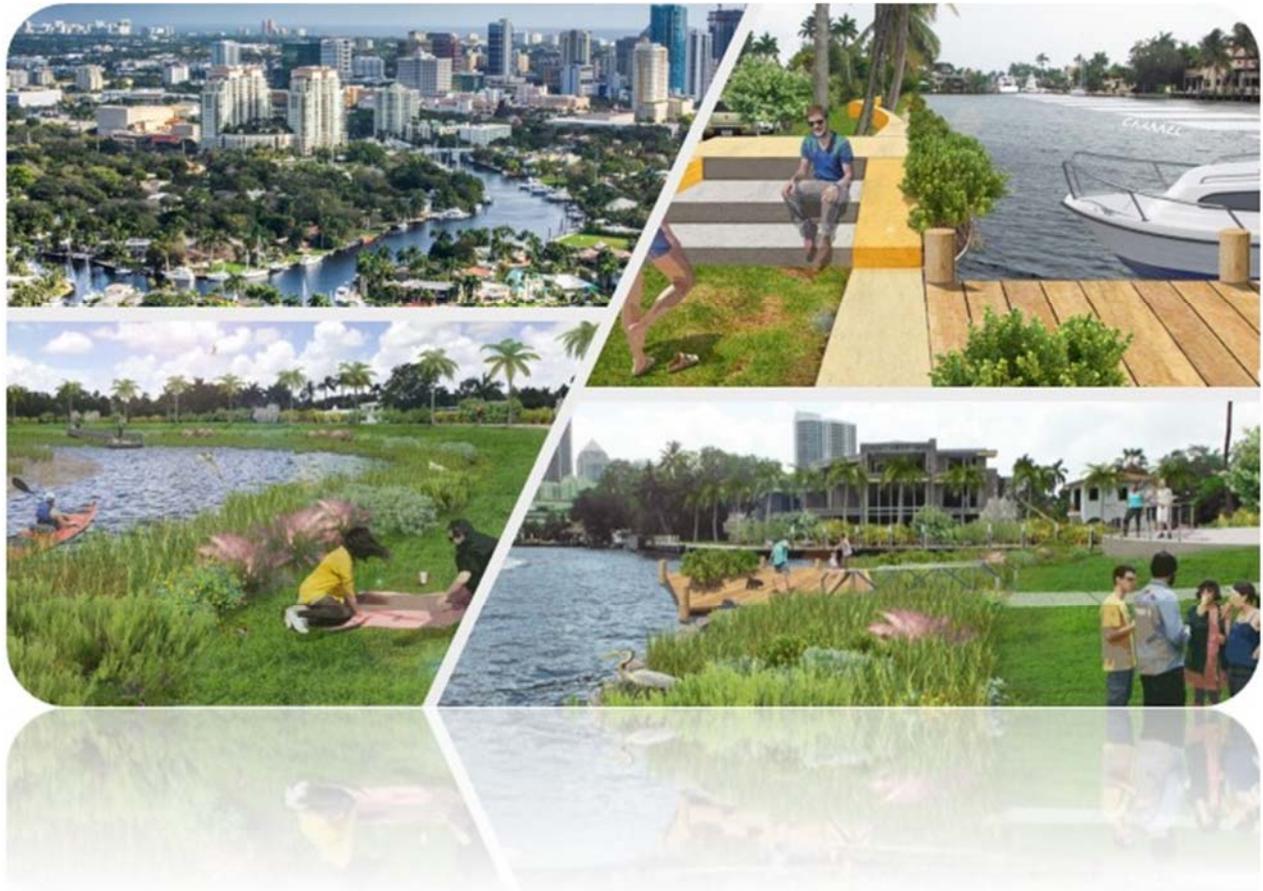


BROWARD COUNTY RESILIENT SHORELINES SEAWALL DESIGN ALTERNATIVES: PERMITTING AND PROBABLE COSTING GUIDE

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BROWARD COUNTY RESILIENT SHORELINES SEAWALL DESIGN ALTERNATIVES: PERMITTING AND PROBABLE COSTING GUIDE

1.0 INTRODUCTION

In Broward County, by the year 2060, sea level is expected to increase over 2-feet¹ (**Figure 1**). Unaddressed, accompanying nuisance tidal flooding (sunny day flooding) has potential to exceed 200-days a year². This has prompted County planning investigations into regional resilience standards for seawall development and revealed a protective short-coming among waterfront properties in the County; many seawalls are of insufficient height to meet coastal hazard projections³. To sustain the quality of our neighborhoods, and succeed in addressing future property risk⁴, the community must respond. The pace of redevelopment in the region is intensifying and every seawall unable to meet future flood risk is a potential point of community vulnerability. However, under the legacy of traditional shoreline armoring and channelization, many of the County's ecologically and commercially important estuarine resources are already faltering. Without a parallel effort to restore shoreline habitat and improve water quality, the patterns of conventional development and the pressures of climate change will likely overwhelm the existing inshore ecosystem. We must act, not only to preserve our homes and properties, but also to preserve our environment. With a need for community action driving updated seawall and flood protections standards, the potential for accompanying community and environmental benefit has seldom been more pragmatically and expediently achievable.

The standard of living enjoyed by County residents and visitors, alike, can be sustained under the threat of climate change and associated developmental pressures if protective coastal flood barriers are reimagined to alternatively provide ecological benefits as "living shorelines". Habitat enhancing components can be developed and integrated into flood protection infrastructure that serve to improve or provide ecologically important services lost to tradition vertical armoring practices. The timing couldn't be more critical. In the wake of broad-scale redevelopment expected with renewed seawall policy guidance^{5,6}, each incremental improvement in environmental benefit has the potential to add to a collectively larger positive impact. Furthermore, environmental benefits naturally extend to local economy as well, with a healthy environment and waters assuring the support of real property interests and commercially important resources, like larval fin fish and coral reefs. To better our community, and prepare for the challenges to come, underdeveloped and failing seawalls must be redeveloped to foster both a more resilient community *and* a more resilient environment.

*Many terms and concepts in this report are technically oriented and may not be familiar to non-specialists. For ease of use, many these terms have been printed in a **bold italic font** and have been included in a Glossary of terms for potential clarification.*

This report offers a starting point to navigating the decision-making process for creating habitat supporting, living shoreline-based, seawall enhancements. The details, documents, and agency contacts

provided herein are meant to offer a lead in understanding the options and demystifying the regulatory process. They introduce living shoreline design, regulatory permitting agency, and costing considerations, and explore their associations through case studies involving living shoreline/bioengineered seawall adaptation of existing infrastructure under four general site conditions: shallow-water, low- and high-wake conditions, and deep-water, low- and high-wake conditions. These site conditions are considered broadly representative of those likely to be encountered along the shoreline of estuarine waterfront properties in Broward County. The living seawall case studies explored in this document are designed to provide protection and adaptive flexibility to changing environmental conditions projected through the year 2060; however, they are not fully representative of all potential design options, they offer only a cursory illustration of a myriad of options, for living shoreline redevelopment and seawall habitat enhancement. Each property is unique in layout and environmental condition, but common to them all is the threat of changing coastal climate and rising seas. Environmental restoration goals *can* be aligned with the seawall adaptation process. When the time comes to repair or replace your existing seawall, explore the possibilities of protecting your property with a *living shoreline* to create a safer community and a healthier ecosystem.

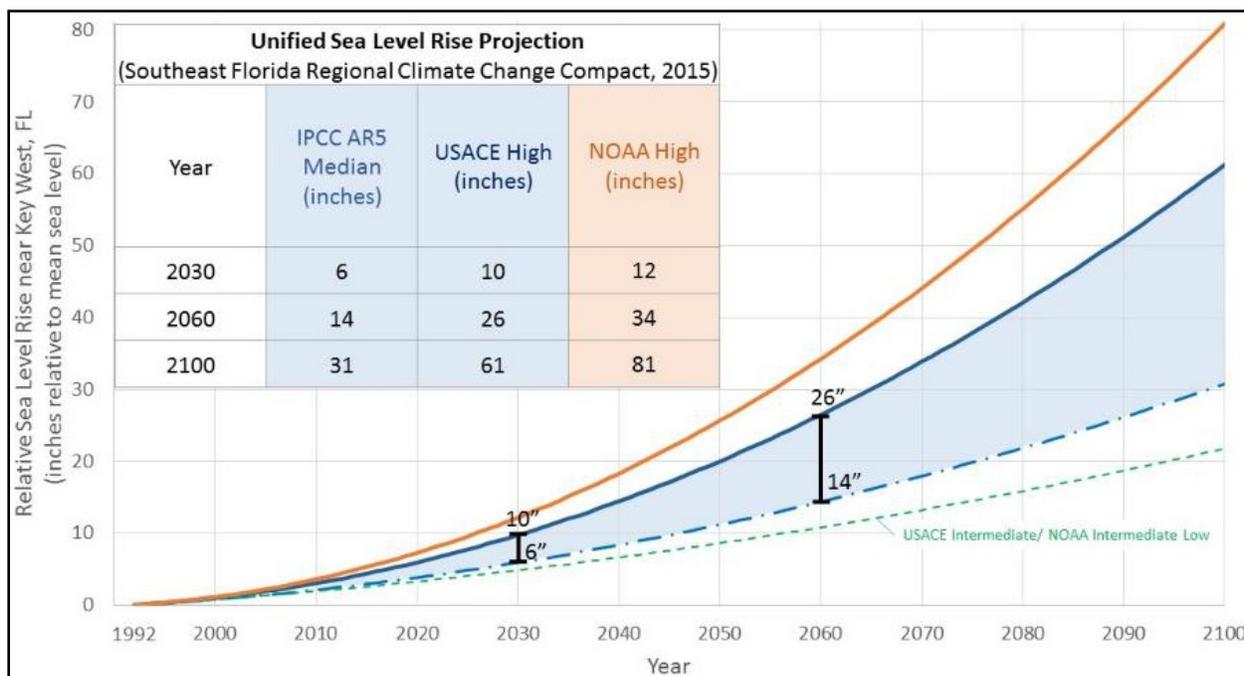


Figure 1: Unified Southeast Florida Sea Level Rise Projection

Published by the Southeast Florida Regional Climate Change Compact, 2015. Expectations driving design specifications in this report are derived using the USACE, high, 2060 sea level elevation projections of 26-inches above current conditions.

2.0 WHAT IS A LIVING SHORELINE?

The collective legacy of traditional concrete shoreline armoring and channelization in South East Florida has resulted in the loss of many important and economically beneficial habitats and species from County estuaries^{6,7}. Nature based, or green, seawall treatments are emerging as an effective option to that tradition⁸. These types of treatments include, or mimic, natural environmental features to protect coastal properties from flooding and storms, enhance natural beauty, and convey ecological benefit to the associated estuary by restoring or enhancing shoreline habitat and improving water quality.

Often referred to as “seawall enhancements”, when the shoreline greening concept is extended to include naturally graded and native planted restorations, it is more commonly referred to as “living shorelines”. The primary aim of enhanced seawall and living shoreline designs and components include:

1. creating, preserving, or facilitating the capacity of shorelines or shoreline infrastructure to protect against risk, and/or adapt to future risk level(s) from coastal tidal and storm flooding,
2. creating ecologically useful shoreline and submerged shoreline habitat, through the inclusion of shoreline structure or structures favorable to the survival or recruitment of plant and animal communities (e.g. intertidal grasses, trees, butterflies, fish, bivalves, sponges, seagrasses, and algae) that would not otherwise be present as a result of development or other non-naturally induced factors,
3. improving water quality by promoting ground water adsorption of localized stormwater that would typically pond or contribute to channelized stormwater runoff and/or providing for natural filtration of excessive stormwater runoff through planted or otherwise biologically filtered drainage pathways.

For the most part, well designed living shoreline-based seawalls will inherently convey environmental benefit to the shoreline and nearshore environment over traditional vertical concrete **bulkheads**; the bar is not high. Seawall designs and treatments to restore habitat benefits typically include the restoration of natural environmental characteristics (e.g. graded slope, cap rock ridge) and components (e.g. plants and planters), within the intertidal range of the upper shoreline and subtidal bottom; however, if space is available, nearshore breakwaters and sills are also commonly used to provide wave **attenuation**, for protection of shoreline components, and expansion of subtidal habitat (e.g. seagrass restoration). Many of these treatments will potentially fulfill multiple purposes; for example, planters can be configured to provide space for intertidal vegetation, add subtidal habitat complexity, attenuate wave energy, and filter stormwater runoff. Even relatively simple additions to existing seawalls, such as placing subtidal rip-rap at the base of a seawall, a scour-toe, can help not only extend seawall life expectancy, but also provide habitat complexity (that is beneficial to juvenile fish) and improve water quality (by supporting filter feeding organisms such as bivalves and sponges).



Figure 2: Living Shoreline at Stewart Middle School (Tampa, FL)

Other components, that can be included during new seawall construction, redevelopment, and retrofit, and serve to enhance and improve habitat conditions will be discussed, later in this guide, through the use of design case studies (Section 5.0).

3.0 LIVING SHORELINE SITE ASSESSMENT AND DESIGN CONSIDERATIONS

This section addresses living seawall design factors that will be necessary to complete the project design process and, ultimately, be required for permitting of project construction. Obtaining reliable design and engineering services for the development any seawall or shoreline restoration is imperative. The employment of engineering and environmental professionals to thoroughly assess property layout and environmental conditions will ensure the highest likelihood of project success and longevity. Furthermore, before committing to a course of action, it is recommended that you initiate preliminary consultation, regarding design specifications and objectives, with local, state, and federal regulatory permitting agencies (see Section 3.0); professional engineers and designers will be able to facilitate these discussions. The information needed by permitting agencies, to determine project feasibility, can seem technically and administratively overwhelming; however, it is meant to assure not only a safe and functional project, but also the safety of the neighboring community. If, through professional training or otherwise, you are inclined to manage (i.e. coordinate, subcontract) or tackle any aspect(s) of project design and engineering on your own, consult with an industry professional contractor, engineer, or

applicable regulatory agency to be sure that the quantity and quality of data gathered are sufficient for project regulatory review.

3.1 Site Assessments

Site investigations are an essential project component in selecting design alternatives that are suitable for a particular shoreline. At a minimum, data collected when characterizing a given property should include land-survey and mapping data, environmental resource assessment(s), and sediment/geotechnical investigations. The location and size of a project will affect the necessary level of scope to these investigations, for example, site assessments on residential properties will likely be significantly curtailed relative to those for city parks or substantially larger projects. Site conditions can influence project design specifications, the type of construction materials used, and the expected maintenance costs and structural lifespan of a project. For example, sediment core samples might determine that shoreline profile stability is too unstable for certain design elements, such as pre-cast planter structures, and that bedding stone and rip-rap foundation are needed to minimize structural settlement. For the most part, if needed, all of these services can be arranged and facilitated by a professional project contractor or engineer.

Land Survey and Mapping - Survey information should be collected by a professional surveyor registered in the State of Florida. Professional land surveyors can be found through your local telephone index, and further licensing information is available through the Florida Department of Agriculture and Consumer Services, through which the licensing status of surveyors and mappers can be queried by county and city⁹.

Typically, survey data is collected on regularly spaced intervals ranging from 25-foot to 50-foot intervals along a subject property and should extend at least 20-feet past the limits of the anticipated project area. Survey will need to include both upland (topographic) and offshore (bathymetric) data points plotted on an aerial background. Regulatory agencies will look at legal setbacks and proposed project specifications in relation to existing shoreline protection for potential permitting exemptions.

Environmental Resource Assessments – Regulatory agencies will be looking to see whether there is wetland habitat, submerged aquatic vegetation (SAV), or otherwise protected habitat or species within or adjacent to a project area. Environmental assessments, in concert with land survey and mapping, will help to avoid any impacts to these protected environmental components and expedite permitting overview. Environmental resources surveys may include:

Wetland Survey – The specific location of onsite natural resources such as wetland communities is officially known as the jurisdictional boundaries of protected/regulated natural resources. If there are wetlands within the proposed project limits these have to be documented and characterized. Working with an industry professional (biologist/ecologist) the extent of the wetland community can be delineated and characterized. This is a required step in the regulatory review process. The jurisdictional limits of any onsite wetlands should also be depicted on the topographic survey, thus this site assessment should be done first so that the limits of any jurisdictional wetlands can be picked up by the land surveyor. The regulatory agencies, Broward County staff, can verify those limits as part of their onsite review process. If possible, the resultant living shoreline design should try and avoid permanent impacts to these resources to help streamline the regulatory approval process.

Benthic Resources Survey – In addition to the assessment of the upland areas for jurisdictional wetlands communities; the adjacent underwater areas also need to be canvassed to determine whether there are any seagrass beds or other essential fisheries habitat, such as oyster beds or corals. Again, working with a biologist/ecologist to field verify whether there are any of these natural resources within the project vicinity. If possible, avoidance of impacts to these natural resources is the best way to expedite the regulatory approval process.

Soil and Sediment Stability - Assessing soil types within and adjacent to a project area are a crucial part of choosing design alternatives. Sediment samples may be necessary to determine the suitability of local soils for aggregate stability, drainage adequacy, or to ensure plant survival. For example, it is helpful to identify soil and rock layers, and their respective depths, so that engineering design specifications can be properly incorporated into a project.; Canals can often collect detritus and organic mucks that are not conducive for the placement of heavier building materials like rip-rap. Mucky soils may need to be removed and replaced with sand, or other aggregates, which can then be compacted and/or graded (e.g. 6:1 to 10:1 slope) to increase a shoreline’s stability or to dissipate wave energy when creating a vegetated habitat buffer.

3.2 Project Design Considerations

As a property owner, there are at least a few design factors that should be considered when planning to construct or redevelop a seawall. Flooding and erosion are two major threats to waterfront homeowners, and protection from these hazards is of primary importance to the success and longevity of any seawall project (i.e. assuring the protection of property and the safety of residents). The good news is that these issues have been well studied within the County¹⁰, and shoreline stabilization design solutions are available. Secondly, perhaps, maintaining recreational access to the water and an owner’s aesthetics and personal values need to be considered. Below we provide a few examples of criterion that water front property owners may wish to reflect upon when addressing the function of their **seawall** as a flood protection barrier, a point of egress to the water, and in relation to personal aesthetics and values when designing a more naturally responsible option to traditional concrete **bulkheads**.

Flood and Erosion Protection – Three main hazards that must be addresses for any given seawall enhancement project are sea level rise (and the potential for additive storm surge), **attenuation** of erosional wave fields, and stormwater conveyance. Any project design that fails to properly protect from flood and erosion risk is also likely to fail in other intents.

Sea Level Rise/Storm Surge - The U.S. Army Corps of Engineers estimates that up to 87 percent of seawalls in Broward County are insufficient to meet even near-term decadal tidal flood projections². Locally, unified action is an important component of response to this threat, as significant flood water trespass on any given property is likely to also impact the neighboring community. Consequently, to protect property and the broader community, local government is responding by implementing unified code policy for the new development and redevelopment of flood protection structures. For example, in 2016, the City of Fort Lauderdale raised the minimum seawall height standard for new or replacement construction to 3.9 feet¹¹. Therefore, when considering seawall design heights, local ordinance(s) and agencies should first be consulted. If your community has yet to implement similar policy, regional

projections of sea level rise and storm surge hazard are publicly available¹ and may be consulted to achieve design specifications for a successful project with many years of functional life.

Broward County is encouraging residents and businesses to raise the level of their shoreline protection infrastructure to 5.0 feet NAVD 88⁵. This is in anticipation of a mean sea-level increase of 26-inches, above current conditions, by year 2060 (Figure 1). Additionally, the County recommended sea wall height provides protection against the expected tidal surge from a high frequency storm event (estimated 3-year return interval).

Depth/Wave Field - Coastal seawalls and shore protection projects must address the issue of wave field **attenuation** and accompanying erosional forces. Waves and currents increase the risk of erosional shoreline degradation and/or structural undermining. The predominate form of wave generation in County canals and waterways is from boat traffic; however, long stretches of the Intracoastal Waterway (ICWW) are open to north-south wind generated waves as well. In deep water, absent of no wake zones, wave heights and wave fields can grow to 2-4 feet. In areas surrounded by traditional vertical seawalls, even small wakes can be reflected and create similarly large waves conditions. Enhancing a shoreline with a suitably graded (sloped) shoreline, installing habitat enhancing planters, or a riprap scour-toe can help to dissipate wave energy and prevent waves from building in size and causing erosion or structural undermining. If space is available, nearshore **breakwaters** and sills can also function to serve a similar purpose.

Stormwater Conveyance – Stormwater runoff is generated from rain events that flow over land or impervious surfaces, and do not soak into the ground. Raising the crest elevation of shoreline protection infrastructure may alter the way that a property drains and/or require new routes for stormwater conveyance. Proper design of stormwater conveyance and control structures (e.g. drains, culverts, check valves and flap gates) may be required to prevent landward ponding or flooding due to rainfall and/or overtopping of neighboring seawalls¹ and help prevent sheet flow and pooling.

Care should be taken during project design to ensure that the proposed new shoreline topography doesn't adversely affect water pooling or contribute to flooding on adjacent properties. Pooling water in this fashion can exert excessive pressure behind bulkheads and result in seawall bowing or failure.



Figure 3: Failed tie-backs and failed concrete seawall

During lesser rainfall events, swales, ditch blocks, and/or French drains can be used to slow water flow, containing it to promote natural groundwater infiltration; however, these same stormwater treatments can also be fit to convey water off of a property during heavy rainfall.

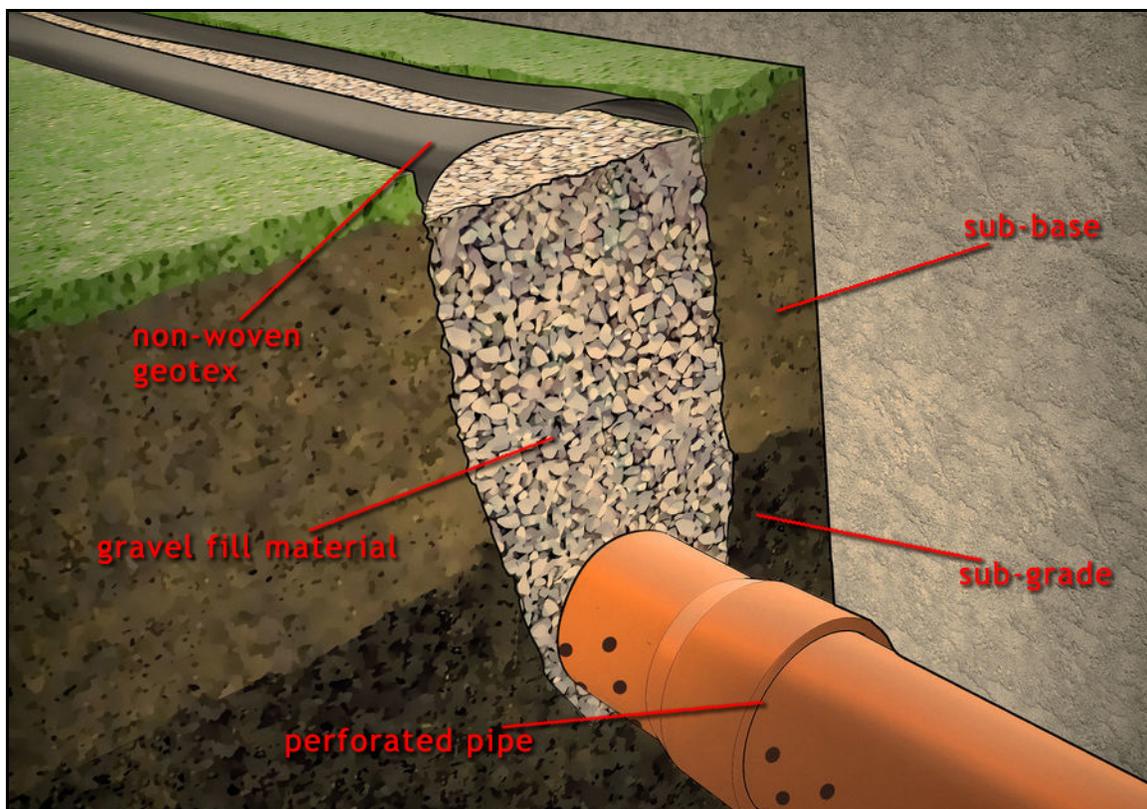


Figure 4: French Drain Section

French drains and *bio-swales* can also be configured to collect runoff behind a berm or seawall and redirect it under shoreline infrastructure or to auxiliary stormwater channels. To resist flooding from tides and/or storm surge, the invert elevation on stormwater drain pipes (i.e. the bottom of the pipe) should be set above projected mean high-water levels and, if not practicable, stormwater outfalls can be fitted with inline check- or flap-valves. As with any mechanical system, proper maintenance is required to ensure stormwater systems function as intended. Furthermore, as sea-level rises, inadequately designed stormwater conveyance systems may need to be lifted, adjusted, or retrofit accordingly.

Maintaining Water Access – There are a number of accessibility options that a property owner can incorporate into, landward of, or potentially waterward of a seawall, which can provide area for the creation of natural habitat and also allow for flood protection capacity and recreational or boating water access. The inclusion of stem walls, steps, seat-walls, boardwalks, and/or floating docks are a few that will be discussed below, and for which applicable uses and illustrations can be found in Section X: Case Studies, later in this guide.

Stem walls, Steps and Seat walls – Stem walls, when used in development of flood control infrastructure, are a type of retaining wall that can be used, at offset to a seawall, to provide both flood protection, recreational water access, and/or to create shoreline habitat. Stem walls can be constructed of suitable materials, as well as cantilevered (self-supporting) or tied back to a sub-surface anchoring system, to provide water tight flood control and soil retention. They can, furthermore, be configured,

through elevated tiering and other novel uses, to provide access points and areas amenable to both natural greening and/or entertainment and recreational use (see Figure 5).



Figure 5: Tiered Soil Retention with Plantings

Stem walls are typically made from poured or prefabricated concrete, or prefabricated steel or vinyl sheet pile, and counter sunk into the existing grade to depths generally less than 6 feet. They can be totally buried and, for example, used to create an erosional preventive sill, or have a portion of the wall face exposed, functioning to add a specified level of flood protection. One particular advantage of using stem walls to increase flood protection capacity and create shoreline intertidal habitat is that “in-water” construction can be avoided. By limiting construction to upland elements and areas, project permitting documentation becomes potentially eligible for expedited local, state and federal review, as discussed in Section 4.3.

Living Boardwalks and Docks – A recent trend in shore side boardwalk and floating dock design is the inclusion of living shoreline enhancement components. More commonly, this includes the integration of partially submerged planters, for the display and benefit of native plant vegetation; however, many structures are also being modified to allow attachment of undercarriage structures, e.g. oyster trees, to facilitate bivalve attachment and provide water quality filtration. Because these structures are typically floating, gangways may be needed to provide functional access with changing water elevations.

Owner Aesthetics and Values - Coastal property owners are uniquely connected to the water and, as stewards of waterfront property, they may enhance the value of that asset in many ways. These may include improving the natural aesthetic by providing a more seamless transition to the shoreline and water (as seen above in **Figure 2**). Traditionally engineered flood control infrastructure has neglected to consider this transition, and the results of this neglect has impacted the health of urban estuaries

gravely, not only in Broward County but nationwide. In fact, greater than 80% of Broward Counties tidal waters are hardened (Gittman, 2014). Therefore, whether an owner's motivation is limited strictly to property beautification or cost savings, a well-planned living shoreline project can provide environmental services that benefit the property owner and community, alike. The choices for property protection, beautification, and community action do not have to be mutually exclusive. However, many property owners live next to the water for the view and they likely want to preserve that view to the greatest extent possible. Positioning living and growing habitat components between them and the water may seem contrary to that aim. Project expectations of maintenance and longevity should be considered prior to living shoreline, or seawall enhancement, upgrades.

Maintaining Viewshed – Installing plantings with living shoreline-based infrastructure will beautify a property while providing shade and shelter for residents and wildlife (e.g. shorebirds, butterflies) alike, but these additions may seem counter-intuitive to maintaining a view of the water. Furthermore, with rising seas, associated increases in the height of seawalls may be problematic to maintaining views. Not only is the drainage capacity of a property affected by increases in seawall height (Section 2.2.1), but also a properties viewshed. Therefore, proper planting design is required to satisfy property owner aesthetics and views. Predicting the behavior of plantings within a tidal range can be difficult. Therefore, when selecting contractors or engineers to design a seawall enhancement project, it is important that a biologist/ecologist is involved for proper plant selection. Expect that there may be an initial maintenance period during which some the plants will need to be replaced and pruned. Furthermore, maintenance routines (e.g. standard trimming) can easily be included in project permitting documentation to allow trimming of protected species, like mangroves. If some of the mangrove trees are strategically allowed to grow, or already exist on a property, permitting conditions might also include “windowing”, which removes the leafy and brushy, small limb, portions of trees at viewing height and preserves the top portion to provide shade.



Figure 6: Windowed Mangroves

Viewshed friendly protective barrier alternatives are available. For example, clear glass seawall alternatives have been developed and tested that can be added to the top of a new or existing **seawall cap** to preserve property viewshed and provide protection from rising waters. Currently in use by the United States military (Naval Academy in Maryland), these features protect against flood events while preserving the historic view of the river.

Project Longevity – Generally, seawalls age (deteriorate) over time, while true living shoreline restorations mature and become more resilient^{ref} over time.* This can also be true for a living seawall feature as these designs prolong the life of the seawall, while also providing ecological benefits which are superior to traditional seawalls built to similar capacity. In fact, because of the design inclusion of wave dissipating structural components of enhanced seawalls (e.g. erosion protective scour-toes and wave deflective planters) extended seawall performance has been demonstrated. Furthermore, living components of enhanced seawalls can also develop protective capacity through time. For example, the expectation of intertidal plantings is typically that they will thrive and provide erosional benefit, but also, their root mass form a foreshore wave attenuating network¹². For projects with nearshore living **breakwaters** (e.g. oyster bags) and **breakwater** islands, the expectation of these structures is to adapt with rising seas through time and, if necessary additional layers of oyster bags can be added. With

careful engineering, the expectations of longevity for seawalls and living seawalls will be largely similar, and more likely favor the enhanced structure.

4.0 PERMITTING CONSIDERATIONS

Historically, the predictability of permitting procedures has facilitated the routine of traditional vertical armoring in South Florida and thus inhibited innovative seawall renovations or shore protection ideas. As coastal municipalities have expanded and merged into the regional conurbation that we have today, there is an ongoing realization of the negative effects that these vertical wall features have on the environment. The extent of water quality and habitat decline, inclusive of the loss of associated plants and animals, coupled with the inflexibility of existing infrastructure to respond to changing environmental conditions has forced a re-examination of coastal development strategies. Regulatory agencies, at all levels of government are revising policy and ordinance to promote community climate change adaptation by facilitating more natural, green, infrastructure development^{Refs}. Permitting policy and procedures are being updated and streamlined to facilitate these innovative project designs that provide added environmental benefit while still providing the functional design integrity and property protection.

Regulatory permitting is conducted at local- (e.g. municipal and county), state-, and federal-levels to protect the environment and communities from improperly sited and designed construction. This also pertains to coastal restorations and development of shoreline stabilization and flood control structures. The level(s) of oversight can overlap dependent on project location, size, and scope. Review by an individual agency is commonly facilitated or exempted by agreement between agencies, for example, if certain minimal project conditions are met, state agency oversight may be waived in deferral to the local level. The construction of any individual living shoreline or seawall enhancement project will need to be permitted, but the planning and design processes can be facilitated or abridged, under design specifications outlined in the policy code, exemptions, and agreements of regulatory agencies.

4.1 Application for Permits and the Pre-Application Meeting

At all levels of regulatory oversight, application for a coastal construction project is a formal process typically conducted under defined policy and procedure. As a first step to navigating this process, a preliminary project plan will be needed. This plan can be professionally produced or otherwise; however, the more thorough the site and construction detail, the more quickly regulatory review staff can determine the required level of permitting. This is important, because the detail needed to determine project impacts and feasibility can be substantially different between levels of application. For example, in Broward County plans and cross-sectional drawings are required to complete an Environmental Resources License, required for works in surface waters or wetlands which would be needed for most living shoreline designs. However, if in-water work is avoided (e.g. adding a landward-offset retaining/stem wall, in adaptation to sea level rise) then this would qualify under the County's General Permit which may not require engineering plans. With preliminary plans in hand, agency staff will be able to direct clients toward the appropriate level of licensing or permitting.

Licensing and permitting agencies have the same goals as you, to keep you and your property safe and the environment healthy. In advance of a formal permit application, agency staff are often available to answer questions and provide suggestions if there is any uncertainty regarding the application process.

Simple telephone calls or emails may be all that is needed to guide an applicant through this process. With this direction, formal plans can be prepared and then it is recommended that a “pre-application meeting” can be formally requested via phone call or email. Pre-application meetings are formal in-person gatherings of clients, or design professionals, and agency staff to review project plans for permitting completeness, fee schedules, and filing requirements.

These types of meetings are common among environmental professionals when proposing large-scale projects, and often present opportunities to modify plans to improve outcomes and/or expedite the permitting process.

Care should be exercised when formally submitting a permit application because processing time can be significantly delayed if agency staff determine that plans are insufficient for formal review, or incomplete. Agency staff typically review project plans and specifications for “completeness”, and incomplete applications or project plans will prolong the review process. Incomplete applications, or poorly specified documentation, can necessitate request(s) for additional information (sometimes abbreviated RAI) and again this can substantially delay processing times. Therefore, it may be beneficial to develop projects under consultation with coastal engineering professionals that are familiar with application process and applicable planning detail requirements.

4.2 Local Regulatory Governance

Because of “home rule” power, Florida cities and counties often have the capacity to act independent of state review when enacting ordinances, codes, plans, and resolutions that do not conflict with state or federal law¹⁴. Local government ordinances regulating seawall height standards, construction materials, etc., may therefore differ from state or federal recommendations, and should be consulted early in the project design and planning process.

Municipal Permitting

Municipal-level ordinances governing seawall construction standards are not unified within Broward County. Regulatory compliance with municipal code should, therefore, serve as a functional baseline for project development and should not conflict with County, State, or Federal standards. In addition to the development of height standards, municipal ordinances and code tend to govern or guard against locally relevant concerns. For example, the preservation of safe navigation figures prominently in many municipalities’ codes and ordinances (see Attachments B, D & E), and project plans typically must show the limits of construction in reference to the centerline of associated waterways (e.g. dock installation or rip-rap).

*It is, therefore, imperative that city or township regulatory codes be consulted **prior to planning or design for significant seawall redevelopment or living shoreline-based enhancement.***

Applicants for living shoreline or seawall enhancement construction should schedule a pre-application meeting with municipal regulatory agency staff, as early in the planning process as possible to review preliminary design specifications, review steps in the permitting approval process, and to assess permitting fee schedules.

Broward County Permitting

Broward County regulatory ordinance governing dredge and fill activities, seawall construction, and the protection of aquatic and wetland resources are specified under Article XI. – Aquatic and Wetland Resource Protection (see Appendix C). Furthermore, the County Environmental Engineering and Permitting Division (EPPD)¹⁵ has been delegated authority to oversee permitting, compliance, and enforcement of certain State of Florida, Department of Environmental Protection (FDEP), Environmental Resource Permit (ERP) and Wetland Resource Management (WRM) program responsibilities¹³. With exceptions, this authority extends to state permitting of docks, seawalls, and wetland impacts involving work in, on, over, or under waters or wetlands of Broward County. Minor projects with no natural resource impacts may qualify for an Environmental Resource General License (GL) for a fee of \$100. A list of those projects are in the Code (27-336(a)(a) a-m) (Attachment C). Processing of the application is usually less than 2 weeks. The repair of an existing functional seawall, raising a **seawall cap**, docks less than 500 square feet, all are examples of projects that would qualify for a GL. In some cases, like mangrove trimming permits, County agents can authorize environmental resource permits on behalf of the state.

Larger projects and those that have potential impacts to natural resources require a regular Environmental Resource License (ERL). The application is attached along with the fee schedule. For example, replacing a seawall, extending a **cap** with a dock to be more than 500 square feet etc., would require an ERL.

4.3 State of Florida Permitting

Unless transferred through deed, the State of Florida owns tidally submerged lands up to the mean high-water line (MHW), therefore authorization is required to construct seawalls, rip-rap, and shoreline stabilization structures that impact state-owned submerged lands is through the Department of Environmental Protection (FDEP). One of the first things to consider before planning a living shoreline project is whether or not it will occur on sovereign submerged lands. Although there are many instances where submerged lands are privately owned, most submerged lands adjacent to the shoreline are held by the state (Fla. Stat. § 253.12(1) 2017). In these cases, the property owner must first obtain sovereign submerged lands authorization from the FDEP before proceeding with a permit application. This authorization can come in the form of an exception, a lease, a letter of consent, or consent by rule (Fla. Admin. Code Ann. r. 18-21.005 2009). Broward County has been delegated State permitting authority, so that they may be able to issue on the State's behalf, especially if there are no impacts to natural resources (seagrass, oysters, or corals). If impacting these resources are unavoidable, then a State permit will also be required.

The State permit options vary in costs and complexity based on the layout and the site conditions, and regional FDEP staff can help identify which permits will be required based on your needs. Most living shoreline projects on private properties are small, and can be considered "exempt" from some of the regulatory requirements that are involved with larger projects, if they meet certain conditions [Ch. 62-330.051(12)(e)]. All property owners are encouraged to meet with the FDEP representative prior to submitting an application to FDEP for verification that the proposed project is exempt.

Permit Exemptions

Many individually owned shorelines on public and private property are small enough to fall within the exemption of Ch. 62-330.051(12)(e) of the Florida Administrative Code.

To qualify for an exemption, the living shoreline project must meet several criteria:

- The project must be 500 linear feet or less.
- The project must be located no farther than 10 feet water ward of the mean high water line
- Plantings must be native wetland plants appropriate for the site and must be obtained from local commercially grown stock.
- The living shoreline project must also include plans to remove invasive plants and deploy a turbidity curtain during construction to control silt and sediment.
- Qualifying projects may not involve depositing fill materials in surface waters or wetlands (Fla. Stat. § 373.403(14) 2017) unless necessary for a **breakwater** (Fla. Admin. Code Ann. r. 62-330.051(12)(e) 2013).
- A **breakwater** may be used if permanent wave **attenuation** is necessary to maintain the shoreline vegetation (Fla. Admin. Code Ann. r. 62-330.051(12)(e) 2013). If the project requires a **breakwater**, the inner toe of the breakwater must extend no more than 10 feet water ward of the mean high water line, and it must not be taller than the mean high tideline. Any such **breakwater** must be composed predominantly of natural oyster shell (in mesh bags having openings of no more than 3 inches) or other stable, non-degradable material. **Breakwaters** must not be placed within three feet of any submerged grass or emergent marsh vegetation and must have gaps at least 3 feet wide located at least every 20 feet along the **breakwater** so as to not substantially impede the flow of water (Fla. Admin. Code Ann. r. 62-330.051(12) (e) 2013).



Figure 7: Aerial View of Oyster Bag Breakwater

Projects that qualify for exemptions often lead to the shortest review timeframes (30-day initial review) and lower permitting fees. If the project qualifies for the exemption, the shoreline owner should pursue the verification of exemption through FDEP's website: <https://floridadep.gov/water/submerged-lands-environmental-resources-coordination/forms/request-verification-exemption>

4.4 Federal Permitting

Federal review of shoreline construction projects are typically conducted under authority granted by the National Environmental Policy Act (NEPA), assuring that all branches of government give proper consideration to the environment prior to undertaking any federal action that significantly affects the environment. The Clean Water Act (CWA) regulates pollution discharges into waters of the United States and the Endangered Species Act (ESA) providing oversight for the conservation of threatened and endangered plants and animals. Most likely, a NEPA review will not be required for smaller projects, but CWA and ESA determinations will still need to be verified.

For living shoreline and seawall enhancement projects, federal regulatory review will be headed by the United States Army Corps of Engineers (USACE)^{ref}. If applicable, the USACE will review project plans and will initiate consultation with associated environmental resource agencies, for example, EPA, US Fish and Wildlife Service, and National Marine Fisheries Service, for determinations of potential impacts.

The USACE currently has two primary regulatory mechanisms to streamline permitting for habitat restoration or living shoreline projects: Nationwide Permits 27 and 54. The Nationwide 27 has traditionally been utilized for authorizing a variety of bank stabilization and habitat restoration projects. However, the recently authorized (March, 2017) Nationwide 54 Permit was developed specifically for living shorelines.

Another improvement to the permitting timeline is the Jacksonville Biological Opinion or "JaxBO" (Attachment B), if a project is able to meet the criteria for the JaxBO (no impacts to natural resources) then the USACE does not have to hold a separate consultation with National Marine Fisheries Service (NMFS) and/or the US Fish and Wildlife (USFWS).

This saves a lot time in the review process. Below is a description of federal permitting options starting from the least cumbersome to the more intricate permitting for larger shoreline stabilization and living shoreline designs. Additional Federal permitting information can be found here: <http://w3.saj.usace.army.mil/permits/trainingmodule/index.html>

Nationwide Permit 54

The recently adopted Nationwide Permit 54 may be a fairly easy way to permit a living shoreline. For a project to qualify for the NWP 54, the following conditions must be adhered to in order to qualify for authorization. The living shoreline should have a substantial biological component that maintains the natural continuity of the land-water interface and retain or enhance shoreline ecological processes. In addition, the following design conditions must be met:

- The structure and/or fill area cannot extend more than 30 feet from mean low water in tidal waters.
- The activity is no more than 500 feet in length along the bank.

- Structural materials (*coir logs, oyster shell, etc.*) must be anchored or be sufficiently weighted to prevent relocation due to wave action or flows.
- Native vegetation should be utilized.
- The discharges of dredged or fill material must be the minimum necessary for establishment of the living shoreline.
- The activity must be designed, constructed, and maintained so that it has no more than minimal adverse effects on water movement between the waterbody and the shore.
- The living shoreline must be properly maintained (exotic vegetation must be removed in perpetuity).
- If the project is along the Intracoastal Waterway (ICWW) the project plans must show the limits of the project referenced to the Federal Channel right-of-way and must be greater than 62.5 feet from the centerline of the ICWW.

Letter of Permission (LOP)

For living shoreline projects that do not qualify for a Nationwide Permit, the LOP is an option. A LOP is a type of individual permit issued through an abbreviated processing process which includes coordination with federal and state fish and wildlife agencies and public interest evaluation, but without the publishing of an individual public notice. The process is less cumbersome than the Individual Permit, which is for projects that have a more significant likelihood of environmental impacts.

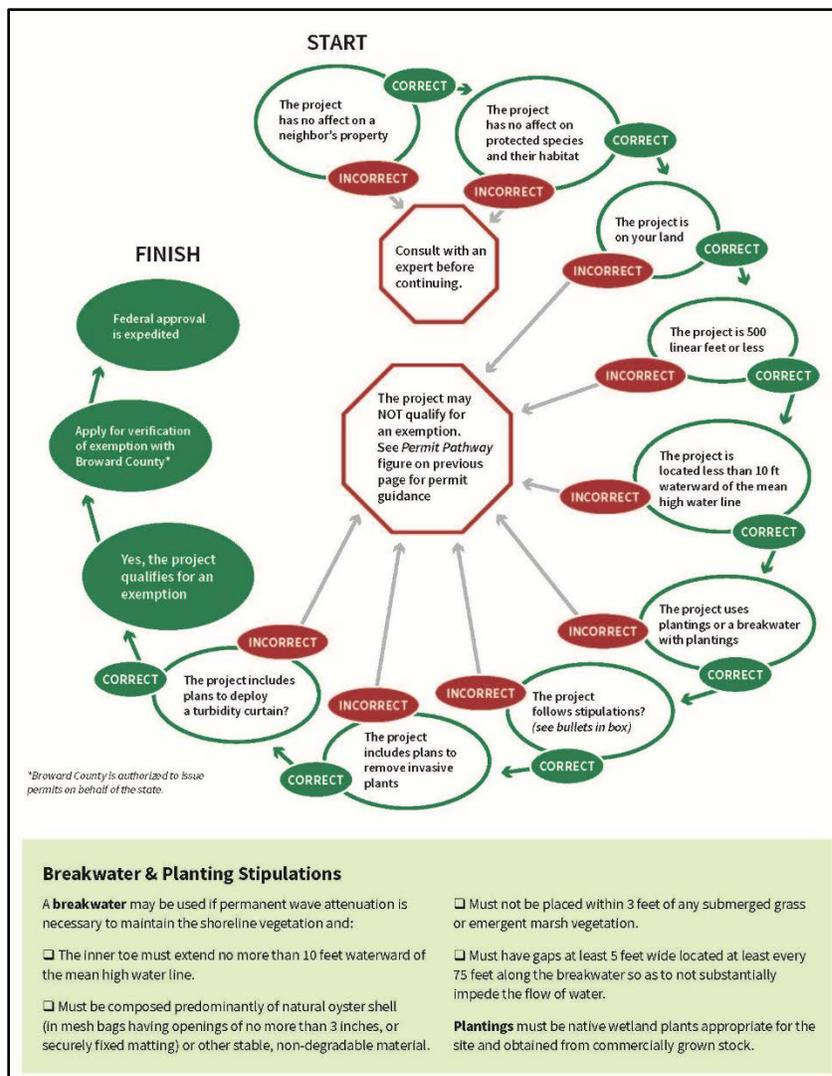


Figure 8: The Permitting Path to Exemption

For local permitting information and permit applications visit: <http://www.broward.org/ePermits/Search/Pages/PermitDetails.aspx?permitID=424>

5.0 PROBABLE COST ESTIMATES

Many elements factor into the cost of the seawall enhancement or living shoreline project beyond just selecting the structural and aesthetic portions of the project there are the design, permitting, construction and maintenance components. Much like renovating a house and adding new features and value, seawall enhancements and living shorelines can also be a creative process that helps define the space along the water’s edge. Some of these projects may even be phased to address immediate structural concerns immediately and add other amenities later as project budgets allow.

5.1 Design

There are two main approaches to design 1) design-bid-build or 2) design-build. Design-bid-build generally starts with hiring a consulting engineer or team of consultants that work with you to design and permit your project then bid the project to several bidders, review those bids and select the best option or low bid to construct the project. Design-build is generally based on a relationship or interview with several contractors which may have an established team of designers and permitting personnel that work for the construction company. Both are good options for these living shoreline and seawall enhancement projects. It is up to the homeowner/client to determine which process fits. In either case it is recommended you speak with several firms before deciding who is best to complete your project.

Whether it's an engineer or a contractor make sure they are licensed and insured and ask for references for similar work.

Experience with these types of projects in the Broward County area will help to insure a proper design. Designs should include a plan and cross-section view of the project and specifications about the products and materials that will be used in construction. Some specifications may use the term “or equal”. It is important that the contractor not sacrifice on quality of stone, concrete or geotextile from the designed intent, doing so may shorten the usable life of the living shoreline or seawall enhancement. Design costs will typically range between 10% and 25% of the overall construction cost depending on the complexity of the site.

Sites that have less wave energy in a protected canal or no wake zone may require less rigorous engineering analysis than open areas that are susceptible to storms and high wake from boat traffic. It is important that engineering calculations are still performed to make sure the shoreline treatments proposed will perform as designed for the project lifetime. Also when seawall enhancements are added to an existing wall a structural engineer should evaluate the condition and usable life expectancy of the existing seawall before adding additional habitat panels. The seawall shouldn't be compromised by these added features. Also items like additional tie-backs may be required to spread any additional loads throughout the wall.

5.2 Permitting

Projects that can work towards exempt status, avoid impacts to natural resources and native vegetation or contain resiliency measures in the uplands will generally cost less to permit. Not only will permit fees be lower, but it will be a lower level effort to compile project data for permit submittal. This approach is also generally more consistent with the goals of living shorelines projects to enhance what is already working and thriving along the shoreline. If natural resource impacts cannot be avoided, then the additional cost of mitigation credits (if available), the UMAM process and mitigation planning can quickly double the cost of permitting. Any work that extends offshore more than 10 feet from the mean high water line may also fall over sovereign submerged lands (state owned) and require a private easement through FDEP. Permitting costs can also range from 8% to 25% of the overall construction cost.

5.3 Construction

Construction costs are usually the highest cost of the project with 1/3 of the cost going to materials and 2/3 of the cost going to labor and equipment. Availability of materials and ease of access to the site are major determining factors in cost. If a truck driver has to spend more time and burn more diesel delivering rock from a quarry two counties away, the cost of that rock is going to reflect the extra distance traveled for each load. If the property has access to the work site then material can be delivered and stored onsite reducing costs. If access is limited and materials and equipment have to be delivered by crane or by barge each time that material is loaded and offloaded by different equipment the costs will increase. Construction costs also come down to how much risk a contractor has on a particular project and how comfortable they are in the design and installation process. Clear, concise design documents and ease of access to the site limit the risk to the contractor that work may not work continuously without stoppages and limit the chance of having to re-do work or damage property that then the contractor must repair or replace.

5.4 Maintenance

Maintenance is critical to extending the lifetime of the shoreline stabilization. Quickly repairing any damaged areas after a storm, adding extra oyster bags or plantings to enhance the project help make the shoreline more resilient for the long term.

If an area is damaged due to a storm and it is not fixed, then boat wakes or high currents may continue to erode the shoreline focusing wave energy on the weakened area.

The same can be said for concrete structures. Small stress cracks can appear due to settling after construction and if left unattended, salt water can seep into the concrete and start to corrode the rebar encased inside. Injecting an epoxy/cement mix into these cracks can prevent salt water seeping into the concrete. Maintenance can be 5-10% of the original construction cost, per year. Maintenance may not be required every year, but should be budgeted for so that 5-10 years after construction, a more robust maintenance event can be completed, likely post-storm. The site should be inspected annually to see if maintenance is required.

5.5 Monitoring

Monitoring for water quality, seagrasses or mangroves may be required after the project is complete to ensure the project is performing as intended. Monitoring is usually required if natural resources like seagrass or mangrove will be impacted during construction and other areas were planted with seagrass or mangroves to offset those impacts. Monitoring typically lasts for 3 to 5 years post-construction, unless the mitigation plan is deemed successful before that timeframe. Monitoring costs vary and the regulatory agencies have specific protocols regarding monitoring requirements, timing and submittal of data. These costs should be budgeted as the mitigation or planting plans are developed during permitting.

5.6 Cost Comparisons

There are several options and potential upgrades to enhance both the stability and the aesthetics of a waterfront shoreline. Each project has unique elements that might affect overall cost, however for the cost comparisons below in the case studies, costs for items that increasing the primary stability of the shoreline or flood protection are provided as well as elements of the project that might improve resiliency for the future, since protection of property and upland infrastructure are of primary importance. Added elements to the project that might enhance the aesthetics, or provide additional amenities that will add to the viewshed (clear glass wall), boat access (floating dock) which enhance the property value and it's use, but may also carry a higher price tag. This differentiation between the "needs" and the "wants" is designed to help a homeowner compare the options on a level basis. For example, adding a 2-foot concrete *cap* (\$25,000) to a seawall, with years of usable life left, will help increase resiliency and meet new building codes. However, adding a 2-foot seat wall and stairs may accomplish the same 2-feet of additional protection, but also adds seating area with a slightly higher cost - \$38,000.

Having multiple resources for real construction costs helps to provide a more accurate estimate for your project. The national standard used by many consultants, governments and contractors for construction cost estimating is RS Means. We included costs from the RS Means database which has the ability to drill-down to costs by region and major cities. Additionally, the 2018 FDOT Cost Index for Broward County, was used as a local basis for the construction material costs. FDOT costs are a weighted average based on the number of contracts FDOT had in a given fiscal year. The most recent Cost Index was used for the period from October 2017 to September 2018. Labor was assumed to be 200% of the material cost. For example, the cost of Riprap (Rubble), Bank and Shore is \$100 per ton, per the FDOT Cost Index, however from completed projects, the installed cost for the same Riprap is \$300 per ton. This ratio of material to labor remained approximately the same for most items (bedding stone, geotextile fabric, turbidity curtain). Structural items like steel sheet pile (\$45/sq. ft.) were called out in the Index as Furnished and Installed (F&I). Thus, no labor price was added for these items in the cost estimate. The full 2017/2018 FDOT Price Index can be found in Attachment G.

6.0 CASE STUDY EXAMPLES

It would be impossible to explore the full suite of property layouts and environmental conditions found within the entire County and so, for simplicity, we explored four conditional case studies. Each case study is meant to demonstrate project permitting and costing considerations under conditions broadly representative of those likely to be encountered on estuarine waterfront properties in Broward County. All properties will be unique in environment and layout. Living shoreline design options and components from any of the following case studies, therefore, may or may not be practically amenable to any particular real property.

It is strongly recommended that property owners consult with a professional engineer registered with the State of Florida when evaluating site conditions for appropriate shoreline stabilization solutions.

In each of the following conditional case studies, it is assumed that the existing seawall crest is being modified from an elevation of +1.5 ft. (**NAVD 88**) to a design elevation of +5.0 ft. (**NAVD 88**). The existing seawall crest elevation of +1.5 feet is consistent with recent determinations of flood vulnerability in low lying coastal areas of Broward County³, while a design elevation +5.0 ft. is expected to offer flood protection from sea-level rise, extreme tidal events (e.g. king tides), and approximately 1-foot of additional storm surge, into year 2060³.

For this document, shallow water is generally considered less than 5 feet deep, therefore deep water refers to conditions greater than 5 feet deep. Wave and boat wake scenarios vary from 2 feet or less in the low wake scenario and up to 2-4 feet in a high wake scenario. Under low wake conditions, conversion of seawalls or other hardened structures to living shorelines with more vegetation might make sense to create a more aesthetically pleasing property which can provide flexibility to changing environmental conditions. For high wake scenarios, seawalls will likely need to remain, but added enhancements can extend the life of a seawall and create habitat. Research local contractors and consultants, explore the possibilities creating a safer home, a more beautiful environment, and a healthier ecosystem for your family.

These estimated costs are based upon the main construction access from the land-side (no barge required), but some design elements may require a barge for placement. Those project elements have been identified and barge costs included. Costs are based on material supplied within 100-mile range of the project site. Costs could fluctuate due to the price of fuel, distance for hauling materials, etc. The project costs are based on a 100-foot shoreline project length. The design and permitting costs are similar for both the traditional seawall and living shoreline alternative, however the construction costs vary for the different case studies. The alternative cost and the traditional seawall costs are also provided for each option. Many times the alternative approach provides a cost savings and other times the cost may be about equal, depending on the different amenities or added elements chosen by the property owner. A full price breakdown per site, with unit costs, can be found in Attachment F – Cost Table Breakdown.

Case Study 1: Shallow Water/Low Wake Conditions

The shallow water/low wake condition is considered generally applicable to properties abutting narrow waterways, typical of residential canal-side properties in the County. It is likely that the property is constrained both landward, with little room available for developmental intrusion beyond the current **seawall** footprint, and waterward, with expansion constricted by jurisdictional or proprietary constraints. The canal is likely too narrow for significant wave height development due to wind and storms, and vessel speeds are likely legally restricted to “no wake”, or high speeds are avoided as simply unsafe. As a case example, we shall consider a privately-owned seawall, separated from the primary property by a residential street, as depicted in **Figure 9**; however, other similarly space constrained conditions may also apply.



Figure 9: Las Olas Neighborhood, shallow water, low wake site representative conditions.

Primary design concerns for this property condition include increasing protective capacity to meet **sea level rise** and flood stage projections, maintaining adequate storm water drainage capacity, maintaining recreational water access, and providing for enhanced habitat benefit. In this case, the following auxiliary conditions have been assumed:

- Canal depth of 5 feet or less
- Typical wave and boat wake height less than 2 feet
- Minimum or no space for expansion beyond existing seawall footprint.

Case Study 1: Shallow Water, Low Wake Design Factors

To address flooding under shallow water/low wake, spatially constrained conditions, a terraced seawall concept is envisioned (**Figure 10a**). Under this concept, the height of the existing seawall (offset-wall) would be raised beyond existing grade, by capping, to meet immediate needs to address king tide flooding and intermediate time scale **sea level rise** projections. Interior, or landward, of the offset-wall, a stem-wall (seawall) would then be constructed to create an elevated and continuous barrier against the fully anticipated measure of sea level rise and storm flood water conditions (**Figure 11a**).

Furthermore, allowing for potential habitat enhancement, the seaward extent of the seawall would be sacrificially flooded during exceptionally high tide (**king tide**) and storm tide scenarios (see **Figure 11b, blue dashed line**), while, so long as the seawall crest elevation is not overtopped, halting the trespass of flood waters into public spaces and homes. Under suitable environmental and geotechnical conditions (see **Section 2.1 above**), access to docks and boat lifts could also be supported, maintaining

recreational access and benefits, and further protect the seawall from erosional undermining (i.e. scouring) and enhance subtidal habitat value, pre-cast planters may be attached to the outer (seaward) offset-wall.

In raising the effective **seawall** elevation, while impeding flood potential from seaward **overtopping**, additional potential for rain and coastal runoff sourced flooding needs to be addressed. Depending on elevations landward of the seat-wall, stormwater management and drainage capacity (see **Section 2.2**) may be an issue. As apparent in **Figure 11a**, rainfall, runoff, and sea water (from overtopping or localized coastal barrier circumvention) may collect behind the seat-wall. Design specifications may require auxiliary infrastructure to convey flood waters back into the canal. Conveyance systems may employ active (pumps) or passive (gravity); however, because stormwater management is highly dependent upon the **tailwater** conditions, i.e. canal water elevations, sea level rise will dictate the long-term drainage capacity. Through time, existing culverts may need to be repositioned and/or retrofitted with check- or flap-valves to maintain seawater flood control capacity.

Case Study 1: Shallow Water, Low Wake Permitting Pathways

Regulatory review of shoreline stabilization projects is required prior to construction. The same site data used for design will need to be packaged with the application and submitted to the appropriate Local, State and Federal Agencies. Local permitting will be handled though the County, or the municipality where the project is located. State permitting will likely be handled by Broward County if there are no natural resource permitting issues or state lands concerns. Federal permitting will entail demonstrating that the design meets their NW 54 permit exception provision. Which this site design would qualify for as long as there is no seagrass, oysters or coral impacts. The predominantly upland features (stem and seat wall) should not affect Federally listed species, thus this design should qualify under this expedited NW 54 authorization. See Permitting Considerations Section above for more details.

Exempt Items

- The seat-wall and stairs would be exempt items because they are upland elements. If a replacement seawall is constructed, it can be installed within 18 inches in front of the existing seawall.
- The mangrove planter should qualify as a de-minimis exemption, as it is within 10 feet of the face of the existing seawall and less than 500 feet in length.

Nationwide 54 Permit

- The dock and boat lift would need to be permitted through the Army Corps of Engineers and through the local municipality (Broward County).
- The dock and boat lift length (combined) would be restricted to 30% of the waterway width and must not extend beyond the navigable channel right-of-way.

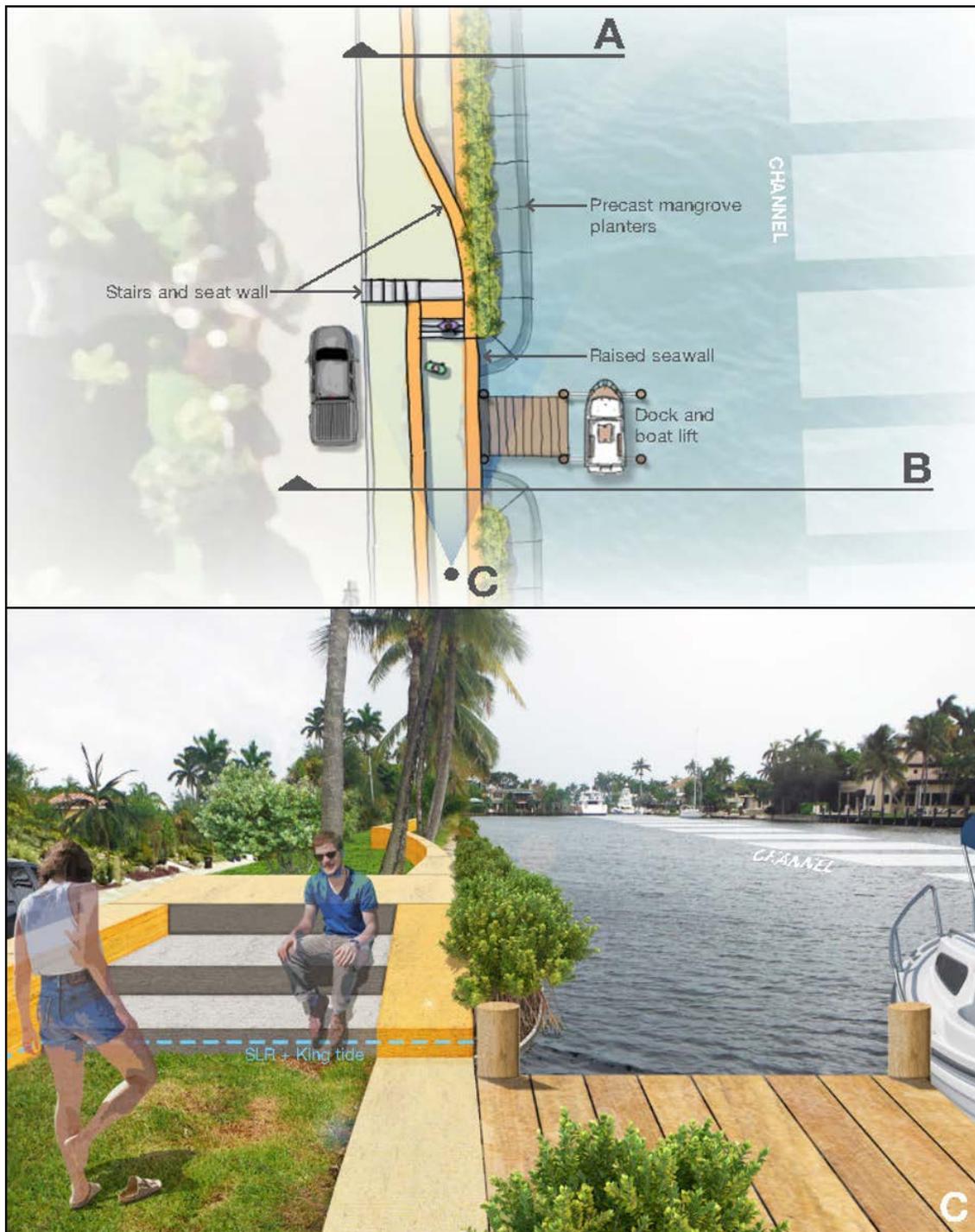


Figure 10(a) Plan view and (b) perspective view of the terraced seat-wall design modification

Proposed for spatially constrained shallow water/low wake condition seawall designs and modifications. This design envisions capping an existing seawall (4a, seat-wall) to intermediate flood level projections (4b, blue dashed line) with landward backing by a fully protective stem-wall (4a seat-wall). The design allows for enhanced habitat value in intermittently flooded areas and maintenance of coastal access by integrating stairways.

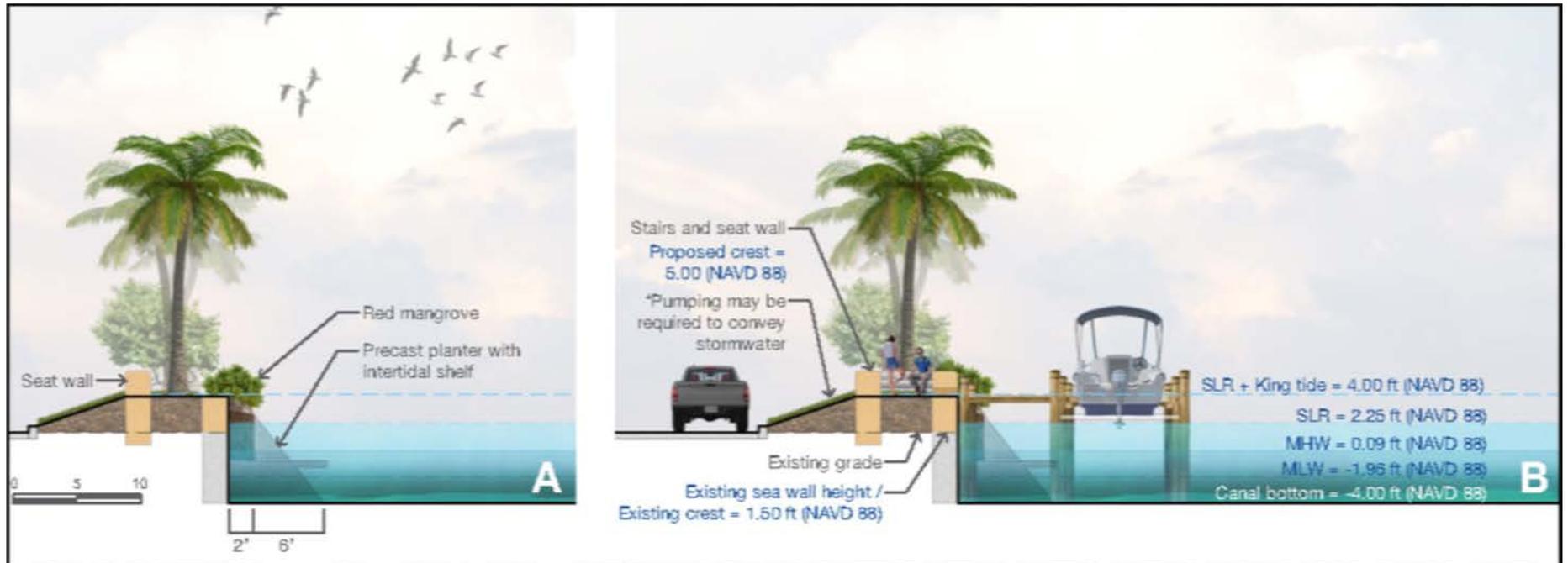


Figure 11: Section View (a) Terraced seat-wall and (b) Stair Access to the boat lift proposed for spatially constrained shallow water/low wake condition seawall enhancements

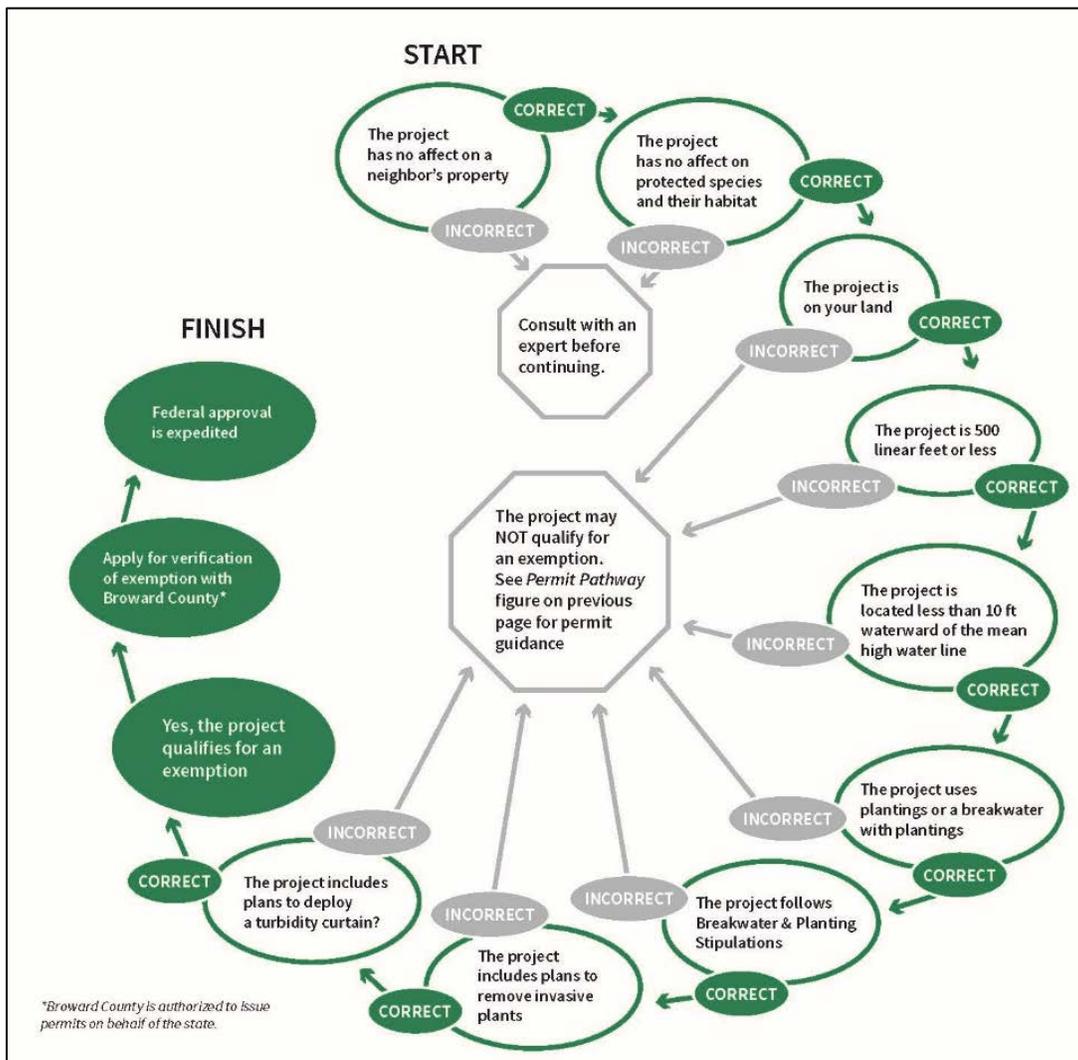


Figure 12: Shallow Water, Low Water Permit Pathway

Case Study 1: Shallow Water, Low Wake Probable Costs and Maintenance Requirements

The associated costs segregated by the various components (design, permitting and construction) of implementing seawall enhancement protection solutions is provided below, in 2018 dollar values. These estimates costs are based upon construction access from the land-side (no barge required) and materials were within 100 mile range of the project site. Costs could fluctuate due to the price of fuel, distance for hauling materials, etc. These costs are based on 100-foot shoreline project length. The design and permitting costs are similar for both the traditional seawall and seawall enhancement alternative, however especially in the shallow water low wake scenario, the seawall enhancement could be about sixty percent of the construction cost of the traditional seawall (Tables 1 & 2).

For this particular design, the mangrove planters help to resist the wall moving outward if tie-backs fail as the seawall ages. Since this is a low wake scenario, replacement of the seawall for the enhancement scenario was not included in the cost. Seawall replacement was included in the cost for a new wall with an increase in the *cap* height because no planters would be placed in that scenario.

The anticipated maintenance is primarily related to the care of the mangrove plants and addressing any stress cracks in the concrete that develop. The installed plants will need to be monitored to assess whether any plants need to be replaced. Once these plants take root and initial settling of the planters and seat wall have occurred, the maintenance activities will be minimal.

TABLE 1: SHALLOW WATER, LOW WAKE SEAWALL ENHANCEMENT – 100 FT SECTION (LAS OLAS)

	Amount	Unit Cost	Units	Total	
Design Survey	1	\$1,000	LS	\$1,000	
As-built Survey	1	\$1,000	LS	\$1,000	
Environmental Assessment	1	\$5,000	LS	\$5,000	
Sediment Samples	5	\$125	EA	\$625	Design & Permitting
Design & Engineering	1	\$10,000	LS	\$10,000	
Permitting Fees (Local, State & Federal)	1	\$1,000	LS	\$1,000	
Turbidity Curtain	200	\$17	LF	\$3,400	
Silt Fence	200	\$4	LF	\$800	
Clearing & Grubbing	0.1	\$11,000	AC	\$1,100	
Precast Planter	4	\$5,000	EA	\$20,000	
Native Estuarine Plantings	40	\$20	EA	\$800	
Concrete Seat-wall	100	\$350	LF	\$35,000	Construction
Concrete Stairs	1	\$3,000	EA	\$3,000	
Annual Maintenance	5%	\$3,200	LS	\$3,200	
			TOTAL	\$85,930	

TABLE 2: SHALLOW WATER, LOW WAKE SEAWALL - 100 FT SECTION (LAS OLAS)

	Amount	Unit Cost	Units	Total	
Design Survey	1	\$1,000	LS	\$1,000	
As-built Survey	1	\$1,000	LS	\$1,000	
Environmental Assessment	1	\$5,000	LS	\$5,000	
Sediment Samples	5	\$250	EA	\$1,250	Design & Permitting
Design & Engineering	1	\$10,000	LS	\$10,000	
Permitting Fees (Local, State & Federal)	1	\$1,000	LS	\$1,000	
Turbidity Curtain	200	\$17	LF	\$3,400	
Silt Fence	200	\$4	LF	\$800	
Clearing & Grubbing	0.1	\$11,000	AC	\$1,100	
Precast Seawall	100	\$800	LF	\$80,000	Construction
Additional 2 foot Height	100	\$250	LF	\$25,000	\$110,300
Annual Maintenance	5%	\$5,500	LS	\$5,500	
			TOTAL	\$135,050	

Case Study 2: Shallow water, High Wake Conditions

The shallow water high wake condition is generally applicable to properties abutting wider waterways, typically around embayment or cove features in some of Broward County's waterways. The property is fairly open (landward and/or waterward), but permitting considerations may dictate the waterward design as discussed in Section 2—Permitting Considerations. The open water of the “lake area” provides ample room for waves to reach two to four-foot heights due to wind or storms, and these areas may be popular for waterskiing and jet skis. As a case example, we considered a sloped shoreline that has a previous shoreline treatment to aid in stabilization. (**Figure 13**).



Figure 13: Present Day Condition of Hollywood Lakes

The primary design concerns for this property condition include increasing protective capacity to meet sea level rise and flood stage projections, addressing current flooding issues and maintaining adequate storm water drainage capacity, maintaining recreational water access, and providing for enhanced habitat benefit. In this case, the following auxiliary conditions have been assumed:

- Lake Depth of 5 feet or less
- Typical waves and boat wake height of 2-4 feet
- Ample space for construction of shoreline solutions and while maintaining park amenities
- Existing sloped shoreline fortification (i.e. concrete slurry wall or rip rap revetment)

Case Study 2: Shallow Water, High Wake Design Factors

The upland berm concept extends the crest height of the existing shoreline treatment. The upland berm will need to incorporate an impervious liner (or stem wall) to ensure the berm is not saturated, which could compromise the structural integrity. The upland berm provides an enhanced viewpoint of the adjacent waterway, preserves access to the water while creating a continuous barrier to sea level rise and waves. The area seaward of the berm should be considered flood plain area, which will be inundated during seasonal high tides or storms. (Figure 14) Therefore, the existing sidewalk adjacent to the water may need to be relocated landward to the top of the upland berm.

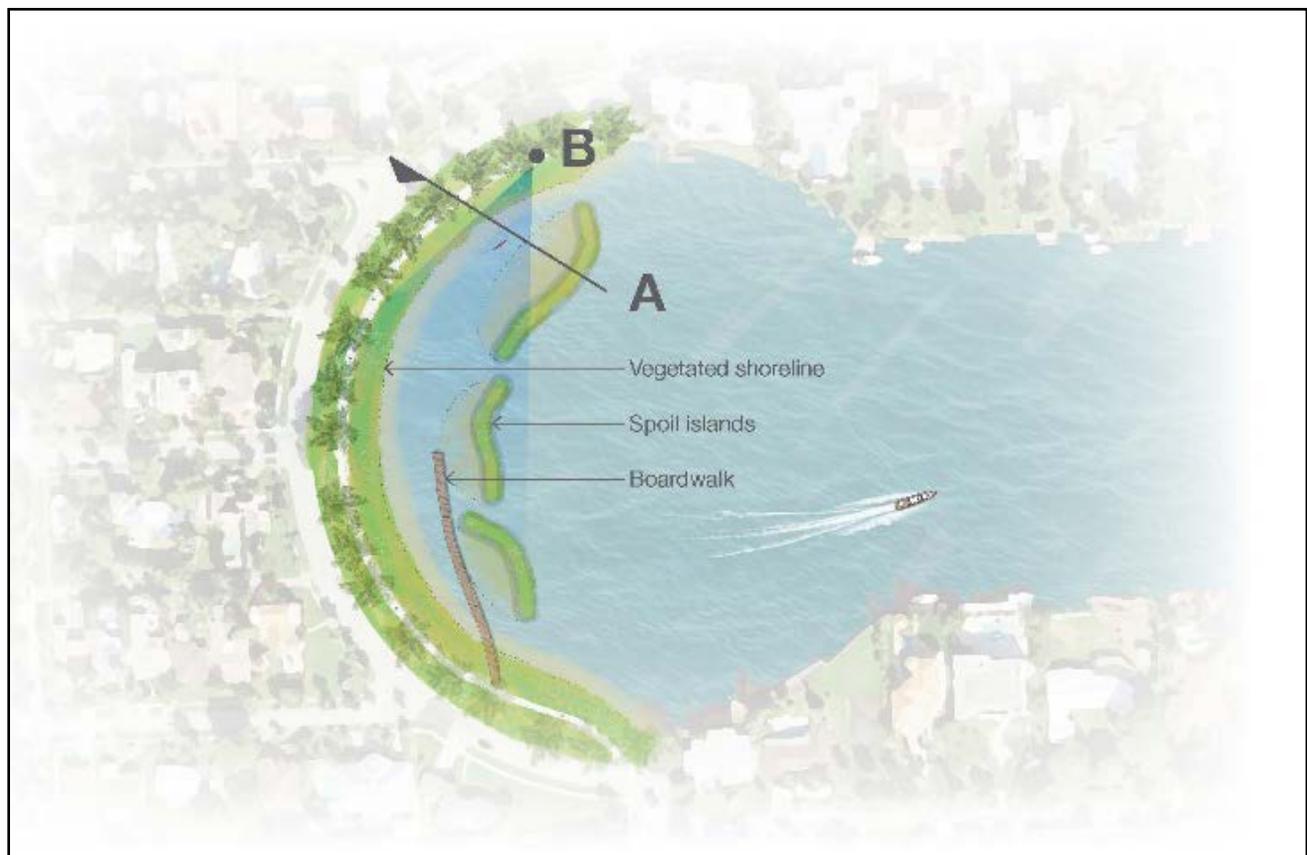


Figure 14: Shallow Water, High Wake - Plan View showing the vegetated shoreline, spoil islands and added boardwalk amenity.

The upland berm does not allow the seawater to trespass into the street and homes as long as the crest elevation is not overtopped. Along the slopes of the upland berm there are coastal upland plantings that can stabilize the slopes of the upland berm, prevent rainfall runoff *erosion* and visually enhance the shoreline. (Figure 15). There may be the need to add fill in front of and behind the upland berm and grading for drainage purposes. Depending on the elevation of the adjacent roads and finished floor elevations of the houses, *stormwater* management will also be an issue. Figure 16 shows that rainfall runoff may be collected behind the new berm in a *bioswale* or French drain and require additional stormwater infrastructure to passively (gravity) or actively (pumps) convey *stormwater* to the canal. Stormwater management is highly dependent upon the *tailwater* condition, or elevation of the sea

water in the canal, so sea level rise will dictate the long term drainage capacity and existing culverts may need to be elevated or retrofitted with check valves, duckbill valves or flap valves (**Figure 17**) to keep seawater from entering the system. Again, flood control is really a 2-part solution and installing the upland berm will control seawater flooding, but rainfall runoff needs to be considered as well, in order to keep the property protected from freshwater flooding.



Figure 15: Shallow Water, High Wake - Perspective View of upland berm with relocated sidewalk, intertidal plantings with spoil islands offshore and an added boardwalk.

The shoreline would be planted with a variety of dune and estuarine species providing habitat and as their root base matures, will stabilize the shoreline resisting the potential for sediment movement by waves and runoff. The planted slope will migrate and species composition can change as sea level rise increases as depicted by the blue dashed line. This vegetative buffer dissipates low energy waves and stabilizes the shoreline.

Spoil islands or a **breakwater** feature immediately offshore would be a bigger permitting effort, (**Section 3**), but necessary if larger waves or persistent boat wakes are causing shoreline erosion. If spoil (fill) comes from a nearby dredging project, it can be a win-win for both projects, but careful coordination will be required with both the permitting agencies and the contractors to make the project a success. Spoil islands can be protected with a combination of rip and oyster shell bags which provide habitat for juvenile fish and crustaceans (**Figure 16**). The protected sub-tidal areas in the lee of the spoil islands are good places for seagrasses to recruit.

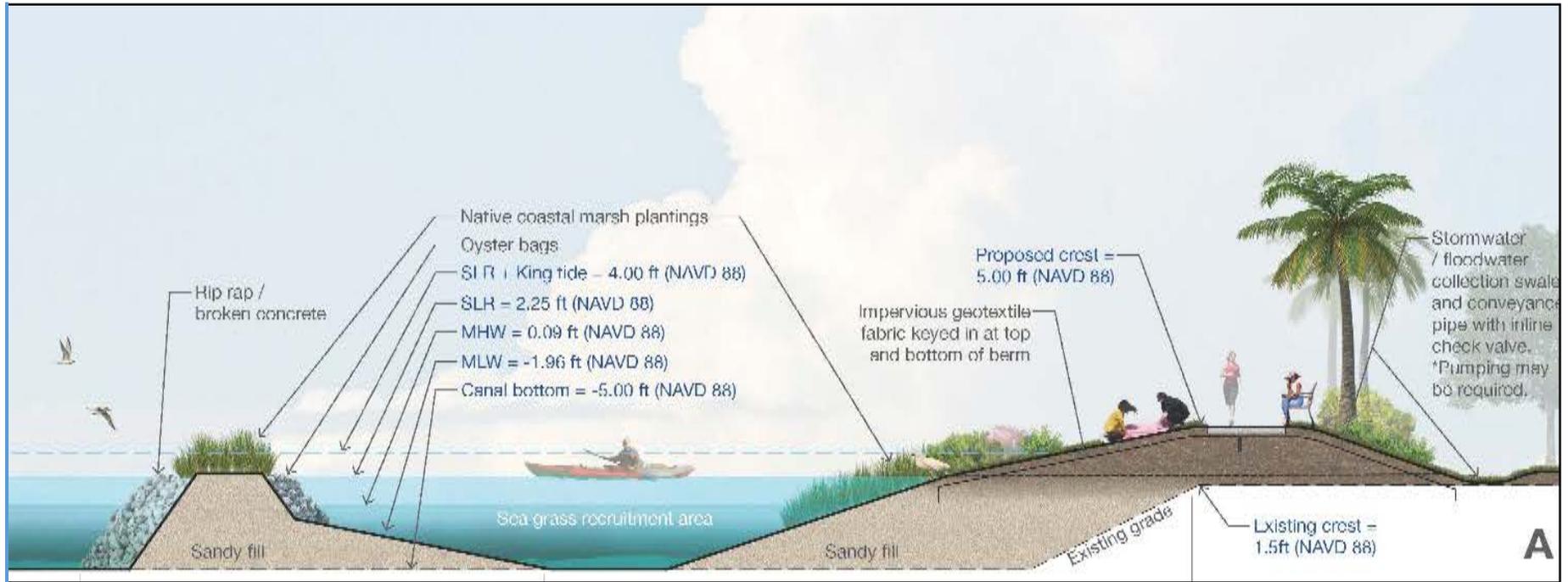


Figure 16: Shallow Water, High Wake – Section View depicting fill placed for the upland berm, nearshore slope and offshore spoil islands.



Figure 17: WaPro In-line Check Valve – one of several valve options to keep seawater from flooding into streets through storm drains

Case Study 2: Shallow Water/High Wake Permitting Pathways

Exempt Items/Nationwide Permit

- For this specific example, as the project length is more than 500 feet and distance offshore is greater than 10 feet from the mean high water line, this project exceeds exempt conditions.

Individual Permit/Letter of Permission

- This design example would require a letter of permission due to the size and length or an individual permit if there are impacts to natural resources (seagrass, oysters, or corals).
- If there were any impacts to environmental resources (mangrove, seagrass and oysters) mitigation could be required at a 2:1 ratio. Where a project impacts 0.1 acres of seagrass, the applicant could be required to construct 0.2 acres of seagrass habitat in the same watershed or buy 0.2 acres of mitigation credits from a nearby mitigation bank.
- The amount of mitigation will be based upon the agency's Uniform Mitigation Assessment Method (UMAM).
- If the project was scaled down for a smaller property it may qualify for a Nationwide 54 Permit form the USCE and Living Shorelines Exemption from the State (FDEP).

Case Study 2: Shallow Water, High Wake Probable Costs and Maintenance Requirements

The associated costs segregated by the various components (design, permitting and construction) of implementing living shoreline protection solutions is provided below, in 2018 dollar values. These estimates costs are based upon construction access from the land-side and the waterside and materials were within 100 mile range of the project site. Costs could fluctuate due to the price of fuel, distance for hauling materials, etc. These costs are based on 100-foot shoreline project length. The design and permitting costs are similar for both the living shoreline alternative (Table 3) and the traditional seawall (Table 4). For the shallow water, high wake scenario, the living shoreline option could be about the same as the construction cost of the traditional seawall depending on whether spoil islands or rip rap **breakwaters** are needed. Some properties will not need those options, therefore they are listed below the total as added elements.

There would be maintenance required for this design, primarily to ensure that the installed plants thrive and coalesce; as the planted bank slope can only remain stable if the plant roots are well established. Once these plants are rooted, the only other maintenance related to the vegetative component is the trimming of the mangrove tress, to provide the viewshed from the road; however, this would not be an issues for approximately 10 years post construction. The authorization to trim the mangroves trees could be built into the Count's permit approval process.

TABLE 3: SHALLOW WATER, HIGH WAKE LIVING SHORELINE - 100 FT SECTION (HOLLYWOOD LAKES)

Shallow Water/High Wake (Hollywood)	Amount	Unit Cost	Units	Total	
Design Survey	1	\$1,000	LS	\$1,000	
As-built Survey	1	\$1,000	LS	\$1,000	
Environmental Assessment	1	\$5,000	LS	\$5,000	
Sediment Samples	5	\$250	EA	\$1,250	Design & Permitting
Design & Engineering	1	\$10,000	LS	\$10,000	
Permitting Fees (Local, State & Federal)	1	\$1,000	LS	\$1,000	
					\$19,250
Turbidity Curtain	200	\$17	LF	\$3,400	
Silt Fence	200	\$8	LF	\$1,600	
Clearing & Grubbing	0.1	\$11,000	AC	\$1,100	
Earthen Berm/Embankment Fill	400	\$36	CY	\$14,400	
Fill Slope/Spoil Island	600	\$40	CY	\$24,000	
Native Estuarine Plantings	200	\$20	EA	\$4,000	
Impervious Liner	100	\$125	LF	\$12,500	Construction
Seed/Sod	2500	\$9	SF	\$22,500	\$83,500
Annual Maintenance	5%	\$4,200	LS	\$4,200	
			TOTAL	\$106,950	
Spoil Island	400	\$40	CY	\$16,000	
Geotextile	100	\$20	LF	\$2,000	
Rip rap	400	\$300	TN	\$120,000	
Oyster Bags	1000	\$2.5	EA	\$2,500	
Boardwalk	100	\$300	LF	\$30,000	
2 foot Stem-Wall	100	\$250	LF	\$25,000	
			ADDED ELEMENTS	\$195,500	

TABLE 4: SHALLOW WATER, HIGH WAKE SEAWALL - 100 FT SECTION (HOLLYWOOD LAKES)

Shallow Water/High Wake (Hollywood) Wall	Amount	Unit Cost	Units	Total	
Design Survey	1	\$1,000	LS	\$1,000	
As-built Survey	1	\$1,000	LS	\$1,000	
Environmental Assessment	1	\$5,000	LS	\$5,000	
Sediment Samples	5	\$250	EA	\$1,250	Design & Permitting
Design & Engineering	1	\$10,000	LS	\$10,000	
Permitting Fees (Local, State & Federal)	1	\$1,000	LS	\$1,000	
				\$19,250	
Turbidity Curtain	200	\$17	LF	\$3,400	
Silt Fence	200	\$8	LF	\$1,600	
Clearing & Grubbing	0.1	\$11,000	AC	\$1,100	
Precast Seawall	100	\$1,000	EA	\$100,000	Construction
Additional 2 feet in height	100	\$250	LF	\$25,000	
				\$131,100	
Annual Maintenance	5%	\$6,500	LS	\$6,500	
			TOTAL	\$156,850	

Case Study 3: Deep water, Low Wake Conditions

This condition is generally applicable to properties abutting main navigation channels, New and Middle Rivers, and ICWW where no wake zones are in place. The property is fairly open, with room for construction landward and/or waterward of the Mean High Water Line, but the nearshore depths are greater than 5 feet, so the slope drops quickly at the edge of the water. For this example, there is an existing seawall, but the owner may want to explore other methods of shore protection. (Figure 19).

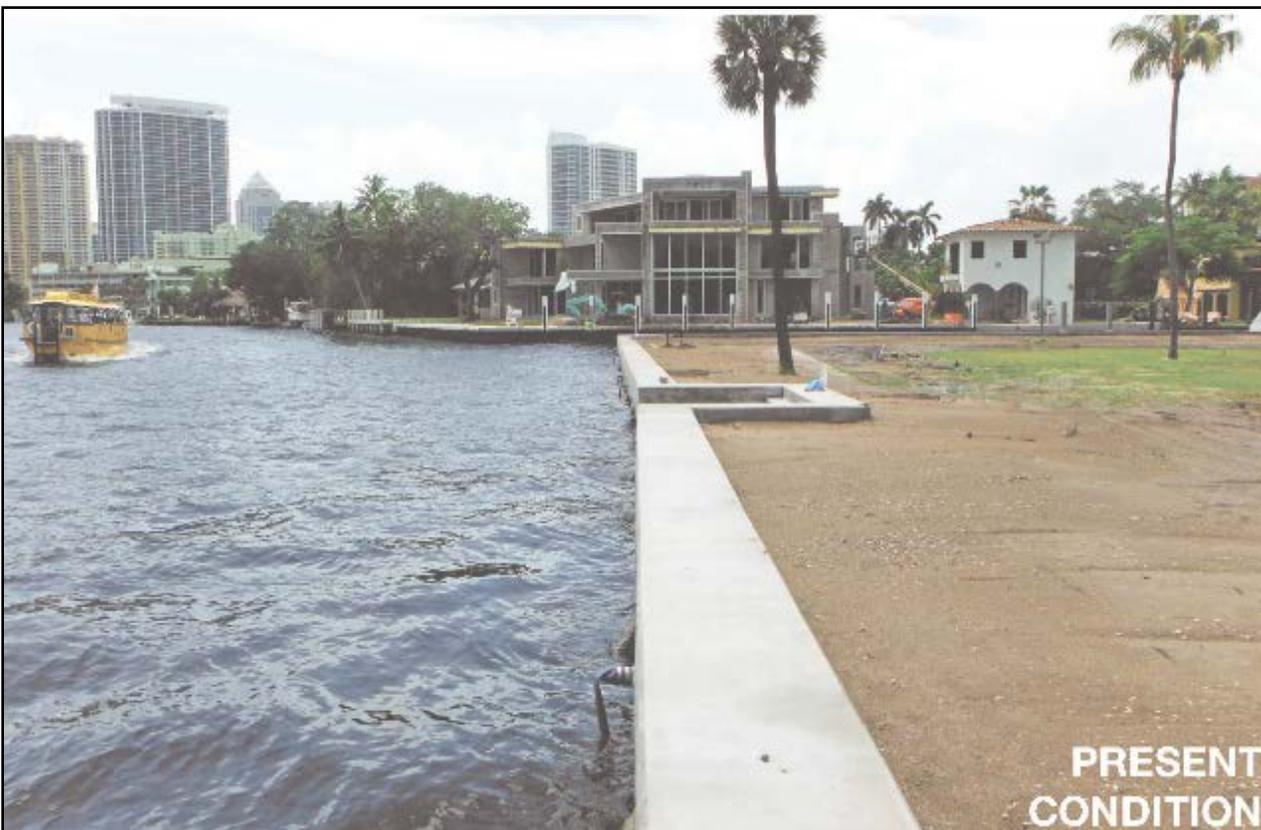


Figure 19: Present Day Condition at All Saints Church. The seawall cap recently replaced, but space remains upland of the wall to install additional protection measures and seaward of the wall to install shoreline treatments to dissipate wave energy and create habitat.

The primary design concerns for this property condition include increasing protective capacity to meet sea level rise and flood stage projections, maintaining adequate storm water drainage capacity, maintaining recreational water access, and providing for enhanced habitat benefit. In this case, the following auxiliary conditions have been assumed:

- Depth of more than 5 feet at the seawall
- Typical waves and boat wake height of less than 2 feet
- Ample space for construction of shoreline solutions and amenities
- Existing vertical *seawall* or *Bulkhead* in good condition

Case Study 3: Shallow Water/High Wake Design Factors

The seawall in this case study has just been rehabilitated, but the owner could have chosen to remove the dilapidated seawall completely or, to reduce removal costs, merely cut it off at ground level and incorporate into the living shoreline design. Large boulders can be placed up to 10 feet seaward of the existing wall in accordance with the FDEP guidelines for living shorelines. The large boulders will stabilize

the toe and allow backfill with clean sand to between the boulders and the existing wall. The boulders would be 3-4 feet in diameter limestone, so that the weight of the stone can hold the submerged and emergent slope. The boulders will also create underwater habitat. Elevating the toe, allows for a gentler shoreline design (6:1 slope) with increased space for vegetative plantings that will prevent rainfall runoff erosion and visually enhance the shoreline. These plantings will change in species composition and will migrate up slope as sea level rises, continuing to adapt and protect the shoreline.

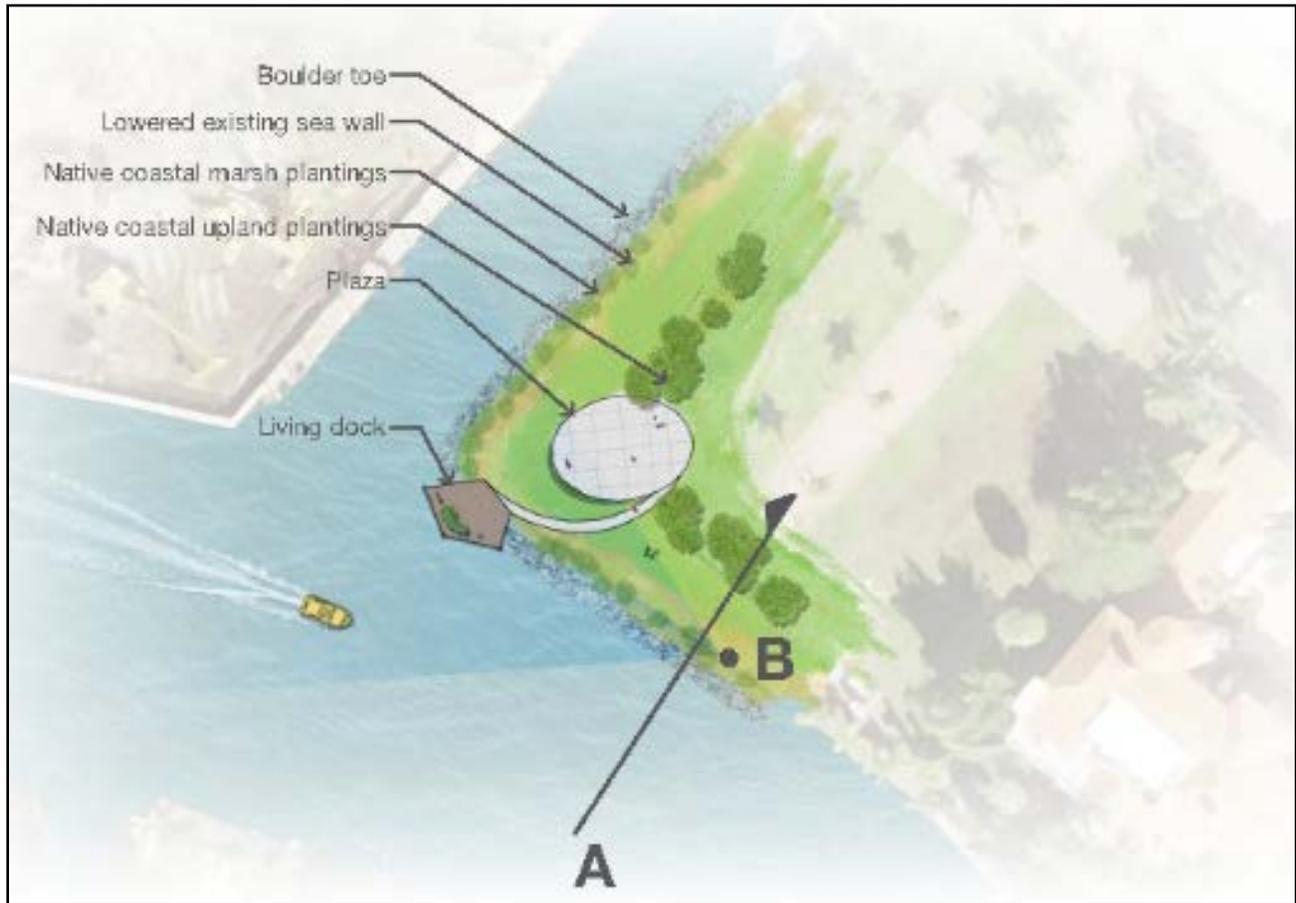


Figure 20: Plan view - Deep Water, Low wake shoreline solutions including an upland berm, boulder toe, and graded fill placement that stabilize and support amenities like the plaza and living dock as well as native marsh and coastal upland plantings.

A floating/living dock can be integrated into the design to provide water access for kayaks or mooring of larger boats. The “living” aspect of the dock comes from the addition of planters which extend below the dock into the water. This connection to the water below provides irrigation for the salt tolerant species in the planter practically eliminating the need for irrigation and enhancing the look of the dock. Seating can also be integrated in to the planters as shown in **Figure 21**. The floating/living dock can adjust to continue to provide access to the water even with sea level rise and changing water levels.



Figure 21: Living Dock with planters and seating (South Cove, West Palm Beach)

Landward of the plantings and living dock, the slope increases slightly to 4:1 creating the upland berm. The berm will serve to increase the **crest** height adding protective capacity (**crest** elevation) for rising sea levels and increased storm surges. The stem wall in the middle of the berm helps to maintain structural integrity should the berm be exposed to long term inundation by seawater. The stem wall could be constructed out of concrete with steel reinforcement, or vinyl reinforced plastic. A structural engineer will ensure the wall is properly designed for the loading requirements and installed at the correct elevations to keep the berm watertight while still maintaining adequate storm water drainage capacity. Everything seaward of the upland berm is designed to have periodic inundation, lasting days to weeks at a time allowing for seasonal and storm related fluctuations in water level. The berm will also provide an elevated viewing platform of the waterway. It can be grassed or planted with native, coastal upland species to prevent erosion from rainfall runoff and provide habitat. (**Figure 22**).



Figure 22: Perspective View - Deep Water, Low Wake

There may be the need to add fill in front of and behind the upland berm for drainage purposes. Depending on the elevation of the adjacent roads and finished floor elevations of the buildings, stormwater management will also be an issue. **Figure 23** shows that rainfall runoff may be collected behind the new berm in a **bioswale** or French drain and require additional **stormwater** infrastructure to passively (gravity) or actively (pumps) convey stormwater to the canal. Stormwater management is highly dependent upon the **tailwater** condition, or elevation of the sea water in the canal, so sea level rise will dictate the long term drainage capacity. Existing culverts may need to be elevated or retrofitted with check valves or flap valves to keep seawater from entering the system. Again, flood control is really a 2-part solution and installing the upland berm will control seawater flooding, but rainfall runoff needs to be considered as well in order to keep the property protected from freshwater flooding.

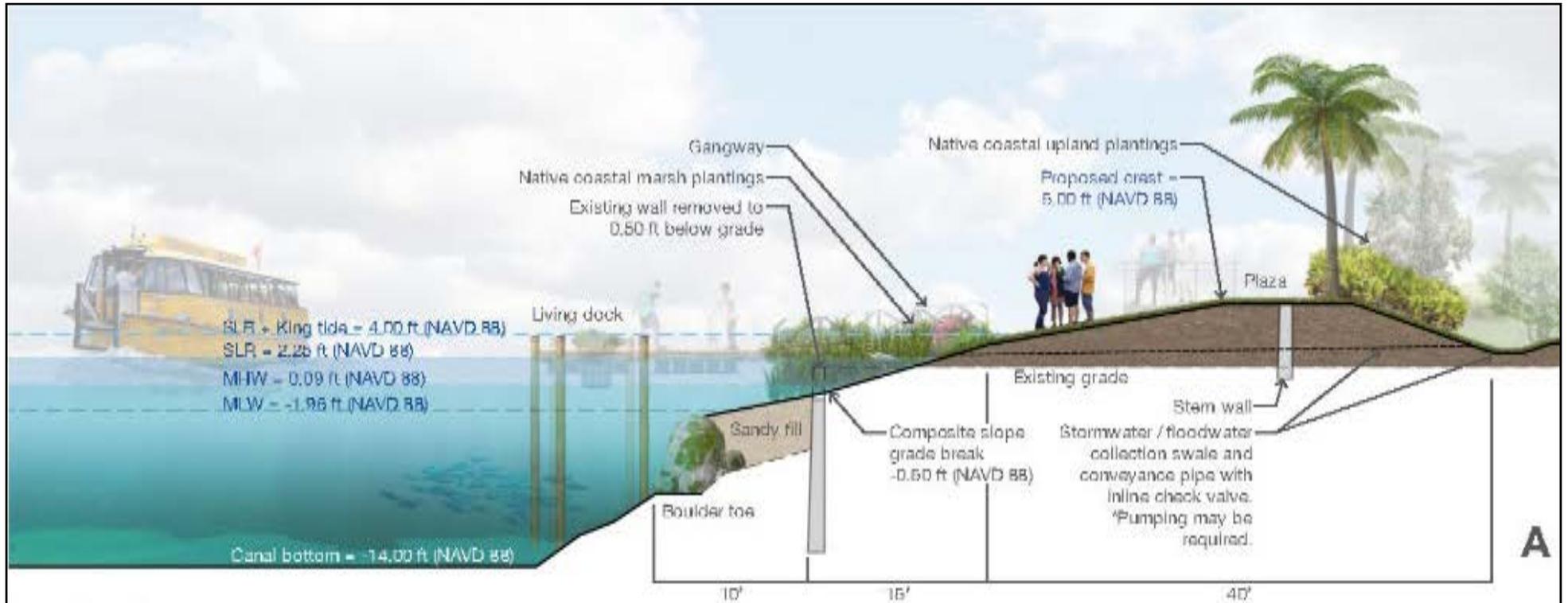


Figure 23: Deep Water, Low Wake - Cross Section View showing upland berm with a stem wall, shoreline intertidal vegetation and the boulder toe and floating/living dock amenity.

Case Study 3: Deep Water, Low Wake Permitting Pathway

Exempt Items

- Earthen Berm, is an exempt item because it is an upland element.
- The rip rap at the toe of the wall would need to stay within 10 ft. of the face of the existing seawall to remain an exempt item.
- If an existing seawall is replaced, it can be installed within 18 inches in front of the existing seawall.

Nationwide Permit

- The Rock Sill and planted slope would qualify as a living shoreline exemption from the FDEP, but would require proof that it qualifies as a Nationwide 54 permit authorization from the USACE.
- The dock, with or without the living shoreline component, would need to be permitted through USACE and locally through Broward County or other local municipality.
- The dock length would be restricted to 30% of the waterway width or 62.5' from the navigable channel centerline.

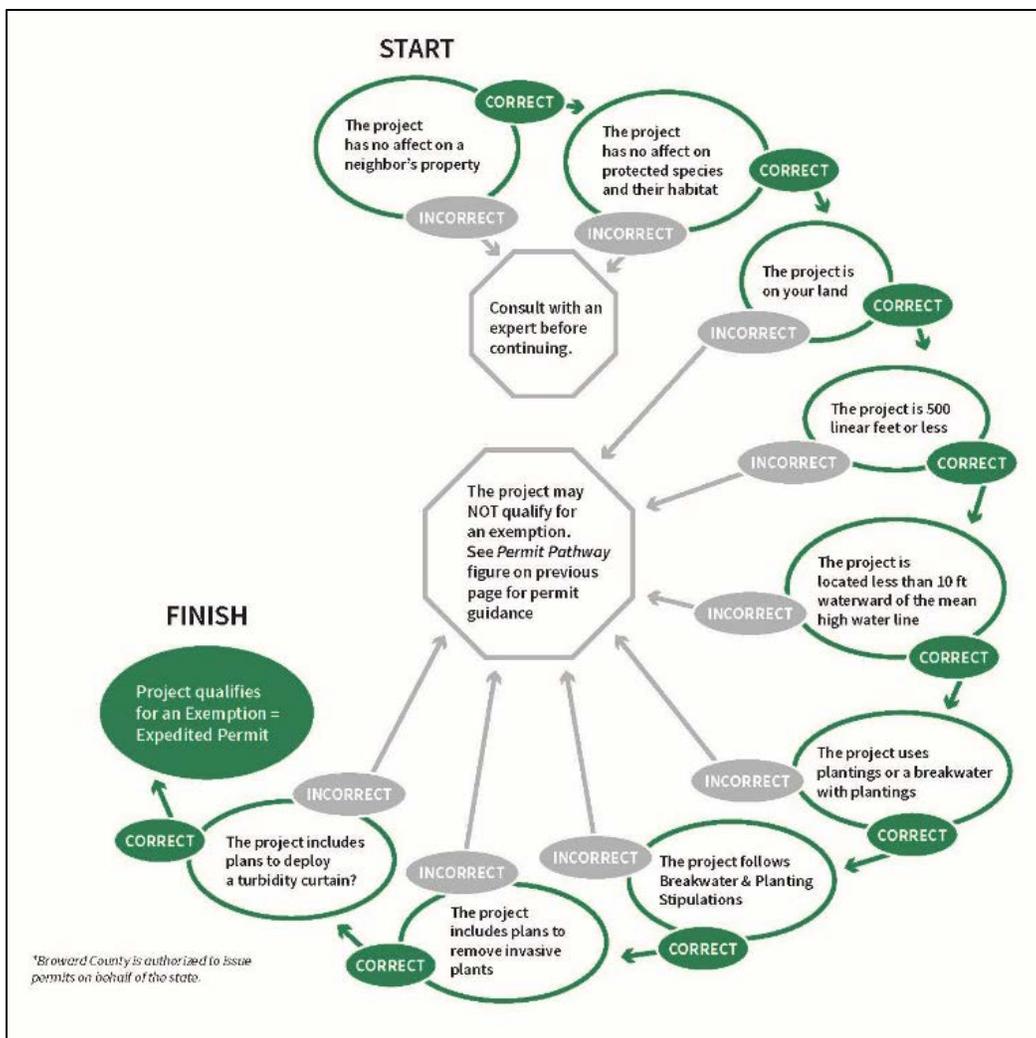


Figure 24: Deep Water, Low Wake Permitting Pathway

Case Study 3: Deep Water, Low Wake Probable Costs and Maintenance Requirements

The associated costs segregated by the various components (design, permitting and construction) of implementing living shoreline protection solutions is provided below, in 2018 dollar values. These estimates costs are based upon construction access from the land-side and waterside and materials were within 100 mile range of the project site. Costs could fluctuate due to the price of fuel, distance for hauling materials, etc. These costs are based on 100-foot shoreline project length. The design and permitting costs are similar for both the traditional seawall and living shoreline alternative, however in the deep water, low wake scenario, the living shoreline option (Table 5) could be about the same as the construction cost of the traditional seawall (Table 6), depending on added elements the property owner selects.

There would be maintenance required for this design, primarily to ensure that the installed plants thrive and coalesce; as the planted bank slope can only remain stable if the plant roots are well established.

Once these plants are rooted, the only other maintenance related to the vegetative component is the trimming of the mangrove tress, to provide the viewshed from the property; however, this would not be an issues for approximately 10 years post construction. The authorization to trim the mangroves trees could be built into the Count's permit approval process.

TABLE 5: DEEP WATER, LOW WAKE LIVING SHORELINE - 100 FT SECTION (ALL-SAINTS)

	Amount	Unit Cost	Units	Total	
Design Survey	1	\$1,000	LS	\$1,000	
As-built Survey	1	\$1,000	LS	\$1,000	
Environmental Assessment	1	\$5,000	LS	\$5,000	
Sediment Samples	5	\$250	EA	\$1,250	Design & Permitting
Design & Engineering	1	\$10,000	LS	\$10,000	
Permitting Fees (Local, State & Federal)	1	\$1,000	LS	\$1,000	
					\$19,250
Turbidity Curtain	200	\$17	LF	\$3,400	
Silt Fence	200	\$8	LF	\$1,600	
Clearing & Grubbing	0.1	\$11,000	AC	\$1,100	
Earthen Berm/Embankment Fill	370	\$36	CY	\$13,320	
Remove Seawall	50	\$150	LF	\$7,500	
Native Estuarine Plantings	200	\$20	EA	\$4,000	
Impervious Liner	100	\$125	LF	\$12,500	
Geotextile	100	\$20	LF	\$2,000	
Rip rap	224	\$300	TN	\$67,200	Construction
Seed/Sod	2500	\$9	SF	\$22,500	\$135,120
Annual Maintenance	5%	\$6,750	LS	\$6,750	
			TOTAL	\$161,120	
French Drain	100	\$160	LF	\$16,000	
8" HDPE Pipe	40	\$150	LF	\$6,000	
Check Valve	1	\$500	EA	\$500	
Living Dock	50	\$400	SF	\$20,000	
3 foot Stem Wall	100	\$350	LF	\$35,000	
			ADDED ELEMENTS	\$77,500	

TABLE 6: DEEP WATER, LOW WAKE SEAWALL - 100 FT SECTION (ALL-SAINTS)

	Amount	Unit Cost	Units	Total	
Design Survey	1	\$1,000	LS	\$1,000	
As-built Survey	1	\$1,000	LS	\$1,000	
Environmental Assessment	1	\$5,000	LS	\$5,000	
Sediment Samples	5	\$250	EA	\$1,250	Design & Permitting
Design & Engineering	1	\$10,000	LS	\$10,000	
Permitting Fees (Local, State & Federal)	1	\$1,000	LS	\$1,000	\$19,250
Turbidity Curtain	200	\$17	LF	\$3,400	
Silt Fence	200	\$8	LF	\$1,600	
Clearing & Grubbing	0.1	\$11,000	AC	\$1,100	
Precast Seawall	100	\$1,000	EA	\$100,000	Construction
Additional 3 foot height	100	\$350	LF	\$35,000	\$141,100
Annual Maintenance	5%	\$7,000	LS	\$7,000	
			TOTAL	\$167,350	

Case Study 4: Deep Water, High Wake – Pompano Beach

This condition is generally applicable to properties abutting main navigation channels and the ICWW where there are higher vessel operating speeds and higher wake. It is likely that the property is constrained both landward from the current seawall footprint, with 15 to 30 feet of width available for construction, and waterward, with expansion constricted by jurisdictional or proprietary constraints. Nearshore depths are greater than 5 feet, so the slope drops quickly at the edge of the water out to the channel. In the site considered, there is an existing seawall, at the end of a residential street which is adjacent to the ICWW. (Figure 25).



Figure 25: Present Day Condition at Pompano Beach. Space is available upland of the wall to install additional protection measures and up to 10 feet seaward of the wall to install shoreline treatments to dissipate wave energy and create subtidal habitat.

The primary design concerns for this property condition include increasing protective capacity to meet sea level rise and flood stage projections, maintaining adequate storm water drainage capacity, maintaining the current level of public access and providing for enhanced subtidal habitat benefit. In this case, the following auxiliary conditions have been assumed:

- Depth of more than 5 feet at the seawall
- Typical waves and boat wake height of 2-4 feet
- Restricted space for construction of shoreline solutions

- Preservation or upgrade to existing amenities
- Existing vertical *seawall* or *Bulkhead* in good condition

Case Study 4: Shallow Water/High Wake Design Factors

The seawall in this case study has usable life remaining and the design shown is intended to enhance that seawall and extend the usable life of that structure. Rip rap can be placed up to 10 feet seaward of the existing wall in accordance with the FDEP guidelines for living shorelines and provide toe scour protection. The rip rap will stabilize the toe of the existing wall will also create underwater habitat. Also there are habitat panels that can be attached to the existing wall increasing the amount of surface area for crustaceans, attached algae and soft corals. Some of these seawall treatments mimic mangrove roots, giving 3-dimensional habitat and some wave dissipation to the seawall.

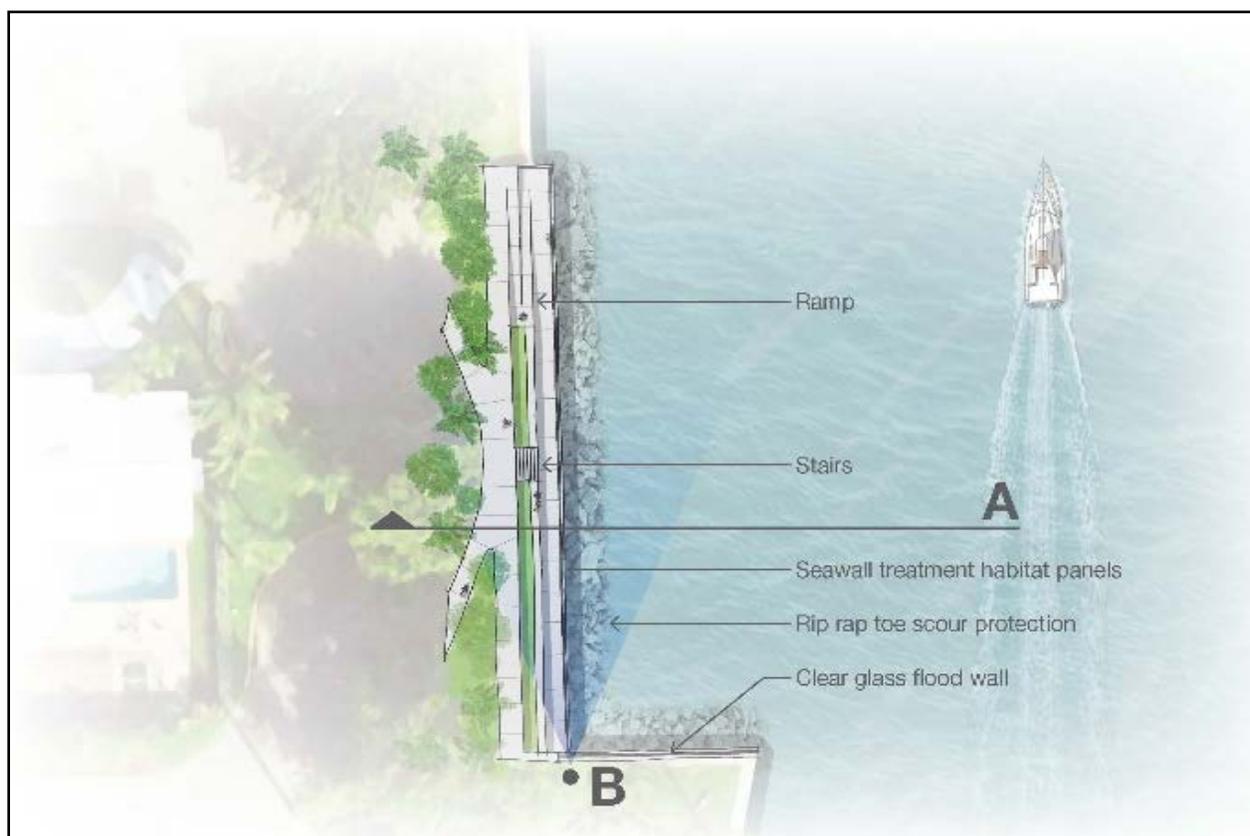


Figure 26: Plan view - Deep Water, High wake shoreline solutions including an upland berm with seat walls, rip rap toe, habitat panels and clear glass flood wall.

The clear glass/plexiglass flood wall increases the crest elevation and level of protection to extreme events while maintaining the viewshed of the water from the park. The glass/plexiglass flood wall would be approximately the same size and height as the existing railing, but would provide a water-tight, safe, railing solution along the waterfront without changing the existing concrete seawall cap (Figure 20). The glass/plexiglass flood wall may be a good intermediate option to address sea level rise and storm events for the remaining usable life of the seawall.



Figure 27: Glass wall affixed to the top of an existing concrete seawall cap (Flood Control International, England)

Landward of the seawall, the upland berm provides a secondary level of defense should the glass wall be overtopped. The upland berm prevents storm tides and waves from reaching the streets and adjacent residences. The berm will serve to increase the crest height adding protective capacity (crest elevation) for long term rising sea levels and increased storm surges. The terraced, seat walls along the seaward side of the berm helps to maintain structural integrity should the berm be exposed to long term inundation by seawater. The seat walls can be constructed of concrete with steel reinforcement, or vinyl reinforced plastic. A structural engineer will ensure the wall is properly designed for the loading requirements and installed at the correct elevations to keep the berm water tight while still maintaining adequate storm water drainage capacity. Everything seaward of the upland berm will be designed to have periodic inundation lasting days to weeks at a time allowing for seasonal and storm related fluctuations in water level. The berm will also provide an elevated viewing platform of the waterway. It can be grassed or planted with native, coastal upland species to prevent erosion from rainfall runoff and provide habitat. (Figure 28).

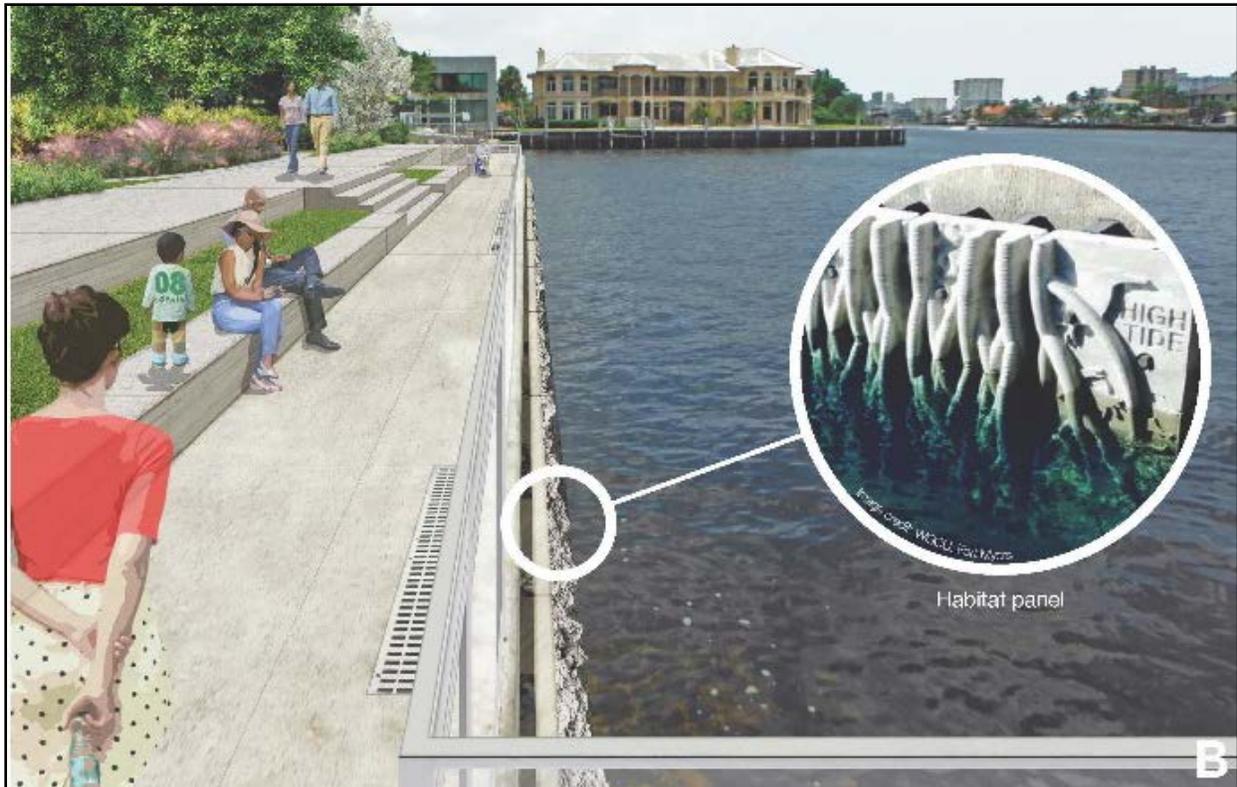


Figure 28: Perspective View - Deep Water, Low Wake

There may be the need to add stormwater infrastructure for drainage purposes, depending on the elevation of the adjacent roads and finished floor elevations of the buildings, stormwater management will also be an issue. **Figure 29** shows that rainfall runoff may be collected behind the new upland berm or in a drain immediately behind the glass flood wall and require additional stormwater infrastructure to passively (gravity) or actively (pumps) convey stormwater to the ICWW. Stormwater management is highly dependent upon the tailwater condition, or elevation of the sea water in the canal, so sea level rise will dictate the long term drainage capacity. Existing culverts may need to be elevated or retrofitted with check valves or flap valves to keep seawater from entering the system. Again, flood control is really a 2-part solution and installing the upland berm will control seawater flooding, but rainfall runoff needs to be considered in the design in order to keep the property protected from rainfall flooding as well.

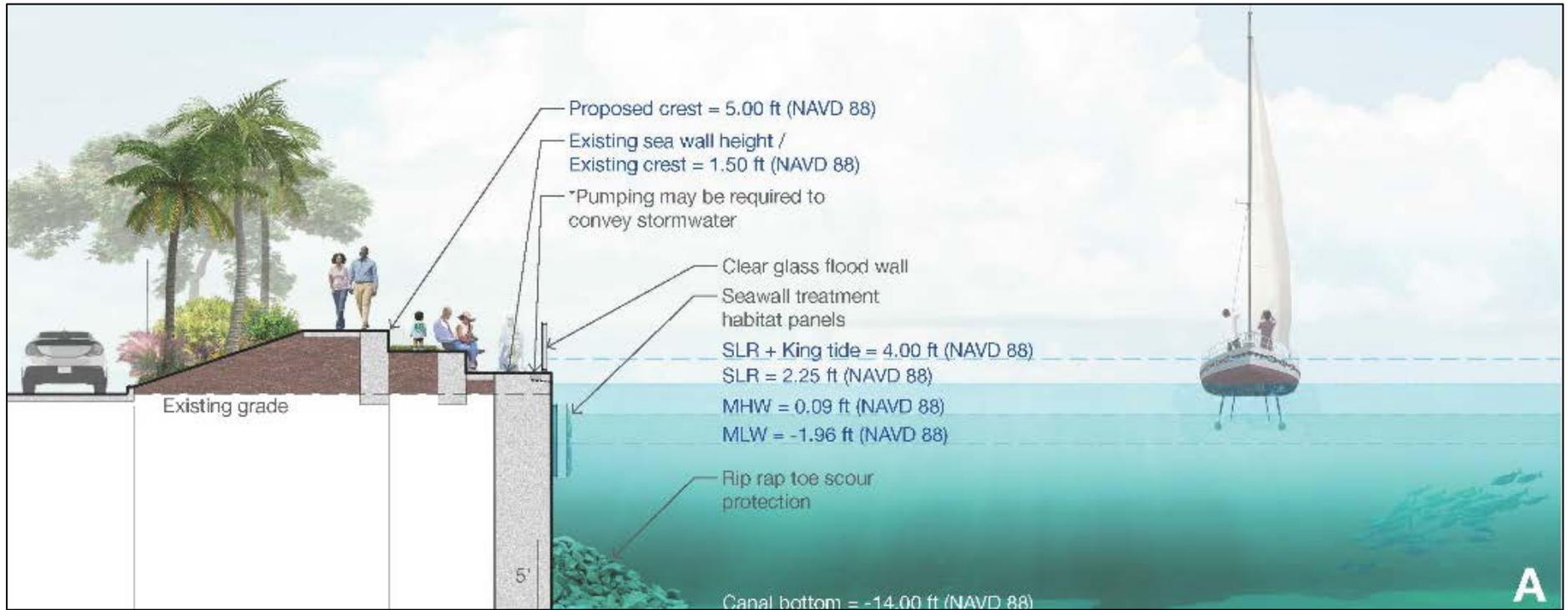


Figure 29: Cross Section View - Deep Water, Low Wake

Case Study 4: Deep Water, Low Wake Permitting Pathway

Exempt Items

- The earthen berm, is an exempt item because it is an upland element.
- The rip rap at the toe of the wall would need to stay within 10 feet of the face of the existing seawall to remain an exempt item.
- If an existing seawall is replaced, it can be installed within 18 inches in front of the existing seawall.
- The habitat panels are exempt, if they are less than 19" off of the seawall.

Nationwide Permit

- Tow scour rip-rap would qualify under the NW 54 (USACE) if it doesn't extend more than 10' off of the existing seawall. Submittal of a permit exception review, demonstrating that the design qualifies as a NW 54, would need to be received by the USACE so they can confirm that it fits the NW 54 exception.
- New, additional stormwater outfalls would require a permit.

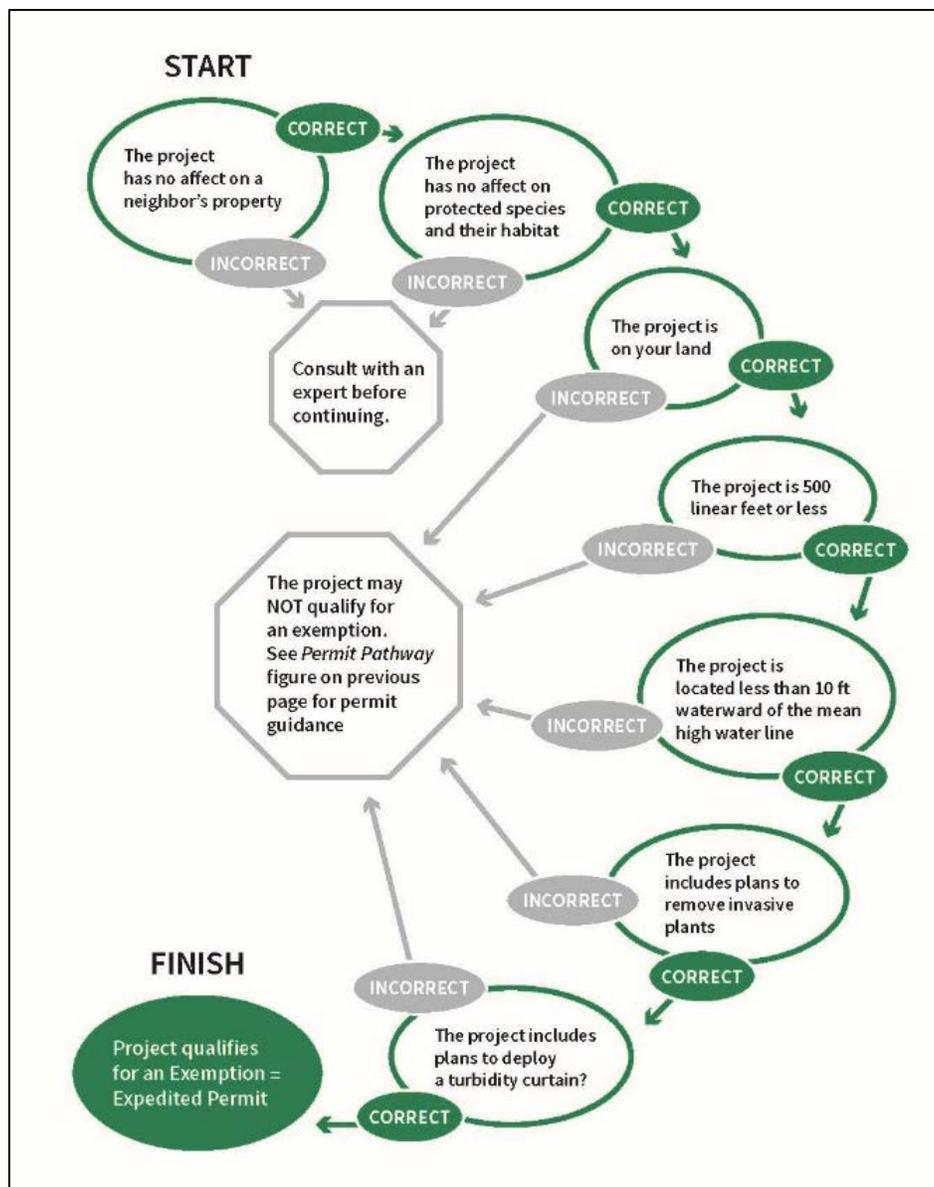


Figure 30: Deep Water, High Wake Permitting Pathway

Case Study 4: Deep Water, Low Wake Probable Costs and Maintenance Requirements

The associated costs segregated by the various components (design, permitting and construction) of implementing seawall enhancement protection solutions is provided below, in 2018 dollar values. These estimates costs are based upon construction access from the land-side (no barge required) and materials were within 100 mile range of the project site. Costs could fluctuate due to the price of fuel, distance for hauling materials, etc. These costs are based on 100-foot shoreline project length. The design and permitting costs are similar for both the traditional seawall and seawall enhancement alternative, however in the deep water, low wake scenario, the construction cost of the seawall enhancement option could be less than the construction cost of the traditional seawall (Table 8).

There would be minimal maintenance requirements for this design.

TABLE 7: DEEP WATER, HIGH WAKE SEAWALL ENHANCEMENT - 100 FT SECTION (POMPANO BEACH)

	Amount	Unit Cost	Units	Total	
Design Survey	1	\$1,000	LS	\$1,000	
As-built Survey	1	\$1,000	LS	\$1,000	
Environmental Assessment	1	\$5,000	LS	\$5,000	
Sediment Samples	5	\$250	EA	\$1,250	Design & Permitting
Design & Engineering	1	\$10,000	LS	\$10,000	
Permitting Fees (Local, State & Federal)	1	\$1,000	LS	\$1,000	
					\$19,250
Turbidity Curtain	200	\$17	LF	\$3,400	
Silt Fence	200	\$8	LF	\$1,600	
Clearing & Grubbing	0.1	\$11,000	AC	\$1,100	
Earthen Berm/Embankment Fill	260	\$36	CY	\$9,360	
Rip Rap	175	\$300	TN	\$52,500	
Concrete Seatwall	100	\$350	LF	\$35,000	Construction
Concrete Stairs	1	\$5,000	EA	\$5,000	
					\$107,960
Annual Maintenance	5%	\$5,500	LS	\$5,500	
			TOTAL	\$132,710	
Habitat Panels	100	\$40	LF	\$4,000	
Glass/Plexiglass Wall	100	\$450	LF	\$45,000	
			ADDED ELEMENTS	\$49,000	

TABLE 8: DEEP WATER HIGH WAKE SEAWALL - 100 FT SECTION (POMPANO BEACH)

	Amount	Unit Cost	Units	Total	
Design Survey	1	\$1,000	LS	\$1,000	
As-built Survey	1	\$1,000	LS	\$1,000	
Environmental Assessment	1	\$5,000	LS	\$5,000	
Sediment Samples	5	\$250	EA	\$1,250	Design & Permitting
Design & Engineering	1	\$10,000	LS	\$10,000	
Permitting Fees (Local, State & Federal)	1	\$1,000	LS	\$1,000	\$19,250
Turbidity Curtain	200	\$17	LF	\$3,400	
Silt Fence	200	\$8	LF	\$1,600	
Clearing & Grubbing	0.1	\$11,000	AC	\$1,100	
Precast Seawall	100	\$1,300	EA	\$130,000	Construction
Additional 3 feet height	100	\$350	LF	\$35,000	\$171,100
Annual Maintenance	5%	\$8,500	LS	\$8,500	
			TOTAL	\$198,850	

Attachment A

Permitting

Contacts/Communications

Broward County Permitting					
Municipality	Department	Contact	Phone Number	Email	Status
Broward County	Environmental Protection & Growth Management	Linda Sunderland	954-519-1454	LSUNDERLAND@broward.org	Permit process received!
Pompano Beach	Building Dept.		954-786-4198		
Pompano Beach	Engineering Dept.	John Sfiropoulos	954-786-4060	John.Sfiropoulos@copbfl.com	no current codes
Lighthouse Point	Building Dept.		954-943-6509		
Wilton Manors	Community Development Services Dept.	Roberta Moore	954-390-2180	rmoore@wiltonmanors.com	Comp Plan updates underway
City of Fort Lauderdale	Public Works Director	Nancy J. Gassman, Ph.D.	954-828-5769		Conference call
City of Fort Lauderdale	Sustainable Development	Anthony Greg Fajardo	954-828-6852	AFajardo@fortlauderdale.gov	Conference call
Lauderdale-by-the-Sea	Development Services	Susan Leven	954-640-4221	susanl@lauderdale.by.the.sea-fl.gov	email sent
Oakland Park	Building & Permitting	Stephen Scott	954-630-4350	stephens@oaklandparkfl.gov	email sent
Dania Beach	Community Development	Marc La Ferrier	954-924-6805	mlaferrier@daniabeachfl.gov	email sent
Hollywood	Engineering Division	Luis Lopez	954-921-3900	LLopez@hollywoodfl.org	email sent
Hollywood	Public Utilities	Steve Joseph	954-967-4455	sjoseph@hollywoodfl.org	email sent
Hallandale Beach	Public Works	Steven Parkinson	954-457-1611	sparkinson@hallandalebeachfl.gov	email sent
Hallandale Beach	Green Initiatives Coordinator	Maria Bower	954-457-1617	mbower@cohb.org	email sent
USACE	Regulatory	Portia Caldwell	561-681-6600	Southeast.District@floridadep.gov	Conference Call
DEP	Regulatory	Linda Knoeck	561-683-0498	West.PB.RO@usace.army.mil	Conference Call



meeting notes

project Broward County Resilient Shorelines project no. D01789.23
date November 16, 2018 time 2:00pm
present Anthony Fajardo – FTL route to
 Dr. Nancy Gassman - FTL
 Tom Ries – ESA
 Bryan Flynn - ESA
subject City of Ft. Lauderdale Review of Resilient Shorelines

The meeting started with review of the 4 site renderings.

Shallow/Low Wake (Las Olas)

- Typically docks are parallel not perpendicular due to navigational concerns
- City owns seawall where road abuts, exceptions are at NE 20th and Idlewild Dr.
- Worried mangroves will be a disincentive, impact on viewshed, need for trimming permit, impact on life of seawall.

Shallow/High Wake

- Liked the idea
- FAU Group trying to get a NEA permit for something similar on the west side of North Beach Village.

Deep/Low Wake

- Living Floating Dock – like the idea but concerns about maintenance

Deep/High Wake

- Probably most similar to City conditions
- Liked berm and seat wall.

Overall

- Concerns about vegetation maintenance
- Structures are to be permitted through engineering
- Standard process per Section 47-19.3 (emailed)
- No ordinances specifically for living shorelines would just go through regular process
- City would like to work with the County to streamline process and standardize the elevations, materials etc.



4200 West Cypress Street
Suite 450
Tampa, FL 33607
813.207.7200 phone
813.207.7201 fax

www.esassoc.com

meeting notes

project Broward County Resilient Shorelines project no. D01789.23
date August 9, 2018 time 11:00am
present Roberta Moore - CWM route to
 Bryan Flynn - ESA
subject City of Wilton Manors Conference Call for Resilient Shorelines

- No more than 30% of the waterway can be obstructed. Sec. 27-336. - General licenses j. The installation of natural limerock rip-rap at the waterward face of an existing vertical bulkhead provided that the rip-rap is clean and free of debris, that no seagrasses are covered by the rip-rap, that no dredging or other filling is conducted and that the rip-rap is placed at a slope no steeper than 2H:1V and that no interference to other riparian property rights, or navigation occurs. Sec. 27-337. - Criteria for issuance or denial of an environmental resource license. (5)
- All vertical bulkheads or seawalls constructed in marine waters where no previous seawall existed shall be provided with natural limerock rip-rap, or other approved habitat enhancement, at the waterward face of the bulkhead or seawall. (10)
- Mangrove alteration shall be licensed only if the alternation is in conformity with Chapter 373, Pt. IV, F.S. (§ 373.403, F.S. et seq.), and Chapter 403, F.S., as amended. Sec. 27-341. - Alterations of voluntarily created wetlands
- Calvin Giordano is in the process of updating the comp plan



meeting notes

project Broward County Resilient Shorelines project no. D01789.23
date October 25, 2018 time 2:00pm
present Linda Knoeck – USACE route to
 Greg Ward – Broward
 Tom Ries – ESA
 Emily Keenan - ESA
 Bryan Flynn - ESA
subject USACE Permitting Discussion on Resilient Shorelines

- Meeting started with discussion of renderings for different proposed locations.

Shallow/Low wake:

- USACE has not used the Nationwide 54 much, but would like to! Just need more applicants wanting to do living shorelines.
- More requests for the Nationwide 13 for shoreline stabilization/seawall.
- Pre-construction notification, USACE Review, no permit fee
- Docks/Boat lifts if rebuild/maintenance are a general permit #20 or #17.
- Navigation setback will be 25 % of the waterway.
- The new JaxBO eliminates NMFS consultation, saves time. If the project doesn't qualify then requires and ESA consultation.
- JaxBO – Activity 7 has design criteria. Matches well with DEP. (5ft gaps in living shoreline every 75ft)
- Exceptions are allowed through the supercedence process.

Shallow/High wake:

- Standard Permit would apply, public notice
- Beneficial Use of Dredged Material will require dredging permit to be modified to include location as a disposal site. Need to work out ahead of time with the dredging consultant/contractor. Timing critical.

Deep/Low wake:

- NW 54 would apply
- Benthic resource surveys would be required.
- As long as overall net improvement is beneficial, should be apparent.

Deep/High wake:

- Habitat can't be impacted. If the habitat panels have to be removed to repair seawall then mitigation may be required if coral recruits greater than 10 cm. Sponges and algae are exempt from mitigation.
- Like the innovative and forward thinking concepts.

Attachment B

Broward County Permitting Information

From: [Sunderland, Linda](#)
To: [Bryan Flynn](#)
Cc: [Decker, Michelle](#)
Subject: RE: Broward County Shoreline Protection Permitting
Date: Wednesday, September 5, 2018 11:36:55 AM
Attachments: [image001.png](#)
[image002.png](#)
[Article XI.pdf](#)
[EnviroResourceLicApp 2016.docx](#)
[General License application - 04-20-17.docx](#)
[1. FEE SCHEDULE as of 08-22-17.pdf](#)

Hi Bryan,

Any work in, on, over or under waters or wetlands of Broward County requires our review and may require a license. A copy of the Code is attached.

Minor projects with no natural resource impacts may qualify for an Environmental Resource General License (GL). There is a list of those projects in the Code (27-336(a)(a) a-m). The application is attached. The fee is \$100. Processing of the application is usually less than 2 weeks. For example, the repair of an existing functional seawall, raising a seawall cap, docks less than 500 square feet, etc., would qualify for a GL

Larger projects and projects with potential impacts to natural resources require a regular Environmental Resource License (ERL). The application is attached along with the fee schedule. For example, replacing a seawall, extending a cap with a dock to be more than 500 square feet etc., would require an ERL.

We also have delegation from the state to issue Environmental Resource Permits on their behalf in certain areas of the County (not on Sovereign Submerged Lands). The state application and appropriate fees are required.

I know the City of Fort Lauderdale has also been working on an ordinance requiring seawall caps to be a certain height by 2025. You may want to reach out to Dr. Nancy Gassman for more information. Her contact info is:

Nancy J. Gassman, Ph.D., LEED Green Associate
Interim Deputy Public Works Director
City of Fort Lauderdale
101 N.E. 3rd Avenue, Suite 1400
Fort Lauderdale, FL 33301
954-828-5769

Please let me know if you need any additional information.



Linda Sunderland

Natural Resources Section Manager

Environmental Protection and Growth Management Department
ENVIRONMENTAL ENGINEERING AND PERMITTING DIVISION
1 North University Drive, Mailbox 201, Plantation, FL 33324-2038
Office: (954) 519-1454

Web links: Broward.org/Environment | [ePermits](#)

broward.org



We value your feedback as a customer. You can comment on the quality of service you received by [completing our Customer Satisfaction Survey](#). Thank you!

From: Decker, Michelle
Sent: Wednesday, September 05, 2018 7:51 AM
To: Sunderland, Linda <LSUNDERLAND@broward.org>
Subject: FW: Broward County Shoreline Protection Permitting

Linda,

I think this may be for you ☺



MICHELLE DECKER, M.S., PROGRAM/PROJECT COORDINATOR
Environmental Protection and Growth Management Department
ENVIRONMENTAL ENGINEERING AND PERMITTING DIVISION
1 North University Drive, Mailbox 201, Plantation, FL 33324-2038
Office: (954) 519-1205

Broward.org/Environment | [ePermits](#)

We value your feedback as a customer. You can comment on the quality of service you received by [completing our survey](#). Thank you!

From: Bryan Flynn [<mailto:BFlynn@esassoc.com>]
Sent: Tuesday, September 04, 2018 4:07 PM
To: Decker, Michelle <MDECKER@broward.org>

Cc: Thomas Ries <TRies@esassoc.com>

Subject: Broward County Shoreline Protection Permitting

Hello Michelle,

We are working with Greg and Samantha on developing a program for resilient shorelines in Broward County. We are working to layout the permitting process for residents and business owners that may be considering replacing or upgrading their seawalls. Are there any permitting conditions in place specific to Broward County that are over and above what the Corps or DEP have in place? Any applications or fees? Some of the municipalities we have reached out to don't really have anything in place yet, but are working on updating their comp plans. Wilton Manors was really the only area that had very specific information so far, but they were still generally in line with what DEP has, just more information regarding plant types and setbacks really.

I've attached some of the renderings of things we are talking about promoting to increase resilience, property and habitat value.

If you would like to discuss via phone, I am happy to set up a conference call!

Thank you!

Bryan D. Flynn, PE
Program Manager

ESA | Environmental Science Associates

4200 West Cypress Street, Suite 450

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ARTICLE XI. - AQUATIC AND WETLAND RESOURCE PROTECTION*

Editor's note—

Section 1 of Ord. No. 93-49, adopted Nov. 23, 1993, effective Dec. 8, 1993, changed the title of this article from "Dredge and Fill projects" to "Aquatic and Wetland Resource Protection."

[Sec. 27-331. - Declaration of intent.](#)

[Sec. 27-332. - Definitions.](#)

[Sec. 27-333. - Prohibited activities.](#)

[Sec. 27-334. - Application requirement and standards.](#)

[Sec. 27-335. - Exemptions.](#)

[Sec. 27-336. - General licenses.](#)

[Sec. 27-337. - Criteria for issuance or denial of an environmental resource license.](#)

[Sec. 27-338. - Mitigation.](#)

[Sec. 27-339. - General and specific conditions to be included in all licenses.](#)

[Sec. 27-340. - Other licenses, permits or authorizations.](#)

[Sec. 27-341. - Alterations of voluntarily created wetlands.](#)

[Secs. 27-342. - Marine facility operating licenses.](#)

[Secs. 27-343—27-350. - Reserved.](#)

Sec. 27-331. - Declaration of intent.

The board desires to avoid water pollution and the resultant environmental degradation by protecting the Everglades wetlands and waters of Broward County (county) because of their value to the maintenance of the quality of life, public drinking water supply, flood storage, groundwater recharge and discharge, recreation, propagation of fish and wildlife, and the public health, safety and welfare, and hereby declares that:

(1)

It is the purpose and intent of this article to maintain the functions and values provided by aquatic and wetland resources so that there will be no overall net loss in the functions and values and to strive for a net resource gain in aquatic and wetland resources over present conditions.

(2)

The alteration of existing regulated aquatic or jurisdictional wetland areas may have an adverse environmental impact on the waters of Broward County and on the ecological functional values provided by those areas which causes adverse impacts to the people and biota of Broward County. This adverse impact must be regulated by avoidance as the first priority, minimized as a second priority, or mitigated as a third priority.

(3)

Wetland resource alteration includes the dredging, filling, drainage or flooding of jurisdictional wetland areas.

(4)

Dredging and filling or aquatic resource alteration projects include, without limitation, construction or replacement of seawalls, bulkheads, docks and piers, the filling of any existing regulated water body, the creation of new canals or lakes within upland areas, maintenance dredging of existing canals, ditches or waterways, installation of pilings, buoys or aids to navigation, the installation of subaqueous utility crossings or lines, the construction or replacement of bridges, the removal or alteration of any mangroves as defined within Chapter 373, pt. IV, F.S. (§ 373.403, F.S. et seq.), and Chapter 403, F.S., as amended, and any other work done in, on or under the waters of Broward County, except for those activities specifically exempted by this article.

(5)

Although some dredging and filling, aquatic resource alteration and wetland alteration activities in the waters or wetland resources of Broward County may by themselves have a minor impact, the cumulative effect of several otherwise unrelated changes can result in a major impairment of aquatic or wetland resources.

(Ord. No. 90-49, § 1(27-11.01), 12-18-90; Ord. No. 93-49, § 1, 11-23-93)

Sec. 27-332. - Definitions.

The definitions in this article apply only to this article. The general definitions of this chapter [section 27-4] shall apply unless in conflict with a definition contained herein.

Alteration means any human activity that causes negative impacts to regulated aquatic resource or jurisdictional wetlands,

including but not limited to dredging or filling, excavation of drainage ditches in or adjacent to jurisdictional wetlands, installation and operation of hydraulic pumps in or adjacent to jurisdictional wetlands, wells, or other devices or practices in the vicinity that may affect the hydrology of the wetland. "Alteration" also means the destruction or removal of plant life through any activity, including mowing at lower than six (6) inches and which negatively impacts the wetland. "Alteration" in the context of mangroves shall mean anything other than trimming of mangroves, as defined in the Mangrove Trimming and Preservation Act, Section 403.9321, F.S. et seq., as amended.

Applicant means any person that requires a license and has made application for such license to EPGMD.

Buffer means an upland area intended to protect wetlands from alteration or adverse impacts or to provide additional ecological values to mitigation areas.

Clean fill means material that does not contain solid waste or materials capable of decomposition or materials which will cause water quality degradation beyond those state and Broward County water quality standards which apply to the water body or wetland being filled, i.e., native organic soils, or nonputrescible construction debris.

Conceptual review means a review of land for the presence of wetland conditions and an analysis of the potential impacts to any identified wetland areas as a result of a proposed development plan or activity.

Contaminant or contamination means any substance that is harmful to plant, animal or human life in the quantity and/or quality present.

Creation or created means a human activity that causes a wetland area to exist at a location that was previously an upland area.

Ditch means a trench, dug for the purpose of draining water from the land or for transporting water for use on the land and is not built for navigational purposes.

Dock means a facility, such as, but not limited to, piers, walkways or other structures, that are constructed within a waterward area and is for the purpose of mooring a vessel.

Dredging means removal of benthic material, by any means, from beneath regulated surface waters or from within jurisdictional wetlands as defined by this article. It also means the enlargement or creation of a water body which is, or is to be, connected to regulated surface waters or jurisdictional wetlands, as defined herein, directly or via other dredging or excavation.

EPGMD means the Broward County Environmental Protection and Growth Management Department.

Enhancement means a human activity that increases or improves one (1) or more of the functional values of an existing wetland area.

Environmental resource license means an approval issued by EPGMD for activities involving dredging and filling an aquatic resource, wetland alteration, mangrove alteration or mitigation banking, as defined by this section.

Excavation means the disruption or displacement of soil from an upland area that creates a water body.

Filling means the deposition, by any means, of materials in or on regulated aquatic resources or jurisdictional wetlands as defined by this article.

Functional values means those ecological values provided by wetland resources, including but not necessarily limited to flood storage, flood conveyance, groundwater recharge and discharge, erosion control, wave attenuation, water quality enhancement and protection, nutrient removal, food chain support, fish and wildlife habitat, nursery and breeding grounds.

Hydrophyte means plant life adapted to growth and reproduction under periodically saturated root zone conditions during at least a portion of the growing season.

Impact means any activity which negatively affects any regulated aquatic or wetland resource; such as, but not limited to, construction, demolition, mowing, accidental occurrences, ship groundings, and cable drags.

In-kind means the creation or enhancement of a wetland area with functional values or vegetation, hydrology or soils that are the same as those of an impacted wetland.

Interim successful mitigation project means a mitigation project that has been approved by EPGMD as successfully created, or enhanced as a result of appropriate wetland planting or construction activities but has not yet been certified by EPGMD as a successful mitigation project that is providing the required wetland functional values.

Isolated wetland means a wetland that is not hydrologically connected through surface flows to streams, wetlands or other surface waters.

Jurisdictional wetland means those areas that are inundated or saturated by surface water or groundwater at a frequency and a duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for

life in saturated soils, and which would satisfy the requirements of a jurisdictional determination. Soils present in wetlands generally are classified as hydric or alluvial, or possess characteristics that are associated with reducing soil conditions. The prevalent vegetation in wetlands generally consists of facultative or obligate hydrophytic macrophytes that are typically adapted to areas having soil conditions described above, including but not necessarily limited to, swamps, marshes, bogs, sloughs, wet meadows, river floodplains, mud flats, and wet prairies, whether or not adjacent to a surface water body. The term "wetland(s)" as used in this chapter means jurisdictional wetland.

Maintenance means an activity that sustains an area to its original design or construction specifications whichever is most restrictive.

Mitigation means compensation for, or replacement of, lost or impacted wetland areas and functional values by the creation of new wetland areas or by the enhancement of existing wetland areas.

Mitigation bank means a project within the mitigation service area designated and licensed for the purpose of providing compensation for wetland impacts, and includes a resource analysis, credit assignment system and long-term maintenance plan that assures persistence of the mitigation bank and the wetland functional values.

Mitigation service area means the geographic area within which the mitigation credits from a mitigation bank may be used to offset adverse wetland impacts.

Mixing zone means an area, or volume of water containing the point of discharge and within which an opportunity for the dispersion of the discharge has been authorized by EPGMD.

Regulated aquatic and wetland resources means all rivers, lakes, streams, springs, canals, ditches, impoundments, wetlands, and all other bodies of water, whether artificial or natural, including fresh, brackish, saline, tidal, surface or underground.

Solid waste means garbage, rubbish, refuse, sludge or other discarded solid or semisolid material resulting from domestic, commercial, industrial, agricultural or governmental activities or operations. This includes but is not necessarily limited to wood, putrescible construction and demolition debris, and asphalt or other asphaltic material.

Significant benthic community means an assemblage of organisms occupying the benthic substrate that is composed of economically important shellfish, hard or soft corals, seagrasses, or a diverse macroinvertebrate association.

Unified Mitigation Assessment Method (UMAM) as set forth in Chapter 62-345, F.A.C., means a technique used to determine the amount of mitigation needed to offset adverse impacts to wetlands and other surface waters and to award and deduct mitigation bank credit.

Voluntarily created wetlands means wetlands that have been purposefully created apart from requirements of any entity, including but not limited to federal, state or local regulatory agencies.

Wetland Benefit Index (WBI) means the technique utilized by EPGMD for quantifying wetland values and functions. The system assigns numerical values to ecological components creating a value-based scale from 0.25 to 1.0 where 0.25 is the poorest quality wetland and 1.0 is the highest quality wetland. A rebuttable presumption for preservation or enhancement is created when a given wetland is ranked at or above 0.8 WBI.

(Ord. No. 90-49, § 1(27-11.02), 12-18-90; Ord. No. 93-49, § 1, 11-23-93; Ord. No. 1999-55, § 1, 10-12-99; Ord. No. 2004-39, § 1, 11-09-04; Ord. No. 2005-11, § 9, 5-24-05; Ord. No. 2007-34, § 2, 11-27-07; Ord. No. 2009-56, § 1, 8-25-09)

Sec. 27-333. - Prohibited activities.

(a)

Prohibitions.

(1)

No person shall cause, permit, suffer, allow, conduct or cause to be conducted impact, alteration, construction, demolition, dredging or filling in regulated aquatic or wetland resources, except in accordance with a currently valid environmental resource license issued by EPGMD and all general and specific license conditions contained therein.

(2)

No person shall cause, suffer, permit or allow the alteration or trimming of mangroves unless performed in accordance with the requirements of Chapter 373, Part IV, F.S. (§373.403, F.S. et seq.), and Chapter 403, F.S., as amended.

(3)

No person shall excavate or cause to be excavated a water body in the uplands, of equal to or greater than one (1) acre but less than two (2) acres without a currently valid general license, or with a size of equal to or greater than two (2) acres except in accordance with a currently valid environmental resource license issued by EPGMD, and all general and specific license conditions.

(4)

No local government in Broward County may issue a development order for development within wetlands, as defined herein, until a EPGMD license has been issued pursuant to this article. However, local government entities may issue

land use planning amendments, rezoning, site plan, plat approval or development orders issued pursuant to Chapter 380, F.S., in areas containing wetlands upon the issuance of a Conceptual Dredge and Fill Review Report by EPGMD.

(Ord. No. 90-49, § 1(27-11.03), 12-18-90; Ord. No. 92-30, § 1, 9-8-92; Ord. No. 93-49, § 1, 11-23-93; Ord. No. 1999-55, § 1, 10-12-99; Ord. No. 2004-39, § 2, 11-09-04; Ord. No. 2005-11, § 9, 5-24-05; Ord. No. 2009-56, § 1, 8-25-09)

Sec. 27-334. - Application requirement and standards.

(a)

Application Forms: Application for a license shall be on the approved EPGMD wetland or aquatic resource alteration form along with the currently approved EPGMD addendum. All application forms shall be available from EPGMD. The application must be submitted and a license issued prior to commencement of work activities as herein regulated.

(b)

Required Data: The completed form and two (2) copies shall be accompanied by the following:

(1)

A vicinity map showing the location and extent of the project as proposed (8"X11" sheets).

(2)

A set of plan view and cross-sectional drawings which identify the engineering and environmental conditions which presently exist at the site (8"X11" sheets).

(3)

A set of plan view and cross-sectional drawings which identify the engineering and environmental conditions as they are proposed to exist after the project is completed (8"X11" sheets).

(4)

A detailed description of the location where the project is proposed and of the materials, equipment, and methods to be used, and any other pertinent information that is necessary to accurately and completely review the proposed work. This must also include a detailed description of the methods and materials which will be employed to protect the regulated aquatic resource or jurisdictional wetland of Broward County from environmental harm.

(5)

Additional reasonable information when necessary to complete a review of the project, as required by EPGMD.

(c)

Fees:

(1)

Each application shall be accompanied by a nonrefundable filing fee, as adopted by resolution of the Board. Processing of an application will not begin until the appropriate fees are received by EPGMD.

(2)

Pursuant to the Broward County Manatee Protection Plan ("MPP"), each Environmental Resource License applicant proposing one or more new boat slips above the historical number of slips present, except for projects at a single-family residence as defined in the MPP, is required to pay to EPGMD a nonrefundable application fee of one hundred dollars (\$100.00) per new slip as partial payment of the total new-slip fee in Table I. The application fee portion of the new-slip fee is due at the time an application is submitted. At the time that an application is determined by EPGMD to be in "good faith" pursuant to the MPP, slips for the proposed project are allocated to the project from the pool of slips available under the MPP. A nonrefundable payment of the current fiscal year's total new-slip fee, less any application fee already paid pursuant to this Subsection, is due and must be received by EPGMD after the completion of the application process and prior to issuance of the Environmental Resource License. If an application denial becomes final without legal challenge, or a denial is upheld as the end result of any legal challenge, the slips allocated to the proposed project from those available pursuant to the MPP shall return to the pool of slips. Additionally, starting in Fiscal Year 2009 (on October 1, 2008) and in accordance with Section 27-342, each multi-slip facility with five (5) or more slips shall also pay to EPGMD an annual manatee mitigation fee in accordance with Table I on or before the anniversary date of the issuance of the facility's Marine Facility Operating License.

TABLE I
MANATEE PROTECTION PLAN FEES

Fiscal Year	New-Slip Fee Per Proposed Slip	Manatee Mitigation Fee Per Each Existing Slip
2008	\$400.00	\$0.00
2009	416.00	20.00
2010	432.64	20.80
2011	449.95	21.63
2012	467.94	22.50
2013	486.66	23.40
2014	506.13	24.33

2015	526.38	25.31
2016	547.44	26.32
2017	569.34	27.37

New-slip fees and manatee mitigation fees not specifically listed in Table I shall continue to increase at a rate of four percent (4%) per year. There is created a Manatee Protection Plan Fund ("MPP Fund"), which is to be supervised and utilized by the County to expend monies to meet its obligations under the MPP. The MPP Fund shall consist of all monies collected as new-slip fees and manatee mitigation fees received pursuant to this Subsection, in addition to any other monies as may be authorized to be deposited or transferred into the MPP Fund by resolution of the Board or as otherwise established by County ordinance.

(d)

Procedure: Within thirty (30) days after the receipt of an application for an environmental resource license, the applicant may be requested to provide such additional information that is reasonably necessary to determine whether the license should be issued or denied. A decision, which is based upon the criteria contained in this article, sections 27-331 to 27-341, on the application shall be in writing and mailed to the applicant's address no later than ninety (90) days after the additional information is received from the applicant, or if a timely request for additional information is not made, no later than ninety (90) days after receipt of the application. If an application is not approved or denied within the applicable ninety (90) days, the applicant may, within thirty (30) days of the last date when a timely decision could have been made, request EPGMD to make a final determination on the license. Then the applicant may seek administrative review as provided by this chapter.

(e)

Wetland Delineation: Wetland delineation (jurisdictional determination) shall be conducted in accordance with the procedures identified in Chapter 62-340, F.A.C., as amended.

(f)

Denials and Administrative Review: In the denial of a license, the applicant shall be provided with a written statement setting forth the reasons for denial and the rights of administrative review as established in this chapter.

(g)

License Conditions: The approval of an environmental resource license may be subject to the applicant's compliance with a set of general and specific conditions which shall be in writing and made a part of the license.

(h)

As-Built Drawings Required: When appropriate, it shall be required that, after a regulated aquatic resource has been excavated and finished grading has occurred, the applicant submit as-built drawings for approval. Such as-built drawings shall be signed and sealed by a professional engineer or professional land surveyor registered in the State of Florida.

(i)

Public Notice: When an environmental resource license application is received, a description of the project and its location will be publicly available at the main EPGMD office pursuant to Chapter 119, F.S. and public comment welcomed. Where an application is reviewed for work within a municipality, that municipality will be provided a copy of the application for comment prior to final agency "action" on the application.

(Ord. No. 90-49, § 1(27-11.04), 12-18-90; Ord. No. 93-1, § 8, -12-93; Ord. No. 93-49, § 1, 11-23-93; Ord. No. 1999-55, § 1, 10-12-99; Ord. No. 2004-39, § 3, 11-09-04; Ord. No. 2005-11, § 9, 5-24-05; Ord. No. 2007-34, § 2, 11-27-07; Ord. No. 2009-56, § 1, 8-25-09)

Sec. 27-335. - Exemptions.

The following projects are exempt from license requirements:

(1)

The excavation of a new lake or pond of less than one (1) acre in size that is totally isolated from surface waters or wetlands and does not exchange water with any surface water body or wetland. For the purpose of this exemption, the area of the excavation shall be measured at the elevation of the average annual water table.

(2)

All licensed or permitted excavations designed to be constructed with an impervious bottom and sides, including but not limited to sewage treatment ponds, industrial or wastewater ponds, lagoons and swimming pools.

(3)

The filling of any excavation that has been constructed with an impervious bottom and sides with clean fill.

(4)

Any temporary excavation in nonwetlands areas constructed for the purpose of demucking, site runoff control or erosion control, or the removal of materials unsuitable for construction, for the purpose of preparing land for development, providing that the excavation is designed to be filled to at or above the average annual water table with clean fill or original suitable fill from on-site operations.

(5)

The maintenance of existing residential or agricultural drainage ditches and canals, and intake or discharge canals, provided that the maintenance work be conducted in accordance with the original design specifications or construction specifications, whichever is most restrictive, and that the ditch or canal does not negatively impact, drain or pass through wetland areas. The material removed from the existing ditch must be placed on the uplands and disposed of in an approved manner. Water quality standards must not be violated as a result of the maintenance activity.

(6)

Projects for which Broward County, through EPGMD, is the project manager. EPGMD shall ensure that all actions undertaken as part of the project comply with the requirements of this Article.

(Ord. No. 90-49, § 1(27-11.07), 12-18-90; Ord. No. 93-49, § 2, 11-23-93; Ord. No. 2004-39, § 4, 11-09-04; Ord. No. 2005-11, § 9, 5-24-05; Ord. No. 2009-56, § 1, 8-25-09)

Note—

Formerly, § 27-337; former § 27-335 is now § 27-337.

Sec. 27-336. - General licenses.

(a)

Projects Meeting Criteria for General License: Projects described below shall qualify for a general license upon application to EPGMD, and subject to the requirements of this section:

Requirements To Obtain a General License:

(1)

A general license will be issued within ten (10) days of receipt of the application. This application shall include information that demonstrates that the project will not substantially impede water flow, will not impact natural resources or submerged aquatic vegetation, or will not violate applicable local and state water quality standards, or criteria contained in this article, sections 27-331 to 27-341, and that clean fill will be used in any filling activities.

a.

The repair or replacement of existing docks, provided that no additional waterward fill is used and the new or repaired dock is not enlarged beyond a total of five hundred (500) square feet over-water surface area for the new and existing structure.

b.

The repair, maintenance, or restoration of existing seawalls no more than one (1) foot waterward of their original authorized location.

c.

The relocation within an already approved right-of-way, repair or maintenance of existing utility transmission or distribution lines and associated adjacent facilities required to effect the repair.

d.

New lake or pond excavations of less than two (2) acres, but equal to or greater than one (1) acre that are not connected with and do not exchange water with any other surface water body or wetland, except by means of a permitted overflow structure.

e.

The installation of private, noncommercial docks of five hundred (500) square feet or less of over-water surface area, where no dredging or filling is required except to install the pilings.

f.

Projects which are within isolated wetlands or lakes and/or otherwise, in the opinion of EPGMD, will not significantly degrade the environment.

g.

Proposed or existing rock quarry excavations that are not in wetlands, are self-contained and not connected to and do not exchange water with any other surface water body or wetland, except when specifically directed to discharge water for the purpose of flood protection by the water management district having specific jurisdiction. This does not authorize expansion or excavation of a rock quarry into wetland areas.

h.

The construction, repair, maintenance or operation of any permitted stormwater control/treatment structure when not exempt by wetland delineations.

i.

The one-time dredging of twenty (20) cubic yards or less of sediment from isolated lakes, or ponds, and residential canals with no seagrasses within the project site, where the sediment is removed from the waterway and deposited on a self-contained upland site.

j.

The installation of natural limerock rip-rap at the waterward face of an existing vertical bulkhead provided that the rip-rap is clean and free of debris, that no seagrasses are covered by the rip-rap, that no dredging or other filling is conducted and that the rip-rap is placed at a slope no steeper than 2H:1V and that no interference to other riparian property rights, or navigation occurs.

k.

The repair or replacement of existing functional headwalls, pipes, or culverts provided that they are otherwise in compliance with this chapter and are in artificially created waterways which discharge water for stormwater runoff. The pipes must be replaced in the original size and configuration and all elevations must be the same as the preredplacement condition. Pipe or culvert material may change from the original but must not change the

discharge capabilities of the original design. All water quality protection features must be utilized; and the rerouting of water bodies is not authorized by this general license except by pumps, pipes or cofferdams. Wetland areas may not be impacted as a result of this activity.

I.

The installation of utility or transmission lines laid on or embedded in the substrate provided that no dredging or filling is required and that no seagrasses or significant benthic communities will be affected by the activity.

m.

Existing commercial rock quarry excavations that have been in continuous operation from 1985 and are permitted by the Florida Department of Environmental Regulation (DER) [now Department of Environmental Protection (DEP)] and the U.S. Army Corp of Engineers (COE) as appropriate, will be issued a EPGMD license following application if the application is made within sixty (60) days of the final adoption of this article [November 23, 1993]. The license will be for the length of time identified in the DEP or COE permit that expires first and will be subject to the conditions contained in the most restrictive permit. Upon expiration of this EPGMD license, any additional regulated work that is proposed shall be subject to the appropriate sections of this article.

(2)

A general license for the emergency repair, replacement or maintenance of existing utility transmission or distribution lines is hereby issued provided that the owner of the damaged facility or the owner's agent provides verbal notice to the county of the condition, its location and expected length of time required for repair, replacement or maintenance activities.

(3)

A general license is granted to the Florida Department of Transportation, following appropriate EPGMD notification procedures, for the following minor works within FDOT rights-of-way and provided that all other water quality standards are not violated:

a.

Repair of existing concrete bridge pilings by the construction of pile jackets provided that the permanent outer form is composed of inert materials, and the quantity of material shall not exceed three hundred (300) cubic yards of dredging or three hundred (300) cubic yards of filling per project. Although the bottom sediments within the forms may be removed by jetting or pumping, and may not be recoverable, proper turbidity control measures shall be employed as necessary to prevent violations of state or county water quality standards.

b.

The maintenance, repair, or replacement of existing drainage facilities provided that no wetlands will be affected and that the original specifications of the facilities will not be modified.

c.

The installation of fences within regulated waters or wetlands provided no dredging or filling occurs other than that necessary for the posts and that water flow is not impeded.

(Ord. No. 90-49, § 1(27-11.06), 12-18-90; Ord. No. 93-49, § 3, 11-23-93; Ord. No. 1999-55, § 1, 10-12-99; Ord. No. 2004-39, § 5, 11-09-04; Ord. No. 2005-11, § 9, 5-24-05; Ord. No. 2009-56, § 1, 8-25-09)

Sec. 27-337. - Criteria for issuance or denial of an environmental resource license.

(a)

Application Requirements: A license shall be granted only after the applicant provides EPGMD with reasonable assurances that the license is not contrary to the public interest. In determining whether a project is not contrary to the public interest, EPGMD shall consider and balance the following criteria:

All Projects:

(1)

Whether the activity will adversely affect the public health, safety, or welfare or the property of others.

(2)

Whether the activity will adversely affect the conservation of fish and wildlife, including endangered or threatened species, or their habitats.

(3)

Whether the activity will adversely affect navigation or the flow of water or cause harmful erosion or shoaling.

(4)

Whether the activity will adversely affect the fishing or recreational values or marine productivity in the vicinity of the activity.

(5)

Whether the activity will be of a temporary or permanent nature.

(6)

Whether the activity will adversely affect or will enhance significant historical and archaeological resources under the provisions of § 267.061, F.S., as amended.

(7)

The current condition and relative value of functions being performed by areas affected by the proposed activity.

- (8) Whether the activity will adversely affect the Everglades as defined by the Everglades S.W.I.M. Plan, or Comprehensive Everglades Restoration Plan, as adopted by state and federal agencies.

(b)

Design Criteria: In addition to the general criteria, for all projects, a license shall not be issued for specific activity unless all the following criteria are met:

- (1) No permanent mooring of vessels will occur over seagrasses unless the water depth is three (3) feet or greater at mean low water.
- (2) No construction shall occur over seagrasses unless the vertical separation between the construction and the substrate is equal to or greater than five (5) feet.
- (3) Permanent terminal platforms, roof structures, or decks shall not be located over seagrasses or significant benthic communities.
- (4) Permanent access piers shall not be licensed over seagrasses or significant benthic communities unless the pier is four (4) feet wide or less, or six (6) feet wide or less and elevated five (5) feet or more above mean high water.
- (5) All vertical bulkheads or seawalls constructed in marine waters where no previous seawall existed shall be provided with natural limerock rip-rap, or other approved habitat enhancement, at the waterward face of the bulkhead or seawall.
- (6) Wetland impacts will not be licensed where an upland alternative is practicable or economically feasible.
- (7) Wetland impacts will be avoided or minimized to the greatest extent practicable.
- (8) Wetland losses which are unavoidable shall be replaced by compensatory mitigation such that ecological functional values provided by the subject wetland area are not lost as a result of the project.
- (9) There shall be a presumption that higher quality wetlands shall receive greater protection and enhancement than lower quality wetlands.
- (10) Mangrove alteration shall be licensed only if the alternation is in conformity with Chapter 373, Pt. IV, F.S. (§ 373.403, F.S. et seq.), and Chapter 403, F.S., as amended.
- (11) Any lake excavation shall meet design criteria that provides a minimum slope of one (1) foot vertical to every four (4) feet horizontal between the ordinary high water line to two (2) feet below the average dry season low water table elevation as demonstrated by water management district or county maps.

(c)

The Comprehensive Everglades Restoration Plan (CERP) includes numerous components across multiple counties in South Florida. It does not lend itself to licensing in the manner of associating mitigation to impact like typical development projects. Accordingly, CERP projects will be licensed based on reviewing and minimizing only the design and construction impacts and ensuring consistency with the conceptual design originally acknowledged by the County Commission.

(d)

Mitigation Functional Assessment Methods.

- (1) For all Environmental Resource License applications received by EPGMD on or after February 2, 2004, mitigation requirements shall be determined using the Uniform Mitigation Assessment Method, as described in Chapter 62-345, F.A.C., as amended.
- (2) For Environmental Resource License applications received by EPGMD prior to February 2, 2004, mitigation requirements and license modifications shall be determined using the Wetland Benefit Index as described herein.
 - a. Should an applicant choose not to conduct a wetland benefit evaluation, the applicant shall comply with the following base replacement ratios for mitigation; and the WBI of the impacted area will be considered to be 1.0. Compensatory mitigation ratios shall be based upon the following criteria for each type of mitigation and wetland when performed concurrently with impacts (ratios are expressed as acres of compensatory mitigation required versus acres of impact):

TABLE II. BASE REPLACEMENT RATIOS FOR MITIGATION

Wetland Type	Creation	Enhancement Higher	Enhancement Lower
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			Quality* (≥0.52 WBI)	Quality* (<0.52 WBI)
1.	Tidal wetlands	3.0:1	2.5:1	2.0:1
2.	Forested freshwater, noncypress	3.5:1	3.0:1	2.5:1
3.	Forested freshwater, cypress	3.0:1	2.5:1	2.0:1
4.	Herbaceous freshwater	2.0:1	1.5:1	1.0:1

b.

The following modifiers will be used to calculate the final acreage requirements:

1. Off-site, same basin X1.2
2. Off-site, different basin X1.5
3. Compensatory mitigation performed and completed prior to impacts occurring to subject wetland X0.95
4. Where it is determined by EPGMD that compensatory mitigation performed off site in the same basin or off site in a different basin is ecologically preferable to mitigation on site, and where the applicant has agreed to either have such mitigation performed in a mitigation bank licensed by EPGMD or if the applicant has provided assurances that other proposed off site mitigation will be performed in accordance with federal, state and EPGMD mitigation banking laws and rules and standards, the modifier will be X 1.0.

c.

Formula for determining final requirement for compensatory mitigation amount:

Acres X WBI IMPACT AREA X BASE REPL. RATIO X MODIFIER(S)= ACRES NEEDED X (1.0-WBI OF MITIGATION AREA)

*Higher/lower quality is determined whether above or below median (0.52 WBI).

d.

EPGMD shall evaluate wetland quality in accordance with Table II, Wetland Benefit Index. The Board requires and delegates the authority for EPGMD to develop a standard operating procedure for the Wetlands Benefit Index. The standard operating procedure shall be based upon commonly accepted scientific criteria and methodology and used by EPGMD to evaluate the categories of Table III.

TABLE III
WETLAND BENEFIT INDEX

(1)

Fish and Wildlife Values/Diversity (Select as many as apply):

	<i>Points Earned</i>
Fish or shellfish	1
Waterfowl or wading birds	1
Furbearer	1
Amphibians, aquatic macroinvertebrates, and aquatic reptiles	1
Endangered and threatened fauna	2

Apply to freshwater, saltwater, brackish and mitigation systems.

(2)

Hydrophyte Dominance Points Earned

≥80%	3
≥65%<80%	2
≥51%<65%	1

Apply to freshwater, saltwater, brackish and mitigation systems.		
(3)	<i>Intactness of Wetland Community (Select one category)</i>	<i>Points Earned</i>
	Unaltered	5
	Altered hydrology:	
	a. Slight	4
	b. Moderate	3
	c. Extreme	2
Apply to freshwater, saltwater and brackish systems.		
Alternate to (3) for mitigation/voluntarily created systems only:		
	<i>Intactness of Mitigation System (Select one category)</i>	<i>Points Earned</i>
	Mitigation area complies with mitigation proposal and drawings for required hydrophytic vegetative association and hydrology	5
	Mitigation complies with the proposal and drawings for an alternate hydrophytic vegetative association and required hydrology	4
	Mitigation complies with the proposal and drawings for an alternate hydrophytic vegetative association and an alternate yet wetland hydrology	3
	Mitigation area complies with wetlands hydrology, but hydrophytic vegetative association is lacking or overgrown with nuisance species	2
	Mitigation area lacks hydrology and vegetative association	0
(4)	<i>Connectedness, Surface Water hydrology (Select one category)</i>	<i>Points Earned</i>
	Major connection (flowing water or floodplain)	5
	Minor connection (runoff collection point, etc.)	3
	Isolated from surface water system	2
Apply to freshwater, saltwater, brackish and mitigation systems.		
(5)	<i>Connectedness, Location in Landscape (Select one category)</i>	<i>Points Earned</i>
	Located within or directly contiguous to a significant natural area over greater than 25% of the parcel boundary	5
	Located directly adjacent to a significant natural area by less than 25% of the parcel boundary	3
	Located within 3,000 feet of a significant natural area and separated by suitable natural lands, or forming a direct corridor with or between other significant natural lands	2
	Located more than 3,000 feet from a significant natural area and separated by unsuitable lands or developed areas only	1
Apply to freshwater, saltwater, brackish and mitigation systems.		
(6)	<i>Hydroperiod:</i>	<i>Points Earned</i>
	≥5 Months Inundated or Saturated	3
	≥3 Months < 5 Months	2
	<3 Months	1
Apply to freshwater systems.		
Alternate to (6) for saltwater, brackish (tidal) systems only:		
	<i>Hydroperiod (Select one category)</i>	<i>Points Earned</i>
	Inundated by ≥90% high tides	3
	Inundated by "spring" tides only	2
	Saturated by normal tidal action	1

(7)

<i>Soils:</i>	<i>Points Earned</i>
Organic soil classified hydric soil, or required replacement soil in mitigation areas ≥ 12 inches or any thickness over bedrock/caprock	5
Organic soil classified hydric soil, or required replacement soil in mitigation areas $\geq 6 < 12$ inches	4
Soil classified hydric soil, or required replacement soil in mitigation areas $\geq 1 < 6$ inches	3
Organic soil classified hydric soil, or required replacement soil in mitigation area < 1 inch	2

Apply to freshwater, saltwater, brackish and mitigation systems.

(8)

<i>Native, Nonexotic or Mitigation Plant Cover (Current):</i>	<i>Points Earned</i>
$\geq 95\%$	4
$\geq 75\% < 95\%$	3
$\geq 25\% < 75\%$	2
$\geq 10\% < 25\%$	1
$< 10\%$	0

(9)

<i>Habitat Diversity:</i>	<i>Points Earned</i>
≥ 3 communities embedded in site	5
2 or 3 communities	3
1 community, mosaic	2
1 community, monoculture	1

Apply to freshwater, saltwater, brackish or mitigation systems.

(10)

<i>Habitat Diversity Within 1,000 Feet:</i>	<i>Points Earned</i>
≥ 3 alternative habitats available	3
2 or 3 alternative habitats	2
1 alternative habitat	1

Apply to freshwater, saltwater, brackish or mitigation systems.

The WBI value is calculated by adding total points (maximum of 44) and dividing by 44. The maximum value would then be 1.0.

(Ord. No. 90-49, § 1(27-11.05), 12-18-90; Ord. No. 93-49, § 4, 11-23-93; Ord. No. 95-3, § 1.01, 1-24-95; Ord. No. 1999-55, § 1, 10-12-99; Ord. No. 2004-39, § 6, 11-09-04; Ord. No. 2005-11, § 9, 5-24-05; Ord. No. 2007-34, § 3, 11-27-07; Ord. No. 2009-56, § 1, 8-25-09)

Note—

Formerly, § 27-335; former § 27-337 is now § 27-335.

Sec. 27-338. - Mitigation.

(a)

Projects that do not otherwise meet the licensing criteria contained in section 27-337 must provide assurances that lost ecological functional values will be compensated for by providing a mitigation plan for EPGMD approval prior to the license being issued. The mitigation plan must include, at a minimum, the following:

(1)

Identification of the hydrology of the mitigated area, including the length of time flooding or saturation to the soil/air interface occurs, and the depth of flooding during the wet season as described by water management district or county maps.

(2)

Identify a connection to other surface waters or wetland areas, if appropriate.

(3)

Characterization of existing and proposed soils in the mitigation area and the extent of earth work proposed for the mitigation site.

(4)

Where enhancement is proposed, an analysis of the existing vegetative association must be provided showing dominant taxa and wetland designations; a description of modifications proposed to the plant association that will

- provide the wetland benefits lost in the subject wetland.
- (5) Where creation is proposed, a listing of the plants proposed to be installed in the created wetland along with size and total number of each taxa; a description of how the selected plants will provide the wetland benefits lost in the subject wetland.
- (6) Wetland creation or enhancement may be licensed only where EPGMD has determined that the created or enhanced wetland will provide the identified values comparable to or greater than that of the subject wetland. EPGMD will require a management plan to assure the long-term survival of the mitigation area.
- (7) Mitigation for wetland impacts may include upland areas or buffers for habitat where it can be demonstrated that the upland areas provide or improve the overall wetland ecological functional values originally provided by the subject wetland area.
- (8) Final success of any compensatory mitigation project will be determined by EPGMD based upon the actual functions performed by the mitigation area using the UMAM or WBI analysis, as appropriate, and compliance with general and specific license conditions. Monitoring reports shall be submitted by the applicant, and independent field verification and analysis will be performed by EPGMD.
- (9) The responsible entity(s) for wetland mitigation projects are as follows, in order,
- a. Original applicant.
 - b. EPGMD-approved successor.
 - c. Landowner where subject wetland impact occurs.
 - d. Landowner where mitigation occurs if off-site mitigation provided.
- (10) Evidence of financial resources necessary to complete a mitigation project shall be provided to the county attorney and may include, but not be necessarily limited to:
- a. An approved letter of credit.
 - b. A bond for the proposed mitigation.
 - c. Other security approved by Broward County Risk Management as to adequacy and the Broward County Attorney's Office as to form.
 - d. Proof of financial resources are not required if the mitigation occurs prior to reference wetland impacts and the mitigation is approved as a interim successful project.
- (11) Evidence of technical and scientific resources necessary to complete the mitigation project shall be provided to EPGMD and may include, but not necessarily be limited to:
- a. Certification by an appropriate professional environmental association;
 - b. Registered professional engineer or surveyor and experience in ecological or biological projects;
 - c. Demonstrated scientific or technical experience in biological or ecological fields of study; or
 - d. Other similar evidence as required by EPGMD.
- (12) *Mitigation banking* shall be encouraged by the identification of sites suitable for banking and through the utilization of the wetland benefit index to establish a credit system for potential mitigation banking areas. The application of a habitat mosaic credit 0.9 shall be utilized in multiple-habitat banks approved by EPGMD to encourage the use of mitigation banks when such use will more effectively offset project related wetland impacts.
- a. A mitigation bank license shall be issued by EPGMD following the successful demonstration by the applicant that all of the requirements of this section 27-338 are met and that a credit system and long-term maintenance plan ensuring persistence of this bank have been put in place.
 - b. Specific mitigation bank credits will be assigned by assessing the existing wetland values through the wetland

benefit index (WBI) and applying the habitat mosaic credit (HMC) of 0.90 by the following formula:

WBI X HMC= Mitigation Bank Value

1.0 - MBV = Mitigation Bank Credit

c.

Additional mitigation bank credits may be established based upon the affirmative demonstration by the banker that the following conditions will be provided by the bank:

1. The bank will provide a corridor to or with other environmentally significant lands that are protected.
2. The bank will provide critical type habitat for listed species (threatened, endangered, or species of special concern).
3. The bank will provide additional lands for preservation that are not, or have not previously been, preserved.
4. The bank shall be constructed prior to credit use.
5. Wetland benefits as identified in the mitigation bank proposal are provided prior to credit use.

d.

The mitigation bank license shall be binding on the bank applicant, successors and bank landowners as identified in section 27-338.

(Ord. No. 93-49, § 5, 11-23-93; Ord. No. 1999-55, § 1, 10-12-99; Ord. No. 2004-39, § 7, 11-09-04; Ord. No. 2005-11, § 9, 5-24-05; Ord. No. 2009-56, § 1, 8-25-09)

Note—

Former § 27-338 is now § 27-340.

Sec. 27-339. - General and specific conditions to be included in all licenses.

The following list of general and specific conditions will be included in all licenses at a minimum. Each license may also contain additional conditions that will be specific to such license. All conditions must be followed to maintain the license in its effective state through the expiration date.

(1)

General conditions:

- a. The terms, conditions, requirements, limitations and restrictions set forth herein are accepted by the licensee and enforceable by EPGMD pursuant to this chapter. EPGMD will review this license periodically and may revoke the license, initiate administrative and/or judicial action for any violation of the conditions by the licensee, its agents, employees, servants or representatives or principals.
- b. This license is valid only for the specific uses set forth in the license application, and any deviation from the approved uses may constitute grounds for revocation and enforcement action by EPGMD.
- c. In the event the licensee is temporarily unable to comply with any of the conditions of the license, the licensee shall notify EPGMD within twelve (12) hours. Within five (5) working days of the event, the licensee shall submit a written report to EPGMD that describes the incident, its cause, the measures being taken to correct the problem and prevent its reoccurrence, the owner's intention toward repair, replacement, and reconstruction of destroyed facilities, and a schedule of action leading toward operation within the license conditions.
- d. The issuance of this license does not convey any vested rights or exclusive privileges, nor does it authorize any injury to public or private property or any invasion of personal rights, or any violations of federal, state or local laws or regulations.
- e. This license must be available for inspection on the licensee's premises during the entire life of the license.
- f. By accepting this license, the licensee understands and agrees that all records, notes, monitoring data and other information relating to the construction or operation of this permitted source, that are submitted to EPGMD, may be used by EPGMD as evidence in any enforcement proceeding arising under this chapter 27, except where such use is prohibited by § 403.111, F.S.
- g. The licensee agrees to comply with this chapter 27, as amended.

- h.** Any new owner of a licensed facility shall apply by letter for a transfer of license within thirty (30) days after sale or legal transfer. The transferor shall remain liable for performance in accordance with the license until the transferee applies for, and is granted the transfer of license. The transferee shall also be liable for performance in accordance with the license.
- i.** The licensee, by acceptance of this license, specifically agrees to allow access to the licensed source at reasonable times by EPGMD personnel for the purposes of inspection and testing to determine compliance with this license and this chapter 27.
- j.** This license does not constitute a waiver or approval of any other license that may be required for other aspects of the total project.
- k.** If the licensee wishes to renew a license or extend its term, the licensee shall make application sixty (60) days prior to its expiration. Expired licenses are not renewable.
- l.** In addition to the general conditions set forth above, each license issued by EPGMD shall contain specific conditions determined by site conditions and requirements pursuant to the regulations as determined by the director of EPGMD. The licensee agrees that specific conditions are enforceable by EPGMD for any violation thereof.

(2)

Standard specific conditions:

- a.** Notify EPGMD in writing a minimum of forty-eight (48) hours prior to project commencement and a maximum of forty-eight (48) hours after project completion.
- b.** Notify the department immediately in the event of any project-caused environmental problem(s).
- c.** All project-generated solid waste and/or spoil material must be disposed of in a suitable approved manner at an upland location.
- d.** Turbidity screens or equivalent shall be properly employed and maintained as necessary during construction activities so that turbidity levels do not exceed twenty-nine (29) NTU's above natural background fifty (50) feet downstream of project.
- e.** Only clean fill and clean demolition materials shall be placed in the water bodies being filled. Clean demolition materials include things such as brick, stone, ceramic and concrete rubble which are uncontaminated by other materials. Any fill material used shall be free of garbage, rubbish, refuse, asphalt, hazardous materials, organic matter such [as] wood, lumber, tree or tree trimmings, or other contaminants. The disposal of any putrescible or deleterious debris in any water body is prohibited.
- f.** A letter, stating that the lake slopes have been surveyed and are in substantial compliance with the licensed plans, shall be submitted by a professional engineer registered in the State of Florida. The letter must be submitted to EPGMD within thirty (30) days from completion of final grading of the lake and prior to any certificate of occupancy being issued to any structures surrounding the lake.

(3)

Compensatory mitigation (area) specific conditions:

- a.** Construction and installation of the area shall be in accordance with plans dated (date) by EPGMD (attached) and associated information. The area shall be installed concurrently with licensed construction. Compensatory mitigation for projects requiring less than ten (10) acres of mitigation in a mitigation bank licensed by EPGMD shall be exempt from the concurrent installation requirement of this section if EPGMD has approved a schedule for phasing such mitigation in the mitigation bank. Said schedule shall provide that construction of the compensatory mitigation within the mitigation bank shall commence within six (6) months and be completed within eighteen (18) months of issuance of the final certificate of occupancy at the impact site.
- b.** Upon completion of the area, the following documentation shall be submitted to EPGMD:
 - 1.** Certification of elevations in relation to design;
 - 2.** Verification of actual acreage; and
 - 3.** The time-zero monitoring report.
 This documentation is required within thirty (30) days of completion of the area and prior to any certificate of

occupancy's being issued for any structure on the site/phase.

c.

A viable wetland system shall be established that replicates a natural reference wetland in basic structure and function. In order to assure that the area becomes self-sustaining, the following criteria shall be met:

1.

A minimum of eighty (80) percent coverage by desirable wetland species after a two-year period and demonstration of persistence for three (3) additional years.

2.

Less than five (5) percent coverage by invasive exotic and undesirable species. Exotic and undesirable species include, but are not limited to, melaleuca, Australian pine, Brazilian pepper, bischofia, torpedo grass, primrose-willow, and cattail.

3.

A minimum of eighty (80) percent survival of each planted species. This rate shall be maintained each quarter except where species composition, density of planted and recruitment species and overall wetland condition, growth rates and viability of the area are of higher quality, as determined by EPGMD.

4.

Hydrologic conditions and soil characteristics are in general conformity to those specified in plans.

The area shall be monitored and reports submitted quarterly for five (5) years describing in detail the condition of the area relative to the reference wetland and the criteria listed above.

d.

Should EPGMD determine that the area is not achieving the listed criteria during some portion of the monitoring period, the licensee shall prepare contingency plans that demonstrate clearly how the problem(s) will be corrected and submit such plans immediately to EPGMD for approval.

e.

The applicant, as licensee, is the responsible entity.

(4)

Specific conditions may be modified, added to or deleted based upon the nature of each individual project and associated activities. All conditions contained in each license are however directed at aiding in or guaranteeing, to the greatest extent possible, that the project is undertaken in the most environmentally acceptable manner.

(Ord. No. 93-49, § 6, 11-23-93; Ord. No. 95-3, § 1.02, 1-24-95; Ord. No. 1999-55, § 1, 10-12-99; Ord. No. 2005-11, § 9, 5-24-05; Ord. No. 2009-56, § 1, 8-25-09)

Note—

Former § 27-339 is now § 27-341

Sec. 27-340. - Other licenses, permits or authorizations.

(a)

Additional Permits/Licenses: The successful acquisition of an environmental resource license from EPGMD does not relieve, or replace the requirements of, the applicant from obtaining any other federal, state or local permits/licenses as mandated.

(b)

Conflicting Provisions: In the event that the provisions of this article are in conflict with the provisions of Florida Administrative Code or of Florida Statutes, those provisions which are more stringent shall govern.

(Ord. No. 90-49, § 1(27-11.08), 12-18-90; Ord. No. 93-49, § 7, 11-23-93; Ord. No. 1999-55, § 1, 10-12-99; Ord. No. 2005-11, § 9, 5-24-05; Ord. No. 2009-56, § 1, 8-25-09)

Note—

Formerly § 27-338; former § 27-340 is now § 27-342.

Sec. 27-341. - Alterations of voluntarily created wetlands.

Alteration of voluntarily created wetlands are exempted from sections 27-327 to 27-336 licensing criteria provided the following conditions are met:

(1)

Upon construction of a licensed (where required) created wetland, a detailed drawing and survey with a legal description of the wetland limits shall be submitted to EPGMD for certification as a voluntarily created wetland.

(2)

Prior to any alteration of a voluntarily created wetland or a portion thereof, a EPGMD certified voluntarily created wetland drawing and survey, along with a completed EPGMD application form with addendum and appropriate review fee, shall be submitted for review and approval. No mitigation shall be required for alteration of certified voluntary created wetlands.

(3)

No areas outside of the original surveyed property as shown on the certified drawing and survey with attached legal description will be subject to the exemption.

(Ord. No. 90-49, § 1(27-11.09), 12-18-90; Ord. No. 93-49, § 7, 11-23-93; Ord. No. 1999-55, § 1, 10-12-99; Ord. No. 2005-11, § 9, 5-24-05; Ord. No. 2009-56, § 1, 8-25-09)

Note—

Formerly, § 27-339.

Secs. 27-342. - Marine facility operating licenses.

Pursuant to the MPP, a Marine Facility Operating License is hereby established. Each existing, new, or reconstructed multi-slip facility with five (5) or more slips located in coastal waters as defined in the MPP is required to apply for and obtain a Marine Facility Operating License and pay the manatee mitigation fee required in Subsection 27-334(c)(2) prior to operation of the facility. Applications must be made on forms approved by EPGMD. Existing facilities must apply for a Marine Facility Operating License on or before October 1, 2008. A Marine Facility Operating License is valid for one (1) year and must be renewed annually prior to expiration. Renewal of a Marine Facility Operating License requires payment of the manatee mitigation fee applicable during the current fiscal year as established in Subsection 27-334(c)(2).

(Ord. No. 2007-34, § 4, 11-27-07; Ord. No. 2009-56, § 1, 8-25-09)

Secs. 27-343—27-350. - Reserved.

**APPLICATION FOR AN ENVIRONMENTAL RESOURCE
GENERAL LICENSE**

Mailing Address:

Environmental Protection and Growth Management Department
1 North University Drive, Suite 201
Plantation, Florida 33324

Application Fee: \$ 100.00

Make Check payable to:
Broward County Board of
County Commissioners

**Questions 1 - 9 must be completed. Please submit electronically at: <https://webapps.broward.org/EPermits/>
Electronic payments are also accepted through this secure website.**

The submittal of the following information with the application will ensure timely processing and is necessary for staff to effectively evaluate each proposed project:

- One set of signed & sealed plans (**separate .pdf from the application and following documentation**)
- A copy of a property survey clearly depicting the **existing** conditions. Please be sure all over water structures are clearly labeled with the dimensions as **measured from the wet face of the seawall**;
- Photographs of existing conditions, if possible;
- A location / street map with the project site identified;
- Proof of ownership or sufficient interest in the project property;
- Plan view and cross-sectional drawings showing the proposed project **must** include:
 - accurate dimension of length and width for **all structures** over water measured **from the wet face of the seawall** (seawall cap, docks, boardwalks, boatlifts, floating docks, etc.)
 - the Mean High Water Level (MHW), Mean Low Water and substrate elevation (referenced to NGVD or Mean Sea Level)
 - the height of the proposed dock above MHW
 - name and width of water body
 - presence of any **wetland** or **benthic** (seagrasses, oysters, etc.) communities;
- If maintenance dredging is proposed, please provide:
 - documentation of original dredged depth
 - plan view of dredging location, with approximate dimensions
 - cross-sectional drawings depicting historical, existing and proposed conditions with elevations labeled.
 - calculations for amount of material to be removed (in cubic yards); and,
- If the proposed project will be constructed on property owned by a Drainage District, homeowners or condominium association, a letter from the association approving the project is required.

1. **Agent processing application:** _____
Street: _____
City: _____ State: _____ Zip: _____
Telephone: _____ Fax: _____
Email: _____

(Licenses will be emailed so please PRINT clearly)

2. **Contractor to do work:** _____
Street: _____
City: _____ State: _____ Zip: _____
Telephone: _____ Fax: _____
Email: _____

3. **Property Owner Name:** _____
Street: _____
City: _____ State: _____ Zip: _____
Telephone: _____ Fax: _____
Email: _____

APPLICATION FOR AN ENVIRONMENTAL RESOURCE GENERAL LICENSE

4. **Location of proposed work:** Folio # (required): _____
Street: _____ City: _____ Zip: _____
5. **Are there any existing structures at the proposed work site that have been licensed by this agency?** If so, provide license number _____. **Are there any other pending applications with this agency?** If so, for what type of license _____ and when was it submitted _____?

PLEASE BE ADVISED THAT THE PERSON(S) SIGNING BELOW IS/ARE CERTIFYING THAT THE PROPOSED PROJECT WILL BE IN COMPLIANCE WITH THE FOLLOWING CRITERIA FOR OBTAINING AN ENVIRONMENTAL RESOURCE GENERAL LICENSE.

A General License does not authorize any mangrove alteration activities, impacts to any submerged aquatic vegetation (seagrasses) or other natural resources.

6. **Provide a complete detailed description of all proposed activities:** _____

7. **Description of proposed work** (*check all applicable items*) Section 27-336(a) (1)...
- (a) The repair or replacement of **existing functional** docks, provided that no additional waterward fill is used and the new or repaired dock is not enlarged beyond a **total** of 500 square feet over-water surface area for the new and existing structure.
 - (b) The repair, maintenance, or restoration of **existing functional** seawalls no more than one foot waterward of their original authorized location.
 - (c) The relocation within an already approved right-of-way, repair or maintenance of existing utility transmission or distribution lines and associated adjacent facilities required to effect the repair.
 - (d) New lake or pond excavation of less than 2 acres, but equal to or greater than 1 acre, that are not connected with and do not exchange water with any other surface water body of wetland, except by means of a permitted overflow structure.
 - (e) The installation of **new** private, noncommercial docks of 500 square feet or less over water surface area, where no dredging or filling is required except to install the pilings.
 - (f) Projects which are within isolated wetlands or lakes and/or otherwise, in the opinion of THE COUNTY, will not significantly degrade the environment (boatlifts, mooring pilings, headwalls, culverts, etc.)
 - (g) Proposed or existing rock quarry excavations. (*Please see Section 27-336(a) (1) for additional information*)
 - (h) The construction, repair, maintenance or operation of any permitted storm water control/treatment structure when not exempt pursuant to 62-340.700 F.A.C. as amended.
 - (i) The one time dredging of 20 cubic yards or less of sediment from isolated lakes or ponds and residential canals, with no seagrasses within the project site, where the sediment is removed from the waterway and deposited on a self-contained upland site.
 - (j) The installation of natural limerock rip-rap at the waterward face of an existing vertical bulkhead provided that the rip-rap is clean and free of debris, that no seagrasses are covered by the rip-rap, that no dredging or other filling is conducted and that the rip-rap is placed at a slope no steeper than 2H:1V and that no interference to other riparian property rights or navigation occurs.

APPLICATION FOR AN ENVIRONMENTAL RESOURCE GENERAL LICENSE

- (k) The repair or replacement of **existing functional** headwalls, pipes, culverts provided that they are otherwise in compliance with the code and are in artificially created waterways which discharge water for stormwater runoff. The pipes must be replaced in the original size and configuration and all elevations must be the same as the pre-replacement condition. All water quality protection features must be utilized and the rerouting of water bodies is not authorized by this General License except by pumps, pipes or cofferdams. Wetland areas may NOT be impacted by the activity.
- (l) The installation of utility or transmission lines laid on or embedded in the substrate provided that no dredging or filling is required and that no seagrasses or significant benthic communities will be affected by the activity.
- (m) Existing commercial Rock Quarry Excavations (*please see Section 27-336(a) (1) for additional information*)
- The emergency repair, replacement or maintenance of existing utility transmission or distribution lines, provided that the owner of the damaged facility or the owner’s agent provides verbal notice to the county of the condition, its location and expected length of time required for the repair, replacement or maintenance activities. *Section 27-336(a) (2)*

8. Mangrove alteration and certain types of trimming activities require an Environmental Resource License pursuant to Sec. 27-332 of the Broward County Code and Section 403.9321 Florida Statute. **The General License does not authorize any mangrove alteration activities.**

Are there mangroves on-site? Yes No
 Will this work require mangrove alteration or trimming? Yes No
If “Yes”, an Environmental Resource License is required.

9. Are there any natural aquatic or submerged resources in the construction area? Yes No
 Natural aquatic resources include seagrasses, oysters, etc. **Describe how this determination was made.**

*Per Section 27-58(b)(9), “The licensee, by acceptance of this license, specifically agrees to allow access and shall allow access to the licensed source, activity, or facility at times to THE COUNTY personnel for the purposes of inspection and testing to determine compliance with this license and this chapter.” **Enforcement actions may be initiated for any violations.***

Issuance of this license does not relieve the licensee from obtaining any other required federal, state or local permits or authorizations required for this project prior to commencement. Please be advised a site inspection may also be conducted prior to license issuance to verify existing conditions.

Signature of property owner

Date

Printed Name

BROWARD COUNTY

ENVIRONMENTAL PROTECTION AND GROWTH MANAGEMENT DEPARTMENT

ENVIRONMENTAL RESOURCE LICENSE APPLICATION FORM

SUBMIT HARDCOPY APPLICATIONS TO: **SUBMIT ELECTRONIC APPLICATIONS VIA:**
Env. Licensing & Building Permitting Division E-permits [Electronic Permitting Uploader](#)
Aquatic & Wetland Resources Program
1 North University Dr, Suite 201
Plantation, Florida 33324

SECTION I: Application Checklist

The following information is required for works in surface waters or wetlands of Broward County or the creation of same. Initial application packages that do not include all applicable information requested below may not be accepted. Upon review of the application, additional information may be required. If you have questions regarding the application form or required information, please call (954) 519-1483 for assistance.

Basic information to be included with all applications:

- a completed and notarized application form with all the requested applicable information;
- the appropriate application fee according to the Aquatic & Wetland Resources [Fee Schedule](#);
- proof of ownership or legal interest in the property (i.e. [Warranty Deed](#)) where the project will occur (Include [corporate records](#) showing authorized individuals for corporate owners);
- a location / street map with the project site identified ([maps](#));
- a sketch and legal description of the subject property, preferably sealed, clearly depicting the existing site conditions; and
- one (1) set of legible plan view and cross-sectional drawings clearly depicting both the **existing** and **proposed** site conditions (final engineered plans and/or additional sets may be required prior to issuance).

SECTION II- Project Summary

Site and Background Information:

Project name: _____	Total site acreage: _____
Street address: _____	Total project acreage: _____
City: _____	Zip code: _____
Folio number(s): _____	Drainage District : _____

Provide details of the proposed activities in, on, over surface waters or wetlands:

List any previous Federal (USACOE), State (FDEP/SFWMD), County, or Local permits, licenses, or enforcement actions for the project site:

Times, dates and attendees for any pre-application meetings or correspondence with County staff:

SECTION III- Contact Information

Owner of land

Name: _____
Title and Company: _____
Street address: _____
City: _____ State: _____ Zip: _____
Telephone: _____ Fax: _____ E-mail: _____

Applicant (if different from owner – provide proof of authorization; e.g. easement, lease, etc.)

Name: _____
Title and Company: _____
Street address: _____
City: _____ State: _____ Zip: _____
Telephone: _____ Fax: _____ E-mail: _____

Authorized representative (e.g. agent, consultant, contractor, attorney, etc.)

Name: _____
Title and Company: _____
Street address: _____
City: _____ State: _____ Zip: _____
Telephone: _____ Fax: _____ E-mail: _____

Contractor to do work (If different from above - must be provided prior to commencement)

Name: _____
Title and Company: _____
Street address: _____
City: _____ State: _____ Zip: _____
Telephone: _____ Fax: _____ E-mail: _____

SECTION IV: Project Details

PART 1: DOCKS

Not applicable:

A - Provide the following information for any existing docks at the site:

Marginal dock/terminal platform dimensions: Length: _____ ft.; width: _____ ft.; area: _____ sq. ft.
Over-water width of structure as measured from the wet face of the seawall panel: _____ ft.
Number (_____), length, and width of existing finger/access piers (if applicable): _____ X _____ ft.
Over-water area of existing structures (measured from MHW line or seawall wet face): _____ sq. ft.
Number of existing mooring slips at the site: _____ Maximum draft of vessels at the site: _____ ft.
Existing structures: **to be removed** / **to remain** / **to be modified** (check all that apply)

B - Provide the following information for any proposed/new dock construction at the site:

Marginal dock/terminal platform dimensions: Length: _____ ft.; width: _____ ft.; area: _____ sq. ft.
Over-water width of structure as measured from the wet face of the seawall panel: _____ ft.
Number (_____), length, and width of new finger/access piers (if applicable): _____ X _____ ft.
Over-water area of new structures (measured from the MHW line or seawall wet face): _____ sq. ft.
Number of new mooring slips at the site: _____ Maximum draft of vessels at the site: _____ ft.

C – Finished Project Configuration:

Maximum length: _____ ft. Maximum width: _____ ft. Square footage: _____ square ft.
Maximum width of structure as measured from the wet face of the seawall panel: _____ ft.
Number (_____), length, and width of all finger/access piers (if applicable): _____ X _____ ft.
Total over-water area of the finished dock configuration (measured from the MHW line or seawall wet face): _____ square ft.
of vessels/mooring areas at the site: _____ Maximum draft of vessels at the site: _____ ft.

Note: Large docks may also require installation of a riprap footer at the base of the seawall. Refer to the [County's riprap policy](#) for further guidance. If required, depict the riprap on the plans.

Additional information to be included on the project drawings/exhibits (if applicable):

- accurate dimensions (length and width) for all structures over water **measured from the wet face of the seawall panel** (i.e. seawall cap, fixed/floating docks, piers, boatlifts, floating platforms, etc.)
- Mean High Water Level (MHW), Mean Low Water Level (MLW), and the **elevation of the substrate in the mooring area(s)** ([referenced to NGVD, NAVD, or Mean Sea Level](#));
- the maximum elevation (or height above MHW) of the proposed dock or seawall cap;
- the width of the adjacent water body;
- the total linear feet of shoreline owned by the applicant;
- the volume of riprap to be installed; and
- a benthic resources (seagrasses, corals, oysters, etc.) survey for projects east of US-1.

Additional information needed for multifamily docking facilities, marinas and dry stacks:

- the current Marine Facility Operating License Number (MFOL# _____);
- the required [New Slip Fees](#) (25% of the total new slip fee is due at time of application);
- the number of existing wet, dry, and/or trailer slips shown on an “existing conditions” drawing (documentation of historical use is required for any existing slips);
- the number of proposed wet, dry, and/or trailer slips shown on a “proposed conditions” drawing;
- the locations of any sewage pump-out facilities, fueling facilities, fish cleaning stations, and/or liveaboard dockage proposed;
- the proposed upland site plan if upland development/redevelopment/modification is proposed; and
- a bathymetric survey of the project area referenced to mean low water, NGVD, or NAVD.

PART 2: SHORELINE STABILIZATION

Not applicable:

Type of construction (check all applicable):

- | | |
|---|--|
| <input type="checkbox"/> Geo-tube | <input type="checkbox"/> Sheet pile |
| <input type="checkbox"/> Riprap | <input type="checkbox"/> New seawall in front of existing |
| <input type="checkbox"/> Interlocking revetment | <input type="checkbox"/> Seawall removal and replacement |
| <input type="checkbox"/> Footer | <input type="checkbox"/> New wall where no wall previously existed |
| <input type="checkbox"/> Batter/T/King piles | <input type="checkbox"/> Existing wall to remain |
| <input type="checkbox"/> Cap | <input type="checkbox"/> Existing wall to be removed |
| <input type="checkbox"/> Concrete panel | |

Additional information needed for mangrove trimming/alteration projects:

- copies of any prior licenses for mangrove trimming, alteration, and/or mitigation at the site;
- copies of any prior enforcement actions/cases;
- linear footage of mangrove dominated shoreline owned/controlled by the applicant _____ l.f.;
- the percentage of mangroves on-site to be trimmed (as measured by canopy) _____ s.f.;
- Will a [Professional Mangrove Trimmer](#) be conducting the work? No Yes;
- a description of the type and scope of trimming will be conducted? (check any/all that apply):
 - window trim height reduction thinning lateral trim other _____;
- a detailed discussion of impact avoidance/minimization measures considered/implemented; and
- a detailed mitigation plan for altered mangroves (lost canopy must be replaced within 5 years).

PART 5: WETLANDS (FRESHWATER OR TIDAL)

Not applicable:

Amount of wetlands on site: _____ square feet / _____ acres (must depict wetlands on drawings)
How wetland limits were determined: _____
Has the County conducted a wetland jurisdictional determination on the property? No Yes
If yes, attach a copy of the determination and/or provide the file number [WD_____ - _____]
Wetland to be Filled: _____ acres Fill volume: _____ cubic yards
Wetland to be Dredged: _____ acres Dredge volume: _____ cubic yards
Max. Depth of Dredging: _____ NGVD/NAVD Seasonal HWL: _____ NGVD/NAVD

Additional information necessary for wetland mitigation projects:

- a detailed discussion of all site development constraints, design alternatives considered, and impact avoidance/minimization measures implemented prior to arriving at the current site plan;
- preliminary [UMAM](#), [WATER](#), or [M-WRAP](#) calculations;
- a draft mitigation plan which, at a minimum, includes details of the mitigation area, proposed grading contours at 1-foot intervals, and monitoring, maintenance and planting plans; and
- the required [monitoring fee](#) (40% of the initial license fee for each of the 5 years of the monitoring period) is required before license issuance for all projects which are required to provide mitigation.

PART 6: VOLUNTARILY CREATED WETLANDS

Not applicable:

Current site conditions: _____
Seasonal High Water Elevation or Control Water Elevation: _____ (NGVD or NAVD)
Excavation area: _____ square feet _____ acres
Excavation volume: _____ cubic yards Maximum depth of excavation: _____ NGVD/NAVD
Final disposal location of excavated material: _____
Is a connection to existing surface waters proposed? Yes _____ No _____
Is the proposed wetland part of the stormwater treatment system? Yes _____ No _____

Additional information needed for voluntary wetland creation projects:

- a proposed planting plan, and
- a copy of a sketch and legal description of the voluntary creation area.

SECTION V- Certifications and Signatures

Part 1: Owner/Applicant Certification

By signing below I _____ certify the following:

- a) I understand this is an application and not a license, and that work prior to approval is a violation
- b) I certify that I am familiar with the information contained in this application, and that to the best of my knowledge and belief, such information is true, complete and accurate.
- c) I further certify that I possess the authority to undertake the proposed activities.
- d) I understand that I may have to provide additional information/data that may be necessary to show that the proposed project will comply with Sections 27-331 through 27-341, titled Aquatic and Wetland Resource Protection, of the Natural Resource Protection Code.
- e) Should the information I provide not be adequate for review, I understand that the Department is not obligated to issue a comprehensive Completeness Summary.
- f) In addition, I agree to provide entry to the project site, for inspectors with proper identification, for the purpose of reviewing the site as covered by the scope of Sections 27-331 through 27-341, titled Aquatic and Wetland Resource Protection, of the Natural Resource Protection Code.
- g) Further, I hereby acknowledge the obligation and responsibility for obtaining all of the required federal, state and local permits before commencement of construction activities.
- h) If a license is issued, I agree, or I agree on behalf of the applicant, to construct and maintain the project in compliance with the license conditions, unless the Department authorizes transfer of the license to another entity.
- i) **I understand that knowingly making any false statement or representation in this application is a violation of Section 373.430, F.S. and 18 U.S.C. Section 1001.**
- j) Should a County Environmental Resource License be granted, I hereby certify that I will comply with all general and specific conditions of that license and with the Broward County Natural Resource Protection Code (Chapter 27, Ord. 90-49, as amended).

Signature of Owner/Applicant _____

Date _____

Typed / Printed Name of Owner/Applicant _____

Corporate Title (if applicable) _____

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Part 2: Designation of Authorized Representative

(The applicant/owner should sign this section if he/she is authorizing an agent, consultant, contractor or other individual to act on his/her behalf)

By signing below I hereby designate:

Individual Name (printed): _____

Company Name: _____

as my representative in the processing of this application, and authorize the representative to furnish supplemental information and documentation in support of the application on my behalf. In addition, I authorized this representative to bind me, or my Corporation, to perform any requirements which may be necessary to procure the license for authorization as indicated above.

Signature of Owner/Applicant

Date

Part 3: Authorized Representative Certification

(If Part 2 above is completed by the applicant this section should be certified by the agent/contractor authorized in Part 2 above)

By signing below I _____ certify the following:

- a) I understand this is an application and not a license, and that work prior to approval is a violation
- b) I certify that I am familiar with the information contained in this application, and that to the best of my knowledge and belief, such information is true, complete and accurate.
- d) I understand that I may have to provide additional information/data that may be necessary to show that the proposed project will comply with Sections 27-331 through 27-341, titled Aquatic and Wetland Resource Protection, of the Natural Resource Protection Code.
- e) Should the information I provide not be adequate for review, I understand that the Department is not obligated to issue a comprehensive Completeness Summary.
- f) In addition, I agree to provide entry to the project site, for inspectors with proper identification, for the purpose of reviewing the site as covered by the scope of Sections 27-331 through 27-341, titled Aquatic and Wetland Resource Protection, of the Natural Resource Protection Code.
- g) Further, I hereby acknowledge the obligation and responsibility for obtaining all of the required federal, state and local permits before commencement of construction activities.
- h) If a license is issued, I agree on behalf of the applicant, to construct and maintain the project in compliance with the license conditions, unless the Department authorizes transfer of the license to another entity.
- i) **I understand that knowingly making any false statement or representation in this application is a violation of Section 373.430, F.S. and 18 U.S.C. Section 1001.**
- j) Should a County Environmental Resource License be granted, I hereby certify that I will comply with all general and specific conditions of that license and with the Broward County Natural Resource Protection Code (Chapter 27, Ord. 90-49, as amended).

Signature of Authorized Representative

Date

Name of Corporation/Business

Corporate Title (if applicable)

Part 4: Contractor Certification

(If different from the authorized representative in Part 3 above)

By signing below I _____ certify the following:

- a) I understand this is an application and not a license, and that work prior to approval is a violation.
- b) I hereby acknowledge the obligation and responsibility for obtaining all of the required federal, state and local licenses before commencement of construction activities.
- c) If a license is issued, I agree on behalf of the applicant, to construct and maintain the project in compliance with the license conditions, unless the Department authorizes transfer of the license to another entity.
- d) **I understand that knowingly making any false statement or representation in this application is a violation of Section 373.430, F.S. and 18 U.S.C. Section 1001.**
- e) Should a County Environmental Resource License be granted, I hereby certify that I will comply with all general and specific conditions of that license and with the Broward County Natural Resource Protection Code (Chapter 27, Ord. 90-49, as amended).

Signature of Contractor

Date

Name of Corporation/Business

Corporate Title (if applicable)

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Aquatic and Wetland Resources License Fee Schedule

(Effective as of 08/22/17)

PLEASE make checks payable to: *Broward County Board of County Commissioners*

*This is not intended to be an all inclusive list of possible projects.
 If you need assistance to determine to correct fee, please contact 954-519-1254.*

1. For Section 27-336: General Licenses	\$ 100.00
2. For Items (3) through (7) below, if the project proposes impacts to aquatic or wetland resources, add <u>100%</u> to the license fee.	
3. For Section 27-334: Maintenance dredging or projects equal to or less than 100 cubic yards of dredged and/or fill material; and / or installation of buoys or aids to navigation (added 8/22/17)	\$ 250.00
4. For Section 27-334: <ul style="list-style-type: none"> • Projects greater than 101 to less than 1,000 cubic yards of dredged or fill material; • Marina or dockage facility less than or equal to 10,000 square feet of water surface area; • Seawall less than or equal to 200 feet in length; • Installation of subaqueous transmission or distribution lines with less than 1000 cubic yards of dredged or fill material. 	\$450.00
5. For Section 27-334: <ul style="list-style-type: none"> • Projects with 1,001 to 10,000 cubic yards of dredged or fill material; • Marina or dockage facility with greater than 10,000 square feet of water surface area; • Seawalls greater than 200 feet in total length. 	\$ 800.00
6. For Section 27-334 <ul style="list-style-type: none"> • Projects with 10,001 to 100,000 cubic yards of dredged or fill material 	\$ 2000.00
7. For Section 27-334: <ul style="list-style-type: none"> • Projects greater than 100,000 cubic yards of dredged or fill material 	\$ 4000.00
8. For Section 27-334: Request for license transfer	\$ 100.00
9. For Section 27-334: Request for license modification	\$ 100.00
10. For Section 27-334: "Mitigation Monitoring Fee" for in-county mitigation projects: <ul style="list-style-type: none"> • The annual fee shall be <u>40%</u> of the initial license fee which shall be submitted prior to license issuance. • As of 8/22/17 Ordinance change, there is no fee for mitigation bank projects. 	
11. For Section 27-334: "Wetland Jurisdictional Determinations" <ul style="list-style-type: none"> • Determinations will be performed subsequent to the receipt of a written request accompanied by the following processing fees: <ul style="list-style-type: none"> (a) for parcels less than or equal to 2 acres (b) each additional acre or portion thereof 	\$ 35.00 \$ 30.00
12. For Section 27- 334 (c): Projects proposing new or expanding marine facilities: <ul style="list-style-type: none"> • A non-refundable filing fee deposit of \$100 per new slip proposed to be submitted with an Environmental Resource License (ERL) application • A mitigation fee based on the Manatee Protection Plan (MPP) fee schedule for the year the ERL is issued. <p>An Annual Marine Facility Operating License (MFOL) fee based on the MPP fee schedule below.</p>	See MPP fee schedule below

MPP	Mitigation fee per	
	Fiscal Year	new slip
	Annual MFOL per slip fee	
	FY2017	\$ 569.32
	FY2018	\$ 592.10
FY2019	\$ 615.78	
FY2020	\$ 640.43	

There is an on-going 4% per year increase per Ordinance.

Attachment C

Jacksonville Biological Opinion

pile installation in Gulf sturgeon critical habitat migratory restriction zones. Boat ramp projects occurring in areas outside of Gulf sturgeon critical habitat migratory restriction zones will occur along the shore and will not restrict the movement of sturgeon. Therefore, any effects are extremely unlikely to occur.

Because the effects to the PCEs of abundant prey items, water quality, and sediment quality will be insignificant and effects to safe and unobstructed migratory pathways will be discountable, we believe that boat ramp activities may affect, but are not likely to adversely affect, Gulf sturgeon critical habitat.

Potential Routes of Effect to Johnson's Seagrass Critical Habitat

We believe there will be no effect to Johnson's seagrass critical habitat from boat ramps because PDC A6.9 excludes new or expanded boat ramp projects in Johnson's seagrass critical habitat where the essential features are present, and repair and replacement can only occur within the same footprint. USACE anticipates that 2 boat ramp activities meeting the requirements of this Opinion may be authorized per 5-year period in Johnson's seagrass critical habitat. Given the PDCs, these projects can only occur in areas lacking the essential features or can only occur within the same footprint (preventing new or additional effects to the essential features).

2.2.7 Activity 7 (A7): Aquatic Habitat Enhancement, Establishment, and Restoration Activities

General Description

As used in this Opinion, aquatic enhancement includes (1) constructing oyster reefs on unvegetated bottom in tidal waters, (2) constructing living shorelines, including using vegetative plantings and fill material to construct breakwaters parallel to the shore (3) enhancing or establishing submerged aquatic vegetation, (4) constructing artificial reefs, and (5) filling in areas to restore natural contours or improve water quality.

Oyster Reefs and Living Shorelines

Oyster reefs and living shorelines are placed in shallow water environments. Both can be constructed to act as a natural breakwater along eroding shorelines. Living shorelines can be constructed out of different materials, including oysters or limestone boulders. The installation methods and materials used to create oyster reefs and living shorelines are described below. Oyster reefs can be configured in a number of different ways, including as a stand-alone reef or a series of reefs. When placed near shore, oyster reefs also can act as a breakwater/living shoreline (see below). Many oyster reefs are constructed of bags filled with oyster cultch (i.e., oyster shells placed to facilitate new oyster spat recruitment). Often, these bags are hand-placed. Sometimes, a perimeter is created with the oyster bags and the center is filled with loose cultch so that the loose material is contained. Loose material is often offloaded using barge-mounted mechanical equipment. Some oyster reefs are created by placing flat mats weighted to the seafloor with oyster cultch attached. All of these methods rely on natural recruitment of live oysters from the surrounding waters. Figure 18 provides images of different types of oyster reefs and equipment and materials used in oyster reef construction.



Figure 18. Oyster reefs. The left image shows oyster bags, the middle is an oyster mat, and the right is a barge filled with loose oyster cultch. All 3 images are from the Charlotte Harbor Habitat Restoration Plan (Boswell et al. 2012).

Living shorelines are created by placing a breakwater parallel to the shore. Breakwaters can be constructed of artificial materials such as prefabricated structures like reef balls or constructed of natural materials such as oysters, limestone boulders, mangrove island barriers, or biologs. Shoreline structures are aligned parallel with the shore as straight-line sections or shaped into crescent sections to reduce wave attenuation. Vegetation is often planted landward of the structures, between structure and the shoreline, to stabilize the shoreline. Below is a cross section diagram showing the transition from the living breakwater to the uplands (Figure 19). The PDCs require that all living shoreline structures must have breaks or gaps in the sections of living shoreline to allow for tidal flushing and species movement. We developed PDCs to set the living shoreline lengths and gap widths based on the practices and recommendations of FDEP and non-government organizations that specialize in living shorelines.

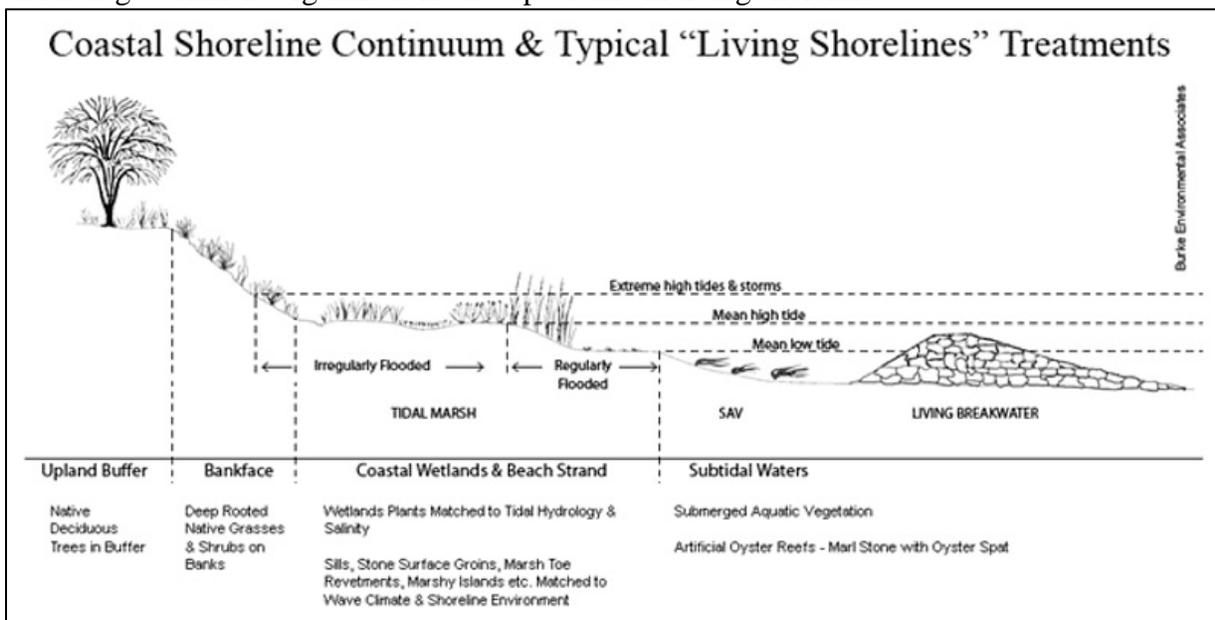


Figure 19. Living shoreline. This sample living shoreline cross-section is provided by NOAA's Habitat Conservation and Restoration website (<http://www.habitat.noaa.gov/restoration/techniques/implementation.html>).

Seagrass Planting

Seagrass planting is often used to develop or restore seagrass beds for the purpose of aquatic habitat restoration. Sometimes, seagrass is planted on a site with no site preparation. In some cases, prior to planting, the site elevation must be restored, which is typically done by placing fill (either suitable loose sediment or bagged sediment) in blowholes/dredge holes or prop scars until

the holes are filled to an elevation level with the adjacent area. Loose material is often offloaded using barge-mounted mechanical equipment. Seagrass plants typically are obtained from laboratories, specialty nurseries, or from transplants from existing seagrass bed. Bird roosting stakes sometimes are used to speed seagrass recovery by taking advantage of a natural source of fertilizer (Figure 20). Bird roosting stakes normally are small wood or plastic stakes installed by hand.



Figure 20. Seagrass restoration. The left image is the placement of sediment to return a blowhole to pre-injury elevation. The image on the right shows bird stakes placed in a restoration area (Both images are from www.darrp.noaa.gov).

Artificial Reefs

Artificial reefs can consist of a variety of materials. This Opinion is limited to reefs constructed of the materials described in the PDCs below. Materials are typically transported to the site by barge. Pre-fabricated reef modules are off-loaded by crane and loose concrete material is dumped over side onto a pre-surveyed, defined location. Pre-fabricated structures are available in a variety of shapes, including those pictured below (Figure 21).

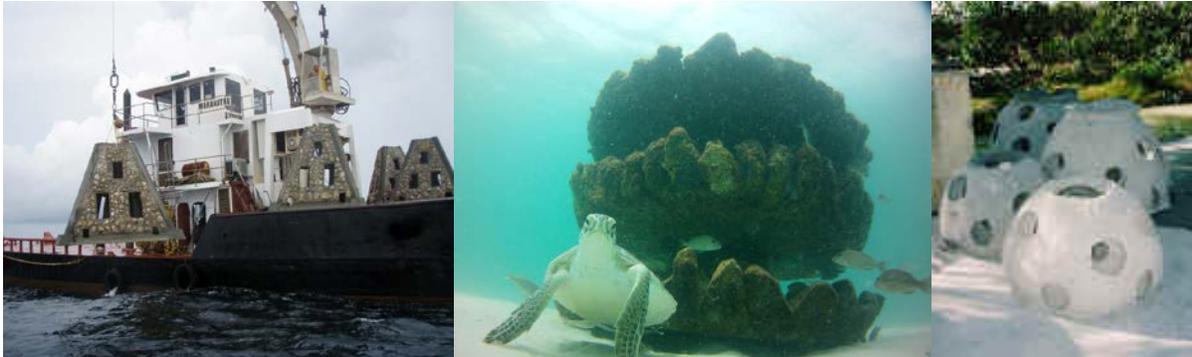


Figure 21. Artificial reef materials. The left image is an open top and bottom tetrahedron design, the middle image is a series of discs mounted to a pile, and the right image is a reef ball. Left and middle images are from Reef Maker (<http://www.reefmaker.com>) and the right image is from the Reef Ball Foundation (www.reefball.org).

Fill to Restore Natural Contours or Improve Water Quality

In areas where historic dredging has occurred or areas with ruts or scars from vessel groundings, fill is sometimes the best way to restore the natural contours of the area so that aquatic vegetation can recover or so that water quality can improve. With respect to water quality, if an area is significantly deeper than the surrounding habitat, it can create hypoxic conditions where oxygen levels in the deeper area are so low as to become deadly to aquatic life. Depending on the size and depth, these areas may be filled with hand held equipment or from mechanical equipment such as backhoes and bucket dredges from land or barge.

Project Design Criteria

PDCs Specific to Activity 7 for Aquatic Habitat Enhancement, Establishment, and Restoration Activities:

A7.1. Only native plant species can be planted.

Additional Conditions for living shoreline and oyster habitat on unvegetated bottom in tidal waters:

A7.2. Oyster reef materials shall be placed and constructed in a manner that ensures that materials will remain stable and that prevents movement of materials to surrounding areas (e.g., oysters will be contained in bags or attached to mats and loose cultch must be surrounded by contained bagged oysters or another stabilizing feature).

A7.3. Oyster reef materials must be placed in designated locations only (i.e., the materials shall not be indiscriminately or randomly dumped or allowed to spread outside of the reef structure).

A7.4. Living shorelines can only be constructed in unvegetated, nearshore water along shorelines to create tidal marshes or mangrove habitat for the purpose of shoreline erosion control or aquatic habitat enhancement. Native plants can be placed along the shoreline or between the shoreline and the living shoreline structure.

A7.5. Living shoreline structures and permanent wave attenuation structures can only be constructed out of the following materials: oyster breakwaters (described above in the project description and A7.2), clean limestone boulders or stone (sometimes contained in metal baskets or cages to contain the material), small mangrove islands, biologs, coir, rock sills, and pre-fabricated structures made of concrete and rebar that are designed in a manner so that they do not trap sea turtles, smalltooth sawfish, or sturgeon. Reef balls or similar structures that are not open on the bottom, open-bottom structures with a top opening of at least 4 ft, and reef discs stacked on a pile are pre-fabricated structures are designed in a manner so that they do not trap sea turtles. Other materials may be used for living shorelines if pre-approved by NMFS to ensure that they are stable and not an entanglement risk to listed species. The approval process to use other materials is described in the Section 2.3 (Project-Specific Review).

A7.6. Both living shoreline and oyster reefs must have 5 ft gaps at least every 75 ft in length, as measured parallel to the shoreline and at the sea floor, to allow for tidal flushing and species movement.

Additional Conditions for the establishment or restoration of submerged aquatic vegetation:

A7.7. The placement of loose or bagged sediment suitable for the project site in blowholes/dredge holes or in prop scars, and berm redistribution or sod replacement in excavations, must be to an elevation level with or otherwise consistent with the adjacent area.

- A7.8. This Opinion covers leveling submerged spoil piles or berms if necessary to level the restoration area to match the elevation of adjacent seagrass beds.
- A7.9. Exclusion cages may be used around seagrass restoration areas if necessary to allow the seagrass beds to establish themselves to the point where they are sustainable after the cages are removed. Exclusion cages can only be used on a temporary basis, for a period not to exceed 4 months. Each exclusion cage must be securely fastened to the substrate so that it does not become detached. All cages must be constructed of firm, taut materials and cannot include any loose mesh, thin twistable wire, or rope that could twist or become entangled or present an entanglement risk to species.
- A7.10. Seagrass transplantation and harvesting from the donor site may occur only by hand. Donor sites could include (i) upland seagrass farms, (ii) areas with seagrasses that would be impacted by another project, or (iii) existing seagrass beds, as long as the seagrass is removed in a manner that is not detrimental to the existing seagrass bed. Transplantation methods may include, but are not limited to, plugging devices, manual transplant, peat pellets, peat pots, and coconut fiber mats. No in-water machinery (e.g., marsh buggies, track hoe) may be used in harvesting or transplanting the seagrasses. The selection of and harvesting from seagrass donor sites shall be coordinated with NMFS Habitat Conservation Division. This Opinion does not cover transplantation of the invasive seagrasses (e.g., *Halophila stipulacea*).
- A7.11. In Florida, this Opinion covers installation of stakes to attract birds, if necessary or appropriate for the project. Bird stakes should not be used in areas where additional nutrients may be detrimental to the seagrass. Bird stakes are not authorized in the U.S. Caribbean.
- A7.12. This Opinion covers installation of signage (supported on piles or anchored) if the signs are necessary to prevent motorized boats from entering the area and anchoring. Signs must be sized and placed in a manner that prevents the loss of native seagrasses from sign shading.

Additional conditions for the installation of artificial reefs from the placement of man-made materials:

- A7.13. Artificial reef materials shall be clean and free from asphalt, creosote, petroleum, other hydrocarbons and toxic residues, loose free-floating material, or other deleterious substances.
- A7.14. New reef sections are limited to 1 reef section measuring ¼- by ¼-nmi area (40 ac) in size with a distance of 500 ft between each section. Offshore reefs shall maintain a minimum vertical clearance of twice the height of the structure from the top of the deployed material relative to the MLW at all times.
- A7.15. Reauthorization of existing reefs is limited to the previously permitted size. Approved

materials defined in PDC A7.19 can be added to the existing reef area.

A7.16. No artificial reef materials shall be deployed until a benthic assessment of the bottom conditions has been accomplished by diver or submersible video camera. The inspection of the deployment area may occur at the time of deployment but no more than 1 year prior to deployment. The permittee shall maintain a deployment buffer of at least 200 ft from any submerged aquatic resources, including seagrasses, macroalgae, hard or soft coral (including coral reefs), sponges, oysters, or hard bottom when placed in areas of sand. If materials are off-loaded from a barge or placed in areas that may generate turbidity (e.g., areas with fines or muck), a 500 ft buffer is required.

A7.17. This Opinion does not cover the use of mid-water fish aggregation devices.

A7.18. All reefs must be cleaned annually to remove marine debris and derelict fishing line in areas safely accessible to recreational SCUBA divers. Cleanup efforts shall follow the PDCs for Activity 9, marine debris removal, and all pertinent general PDCs.

Additional conditions for reef materials:

A7.19. Individual reef units or modules must weigh at least 500 pounds. Reef materials shall be clean and free from asphalt, petroleum, other hydrocarbons, and toxic residues, as well as loose, free-floating material, or other deleterious substances. All artificial reef materials and/or structures will be selected, designed, constructed, and deployed to create stable and durable marine habitat. Only the following reef materials may be used under this Opinion:

A7.19.1. Prefabricated artificial reef modules composed of ferrous and/or aluminum-alloy metals, concrete, rock, or a combination of these materials.

A7.19.2. Natural rock boulders and pre-cast concrete material, such as culverts, stormwater junction boxes, power poles, railroad ties, jersey barriers, or other similar concrete material.

A7.19.3. Clean steel and concrete bridge or large building demolition materials such as slabs or piles with all steel reinforcement rods cut at the base of the concrete so no rebar or metal protrudes from the concrete.

A7.20. Reef structures, materials, and installation methods shall be designed and deployed to prevent entanglement and entrapment of listed species. Open-bottom pre-fabricated reef modules may not be used unless the module also has a top opening sufficiently large to allow a turtle to escape. Approved open-bottom modules include:

A7.20.1. Three-sided modules where each side of the top opening is at least 36-in in length along its edge.

A7.20.2. Four or more sided modules where each side of the top opening is at least 40-in in length along its edge.

A7.20.3. Modules with a round opening with a diameter of at least 40-in (oval openings are not allowed unless a 40-in diameter circle space can fit within the oval).

A7.20.4. Modules that are approved by the FWS Artificial Reef Program as being turtle friendly. FWS is currently working on developing this list.

No open-bottom modules are allowed that include additional modules, discs, or other materials stacked or placed on or immediately adjacent to the top opening, as they may prevent turtles from easily escaping.

A7.21. This Opinion does not cover projects that use explosives to deploy reef material.

A7.22. If pile placement is required in the construction of a reef, such placement must comply with the PDCs for Activity 2, pile-supported structures, and all applicable general PDCs.

Fill to restore natural contours or improve water quality:

A7.23. Fill of scars or ruts caused by vessel groundings or similar activities must match the surrounding natural elevation.

A7.24. This Opinion covers fill of deep holes or canal bottoms that are determined to be hypoxic (i.e., that have critically low dissolved oxygen levels).

Additional PDCs for Activity 7 applicable in critical habitat:

In addition to the PDCs above, the project must be designed to meet the following PDCs if the project occurs in the critical habitat, as described below.

A7.25. Smalltooth sawfish critical habitat: Oyster reefs, living shorelines, and artificial reefs cannot be placed in waters containing the shallow, euryhaline essential feature. Fill to restore natural contours or improve water quality and seagrass restoration can occur in waters containing the shallow, euryhaline essential feature, as long as the activity meets the PDCs for Activity 7 and all pertinent general PDCs. No aquatic habitat enhancement, establishment, or restoration activities are allowed in areas identified as smalltooth sawfish limited exclusion zones (Section 2.1.1.1).

A7.26. Gulf sturgeon critical habitat: Oyster reefs, living shorelines, and seagrass restoration in Gulf sturgeon critical habitat are restricted to areas that are in water depths shallower than -6 ft (-2 m) MHW (i.e., between the shoreline and -6 ft deep). Artificial reef structures cannot be placed in Gulf sturgeon critical habitat. Fill to restore natural contours or improve water quality can occur in Gulf sturgeon critical habitat, regardless of project depth. Living shorelines, oyster reefs, and artificial reefs cannot be placed in Gulf sturgeon critical habitat migratory restriction zones, defined in Section 2.1.1.2.

A7.27. North Atlantic right whale critical habitat: All artificial reefs must meet specifications below. Oyster reefs, living shorelines, seagrass restoration, and fill to restore natural contours or improve water quality can occur in North Atlantic right whale critical habitat, as long as those activities meet the PDCs for Activity 7 and any pertinent general PDCs, as described above.

A7.27.1. No artificial reefs can be placed in water shallower than 30 ft deep

A7.27.2. The maximum reef height off the sea floor is 20 ft

A7.27.3. The maximum footprint of new reefs shall be 1 nmi². If a new reef is added to an existing artificial reef, the total footprint of the combined reefs must not exceed 1 nmi².

A7.27.4. Density of newly permitted reefs shall not exceed 2 reefs (old or new) per 10 nmi²

A7.27.5. All effort should be made to avoid placing reef material during North Atlantic right whale calving season (November 15 through April 15). If reef material has to be placed during North Atlantic right whale calving season, then the following additional measures are required:

- The maximum speed for all vessels involved in placing the reef material is 10 knots.
- Deployments cannot be conducted at any time when lighting or weather or sea conditions (e.g., darkness, rain, fog, sea state) prevent visual monitoring of the project area.
- Deployment activities will not commence until the protected species observer reports that no marine mammals or sea turtles have been sighted for at least 60 minutes.
- Deployment activities will cease immediately if sea turtles or marine mammals are sighted within the project area.
- Deployment activities will not recommence until the protected species observer reports that no marine mammals or sea turtles have been sighted for at least 60 minutes.

A7.28. *Acropora* critical habitat: This Opinion does not cover any aquatic habitat enhancement, establishment, or restoration activities in *Acropora* critical habitat where the essential feature is present.

A7.29. Johnson's seagrass critical habitat: Living shorelines, oyster reefs, and artificial reefs cannot be placed in waters shallower than -13 ft MHW within the geographic boundaries of Johnson's seagrass critical habitat. Seagrass restoration and fill to restore natural contours or improve water quality can occur in Johnson's seagrass critical habitat regardless of depth, as long as those activities meet the PDCs for Activity 7 and any pertinent general PDCs, as described above.

A7.30. Loggerhead critical habitat: Living shorelines, oyster reefs, and artificial reefs cannot be placed in nearshore reproductive habitat of loggerhead critical habitat. Seagrass restoration and fill to restore natural contours or improve water quality can occur in nearshore reproductive habitat of loggerhead critical habitat, as long as those activities meet the PDCs for Activity 7 and any pertinent general PDCs, as described above.

A7.31. U.S. Caribbean Sea Turtle Critical Habitat (NA DPS of green, Hawksbill, and Leatherback Sea Turtle Critical Habitat): No aquatic enhancement activities (living shorelines, oyster reefs, artificial reefs, seagrass restoration, and fill to restore natural contours or improve water quality) can occur within sea turtle critical habitat in the U.S. Caribbean.

Attachment D

City of Pompano

Permitting/Waterways Code

CHAPTER 151: BEACHES AND WATERWAYS

Section

- 151.01 Intent
- 151.02 Permit required
- 151.03 Structures in waterways
- 151.04 Bulkhead lines
- 151.05 Seawalls
- 151.06 Disregard of notice
- 151.07 Backfilling seawalls
- 151.08 Structures on seawalls
- 151.09 Variances

§ 151.01 INTENT.

The intent of this chapter is to permit construction in, over and upon the waterways within the city of fixed docks, floating docks, floating vessel platforms, wharves, finger piers, boat lifting devices (floating or stationary), dolphin, fender or mooring piles, mooring buoys, and other related structures, which do not interfere with navigation, endanger life or property, or deny the public reasonable access to public waterways. Structures not similar in nature to those listed herein shall be prohibited.

(Ord. 94-06, passed 12-14-93; Am. Ord. 2012-47, passed 6-12-12) Penalty, see § 10.99

§ 151.02 PERMIT REQUIRED.

(A) It shall be unlawful for any person to construct, erect or install fixed docks, floating docks, wharves, piers, or dolphin piles, mooring piles, or fender piles, mooring buoys or any type of boat lifting device or mooring device, platform or any other fixed or floating structure in, over, or upon the canals, waterways, rivers, or basins within the city without first obtaining an engineering permit from the City Engineer, as provided in this chapter and a building permit from the City Building Official as provided in Chapter 152. The qualified applicant for the proposed work, as defined in F.S. Chapter 489 and Chapter 9 of the Broward County Ordinances, shall also be required to seek the necessary approvals, permits and/or exemptions from the Broward County Environmental Protection and Growth Management Department, Florida Department of Environmental Protection or South Florida Water Management District, United States Army Corps of Engineers, and other governmental agencies as applicable.

(1) Permits shall be required for replacement of structural elements including, but not limited to, pilings, stringers and footers, as well as replacement of more than 25% of decking.

(2) Replacement of 25% or less of existing decking within a calendar year shall be exempt from the requirement to obtain a permit.

(3) Nonconforming docks and other similar marine structures as described above that were properly permitted by the city at the time of initial installation which are destroyed by fire or other casualty or act of God may only be reconstructed in conformity with all current applicable regulations. Nonconforming structures which are damaged or otherwise require maintenance may be repaired and remain in their existing nonconforming configuration, provided such repairs do not require replacement of more than 50% of structural elements including, but not limited to, pilings, stringers and footers, at any one time or collectively within a one-year period.

(‘58 Code, § 44.01) (Ord. 720, passed 10-14-59; Am. Ord. 66-33, passed 3-21-66; Am. Ord. 73-4, passed 11-8-72; Am. Ord. 94-06, passed 12-14-93; Am. Ord. 2012-47, passed 6-12-12)

(B) The application for a permit prescribed by (A) above shall describe the work to be done, shall include detailed cost information on the value of the proposed work, and the manner in which it is to be done; shall conform with the requirements listed herein; and shall comply in all applicable respects with the requirements of the technical codes of Chapter 152.

(C) The application shall be accompanied by detailed plans and specifications for the structure at the proposed site, together with a site plan or survey showing the location of the proposed structure or alteration in conjunction with adjoining lands, waters and channels. The plans and specifications must be prepared by an engineer licensed in the State of Florida. As-built drawings and final certification of completion and compliance to that engineer’s design shall be submitted to the city before the city’s final acceptance.

(D) The engineering fee for a permit shall be 4% of the cost of the proposed construction, as submitted by

the applicant and as verified by the Building Official or designee, with a minimum fee of \$100.

('58 Code, § 44.01.1) (Ord. 574-A, passed - -)

(Ord. 529, passed - - ; Am. Ord. 63-50, passed 8-6-63; Am. Ord. 94-06, passed 12-14-93; Am. Ord. 2012-47, passed 6- 12-12)

(E) Permit fees for city capital improvement projects. Engineering permit fees shall be waived for the construction of city owned capital improvement projects.

(F) Project cost valuation by city. Should the applicant for the permit fail to supply the Building Official with its detailed cost information, the Building Official shall value the cost of the improvement using information obtained from generally accepted construction cost data publications.

(G) Application for permit. An Engineering Division permit application must be submitted by a qualified applicant, according to Chapter 489 of the Florida Statutes and Chapter 9 of the Broward County Code of Ordinances, for the proposed work.

(H) Double Fee. Any permit applicant who has commenced any construction work for which an engineering permit is required prior to the permit being issued shall be subject to a penalty of 100% of the usual application fee in addition to the required application fees. The payment of the double fee shall not relieve any person, firm, or corporation from compliance with all applicable regulations and codes, nor shall it relieve the person, firm, or corporation from being subject to any of the penalties therein.

(I) Re-inspection fees. If the Engineering Inspector, while performing a partial or final inspection of the construction work, finds that the work does not conform or comply with approved plans or the city's Code of Ordinances, he/she shall notify the contractor or property owner and indicate the required corrections. The contractor or property owner shall notify the Engineering Inspector to request a re-inspection after the required corrections have been made. A re-inspection fee of \$30 will be charged for the re-inspection; however, when an extra inspection is necessary due to any of the below listed reasons, a fee charge of four times the amount of the first re-inspection shall be imposed:

(1) Wrong address provided for the initial inspection by the permittee or contractor;

(2) Repairs or correction not completed when re-inspection has been requested;

(3) Work not ready or job site inaccessible for inspection;

(4) The final or other inspections could not be performed due to the actions of the permittee or contractor;

(5) Second or subsequent failed inspection of the same repair/correction.

Payment of re-inspection fees shall be made prior to the issuance of city final inspection and permit close-out. No further inspections will be scheduled or performed until all outstanding re-inspection fees have been paid.

(J) Plan revisions or change of contractor. A fee of \$40 will be charged for all revised plans submitted for review or for a change of contractor application. An estimate of the cost of construction for the additional work shall be submitted with the revised plans. A revised permit and plan approval will be issued for this work. If additional work is shown on the revised plans, a permit fee will be charged based on 4% of the cost of construction of the additional work.

(K) Nonrefundable fees. All permit fees and re-inspection fees are nonrefundable.

(L) Time limitation. Permits shall expire and become null and void if the work authorized by the permit is not commenced within 180 days from the issuance date of the permit, or if such work is commenced and is abandoned or suspended for a period of 90 days. If work has commenced, and the permit becomes null and void or expires because of abandonment or a lack of progress, a new permit for the proposed work shall be obtained before proceeding with the work. If the work covered by the permit has not commenced, or has commenced and been suspended or abandoned, the City Engineer may extend such permit for a single period of 180 days from the date of expiration of the original permit, if request for extension is made prior to the expiration date of the original permit. No permit shall remain valid for a period in excess of two years.

(M) Voided permits. Permits may be voided in the event permit fees or re-inspection fees are not paid in full and/or due to forged signatures, or any false statement or misrepresentation of fact, on permit applications or documents.

(N) Applicants for floating vessel platforms and floating boat lifts in tidal waters which qualify for the exemption contained within F.S. § 403.813(l)(s), shall provide proof of said exemption from all necessary governmental agencies as applicable.

(Ord. 2012-47, passed 6-12-12) Penalty, see § 10.99

§ 151.03 STRUCTURES IN WATERWAYS.

(A) For the purpose of this section, the following definitions shall apply unless the context clearly indicates or requires a different meaning.

COMMON DOCKING AREA. That part of a canal or waterway that is shared by lots adjacent to each other and adjacent or contiguous to a canal or waterway and created when boundary lot lines intersect when extended into a canal or waterway, but excluding the navigational channel area.

LOT. Shall be defined in this subsection (A) as it presently or as it may hereafter be amended in Chapter 155.

MEASUREMENT REFERENCE LINE. A measurement standard utilized for purpose of distance measurement for structures in waterways regulated under this section where a recorded property line of the adjacent waterfront property is landward of the wet face of the seawall (a minimum of one foot or greater), and where the wet face of the seawall is then utilized as the reference line for distance measurement into the waterway for such structures, in lieu of the recorded property line.

REVERSE CORNER LOT. Any lot when its boundary line abutting a canal or waterway is concave.

(B) In a canal, river, basin or waterway 50 feet in width or less, wharves, finger piers, fixed docks, floating docks, boat lifts (floating or stationary), floating vessel platforms, dolphin, fender or mooring piles, mooring buoys or any other structures shall not be constructed or installed more than five feet waterward of the recorded property line or measurement reference line.

(C) In a canal, river, basin or waterway which is more than 50 feet in width, wharves, finger piers, fixed docks, floating docks, boat lifts (floating or stationary), floating vessel platforms, dolphin, fender or mooring piles, and/or mooring buoys must be constructed or installed pursuant to the following conditions provided that the navigational channel is not encroached upon:

(1) For the purpose of this section, the **NAVIGATIONAL CHANNEL** shall be defined as the 45% of the width of a canal, river, basin, or waterway with a minimum width of 40 feet. The center of the navigational channel shall coincide with the centerline of the canal, river, basin, or waterway. Where the navigational channel runs to the terminus of a dead-end canal, river, basin or waterway, the navigational channel shall end a distance from the dead- end canal, river, basin or waterway that is equal to the distance between the navigational channel and seawall or shoreline as measured along the same canal, river, basin or waterway but before the terminus of a dead-end canal, river, basin or waterway.

(2) Fixed boat docks, floating docks or wharves may be constructed or installed to extend into any canal, river, basin, or waterway a distance of 10% of the width of the canal, river, basin, or waterway or a distance of eight feet whichever is less, as measured from the recorded property line or measurement reference line.

(3) Fixed finger piers and floating finger piers may be constructed or erected to extend into any canal, river, basin, or waterway a distance of 20% of the width of the canal, river, basin, or waterway or a distance of 20 feet, whichever is less, as measured from the recorded property line or measurement property line. A finger pier (floating or stationary) shall not be constructed to a width greater than four feet. The distance between finger piers shall not be less than 25 feet.

(4) Boat davits, elevator lifts, cradle lifts, floating lifts, floating platforms used for the express purpose of storing a watercraft out of the water or any other similar form of boat lifting device may be constructed or installed to extend into any canal, river, basin, or waterway, in a fully raised position, a distance equal to 20% of the width of the canal, river, basin, or waterway or a distance of 20 feet, whichever is less, as measured from the recorded property line or measurement reference line.

(5) If an elevator lift is permitted and built, an access platform may be constructed pursuant to an approved permit to facilitate access to vessels when the lift is in the down position. Said access platform, attached to an approved dock structure, shall be limited to the spacing between the battered support beams of the elevator and shall not extend more than three feet beyond the dock into the waterway or exceed ten feet in width. Said access platform is deemed an accessory to the elevator lift and its authorized placement is contingent upon the existence of a permitted and properly operating lift at the location. Should the lift fall into disrepair and no longer function or is removed and not replaced, then an approved existing access platform must be removed if it causes the dock structure to exceed any of the size restrictions set forth in this section, including but not limited to, the requirements of subsection (C)(2) above.

(6) In a canal, river, basin or waterway less than 150 feet, but more than 50 feet in width, dolphin, mooring, or fender piles and/or mooring buoys may not be installed in any canal, river, basin, or waterway any further than the navigation channel boundary line as measured from the recorded property line or

measurement property line. In a canal, river, basin or waterway 150 feet or greater in width, dolphin, mooring, or fender piles and/or mooring buoys may not be installed in any canal, river, basin, or waterway any further than 40 feet as measured from the recorded property line or measurement property line. Dolphin, mooring, and fender piles shall have a six inch wide fluorescent or reflective band placed two feet below the top of the piling. Mooring buoys shall have a reflective band a minimum of four inches wide. The minimum spacing between dolphin, fender, and/or mooring piles shall be ten feet.

(7) No roofs or similar covering structures may be installed in, over, or upon any canal, river basin, or waterway within the city. This shall include covered structures over docks and boatlifts.

(D) No fixed docks, floating docks, wharves, finger piers, boat lifts (floating or stationary), mooring devices, dolphin, mooring or fender piles, mooring buoys or other similar structures may be erected or installed within five feet of an extended side property line or cause a watercraft to extend within five feet of an extended side property line unless the following conditions have been met prior to any permit being issued pursuant to the terms of this section:

(1) The affected abutting property owners shall enter into an agreement with the city which states the property owners have reviewed and approved the proposed plans as they relate to the placement of any structure which is erected within five feet of the extended property line and the owners indemnify the city for any claim brought against the city for the placement of structures installed within five feet of the extended property line. The agreement shall be approved by the Office of the City Attorney for legal content and recorded along with a copy of the approved plans in the Public Records of Broward County, Florida, and shall be considered to be a restriction running with the land and shall bind the heirs, successors and assigns of the property owners.

(2) The width of the canal, river, basin or waterway along which the structure is erected must have a minimum width of 50 feet.

(3) No boat lifts (floating or stationary) shall be erected within five feet of the extended property line.

(4) Watercraft shall not be docked within five feet of the extended property line.

(5) Fire suppression systems shall be installed in accordance with all applicable fire codes.

(E) Fixed boat docks, floating docks, wharves, or finger piers shall not be constructed or erected so as to cause the elevation of the deck to exceed the elevation of the top of the abutting seawall.

(F) In addition to the requirements contained in subsections (A) through (D), if two or more lots share a common docking area, in lieu of provisions found in subsections (D)(1) - (5), the following conditions must be met prior to any permit being issued under the terms of this section. The affected property owners shall enter into an agreement with the city which shall state the property owners have reviewed and approved the proposed plans as it relates to the placement of any structure in the common docking area as well as the proposed docking of any boat or watercraft as permitted in § 91.10. The agreement shall be approved by the Office of the City Attorney for legal content and recorded along with a copy of the approved plans in the Public Records of Broward County, Florida, and shall be considered to be a restriction running with the land and shall bind the heirs, successors and assigns of the property owners.

(G) The provisions of subsections (B) through (F) shall not apply where a court of competent jurisdiction has adjudicated the docking rights of the adjoining property owners.

(H) Any structure erected pursuant to this section shall be kept in good repair by the owner thereof and shall be subject to removal by the city in the event that they are unsafe or create a hazard to navigation as determined by the City Engineer or City Building Inspector, the cost thereof to be assessed against the owner. However, opportunity for notice and a hearing shall be afforded to the owner prior to such removal by the city.

(I) For the purpose of this section, *TERMINUS* shall mean the ending point or boundary limit of a dead-end canal, river, basin or waterway.

(J) Diagrams which document examples of the different docking provisions and waterways described by this section shall be maintained by and with the Code Enforcement Division.

(‘58 Code, § 44.01) (Ord. 529, passed - - ; Am. Ord. 63-50, passed 8-6-63; Am. Ord. 66-33, passed 3-21-66; Am. Ord. 73-4, passed 11-8-72; Am. Ord. 94-06, passed 12-14-93; Am. Ord. 96-8, passed 11-7-95; Am. Ord. 96-80, passed 7-9-96; Am. Ord. 2006-48, passed 7-11-06; Am. Ord. 2012-47, passed 6-12-12; Am. Ord. 2013-30, passed 12-11-12; Am. Ord. 2017-09, passed 12-13-16; Am. Ord. 2018- 57, passed 5-22-18) Penalty, see § 10.99

§ 151.04 BULKHEAD LINES.

There is hereby established in Hillsboro Bay, a bulkhead line the legal description and location of which is as more fully shown on that drawing dated November 19, 1965, and bearing drawing No. PB-28-65, a copy of which is made a part hereof as if set forth in full, and is on file in the office of the City Clerk. This section and the creation of any bulkhead or bulkhead line in accord with the provisions hereof shall in no way affect required front, side, or rear yards or other similar building setback lines applicable to the property abutting the bulkhead or bulkhead line under other provisions of this code.

('58 Code, § 44.01.2) (Ord. 66-40, passed 4-4-66; Am. Ord. 94-06, passed 12-14-93)

§ 151.05 SEAWALLS.

(A) Whenever it shall come to the attention of the City Engineer or the City Building Inspector that any property adjacent to any natural or artificial canal, stream, or other body of water requires the construction of or maintenance of a seawall on the property in order to abate a public nuisance or abate a condition which is injurious to the health, safety, or welfare of the neighborhood or community or dangerous to the navigability of any canal, stream, or other body of water or to abate a condition causing soil erosion or mitigation of soil to such body of water the City Engineer or Building Official shall inspect the premises. The City Engineer or the City Building Official of the city shall give to the owner or person having a beneficial interest in the property notice of the condition. This notice shall require the owner or person having beneficial interest in the property to obtain all necessary approvals and permits to abate the condition and to complete construction or repair. Proper service shall be as set forth in F.S. Ch. 162 and Chapter 37 of this code. In the event that after a hearing before the Pompano Beach Special Magistrate for Code Enforcement a violation of this section is found, the Special Magistrate shall hear testimony by the alleged violator and the Pompano Beach Building Official or City Engineer or their designees prior to setting a time for compliance. Such testimony shall include a listing of the regulatory agencies which will be involved in the permitting process and the magnitude of the work which will be involved to abate the condition.

(B) For the purposes of this chapter, a **SEAWALL** shall mean a man-made structure that is built along and parallel to a shoreline for the purpose of protecting and stabilizing the shore against erosion and wave action. A **SEAWALL** shall also include, for the purpose of this chapter, riprap to protect and stabilize the shore against erosion and wave action, and shall be designed by a professional engineer registered in the state.

(C) The desired elevation of seawalls shall not exceed an elevation of five feet ten inches NAVD 88. Persons desiring to construct or repair a seawall shall obtain all required permits and furnish a plan to the City Engineer for approval, which are prepared by an engineer in the State of Florida, showing elevations or proposed and adjacent seawalls referenced to North American Vertical Datum of 1988 (NAVD 88). ('58 Code, § 44.01.3) (Ord. 70-19, passed 2-17-70; Am. Ord. 85-19, passed 1-29-85; Am. Ord. 90-30, passed 2-6-90; Am. Ord. 91-52, passed 5-7-91; Am. Ord. 94-06, passed 12-14-93; Am. Ord. 2012-47, passed 6-12-12; Am. Ord. 2017-69, passed 9-26-17) Penalty, see § 10.99

§ 151.06 DISREGARD OF NOTICE.

(A) It shall be an offense and a violation of this code to refuse or fail to commence or complete repair or construction of the seawall as set forth in the notice received by the property owner or the person having a beneficial interest in the property pursuant to § 151.05 herein.

('58 Code, § 44.01.6)

(B) No building permits shall be issued for any construction, enlargement, alteration, repairing, moving, removing, installation, or demolishing or other such work on any building, structure, or any part thereof (other than the required seawall) until the owner or the one having beneficial interest has complied with all provisions herein or any order of the Code Enforcement Board of the city.

('58 Code, § 44.01.7)

(Ord. 72-49, passed 6-27-72; Am. Ord. 85-19, passed 1-29-85; Am. Ord. 94-06, passed 12-14-93) Penalty, see § 10.99

§ 151.07 BACKFILLING SEAWALLS.

(A) All seawalls newly erected or repaired on private property shall be backfilled with clean fill material. The fill material shall be backfilled to the finished elevation of the seawall. There shall be no depressions, holes, or any other conditions which would allow stagnant water to accumulate anywhere landward behind the seawall.

(B) Existing seawalls shall be maintained in such a manner as to prevent the erosion or damage to any adjoining property. All holes, depressions, or other similar conditions occurring on property behind existing

seawalls as a result of settlement, erosion, or any other condition of the soil or seawall shall be filled and maintained at the finished elevation of the seawall.

('58 Code, § 44.01) (Ord. 529, passed - - ; Am. Ord. 66-33, passed 3-21-66; Am. Ord. 73-4, passed 11-8-72; Am. Ord. 85-19, passed 1-29-85; Am. Ord. 94-06, passed 12-14-93) Penalty, see § 10.99

§ 151.08 STRUCTURES ON WALLS.

No dock, deck, finger pier, terrace, retaining wall, stairway or other related structures shall be erected on top of or over a seawall.

(Ord. 94-06, passed 12-14-93; Am. Ord. 2017-69, passed 9-26-17) Penalty, see § 10.99

§ 151.09 VARIANCES.

(A) The Zoning Board of Appeals of the City shall hear and decide any variance requests from the regulations contained within this chapter.

(B) (1) Any such application for variance must first be submitted to the Marine Advisory Board for its review and recommendations.

(2) The procedures, applications, form, timetables, and fees for the filing of a variance from these regulations shall be the same as that provided for a variance from any zoning ordinance as provided in Chapter 155.

(Ord. 98-10, passed 11-25-97)

Attachment E

City of Ft. Lauderdale Code

Attachment F

City of Hollywood Tidal Control Structures

City of Hollywood, FL

Department of Public Utilities

Lakes Area Tidal Control Structures

November 9, 2016



Presented By:
Steve Joseph, P.E. | Public Utilities Director

Impact of King Tides on the Lakes Area



- There are two main types of impacts:

1. Street flooding caused by tidal flows through drainage pipes



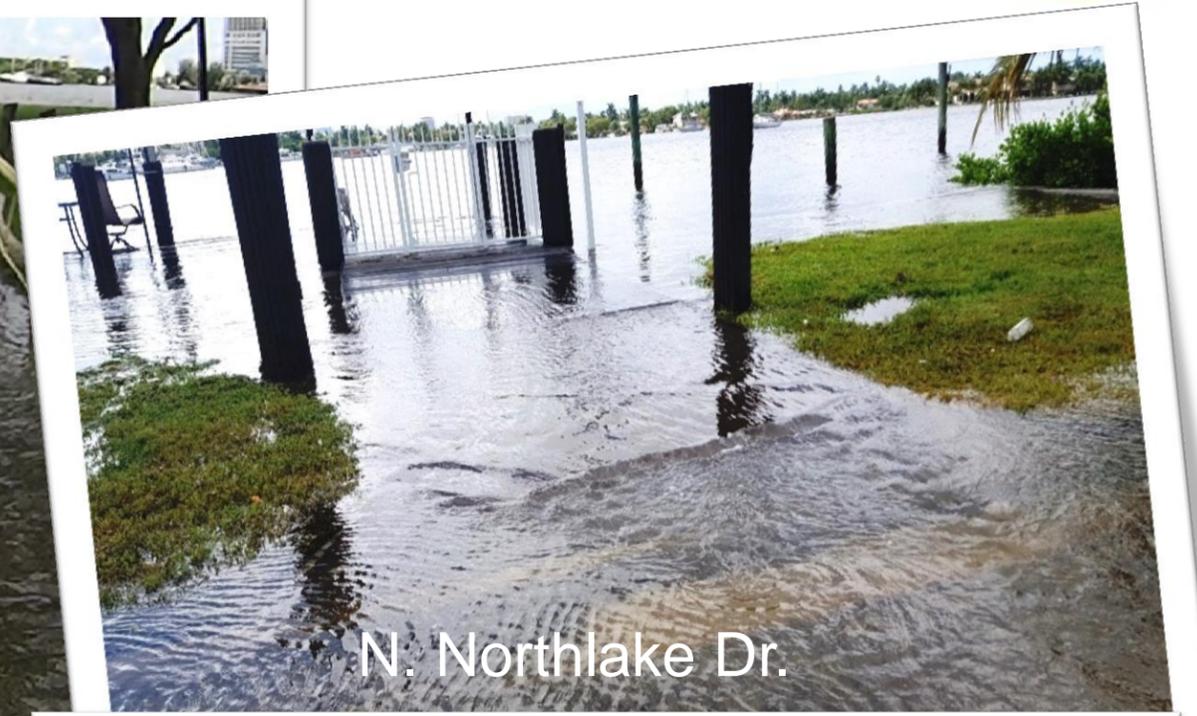
Impact of King Tides on the Lakes Area



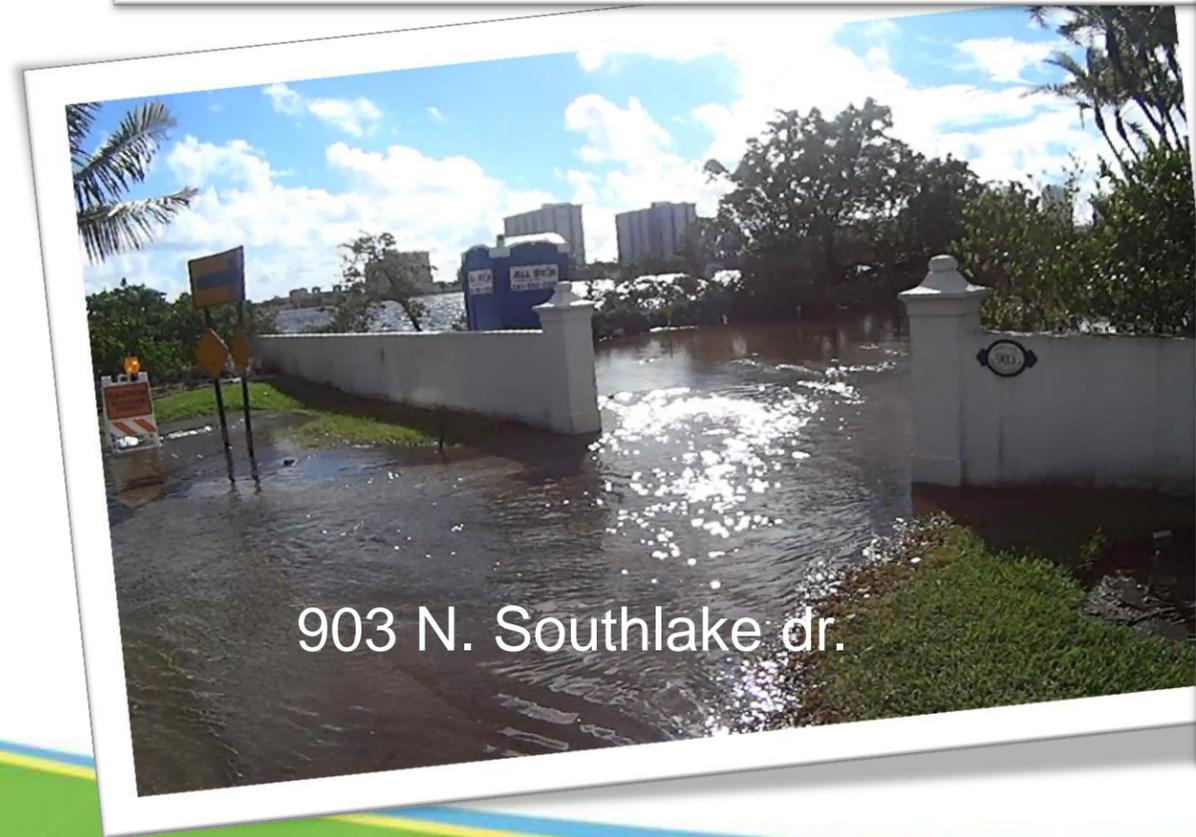
2. Flooding caused by tidal flow breaches in shorelines or seawalls



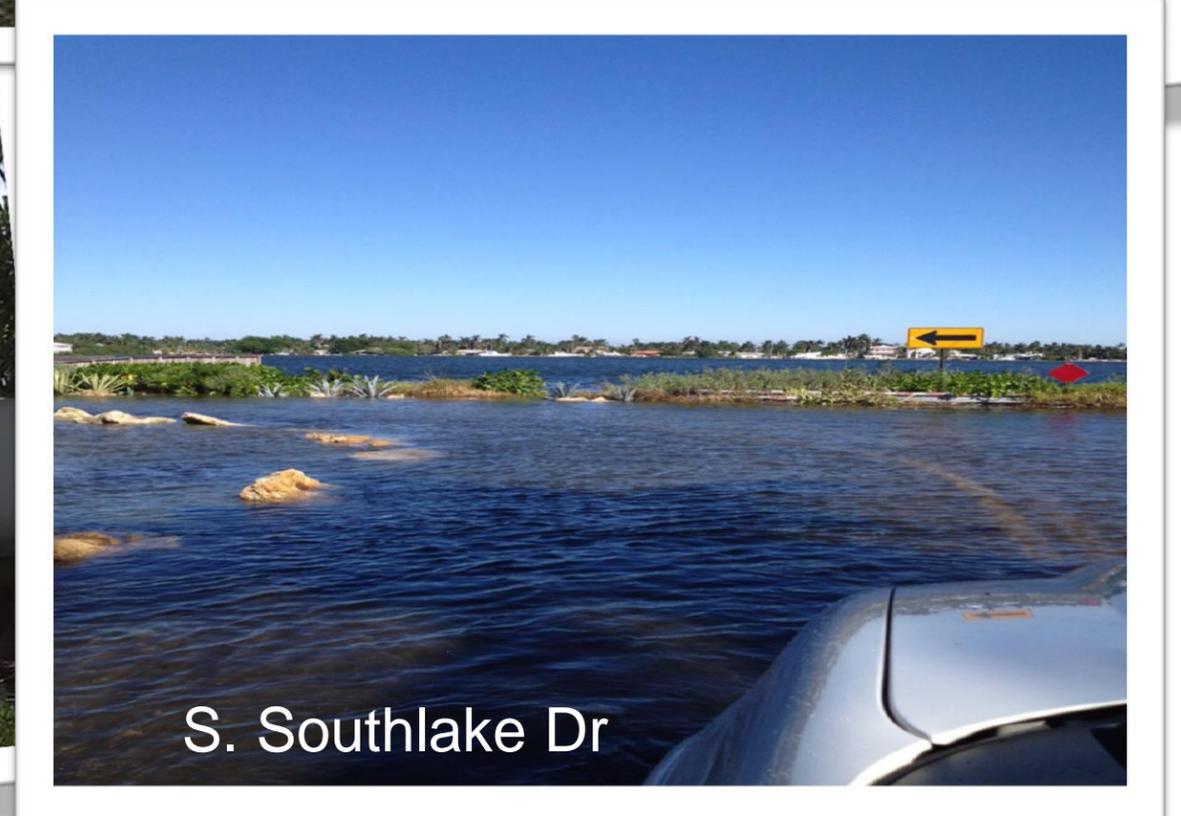
Hollywood Marina



N. Northlake Dr.



903 N. Southlake dr.



S. Southlake Dr

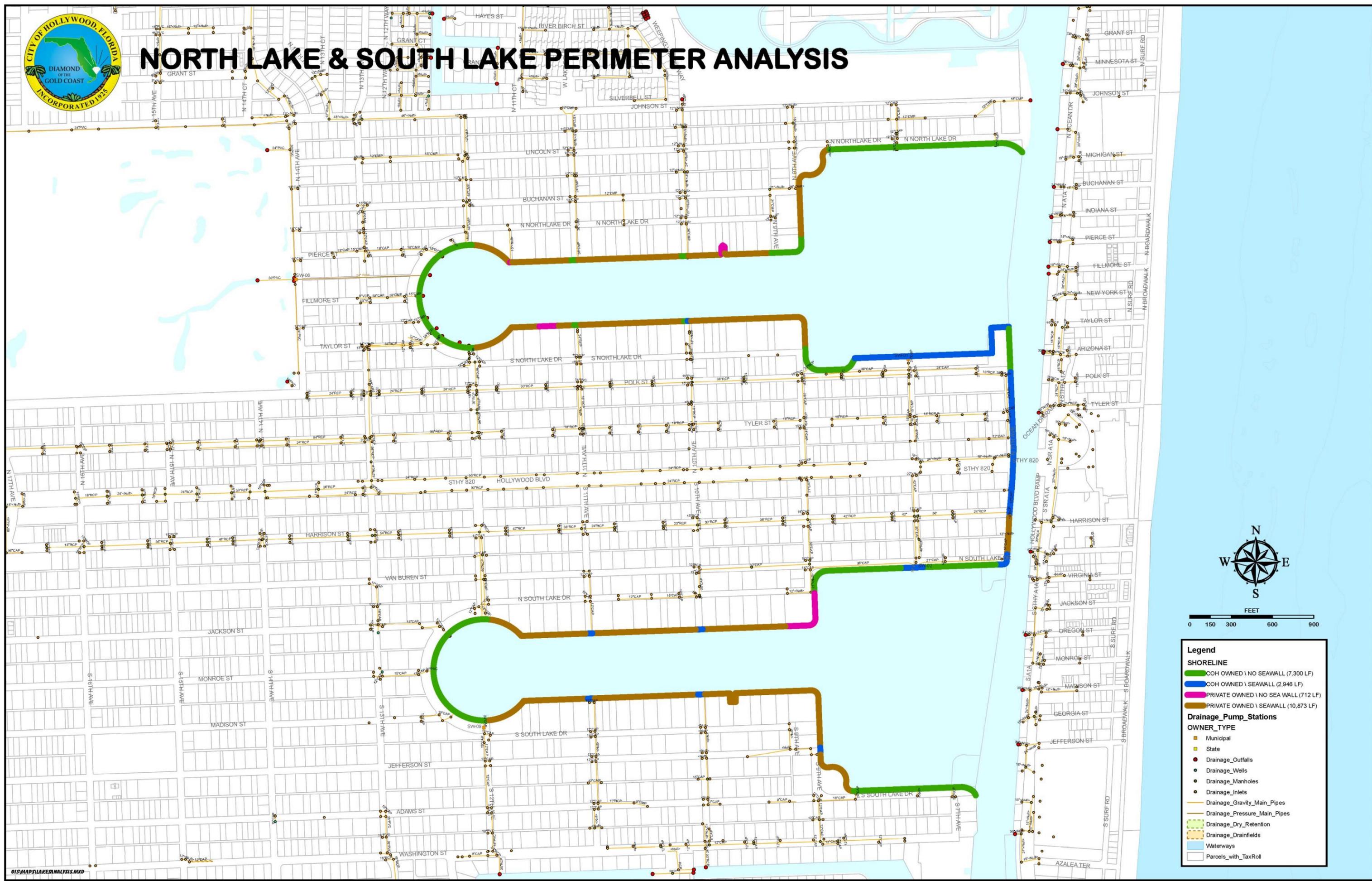


What is being done about it?

- Inspected, cleaned and repaired all drainage outfalls at both North Lake and South Lake and performed a perimeter analysis
- Installed new control structures with flap gates on all outfalls to reduce tidal flows into the drainage system
- Coordinated with FDOT to install a flap gate on their 84” drainage outfall pipe at North Lake and advocated for similar work to be done on A1A
- Partner with Broward County and USACE to determine new standards for seawall heights
- Future actions to include installation of seawalls, where none exist, to prevent breaches along the shoreline



NORTH LAKE & SOUTH LAKE PERIMETER ANALYSIS



Legend

SHORELINE

- COH OWNED \ NO SEAWALL (7,300 LF)
- COH OWNED \ SEAWALL (2,946 LF)
- PRIVATE OWNED \ NO SEA WALL (712 LF)
- PRIVATE OWNED \ SEAWALL (10,873 LF)

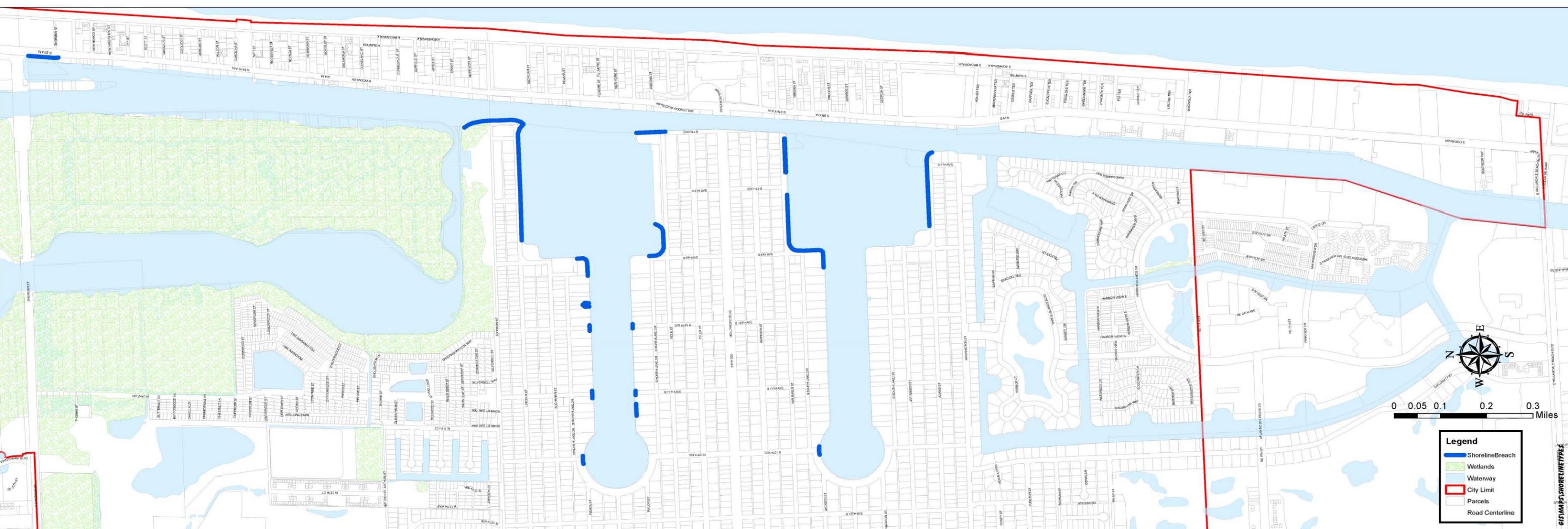
Drainage_Pump_Stations

OWNER_TYPE

- Municipal
- State
- Drainage_Outfalls
- Drainage_Wells
- Drainage_Manholes
- Drainage_Inlets
- Drainage_Gravity_Main_Pipes
- Drainage_Pressure_Main_Pipes
- Drainage_Dry_Retention
- Drainage_Drainfields
- Waterways
- Parcels_with_TaxRoll



SHORELINE BREACHING BY TIDAL SEA WATER



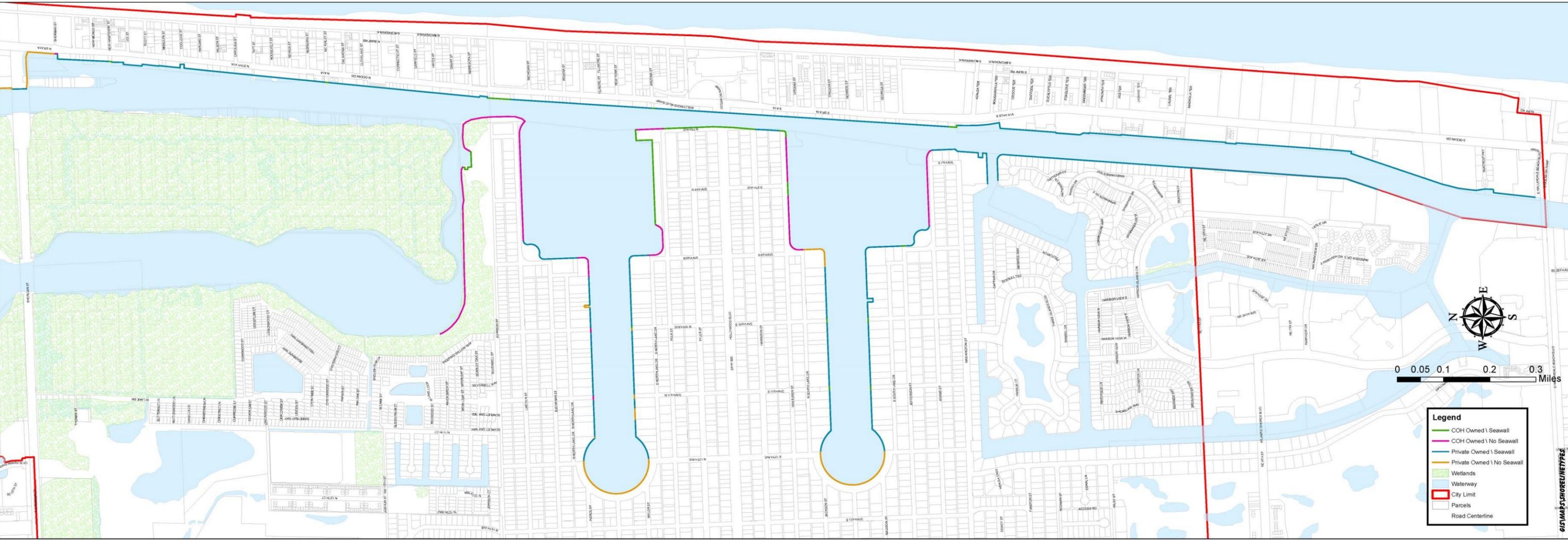
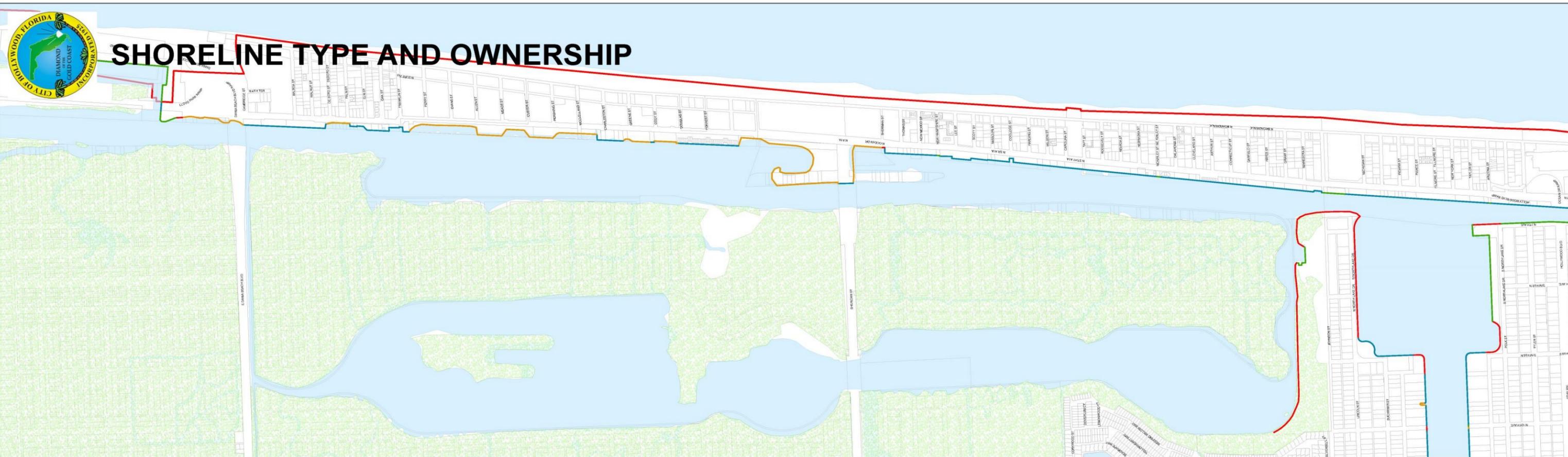
0 0.05 0.1 0.2 0.3 Miles

Legend

- ShorelineBreach
- Wetlands
- Waterway
- City Limit
- Parcels
- Road Centerline

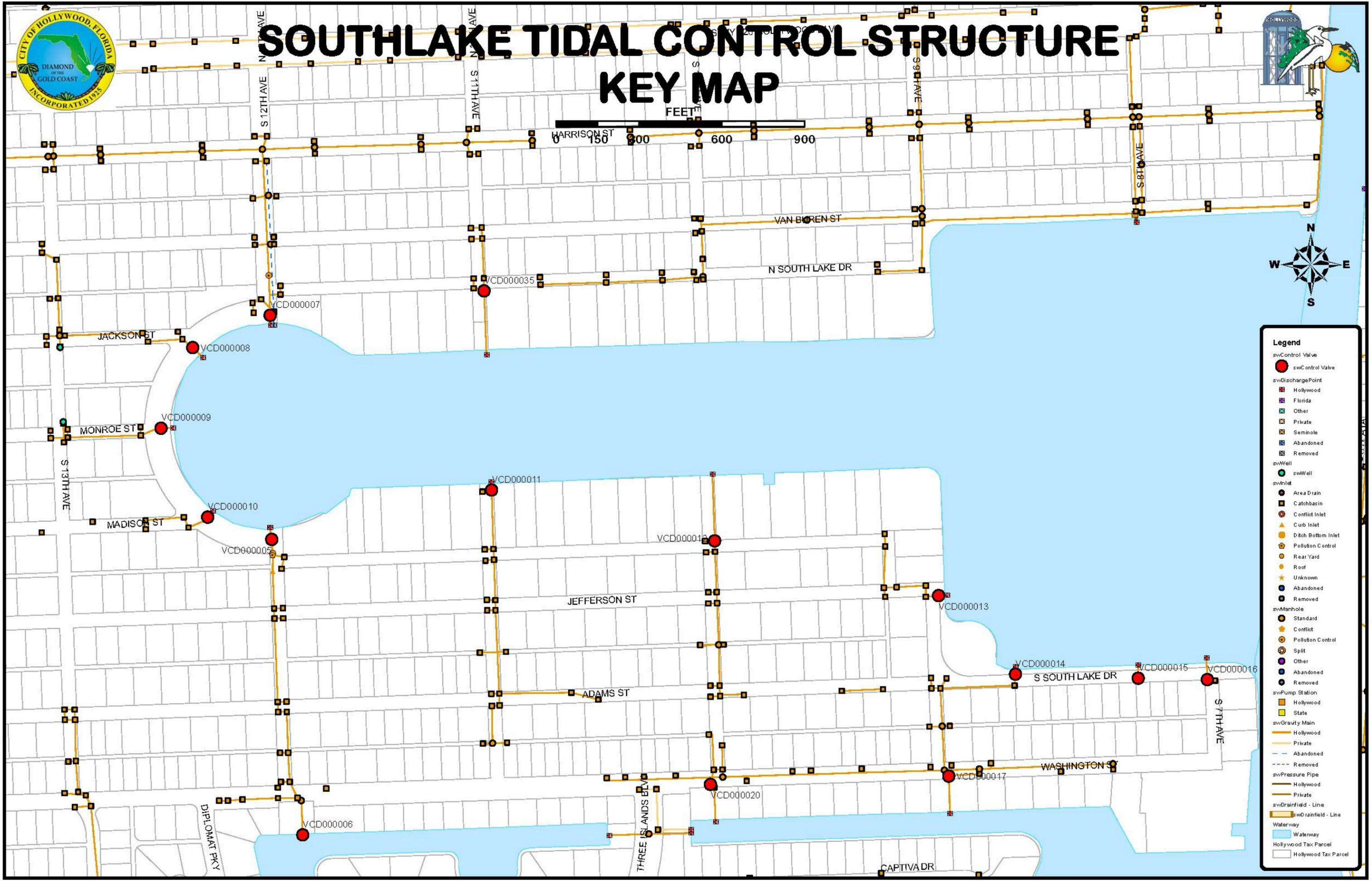


SHORELINE TYPE AND OWNERSHIP





SOUTHLAKE TIDAL CONTROL STRUCTURE KEY MAP

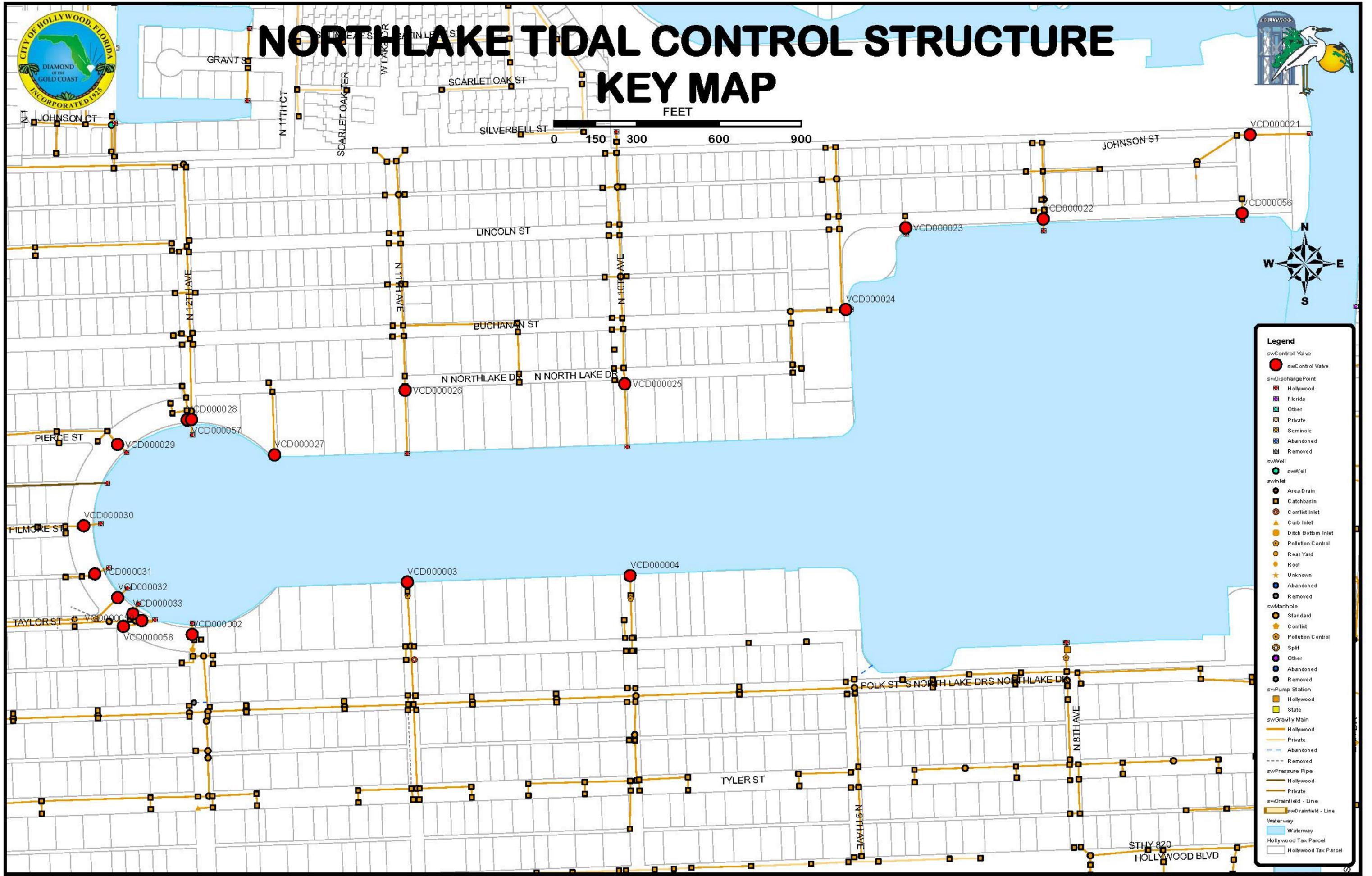


Legend

- swControl Valve: Red circle
- swDischargePoint: Red square
- Hollywood: Red square with 'H'
- Florida: Blue square with 'F'
- Other: Green square
- Private: Yellow square
- Seminole: Blue square with 'S'
- Abandoned: Blue square with 'A'
- Removed: Blue square with 'R'
- swWell: Green circle
- swInlet: Blue circle
- Area Drain: Blue circle with 'A'
- Catchbasin: Blue square with 'C'
- Conflict Inlet: Blue circle with 'C'
- Curb Inlet: Blue circle with 'C'
- Ditch Bottom Inlet: Blue circle with 'D'
- Pollution Control: Blue circle with 'P'
- Rear Yard: Blue circle with 'R'
- Roof: Blue circle with 'R'
- Unknown: Blue circle with 'U'
- Abandoned: Blue circle with 'A'
- Removed: Blue circle with 'R'
- swManhole: Blue circle
- Standard: Blue circle with 'S'
- Conflict: Blue circle with 'C'
- Pollution Control: Blue circle with 'P'
- Split: Blue circle with 'S'
- Other: Blue circle with 'O'
- Abandoned: Blue circle with 'A'
- Removed: Blue circle with 'R'
- swPump Station: Blue circle
- Hollywood: Blue square with 'H'
- State: Blue square with 'S'
- swGravity Main: Blue line
- Hollywood: Blue line with 'H'
- Private: Blue line with 'P'
- Abandoned: Blue line with 'A'
- Removed: Blue line with 'R'
- swPressure Pipe: Blue line
- Hollywood: Blue line with 'H'
- Private: Blue line with 'P'
- swDrainfield - Line: Blue line
- Hollywood: Blue line with 'H'
- Private: Blue line with 'P'
- Waterway: Blue area
- Hollywood Tax Parcel: Red outline
- Hollywood Tax Parcel: Blue outline



NORTHLAKE TIDAL CONTROL STRUCTURE KEY MAP



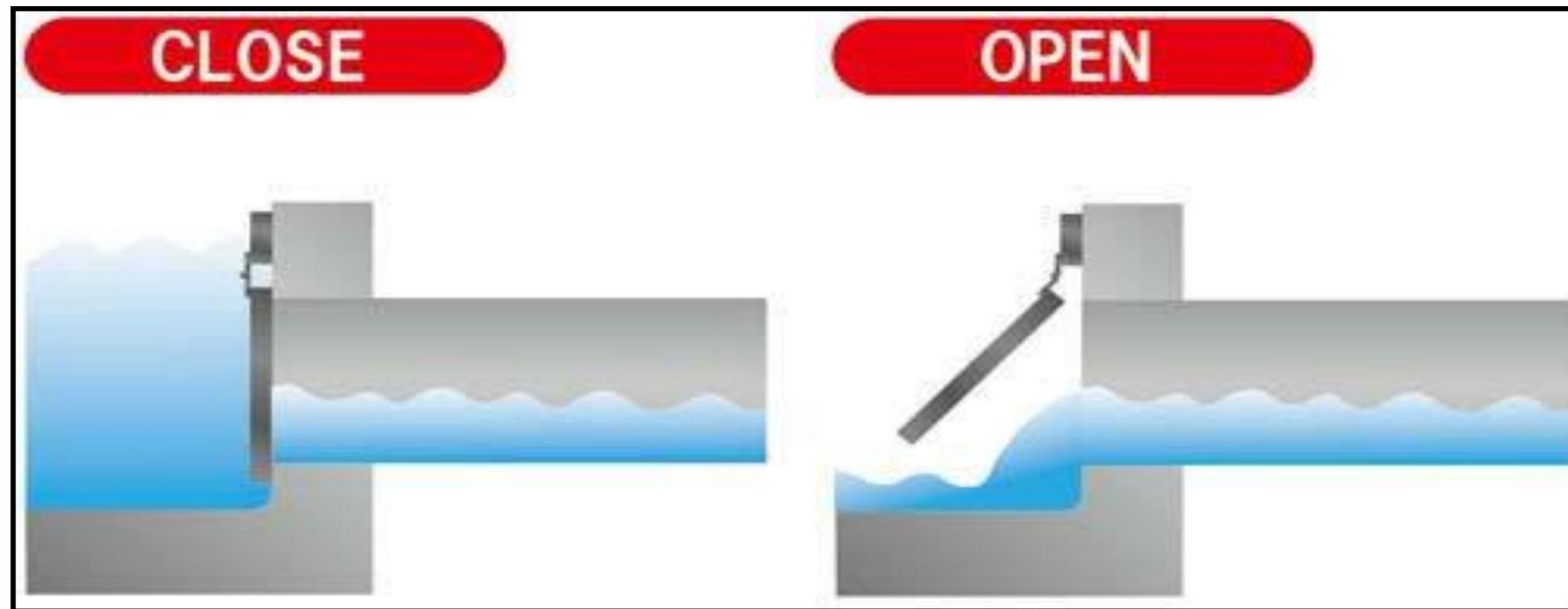
Legend

- swControl Valve
● swControl Valve
- swDischargePoint
■ Hollywood
■ Florida
■ Other
■ Private
■ Seminole
■ Abandoned
■ Removed
- swWell
● swWell
- swInlet
● Area Drain
● Catchbasin
● Conflict Inlet
● Curb Inlet
● Ditch Bottom Inlet
● Pollution Control
● Rear Yard
● Roof
● Unknown
● Abandoned
● Removed
- swManhole
● Standard
● Conflict
● Pollution Control
● Split
● Other
● Abandoned
● Removed
- swPump Station
■ Hollywood
■ State
- swGravty Main
— Hollywood
— Private
- - - Abandoned
- - - Removed
- swPressure Pipe
— Hollywood
— Private
- swDrainfield - Line
— swDrainfield - Line
- Waterway
■ Waterway
■ Hollywood Tax Parcel
■ Hollywood Tax Parcel

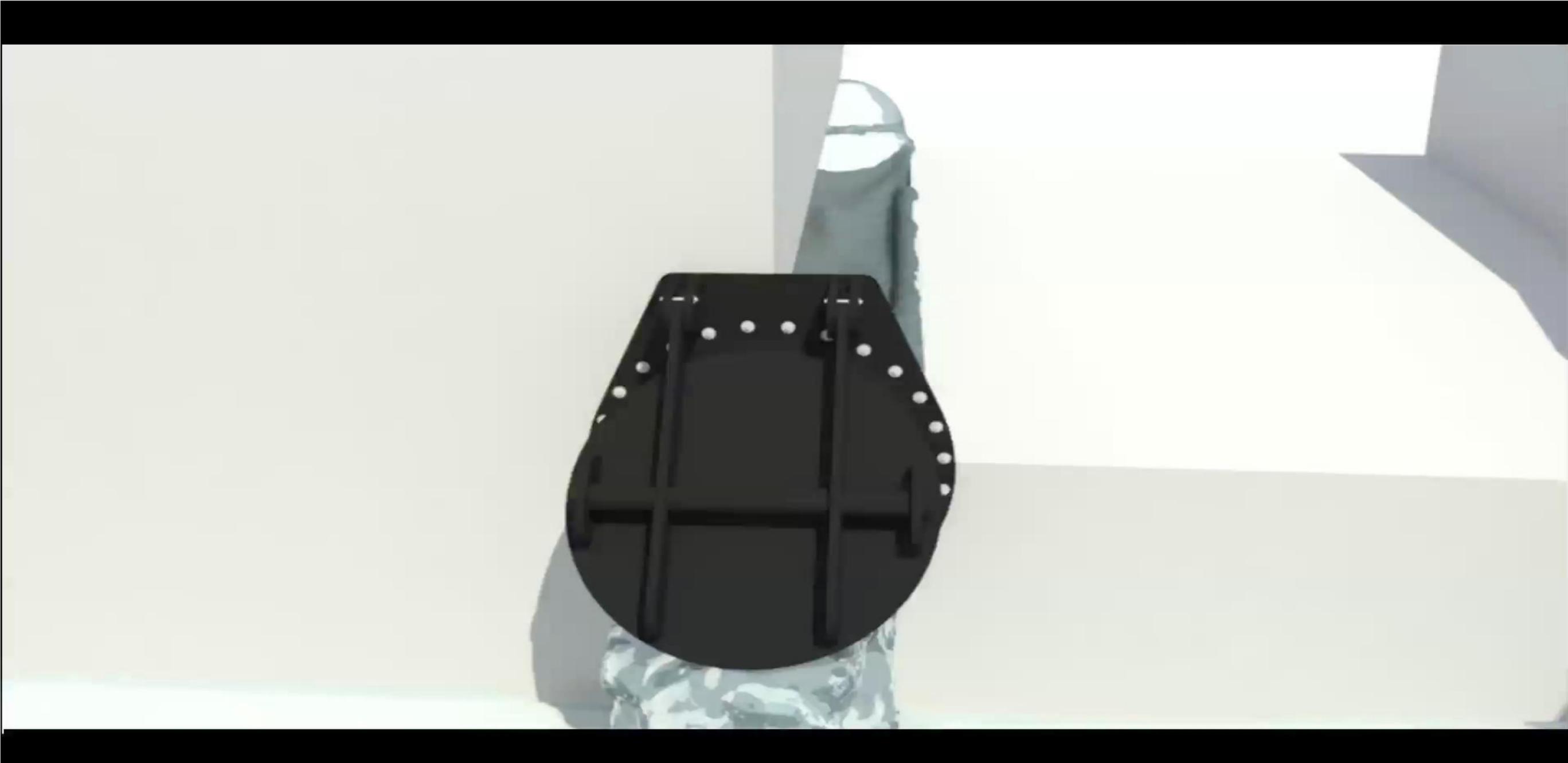
Tidal Inflow Reduction Using Flap Gates



- High Density Polyethylene (HDPE) Flap gates installed
- Self-regulated mechanism
- Improved material properties



HDPE Flap Gate Animation



South Lake Tidal Control Structures (Phase I)



■ Project Summary

- Contractor - GPE Engineering & General Contractor Corp
- Installed six (6) two-compartment control structures with HDPE flap gates
- Installed three (3) one-compartment control structures with HDPE flap gates
- Installed three (3) in-line check valves
- Total project cost - **\$359,923.85**

Installed Structures with Flap Gates – South Lake



Jackson St and N. S. Lake Drive



10th Ave. and S. S. Lake Drive



9th Ave. and Jefferson St.



12th Ave. and N. S. Lake Drive

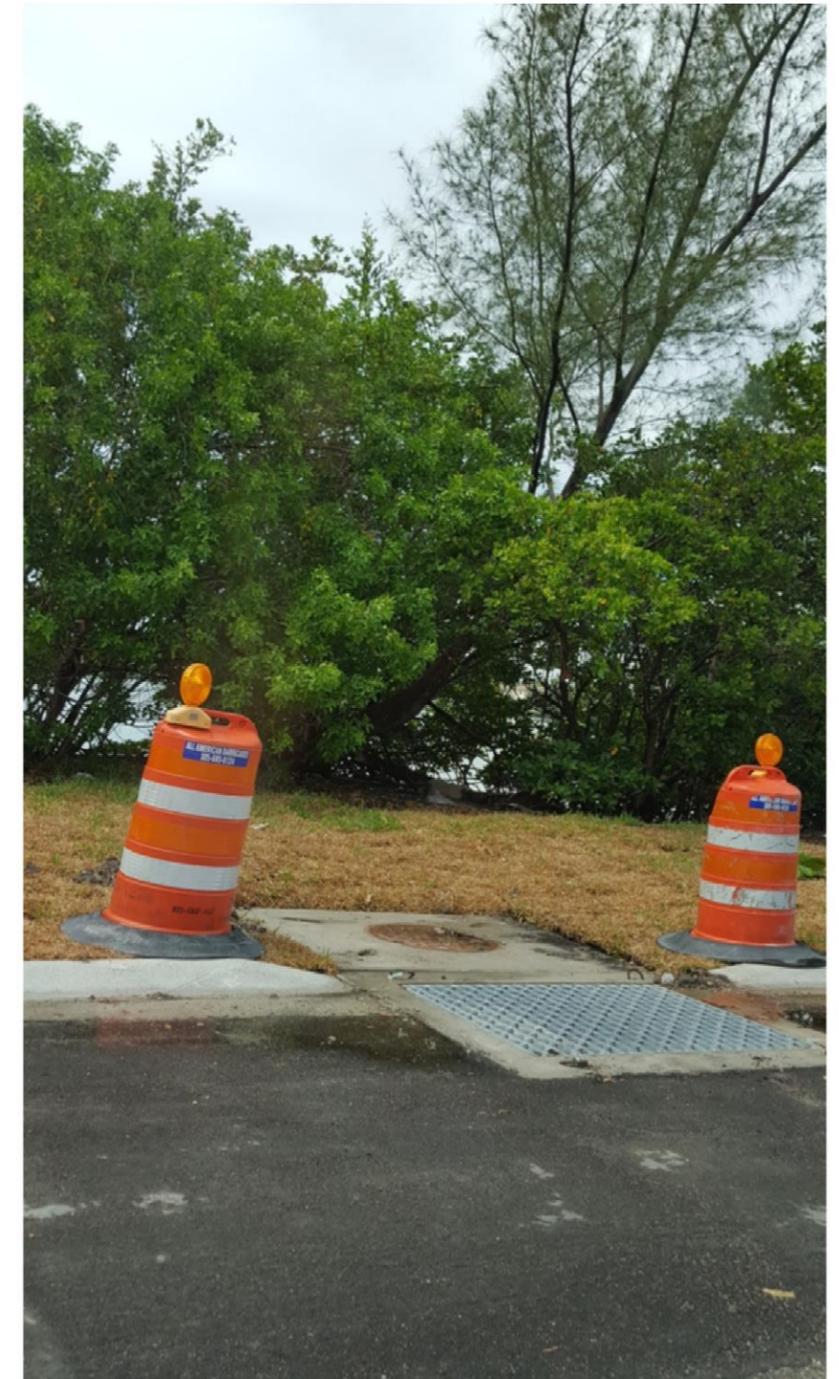
North Lake Tidal Control Structures (Phase II)



▪ Project Summary

- Contractor - Southeastern Engineering Contractor, Inc.
- Installed ten (10) two-compartment control structures with HDPE flap gates
- Installed two (2) one-compartment control structure with HDPE flap gates
- Installed three (3) in-line check valves
- Replaced four (4) existing metal flap gates with HDPE flap gates
- Replaced existing outfall piping sections at various locations (point repair)
- Total project cost - **\$839,246.66** (including FDOT structure - \$176,434.16)

Installation of Structures at North Lake



Lincoln Street and N 8th Avenue

Installation of Structures at North Lake

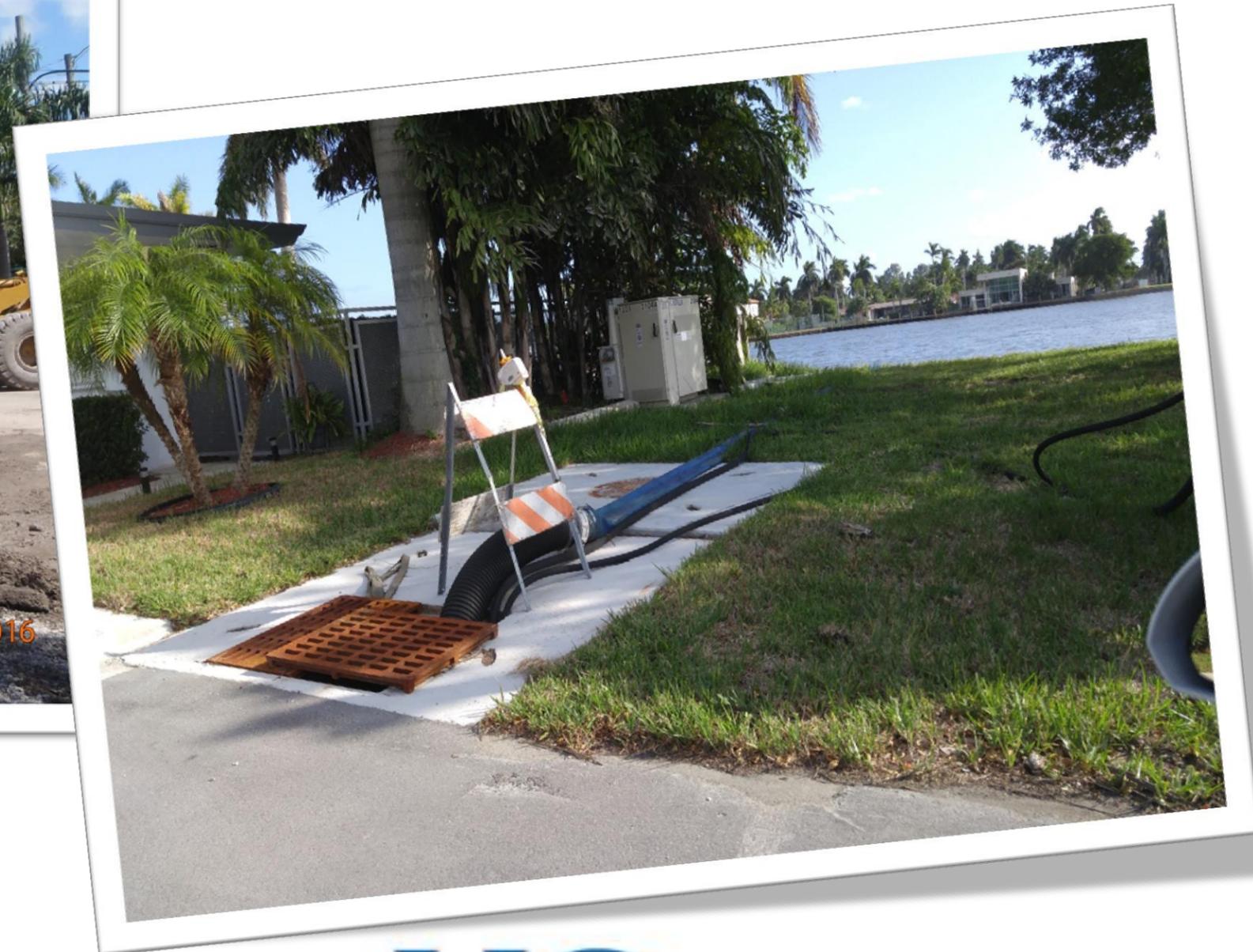


N. North Lake Dr & 11th Ave (36" Flap Gate)

Installation of Structures at North Lake



N. North Lake Dr & 12th Ave (48" Flap Gate)



Installation of Structures at North Lake

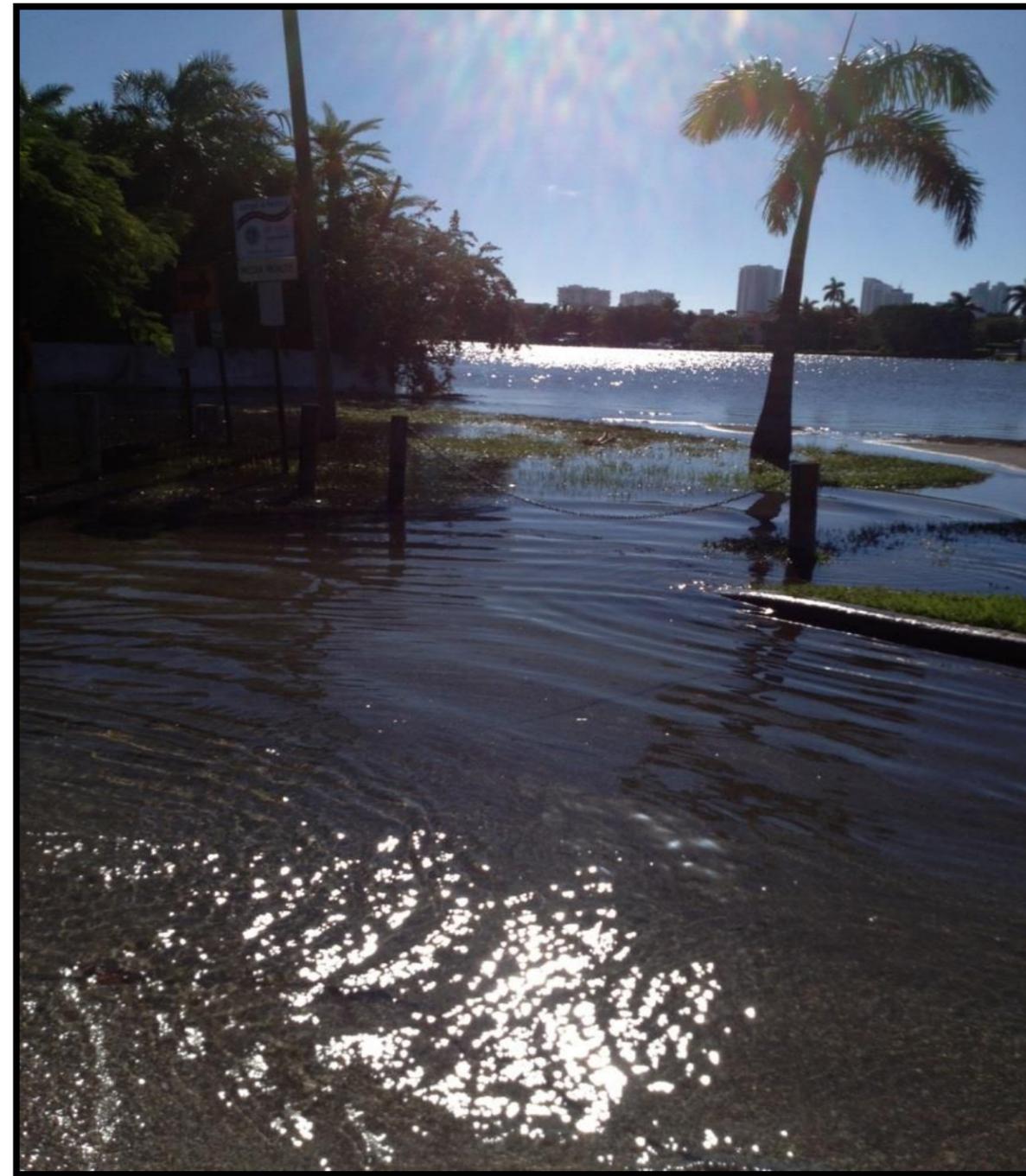


S. North Lake Dr & 12th Ave (FDOT 84" Flap Gate)

Tidal Control Structure Installations



**Will only help when
overland barriers are not
breached...**

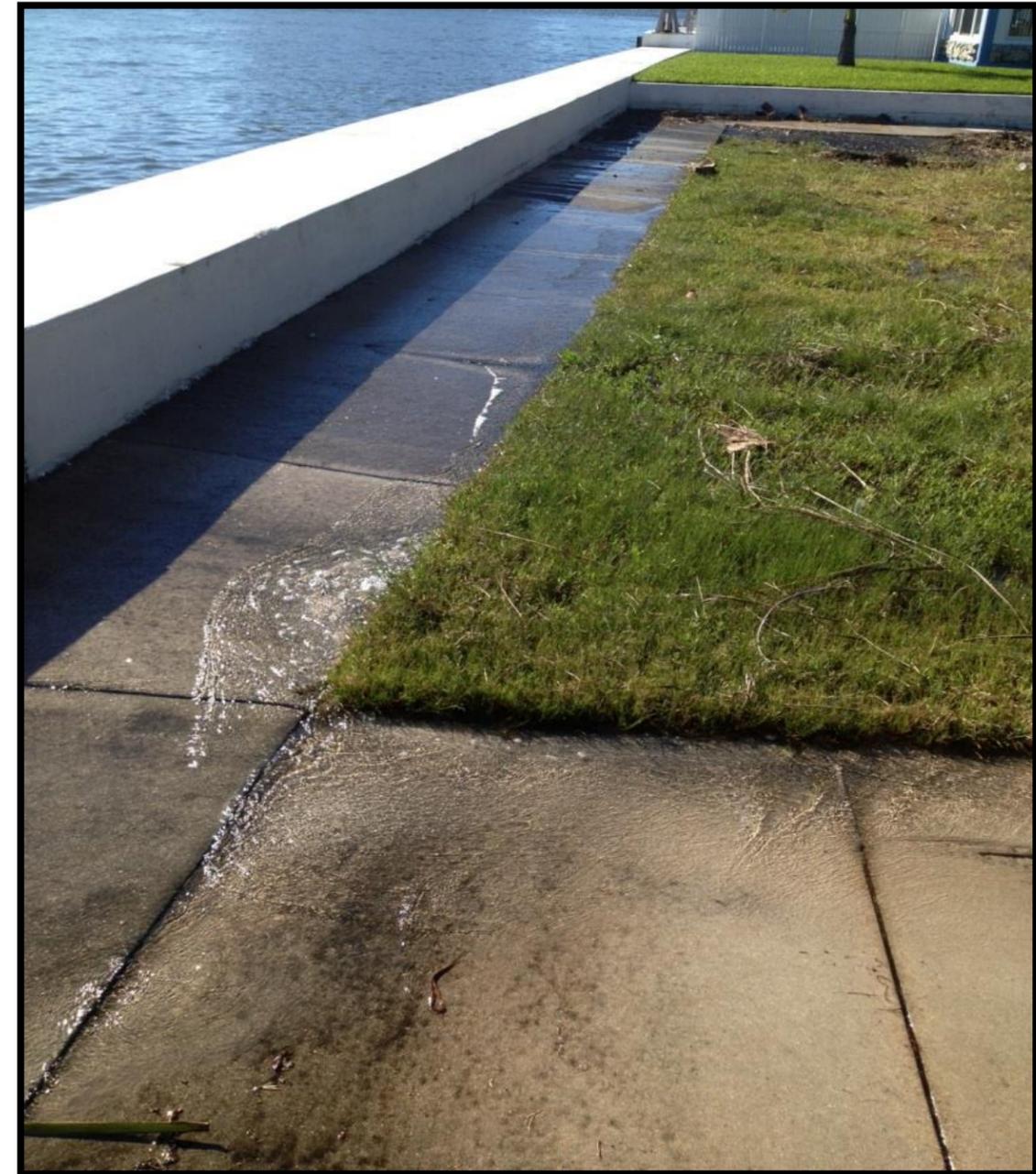


Tidal Waters



Can also come into low-lying areas:

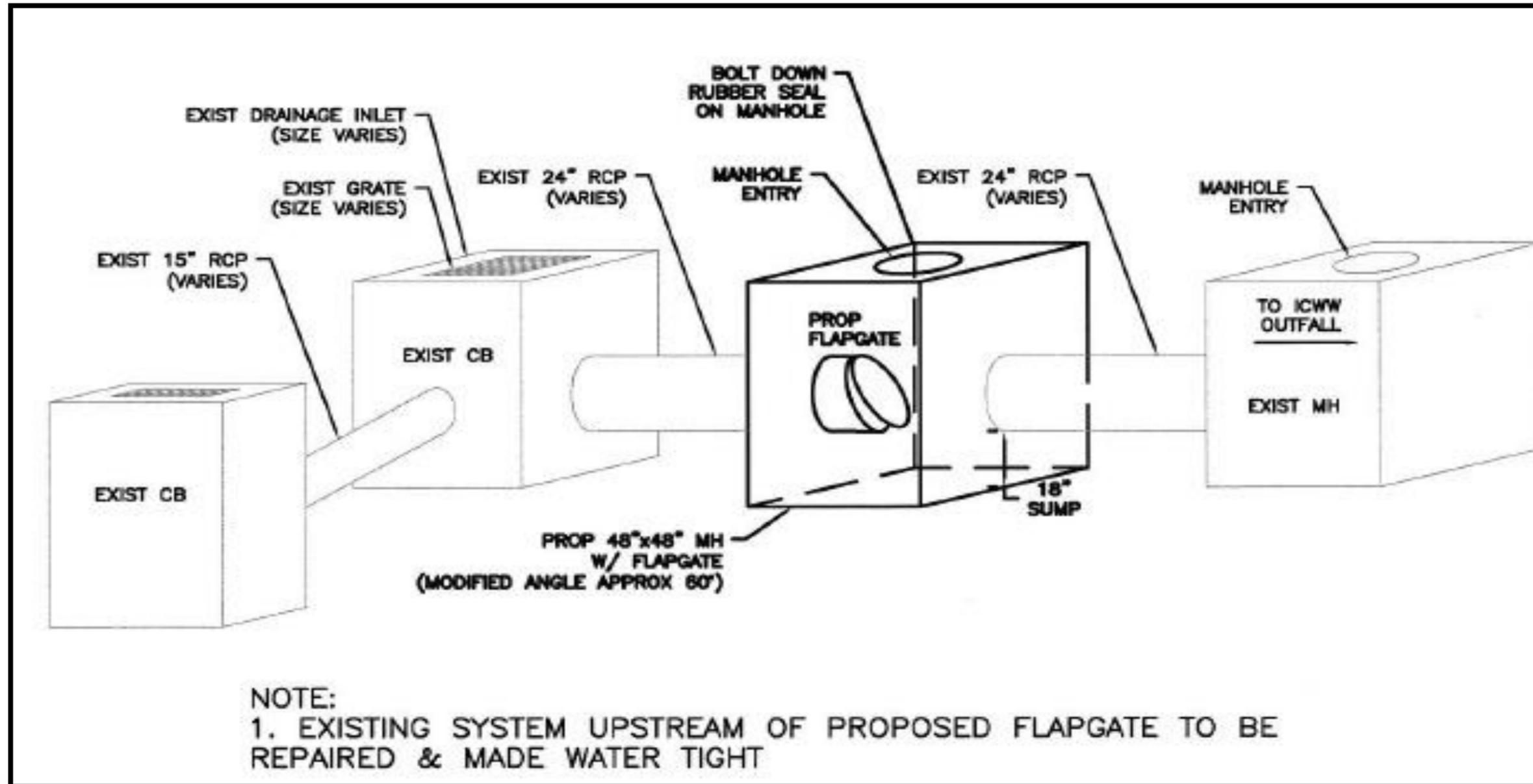
- **Over Berms / Seawalls**
- **Under Seawalls**
- **Rising up through lower ground surfaces**





Ocean Drive (A1A) Flap Gates

Anticipated to begin in early 2017 by FDOT





Street Name

- 1 Michigan
- 2 Taylor
- 3 Polk St. Beach Parking
- 4 Harrison
- 5 Van Buren
- 6 Virginia
- 7 Jackson
- 8 Oregon
- 9 Monroe
- 10 Madison
- 11 Georgia
- 12 Jefferson
- 13 Bouganvilla Terrace
- 14 Crocus Terrace
- 15 Eucalyptus
- 16 Foxglove
- 17 Greenbrier
- 18 Hyacinth
- 19 Iris Terrace

● PROPOSED FLAP GATE INSTALLATION BY FDOT



Questions?



Sec. 47-19.3. - Boat slips, docks, boat davits, hoists and similar mooring structures.

(a) The following words when used in this section shall, for the purposes of this section, have the following meaning:

- (1) *Mooring device* means a subset of mooring structures as defined herein including boat davits, hoists, boat lifts and similar devices that are erected on or adjacent to a seawall or dock and upon which a vessel can be moored. A mooring device does not include docks, slips, seawall or mooring pile.
- (2) *Mooring structure* means a dock, slip, seawall, boat davit, hoist, boat lift, mooring pile or a similar structure attached to land more or less permanently to which a vessel can be moored.
- (3) *NGVD 29* or the National Geodetic Vertical Datum of 1929 means the vertical control datum established for vertical control surveying in the United States of America by the General Adjustment of 1929. The datum is used to measure elevation or altitude above, and depression or depth below, mean sea level (MSL).
- (4) *NAVD88* or the North American Vertical Datum means the vertical control datum of orthometric height established for vertical control surveying in the United States of America based upon the General Adjustment of the North American Datum of 1988.
- (5) *Seawall* means vertical or near vertical structures placed between an upland area and a waterway. For the purposes of Section 47-19.3(f), rip rap is not considered a seawall.
- (6) *Rip rap* means a foundation of unconsolidated boulders, stone, concrete or similar materials placed on or near a shoreline to mitigate wave impacts and prevent erosion.

(b) Boat davits, hoists and similar mooring devices may be erected on a seawall or dock subject to the following limitations on the number and location as follows:

- (1) Except as provided herein, only one (1) mooring device per the first one hundred (100) feet of lot width or portion thereof, and one mooring device for each additional one hundred (100) feet of lot width. A second mooring device may be permitted within the lot area greater than one hundred (100) feet but less than two hundred (200) feet if approved as a Site Plan Level II permit, subject to the following criteria:
 - a. The location of the proposed mooring device will not interfere with the view from adjacent properties to a degree greater than the intrusion already permitted as a result of the berthing of a vessel at applicant's property within the setback and extension limitations provided in the Code.
 - b. The type of mooring device is the least intrusive and most compatible with the view from the waterway.
 - c. No conflict with a neighboring property owner's usage of the waterway will be created as a result of the additional mooring device.

Pursuant to Site Plan Level II review, the development review committee ("DRC") shall determine whether the proposed additional mooring device meets the criteria based on its location and the relationship of applicant's property to abutting properties with regard to height, angle of view of the device from abutting properties and the height, width and length of the mooring device proposed.

Approval of a Site Plan Level II development permit for an additional mooring device shall not be final until thirty (30) days after preliminary DRC approval and then only if no motion is approved by the City Commission seeking to review the application pursuant to the process provided in Section 47-26. The denial of an application for an additional mooring device may be appealed to the City Commission in accordance with the provisions of Section 47-26.

- (2) In addition to the mooring device described in paragraph (b)(1) of this section, one (1) lift designed and used solely for the lifting of a personal watercraft (PWC) per development site is permitted. For purposes of this subsection (2) a PWC is as defined in F.S. Ch. 327.
 - (3) The cross section of the davit, hoist or other mooring device shall not exceed one (1) square foot and have a maximum height of six and one-half (6½) feet above lot grade.
 - (4) The lowest appendage of a vessel may not be hoisted greater than one (1) foot above a seawall cap or if no seawall, above the average grade of the upland property and properties abutting either side of the upland property, whichever is less.
- (c) No boat slips, docks, boat davits, hoists, and similar mooring structures not including mooring or dolphin piles or a seawall, may be constructed by any owner of any lot unless a principal building exists on such lot and such lot abuts a waterway. Mooring structures, not including mooring or dolphin piles, shall not extend into the waterway more than twenty-five (25) percent of the width of the waterway or twenty-five (25) feet whichever is less as measured from the property line.
- (d) Mooring or dolphin piles, shall not be permitted to extend more than thirty (30) percent of the width of the waterway, or twenty-five (25) feet beyond the property line, whichever is less.
- (e) The City Commission may waive the limitations of Sections 47-19.3.(c), 47-19.3.(d) and 47-39.A.1.b.(12).(a) and 47-39.A.1.b.(12).(b) under extraordinary circumstances, provided permits from all governmental agencies, as required, are obtained after approval of the City Commission, after a public hearing and notification to property owners within three hundred (300) feet. In no event shall the extension exceed thirty (30) percent of the width of the waterway and no variance may be approved by the Board of Adjustment or other agency permitting an extension beyond the thirty percent (30%) limitation. Reflector tape shall be affixed to and continually maintained on all mooring or dolphin piles authorized under this subsection to extend beyond the limitations provided in subsection (d). The reflector tape must be formulated for marine use and be in one (1) of the following uniform colors: international orange or iridescent silver. On all such piles, the reflector tape shall be at least five (5) inches wide and within eighteen (18) inches of the top of the pile.
- (f) The top surface of a seawall shall have a minimum elevation of 3.9 feet NAVD88 (see table). The elevation of a seawall or dock shall not exceed a maximum of the base flood elevation (BFE) as identified in the corresponding FEMA Flood Insurance Rate Map (FIRM) for the property, except as specifically set forth herein. For properties with a BFE of 4.0 feet NAVD88, the minimum seawall elevation shall meet 3.9 feet NAVD88 and the maximum seawall or dock elevation shall be 5.0 feet NAVD88. For waterfront properties with a habitable finished floor elevation of less than 3.9 feet NAVD88, a seawall may be constructed at less than the stated minimum elevation if a waiver is granted by the City Engineer. For properties within an X zone, the minimum seawall elevation shall meet 3.9 feet NAVD88 and the maximum seawall or dock elevation shall meet the definition of grade as determined by subsection 47-2.2 (g)(1)(a). The maximum height of related structures attached to a seawall shall not exceed the elevation of the seawall to which the structure is attached. In the event of a conflict between subsection 47-19.5.B.Table 1, Note G: subsection 1.a.ii. and the requirements of this section, this section shall govern. Property owners choosing to construct seawalls at less than 5.0 feet NAVD88 are strongly encouraged to have the foundation designed to accommodate a future seawall height extension up to a minimum elevation of 5.0 feet NAVD88.

Property's FEMA Flood Insurance Rate Map Location	Minimum Allowable Seawall Elevation	Maximum Allowable Seawall or Dock Elevation
In a floodplain with a base flood elevation greater than or	3.9 feet NAVD88	Base flood elevation of the property

equal to 5.0 feet NAVD88		
In a floodplain with a base flood elevation equal to 4.0 feet NAVD88	3.9 feet NAVD88	5 feet NAVD88
In an X zone, not in a floodplain	3.9 feet NAVD88	Meet the definition of grade as determined by Section 47-2.2(g)(1)(a)

- (1) Seawalls must be designed and built in a substantially impermeable manner to prevent tidal waters from flowing through the seawall while still allowing for the release of hydrostatic pressure from the upland direction.
- (2) Fixed docks may be constructed at an elevation less than the elevation of the seawall to which it is attached but shall not be constructed at an elevation more than ten (10) inches above the seawall's elevation. The dock elevation may not exceed the maximum elevation as described in subsection (f) of this section. Floating docks shall be allowed and must be permitted and permanently attached to a marginal dock, finger pier, mooring pilings, or seawall.
- (3) Seawall improvements constituting substantial repair at the time of permit application shall meet the minimum elevation and consider the design recommendations (see subsection (f) above) for the continuous seawall for the length of the property. For the purposes of this section, the substantial repair threshold shall mean the following:
 - (i) Any improvement to the seawall of more than fifty percent (50%) of the length of the structure, which for the purposes of this section, shall include both the seawall and cap; or
 - (ii) Any improvement to the seawall which results in an elevation change along more than fifty percent (50%) of the length of the structure.
- (4) All property owners must maintain their seawalls in good repair. A seawall is presumed to be in disrepair if it allows for upland erosion, transfer of material through the seawall or allows tidal waters to flow unimpeded through the seawall to adjacent properties or public right-of-way. Property owners failing to maintain their seawalls may be cited. The owner of the property on which the seawall is constructed is required to initiate a process, including but not limited to hiring a contractor or submitting a building permit, and be able to demonstrate progress toward repairing the cited defect within sixty (60) days of receiving notice from the city and complete the repair within three hundred sixty-five (365) days of citation. If the required repair meets the substantial repair threshold, the property owner shall design, permit, and construct the seawall to meet the minimum elevation requirement and design requirement (see subsection 47-19.3(f)) within three hundred sixty-five (365) days of citation.
- (5) Property owners with seawalls below the minimum elevation, or permeable erosion barriers such as rip rap, or a land/water interface of another nature shall not allow tidal waters entering their property to impact adjacent properties or public rights-of-way. Property owners failing to prevent tidal waters from flowing overland and leaving their property may be cited. The owner of the property is required to initiate a process, including but not limited to, hiring a contractor or submitting a building permit, and be able to demonstrate progress toward addressing the cited concern within sixty (60) days of receiving notice from the city and complete the proposed remedy within three hundred sixty-five (365) days of citation.

- (g) No boathouse, permanent covering, or temporary covering for a boat shall be permitted within the setback area required for the zoning district in which such shelter is to be located, nor shall any boathouse, permanent covering or temporary covering for a boat, or any other structure not otherwise specifically permitted, be permitted within or cover any public waterway.
- (h) No watercraft shall be docked or anchored adjacent to residential property in such a position that causes it to extend beyond the side setback lines required for principal buildings on such property, as extended into the waterway, or is of such length that when docked or anchored adjacent to such property, the watercraft extends beyond such side setback lines as extended into the waterway. The owner of real property which would be entitled to the density limitation of a maximum of forty (40) units per acre pursuant to the terms for habitation of floating homes or vessels, Section 47-19.6, may apply for an exception to the setback requirements contained herein. An application for such exception shall be heard by the Planning and Zoning Board (board) at a public hearing called for that purpose. After the public hearing, the board shall make a recommendation to the City Commission that the application be granted or denied, or granted subject to conditions. If the board recommends that the application be either granted or granted subject to conditions, the City Clerk shall place the recommendation on the agenda of the City Commission for a public hearing at a regular meeting. The City Commission shall, by resolution, either grant the application, deny the application, or grant the application subject to such conditions as it finds necessary to the health, safety and general welfare of the citizens of the city. In deciding whether to grant or deny the application, the City Commission shall consider the neighborhood within which the applicant's property lies and the effect that the exception to the setbacks would have on the following:
 - (1) The surrounding property.
 - (2) The ability of adjacent property owners to enjoy abutting waterways.
- (i) Waiver of limitations. Property owners of lands located on the Isle of Venice and Hendricks Isle may dock or anchor watercraft adjacent to their respective properties in a manner which extends beyond side setback lines, required by this section as approved by Resolution No. 85-270.

(Ord. No. C-97-19, § 1(47-19.3), 6-18-97; Ord. No. C-04-2, § 4, 1-12-04; [Ord. No. C-10-44, § 2, 12-7-10](#); [Ord. No. C-13-18, § 2, 6-4-13](#); Ord. No. [C-16-13](#), § 1, 6-21-16; [Ord. No. C-16-27](#), § 1, 12-6-16)

Attachment G

Cost Table Breakdown

Shallow Water/Low Wake - 100ft Section (Las Olas)	Amount	Unit Cost	Units	Total	
Design Survey	1	\$1,000	LS	\$1,000	
As-built Survey	1	\$1,000	LS	\$1,000	
Environmental Assessment	1	\$5,000	LS	\$5,000	
Sediment Samples	5	\$125	EA	\$625	Design &
Design & Engineering	1	\$10,000	LS	\$10,000	Permitting
Permitting Fees (Local, State & Federal)	1	\$1,000	LS	\$1,000	\$18,625
Turbidity Curtain	200	\$17	LF	\$3,400	
Silt Fence	200	\$4	LF	\$800	
Clearing & Grubbing	0.1	\$11,000	AC	\$1,100	
Precast Planter	4	\$5,000	EA	\$20,000	
Native Estuarine Plantings	40	\$20	EA	\$800	
Concrete Seatwall	100	\$350	LF	\$35,000	Construction
Concrete Stairs	1	\$3,000	EA	\$3,000	\$64,100
Annual Maintenance	5%	\$3,200	LS	\$3,200	
			TOTAL	\$85,925	

Shallow Water/Low Wake - 100ft Section (Las Olas) wall	Amount	Unit Cost	Units	Total	
Design Survey	1	\$1,000	LS	\$1,000	
As-built Survey	1	\$1,000	LS	\$1,000	
Environmental Assessment	1	\$5,000	LS	\$5,000	Design &
Sediment Samples	5	\$250	EA	\$1,250	Permitting
Design & Engineering	1	\$10,000	LS	\$10,000	\$19,250
Permitting Fees (Local, State & Federal)	1	\$1,000	LS	\$1,000	
Turbidity Curtain	200	\$17	LF	\$3,400	
Silt Fence	200	\$4	LF	\$800	
Clearing & Grubbing	0.1	\$11,000	AC	\$1,100	Construction
Precast Seawall	100	\$800	LF	\$80,000	\$110,300
Addtl 2 ft Height	100	\$250	LF	\$25,000	
Annual Maintenance	5%	\$5,500	LS	\$5,500	
			TOTAL	\$135,050	

Shallow Water/High Wake - 100ft Section (Hollywood)	Amount	Unit Cost	Units	Total		
Design Survey	1	\$1,000	LS	\$1,000	Design & Permitting	
As-built Survey	1	\$1,000	LS	\$1,000		
Environmental Assessment	1	\$5,000	LS	\$5,000		
Sediment Samples	5	\$250	EA	\$1,250		
Design & Engineering	1	\$10,000	LS	\$10,000	\$19,250	
Permitting Fees (Local, State & Federal)	1	\$1,000	LS	\$1,000		
Turbidity Curtain	200	\$17	LF	\$3,400		
Silt Fence	200	\$8	LF	\$1,600		
Clearing & Grubbing	0.1	\$11,000	AC	\$1,100		
Earthen Berm/Embankment Fill	400	\$36	CY	\$14,400		
Fill Slope/Spoil Island	600	\$40	CY	\$24,000		Construction
Native Estuarine Plantings	200	\$20	EA	\$4,000		\$83,500
Impervious Liner	100	\$125	LF	\$12,500		
Seed/Sod	2500	\$9	SF	\$22,500		
Annual Maintenance	5%	\$4,200	LS	\$4,200		
TOTAL				\$106,950		
Spoil Island	400	\$40	CY	\$16,000		
Geotextile	100	\$20	LF	\$2,000		
Rip rap	400	\$300	TN	\$120,000		
Oyster Bags	1000	\$2.5	EA	\$2,500		
Boardwalk	100	\$300	LF	\$30,000		
2 ft Stem Wall	100	\$250	LF	\$25,000		
ADDED ELEMENTS				\$195,500		

Shallow Water/High Wake - 100ft Section (Hollywood) wall	Amount	Unit Cost	Units	Total		
Design Survey	1	\$1,000	LS	\$1,000	Design & Permitting	
As-built Survey	1	\$1,000	LS	\$1,000		
Environmental Assessment	1	\$5,000	LS	\$5,000		
Sediment Samples	5	\$250	EA	\$1,250		
Design & Engineering	1	\$10,000	LS	\$10,000	\$19,250	
Permitting Fees (Local, State & Federal)	1	\$1,000	LS	\$1,000		
Turbidity Curtain	200	\$17	LF	\$3,400		
Silt Fence	200	\$8	LF	\$1,600		Construction
Clearing & Grubbing	0.1	\$11,000	AC	\$1,100		\$131,100
Precast Seawall	100	\$1,000	EA	\$100,000		
Addtl 2 ft height	100	\$250	LF	\$25,000		
Annual Maintenance	5%	\$6,500	LS	\$6,500		
TOTAL				\$156,850		

Deep Water/Low Wake - 100ft Section (All-Saints)	Amount	Unit Cost	Units	Total	
Design Survey	1	\$1,000	LS	\$1,000	
As-built Survey	1	\$1,000	LS	\$1,000	
Environmental Assessment	1	\$5,000	LS	\$5,000	
Sediment Samples	5	\$250	EA	\$1,250	Design & Permitting
Design & Engineering	1	\$10,000	LS	\$10,000	
Permitting Fees (Local, State & Federal)	1	\$1,000	LS	\$1,000	\$19,250
Turbidity Curtain	200	\$17	LF	\$3,400	
Silt Fence	200	\$8	LF	\$1,600	
Clearing & Grubbing	0.1	\$11,000	AC	\$1,100	
Earthen Berm/Embankment Fill	370	\$36	CY	\$13,320	
Remove Seawall	50	\$150	LF	\$7,500	
Native Estuarine Plantings	200	\$20	EA	\$4,000	
Impervious Liner	100	\$125	LF	\$12,500	
Geotextile	100	\$20	LF	\$2,000	
Rip rap	224	\$300	TN	\$67,200	Construction
Seed/Sod	2500	\$9	SF	\$22,500	
Annual Maintenance	5%	\$6,750	LS	\$6,750	\$135,120
			TOTAL	\$161,120	
French Drain	100	\$160	LF	\$16,000	
8" HDPE Pipe	40	\$150	LF	\$6,000	
Check Valve	1	\$500	EA	\$500	
Living Dock	50	\$400	SF	\$20,000	
3 ft Stem Wall	100	\$350	LF	\$35,000	
			ADDED ELEMENTS	\$77,500	

Deep Water/Low Wake - 100ft Section (All-Saints) wall	Amount	Unit Cost	Units	Total	
Design Survey	1	\$1,000	LS	\$1,000	
As-built Survey	1	\$1,000	LS	\$1,000	
Environmental Assessment	1	\$5,000	LS	\$5,000	Design & Permitting
Sediment Samples	5	\$250	EA	\$1,250	
Design & Engineering	1	\$10,000	LS	\$10,000	\$19,250
Permitting Fees (Local, State & Federal)	1	\$1,000	LS	\$1,000	
Turbidity Curtain	200	\$17	LF	\$3,400	
Silt Fence	200	\$8	LF	\$1,600	
Clearing & Grubbing	0.1	\$11,000	AC	\$1,100	Construction
Precast Seawall	100	\$1,000	EA	\$100,000	
Addtl 3 ft height	100	\$350	LF	\$35,000	\$141,100
Annual Maintenance	5%	\$7,000	LS	\$7,000	
			TOTAL	\$167,350	

Deep Water/High Wake - 100ft Section (Pompano)	Amount	Unit Cost	Units	Total	
Design Survey	1	\$1,000	LS	\$1,000	Design & Permitting
As-built Survey	1	\$1,000	LS	\$1,000	
Environmental Assessment	1	\$5,000	LS	\$5,000	
Sediment Samples	5	\$250	EA	\$1,250	
Design & Engineering	1	\$10,000	LS	\$10,000	
Permitting Fees (Local, State & Federal)	1	\$1,000	LS	\$1,000	Construction
Turbidity Curtain	200	\$17	LF	\$3,400	
Silt Fence	200	\$8	LF	\$1,600	
Clearing & Grubbing	0.1	\$11,000	AC	\$1,100	
Earthen Berm/Embankment Fill	260	\$36	CY	\$9,360	
Rip Rap	175	\$300	TN	\$52,500	
Concrete Seatwall	100	\$350	LF	\$35,000	
Concrete Stairs	1	\$5,000	EA	\$5,000	
Annual Maintenance	5%	\$5,500	LS	\$5,500	
			TOTAL	\$132,710	
Habitat Panels	100	\$40	LF	\$4,000	ADDED ELEMENTS
Glass/Plexiglass Wall	100	\$450	LF	\$45,000	
				\$49,000	

Deep Water/Low Wake - 100ft Section (Pompano) wall	Amount	Unit Cost	Units	Total	
Design Survey	1	\$1,000	LS	\$1,000	Design & Permitting
As-built Survey	1	\$1,000	LS	\$1,000	
Environmental Assessment	1	\$5,000	LS	\$5,000	
Sediment Samples	5	\$250	EA	\$1,250	
Design & Engineering	1	\$10,000	LS	\$10,000	
Permitting Fees (Local, State & Federal)	1	\$1,000	LS	\$1,000	Construction
Turbidity Curtain	200	\$17	LF	\$3,400	
Silt Fence	200	\$8	LF	\$1,600	
Clearing & Grubbing	0.1	\$11,000	AC	\$1,100	
Precast Seawall	100	\$1,300	EA	\$130,000	
Addtl 3 ft height	100	\$350	LF	\$35,000	
Annual Maintenance	5%	\$8,500	LS	\$8,500	
			TOTAL	\$198,850	

Attachment H

2017/2018 FDOT Cost Index for Area 12 (Broward and Dade Counties)

Florida Department of Transportation
Item Average Unit Cost
From 2017/10/01 to 2018/09/30

Contract Type: CC AREAS: 12
Displaying: VALID ITEMS WITH HITS
From: 0102 1 To: 9999999

Item	No. of Conts	Weighted Average	Total Amount	Total Quantity	Unit Meas	Obs?	Description
0102 1	22	\$1,103.16	\$11,026,037.63	9,995.000	DA	N	MAINTENANCE OF TRAFFIC
0102 2 1	5	\$459,980.44	\$2,759,882.65	6.000	LS	N	SPECIAL DETOUR 1
0102 2 2	4	\$45,348.12	\$226,740.62	5.000	LS	N	SPECIAL DETOUR 2
0102 2 3	1	\$25,000.00	\$25,000.00	1.000	LS	N	SPECIAL DETOUR 3
0102 2 4	1	\$247,500.00	\$495,000.00	2.000	LS	N	SPECIAL DETOUR 4
0102 2 5	1	\$90,000.00	\$90,000.00	1.000	LS	N	SPECIAL DETOUR 5
0102 2 6	1	\$2,900,000.00	\$2,900,000.00	1.000	LS	N	SPECIAL DETOUR 6
0102 2 7	1	\$47,000.00	\$47,000.00	1.000	LS	N	SPECIAL DETOUR 7
0102 2 8	1	\$65,000.00	\$65,000.00	1.000	LS	N	SPECIAL DETOUR 8
0102 2 9	1	\$350,000.00	\$350,000.00	1.000	LS	N	SPECIAL DETOUR 9
0102 2 10	1	\$51,500.00	\$51,500.00	1.000	LS	N	SPECIAL DETOUR 10
0102 3	6	\$28.94	\$24,359.93	841.800	CY	N	COMMERCIAL MATL FOR TEMP DRIVEWAY MAINT
0102 14	11	\$52.20	\$342,668.00	6,564.000	HR	N	TRAFFIC CONTROL OFFICER
0102 60	22	\$.24	\$109,855.89	463,833.000	ED	N	WORK ZONE SIGN
0102 61	6	\$75.92	\$6,756.44	89.000	EA	N	BUSINESS SIGN
0102 62	1	\$.35	\$1,060.50	3,030.000	ED	N	BARRIER MOUNTED WORK ZONE SIGN
0102 71 13	5	\$58.80	\$966,655.04	16,441.000	LF	N	TEMPORARY BARRIER, F&I,LOW PROFILE,CONC
0102 71 23	5	\$6.88	\$117,453.66	17,073.000	LF	N	TEMPORARY BARRIER, REL,LOW PROFILE CONC
0102 74 1	22	\$.11	\$352,066.22	3,116,315.000	ED	N	CHANNEL DEVICE-TYPS I,II,DI,VP, DRUM, LC
0102 74 2	17	\$.26	\$19,694.68	75,607.000	ED	N	CHANNELIZING DEVICE, TYPE III, 6'
0102 74 7	17	\$2.11	\$337,741.01	159,841.000	LF	N	CHANNELIZING DEVICE- PED LCD
0102 75 1	1	\$19.05	\$17,773.65	933.000	LF	N	TEMPORARY SEPARATOR, F&I REMOVE
0102 76	21	\$5.05	\$111,868.19	22,158.000	ED	N	ARROW BOARD /ADVANCE WARNING ARROW PANEL
0102 78	12	\$3.46	\$326,954.88	94,534.000	EA	N	TEMPORARY RETROREFLECTIVE PAVT MARKER
0102 89 1	10	\$1,009.92	\$287,826.74	285.000	LO	N	TEMPORARY CRASH CUSHION, RED OPT
0102 94 1	1	\$2.02	\$118,917.40	58,870.000	LF	N	TEMP GLARE SCREEN,F&I,WALL MAT-CONC
0102 94 11	1	\$2.02	\$73,103.80	36,190.000	LF	N	GLARE SCREEN,TEMP,REL,WALL MAT-CONC
0102 99	22	\$11.16	\$496,383.53	44,478.000	ED	N	PORTABLE CHANGEABLE MESSAGE SIGN,TEMP
0102104	12	\$4.93	\$78,923.94	16,001.000	ED	N	TEMPORARY SIGNALIZATION AND MAINT, INTER
0102107 1	12	\$4.78	\$91,932.03	19,246.000	ED	N	TEMP TRAFFIC DETECTION & MAINTEN, INTER
0102150 1	5	\$5.37	\$108,479.50	20,216.000	ED	N	PORTABLE REGULATORY,SIGN
0102150 2	4	\$5.27	\$100,893.90	19,136.000	ED	N	RADAR SPEED DISPLAY UNIT
0102911 1	4	\$2.12	\$26,344.92	12,431.000	LF	N	PAVT MARKING REMOVABLE TAPE,WH BLK,SKIP
0102911 2	5	\$2.08	\$48,534.02	23,326.000	LF	N	PAVT MARKING REMOVABLE TAPE,WH BLK,SOLID
0102911 3	1	\$4.00	\$68.00	17.000	SF	N	PAVT MARKING REMOVABLE TAPE,WH BLK,OTHER
0102912 2	4	\$2.08	\$33,594.42	16,185.000	LF	N	PAVT MARKING REMOVABLE TAPE,YELLOW,SOLID
0104 1	1	\$9.50	\$26,533.50	2,793.000	SY	N	ARTIFICIAL COVERINGS / ROLL EROSION CNTL
0104 7	1	\$2,550.00	\$7,650.00	3.000	EA	N	SEDIMENT BASIN / CONTAINMENT SYSTEM
0104 9	1	\$1,350.00	\$4,050.00	3.000	EA	N	SEDIMENT BASIN / CONTAINMENT SY CLEANOUT
0104 10 3	16	\$1.07	\$379,811.74	356,151.000	LF	N	SEDIMENT BARRIER

Florida Department of Transportation
Item Average Unit Cost
From 2017/10/01 to 2018/09/30

Contract Type: CC AREAS: 12
Displaying: VALID ITEMS WITH HITS
From: 0102 1 To: 9999999

Item	No. of Conts	Weighted Average	Total Amount	Total Quantity	Unit Meas	Obs?	Description
0104 11	8	\$15.66	\$335,477.48	21,416.000	LF	N	FLOATING TURBIDITY BARRIER
0104 12	1	\$2.62	\$327,680.78	125,069.000	LF	N	STAKED TURBIDITY BARRIER- NYL REINF PVC
0104 15	3	\$4,269.38	\$111,003.86	26.000	EA	N	SOIL TRACKING PREVENTION DEVICE
0104 18	19	\$135.77	\$211,942.17	1,561.000	EA	N	INLET PROTECTION SYSTEM
0107 1	15	\$12.59	\$227,904.20	18,096.010	AC	N	LITTER REMOVAL
0107 2	15	\$17.44	\$238,192.55	13,658.880	AC	N	MOWING
0108 1	11	\$5,542.35	\$88,677.54	16.000	LS	N	MONITOR EXISTING STRUCTURES- SETTLE
0108 2	10	\$12,432.01	\$174,048.16	14.000	LS	N	MONITOR EXISTING STRUCTURES- VIBRA
0108 3	1	\$2,019.57	\$2,019.57	1.000	LS	N	MONITOR EXISTING STRUCTURES- GROUND
0110 1 1	17	\$9,506.10	\$5,688,600.96	598.416	AC	N	CLEARING & GRUBBING
0110 2 2	3	\$24,055.88	\$38,489.40	1.600	AC	N	SELECTIVE CLEARING AND GRUBBING, TREES R
0110 2 3	2	\$10,847.92	\$133,212.50	12.280	AC	N	SELECTIVE CLEARING AND GRUB, PLANT PRES
0110 3	3	\$21.27	\$772,934.31	36,347.000	SF	N	REMOVAL OF EXISTING STRUCTURES/BRIDGES
0110 4 10	19	\$17.51	\$1,016,052.62	58,014.000	SY	N	REMOVAL OF EXIST CONC
0110 7 1	2	\$186.66	\$15,679.32	84.000	EA	N	MAILBOX, F&I SINGLE
0110 86	1	\$1,850.00	\$1,850.00	1.000	LS	N	DELIVERY OF SALVAGEABLE MATERIAL TO FDOT
0120 1	15	\$5.78	\$2,563,239.63	443,298.200	CY	N	REGULAR EXCAVATION
0120 2 2	1	\$100.00	\$37,200.00	372.000	CY	N	BORROW EXCAVATION, TRUCK MEASURE
0120 4	3	\$8.61	\$219,783.88	25,539.300	CY	N	SUBSOIL EXCAVATION
0120 5	1	\$16.00	\$29,568.00	1,848.000	CY	N	CHANNEL EXCAVATION
0120 6	14	\$11.51	\$13,246,218.04	1,150,591.000	CY	N	EMBANKMENT
0120 71	2	\$35,500.00	\$71,000.00	2.000	LS	N	REGULAR EXCAVATION (3-R PROJECTS ONLY)
0125 1	1	\$60.00	\$672.00	11.200	CY	N	EXCAVATION FOR STRUCTURES
0145 2	1	\$3.71	\$56,139.72	15,132.000	SY	N	GEOSYNTHETIC REINF FND OVER SOFT SOIL
0160 4	14	\$3.99	\$4,648,920.96	1,165,167.000	SY	N	TYPE B STABILIZATION
0162 1 11	6	\$.54	\$153,658.70	285,788.000	SY	N	PREPARED SOIL LAYER, FINISH SOIL, 6"
0285701	3	\$5.10	\$275,048.23	53,894.000	SY	N	OPTIONAL BASE,BASE GROUP 01
0285702	3	\$10.36	\$131,520.35	12,697.000	SY	N	OPTIONAL BASE,BASE GROUP 02
0285703	3	\$9.51	\$646,757.65	68,015.000	SY	N	OPTIONAL BASE,BASE GROUP 03
0285704	2	\$13.42	\$10,373.68	773.000	SY	N	OPTIONAL BASE,BASE GROUP 04
0285705	1	\$7.00	\$446,901.00	63,843.000	SY	N	OPTIONAL BASE,BASE GROUP 05
0285706	2	\$11.20	\$231,219.64	20,642.000	SY	N	OPTIONAL BASE,BASE GROUP 06
0285707	2	\$8.54	\$392,245.98	45,921.000	SY	N	OPTIONAL BASE,BASE GROUP 07
0285708	1	\$9.50	\$127,765.50	13,449.000	SY	N	OPTIONAL BASE,BASE GROUP 08
0285709	12	\$15.04	\$8,518,297.31	566,419.000	SY	N	OPTIONAL BASE,BASE GROUP 09
0285711	1	\$13.50	\$288,927.00	21,402.000	SY	N	OPTIONAL BASE,BASE GROUP 11
0285712	1	\$13.00	\$850,161.00	65,397.000	SY	N	OPTIONAL BASE,BASE GROUP 12
0285713	1	\$27.00	\$166,374.00	6,162.000	SY	N	OPTIONAL BASE,BASE GROUP 13
0285714	1	\$87.66	\$68,462.46	781.000	SY	N	OPTIONAL BASE,BASE GROUP 14
0285715	2	\$53.23	\$3,994,301.00	75,037.000	SY	N	OPTIONAL BASE,BASE GROUP 15

Florida Department of Transportation
Item Average Unit Cost
From 2017/10/01 to 2018/09/30

Contract Type: CC AREAS: 12
Displaying: VALID ITEMS WITH HITS
From: 0102 1 To: 9999999

Item	No. of Conts	Weighted Average	Total Amount	Total Quantity	Unit Meas	Obs?	Description
0286 1	2	\$27.90	\$11,187.55	401.000	SY	N	TURNOUT CONSTRUCTION
0286 2	1	\$300.00	\$1,560.00	5.200	TN	N	TURNOUT CONSTRUCTION-ASPHALT
0327 70 1	14	\$2.36	\$1,213,167.98	514,463.000	SY	N	MILLING EXIST ASPH PAVT, 1" AVG DEPTH
0327 70 4	2	\$2.91	\$66,746.50	22,957.000	SY	N	MILLING EXIST ASPH PAVT, 3" AVG DEPTH
0327 70 5	2	\$2.87	\$23,930.00	8,350.000	SY	N	MILLING EXIST ASPH PAVT, 2" AVG DEPTH
0327 70 6	7	\$3.75	\$935,883.54	249,892.000	SY	N	MILLING EXIST ASPH PAVT,1 1/2" AVG DEPTH
0327 70 8	2	\$3.30	\$375,429.14	113,921.000	SY	N	MILLING EXIST ASPH PAVT,2 1/2" AVG DEPTH
0327 70 9	1	\$5.50	\$156,882.00	28,524.000	SY	N	MILLING EXIST ASPH PAVT,5 1/4" AVG DEPTH
0327 70 11	3	\$4.19	\$2,628,266.60	627,215.000	SY	N	MILLING EXIST ASPH PAVT,2 1/4" AVG DEPTH
0327 70 12	2	\$2.12	\$218,374.10	102,956.000	SY	N	MILLING EXIST ASPH PAVT,1 1/4" AVG DEPTH
0327 70 13	1	\$3.15	\$53,880.75	17,105.000	SY	N	MILLING EXIST ASPH PAVT,1 3/4" AVG DEPTH
0327 70 15	2	\$2.75	\$424,670.48	154,404.000	SY	N	MILLING EXIST ASPH PAVT,2 3/4" AVG DEPTH
0327 70 17	1	\$4.45	\$166,403.30	37,394.000	SY	N	MILLING EXIST ASPH PAVT,3 1/4" AVG DEPTH
0327 70 19	2	\$2.93	\$29,070.02	9,917.000	SY	N	MILLING EXIST ASPH PAVT, 3/4" AVG DEPTH
0327 70 20	1	\$8.45	\$29,600.35	3,503.000	SY	N	MILLING EXIST ASPH PAVT,3 3/4" AVG DEPTH
0327 70 22	1	\$4.95	\$93,173.85	18,823.000	SY	N	MILLING EXIST ASPH PAVT,4 1/4" AVG DEPTH
0327 70 26	2	\$6.22	\$87,442.30	14,062.000	SY	N	MILLING EXIST ASPH PAVT,4 3/4" AVG DEPTH
0327 70 29	1	\$7.70	\$14,245.00	1,850.000	SY	N	MILLING EXIST ASPH PAVT,6 1/4" AVG DEPTH
0327 70 33	1	\$10.75	\$107,747.25	10,023.000	SY	N	MILLING EXIST ASPH PAVT,7 3/4" AVG DEPTH
0334 1 11	2	\$106.22	\$439,849.50	4,140.900	TN	N	SUPERPAVE ASPHALTIC CONC, TRAFFIC A
0334 1 12	4	\$106.34	\$3,912,078.13	36,787.200	TN	N	SUPERPAVE ASPHALTIC CONC, TRAFFIC B
0334 1 13	11	\$100.04	\$4,775,851.63	47,738.200	TN	N	SUPERPAVE ASPHALTIC CONC, TRAFFIC C
0334 1 14	5	\$103.74	\$9,773,497.82	94,211.500	TN	N	SUPERPAVE ASPHALTIC CONC, TRAFFIC D
0334 1 52	1	\$130.00	\$139,880.00	1,076.000	TN	N	SUPERPAVE ASPH CONC, TRAF B, PG76-22
0334 1 53	6	\$112.84	\$2,166,142.63	19,197.100	TN	N	SUPERPAVE ASPH CONC, TRAF C, PG76-22
0334 1 54	4	\$105.86	\$17,696,558.17	167,175.200	TN	N	SUPERPAVE ASPH CONC, TRAF D, PG76-22
0337 7 25	5	\$128.90	\$7,785,212.35	60,399.400	TN	N	ASPH CONC FC,INC BIT,FC-5,PG76-22
0337 7 82	10	\$145.19	\$2,759,983.28	19,009.200	TN	N	ASPH CONC FC,TRAFFIC C,FC-9.5,PG 76-22
0337 7 83	4	\$117.61	\$4,305,452.45	36,608.000	TN	N	ASPH CONC FC,TRAFFIC C,FC-12.5,PG 76-22
0337 7 85	3	\$139.31	\$535,066.35	3,840.900	TN	N	ASPH CONC FC,TRAFFIC D,FC-12.5,PG 76-22
0339 1	10	\$211.64	\$735,423.19	3,474.800	TN	N	MISCELLANEOUS ASPHALT PAVEMENT
0350 3 13	1	\$101.44	\$97,686.72	963.000	SY	N	PLAIN CEMENT CONC PAVT, 12"
0400 0 11	7	\$410.10	\$3,813,321.66	9,298.500	CY	N	CONC CLASS NS, GRAVITY WALL
0400 1 2	2	\$3,712.99	\$380,210.28	102.400	CY	N	CONC CLASS I, ENDWALLS
0400 2 4	3	\$658.39	\$2,176,686.87	3,306.100	CY	N	CONC CLASS II, BRIDGE SUPERSTRUCTURE
0400 2 8	1	\$450.00	\$70,425.00	156.500	CY	N	CONC CLASS II, BULKHEAD
0400 2 10	4	\$298.96	\$703,546.92	2,353.300	CY	N	CONC CLASS II, APPROACH SLABS
0400 2 11	1	\$750.00	\$8,250.00	11.000	CY	N	CONC CLASS II, RETAINING WALLS
0400 3 20	1	\$300.00	\$17,640.00	58.800	CY	N	CONC CLASS III, SEAL
0400 4 1	1	\$2,100.00	\$185,850.00	88.500	CY	N	CONC CLASS IV, CULVERTS

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0400 4 4	1	\$1,291.12	\$1,759,538.34	1,362.800	CY	N	CONC CLASS IV, SUPERSTRUCTURE
0400 4 5	4	\$1,037.20	\$2,161,218.31	2,083.700	CY	N	CONC CLASS IV, SUBSTRUCTURE
0400 4 11	1	\$1,000.00	\$22,100.00	22.100	CY	N	CONC CLASS IV, RETAINING WALLS
0400 4 25	1	\$930.00	\$158,565.00	170.500	CY	N	CONC CLASS IV, MASS, SUBSTRUCTURE
0400 7	1	\$5.00	\$93,215.00	18,643.000	SY	N	BRIDGE DECK GROOVING, LESS THAN 8.5"
0400 9	3	\$9.43	\$80,225.85	8,505.000	SY	N	BRIDGE DECK GROOV & PLANING, DECK 8.5" GR
0400143	1	\$2.00	\$19,616.00	9,808.000	SF	N	CLEAN & COAT CONCRETE SURF , CLASS 5
0400147	2	\$902.27	\$118,377.95	131.200	CF	N	COMPOSITE NEOPRENE PADS
0400148	1	\$2,036.00	\$18,324.00	9.000	CF	N	PLAIN NEOPRENE BEARING PADS
0415 1 1	1	\$1.75	\$40,855.50	23,346.000	LB	N	REINF STEEL- ROADWAY
0415 1 3	3	\$1.56	\$6,882.60	4,416.000	LB	N	REINF STEEL- RETAINING WALL
0415 1 4	4	\$.97	\$1,180,974.71	1,221,215.000	LB	N	REINF STEEL- SUPERSTRUCTURE
0415 1 5	4	\$.99	\$559,364.29	562,181.000	LB	N	REINF STEEL- SUBSTRUCTURE
0415 1 8	1	\$1.00	\$12,473.00	12,473.000	LB	N	REINF STEEL- BULKHEAD
0415 1 9	4	\$1.05	\$491,139.42	466,626.000	LB	N	REINF STEEL- APPROACH SLABS
0425 1201	3	\$4,349.94	\$26,099.61	6.000	EA	N	INLETS, CURB, TYPE 9, <10'
0425 1311	2	\$8,595.54	\$25,786.61	3.000	EA	N	INLETS, CURB, TYPE P-1, <10'
0425 1321	1	\$10,600.00	\$10,600.00	1.000	EA	N	INLETS, CURB, TYPE P-2, <10'
0425 1331	1	\$8,880.00	\$8,880.00	1.000	EA	N	INLETS, CURB, TYPE P-3, <10'
0425 1341	1	\$8,880.00	\$8,880.00	1.000	EA	N	INLETS, CURB, TYPE P-4, <10'
0425 1351	11	\$4,977.15	\$418,080.19	84.000	EA	N	INLETS, CURB, TYPE P-5, <10'
0425 1352	1	\$12,300.00	\$12,300.00	1.000	EA	N	INLETS, CURB, TYPE P-5, >10'
0425 1355	1	\$3,925.00	\$31,400.00	8.000	EA	N	INLETS, CURB, TYPE P-5, PARTIAL
0425 1359	1	\$8,885.00	\$17,770.00	2.000	EA	N	INLETS, CURB, TYPE P-5, MODIFY
0425 1361	10	\$4,815.07	\$442,986.47	92.000	EA	N	INLETS, CURB, TYPE P-6, <10'
0425 1365	1	\$4,234.86	\$135,515.52	32.000	EA	N	INLETS, CURB, TYPE P-6, PARTIAL
0425 1411	1	\$8,163.76	\$8,163.76	1.000	EA	N	INLETS, CURB TYPE J-1, <10'
0425 1451	5	\$8,176.19	\$122,642.87	15.000	EA	N	INLETS, CURB, TYPE J-5, <10'
0425 1452	1	\$11,330.00	\$22,660.00	2.000	EA	N	INLETS, CURB, TYPE J-5, >10'
0425 1459	1	\$15,965.00	\$15,965.00	1.000	EA	N	INLETS, CURB, TYPE J-5, MODIFY
0425 1461	3	\$11,120.07	\$88,960.58	8.000	EA	N	INLETS, CURB, TYPE J-6, <10'
0425 1471	2	\$4,609.17	\$13,827.50	3.000	EA	N	INLETS, CURB, TYPE 7, <10'
0425 1481	1	\$5,670.59	\$22,682.36	4.000	EA	N	INLETS, CURB, TYPE 8, <10'
0425 1511	1	\$3,800.00	\$7,600.00	2.000	EA	N	INLETS, DT BOT, TYPE B, <10'
0425 1515	1	\$9,000.00	\$9,000.00	1.000	EA	N	INLETS, DT BOT, TYPE B, PARTIAL
0425 1521	8	\$4,056.32	\$64,901.06	16.000	EA	N	INLETS, DT BOT, TYPE C, <10'
0425 1523	1	\$11,634.00	\$23,268.00	2.000	EA	N	INLETS, DT BOT, TYPE C, J BOT, <10'
0425 1524	1	\$7,000.00	\$7,000.00	1.000	EA	N	INLETS, DT BOT, TYPE C, J BOT, >10'
0425 1541	5	\$4,032.01	\$536,257.49	133.000	EA	N	INLETS, DT BOT, TYPE D, <10'
0425 1542	2	\$8,245.53	\$49,473.20	6.000	EA	N	INLETS, DT BOT, TYPE D, >10'

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0425 1543	1	\$5,800.00	\$29,000.00	5.000	EA	N	INLETS, DT BOT,TYPE D, J BOT, <10'
0425 1549	2	\$4,128.45	\$119,725.00	29.000	EA	N	INLETS, DT BOT, TYPE D, MODIFY
0425 1551	5	\$4,828.31	\$197,960.72	41.000	EA	N	INLETS, DT BOT, TYPE E, <10'
0425 1561	3	\$4,180.33	\$62,705.00	15.000	EA	N	INLETS, DT BOT, TYPE F, <10'
0425 1565	1	\$4,200.00	\$16,800.00	4.000	EA	N	INLETS, DT BOT,TYPE F, PARTIAL
0425 1569	1	\$9,755.00	\$78,040.00	8.000	EA	N	INLETS,DT BOT,TYPE F,MODIFY
0425 1584	1	\$20,804.55	\$20,804.55	1.000	EA	N	INLETS, DT BOT, TYPE H, J BOTTOM >10'
0425 1589	1	\$6,600.00	\$33,000.00	5.000	EA	N	INLETS, DT BOT, TYPE H, MODIFY
0425 1701	1	\$3,800.00	\$155,800.00	41.000	EA	N	INLETS, GUTTER, TYPE S, <10'
0425 1702	1	\$6,500.00	\$19,500.00	3.000	EA	N	INLETS, GUTTER, TYPE S, >10'
0425 1704	1	\$9,500.00	\$47,500.00	5.000	EA	N	INLETS, GUTTER, TYPE S, J BOT, >10'
0425 1705	1	\$5,700.00	\$17,100.00	3.000	EA	N	INLETS, GUTTER, TYPE S, PARTIAL
0425 1881	2	\$6,000.00	\$12,000.00	2.000	EA	N	INLETS, BARRIER WALL, RIG, C&G, <10'
0425 1891	1	\$6,500.00	\$286,000.00	44.000	EA	N	INLETS, BARRIER WALL, <10'
0425 1892	1	\$7,500.00	\$75,000.00	10.000	EA	N	INLETS, BARRIER WALL, >10'
0425 1910	3	\$3,147.30	\$88,124.52	28.000	EA	N	INLETS, CLOSED FLUME
0425 2 41	5	\$3,762.09	\$229,487.54	61.000	EA	N	MANHOLES, P-7, <10'
0425 2 42	3	\$6,208.34	\$136,583.52	22.000	EA	N	MANHOLES, P-7, >10'
0425 2 43	7	\$3,365.02	\$117,775.78	35.000	EA	N	MANHOLES, P-7, PARTIAL
0425 2 61	4	\$5,423.97	\$43,391.73	8.000	EA	N	MANHOLES, P-8, <10'
0425 2 63	6	\$3,198.04	\$54,366.62	17.000	EA	N	MANHOLES, P-8, PARTIAL
0425 2 71	4	\$6,287.10	\$81,732.36	13.000	EA	N	MANHOLES, J-7, <10'
0425 2 72	2	\$11,460.78	\$57,303.89	5.000	EA	N	MANHOLES, J-7, >10'
0425 2 91	3	\$8,760.00	\$61,320.00	7.000	EA	N	MANHOLES, J-8, <10'
0425 2 93	1	\$4,000.00	\$8,000.00	2.000	EA	N	MANHOLES, J-8, PARTIAL
0425 4	2	\$1,991.24	\$61,728.39	31.000	EA	N	INLETS, ADJUST
0425 5	8	\$1,143.09	\$162,318.30	142.000	EA	N	MANHOLE, ADJUST
0425 5 1	1	\$875.00	\$9,625.00	11.000	EA	N	MANHOLE, ADJUST, UTILITIES
0425 6	6	\$442.47	\$30,087.97	68.000	EA	N	VALVE BOXES, ADJUST
0425 8	1	\$1,300.00	\$1,300.00	1.000	EA	N	DRAINAGE STRUCTURES, MISC, ADJUST
0425 11	2	\$2,166.67	\$13,000.00	6.000	EA	N	MODIFY EXISTING DRAINAGE STRUCTURE
0430173112	1	\$62.17	\$9,822.86	158.000	LF	N	PIPE CULV OPT MATL, ROUND, 12", GD
0430173115	1	\$59.39	\$33,495.96	564.000	LF	N	PIPE CULV OPT MATL, ROUND, 15", GD
0430173118	2	\$56.06	\$29,933.92	534.000	LF	N	PIPE CULV OPT MATL, ROUND, 18", GD
0430173124	1	\$227.63	\$910.52	4.000	LF	N	PIPE CULV OPT MATL, ROUND, 24", GD
0430174115	1	\$105.00	\$18,270.00	174.000	LF	N	PIPE CULV, OPT MATL, ROUND,15"SD
0430174118	1	\$113.00	\$6,893.00	61.000	LF	N	PIPE CULV, OPT MATL, ROUND,18"SD
0430174130	1	\$110.00	\$11,000.00	100.000	LF	N	PIPE CULV, OPT MATL, ROUND,30"SD
0430175115	8	\$163.50	\$71,122.70	435.000	LF	N	PIPE CULV, OPT MATL, ROUND, 15"S/CD
0430175118	10	\$81.49	\$2,468,321.23	30,291.000	LF	N	PIPE CULV, OPT MATL, ROUND, 18"S/CD

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0430175124	8	\$79.12	\$2,309,574.82	29,190.000	LF	N	PIPE CULV, OPT MATL, ROUND, 24"S/CD
0430175130	7	\$122.25	\$1,040,234.89	8,509.000	LF	N	PIPE CULV, OPT MATL, ROUND, 30"S/CD
0430175136	4	\$176.74	\$257,859.90	1,459.000	LF	N	PIPE CULV, OPT MATL, ROUND, 36"S/CD
0430175142	3	\$131.26	\$182,841.00	1,393.000	LF	N	PIPE CULV, OPT MATL, ROUND, 42"S/CD
0430175148	4	\$325.77	\$52,123.84	160.000	LF	N	PIPE CULV, OPT MATL, ROUND, 48"S/CD
0430175154	1	\$200.00	\$425,600.00	2,128.000	LF	N	PIPE CULV, OPT MATL, ROUND, 54"S/CD
0430175160	1	\$369.37	\$129,648.87	351.000	LF	N	PIPE CULV, OPT MATL, ROUND, 60"S/CD
0430175172	1	\$900.00	\$15,300.00	17.000	LF	N	PIPE CULV, OPT MATL, ROUND, 72"S/CD
0430175218	4	\$72.98	\$628,111.63	8,607.000	LF	N	PIPE CULV, OPT MATL, OTHER, 18"S/CD
0430175224	2	\$112.75	\$107,227.63	951.000	LF	N	PIPE CULV, OPT MATL, OTHER, 24"S/CD
0430175230	2	\$138.87	\$62,908.38	453.000	LF	N	PIPE CULV, OPT MATL, OTHER, 30"S/CD
0430175236	1	\$170.00	\$35,360.00	208.000	LF	N	PIPE CULV, OPT MATL, OTHER, 36"S/CD
0430175248	1	\$230.00	\$312,570.00	1,359.000	LF	N	PIPE CULV, OPT MATL, OTHER, 48"S/CD
0430185118	1	\$540.00	\$382,860.00	709.000	LF	N	PIPE CULV,OPT MATL, ROUND, JACK&BORE,18"
0430185124	2	\$620.72	\$1,091,853.86	1,759.000	LF	N	PIPE CULV,OPT MATL, ROUND, JACK&BORE,24"
0430185130	2	\$781.70	\$1,041,222.38	1,332.000	LF	N	PIPE CULV,OPT MATL, ROUND, JACK&BORE,30"
0430185136	1	\$750.00	\$305,250.00	407.000	LF	N	PIPE CULV,OPT MATL, ROUND, JACK&BORE,36"
0430610025	1	\$2,347.75	\$37,564.00	16.000	EA	N	U-ENDWALL,INDEX 261/430-011,1:6 SLP, 18"
0430610029	1	\$3,079.84	\$6,159.68	2.000	EA	N	U-ENDWALL,INDEX 261/430-011,1:6 SLP, 24"
0430610225	1	\$3,947.72	\$15,790.88	4.000	EA	N	U-ENDWALL,INDEX 261/430-011,1:3 SLP, 18"
0430610325	1	\$7,855.00	\$23,565.00	3.000	EA	N	U-ENDWALL, 261/430-011,1:2 SLP, 18"
0430611125	1	\$1,800.00	\$14,400.00	8.000	EA	N	U-ENDWALL, BAFF,261/430-011,1:4 SLP, 18"
0430611129	1	\$2,050.00	\$4,100.00	2.000	EA	N	U-ENDWALL, BAFF,261/430-011,1:4 SLP, 24"
0430611325	1	\$1,700.00	\$13,600.00	8.000	EA	N	U-ENDWALL, BAFF, 261/430-011,1:2 SLP,18"
0430821 23	1	\$550.00	\$1,100.00	2.000	EA	N	CLEANING & SEALING EXIST PIPE JNT,15" SS
0430821 25	1	\$650.00	\$4,550.00	7.000	EA	N	CLEANING & SEALING EXIST PIPE JNT,18" SS
0430822 29	1	\$760.00	\$760.00	1.000	EA	N	CLEANING & SEALING EXIST PIPE JNT,24" CD
0430822 38	1	\$1,050.00	\$1,050.00	1.000	EA	N	CLEANING & SEALING EXIST PIPE JNT,36" CD
0430822 41	1	\$1,300.00	\$3,900.00	3.000	EA	N	CLEANING & SEALING EXIST PIPE JNT,48" CD
0430830	5	\$378.89	\$214,375.73	565.800	CY	N	PIPE FILLING AND PLUGGING
0430950	1	\$155.79	\$71,911.11	461.590	CY	N	DESILTING CONCRETE BOX CULVERT
0430963 1	1	\$150.00	\$1,800.00	12.000	LF	N	PVC PIPE FOR BACK OF SIDEWALK, 4"
0430982125	2	\$1,451.96	\$56,626.60	39.000	EA	N	MITERED END SECT, OPTIONAL RD, 18" CD
0430982129	2	\$1,521.04	\$19,773.50	13.000	EA	N	MITERED END SECT, OPTIONAL RD, 24" CD
0430982133	2	\$1,643.68	\$6,574.73	4.000	EA	N	MITERED END SECT, OPTIONAL RD, 30" CD
0430982625	1	\$1,626.81	\$65,072.40	40.000	EA	N	MITERED END SECT, OPT - OTHER, 18" CD
0430982629	1	\$1,931.51	\$9,657.55	5.000	EA	N	MITERED END SECT, OPT - OTHER, 24" CD
0430982633	1	\$2,326.08	\$2,326.08	1.000	EA	N	MITERED END SECT, OPT - OTHER, 30" CD
0430984125	1	\$1,438.94	\$18,706.22	13.000	EA	N	MITERED END SECT, OPTIONAL RD, 18" SD
0430984129	1	\$1,514.68	\$15,146.80	10.000	EA	N	MITERED END SECT, OPTIONAL RD, 24" SD

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0430984133	1	\$3,500.00	\$14,000.00	4.000	EA	N	MITERED END SECT, OPTIONAL RD, 30" SD
0430984625	1	\$1,438.94	\$43,168.20	30.000	EA	N	MITERED END SECT, OPT / OTHER, 18" SD
0430984629	1	\$2,978.87	\$11,915.48	4.000	EA	N	MITERED END SECT, OPT / OTHER, 24" SD
0430984633	1	\$3,938.16	\$3,938.16	1.000	EA	N	MITER END SECT, OPT/ELLIP/ARCH, 30" SD
0431 1 1	1	\$250.00	\$12,750.00	51.000	LF	N	PIPE LINER, OPTIONAL MATERIAL, 0-24"
0436 1 1	3	\$168.31	\$203,660.75	1,210.000	LF	N	TRENCH DRAIN, STANDARD
0443 70 3	2	\$159.29	\$111,500.00	700.000	LF	N	FRENCH DRAIN, 18"
0443 70 4	3	\$129.16	\$183,410.00	1,420.000	LF	N	FRENCH DRAIN, 24"
0450 1 1	1	\$170.00	\$963,390.00	5,667.000	LF	N	PREST BEAMS, TYPE II
0450 2 36	1	\$271.65	\$290,937.15	1,071.000	LF	N	PREST BEAMS: FLORIDA-I BEAM 36"
0450 2 45	1	\$280.00	\$1,321,600.00	4,720.000	LF	N	PREST BEAMS: FLORIDA-I BEAM 45"
0450 2 54	1	\$351.18	\$638,094.06	1,817.000	LF	N	PREST BEAMS: FLORIDA-I BEAM 54"
0450 2 72	1	\$415.22	\$873,622.88	2,104.000	LF	N	PREST BEAMS: FLORIDA-I BEAM 72"
0450 88 18	1	\$72.00	\$417,744.00	5,802.000	SF	N	PRESTR SLAB UNITS TRANSV POST TENS, 18"
0455 34 3	2	\$130.70	\$2,046,620.52	15,659.000	LF	N	PRESTRESSED CONCRETE PILING, 18" SQ
0455 34 5	2	\$132.80	\$1,213,122.55	9,135.000	LF	N	PRESTRESSED CONCRETE PILING, 24" SQ
0455 35 6	1	\$125.00	\$1,358,750.00	10,870.000	LF	N	STEEL PILING, HP 14 X 89
0455133 2	1	\$16.44	\$346,785.36	21,094.000	SF	N	SHEET PILING STEEL, TEMPORARY-CRITICAL
0455133 3	1	\$45.00	\$256,050.00	5,690.000	SF	N	SHEET PILING STEEL, F&I PERMANENT
0455143 3	2	\$203.38	\$415,096.43	2,041.000	LF	N	TEST PILES-PREST CONCRETE,18" SQ
0455143 5	2	\$364.60	\$344,550.85	945.000	LF	N	TEST PILES-PREST CONCRETE,24" SQ
0455144 6	1	\$170.00	\$271,150.00	1,595.000	LF	N	TEST PILES - STEEL, HP 14 x 89
0458 1 11	3	\$32.40	\$195,331.84	6,029.000	LF	N	BRIDGE DECK EXPANSION JNT,NEW,POURED
0458 1 12	1	\$335.69	\$68,145.07	203.000	LF	N	BRIDGE DECK EXPANSION JNT,NEW,STRIP SEAL
0458 1 21	1	\$38.00	\$6,080.00	160.000	LF	N	BRIDGE DECK EXPANSION JNT, REHAB,POURED
0459 71	1	\$10.33	\$3,222.96	312.000	SY	N	PILES, POLYETHYLENE SHEETING
0460 2 1	1	\$1.40	\$69,787.92	49,761.000	LB	N	STRUCT STEEL, CARBON
0460 2 2	1	\$2.31	\$1,557,198.20	675,160.000	LB	N	STRUCT STEEL, LOW ALLOY
0462 2 11	1	\$22.00	\$115,258.00	5,239.000	LB	N	POST TENSIONING TENDONS, SUPSTR STRAND G
0515 1 2	6	\$28.46	\$472,220.12	16,595.000	LF	N	PIPE HANDRAIL - GUIDERAIL, ALUMINUM
0515 2311	2	\$99.42	\$77,152.00	776.000	LF	N	PED/BICYCLE RAILING, ALUM,42" TYPE 1
0515 4 2	3	\$48.75	\$37,730.64	774.000	LF	N	BULLET RAIL, DOUBLE RAIL
0515 4 42	1	\$29.00	\$8,874.00	306.000	LF	N	BULLET RAIL, RELOCATE- DOUBLE RAIL
0519 78	1	\$656.36	\$37,412.52	57.000	EA	N	BOLLARDS
0520 1 7	5	\$10.81	\$1,066,224.43	98,591.000	LF	N	CONCRETE CURB & GUTTER, TYPE E
0520 1 10	17	\$14.89	\$1,562,586.75	104,926.000	LF	N	CONCRETE CURB & GUTTER, TYPE F
0520 1 11	2	\$21.51	\$9,465.08	440.000	LF	N	CONCRETE CURB & GUTTER, VAR HT TYPE F
0520 1 12	1	\$18.00	\$3,420.00	190.000	LF	N	CONCRETE CURB & GUTTER, TYPE F W/SP GUTT
0520 2 2	2	\$11.79	\$2,641.03	224.000	LF	N	CONCRETE CURB, TYPE B
0520 2 4	7	\$16.76	\$40,664.46	2,426.000	LF	N	CONCRETE CURB, TYPE D

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0520 2 8	1	\$21.56	\$16,320.92	757.000	LF	N	CONCRETE CURB, TYPE RA
0520 3	1	\$18.00	\$1,152.00	64.000	LF	N	VALLEY GUTTER- CONCRETE
0520 5 11	3	\$33.61	\$69,131.54	2,057.000	LF	N	TRAF SEP CONC-TYPE I, 4' WIDE
0520 5 12	1	\$18.41	\$17,526.32	952.000	LF	N	TRAF SEP CONC-TYPE I, 6' WIDE
0520 5 21	1	\$281.00	\$2,248.00	8.000	LF	N	TRAF SEP CONC - TYPE II, 4' WIDE
0520 5 22	1	\$77.47	\$16,733.52	216.000	LF	N	TRAF SEP CONC - TYPE II, 6' WIDE
0520 5 41	4	\$36.79	\$89,461.35	2,432.000	LF	N	TRAF SEP CONC-TYPE IV, 4' WIDE
0520 6	2	\$18.33	\$202,377.00	11,040.000	LF	N	SHOULDER GUTTER- CONCRETE
0520 70	4	\$86.09	\$185,003.40	2,149.000	SY	N	CONCRETE TRAFFIC SEPARATOR, SP- VAR WIDT
0521 5 4	1	\$95.00	\$39,045.00	411.000	LF	N	CONC TRAF RAIL- BRG, 32" VERT FACE
0521 6 31	1	\$105.00	\$47,250.00	450.000	LF	N	CONC PARAPET, RETAINING WALL SYS, 27"
0521 8 3	1	\$291.00	\$25,026.00	86.000	LF	N	CONC TRAF RAIL BAR,JCT SLAB,32"V SHP
0522 1	15	\$33.23	\$2,038,822.40	61,363.000	SY	N	CONCRETE SIDEWALK AND DRIVEWAYS, 4"
0522 2	16	\$49.43	\$1,846,757.30	37,364.000	SY	N	CONCRETE SIDEWALK AND DRIVEWAYS, 6"
0522 3	1	\$100.23	\$5,312.19	53.000	SY	N	BUS BOARDING PAD- CONCRETE
0522 4	5	\$124.99	\$37,620.83	301.000	SY	N	BUS SHELTER PAD- CONCRETE
0523 1	1	\$68.00	\$20,740.00	305.000	SY	N	PATTERNED PAVEMENT, VEHICULAR AREAS
0523 1 3	9	\$45.12	\$320,521.34	7,103.000	SY	N	PATTERNED PAVEMENT, VEHIC AREAS- BIKE LA
0523 2	1	\$86.76	\$17,178.48	198.000	SY	N	PATTERNED PAVEMENT, NON-VEHICULAR AREAS
0524 1 1	2	\$41.31	\$238,427.70	5,771.000	SY	N	CONCRETE DITCH PAVT, NR, 3"
0524 2 2	1	\$77.69	\$308,292.00	3,968.000	SY	N	CONC SLOPE PAVT, NR, 4"
0526 1 2	5	\$128.90	\$56,199.13	436.000	SY	N	PAVERS, ARCHITECTURAL, SIDEWALK
0527 2	17	\$26.83	\$311,466.57	11,609.000	SF	N	DETECTABLE WARNINGS
0530 1	2	\$384.94	\$212,716.63	552.600	CY	N	RIPRAP, SAND-CEMENT
0530 3 3	4	\$100.07	\$484,372.75	4,840.400	TN	N	RIPRAP- RUBBLE, BANK AND SHORE
0530 3 4	2	\$86.53	\$21,452.00	247.900	TN	N	RIPRAP, RUBBLE, F&I, DITCH LINING
0530 3 8	1	\$35.00	\$15,319.50	437.700	CY	N	RIPRAP- RUBBLE, REM EXIST & REINSTALL
0530 4 4	1	\$64.00	\$254,208.00	3,972.000	SY	N	ARTICULATING CONC BLOCK REVET SYS, 4"
0530 74	3	\$120.10	\$241,748.90	2,012.900	TN	N	BEDDING STONE
0534 72101	2	\$27.93	\$10,009,976.50	358,425.000	SF	N	SOUND/NOISE BARRIER-INC FOUNDATION, PERM
0536 1 0	3	\$28.77	\$4,776.20	166.000	LF	N	GUARDRAIL- ROADWAY, GEN/LS TL-2
0536 1 1	8	\$19.35	\$1,466,920.02	75,825.000	LF	N	GUARDRAIL- ROADWAY, GEN TL-3
0536 1 3	1	\$33.00	\$726.00	22.000	LF	N	GUARDRAIL- ROADWAY, DOUBLE FACE
0536 1 11	2	\$37.07	\$55,906.00	1,508.000	LF	N	GUARDRAIL, ROADWAY, MOD THRIE BEAM
0536 6	6	\$14.27	\$445,760.50	31,234.000	LF	N	PIPE RAIL FOR GUARDRAIL
0536 7 2	4	\$224.46	\$34,567.56	154.000	EA	N	SPECIAL GUARDRAIL POST- SP STEEL POST CM
0536 7 3	6	\$249.81	\$37,722.06	151.000	EA	N	SPECIAL GUARDRAIL POST- ENCASED POST SM
0536 8 11	5	\$3,070.98	\$30,709.81	10.000	EA	N	APPR TRANS TO RIGID BARR CONNECT, F&I
0536 8 12	1	\$1,500.00	\$1,500.00	1.000	EA	N	APPROACH TRANS CONN TO RIGID BA, F&I, 2
0536 8 13	4	\$3,185.79	\$127,431.60	40.000	EA	N	APPROACH TRANS CONN TO RIGID BA, F&I, 3

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0536 73	8	\$1.27	\$132,823.99	104,682.000	LF	N	GUARDRAIL REMOVAL
0536 85 24	4	\$2,894.99	\$104,219.54	36.000	EA	N	GUARDRAIL END TREATMENT- PARA APP TERM
0536 85 25	8	\$768.27	\$74,522.06	97.000	EA	N	GUARDRAIL END TREAT- TRAIL AN TYPE II
0536 85 26	2	\$2,157.34	\$8,629.36	4.000	EA	N	GUARDRAIL END TREATMENT- TYPE CRT
0538 1	4	\$4.89	\$96,797.02	19,810.000	LF	N	GUARDRAIL RESET
0542 70	1	\$78.00	\$15,834.00	203.000	EA	N	BUMPER GUARDS, CONCRETE
0544 75 1	3	\$24,111.11	\$217,000.00	9.000	EA	N	CRASH CUSHION
0546 72 1	1	\$1,340.00	\$32,050.12	23.918	GM	N	GROUND-IN RUMBLE STRIPS, 16"
0548 12	1	\$26.88	\$1,896,410.88	70,551.000	SF	N	RET WALL SYSTEM, PERM, EX BARRIER
0550 10218	2	\$27.99	\$30,453.56	1,088.000	LF	N	FENCING, TYPE B, 0.0-5.0', RESET EXIST
0550 10220	2	\$21.15	\$19,251.00	910.000	LF	N	FENCING, TYPE B, 5.1-6.0', STANDARD
0550 10221	1	\$25.00	\$948,950.00	37,958.000	LF	N	FENCING, TYPE B, 5.1-6.0', W/ BARB ATTMT
0550 10222	1	\$25.64	\$337,089.08	13,147.000	LF	N	FENCING, TYPE B, 5.1-6.0, W/ VINYL COAT
0550 10228	1	\$14.72	\$8,081.28	549.000	LF	N	FENCING, TYPE B, 5.1-6.0, RESET EXISTING
0550 10250	1	\$23.76	\$64,270.80	2,705.000	LF	N	FENCING, TYPE B, 8.1-10.0', STANDARD FEA
0550 10256	1	\$29.89	\$658,805.49	22,041.000	LF	N	FENCING, TYPE B, 8-10.0', VIN BARB
0550 10420	1	\$48.00	\$3,504.00	73.000	LF	N	FENCING, WOOD, 5.1-6.0'
0550 60211	1	\$1,398.28	\$9,787.96	7.000	EA	N	FENCE GATE,TYP B,SGL, 0- 6.0' OPENING
0550 60212	1	\$1,294.99	\$3,884.97	3.000	EA	N	FENCE GATE,TYP B,SGL,6.1-12.0' OPENING
0550 60225	1	\$2,210.40	\$4,420.80	2.000	EA	N	FENCE GATE,TYP B, DBL, 20.1-24' OPENING
0550 60400	1	\$3,227.80	\$6,455.60	2.000	EA	N	FENCE GATE, RESET EXISTING
0561 1	1	\$2,186.24	\$924,997.92	423.100	TN	N	COATING EXISTING STRUCTURAL STEEL
0563 4	1	\$.46	\$21,759.84	47,304.000	SF	N	ANTI-GRAFFITI COATING, NON-SACRIFICIAL
0570 1 1	2	\$.75	\$31,925.91	42,755.000	SY	N	PERFORMANCE TURF
0570 1 2	18	\$3.14	\$4,165,796.88	1,327,860.000	SY	N	PERFORMANCE TURF, SOD
0571 1 13	1	\$25.00	\$575.00	23.000	SY	N	PLASTIC EROSION MAT, TRM, TYPE 3
0580 2 1	2	\$173.42	\$3,295.00	19.000	EA	N	LANDSCAPE- RELOCATE TREE, PALMS <14'
0580 2 2	1	\$360.00	\$112,680.00	313.000	EA	N	LANDSCAPE- RELOCATE TREE, PALMS >14'
0580 2 5	2	\$2,650.00	\$31,800.00	12.000	EA	N	LANDSCAPE- RELOCATE TREE, TREES >5"
0580 2 7	2	\$469.58	\$5,635.00	12.000	EA	N	LANDSCAPE- RELOCATE TREE, PALMS <14' SAB
0580 2 8	3	\$366.01	\$54,170.00	148.000	EA	N	LANDSCAPE- RELOCATE TREE, PALMS >14' SAB
0590 70 1	3	\$13,313.05	\$39,939.15	3.000	LS	N	IRRIGATION SYSTEM REPAIRS
0630 2 11	18	\$7.66	\$1,692,610.52	220,924.000	LF	N	CONDUIT, F& I, OPEN TRENCH
0630 2 12	20	\$19.52	\$1,327,797.69	68,007.000	LF	N	CONDUIT, F& I, DIRECTIONAL BORE
0630 2 14	3	\$19.16	\$79,831.40	4,167.000	LF	N	CONDUIT, F& I, ABOVEGROUND
0630 2 15	3	\$19.58	\$65,096.50	3,325.000	LF	N	CONDUIT, F& I, BRIDGE MOUNT
0632 7 1	9	\$5,198.33	\$135,156.53	26.000	PI	N	SIGNAL CABLE- NEW OR RECO, FUR & INSTALL
0632 7 2	9	\$2.89	\$36,533.88	12,649.000	LF	N	SIGNAL CABLE, REPAIR/REPL-FUR & INSTALL
0632 7 4	1	\$850.00	\$850.00	1.000	PI	N	SIGNAL CABLE, ADJUST
0632 7 6	4	\$782.69	\$10,174.95	13.000	PI	N	SIGNAL CABLE, REMOVE- INTERSECTION

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0632 7 7	1	\$1.00	\$450.00	450.000	LF	N	SIGNAL CABLE, REMOVE- OUTSIDE OF INTERSE
0633 1121	6	\$2.40	\$33,733.50	14,034.000	LF	N	FIBER OPTIC CABLE, F&I, UG,2-12
0633 1122	3	\$2.03	\$235,190.05	115,751.000	LF	N	FIBER OPTIC CABLE, F&I, UG,13-48
0633 1123	1	\$8.70	\$1,044.00	120.000	LF	N	FIBER OPTIC CABLE, F&I, UG,49-96
0633 1124	1	\$2.50	\$123,165.00	49,266.000	LF	N	FIBER OPTIC CABLE, F&I, UG,97-144
0633 1420	2	\$8.43	\$18,363.60	2,178.000	LF	N	FIBER OPTIC CABLE, REL, UG
0633 1620	2	\$.52	\$38,607.25	74,402.000	LF	N	FIBER OPTIC CABLE, REM, UG
0633 2 31	3	\$44.96	\$109,695.80	2,440.000	EA	N	FIBER OPTIC CONNECTION, INSTALL, SPLICE
0633 2 32	4	\$59.28	\$12,211.04	206.000	EA	N	FIBER OPTIC CONNECTION, INSTALL, TERM
0633 3 11	3	\$750.16	\$28,506.10	38.000	EA	N	FIBER OPTIC CONN HDWR, SPLICE ENCLOSURE
0633 3 12	3	\$26.30	\$6,129.05	233.000	EA	N	FIBER OPTIC CONN HDWR, SPLICE TRAY
0633 3 13	2	\$116.67	\$63,820.00	547.000	EA	N	FIBER OPTIC CONN HDWR, PRETERM CONNECT A
0633 3 15	4	\$1,581.00	\$42,687.08	27.000	EA	N	FIBER OPTIC CONN HDWR, PRETERM PATCH PAN
0633 3 16	3	\$571.79	\$70,330.00	123.000	EA	N	FIBER OPTIC CONN HDWR, PATCH PANEL- FIE
0633 3 17	1	\$250.00	\$18,750.00	75.000	EA	N	FIBER OPTIC CONN HDWR, CONNECTOR PANEL
0633 3 51	2	\$485.00	\$1,455.00	3.000	EA	N	FIBER OPTIC CONN HDWR, SPLICE ENCLOSURE
0633 3 52	1	\$150.00	\$2,550.00	17.000	EA	N	FIBER OPTIC CONN HDWR, ADJ, SPL TRAY
0633 3 56	1	\$300.00	\$3,600.00	12.000	EA	N	FIBER OPTIC CONN HDWR, ADJ, PATCH PANEL
0633 8 1	3	\$4.82	\$5,223.00	1,084.000	LF	N	MULTI-CONDUCTOR COMMUNICATION CABLE, F&I
0633 8 6	1	\$1.20	\$580.80	484.000	LF	N	MULTI-CONDUCTOR COMMUNICATION CABLE, REM
0634 4152	1	\$1,423.00	\$1,423.00	1.000	PI	N	SPAN WIRE ASSEMBLY, F&I, TWO PT, DIAG
0634 4153	2	\$1,542.55	\$10,797.88	7.000	PI	N	SPAN WIRE ASSEM, F&I, TWO PT, BOX/DROP B
0634 4600	2	\$750.00	\$1,500.00	2.000	PI	N	SPAN WIRE ASSEMBLY, REMOVE- POLES REMAIN
0634 4700	1	\$1,150.00	\$1,150.00	1.000	PI	N	SPAN WIRE ASSEMBLY, RE-TENSION CABLE - M
0635 2 11	21	\$635.57	\$1,145,291.04	1,802.000	EA	N	PULL & SPLICE BOX, F&I, 13" x 24"
0635 2 12	9	\$1,186.52	\$303,748.32	256.000	EA	N	PULL & SPLICE BOX, F&I, 24" X 36"
0635 2 13	4	\$2,543.77	\$132,275.85	52.000	EA	N	PULL & SPLICE BOX, F&I, 30" X 60" OR 36"
0635 3 11	1	\$455.00	\$4,095.00	9.000	EA	N	JUNCTION BOX, FURNISH & INSTALL, AERIAL
0635 3 12	3	\$388.76	\$19,049.00	49.000	EA	N	JUNCTION BOX, FURNISH & INSTALL, MOUNTED
0639 1112	2	\$2,695.96	\$21,567.70	8.000	AS	N	ELECTRICAL POWER SRV,F&I,OH,M,PUR BY CON
0639 1121	2	\$8,633.33	\$25,900.00	3.000	AS	N	ELECTRICAL POWER SRV,F&I, UG,FUR BY POWE
0639 1122	4	\$3,295.64	\$56,025.80	17.000	AS	N	ELECTRICAL POWER SRV,F&I, UG,PUR CONT
0639 1123	1	\$1,500.00	\$4,500.00	3.000	AS	N	ELECTRICAL POWER SRV,F&I, UG,PUR,NOT REQ
0639 1410	1	\$1,493.80	\$1,493.80	1.000	AS	N	ELECTRICAL POWER SRV,REL OHD,
0639 1420	1	\$1,300.00	\$2,600.00	2.000	AS	N	ELECTRICAL POWER SRV,REL UND
0639 1610	1	\$617.99	\$3,089.95	5.000	AS	N	ELECTRICAL POWER SRV,REM OHD
0639 1620	2	\$737.67	\$2,213.00	3.000	AS	N	ELECTRICAL POWER SRV,REM UND
0639 2 1	10	\$5.50	\$362,596.12	65,945.000	LF	N	ELECTRICAL SERVICE WIRE, F&I
0639 2 6	5	\$.77	\$6,557.62	8,467.000	LF	N	ELECTRICAL SERVICE WIRE, REMOVE
0639 3 11	3	\$758.64	\$44,760.00	59.000	EA	N	ELEC SERV DISCON, F&I, POLE MNT

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0639	3 12	1	\$712.38	\$2,849.52	4.000	EA	N	ELEC SERV DISCON, F&I, CABINET
0639	3 60	1	\$300.00	\$300.00	1.000	EA	N	ELEC SERV DISCON, REMOVE
0639	6 1	3	\$1,644.43	\$77,288.44	47.000	EA	N	ELECTRICAL POWER SERVICE- TRANSF, F&I
0641	2 11	2	\$1,471.90	\$30,910.00	21.000	EA	N	PREST CNC POLE,F&I,TYP P-II,PEDESTAL
0641	2 12	5	\$1,446.31	\$27,479.87	19.000	EA	N	PREST CNC POLE,F&I,TYP P-II SRV POLE
0641	2 13	2	\$7,082.14	\$198,300.00	28.000	EA	N	PREST CNC POLE,F&I,TYP P-III
0641	2 14	1	\$10,200.00	\$122,400.00	12.000	EA	N	PREST CNC POLE,F&I,TYP P-IV
0641	2 15	1	\$11,600.00	\$104,400.00	9.000	EA	N	PREST CNC POLE,F&I,TYP P-V
0641	2 18	1	\$10,299.81	\$247,195.44	24.000	EA	N	PREST CNC POLE,F&I,TYP P-VIII
0641	2 60	2	\$317.50	\$1,270.00	4.000	EA	N	PREST CNC POLE, REMOVE
0641	2 70	2	\$1,376.66	\$41,299.80	30.000	EA	N	PREST CNC POLE, REMOVE SHALLOW
0641	2 80	1	\$4,400.00	\$57,200.00	13.000	EA	N	PREST CNC POLE, REMOVE COMPLETE
0641	3163	1	\$20,500.00	\$61,500.00	3.000	EA	N	CONCRETE CCTV POLE, FUR & INS W/LOW
0641	3175	1	\$22,000.00	\$44,000.00	2.000	EA	N	CONCRETE CCTV POLE, FUR & INS W/LOW
0641	3180	1	\$22,000.00	\$44,000.00	2.000	EA	N	CONCRETE CCTV POLE, FUR & INS W/LOW
0641	3186	1	\$24,700.00	\$49,400.00	2.000	EA	N	CONCRETE CCTV POLE, FUR & INS W/LOW
0641	3800	1	\$5,500.00	\$16,500.00	3.000	EA	N	CONCRETE CCTV POLE, REMOVE
0646	1 11	11	\$1,090.72	\$152,700.61	140.000	EA	N	ALUMINUM SIGNALS POLE, PEDESTAL
0646	1 12	5	\$1,432.92	\$40,121.80	28.000	EA	N	ALUMINUM SIGNALS POLE, PED DETECT POST
0646	1 40	3	\$1,061.97	\$7,433.80	7.000	EA	N	ALUMINUM SIGNALS POLE, RELOCATE
0646	1 60	7	\$352.27	\$13,738.40	39.000	EA	N	ALUMINUM SIGNALS POLE, REMOVE
0646	2400	1	\$715.00	\$715.00	1.000	EA	N	ALUMINUM POLE- INDEX 17900, RELOCATE
0649	1 17	1	\$7,000.00	\$7,000.00	1.000	EA	N	STEEL STRAIN POLE, F&I, TYPE PS- X
0649	1 63	1	\$900.00	\$900.00	1.000	EA	N	STEEL STRAIN POLE, REMOVE, SHALLOW, BOLT
0649	21 1	1	\$30,000.00	\$30,000.00	1.000	EA	N	STEEL MAST ARM ASSEMBLY, F&I, 30'
0649	21 3	1	\$30,000.00	\$30,000.00	1.000	EA	N	STEEL MAST ARM ASSEMBLY, F&I, 40'
0649	21 6	3	\$32,120.26	\$224,841.84	7.000	EA	N	STEEL MAST ARM ASSEMBLY, F&I, 50'
0649	21 10	2	\$37,649.78	\$225,898.65	6.000	EA	N	STEEL MAST ARM ASSEMBLY, F&I, 60'
0649	21 15	2	\$45,051.50	\$180,206.00	4.000	EA	N	STEEL MAST ARM ASSEMBLY, F&I, 70'
0649	21 18	1	\$55,413.00	\$55,413.00	1.000	EA	N	STEEL MAST ARM ASSEMBLY, F&I, 70'- 50'
0649	21 19	1	\$62,000.00	\$62,000.00	1.000	EA	N	STEEL MAST ARM ASSEMBLY, F&I, 70-60
0649	21 20	1	\$60,000.00	\$60,000.00	1.000	EA	N	STEEL MAST ARM ASSEMBLY, F&I, 70-70
0649	21 21	3	\$51,117.38	\$204,469.50	4.000	EA	N	STEEL MAST ARM ASSEMBLY, F&I, 78'
0649	21 27	1	\$68,000.00	\$68,000.00	1.000	EA	N	STEEL MAST ARM ASSEMBLY, F&I, 78-78
0649	26 3	4	\$3,788.95	\$34,100.51	9.000	EA	N	STEEL MAST ARM ASSEMBLY, REMOVE
0649	26 5	1	\$5,000.00	\$35,000.00	7.000	EA	N	STEEL MAST ARM ASSEMBLY, REMOVE
0650	1 13	1	\$900.00	\$4,500.00	5.000	AS	N	VEH TRAF SIGNAL,F&I ALUMINUM, 2 S 1-2 W
0650	1 14	6	\$873.87	\$173,026.82	198.000	AS	N	VEH TRAF SIGNAL,F&I ALUMINUM, 3 S 1 W
0650	1 15	1	\$1,700.00	\$5,100.00	3.000	AS	N	VEH TRAF SIGNAL,F&I ALUMINUM, 3 S 2-4 W
0650	1 18	3	\$1,183.33	\$7,100.00	6.000	AS	N	VEH TRA SIGNAL,F&I ALUMINUM, 5 S STR 1 W

Florida Department of Transportation
Item Average Unit Cost
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Item	No. of Conts	Weighted Average	Total Amount	Total Quantity	Unit Meas	Obs?	Description
0650 1 19	5	\$1,273.46	\$40,750.58	32.000	AS	N	VEH TRAF SIGNAL,F&I ALUMINUM, 5 S CL 1 W
0650 1 34	1	\$798.38	\$4,790.28	6.000	AS	N	VEH TRAF SIGNAL,F&I POLYCARBONA, 3 S 1 W
0650 1 60	3	\$60.63	\$1,455.00	24.000	AS	N	VEH TRAF SIGNAL, REMOVE- POLES TO REMAIN
0650 1 70	1	\$650.00	\$4,550.00	7.000	AS	N	VEHICULAR TRAFFIC SIGNAL, RELOCATE
0653 1 11	12	\$767.51	\$91,333.65	119.000	AS	N	PEDESTRIAN SIGNAL, F&I LED COUNT, 1 WAY
0653 1 12	8	\$1,020.80	\$29,603.19	29.000	AS	N	PEDESTRIAN SIGNAL, F&I LED COUNT, 2 WAYS
0653 1 40	3	\$350.34	\$2,802.70	8.000	AS	N	PEDESTRIAN SIGNAL, RELOCATE
0653 1 60	7	\$80.95	\$5,666.60	70.000	AS	N	PEDESTRIAN SIGNAL, REMOVE
0660 1109	2	\$113.00	\$8,136.00	72.000	EA	N	LOOP DETECTOR INDUCTIVE, F&I, TYPE 9
0660 1110	2	\$160.83	\$965.00	6.000	EA	N	LOOP DETECTOR INDUCTIVE, F&I, TYPE 10
0660 1600	1	\$30.00	\$60.00	2.000	EA	N	LOOP DETECTOR INDUCTIVE, REMOVE
0660 2102	1	\$1,029.98	\$80,338.44	78.000	AS	N	LOOP ASSEMBLY, F&I, TYPE B
0660 2106	2	\$1,227.45	\$119,062.52	97.000	AS	N	LOOP ASSEMBLY, F&I, TYPE F
0660 3 11	1	\$200.00	\$9,800.00	49.000	EA	N	VEHICLE DETECTION SYSTEM- MICRO,F&I, CAB
0660 3 12	1	\$7,800.00	\$382,200.00	49.000	EA	N	VEHICLE DETECTION SYSTEM- MICRO,F&I, ABO
0660 3 52	1	\$1,200.00	\$1,200.00	1.000	EA	N	VEHICLE DETECTION SYSTEM- MICRO,A&J,ABOV
0660 3 60	1	\$400.00	\$5,200.00	13.000	EA	N	VEHICLE DETECTION SYSTEM- MICRO,REM,SYST
0660 4 11	8	\$10,123.65	\$212,596.59	21.000	EA	N	VEHICLE DETECTION SYSTEM- VIDEO, CABINET
0660 4 12	7	\$3,741.17	\$202,022.93	54.000	EA	N	VEHICLE DETECTION SYSTEM- VIDEO, ABOVE G
0660 4 51	1	\$913.00	\$1,826.00	2.000	EA	N	VEHICLE DETECTION SYSTEM- VIDEO, CABINET
0660 4 52	1	\$913.00	\$1,826.00	2.000	EA	N	VEHICLE DETECTION SYSTEM- VIDEO, ABOVE G
0660 5 11	1	\$16,956.90	\$16,956.90	1.000	EA	N	VEHICLE DETECTION SYSTEM- W MAG, CAB EQU
0660 5 12	1	\$16,729.12	\$16,729.12	1.000	EA	N	VEHICLE DETECTION SYSTEM- W MAG, AG EQUI
0660 5 13	1	\$2,865.38	\$5,730.76	2.000	EA	N	VEHICLE DETECTION SYSTEM- W MAG, IN-ROAD
0660 6112	1	\$12,000.00	\$156,000.00	13.000	EA	N	VEHICLE DETECTION SYSTEM- AVI T,F&I, ABO
0660 6121	1	\$2,150.00	\$8,600.00	4.000	EA	N	VEHICLE DETECTION SYSTEM- AVI B,F&I, CAB
0660 6122	1	\$7,400.00	\$29,600.00	4.000	EA	N	VEHICLE DETECTION SYSTEM- AVI B,F&I, ABO
0660 6421	1	\$925.00	\$925.00	1.000	EA	N	VEHICLE DETECTION SYSTEM- AVI B, REL
0660 6600	1	\$400.00	\$2,000.00	5.000	EA	N	VEHICLE DETECTION SYSTEM- AVI REMOVE
0665 1 11	11	\$301.77	\$48,282.84	160.000	EA	N	PEDESTRIAN DETECTOR, F&I, STANDARD
0665 1 12	2	\$2,261.54	\$58,800.00	26.000	EA	N	PEDESTRIAN DETECTOR, F&I, ACCESSIBLE
0665 1 40	2	\$413.33	\$1,240.00	3.000	EA	N	PEDESTRIAN DETECTOR, RELOCATE
0665 1 60	8	\$62.85	\$6,096.38	97.000	EA	N	PEDESTRIAN DETECTOR, REMOVE
0670 5110	3	\$27,003.18	\$189,022.24	7.000	AS	N	TRAF CNTL ASSEM, F&I, NEMA
0670 5111	1	\$29,869.45	\$119,477.80	4.000	AS	N	TRAF CNTL ASSEM, F&I, NEMA, 1 PREEMPT
0670 5112	1	\$27,550.00	\$27,550.00	1.000	AS	N	TRAF CNTL ASSEM, F&I, NEMA, 2 PREEMPT
0670 5122	1	\$29,000.00	\$87,000.00	3.000	AS	N	TRAF CNTL ASSEM, F&I, 170,2 PREEM PLANS
0670 5400	8	\$2,628.46	\$44,683.80	17.000	AS	N	TRAF CNTL ASSEM, MODIFY
0670 5600	5	\$941.75	\$9,417.47	10.000	AS	N	TRAF CNTL ASSEM, REMOVE
0671 2 50	1	\$1,855.00	\$1,855.00	1.000	EA	N	TRAFFIC CONTROLLER, RELOCATE

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0676 1116	1	\$20,413.00	\$20,413.00	1.000	EA	N	TRAFFIC SIGNAL CONTR CAB, F&I, NEMA S 1
0676 1131	1	\$3,250.00	\$6,500.00	2.000	EA	N	TRAFFIC SIGNAL CONT CAB, F&I W/O CONTROL
0676 1600	2	\$685.00	\$2,055.00	3.000	EA	N	TRAFFIC SIGNAL CONTR CAB, REMOVE
0676 2111	1	\$2,900.00	\$55,100.00	19.000	EA	N	ITS CABINET- F&I, POLE, 336
0676 2121	1	\$6,300.00	\$31,500.00	5.000	EA	N	ITS CABINET- F&I, POLE, 336
0676 2122	1	\$6,500.00	\$162,500.00	25.000	EA	N	ITS CABINET- F&I, POLE, 336S
0676 2131	1	\$8,500.00	\$8,500.00	1.000	EA	N	ITS CABINET- F&I, BASE, 336
0676 2142	1	\$8,409.54	\$16,819.08	2.000	EA	N	ITS CABINET- F&I, BASE WITH SUN, 336S
0676 2143	2	\$9,822.22	\$88,400.00	9.000	EA	N	ITS CABINET- F&I, BASE, 334
0676 2144	1	\$13,413.00	\$13,413.00	1.000	EA	N	ITS CABINET- F&I, BASE, 340
0676 2400	1	\$2,400.00	\$14,400.00	6.000	EA	N	ITS CABINET- RELOCATE
0676 2500	1	\$3,500.00	\$3,500.00	1.000	EA	N	ITS CABINET- ADJUST/MODIFY
0676 2600	2	\$783.75	\$15,675.00	20.000	EA	N	ITS CABINET- REMOVE
0676 3 10	1	\$1,300.00	\$36,400.00	28.000	EA	N	SMALL EQUIPMENT ENCLOSURE, F&I,>10X13X11
0676 3 50	1	\$450.00	\$450.00	1.000	EA	N	SMALL EQUIPMENT ENCLOSURE, ADJUST/MODIFY
0682 1113	1	\$8,456.50	\$33,826.00	4.000	EA	N	ITS CCTV CAMERA, F&I, DOME ENCL-PRESS
0682 1133	1	\$4,700.00	\$42,300.00	9.000	EA	N	ITS CCTV CAMERA, F&I, DOME ENCL-NP.
0682 1400	3	\$1,665.14	\$11,656.00	7.000	EA	N	ITS CCTV CAMERA, RELOCATE
0682 1600	1	\$600.00	\$2,400.00	4.000	EA	N	ITS CCTV CAMERA, REMOVE & DISPOSAL
0684 1 1	6	\$5,564.46	\$261,529.46	47.000	EA	N	MANAGED FIELD ETHERNET SWITCH, F&I
0684 1 4	1	\$455.00	\$455.00	1.000	EA	N	MANAGED FIELD ETHERNET SWITCH, RELOCATE
0684 2 1	1	\$430.00	\$9,460.00	22.000	EA	N	DEVICE SERVER, F&I
0684 3 41	1	\$155.00	\$310.00	2.000	EA	N	DIGITAL VIDEO ENC W SO, REL HARD ENCODER
0684 5 1	2	\$440.19	\$23,330.00	53.000	EA	N	MEDIA CONVERTER, FURNISH & INSTALL
0684 5 4	1	\$3,100.00	\$3,100.00	1.000	EA	N	MEDIA CONVERTER, RELOCATE
0684 6 11	1	\$7,500.00	\$30,000.00	4.000	EA	N	WIRELESS COMMUNICATION DEVICE, F&I, ETHE
0684 6 12	1	\$5,000.00	\$40,000.00	8.000	EA	N	WIRELESS COMMUNICATION DEVICE, F&I, ETHE
0684 6 60	1	\$750.00	\$750.00	1.000	EA	N	WIRELESS COMMUNICATION DEVICE, REMOVE
0685 1 11	4	\$4,349.61	\$30,447.28	7.000	EA	N	UPS POWER SUPPLY, F&I, LINE INTERACTIVE
0685 1 12	1	\$2,100.00	\$58,800.00	28.000	EA	N	UPS, F&I, ONLINE DOUBLE CONVERSION
0685 1 14	1	\$400.00	\$800.00	2.000	EA	N	UPS, F&I, ONLINE DOUBLE CONVERSION W CAB
0687 1 50	1	\$14,000.00	\$14,000.00	1.000	EA	N	HIGHWAY ADVISORY RADIO, MODI, AC POWERED
0695 1 1	6	\$1,356.28	\$99,008.62	73.000	EA	N	TMS VEH SNSR-NON-WEIGHT, F&I,
0695 6 12	6	\$1,329.76	\$97,072.82	73.000	EA	N	TMS IND LOOP ASSEMBLY
0695 7131	1	\$3,750.00	\$7,500.00	2.000	EA	N	TMS CABINET, F&I , TYP 3 BASE MOUNT
0695 7132	3	\$4,156.57	\$37,409.10	9.000	EA	N	TMS CABINET, F&I , TYP 3 PEDESTAL
0695 7141	2	\$3,985.00	\$11,955.00	3.000	EA	N	TMS CABINET, F&I , TYP 4 BASE
0695 7600	2	\$350.00	\$1,400.00	4.000	EA	N	TMS CABINET, REMOVE
0700 1 11	17	\$358.32	\$389,488.55	1,087.000	AS	N	SINGLE POST SIGN, F&I GM, <12 SF
0700 1 12	13	\$1,296.20	\$300,717.50	232.000	AS	N	SINGLE POST SIGN, F&I GM, 12-20 SF

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Item	No. of Conts	Weighted Average	Total Amount	Total Quantity	Unit Meas	Obs?	Description
0700 1 13	9	\$1,428.77	\$55,722.01	39.000	AS	N	SINGLE POST SIGN, F&I GM, 21-30 SF
0700 1 14	2	\$1,685.71	\$11,800.00	7.000	AS	N	SINGLE POST SIGN, F&I GM, 31+ SF
0700 1 21	1	\$1,048.39	\$2,096.78	2.000	AS	N	SINGLE POST SIGN, F&I BARR MT, LT 12 SF
0700 1 31	1	\$1,621.64	\$19,459.68	12.000	AS	N	SINGLE POST SIGN, F&I BRG MNT, <12 SF
0700 1 32	1	\$2,250.00	\$4,500.00	2.000	AS	N	SINGLE POST SIGN, F&I BRG MNT, 12-20 SF
0700 1 40	1	\$120.00	\$120.00	1.000	AS	N	SINGLE POST SIGN, INSTALL
0700 1 50	12	\$325.81	\$39,422.79	121.000	AS	N	SINGLE POST SIGN, RELOCATE
0700 1 60	18	\$29.02	\$19,846.62	684.000	AS	N	SINGLE POST SIGN, REMOVE
0700 2 12	1	\$3,294.93	\$3,294.93	1.000	AS	N	MULTI- POST SIGN, F&I GM, 12-20 SF
0700 2 13	3	\$3,926.00	\$19,630.00	5.000	AS	N	MULTI- POST SIGN, F&I GM, 21-30 SF
0700 2 14	5	\$4,678.72	\$79,538.23	17.000	AS	N	MULTI- POST SIGN, F&I GM, 31-50 SF
0700 2 15	4	\$6,054.07	\$230,054.50	38.000	AS	N	MULTI- POST SIGN, F&I GM, 51-100 SF
0700 2 16	3	\$11,326.09	\$260,500.00	23.000	AS	N	MULTI- POST SIGN, F&I GM, 101-200 SF
0700 2 17	1	\$15,700.00	\$31,400.00	2.000	AS	N	MULTI- POST SIGN, F&I GM, 201-300 SF
0700 2 50	4	\$4,644.95	\$65,029.36	14.000	AS	N	MULTI- POST SIGN, RELOCATE
0700 2 60	7	\$931.51	\$67,068.71	72.000	AS	N	MULTI- POST SIGN, REMOVE
0700 3101	5	\$216.65	\$6,282.89	29.000	EA	N	SIGN PANEL, F&I GM, UP TO 12 SF
0700 3102	1	\$504.89	\$6,058.68	12.000	EA	N	SIGN PANEL, F&I GM, 12-20 SF
0700 3104	1	\$1,275.00	\$1,275.00	1.000	EA	N	SIGN PANEL, F&I GM, 31-50 SF
0700 3201	7	\$285.40	\$23,402.53	82.000	EA	N	SIGN PANEL, F&I OM, UP TO 12 SF
0700 3202	1	\$650.00	\$1,300.00	2.000	EA	N	SIGN PANEL, F&I OM, 12-20 SF
0700 3203	1	\$1,200.00	\$16,800.00	14.000	EA	N	SIGN PANEL, F&I OM, 21-30 SF
0700 3204	1	\$4,155.00	\$8,310.00	2.000	EA	N	SIGN PANEL, F&I OM, 31-50 SF
0700 3205	2	\$2,833.33	\$8,500.00	3.000	EA	N	SIGN PANEL, F&I OM, 51-100 SF
0700 3206	2	\$5,205.56	\$93,700.00	18.000	EA	N	SIGN PANEL, F&I OM, 101-200 SF
0700 3207	3	\$7,600.00	\$121,600.00	16.000	EA	N	SIGN PANEL, F&I OM, 201-300 SF
0700 3208	1	\$9,000.00	\$72,000.00	8.000	EA	N	SIGN PANEL, F&I OM, 301-400 SF
0700 3209	1	\$13,500.00	\$27,000.00	2.000	EA	N	SIGN PANEL, F&I OM, 401-500 SF
0700 3211	1	\$20,000.00	\$40,000.00	2.000	EA	N	SIGN PANEL, F&I OM, 601 SF AND GREATER
0700 3501	3	\$188.67	\$1,698.00	9.000	EA	N	SIGN PANEL, RELOCATE, UP TO 12 SF
0700 3502	1	\$253.06	\$253.06	1.000	EA	N	SIGN PANEL, RELOCATE, 12-20 SF
0700 3601	9	\$46.56	\$5,308.21	114.000	EA	N	SIGN PANEL, REMOVE, UP TO 12 SF
0700 3605	1	\$2,140.00	\$2,140.00	1.000	EA	N	SIGN PANEL, REMOVE, 51-100 SF
0700 3606	1	\$1,000.00	\$8,000.00	8.000	EA	N	SIGN PANEL, REMOVE, 101-200 SF
0700 3607	2	\$1,377.14	\$9,640.00	7.000	EA	N	SIGN PANEL, REMOVE, 201-300 SF
0700 3625	1	\$1,300.00	\$1,300.00	1.000	EA	N	SIGN PANEL, REMOVE, 51-100 SF W LIGHTING
0700 3626	1	\$900.00	\$900.00	1.000	EA	N	SIGN PANEL, REMOVE, 101-200 SF W LIGHT
0700 3627	1	\$915.00	\$1,830.00	2.000	EA	N	SIGN PANEL, REMOVE, 201-300 SF W LIGHT
0700 4111	1	\$56,000.00	\$56,000.00	1.000	EA	N	OH STATIC SIGN STR, F&I, C UP TO 20 FT
0700 4112	2	\$65,687.50	\$525,500.00	8.000	EA	N	OH STATIC SIGN STR, F&I, C 21-30 FT

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0700 4113	1	\$80,500.00	\$483,000.00	6.000	EA	N	OH STATIC SIGN STR, F&I, C 31-40 FT
0700 4114	2	\$91,111.11	\$820,000.00	9.000	EA	N	OH STATIC SIGN STR, F&I, C 41-50 FT
0700 4125	1	\$188,000.00	\$1,880,000.00	10.000	EA	N	OH STATIC SIGN STR, F&I, S 51-100 FT
0700 4126	1	\$193,000.00	\$772,000.00	4.000	EA	N	OH STATIC SIGN STR, F&I, S 101-150 FT
0700 4127	1	\$236,000.00	\$236,000.00	1.000	EA	N	OH STATIC SIGN STR, F&I, S 151-200 FT
0700 4610	3	\$4,285.71	\$30,000.00	7.000	EA	N	OH STATIC SIGN STR, REMOVE, CANT
0700 4620	1	\$11,200.00	\$100,800.00	9.000	EA	N	OH STATIC SIGN STR, REMOVE, SPAN
0700 4640	2	\$2,266.67	\$6,800.00	3.000	EA	N	OH STATIC SIGN STR, REMOVE, BRIDGE MOUNT
0700 5 21	1	\$2,574.95	\$30,899.40	12.000	EA	N	INTERNAL ILLUM SIGN, F&I OM, UP TO 12 SF
0700 5 22	5	\$3,169.35	\$123,604.64	39.000	EA	N	INTERNAL ILLUM SIGN, F&I OM, 12-18 SF
0700 5 50	2	\$926.06	\$1,852.11	2.000	EA	N	INTERNAL ILLUM SIGN, RELOCATE
0700 5 60	2	\$255.00	\$510.00	2.000	EA	N	INTERNAL ILLUM SIGN, REMOVE
0700 6 21	1	\$3,871.71	\$19,358.55	5.000	AS	N	HIGHLIGHTED SIGN, F&I GM- SOLAR, <12 SF
0700 6 22	1	\$5,000.00	\$30,000.00	6.000	AS	N	HIGHLIGHTED SIGN, F&I GM- SOLA, 12-20 SF
0700 7131	1	\$41,589.98	\$41,589.98	1.000	EA	N	EMBED DYNAMIC MESS SIGN, F&I, FULL, >12
0700 7500	1	\$7,150.00	\$42,900.00	6.000	EA	N	EMBED DYNAMIC MESS SIGN, RELOCATE
0700 8136	1	\$80,000.00	\$160,000.00	2.000	EA	N	FRONT ACC DYN MESS SIGN, F&I, FULL,101-
0700 8500	1	\$9,300.00	\$18,600.00	2.000	EA	N	FRONT ACC DYN MESS SIGN, RELOCATE
0700 8600	1	\$2,500.00	\$2,500.00	1.000	EA	N	FRONT ACC DYN MESS SIGN, REMOVE
0700 9137	1	\$139,000.00	\$417,000.00	3.000	EA	N	WALK-IN DYN MESS SIGN,F&I, FULL,201-
0700 9500	1	\$12,900.00	\$12,900.00	1.000	EA	N	WALK-IN DYN MESS SIGN, RELOCATE
0700 9600	1	\$6,050.00	\$12,100.00	2.000	EA	N	WALK-IN DYN MESS SIGN, REMOVE
0700 10115	1	\$132,500.00	\$265,000.00	2.000	EA	N	DMS SUPPORT STRUCTURE, SPAN, 51-100 FT
0700 10116	1	\$25,500.00	\$51,000.00	2.000	EA	N	DMS SUPPORT STRUCTURE, SPAN, 101-150 FT
0700 10124	1	\$80,000.00	\$80,000.00	1.000	EA	N	DMS SUPPORT STRUCTURE, CANT, 41-50 FT
0700 10140	1	\$6,888.77	\$6,888.77	1.000	EA	N	DMS SUPPORT STRUCTURE, F&I MULTI POST
0700 10600	1	\$5,900.00	\$11,800.00	2.000	EA	N	DMS SUPPORT STRUCTURE, REMOVE
0700 11222	1	\$7,500.00	\$37,500.00	5.000	AS	N	ELECT DISP SIGN, F&I GM- SO, ELECT REGUL
0700 11231	1	\$9,881.04	\$39,524.16	4.000	AS	N	ELECT DISP SIGN, F&I GM- SO, SPEED FEEDB
0700 11321	1	\$5,013.00	\$5,013.00	1.000	AS	N	ELECT DISP SIGN, F&I OM- AC, EL REG UP
0700 11391	2	\$6,339.29	\$88,750.00	14.000	AS	N	ELECT DISP SIGN, F&I OM- AC, BLANK OUT
0700 11700	1	\$178.00	\$178.00	1.000	AS	N	ELECT DISP SIGN, REMOVE- OVERHEAD MOUNT
0700 12 12	1	\$6,385.88	\$76,630.56	12.000	AS	N	SIGN BEACON, F&I GM- AC, TWO BEACONS
0700 12 22	1	\$2,705.33	\$10,821.32	4.000	AS	N	SIGN BEACON, F&I GM- SOLAR, TWO BEACONS
0700 12 60	1	\$617.99	\$2,471.96	4.000	AS	N	SIGN BEACON, REMOVE BEACON- SIGN TO REMA
0700 13 10	1	\$85.00	\$680.00	8.000	EA	N	RETROREFLECTIVE SIGN STRIP- RR BLADES
0700 13 12	3	\$127.70	\$1,532.40	12.000	EA	N	RETROREFLECTIVE SIGN STRIP- F&I, 2'
0700 13 15	1	\$200.00	\$2,000.00	10.000	EA	N	RETROREFLECTIVE SIGN STRIP- F&I, 5'
0705 10 1	6	\$195.17	\$14,052.57	72.000	EA	N	OBJECT MARKER, TYPE 1
0705 10 2	3	\$165.34	\$69,775.19	422.000	EA	N	OBJECT MARKER, TYPE 2

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Item	No. of Conts	Weighted Average	Total Amount	Total Quantity	Unit Meas	Obs?	Description
0705 10 3	2	\$189.95	\$949.74	5.000	EA	N	OBJECT MARKER, TYPE 3
0705 11 1	3	\$55.00	\$23,595.51	429.000	EA	N	DELINEATOR, FLEXIBLE TUBULAR
0705 11 2	2	\$79.33	\$15,548.59	196.000	EA	N	DELINEATOR, NON-FLEXIBLE
0705 11 3	7	\$151.19	\$13,758.15	91.000	EA	N	DELINEATOR, FLEX HIGH VISABILITY MED
0705 11 4	1	\$95.00	\$4,845.00	51.000	EA	N	DELINEATOR, FLEX HIGH PERFORMANCE 48"
0706 3	1	\$3.00	\$34,089.00	11,363.000	EA	N	RETRO-REFLECTIVE/RAISED PAVEMENT MARKERS
0710 11101	15	\$883.68	\$209,914.37	237.547	GM	N	PAINTED PAVT MARK,STD,WHITE,SOLID,6"
0710 11102	8	\$1,169.69	\$6,509.30	5.565	GM	N	PAINTED PAVT MARK,STD,WHITE,SOLID,8"
0710 11103	4	\$1,925.77	\$18,194.65	9.448	GM	N	PAINTED PAVT MARK,STD,WHITE,SOLID,12"
0710 11123	8	\$.58	\$18,716.95	32,491.000	LF	N	PAINTED PAVT MARK,STD,WHITE,SOLID, 12"
0710 11124	6	\$.98	\$6,602.44	6,716.000	LF	N	PAINTED PAVT MARK,STD,WHITE,SOLID, 18"
0710 11125	12	\$1.19	\$18,229.03	15,270.000	LF	N	PAINTED PAVT MARK,STD,WHITE,SOLID,24"
0710 11131	12	\$348.67	\$65,134.30	186.810	GM	N	PAINTED PAVT MARK,STD,WHITE,SKIP, 6"
0710 11141	9	\$391.47	\$8,890.62	22.711	GM	N	PAINTED PAVT MARK,STD,WH,DOT GUIDE, 6"
0710 11160	11	\$43.09	\$18,182.42	422.000	EA	N	PAINTED PAVT MARK,STD,WHITE, MESSAGE
0710 11170	12	\$32.71	\$32,844.62	1,004.000	EA	N	PAINTED PAVT MARK,STD,WHITE, ARROWS
0710 11201	14	\$872.22	\$146,111.29	167.516	GM	N	PAINTED PAVT MARK,STD,YELLOW,SOLID,6"
0710 11202	3	\$1,397.58	\$10,185.56	7.288	GM	N	PAINTED PAVT MARK,STD,YELLOW,SOLID,8"
0710 11224	10	\$.58	\$9,012.21	15,442.000	LF	N	PAINTED PAVT MARK,STD,YELLOW,SOLID,18"
0710 11231	1	\$350.00	\$317.10	.906	GM	N	PAINTED PAVT MARK,STD,YELLOW,SKIP,6"
0710 11241	5	\$359.71	\$327.70	.911	GM	N	PAINTED PAVT MARK,STD,YELLOW,DOT,6"
0710 11290	8	\$2.96	\$3,944.05	1,332.000	SF	N	PAINTED PAVT MARK,STD,YELLOW,ISLAND NOSE
0710 90	15	\$33,810.16	\$608,582.86	18.000	LS	N	PAINTED PAVEMENT MARKINGS, FINAL SURFACE
0711 11102	1	\$7,500.00	\$1,522.50	.203	GM	N	THERMOPLASTIC, STD, WHITE, SOLID, 8"
0711 11103	3	\$8,550.60	\$38,828.26	4.541	GM	N	THERMOPLASTIC, STD, WHITE, SOLID, 12"
0711 11123	14	\$1.88	\$52,324.03	27,802.000	LF	N	THERMOPLASTIC, STD, WHITE, SOLID, 12"
0711 11124	12	\$2.80	\$46,108.51	16,446.000	LF	N	THERMOPLASTIC, STD, WHITE, SOLID, 18"
0711 11125	15	\$3.43	\$31,116.30	9,073.000	LF	N	THERMOPLASTIC, STD, WHITE, SOLID, 24"
0711 11141	15	\$1,175.93	\$21,045.57	17.897	GM	N	THERMOPLASTIC, STD, WHITE, DOT GUIDE, 6"
0711 11160	12	\$88.83	\$23,273.76	262.000	EA	N	THERMOPLASTIC, STD, WHITE, MESSAGE
0711 11170	14	\$55.16	\$64,757.28	1,174.000	EA	N	THERMOPLASTIC, STD, WHITE, ARROW
0711 11180	1	\$3.40	\$819.40	241.000	LF	N	THERMOPLASTIC, STD, WHITE, YIELD LINE
0711 11224	15	\$2.48	\$43,964.06	17,760.000	LF	N	THERMOPLASTIC, STD, YELLOW, SOLID, 18"
0711 11241	9	\$1,237.53	\$2,300.57	1.859	GM	N	THERMOPLASTIC,STD,YELLOW,DOT / GUIDE, 6"
0711 11421	1	\$6.82	\$1,909.60	280.000	LF	N	THERMOPLASTIC, STD, BLUE, SOLID,6"
0711 12201	1	\$3,300.00	\$99.00	.030	GM	N	THERMOPLASTIC, REFURB, YELLOW, SOLID, 6"
0711 14123	6	\$4.73	\$48,085.41	10,168.000	LF	N	THERMOPLASTIC, PREFORM, WHITE, SOLID,12"
0711 14125	12	\$14.51	\$329,108.50	22,675.000	LF	N	THERMOPLASTIC, PREFORM, WHITE, SOLID,24"
0711 14160	15	\$254.23	\$171,606.64	675.000	EA	N	THERMOPLASTIC, PREFORMED, WHITE, MESSAGE
0711 14170	14	\$114.40	\$60,746.55	531.000	EA	N	THERMOPLASTIC, PREFORMED, WHITE, ARROW

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0711 14241	1	\$22,800.00	\$1,482.00	.065	GM	N	THERMOPLASTIC, PREF, YELLOW, 2-4' CONC
0711 14560	1	\$790.07	\$21,331.89	27.000	EA	N	THERMOPLASTIC, PREFORMED, WHITE, MESSAGE
0711 14570	1	\$754.39	\$29,421.21	39.000	EA	N	THERMOPLASTIC, PREF, WHITE CONTRAST
0711 14660	1	\$3,200.00	\$12,800.00	4.000	EA	N	THERMOPLASTIC, PREFORMED, MULTI, ROUTE S
0711 15101	6	\$4,606.71	\$323,902.20	70.311	GM	N	THERMOPLASTIC, STD-OP, WHITE, SOLID, 6"
0711 15102	5	\$5,629.76	\$29,387.37	5.220	GM	N	THERMOPLASTIC, STD-OP, WHITE, SOLID, 8"
0711 15131	6	\$1,267.51	\$144,623.23	114.100	GM	N	THERMOPLASTIC, STD-OP, WHITE, SKIP, 6"
0711 15133	2	\$2,234.06	\$2,026.29	.907	GM	N	THERMOPLASTIC, STD-OP, WHITE, SKIP, 12"
0711 15201	6	\$4,568.29	\$241,763.26	52.922	GM	N	THERMOPLASTIC, STD-OP, YELLOW, SOLID, 6"
0711 15202	3	\$6,525.55	\$52,230.49	8.004	GM	N	THERMOPLASTIC, STD-OP, YELLOW, SOLID, 8"
0711 16101	11	\$4,111.27	\$273,798.54	66.597	GM	N	THERMOPLASTIC, STD-OTH, WHITE, SOLID, 6"
0711 16102	7	\$5,460.22	\$26,891.56	4.925	GM	N	THERMOPLASTIC, STD-OTH, WHITE, SOLID, 8"
0711 16131	9	\$986.71	\$33,298.44	33.747	GM	N	THERMOPLASTIC, STD-OTH, WHITE, SKIP, 6"
0711 16133	3	\$4,343.39	\$768.78	.177	GM	N	THERMOPLASTIC, STD-OTH, WHITE, SKIP, 12"
0711 16201	11	\$4,086.71	\$154,367.15	37.773	GM	N	THERMOPLASTIC, STD-OTH, YELLOW, SOLID, 6"
0711 16202	2	\$5,718.92	\$2,276.13	.398	GM	N	THERMOPLASTIC, STD-OT, YELLOW, SOLID, 8"
0711 16231	4	\$1,430.97	\$5,263.11	3.678	GM	N	THERMOPLASTIC, STD-OTH, YELLOW, SKIP, 6"
0711 17	1	\$2.00	\$392.00	196.000	SF	N	THERMOPLASTIC, REMOVE
0713103101	5	\$23,699.54	\$46,024.51	1.942	GM	N	PERMANENT TAPE, WHITE, SOLID, 6" CONC BR
0713103102	2	\$29,357.14	\$4,110.00	.140	GM	N	PERM TAPE, WHITE, S, 8" EXIT CONC PAVMT
0713103131	5	\$6,755.34	\$14,537.49	2.152	GM	N	PERMANENT TAPE, WHITE, SKIP/D, 6" FOR CONC
0713103133	1	\$12,000.00	\$3,924.00	.327	GM	N	PERM TAPE, WHITE, SK, 12" 3'-9 CON PVMT
0713103201	6	\$23,561.10	\$36,496.15	1.549	GM	N	PERMANENT TAPE, YELLOW, SOLID, 6" CONC BR
0713103331	5	\$7,372.40	\$12,820.60	1.739	GM	N	PERMANENT TAPE, BLACK, SKIP/D, 6" FOR CONC
0713103333	1	\$12,000.00	\$3,924.00	.327	GM	N	PERM TAPE, BLACK,, 3'-9' DROP LN, 12"
0713107	3	\$1.71	\$62,944.96	36,888.000	SF	N	PREFORMED/PERMANENT TAPE, REMOVE
0715 1 11	1	\$1.00	\$4,482.00	4,482.000	LF	N	LIGHTING CONDUCTORS, F&I, INSUL, NO.10 OR<
0715 1 12	18	\$1.35	\$963,611.46	714,493.000	LF	N	LIGHTING CONDUCTORS, F&I, INSUL, NO.8-6
0715 1 13	9	\$2.06	\$124,412.05	60,357.000	LF	N	LIGHTING CONDUCTORS, F&I, INSUL, NO.4-2
0715 1 15	1	\$5.00	\$34,490.00	6,898.000	LF	N	LIGHTING CONDUCTORS, F&I, NO.1/0-3/0
0715 1 60	13	\$.34	\$28,671.14	83,590.000	LF	N	LIGHTING CONDUCTORS, R&D, CONT OWNS
0715 4 11	3	\$4,685.71	\$32,800.00	7.000	EA	N	LIGHT POLE COMPLETE, F&I- STD, 30'
0715 4 12	2	\$4,647.50	\$37,179.97	8.000	EA	N	LIGHT POLE COMPLETE, F&I- STD, 35'
0715 4 13	11	\$5,494.33	\$1,010,957.16	184.000	EA	N	LIGHT POLE COMPLETE, F&I- STD, 40'
0715 4 14	7	\$5,949.36	\$999,492.97	168.000	EA	N	LIGHT POLE COMPLETE, F&I- STD, 45'
0715 4 15	3	\$6,280.42	\$2,034,855.96	324.000	EA	N	LIGHT POLE COMPLETE, F&I- STD, 50'
0715 4 23	2	\$7,167.86	\$100,350.00	14.000	EA	N	LIGHT POLE COMPLETE, F&I- STD P, SP, 40'
0715 4 24	2	\$9,060.00	\$45,300.00	5.000	EA	N	LIGHT POLE COMPLETE, F&I- STD P, SP, 45'
0715 4 31	2	\$6,206.67	\$37,240.00	6.000	EA	N	LIGHT POLE COMPLETE, F&I- UTI 17515, 30'
0715 4 32	3	\$5,263.09	\$57,894.02	11.000	EA	N	LIGHT POLE COMPLETE, F&I- UTI 17515, 35'

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0715 4 41	1	\$5,330.00	\$5,330.00	1.000	EA	N	LIGHT POLE COMPLETE, F&I- UTI SP, 30'
0715 4 42	1	\$7,500.00	\$30,000.00	4.000	EA	N	LIGHT POLE COMPLETE, F&I- SP, 35'
0715 4 60	5	\$2,876.58	\$51,778.40	18.000	EA	N	LIGHT POLE COMPLETE, RELOCATE
0715 4 70	8	\$458.35	\$73,793.90	161.000	EA	N	LIGHT POLE COMPLETE, REMOVE POLE/FOUND
0715 5 21	2	\$1,773.04	\$24,822.49	14.000	EA	N	LUMINAIRE & BRACKET ARM, REPLACE L &ARM
0715 5 31	4	\$1,677.01	\$58,695.37	35.000	EA	N	LUMINAIRE & BRACKET ARM, F&I NEW
0715 5 51	1	\$150.00	\$300.00	2.000	EA	N	LUMINAIRE & BRACKET ARM, REMOVE L &ARM
0715 7 11	6	\$12,245.85	\$281,654.52	23.000	EA	N	LOAD CENTER, F&I, SECONDARY VOLTAGE
0715 7 21	3	\$3,162.67	\$12,650.67	4.000	EA	N	LOAD CENTER, REWORK, SECONDARY VOLTAGE
0715 7 41	2	\$796.00	\$3,184.00	4.000	EA	N	LOAD CENTER, REMOVE, SECONDARY VOLTAGE
0715 11125	3	\$1,133.70	\$45,348.00	40.000	EA	N	LUMINAIRE,F&I,UNDER DECK, WALL MOUNT
0715 11211	8	\$1,081.94	\$192,584.72	178.000	EA	N	LUMINAIRE ,F&I-REP EXIST, RDWY, COBRA H
0715 11213	2	\$1,579.19	\$53,692.48	34.000	EA	N	LUMINAIRE ,F&I-REP EXIST, RDWY, POLE T
0715 11214	1	\$1,350.68	\$21,610.88	16.000	EA	N	LUMINAIRE ,F&I-REP EXIST, RDWY, POLE T
0715 11216	2	\$1,954.00	\$48,850.00	25.000	EA	N	LUMINAIRE ,F&I-REP ON POLE EXIST , RDWY
0715 11500	3	\$135.22	\$12,170.00	90.000	EA	N	LUMINAIRE, REMOVE
0715 19 13	1	\$54,000.00	\$270,000.00	5.000	EA	N	HIGH MAST LIGHT POLE, F&I, 120'
0715 19 51	1	\$6,500.00	\$6,500.00	1.000	EA	N	HIGH MAST LIGHT POLE, REPLACE HPS LIGHT
0715 19 60	2	\$5,900.00	\$147,500.00	25.000	EA	N	HIGH MAST LIGHT POLE, REM POLE & FOUND
0715 21 2	3	\$624.79	\$38,112.00	61.000	EA	N	LIGHTING REPAIRS AND RETROFITS, LED RETR
0715500 1	14	\$822.63	\$759,284.06	923.000	EA	N	POLE CABLE DIST SYS, CONVENTIONAL
0715500 2	1	\$600.00	\$3,000.00	5.000	EA	N	POLE CABLE DISTRIBUTION SYS, HIGH MAST
0715500 3	1	\$350.00	\$4,900.00	14.000	EA	N	POLE CABLE DISTRIBUTION SYS, WALL MOUNT
0715511140	1	\$13,500.00	\$162,000.00	12.000	EA	N	LIGHT POLE COMP,F&I,SGL ARM SM, AL,40'
0715511320	1	\$10,255.00	\$20,510.00	2.000	EA	N	LIGHT POLE COMP- SP,F&I,SGL SM, CON,20'
0715511335	1	\$13,000.00	\$91,000.00	7.000	EA	N	LIGHT POLE COMP,F&I,SGL ARM SM,CONC,35'
0715511350	1	\$4,350.00	\$26,100.00	6.000	EA	N	LIGHT POLE COMP,F&I,SGL ARM SM,CONC,50'
0715512140	1	\$9,950.00	\$19,900.00	2.000	EA	N	LIGHT POLE COMP, F&I, DBL ARM SM, AL,40'
0715512350	1	\$5,500.00	\$11,000.00	2.000	EA	N	LI/PL COMP,F&I,DBL ARM SHLD MNT-CONC,50'
0715540000	1	\$1,400.00	\$2,800.00	2.000	EA	N	LIGHT POLE COMP-SPECIAL, RELOCATE
0735 74 1	1	\$1,300,000.00	\$1,300,000.00	1.000	LS	N	TOLL PLAZA, LOCATION 1
0735 74 2	1	\$1,300,000.00	\$1,300,000.00	1.000	LS	N	TOLL PLAZA, LOCATION 2
0735 88 1	1	\$20,000.00	\$20,000.00	1.000	LS	N	TOLL PLAZA MODIFY EXISTING, LOCATION 1
0751 35 13	1	\$53,038.70	\$53,038.70	1.000	EA	N	ARCHITECTURAL, BUS SHELTER, F&I, 101-150
0751 35 42	1	\$2,300.00	\$2,300.00	1.000	EA	N	ARCHITECTURAL, BUS SHELTER, REL, 50-100
0751 35 43	2	\$8,750.00	\$35,000.00	4.000	EA	N	ARCHITECTURAL, BUS SHELTER, REL, 101-150
0751 36 12	1	\$541.20	\$2,164.80	4.000	EA	N	BICYCLE RACK, FURNISH & INSTALL, 2-6 BI
0751 37	1	\$993.30	\$3,973.20	4.000	EA	N	TRASH RECEPTACLE
0999 16	11	\$7,909.09	\$87,000.00	11.000	LS	N	PARTNERING, DO NOT BID
0999 20 1	4	\$3,300.00	\$313,500.00	95.000	DA	N	DISPUTES REVIEW BD, MEETING- DO NOT BID

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0999 20 2	4	\$4,000.00	\$32,000.00	8.000	EA	N	DISPUTES REVIEW BD, HEARING- DO NOT BID
0999 25	22	\$34,570.65	\$1,521,108.51	44.000	LS	N	INITIAL CONTINGENCY AMOUNT, DO NOT BID
1050 16002	1	\$31.00	\$7,378.00	238.000	LF	N	UTILITY PIPE,REMOVE- DISPOSE,2-4.9"
1050 16003	1	\$32.00	\$384.00	12.000	LF	N	UTILITY PIPE,REMOVE & DISPOSE,5-7.9"
1050 16004	3	\$21.98	\$26,964.75	1,227.000	LF	N	UTILITY PIPE,REMOVE & DISPOSE,8-19.9"
1050 16005	1	\$57.00	\$25,422.00	446.000	LF	N	UTILITY PIPE,REMOVE & DISPOSE, 20-49.9"
1050 18004	1	\$15.15	\$22,725.00	1,500.000	LF	N	UTILITY PIPE,PLUG & OUT OF SERV,8-19.9"
1050 51204	1	\$124.00	\$30,008.00	242.000	LF	N	UTILITY PIPE- DI/CI, F&I, WATER/SEWER, 4
1050 51206	3	\$52.43	\$19,557.00	373.000	LF	N	UTILITY PIPE- DI/CI, F&I, WATER/SEWER, 6
1050 51208	1	\$146.42	\$5,856.80	40.000	LF	N	UTILITY PIPE- DI/CI, F&I, WATER/SEWER, 8
1050 51212	2	\$98.47	\$144,358.80	1,466.000	LF	N	UTILITY PIPE- DI/CI, F&I, WATER/SEWER,12
1050 51216	1	\$324.00	\$105,300.00	325.000	LF	N	UTILITY PIPE- DI/CI, F&I, WATER/SEWER,16
1050 51218	1	\$321.11	\$64,222.00	200.000	LF	N	UTILITY PIPE- DI/CI, F&I, WATER/SEWER,18
1050 51230	1	\$690.00	\$298,770.00	433.000	LF	N	UTILITY PIPE- DI/CI, F&I, WATER/SEWER,30
1055 16	1	\$316.00	\$632.00	2.000	EA	N	UTILITY FITTINGS, REMOVE & DISPOSAL
1055 51108	1	\$737.14	\$2,948.56	4.000	EA	N	UTILITY FITTINGS, DI/CI F&I ELBOW, 8"
1055 51112	2	\$1,073.48	\$57,968.10	54.000	EA	N	UTILITY FITTINGS, DI/CI F&I ELBOW, 12"
1055 51116	1	\$1,545.00	\$18,540.00	12.000	EA	N	UTILITY FITTINGS, DI/CI F&I ELBOW, 16"
1055 51118	1	\$3,281.80	\$65,636.00	20.000	EA	N	UTILITY FITTINGS, DI/CI F&I ELBOW, 18"
1055 51130	1	\$6,180.00	\$74,160.00	12.000	EA	N	UTILITY FITTINGS, DI/CI F&I ELBOW, 30"
1055 51212	1	\$1,340.00	\$1,340.00	1.000	EA	N	UTILITY FITTINGS, DI/CI F&I TEE, 12"
1055 51216	1	\$1,700.00	\$1,700.00	1.000	EA	N	UTILITY FITTINGS, DI/CI F&I TEE, 16"
1055 51412	2	\$1,090.61	\$14,177.97	13.000	EA	N	UTILITY FITTINGS, DI/CI F&I UNION, 12"
1055 51416	1	\$2,575.00	\$10,300.00	4.000	EA	N	UTILITY FITTINGS, DI/CI F&I UNION, 16"
1055 51430	1	\$6,695.00	\$26,780.00	4.000	EA	N	UTILITY FITTINGS, DI/CI F&I UNION, 30"
1055 51512	1	\$504.89	\$1,009.78	2.000	EA	N	UTILITY FITTINGS, DI/CI F&I CAP/PL, 12"
1060 11211	1	\$7,674.37	\$7,674.37	1.000	EA	N	UTIL STRCT,BLW GRN,F&I,WTR/SWR,0-80,0-6'
1060 16	1	\$1,060.27	\$2,120.54	2.000	EA	N	UTILITY STR,BLW GRN,R&D,CONT OWNS
1080 21102	1	\$2,750.00	\$22,000.00	8.000	EA	N	UTILITY FIXTURE, VALVE/MET BOX, F&I 2"
1080 21110	1	\$600.00	\$3,000.00	5.000	EA	N	UTILITY FIXTURE, VALVE/METER BOX,F&I 10"
1080 21112	1	\$600.00	\$1,200.00	2.000	EA	N	UTILITY FIXTURE, VALVE/METER BOX,F&I 12"
1080 21116	1	\$600.00	\$600.00	1.000	EA	N	UTILITY FIXTURE, VALVE/METER BOX,F&I,16"
1080 21130	1	\$600.00	\$1,200.00	2.000	EA	N	UTILITY FIXTURE, VALVE/METER BOX,F&I,30"
1080 21500	1	\$429.16	\$27,895.40	65.000	EA	N	UTILITY FIXTURE, VALVE/METER BOX, ADJUST
1080 21600	1	\$635.00	\$5,080.00	8.000	EA	N	UTILITY FIXTURE, VALVE/METER BOX, REMOVE
1080 22102	1	\$2,050.00	\$2,050.00	1.000	EA	N	UTILITY FIXTURE- BACKFLOW ADDEM, F&I, 2"
1080 22600	1	\$635.00	\$635.00	1.000	EA	N	UTILITY FIXTURE- BACKFLOW ASSY REMOVE
1080 23112	1	\$4,846.97	\$19,387.88	4.000	EA	N	UTILITY FIXTURE- TAPPING SAD/SL, F&I 12"
1080 23124	1	\$6,513.11	\$19,539.33	3.000	EA	N	UTILITY FIXTURE- TAPPING SAD/SL, F&I 24"
1080 24106	3	\$1,629.34	\$13,034.70	8.000	EA	N	UTILITY FIXTURE, VALVE ASSEMBLY, F&I 6"

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From: 0102 1 To: 9999999

Item	No. of Conts	Weighted Average	Total Amount	Total Quantity	Unit Meas	Obs?	Description
1080 24112	1	\$3,029.36	\$12,117.44	4.000	EA	N	UTILITY FIXTURE, VALVE ASSEMBLY, F&I 12"
1080 24116	1	\$4,326.00	\$8,652.00	2.000	EA	N	UTILITY FIXTURE, VALVE ASSEMBLY, F&I 16"
1080 24130	1	\$41,200.00	\$41,200.00	1.000	EA	N	UTILITY FIXTURE, VALVE ASSEMBLY, F&I 30"
1080 24600	1	\$635.00	\$635.00	1.000	EA	N	UTILITY FIXTURE, VALVE ASSEMBLY, REMOVE
1080 26116	1	\$1,600.00	\$1,600.00	1.000	EA	N	UTILITY FIXTURE, VAC/AIR ASSEMB, F&I 16"
1080 26130	1	\$5,150.00	\$5,150.00	1.000	EA	N	UTILITY FIXTURE, VAC/AIR ASSEMB, F&I, 30"
1080 27104	1	\$10,300.00	\$10,300.00	1.000	EA	N	UTILITY FIXTURE- LINE STOP ASSY, F&I, 4"
1080 27106	1	\$10,000.00	\$10,000.00	1.000	EA	N	UTILITY FIXTURE- LINE STOP ASSY, F&I, 6"
1080 27108	1	\$6,664.58	\$6,664.58	1.000	EA	N	UTILITY FIXTURE- LINE STOP ASSY, F&I, 8"
1080 27110	1	\$18,000.00	\$18,000.00	1.000	EA	N	UTILITY FIXTURE- LINE STOP ASSY, F&I, 1"
1080 27112	2	\$16,547.39	\$231,663.40	14.000	EA	N	UTILITY FIXTURE- LINE STOP ASSY, F&I, 12"
1080 27118	1	\$15,626.43	\$31,252.86	2.000	EA	N	UTILITY FIXTURE- LINE STOP ASSY, F&I, 18"
1080 27130	1	\$47,380.00	\$94,760.00	2.000	EA	N	UTILITY FIXTURE- LINE STOP ASSY, F&I, 30"
1080 29104	1	\$309.00	\$4,944.00	16.000	EA	N	UTILITY FIXTURE, MECH JT RESTR, F&I 4"
1080 29106	1	\$400.00	\$1,600.00	4.000	EA	N	UTILITY FIXTURE, MECH JT RESTR, F&I 6"
1080 29116	1	\$927.00	\$51,912.00	56.000	EA	N	UTILITY FIXTURE, MECH JT RESTR, F&I 16"
1080 29130	1	\$3,090.00	\$179,220.00	58.000	EA	N	UTILITY FIXTURE, MECH JT RESTR, F&I 30"
1080 32112	1	\$681.61	\$4,089.66	6.000	EA	N	UTILITY FIXTURE- SAMPLE POINT, F&I 12"
1080 32116	1	\$900.00	\$1,800.00	2.000	EA	N	UTILITY FIXTURE- SAMPLE POINT, F&I 16"
1644113 08	2	\$4,134.73	\$86,829.40	21.000	EA	N	FIRE HYDRANT, F&I, STD, 2 HOSE, 1 PUMP, 6"
1644800	1	\$3,275.00	\$9,825.00	3.000	EA	N	FIRE HYDRANT, RELOCATE
1644900	2	\$557.50	\$11,707.60	21.000	EA	N	FIRE HYDRANT, REMOVE

Note : Averages and totals are based on the awarded unit price only.
Weighted average is weighted on Quantity at the contract level.

Attachment I

Glossary of Terms

Glossary

- Attenuation - to lessen the amount, magnitude, or weaken a force. Usually referring to wave energy reduction; i.e. to weaken waves to minimize erosion.
- Bio-swales - are landscape elements designed to concentrate or remove debris and pollution out of surface runoff water. They consist of a depressional drainage feature with gently sloped sides which can be filled with vegetation.
- Benthic – the ecological region at the lowest level of a body of water such as an ocean, estuary, lake, river or stream, including the sediment surface and some sub-surface layers.
- Breakwater/sills - Hybrid living shoreline design alternatives include structures (oyster bags, rock, oyster domes, etc.) to change physical wave conditions, to support vegetation growth and/or to protect shorelines from erosion.
- Bulkheads and seawalls - usually vertical structures built to prevent waves from eroding shoreline, or to level off a yard sloping toward water's edge. A seawall with sufficient riprap and filter cloth placed at the toe is not considered a vertical seawall.
- Cap – The top of a seawall which is usually formed and poured with concrete and rebar.
- Coalescence - to grow together or into one body; plants growing into a solid bed covering the sediment.
- Compact – South Florida Regional Climate Change Compact – a collaborative effort by Monroe, Miami-Dade, Broward and Palm Beach County to respond to impacts from climate change.
- Crest – highest portion of a shoreline feature
- Estuary – an area where salt and fresh water mix that has high importance for fisheries and plant communities like seagrass and mangroves with valuable spawning areas and habitat for juvenile fish and crustaceans.
- Erosion – the process of losing soil to wind, water or other natural processes.
- Fetch – the distance of open water over which wind blows or waves propagate unobstructed.
- FDEP – Florida Department of Environmental Protection – State regulatory agency based in Tallahassee with a regional office in West Palm Beach.
- FDOT – Florida Department of Transportation
- Geotextile Fabric – a synthetic fabric that can be impervious or semi-pervious to water and soil. Used in conjunction with rip rap and plantings to stabilize slopes.

- Grade (slope, incline, gradient, pitch) – a physical feature of a landform which is described by the tangent of the angle the surface makes to horizontal. Typically described by the ratio of “rise over run” or vertical to horizontal distance.
- King tide – exceptionally high tides which occur seasonally around a new or full moon when the Moon is at its perigee (closest point to Earth).
- ICWW – Intracoastal Waterway – a federally maintained channel that is situated between the barrier island (beach) and mainland.
- Invert elevation – refers to the base interior level of a pipe or trench; it can be considered the "floor" level. This elevation controls the amount of flow (water) and is important element in designing conveyance systems.
- IPCC – Intergovernmental Panel on Climate Change – the United Nations body for assessing the science related to climate change.
- Load – forces acting on an object (sea wall or shoreline stabilization) can be from ground water, other structures, soil, or waves. **Note: Also a single dump truck worth of material is referred to one load.**
- JaxBO – Jacksonville Biological Opinion – a predetermined assessment of biological conditions for the State of Florida. If the project meets these conditions, then it avoids the necessity for comments from USFWS and NMFS.
- MHWL – Mean High Water Line – Average of the two high tides per day for a site over a tidal epoch (18-year timeframe).
- Modular concrete units/planters – pre-cast concrete units that come in a variety of shapes and weights that can be used to dissipate wave energy and can incorporate plants.
- MLWL – Mean Low Water Line - Average of the two low tides each day for a site over a tidal epoch (18-year timeframe).
- NAVD 88 - North American Vertical Datum of 1988 - at network of benchmarks that are referenced to a single point in Quebec, Canada and used to establish uniform control elevations across the continent.
- NMFS – National Marine Fisheries – commenting agency to USACE concerned with a project’s impact to fisheries where construction extends below the Mean High Water Line.
- NOAA - National Oceanic and Atmospheric Administration – Federal agency that monitors weather, climate tides and fisheries across North America.

- Overtopping – When water levels or waves are elevated above the crest height of a shoreline treatment or seawall.
- Oyster Bags – 35-40 lb. of 2"-3" oyster shell placed in mesh bags. This holds the shell together resisting wave action while trapping oyster spat (larva), giving new oysters a place to attach and grow.
- Rebar – steel rod with ridges used for structural reinforcement in concrete.
- Revetments - usually made of large, loose, irregularly-shaped stone or other material such as limerock or clean concrete rubble and have a slope on the waterward face.
- Rip Rap/Armor Stone – generally rounded, limestone or granite that is placed on a slope to interlock and dissipate wave energy. Also very good at retaining sediment when used in conjunction with geotextile fabric.
- Sea level rise – the projected rise in water level for the Atlantic Ocean without the influence of a storm.
- Sheet Pile – planks of various materials (wood, concrete, vinyl or steel) which are driven to designated depths into the ground and interlock with adjacent planks to form a wall.
- Storm Surge – abnormal rise in the water elevation caused by a combination of effects from a storm including the atmospheric pressure changes, wind effects, the Earth's rotation, shallow water depth and increased rainfall.
- Stormwater – Water generated from rainfall that flows via gravity or pumping to a retention pond or out into the Intracoastal Waterway.
- Subtidal Habitat Enhancement and Augmentation – Adding complexity to subtidal habitat can create niche space for recruitment and foraging of wildlife.
- Tailwater - refers to waters located immediately downstream from a hydraulic structure, such as a dam or culvert. Typically used to refer to water that may backup and potentially cause flooding conditions.
- Toe – bottom or farthest landward portion of a slope
- Toe scour - damage caused at the outside base of a structure or dam wall due to overflowing flood waters or currents damaging the foundational base.
- Tie-backs – galvanized steel rods which connect a seawall cap to the deadmen to keep the wall from moving seaward.

- USACE – United States Army Corps of Engineers – Federal regulatory agency with a District Office in Jacksonville and a regional office in West Palm Beach.
- USFWS – United States Fish and Wildlife Service – a commenting agency to USACE in the permitting process concerned with threatened and endangered species.
- Wetland - A distinct ecosystem that is inundated by water, either permanently or seasonally, where oxygen-free processes prevail. The primary factor that distinguishes wetlands from other land forms or water bodies is the characteristic vegetation of aquatic plants, adapted to the unique hydric soil.

Attachment J

References

References

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