## SAULS STREET BRIDGE REPLACEMENT FEASIBILITY STUDY

FM 447018-1 City of South Daytona FINAL Report, February 2020



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The City of South Daytona (the City) filed a 2019 Application for Project Prioritization with the River to Sea Transportation Planning Organization (R2CTPO) for this project. The purpose of this study is to evaluate the feasibility of replacing the existing narrow bridge at the intersection of Sauls Street and Reed Canal Road with a new, wider facility that accommodates pedestrian and bicycle traffic. The study limits are shown in Figure 1. The existing bridge contains an asphalt walkway that is separated from the travel lanes by a traffic separator and gore striping. However, improvements requested in the City's application include demolition of the existing bridge, reconstruction of the travel lanes, and installation of a 10-foot wide shared use path separated from the travel lanes with a more prominent barrier to protect pedestrians and bicyclists, as this intersection is located along the proposed alignment of the St. Johns River to Sea (SJR2C) Loop of the Shared-Use Nonmotorized (SUN) Trail Regional System. Additionally, the City desires the bridge facility be constructed as a pre-engineered arch type structure on the appropriate foundation system, similar to the ones recently constructed at the nearby intersections of Lantern Drive and Oak Lea Drive, with an enhanced pedestrian crossing containing a special emphasis crosswalk constructed of patterned pavement and command activated lighted signage. In addition to providing safer access for pedestrians and bicyclists, the proposed shared use path along Sauls Street would provide local residents with safer access to public transportation, commercial properties, and other community amenities within the area. The project purpose and scope for this feasibility study are further explained in Section 2.



### **2** PROJECT PURPOSE AND SCOPE

As noted in the City's application, there are single-family residential neighborhoods, apartment complexes, condominiums and City owned parks and facilities located in close proximity to the bridge, as well as several other commercial amenities, such as a shopping mall, retail center, activity center, vocational school, post office, driver's license office, etc. The City's objective is to provide a safer access for pedestrians moving along Sauls Street that regularly cross Reed Canal Road to travel to these various destinations.

An initial scoping meeting for this project was held on July 8, 2019 with members of the City, the Florida Department of Transportation (FDOT), and the R2CTPO) in attendance. Volusia County (the County) was invited, but not able to attend the meeting. Review of the County's Capital Improvement Program (CIP) suggests that there are no scheduled improvements at the intersection of Reed Canal and Sauls Street.

At the scoping meeting, the City reiterated that their vision for this project is to reconstruct the existing bridge in a manner very similar to that which was completed in two (2) other similar bridge replacement projects along Reed Canal Road at the nearby intersections of Lantern Drive (FPID 435580-1-58-01) and Oak Lea Drive (FPID 430184-1-58-01). Both of these projects were completed through the Local Agency Program (LAP), as administered by the FDOT.

There are three (3) underlying studies of record relevant to the proposed bridge replacement, which were considered in the preparation of this feasibility study, as summarized below:

#### CDM Flood Study

The City furnished a copy of the Nova Canal Flood Control and Integrated Water Resource Program dated July of 2010, as prepared by Camp Dresser & McKee, Inc. (CDM) for the East Volusia Regional Water Authority (EVRWA). As a collaboration amongst the City of Ormond Beach, the City of Holly Hill, Volusia County, the City of Daytona Beach, the City of South Daytona, the City of Port Orange, and FDOT, this study analyzed large basins spanning over multiple cities, and modeled various major nodes and reaches under various storm events to assess flooding and potential improvements that would mitigate flooding in particular areas of concern. For preliminary hydraulic considerations, flow and stages along the Reed Canal system were extracted from the CDM Flood Study for sizing of the arch culvert conceptualized in this feasibility study.

#### RS&H Feasiblity Study

Reynolds, Smith, and Hills (RS&H) previously completed a Bicycle/Pedestrian Feasibility Study in April 2012 for a sidewalk on the north side of Reed Canal Road, as well as a shared use path on the south side. Of particular relevance is the fact that based on impacts that were anticipated within Reed Canal as a result of the shared use path improvements, RS&H had corresponded with Volusia County Road and Bridge, the St. Johns River Water Management District (SJRWMD) and the U.S. Army Corps of Engineers (USACE) concerning drainage design requirements, permitting, and mitigation of impacts within the canal. Refer to *Appendix A* for a copy of the meeting notes from January 5, 2012 (SJRWMD) and January 6,

2012 (USACE) that were included within the RS&H feasibility study, as discussed in further detail later in this report.

#### SJR2C Loop PD&E

Under FPID 439865-1, FDOT is in the process of completing a Project Development and Environment (PD&E) study for the SJR2C Loop of the SUN Trail Regional Trail System, which was originally anticipated to cross Reed Canal Road at the Sauls Street intersection. Based on a phone conversation with the PD&E consultant, John Scarlatos, PE / Scalar Consulting Group, Inc., there is limited right of way on Sauls Street south of the bridge, and it is envisioned that bicyclists will need to utilize "Sharrows" on the roadway from George Hecker Drive leading up to the Sauls Street bridge, though there is currently a sidewalk on the east side of the road for pedestrians. As a result of discoveries made in the RS&H feasibility study, the City and County identified an alternative route for the SJR2C Loop trail, and at the bridge, the future trail will be routed along the south bank of Reed Canal between Sauls Street and Carmen Drive. The City and County subsequently entered into an agreement for maintenance responsibilities once the future bike path is constructed. A copy of this agreement has been included in *Appendix C*.

Additionally, the following on-going project may also have some impact on design of the proposed sidewalk improvements, depending upon timing, as further described below:

#### Reed Canal Sidewalk

Under FM 447019-1, a separate feasibility study is being simultaneously prepared for replacement of sidewalks along the north side of Reed Canal Road, as also requested by the City. With overlap at the intersection, that study is being prepared to include similar enhancements to the existing crosswalk as proposed within this feasibility study, including patterned pavement crosswalk, signage, and pedestrian signalization. Timing of funding for design and construction for both projects will likely dictate in which one (1) these improvements are constructed. For further details, refer to the feasibility study prepared for this project.

A base map was assembled with current aerial photography and GIS data available from the County, including private property owners, parcel limits, right of way, and LIDAR topography. Available historical records were also obtained for a desktop review of the physical features present within the project corridor, including as-built surveys, record plans, right of way maps, These items were traced for incorporation of existing elements into the base map, etc. including buildings, roadways, sidewalks, driveways, curbing, drainage facilities, signs, pavement markings, traffic control devices, lighting, and utilities. A field review was then conducted to inventory the corridor and validate existing conditions. Physical features of the corridor were investigated to identify conditions that would have impact on the proposed sidewalk improvements for development of concept plans and a cost estimate. These include right-of-way constraints, unusual geometrics, visual obstructions, signing and pavement marking deficiencies, utility conflicts, etc. Color photographs were taken along the study corridor with emphasis on obtaining visual information which would be of value to the City, the County, R2CTPO, FDOT and/or the designer(s) that will complete plans preparation in any subsequent design phases of the project.

An ecological feasibility analysis was performed to identify potential impacts to wetlands and threatened and endangered species which would result from the proposed bridge replacement included in this study. A cultural resources desktop study was also conducted that includes background research in the history of the project corridor, as well as a records search for previously recorded cultural resources and professional archaeological surveys within or near this segment of Reed Canal Road.

Upon compiling the base map information and conducting field review, an initial layout of proposed improvements was completed. Considerations were made for the requirements of the Americans with Disabilities Act (ADA) to eliminate the associated liabilities from the corridor. Considerations were also made for the design requirements related to "off-system" projects, or projects not located on the State Highway System (SHS), as specified within the 2019 FDOT Design Manual (FDM), 2019 FDOT Drainage Manual, Federal Highway Administration (FHWA) Hydraulic Design of Highway Culverts (4/2012), the 2016 Manual of Uniform Minimum Standards for Design, Construction and Maintenance (Florida Greenbook), and other various publications. Based on the review and findings, Typical Sections and Concept Plans were prepared showing all existing elements and the recommended improvements, as included in *Appendix B*.

### **3** EXISTING CONDITIONS

The following section provides a general description of the characteristics observed within the project study limits in regards to the physical conditions, environmental conditions, drainage and utilities, and it also includes an assessment of the apparent right-of-way.

#### **General Description**

Sauls Street is a two-lane minor collector road that serves multiple residential developments in the surrounding area. It extends northerly from Madeline Avenue in the City of Port Orange, up to the point where it intersects with Reed Canal Road. The study area intersection has no vehicular or pedestrian signalization, although there is an existing crosswalk across Reed Canal Road. Sauls Street is posted at 25 mph with a 5-foot sidewalk on the east side of the road, utilizing shallow swales to convey the stormwater to ditch bottom inlets. The posted speed limit is 30 mph on Reed Canal Road. The existing bridge spans over Reed Canal, which runs east-west adjacent to the south side of Reed Canal Road.

#### **Bridge**

The existing bridge (Bridge Number 796518) consists of a single-span over Reed Canal. The superstructure is comprised of prestressed concrete double-tee beams with an asphalt overlay supported by prestressed pile bents. The bridge is considered to have "unknown" foundation that has not been evaluated for scour. This unknown foundation designation is due to the fact that the pile tip elevation data and existing pile driving records are not available. The existing bridge was constructed in 1965 (54 years old), and has a sufficiency rating of 77.6 with a health index value of 89.45. The bridge is posted with weight limit restrictions. This means that not all legal trucks can go over this bridge. The existing bridge typical section consists of two (2) 12-foot travel lanes with a separated sidewalk that varies in width from approximately 6-foot to 9-foot. The sidewalk is located adjacent to the northbound lane, separated with gore striping and a raised concrete traffic separator. Concrete railings with raised curbs shield both sides of the bridge with no approach guardrails at the begin bridge (south side) and substandard guardrails at the bridge ends (north side). The overall bridge width from curb to curb is 49.9 feet.





#### Right-of-Way

The plat of Palm Grove Subdivision - Ninth Addition (MB 31, PG 39) suggests that as of 1971, there was 130 feet of right of way for Reed Canal Road in the study area. Additionally, as a result of early collaboration for this project with the County's Deputy Director of Road & Bridge (Ben Bartlett) and County Engineer (Tadd Kasbeer), the County's Survey Department prepared a DRAFT Maintenance map to determine existing right of way that could potentially be claimed by maintenance, that covers the study area. The maintenance maps identify a northern right of way line that is located further north than shown in the underlying plat of Palm Grove Subdivision – Ninth Addition. A CAD file of this mapping was provided for use in this study. According to the CAD file, the existing bridge is located entirely within the Reed Canal Road right of way, which is maintained by Volusia County.

South of Reed Canal, the underlying plats of Hammock Lake Estates (PB 47, PG 122-123) and Glen Subdivision (PB 52, PG 131-132) suggest that Sauls Street originally had 30 feet of right of way. Additional right of way that varies in width was dedicated on the west side, and an additional 20 feet of right of way was dedicated on the east side, with exception of in front of parcel 633747000010 (2801 Sauls Street). No additional documents dedicating additional right of way in front of this property were discovered. However, there is an existing masonry block wall with stucco that sits behind the existing sidewalk. It may be necessary for the City to perform maintenance mapping to establish the areas over the existing sidewalk as existing right of way. Copies of the County's DRAFT Maintenance Map and underlying plats of relevance have been included *Appendix C*, and existing right of way has been shown on the Concept Plans based on this information.

#### <u>Driveways</u>

There are two (2) driveways within the study corridor that are in close proximity to the bridge.



While no physical impacts to these driveways are expected to occur, their normal operation could be affected by the construction activities such as maintenance of traffic.

#### <u>Utilities</u>

The City provided Utility As-Built Maps depicting underground potable water, reclaimed water, sanitary sewer, and stormwater utilities within the study area. These maps were traced for inclusion in the base mapping, and an assessment of existing utilities was made during the field visit.

Overhead power lines are located on the west side of Sauls Street which cross over Reed Canal Road. Overhead lines also exist on the south side of Reed Canal Road. A total of three (3) overhead utility poles are in close proximity. One of the poles located on Reed Canal Road is protected by guardrail. During the field visit two (2) street lighting luminaires on overhead utility poles were noted on the west side of the bridge, on both the north and south sides of Reed Canal. No lighting is present on the east side of the bridge where the existing sidewalk is located.

No sanitary sewer, potable water, or reclaimed water utilities were depicted on the as-builts in the area of the bridge, nor was any evidence of these utilities noted during field review.



#### Floodway / Floodplain

According to FEMA FIRM Panel 12127C0367J, as last revised September 29, 2017, no portions of the study corridor lie within Special Flood Hazard Areas (SFHAs), although portions of the existing Sauls Street right of way are noted to be within the 0.2% Annual Chance Flood Hazard Areas, of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile. A copy of the referenced FEMA map is provided in *Appendix D*.

#### Drainage and Permitting

As documented in the CDM Flood Study from July 2010, Reed Canal serves as one (1) of several east-west conveyance channels that convey stormwater from the Nova Road Canal easterly to the Halifax River. Within this study, multiple storm events were modeled under several different scenarios, including **Existing Conditions**, as well as **Alternative 1** through **Alternative 7**. As further described in CDM's report, each of the alternatives considered varying levels of proposed improvements. Section ES.7 Conclusions of the report indicates that **Alternative 4** was selected by the stakeholders. However, the magnitude of the improvements recommended within this alternative is such that they would require significant funding and several years to implement.

CDM's Project Manager, Michael Schmidt, PE, was contacted to confirm the understanding of previous efforts completed, and to inquire if any of the proposed improvements had been implemented that would affect model results near the Reed Canal outfall system. He was not aware of any improvements that had been implemented since preparation of the report in July 2010, and agreed that the **Existing Conditions** scenario was appropriate for completing preliminary hydraulic analysis related to the proposed bridge culvert. Excerpts from the CDM Flood Study are included within **Appendix E**, which document stage and flow information for the **Existing Conditions** and **Alternative 1** scenarios, which are the only two (2) scenarios presented in this feasibility study, as the report did not contain similar data (for both stage and flow) for any of the other alternatives. For the reader's benefit, it is noted that in the summary of peak flows, the node just upstream of the feasibility study intersection is entitled Start of Reed Canal (conduit 81243), while in the summary of peak stages, this same node is entitled

Reed Canal at Nova Road (node 13104). Additionally, Fig. 2-13 of the CDM Flood Study provides FEMA Stillwater Elevations in the Halifax River which were utilized in the analysis.

**Table 1** below provides a summary of stage and flow information extracted from the CDM Flood Study at nodes and conduits that pertain to the feasibility study project intersection. This stage and flow data is as was reported for the 100YR / 96HR storm event with the 100 YR Stillwater tailwater condition.

CANAL STAGE - (ft) NAVD88					
	NODE	EXISTING CONDITIONS	ALTERNATIVE 1		
REED CANAL AT STEVENS CANAL	128	7.70	7.70		
SAULS STREET	122	8.30	8.20		
REED CANAL AT NOVA ROAD	13104	9.30	9.00		
CA	NAL FLO	W (cfs)			
	CONDUIT EXISTING ALTERNATIVE				
REED CANAL AT STEVENS CANAL	81281	1,114	1,242		
SAULS STREET	81221	309	316		
SAULS STREET	81221A	309	316		
SAULS STREET	81221B	309	316		
REED CANAL AT NOVA ROAD	81243	808	821		

## Table 1Stage and Flow along Reed Canal(100YR / 96 HR Storm Event with 100 YR Stillwater)





As of April 26, 2004, the SJRWMD issued Environmental Resource Permit (ERP) No. 92356-1 for the Sauls Road Drainage Improvements. This permit authorized piping of a ditch along the east side of Sauls Street, determined to be a motorist safety hazard because it was less than 2-foot to the edge of pavement. The pipe was extended to Reed Canal, and 1,200 LF of sidewalk was constructed over the new 54" RCP culvert, providing connectivity to Sugar Mill Elementary School. A copy of the Technical Staff Report from ERP No. 92356-1 has been included in *Appendix F*. It is noted that Utility Atlas Maps provided by the City depict a 54" RCP culvert entering the bridge area from the southeast through a headwall into the canal. The City confirmed that this outfall pipe extends into the canal near the southeast headwall as suggested in the record documents, though this pipe could not be located during field review. No other drainage culvert information was identified in close proximity to the bridge project. Scuppers are present at the curb line on the bridge for removal of stormwater from the bridge deck, which were clogged with debris at the time of the field review.

#### <u>Soils</u>

The City retained Universal Engineering Sciences (UES) to conduct a preliminary geotechnical investigation, which was provided to Florida Bridge and Transportation, Inc. (FBT) for conceptual foundation design purposes. A copy of UES's report is included in *Appendix G*.

The proposed bridge and sidewalk traverses through Tuscawilla-Urban land complex soils. Additionally, Tuscawilla fine sand is present at the southern area just before the bridge. Included in *Appendix H* is a soils map prepared through the Web Soil Survey (WSS) operated by USDA Natural Resources Conservation Services (NRCS).

#### Environmental

Environmental Services, Inc. (ESI) completed an ecological feasibility study for the proposed bridge and shared use path project. The purpose of the investigation was to preliminarily assess the work corridor for the presence of jurisdictional wetlands in accordance with the current methodologies of the USACE and SJRWMD. In addition, the study corridor was investigated for the potential presence and/or use of the area by any species protected by the

Florida Fish and Wildlife Conservation Commission (FWC) and/or the U.S. Fish and Wildlife Service (FWS). The study was initiated with a review of topographic maps, soil survey information, and color infrared aerial photographs of the study area, along with relevant technical publications and field guides. Upon completion of the in-house review, ESI staff inspected the study area on October 2019. Please see *Appendix I* for the full report and photos.

#### Cultural Resources

ESI also completed a cultural resources feasibility study to preliminarily assess the corridor for the presence of known cultural resources, areas that have been previously tested using current standards, and areas of moderate to high probability for containing these resources. A copy of the study has been included in *Appendix J*.

## 4

#### BRIDGE AND SHARED-USE PATH CONCEPT PLAN

As noted above, the City desires demolition of the existing Sauls Street bridge, and replacement with the new pre-engineered arch type structure on the appropriate foundation system, with aesthetic upgrades such as decorative lighting and stone veneer that may require additional funding contribution on behalf of the City, similar to the ones recently constructed at the nearby intersections of Lantern Drive and Oak Lea Drive. Additionally, the City desires that the new bridge provide for a protected shared use path with an enhanced pedestrian crossing containing a special emphasis crosswalk constructed of patterned pavement and command activated lighted signage. This section of the report provides a discussion of the bridge concept plan formulated to support the roadway and shared use path improvements, as well as the associated drainage and utilities improvements required to implement the project.

#### Bridge and Shared-Use Path Improvements

While Chapter 9.C. of the Florida Greenbook prescribes minimum requirements for shared use paths, the requirements within FDM 224 contain some special requirements for SUN Trail, which should be upheld since the trail is anticipated the serve as a junction within the future SJR2C Loop trail, providing direct access to several City residents on the north side of Reed Canal Road. While the City's application had originally requested the path be 10-foot in width, the R2CTPO requested it be increased to the standard 12-foot width prescribed for SUN Trail improvements per FDM 224.4. In accordance with ADA requirements, maximum cross slope should be maintained at 2% and the maximum longitudinal grade should be maintained at 5%. FDM 224.7 specifies a 4-foot clear area adjacent to both sides of the path, but in restricted conditions allows for bridge abutments, sign columns, fencing, and railing to be located within 4 feet from the edge of pavement. In accordance with FDM 224.8, 12-foot vertical clearance is desirable for SUN Trail paths.

The new bridge will be a precast arched culvert type structure supported on shallow foundations. The overall bridge opening consists of a 55-foot span. The bridge's typical section will include two (2) 12-foot travel lanes, curb and gutter, and a 12-foot shared use path separated by concrete barrier wall that provides protection to bicyclists and pedestrians for safe movements over the Sauls Street bridge. It will be critical to ensure sight distance is not compromised with the design of the bridge headwalls. This bridge replacement requires full-depth excavation of the road section and a portion of the existing embankment in order to construct the new bridge and wingwalls, along full depth reconstruction of the roadway. Temporary sheet piles will need to be placed on the south side of the bridge, as well as along the south edge of Reed Canal Road. Construction will require the contractor to close the northern connection of Sauls Street. The City has indicated that in construction of both former bridge replacements, it was necessary fully shut down Reed Canal Road within the work area. There is opportunity to establish a detour around the work area along the route of Pope Avenue / Palm Grove Avenue / Magnolia Avenue. A detailed maintenance of traffic plan with the appropriate road closure signage should be included in the design.

The following bridge improvements are anticipated:

- Demolish existing bridge and approach slabs.
- Construct temporary sheet piling in front of both bridge approaches to avoid damage to adjacent paving and/or structures.
- Construct a new arch-style bridge culvert.
- Construct adequate shallow foundations for bridge placement.
- Line channel under bridge and protect wingwalls with bank and shore rip-rap.
- Construct wingwalls on all four (4) corners with natural rock finish similar to the Lantern Street and Oak Lea Drive bridges.
- Construct decorative natural rock finish headwalls with bridge signs and a bronze dedication plaque.
- Construct decorative bridge lighting.
- Construct two (2) new guardrail transitions from the existing guardrail to the new bridge wingwalls along Reed Canal Road.
- Construct two (2) 12- foot wide lanes of full depth asphalt and limerock.
- Install stop bar and double yellow centerline striping.
- Install maintenance of traffic (MOT) for a detour of the closure of Sauls Street, as well as Reed Canal Road.

Refer to *Appendix K* for a list of design criteria considered in developing the concept plans, which contains links to the various publications and reference manuals cited.

#### Signing, Pedestrian Signalization, and Lighting

Per the FDOT's Traffic Engineering Manual (TEM) supplemental beacons may be considered to provide additional emphasis of the marked crosswalk and the presence of pedestrians. Two (2) options that are currently available for use are standard flashing yellow warning beacons and Rectangular Rapid Flashing Beacons (RRFB's). Use of RRFB's should be limited to roadways with four (4) or fewer through lanes and should be limited to locations with the most critical safety concerns, such as pedestrian and school crosswalks across uncontrolled approaches. Data has shown that drivers exhibit yielding behavior much further in advance of the crosswalk with RRFB's than with standard flashing yellow warning beacons. Additionally, RRFB's offer significant potential safety and cost benefits, because it achieves very high rates of compliance at a very low relative cost in comparison to other more restrictive devices that provide comparable results. Therefore, it is recommended to install RRFB's at the Sauls Street existing midblock crosswalk. A midblock crosswalk requires the need for additional street lighting. This additional pedestrian lighting has been added to the concept plans and estimate.

The following trail improvements are recommended:

- Construct a 12-foot wide shared use path with 4- inch thick concrete.
- Construct concrete curb & gutter barrier.
- Construct patterned pavement crosswalk similar to Lantern Drive and Oak Lea Drive.
- Construct RRFB's for the crosswalk at Reed Canal Road.
- Construct appropriate street lighting for midblock crosswalk.
- Construct appropriate RRFB and crosswalk signalization, signage and striping.

- Construct detectable warnings on the north and south curb ramps to Reed Canal Road.
- Construct sidewalk to trail tie-in on south side of bridge approach.

#### Drainage and Permitting

During completion of the study, RS&H contacted Volusia County Road and Bridge, and Judy Grim expressed a concern that work in the canal had the potential to raise the water level above the existing Ordinary High Water (OHW) elevation. Meetings with SJRWMD and the USACE were held to discuss design and permitting requirements that were comprehensively summarized within meeting notes, copies of which are included in *Appendix A*. Key points of the discussions are summarized below.

SJRWMD indicated that the water surface elevation of Reed Canal as a result of the proposed project would need to be documented. Furthermore, since the Nova Canal has known flooding issues, they would like to see no rise in water surface elevation from the project. While they agreed that no rise would be ideal, RS&H indicated that goal may be unattainable. SJRWMD mentioned that if the canal water surface elevation rises as a result of the project, impacts to upstream properties would need to be addressed. RS&H proposed using the CDM Smith model of the Nova Canal to demonstrate impacts. It was stated that Reed Canal was originally constructed in uplands and it is classified as a surface water, with no mitigation necessary for surface water impacts.

On a conference call, it was confirmed that USACE regulates Reed Canal. Like SJRWMD, USACE concurred that the canal was originally constructed in uplands and is classified as a surface water. It was determined that direct dredge or fill impacts would be considered below the Mean High Water (MHW) for the tidally influenced part of the canal and below the OHW mark for the non-tidally influenced parts of the canal.

ESI reviewed the project area for wetlands and concluded there is one (1) surface water under Sauls Street Bridge known as Reed Canal. Consistent with the RS&H study findings, the intended project will require permits from ACOE (Nationwide Permit 3: Maintenance), and a SJRWMD General Permit 62-330.443 (General Permit to the Florida Department of Transportation, Counties, and Municipalities for Minor Bridge Alteration, Placement, Replacement, Removal, Maintenance, and Operation). The work will also require a Right of Way Use Permit from Volusia County.

Preliminary hydraulic analysis for selection of an appropriate arch culvert was completed using HY-8 (version 7.60) culvert modeling software from the FHWA. As summarized in **Table 1** previously, flow and stage information reported in the CDM Flood Study for the 100-year / 96-hour storm event with 100 YR Stillwater tailwater condition were analyzed, and hydraulic analysis was completed using the values from **Alternative 1** to be more conservative, as they represented the maximum flow conditions (948 cfs combined within conduits 81221, 81221A, and 81221B). Existing conditions were modeled to establish a baseline rise in canal stage across the existing bridge, with tailwater set at elevation 6.0 feet NAVD88. Using 400 sf of cross-sectional area for the existing bridge, the upstream stage was 6.20 feet NAVD88 (0.20-foot rise). With several iterations completed at an invert of 2.0 feet NAVD 88, a Contech "O" series 1055 arch culvert with 380 sf of waterway area was selected as it produced an

upstream elevation of 6.16 NAVD88 feet (0.16-foot rise). This solution seems logical as compared to the Lantern Drive culvert recently constructed downstream with 387 sf of cross-sectional area, which receives slightly more contributing flow. Sufficient basin analysis and bridge hydraulics should be included during the design phase to further assess flow being conveyed to and through the canal.

The following drainage improvements are anticipated:

- Remove a portion of the 54" RCP that enters Reed Canal on the southeast, and further evaluate penetration of the wingwall or other appropriate termination that provides for adequate erosion protection.
- Construct Type-F curb and gutter on the west side to direct runoff into flumes through the wingwalls.
- Construct Curb & Gutter Concrete Barrier on the east side to direct runoff into the flumes through the wingwalls.
- Construct bank and shore rip-rap channel bottom under the bridge culvert.
- Construct coffer dams on each side of canal to hold water back and help with dewatering.
- Construct a temporary bypass culvert during construction so there is no overtopping of the coffer dams.
- Install turbidity curtain across the canal beyond each coffer dam.

#### <u>Right of Way</u>

As noted above, existing right of way on the east side of Sauls Street in front of parcel 633747000010 (2801 Sauls Street) is limited, and maintenance mapping is recommended to document existing right of way where sidewalk presently exists in front of the masonry wall. The proposed bridge and shared use path improvements are expected to be constructed entirely within the existing Reed Canal Road right-of-way, but transition curbing on the southeast side may be dependent upon the areas of additional right of way to be maintenance mapped. Survey is required to verify encroachment, and right of way issues will need to be resolved in order for the City to be able to certify the right-of-way on this project.

#### <u>Utilities</u>

No water or sewer utilities are shown crossing the Sauls Street bridge on the City's Utility Map, nor were any related facilities noticed during the site inspection. Therefore, conflicts with these utilities are not expected. Additionally, there were no gas markers visible or other evidence suggesting existing gas lines are present within the work area. Existing overhead electric poles and lines at the intersection are expected to be impacted by construction activities. Coordination with Florida Power and Light (FPL) will be required for relocation of poles, as well as additional street lighting for pedestrian safety. Several other overhead lines are also located on overhead electric poles, but there was no evidence of underground telephone, CATV, and/or fiber optic lines in the work area. Utility coordination will be required to verify all existing utilities and adjustments that may be required.

#### Environmental

As noted above, ESI completed an ecological feasibility study for the proposed bridge and shared use path project. Based on their findings, surface water impacts may apply, but mitigation of wetland impacts is not expected to be required. Additionally, it is not anticipated the project will have any detrimental impacts on any state or federally listed species. For further details, refer to the report included within *Appendix I*.

#### Cultural Resources

As noted above, ESI completed a cultural resources feasibility study which recommends that as part of the permitting process, the Sauls Street Bridge should be recorded as a historic resource and that an architectural historian assess its status for eligibility or ineligibility for inclusion in the National Register of Historic Places (NHRP). Reed Canal is the only other recorded historic resource within the area. There will be a need for further cultural investigation during the design phase. For the complete report, please see **Appendix J**.

## 5

#### FINANCIAL FEASIBILITY

This section summarizes preliminary cost estimates for the design and construction of the proposed bridge and shared use path improvements on Sauls Street at the intersection of Reed Canal Road. This cost estimate is completed for the purposes of the feasibility study and to allow the River to Sea TPO and City of South Daytona to prioritize planned bridge and shared use path improvements. The overall improvement costs were estimated based on FDOT historical unit prices from the FDOT Basis of Estimates. To adjust for potential future increases in the project's cost estimates, an annual inflation factor was applied based on FDOT guidelines. FDOT provides annual inflation factors for roadway construction costs. A listing of the FDOT approved inflation factors through 2028 is available in *Appendix L*.

The total cost of the improvements, including engineering and CEI, is estimated at approximately \$2,505.388.46, as reported in *Table 2* on the following pages. For planning budgetary purposes, proportionate shares of the total project costs estimated for roadway and shared use path improvements are as follows:

Shared Use Path improvements	\$1,077,317.04 (43%)
Roadway Improvements	\$1,428,071.42 (57%)
Total	\$2,505,388.46 (100%)

Using FDOT inflation factors, the three-year breakdown for cost estimates is provided below:

- Year 1 (2021) cost estimate adjusted for inflation \$2,570,528.56
- Year 2 (2022) cost estimate adjusted for inflation \$2,639,932.83
- Year 3 (2023) cost estimate adjusted for inflation \$2,713,850.95

#### Page | 19

#### Table 2 Cost Estimate

ENGINEER'S OPINION OF PROBABLE COSTS						
	SAULS STREET BRIDGE, FEASIBILITY STUDY					
	CITY OF SOUTH DAYT	ONA				
PAY ITEM NO.	PAY ITEM DESCRIPTION	UNIT	QUANTITY	2019 UNIT PRICE	AMOUNT	
101-1	MOBILIZATION	LS	1	\$219,253.00	\$219,253.00	
102-1	MAINTENANCE OF TRAFFIC	LS	1	\$292,337.00	\$292,337.00	
102 71 15	TEMPORARY BARRIER, ANCHORED	LF	75	\$28.21	\$2,115.75	
104-10-3	SEDIMENT BARRIER	LF	2432	\$1.89	\$4,596.48	
104-11	FLOATING TURBIDITY BARRIER	LF	91	\$10.00	\$910.00	
110-1-1	CLEARING AND GRUBBING	AC	0.308	\$17,217.00	\$5,302.84	
110-3	REMOVAL OF EXISTING STRUCTURES/BRIDGES	SF	2016	\$31.28	\$63,060.48	
110-4-10	REMOVAL OF EXISTING CONCRETE	SY	732	\$21.00	\$15,372.00	
120-1	REGULAR EXCAVATION	СҮ	2175.8	\$6.00	\$13,054.67	
120-2-2	BORROW EXCAVATION, TRUCK MEASURE	СҮ	0	\$17.84	\$0.00	
120-6	EMBANKMENT	СҮ	702.8	\$12.00	\$8,433.33	
285-711	OPTIONAL BASE, BASE GROUP 11	SY	349	\$19.00	\$6,631.00	
334-1-13	SUPER PAVE ASPHALTIC CONCRETE, TRAFFIC C	ΤN	29	\$130.00	\$3,770.00	
337-7-82	APHALT CONCRETE FRICTION COURSE, TRAFFIC C, FC-9.5, PG 76-22	ΤN	19	\$150.00	\$2,850.00	
400-4-5	CONCRETE CLASS IV, BRIDGE SUBSTRUCTURE	СҮ	136.5	\$1,045.69	\$142,717.32	
415-1-5	REINFORCING STEEL- BRIDGE SUBSTRUCTURE	LB	34120	\$1.09	\$37,191.20	
425-19-10	INLETS, CLOSED FLUME	EA	2	\$4,400.00	\$8,800.00	
425-2-72	MANHOLES, J-7, <10'	EA	1	\$9,750.00	\$9,750.00	
430-174-154	PIPE CULVERT, OPTIONAL MATERIAL, ROUND, 54" SD	LF	18	\$160.00	\$2,880.00	
455-133-3	SHEET PILING STEEL, TEMPORARY - CRITICAL	SF	6800	\$19.36	\$131,648.00	
515-2-211	PEDESTRIAN/BICYCLE RAILING, (STEEL)	LF	60	\$128.04	\$7,682.40	
520-1-10	CONCRETE CURB & GUTTER, TYPE F	LF	202	\$23.00	\$4,646.00	
521-72-43	SHLDR CONC BARRIER, CURB AND GUTTER BARR	LF	71	\$235.00	\$16,685.00	
522-1	CONCRETE SIDEWALK, 4" THICK (WITH FIBER) (3000 PSI)	SY	102	\$45.00	\$4,590.00	
523-1	PATTERNED PAVEMENT, VEHICULAR AREAS	SY	47	\$100.00	\$4,700.00	
527-2	DETECTABLE WARNINGS	SF	68	\$29.00	\$1,972.00	
530-1	RIPRAP, SAND-CEMENT	СҮ	19.1	\$490.64	\$9,376.68	
530-3-3	RIPRAP-RUBBLE, BANK AND SHORE	ΤN	258.3	\$82.57	\$21,327.83	
530-74	BEDDING STONE	ΤN	92.0	\$77.73	\$7,151.16	
536-1-0	GUARDRAIL -ROADWAY, GENERAL/LOW SPEED TL-2	LF	29	\$16.00	\$464.00	
570-1-2	PERFORMANCE TURF, SOD	SY	1,042	\$2.50	\$2,605.00	
630-2-11	CONDUIT, F&I, OPEN TRENCH	LF	147	\$7.50	\$1,102.50	
630-2-12	CONDUIT, F&I, DIRECTIONAL BORE	LF	83	\$22.00	\$1,826.00	
630-2-16	CONDUIT, FURNISH & INSTALL, EMBEDDED CONCRETE BARRIERS AND TRAFFIC RAILINGS	LF	150	\$10.00	\$1,500.00	

Table 2 Cost Estimate (cont.)

	ENGINEER'S OPINION OF PROB SAULS STREET BRIDGE, FEASI CITY OF SOUTH DAYTO	ABLE COST BILITY STU DNA	s DY		
PAY ITEM NO.	PAY ITEM DESCRIPTION	UNIT	QUANTITY	2019 UNIT PRICE	AMOUNT
635-2-11	PULL & SPLICE BOX, F&1. 13" x 24" (F&1)	ĔΑ	3	\$7 55.00	\$2,265.00
639-1	ELECTRICAL POWER SERVICE	AS	1		
646-1-12	ALUMINUM SIGNAL POLE, F&I PEDESTRIAN DETECTOR POST	ΕA	2	\$1,168.00	\$2,336.00
654-2-22	RECTANGULAR RAPID FLASHING BEACON, FURNISH & INSTALL - SOLAR POWERED, I COMPLETE SIGN ASSEMBLY	AS	2	\$7,800.00	\$15,600.00
700-1-11	SINGLE POST SIGN, F&I, GROUND MOUNT, UP TO 125F	AS	7	\$356.00	\$2,492.00
700-1-60	SINGLE POST SIGN, REMOVE	AS	7	\$27.00	5189.00
711-11-123	THERMOPLASTIC, ST AND ARD, WHITE, SOLID, 12	LF	74	\$3.00	\$222.00
711-11-125	THERMOPLASTIC, STANDARD, WHITE, SOLID, 24"	LF	34	\$5.00	\$170.00
711-16-101	THERMOPLASTIC, STD-OTH, WHITE, SOLID, 6"	ĞМ	0.050	\$4,060.00	\$203.00
711-16-201	THERMOPLASTIC, STD-OTH, YELLOW, SOLID, 6"	GM	0.025	\$4,153.00	\$103.83
715-1-12	LIGHTING CONDUCTORS, F&I, INSULATED, NO. 8 - 6	LF	1428	\$2.00	\$2,856.00
715-7-11	LOAD CENTER, F&I. SECONDARY VOLTAGE	EA	1	\$10,466.00	\$10,466.00
715-500-1	POLE CABLE DISTRIBUTION SYSTEM. CONVENTIONAL	ΕA	4	\$546.00	\$2,184.00
+	LIGHT POLE BY POWER COMPANY	ΕA	2	\$5,500.00	\$11,000.00
	DECORATIVE PEDESTRIAN LED LIGHT POLE LUMINAIRE AND POLE (WALL MOUNTED)	ΕA	4	\$3,500.00	\$14,000.00
Z999-1	DECORATIVE BRIDGE FEATURES	LS	1	\$15,000.00	\$15,000.00
2999-2	BRIDGE O-SERIES 01055 CONSPAN	LS	1	\$480,000.00	\$480,000.00
Z999-3	BRIDGE O-SERIES 01055 CONSPAN INSTALLATION	LS	I	\$360,000.00	\$360,000.00
		COM	STRUCTION C	OSTS SUBTOTAL	\$1,975,388.46
	SUBVEVING	1 16	Ť.	E 15.000.00	c 15.000.00
	CULTURAL RESOURCES	15	1	\$ 4500.00	c 4 500.00
	COTCOURCE	15	1	4,000.00	4,000,00
	ENVIRONMENTAL INCTIANDS AND RROTECTED SPECIES ASSESSMENTS	10	1	2 2200.00	5 500.00
	ENVINCIMENTAL (WEILANDS AND PROTECTED SPECIES ASSESSMENT)	15	1	\$ 40,000,00	\$ 40,000,00
	CTRUCTURAL	15	1	\$ 250,000,00	\$ 250,000,00
	STRUCTURAL	10	1	\$ 15000.00	5 250,000,00
	SUE CEI	10	1	5 125,000,00	< 185,000,00
	221	CUDV	TY / DESIGN	CEL SUPTOTAL	\$ 185,000,00
		3011	TOTAL	CET SUBTOTAL	\$350,000.00
			TUTAL	PROJECT COST	52,505,588.40
	FDOT INFLATION-ADJUSTED	ESTIMATE	INFLATION FACTOR	PDC MULTIPLIER	ADJUSTED COST
T.	2021 ESTIMATED PRO	DJECT COST	2.6%	1.026	\$2,570,528.56
	2022 ESTIMATED PR	DJECT COST	2.7%	1.054	\$2,639,932.83
	2023 ESTIMATED PRI	DJECT COST	2.8%	1.083	\$2,713,850.95
* Costs for	mitigation of impacts to wetlands or protected species are not inclu	ded as they	are not antic	ipated in this pr	oject.
* Costs for	mitigation of impacts to cultural resources are not included as none	are anticij	pated in this p	roject.	

### 6 CONCLUSION

The purpose of this study was to evaluate the feasibility of replacing the existing bridge on Sauls Street over Reed Canal with an arch culvert type structure with improved traffic lanes and a 12-foot wide shared use path. From the preliminary investigation, and review of the hydraulic information, a Conspan "O" series 1055 was preliminarily selected as the proposed arch culvert structure. In addition, key components of the study include pedestrian and bicyclist safety as they cross the Reed Canal on Sauls Street, and adjustments to drainage and utility systems warranted by reconstruction of the bridge. The primary purpose of this project is to provide safe pedestrian and bicyclist connectivity along Sauls Street to the north side of Reed Canal Road, for adaption to the future SJR2C Loop trail. The following recommendations and conditions are mentioned below:

- Demolish the existing Sauls Street bridge, approaches, and abutments.
- Construct a new pre-fabricated arch-style bridge culvert that has a span of 55 feet, which will incorporate two (2) 12-foot travel lanes and a 12-foot shared use path on the east side (approximately 54 feet in width).
- Construct shallow foundations to support the arch culvert and wingwalls.
- Construct a concrete curb & gutter barrier on the east side of the northbound travel lane to protect pedestrians and bicyclists.
- Construct a patterned pavement crosswalk with appropriate pedestrian lighting, solar powered RRFB's, signing, and striping.
- Modify the existing 54" stormwater culvert that enters the canal from southeastern side to accommodate the proposed wingwall construction, with adequate permanent erosion protection.
- Provide ADA compliant pedestrian curb ramps with detectable warnings at the Reed Canal Road intersection with Sauls Street.
- Conduct sufficient coordination, research, and analysis to substantiate the use of flow and stage information provided for the Reed Canal system within the CDM Flood Study completed approximately 9.5 years ago, which recommended several optional improvements to reduce flooding.
- Emulate the aesthetical design aspects of the previous bridge replacement projects at Lantern Drive and Oak Lea Drive components.
- The engineering and construction costs associated with these improvements are estimated at approximately \$2,505,388.46 in 2020.

#### **APPENDIX A**

### SJRWMD AND USACE MEETING NOTES

#### **MEETING NOTES**

Subject:	Reed Canal Road Trail SJRWMD Coordination Meeting			
Date:	January 12, 2012			
Meeting Location:	St. Johns River Water Management District Meeting Date: Janu Maitland Service Center Meeting Time: 10:00 601 South Lake Destiny Road, Suite 200 Maitland, FL 32751			January 5, 2012 10:00 AM
Meeting Participants Perry Jennings, PE Gary Haddle Jeff Glenn, PE, D.WR Katherine Luetzow, El	: E, CFM , CFM	Professional Engineer Regulatory Scientist II Water Resources Discipline Leader Water Resources Engineering	-	SJRWMD SJRWMD RS&H RS&H
<b>Distribution:</b> Meeting Participants Greg Kern, AICP		Project Manager		RS&H

#### Following are the Notes from this Meeting:

Please review these notes and direct any required revisions to Katherine Luetzow at 407-893-5814, 407-648-2128 (fax), or <u>Katherine.luetzow@rsandh.com</u> within one week from the above date. Thank you.

The following is a summary of the discussions that occurred during the Coordination Meeting for the Reed Canal Road Trail project in Volusia County along Reed Canal Road from Nova Road to US 1.

- 1. The project will require a standard general permit. Even though the project involves construction of a minor roadway safety feature (sidewalk) and a recreational trail on either side of Reed Canal Road, the project will not be exempted from permitting for stormwater management systems under Chapter 40C-42.0225(5)(a) and (6), FAC, respectively. See Item 3, below, for more information.
- 2. The impact to the water surface elevation of the Reed Canal as a result of the proposed project will need to be documented. RS&H proposed to use CDM's model of the Nova Canal Basin which contains the Reed Canal to demonstrate the impact of the proposed project. As the Nova Canal has a known flooding problem, SJRWMD would like to see no rise in water surface elevation from the proposed project. RS&H agreed that no rise would be ideal, but suggested that goal may be unattainable. If the canal water surface elevation does rise as a result of this project, then the impacts to upstream properties would need to be assessed.
- 3. Treatment volume requirements could be waived under Chapter 40C-42.024(2)(c), FAC, as long as the project demonstrated a net improvement. Additionally, if treatment is being provided in the existing condition by swales or ponding areas adjacent to Reed Canal Road and this existing treatment volume would be reduced or eliminated in the proposed condition, then compensation for the loss of the existing treatment volume will need to be provided. This treatment volume compensation, as well as the





demonstration of a net improvement, could be in the form of treatment swales or other Best Management Practices (BMPs), such as baffle boxes, development of public information literature describing the benefits of Low Impact Development, reducing fertilizer usage, etc.

- 4. Demonstration that attenuation of the proposed stormwater discharge from the project can be accomplished by documenting the pre-development and post-development discharges of the Reed Canal at US 1.
- 5. The Reed Canal was originally constructed in uplands and it is classified as a surface water. No mitigation is necessary for surface water impacts.
- 6. The Florida Fish and Wildlife Conservation Commission (FWC) may require standard manatee conditions for a portion of the project.
- 7. It is unlikely that the Reed Canal is considered Sovereignty Submerged Lands (SSL) by the Board of Trustees of the Internal Improvement Trust Fund (TIITF). SJRWMD will submit a SSL determination request to FDEP during the ERP application process.
- 8. The project is not located within a 100-year floodplain, with the exception of approximately 400 feet at the end of the project west of US 1. SJRWMD is only concerned with the 10-year floodplain.
- 9. SJRWMD requested that existing drainage conditions and trail design criteria be documented.





#### **MEETING NOTES**

Subject:	Reed Ca USACE (	nal Road Trail Coordination Meeting		
Date:	January	9, 2012		
Meeting Location:	Conference Call Meeting Date: Meeting Time:		January 6, 2012 2:30 PM	
Meeting Participants Irene Sadowski Jeff Glenn, PE, D.WR	: E, CFM	Team Leader Water Resources Discipline Leade	r	USACE RS&H
Distribution: Meeting Participants Greg Kern, AICP Katherine Luetzow, EI	, CFM	Project Manager Water Resources Engineering		RS&H RS&H

#### Following are the Notes from this Meeting:

Please review these notes and direct any required revisions to Jeff Glenn at 407-893-5820, 407-648-2128 (fax), or jeff.glenn@rsandh.com within one week from the above date. Thank you.

The following is a summary of the discussions that occurred during the Coordination Meeting for the Reed Canal Road Trail project in Volusia County along Reed Canal Road from Nova Road to US 1.

- 1. The USACE regulates the Reed Canal. The project may be permitted with a Letter Permit or a Nationwide Permit.
- Direct dredge or fill impacts would be considered below the Mean High Water (MHW) elevation for the tidally-influenced portion of the canal and below the Ordinary High Water (OHW) elevation for the non-tidally-influenced portion of the canal. Secondary shading impacts could be considered from the overhanging portion of the cantilevered pedestrian trail.
- 3. The Reed Canal was originally constructed in uplands and it is classified as a surface water. There is little to no aquatic vegetation present. It is very likely that no mitigation would be necessary for impacts to this water resource.





#### **APPENDIX B**

TYPICAL SECTION AND CONCEPT PLANS





	VISION - PL
AUTHORIZATION #27392	



BWilliams 1/29/2020

3:57:29 PM P:\2017\17-108.01 Sauls Street Bridge\(PR0JECT NUMBER)\Struct\B1BridgeSection01.dgn



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DIRECTION OF STATIONING

PLAN AND ELEVATION	REF. DWG. NO.
ULS STREET OVER REED CANAL	SHEET NO.
	B1 - XX

#### **APPENDIX C**

RIGHT OF WAY DOCUMENTS AND LAND RECORDS

#### MAINTANANCE AGREEMENT BETWEEN COUNTY OF VOLUSIA AND CITY OF SOUTH DAYTONA FOR REED CANAL MAINTENANCE RESPONSIBILITIES AFTER CONSTRUCTION OF ADJACENT BIKE PATH

THIS AGREEMENT (AGREEMENT) is made and entered into by and between the County of Volusia (County), a political subdivision of the State of Florida, and the City of South Daytona (City), a municipal corporation of the State of Florida, for maintenance responsibilities of Reed Canal after construction of an adjacent bike trail in the City. Each of the above individually may be referred to as Party, and collectively as Parties.

WHEREAS, there is a proposal between the Florida Department of Transportation (FDOT) and the City to construct a portion of bike path, part of the St. John's River To Sea Loop (Bike Path) along the south bank of the Reed Canal between Carmen Drive and Sauls Street within Right of Way that is owned and maintained by the County; and

WHEREAS, the County desires to support construction of the Bike Path as long as the City agrees to maintain and repair the proposed Bike Path; and

WHEREAS, the City shall be responsible for the maintenance and repair of the Bike Path located in the Reed Canal Right of Way between Carmen Drive and Sauls Street.

NOW, THEREFORE, for and in consideration of mutual covenants contained herein, the sufficiency of which are hereby acknowledged, the undersigned parties agree to the following:

1) The recitals set forth above are true and correct and are intended to form a material part of this Interlocal Agreement.

2) The County agrees that this Agreement pursuant to the conditions herein shall permit the Bike Path to be constructed within County owned Right-of-Way on the south bank of Reed Canal between Carmen Drive and Sauls Street. This Agreement shall function as a use permit or licensing agreement authorizing the City to place the Bike Path in the County Right of Way pursuant to the terms contained herein. Prior to Bike Path construction, the City shall provide the County with design and engineering plans for approval by the County Engineer at the 60%, 90%, and 100% design plan phases.

3) The County shall continue to maintain Reed Canal at the current levels of service which serve only to ensure the canal's primary function as a stormwater conveyance system is being properly met. The current level of maintenance does not include the removal of litter or debris for aesthetic purposes that cause no impact to the conveyance of stormwater through the canal.

4) At the conclusion of construction, the City shall own, operate, and be responsible for all maintenance and repairs of the Bike Path, to all applicable standards, including any FDOT maintenance agreement and approved construction plans. The Bike Path shall include all improvements and associated amenities constructed as part of the proposed Bike Path by, or on behalf of, the City in the Reed Canal Right of Way. These improvements and amenities to include, but are not limited to, concrete paving, asphalt paving, striping, retaining walls, sheet piling, drainage systems, signage, handrail, guardrail, lighting, landscaping and any Bike Path crossings of local and county roads.

5) If, at any time while the terms of this agreement are in effect, it shall come to the attention of the County, that the City's responsibility as established herein or a part thereof is not being properly accomplished pursuant to the terms of this agreement, the County Manager, may, at his/her sole discretion, issue a written notice in care of the City Manager to place the City on notice thereof. Thereafter, the City shall have a period of (30) thirty calendar days within which to correct the cited deficiency or deficiencies. If said deficiency or deficiencies are not corrected within this time period the County may at its option, proceed as follows:

Maintain the declared deficiency with County or a Contractor's material, equipment and personnel. The actual cost for such work will be the responsibility of the City and the County will send an invoice for actual cost to the City.

6) The City shall also have the right, but not the obligation, to provide aesthetic maintenance and repairs, which only includes removal of litter and debris, to Reed Canal above and beyond the County's obligation herein. The City shall acquire written approval from County for any maintenance or repairs to Reed Canal beyond removing litter or debris from Reed Canal.

7) All notices required to be given by either party under this Interlocal Agreement shall be in writing, addressed to the other party as follows, and delivered by certified mail, return receipt requested. or in person:

- (a) City of South Daytona ATTN: City Manager
  1672 S Ridgewood Ave. South Daytona, FL 32119
- (b) County of Volusia ATTN: County Manager 123 West Indiana Avenue DeLand, FL 32720

Either party may, by written notice to the other party as provided herein above, change the address for any subsequent notice.

8) SOVEREIGN IMMUNITY. The City acknowledges that its use of the Bike Path in the County's Right-of-Way shall be at the City's sole risk and expense. The City agrees to indemnify, hold harmless and defend the County, from and against, all liability and expense, including reasonable attorney's fees and costs, in conjunction with any and all claims whatsoever for personal injuries or property damage, including loss of use caused by the negligent or delibert acts or omissions of the City, his/her/their agents, officers or employees arising in any way out of the construction, operation and maintenance of the Bike Path. Each party to this Agreement expressly retains all rights, benefits and immunities of sovereign immunity that they presently enjoy under the Constitution and Statutes of the State of Florida, and particularly with respect to Chapter 768, Florida Statutes.Notwithstanding anything set forth in this Agreement to the contrary, nothing in this Agreement shall be deemed as a waiver of immunity or limits of liability of either party beyond any statutory limited waiver of immunity or limits of liability which may have been adopted by the Florida Legislature or may be adopted by the Florida Legislature and any liability of either party for damages shall not exceed the statutory limits of liability, regardless of the number or nature of any claim which may arise including but not limited to a claim sounding in tort, equity or contract. The County shall in no way be liable to the City or any third party for any costs, expenses, losses, damages, or liabilities incurred by the City or any third party in its use of the County's Right-of-Way. Nothing in this Agreement shall inure to the benefit of any third party for the purpose of allowing any claim against any party, which would otherwise be barred under the Doctrine of Sovereign Immunity or by operation of law.

9) THIRD PARTIES. In no event shall any of the terms of this Agreement confer upon any third person, corporation, or entity other than the parties hereto any right or cause of action for damages claimed against any of the parties to this Agreement arising from the performance of the obligations and responsibilities of the parties herein or for any other reason.

10) DISPUTE RESOLUTION. Any disputes concerning non-performance or other aspects of this agreement by which either party initiates litigation to enforce its rights hereunder, shall be subject to the provisions of Chapter 164, Florida Statutes, the "Florida Governmental Cooperation Act".

11) MISCELLANEOUS. It is expressly agreed and understood between the CITY and the COUNTY that there are no other written or verbal agreements applicable herein between the PARTIES.

This Agreement shall become effective when it is last approved and executed by the COUNTY and the CITY.

Upon execution, either party may record this Agreement in the public records of Volusia County, Florida.

This Agreement shall be executed in triplicate (3), the aggregate of which shall constitute a single document, and electronic and/or facsimile signatures shall be deemed original signatures

12) ENTIRE AGREEMENT. This Agreement sets forth the entire Agreement between the Parties. Modifications to this Agreement may not be made unless such modifications are in writing and executed by both Parties.
IN WITNESS WHEREOF, the parties hereto executed this Interlocal Agreement, by and through their duly authorized representatives, on the respective dates below.

ATTEST:

GEORGE RECKTENWALD COUNTY MANAGER COUNTY OF VOLUSIA, FLORIDA

BY: ED KELLEY, COUNTY CHAIR

DATE: 12-10-2019

County and South Daytona Bike Path and Reed Canal Maintenance Agreement ATTEST:

JAMES L. GILLIS, JR. CITY MANAGER CITY OF SOUTH DAYTONA, FLORIDA

WILLIAM C. HALL MAYOR

County and South Daytona Bike Path and Reed Canal Maintenance Agreement

MAP BOOK31 PAGE 39 Grove Sub =PALMGROVE SUB 8TH. ADDITION, M.B. 29, P18 HAMLIN DRIVE 60' Ninth IN LOTS 78, 79, 80, 99 AND 100 TOWN OF BLAKE, AS RECORDED IN MAP BOOK 1. PAGE 38, AND/OR DEED BOOK "E" PAGE 150, PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA EAST (33) WEST  $(\tilde{\boldsymbol{x}},\tilde{\boldsymbol{y}})$  $(\overline{3})$ (3) (39) STEPP & UPHAM , INC. HAMLIN DRIVE 60 REGISTERED ENGINEERS & SURVEYORS, N 65° 13'E 1110.28' (四) DAYTONA BEACH, FLORIDA 135.34' 60.17 139.65 105.0 120.0 105 LIO UTILITY EASEMENT SCALE: 1" EQUALS 100FT. 6 JULY 1971 8 66  $\bigcirc$ (4)(5) (3) (2)D=PERMANENT REFERENCE MONUMENT 135.0'  $(\mathbf{i})$ (\*\*) (;;;) (;;;) NG5 - 13 E 1158.69 105! 129.32 --- P.O.B. 105 120.0' 65 120' 7067 106' 1061 1900 106' 106 135.00' 122.69' LIO UTILITY EASEMENT DRIVE 60' CAREY Q. +2.5 \$ 0 (1)(31) (32) 135 35 34) (33) 120.0 36 124.75' Lb 38 (37) 60 L 10 DRAIN EASEMENT 4 W X X 1. PS 18=25 EASEMENT (64) O WN 120' 106 ' (12)(16) (15) (14) (13)(1)(9)122.57 106' Ŷ Q 200 60′ 2 DRIVE CAREY EASEMENT 114.26' 105 5 10 DRAIN EASEMENT 120' 105  $\bigcirc$ (63) 120' 144,26' 106 2Q R=25 1007 R: 122.52' 100' 120' 106'  $\langle 0 \rangle$ LIO'UTILITY EASEMENT min - 5'AERIAL EASEMENT (21)(23) 24) (17)(18) (22)(19)(20) 30 (29) 25 26 (28) (24) (27) (23) £1. 19. 4 2 B K (62) FIO UTILITY EASEMENT 120' (106 100 ... 106 133.83 122.40 100' 120'  $\supset$ 5.05 (4)60' DRIVE WELLS 1 -----R R C 10 DRAIN (17) (15) 129.30, 25 (16)(19)(20)(18) (22) (G1)EASEMENT 100' P. 120' 100' 2:25 1 - ES'AERIAL EASEMENT 120' (5) 10G 25 122.28 (27) 106 (26) 30 (32) (31) 24 5 (10' DRAIN 60' DRIVE Z WELLS 60 Z 118.73 \_120' 100 1201 130.731 p 122.23 106 98' 981 1037 LIO UTILITY EASEMENT (40) (39) (38) (37) 9 (10)(8) (34) (35) (36) 6 (33) (59) 5 AERIAL in ? EASEMENT 135.0 N A-2°54'42" w Ch. 25.23 120 2:/ 106' 122.12 135.00 120.27 98 60 ୨୫ି 120 1 5 UTILITY EASEMENT 5 65° 44' W 1098.12' 60 PALM GROVE COURT (58) STATE OF FLORIDA S.S. Pips. 121.72' 97 120 135.98' WE, JAMES E. CAREY AND ALICE M. CAREY, AS PRESIDENT AND SECRETARY RESPECTIVELY, OF PAGO. INC., A FLORIDA CORPORATION, DO HEREBY CERTIFY THAT WE ARE THE OWNERS OF THE FOLLOWING DESCRIBED 1-2.5 A= 11° 41' 47' Ch = 101.17' A 18:45.09 Ch. 142.23 -- 5'AERIAL PAGE 38, AND/OR DEED BOOK"E" PAGE 150, PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA, AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS: EASEMEN 0 38. MORE PARTICULARLY DESCRIBED AS FOLLOWS: BEGINNING AT THE SOUTH WEST CORNER OF PALM GROVE SUBDIVISION, EIGHTH ADDITION, AS RECORDED IN MAP BOOK 29, PAGE 18, PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA, RUN THENCE ALONG THE SOUTHERLY LINE OF PALM GROVE SUB. BTH ADDITION AFORESAID THE FOLLOWING CALLS: N 65° 13'E 1158.69 FT. TO THE EASTERLY LINE OF MAGNOLIA AVE. A GO FT. STREET AS ESTABLISHED AND OCCUPIED; N 24° 47'W ALONG SAID EASTERLY LINE 130.84 FT. TO A POINT; N 65° 13'E A DISTANCE OF 1110.28 FT. TO THE SOUTHEASTERLY CORNER OF PALM GROVE SUBDIVISION BTH ADDITION AS RECORDED IN MAP BOOK 31, PAGE 21, PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA, AND A PROJECTION THEREOF, A DISTANCE OF 1094.6' TO A POINT; THENCE S56° -54'W A DISTANCE OF 232.3 FT. TO A POINT; THENCE S 10° 58'10'E A DISTANCE OF 841.82 FT. TO A POINT IN THE NORTHERLY LINE OF REED CANAL ROAD, A 130 FT.RIGHT-OF.WAY AS ESTABLISHED AND OCCUPIED; THENCE SG6° 44'40'W ALONG SAID NORTHERLY LINE A DISTANCE OF 841.82 FT. TO A POINT IN THE WESTERLY LINE OF REED CANAL ROAD, A 130 FT.RIGHT-OF.WAY AS ESTABLISHED AND OCCUPIED; THENCE SG6° 44'40'W ALONG SAID NORTHERLY LINE A DISTANCE OF 841.82 FT. TO A POINT IN THE WESTERLY LINE OF MAGNOLIA AVENUE AFORESAID; THENCE N 24° 47'W ALONG SAID WESTERLY LINE A DISTANCE OF 355.6 FT.TO A POINT; THENCE S 06° 44'W A DISTANCE OF 109.12'FT. TO A POINT IN THE WESTERLY LINE OF MAGNOLIA AVENUE AFORESAID; THENCE N 24° 547'W ALONG SAID WESTERLY LINE ADISTANCE OF 355.6 FT.TO A POINT; THENCE S 02° 50'W ALONG SAID WESTERLY LINE ADISTANCE OF 355.6 FT.TO A POINT; THENCE N 24° 50'W ALONG SAID WESTERLY LINE OF LOT 99 AND 100 A DISTANCE OF 650.7 FT. TO THE POINT OF BEGINNING. A DISTANCE OF 650.7 FT. TO THE POINT OF BEGINNING. SURVEY AND REPLAT TO BE MADE OF SAID 100 MET FOR THE CAUSE THE CAUSE A ADDITION AND THE WESTERLY (48) (44) (42)(41)(47) (46) (57)(43) 151.39 87.31 97 97 120' A= 13:23:41 Ch 115:80' Na 184.3' 4 Ch. 68.12" LIO UTILITY EASEMENT mr. (53) (54) (55)50 ക 53° 27'09E 25' -556°26'53W 232, 61.00' 58°30'21E 58.30.21"E 44.35' 44.04 120.04 97.03 SURVEY AND REPLAT TO BE MADE OF SAID LANDS AS SHOWN HEREON AND THAT THE SAME IS CORRECT TO THE BEST OF OUR KNOWLEDGE AND BELIEF AND WE DO HEREBY DEDICATE TO PUBLIC USE FOREVER ANY AND ALL STREETS, LANES OR OTHER THOROUGHFARES AND EASEMENTS LYING WITHIN SAID PROPERTY LINES, AND WE DO HEREBY FILE THIS PLAT FOR PUBLIC RECORD. 9712 566° 44' 40 "W 845.84' CANAL ROAD REED 1301 R/W APPROVED AND ACCEPTED BY THE CITY OF SOUTH DAYTONA, FLORIDA PAGO INC. A.D., 197-THIS / AT DAY OF\_ JAMESE, CAREY MAY PRESIDENT CLERK WITNESSES SURVEYORS CERTIFICATE atios. I HEREBY CERTIFY THAT THE FOREGOING PLAT IS A CORRECT REPRESENTATION OF THE LAND SURVEYED AND THAT PERMANENT REFERENCE MONUMENTS HAVE BEEN PLACED AS REQUIRED BY THE SURVEY LAWS OF THE STATE OF FLORIDAY VIRIED SECRETARY ALICE M. CAREY S ຽ ···· PADE  $\mathbf{D}$ 1971 JUL PREGOSTERED STATE OF FLORIDA.S.S. SURVEYOR #669 I HEREBY CERTIFY THAT ON THIS DAY BEFORE ME, AN OFFICER DULY AUTHORIZED IN THE STATE AND COUNTY AFORESAID TO TAKE ACKNOWLEDGEMENTS, PERSONALLY APPEARED JAMESE, CAREY AND ALICE M. CAREY, TO ME KNOWN TO BE THE PERSONS DESCRIBED IN AND WHO EXECUTED THE FOREGOING INSTRUMENT AND ACKNOWLEDGED BEFORE ME THAT THEY EXECUTED THE SAME. WITNESS MY HAND AND OFFICIAL SEAL IN THE STATE AND COUNTY LAST AFORESAID 的这些流行的 CERTIFICATES OF APPROVAL A.D., 1971 THIS ANDAY OF\_ DATE July 21, 1971 CHAIRMAN DONOLOM A COLLEGY IN ZONING COMMISSION Ang Cartonic in a lage to see an an X Pender By Street Lynn & Vnen MY COMMISSION EXPIRES CITY ENGINEER L.J. Willardy. DATE July 16, 197 CITY ATTORNEY Robert abraham DATE July 22, 1871 NOTARY PUBLIC

INDEX:

COVER SHEET	
"SEGMENT A"	DETAIL
"SEGMENT B"	DETAIL
	COVER SHEET "SEGMENT A" "SEGMENT B"

SURVEYORS NOTES:

- 1. THE BEARINGS AND COORDINATES SHOWN HEREON ARE BASED ON THE FLORIDA STATE PLANE COORDINATE SYSTEM, EAST ZONE, 1983 NORTH AMERICAN DATUM, 2007 ADJUSTMENT, AS ESTABLISHED FROM MULTIPLE OBSERVATIONS USING THE LENGEMANN REAL TIME KINEMATIC REFERENCE STATIONS, ALSO KNOWN AS THE L-NET (TopNET GNSS Network).
- A. DERIVING A BEARING OF N 65°04'53" E ALONG THE NORTH RIGHT OF WAY LINE OF REED CANAL ROAD ACCORDING TO THE FLORIDA DEPARTMENT OF TRANSPORTATION RIGHT OF WAY MAP OF STATE ROAD NO. 5A (NOVA ROAD), SECTION NO. 79190-2510 SHEET 7 OF 17, FOR THE BEARING BASE OF SEGMENT A, AS MAPPED ON SHEET 2 OF 3, OF THIS SURVEY.
- B. DERIVING A BEARING OF N 65°45'44" E ALONG THE SOUTH LINE OF LOTS 49 TO 55, PALM GROVE SUBDIVISION NINTH ADDITION, RECORDED IN MAP BOOK 31, PAGE 39, OF THE PUBLIC RECORDS OF VOLUSIA COUNTY, FOR THE BEARING BASE OF SEGMENT B, AS MAPPED ON SHEET 3 OF 3, OF THIS SURVEY.
- 2. THE SPECIFIC PURPOSE OF THIS SURVEY IS TO:
- A. ESTABLISH THE SURVEY BASELINES AS DESCRIBED HEREON.
- B. ESTABLISH AND MAP THE MAINTAINED NORTHERLY RIGHT OF WAY OF REED CANAL ROAD ALONG SEGMENTS A AND B AS SHOWN HEREON.
- 3. ON MARCH 28, 2017, TADD KASBEER (ASSISTANT VOLUSIA COUNTY ENGINEER), BENJAMIN BARTLETT (ENGINEERING SECTION MANAGER VOLUSIA COUNTY ROAD AND BRIDGE DEPARTMENT) AND LES GILLIS (CITY OF SOUTH DAYTONA, PUBLIC WORKS DIRECTOR), MET IN THE FIELD TO DETERMINE THE LIMITS OF THE MAINTAINED RIGHT OF WAY.
- 4. THE VOLUSIA COUNTY MAINTAINED RIGHT OF WAY HAS BEEN DETERMINED BY BENJAMIN BARTLETT TO BE 1.00 FOOT NORTH OF THE EDGE OF SIDEWALK.
- 5. THE CITY OF SOUTH DAYTONA BEACH MAINTAINED UTILITY LIMITS , SHOWN HEREON, HAVE BEEN DETERMINED BY LES GILLIS.
- 6. THE DISTANCES SHOWN HEREON ARE IN US SURVEY FEET AND ARE FIELD MEASURED OR CALCULATED FROM FIELD MEASUREMENTS UNLESS OTHERWISE NOTED.
- 7. PROPERTY LINES ARE SHOWN FOR INFORMATIONAL PURPOSES ONLY AND ARE NOT TO BE CONSIDERED SURVEY QUALITY.
- 8. UNDERGROUND UTILITIES AND FOUNDATIONS HAVE NOT BEEN LOCATED AS A PART OF THIS SURVEY.
- 9. ALL RECORDING INFORMATION SHOWN HEREON IS RECORDED IN THE PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA.
- 10. ONLY PERTINENT FIXED IMPROVEMENTS, SUCH AS EVIDENCE OF BOUNDARY INCLUDING BUT NOT LIMITED TO, FENCES, SIDEWALKS, AND UTILITY LINES, HAVE BEEN SHOWN IN RELATIONSHIP TO THE MAINTAINED RIGHT OF WAY.
- 11. THE FIELD DATE OF THIS SURVEY IS MAY 26. 2017.



		LEGEND	& ABBREVIATIONS	
<ul> <li>BENCHMARK</li> <li>CENTRAL ANGLE</li> <li>CONCRETE</li> <li>CONCRETE MONUMENT</li> <li>DEGREES</li> <li>ELECTRIC BOX</li> <li>FIRE HYDRANT</li> <li>GUY ANCHOR</li> <li>GUY POLE</li> <li>IRON PIPE</li> </ul>	<ul> <li>LIGHT POLE</li> <li>POWER POLE</li> <li>ROD &amp; CAP</li> <li>SANITARY MANHOLE</li> <li>STORMWATER MANHOLE</li> <li>TELEPHONE SERVICE BOX, CABLE TV BO or SANITARY VALVE BOX</li> <li>UTILITY POLE</li> <li>WATER METER</li> <li>WATER VALVE or RECLAIMED WATER VA</li> </ul>	DX LVE	A/C = AIR CONDITIONER ASPH = ASPHALT (C) = CALCULATED C/L = CENTERLINE C.B. = CHORD BEARING CH. = CHORD DISTANCE C.M. = CONCRETE MONUM CONC. = CONCRETE CONST. = CONSTRUCTION (D) = DEED ELEV. = ELEVATIONS EXIST = EXISTING F.D.O.T. = FLORIDA DEPARTMENT OF TRANSPORTATION	FND. = FOUND F.M. = FIELD ME ID = IDENTIFICAT I.P. = IRON PIPE IRC = IRON ROD LT = LEFT L = ARC LENGTH (P) = PLAT P.O.B. = POINT OF P.C. = POINT OF P.I. = POINT OF P.K. = PARKER P.T. = POINT OF P/L = PROPERTY

# COUNTY ROAD No. 4078 REED CANAL ROAD

"MAINTENANCE MAP"

SEGMENT A

FROM NOVA ROAD TO JUST WEST OF CITRUS AVE. SEGMENT B

FROM MAGNOLIA AVE. TO JUST EAST OF SAULS RD. IN SECTIONS 42 & 43 ALL

IN TOWNSHIP 15 SOUTH, RANGE 33 EAST



Segment A (Survey Baseline description):

Commence at a Copper Coated Rod with Cap stamped FDOT marking the Southerly corner of the Right of Way corner clip at the northeasterly corner of Nova Road and Reed Canal Road as depicted on Sheet 7 of 17 of the Right of Way Map for State Road 5A (Nova Road) Section 79190-2510; thence run N 65°04'53" E (N 65°03'55" E, FDOT Map), along the north Right of Way line of said Reed Canal Road, a distance of 310.35 feet (310.28 feet, FDOT Map) to a Copper Coated Rod with Cap stamped FDOT; thence N 68°42' 55" E (N 68°45'30" E, FDOT Map) along said right of way a distance of 170.35 feet (170.44 feet FDOT map) to a Copper Coated Rod with Cap stamped FDOT; thence S 24°59'29" E (S 24°55'49" E, FDOT Map), a distance of 44.05 feet (44.00 feet, FDOT Map) to a Parker-Kalon Nail (P.K. Nail) with disk stamped FDOT and the Point of Beginning: thence departing said Right of Way line, N 65°49'28" E, a distance of 948.75 feet to the Point of Terminus.

Segment B (Survey Baseline description):

Beginning at the intersection of the westerly projection of the southerly line of Lots 49 through 55 inclusive and the centerline of Right of Way of Magnolia Avenue, a 60.00 foot-wide Right of Way, as depicted on the plat of Palm Grove Sub., Ninth Addition, as recorded in Map Book 31, Page 39; thence run N 65°45'44" E, along said westerly projection, the South line of said lots and the easterly projection thereof, a distance of 795.18 feet; thence departing said easterly projection, N 88°47'46'E, a distance of 388.38 feet to the Point of Terminus.

EASURED TION W/ CAP

OF BEGINNING CURVATURE **INTERSECTION** – KALON TANGENCY LINE

PROP. = PROPOSEDPVMT. = PAVEMENTR = RADIUSRNG. = RANGERT = RIGHTRWV = RECLAIMED WATER VALVE R/W = RIGHT OF WAYSEC. = SECTION STA = STATIONOF COMMENCEMENT SVB = SANITARY VALVE BOX T = TANGENTTELS = TELEPHONE SERVICE BOX TVBX = CABLE TV BOXTWP. = TOWNSHIPVOL. CO. = VOLUSIA COUNTY

Vollusia County FLORIDA

COUNTY OF VOLUSIA PUBLIC WORKS DEPARTMENT ENGINEERING & CONSTRUCTION SURVEY DIVISION 123 W. INDIANA AVE., DELAND, FL. 32720 PHONE 1-386-736-5967 FAX 1-386-822-5736

	NA
CADD	ME
SURVEY DATE	ММ /
CHECKED	J
FIELD BOOK	NO.
SURVEYORS CEI NOT VALID WITH SEAL OF A FLC	RTIFICA 10UT TI )RIDA L

\_\_\_\_\_ JEFF W. BARNES

R/W MAP BOOK	,PG

CERTIFICATE OF APPROVAL BY THE CITY OF SOUTH DAYTONA PUBLIC WORKS DIRECTOR

THIS IS TO CERTIFY, That <u>UTILITIES ALONG REED CANAL ROAD</u> have been constructed, maintained or repaired, continuously and uninterruptedly for more than 4 years by the City of South Daytona Public Works Department and that this Maintenance Map shall vest all right, title, easement and appurtenances in and to the road to the County of Volusia, in accordance with subsection (1) of Chapter 95.361 of the Florida Statutes of 2013.

MR. LES GILLIS CITY OF SOUTH DAYTONA, PUBLIC WORKS DIRECTOR

CERTIFICATE OF APPROVAL BY <u>JEFF W BARNES</u> REGISTERED LAND SURVEYOR FOR VOLUSIA COUNTY

THIS IS TO CERTIFY, That on \_\_\_ \_\_a survey of the prescriptive roadway was performed under my direction and supervision and that this Maintenance Map is a correct representation of the existing roadway and is in compliance with Chapter 95.361 of the Florida Statutes of 2013.

JEFF W. BARNES, P.S.M. # 5576 REGISTERED LAND SURVEYOR

CERTIFICATE OF APPROVAL BY THE VOLUSIA COUNTY ROAD AND BRIDGE DIRECTOR

THIS IS TO CERTIFY, That <u>REED CANAL ROAD</u> was constructed, maintained or repaired, continuously and uninterruptedly for more than 4 years by Volusia County Road and Bridge Division and that this Maintenance Map shall vest all right, title, easement and appurtenances in and to the road to the County of Volusia, in accordance with subsection (1) of Chapter 95.361 of the Florida Statutes of 2013.

JUDY GRIM

VOLUSIA COUNTY ROAD AND BRIDGE DIRECTOR

CERTIFICATE OF APPROVAL BY THE COUNTY COUNCIL OF VOLUSIA COUNTY, FLORIDA

THIS IS TO CERTIFY, That on \_\_\_\_\_\_ the foregoing map was approved by the County Council of Volusia County, Florida.

Ed Kelley, Chair of the County Council of Volusia County

Attest: \_\_\_\_ James Dinneen, County Manager of Volusia County and Ex-officio Clerk

County Seal

CERTIFICATE OF CLERK I HEREBY CERTIFY, That I have examined the foregoing map and find that it complies in form of Chapter 95.361 Florida Statutes, and was filed

for record on \_\_\_\_\_at\_\_\_\_\_

RECORDED IN RIGHT OF WAY BOOK \_\_\_\_\_ PAGE \_\_\_\_\_

Clerk of the Circuit Court in and for Volusia County, Florida

VAME	DATE	PLOT DATE:								
МЕМ	5/17	6/8/17	REED CANAL ROAF							
/ MB	5/26/17		REED CANAL ROAD							
JB	5/17	SCALE:	SEGMENTS A AND	BI						
), .	378	N/A	NODILL D /W LINATS DY MAINTENIANCE							
CATE:	IGINAL SIGNA	TURE AND RAISED	NUKIM K/W LIMIIS BI MAINTENANCE							
LICENSED SURVEYOR AND MAPPER			TYPE OF SURVEY	Proj. No: N/A						
		Draw No: 2443								
5, P.S.M	M. #5576		Sh No: 1 of							





# HAMMOCK LAKE ESTATES City of South Daytona, Volusia County, Florida A PORTION OF SECTION 43, TOWNSHIP 15 SOUTH, RANGE 33 EAST

LEGAL DESCRIPTION: LOT 1, LESS THE WEST 346.71' THEREOF, THE NORTH 1/2 LOT 3 AND LOT 2, BLOCK 3, DUNLAWTON, AS RECORDED IN MAP BOOK M, PAGE 187 OF THE PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA.



- VEPICTION OF THE SUBDIVIDED LANDS DESCE NO CIRCLINISTANCES BE SUPPLANTED IN AUTHORITY
- SHOWN ON THIS PLAT OF SURVEY/SKETCH OF DESCRIPTION THE PUBLIC RECORDS OF THIS COLIMITY.
- LINDERGROUND
- 5 ACCURACY: THE BOUNDA
- SECONDS MULTIPLIED BY ANGLES TURNED.
- 6. THE HAMMOCK LAKE ESTATES HOMEOWINERS ASSOCIATION, INC. SHALL BE RESPONSIBLE FOR THE OPERATION AND MAINTENANCE OF THE DRAINAGE SYSTEM WITHIN ALL COMMON AREAS AS SHOWN ON THIS PLAT, AS DEPICTED ON THE STORMWATER WANAGEMENT PLAN APPROVED FOR THIS DEVELOPMENT BY THE CITY OF SOUTH DAYTONA. 7. THE ARTICLES OF INCORPORATION OF THE HAMMOCK LAKE ESTATES HOMEOWNERS ASSOCIATION, INC., ARE RECORDED IN OFFICIAL RECORDS BOOK 77.4 PAGES 39.0 THINOUGH OF THE PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA. THE DECLARATION OF COVENANTS AND DESTRICTIONS ARE RECORDED IN OFFICIAL RECORDS BOOK 72.2 PAGES 37.2 THRU \_\_\_\_\_\_ PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA. 8.NOTE: ALL MEASUREMENTS REFER TO HORIZONTAL PLANE IN ACCORDANCE WITH THE DEFINITION OF THE U.S. SURVEY FOOT OR METER ADOPTED BY
- WITH THE DEFINITION OF THE U.S. SURVEY FOOT OR METER ADOPTED BY THE NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY. ALL MEASUREMENTS SHALL USE THE 39.27/12-3.2808333333 EQUATION FOR CONVERSION FROM U.S. FOOT TO METERS.
- 9. THIS PLAT IS SUBJECT TO ALL EASEMENTS OF RECORD AND RESERVATIONS OF EASEMENTS, INCLUDING BUT NOT LIMITED TO DRAINAGE AND UTILITY EASEMENTS DEDICATED HEREON WHICH SHALL BE LOCATED AS FOLLOWS EXCEPT AS OTHERWISE NOTED ON THE PLAT.
- FRONT LOT LINES 10', SIDE LOT LINES 5' AND REAR LOT LINES 7.5'. 10. UTILITY EASEMENTS PROVIDED ON THIS PLAT INCLUDE EASEMENTS FOR THE CONSTRUCTION, INSTALLATION, MAINTENANCE AND OPERATION OF CABLE TELEVISION SERVICES: PROMDED HOWEVER, NO SUCH CONSTRUCTION. INSTALLATION, MAINTENANCE AND OPERATION OF CABLE TELEVISION SERVICES SHALL INTERFERE WITH THE FACILITIES AND SERVICE OF AN ELECTRIC, TELEPHONE, GAS OR OTHER PUBLIC UTILITY.
- 11. UTILITIES SHALL INCLUDE BUT NOT LIMITED TO POTABLE WATER, SANITARY SEWER, RECLAIMED WATER, STORM DRAINAGE, TELEPHONE, CABLE TV, ELECTRIC, SECURITY AND NATURAL GAS.
- 12. COMMON AREAS ARE DEDICATED TO THE HAMMOCK LAKE ESTATES HOMEOWNERS ASSOCIATION, INC.

#### PREPARED BY:

KEN BLIZZARD PROFESSIONAL SURVEYOR & MAPPER # 3865, LB.# 4567 SPRUCE CREEK LAND SURVEYORS, INC. 3869 S. NOVA RAOD PORT ORANGE, FLORIDA 32127 386-767-0740



12/23/2005 12:58 PM Instrument# 2005-355188 # 1 Book: 52 Page: 131

JOINDER AND CONSENT TO PLAT DEDICATION

religned hereby certifies that it is the holder of a mortgage, lien or other encumbrance above described property which encumbrance is recorded in Official Records Book Page 25, 25, 5, of the Public Records of Volusia County, Florida and that the undersigned its to the recording of the above referenced plat and the dedi ribed in the dedication block therein by the owner thereof, and agrees or other encumbrance shall be subordinated to the above dedication. the lands

CYPRESS COQUINA BANK

Signed, sected presence of: and delivered in the Print Nome: JAMES K. Gorato Kristic G.Koch

Print Name: Mushaw Mark O. Blanford Title: Executive Vice Archident STATE OF Florida

This is to certify, that on December 8 withorized to take additioned 40025 COQUING behalf of sold corporation. me, or (1 has/has

		PAGE	13
	DEDICATION	:	
	KNOW ALL MEN BY THES A FLORIDA CORPORATION DESCRIBED IN THE AT ESTATES" LOCATED IN THE FLORIDA, DO HEREBY DEI AND THE STREETS ANI FLORIDA, AND DEDICAT RETENTION AND COMMI HOMEOWNERS ASSOCIATION IN WITNESS WHEREOF THESE PRESENTS TO BE	E PRESENTS, THAT A ( , BEING THE OWNER IN TACHED PLAT ENTIT HE CITY OF SOUTH D DICATE THE UTILITY EA D RIGHTS OF WAY TO TES THE DRAINAGE ON AREAS TO THE DN, INC. , A & H INVESTMENT EXECUTED IN THEIR N/ EXECUTED IN THEIR N/	H INVESTME FEE SIMPLE LED "HAMMA AYTONA, SEMENTS SHI THE CITY OF S EASEMENTS H HAMMOCK LAP GROUP, LLC AME, AND THE
	Dec., 2005		
	A & H INVESTMENT GRO		
	BY William	Hunbert	in an
	ATTEST: Signed, sealed and de	 Livered in the prese	NCE OF:
l	Bolin Den	na	
	STATE OF 51 OBIDA	COUNTY OF VOLUSIA	
	THE FOREGOING INSTRUM	IENI WAS ACKNOWLED	ED BEFORE M
	BEHALF OF THE CORPOR	THE ABOVE NAMED COF	PORATION, O
l	BOLL LOUNT	a	GCIME EXI EXI ON COM
	CERTIFICATE OF SURVEY KNOW ALL MEN BY THE AND, RECISTERED SURVE 12/2/02 THE SUR FOREGOING PLAT; THAT THE LANDS THEREIN DE UNDER MY RESPONSIBLE COMPLIES WITH ALL OF AND THAT SAID LAND IS COUNTY, FLORIDA.	OR AND MAPPER SE PRESENTS, THAT TH YOR AND MAPPER, DOI IVEY WAS COMPLETED SAID PLAT IS A TRUE SCRIBED AND PLATTED; DIRECTION AND SUPE THE REQUIREMENTS OF S LOCATED IN THE CITY	E UNDERSIGNI ES HEREBY CE OF THE LANDS AND CORREC THAT SAID F RVISION; THAT CHAPTER 17 OF EDGEWAT
	KEN BLIZZARD PROFESSIONAL SURVEYO SPRUCE CREEK LAND SU 3869 S. NOVA RAOD PORT ORANGE, FLORIDA 386-767-0740	R & MAPPER & 3865, RAEVORS, INC. 32127	L.B.# 4567
	CERTIFICATE OF APPROV	/AL	
	THIS IS TO CERTIFY TH PLAT WAS APPROVED 9	THE CITY OF SOUTH	DAYTONA EN
V	THIS IS TO CERTIFY THAPLAT WAS APPROVED B	AT ON DAG	ARF THIS DAYTONA.
	THIS IS TO CERTIFY THAT WAS APPROVED	ng on Da.c 2/20	X.D.F.THIS
	Section 10	mage 11	
	CITY ATTORNEY THE CITY OF SOUTH DA PLAT FOR HAMMOCK LA	YTONA PLANNING BO	NO HEREBY
	CHAIRMAN, CITY OF SO	UTH DAYTONA PLANNIN	G BOARD
		VAL BY THE CITY COUR	iciL
	THIS IS TO CERTIFY TH AFOREGOING PLAT WAS	AT ON JOA MALY 13, APPROVED BY THE C	19.4 THE
ber	MAYOR Blain	Dered	
	ATTEST Deputie	H. Fitzgreard	<del>а</del> А.
	CERTIFICATE OF CLERK		
	I HEREBY CERTIFY THA THAT IT COMPLIES IN F 177, FLORIDA STATUTE AT UCLOAD	T I HAVE EXAMINED TH FORM WITH ALL THE S, AND WAS FILED FOR Arm	E FOREGOING REQUIREMENTS RECORD ON
	HailPurnis	COURT IN AND FOR V	OLUSIA COUNT
	CERTIFICATE OF CITY S	SURVEYOR at I have reviewed the	forecoinc on









- Delta=90"51'23" R=25.00' T=25.38' L=39.64' 5' WALL & SIGN EASEMENT Delto=89'08'37" R=25.00' T=24.63' L=38.90'



A REPLAT OF A PORTION OF LOTS 1 AND 2, BLOCK 4, DUNLAWTON, AS RECORDED IN DEED BOOK "M", PAGE 187 OF THE PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA, AND A PORTION OF GOVERNMENT LOTS 4 AND 5, SECTION 33, TOWNSHIP 15 SOUTH, RANGE 33 EAST, LOCATED IN THE CITY OF SOUTH DAYTONA, VOLUSIA COUNTY, FLORIDA.

# **DESCRIPTION:**

A PORTION OF LOTS 1 AND 2, BLOCK 4, DUNLAWTON AS RECORDED IN DEED BOOK "M", PAGE 187 OF THE PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA, AND A PORTION OF GOVERNMENT LOTS 4 AND 5, SECTION 33, TOWNSHIP 15 SOUTH, RANGE 33 EAST, VOLUSIA COUNTY, FLORIDA, DESCRIBED AS FOLLOWS:

FROM THE NORTHWESTERLY CORNER OF LOT 1, LANTERN PARK, UNIT 1 AS RECORDED IN PLAT BOOK 31, PAGE 178 OF THE PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA, AS THE POINT OF BEGINNING, RUN SOUTH 05 DEGREES 14 MINUTES 49 SECONDS EAST ALONG THE WESTERLY LINE OF SAID LANTERN PARK, UNIT 1, A DISTANCE OF 341.19 FEET; THENCE DEPARTING SAID WESTERLY LINE, RUN SOUTH 76 DEGREES 39 MINUTES 00 SECONDS WEST, A DISTANCE OF 289.93 FEET; THENCE SOUTH 26 DEGREES 45 MINUTES 16 SECONDS EAST, A DISTANCE OF 10.00 FEET; THENCE SOUTH 63 DEGREES 24 MINUTES 04 SECONDS WEST, A DISTANCE OF 404.27 FEET TO THE EASTERLY RIGHT OF WAY LINE OF SAULS STREET, A 30 FOOT RIGHT OF WAY; THENCE NORTH 27 DEGREES 50 MINUTES 39 SECONDS WEST ALONG SAID EASTERLY RIGHT OF WAY LINE, A DISTANCE OF 389.61 FEET; THENCE DEPARTING SAID EASTERLY RIGHT OF WAY LINE, RUN NORTH 69 DEGREES 52 MINUTES 35 SECONDS EAST, A DISTANCE OF 20.18 FEET; THENCE SOUTH 27 DEGREES 50 MINUTES 39 SECONDS EAST, A DISTANCE OF 2.29 FEET TO THE POINT OF CURVATURE OF A CURVE, CONCAVE NORTHERLY, HAVING A RADIUS OF 30.00 FEET, A CENTRAL ANGLE OF 90 DEGREES 00 MINUTES 00 SECONDS, AND A CHORD BEARING OF SOUTH 72 DEGREES 50 MINUTES 39 SECONDS EAST; THENCE RUN EASTERLY ALONG THE ARC OF SAID CURVE, A DISTANCE OF 47.12 FEET TO THE POINT OF TANGENCY OF SAID CURVE; THENCE NORTH 62 DEGREES 09 MINUTES 21 SECONDS EAST, A DISTANCE OF 42.74 FEET TO THE POINT OF CURVATURE OF A CURVE, CONCAVE SOUTHERLY, HAVING A RADIUS OF 320.00 FEET, A CENTRAL ANGLE OF 14 DEGREES 39 MINUTES 03 SECONDS, AND A CHORD BEARING OF NORTH 69 DEGREES 28 MINUTES 53 SECONDS EAST; THENCE RUN EASTERLY ALONG THE ARC OF SAID CURVE, A DISTANCE OF 81.83 FEET TO THE POINT OF TANGENCY OF SAID CURVE; THENCE NORTH 76 DEGREES 48 MINUTES 24 SECONDS EAST, A DISTANCE OF 216.58 FEET; THENCE NORTH 03 DEGREES 02 MINUTES 37 SECONDS WEST, A DISTANCE OF 147.00 FEET TO THE SOUTHERLY RIGHT OF WAY LINE OF REED CANAL ROAD, A 130 FOOT RIGHT OF WAY; THENCE NORTH 87 DEGREES 55 MINUTES 21 SECONDS EAST ALONG SAID SOUTHERLY RIGHT OF WAY LINE, A DISTANCE OF 412.29 FEET TO THE POINT OF BEGINNING.

CONTAINING 6.30 ACRES, MORE OR LESS.

## NOTES:

- 14	NO	TICE	TH	15
	OF	FICIA	LDE	-
	WIL	LIN	NO	
	GR	APH	C 0	R
	RE	STRI	CTIO	Ν
	IN	THE	PUE	31

AND UTILITIES: FRONT AND SIDE STREET LOT LINES = 10' INTERIOR SIDE LOT LINES = 5' REAR LOT LINE = 7.5'

TYPICAL BUILDING SETBACKS ARE AS LISTED BELOW UNLESS OTHERWISE 3. FRONT = 25'SHOWN:

6.

ALL PLATTED UTILITY EASEMENTS SHOWN HEREON SHALL PROVIDE THAT SUCH EASEMENTS SHALL ALSO BE EASEMENTS FOR THE CONSTRUCTION, INSTALLATION, MAINTENANCE, AND OPERATION OF CABLE TELEVISION SERVICES; PROVIDED, HOWEVER. NO SUCH CONSTRUCTION, INSTALLATION, MAINTENANCE, OR OPERATION OF CABLE TELEVISION SERVICES SHALL INTERFERE WITH THE FACILITIES AND SERVICES OF AN ELECTRIC, TELEPHONE, GAS, OR OTHER PUBLIC UTILITY. IN THE EVENT A CABLE TELEVISION COMPANY DAMAGES THE FACILITIES OF ANY OTHER PARTY UTILIZING SUCH EASEMENTS, THE CABLE TELEVISION COMPANY SHALL BE SOLELY RESPONSIBLE FOR ALL DAMAGES.

R = RADIUSL = ARC LENGTHCB = CHORD BEARINGR/W = RIGHT OF WAY(R) = RADIAL(NR) = NON - RADIALFD. = FOUNDC.M. = CONCRETE MONUMENT I.P. = IRON PIPE= PERMANENT REFERENCE MONUMENT LB#4335, SET. UNLESS SHOWN OTHERWISE.  $\mathbf{A} = \text{PERMANENT CONTROL}$ POINT LB#4335, SET.  $\Theta = 5/8$ " IRON ROD WITH CAP LB#4335, SET, UNLESS SHOWN OTHERWISE.

LEGEND / ABBREVIATIONS

 $\Delta = CENTRAL ANGLE$ 

P.L.S. = PROFESSIONAL LAND SURVEYOR O.R. BK. = OFFICIAL RECORDS BOOK PG(S) = PAGE(S)D.B. = DEED BOOKP.B. = PLAT BOOK(C) = CALCULATED DATAGOVT, = GOVERNMENT

PREPARED BY: MARK DOWST & ASSOCIATES, INC. 428 NORTH PENINSULA DRIVE DAYTONA BEACH, FL. 32118

01/06/2000 11:20 Instrument # 2000-002601 BOOK : 47 PAGE : 122

# **GLEN SUBDIVISION**

IS PLAT, AS RECORDED IN ITS GRAPHIC FORM, IS THE PICTION OF THE SUBDIVIDED LANDS DESCRIBED HEREIN AND CIRCUMSTANCES BE SUPPLANTED IN AUTHORITY BY ANY OTHER DIGITAL FORM OF THE PLAT. THERE MAY BE ADDITIONAL NS THAT ARE NOT RECORDED ON THIS PLAT THAT MAY BE FOUND LIC RECORDS OF THIS COUNTY.

2. UNLESS OTHERWISE SHOWN THE FOLLOWING EASEMENTS ARE HEREBY PROVIDED ON ALL LOTS FOR FLORIDA POWER & LIGHT CO., DRAINAGE

REAR = 25'

 $SIDE = 10^{\circ}$ SIDE STREET = 20

BEARING STRUCTURE IS ASSUMED, WITH THE BEARING ON THE SOUTHERLY RIGHT OF WAY LINE OF REED CANAL ROAD BEING N 87'55'21" E.

DESCRIPTION PREPARED BY MARK DOWST & ASSOCIATES, INC.

PLAT BOOK 47 PAGE 122 DEDICATION KNOW ALL MEN BY THESE PRESENTS, THAT SANDRA B. ABRAHAM, BEING THE OWNER IN FEE SIMPLE OF THE LANDS DESCRIBED IN THE ATTACHED PLAT ENTITLED "GLEN SUBDIVISION", LOCATED IN THE CITY OF SOUTH DAYTONA, VOLUSIA COUNTY, FLORIDA, HEREBY DEDICATES SAID LANDS AND PLAT FOR THE USES AND PURPOSES THEREIN EXPRESSED, AND DOES HEREBY DEDICATE THE DRAINAGE AND UTILITY EASEMENTS, STREETS AND RIGHTS OF WAY TO THE CITY OF SOUTH DAYTONA, FLORIDA. IN WITNESS WHEREOF, SANDRA B. ABRAHAM HAS EXECUTED THIS INSTRUMENT ON THIS 3 DAY OF DECUMARE 1911 fre & alexilie SANDRA B. ABRAHAM SIGNED, SEALED AND DELIVERED IN THE PRESENCE OF: MINESS: Autrice & Marthurp MINESS: Earole bierda STATE OF FILMEL COUNTY OF VALUEIL THE FOREGOING INSTRUMENT WAS ACKNOWLEDGED BEFORE ME THIS 23 DAY, OF December, 1997, BY Sinter HORADAN NOTARY PUBLIC: MY COMMISSION EXPIRES: CERTIFICATE OF SURVEYOR AND MAPPER KNOW ALL MEN BY THESE PRESENTS, THAT THE UNDERSIGNED BEING A LICENSED AND REGISTERED SURVEYOR AND MAPPER, DOES HEREBY CERTIFY THAT ON 12-22-99, THE SURVEY WAS COMPLETED OF THE LANDS AS SHOWN ON THE FOREGOING PLAT, THAT THE PLAT IS A TRUE AND CORRECT REPRESENTATION OF THE LANDS SURVEYED, THAT THE SURVEY WAS MADE UNDER MY RESPONSIBLE DIRECTION AND SUPERVISION, THAT THE SURVEY DATA COMPLIES WITH ALL OF THE REQUIREMENTS OF CHAPTER 177, FLORIDA STATUTES, AND MEETS THE MINIMUM TECHNICAL STANDARDS ADOPTED BY THE FLORIDA BOARD OF SURVEYORS AND MAPPERS PURSUANT TO SECTION 472.027, FLORIDA STATUTES, THAT ALL PERMANENT REFERENCE MONUMENTS HAVE BEEN SET AS SHOWN HEREON, AND THAT SAID LAND IS LOCATED IN VOLUSIA COUNTY, FLORIDA. 12-22-99 JOHN RUST PENDLETON, P.L.S. NO. 5232 DATE MARK DOWST & ASSOCIATES, INC. LB NO. 4335 428 NORTH PENINSULA DRIVE DAYTONA BEACH FL. 32118 CERTIFICATE OF APPROVAL BY THE CITY COUNCIL THIS IS TO CERTIFY, THAT ON \_\_\_\_\_\_ Dec. 14 THE CITY COUNCIL OF THE CITY OF SOUTH DAYTONA, FLORIDA Jac hours MAYOR 114 Un C pre-ATTEST: CITY CLERK CERTIFICATE OF APPROVAL BY THE PLANNING BOARD 22 THIS IS TO CERTIFY THAT ON \_\_\_\_\_\_APTI \_\_\_\_ THE PLANNING BOARD OF THE CITY OF SOUTH DAYTONA, FLORIDA APPROVED THE FOREGOING PLAT. John M. Rechan PLANNING BOARD CHAIRMAN

CERTIFICATES OF APPROVAL THIS IS TO CERTIFY, THAT ON Dec. 14 THE FOREGOING PLAT WAS APPROVED BY THE CITY OF SOUTH DAYTONA. MU. C.

CITY MANAGER ( THIS IS TO CERTIFY, THAT ON \_\_\_\_\_ THE FOREGOING PLAT WAS APPROVED BY THE CITY OF SOUTH DAYTONA ENGINEERING DEPARTMENT

CITY ENGINEER

CERTIFICATE OF CLERK I HEREBY CERTIFY THAT I HAVE EXAMINED THE FOREGOING PLAT AND FIND THAT IT COMPLIES IN FORM WITH ALL THE REQUIREMENTS OF CHAPTER

Dail Punois Deputy Clerk CLERK OF THE CIRCUIT COURT IN AND FOR VOLUSIA COUNTY, FLORIDA REVIEW BY THE CITY'S SURVEYOR AND MAPPER

KNOW ALL MEN BY THESE PRESENTS, THAT THE UNDERSIGNED BEING A LICENSED SURVEYOR AND REGISTERED SURVEYOR AND MAPPER IN THE STATE OF FLORIDA, DOES HEREBY CERTIFY TO THE CITY THAT A REVIEW OF THE FOREGOING PLAT HAS BEEN PERFORMED AND BASED ON SUCH REVIEW HAS DETERMINED THAT THE PLAT COMPLIES WITH THE REQUIREMENTS OF CHAPTER 177, FLORIDA STATUTES. THIS REVIEW IS FOR INSPECTION OF MONUMENTATION AND FOR CONFORMITY OF THE FLORIDA STATUTES CHAPTER 177 BY THE DEVELOPMENT REVIEW PROGRAM FOR THE CITY OF SOUTH DAYTONA, FLORIDA. THE REVIEW SURVEYOR AND THE CITY SHALL BE HELD HARMLESS IN RESPONSIBILITY OR LIABILITY TO THE SURVEYOR OF RECORD OR THEIR CLIENTS.

Mamil & Han-DANIEL E. STEVENS, PSM NO. 5072





BOOK: 47 FAGE: 123 Diane M. Matousek Volusia County. Clerk of Court



**APPENDIX D** 

# FEMA MAP



#### FLOOD HAZARD INFORMATION

	HTTP://	MSC.FEMA.GOV
	10.0	Without Base Flood Elevation (BFE)
	_	With BFE or Depth 2000 AF Also we are also
SPECIAL FLOOD HAZARD AREAS	80079	Regulatory Floodway
		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile dure if
OTHER AREAS OF FLOOD HAZARD	1000	Future Conditions 1% Annual Chance Flood Hazard Jame X Area with Reduced Flood Risk due to Levee See Notes Jame X
-	NUSCREEN	Areas of Minimal Flood Hazard
AREAS		Area of Undetermined Flood Hazard Zone (
		Channel, Culvert, or Storm Sewer
Service 4	-10110-1-11110-002	Accredited or Provisionally Accredited
		LOTOD, MINO, OTTIGOUNDI

E 48.2 47.5 Gross Sections with 1% Annua) Chance Water Surface Elevation (BFE) 5

#### NOTES TO USERS



is Courty Growth and Resource attalion U.S. Fain and Webble Map orformal apartment, Vol. Kas, U.S. Galo County GES Dapa a County GES Dapa al Survey and FEMA an provided in signal format by your and Format Department of Transf

ints used to define the topology of the h

sitor, Florida Eam Zone 0901 Western Hemischere, Vertical Datum, NAVD98 N 1 inch = 500 feet 1:6,000 2,000 500 1,000 ters 250 125 500 PANEL LOCATOR 0357 \$378 11356 (1362 0366 1067 0388 10387

### National Flood Insurance Program NATIONAL FLOOD INSURANCE PROGRAM VOLUSIA COUNTY, FLORIDA MINE 367 OF 930 Sumitament. COMMUNITY DAYTCINA BEACH OTY OF PORT DRANGE OTY OF BOUTH DRATONAL OTY OF NOTICEN COMMENTY PANEL 03417 03417 0347 0347 SUFFIC 123099 120513 120514 120514

S FEMA

## **APPENDIX E**

# EXCERPTS FROM CAMP DRESSER and McKEE FLOOD STUDY





#### Nova Canal Flood Control and Integrated Water Resources Project Project Alternative 1 - Peak Stages for 96-hour Design Storms Reed Canal System

	SJRWMD 96-hr Design Storm with 1-Year Stillwater														
			Indicator		Peak Stages (ft NGVD)										
Location	Jurisdiction	Model Node	Elevation (ft NGVD)	Existing Mean Annual	Alt. 1 Mean Annual	Change (ft)	Existing 10-Year	Alt. 1 10-Year	Change (ft)	Existing 25-Year	Alt. 1 25-Year	Change (ft)	Existing 100-Year	Alt. 1 100-Year	Change (ft)
Reed Canal Outfall	SD	12102	-	2.2	2.2	0.0	2.2	2.2	0.0	2.2	2.2	0.0	2.2	2.2	0.0
Upstream of US 1	SD	12101	7.5	2.6	2.9	0.3	2.8	3.1	0.3	3.0	3.0	0.1	3.2	3.2	-0.1
Downstream of RR / Upstream of Proposed Gate	SD	12804	11.5	4.2	3.0	-1.2	4.8	5.1	0.3	5.1	5.6	0.5	5.4	6.1	0.7
Reed Canal at Stevens Canal	SD	128	8.8	5.4	4.7	-0.7	6.2	6.2	0.0	6.6	6.7	0.1	7.0	7.2	0.2
Saul Drive	SD	122	9.6	6.1	5.8	-0.4	6.9	6.9	0.0	7.3	7.3	0.0	7.8	7.9	0.1
Reed Canal at Nova Road	SD	13104	9.2	7.0	6.9	-0.2	7.9	7.8	0.0	8.3	8.3	0.0	8.9	8.9	0.0
Downstream end of Stevens Canal	SD	11901	5.4	5.5	4.8	-0.7	6.4	6.4	0.0	6.8	6.9	0.1	7.3	7.5	0.1
Stevens Canal at Ridge Drive	SD	11001	6.9	5.8	5.3	-0.4	6.8	6.8	-0.1	7.3	7.3	0.0	7.8	7.8	0.0
Stevens Canal at Big Tree Road	SD	10101	8.6	6.1	5.9	-0.2	7.4	7.3	0.0	7.9	7.9	0.0	8.4	8.4	0.0
Upstream end of Stevens Canal	SD	101	6.6	6.3	6.1	-0.1	7.6	7.5	0.0	8.0	8.0	0.0	8.5	8.5	0.0

	SIRWMD 96-hr Design Storm with 100-Year Stillwater														
			Indicator		Peak Stages (ft NGVD)										
Location	Jurisdiction	Model Node	Elevation (ft NGVD)	Existing Mean Annual	Alt. 1 Mean Annual	Change (ft)	Existing 10-Year	Alt. 1 10-Year	Change (ft)	Existing 25-Year	Alt. 1 25-Year	Change (ft)	Existing 100-Year	Alt. 1 100-Year	Change (ft)
Reed Canal Outfall	SD	12102	-	6.0	6.0	0.0	6.0	6.0	0.0	6.0	6.0	0.0	6.0	6.0	0.0
Upstream of US 1	SD	12101	7.5	6.2	6.5	0.3	6.4	6.4	0.0	6.5	6.5	0.0	6.7	6.6	-0.1
Downstream of RR / Upstream of Proposed Gate	SD	12804	11.5	6.4	6.4	0.0	6.7	6.4	-0.3	6.8	6.6	-0.2	7.0	6.9	-0.1
Reed Canal at Stevens Canal	SD	128	8.8	6.8	6.2	-0.6	7.3	6.9	-0.3	7.5	7.3	-0.2	7.7	7.7	-0.1
Saul Drive	SD	122	9.6	7.1	6.2	-0.9	7.7	7.3	-0.3	7.9	7.7	-0.3	8.3	8.2	-0.1
Reed Canal at Nova Road	SD	13104	9.2	7.7	7.1	-0.6	8.3	8.1	-0.3	8.7	8.5	-0.2	9.3	9.0	-0.2
Downstream end of Stevens Canal	SD	11901	5.4	6.8	5.7	-1.1	7.4	7.0	-0.4	7.7	7.4	-0.3	7.9	7.8	0.0
Stevens Canal at Ridge Drive	SD	11001	6.9	6.9	5.9	-1.0	7.5	7.2	-0.4	7.9	7.6	-0.3	8.4	8.1	-0.4
Stevens Canal at Big Tree Road	SD	10101	8.6	7.0	6.2	-0.8	7.9	7.5	-0.3	8.2	8.0	-0.3	8.7	8.5	-0.3
Upstream end of Stevens Canal	SD	101	6.6	7.1	6.3	-0.8	8.0	7.6	-0.3	8.3	8.1	-0.2	8.8	8.6	-0.2

SD = South Daytona

Nova Canal Flood Control and Integrated Water Resources Project Project Alternative 1 - Peak Flows for 96-Hour Design Storms Reed Canal System

	1-Year Stillwater													
								Peak fl	ow (cfs)					
Location	Jurisdiction	SWMM5 Conduit	Existing Mean Annual	Alternative 1 Mean Annual	Change	Existing 10-Year	Alternative 1 10-Year	Change	Existing 25-Year	Alternative 1 25-Year	Change	Existing 100-Year	Alternative 1 100-Year	Change
Reed Canal at US 1 Culvert	SD	81211	1,020	1,381	361	1,280	1,539	259	1,456	1,506	50	1,677	1,618	-59
Reed Canal downstream of Railroad	SD	81285	1,004	1,311	307	1,252	1,316	64	1,370	1,316	-55	1,499	1,339	-161
Reed Canal downstream of Stevens Canal	SD	81281	930	998	69	1,148	1,190	42	1,261	1,313	52	1,383	1,397	14
Reed Canal at Saul Drive culverts	SD	81221	218	232	13	251	256	6	285	289	3	326	326	0
		81221A	218	232	13	251	256	6	285	289	3	326	326	0
		81221B	218	232	13	251	256	6	285	289	3	326	326	0
Start of Reed Canal	SD	81243	611	642	31	710	708	-3	763	768	5	855	853	-2
Stevens Canal at Ridge Drive culvert	SD	81102	111	116	5	170	177	7	192	194	2	215	204	-11
Stevens Canal at Big Tree Road culvert	SD	81012	23	23	0	38	39	2	42	43	1	47	46	-1

	100-Year Stillwater													
								Peak flo	ow (cfs)					
		SWMM5	Existing	Alternative 1	1 Change Existing al 10-Year	Existing	Alternative 1	Change	Existing	Alternative 1	Chango	Existing	Alternative 1	Change
Location	Jurisdiction	Conduit	Mean Annual	Mean Annual		10-Year	Change	25-Year	25-Year	Change	100-Year	100-Year	Change	
Reed Canal at US 1 Culvert	SD	81211	795	1,179	384	1,021	1,086	65	1,170	1,156	-13	1,346	1,250	-96
Reed Canal downstream of Railroad	SD	81285	783	1,131	348	1,005	1,131	126	1,106	1,131	25	1,214	1,219	4
Reed Canal downstream of Stevens Canal	SD	81281	723	925	202	928	1,138	210	1,020	1,213	193	1,114	1,242	127
Reed Canal at Saul Drive culverts	SD	81221	192	222	30	231	252	21	266	275	9	309	316	7
		81221A	192	222	30	231	252	21	266	275	9	309	316	7
		81221B	192	222	30	231	252	21	266	275	9	309	316	7
Start of Reed Canal	SD	81243	540	621	81	634	680	47	706	730	25	808	821	13
Stevens Canal at Ridge Drive culvert	SD	81102	85	108	23	134	142	8	154	154	0	189	168	-21
Stevens Canal at Big Tree Road culvert	SD	81012	19	23	4	29	32	3	34	34	0	39	37	-2

SD = South Daytona



Figure 2-13 FEMA Tidal Stillwater Elevations in the Halifax River

# APPENDIX F

# SJRWMD PERMIT 92356-1 TECHNICAL STAFF REPORT

#### STANDARD GENERAL ENVIRONMENTAL RESOURCE PERMIT TECHNICAL STAFF REPORT

February 26, 2004 APPLICATION #: 40-127-92356-1

DATE RECEIVED:	(	DATE COMPLETED:	21ST DA	Y:	28TH DAY:	
February 02, 2004	Ν	/larch 29, 2004	April 19, 20	004	April 26, 2004	
Applicant:	City of C/O N 1672 \$ South (386) \$	f South Daytona Iark T Juliano S Ridgewood Avenu Daytona, FL 32121 322-3080	e			
Agent:	Dillard C/O Jo 724 S Dayto (386)	ard & Associates Consulting Engineers, Inc. ) John A Dillard Jr PE I S Beach Street Ste 3 ytona Beach, FL 32114 6) 255-2988				
Project Name: Project Acreage: Planning Unit: Receiving Water B County: Correct Fee Submi	ody: tted:	Sauls Road Drainag .930 9A Halifax River Volusia Yes	ge Improveme Amount Re	ents Class: ceived: \$5	III Fresh. 00.00	
Authority:		40C-4.041(2)(b)8				
Type of Treatment: Type of Development: Type of System: Final O&M Entity: Pre/Post Peak Rate Atten Pre/Post Volume Attenua Mean Annual Storm Atte Recovery of Water Quali Recovery of Peak Attenu Interested Parties: Objectors:		N/A Governmental/Instit N/A City of South Dayto nuation Provided: nuation Provided: nuation Provided: ty Vol. Within Req. No No	utional, Road na Time: eq. Time:	way Yes Yes Yes Yes Yes		

## **Authorization Statement**

## A Permit Authorizing:

Pipe installation within 1120 feet of roadside ditch along the east side of Sauls Road.

## **Staff Comments:**

This project is sited along the east side of Sauls Road south of the Reed Canal Road intersection, South Daytona. The applicant proposes to pipe about 1120 feet of roadside ditch that was excavated prior to effective surface water management criteria. The project site has long (before the 1950s) been urbanized and no natural habitats occur on or near the site.

The work is considered necessary for public safety and welfare reasons:

- the ditch is too close to a narrow road traveled by moderately heavy traffic; and
- a 6'x1200 foot sidewalk (not now present) will be laid atop the filled ditch to connect residential neighborhoods to a grade school.

About 0.2 acre of surface waters will be filled to accomplish the work. However, the ditch has no remarkable wildlife habitat value and is exempt from most review criteria regarding (1) impact reduction analysis; and (2) the loss of wildlife and other ecological functions through direct, secondary or cumulative impacts (i.e., 12.2.2 - 12.2.3, 12.2.3 - 12.2.3.7, 12.2.5 - 12.3.8, ERP A.H.). The project is sufficiently distant from offsite wetlands to ensure that the project will not cause unacceptable adverse secondary or cumulative impacts to those wetlands or upland habitats required by "listed" wetland-dependent species.

Currently the roadway runoff sheetflows directly into the open ditch and does not receive any treatment. The post-development condition will provide a shallow swale approximately 935 feet long along the sidewalk in order to provide conveyance and some treatment of runoff prior to discharging into Reed Canal. No appreciable increase in pollutant loading is expected from the construction of the sidewalk.

The applicant has demonstrated that the proposed modification of the existing stormwater management system by the City of South Daytona will not decrease the original design capacity of the ditch, increase pollutant loading nor alter points of discharge.

Wetland Summary Table Sauls Road Drainage Improvements	Governmental/Institutional, Roadway	
	Acres	
Total Wetlands On-site	0.000	
Total Surface Waters On-site	0.250	
Impacts that Require Mitigation	0.000	
Impacts that Require No Mitigation	0.250	
Mitigation	0.000	

The proposed project meets all applicable conditions for permit issuance pursuant to sections 40C-4.301 and 40C-4.302, F.A.C.

## Conditions for Application Number 40-127-92356-1:

**ERP General Conditions by Rule (October 03, 1995):** 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19

# ERP/MSSW/Stormwater Special Conditions (November 09, 1995):

1, 10, 13

### **Other Conditions:**

1. The proposed surface water management system must be constructed and operated in accordance with the plans received by the District on March 29, 2004.

**Reviewers:** Annie Akarjalian & Lee Kissick

**APPENDIX G** 

# SOILS MAP



Web Soil Survey National Cooperative Soil Survey

MAP	LEGEND	MAP INFORMATION	
Area of Interest (AOI) Area of Interest (AOI)	<ul><li>Spoil Area</li><li>Stony Spot</li></ul>	The soil surveys that comprise your AOI were mapped at 1:20,000.	
SoilsSoil Map Unit PolygonsSoil Map Unit LinesSoil Map Unit LinesSoil Map Unit PointsSpecial Vert FeaturesImage: Special Vert SeaturesImage: Special Vert Se	Image: Constraint of the sector of the se	<ul> <li>1:20,000.</li> <li>Warning: Soil Map may not be valid at this scale.</li> <li>Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.</li> <li>Please rely on the bar scale on each map sheet for map measurements.</li> <li>Source of Map: Natural Resources Conservation Service Web Soil Survey URL: Coordinate System: Web Mercator (EPSG:3857)</li> <li>Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection should be used if more accurate calculations of distance or area are required.</li> <li>This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.</li> <li>Soil Survey Area: Volusia County, Florida Survey Area Data: Version 18, Sep 17, 2019</li> <li>Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.</li> <li>Date(s) aerial images were photographed: Dec 12, 2013—Dec 18, 2013</li> <li>The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.</li> </ul>	
Slide or Slip			



# Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
69	Tuscawilla fine sand	0.0	3.6%
70	Tuscawilla-Urban land complex	0.4	96.4%
Totals for Area of Interest		0.5	100.0%

# **APPENDIX H**

# **GEOTECHNICAL EVALUATION**

(by Universal Engineering Sciences, Inc.)



#### **GEOTECHNICAL EVALUATION**

Sauls Street Bridge Replacement South Daytona, Volusia County, Florida

UES Project No. 0430.1900179.0000 UES Report No. 135151

November 5, 2019

Prepared for:

Mr. Les Gillis, P.E. City of South Daytona P.O. Box 214960 South Daytona, Florida 32121

Prepared by:

UNIVERSAL ENGINEERING SCIENCES 911 Beville Road, Suite 3 South Daytona, Florida 32119

#### **CONSULTANTS:**

Geotechnical Engineering • Environmental Engineering • Construction Materials Testing Threshold Inspection • Private Provider Inspection • Geophysical Studies

OFFICES: Daytona Beach, FL • Fort Myers, FL • Fort Pierce, FL • Gainesville, FL • Jacksonville, FL • Leesburg, FL • Miami, FL • Norcross, GA • Ocala, FL • Orange City, Orlando, FL Palm Coast, FL • Panama City, FL • Pensacola, FL • Rockledge, FL • Sarasota, FL • St. Augustine, FL • Tampa, FL • West Palm Beach, FL



November 5, 2019

LOCATIONS:

- Atlanta
- Daytona Beach
- Fort Myers
- Fort Pierce
- Gainesville
   Jacksonville
- Jacksonville
   Kissimmee
- Leesburg
- Miami
- Ocala
- Orlando (Headquarters)
   Palm Coast
- Paim Coast
   Panama City
- Pensacola
- Rockledge
- Sarasota
   Tampa
- West Palm Beach

Mr. Les Gillis, P.E. City of South Daytona P.O. Box 214960 South Daytona, Florida 32121

#### Reference: GEOTECHNICAL EVALUATION Sauls Street Bridge Replacement South Daytona, Volusia County, Florida UES Project No. 0430.1900179.0000 and UES Report No. 135151

Dear Mr. Gillis:

Universal Engineering Sciences, Inc. has completed the geotechnical evaluation for the subject project. This report contains the results of our investigations, an engineering interpretation of these with respect to the project characteristics described to us, and recommendations for foundation support and site preparation.

We appreciate the opportunity to have worked with you on this project and look forward to a continued association. Please do not hesitate to contact us if you should have any questions, or if we may further assist you as your plans proceed.

Respectfully submitted,

UNIVERSAL ENGINEERING SCIENCES

Cody Wilson, E.I., Project Engineer

Cc: Patricia Clark – City of South Daytona

Attachments

CW/BCP/cme



#### 1.0 INTRODUCTION

#### 1.1 GENERAL

In this report we present the results of the subsurface evaluation for the proposed bridge replacement project in South Daytona, Florida. We have divided this report into the following sections:

- SECTION 2.0 SCOPE OF SERVICES
- SECTION 3.0 FINDINGS
- SECTION 4.0 FOUNDATION RECOMMENDATIONS
- SECTION 5.0 CONSTRUCTION RELATED SERVICES
- SECTION 6.0 LIMITATIONS

#### 2.0 SCOPE OF SERVICES

#### 2.1 PROJECT DESCRIPTION

Project information has been provided to us in discussions with you. Based on the information provided to us, it is understood that the bridge at Reed Canal Road and Sauls Street will be replaced with a precast concrete pre-engineered bridge. It is anticipated the loading conditions and construction techniques will be similar to the bridge constructed at the intersection of Reed Canal Road and Lantern Drive. We understand that the loads will be on the order of 26 kips per foot and 16 kips per foot for the vertical and horizontal loads respectively.

Our recommendations are based upon the above considerations. If any of this information is incorrect, or if you anticipate any changes, inform Universal Engineering Sciences so that we may review our recommendations.

#### 2.2 PURPOSE

The purposes of this investigation were:

- to investigate the general subsurface conditions at the site;
- to interpret and review the subsurface conditions with respect to the proposed construction; and
- to provide geotechnical engineering recommendations for foundation support and site preparation.

This report presents an evaluation of site conditions on the basis of traditional geotechnical procedures for site characterization. The recovered samples were not examined, either visually or analytically, for chemical composition or environmental hazards. Universal Engineering Sciences would be pleased to perform these services, at your request.

Our investigation was confined to the zone of soil likely to be influenced by the proposed construction. Our work did not address the potential for surface expression of deep geological conditions, such as sinkhole development related to karst activity. A deep geological evaluation requires a more extensive range of field services than performed in this study.



#### 2.3 FIELD INVESTIGATION

#### 2.3.1 Borings

The subsurface conditions within the proposed foundation area was investigated with one (1) Standard Penetration Test (SPT) boring advanced to a depth of approximately 93 feet below existing grade. We performed the SPT borings according to the procedures of ASTM D-1586.

Samples obtained from the borings were transported to our laboratory for further evaluation. Samples of the soils encountered will be held in our laboratory for your inspection for 60 days unless we are notified otherwise.

#### 2.4 LABORATORY INVESTIGATION

#### 2.4.1 Index Testing

The soil samples recovered from the soil borings were returned to our laboratory and then a UES Engineer visually examined and reviewed the field descriptions. The soils were classified in accordance with the Unified Soil Classification System (USCS). We performed tests on selected soil samples consisting of 200 wash gradations to help in classification of the soils. The results of the tests are on the Boring Profiles in Appendix A.

#### 3.0 FINDINGS

#### 3.1 SUBSURFACE CONDITIONS

The boring locations and detailed subsurface conditions are illustrated in Appendix A: Boring Location Plan and Subsurface Profiles. The classifications and descriptions shown on the profiles are based upon visual characterizations of the recovered soil samples. Also, see Appendix A: Key to Boring Log, for further explanation of the symbols and placement of data on the Subsurface Profiles. The following discussion summarizes the soil conditions encountered.

The results of the SPT boring generally indicated the presence of topsoil in the upper approximate 1.0 foot underlain by intermittent layers of loose to very dense fine sand (SP), fine sand with silt (SP-SM) and sandy shell to approximately 68.5 feet below existing grade further underlain by medium dense very clayey fine sand (SC) to approximately 73.5 feet below existing grade. The sandy soil layers were underlain by medium to very stiff clay (CH) to approximately 91 feet below existing grade. As an exception, loose silty fine sand (SM) was encountered between approximately 18.5 and 23.5 feet below existing grade.

#### 3.2 **GROUNDWATER**

We recorded groundwater subsequent to drilling, at a depth of approximately 6.0 feet below the ground surface. The depth of the measured groundwater level is noted on the Subsurface Profiles. It should be anticipated the groundwater level will fluctuate due to seasonal climatic variations, tidal fluctuations, surface water runoff patterns, construction operations, and other interrelated factors.

We recommend positive drainage be established and maintained on the site during construction. We further recommend permanent measures be constructed to maintain positive drainage from the site throughout the life of the project.



#### 4.0 FOUNDATION AREA RECOMMENDATIONS

#### 4.1 GENERAL

The following recommendations are made based upon a review of the attached soil test data, our understanding of the proposed construction, and experience with similar projects and subsurface conditions. If the structural loadings, construction locations, or grading information change from those discussed previously, we request the opportunity to review and possibly amend our recommendations with respect to those changes.

Additionally, if subsurface conditions are encountered during construction which was not encountered in the borings, report those conditions immediately to us for observation and recommendations.

#### 4.2 STRUCTURE FOUNDATIONS

#### 4.2.1 Bearing Pressure

The maximum allowable net soil bearing pressure for shallow foundations should not exceed 4,000 pounds per square foot (psf). Net bearing pressure is defined as the soil bearing pressure at the base of the foundation in excess of the natural overburden pressure. The foundations should be designed based upon the maximum load that could be imposed by all loading conditions.

#### 4.2.2 Foundation Size

The minimum width recommended for any continuous footing is 18 inches. Even though the maximum allowable soil bearing pressure may not be achieved, these width recommendations should control the size of the foundations.

#### 4.2.3 Bearing Depth

The foundation should bear at a depth of at least 24 inches below the final to provide confinement to the bearing level soils. We recommend stormwater and surface water be diverted away from the building exterior, both during and after construction, to reduce the possibility of erosion beneath the footings.

#### 4.2.4 Bearing Material

The foundation may bear on either the compacted suitable natural soils or compacted structural fill. The bearing level soils, after compaction, should exhibit densities of at least 95 percent of the maximum dry density of the bearing soils as determined by ASTM D-1557 (Modified Proctor), to the depth described subsequently in the Site Preparation section of the report. In addition to compaction, the bearing soils must exhibit stability and be free of "pumping" conditions.

#### 4.2.5 Settlement Estimates

Post-construction settlement of the bridge structure will be influenced by several interrelated factors, such as (1) subsurface stratification and strength/compressibility characteristics of the bearing soils; (2) footing size, bearing level, applied loads, and resulting bearing pressures beneath the foundation; (3) site preparation and earthwork construction techniques used by the contractor, and (4) external factors, including but not limited to vibration from offsite sources and groundwater fluctuations beyond those normally anticipated for the naturally-occurring site and soil conditions which are present.



Our settlement estimates for the structure are based upon the use of successful adherence to the site preparation recommendations presented later in this report. Any deviation from these recommendations could result in an increase in the estimated post-construction settlement of the structure.

Due to the nature of the surficial soils, following the compaction operations, we expect a significant portion of settlement to be elastic in nature. This settlement is expected to occur relatively quickly, upon application of the loads, during and immediately following construction. Using the recommended maximum bearing pressure, the assumed maximum structural loads, and the field test data which we have correlated to the strength and compressibility characteristics of the subsurface soils, we estimate the total settlements of the structure to be less than one inch.

Differential settlement results from differences in applied bearing pressures and the variations in the compressibility characteristics of the subsurface soils. Based on the subsurface conditions as determined by our borings, it is anticipated that differential settlements will be within tolerable limits.

#### 4.3 SITE PREPARATION FOR SHALLOW FOUNDATIONS

We recommend the following site preparation procedures for the bridge foundation areas:

- 1. Prior to construction, the location of existing underground utility lines within the construction area should be established. Provisions should then be made to relocate interfering utilities to appropriate locations. It should be noted that if underground pipes are not properly removed or plugged, they may serve as conduits for subsurface erosion which may subsequently lead to excessive settlement of the overlying bridge structure.
- 2. Strip the proposed construction limits of all grass, roots, topsoil, asphalt and other deleterious materials within and 5 feet beyond the perimeter of the proposed structure. Expect initial clearing and grubbing to depths of approximately 6 to 12 inches.
- 3. Based on groundwater level, anticipated fill, and potential deep foundation bearing levels dewatering for foundation excavation and compaction may be necessary. We recommend implementing temporary groundwater control measures if the groundwater is within two feet of the required depth of excavation at the time of construction. Dewatering measures should be the responsibility of the contractor. We recommend the groundwater control measures remain in-place until compaction of the existing soils is completed and backfilling has reached a height of 2 feet above the groundwater level at the time of construction. The site should be graded to direct surface water runoff from the construction area.
- 4. Compact the exposed surface using light compaction or vibratory equipment. We recommend that vibratory equipment be operated in static mode within 75 feet of any existing structures. The upper two feet of soils below the exposed surface within the footing areas should be improved to achieve a minimum compaction requirement of 95% of the Modified Proctor Test (ASTM D-1557). We recommend the compacted soils exhibit moisture content within 2 percent of the soils optimum moisture content as determined by the Modified Proctor Test (ASTM D-1557). Should the soils experience pumping and soil strength loss during the compaction operations, compaction work should be immediately terminated and (1) the disturbed soils removed and backfilled with dry structural fill soils which are then compacted, or (2) the excess moisture content within the disturbed soils allowed to dissipate before recompacting.
- 5. Test the compacted surface for compliance at a minimum of three locations within each footing area.



- 6. Place fill material, as required. The fill should consist of "clean," fine sand with less than 5 percent soil fines. You may use fill materials with soil fines between 5 percent and 10 percent, but strict moisture control may be required. Place fill in uniform 8 to 12-inch loose lifts and compact each lift to a minimum density of 95 percent of the Modified Proctor maximum dry density. We recommend the compacted soils exhibit moisture content within 2 percent of the soils optimum moisture content as determined by the Modified Proctor Test (ASTM D-1557). If light compaction equipment is used, we recommend the lift thickness be reduced to 8 inch thick lifts.
- 7. Perform compliance tests within the backfill and fill soils at a minimum of one location per 2,500 square feet per lift (minimum four locations).
- 8. Compact and test footing cuts for compaction to a depth of one foot below bearing level. We recommend that you perform one test per every 20 linear feet of the bridge footing. Compaction operations in confined areas, such as footing excavations, can best be performed with a lightweight vibratory sled or other hand-held compaction equipment.

#### 6.0 CONSTRUCTION RELATED SERVICES

We recommend the owner retain Universal Engineering Sciences to perform construction materials tests and observations on this project. Field tests and observations include verification of foundation subgrades by monitoring filling operations and performing quality assurance tests on the placement of compacted natural soils and structural fill. We can also perform concrete testing, pavement section testing, structural steel testing and other construction materials testing services.

The geotechnical engineering design does not end with the advertisement of the construction documents. The design is an on-going process throughout construction. Because of our familiarity with the site conditions and the intent of the engineering design, we are most qualified to address problems that might arise during construction in a timely and cost-effective manner.

#### 7.0 LIMITATIONS

During the early stages of most construction projects, geotechnical issues not addressed in this report may arise. Because of the natural limitations inherent in working with the subsurface, it is not possible for a geotechnical engineer to predict and address all possible problems. An Association of Engineering Firms Practicing in the Geosciences (ASFE) publication, "Important Information about Your Geotechnical Engineering Report" appears in Appendix C, and will help explain the nature of geotechnical issues. Further, we present documents in Appendix C: Constraints and Restrictions, to bring to your attention the potential concerns and the basic limitations of a typical geotechnical report.



# **APPENDIX A**

BORING LOCATION PLAN SUBSURFACE PROFILES SOILS CLASSIFICATION CHART




19-0677-01

# APPENDIX B

LABORATORY TESTING PROCEDURES

### DESCRIPTION OF LABORATORY TESTING PROCEDURES

### LABORATORY PERMEABILITY TEST

The laboratory permeability test is a Falling Head Test that is performed on soil samples recovered from this site. The data recovered from this test are used to calculate Darcy's Coefficient of Permeability (k) of the soil.

### WASH 200 TEST

The Wash 200 test is performed by passing a representative soil sample over a No. 200 sieve and rinsing with water. The percentage of the soil grains passing this sieve is then calculated.

### **ORGANIC CONTENT TESTS**

The organic content test is performed by weighing a sample before and after placing in a high temperature oven which burns the organic material in the sample. The percent of organic material by weight is then calculated.

### **MOISTURE CONTENT DETERMINATION ASTM D-2216**

Moisture content is the ratio of the weight of water to the dry weight of soil. Moisture content is measured by drying a sample at 105 degrees Celsius. The moisture content is expressed as a percent of the oven dried soil mass.

### ATTERBERG LIMITS

The Atterberg Limits consist of the Liquid Limit (LL) and the Plastic Limit (PL). The LL and PL were determined in general accordance with the latest revision of ASTM D-4318. The LL is the water content of the material denoting the boundary between the liquid and plastic states. The PL is the water content denoting the boundary between the plastic and semi-solid states. The Plasticity Index (PI) is the range of water content over which a soil behaves plastically and is denoted numerically by as the difference between the LL and the PL. The water content of the sample tested was determined in general accordance with the latest revision of ASTM D-2216. The water content is defined as the ratio of "pore" or "free" water in a given mass of material to the mass of solid material particles.

### **CONSOLIDATION TESTING**

A single selected portion of the undisturbed sample was extruded from the 3-inch diameter sample tube for consolidation testing. The selected sample was trimmed and confined into a stainless steel disc having a diameter of 2.5 inches and a height of 1 inch. The disc was then "sandwiched" between 2 porous stones, saturated and subjected to incrementally increasing loads. The resulting deformation of the sample within the steel disc was measured using a micrometer gauge.

# **APPENDIX C**

GENERAL CONDITIONS CONSTRAINTS AND RESTRICTIONS AND IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL ENGINEERING REPORT

#### Universal Engineering Sciences, Inc. GENERAL CONDITIONS

#### SECTION 1: RESPONSIBILITIES

- 1.1 Universal Engineering Sciences, Inc., ("UES"), has the responsibility for providing the services described under the Scope of Services section. The work is to be performed according to accepted standards of care and is to be completed in a timely manner. The term "UES" as used herein includes all of Universal Engineering Sciences, Inc's agents, employees, professional staff, and subcontractors.
- 1.2 The Client or a duly authorized representative is responsible for providing UES with a clear understanding of the project nature and scope. The Client shall supply UES with sufficient and adequate information, including, but not limited to, maps, site plans, reports, surveys and designs, to allow UES to properly complete the specified services. The Client shall also communicate changes in the nature and scope of the project as soon as possible during performance of the work so that the changes can be incorporated into the work product.
- 1.3 The Client acknowledges that UES's responsibilities in providing the services described under the Scope of Services section is limited to those services described therein, and the Client hereby assumes any collateral or affiliated duties necessitated by or for those services. Such duties may include, but are not limited to, reporting requirements imposed by any third party such as federal, state, or local entities, the provision of any required notices to any third party, or the securing of necessary permits or permissions from any third parties required for UES's provision of the services so described, unless otherwise agreed upon by both parties.
- 1.4 Universal will not be responsible for scheduling our services and will not be responsible for tests or inspections that are not performed due to a failure to schedule our services on the project or any resulting damages.

# 1.5 PURSUANT TO FLORIDA STATUTES §558.0035, ANY INDIVIDUAL EMPLOYEE OR AGENT OF UES MAY NOT BE HELD INDIVIDUALLY LIABLE FOR NEGLIGENCE.

#### SECTION 2: STANDARD OF CARE

- 2.1 Services performed by UES under this Agreement will be conducted in a manner consistent with the level of care and skill ordinarily exercised by members of UES's profession practicing contemporaneously under similar conditions in the locality of the project. No other warranty, express or implied, is made.
- 2.2 The Client recognizes that subsurface conditions may vary from those observed at locations where borings, surveys, or other explorations are made, and that site conditions may change with time. Data, interpretations, and recommendations by UES will be based solely on information available to UES at the time of service. UES is responsible for those data, interpretations, and recommendations, but will not be responsible for other parties' interpretations or use of the information developed.
- 2.3 Execution of this document by UES is not a representation that UES has visited the site, become generally familiar with local conditions under which the services are to be performed, or correlated personal observations with the requirements of the Scope of Services. It is the Client's responsibility to provide UES with all information necessary for UES to provide the services described under the Scope of Services, and the Client assumes all liability for information not provided to UES that may affect the quality or sufficiency of the services so described.
- 2.4 Should UES be retained to provide threshold inspection services under Florida Statutes §553.79, Client acknowledges that UES's services thereunder do not constitute a guarantee that the construction in question has been properly designed or constructed, and UES's services do not replace any of the obligations or liabilities associated with any architect, contractor, or structural engineer. Therefore it is explicitly agreed that the Client will not hold UES responsible for the proper performance of service by any architect, contractor, structural engineer or any other entity associated with the project.

#### SECTION 3: SITE ACCESS AND SITE CONDITIONS

- 3.1 Client will grant or obtain free access to the site for all equipment and personnel necessary for UES to perform the work set forth in this Agreement. The Client will notify any and all possessors of the project site that Client has granted UES free access to the site. UES will take reasonable precautions to minimize damage to the site, but it is understood by Client that, in the normal course of work, some damage may occur, and the correction of such damage is not part of this Agreement unless so specified in the Proposal.
- 3.2 The Client is responsible for the accuracy of locations for all subterranean structures and utilities. UES will take reasonable precautions to avoid known subterranean structures, and the Client waives any claim against UES, and agrees to defend, indemnify, and hold UES harmless from any claim or liability for injury or loss, including costs of defense, arising from damage done to subterranean structures and utilities not identified or accurately located. In addition, Client agrees to compensate UES for any time spent or expenses incurred by UES in defense of any such claim with compensation to be based upon UES's prevailing fee schedule and expense reimbursement policy.

#### SECTION 4: SAMPLE OWNERSHIP AND DISPOSAL

- 4.1 Soil or water samples obtained from the project during performance of the work shall remain the property of the Client.
- 4.2 UES will dispose of or return to Client all remaining soils and rock samples 60 days after submission of report covering those samples. Further storage or transfer of samples can be made at Client's expense upon Client's prior written request.
- 4.3 Samples which are contaminated by petroleum products or other chemical waste will be returned to Client for treatment or disposal, consistent with all appropriate federal, state, or local regulations.

#### SECTION 5: BILLING AND PAYMENT

- UES will submit invoices to Client monthly or upon completion of services. Invoices will show charges for different personnel and expense classifications.
   Payment is due 30 days after presentation of invoice and is past due 31 days from invoice date. Client agrees to pay a finance charge of one and one-half percent (1 ½ %) per month, or the maximum rate allowed by law, on past due accounts.
- 5.3 If UES incurs any expenses to collect overdue billings on invoices, the sums paid by UES for reasonable attorneys' fees, court costs, UES's time, UES's expenses, and interest will be due and owing by the Client.

#### SECTION 6: OWNERSHIP AND USE OF DOCUMENTS

- 6.1 All reports, boring logs, field data, field notes, laboratory test data, calculations, estimates, and other documents prepared by UES, as instruments of service, shall remain the property of UES.
- 6.2 Client agrees that all reports and other work furnished to the Client or his agents, which are not paid for, will be returned upon demand and will not be used by the Client for any purpose.
- 6.3 UES will retain all pertinent records relating to the services performed for a period of five years following submission of the report, during which period the records will be made available to the Client at all reasonable times.
- 6.4 All reports, boring logs, field data, field notes, laboratory test data, calculations, estimates, and other documents prepared by UES, are prepared for the sole and exclusive use of Client, and may not be given to any other party or used or relied upon by any such party without the express written consent of UES.

#### SECTION 7: DISCOVERY OF UNANTICIPATED HAZARDOUS MATERIALS

- 7.1 Client warrants that a reasonable effort has been made to inform UES of known or suspected hazardous materials on or near the project site.
- 7.2 Under this agreement, the term hazardous materials include hazardous materials (40 CFR 172.01), hazardous wastes (40 CFR 261.2), hazardous substances (40 CFR 300.6), petroleum products, polychlorinated biphenyls, and asbestos.
- 7.3 Hazardous materials may exist at a site where there is no reason to believe they could or should be present. UES and Client agree that the discovery of unanticipated hazardous materials constitutes a changed condition mandating a renegotiation of the scope of work. UES and Client also agree that the discovery of unanticipated hazardous materials may make it necessary for UES to take immediate measures to protect health and safety. Client agrees to compensate UES for any equipment decontamination or other costs incident to the discovery of unanticipated hazardous waste.
- 7.4 UES agrees to notify Client when unanticipated hazardous materials or suspected hazardous materials are encountered. Client agrees to make any disclosures required by law to the appropriate governing agencies. Client also agrees to hold UES harmless for any and all consequences of disclosures made by UES which are required by governing law. In the event the project site is not owned by Client, Client recognizes that it is the Client's responsibility to inform the property owner of the discovery of unanticipated hazardous materials or suspected hazardous materials.
- 7.5 Notwithstanding any other provision of the Agreement, Client waives any claim against UES, and to the maximum extent permitted by law, agrees to defend, indemnify, and save UES harmless from any claim, liability, and/or defense costs for injury or loss arising from UES's discovery of unanticipated hazardous materials or suspected hazardous materials including any costs created by delay of the project and any cost associated with possible reduction of the property's value. Client will be responsible for ultimate disposal of any samples secured by UES which are found to be contaminated.

#### SECTION 8: RISK ALLOCATION

8.1 Client agrees that UES's liability for any damage on account of any breach of contract, error, omission or other professional negligence will be limited to a sum not to exceed \$50,000 or UES's fee, whichever is greater. If Client prefers to have higher limits on contractual or professional liability, UES agrees to increase the limits up to a maximum of \$1,000,000.00 upon Client's written request at the time of accepting our proposal provided that Client agrees to pay an additional consideration of four percent of the total fee, or \$400.00, whichever is greater. The additional charge for the higher liability limits is because of the greater risk assumed and is not strictly a charge for additional professional liability insurance.

#### SECTION 9: INSURANCE

9.1 UES represents and warrants that it and its agents, staff and consultants employed by it, is and are protected by worker's compensation insurance and that UES has such coverage under public liability and property damage insurance policies which UES deems to be adequate. Certificates for all such policies of insurance shall be provided to Client upon request in writing. Within the limits and conditions of such insurance, UES agrees to indemnify and save Client harmless from and against loss, damage, or liability arising from negligent acts by UES, its agents, staff, and consultants employed by it. UES shall not be responsible for any loss, damage or liability beyond the amounts, limits, and conditions of such insurance or the limits described in Section 8, whichever is less. The Client agrees to defend, indemnify and save UES harmless for loss, damage or liability arising from acts by Client, Client's agent, staff, and other UESs employed by Client.

#### SECTION 10: DISPUTE RESOLUTION

- 10.1 All claims, disputes, and other matters in controversy between UES and Client arising out of or in any way related to this Agreement will be submitted to alternative dispute resolution (ADR) such as mediation or arbitration, before and as a condition precedent to other remedies provided by law, including the commencement of litigation.
- 10.2 If a dispute arises related to the services provided under this Agreement and that dispute requires litigation instead of ADR as provided above, then: (a) the claim will be brought and tried in judicial jurisdiction of the court of the county where UES's principal place of business is located and Client
  - waives the right to remove the action to any other county or judicial jurisdiction, and
    - (b) The prevailing party will be entitled to recovery of all reasonable costs incurred, including staff time, court costs, attorneys' fees, and other claim related expenses.

#### SECTION 11: TERMINATION

- 11.1 This agreement may be terminated by either party upon seven (7) days written notice in the event of substantial failure by the other party to perform in accordance with the terms hereof. Such termination shall not be effective if that substantial failure has been remedied before expiration of the period specified in the written notice. In the event of termination, UES shall be paid for services performed to the termination notice date plus reasonable termination expenses.
- 11.2 In the event of termination, or suspension for more than three (3) months, prior to completion of all reports contemplated by the Agreement, UES may complete such analyses and records as are necessary to complete its files and may also complete a report on the services performed to the date of notice of termination or suspension. The expense of termination or suspension shall include all direct costs of UES in completing such analyses, records and reports.

#### SECTION 12: ASSIGNS

12.1 Neither the Client nor UES may delegate, assign, sublet or transfer their duties or interest in this Agreement without the written consent of the other party.

#### SECTION 13. GOVERNING LAW AND SURVIVAL

- 13.1 The laws of the State of Florida will govern the validity of these Terms, their interpretation and performance.
- 13.2 If any of the provisions contained in this Agreement are held illegal, invalid, or unenforceable, the enforceability of the remaining provisions will not be impaired. Limitations of liability and indemnities will survive termination of this Agreement for any cause.

#### SECTION 14. INTEGRATION CLAUSE

- 14.1 This Agreement represents and contains the entire and only agreement and understanding among the parties with respect to the subject matter of this Agreement, and supersedes any and all prior and contemporaneous oral and written agreements, understandings, representations, inducements, promises, warranties, and conditions among the parties. No agreement, understanding, representation, inducement, promise, warranty, or condition of any kind with respect to the subject matter of this Agreement shall be relied upon by the parties unless expressly incorporated herein.
- 14.2 This Agreement may not be amended or modified except by an agreement in writing signed by the party against whom the enforcement of any modification or amendment is sought.

Rev. 06/10/2015

#### **CONSTRAINTS AND RESTRICTIONS**

#### WARRANTY

Universal Engineering Sciences has prepared this report for our client for his exclusive use, in accordance with generally accepted soil and foundation engineering practices, and makes no other warranty either expressed or implied as to the professional advice provided in the report.

#### UNANTICIPATED SOIL CONDITIONS

The analysis and recommendations submitted in this report are based upon the data obtained from soil borings performed at the locations indicated on the Boring Location Plan. This report does not reflect any variations which may occur between these borings.

The nature and extent of variations between borings may not become known until excavation begins. If variations appear, we may have to re-evaluate our recommendations after performing on-site observations and noting the characteristics of any variations.

#### **CHANGED CONDITIONS**

We recommend that the specifications for the project require that the contractor immediately notify Universal Engineering Sciences, as well as the owner, when subsurface conditions are encountered that are different from those present in this report.

No claim by the contractor for any conditions differing from those anticipated in the plans, specifications, and those found in this report, should be allowed unless the contractor notifies the owner and Universal Engineering Sciences of such changed conditions. Further, we recommend that all foundation work and site improvements be observed by a representative of Universal Engineering Sciences to monitor field conditions and changes, to verify design assumptions and to evaluate and recommend any appropriate modifications to this report.

#### **MISINTERPRETATION OF SOIL ENGINEERING REPORT**

Universal Engineering Sciences is responsible for the conclusions and opinions contained within this report based upon the data relating only to the specific project and location discussed herein. If the conclusions or recommendations based upon the data presented are made by others, those conclusions or recommendations are not the responsibility of Universal Engineering Sciences.

#### CHANGED STRUCTURE OR LOCATION

This report was prepared in order to aid in the evaluation of this project and to assist the architect or engineer in the design of this project. If any changes in the design or location of the structure as outlined in this report are planned, or if any structures are included or added that are not discussed in the report, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and the conclusions modified or approved by Universal Engineering Sciences.

#### **USE OF REPORT BY BIDDERS**

Bidders who are examining the report prior to submission of a bid are cautioned that this report was prepared as an aid to the designers of the project and it may affect actual construction operations.

Bidders are urged to make their own soil borings, test pits, test caissons or other investigations to determine those conditions that may affect construction operations. Universal Engineering Sciences cannot be responsible for any interpretations made from this report or the attached boring logs with regard to their adequacy in reflecting subsurface conditions which will affect construction operations.

#### STRATA CHANGES

Strata changes are indicated by a definite line on the boring logs which accompany this report. However, the actual change in the ground may be more gradual. Where changes occur between soil samples, the location of the change must necessarily be estimated using all available information and may not be shown at the exact depth.

#### **OBSERVATIONS DURING DRILLING**

Attempts are made to detect and/or identify occurrences during drilling and sampling, such as: water level, boulders, zones of lost circulation, relative ease or resistance to drilling progress, unusual sample recovery, variation of driving resistance, obstructions, etc.; however, lack of mention does not preclude their presence.

#### WATER LEVELS

Water level readings have been made in the drill holes during drilling and they indicate normally occurring conditions. Water levels may not have been stabilized at the last reading. This data has been reviewed and interpretations made in this report. However, it must be noted that fluctuations in the level of the groundwater may occur due to variations in rainfall, temperature, tides, and other factors not evident at the time measurements were made and reported. Since the probability of such variations is anticipated, design drawings and specifications should accommodate such possibilities and construction planning should be based upon such assumptions of variations.

#### LOCATION OF BURIED OBJECTS

All users of this report are cautioned that there was no requirement for Universal Engineering Sciences to attempt to locate any manmade buried objects during the course of this exploration and that no attempt was made by Universal Engineering Sciences to locate any such buried objects. Universal Engineering Sciences cannot be responsible for any buried man-made objects which are subsequently encountered during construction that are not discussed within the text of this report.

#### TIME

This report reflects the soil conditions at the time of investigation. If the report is not used in a reasonable amount of time, significant changes to the site may occur and additional reviews may be required.

# Important Information about This Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

# Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a civil engineer may not fulfill the needs of a constructor — a construction contractor — or even another civil engineer. Because each geotechnical- engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. No one except you should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one* — *not even you* — should apply this report for any purpose or project except the one originally contemplated.

### **Read the Full Report**

Serious problems have occurred because those relying on a geotechnical-engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

# Geotechnical Engineers Base Each Report on a Unique Set of Project-Specific Factors

Geotechnical engineers consider many unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk-management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical-engineering report that was:

- not prepared for you;
- not prepared for your project;
- not prepared for the specific site explored; or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical-engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a lightindustrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an

assessment of their impact. *Geotechnical engineers cannot* accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.

### **Subsurface Conditions Can Change**

A geotechnical-engineering report is based on conditions that existed at the time the geotechnical engineer performed the study. *Do not rely on a geotechnical-engineering report whose adequacy may have been affected by*: the passage of time; man-made events, such as construction on or adjacent to the site; or natural events, such as floods, droughts, earthquakes, or groundwater fluctuations. *Contact the geotechnical engineer before applying this report to determine if it is still reliable.* A minor amount of additional testing or analysis could prevent major problems.

### Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ — sometimes significantly — from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide geotechnical-construction observation is the most effective method of managing the risks associated with unanticipated conditions.

### A Report's Recommendations Are Not Final

Do not overrely on the confirmation-dependent recommendations included in your report. *Confirmationdependent recommendations are not final*, because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations *only* by observing actual subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's confirmation-dependent recommendations if that engineer does not perform the geotechnical-construction observation required to confirm the recommendations' applicability.* 

# A Geotechnical-Engineering Report Is Subject to Misinterpretation

Other design-team members' misinterpretation of geotechnical-engineering reports has resulted in costly

problems. Confront that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Constructors can also misinterpret a geotechnical-engineering report. Confront that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing geotechnical construction observation.

### Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical-engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.* 

# Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make constructors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give constructors the complete geotechnical-engineering report, but preface it with a clearly written letter of transmittal. In that letter, advise constructors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/ or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure constructors have sufficient time* to perform additional study. Only then might you be in a position to give constructors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

### **Read Responsibility Provisions Closely**

Some clients, design professionals, and constructors fail to recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely*. Ask questions. Your geotechnical engineer should respond fully and frankly.

#### **Environmental Concerns Are Not Covered**

The equipment, techniques, and personnel used to perform an *environmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnicalengineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures*. If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. *Do not rely on an environmental report prepared for someone else.* 

# Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the express purpose of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold-prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, many mold- prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical- engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.

# Rely, on Your GBC-Member Geotechnical Engineer for Additional Assistance

Membership in the Geotechnical Business Council of the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project. Confer with you GBC-Member geotechnical engineer for more information.



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# **APPENDIX I**

# ENVIRONMENTAL FEASIBILITY STUDY

# (by Environmental Services, Inc.)

### FEASIBILITY STUDY

### SAULS STREET BRIDGE REPLACEMENT VOLUSIA COUNTY, FLORIDA

### **OCTOBER 2019**

For

River to Sea TPO 2570 West International Speedway Boulevard, Suite 100 Daytona Beach, Florida 32114

### HK197199



Environmental Services, Inc., A Terracon Company 7220 Financial Way, Suite 100 Jacksonville, Florida 32256

## I. INTRODUCTION

Environmental Services, Inc., A Terracon Company (ESI) has completed an ecological feasibility study for the proposed bridge replacement and sidewalk installation project along Saul Street in Volusia County, Florida. The study corridor is described as approximately 60 linear feet of bridge and road along Sauls Street, just south of the intersection of Sauls Street and Reed Canal Road. More specifically, the project is located in Sections 42, and 43, Township 15 South, and Range 33 East at the approximate central coordinates of 29.1582° north latitude, 81.0103° west longitude (Figure 1).

Per the information provided to ESI from Traffic Engineering Data Solutions, Inc. (TEDS), the proposed project will consist of the replacement of the existing narrow bridge at the intersection of Sauls Street and Reed Canal Road with a wider bridge designed for ease of pedestrian movement. The bridge replacement will also include the installation of a 10-foot wide shared use path and improved traffic lanes.

The purpose of our investigation was to preliminarily assess the work corridor for the presence of jurisdictional wetlands in accordance with the current methodologies of the U.S. Army Corps of Engineers (ACOE) and the St. Johns River Water Management District (SJRWMD). In addition, ESI also investigated the study corridor for the potential presence and/or use of the area by any species protected by the Florida Fish and Wildlife Conservation Commission (FWC) and/or the U.S. Fish and Wildlife Service (FWS). The study was initiated with a review of topographic maps, soil survey information, and color infrared aerial photographs of the study area, along with relevant technical publications and field guides. An additional in-house review of previous state and local permitting information was also reviewed to help further characterize the area. Upon completion of the in-house review, ESI staff inspected the study area on 14 October 2019. The following report summarizes our interpretation of the status of the subject project area.

# II. WILDLIFE STUDY

ESI initiated a wildlife study of the Reed Canal Road corridor with a literature search of the listed species known to occur in this portion of Volusia County, Florida. The literature consulted included lists supplied by FWC, FWS, and the Florida Natural Areas Inventory (FNAI) along with technical publications and field guides. Based on this information, and knowledge of the specific habitat requirements for the individual listed species, the probability of each species occurrence on the site was considered.

Table 1 - Comprehensive List of Endangered and Threatened Species - Volusia, Florida (Source: FWC, FNAI, and USFWS)						
Common Name	Scientific Name	Federal Status*	State Status*	Habitat Typically Utilized By Species	Habitat Present?	Observed on site?
Okeechobee gourd	Cucurbita okeechobeensis ssp.	Е	FE	Pond apple swamps and mucky soils along St. Johns River floodplain forests, and Lake	No	No
Rugel's Pawpaw	Deeringothamnus rugelii	Е	FE	Open slash pine or longleaf pine flatwoods with wiregrass and sawpalmetto understory	No	No
Red-cockaded Woodpecke	Picoides borealis	Е	FE	Open, mature pine woodlands	No	No
Everglade Snail Kite	Rostrhamus sociabilis plumbeus	Е	FE	Large open freshwater marshes and lakes with shallow water	No	No
Piping Plover	Charadrius melodus	Т	FT	Open sandy beaches and on tidal mudflats and sandflats	No	No
Wood Stork	Mycteria americana	Т	FT	Freshwater and estuarine wetlands, freshwater marshes, tidal creeks	Yes	No
Florida Scrub-jay	Aphelocoma coerulescens	Т	FT	Fire-dominated, low-growing oak scrub found on well-drained sandy soils	No	No
Tricolored Heron	Egretta tricolor	-	ST	Forested and open water wetlands, streams, lakes, and swamps	Yes	No
Little Blue Heron	Egretta caerulea	-	ST	Shallow freshwater lakes, marshes, swamps and streams	Yes	No
American Oystercatcher	Haematopus palliates	-	ST	Large areas of beach, sandbar, mud flat, and shellfish beds	No	No
Black Skimmer	Rynchops niger	-	ST	Coastal waters, beaches, bays, estuaries, sandbars, tidal creeks and inland waters including large lakes and flooded agricultural fields	No	No
Florida Sandhill Crane	Grus canadensis	-	ST	Praries, freshwater marshes, and pasture lands	No	No
Redish Egret	Egretta rufescens	-	ST	Forested and open water wetlands, streams, lakes, and swamps	Yes	No
Least Tern	Sternula antillarum	-	ST	Coastal areas, beaches, lagoons, bays, and estuaries	No	No
Southeastern American Kestrel	Falco sparverius paulus	-	ST	Open pine, woodland edges, prairies and pastures	No	No
Roseatte Spoonbill	Platalea ajaja	-	ST	Coastal marshes, mangrove-dominated inlets, freshwater sloughs and marshes	Marginal	No
Shortnose Sturgeon	Acipenser brevirostrum	Е	FE	Salt, brackish, and freshwater habitats	Yes	No
Bluenose Shiner	Pteronotropis welaka	-	ST	Quiet backwaters and pools of blackwater streams and riverd and spring runs	No	No
Gopher Tortoise	Gopherus polyphemus	С	ST	Dry upland habitats; also disturbed habitats such as pastures, oldfields, and road shoulders	No	No
Florida Pine Snake	Pituophis melanoleucus migitus	-	ST	Dry upland habitats such as sandhills and scrubby flatwoods; also oldfields and pastures	No	No
Eastern Indigo Snake	Drymarchon corais couperi	Т	FT	Broad range including scrub, sandhill, wet praries, and mangrove swamps	No	No
Atlantic Salt Marsh Snake	Nerodia clarkii taeniata	Т	FT	Saltmarsh tidal flats that contain grasses such as glasswort, Spartina, and Juncus	No	No
American Alligator	Alligator mississippiensis	-	FT	Freshwater lakes, slow moving rivers, and brackish water habitats	Marginal	No
Green Sea Turtle	Chelonia mydas	Т	FE	Estuarine and marine coastal and oceanic waters	No	No
Hawksbill Sea Turtle	Eretmochelys imbricata	Е	FE	Marine coastal and oceanic waters	No	No
Kemps Ridley Sea Turtle	Lepidochelys kempii	Е	FE	Marine coastal waters, usually with sand or mud bottoms	No	No
Leatherback Sea Turtle	Dermochelys coriacea	Е	FE	Oceanic waters	No	No
Loggerhead Sea Turtle	Caretta caretta	Т	FT	Marine coastal and oceanic waters	No	No
North Atlantic Right Whale	Eubalaena glacialis	Е	FE	Atlantic Ocean	No	No
West Indian Manatee	Trichechus manatus	Т	FT	Coastal waters, bays, rivers, and occasional lakes	Marginal	No
*Defintions of above terms: T - Threatened, E - Endangered, FE - State Listed as Federally-designated Endagered, FT - State Listed as Federally-designated Threatened, ST - State Listed as						
	**Table Sources: [FNAI]	Florida Natura	l Areas Invent	tory.FNAI Tracking List. http://fnai.org/bioticssearch.cfm.		
[USFWS] United States Fish and Wildlife Service. Environmental Conservation Online System. http://ecos.fws.gov/tess_public/reports/species-by-current- range-county?fips=12031.						
[FWC] Florida Fish and Wildlife Conservation Commission. Florida's Imperiled Species Management Plan, Oct 12, 2015 Draft. http://myfwc.com/media/3344480/draft-ismp-october-2015.pdf						
2						

Due to the nature of the proposed project, use of the area by a wide variety of protected species is not likely. The work area is an existing two-lane bridge with a pedestrian sidewalk surrounded by commercial and residential uses on the southern half, and an upland cut canal named the Reed Canal running south-west/north-east under the bridge; and work will primarily occur within an existing mowed and maintained right-of-way.

Based on ESI's review, it is not anticipated that the project will have any detrimental impact on any state or federally listed species. Soils surrounding the study corridor do not appear to be sufficiently drained to support habitat for the gopher tortoise (*Gopherus polyphemus*), and at no point during the site investigation were any signs of gopher tortoise, or gopher tortoise burrows observed. Should work be limited to within the existing maintained right-of-way, no adverse effect is likely for this species.

Marginal foraging habitat for wading birds such as the wood stork (*Mycteria americana*) occurs along the littoral fringes of the Reed Canal system that runs along the study corridor. Impacts to wood storks will be considered as part of the federal wetland permitting process (if necessary), but it is unlikely the proposed project will be determined to adversely affect the species. Additionally, the study corridor is not within the core foraging area (CFA) of any wood stork rookeries, and therefore would be unlikely to adversely affect the species. As for the remaining wading birds, if the Reed Canal system south of the road remains unchanged, the project would be unlikely to adversely affect any of the listed species, and no further action would be necessary.

Marginal habitat for the West Indian manatee (*Trichechus manatus*), American alligator (*Alligator mississippiensis*), and shortnose sturgeon (*Acipenser brevirostrum*), is also present due to the Reed Canal system that runs along the study corridor, and its connection to the Halifax River. Though the continuation of the proposed project would not have any effect on these species if the Reed Canal system remains un altered.

The study corridor was also reviewed for the presence of bald eagle (*Haliaeetus leucocephalus*), and osprey (*Pandion haliaetus*), and the occurrence of any nests. At no point during the site investigation were either of these species, or their nests observed within the study corridor, or the adjacent properties. After review of the FWC Bald Eagle (*Haliaeetus leucocephalus*) nesting data resulted in zero nests within one mile of the study corridors boundaries. Nest ID VO049 was located just outside a mile west of the intersection of S. Nova Road and Reed Canal Road. This nest was last known to be active in 2003 and was last surveyed in 2016. Due to the study corridor being located further than 660 feet from the eagle nest, there will be no further action required. The continuation of the proposed project would have no adverse effect on these species.

# III. WETLANDS STUDY

ESI has investigated the proposed project corridor for the presence of any state or federally jurisdictional wetlands or surface waters in accordance with the current methodologies of ACOE and SJRWMD. ESI initiated the investigation with a review of historic and infrared aerial photography, along with National Wetlands Inventory (NWI) data and soils maps. This review was supplemented with a historic permitting review. Based on this information, there is one surface

water (Reed Canal) that runs beneath the Sauls Street Bridge. On 14 October 2018, ESI staff performed a site review of the corridor to further investigate for the presence of any jurisdictional wetlands or surface waters within the intended project area.

The intended project will require an ACOE Nationwide Permit 3: Maintenance, and a SJRWMD General Permit 62-330.443: General Permit to the Florida Department of Transportation, Counties, and Municipalities for Minor Bridge Alteration, Placement, Replacement, Removal, Maintenance, and Operation, for the demolition and reconstruction of the Sauls Street Bridge. This process could require three to four months time for acquisition, and ESI does not anticipate any mitigation to be required.

## IV. SUMMARY

ESI has performed an ecological feasibility assessment of the proposed Sauls Street Bridge project. Based on in-house and field reviews, wetlands may need to be addressed if construction occurs outside of the maintained right-of-way of Sauls Street and Reed Canal Road. Permits will likely be required on a state and federal level, but mitigation is not likely to be required. Permit acquisition is estimated to take three to four months. ESI also reviewed the project area for the potential presence and/or utilization by listed wildlife species. It is not anticipated this phase of the project will have any detrimental impacts on any state or federally listed species.

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# **APPENDIX J**

# CULTURAL RESOURCES FEASIBILITY STUDY

(by Environmental Services, Inc.)

### **CULTURAL RESOURCES FEASIBILITY STUDY:**

# SAUL STREET BRIDGE REPLACEMENT AND SIDEWALK CONSTRUCTION VOLUSIA COUNTY, FLORIDA

#### OCTOBER 2019

For

### River to Sea TPO 2570 West International Speedway Boulevard, Suite 100 Daytona Beach, Florida 32114

### Environmental Services, Inc., A Terracon Company 7220 Financial Way, Suite 100 Jacksonville, Florida 32256

### ESI Project Number: HK197198

Environmental Services, Inc., A Terracon Company (ESI) has completed a cultural resource feasibility study for the proposed bridge replacement and sidewalk installation project along Saul Street in Volusia County, Florida. The study corridor is described as approximately 60 linear feet of bridge and road along Sauls Street, just south of the intersection of Sauls Street and Reed Canal Road. More specifically, the project is located in Sections 42, and 43, Township 15 South, and Range 33 East at the approximate central coordinates of 29.1582° north latitude, 81.0103° west longitude. The proposed project will consist of the replacement of the existing narrow bridge at the intersection of Sauls Street and Reed Canal Road with a wider bridge designed for ease of pedestrian movement. The bridge replacement will also include the installation of a 10-foot wide shared use path and improved traffic lanes.

The purpose of this desktop investigation was to preliminarily assess the work corridor for the presence of known cultural resources, areas that have been previously tested using current standards, and areas of moderate to high probability for containing these resources. The study was initiated with a review of topographic maps, historic aerials, and soil survey information of the study area, along with relevant technical publications and a search of the Florida Master Site File (FMSF) for previously recorded cultural resources such as archaeological sites, cemeteries, and historic structures (buildings, bridges, and canals).

As a result of the cultural resource desktop evaluation, it was determined that no previous cultural resource assessment surveys have been completed within the project vicinity. The only known cultural resource recorded nearby is the Reed Canal (8VO9790), which was deemed ineligible for listing in the National Register of Historic Places (NRHP) by the recorders and the Florida Division of Historical Resources (aka SHPO). According to records, the Sauls Street bridge was

constructed in 1965, which makes it a historic resource.

Recommendations: It is recommended that as part of the permitting process, the Sauls Street Bridge be recorded as a historic resource and that an architectural historian assess its status for eligibility or ineligibility for inclusion in the NRHP. The surrounding area appears to have a low probability for containing archaeological resources, therefore subsurface testing is not recommended for this project.

# APPENDIX K

# **REFERENCE MANUAL LINKS**

# Design Criteria

Publication	Requirement	Notes
FDOT Design Manual (2019)		
Section / Part		
Ch. 260.1.1 Partial Bridge Sections	Per Fig 260.1.3 Partial Bridge Sections for Curbed Arterials and Collectors Design Speed 45 mph and less. Pg. 4	Typical section, sheet 4, shows no traffic barrier necessary
Ch. 260.8.1 Vertical Clearance	260.8.1 Bridges Over Waterways; Drainage pg 14.	2' minimum, below bridge low member and design flood stage. NA for bridge culverts
Ch. 260.8.2 Horizontal Clearance	260.8.2 Bridges Over Waterways; Drainage pg 15.	consistant with debris conveyance, defined as unobstructed clear distance between piers.
<u>Ch. 305 Bride Hydraulic</u> <u>Recommendations</u>	Sec. 305 Drainage Map and Bridge Hydraulic Recommendation Sheet	setting up scales for dwg and presentation of the data in BHRS. Also refer to DDG, Section 5.6.9 for additional guideance.
Ch. 306 Typical Sections	Sec. 306 Typical Sections	guidelines on layout and dimensioning of Typical Sections
FDOT Standard Plans (9/2019)		
Section / Part		
<u>Ch. 400-090</u>	Index 400-090 - Flexible Pavement 30' approach slabs	
<u>Ch. 515-021</u>	Ch. 515-022 Pedestrian Bullet Rail for Traffic Railing	

Ch 515-022Ch. 515-022 Pedestrian Bullet Rail DetailsCh. 521-423Ch. 521-423 32" Vertical Traffic Railing

# FDOT Drainage Manual (1/2019)

Section / Part		
<u>Ch. 4.3.1</u>	4.3.1 Design Frequency for Bridge culverts	50 year - because AADT > 1500
Ch. 4.8 Hydraulic Analysis	Ch. 4.8.1.1 - Analyze bridge culverts per FHWA Hydraulic Design Series	FHWA HDS Series 5
	#5	

Ch. 4.11.2.1 Bridges on Controllec Canals	4.11.2.1 Bridges on Controlled Canals	refers users to Chapter 5 of the Bridge Hydraulics Handbook.
<u>Ch. 5.1.4.1 Debris</u>	Ch. 5.1.4.1 Debris	2' minimum drift clearance is typically acceptable
<u>Ch. 5.1.5 Bridge Length</u> Justification	Ch. 5.1.5 Bridge Length Justification	parameters for establishing bridge length
Ch. 5.2.1.6 Upstream Controls	Ch. 5.2.1.6 Upstream Controls	look at pump stations as well as tidal gates which are modeled by CDM
Ch. 5.2.2 Hydrology	Ch. 5.2.2 Hydrology	Routing analysis of surface water profiles and headloss at 0 through the bridge.
Ch. 5.2.4 Model Setup	Ch. 5.2.4 Model Setup	Data needed to perform hydraulic and scour analysis.
Ch. 5.3.1.2 Geotechnical Data	5.3.1.2 Geotechnical Data	This will be needed for scour calculations to establish bed composition and resistance to scour.
Ch. 5.7 Bridge Hydraulics Report Format and Documentation	Ch. 5.7 Bridge Hydraulics Report Format and Documentation	lists minimum information to include in the BHR. Includes bridge culverts
<u>Ch. 5.7.4 Bridge Hydraulics</u> <u>Recommendations Sheet (BHRS)</u>	Ch. 5.7.4 Bridge Hydraulics Recommendations Sheet (BHRS)	Line by line guide to completing the BHRS, for all four sections.
FHWA Hydraulic Design of		
Highway Culverts (4/2012)		
Section / Part		
Ch. 1.2 Comparisons Between	Ch. 1.2 Comparisons Between Culverts, Bridges, and Storm Drains	If a culvert exceeds 20' span width,

Ch. 1.2 Comparisons Between	Ch. 1.2 Comparisons Between Culverts, Bridges, and Storm Drains	If a culvert exceeds 20' span width,
Culverts, Bridges, Storm Drains		National Bridge Inspection Standards
		considers it a bridge.
Ch. 1.4 Culvert Hydraulics	Ch. 1.4 Culvert Hydraulics	

Flow conditions, headwater, tailwater

Ch. 2.1 Hydrology	Ch. 2.1 Hydrology	Peak design flow, hydrographs, computer models
Ch. 3.5 Culvert Design Using	Ch. 3.5 Culvert Design Using Software	
<u>Software</u>		Use updated version of HY-8.
	Ch. 3.5.5 Application of HY-8	If a crossing is to be designed, HY-8
		should be used to analyze.
Ch. 5.2.2 Low Head Installations	Ch. 5.2.2 Low Head Installations	Minimum head and energy loss, and
		minimum headwater buildup
Ch. 5.4.5 Embankment	Ch. 5.4.5 Embankment Overtopping	Design not to overtop for the 50 year
Overtopping		flood event.

# APPENDIX L

# FDOT APPROVED INFLATION FACTORS



TRANSPORTATION

TRANSPORTATION COSTS REPORTS

# **Inflation Factors**

This *"Transportation Costs"* report is issued by the Office of Policy Planning. It provides information on inflation factors and other indices that may be used to convert Present Day Costs (PDC) to future Year Of Expenditure costs (YOE) or vice versa. This report is updated regularly based on the FDOT Work Program Instructions.

Please note that the methodology for inflationary adjustments relating to specific transportation projects should be addressed with the district office where the project will be located. For general use or non-specific areas, the guidelines provided herein may be used for inflationary adjustments.

### **Construction Cost Inflation Factors**

The table on the next page includes the inflation factors and Present Day Cost (PDC) multipliers that are applied to the Department's Work Program for highway construction costs expressed in Fiscal Year 2019 dollars (FY 2019 runs from July 1, 2018 to June 30, 2019).

### **Other Transportation Cost Inflation Factors**

Other indices may be used to adjust project costs for other transportation modes or nonconstruction components of costs. Examples are as follows:

The <u>Consumer Price Index</u> (CPI, also retail price index) is a weighted average of prices of a specified set of products and services purchased by wage earners in urban areas. As such, it provides one measure of inflation. The CPI is a fixed quantity price index and a reasonable cost-of-living index.

The <u>Employment Cost Index</u> (ECI) is based on the National Compensation Survey, administered by the Bureau of Labor Statistics (BLS). It measures quarterly changes in compensation costs, which include wages, salaries, and other employer costs for civilian workers (nonfarm private industry and state and local government).

The monthly series, <u>Producer Price Index for Highway and Street Construction</u>, is also available from BLS. It provides national-level estimates of past and recent highway construction inflation. The Producer Price Index (PPI) web site is <u>http://www.bls.gov/ppi/home.htm</u>.

# TRANSPORTATION

### TRANSPORTATION COSTS REPORTS

Fiscal Year	Inflation Factor	PDC Multiplier	
2019	Base	1.000	
2020	2.6%	1.026	
2021	2.6%	1.053	
2022	2.7%	1.081	
2023	2.8%	1.111	
2024	2.9%	1.144	
2025	3.0%	1.178	
2026	3.1%	1.214	
2027	3.2%	1.253	
2028	3.3%	1.295	
2029	3.3%	1.337	
2030	3.3%	1.381	
2031	3.3%	1.427	
2032	3.3%	1.474	
2033	3.3%	1.523	
2034	3.3%	1.573	
2035	3.3%	1.625	
2036	3.3%	1.679	
2037	3.3%	1.734	
2038	3.3%	1.791	
2039	3.3%	1.850	
Source: Offices of Work Program and Budget and Policy Planning (Fiscal Year 2019 is July 1, 2018 to June 30, 2019)			

### Work Program Highway Construction Cost Inflation Factors

### **Advisory Inflation Factors For Previous Years**

Another *"Transportation Costs"* report covers highway construction cost inflation for previous years. *"Advisory Inflation Factors For Previous Years (1987-2018)* provides Present Day Cost (PDC) multipliers that enable project cost estimates from previous years to be updated to FY 2018. For the table and text providing this information, please go to <u>https://fdotwww.blob.core.windows.net/sitefinity/docs/default-</u>source/planning/policy/economic/retrocostinflation220259309.pdf?sfvrsn=ce29b2b6 2

# **APPENDIX M**

# **RIVER TO SEA TPO RESOLUTION 2017-3**

#### RIVER TO SEA TRANSPORTATION PLANNING ORGANIZATION

#### **RESOLUTION 2017-03**

### RESOLUTION OF THE RIVER TO SEA TRANSPORTATION PLANNING ORGANIZATION ESTABLISHING THE POLICY FOR THE ANNUAL ALLOCATION OF SURFACE TRANSPORTATION PROGRAM (STP) URBAN ATTRIBUTABLE (SU) FUNDING AND OTHER STATE AND FEDERAL FUNDS IDENTIFIED IN THE 2040 LONG RANGE TRANSPORTATION PLAN FOR LOCAL INITIATIVES

WHEREAS, Florida Statutes 339.175; 23 U.S.C. 134; and 49 U.S.C. 5303 require that every urbanized area with a population of 50,000 or more, as a condition to the receipt of federal capital or operating assistance, shall have a continuing, cooperative, and comprehensive transportation planning process that results in plans and programs consistent with the comprehensively planned development of the urbanized area; and

WHEREAS, the River to Sea Transportation Planning Organization (TPO) is the duly designated and constituted body responsible for carrying out the urban transportation planning and programming process for the designated Metropolitan Planning Area (MPA) comprised of Volusia County and the urbanized areas of Flagler County including the cities of Flagler Beach, Beverly Beach, and portions of Palm Coast and Bunnell; and

WHEREAS, 23 C.F.R. 450.104 provides that the River to Sea TPO shall annually endorse, and amend as appropriate, the plans and programs required, among which is the Surface Transportation Program (STP) projects list of the annual Transportation Improvement Program (TIP) submission; and

WHEREAS, each year the appropriate River to Sea TPO committees, made up of a crosssection of interested citizens and staff, are charged with the responsibility of drafting a list of prioritized projects; and

WHEREAS, it is the responsibility of the River to Sea TPO to establish project priorities that are equitable for all areas within the River to Sea TPO's planning boundaries ; and

WHEREAS, the River to Sea TPO reaffirms its commitment to the priority process and related policies;

Now, THEREFORE, BE IT RESOLVED by the River to Sea TPO that:

 Annual set-asides of the River to Sea TPO's total Surface Transportation Program (STP) Urban Attributable (SU) funding will be made in the following manner: 40% of the total SU funds will be used for Traffic Operations, Safety, and Local Initiatives (traffic operations focused) Project Priorities, 30% of the total SU funds will be used for Transit Project Priorities, and 30% of the total SU funds will be used for Bicycle/Pedestrian, Transportation Alternatives, Regional Trails, and Local Initiatives (bicycle/pedestrian focused) Project Priorities;

- 2. Annual set-asides of other state and federal funds identified in the 2040 Long Range Transportation Plan for Local Initiatives will be made available in the following manner: 50% of the funds will be used for Traffic Operations, Safety, and Local Initiatives (traffic operations focused) Project Priorities and 50% will be used for Bicycle/Pedestrian, Transportation Alternatives, Regional Trails, and Local Initiatives (bicycle/pedestrian focused) Project Priorities;
- 3. Mixed projects (defined as a project that is not a stand-alone bicycle or pedestrian project) will only be accepted and ranked if the predominant cost component is consistent with the category of funding to which it is submitted. All other cost components are subject to eligibility of available funding. Mixed projects submitted by a member local government will be presented to the TPO Board for final determination prior to being ranked in the TPO's list of Priority Projects for Bicycle/Pedestrian facilities;
- 4. For projects funded in whole or in part with Urban Attributable (SU) funding and/or other state and federal funds obtained through the TPO's Priority Project Process, if the recipient of the funds chooses to display any signs or markers at the project site, said signs or markers shall include language acknowledging the River to Sea TPO, Florida Department of Transportation (FDOT), Federal Highway Administration (FHWA), Federal Transit Administration (FTA), and/or other funding partners, as may be applicable, for providing funding for the project. In addition to the language, the sign or marker shall include these agencies' official logos.

Additionally, any public pronouncements made by or on behalf of the recipient regarding the project, including press releases, publications, annual reports, video credits, and dedications, shall acknowledge the funding support provided by the TPO, FDOT, FHWA, and FTA.

- 5. Resolution 2016-03 is hereby repealed and replaced by this resolution;
- The policies set forth in this resolution shall remain in effect unless and until they are repealed by the TPO; and
- 7. The Chairman of the River to Sea TPO (or his designee) is hereby authorized and directed to provide a copy of this resolution to the:
  - a. Florida Department of Transportation (FDOT);
  - Federal Transit Administration (FTA) (through the Florida Department of Transportation); and
  - Federal Highway Administration (FHWA) (through the Florida Department of Transportation).

River to Sea TPO Resolution 2017-03 Page 3

DONE AND RESOLVED at the regular meeting of the River to Sea TPO held on the 25<sup>th</sup> day of January 2017.

**RIVER TO SEA TRANSPORTATION PLANNING ORGANIZATION** 

CITY OF FLAGLER BEACH COMMISSIONER MARSHALL SHUPE CHAIRMAN, RIVER TO SEA TPO

CERTIFICATE:

The undersigned duly qualified and acting Recording Secretary of the River to Sea TPO certified that the foregoing is a true and correct copy of a resolution, adopted at a legally convened meeting of the River to Sea TPO held on January 25, 2017.

ATTEST:

any

PAMELA C. BLANKENSHIP, RECORDING SECRETARY RIVER TO SEA TRANSPORTATION PLANNING ORGANIZATION