



FLORIDA'S TURNPIKE ENTERPRISE LANDSCAPE PROGRAM MASTER PLAN

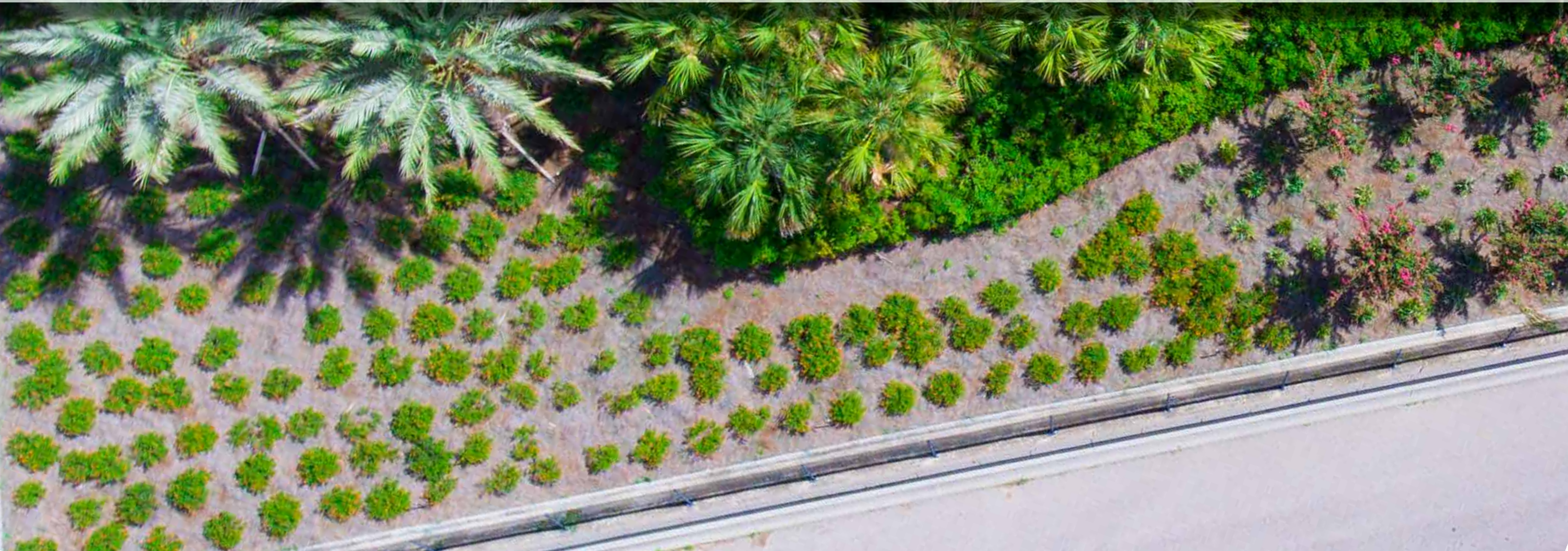


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EXECUTIVE SUMMARY

In order to achieve a successful, predictable and efficient Landscape Program, Florida's Turnpike Enterprise (FTE) has developed this Landscape Master Plan (Plan). The plan coalesces many of the policies and procedures already being utilized into a comprehensive approach to managing the FTE Landscape Program. The plan is comprised of several sections which outline the vision, design philosophy, work program, technical criteria and performance monitoring metrics, all necessary for the implementation of a successful landscape program.

Consistent with the Departmental Mission, the FTE Landscape Vision is, ***"To Promote Safe, Cost Efficient, Environmentally Responsible Landscapes Which Delight the Traveling Public"***. Components of this Master Plan serve to provide specific guidance beyond statewide standards for the development of landscape projects within the FTE highway systems. The goal is to establish a comprehensive management system, design approach and guidelines which will assist with the implementation of landscape projects to provide long-term value for FTE and its customers.



LANDSCAPE PROGRAM ORGANIZATION

The FTE Landscape Program is managed by the District Landscape Architect under the Transportation Development Section. The District Landscape Architect is supported by in-house staff who develop concepts, and a General Design Consultant who is primarily responsible for the development of the landscape working drawings.

Landscape working drawings can be prepared in several distinct ways. Stand-alone independent landscape plans are projects which do not necessarily follow or are 'tied to' roadway construction projects. Stand alone dependent landscape plans are produced as part of new roadway projects however, these are separate projects and are usually let independently or as a goes-with project. Landscape projects which are included as part of the roadway construction project are considered incidental and cannot exceed the lesser of \$100,000 or 10% of the preliminary cost estimate.

Each have specific, unique preparation and contractual obligations which are defined in Section Three of the Master Plan. Stand alone landscape projects are let for bidding and are maintained by the Operations and Maintenance Section. Coordination between these sections occurs at mean levels and is essential to a successful landscape program and projects.



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MASTER PLAN ORGANIZATION

The Master Plan is organized into six main sections with an Executive Summary. The Executive Summary explains the purpose of the Plan; the first section, *Controlling Criteria*, provides an overview of the Federal, State, Departmental and FTE governing policies and procedures to which our program must adhere; the second section, *Design Philosophy*, identifies components of project planning and guides the development of our landscapes; the third section, *Context*, describes the overall system and specific system features which are unique to FTE; the fourth section, *Plan Development*, identifies the design processes which are critical for maintaining consistency and delivering successful landscape projects; The fifth section, *Landscape Work Program*, contains an explanation of the methodology by which projects are selected and the current five year work program; The final section, *Resources*, contains procedures, templates, examples, checklists, and links to outside resources that serve as references to consultants as they perform work for FTE’s Landscape Program.



SECTION 1 - CONTROLLING CRITERIA

The FTE Landscape Program has been developed in accordance with and must comply with numerous Federal, State and Departmental criteria which are shown below.

GOVERNING POLICIES

ARTICLE II, SECTION 7(A), FLORIDA CONSTITUTION

"It shall be the policy of the state to conserve and protect its natural resources and scenic beauty."

SECTION 334.044 (26) FLORIDA STATUTES

"The department shall have the powers and duties to...conserve the natural roadside growth and scenery; and to provide for the implementation and maintenance of roadside conservation, enhancement, and stabilization programs. No less than 1.5 percent of the amount contracted for construction projects shall be allocated by the department for the purchase of plant materials...."

FDOT POLICY TOPIC NO. : 000-650-011-D

"It is the policy of the Florida Department of Transportation to conserve, protect, restore and enhance Florida's natural resources and scenic beauty when constructing and maintaining the State Highway System."



FDOT MISSION STATEMENT

The department will provide a safe transportation system that ensures the mobility of people and goods, enhances economic prosperity, and preserves the quality of our environment and communities.

FDOT HIGHWAY BEAUTIFICATION POLICY

It is the policy of the Florida Department of Transportation to conserve, protect, restore, and enhance Florida's Natural resources and scenic beauty when constructing and maintaining the State Highway System. Under this policy, Florida can have:

- » The nation's most beautiful highways that attract and grow business.
- » Safe roadsides that are durable as well as ecologically and economically sustainable.
- » Measurable returns on investments that grow in value over time.

IN CARRYING OUT THIS POLICY, THE DEPARTMENT WILL:

- » Make highway beautification everyone's business.
- » Accommodate existing and proposed trees and other long-lived plants by consistently integrating landscape conservation and highway beautification into the processes that are used to plan, design, construct, and maintain roadways.
- » Utilize design strategies that enhance Florida's distinctive sense of place, create lasting curb appeal, minimize cost, conserve, and maintain high quality landscapes.
- » Accept responsibility for maintenance of the state's highest priority landscapes, as established by the Department, when necessary to implement this policy.
- » Develop and implement a system to track costs and accomplishments of progress contributing to highway beautification.



SECTION 2 - DESIGN PHILOSOPHY

FTE's landscape design philosophy incorporates landscape and conservation values. Our focus as a program has shifted away from the "bold vision" design approach characterized by designing beautification projects using many large signature palms and few, if any, shrubs and returned to its historical roots of developing sustainable native landscapes. The FTE landscape program limits high intensity landscapes to landmark destinations and focuses on healing native landscapes and developing opportunities to incorporate ecosystem services enhancing and conserving Florida's natural environment.

While important, aesthetics is only part of the complex equation for producing responsible landscapes within the FTE highway system. Turnpike landscapes must also be called upon to modulate traffic behavior, stabilize steep erodible embankments, screen or emphasize views, provide environmental services, mitigate the effects of pavement and other man-made structures on the environment and minimize maintenance needs. Therefore, in keeping with the mandate issued by Department Policy Topic No. 000-650-011c, "Highway Beautification" future landscapes will provide a balance of high intensity landscapes and native or naturalistic plantings.




LANDSCAPE INTENSITY

Each project shall develop a landscape hierarchy based on level of importance and required maintenance. These levels are identified as Low Intensity and High Intensity. These intensity levels relate to both their aesthetic impact and their level of required life-cycle maintenance.

LOW INTENSITY

Low intensity areas are intended to be native or naturalistic plantings utilized for screening a view, ecosystem restoration, or as a backdrop to specimen landscapes. These low intensity areas will accordingly require less long-term maintenance.



Low Intensity areas (buffers, meadow condition, or reforestation) and non-landscaped areas (storm water management, limits of horizontal clearance, etc.) make up 75% of the project area.

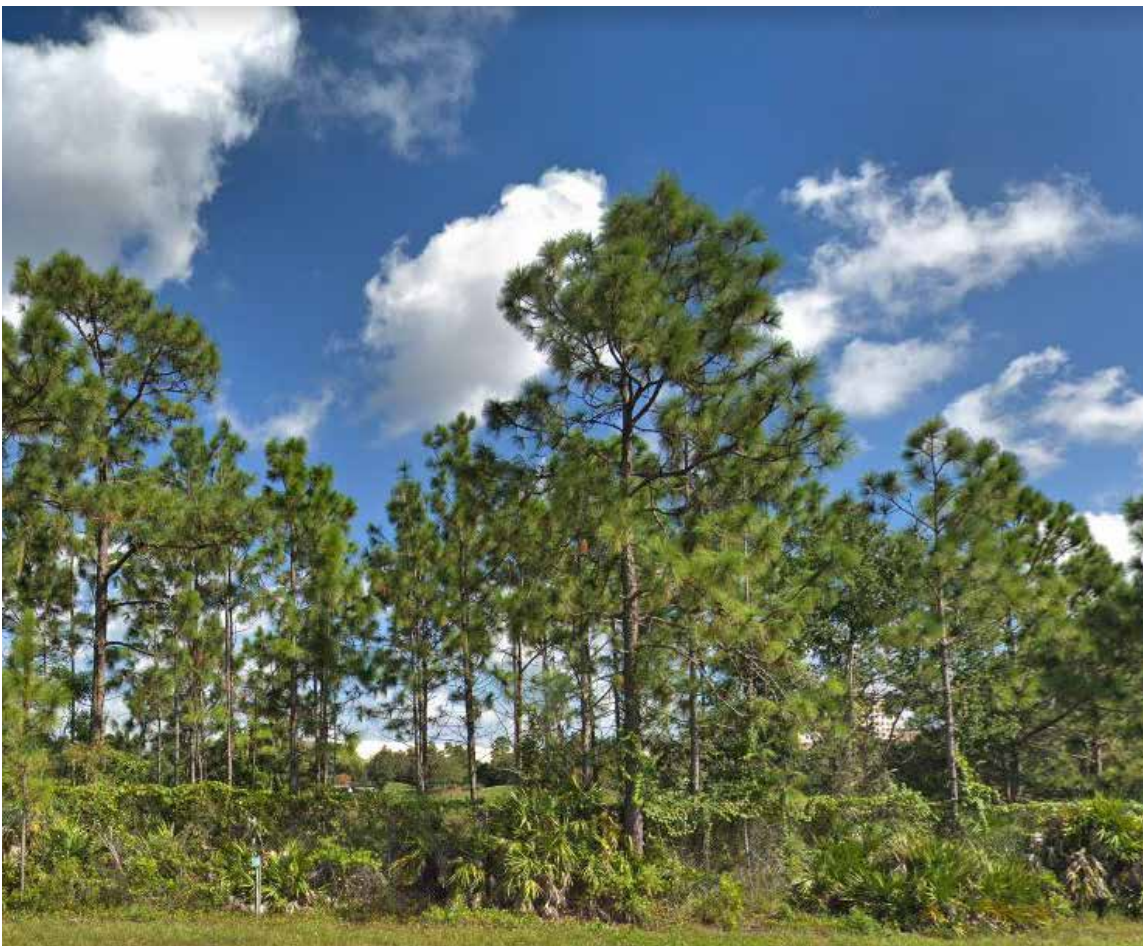
REFORESTATION AND SLOPE STABILIZATION

Plantings of pines and cabbage palms with native understory plants to reduce maintenance, mowing operations, and erosion on steep slopes.



REFORESTATION AND LANDSCAPE BUFFER

Plantings of pines, cabbage palms, and oaks, with native understory plants to buffer adjacent neighborhood.



HIGH INTENSITY

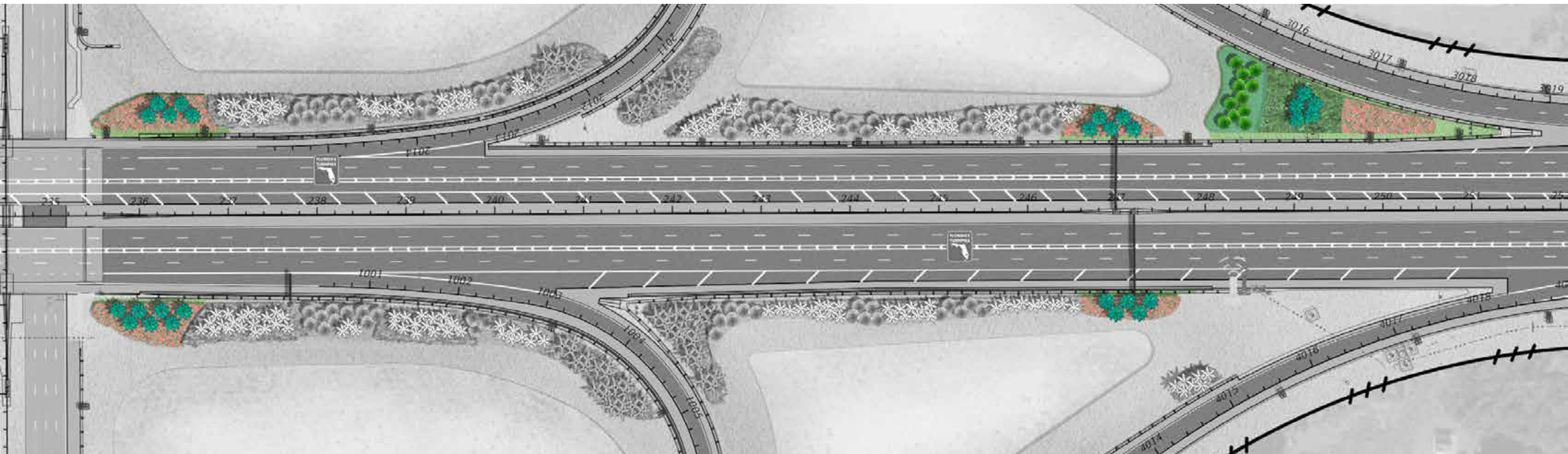
High intensity landscape areas, located in the most visible areas are designed for maximum aesthetic impact and may require a higher level of long-term maintenance.



It is intended that the high intensity landscape areas comprise no more than 25% of the total landscape for each project.

FOCAL POINTS AND GATEWAYS

Signature palms with staggered heights and flowering understory to accent gantry sign and enhance sense of arrival.



ADDITIONAL DESIGN CONSIDERATIONS

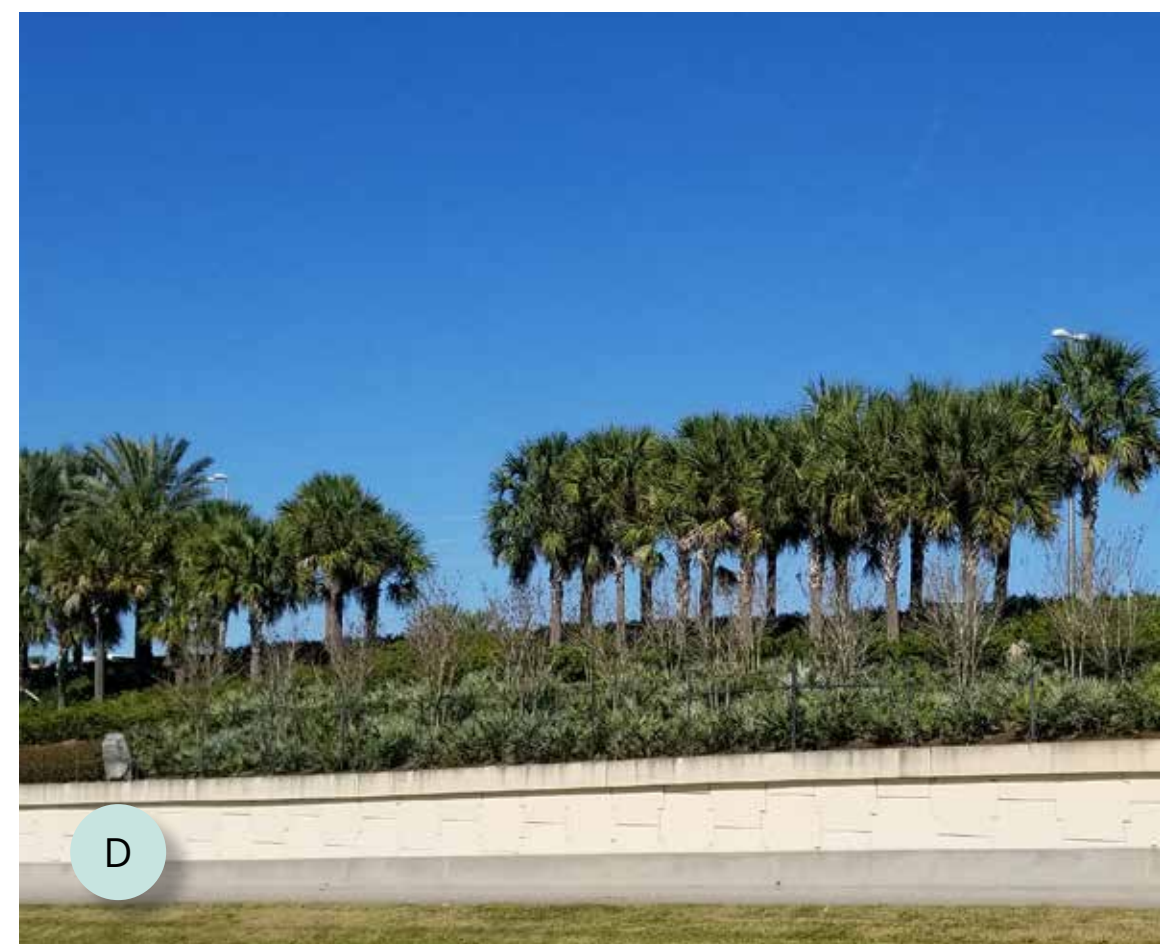
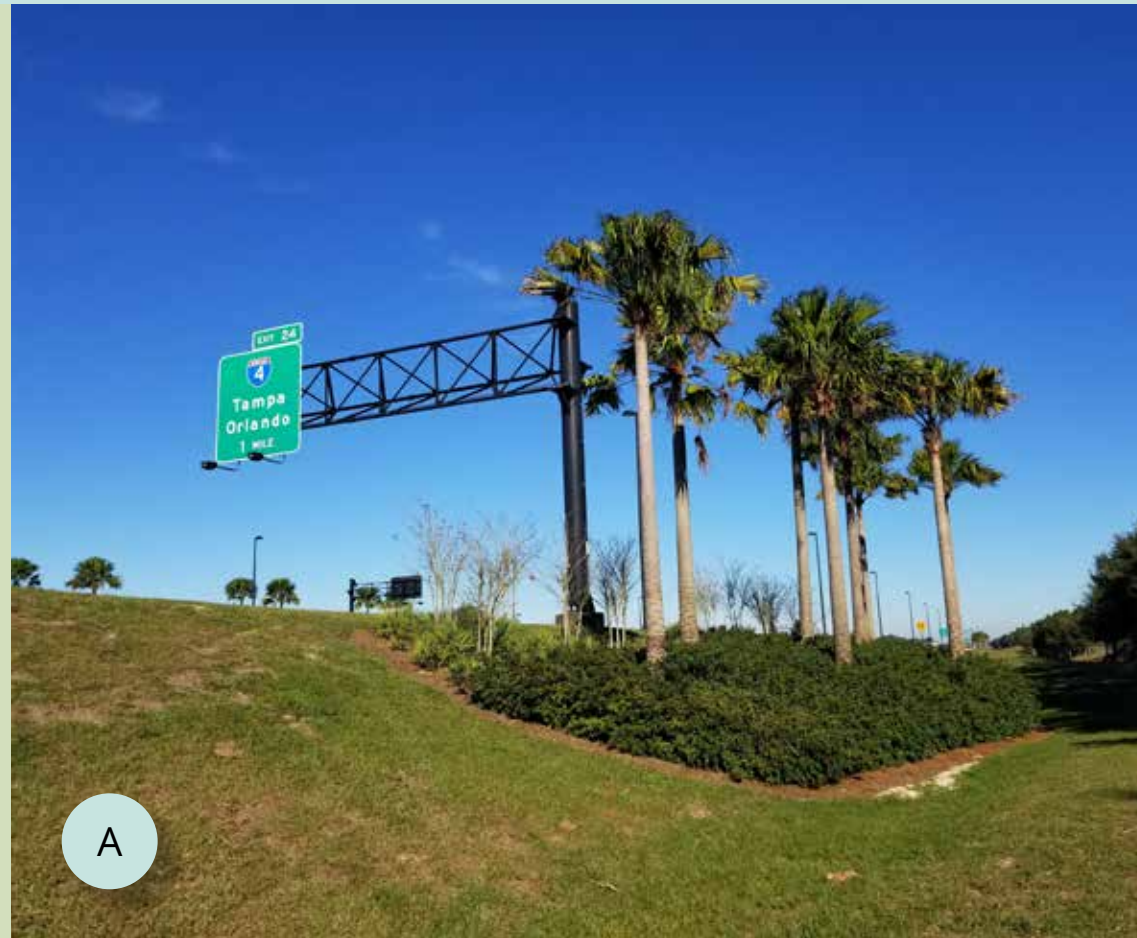
- » Emphasize naturalistic design, staggered heights, and groupings rather than straight lines.
- » Emphasize large groupings to provide a high intensity and immediate visual impact.
- » Minimize use of shrubs except in specific applications.
- » Utilize indigenous and hardy non-native plant species suitable to the project site's environmental conditions.
- » Reinforce native canopy when possible.
- » Respect adjacent land uses and their rural, urban or suburban characteristics.
- » Utilize Xeriscape (Florida-friendly) planting principles.
- » Use low maintenance and sustainable plant materials.
- » Provide a lasting and memorable visual statement with the use of seasonal flower or foliage color and unique and contrasting plant types that reflecting Florida's climate.
- » Promote large displays of wildflowers or meadow in large dry retention areas as an alternative to sod.
- » Remove Category 1 Invasive exotic plant material threatening our native plant communities. Refer to www.fleppc.org for current listings.
- » No category I invasive exotic plants shall be proposed on a FTE system. Category II invasive exotics are considered on a case by case basis subject to FTE approval.



SHRUB UTILIZATION

A strong element of implementing the Departmental Policy is the directive to design with few (if any) shrubs. Shrub utilization may be utilized under the following circumstances on a limited basis:

- A.** Screen gantry equipment from travel ways.
- B.** Shrub beds beneath trees and palms to protect from mower damage.
- C.** Placement on steep slope conditions to minimize mowing maintenance efforts (i.e. interchanges, overpasses or cross road embankments).
- D.** Reduce maintenance efforts in isolated areas where it is difficult or dangerous to access.



- E.** To provide color and visual interest.
- F.** Screening undesirable views from high intensity or other unsightly land uses, such as industrial areas, where no noise walls are present.
- G.** Soften or accent noise walls.
- H.** Addressing Community commitments agreed to during the public involvement process or other jurisdictional requests.



PLANT DIVERSITY GOALS

Indigenous Species	50% Minimum
Exotic Species	Not Greater than 25%
Broad Leaf or Pine Species	50% Minimum

It is intended that the High Intensity landscape areas comprise no more than 25% of the total landscape for each project. The remainder will be Low Intensity landscape (buffers, meadow condition, or reforestation) and non-landscaped areas (storm water management, limits of horizontal clearance, etc.). A minimum of 50% of the plant palette should be native and indigenous to the respective USDA climatic hardiness zone. Wildflower use should be used where appropriate.



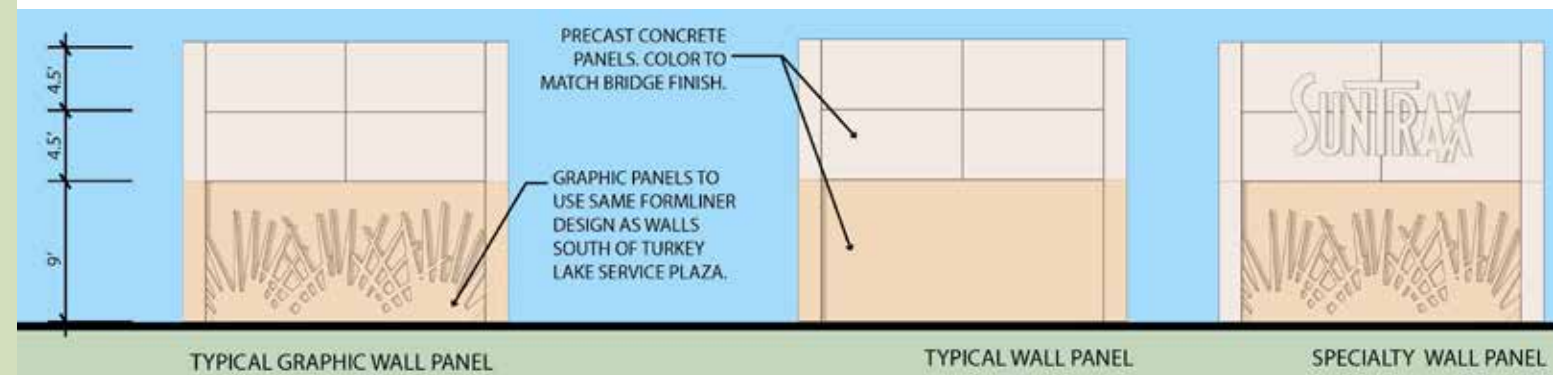
HARDSCAPE

Due to the increasing widening of FTE facilities, right of way is becoming more constrained. This limits the use of landscape plantings to achieve enhanced aesthetics. Accordingly, the use of hardscape, paint applications and graphics are often times the only way to beautify the corridor.

Roadway structural elements such as bridge columns and support elements, retaining walls, noise abatement walls and stand alone hardscape structures should be considered as an opportunity to provide required roadway aesthetics.

For more information:

- » Noise walls and Perimeter walls:
https://fdotwww.blob.core.windows.net/sitefinity/docs/default-source/roadway/fdm/2020/2020fdm264noiseperimwalls.pdf?sfvrsn=3962e82a_2
- » Retaining walls:
https://fdotwww.blob.core.windows.net/sitefinity/docs/default-source/roadway/fdm/2020/2020fdm262retwalls.pdf?sfvrsn=6e1e0804_2
- » Form Liners:
<https://www.concretenetwork.com/architectural-form-liners>

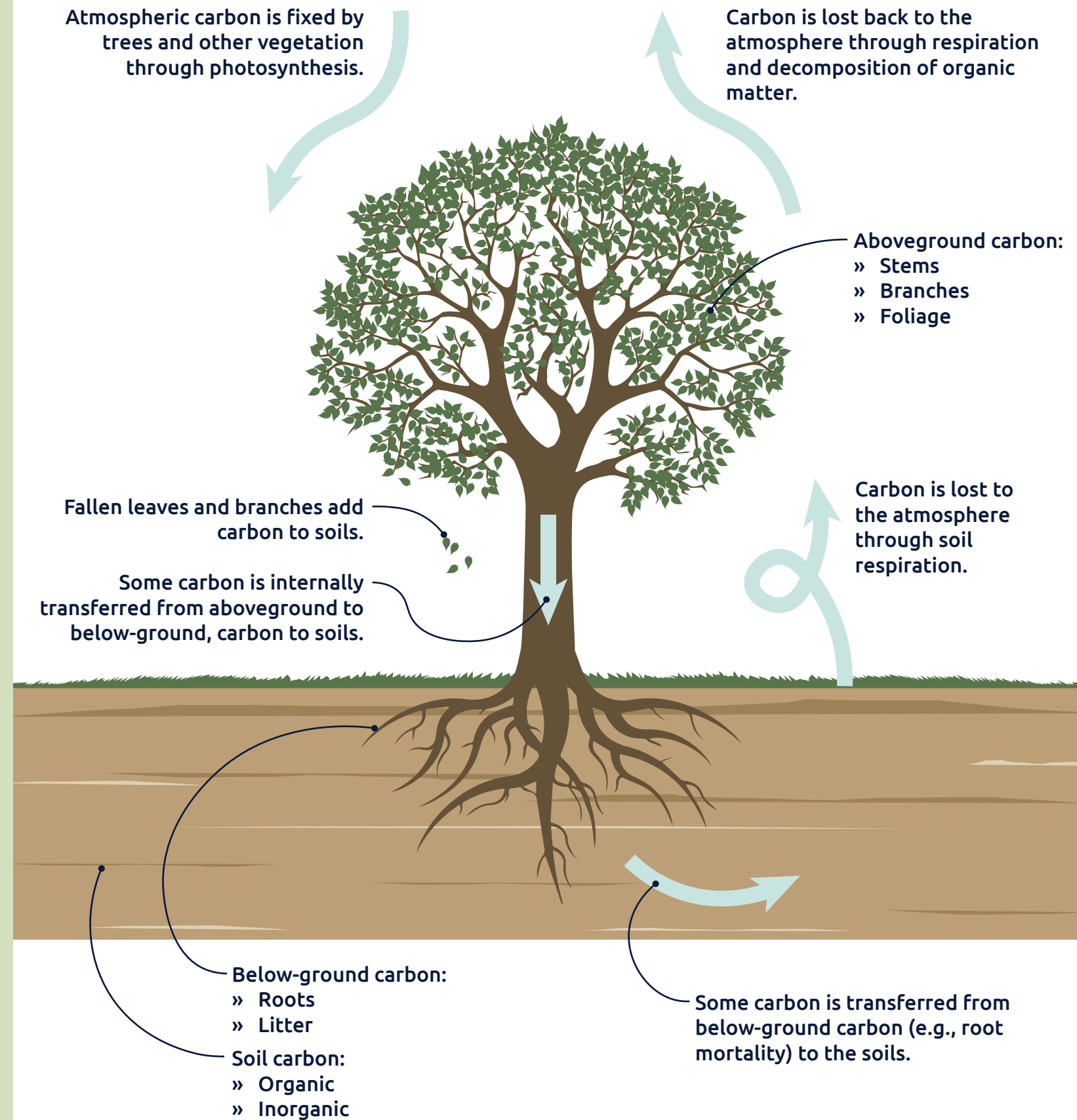


ECOSYSTEM SERVICES

Consistent with the Department's Mission and revised policy, the FTE Landscape Program will address the preservation of our environment and the provision of ecosystem services. The following criteria have been established to guide our designers to provide maximum Ecosystem Services integral to their landscape designs.

Providing an ecologically balanced landscape helps to control lifetime costs and provide a landscape that will appreciate over time.

The economic value of runoff prevention, carbon sequestration, pollination and other insect services, air quality, invasive species resistance, and aesthetics was estimated for Florida's State Highway System roadside right-of-way (ROW) ecosystem using the benefits transfer method. Regardless of whether these benefits are classified as ecosystem services or functions. In a March 2014 report prepared for FDOT entitled *Economic Impact of Ecosystem Services Provided by Ecologically Sustainable Right of Way Vegetation Management Practices*, the sum-total value of these benefits was conservatively estimated at nearly half billion dollars.



Source: U.S. Environmental Protection Agency

Utilizing sustainable vegetation management practices more than doubles the total value. And incorporating Wildflower Areas (WAs; remnant native plant communities as well as wildflower plantings) nearly triples the value of these benefits. While roadside ROW vegetation historically has been treated as a financial liability to fulfill main FDOT functions, information obtained by the Department provides evidence that roadside ROW vegetation is an asset. The cost of vegetation management, at least \$33.5 million in 2011-12, is more than offset by the value of only carbon sequestration, a service that potentially could generate income for FDOT via the sale of carbon credits.

Implementing sustainable management practices will reduce vegetation management costs nearly 30 percent. Understanding the economic benefits of the roadside ROW ecosystem and sustainable management practices will allow the department to measure outcomes and establish performance targets. Findings in this report serve as an incentive for FDOT to gradually implement innovative, broad scale, ecologically sustainable roadside ROW vegetation management practices and expand the number and acreage of WAs.



It should be noted that the enhancement of ecosystem services can be easily achieved simply by altering the maintenance operations for the designated area. Significant cost savings can result by reducing mowing, reducing rainwater runoff and mitigating heat island effect, etc.

Four specific strategies for creating Ecosystem Services are discussed in this section. They are pollinator habitat plans, transitional native plantings, meadow conditions, and wildflowers.



POLLINATOR HABITATS

Pollinators are an essential part of healthy ecosystems. Wild pollinators, including bees, wasps, butterflies, moths and hummingbirds are experiencing declines in population due to a loss of habitat, the spread of disease, and other factors. Florida's Turnpike Enterprise encourages the planning and creation of designated pollinator habitat sites in order to promote and bolster pollinator populations throughout Florida. These vital habitats can be planned along stretches of roadway shoulders, welcome centers, rest areas, select office complexes and similar facilities. These sites should be created throughout the state and include a wide variety of pollen and nectar sources. At welcome centers and rest areas, these pollinator habitats should include interpretive signage with education about specific plantings and pollinators.



Pollinators are a vital part of agriculture production. In the United States, more than one-third of all crop production requires insect pollination. Managed honey bee colonies are the primary pollinators, adding at least \$15 billion a year by increasing crop yields and helping to ensure superior-quality harvests. Therefore, planning and managing these habitats where possible can provide a great economic benefit. The right of way acreage and other lands owned and managed by Florida's Turnpike Enterprise can present great opportunities for pollinator habitats.

The goal of creating pollinator habitats is to enhance habitat areas for bees, butterflies, and other threatened and dwindling pollinators by: Providing seasonal flowers that provide nectar, pollen and nesting sites for pollinators. Providing refuge areas with plants and seeds not treated with neonicotinoid pesticides. Providing educational signage about pollinators, their habitats, and their significance.

For more information on Florida-Friendly plants for pollinators, visit:

- » <http://gardeningolutions.ifas.ufl.edu/design/gardening-with-wildlife/bee-plants.html>.
- » https://ffl.ifas.ufl.edu/handbook/Attract_Wildlife_vSept09.pdf
- » <https://www.floridamuseum.ufl.edu/wildflowers/>



TRANSITIONAL NATIVE PLANTINGS

Rains can wash exposed soil, landscape debris, fertilizers, and pesticides off the landscape becoming part of the stormwater runoff. Stormwater runoff makes its way to rivers, lakes and canals and, ultimately connects to Florida's groundwater supplies. Groundwater comes from the aquifer, which is the source of almost all of the water we use in our daily lives.

Transitional areas describe areas and ecosystems that function to collect, temporary hold and filter stormwater. These transitional areas can provide many ecological benefits in filtering stormwater and also require very little to no maintenance when planted with the appropriate native material. It should be noted that exotic, non-native plant material generally require large amounts of fertilizer to maintain their health. Inevitably, this fertilizer finds its way into our surface and ground water supplies.



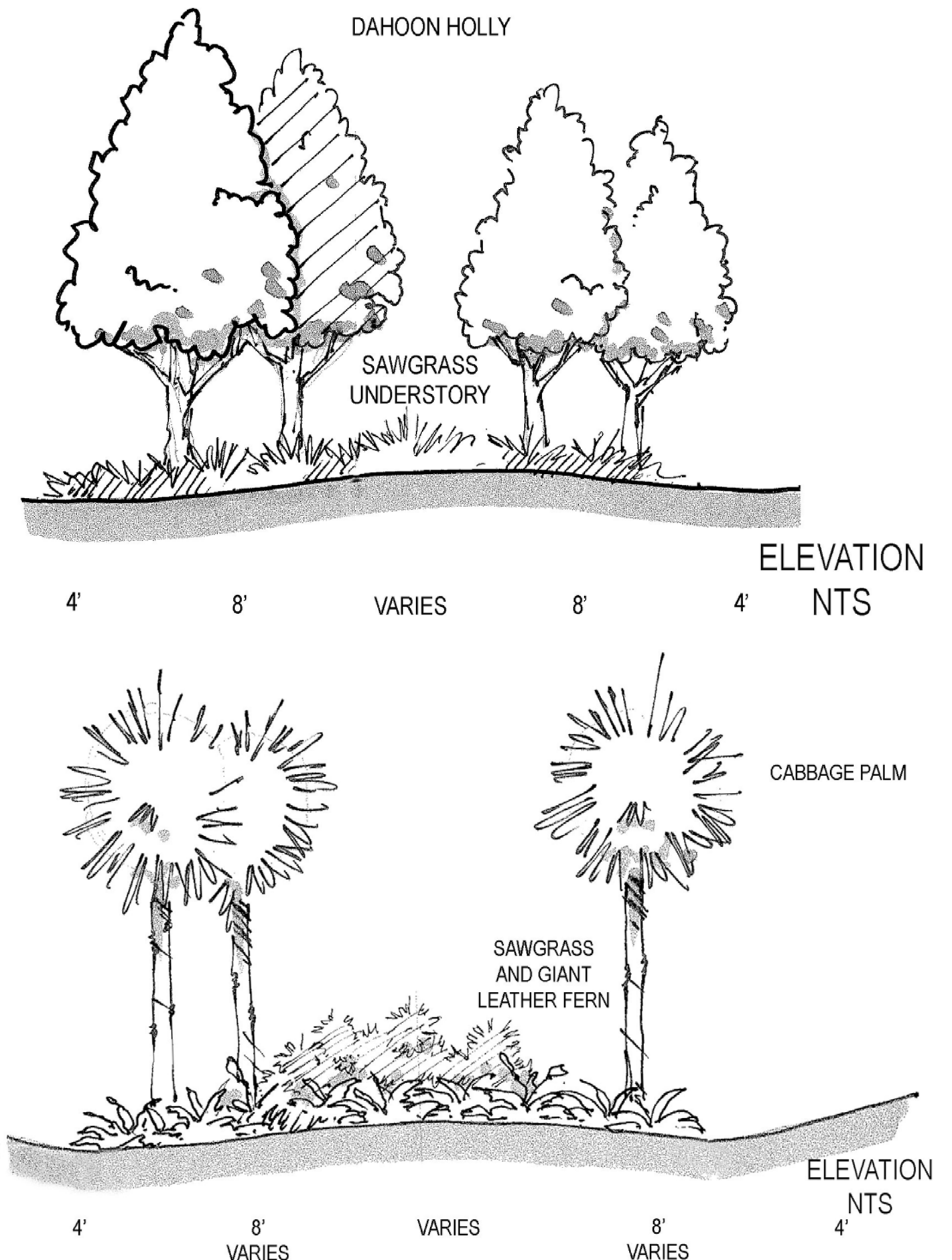
Detention areas and other low-lying areas can be opportunities for plantings that reduce and filter stormwater runoff. Planting these areas with Florida native plant material means that constant trimming (producing debris), fertilizing, and pesticide treatment is unnecessary. Shallow areas can be planted with grasses and other plants to filter water before letting it flow naturally into the ground. Water kept within a landscape this way return to the aquifer, helping to replenish Florida's water supplies with cleaner water.

For more information on planting within Transitional Areas, visit:

- » https://ffl.ifas.ufl.edu/handbook/Protect_the_Waterfront_vSept09.pdf
- » https://ffl.ifas.ufl.edu/handbook/Reduce_Stormwater_Runoff_vSept09.pdf.

For more information on native plant choices for Transitional Areas, visit:

- » <http://publicserver2.sjrwmd.com/waterwise/search.jsp>
- » <http://www.floridayards.org/fyplants/index.php>



MEADOW CONDITION

A meadow is an ecosystem type comprised of one or more plant communities dominated by herbaceous species. Woody vegetation like trees or shrubs, may occur but are not dominant. Meadows should be maintained to prevent succession forests from occurring.

Meadow Condition is an open habitat, or field, vegetated by grass and other non-woody plants. They attract a multitude of wildlife and support flora and fauna that could not thrive in other habitats.

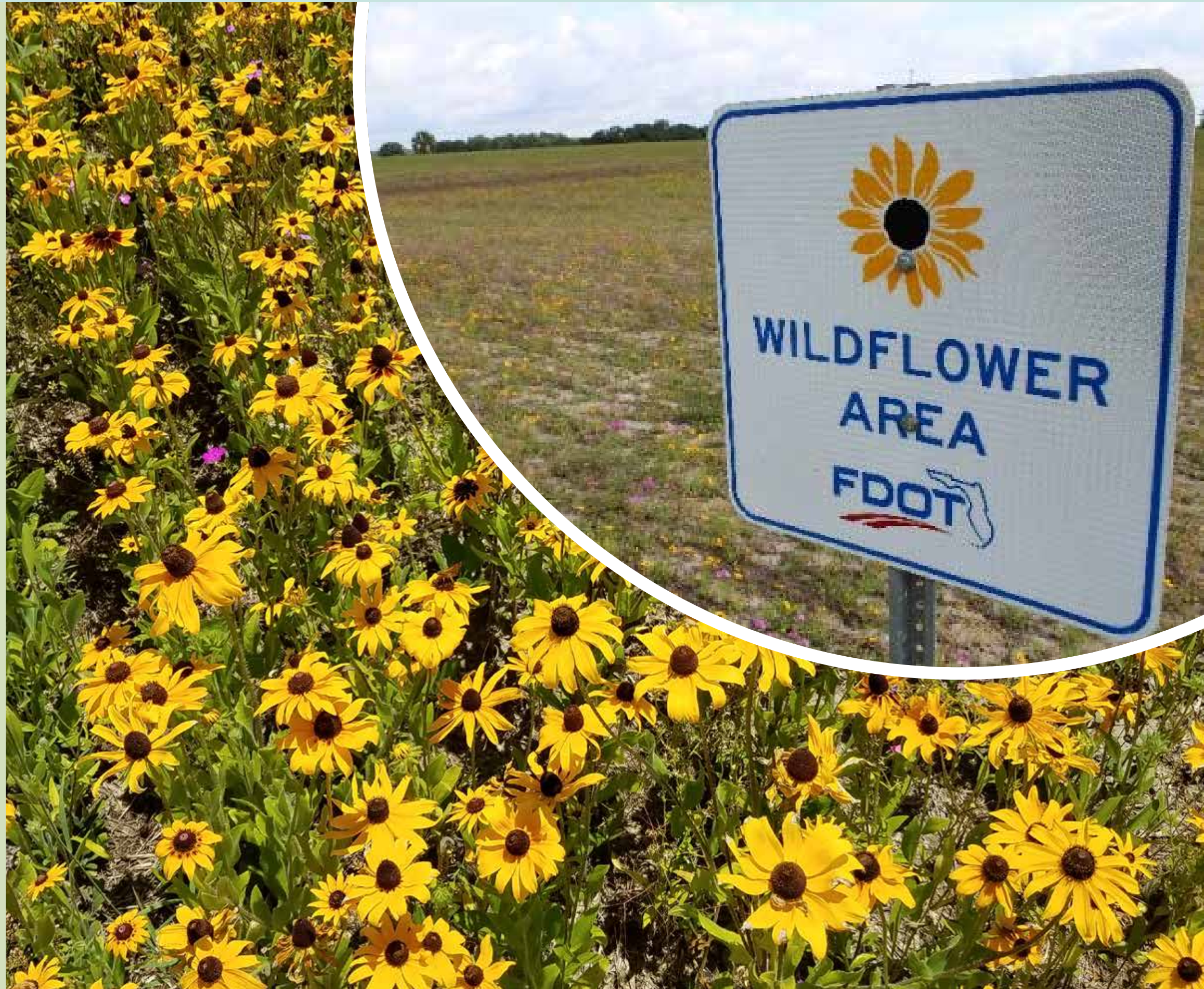
It is expected that Meadow Condition can be achieved with little or no effort beyond controlling the maintenance activities associated with the designated area. Specific Meadow areas will be designated on the plan set, quantified and maintenance activities designated that will facilitate the development of desired plant species.

Each landscape project will be required to include a percentage of this condition in the design and the amounts will be tracked cumulatively each Fiscal Year.



WILDFLOWERS

Wildflowers along Florida's Turnpike roadway are an important element that are enjoyed by millions of residents and visitors every day. To comply with Florida's Wildflower Program, FTE has planted approximately 80 acres along Florida's Turnpike. Continuing to incorporate wildflowers into the design can benefit wildlife, reduce stress on natural resources and reduce maintenance costs.



Using the guiding principles of protection, establishment and management, FTE identified the following wildflower planting designations:

- » Natural Stands – Extensions or remnants of neighboring areas that contain wildflowers.
- » Roadside Meadows – Long blooming areas with a species mix that is best suited for a site.
- » High Impact – Presenting an intense visual statement for high profile locations.

The Landscape Architect of Record (LAOR) shall consider potential and future wildflower sites within their projects. Contact the FTE Roadway Maintenance Department to coordinate appropriate wildflower seed species, locations and installation/ establishment techniques.



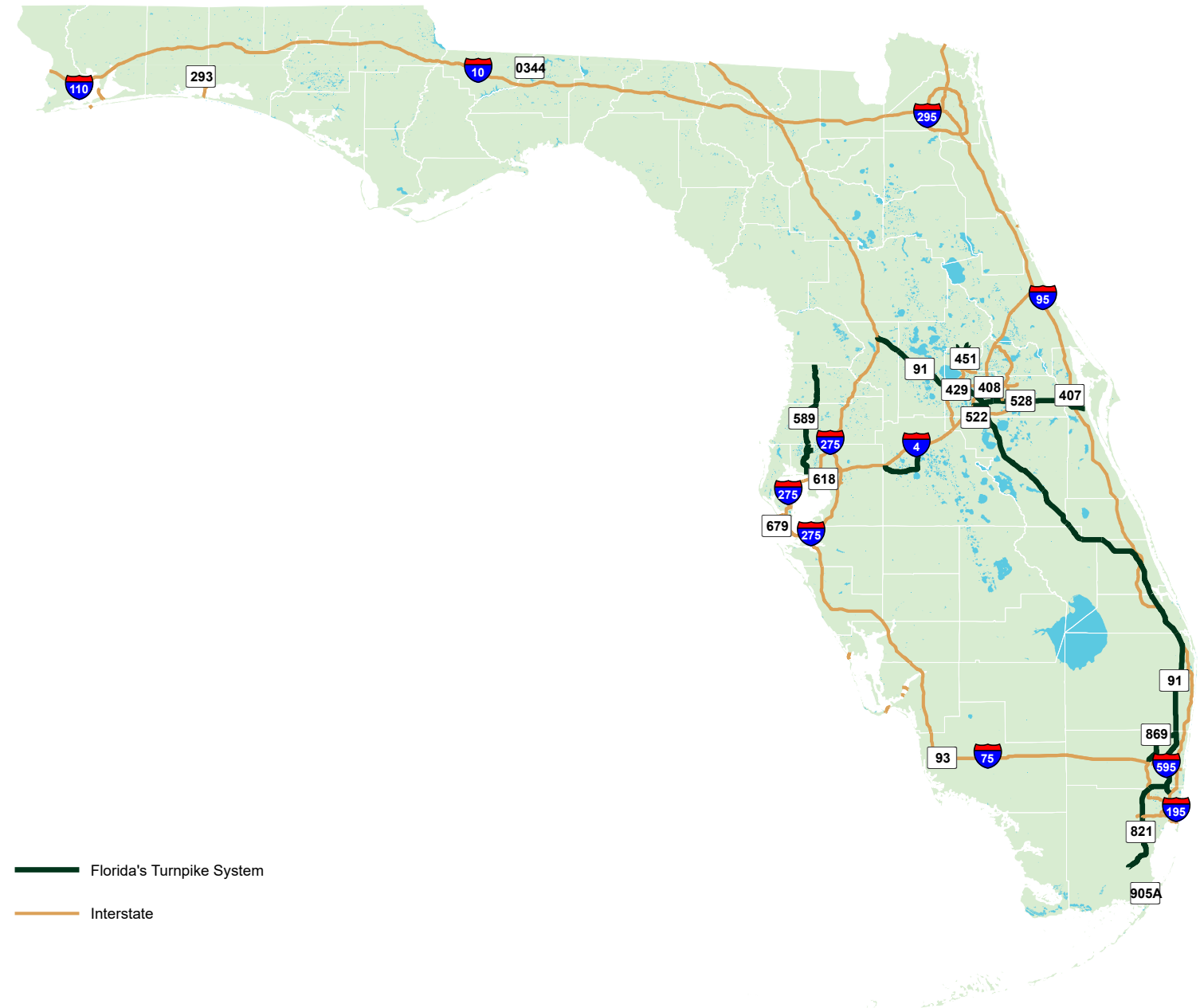
SECTION 3 - CONTEXT

DISTRICT DESCRIPTION

The Turnpike system consists of over 480 miles of limited access toll highways and eight (8) service plazas across many regions of the State of Florida. An average of five million motorists utilize these highways daily. For the purposes of this Master Plan the Turnpike System has been identified by four regions: South Florida, Turnpike mainline from Miami to North Central Florida (SR 91), as well as the Homestead Extension (HEFT-SR 821), Sawgrass Expressway (SR 869); Central Florida, Seminole Expressway (SR 417), Beachline Expressway (SR 528), Southern Connector Extension of the Central Florida GreeneWay (SR 417), Western Beltway (SR 429); and West Florida, the Veterans Expressway (SR 589), Suncoast Parkway (SR 589) and Polk Parkway (SR 570) and the North, First Coast Expressway. The Turnpike's mainline alone consists of 312 miles extending through 11 counties.

To view more maps of the Turnpike's facilities, please visit:

» <http://www.floridasturnpike.com/about.html>



DISTRICT FEATURES

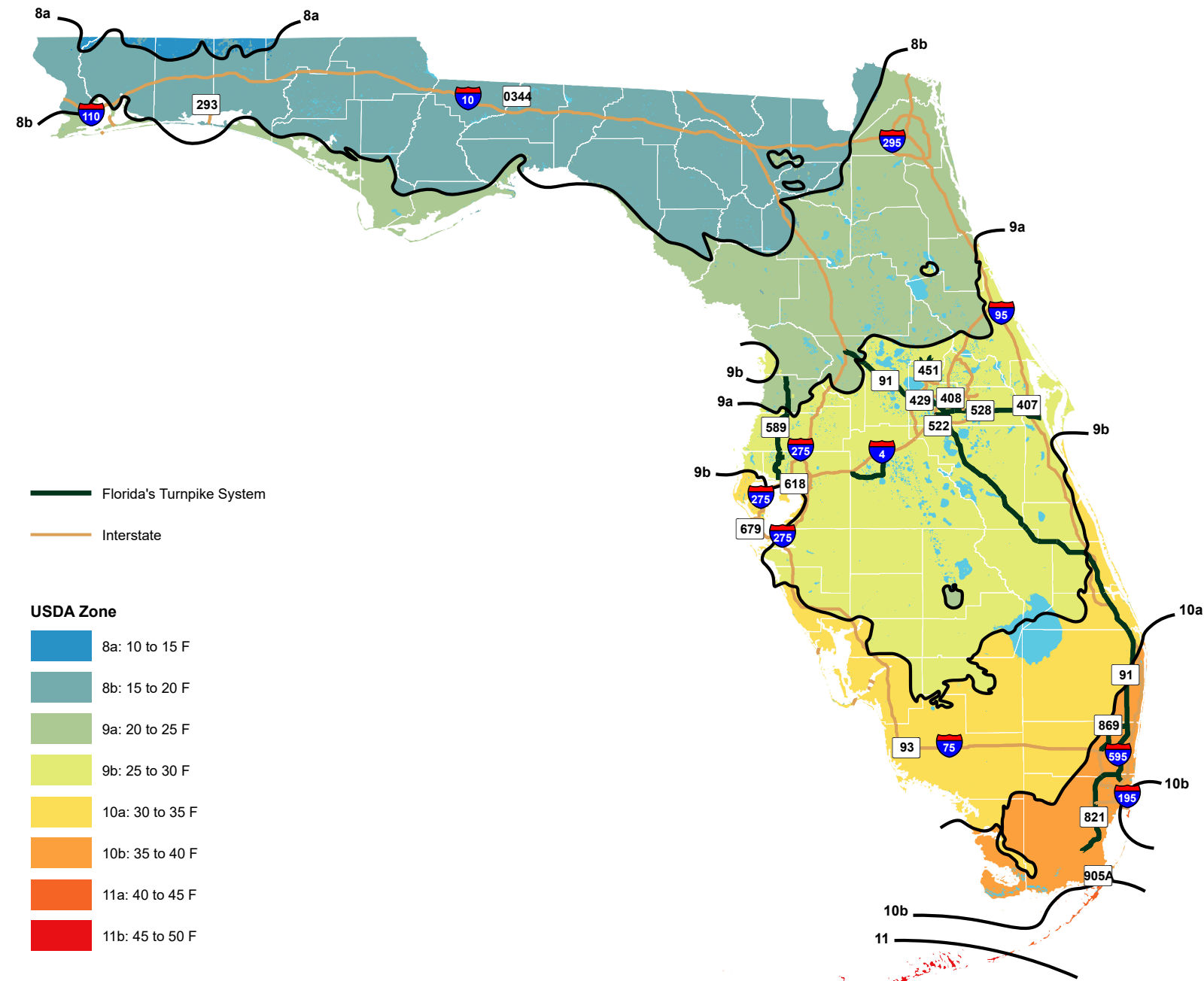
This geographic diversity necessitates maximum flexibility of our designers to respond to regional context and variable climatic conditions. FTE must also balance the landscape program to allow for equitable distribution of the overall landscape budget amongst the South, North and Western Regions.

The Turnpike system extends from Miami-Dade County to Jacksonville and across the state from the Atlantic Ocean to the Gulf of Mexico. It crosses four plant hardiness zones as established by the US Department of Agriculture. Based on the variation of hardiness zones, the FTE system has been divided into two distinct plant palettes: North and West Region (Zones 9A & 9B) and South Region (Zones 10A & 10B).

Although the plants within this document are categorized into two palettes, the cultural identity of the Turnpike System varies greatly based on the communities through which it passes, and designers must consider context when making selections.

The Florida Association of Native Nurseries has published a useful tool linking native plant communities to their USDA hardiness zones. Link to FANN website here:

» <https://www.floridanativenurseries.org/plant-communities/>



COMMUNITY AESTHETIC FEATURES

Community Aesthetic Features (CAF) are an opportunity for a local governmental entity to convey the culture, identity and values of the community through a stand-alone structure or an element affixed to an existing structure in the LA R/W. These features are categorized as Public Art or Local ID Marker. The Local government must enter into a CAF agreement by adopting a resolution to design, construct and maintain the feature. In addition, the CAF agreement requires a bond for the removal of the feature, if this becomes necessary.

The process also involves a review by the Roadway Aesthetics Community of Practice, with representatives from FDOT Central Office, FTE and other Districts who will offer verbal comments. Once the design is approved; and the CAF agreement is executed the CAF can be constructed. Stand alone features could be a statue, monument or sign-wall. Affixed features can be medallions, plaques or other art elements.

For more information:

- » Community Aesthetic Features:
https://fdotwww.blob.core.windows.net/sitefinity/docs/default-source/roadway/fdm/2020/2020fdm127caf.pdf?sfvrsn=b1ef5a9b_2
- » Manual of Uniform Traffic Control Devices:
https://mutcd.fhwa.dot.gov/htm/2009r1r2/html_index.htm



SECTION 4 - PLAN DEVELOPMENT

Planning roadside landscapes within a limited access right-of-way requires overlaying information to develop a design solution. In order to ensure safety, protect existing assets, and meet FTE's project goals, designers must identify and understand critical site issues impacting the project. Design solutions must be context sensitive and tailored to the unique site conditions of each project. This section describes the most common critical issues found in projects and processes specific to FTE. The list should not be considered comprehensive. Designers should also reference the most current Turnpike Design Handbook (TDH), FDOT Design Manual (FDM), standard and supplemental indexes. This section represents a starting point for designers to develop a checklist and identify common project issues for discussion with the District Landscape Architect (DLA) and the procedures unique to the FTE Landscape Program. FTE Landscape procedures for drawing production are found starting in Section 301-2 of the TDH. The TDH outlines procedures for PD&E, Standalone Landscape Projects, and Roadway dependent projects. The sections below place significant emphasis on the Phase I submittal required for Standalone and Roadway dependent projects. The FTE Landscape Program places significant emphasis on site analysis and a full understanding of existing conditions prior to the development of landscape plans. Phase I submittals require both a Site Analysis Plan (SAP) of the project limits and a Landscape Opportunity Plan (LOP) to be reviewed in person with the DLA and critical staff for the project. Designers are expected to visit the project site and to be prepared to perform a field review with the DLA or their designee for FTE Landscape Projects.



COMMON CRITICAL ISSUES

ROADSIDE SAFETY AND FDOT DESIGN STANDARDS

Safety is the most spoken word within FTE. Understanding the roadway components and the regulations that control them is paramount. Designers should be familiar with the TDH, FDM and the AASHTO Green Book and apply the requirements found within to their projects. Typical elements that apply to every project include the identification of clear zones, lateral offsets, and sight distances. Additional elements are identified in the TDH. If designers have specific questions, they should work with their FTE Project Manager to connect with the proper staff to get the answers needed.

- » [Turnpike Design Handbook \(TDH\) - Design Criteria - Part 2](#)
- » [FDOT Design Manual](#)
- » [AASHTO Green Book](#)



INTELLIGENT TRANSPORTATION SYSTEMS (ITS)

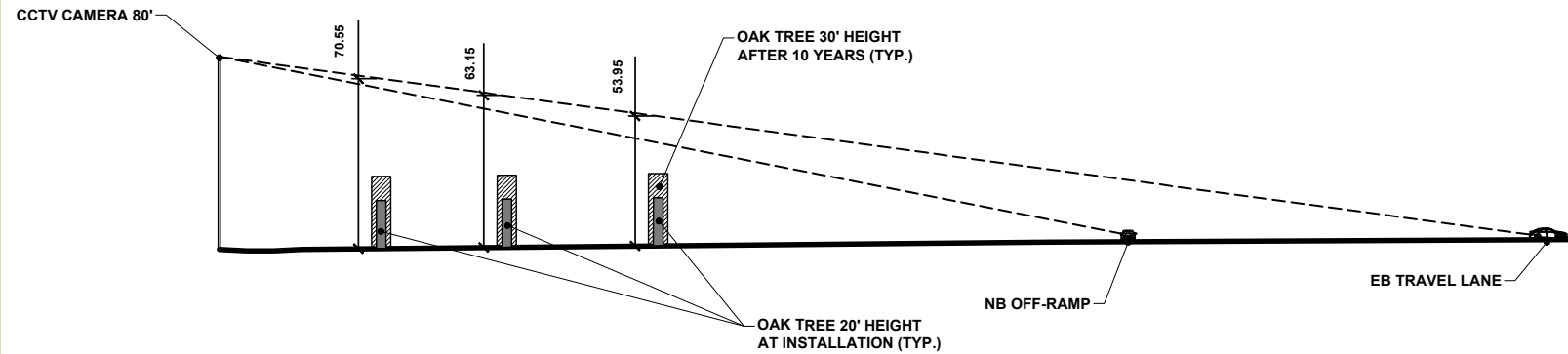
FTE's ITS facilities are managed by Traffic Engineering and Operations and are one of the most critical facilities within the Limited Access Right of Way (LARW) that can affect landscape projects. The main function of the ITS facilities are to provide video feeds through a network of Closed-Circuit Television (CCTV) cameras, and to provide drivers with information through digital message signs.

When planning a landscape project, ITS should be on the top of the designers list of coordination items, for both camera view zones and associated below ground infrastructure. Coordinate with the DLA and ITS Manager to schedule a meeting to review camera locations (including mounting heights) and camera view zones.

Refer to the Turnpike Design Handbook (TDH), Design Criteria - Part 2, Section 221 Intelligent Transportation Systems (ITS) for more information.

» [Turnpike Design Handbook \(TDH\) - Design Criteria - Part 2](#)

ITS SIGHTLINE ANALYSIS

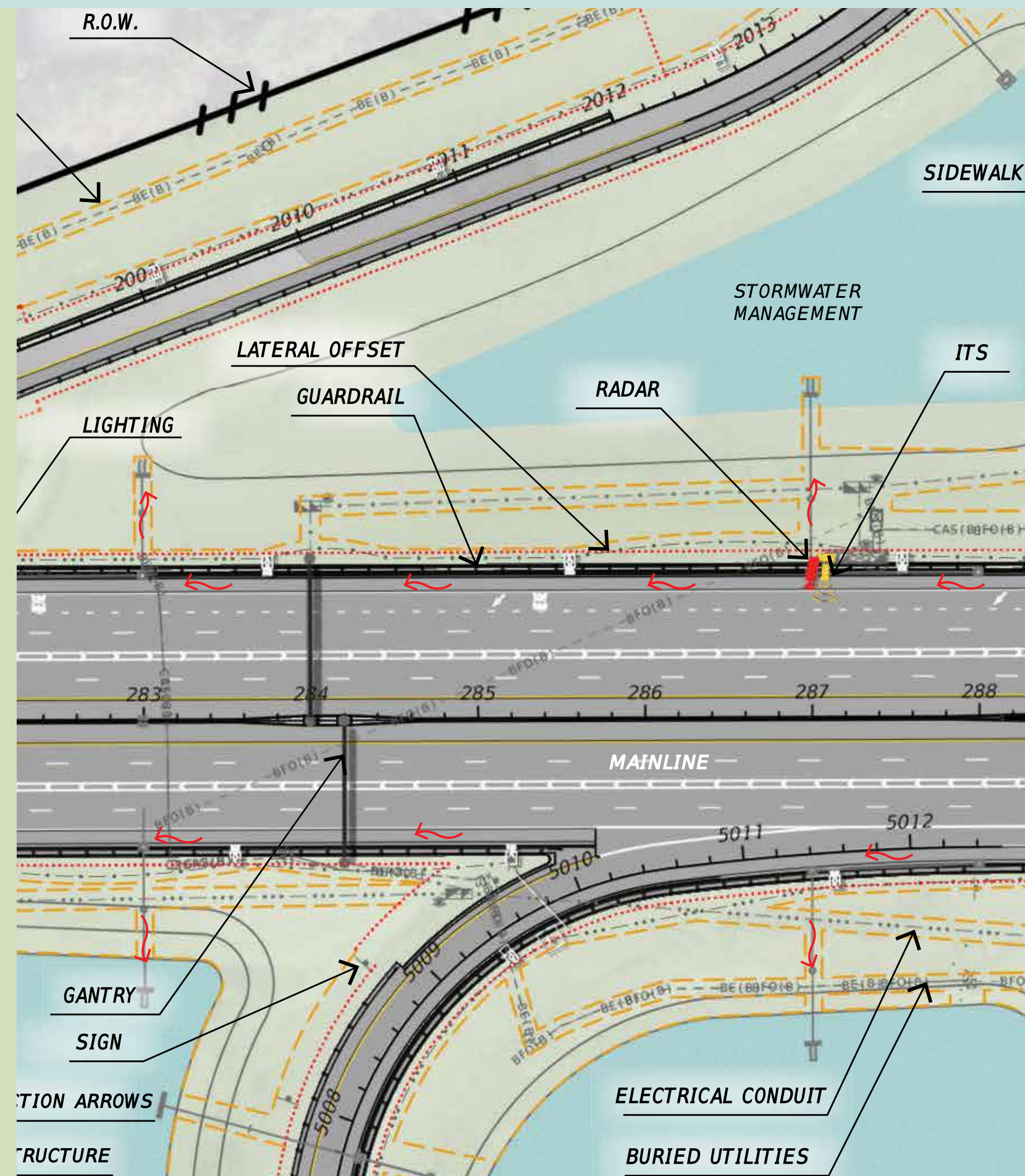


UTILITY COORDINATION

Utility coordination for landscape projects is a critical task. The location of existing utilities plays a significant role in identifying plantable areas within your project limits. FTE maintains a setback chart identifying minimum setbacks requirements for different vegetation types relating to utilities/ facilities. Referring to the Utility Setback Chart, show utilities on the plan with the respected minimum setback requirements set forth by the Turnpike.

Most FTE landscape projects do not provide for utility designation or survey. Utility locations, if shown on the plans, are usually obtained from historical drawings and may not be current or accurate. Accordingly, utility designation and location is delegated to the contractor by means of plan notes.

Utilities will also impact the design of irrigation for your project. Early coordination and documentation with the power service provider when planning for an irrigation system is critical. Designers need to know the location and type of available power for specifying the proper irrigation equipment and establishing service. This will be discussed further in the Resources, section 6, under Irrigation Feasibility Report.

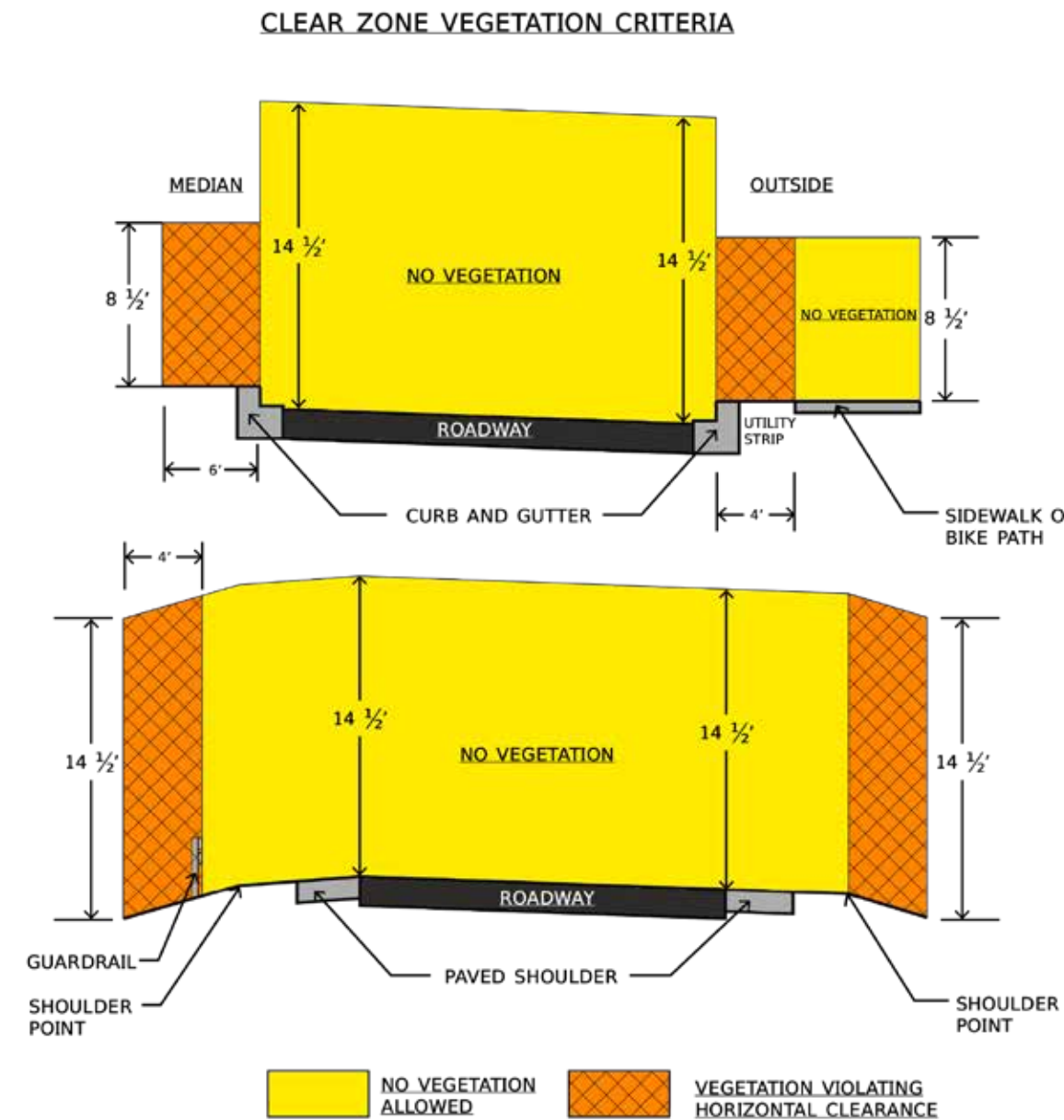


MAINTENANCE

Designers must consider long term maintenance as one of the leading factors in developing their design. It is estimated that 80% of lifetime costs for a landscape planting occur during the anticipated 30 year life-cycle. Accordingly, landscapes must be designed with the intent to minimize these maintenance costs. The use of native species, meadow condition and reforestation as well as following Florida Friendly Landscaping™ principles are a requirement for our design professionals.

For more information visit IFAS FFL:

» <https://ffl.ifas.ufl.edu/>



OUTDOOR ADVERTISING (ODA)

ODA owners have view zone rights. These view zones need to be shown on the plans and cannot be impacted by proposed or existing landscape. When planning the landscape design, give consideration to a plant's future growth and ensure it does not impact the ODA view zone.

"The Outdoor Advertising regulatory program is based on federal law and regulations as well as state statute and rule. Federal law is set forth in the Highway Beautification Act while federal regulations can be found at 23 C.F.R., Section 750. State laws are found in [Chapter 479](#), Florida Statutes. In addition to the state statutes, the Department writes administrative rules to interpret the intent of the statute for the general public. [Chapter 14-10](#), Florida Administrative Code, is the Department's rule chapter which governs outdoor advertising. Copies of the complete rule chapter may be obtained from the Outdoor Advertising Office. Local governments often have their own ordinances which regulate outdoor advertising in their community. The Department cannot issue a permit for an outdoor advertising sign which is not allowed by local ordinances."

The process of working with ODA owners to ensure that their rights are preserved is well documented and described on FDOT's website.

» <https://www.fdot.gov/rightofway/OutdoorAdvertising.shtm>



EXISTING SITE FEATURES

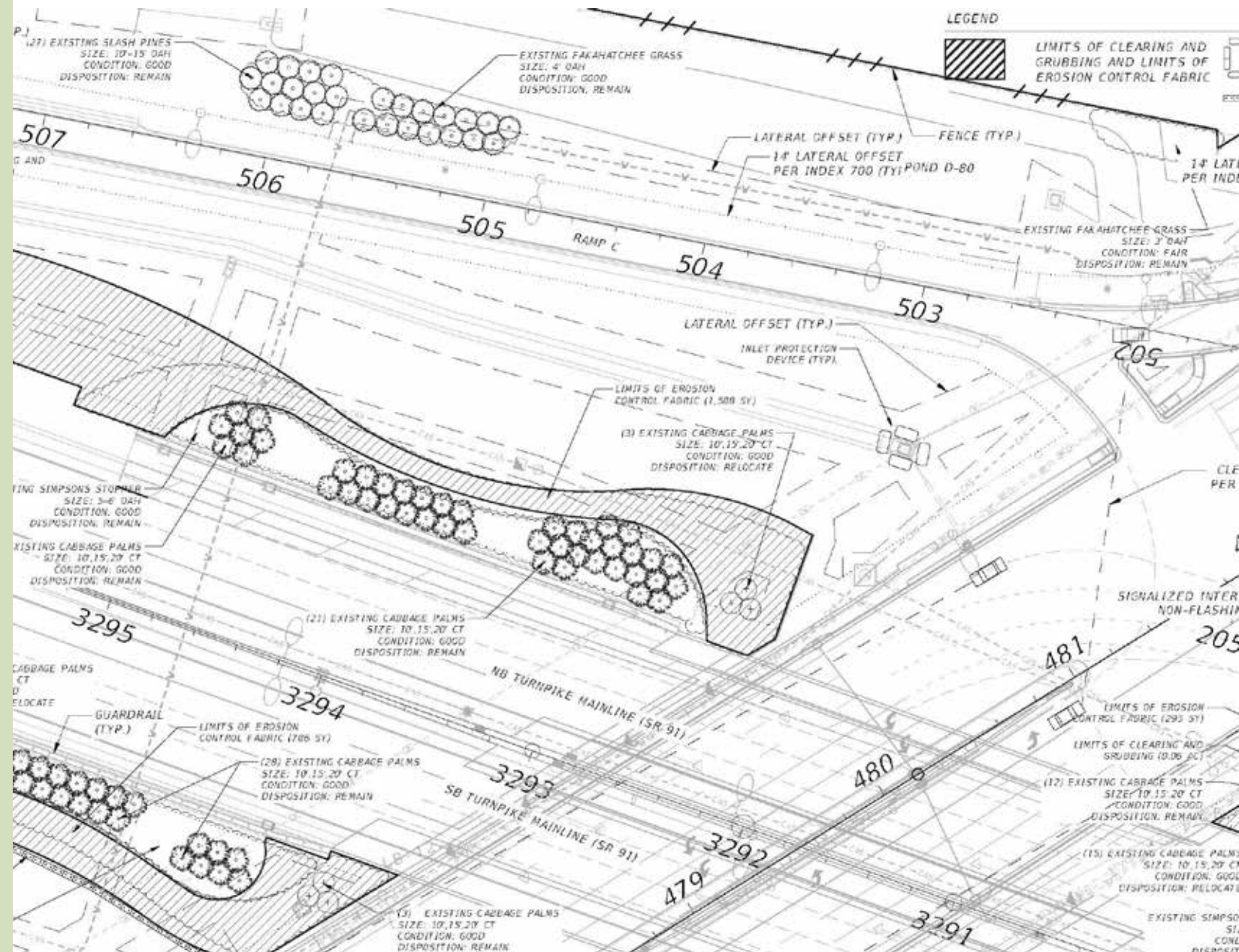
Most sites contain other existing site features critical for further identifying both opportunities and constraints. Examples of these are the following:

EXISTING VEGETATION

Vegetation preservation is the most cost effective way to provide highway beautification. Existing trees that are preserved also contribute more to Ecosystem Services than newly planted trees. State Statute and Departmental Policy require that we conserve existing landscape to the greatest extent possible. Consistent with Departmental Policy, each project must include an evaluation of the existing vegetation and a recommendation for its protection, relocation or removal. Documents included in the Resources section of this manual provide further guidance for vegetation assessment as part of the Existing Roadway Condition Report (ERCAR) process.

Also, refer to FDM chapter 229. Selective Clearing and Grubbing.

» https://fdotwww.blob.core.windows.net/sitefinity/docs/default-source/roadway/fdm/2020/2020fdm229selcleargrubdsn.pdf?sfvrsn=3370acb0_2



ENVIRONMENTAL FEATURES

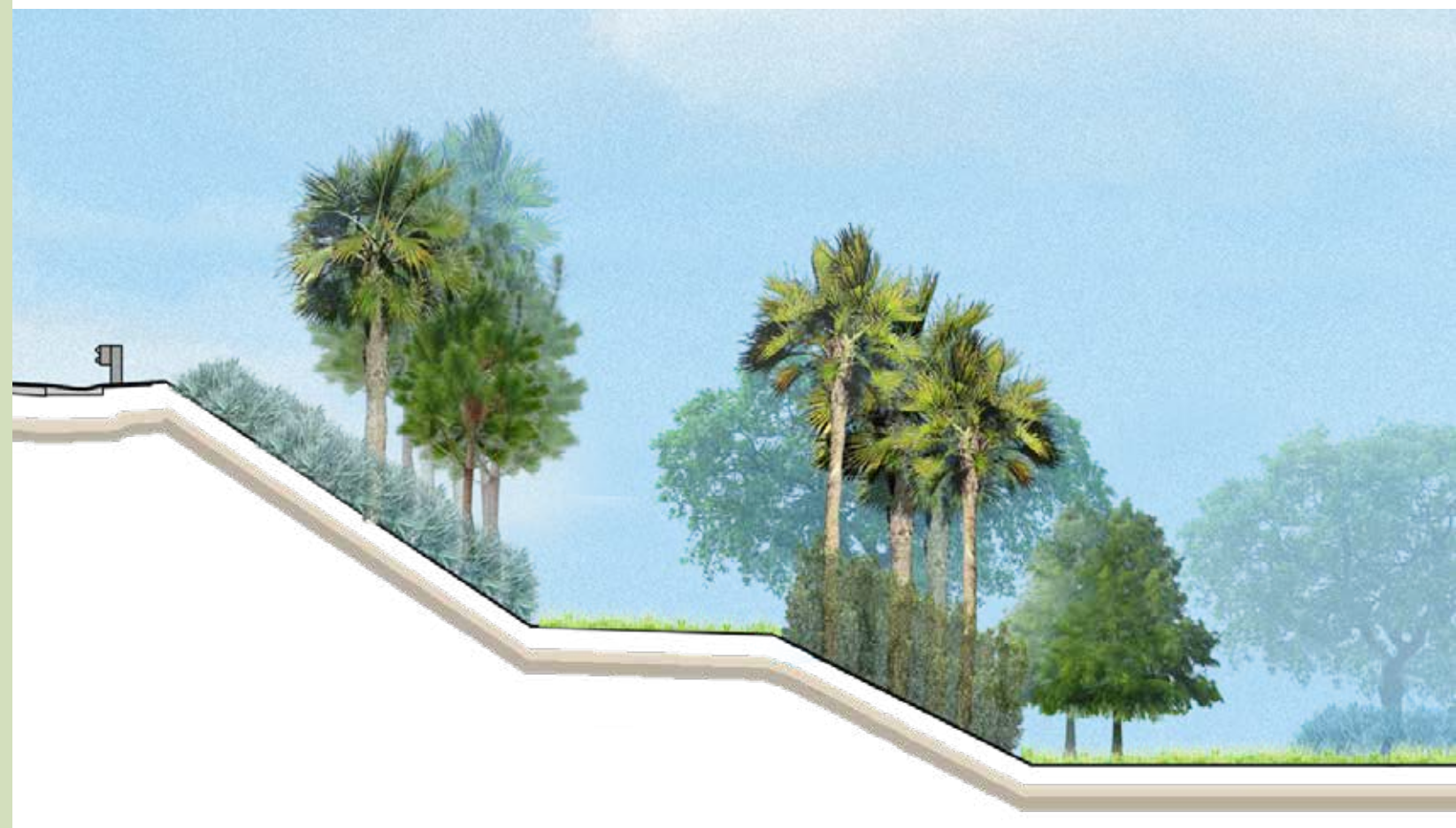
Site analysis must include identification and understanding of the benefits or impacts created by existing environmental conditions. Soils must be analyzed to determine the most suitable plant materials or remediation that may be required for a successful landscape planting. Sites must be analyzed for the presence of threatened or endangered species and the appropriate measures taken if present. Storm water facilities, surface waters and wetlands must be identified and accommodated within the landscape design either as elements to be avoided or enhanced in accordance with current environmental laws.



SLOPE ANALYSIS

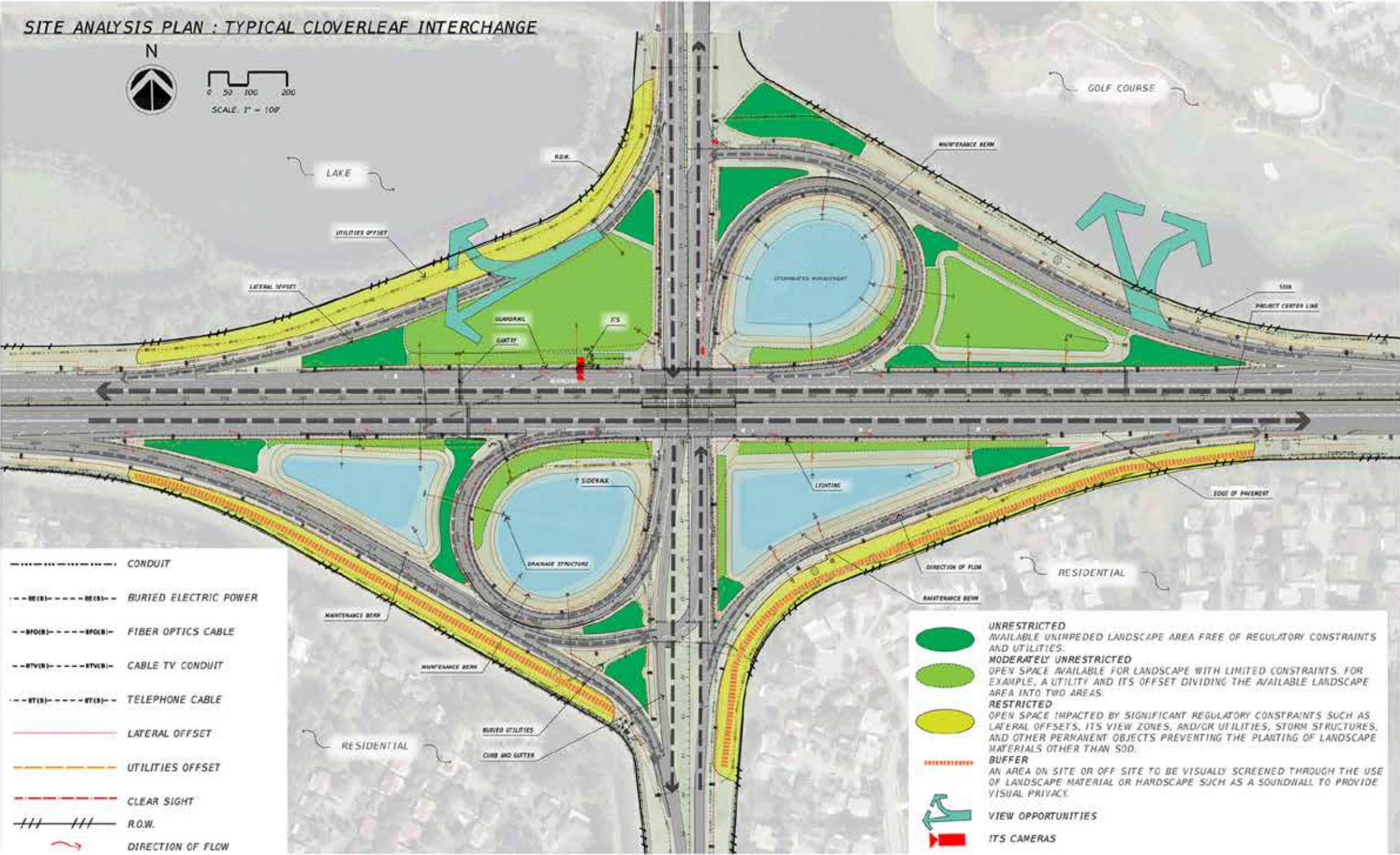
A common issue associated with FTE landscape projects is the presence of steep slopes. Steep slopes are dangerous to mow, difficult or impractical to plant on and often suffer severe erosion. Accordingly, designers must assess slopes for these conditions and recommend suitable solutions. Preferred methods include planting tree species that require little if any maintenance, under-planting trees with shrubs to eliminate mowing and help stabilize soils, the use of erosion control fabric or providing terrace walls. Some erosion issues will require more than the installation of plant material to resolve.

- » Slopes 4:1 or less are considered mild to moderate
- » Slopes 3:1 or greater are considered moderate to extreme and are the upper limit of what is considered mowable.
- » Slopes 2:1 or greater are considered extreme and may require the introduction of retaining walls to create areas suitable for planting.



SITE ANALYSIS PLANS (SAP)

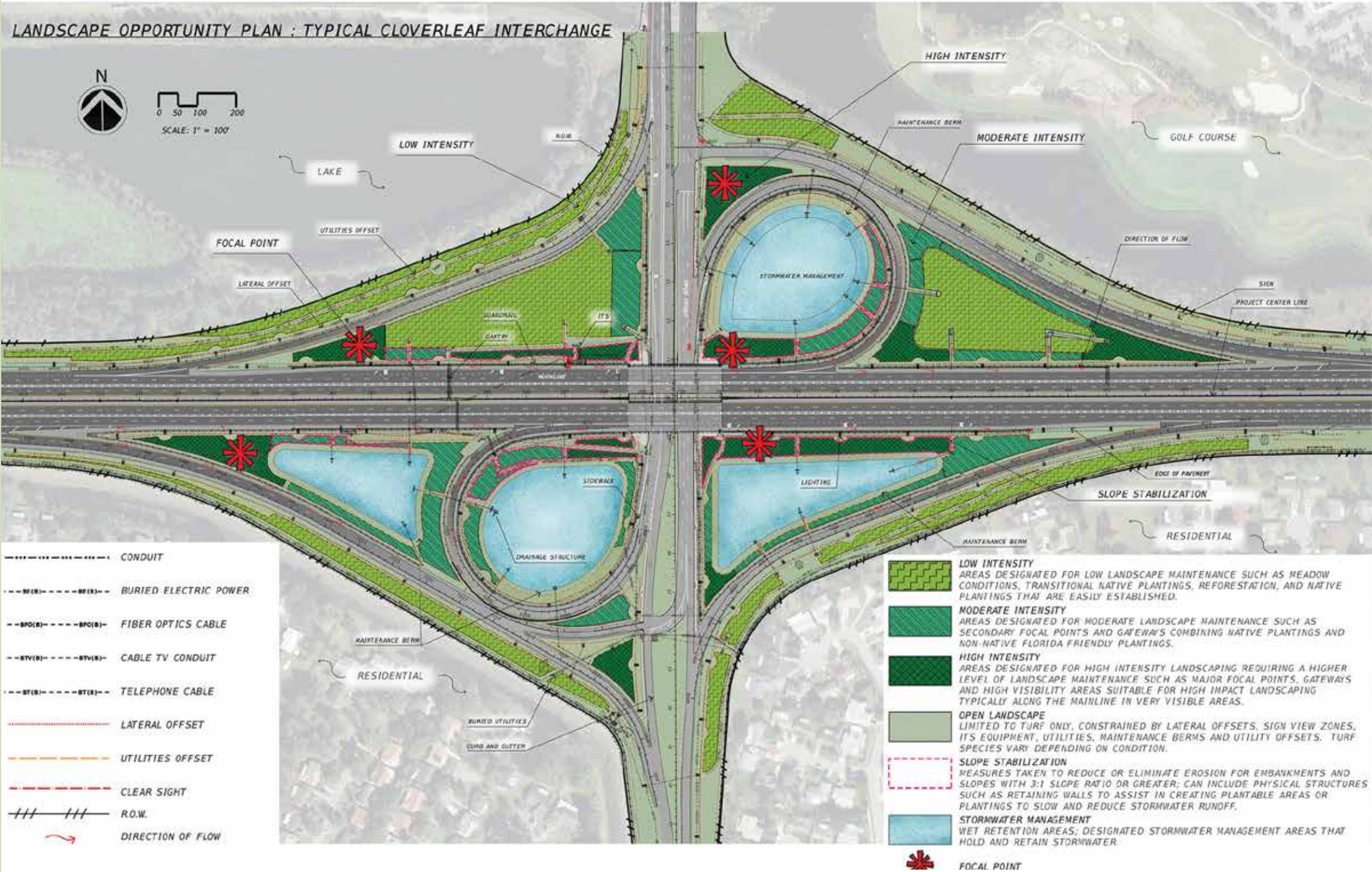
Site Analysis Plans must be developed in order to portray issues with the existing site and serve as a basis for the development of design solutions. Refer to the Turnpike Design Handbook for further guidance.



In addition to identifying the existing conditions found in the field, SAP's should also identify areas available for landscape using the following terms: Unrestricted, Moderately Restricted, and Restricted. **Unrestricted** areas indicate unimpeded open areas free of regulatory constraints and utilities available for landscape improvements. **Moderately Restricted** areas are open space available for landscape with limited constraints. For example, a utility and its offset dividing the available landscape area into two areas. **Restricted** areas are open space impacted by significant regulatory constraints such as lateral offsets, ITS view zones, and/or utilities, storm structures, and other permanent objects preventing the planting of landscape materials other than sod or groundcover. SAP's should also include a discussion of buffers and desirable and undesirable views from and of the roadway. **Buffers** are areas on site or off site to be visually screened through the use of landscape material or hardscape, such as a soundwall, to provide visual privacy.

LANDSCAPE OPPORTUNITY PLANS (LOP)

Landscape Opportunity Plans are developed for PD&E design projects and roadway design projects with no landscape component. The intent is for the landscape designer to work closely with the roadway design team to preserve existing vegetation and areas for future landscape plantings. The design approach should be consistent with the philosophy and directives already outlined.



1. GOALS AND EXPECTATIONS

- » The designer should begin by establishing goals for the project through coordination with the FTE Project Manager and determining if there are any commitments that have been made to the impacted community regarding landscape enhancement.
- » Goals should be developed based on specific project conditions. Examples include slope stabilization, the enhancement of favorable views, buffering of roadway impact on residential neighborhoods, mitigation for impacted ecosystems, etc.

2. IDENTIFYING LANDSCAPE

- » Intensity Zones
After identifying site constraints and defining goals for the project, the designer should develop a landscape concept to be depicted on the LOP. In addition to the information required in the [Turnpike Design Handbook in Section 301.2.1](#), designers should identify landscape intensity for the project site based on the definitions found in Chapter 2 Design Philosophy. These include, but are not limited to, Level 1 – Low Intensity, Level 2 – Moderate Intensity, Level 3 – High Intensity, Level 4 – Meadow Condition

3. IRRIGATION FEASIBILITY

SECTION 5 - LANDSCAPE WORK PROGRAM

PROGRAMMATIC CONSIDERATIONS

Like many programs within FDOT, cost and budget are major factors that help to determine which landscape projects should be developed. Policy dictates that 1.5% of the roadway development program be allocated to landscape projects on a yearly basis. To achieve balance, FTE has created a system for ranking potential landscape projects across all three regions (North, South and West). The hierarchy created as part of FTE's approach places the highest priority and budgets on those areas with the greatest traffic volumes and maximum opportunities for attracting business and tourism. In addition, concentrations of new specimen landscaping at these locations in combination with the appropriate balance of native indigenous species will provide FTE with the highest impact and greatest value for our landscape investment.

FTE has developed a system of project prioritization which informs the development of the five (5) year work program. Project sites are ranked in accordance with their volume of traffic, proximity to major commercial, cultural or recreational features, level of existing landscape treatments and other factors. Each year the work program will be updated to address completed projects, changing demographics or system needs.



PROJECT RANKING CRITERIA

The Landscape Master Plan Ranking Spreadsheet is a planning tool that is used to assist in organizing and prioritizing interchanges on the system for the upcoming fiscal year(s). The categories in which the interchanges are scored are described as follows:

Traffic Volumes Ranking: The primary ranking utilizes traffic volume count in increments of 25,000 into a representative numerical score with the most highly traveled interchanges given priority.

Secondary Ranking: The top scoring projects from the Primary screen are further analyzed in accordance with the following values to determine eligible projects for the Five (5) year Tentative Work Plan:

- » Landmark Destination
- » Available Landscape Area
- » Existing Vegetation Quality
- » Adherence to Design Principles

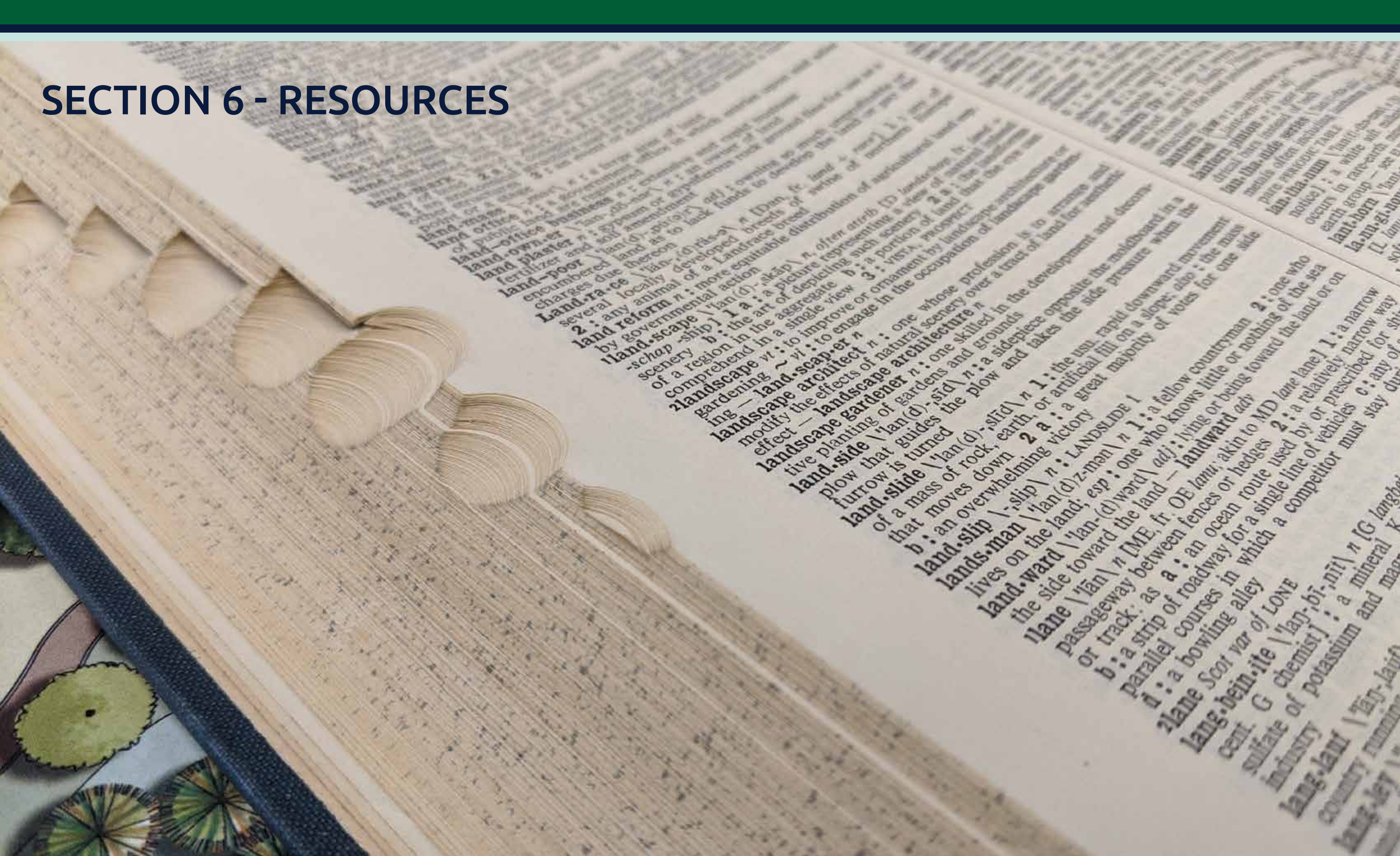
A weighted numerical score is assigned to each ranking category for an interchange. The interchange with the highest scores in the region are considered for further investigation based on interchange design and construction completion dates. The further investigation is based on reported projects associated with the interchange and final selection of the interchanges are based on the professional judgment of the District Landscape Architect and presented to Management for approval. The majority of landscape projects for FTE occur at interchanges. The occasional mainline roadside plantings can be addressed in association with an interchange project. There are also eight (8) rest areas which will be programmed independently.



RANKING SPREADSHEET MATRIX

CURRENT FISCAL YEAR WORK PROGRAM

SECTION 6 - RESOURCES



GLOSSARY

DEFINITIONS

Analysis Plan – Plan which denotes existing site conditions including steep slopes, areas susceptible to erosion, existing vegetation, existing views to screen or enhance, utility clearances, roadway clearances or setback distances, etc.

Clear Sight – See “Sight Distance”

Bubble Diagram – Conceptual plan showing site context, landscape opportunity areas, and areas for proposed planting.

Clear Zone – designated area offset from edge of pavement that should remain clear and free from plantings or other objects; should be plotted or noted on each plan set.

Clearance Pruning – Selective pruning performed by systematically cutting and reducing branches (by performing reduction cuts) on the sides of a tree to provide clearance from buildings, lighting, signage and more.

District Landscape Architect – Landscape Architect for Florida’s Turnpike or other district of FDOT who reviews Final Plans and performs back checks. A list of District

Landscape Architects and contact information can be found here: <https://www.fdot.gov/designsupport/highwaybeautification/contacts.shtm>

Drainage Systems/Structures – Any underground or at grade structures, piping, sleeving, or other equipment for controlling and managing storm water.

Ecosystem Services – landscape areas that enhance the surrounding ecosystem and help maintain the health of the natural surroundings. Ecosystem services included meadow conditions, reforestation, transitional native plantings and pollinator habitats.

Elevation Clearance – Raising or lifting the canopy done by selectively removing branches to provide vertical clearance underneath the canopy. Removal of the lower branches can provide clearance for buildings, signs, vehicle circulation, pedestrian circulation or visual clearance beneath a tree’s canopy.

ERCAR – Existing Roadway Condition Assessment Report; evaluation of all elements against new in construction. <http://www.floridasturnpike.com/design/Documents/DocsPublications/ERCAR%20Sample%20Outline%2020180418.pdf>

FDOT – Florida Department of Transportation; a decentralized agency charged with the establishment, maintenance, and regulation of public transportation in the state of Florida.

Florida Grade #1 – Standard of tree aesthetics that require the trunk branches (forks) into two nearly equal-diameter trunks in the upper half of the tree. (If one trunk is two-thirds of less than the diameter of the other trunk, they do not have equal diameters, making the trunk Florida Fancy.) A noticeable but small void will be left in the crown after removing the top portion of one of the trunks. If there is one trunk, but it has a 5- to 15-degree bow, its grade is Florida #1. Refer to current version of Florida Grades and Standards available from Florida Department of Agriculture and Consumer Services for further detail. <https://www.fdacs.gov/ezs3download/download/60817/1267268/Media/Files/Plant-Industry-Files/Grades-and-Standards/Grades%20and%20Standards%20FEB17%202017.1.pdf>

FTE – Florida’s Turnpike Enterprise; a unit of the Florida Department of Transportation, employing private sector business practices to operate its 461-mile system of limited-access toll highways for the benefit of Florida’s traveling public.

FTE Project Manager – The design consultant must report to the Turnpike’s Project Manger throughout the design process and perform and deliver plan sets as directed by the Project Manager. <https://www.fdot.gov/designsupport/pm/default.shtm>

Gantry – An overhead structure, bridging over an area or roadway, with a platform supporting equipment such as signage, signals, lights or cameras.

Guardrail – protective guarding structures along roadway.

Guardrail Setback Line – distance from which objects can be placed behind (non-roadway side) of guardrail.

Horizontal Clearance – lateral offset distance from the edge of pavement or travel lane to a vertical roadside element or object.

High Intensity Maintenance Zone – The highest level of expected quality and utilization with a high degree of stress on plant material and wear and tear on pavements and site furnishings.

IFAS – University of Florida, Institute of Food and Agricultural Sciences

Intelligent Transportation Systems (ITS) – technology that advances transportation safety and mobility by integrating advance communications technologies into transportation infrastructure and into vehicles. This technology includes electronic toll collection, meters, radar and cameras. https://www.its.dot.gov/factsheets/benefits_factsheet.htm

Intensity (Low) – areas designated for low landscape maintenance such as meadow conditions, transitional native plantings, reforestation, and native plantings that are easily established.

Intensity (High) – areas designated for high intensity landscaping requiring a higher level of landscape maintenance such as major focal points, gateways and high visibility areas suitable for high impact landscaping typically along the mainline in very visible areas.

Landscape Architect – licensed professional in environmental design; the discipline includes the analysis, planning, design, management and stewardship of the natural and built environments and the application of ecological design in development and restoration projects.

Landscape Intensity Zone – varying levels of landscape intensity or density identified per opportunities along a roadway. Levels include Low Intensity and High Intensity.

Landscape Opportunity Plan (LOP) – a plan typically prepared after the site analysis phase and during the roadway concept plan development or the roadway final design phase. A LOP identifies areas that can be planted and planted at which Level. The components of a LOP can be found in Section 301.3.2 of the Turnpike Design Handbook (TDH). <http://www.floridasturnpike.com/design/Documents/DocsPublications/TDH/Final%20TDH/2019%20TDH%20Part%203%20Addendum%201.pdf>

Lateral Offset – setback distance from the edge of the pavement or travel lane to a vertical roadside element or object.

Open Landscape – limited to turf only, constrained by lateral offsets, sign view zones, ITS equipment, utilities, maintenance berms and utility offsets. Turf species vary depending on condition.

Outdoor Advertising (ODA) – a regulatory program based on federal law and regulations as well as state statute and rules. Federal law is set forth in the Highway Beautification Act. Local governments often have their own ordinances which regulate outdoor advertising in their community. The Department (FDOT) cannot issue a permit for an outdoor advertising sign which is not allowed by local ordinances. For ODA, such as billboards, ODA owners have view zone rights.

Pollinator Habitat Plan – plan that includes habitats and planting selections that attract and support natural pollinators such as bees, hummingbirds and butterflies.

Pruning – A method of cutting and removing parts of a tree or plant to control size, health and appearance.

Radar – Radar detection associated with ITS facilities to track speed of vehicles.

Reduction Pruning – Reduction is the selective removal of branches and stems to decrease the height and/or spread of a tree. This type of pruning is used to make the entire tree or portions of the tree smaller and should be accomplished with reduction cuts, not heading cuts. (A heading cut is a type of cut that prunes a shoot no more

than 2 years old back to a bid.) No more than 20%-25% percent of live foliage should be removed from a mature tree in a single pruning.

Sight Distance/Clear Sight Distance – length of roadway visible to a driver; distances in which unobstructed views shall be maintained to allow for safe flow of travel.

Slope Stabilization – measures taken to reduce or eliminate erosion for embankments and slopes with 3:1 slope ratio or greater; can include physical structures such as retaining walls to assist in creating plantable areas or plantings to slow and reduce storm water runoff.

Stormwater Management Areas – wet retention areas; designated stormwater management areas that hold and retain stormwater.

Structural Pruning – The removal of live branches and stems to influence the orientation, spacing, growth rate, strength of attachment, and ultimate size of branches and stems. Structural pruning is used on young and medium-aged trees to help engineer a sustainable trunk and branch arrangement. If young trees are trained early, they will be more likely to remain healthy in the landscape longer than trees left unpruned prior to maturity. Canopy growth can be cleaned, thinned, reduced, raised, or restored to manage risk.

Transitional Native Plantings – Plantings that occur in areas that are neither aquatic nor upland plantings;

these species are native to Florida and can be planted in low areas as they can tolerate the fluctuation between periods of extreme moisture or dry conditions. These native plantings typically require little to no maintenance.

Turnpike Design Handbook (TDH) – Handbook/guide developed to provide consultants, reviewers and management with a single source of additional Turnpike-specific requirements that modify or add to the requirements included in the [Florida Department of Transportation \(FDOT\) Design Manual \(FDM\)](#) as part of the Turnpike’s continuing quality enhancement effort. (See those documents [here](#).) The FDM and the TDH are both 3-part documents: [Part 1 – Development and Processes](#); [Part 2 – Design Criteria](#); [Part 3 – Plans Production](#)

UF/IFAS - University of Florida, Institute of Food and Agricultural Sciences

Utilities Offset – landscape setbacks for trees, palms and narrow trees, shrubs and grasses from various utilities including various underground utilities, overhead wire, gas lines, light poles, and ITS utilities.

FTE SETBACKS

FLORIDA'S TURNPIKE ENTERPRISE (FTE) LANDSCAPE SETBACK CHART																														
GENERAL NOTES:																														
A. DIMENSIONS NOTED THAT ARE NOT INCLUDED IN THE FDOT DESIGN STANDARD INDEXES ARE THOSE ASSIGNED BY FTE. THESE DIMENSIONS MAY BE REDUCED IN SPECIAL CONDITIONS THAN NOTED BELOW SUBJECT TO FTE REVIEW AND APPROVAL ONLY.																														
B. ROADWAY RELATED SETBACKS ARE MEASURED FROM THE EDGE OF TRAVEL LANE.																														
MINIMUM & PREFERRED LANDSCAPE SETBACKS FOR INSTALLATION AND MAINTENANCE OPERATIONS																														
Plant Type	Turnpike Mainline Travel Lane		Multi Lane Ramp		Auxiliary Lanes & Single Lane Ramp		Side Road Travel Lane	Back of Guardrail		M.S.E. Wall	R/W Fence	Drainage Structures	Storm Sewer Pipes	Stormwater Facilities	Wetlands, Open Water Bodies and Wet Stormwater Facilities	Miscellaneous Underground Utilities	Overhead Wires	Gas	Light Poles and Signs	ITS Poles		ITS Duct and Conduct Bank								
	(No Guardrail)		(No Curb and No Guardrail)		(No Curb and No Guardrail)		(With "F" or "E" Guardrail)								(from high water line)		(6)		(7)	(7)										
	P	M	P	M	P	M	P	P	M	M		P	M	M	M	M	P	M	P		P	M	P	M						
CANOPY TREES	40'	36'	24'	18' (1a)	15'	10' (1a)	10'	5'	15'	10'	10'	20'	15'		15' (4)	15'	20'	25'	20'	30'	30'	25'	10'	10'						
			30'	24' (1b)	20'	14' (1b)																								
			36'	30' (1c)	24'	18' (1c)																								
			40'	36' (1d)	30'	24' (1d)																								
PALMS & NARROW TREES	40'	36'	24'	18' (1a)	15'	10' (1a)	10'	6'	10'	6'	10'	6' (5)	15'	10'		20'	15' (4)	10'	5'	20'	10'	20'	15'	20'	30'	20'	10'	6'		
			30'	24' (1b)	20'	14' (1b)																								
			36'	30' (1c)	24'	18' (1c)																								
			40'	36' (1d)	30'	24' (1d)																								
SHRUBS & GRASSES	36'	20'	10'	4'	10'	4'	10'	4'	6'	6'	10'	4' (5)	10'	4' (5)	10'	5'	20'	15'	N/A	N/A	N/A	N/A	N/A	N/A	10'	4'	10'	6'	6'	4'
LEGEND: P=PREFERRED, M=MINIMUM																														
NOTES:																														
(1a) LESS THAN 45 MPH SPEED LIMIT																														
(1b) 45-50 MPH SPEED LIMIT																														
(1c) 55 MPH SPEED LIMIT																														
(1d) GREATER THAN 55 MPH SPEED LIMIT																														
(2) DISTANCE MAY BE GREATER DEPENDING ON MAINTAINED TREE SPECIES CANOPY. LAOR SHALL VERIFY WITH FTE FOR CONFIRMATION OF DIMENSION AS APPLICABLE.																														
(3) PLANTING ON SLOPES OF DRY STORM WATER FACILITIES AND SWALES IS PERMITTED. NO OBLIGATE AND FACULTATIVE WETLAND SPECIES ARE PERMITTED WITHIN 25' FROM SEASONAL HIGH WATER LINE OF THE STORM WATER FACILITY. ONLY PINE STRAW MAY BE USED AT PROPOSED PLANTING LOCATIONS. PLANTING IN BOTTOM OF DRY PONDS SHALL NOT BE PERMITTED. EXCEPTIONS, HOWEVER, MAY BE PERMITTED BY FTE ON A CASE BY CASE BASIS AND ONLY IF ALL OBLIGATE AND FACULTATIVE WETLAND SPECIES ARE AVOIDED. WILDFLOWERS MAY ALSO BE CONSIDERED ON SITE BY SITE BASIS BUT SHALL BE SUBJECT TO FTE APPROVAL.																														
(4) NO OBLIGATE AND FACULTATIVE WETLAND SPECIES ARE PERMITTED WITHIN 25' FROM SEASONAL HIGH WATER LINE OF THE STORM WATER FACILITY. ONLY PINE STRAW MAY BE USED AT PROPOSED PLANTING LOCATIONS.																														
(5) DEPENDENT ON AVAILABLE LANDSCAPE AREA.																														
(6) COMPLY WITH UTILITY COMPANY GUIDELINES AS APPLICABLE.																														
(7) DIMENSIONS SHOWN ARE FROM LIGHT AND SIGN STRUCTURES. NO TREES OR PALMS SHALL BLOCK LINES OF SIGHT.																														
(8) TREES MAY NOT BE PLANTED WITHIN 10 FEET OF THE OUTSIDE EDGE OF STORM SEWER PIPES.																														

Refer to the standalone document "Turnpike Landscape Setback Guide" that is available on the Turnpike Design website under [Design Criteria and Standards](#).

PREFERRED PLANT LIST - CENTRAL FLORIDA

TREES - LARGE

- » American Elm, *Ulmus Americana*
- » Live Oak, *Quercus virginiana*
- » Loblolly Pine, *Pinus taeda*
- » Longleaf Pine, *Pinus palustris*
- » Northern Slash Pine, *Pinus elliottii*
- » Pond Cypress, *Taxodium* spp.
- » Red Maple, *Acer rubrum*
- » River Birch, *Betula nigra*
- » Shumard Oak, *Quercus shumardii*
- » Southern Magnolia, *Magnolia grandiflora*
- » Southern Red Oak, *Quercus falcata*
- » Southern Slash Pine, *Pinus elliottii* var. *densa*
- » Sweet Bay Magnolia, *Magnolia virginiana*
- » Winged Elm, *Ulmus alata*

TREES - MEDIUM

- » American Holly, *Ilex opaca*
- » Crape Myrtle, *Lagerstroemia indica*
- » Dahoon Holly, *Ilex cassine*
- » East Palatka Holly, *Ilex x attenuate*
- » Japanese Blueberry, *Elaeocarpus decipens*
- » Southern Red Cedar, *Juniperus silicola*

TREES - SMALL

- » Buttonbush, *Cephalanthus occidentalis*
- » Florida Privet, *Forestiera segregate*
- » Ligustrum, *Ligustrum japonicum*
- » Nellie R. Stevens Holly, *Ilex x ‘Nellie R. Stevens’*
- » Wax Myrtle, *Myrica cerifera*
- » Yaupon Holly, *Ilex vomitoria*

PALMS

- » Bismarck Palm, *Bismarckia nobilis*
- » Cabbage Palm, *Sabal Palmetto*
- » Chinese Fan Palm, *Livistonia* spp.
- » Date Palms, *Phoenix* spp.
- » European Fan Palm, *Chamaerops humilis*
- » Pindo Palm, *Butia capitata*
- » Washingtonia Palm, *Washingtonia robusta*

SHRUBS - LARGE

- » Buttonbush, *Cephalanthus occidentalis*
- » Bottlebrush, *Callistemon* spp.
- » Florida Privet, *Forestiera segregate*
- » Glossy Abelia, *Abelia x grandiflora*
- » Golden Dewdrop, *Duranta erecta*
- » Lady Palm, *Rhapis excelsa*
- » Loropetalum, *Loropetalum chinense*
- » Needle Palm, *Rhapidophyllum hystrix*
- » Podocarpus, *Podocarpus macropjyllus*
- » Saw Palmetto, *Serenoa repens*
- » Stoppers, *Eugenia* spp.
- » Thryallis, *Galphimia glauca*
- » Wax Myrtle, *Myrica cerifera*
- » Wild Coffee, *Psychotria nervosa*
- » Wild Olive, *Osmanthus americanus*
- » Yaupon Holly, *Ilex vomitoria*

SHRUBS - SMALL

- » Coontie, *Zamia pumila*
- » Fetterbush, *Lyonia lucida*
- » Rosemary, *Rosmarinus* spp.
- » Scrub Palmetto, *Sabal etonia*
- » Texas Sage, *Leucophyllum frutescens*
- » Weeping Lantana, *Lantana depressa*

GRASSES

- » Cordgrass, *Spartina* spp.
- » Fakahatchee Grass, *Tripsacum dactyloides*
- » Florida Gama Grass, *Tripsacum floridana*
- » Muhly Grass, *Muhlenbergia capillaris*

PREFERRED PLANT LIST - SOUTH FLORIDA

TREES - LARGE

- » Buttonwood, *Conocarpus erectus*
- » Live Oak, *Quercus virginiana*
- » Pond Cypress, *Taxodium* spp.
- » Southern Slash Pine, *Pinus elliotii* var. *densa*
- » West Indian Mahogany, *Swietenia mahagoni*
- » Wild Tamarind, *Lysiloma latisiliquum*

TREES - MEDIUM

- » American Holly, *Ilex opaca*
- » Crape Myrtle, *Lagerstroemia indica*
- » Dahoon Holly, *Ilex cassine*
- » East Palatka Holly, *Ilex x attenuate*
- » Geiger Tree, *Cordia sebestena*
- » Japanese Blueberry, *Elaeocarpus decipens*
- » Pigeonplum, *Coccoloba diversifolia*
- » Purple Trumpet Tree, *Tabebuia impetiginosa*
- » Royal poinciana, *Delonix regia*

TREES - SMALL

- » Bottlebrush, *Callistemon* spp.
- » Buttonbush, *Cephalanthus occidentalis*
- » Florida Privet, *Forestiera segregata*
- » Ligustrum, *Ligustrum japonicum*
- » Seagrape, *Coccoloba uvifera*
- » Simpson’s Stopper, *Myrcianthes fragrans*
- » Stoppers, *Eugenia* spp.
- » Wax Myrtle, *Myrica cerifera*
- » White Geiger, *Cordia boissieri*
- » Yaupon Holly, *Ilex vomitoria*

PALMS

- » Alexander Palm, *Ptychosperma elegans*
- » Bismarck Palm, *Bismarckia nobilis*
- » Brittle Thatch Palm/Key Thatch Palm, *Thrinax morrisii*
- » Buccaneer Palm, *Pseudophoenix sargentii*
- » Cabbage Palm, *Sabal Palmetto*
- » Carpentaria Palm, *Carpentaria acuminata*
- » Chinese Fan Palm, *Livistonia* spp.
- » Date Palms, *Phoenix* spp.
- » European Fan Palm, *Chamaerops humilis*
- » Florida Thatch Palm, *Thrinax radiata*
- » Foxtail Palm, *Wodyetia bifurcata*
- » Macarthur Palm, *Ptychosperma macarthurii*
- » Paurotis Palm, *Acolorrhaphe wrightii*
- » Pindo Palm, *Butia capitata*
- » Royal Palm, *Roystonea regia*
- » Washington Palm, *Washingtonia robusta*

SHRUBS - LARGE

- » Beautyberry, *Callicarpa Americana*
- » Buttonbush, *Cephalanthus occidentalis*
- » Cardboard Plant, *Zamia fufuracea*
- » Cocoplum, *Chrysobalanus icaco*
- » Firebush, *Hamelia patens*
- » Florida Privet, *Forestiera segregate*
- » Golden Dewdrop, *Duranta erecta*
- » Lady Palm, *Rhapis excelsa*
- » Loropetalum, *Loropetalum chinense*
- » Needle Palm, *Rapidophyllum hystrix*
- » Pittosporum, *Pittosporum tobira*
- » Podocarpus, *Podocarpus macrophyllus*
- » Rusty Lyonia, *Lyonia ferruginea*

- » Saw Palmetto, *Serenoa repens*
- » Seagrape, *Coccoloba uvifera*
- » Simpson’s Stopper, *Myrcianthes fragrans*
- » Sparkleberry, *Vaccinium arboretum*
- » Stoppers, *Eugenia* spp.
- » Thryallis, *Galphimia glauca*
- » Wax Myrtle, *Myrica cerifera*
- » Wild Coffee, *Psychotria nervosa*
- » Yaupon Holly, *Ilex vomitoria*

SHRUBS - SMALL

- » Coontie, *Zamia pumila*
- » Fetterbush, *Lyonia lucida*
- » Firecracker Plant, *Russelia sarmentosa*
- » Natal Plum, *Carissa macrocarpa*
- » Scrub Palmetto, *Sabal etonia*
- » Texas Sage, *Leucophyllum frutescens*
- » Weeping Lantana, *Lantana depressa*

GRASSES

- » Cordgrass, *Spartina* spp.
- » Fakahatchee Grass, *Tripsacum dactyloides*
- » Florida Gama Grass, *Tripsacum floridana*
- » Muhly Grass, *Muhlenbergia capillaris*

LANDSCAPE IRRIGATION

Roadsides are a hostile environment for plant materials. Less than desirable soils, drainage patterns, heat-island effect and wind make plant survival difficult. Even the most drought-tolerant plants require supplemental watering particularly during the establishment period.

While it is generally not feasible for Florida's Turnpike Enterprise (TPE) to maintain irrigation systems for extended periods, it has been determined that the design and installation of temporary irrigation can be in the best interest of FTE. Providing a well-designed temporary irrigation system for use during the establishment period provides several advantages, including:

- » ***Ensuring FTE's significant investment in plant materials is successful.*** Lack of adequate water during the contractor's establishment period may result in deficiencies in expensive plant materials, particularly palms, which will not be manifested until well after the contractor's obligations for establishment have expired. This results in FTE inheriting many substandard plants that will not perform well or die during their anticipated lifetime.
- » ***Confirming contractors' bids are comparable.*** Experience has demonstrated that if an irrigation system is not included in the bid documents, many contractors will not include sufficient funds in their bids to cover the minimum water requirements for successful plant establishment. They will rely on manual watering or worse, rainfall. These methods have proven unsuccessful on for the majority of projects on which they have been used.
- » ***Enhancing roadside safety and protection of the right of way (ROW).*** Relying on heavy water tanker trucks entering and leaving the highway at uncontrolled points and traveling over buried utilities and drainage structures or over soft ground creates safety and maintenance concerns.

Accordingly, FTE has required under most circumstances, temporary irrigation systems to be installed with the landscape projects.

IRRIGATION FEASIBILITY STUDY

The purpose of the Feasibility Report will be to document the design process that may be used to complete irrigation system design documents, determine availability of a reliable water and power source, and to determine the financial feasibility of installing the irrigation system. The consultant shall prepare a Feasibility Report including an analysis of the water sources, power sources, permitting requirements, watering methods, materials and operational costs associated with a proposed irrigation system design. The Feasibility Report shall include an overall map of the project limits showing preliminary locations of major system components, including water sources, controllers, electrical connections, and sleeves.

WATER SOURCES

The consultant shall determine the appropriate water sources, selected to meet the intent of the project on the basis of durability, cost, water conservation and efficiency, and compatibility with existing Turnpike operations and facilities. FTE encourages the use of a well and manufactured pump system or reclaimed water where available.

WELL WATER

A pump system utilizing a well will provide a very reliable water source for both a permanent and temporary irrigation system installation. There are high initial installation costs for constructing and permitting a well with a pump, however the costs for maintaining an efficient system are low compared to other sources.

The installation of pump system will be dependent on the availability of establishing an electrical service if not already available within the project limits. The well sources may be utilized during construction and during establishment by water trucks as an on-site water source, or utilized by a more permanent installation with an automated irrigation controller.



SURFACE WATER

Pump systems similar to the well source may be used to utilize surface water from retention areas. Retention areas could provide water for a plant establishment period, but may be an unreliable long term solution due to seasonal fluctuations in water levels. In addition, fluctuations in surface water levels caused by withdrawal could have a potential impact to any nearby wetlands.

The installation of a pump system will require an electrical service establishment near the water source. The associated costs of a surface water pump system include the initial installation costs for construction and permitting.

RECLAIMED WATER

Reclaimed water is a reliable water source where available, however pressure conditions may vary with demand. It is an ideal solution where concerns for environmentally sensitive wetlands may be impacted from well or surface water withdrawal.

The water source would not require an electrical connection to operate a pump system or controller. Other benefits of reclaimed water include low installation costs for construction with low impact fees, as well as low ongoing costs for water usage for life of system.



POTABLE WATER

A potable water connection is the most reliable water source with low installation costs for construction. However, potable water has potential high impact fees and high ongoing costs for water usage for life of system.

This water source would not require an electrical connection to operate a pump system or controller.

WATER TRUCK

Another potential irrigation source is manual hand watering with the use of water trucks, hose spraying, and tree water bags. This can be ideal for isolated areas where temporary or permanent irrigation system could not be installed due to location or lack of availability of a reliable power source. In addition, water trucks could utilize any of the above water sources to eliminate the cost for delivering water to the site.

Manual irrigation will require additional costs of labor, safety, and mobilization for the length of plant establishment, however there will be no continuing maintenance costs after plant establishment.



POWER SOURCES

Coordination with the appropriate electrical utility provider on the availability and type of electrical source will be a critical step to establishing the feasibility of installing an irrigation system. The consultant must pull a design ticket to identify utility providers within the project limits. Proposed irrigation system utilizing a power source will require an independent electrical meter account that will be established and owned by the contractor throughout the installation and establishment period.

HARDWIRED (UTILITY)

A hardwired power source utilizing a utility will be required for use with well or surface water source to power a pump system. While this configuration is the most reliable, a new power service will have a moderate installation cost with continuing usage costs for the life of the system, with the potential for an impact fee from the utility service provider.

SOLAR

Solar power could be utilized to operate automated controllers on systems utilizing reclaimed or potable water that do not require a pump system. Solar power can have higher installation costs with little to no ongoing costs for life of system and is ideal for isolated areas where power is not available or accessible.

BATTERY

Similar to solar, battery-powered controllers may be utilized to operate automated irrigation controllers on systems utilizing reclaimed or potable water that do not require a pump system. Battery-powered controllers are the most affordable option with low installation costs, however battery-operated controllers will require a maintenance plan for battery replacement. In addition, a typical battery-operated controller lacks features available to traditionally hardwired controllers.



PERMITTING

Water use permits, well construction permits, applications and payment of associated fees should be documented in the Feasibility Report. The consultant shall provide coordination with the appropriate water management district, health department, and local municipalities to determine permit fees and procedures. Permitting, where required, will become the responsibility of the contractor.

IRRIGATION METHODS

If an irrigation system installation is recommended in the Feasibility Report, the consultant shall determine the types of irrigation strategies that shall be utilized throughout the project.

Preliminary calculations of water use to size the water source and electrical requirements.

OVERHEAD

Overhead application of water is the primary application method for landscape and turf irrigation systems due to water efficiency, automation, and cost effectiveness.

Overhead irrigation offers flexibility with water sources. The products commercially available are designed to utilize a variety of water sources including wells, surface water, reclaimed, or potable water. In addition, equipment designs focus on applying water efficiently by maximizing distribution uniformity for various weather and soil conditions. A well-designed system will take into account equipment performance, head spacing, and distribution uniformity to effectively provide supplemental water to landscapes.

Different types of overhead application nozzles include sprays, rotary, and rotor type irrigation application devices.

Rotary nozzles, a type of multi-trajectory rotating stream nozzle, are the most efficient product for overhead type irrigation with a distribution uniformity of 80%. Rotary nozzles distribute water uniformly onto landscape at a slower application rate to allow the soil to intake water without runoff. The low precipitation application is beneficial on slopes and roadway embankments to establish stabilization plantings. Increased efficiency results in 30% less water use when compared to traditional sprays and significantly reduces wasteful runoff.

Water conservation can be improved when utilizing more traditional rotors and sprays through the use of water saving features such as check valves, matched precipitation, and pressure regulation.



MICRO IRRIGATION

Micro irrigation is considered to be the most efficient form of water application when designed and maintained properly. Micro irrigation utilizes slow and frequent application of water to the soil, delivering water efficiently to the base of each plant through a system of flexible irrigation tubing, drip emitters, bubblers, and micro sprays.

Due to the small diameter of pipe tubing and emitters, micro irrigation is prone to clogging where low-quality water is being utilized. A system with a well or surface water source will be dependent on the use of filtration to remove inorganic particles and control the organic material that may enter the system.

MANUAL WATERING

Supplemental water for establishing landscape plantings can be provided to landscape that are isolated from a viable

water or power source through the use of a combination of water trucks, hose spraying, and tree watering bags.

Manual watering requires additional cost for labor, safety, and mobilization. Ensuring the safety of landscape crews and the accessibility of the site will be especially important to consider when selecting suitable areas to receive this method of watering; specifically along high speed areas, pull off areas, and steep embankments.

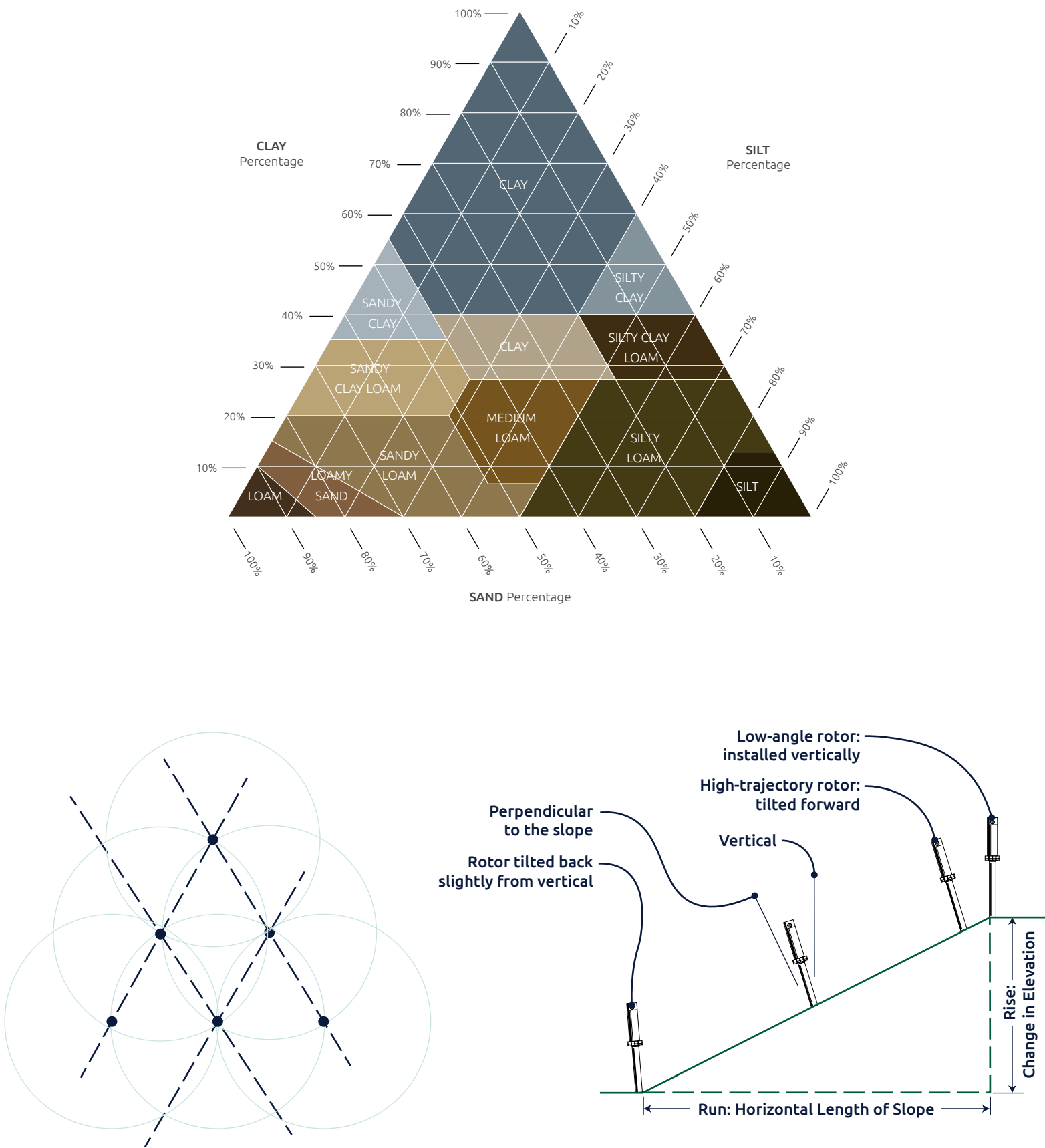
While a sprinkler or drip emitter can be designed to efficiently distribute water automatically, manual watering relies on the expertise of the operator to ensure plant material receives water and can be an inefficient application of water to turf and ornamental landscape. Watering bags for tree establishment provide a slow release of water directly to the root system, but are susceptible to damage.



IRRIGATION DESIGN STRATEGIES

The following irrigation strategies are recommended to encourage consistency between irrigation designs along the FTE system. The strategies have been developed from best practices and lessons learned from previous FTE landscape projects, and are intended to serve as a guide to encourage the design of irrigation systems that help to ensure successful landscape installations, are resilient to harsh conditions, and do not significantly increase project maintenance requirements.

In addition to the design strategies, the irrigation design shall incorporate standards defined in the Florida Building Code, Appendix F. The design shall also incorporate recommendations from the Florida Irrigation Society Standards and Specifications for Turf and Landscape Irrigation Systems, Fourth Edition.



TURF AREAS

Irrigation of turf areas along the FTE is generally discouraged due to the high watering requirement and increased maintenance and mowing of large areas. Turf areas adjacent to heavy pedestrian activity such as parking areas and rest stops may benefit from an irrigation system. High visibility areas, gateways, and areas susceptible to soil erosion where shrubs or groundcovers cannot be utilized may also benefit from irrigation and add to beautification. The use of irrigation for establishing turf areas may be approved on a case-by-case basis.

- » Spray nozzles with matched precipitation installed on a 6" pop-up are recommended for areas 4' wide up to 18'. Factory-installed pressure regulation is recommended to reduce misting and overspray on to roadways and hardscape areas.
- » Low-volume rotary type nozzles installed on a 6" pop-up are recommended for areas 4' wide up to 35', especially where low application rates are desired for embankments and poor soil intake rates.
- » Pop-up rotors may be utilized for irrigating large areas, 25' and greater.

GROUNDCOVERS, SHRUBS, AND ORNAMENTAL GRASSES

Where groundcovers and shrubs are used for screening, embankment stabilization, or beautification, overhead irrigation is encouraged for the duration of the establishment period. The design should consider plant watering requirements, micro-climate factors, and soil intake rates when zoning a system and selecting the appropriate irrigation products.

- » Drip irrigation is only recommended to eliminate overspray onto buildings where hard water or iron deposits are present in the water source. Drip irrigation may also be recommended in areas smaller than 4' wide.
- » Spray nozzles with matched precipitation installed on a fixed shrub riser are recommended for areas 4' wide up to 18'. Factory-installed pressure regulation is recommended to reduce misting and overspray on to roadways and hardscape areas.
- » Low-volume rotary type nozzles installed on a fixed shrub riser are recommended for areas 4' wide up to 35', especially where low application rates are desired for embankments and poor soil intake rates.
- » Rotors installed on a riser may be utilized for irrigating large areas, 25' and greater.



TREES AND PALMS

Trees and palms along the FTE contribute the greatest visual impact in a landscape project. Many of these plantings located in harsh micro-climates and artificially created planting areas are susceptible to stress, making supplemental watering essential to proper establishment. When roadway conditions make these areas inaccessible to maintenance vehicles or water trucks, a well designed irrigation system will ensure proper watering has occurred.

- » Fixed flow rate pressure compensating bubblers on a flex hose riser, installed inside of mulch watering ring. Size flow rate and quantity of bubblers to provide the proper amount of water for each planting. Design to consider planting size, location, elevation, and soil type.
- » Fixed flow rate pressure compensating bubblers installed below grade inside a preferred pipe, ideal for areas with compacted soils or plaza areas with tree planting pits. Size flow rate and quantity of bubblers to provide the proper amount of water for each planting. Design to consider planting size, location, elevation, and soil type.

WILDFLOWERS AND NATIVE PLANTINGS

When necessary for the establishment of native area infill plantings and wildflower areas, manual watering with quick-coupler valves installed on nearby irrigation systems can provide a reliable water source without the need to transport water to the site.

- » Quick-coupler valves installed below grade on a swing-type riser. Valve boxes with SCTE Tier 8 load ratings are recommended in grassed areas for protection from landscape equipment and light trucks.

AUTOMATIC IRRIGATION CONTROLLER

Automated scheduling adjustments based on weather or accumulated rainfall promote water conservation and help to ensure landscape material is not over-watered. Irrigation controllers or pump monitoring systems that feature remote water management will help to ensure the landscape has received irrigation and alerts maintenance of issues in the field.

Decoder controllers allow for future system expansion and can reduce the complexity of an irrigation system on very long or large projects.

DIRECTIONAL BORING

Limit the number of directional bores. Design ticket and utility coordination is critical during the installation. May be used to extend irrigation water sources, electrical service, and automated irrigation control across interchanges, into medians, and other isolated areas that may not have direct access to water or power.

IRRIGATION EQUIPMENT

Valve boxes for irrigation valves installed within grassed areas are more susceptible to damage from incidental traffic and maintenance activity. Where valve boxes cannot be installed in shrub beds, a valve box with SCTE Tier 8 load ratings are recommended to protect irrigation equipment from landscape equipment and light trucks.

Waterproof irrigation wiring connections.



IRRIGATION TECHNICAL SPECIAL PROVISIONS

When specifying an irrigation system design, the consultant shall comply with the FDOT Specifications Handbook for developing the Irrigation Technical Special Provisions (TSP) package. The Irrigation TSP must complement the Irrigation Plans and incorporate all recommendations developed in the Irrigation Feasibility Study.

REFERENCES

BIBLIOGRAPHY