Request for Qualifications (RFQ 16-002)

Engineering & Construction Management Services
for the Stormwater Capture, Reuse, &
Aquifer Recharge Project

City of Winter Garden
300 West Plant Street
Winter Garden, FL 34787
(407) 656-4111

REQUEST FOR QUALIFICATIONS

Engineering & Construction Management Services
for the City of Winter Garden's
Stormwater Capture, Reuse, & Aquifer Recharge Project

(RFQ 16-002)

The City of Winter Garden, Florida, in conformance with the Consultants' Competitive Negotiations Act (CCNA), Florida Statutes Section 287.055, et seq., and the policies and procedures of the City of Winter Garden ("the City"), is soliciting statements of qualifications from qualified professional engineering firms that are interested in providing engineering services for design, plans production, permitting, construction management, and other miscellaneous engineering and planning services for the City's Stormwater Capture, Reuse, & Aquifer Recharge Project.

The City intends to award the contract to the firm deemed to be the most highly qualified to perform the required services. In determining whether a firm is qualified, the City shall consider such factors as the firm's understanding of the project and its requirements; the quality and innovation shown in the firm's description of its proposed approach and methodology; the experience and ability of its professional personnel; and its past performance with similar projects.

Interested firms may obtain a copy of the RFQ documents from the City's website at www.cwgdn.com/business/ bids/. The documents are also available at Winter Garden's City Hall located at 300 West Plant Street, Winter Garden, FL 34787. Firms interested in providing engineering services for this project shall submit one (1) original and five (5) copies of their qualifications to the City of Winter Garden reception desk no later than **2:00 p.m. (local time) on April 19, 2016**. Please address qualification packages as follows:

Donald R. Cochran
City of Winter Garden
300 West Plant Street
Winter Garden, Florida 34787
RFQ 16-002

Any qualification packages received after the above-noted deadline will not be accepted under any circumstances. Any uncertainty regarding the time a qualification package is received will be resolved against the respondent. Qualification packages submitted after the designated time will be returned unopened. No faxed or electronic submissions will be accepted.

Inquiries will be received in writing only. Please address any questions to Donald R. Cochran via email at dcochran@cwgdn.com. The deadline for the receipt of written inquiries is **April 12, 2016.**

Pursuant to Section 287.133(2)(a) of Florida Statutes, interested firms who have been placed on the convicted vendor list following a conviction for public entity crimes may not submit a proposal on a contract to provide services for a public entity, may not be awarded a consultant contract, and may not transact business with a public entity for services, the value of which exceeds $15,000, for a period of 36 months from the date of being placed on the convicted vendor list.

CONTENTS

Project Description	5
Scope of Services	9
Submission Requirements	11
Selection Criteria	13
General Instructions	15
Required Forms	18
AEI Report (Conceptual Plan for Stormwater Capture, Reuse & Aquifer Recharge)	22
AEI Geotechnical Investigations	41

PROJECT DESCRIPTION

The purpose of this project is to construct stormwater and surface water capture ponds along the southern shores of Lake Apopka to augment the City's reclaimed water system. The overall plan is to intercept and capture as much of the stormwater and surface water as possible during dry and wet season periods. During dry season periods the majority, if not all, of the captured and treated water will be reused for irrigation. However, during wet season periods, the stormwater will be pumped to the southern limits of City's service area and used for artificial aquifer recharge. The artificial aquifer recharge areas and infrastructure needed to deliver the water to these recharge systems is not part of the work proposed under this RFQ. The capture, treatment, and reuse of this water will benefit the water quality of Lake Apopka and reduce the need for groundwater sources from the regional aquifer system.

The conceptual description of the project included below is excerpted from a report prepared by Andreyev Engineering, Inc. See page 22 of this RFQ package for the complete report.

Based on the data collected and review of existing drainage systems within the city limits and input from City's staff, two (2) specific stormwater runoff sources have been identified. The 2 most reliable stormwater runoff basins were selected based on their potential to capture a significant amount of stormwater which currently receives minimal pre-treatment prior to discharge to Lake Apopka. These sites are located near existing reclaimed water transmission lines and can be easily connected to the City's overall reclaimed water supply system. The two (2) selected drainage basins are presented in **Figure 1** and the specific stormwater capture pond areas are presented in **Figures 2 and 3**. Flow monitoring and modeling indicates that about 1.5 MGD of annual average daily flow (AADF) will be possible from these two basins. However, the capture and treatment systems must be designed for a maximum daily capture and treatment capacity of 3.0 MGD, or 1.5 MGD at each of the two facilities.

Source #1 – The City's Wastewater Treatment Facility Site

This site is the City's existing wastewater treatment facility (WWTF). Currently, the WWTF site has some vacant land on both sides of the facility with drainage canals that provide significant discharge of stormwater from the City's downtown and adjacent areas. A drainage ditch exists on the western side of the site that discharges directly into Lake Apopka. The wastewater treatment facility also has an associated stormwater retention pond located on the western side of the property. The eastern side of the property is bisected by a drainage canal that also discharges to Lake Apopka. East of this drainage canal is a large vacant area.

It is proposed to utilize the existing retention pond, the two drainage canals, and the vacant area on the east side for stormwater runoff capture and reuse. The entire site will be designed with new retention ponds and overflow structures to maximize the capture of stormwater and

base flow of surface water for reclaimed water augmentation. The captured stormwater/surface water will be pumped to a filtration and chlorination system for treatment and then combined with the existing reclaimed water sources at the City's WWTF.

Source #1 Summary

Source Description	City's Existing WWTF on East Crest Avenue
Total Area Available for Stormwater Capture Ponds	4 Acres
Number of Pump Stations	1
Number of Filtration and Chlorination Systems	1
Maximum Day Capture & Treatment Capacity	1.5 MGD

Description of Work

Prepare final construction plans for the following:

Convert existing retention pond, the two drainage ditches and the eastern vacant land area into an interconnected stormwater capture pond with a control/overflow structure and an intake structure. Install a wet well, pump station, necessary piping, a filtration and chlorination system, an electrical system, and other structures as needed to capture stormwater runoff and base flow of surface water to augment the City's reclaimed water system. This will provide water sources for irrigation and artificial aquifer recharge. The intake and filtration chlorination systems shall be designed to capture a maximum day flow of 1.5 MGD and an annual average capture capacity of 0.8 MGD. See **Figure 2**.

Source #2 – Bradford Park and Existing Retention Pond Site

The site is a combination of an existing stormwater pond, bordered on the east by a large drainage canal, and a small park area. The entire site is owned by the City and is available for design and reconstruction for the alternative water supply system proposed in this report. The site is located on the south shores of Lake Apopka, at North Lakeview Avenue and Division Street. The existing canal that bisects the site provides a direct connection/discharge to Lake Apopka.

It is proposed to combine the existing retention pond on the west with the drainage canal and the park area into one large pond with a control/outfall structure. The captured stormwater will be captured at the proposed intake/pump station system, pumped through a filtration and chlorination system, and then pumped directly into the City's existing reclaimed water system. Reclaimed water line is located adjacent to the site on North Lakeview Avenue. A

conceptual plan showing the general details and layout of the proposed site modification is provided in **Figure 3**.

Source #2 Summary

Source Description	Bradford Park and pond area at North Lakeview Ave. and East Division St
Total Area Available for Stormwater Capture Ponds	6 Acres
Number of Pump Stations	1
Number of Filtration and Chlorination Systems	1
Maximum Day Capture & Treatment Capacity	1.5 MGD

Description of Work

Prepare final construction plans for the following:

Convert existing retention pond, large drainage ditch, and the adjacent City park areas into a single large stormwater capture pond with a control/overflow structure. Install a wet well, pump station, necessary piping, a filtration and chlorination system, electrical system, and other structures as needed to capture stormwater runoff and base flow of surface water to augment the City's reclaimed water system. This will provide water sources for irrigation and artificial aquifer recharge. See **Figure 3.**

Site specific preliminary geotechnical investigations for these sites have been completed by AEI, and the reports are attached to this RFQ for reference. The contractor shall not fully rely on these preliminary geotechnical reports and shall plan and conduct any supplemental geotechnical investigation that may be necessary for final design, development of construction plans, and permitting. It is expected that the specific components for this project will generally consist of the following:

Project #1 – City of Winter Garden WWTP Site

Stormwater and surface water retention and storage pond

Site work and yard piping

Wet well/pump station with transfer pumps

Filtration system for captured stormwater and surface water

Chlorine contact and disinfection system

Pumping station to combine water with reclaimed water at the WWTP

Instrumentation and controls

Project #2 – City of Winter Garden Bradford Park Site

Stormwater and surface water retention and storage pond

Site work and yard piping

Wet well/pump station with transfer pumps

Filtration system for captured stormwater and surface water

Chlorine contact and disinfection system

Pumping station to combine water with reclaimed water at the West Division Street reclaimed water main

Instrumentation and controls

SCOPE OF SERVICES

Specific services for these projects may include, but not be limited to:

Preliminary Evaluation and Analysis

- Perform an evaluation and analysis of nontraditional processes vs. traditional methods and advantages/disadvantages associated with each.
- Value engineering analysis of the treatment methods described above to include capital costs, life cycle costing, and long term operational and maintenance costs.
- Modeling services, as necessary.
- Provide recommendations regarding the processes and preferred alternatives.
- Develop a preliminary schedule, establish performance standards for the project, and budget estimate for the selected alternative method.

Design and Bidding Services

- Provide survey and topographical services, as necessary.
- Prepare a preliminary site plan and design report that includes the basis for design for the alternative processes to meet FDEP reclaimed water use standards and reclaimed water distribution system, and which will be suitable for FDEP permitting purposes as a Preliminary Design Report as defined by FDEP.
- Prepare design plans and technical specifications with document review at 60% and 90% completion for the project site, associated structures/buildings, equipment, control and SCADA systems, instrumentation, electrical components, stormwater and surface water withdrawal systems, alternative treatment facilities (filtration/chlorination), yard piping, stormwater capture and pumping facilities, and other associated construction works needed to complete the project.
- Designs and reports shall meet the requirements and be in accordance with FDEP regulations, Chapters 62-600 and 62-610, F.A.C. for the collection, distribution, and use of stormwater and surface water sources and their standards as it applies to combining the treated stormwater/surface water with reclaimed water sources.
- Provide design schedule details, project scope, establish performance standards as appropriate, and an engineer's preliminary cost estimate at various design stages.
- Coordinate and manage various design and review meetings.
- Direct oversight of the production and certification of construction documents including plans, specifications, and miscellaneous contract documents.
- Provide supplemental geotechnical services, as necessary.
- Prepare permit applications and obtain all required permits or approvals from regulatory agencies on behalf of the City of Winter Garden, including but not limited to the FDEP, SJRWMD, ACOE, and EPA.

- Prepare bid documents, including technical specifications, quantities summary, and engineer's opinion of probable cost of construction.
- Provide bidding support to the City of Winter Garden during the bidding process, including participating in the mandatory pre-bid conference and responding to contractor's questions during the bidding period.

Construction, Contract, and Inspection Management Services

- Attend pre-construction conference.
- Provide engineering support services during construction.
- Review and approval of shop drawings.
- Furnish resident engineers or inspectors for inspection of construction as may be authorized by the City from time to time.
- Coordination and monitoring of requests for information (RFI) and change orders.
- Review and verify contractor's progress payment requests.
- Attend biweekly construction management meetings.
- Conduct final inspection and process certifications of completion for regulatory agencies.
- Prepare accurate signed and sealed record drawings of as-built conditions and any other documentation that may be required by the City.
- Coordinate project closeout with the contractor, sub-consultants, and the City that may be involved with the project.
- Prepare facility operation and maintenance manuals, equipment documentation, and coordinate with City staff.
- Assist in the start-up, testing, and first 45 days of operations of each of the projects.

SUBMISSION REQUIREMENTS

The submittal in response to this Request for Qualifications (RFQ) shall be presented on 8-1/2" x 11" white paper and spiral bound. It shall be clear and concise and provide the information requested herein. Statements submitted without the required information will not be considered. Responses/bids/proposals shall be organized into tabbed sections. Respondents should not withhold any information from the written response in anticipation of presenting the information orally, since oral presentations may not be solicited. Each respondent must submit adequate documentation to certify the respondent's compliance with the City's requirements. Respondents should focus specifically on the information requested. Additional information, unless specifically relevant, may distract rather than add to the respondent's overall evaluation.

The following information, at a minimum, shall be included in the submittal:

Cover Page: Shall consist of the first page of the required forms packet (Company Information/RFQ Signature Sheet). The form shall be completed in its entirety and signed by the respondent's authorized representative.

Letter of Interest: Shall be no more than two pages in length and shall contain the respondent's name, address, telephone number, and the name of the respondent's contact person.

Tabbed Sections as follows:

Tab 1. Executive Summary (0 Points)

Provide an overview of how your firm will work with the City to provide the required services and meet time and budget requirements. Provide a brief, concise summary of your company and its capabilities. List the name(s) of the person(s) who will be authorized to make representations for your firm, their title, address, and telephone numbers. The signer of the proposal must declare that the proposal is in all respects fair and in good faith without collusion or fraud and that the signer of the proposal has the authority to bind the principal proponent.

Tab 2. Understanding of Project and Project Requirements (15 points)

Describe your understanding of the mission and goals of the project, including a general awareness of the project and its requirements. Describe your awareness of environmental impacts, benefits and constraints, or any public concerns. Identify your familiarity with and use of existing materials, tools, data, studies, organizations, and regulations relative to reclamation projects in Florida.

Tab 3. Project Approach and Method (15 points)

Provide a review of the firm's methodology for executing the project scope, controlling its quality, correcting mistakes, and maintaining or advancing the schedule. Include discussion of staffing allocation, project controls, and contract administration methods to be employed. Identify roadblocks and milestones found in similar projects and the firm's approach to

managing them. Identify the primary contact person. Describe team roles and reporting responsibilities. Indicate which team members have worked together on projects of similar size. Provide details of tasks and personnel required to accomplish the scope of work contained in this RFQ.

Tab 4. Experience/Ability (30 points)

Provide the names, professional qualifications, and experience of key personnel who will be responsible for completion of the assignment. Provide as well a list of the firm's sub-consultants, their qualifications, and their role in this project. Include copies of firm's, employees', and sub-consultants' licenses, certifications, and registrations with regulatory agencies, professional organizations, etc.

Tab 5. Past Performance (30 points)

Describe firm's qualifications and expertise related to the subject project. Discuss experience with managing similar large water resource and utility projects. Provide a list of no more than five clients (including name of contact, address, phone number, and description of work performed) for whom similar projects have been performed by the key personnel identified in the paragraph above. Provide a five-year litigation history.

Tab 6. Location (10 points)

Provide a description of the firm's local (Florida) presence, including local office, personnel, clients, etc.

Tab 7. Required Forms (0 points)

The respondent shall complete and execute the forms specified below (see pages 18–20 of this RFQ) and shall include them in this section, under Tab 7:

Company Information/RFQ Signature Sheet

Noncollusion Affidavit Form

Drug-Free Workplace Form

The following shall also be included under Tab 7:

Proof of insurance

Copies of all applicable licenses

Addenda issued and acknowledged during this solicitation

SELECTION CRITERIA

The City reserves the right to reject any and all responses and to waive technical errors and irregularities as may be deemed best for the interests of the City. Responses containing any modifications that are incomplete, unbalanced, conditional, obscure, or which contain additions not requested or irregularities of any kind, or which do not comply in every respect with the instructions to respondent and the contract documents may be rejected at the option of the City.

Each tabbed section will be scored and evaluated as follows:

Understanding of Project and Project Requirements (15 points)

- General awareness of project and its requirements
- Awareness of environmental impacts, benefits, and constraints
- Awareness of any public concerns
- Familiarity with and use of existing materials, tools, data, studies, organizations, and regulations relative to stormwater capture, filtration, chlorination, and reuse projects in Florida

Project Approach and Method (15 points)

- Quality and innovation contained in proposal and the comprehensiveness of the approach. The logic of the approach and insight shown by the approach of the nature and complexity of the project.
- Organization profile and proposed project management
- Continuity, structure, configuration, and anatomy of the team to provide and perform construction, engineering, and inspection services for this project
- Provide a proposed team organization and projected staffing matrix, with location and available hours of the project team and their responsibilities

Experience and Ability (30 points)
(Information regarding personnel who will be assigned to actively work on this project only.)

The following are <u>all</u> minimum requirements:

- A minimum of one project must be submitted for each of the key project personnel demonstrating experience relevant to the requirements of this RFQ
- Demonstration of engineering services by one of the key project personnel for alternative water resources projects. Identification of specific responsibility for project phases such as feasibility, permitting, preliminary design, final design, construction administrations, inspections, etc. should be clearly presented.

- Demonstration of engineering services by one of the key project personnel for contract administration, shop drawing reviews, pay application processing, change order review and recommendations, etc. should be clearly presented

Evidence of the following minimum requirements for key project personnel in their current professional status, licenses, and registrations:

- Project Manager/Engineer/Inspector shall have as appropriate for their position:

  P.E. in the State of Florida
  ICC certifications from IBC
  FDOT CTQP courses and certifications
  State of Florida General Contractor's License or Certified Underground License (either preferred)
- Program Manager shall have ten (10) years of experience in supervision of similar projects.
- Professional Engineer shall have five (5) years of experience in completing similar projects.
- The firm shall have at least five (5) years of operation and experience with projects of similar size and nature in the State of Florida.

Past Performance (30 points)

Proven past performance of the team on the following:

- Performance on contracts of this type
- Experience in coordination/facilitation of multi-party consensus driven processes
- Past or present experience of the proposed project manager on projects of this type with a statement of relevance for each cited water main reclamation plant projects
- Demonstrated key leadership including project coordination lead
- Relate how work resulted in successful implementation
- Explain how services resulted in value added solutions
- Past experience with the City of Winter Garden or other references

Team Location (10 points)

Provide firm's local (Florida) presence, including local office, personnel, clients, etc. with relation to the location of the project site.

GENERAL INSTRUCTIONS

Insurance Requirements

The successful respondent awarded a contract by the City (or "contractor") shall be required to provide in its proposal package evidence of workers' compensation insurance, automobile liability insurance, general comprehensive liability insurance and professional (design errors and omissions) liability insurance in minimum amounts as set forth herein. Upon notice of award, the successful respondent shall provide the City with certificates of insurance evidencing compliance with the insurance required herein. The certificate of insurance for the general comprehensive liability insurance policy shall name the City of Winter Garden as an additional insured. The certificates of insurance shall be completed by the authorized resident agent. These certificate(s) on insurance shall be dated and show:

1. The name of the insured contractor, the specific job by name and job number, the name of the insurer, the number of the policy, its effective date, and its termination date.

2. A statement that the insurer shall mail notice to the City of Winter Garden at least thirty (30) days prior to any material changes in provisions or cancellation of the policy.

Insurance shall be provided by companies acceptable to the City of Winter Garden at the following minimum limits and coverages with deductible amounts acceptable to the City:

Comprehensive General Liability Insurance:
$2,000,000.00 General Aggregate
$1,000,000.00 per Occurrence
(The City of Winter Garden is to be named as an additional insured.)
Include Waiver of Subrogation in favor of the City of Winter Garden

Professional Liability Insurance: $1,000,000.00 minimum
(Design errors and omissions)

Workers' Compensation Insurance: The contractor shall obtain during the life of the contract, Workers' Compensation Insurance with Employer's Liability Limits of $500,000/$500,000/$500,000 for all the contractor's employees connected with the work of this project and, in the event any work is sublet, the contractor shall require the subcontractor similarly to provide Workers' Compensation Insurance for all of the latter's employees unless such employees are covered by the protection afforded by the Contractor. Such insurance shall comply fully with the Florida Workers' Compensation law. In case any class of employees engaged in hazardous work under this contract for the City is not protected under the Workers' Compensation statute, the contractor shall provide, and cause each subcontractor to provide adequate insurance, satisfactory to the City, for the protection of the contractor's employees not otherwise protected. Include Waiver of Subrogation in favor of the City of Winter Garden.

Automobile Bodily Injury Liability & Property Damage Liability:
$1,000,000 Combined single limit per occurrence (each person, each accident)
Liability coverage will include hired and non-owned automobile liability
Include Waiver of Subrogation in favor of the City of Winter Garden

Loss Deductible Clause: The City shall be exempt from, and in no way liable for, any sums of money, which may represent a deductible in any insurance policy. The payment of such deductible shall be the sole responsibility of the contractor and/or subcontractor providing such insurance.

The contractor shall not commence any services or work in connection with an awarded contract until all of the types of insurance listed below have been obtained and such insurance has been approved by the City, nor shall the contractor allow any subcontractor to commence services or work on a subcontract until all similar insurance required of the subcontractor has been so obtained and approved. Policies other than Workers' Compensation shall be issued only by companies authorized by subsisting certificates of authority issued to the companies by the Department of Insurance of Florida which maintain a Best's Rating of "A" or better and a Financial Size Category of "VII" or better according to the A.M. Best Company. Policies for Workers' Compensation may be issued by companies authorized as a group self-insurer by F.S. 440.57, Florida Statutes.

Modification of Responses

A respondent may make modifications to his response by submitting them in writing via email *and* certified mail, provided such communication is received prior to the closing time. Modifications shall be emailed to Donald R. Cochran at dcochran@cwgdn.com and mailed via certified mail to the following address:

Donald R. Cochran
City of Winter Garden
300 West Plant Street
Winter Garden, Florida 34787
RFQ 16-002

Any request to withdraw a qualification package must be submitted in writing via email *and* certified mail to the addresses provided above. Such requests must be received by the City prior to the deadline for submission.

Responsibility for Response

The respondent is solely responsible for all costs associated with preparing and submitting the response, regardless of whether a contract award is made by the City.

Receipt and Opening of Responses

Responses will be received until the designated time, and the names of the respondents will be read aloud. The City's representative authorized to open the responses will decide when the specified time has arrived, and no responses received thereafter will be considered. Respondents or their authorized agents are invited to be present.

Award of Contract

A contract will be awarded to the respondent deemed most qualified to provide the service, upon successful negotiations and in the best interest of the City.

The City reserves the right to waive any informality in any response; to accept or reject any or all submittals that it may, in its sole discretion, deem unresponsive; or to re-advertise for all or part of the work contemplated. The City also reserves the right to reject the response of a respondent who has previously failed to perform properly or to complete contracts of a similar nature on time.

If responses are found to be acceptable by the City, written notice will be posted on the City's website of the award of the contract. Recommendation of award will be presented to the City Commission for final approval of award.

If the award of a contract is annulled, the City may award the contract to another respondent or the work may be re-advertised or may be performed by other qualified personnel as the City decides.

Execution of Contract

The respondent to whom a contract is awarded will be required to return to the City two (2) executed counterparts of the contract together with the required certificates of insurance.

REQUIRED FORMS

The following required forms are to be included under Tab 7 of each respondent's submittal package:

Company Information/RFQ Signature Sheet
Noncollusion Affidavit Form
Drug-Free Workplace Form

These forms are included below on pages 19–21.

Please also include the following items under Tab 7:

Proof of insurance
Copies of all applicable licenses
Addenda issued and acknowledged during this solicitation

COMPANY INFORMATION/RFQ SIGNATURE SHEET

FAILURE TO COMPLY WITH THESE RFQ INSTRUCTIONS WILL RESULT IN DISQUALIFICATION OF YOUR SUBMITTAL PACKAGE. PLEASE SIGN BELOW ATTESTING THAT YOU HAVE READ AND UNDERSTAND ALL RFQ INSTRUCTIONS AND THAT YOU UNDERSTAND THAT THE SUCCESFUL RESPONDENT WILL BE REQUIRED TO ENTER INTO A LEGALLY BINDING CONTRACT WITH THE CITY OF WINTER GARDEN.

COMPANY NAME	TELEPHONE (INCLUDE AREA CODE)
	FAX (INCLUDE AREA CODE)
AUTHORIZED SIGNATURE	E-MAIL ADDRESS
NAME/TITLE (PLEASE PRINT)	
ADDRESS 1	REMITTANCE ADDRESS 1
ADDRESS 2	REMITTANCE ADDRESS 2
CITY STATE ZIP	CITY STATE ZIP

FEDERAL ID# _____

☐ Individual ☐ Corporation ☐ Partnership ☐ Other (Specify): _____

Sworn and subscribed before me this _____ day of _____ , 2016.

☐ Personally Known or
☐ Produced Identification Type of Identification: _____

NOTARY PUBLIC – State of _____

County of _____

Signature of Notary Public _____

NOTARY SEAL

NONCOLLUSION AFFIDAVIT OF PRIME BIDDER

State of _____

County of _____

_____, being first duly sworn, deposes and says that:
(Name/s)

1. He/She is _____ of _____,
   (Title) *(Name of Company)*
   the Bidder that has submitted the attached bid;
2. He/She is fully informed respecting the preparation and contents of the attached bid and of all pertinent circumstances representing the Bid;
3. Such Bid is genuine and is not a collusive or sham Bid;
4. Only one submittal for the above project is being submitted and that the above named entity has no financial interest in other entities submitting proposals for the same project.
5. Neither the said Bidder nor any of its officers, partners, owners, agents, representatives, employees, subsidiaries, or parties of interest, and including this affiant, has in any way colluded, conspired, connived, or agreed, directly or indirectly, with any other bidder, firm or person to submit a collusive or sham Bid in connection with the contract for the attached bid that has been submitted or to refrain from bidding in connection with such contract or has in any manner, directly or indirectly, sought agreement or collusion or communication or conference with any other Bidder, firm or person to fix the price or prices in the attached Bid or of any other Bidder, or to secure through collusion, conspiracy, connivance, or unlawful agreement any advantage against the City of Winter Garden or any person interested in the proposed contract; and
6. The price or prices quoted in the attached Bid are fair and proper and are not tainted by any collusion, conspiracy, connivance or unlawful agreement on the part of the Bidder or any of its agents, representatives, owners, employees or parties in interest, including this affiant.
7. Neither the said Bidder nor its affiliates, nor anyone associated with them, is presently suspended or otherwise ineligible from participating in contract lettings by any local, state, or federal agency.

Signed:_____

Title:_____

Subscribed to and sworn before me this ___ day of _____ , 2016, by _____

_____ , who is personally known to me or who produced _____

_____ as identification.

_____
Notary Public

My commission expires: _____

DRUG-FREE WORKPLACE FORM

The undersigned vendor, in accordance with Florida Statute 287.087, hereby certifies that

_____ does:
(Name of Business)

1. Publish a statement notifying employee that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the workplace and specifying the actions that will be taken against employees for violations of such prohibition.

2. Inform employees about the dangers of drug abuse in the workplace, the business's policy of maintaining a drug-free workplace, any available drug counseling, rehabilitation, and employee assistance programs, and the penalties that may be imposed upon employees for drug abuse violations.

3. Give each employee engaged in providing the commodities or contractual services that are proposed a copy of the statement specified in subsection (1).

4. In the statement specified in subsection (1), notify the employees that, as a condition of working on the commodities or contractual services that are under bid, the employee will abide by the terms of the statement and will notify the employer of any conviction of, or plea of guilty or nolo contendere to, any violation of Chapter 893 or of any controlled substance law of the United States or any state, for a violation occurring in the workplace no later than five (5) days after such conviction.

5. Impose a sanction on, or require the satisfactory participation in a drug abuse assistance or rehabilitation program if such is available in the employee's community, by any employee who is so convicted.

6. Make a good faith effort to continue to maintain a drug-free workplace through implementation of this section.

As the person authorized to sign this statement, I certify that this firm complies fully with the above requirements.

_____
Proposer's Signature

_____
Date

(THIS FORM MUST BE COMPLETED IF APPLICABLE AND RETURNED WITH YOUR PROPOSAL)

Andreyev Engineering, Inc., Report

Conceptual Plan for Stormwater Capture, Reuse & Aquifer Recharge

Andreyev Engineering, Inc.

SANFORD OFFICE
4055 St. John's Parkway
Sanford, Florida 32771
407-330-7763
Fax: 407-330-7765

▼ Groundwater ▼ Environmental ▼ Geotechnical ▼ Construction Materials Testing

July 28, 2014

TO: City of Winter Garden
251 West Plant Street
Winter Garden, FL 34787

Attention: Donald Cochran, P.E.

SUBJECT: Conceptual Plan for Stormwater Capture, Reuse & Aquifer Recharge
City of Winter Garden, Orange County, Florida

Dear Mr. Cochran:

Andreyev Engineering, Inc. (AEI) has prepared this summary report which presents the development of a conceptual plan to capture stormwater runoff to supplement reclaimed water sources for irrigation and for artificial aquifer recharge.

The conceptual stormwater capture and reuse plan was developed based on our knowledge of the region, available published geologic and hydrogeologic data and the aquifer data included in the existing regional groundwater flow model (ECF model prepared by SJRWMD). No site specific investigations or comprehensive evaluations of the retention ponds or the aquifer recharge areas were made at this time.

The following report presents a summary of the work, evaluation and estimated quantities of stormwater capture and reuse as well as calculations estimating the resulting nutrient load reduction to Lake Apopka. An approximate cost estimate for the various components of the project are also included in this report. If you have any questions or comments, please contact the undersigned.

Sincerely,
Andreyev Engineering, Inc.

NICOLAS E. ANDREYEV
LICENSE
NO. 35459
STATE OF
FLORIDA
PROFESSIONAL ENGINEER

Nicolas E. Andreyev, P.E.
President
Florida Registration No.: 35459

Purpose

The purpose of this conceptual stormwater capture and reuse plan is to present an approach to capturing stormwater runoff for reclaimed water augmentation and for artificial aquifer recharge when irrigation water is not required.

Artificial Aquifer Recharge Concept

The capture of excess stormwater and artificial aquifer recharge is the least expensive and the most effective option for long term aquifer management and sustainability of water supply in Central Florida region. Aquifer recharge is the natural process of water cycle in the region that has been in effect for thousands of years. As development progresses, drainage improvements are made which increase runoff and effectively decrease the amount of water available for aquifer recharge. Development also increases withdrawal of groundwater from the aquifers creating further imbalance of the natural cycle of balanced aquifer recharge and discharge.

The idea of stormwater capture and artificial aquifer recharge is simply to restore the natural cycle of aquifer recharge or improve aquifer recharge in the available and suitable recharge areas. The aquifer recharge imbalance can be observed through an evaluation of historic decline of groundwater levels and potentiometric surface levels of the aquifers, the historic decline of spring flow rates, and the historical increases in flow rates in rivers and creeks downstream of developed areas. These are the actual field observable indicator parameters that can be monitored and used as a guide to determine the location and the amount of aquifer imbalance. To mitigate the observed aquifer recharge imbalance, the aquifer can be artificially recharged by applying water at specific (strategic) locations. Preferably, these locations are upstream of the impacted areas and are conducive to effective aquifer recharge.

The captured stormwater sources for aquifer recharge can be combined with reclaimed water, surface water from creeks, rivers, drainage ditches, lakes and even groundwater extracted from other regions of the aquifer system. In many cases, the artificial aquifer recharge system can be implemented with minimal initial capital investment by extending or upgrading existing reclaimed water systems and integrating natural depressions and/or existing retention ponds as artificial aquifer recharge areas. A stormwater capture and artificial aquifer recharge system can be continuously upgraded based on the observed aquifer imbalance data and the available opportunities to increase or decrease recharge, as necessary.

Scope of Work

For this conceptual stormwater capture and reuse plan the following scope of work was conducted:

1. Obtained the latest regional groundwater flow model from the SJRWMD (ECF Model) and utilized the aquifer parameter data to identify beneficial artificial aquifer recharge areas for City's water supply wells and for spring flow protection. The scope of work did not include specific modeling scenarios,

regional model updates or analyses of the effects of proposed source water capture and recharge.

2. Identified and reviewed available properties owned by or accessible to the City that can be used for stormwater capture and for artificial aquifer recharge. This was obtained from City's GIS database and discussions with Donald Cochran and Art Miller.

3. Identified and reviewed available surface water bodies, drainage ways, canals, existing stormwater retention areas and other water source areas for potential capture of stormwater runoff that would normally discharge to Lake Apopka. Identification of source water areas were not considered in the areas of closed drainage basins, where excess water will naturally recharge the aquifer. The capture of stormwater runoff was restricted to areas along the southern shores of Lake Apopka, where multiple creeks and drainage ways discharge directly into the lake. Capture of these water sources will be beneficial both for the reclaimed water augmentation, aquifer recharge and for water quality improvement in Lake Apopka.

4. Identified and selected two (2) source stormwater sites along the south shore of Lake Apopka. These include existing stormwater drainage systems and discharge points from the City's downtown drainage basins. The stormwater source sites will require considerable design modifications to convert the existing areas into large stormwater retention and capture systems. The captured stormwater will be filtered and chlorinated and then pumped directly into the City's existing Reclaimed Water System.

5. Identified artificial aquifer recharge site to discharge the excess reclaimed water sources (during wet season period or during period of low irrigation demand), including captured stormwater.

6. Obtained drainage basin data from the City's Drainage Master Plan and estimated the amount of runoff from the two selected basins. Utilizing the land use plans within the basin areas, estimate the annual generation of Nitrogen and Phosphorus and calculated the amount of nutrient load reduction to Lake Apopka that would results from capturing and reusing the stormwater runoff.

7. Estimated the anticipated cost of constructing the stormwater capture ponds, installation of the intake structures, filtration and chlorination equipment, connection and extension pipelines, manholes, valves, electrical equipment and other equipment to allow implementation of this project.

8. Prepared this summary report with conceptual plans to design the stormwater capture, filter, chlorinate and reuse or recharge the aquifer. This report can be used for planning, budgeting, funding alternatives and other purposes.

Conceptual Plan

Source Locations

Based on the data collected and review of existing drainage systems within the city limits and input from City's staff, two (2) specific stormwater runoff sources have been identified. The 2 most reliable stormwater runoff basins were selected based on their potential to capture significant amount of stormwater which currently receive minimal pre-treatment prior to discharge to Lake Apopka. These sites are located near existing reclaimed water transmission lines and can be easily connected to the overall city's reclaimed water supply system. The two (2) selected drainage basins are presented on **Figure 1** and the specific stormwater capture pond areas are presented on **Figures 2 and 3**.

Source #1 – City's Wastewater Treatment Facility Site

The simplest site for stormwater capture is the existing city's wastewater treatment facility (WWTF) site. Currently, the WWTF site has some vacant land on both sides of the facility with drainage canals that provide significant discharge of stormwater from the downtown and adjacent areas. A drainage ditch exists on the western side of the site which discharges directly into Lake Apopka. The wastewater treatment facility also has an associated stormwater retention pond located on the western side of the property. The eastern side of the property is bisected by a drainage canal also discharging to Lake Apopka. East of this drainage canal is a large vacant area.

It is proposed to utilize the existing retention pond, the two drainage canals and the vacant area on the east side for stormwater runoff capture and reuse. The entire site will be designed with new retention ponds and overflow structures to maximize capture of stormwater for reclaimed water augmentation. The captured stormwater will be pumped directly from the retention ponds to the WWTP, filtered/chlorinated and combined with the existing reclaimed water sources of the WWTP.

Source #1 Summary

Source Description	***Existing City's WWTF on East Crest Avenue***
Total Area of Retention Ponds	***4 Acres***
Number of Pump Stations	***1***
Estimated Capture Capacity	***0.8 MGD (292 MGY)***
Description: Convert existing retention pond, the two drainage ditches and the eastern vacant land area into two retention and capture ponds with a control/overflow structures and an interconnected intake structure. Install a pump station and necessary piping to capture stormwater and augment the reclaimed water system, provide reclaimed water sources for irrigation and artificial aquifer recharge during wet season periods and low irrigation demand periods, see **Figure 2**.	

Source #2 - City Park and Existing Pond Site

This site is another viable source of water for the alternative water supply system. The site is a combination of an existing stormwater pond, bordered on the east by a large drainage canal and includes a small park area. The entire site is owned by the city and is available for design and reconstruction for the alternative water supply system proposed in this report. The site is located on south shores of Lake Apopka, at North Lakeview Avenue and Division Street. The existing canal that bisects the site provides a direct connection/discharge to Lake Apopka.

The proposed conceptual plan for this site will include combining the existing retention pond on the west with the drainage canal and the park area into one large pond with an outfall structure. This will minimize or eliminate the direct stormwater discharge to Lake Apopka The captured stormwater will be pumped from the retention pond, filtered and chlorinated and then pumped directly into the City's existing Reclaimed Water System Trunkline located adjacent to the site on North Lakeview Avenue. A conceptual plan showing the general details and layout of the proposed site modification is provided on **Figure 3**.

Source #2 Summary

Source Description	***City Park and Pond Area at North Lakeview Avenue and East Division Street***
Total Area of Ponds	***6 Acres***
Number of Pump Stations	***1***
Estimated Capture Capacity	***1.2 MGD (430 MGY)***
Description: Convert existing retention pond, large drainage ditch and the adjacent city park into a single large retention pond with a control/overflow structure. Install an intake structure, a filtration and chlorination system, electrical system and a pump station to capture stormwater runoff to augment the City's reclaimed water system. This will provide water sources for irrigation and artificial aquifer recharge during wet season periods and low irrigation demand periods, see **Figure 3**.	

Aquifer Recharge Basin

To evaluate the regional beneficial aquifer recharge locations, the location of the city's water supply wells, the boundaries of the springshed, the geology of the area and the hydrogeologic conditions of the aquifers were reviewed. The evaluation included identification of regional significant recharge areas, observed closed drainage basin areas and other obvious indicator parameters that indicate internally drained conditions that would be beneficial for aquifer recharge. For this purpose, we have reviewed the soil boring profiles from various geotechnical investigations by AEI and others in the area, the well logs from water supply wells in the area, the lake levels, the lake overflow elevations, the data included in the regional groundwater flow model and conducted a visual field survey of each property.

Once the regional effective recharge areas were identified, the potential aquifer recharge basins were evaluated and discussed with the City's planning and engineering personnel. The final properties were selected in consultation with Donald Cochran and

Art Miller, based on city owned properties, properties that are accessible for city's use, and/or undeveloped properties that could be acquired by the city. These sites were then evaluated further using available geologic and hydrogeologic data and field observations. Although no site specific testing was conducted at this time, the field observations included assessment of topographic setting and observed depth to groundwater level in lakes and depressional areas, which provide an indication of the groundwater conditions in the area.

The regional geologic/hydrogeologic evaluation revealed that the most beneficial artificial aquifer recharge areas are located in the southwestern portion of the City limits, in the general vicinity of the Conserve II project limits.

The northern and eastern portions of the City limits were determined to have limited benefit for artificial aquifer recharge. The majority of the northern and eastern parts of the City of Winter Garden are characterized by a thick sequence of confining soil layers which hydraulically separate the surficial and Upper Floridan aquifers. Water applied in these areas recharge the shallow aquifer, then perch on top of the confining soil layers and flow laterally towards Lake Apopka. Very little, if any, of the recharging water at the surface reaches the Floridan aquifer in this region.

In contrast, the southwestern portion of the City limits, these confining layers thin out and become highly leaky. A thicker sequence of extremely well drained soils is present in these areas that would allow storage of large quantities of captured stormwater within the surficial aquifer sands with subsequent vertical leakage into the Floridan aquifer. These are the areas that will provide the greatest opportunity for beneficial aquifer recharge. The high soil storage capacity will provide the needed storage of excess captured water during wet season periods and the subsequent vertical leakage will provide for aquifer recharge when captured water is used for irrigation.

The final selection of storage basin sites and potential aquifer recharge sites were reduced to a total of three properties that have the best potential for City's control and implementation. The following are the selected three artificial aquifer recharge sites.

Site #1- Marsh Road Site (City Owned)

Storage & Recharge Type	***Pond, Swales & Wetland Hydration***
Total Area of Property	***40 Acres (+/-)***
Available Storage Capacity	***6 MG***
Effective Recharge Area	***5 Acres***
Estimated Recharge Capacity	***0.4 to 0.6 (146 - 219 MGY)***
Description: This site is owned by the City, located on Marsh Road, it abuts the northeast corner of the Carriage Pointe Subdivision. Observations of the site conditions indicated a significant portion of the site contain wetlands that are surrounded by upland areas on the southeast and northwest. Our assessment of this site indicates some potential for aquifer recharge. This site could also be utilized for wetland hydration, which can improve wetlands and create regionally higher groundwater levels that would help recharge the aquifer. Its proximity to the reclaimed water system and regional recharge areas can be beneficial for storage and recovery and for artificial aquifer recharge. See **Figure 4**.	

Site #2 – Retention Pond at Carriage Pointe Subdivision

Storage & Recharge Type	***Retention Pond & Recharge Basin***
Total Area of Property	***3 Acres (+/-)***
Available Storage Capacity	***3 to 5 MG***
Effective Recharge Area	***3 Acres***
Estimated Recharge Capacity	***0.2 to 0.4 MGD (73 - 146 MGY)***
Description: The existing retention pond is currently used for stormwater retention and treatment. The City will take control of the operation and maintenance of the pond and convert it into a dual use system. Stormwater will continue to be directed to the retention pond. However, this pond is located in an area of very deep groundwater table and highly permeable soils. Captured stormwater or reclaimed water will be applied periodically into the pond for aquifer recharge purposes. An additional benefit of this site will be the recharge to the shallow aquifer, which will first create a mound in the shallow aquifer and then flow laterally towards area lakes and wetlands, including Johns Lake, which is known to recharge the Floridan aquifer system and is an MFL lake. See **Figure 5**.	

Site #3 – Retention Pond at Alexander Ridge Subdivision

Storage & Recharge Type	***Retention Pond & Recharge Basin***
Total Area of Property	***4 Acres (+/-)***
Available Storage Capacity	***4 to 6 MG***
Effective Recharge Area	***4 Acres***
Estimated Recharge Capacity	***0.3 to 0.5 MGD (110 - 182 MGY)***
Description: The existing retention pond is currently used for stormwater retention and treatment. The City will take control of the operation and maintenance of the pond and convert it into a dual use system. Stormwater will continue to be directed to the retention pond. However, this pond is located in an area of very deep groundwater table and highly permeable soils. Captured stormwater or reclaimed water will be applied periodically into the pond for aquifer recharge purposes. An additional benefit of this site will be the recharge to the shallow aquifer, which will first create a mound in the shallow aquifer and then flow laterally towards area lakes and wetlands, including Johns Lake, which is known to recharge the Floridan aquifer system and is an MFL lake. See **Figure 6**.	

Preliminary Cost Estimates

The following are our preliminary cost estimates to construct the two stormwater capture areas (sources) and the three artificial aquifer recharge areas. These estimates are intended for preliminary planning and funding purposes only. The cost estimates were based on other similar projects and were not based on site specific soil and groundwater data. Prior to final construction, each site will need to be investigated and final construction plans will need to be prepared for each site.

Project Cost Estimates				
Source 1 Stormwater Capture and Reuse				
Construct Collection Pond at WWTP Site East (combine stormwater ponds)				
	Excavation/Berm Construction (4 ac x 6' deep)		$ 120,000	
	Control/Overflow Structures		$ 100,000	
	Site Works (sod, landscaping, berm, etc.)		$ 100,000	
	Yard Piping (16", 1000 ft @ $80/LF)		$ 80,000	
	Wet Well, Pump Station, Connection to WWTP..)		$ 250,000	
	Drainage Structures and Manholes		$ 50,000	
	Electrical and Instrumentation		$ 50,000	
		SUBTOTAL	$ 750,000	
		Contingency @ 10%	$ 75,000	
		Engineering & CEI Services @ 15%	$ 112,500	
	TOTAL FOR SOURCE 1		**$ 937,500**	
Source 1 - Estimated Stormwater Capture Capacity				
Total Capture Volume			**38,497,527**	**CFY**
Total Capture Volume			**288**	**MGY**
Capture Capacity per Irrigation Day (total of 144 Irrigation days/year)			**2.00**	**MGD**
Equivalent Annual Average Capture Rate (3654 days per year)			**0.80**	**MGD**
Source 2 Stormwater Capture and Reuse				
Reconstruct Park Area into a Collection Pond				
	Excavation/Berm Construction (6 ac x 6' deep)		$ 185,000	
	Control/Overflow Structure		$ 100,000	
	Site Works (sod, landscaping, berm, etc.)		$ 100,000	
	Yard Piping (16", 1,500 ft @ $80/LF)		$ 120,000	
	Wet Well, Pump Station, Mech. Filter, Disinfection..)		$ 750,000	
	Drainage Structures and Manholes		$ 50,000	
	Electrical and Instrumentation		$ 100,000	
		SUBTOTAL	$ 1,405,000	
		Contingency @ 10%	$ 140,500	
		Engineering & CEI Services @ 15%	$ 210,750	
	TOTAL FOR SOURCE 2		**$ 1,756,250**	
Source 2 - Estimated Annual Stormwater Capture				
Total Capture Volume			**57,813,127**	**CFY**
Total Capture Volume			**432**	**MGY**
Capture Capacity per Irrigation Day (total of 173 Irrigation days/year)			**2.50**	**MGD**
Equivalent Annual Average Capture Rate (3654 days per year)			**1.20**	**MGD**

Site 1: Aquifer Recharge Basins on Mash Raod (City owned)				
Construct Infiltration Ponds, Swales, Wetland Hydration Systems				
	Excavation/Berm Construction (Multipe Systems, 5-6 acres)		$ 290,400	
	Extend Reclaimed Water Lines, connections, discharge Structures)		$ 100,000	
		SUBTOTAL	$ 390,400	
		Contingency @ 10%	$ 39,040	
		Engineering & CEI Services @ 15%	$ 58,560	
	TOTAL FOR SITE 1		**$ 488,000**	
Site 2: Aquifer Recharge - Existing Retention Pond at Carriage Pointe Subdivision				
	Extend Reclaimed Water Lines, connections, discharge structures)		$ 150,000	
		SUBTOTAL	$ 150,000	
		Contingency @ 10%	$ 15,000	
		Engineering & CEI Services @ 15%	$ 22,500	
	TOTAL FOR SITE 2		**$ 187,500**	
Site 3: Aquifer Recharge - Existing Retention Pond at Alexander Ridge Subdivision				
	Extend Reclaimed Water Lines, connections, discharge Structures)		$ 180,000	
		SUBTOTAL	$ 180,000	
		Contingency @ 10%	$ 18,000	
		Engineering & CEI Services @ 15%	$ 27,000	
	TOTAL FOR SITE 3		**$ 225,000**	
GRAND TOTAL			**$ 3,594,250.00**	
	SJRWMD Participation @ 33%		**$ 1,186,102.50**	
	City of Winter Garden Matching Funds		**$ 2,408,147.50**	

Nutrient Capture Estimates

The following calculations show the estimated volume of total nitrogen and total phosphorus that can potentially be captured and diverted from discharging to Lake Apopka, if both drainage basins are included in the stormwater capture and aquifer recharge project. This assumes that the proposed two ponds will be capable of capturing the estimated 1.8 MGD of stormwater on an annual average basis. The calculations indicate that about **10,950 pounds of total nitrogen and about 1,988 pounds of total phosphorus** can be captured. This can be a significant beneficial effect on Lake Apopka.

Table 1
City of Winter Garden Stormwater Improvements - Source 1
Nitrogen (N) and Phosporous(P) Generation per Basin

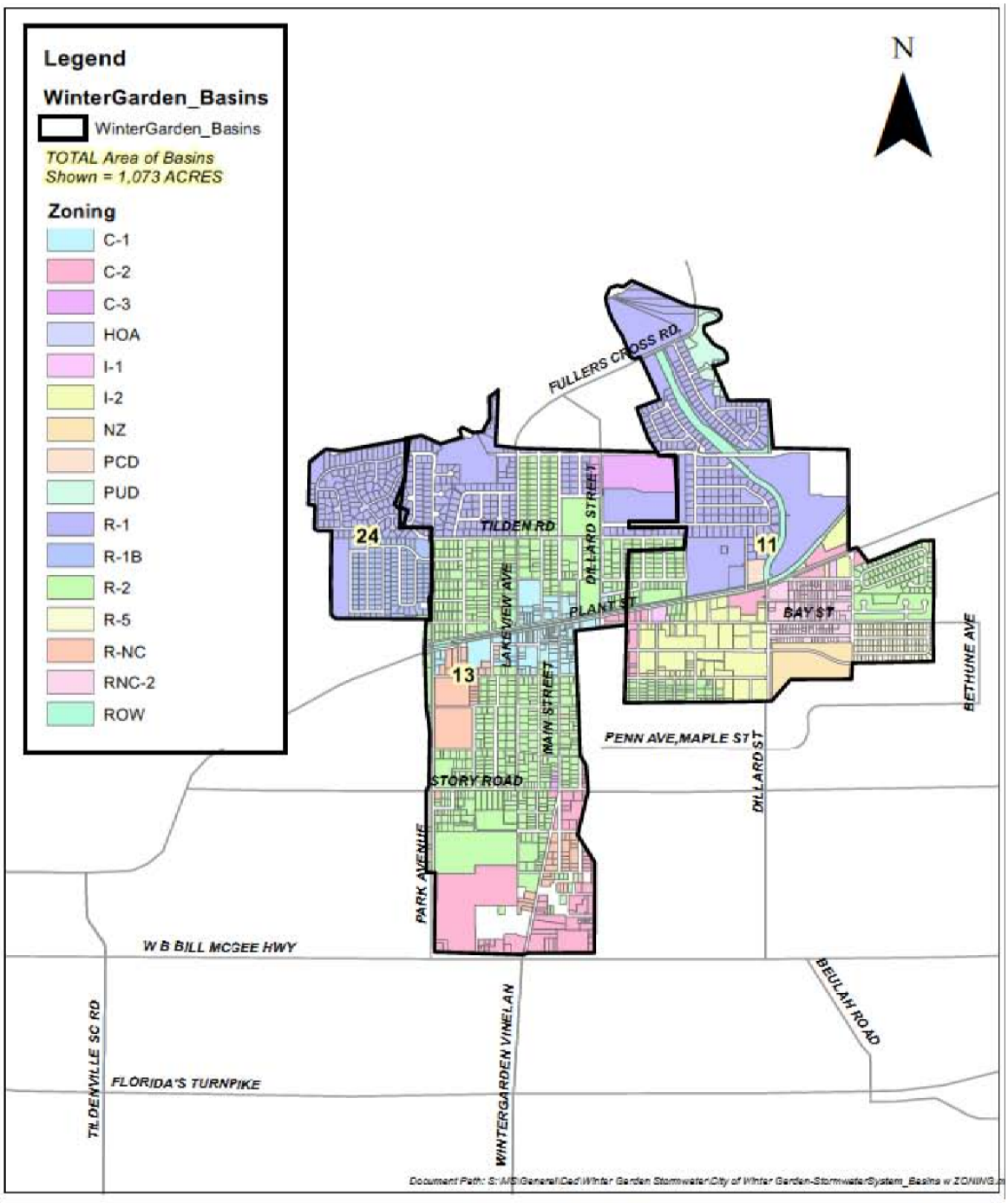
Area	Basin Land Use	Drainage Area(ac)	Runoff Coefficient - C	Annual Rainfall(inches)	Annual Runoff Volume (MG)	Annual Runoff Volume (m^3)	EMC N (mg/L)	EMC P (mg/L)	TN Generated Annually (lbs)	TP Generated Annually (lbs)
13-R	1200	250.61	0.35	50.70	120.75	457215	2.23	0.32	2248	318.60
13-C	1400	13.97	0.80	50.70	15.39	58271	1.93	0.48	248	61.70
13-I	1550	56.23	0.78	50.70	60.37	228735	1.55	0.15	782	75.70
13-NZ/ROW	1750	149.7	0.60	50.70	123.63	468372	1.80	0.48	1859	495.70
13-Vacant	4100	77	0.25	50.70	26.50	100398	0.70	0.09	155	19.90
Subtotals		**547.49**			**346.64**				**5292**	**971.60**
24-R	1200	86.2	0.35	50.70	41.52	157220	2.23	0.32	773	109.50
24-C	1400	0	0.80	50.70	0.00	0	1.93	0.48	0	0.00
24-I	1550	0	0.78	50.70	0.00	0	1.55	0.15	0	0.00
24-NZ/ROW	1750	0	0.60	50.70	0.00	0	1.80	0.48	0	0.00
24-Vacant	4100	11	0.25	50.70	3.79	14334	0.70	0.09	22	2.80
Subtotals		**97.18**			**45**				**795**	**112.30**
Totals		**644.67**							**6087.00**	**1083.90**

Table 2
City of Winter Garden Stormwater Improvements - Source 2
Nitrogen (N) and Phosporous(P) Generation per Basin

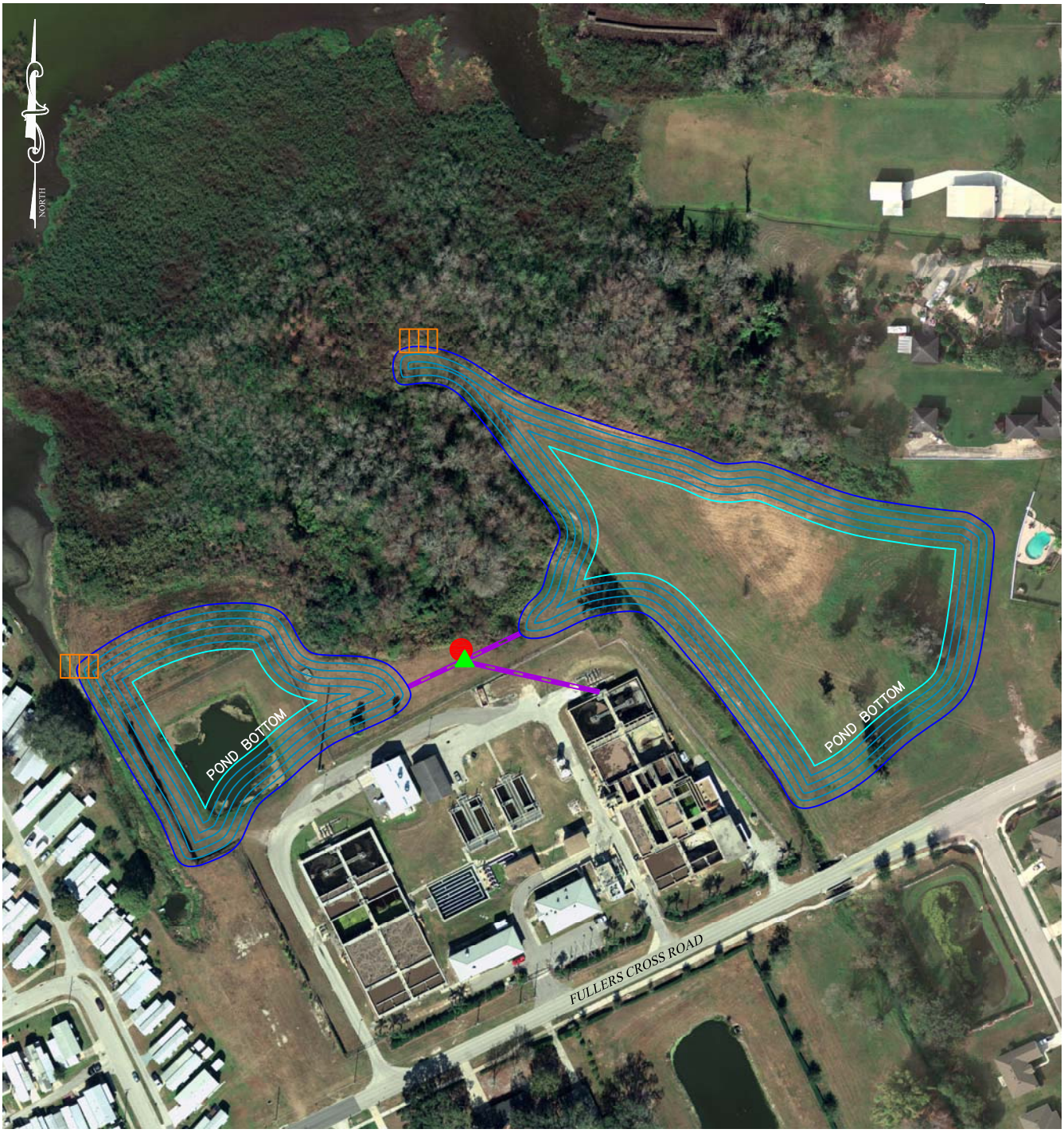
Area	Basin Land Use	Drainage Area(ac)	Runoff Coefficient - C	Annual Rainfall(inches)	Annual Runoff Volume (MG)	Annual Runoff Volume (m^3)	EMC N (mg/L)	EMC P (mg/L)	TN Generated Annually (lbs)	TP Generated Annually (lbs)
11-R	1200	318.52	0.35	50.70	153.47	581098	2.23	0.32	2857	404.90
11-C	1400	109.77	0.80	50.70	120.89	457733	1.93	0.48	1948	484.50
11-I	1550	0.00	0.78	50.70	0.00	0	1.55	0.15	0	0.00
11-NZ/ROW	1750	4.6	0.60	50.70	3.77	14281	1.80	0.48	57	15.10
11-Vacant	4100	0	0.25	50.70	0.00	0	0.70	0.09	0	0.00
Subtotals		**432.85**			**278.13**				**4862**	**904.50**

RUNOFF COEFFICIENTS								
		Soil Type						
FLUCCS	Definition	A	B/D	C	C/D	D	U	W
1100	Residential, low density	0.174	0.342	0.286		0.342		0.258
1190	Residential, low density, under construction	0.160	0.223	0.202			0.223	0.258
1200	Residential, medium density	0.220	0.304	0.389		0.473	0.347	0.347
1300	Residential, high density	0.631	0.662	0.692	0.692	0.733	0.677	0.677
1390	Residential, high density, under construction		0.223	0.202		0.223		0.677
1400	Commercial and services	0.886	0.887	0.888		0.900	0.890	0.890
1460	Tourist services	0.886					0.890	
1510	Food processing		0.793					0.809
1550	Other light industry	0.544	0.577	0.609			0.593	0.593
1600	Extractive	0.220	0.304					0.347
1700	Institutional	0.696	0.741	0.786	0.786	0.856	0.770	0.770
1730	Military	0.680	0.724	0.768			0.752	0.752
1750	Governmental	0.680	0.724	0.768	0.768	0.836	0.752	0.752
1800	Recreational	0.127	0.183	0.182		0.210	0.169	0.169
1820	Golf Course	0.182	0.222	0.258		0.298	0.240	0.240
1840	Marinas and fish camps		0.319	0.407		0.494	0.363	0.363
1860	Community recreational facilities	0.127	0.183	0.182			0.169	0.169
1890	Other recreational	0.499	0.543			0.637		
2110	Improved pasture	0.251	0.405					
2150	Field crops		0.411					
2200	Tree crops	0.251				0.302		
2210	Citrus	0.251	0.268	0.285	0.285	0.302		0.277
2240		0.251	0.268	0.285				
2500	Specialty farms			0.454			0.429	
3100	Herbaceous (Dry Prairie)	0.100	0.411	0.300	0.411	0.411	0.252	0.252
3200	Upland Shrub and Brushland	0.060	0.400	0.287	0.400	0.400	0.231	0.231
3300	Mixed rangeland	0.060	0.400	0.287	0.400	0.400	0.231	0.231
4100	Upland Coniferous Forest		0.413		0.413	0.413		
4110	Pine flatwood	0.102	0.413	0.309	0.413	0.413	0.258	0.258
4130	Sand pine	0.102		0.309		0.413		
4200	Upland Hardwood Forest	0.102	0.413	0.309		0.413	0.258	0.258
4210	Xeric oak	0.102	0.413	0.309		0.413	0.258	0.258
4340	Hardwood - Conifer Mixed	0.102	0.413	0.309	0.413	0.413	0.258	0.258
4370	Australian Pine	0.102	0.413	0.309		0.413	0.258	0.258
4430	Forest Regeneration Areas		0.413	0.309	0.413	0.413		
5100	Streams and Waterways	1.000	1.000	1.000	1.000	1.000	1.000	1.000
5200	Lakes	0.500		0.500		0.500		0.500
5300	Reservoirs	0.500	0.500	0.500	0.500	0.500	0.500	0.500
5340	Reservoirs, <10 acres	0.500	0.500	0.500	0.500	0.500	0.500	0.500
5400	Bays and estuaries	1.000	1.000	1.000	1.000	1.000	1.000	1.000
5430	Enclosed salt water ponds within salt marsh	1.000	1.000	1.000		1.000		1.000
6120	Mangrove Swamp	0.191	0.303	0.266	0.303	0.303	0.247	0.247
6170	Mixed wetland hardwood	0.191	0.303	0.266	0.303	0.303	0.247	0.247
6181		0.124	0.303	0.266	0.303	0.303	0.152	0.152
6182			0.303		0.303	0.303		0.152
6210	Cypress		0.303		0.303	0.303		
6300	Wetland Forested Mixed	0.191	0.303	0.266	0.303	0.303	0.247	0.247
6410	Freshwater Marshes / Graminoid Prairie - Ma	0.191	0.303	0.266	0.303	0.303	0.247	0.247
6420	Saltwater Marshes / Halophytic Herbaceous I	0.191	0.303	0.266	0.303	0.303	0.247	0.247
6430	Wet prairie	0.191	0.303	0.266	0.303	0.303	0.247	
6440	Emergent aquatic vegetation		0.303	0.266		0.303		0.247
6460		0.191	0.303	0.266	0.303	0.303	0.247	0.247
6500	Non-Vegetated Wetlands			0.266		0.303		0.247
7100	Beaches	0.102		0.309		0.413	0.258	0.258
7200	Sand other than beaches			0.309				0.258
7400	Disturbed land	0.160	0.223	0.202		0.223		0.191
7410	Rural land in transition (no indicators of new	0.151	0.234	0.234		0.276	0.255	0.255
7430	Spoil area	0.169	0.169	0.169		0.169	0.169	0.169
8110	Airports	0.326	0.399	0.473		0.546	0.436	0.436
8120	Railroads and railyards	0.200	0.250	0.300		0.350	0.275	0.275
8140	Roads and highways	0.630	0.703	0.777	0.777	0.850	0.740	0.740
8150	Port Facilities	0.630		0.777		0.850	0.740	0.740
8180	Auto parking facilities						0.890	0.890
8200	Communication						0.169	0.169
8310	Electrical power facilities		0.793	0.825				
8320	Electrical Power Transmission Lines	0.127	0.210	0.182		0.210	0.169	0.169
8330	Water Supply Plants - Including Pumping Stat	0.174		0.286			0.258	0.258
8340	Sewage Treatment			0.286			0.258	0.258

FIGURES



Andreyev Engineering, Inc.			CONCEPTUAL PLAN FOR STORMWATER CAPTURE REUSE & AQUIFER RECHARGE **CITY OF WINTER GARDEN** ORANGE COUNTY, FL
APPROXIMATE SCALE: N.T.S.	DATE: 07/28/14	ENGINEER: NA	CITY OF WINTER GARDEN DRAINAGE BASINS FOR TWO WATER SOURCES
	PN:	DRAWN BY: DLS	FIGURE 1



LEGEND:

- PROPOSED POND AREAS
- PROPOSED OVERFLOW/CONTROL STRUCTURES
- PROPOSED INTAKE STRUCTURE, PUMP & PIPING
- PROPOSED PUMP STATION
- PROPOSED INTERCONNECTION & CONNECTION TO WWTP

Andreyev Engineering, Inc.

APPROXIMATE SCALE:	DATE: 08/04/14	ENGINEER: NA
1"=200'	PN: GPGW-13-0210	DRAWN BY: DLS

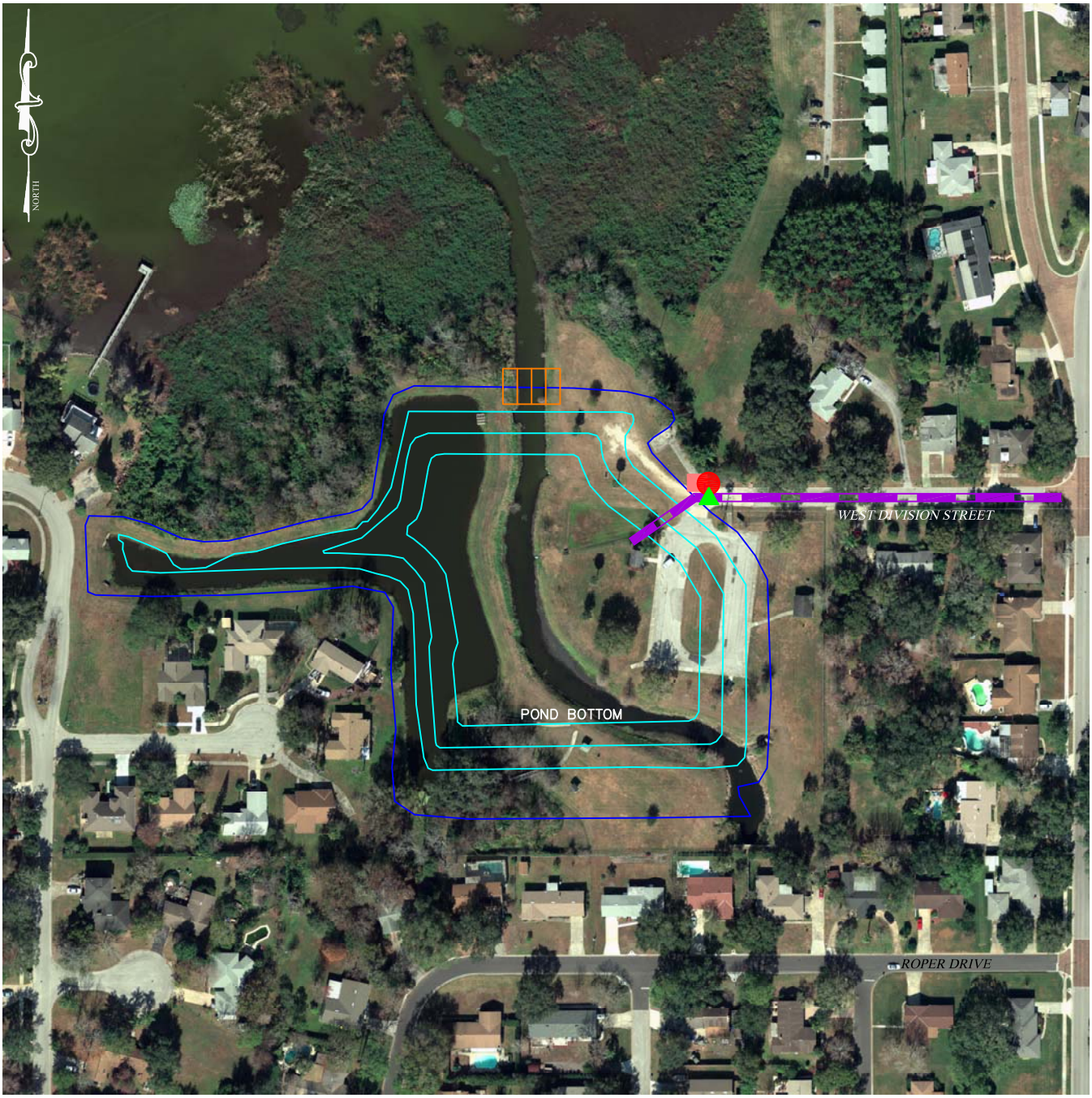
CONCEPTUAL PLAN FOR STORMWATER CAPTURE REUSE & AQUIFER RECHARGE

CITY OF WINTER GARDEN

ORANGE COUNTY, FL

SOURCE 1 SITE PLAN AND CONSTRUCTION COMPONENTS

FIGURE 2



LEGEND:

- PROPOSED POND AREA
- PROPOSED OVERFLOW/CONTROL STRUCTURE
- PROPOSED INTAKE STRUCTURE & PIPING
- PROPOSED PUMP STATION & FILTRATION/CHLORINATION UNIT
- ELECTRICAL UNIT
- PROPOSED DISCHARGE PIPING & CONNECTION TO RECLAIMED WATER LINES

Andreyev Engineering, Inc.

APPROXIMATE SCALE:	DATE: 08/04/14	ENGINEER: NA
1"=200'	PN: GPGW-13-0210	DRAWN BY: DLS

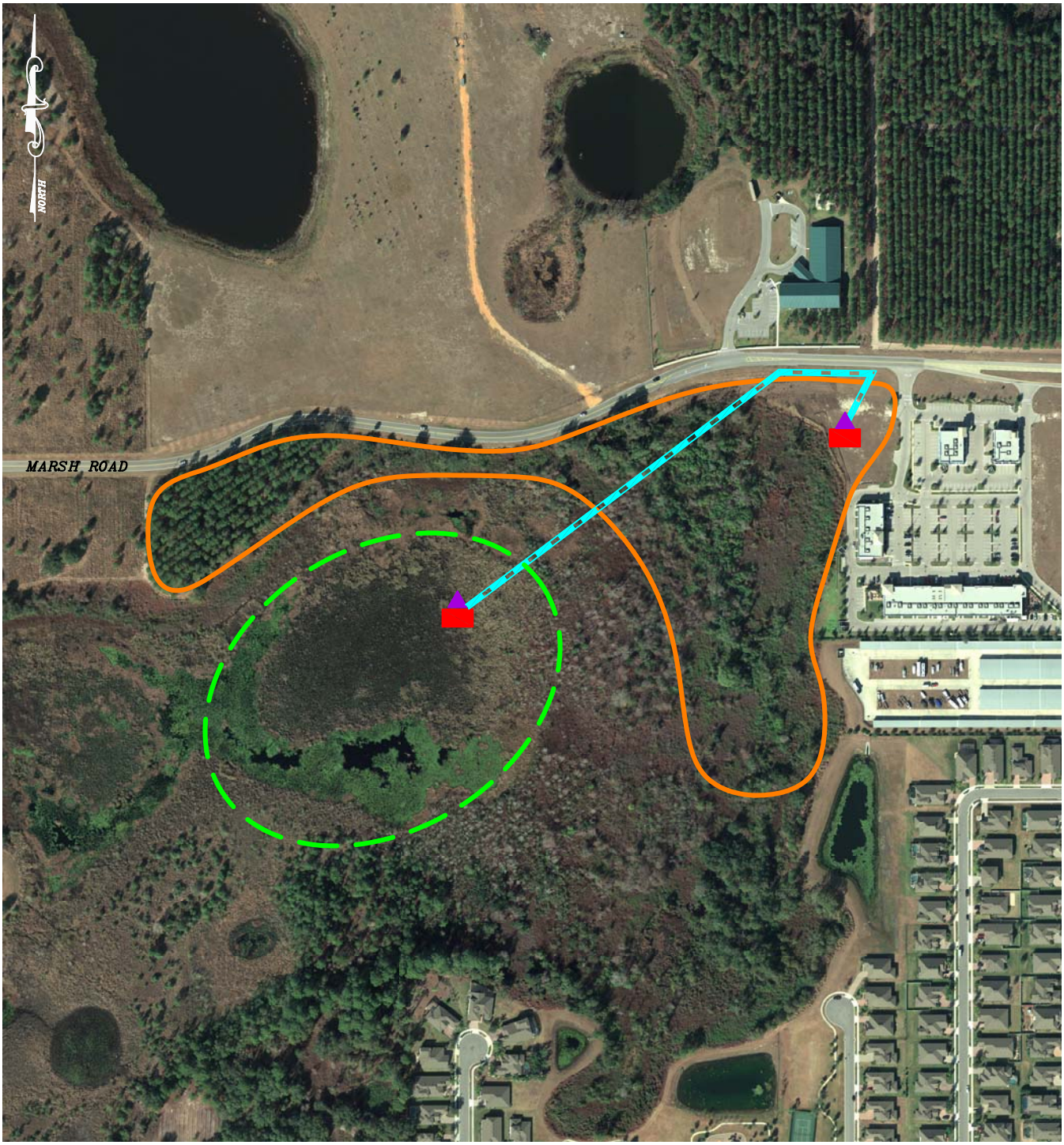
CONCEPTUAL PLAN FOR STORMWATER CAPTURE REUSE & AQUIFER RECHARGE

CITY OF WINTER GARDEN

ORANGE COUNTY, FL

SOURCE 2 SITE PLAN AND CONSTRUCTION COMPONENTS

FIGURE 3



LEGEND:

- PROPOSED STORAGE & AQUIFER RECHARGE AREA
- PROPOSED WETLAND HYDRATION & AQUIFER RECHARGE AREA
- PROPOSED RECLAIMED WATER DISCHARGE STRUCTURE
- PROPOSED EROSION CONTROL PAD/RIP RAP
- PROPOSED CONNECTION DISCHARGE PIPING

Andreyev Engineering, Inc.

APPROXIMATE SCALE:	DATE: 08/04/14	ENGINEER: NA
1"=400'	PN: GPGW-13-0210	DRAWN BY: DLS

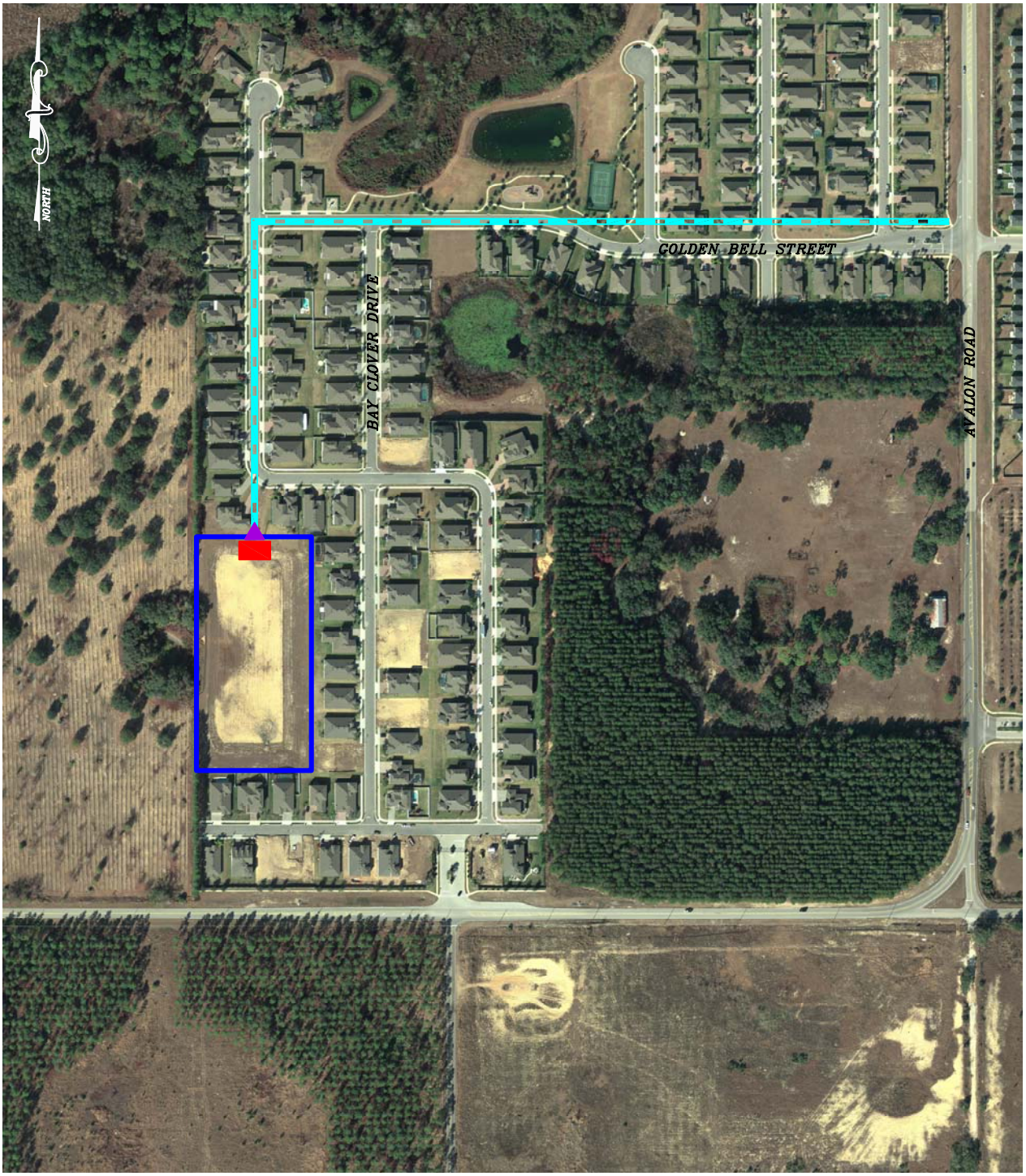
CONCEPTUAL PLAN FOR STORMWATER CAPTURE REUSE & AQUIFER RECHARGE

CITY OF WINTER GARDEN

ORANGE COUNTY, FL

SITE 1 – MARSH ROAD STORAGE & AQUIFER RECHARGE PLAN & CONSTRUCTION COMPONENTS

FIGURE 4



LEGEND:

- EXISTING RETENTION POND – AQUIFER RECHARGE AREA
- PROPOSED STORMWATER/RECLAIMED WATER DISCHARGE STRUCTURE
- PROPOSED EROSION CONTROL PAD/RIP RAP
- PROPOSED CONNECTION DISCHARGE PIPING

Andreyev Engineering, Inc.

APPROXIMATE SCALE:	DATE: 08/04/14	ENGINEER: NA
1"=400'	PN: GPGW-13-0210	DRAWN BY: DLS

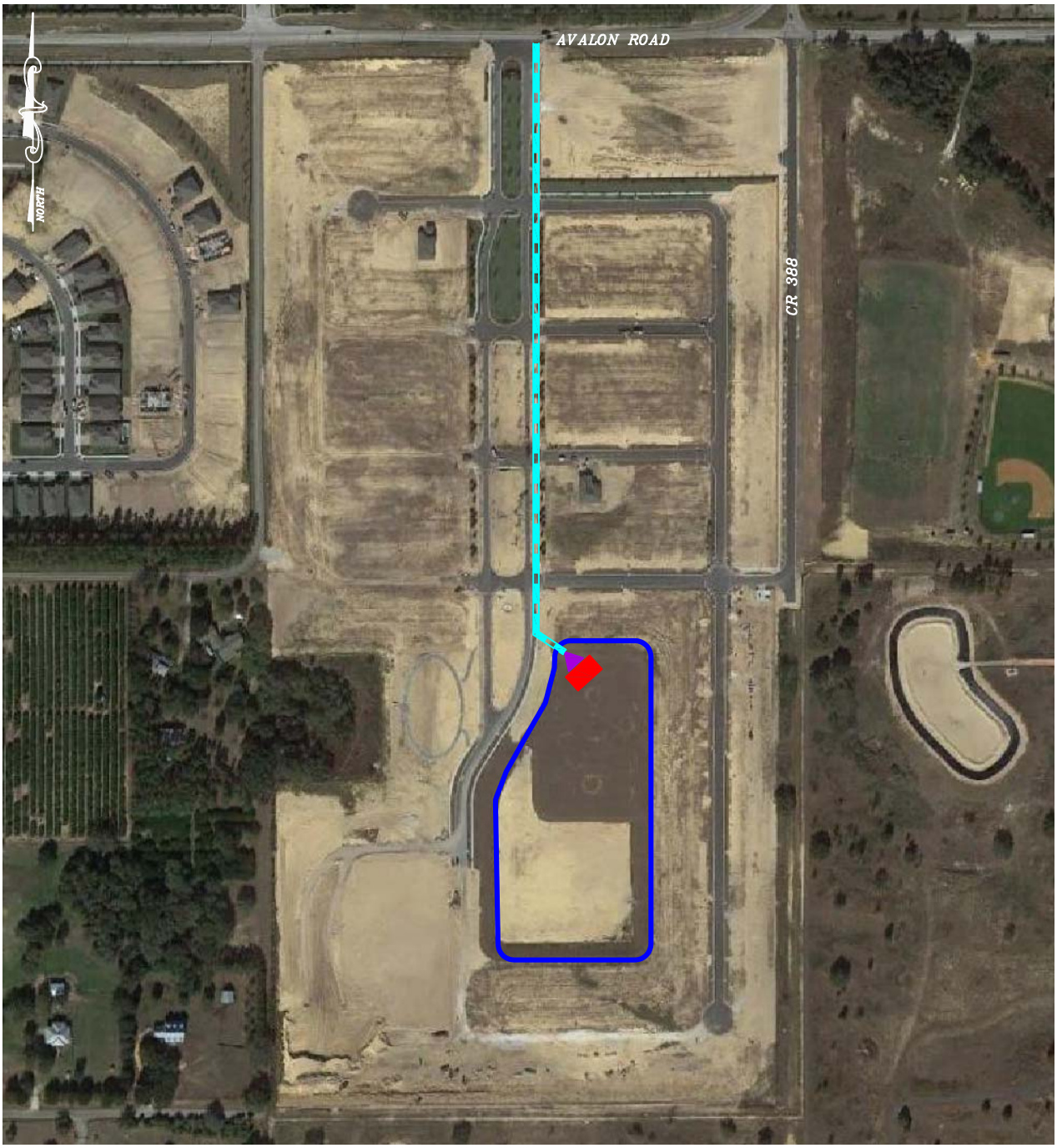
CONCEPTUAL PLAN FOR STORMWATER CAPTURE REUSE & AQUIFER RECHARGE

CITY OF WINTER GARDEN

ORANGE COUNTY, FL

SITE 2 – CARRIAGE POINTE SUBDIVISION AQUIFER RECHARGE POND & CONSTRUCTION COMPONENTS

FIGURE 5



LEGEND:

- EXISTING RETENTION POND – AQUIFER RECHARGE AREA
- PROPOSED STORMWATER/RECLAIMED WATER DISCHARGE STRUCTURE
- PROPOSED EROSION CONTROL PAD/RIP RAP
- PROPOSED CONNECTION DISCHARGE PIPING

Andreyev Engineering, Inc.

APPROXIMATE SCALE:	DATE: 08/04/14	ENGINEER: NA
1"=400'	PN: GPGW–13–0210	DRAWN BY: DLS

CONCEPTUAL PLAN FOR STORMWATER CAPTURE REUSE & AQUIFER RECHARGE

CITY OF WINTER GARDEN

ORANGE COUNTY, FL

SITE 3 – ALEXANDER RIDGE SUBDIVISION AQUIFER RECHARGE POND & CONSTRUCTION COMPONENTS

FIGURE 6

AEI Geotechnical Investigations

Andreyev Engineering, Inc.

SANFORD OFFICE
4055 St. John's Parkway
Sanford, Florida 32771
407-330-7763
Fax: 407-330-7765

▼ Groundwater ▼ Environmental ▼ Geotechnical ▼ Construction Materials Testing

December 30, 2015
GPGW-15-0107

To: City of Winter Garden
251 West Plant Street
Winter Garden, FL 34787

Attention: Mr. Donald Cochran, Assistant City Manager

Subject: Geotechnical Investigation, City of Winter Garden WWTP Site
Stormwater Capture and Aquifer Recharge Project
Winter Garden, Orange County, Florida

Dear Mr. Cochran:

As requested, Andreyev Engineering, Inc. (AEI) has completed a geotechnical investigation for the subject site to assist in the final design and development of construction plans for the City of Winter Garden WWTP site (101 East Crest Avenue) Stormwater Capture and Aquifer Recharge Design Study. The following report presents the results of our field and laboratory investigations, and recommendations for the final design of the proposed stormwater capture, retention and treatment pond system.

SITE LOCATION AND DESCRIPTION

The subject site is located at 101 East Crest Avenue, Winter Garden, Florida along the south shore of Lake Apopka. The site is located in Section 14, Township 22 South, and Range 27 East in Orange County, Florida. The attached site plan labeled **Figure 1** shows the site layout. The City of Winter Garden Stormwater Treatment Facility currently exists at the site and the capture/retention pond is planned to be constructed around the WWPT facility. The proposed site development plan includes combining the vacant land located to the east, northeast and northwest around the facility to construct a stormwater capture/retention pond system to intercept and collect stormwater and surface water for filtration, chlorination and reuse for irrigation and aquifer recharge purposes.

PURPOSE AND SCOPE OF SERVICES

The purpose of this study was investigate the soil and groundwater conditions at the site to assess the stormwater capture capabilities of a proposed storage pond area for the City of Winter Garden.

SUBSURFACE INVESTIGATIONS

AEI's field exploration consisted of drilling two (2) Standard Penetration Test (SPT) borings, designated as TB-1 and TB-2, to depths of 60 and 50 feet, respectively and seven (7) machine Auger (AB) borings, designated as AB-1 to AB-7, drilled to a depth of 20 feet to assess soil and groundwater conditions in the areas of the proposed stormwater capture and retention pond system.

Samples were recovered from the boring and returned to AEI's laboratory for visual classification and stratification. Soils strata were classified according to the Unified Soil Classification System (USCS). The approximate boring locations are shown on **Figure 1** and results of the boring, in profile form, are presented on **Figure 2.** On the profile, horizontal lines designating the interface between differing materials represent approximate boundaries. The actual transition between layers is typically gradual.

Five (5) soil strata were identified in the borings.

- Stratum 1, fine sand to slightly clayey fine sands.
- Stratum 2, clayey fine sand to sandy clay.
- Stratum 3, peat and/or muck.
- Stratum 4, sandy clay.
- Stratum 5, limestone.

The results of this investigation indicate the site soil conditions at the SPT boring locations TB-1 and TB-2, generally consist of Stratum 1 fine sand to slightly clayey fine sand from the ground surface to depths ranging from 1 to 6 feet below existing ground surface, underlain by Strata 2, 3, and 4 clayey fine sand to sandy clay, peat and/or muck, and sandy clay, to depths ranging from 40.0 to 60.0 feet. Below the Stratum 4 soils at TB-2, Stratum 5 limestone was encountered from 40.0 feet to the termination depth of drilling of 60.0 feet. For a more detailed view of individual borings reference **Figure 2.**

The results of this investigation indicate the site soil conditions at machine auger borings (AB) locations AB-1 through AB-7, generally consist of Stratum 1 fine sand to slightly clayey fine sand from the ground surface to depths ranging from 1 to 8.5 feet below existing ground surface, underlain by Strata 2, 3, and/or 4 clayey fine sand to sandy clay, peat and/or muck, and sandy

clay, to the termination depth of drilling of 20.0 feet. For a more detailed view of individual borings reference **Figure 2.**

The groundwater table was encountered between the depths of 1.5 feet and 5.0 feet below existing ground surface at the boring locations. Based on the time of year these borings were drilled and the amount of rainfall that occurred prior to our investigations, the normal wet season groundwater levels are estimated to occur at about 1.0 feet above the recorded levels or 0.5 to 4.0 feet below existing ground surface.

NATURAL RESOURCES CONSERVATION SERVICE SOIL SURVEY

The publication titled "Soil Survey of Orange County, Florida" published by the U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS) was reviewed. For your reference, we have included a portion of the NRCS Soil Map which depicts the location of the subject site on the attached **Figure 3**. The soil map units for the investigated area are identified as:

Soil Map Unit Symbol	Soil Map Unit Name	Seasonal High Groundwater Table
#6	Candler-Apopka Fine Sands	48 – 72 inches below ground surface
#25	Okeelanta Muck	Within 10 inches of ground surface to ponded above ground surface
#41	Samsula-Hontoon-Basinger Association	Within 10 inches of the ground surface

It should be noted that the investigated area has been filled as evidenced by the buried organic materials (muck) in the northern portions of the site, thus the NRCS soil descriptions would not apply to the surficial soil conditions at this site. The NRCS estimates of groundwater levels would also be inaccurate due to fill placement at this site.

EVALUATION AND RECOMMENDATIONS

For the purpose of final design and permitting of the stormwater capture, storage and treatment for this project the following geotechnical recommendations are provided:

1. Based on the results of this investigation and our evaluation of encountered subsurface conditions, it is our opinion that proposed stormwater capture and retention pond location can be constructed at this site.

2. The presence of relatively high groundwater levels at this site, especially during wet season periods, will require an effective dewatering system to allow excavation of the pond areas and construction of pond berms, installation of pipelines, control structures and the pumping station.
3. The presence of buried organic materials (muck) in the northern portions of the site must be carefully considered during planning and layout of the pond to minimize the need to over-excavate and dispose of unsuitable soil.
4. Pond berms constructed over these buried organic materials (muck) will be subject to settling and instability. Careful consideration shall be given to the long term stability of the pond and pond berms. The pond area and volume shall be maximized in the areas free of unsuitable organic materials as much as possible. Any pond berms constructed over the buried organic materials should anticipate the need to fully over-excavate and remove the unsuitable soils and replace it with fine sand or clayey fine sand soils, approved by a geotechnical engineer.
5. The overflow structure shall be constructed on properly compacted fine sand or clayey fine sand support materials. All organic materials (muck), or other similarly unsuitable foundation support materials shall be completely removed from under the structure and at least 5 feet beyond the outside perimeter of the structure and replaced with clean fine sand or suitable clayey fine sand, approved by a geotechnical engineer. All clayey soils, if present at the bottom of the structure, shall be over-excavated to a minimum of 2 feet below the bottom of the structure and replaced with clean fine sand or suitable clayey fine sand. All fill placement below the structure shall be conducted in a dry (properly dewatered) area and compacted in 12-inch lifts to a minimum of 95% of the Modified Proctor maximum density of the fill material.
6. The wet well and pump station structures shall be constructed on properly compacted fine sand or clayey fine sand support materials. All organic materials (muck), or other similarly unsuitable foundation support materials shall be completely removed from under the structure and at least 5 feet beyond the outside perimeter of the structure and replaced with clean fine sand or suitable clayey fine sand, approved by a geotechnical engineer. All clayey soils, if present at the bottom of the structure, shall be over-excavated to a minimum of 2 feet below the bottom of the structure and replaced with clean fine sand or suitable clayey fine sand. All fill placement below the structure shall be conducted in a dry (properly dewatered) area and compacted in 12-inch lifts to a minimum of 95% of the Modified Proctor maximum density of the fill material. The wet well structure shall be ballasted by either direct weight or flanged for soil friction to counter act uplift pressures due to high groundwater conditions at this site. Once the structure's location and depths

have been defined, additional geotechnical testing shall be conducted to provide site specific design parameters to the civil engineer.

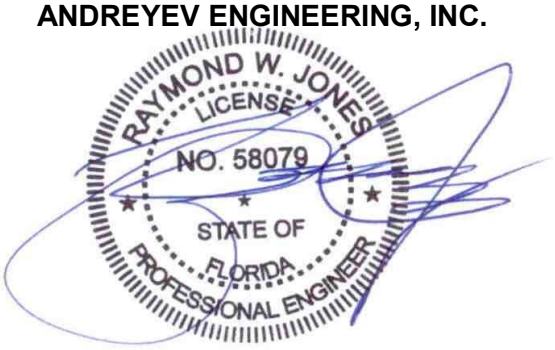
7. The entire pond system, existing retention pond in the northwestern area, the existing drainage ditch on the east and the available open areas to the east and northeast shall be converted to a single interconnected stormwater capture and storage/retention pond that leads to a wet well and pump station. For periods of excessive stormwater runoff an adequate overflow structure shall be installed to allow full volume overflow of stormwater.
8. The designer of the stormwater capture/storage/retention system shall maximize the use of better subsurface soil areas and minimize constructing the pond over the unsuitable buried organic (muck) soils.
9. Based on the results of soil borings and measurements of groundwater levels, we recommend that the bottom of the proposed pond shall be about 8 feet below the existing ground surface. We recommend that the overflow structure be designed with an overflow elevation at about 1 to 2 feet below existing ground surface.
10. The wet well and pump station should be designed to allow capture of stormwater and surface water in the pond down to about 1 foot above the pond bottom or about 7 feet below existing ground surface.

CLOSURE

AEI appreciates the opportunity to participate in this project, and we trust that the information herein is sufficient for your immediate needs. If you have any questions or comments concerning the contents of this report, please do not hesitate to contact the undersigned.

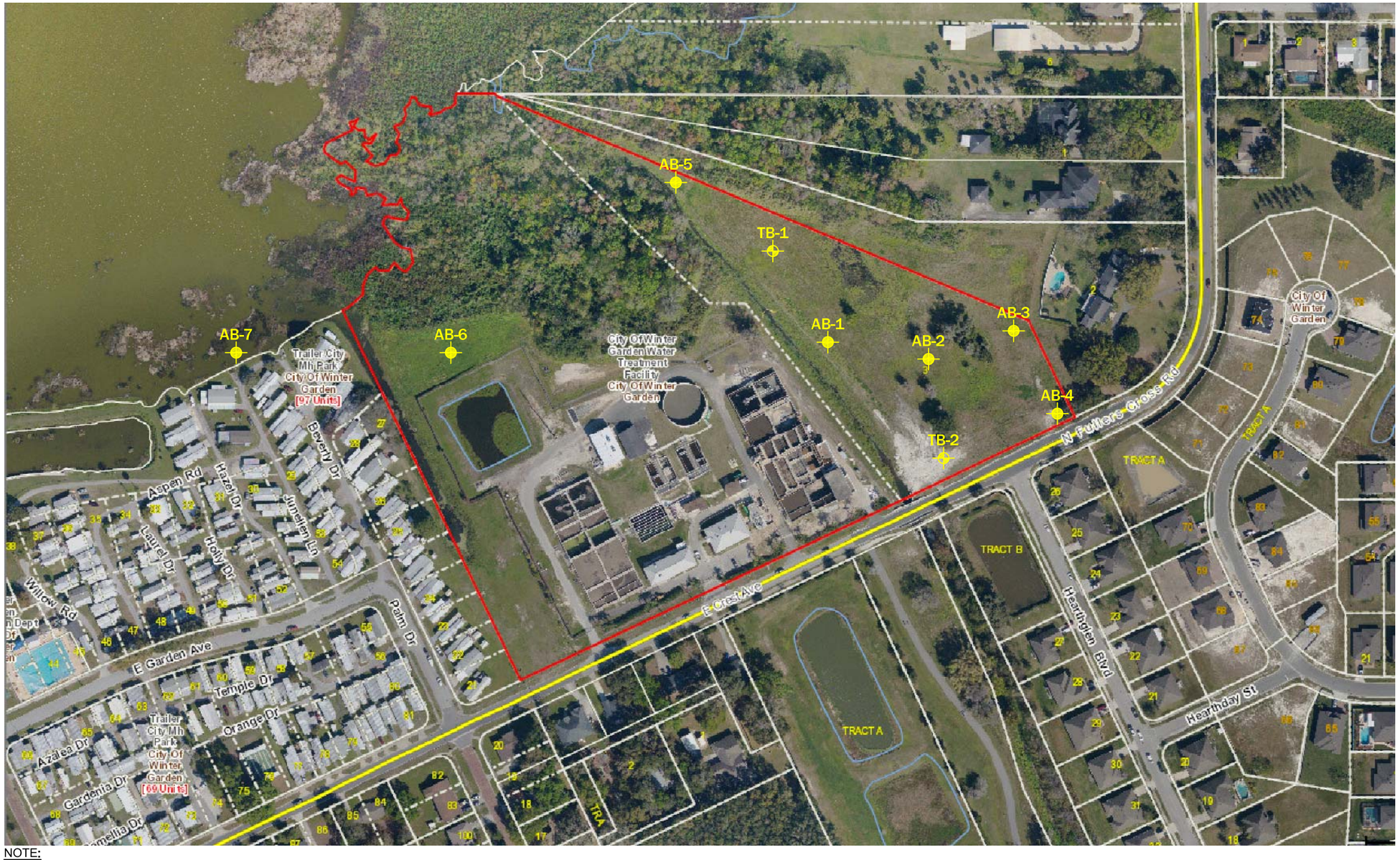
Sincerely,

ANDREYEV ENGINEERING, INC.



Raymond W. Jones, P.E.
Vice President
Florida Registration No. 58079

FIGURES



NOTE:
PROPERTY BOUNDARY OBTAINED FROM ORANGE COUNTY PROPERT APPRAISER

0 100 200 400

GRAPHIC SCALE: 1"=200'

LEGEND:

- APPROXIMATE SPT BORING LOCATION
- APPROXIMATE AUGER BORING LOCATION

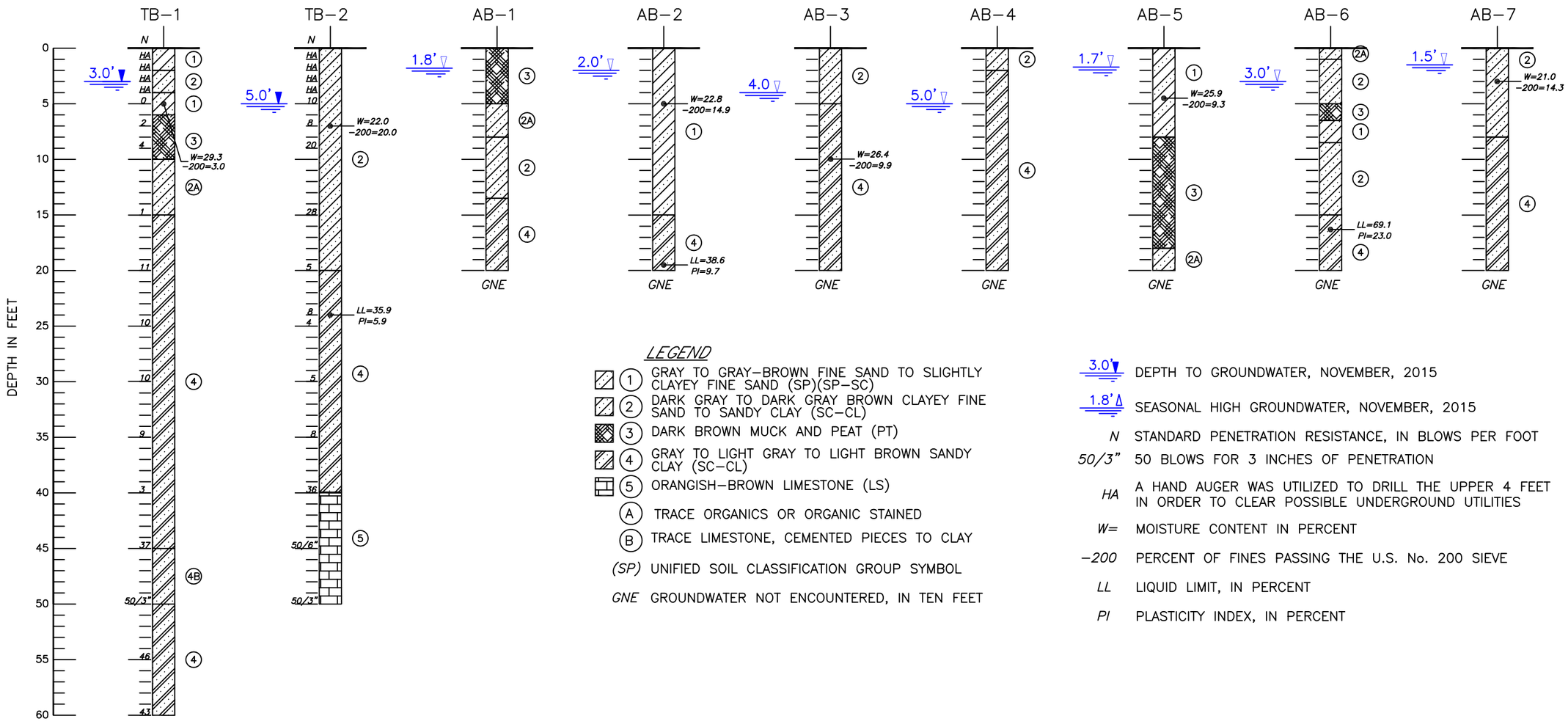
Andreyev Engineering, Inc.

GEOTECHNICAL INVESTIGATION
CITY OF WINTER GARDEN
STORMWATER CAPTURE AND AQUIFER RECHARGE PROJECT
101 EAST CREST AVENUE
ORANGE COUNTY, FLORIDA

APPROXIMATE SCALE:	DATE: 11/05/15	ENGINEER: RJ
1"=200'	PN: GPGW-15-0107	DRAWN BY: MS

BORING LOCATION PLAN

FIGURE 1



LEGEND

- (1) GRAY TO GRAY–BROWN FINE SAND TO SLIGHTLY CLAYEY FINE SAND (SP)(SP–SC)
- (2) DARK GRAY TO DARK GRAY BROWN CLAYEY FINE SAND TO SANDY CLAY (SC–CL)
- (3) DARK BROWN MUCK AND PEAT (PT)
- (4) GRAY TO LIGHT GRAY TO LIGHT BROWN SANDY CLAY (SC–CL)
- (5) ORANGISH–BROWN LIMESTONE (LS)
- (A) TRACE ORGANICS OR ORGANIC STAINED
- (B) TRACE LIMESTONE, CEMENTED PIECES TO CLAY
- *(SP)* UNIFIED SOIL CLASSIFICATION GROUP SYMBOL
- *GNE* GROUNDWATER NOT ENCOUNTERED, IN TEN FEET

- 3.0' DEPTH TO GROUNDWATER, NOVEMBER, 2015
- 1.8' SEASONAL HIGH GROUNDWATER, NOVEMBER, 2015
- *N* STANDARD PENETRATION RESISTANCE, IN BLOWS PER FOOT
- *50/3"* 50 BLOWS FOR 3 INCHES OF PENETRATION
- *HA* A HAND AUGER WAS UTILIZED TO DRILL THE UPPER 4 FEET IN ORDER TO CLEAR POSSIBLE UNDERGROUND UTILITIES
- *W=* MOISTURE CONTENT IN PERCENT
- *–200* PERCENT OF FINES PASSING THE U.S. No. 200 SIEVE
- *LL* LIQUID LIMIT, IN PERCENT
- *PI* PLASTICITY INDEX, IN PERCENT

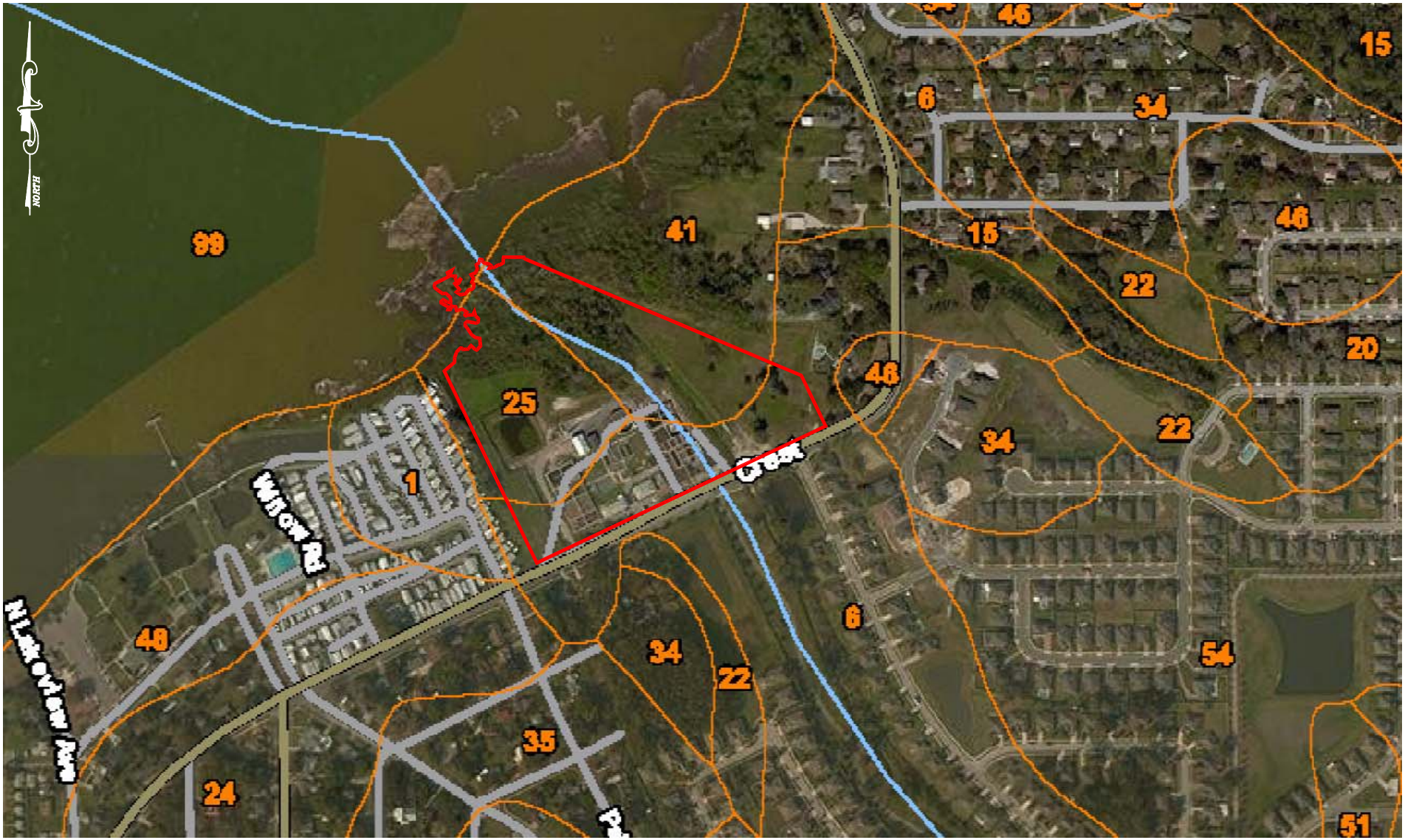
Andreyev Engineering, Inc.

GEOTECHNICAL INVESTIGATION
CITY OF WINTER GARDEN
STORMWATER CAPTURE AND AQUIFER RECHARGE PROJECT
101 EAST CREST AVENUE
ORANGE COUNTY, FLORIDA

APPROXIMATE SCALE:	DATE: 11/05/15	ENGINEER: RJ
1"=10'	PN: GPGW–15–0107	DRAWN BY: MS

SOIL PROFILES

FIGURE 2



REFERENCE:
WEB SOIL SURVEY

LEGEND:

—	APPROXIMATE SUBJECT PROPERTY BOUNDARY	25	OKEELANTA MUCK
6	CANDLER-APOPKA FINE SANDS, 5 TO 12 PERCENT SLOPES	41	SAMSULA-HONTOON-BASINGER ASSOCIATION, DEPRESSIONAL

Andreyev Engineering, Inc.

GEOTECHNICAL INVESTIGATION
CITY OF WINTER GARDEN
STORMWATER CAPTURE AND AQUIFER RECHARGE PROJECT
101 EAST CREST AVENUE
ORANGE COUNTY, FLORIDA

N.R.C.S. SOIL SURVEY MAP

SCALE: 1"=500'	DATE: 11/05/15	ENGINEER: RJ
	PN: GPGW-15-0107	DRAWN BY: MS

FIGURE 3

Andreyev Engineering, Inc.

SANFORD OFFICE
4055 St. John's Parkway
Sanford, Florida 32771
407-330-7763
Fax: 407-330-7765

▼ Groundwater ▼ Environmental ▼ Geotechnical ▼ Construction Materials Testing

December 29, 2015
GPGW-15-0107

To: City of Winter Garden
251 West Plant Street
Winter Garden, FL 34787

Attention: Mr. Donald Cochran, Assistant City Manager

Subject: Geotechnical Investigation, City of Winter Garden Bradford Park Site
Stormwater Capture and Aquifer Recharge Project
Winter Garden, Orange County, Florida

Dear Mr. Cochran:

As requested, Andreyev Engineering, Inc. (AEI) has completed a geotechnical investigation for the subject site to assist in the final design and development of construction plans for the City of Winter Garden Bradford Park (West Division Street) Stormwater Capture and Aquifer Recharge Design Study. The following report presents the results of our field and laboratory investigations, and recommendations for the final design of the proposed stormwater capture, retention and treatment pond system.

SITE LOCATION AND DESCRIPTION

The subject site is located at the west end of West Division Street, in Winter Garden, Florida along the south shore of Lake Apopka. The site is located in Section 14, Township 22 South, and Range 27 East in Orange County, Florida. The attached site plan labeled **Figure 1** shows the site layout. A stormwater pond, canal, wetland area, parking lot, and park currently exist at the site as part of the existing City of Winter Garden Bradford Park facility. At the time of our study, the existing pond and the adjacent wetland area was wet with standing water. The proposed site development plan includes combining the existing pond, conveyance canal, parking lot, and the park area to construct a stormwater capture/retention pond system to intercept and collect stormwater and surface water for filtration, chlorination and reuse for irrigation and aquifer recharge purposes.

PURPOSE AND SCOPE OF SERVICES

The purpose of this study was investigate the soil and groundwater conditions at the site to assess the stormwater capture capabilities of a proposed storage pond area for the City of Winter Garden.

SUBSURFACE CONDITIONS

AEI's field exploration consisted of one (1) Standard Penetration Test (SPT) boring, designated as TB-1, drilled to a depth of 60 feet within the proposed expanded storage pond area. Previous geotechnical investigations conducted by Devo Engineering, Inc. (Devo) were used for the purpose of this evaluation and included a series of SPT borings, power auger borings and hand auger borings. A copy of Devo's geotechnical field investigation data is included in **Appendix A**.

Samples were recovered from the boring and returned to AEI's laboratory for visual classification and stratification. Soils strata were classified according to the Unified Soil Classification System (USCS). The approximate boring locations are shown on **Figure 1** and results of the boring, in profile form, are presented on **Figure 2.** On the profile, horizontal lines designating the interface between differing materials represent approximate boundaries. The actual transition between layers is typically gradual.

Five (5) soil strata were identified in the boring TB-1.

- Stratum 1, fine sands with trace organic materials (topsoil) encountered from the ground surface to a depth of 2 feet.
- Stratum 2, silty fine sands encountered from 2 feet to 6 feet below ground surface.
- Stratum 3, peat and/or muck were encountered from 6 feet to 10 feet below ground surface.
- Stratum 4, silty fine sands were encountered 10 to 25 feet below ground surface.
- Stratum 5, clayey fine sands to sandy clays were encountered from 25 feet to the borehole termination depth of 60 feet.

The results of this investigation indicate the site soil conditions at the SPT boring TB-1 generally consist of fine sand and silty fine sand to a depth of 25 feet (within excavation depths) with an intervening layer of peat/muck at 6 to 10 feet below ground surface. The deeper soils, 25 to 60 feet consist of clayey fine sand and sandy clay (below excavation depths). For a more detailed view of boring data reference **Figure 2.**

The groundwater table at TB-1 was encountered 3.0 feet below existing ground surface. Based on the time of year these borings were drilled and the amount of rainfall that occurred prior to our investigations, the normal wet season groundwater levels are estimated to occur at about 1.0 feet above the recorded levels or 2.0 feet below existing ground surface.

Devo Engineering, Inc. (Devo) conducted a geotechnical investigation of the site and documented their findings along with recommendations and conclusion in their geotechnical engineering report dated, September 20, 2006. Briefly, Devo performed four (4) standard penetration test (SPT) borings, two (2) hand auger (HA) borings, two (2) auger (AB) borings, and a series of muck probes. The results of the DEVO geotechnical are attached for review in **Appendix A.**

NATURAL RESOURCES CONSERVATION SERVICE SOIL SURVEY

The publication titled "Soil Survey of Orange County, Florida" published by the U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS) was reviewed. For your reference, we have included a portion of the NRCS Soil Map which depicts the location of the subject site on the attached **Figure 3**. The soil map units for the investigated area are identified as:

Soil Map Unit Symbol	Soil Map Unit Name	Seasonal High Groundwater Table
#1	Arents	24-36 inches of ground surface
#3	Basinger Fine Sand	Within 10 inches of ground surface
#13	Felda Fine Sand	Within 10 inches of ground surface
#51	Wabasso Fine Sand	Within 10 inches of ground surface

It should be noted that the investigated area has been filled as evidenced by the buried organic materials (muck) in the northern portions of the site, thus the NRCS soil descriptions would not apply to the surficial soil conditions at this site. The NRCS estimates of groundwater levels would also be inaccurate due to fill placement at this site.

EVALUATION AND RECOMMENDATIONS

For the purpose of final design and permitting of the stormwater capture, storage and treatment for this project the following geotechnical recommendations are provided:

1. Based on the results of this investigation and our evaluation of encountered subsurface conditions, it is our opinion that proposed stormwater capture and retention pond location can be constructed at this site.
2. The presence of relatively high groundwater levels at this site, especially during wet season periods, will require an effective dewatering system to allow excavation of the pond areas and construction of pond berms, installation of pipelines, control structures and the pumping station. Due to silty, clayey and organic soils present within the excavation depths, dewatering with well points may not be possible.
3. The presence of buried organic materials (muck) in the northern portions of the site must be carefully considered during planning and layout of the pond to minimize the need to over-excavate and dispose of unsuitable soil.
4. Pond berms constructed over these buried organic materials (muck) will be subject to settling and instability. Careful consideration shall be given to the long term stability of the pond and pond berms. The pond area and volume shall be maximized in the areas free of unsuitable organic materials as much as possible. Any pond berms constructed over the buried organic materials should anticipate the need to fully over-excavate and remove the unsuitable soils and replace it with fine sand or clayey fine sand soils, approved by a geotechnical engineer.
5. The overflow structure shall be constructed on properly compacted fine sand or clayey fine sand support materials. All organic materials (muck), or other similarly unsuitable foundation support materials shall be completely removed from under the structure and at least 5 feet beyond the outside perimeter of the structure and replaced with clean fine sand or suitable clayey fine sand, approved by a geotechnical engineer. All clayey soils, if present at the bottom of the structure, shall be over-excavated to a minimum of 2 feet below the bottom of the structure and replaced with clean fine sand or suitable clayey fine sand. All fill placement below the structure shall be conducted in a dry (properly dewatered) area and compacted in 12-inch lifts to a minimum of 95% of the Modified Proctor maximum density of the fill material.
6. The wet well and pump station structures shall be constructed on properly compacted fine sand or clayey fine sand support materials. All organic materials (muck), or other similarly unsuitable

foundation support materials shall be completely removed from under the structure and at least 5 feet beyond the outside perimeter of the structure and replaced with clean fine sand or suitable clayey fine sand, approved by a geotechnical engineer. All clayey soils, if present at the bottom of the structure, shall be over-excavated to a minimum of 2 feet below the bottom of the structure and replaced with clean fine sand or suitable clayey fine sand. All fill placement below the structure shall be conducted in a dry (properly dewatered) area and compacted in 12-inch lifts to a minimum of 95% of the Modified Proctor maximum density of the fill material. The wet well structure shall be ballasted by either direct weight or flanged for soil friction to counter act uplift pressures due to high groundwater conditions at this site. Once the structure's location and depths have been defined, additional geotechnical testing shall be conducted to provide site specific design parameters to the civil engineer.

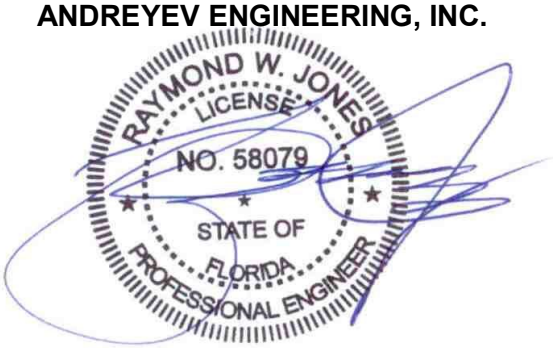
7. The entire pond system, existing retention pond in the northwestern area, the existing conveyance canal in the central area and the available open areas of existing Bradford Park, eastern areasof the site shall be converted to a single interconnected stormwater capture and storage/retention pond that leads to a wet well and pump station. For periods of excessive stormwater runoff an adequate overflow structure shall be installed to allow full volume overflow of stormwater.
8. The designer of the stormwater capture/storage/retention system shall maximize the use of better subsurface soil areas and minimize constructing the pond over the unsuitable buried organic (muck) soils.
9. Based on the results of soil borings and measurements of groundwater levels, we recommend that the bottom of the proposed pond be placed at about the existing bottom of the conveyance canal or about 8 feet below the existing ground surface of the park. We recommend that the overflow structure be designed with an overflow elevation at about 1 to 2 feet below existing ground surface.
10. The wet well and pump station should be designed to allow capture of stormwater and surface water in the pond down to about 1 foot above the pond bottom or about 7 feet below existing ground surface.

CLOSURE

AEI appreciates the opportunity to participate in this project, and we trust that the information herein is sufficient for your immediate needs. If you have any questions or comments concerning the contents of this report, please do not hesitate to contact the undersigned.

Sincerely,

ANDREYEV ENGINEERING, INC.



Raymond W. Jones, P.E.
Vice President
Florida Registration No. 58079

FIGURES

NORTH

NOTE:
PROPERTY BOUNDARY OBTAINED FROM
ORANGE COUNTY PROPERT APPRAISER

0 75 150 300

GRAPHIC SCALE: 1"=150'

LEGEND:

APPROXIMATE SPT BORING LOCATION

PREVIOUS BORING LOCATION BY DEVO ENGINEERING

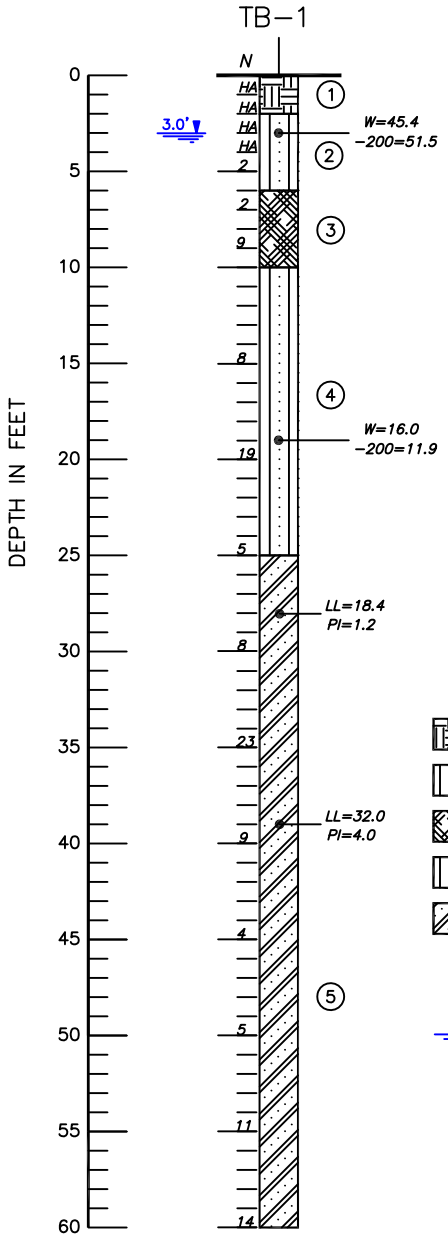
Andreyev Engineering, Inc.

APPROXIMATE SCALE:	DATE: 11/05/15	ENGINEER: RJ
1"=150'	PN: GPGW-15-0107	DRAWN BY: MS

GEOTECHNICAL INVESTIGATION
CITY OF WINTER GARDEN
STORMWATER CAPTURE AND AQUIFER RECHARGE PROJECT
BRADFORD PARK
ORANGE COUNTY, FLORIDA

BORING LOCATION PLAN

FIGURE 1



LEGEND

1. DARK BROWN FINE SAND WITH TRACE ORGANIC MATERIALS (TOPSOIL)
2. GRAY TO DARK GRAY BROWN SILTY FINE SAND (SM)
3. DARK BROWN TO BLACK PEAT/MUCK (PT)
4. GRAY SILTY FINE SAND (SM)
5. GRAY TO LIGHT GRAY BROWN CLAYEY FINE SAND TO SANDY CLAY (SC)(SC–CL)

(SP) UNIFIED SOIL CLASSIFICATION GROUP SYMBOL

3.0' DEPTH TO GROUNDWATER, NOVEMBER, 2015

N STANDARD PENETRATION RESISTANCE, IN BLOWS PER FOOT

HA A HAND AUGER WAS UTILIZED TO DRILL THE UPPER 4 FEET IN ORDER TO CLEAR POSSIBLE UNDERGROUND UTILITIES

LL LIQUID LIMIT, IN PERCENT

PI PLASTICITY INDEX, IN PERCENT

W MOISTURE CONTENT, IN PERCENT

–200 PERCENT OF FINES PASSING THE U.S. No. 200 SIEVE

Andreyev Engineering, Inc.

GEOTECHNICAL INVESTIGATION
CITY OF WINTER GARDEN
STORMWATER CAPTURE AND AQUIFER RECHARGE PROJECT
BRADFORD PARK
ORANGE COUNTY, FLORIDA

SOIL PROFILE

SCALE:	DATE: 11/04/15	ENGINEER: RJ
1"=10'	PN: GPGW–15–0107	DRAWN BY: MS

FIGURE 2

REFERENCE:
WEB SOIL SURVEY

LEGEND:

APPROXIMATE SUBJECT PROPERTY BOUNDARY

1 ARENTS, NEARLY LEVEL

3 BASINGER FINE SAND, DEPRESSIONAL 0 TO 1 PERCENT SLOPES

13 FELDA FINE SAND 0 TO 2 PERCENT SLOPES

51 WABASSO FINE SAND, 0 TO 2 PERCENT SLOPES

Andreyev Engineering, Inc.

SCALE:	DATE: 11/05/15	ENGINEER: RJ
1"=500'	PN: GPGW-15-0107	DRAWN BY: MS

GEOTECHNICAL INVESTIGATION

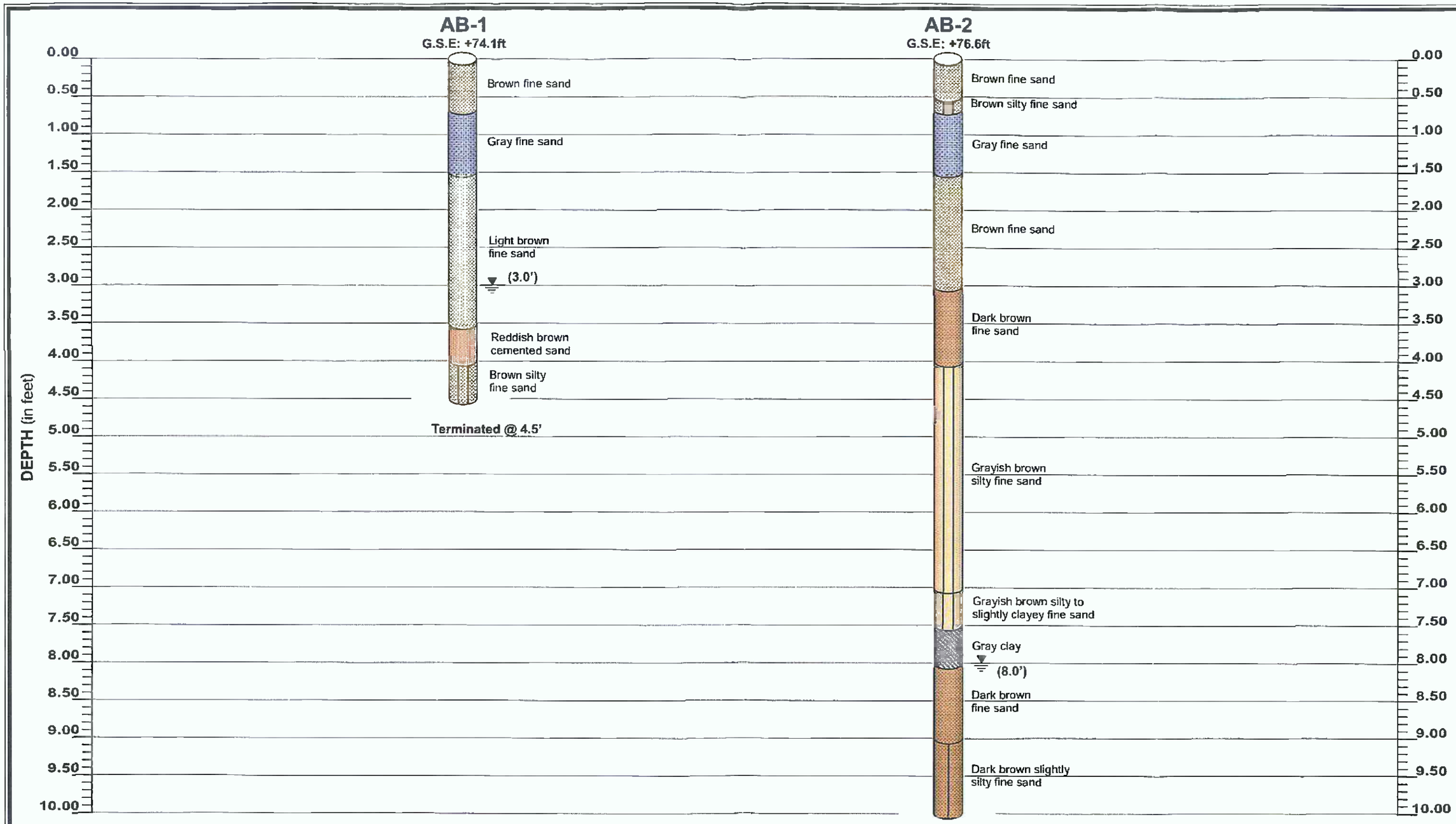
CITY OF WINTER GARDEN
STORMWATER CAPTURE AND AQUIFER RECHARGE PROJECT
BRADFORD PARK
ORANGE COUNTY, FLORIDA

N.R.C.S. SOIL SURVEY MAP

FIGURE 3

APPENDIX A

NORTH
GRAPHIC SCALE
1 INCH = 100 FEET
LEGEND:
PB-4 25 ft deep SPT Pond Borings
HA-2 Control Structure Hand Augers
AB-2 Alum Treatment Plant Hand Augers
WETLAND
RE-CREATION AREA
TO LAKE APOPKA
PROPOSED CONTROL STRUCTURE UNDER BRIDGE
PROPOSED BRIDGE
HA-2
HA-1
PROPOSED BENCHES (TYP.)
MULCHED & TIMBERED PATHWAY
PB-4
LIMITS OF PROJECT AREA
EXISTING CITY OF WINTER GARDEN LIFT STATION #1
EXISTING WETLANDS
PROPOSED REGIONAL STORMWATER POND
24"
AB-1
PB-1
PB-3
EXISTING COVERED CULVERT (TO BE RELOCATED)
PB-2
2"
EXISTING INFLOW PIPE #2
EXISTING WETLANDS
AB-2
PROPOSED TRANSITION TO EXISTING WETLANDS
EXISTING INFLOW PIPE #4
DEVO
BORING LOCATION PLAN
DR BRADFORD MEMORIAL PARK
REGIONAL STORMWATER FACILITY
Checked & Approved by DS
Drawn By SM
Date 08-23-06
Scale Noted
Proj # 06-121.198
Figure 1.4



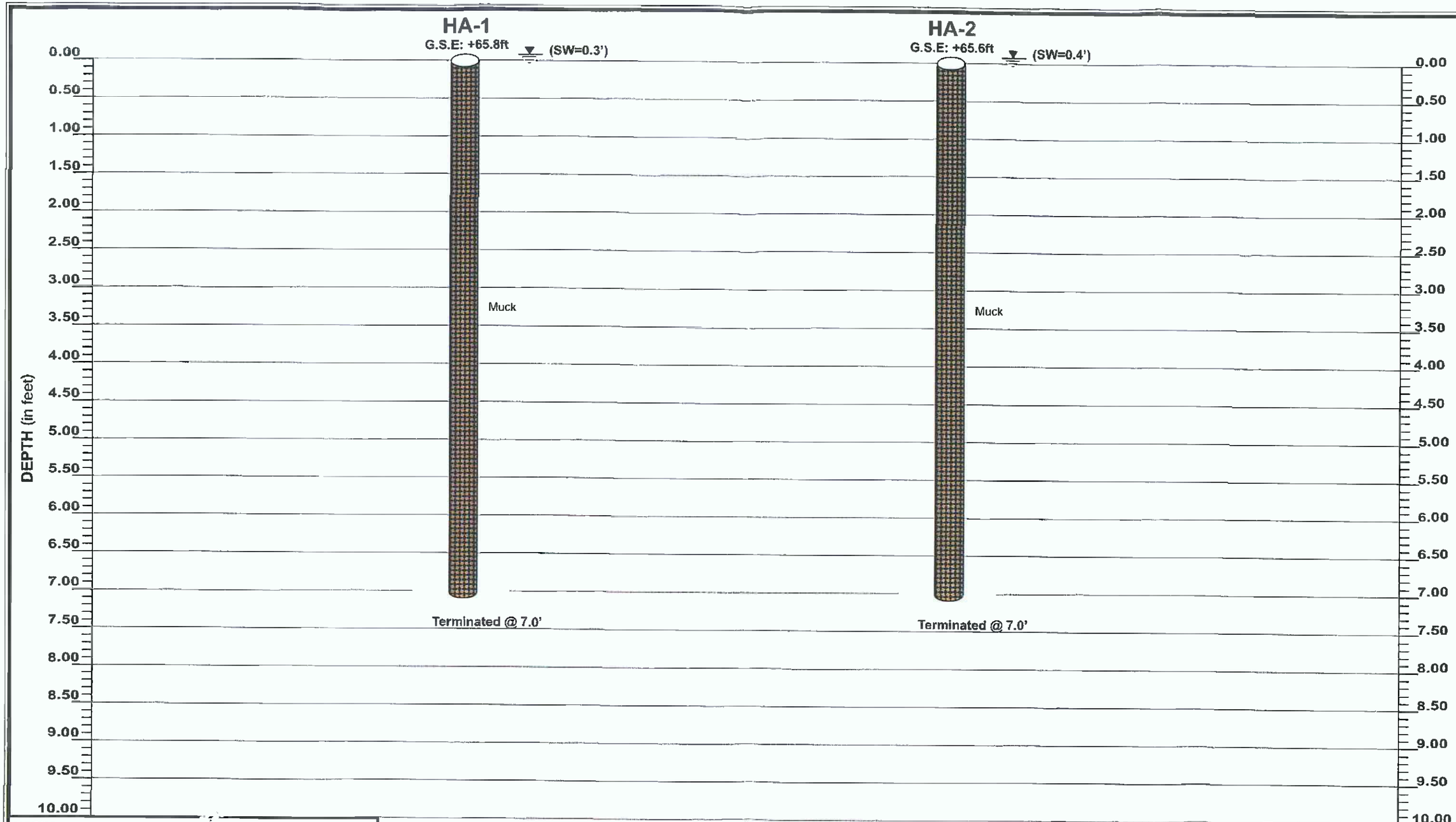
NOTES:

Borings drilled on August 23, 2006

Water level measured on date of drilling

G.S.E Surveyed ground surface elevation (ft NGVD)

Figure Name: SOIL PROFILES FOR AB-1 & AB-2				
Project Name: DR. BRADFORD MEMORIAL PARK REGIONAL STORMWATER FACILITY				
Checked & Approved By: DS	Drawn By: MZ	Date: 08-24-06	Scale: NOTED	Project # 06-121.198	Figure 2.1



NOTES:

Borings drilled on August 23, 2006

Water level measured on date of drilling

SW Standing water at borehole location on date of drilling

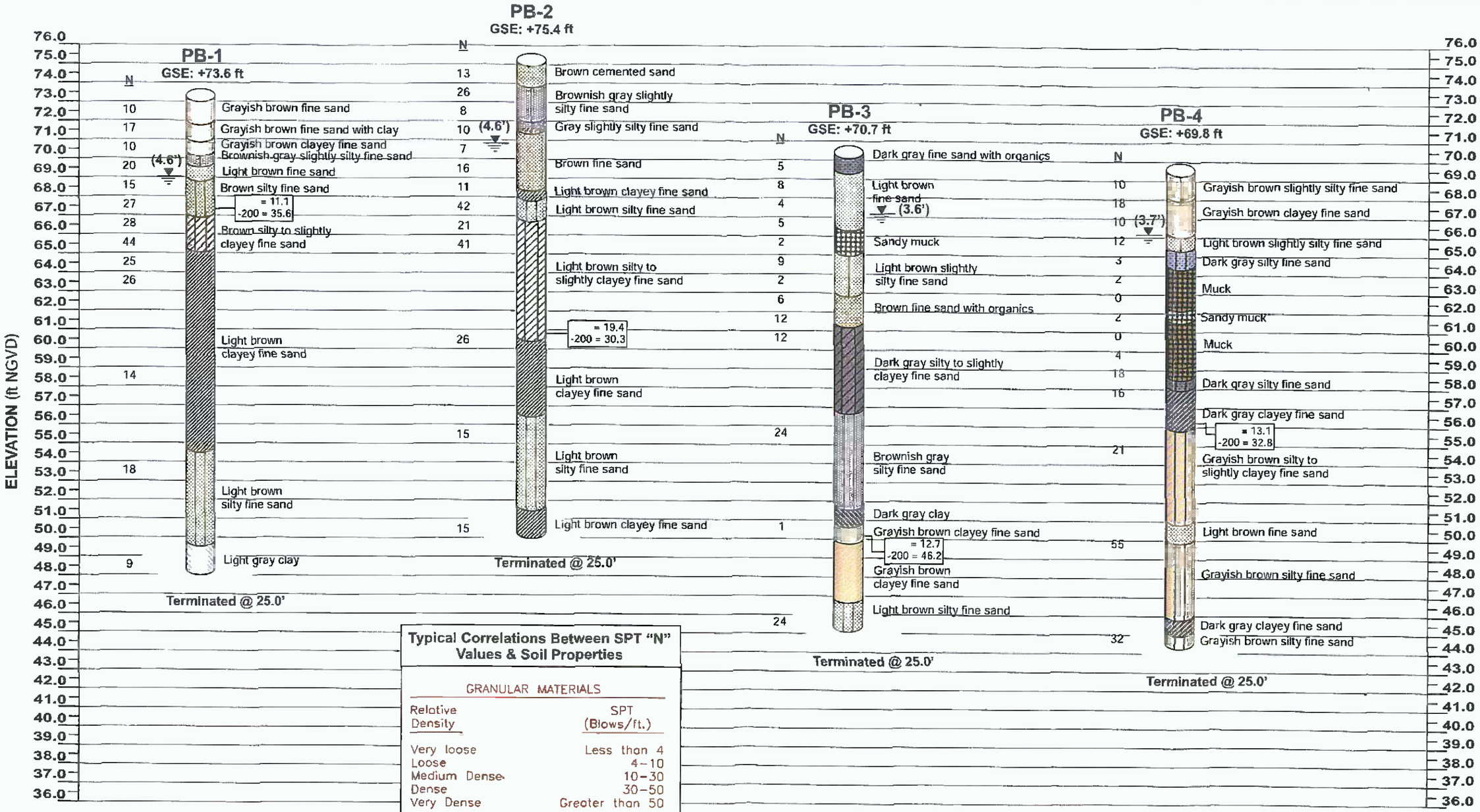
G.S.E Surveyed ground surface elevation (ft NGVD)

DEVO Engineering
CONSULTING GEOTECHNICAL ENGINEERS

Figure Name: SOIL PROFILES FOR HA-1 & HA-2

Project Name: DR. BRADFORD MEMORIAL PARK REGIONAL STORMWATER FACILITY

Checked & Approved by	Drawn By	Date	Scale	Project #	
DS	MZ	08-24-06	NOTED	06-121.198	Figure 3.1



Typical Correlations Between SPT "N" Values & Soil Properties

GRANULAR MATERIALS

Relative Density	SPT (Blows/ft.)
Very loose	Less than 4
Loose	4–10
Medium Dense	10–30
Dense	30–50
Very Dense	Greater than 50

SILTS AND CLAYS

Consistency	SPT (Blows/ft.)
Very soft	Less than 2
Soft	2–4
Firm	4–8
Stiff	8–15
Very stiff	15–30
Hard	Greater than 30

NOTES:

Borings drilled on August 18, 2006

Water level measured on date of drilling

N Standard Penetration Test Resistance (blows/ft)

GSE Surveyed Ground Surface Elevation (ft NGVD)

NOTES:

= Field moisture content %

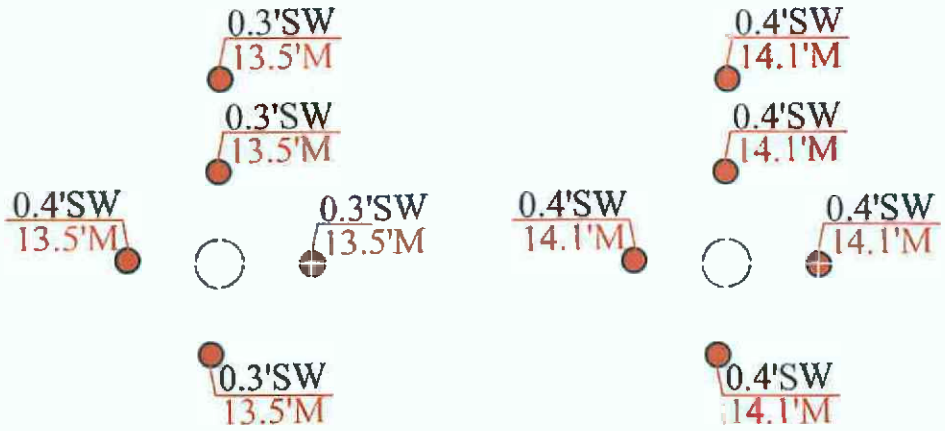
-200= Percent passing US #200 Sieve

DEVO Engineering
CONSULTING GEOTECHNICAL ENGINEERS

Figure Name: **SOIL PROFILES FOR PB-1 TO PB-4**

Project Name: DR. BRADFORD MEMORIAL PARK REGIONAL STORMWATER FACILITY

Checked & Approved By:	Drawn By:	Date:	Scale	Project #	
DS	MZ	08-24-06	NOTED	06-121.198	Figure 4.1



NORTH

GRAPHIC SCALE
1 INCH = 20 FEET

LEGEND:

1.5'SW / 0.5'M — Muck probe performed on August 23, 2006

SW	Standing Water
M	Muck
S	Sand
MS	Mucky Sand

KEY MAP:

Note:

- The manual muck probe procedure involves pushing a slender metal rod into the surficial organics and evaluating the relative resistance of the soil to this manual penetration.
- Highly organic soils such as muck and peat are characteristically very soft and/or fibrous and will typically yield to the penetration of the manual muck probe.
- However, manual muck probes cannot detect peat or muck layers which exist beneath layers of sand or dense soils which cannot be penetrated.
- The probes can also penetrate to some extent in loose granular soils which may exist beneath peat or muck layers.
- These limitations can at times lead to some overestimation or underestimation of peat or muck thicknesses and the data must be treated with these limitations in mind.
- It is not recommended that muck probe data be used for earthwork quantity estimates except on a very preliminary basis.
- Backhoe test pits or auger borings are recommended where more definite information is needed on the thickness of surficial organics and the texture and stratification of underlying soil.

DEVO Engineering
CONSULTING GEOTECHNICAL ENGINEERS

Figure Name: MUCK PROBE DATA

Project Name: DR BRADFORD MEMORIAL PARK REGIONAL STORMWATER FACILITY

Checked & Approved by	Drawn By	Date	Scale	Proj #	
DS	SM	08-23-06	Noted	06-121.198	Figure 5.1