



**SOUTH FLORIDA EAST COAST (FEC)
ALTERNATIVES ANALYSIS**

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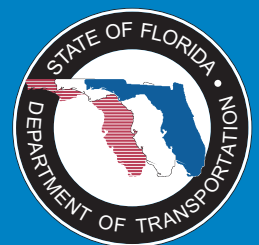
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***Phase 2 Environmental Sustainability
Technical Memorandum***

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To: Scott Seeburger
From: Rob McMullen
Date: July 23, 2010
Subject: South Florida East Coast Corridor Transit Analysis (SFECCTA) Study:
Environmental Sustainability Technical Memorandum

INTRODUCTION

Purpose

The purpose of this technical memorandum is to present the results of a geographic information system (GIS) based Environmental Sustainability Screening Model (ESSM) that provides an environmental sustainability value of transit stations and operations and maintenance (O&M) facilities. Environmental sustainability, as it relates to the SFECCTA study and the ESSM, is defined as: the ability of a site to improve air quality, reduce greenhouse gas (GHG) emissions, facilitate compact development, conserve land, decrease travel demand, save energy, and minimize environmental impacts. The results of the ESSM provide a numerical score for each potential transit station area and each potential O&M facility site. The score is based on the ability of the site to meet specific criteria, much of which is taken from the United States Green Building Councils (USGBC) Leadership in Efficient Energy Design (LEED) New Construction (NC) program. This guidance is used to determine where best to build/develop a transit station or O&M facility when considering environmental sustainability. Of all the various alternative elements considered (i.e., modal technologies, waterway crossings, transitway-highway crossings) only proposed transit stations and potential O&M facilities were screened using the ESSM. This was due to the ESSM model which is designed to screen undeveloped areas with a fixed geographic location, and not areas that have existing transit infrastructure. Additional environmentally sustainable measures, external to the ESSM are also listed as guidance for reducing impacts for the proposed transit improvements.

Project Description

The Florida Department of Transportation (FDOT) initiated the multi-phased South Florida East Coast Corridor Transit Analysis (SFECCTA) study in December 2005 recognizing that the Florida East Coast (FEC) Railway was and is a unique transportation asset that should be evaluated and developed in the context of regional transportation issues, priorities and needs. The SFECCTA study is designed to evaluate the reintroduction of passenger service along a portion of the FEC Railway corridor from Miami to Jupiter. In its second phase, the SFECCTA study continued the Alternative Analysis (AA) – Early Scoping process that was initiated in Phase 1. A discussion of the Phase 1 AA may be found in the Phase 1 Conceptual Alternatives Analysis/Environmental Screening Report (AA/ESR) on the project website (<http://www.sfecstudy.com/>).

Figure 1: Project Location Map

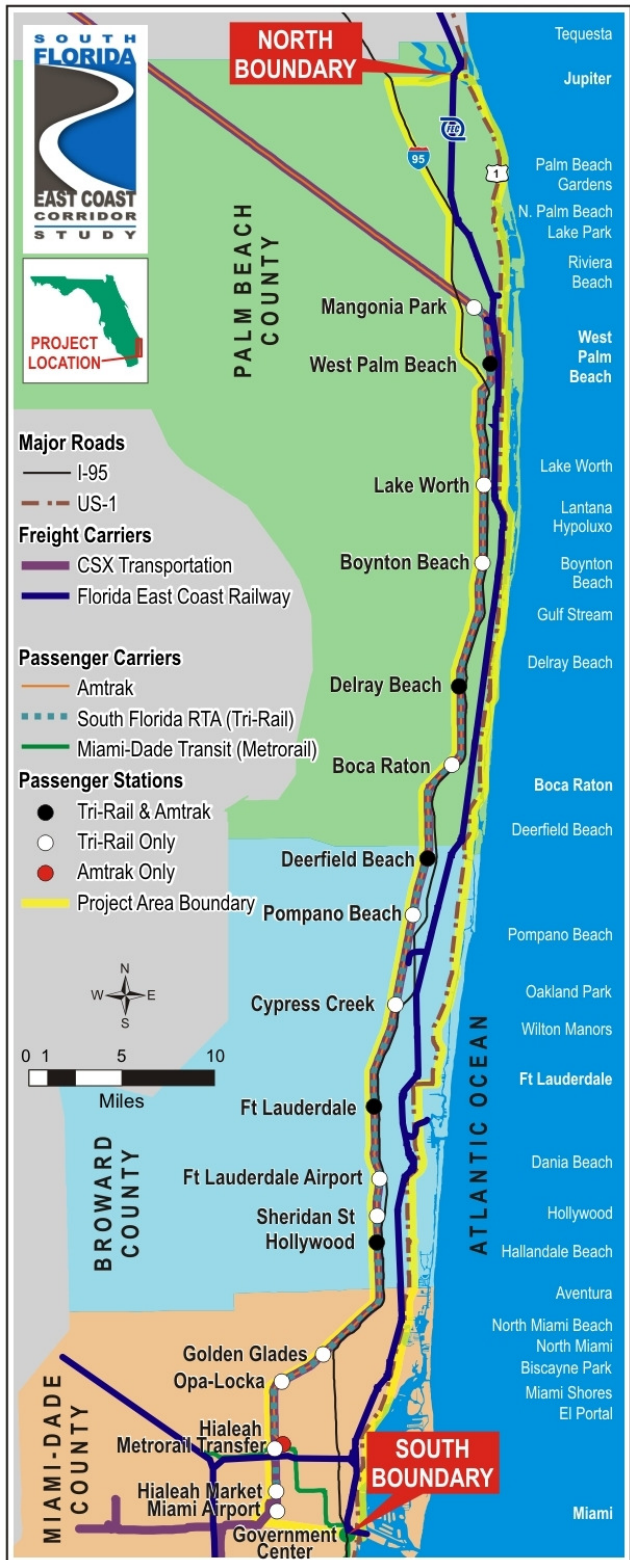
Phase 2 of the SFECCTA was initiated in January 2009 and was designed to build upon the Phase 1 AA to refine and further develop through an iterative process, the alternatives identified at the conclusion of the first phase. The primary focus of Phase 2 was to identify a locally preferred alternative (LPA) within the study area, in accordance with Federal Transit Administration (FTA) and FDOT project development processes, that could ultimately be submitted to FTA for federal assistance in the form of New Starts funding. A Phase 2 Draft Detailed Environmental Screening Report (ESR) has been prepared to describe the detailed environmental screening approach conducted as part of the Phase 2 AA and is supported by a series of technical memoranda and reports like the one presented here.

Project Area

The SFECCTA project area, illustrated on the Project Location Map (Figure 1), is bounded on the south by Flagler Street, just south of the Miami-Dade Government Center, in the City of Miami and on the north by the southern shoreline of the Loxahatchee River in the Town of Jupiter.

The western boundary of the project area runs parallel to and 0.5-mile west of the South Florida Rail Corridor (SFRC)/Tri-Rail corridor from the Miami Intermodal Center (MIC) north to Mangonia Park then continues in a northwesterly direction parallel to and 0.5-mile west of I-95 to the southern shoreline of Southwest Fork of the Loxahatchee River (C-18). The eastern boundary of the project area runs parallel to and 0.5-miles east of Highway US-1 from the Central Business District (CBD) of the City of Miami north to the southern shoreline of the Loxahatchee River in Jupiter.

Within the SFECCTA project area are several unique study areas that were developed specifically to define the affected environment and screen/evaluate the various project alternatives.



Generally, the affected environment is a GIS inventory of environmental, social, and cultural resources that could be affected by the proposed improvements. The affected environment and screening process are defined and documented in the Draft ESR.

The primary study area, where most of the improvements are expected to occur, is the FEC Railway corridor that extends from the CBD of the City of Miami north to the Town of Jupiter in Palm Beach County (a linear distance of approximately 83 miles). A detailed description of each study area and environmental screening methodology is provided in Chapter 3 and Appendix A, respectively, of the Draft ESR.

Sustainability Screening Process

The development and construction process of a transit station or O&M facility can have a positive and/or negative impact on the ecology of the local environment. Within the context of the SFECCTA study, a transit station is defined as a location where passengers can board or alight an operating transit vehicle. An O&M facility is a location used to operate, maintain, and store the transit vehicles of the system. The selection of an appropriate site can reduce the need for private vehicles, encourage urban infill and the redevelopment of brownfield sites, reduce stormwater runoff impact to receiving waters, and improve the quality of life for the local populous. It is important to note that the FDOT has standard procedures and manuals to be followed by contractors to work in contaminated or potentially contaminated areas, thereby reducing the risks associated with these site redevelopments.

When considering various site alternatives, it is important to consider environmental criteria throughout the site selection process. Equally important is the minimization of project impacts on surrounding areas after construction is complete and facilities are being utilized.

The ESSM was developed for screening the potential transit station areas and proposed O&M facility sites against the criteria of environmental sustainability. The screening process utilized the GIS-based ModelBuilder[®] application and guidance from the USGBC LEED Green Building Rating System for NC, Site Selection. The model uses assigned numeric weights/values and unique GIS datasets to calculate a final mathematical score for each alternative station area and O&M facility site location, described in Chapter 2 of the Draft ESR. For detailed technical information about the GIS-based model and the ModelBuilder[®] application please reference the *Phase 2 Environmental Modeling Requirements Technical Memorandum*.

As previously stated, much of the guidance used in developing the model was derived from the USBC LEED Green Building Rating System for NC, Site Selection. This rating system is based on a set of performance standards used for certifying the design and construction of buildings, of all sizes, in both the public and private sectors. The performance standards of "Site Selection" establish sustainable design objectives and integrate building locations and sustainable features as a metric for selecting a building site. The goal is to encourage development practices that limit the environmental impact of buildings on local ecosystems through preservation and restoration. For detailed information about the Sustainable Sites criteria please reference the USGBC *New Construction & Major Renovation Reference Guide, Version 2.2* (September 2006).

The guidance for developing the ESSM is based on the following principles:

Site Selection

- Do not develop buildings, roads or parking areas on portions of sites that meet any one of the following criteria:
 - Land defined by the United States Department of Agriculture (USDA) as Prime Farmlands.

Table 1. Numerical Weight Assignments

Numerical Weight Assignments - Environmental Sustainability Model	
Site Suitability Datasets & Description	Value
Prime and Unique Farmland	
NA	NA
Land within 100-yr Floodplain	
100-yr Floodzone	5
Critical Habitat / Listed Species	
Scrub Jay Habitat	5
Manatee Zones	5
Scrub Habitat	5
Public Lands (Conservation Purposes)	5
Johnson Seagrass (Essential Fish Habitat)	5
Water / Wetlands / Areas of Special Concern	
Well Protection Zones	5
Outstanding Florida Waters	5
Special Outstanding Florida Waters	5
Wetlands	5
Other Surface Waters	5
Aquatic Preserves	5
Land Managed Areas	5
Save Our Rivers	5
Public Parkland / Section 4(f) / 6(f)	
Parks and Recreation Areas	5
Recreational Trails	5
Development Density Datasets Area > or = 60,000 ft²/acre	
NA	NA
Brownfield / Redevelopment Datasets	
Brownfield Areas	-5
Alternative Transportation Datasets	
Multi Modal / Bus / Rapid Trans / Light Rail	
Bus Routes	-5
Tri-Rail Stations	-5
Metro Mover Stations	-5
Metro Rail Stations	-5
Bike Facilities	
Bike Lanes	-5
Assisted Housing	
Assisted Housing Facilities	-5

- Land with elevation lower than 5 feet above the elevation of the 100-year floodplain as defined by the Federal Emergency Management Agency (FEMA).
- Land which is specifically identified as habitat for any species listed as Federal or State Threatened or Endangered.
- Land within 100 feet of any body of water (including; wetlands, isolated wetlands and areas of special concern), or land that is less than/within the distances stipulated in state or local regulation as defined by local or state rule or law, whichever is more stringent.
- Land designated as public parkland.

Development Density

- Land located within an existing minimum development density of 60,000 square feet per acre.

Brownfield Redevelopment

- Land documented as contaminated (by means of an ASTM Phase II Environmental Site Assessment) or land classified as a brownfield by a local, state, or federal governmental agency. Effectively remediate site contamination.

Alternative Transportation

- Land within 0.5-mile of a commuter rail, light rail, or subway station or within 0.25 mile of two or more public or campus bus lines usable by building occupants.
- Land near bicycle-friendly facilities such as bike lanes.

Other Considerations

- Land located in close proximity (i.e., 50 feet) to available and affordable housing.
- Land with the ability to optimize pedestrian access to retail and commercial facilities.
- Land which exploits opportunities for mixed use development.

These principles are manifested in the ESSM by the inclusion and ranking of specific GIS datasets that

relates to each category. **Table 1** is a list of various GIS datasets incorporated into the ESSM and includes the respective numeric weigh assignment. It is important to note that unlike other models used in the SFECCTA study the ESSM assigns a negative numeric weight to selected GIS datasets. In this case, a value of negative (-) five represents a GIS dataset with a desirable quality whose presence is beneficial to environmental sustainability. This is opposed to a positive value of five that represent resources which should be avoided due to a negative or adverse effect to environmental sustainability.

The ESSM provides a numeric score that indicates which potential transit station area or proposed O&M facility site location is desirable for development based on the criteria of environmental sustainability. Sites with a lower score have the most beneficial, sustainable elements present. Potential transit station areas with a higher score are less sustainable and those with a very high score have elements that pose a potential negative impact (i.e., impact to nearby water bodies or wetlands).

Environmental Sustainability Screening Results

Potential transit station areas and proposed O&M facility site locations were screened utilizing the ESSM. Sixty-five potential transit station areas were screened using the ESSM. Of these 65 transit station areas, 56 are located along the FEC Railway mainline and nine are located along potential or existing SFRC-FEC Railway Connections or off-corridor. The study area for the ESSM was created by dividing each potential transit station area into two conceptual alternatives or areas (north and south or east and west of its respective intersection) to help inform the eventual transit station site selection. The environmental sustainability screening final, normalized score and *sustainability potential* for each conceptual alternative is listed in **Table 2**.

The ESSM is only one aspect of how these alternatives were evaluated. Other factors such as population/employment density, transit connectivity, community preference, land availability, etc., were also considered in the evaluation and recommendation to eliminate station area options. In conclusion, the terminal stations located in downtown Miami have the highest “sustainability potential” while other stations located in the urban centers of other cities also scored low. For a detailed list of these other factors please refer to the *Station Location Evaluation Methodology Technical Memorandum, Draft ESR*, and the *Alternatives Analysis Report*. In subsequent phases of the study, more detailed station site alternatives will be reviewed and re-screened at these station areas.

There are four proposed locations or sites that were selected for the screening of O&M facilities. These optional facility site areas were screened and the environmental sustainability screening final, normalized scores and *sustainability potential* are listed in **Table 3**. In addition, six proposed storage yards were screened (see **Table 3**). There are several existing and operational bus maintenance/storage facilities and two existing rail yards (i.e., Hialeah and West Palm Beach Rail Yards) that were not screened in the ESSM since this model is designed to screen undeveloped areas that are proposed for site development and not existing transit facilities.

The majority of environmental resources surrounding these optional sites are brownfields, low-income and minority communities, industrial land uses, and wellfields. Furthermore, factors such as site selection for sustainability are a key factor in the selection of an environmentally sustainable site. In conclusion, Site 4 and Site 10 would be the preferred optional locations because the degree of *sustainability potential* is high (i.e., low final score) for these sites.

Other factors such as, feasibility, size, configuration, cost, etc., were also considered in the evaluation to determine the best overall location for proposed O&M facilities, storage yards, and bus depots (see *Regional Operations and Maintenance Summary Technical Memorandum* and the *Draft ESR*).

Table 2. Environmental Sustainability Screening Results - Station Conceptual Alternatives

County	ID	Station Name	Sustainability Potential: N/E	Sustainability Potential: S/W
Palm Beach	1	JUP Indiantown Rd		
	2	JUP Toney Penna Dr		
	3-A	JUP Frederick Small Rd		
	3-B	JUP Donald Ross Rd		
	4	PBG PGA Blvd		
	5	NPB Northlake Blvd		
	6	LPK Park Av		
	7	RVB Blue Heron Blvd (OC)		
	8	RVB 13 St		
	9	WPB St Mary's (OC)		
	10	WPB 45 St		
	11	WPB Northwood (OC)		
	12	WPB 23-25 St		
	13	WPB Palm Beach Lakes Blvd		
	14	WPB Government Center		
	15	WPB Evernia (OC)		
	16	WPB Okeechobee Blvd		
	17	WPB Belvedere Rd		
	18	WPB Southern Blvd		
	19	WPB Forest Hill Blvd		
	20	LKW 10 Av N		
	21	LKW Lake - Lucerne Avs		
	22	LAN Lantana Rd		
	23	LAN Hypoluxo Rd		
	24	BYN Boynton Beach Blvd		
	25	BYN SE 15 Av		
	26	DLR Atlantic Av		
	27	DLR Linton Blvd		
	28	BOC NW 51 St		
	29	BOC NW 20 St		
30	BOC Palmetto Park Rd			
Broward	31	DRF E Hillsboro Blvd		
	32	DRF SW 10 St		
	33	PMP E Sample Rd		
	34	PMP Copans Rd		
	35	PMP Pompano Transfer (OC)		
	36	PMP NW 6 Ave (OC)		
	37	PMP E Atlantic Blvd		
	38	PMP McNab Rd		
	39	OAK Commercial Blvd		
	40	OAK NE 38 St		
	41	WLT NE 26 St		
	42	FTL Sunrise Blvd		
	43	FTL Sistrunk Blvd (NW 6th)		
	44	FTL Government Center		
	45	FTL SE 17 St		
	46	FLL Terminal Dr		
	47	DAN Dania Beach Blvd		
	48	HLY Sheridan St		
	49	HLY Hollywood Blvd		
	50	HLY Pembroke Ave		
	51	HAL E Hallandale Beach Blvd		
Miami-Dade	52	AVE NE 193-203 St		
	53	AVE NE 185 St		
	54	NMB NE 163 St		
	55	NMB NE 151 St		
	56	NMI NE 125 St		
	57	MIS NE 96 St		
	58	MIA NE 79 St		
	59	IRS NW 22 Av (OC)		
	60	IRS NW 27 Av (OC)		
	61	MIA NE 54 St		
	62	MIA NE 36 St		
	63	MIA NW 8/11 St		
	64	MIA Biscayne Blvd (OC)		
	65	MIA Government Center		
Legend:			Score Range:	
N = North of Respective Intersection			(-)20.1 - (-)14 =	Excellent
S = South of Respective Intersection			(-)13.9 - (-)7.8 =	Very Good
E = East of Respective Intersection			(-)7.7 - (-)4.6 =	Good
W = West of Respective Intersection			(-)4.5 - (-)1.1 =	Fair
			(-)1 - 7.5 =	Poor
OC = Off Corridor (e.g., SFRC-FEC Railway Connection, Port Spur Lead, etc.)				
Municipal Abbreviations:				
JUP = Jupiter		OAK = Oakland Park		
PBG = Palm Beach Gardens		WLT = Wilton Manors		
NPB = North Palm Beach		FTL = Fort Lauderdale		
LPK = Lake Park		FLL = Fort Lauderdale/Hollywood I		
RVB = Riviera Beach		DAN = Dania Beach		
WPB = West Palm Beach		HLY = Hollywood		
LKW = Lake Worth		HAL = Hallandale Beach		
LAN = Lantana		AVE = Aventura		
BYN = Boynton Beach		NMB = North Miami Beach		
DLR = Delray Beach		NMI = North Miami		
BOC = Boca Raton		MIS = Miami Shores		
DRF = Deerfield Beach		MIA = Miami		
PMP = Pompano Beach		IRS = Little River FEC Spur		

Table 3. Sustainability Screening Results - Proposed O&M Facilities

County	Site #	Name	Facility Type	Approx. Area (ac.)	Sustainability Potential
Broward	1	Pompano Beach / NW 15 St. / I-95	O&M	10	
	2	Pompano Beach / NW 15 St. / I-95		4	
	3	Pompano Beach / NW 15 St. / I-95		20	
	4	Pompano Beach / NE 48 St & Dixie Highway		48	
Palm Beach	5	Jupiter / Indiantown Road	Storage Yard	19	
	6	West Palm Beach / Flagler Boulevard		4	
Miami-Dade	7	Miami / Little River / NE 73 St		9	
	8	Miami / NW 19 St		4	
	9	Miami / NW 15-17 St		5	
	10	Miami / Government Center		6	

Legend:

Sustainability Potential / Score Range		
	O&M	Storage
Excellent	(-)9	(-)9
Very Good	(-)8 - (-)4	(-)8 - (-)6
Good	(-)3	(-)5
Fair	(-)2	(-)4 - (-)2
Poor	>(-)2	>(-)2

Sustainable Initiatives – Design, Construction, and Operation

In addition to the sustainability screening of proposed transit station areas and O&M facility locations, other sustainable initiatives were considered in Phase 2 in order to evaluate efforts to increase energy efficiency, reduce energy consumption, and reduce GHG emissions of the project as a whole. These initiatives include implementing design strategies for all inhabitable structures (i.e., stations and O&M facilities), developing operational guidelines for construction activities, and developing guidelines for the long-term operations and maintenance of all inhabitable structures.

There are nine broad areas where energy and environmental sustainability can and should be incorporated into the design, construction, and operation of transit facilities, which includes buildings. These are as follows:

1) Favor Multimodal Transportation Options:

- Provide an interconnected network of covered, safe/secure, and appropriately sized pedestrian travel and waiting areas.
- Integrate with parks/recreational facilities, open spaces, woodlands, civic areas, natural areas, and trails/greenways.

- Provide for short and long-term bicycle parking/storage as well as connecting bicycle lanes and trails.
- Provide public transit service and facilities for all potential users (employees, customers, etc.).
- Provide priority areas for ridesharing and feeder buses.
- Minimize walk distances to/from vehicle park-and-ride facilities to/from transit platforms.
- Invest in regional intelligent transportation systems (ITS) such as passenger information and electronic payment systems.

2) Minimize Energy Consumption: (Energy Modeling and Daylighting Analysis)

- Provide proper grouping of buildings.
- Minimize amount of required indoor space.
- Obtain energy from renewable sources (solar, wind, etc.) on site if possible.
- Utilize native trees and shrubs to provide shade and shelter.
- Provide natural ventilation with demand fan assist.
- Provide “green” or “eco-roofs”.
- Provide light-colored, high reflectance, and low-emissivity roofing.
- Provide high value building insulation, window/door glazing and/or high-performance glass.
- Provide operable windows.
- Provide strategic window placement (most windows and doors on north and south face) and skylights, clerestories, or retractable ceilings with monitors to maximize use of day/sunlight while minimizing potential heat gains.
- Provide high-performance lighting (such as LEDs), dimming and occupancy controls, and timers.
- Provide light shelves, fins, overhangs and diffused glass for sun control.
- Provide power control system(s).
- Provide shading over windows and doors.
- Provide high-efficiency HVAC systems and appliances (Energy Star rated).
- Provide non-CFC based refrigerants.
- Utilize light-colored materials and paints where it is desirable to reduce the heat island effect.

3) Minimize Water Consumption:

- Utilize low-flow and metered potable water fixtures (including waterless devices).
- Reclaim, store, and re-cycle rainwater (rainwater harvesting).
- Apply new rainfall dispersion methods.
- Minimize/avoid need for landscape irrigation (zero irrigation landscaping) particularly utilizing potable water.

4) Reduce Stormwater Flows:

- Protect undisturbed natural lands (minimize clearing, filling, and grading).
- Direct development to already degraded land.
- Preserve and maximize the use of open green space.
- Minimize the overall amount of impervious cover by providing:
 - Narrower roads and sidewalks
 - Smaller parking lots and smaller footprint parking facilities
 - Green or pervious/porous parking lot and driveway surfaces
 - Shared driveways
 - Reduced setbacks to reduce length of driveways
 - Integrated mixed-use development
 - Compact residential development (cluster development)
 - Green and park areas designed to maximize infiltration

- Provide bioretention areas in each yard or lot.
- Avoid downspouts at driveway areas or similar surfaces.
- Avoid the use of curbs and maximize the use of swales and vegetated median strips.
- Utilize infiltration basins and trenches.
- Utilize pocket wetlands and infiltration planters.
- Utilize porous/permeable pavement or other surfaces.
- Utilize rain gardens and other vegetated treatment systems.
- Utilize rainwater capture and storage for re-use, gradual infiltration, or irrigation.
 - Impervious area storage (underground vaults)
 - Rain barrels and cisterns
 - Depressional ground/landscape storage
 - Green roofs
 - Trees and tree boxes
- Utilize LID conveyance practices (natural features).
 - Avoid use of curbs and gutters
 - Utilize vegetated/grassed swales and grassed line channels
 - Roughen conveyance surfaces
 - Create long flow paths over landscaped areas
 - Use smaller culverts, pipes, and drainage inlets
 - Utilize terraces and check dams
- Utilize low impact landscaping.
 - Plant native, drought tolerant plants
 - Maximize use of trees and shrubs as opposed to turf
 - Maintain longer grass length
- Amend soils to improve infiltration.

5) Minimize Waste Production:

- Encourage/promote waste minimization and recycling of waste (programs).
- Separate, store, and recycle all on-site waste.
- Provide bio-filtration methods for stormwater retention/treatment.
- Utilize re-used or recycled content materials for construction.
- Utilize locally available materials for construction and operations.
- Minimize facility lighting spillover.

6) Enhance Indoor/Outdoor Environmental Quality:

- Avoid use of toxic substances in building materials (utilize low-emitting materials).
- Provide low-emission products and furnishings.
- Provide very low maintenance flooring.
- Provide carbon monitors.
- Provide evaporative cooling and fans in outdoor waiting areas.
- Utilize ultra-low sulfur fuel/clean technology on all construction equipment.
- Utilize non toxic pest management practices.

7) Promote Natural Areas and Wildlife:

- Retain existing native vegetation.
- Utilize native (drought tolerant) landscaping to create diverse natural habitats.
- Create, protect, and enhance conservation areas and nature parks.

8) Provide Sustainable Operations:

- Implement sustainable purchasing programs.
- Utilize green custodial practices.
- Sell and consume only healthy food products (fresh fruits, vegetables, and whole grains as an alternative to refined starches and sugars, artificial preservatives, and processed foods).
- Purchase locally grown and raised food.
- Utilize locally sourced, alternative fuels for construction activities.
 - Biodiesel for heavy equipment and generators
 - Photo-Voltaic (PV) power systems on temporary construction structures

9) Measure, Monitor, and Report:

- Develop and implement a green/sustainability measurement and verification plan.
- Develop and implement an energy benchmarking and energy tracking program.

It is anticipated that these, and potentially other, energy and environmental sustainability initiatives would be incorporated into the design, construction, and operation of transit facilities and buildings to take place in subsequent phases of the study.

References

United States Green Building Council. New Construction & Major Renovation. Version 2.2. September 2006.