this varies with manufacturer support and specifics of the transit agency's operations.

II-21.B.2. PEV Transit History

The history of PEV transit buses in South Florida goes back over 100 years. The first electric trolley began in Miami in 1906; however, the city's population was not sufficient to support it and service ended in 1908. Again in 1915, a battery-operated trolley on rails from the location of Marlins Park ran to NE 2nd Avenue and then north to NE 36th Street, but it ceased operation in 1919. In 1922, a streetcar using overhead electric supply began again in downtown Miami, and in 1924 was expanded to serve Coral Gables from Flagler Street in downtown Miami. After 1926, another line was added to go from the News Tower (now the Freedom Tower) in Miami to Miami Beach. While the electric trolley lines served the mass transit needs of the area through the 20's and 30', by 1940 the trolleys ceased operation and the tracks and overhead lines were subsequently removed from the streets. As with many American cities at this time, the trolleys were considered obsolete in light of the upcoming popularity of use personal automobiles and internal combustion engine powered buses to meet growing urban, suburban and regional transportation needs.

Electric transit would return again to South Florida in 1998 in the form of the Miami Beach Electrowave, a battery-electric transit service in the South Beach district of Miami Beach. The Electrowave started with seven 22-passenger buses built by AVS in Chattanooga, Tennessee. They were based on lead-acid battery tray

technology in which batteries on sliding trays could be swapped out for recharging, allowing the buses to remain in service while the second set of batteries recharged. Initially, the program was funded in part by a Florida Department of Transportation (FDOT) grant, operated by the City of Miami Beach Transportation Management Association, and received technical support from Florida Power & Light. Operations were co-funded by (FDOT), the City of Miami Beach, and the County through the Peoples Transportation Plan. In 2000, the service which was initially free began to charge a 25-cent fare, and its service area was expanded to South Point and Sunset Harbor. To serve the expanded area, four additional AVS vehicles were added to provide 11 buses in total. In 2005, the City of Miami Beach signed an interlocal agreement with Miami-Dade Transit (MDT) to take over operation of the service, and on September 25, 2005, the Electrowave was combined with the MDT Route W into the South Beach Local. At that time, MDT determined that operating a separate maintenance facility on Terminal Island (where the battery change-out facility was) and maintaining a mixed fuel fleet was not efficient, and replaced the AVS electric buses with diesel-fueled 30-foot buses on the South Beach Local route.

II-21.B.3. PEV Transit Bus Current Technology

The current technology for PEV transit buses is based on fast charging battery technologies: including lithium ion iron phosphate (LFP) and lithium titanate (LTO), with many using inductive fast charging from dedicated overhead facilities that allow for recharging along the service route. Extended range fuel cell hybrid buses are currently in test operation.

There are over 25 manufacturers of PEV transit buses worldwide, including four American manufacturers which are listed in **Table II-21.3**.

Table II-21.3
American PEV Transit Bus Manufacturers

Manufacturer		Bus Sizes	Charging Technology	Current Deployments	Other Notes
APS Systems	Oxnard, CA	22-ft, 26-ft. 30-ft. 35-ft.	?	Lompoc, CA; Burbank, CA; Santa Barbara, CA; Pittsburgh, PA Honolulu International Airport, HI; Yosemite National Park; Vandenberg AFB	current status not confirmed
Ebus	Downey, CA	22-ft.	NiCd batteries; 30-min. plug-in	Anaheim, CA ?	
Proterra	Golden, CO	35-ft.	LTO batteries; fast induction	Burbank, CA; San Gabriel Valley, CA; Stockton, CA; Tallahassee, FL; Reno, NV; Niskayuna / Schenectady, NY; San Antonio, TX; Austin, TX; Seneca, SC; Fort Lewis, WA	
Smith Electric Vehicles US Corp	Kansas City, MO	shuttle	LTO batteries; fast induction	Utah State University	primarily manufacture PEV commercial trucks, including the Edison and the Newton

To provide a benchmark for consideration of how PEV transit buses may be used for existing routes along the South Dade Busway, performance characteristics of the Proterra Ecoride BE-35 were used. The use of data for this specific model is not intended as an endorsement or recommendation, only as a benchmark for a current production model, full size PEV transit bus. The model was compared to the characteristics of the North American Bus Industries (NABI) 40-LFW which is the predominant full size, conventional diesel bus in the MDT fleet, with 620 of them having been put into service by MDT since 1999.

In 2009, MDT was awarded a grant through the American Recovery and Reinvestment Act of 2009 to purchase 5 Gillig 40-foot hybrid diesel-electric buses. Since then, MDT has put 43 hybrid diesel-electric buses into service, which include the 5 Gilligs, 13 40-foot NABI hybrid buses, and 25 60-foot long articulated hybrid buses by New Flyer. Table II-21.4 includes comparative specifications for the Proterra PEV bus, and the NABI buses with diesel fuel, CNG fuel, and hybrid power units.

Table II-21.4 PEV Transit Bus Performance Specifications Benchmark Example: Proterra Ecoride BE-35, NABI 40-LFW, NABI 40-LFW Hybrid				
Specification	**PEV**	**Hybrid**	**CNG Engine**	**Conventional Diesel**
Model	Proterra Ecoride BE-35	NABI 40-LFW	NABI 40-LFW	NABI 40-LFW
Body Length	34'-9"	40'-8"	40'-8"	40'-8"
Wheelbase	19'-9"	22'-11"	22'-11"	22'-11"
Width	8'-6"	8'-6"	8'-6"	8'-6"
Height	11'-2"	10'-5"	11'-1"	11'-1"
Step Height - entry door	16.5"	15.5"	15.5"	15.5"
Outside Turning Radius		40'	40'	40'
Seated Capacity	35	40	40	40
Standing Capacity	31	30	30	30
Power	Traction Motor: 150kW peak, 100kW continuous 0-6,500 RPM; 650 Nm torque	Diesel Engine: Cummins ISB w/ 160kW generator and twin Siemens drive motors	Converted CNG Engine: Cummins LG-320 low compression spark ignition	Diesel Engine: Detroit Diesel, Caterpillar
Fuel	-	diesel	CNG	diesel
Fuel Capacity	-	125 gallons	26,600 SCF	125 gallons
Battery Type	LTO	NiMH	-	-
Battery Capacity	55kWh - 72kWh		-	-
Fuel Economy	1.8-2.5 kWh/mi. 17 - 29 MPGe	4.5 mpg		3.3 - 3.5 mpg
Range (full load, full AC)	30 mi.	563 mi.		425 mi.
Duration (at avg 12 mph)	2 hr. 30 min.	47 hours		35 hours
Recharge Time	10 min.	-	-	-
Recharge Type	Level 3 inductive	-	-	-
Battery Cycles	10,000	-	-	-
Battery Life (at 16 hr service span, 365 days/yr, 2 hr between charges)	3 years	-	-	-
Maximum Speed	55 mph	65 mph	65 mph	65 mph
Interior Noise		75 dBA*	75 dBA	75 dBA
Exterior Noise (constant speed)	57 dBA	79 dBA*	79 dBA	79 dBA

Source: Proterra Response to Kennedy Space Center Solicitation; Proterra, Greenville, SC; 2012, Proterra website, and NABI website

Referring to **Table II-21.4**, the PEV transit bus example used has similar dimensional characteristics to current MDT full-size buses, although at a 13% reduction in seated passenger capacity, and 6% reduction in total passenger capacity. For existing routes that approach 88% capacity for any peak, additional buses would be required if replaced by the 35-passenger PEV. In these cases, the cost of the extra bus, labor, and other operating costs would need to be evaluated in addition to other costs and benefits. The expected operational benefits based on this comparison are, fuel cost savings, and some possibility to reduce deadhead time. The primary limitation for deploying PEV transit buses is range and recharging time. **Table II-21.5** summarizes the pertinent characteristics of each route regarding the alignment and schedule to assess the suitability of each route for conversion to PEV transit buses.

Table II-21.5
South Dade Busway Route Requirements Pertinent to PEV

Route	**31**	**34**	**38**	**35**	**52**	**252**	**287**
	Busway Local	Busway Flyer	Busway MAX			Coral Reef MAX	Saga Bay MAX
Service Type	Busway all stops	Peak Hr. Commute Express	Busway Limited Stop	South Dade Regional	South Dade Regional	Commute Limited Stop	Peak Hr. Commute Limited
Alignment:							
Patterns	1	1	1	2	2	7	1
Total 2-Way Distance (mi.)	20.3	22.6 (OW)	50.3	58.9-60.2	42.0-47.4	23.0-33.7	19.1
Busway 2- Way Distance (mi.)	18.1	22.1 (OW)	44.1	12.0	11.0	8.8	10.6
Off Busway 2-Way Dist. (mi.)	2.2	1.0	6.2	46.9-48.2	31.0-36.4	14.2-24.9	8.5
Busway North End Point	Dadeland South	Dadeland South	Dadeland South	SW 186th St.	Dadeland North	Dadeland South	Dadeland South
Busway South End Point	SW 112th Av.	SW 344th St.	SW 344th St.	SW 264th St.	SW 152nd St.	SW 152nd St.	SW 168th St.
Schedule:							
1-Way Travel Time (min.)	27-35	60-70	75-85	95-100	75-105	45-50	40
Average Speed (mph)	19	21	19	18	15	18	14
Weekday Service Span (hr.)	16	4 (am) 4 (pm)	24	18	18	16	4 (am) 4 (pm)
Saturday Service Span (hr.)	16	no service	24	18	17	13	no service
Sunday Service Span (hr.)	16	no service	24	14	17	13	no service
Peak Headway (min.)	15	15	15	30	30	15	30
Off-Peak Headway (min.)	30	no service	30	30	60	60	no service
Saturday Headway (min.)	30	no service	15-30	60	45	60	no service
Sunday Headway (min.)	30	no service	15-60	60	45	60	no service
Number of Weekday RT Trips	42	40 (ow)	75	32	54	36	14 (ow)
Layover Time (min.)							
Number of Buses (peak)	5	8	11	7	4	8	3
Capacity:							
Seated Peak Hour	320	160	320	160	320	320	320
Seated Off-Peak	160	no service	160	160	80	80	no service

Source: Miami-Dade Transit Authority current schedule data

Based on the combination of the PEV transit bus characteristics, and the characteristics of the seven MDT Busway routes, the suitability for each route for PEV transit bus deployment is assessedt below. For each analysis, a recharging station is assumed for each end point of the Busway: one at Dadeland South, and the other at SW 344th Street in Florida City.

Route 31, Busway Local

The route runs from Dadeland South to the South Dade Government Center and back, with most of the alignment along the Busway. The route does not go to Florida City, so all recharging would have to be at Dadeland South. The round trip distance is 20.3 miles, within the 30-mile full load range of the PEV transit bus. It is possible to deploy PEV transit buses along the route. During peak periods with a 15-minute headway and 10-minute recharging times, the route would use 67% of the recharging station's available time.

Route 34, Busway Flyer

The express route runs along the Busway from Dadeland South to Florida City in peak hours as a one-way service. Morning routes run north, and afternoon routes run south. The round trip distance including the deadhead trips is 45 miles, so the recharging would be at both Dadeland South and Florida City to operate within the 30-mile full load range of the PEV transit bus. It is possible to deploy PEV transit buses along the route. During peak periods, with a 15-minute headway and 10-minute recharging times, the route would use 67% of the recharging station's available time at each end.

Route 38, Busway MAX

The route runs from Dadeland South to Florida City throughout the day. A diversion from the Busway is made to the South Dade Government Center. The round trip distance is 50.3 miles, so recharging would be at both Dadeland South and Florida City to operate within the 30-mile full load range of the PEV transit bus. It is possible to deploy PEV transit buses along the route. During peak periods with a 15-minute headway and 10-minute recharging times, the route would use 67% of the recharging station's available time at each end.

Route 35

The route runs from the Miami-Dade College Kendall Campus to Homestead High School in Florida City. Very little of the alignment is along the Busway. The route does not go to the Dadeland South Metrorail Station, so all recharging would have to be at the Florida City end in a mid-route location. With a 60-mile round trip, the route is not suited to the deployment of PEV transit buses with charging facilities at the two endpoints of the Busway.

Route 52

The route runs from the Dadeland North Metrorail Station to Community Health of South Dade at SW 102nd Avenue and Old Cutler Road. The route runs along the Busway from the Dadeland South Metrorail Station to SW 152nd Street. All recharging would have to be at Dadeland South, which is a mid-route location. With a 42 to 47-mile round trip, the route is not suited to the deployment of PEV transit buses with charging facilities at the two endpoints of the Busway.

Route 252, Coral Reef MAX

The route runs from Dadeland South to the area west of the Country Walk community along SW 152nd Street and back. The route runs along the Busway from Dadeland South to SW 152nd Street, so all recharging would have to be at Dadeland South. There are multiple patterns for this route with the round trip distances ranging from 23 to 33.7 miles. Some of the patterns are within the 30 mile full load range of the PEV transit bus, while the longest is not. It may be possible to deploy PEV transit buses along the route; however, further analysis would be required, and it is possible that the longest pattern would not be able to be served. At this level of analysis, a conservative approach would be that the route is not suited to the deployment of PEV transit buses with charging facilities at the two endpoints of the Busway.

Route 287, Saga Bay MAX

The route is a peak-period, two-way service that runs from Dadeland South to the South Dade Health Center and back. It runs along the Busway from Dadeland South to SW 168th Street, so all recharging would have to be at Dadeland South. The round trip distance is 19.1 miles, within the 30-mile full load range of the PEV transit bus. It is possible to deploy PEV transit buses along the route. During peak periods, with a 30-minute headway and 10-minute recharging times the route would use 33% of the recharging station's available time.

A summary of the suitability of the Busway routes for deployment of PEV transit buses and the requirements for Level 3 charging capacity at each end is provided in **Table II-21.6**.

Table II-21.6
Busway Route Suitability for PEV Transit Bus Deployment and Level-3 EVSE Requirements

Busway Route		Suitable for PEV Transit Bus Deployment	Number of Peak Hour Buses	EVSE Peak Hour Time Required			
				Dadeland South	Dadeland South Cumulative	Florida City	Florida City Cumulative
31	Busway Local	yes	5	67%	0.67	0%	0
34	Busway Flyer	yes	8	67%	1.33	67%	0.67
38	Busway MAX	yes	11	67%	2	67%	1.33
35		no					
52		no					
252	Coral Reef MAX	no					
287	Saga Bay MAX	yes	3	33%	2.33	0%	1.33
Total PEV Transit Buses w/o Spares			**27**				
Total EVSE Level 3 Charging Stations at Each End					**3**		**2**

Deployment of PEV transit buses for South Dade Busway MDT routes is provided here as a preliminary assessment in the US-1 Corridor plan. To continue the planning effort, additional tasks would include:

- Continued outreach with MDT, MDX, FDOT, the MPO, Miami-Dade County, and local governments along the Busway.
- Preliminary feasibility studies with cost benefit analysis
- Identification of funding sources
- MDT staff, MPO, and Board of County Commissioners approval

II-21.C. South Dade Busway - Local Government PEV Transit Bus Circulators

The Peoples Transportation Plan (PTP) of Miami-Dade County (adopted by ordinance 02-116 of the Miami-Dade Board of County Commissioners (BCC) on July 9, 2002) created a funding source to allow incorporated municipalities to implement municipal transportation improvements. Twenty percent of the funding for each municipality is required to be used for transit improvements. The improvements can be used for capital or operating expenses and have been used by municipalities for transit stop improvements and other fixed infrastructure; however, many municipal governments in Miami-Dade County have used the funds to develop community transit services, often referred to as community circulators. The utilization of these circulators vary, but all are additive to the County transit system, as their route is required to be not duplicative of an MDT route by more than 20% of the alignment. Along the South Dade Busway, four local governments have implemented PTP funded community circulators, shown in **Table II-21.7.**

Table II-21.7
Busway Corridor PTP Community Circulators

PTP Circulator	Municipality	Service Area	Busway Transfer	Busway Use	Number of Vehicles	Existing Fuel	Operating Since
Pinecrest People Mover	Pinecrest	Pinecrest	No	No	1	diesel	2011
I Bus	Palmetto Bay	Palmetto Bay	Yes	No	1	diesel	2008
Cutler Bay Mini Bus	Cutler Bay	Cutler Bay	Yes	No	1	diesel	2012
Homestead Trolley	Homestead	Homestead	Yes	No	2	diesel	2010

Generally serving low density residential areas, two of the systems use one or two small buses of approximately 20-passenger seated capacity. The Cutler Bay Mini Bus is contracted through MDT and uses a 30-foot bus. While these community circulator systems do not use the Busway for their existing alignments, they can use the Busway to provide additional connections between their community and the Dadeland South Metrorail Station. All three use turn-key contracts with to provide the buses, labor, reporting, and management on an hourly basis.

These community circulators represent another opportunity to increase the use of PEV transit vehicles along the Busway Corridor. Furthermore, if the routes are expanded to provide commuter service along the Busway to Dadeland South, jointly used EVSE can reduce infrastructure costs for the community transit operators.

As provided in the prior section, "*South Dade Busway - Electric Vehicle Bus Rapid Transit*", there are benefits and barriers to converting community circulators to PEV transit buses. The benefits and barriers are parallel to those discussed for the MDT system; however, quantitative impacts vary.

Benefits:

- Lower GHG emissions
- Lower noise levels
- Lower fuel cost
- Fuel price stability
- Public perception and approval

Barriers:

- Capital cost of bus
- Capital cost of charging infrastructure
- Permitting for infrastructure
- Operating cost of battery replacement
- Mixed fleet maintenance for bus provider

Source: Proterra Response to Kennedy Space Center Solicitation; Proterra, Greenville, SC; 2012.

An approach for using PEV transit buses for local government PTP transit circulators is provided here as a preliminary assessment in the plan. As part of a follow-up planning effort, additional tasks would include:

- Local government outreach
- Citizens Independent Transportation Trust (CITT) outreach
- Preliminary feasibility studies with cost benefit analysis and identification of funding sources
- Local government and CITT approval

II-21.D. South Dade Busway Corridor - Station Car Program at Dadeland South Station & Dadeland North Station

The station car model of car sharing was described in **Section II-21.D** of this report as an operational model of car sharing. For convenience, the description is restated here:

Station Cars: In the same way as the fleet programs, station cars double-up on utilization by addressing two distinct markets. Station car programs are a systems mobility approach that manages the linkage of "first and last mile" personal mobility demands with high density transit modes. The share transfer point for this car sharing approach is always a transit station, a property typically managed by a public agency. US station car programs have been linked to alternative fuel vehicles, and more recently PEV with recharging capacity at reserved station parking spaces. Station car models have also been successfully used for bicycles and low speed electric vehicles. There are two ways that a station car program may operate:

1. **Work-Based Transit Station:** A member of the program arrives at the transit station in the morning, and uses a station car to complete her trip to work. At the work location, the station car is available as a car sharing vehicle to short term day users either through an employment center-based 2-way pod model, or through a fleet model. All short trips must be coordinated to assure availability at the end of the day for commuter members who reuse a station car to return to the transit station.
2. **Home-Based Transit Station:** An assigned commuter member of the program arrives at the transit station in the morning from home with the station car, and uses transit to complete the trip to work, the location of which is within walking distance of the destination transit station. At the origin

transit station, the station car is available for short term day uses with the station location as the pod. Both stations are co-located within walking distance of centers of employment and day commerce: a condition which should be typical for many high density transit stations, especially heavy rail systems. At the end of the work day, day uses are complete, and the station car is available again for the commuter to go home when they arrive at the station. Typically, the commuter user is an assigned program member with a long-term contract.

The advantages of station cars are higher utilization for the car sharing vehicles, increased mode share for the transit system, and the ability to integrate payments with transit passes; however, station cars require greater levels of management and coordination by a CSO, as well as the inclusion of additional programs such as guaranteed ride home.

This is the fourth approach considered for accomplishing the goal of increasing PEV commuting share and extension of electric vehicles to the mass transit system along the South Dade US-1 Corridor. While not a deployment of electric transit vehicles, station cars are so closely linked in function to transit utilization that the approach is well considered for this effort. As such, the approach underscores a critically important integrative approach to more seamlessly alloy planning for different modes; coordination between public and private sectors; and integration of energy, transportation, and transit programs and funding. The specific reasons to consider station cars for this effort are outlined below:

1. While station cars are a form of car sharing, the level of management and control is very different from a more market-oriented residential pod or free-floating car sharing model. The management activities needed to coordinate among end users, employers, and transit agencies is more familiar and customary to government agencies or their contractors that coordinate car-pooling or other TDM programs.
2. As a sub-market model of car sharing, integration of station cars to supplant neighborhood or pod based programs provides greater opportunity for management, marketing, and public awareness synergies to help overcome the economic challenges for either program
3. Station car programs are not equally effective at all transit stations, and typically have the greatest possibilities for success along rail stations, and in particular at end-of-line rail stations.
4. Station car programs, in part because of their managed use trip patterns, align well with the more limited ranges of current plug-in electric vehicles. In addition, the rail station provides a publically owned parking facility in which dedicated EVSE can be located
5. Station car programs that have been operated in the US, including Car Link I, Car Link II, and the ZEVNET program have used alternative fuel and zero-emissions vehicles. Car Link I, a pilot program conducted in 1994 in partnership with Bay Area Rapid Transit (BART) in California used CNG fueled Honda Civics. From 2001 to 2002, Car Link II, in partnership with CalTrans in California used ultra low emission (ULEV) Honda Civics. The ZEVNET Program, which is still in operation since 2002, uses Toyota RAV4-PEV, a PEV with a top speed of 78 mph and a range of 80 to 100 miles per charge.
6. Although there is no definitive study to quantify or explain it, it is commonly accepted that there many people that would use rail transit would still not use bus transit, even if it is BRT that performs as well as rail over the same corridor. If this is accepted, a station car program provides a mechanism to draw new rail transit users, providing a cost efficient total mobility package to the end user and helping the region to increase the share of totally electric, zero emissions commute trips.

The concept is to develop pilot programs for PEV-based station car programs at the Dadeland South Metrorail Station and Dadeland North Metrorail Station. (see also references in Dadeland North and Dadeland South Plans.)

II-21.D.1. Dadeland North Station Car Program

The Dadeland North program would be oriented toward use as home-based transit station use pattern, since it is not the end-of the line station, is not a major employment center, but is positioned with direct access from the Snapper Creek Expressway to bring commuters from homes to the west. Referring to **Figure II-21.3**, the highest concentration of park-and-ride home origins for Dadeland North are from the west Kendall area, approximately west and southwest of the station. This reinforces the concept of a proportion of park-and-ride users coming in from the South Dade expressway network via the end of the Snapper Creek Expressway. It is also worth noting that there is a smaller but identifiable concentration of park-and-ride commuters driving up US-1 from Homestead alongside the Busway, to reach the Dadeland North Station. This underscores the concept that some commuters that would use rail transit would still not use bus rapid transit.

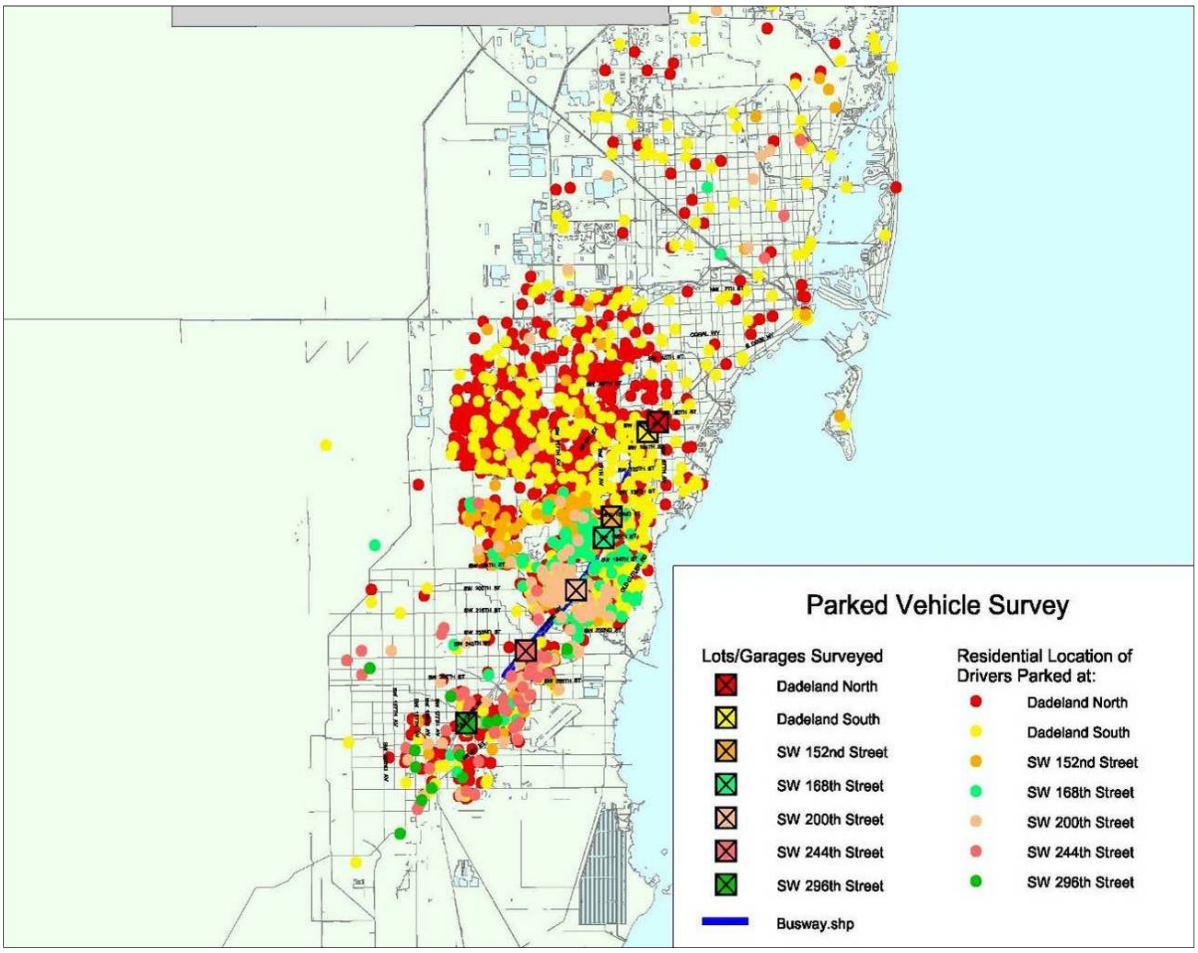
II-21.D.2. Dadeland South Station Car Program

The Dadeland South program would be oriented toward use as both work-based transit station and home-based transit station use patterns, since it is the end-of the line station and is a major mixed employment center. Referring to **Figure II-21.3**, the highest concentration of park-and-ride home origins for Dadeland South are from the near southwest and south in the villages of Pinecrest and Palmetto Bay. As with Dadeland North, there is a smaller but identifiable concentration of park-and-ride commuters driving up US-1 from Homestead and the Cutler Ridge area to the Dadeland South Metrorail Station. This again underscores the concept that some commuters that would use rail transit would still not use bus rapid transit.

II-21.D.3. Park-and-Ride Origin-Destination Patterns

Park-and-ride origin destination patterns were identified and mapped by transportation analysis zone (TAZ) in 2007 for use in the *South Dade Busway Feeder Study*, performed for MDT by the Lehman Center for Transportation Research. Although in need of update, the data is presented to illustrate origin-destination patterns for park-and-ride trips in South Dade.

Figure II-21.3
Busway, Dadeland South Metrorail Station, and Dadeland North Metrorail Station Park-and-Ride Origins and Destinations – 2007
Potential Market for PEV Station Car Program as Supplement to Car Sharing Program



Source: South Dade Busway Feeder Study; Mark Alvarez, and Fabian Cevallos, Ph.D., Lehman Center for Transportation Research (LCTR), Florida International University, Miami, Florida; 2008.

An approach for using PEV station cars at the Dadeland North and Dadeland South Metrorail Stations is provided here as a preliminary component in the US-1 Corridor. As part of a follow-up planning effort, additional tasks would include:

- Continued local government and Dade County government outreach
- Coordination with the Miami-Dade Expressway Authority (MDX)
- Coordination with FDOT and the South Florida Commuter Services car-pool and van-pool management contractor for FDOT
- Preliminary market and feasibility assessments for Dadeland North and Dadeland South
- Identification of funding sources for EVSE infrastructure
- Identification of a vehicle vendor and/or management entity
- Permitting and approvals as required

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Appendix II-4.A
Market Analysis Methodology

Appendix II-4.A
Car Sharing Market Analysis Methodology
Metrorail US-1 Corridor Stations

The methodology described below uses existing available data to identify geographic, demographic, auto ownership, geographic, and travel data characteristics for the station area residents and mass Metrorail commuters usage along the US-1 Corridor that would support residential and transit-linked car sharing programs and the installation of both dedicated EVSE for the car sharing program and additional EVSE for public access along the US-1 Corridor Metrorail stations. The process consists of 8 steps.

1. Car Sharing Market Analysis
2. Car Sharing Vehicles Estimate
3. Exiting Car Sharing Programs Identification
4. Car Sharing PEV Split
5. Car Sharing EVSE
6. Public Access EVSE Estimation
7. Existing EVSE Identification
8. Net Total EVSE Required

This appendix documents in greater detail, the components and assumptions of the first step:

Car Sharing Market Analysis:

Based on the review of other car sharing programs, deployment of plug-in electric vehicles for use in a car sharing program would initially require that the the PEV be part of a larger fleet that includes conventionally powered vehicles. This assures that the CSO can provide a viable product mix, while consumer membership is not impacted by PEV barriers, and the largest possible base is maintained for people to "test drive" a PEV on the road in South Florida. The market analysis step estimates relative car sharing demand among the 12 Metrorail stations (from Civic Center to Dadeland South) and their station areas based on 11 variables of geographic, demographic, auto ownership characteristics and travel behavior patterns characteristics that are correlated to car sharing membership.

There are two components of the market analysis: 1) demand for car sharing by residents of the station area; and 2) transit linked demand by transit riders that get on or off at each Metrorail station in the US-1 Corridor. While employment levels for each area have been collected and included in the station area descriptions, it is insufficient to provide a quantitative analysis by employees.

The residential demand for car sharing is based on a regression analysis using market analysis survey data of car sharing program members in large US cities. The survey was conducted in 2005 and included in *TCRP Report 108 - Car-Sharing: Where and How It Succeeds*. The survey output provides correlation coefficients for geographic, demographic, and trip characteristic variables as they relate to car sharing level-of-service (a measure of whether a car sharing program succeeds in an area) The coefficients were applied to the same variables as they occur in the station areas along the US-1 Corridor. The variables for the US-1 Corridor station areas are extracted from 2010 Census and American Community Survey data. Each station area is defined as a ¼-mile radius around the Metrorail station entrance; however, the use of census data for the residential demand requires that approximations based on census block group boundaries be used. In most cases, the final station areas are larger than the 126 acres that would be inscribed by a ¼-mile radius., with some around ½-mile. The ¼-mile to ½-mile radius is still consistent with the survey methodology. The TCRP report found little difference in results for ¼-mile radii versus ½-mile radii. The resulting units of the analysis are mixed: geographic densities, households (people), and employed commuters (people). While the values provide for good relative descriptions of demand among the stations of the corridor, interpretation as a market unit, such as members or car sharing trips should not be made.

The transit linked demand for car sharing is based on the same analysis as for residential demand; however, the TCRP survey output is projected to the same demographic and travel pattern characteristics for the transit rider populations for each station area. People who use Metrorail and live in the station area were identified are not

double counted in both parts of the demand analysis. The data is applied to Metrorail passenger survey data that was completed in 2007, and the characteristics for all passengers either boarding or exiting a station are used. The characteristics are applied to the current ridership populations for each station, average daily boardings for the last two years that data is available at the time of analysis (October 2010 to September 2012). The resulting units of the analysis are generally people, but the same caution to interpretation in the residential analysis applies. While the transit linked analysis provides for good relative assessments of demand among the stations of the corridor, its comparison to the residential market demand for any given station is approached with caution.

Step 2 reduces the demand assessments for each station to a number of car sharing vehicles to a number of car sharing vehicles, using industry-based ranges of membership to vehicles ratios. The ratio is based on the historical ranges of members per vehicle among US sharing programs, which ranges between 40 and 65 members per vehicle, depending on the program's age in its market, and also dependent on the car sharing operational model. It is understood, that given the caveats for interpreting demand values as units of membership, this step , although necessary, must be understood to have the potential for variation. This number of total vehicles, has been further reduced in using industry practice for initial placements of vehicles in new car sharing markets.

Car sharing programs use a phased implementation approach for new markets. An initial number of vehicles are placed at locations within a market based on market analysis, assumptions, programmatic objectives, and the availability of space. Membership and utilization rates by location are monitored, users are surveyed, and additional specific models of vehicles are placed at specific locations as the program grows. At stations where pods are too large for an initial implementation based on benchmarking analysis and CSO experiences, a phased approach is applied.

The station area characteristics data source is the 2010 Census and American Community Survey. For the transit-linked component of demand, the data sources are Miami-Dade Transit Technical Reports for ridership data, and demographic, travel and attitudinal data from on-board Metrorail surveys taken in 2006 and 2009.

The demand values that result from this step are relative indicators of membership among the station area.

The station area market forecast method addresses each station area for residential demand and transit-linked demand. The correlation coefficients are Pearson Correlation Coefficients (PCC) obtained from *TCRP Report 108 - Car-Sharing: Where and How It Succeeds*[1]. The form for each of the demand analysis is given below, with a description of teach term included in Tables 1 and 2.

Residential Demand =

$[0.174G_{RD} + 0.290G_{ID}]$ x land area (acres)	*geographic variables*
$+ [+ 0.478H_{1P} - 0.412H_C + 0.301H_R]$ x total households	*household composition variables*
$+ [- 0.458V_A + 0.399V_0 + 0.488V_1]$ x total households	*auto ownership variables*
$+ [- 0.431M_{SOV} - 0.363M_{CP} + 0.104M_T - 0.003M_B + 0.512M_W]$ x employed residents	*travel mode to work variables*

Transit Linked Demand =

$[+ 0.478H_{1P}]$ x average annual daily boardings (AADB)	*household composition variables*
$+ [- 0.458V_A + 0.399V_0 + 0.488V_1]$ x AADB	*auto ownership variables*
$+ [- 0.431M_{SOV} - 0.363M_{CP} + 0.104M_T - 0.003M_B + 0.512M_W]$ x average annual weekday home-based-work trips	*travel mode to transit variables*

1 *TCRP Report 108 - Car-Sharing: Where and How It Succeeds*: Adam Millard-Ball, Gail Murray, Jessica ter Schure, Christine Fox; Nelson/Nygaard Consulting; San Francisco, CA; and Jon Burkhardt, Westat, Rockville, MD; for the Transit Cooperative Research Program (TCRP) Transportation Research Board of the National Academies, Washington DC; sponsored by the Federal Transit Administration; 2005.

Appendix II-4.A Table 1
Market Prediction Terms - Residential Markets for Car Sharing Program

Area Geographic Characteristics					
+	G_{RD}	**Residential Density**	North American car sharing is concentrated in the largest metropolitan areas. The most successful "pod neighborhoods" (area within ½-mile of a car share pod) are in dense urban districts with residential densities of 7 to 25 dwelling units per acre. Mixed use districts further enhance car share level of service. The residential density (DU/Ac.) of a pod neighborhood was observed by the TCRP survey to be correlated with car sharing level of service. There is a strong positive correlation for seven of the eight cities. (very strong in Boston, +0.751; Philadelphia, +0.843; and Washington DC, +0.890). The exception is Los Angeles, where it is a strong negative (-0.445). The strength of the correlation may be affected by the relative amount of suburban sprawl. The Pearson Correlation coefficient is +0.174, with significance at the 0.05 level.	+ 0.174	Residential Dwelling Units / Land Area (acre)
+	G_{ID}	**Intersection Density**	Car sharing level of service is also dependent on the walkability of the neighborhood where car sharing is located. There are many characteristics that combine to make a walkable neighborhood. One objectively quantifiable indicator is intersection density. Intersection density is correlated to car sharing level of service for seven of the eight cities in he TCRP survey. The exception is New York, where it is negative (-0.259), and may be effected by the much higher intersection density of New York compared to the other cities. The Pearson Correlation Coefficient is +0.290 with significance at the 0.05 level.	+ 0.290	Street Intersections / Land Area (acre)
Household Composition Characteristics					
+	H_{1P}	**1-Person Households**	Smaller than average (1-2 person) households are more prevalent among car share members. Average household size of all of the TCRP report survey respondents was 2.02. While average household size is not reported as having a significant dependence relationship, the percentage of single-person households is correlated with car sharing level of service. It has a positive correlation for all eight cities, and strongly correlated in six of the eight. The Pearson Correlation Coefficient is +0.478, significant at the 0.05 level.	+ 0.478	Number of Households in Station Area
+	H_C	**Households with Children**	The percentage of households with children is correlated with car sharing level of service. This is a strong negative dependence variable for seven of the eight cities. The presumed logic is that in all but the most urbanized cities, the presence of children creates a greater demand for increased daily trips beyond the twice daily work commute trips, this in turn creating a greater necessity for increased auto ownership in the household. The exception is Los Angeles where it is weakly positive. The Pearson Correlation Coefficient is -0.412, significant at the 0.05 level.	- 0.412	Number of Households in Station Area
+	H_R	**Rental Households**	A proxy for mobility and residential tenure, the percent of households that rent their home is correlated with car sharing level of service. This is a positive dependence variable for all eight cities, and the correlation is stronger in Portland and Seattle, and weak in Boston and New York. The strength of the correlation may be affected by the relative size of rental market for the city. The variable may be a proxy for household size, the presence of children, auto ownership, land use density, and a walkable urban environment. The Pearson Correlation Coefficient is +0.301, with significance at the 0.05 level.	+ 0.301	Number of Households in Station Area
Auto Ownership Characteristics					
+	V_A	**Average Vehicles per**	Auto ownership is an often used analysis variable to indicate transportation mode choice. The characteristic decreasing marginal costs associated with	- 0.458	Number of Households in

		Household	the using a personal vehicle strongly motivates the use of a car once it is owned. Auto ownership is typically reported as an important indicator in many surveys of car sharing, reinforced by findings that long-term car sharing members often reduce the number of personal vehicles when there is an opportunity. The average number of vehicles per household is correlated with car sharing level of service, and is reported as a strong negative correlation for all eight cities in the survey. The Pearson Correlation Coefficient is -0.458, with significance at the 0.05 level.		Station Area
+	V_0	**Households with No (0) Vehicles**	See comments above. The percent of households with no (0) vehicles is a strong positive correlation for car sharing level of service in all of the cities. The Pearson Correlation Coefficient is +0.399, significant at the 0.05 level.	+ 0.399	Number of Households in Station Area
+	V_1	**Households with 1 Vehicle**	See comments for average vehicle ownership per household. The percent of households with no (0) vehicles has a strong positive correlation with car sharing level of service in all of the eight cities. Unexpectedly, the presence of 1 vehicle in a household has a higher correlation to car sharing than no vehicles. An explanation may be that it is related to a higher likelihood of licensed drivers, or the establishment of trip patterns that are dependent on a private vehicle; however, there is no evidence for this explanation. The Pearson Correlation Coefficient is +0.488, significant at the 0.05 level.	+ 0.488	Number of Households in Station Area
Travel Characteristics					
+	M_{SOV}	**Travel Mode to Work : SOV**	Travel mode to work is a widely used travel characteristic for transportation market analysis. While the other variables in this analysis are continuous for a population (asks how much), travel mode choice is a multinomial discrete choice variable (asks which, instead of how much), and every attempt must be made to evaluate each travel mode choice. This has led to the inclusion of all surveyed response choices (except "other" which is not available) even when the statistics of the mode choice are less reliable than others. The percent of employed people that commute to work in a single-occupant vehicle (SOV) has a strong negative correlation with car sharing level of service in all of the eight surveyed cities. The Pearson Correlation Coefficient is -0.431, significant at the 0.05 level.	- 0.431	Employed Population in Station Area
+	M_{CP}	**Travel Mode to Work : Car Pool**	The percent of employed people that commute to work in carpools has a strong negative correlation with car sharing level of service in seven of the eight cities. The exception is Los Angeles, where it is a positive correlation. The Pearson Correlation Coefficient is -0.363, significant at the 0.05 level.	- 0.363	Employed Population in Station Area
+	M_T	**Travel Mode to Work : Transit**	The percent of employed people that take transit to work is reported by the TCRP report as a positive correlation with car sharing level of service. It is strongly positive in Portland (+0.607), Los Angeles (+0.492), and the San Francisco Bay Area (+0.477); but weakly positive in New York (+0.043), Boston (+0.033), and Washington DC (+0.198). There is no explanation for this; however, transit utilization, regional density, or other geographic and cultural factors are possible. Philadelphia is a strong outlier at -0.626; especially important because Philly Car Share has been in operation since 2002, and coordinated with SEPTA transit service. The correlation is used to complete a discrete choice vector of alternatijves, but should be used with caution, since correlation is with a wider dispersion of relationships. It is used because the vector for mode to work must be complete, but also that transit linked trips are critical to the objectives of this plan. The US-1 Corridor is more suburban along most of stations and transit utilization for the area is comparatively low, which may provide greater confidence in this variable as an indicator. The Pearson Correlation Coefficient is +0.104, significant at the 0.10 level.	+ 0.104	Employed Population in Station Area
+	M_B	**Travel Mode to**	The percent of employed people that commute to work by bicycle is a very weak negative dependence variable for car sharing level of service, and there	- 0.003	Employed Population in

	Work : Bicycle	are wide dispersion of values both in magnitude and direction (sign) among the eight cities. The Pearson Correlation Coeficient is -0.003, significant at the 0.01 level. This variable is not a viable indicator based on the TCRP source; however, it should be noted that more recent empirical information by CSOs that were interviewed as a part of this study suggests that car sharing programs perform better in areas with large existing bike sharing programs.		Station Area
+ M_W	**Travel Mode to Work : Walk**	The percent of employed people that regularly walk to work is a strong positive dependence variable for car sharing level of service in all eight cities surveyed in the TCRP report. Some of the highest positive PCC are observed for this variable: Portland,+0.915; Seattle,+0.850). Still, the dispersion among PCC is wide, with four cities at relatively low values: San Francisco,+0.281; Los Angeles,+0.337; Boston,+0.374; New York,+0.376. The logic of walking to work as a strong indicator for car sharing is that walking suggests the possibility of a more walkable urban environment, low vehicle ownership, and the work trip needs already met. The Pearson Correlation Coefficient is +0.512, significant at the 0.05 level.	+ 0.512	Employed Population in Station Area

Appendix 6-IV-A - Table 2
Market Prediction Terms - Transit Linked Markets for Car Sharing

Household Composition Characteristics					
+	H_{1P}	**1-Person Households**	Same as for Residential Market applied to each station's transit user population that is at least 18 years old (average annual daily boardings). Each user is assumed to represent one household. The PCC is +0.478.	+ 0.478	Station Transit Users
+	H_C	**Households with Children**	The presence of children in the transit user's household is not known, and not used for the transit analysis. The PCC is -.0412. Compared to the residential analysis, this omission will overestimate transit-linked car sharing.	- 0.412	Not Used
+	H_R	**Rental Households**	The home rental characteristics for transit users is not known, and not used for the transit analysis. The PCC is +0.301. Compared to the residential analysis, this omission will underestimate transit-linked car sharing.	+ 0.301	Not Used
Auto Ownership Characteristics					
+	V_A	**Average Vehicles per Household**	Same as for Residential Market applied to each station's transit user population that is at least 18 years old (average annual daily boardings). Each user is assumed to represent one household. The PCC is -0.458.	- 0.458	Station Transit Users
+	V_0	**Households with No (0) Vehicles**	Same as for Residential Market applied to each station's transit user population that is at least 18 years old (average annual daily boardings). Each user is assumed to represent one household. The PCC is +0.399.	+ 0.399	Station Transit Users
+	V_1	**Households with 1 Vehicle**	Same as for Residential Market applied to each station's transit user population that is at least 18 years old (average annual daily boardings). Each user is assumed to represent one household. The PCC is +0.488.	+ 0.488	Station Transit Users
Travel Characteristics					
+	M_{SOV}	**Travel Mode to Work : SOV**	Same as for Residential Market, but interpreted as SOV to transit for a work trip. The PCC is applied only to the mode percentage for weekday, home-based work trips for the Metrorail riders of each station, because the PCC is based on mode choice for work trips only. The PCC is -0.431.	- 0.431	Home-based Work Trips for Station Transit Users
+	M_{CP}	**Travel Mode to Work : Car Pool**	Same as for Residential Market, but interpreted as car pooling to transit for a work trip. The PCC is applied only to the mode percentage for weekday, home-based work trips for the Metrorail riders of each station, because the PCC is based on mode choice for work trips only. The PCC is -0.363.	- 0.363	Home-based Work Trips for Station Transit Users
+	M_T	**Travel Mode to Work : Transit**	Same as for Residential Market, but interpreted as bus or Metromover to transit for a work trip. The PCC is applied only to the mode percentage for weekday, home-based work trips for the riders of each station, because the PCC is based on mode choice for work trips only. The PCC is +0.104.	+ 0.104	Home-based Work Trips for Station Transit Users
+	M_B	**Travel Mode to Work : Bicycle**	Same as for Residential Market, but interpreted as bike to transit for a work trip. The PCC is applied only to the mode percentage for weekday, home-based work trips for the Metrorail riders of each station, because the PCC is based on mode choice for work trips only. The PCC is -0.003.	- 0.003	Home-based Work Trips for Station Transit Users
+	M_W	**Travel Mode to Work : Walk**	Same as for Residential Market, but interpreted as walk to transit for a work trip. The PCC is applied only to the mode percentage for weekday, home-based work trips for the Metrorail riders of each station, because the PCC is based for mode choice for work trips only. The PCC is +0.512. A potential double counting error caused by counting transit riders that use Metrorail from a home within the station area, and part of the residential population that uses transit to go to work has been addressed by removing transit riders that walk to a station from their home on a work trip from this term.	+ 0.512	Employed Population in Station Area

Appendix 6-IV-A - Table 3
Market Prediction Terms Not Used for Residential or Transit-Linked Analysis

Demographics				
	Age	Literature sources often observe that car sharing is typically attractive to the people in their mid-30s to mid 40s; however, surveyed ages vary widely by car share operator and city. A quantitative measure of correlation among multiple cities and CSOs is not available; therefore, age is not used. For all analysis, age has only been used as a qualifier: all PCC terms are applied only to populations that are eligible to drive and can legally sign a contract. Only populations of 18 years age and over are used.	none	Not Used
	Gender	Literature sources often observe that car sharing is slightly more attractive to males; however, a quantitative measure of correlation among multiple cities and CSOs is not available. Gender is not used.	none	Not Used
	Average Household Income	Literature review sources observe that median income levels of the population are also typical for U.S. car sharing members, suggesting little correlation value to predict car sharing level of service.	none	Not Used
	Household Income Over $100,000	The TCRP survey observed a weak negative correlation between the percentage of high income households and car share level of service. The PCC is -0.066, with significance at the 0.10 level. The correlation is also very dispersed from city to city. It is negative in Los Angeles, Portland, Seattle, and Washington DC, but positive in Boston, New York, Philadelphia and San Francisco. It is not be considered as a reliable predictor and not used.	- 0.066	Not Used
	Bachelor Degree or Higher	Literature review sources suggest some correlation between education levels and car sharing with higher education observed to be more prevalent among car sharing members. This is reinforced by the general concept that high education level is a strong predictor or whether a person is an early adopter. It should be recognized that many early car share programs were located on college campuses, and earlier program memberships may be biased by this. The TCRP survey observed the correlation between having attained a bachelors degree or higher and car sharing level of service to be a very weak positive correlation. The PCC is +0.063, with significance at the 0.01 level. The correlation is also very dispersed from city to city. It is negative in Los Angeles, Portland, San Francisco, Seattle, and Washington DC, but positive in Boston, New York, and Philadelphia. It is not be considered as a reliable predictor and not used.	+ 0.063	Not Used
	Trigger Event Indicators	Trigger events are significant changes in a person's life that disrupts habitual patterns, such as moving, marriage, pregnancy, birth of children, and new jobs. Trigger events typically facilitate the adoption of new products or services such as car sharing. Trigger events could be suggested at macro level by demographic data; however, there are no published correlations.		Not Used
Geographic Characteristics				
	Percent of Dwelling Units Built Before 1940	The TCRP survey provides that there is a weak correlation between dwelling units built before 1940 and car sharing level of service, with a PCC of +0.223 at 0.05 significance. The age of homes is assumed to be proxy variable for neighborhood walkability, and constrained on-street parking (a disincentive to auto ownership). There is much variation among cities. Los Angeles, New York, and Philadelphia show a negative correlation while the other five cities show a positive correlation. Most of the US-1 Corridor, similar to much of South Florida, is comprised of relatively new development. Only at the Vizcaya Station, where the station area encompasses some of “The Roads”, an old Miami neighborhood, are there some houses built before 1940. The variable is not applicable to the US-1 Corridor, and it is not used.	+ 0.223	Not Used

Appendix II-4.B
Market Analysis Tables

Appendix 6-IV Civic Center Station Car Sharing Assessment, p. 1 of 4

Civic Center Station Area Geographic Qualifiers						cc
parameter	acre	miles	kilometers	Pearson Coefficient	Regression Term	0
Land Area	396	0.62	1.60	equivalent radius (mi)=		0.44
Population Density	14	8,952	3,456			
Residential Density	5.4	3,450	0	0.174	371	
Employment Density	12	7,729	2,984			
Transit Service (rail & bus lines)		6 transit lines				
Intersection Density	0.06	39	15	0.290	7	
Proximity to CBD (distance)	n.a.	1.9	3.1			

Civic Center Station Area Residential Market Assessment						
parameter	value	percent	Pearson Coefficient	Correlation Comment	Regression Prediction Term	LOS Qualitative Measure
Basis						
Station Area Population	5,539	8%	*population percentage of US-1 Corridor station areas*			
Persons Over 18	4,819	87%	*percentage of station area population qualified to drive*			
LOS Regression Variables to Identify Station Area Resident Car Sharing Probability						
Household Composition						
Station Area Households	1,887	-	-	-	-	-
Average Household Size	2.94	-	-	-	-	-
1-Person Household	1,192	63%	*0.478*	*moderate correlation*	570	Low LOS
Household with Children	845	45%	*-0.412*	*moderate correlation*	-348	-
Rental Households	1,782	94%	*0.301*	*moderate correlation*	536	-
Auto Ownership						
No Vehicle	717	38%	*0.399*	*moderate correlation*	286	Low LOS
1 Vehicle	1,003	53%	*0.488*	*moderate correlation*	490	Low LOS
Average Vehicles / Household	0.72	-	*-0.458*	*moderate correlation*	-705	-
Transportation Mode to Work						
Employed Workforce	2,235	46%	-	-	-	-
Private Car	1,613	72%	-	-	-	-
Drive Alone	1,330	60%	*-0.431*	*moderate correlation*	-573	Low LOS
Car Pool	282	13%	*-0.363*	*moderate correlation*	-103	-
Transit	230	10%	*0.104*	*weak correlation*	24	-
Bike	0	0%	*-0.003*	*weak correlation*	0	-
Walk	300	13%	*0.512*	*strong correlation*	153	Below Threshold
Telecommute	68	3%		*correlation not available*	not used for this assessment	-
Sum of LOS Correlation Terms x Population Basis						
					330	6.8%

Civic Center Station Metrorail Market Assessment

479

parameter	value	percent	Pearson Coefficient	Correlation Comment	Regression Prediction Term	Note
Basis: Boardings Oct 2011 through Sep 2012						
Weekday Boardings	5,943	12%	*percent of Corridor total boardings for 12 stations*			
Saturday Boardings	1,076	5%	*percent of Corridor total boardings for 12 stations*			
Sunday Boardings	815	5%	*percent of Corridor total boardings for 12 stations*			
Holiday Boardings	1,728	8%	*percent of Corridor total boardings for 12 stations*			
Avg. Annual Daily Boardings	**4,348**	11%	*percent of Corridor total boardings for 12 stations*			
Home-Based Work Weekday	**2,525**	42%	*0.104*	*weak correlation*	263	
LOS Regression Variables to Identify Station Commuter Car Sharing Probability						
MetroRail Passenger Household Size				*Station sample size:*		*1042*
Passengers Age 18 & Over	5,744	97%	*station passengers qualified to drive*			-
Passenger Households	1,801	-	-	-	-	-
Pass. Avg. Household Size	3.19	-	-	-	-	-
1-Person Household	717	12%	*0.478*	*moderate correlation*	251	*basis is ADB*
MetroRail Passenger Auto Ownership						
No Vehicle	1,213	20%	*0.399*	*moderate correlation*	354	*basis is ADB*
1 Vehicle	1,725	29%	*0.488*	*moderate correlation*	616	*basis is ADB*
Average Veh. / Household	1.54	-	*-0.458*	*moderate correlation*	-1,273	*basis is ADB*
MetroRail Passenger Work Trip Travel Mode to Train						
Drove Alone (5)	60	1%	*-0.431*	*moderate correlation*	-26	*Basis is HBW*
Carpool (3)	16	0%	*-0.363*	*moderate correlation*	-6	*Basis is HBW*
Metro Mover (6)	8	0%	*0.104*	*weak correlation*	1	*Basis is HBW*
Tri-Rail (7)	0	0%	*0.104*	*weak correlation*	0	*Basis is HBW*
Metro Bus (8)	105	2%	*0.104*	*weak correlation*	11	*Basis is HBW*
Bike (4)	0	0%	*-0.003*	*weak correlation*	0	*Basis is HBW*
Walk up to 3 Blocks (1)	1,444	33%	*0.512*	*strong correlation*	739	*Basis is HBW*
Walk More than 3 Blocks (2)	198	5%	*0.512*	*strong correlation*	101	*Basis is HBW*
Sum of LOS Correlation Terms x Average Annual Metrorail Boardings Basis						
	1,831				**1,031**	17.9%

Station passengers includes embarking and debarking riders, and include all trip purposes for household size and auto ownership variables. Mode to work includes only home-based-work trips in both directions. Transit-linked analysis captures both residential and employment for station areas.

Civic Center Station Area Car Sharing Demand Assessment

Station Area Geographic Market Assessment Value	*not included*	378
Station Area Residential Market Assessment Value	*included*	330
Station Transit User Market Assessment Value	*included*	1,031
Total of Residential and Transit Market		**1,361**

Civic Center Station Area Car Sharing Program Spaces and Dedicated EVSE		
Method 1: PCC Bivariate Summations		
Total Car Sharing Market		1,361
Market Value to Vehicle Placement Factor (max. vehicles = 10; min. vehicles =4)		333.4
Recommended Car Sharing Vehicles at Station (all fuels)		4
Car Sharing Vehicles per Square Mile	6	Low LOS
Residents over 18 / Car Sharing Vehicle	1,205	
Employees per Car Sharing Vehicle	1,196	
Method 2: Two Variable LOS Forecast		
Residential:		
Average vehicles / Household		0.72
Commuters that Walk to Work		300
Number of Car Sharing Vehicles in Station Area		7.2
Transit Linked:		
Average vehicles / Household		1.54
Commuters that Walk to Metrorail for HBW Trip		697
Number of Transit Linked Car Sharing Vehicles in Station Area		2.7
Total Number of Vehicles		**10**
Car Sharing Vehicles per Square Mile	16	Low LOS
Residents over 18 / Car Sharing Vehicle	482	
Employees per Car Sharing Vehicle	478	
EVSE – PCC Bivariate Summations Method 1		
Car Sharing PEV or PHEV Vehicles		1
EVSE Dedicated to Car Sharing Program		1
Public EVSE at 1 to 1 Ratio with Dedicated EVSE		1
Total EVSE: Dedicated & Public		**2**
Parking Required		
Car Sharing Parking Spaces Without EVSE		3
Car Sharing Parking Spaces With Dedicated EVSE		1
Total of All Spaces to be Allocated for Car Sharing		**4**
MDT Station Parking Availability		
Station Park & Ride Facility Spaces		0
Annual Average Parking Utilization (October 2011 - September 2012)		n.a.
Maximum Monthly Parking Utilization (October 2011 - September 2012)		n.a.
Average Available Spaces		0
Minimum Available Spaces		0

Civic Center Station Area Potential EV Adopter Demograpics

	Area Residents		Area Employees		Transit Riders (HBW) that use a Car to/from Metrorail	
Housing Unit Types						
Total Housing Units	2,362		not applicable		not applicable	
Single Family Housing	167	7%	not applicable		not applicable	
Detached SFH	86	4%	not applicable		not applicable	
Attached SFH	81	3%	not applicable		not applicable	
Multifamily Housing	2,195	93%	not applicable		not applicable	
2 Units per Building	11	0%	not applicable		not applicable	
3 or more Units	2,184	92%	not applicable		not applicable	
Note to Housing Units: Most EV charging assumed to be done at home, with single family homes having the fewest administrative, legal, and permitting barriers. Single family attached homes and duplex units may or may not have the same conditions for EVSE installation as single family homes. Multi-family homes, particularly for buildings with 3 or more units have more barriers. Areas with high numbers of multi-family homes with 3 or more units may have greater need for public charging facilities in the near term.						
Income						
$30,000 - $39,999	356	19%				
$40,000 - $49,999			2,944	62%	17	38%
$50,000 - $59,999	114	6%				
$60,000 - $74,000					17	38%
$75,000 - $79,999	38	2%				
$80,000 - $99,999					1	2%
$100,000 and above	46	2%				
Area Residents in MUD and HH Income > $100k						
Educational Attainment						
High School (over 18)	1,668	35%	3,778	92%	data not available	
Bachelor or Higher (over 21 years old)	401	9%	1,649	34%	data not available	
Age (males & females)						
30 - 40	767	13%	2,949	62%	17	38%
40 - 50	851	15%			17	38%
50 - 55	1,065	18%			11	26%
55 - 60						
60 - 65					0	0%

Civic Center Station Area Employment

parameter	value
Residents that are Employed	2,235
Employees Working in Area	4,782

Culmer Station Area Geographic Qualifiers — cu

parameter	acre	miles	kilometers	Pearson Coefficient	Regression Term	0
Land Area	300	0.47	1.21	equivalent radius (mi)=		0.39
Population Density	13	8,188	3,161			
Residential Density	6.3	4,063	0	0.174	331	
Employment Density	0	124	48			
Transit Service (rail & bus lines)		4 transit lines				
Intersection Density	0.13	83	32	0.290	11	
Proximity to CBD (distance)	n.a.	1.2	2.0			

Culmer Station Area Residential Market Assessment

parameter	value	percent	Pearson Coefficient	Correlation Comment	Regression Prediction Term	LOS Qualitative Measure
Basis						
Station Area Population	3,832	5%	*population percentage of US-1 Corridor station areas*			
Persons Over 18	2,906	76%	*percentage of station area population qualified to drive*			
LOS Regression Variables to Identify Station Area Resident Car Sharing Probability						
Household Composition						
Station Area Households	1,596	-	-	-	-	-
Average Household Size	2.40	-	-	-	-	-
1-Person Household	546	34%	*0.478*	*moderate correlation*	261	Low LOS
Household with Children	1,123	70%	*-0.412*	*moderate correlation*	-463	-
Rental Households	1,193	75%	*0.301*	*moderate correlation*	359	-
Auto Ownership						
No Vehicle	461	29%	*0.399*	*moderate correlation*	184	Below Threshold
1 Vehicle	890	56%	*0.488*	*moderate correlation*	434	Low LOS
Average Vehicles / Household	0.91	-	*-0.458*	*moderate correlation*	-627	-
Transportation Mode to Work						
Employed Workforce	1,336	46%	-	-	-	-
Private Car	891	67%	-	-	-	-
Drive Alone	812	61%	*-0.431*	*moderate correlation*	-350	Low LOS
Car Pool	79	6%	*-0.363*	*moderate correlation*	-29	-
Transit	304	23%	*0.104*	*weak correlation*	32	-
Bike	13	1%	*-0.003*	*weak correlation*	0	-
Walk	37	3%	*0.512*	*strong correlation*	19	Below Threshold
Telecommute	8	1%		*correlation not available*	not used for this assessment	-
Sum of LOS Correlation Terms x Population Basis						
					0	0.0%

Culmer Station Metrorail Market Assessment						488
parameter	value	percent	Pearson Coefficient	Correlation Comment	Regression Prediction Term	Note
Basis: Boardings Oct 2011 through Sep 2012						
Weekday Boardings	1,290	3%	*percent of Corridor total boardings for 12 stations*			
Saturday Boardings	706	3%	*percent of Corridor total boardings for 12 stations*			
Sunday Boardings	518	3%	*percent of Corridor total boardings for 12 stations*			
Holiday Boardings	681	3%	*percent of Corridor total boardings for 12 stations*			
Avg. Annual Daily Boardings	**1,063**	3%	*percent of Corridor total boardings for 12 stations*			
Home-Based Work Weekday	**300**	23%	*0.104*	*weak correlation*	31	
LOS Regression Variables to Identify Station Commuter Car Sharing Probability						
MetroRail Passenger Household Size				*Station sample size:*		*274*
Passengers Age 18 & Over	1,159	90%	*station passengers qualified to drive*			-
Passenger Households	289	-	-	-	-	-
Pass. Avg. Household Size	4.01	-	-	-	-	-
1-Person Household	140	11%	*0.478*	*moderate correlation*	55	*basis is ADB*
MetroRail Passenger Auto Ownership						
No Vehicle	474	37%	*0.399*	*moderate correlation*	156	*basis is ADB*
1 Vehicle	317	25%	*0.488*	*moderate correlation*	128	*basis is ADB*
Average Veh. / Household	1.34	-	*-0.458*	*moderate correlation*	-177	*basis is ADB*
MetroRail Passenger Work Trip Travel Mode to Train						
Drove Alone (5)	10	1%	*-0.431*	*moderate correlation*	-5	*Basis is HBW*
Carpool (3)	21	2%	*-0.363*	*moderate correlation*	-8	*Basis is HBW*
Metro Mover (6)	0	0%	*0.104*	*weak correlation*	0	*Basis is HBW*
Tri-Rail (7)	3	0%	*0.104*	*weak correlation*	0	*Basis is HBW*
Metro Bus (8)	91	9%	*0.104*	*weak correlation*	9	*Basis is HBW*
Bike (4)	3	0%	*-0.003*	*weak correlation*	0	*Basis is HBW*
Walk up to 3 Blocks (1)	80	8%	*0.512*	*strong correlation*	41	*Basis is HBW*
Walk More than 3 Blocks (2)	28	3%	*0.512*	*strong correlation*	14	*Basis is HBW*
Sum of LOS Correlation Terms x Average Annual Metrorail Boardings Basis						
	237				**245**	21.2%

Station passengers includes embarking and debarking riders, and include all trip purposes for household size and auto ownership variables. Mode to work includes only home-based-work trips in both directions. Transit-linked analysis captures both residential and employment for station areas.

Culmer Station Area Car Sharing Demand Assessment		
Station Area Geographic Market Assessment Value	*not included*	342
Station Area Residential Market Assessment Value	*included*	0
Station Transit User Market Assessment Value	*included*	245
Total of Residential and Transit Market		**245**

Culmer Station Area Car Sharing Program Spaces and Dedicated EVSE

Method 1: PCC Bivariate Summations		
Total Car Sharing Market		245
Market Value to Vehicle Placement Factor (max. vehicles = 10; min. vehicles =4)		333.4
Recommended Car Sharing Vehicles at Station (all fuels)		4
Car Sharing Vehicles per Square Mile	9	Low LOS
Residents over 18 / Car Sharing Vehicle	727	
Employees per Car Sharing Vehicle	15	
Method 2: Two Variable LOS Forecast		
Residential:		
Average vehicles / Household		0.91
Commuters that Walk to Work		37
Number of Car Sharing Vehicles in Station Area		5.4
Transit Linked:		
Average vehicles / Household		1.34
Commuters that Walk to Metrorail for HBW Trip		25
Number of Transit Linked Car Sharing Vehicles in Station Area		2.6
Total Number of Vehicles		**8**
Car Sharing Vehicles per Square Mile	17	Low LOS
Residents over 18 / Car Sharing Vehicle	363	
Employees per Car Sharing Vehicle	7	
EVSE – PCC Bivariate Summations Method 1		
Car Sharing PEV or PHEV Vehicles		1
EVSE Dedicated to Car Sharing Program		1
Public EVSE at 1 to 1 Ratio with Dedicated EVSE		1
Total EVSE: Dedicated & Public		**2**
Parking Required		
Car Sharing Parking Spaces Without EVSE		3
Car Sharing Parking Spaces With Dedicated EVSE		1
Total of All Spaces to be Allocated for Car Sharing		**4**
MDT Station Parking Availability		
Station Park & Ride Facility Spaces		10
Annual Average Parking Utilization (October 2011 - September 2012)		0%
Maximum Monthly Parking Utilization (October 2011 - September 2012)		0%
Average Available Spaces		10
Minimum Available Spaces		10

Culmer Station Area Potential EV Adopter Demograpics

	Area Residents		Area Employees		Transit Riders (HBW) that use a Car to/from Metrorail	
Housing Unit Types						
Total Housing Units	1,988		not applicable		not applicable	
Single Family Housing	460	23%	not applicable		not applicable	
Detached SFH	218	11%	not applicable		not applicable	
Attached SFH	242	12%	not applicable		not applicable	
Multifamily Housing	1,528	77%	not applicable		not applicable	
2 Units per Building	22	1%	not applicable		not applicable	
3 or more Units	1,506	76%	not applicable		not applicable	
Note to Housing Units: Most EV charging assumed to be done at home, with single family homes having the fewest administrative, legal, and permitting barriers. Single family attached homes and duplex units may or may not have the same conditions for EVSE installation as single family homes. Multi-family homes, particularly for buildings with 3 or more units have more barriers. Areas with high numbers of multi-family homes with 3 or more units may have greater need for public charging facilities in the near term.						
Income						
$30,000 - $39,999	300	19%				
$40,000 - $49,999			7	12%	0	0%
$50,000 - $59,999	145	9%				
$60,000 - $74,000					0	0%
$75,000 - $79,999	60	4%				
$80,000 - $99,999					0	0%
$100,000 and above	160	10%				
Area Residents in MUD and HH Income > $100k						
Educational Attainment						
High School (over 18)	1,700	58%	31	69%	data not available	
Bachelor or Higher (over 21 years old)	308	11%	8	14%	data not available	
Age (males & females)						
30 - 40	572	14%	32	55%	0	0%
40 - 50	508	13%			0	0%
50 - 55	635	16%			5	53%
55 - 60						
60 - 65					0	0%

Culmer Station Area Employment

parameter	value
Residents that are Employed	1,336
Employees Working in Area	58

Overtown Station Area Geographic Qualifiers — ov

parameter	acre	miles	kilometers	Pearson Coefficient	Regression Term	0
Land Area	231	0.36	0.94	equivalent radius (mi)=		0.34
Population Density	22	14,350	5,540			
Residential Density	14.7	9,398	0	0.174	591	
Employment Density	17	10,905	4,210			
Transit Service (rail & bus lines)		6 transit lines				
Intersection Density	0.22	144	56	0.290	15	
Proximity to CBD (distance)	n.a.	0.3	0.5			

Overtown Station Area Residential Market Assessment

parameter	value	percent	Pearson Coefficient	Correlation Comment	Regression Prediction Term	LOS Qualitative Measure
Basis						
Station Area Population	5,182	7%	*population percentage of US-1 Corridor station areas*			
Persons Over 18	4,341	84%	*percentage of station area population qualified to drive*			
LOS Regression Variables to Identify Station Area Resident Car Sharing Probability						
Household Composition						
Station Area Households	2,365	-	-	-	-	-
Average Household Size	2.19	-	-	-	-	-
1-Person Household	813	34%	*0.478*	*moderate correlation*	389	Low LOS
Household with Children	1,647	70%	*-0.412*	*moderate correlation*	-679	-
Rental Households	2,061	87%	*0.301*	*moderate correlation*	620	-
Auto Ownership						
No Vehicle	749	32%	*0.399*	*moderate correlation*	299	Low LOS
1 Vehicle	1,151	49%	*0.488*	*moderate correlation*	562	Low LOS
Average Vehicles / Household	0.88	-	*-0.458*	*moderate correlation*	-699	-
Transportation Mode to Work						
Employed Workforce	2,234	51%	-	-	-	-
Private Car	1,403	63%	-	-	-	-
Drive Alone	1,231	55%	*-0.431*	*moderate correlation*	-531	Low LOS
Car Pool	171	8%	*-0.363*	*moderate correlation*	-62	-
Transit	393	18%	*0.104*	*weak correlation*	41	-
Bike	44	2%	*-0.003*	*weak correlation*	0	-
Walk	233	10%	*0.512*	*strong correlation*	119	Below Threshold
Telecommute	82	4%		*correlation not available*	not used for this assessment	-
Sum of LOS Correlation Terms x Population Basis						
					59	1.4%

Appendix 6-IV Overtown Station Car Sharing Assessment, p. 2 of 4

Overtown Station Metrorail Market Assessment						515
parameter	value	percent	Pearson Coefficient	Correlation Comment	Regression Prediction Term	Note
Basis: Boardings Oct 2011 through Sep 2012						
Weekday Boardings	1,735	3%	*percent of Corridor total boardings for 12 stations*			
Saturday Boardings	485	2%	*percent of Corridor total boardings for 12 stations*			
Sunday Boardings	378	2%	*percent of Corridor total boardings for 12 stations*			
Holiday Boardings	549	2%	*percent of Corridor total boardings for 12 stations*			
Avg. Annual Daily Boardings	**1,314**	3%	*percent of Corridor total boardings for 12 stations*			
Home-Based Work Weekday	**444**	26%	*0.104*	*weak correlation*	46	
LOS Regression Variables to Identify Station Commuter Car Sharing Probability						
MetroRail Passenger Household Size				*Station sample size:*		*236*
Passengers Age 18 & Over	1,638	94%	*station passengers qualified to drive*			-
Passenger Households	475	-	-	-	-	-
Pass. Avg. Household Size	3.45	-	-	-	-	-
1-Person Household	243	14%	*0.478*	*moderate correlation*	88	*basis is ADB*
MetroRail Passenger Auto Ownership						
No Vehicle	694	40%	*0.399*	*moderate correlation*	210	*basis is ADB*
1 Vehicle	444	26%	*0.488*	*moderate correlation*	164	*basis is ADB*
Average Veh. / Household	1.11	-	*-0.458*	*moderate correlation*	-241	*basis is ADB*
MetroRail Passenger Work Trip Travel Mode to Train						
Drove Alone (5)	0	0%	*-0.431*	*moderate correlation*	0	*Basis is HBW*
Carpool (3)	21	2%	*-0.363*	*moderate correlation*	-8	*Basis is HBW*
Metro Mover (6)	5	0%	*0.104*	*weak correlation*	1	*Basis is HBW*
Tri-Rail (7)	0	0%	*0.104*	*weak correlation*	0	*Basis is HBW*
Metro Bus (8)	84	6%	*0.104*	*weak correlation*	9	*Basis is HBW*
Bike (4)	26	2%	*-0.003*	*weak correlation*	0	*Basis is HBW*
Walk up to 3 Blocks (1)	131	10%	*0.512*	*strong correlation*	67	*Basis is HBW*
Walk More than 3 Blocks (2)	47	4%	*0.512*	*strong correlation*	24	*Basis is HBW*
Sum of LOS Correlation Terms x Average Annual Metrorail Boardings Basis						
	315				**360**	22.0%

Station passengers includes embarking and debarking riders, and include all trip purposes for household size and auto ownership variables. Mode to work includes only home-based-work trips in both directions. Transit-linked analysis captures both residential and employment for station areas.

Overtown Station Area Car Sharing Demand Assessment		
Station Area Geographic Market Assessment Value	*not included*	606
Station Area Residential Market Assessment Value	*included*	59
Station Transit User Market Assessment Value	*included*	360
Total of Residential and Transit Market		**419**

Overtown Station Area Car Sharing Program Spaces and Dedicated EVSE

Method 1: PCC Bivariate Summations		
Total Car Sharing Market		419
Market Value to Vehicle Placement Factor (max. vehicles = 10; min. vehicles =4)		333.4
Recommended Car Sharing Vehicles at Station (all fuels)		4
Car Sharing Vehicles per Square Mile	11	Low LOS
Residents over 18 / Car Sharing Vehicle	1,085	
Employees per Car Sharing Vehicle	985	
Method 2: Two Variable LOS Forecast		
Residential:		
Average vehicles / Household		0.88
Commuters that Walk to Work		233
Number of Car Sharing Vehicles in Station Area		6.0
Transit Linked:		
Average vehicles / Household		1.11
Commuters that Walk to Metrorail for HBW Trip		46
Number of Transit Linked Car Sharing Vehicles in Station Area		4.1
Total Number of Vehicles		**10**
Car Sharing Vehicles per Square Mile	28	Low LOS
Residents over 18 / Car Sharing Vehicle	434	
Employees per Car Sharing Vehicle	394	
EVSE – PCC Bivariate Summations Method 1		
Car Sharing PEV or PHEV Vehicles		1
EVSE Dedicated to Car Sharing Program		1
Public EVSE at 1 to 1 Ratio with Dedicated EVSE		1
Total EVSE: Dedicated & Public		**2**
Parking Required		
Car Sharing Parking Spaces Without EVSE		3
Car Sharing Parking Spaces With Dedicated EVSE		1
Total of All Spaces to be Allocated for Car Sharing		**4**
MDT Station Parking Availability		
Station Park & Ride Facility Spaces		588
Annual Average Parking Utilization (October 2011 - September 2012)		0%
Maximum Monthly Parking Utilization (October 2011 - September 2012)		0%
Average Available Spaces		588
Minimum Available Spaces		588

Overtown Station Area Potential EV Adopter Demograpics

	Area Residents		Area Employees		Transit Riders (HBW) that use a Car to/from Metrorail	
Housing Unit Types						
Total Housing Units	2,942		not applicable		not applicable	
Single Family Housing	82	3%	not applicable		not applicable	
Detached SFH	55	2%	not applicable		not applicable	
Attached SFH	27	1%	not applicable		not applicable	
Multifamily Housing	2,860	97%	not applicable		not applicable	
2 Units per Building	29	1%	not applicable		not applicable	
3 or more Units	2,831	96%	not applicable		not applicable	
Note to Housing Units: Most EV charging assumed to be done at home, with single family homes having the fewest administrative, legal, and permitting barriers. Single family attached homes and duplex units may or may not have the same conditions for EVSE installation as single family homes. Multi-family homes, particularly for buildings with 3 or more units have more barriers. Areas with high numbers of multi-family homes with 3 or more units may have greater need for public charging facilities in the near term.						
Income						
$30,000 - $39,999	562	24%				
$40,000 - $49,999			587	15%	0	0%
$50,000 - $59,999	191	8%				
$60,000 - $74,000					0	0%
$75,000 - $79,999	199	8%				
$80,000 - $99,999					0	0%
$100,000 and above	183	8%				
Area Residents in MUD and HH Income > $100k						
Educational Attainment						
High School (over 18)	1,881	43%	2,677	82%	data not available	
Bachelor or Higher (over 21 years old)	459	11%	690	18%	data not available	
Age (males & females)						
30 - 40	1,137	21%			0	0%
40 - 50	765	14%	2,219	56%	0	0%
50 - 55					0	0%
55 - 60	748	14%				
60 - 65					0	0%

Overtown Station Area Employment

parameter	value
Residents that are Employed	2,234
Employees Working in Area	3,938

Appendix 6-IV Government Center Station Car Sharing Assessment, p. 1 of 4

Government Center Station Area Geographic Qualifiers						gc
parameter	acre	miles	kilometers	Pearson Coefficient	Regression Term	0
Land Area	389	0.61	1.58	equivalent radius (mi)=		0.44
Population Density	19	11,902	4,595			
Residential Density	11.4	7,313	0	0.174	774	
Employment Density	91	57,942	22,371			
Transit Service (rail & bus lines)		22 transit lines				
Intersection Density	0.31	196	76	0.290	35	
Proximity to CBD (distance)	n.a.	0.0	0.0			

Government Center Station Area Residential Market Assessment						
parameter	value	percent	Pearson Coefficient	Correlation Comment	Regression Prediction Term	LOS Qualitative Measure
Basis						
Station Area Population	7,242	10%	*population percentage of US-1 Corridor station areas*			
Persons Over 18	6,759	93%	*percentage of station area population qualified to drive*			
LOS Regression Variables to Identify Station Area Resident Car Sharing Probability						
Household Composition						
Station Area Households	3,520	-	-	-	-	-
Average Household Size	2.06	-	-	-	-	-
1-Person Household	1,377	39%	*0.478*	*moderate correlation*	658	Low LOS
Household with Children	265	8%	*-0.412*	*moderate correlation*	-109	-
Rental Households	3,336	95%	*0.301*	*moderate correlation*	1,004	-
Auto Ownership						
No Vehicle	1,023	29%	*0.399*	*moderate correlation*	408	Below Threshold
1 Vehicle	2,013	57%	*0.488*	*moderate correlation*	983	Low LOS
Average Vehicles / Household	0.85	-	*-0.458*	*moderate correlation*	-765	-
Transportation Mode to Work						
Employed Workforce	3,276	48%	-	-	-	-
Private Car	2,212	68%	-	-	-	-
Drive Alone	1,350	41%	*-0.431*	*moderate correlation*	-582	Low LOS
Car Pool	171	5%	*-0.363*	*moderate correlation*	-62	-
Transit	376	11%	*0.104*	*weak correlation*	39	-
Bike	0	0%	*-0.003*	*weak correlation*	0	-
Walk	487	15%	*0.512*	*strong correlation*	250	Below Threshold
Telecommute	171	5%		*correlation not available*	not used for this assessment	-
Sum of LOS Correlation Terms x Population Basis						
					1,824	27.0%

Government Center Station Metrorail Market Assessment

531

parameter	value	percent	Pearson Coefficient	Correlation Comment	Regression Prediction Term	Note
Basis: Boardings Oct 2011 through Sep 2012						
Weekday Boardings	10,957	22%	*percent of Corridor total boardings for 12 stations*			
Saturday Boardings	4,778	23%	*percent of Corridor total boardings for 12 stations*			
Sunday Boardings	3,546	23%	*percent of Corridor total boardings for 12 stations*			
Holiday Boardings	4,771	22%	*percent of Corridor total boardings for 12 stations*			
Avg. Annual Daily Boardings	**8,714**	22%	*percent of Corridor total boardings for 12 stations*			
Home-Based Work Weekday	**3,721**	34%	*0.104*	*weak correlation*	387	
LOS Regression Variables to Identify Station Commuter Car Sharing Probability						
MetroRail Passenger Household Size				*Station sample size:*		*2749*
Passengers Age 18 & Over	10,322	94%	*station passengers qualified to drive*			-
Passenger Households	3,132	-	-	-	-	-
Pass. Avg. Household Size	3.3	-	-	-	-	-
1-Person Household	1,273	12%	*0.478*	*moderate correlation*	484	*basis is ADB*
MetroRail Passenger Auto Ownership						
No Vehicle	2,974	27%	*0.399*	*moderate correlation*	944	*basis is ADB*
1 Vehicle	2,820	26%	*0.488*	*moderate correlation*	1,094	*basis is ADB*
Average Veh. / Household	1.48	-	*-0.458*	*moderate correlation*	-2,124	*basis is ADB*
MetroRail Passenger Work Trip Travel Mode to Train						
Drove Alone (5)	75	1%	*-0.431*	*moderate correlation*	-32	*Basis is HBW*
Carpool (3)	30	0%	*-0.363*	*moderate correlation*	-11	*Basis is HBW*
Metro Mover (6)	878	10%	*0.104*	*weak correlation*	91	*Basis is HBW*
Tri-Rail (7)	12	0%	*0.104*	*weak correlation*	1	*Basis is HBW*
Metro Bus (8)	705	8%	*0.104*	*weak correlation*	73	*Basis is HBW*
Bike (4)	15	0%	*-0.003*	*weak correlation*	0	*Basis is HBW*
Walk up to 3 Blocks (1)	1,024	12%	*0.512*	*strong correlation*	524	*Basis is HBW*
Walk More than 3 Blocks (2)	152	2%	*0.512*	*strong correlation*	78	*Basis is HBW*
Sum of LOS Correlation Terms x Average Annual Metrorail Boardings Basis						
	2,891				**1,510**	14.6%

Station passengers includes embarking and debarking riders, and include all trip purposes for household size and auto ownership variables. Mode to work includes only home-based-work trips in both directions. Transit-linked analysis captures both residential and employment for station areas.

Government Center Station Area Car Sharing Demand Assessment

Station Area Geographic Market Assessment Value	*not included*	809
Station Area Residential Market Assessment Value	*included*	1,824
Station Transit User Market Assessment Value	*included*	1,510
Total of Residential and Transit Market		**3,334**

Government Center Station Area Car Sharing Program Spaces and Dedicated EVSE

Method 1: PCC Bivariate Summations		
Total Car Sharing Market		3,334
Market Value to Vehicle Placement Factor (max. vehicles = 10; min. vehicles =4)		333.4
Recommended Car Sharing Vehicles at Station (all fuels)		10
Car Sharing Vehicles per Square Mile	16	Low LOS
Residents over 18 / Car Sharing Vehicle	676	
Employees per Car Sharing Vehicle	3,526	
Method 2: Two Variable LOS Forecast		
Residential:		
Average vehicles / Household		0.85
Commuters that Walk to Work		487
Number of Car Sharing Vehicles in Station Area		6.8
Transit Linked:		
Average vehicles / Household		1.48
Commuters that Walk to Metrorail for HBW Trip		400
Number of Transit Linked Car Sharing Vehicles in Station Area		2.4
Total Number of Vehicles		**9**
Car Sharing Vehicles per Square Mile	15	Low LOS
Residents over 18 / Car Sharing Vehicle	751	
Employees per Car Sharing Vehicle	3,917	
EVSE – PCC Bivariate Summations Method 1		
Car Sharing PEV or PHEV Vehicles		2
EVSE Dedicated to Car Sharing Program		2
Public EVSE at 1 to 1 Ratio with Dedicated EVSE		2
Total EVSE: Dedicated & Public		**4**
Parking Required		
Car Sharing Parking Spaces Without EVSE		8
Car Sharing Parking Spaces With Dedicated EVSE		2
Total of All Spaces to be Allocated for Car Sharing		**10**
MDT Station Parking Availability		
Station Park & Ride Facility Spaces		0
Annual Average Parking Utilization (October 2011 - September 2012)		n.a.
Maximum Monthly Parking Utilization (October 2011 - September 2012)		n.a.
Average Available Spaces		0
Minimum Available Spaces		0

Government Center Station Area Potential EV Adopter Demograpics

	Area Residents		Area Employees		Transit Riders (HBW) that use a Car to/from Metrorail	
Housing Unit Types						
Total Housing Units	3,132		not applicable		not applicable	
Single Family Housing	47	2%	not applicable		not applicable	
Detached SFH	47	2%	not applicable		not applicable	
Attached SFH	0	0%	not applicable		not applicable	
Multifamily Housing	3,085	98%	not applicable		not applicable	
2 Units per Building	0	0%	not applicable		not applicable	
3 or more Units	3,085	98%	not applicable		not applicable	
Note to Housing Units: Most EV charging assumed to be done at home, with single family homes having the fewest administrative, legal, and permitting barriers. Single family attached homes and duplex units may or may not have the same conditions for EVSE installation as single family homes. Multi-family homes, particularly for buildings with 3 or more units have more barriers. Areas with high numbers of multi-family homes with 3 or more units may have greater need for public charging facilities in the near term.						
Income						
$30,000 - $39,999	405	12%				
$40,000 - $49,999			21,823	62%	20	45%
$50,000 - $59,999	555	16%				
$60,000 - $74,000					20	45%
$75,000 - $79,999	173	5%				
$80,000 - $99,999					2	4%
$100,000 and above	295	8%				
Area Residents in MUD and HH Income > $100k						
Educational Attainment						
High School (over 18)	2,201	33%	27,249	87%	data not available	
Bachelor or Higher (over 21 years old)	600	9%	9,059	26%	data not available	
Age (males & females)						
30 - 40	1,821	24%	23,384	66%	24	54%
40 - 50	1,122	15%			16	36%
50 - 55	1,066	14%			8	18%
55 - 60						
60 - 65					4	9%

Government Center Station Area Employment

parameter	value
Residents that are Employed	3,276
Employees Working in Area	35,255

Brickell Station Area Geographic Qualifiers — br

parameter	acre	miles	kilometers	Pearson Coefficient	Regression Term	0
Land Area	309	0.48	1.25	equivalent radius (mi)=		0.39
Population Density	46	29,538	11,405			
Residential Density	38.6	24,702	0	0.174	2,074	
Employment Density	16	10,363	4,001			
Transit Service (rail & bus lines)		9 transit lines				
Intersection Density	0.11	68	26	0.290	10	
Proximity to CBD (distance)	n.a.	0.8	1.4			

Brickell Station Area Residential Market Assessment

parameter	value	percent	Pearson Coefficient	Correlation Comment	Regression Prediction Term	LOS Qualitative Measure
Basis						
Station Area Population	14,255	20%	*population percentage of US-1 Corridor station areas*			
Persons Over 18	12,946	91%	*percentage of station area population qualified to drive*			
LOS Regression Variables to Identify Station Area Resident Car Sharing Probability						
Household Composition						
Station Area Households	8,329	-	-	-	-	-
Average Household Size	1.71	-	-	-	-	-
1-Person Household	2,378	29%	*0.478*	*moderate correlation*	1,137	Below Threshold
Household with Children	1,403	17%	*-0.412*	*moderate correlation*	-578	-
Rental Households	5,781	69%	*0.301*	*moderate correlation*	1,740	-
Auto Ownership						
No Vehicle	987	12%	*0.399*	*moderate correlation*	394	Below Threshold
1 Vehicle	5,017	60%	*0.488*	*moderate correlation*	2,448	Low LOS
Average Vehicles / Household	1.17	-	*-0.458*	*moderate correlation*	-2,394	-
Transportation Mode to Work						
Employed Workforce	8,961	69%	-	-	-	-
Private Car	6,674	74%	-	-	-	-
Drive Alone	6,211	69%	*-0.431*	*moderate correlation*	-2,677	Low LOS
Car Pool	462	5%	*-0.363*	*moderate correlation*	-168	-
Transit	843	9%	*0.104*	*weak correlation*	88	-
Bike	28	0%	*-0.003*	*weak correlation*	0	-
Walk	766	9%	*0.512*	*strong correlation*	392	Below Threshold
Telecommute	529	6%		*correlation not available*	not used for this assessment	-
Sum of LOS Correlation Terms x Population Basis						
					381	2.9%

Brickell Station Metrorail Market Assessment						574
parameter	value	percent	Pearson Coefficient	Correlation Comment	Regression Prediction Term	Note
Basis: Boardings Oct 2011 through Sep 2012						
Weekday Boardings	4,326	9%	*percent of Corridor total boardings for 12 stations*			
Saturday Boardings	2,081	10%	*percent of Corridor total boardings for 12 stations*			
Sunday Boardings	1,644	11%	*percent of Corridor total boardings for 12 stations*			
Holiday Boardings	2,214	10%	*percent of Corridor total boardings for 12 stations*			
Avg. Annual Daily Boardings	**3,515**	9%	*percent of Corridor total boardings for 12 stations*			
Home-Based Work Weekday	**2,109**	49%	*0.104*	*weak correlation*	219	
LOS Regression Variables to Identify Station Commuter Car Sharing Probability						
MetroRail Passenger Household Size				*Station sample size:*		*603*
Passengers Age 18 & Over	4,102	95%	*station passengers qualified to drive*			-
Passenger Households	1,277	-	-	-	-	-
Pass. Avg. Household Size	3.21	-	-	-	-	-
1-Person Household	463	11%	*0.478*	*moderate correlation*	180	*basis is ADB*
MetroRail Passenger Auto Ownership						
No Vehicle	1,428	33%	*0.399*	*moderate correlation*	463	*basis is ADB*
1 Vehicle	1,177	27%	*0.488*	*moderate correlation*	467	*basis is ADB*
Average Veh. / Household	1.24	-	*-0.458*	*moderate correlation*	-727	*basis is ADB*
MetroRail Passenger Work Trip Travel Mode to Train						
Drove Alone (5)	6	0%	*-0.431*	*moderate correlation*	-2	*Basis is HBW*
Carpool (3)	50	1%	*-0.363*	*moderate correlation*	-18	*Basis is HBW*
Metro Mover (6)	310	9%	*0.104*	*weak correlation*	32	*Basis is HBW*
Tri-Rail (7)	17	0%	*0.104*	*weak correlation*	2	*Basis is HBW*
Metro Bus (8)	497	14%	*0.104*	*weak correlation*	52	*Basis is HBW*
Bike (4)	22	1%	*-0.003*	*weak correlation*	0	*Basis is HBW*
Walk up to 3 Blocks (1)	614	17%	*0.512*	*strong correlation*	314	*Basis is HBW*
Walk More than 3 Blocks (2)	188	5%	*0.512*	*strong correlation*	96	*Basis is HBW*
Sum of LOS Correlation Terms x Average Annual Metrorail Boardings Basis						
	1,702				**1,078**	26.3%

Station passengers includes embarking and debarking riders, and include all trip purposes for household size and auto ownership variables. Mode to work includes only home-based-work trips in both directions. Transit-linked analysis captures both residential and employment for station areas.

Brickell Station Area Car Sharing Demand Assessment		
Station Area Geographic Market Assessment Value	*not included*	2,084
Station Area Residential Market Assessment Value	*included*	381
Station Transit User Market Assessment Value	*included*	1,078
Total of Residential and Transit Market		**1,459**

Brickell Station Area Car Sharing Program Spaces and Dedicated EVSE

Method 1: PCC Bivariate Summations		
Total Car Sharing Market		1,459
Market Value to Vehicle Placement Factor (max. vehicles = 10; min. vehicles =4)		333.4
Recommended Car Sharing Vehicles at Station (all fuels)		4
Car Sharing Vehicles per Square Mile	8	Low LOS
Residents over 18 / Car Sharing Vehicle	3,237	
Employees per Car Sharing Vehicle	1,250	
Method 2: Two Variable LOS Forecast		
Residential:		
Average vehicles / Household		1.17
Commuters that Walk to Work		766
Number of Car Sharing Vehicles in Station Area		5.2
Transit Linked:		
Average vehicles / Household		1.24
Commuters that Walk to Metrorail for HBW Trip		391
Number of Transit Linked Car Sharing Vehicles in Station Area		4.0
Total Number of Vehicles		**9**
Car Sharing Vehicles per Square Mile	19	Low LOS
Residents over 18 / Car Sharing Vehicle	1,438	
Employees per Car Sharing Vehicle	556	
EVSE – PCC Bivariate Summations Method 1		
Car Sharing PEV or PHEV Vehicles		1
EVSE Dedicated to Car Sharing Program		1
Public EVSE at 1 to 1 Ratio with Dedicated EVSE		1
Total EVSE: Dedicated & Public		**2**
Parking Required		
Car Sharing Parking Spaces Without EVSE		3
Car Sharing Parking Spaces With Dedicated EVSE		1
Total of All Spaces to be Allocated for Car Sharing		**4**
MDT Station Parking Availability		
Station Park & Ride Facility Spaces		0
Annual Average Parking Utilization (October 2011 - September 2012)		n.a.
Maximum Monthly Parking Utilization (October 2011 - September 2012)		n.a.
Average Available Spaces		0
Minimum Available Spaces		0

Brickell Station Area Potential EV Adopter Demograpics

	Area Residents		Area Employees		Transit Riders (HBW) that use a Car to/from Metrorail	
Housing Unit Types						
Total Housing Units	7,879		not applicable		not applicable	
Single Family Housing	125	2%	not applicable		not applicable	
Detached SFH	111	1%	not applicable		not applicable	
Attached SFH	14	0%	not applicable		not applicable	
Multifamily Housing	7,754	98%	not applicable		not applicable	
2 Units per Building	29	0%	not applicable		not applicable	
3 or more Units	7,725	98%	not applicable		not applicable	
Note to Housing Units: Most EV charging assumed to be done at home, with single family homes having the fewest administrative, legal, and permitting barriers. Single family attached homes and duplex units may or may not have the same conditions for EVSE installation as single family homes. Multi-family homes, particularly for buildings with 3 or more units have more barriers. Areas with high numbers of multi-family homes with 3 or more units may have greater need for public charging facilities in the near term.						
Income						
$30,000 - $39,999	1,480	18%				
$40,000 - $49,999			1,992	40%	0	0%
$50,000 - $59,999	1,507	18%				
$60,000 - $74,000					0	0%
$75,000 - $79,999	869	10%				
$80,000 - $99,999					0	0%
$100,000 and above	1,922	23%				
Area Residents in MUD and HH Income > $100k						
Educational Attainment						
High School (over 18)	5,509	43%	3,048	82%	data not available	
Bachelor or Higher (over 21 years old)	1,821	15%	1,079	22%	data not available	
Age (males & females)						
30 - 40	4,071	28%	2,888	58%	7	22%
40 - 50	1,722	12%			0	0%
50 - 55	1,480	10%			14	43%
55 - 60						
60 - 65					0	0%

Brickell Station Area Employment

parameter	value
Residents that are Employed	8,961
Employees Working in Area	5,001

Vizcaya Station Area Geographic Qualifiers — vz

parameter	acre	miles	kilometers	Pearson Coefficient	Regression Term	0
Land Area	650	1.02	2.63	equivalent radius (mi)=		0.57
Population Density	8	5,402	2,086			
Residential Density	4.0	2,587	0	0.174	457	
Employment Density	1	477	184			
Transit Service (rail & bus lines)		5 transit lines				
Intersection Density	0.05	33	13	0.290	10	
Proximity to CBD (distance)	n.a.	2.3	3.7			

Vizcaya Station Area Residential Market Assessment

parameter	value	percent	Pearson Coefficient	Correlation Comment	Regression Prediction Term	LOS Qualitative Measure
Basis						
Station Area Population	5,489	8%	*population percentage of US-1 Corridor station areas*			
Persons Over 18	4,527	82%	*percentage of station area population qualified to drive*			
LOS Regression Variables to Identify Station Area Resident Car Sharing Probability						
Household Composition						
Station Area Households	2,413	-	-	-	-	-
Average Household Size	2.27	-	-	-	-	-
1-Person Household	786	33%	*0.478*	*moderate correlation*	376	Low LOS
Household with Children	851	35%	*-0.412*	*moderate correlation*	-351	-
Rental Households	1,052	44%	*0.301*	*moderate correlation*	317	-
Auto Ownership						
No Vehicle	266	11%	*0.399*	*moderate correlation*	106	Below Threshold
1 Vehicle	946	39%	*0.488*	*moderate correlation*	462	Low LOS
Average Vehicles / Household	1.55	-	*-0.458*	*moderate correlation*	-1,809	-
Transportation Mode to Work						
Employed Workforce	3,202	71%	-	-	-	-
Private Car	2,857	89%	-	-	-	-
Drive Alone	2,574	80%	*-0.431*	*moderate correlation*	-1,109	Low LOS
Car Pool	283	9%	*-0.363*	*moderate correlation*	-103	-
Transit	118	4%	*0.104*	*weak correlation*	12	-
Bike	0	0%	*-0.003*	*weak correlation*	0	-
Walk	69	2%	*0.512*	*strong correlation*	35	Below Threshold
Telecommute	158	5%		*correlation not available*	not used for this assessment	-
Sum of LOS Correlation Terms x Population Basis						
					0	0.0%

Vizcaya Station Metrorail Market Assessment						1050
parameter	value	percent	Pearson Coefficient	Correlation Comment	Regression Prediction Term	Note
Basis: Boardings Oct 2011 through Sep 2012						
Weekday Boardings	1,312	3%	*percent of Corridor total boardings for 12 stations*			
Saturday Boardings	645	3%	*percent of Corridor total boardings for 12 stations*			
Sunday Boardings	481	3%	*percent of Corridor total boardings for 12 stations*			
Holiday Boardings	684	3%	*percent of Corridor total boardings for 12 stations*			
Avg. Annual Daily Boardings	**1,066**	3%	*percent of Corridor total boardings for 12 stations*			
Home-Based Work Weekday	**331**	25%	*0.104*	*weak correlation*	34	
LOS Regression Variables to Identify Station Commuter Car Sharing Probability						
MetroRail Passenger Household Size				*Station sample size:*		*251*
Passengers Age 18 & Over	1,124	86%	*station passengers qualified to drive*			-
Passenger Households	339	-	-	-	-	-
Pass. Avg. Household Size	3.31	-	-	-	-	-
1-Person Household	157	12%	*0.478*	*moderate correlation*	61	*basis is ADB*
MetroRail Passenger Auto Ownership						
No Vehicle	497	38%	*0.399*	*moderate correlation*	161	*basis is ADB*
1 Vehicle	286	22%	*0.488*	*moderate correlation*	114	*basis is ADB*
Average Veh. / Household	1.33	-	*-0.458*	*moderate correlation*	-207	*basis is ADB*
MetroRail Passenger Work Trip Travel Mode to Train						
Drove Alone (5)	15	1%	*-0.431*	*moderate correlation*	-6	*Basis is HBW*
Carpool (3)	15	1%	*-0.363*	*moderate correlation*	-5	*Basis is HBW*
Metro Mover (6)	4	0%	*0.104*	*weak correlation*	0	*Basis is HBW*
Tri-Rail (7)	0	0%	*0.104*	*weak correlation*	0	*Basis is HBW*
Metro Bus (8)	127	12%	*0.104*	*weak correlation*	13	*Basis is HBW*
Bike (4)	4	0%	*-0.003*	*weak correlation*	0	*Basis is HBW*
Walk up to 3 Blocks (1)	62	6%	*0.512*	*strong correlation*	32	*Basis is HBW*
Walk More than 3 Blocks (2)	44	4%	*0.512*	*strong correlation*	22	*Basis is HBW*
Sum of LOS Correlation Terms x Average Annual Metrorail Boardings Basis						
	269				**219**	19.5%

Station passengers includes embarking and debarking riders, and include all trip purposes for household size and auto ownership variables. Mode to work includes only home-based-work trips in both directions. Transit-linked analysis captures both residential and employment for station areas.

Vizcaya Station Area Car Sharing Demand Assessment		
Station Area Geographic Market Assessment Value	*not included*	467
Station Area Residential Market Assessment Value	*included*	0
Station Transit User Market Assessment Value	*included*	219
Total of Residential and Transit Market		**219**

Vizcaya Station Area Car Sharing Program Spaces and Dedicated EVSE

Method 1: PCC Bivariate Summations		
Total Car Sharing Market		219
Market Value to Vehicle Placement Factor (max. vehicles = 10; min. vehicles =4)		333.4
Recommended Car Sharing Vehicles at Station (all fuels)		4
Car Sharing Vehicles per Square Mile	4	Low LOS
Residents over 18 / Car Sharing Vehicle	1,132	
Employees per Car Sharing Vehicle	121	
Method 2: Two Variable LOS Forecast		
Residential:		
Average vehicles / Household		1.55
Commuters that Walk to Work		69
Number of Car Sharing Vehicles in Station Area		1.3
Transit Linked:		
Average vehicles / Household		1.33
Commuters that Walk to Metrorail for HBW Trip		27
Number of Transit Linked Car Sharing Vehicles in Station Area		2.6
Total Number of Vehicles		**4**
Car Sharing Vehicles per Square Mile	4	Low LOS
Residents over 18 / Car Sharing Vehicle	1,132	
Employees per Car Sharing Vehicle	121	
EVSE – PCC Bivariate Summations Method 1		
Car Sharing PEV or PHEV Vehicles		1
EVSE Dedicated to Car Sharing Program		1
Public EVSE at 1 to 1 Ratio with Dedicated EVSE		1
Total EVSE: Dedicated & Public		**2**
Parking Required		
Car Sharing Parking Spaces Without EVSE		3
Car Sharing Parking Spaces With Dedicated EVSE		1
Total of All Spaces to be Allocated for Car Sharing		**4**
MDT Station Parking Availability		
Station Park & Ride Facility Spaces		91
Annual Average Parking Utilization (October 2011 - September 2012)		62%
Maximum Monthly Parking Utilization (October 2011 - September 2012)		68%
Average Available Spaces		34
Minimum Available Spaces		29

Vizcaya Station Area Potential EV Adopter Demograpics

	Area Residents		Area Employees		Transit Riders (HBW) that use a Car to/from Metrorail	
Housing Unit Types						
Total Housing Units	3,010		not applicable		not applicable	
Single Family Housing	1,886	63%	not applicable		not applicable	
Detached SFH	1,449	48%	not applicable		not applicable	
Attached SFH	437	15%	not applicable		not applicable	
Multifamily Housing	1,124	37%	not applicable		not applicable	
2 Units per Building	51	2%	not applicable		not applicable	
3 or more Units	1,073	36%	not applicable		not applicable	
Note to Housing Units: Most EV charging assumed to be done at home, with single family homes having the fewest administrative, legal, and permitting barriers. Single family attached homes and duplex units may or may not have the same conditions for EVSE installation as single family homes. Multi-family homes, particularly for buildings with 3 or more units have more barriers. Areas with high numbers of multi-family homes with 3 or more units may have greater need for public charging facilities in the near term.						
Income						
$30,000 - $39,999	608	25%				
$40,000 - $49,999			182	38%	10	116%
$50,000 - $59,999	345	14%				
$60,000 - $74,000					10	116%
$75,000 - $79,999	157	6%				
$80,000 - $99,999					0	0%
$100,000 and above	664	27%				
Area Residents in MUD and HH Income > $100k						
Educational Attainment						
High School (over 18)	4,190	93%	301	82%	data not available	
Bachelor or Higher (over 21 years old)	1,182	27%	108	22%	data not available	
Age (males & females)						
30 - 40	907	16%	281	58%	5	58%
40 - 50	844	15%			5	58%
50 - 55	972	17%			0	0%
55 - 60						
60 - 65					5	58%

Vizcaya Station Area Employment

parameter	value
Residents that are Employed	3,202
Employees Working in Area	485

Coconut Grove Station Area Geographic Qualifiers						cg
parameter	acre	miles	kilometers	Pearson Coefficient	Regression Term	0
Land Area	406	0.63	1.64	equivalent radius (mi)=		0.45
Population Density	15	9,797	3,783			
Residential Density	7.8	5,007	0	0.174	552	
Employment Density	3	1,693	654			
Transit Service (rail & bus lines)		6 transit lines				
Intersection Density	0.11	71	27	0.290	13	
Proximity to CBD (distance)	n.a.	4.2	6.7			

Coconut Grove Station Area Residential Market Assessment						
parameter	value	percent	Pearson Coefficient	Correlation Comment	Regression Prediction Term	LOS Qualitative Measure
Basis						
Station Area Population	6,210	9%	*population percentage of US-1 Corridor station areas*			
Persons Over 18	5,248	85%	*percentage of station area population qualified to drive*			
LOS Regression Variables to Identify Station Area Resident Car Sharing Probability						
Household Composition						
Station Area Households	2,792	-	-	-	-	-
Average Household Size	2.22	-	-	-	-	-
1-Person Household	1,095	39%	*0.478*	*moderate correlation*	523	Low LOS
Household with Children	1,336	48%	*-0.412*	*moderate correlation*	-550	-
Rental Households	1,437	51%	*0.301*	*moderate correlation*	433	-
Auto Ownership						
No Vehicle	199	7%	*0.399*	*moderate correlation*	79	Below Threshold
1 Vehicle	1,474	53%	*0.488*	*moderate correlation*	719	Low LOS
Average Vehicles / Household	1.45	-	*-0.458*	*moderate correlation*	-1,861	-
Transportation Mode to Work						
Employed Workforce	3,763	72%	-	-	-	-
Private Car	3,085	82%	-	-	-	-
Drive Alone	2,656	71%	*-0.431*	*moderate correlation*	-1,145	Low LOS
Car Pool	430	11%	*-0.363*	*moderate correlation*	-156	-
Transit	250	7%	*0.104*	*weak correlation*	26	-
Bike	17	0%	*-0.003*	*weak correlation*	0	-
Walk	173	5%	*0.512*	*strong correlation*	88	Below Threshold
Telecommute	188	5%		*correlation not available*	not used for this assessment	-
Sum of LOS Correlation Terms x Population Basis						
					0	0.0%

Coconut Grove Station Metrorail Market Assessment

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parameter	value	percent	Pearson Coefficient	Correlation Comment	Regression Prediction Term	Note
Basis: Boardings Oct 2011 through Sep 2012						
Weekday Boardings	1,854	4%	*percent of Corridor total boardings for 12 stations*			
Saturday Boardings	1,142	5%	*percent of Corridor total boardings for 12 stations*			
Sunday Boardings	860	5%	*percent of Corridor total boardings for 12 stations*			
Holiday Boardings	1,113	5%	*percent of Corridor total boardings for 12 stations*			
Avg. Annual Daily Boardings	**1,566**	4%	*percent of Corridor total boardings for 12 stations*			
Home-Based Work Weekday	**657**	35%	*0.104*	*weak correlation*	68	
LOS Regression Variables to Identify Station Commuter Car Sharing Probability						
MetroRail Passenger Household Size				*Station sample size:*		*380*
Passengers Age 18 & Over	1,770	95%	*station passengers qualified to drive*			-
Passenger Households	570	-	-	-	-	-
Pass. Avg. Household Size	3.1	-	-	-	-	-
1-Person Household	256	14%	*0.478*	*moderate correlation*	103	*basis is ADB*
MetroRail Passenger Auto Ownership						
No Vehicle	676	36%	*0.399*	*moderate correlation*	228	*basis is ADB*
1 Vehicle	554	30%	*0.488*	*moderate correlation*	228	*basis is ADB*
Average Veh. / Household	1.10	-	*-0.458*	*moderate correlation*	-287	*basis is ADB*
MetroRail Passenger Work Trip Travel Mode to Train						
Drove Alone (5)	59	4%	*-0.431*	*moderate correlation*	-25	*Basis is HBW*
Carpool (3)	28	2%	*-0.363*	*moderate correlation*	-10	*Basis is HBW*
Metro Mover (6)	8	1%	*0.104*	*weak correlation*	1	*Basis is HBW*
Tri-Rail (7)	0	0%	*0.104*	*weak correlation*	0	*Basis is HBW*
Metro Bus (8)	149	10%	*0.104*	*weak correlation*	16	*Basis is HBW*
Bike (4)	39	3%	*-0.003*	*weak correlation*	0	*Basis is HBW*
Walk up to 3 Blocks (1)	138	9%	*0.512*	*strong correlation*	70	*Basis is HBW*
Walk More than 3 Blocks (2)	122	8%	*0.512*	*strong correlation*	62	*Basis is HBW*
Sum of LOS Correlation Terms x Average Annual Metrorail Boardings Basis						
	543				**455**	25.7%

Station passengers includes embarking and debarking riders, and include all trip purposes for household size and auto ownership variables. Mode to work includes only home-based-work trips in both directions. Transit-linked analysis captures both residential and employment for station areas.

Coconut Grove Station Area Car Sharing Demand Assessment

Station Area Geographic Market Assessment Value	*not included*	565
Station Area Residential Market Assessment Value	*included*	0
Station Transit User Market Assessment Value	*included*	455
Total of Residential and Transit Market		**455**

Coconut Grove Station Area Car Sharing Program Spaces and Dedicated EVSE

Method 1: PCC Bivariate Summations		
Total Car Sharing Market		455
Market Value to Vehicle Placement Factor (max. vehicles = 10; min. vehicles =4)		333.4
Recommended Car Sharing Vehicles at Station (all fuels)		4
Car Sharing Vehicles per Square Mile	6	Low LOS
Residents over 18 / Car Sharing Vehicle	1,312	
Employees per Car Sharing Vehicle	268	
Method 2: Two Variable LOS Forecast		
Residential:		
Average vehicles / Household		1.45
Commuters that Walk to Work		173
Number of Car Sharing Vehicles in Station Area		2.2
Transit Linked:		
Average vehicles / Household		1.10
Commuters that Walk to Metrorail for HBW Trip		92
Number of Transit Linked Car Sharing Vehicles in Station Area		4.3
Total Number of Vehicles		**6**
Car Sharing Vehicles per Square Mile	9	Low LOS
Residents over 18 / Car Sharing Vehicle	875	
Employees per Car Sharing Vehicle	179	
EVSE – PCC Bivariate Summations Method 1		
Car Sharing PEV or PHEV Vehicles		1
EVSE Dedicated to Car Sharing Program		1
Public EVSE at 1 to 1 Ratio with Dedicated EVSE		1
Total EVSE: Dedicated & Public		**2**
Parking Required		
Car Sharing Parking Spaces Without EVSE		3
Car Sharing Parking Spaces With Dedicated EVSE		1
Total of All Spaces to be Allocated for Car Sharing		**4**
MDT Station Parking Availability		
Station Park & Ride Facility Spaces		204
Annual Average Parking Utilization (October 2011 - September 2012)		47%
Maximum Monthly Parking Utilization (October 2011 - September 2012)		52%
Average Available Spaces		108
Minimum Available Spaces		97

Coconut Grove Station Area Potential EV Adopter Demograpics

	Area Residents		Area Employees		Transit Riders (HBW) that use a Car to/from Metrorail	
Housing Unit Types						
Total Housing Units	3,073		not applicable		not applicable	
Single Family Housing	1,799	59%	not applicable		not applicable	
Detached SFH	1,083	35%	not applicable		not applicable	
Attached SFH	716	23%	not applicable		not applicable	
Multifamily Housing	1,274	41%	not applicable		not applicable	
2 Units per Building	115	4%	not applicable		not applicable	
3 or more Units	1,159	38%	not applicable		not applicable	
Note to Housing Units: Most EV charging assumed to be done at home, with single family homes having the fewest administrative, legal, and permitting barriers. Single family attached homes and duplex units may or may not have the same conditions for EVSE installation as single family homes. Multi-family homes, particularly for buildings with 3 or more units have more barriers. Areas with high numbers of multi-family homes with 3 or more units may have greater need for public charging facilities in the near term.						
Income						
$30,000 - $39,999	658	24%				
$40,000 - $49,999			353	33%	15	40%
$50,000 - $59,999	585	21%				
$60,000 - $74,000					15	40%
$75,000 - $79,999	267	10%				
$80,000 - $99,999					2	6%
$100,000 and above	588	21%				
Area Residents in MUD and HH Income > $100k						
Educational Attainment						
High School (over 18)	4,344	83%	618	81%	data not available	
Bachelor or Higher (over 21 years old)	1,280	25%	211	20%	data not available	
Age (males & females)						
30 - 40	1,184	18%	582	54%	5	13%
40 - 50	1,000	16%			10	27%
50 - 55	1,113	17%			24	67%
55 - 60						
60 - 65					0	0%

Coconut Grove Station Area Employment

parameter	value
Residents that are Employed	3,763
Employees Working in Area	1,073

Douglas Road Station Area Geographic Qualifiers						dr
parameter	acre	miles	kilometers	Pearson Coefficient	Regression Term	0
Land Area	669	1.04	2.71	equivalent radius (mi)=		0.58
Population Density	10	6,617	2,555			
Residential Density	4.6	2,922	0	0.174	531	
Employment Density	3	2,084	805			
Transit Service (rail & bus lines)		9 transit lines				
Intersection Density	0.07	42	16	0.290	13	
Proximity to CBD (distance)	n.a.	5.3	8.5			

Douglas Road Station Area Residential Market Assessment						
parameter	value	percent	Pearson Coefficient	Correlation Comment	Regression Prediction Term	LOS Qualitative Measure
Basis						
Station Area Population	6,913	10%	*population percentage of US-1 Corridor station areas*			
Persons Over 18	5,581	81%	*percentage of station area population qualified to drive*			
LOS Regression Variables to Identify Station Area Resident Car Sharing Probability						
Household Composition						
Station Area Households	2,704	-	-	-	-	-
Average Household Size	2.56	-	-	-	-	-
1-Person Household	737	27%	*0.478*	*moderate correlation*	352	Below Threshold
Household with Children	1,846	68%	*-0.412*	*moderate correlation*	-761	-
Rental Households	1,386	51%	*0.301*	*moderate correlation*	417	-
Auto Ownership						
No Vehicle	303	11%	*0.399*	*moderate correlation*	121	Below Threshold
1 Vehicle	1,051	39%	*0.488*	*moderate correlation*	513	Low LOS
Average Vehicles / Household	1.48	-	*-0.458*	*moderate correlation*	-1,765	-
Transportation Mode to Work						
Employed Workforce	3,266	59%	-	-	-	-
Private Car	2,570	79%	-	-	-	-
Drive Alone	2,289	70%	*-0.431*	*moderate correlation*	-987	Low LOS
Car Pool	281	9%	*-0.363*	*moderate correlation*	-102	-
Transit	167	5%	*0.104*	*weak correlation*	17	-
Bike	0	0%	*-0.003*	*weak correlation*	0	-
Walk	132	4%	*0.512*	*strong correlation*	67	Below Threshold
Telecommute	365	11%		*correlation not available*	not used for this assessment	-
Sum of LOS Correlation Terms x Population Basis						
					0	0.0%

Douglas Road Station Metrorail Market Assessment						1080
parameter	value	percent	Pearson Coefficient	Correlation Comment	Regression Prediction Term	Note
Basis: Boardings Oct 2011 through Sep 2012						
Weekday Boardings	3,973	8%	*percent of Corridor total boardings for 12 stations*			
Saturday Boardings	1,826	9%	*percent of Corridor total boardings for 12 stations*			
Sunday Boardings	1,399	9%	*percent of Corridor total boardings for 12 stations*			
Holiday Boardings	1,970	9%	*percent of Corridor total boardings for 12 stations*			
Avg. Annual Daily Boardings	**3,194**	8%	*percent of Corridor total boardings for 12 stations*			
Home-Based Work Weekday	**1,389**	35%	*0.104*	*weak correlation*	144	
LOS Regression Variables to Identify Station Commuter Car Sharing Probability						
MetroRail Passenger Household Size				*Station sample size:*		*675*
Passengers Age 18 & Over	3,619	91%	*station passengers qualified to drive*			-
Passenger Households	1,056	-	-	-	-	-
Pass. Avg. Household Size	3.43	-	-	-	-	-
1-Person Household	407	10%	*0.478*	*moderate correlation*	157	*basis is ADB*
MetroRail Passenger Auto Ownership						
No Vehicle	1,265	32%	*0.399*	*moderate correlation*	406	*basis is ADB*
1 Vehicle	1,163	29%	*0.488*	*moderate correlation*	456	*basis is ADB*
Average Veh. / Household	1.21	-	*-0.458*	*moderate correlation*	-585	*basis is ADB*
MetroRail Passenger Work Trip Travel Mode to Train						
Drove Alone (5)	69	2%	*-0.431*	*moderate correlation*	-30	*Basis is HBW*
Carpool (3)	86	3%	*-0.363*	*moderate correlation*	-31	*Basis is HBW*
Metro Mover (6)	9	0%	*0.104*	*weak correlation*	1	*Basis is HBW*
Tri-Rail (7)	4	0%	*0.104*	*weak correlation*	0	*Basis is HBW*
Metro Bus (8)	513	16%	*0.104*	*weak correlation*	53	*Basis is HBW*
Bike (4)	22	1%	*-0.003*	*weak correlation*	0	*Basis is HBW*
Walk up to 3 Blocks (1)	224	7%	*0.512*	*strong correlation*	115	*Basis is HBW*
Walk More than 3 Blocks (2)	99	3%	*0.512*	*strong correlation*	51	*Basis is HBW*
Sum of LOS Correlation Terms x Average Annual Metrorail Boardings Basis						
	1,026				**738**	20.4%

Station passengers includes embarking and debarking riders, and include all trip purposes for household size and auto ownership variables. Mode to work includes only home-based-work trips in both directions. Transit-linked analysis captures both residential and employment for station areas.

Douglas Road Station Area Car Sharing Demand Assessment		
Station Area Geographic Market Assessment Value	*not included*	544
Station Area Residential Market Assessment Value	*included*	0
Station Transit User Market Assessment Value	*included*	738
Total of Residential and Transit Market		**738**

Douglas Road Station Area Car Sharing Program Spaces and Dedicated EVSE

Method 1: PCC Bivariate Summations		
Total Car Sharing Market		738
Market Value to Vehicle Placement Factor (max. vehicles = 10; min. vehicles =4)		333.4
Recommended Car Sharing Vehicles at Station (all fuels)		4
Car Sharing Vehicles per Square Mile	4	Low LOS
Residents over 18 / Car Sharing Vehicle	1,395	
Employees per Car Sharing Vehicle	544	
Method 2: Two Variable LOS Forecast		
Residential:		
Average vehicles / Household		1.48
Commuters that Walk to Work		132
Number of Car Sharing Vehicles in Station Area		1.9
Transit Linked:		
Average vehicles / Household		1.21
Commuters that Walk to Metrorail for HBW Trip		113
Number of Transit Linked Car Sharing Vehicles in Station Area		3.6
Total Number of Vehicles		**5**
Car Sharing Vehicles per Square Mile	5	Low LOS
Residents over 18 / Car Sharing Vehicle	1,116	
Employees per Car Sharing Vehicle	435	
EVSE – PCC Bivariate Summations Method 1		
Car Sharing PEV or PHEV Vehicles		1
EVSE Dedicated to Car Sharing Program		1
Public EVSE at 1 to 1 Ratio with Dedicated EVSE		1
Total EVSE: Dedicated & Public		**2**
Parking Required		
Car Sharing Parking Spaces Without EVSE		3
Car Sharing Parking Spaces With Dedicated EVSE		1
Total of All Spaces to be Allocated for Car Sharing		**4**
MDT Station Parking Availability		
Station Park & Ride Facility Spaces		226
Annual Average Parking Utilization (October 2011 - September 2012)		85%
Maximum Monthly Parking Utilization (October 2011 - September 2012)		94%
Average Available Spaces		35
Minimum Available Spaces		14

Douglas Road Station Area Potential EV Adopter Demograpics

	Area Residents		Area Employees		Transit Riders (HBW) that use a Car to/from Metrorail	
Housing Unit Types						
Total Housing Units	3,146		not applicable		not applicable	
Single Family Housing	2,456	78%	not applicable		not applicable	
Detached SFH	1,669	53%	not applicable		not applicable	
Attached SFH	787	25%	not applicable		not applicable	
Multifamily Housing	690	22%	not applicable		not applicable	
2 Units per Building	232	7%	not applicable		not applicable	
3 or more Units	458	15%	not applicable		not applicable	
Note to Housing Units: Most EV charging assumed to be done at home, with single family homes having the fewest administrative, legal, and permitting barriers. Single family attached homes and duplex units may or may not have the same conditions for EVSE installation as single family homes. Multi-family homes, particularly for buildings with 3 or more units have more barriers. Areas with high numbers of multi-family homes with 3 or more units may have greater need for public charging facilities in the near term.						
Income						
$30,000 - $39,999	464	17%				
$40,000 - $49,999			1,195	55%	6	9%
$50,000 - $59,999	494	18%				
$60,000 - $74,000					6	9%
$75,000 - $79,999	358	13%				
$80,000 - $99,999					2	3%
$100,000 and above	396	15%				
Area Residents in MUD and HH Income > $100k						
Educational Attainment						
High School (over 18)	4,008	72%	1,537	86%	data not available	
Bachelor or Higher (over 21 years old)	984	19%	602	28%	data not available	
Age (males & females)						
30 - 40	960	13%	1,399	64%	24	35%
40 - 50	985	13%			12	17%
50 - 55	1,151	16%			6	9%
55 - 60						
60 - 65					0	0%

Douglas Road Station Area Employment

parameter	value
Residents that are Employed	3,266
Employees Working in Area	2,177

University Station Area Geographic Qualifiers

un

parameter	acre	miles	kilometers	Pearson Coefficient	Regression Term	0
Land Area	130	0.20	0.53	equivalent radius (mi)=		0.25
Population Density	7	4,507	1,740			
Residential Density	3.3	2,104	0	0.174	75	
Employment Density	9	5,611	2,166			
Transit Service (rail & bus lines)		4 transit lines				
Intersection Density	0.23	147	57	0.290	9	
Proximity to CBD (distance)	n.a.	7.1	11.5			

University Station Area Residential Market Assessment

parameter	value	percent	Pearson Coefficient	Correlation Comment	Regression Prediction Term	LOS Qualitative Measure
Basis						
Station Area Population	919	1%	*population percentage of US-1 Corridor station areas*			
Persons Over 18	745	81%	*percentage of station area population qualified to drive*			
LOS Regression Variables to Identify Station Area Resident Car Sharing Probability						
Household Composition						
Station Area Households	394	-	-	-	-	-
Average Household Size	2.33	-	-	-	-	-
1-Person Household	144	37%	*0.478*	*moderate correlation*	69	Low LOS
Household with Children	227	58%	*-0.412*	*moderate correlation*	-94	-
Rental Households	123	31%	*0.301*	*moderate correlation*	37	-
Auto Ownership						
No Vehicle	70	18%	*0.399*	*moderate correlation*	28	Below Threshold
1 Vehicle	126	32%	*0.488*	*moderate correlation*	61	Low LOS
Average Vehicles / Household	1.34	-	*-0.458*	*moderate correlation*	-225	-
Transportation Mode to Work						
Employed Workforce	389	52%	-	-	-	-
Private Car	272	70%	-	-	-	-
Drive Alone	258	66%	*-0.431*	*moderate correlation*	-111	Low LOS
Car Pool	14	4%	*-0.363*	*moderate correlation*	-5	-
Transit	20	5%	*0.104*	*weak correlation*	2	-
Bike	0	0%	*-0.003*	*weak correlation*	0	-
Walk	97	25%	*0.512*	*strong correlation*	50	Below Threshold
Telecommute	0	0%		*correlation not available*	not used for this assessment	-
Sum of LOS Correlation Terms x Population Basis						
					0	0.0%

University Station Metrorail Market Assessment						1089
parameter	value	percent	Pearson Coefficient	Correlation Comment	Regression Prediction Term	Note
Basis: Boardings Oct 2011 through Sep 2012						
Weekday Boardings	1,977	4%	*percent of Corridor total boardings for 12 stations*			
Saturday Boardings	685	3%	*percent of Corridor total boardings for 12 stations*			
Sunday Boardings	503	3%	*percent of Corridor total boardings for 12 stations*			
Holiday Boardings	811	4%	*percent of Corridor total boardings for 12 stations*			
Avg. Annual Daily Boardings	**1,525**	4%	*percent of Corridor total boardings for 12 stations*			
Home-Based Work Weekday	**498**	25%	*0.104*	*weak correlation*	52	
LOS Regression Variables to Identify Station Commuter Car Sharing Probability						
MetroRail Passenger Household Size				*Station sample size:*		*431*
Passengers Age 18 & Over	1,805	91%	*station passengers qualified to drive*			-
Passenger Households	558	-	-	-	-	-
Pass. Avg. Household Size	3.24	-	-	-	-	-
1-Person Household	222	11%	*0.478*	*moderate correlation*	82	*basis is ADB*
MetroRail Passenger Auto Ownership						
No Vehicle	603	31%	*0.399*	*moderate correlation*	186	*basis is ADB*
1 Vehicle	448	23%	*0.488*	*moderate correlation*	169	*basis is ADB*
Average Veh. / Household	1.52	-	*-0.458*	*moderate correlation*	-389	*basis is ADB*
MetroRail Passenger Work Trip Travel Mode to Train						
Drove Alone (5)	39	3%	*-0.431*	*moderate correlation*	-17	*Basis is HBW*
Carpool (3)	48	3%	*-0.363*	*moderate correlation*	-18	*Basis is HBW*
Metro Mover (6)	3	0%	*0.104*	*weak correlation*	0	*Basis is HBW*
Tri-Rail (7)	3	0%	*0.104*	*weak correlation*	0	*Basis is HBW*
Metro Bus (8)	65	4%	*0.104*	*weak correlation*	7	*Basis is HBW*
Bike (4)	6	0%	*-0.003*	*weak correlation*	0	*Basis is HBW*
Walk up to 3 Blocks (1)	158	10%	*0.512*	*strong correlation*	81	*Basis is HBW*
Walk More than 3 Blocks (2)	39	3%	*0.512*	*strong correlation*	20	*Basis is HBW*
Sum of LOS Correlation Terms x Average Annual Metrorail Boardings Basis						
	362				**173**	9.6%

Station passengers includes embarking and debarking riders, and include all trip purposes for household size and auto ownership variables. Mode to work includes only home-based-work trips in both directions. Transit-linked analysis captures both residential and employment for station areas.

University Station Area Car Sharing Demand Assessment		
Station Area Geographic Market Assessment Value	*not included*	83
Station Area Residential Market Assessment Value	*included*	0
Station Transit User Market Assessment Value	*included*	173
Total of Residential and Transit Market		**173**

University Station Area Car Sharing Program Spaces and Dedicated EVSE

Method 1: PCC Bivariate Summations		
Total Car Sharing Market		173
Market Value to Vehicle Placement Factor (max. vehicles = 10; min. vehicles =4)		333.4
Recommended Car Sharing Vehicles at Station (all fuels)		4
Car Sharing Vehicles per Square Mile	20	Low LOS
Residents over 18 / Car Sharing Vehicle	186	
Employees per Car Sharing Vehicle	286	
Method 2: Two Variable LOS Forecast		
Residential:		
Average vehicles / Household		1.34
Commuters that Walk to Work		97
Number of Car Sharing Vehicles in Station Area		2.7
Transit Linked:		
Average vehicles / Household		1.52
Commuters that Walk to Metrorail for HBW Trip		50
Number of Transit Linked Car Sharing Vehicles in Station Area		1.4
Total Number of Vehicles		**4**
Car Sharing Vehicles per Square Mile	20	Low LOS
Residents over 18 / Car Sharing Vehicle	186	
Employees per Car Sharing Vehicle	286	
EVSE – PCC Bivariate Summations Method 1		
Car Sharing PEV or PHEV Vehicles		1
EVSE Dedicated to Car Sharing Program		1
Public EVSE at 1 to 1 Ratio with Dedicated EVSE		1
Total EVSE: Dedicated & Public		**2**
Parking Required		
Car Sharing Parking Spaces Without EVSE		3
Car Sharing Parking Spaces With Dedicated EVSE		1
Total of All Spaces to be Allocated for Car Sharing		**4**
MDT Station Parking Availability		
Station Park & Ride Facility Spaces		401
Annual Average Parking Utilization (October 2011 - September 2012)		46%
Maximum Monthly Parking Utilization (October 2011 - September 2012)		52%
Average Available Spaces		217
Minimum Available Spaces		191

University Station Area Potential EV Adopter Demograpics

	Area Residents		Area Employees		Transit Riders (HBW) that use a Car to/from Metrorail	
Housing Unit Types						
Total Housing Units	410		not applicable		not applicable	
Single Family Housing	167	41%	not applicable		not applicable	
Detached SFH	143	35%	not applicable		not applicable	
Attached SFH	24	6%	not applicable		not applicable	
Multifamily Housing	243	59%	not applicable		not applicable	
2 Units per Building	34	8%	not applicable		not applicable	
3 or more Units	209	51%	not applicable		not applicable	
Note to Housing Units: Most EV charging assumed to be done at home, with single family homes having the fewest administrative, legal, and permitting barriers. Single family attached homes and duplex units may or may not have the same conditions for EVSE installation as single family homes. Multi-family homes, particularly for buildings with 3 or more units have more barriers. Areas with high numbers of multi-family homes with 3 or more units may have greater need for public charging facilities in the near term.						
Income						
$30,000 - $39,999	76	19%				
$40,000 - $49,999			329	29%	9	32%
$50,000 - $59,999	27	7%				
$60,000 - $74,000					9	32%
$75,000 - $79,999	0	0%				
$80,000 - $99,999					3	11%
$100,000 and above	178	45%				
Area Residents in MUD and HH Income > $100k						
Educational Attainment						
High School (over 18)	531	71%	623	85%	data not available	
Bachelor or Higher (over 21 years old)	217	32%	205	18%	data not available	
Age (males & females)						
30 - 40	113	11%	542	47%	9	32%
40 - 50	134	14%			9	32%
50 - 55	170	17%			14	48%
55 - 60						
60 - 65					0	0%

University Station Area Employment

parameter	value
Residents that are Employed	389
Employees Working in Area	1,144

South Miami Station Area Geographic Qualifiers						sm
parameter	acre	miles	kilometers	Pearson Coefficient	Regression Term	0
Land Area	323	0.51	1.31	equivalent radius (mi)=		0.40
Population Density	11	7,314	2,824			
Residential Density	6.1	3,922	0	0.174	345	
Employment Density	12	7,870	3,039			
Transit Service (rail & bus lines)		5 transit lines				
Intersection Density	0.16	103	40	0.290	15	
Proximity to CBD (distance)	n.a.	8.1	13.1			

South Miami Station Area Residential Market Assessment						
parameter	value	percent	Pearson Coefficient	Correlation Comment	Regression Prediction Term	LOS Qualitative Measure
Basis						
Station Area Population	3,696	5%	*population percentage of US-1 Corridor station areas*			
Persons Over 18	3,072	83%	*percentage of station area population qualified to drive*			
LOS Regression Variables to Identify Station Area Resident Car Sharing Probability						
Household Composition						
Station Area Households	1,727	-	-	-	-	-
Average Household Size	2.14	-	-	-	-	-
1-Person Household	620	36%	*0.478*	*moderate correlation*	296	Low LOS
Household with Children	585	34%	*-0.412*	*moderate correlation*	-241	-
Rental Households	1,011	59%	*0.301*	*moderate correlation*	304	-
Auto Ownership						
No Vehicle	296	17%	*0.399*	*moderate correlation*	118	Below Threshold
1 Vehicle	772	45%	*0.488*	*moderate correlation*	377	Low LOS
Average Vehicles / Household	1.29	-	*-0.458*	*moderate correlation*	-781	-
Transportation Mode to Work						
Employed Workforce	1,652	54%	-	-	-	-
Private Car	1,311	79%	-	-	-	-
Drive Alone	1,256	76%	*-0.431*	*moderate correlation*	-541	Low LOS
Car Pool	55	3%	*-0.363*	*moderate correlation*	-20	-
Transit	187	11%	*0.104*	*weak correlation*	19	-
Bike	120	7%	*-0.003*	*weak correlation*	0	-
Walk	26	2%	*0.512*	*strong correlation*	13	Below Threshold
Telecommute	9	1%		*correlation not available*	not used for this assessment	-
Sum of LOS Correlation Terms x Population Basis						
					0	0.0%

South Miami Station Metrorail Market Assessment

1101

parameter	value	percent	Pearson Coefficient	Correlation Comment	Regression Prediction Term	Note
Basis: Boardings Oct 2011 through Sep 2012						
Weekday Boardings	3,311	7%	*percent of Corridor total boardings for 12 stations*			
Saturday Boardings	1,721	8%	*percent of Corridor total boardings for 12 stations*			
Sunday Boardings	1,202	8%	*percent of Corridor total boardings for 12 stations*			
Holiday Boardings	1,646	7%	*percent of Corridor total boardings for 12 stations*			
Avg. Annual Daily Boardings	**2,700**	7%	*percent of Corridor total boardings for 12 stations*			
Home-Based Work Weekday	**1,223**	37%	*0.104*	*weak correlation*	127	
LOS Regression Variables to Identify Station Commuter Car Sharing Probability						
MetroRail Passenger Household Size				*Station sample size:*		*803*
Passengers Age 18 & Over	3,011	91%	*station passengers qualified to drive*			-
Passenger Households	847	-	-	-	-	-
Pass. Avg. Household Size	3.56	-	-	-	-	-
1-Person Household	281	8%	*0.478*	*moderate correlation*	110	*basis is ADB*
MetroRail Passenger Auto Ownership						
No Vehicle	788	24%	*0.399*	*moderate correlation*	256	*basis is ADB*
1 Vehicle	911	28%	*0.488*	*moderate correlation*	363	*basis is ADB*
Average Veh. / Household	1.53	-	*-0.458*	*moderate correlation*	-594	*basis is ADB*
MetroRail Passenger Work Trip Travel Mode to Train						
Drove Alone (5)	388	14%	*-0.431*	*moderate correlation*	-167	*Basis is HBW*
Carpool (3)	86	3%	*-0.363*	*moderate correlation*	-31	*Basis is HBW*
Metro Mover (6)	6	0%	*0.104*	*weak correlation*	1	*Basis is HBW*
Tri-Rail (7)	0	0%	*0.104*	*weak correlation*	0	*Basis is HBW*
Metro Bus (8)	83	3%	*0.104*	*weak correlation*	9	*Basis is HBW*
Bike (4)	6	0%	*-0.003*	*weak correlation*	0	*Basis is HBW*
Walk up to 3 Blocks (1)	284	11%	*0.512*	*strong correlation*	146	*Basis is HBW*
Walk More than 3 Blocks (2)	138	5%	*0.512*	*strong correlation*	70	*Basis is HBW*
Sum of LOS Correlation Terms x Average Annual Metrorail Boardings Basis						
	991				**288**	9.6%

Station passengers includes embarking and debarking riders, and include all trip purposes for household size and auto ownership variables. Mode to work includes only home-based-work trips in both directions. Transit-linked analysis captures both residential and employment for station areas.

South Miami Station Area Car Sharing Demand Assessment

Station Area Geographic Market Assessment Value	*not included*	360
Station Area Residential Market Assessment Value	*included*	0
Station Transit User Market Assessment Value	*included*	288
Total of Residential and Transit Market		**288**

South Miami Station Area Car Sharing Program Spaces and Dedicated EVSE

Method 1: PCC Bivariate Summations		
Total Car Sharing Market		288
Market Value to Vehicle Placement Factor (max. vehicles = 10; min. vehicles =4)		333.4
Recommended Car Sharing Vehicles at Station (all fuels)		4
Car Sharing Vehicles per Square Mile	8	Low LOS
Residents over 18 / Car Sharing Vehicle	768	
Employees per Car Sharing Vehicle	994	
Method 2: Two Variable LOS Forecast		
Residential:		
Average vehicles / Household		1.29
Commuters that Walk to Work		26
Number of Car Sharing Vehicles in Station Area		2.9
Transit Linked:		
Average vehicles / Household		1.53
Commuters that Walk to Metrorail for HBW Trip		156
Number of Transit Linked Car Sharing Vehicles in Station Area		1.6
Total Number of Vehicles		**4**
Car Sharing Vehicles per Square Mile	8	Low LOS
Residents over 18 / Car Sharing Vehicle	768	
Employees per Car Sharing Vehicle	994	
EVSE – PCC Bivariate Summations Method 1		
Car Sharing PEV or PHEV Vehicles		1
EVSE Dedicated to Car Sharing Program		1
Public EVSE at 1 to 1 Ratio with Dedicated EVSE		1
Total EVSE: Dedicated & Public		**2**
Parking Required		
Car Sharing Parking Spaces Without EVSE		3
Car Sharing Parking Spaces With Dedicated EVSE		1
Total of All Spaces to be Allocated for Car Sharing		**4**
MDT Station Parking Availability		
Station Park & Ride Facility Spaces		1,774
Annual Average Parking Utilization (October 2011 - September 2012)		43%
Maximum Monthly Parking Utilization (October 2011 - September 2012)		50%
Average Available Spaces		1,010
Minimum Available Spaces		881

South Miami Station Area Potential EV Adopter Demograpics

	Area Residents		Area Employees		Transit Riders (HBW) that use a Car to/from Metrorail	
Housing Unit Types						
Total Housing Units	1,656		not applicable		not applicable	
Single Family Housing	511	31%	not applicable		not applicable	
Detached SFH	437	26%	not applicable		not applicable	
Attached SFH	74	4%	not applicable		not applicable	
Multifamily Housing	1,145	69%	not applicable		not applicable	
2 Units per Building	12	1%	not applicable		not applicable	
3 or more Units	1,133	68%	not applicable		not applicable	
Note to Housing Units: Most EV charging assumed to be done at home, with single family homes having the fewest administrative, legal, and permitting barriers. Single family attached homes and duplex units may or may not have the same conditions for EVSE installation as single family homes. Multi-family homes, particularly for buildings with 3 or more units have more barriers. Areas with high numbers of multi-family homes with 3 or more units may have greater need for public charging facilities in the near term.						
Income						
$30,000 - $39,999	336	19%				
$40,000 - $49,999			698	18%	45	21%
$50,000 - $59,999	177	10%				
$60,000 - $74,000					45	21%
$75,000 - $79,999	246	14%				
$80,000 - $99,999					18	8%
$100,000 and above	183	11%				
Area Residents in MUD and HH Income > $100k						
Educational Attainment						
High School (over 18)	1,502	49%	1,975	80%	data not available	
Bachelor or Higher (over 21 years old)	463	19%	551	14%	data not available	
Age (males & females)						
30 - 40	474	11%	1,929	49%	58	27%
40 - 50	381	9%			70	33%
50 - 55	430	10%			82	38%
55 - 60						
60 - 65					37	17%

South Miami Station Area Employment

parameter	value
Residents that are Employed	1,652
Employees Working in Area	3,977

Dadeland North Station Area Geographic Qualifiers						dn
parameter	acre	miles	kilometers	Pearson Coefficient	Regression Term	0
Land Area	259	0.40	1.05	equivalent radius (mi)=		0.36
Population Density	14	8,878	3,428			
Residential Density	7.5	4,770	0	0.174	336	
Employment Density	6	3,673	1,418			
Transit Service (rail & bus lines)		9 transit lines				
Intersection Density	0.07	47	18	0.290	6	
Proximity to CBD (distance)	n.a.	9.6	15.4			

Dadeland North Station Area Residential Market Assessment						
parameter	value	percent	Pearson Coefficient	Correlation Comment	Regression Prediction Term	LOS Qualitative Measure
Basis						
Station Area Population	3,592	5%	*population percentage of US-1 Corridor station areas*			
Persons Over 18	2,995	83%	*percentage of station area population qualified to drive*			
LOS Regression Variables to Identify Station Area Resident Car Sharing Probability						
Household Composition						
Station Area Households	1,697	-	-	-	-	-
Average Household Size	2.12	-	-	-	-	-
1-Person Household	456	27%	*0.478*	*moderate correlation*	218	Below Threshold
Household with Children	841	50%	*-0.412*	*moderate correlation*	-346	-
Rental Households	1,236	73%	*0.301*	*moderate correlation*	372	-
Auto Ownership						
No Vehicle	257	15%	*0.399*	*moderate correlation*	102	Below Threshold
1 Vehicle	826	49%	*0.488*	*moderate correlation*	403	Low LOS
Average Vehicles / Household	1.25	-	*-0.458*	*moderate correlation*	-782	-
Transportation Mode to Work						
Employed Workforce	1,946	65%	-	-	-	-
Private Car	1,329	68%	-	-	-	-
Drive Alone	1,239	64%	*-0.431*	*moderate correlation*	-534	Low LOS
Car Pool	90	5%	*-0.363*	*moderate correlation*	-33	-
Transit	326	17%	*0.104*	*weak correlation*	34	-
Bike	0	0%	*-0.003*	*weak correlation*	0	-
Walk	184	9%	*0.512*	*strong correlation*	94	Below Threshold
Telecommute	36	2%		*correlation not available*	not used for this assessment	-
Sum of LOS Correlation Terms x Population Basis						
					0	0.0%

Dadeland North Station Metrorail Market Assessment						1105
parameter	value	percent	Pearson Coefficient	Correlation Comment	Regression Prediction Term	Note
Basis: Boardings Oct 2011 through Sep 2012						
Weekday Boardings	6,284	13%	*percent of Corridor total boardings for 12 stations*			
Saturday Boardings	2,567	12%	*percent of Corridor total boardings for 12 stations*			
Sunday Boardings	1,893	12%	*percent of Corridor total boardings for 12 stations*			
Holiday Boardings	2,763	12%	*percent of Corridor total boardings for 12 stations*			
Avg. Annual Daily Boardings	**4,961**	13%	*percent of Corridor total boardings for 12 stations*			
Home-Based Work Weekday	**2,266**	36%	*0.104*	*weak correlation*	236	
LOS Regression Variables to Identify Station Commuter Car Sharing Probability						
MetroRail Passenger Household Size				*Station sample size:*		*1531*
Passengers Age 18 & Over	5,841	93%	*station passengers qualified to drive*			-
Passenger Households	1,694	-	-	-	-	-
Pass. Avg. Household Size	3.45	-	-	-	-	-
1-Person Household	450	7%	*0.478*	*moderate correlation*	170	*basis is ADB*
MetroRail Passenger Auto Ownership						
No Vehicle	1,251	20%	*0.399*	*moderate correlation*	394	*basis is ADB*
1 Vehicle	1,564	25%	*0.488*	*moderate correlation*	603	*basis is ADB*
Average Veh. / Household	1.72	-	*-0.458*	*moderate correlation*	-1,333	*basis is ADB*
MetroRail Passenger Work Trip Travel Mode to Train						
Drove Alone (5)	720	15%	*-0.431*	*moderate correlation*	-310	*Basis is HBW*
Carpool (3)	139	3%	*-0.363*	*moderate correlation*	-50	*Basis is HBW*
Metro Mover (6)	15	0%	*0.104*	*weak correlation*	2	*Basis is HBW*
Tri-Rail (7)	3	0%	*0.104*	*weak correlation*	0	*Basis is HBW*
Metro Bus (8)	527	11%	*0.104*	*weak correlation*	55	*Basis is HBW*
Bike (4)	9	0%	*-0.003*	*weak correlation*	0	*Basis is HBW*
Walk up to 3 Blocks (1)	283	6%	*0.512*	*strong correlation*	145	*Basis is HBW*
Walk More than 3 Blocks (2)	66	1%	*0.512*	*strong correlation*	34	*Basis is HBW*
Sum of LOS Correlation Terms x Average Annual Metrorail Boardings Basis						
	1,762				**0**	0.0%

Station passengers includes embarking and debarking riders, and include all trip purposes for household size and auto ownership variables. Mode to work includes only home-based-work trips in both directions. Transit-linked analysis captures both residential and employment for station areas.

Dadeland North Station Area Car Sharing Demand Assessment		
Station Area Geographic Market Assessment Value	*not included*	341
Station Area Residential Market Assessment Value	*included*	0
Station Transit User Market Assessment Value	*included*	0
Total of Residential and Transit Market		**0**

Dadeland North Station Area Car Sharing Program Spaces and Dedicated EVSE

Method 1: PCC Bivariate Summations		
Total Car Sharing Market		0
Market Value to Vehicle Placement Factor (max. vehicles = 10; min. vehicles =4)		333.4
Recommended Car Sharing Vehicles at Station (all fuels)		0
Car Sharing Vehicles per Square Mile	0	Low LOS
Residents over 18 / Car Sharing Vehicle	#DIV/0!	
Employees per Car Sharing Vehicle	#DIV/0!	
Method 2: Two Variable LOS Forecast		
Residential:		
Average vehicles / Household		1.25
Commuters that Walk to Work		184
Number of Car Sharing Vehicles in Station Area		3.5
Transit Linked:		
Average vehicles / Household		1.72
Commuters that Walk to Metrorail for HBW Trip		126
Number of Transit Linked Car Sharing Vehicles in Station Area		0.3
Total Number of Vehicles		**4**
Car Sharing Vehicles per Square Mile	10	Low LOS
Residents over 18 / Car Sharing Vehicle	749	
Employees per Car Sharing Vehicle	372	
EVSE – PCC Bivariate Summations Method 1		
Car Sharing PEV or PHEV Vehicles		0
EVSE Dedicated to Car Sharing Program		0
Public EVSE at 1 to 1 Ratio with Dedicated EVSE		0
Total EVSE: Dedicated & Public		**0**
Parking Required		
Car Sharing Parking Spaces Without EVSE		0
Car Sharing Parking Spaces With Dedicated EVSE		0
Total of All Spaces to be Allocated for Car Sharing		**0**
MDT Station Parking Availability		
Station Park & Ride Facility Spaces		1,974
Annual Average Parking Utilization (October 2011 - September 2012)		84%
Maximum Monthly Parking Utilization (October 2011 - September 2012)		90%
Average Available Spaces		315
Minimum Available Spaces		200

Dadeland North Station Area Potential EV Adopter Demograpics

	Area Residents		Area Employees		Transit Riders (HBW) that use a Car to/from Metrorail	
Housing Unit Types						
Total Housing Units	1,886		not applicable		not applicable	
Single Family Housing	105	6%	not applicable		not applicable	
Detached SFH	105	6%	not applicable		not applicable	
Attached SFH	0	0%	not applicable		not applicable	
Multifamily Housing	1,781	94%	not applicable		not applicable	
2 Units per Building	0	0%	not applicable		not applicable	
3 or more Units	1,781	94%	not applicable		not applicable	
Note to Housing Units: Most EV charging assumed to be done at home, with single family homes having the fewest administrative, legal, and permitting barriers. Single family attached homes and duplex units may or may not have the same conditions for EVSE installation as single family homes. Multi-family homes, particularly for buildings with 3 or more units have more barriers. Areas with high numbers of multi-family homes with 3 or more units may have greater need for public charging facilities in the near term.						
Income						
$30,000 - $39,999	383	23%				
$40,000 - $49,999			230	15%	90	23%
$50,000 - $59,999	271	16%				
$60,000 - $74,000					90	23%
$75,000 - $79,999	166	10%				
$80,000 - $99,999					32	8%
$100,000 and above	267	16%				
Area Residents in MUD and HH Income > $100k						
Educational Attainment						
High School (over 18)	1,849	62%	680	74%	data not available	
Bachelor or Higher (over 21 years old)	490	18%	188	13%	data not available	
Age (males & females)						
30 - 40	627	16%	716	48%	140	36%
40 - 50	499	13%			103	26%
50 - 55	615	16%			90	23%
55 - 60						
60 - 65					21	5%

Dadeland North Station Area Employment

parameter	value
Residents that are Employed	1,946
Employees Working in Area	1,486

Dadeland South Station Area Geographic Qualifiers						ds
parameter	acre	miles	kilometers	Pearson Coefficient	Regression Term	0
Land Area	786	1.23	3.18	equivalent radius (mi)=		0.63
Population Density	9	5,800	2,239			
Residential Density	5.3	3,365	0	0.174	719	
Employment Density	10	6,490	2,506			
Transit Service (rail & bus lines)		10 transit lines				
Intersection Density	0.06	37	14	0.290	13	
Proximity to CBD (distance)	n.a.	10.2	16.4			

Dadeland South Station Area Residential Market Assessment						
parameter	value	percent	Pearson Coefficient	Correlation Comment	Regression Prediction Term	LOS Qualitative Measure
Basis						
Station Area Population	7,125	10%	*population percentage of US-1 Corridor station areas*			
Persons Over 18	5,907	83%	*percentage of station area population qualified to drive*			
LOS Regression Variables to Identify Station Area Resident Car Sharing Probability						
Household Composition						
Station Area Households	3,385	-	-	-	-	-
Average Household Size	2.10	-	-	-	-	-
1-Person Household	991	29%	*0.478*	*moderate correlation*	474	Below Threshold
Household with Children	1,065	31%	*-0.412*	*moderate correlation*	-439	-
Rental Households	1,720	51%	*0.301*	*moderate correlation*	518	-
Auto Ownership						
No Vehicle	206	6%	*0.399*	*moderate correlation*	82	Below Threshold
1 Vehicle	1,646	49%	*0.488*	*moderate correlation*	803	Low LOS
Average Vehicles / Household	1.49	-	*-0.458*	*moderate correlation*	-1,814	-
Transportation Mode to Work						
Employed Workforce	3,586	61%	-	-	-	-
Private Car	2,954	82%	-	-	-	-
Drive Alone	2,720	76%	*-0.431*	*moderate correlation*	-1,172	Low LOS
Car Pool	233	7%	*-0.363*	*moderate correlation*	-85	-
Transit	320	9%	*0.104*	*weak correlation*	33	-
Bike	0	0%	*-0.003*	*weak correlation*	0	-
Walk	159	4%	*0.512*	*strong correlation*	81	Below Threshold
Telecommute	141	4%		*correlation not available*	not used for this assessment	-
Sum of LOS Correlation Terms x Population Basis						
					0	0.0%

Dadeland South Station Metrorail Market Assessment						1153
parameter	value	percent	Pearson Coefficient	Correlation Comment	Regression Prediction Term	Note
Basis: Boardings Oct 2011 through Sep 2012						
Weekday Boardings	6,934	14%	*percent of Corridor total boardings for 12 stations*			
Saturday Boardings	3,122	15%	*percent of Corridor total boardings for 12 stations*			
Sunday Boardings	2,407	15%	*percent of Corridor total boardings for 12 stations*			
Holiday Boardings	3,192	14%	*percent of Corridor total boardings for 12 stations*			
Avg. Annual Daily Boardings	**5,554**	14%	*percent of Corridor total boardings for 12 stations*			
Home-Based Work Weekday	**2,518**	36%	*0.104*	*weak correlation*	262	
LOS Regression Variables to Identify Station Commuter Car Sharing Probability						
MetroRail Passenger Household Size				*Station sample size:*		*1636*
Passengers Age 18 & Over	6,550	94%	*station passengers qualified to drive*			-
Passenger Households	1,859	-	-	-	-	-
Pass. Avg. Household Size	3.52	-	-	-	-	-
1-Person Household	605	9%	*0.478*	*moderate correlation*	231	*basis is ADB*
MetroRail Passenger Auto Ownership						
No Vehicle	1,601	23%	*0.399*	*moderate correlation*	512	*basis is ADB*
1 Vehicle	1,926	28%	*0.488*	*moderate correlation*	753	*basis is ADB*
Average Veh. / Household	1.55	-	*-0.458*	*moderate correlation*	-1,317	*basis is ADB*
MetroRail Passenger Work Trip Travel Mode to Train						
Drove Alone (5)	609	11%	*-0.431*	*moderate correlation*	-263	*Basis is HBW*
Carpool (3)	176	3%	*-0.363*	*moderate correlation*	-64	*Basis is HBW*
Metro Mover (6)	16	0%	*0.104*	*weak correlation*	2	*Basis is HBW*
Tri-Rail (7)	0	0%	*0.104*	*weak correlation*	0	*Basis is HBW*
Metro Bus (8)	731	13%	*0.104*	*weak correlation*	76	*Basis is HBW*
Bike (4)	13	0%	*-0.003*	*weak correlation*	0	*Basis is HBW*
Walk up to 3 Blocks (1)	266	5%	*0.512*	*strong correlation*	136	*Basis is HBW*
Walk More than 3 Blocks (2)	148	3%	*0.512*	*strong correlation*	76	*Basis is HBW*
Sum of LOS Correlation Terms x Average Annual Metrorail Boardings Basis						
	1,959				**404**	6.2%

Station passengers includes embarking and debarking riders, and include all trip purposes for household size and auto ownership variables. Mode to work includes only home-based-work trips in both directions. Transit-linked analysis captures both residential and employment for station areas.

Dadeland South Station Area Car Sharing Demand Assessment		
Station Area Geographic Market Assessment Value	*not included*	732
Station Area Residential Market Assessment Value	*included*	0
Station Transit User Market Assessment Value	*included*	404
Total of Residential and Transit Market		**404**

Dadeland South Station Area Car Sharing Program Spaces and Dedicated EVSE

Method 1: PCC Bivariate Summations		
Total Car Sharing Market		404
Market Value to Vehicle Placement Factor (max. vehicles = 10; min. vehicles =4)		333.4
Recommended Car Sharing Vehicles at Station (all fuels)		4
Car Sharing Vehicles per Square Mile	3	Low LOS
Residents over 18 / Car Sharing Vehicle	1,477	
Employees per Car Sharing Vehicle	1,993	
Method 2: Two Variable LOS Forecast		
Residential:		
Average vehicles / Household		1.49
Commuters that Walk to Work		159
Number of Car Sharing Vehicles in Station Area		1.9
Transit Linked:		
Average vehicles / Household		1.55
Commuters that Walk to Metrorail for HBW Trip		150
Number of Transit Linked Car Sharing Vehicles in Station Area		1.5
Total Number of Vehicles		**3**
Car Sharing Vehicles per Square Mile	2	Low LOS
Residents over 18 / Car Sharing Vehicle	1,969	
Employees per Car Sharing Vehicle	2,658	
EVSE – PCC Bivariate Summations Method 1		
Car Sharing PEV or PHEV Vehicles		1
EVSE Dedicated to Car Sharing Program		1
Public EVSE at 1 to 1 Ratio with Dedicated EVSE		1
Total EVSE: Dedicated & Public		**2**
Parking Required		
Car Sharing Parking Spaces Without EVSE		3
Car Sharing Parking Spaces With Dedicated EVSE		1
Total of All Spaces to be Allocated for Car Sharing		**4**
MDT Station Parking Availability		
Station Park & Ride Facility Spaces		1,356
Annual Average Parking Utilization (October 2011 - September 2012)		80%
Maximum Monthly Parking Utilization (October 2011 - September 2012)		91%
Average Available Spaces		266
Minimum Available Spaces		121

Dadeland South Station Area Potential EV Adopter Demograpics

	Area Residents		Area Employees		Transit Riders (HBW) that use a Car to/from Metrorail	
Housing Unit Types						
Total Housing Units	3,707		not applicable		not applicable	
Single Family Housing	579	16%	not applicable		not applicable	
Detached SFH	482	13%	not applicable		not applicable	
Attached SFH	97	3%	not applicable		not applicable	
Multifamily Housing	3,128	84%	not applicable		not applicable	
2 Units per Building	27	1%	not applicable		not applicable	
3 or more Units	3,101	84%	not applicable		not applicable	
Note to Housing Units: Most EV charging assumed to be done at home, with single family homes having the fewest administrative, legal, and permitting barriers. Single family attached homes and duplex units may or may not have the same conditions for EVSE installation as single family homes. Multi-family homes, particularly for buildings with 3 or more units have more barriers. Areas with high numbers of multi-family homes with 3 or more units may have greater need for public charging facilities in the near term.						
Income						
$30,000 - $39,999	782	23%				
$40,000 - $49,999			3,342	42%	68	19%
$50,000 - $59,999	622	18%				
$60,000 - $74,000					68	19%
$75,000 - $79,999	391	12%				
$80,000 - $99,999					18	5%
$100,000 and above	667	20%				
Area Residents in MUD and HH Income > $100k						
Educational Attainment						
High School (over 18)	3,773	64%	4,913	86%	data not available	
Bachelor or Higher (over 21 years old)	1,186	21%	1,908	24%	data not available	
Age (males & females)						
30 - 40	1,151	15%	4,483	56%	89	25%
40 - 50	1,120	15%			89	25%
50 - 55	1,288	17%			72	20%
55 - 60						
60 - 65					4	1%

Dadeland South Station Area Employment

parameter	value
Residents that are Employed	3,586
Employees Working in Area	7,973

Appendix II-4.C
Public Access EVSE Methodology & Estimation

Appendix II-4.C
Public Access EVSE Methodology & Estimation
Metrorail US-1 Corridor Stations

The methodology described below uses existing available data to identify geographic, demographic, auto ownership, geographic, and travel data characteristics for the station area residents and mass Metrorail commuters usage along the US-1 Corridor that would support residential and transit-linked car sharing programs and the installation of both dedicated EVSE for the car sharing program and additional EVSE for public access along the US-1 Corridor Metrorail stations. The process consists of 8 steps.

1. Car Sharing Market Analysis
2. Car Sharing Vehicles Estimate
3. Exiting Car Sharing Programs Identification
4. Car Sharing PEV Split
5. Car Sharing EVSE
6. Public Access EVSE Estimation
7. Existing EVSE Identification
8. Net Total EVSE Required

This appendix documents in greater detail, the components and assumptions of Step 6.

Public Access EVSE Estimation:

The co-location of highly visible public EVSE along with EVSE that are dedicated to car sharing programs provides infrastructure at long-term parking locations for transit linked trips. At stations that are co-located at employment centers, the public EVSE may also provide daytime charging capacity for employees. At station areas with a high proportion of multi-family dwellings, public EVSE at the stations may also be useful to PEV early adopters that do not have access to an EVSE in their condominium or apartment. In each instance, co-located public EVSE reduce barriers to PEV adoption.

The estimate for the number of public access EVSE is based on an empirical methodology that applies decision model logic to factors that indicate early adopters for PEV ownership and concepts of locating EVSE at destination locations with relatively long term parking duration, such as employment centers, regional draw shopping and entertainments centers, and cultural centers. Factors include:

- the location of a major non-employment destination within walking distance of the station or EVSE;
- employment density within the station area;
- the proportion of households multi-unit dwellings combined with the proportion of households with annual incomes over $100,000;
- and the number of Metrorail riders at each station that use a car to access Metrorail for a home-based-work commute trip and have household incomes over $80,000.

The decision model logic includes the following:

- Public day use EVSE estimate is based on existence of major destinations and transit commuters on home-based work trips
- Major work destinations are indicated by employment within station area
- Major non-work destinations noted but there is no specific numeric usage data
- Destination day use EVSE estimate is based on rule: if station area employment is 4,000 or more, or if there is a major non-work destination, then EVSE = 4, implying a PEV market penetration of 0.1% for major employment centers. Four EVSE are used as a minimum number for a location to balance: economies of scale regarding conduit, supply infrastructure, and other improvements necessary for the EVSE installation; and avoiding too many EVSE that would reduce general parking supply at a location.

- EVSE estimate for transit commuters is based on survey data and identification of transit station users that use a car to or from Metrorail for a home-based work trip, and have a household income greater than $80,000. ($80k used instead of $100k because of survey categories). This is a very deep cross tabulation, so the results are very small. Where results reach approximately 20, 1 EVSE is estimated for each 10 of these potential users.
- The public day use EVSE estimate is the sum of the destination-based and transit-based estimates.
- Public night use EVSE estimates are based on the presences of significant numbers of multi-unit dwellings and of household incomes over $100,000. The rule used is that: if the proportion of multi-family dwelling households is 40% or greater, and the proportion of households with annual incomes of $100,000 or more is 20% or greater, then 4 public access EVSE are estimated for potential night use.
- The total intermediate EVSE estimate is the maximum of day use, or night use, with a minimum no lower than the number of dedicated EVSE for the Car Sharing Program, and a maximum no higher than 4.
- It is desirable to provide an even number of spaces so that in the predominantly 90-degree parking facilities, more cost effective siamesed devices can be used to serve two spaces.; however, the consideration for estimating EVSE installations must also consider sensitivity to installing too many EVSE, and having public parking un-necessarily reserved for EVSE space that could be underutilized (empty). With this in mind, odd totals of EVSE (dedicated and public) occur, and it should be noted that infrastructure and location of the spaces should allow for expansion as future EVSE utilization warrants.

The results are shown in the Table 1.

Appendix II-4.C

Table 1
Public Access EVSE Estimation

Station	Public Day Use EVSE						Public Night Use EVSE								
	Major Non-Work Destination	Employment	Destination Day Use EVSE*	Weekday Transit Riders that Drive to MR Station for HBW Trip and Income >$100k	Transit Day Use EVSE	Total Day Use Public EVSE	Multi-Unit Dwellings			HH Income > $100k		EVSE Night Use (complementary to day use)	Car Sharing Dedicated EVSE	Total Public EVSE (greater of day night and 1 added to make total even num)	Total EVSE: Public and Car Sharing
Civic Center	yes	4,782	4	1	0	4	2,195	2,362	93%	46	2%	0	1	4	5
Culmer	no	58	0	0	0	0	1,528	1,988	77%	160	10%	0	1	1	2
Overtown	no	3,938	0	0	0	0	2,860	2,942	97%	183	8%	0	1	1	2
Government Center	yes	35,255	4	2	0	4	3,085	3,132	98%	295	8%	0	2	4	6
Brickell	yes	5,001	4	0	0	4	7,754	7,879	98%	1,922	23%	4	1	4	5
Vizcaya	no	485	0	0	0	0	1,124	3,010	37%	664	27%	0	1	1	2
Coconut Grove	no	1,073	0	2	0	0	1,274	3,073	41%	588	21%	4	1	4	5
Douglas Road	yes	2,177	4	2	0	4	690	3,146	22%	396	15%	0	1	4	5
University	no	1,144	0	3	0	0	243	410	59%	178	45%	4	1	4	5
South Miami	yes	3,977	4	18	2	6	1,145	1,656	69%	183	11%	0	1	4	5
Dadeland North	no	1,486	0	32	4	4	1,781	1,886	94%	267	11%	0	0	4	4
Dadeland South	yes	7,973	4	18	2	6	3,128	3,707	84%	667	20%	4	1	4	5
Corridor Totals	0	67,349	24	78	8	32	26,807	35,191	76%	5,549	Err:502	16	12	39	51