GENERAL CONDITIONS

1. All activities authorized by this permit shall be implemented as set forth in the plans, specifications and performance criteria as approved by this permit. Any deviation from the permitted activity and the conditions for undertaking that activity shall constitute a violation of this permit and Part IV, Chapter 373, F.S.

2. This permit or a copy thereof, complete with all conditions, attachments, exhibits, and modifications shall be kept at the work site of the permitted activity. The complete permit shall be available for review at the work site upon request by District staff. The permittee shall require the contractor to review the complete permit prior to commencement of the activity authorized by this permit.

3. Activities approved by this permit shall be conducted in a manner which does not cause violations of State water quality standards. The permittee shall implement best management practices for erosion and pollution control to prevent violation of State water quality standards. Temporary erosion control shall be implemented prior to and during construction, and permanent control measures shall be completed within 7 days of any construction activity. Turbidity barriers shall be installed and maintained at all locations where the possibility of transferring suspended solids into the receiving waterbody exists due to the permitted work. Turbidity barriers shall remain in place at all locations until construction is completed and soils are stabilized and vegetation has been established. All practices shall be in accordance with the guidelines and specifications described in Chapter 6 of the Florida Land Development Manual; A Guide to Sound Land and Water Management (Department of Environmental Regulation, 1988), incorporated by reference in Rule 40E-4.091, F.A.C. unless a project-specific erosion and sediment control plan is approved as part of the permit. Thereafter the permittee shall be responsible for the removal of the barriers. The permittee shall correct any erosion or shoaling that causes adverse impacts to the water resources.

4. The permittee shall notify the District of the anticipated construction start date within 30 days of the date that this permit is issued. At least 48 hours prior to commencement of activity authorized by this permit, the permittee shall submit to the District an Environmental Resource Permit Construction Commencement Notice Form Number 0960 indicating the actual start date and the expected construction completion date.

5. When the duration of construction will exceed one year, the permittee shall submit construction status reports to the District on an annual basis utilizing an annual status report form. Status report forms shall be submitted the following June of each year.

6. Within 30 days after completion of construction of the permitted activity, the permitee shall submit a written statement of completion and certification by a registered professional engineer, or other appropriate individual as authorized by law, utilizing the supplied Environmental Resource Permit Construction Completion/Certification Form Number 0881. The statement of completion and certification shall be based on onsite observation of construction or review of as-built drawings for the purpose of determining if the work was completed in compliance with permitted plans and specifications. This submittal shall serve to notify the District that the system is ready for inspection. Additionally, if deviation from the approved drawings is discovered during the certification process, the certification must be accompanied by a copy of the approved permit drawings with deviations noted. Both the original and revised specifications must be clearly shown. The plans must be clearly labeled as "As-built" or "Record" drawing. All surveyed dimensions and elevations shall be certified by a registered surveyor.

7. The operation phase of this permit shall not become effective: until the permittee has complied with the requirements of condition (6) above, and submitted a request for conversion of Environmental Resource Permit from Construction Phase to Operation Phase, Form No. 0920; the District determines the system to be in compliance with the permitted plans and specifications; and the entity approved by the District in accordance with Sections 9.0 and 10.0 of the Basis of Review for Environmental Resource Permit Applications within the South Florida Water Management District,

accepts responsibility for operation and maintenance of the system. The permit shall not be transferred to such approved operation and maintenance entity until the operation phase of the permit becomes effective. Following inspection and approval of the permitted system by the District, the permittee shall initiate transfer of the permit to the approved responsible operating entity if different from the permittee. Until the permit is transferred pursuant to Section 40E-1.6107, F.A.C., the permittee shall be liable for compliance with the terms of the permit.

8. Each phase or independent portion of the permitted system must be completed in accordance with the permitted plans and permit conditions prior to the initiation of the permitted use of site infrastructure located within the area served by that portion or phase of the system. Each phase or independent portion of the system must be completed in accordance with the permitted plans and permit conditions prior to transfer of responsibility for operation and maintenance of the phase or portion of the system to a local government or other responsible entity.

9. For those systems that will be operated or maintained by an entity that will require an easement or deed restriction in order to enable that entity to operate or maintain the system in conformance with this permit, such easement or deed restriction must be recorded in the public records and submitted to the District along with any other final operation and maintenance documents required by Sections 9.0 and 10.0 of the Basis of Review for Environmental Resource Permit applications within the South Florida Water Management District, prior to lot or units sales or prior to the completion of the system, whichever comes first. Other documents concerning the establishment and authority of the operating entity must be filed with the Secretary of State, county or municipal entities. Final operation and maintenance documents must be received by the District when maintenance and operation of the system is accepted by the local government entity. Failure to submit the appropriate final documents will result in the permittee remaining liable for carrying out maintenance and operation of the permitted system and any other permit conditions.

10. Should any other regulatory agency require changes to the permitted system, the permittee shall notify the District in writing of the changes prior to implementation so that a determination can be made whether a permit modification is required.

11. This permit does not eliminate the necessity to obtain any required federal, state, local and special district authorizations prior to the start of any activity approved by this permit. This permit does not convey to the permittee or create in the permittee any property right, or any interest in real property, nor does it authorize any entrance upon or activities on property which is not owned or controlled by the permittee, or convey any rights or privileges other than those specified in the permit and Chapter 40E-4 or Chapter 40E-40, F.A.C..

12. The permittee is hereby advised that Section 253.77, F.S. states that a person may not commence any excavation, construction, or other activity involving the use of sovereign or other lands of the State, the title to which is vested in the Board of Trustees of the Internal Improvement Trust Fund without obtaining the required lease, license, easement, or other form of consent authorizing the proposed use. Therefore, the permittee is responsible for obtaining any necessary authorizations from the Board of Trustees prior to commencing activity on sovereignty lands or other state-owned lands.

13. The permittee must obtain a Water Use permit prior to construction dewatering, unless the work qualifies for a general permit pursuant to Subsection 40E-20.302(3), F.A.C., also known as the "No Notice" Rule.

14. The permittee shall hold and save the District harmless from any and all damages, claims, or liabilities which may arise by reason of the construction, alteration, operation, maintenance, removal, abandonment or use of any system authorized by the permit.

GENERAL CONDITIONS

15. Any delineation of the extent of a wetland or other surface water submitted as part of the permit application, including plans or other supporting documentation, shall not be considered binding, unless a specific condition of this permit or a formal determination under Section 373.421(2), F.S., provides otherwise.

16. The permittee shall notify the District in writing within 30 days of any sale, conveyance, or other transfer of ownership or control of a permitted system or the real property on which the permitted system is located. All transfers of ownership or transfers of a permit are subject to the requirements of Rules 40E-1.6105 and 40E-1.6107, F.A.C.. The permittee transferring the permit shall remain liable for corrective actions that may be required as a result of any violations prior to the sale, conveyance or other transfer of the system.

17. Upon reasonable notice to the permittee, District authorized staff with proper identification shall have permission to enter, inspect, sample and test the system to insure conformity with the plans and specifications approved by the permit.

18. If historical or archaeological artifacts are discovered at any time on the project site, the permittee shall immediately notify the appropriate District service center.

19. The permittee shall immediately notify the District in writing of any previously submitted information that is later discovered to be inaccurate.

SPECIAL CONDITIONS

1. The conceptual phase of this permit shall expire on March 11, 2006.

2 Operation of the surface water management system shall be the responsibility of Banyan Bay Property Owner's Association. Within one year of permit issuance or concurrent with the engineering certification of construction completion, whichever comes first, the permittee shall submit a copy of the recorded deed restrictions, a copy of the filed articles of incorporation, and a copy of the certificate of incorporation for the association.

3. Discharge Facilities:

Basin: A, Structure: CS-A

1-4.5" WIDE SHARP CRESTED weir with crest at elev. 10.58' NGVD.
1-3.25" dia. CIRCULAR ORIFICE with invert at elev. 9.5' NGVD.

Receiving body : On-site wetland
Control elev : 9.5 feet NGVD.

Basin: B, Structure: CS-B

1-4.75" WIDE SHARP CRESTED weir with crest at elev. 10.88' NGVD.
1-3" dia. CIRCULAR ORIFICE with invert at elev. 9.9' NGVD.

Receiving body : On-site wetland
Control elev : 9.9 feet NGVD.

Basin: C1, Structure: CS-C1

1-28' WIDE SHARP CRESTED weir with crest at elev. 12.15' NGVD.
1-3" dia. CIRCULAR ORIFICE with invert at elev. 10' NGVD.

Receiving body : Lake C2
Control elev : 10 feet NGVD.

Basin: C2, Structure: CS-C2

1-4.25" WIDE SHARP CRESTED weir with crest at elev. 10.95' NGVD.
1-3.5" dia. CIRCULAR ORIFICE with invert at elev. 10' NGVD.

Receiving body : On-site wetland
Control elev : 10 feet NGVD.

Basin: C2, Structure: CS-C3

1-4.25" WIDE SHARP CRESTED weir with crest at elev. 10.95' NGVD.

Receiving body : On-site wetland
Control elev : 10 feet NGVD.

Basin: D1, Structure: CS-D1

1-12" WIDE SHARP CRESTED weir with crest at elev. 9.67' NGVD.
1-3" dia. CIRCULAR ORIFICE with invert at elev. 8.5' NGVD.

SPECIAL CONDITIONS

Receiving body : Lake D2
Control elev : 8.5 feet NGVD.

Basin: D2, Structure: CS-D2

1-2" WIDE SHARP CRESTED weir with crest at elev. 7.57' NGVD.
1-3" dia. CIRCULAR ORIFICE with invert at elev. 6.5' NGVD.

Receiving body : On-site Wetland
Control elev : 6.5 feet NGVD.

Basin: D3, Structure: CS-D3

1-2" WIDE SHARP CRESTED weir with crest at elev. 7.5' NGVD.
1-3" dia. CIRCULAR ORIFICE with invert at elev. 6.5' NGVD.

Receiving body : On-site Wetland
Control elev : 6.5 feet NGVD.

Basin: E1, Structure: CS-E1

1-14.5" WIDE SHARP CRESTED weir with crest at elev. 8.04' NGVD.
1-4.25" dia. CIRCULAR ORIFICE with invert at elev. 7' NGVD.

Receiving body : On-site Wetland
Control elev : 7 feet NGVD.

Basin: E2, Structure: CS-E2

1-20" WIDE SHARP CRESTED weir with crest at elev. 11.17' NGVD.
1-3" dia. CIRCULAR ORIFICE with invert at elev. 9.2' NGVD.

Receiving body : Lake E1
Control elev : 9.2 feet NGVD.

Basin: E3, Structure: CS-E3

1-30" WIDE SHARP CRESTED weir with crest at elev. 9.35' NGVD.
1-3" dia. CIRCULAR ORIFICE with invert at elev. 7' NGVD.

Receiving body : Lake E1
Control elev : 7 feet NGVD.

4. The permittee shall be responsible for the correction of any erosion, shoaling or water quality problems that result from the construction or operation of the surface water management system.
5. Measures shall be taken during construction to insure that sedimentation and/or turbidity violations do not occur in the receiving water.
6. The District reserves the right to require that additional water quality treatment methods be incorporated into the drainage system if such measures are shown to be necessary.
7. Lake side slopes shall be no steeper than 4:1 (horizontal:vertical) to a depth of two feet below the control elevation. Side slopes shall be nurtured or planted from 2 feet below to 1 foot above control elevation to insure vegetative growth, unless shown on the plans

SPECIAL CONDITIONS

8. Facilities other than those stated herein shall not be constructed without an approved modification of this permit.

9. A stable, permanent and accessible elevation reference shall be established on or within one hundred (100) feet of all permitted discharge structures no later than the submission of the certification report. The location of the elevation reference must be noted on or with the certification report.

10. The permittee shall provide routine maintenance of all of the components of the surface water management system in order to remove all trapped sediments/debris. All materials shall be properly disposed of as required by law. Failure to properly maintain the system may result in adverse flooding conditions.

11. This permit is issued based on the applicant's submitted information which reasonably demonstrates that adverse water resource related impacts will not be caused by the completed permit activity. Should any adverse impacts caused by the completed surface water management system occur, the District will require the permittee to provide appropriate mitigation to the District or other impacted party. The District will require the permittee to modify the surface water management system, if necessary, to eliminate the cause of the adverse impacts.

12. Minimum building floor elevation: BASIN: A - 14.00 feet NGVD.
BASIN: B - 12.94 feet NGVD.
BASIN: C1 - 13.48 feet NGVD.
BASIN: C2 - 13.39 feet NGVD.
BASIN: D1 - 10.67 feet NGVD.
BASIN: D2 - 10.58 feet NGVD.
BASIN: D3 - 9.75 feet NGVD.
BASIN: E1 - 10.77 feet NGVD.
BASIN: E2 - 12.27 feet NGVD.
BASIN: E3 - 10.94 feet NGVD.

13. Minimum road crown elevation: Basin: A - 11.51 feet NGVD.
Basin: B - 11.50 feet NGVD.
Basin: C1 - 12.87 feet NGVD.
Basin: C2 - 12.00 feet NGVD.
Basin: D1 - 10.50 feet NGVD.
Basin: D2 - 8.50 feet NGVD.
Basin: D3 - 8.50 feet NGVD.
Basin: E1 - 9.00 feet NGVD.
Basin: E2 - 11.51 feet NGVD.
Basin: E3 - 10.17 feet NGVD.

14. Endangered species, threatened species and/or species of special concern have been observed onsite and/or the project contains suitable habitat for these species. It shall be the permittee's responsibility to coordinate with the Florida Fish and Wildlife Conservation Commission and/or the U.S. Fish and Wildlife Service for appropriate guidance, recommendations and/or necessary permits to avoid impacts to listed species.

15. The wetland conservation areas and upland buffer zones and/or upland preservation areas shown on Exhibit(s) 2 and 4G may in no way be altered from their natural or permitted state. Activities prohibited within the conservation areas include, but are not limited to: construction or placing of buildings on or above the ground; dumping or placing soil or other substances such as trash; removal or destruction of trees, shrubs, or other vegetation - with the exception of exotic vegetation removal; excavation, dredging, or removal of soil materials; diking or fencing; and any other activities detrimental to drainage, flood control, water conservation, erosion control, or fish and wildlife habitat conservation or preservation.

16. A mitigation program for Banyan Bay shall be implemented in accordance with Exhibit Nos. 3 and 4.

SPECIAL CONDITIONS

The permittee shall preserve 78.11 acres of wetlands and 5.2 acres of upland compensation areas.

17. A monitoring and maintenance program shall be implemented in accordance with Exhibit No. 4. The monitoring program shall extend for a period of 5 years with annual reports submitted to District staff. Maintenance for the preserved wetland areas will occur on a regular basis to ensure the integrity and viability of those areas as permitted. Maintenance shall be conducted in perpetuity to ensure that the conservation area is maintained free from Category 1 exotic vegetation (as defined by the Florida Exotic Pest Plant Council at the time of permit issuance) immediately following a maintenance activity. Coverage of exotic and nuisance plant species shall not exceed 5% of total cover between maintenance activities. In addition, the permittee shall manage the conservation areas such that exotic/nuisance plant species do not dominate any one section of those areas.

18. Upon submittal of the first application for construction approval, the permittee shall submit a work schedule, subject to District staff review and approval, specifying completion dates for each mitigation, monitoring and maintenance task.

19. At the time of application for construction approval, the applicant shall submit sketches and legal descriptions of all the wetlands preservation areas and upland buffer zones for review.

    Prior to the commencement of construction resulting in wetland impacts, the permittee shall submit two certified copies of the recorded conservation easement for the mitigation areas and associated buffers. The data should also be supplied in a digital CAD (.dxf) or GIS (ESRI Coverage) format. The files should be in the Florida State Plane coordinate system, East Zone (3601) with a data datum of NAD83, HARN with the map units in feet. This data should reside on a CD or floppy disk and be submitted to the District's Environmental Resource Compliance Division in the service area office where the application was submitted.

    The recorded easement shall be in substantial conformance with Exhibit 5. Any proposed modifications to the approved form must receive prior written consent from the District. The easement must be free of encumbrances or interests in the easement which the District determines are contrary to the intent of the easement. In the event it is later determined that there are encumbrances or interests in the easement which the District determines are contrary to the intent of the easement, the permittee shall be required to provide release or subordination of such encumbrances or interests.

20. At the time of application for construction approval for any phase along the South Fork of the St. Lucie River, the permittee shall submit a draft mangrove trimming and monitoring plan. The plan is subject to review and approval by District staff. All mangrove trimming activities shall be accomplished by a certified professional mangrove trimmer and in accordance with the Mangrove Trimming and Preservation Act (Sections 403.9321-403.9333 Florida Statutes).

21. The District reserves the right to require remedial measures to be taken by the permittee if monitoring or other information demonstrates that adverse impacts to onsite or offsite wetlands, upland conservation areas or buffers, or other surface waters have occurred due to project related activities.

22. The permittee shall instruct all personnel associated with the project of the potential presence of manatees and the need to avoid collisions with manatees. All construction personnel are responsible for observing water-related activities for the presence of manatee(s).

    The permittee shall advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing manatees which are protected under the Marine Mammal Protection Act of 1972, The Endangered Species Act of 1973, and the Florida Manatee Sanctuary Act.

    Siltation barriers shall be made of material in which manatees cannot become entangled, are properly secured, and are regularly monitored to avoid manatee entrapment. Barriers must not block manatee entry to or exist from essential habitat.

SPECIAL CONDITIONS

All vessels associated with the construction project shall operate at "no wake/idle" speeds at all times while in the construction area and while in water where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels will follow routes of deep water whenever possible.

If manatee(s) are seen within 100 yards of the active daily construction/dredging operation or vessel movement, all appropriate precautions shall be implemented to ensure protection of the manatee. These precautions shall include the operation of all moving equipment no closer than 50 feet of a manatee. Operation of any equipment closer than 50 feet to a manatee shall necessitate immediate shutdown of that equipment. Activities will not resume until the manatee(s) has departed the project area of its own volition.

Any collision with and/or injury to a manatee shall be reported immediately to the FWC Hotline at 1-888-404-FWCC. Collision and/or injury should also be reported to the U.S. Fish and Wildlife Service in Jacksonville (1-904-232-2580) for north Florida or Vero Beach (1-561-562-3909) in south Florida.

Temporary signs concerning manatees shall be posted prior to and during all construction/dredging activities. All signs are to be removed by the permittee upon completion of the project. A sign measuring at least 3 ft. by 4 ft. which reads Caution: Manatee Area will be posted in a location prominently visible to water related construction crews. A second sign should be posted if vessels are associated with the construction, and should be placed visible to the vessel operator. The second sign should be at least 81/2" by 11" which reads Caution: Manatee Habitat. Idle speed is required if operating a vessel in the construction area. All equipment must be shutdown if a manatee comes within 50 feet of operation. Any collision with and/or injury to a manatee shall be reported immediately to the FWC Hotline at 1-888-404-FWCC The U.S. Fish and Wildlife Service should also be contacted in Jacksonville (1-904-232-2580) for north Florida or in Vero Beach (1-561-562-3909) for south Florida.

CONSENT OF USE CONDITIONS

1. No activities other than those set forth in Application No. 030429-7 and in this permit are authorized. Any additional activities on state-owned sovereignty submerged lands must receive further consent from the Governor and Cabinet, sitting as the Board of Trustees of the Internal Improvement Trust Fund (hereinafter the "Board") or their properly designated agent.

2. Grantee agrees that all title and interest to all lands lying below the historical mean high water line or ordinary high water line are vested in the Board, and shall make no claim of title or interest in said lands by reason of the occupancy or use thereof.

3. Grantee agrees to use or occupy the subject premises for those purposes specified herein, and grantee shall not permit the premises or any part thereof to be used or occupied for any other purpose or knowingly permit or suffer any nuisances or illegal operations of any kind of the premises.

4. Grantee agrees to maintain the premises in good condition in the interest of the public health, safety and welfare. The premises are subject to inspection by the Board or its designated agent at any reasonable time.

5. Grantee agrees to indemnify, defend and hold harmless the Board and the State of Florida from all claims, actions, lawsuits and demands arising out of this consent.

6. No failure, or successive failures, on the part of the Board to enforce any provision, waiver or successive waivers on the part of the Board of any provision herein, shall operate as a discharge thereof or render the same inoperative or impair the right of the Board to enforce the same in the event of subsequent breach.

7. Grantee binds itself and its successors and assigns to abide by the provisions and conditions set forth herein. In the event grantee fails or refuses to comply with the provisions and conditions of this consent, the consent of use may be terminated by the Board after written notice to the grantee. Upon receipt of such notice, the grantee shall have thirty (30) days in which to correct the violation. Failure to correct the violation(s) within this period shall result in the automatic revocation of this consent of use.

8. All costs, including attorneys' fees, incurred by the Board in enforcing the terms and conditions of this consent shall be paid by the grantee. Grantee agrees to accept service by certified mail of any notice required by Chapter 18-14, Florida Administrative Code, at the address shown on page one of this permit and further agrees to notify the Board in writing of any change of address at least ten days before the change becomes effective.

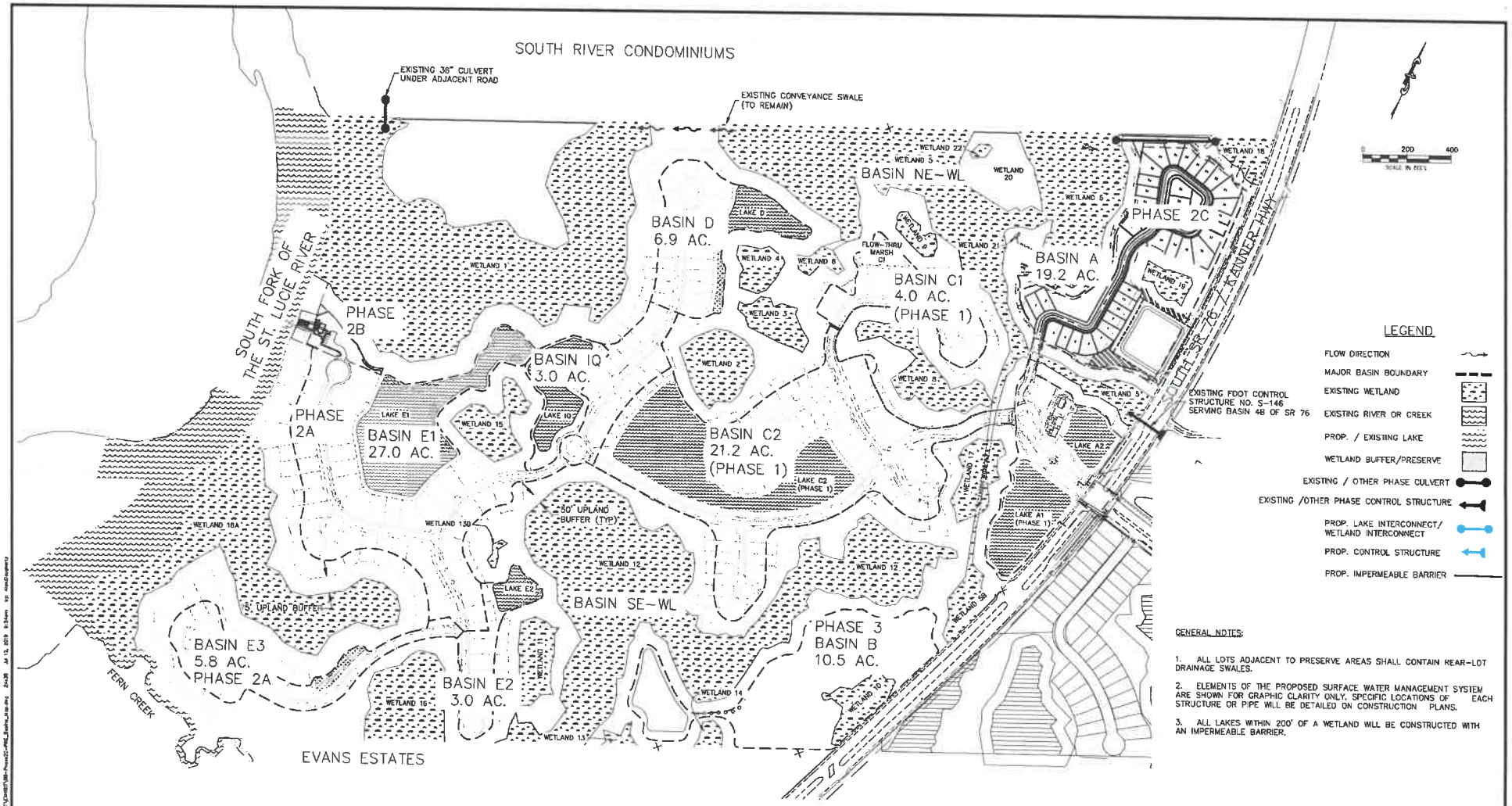
9. Grantee agrees to assume responsibility for all liabilities that accrue to the sovereignty submerged land or to the improvements thereon, including any and all drainage or special assessments or taxes of every kind and description which are now or may be hereafter lawfully assessed and levied against the property during the effective period of this consent.

10. Grantee agrees that any dispute arising from matters relating to this consent shall be governed by the laws of Florida and initiated only in Leon County, Florida.

11. The consent of use associated with these general consent conditions as well as these conditions themselves are subject to modification after 5 years in order to reflect any applicable changes in statutes, rule or policies of the Board or its designated agent.

12. In the event that any part of the structure(s) consented to herein is determined by a final adjudication issued by a court of competent jurisdiction to encroach on or interfere with adjacent riparian rights, grantee agrees to either obtain written consent for the offending structure from the affected riparian owner or to remove the interference or encroachment within 60 days from the date of the adjudication. Failure to comply shall constitute a material breach of this consent and shall be grounds for its immediate termination.

APPENDIX C
Basin Map



GENERAL NOTES:

1. ALL LOTS ADJACENT TO PRESERVE AREAS SHALL CONTAIN REAR-LOT DRAINAGE SWALES.
2. ELEMENTS OF THE PROPOSED SURFACE WATER MANAGEMENT SYSTEM ARE SHOWN FOR GRAPHIC CLARITY ONLY. SPECIFIC LOCATIONS OF EACH STRUCTURE OR PIPE WILL BE DETAILED ON CONSTRUCTION PLANS.
3. ALL LAKES WITHIN 200' OF A WETLAND WILL BE CONSTRUCTED WITH AN IMPERMEABLE BARRIER.

PRE DEVELOPMENT BASIN MAP PHASE 2B

BANYAN BAY PHASE 2B
MARTIN COUNTY, FLORIDA

NO.	REVISIONS	DATE	BY
1	REVISIONS PER MARTIN CO. JUNE 2007 COMMENTS	07-24-07	RHD

PROFESSIONAL ENGINEER G. MARK BROCKWAY, P.E. 28331 STATE OF FLORIDA SEAL

SCALE	AS SHOWN
DESIGNED BY	MS
DRAWN BY	MS
CHECKED BY	GMB
FILE	BB-MDP

Kimley-Horn and Associates, Inc.
2400 S.E. FEDERAL HIGHWAY, SUITE 320, STUART, FL 34994
PHONE (561) 288-2180
C.A. #396

DATE JUL 2006
FILE & DRAWING NO. 041052002
SHEET 1 OF 1

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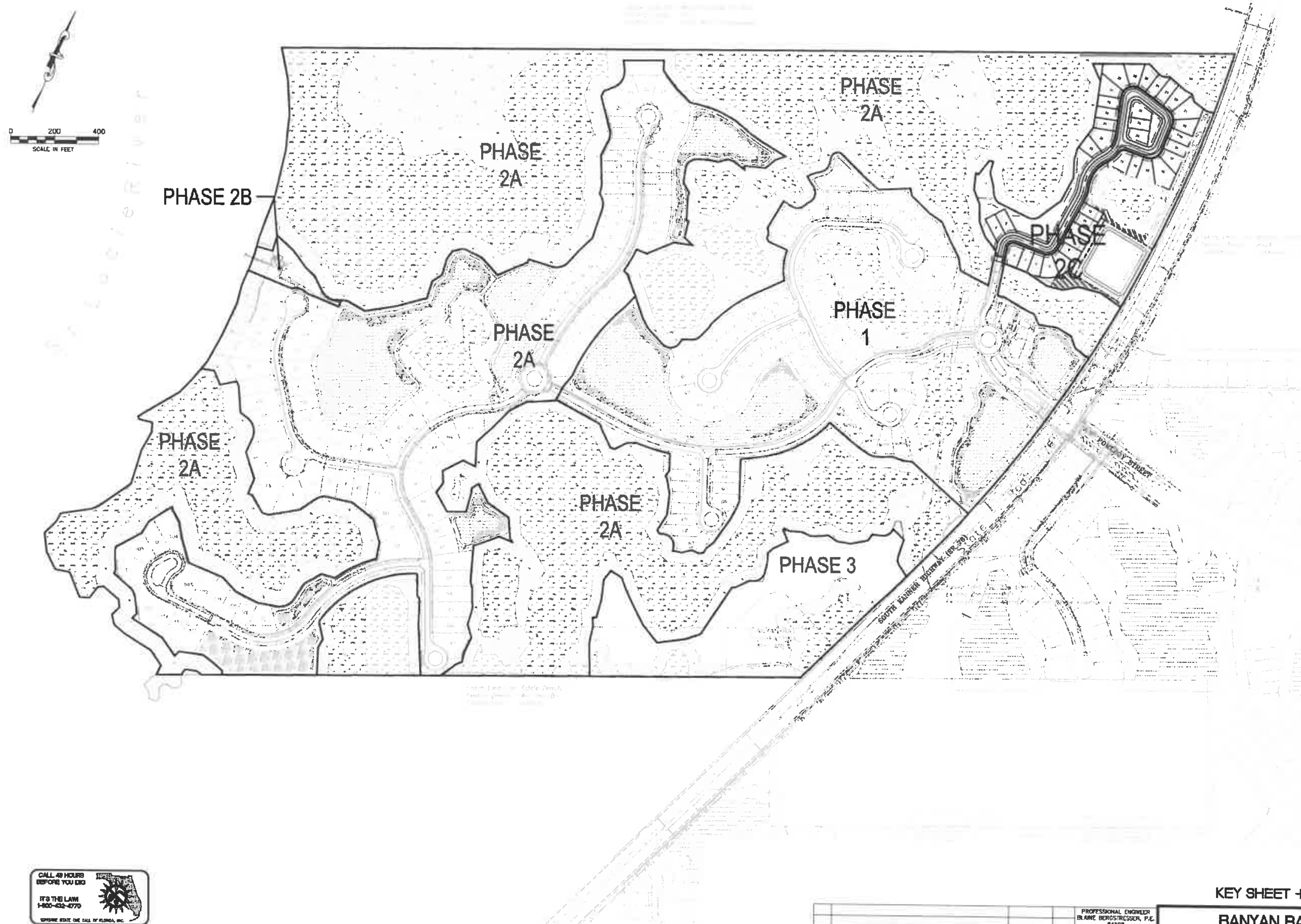
APPENDIX D
Phasing Plan



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KEY SHEET + PHASING PLAN

BANYAN BAY - PHASE 2C
MARTIN COUNTY, FLORIDA

PROFESSIONAL ENGINEER
BLAINE BERGSTRESSER, P.E.
64598

No.	REVISIONS	DATE	BY

SCALE AS SHOWN
DESIGNED BY SDS
DRAWN BY SDS
CHECKED BY PVR

Kimley»Horn
445 24TH STREET, SUITE 200, VERO BEACH, FL 32960
PHONE (772) 794-4100 FAX (772) 794-4130
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CA 00000696

DATE JUNE 2017
FILE & DRAWING NO. 041052000
SHEET 2 OF 17

APPENDIX E
Geotechnical Report

UNIVERSAL
ENGINEERING SCIENCES
Consultants In: Geotechnical Engineering • Environmental Sciences
Geophysical Services • Construction Materials Testing • Threshold Inspection
Building Inspection • Plan Review • Building Code Administration

LOCATIONS:
- Atlanta, GA
- Daytona Beach, FL
- Fort Myers, FL
- Fort Pierce, FL
- Gainesville, FL
- Jacksonville, FL
- Miami, FL
- Ocala, FL
- Orlando, FL (Headquarters)
- Palm Coast, FL
- Panama City, FL
- Pensacola, FL
- Rockledge, FL
- Sarasota, FL
- Tampa, FL
- Tifton, GA
- West Palm Beach, FL

November 21, 2016

Mr. Michael DeBock
Market Land Manager
Ryan Homes
2005 Vista Parkway, Suite 102
West Palm Beach, FL 33411

Reference: Surface Soil Survey Report for Banyan Bay
Kanner Highway and SW Pomeroy Street
Stuart, Martin County, Florida
UES Project No. 0630.1600096
UES Report No. 14080

Dear Mr. DeBock:

Universal Engineering Sciences, Inc. (UES) has completed a limited subsurface soil assessment for Banyan Bay in Stuart, Martin County, Florida. This letter contains the results of our review and analysis of the Natural Resources Conservation Service (NRCS) data exploration for the of the approximate 240 acre site.

From the NRCS Soil Survey Map, found in the attachments, about 220 acres or about 90 percent of the total site is designated as sand, with muck designated for the remaining 20 acres or about 10 percent of the total site area. A majority of the muck areas are in wetland areas, as shown on the supplied site plan, and in the southwestern portion of the site where homes are to be located. The three muck types that identified in the soil survey include: 1) Okeelanta muck; 2) Wulfert and Durbin mucks; and 3) Samsula muck.

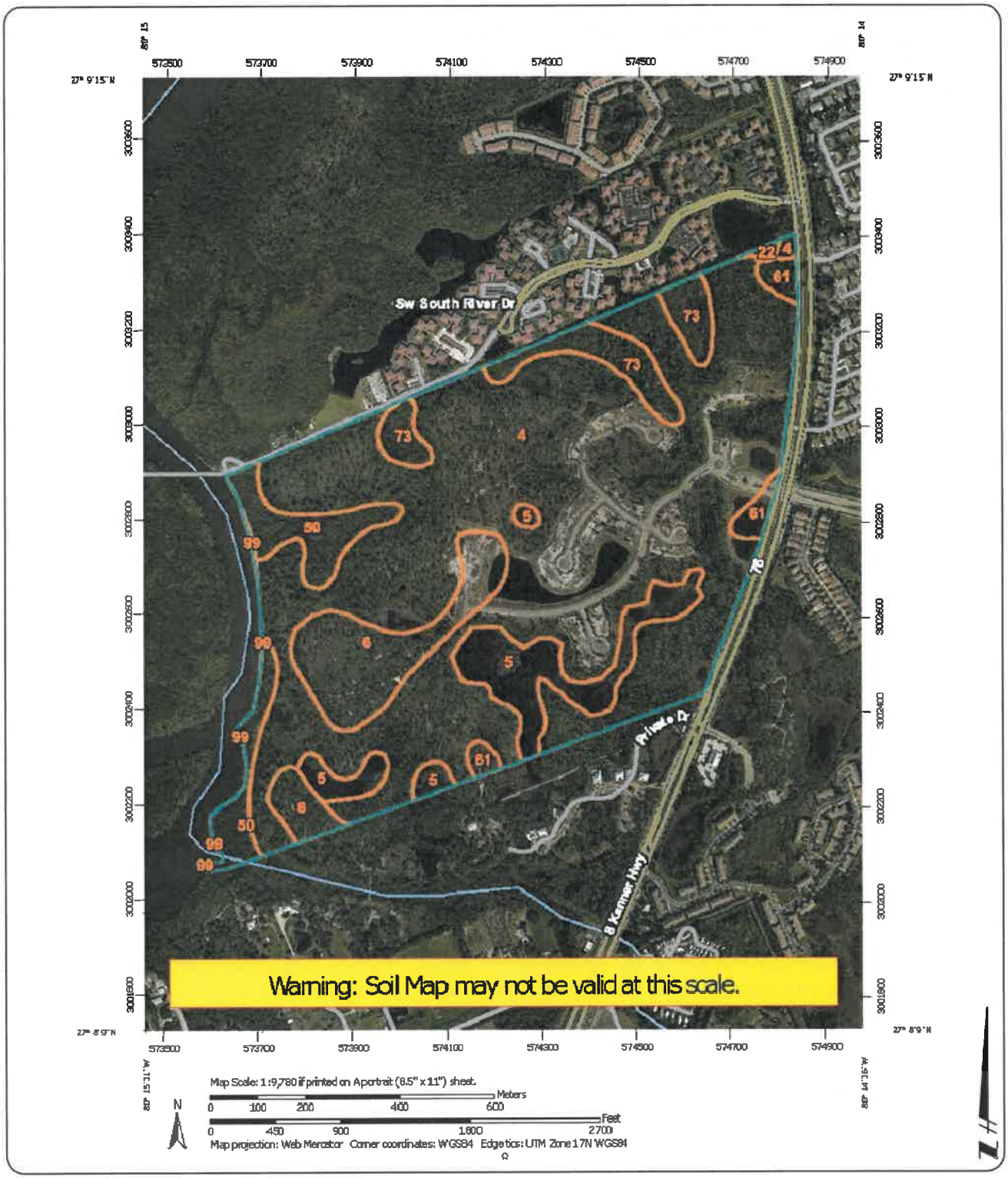
Attached is a map of the approximate muck locations as it pertains to the site layout prepared by Lucido & Associates that was provided to us. This map indicates the possible encounter of muck and other undesirable soils in locations indicated by the NRCS Soil Survey. Once the roadway areas are field staked and cleared for access, soil borings can be advanced to further define the subsurface soil profile for development areas. Please see attachments for further details. Should you have any questions please feel free to contact UES.

Respectfully submitted,
Universal Engineering Sciences, Inc.
Certificate of Authorization No. 549

John A. Gentile Jr., E.I
Staff Engineer

Peter G. Read, PE
Regional Manager

Attachments: NRCS Soil Map, NRCS Map Legend
Approximate Muck Location Map



UNIVERSAL
ENGINEERING SCIENCES

GEOTECHNICAL EXPLORATION SERVICES
BANYAN BAY
STUART, MARTIN COUNTY, FLORIDA

SOIL SURVEY MAP

DRAWN BY:	JAG	DATE:	11/21/2016	CHECKED BY:	P.G.R.	DATE:	11/21/2016
SCALE:	AS SHOWN	PROJECT NO:	0630.1600096	REPORT NO:		PAGE NO:	1/1

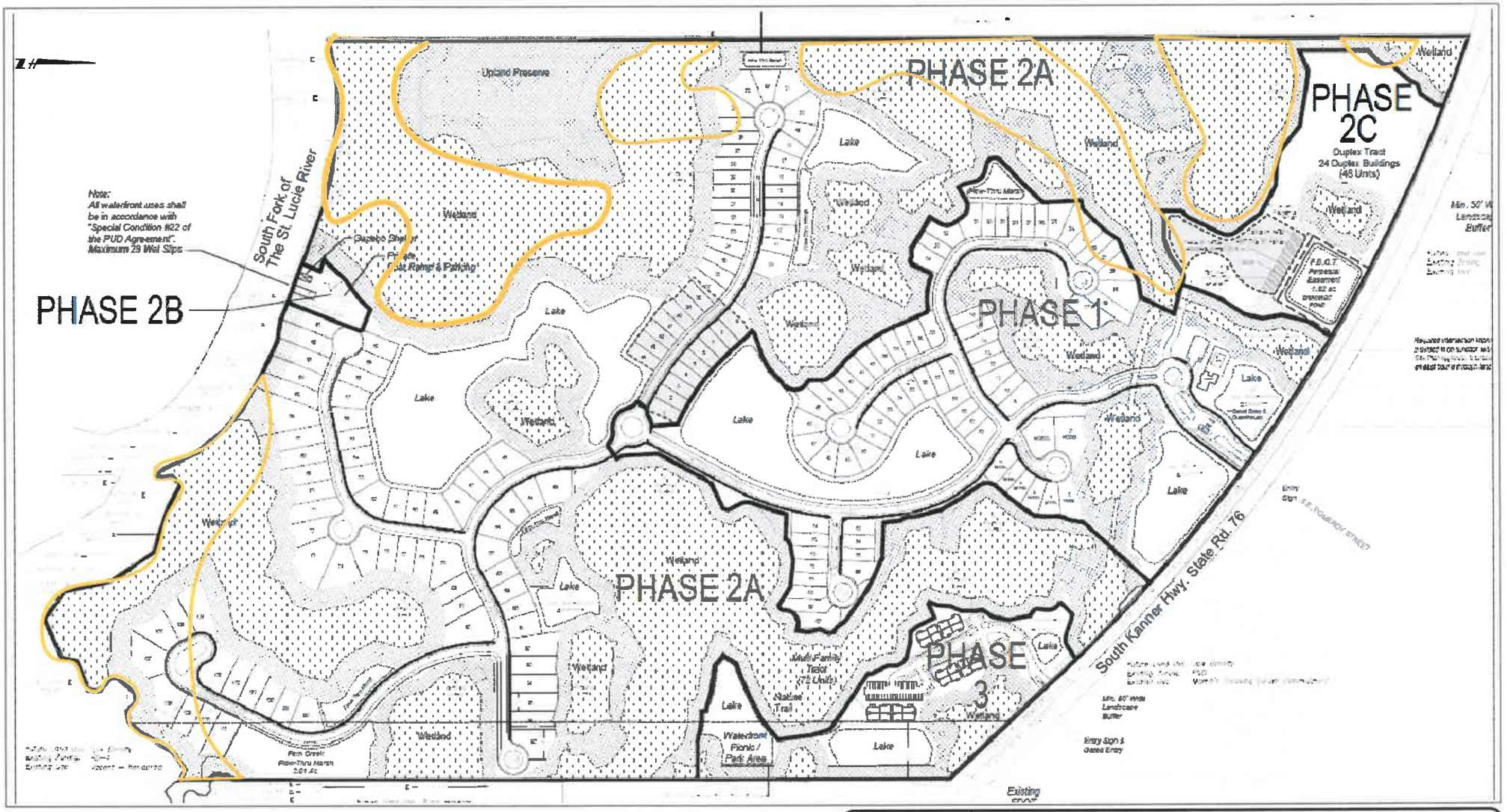
Martin County, Florida (FL085)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
4	Waveland and Immokalee fine sands	171.1	71.7%
5	Waveland and Lawnwood fine sands, depressional	17.7	7.4%
6	Paola and St. Lucie sands, 0 to 8 percent slopes	19.6	8.2%
22	Okeelanta muck, depressional, 0 to 1 percent slopes	0.4	0.2%
50	Wulfert and Durbin mucks, tidal	13.1	5.5%
61	Hobe fine sand, 0 to 5 percent slopes	4.0	1.7%
73	Samsula muck, frequently ponded, 0 to 1 percent slopes	12.3	5.1%
99	Water	0.2	0.1%
Totals for Area of Interest		238.5	100.0%

UNIVERSAL
ENGINEERING SCIENCES

GEOTECHNICAL EXPLORATION SERVICES
BANYAN BAY
STUART, MARTIN COUNTY, FLORIDA

LEGEND

DRAWN BY:	JAG	DATE:	11/21/2016	CHECKED BY:	P.G.R.	DATE:	11/21/2016
SCALE:	AS SHOWN	PROJECT NO:	0630.1600096	REPORT NO:		PAGE NO:	1/1



LEGEND

SUSPECTED MUCK LOCATION

NOTE: ALL LOCATIONS ARE APPROXIMATE

UNIVERSAL ENGINEERING SCIENCES

GEOTECHNICAL EXPLORATION SERVICES
BANYAN BAY
STUART, MARTIN COUNTY, FLORIDA

APPROXIMATE MUCK LOCATION MAP

DRAWN BY:	JAG	DATE: 11/21/2016	CHECKED BY:	P.G.R.	DATE: 11/21/2016
SCALE:	NTS	PROJECT NO: 0630.1600096	REPORT NO:		PAGE NO: 1/1

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ENGINEERING SCIENCES

PRELIMINARY GEOTECHNICAL ENGINEERING REPORT BANYAN BAY – PHASE 1 KANNER HIGHWAY AND SW POMEROY STREET STUART, FLORIDA

UES PROJECT NO. 0630.1600096
UES REPORT NO. 13980

Prepared For:

Mr. Michael DeBock
Market Land Manager
Ryan Homes
2005 Vista Parkway, Suite 102
West Palm Beach, FL 33411

Prepared By:

Universal Engineering Sciences
1818 7th Avenue North, Unit 1
Lake Worth, Florida 33461
(561) 540-6200

APPENDIX A

UNIVERSAL
ENGINEERING SCIENCES

N

UNIVERSAL
ENGINEERING SCIENCES

GEOTECHNICAL EXPLORATION SERVICES
BANYAN BAY - PHASES 1, 2A, 2B, 2C, & 3
STUART, MARTIN COUNTY, FLORIDA

SITE LOCATION MAP

DRAWN BY:	A.G.A.	DATE:	09/27/16	CHECKED BY:	P.G.R.	DATE:	09/27/16
SCALE:	N.T.S.	PROJECT NO:	0630.1600096	REPORT NO:	13980	PAGE NO:	A–1

LEGEND

4 Waveland and Immokalee fine sands

73 Samsula muck, 0 to 1 percent slopes

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ENGINEERING SCIENCES

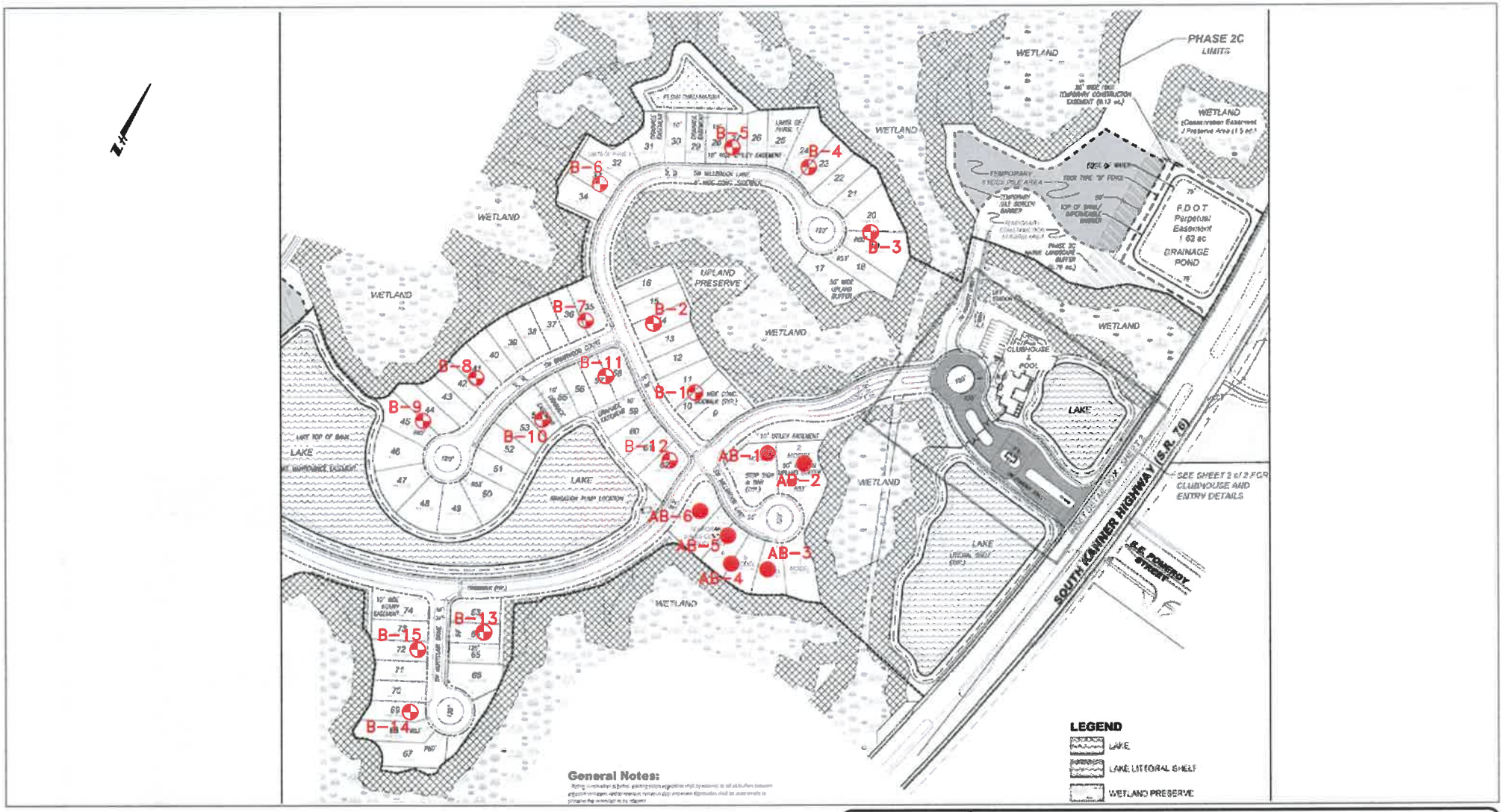
GEOTECHNICAL EXPLORATION SERVICES
BANYAN BAY - PHASES 1, 2A, 2B, 2C, & 3
STUART, MARTIN COUNTY, FLORIDA

SOIL SURVEY MAP

DRAWN BY:	A.G.A.	DATE:	09/27/16	CHECKED BY:	P.G.R.	DATE:	09/27/16
SCALE:	AS SHOWN	PROJECT NO:	0630.1600096	REPORT NO:	13980	PAGE NO:	A-2

APPENDIX B

UNIVERSAL
ENGINEERING SCIENCES



LEGEND

- INDICATES SPT BORING
- INDICATES AUGER BORING

NOTE: ALL SOIL BORING LOCATIONS ARE APPROXIMATE

UNIVERSAL ENGINEERING SCIENCES

GEOTECHNICAL EXPLORATION SERVICES
BANYAN BAY - PHASES 1, 2A, 2B, 2C, & 3
STUART, MARTIN COUNTY, FLORIDA

BORING LOCATION PLAN

DRAWN BY:	A.G.A.	DATE:	09/29/16	CHECKED BY:	P.G.R.	DATE:	09/29/16
SCALE:	NTS	PROJECT NO:	0650.1600096	REPORT NO:	13980	PAGE NO:	B-1

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	0630.1500096
REPORT NO.:	13980
PAGE:	B-2

PROJECT: Banyan Bay - Phases 1, 2A, 2B, 2C, & 3
Kanner Highway and SW Pomeroy Street
Stuart, Florida

BORING DESIGNATION: **B-1** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

CLIENT: Ryan Homes

LOCATION: See Boring Location Plan

REMARKS:

G.S. ELEVATION (ft):
WATER TABLE (ft): 4.0
DATE OF READING: 9/26/16
EST. W.S.W.T. (ft): 3.0

DATE STARTED: 9/26/16
DATE FINISHED: 9/26/16
DRILLED BY: CG/BR
TYPE OF SAMPLING: SPT

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%) (Term)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	K (FT./ DAY)	ORG. CONT. (%)
0												
		4-8-11-11	19			Medium dense, brown to dark brown sand with roots [SP]						
		6-6-9-7	15	▽ ▼		Medium dense, gray to light brown sand with some clayey sand lenses [SP]						
5		8-13-17-17	30			Medium dense, very light gray sand with trace roots [SP]						
		12-14-16-17	30									
10		7-7-5-7	12			Medium dense, light brown sand [SP]						
15		4-4-6-5	10			.....loose Boring terminated @ 15 feet						

BL3

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	0630.1500096
REPORT NO.:	13980
PAGE:	B-3

PROJECT: Banyan Bay - Phases 1, 2A, 2B, 2C, & 3
Kanner Highway and SW Pomeroy Street
Stuart, Florida

CLIENT: Ryan Homes

LOCATION: See Boring Location Plan

REMARKS:

BORING DESIGNATION: **B-2** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

G.S. ELEVATION (ft):
WATER TABLE (ft): 4.5
DATE OF READING: 9/26/16
EST. W.S.W.T. (ft): 3.5

DATE STARTED: 9/26/16
DATE FINISHED: 9/26/16
DRILLED BY: CG/BR
TYPE OF SAMPLING: SPT

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%) (Term)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	K (FT./ DAY)	ORG. CONT. (%)
0												
		4-6-9-8	15			Medium dense to loose, light gray to brown sand with lenses of clayey sand trace roots [SP]						
		3-3-6-8	9	▽ ▼								
5		8-9-11-11	20			Medium dense, very light gray sand trace roots [SP]						
						Very dark brown sand trace roots [SP]						
		12-17-18-17	35			Dense, brown sand with clayey sand [SP]						
10		3-3-4-4	7			Loose, light brown sand with trace clay [SP]						
15		4-5-6-8	11			Medium dense, light brown sand [SP]						
						Boring terminated @ 15 feet						

BL3

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	0630.1500096
REPORT NO.:	13980
PAGE:	B-4

PROJECT: Banyan Bay - Phases 1, 2A, 2B, 2C, & 3
Kanner Highway and SW Pomeroy Street
Stuart, Florida

BORING DESIGNATION: **B-3** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

CLIENT: Ryan Homes

LOCATION: See Boring Location Plan

REMARKS:

G.S. ELEVATION (ft):
WATER TABLE (ft): 4.5
DATE OF READING: 9/26/16
EST. W.S.W.T. (ft): 3.5

DATE STARTED: 9/26/16
DATE FINISHED: 9/26/16
DRILLED BY: CG/BR
TYPE OF SAMPLING: SPT

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%) (Term)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	K (FT./ DAY)	ORG. CONT. (%)
0												
		3-8-10-11	21			Medium dense, gray to brown sand with clayey sand lenses and trace roots [SP]						
		11-12-10-10	22	▽ ▼								
5												
		9-9-12-13	21			Medium dense, gray sand with roots [SP]						
		12-13-15-15	28			Medium dense, very light gray sand with trace roots [SP]						
						Very dark brown sand with trace roots [SP]						
		8-5-3-3	8			Loose, brown sand with trace clay [SP]						
10												
		3-4-3-5	7			Loose, light brown sand with trace clayey sand [SP]						
15						Boring terminated @ 15 feet						

BL3

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	0630.1500096
REPORT NO.:	13980
PAGE:	B-5

PROJECT: Banyan Bay - Phases 1, 2A, 2B, 2C, & 3
Kanner Highway and SW Pomeroy Street
Stuart, Florida

CLIENT: Ryan Homes

LOCATION: See Boring Location Plan

REMARKS:

BORING DESIGNATION: **B-4** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

G.S. ELEVATION (ft):
WATER TABLE (ft): 5.7
DATE OF READING: 9/26/16
EST. W.S.W.T. (ft): 4.7

DATE STARTED: 9/26/16
DATE FINISHED: 9/26/16
DRILLED BY: CG/BR
TYPE OF SAMPLING: SPT

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%) (Term)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	K (FT./ DAY)	ORG. CONT. (%)
0												
		3-4-7-8	11			Medium dense, gray to brown sand with lenses of clayey sand [SP]						
		8-7-7-9	14	▽								
5												
		6-6-7-7	13	▼								
		5-9-12-12	21			Medium dense, dark gray to gray sand with trace roots [SP]						
		7-13-8-6	21			Medium dense, very dark brown sand with weakly cemented sand and trace roots [SP]						
10						Brown clayey sand [SC]						
		5-6-9-7	15			Medium dense, gray sand with trace clay [SP]						
15						Boring terminated @ 15 feet						

BL3

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	0630.1500096
REPORT NO.:	13980
PAGE:	B-6

PROJECT: Banyan Bay - Phases 1, 2A, 2B, 2C, & 3
Kanner Highway and SW Pomeroy Street
Stuart, Florida

BORING DESIGNATION: **B-5** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

CLIENT: Ryan Homes
LOCATION: See Boring Location Plan
REMARKS:

G.S. ELEVATION (ft):
WATER TABLE (ft): 5.1
DATE OF READING: 9/26/16
EST. W.S.W.T. (ft): 4.1

DATE STARTED: 9/26/16
DATE FINISHED: 9/26/16
DRILLED BY: CG/BR
TYPE OF SAMPLING: SPT

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%) (Term)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	K (FT./ DAY)	ORG. CONT. (%)
0						Brown sand with clayey sand trace roots [SP]						
		2-5-6-8	11			Medium dense, light tan sand [SP]						
		5-5-5-3	10	▽		Loose, light tan sand with clayey sand lenses [SP]						
5				▼								
		3-3-7-8	10			Loose, gray to light gray sand with trace roots [SP]						
						Very light gray sand with trace roots [SP]						
		9-10-12-9	22			Medium dense, dark brown weakly cemented sand trace roots [SP]						
10		10-12-12-10	24			Medium dense, dark brown weakly cemented sand with trace roots [SP]						
15		3-4-4-6	8			Loose, light grayish brown sand with trace clay [SP]						
						Boring terminated @ 15 feet						

BL3

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	0630.1500096
REPORT NO.:	13980
PAGE:	B-7

PROJECT: Banyan Bay - Phases 1, 2A, 2B, 2C, & 3
Kanner Highway and SW Pomeroy Street
Stuart, Florida

CLIENT: Ryan Homes

LOCATION: See Boring Location Plan

REMARKS:

BORING DESIGNATION: **B-6** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

G.S. ELEVATION (ft):
WATER TABLE (ft): 5.5
DATE OF READING: 9/26/16
EST. W.S.W.T. (ft): 4.5

DATE STARTED: 9/26/16
DATE FINISHED: 9/26/16
DRILLED BY: CG/BR
TYPE OF SAMPLING: SPT

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%) (Term)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	K (FT./ DAY)	ORG. CONT. (%)
0												
		2-4-7-9	11			Medium dense, brown sand with some clayey sand lenses [SP]						
		9-8-7-6	15	▽		Medium dense, very light gray sand [SP]						
5												
		3-5-7-9	12	▼		Medium dense, brown to light gray sand with clayey sand [SP]						
		10-11-12-12	23			Medium dense, very light gray sand with trace roots [SP]						
10		7-9-12-10	21			Medium dense, dark brown to brown sand with silt, weakly cemented sand, trace roots [SP-SM]	9	21				
						Brown silty sand [SM]						
15		5-5-10-8	15			Medium dense, brown clayey sand [SC]						
						Boring terminated @ 15 feet						

BL3

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	0630.1500096
REPORT NO.:	13980
PAGE:	B-8

PROJECT: Banyan Bay - Phases 1, 2A, 2B, 2C, & 3
Kanner Highway and SW Pomeroy Street
Stuart, Florida

BORING DESIGNATION: **B-7** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

CLIENT: Ryan Homes
LOCATION: See Boring Location Plan
REMARKS:

G.S. ELEVATION (ft):
WATER TABLE (ft): 4.7
DATE OF READING: 9/26/16
EST. W.S.W.T. (ft): 3.7

DATE STARTED: 9/26/16
DATE FINISHED: 9/26/16
DRILLED BY: CG/BR
TYPE OF SAMPLING: SPT

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%) (Term)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	K (FT./ DAY)	ORG. CONT. (%)
0		1-8-12-11	20			Medium dense, brown clayey sand [SC]						
		11-12-14-9	26	▽ ▼		Medium dense, gray to brown sand with clayey sand lenses and trace roots [SP]						
5		6-8-10-14	18									
		10-15-15-17	30			Medium dense, very light gray sand with trace roots [SP]						
10		8-14-12-13	26			Medium dense, very dark brown weakly cemented sand trace roots [SP]						
						Light gray clayey sand [SC]						
15		4-5-5-4	10			Loose, gray sand [SP]						
						Boring terminated @ 15 feet						

BL3

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	0630.1500096
REPORT NO.:	13980
PAGE:	B-9

PROJECT: Banyan Bay - Phases 1, 2A, 2B, 2C, & 3
Kanner Highway and SW Pomeroy Street
Stuart, Florida

CLIENT: Ryan Homes

LOCATION: See Boring Location Plan

REMARKS:

BORING DESIGNATION: **B-8** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

G.S. ELEVATION (ft):
WATER TABLE (ft): 4.0
DATE OF READING: 9/27/16
EST. W.S.W.T. (ft): 3.0

DATE STARTED: 9/27/16
DATE FINISHED: 9/27/16
DRILLED BY: CG/BR
TYPE OF SAMPLING: SPT

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%) (Term)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	K (FT./ DAY)	ORG. CONT. (%)
0												
		4-5-8-12	13	▽		Medium dense, brown clayey sand [SC]						
		8-13-15-15	28	▼								
5												
		12-15-18-18	33			Dense, gray to light gray sand with trace roots [SP]						
		10-10-15-17	25			.....medium dense						
10		10-8-9-14	17			Medium dense, dark brown weakly cemented sand with trace roots [SP]						
15		5-7-10-8	17			Medium dense, light grayish brown silty sand [SM]						
						Boring terminated @ 15 feet						

BL3

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	0630.1500096
REPORT NO.:	13980
PAGE:	B-10

PROJECT: Banyan Bay - Phases 1, 2A, 2B, 2C, & 3
Kanner Highway and SW Pomeroy Street
Stuart, Florida

BORING DESIGNATION: **B-9** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

CLIENT: Ryan Homes

LOCATION: See Boring Location Plan

REMARKS:

G.S. ELEVATION (ft):
WATER TABLE (ft): 3.9
DATE OF READING: 9/27/16
EST. W.S.W.T. (ft): 3.0

DATE STARTED: 9/27/16
DATE FINISHED: 9/27/16
DRILLED BY: CG/BR
TYPE OF SAMPLING: SPT

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%) (Term)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	K (FT./ DAY)	ORG. CONT. (%)
0												
		4-9-10-12	19			Medium dense, brown clayey sand with trace roots [SC]						
		9-12-13-12	25	▼								
5												
		13-13-17-18	30			Medium dense, gray to light gray sand with trace roots [SP]						
		12-15-16-15	31			Dense, light gray sand [SP]						
						Dark brown weakly cemented sand trace roots [SP]						
10		8-6-6-8	12			Medium dense, brown clayey sand [SC]						
15		6-5-7-7	12			Boring terminated @ 15 feet						

BL3

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	0630.1500096
REPORT NO.:	13980
PAGE:	B-11

PROJECT: Banyan Bay - Phases 1, 2A, 2B, 2C, & 3
Kanner Highway and SW Pomeroy Street
Stuart, Florida

CLIENT: Ryan Homes

LOCATION: See Boring Location Plan

REMARKS:

BORING DESIGNATION: **B-10** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

G.S. ELEVATION (ft):
WATER TABLE (ft): 4.0
DATE OF READING: 9/27/16
EST. W.S.W.T. (ft): 3.0

DATE STARTED: 9/27/16
DATE FINISHED: 9/27/16
DRILLED BY: CG/BR
TYPE OF SAMPLING: SPT

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%) (Term)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	K (FT./ DAY)	ORG. CONT. (%)
0												
		5-7-8-8	15	▽		Medium dense, brown clayey sand [SP]						
		5-4-8-12	12	▼								
5						Medium dense, very light gray sand trace roots [SP]						
		12-11-12-15	23									
		10-20-20-17	40			Dense, dark brown weakly cemented sand with trace roots [SP]						
		3-3-4-4	7			Loose, brown clayey sand with roots [SC]						
10												
		4-6-7-7	13			Medium dense, light brown sand [SP]						
15						Boring terminated @ 15 feet						

BL3

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	0630.1500096
REPORT NO.:	13980
PAGE:	B-12

PROJECT: Banyan Bay - Phases 1, 2A, 2B, 2C, & 3
Kanner Highway and SW Pomeroy Street
Stuart, Florida

BORING DESIGNATION: **B-11** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

CLIENT: Ryan Homes

LOCATION: See Boring Location Plan

REMARKS:

G.S. ELEVATION (ft):
WATER TABLE (ft): 3.1
DATE OF READING: 9/27/16
EST. W.S.W.T. (ft): 2.0

DATE STARTED: 9/27/16
DATE FINISHED: 9/27/16
DRILLED BY: CG/BR
TYPE OF SAMPLING: SPT

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%) (Term)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	K (FT./ DAY)	ORG. CONT. (%)
0		2-3-3-4	6	▽		Loose, very light gray to brown sand with trace roots [SP]						
		3-4-5-8	9	▼								
5		8-11-15-18	26			Medium dense, gray sand with roots [SP]						
		10-15-17-17	32			Dense, very light gray sand with trace roots [SP]						
		3-4-4-5	8			Loose, brown clayey sand with roots [SC]	30	20				
10												
		3-3-4-7	7			Loose, light gray sand with trace clay [SP]						
15						Boring terminated @ 15 feet						

BL3

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	0630.1500096
REPORT NO.:	13980
PAGE:	B-13

PROJECT: Banyan Bay - Phases 1, 2A, 2B, 2C, & 3
Kanner Highway and SW Pomeroy Street
Stuart, Florida

CLIENT: Ryan Homes

LOCATION: See Boring Location Plan

REMARKS:

BORING DESIGNATION: **B-12** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

G.S. ELEVATION (ft):
WATER TABLE (ft): 4.5
DATE OF READING: 9/27/16
EST. W.S.W.T. (ft): 3.5

DATE STARTED: 9/27/16
DATE FINISHED: 9/27/16
DRILLED BY: CG/BR
TYPE OF SAMPLING: SPT

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%) (Term)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	K (FT./ DAY)	ORG. CONT. (%)
0												
		4-6-10-12	16			Medium dense, brown to light brown clayey sand [SP]						
		6-10-12-10	22	▽		Medium dense, light brown to gray sand and clayey sand lenses [SP]						
				▼								
5		6-10-12-17	22			Medium dense, gray to light gray sand with trace roots [SP]						
		10-12-15-15	27			Medium dense, very light gray sand trace roots [SP]						
		7-12-10-10	22			Medium dense, dark brown weakly cemented sand with trace roots [SP]						
10												
		3-4-6-8	10			Loose, grayish brown clayey sand [SC]						
15						Boring terminated @ 15 feet						

BL3

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	0630.1500096
REPORT NO.:	13980
PAGE:	B-14

PROJECT: Banyan Bay - Phases 1, 2A, 2B, 2C, & 3
Kanner Highway and SW Pomeroy Street
Stuart, Florida

BORING DESIGNATION: **B-13** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

CLIENT: Ryan Homes

LOCATION: See Boring Location Plan

REMARKS:

G.S. ELEVATION (ft):
WATER TABLE (ft): 3.3
DATE OF READING: 9/27/16
EST. W.S.W.T. (ft): 2.3

DATE STARTED: 9/27/16
DATE FINISHED: 9/27/16
DRILLED BY: CG/BR
TYPE OF SAMPLING: SPT

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%) (Term)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	K (FT./ DAY)	ORG. CONT. (%)
0		6-8-7-6	15	▽		Medium dense, light brown to brown sand with silt [SP-SM]	11	8				
		3-3-6-10	9	▼		Loose, gray to light gray sand with trace roots [SP]						
5		9-10-12-12	22			Medium dense, very light gray sand with trace roots [SP]						
		7-6-6-8	12			Medium dense, dark brown weakly cemented sand with trace roots [SP]						
		3-3-4-6	7			Loose, light gray silty sand [SM]						
10												
		4-5-7-7	12			Medium dense, light grayish brown silty sand [SM]						
15						Boring terminated @ 15 feet						

BL3

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	0630.1500096
REPORT NO.:	13980
PAGE:	B-15

PROJECT: Banyan Bay - Phases 1, 2A, 2B, 2C, & 3
Kanner Highway and SW Pomeroy Street
Stuart, Florida

CLIENT: Ryan Homes

LOCATION: See Boring Location Plan

REMARKS:

BORING DESIGNATION: **B-14** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

G.S. ELEVATION (ft):
WATER TABLE (ft): 4.3
DATE OF READING: 9/28/16
EST. W.S.W.T. (ft): 3.3

DATE STARTED: 9/28/16
DATE FINISHED: 9/28/16
DRILLED BY: CG/BR
TYPE OF SAMPLING: SPT

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%) (Term)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	K (FT./ DAY)	ORG. CONT. (%)
0												
		3-5-8-6	13			Medium dense, brown to dark brown sand and clayey sand [SP]						
		3-3-5-5	8	▽ / ▼		.....loose						
5		6-12-16-17	28			Medium dense, gray to light gray sand with trace roots [SP]						
		10-14-17-17	31			Dense, very light gray sand with trace roots [SP]						
10		11-12-13-11	25			Medium dense, dark brown weakly cemented sand trace roots [SP]						
						Gray clayey sand [SC]						
15		4-4-4-5	8			Loose, gray sand with trace clay [SP]						
						Boring terminated @ 15 feet						

BL3

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	0630.1500096
REPORT NO.:	13980
PAGE:	B-16

PROJECT: Banyan Bay - Phases 1, 2A, 2B, 2C, & 3
Kanner Highway and SW Pomeroy Street
Stuart, Florida

BORING DESIGNATION: **B-15** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

CLIENT: Ryan Homes

LOCATION: See Boring Location Plan

REMARKS:

G.S. ELEVATION (ft):
WATER TABLE (ft): 3.5
DATE OF READING: 9/28/16
EST. W.S.W.T. (ft): 2.5

DATE STARTED: 9/28/16
DATE FINISHED: 9/28/16
DRILLED BY: CG/BR
TYPE OF SAMPLING: SPT

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%) (Term)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	K (FT./ DAY)	ORG. CONT. (%)
0												
		3-4-7-7	11	▽		Medium dense, dark brown sand with trace clayey sand lenses [SP]						
		5-4-5-9	9	▼		Loose, brown clayey sand [SC]						
5		12-14-17-21	31			Dense, light gray sand with trace roots [SP]						
		8-17-17-17	34			Dense, dark brown weakly cemented sand with trace roots [SP]						
10		3-3-6-7	9									
						Loose, gray clayey sand [SC]						
15		4-4-4-5	8			Boring terminated @ 15 feet						

BL3

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	0630.1500096
REPORT NO.:	13980
PAGE:	B-17

PROJECT: Banyan Bay - Phases 1, 2A, 2B, 2C, & 3
Kanner Highway and SW Pomeroy Street
Stuart, Florida

CLIENT: Ryan Homes

LOCATION: See Boring Location Plan

REMARKS:

BORING DESIGNATION: **AB-1** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

G.S. ELEVATION (ft):
WATER TABLE (ft): 4.7
DATE OF READING: 9/28/16
EST. W.S.W.T. (ft): 3.7

DATE STARTED: 9/28/16
DATE FINISHED: 9/28/16
DRILLED BY: CG/BR
TYPE OF SAMPLING: AUGER

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%) (Term)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	K (FT./ DAY)	ORG. CONT. (%)
0						Gray to dark brown sand with trace roots [SP]						
				▽		Very light gray sand [SP]						
5				▼		Brown clayey sand [SC]						
						Gray silty sand trace clay [SM]						
10												
15						Boring terminated @ 15 feet						

BL3

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	0630.1500096
REPORT NO.:	13980
PAGE:	B-18

PROJECT: Banyan Bay - Phases 1, 2A, 2B, 2C, & 3
Kanner Highway and SW Pomeroy Street
Stuart, Florida

BORING DESIGNATION: **AB-2** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

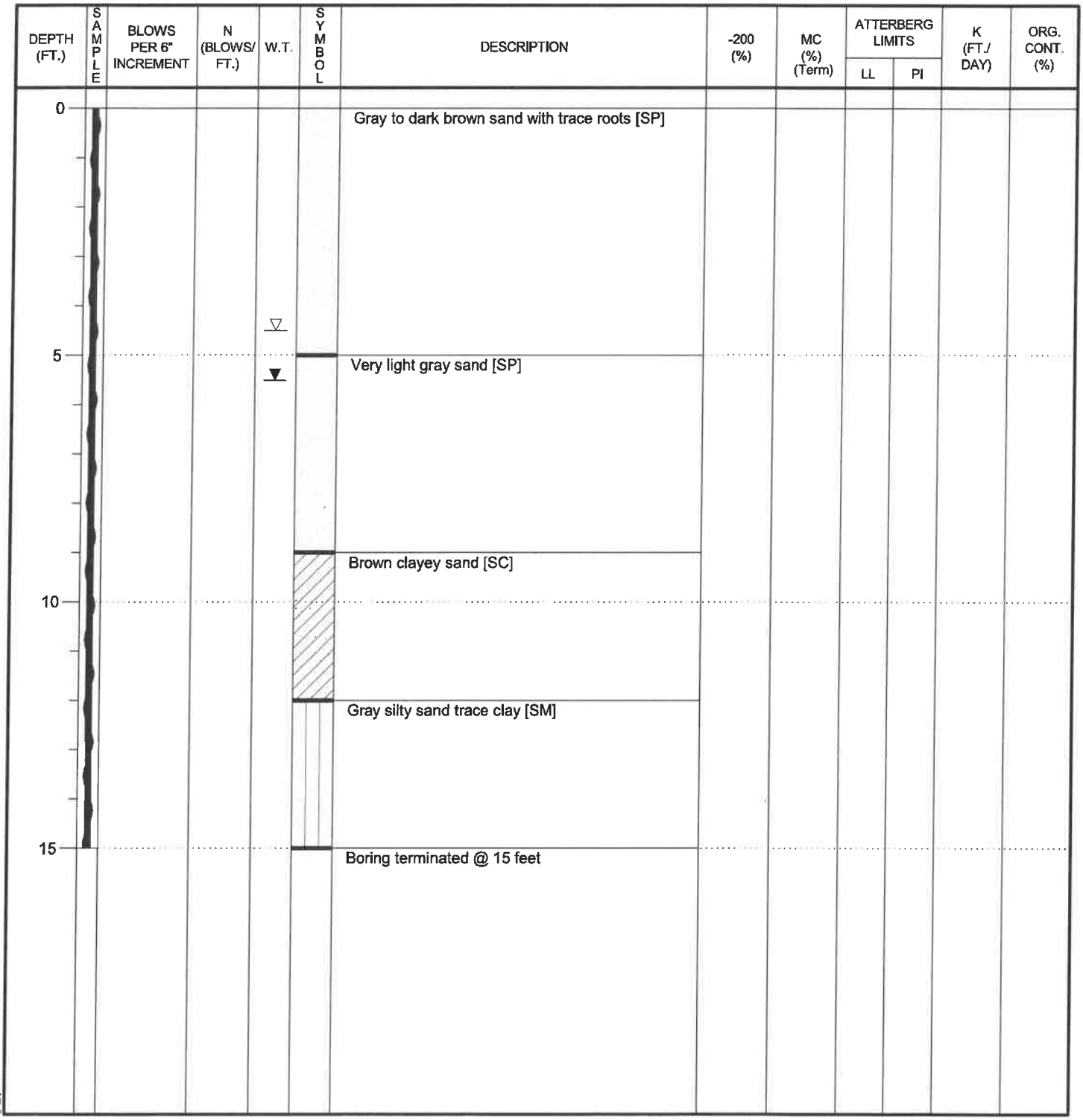
CLIENT: Ryan Homes

LOCATION: See Boring Location Plan

REMARKS:

G.S. ELEVATION (ft):
WATER TABLE (ft): 5.5
DATE OF READING: 9/28/16
EST. W.S.W.T. (ft): 4.5

DATE STARTED: 9/28/16
DATE FINISHED: 9/28/16
DRILLED BY: CG/BR
TYPE OF SAMPLING: AUGER



BL3

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	0630.1500096
REPORT NO.:	13980
PAGE:	B-19

PROJECT: Banyan Bay - Phases 1, 2A, 2B, 2C, & 3
Kanner Highway and SW Pomeroy Street
Stuart, Florida

CLIENT: Ryan Homes

LOCATION: See Boring Location Plan

REMARKS:

BORING DESIGNATION: **AB-3** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

G.S. ELEVATION (ft):
WATER TABLE (ft): 4.4
DATE OF READING: 9/28/16
EST. W.S.W.T. (ft): 3.4

DATE STARTED: 9/28/16
DATE FINISHED: 9/28/16
DRILLED BY: CG/BR
TYPE OF SAMPLING: AUGER

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%) (Term)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	K (FT./ DAY)	ORG. CONT. (%)
0						Brown to gray sand with clayey sand and trace roots [SP]						
				▽		Gray to very light gray sand with trace roots [SP]						
5				▼		Dark brown weakly cemented sand with trace roots [SP]						
						Gray clayey sand [SC]						
10												
15						Boring terminated @ 15 feet						

BL3

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	0630.1500096
REPORT NO.:	13980
PAGE:	B-20

PROJECT: Banyan Bay - Phases 1, 2A, 2B, 2C, & 3
Kanner Highway and SW Pomeroy Street
Stuart, Florida

BORING DESIGNATION: **AB-4** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

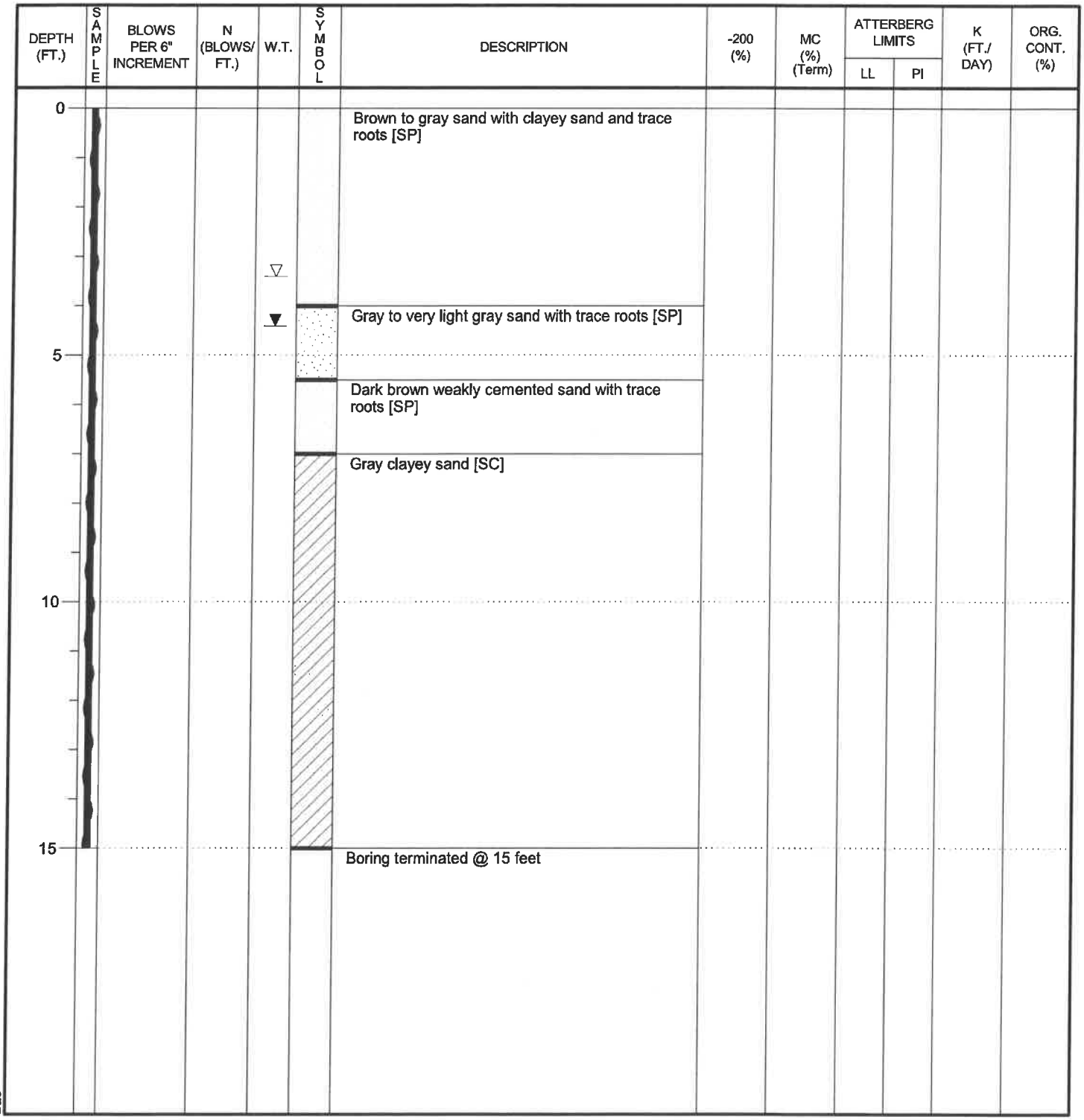
CLIENT: Ryan Homes

LOCATION: See Boring Location Plan

REMARKS:

G.S. ELEVATION (ft):
WATER TABLE (ft): 4.4
DATE OF READING: 9/28/16
EST. W.S.W.T. (ft): 3.4

DATE STARTED: 9/28/16
DATE FINISHED: 9/28/16
DRILLED BY: CG/BR
TYPE OF SAMPLING: AUGER



BL3

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	0630.1500096
REPORT NO.:	13980
PAGE:	B-21

PROJECT: Banyan Bay - Phases 1, 2A, 2B, 2C, & 3
Kanner Highway and SW Pomeroy Street
Stuart, Florida

CLIENT: Ryan Homes

LOCATION: See Boring Location Plan

REMARKS:

BORING DESIGNATION: **AB-5** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

G.S. ELEVATION (ft):
WATER TABLE (ft): 4.2
DATE OF READING: 9/28/16
EST. W.S.W.T. (ft): 3.2

DATE STARTED: 9/28/16
DATE FINISHED: 9/28/16
DRILLED BY: CG/BR
TYPE OF SAMPLING: AUGER

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%) (Term)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	K (FT./ DAY)	ORG. CONT. (%)
0				▽		Gray to brown sand with clayey sand lenses [SP]						
				▼								
5						Gray to very light gray sand with trace roots [SP]						
						Dark brown weakly cemented sand with trace roots [SP]						
						Gray clayey sand [SC]						
10												
15						Boring terminated @ 15 feet						

BL3

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	0630.1500096
REPORT NO.:	13980
PAGE:	B-22

PROJECT: Banyan Bay - Phases 1, 2A, 2B, 2C, & 3
Kanner Highway and SW Pomeroy Street
Stuart, Florida

BORING DESIGNATION: **AB-6** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

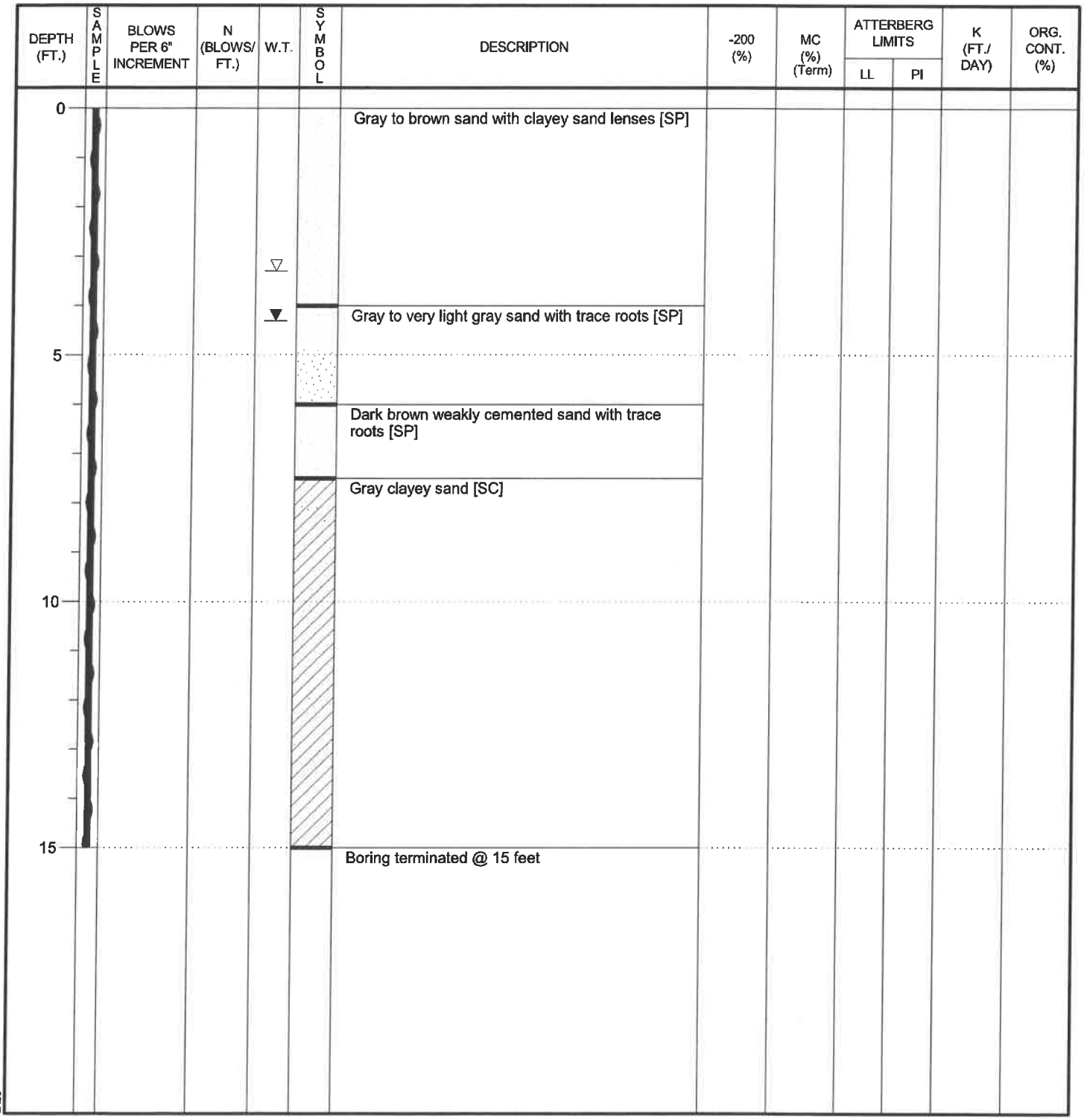
CLIENT: Ryan Homes

LOCATION: See Boring Location Plan

REMARKS:

G.S. ELEVATION (ft):
WATER TABLE (ft): 4.3
DATE OF READING: 9/28/16
EST. W.S.W.T. (ft): 3.3

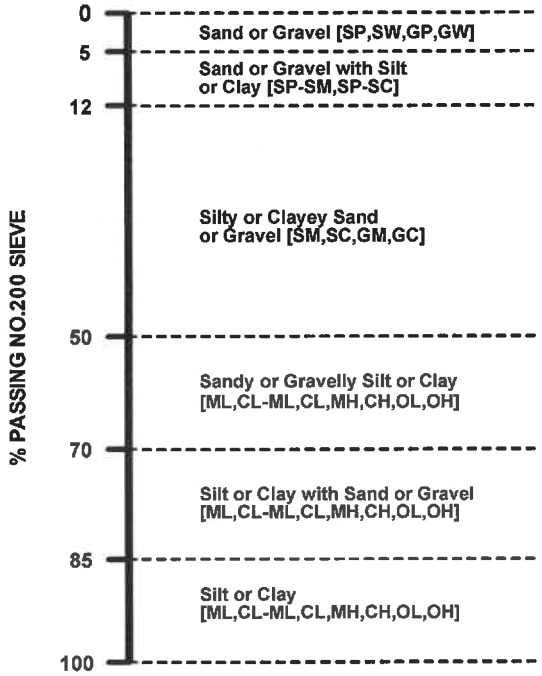
DATE STARTED: 9/28/16
DATE FINISHED: 9/28/16
DRILLED BY: CG/BR
TYPE OF SAMPLING: AUGER



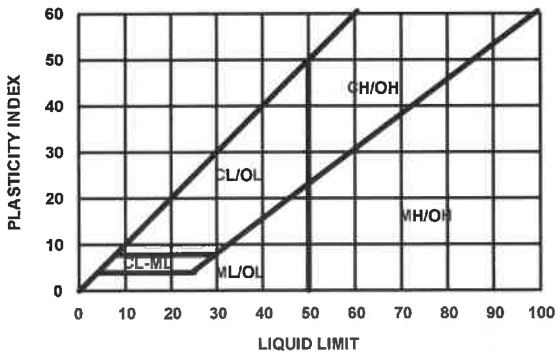
BL3

KEY TO BORING LOGS

SOIL CLASSIFICATION CHART*



UNIVERSAL ENGINEERING SCIENCES, INC.



PLASTICITY CHART

GROUP NAME AND SYMBOL

COARSE GRAINED SOILS

- WELL-GRADED SANDS [SW]
- POORLY-GRADED SANDS [SP]
- POORLY-GRADED SANDS WITH SILT [SP-SM]
- POORLY-GRADED SANDS WITH CLAY [SP-SC]
- SILTY SANDS [SM]
- CLAYEY SANDS [SC]
- SILTY CLAYEY SANDS [SC-SM]
- WELL-GRADED GRAVELS [GW]
- POORLY-GRADED GRAVELS [GP]
- POORLY-GRADED GRAVELS WITH SILT [GP-GM]
- POORLY-GRADED GRAVELS WITH CLAY [GP-GC]
- SILTY GRAVELS [GM]
- CLAYEY GRAVELS [GC]

FINE GRAINED SOILS

- INORGANIC SILTS SLIGHT PLASTICITY [ML]
- INORGANIC SILTY CLAY LOW PLASTICITY [CL-ML]
- INORGANIC CLAYS LOW TO MEDIUM PLASTICITY [CL]
- INORGANIC SILTS HIGH PLASTICITY [MH]
- INORGANIC CLAYS HIGH PLASTICITY [CH]

HIGHLY ORGANIC SOILS

- ORGANIC SILTS/CLAYS LOW PLASTICITY [OL]**
- ORGANIC SILTS/CLAYS MEDIUM TO HIGH PLASTICITY [OH]**
- PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS [PT]**

RELATIVE DENSITY

(SAND AND GRAVEL)

VERY LOOSE - 0 to 4 Blows/ft.
LOOSE - 5 to 10 Blows/ft.
MEDIUM DENSE - 11 to 30 Blows/ft.
DENSE - 31 to 50 Blows/ft.
VERY DENSE - more than 50 Blows/ft.

CONSISTENCY

(SILT AND CLAY)

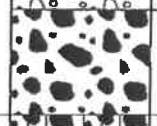
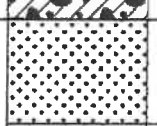
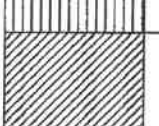
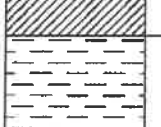
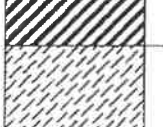
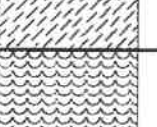
VERY SOFT - 0 to 2 Blows/ft.
SOFT - 3 to 4 Blows/ft.
FIRM - 5 to 8 Blows/ft.
STIFF - 9 to 16 Blows/ft.
VERY STIFF - 17 to 30 Blows/ft.
HARD - more than 30 Blows/ft.

* IN ACCORDANCE WITH ASTM D 2487 - UNIFIED SOIL CLASSIFICATION SYSTEM.

** LOCALLY MAY BE KNOWN AS MUCK.

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

USCS LEGEND 10/02/07

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

APPENDIX C

UNIVERSAL
ENGINEERING SCIENCES

Important Information about Your

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 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 your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you —* should apply the 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.

A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of 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 light industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- 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 study was performed. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the 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 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 construction recommendations included in your report. *Those 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 recommendations if that engineer does not perform construction observation.*

A Geotechnical Engineering Report Is Subject to Misinterpretation

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower 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. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing 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 Contractors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise contractors 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 contractors have sufficient time* to perform additional study. Only then might you be in a position to give contractors 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 contractors do not 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.

Geoenvironmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform a *geoenvironmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental 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 geoenvironmental 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, a number of 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 ASFE-Member Geotechnical Engineer for Additional Assistance

Membership in ASFE/The Best People on Earth exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with your ASFE-member geotechnical engineer for more information.

ASFE THE GEOPROFESSIONAL BUSINESS ASSOCIATION

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IIGER03135.0MRP

CONSTRAINTS AND RESTRICTIONS

WARRANTY

UES 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 UES of such changed conditions. Further, we recommend that all foundation work and site improvements be observed by a representative of UES 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

UES 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 UES.

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 UES.

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. UES 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 UES to attempt to locate any man-made buried objects during the course of this exploration and that no attempt was made by UES to locate any such buried objects. UES 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.

APPENDIX D

UNIVERSAL
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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

5.1 UES will submit invoices to Client monthly or upon completion of services. Invoices will show charges for different personnel and expense classifications.

5.2 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.

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- Palm Coast, FL
- Panama City, FL
- Pensacola, FL
- Rockledge, FL
- Sarasota, FL
- Tampa, FL
- Tifton, GA
- West Palm Beach, FL

September 30, 2016

Mr. Michael DeBock
Market Land Manager
Ryan Homes
2005 Vista Parkway, Suite 102
West Palm Beach, FL 33411

Reference: Preliminary Geotechnical Engineering Report
Banyan Bay - Phase 1
Kanner Highway and SW Pomeroy Street
Stuart, Martin County, Florida
UES Project No. 0630.1600096
UES Report No. 13980

Dear Mr. DeBock:

Universal Engineering Sciences, Inc. (UES) has completed the additional geotechnical exploration and engineering report at the above referenced site in Stuart, Martin County, Florida. The scope of this exploration was conducted in general accordance with UES Opportunity No. 0630.0816.00007 authorized August 15, 2016. This exploration was performed in accordance with generally accepted soil and foundation engineering practices. No other warranty, expressed or implied, is made.

The following report presents the results of the field exploration, and our interpretation of those results with respect to the proposed development. Preliminary recommendations have been included for site preparation procedures and foundation design parameters, pavement design, groundwater considerations and other concerns as appropriate.

We appreciate the opportunity to work with you on this project and look forward to a continued association. If you have any questions, or when preliminary or final project design plans are available for our recommended review, please contact the undersigned.

Respectfully submitted,
UNIVERSAL ENGINEERING SCIENCES, INC.
Certificate of Authorization No. 549

Allan G. Abubakar, P.E.
Project Engineer

Peter G. Read, P.E.
Regional Manager

Dist: Client (PDF)

TABLE OF CONTENTS

TABLE OF CONTENTS - Continued

APPENDICES

1.0 INTRODUCTION

1.1 GENERAL

This report contains the results of the additional subsurface exploration conducted for Phase 1 of the proposed residential development in Stuart, Martin County, Florida. Please note, this is a preliminary report only, based upon limited exploration to answer specific questions posed by you. This report has not been prepared to meet the needs of design professional, contractors, or any other parties, and the use of this report by them without the guidance of UES may lead to erroneous assumptions, faulty conclusions and other problems. This report includes the following sections:

- SCOPE OF SERVICES - Defines what services were completed
- FINDINGS - Describes what was encountered
- RECOMMENDATIONS - Describes what we encourage you to do
- LIMITATIONS - Describes the restrictions inherent in this report
- SUMMARY - Reviews the material in this report
- APPENDICES - Presents support materials referenced in this report.

1.2 PROJECT DESCRIPTION

We understand that this project will include the construction of residential community consisting of one hundred eighty-five (185) single-family lots, twenty-four (24) twin villas (48 units), three (3), 3-story multifamily buildings (72 units), boat ramp, dock facilities, and site amenities located at Kanner Highway and SW Pomeroy Street in Stuart, Martin County, Florida. A Site Location Map is included as Page A-1 in Appendix A. Our understanding of the proposed construction was based on review of overall site plan provided by Ryan Homes. The site plan showed the property boundary limits, adjacent roadways, and layout of the proposed single-family residential buildings, and driveways.

We anticipate the planned buildings will be comprised of concrete block and wood frame construction. We were provided with a site plan which depicts the layout of the proposed development. We used this information in preparing this exploration.

Specific structural loading information was not available at the time this report was prepared. We have assumed that the column and wall loads will not exceed 100 kips and 5 kips per linear foot, respectively. The proposed site layout is shown on the Boring Location Plan, Page B-1 in Appendix B.

We anticipate the proposed buildings to be supported by either shallow foundations or thickened edge monolithic slabs and that 2 feet of fill will be placed across the existing ground surface to achieve planned subgrade elevations at the site.

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

2.0 SCOPE OF SERVICES

2.1 PURPOSE

The purposes of this preliminary geotechnical exploration were:

- to explore and evaluate the shallow subsurface conditions at the site on a limited basis for conceptual planning and preliminary design; and
- to provide preliminary geotechnical engineering recommendations for groundwater considerations, foundation design, 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. UES would be pleased to perform these services, if you desire.

2.2 FIELD EXPLORATION

The subsurface conditions at the site for the Phase 1 portion was explored with a total of fifteen (15) Standard Penetration Test (SPT) borings designated as B-16 through B-15 drilled to a depth of 15 feet below existing grade and a total of six (6) auger borings designated as AB-1 through AB-6 drilled to a depth of 15 feet below existing grade. The approximate locations of the soil borings are presented in Appendix B. Boring Location Plan.

Our drilling crew located the borings based upon estimated distances and relationships to obvious landmarks. Consider the indicated locations and depths to be approximate.

The SPT borings were advanced to their respective termination depths using the rotary wash method; samples were collected while performing the SPT at regular intervals. We completed the SPT in general accordance with ASTM D-1586 guidelines, with continuous sampling from 0 to 10 feet, and then at 5-foot sampling interval. The SPT test consists of driving a standard split-barrel sampler (split-spoon) into the subsurface using a 140-pound hammer free-falling 30 inches. The number of hammer blows required to drive the sampler 12 inches, after first seating it 6 inches, is designated the penetration resistance, or SPT-N value. This value is used as an index to soil strength and consistency.

Soil samples collected during the SPT were placed in clean sample containers and transported to our laboratory where they were visually classified by a member of our geotechnical engineering staff in accordance with ASTM D-2488. These soil samples will be held in our laboratory for your inspection for 90 days, after which time they will be discarded unless we are otherwise notified.

2.3 LABORATORY TESTING

The soil samples recovered from the soil test borings were returned to the laboratory where a member of our geotechnical staff visually classified them, reviewed the field descriptions, and selected representative samples for laboratory tests.

Tests were performed to aid in classifying the soils and to help evaluate the general engineering characteristics of the site soils. The tests performed included a total of three (3) No. 200 wash analyses, and three (3) moisture content tests. See Appendix B: Boring Logs, Key to Boring Logs, for further data and explanations.

3.0 FINDINGS

3.1 SOIL SURVEY

At the time of exploration, the site was cleared vacant parcel of land. Based on the 1981 Soil Survey for Martin County, Florida, as prepared by the US Department of Agriculture, Natural Resources Conservation Service (NRCS), the predominant soil type at the site are identified as Waveland sand and Samsula muck. The published general description of these soils with depth, range of permeability characteristics, and range of seasonal high groundwater levels, are presented in Table 1 below. The Soil Survey Map for the site is included in Appendix A.

TABLE 1
Summary of NRCS Soil Survey Information

Soil Type	Constituents		Hydrologic Group	Natural Drainage	Soil Permeability (Inches/Hr)		Seasonal High Water Table (Depth in Feet)
Waveland (4)	0 – 18" 18" – 43" 43" – 91" 91" – 99"	Sand Sand, fine sand Sand, fine sand, loamy sand Sand, fine sand, loamy fine sand	B/D	Poorly Drained	0 – 18" 18" – 43" 43" – 91" 91" – 99"	>6.0 >6.0 <0.2 2.0 – 20.0	0 – 1.0
Samsula muck (73)	0" – 34" 34" – 65"	muck Sand, fine sand, loamy sand	A/D	Very Poorly Drained	0" – 34" 34" – 65"	6 – 20 6 – 20	+2 – 1.0

3.2 SUBSURFACE CONDITIONS

The results of our field exploration, together with pertinent information obtained from the SPT borings, such as soil profiles, penetration resistance and groundwater levels are shown on the boring logs included in Appendix B. The Key to Boring Logs is also included in Appendix B. The stratification lines shown on the boring logs represent the approximate boundaries between soil types, and may not depict exact subsurface soil conditions. The actual soil boundaries may be more transitional than depicted. A generalized profile of the soils found at our boring locations is presented in Table 2. The soil profile was prepared from field logs after the recovered soil samples were visually classified by a member of our geotechnical staff.

TABLE 2: GENERAL SOIL PROFILE

Typical Depths Below Grade (feet)	Soil Description
0 – 8	Loose to dense, light gray to brown sand with trace roots, sand with clayey sand lenses, clayey sand [SP, SC]
8 – 15*	Loose to medium dense, light brown to dark brown sand, weakly cemented sand, silty sand, clayey sand [SP, SM, SC]
* Boring Termination depth	

Groundwater was measured at approximately 3 to 5.5 feet below the existing land surface in the test borings. The difference in groundwater levels can most likely be attributed to the difference in ground surface elevations.

4.0 PRELIMINARY RECOMMENDATIONS

4.1 GENERAL

The following preliminary recommendations are made based upon a review of the attached soil test data, our stated understanding of the proposed construction, and experience with similar projects and subsurface conditions. When the grading and site plans are formalized, we recommend you to contact our office to review these items and propose a final geotechnical scope of exploration. Final recommendations regarding the bearing capacity, settlements, and foundation design must be made after completion of a final geotechnical exploration program.

In this section of the report, preliminary recommendations are presented for groundwater considerations, building foundations, pavement design, and site preparation.

4.2 GROUNDWATER CONSIDERATIONS

The groundwater table will fluctuate seasonally depending upon local rainfall. The rainy season in South Florida is normally between May and October. Based upon the test boring data, a reasonable estimate for the seasonal high groundwater table is approximately 2 to 4.5 feet below existing grade. The existing and estimated seasonal high groundwater table at each location appears on the boring logs in Appendix B.

Note that our estimate of seasonal high groundwater level is based on limited data and does not provide any assurance that groundwater levels will not exceed the estimated level during any given year in the future. If the rainfall intensity and duration or total rainfall quantities exceed those normally anticipated, then groundwater levels will likely exceed the seasonal high estimate.

The estimate of seasonal high groundwater level is made for the site at the present time. Future development of adjoining or nearby properties and development on a regional scale may affect the local seasonal high groundwater table. Universal makes no warranty on the estimate of the seasonal high groundwater table.

UES recommends that all foundation and pavement design incorporate assumption of the seasonal high groundwater condition. We recommend that positive drainage be established and maintained on the site during construction. UES further recommends that permanent measures be implemented to maintain positive drainage throughout the life of the project.

4.3 BUILDING FOUNDATIONS

4.3.1 SHALLOW FOUNDATIONS

After successful completion of the site preparation procedures, The anticipated buildings will most likely be able to be supported on shallow foundations or thickened edge monolithic slab to exert a maximum allowable net soil bearing pressure of 2,500 pounds per square foot (psf). Net bearing pressure is defined as the soil bearing pressure at the foundation bearing level in excess of the natural overburden pressure at that level.

Shallow foundations should be embedded at least 18 inches below lowest adjacent grade (finished surrounding grade, for example). Further, maintain minimum foundation widths of 18 and 24 inches for strip and square footings, respectively, even though the maximum allowable soil bearing pressure may not be developed in all cases. We estimate the foundations will have a minimum factor of safety of two against bearing capacity failure.

Post-construction settlements of the structure will be influenced by several interrelated factors, including: (1) strength and compressibility characteristics of the subsurface; (2) footing size, bearing level, applied loads, and resulting bearing pressures beneath the foundations; and (3) site preparation and earthwork construction techniques used by the contractor. Our settlement estimates for the structure are based on the use of site preparation/earthwork construction techniques as recommended above and in Section 4.5 of this report. Any deviation from these recommendations could result in an increase in the estimated post-construction settlements of the structure.

Assuming all soils are properly prepared and using the recommended maximum bearing pressure, maximum structural loads and the field data (which were correlated to geotechnical strength and compressibility characteristics of the subsurface soils), we estimate that total post construction settlements of the structure will be 1 inch or less.

Differential settlements result from differences in applied bearing pressures and variations in the compressibility characteristics of the subsurface soils. If the recommended site preparation and earthwork construction techniques outlined above and in Section 4.5 are followed, differential settlements of ½ inch or less should be anticipated.

4.3.2 STANDARD FLOOR SLAB

For floor slabs, we recommend using a standard concrete slab-on-grade, reinforced with welded wire mesh to control cracking. Normal weight concrete having a 28-day compressive strength (f'c) of at least 3,000 pounds per square inch (psi) should be used. A modulus of subgrade reaction of 150 pounds per cubic inch (pci) can be used for design, assuming the slab is supported on compacted structural fill or compacted existing subgrade soils and should be structurally isolated from other foundation elements or adequately reinforced to prevent distress due to differential movements.

4.3.3 FLOOR SLAB MOISTURE CONTROL

The Florida Building Code requires the use of a vapor barrier beneath the floor slab to control moisture. We recommend using a minimum 10-mil, rolled plastic (Visqueen) vapor barrier between the bottom of the floor slab and the top of the subgrade. This will help to minimize floor dampness and moisture intrusion into the structure through the slab. Care should be exercised during construction to prevent tearing or punching of the vapor barrier prior to slab placement. Any tears must be repaired immediately.

4.4 PAVEMENTS

4.4.1 GENERAL

UES recommends using a flexible pavement section on this project in areas where light autos, pickup trucks and smaller delivery vehicles will travel. Flexible pavements combine the strength and durability of several layer components to produce an appropriate and cost-effective combination of available materials.

4.4.2 FLEXIBLE PAVEMENTS

For preliminary pavement designs, we recommend that a three-layer pavement section consisting of stabilized subgrade, base course, and surface course, placed on top of existing subgrade or a compacted structural fill be used. Because traffic loadings are commonly unavailable, we have generalized our pavement design into groups. The group descriptions and the recommended component thicknesses are presented in Table 3: Pavement Component Recommendations. The structural numbers in Table 3 are based on a structural number analysis with the stated estimated daily traffic volume for a 15-year placement design life. For loading conditions greater than those presented in Table 3, a pavement design should be made for the projected traffic data.

TABLE 3: PAVEMENT COMPONENT RECOMMENDATIONS

Traffic Group	Structural Number	Component Thickness (inches)		
		Stabilized Subgrade	Limerock Base	Asphalt Course
Parking lots - light duty	2.6	10	6	1.5

Parking lots - light duty: Auto parking areas; over eighty cars; light panel and pickup trucks; and suitable for the internal roadways for this project.

4.4.3 STABILIZED SUBGRADE

We recommend that subgrade materials be compacted in place according to the requirements in the "Site Preparation" section of this report. The stabilized subgrade should be compacted to at least 98 percent of the modified Proctor maximum dry density [American Association of State Highway and Transportation Officials (AASHTO)T-180].

The stabilized subgrade can be imported material or a blend of on-site soils and imported materials. If a blend is proposed, we recommend that the contractor perform a mix design to find the optimum mix proportions.

4.4.4 BASE COURSE

UES recommends the base course be either limerock or crushed concrete. Limerock or crushed concrete should have a minimum LBR of 100 percent. Place limerock in maximum 6-inch lifts and compact each lift to a minimum density of 98 percent of the modified Proctor maximum dry density (AASHTO T-180). The base course can also be a crushed concrete material supplied by an FDOT approved plant with quality control procedures and should have an average LBR value of not less than 100. The gradation for crushed concrete should meet the current requirements for graded aggregate base per Section 204, FDOT "Standard Specifications for Roadway and Bridge Construction" (SSRBC). Perform compliance testing for either limerock or crushed concrete at a frequency of one test per 10,000 square feet, or at a minimum of two test locations, whichever is greater.

4.4.5 SURFACE COURSE

In light duty areas where there is occasional truck traffic, but primarily passenger cars, we recommend using an asphaltic concrete, FDOT Type S-III or equivalent, which has a stability of 1,200 pounds. The asphaltic concrete course can be applied in a two, 1-inch lifts.

Asphaltic concrete mixes should be a current FDOT approved design for the materials actually used. Samples of the materials delivered to the project should be tested to verify that the aggregate gradation and asphalt content satisfies the mix design requirements. Compact the asphalt to a minimum of 95 percent of the Marshall design density. After placement and field compaction, core the wearing surface to evaluate material thickness and to perform laboratory densities. Obtain cores at frequencies of at least one core per 3,000 square feet of placed pavement or a minimum of two cores per day's production.

For extended life expectancy of the surface course in parking lots, we recommend applying a coal tar emulsion sealer at least six months after placement of the surface course. The seal coat will help to patch cracks and voids, and protect the surface from damaging ultraviolet light and automobile liquid spillage. Please note that applying the seal coat prior to six months after placement may hinder the "curing" of the surface course, leading to its early deterioration.

4.4.6 EFFECTS OF GROUNDWATER

Adequate separation between the pavement subgrade and the seasonal high groundwater level is critical for long-term pavement performance. Many roadways and parking areas have been destroyed as a result of deterioration of the base and the base/surface course bond. Regardless of the type of pavement base selected, we recommend that the control water level and the bottom of base rock be separated by at least 18 inches.

4.5 SITE PREPARATION

We recommend normal, good practice site preparation procedures for the building and pavement areas. These procedures include: stripping the site of vegetation, topsoil, and deleterious material, proof-rolling, and proof-compacting the subgrade, and filling to grade with engineered fill. A general outline of the anticipated earthwork is as follows:

1. If required, perform remedial dewatering prior to any earthwork operations.

2. Prior to construction, remnants of previous development, including foundations, pavements and underground utility lines within the construction area should be located and removed if required. Provisions should be made to relocate interfering utilities. Note that if underground pipes are not properly removed or plugged, they may serve as conduits for subsurface erosion which may lead to excessive settlement of overlying structures.

3. Strip the proposed construction limits of vegetation, topsoil, organics, and deleterious materials within and 5 feet beyond the perimeter of the proposed building and pavement areas.

4. The site should be graded to direct surface water runoff away from the construction areas. Positive drainage must be maintained throughout the design life of the project.

5. After clearing and stripping of the site is completed, the prepared subgrade soils outside the building areas should be observed by a qualified geotechnical engineer or his representative to locate any surficial deposits of organic soils, vegetation, excessive roots or debris. Organic soils, vegetation, or deleterious material should be undercut until clean natural soils are encountered, and the resulting excavations backfilled according to the fill placement procedures provided later in this section.

6. The subgrade should be compacted using a smooth drum vibratory roller ***in the static mode***, having a minimum static, at-drum weight on the order of 10 tons and a drum diameter on the order of 3 to 4 feet making a minimum of eight overlapping passes with the second set of 4 passes perpendicular to the first set of 4 passes. Typically, the material should exhibit moisture content within +/- 2 percent of the Modified Proctor optimum moisture content (ASTM D-1557) during the compaction

operations. Compaction should continue until densities of at least 95 percent of the Modified Proctor maximum dry density (ASTM D-1557) have been uniformly achieved within the upper 12 inches of the compacted natural soil surface.

7. Place fill material, as required. The fill should consist of sand with less than 12 percent soil fines. Place fill in uniform 10- to 12-inch loose lifts and compact each lift to a minimum density of at least 95 percent of the Modified Proctor maximum dry density (ASTM D1557).

8. Complete in-situ density tests on the subgrade and each lift of fill at a frequency of not less than one test per 2,500 square feet in the building areas and one test per 10,000 square feet in paved areas.

9. In the building areas, test all footing cuts for compaction to a depth of 1 foot. We recommend you test every column footing, and conduct one test for every 50 lineal feet of wall footing.

10. If difficult compaction conditions are encountered during the site work operations, the compaction efforts should stop and the geotechnical engineer should be contacted. The geotechnical engineer or his representative should observe proof-rolling of the exposed subgrade to determine if additional compaction is warranted or if any material needs to be over-excavated and replaced.

If site preparation work is performed during the rainy season (May through October), special care should be taken to maintain positive drainage from the building pad and paved areas to drains or ditches around the site. Unexpected wet periods can also occur in Florida during the "dry" season. Such events can raise water tables to levels above seasonal highs without the associated high temperatures to evaporate ponded water. Therefore, the contractor should practice wet weather means and methods for earthwork during the "dry" season as well. Groundwater and surface water control, use of granular fill material and aeration are typical means to accomplish wet weather grading.

5.0 LIMITATIONS

Our field exploration did not find unsuitable or unexpected materials at the time of occurrence. The test borings completed for this report were widely spaced and are not considered sufficient for reliably detecting the presence of isolated, anomalous surface or subsurface conditions, or reliably estimating unsuitable or suitable material quantities. Accordingly, UES does not recommend relying on our boring information to negate the presence of anomalous materials or for estimation of material quantities. Therefore, UES will not be responsible for any extrapolation or use of our data by others beyond the purpose(s) for which it is applicable or intended.

During the early stages of this construction project, 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 (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.

6.0 SUMMARY

In summary, we understand that you propose to construct a residential community in Stuart, Martin County, Florida. Field tests have been performed to provide preliminary geotechnical engineering recommendations for foundation and pavement design, and site preparation.

The soils encountered generally consist of loose to dense, light gray to brown sand with trace roots, sand with clayey sand lenses, clayey sand [SP, SC] to a depth of 8 feet below land surface (bls) underlain by loose to medium dense, light brown to dark brown sand, weakly cemented sand, silty sand, clayey sand [SP, SM, SC] to the maximum explored depth of 15 feet (bls).

Groundwater was measured at approximately 3 to 5.5 feet below the existing land surface in the test borings. A reasonable estimate for an average wet seasonal high groundwater table is approximately 2 to 4.5 feet below land surface (bls).

We believe the proposed structures can be supported on a conventional shallow foundation with an allowable soil bearing pressure of 2,500 psf provided the site is prepared as recommended and the structural loads anticipated by our firm are not exceeded.

UES recommends normal, good practice site preparation procedures to prepare the subgrade to support the structures and pavements.

APPENDIX F
Land Use

BANYAN BAY
SITE DATA

Cumulative Site Data:

Description	Acres
Total Basin Area	100.6
Roof Area	20.3
Pavement	19.4
Lake	19.5
Wetland	2.6
Flow Through Marsh	2.2
Lake/FTM Bank	7.0
Open Space	31.0
Offsite SR 76	0.5

Basin A Land Use:

Description	Acres
Total Basin A Area	19.2
Phase 1 Roof Area	0.11
Phase 1 Impervious	1.35
Phase 1 Pervious	1.10
Lake	3.20
Offsite SR 76(Impervious)	0.50
Phase 1 Total =	6.26
Phase 2C Impervious	1.19
Phase 2C Roof Area	4.11
Phase 2C Pervious	3.75
Upland Preserve	0.90
Wetland Preserve	0.60
FDOT Pond-Open Water	0.99
FDOT Pond-Pervious	0.63
2C Landscape Buffer	0.76
Phase 2C Total =	12.93

Basin A - Permitted Land Uses

Building Area	3.0
Lake Area	3.4
Pavement Area	5.0
Pervious Area	6.7
Wetland Area	0.6
Basin A Total =	18.7

Basin A - Total Land Use Breakdown

Building Area	4.22
Lake Area	4.19
Pavement Area	2.54
Pervious Area	7.14
Wetland Area	0.60
Offsite SR-76	0.50
Basin A Total =	19.2

APPENDIX G
Curve Numbers

BANYAN BAY
Curve Number

BASIN	BASIN AREA (Ac)	ROOF & PAVT (Ac)	WMA AREA (Ac)	WETLAND AREA (Ac)	TOTAL IMP (Ac)	IMP CN	PERVIOUS AREA (Ac)	PERVIOUS CN	BASIN CN
A	19.2	6.8	3.2	0.6	10.6	98	8.6	70	85
B	10.5	3.2	2.4	1.1	6.7	98	3.8	70	88
C1	4.0	2.4	0.3	0.0	2.7	98	1.3	70	89
C2	21.2	7.7	5.4	0.0	13.1	98	8.1	70	87
D	6.9	3.2	1.4	0.0	4.6	98	2.3	70	89
E1	27.0	11.3	4.9	1.5	17.7	98	9.3	70	88
E2	3.0	1.4	0.6	0.0	2.0	98	1.0	70	89
E3	5.8	3.5	1.9	0.0	5.4	98	0.4	70	96
IQ Lake	3.0	0.2	1.8	0.0	2.0	98	1.0	70	89
NE-WL	44.5	0.0	0.0	25.2	25.2	98	19.3	70	86
SE-WL	39.6	0.0	0.0	20.2	20.2	98	19.4	70	84

APPENDIX H
Time of Concentration

BANYAN BAY
Time of Concentration

Post Development Time of Concentration TR-55, **Tc (min)**

BASIN	SHEET FLOW					SHALLOW CONCENTRATED FLOW					CULVERT FLOW									TIME OF CONCENTRATION	
ID #	Manning n (--)	Flow Length L (ft)	2-Year 24-Hour Rain, P2 (in)	Land Slope s (ft/ft)	Tt_1 (hr)	Paved or Unpvd. (P or U)	Flow Length L (ft)	Water-course Slope, s (ft/ft)	Avg. Velocity V (ft/s)	Tt_2 (hr)	Culvert Diam. D (ft)	Cross-Section Area, a (ft^2)	Wetted Perim. Pw (ft)	Hydraul. Radius r (ft)	Channel Slope s (ft/ft)	Manning n (--)	Avg. Velocity V (ft/s)	Flow Length L (ft)	Tt_3 (hr)	Tc (hr)	Tc (min)
A	0.450	100	5.25	0.05	**0.21**	P	200	0.005	1.44	**0.04**	3.00	7.07	9.42	0.75	0.0001	0.012	1.02	1000	**0.27**	0.52	**31**
B	0.450	100	5.25	0.05	**0.21**	P	200	0.005	1.44	**0.04**	2.00	3.14	6.28	0.50	0.0001	0.012	0.78	750	**0.27**	0.52	**31**
C1	0.450	100	5.25	0.05	**0.21**	P	200	0.005	1.44	**0.04**	2.00	3.14	6.28	0.50	0.0001	0.012	0.78	300	**0.11**	0.36	**21**
C2	0.450	100	5.25	0.05	**0.21**	P	200	0.005	1.44	**0.04**	2.00	3.14	6.28	0.50	0.0001	0.012	0.78	500	**0.18**	0.43	**26**
D	0.450	100	5.25	0.05	**0.21**	P	150	0.005	1.44	**0.03**	2.00	3.14	6.28	0.50	0.0001	0.012	0.78	500	**0.18**	0.42	**25**
E1	0.450	100	5.25	0.05	**0.21**	P	200	0.005	1.44	**0.04**	2.00	3.14	6.28	0.50	0.0001	0.012	0.78	150	**0.05**	0.30	**18**
E2	0.450	100	5.25	0.05	**0.21**	P	200	0.005	1.44	**0.04**	2.00	3.14	6.28	0.50	0.0001	0.012	0.78	250	**0.09**	0.34	**20**
E3	0.450	100	5.25	0.05	**0.21**	P	200	0.005	1.44	**0.04**	2.00	3.14	6.28	0.50	0.0001	0.012	0.78	350	**0.12**	0.38	**23**

Sheet Flow, $Tt_1 = (0.007(n*L)^{0.8})/((P_2)^{0.5} * s^{0.4})$
Where:
Tt = travel time (hr)
n = manning's coefficient
L = flow length (ft)
P_2 = 2-year, 24 hour rainfall (in)
s= land slope (ft/ft)

Shallow Concentrated Flow , $Tt_2 = L/(3600*V)$
Where:
Tt = travel time (hr)
L = flow length (ft)
V = velocity (ft/s)

Channel Flow , $Tt_3 = L/(3600*V)$
Where:
Tt = travel time (hr)
L = flow length (ft)
V = velocity (ft/s) = $(1.49*r^{2/3} * s^{1/2})/n$
n = manning's roughness coefficient

s= slope of hrdraulic grade line (ft/ft)
r= hydraulic radius (ft)= a/Pw
a= cross sectional area of flow (ft^2)
Pw= wetted perimeter (ft)

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APPENDIX I
Water Quality Calculations

BASIN A
WATER QUALITY TREATMENT VOLUME (Martin County)

Requirement = Provide a minimum of 3 inches of water quality treatment volume (WQTV).
Provide 14 day residence time of the permanent pool volume for wet detention .

Martin County code determines the treatment volume based on the method used as follows:

Dry Detention = 3.75" times % Impervious times Basin Area (less preserves, lakes, and wetlands)
Wet Detention = 4.5" times % Impervious times Basin Area (less preserves, lakes, and wetlands)

4.5 inches times % Impervious Area for Water Quality:

Site Area for Water Quality = (Basin Area - Preserve - Water Management Areas - FDOT Pond - Wetlands)
Site Area for Water Quality = 19.2 ac - 0.0 ac - 3.2 ac- 0.99 ac - 0.60 ac
Site Area for Water Quality = 14.41 ac

Impervious Area for Water Quality = (Phase 1 + Offsite Imp + Phase 2C Impervious Area)
Impervious Area for Water Quality = (1.46 ac + 0.5 ac + 5.30 ac)
Impervious Area for Water Quality = 7.26 ac

% Impervious Area for Water Quality = (imp. area for water quality / site area for water quality)
% Impervious Area for Water Quality = (7.26 ac / 14.46 ac)
% Impervious Area for Water Quality = 50%

Wet Detention = (4.5 in * % Imp Water Quality * Site Area for Water Quality)
Wet Detention = (4.5 in * 0.50 * 14.46 ac) / (12 in / 1 ft) = 2.7 ac-ft

MCC Required Water Quality Treatment Volume = 2.7 ac-ft

Provided Water Quality Treatment Volume:

Martin County criteria for water quality exceed SFWMD criteria. Therefore, Martin County criteria was used to set the water quality treatment elevation. Please see the enclosed stage storage calculations.

Provided Water Quality Treatment Volume = 3.1 ac-ft

BASIN A
WATER QUALITY TREATMENT VOLUME (SFWMD Vol. IV)

Requirement = Provide water quality treatment volume (WQTV) equivalent to the first inch of rain or 2.5 inches times the percent imperviousness which ever is greater.

First Inch:

Volume = (1 inch * Drainage Basin Area)
Volume =(1 inch * 19.2 ac)* (1 ft/12 in)

First inch =	**1.6**	**ac-ft**

2.5 inches times % Impervious Area for Water Quality:

Site Area for Water Quality = (Basin Area - Building - Water Management Area - FDOT Pond - Wetlands)
Site Area for Water Quality = 19.2 ac - 4.22 ac - 3.2 ac - 0.99 - 0.60 ac
Site Area for Water Quality = 10.19 ac

Impervious Area for Water Quality = (Site Area for Water Quality - Pervious Area)
Impervious Area for Water Quality = 9.61 ac - (1.10 ac + 3.75 ac + 0.90 ac + 0.63 ac + 0.76 ac)
Impervious Area for Water Quality = 3.05 ac

% Impervious Area for Water Quality = (imp. area for water quality / site area for water quality)
% Impervious Area for Water Quality = (3.05 ac / 10.19 ac)
% Impervious Area for Water Quality = 30%

Wet Detention = 2.5 in * % Imp Water Quality * (Basin Area - Lake Area - Wetlands) =
Wet Detention = (2.5 in * 0.30 * 10.19 ac) / (12 in / 1 ft) = 0.6 ac-ft

Therefore, first inch governs,

Required Water Quality Treatment Volume = 1.6 ac-ft

Provided Water Quality Treatment Volume:

Martin County criteria for water quality exceed SFWMD criteria. Therefore, Martin County criteria was used to set the water quality treatment elevation. Please see the enclosed stage storage calculations.

Provided Water Quality Treatment Volume = 3.1 ac-ft

APPENDIX J
Permanent Pool Volume

BANYAN BAY
PERMANENT POOL VOLUME (MARTIN COUNTY)

Martin County Required Permanent Pool Volume for Wet Detention Water Quality Treatment (ac-ft)

$$PPV = \frac{DA * C * R * RT}{WS * CF}$$

Where:

PPV = Permanent pool volume (ac-ft)
DA = Drainage Area (ac)
RT = Residence Time (days)
C = Manning Overland Flow Runoff Coefficient
R = Wet Season Rain Fall Depth (in)
WS = Length of Wet Season (days)
CF = Conversion Factor (12in/ft)

Basin	Basin Area (A) (ac)	Runoff Coeff. (C)	Rain Fall Depth (R) (in)	Residence Time (RT) (days)	Wet Season (WS) (days)	Required (PPV) (ac-ft)	Lake Mean Depth (ft)	Lake Area @ SHW (ac)	Provided (PPV) (ac-ft)
A	19.2	0.45	32	14	153	**2.1**	11.0	3.2	**35.2**
B	10.5	0.45	32	14	153	**1.2**	11.0	2.4	**26.4**
C2	21.2	0.45	32	14	153	**2.3**	11.0	5.4	**59.4**
D	6.9	0.45	32	14	153	**0.8**	11.0	1.2	**13.2**
E1	27.0	0.45	32	14	153	**3.0**	11.0	4.9	**53.9**
E2	3	0.45	32	14	153	**0.3**	11.00	0.60	**6.6**

APPENDIX K
Bleeder Size

BANYAN BAY
Bleeder Design (SFWMD Vol. IV / MCC)

Bleeder Design:
The bleeder design is based on both MCC and SFWMD Vol IV criteria.

Martin County Code:
MCC requires recovery of 90 percent of the treatment volume within 12 days of the design storm.

SFWMD Water Quality Rate:
The Water Quality Rate (SFWMD) = 1/2" over the basin area minus lake areas divided by 24 hours.

Compliance with the required discharge rates and recovery criteria can be seen in the following calculations and storm water routings.

Basin A

Water Quality Rate (Q) = (0.5/12) * (19.2-3.2)
Water Quality Rate (Q) = 0.7 ac-ft/day

The weir elevation is 10.45 and the bleeder invert is 9.50. A circular bleeder is proposed.

Converting the Water Quality Rate (Q) from ac-ft/day to cfs:

$Q = (0.7 \text{ ac-ft/day} * 43{,}560 \text{ ft}^2 / \text{ac}) / (84600 \text{ sec / day})$
Q = 0.3 cfs

Orifice flow, Q = 4.8 AH ^1/2
Where :
A = Area, (sf)
H = Head at Centroid, (ft)
Q = Flow, (cfs)

Solving the Orifice flow equation for the diameter of a circle:
A = Q/(4.8 * H^1/2)
A = 0.3 / (4.8 * (0.95)^(1/2))
A = 0.06 sf
A = 9 sq inches **3.43 inch diameter allowable**

Therefore, a circular orifice with a diameter of 3.25 inches is proposed.

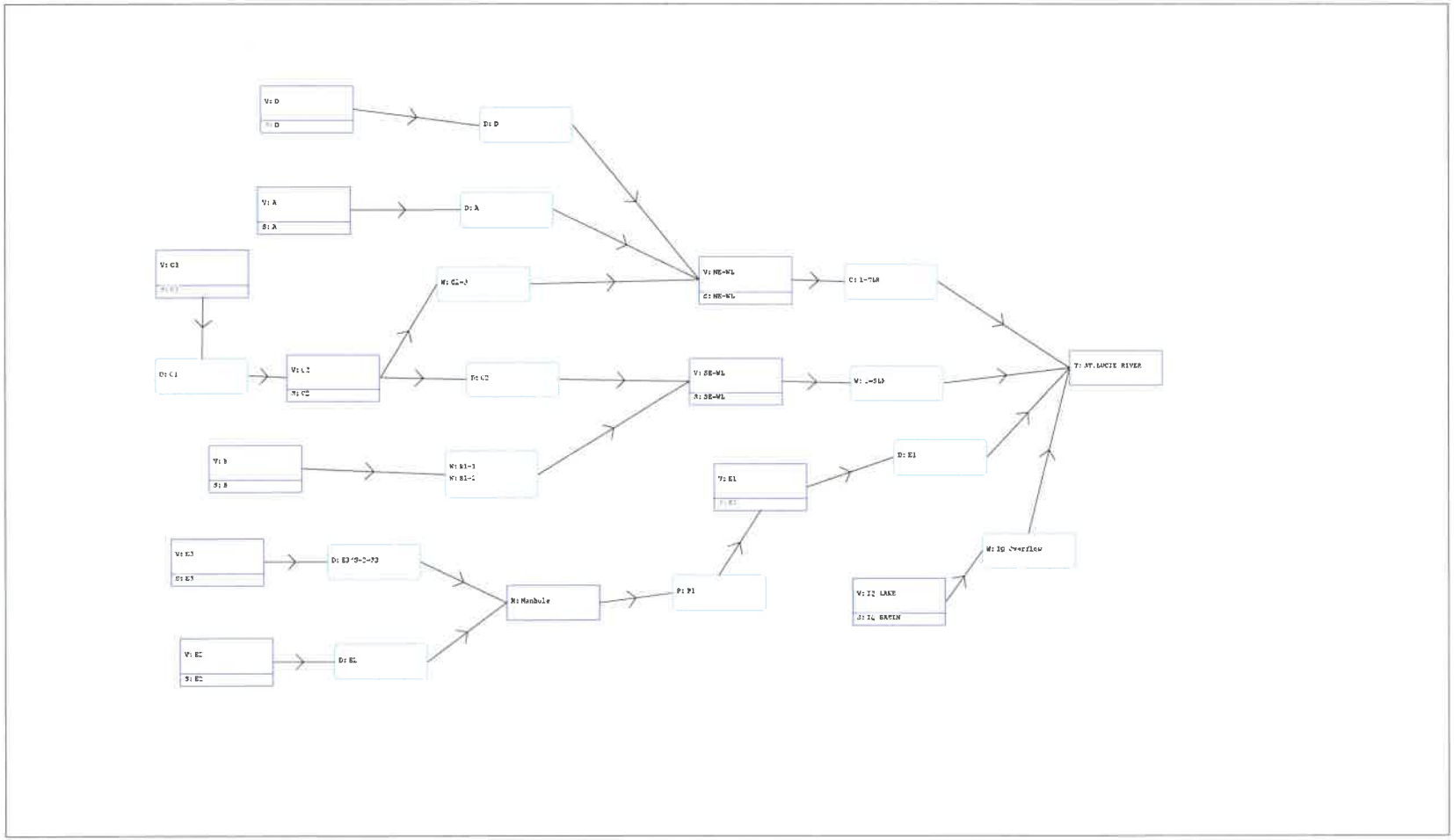
APPENDIX L
ICPR Results

Banyan Bay
Input

Nodes
A Stage/Area
V Stage/Volume
T Time/Stage
M Manhole

Basins
O Overland Flow
U SCS Unit CN
S SBUH CN
Y SCS Unit GA
Z SBUH GA

Links
P Pipe
W Weir
C Channel
D Drop Structure
B Bridge
R Rating Curve
H Breach
E Percolation
F Filter
X Exfil Trench



Manual Basin: A

Scenario: Icpr3
Node: A
Hydrograph Method: Santa Barbara Urban Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 31.0000 min
Max Allowable Q: 999999.00 cfs
Time Shift: 0.0000 hr

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coeficient Zone	Reference ET Station
17.5800	A	A	Sfwmd72		

Comment: NORTHERN MULIT-FAMILY PARCEL

Manual Basin: B

Scenario: Icpr3
Node: B
Hydrograph Method: Santa Barbara Urban Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 31.0000 min
Max Allowable Q: 999999.00 cfs
Time Shift: 0.0000 hr

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coeficient Zone	Reference ET Station
10.5000	B	B	Sfwmd72		

Comment: MULTI-FAMILY PARCEL TO THE SOUTHEAST

Manual Basin: C1

Scenario: Icpr3
Node: C1
Hydrograph Method: Santa Barbara Urban Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 21.0000 min
Max Allowable Q: 999999.00 cfs
Time Shift: 0.0000 hr

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coeficient Zone	Reference ET Station
4.0000	C1	C1	Sfwmd72		

Comment:

Manual Basin: C2

Scenario: Icpr3
Node: C2
Hydrograph Method: Santa Barbara Urban Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 26.0000 min
Max Allowable Q: 999999.00 cfs
Time Shift: 0.0000 hr

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coeficient Zone	Reference ET Station
21.2000	C2	C2	Sfwmd72		

Comment:

Manual Basin: D

Scenario: Icpr3
Node: D
Hydrograph Method: Santa Barbara Urban Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 25.0000 min
Max Allowable Q: 999999.00 cfs
Time Shift: 0.0000 hr

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coeficient Zone	Reference ET Station
6.9000	D	D	Sfwmd72		

Comment:

Manual Basin: E1

Scenario: Icpr3
Node: E1
Hydrograph Method: Santa Barbara Urban Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 18.0000 min
Max Allowable Q: 999999.00 cfs
Time Shift: 0.0000 hr

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coeficient Zone	Reference ET Station
27.0000	E1	E1	Sfwmd72		

Comment:

Manual Basin: E2

Scenario: Icpr3

Node: E2
Hydrograph Method: Santa Barbara Urban Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 20.0000 min
Max Allowable Q: 999999.00 cfs
Time Shift: 0.0000 hr

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coeficient Zone	Reference ET Station
3.0000	E2	E2	Sfwmd72		

Comment:

Manual Basin: E3

Scenario: Icpr3
Node: E3
Hydrograph Method: Santa Barbara Urban Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 23.0000 min
Max Allowable Q: 999999.00 cfs
Time Shift: 0.0000 hr

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coeficient Zone	Reference ET Station
5.8000	E3	E3	Sfwmd72		

Comment:

Manual Basin: IQ BASIN

Scenario: Icpr3
Node: IQ LAKE
Hydrograph Method: Santa Barbara Urban Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 10.0000 min
Max Allowable Q: 999999.00 cfs
Time Shift: 0.0000 hr

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coeficient Zone	Reference ET Station
3.0000	IQ BASIN	IQ BASIN	Sfwmd72		

Comment:

Manual Basin: NE-WL

Scenario: Icpr3
Node: NE-WL

Hydrograph Method: Santa Barbara Urban Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 30.0000 min
Max Allowable Q: 999999.00 cfs
Time Shift: 0.0000 hr

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coeficient Zone	Reference ET Station
44.5400	NE-WL	NE-WL	Sfwmd72		

Comment: NORTHEAST WETLAND BASIN

Manual Basin: SE-WL

Scenario: Icpr3
Node: SE-WL
Hydrograph Method: Santa Barbara Urban Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 30.0000 min
Max Allowable Q: 999999.00 cfs
Time Shift: 0.0000 hr

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coeficient Zone	Reference ET Station
39.6000	SE-WL	SE-WL	Sfwmd72		

Comment: SOUTHEASTERN WETLAND SYSTEM

Node: A

Scenario: Icpr3
Type: Stage/Volume
Base Flow: 0.00 cfs
Initial Stage: 7.45 ft
Warning Stage: 0.00 ft

Stage [ft]	Volume [ac-ft]	Volume [ft3]
7.54	0.00	0
8.54	1.60	69696
8.99	3.10	135036
9.04	3.30	143748
9.54	5.00	217800
10.04	6.70	291852
10.54	8.80	383328
11.04	11.70	509652
11.54	15.60	679536
12.04	20.30	884268
12.54	26.10	1136916
13.04	32.70	1424412
13.54	40.10	1746756

Comment: LAKES A1 AND A2

Node: B

Scenario: Icpr3
Type: Stage/Volume
Base Flow: 0.00 cfs
Initial Stage: 8.44 ft
Warning Stage: 0.00 ft

Stage [ft]	Volume [ac-ft]	Volume [ft3]
8.44	0.00	0
8.54	0.40	17424
9.04	2.10	91476
9.54	4.00	174240
10.04	5.90	257004
10.54	7.90	344124
11.04	10.40	453024
11.54	13.80	601128
12.04	17.50	762300
12.54	21.50	936540
13.04	25.70	1119492

Comment: LAKES B1, B2 and B3

Node: C1

Scenario: Icpr3
Type: Stage/Volume
Base Flow: 0.00 cfs
Initial Stage: 8.54 ft
Warning Stage: 0.00 ft

Stage [ft]	Volume [ac-ft]	Volume [ft3]
8.54	0.00	0
9.04	0.20	8712
9.54	0.30	13068
10.04	0.50	21780
10.54	0.70	30492
11.04	1.10	47916
11.54	2.00	87120
12.04	3.30	143748
12.54	4.60	200376
13.04	6.00	261360
13.54	7.30	317988
14.04	8.70	378972

Comment:

Node: C2

Scenario: Icpr3
Type: Stage/Volume
Base Flow: 0.00 cfs
Initial Stage: 8.54 ft
Warning Stage: 0.00 ft

Stage [ft]	Volume [ac-ft]	Volume [ft3]
8.54	0.00	0
9.04	2.70	117612
9.54	5.50	239580
10.04	8.40	365904
10.54	11.40	496584
11.04	15.10	657756
11.54	20.20	879912
12.04	26.60	1158696
12.54	34.10	1485396
13.04	42.20	1838232
13.54	50.90	2217204
14.04	59.90	2609244

Comment:

Node: D

Scenario: Icpr3
Type: Stage/Volume
Base Flow: 0.00 cfs
Initial Stage: 7.04 ft
Warning Stage: 0.00 ft

Stage [ft]	Volume [ac-ft]	Volume [ft3]
7.04	0.00	0
7.54	0.70	30492
8.04	1.50	65340
8.54	2.30	100188
9.04	3.10	135036
9.54	4.20	182952
10.04	5.90	257004
10.54	7.80	339768
11.04	9.90	431244
11.54	12.20	531432
12.04	14.60	635976
12.54	17.10	744876
13.04	19.60	853776

Comment:

Node: E1

Scenario: Icpr3
Type: Stage/Volume
Base Flow: 0.00 cfs
Initial Stage: 5.54 ft
Warning Stage: 0.00 ft

Stage [ft]	Volume [ac-ft]	Volume [ft3]
5.54	0.00	0
6.04	3.20	139392
6.54	6.50	283140
7.04	9.90	431244
7.54	13.30	579348
8.04	17.00	740520
8.54	21.30	927828
9.04	26.40	1149984
9.54	32.40	1411344
10.04	39.20	1707552
10.54	46.80	2038608
11.04	55.30	2408868
11.54	64.50	2809620
12.04	74.60	3249576
12.54	85.10	3706956

Comment:

Node: E2

Scenario: Icpr3
Type: Stage/Volume
Base Flow: 0.00 cfs
Initial Stage: 7.74 ft
Warning Stage: 0.00 ft

Stage [ft]	Volume [ac-ft]	Volume [ft3]
7.74	0.00	0
8.04	0.20	8712
8.54	0.50	21780
9.04	0.80	34848
9.54	1.20	52272
10.04	1.60	69696
10.54	2.30	100188
11.04	3.20	139392
11.54	4.10	178596

Stage [ft]	Volume [ac-ft]	Volume [ft3]
12.04	5.10	222156
12.54	6.20	270072
13.04	7.40	322344
13.54	8.50	370260
14.04	9.70	422532
14.54	10.80	470448

Comment:

Node: E3

Scenario: Icpr3
Type: Stage/Volume
Base Flow: 0.00 cfs
Initial Stage: 5.54 ft
Warning Stage: 0.00 ft

Stage [ft]	Volume [ac-ft]	Volume [ft3]
5.54	0.00	0
6.04	0.20	8712
6.54	0.30	13068
7.04	0.50	21780
7.54	0.70	30492
8.04	0.90	39204
8.54	1.50	65340
9.04	2.30	100188
9.54	3.40	148104
10.04	4.80	209088
10.54	6.50	283140
11.04	8.50	370260
11.54	10.60	461736
12.04	12.70	553212
12.54	14.90	649044

Comment:

Node: IQ LAKE

Scenario: Icpr3
Type: Stage/Volume
Base Flow: 0.00 cfs
Initial Stage: 5.54 ft
Warning Stage: 10.00 ft

Stage [ft]	Volume [ac-ft]	Volume [ft3]
5.54	0.00	0
6.04	0.90	39204

Stage [ft]	Volume [ac-ft]	Volume [ft3]
6.54	1.90	82764
7.04	2.90	126324
7.54	3.90	169884
8.04	4.90	213444
8.54	6.00	261360
9.04	7.10	309276
9.54	8.30	361548
10.04	9.50	413820
10.54	10.70	466092
11.04	12.00	522720
11.54	13.40	583704
12.04	14.80	644688
12.54	16.20	705672

Comment:

Node: Manhole

Scenario: Icpr3
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 5.54 ft
Warning Stage: 8.54 ft

Stage [ft]	Area [ac]	Area [ft2]
5.54	0.0001	4
12.54	0.0002	9

Comment: (converted from manhole to stage/area node)

Node: NE-WL

Scenario: Icpr3
Type: Stage/Volume
Base Flow: 0.00 cfs
Initial Stage: 4.54 ft
Warning Stage: 0.00 ft

Stage [ft]	Volume [ac-ft]	Volume [ft3]
4.54	0.00	0
5.04	3.60	156816
5.54	13.50	588060
6.04	24.50	1067220
6.54	36.50	1589940
7.04	49.60	2160576
7.54	64.60	2813976

Stage [ft]	Volume [ac-ft]	Volume [ft3]
8.04	81.70	3558852
8.54	100.20	4364712
9.04	120.60	5253336
9.54	142.10	6189876
10.04	164.00	7143840
10.54	186.00	8102160

External Hydrograph
NE-WL#1

Comment: NORTHERN WETLAND SLOUGH

Node: SE-WL

Scenario: Icpr3
Type: Stage/Volume
Base Flow: 0.00 cfs
Initial Stage: 7.04 ft
Warning Stage: 0.00 ft

Stage [ft]	Volume [ac-ft]	Volume [ft3]
7.04	0.00	0
7.54	3.90	169884
8.04	15.40	670824
8.54	29.50	1285020
9.04	46.00	2003760
9.54	64.70	2818332
10.04	84.50	3680820
10.54	104.30	4543308

Comment:

Node: ST.LUCIE RIVER

Scenario: Icpr3
Type: Time/Stage
Base Flow: 0.00 cfs
Initial Stage: -0.36 ft
Warning Stage: 0.00 ft
Boundary Stage:

Year	Month	Day	Hour	Stage [ft]
0	0	0	0.0000	-0.36
0	0	0	9999.0000	-0.36

Comment: BOUNDARY NODE

Channel Links 1-SLR		Upstream		Downstream	
Scenario:	Icpr3	Invert:	4.84 ft	Invert:	3.04 ft
From Node:	NE-WL	Manning's N:	0.0350	Manning's N:	0.0350
To Node:	ST.LUCIE RIVER	Geometry: Trapezoidal		Geometry: Trapezoidal	
Link Count:	1	Max Depth:	9999.00 ft	Max Depth:	9999.00 ft
Flow Direction:	Both	Extrapolation:	Normal	Extrapolation:	Normal
Damping:	0.0000 ft	Bottom Width:	10.00 ft	Bottom Width:	10.00 ft
Length:	315.00 ft	Left Slope:	4.000 (h:v)	Left Slope:	4.000 (h:v)
Contraction Coef:	0.00	Right Slope:	4.000 (h:v)	Right Slope:	4.000 (h:v)
Expansion Coef:	0.00	Bottom Clip			
Entr Loss Coef:	0.00	Default:	0.00 ft	Default:	0.00 ft
Exit Loss Coef:	0.00	Op Table:		Op Table:	
Bend Loss Coef:	0.00	Ref Node:		Ref Node:	
Bend Location:	0.00 ft	Manning's N:	0.0350	Manning's N:	0.0350
Energy Switch:	Energy	Top Clip			
		Default:	0.00 ft	Default:	0.00 ft
		Op Table:		Op Table:	
		Ref Node:		Ref Node:	
		Manning's N:	0.0350	Manning's N:	0.0350

Comment: Conveyance Swale between Northern Wetlands (Wetland 5) and Tidal wetlands (Wetland 1)

Weir Link: 2-SLR		Bottom Clip	
Scenario:	Icpr3	Default:	0.00 ft
From Node:	SE-WL	Op Table:	
To Node:	ST.LUCIE RIVER	Ref Node:	
Link Count:	1	Top Clip	
Flow Direction:	Both	Default:	0.00 ft
Damping:	0.0000 ft	Op Table:	
Weir Type:	Sharp Crested Vertical	Ref Node:	
Geometry Type:	Rectangular	Discharge Coefficients	
Invert:	7.34 ft	Weir Default:	3.200
Control Elevation:	7.34 ft	Weir Table:	
Max Depth:	8333.25 ft	Orifice Default:	0.600
Max Width:	200.00 ft	Orifice Table:	
Fillet:	0.00 ft		

Comment: OFFSITE FLOW FROM WETLAND 12

Drop Structure Link: A		Upstream Pipe		Downstream Pipe	
Scenario:	Icpr3	Invert:	1.54 ft	Invert:	1.54 ft
From Node:	A	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	NE-WL	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	2.50 ft	Max Depth:	2.50 ft
Flow Direction:	Both	Bottom Clip			
Solution:	Combine	Default:	0.00 ft	Default:	0.00 ft
Increments:	10	Op Table:		Op Table:	
Pipe Count:	1	Ref Node:		Ref Node:	

Damping:	0.0000 ft	Manning's N:	0.0120	Manning's N:	0.0120
Length:	364.00 ft	Top Clip			
FHWA Code:	1	Default:	0.00 ft	Default:	0.00 ft
Entr Loss Coef:	0.00	Op Table:		Op Table:	
Exit Loss Coef:	0.00	Ref Node:		Ref Node:	
Bend Loss Coef:	0.00	Manning's N:	0.0120	Manning's N:	0.0120
Bend Location:	0.00 ft				
Energy Switch:	Energy				

Pipe Comment:

Weir Component		Bottom Clip	
Weir:	1	Default:	0.00 ft
Weir Count:	1	Op Table:	
Weir Flow Direction:	Positive	Ref Node:	
Damping:	0.0000 ft	Top Clip	
Weir Type:	Sharp Crested Vertical	Default:	0.00 ft
Geometry Type:	Circular	Op Table:	
Invert:	8.04 ft	Ref Node:	
Control Elevation:	8.04 ft	Discharge Coefficients	
Max Depth:	0.27 ft	Weir Default:	3.200
		Weir Table:	
		Orifice Default:	0.600
		Orifice Table:	

Weir Comment:

Weir Component		Bottom Clip	
Weir:	2	Default:	0.00 ft
Weir Count:	1	Op Table:	
Weir Flow Direction:	Positive	Ref Node:	
Damping:	0.0000 ft	Top Clip	
Weir Type:	Sharp Crested Vertical	Default:	0.00 ft
Geometry Type:	Rectangular	Op Table:	
Invert:	8.99 ft	Ref Node:	
Control Elevation:	8.99 ft	Discharge Coefficients	
Max Depth:	83.25 ft	Weir Default:	3.200
Max Width:	0.40 ft	Weir Table:	
Fillet:	0.00 ft	Orifice Default:	0.600
		Orifice Table:	

Weir Comment:

Drop Structure Comment:

Weir Link: B1-1		Bottom Clip	
Scenario:	Icpr3	Default:	0.00 ft
From Node:	B	Op Table:	
To Node:	SE-WL	Ref Node:	
Link Count:	1		

Flow Direction:	Both
Damping:	0.0000 ft
Weir Type:	Sharp Crested Vertical
Geometry Type:	Circular
Invert:	8.44 ft
Control Elevation:	8.44 ft
Max Depth:	0.25 ft

Top Clip

Default:	0.00 ft
Op Table:	
Ref Node:	

Discharge Coefficients

Weir Default:	3.200
Weir Table:	
Orifice Default:	0.600
Orifice Table:	

Comment:

Weir Link: B1-2

Scenario:	Icpr3
From Node:	B
To Node:	SE-WL
Link Count:	1
Flow Direction:	Both
Damping:	0.0000 ft
Weir Type:	Sharp Crested Vertical
Geometry Type:	Rectangular
Invert:	8.94 ft
Control Elevation:	8.94 ft
Max Depth:	83.25 ft
Max Width:	0.38 ft
Fillet:	0.00 ft

Bottom Clip

Default:	0.00 ft
Op Table:	
Ref Node:	

Top Clip

Default:	0.00 ft
Op Table:	
Ref Node:	

Discharge Coefficients

Weir Default:	3.200
Weir Table:	
Orifice Default:	0.600
Orifice Table:	

Comment:

Drop Structure Link: C1

Scenario:	Icpr3
From Node:	C1
To Node:	C2
Link Count:	1
Flow Direction:	Both
Solution:	Combine
Increments:	10
Pipe Count:	1
Damping:	0.0000 ft
Length:	1028.00 ft
FHWA Code:	1
Entr Loss Coef:	0.00
Exit Loss Coef:	0.00
Bend Loss Coef:	0.00
Bend Location:	0.00 ft
Energy Switch:	Energy

Upstream Pipe

Invert:	4.04 ft
Manning's N:	0.0120

Geometry: Circular

Max Depth:	2.50 ft

Bottom Clip

Default:	0.00 ft
Op Table:	
Ref Node:	
Manning's N:	0.0120

Top Clip

Default:	0.00 ft
Op Table:	
Ref Node:	
Manning's N:	0.0120

Downstream Pipe

Invert:	4.04 ft
Manning's N:	0.0120

Geometry: Circular

Max Depth:	2.50 ft

Bottom Clip

Default:	0.00 ft
Op Table:	
Ref Node:	
Manning's N:	0.0120

Top Clip

Default:	0.00 ft
Op Table:	
Ref Node:	
Manning's N:	0.0120

Pipe Comment:

Weir Component	
Weir:	1
Weir Count:	1
Weir Flow Direction:	Both
Damping:	0.0000 ft
Weir Type:	Horizontal
Geometry Type:	Rectangular
Invert:	8.54 ft
Control Elevation:	8.54 ft
Max Depth:	3.00 ft
Max Width:	4.50 ft
Fillet:	0.00 ft

Bottom Clip	
Default:	0.00 ft
Op Table:	
Ref Node:	

Top Clip	
Default:	0.00 ft
Op Table:	
Ref Node:	

Discharge Coefficients	
Weir Default:	3.200
Weir Table:	
Orifice Default:	0.600
Orifice Table:	

Weir Comment:

Drop Structure Comment:

Drop Structure Link: C2	
Scenario:	Icpr3
From Node:	C2
To Node:	SE-WL
Link Count:	1
Flow Direction:	Both
Solution:	Combine
Increments:	10
Pipe Count:	1
Damping:	0.0000 ft
Length:	147.00 ft
FHWA Code:	1
Entr Loss Coef:	0.00
Exit Loss Coef:	0.00
Bend Loss Coef:	0.00
Bend Location:	0.00 ft
Energy Switch:	Energy

Upstream Pipe	
Invert:	3.31 ft
Manning's N:	0.0120
Geometry: Circular	
Max Depth:	2.50 ft
Bottom Clip	
Default:	0.00 ft
Op Table:	
Ref Node:	
Manning's N:	0.0120
Top Clip	
Default:	0.00 ft
Op Table:	
Ref Node:	
Manning's N:	0.0120

Downstream Pipe	
Invert:	3.31 ft
Manning's N:	0.0120
Geometry: Circular	
Max Depth:	2.50 ft
Bottom Clip	
Default:	0.00 ft
Op Table:	
Ref Node:	
Manning's N:	0.0120
Top Clip	
Default:	0.00 ft
Op Table:	
Ref Node:	
Manning's N:	0.0120

Pipe Comment:

Weir Component	
Weir:	1
Weir Count:	1
Weir Flow Direction:	Both
Damping:	0.0000 ft
Weir Type:	Sharp Crested Vertical
Geometry Type:	Circular
Invert:	8.54 ft
Control Elevation:	8.54 ft
Max Depth:	0.35 ft

Bottom Clip	
Default:	0.00 ft
Op Table:	
Ref Node:	

Top Clip	
Default:	0.00 ft
Op Table:	
Ref Node:	

Discharge Coefficients	
Weir Default:	3.200

Weir Table:	
Orifice Default:	0.600
Orifice Table:	

Weir Comment:

Weir Component

Weir:	2
Weir Count:	1
Weir Flow Direction:	Both
Damping:	0.0000 ft
Weir Type:	Sharp Crested Vertical
Geometry Type:	Rectangular
Invert:	9.19 ft
Control Elevation:	9.19 ft
Max Depth:	83.25 ft
Max Width:	0.29 ft
Fillet:	0.00 ft

Bottom Clip

Default:	0.00 ft
Op Table:	
Ref Node:	

Top Clip

Default:	0.00 ft
Op Table:	
Ref Node:	

Discharge Coefficients

Weir Default:	3.200
Weir Table:	
Orifice Default:	0.600
Orifice Table:	

Weir Comment:

Drop Structure Comment:

Weir Link: C2-3

Scenario:	Icpr3
From Node:	C2
To Node:	NE-WL
Link Count:	1
Flow Direction:	Both
Damping:	0.0000 ft
Weir Type:	Sharp Crested Vertical
Geometry Type:	Rectangular
Invert:	9.19 ft
Control Elevation:	9.19 ft
Max Depth:	83.25 ft
Max Width:	0.29 ft
Fillet:	0.00 ft

Bottom Clip

Default:	0.00 ft
Op Table:	
Ref Node:	

Top Clip

Default:	0.00 ft
Op Table:	
Ref Node:	

Discharge Coefficients

Weir Default:	3.200
Weir Table:	
Orifice Default:	0.600
Orifice Table:	

Comment:

Drop Structure Link: D

Scenario:	Icpr3
From Node:	D
To Node:	NE-WL
Link Count:	1
Flow Direction:	Both

Upstream Pipe

Invert:	1.39 ft
Manning's N:	0.0120

Geometry: Circular

Max Depth:	2.00 ft

Bottom Clip

Downstream Pipe

Invert:	1.39 ft
Manning's N:	0.0120

Geometry: Circular

Max Depth:	2.00 ft

Solution:	Combine	Default:	0.00 ft	Default:	0.00 ft
Increments:	10	Op Table:		Op Table:	
Pipe Count:	1	Ref Node:		Ref Node:	
Damping:	0.0000 ft	Manning's N:	0.0120	Manning's N:	0.0120
Length:	76.00 ft	Top Clip			
FHWA Code:	1	Default:	0.00 ft	Default:	0.00 ft
Entr Loss Coef:	0.00	Op Table:		Op Table:	
Exit Loss Coef:	0.00	Ref Node:		Ref Node:	
Bend Loss Coef:	0.00	Manning's N:	0.0120	Manning's N:	0.0120
Bend Location:	0.00 ft				
Energy Switch:	Energy				

Pipe Comment:

Weir Component

Weir:	1
Weir Count:	1
Weir Flow Direction:	Both
Damping:	0.0000 ft
Weir Type:	Sharp Crested Vertical
Geometry Type:	Circular
Invert:	7.04 ft
Control Elevation:	7.04 ft
Max Depth:	0.25 ft

Bottom Clip

Default:	0.00 ft
Op Table:	
Ref Node:	

Top Clip

Default:	0.00 ft
Op Table:	
Ref Node:	

Discharge Coefficients

Weir Default:	3.200
Weir Table:	
Orifice Default:	0.600
Orifice Table:	

Weir Comment:

Weir Component

Weir:	2
Weir Count:	1
Weir Flow Direction:	Both
Damping:	0.0000 ft
Weir Type:	Sharp Crested Vertical
Geometry Type:	Rectangular
Invert:	7.84 ft
Control Elevation:	7.84 ft
Max Depth:	83.25 ft
Max Width:	0.17 ft
Fillet:	0.00 ft

Bottom Clip

Default:	0.00 ft
Op Table:	
Ref Node:	

Top Clip

Default:	0.00 ft
Op Table:	
Ref Node:	

Discharge Coefficients

Weir Default:	3.200
Weir Table:	
Orifice Default:	0.600
Orifice Table:	

Weir Comment:

Weir Component

Weir:	3
Weir Count:	1
Weir Flow Direction:	Both
Damping:	0.0000 ft
Weir Type:	Horizontal

Bottom Clip

Default:	0.00 ft
Op Table:	
Ref Node:	

Top Clip