Solid Waste Authority of Palm Beach County

7501 North Jog Road • West Palm Beach, FL 33142

Appendix 10.7.3

Environmental Resource Permit Application

July 2010

Prepared By:

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3582056

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7-9-10

Christopher C. Tilman
Florida P.E. No. 61903

Solid Waste Authority of Palm Beach County
Palm Beach Renewable Energy Facility No. 2
Environmental Resource Permit

Attachment A

Application Forms (A, C, & E)

FORM #: 62-343.900 (1)
FORM TITLE: JOINT ENVIRONMENTAL RESOURCE PERMIT APPLICATION
DATE: March 26, 2004

SECTION A

FOR AGENCY USE ONLY	
ACOE Application #	DEP/WMD Application #
Date Application Received	Date Application Received
Proposed Project Lat.	Fee Received $
Proposed Project Long.	Fee Receipt #

PART 1:

Are any of the activities described in this application proposed to occur in, on, or over wetlands or other surface waters? ☐ yes ☒ no

Is this application being filed by or on behalf of a government entity or drainage district? ☒yes ☐no

PART 2:

A. Type of Environmental Resource Permit Requested (check at least one). See Attachment 2 for thresholds and descriptions.

- ☐ Noticed General - include information requested in Section B.
- ☐ Standard General (Single Family Dwelling) - include information requested in Sections C and D.
- ☐ Standard General (all other Standard General projects) - include information requested in Sections C and E.
- ☐ Individual (Single Family Dwelling) - include information requested in Sections C and D.
- ☒ Individual (all other Individual projects) - include information requested in Sections C and E.
- ☐ Conceptual - include information requested in Sections C and E.
- ☐ Mitigation Bank Permit (construction) - include information requested in Sections C and F. (If the proposed mitigation bank involves the construction of a surface water management system requiring another permit defined above, check the appropriate box and submit the information requested by the applicable section.)
- ☐ Mitigation Bank (conceptual) - include information requested in Sections C and F.

B. Type of activity for which you are applying (check at least one)

- ☐ Construction or operation of a new system, other than a solid waste facility, including dredging or filling in, on or over wetlands and other surface waters.
- ☒ Construction, expansion or modification of a solid waste facility.
- ☐ Alteration or operation of an existing system which was not previously permitted by a WMD or DEP.
- ☐ Modification of a system previously permitted by a WMD or DEP.

Provide previous permit numbers:_____

☐	Alteration of a system	☐	Extension of permit duration
☐	Abandonment of a system	☐	Construction of additional phases of a system
☐	Removal of a system		

C. Are you requesting authorization to use Sovereign Submerged Lands?

☐yes ☒no

(See Section G and Attachment 5 for more information before answering this question.)

D. For activities in, on, or over wetlands or other surface waters, check type of federal dredge and fill permit requested:

☐Individual	☐Programmatic General	☐General
☐Nationwide	☒Not Applicable	

E. Are you claiming to qualify for an exemption? ☐yes ☒no

If yes, provide rule number if known. _____

FORM #: 62-343.900 (1)
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PART 3: **A. OWNER(S) OF LAND**	**B. ENTITY TO RECEIVE PERMIT (IF OTHER THAN OWNER)**
Name Mark Hammond	Name
Title and Company Executive Director, Solid Waste Authority of Palm Beach County	Title and Company
Address 7501 North Jog Road	Address
City, State, Zip West Palm Beach, FL 33412	City, State, Zip
Telephone and Fax (561) 640-4000 and (561) 640-3400	Telephone and Fax
E-mail Address: (optional) mhammond@swa.org	E-mail Address: (optional)
C. AGENT AUTHORIZED TO SECURE PERMIT	**D. CONSULTANT (IF DIFFERENT FROM AGENT)**
Name Christopher C. Tilman, P.E.	Name
Title and Company Senior Consultant, Malcolm Pirnie, Inc.	Title and Company
Address 4315 Metro Parkway, Suite 520	Address
City, State, Zip Fort Myers, FL 33916	City, State, Zip
Telephone and Fax (239) 332-1300 and (239) 332-1789	Telephone and Fax
E-mail Address: (optional) ctilman@pirnie.com	E-mail Address: (optional)

PART 4: (Please provide metric equivalent for federally funded projects):

A. Name of Project, including phase if applicable: Palm Beach Renewable Energy Facility No. 2

B. Is this application for part of a multi-phase project? ☐ Yes ☒ No

C. Total applicant-owned area contiguous to the project? 1,320 ac.; _____ ha.

D. Total area served by the system: 60.63 ac.; _____ ha.

E. Impervious area for which a permit is sought: 25 ac. (approximate); _____ ha.

F. Volume of water that the system is capable of impounding: 2.66 ac. ft.; _____ m^3

G. What is the total area of work in, on, or over wetlands or other surface waters?
0 ac.; _____ ha.; _____ sq. ft.; _____ sq. m.

H. Total volume of material to be dredged: 0 yd^3; 0 m^3

I. Number of new boat slips proposed: 0 wet slips; 0 dry slips

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PART 5:

Project location (use additional sheets if needed):
County(ies)Palm Beach

Section(s) 34	Township 42	Range 42
Section(s)	Township	Range
Section(s)	Township	Range

Land Grant name, if applicable: N/A

Tax Parcel Identification Number: 74-42-42-34-00-000-1010

Street Address, Road or other location: Northwest of the intersection of 45th Street and Jog Road, west of Jog Road.

City, Zip Code, if applicable: West Palm Beach, FL 33412

PART 6: Describe in general terms the proposed project, system, or activity.

The Solid Waste Authority of Palm Beach County (Authority) is planning to construct a 3,000 tons per day Waste-to-Energy (WTE) facility on the Authority's existing Palm Beach Renewable Energy Park (Energy Park), previously known as the North County Resource Recovery Facility (NCRRF) Campus. The proposed facility, Palm Beach Renewable Energy Facility No. 2 (PBREF No. 2), will increase the Authority's overall waste processing capacity as well as extend the life of the Class I landfill.

This environmental resource permit application is part of an overall Petition to Modify Conditions of Certification PA 84-20 as part of the Power Plant Siting process.

The proposed stormwater management system maintains the existing discharge location and historical drainage patterns, and includes a gravity collection system and a stormwater harvesting system. The gravity collection system consists of a dry retention system designed to treat runoff from a 25-year, 72-hour storm event and the system includes a dry retention swale, conveyance swales, inlets, culverts, and outfall structures. The stormwater harvesting system includes a stormwater harvesting tank, duplex pump stations, and overflow pipe drains to the gravity stormwater system.

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PART 7:

A. If there have been any pre-application meetings, including on-site meetings, with regulatory staff, please list the date(s), location(s), and names of key staff and project representatives.
1. November 23, 2009 – FDEP Southeast District Office, Indarjit Jagnarine (FDEP), Christopher Tilman and Kushala Gowda (Malcolm Pirnie)
2. March 18, 2010 - FDEP Southeast District Office, Indarjit Jagnarine (FDEP), Marc Bruner and Mary Beth Morrison (Solid Waste Authority), Leah Richter and Christopher Tilman (Malcolm Pirnie).

B. Please identify by number any MSSW/Wetland Resource/ERP/ACOE Permits pending, issued or denied for projects at the location, and any related enforcement actions.

Agency	Date	No.\Type of Application	Action Taken
USACOE	10/20/1986	85IPB-21054 Dredge & Fill Permit	Issued
USACOE	10/15/2002	198501054 20-year Extension	Issued
USACOE	06/12/2009	Joint ERP/Federal Dredge & Fill Permit (SAJ-1985-01054 (IP-LCK))	Pending

C. Note: The following information is required for projects proposed to occur in, on or over wetlands that need a federal dredge and fill permit or an authorization to use state owned submerged lands. Please provide the names, addresses and zip codes of property owners whose property directly adjoins the project (excluding application) and/or (for proprietary authorizations) is located within a 500 ft. radius of the applicant's land. Please attach a plan view showing the owner's names and adjoining property lines. Attach additional sheets if necessary.

1. 2.

3. 4.

5. 6.

7. 8.

FORM #: 62-343.900 (1)
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DATE: March 26, 2004

PART 8:

A. By signing this application form, I am applying, or I am applying on behalf of the applicant, for the permit and any proprietary authorizations identified above, according to the supporting data and other incidental information filed with this application. I am familiar with the information contained in this application and represent that such information is true, complete and accurate. I understand this is an application and not a permit, and that work prior to approval is a violation. I understand that this application and any permit issued or proprietary authorization issued pursuant thereto, does not relive me of any obligation for obtaining any other required federal, state, water management district or local permit prior to commencement of construction. I agree, or I agree on behalf of the applicant, to operate and maintain the permitted system unless the permitting agency authorizes transfer of the permit to a responsible operation entity. I understand that knowingly making any false statement or representation in this application is a violation of Section 373.430, F.S. and 18 U.S.C. Section 1001.

Christopher C. Tilman, P.E.
Typed/Printed Name of Applicant (If no Agent is used) or Agent (If one is so authorized below)

Signature of Applicant/Agent — Date: 7-9-10

Senior Consultant
(Corporate Title if applicable)

AN AGENT MAY SIGN ABOVE ONLY IF THE APPLICANT COMPLETES THE FOLLOWING:

B. I hereby designate and authorize the agent listed above to act on my behalf, or on behalf of my corporation, as the agent in the processing of this application for the permit and/or proprietary authorization indicated above; and to furnish, on request, supplemental information in support of the application. In addition, I authorize the above-listed agent to bind me, or my corporation, to perform any requirements which may be necessary to procure the permit or authorization indicated above. I understand that knowingly making any false statement or representation in this application is a violation of Section 373.430, F.S. and 18 U.S.C. Section 1001.

Mark Hammond	Mark M	7/7/10
Typed/Printed Name of Applicant	Signature of Applicant	Date

Executive Director
(Corporate Title if applicable)

Please note: The applicant's original signature (not a copy) is required above.

PERSON AUTHORIZING ACCESS TO THE PROPERTY MUST COMPLETE THE FOLLOWING:

C. I either own the property described in this application or I have legal authority to allow access to the property, and I consent, after receiving prior notification, to any site visit on the property by agents or personnel from the Department of Environmental Protection, the Water Management District and the U.S. Army Corps of Engineers necessary for the review and inspection of the proposed project specified in this application. I authorize these agents or personnel to enter the property as many times as may be necessary to make such review and inspection. Further, I agree to provide entry to the project site for such agents or personnel to monitor permitted work if a permit is granted.

Mark Hammond	Mark M	7/7/10
Typed/Printed Name of Applicant	Signature of Applicant	Date

Executive Director
(Corporate Title if applicable)

SECTION C

Environmental Resource Permit Notice of Receipt of Application

Note: this form does not need to be submitted for noticed general permits.
This information is required in addition to that required in other sections of the application. Please submit five copies of this notice of receipt of application and all attachments with the other required information. Please submit all information on 8 1/2" x 11" paper.

Project Name	Palm Beach Renewable Energy Facility No. 2 (PBREF No. 2)
County	Palm Beach County
Owner	Solid Waste Authority of Palm Beach County
Applicant:	Mark Hammond, Executive Director
Applicant's Address:	7501 N Jog Road, West Palm Beach, FL 33412

1. Indicate the project boundaries on a USGS quadrangle map. Attach a location map showing the boundary of the proposed activity. The map should also contain a north arrow and a graphic scale; show Section(s), Township(s), and Range(s); and must be of sufficient detail to allow a person unfamiliar with the site to find it.

See Attachment B, Figure 1 for project location and USGS topographic map.

2. Provide the names of all wetlands, or other surface waters that would be dredged, filled, impounded, diverted, drained, or would receive discharge (either directly or indirectly), or would otherwise be impacted by the proposed activity, and specify if they are in an Outstanding Florida Water or Aquatic Preserve:

See Attachment B, Figure 2 for wetlands map. There are no wetlands located within the proposed project area and no impacts to wetlands are anticipated from the proposed project. The South Borrow Lake will be filled upon issuance of dredge and fill permit by the U.S. Army Corps of Engineers (USACOE), which is currently in the final permitting stage (USACOE Application No. SAJ-1985-01054 (IP-LCK)). The stormwater calculations for the PBREF No. 2 project area are based on the South Borrow Lake being filled to elevation 19 feet NGVD. Stormwater from the project area will be routed through the dry retention system and eventually discharged to the conservation area to the west at the existing outfall location.

3. Attach a depiction (plan and section views), which clearly shows the works or other facilities proposed to be constructed. Use multiple sheets, if necessary. Use a scale sufficient to show the location and type of works.

See Attachment C, Permit Drawings, for plan and section views of the Palm Beach Renewable Energy Facility No. 2.

4. Briefly describe the proposed project (such as "construct dock with boat shelter", "replace two existing culverts", "construct surface water management system to serve 150 acre residential development"):

The proposed project involves construction of a new 3,000 tons per day waste-to-energy facility. The proposed stormwater management system includes a stormwater harvesting system and a gravity collection system that is capable of treating stormwater from a 25-year, 72-hour storm (design storm).

5. Specify the acreage of wetlands or other surface waters, if any, that are proposed to be filled, excavated, or otherwise disturbed or impacted by the proposed activity:

filled N/A ac.; N/A excavated ac.;

other impacts N/A ac. (temporary impacts)

6. Provide a brief statement describing any proposed mitigation for impacts to wetlands and other surface waters (attach additional sheets if necessary):

There are no anticipated impacts to wetlands; therefore, no mitigation is proposed.

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Application Name:

Application Number:

Office where the application can be inspected:

Note to Notice recipient: The information in this notice has been submitted by the applicant, and has not been verified by the agency. It may be incorrect, incomplete or may be subject to change.

SECTION E

INFORMATION REQUESTED FOR STANDARD GENERAL, INDIVIDUAL AND CONCEPTUAL ENVIRONMENTAL RESOURCE PERMIT APPLICATIONS NOT RELATED TO A SINGLE FAMILY DWELLING UNIT

Please provide the information requested below if the proposed project requires either a standard general, individual, or conceptual approval environmental resource permit and is not related to an individual, single family dwelling unit, duplex or quadruplex. The information listed below represents the level of information that is usually required to evaluate an application. The level of information required for a specific project will vary depending on the nature and location of the site and the activity proposed. Conceptual approvals generally do not require the same level of detail as a construction permit. However, providing a greater level of detail will reduce the need to submit additional information at a later date. If an item does not apply to your project, proceed to the next item. Please submit all information that is required by the Department on either 8 1/2 in. X 11 in. paper or 11 in. X 17 in. paper. Larger drawings may be submitted to supplement but not replace these smaller drawings.

I. Site Information

A. Provide a map(s) of the project area and vicinity delineating USDA/SCS soil types.

See Attachment B, Figure 3 for USDA/SCS soils map.

B. Provide recent aerials, legible for photo interpretation with a scale of 1" = 400 ft, or more detailed, with project boundaries delineated on the aerial.

See Attachment B, Figure 4 for an aerial map of the project area.

C. Identify the seasonal high water or mean high tide elevation and normal pool or mean low tide elevation for each on site wetland or surface water, including receiving waters into which runoff will be discharged. Include dates, datum, and methods used to determine these elevations.

The seasonal high ground water elevation for the proposed project area was estimated to be 18 feet NGVD based on William Earth Science, Inc. (July 2008), Nutting Engineer (February 2008), and Dunkelberger Engineering & Testing, Inc.'s (May 2010) geotechnical reports. Refer to ERP Attachment H, CD-ROM for geotechnical reports. Hard copies of the geotechnical reports are included in Appendix 10.10.1 of the Petition to Modify Conditions of Certification PA 84-20: Palm Beach Renewable Energy Facility No. 2 (Application).

D. Identify the wet season high water tables at the locations representative of the entire project site. Include dates, datum, and methods used to determine these elevations.

The seasonal high water table (SHWT) was estimated to be 18 feet NGVD. Refer to Attachment H, CD-ROM for geotechnical reports.

II. Environmental Considerations

A. Provide results of any wildlife surveys that have been conducted on the site, and provide any comments pertaining to the project from the Florida Game and Fresh Water Fish Commission and the U.S. Fish and Wildlife Service.

The Florida Natural Areas Inventory (FNAI), Florida Fish & Wildlife Conservation Commission (FWC) and the U.S. Fish and Wildlife Service (USFWS) compile county lists of species under the protection of the State and Federal Endangered Species Laws. These lists were obtained from the USFWS and FNAI (See Attachment B) via the internet by Malcolm Pirnie and reviewed for possible Listed species habitat within the 60-acre project site. The project site was determined to have potential habitat for numerous species on these lists. The known occurrence data was then obtained from FNAI to determine what listed species are known to be in the surrounding area. There were no previously reported Listed species inhabiting the project site. This was also confirmed through observations made during wetland monitoring efforts by Authority staff scientists and during two site visits to the South Borrow Lake site (which is within the project site) by Malcolm Pirnie Biologists in February and October

2008. The South Borrow Lake will be ultimately filled to provide suitable constructible land, which accounts for approximately 25 acres of the PBREF No. 2 project area. See Attachment B, Figure 5.

In addition, Malcolm Pirnie Biologists have conducted six site visits to the Authority's Energy Park as part of separate efforts related to habitat and wildlife surveys. During these site visits, Malcolm Pirnie Biologists did not observe known Listed species utilizing the project site for foraging or as a permanent habitat. However, Authority staff scientists have observed Listed species including the Everglades Snail Kite (Rostrhamus sociabilis plumbeus), and Wood Stork (Mycteria Americana) utilizing portions of the project site for foraging. There is a wading bird rookery located approximately 2,000 feet southwest of the project site, which provides permanent nesting habitat for the Listed species noted above.

Ms. Kristi Yanchis, a USFWS Biologist, conducted a site visit at the South Borrow Lake site, as part of the USACOE Dredge and Fill permit effort, to assess the functionality of the littoral wetland habitat and potential impacts to Listed species in the vicinity of the South Borrow Lake. Based on the site visit, and Malcolm Pirnie's subsequent follow-up correspondence with Ms. Yanchis and Mr. Paul Souza, a USFWS Field Supervisor, a letter was issued on April 20, 2010 to the USACOE stating that the South Borrow Lake fill project is not expected to adversely affect the fish and wildlife habitat resources. Please refer to the Joint Application for Environmental Resource Permit/Federal Dredge and Fill Permit (Joint Application) (USACOE application number SAJ-1985-01054 (IP-LCK)) for additional information related to wetland and wildlife survey results.

The USACOE has conducted a site visit to determine the functionality of wetlands habitats and potential impacts to Listed species for the 25-acre South Borrow Lake site that lies within the PBREF No. 2 project area. Because the areas outside the South Borrow Lake consists of the existing dry retention area and wooded dry retention area (part of existing facility, PBREF No. 1 stormwater management system), existing roadways and landscaping, a site visit was not conducted to determine the functionality of wetland habitats and potential impacts to Listed species for these areas. The portions of the PBREF No. 1 stormwater management system that lie within the PBREF No. 2 project area are not considered jurisdictional wetland under state or federal regulations and therefore are exempt from wetland impact. In addition, Malcolm Pirnie Biologists and Authority staff scientists have not observed known Listed species utilizing this area for foraging or as a permanent habitat.

B. Provide a description of how water quantity, quality, hydroperiod, and habitat will be maintained in on-site wetlands and other surface waters that will be preserved or will remain undisturbed.

The proposed activities at the site will not impact surface waters or wetlands. Stormwater resulting from the 25-year, 72-hour storm event (design storm) from the project area will be treated in the dry retention system and eventually discharged to the conservation area (on the western side of the project area) at the existing outfall location, which will maintain the current discharge point, hydroperiod, and drainage pattern.

C. Provide a narrative description of any proposed mitigation plans, including purpose, maintenance, monitoring, and construction sequence and techniques, and estimated costs.

There are no anticipated impacts to wetlands and therefore, no mitigation is proposed. Wetland impacts have been assessed under the prior Joint Application (SAJ-1985-01054 (IP-LCK)) for the South Borrow Lake Fill Project.

D. Describe how boundaries of wetlands or other surface waters were determined. If there has ever been a jurisdictional declaratory statement, a formal wetland determination, a formal determination, a validated informal determination, or a revalidated jurisdictional determination, provide the identifying number.

Malcolm Pirnie Biologists conducted a wetland assessment of the project site in October 2008. The purpose of this wetland assessment was to evaluate the absence/presence of Waters of the United States (WOUS) on the project site. WOUS are subject to the jurisdiction of the USACOE pursuant to Section 404 of the Clean Water Act. WOUS are defined in 33 CRF Part 328.3 and include ponds, streams, and wetlands. Wetlands were identified based on the 1987 Corps of Engineers Wetland Delineation Manual. The State of Florida also extends jurisdiction to surface water habitats under Part IV, Ch. 373, F.S., to all ponds, streams, and wetlands on the platted property. The State of Florida and its political subdivisions delineate wetland boundaries under the provisions of Ch. 62-340, F.A.C., as ratified by the Florida Legislature in sections 373.421 and 373.4211, F.S.

Based on this wetland assessment methodology, Malcolm Pirnie Biologists determined that the only wetland habitat within the project site were approximately 5.97 acres of manmade littoral wetland habitat located along the perimeter of the South Borrow Lake. The USACOE claimed jurisdiction over this littoral wetland habitat within

the boundaries of the project site even though the South Borrow Lake is an isolated system and does not drain into other surface waters.

The Authority submitted a Joint Application to the USACOE in June 2009 for the filling of the South Borrow Lake. Currently, the USACOE is in the final stages of reviewing this Joint Application (SAJ-1985-01054 (IP-LCK)) for issuance. There is mitigation associated with the South Borrow Lake filling project, which will provide compensation for the existing littoral wetland habitat and will be mitigated for in the Loxahatchee Mitigation Bank. The USFWS agrees with the USACOE that the proposed mitigation sufficiently compensates for the loss of the littoral zone wetlands at the South Borrow Lake. However, an FDEP condition of filling the South Borrow Lake was to retain approximately 1.25 acres of the existing vegetated fringe area (referred as "fringe preservation area") of the South Borrow Lake when this lake is filled, which provides on-site storage of stormwater for the PBREF No.2. Therefore, there are no jurisdictional wetlands located within the proposed project site boundaries.

E. Impact Summary Tables:

1. For all projects, complete Tables 1, 2 and 3 as applicable.

N/A

2. For docking facilities or other structures constructed over wetlands or other surface waters, provide the information requested in Table 4.

N/A

3. For shoreline stabilization projects, provide the information requested in Table 5.

N/A

III. Plans

Provide clear, detailed plans for the system including specifications, plan (overhead) views, cross sections (with the locations of the cross sections shown on the corresponding plan view), and profile (longitudinal) views of the proposed project. The plans must be signed and sealed by an appropriate registered professional as required by law. Plans must include a scale and a north arrow. These plans should show the following:

A. Project area boundary and total land area, including distances and orientation from roads or other land marks;

See Attachment C, Permit Drawings.

B. Existing land use and land cover (acreage and percentages), and on-site natural communities, including wetlands and other surface waters, aquatic communities, and uplands. Use the Florida Land Use Cover & Classification System (FLUCCS)(Level 3) for projects proposed in the South Florida Water Management District, the St. Johns River Water Management District, and the Suwannee River Water Management District and use the National Wetlands Inventory (NWI) for projects proposed in the Southwest Florida Water Management District. Also identify each community with a unique identification number which must be consistent in all exhibits.

See Attachment B, Figure 6 for FLUCCS map and Attachment F, Drainage Calculations for the existing land cover information.

C. The existing topography extending at least 100 feet off the project area, and including adjacent wetlands and other surface waters. All topography shall include the location and a description of known benchmarks, referenced to NGVD. For systems waterward of the mean high water (MHW) or seasonal high water lines, show water depths, referenced to mean low water (MLW) in tidal areas or seasonal low water in non-tidal areas, and list the range between MHW and MLW. For docking facilities, indicate the distance to, location of, and depths of the nearest navigational channel and access routes to the channel.

See Attachment D for boundary survey and topographical map.

D. If the project is in the known flood plain of a stream or other water course, identify the following: 1) the flood plain boundary and approximate flooding elevations; and 2) the 100-year flood elevation and floodplain boundary of any lake, stream or other watercourse located on or adjacent to the site;

See Attachment B, Figure 8 for the flood plain map. The proposed project does not lie within the 100-year flood zone.

E. The boundaries of wetlands and other surface waters within the project area. Distinguish those wetlands and other surface waters that have been delineated by any binding jurisdictional determination;

See Attachment B, Figure 2 for Wetland map. There are no jurisdictional wetlands within the proposed project area.

F. Proposed land use, land cover and natural communities (acreage and percentages), including wetlands and other surface waters, undisturbed uplands, aquatic communities, impervious surfaces, and water management areas. Use the same classification system and community identification number used in III (B) above.

See Attachment B, Figure 7 for FLUCCS map and Attachment F, Drainage Calculations for the proposed land cover information.

G. Proposed impacts to wetlands and other surface waters, and any proposed connections/outfalls to other surface waters or wetlands;

There are no anticipated impacts to wetlands. See Attachment C, Permit Drawings for proposed outfall structures location.

H. Proposed buffer zones;

See Attachment B, Figure 2 for Wetland map and Attachment C for Permit Drawings.

I. Pre- and post-development drainage patterns and basin boundaries showing the direction of flows, including any off-site runoff being routed through or around the system; and connections between wetlands and other surface waters;

See Attachment F for Drainage Calculations and Attachment C, Permit Drawings for drainage map.

J. Location of all water management areas with details of size, side slopes, and designed water depths;

See Attachment C, Permit Drawings for proposed stormwater management system details.

K. Location and details of all water control structures, control elevations, any seasonal water level regulation schedules; and the location and description of benchmarks (minimum of one benchmark per structure);

See Attachment C, Permit Drawings.

L. Location, dimensions and elevations of all proposed structures, including docks, seawalls, utility lines, roads, and buildings;

See Attachment C, Permit Drawings.

M. Location, size, and design capacity of the internal water management facilities;

See Attachment C, Permit Drawings for the proposed stormwater management system location and details. See Attachment F for Drainage Calculations and Attachment H, CD-ROM for ICPR report.

N. Rights-of-way and easements for the system, including all on-site and off-site areas to be reserved for water management purposes, and rights-of-way and easements for the existing drainage system, if any;

Proposed work will be performed within the Authority's right-of-way.

O. Receiving waters or surface water management systems into which runoff from the developed site will be discharged;

Stormwater from the project area will be routed through the dry retention area located north of the proposed facility and eventually discharged to the conservation area at the existing outfall location via existing culverts. See Attachment F for Drainage Calculations and Attachment C for Permit Drawings.

P. Location and details of the erosion, sediment and turbidity control measures to be implemented during each phase of construction and all permanent control measures to be implemented in post-development conditions;

See Attachment C, Permit Drawings for Sediment and Erosion Control Details.

Q. Location, grading, design water levels, and planting details of all mitigation areas;

There are no mitigation areas proposed for the project site.

R. Site grading details, including perimeter site grading;

See Attachment C, Permit Drawings for Grading Plans.

S. Disposal site for any excavated material, including temporary and permanent disposal sites;

Any excavated material requiring disposal will be disposed of in the Authority-owned Class I or III landfill.

T. Dewatering plan details;

No dewatering activities are anticipated. Dewatering plans, if required, will be provided by the Contractor and will be prepared in accordance with the PPSA PA 84-20, Conditions of Certification XIII. A. 13.

U. For marina facilities, locations of any sewage pumpout facilities, fueling facilities, boat repair and maintenance facilities, and fish cleaning stations;

N/A

V. Location and description of any nearby existing offsite features which might be affected by the proposed construction or development such as stormwater management ponds, buildings or other structures, wetlands or other surface waters.

There will be no impacts to the existing offsite structures or features. The proposed stormwater management system, which is a dry retention system, will treat runoff from the 25-year, 72-hour storm event (design storm) from the Palm Beach Renewable Energy Facility No. 2 area and portions of the existing renewable energy facility that drain north. The proposed stormwater management system will also route stormwater overflow from the Jog Road drainage system through the site to the conservation area on the western side.

W. For phased projects, provide a master development plan.

This is not a phased project.

IV. Construction Schedule and Techniques

Provide a construction schedule, and a description of construction techniques, sequencing and equipment. This information should specifically include the following:

A. Method for installing any pilings or seawall slabs;

N/A

B. Schedule of implementation of temporary or permanent erosion and turbidity control measures;

Appropriate erosion and turbidity control measures will be placed in accordance with the construction schedule. These measures will be implemented by the Contractor at the appropriate time and location to prevent erosion. See Attachment C, Permit Drawings for sediment and erosion control notes and details.

C. For projects that involve dredging or excavation in wetlands or other surface waters, describe the method of excavation, and the type of material to be excavated;

N/A

D. For projects that involve fill in wetlands or other surface waters, describe the source and type of fill material to be used. For shoreline stabilization projects that involve the installation of riprap, state how these materials are to be placed, (i.e., individually or with heavy equipment) and whether the rocks will be underlain with filter cloth;

N/A

E. If dewatering is required, detail the dewatering proposal including the methods that are proposed to contain the discharge, methods of isolating dewatering areas, and indicate the period dewatering structures will be in place (Note: a consumptive use or water use permit may by required);

No dewatering activities are anticipated. Dewatering plans, if required, will be provided by the Contractor and will be prepared in accordance with the PPSA PA 84-20, Conditions of Certification XIII. A. 13.

F. Methods for transporting equipment and materials to and from the work site. If barges are required for access, provide the low water depths and draft of the fully loaded barge;

Equipment and materials will be transported to the site utilizing the existing roadway.

G. Demolition plan for any existing structures to be removed; and

See Attachment C, Permit Drawings for demolition plan.

H. Identify the schedule and party responsible for completing monitoring, record drawings, and as-built certifications for the project when completed.

The Engineer of Record and Contractor selected by Authority to construct this project will provide these services.

V. Drainage Information

A. Provide pre-development and post-development drainage calculations, signed and sealed by an appropriate registered professional, as follows:

See Attachment F for signed and sealed Drainage Calculations and Attachment H, CD-ROM for ICPR Report.

1. Runoff characteristics, including area, runoff curve number or runoff coefficient, and time of concentration for each drainage basin;

See Attachment F for signed and sealed Drainage Calculations and Attachment H, CD-ROM for ICPR Report.

2. Water table elevations (normal and seasonal high) including aerial extent and magnitude of any proposed water table draw down;

See Attachment H, CD-ROM for geotechnical reports and ICPR Report.

3. Receiving water elevations (normal, wet season, design storm);

See Attachment F for signed and sealed Drainage Calculations and Attachment H, CD-ROM for ICPR Report.

4. Design storms used including rainfall depth, duration, frequency, and distribution;

See Attachment F for signed and sealed Drainage Calculations and Attachment H, CD-ROM for ICPR Report.

5. Runoff hydrograph(s) for each drainage basin, for all required design storm event(s);

See Attachment F for signed and sealed Drainage Calculations and Attachment H, CD-ROM for ICPR Report.

6. Stage-storage computations for any area such as a reservoir, close basin, retention area, or channel, used in storage routing;

See Attachment F for signed and sealed Drainage Calculations and Attachment H, CD-ROM for ICPR Report.

7. Stage-discharge computations for any storage areas at a selected control point, such as control structure or natural restriction;

See Attachment F for signed and sealed Drainage Calculations and Attachment H, CD-ROM for ICPR Report.

8. Flood routings through on-site conveyance and storage areas;

See Attachment F for signed and sealed Drainage Calculations.

9. Water surface profiles in the primary drainage system for each required design storm event(s);

See Attachment F for signed and sealed Drainage Calculations and Attachment H, CD-ROM for ICPR Report.

10. Runoff peak rates and volumes discharged from the system for each required design storm event(s);

See Attachment F for signed and sealed Drainage Calculations and Attachment H, CD-ROM for ICPR Report.

11. Tail water history and justification (time and elevation); and

N/A

12. Pump specifications and operating curves for range of possible operating conditions (if used in system).

Pump specifications and operating curves for the stormwater harvesting system will be provided by the Contractor selected by the Authority to design this project.

B. Provide the results of any percolation tests, where appropriate, and soil borings that are representative of the actual site conditions;

See Attachment H, CD-ROM for geotechnical reports.

C. Provide the acreage, and percentages of the total project, of the following:

1. Impervious surfaces, excluding wetlands;

See Attachment F for signed and sealed Drainage Calculations.

2. Pervious surfaces (green areas, not including wetlands);

See Attachment F for signed and sealed Drainage Calculations.

3. Lakes, canals, retention areas, other open water areas; and

See Attachment F for signed and sealed Drainage Calculations.

4. Wetlands.

See Attachment B, Figure 2 for wetland map.

D. Provide an engineering analysis of floodplain storage and conveyance (if applicable), including:

1. Hydraulic calculations for all proposed traversing works;

N/A

2. Backwater water surface profiles showing upstream impact of traversing works;

N/A

3. Location and volume of encroachment within regulated floodplain(s); and

See Attachment B, Figure 8 for floodplain map.

4. Plan for compensating floodplain storage, if necessary, and calculations required for determining minimum building and road flood elevations.

Floodplain compensation plan is not applicable. See Attachment B, Figure 7 for floodplain map. Refer to Attachment F, Drainage Calculations for minimum building and road elevations.

E. Provide an analysis of the water quality treatment system including:

1. A description of the proposed stormwater treatment methodology that addresses the type of treatment, pollution abatement volumes, and recovery analysis; and

The proposed stormwater management system is a dry retention system that includes a stormwater harvesting system and a gravity collection system. The stormwater harvesting system captures runoff from selected roof areas and consists of manifolded roof drains, a stormwater harvesting tank, two duplex pump stations and their associated force mains, and overflow pipe drains to the gravity stormwater system. The gravity collection system consists of several inlet and pipe networks discharging to a dry retention system designed to treat the required runoff volume from the 25-year, 72-hour storm event (design storm) from the project area in accordance with FDEP and SFWMD criteria. The dry retention system discharges into an on-site preservation area that provides additional storage, and also through a control structure that eventually discharges into the conservation area at the existing outfall location. See Attachment F for signed and sealed Drainage Calculations and Attachment H, CD-ROM for ICPR Report.

2. Construction plans and calculations that address stage-storage and design elevations, which demonstrate compliance with the appropriate water quality treatment criteria.

See Attachment C for Permit Drawings. See Attachment F for Drainage Calculations including stage vs. storage calculations and Attachment H, CD-ROM for ICPR Report.

F. Provide a description of the engineering methodology, assumptions and references for the parameters listed above, and a copy of all such computations, engineering plans, and specifications used to analyze the system. If a computer program is used for the analysis, provide the name of the program, a description of the program, input and output data, two diskette copies, if available, and justification for model selection.

See Attachment F for Drainage Calculations including stage vs. storage calculations, Attachment H, CD-ROM for ICPR Report, and Attachment C for Permit Drawings.

VI. Operation and Maintenance and Legal Documentation

A. Describe the overall maintenance and operation schedule for the proposed system.

Solid Waste Authority of Palm Beach County will be responsible for the overall maintenance and operation of the proposed system. The Contractor will also maintain the stormwater harvesting system as part of operation and maintenance of the facility.

B. Identify the entity that will be responsible for operating and maintaining the system in perpetuity if different than the permittee, a draft document enumerating the enforceable affirmative obligations on the entity to properly operate and maintain the system for its expected life, and documentation of the entity's financial responsibility for long-

term maintenance. If the proposed operation and maintenance entity is not a property owner's association, provide proof of the existence of an entity, or the future acceptance of the system by an entity which will operate and maintain the system. If a property owner's association is the proposed operation and maintenance entity, provide copies of the articles of incorporation for the association and copies of the declaration, restrictive covenants, deed restrictions, or other operational documents that assign responsibility for the operation and maintenance of the system. Provide information ensuring the continued adequate access to the system for maintenance purposes. Before transfer of the system to the operating entity will be approved, the permittee must document that the transferee will be bound by all terms and conditions of the permit.

Solid Waste Authority of Palm Beach County will be responsible for the operation and maintenance of the system. The Contractor will also maintain the stormwater harvesting system as part of operation and maintenance of the facility.

C. Provide copies of all proposed conservation easements, storm water management system easements, property owner's association documents, and plats for the property containing the proposed system.

See Attachment D for Boundary Survey and Attachment G for Legal Description of the site.

D. Provide indication of how water and waste water service will be supplied. Letters of commitment from off-site suppliers must be included.

Potable water and domestic wastewater service will be provided by the City of West Palm Beach. Letters of commitment will be obtained during the design phase prior to construction.

E. Provide a copy of the boundary survey and/or legal description and acreage of the total land area of contiguous property owned/controlled by the applicant.

See Attachment D for Boundary Survey and Attachment G for Legal Description of the site.

VII. Water Use

A. Will the surface water system be used for water supply, including landscape irrigation, or recreation.

N/A

B. If a Consumptive Use or Water Use permit has been issued for the project, state the permit number.

N/A

C. If no Consumptive Use or Water Use permit has been issued for the project, indicate if such a permit will be required and when the application for a permit will be submitted.

N/A

D. Indicate how any existing wells located within the project site will be utilized or abandoned.

N/A

TABLE 1
Project Impact Summary

WL & SW ID	WL & SW TYPE	WL & SW SIZE (ac.) ON SITE*	WL & SW ACRES NOT IMPACTED	PERMANENT IMPACTS TO WL & SW		TEMPORARY IMPACTS TO WL & SW		MITIGATION ID
				IMPACT SIZE (acres)	IMPACT CODE	IMPACT SIZE (acres)	IMPACT CODE	

* On the property site but not within the proposed project area.

WL = Wetland; **SW** = Surface water; **ID** = Identification number, letter, etc.
Wetland Type: Use an established wetland classification system and, in the comments section below, indicate which classification system is being used.
Impact Code (Type): D = dredge; F = fill; H = change hydrology; S = shading; C = clearing; O = other. Indicate the final impact if more than one impact type is proposed in a given area. For example, show F only for an area that will first be demucked and then backfilled.

Note: Multiple entries per cell are not allowed, except in the "Mitigation ID" column. Any given acreage of wetland should be listed in one row only, such that the total of all rows equals the project total for a given category (column). For example, if Wetland No. 1 includes multiple wetland types and multiple impact codes are proposed in each type, then each proposed impact in each wetland type should be shown on a separate row, while the size of each wetland type found in Wetland No. 1 should be listed in only one row.

Comments: _____

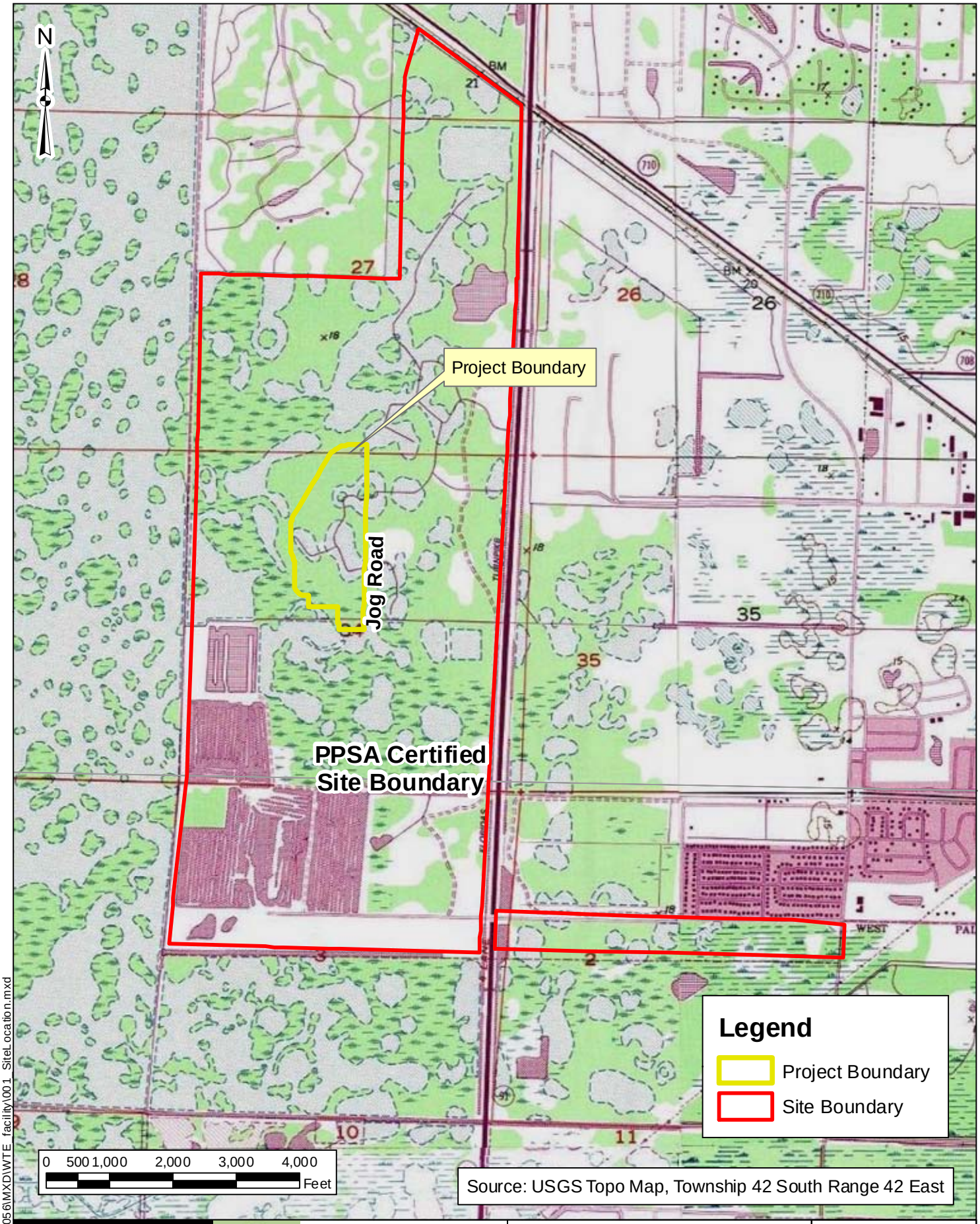
Solid Waste Authority of Palm Beach County
Palm Beach Renewable Energy Facility No. 2
Environmental Resource Permit

Attachment B

ERP Figures and Threatened & Endangered Species Information

APPLICATION FIGURES

FIGURE TITLE	FIGURE NUMBER
Site Location and USGS Topographic Map	1
Wetland Map	2
Soil Survey Map	3
Aerial Map	4
Threatened and Endangered Species Map	5
FLUCCS Map Existing Site Condition	6
FLUCCS Map Proposed Site Condition	7
Flood Zone Map	8



Source: USGS Topo Map, Township 42 South Range 42 East

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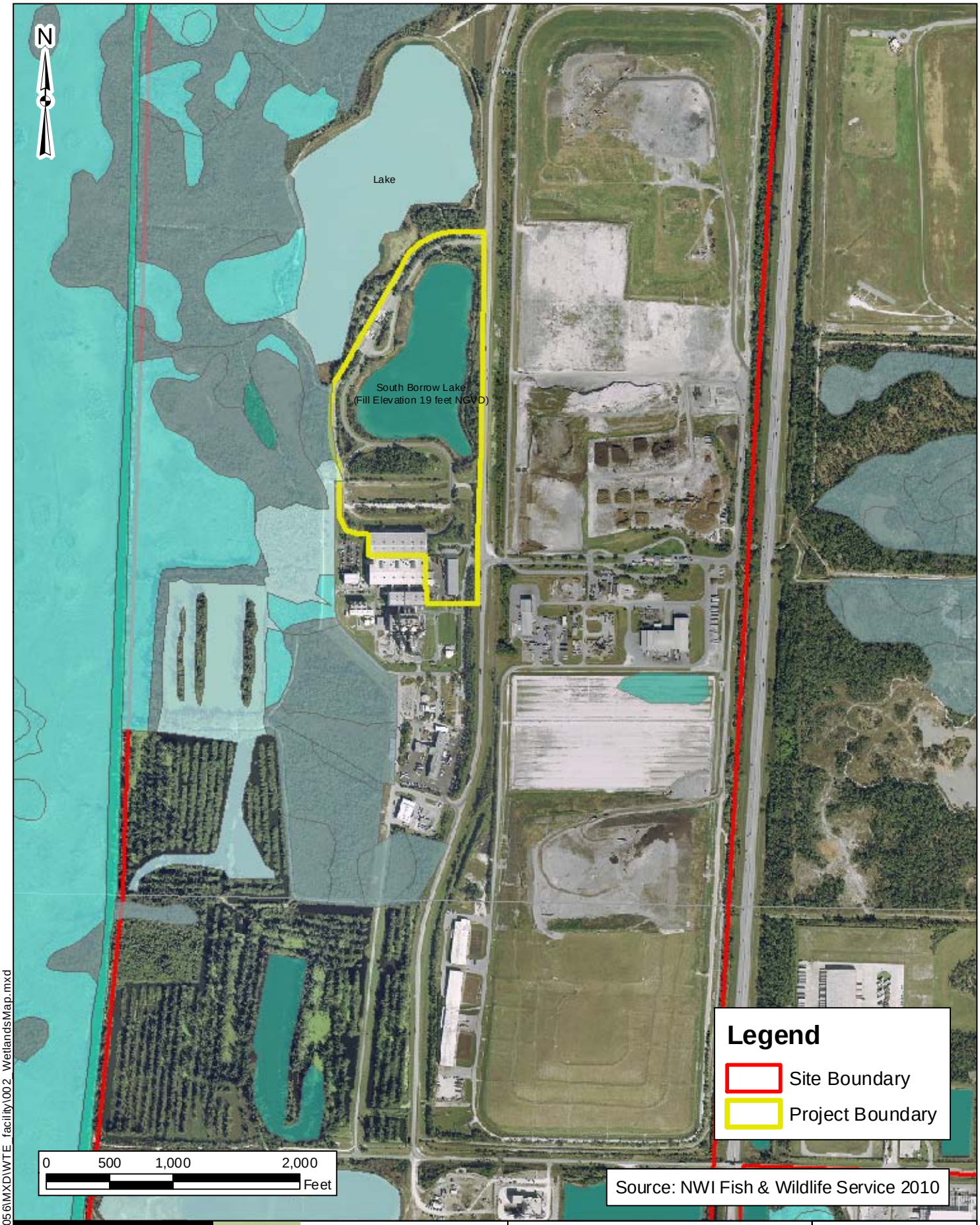
SWA SOLID WASTE AUTHORITY

Solid Waste Authority of Palm Beach County

PBREF No. 2
Environmental Resource Permit
Site Location and USGS Topographic Map

July 2010

FIGURE 1



G:\Projects\3582\056\MXD\WTE_facility\002_WetlandsMap.mxd

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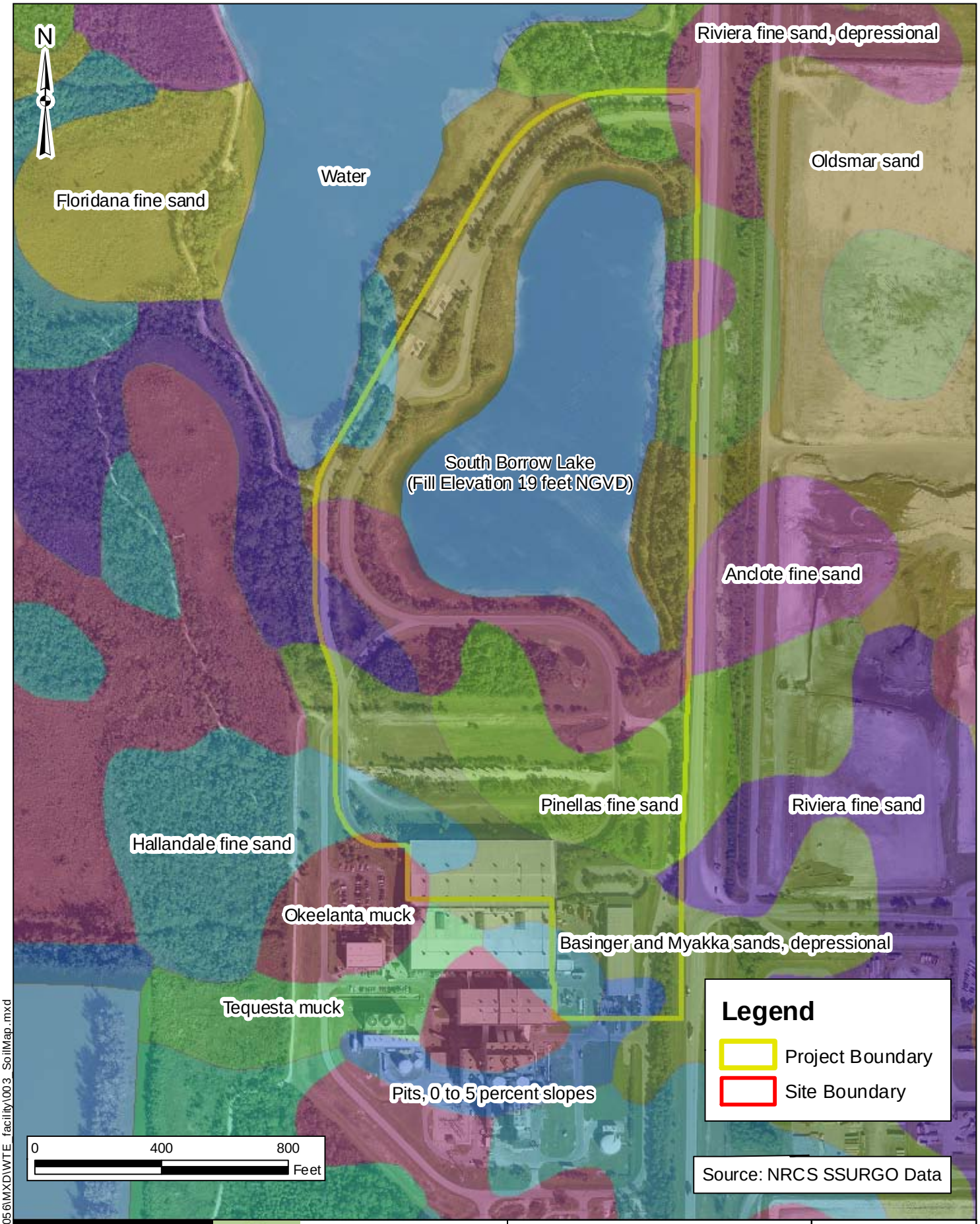
SWA SOLID WASTE AUTHORITY

Solid Waste Authority of Palm Beach County

PBREF No. 2
Environmental Resource Permit
Wetland Map

July 2010

FIGURE 2



G:\Projects\3582\056\MXD\WTE_facility\003_SoilMap.mxd

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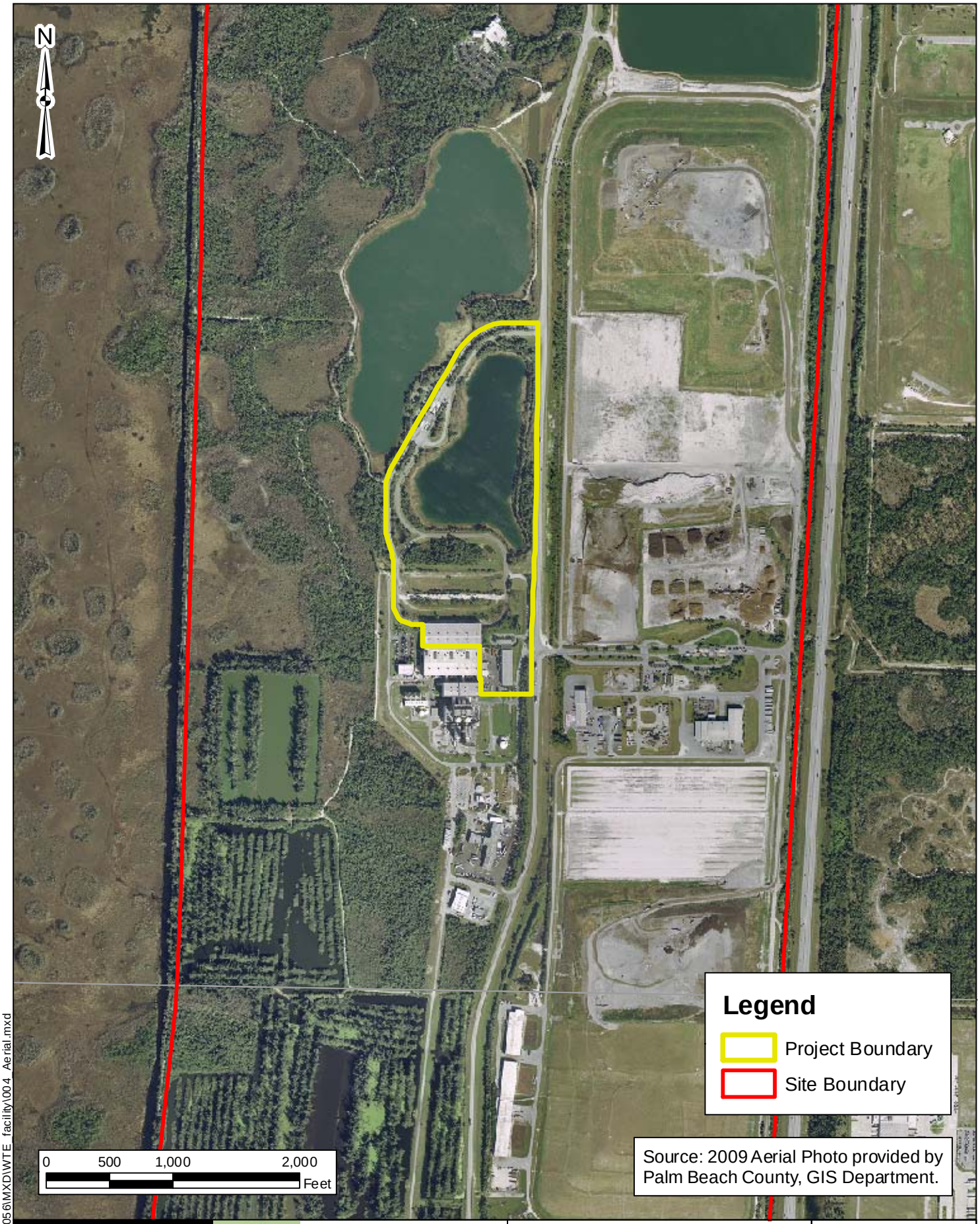
SWA SOLID WASTE AUTHORITY

Solid Waste Authority of Palm Beach County

PBREF No. 2
Environmental Resource Permit
Soil Survey Map

July 2010

FIGURE 3



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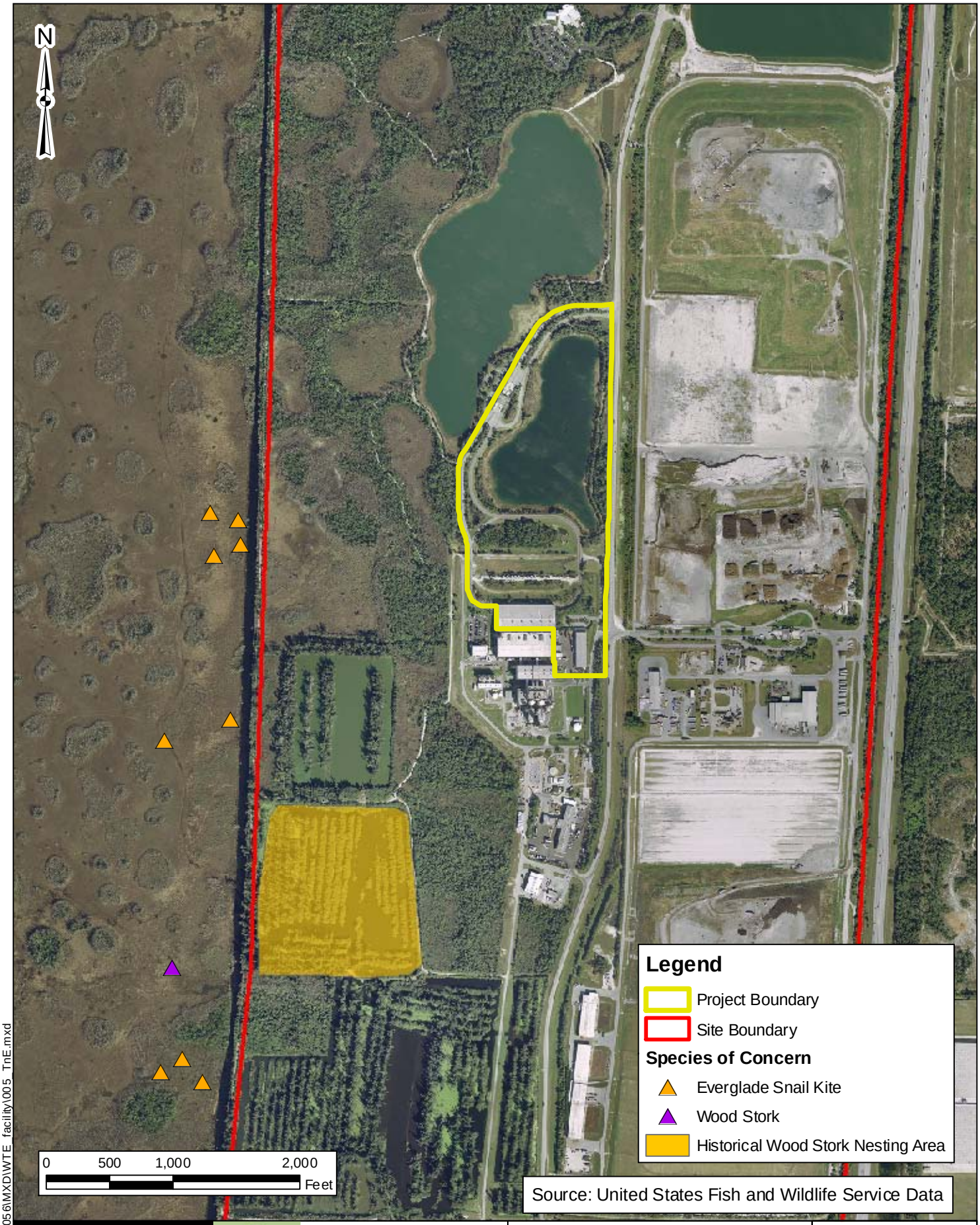
SWA SOLID WASTE AUTHORITY

Solid Waste Authority of Palm Beach County

PBREF No. 2
Environmental Resource Permit
Aerial Map

July 2010

FIGURE 4



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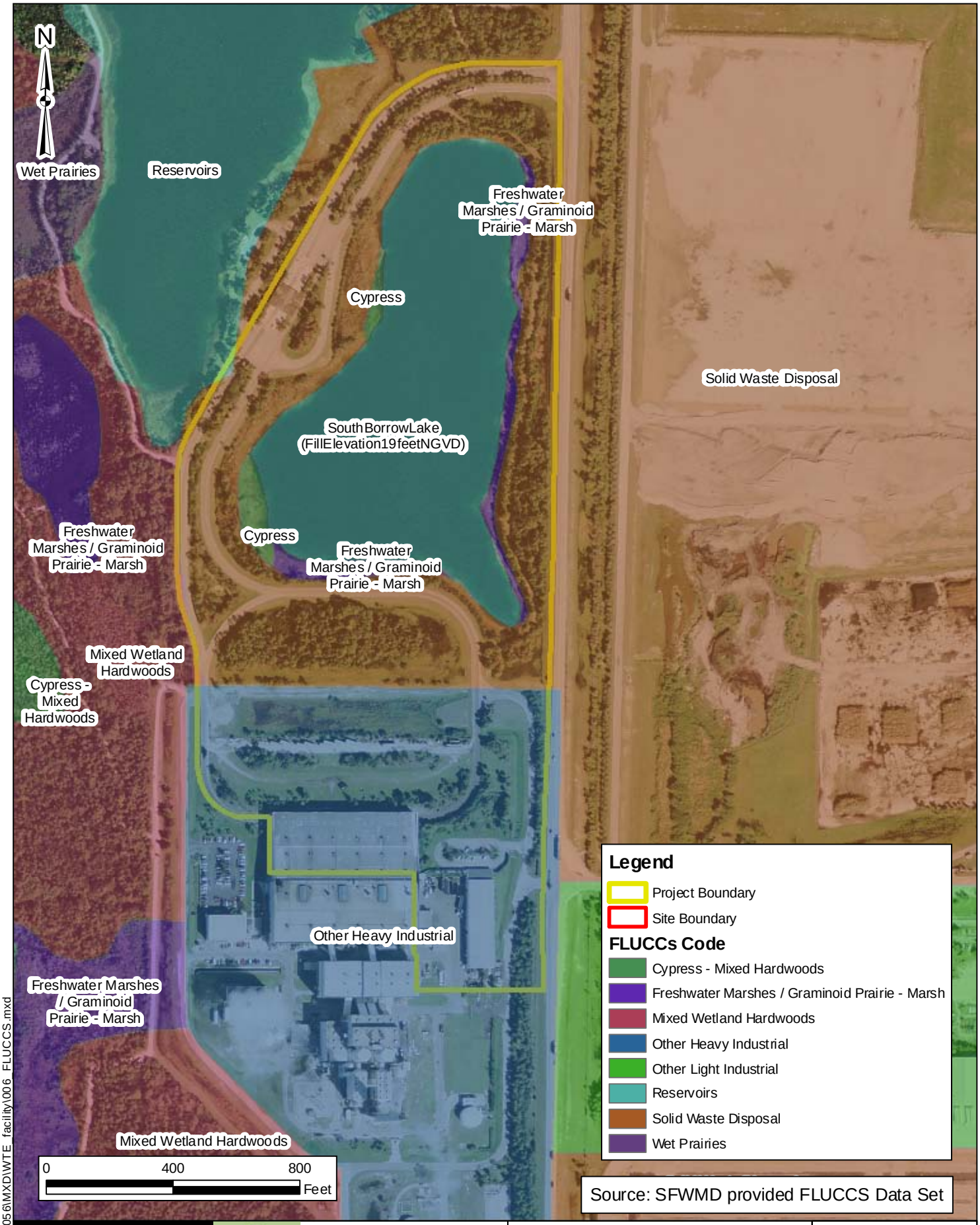
SWA SOLID WASTE AUTHORITY

Solid Waste Authority of Palm Beach County

PBREF No. 2
Environmental Resource Permit
Threatened and Endangered Species Map

July 2010

FIGURE 5



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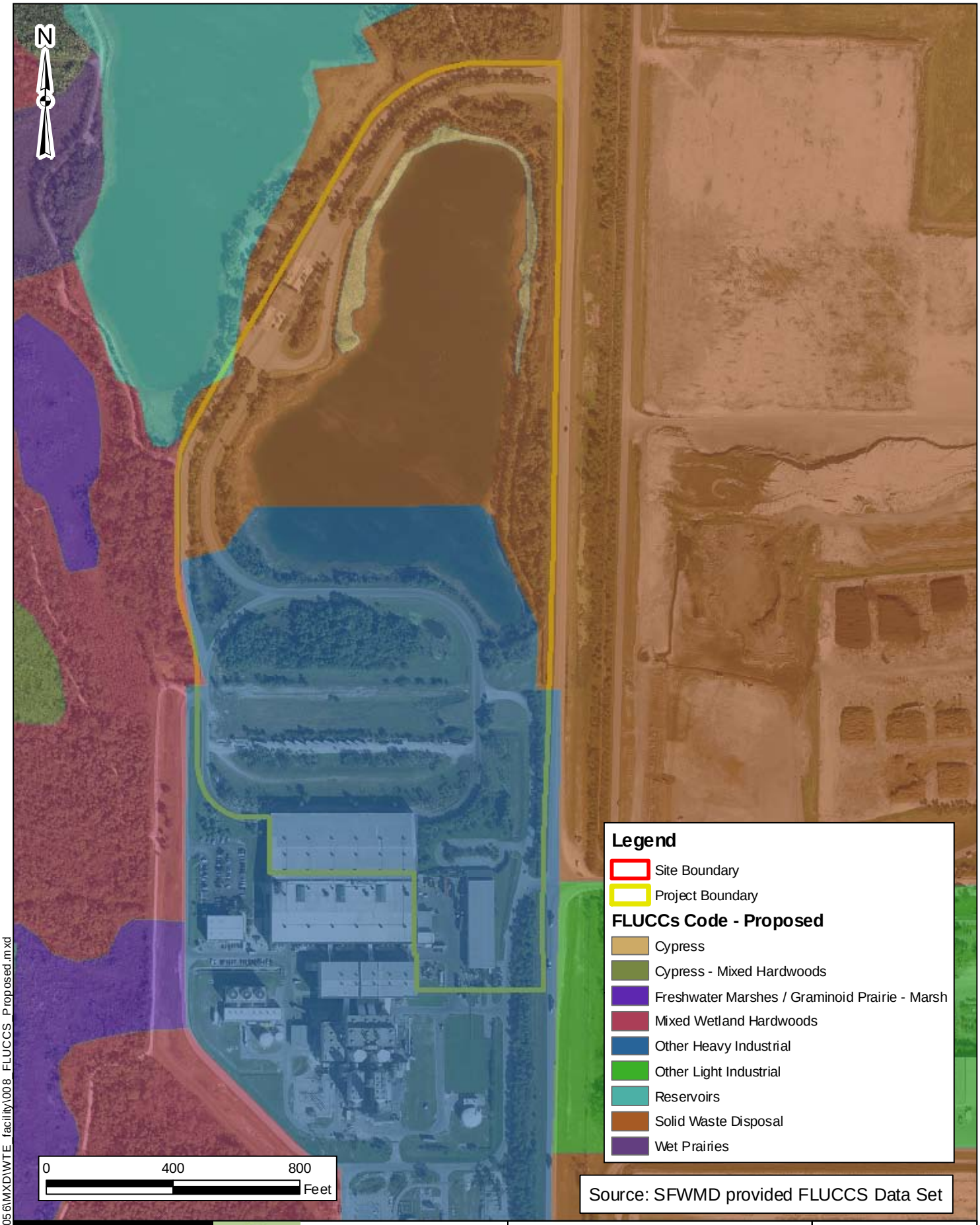
SWA SOLID WASTE AUTHORITY

Solid Waste Authority of Palm Beach County

PBREF No. 2
Environmental Resource Permit
Existing Site Conditions FLUCCS Map

July 2010

FIGURE 6



G:\Projects\3582\056\MXD\WTE_facility\008_FLUCCS_Proposed.mxd

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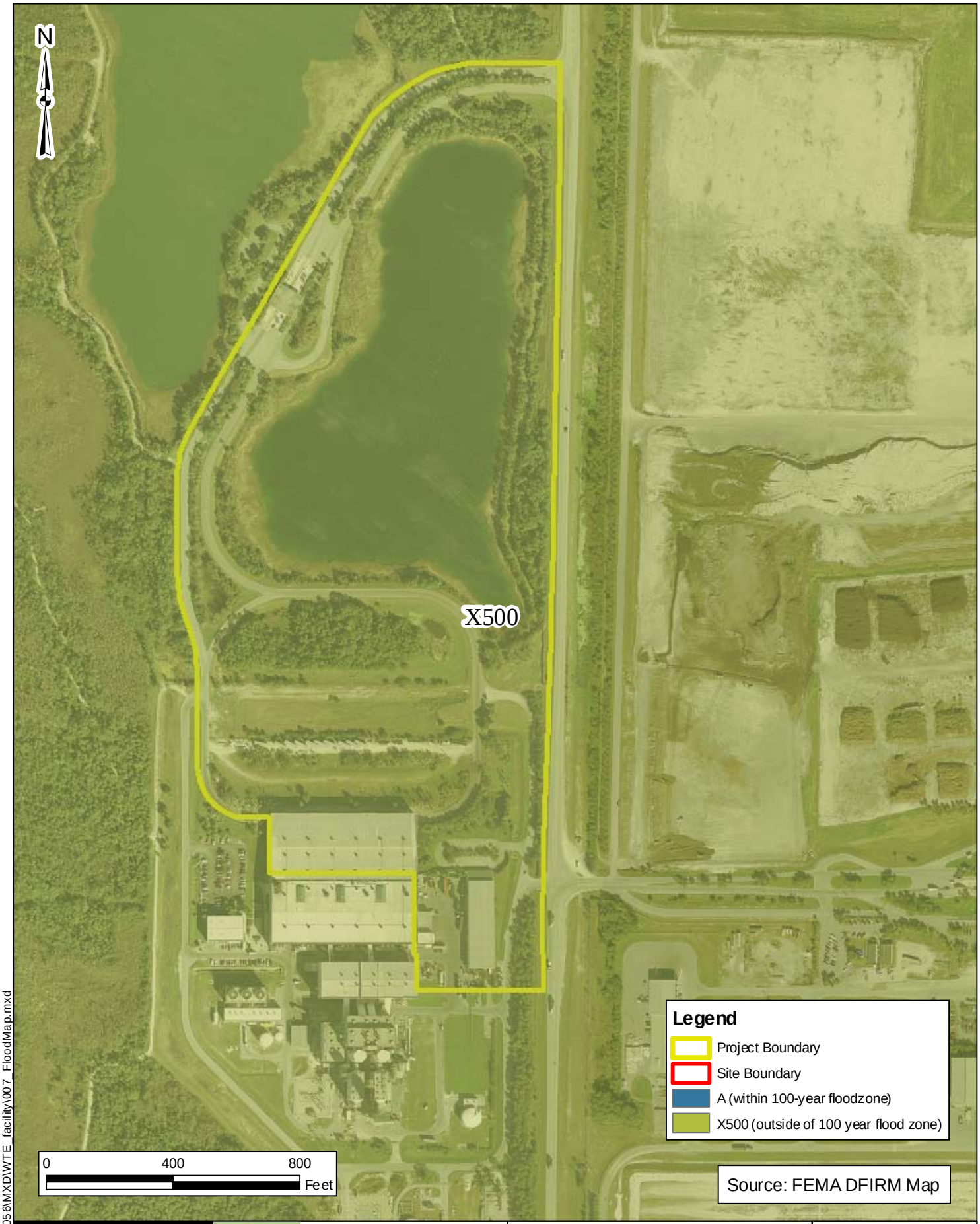
SWA SOLID WASTE AUTHORITY

Solid Waste Authority of Palm Beach County

PBREF No. 2
Environmental Resource Permit
Proposed Site Conditions FLUCCS Map

July 2010

FIGURE 7



G:\Projects\3582\056\MXD\WTE_facility\007_FloodMap.mxd

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SWA SOLID WASTE AUTHORITY

Solid Waste Authority of Palm Beach County

PBREF No. 2
Environmental Resource Permit
FEMA Flood Zone Map

July 2010

FIGURE 8

FNAI tracking list

PALM BEACH COUNTY
136 Total Elements Found
Last Updated: March 2009

Key

Scientific Name is linked to the FNAI Online Field Guides when available.

- links to **NatureServe Explorer**, an online encyclopedia of more than 55,000 plants, animals, and natural communities in North America, compiled by the **NatureServe** network of natural heritage programs, of which the Florida Natural Areas Inventory is a member.

- links to a species distribution map (**Adobe SVG viewer** required). If your browser does not support Adobe SVG, try this **link**

SEARCH RESULTS

NOTE: This is not a comprehensive list of all species and natural communities occurring in the location searched. Only element occurrences documented in the FNAI database are included.

Plants and Lichens EXPLANATION

Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status
Acrostichum aureum	Golden Leather Fern	G5	S3	N	LT
Argusia gnaphalodes	Sea Lavender	G4	S3	N	LE
Asimina tetramera	Four-petal Pawpaw	G1	S1	LE	LE
Calopogon multiflorus	Many-flowered Grass-pink	G2G3	S2S3	N	LE
Chamaesyce cumulicola	Sand-dune Spurge	G2	S2	N	LE
Cladonia perforata	Perforate Reindeer Lichen	G1	S1	LE	LE
Coccothrinax argentata	Silver Palm	G4	S3	N	LT
Conradina grandiflora	Large-flowered Rosemary	G3	S3	N	LT
Cucurbita okeechobeensis	Okeechobee Gourd	G1	S1	LE	LE

Glandularia maritima	Coastal Vervain	G3	S3	N	LE
Halophila johnsonii	Johnson's Seagrass	G2	S2	LT	N
Jacquemontia reclinata	Beach Jacquemontia	G1	S1	LE	LE
Lantana depressa var. floridana	Atlantic Coast Florida Lantana	G2T1	S1	N	LE
Lechea cernua	Nodding Pinweed	G3	S3	N	LT
Lechea divaricata	Pine Pinweed	G2	S2	N	LE
Linum carteri var. smallii	Small's Flax	G2T2	S2	N	LE
Nemastylis floridana	Celestial Lily	G2	S2	N	LE
Okenia hypogaea	Burrowing Four-o'clock	G3?	S2	N	LE
Ophioglossum palmatum	Hand Fern	G4	S2	N	LE
Panicum abscissum	Cutthroat Grass	G3	S3	N	LE
Polygala smallii	Tiny Polygala	G1	S1	LE	LE
Pteris bahamensis	Bahama Brake	G4	S3	N	LT
Pteroglossaspis ecristata	Giant Orchid	G2G3	S2	N	LT
Sacoila lanceolata var. paludicola	Fahkahatchee Ladies' -tresses	G4T1	S1	N	LT
Schizaea pennula	Ray Fern	G5	S1	N	LE
Tephrosia angustissima var. curtissii	Coastal Hoary-pea	G1T1	S1	N	LE
Thelypteris serrata	Toothed Maiden Fern	G5	S1	N	LE
Tillandsia flexuosa	Banded Wild-pine	G5	S3	N	LT
Tolumnia bahamensis	Dancing-lady Orchid	G3	S1	N	LE

Gastropods (Snails and Allies) EXPLANATION

Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status
Orthalicus reses reses	Stock Island Tree Snail	G2T1	S1	LT	LE

Spiders EXPLANATION

Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status
Latrodectus bishopi	Red Widow Spider	G3G4	S3S4	N	N

Dragonflies and Damselflies EXPLANATION

Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status
Libellula jesseana	Purple Skimmer	G1	S1	N	N

Grasshoppers and Allies EXPLANATION

Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status
Melanoplus indicifer	East Coast Scrub Grasshopper	G1G2	S1S2	N	N

Beetles EXPLANATION

Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status
Ataenius saramari	Sand Pine Scrub Ataenius Beetle	G3G4	S3	N	N
Bolbocerosoma hamatum	Bicolored Burrowing Scarab Beetle	GNR	S3S4	N	N
Chelyoxenus xerobatis	Gopher Tortoise Hister Beetle	GNR	S1S3	N	N
Copris gopheri	Gopher Tortoise Copris Beetle	G2	S2	N	N
Cremastocheilus squamulosus	Scaly Anteater Scarab Beetle	GNR	S2S3	N	N
Desmopachria cenchramis	Fig Seed Diving Beetle	G1	S1	N	N
Geopsammodius fuscus	Dark Tiny Sand-loving Scarab	G1	S1	N	N
Onthophagus polyphemi polyphemi	Punctate Gopher Tortoise Onthophagu	GNRTNR	S2S3	N	N
Phyllophaga elizoria	Elizoria June Beetle	G2G3	S2S3	N	N
Phyllophaga elongata	Elongate June Beetle	G2G4	S2S4	N	N
Serica tantula	Little Silky June Beetle	G1?	S1?	N	N

Butterflies and Moths EXPLANATION

Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status
Anthanassa frisia	Cuban Crescent	G5	S2	N	N
Aphrissa statira	Statira	G5	S2S3	N	N
Appias drusilla	Florida White	G5	S2S3	N	N
Eumaeus atala	Atala	G4	S3	N	N
Eunica tatila tatilista	Florida Purplewing	G5T4T5	S1	N	N
Ministrymon azia	Gray Ministreak	G5	S2S3	N	N
Neonympha helicta dadeensis	Helicta Satyr	G3G4T1T3Q	S1S3	N	N
Siproeta stelenes	Malachite	G5	S2S3	N	N
Strymon acis bartrami	Bartram's Scrub-Hairstreak	G4T1T2	S1	C	N

Fish EXPLANATION

Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status
Bairdiella sanctaeluciae	Striped Croaker	G5	S2	SC	N
Ctenogobius stigmaturus	Spottail Goby	G2	S2	N	N
Gobiomorus dormitor	Bigmouth Sleeper	G4	S2	N	N
Microphis brachyurus	Opossum Pipefish	G4G5	S2	SC	N

Amphibians EXPLANATION

Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status
Rana capito	Gopher Frog	G3	S3	N	LS

Reptiles EXPLANATION

Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status
Alligator mississippiensis	American Alligator	G5	S4	SAT	LS
Caretta caretta	Loggerhead	G3	S3	LT	LT

Chelonia mydas		Green Turtle	G3	S2	LE	LE
Crocodylus acutus		American Crocodile	G2	S2	LT	LE
Crotalus adamanteus		Eastern Diamondback Rattlesnake	G4	S3	N	N
Dermochelys coriacea		Leatherback	G2	S2	LE	LE
Drymarchon couperi		Eastern Indigo Snake	G3	S3	LT	LT
Eretmochelys imbricata		Hawksbill	G3	S1	LE	LE
Gopherus polyphemus		Gopher Tortoise	G3	S3	N	LT
Lampropeltis getula		Common Kingsnake	G5	S2S3	N	N
Lepidochelys kempii		Kemp's Ridley	G1	S1	LE	LE
Pituophis melanoleucus mugitus		Florida Pine Snake	G4T3	S3	N	LS
Sceloporus woodi		Florida Scrub Lizard	G3	S3	N	N

Birds

EXPLANATION

Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status
Accipiter cooperii	Cooper's Hawk	G5	S3	N	N
Aimophila aestivalis	Bachman's Sparrow	G3	S3	N	N
Aphelocoma coerulescens	Florida Scrub-jay	G2	S2	LT	LT
Aramus guarauna	Limpkin	G5	S3	N	LS
Ardea alba	Great Egret	G5	S4	N	N
Ardea herodias occidentalis	Great White Heron	G5T2	S2	N	N
Athene cunicularia floridana	Florida Burrowing Owl	G4T3	S3	N	LS
Buteo brachyurus	Short-tailed Hawk	G4G5	S1	N	N
Caracara cheriway	Crested Caracara	G5	S2	LT	LT
Charadrius melodus	Piping Plover	G3	S2	LT	LT

Dendroica discolor paludicola	Florida Prairie Warbler	G5T3	S3	N	N
Egretta caerulea	Little Blue Heron	G5	S4	N	LS
Egretta thula	Snowy Egret	G5	S3	N	LS
Egretta tricolor	Tricolored Heron	G5	S4	N	LS
Elanoides forficatus	Swallow-tailed Kite	G5	S2	N	N
Elanus leucurus	White-tailed Kite	G5	S1	N	N
Eudocimus albus	White Ibis	G5	S4	N	LS
Falco columbarius	Merlin	G5	S2	N	N
Falco peregrinus	Peregrine Falcon	G4	S2	N	LE
Falco sparverius paulus	Southeastern American Kestrel	G5T4	S3	N	LT
Fregata magnificens	Magnificent Frigatebird	G5	S1	N	N
Grus canadensis pratensis	Florida Sandhill Crane	G5T2T3	S2S3	N	LT
Haematopus palliatus	American Oystercatcher	G5	S2	N	LS
Haliaeetus leucocephalus	Bald Eagle	G5	S3	N	N
Ixobrychus exilis	Least Bittern	G5	S4	N	N
Mycteria americana	Wood Stork	G4	S2	LE	LE
Nyctanassa violacea	Yellow-crowned Night-heron	G5	S3	N	N
Nycticorax nycticorax	Black-crowned Night-heron	G5	S3	N	N
Pandion haliaetus	Osprey	G5	S3S4	N	LS*
Passerina ciris	Painted Bunting	G5	S3	N	N
Pelecanus occidentalis	Brown Pelican	G4	S3	N	LS
Picoides borealis	Red-cockaded Woodpecker	G3	S2	LE	LS
Picoides villosus	Hairy Woodpecker	G5	S3	N	N
Platalea ajaja	Roseate Spoonbill	G5	S2	N	LS

Plegadis falcinellus	Glossy Ibis	G5	S3	N	N
Rallus longirostris scottii	Florida Clapper Rail	G5T3?	S3?	N	N
Rostrhamus sociabilis plumbeus	Snail Kite	G4G5T3Q	S2	LE	LE
Rynchops niger	Black Skimmer	G5	S3	N	LS
Setophaga ruticilla	American Redstart	G5	S2	N	N
Sterna antillarum	Least Tern	G4	S3	N	LT
Sterna caspia	Caspian Tern	G5	S2	N	N
Sterna maxima	Royal Tern	G5	S3	N	N
Sterna sandvicensis	Sandwich Tern	G5	S2	N	N
Vireo altiloquus	Black-whiskered Vireo	G5	S3	N	N

Mammals EXPLANATION

Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status
Neofiber alleni	Round-tailed Muskrat	G3	S3	N	N
Podomys floridanus	Florida Mouse	G3	S3	N	LS
Puma concolor coryi	Florida Panther	G5T1	S1	LE	LE
Sciurus niger shermani	Sherman's Fox Squirrel	G5T3	S3	N	LS
Trichechus manatus	Manatee	G2	S2	LE	LE
Ursus americanus floridanus	Florida Black Bear	G5T2	S2	N	LT*

Natural Communities DESCRIPTION EXPLANATION

Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status
Beach dune		G3	S2	N	N
Coastal strand		G3	S2	N	N
Depression marsh		G4	S4	N	N

Dome swamp		G4	S4	N	N
Hydric hammock		G4	S4	N	N
Maritime hammock		G3	S2	N	N
Mesic flatwoods		G4	S4	N	N
Mesic hammock		G3	S2	N	N
Scrub		G2	S2	N	N
Scrubby flatwoods		G3	S3	N	N
Swale		G3	S3	N	N
Wet flatwoods		G4	S4	N	N

Other Elements EXPLANATION

Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status
Bird Rookery		GNR	SNR	N	N
Geological feature		GNR	SNR	N	N
Manatee aggregation site		GNR	SNR	N	N

FLORIDA
Natural Areas
INVENTORY

1018 Thomasville Road
Suite 200-C
Tallahassee, FL 32303
850-224-8207
fax 850-681-9364
www.fnai.org

June 28, 2007

Elizabeth Shaffer
Malcolm Pirnie, Inc.
1300 East 8th Avenue, Suite F100
Tampa, FL 33605

Dear Ms. Shaffer:

Thank you for your request for information from the Florida Natural Areas Inventory (FNAI). We have compiled the following information for your project area.

Project:	Solid Waste Authority of Palm Beach; Material Recycling Facility
Date Received:	June 27, 2007
Location:	Township 43 S, Range 42 E, Section 2 Palm Beach County

Element Occurrences

A search of our maps and database indicates that currently we have several Element Occurrences mapped within the vicinity of the study area (see enclosed map and element occurrence table). Please be advised that a lack of element occurrences in the FNAI database is not a sufficient indication of the absence of rare or endangered species on a site.

The Element Occurrences data layer includes occurrences of rare species and natural communities. The map legend indicates that some element occurrences occur in the general vicinity of the label point. This may be due to lack of precision of the source data, or an element that occurs over an extended area (such as a wide ranging species or large natural community). For animals and plants, Element Occurrences generally refer to more than a casual sighting; they usually indicate a viable population of the species. Note that some element occurrences represent historically documented observations which may no longer be extant.

Likely and Potential Rare Species

In addition to documented occurrences, other rare species and natural communities may be identified on or near the site based on habitat models and species range models (see enclosed Biodiversity Matrix Report). These species should be taken into consideration in field surveys, land management, and impact avoidance and mitigation.

FNAI habitat models indicate areas, which based on landcover type, offer suitable habitat for one or more rare species that is known to occur in the vicinity. Habitat models have been developed for approximately 300 of the most rare species tracked by the Inventory, including all federally listed species.

Florida Resources
and Environmental
Analysis Center

Institute of Science
and Public Affairs

The Florida State University

FNAI species range models indicate areas that are within the known or predicted range of a species, based on climate variables, soils, vegetation, and/or slope. Species range models have been developed for approximately 340 species, including all federally listed species.

The FNAI Biodiversity Matrix Geodatabase compiles Documented, Likely, and Potential species and natural communities for each square mile Matrix Unit statewide.

The Inventory always recommends that professionals familiar with Florida's flora and fauna should conduct a site-specific survey to determine the current presence or absence of rare, threatened, or endangered species.

Please visit www.fnai.org/trackinglist.cfm for county or statewide element occurrence distributions and links to more element information.

The database maintained by the Florida Natural Areas Inventory is the single most comprehensive source of information available on the locations of rare species and other significant ecological resources. However, the data are not always based on comprehensive or site-specific field surveys. Therefore, this information should not be regarded as a final statement on the biological resources of the site being considered, nor should it be substituted for on-site surveys. Inventory data are designed for the purposes of conservation planning and scientific research, and are not intended for use as the primary criteria for regulatory decisions.

Information provided by this database may not be published without prior written notification to the Florida Natural Areas Inventory, and the Inventory must be credited as an information source in these publications. FNAI data may not be resold for profit.

Thank you for your use of FNAI services. If I can be of further assistance, please give me a call at (850) 224-8207.

Sincerely,

Jason A. Griffin

Jason A. Griffin
Data Services Coordinator

encl

Solid Waste Authority of Palm Beach; Recycling Facility

Site boundaries are approximate.

Palm Beach County

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FLORIDA Natural Areas INVENTORY

Element Occurrences

- Animals
- Plants
- Communities
- Other
- Data Sensitive
- Point Indicates General Vicinity of Element
- U.S. Fish & Wildlife Service Scrub Jay Survey 1992-96

Conservation Lands

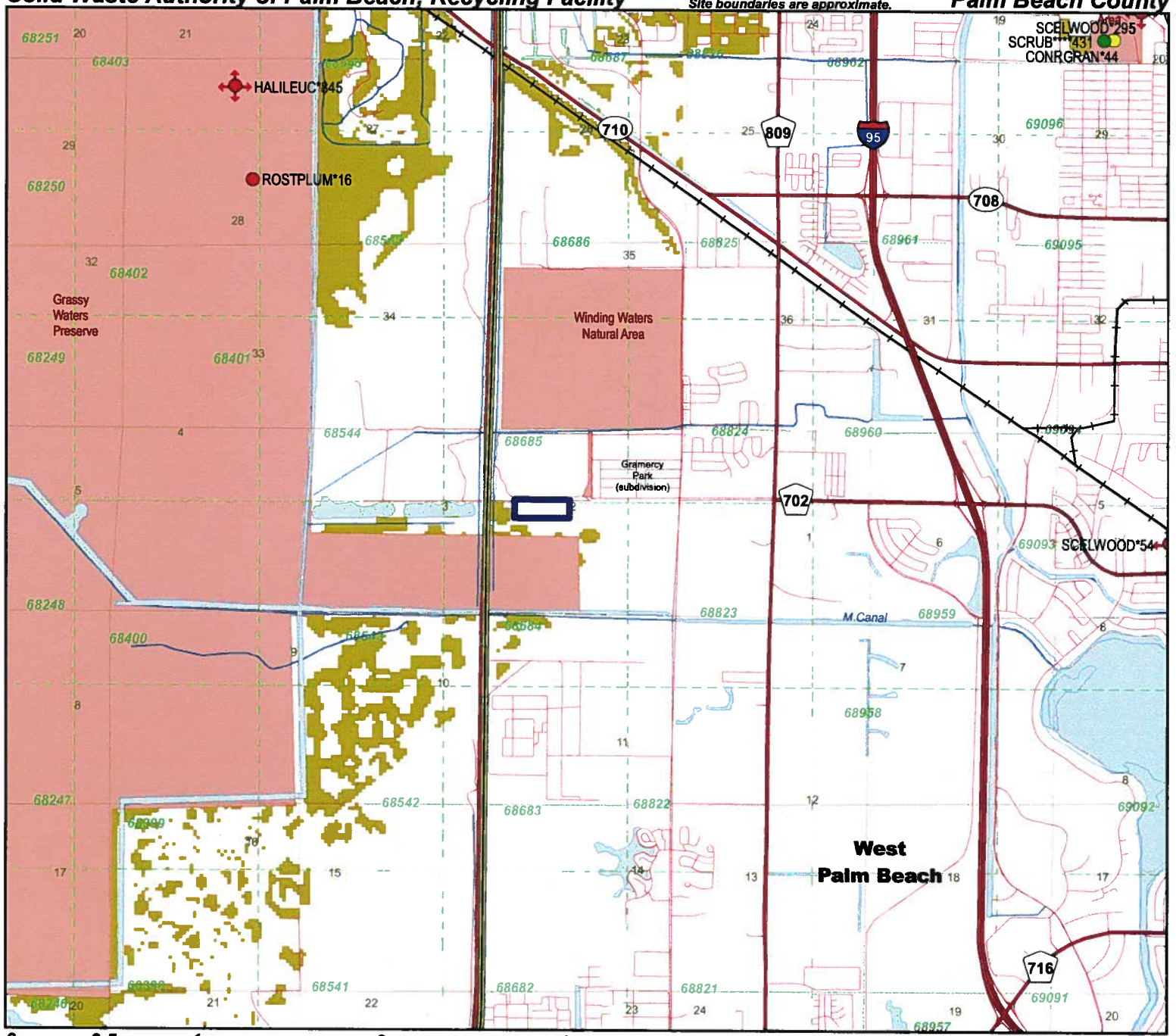
- Federal
- State
- Local
- Private
- State Aquatic Preserves

Land Acquisition Projects

- Florida Forever Board of Trustees Projects

- FNAI Rare Species Habitat
- FNAI Biodiversity Matrix Square Mile Units

- County Boundary
- Interstate
- Turnpike
- Major Highway
- Local Road
- Railroad [Inactive railroads shown in Gray]
- Water



N
W E
S

NOTE
Map should not be interpreted without accompanying documents.

Map produced by JAG
Map Date: 28 JUN 2007

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Tallahassee, FL 32303
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(850) 681-9364 Fax
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FLORIDA Natural Areas INVENTORY

Florida Natural Areas Inventory

ELEMENT OCCURRENCES DOCUMENTED ON OR NEAR *PROJECT SITE*

Map Label	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Listing	Observation Date	Description	EO Comments
SCELWOOD*54	Sceloporus woodi	Florida Scrub Lizard	G3	S3	N	N	1956-08-22	No general description given	1956-08-22: KING COLLECTED SPECIMEN HERE.
SCRUB****431	Scrub		G2	S2	N	N	1999	MATURE SCRUB WITH TOPPLING SAND PINE.	1999: Update to last obs date was based on interpretation of aerial photography (previous value was 1988-06-09) (U05FNA02FLUS). SAND PINE SCRUB WITH OAKS BEGINNING TO REACH TREE SIZE. SOME AREAS HAVE MIXED SCRUB AND FLATWOODS- -WITHISLAND OF SCRUB ON HIGH
SCELWOOD*295	Sceloporus woodi	Florida Scrub Lizard	G3	S3	N	N	1986-05-09	Coastal scrub	1986-05-09: K.E. Enge, GFC, observation. See Enge et al (1986; Coop Unit Tech Rep No 26).
CONRGRAN*44	Conradina grandiflora	Large-flowered Rosemary	G3	S3	N	LT	1988-06-09	MATURE SCRUB WITH TOPPLING SAND PINE.	200 SCATTERED PLANTS OVER ABOUT 100 ACRES. PLANTS FLOWERING.
ROSTPLUM*16	Rostrhamus sociabilis plumbeus	Snail Kite	G4G5T3Q	S2	LE	LE	1992-12	Slough, wet prairie, tree islands. Artificially maintained impoundment formerly connected to the Everglades to the southwest.	Sporadic foraging and roosting site. Lake Park Reservoir/Loxahatchee Slough was apparently heavily used prior to 1927. No birds were reported from 1928 - 1970. Site has been used inconsistently and sporadically since 1970. A peak of 372 kites was recorde
HALILEUC*845	Haliaeetus leucocephalus	Bald Eagle	G5	S3	LT,PDL	LT	2003	No general description given	Nest status 1995-2003: Continuously active. (U03FWC01FLUS). Previous data (note different format) Nest; 1995: Produced 2 young; 1994: Produced 2 young; 1993: Active, produced 0 young; 1992: Produced 1 young.

FLORIDA
Natural Areas
INVENTORY

Technical Assistance Provided by:

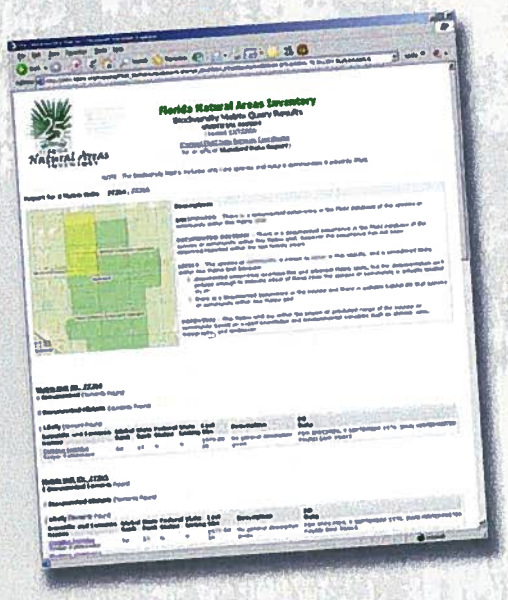
FREAC
FLORIDA RESOURCES & ENVIRONMENTAL ANALYSIS CENTER
AT THE FLORIDA STATE UNIVERSITY

FOR IMMEDIATE RELEASE



FNAI's Biodiversity Matrix Online

The Biodiversity Matrix Map Server is a new **screening tool** from FNAI that provides **immediate, free access** to rare species occurrence information statewide. This tool allows you to zoom to your site of interest and create a report listing documented, likely, and potential occurrences of rare species and natural communities.



The FNAI Biodiversity Matrix offers **built-in interpretation** of the likelihood of species occurrence for each 1-square-mile Matrix Unit across the state. The report includes a site map and list of species and natural communities by occurrence status: Documented, Documented-Historic, Likely, and Potential.

Try it today:

www.fnai.org/biointro.cfm

Please note: FNAI will continue to offer our Standard Data Report service as always. The Standard Data Report offers the most comprehensive information available on rare species, natural communities, conservation lands, and other natural resources.

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FLORIDA Natural Areas INVENTORY

Florida Natural Areas Inventory

Biodiversity Matrix Report

Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Listing
Matrix Unit ID: 68684					
Likely					
Grus canadensis pratensis	Florida Sandhill Crane	G5T2T3	S2S3	N	LT
Rostrhamus sociabilis plumbeus	Snail Kite	G4G5T3Q	S2	LE	LE
Matrix Unit ID: 68685					
Likely					
Grus canadensis pratensis	Florida Sandhill Crane	G5T2T3	S2S3	N	LT
Rostrhamus sociabilis plumbeus	Snail Kite	G4G5T3Q	S2	LE	LE
Potential from any/all selected units					
Aimophila aestivalis	Bachman's Sparrow	G3	S3	N	N
Athene cunicularia floridana	Florida Burrowing Owl	G4T3	S3	N	LS
Coelorachis tuberculosa	Piedmont Jointgrass	G3	S3	N	LT
Conradina grandiflora	Large-flowered Rosemary	G3	S3	N	LT
Elytraria caroliniensis var. angustifolia	Narrow-leaved Carolina Scalystem	G4T2	S2	N	N
Encyclia cochleata var. triandra	Clamshell Orchid	G4G5T2	S2	N	LE
Forestiera segregata var. pinetorum	Florida Pinewood Privet	G4T2	S2	N	N
Gopherus polyphemus	Gopher Tortoise	G3	S3	N	LS
Lechea cernua	Nodding Pinweed	G3	S3	N	LT
Linum carteri var. smallii	Carter's Large-flowered Flax	G2T2	S2	N	LE
Mesic flatwoods		G4	S4	N	N
Nemastylis floridana	Celestial Lily	G2	S2	N	LE
Panicum abscissum	Cutthroat Grass	G3	S3	N	LE
Polygala smallii	Tiny Polygala	G1	S1	LE	LE
Rana capito	Gopher Frog	G3	S3	N	LS
Roystonea elata	Florida Royal Palm	G2G3	S2	N	LE
Sceloporus woodi	Florida Scrub Lizard	G3	S3	N	N
Trichomanes punctatum ssp. floridanu	Florida Filmy Fern	G4G5T1	S1	N	LE

Definitions: *Documented - Rare species and natural communities documented on or near this site.*
Documented-Historic - Rare species and natural communities documented, but not observed/reported within the last twenty years.
Likely - Rare species and natural communities likely to occur on this site based on suitable habitat and/or known occurrences in the vicinity.
Potential - This site lies within the known or predicted range of the species listed.

GLOBAL AND STATE RANKS

Florida Natural Areas Inventory (FNAI) defines an **element** as any rare or exemplary component of the natural environment, such as a species, natural community, bird rookery, spring, sinkhole, cave, or other ecological feature. FNAI assigns two ranks to each element found in Florida: the **global rank**, which is based on an element's worldwide status, and the **state rank**, which is based on the status of the element within Florida. Element ranks are based on many factors, including estimated number of occurrences, estimated abundance (for species and populations) or area (for natural communities), estimated number of adequately protected occurrences, range, threats, and ecological fragility.

GLOBAL RANK DEFINITIONS

G1	Critically imperiled globally because of extreme rarity (5 or fewer occurrences or less than 1000 individuals) or because of extreme vulnerability to extinction due to some natural or man-made factor.
G2	Imperiled globally because of rarity (6 to 20 occurrences or less than 3000 individuals) or because of vulnerability to extinction due to some natural or man-made factor.
G3	Either very rare and local throughout its range (21-100 occurrences or less than 10,0000 individuals) or found locally in a restricted range or vulnerable to extinction from other factors.
G4	Apparently secure globally (may be rare in parts of range).
G5	Demonstrably secure globally.
G#?	Tentative rank (e.g., G2?)
G#G#	Range of rank; insufficient data to assign specific global rank (e.g., G2G3)
G#T#	Rank of a taxonomic subgroup such as a subspecies or variety; the G portion of the rank refers to the entire species and the T portion refers to the specific subgroup; numbers have same definition as above (e.g., G3T1)
G#Q	Rank of questionable species - ranked as species but questionable whether it is species or subspecies; numbers have same definition as above (e.g., G2Q)
G#T#Q	Same as above, but validity as subspecies or variety is questioned.
GH	Of historical occurrence throughout its range, may be rediscovered (e.g., ivory-billed woodpecker)
GNA	Ranking is not applicable because element is not a suitable target for conservation (e.g. as for hybrid species)
GNR	Not yet ranked (temporary)
GNRTNR	Neither the full species nor the taxonomic subgroup has yet been ranked (temporary)
GX	Believed to be extinct throughout range
GXC	Extirpated from the wild but still known from captivity/cultivation
GU	Unrankable. Due to lack of information, no rank or range can be assigned (e.g., GUT2).

STATE RANK DEFINITIONS

Definition parallels global element rank: substitute "S" for "G" in above global ranks, and "in Florida" for "globally" in above global rank definitions.

FEDERAL AND STATE LEGAL STATUSES (U.S. Fish and Wildlife Service – USFWS) PROVIDED BY FNAI FOR INFORMATION ONLY.

For official definitions and lists of protected species, consult the relevant state or federal agency.

FEDERAL LEGAL STATUS

Definitions derived from U.S. Endangered Species Act of 1973, Sec. 3. Note that the federal status given by FNAI refers only to Florida populations and that federal status may differ elsewhere.

LE	Listed as Endangered Species in the List of Endangered and Threatened Wildlife and Plants under the provisions of the Endangered Species Act. Defined as any species which is in danger of extinction throughout all or a significant portion of its range.
LE,XN	A non essential experimental population of a species otherwise Listed as an Endangered Species in the List of Endangered and Threatened Wildlife and Plants. LE,XN for Grus americana (Whooping crane), Federally listed as XN (Non essential experimental population) refers to the Florida experimental population only. Federal listing elsewhere for Grus americana is LE.
PE	Proposed for addition to the List of Endangered and Threatened Wildlife and Plants as Endangered Species.
LT	Listed as Threatened Species, defined as any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.
LT,PDL	Species currently listed Threatened but has been proposed for delisting.
PT	Proposed for listing as Threatened Species.
C	Candidate Species for addition to the list of Endangered and Threatened Wildlife and Plants, Category 1. Federal listing agencies have sufficient information on biological vulnerability and threats to support proposing to list the species as Endangered or Threatened.
SAT	Threatened due to similarity of appearance to a threatened species.
SC	Species of Concern, species is not currently listed but is of management concern to USFWS.
N	Not currently listed, nor currently being considered for addition to the List of Endangered and Threatened Wildlife and Plants.

FLORIDA LEGAL STATUSES (Florida Fish and Wildlife Conservation Commission – FFWCC/ Florida Department of Agriculture and Consumer Services – FDACS)

Animals: Definitions derived from "Florida's Endangered Species and Species of Special Concern, Official Lists" published by Florida Fish and Wildlife Conservation Commission - FFWCC, 1 August 1997, and subsequent updates.

LE	Listed as Endangered Species by the FFWCC. Defined as a species, subspecies, or isolated population which is so rare or depleted in number or so restricted in range of habitat due to any man-made or natural factors that it is in immediate danger of extinction or extirpation from the state, or which may attain such a status within the immediate future.
LT	Listed as Threatened Species by the FFWCC. Defined as a species, subspecies, or isolated population which is acutely vulnerable to environmental alteration, declining in number at a rapid rate, or whose range or habitat is decreasing in area at a rapid rate and as a consequence is destined or very likely to become an endangered species within the foreseeable future.
LT*	Indicates that a species has LT status only in selected portions of its range in Florida. LT* for Ursus americanus floridanus (Florida black bear) indicates that LT status does not apply in Baker and Columbia counties and in the Apalachicola National Forest. LT* for Neovison vison pop. 1 (Southern mink, South Florida population) state listed as Threatened refers to the Everglades population only (Note: species formerly listed as Mustela vison mink pop. 1. Also, priorly listed as Mustela evergladensis).
LS	Listed as Species of Special Concern by the FFWCC, defined as a population which warrants special protection, recognition, or consideration because it has an inherent significant vulnerability to habitat modification,

environmental alteration, human disturbance, or substantial human exploitation which, in the foreseeable future, may result in its becoming a threatened species.

LS* Indicates that a species has LS status only in selected portions of its range in Florida. LS* for Pandion haliaetus (Osprey) state listed as LS (Species of Special Concern) in Monroe County only.

PE Proposed for listing as Endangered.

PT Proposed for listing as Threatened.

PS Proposed for listing as a Species of Special Concern.

N Not currently listed, nor currently being considered for listing.

Plants: Definitions derived from Sections 581.011 and 581.185(2), Florida Statutes, and the Preservation of Native Flora of Florida Act, 5B-40.001. FNAI does not track all state-regulated plant species; for a complete list of state-regulated plant species, call Florida Division of Plant Industry, 352-372-3505 or please visit: http://DOACS.State.FL.US/PI/Images/Rule05b.pdf

LE Listed as Endangered Plants in the Preservation of Native Flora of Florida Act. Defined as species of plants native to the state that are in imminent danger of extinction within the state, the survival of which is unlikely if the causes of a decline in the number of plants continue, and includes all species determined to be endangered or threatened pursuant to the Federal Endangered Species Act of 1973, as amended.

PE Proposed by the FDACS for listing as Endangered Plants.

LT Listed as Threatened Plants in the Preservation of Native Flora of Florida Act. Defined as species native to the state that are in rapid decline in the number of plants within the state, but which have not so decreased in such number as to cause them to be endangered. LT* indicates that a species has LT status only in selected portions of its range in Florida.

PT Proposed by the FDACS for listing as Threatened Plants.

N Not currently listed, nor currently being considered for listing.

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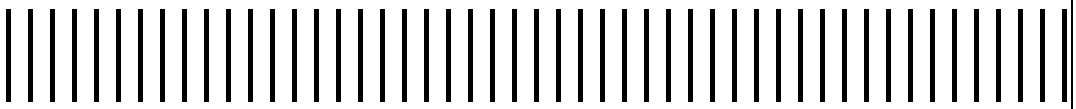
FLORIDA
Natural Areas
INVENTORY

Tracking Florida's Biodiversity

Solid Waste Authority of Palm Beach County
Palm Beach Renewable Energy Facility No. 2
Environmental Resource Permit

Attachment C

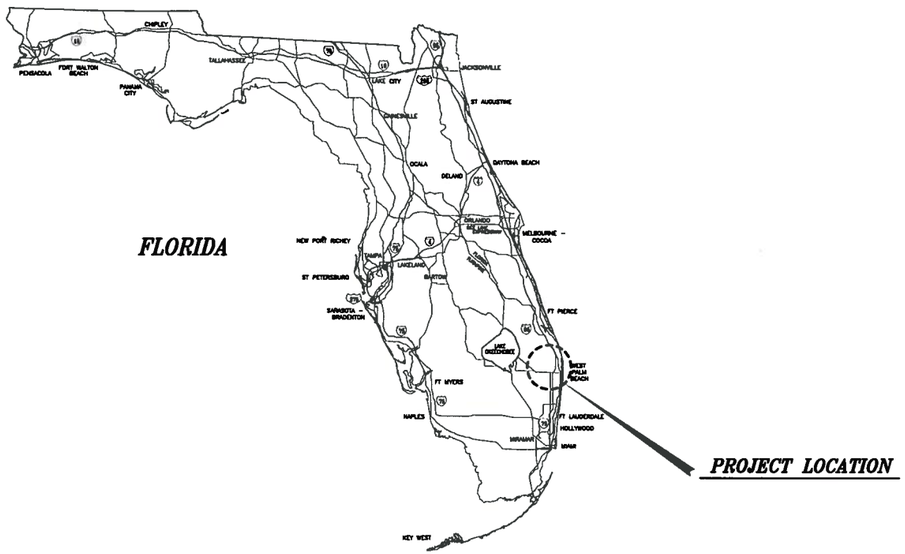
Permit Drawings



3582056 / FTL

SOLID WASTE AUTHORITY OF PALM BEACH COUNTY
PALM BEACH RENEWABLE ENERGY FACILITY NO. 2
ENVIRONMENTAL RESOURCE PERMIT

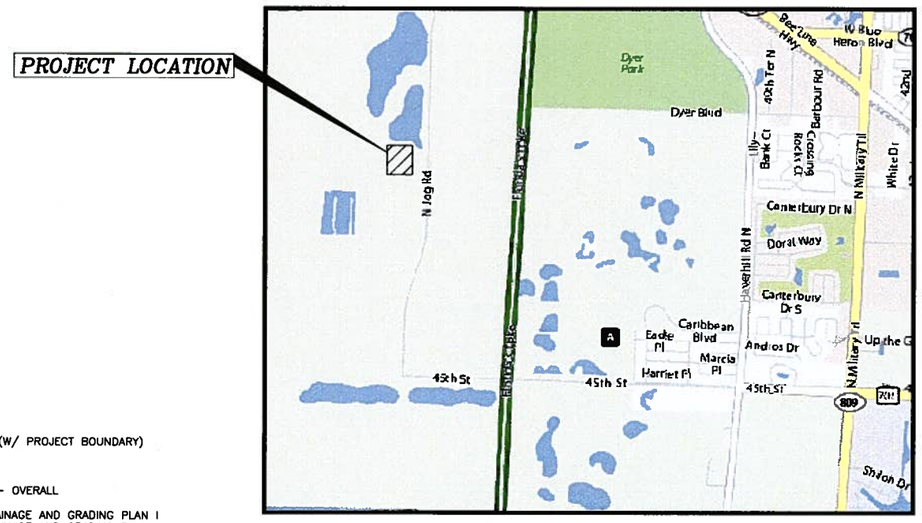
JULY 2010



VICINITY MAP

INDEX OF DRAWINGS

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2	GENERAL NOTES
3	EXISTING SITE SURVEY (W/ PROJECT BOUNDARY)
4	EXISTING SITE AERIAL
5	DEMOLITION PLAN I
6	DEMOLITION PLAN II
7	PROPOSED SITE PLAN – OVERALL
8	BASIN BOUNDARY MAP
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23	CONTROL STRUCTURE DETAILS
24	ERROSION CONTROL DETAILS



LOCATION MAP

PREPARED FOR:
SOLID WASTE AUTHORITY OF PALM BEACH COUNTY
MARK HAMMOND, EXECUTIVE DIRECTOR
7501 N JOG ROAD WEST PALM BEACH, FL 33412

MALCOLM PIRNIE

CERTIFICATE OF AUTHORIZATION NO. 67
INDEPENDENT ENVIRONMENTAL ENGINEERS,
SCIENTISTS AND CONSULTANTS
8201 PETERS ROAD, SUITE 3400
PLANTATION, FL 33324
PHONE (954) 761-3460
FAX (954) 761-7939

PIRNIE PROJECT NO.: 3582056

7-9-10

PERMIT DRAWINGS NOT FOR CONSTRUCTION

User:BENSON Spec:PIRNIE STANDARD File:K:\ACAD\PROJ\3582056\DESIGN\3582056_T1.DWG Scale:1:1 Date:07/06/2010 Time:12:15 Layout:T1
User:CADD Spec:ACAD File:K:\ACAD\PROJ\3582056\DESIGN\3582056_T1.DWG Scale:1:1 Date:03/31/2010 Time:18:02 Layout:T1

GENERAL NOTES

1. CONTRACTOR SHALL BE RESPONSIBLE FOR CHECKING SITE CONDITIONS OF WORK. WORK PERFORMED SHALL BE IN FULL COMPLIANCE WITH THE REQUIREMENTS OF PALM BEACH COUNTY, DESIGN ENGINEER AND ALL OTHER AGENCIES WHICH MAY EXERT JURISDICTION. WHEN CONFLICTS OCCUR BETWEEN REQUIREMENTS SHOWN ON THESE DRAWINGS/SPECIFICATIONS AND REGULATORY CRITERIA, THE MORE STRINGENT REQUIREMENT SHALL PREVAIL. THE CONTRACTOR SHALL VERBALLY BRING CONFLICTS TO THE ATTENTION OF THE DESIGN ENGINEER IMMEDIATELY, FOLLOWED BY AN OFFICIAL WRITTEN NOTIFICATION WITHIN 24 HOURS BEFORE BEGINNING WORK.

2. EXISTING UNDERGROUND FACILITIES HAVE NOT BEEN PHYSICALLY LOCATED BY THE DESIGN ENGINEER. DETERMINING AND VERIFYING THE ACTUAL LOCATION AND ELEVATIONS OF EXISTING UTILITIES IS THE CONTRACTOR'S RESPONSIBILITY. BEFORE COMMENCING WORK, IT IS THE CONTRACTOR'S RESPONSIBILITY TO CONTACT THE VARIOUS UTILITY COMPANIES WHICH MAY HAVE BURIED OR AERIAL UTILITIES WITHIN OR NEAR THE CONSTRUCTION AREA. (PROVIDE 48 HOURS MINIMUM NOTICE TO UTILITY COMPANIES PRIOR TO BEGINNING CONSTRUCTION). THE CONTRACTOR IS FULLY RESPONSIBLE FOR DAMAGES WHICH MIGHT BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE UNDERGROUND UTILITIES. THE OWNER AND DESIGN ENGINEER ASSUME NO LIABILITY FOR DAMAGES SUSTAINED OR COST INCURRED BECAUSE OF THE CONTRACTOR'S OPERATIONS IN THE VICINITY OF EXISTING UTILITIES OR STRUCTURES, NOR FOR TEMPORARY BRACING AND SHORING OF SAME. SCHEDULE AND EXECUTE WORK INVOLVING EXISTING UTILITIES IN ORDER TO MINIMIZE INTERRUPTION OF SERVICES. WHENEVER SUCH INTERRUPTION IS NECESSARY FOR COMPLETION OF THE WORK, NOTIFY THE DESIGN ENGINEER AND THE COUNTY AT LEAST 48 HOURS IN ADVANCE. WORK TO REPAIR/RESTORE UTILITY SERVICE SHALL BE PERFORMED AS REQUIRED BY THE APPROPRIATE UTILITY. IF IT IS NECESSARY TO SHORE, BRACE, OR SWING A UTILITY, CONTACT THE UTILITY COMPANY OR DEPARTMENT AFFECTED AND OBTAIN THEIR PERMISSION REGARDING THE METHOD TO USE FOR SUCH WORK. COSTS RELATED TO SERVICE, MAINTENANCE, INTERRUPTION, REPAIR, RELOCATION AND RESTORATION ARE TO BE INCLUDED IN THE CONTRACTOR'S BID. DELAYS OR INCONVENIENCES CAUSED TO THE CONTRACTOR BY THE VARIOUS UTILITIES SHALL BE INCIDENTAL TO THE CONTRACT, AND NO EXTRA COMPENSATION SHALL BE PAID.

3. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND PAYING FOR REQUIRED PERMITS WHICH MAY BE REQUIRED THAT PERTAIN TO HIS CONTRACTED WORK. SUCH PERMITS SHALL BE OBTAINED BY THE CONTRACTOR PRIOR TO THE CONTRACTOR BEGINNING WORK ON THE PORTION OF THE PROJECT REQUIRING SAID PERMITS.

4. THE CONTRACTOR IS RESPONSIBLE FOR CONSTRUCTION STAKING TO INCLUDE HORIZONTAL AND VERTICAL CONTROL FOR ALIGNMENT OF WORK. SURVEY WORK TO ESTABLISH THE HORIZONTAL AND VERTICAL CONTROL SHALL BE UNDER THE GUIDANCE AND DIRECT SUPERVISION OF A REGISTERED PROFESSIONAL SURVEYOR AND MAPPER.

5. TREES, SHRUBS. ETC., ALONG THE LINES OF CONSTRUCTION SHALL BE PROTECTED WHERE POSSIBLE UNLESS NOTED OTHERWISE ON THE DRAWINGS. NO TREES LARGER THAN THREE INCHES (3") IN DIAMETER SHALL BE DESTROYED WITHOUT PRIOR APPROVAL OF THE DESIGN ENGINEER AND COUNTY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE REPLACEMENT OF DAMAGED TREES WITH TREES OF SIMILAR QUANTITIES AND SPECIES, SIZED AT THE DIRECTION OF THE COUNTY AT NO COST TO THE COUNTY.

6. CONTRACTOR IS RESPONSIBLE FOR OBTAINING AREAS FOR STORAGE OF MATERIALS AND EQUIPMENT. SECURITY OF CONSTRUCTION EQUIPMENT AND MATERIALS IS THE RESPONSIBILITY OF THE CONTRACTOR.

7. ALL INFORMATION REGARDING EXISTING CONDITIONS SHOWN ON THESE CONSTRUCTION DRAWINGS HAS BEEN FURNISHED TO THE ENGINEER BY GREENHORNE & O'MARA, INC., 3223 COMMERCE PLACE, SUITE 100, WEST PALM BEACH, FLORIDA. (561) 686-7707.

8. THE ENGINEER CANNOT GUARANTEE THAT TEMPORARY BENCHMARKS (TBM'S) OR OTHER SURVEY CONTROL POINTS WILL NOT BE DISTURBED PRIOR TO CONSTRUCTION. BEFORE COMMENCING WORK, THE CONTRACTOR SHALL SATISFY HIMSELF AS TO THE ACCURACY OF ALL SURVEY OR EXISTING SITE INFORMATION AS INDICATED IN THE DRAWINGS OR SPECIFICATIONS. SHOULD THE CONTRACTOR DISCOVER ANY ERRORS, INACCURACIES OR OMISSIONS IN THE SURVEY DATA, HE SHALL IMMEDIATELY NOTIFY THE ENGINEER. BEFORE BEGINNING WORK, TAKE CARE TO PRESERVE ALL CONTROL STAKES, BENCHMARKS, REFERENCE POINTS AND PROPERTY CORNERS. THE OWNER WILL GRANT NO CLAIM FOR DAMAGES OR LOSS OF TIME BY THE CONTRACTOR DUE TO LOSS OR DISTURBANCE OF SURVEY CONTROL POINTS. CONTROL STAKES, BENCHMARKS, REFERENCE POINTS AND PROPERTY CORNERS DISTURBED BY THE CONTRACTOR'S WORK SHALL BE REPLACED BY A FLORIDA REGISTERED PROFESSIONAL SURVEYOR AND MAPPER WHO WILL BE SELECTED BY AND PAID BY THE CONTRACTOR. THE OWNER WILL NOT MAKE FINAL PAYMENT TO THE CONTRACTOR UNTIL ALL DISTURBED OR DESTROYED PROPERTY CORNERS AND PERMANENT BENCHMARKS HAVE BEEN REPLACED BY THE FLORIDA REGISTERED SURVEYOR AND MAPPER. THE SURVEYOR SHALL CERTIFY THAT SUCH MARKERS HAVE BEEN REPLACED IN ACCORDANCE WITH THE STATE OF FLORIDA ADMINISTRATIVE CODE, CHAPTER 61G17-6, "MINIMUM TECHNICAL STANDARDS".

9. RESTORE ALL PRIVATE AND PUBLIC PROPERTY AFFECTED BY THIS WORK TO A CONDITION EQUAL TO OR BETTER THAN EXISTED BEFORE COMMENCING CONSTRUCTION WORK, UNLESS SPECIFICALLY EXEMPTED BY THE DRAWINGS. RESTORATION WORK INCLUDES, BUT IS NOT LIMITED TO PAVEMENT, BASE, SUBGRADE, CONCRETE CURBS, THERMOPLASTIC TRAFFIC MARKINGS, SIDEWALKS, STORM WATER PIPE, ETC. ALL RESTORATION WORK SHALL BE PER FDOT STANDARDS AND SPECIFICATIONS AND FDOT PERMIT REQUIREMENTS. IF THERE IS A CONFLICT WITH FDOT REQUIREMENTS AND THE CONTRACT DOCUMENTS, THE MORE STRINGENT REQUIREMENT SHALL GOVERN. IF ADDITIONAL TOPOGRAPHY

   OR ANY OTHER INFORMATION IS NECESSARY FOR THE CONTRACTOR TO RECONSTRUCT ALL FACILITIES TO PRE CONSTRUCTION GRADES AND DIMENSIONS, THE ACQUISITION OF SUCH ADDITIONAL INFORMATION SHALL BE THE CONTRACTOR'S RESPONSIBILITY, AND AT HIS EXPENSE. RECONSTRUCT ALL FACILITIES TO PRECONSTRUCTION GRADES AND DIMENSIONS, UNLESS OTHERWISE NOTED. WATER, FERTILIZE AND SUPPLY ALL ITEMS AND CARE NECESSARY TO MAINTAIN THE HEALTH OF ALL NEW VEGETATION AND VEGETATION REMOVED AND REPLACED, AT NO EXPENSE TO THE OWNER, IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.

10. THE CONTRACTOR IS RESPONSIBLE FOR TRAFFIC MAINTENANCE IN ACCORDANCE WITH THE SPECIFICATIONS, U.S. DEPARTMENT OF TRANSPORTATION'S "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES," FLORIDA DEPARTMENT OF TRANSPORTATION SPECIFICATIONS AND OTHER GOVERNING AGENCY'S SPECIFICATIONS. IN THE EVENT OF A CONFLICT, THE MORE STRINGENT SPECIFICATION OR REQUIREMENT SHALL GOVERN. PROVIDE ALL NECESSARY BARRICADES, WARNING SIGNS, DELINEATORS, FLAGMEN, PILOT CARS, ETC., REQUIRED FOR TRAFFIC CONTROL AND/OR MAINTENANCE.

11. PROVIDE ANY TEMPORARY CONTROLS AND/OR STRUCTURES REQUIRED TO MAINTAIN SUITABLE AND SAFE WORKING CONDITIONS AT ALL TIMES. SUCH ITEMS SHALL BE REMOVED ONCE THAT PORTION OF WORK HAS BEEN COMPLETED.

12. STORE CONSTRUCTION EQUIPMENT AND MATERIALS ONLY IN THOSE AREAS APPROVED BY THE OWNER. SECURITY OF CONSTRUCTION EQUIPMENT AND MATERIALS IS THE RESPONSIBILITY OF THE CONTRACTOR. PUBLIC RIGHTS-OF-WAY MAY NOT BE UTILIZED FOR STORAGE OF EQUIPMENT OR MATERIALS WITHOUT PRIOR WRITTEN APPROVAL FROM THE ENTITY WHICH OWNS THE RIGHT-OF-WAY.

13. UPON COMPLETION OF THE PROJECT, PROVIDE A AS-BUILT SURVEY OF ALL IMPROVEMENTS IN AUTOCAD FORMAT. THE AS-BUILT SURVEY MUST BE PREPARED BY A FLORIDA REGISTERED SURVEYOR AND MAPPER IN ACCORDANCE WITH THE STATE OF FLORIDA ADMINISTRATIVE CODE, CHAPTER 61G17-6, "MINIMUM TECHNICAL STANDARDS". AS A MINIMUM, AS-BUILT DRAWINGS FOR PIPELINE CONSTRUCTION SHALL SHOW CONSTRUCTED HORIZONTAL AND VERTICAL LOCATIONS OF ALL BENDS, FITTINGS AND VALVES, AND ELEVATIONS AT ALL LOCATIONS WHERE PROPOSED DESIGN ELEVATIONS ARE SHOWN ON THE DRAWINGS. THE AS-BUILT SURVEY SHALL BE TIED INTO THE STATE PLANE COORDINATE SYSTEM.

14. THE STATIONS AND OFFSETS FOR PROPOSED WATER MAIN ARE APPROXIMATE.

15. SPECIAL EMPHASIS ON EXCAVATION SAFETY AND TRENCH CONSTRUCTION:

   A. OSHA'S EXCAVATION SAFETY STANDARDS 29, CFR PART 1926.650-652 SUBPART P, AS WELL AS FLORIDA'S TRENCH SAFETY ACT (FLORIDA STATUTE 90-96) ARE CONSIDERED AS COMPLIMENTARY TO THESE CONTRACT DOCUMENTS. IF THERE IS ANY DUPLICATION, REDUNDANCY OR CONFLICT BETWEEN THE STIPULATIONS OF THESE CONTRACT DOCUMENTS AND THOSE STANDARDS, THE MOST STRINGENT REQUIREMENT SHALL GOVERN. THE CONTRACTOR SHALL ALSO COMPLETE THE FLORIDA TRENCH SAFETY ACT STATEMENT PROVIDED IN THE CONTRACT DOCUMENTS.

   B. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE THAT EXCAVATIONS DO NOT ENDANGER WORKMEN, EXISTING STRUCTURES, UTILITIES, OR OTHER FACILITIES. IF SUCH CONDITIONS OCCUR WHICH MAY ENDANGER WORKMEN, EXISTING STRUCTURES, UTILITIES, OR OTHER FACILITIES, IMMEDIATELY INSTALL AND MAINTAIN ADEQUATE SHEETING AND BRACING PER OSHA SPECIFICATIONS. CEASE ALL WORK UNTIL THE SHEETING AND BRACING HAS BEEN PROPERLY AND COMPLETELY INSTALLED. INSTALL THE SHEETING AND BRACING IN A MANNER THAT WILL ALLOW REMOVAL WITHOUT INJURING OR ENDANGERING WORKMEN, THE WORK, ADJACENT STRUCTURES, AND THE LIKE. PROMPTLY AND COMPLETELY FILL ALL VOIDS CAUSED BY THE WITHDRAWAL OF SHEETING WITH SAND AND COMPACT TO A DEGREE EQUAL TO THE SURROUNDING SOIL. REMOVE THE SHEETING AS THE WORK PROGRESSES OR, AT THE DISCRETION OF THE ENGINEER, CUT THE SHEETING OFF BELOW FINISHED GRADE AND LEAVE IN PLACE.

16. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING AND RELOCATING ALL INFORMATION AND TRAFFIC SIGNS TEMPORARILY DURING CONSTRUCTION. SIGN SHOULD BE VISIBLE TO MOTORIZED VEHICLES. REPOSITION SIGNS IN PRE-CONSTRUCTION LOCATION IMMEDIATELY AFTER CONSTRUCTION IS COMPLETED.

17. THE CONTRACTOR SHALL MAINTAIN ACCESS TO PRIVATE PROPERTY AT ALL TIMES.

18. ALL AFFECTED GRASSED AREAS SHALL BE RESTORED WITH THE APPLICATION OF ARGENTINE BAHIA SOD OR IDENTICAL SOD AS IN PRE-CONSTRUCTION. ANY SOD LAID ON A INCLINE SHALL BE PROPERLY PINNED.

19. CONTRACTOR SHALL ASSURE THAT ALL CATCH BASINS, MITERED END SECTIONS, CONCRETE CURBING, PIPE AND INSTALLATIONS CONFORM TO ALL APPLICABLE REQUIREMENTS OF THE CURRENT EDITION OF THE FLORIDA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION.

LEGEND

E	ELECTRIC BOX
	BOLLARD
	POWER POLE CONCRETE
	CONCRETE
—X—X—	6'CHAIN LINK FENCE
	SIGN
x 19.06	SPOT ELEVATION
	WETLAND FLAG
	GOPHER TURTLE HOLE
	PULL BOX
	POWER POLE WOOD
	GUY ANCHOR
19.06	TREE
S	MANHOLE SANITARY
	WATER METER
	LAMP
	CENTER LINE

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION
		PERMIT DRAWINGS NOT FOR CONSTRUCTION			

MALCOLM PIRNIE

PREPARED BY: 7-2-10 CHRISTOPHER C. TILMAN FLORIDA P.E. NO. 61903

SOLID WASTE AUTHORITY OF PALM BEACH COUNTY

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

PALM BEACH RENEWABLE ENERGY FACILITY NO. 2

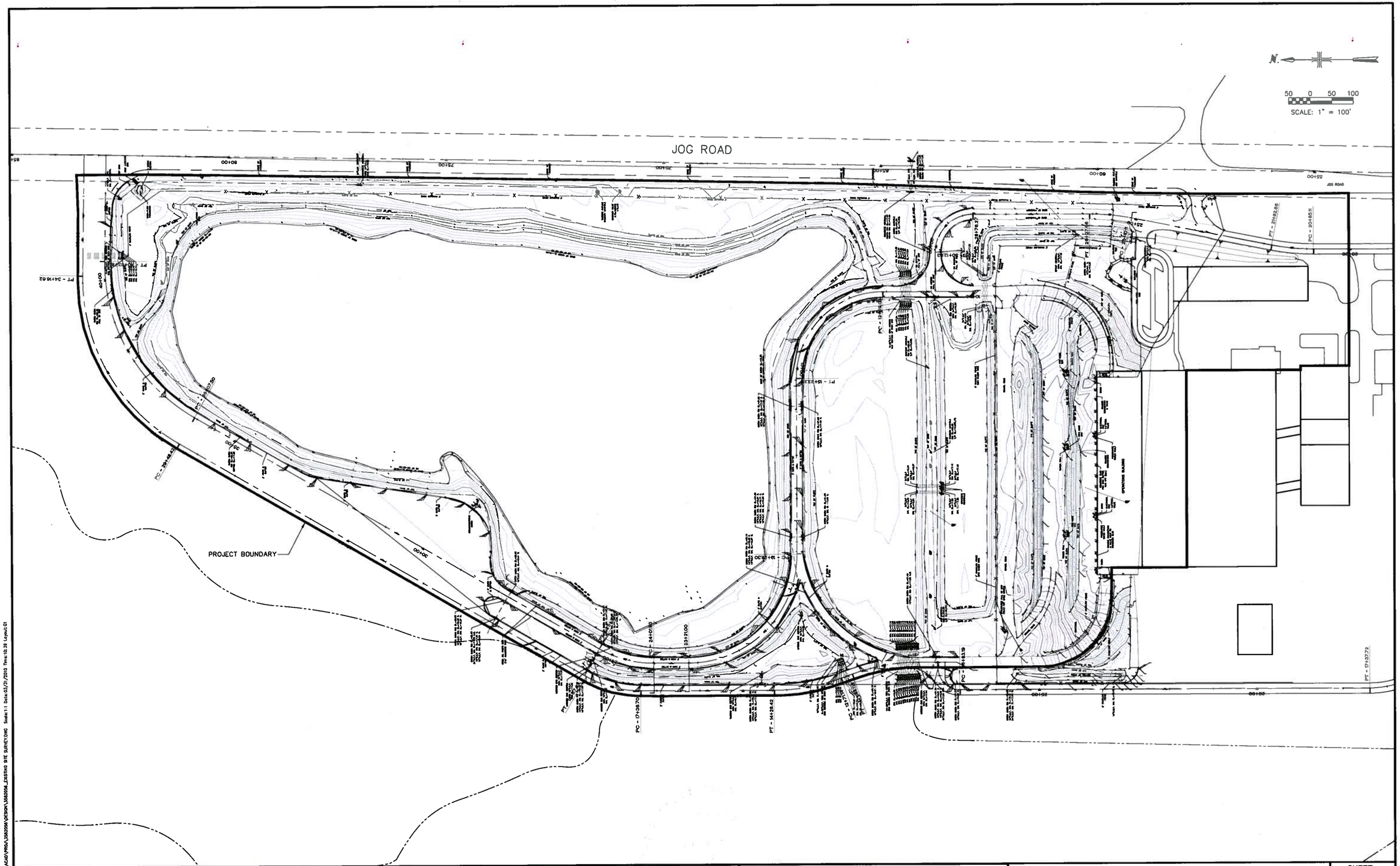
GENERAL

GENERAL NOTES

SHEET NO. 2

JULY 2010

User:BENSON Spec:PIRNIE STANDARD File:K:\ACAD\PROJ\3582056\DESIGN\3582056_GENERAL NOTES.DWG Scale:1:1 Date:07/06/2010 Time:13:33 Layout:Layout1



REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION
		PERMIT DRAWINGS NOT FOR CONSTRUCTION			

MALCOLM PIRNIE

PREPARED BY:
7-9-10
CHRISTOPHER C. TILMAN
FLORIDA P.E. NO. 61903

SOLID WASTE AUTHORITY OF PALM BEACH COUNTY

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

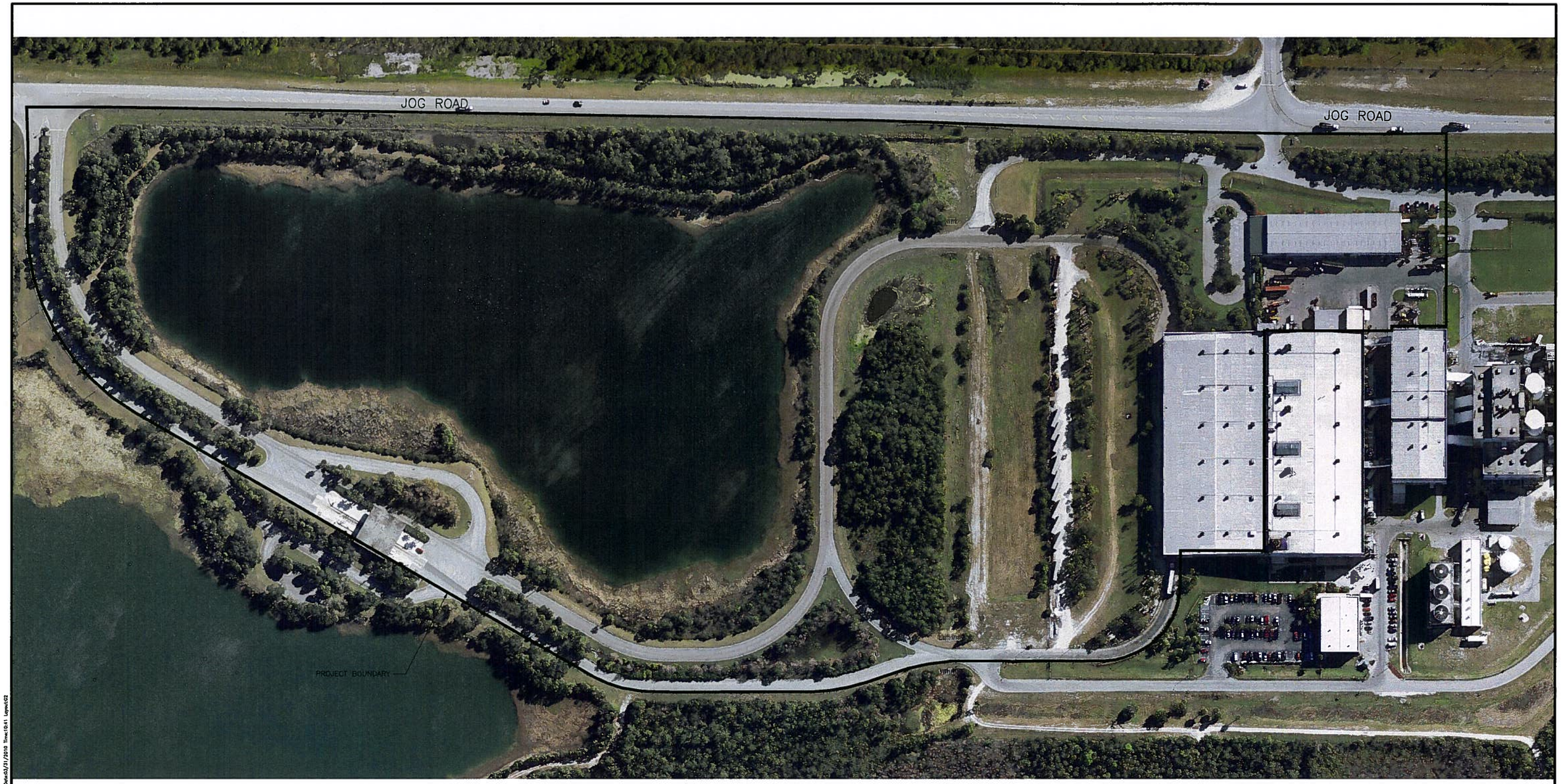
PALM BEACH RENEWABLE ENERGY FACILITY NO. 2

EXISTING SITE SURVEY WITH PROJECT BOUNDARY

SHEET NO. 3

JULY 2010

User:BENSON Spec:PIRNIE STANDARD File:K:\ACAD\PROJ\3582056\DESIGN\3582056_EXISTING SITE SURVEY.DWG Scale:1:1 Date:07/06/2010 Time:13:35 Layout:GI
User:CADD Spec:ACAD File:K:\ACAD\PROJ\3582056\DESIGN\3582056_EXISTING SITE SURVEY.DWG Scale:1:1 Date:03/31/2010 Time:10:39 Layout:GI



N

50 0 50 100
SCALE: 1" = 100'

REVISIONS						PREPARED BY :	SOLID WASTE AUTHORITY OF PALM BEACH COUNTY			PALM BEACH RENEWABLE ENERGY FACILITY NO. 2	SHEET NO.
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	MALCOLM PIRNIE	ROAD NO.	COUNTY	FINANCIAL PROJECT ID	EXISTING SITE AERIAL	4
		PERMIT DRAWINGS NOT FOR CONSTRUCTION				CHRISTOPHER C. TILMAN FLORIDA P.E. NO. 61903					JULY 2010

XREFS: ..\XREF\358278-Mass Burn.dwg None IMAGES:K:\ACAD\PROJ\..\358205\6\XREF\ERF.sld
User:BENSON Spec:PRINE STANDARD File:K:\ACAD\PROJ\..\358205\6\DESIGN\358205_EXISTING SITE AERIAL.DWG Scale:1:1 Date:06/22/2010 Time:14:17 Layout:G2
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(TO REMAIN)
CATCH BASIN RIM EL.=22.87
18"R.C.P. INV. EL.=18.20 E.
18"R.C.P. INV. EL.=18.37 W.

(TO REMAIN)
CATCH BASIN RIM EL.=22.93
24"R.C.P. INV. EL.=17.75 N.W.
18"R.C.P. INV. EL.=17.81 E.
18"R.C.P. INV. EL.=18.54 W.

(TO REMAIN)
CATCH BASIN RIM EL.=22.82
18"R.C.P. INV. EL.=18.44 W.

(TO REMAIN)
CATCH BASIN RIM EL.=21.91
18"R.C.P. INV. EL.=18.15 E.
18"R.C.P. INV. EL.=17.52 W.

(TO REMAIN)
MITERED END SECTION
WITH 36"R.C.P.
INV. EL.=17.57

(TO REMAIN)
MITERED END SECTION
WITH 18"R.C.P.
INV. EL.=17.53

(TO REMAIN)
MITERED END SECTION
WITH 18"R.C.P.
INV. EL.=17.52

(TO REMAIN)
MITERED END SECTION
WITH 18"R.C.P.
INV. EL.=16.16

(REMOVE)
CATCH BASIN RIM EL.=21.82
18"R.C.P. INV. EL.=16.47 E.
18"R.C.P. INV. EL.=17.57 W.

(REMOVE)
CATCH BASIN RIM EL.=22.19
18"R.C.P. INV. EL.=16.30 E.
18"R.C.P. INV. EL.=16.57 W.

(REMOVE)
CATCH BASIN RIM EL.=21.93
18"R.C.P. INV. EL.=16.81 E.
18"R.C.P. INV. EL.=16.71 E.
18"R.C.P. INV. EL.=16.63 W.

(REMOVE)
CATCH BASIN RIM EL.=21.92
18"R.C.P. INV. EL.=17.47 S.
18"R.C.P. INV. EL.=17.65 W.

(REMOVE)
CATCH BASIN RIM EL.=21.90
18"R.C.P. INV. EL.=17.46 N.

(REMOVE)
CATCH BASIN RIM EL.=21.90
18"R.C.P. INV. EL.=17.00 N.

3-30"R.C.P. WITH MITERED
END SECTION AT EACH END

18"R.C.P. INV. EL.=14.49

CULVERT SYSTEMS TO
REMAIN (PLUG AT
EAST END)
INV. EL.=16.93
INV. EL.=16.88
INV. EL.=16.94

INV. EL.=16.81
INV. EL.=16.74
INV. EL.=16.81

SAW-CUT & REMOVE EXIST.
PAVEMENT SOUTHWARD

REMOVE EXIST. INLETS, STORM PIPE & MES

REMOVE EXIST. PAVEMENT

REMOVE EXIST. STORM PIPE & MES

REMOVE EXIST. STORM PIPE

REMOVE EXIST. PAVEMENT

REMOVE EXIST.
STORM PIPE & MES

REMOVE EXIST. MES'S
& PLUG 30" RCP'S

REMOVE EXIST. STORM PIPE & MES

REMOVE EXIST. STORM PIPES & MES'S

COMMUNICATIONS
TOWER

STEEL SQ. POSTS WITH
2'x2' CONCRETE BASE

2' CURB & GUTTER

TOP OF BANK

TOE OF SLOPE

EDGE OF WATER EL.=15.58
AS OF 03-02-09

EDGE OF WATER EL.=15.58
AS OF 03-02-09

6' CHAINLINK FENCE

EDGE OF
PAVEMENT

RIMBERS OUTLINE
SANITARY MANHOLE

SANITARY VALVE
W/CONCRETE
COLLAR

JOG ROAD

N.

25 0 25 50
SCALE: 1" = 50'

DEMOLITION LEGEND

PAVEMENT REMOVAL

STORM PIPE REMOVAL

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION
		PERMIT DRAWINGS NOT FOR CONSTRUCTION			

MALCOLM PIRNIE

PREPARED BY :
7-9-10
CHRISTOPHER C. TILMAN
FLORIDA P.E. NO. 61903

SOLID WASTE AUTHORITY
OF PALM BEACH COUNTY

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

PALM BEACH RENEWABLE ENERGY FACILITY NO. 2

DEMOLITION PLAN I

SHEET NO. 5

JULY 2010

XREFS:..\XREF\SWA_NOLF SURVEY.DWG ..\XREF\358218-Mass Burn.dwg IMAGES:None
XREFS:..\XREF\SWA_NOLF SURVEY.DWG ..\XREF\358218-Mass Burn.dwg IMAGES:None
User:CADD Spec:ACAD File:\VCAD\PROJ\3582058\DESIGN\3582058_DEMOLITION PLAN.DWG Scale:1:1 Date:04/12/2010 Time:11:43 Layout:DEMO 1

(TO REMAIN)
CATCH BASIN RIM EL.=22.18
18"R.C.P. INV. EL.=16.81 N

SAW-CUT & REMOVE EXIST. PAVEMENT EASTWARD

SAW-CUT EACH RCP & REMOVE EXIST. EAST MITERED END SECTIONS

(TO REMAIN)
12"-30"R.C.P. WITH MITERED END SECTION AT EACH END
INV. EL.=16.84
INV. EL.=17.07
INV. EL.=17.07
INV. EL.=16.92
INV. EL.=16.96
INV. EL.=16.75
INV. EL.=16.79
INV. EL.=16.92
INV. EL.=16.93
INV. EL.=16.88
INV. EL.=16.94
MITERED END SECTION WITH 24"R.C.P. INV. EL.=17.04

(TO REMAIN)
CATCH BASIN RIM EL.=21.35
18"R.C.P. INV. EL.=16.81 E.
18"R.C.P. INV. EL.=16.88 S
24"R.C.P. INV. EL.=17.78 S/W

(TO REMAIN)
CATCH BASIN RIM EL.=21.27
18"R.C.P. INV. EL.=16.80 N

(TO REMAIN)
CATCH BASIN RIM EL.=20.89
24"C.M.P. INV. EL.=18.31 E
24"C.M.P. INV. EL.=17.91 W

(TO REMAIN)
CATCH BASIN RIM EL.=22.18
18"R.C.P. INV. EL.=17.52 N.W.

REMOVE EXIST. STORM PIPES & MES'S

REMOVE EXIST SANITARY SEWER SYSTEM

REMOVE EXIST. STORM PIPE & MES

REMOVE EXIST. STORM PIPE & HEADWALLS

24"C.M.P. INV. EL.=16.93
24"C.M.P. INV. EL.=16.94
24"C.M.P. INV. EL.=16.34
24"C.M.P. INV. EL.=16.42
24"C.M.P. INV. EL.=17.35
24"C.M.P. INV. EL.=17.26
24"C.M.P. INV. EL.=17.16
24"C.M.P. INV. EL.=17.18
CONCRETE HEADWALLS

SANITARY MANHOLE RIM EL.=22.80 t/P EL.=19.05E,/W

SANITARY MANHOLE RIM EL.=22.62 t/P EL.=19.56E

ARV MANHOLE RIM EL.=23.26 t/P EL.=19.50E,/W

MITERED END SECTION WITH 24"R.C.P. INV. EL.=16.53

(REMOVE)
NO ACCESS
FULL OF DIRT

(REMOVE)
STRUCTURES FULL OF DIRT
COULD NOT OPEN CHAMBER

(REMOVE)
6' CHAINLINK FENCE WITH RAZOR WIRE

(REMOVE)
6' CHAINLINK FENCE WITH RAZOR WIRE

(REMOVE)
CATCH BASIN
12"C.M.P.E.
INV. EL.=19.24

REMOVE EXIST. STORM PIPE

EXIST. CULVERTS TO REMAIN

24" R.C.P. PIPE

CONCRETE HEADWALL
NORTH INV. EL.=17.08
SOUTH INV. EL.=17.25

CONCRETE HEADWALL
NORTH INV. EL.=17.09
SOUTH INV. EL.=17.05

SANITARY MANHOLE
RIM E.=21.36
T/P=16.56E

RIPRAP HEADWALL
WITH 12"C.M.P.
INV. EL.=17.30

CONCRETE HEADWALL WITH 24"C.P.P. INV. EL.=17.08

CONCRETE HEADWALL WITH 24"C.P.P. INV. EL.=17.25

CONTROL POINT
N:888020.74
E:780491.19
EL:22.56

CONTROL POINT
N:887963.97
E:779870.73
EL:39.11

OPERATIONS BUILDING

PRESSURIZE WATER VAULT

SIAMESE CONNECTION & VALVE NEXT TO CONCRETE SLAB

DOOR

ELECTRICAL BOX 2.5"STEEL VALVE

CONCRETE SLAB FOR RAIN GUTTER RUN OFF (typ.)

SIAMESE CONNECTION

PRESSURIZE WATER VAULT

ELECTRICAL BOX 2.5"STEEL VALVE

SIAMESE CONNECTION & VALVE

DOOR

FIRE HOSE BOX

TIMBER WALL

TIMBER WALL

FIRE HOSE BOX

RAILROAD TIES

RAILROAD TIES

FIRE-HOSE BOX

TIMBERS OUTLINE ARV MANHOLE

EXIST. STORMPIPE TO REMAIN

JOG ROAD

GUARDRAIL

EDGE OF PAVEMENT

EDGE OF PAVEMENT

REMOVE EXIST. PAVEMENT

SAW-CUT & REMOVE EXIST. PAVEMENT NORTHWARD

CHAINLINK FENCE

6' CHAINLINK FENCE

CURB

CURB & GUTTER

GRAVEL ROAD

GRAVEL ROAD

TOP OF BANK

TOE OF SLOPE

TOP OF SLOPE

TOP OF DITCH

BOTTOM OF DITCH

N.

25 0 25 50
SCALE: 1" = 50'

DEMOLITION LEGEND

PAVEMENT REMOVAL

STORM PIPE REMOVAL

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION
		PERMIT DRAWINGS NOT FOR CONSTRUCTION			

MALCOLM PIRNIE

PREPARED BY :
7-9-10
CHRISTOPHER C. TILMAN
FLORIDA P.E. NO. 61903

SOLID WASTE AUTHORITY OF PALM BEACH COUNTY

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

PALM BEACH RENEWABLE ENERGY FACILITY NO. 2

DEMOLITION PLAN II

SHEET NO. 6

JULY 2010

XREFS: \XREF\SWA NCLF SURVEY.DWG - \XREF\358718-Mass Burn.dwg IMAGES:None
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XREFS: \XREF\SWA NCLF SURVEY.DWG - \XREF\358718-Mass Burn.dwg IMAGES:None
User:BENSON Save:By: P:\ACAD\PROJECTS\2358718\DESIGN\2358718-DEMO PLAN.DWG Scale:1:1 Date:07/06/2010 Time:13:39 Layout:DEMO 2
User:BENSON Save:By: P:\ACAD\PROJECTS\2358718\DESIGN\2358718-DEMO PLAN.DWG Scale:1:1 Date:07/01/2010 Time:16:44 Layout:Layout2

STRUCTURE LEGEND

ID	DESCRIPTION	ROOF DIMENSIONS (LxWxH)
A	TIPPING FLOOR AND BUILDING	420'x150'x105'
B	REFUSE STORAGE PIT AND BUILDING	420'x120'x108'
C	ASH CONVEYING GALLERY	90'x20'x20'
D	SWITCHGEAR ROOM	140'x30'x16'
E	OUTAGE MAINTENANCE SHOP	30'x60'x17'
G	FIRE WATER TANK	50'ø x35'H (500,000 GAL)
H	WASTE WATER STORAGE TANK	14'ø x35'H
I	TURBINE/GENERATOR	140'x60'x69'
J	AIR COOLED CONDENSER	400'x90'x60'
K	FACILITY ADMINISTRATION OFFICES	80'x80'x22' (2 FLOORS)
L	ASH MANAGEMENT BUILDING	300'x150'x52'
M	WATER TREATMENT BUILDING	60'x60'x20'
N	FACILITY MAINTENANCE AREA	150'x80'x22'
O	RAW WATER HARVEST TANK	350'x120'x124' (MIN. HT.) (x154' MAX. HT.)
P	BOILER AREA	14'ø x65'H
Q	CARBON TANK	40'x20'x10'
R	FUELING STATION	14'ø x25' (25,000 GAL)
S	UREA STATION	10'x20'x10'
T	CEM ENCLOSURE	150'x80'x22'
U	STORAGE AREA	60'x20'x8'D
V	SETTLING BASIN	40'x20'x15'
W	PUMP HOUSE	110'x110'
X	SWITCHYARD	280'x50'x122'
Y1	APC BUILDING – SDA AREA	240'x130'x76'
Y2	APC BUILDING – FFH AREA	50'ø x300'H (TAPERS TO 40'ø)
Z	STACK	10'x20'x10'
a	GUARD HOUSE	14'ø x75'H
d	LIME STORAGE SILO	50'ø x35'H (500,000 GAL)
e	DIRTY WASTE WATER TANK	
f	RAIN WATER HARVEST TANK	

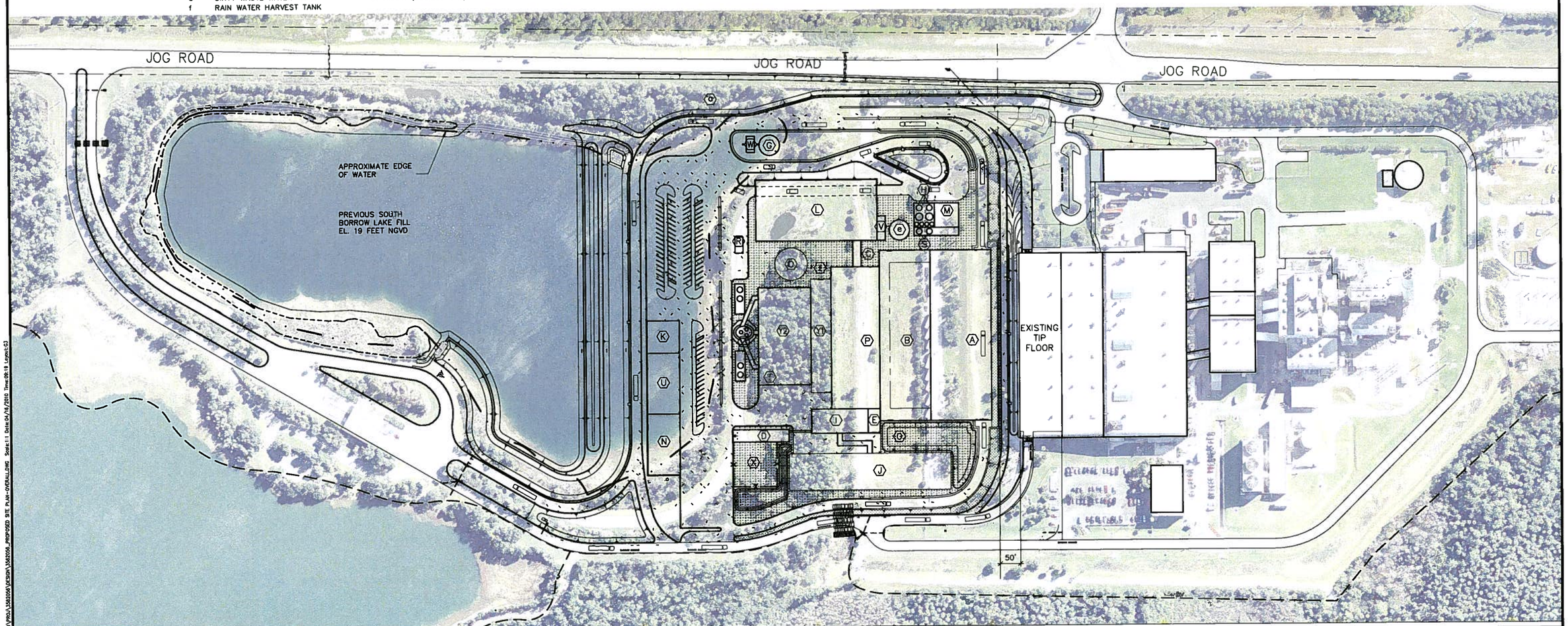
LEGEND

- GRASSY AREA
- GRAVEL AREA
- RETAINING WALL
- ⟨W⟩ STRUCTURE ID
- APPROXIMATE WETLAND BOUNDARY

N.

60 0 60 120

SCALE: 1" = 120'



REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION
		PERMIT DRAWINGS NOT FOR CONSTRUCTION			

MALCOLM PIRNIE

PREPARED BY: CHRISTOPHER C. TILMAN FLORIDA P.E. NO. 61903 7-9-10

SOLID WASTE AUTHORITY OF PALM BEACH COUNTY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID

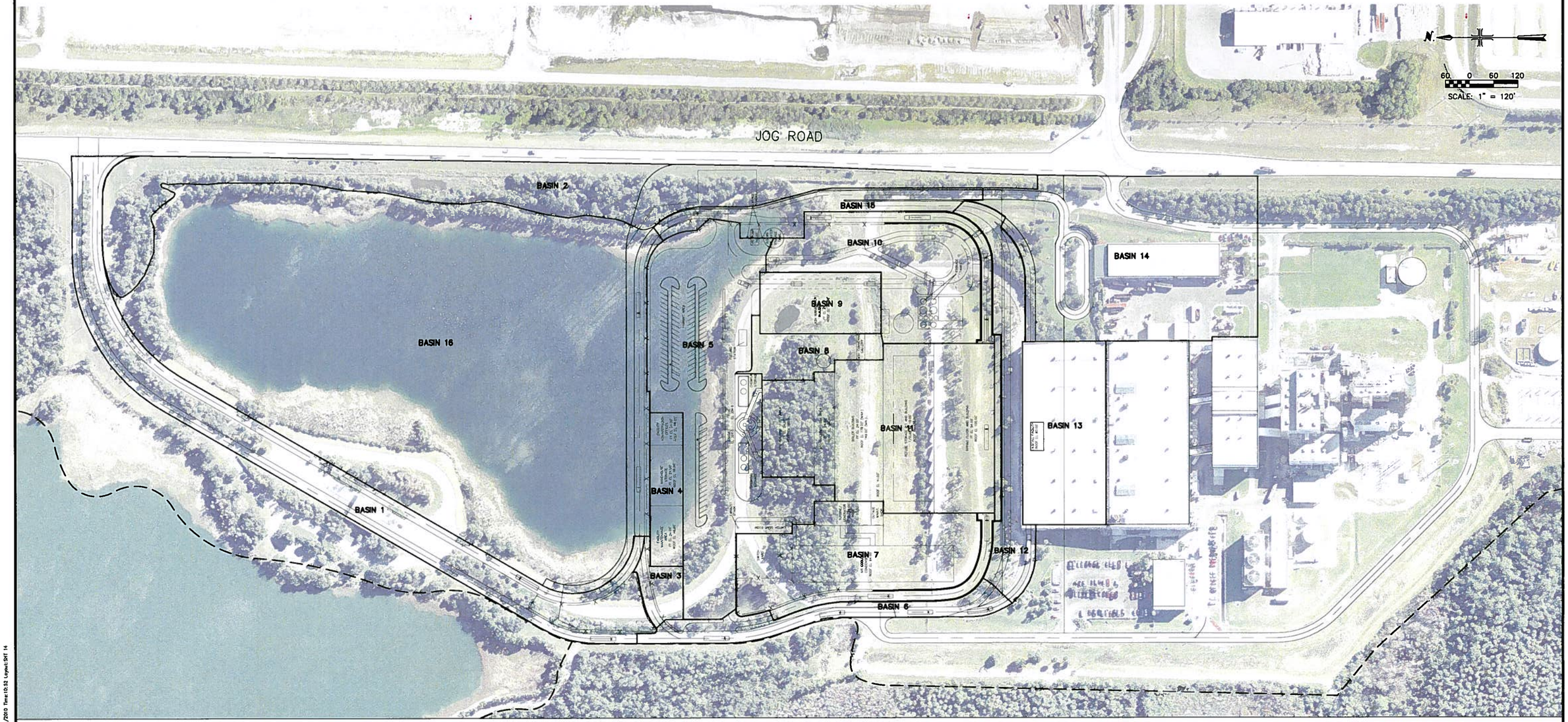
PALM BEACH RENEWABLE ENERGY FACILITY NO. 2

PROPOSED SITE PLAN OVERALL

SHEET NO. 7

JULY 2010

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REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION
		PERMIT DRAWINGS NOT FOR CONSTRUCTION			

MALCOLM PIRNIE

PREPARED BY :

CHRISTOPHER C. TILMAN
FLORIDA P.E. NO. 61903

SOLID WASTE AUTHORITY OF PALM BEACH COUNTY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID

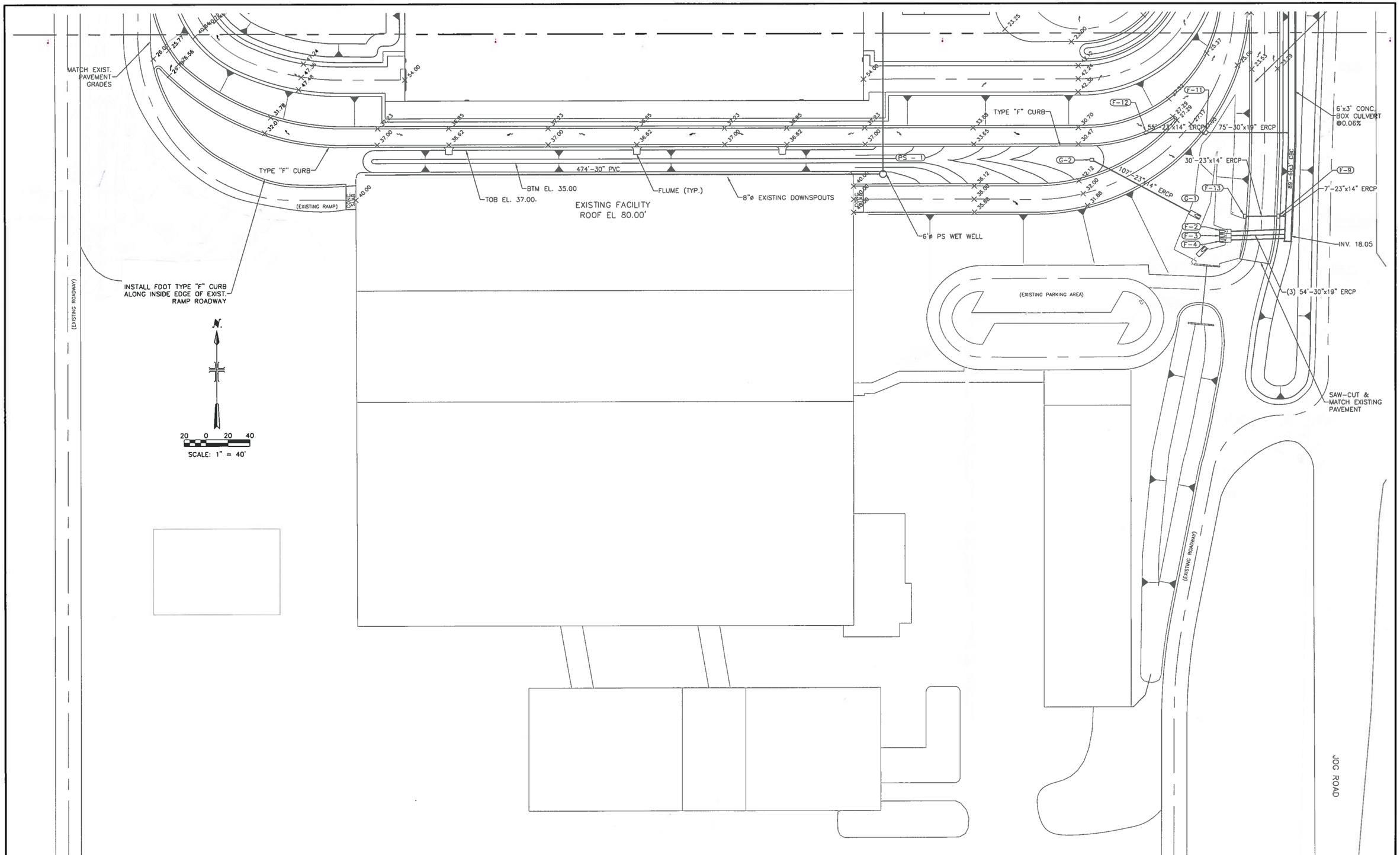
PALM BEACH RENEWABLE ENERGY FACILITY NO. 2

BASIN BOUNDARY MAP

SHEET NO. 8

JULY 2010

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REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION
		PERMIT DRAWINGS NOT FOR CONSTRUCTION			

MALCOLM PIRNIE

PREPARED BY: CHRISTOPHER C. TILMAN FLORIDA P.E. NO 61903 7-2-10

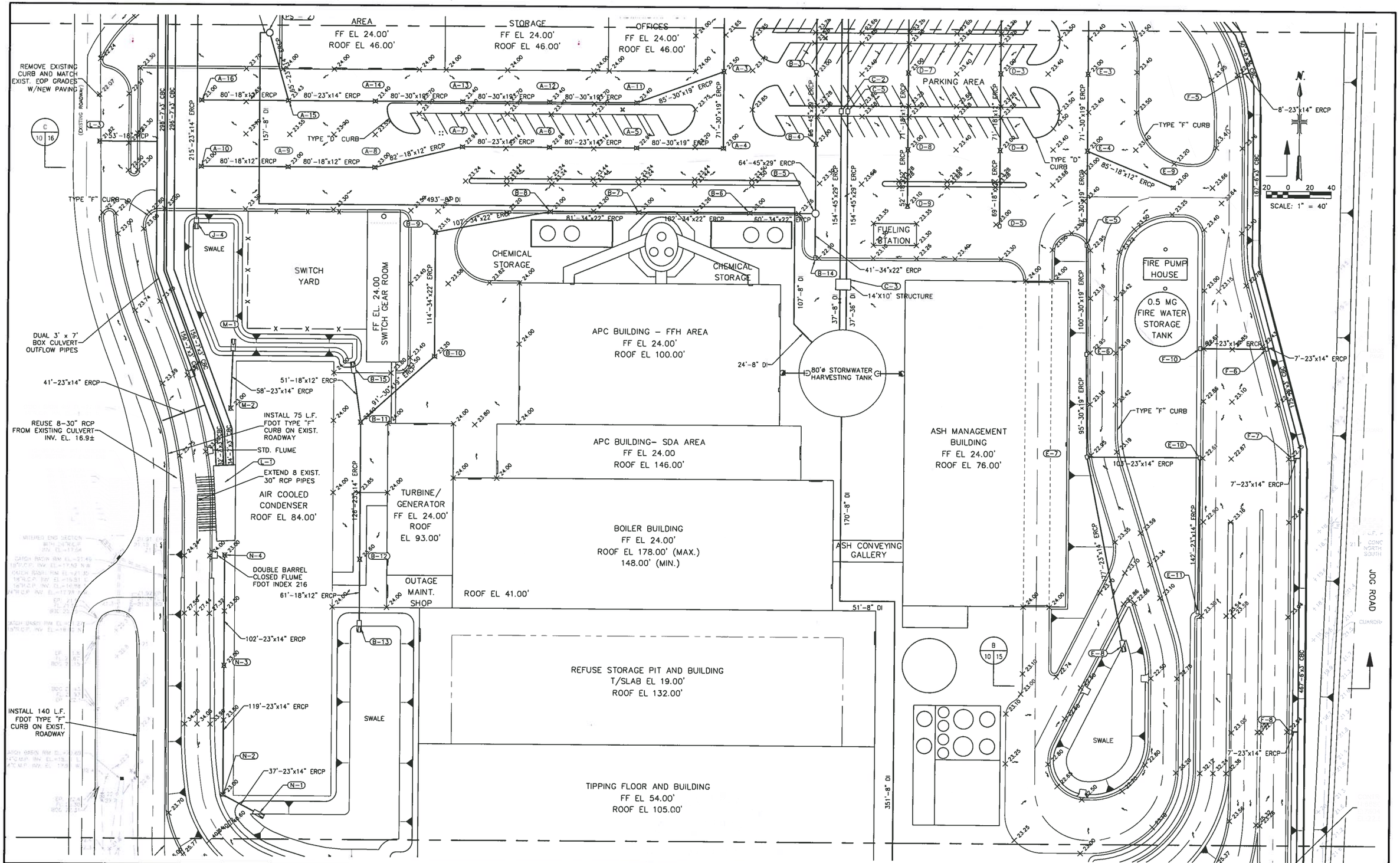
SOLID WASTE AUTHORITY OF PALM BEACH COUNTY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID

PALM BEACH RENEWABLE ENERGY FACILITY NO. 2

PROPOSED PAVING, DRAINAGE AND GRADING PLAN I

SHEET NO. 9

JULY 2010



REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION
		PERMIT DRAWINGS NOT FOR CONSTRUCTION			

MALCOLM PIRNIE

PREPARED BY

CHRISTOPHER C. TILMAN
FLORIDA P.E. NO. 61903

SOLID WASTE AUTHORITY OF PALM BEACH COUNTY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID

PALM BEACH RENEWABLE ENERGY FACILITY NO. 2

PROPOSED PAVING, DRAINAGE AND GRADING PLAN II

SHEET NO. 10

JULY 2010

ESTIMATED FRINGE PRESERVATION AREA

TRAPEZOIDAL DRY RETENTION SWALE FOLLOWS EAST SIDE OF EXIST ROAD INV. EL. 19.0 1364 LF

EXISTING ROADWAY TO REMAIN

SAW-CUT & MATCH EXISTING PAVEMENT

28'-23"x14" ERCP

26'-23"x14" ERCP

TRAPEZOIDAL DRY RETENTION SWALE FOLLOWS NORTH & EAST SIDE OF EXIST ROAD INV. EL. 19.0 1364 LF

CONTROL STRUCTURE OVERFLOW WEIR 20.8 AND PIPE INV. EL. 17.5

181'-45"x29" ERCP

3-38"x60" CLASS III ERCP INV. EL. 17.3

DUAL 3' x 7' BOX CULVERT OUTFLOW PIPES INV. EL. 17.2

REMOVE EXISTING CURB AND MATCH EXIST. EOP GRADES W/NEW PAVING

6'ø PS WET WELL

9'-8" DI

FACILITY MAINTENANCE AREA
FF EL 24.00'
ROOF EL 46.00'

WAREHOUSE STORAGE
FF EL 24.00'
ROOF EL 46.00'

FACILITY ADMINISTRATION OFFICES
FF EL 24.00'
ROOF EL 46.00'

FUTURE FILL AREA TO EL. 22.5

TYPE "F" CURB

56.53'-45"x29" ERCP

57'-45"x29" ERCP

80'-45"x29" ERCP

80'-45"x29" ERCP

172'-45"x29" ERCP

172'-45"x29" ERCP

57'-30"x19" ERCP

59'-30"x19" ERCP

85'-23"x14" ERCP

80'-18"x12" ERCP

80'-18"x12" ERCP

TYPE "D" CURB

78'-30"x19" ERCP

FLUME (TYP.)

4:1 (TYP.)

TOB BANK EL. 22.50

SWALE BTM. EL. 19.0

SUMP EAST END OF SWALE TO EL. 17.40 INSTALL RIP-RAP

MATCH EXIST. GRADE

61'-45"x29" ERCP

61'-45"x29" ERCP

6'x3' CONC. BOX CULVERT @0.06%

JOG ROAD

N.

20 0 20 40
SCALE: 1" = 40'

LEGEND

- (A-1) DRAINAGE STRUCTURE NUMBER
- MITERED END SECTION
- DRAINAGE INLET
- DRAINAGE PIPE
- FLUME
- RIP-RAP
- CONCRETE ENDWALL
- BOX CULVERT
- + PROPOSED PAVEMENT ELEVATION
- SURFACE FLOW DIRECTION

REVISIONS

DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION
		PERMIT DRAWINGS NOT FOR CONSTRUCTION			

MALCOLM PIRNIE

PREPARED BY

CHRISTOPHER C. TILMAN
FLORIDA P.E. NO 61903

SOLID WASTE AUTHORITY OF PALM BEACH COUNTY

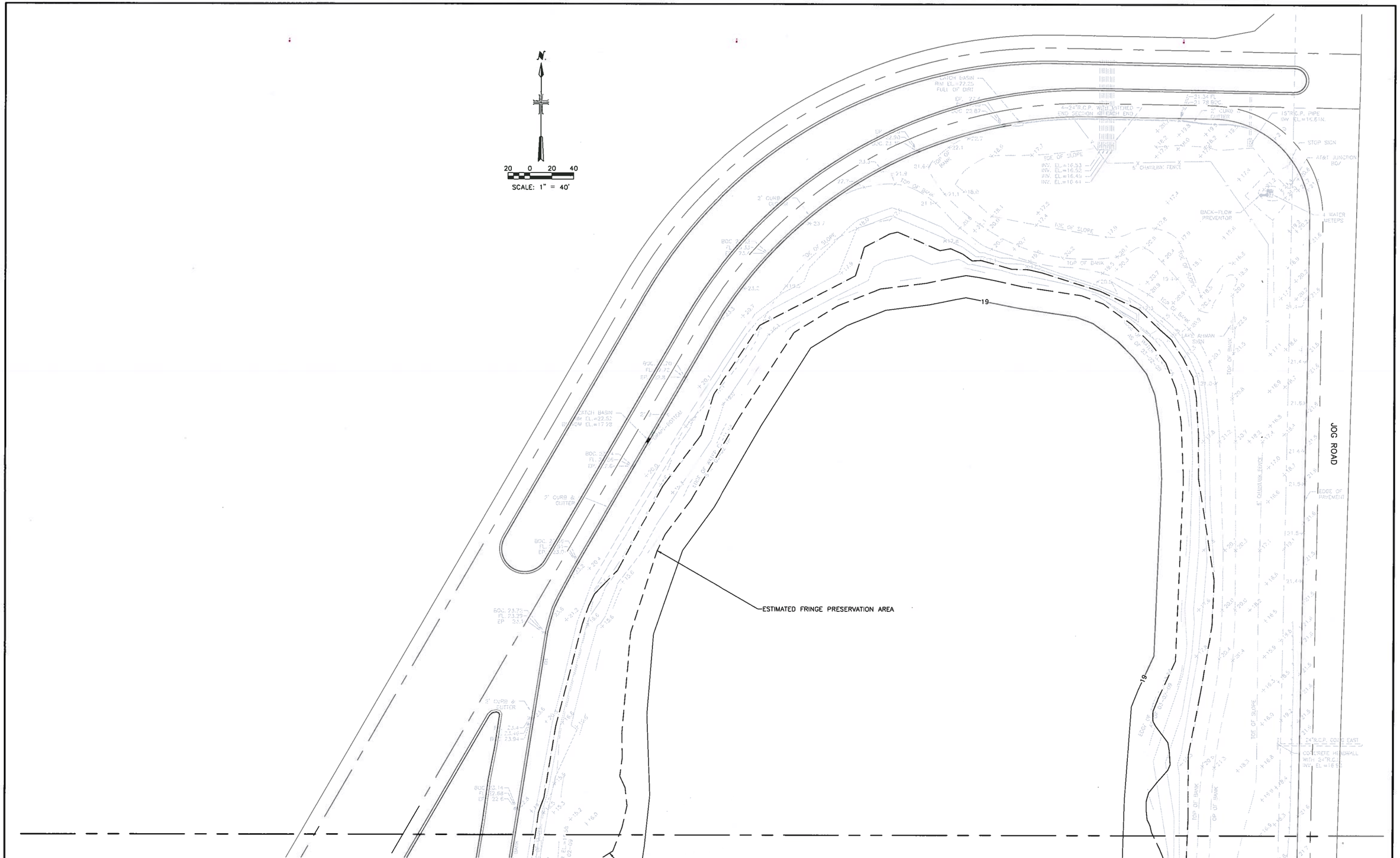
ROAD NO.	COUNTY	FINANCIAL PROJECT ID

PALM BEACH RENEWABLE ENERGY FACILITY NO. 2

PROPOSED PAVING, DRAINAGE AND GRADING PLAN III

SHEET NO. 11

JULY 2010



REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION
		PERMIT DRAWINGS NOT FOR CONSTRUCTION			

MALCOLM PIRNIE

PREPARED BY :
2-9-10
CHRISTOPHER C. TILMAN
FLORIDA P.E. NO 61903

SOLID WASTE AUTHORITY OF PALM BEACH COUNTY

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

PALM BEACH RENEWABLE ENERGY FACILITY NO. 2

PROPOSED PAVING, DRAINAGE AND GRADING PLAN IV

SHEET NO. 12

JULY 2010

Structure Table

Structure Name	Description	Northing	Easting	Grate/Rim	Pipe Inverts
A-1	MITERED END SECTION 4:1	888913.47	779991.45	-	19.00
A-2	TYPE "C" DBI ON "J" BTM (3.5'x6')	888856.94	779991.45	23.50	19.09
A-3	TYPE "C" DBI ON "J" BTM (4'x6')	888776.94	779991.45	23.50	19.21
A-4	TYPE "C" DBI ON "J" BTM (4'x4')	888706.30	779991.45	23.00	19.32
A-5	TYPE "C" DBI ON "J" BTM (4'x4')	888706.30	779911.45	22.94	19.44
A-6	TYPE "C" DBI ON "J" BTM (4'x4')	888706.30	779831.45	22.94	19.56
A-7	TYPE "C" DBI ON "J" BTM (4'x4')	888706.30	779751.45	22.94	19.68
A-8	TYPE "C" DBI	888686.94	779671.45	23.00	19.80
A-9	TYPE "C" DBI	888686.94	779591.45	23.00	19.92
A-10	TYPE "C" DBI	888686.94	779511.45	22.80	20.04
A-11	TYPE "C" DBI ON "J" BTM (4'x4')	888747.79	779911.45	23.40	19.34
A-12	TYPE "C" DBI ON "J" BTM (4'x4')	888747.79	779831.45	23.40	19.46
A-13	TYPE "C" DBI ON "J" BTM (4'x4')	888747.79	779751.45	23.40	19.58
A-14	TYPE "C" DBI ON "J" BTM (4'x4')	888747.79	779671.45	23.40	19.70
A-15	TYPE "C" DBI ON "J" BTM (4'x4')	888747.79	779591.45	23.43	19.82
A-16	TYPE "C" DBI	888747.79	779511.45	23.00	19.94
B-1	MITERED END SECTION 4:1	888913.47	780076.45	-	19.00
B-2	TYPE "C" DBI ON "J" BTM (3.5'x6')	888856.94	780076.45	22.88	19.09
B-3	TYPE "C" DBI ON "J" BTM (3.5'x6')	888776.94	780076.45	23.00	19.21
B-4	TYPE "C" DBI ON "J" BTM (3.5'x6')	888711.00	780076.45	23.00	19.31
B-5	TYPE J-7T MH (5'X6')	888647.16	780076.45	23.30	19.41
B-6	TYPE "C" DBI ON "J" BTM (4'x5')	888647.16	780016.16	23.00	19.50
B-7	TYPE "C" DBI ON "J" BTM (4'x5')	888647.16	779913.89	23.00	19.65
B-8	TYPE "C" DBI ON "J" BTM (4'x5')	888647.16	779832.77	23.00	19.77
B-9	TYPE "C" DBI ON "J" BTM (5'x5')	888627.66	779727.29	23.15	19.93

Structure Table

Structure Name	Description	Northing	Easting	Grate/Rim	Pipe Inverts
B-10	TYPE "E" DBI ON "J" BTM (5'x5')	888513.43	779727.29	23.20	20.10
B-11	TYPE "C" DBI ON "J" BTM (4'x6')	888452.37	779659.95	23.60	20.24
B-12	TYPE "C" DBI	888325.87	779659.95	23.60	20.43
B-13	MITERED END SECTION 4:1	888264.40	779659.95	-	20.52
B-14	TYPE "C" DBI	888606.35	780076.45	22.90	19.47
B-15	MITERED END SECTION 4:1	888502.56	779652.84	-	20.32
C-1	MITERED END SECTION 4:1	888913.47	780099.45	-	19.00
C-2	TYPE "C" DBI ON "J" BTM (3.5'x6')	888741.30	780099.45	24.00	19.26
C-3	TYPE "E" DBI ON "J" BTM (10'x14')	888587.10	780105.45	23.50	19.49
C-4	MITERED END SECTION 4:1	888913.47	780105.45	-	19.00
C-5	TYPE "C" DBI ON "J" BTM (3.5'x6')	888741.30	780105.45	24.00	19.26
D-1	MITERED END SECTION 4:1	888913.47	780246.45	-	19.00
D-2	TYPE "C" DBI ON "J" BTM (4'x4')	888856.94	780246.45	22.88	19.09
D-3	TYPE "C" DBI	888776.94	780246.45	23.00	19.21
D-4	TYPE "C" DBI	888706.34	780246.45	23.00	19.32
D-5	TYPE "C" DBI	888636.94	780246.45	23.00	19.42
D-6	TYPE "C" DBI ON "P" BTM (3.5'x3.5')	888856.94	780161.45	22.88	19.22
D-7	TYPE "C" DBI	888776.94	780161.45	23.00	19.25
D-8	TYPE "C" DBI	888706.34	780161.45	23.00	19.35
D-9	TYPE "C" DBI	888654.27	780161.45	23.10	19.43
E-1	MITERED END SECTION 4:1	888913.47	780326.42	-	19.00
E-2	TYPE "C" DBI ON "J" BTM (3.5'x4')	888854.94	780326.45	22.90	19.09
E-3	TYPE "C" DBI ON "J" BTM (3.5'x4')	888776.94	780326.45	23.00	19.21
E-4	TYPE "C" DBI ON "J" BTM (4'x4')	888706.34	780326.45	23.00	19.31
E-5	TYPE 5 CURB INLET ON "P" BTM (3.5'x3.5')	888619.83	780326.41	22.95	19.44

Structure Table

Structure Name	Description	Northing	Easting	Grate/Rim	Pipe Inverts
E-6	TYPE 5 CURB INLET ON "P" BTM (3.5'x3.5')	888519.45	780326.99	22.95	19.59
E-7	TYPE 5 CURB INLET ON "P" BTM (3.5'x3.5')	888424.79	780328.29	22.95	19.74
E-8	MITERED END SECTION 4:1	888250.96	780362.83	-	20.00
E-9	TYPE "C" DBI	888673.33	780405.31	23.00	19.44
E-10	TYPE 5 CURB INLET ON "P" BTM (3.5'x3.5')	888424.79	780431.65	22.61	19.89
E-11	TYPE 5 CURB INLET ON "P" BTM (3.5'x3.5')	888282.64	780431.13	23.30	20.11
F-1	CONCRETE ENDWALL	888912.84	780379.93	-	17.40
F-2	MITERED END SECTION 4:1	887886.10	780466.42	-	18.14
F-3	MITERED END SECTION 4:1	887882.10	780466.42	-	18.14
F-4	MITERED END SECTION 4:1	887878.10	780466.42	-	18.14
F-5	TYPE 5 CURB INLET ON "P" BTM (3.5'x3.5')	888777.33	780466.70	22.80	17.54
F-6	TYPE 5 CURB INLET ON "P" BTM (3.5'x3.5')	888525.48	780492.23	23.43	17.69
F-7	TYPE 6 CURB INLET ON "P" BTM (3.5'x3.5')	888424.79	780516.94	22.35	17.76
F-8	TYPE 6 CURB INLET ON "P" BTM (3.5'x3.5')	888172.83	780517.44	22.54	17.91
F-9	TYPE 5 CURB INLET ON "P" BTM (3.5'x3.5')	887900.03	780514.47	22.30	18.07
F-10	TYPE 5 CURB INLET ON "P" BTM (3.5'x3.5')	888525.48	780431.26	22.61	17.78
F-11	TYPE 5 CURB INLET ON "P" BTM (3.5'x3.5')	887976.58	780448.60	27.05	22.00 (W) 18.45 (E)
F-12	TYPE 5 CURB INLET ON "P" BTM (3.5'x3.5')	887976.54	780393.89	27.96	22.08
F-13	TYPE 5 CURB INLET ON "P" BTM (3.5'x3.5')	887899.92	780484.14	22.30	18.12
G-1	MITERED END SECTION 4:1	887901.41	780438.23	-	21.00
G-2	TYPE "E" DBI	887951.71	780344.07	30.00	21.17
H-1	MITERED END SECTION 4:1	889015.97	780400.75	-	19.90
H-2	MITERED END SECTION 4:1	889015.97	780461.70	-	20.00
H-3	MITERED END SECTION 4:1	889009.97	780400.77	-	19.90
H-4	MITERED END SECTION 4:1	889009.97	780461.70	-	20.00

REVISIONS

DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION
		PERMIT DRAWINGS NOT FOR CONSTRUCTION			

MALCOLM PIRNIE

PREPARED BY:

7-9-10

CHRISTOPHER C. TILMAN
FLORIDA P.E. NO 61903

SOLID WASTE AUTHORITY OF PALM BEACH COUNTY

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

PALM BEACH RENEWABLE ENERGY FACILITY NO. 2

PROPOSED STRUCTURE TABLES

SHEET NO. 13

JULY 2010

Structure Ta le

Structure Name	Description	Northing	Easting	Grate/Rim	Pipe Inverts
I-1	MITERED END SECTION 4:1	889108.22	779563.38	–	19.00
I-2	TYPE 6 CURB INLET ON "P" BTM (3.5'x3.5')	889121.87	779539.08	22.05	19.04
I-3	TYPE 6 CURB INLET ON "P" BTM (3.5'x3.5')	889134.80	779516.42	22.05	19.09
J-1	MITERED END SECTION 4:1	888946.33	779580.85	–	19.00
J-2	TYPE 6 CURB INLET ON "P" BTM (3.5'x3.5')	888935.60	779570.13	22.50	19.03
J-3	TYPE 5 CURB INLET ON "P" BTM (3.5'x3.5')	888849.76	779507.36	22.23	19.19
J-4	MITERED END SECTION 4:1	888634.87	779507.36	–	19.51
K-1	CONCRETE ENDWALL	888933.14	779524.29	–	17.30
K-2	OUTFALL CONTROL STRUCTURE	888965.37	779567.88	SEE DETAIL	17.50
L-1	JUNCTION BOX	888411.96	779539.49	23.50	17.00
L-2	CONCRETE ENDWALL	888887.29	779478.87	–	17.20
L-3	TYPE "E" DBI	888709.39	779418.04	21.82	17.80
M-1	MITERED END SECTION 4:1	888522.58	779542.11	–	20.00
M-2	TYPE "E" DBI	888464.47	779539.91	23.00	20.10
N-1	MITERED END SECTION 4:1	888091.05	779568.39	–	20.00
N-2	TYPE "E" DBI	888108.32	779535.58	23.00	20.06
N-3	TYPE "C" DBI	888227.38	779535.58	23.00	20.24
N-4	TYPE "C" DBI	888328.95	779535.58	23.00	20.40
O-1	TYPE "H" DBI	889012.97	779479.52	17.50	13.50
O-2	TYPE "H" DBI	889012.97	779660.90	19.00	13.77

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION
		PERMIT DRAWINGS NOT FOR CONSTRUCTION			

MALCOLM PIRNIE

PREPARED BY:
7-9-10
CHRISTOPHER C. TILMAN
FLORIDA P.E. NO 61903

SOLID WASTE AUTHORITY OF PALM BEACH COUNTY

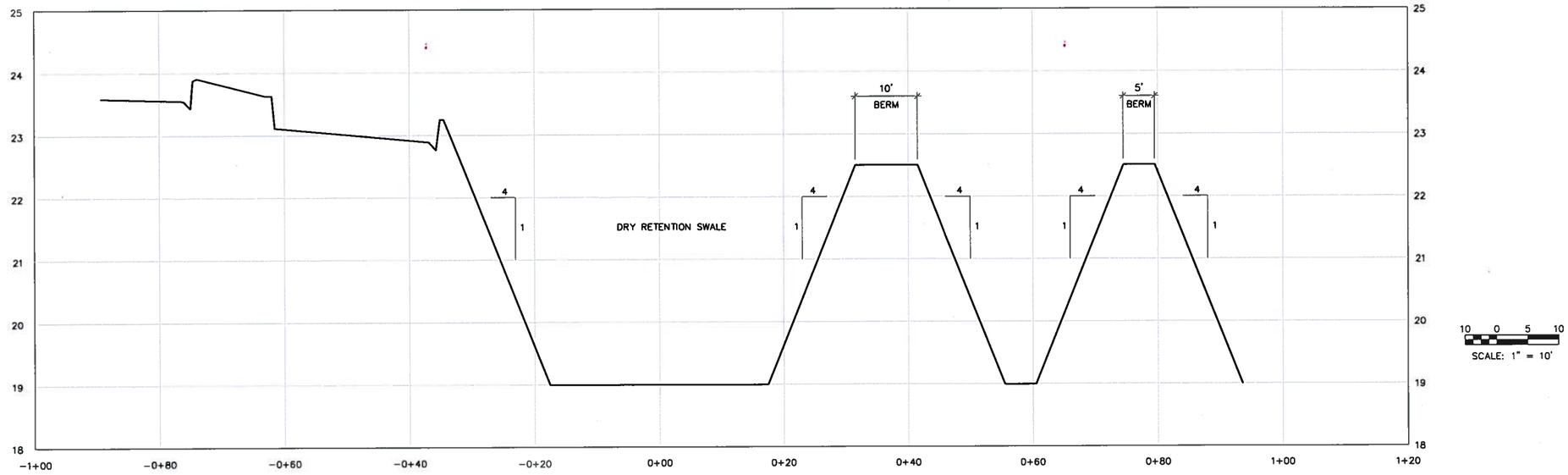
ROAD NO.	COUNTY	FINANCIAL PROJECT ID

PALM BEACH RENEWABLE ENERGY FACILITY NO. 2

PROPOSED STRUCTURE TABLE

SHEET NO. 14

JULY 2010

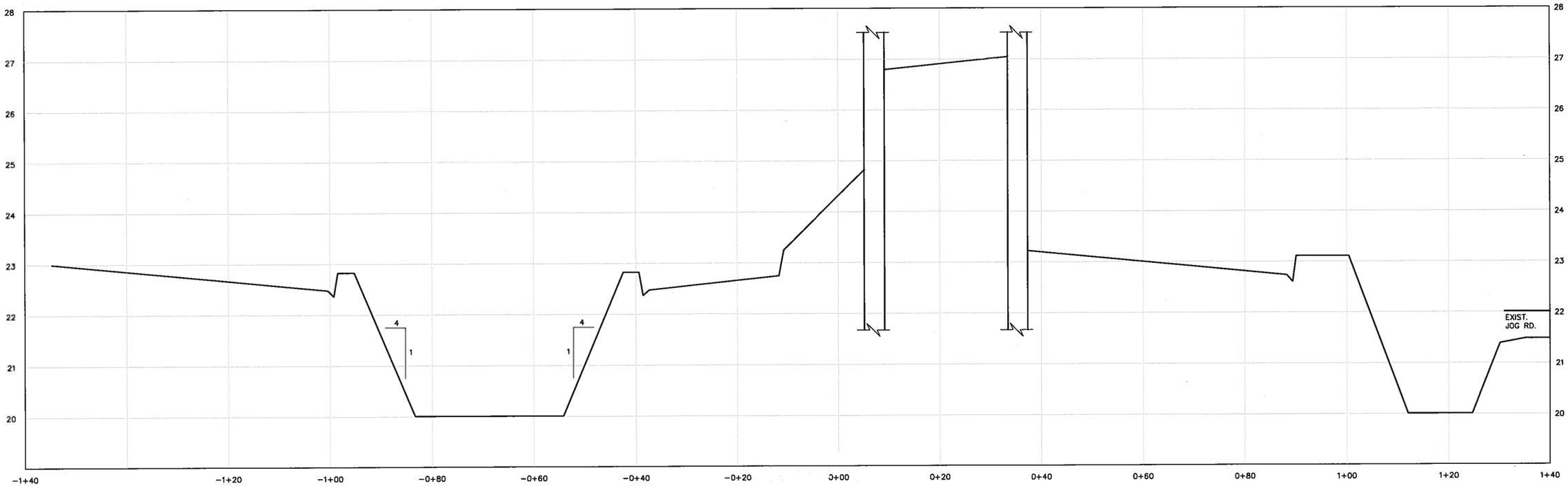


SECTION A (11 | 15)

SCALE: 1" = 10'

10 0 5 10

SCALE: 1" = 10'



SECTION B (10 | 15)

SCALE: 1" = 10'

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION
		PERMIT DRAWINGS NOT FOR CONSTRUCTION			

MALCOLM PIRNIE

PREPARED BY : CHRISTOPHER C. TILMAN FLORIDA P.E. NO. 61903 7-9-10

SOLID WASTE AUTHORITY OF PALM BEACH COUNTY

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

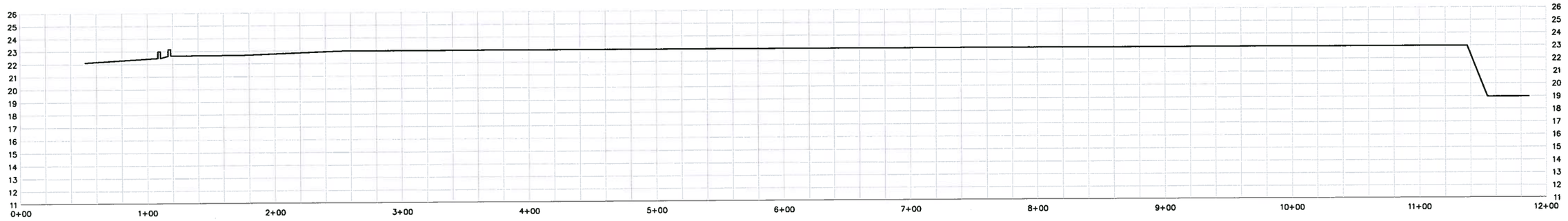
PALM BEACH RENEWABLE ENERGY FACILITY NO. 2

CROSS SECTIONS I

SHEET NO. 15

JULY 2010

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SECTION (C 10 | 16)

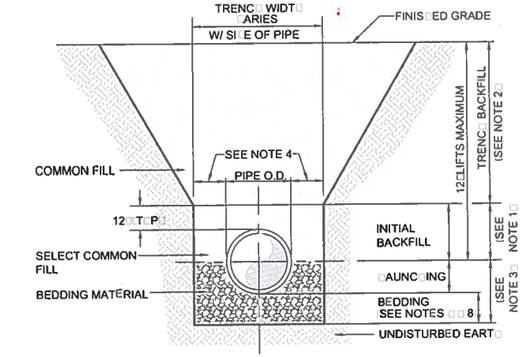
SCALE: 1" = 40'

20 0 20 40

SCALE: 1" = 40'

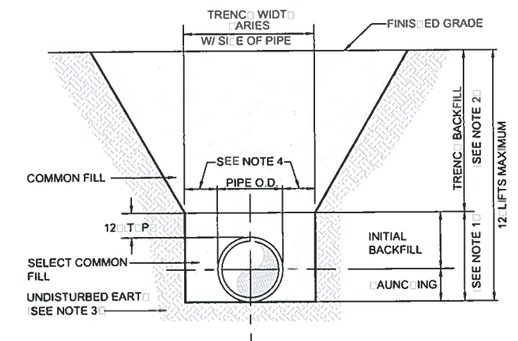
REVISIONS						MALCOLM PIRNIE	PREPARED BY : CHRISTOPHER C. TILMAN FLORIDA P.E. NO. 61803 7-9-10	SOLID WASTE AUTHORITY OF PALM BEACH COUNTY			PALM BEACH RENEWABLE ENERGY FACILITY NO. 2	SHEET NO.
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION			ROAD NO.	COUNTY	FINANCIAL PROJECT ID	CROSS SECTIONS II	16
		PERMIT DRAWINGS NOT FOR CONSTRUCTION										JULY 2010

User:BENSON Spec:PIRNIE STANDARD File:K:\ACAD\PROJ\3582056\DESIGN\3582056_CROSS SECTIONS II.DWG Scale:1:1 Date:06/22/2010 time:14:11 Layout:Layout1
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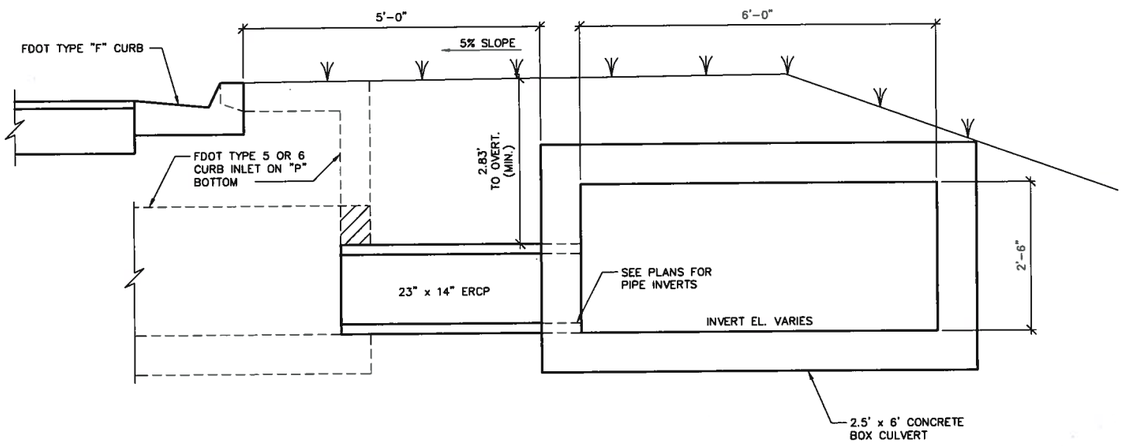
NOTES:
1. INITIAL BACKFILL: SELECT COMMON FILL COMPACTED TO 95□ OF T□E MAXIMUM DENSIT□ AS PER AAS□TO T-180.
2. TRENC□ BACKFILL: COMMON FILL COMPACTED TO 95□ OF T□E MAXIMUM DENSIT□ AS PER AAS□TO T-180.
3. T□PE A BEDDING MATERIAL S□ALL CONFORM TO FDOT NO. 5□AGGREGATE.
4. 15□MAX. (12□MIN.□FOR PIPE DIAMETER LESS T□AN 24□ AND 24□MAX (12□MIN□FOR PIPE DIAMETER 24□AND LARGER.
5. WATER S□ALL NOT BE PERMITTED IN T□E TRENC□ DURING CONSTRUCTION.
6. ALL PIPE TO BE INSTALLED WIT□ BELL FACING UPSTREAM TO T□E DIRECTION OF T□E FLOW.
7. BEDDING DEPT□ S□ALL BE 4□MINIMUM FOR PIPE DIAMETER UP TO 12□AND 6□MINIMUM FOR PIPE DIAMETER 16□AND LARGER.
8. DEPT□ FOR REMO□AL OF UNSUITABLE MATERIAL S□ALL GO□ERN DEPT□ OF BEDDING ROCK BELOW T□E PIPE. UTILITIES S□ALL DETERMINE IN T□E FIELD RE□UIRED REMO□AL OF UNSUITABLE MATERIAL TO REAC□ SUITABLE FOUNDATION.
9. FINAL RESTORATION IN IMPRO□ED AREAS S□ALL BE IN COMPLIANCE WIT□ ALL APPLICABLE REGULATIONS OF GO□ERNING AGENCIES. SURFACE RESTORATION WIT□IN PALM BEAC□ COUNT□ RIG□T-OF-WA□ S□ALL COMPL□ WIT□ RE□UIREMENTS OF R/W UTILI□ATION REGULATIONS AND ROAD CONSTRUCTION SPECIFICATIONS.

BEDDING AND TRENCHING – TYPE A

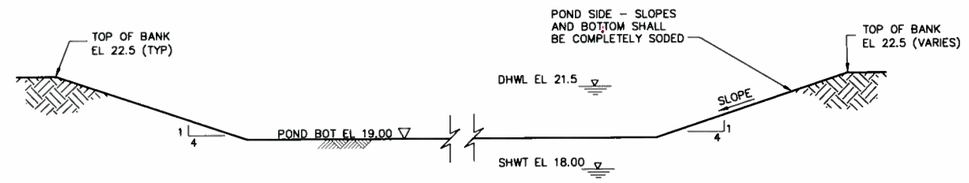


NOTES:
1. INITIAL BACKFILL AND □AUNC□ING: SELECT COMMON FILL COMPACTED TO 95□ OF T□E MAXIMUM DENSIT□ AS PER AAS□TO T-180.
2. TRENC□ BACKFILL: COMMON FILL COMPACTED TO 95□ OF T□E MAXIMUM DENSIT□ AS PER AAS□TO T-180.
3. PIPE BEDDING UTILI□ING SELECT COMMON FILL OR BEDDING ROCK IN ACCORDANCE WIT□ T□PE A BEDDING AND TRENC□ING DETAIL MA□ BE RE□UIRED AS DIRECTED B□ UTILITIES.
4. 15□MAX. (12□MIN.□FOR PIPE DIAMETER LESS T□AN 24□ AND 24□MAX (12□MIN□FOR PIPE DIAMETER 24□AND LARGER.
5. WATER S□ALL NOT BE PERMITTED IN T□E TRENC□ DURING CONSTRUCTION.
6. ALL PIPE TO BE INSTALLED WIT□ BELL FACING UPSTREAM TO T□E DIRECTION OF T□E FLOW.
7. FINAL RESTORATION IN IMPRO□ED AREAS S□ALL BE IN COMPLIANCE WIT□ ALL APPLICABLE REGULATIONS OF GO□ERNING AGENCIES. SURFACE RESTORATION WIT□IN PALM BEAC□ COUNT□ RIG□T-OF-WA□ S□ALL COMPL□ WIT□ RE□UIREMENTS OF RIG□T-OF-WA□ UTILI□ATION REGULATIONS AND ROAD CONSTRUCTION SPECIFICATIONS.

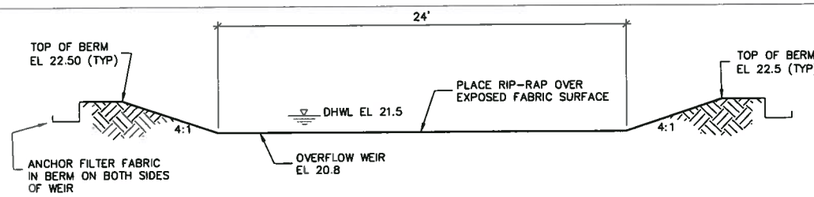
BEDDING AND TRENCHING – TYPE B



TYPICAL SECTION
FDOT TYPE 5 OR 6 CURB INLET @ BOX CULVERT

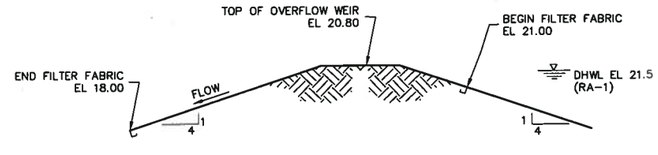


T□PICAL DR□ RETENTION AREA SECTION □NTS□

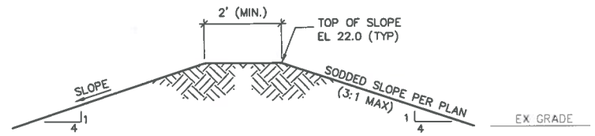


DR□ RETENTION AREA O□ERFLOW DETAIL□FRONT □IEW □NTS□

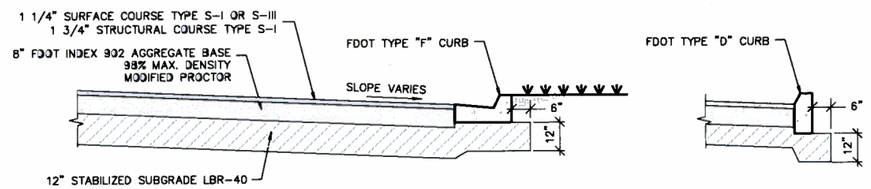
(SEE SHEET 23 FOR OVERFLOW WEIR BAFFLE DETAIL)



DR□ RETENTION AREA O□ERFLOW□SIDE □IEW □NTS□



T□PICAL BERM SECTION □NTS□



T□PICAL ASP□ALTIC PA□EMENT SECTION □NTS□ AT FDOT T□PE □D□CURB

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION
		PERMIT DRAWINGS NOT FOR CONSTRUCTION			

MALCOLM PIRNIE

PREPARED BY:
7-9-10
CHRISTOPHER C. TILMAN
FLORIDA P.E. NO. 81903

SOLID WASTE AUTHORITY OF PALM BEACH COUNTY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID

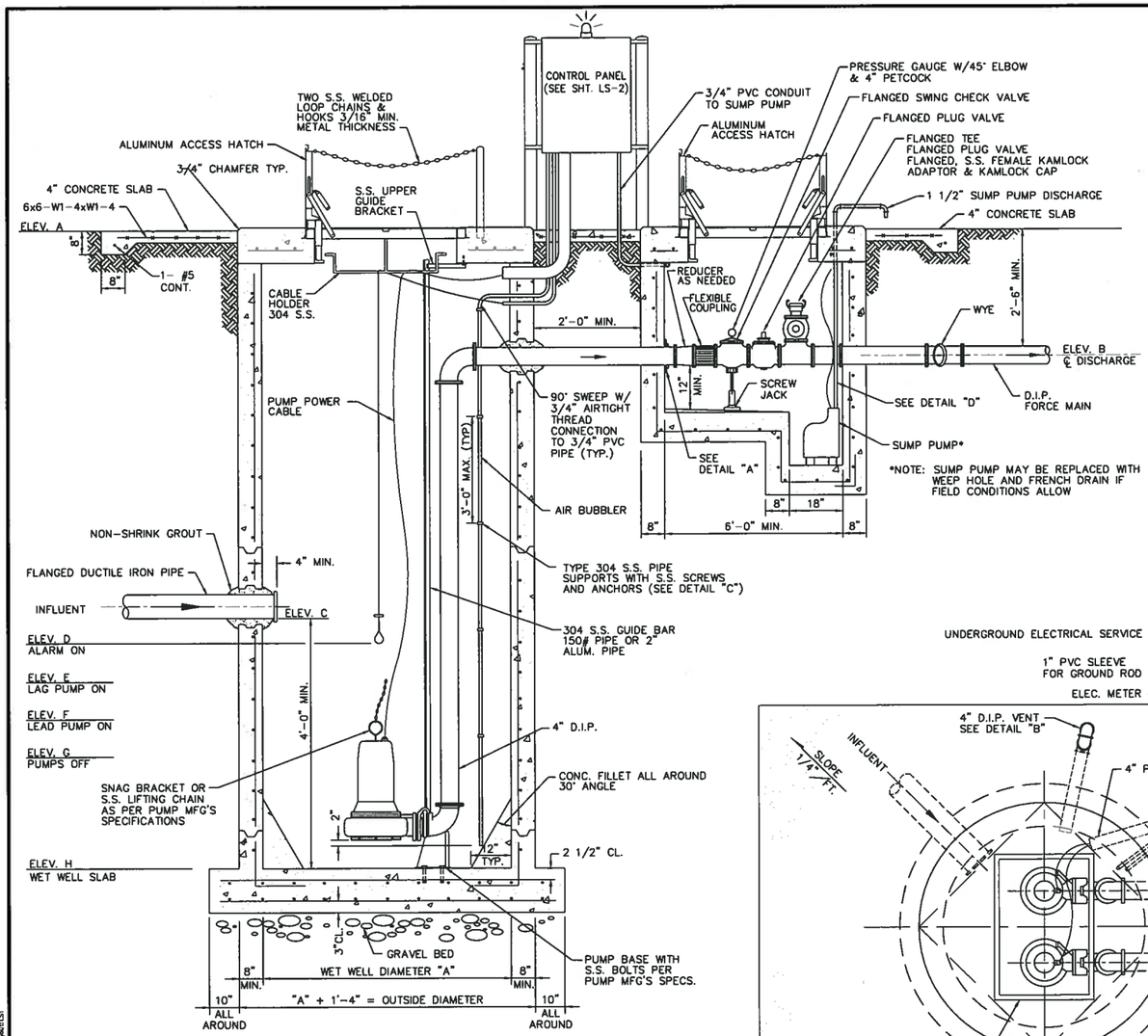
PALM BEACH RENEWABLE ENERGY FACILITY NO. 2

TYPICAL SECTIONS I

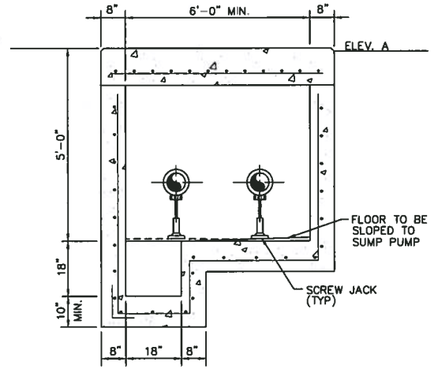
SHEET NO. 17

JULY 2010

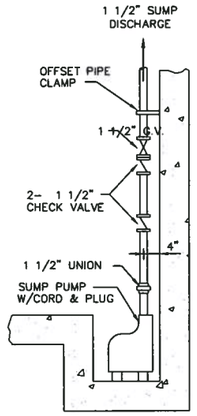
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LIFT STATION ELEVATION

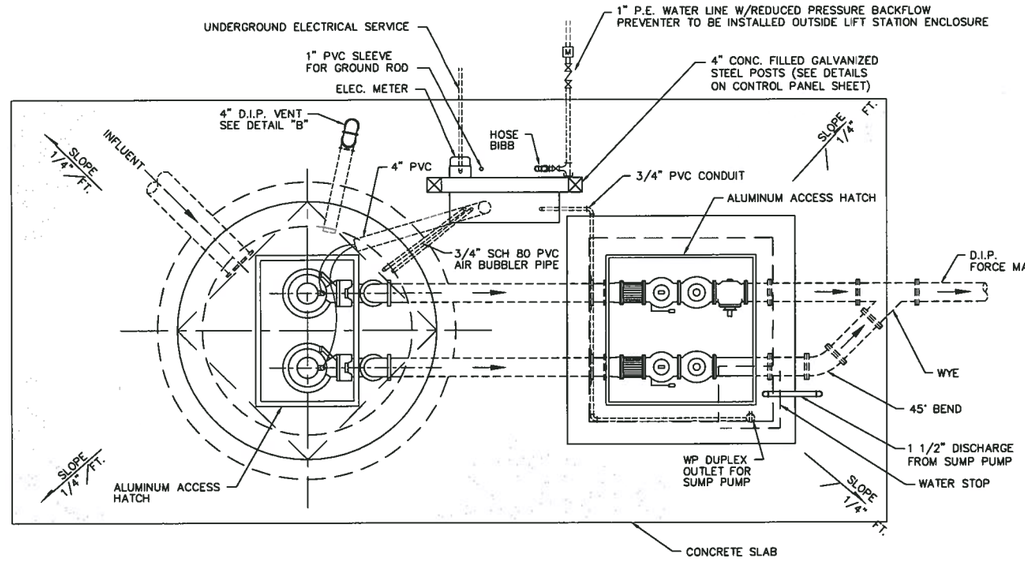


VALVE PIT SECTION

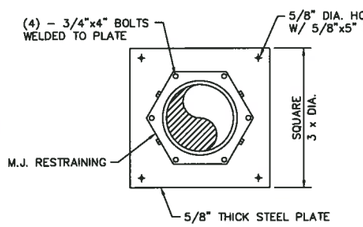


DETAIL "D"

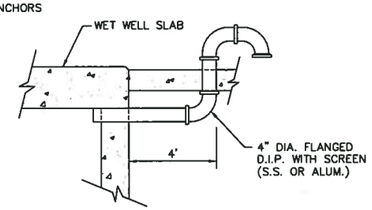
PUMPING STATION DATA TABLE			
ONE PUMP	PUMP CAPACITY	G.P.M.	
	T.D.H	FEET	
TWO PUMPS	PUMP CAPACITY	G.P.M.	
	T.D.H.	FEET	
INFLUENT PEAK FLOW		G.P.M.	
PUMP CYCLE TIME		MINUTES	
WET WELL DIAMETER "A"		FEET	
PUMP MODEL		–	
IMPELLER		–	
B.H.P.		–	
PUMP EFFICIENCY		–	
DISCHARGE PIPE DIAMETER		INCHES	
FORCE MAIN DIAMETER		INCHES	
FINISH GRADE		ELEV. A	
℄ DISCHARGE PIPE		ELEV. B	
INFLUENT PIPE		ELEV. C	
ALARM SIGNAL		ELEV. D	
LAG PUMP ON		ELEV. E	
LEAD PUMP ON		ELEV. F	
PUMPS OFF		ELEV. G	
WET WELL SLAB		ELEV. H	
ELECTRICAL SERVICE		AMP. MIN.	
R.P.M.		–	



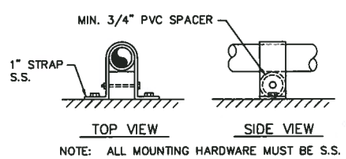
LIFT STATION PLAN



DETAIL "A"



DETAIL "B"



NOTE: ALL MOUNTING HARDWARE MUST BE S.S.

DETAIL "C"

1. MASTER GENERAL NOTES

1.1 ALL CONSTRUCTION AND MATERIALS SHALL COMPLY WITH THE CITY OF WEST PALM BEACH UTILITIES DEPARTMENT MINIMUM SPECIFICATIONS AND ALL APPLICABLE LOCAL AND NATIONAL CODES.

2. CALCULATIONS

2.1 CALCULATIONS SHOWNG INFLUENT FLOW RATE, WET WELL STORAGE CAPACITY, PUMP STATIC AND DYNAMIC HEAD CONDITIONS AND NPSH SHALL BE SUBMITTED.

2.2 LIFT STATION AND CONCRETE STRUCTURES SHALL BE DESIGNED BY A STRUCTURAL ENGINEER, REGISTERED IN THE STATE OF FLORIDA.

3. CONCRETE

3.1 ALL CONCRETE WORK SHALL BE IN ACCORDANCE WITH THE LATEST SOUTH FLORIDA BUILDING CODE, BROWARD COUNTY EDITION, AND ACI 318.

3.2 CONCRETE SHALL BE CLASS A, 4000 PSI AT 28 DAYS.

3.3 REINFORCEMENT STEEL SHALL BE DEFORMED, NEW BILLET STEEL, ASTM A-615 – GRADE 60.

3.4 PIPES, INSERTS AND OTHER METAL OBJECTS SHOWN SHALL BE BUILT INTO, SET IN OR ATTACHED TO THE CONCRETE. ALL HOLES REQUIRED SHALL BE CAST AT THE TIME OF MANUFACTURE.

3.5 PRECAST UNITS SHALL CONFORM TO THE REQUIREMENTS OF ASTM C-478.

3.6 THE BOTTOM SLAB SHALL BE CAST MONOLITHICALLY WITH THE LOWER WALL SECTION.

3.7 EXPOSED EDGES OF SLAB SHALL HAVE A 3/4" CHAMFER.

3.8 PAINT INSIDE AND OUTSIDE OF LIFT STATION AND ALL UNDERGROUND CONCRETE STRUCTURES WITH 2 COATS OF QUANTUM POLYMORPHIC RESIN OR APPROVED EQUAL.

4. METALS AND HARDWARE

4.1 ALUMINUM ACCESS HATCHES TO BE MANUFACTURED BY BILCO OR APPROVED EQUAL, WITH ALL STAINLESS STEEL HARDWARE, INCLUDING AUTOMATIC HOLD OPEN ARMS, HORIZONTAL COMPRESSION SPRINGS, WATERTIGHT SLAM-LOCK AND RECESSED PADLOCK. SAFETY CHAINS AND HINGES TO BE ATTACHED USING TAMPER PROOF CARRIAGE BOLTS WITH WELDED NUTS.

4.2 ALL FASTENERS, BRACKETS AND OTHER HARDWARE SHALL BE 304 STAINLESS STEEL.

4.3 THE ACESS COVERS SHALL HAVE SLOT OPENINGS TO ALLOW WATER.

5. PUMPS AND MOTORS

5.1 SUBMERSIBLE PUMPS AND CONTROLS TO BE DAVIS/EMU, FLYGT OR APPROVED EQUAL.

5.2 PUMPS SHALL BE DESIGNED SUCH THAT THEY CAN PASS A MINIMUM 3" SPHERE.

5.3 EACH PUMP DISCHARGE PIPING SHALL INCLUDE A PRESSURE GAUGE ASSEMBLY.

5.4 PUMP BASE – PERMANENT ANCHORING PER MANUFACTURER'S SPECIFICATIONS, ALIGNMENT OF PUMPS RELATIVE TO OPENING AS PER MANUFACTURER'S SPECIFICATIONS.

6. PIPING AND VALVES

6.1 FORCE MAIN TO BE D.I.P., CLASS 52 UP TO 6" DIAMETER.

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION
		PERMIT DRAWINGS NOT FOR CONSTRUCTION			

MALCOLM PIRNIE

PREPARED BY : 7-9-10 CHRISTOPHER C. TILMAN FLORIDA P.E. NO 61903

SOLID WASTE AUTHORITY OF PALM BEACH COUNTY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID

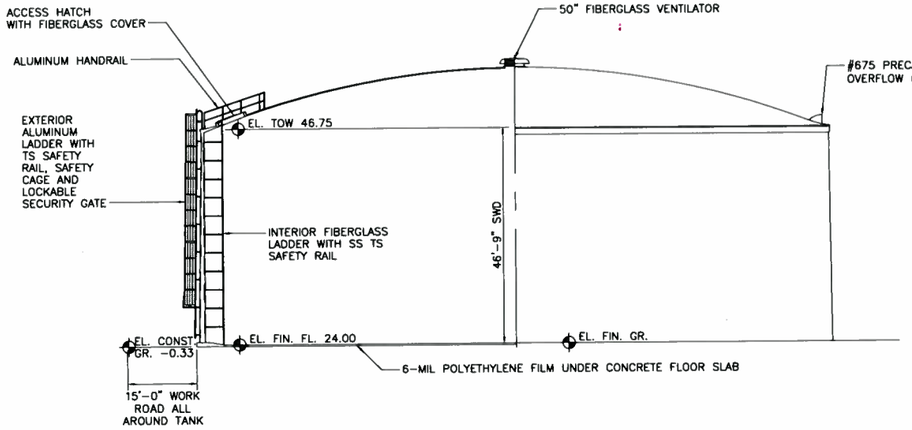
PALM BEACH RENEWABLE ENERGY FACILITY NO. 2

LIFT STATION DETAILS

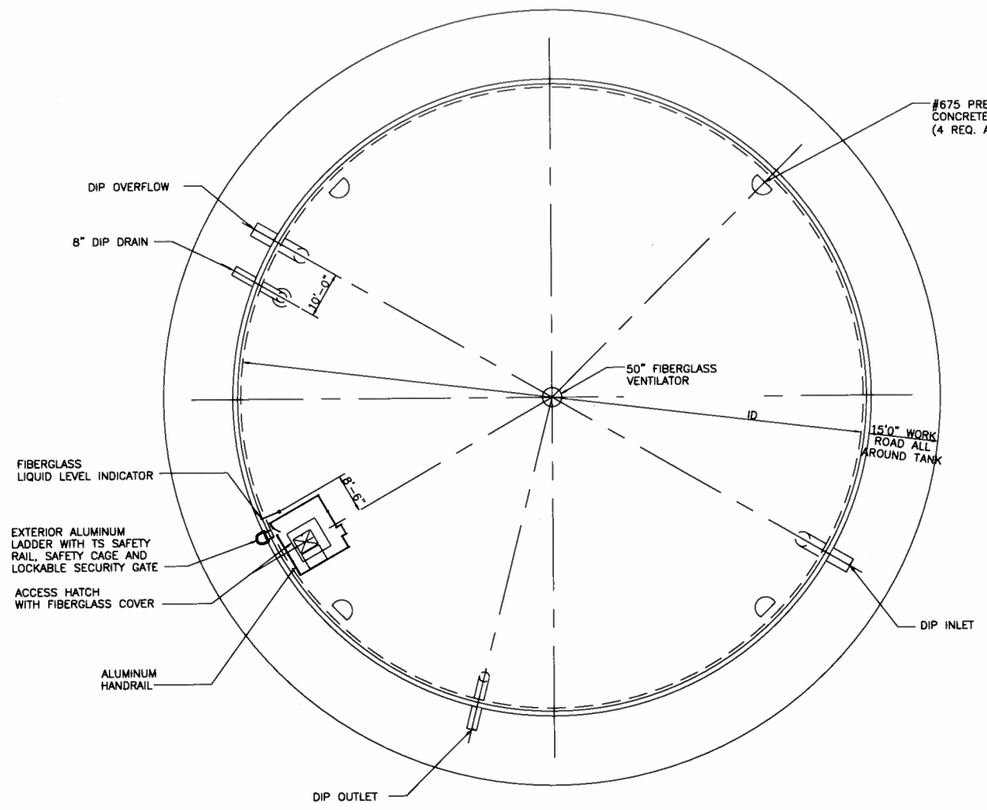
SHEET NO. 18

JULY 2010

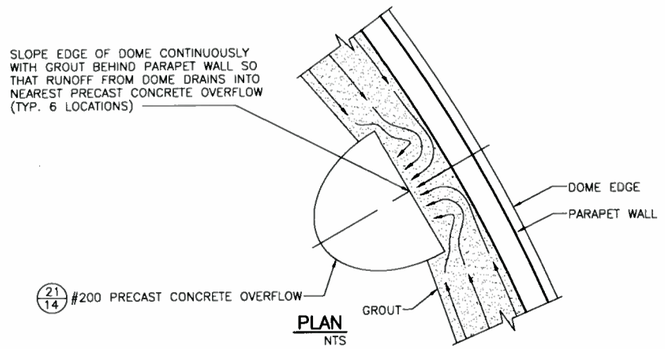
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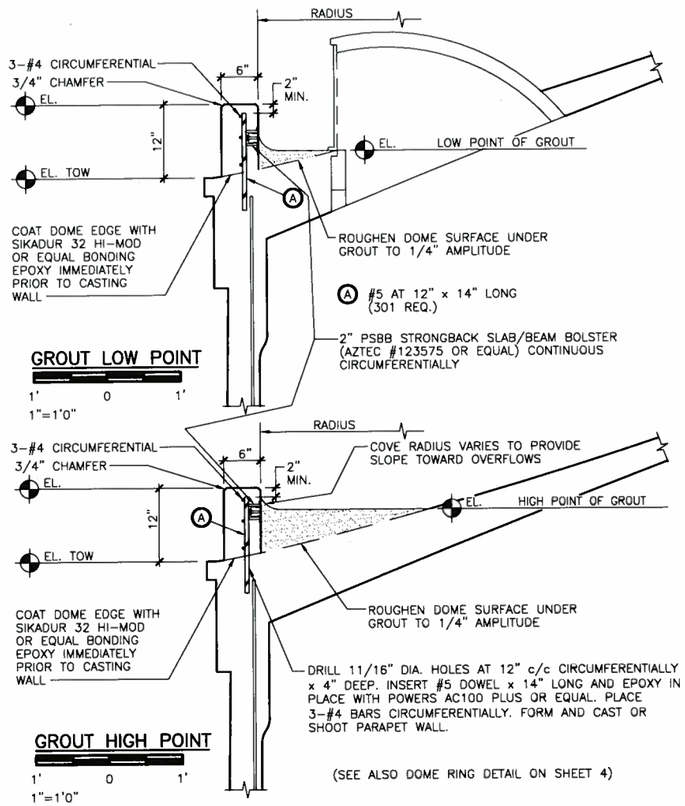
TANK SECTION



TANK PLAN

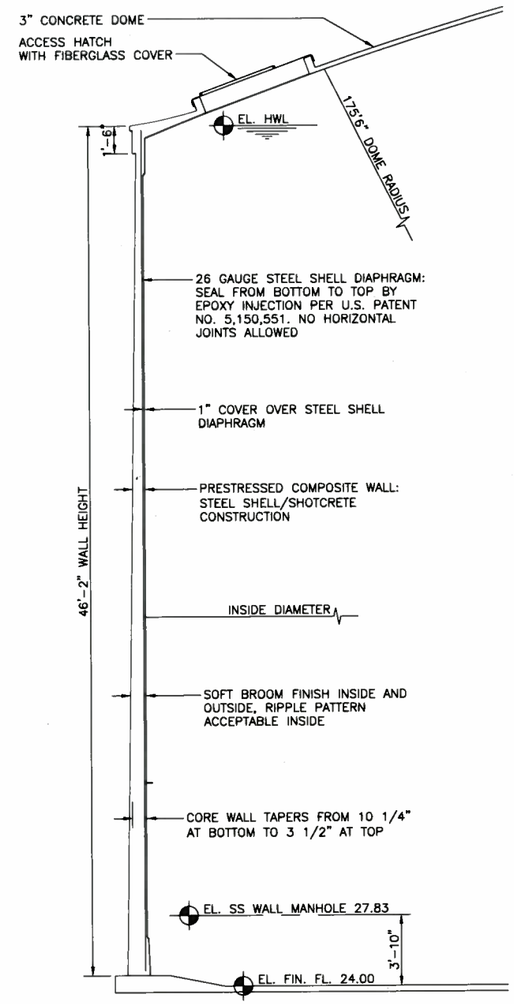


PLAN
NTS



PARAPET WALL

NOTES:
1. SHOTCRETE SHALL BE APPLIED BY OR UNDER DIRECT SUPERVISION OF NOZZLEMEN CERTIFIED BY THE AMERICAN CONCRETE INSTITUTE AS OUTLINED IN ACI CERTIFICATION PUBLICATION CP-50.
2. TENSION IN PRESTRESSING WIRE SHALL BE MEASURED BY AN ELECTRONIC DIRECT-READING STRESSOMETER ACCURATE TO WITHIN 2%.



TYPICAL WALL SECTION

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION
		PERMIT DRAWINGS NOT FOR CONSTRUCTION			

MALCOLM PIRNIE

PREPARED BY: 2-9-10
CHRISTOPHER C. TILMAN FLORIDA P.E. NO 61903

SOLID WASTE AUTHORITY OF PALM BEACH COUNTY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID

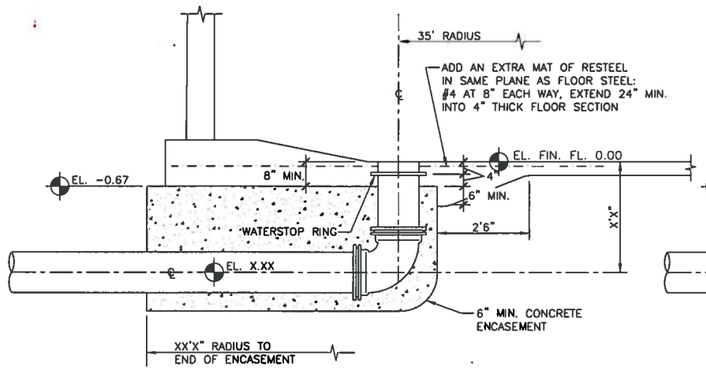
PALM BEACH RENEWABLE ENERGY FACILITY NO. 2

GROUND STORAGE TANK DETAILS I

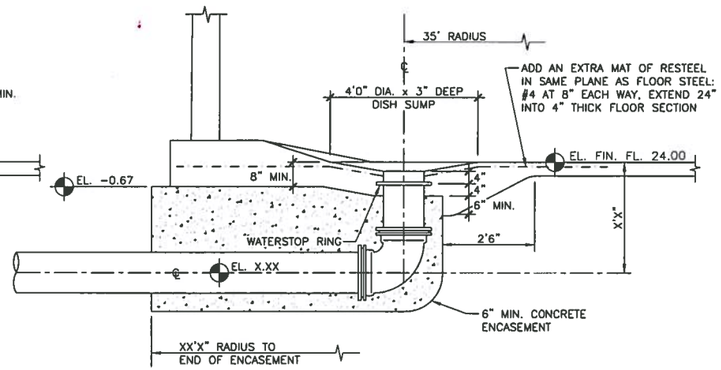
SHEET NO. 19

JULY 2010

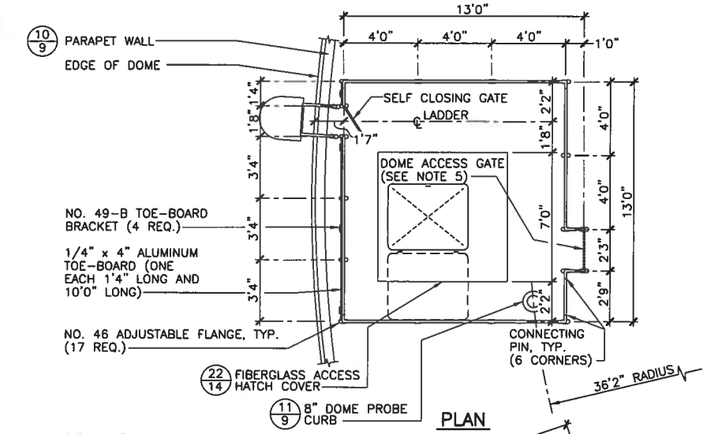
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TYP. DIP INLET AND DIP OUTLET



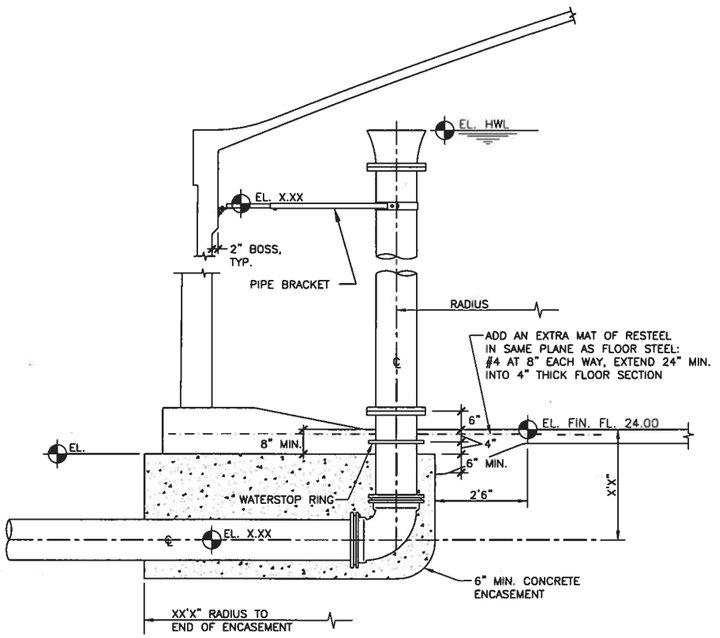
8" DIP DRAIN



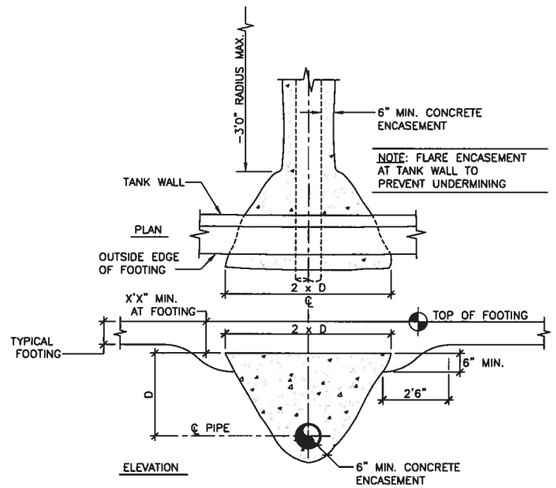
12 ALUMINUM HANDRAIL

1/4"=1'0"

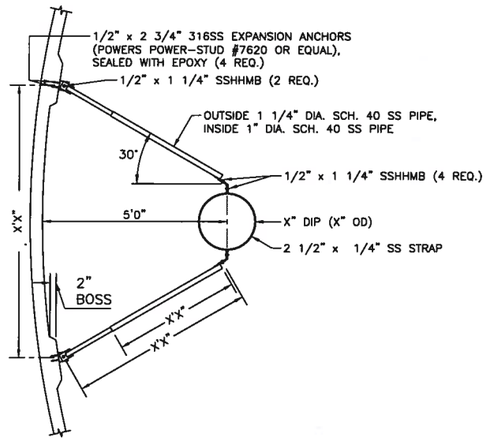
2' 0 2' 4'



DIP OVERFLOW



TYPICAL PIPE ENCASEMENT AT FOOTING



PIPE BRACKET

1/2"=1'0"

1' 0 1' 2'

REVISIONS						
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	
		PERMIT DRAWINGS NOT FOR CONSTRUCTION				

MALCOLM PIRNIE

PREPARED BY: CHRISTOPHER C. TILMAN FLORIDA P.E. NO. 61903 7-9-10

SOLID WASTE AUTHORITY OF PALM BEACH COUNTY

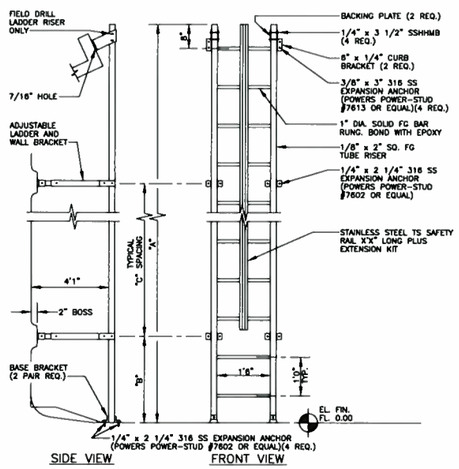
ROAD NO.	COUNTY	FINANCIAL PROJECT ID

PALM BEACH RENEWABLE ENERGY FACILITY NO. 2

GROUND STORAGE TANK DETAILS II

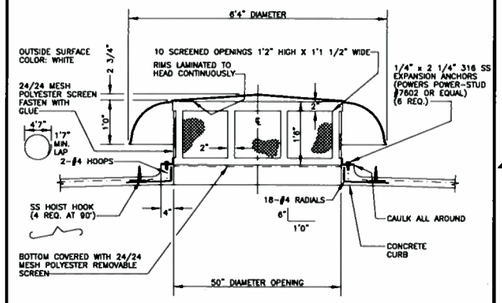
SHEET NO. 20

JULY 2010

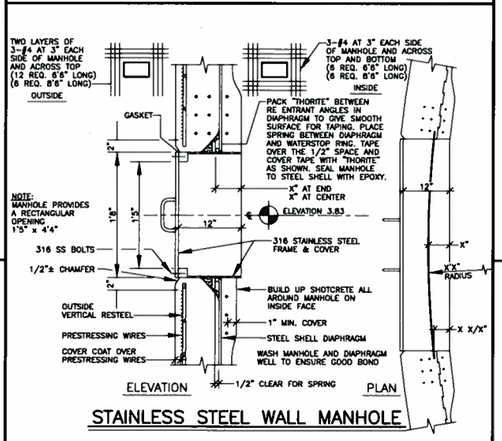


NOTE: 1/4" x 2" FLAT BAR FIBERGLASS CROSS BRACE TO BE PROVIDED FOR BRACING WALL BRACKET SUPPORTS ON EVERY BRACKET.

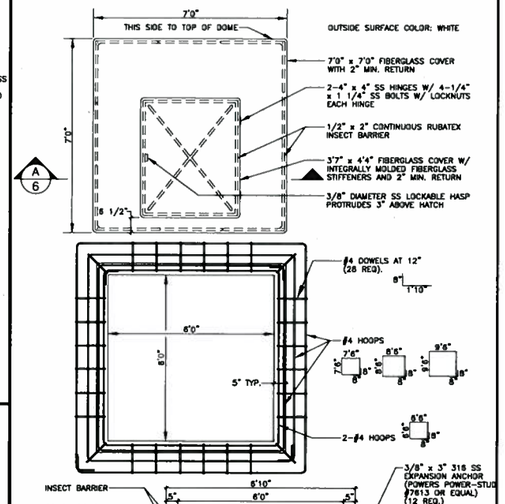
INTERIOR FIBERGLASS LADDER WITH SS TS SAFETY RAIL



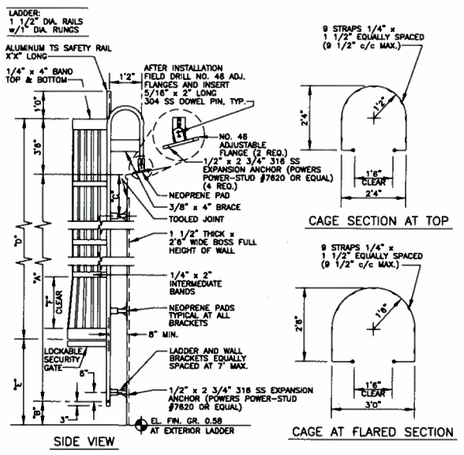
50" FIBERGLASS VENTILATOR



STAINLESS STEEL WALL MANHOLE

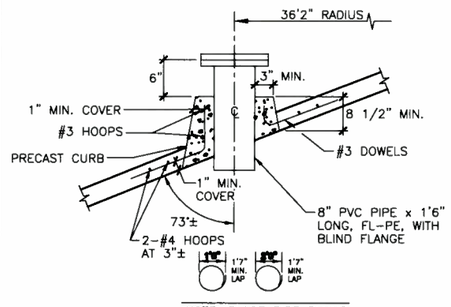


FIBERGLASS HATCH COVER



NOTES:
1. ALL TUBULAR MATERIAL TO BE NOMINAL DIAMETER SCHEDULE 40 ALUMINUM PIPE 6061-T6 OR 6063-T6
2. PLATES AND GUSSETS TO BE STRUCTURAL GRADE ALUMINUM 6061-T6.

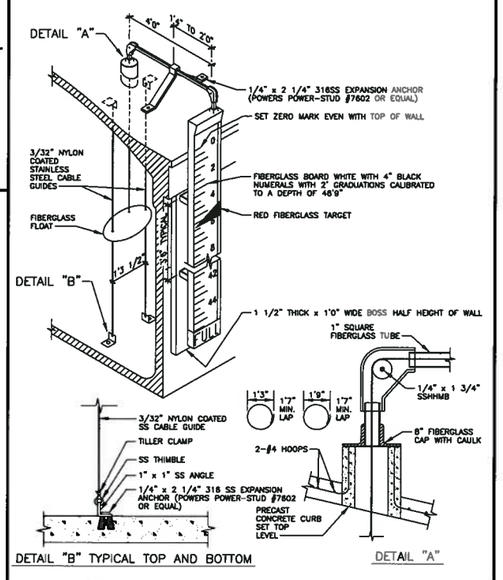
EXTERIOR ALUMINUM LADDER WITH TS SAFETY RAIL, SAFETY CAGE AND LOCKABLE SECURITY GATE



NOTE: PLACE PIPE PLUMB

8" DOME PROBE CURB

NTS



FIBERGLASS LIQUID LEVEL INDICATOR

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION
		PERMIT DRAWINGS NOT FOR CONSTRUCTION			

MALCOLM PIRNIE

PREPARED BY
7-9-10
CHRISTOPHER C. TILMAN
FLORIDA P.E. NO. 61903

SOLID WASTE AUTHORITY OF PALM BEACH COUNTY

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

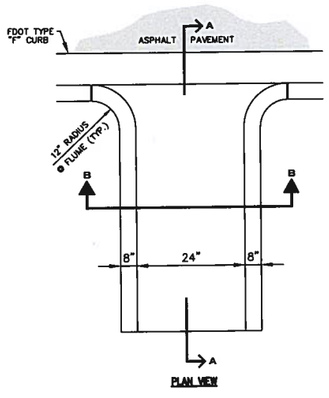
PALM BEACH RENEWABLE ENERGY FACILITY NO. 2

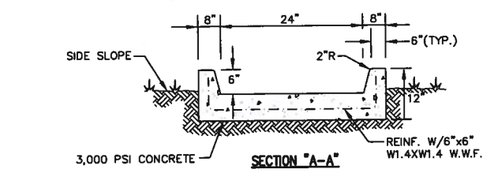
GROUND STORAGE TANK DETAILS III

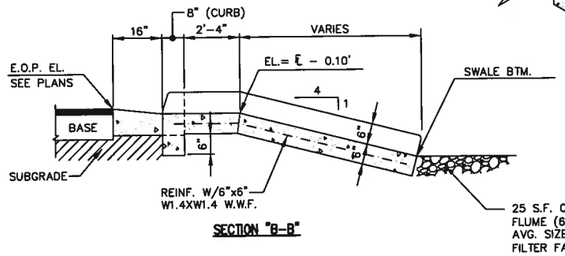
SHEET NO. 21

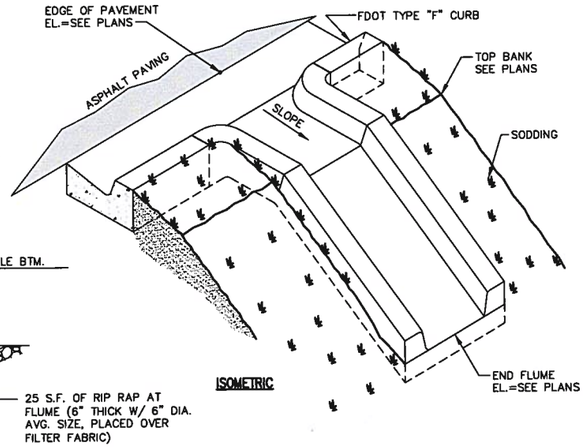
JULY 2010

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CONCRETE FLUME DETAIL

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION
		PERMIT DRAWINGS NOT FOR CONSTRUCTION			

MALCOLM PIRNIE

PREPARED BY : 7-9-10
CHRISTOPHER C. TILMAN FLORIDA P.E. NO. 61903

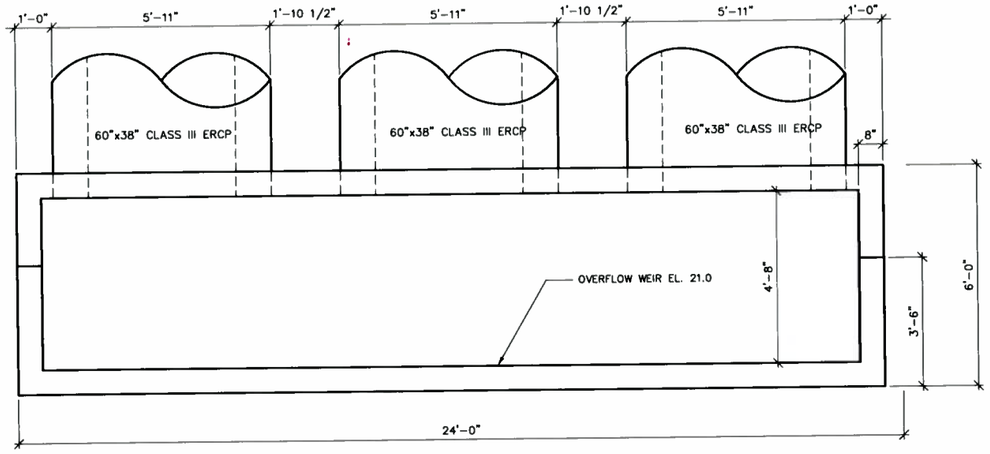
SOLID WASTE AUTHORITY OF PALM BEACH COUNTY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID

PALM BEACH RENEWABLE ENERGY FACILITY NO. 2

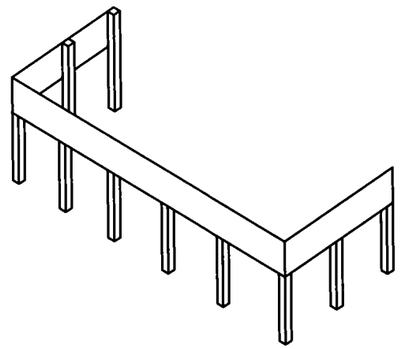
MISCELLANEOUS DETAILS

SHEET NO. 22

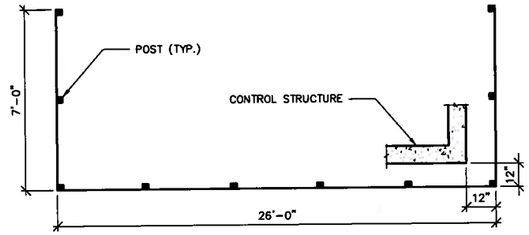
JULY 2010



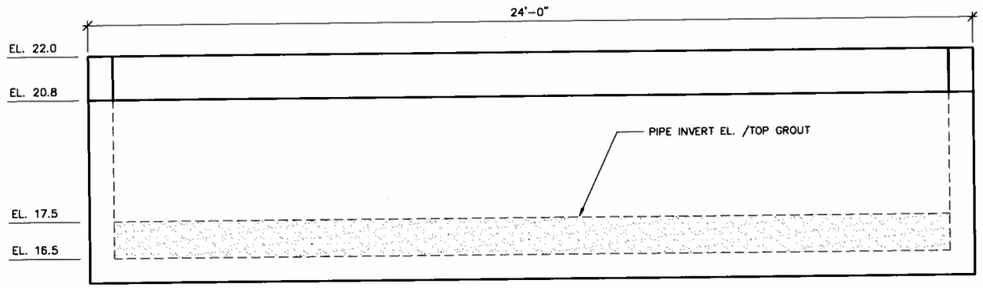
TOP VIEW
SCALE: 1/2" = 1'-0"



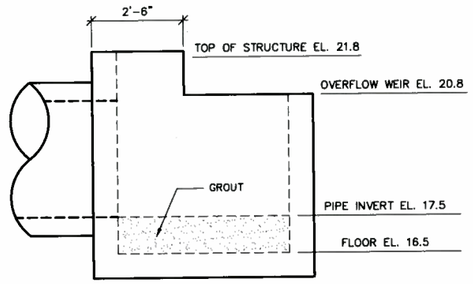
ISO VIEW
NO SCALE



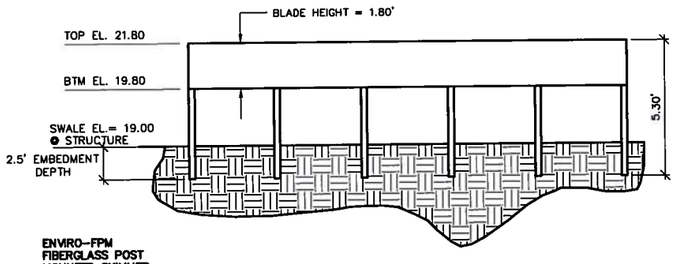
TOP VIEW
NO SCALE



FRONT VIEW
SCALE: 1/2" = 1'-0"



RIGHT SIDE VIEW
SCALE: 1/2" = 1'-0"



ENVIRO-FPM
FIBERGLASS POST
MOUNTED SKIMMER

DECRIPTION:
7' x 26' x 7' x 1/4" THK.

STRUCTURAL POST:
FIBREPOST – 3" SQ. x 1/4" WALL x 5.30'

MATERIAL:
1/4" THK. ENVIRO GLASKIMER STRUCTURAL FRP AS SUPPLIED BY ENVIRONMENTAL COMPOSITES INC. TAVARES, FL 32788. PH. 352-343-3449.

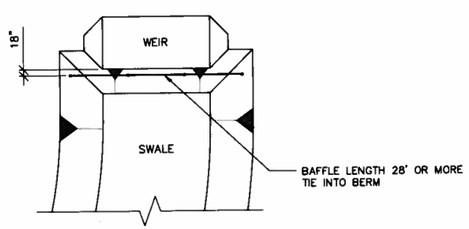
COLOR:
DISAPPEARING GREEN

INSTALLATION HARDWARE:
5/16" – 18 SS HEX HEAD BOLTS W/ NYLOCK NUTS.

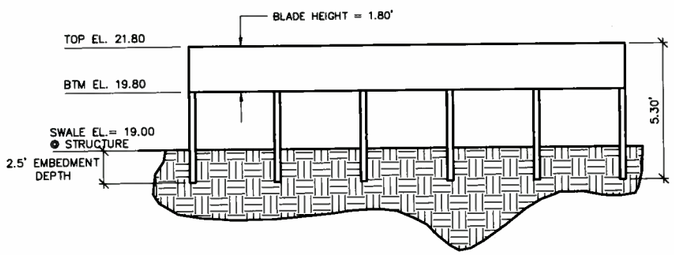
FRONT VIEW
NO SCALE

CONTROL STRUCTURE DETAIL

FREE STANDING POST MOUNT SKIMMER



DRY RETENTION AREA OVERFLOW WEIR BAFFLE TOP VIEW



FRONT VIEW
NO SCALE

OVERFLOW WEIR

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION
		PERMIT DRAWINGS NOT FOR CONSTRUCTION			

MALCOLM PIRNIE

PREPARED BY:
7-9-10
CHRISTOPHER C. TILMAN
FLORIDA P.E. NO. 61903

SOLID WASTE AUTHORITY OF PALM BEACH COUNTY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID

PALM BEACH RENEWABLE ENERGY FACILITY NO. 2

CONTROL STRUCTURE DETAILS

SHEET NO. 23

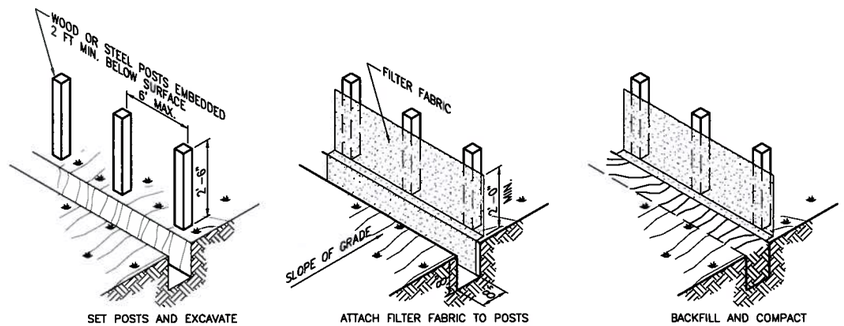
JULY 2010

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User:CADD Spec:ACAD File:K:\ACAD\YR0\1582056\DESIGN\1582056_CONTROL STRUCTURE DETAILS.DWG Scale:1:1 Date:06/16/2010 Time:08:28 Layout:Sht 20

EROSION CONTROL NOTES

1. ALL CONSTRUCTION ACTIVITIES SHALL INCORPORATE BEST MANAGEMENT PRACTICES TO CONTROL EROSION, SEDIMENTATION, AND THE POTENTIAL FOR DOWNSTREAM WATER QUALITY DEGRADATION. CONSTRUCTION PRACTICES INCLUDE:
   A. CONSTRUCT TEMPORARY SEDIMENTATION BASINS OR EARTHEN BERMS AT DOWNGRADIENT ENDS OF NEWLY GRADED AREAS TO PROVIDE FOR SEDIMENT AND TURBIDITY REMOVAL.
   B. LIMIT SITE CLEARING TO THOSE AREAS REQUIRED FOR A PARTICULAR PHASE OF CONSTRUCTION. EXISTING TREES AND VEGETATION TO REMAIN WHEREVER POSSIBLE.
   C. TURBIDITY BARRIERS, HAY BALES AND OTHER EROSION CONTROL MEASURERS SHALL REMAIN IN PLACE UNTIL CONSTRUCTION ACTIVITIES ARE COMPLETE AND THE POTENTIAL FOR EROSION IS ELIMINATED.
2. SOLID SOD DITCH AND SWALE BANKS AS SOON AS POSSIBLE AFTER CONSTRUCTION IN ORDER TO STABILIZE THE SLOPES AND MINIMIZE EROSION. IN AREAS DELINEATED AS "WETLANDS," REVEGETATE IN ACCORDANCE WITH PERMIT CONDITIONS.
3. DO NOT EMPLOY SILT FENCES IN A MANNER TO CAUSE THEM TO ACT AS A DAM ACROSS PERMANENTLY FLOWING WATERCOURSES. USE SILT FENCES AT UPLAND LOCATIONS, AND TURBIDITY BARRIERS IN PERMANENT WATER BODIES, REGARDLESS OF WATER DEPTH.
4. TURBIDITY BARRIERS FOR WATER BODIES MAY BE EITHER FLOATING OR STAKED TYPE, OR ANY COMBINATION OF TYPES THAT WILL SUIT SITE CONDITIONS, AND MEET EROSION CONTROL AND WATER QUALITY REQUIREMENTS. INSTALL POSTS IN STAKED TURBIDITY BARRIERS IN THE VERTICAL POSITION UNLESS OTHERWISE NOTED.
5. TURBIDITY IN ALL WATER BODIES TO BE CONTROLLED TO PREVENT VIOLATION OF WATER QUALITY PURSUANT TO RULE 62-302.510(5)(r), FLORIDA ADMINISTRATIVE CODE. TURBIDITY SHALL NOT EXCEED 29 NEPHELOMETRIC TURBIDITY UNITS ABOVE NATURAL BACKGROUND CONDITIONS.
6. FOR EROSION CONTROL DETAILS, REFER TO FLORIDA DEPARTMENT OF TRANSPORTATION (FDOT) "ROADWAY AND TRAFFIC DESIGN STANDARDS":
   A. TRASH RETAINER AND SEDIMENT BASIN -- INDEX NO. 101
   B. BAILED HAY OR STRAW BARRIERS AND SILT FENCES -- INDEX NO. 102 (ALSO SHOWN THIS SHEET).
   C. TURBIDITY BARRIERS -- INDEX NO. 103.

   ADDITIONALLY, COMPLY WITH FDOT "STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION," SECTION 104 – PREVENTION, CONTROL, AND ABATEMENT OF EROSION AND WATER POLLUTION.
7. MAINTENANCE
   A. INSPECT SILT BARRIERS IMMEDIATELY AFTER EACH RAINFALL AND AT LEAST ONCE A DAY DURING PERIODS OF PROLONGED RAINFALL. MAKE NEEDED REPAIRS IMMEDIATELY.
   B. SHOULD THE FABRIC ON A SILT BARRIER DECOMPOSE OR BECOME INEFFECTIVE PRIOR TO THE END OF THE EXPECTED USABLE LIFE AND IF THE BARRIER IS STILL NEEDED, REPLACE THE FABRIC IMMEDIATELY.
   C. REMOVE SEDIMENT DEPOSITS AFTER EACH STORM EVENT.
   D. ANY SEDIMENT DEPOSITS IN PLACE AFTER THE SILT FENCE OR FILTER BARRIER IS NO LONGER REQUIRED SHALL BE DRESSED TO CONFORM TO THE EXISTING GRADE, AND PREPARED FOR SEEDING OR SODDING.
8. STORMWATER NOTES
   UNDER THE PROVISIONS OF THE CLEAN WATER ACT, AS AMENDED, FEDERAL LAW PROHIBITS DISCHARGES OF POLLUTANTS IN STORMWATER FROM CONSTRUCTION ACTIVITIES WITHOUT A NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM PERMIT (NPDES). THE CONTRACTOR SHALL COMPLETE AND SUBMIT AN FDEP NOI FORM 62-621.300(4)(b) TO THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY AT LEAST 48 HOURS PRIOR TO ANY CONSTRUCTION ACTIVITIES TO OBTAIN COVERAGE UNDER A CONSTRUCTION GENERAL PERMIT.
9. NO UNAUTHORIZED DISTURBANCE OF EXISTING WETLANDS WILL BE PERMITTED. TEMPORARILY INSTALL SILT FENCES, BARRIERS OR HAY BALES IMMEDIATELY ADJACENT TO AND UPLAND FROM ALL EXISTING WETLANDS PRIOR TO CONSTRUCTION ACTIVITIES WHICH MIGHT IMPACT THE WETLANDS. REMOVE ALL WETLAND PROTECTION MEASURES AFTER THE PROJECT HAS BEEN ACCEPTED BY THE OWNER. PERFORM THIS WORK AT NO EXPENSE TO THE OWNER AND COMPLY WITH FLORIDA DEPARTMENT OF TRANSPORTATION'S "ROADWAY AND TRAFFIC DESIGN STANDARDS", INDEX NO. 102, LATEST EDITION.



SET POSTS AND EXCAVATE A TRENCH.

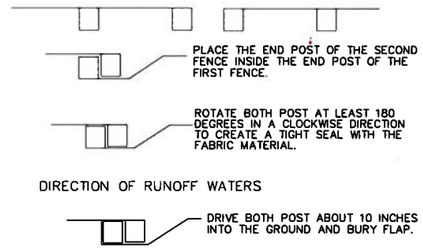
ATTACH FILTER FABRIC TO POSTS ALLOWING 1 FT EXTENSION INTO THE TRENCH AS SHOWN.

BACKFILL AND COMPACT EXCAVATED SOIL.

NOTE:

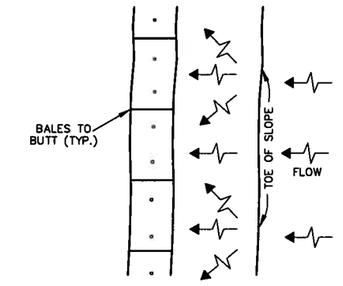
MATERIALS, CONSTRUCTION METHODS AND MAINTENANCE SHALL BE IN ACCORDANCE WITH THE FLORIDA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS & DESIGN STANDARDS, CURRENT EDITION.

SILT FENCE DETAIL

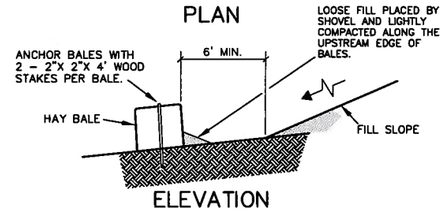


ATTACHING TWO SILT FENCES

NOTES:
1. INSPECT AND REPAIR FENCE AFTER EACH STORM EVENT AND REMOVE SEDIMENT WHEN NECESSARY.
2. REMOVED SEDIMENT SHALL BE DEPOSITED TO AN AREA THAT WILL NOT CONTRIBUTE SEDIMENT OFF-SITE AND CAN BE PERMANENTLY STABILIZED.
3. SILT FENCE SHALL BE PLACED ON SLOPE CONTOURS TO MAXIMIZE PONDING EFFICIENCY.



PLAN



ELEVATION

NOTE: TO BE USED AT SELECTED SITES WHERE THE NATURAL GROUND SLOPES AWAY FROM THE TOE OF SLOPE.

HAY BALE BARRIER DETAIL

(AT CONTRACTOR'S OPTION, HAY BALE BARRIERS MAY BE USED IN PLACE OF SILT FENCE.)

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION
		PERMIT DRAWINGS NOT FOR CONSTRUCTION			

MALCOLM PIRNIE

PREPARED BY: CHRISTOPHER C. TILMAN FLORIDA P.E. NO. 61903 7-9-10

SOLID WASTE AUTHORITY OF PALM BEACH COUNTY		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID

PALM BEACH RENEWABLE ENERGY FACILITY NO. 2

EROSION CONTROL DETAILS

SHEET NO. 24

JULY 2010

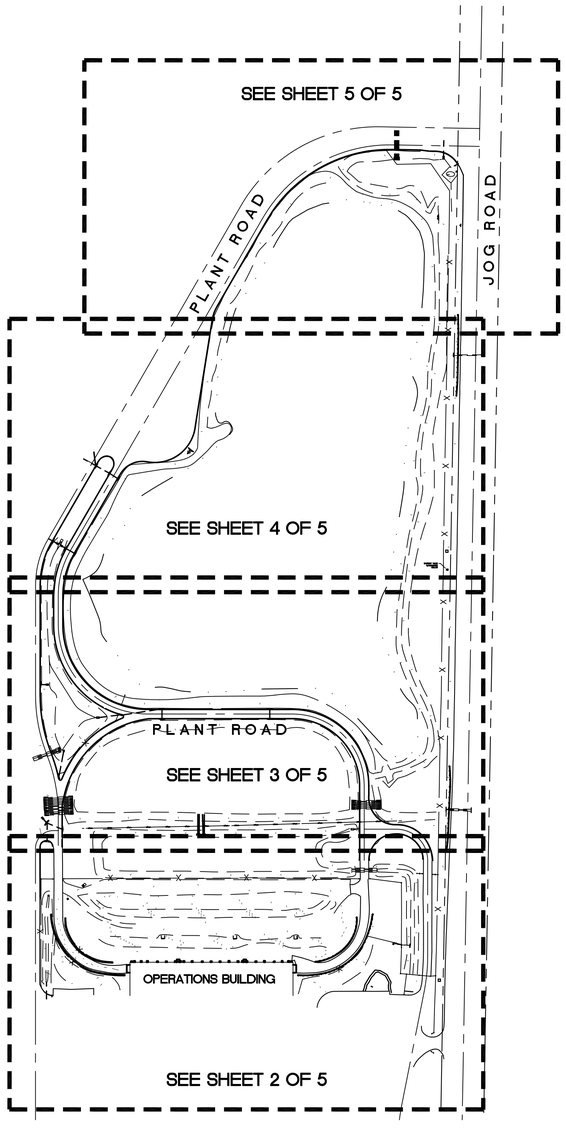
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User:CADD Sped:ACAD File:K:\ACAD\PROJ\1382056\DESIGN\1382056_EROSION CONTROL DETAILS.DWG Scale:1:1 Date:03/31/2010 Time:09:48 Layout:SHT 24

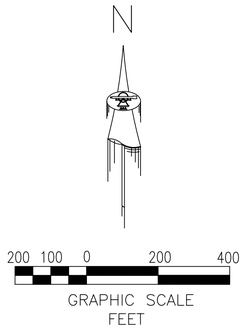
Solid Waste Authority of Palm Beach County
Palm Beach Renewable Energy Facility No. 2
Environmental Resource Permit

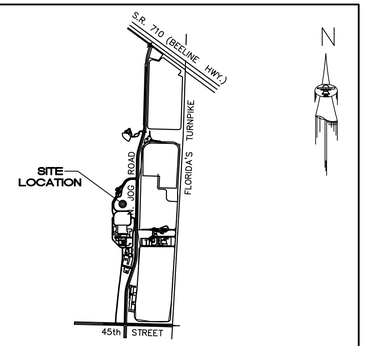
Attachment D

Boundary Survey and Topographical Map

SOLID WASTE AUTHORITY OF PALM BEACH COUNTY
NORTH COUNTY LANDFILL
TOPOGRAPHICAL SURVEY OF THE PROPOSED W.T.E. FACILITY FOR
MALCOLM PIRNIE INC.







LOCATION MAP
NOT TO SCALE

SWA
SOLID WASTE AUTHORITY

LEGEND

C.M.P.	= CORRUGATED METAL PIPE
R.C.P.	= REINFORCE CONCRETE PIPE
EL.	= ELEVATION
EXIST.	= EXISTING
CONC.	= CONCRETE
EP.	= EDGE OF PAVEMENT
FL.	= FLOW LINE
BOC.	= BACK OF CURB
BP	= BEGIN POINT OF BASELINE
PC	= POINT OF CURVATURE
PT	= POINT OF TANGENCY
T/P	= TOP OF PIPE
—x—	= FENCE LINE
	= CATCH BASIN
WV	= WATER VALVE
	= FIRE HYDRANT
	= DRAINAGE MANHOLE
	= SANITARY MANHOLE
	= SANITARY AIR RELEASE VALVE
	= SPRINKLER CONTROL VALVE
	= WATER SPRINKLER
	= SINGLE POST SIGN
	= SANITARY VALVE
	= LIGHT POLE
	= WATER METER
	= WIRE PULL BOX
	= TRAFFIC BOLLARD
x13.6	= SPOT ELEVATION

SURVEYOR'S REPORT
TOPOGRAPHICAL SURVEY FOR
S.W.A. NORTH COUNTY LANDFILL -
OPERATIONS AND MAINTENANCE BUILDING

REPORT OF TOPOGRAPHICAL SURVEY:
THE SURVEY SHOWN HEREON IS A TOPOGRAPHICAL SURVEY LIMITED TO THE TOPOGRAPHY AS SPECIFIED BY MALCOLM PIRNIE INC. AND SHOWN ON SURVEY, LOCATED IN SECTION 27, TOWNSHIP 42 SOUTH, RANGE 42 EAST, PALM BEACH COUNTY. THE SURVEY WAS PERFORMED ON MARCH 05, THROUGH MARCH 23, 2009 UNDER THE DIRECTION OF JOHN H. ADLER III, PROFESSIONAL SURVEYOR AND MAPPER (PSM). THIS REPORT AND SURVEY ARE VALID ONLY WHEN THE SIGNATURE AND RAISED EMBOSSED SEAL ARE FOUND AT THE END OF THIS REPORT.

ACCURACY:
THE FIELD SURVEY WAS PERFORMED IN ACCORDANCE WITH CHAPTER 61G17-6, FLORIDA ADMINISTRATIVE CODE PURSUANT TO SECTION 472.027 FLORIDA STATE STATUTES FOR TOPOGRAPHIC SURVEYS. HORIZONTAL CONTROL VALUES FOR G01 THROUGH G012 WERE OBTAINED BY MEASUREMENTS WITH REAL TIME KINEMATICS (RTK), GLOBAL POSITIONING SYSTEM (GPS) BASED ON HOLDING GPS 1001 AND GPS 1013. SOLID WASTE AUTHORITY CONTROL POINTS ELEVATIONS WERE ESTABLISHED BY RUNNING A CLOSED BENCH LOOP UTILIZING THE A FOREMENTIONED CONTROL POINTS. THE VERTICAL ACCURACY REQUIREMENT OF THE FLORIDA MINIMUM TECHNICAL STANDARDS (MTS) STATES THAT THE CLOSURE IN FEET MUST BE ACCURATE TO A STANDARD OF PLUS OR MINUS 0.05 FEET TIMES THE SQUARE ROOT OF THE DISTANCE IN MILES. ACCURACY OBTAINED BY MEASUREMENTS WITH A DIGITAL LEVEL WAS FOUND TO EXCEED THIS REQUIREMENT. HORIZONTAL VALUES ARE BASED ON SOLID WASTE AUTHORITY LOCAL NORTH AMERICAN DATUM 1927. VERTICAL VALUES ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM 1929 (NGVD29). UNITS SHOWN HEREON ARE IN U.S. SURVEY FEET.

DATA SOURCE:
SOLID WASTE AUTHORITY CONTROL POINT GPS 1001: A BRASS DISK IN CONCRETE STAMPED "MOCK-ROOS, LB 048, PT No. 1001". TO REACH THE CONTROL POINT FROM THE INTERSECTION OF 45TH STREET AND JOG ROAD, GO NORTH ON JOG ROAD FOR 1.3 MILES, AND CONTROL POINT IS APPROXIMATELY 10.7 FEET WEST OF THE NORTH END OF EAST GUARDRAIL. THE CONTROL POINT IS LOCATED 2.0 FEET WEST OF THE EAST EDGE OF PAVEMENT.
COORDINATES: NORTHING = 889740.681, EASTING = 780630.611, LOCAL SOLID WASTE AUTHORITY COORDINATE SYSTEM NGVD29, ELEVATION = 22.379.

SOLID WASTE AUTHORITY CONTROL POINT GPS 1013: A BRASS DISK IN CONCRETE STAMPED "MOCK-ROOS, LB 048, PT No. 1013". TO REACH THE CONTROL POINT FROM THE INTERSECTION OF 45TH STREET AND JOG ROAD, GO NORTH ON JOG ROAD FOR 1.75 MILES, AND CONTROL POINT IS APPROXIMATELY 85 FEET NORTHWEST OF THE THE NORTH END OF EAST GUARDRAIL. THE CONTROL POINT IS LOCATED 2.0 FEET WEST OF THE EAST EDGE OF PAVEMENT.
COORDINATES: NORTHING = 892106.147, EASTING = 780841.654, LOCAL SOLID WASTE AUTHORITY COORDINATE SYSTEM NGVD29, ELEVATION = 22.289.

PLANT ROAD AND JOG ROAD BASELINES PROVIDED BY SOLID WASTE AUTHORITY. THE BASELINES HAVE NOT BEEN SURVEYED BY GREENHORNE & O'MARA, INC.

MEASUREMENT METHODS:
THIS SURVEY WAS PERFORMED UTILIZING REAL-TIME-KINEMATICS (RTK) GPS PROCEDURES WITH A BASE UNIT SET AT CONTROL POINTS 1001 ACCORDING TO A GPS CONTROL SURVEY PREPARED BY MOCK-ROOS FOR THE SOLID WASTE AUTHORITY DRAWING No. 42-42-27-08 DATED FEBRUARY 1997. EQUIPMENT UTILIZED FOR THIS SURVEY WAS A TRIMBLE DUAL FREQUENCY 4700 REAL-TIME KINEMATICS (RTK) BASE RECEIVER WITH A PACIFIC CREST RADIO TRANSMITTER AND TWO 4800 RECEIVER FOR A ROVER WERE USED TO OBTAIN ASBUILT INFORMATION.

PREPARED FOR:
MALCOLM PIRNIE INC.
104 CORPORATE PARK DRIVE
WHITE PLAINS, NY 10602

CERTIFIED TO:
SOLID WASTE AUTHORITY
AND
MALCOLM PIRNIE INC.

APRIL 20, 2009
Date of Signature

JOHN H. ADLER, III
Professional Surveyor and Mapper
Florida License Number 4693

© Latest Date Hereon

SURVEYOR'S NOTES

1. ATTENTION IS DIRECTED TO THE FACT THAT THIS MAP MAY HAVE BEEN REDUCED IN SIZE BY REPRODUCTION. THIS MUST BE CONSIDERED WHEN OBTAINING SCALED DATA.
2. GREENHORNE & O'MARA, INC. AND THE CERTIFYING SURVEYOR ACCEPT NO RESPONSIBILITY FOR RIGHT-OF-WAYS, EASEMENTS RESTRICTIONS OR OTHER MATTERS AFFECTING TITLE TO THE LANDS SURVEYED OTHER THAN THOSE RECITED IN THE CURRENT DEED AND/OR OTHER INSTRUMENT OF RECORD FURNISHED BY THE CLIENT.
3. UNDER GROUND UTILITIES WERE NOT SEARCH FOR OR LOCATED BY GREENHORNE & O'MARA, INC.

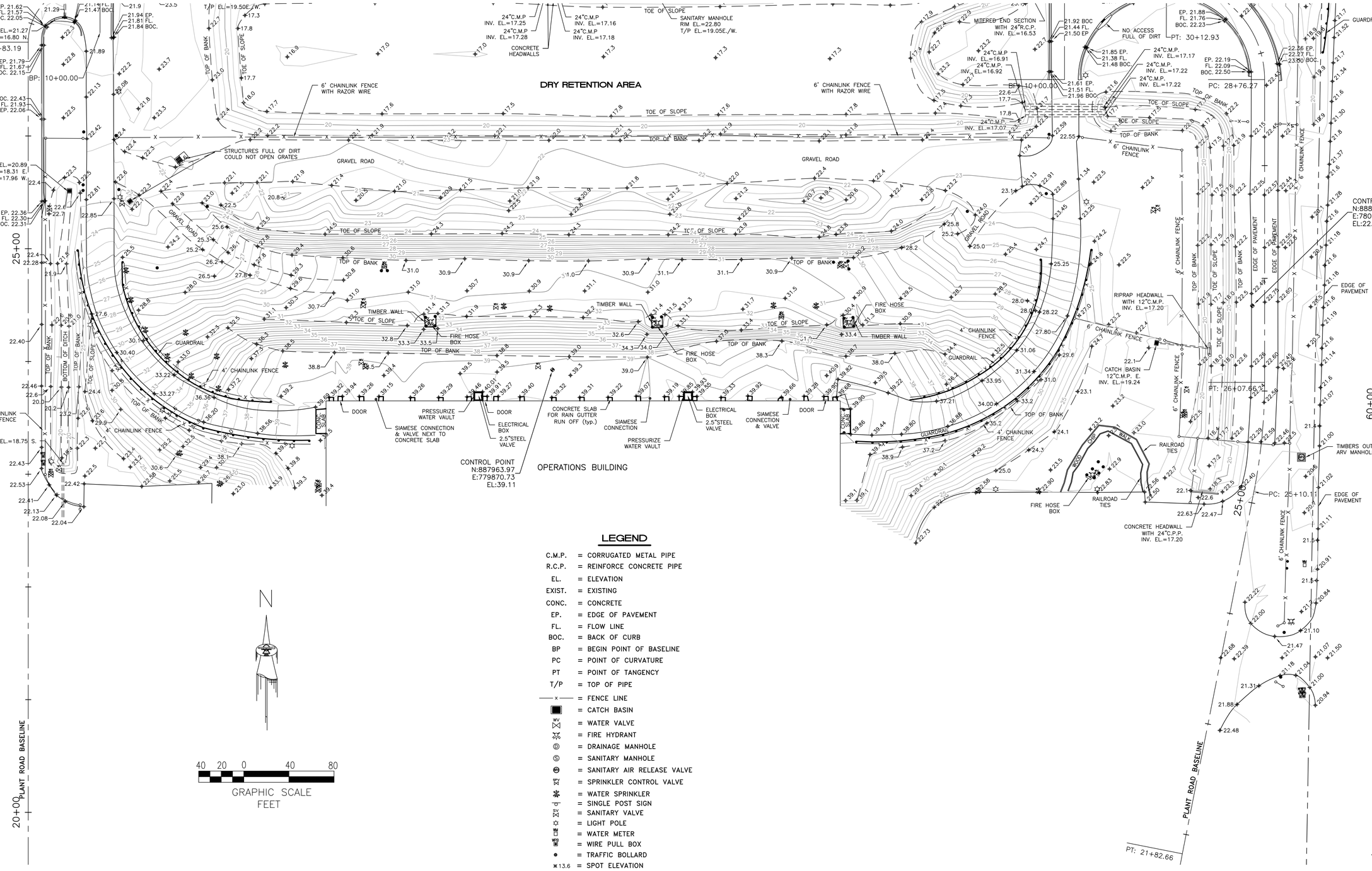
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TOPOGRAPHICAL SURVEY FOR
SOLID WASTE AUTHORITY
NORTH COUNTY LANDFILL
PROPOSED SITE OF THE W.T.E. FACILITY
MALCOLM PIRNIE — PALM BEACH COUNTY, FLORIDA

DESIGN	SCALE: 1" = 40'
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WV	= WATER VALVE
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D	= DRAINAGE MANHOLE
S	= SANITARY MANHOLE
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SV	= SANITARY VALVE
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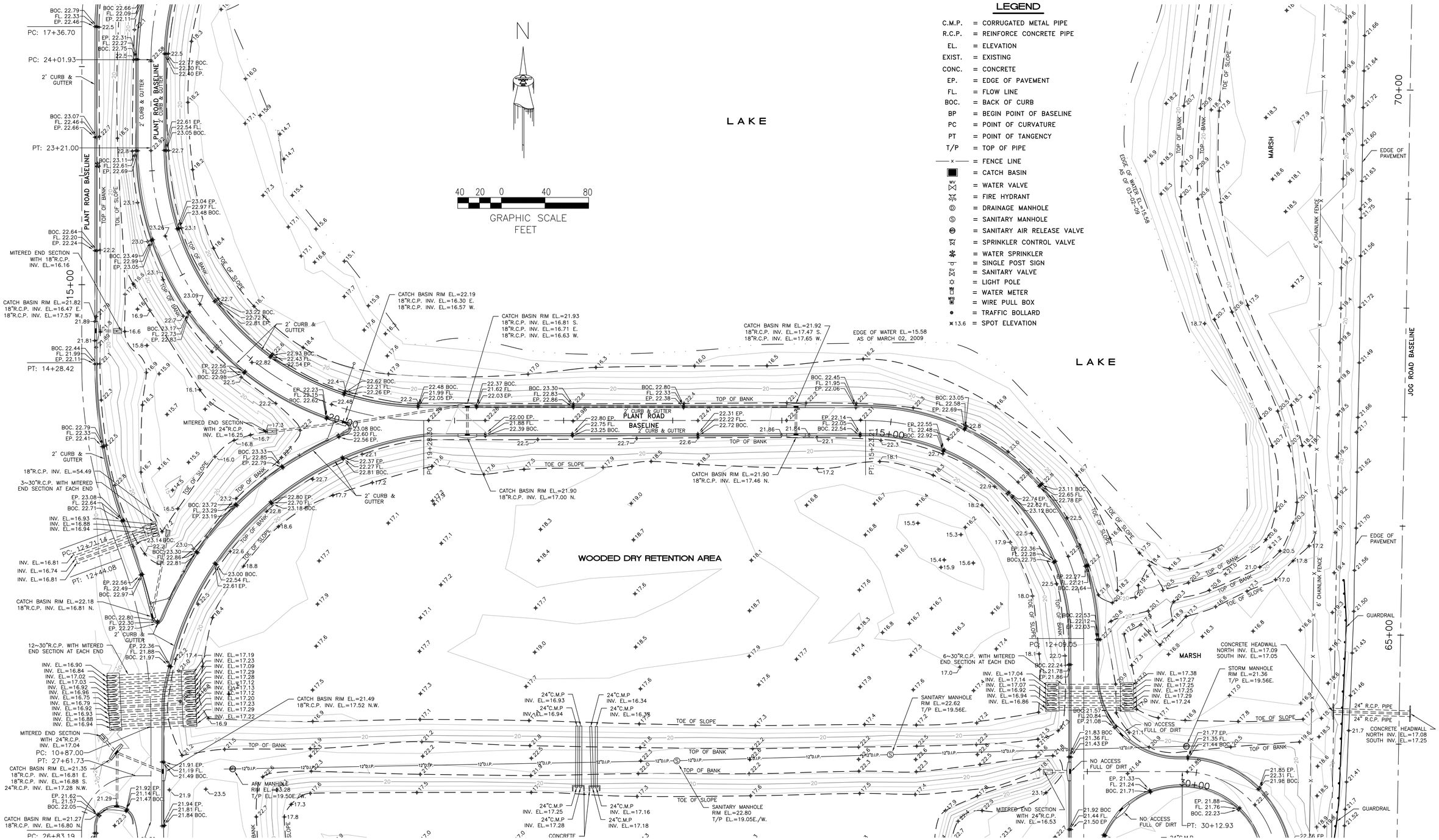
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PROPOSED SITE OF THE W.T.E. FACILITY

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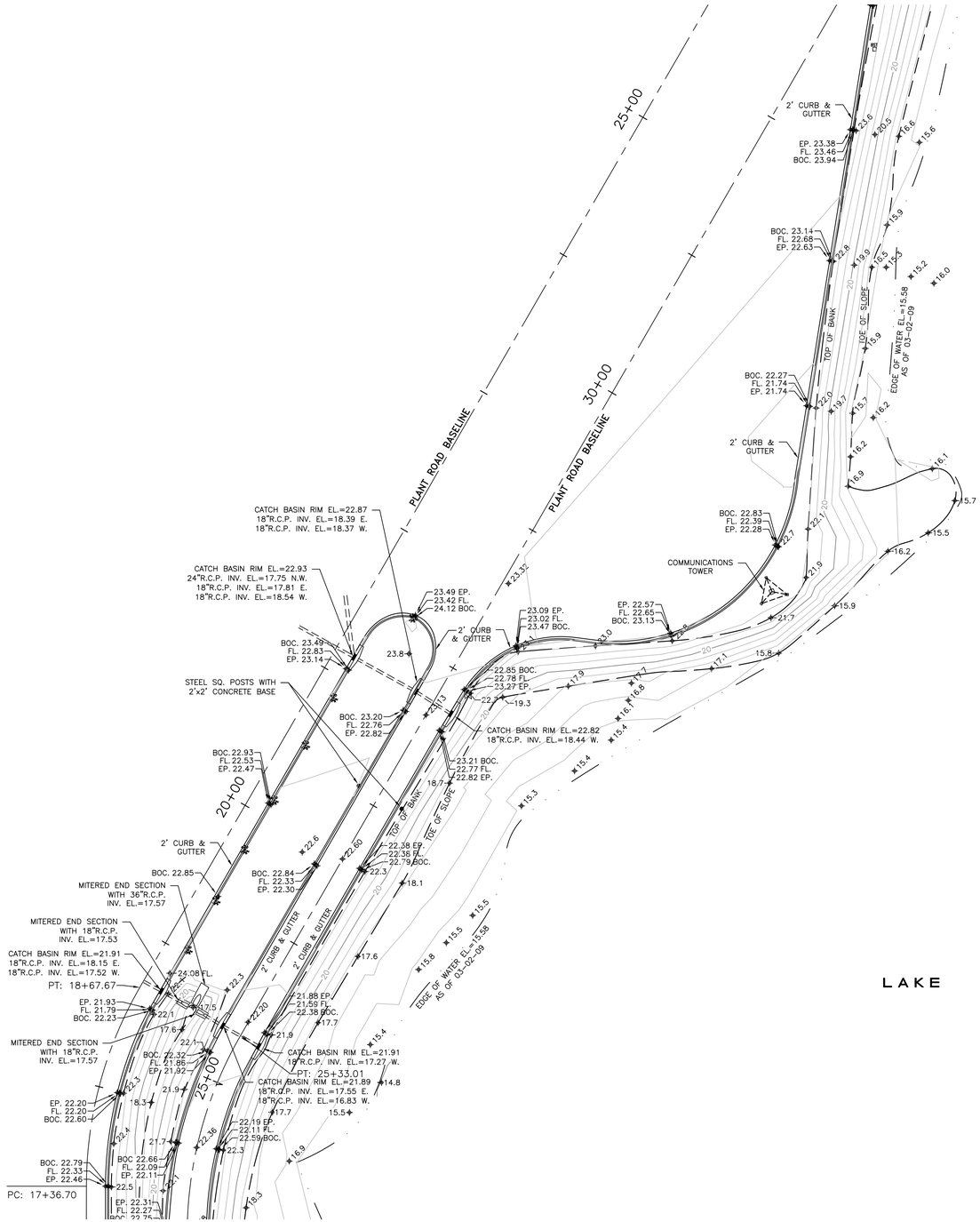
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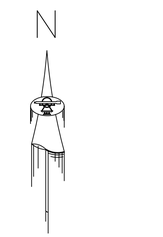
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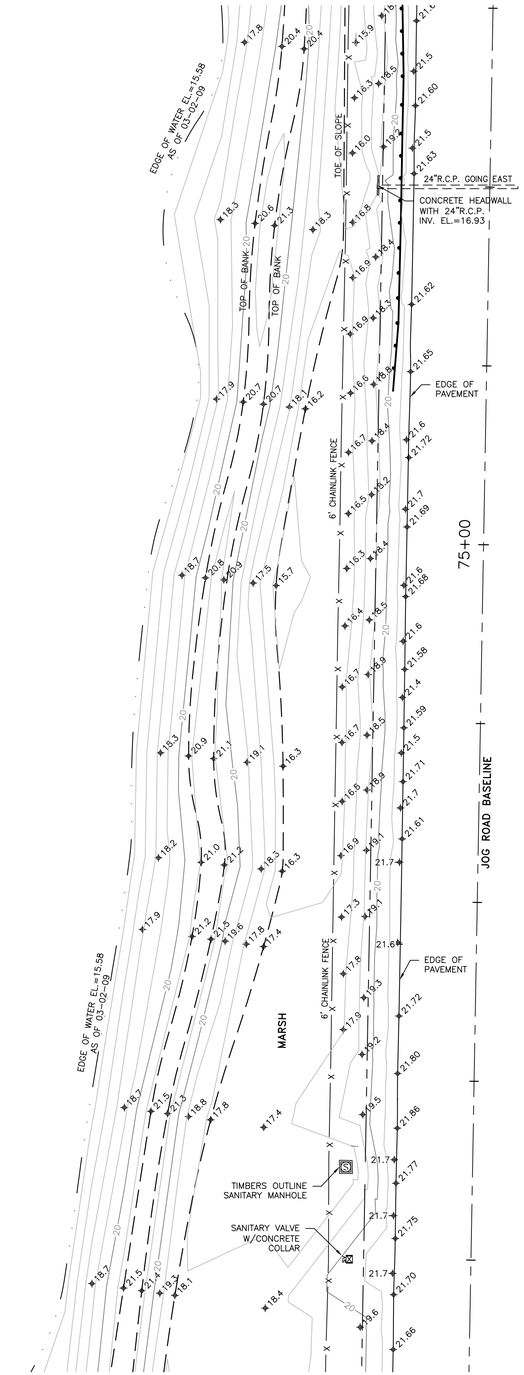




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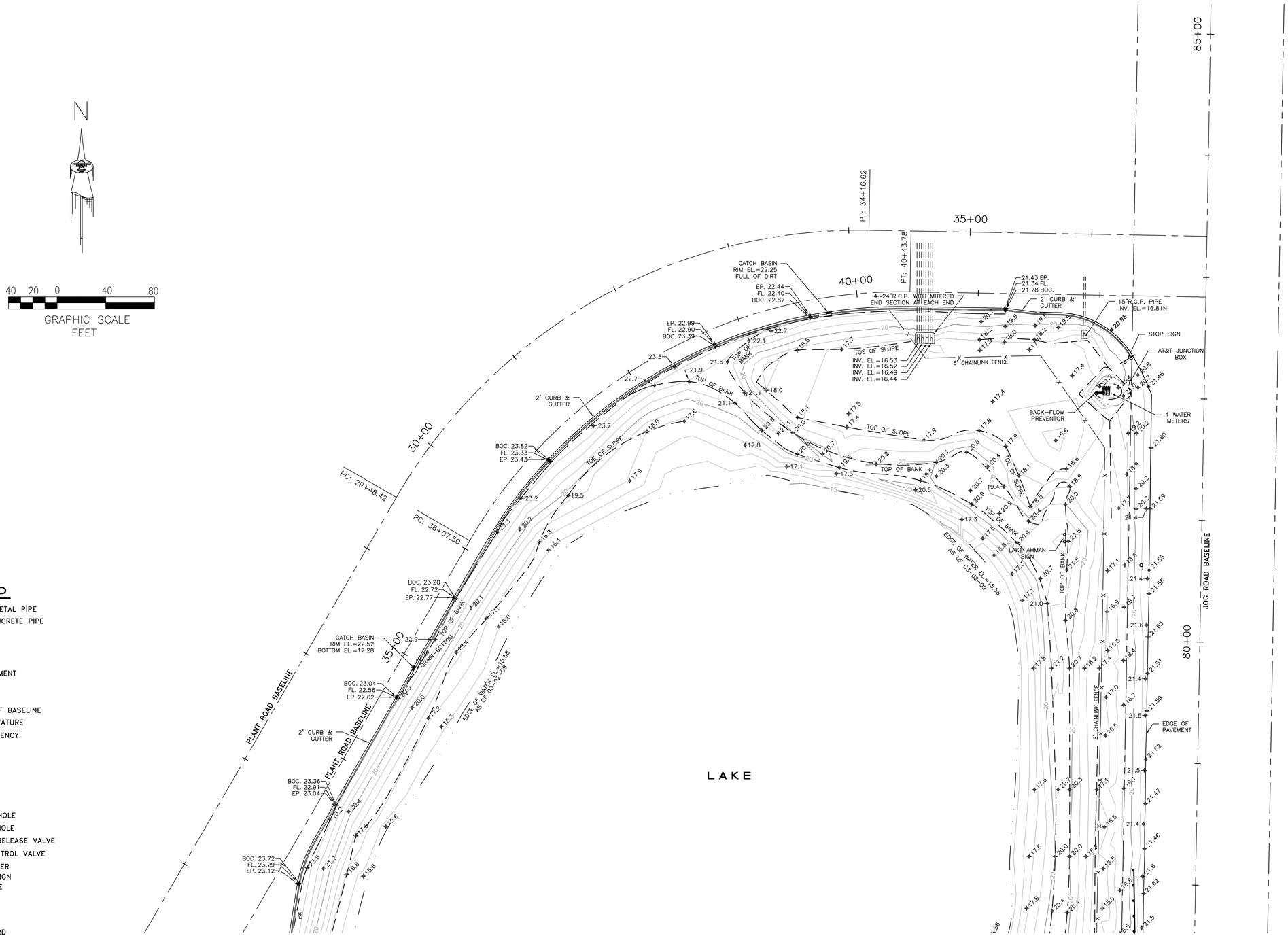
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Solid Waste Authority of Palm Beach County
Palm Beach Renewable Energy Facility No. 2
Environmental Resource Permit

Attachment E

Stormwater Management Report

3582056 / FTL

Solid Waste Authority of Palm Beach County

7501 North Jog Road • West Palm Beach, FL 33412

Palm Beach Renewable Energy Facility No. 2 Stormwater Management Report

July 2010

Report Prepared By:

Malcolm Pirnie, Inc.

8201 Peters Road
Suite 3400
Plantation, FL 33324
(954) 761-3460

3582056-603

ENGINEER'S CERTIFICATION

This report was prepared by a Professional Engineer registered in the State of Florida and is being filed for public record. In accordance with Florida Statutes Chapter 471.025 and Florida Administrative Code Chapter 61G15-23.002(1), this report shall be signed by the licensee, dated, and sealed as evidence of the authenticity of the report.

7-9-10

Christopher C. Tilman, P.E.
Florida Reg. No. 61903

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Attachments

1. Rainfall Maps
2. Model Basin Calculations
3. Infiltration Rating Curve Calculations

1. Introduction

The Solid Waste Authority of Palm Beach County (Authority) currently operates all its waste processing facilities at the Palm Beach Renewable Energy Park (Energy Park) in West Palm Beach, Florida. The entire Energy Park property is approximately 1,320 acres. The Authority's solid waste management system includes the North County Resource Recovery Facility (NCRRF, which is now referred to as Palm Beach Renewable Energy Facility No. 1 (PBREF No. 1)), a Class I Landfill and a Class III Landfill (collectively "Landfill"), a Ferrous Processing Facility (FPF), a Composting Facility, a Vegetation Processing Facility, a Recovered Materials Processing Facility (RMPF), a Biosolids Pellitizer Facility (BPF), Household Hazardous Waste (HHW) Collection Facilities, and five Transfer Stations.

In order to meet the solid waste disposal and energy recovery needs of Palm Beach County's rapidly growing population, the Authority is proposing to expand its electrical generation capacity with the construction of a new mass burn renewable energy facility (Proposed Facility) that will be able to process up to 3,000 tons per day (tpd) of municipal solid waste (MSW). The Proposed Facility will be officially known as the Palm Beach Renewable Energy Facility No. 2 (PBREF No. 2). Construction of the Proposed Facility will increase the Authority's overall waste processing capacity and also extend the life of the Class I Landfill.

The Proposed Facility will use mass burn technology that will include the construction of three boiler units each having a design-rated capacity of 1,000 tpd, a tipping building, refuse pit, an air pollution control system, a cooling tower, an ash handling/storage building, a turbine-generator building, fire water pump building and tank, wastewater tanks, a stack, additional ancillary and interior roadways within the facility. Only MSW and similar materials suitable for a Class I landfill will be used as fuel at the PBREF No. 2, and hazardous waste, biomedical waste, or other prohibited materials will not be accepted. All of the waste handling activities will take place inside a fully enclosed building and no waste will be stored outside.

The sections that follow describe the physical conditions at the Proposed Facility site, the stormwater system design, calculations, and expected performance.

2. Design Requirements

The Proposed Facility location is within the Energy Park immediately north of the existing renewable energy facility (PBREF No. 1), which is certified under the Florida Power Plant Siting Act (PPSA) Site Certification PA-84-20K. As such, it is anticipated that authorization of the project will be accomplished through modification to the Conditions of Certification rather than through issuance of an Environmental Resource Permit (ERP), in accordance with the requirements of the Electrical Power Plant and Transmission Line Siting, Florida Statutes (F.S.) 403.501-519 and chapter 62-17 Part I Florida Administrative Code (F.A.C.).

The design requirements for the stormwater control system for the PBREF No. 2 are set by state and local agencies. The stormwater management system will be designed and constructed in a manner consistent with the following:

- Section 62-40.432, F.A.C. and other applicable stormwater or environmental resource permitting regulations of the Florida Department of Environmental Protection (FDEP).
- South Florida Water Management District (SFWMD) design criteria contained in the Environmental Resource Permit Information Manual Vol. IV (2007).
- Applicable standards of Palm Beach County.
- Applicable standards of The City of West Palm Beach.

3. Site Data

The stormwater management system design for PBREF No. 2 is based on data from onsite testing, research, and/or engineering calculations. The following sections summarize the data used in the design and the methodologies employed during the data collection and analysis.

3.1. Existing Site Description and Basin Boundaries

The Proposed Facility project area is approximately 60 acres (ac.) in size and is located just north of the PBREF No. 1, west of Jog Road and east of the conservation area. The existing site consists of an undeveloped area that was previously the South Borrow Lake that was permitted to be filled with permeable soil material up to elevation 19.0 feet NGVD (Joint ERP/Federal Dredge and Fill Permit Application SAJ-1985-01054 (IP-LCK)), a dry retention area, a wooded dry retention area, access road, and berms. The soil is primarily sand, with intermittent grass cover. The average existing site grade is approximately 19 feet NGVD.

The basin boundaries for the Proposed Facility stormwater system include the edge of pavement of Jog Road on the east, the existing conservation area on the west, the northern edge of the existing entrance road to the north, and portions of the existing PBREF No. 1, Visitor's Center, and maintenance building to the south. The total basin acreage is 60.63 ac., with 11.14 ac. impervious and 49.49 ac. pervious.

3.2. Existing Stormwater Management System

The stormwater management system for the Energy Park is modeled and permitted as a single system that includes three main culvert systems i.e. northern, central, and southern. The central culvert system is located north of the PBREF No. 1 and consists of two 24-inch diameter reinforced concrete pipe (RCP) culverts that convey stormwater across Jog Road (east to west). Six 30-inch RCP culverts convey stormwater from the west side of Jog Road through the wooded dry retention system, and twelve 30-inch RCP culverts convey stormwater from the wooded dry retention area to the conservation area.

A portion of stormwater from the PBREF No. 1 is routed through a combination of inlets, pipes and swales to a dry retention area, which is located north of the PBREF No.1 and south of the wooded dry retention area. This dry retention area is connected to the wooded dry retention area by four 24-inch RCP culverts.

3.3. Seasonal High Water Table (SHWT)

The SHWT was estimated from the results of the geotechnical reports provided by Nutting Engineers of Florida, Inc. dated February 2008, Williams Earth Sciences, Inc. dated July 2008, and Dunkelberger Engineering and Testing, Inc. dated May 2010 (see ERP Attachment H, CD-ROM), and on-site observations. Based on this information, the SHWT was estimated to be at elevation 18.0 feet as referenced in the National Geodetic Vertical Datum (NGVD) 1929.

3.4. Rainfall Amount

The rainfall amount used for the design was determined through the design aids included in Volume IV of the SFWMD Environmental Resource Permit Information Manual Vol. IV (2007). The rainfall total for the 25-year, 72-hour storm was estimated at 13.2 inches, and the 100-year, 72-hour storm was estimated at 15.8 inches. See Attachment 1 for rainfall maps and Attachment F for drainage calculations.

4. Proposed Design

4.1. Proposed Stormwater Management System

The Proposed Facility stormwater management system (System) has been designed as a dry retention system with storage volume sufficient to provide quality treatment for runoff from the 25-year, 72-hour storm (Design Storm) within the 60.63-acre project area for the fully developed condition.

4.1.1. Structure Elevations

The Proposed Facility site is above the FEMA 100-year floodplain elevation. All finished floor elevations for PBREF No. 2 have been set based on the 100-year, 72-hour zero-discharge stage elevation calculations. Roadways and parking areas were set based on the 10-year, 24-hour zero discharge stage.

4.1.2. Design Description

Stormwater generated from the PBREF No. 2 as well as portions of the PBREF No.1 that currently drain north to the existing dry retention area will be routed to the proposed dry retention swale on the northern portion of the site through a combination of pipes, catch basins, and swales. The dry retention swale is designed to retain the first ½ inch of runoff (2.53 ac-ft volume). Stormwater staging above elevation 20.8 NGVD will flow over a 24 feet wide primary control weir to a 2.51-acre on-site fringe preserve area that can provide additional site storage, and will also flow over a 31 feet wide secondary (overflow) weir that ultimately discharges into the conservation area west of the site. The System is designed to maintain the existing discharge point, hydroperiod, and drainage patterns.

The System will also include a Stormwater Harvesting System (SHS) designed to capture, store, and reuse runoff from selected roof areas. The SHS consists of specialized roof drainage systems, two duplex pump stations and their associated forcemains, a prestressed concrete ground storage tank, and ancillary piping systems and appurtenances. For modeling purposes, the SHS system is assumed to be full during the design storm event and has no effect on the stormwater analysis, as all stormwater entering the SHS overflows the tank and discharges into the dry retention swale. However, the SHS will provide a valuable use of stormwater for the facility. All impervious areas not served by the SHS will be drained by a conventional inlet and pipe gravity system that ultimately discharges into the new dry retention swale.

The stormwater retained in the dry retention area will be removed by percolation into the soil, and the System is designed to recover at least half the retention volume within 24

hours and the entire retention volume within 72 hours following the design storm event per SFWMD criteria and FDEP regulations, respectively. The bottom elevation of the dry retention swale has been set at elevation 19.0 NGVD, one foot above the SHWT, in accordance with SFWMD design criteria. All slopes within the retention swale have been designed with minimum 4:1 (H:V) side slopes.

Additionally, the System is designed to maintain the existing east-to-west Jog Road drainage pattern through the site. Water staging above elevation 20.0 feet NGVD in the west Jog Road drainage swale will flow through two 45 inch x 29 inch elliptical RCP (ERCP) culverts to a bypass swale. The bypass swale will convey the water west to an inlet structure and discharge it into the outfall basin upstream of the existing discharge point.

The permit drawings provide the details of the System design and are provided in ERP Attachment C.

5. Calculations and Modeling

A combination of standard SFWMD calculations and models were used in the development of the Proposed Facility stormwater management system design. The following sections summarize the calculations and modeling for the project.

5.1. Calculations

For this design, detailed calculations following standard SFWMD stormwater calculation methods described in the Environmental Resource Permit Information Manual Vol. IV (2007) were completed and are included in Attachment F.

5.2. Modeling

The Advanced Interconnected Channel and Pond Routing (ADICPR) software program was used to generate the detailed hydraulic routing for the system. The runoff method selected for the model was the Soil Conservation Service (SCS) Unit Hydrograph Method with a peaking factor of 256. Post development model was created for the project.

The rainfall distribution was set to use the Florida Modified 3-day hyetograph with a rainfall depth of 15.8 inches, corresponding to the design storm event. The time span for the model simulation was set to 360 hours to verify peak stages and proper recovery of the retention volume after a design storm event. Time step was set to 10.0 minutes to produce a high level of precision in the level pool calculations.

5.2.1. Model Basins

The 60.63 acre project area was divided into 16 model basins along hydraulic break lines in the Proposed Facility layout. Brief descriptions of the model basins are as follows:

Basin 1 (4.378 ac.) includes the existing entrance road and scalehouse area. Although only some areas of this basin will drain to the PBREF No. 2 stormwater system, a conservative approach was used assuming that all of the drainage from this basin is ultimately routed.

Basin 2 (5.079 ac.) includes the Jog Road western right-of-way (ROW) and drainage swale area, and includes seven (7) 24-inch culvert connections to the Jog Road eastern ROW and the Middle Borrow Lake. Using a conservative design, the inflow to this basin during the design storm was assumed to be full pipe flow at a velocity of two feet per second.

Basin 3 (0.35 ac.) includes grass-covered areas and roadway section near the new Administration, Warehouse and Maintenance Building.

Basin 4 (0.697 ac.) includes the roof areas associated with the Administration, Warehouse and Maintenance Building. Runoff from these roof areas are routed to Pump Station No. 2, which pumps the stormwater to the Stormwater Harvesting Tank via an 8 inch diameter ductile iron force main. Excess stormwater entering the Pump Station No. 2 wetwell will flow through an overflow pipe to a parking area inlet structure.

Basin 5 (5.168 ac.) includes the parking and storage areas between the Administration, Warehouse and Maintenance Building, and the Air Pollution Control (APC) Building. This basin also includes the Stack and the adjacent secondary containment structures.

Basin 6 (1.317 ac.) includes a portion of the existing inbound roadway, a portion of the existing inbound ramp, and the new inbound ramp.

Basin 7 (3.176 ac.) includes the Turbine Generator Building, the Outage Maintenance Shop, the Air Cooled Condenser (ACC), the Switch Gear Room and Switchyard. The ACC will be an elevated structure supported by columns, with gravel underneath. The fan openings in the structure comprise the majority of its roof area, so rainfall will pass through to the gravel surface at the base. For modeling purposes, the ACC area footprint was assumed to be a pervious area.

Basin 8 (0.583 ac.) includes the area between the main PBREF No. 2 building complex (Basin 11) and the Ash Management Building (Basin 9). The Stormwater Harvesting Tank is located in this basin.

Basin 9 (1.033 ac.) includes the Ash Management Building. The roof structure drains directly to the Stormwater Harvesting Tank.

Basin 10 (2.812 ac.) includes the Fire Pump House, Fire Water Storage Tank, the roadway and turnaround loop for the Ash Management Building, the Water Treatment Building, the Wastewater Tanks, Urea Station, and grassed areas.

Basin 11 (4.653 ac.) includes the APC Buildings, Boiler Building, Refuse Storage Pit Building, and the Tipping Floor Building. The roof structures drains directly to the Stormwater Harvesting Tank.

Basin 12 (1.794 ac.) includes the bypass road between the PBREF No. 1 and the Proposed Facility Tipping Floor Building, Pump Station No. 1, the modified exit ramp for the PBREF No. 1 Tipping Floor Building, and the exit ramp for the Proposed Facility Tipping Floor Building.

Basin 13 (2.141 ac.) includes the northern half of the PBREF No. 1 Tipping Building and RDF Manufacturing Plant. Roof runoff will be routed through 24 existing 8 inch diameter downspouts on the north end of the building to a 36 inch manifold line, which will flow to the wet well of Pump Station No. 1. The stormwater will then be pumped to the Stormwater Harvesting Tank via an 8 inch diameter ductile iron forcemain. Excess stormwater entering Pump Station No. 1 wet well will flow over a weir in the wet well structure to the swale serving the bypass roadway.

Basin 14 (5.615 ac.) includes the existing Visitor's Center, Maintenance Warehouse, and associated parking areas. Stormwater from this area will be routed through a combination of existing and proposed piping to the proposed concrete box culvert and discharge into the dry retention swale.

Basin 15 (1.13 ac.) includes the exit roads from the PBREF No. 2 tipping floor and the relocated exit ramp for the PBREF No. 1, and the road from the existing Visitor's Center. Stormwater from this area will drain through curb opening inlets to the concrete box culvert and discharge into the dry retention swale.

Basin 16 (20.703 ac.) includes the filled area of the South Borrow Lake, the dry retention swale, the fringe preserve area, the bypass swale, and a portion of the exit roadway. The initial fill elevation for the South Borrow Lake is 19.0 feet NGVD. The berms forming the dry retention and bypass swales will be filled to elevation 22.0 feet. Elevations of future fill areas have not been established, but are assumed to be at a minimum elevation of 22.5 feet NGVD.

The project area boundary and basin boundaries are shown in Sheet 8 of the permit drawings (See ERP Attachment C).

The available storage in the model basins was calculated by measuring the area at the proposed bottom and top elevations using AutoCAD. This data was input into ADICPR, which automatically calculated a stage-storage relationship for each basin.

5.2.2. Time of Concentration

Time of Concentration (T_c) is the elapsed time for runoff in a particular basin to travel from the hydraulically farthest point to the basin outlet. Runoff is typically characterized into three types of flows: overland (sheet) flow, shallow concentrated flow, and channel flow. The time of concentration is the sum of the travel times for these three types of flow. For basins where the calculated T_c was less than the recommended minimum T_c of 6 minutes by the SCS TR-55 methodology, a minimum T_c of 10 minutes was used.

5.2.3. Runoff Curve Numbers

The runoff curve numbers for pervious areas in the model were determined using the soil storage methodology included in the SFWMD Environmental Resource Permit

Information Manual Vol. IV (2007). The curve number (CN) for pervious areas within each model basin was calculated using the following equation:

CN = 1000/(10 + S), where S is soil storage (in.).

A curve number of 98 was used for all impervious areas within each model basin, including pavements, roof areas, and concrete surfaces.

A composite CN was calculated for each model basin according to the SCS TR-55 methodology. Complete model basin data and calculations, including pervious/impervious areas, soil storage, CN values, and time of concentration are shown in Attachment 2. Table 5-1 below summarizes the basin parameters used in the model.

Table 5-1
Model Basin Parameters

Basin	Area (ac.)	Time of Concentration (min)	SCS Composite Curve Number (CN)
1	4.378	10.5	89.2
2	5.079	18.9	69.0
3	0.350	10.0	78.9
4	0.697	10.0	98.0
5	5.166	10.0	92.8
6	1.317	10.0	80.1
7	3.176	10.0	78.1
8	0.583	10.0	69.1
9	1.033	10.0	98.0
10	2.811	10.0	85.6
11	4.653	10.0	98.0
12	1.794	14.1	79.7
13	2.141	10.0	98.0
14	5.615	10.0	85.0
15	1.130	10.0	92.7
16	20.703	13.9	69.9

5.2.4. Infiltration Rating Curve

The stage-discharge calculations for the proposed dry retention swale were performed using Darcy's Equation, $Q = kiA$, where:

Q = discharge (ft^3/sec)
K = hydraulic conductivity (cfs/ft^2)
A = surface area (ft^2)

h = head (ft)
L = drainage distance (ft)
i = hydraulic gradient (dimensionless) = $i = h/L$

Because the South Borrow Lake has not been filled at the time of this application, the data for hydraulic conductivity was obtained from two standard open-hole, constant-head borehole permeability (BHP) tests conducted at the adjacent FPF site by Tierra South Florida, Inc. on July 27, 2009. The fill material at the FPF site is assumed to be similar to what will be used to fill the South Borrow Lake. The average value of the two test results, a hydraulic conductivity value of $2.86E^{-04}$ cfs/ft^2, was used as the infiltration rate for all dry retention basin areas.

An example calculation for obtaining the rating curve is as follows:

Hydraulic conductivity (K) = $2.86E^{-04}$ cfs/ft^2

SHWT elevation = 18.0 feet, NGVD

Average thickness of sand layer (L) = 50 feet

For the flood stage at elevation 20.0 feet NGVD, the available head (h) is

$h = 20.0 – 18.0 = 2$ feet

The surface area of the dry retention basin area at elevation 20.0 feet NGVD is 1.396 acres, as obtained by AutoCAD calculations.

Therefore, the hydraulic gradient (i) can be calculated as:

$i = h/L = 2\text{ft}/50\text{ ft} = 0.04$

The discharge (Q) is then calculated using the Darcy Equation:

$Q = kiA = (2.86E^{-04}\text{ cfs/ft}^2) \times (0.04) \times (1.396\text{ acres} \times 43{,}560\text{ ft}^2/\text{acre}) = 0.69$ cfs

Based on the calculation above, the discharge from the dry retention swale through infiltration is 0.69 cubic feet per second (cfs) when the flood stage is at elevation 20.0 feet NGVD. A spreadsheet was created to calculate the discharges at various stage elevations to obtain a stage-discharge curve (rating curve) for each dry retention basin. The calculations and the rating curve data used in the hydraulic model are included in Attachment 3.

5.2.5. Recovery Time

Recovery times for the dry retention basins were estimated using manual calculations and the ADICPR modeling program. The recovery time is calculated as the difference between the time noted on the graph and the time the storm ceases (i.e. 72 hours). The manual drawdown calculations are included in Attachment F and the ADICPR model data is included in Attachment H (CD-ROM).

6. Summary of Results

6.1. Calculations Summary

Detailed calculations following standard SFWMD stormwater calculation methods described in the Environmental Resource Permit Information Manual Vol. IV (2007) were completed and are included in Attachment F. A summary of the results are as follows:

SHWT (Control Elevation) = 18.0 feet, NGVD
Dry Retention Swale bottom elevation = 19.0 feet, NGVD
Dry Retention Swale overflow weir elevation = 20.8 feet, NGVD
Calculated 100-year, 72-hour zero discharge stage = 23.36 feet, NGVD
Proposed FPF finished floor elevation (FFE) = 24.0 feet, NGVD
Proposed minimum perimeter berm top elevation = 22.0 feet, NGVD
Proposed minimum edge of pavement (EOP) elevation = 22.0 feet, NGVD

6.2. Model Summary

The complete ADICPR input and output reports are included in ERP Attachment H (CD-ROM). The following sections summarize the modeling results for each basin and the performance of the system as a whole.

6.2.1. Basins

As shown on Sheet 8 of the Permit Drawings, the project area was divided into 16 separate basins. Table 6-1 below provides a summary of the peak flow and the total runoff volume for each of the 16 basin areas for the 25-year, 72-hour storm event.

Table 6-1
Basin Summary for the 25-year, 72-hour Storm Event

Basin	Area (ac.)	Runoff Peak Flow (cfs)	Runoff Volume (ac-ft)
1	4.378	13.792	4.321
2	5.079	12.177	3.812
3	0.350	1.054	0.305
4	0.697	2.286	0.752
5	5.168	16.718	5.287
6	1.137	1.170	0.333
7	3.176	9.337	2.726
8	0.583	1.579	0.438
9	1.033	3.388	1.115
10	2.812	8.819	2.662
11	4.653	14.995	5.023
12	1.794	5.567	1.654
13	2.141	6.900	2.311
14	5.615	17.422	5.325
15	1.130	3.652	1.157
16	20.703	55.367	15.773
Site Total	60.63		

6.2.2. Performance

Based on the manual calculations and modeling output reports, the system will function as designed and recover half of the retained volume in 24 hours and the entire storage volume 72 hours after the design storm event. The model drawdown time was slightly longer than the hand calculated time because the model accounts for the retention volume and the additional water volume stored in upstream piping, inlets, culverts, and detention areas.

The maximum stage elevation in the proposed dry retention area is shown in Table 6-2. The minimum proposed berm elevation is 22.0 ft. NGVD, so the system will detain the entire runoff volume from the 25-year, 72-hour storm event. Pre-development peak discharge flows for the design storm were calculated at 97.91 cfs, and the modeling output reports showed that the proposed system reduced the post-development peak discharge flow to 58.679 cfs.

Table 2
Dry Retention Area Summary for the 25-year, 72-hour Storm Event

Retention Area ID	Peak Stage (ft. NGVD)	Peak Storage (ac-ft)	Recovery Time (Hrs)
Dry Retention Area	21.50	3.47	72

7. Conclusions

Based on the results of the calculations, ADICPR modeling, and the design plans, the Proposed Facility stormwater management system meets the design requirements. The model showed the following:

- The first ½ inch of runoff (2.53 ac-ft) from the routed 25-year, 72-hour storm event and approximately 5.7 ac-ft of upstream storage in pipes, culverts, and detention/retention areas will be retained onsite and discharged by percolation. The 2.51-acre on-site fringe preservation area provides approximately seven (7) ac-ft of additional storage volume (above elevation 18.0 NGVD) that will be retained onsite and discharged by percolation.

- The maximum stage elevations within the dry retention area and the fringe preservation area will be below the top of the perimeter berm.

- The entire retention volume of the dry retention area will recover to dry conditions within 72 hours following the design storm event.

- The Proposed Facility and roadways will remain usable during the design storm event.

Solid Waste Authority of Palm Beach County
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Attachment 1

Rainfall Maps

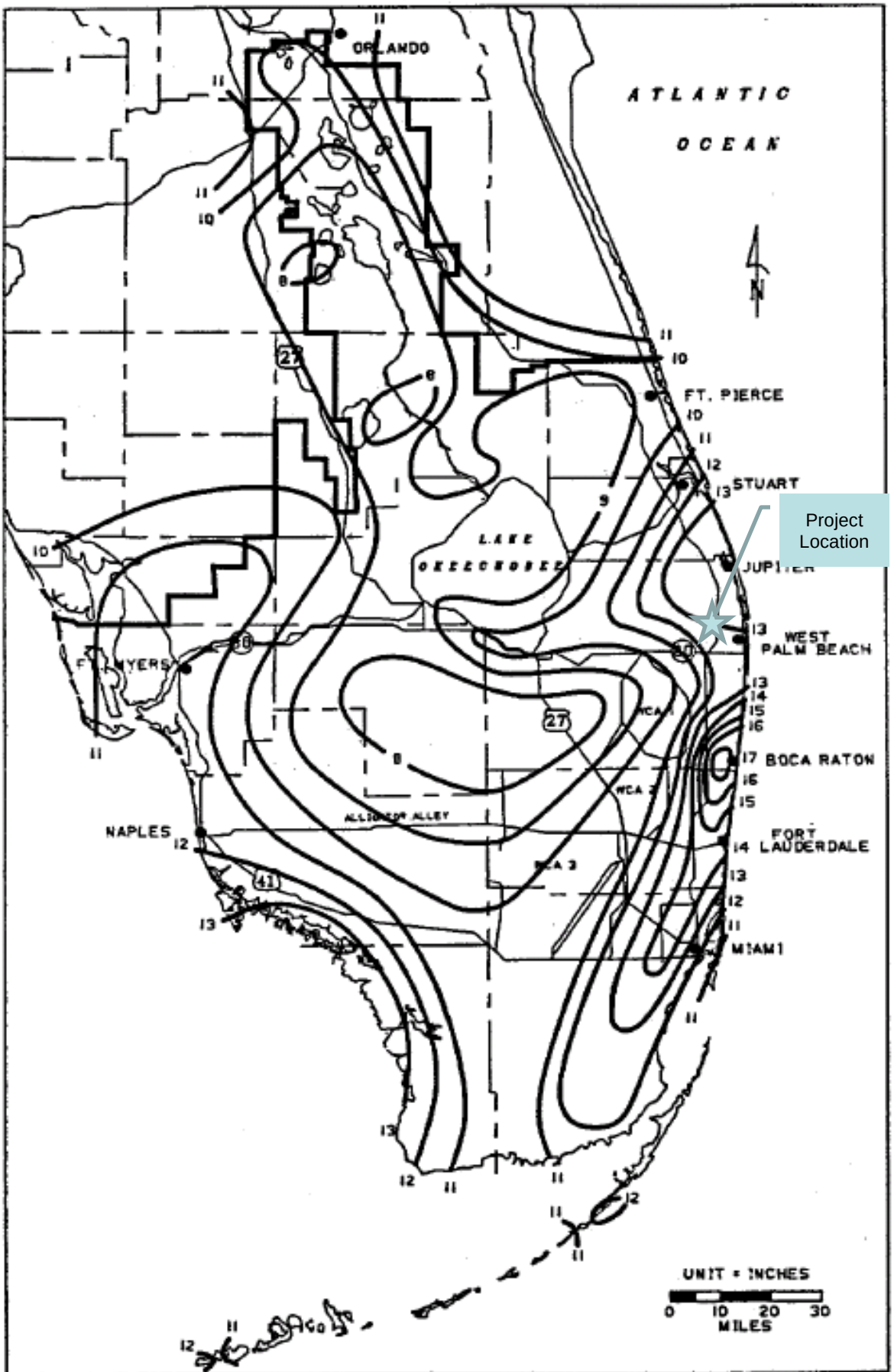


FIGURE C-8. 3-DAY RAINFALL: 25-YEAR RETURN PERIOD

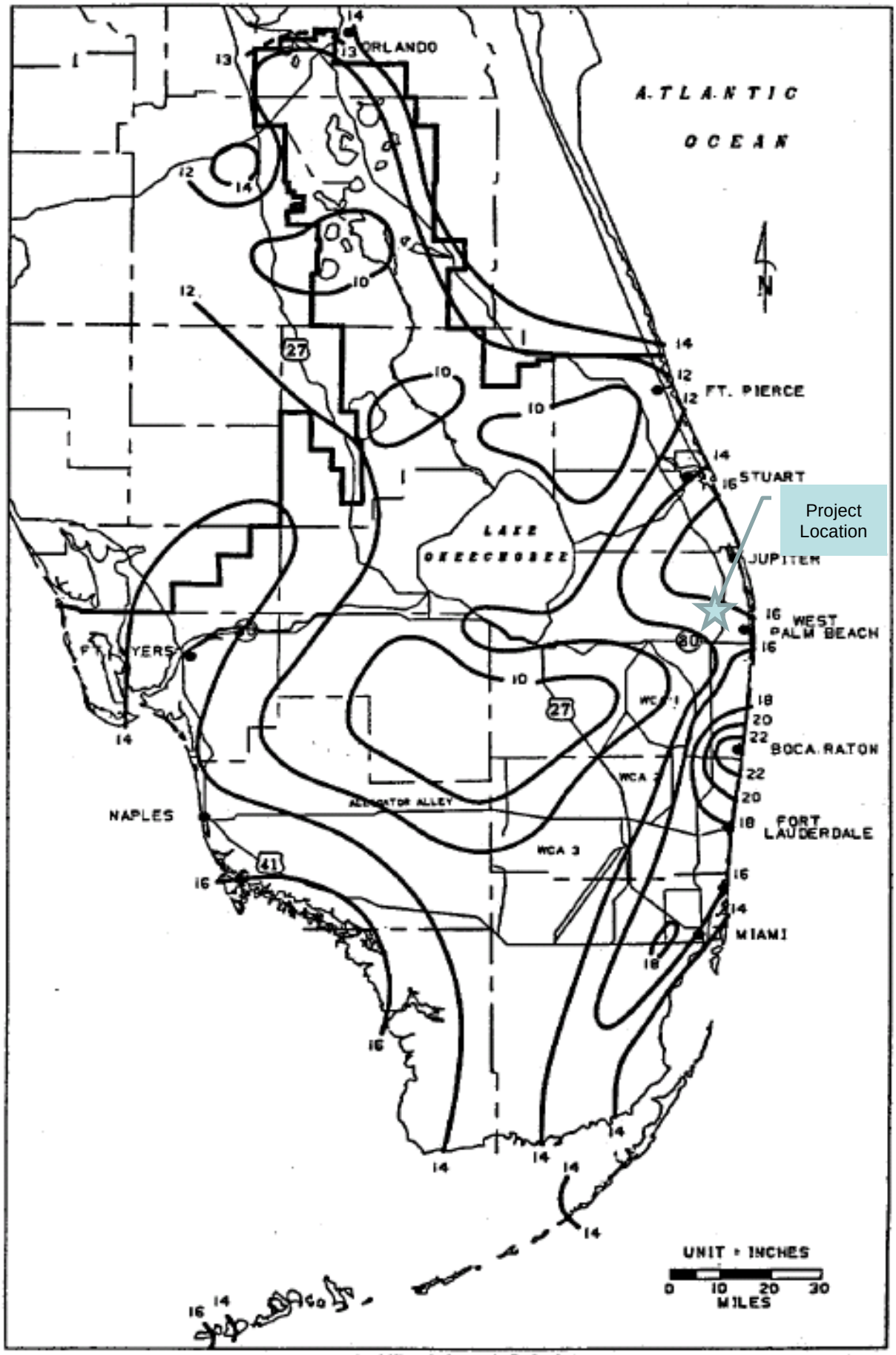


FIGURE C-9. 3-DAY RAINFALL: 100-YEAR RETURN PERIOD

Solid Waste Authority of Palm Beach County
Palm Beach Renewable Energy Facility No. 2
Environmental Resource Permit

Attachment 2

Model Basin Calculations

Palm Beach Renewable Energy Facility No. 2

Palm Beach County, Florida

MODEL BASIN CALCULATIONS

MODEL BASIN 1

COVER DESCRIPTION		*% OF BASIN*	*STAGE ELEVATIONS FROM*	*TO*	SCS CN
Structures	0.000 Ac.	0.0%	0.00	up	98
Pavement	3.050 Ac.	69.7%	22.00	22.75	98
Dry Det Area	0.000 Ac.	0.0%	0.00	0.00	69
Dry Det Bank	0.000 Ac.	0.0%	0.00	0.00	69
Dry Det Sump	0.000 Ac.	0.0%	0.00	0.00	69
Grass	1.328 Ac.	30.3%	17.50	22.00	69
Grass Vert	0.000 Ac.	0.0%	17.50	up	69
TOTAL AREA:	4.378 Ac.	100.0%			

Total Impervious: 3.05
69.66%

Total Pervious: 1.33
30.34%

SHWT Elevation: 18.00 ft. NGVD
Average Site Grade: 21.50 ft. NGVD
Antecedent Moisture Cond: Type II

Determine soil storage for the developed site

a. Avg. Depth to Water Table = Avg. Proposed Grade - SHWT

Avg. Grade:	SHWT:	D=(ft.):
21.50	18.00	3.50

b. Soil Storage (S) = Available Soil Storage x Pervious Area/Total Area
(See Fig. E-1, SFWMD ERP Information Manual, Vol IV (2007))

Compacted Soil Storage: 6.56 in. Interpolated for D=3.5 ft.

Av. Soil St.	Pervious:	Total (Ac.):	S = (in.):
6.56	1.33	4.38	1.99

Composite Curve Number: 89.20

Time of Concentration (Tc):

Overland Flow:

Length of Flow Segment (Lo) =	12	ft.	
n value =	0.10		
Slope (So) =	0.02000	ft./ft.	
To = ((0.67(n)(Lo)/(So^0.5))^0.467 =	2.25	min.	Kerby/Hathaway Eq.

Channelized Flow:

Length of Reach (L) =	600	ft.	
Slope (Sch) =	0.00500	ft./ft.	
Tch (min) = .0078(L^0.77)(S^-0.385) =	8.26	min.	Kirpich Eq.
Tc = To + Tch =	10.52	min.	use 10 min

MODEL BASIN 2

COVER DESCRIPTION		*% OF BASIN*	*STAGE ELEVATIONS FROM*	*TO*	SCS CN
Structures	0.000 Ac.	0.0%	0.00	up	98
Pavement	0.000 Ac.	0.0%	0.00	0.00	98
Dry Det Area	0.000 Ac.	0.0%	0.00	0.00	69
Dry Det Bank	0.000 Ac.	0.0%	0.00	0.00	69
Dry Det Sump	0.000 Ac.	0.0%	0.00	0.00	69
Grass	1.079 Ac.	21.2%	17.00	22.00	69
Grass Vert	4.000 Ac.	78.8%	17.00	up	69
TOTAL AREA:	5.079 Ac.	100.0%			

Total Impervious: 0.00
0.00%

Total Pervious: 5.08
100.00%

SHWT Elevation: 18.00 ft. NGVD
Average Site Grade: 19.50 ft. NGVD
Antecedent Moisture Cond: Type II

Determine soil storage for the developed site

a. Avg. Depth to Water Table = Avg. Proposed Grade - SHWT

Avg. Grade:	SHWT:	D=(ft.):
19.50	18.00	1.50

b. Soil Storage (S) = Available Soil Storage x Pervious Area/Total Area
(See Fig. E-1, SFWMD ERP Information Manual, Vol IV (2007))

Compacted Soil Storage: 1.17 in. Interpolated for D=1.5 ft.

Av. Soil St.	Pervious:	Total (Ac.):	S = (in.):
1.17	5.08	5.08	1.17

Composite Curve Number: 69.00

Time of Concentration (Tc):

Overland Flow:

Length of Flow Segment (Lo) = 50 ft.
n value = 0.10
Slope (So) = 0.02000 ft./ft.
To = ((0.67(n)(Lo)/(So^0.5))^0.467 = 4.38 min. Kerby/Hathaway Eq.

Channelized Flow:

Length of Reach (L) = 1250 ft.
Slope (Sch) = 0.00500 ft./ft.
Tch (min) = .0078(L^0.77)(S^-0.385) = 14.54 min. Kirpich Eq.

Tc = To + Tch = 18.93 min.

MODEL BASIN 3

COVER DESCRIPTION		*% OF BASIN*	*STAGE ELEVATIONS*		SCS
			FROM	*TO*	CN
Structures	0.000 Ac.	0.0%	0.00	up	98
Pavement	0.120 Ac.	34.4%	22.50	23.00	98
Dry Det Area	0.000 Ac.	0.0%	0.00	0.00	69
Dry Det Bank	0.000 Ac.	0.0%	0.00	0.00	69
Dry Det Sump	0.000 Ac.	0.0%	0.00	0.00	69
Grass	0.000 Ac.	0.0%	0.00	0.00	69
Grass Vert	0.230 Ac.	65.6%	23.00	up	69
TOTAL AREA:	0.350 Ac.	100.0%			

Total Impervious: 0.12
34.39%

Total Pervious: 0.23
65.61%

SHWT Elevation: 18.00 ft. NGVD
Average Site Grade: 23.00 ft. NGVD
Antecedent Moisture Cond: Type II

Determine soil storage for the developed site

a. Avg. Depth to Water Table = Avg. Proposed Grade - SHWT

Avg. Grade:	SHWT:	D=(ft.):
23.00	18.00	5.00

b. Soil Storage (S) = Available Soil Storage x Pervious Area/Total Area
(See Fig. E-1, SFWMD ERP Information Manual, Vol IV (2007))

Compacted Soil Storage: 8.18 in. Max. for D= 4 ft.

Av. Soil St.	Pervious:	Total (Ac.):	S = (in.):
8.18	0.23	0.35	5.37

Composite Curve Number: 78.97

Time of Concentration (Tc):

Overland Flow:

Length of Flow Segment (Lo) =	95	ft.	
n value =	0.10		
Slope (So) =	0.02000	ft./ft.	
To = ((0.67(n)(Lo)/(So^0.5))^0.467 =	5.92	min.	Kerby/Hathaway Eq.

Channelized Flow:

Length of Reach (L) =	110	ft.	
Slope (Sch) =	0.00500	ft./ft.	
Tch (min) = .0078(L^0.77)(S^-0.385) =	2.24	min.	Kirpich Eq.
Tc = To + Tch =	8.15	min.	use 10 min

MODEL BASIN 4

COVER DESCRIPTION		*% OF BASIN*	*STAGE ELEVATIONS*		SCS
			FROM	*TO*	CN
Structures	0.697 Ac.	100.0%	24.00	up	98
Pavement	0.000 Ac.	0.0%	0.00	0.00	98
Dry Det Area	0.000 Ac.	0.0%	0.00	0.00	69
Dry Det Bank	0.000 Ac.	0.0%	0.00	0.00	69
Dry Det Sump	0.000 Ac.	0.0%	0.00	0.00	69
Grass	0.000 Ac.	0.0%	0.00	0.00	69
Grass Vert	0.000 Ac.	0.0%	0.00	up	69
TOTAL AREA:	0.697 Ac.	100.0%			

Total Impervious: 0.70
100.00%

Total Pervious: 0.00
0.00%

SHWT Elevation: 18.00 ft. NGVD
Average Site Grade: 24.00 ft. NGVD
Antecedent Moisture Cond: Type II

Determine soil storage for the developed site

a. Avg. Depth to Water Table = Avg. Proposed Grade - SHWT

Avg. Grade:	SHWT:	D=(ft.):
24.00	18.00	6.00

b. Soil Storage (S) = Available Soil Storage x Pervious Area/Total Area
(See Fig. E-1, SFWMD ERP Information Manual, Vol IV (2007))

Compacted Soil Storage: 8.18 in. Max. for D= 4 ft.

Av. Soil St.	Pervious:	Total (Ac.):	S = (in.):
8.18	0.00	0.70	0.00

Composite Curve Number: 98.00

Time of Concentration (Tc):

Overland Flow:

Length of Flow Segment (Lo) =	76	ft.	
n value =	0.10		
Slope (So) =	0.16666	ft./ft.	
To = ((0.67(n)(Lo)/(So^0.5))^0.467 =	3.25	min.	Kerby/Hathaway Eq.

Channelized Flow:

Length of Reach (L) =	400	ft.	
Slope (Sch) =	0.00500	ft./ft.	
Tch (min) = .0078(L^0.77)(S^-0.385) =	6.05	min.	Kirpich Eq.
Tc = To + Tch =	9.30	min.	use 10 min

MODEL BASIN 5

COVER DESCRIPTION		*% OF BASIN*	*STAGE ELEVATIONS*		SCS
			FROM	*TO*	CN
Structures	0.143 Ac.	2.8%	24.00	up	98
Pavement	4.100 Ac.	79.3%	22.90	24.00	98
Dry Det Area	0.000 Ac.	0.0%	0.00	0.00	69
Dry Det Bank	0.000 Ac.	0.0%	0.00	0.00	69
Dry Det Sump	0.000 Ac.	0.0%	0.00	0.00	69
Grass	0.000 Ac.	0.0%	0.00	0.00	69
Grass Vert	0.925 Ac.	17.9%	23.00	up	69
TOTAL AREA:	5.168 Ac.	100.0%			

Total Impervious: 4.24
82.11%

Total Pervious: 0.92
17.89%

SHWT Elevation: 18.00 ft. NGVD
Average Site Grade: 23.00 ft. NGVD
Antecedent Moisture Cond: Type II

Determine soil storage for the developed site

a. Avg. Depth to Water Table = Avg. Proposed Grade - SHWT

Avg. Grade:	SHWT:	D=(ft.):
23.00	18.00	5.00

b. Soil Storage (S) = Available Soil Storage x Pervious Area/Total Area
(See Fig. E-1, SFWMD ERP Information Manual, Vol IV (2007))

Compacted Soil Storage: 8.18 in. Max. for D= 4 ft.

Av. Soil St.	Pervious:	Total (Ac.):	S = (in.):
8.18	0.92	5.17	1.46

Composite Curve Number: 92.81

Time of Concentration (Tc):

Overland Flow:

Length of Flow Segment (Lo) =	12	ft.	
n value =	0.10		
Slope (So) =	0.02000	ft./ft.	
To = ((0.67(n)(Lo)/(So^0.5))^0.467 =	2.25	min.	Kerby/Hathaway Eq.

Channelized Flow:

Length of Reach (L) =	600	ft.	
Slope (Sch) =	0.00500	ft./ft.	
Tch (min) = .0078(L^0.77)(S^-0.385) =	8.26	min.	Kirpich Eq.
Tc = To + Tch =	10.52	min.	

MODEL BASIN 6

COVER DESCRIPTION		*% OF BASIN*	*STAGE ELEVATIONS* *FROM*	*TO*	SCS CN
Structures	0.000 Ac.	0.0%	0.00	up	98
Pavement	0.505 Ac.	38.3%	22.50	30.00	98
Dry Det Area	0.000 Ac.	0.0%	0.00	0.00	69
Dry Det Bank	0.000 Ac.	0.0%	0.00	0.00	69
Dry Det Sump	0.000 Ac.	0.0%	0.00	0.00	69
Grass	0.130 Ac.	9.9%	24.00	29.00	69
Grass Vert	0.682 Ac.	51.8%	24.00	up	69
TOTAL AREA:	1.318 Ac.	100.0%			

Total Impervious: 0.51
38.34%

Total Pervious: 0.81
61.66%

SHWT Elevation: 18.00 ft. NGVD
Average Site Grade: 26.50 ft. NGVD
Antecedent Moisture Cond: Type II

Determine soil storage for the developed site

a. Avg. Depth to Water Table = Avg. Proposed Grade - SHWT

Avg. Grade:	SHWT:	D=(ft.):
26.50	18.00	8.50

b. Soil Storage (S) = Available Soil Storage x Pervious Area/Total Area
(See Fig. E-1, SFWMD ERP Information Manual, Vol IV (2007))

Compacted Soil Storage: 8.18 in. Max. for D= 4 ft.

Av. Soil St.	Pervious:	Total (Ac.):	S = (in.):
8.18	0.81	1.32	5.04

Composite Curve Number: 80.12

Time of Concentration (Tc):

Overland Flow:

Length of Flow Segment (Lo) =	24	ft.	
n value =	0.10		
Slope (So) =	0.02000	ft./ft.	
To = ((0.67(n)(Lo)/(So^0.5))^0.467 =	3.11	min.	Kerby/Hathaway Eq.

Channelized Flow:

Length of Reach (L) =	300	ft.	
Slope (Sch) =	0.00500	ft./ft.	
Tch (min) = .0078(L^0.77)(S^-0.385) =	4.85	min.	Kirpich Eq.
Tc = To + Tch =	7.96	min.	use 10 min

MODEL BASIN 7

COVER DESCRIPTION		*% OF BASIN*	*STAGE ELEVATIONS*		SCS
			FROM	*TO*	CN
Structures	0.270 Ac.	8.5%	24.00	up	98
Pavement	0.733 Ac.	23.1%	23.00	24.00	98
Dry Det Area	0.000 Ac.	0.0%	0.00	0.00	69
Dry Det Bank	0.000 Ac.	0.0%	0.00	0.00	69
Dry Det Sump	0.000 Ac.	0.0%	0.00	0.00	69
Grass	0.258 Ac.	8.1%	20.00	23.00	69
Grass Vert	1.917 Ac.	60.3%	20.00	up	69
TOTAL AREA:	3.177 Ac.	100.0%			

Total Impervious: 1.00
31.56%

Total Pervious: 2.17
68.44%

SHWT Elevation: 18.00 ft. NGVD
Average Site Grade: 22.50 ft. NGVD
Antecedent Moisture Cond: Type II

Determine soil storage for the developed site

a. Avg. Depth to Water Table = Avg. Proposed Grade - SHWT

Avg. Grade:	SHWT:	D=(ft.):
22.50	18.00	4.50

b. Soil Storage (S) = Available Soil Storage x Pervious Area/Total Area
(See Fig. E-1, SFWMD ERP Information Manual, Vol IV (2007))

Compacted Soil Storage: 8.18 in. Max for D= 4 ft.

Av. Soil St.	Pervious:	Total (Ac.):	S = (in.):
8.18	2.17	3.18	5.60

Composite Curve Number: 78.15

Time of Concentration (Tc):

Overland Flow:

Length of Flow Segment (Lo) =	24	ft.	
n value =	0.10		
Slope (So) =	0.02000	ft./ft.	
To = ((0.67(n)(Lo)/(So^0.5))^0.467 =	3.11	min.	Kerby/Hathaway Eq.

Channelized Flow:

Length of Reach (L) =	500	ft.	
Slope (Sch) =	0.00500	ft./ft.	
Tch (min) = .0078(L^0.77)(S^-0.385) =	7.18	min.	Kirpich Eq.
Tc = To + Tch =	10.29	min.	use 10 min

MODEL BASIN 8

COVER DESCRIPTION		*% OF BASIN*	*STAGE ELEVATIONS*		SCS
			FROM	*TO*	CN
Structures	0.000 Ac.	0.0%	24.00	up	98
Pavement	0.003 Ac.	0.5%	23.00	23.50	98
Dry Det Area	0.000 Ac.	0.0%	0.00	0.00	69
Dry Det Bank	0.000 Ac.	0.0%	0.00	0.00	69
Dry Det Sump	0.000 Ac.	0.0%	0.00	0.00	69
Grass	0.000 Ac.	0.0%	0.00	0.00	69
Grass Vert	0.580 Ac.	99.5%	23.00	up	69
TOTAL AREA:	0.583 Ac.	100.0%			

Total Impervious: 0.00
0.46%

Total Pervious: 0.58
99.54%

SHWT Elevation: 18.00 ft. NGVD
Average Site Grade: 23.50 ft. NGVD
Antecedent Moisture Cond: Type II

Determine soil storage for the developed site

a. Avg. Depth to Water Table = Avg. Proposed Grade - SHWT

Avg. Grade:	SHWT:	D=(ft.):
23.50	18.00	5.50

b. Soil Storage (S) = Available Soil Storage x Pervious Area/Total Area
(See Fig. E-1, SFWMD ERP Information Manual, Vol IV (2007))

Compacted Soil Storage: 8.18 in. Max. for D= 4 ft.

Av. Soil St.	Pervious:	Total (Ac.):	S = (in.):
8.18	0.58	0.58	8.14

Composite Curve Number: 69.13

Time of Concentration (Tc):

Overland Flow:

Length of Flow Segment (Lo) =	12	ft.	
n value =	0.10		
Slope (So) =	0.02000	ft./ft.	
To = ((0.67(n)(Lo)/(So^0.5))^0.467 =	2.25	min.	Kerby/Hathaway Eq.

Channelized Flow:

Length of Reach (L) =	300	ft.	
Slope (Sch) =	0.00500	ft./ft.	
Tch (min) = .0078(L^0.77)(S^-0.385) =	4.85	min.	Kirpich Eq.
Tc = To + Tch =	7.10	min.	use 10 min

MODEL BASIN 9

COVER DESCRIPTION		*% OF BASIN*	*STAGE ELEVATIONS* *FROM*	*TO*	SCS CN
Structures	1.033 Ac.	100.0%	24.00	up	98
Pavement	0.000 Ac.	0.0%	0.00	0.00	98
Dry Det Area	0.000 Ac.	0.0%	0.00	0.00	69
Dry Det Bank	0.000 Ac.	0.0%	0.00	0.00	69
Dry Det Sump	0.000 Ac.	0.0%	0.00	0.00	69
Grass	0.000 Ac.	0.0%	0.00	0.00	69
Grass Vert	0.000 Ac.	0.0%	0.00	up	69
TOTAL AREA:	1.033 Ac.	100.0%			

Total Impervious: 1.03
100.00%

Total Pervious: 0.00
0.00%

SHWT Elevation: 18.00 ft. NGVD
Average Site Grade: 24.00 ft. NGVD
Antecedent Moisture Cond: Type II

Determine soil storage for the developed site

a. Avg. Depth to Water Table = Avg. Proposed Grade - SHWT

Avg. Grade:	SHWT:	D=(ft.):
24.00	18.00	6.00

b. Soil Storage (S) = Available Soil Storage x Pervious Area/Total Area
(See Fig. E-1, SFWMD ERP Information Manual, Vol IV (2007))

Compacted Soil Storage: 8.18 in. Max. for D= 4 ft.

Av. Soil St.	Pervious:	Total (Ac.):	S = (in.):
8.18	0.00	1.03	0.00

Composite Curve Number: 98.00

Time of Concentration (Tc):

Overland Flow:

Length of Flow Segment (Lo) =	150	ft.	
n value =	0.10		
Slope (So) =	0.16666	ft./ft.	
To = ((0.67(n)(Lo)/(So^0.5))^0.467 =	4.46	min.	Kerby/Hathaway Eq.

Channelized Flow:

Length of Reach (L) =	241	ft.	
Slope (Sch) =	0.00500	ft./ft.	
Tch (min) = .0078(L^0.77)(S^-0.385) =	4.09	min.	Kirpich Eq.
Tc = To + Tch =	8.56	min.	use 10 min

MODEL BASIN 10

COVER DESCRIPTION		*% OF BASIN*	*STAGE ELEVATIONS* *FROM*	*TO*	SCS CN
Structures	0.247 Ac.	8.8%	24.00	up	98
Pavement	1.365 Ac.	48.5%	22.50	23.50	98
Dry Det Area	0.103 Ac.	3.7%	20.00	23.00	69
Dry Det Bank	0.100 Ac.	3.6%	20.00	22.50	69
Dry Det Sump	0.000 Ac.	0.0%	0.00	0.00	69
Grass	0.000 Ac.	0.0%	0.00	0.00	69
Grass Vert	0.997 Ac.	35.5%	22.00	up	69
TOTAL AREA:	2.812 Ac.	100.0%			

Total Impervious: 1.61
57.32%

Total Pervious: 1.20
42.68%

SHWT Elevation: 18.00 ft. NGVD
Average Site Grade: 22.50 ft. NGVD
Antecedent Moisture Cond: Type II

Determine soil storage for the developed site

a. Avg. Depth to Water Table = Avg. Proposed Grade - SHWT

Avg. Grade:	SHWT:	D=(ft.):
22.50	18.00	4.50

b. Soil Storage (S) = Available Soil Storage x Pervious Area/Total Area
(See Fig. E-1, SFWMD ERP Information Manual, Vol IV (2007))

Compacted Soil Storage: 8.18 in. Interpolated for D=4 ft.

Av. Soil St.	Pervious:	Total (Ac.):	S = (in.):
8.18	1.20	2.81	3.49

Composite Curve Number: 85.62

Time of Concentration (Tc):

Overland Flow:

Length of Flow Segment (Lo) =	24	ft.	
n value =	0.10		
Slope (So) =	0.02000	ft./ft.	
To = ((0.67(n)(Lo)/(So^0.5))^0.467 =	3.11	min.	Kerby/Hathaway Eq.

Channelized Flow:

Length of Reach (L) =	375	ft.	
Slope (Sch) =	0.01000	ft./ft.	
Tch (min) = .0078(L^0.77)(S^-0.385) =	4.41	min.	Kirpich Eq.
Tc = To + Tch =	7.52	min.	use 10 min

MODEL BASIN 11

COVER DESCRIPTION		*% OF BASIN*	*STAGE ELEVATIONS* *FROM*	*TO*	SCS CN
Structures	4.653 Ac.	100.0%	24.00	up	98
Pavement	0.000 Ac.	0.0%	0.00	0.00	98
Dry Det Area	0.000 Ac.	0.0%	0.00	0.00	69
Dry Det Bank	0.000 Ac.	0.0%	0.00	0.00	69
Dry Det Sump	0.000 Ac.	0.0%	0.00	0.00	69
Grass	0.000 Ac.	0.0%	0.00	0.00	69
Grass Vert	0.000 Ac.	0.0%	0.00	up	69
TOTAL AREA:	4.653 Ac.	100.0%			

Total Impervious: 4.65
100.00%

Total Pervious: 0.00
0.00%

SHWT Elevation: 18.00 ft. NGVD
Average Site Grade: 24.00 ft. NGVD
Antecedent Moisture Cond: Type II

Determine soil storage for the developed site

a. Avg. Depth to Water Table = Avg. Proposed Grade - SHWT

Avg. Grade:	SHWT:	D=(ft.):
24.00	18.00	6.00

b. Soil Storage (S) = Available Soil Storage x Pervious Area/Total Area
(See Fig. E-1, SFWMD ERP Information Manual, Vol IV (2007))

Compacted Soil Storage: 8.18 in. Max for D= 4 ft.

Av. Soil St.	Pervious:	Total (Ac.):	S = (in.):
8.18	0.00	4.65	0.00

Composite Curve Number: 98.00

Time of Concentration (Tc):

Overland Flow:

Length of Flow Segment (Lo) =	350	ft.	
n value =	0.10		
Slope (So) =	0.16666	ft./ft.	
To = ((0.67(n)(Lo)/(So^0.5))^0.467 =	6.63	min.	Kerby/Hathaway Eq.

Channelized Flow:

Length of Reach (L) =	350	ft.	
Slope (Sch) =	0.02000	ft./ft.	
Tch (min) = .0078(L^0.77)(S^-0.385) =	3.20	min.	Kirpich Eq.
Tc = To + Tch =	9.83	min.	use 10 min

MODEL BASIN 12

COVER DESCRIPTION		*% OF BASIN*	*STAGE ELEVATIONS* *FROM*	*TO*	SCS CN
Structures	0.000 Ac.	0.0%	0.00	up	98
Pavement	0.661 Ac.	36.9%	27.00	37.00	98
Dry Det Area	0.000 Ac.	0.0%	0.00	0.00	69
Dry Det Bank	0.000 Ac.	0.0%	0.00	0.00	69
Dry Det Sump	0.000 Ac.	0.0%	0.00	0.00	69
Grass	0.551 Ac.	30.7%	31.00	37.00	69
Grass Vert	0.582 Ac.	32.4%	35.00	up	69
TOTAL AREA:	1.794 Ac.	100.0%			

Total Impervious: 0.66
36.86%

Total Pervious: 1.13
63.14%

SHWT Elevation: 18.00 ft. NGVD
Average Site Grade: 33.00 ft. NGVD
Antecedent Moisture Cond: Type II

Determine soil storage for the developed site

a. Avg. Depth to Water Table = Avg. Proposed Grade - SHWT

Avg. Grade:	SHWT:	D=(ft.):
33.00	18.00	15.00

b. Soil Storage (S) = Available Soil Storage x Pervious Area/Total Area
(See Fig. E-1, SFWMD ERP Information Manual, Vol IV (2007))

Compacted Soil Storage: 8.18 in. Max for D= 4 ft.

Av. Soil St.	Pervious:	Total (Ac.):	S = (in.):
8.18	1.13	1.79	5.16

Composite Curve Number: 79.69

Time of Concentration (Tc):

Overland Flow:

Length of Flow Segment (Lo) = 24 ft.
n value = 0.10
Slope (So) = 0.02000 ft./ft.
To = ((0.67(n)(Lo)/(So^0.5))^0.467 = 3.11 min. Kerby/Hathaway Eq.

Channelized Flow:

Length of Reach (L) = 675 ft.
Slope (Sch) = 0.00300 ft./ft.
Tch (min) = .0078(L^0.77)(S^-0.385) = 11.01 min. Kirpich Eq.

Tc = To + Tch = 14.13 min.

MODEL BASIN 13

COVER DESCRIPTION		*% OF BASIN*	*STAGE ELEVATIONS* *FROM*	*TO*	SCS CN
Structures	2.141 Ac.	100.0%	24.00	up	98
Pavement	0.000 Ac.	0.0%	0.00	0.00	98
Dry Det Area	0.000 Ac.	0.0%	0.00	0.00	69
Dry Det Bank	0.000 Ac.	0.0%	0.00	0.00	69
Dry Det Sump	0.000 Ac.	0.0%	0.00	0.00	69
Grass	0.000 Ac.	0.0%	0.00	0.00	69
Grass Vert	0.000 Ac.	0.0%	0.00	up	69
TOTAL AREA:	2.141 Ac.	100.0%			

Total Impervious: 2.14
100.00%

Total Pervious: 0.00
0.00%

SHWT Elevation: 18.00 ft. NGVD
Average Site Grade: 24.00 ft. NGVD
Antecedent Moisture Cond: Type II

Determine soil storage for the developed site

a. Avg. Depth to Water Table = Avg. Proposed Grade - SHWT

Avg. Grade:	SHWT:	D=(ft.):
24.00	18.00	6.00

b. Soil Storage (S) = Available Soil Storage x Pervious Area/Total Area
(See Fig. E-1, SFWMD ERP Information Manual, Vol IV (2007))

Compacted Soil Storage: 8.18 in. Max for D= 4 ft.

Av. Soil St.	Pervious:	Total (Ac.):	S = (in.):
8.18	0.00	2.14	0.00

Composite Curve Number: 98.00

Time of Concentration (Tc):

Overland Flow:

Length of Flow Segment (Lo) = 200 ft.
n value = 0.10
Slope (So) = 0.16666 ft./ft.
To = ((0.67(n)(Lo)/(So^0.5))^0.467 = 5.11 min. Kerby/Hathaway Eq.

Channelized Flow:

Length of Reach (L) = 450 ft.
Slope (Sch) = 0.01000 ft./ft.
Tch (min) = .0078(L^0.77)(S^-0.385) = 5.07 min. Kirpich Eq.

Tc = To + Tch = 10.18 min.

MODEL BASIN 14

COVER DESCRIPTION			*% OF BASIN*	*STAGE ELEVATIONS* *FROM*	*TO*	SCS CN
Structures	0.246	Ac.	4.4%	24.00	up	98
Pavement	2.861	Ac.	51.0%	21.50	23.00	98
Dry Det Area	0.000	Ac.	0.0%	0.00	0.00	69
Dry Det Bank	0.000	Ac.	0.0%	0.00	0.00	69
Dry Det Sump	0.000	Ac.	0.0%	0.00	0.00	69
Grass	0.195	Ac.	3.5%	22.00	30.00	69
Grass Vert	2.313	Ac.	41.2%	19.00	up	69
TOTAL AREA:	5.615	Ac.	100.0%			

Total Impervious: 3.11
55.33%

Total Pervious: 2.51
44.67%

SHWT Elevation: 18.00 ft. NGVD
Average Site Grade: 22.50 ft. NGVD
Antecedent Moisture Cond: Type II

Determine soil storage for the developed site

a. Avg. Depth to Water Table = Avg. Proposed Grade - SHWT

Avg. Grade:	SHWT:	D=(ft.):
22.50	18.00	4.50

b. Soil Storage (S) = Available Soil Storage x Pervious Area/Total Area
(See Fig. E-1, SFWMD ERP Information Manual, Vol IV (2007))

Compacted Soil Storage: 8.18 in. Max for D= 4 ft.

Av. Soil St.	Pervious:	Total (Ac.):	S = (in.):
8.18	2.51	5.62	3.65

Composite Curve Number: 85.05

Time of Concentration (Tc):

Overland Flow:

Length of Flow Segment (Lo) =	24	ft.	
n value =	0.10		
Slope (So) =	0.02000	ft./ft.	
To = ((0.67(n)(Lo)/(So^0.5))^0.467 =	3.11	min.	Kerby/Hathaway Eq.

Channelized Flow:

Length of Reach (L) =	500	ft.	
Slope (Sch) =	0.01000	ft./ft.	
Tch (min) = .0078(L^0.77)(S^-0.385) =	5.50	min.	Kirpich Eq.
Tc = To + Tch =	8.61	min.	use 10 min

MODEL BASIN 15

COVER DESCRIPTION			*% OF BASIN*	*STAGE ELEVATIONS* *FROM*	*TO*	SCS CN
Structures	0.000	Ac.	0.0%	0.00	up	98
Pavement	0.923	Ac.	81.7%	22.50	23.50	98
Dry Det Area	0.000	Ac.	0.0%	0.00	0.00	69
Dry Det Bank	0.000	Ac.	0.0%	0.00	0.00	69
Dry Det Sump	0.000	Ac.	0.0%	0.00	0.00	69
Grass	0.000	Ac.	0.0%	0.00	0.00	69
Grass Vert	0.207	Ac.	18.3%	22.00	up	69
TOTAL AREA:	1.130	Ac.	100.0%			

Total Impervious: 0.92
81.67%

Total Pervious: 0.21
18.33%

SHWT Elevation: 18.00 ft. NGVD
Average Site Grade: 22.75 ft. NGVD
Antecedent Moisture Cond: Type II

Determine soil storage for the developed site

a. Avg. Depth to Water Table = Avg. Proposed Grade - SHWT

Avg. Grade:	SHWT:	D=(ft.):
22.75	18.00	4.75

b. Soil Storage (S) = Available Soil Storage x Pervious Area/Total Area
(See Fig. E-1, SFWMD ERP Information Manual, Vol IV (2007))

Compacted Soil Storage: 8.18 in. Max for D= 4 ft.

Av. Soil St.	Pervious:	Total (Ac.):	S = (in.):
8.18	0.21	1.13	1.50

Composite Curve Number: 92.68

Time of Concentration (Tc):

Overland Flow:

Length of Flow Segment (Lo) =	48	ft.	
n value =	0.10		
Slope (So) =	0.02000	ft./ft.	
To = ((0.67(n)(Lo)/(So^0.5))^0.467 =	4.30	min.	Kerby/Hathaway Eq.

Channelized Flow:

Length of Reach (L) =	190	ft.	
Slope (Sch) =	0.01000	ft./ft.	
Tch (min) = .0078(L^0.77)(S^-0.385) =	2.61	min.	Kirpich Eq.
Tc = To + Tch =	6.91	min.	use 10 min

MODEL BASIN 16

COVER DESCRIPTION			*% OF BASIN*	*STAGE ELEVATIONS* *FROM*	*TO*	SCS CN
Structures	0.000	Ac.	0.0%	0.00	up	98
Pavement	0.639	Ac.	3.1%	22.50	23.00	98
Dry Det Area	1.131	Ac.	5.5%	19.00	22.50	69
Dry Det Bank	0.938	Ac.	4.5%	19.00	22.50	69
Dry Det Sump	0.000	Ac.	0.0%	0.00	0.00	69
Grass	4.291	Ac.	20.7%	19.00	22.00	69
Grass Vert	13.705	Ac.	66.2%	19.00	up	69
TOTAL AREA:	20.703	Ac.	100.0%			

Total Impervious: 0.64
3.09%

Total Pervious: 20.06
96.91%

SHWT Elevation: 18.00 ft. NGVD
Average Site Grade: 20.50 ft. NGVD
Antecedent Moisture Cond: Type II

Determine soil storage for the developed site

a. Avg. Depth to Water Table = Avg. Proposed Grade - SHWT

Avg. Grade:	SHWT:	D=(ft.):
20.50	18.00	2.50

b. Soil Storage (S) = Available Soil Storage x Pervious Area/Total Area
(See Fig. E-1, SFWMD ERP Information Manual, Vol IV (2007))

Compacted Soil Storage: 3.42 in. Interpolated for D= 4 ft.

Av. Soil St.	Pervious:	Total (Ac.):	S = (in.):
3.42	20.06	20.70	3.31

Composite Curve Number: 69.89

Time of Concentration (Tc):

Overland Flow:

Length of Flow Segment (Lo) = 24 ft.
n value = 0.10
Slope (So) = 0.02000 ft./ft.
To = ((0.67(n)(Lo)/(So^0.5))^0.467 = 3.11 min. Kerby/Hathaway Eq.

Channelized Flow:

Length of Reach (L) = 850 ft.
Slope (Sch) = 0.00500 ft./ft.
Tch (min) = .0078(L^0.77)(S^-0.385) = 10.81 min. Kirpich Eq.

Tc = To + Tch = 13.92 min.

Solid Waste Authority of Palm Beach County
Palm Beach Renewable Energy Facility No. 2
Environmental Resource Permit

Attachment 3

Infiltration Rating Curve Calculations

Palm Beach Renewable Energy Facility No. 2

Palm Beach County, Florida

INFILTRATION RATING CURVE CALCULATIONS

SHWT Elevation = 18.00 ft. NGVD
Hydraulic Conductivity (K) = 0.000286 cfs/ft2
Avg. Depth of Sand Layer (L) = 50.00 feet

Retention Area Basin 2	Elevation (ft, NGVD)	Surface Area (Ac)	Head (ft)	Hydraulic Gradient (i)	Discharge Q (cfs)
	18.05	2.02	0.05	0.00	0.03
	19.00	3.04	1.00	0.02	0.76
	21.00	5.07	3.00	0.06	3.79

Retention Area Dry Ret Swale	Elevation (ft, NGVD)	Surface Area (Ac)	Head (ft)	Hydraulic Gradient (i)	Discharge Q (cfs)
	19.00	1.13	1.00	0.02	0.28
	21.00	1.66	3.00	0.06	1.24
	22.50	2.07	4.50	0.09	2.32

Retention Area Cons Area	Elevation (ft, NGVD)	Surface Area (Ac)	Head (ft)	Hydraulic Gradient (i)	Discharge Q (cfs)
	18.40	1.56	0.40	0.01	0.16
	19.75	1.88	1.75	0.04	0.82
	22.50	2.51	4.50	0.09	2.81

Retention Area E-8	Elevation (ft, NGVD)	Surface Area (Ac)	Head (ft)	Hydraulic Gradient (i)	Discharge Q (cfs)
	20.00	0.10	2.00	0.04	0.05
	21.00	0.13	3.00	0.06	0.10
	22.00	0.17	4.00	0.08	0.17
	22.50	0.18	4.50	0.09	0.21

Retention Area N-1/B-13	Elevation (ft, NGVD)	Surface Area (Ac)	Head (ft)	Hydraulic Gradient (i)	Discharge Q (cfs)
	21.00	0.26	3.00	0.06	0.19
	22.00	0.32	4.00	0.08	0.32
	23.00	0.39	5.00	0.10	0.48
	24.00	0.45	6.00	0.12	0.68

Retention Area M-1/J-14	Elevation (ft, NGVD)	Surface Area (Ac)	Head (ft)	Hydraulic Gradient (i)	Discharge Q (cfs)
	22.00	0.09	4.00	0.08	0.09
	23.00	0.14	5.00	0.10	0.17
	24.00	0.19	6.00	0.12	0.28

Retention Area G-2 Swale	Elevation (ft, NGVD)	Surface Area (Ac)	Head (ft)	Hydraulic Gradient (i)	Discharge Q (cfs)
	35.00	0.11	17.00	0.34	0.47
	36.00	0.23	18.00	0.36	1.05
	37.00	0.37	19.00	0.38	1.74

Solid Waste Authority of Palm Beach County
Palm Beach Renewable Energy Facility No. 2
Environmental Resource Permit

Attachment F

Drainage Calculations

ENGINEER'S CERTIFICATION

These calculations were prepared by a Professional Engineer registered in the State of Florida and is being filed for public record. In accordance with Florida Statutes Chapter 471.025 and Florida Administrative Code Chapter 61G15-23.002(1), these calculations shall be signed by the licensee, dated, and sealed as evidence of the authenticity of the report.

7-9-10

Christopher C. Tilman, P.E.
Florida Reg. No. 61903

Palm Beach Renewable Energy Facility No. 2

Palm Beach County, Florida

STORMWATER CALCULATIONS

1.0 DESIGN DESCRIPTION

Palm Beach Co. SWA New Renewable Energy Facility
Total project acreage = 60.63 ac.

2.0 DESIGN STORM RAINFALL AMOUNTS

Storm Frequency	24-hr rainfall (P24)	72-hr rainfall (P72)
10 Year	7.50 in.	10.20 in.
25 Year	10.10 in.	13.20 in.
100 Year	14.10 in.	15.80 in.

Notes: Rainfall values taken from Figs C-4 to C-9 of SFWMD ERP Information Manual, Vol IV (2007).

3.0 PRE-DEVELOPMENT SITE CONDITIONS

3.1. LAND COVERAGE TABLE

COVER DESCRIPTION		*% OF SITE*	*STAGE ELEVATIONS* *FROM*	*TO*	RATIONAL C
Structures	2.781 Ac.	4.6%	24.00	up	0.95
Pavement	8.360 Ac.	13.8%	22.00	22.50	0.95
Lake	0.000 Ac.	0.0%	18.00	22.00	
Det Bank (L)	0.000 Ac.	0.0%	18.00	22.00	
Retention	1.440 Ac.	2.4%	18.00	22.00	0.30
RESERVED(L)	0.000 Ac.	0.0%			0.30
Filled Lake (V)	20.355 Ac.	33.6%	19.00	22.00	0.30
Grass (L)	22.694 Ac.	37.4%	18.00	22.00	0.30
Grass (V)	5.000 Ac.	8.2%	20.00	up	0.30
TOTAL AREA:	60.630 Ac.	100.0%			

Total Impervious: 11.14 ac.
18.38%

Total Lake: 0.00 ac.

Total Pervious: 49.49 ac.
81.62%

SHWT Elevation: 18.00 ft. NGVD
Average Site Grade: 19.00 ft. NGVD
Antecedent Moisture Cond: Type II

Determine soil storage for the developed site

a. Impervious area for soil storage = Impervious + Lake 11.14 ac.

b. Pervious for soil storage = Total - Impervious for soil storage = 49.49 ac.

c. Avg. Depth to Water Table = Avg. Proposed Grade - Water Level

Avg. Grade:	Water Level:	D=(ft.):
19.00	18.00	1.00

d. Soil Storage (S) = Available Soil Storage x Pervious Area/Total Area
(See Fig. E-1, SFWMD ERP Information Manual, Vol IV (2007))

Available Soil Storage = 0.6 in. Compacted fill

Av. Soil St.	Pervious (ac.)	Total (ac.)	S = (in.):
0.60	49.49	60.63	0.49

Time of Concentration (Tc):

Overland Flow:

Length of Flow Segment (Lo) =	100	ft.	
n value =	0.15		Asphalt/roof
Slope (So) =	0.02000	ft./ft.	
To = ((0.67(n)(Lo)/(So^0.5))^0.467 =	7.32	min.	Kerby/Hathaway Eq.

Shallow Concentrated Flow:

Length of Flow Segment (Lo) =	400	ft.	
Slope =	0.00200	ft./ft.	
V = 16.1345(S)^0.5 =	0.72	ft./sec	SCS TR-55
Tsc = (Lsc /(3600*V)) =	9.24	min.	

Channelized Flow:

Length of Reach (L) =	1700	ft.	
Slope (Sch) =	0.00024	ft./ft.	
Tch (min) = .0078(L^0.77)(S^-0.385) =	59.80	min.	Kirpich Eq.
Tc = To + Tch =	76.36	min.	

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STORMWATER CALCULATIONS

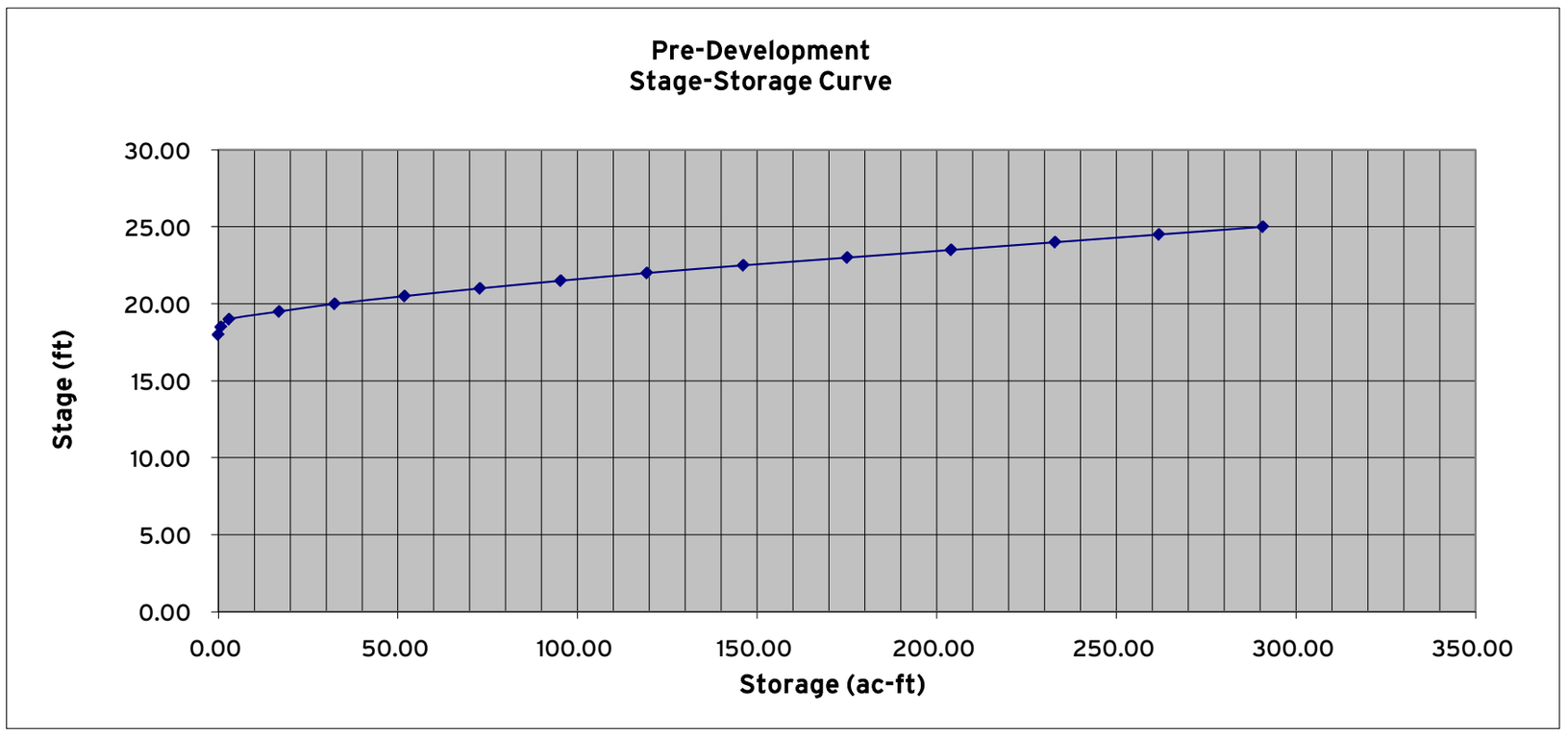
3.2 PRE-DEVELOPMENT SURFACE STORAGE

1. Assumptions:

a.The site storage starts at elevation 18.00 ft. NGVD

2. Develop pre-development stage-storage curve

Stage:	Pavement	Lake	Det Bank (L)	Retention	RESERVED(L)	Filled Lake (V)	Grass (L)	Grass (V)	Total
18.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18.50	0.00	0.00	0.00	0.05	0.00	0.00	0.71	0.00	0.75
19.00	0.00	0.00	0.00	0.18	0.00	0.00	2.84	0.00	3.02
19.50	0.00	0.00	0.00	0.41	0.00	10.18	6.38	0.00	16.97
20.00	0.00	0.00	0.00	0.72	0.00	20.36	11.35	0.00	32.42
20.50	0.00	0.00	0.00	1.13	0.00	30.53	17.73	2.50	51.89
21.00	0.00	0.00	0.00	1.62	0.00	40.71	25.53	5.00	72.86
21.50	0.00	0.00	0.00	2.21	0.00	50.89	34.75	7.50	95.34
22.00	0.00	0.00	0.00	2.88	0.00	61.07	45.39	10.00	119.33
22.50	2.09	0.00	0.00	3.60	0.00	71.24	56.74	12.50	146.17
23.00	6.27	0.00	0.00	4.32	0.00	81.42	68.08	15.00	175.09
23.50	10.45	0.00	0.00	5.04	0.00	91.60	79.43	17.50	204.02
24.00	14.63	0.00	0.00	5.76	0.00	101.78	90.78	20.00	232.94
24.50	18.81	0.00	0.00	6.48	0.00	111.95	102.12	22.50	261.87
25.00	22.99	0.00	0.00	7.20	0.00	122.13	113.47	25.00	290.79



3.3 CALCULATE THE 100-YEAR, 72-HOUR RUNOFF VOLUME AND ZERO DISCHARGE STAGE

1. Compute 100-year, 72-hour zero discharge runoff volume

a. Rainfall - 100 year, 72-hour (P72):
P72 = 15.80 in.

b. Runoff, Q (in.)
Q = {(P - 0.2 x S)^2}/(P + 0.8 x S)

P72 (in.):	S = (in.):	Q (in.):
15.80	0.49	15.23

c. Total Runoff Volume, V (ac-ft.)
V = Q x Total Area

Q (in.):	Total (Ac.):	V=(ac-ft):
15.23	60.63	76.94

d. From the Stage - Storage Curve, the zero discharge elevation is:

Interpolate Stage between...	21.00	21.50
Interpolate Storage between...	72.86	95.34

Zero Discharge Stage 21.09 ft. NGVD Set as preliminary finished floor elevation

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STORMWATER CALCULATIONS

3.4 CALCULATE THE 25-YEAR, 72-HOUR RUNOFF VOLUME, PEAK FLOW AND ZERO DISCHARGE STAGE

1. Compute 25-year, 72-hour zero discharge runoff volume

a. Rainfall - 25-year, 72-hour (P72):

P72 = 13.20 in.

b. Runoff, Q (in.)

Q = {(P - 0.2 x S)^2}/(P + 0.8 x S)

P72 (in.):	S = (in.):	Q (in.):
13.20	0.49	12.63

c. Total Runoff Volume, V (ac-ft.)

V = Q x Total Area x 1 ft. /12 in.

Q (in.):	Total (Ac.):	V = (ac-ft):
12.63	60.63	63.81

d. Calculate Peak 25-year, 72-hour Flow (Qp):

Composite C =	0.42	
25-yr Correction Factor =	1.10	
Corrected Composite C =	0.46	
Tc=	76.36	min
Intensity (i)=	3.50	in/hour (from FDOT Zone 10 25-yr IDF curves)
Area (A)=	60.63	ac.

Qp = 97.91 cfs

e. From the Stage - Storage Curve, the zero discharge elevation is:

Interpolate Stage between...	20.50	21.00
Interpolate Storage between...	51.89	72.86

Zero Discharge Stage 20.78 ft. NGVD

3.5 CALCULATE THE 10-YEAR, 24-HOUR RUNOFF VOLUME AND ZERO DISCHARGE STAGE

2. Compute 10-year, 24-hour zero discharge runoff volume

a. Rainfall - 10-year, 24-hour (P24):

P24 = 7.50 in.

b. Runoff, Q (in.)

Q = {(P - 0.2 x S)^2}/(P + 0.8 x S)

P72 (in.):	S = (in.):	Q (in.):
7.50	0.49	6.94

c. Total Runoff Volume, V (ac-ft.)

V = Q x Total Area x 1 ft. /12 in.

Q (in.):	Total (Ac.):	V = (ac-ft):
6.94	60.63	35.08

d. From the Stage - Storage Curve, the zero discharge elevation is:

Interpolate Stage between...	20.00	20.50
Interpolate Storage between...	32.42	51.89

Zero Discharge Stage 20.07 ft. NGVD Set as preliminary road crown elevation

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STORMWATER CALCULATIONS

4.0 PROPOSED POST-DEVELOPMENT SITE CONDITIONS

4.1. LAND COVERAGE TABLE

COVER DESCRIPTION			*% OF SITE*	*STAGE ELEVATIONS* *FROM*	*TO*	RATIONAL C
Structures	9.430	Ac.	15.6%	24.00	up	0.95
Pavement	14.960	Ac.	24.7%	22.00	24.00	0.95
Dry Ret Area	1.234	Ac.	2.0%	19.00	22.00	0.30
Dry Ret Bank	1.038	Ac.	1.7%	19.00	22.00	0.30
RESERVED	0.000	Ac.	0.0%	22.00	22.00	0.30
Conserv (L)	1.270	Ac.	2.1%	18.00	22.00	0.30
Conserv (V)	1.240	Ac.	2.0%	18.00	22.00	0.30
Grass (L)	6.237	Ac.	10.3%	22.00	22.00	0.30
Grass (V)	25.223	Ac.	41.6%	22.50	24.00	0.30
TOTAL AREA:	60.630	Ac.	100.0%			

Total Impervious: 24.39 ac.
40.23%

Total Pervious: 36.24 ac.
59.77%

SHWT Elevation: 18.00 ft. NGVD
Average Site Grade: 22.59 ft. NGVD
Antecedent Moisture Cond: Type II

Determine soil storage for the developed site

a. Impervious area for soil storage = Impervious + Lake 24.39 ac.

b. Pervious for soil storage = Total - Impervious for soil storage = 36.24 ac.

c. Avg. Depth to Water Table = Avg. Proposed Grade - SHWT

Avg. Grade:	SHWT:	D=(ft.):
22.59	18.00	4.59

d. Soil Storage (S) = Available Soil Storage x Pervious Area/Total Area
(See Fig. E-1, SFWMD ERP Information Manual, Vol IV (2007))

Compacted Soil Storage: 8.18 in. Max D= 4 ft

Av. Soil St.	Pervious Ac.:	Total Ac.:	S = (in.):
8.18	36.24	60.63	4.89

Time of Concentration (Tc):

Overland Flow:

Length of Flow Segment (Lo) =	300	ft.	
n value =	0.20		
Slope (So) =	0.00050	ft./ft.	
To = ((0.67(n)(Lo)/(So^0.5))^0.467 =	33.11	min.	Kerby/Hathaway Eq.

Shallow Concentrated Flow:

Length of Flow Segment (Lsc) =	400	ft.	
Slope =	0.00050	ft./ft.	
V = 16.1345(S)^0.5 =	0.36	ft./sec	SCS TR-55
Tsc = (Lsc /(3600*V)) =	18.48	min.	

Channelized Flow:

Length of Reach (L) =	350	ft.	
Slope (Sch) =	0.00050	ft./ft.	
Tch (min) = .0078(L^0.77)(S^-0.385) =	13.24	min.	Kirpich Eq.
Tc = To + Tsc + Tch =	64.83	min.	

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STORMWATER CALCULATIONS

5.0 DESIGN CRITERIA

5.1 SFWMD QUALITY STANDARDS

IF A WET DETENTION SYSTEM, then the greater of:
a) the first inch of runoff from the entire site
b) the amount of 2.5 times the percentage of imperviousness

IF A DRY DETENTION SYSTEM, then 75% of the wet detention volume.

IF A RETENTION SYSTEM, then 50% of the wet detention volume.

IF INDUSTRIAL ZONING, then minimum 0.5 inch of dry detention or retention volume is required.

Any detention system shall be designed to discharge no more than 0.5 inch of the detained volume per day.

5.2 DESIGN INFORMATION

Preliminary design elevations:

Building finished floor:	21.09	ft. NGVD
Roads		
Centerline no lower tha	20.07	ft. NGVD
Roads shall be at least	2.00	ft. above the control elevation
Control elevation	18.07	ft. NGVD
Receiving Water Elevation:	16.90	ft. NGVD

6.0 COMPUTATIONS

6.1. QUALITY

1. Compute the first inch of runoff from the developed project

V = 1 in. x Total Area x (1/12)

Total Area (Ac	V (ac-in)	V (ac-ft)
60.63	60.63	5.05

2. Compute 2.5 inches times the percentage of imperviousness

a. Site Area = Total Area - (Lake Area + Bldg. Area)

Total (Ac.):	Lake:	Bldg.:	Site (Ac.):
60.63	0.00	9.43	51.20

b. Impervious Area = Site Area - Pervious Area

Site (Ac.):	Pervious:	Imperv.:
51.20	36.24	14.96

c. % Impervious for water quality = Imperv. /Site Area x 100% = 29.22 %

d. 2.5 in. x % Imperv. = 0.73 in.

e. Compute volume required for quality detention

V= inches to be treated x (total site - lak 3.69 ac-ft

3. Required wet detention volume 5.05 ac-ft
Volume reduction factor for retention system: 0.50

4. Compute 0.5 inch of pretreatment

Vp = 0.5 in. x (total site - lake) x (1/12) =	2.53 ac-ft	Minimum volume for dry retention area
Retention provides pretreatment volume	YES	

5. Compute required retention volume

Vr = Total required retention volume = 2.53 ac-ft

6.2 PROJECT SURFACE STORAGE

1. Assumptions:

a. Retention pond storage is vertical starting at elevation 19.00 ft. NGVD
b. Retention bank storage is linear starting at el. 19.0 ft. NGVD and vertical starting at el. 22.0 ft. NGVD
c. Fringe preserve area storage is vertical starting at elevati 18.00 ft. NGVD
d. Fringe preserve area bank storage is linear starting at el. 18.0 ft. NGVD and vertical starting at el. 22.0 ft. NGVD

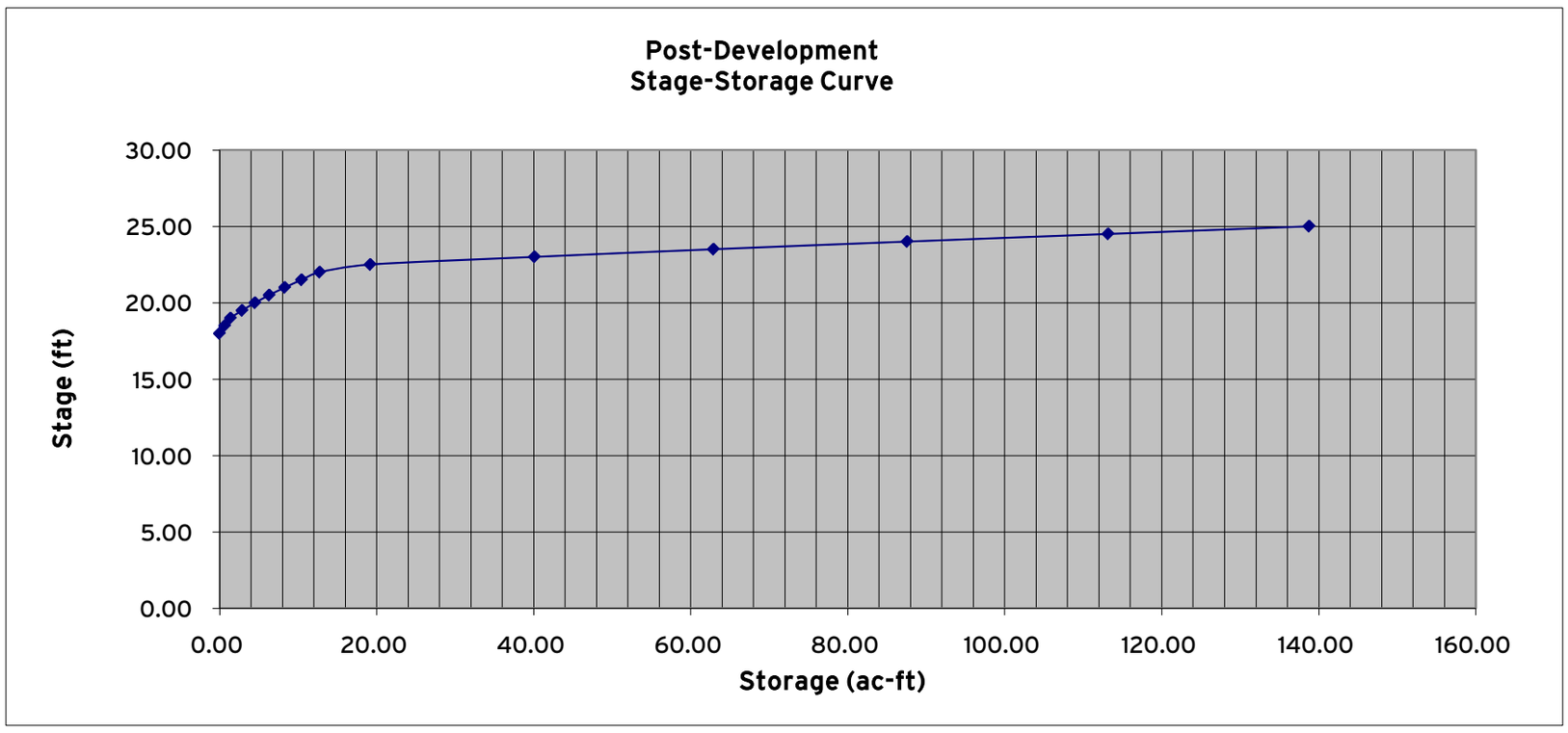
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2. Develop project stage-storage curve

Stage:	Pavement	Dry Ret Area	Dry Ret Bank	RESERVED	Conserv (L)	Conserv (V)	Grass (L)	Grass (V)	Total
18.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18.50	0.00	0.00	0.00	0.00	0.04	0.62	0.00	0.00	0.66
19.00	0.00	0.00	0.00	0.00	0.16	1.24	0.00	0.00	1.40
19.50	0.00	0.62	0.04	0.00	0.36	1.86	0.00	0.00	2.88
20.00	0.00	1.23	0.17	0.00	0.64	2.48	0.00	0.00	4.52
20.50	0.00	1.85	0.39	0.00	0.99	3.10	0.00	0.00	6.33
21.00	0.00	2.47	0.69	0.00	1.43	3.72	0.00	0.00	8.31
21.50	0.00	3.08	1.08	0.00	1.94	4.34	0.00	0.00	10.45
22.00	0.00	3.70	1.56	0.00	2.54	4.96	0.00	0.00	12.76
22.50	0.93	4.32	2.08	0.00	3.18	5.58	3.12	0.00	19.20
23.00	3.74	4.94	2.59	0.00	3.81	6.20	6.24	12.61	40.13
23.50	8.41	5.55	3.11	0.00	4.45	6.82	9.35	25.22	62.92
24.00	14.96	6.17	3.63	0.00	5.08	7.44	12.47	37.83	87.59
24.50	22.44	6.79	4.15	0.00	5.72	8.06	15.59	50.45	113.19
25.00	29.92	7.40	4.67	0.00	6.35	8.68	18.71	63.06	138.79



6.3 CHECK THE MINIMUM BUILDING FLOOR ELEVATION

1. Preliminary Finished Floor Elevation: 21.09 ft. NGVD

2. Compute 100-year, 72-hour zero discharge runoff volume

a. Rainfall - 100 year, 72-hour (P72):
P72 = 15.80 in.

b. Runoff, Q (in.)
Q = {(P - 0.2 x S)^2}/(P + 0.8 x S)

P72 (in.):	S = (in.):	Q (in.):
15.80	4.89	11.15

c. Total Runoff Volume, V (ac-ft.)
V = Q x Total Area

Q (in.):	Total (Ac.):	V=(ac-ft):
11.15	60.63	56.31

d. From the Stage - Storage Curve, the zero discharge elevation is:

Interpolate Stage between...	23.00	23.50
Interpolate Storage between...	40.13	62.92

Zero Discharge Stage 23.36 ft. NGVD Revise Proposed FFE

3. Proposed Finished Floor Elevation: 24.00 ft. NGVD OK

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STORMWATER CALCULATIONS

6.4 CHECK THE 25-YEAR, 72-HOUR PEAK FLOW AND ZERO DISCHARGE STAGE

1. Pre-development 25-year, 72-hour zero discharge stage: 20.78 ft. NGVD

2. Compute 25-year, 72-hour zero discharge runoff volume

a. Rainfall - 25-year, 72-hour (P72):

P72 = 13.20 in.

b. Runoff, Q (in.)

Q = {(P - 0.2 x S)^2}/(P + 0.8 x S)

P72 (in.):	S = (in.):	Q (in.):
13.20	4.89	8.73

c. Total Runoff Volume, V (ac-ft.)

V = Q x Total Area x 1 ft. /12 in.

Q (in.):	Total (Ac.):	V = (ac-ft):
8.73	60.63	44.11

d. Calculate 25-year, 24-hour Peak Flow (Qp):

Composite C =	0.56	
25-yr Correction Factor =	1.10	
Corrected Composite C =	0.62	
Tc=	64.83	min
Intensity (i)=	3.90	in/hour (from FDOT Zone 10 25-yr IDF curves)
Area (A)=	60.63	ac.
Qp =	146.04	cfs

e. From the Stage - Storage Curve, the zero discharge elevation is:

Interpolate Stage between...	23.00	23.50
Interpolate Storage between...	40.13	62.92

Zero Discharge Stage 23.09 ft. NGVD CHECK OK

6.5 CHECK THE MINIMUM ROAD CENTERLINE ELEVATION

1. Preliminary road crown elevation: 20.07 ft. NGVD

2. Compute 10-year, 24-hour zero discharge runoff volume

a. Rainfall - 10 year, 24-hour (P24):

P24 = 7.50 in.

b. Runoff, Q (in.)

Q = {(P - 0.2 x S)^2}/(P + 0.8 x S)

P72 (in.):	S = (in.):	Q (in.):
7.50	4.89	3.73

c. Total Runoff Volume, V (ac-ft.)

V = Q x Total Area x 1 ft. /12 in.

Q (in.):	Total (Ac.):	V = (ac-ft):
3.73	60.63	18.83

d. From the Stage - Storage Curve, the zero discharge elevation is:

Interpolate Stage between...	22.00	22.50
Interpolate Storage between...	12.76	19.20

Zero Discharge Stage 22.47 ft. NGVD Revise Road Crown Elevation

4. Proposed Minimum Road Centerline Elevation: 22.50 ft. NGVD OK

6.6 CHECK CONTROL STRUCTURE DESIGN

1. Total required quality detention volume = 2.53 ac-ft

2. Initial Control structure Design:

Primary control will be dry retention area spillway invert to on-site fringe preservation area. Secondary (overflow) control will be concrete weir structure to main outfall. Aluminum baffle around overflow weir and top of structure.

3. Determine primary and secondary weir crest elevations

a. Calculate minimum weir crest elevation required for quality retention volume from the Stage-Storage curve

Interpolate Stage between...	20.50	21.00
Interpolate Storage between...	2.24	3.16

Minimum weir crest elevation required for quality retention =	20.66	ft. NGVD	
Proposed primary weir control elevation =	20.80	ft. NGVD	OK

b. Set secondary (overflow) weir elevation

Weir crest elevation for zero discharge during design storm	23.09	ft. NGVD	
Proposed secondary weir control elevation =	20.80	ft. NGVD	OK

4. Size the primary and peak discharge (overflow) weir

a. Size primary weir

Allowable (pre-dev) peak discharge (Q) =	97.91	cfs	
25-year, 72-hour zero discharge stage =	23.09	ft. NGVD	
Weir crest elevation =	20.80	ft. NGVD	
Maximum design head (H) =	0.90	ft.	Design max WSE 0.5 ft below typical EOP of 22.2 NGVD
Calc. weir length L = Q/(3.13 x (H)^1.5) =	36.64	ft.	Use 24 foot weir length
Proposed weir length =	24.00	ft.	
Max weir discharge =	64.14	cfs	OK

b. Size secondary (peak discharge) weir

Allowable (pre-dev) peak discharge (Q) =	97.91	cfs	
25-year, 72-hour zero discharge stage =	23.09	ft. NGVD	
Weir crest elevation =	20.80	ft. NGVD	
Maximum design head (H) =	0.90	ft.	Design max WSE 0.5 ft below typical EOP of 22.2 NGVD
Calc. weir length L = Q/(3.13 x (H)^1.5) =	36.64	ft.	Use 31 foot weir length
Proposed weir length =	31.00	ft.	
Max weir discharge =	82.85	cfs	OK

5. Size the baffle area around the primary discharge weir

H = (Q^2)/(2g)(CA)^2

C= 0.60
Q= 64.14
g= 32.20
H= 0.10

Min. Baffle Area (A) = 42.12 sq. ft.

6. Size the baffle area around the secondary discharge weir

H = (Q^2)/(2g)(CA)^2

C= 0.60
Q= 82.85
g= 32.20
H= 0.10

Min. Baffle Area (A) = 54.41 sq. ft.

7. Size the secondary (overflow) control structure outfall pipe

Outfall Pipe Type =	Class III ERCP		
Maximum discharge Q =	82.85	cfs	
Target Outfall Velocity =	2.50	ft/s	
Total Minimum Flow Area =	33.14	sq. ft.	
Number of Pipes =	3.00		
Minimum Pipe Flow Area =	11.05	sq. ft.	
Test pipe size 38 x 60 ERCP =	48.00	inch circular	Af = 12.9 ft2
Flow split Q per pipe =	27.62	cfs	
Manning's n-value =	0.013		
Hydraulic Radius = 0.25D =	1.00	ft	
Upstream pipe invert elevation =	17.35	ft. NGVD	
Downstream pipe invert elevation =	17.30	ft. NGVD	
Outfall pipe length =	54.00	ft.	
Outfall Slope =	0.0009	ft/ft	
Flow velocity =	3.4783	ft/s	CHECK
Minimum Outfall Pipe Diameter =	3.37	ft.	
Proposed Outfall Pipe Diameter =	48.00	inches	OK

8. Control Structure Summary

Top of structure elevation =	21.30	ft. NGVD
Overflow weir crest elev. =	20.80	ft. NGVD
Overflow weir length =	31.00	ft.
Min. Baffle Area =	42.12	sq. ft.

6.7 CHECK RETENTION BASIN RECOVERY TIME

The system must recover 50% of the required retention volume within 24 hours after the design (25-yr, 72-hr) storm event per SFWMD design criteria and the entire retention volume within 72 hours after the design storm event per Chapter 62-25.025(4), FAC.

1. Dry retention volume @ elevation 20.72 NGVD =	2.53	ac-ft	
2. Primary and secondary control weir elevation =	20.80	ft. NGVD	
2. Retention basin bottom elevation:	19.00	ft. NGVD	
3. SHWT elevation:	18.00	ft. NGVD	
4. 50% of retention volume above elevation:	20.00	ft. NGVD	Isosceles Trapezoid calc.
5. Minimum infiltration head (h) for first 50% of retention volume:	2.00	feet	

6. Calculate average soil infiltration rate (Q) and 50% recovery time:

Hydraulic Conductivity (k) =	0.000286	cfs/ft2	Avg Tierra perc tests
Avg. Depth of Sand Layer (L) =	50.00	feet	BPF geo report
Surface Area (A) at elevation 20.00 ft. NGVD =	1.3958	ac.	CAD measurement
Hydraulic gradient (i) = h/L =	0.040		
Minimum infiltration rate (Q) = kiA =	0.70	cfs	
50% of 25-year, 72-hour storm runoff volume =	55,021.82	cubic feet	
50% recovery time based on minimum infiltration rate =	21.97	hours	OK - Check w/ADICPR

7. Check routed 100% recovery time with ADICPR. 72 hours - OK

7.0 FINAL DESIGN SUMMARY

The system is designed as a dry retention system that will provide quality treatment for the 25-year, 72-hour storm.
On-site fringe preservation area provides additional wet retention up to elevation 20.8, then flow outfalls via the concrete overflow weir.

SHWT Elevation =	18.00	ft. NGVD	
Dry Retention Basin bottom elevation =	19.00	ft. NGVD	
Required Dry Retention Volume =	2.53	ac-ft	
Dry retention volume @ elevation 20.66 NGVD =	2.53	ac-ft	
Primary control weir elevation =	20.80	ft. NGVD	
Primary control weir length =	24.00	ft.	
100-Year, 72-Hour Storm Zero Discharge Stage =	23.36	ft. NGVD	
100-Year, 72-Hour Total Runoff Volume =	56.31	ac-ft	
25-Year, 72-Hour Zero Discharge Stage =	23.09	ft. NGVD	
25-Year, 72-Hour Total Runoff Volume =	44.11	ac-ft	

Final design elevations:

Proposed Building finished floor elevation =	24.00	ft. NGVD	OK
Proposed Perimeter berm top elevation =	22.00	ft. NGVD	Check ICPR results for peak routed stage
Roads			
Min EOP 2.00 ft. above control elevation	22.80	ft. NGVD	
Proposed Minimum EOP elevation =	22.00	ft. NGVD	OK

Final Proposed Control Structure Details

Top of structure elevation =	21.30	ft. NGVD	
Overflow weir crest elev. =	20.80	ft. NGVD	
Overflow weir length =	31.00	ft.	
Min. Baffle Area =	42.12	sq. ft.	
Outfall Pipe Type =	Class III RCP		
Number of Outfall Pipes =	3.00		
Maximum discharge Q =	82.85	cfs	
Upstream outfall invert elevation =	17.35	ft. NGVD	
Downstream outfall invert elevation =	17.30	ft. NGVD	
Length of Outfall Pipe =	54.00	ft.	
Outfall Slope =	0.0009	ft/ft	
Proposed Outfall Pipe Diameter =	48.00	inches	38"x60" ERCP

Drawings

See Attachment C for ERP drawings

PRINTED:	PREPARED BY:	REVISED BY:	DATE:
7/9/2010	CCT	CCT	5/18/2010

Solid Waste Authority of Palm Beach County
Palm Beach Renewable Energy Facility No. 2
Environmental Resource Permit

Attachment G

Legal Description

LEGAL DESCRIPTION

OWNERSHIP NO. 1

JOHN E. CORBALLY, JAMES M. FURMAN AND JAMES M MURDOCH TRUSTEES UNDER THE MACARTHUR LIQUIDATING TRUST AGREEMENT DATED DECEMBER 28, 1983.

DESCRIPTION

PARCEL A:

A tract of land lying in Sections 22 and 27, Township 42 South, Range 42 East, Palm Beach County, Florida, and more particularly described as follows:

All that part of Section 22, lying South of the Southerly right-of-way line of the Seaboard Coastline Railroad, and the North one-half of Section 27, Township 42 South, Range 42 East, lying East of a line running North and South which line commences at a point located in the North section line of Section 22, 2,000 feet West of the point at which said North section line is intersected by the Westerly right-of-way of the Sunshine State Parkway, as recorded in Deed Book 1110, Page 583, in the Public Records of Palm Beach County, Florida, and which line terminates at a point situated on the East/West half section of section line of Section 27, 2,000 feet West of a point at which the West right-of-way line of the Sunshine State Parkway intersects said half section line, LESS that part described in Official Record Book 2399, Page 713, in the Public Records of Palm Beach County, Florida, and LESS the right-of-way of said Sunshine State Parkway as conveyed in Deed Book 1110, Page 583, in the Public Records of Palm Beach County, Florida, and as laid out and in use. Also described as: The Easternmost 2,000 feet of Section 22, lying South of the right-of-way of the Seaboard Coastline Railroad, and of the North one-half of Section 27, lying immediately West of the West right-of-way of Sunshine State Parkway, LESS that part described in Official Record Book 2399, Page 713, in the Public Records of Palm Beach County, Florida, and LESS the right-of-way of said Sunshine State Parkway as conveyed in Deed Book 1110, Page 583, in the Public Records of Palm Beach County, Florida, and as laid out and in use.

PARCEL B:

The South half of Section 27 and all of Section 34, Township 42 South, Range 42 East, Palm Beach County, Florida; LESS right-of-way of Sunshine State Parkway as vested in the Florida State Turnpike Authority by Final Judgment in MCC Book 74, Page 662, Public Records of Palm Beach County, Florida, and as laid out and in use.

PARCEL C:

The West 2,632 feet of the North half of Section 3, lying North of State Road 702, LESS the Northwest Quarter of the Northwest Quarter of the Northwest Quarter of said Section 3, all in Township 43 South, Range 42 East, Palm Beach County, Florida.

PARCEL D:

The North one-half of the Northeast quarter of the Northwest quarter of the Northeast quarter of Section 27, Township 42 South, Range 42 East, Palm Beach County, Florida.

OWNERSHIP NO. 2

ARTHUR GLADSTONE, TRUSTEE

DESCRIPTION

PARCEL A:

The North Half of Section 3, Township 43 South, Range 42 East, Palm Beach County, Florida, lying North of the North Right-of-way line of 45th Street (State Road 702) and West of the West right-of-way line of the Sunshine State Parkway, LESS therefrom the West 2,779.41 feet; measured at right angles thereto.

PARCEL B:

The North Half of Section 3, Township 43 South, Range 42 East, Palm Beach County, Florida, lying South of the South right-of-way of 45th Street (State Road 702) and West of the West right-of-way line of the Sunshine State Parkway.

PARCEL C:

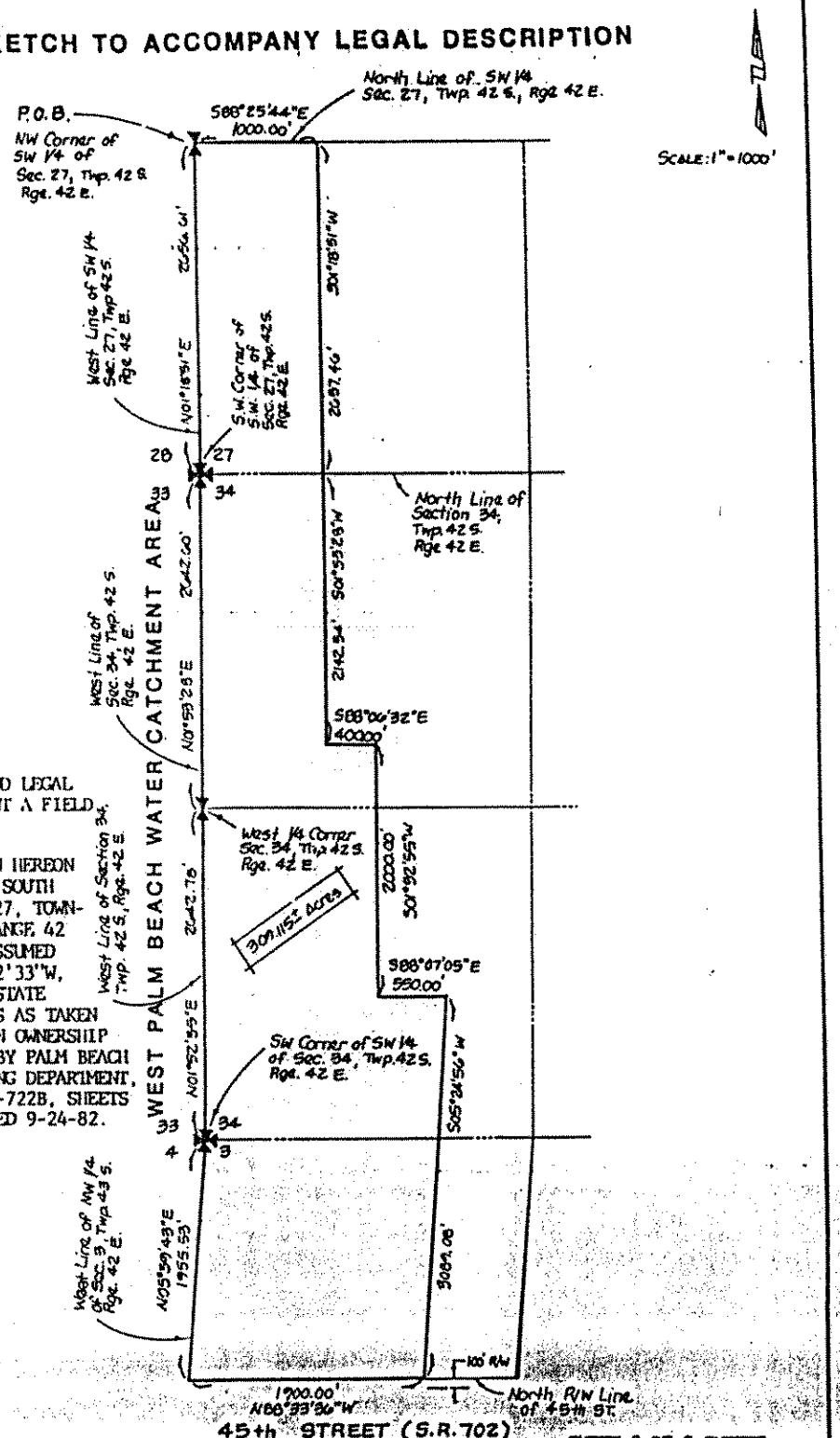
That portion of the north half of Section 2, Township 43 South, Range 42 East, Palm Beach County, Florida, lying south of 45th Street and west of Haverhill Road, said parcel containing 73.40 acres, net, and being more particularly described as follows:

Beginning at the quarter section corner in the east line of said Section 2, which is on the centerline of Haverhill Road, as now laid out and in use; thence, run westerly on the south line of said north half of Section 2, angling 93°28'05" from said centerline, from north to west, a distance of 5,296.30 feet to the quarter section corner in the west line of said Section 2, which point is on the easterly right-of-way line of the sunshine state parkway (now known as the Florida Turnpike); thence, run northerly, along said right-of-way line, which is also the west line of said Section 2, angling 87°00'25" from east to north, a distance of 659.85 feet to a point on the centerline of 45th Street, as now laid out and in use; thence, run easterly on said centerline, parallel to the said south line of the north half of Section 2, a distance of 5,301.79 feet to a point on said east line of Section 2, the said centerline of Haverhill Road; thence, run southerly on said centerline, angling 86°31'55" from west to south, a distance of 660.16 feet to the point of beginning; less the north 50 feet thereof and the east 50 feet thereof for road rights-of-way.

SUBJECT TO: Easement to Florida Power & Light Company dated and filed and record on April 20, 1971, recorded in official record book 1891, page 1098, Palm Beach County, Florida records; right-of-way to county of Palm Beach, dated April 15, 1964, recorded in official record book, 1018, page 365, Palm Beach County, Florida records.

SUBJECT TO: Rights-of-way, easements and other matters of record.

SKETCH TO ACCOMPANY LEGAL DESCRIPTION



NOTES:

1) THIS SKETCH AND LEGAL DOES NOT REPRESENT A FIELD SURVEY.

2) BEARINGS SHOWN HEREON ARE BASED ON THE SOUTH LINE OF SECTION 27, TOWNSHIP 42 SOUTH, RANGE 42 EAST HAVING AN ASSUMED BEARING OF N88°22'33"W, WHICH REFERS TO STATE PLANE COORDINATES AS TAKEN FROM THAT CERTAIN OWNERSHIP SURVEY PREPARED BY PALM BEACH COUNTY ENGINEERING DEPARTMENT, DRAWING NO. S3-82-722B, SHEETS 1 THROUGH 8, DATED 9-24-82.

B5297 P1035

DATED: 1-16-87

SHEET 2 OF 2 SHEETS
FILE NO. 87-9357-SS4

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• engineering • land surveying • land planning • land developmental consultation

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5567 CORAL GATE BOULEVARD (N.W. 29th STREET) • MARGATE, FLORIDA 33063. PHONE (305) 979 0550

RECORD VERIFIED
PALM BEACH COUNTY, FLA.
JOHN B. DUNKLE
CLERK CIRCUIT COURT

JUN-02-1987 12:38PM 87-159613

CONSERVATION EASEMENT

Documentary Tax Pd $ 4.50
$ _____ Intangible Tax Pd.
Clerk, Palm Beach County, Florida

STATE OF FLORIDA
COUNTY OF PALM BEACH

KNOW ALL MEN BY THESE PRESENTS that for and in consideration of the issuance of State of Florida Department of Environmental Regulation permit number DOAH Case No. 85-2032 in the name of Palm Beach County Resource Recovery Project, Power Plant Siting Certification Application No. PA 84-20, and other good and valuable considerations, the receipt of which is hereby acknowledged, **PALM BEACH COUNTY SOLID WASTE AUTHORITY** ("Grantor") has bargained, sold, conveyed and granted unto the **STATE OF FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION** ("Grantee"), 2600 Blair Stone Road, Tallahassee, Florida, a conservation easement in accordance with Section 704.06, Florida Statutes (1985), in and over the following-described real property in Palm Beach County, Florida:

(See attached Exhibit A)

1. In accordance with Section 704.06, Florida Statutes (1985) and the terms of this easement, the following activities are prohibited on the subject property, except as authorized by the above-described permit and any modifications made thereto, and further subject to the specific exceptions herein:

(a) Construction or placing of buildings, roads, signs, billboards or other advertising, utilities, or other structures on or above the ground, except pursuant to permitted construction under the individual permit;

(b) Dumping or placing of soil or other substances or material as landfill, or dumping or placing of trash, waste, or unsightly or offensive materials, except as specifically authorized by the above-described permit;

(c) Removal or destruction of trees, shrubs, or other vegetation beyond the scope of the approved mitigation plan as required by the above-described permit;

(d) Excavation, dredging, or removal of loam, peat, gravel, soil, rock, or other material substance in such manner as to affect the surface beyond the scope of the approved mitigation plan as required by the above-described permit;

(e) Surface use except for purposes that permit the land or water area to remain predominantly in its natural condition, subject to obligations

10.00
2220
130

B5297 P1031

1

1227
34
3

and requirements of Grantor under the above permit and as set forth in paragraph 2 below.

(f) Unpermitted activities detrimental to drainage, flood control, water conservation, erosion control, soil conservation, or fish and wildlife habitat preservation;

(g) Acts or uses detrimental to such retention of land or water areas, except those ancillary uses permitted by the above-described permit.

2. Provided, however, that this easement does not preclude the following specific activities from being undertaken by Grantor on the subject property as authorized pursuant to the above-referenced permit or as required to reconstruct after deterioration due to normal wear and tear, in the event of casualty, or as required by obsolescence:

(a) Construct and maintain improvements to the City of West Palm Beach dike along the western boundary;

(b) Construct and maintain surface water improvements within the conservation area to allow the flow of water from north to south consisting of lowering land elevations in certain upland areas;

(c) Construct and maintain surface water berms around the conservation area;

(d) Construct and maintain improvements on the spoil windrows of the abandoned pit south of the roost area to provide future roost availability;

(e) Access to the conservation area to implement and monitor the restoration and mitigation plan, and to conduct restorations and repairs;

(f) Access to the conservation area for maintenance and monitoring of the surface water management system after construction has been completed, including restoration and routine repairs.

Grantor retains the right to amend this paragraph 2 to include any additional actions required by the Department of Environmental Regulation, State of Florida, or any other jurisdictional agency having jurisdiction over the regional resource recovery facility and landfill, insofar as Grantor may be required to re-enter the premises or undertake action to maintain its permitting and the operation of the resource recovery facility and landfill over and above the properties committed to this easement.

3. In the event that the facility ceases to be constructed or to operate so that the property is not operated as a regional resource recovery

B5291 P1032

facility and landfill as permitted under the original permit request, then this easement shall terminate and the use of the property will revert free and clear of any burden to Grantor, its successors or assigns. However, in the event the premises are used as anticipated subject to the permit and a closure plan is implemented, the property subject to this easement shall be included in said closure plan but shall remain impressed with this easement, except only as may be modified under the terms hereunder, or by agreement between the parties.

IN WITNESS WHEREOF, Grantor has hereunto set Grantor's hand and seal on this 15th day of April, 1987.

Signed, sealed and delivered
in the presence of:

PALM BEACH COUNTY SOLID WASTE AUTHORITY

By: _____

Witnesses as to "Grantor"

The foregoing instrument was acknowledged before me by Chairman Donald Kiselewski on behalf of the PALM BEACH COUNTY SOLID WASTE AUTHORITY this 15th day of April, 1987.

Notary Public
State of Florida at Large

My commission expires:

Notary Public, State of Florida at Large,
My Commission Expires Oct. 31, 1989.
Bonded thru Notary Public Underwriters.

This instrument was prepared by:
Herbert C. Gibson, Esq.
Gibson & Adams, P.A.
Post Office Box 1629
West Palm Beach, FL 33402-1629

8529 P103

EASEMENT

DESCRIPTION:

A PORTION OF THE WEST ONE-HALF (W 1/2) OF SECTIONS 27 AND 34, TOWNSHIP 42 SOUTH, RANGE 42 EAST AND A PORTION OF THE NORTHWEST ONE-QUARTER (N.W. 1/4) OF SECTION 3, TOWNSHIP 43 SOUTH, RANGE 42 EAST, PALM BEACH COUNTI, FLORIDA, BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGIN AT THE NORTHWEST CORNER OF THE SOUTHWEST ONE-QUARTER (S.W. 1/4) OF SECTION 27, TOWNSHIP 42 SOUTH, RANGE 42 EAST AND RUN ON AN ASSUMED BEARING OF S88°25'44"E ALONG THE NORTH LINE OF THE SOUTHWEST ONE-QUARTER (S.W. 1/4) OF SECTION 27, TOWNSHIP 42 SOUTH, RANGE 42 EAST, FOR A DISTANCE OF 1000.00 FEET; THENCE RUN S01°18'51"W ALONG A LINE PARALLEL WITH THE WEST LINE OF THE SOUTHWEST ONE-QUARTER (S.W. 1/4) OF SECTION 27, TOWNSHIP 42 SOUTH, RANGE 42 EAST, FOR A DISTANCE OF 2657.46 FEET TO A POINT LYING ON THE NORTH LINE OF SECTION 34, TOWNSHIP 42 SOUTH, RANGE 42 EAST; THENCE RUN S01°53'28"W ALONG A LINE PARALLEL WITH THE WEST LINE OF THE NORTHWEST ONE-QUARTER (N.W. 1/4) OF SECTION 34, TOWNSHIP 42 SOUTH, RANGE 42 EAST FOR A DISTANCE OF 2142.54 FEET; THENCE RUN S88°06'32"E FOR 400.00 FEET; THENCE RUN S01°52'55"W ALONG A LINE PARALLEL WITH THE WEST LINE OF THE SOUTHWEST ONE-QUARTER (S.W. 1/4) OF SECTION 34, TOWNSHIP 42 SOUTH, RANGE 42 EAST AND ITS NORTHERLY EXTENSION THEREOF FOR A DISTANCE OF 2000.00 FEET; THENCE RUN S88°07'05"E FOR 550.00 FEET; THENCE RUN S05°24'56"W FOR 3089.08 FEET TO A POINT LYING ON THE NORTH RIGHT-OF-WAY LINE OF 45TH STREET (A.K.A. STATE ROAD 702) ACCORDING TO DEED BOOK 1055 AT PAGE 496 OF THE PUBLIC RECORDS OF PALM BEACH COUNTY, FLORIDA; THENCE RUN N88°33'36"W ALONG SAID NORTH RIGHT-OF-WAY LINE FOR A DISTANCE OF 1900.00 FEET TO A POINT LYING ON THE WEST LINE OF THE NORTHWEST ONE-QUARTER (N.W. 1/4) OF SECTION 3, TOWNSHIP 43 SOUTH, RANGE 42 EAST; THENCE RUN N05°59'43"E ALONG SAID WEST LINE OF THE NORTHWEST ONE-QUARTER (N.W. 1/4) OF SECTION 3, TOWNSHIP 43 SOUTH, RANGE 42 EAST FOR A DISTANCE OF 1955.53 FEET TO THE SOUTHWEST CORNER OF THE SOUTHWEST ONE-QUARTER (S.W. 1/4) SECTION 34, TOWNSHIP 42 SOUTH, RANGE 42 EAST; THENCE RUN N01°52'55"E ALONG THE WEST LINE OF SECTION 34, TOWNSHIP 42 SOUTH, RANGE 42 EAST FOR A DISTANCE OF 2642.78 FEET TO THE WEST QUARTER CORNER OF SECTION 34, TOWNSHIP 42 SOUTH, RANGE 42 EAST; THENCE RUN N01°53'28"E ALONG SAID WEST LINE OF SECTION 34, TOWNSHIP 42 SOUTH, RANGE 42 EAST FOR A DISTANCE OF 2642.60 FEET TO THE SOUTHWEST CORNER OF THE SOUTHWEST ONE-QUARTER (S.W. 1/4) OF SECTION 27, TOWNSHIP 42 SOUTH, RANGE 42 EAST; THENCE RUN N01°18'51"E ALONG THE WEST LINE OF THE SOUTHWEST ONE-QUARTER (S.W. 1/4) OF SECTION 27, TOWNSHIP 42 SOUTH, RANGE 42 EAST FOR A DISTANCE OF 2656.61 FEET TO THE POINT OF BEGINNING.

CONTAINING 309.115 ACRES MORE OR LESS.

SAID LANDS SITUATE IN PALM BEACH COUNTY, FLORIDA.

CERTIFICATE:

I HEREBY CERTIFY THAT THE ABOVE LEGAL DESCRIPTION IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

HELLER-WEAVER AND CATO, INC.

BY: DONALD L. CATO
PROFESSIONAL LAND SURVEYOR
FLORIDA REG. NO. 3895

NOTES:

1) THIS SKETCH AND LEGAL DOES NOT REPRESENT A FIELD SURVEY.

2) BEARINGS SHOWN HEREON ARE BASED ON THE SOUTH LINE OF SECTION 27, TOWNSHIP 42 SOUTH, RANGE 42 EAST HAVING A BEARING OF N88°22'33"W, WHICH REFERS TO STATE PLANE COORDINATES AS TAKEN FROM THAT CERTAIN OWNERSHIP SURVEY PREPARED BY PALM BEACH COUNTY ENGINEERING DEPARTMENT, DRAWING NO. 53-82-722B. SHEETS 1 THROUGH 8, DATED 9-24-82.

RECORDER'S MEMO: Legibility of Writing, Typing or Printing unsatisfactory in this document when received.

DATED: 1-16-87

SHEET 1 OF 2 SHEETS
FILE NO. 87-9357-SS3

85297 P1034

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Solid Waste Authority of Palm Beach County
Palm Beach Renewable Energy Facility No. 2
Environmental Resource Permit

Attachment H

Geotechnical Reports and ICPR Report (CD-ROM)

3582056 / FTL

Report of Geotechnical Exploration
For

New Mass Burn WTE Facility
Solid Waste Authority of Palm Beach County

Malcolm Pirnie, Inc.
8201 Peters Road, Suite 3400
Plantation, FL 33324
Project Number: 3582-054

Prepared by:

Williams Earth Sciences, Inc.
Reference # 6308-016-00

WILLIAMS
EARTH SCIENCES INC

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Choose Integrity.

10600 Endeavour Way
Largo, Florida 33777
Office: (727) 541-3444
Fax: (727) 541-1510
www.williamsearthsciences.com

July 2, 2008

Malcolm Pirnie, Inc.
8201 Peters Road, Suite 3400
Plantation, Florida 33324

Attention: Leah Richter, P.E.
Senior Project Engineer

Subject: Report of Geotechnical Exploration for New Mass Burn WTE Facility
Solid Waste Authority of West Palm Beach
Palm Beach County, Florida.
Williams Project No.: 6308-016-00

Dear Ms. Richter:

Williams Earth Sciences, Inc. (Williams) is pleased to submit this Preliminary Geotechnical Report for the above referenced project. The analyses in the following report are based on information gathered by Williams and/or provided by Malcolm Pirnie, Inc.

Included herein are project information, the geotechnical exploration and laboratory results, site and subsurface conditions, and preliminary considerations for site development recommendations.

We appreciate the opportunity to provide our engineering services for the New Mass Burn WTE Facility project. If you have any questions or need additional information, please contact either of the undersigned.

Sincerely,

WILLIAMS EARTH SCIENCES, INC.

Osvaldo Vargas, E.I.
Geotechnical Project Manager

Lawrence D. Spears, P.E.
Senior Geotechnical Engineer
Florida Registration No. 52105

Distribution: Addressee (3)
File (1)

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APPENDICES

Appendix A SITE LOCATION MAP & FIELD EXPLORATION PLAN

Site Location Map

Field Exploration Plan

Appendix B FIELD EXPLORATION REPORTS

Appendix C LABORATORY TEST RESULTS

Table 1 – Sumary of Laboratory Test Results

1.0 INTRODUCTION

1.1 Project information

The project site is located at the west side of North Jog Road in between Bee Line Highway and 45th Street in Palm Beach County, Florida. More specifically, the project site is located within the Solid Waste Authority Landfill Facility in the city of West Palm Beach, Florida. The project consists of the construction of a New Mass Burn WTE Facility by the Solid Waste Authority. Based on the information obtained on or around March 27, 2008 from Malcolm Pirnie, for the proposed construction, the northern portion of an on-site lake, the South Lake, will be dredged and the dredged material will be used as fill for the southern portion of the lake. Additional project specific information, including building design and grading criteria, was not provided to Williams at the time of the investigation. The Site Location map included in Appendix A illustrates the general location of the referenced project.

1.2 Purpose and Scope of Services

The purpose of this study was to explore the subsurface conditions within and around the perimeter of the northern portion of the South Lake, and subsequently develop preliminary geotechnical engineering considerations for the proposed project. More specifically, the study included:

- Standard Penetration Test borings to explore the subsoil and groundwater conditions;
- Laboratory testing of representative soil samples to define their characteristics;
- Engineering analyses of the field data to develop general geotechnical recommendations for the project.

The preliminary geotechnical site development considerations relative to the design are generally included in Section 4.0. Our findings, conclusions and recommendations in this report are subject to the Limitations found in Section 5.0.

2.0 SUBSURFACE EXPLORATION

2.1 Field Testing

Prior to the initiation of fieldwork, "Sunshine State One Call" was notified to clear underground utilities within the site. Our subsurface investigation was performed between June 6, 2008 and June 12, 2008. To explore the subsurface conditions on this site, a total of four Standard Penetration Test (SPT) borings (B-1 to B-4) were drilled. Borings B-1 and B-2 were performed around the perimeter of the South Lake with one of Williams' truck-mounted drill rigs. These two borings were drilled to a depth of 56 feet (approximately 50 feet below the water surface of the lake). Borings B-3 and B-4 were performed within the lake with Williams' Pontoon Barge. These two borings were drilled to depths of 45 and 50 feet, respectively, below the water surface of the lake. For borings B-1 and B-2, soil samples were taken at 5 feet intervals in the upper 35 feet and at 2.5 feet intervals thereafter. For borings B-3 and B-4, soil samples were taken at 2.5 feet intervals. The approximate locations of the borings are shown on the Field Exploration Plan in Appendix A. Samples of each soil encountered were placed in glass jars that were sealed and transported to our laboratory for further review by an engineer or geologist. The results of the SPT borings are shown on the boring

logs in Appendix B. The equipment and procedures used in the SPT borings are also described in Appendix B.

2.2 Laboratory Testing

Representative soil samples collected from the SPT borings were classified and stratified in general accordance with the Unified Soil Classification System. Our classification was based on visual observations, using the results of laboratory testing to confirm the visual classification. Laboratory index property testing consisting of grain size analysis and moisture content were performed on selected samples to assist in soil classification and to provide a general indication of the engineering properties of the soils. The test results are summarized in Appendix C.

2.2.1 Moisture Content

The moisture content, w, is defined as the ratio of the weight of water in a sample to the weight of solids. The wet sample is weighed, then oven-dried to a constant weight at a temperature of about 110° C. The weight after drying is the weight of solids. The change in weight which has occurred during drying is equivalent to the weight of water. Tests were performed in accordance with ASTM D2216. The moisture content is valuable in determining the index properties of soils and can be correlated with other parameters.

2.2.2 Grain Size Analysis

The grain size analysis provides a direct measurement of the particle size distribution of soil by causing the sample to pass through a series of wire screens with progressively smaller openings of known size. The amount of material retained on each sieve is weighed. Results are reported on a combined grain size distribution plot as the percentage of sample smaller than, by weight, versus the log of the particle diameter. This data is necessary for classification of the soil. Tests were performed in accordance with ASTM D422.

3.0 GEOTECHNICAL SITE AND SUBSURFACE CONDITIONS

3.1 Site Conditions

The project site is located within the landfill facility of the Solid Waste Authority of West Palm Beach. More specific, the area under which the investigation was focused is the South Lake. This lake has an approximate area of 28 acres and ranges from 35 to over 40 feet deep. The lake is bordered to the east by North Jog Road and to the north, west and south by an access road to the landfill facility. The areas around the perimeter of the lake are mainly grassy areas with some shrubs and trees.

3.2 Subsurface Conditions

The subsurface soil conditions as encountered in the borings, in the order of depth below the ground surface, are described in the following paragraphs. These descriptions are only intended to be a generalization of the soil conditions. For more detailed information, please refer to the Boring Logs in Appendix B. It is noted that the relative density of the soils encountered in the borings was estimated as a result of the correlation with the SPT values.

Subsurface conditions encountered in borings B-1 and B-2, generally consisted of loose to dense clean sands (SP) below the ground surface to depths of 25 and 15 feet, respectively. Standard penetration test resistances (N-values) in this layer ranged from 4 to 29 blows per foot (bpf).Below

this layer of clean sands, intermittent layers of very loose to medium dense silty, slightly silty, and clean sands (SM, SP-SM, SP) were encountered to a depth of 50 feet. In these layers, the standard penetration test resistances (N-values) ranged from 1 to 16 blows per foot. Finally from a depth of 50 feet to the boring termination depth of 56 feet, a layer of medium dense slightly silty sand with sandstone fragments (SP-SM) was encountered. Standard penetration test resistances (N-values) in this layer ranged from 10 to 17 blows per foot.

For boring B-3, performed around the central area of the lake, the subsurface soil conditions generally consisted of a layer of loose clean sand (SP) from the mudline (encountered at a depth of 33.5 feet below the top of the water) to a depth of 35 feet. The SPT resistance (N-value) in this layer was 7 blows per foot (bpf). Below this layer of clean sand, a layer of loose to medium dense slightly silty sand with sandstone fragments (SP-SM) was encountered to a depth of 44.5 feet. SPT (N-values) in this layer ranged from 5 to 17 blows per foot. Finally from a depth of 44.5 feet to the boring termination depth of 45 feet, a layer of medium dense clayey sand (SC) was encountered.

For boring B-4, performed around the northern area of the lake, the subsurface soil conditions generally consisted of intermittent layers of very loose to medium dense silty, slightly silty, and clean sands (SM, SP-SM, SP) from the mudline (encountered at a depth of 42 feet below the top of the water) to the boring termination depth of 50 feet. For these layers, the SPT resistances (N-values) ranged from 2 to 18 blows per foot (bpf).

3.3 Groundwater

Groundwater observations were made during drilling operations at all boring locations. In borings B-1 and B-2, the groundwater depth was observed to be at an average of 6.0 feet below the ground surface. In borings B-3 and B-4, the water depth was measured to be 33.5 and 42 feet, respectively. In addition to the boring locations, three other additional locations in the lake were selected to measure the depth of the water. In these additional locations, the depth of the water was observed to range from 35 to more than 40 feet deep. The Field Exploration Plan in Appendix A shows the three locations where the water depth was measured.

It should be noted that the elevation of the groundwater is not constant, but varies during the year depending upon the season, recent precipitation, and site drainage characteristics.

4.0 PRELIMINARY ENGINEERING EVALUATION AND RECOMMENDATIONS

From the results of our field exploration and the laboratory testing, it is observed that the soils below the bottom of the lake consist primarily of very loose to medium dense sands with varying contents of silt and rock fragments. From the information provided, we understand that these are the soils that will be dredged for the proposed construction. Based on the results of our investigation and the ease of drilling of these materials, we anticipate that no difficult conditions should be encountered in the dredging operations of these types of materials. However, at the time of the investigation, no information was provided regarding the depth of the dredging operations or the technique to be used for dredging. It should also be noted that the borings performed were widely spaced and that due to the large area of the lake, variations in the soil conditions can occur. Should unexpected dense soil or rock formations be encountered, it can potentially affect the dredging operations.

It is our opinion that the type of soils encountered during our investigation below the bottom of the lake could be acceptable materials to use as fill for the southern portion of the lake, provided that adequate procedures of fill preparation and placement are followed. However, as previously stated,

due to the large area of the lake, variations in the soil conditions can occur. Should unsuitable materials such as clay or muck be encountered during the dredging operations, these materials should be disposed and not used as fill. Finally, we would recommend that once more details regarding the depth of the dredging, the technique to be used for dredging, and the type of structures to be constructed become available, additional borings be performed in order to better delineate the subsurface conditions throughout the site.

5.0 LIMITATIONS OF STUDY

Williams' professional services have been performed, our findings obtained, and our preliminary recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices. This warranty is in lieu of all other warranties, either expressed or implied. Williams Earth Sciences, Inc. is not responsible for the independent conclusions, opinions or recommendations made by others based on the field exploration and laboratory test data presented in this report.

We wish to point out that a preliminary geotechnical study is inherently limited in that the preliminary engineering recommendations are developed from information obtained from the widely spaced soil test borings that only depict subsurface conditions at the specific locations, times and depth shown on the logs. Soil conditions at other locations may differ from those encountered in the test borings, and the passage of time may cause the soils conditions to change from those described in this report.

This report is intended for use by the designers of this project. While Williams has no objections to it being provided for review by other parties for this project, it is not a complete geotechnical study and is not intended as such. To that end, additional exploration at the actual building locations will be required to develop design recommendations.

Furthermore, if the project characteristics are altered significantly from those discussed in this report, if the project information contained in this report is incorrect or if additional information becomes available, a review must be made by this office to determine if any modifications in the recommendations will be necessary.

The scope of our services does not include any environmental assessments or investigations for the presence or absence of hazardous or toxic materials in the soil, groundwater or surface water or beyond the site studied. Any statements in this report or on the test boring logs regarding unusual subsurface conditions and/or composition, odor, staining origin or other characteristics of the surface and/or subsurface materials are strictly for the information of our client.

APPENDIX A

SITE LOCATION MAP

&

FIELD EXPLORATION PLAN



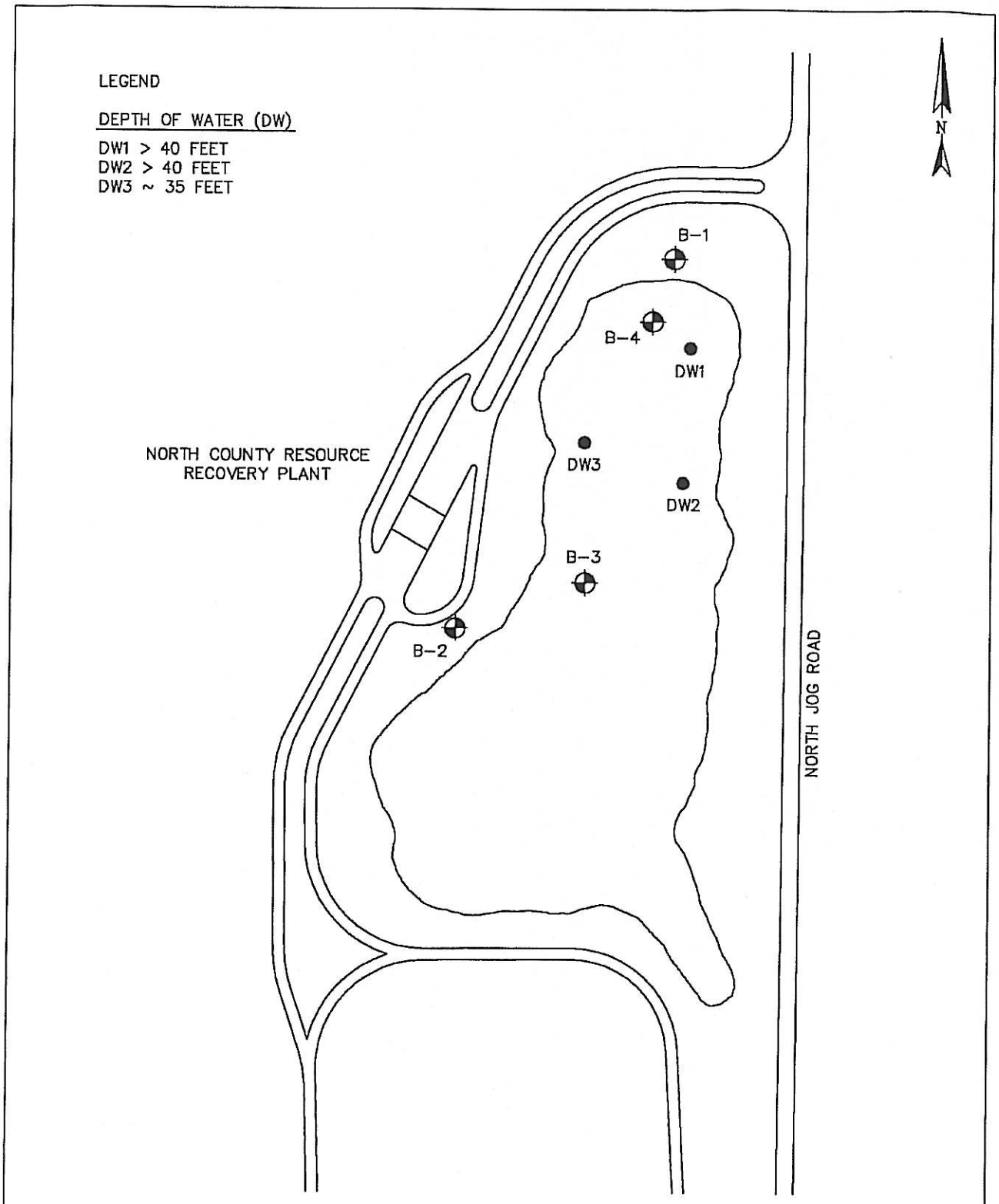
New Mass Burn WTE Facility
West Palm Beach
Palm Beach County, Florida

Williams Project No.: 6308-016-00

Figure 1

SITE LOCATION MAP

WILLIAMS
EARTH SCIENCES INC.



WILLIAMS EARTH SCIENCES, INC.
CORPORATE OFFICE 10600 Endeavour Way, Largo, FL 33777
Jacksonville: (904) 262-8852 FAX: (904) 262-8864
Largo: (727) 541-3444 FAX: (727) 541-1510
Ft. Lauderdale: (954) 972-7570 FAX: (954) 972-6608
Ft. Myers: (239) 337-9781 FAX: (239) 337-9783
Panama City: (850) 747-9419 FAX: (850) 763-2454

NEW MASS BURN WTE FACILITY
PALM BEACH COUNTY, FLORIDA

FIELD EXPLORATION PLAN

Drawn By: TEJ	Date: 6/17/2008	Scale: N.T.S.
Checked By: OJV	Report No. 6308-016-00	Figure No. 2

field

FIELD EXPLORATION REPORTS

APPENDIX B

UNIFIED CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES
COARSE-GRAINED SOILS more than 50% retained on No. 200 sieve *	GRAVELS 50% or more of coarse fraction retained on No. 4 sieve	CLEAN GRAVELS	GW	Well-graded gravels and gravel-sand mixtures, little or no fines
			GP	Poorly graded gravels and gravel-sand mixtures, little or no fines
		GRAVELS WITH FINES	GM	Silty gravels, gravel-sand-silt mixtures
			GC	Clayey gravels, gravel-sand-clay mixtures
	SANDS More than 50% of coarse fraction passes No. 4 sieve	CLEAN SANDS	SW	Well-graded sands and gravelly sands, little or no fines
			SP	Poorly graded sands and gravelly sands, little or no fines
		SANDS WITH FINES	SM	Silty sands, sand-silt mixtures
			SC	Clayey sands, sand-clay mixtures
FINE-GRAINED SOILS 50% or more passes No. 200 sieve *	SILTS AND CLAYS Liquid Limit 50% or less		ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
			OL	Organic silts and organic silty clays of low plasticity
	SILTS AND CLAYS Liquid Limit greater than 50%		MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts
			CH	Inorganic clays or high plasticity, fat clays
			OH	Organic clays of medium to high plasticity
Highly Organic Soils			PT	Peat, muck and other highly organic soils

* Based on the material passing the 3-in. (75-mm) sieve.

AASHTO CLASSIFICATION SYSTEM

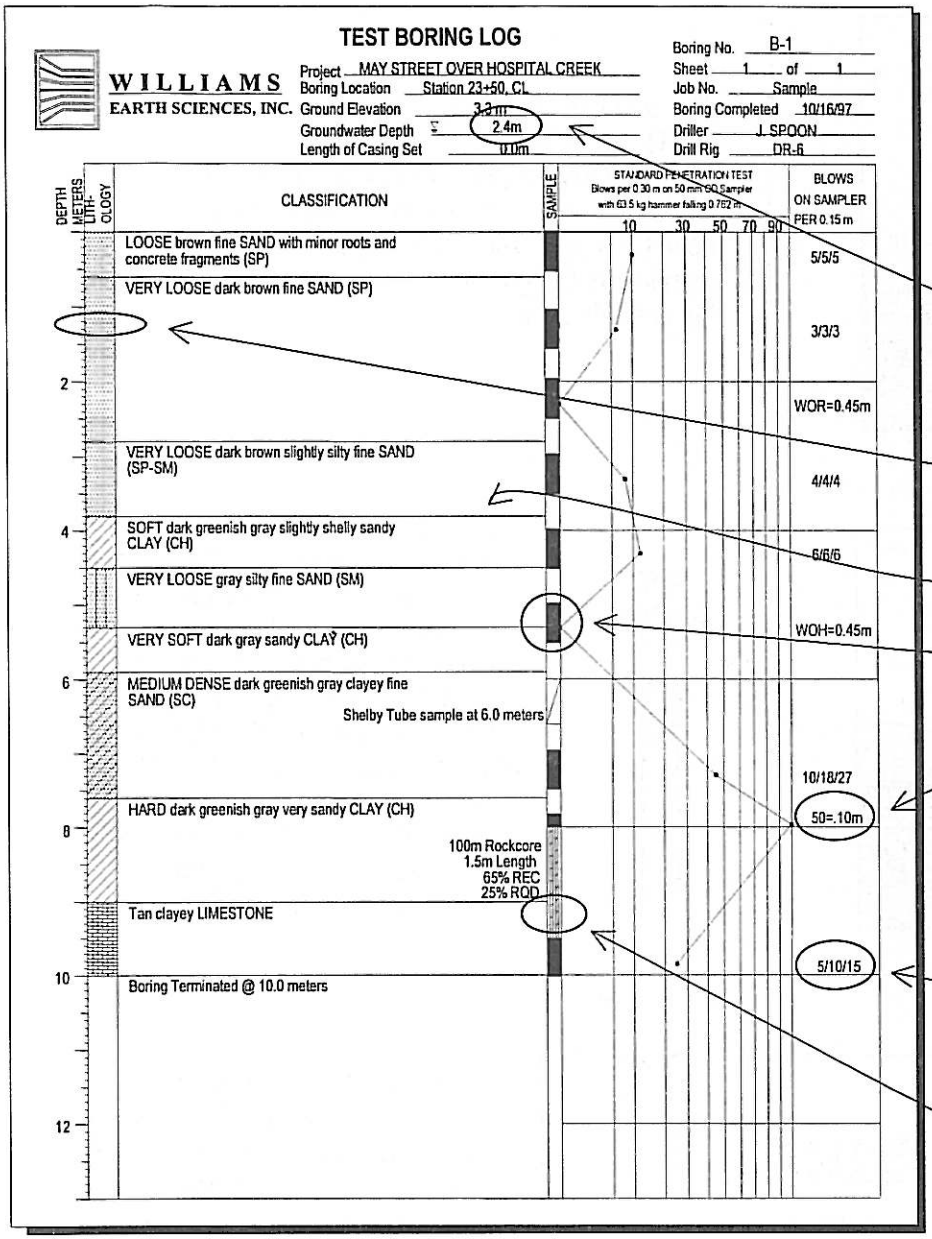
Classification[a] of Soils and Soil-Aggregate Mixtures (with Suggested Subgroups)

General Classification	Granular Materials (35% or less passing No. 200)							Silt-Clay Materials (More than 35% passing No. 200)				
	A-1			A-2							A-7	
											A-7-5	
Group Classification	A-1-a	A-1-b	A-3	A-2-4	A-2-5	A-2-6	A-2-7	A-4	A-5	A-6	A-7-6	A-8 [c]
Sieve analysis, percent passing:												
No. 10	50 max.											
No. 40	30 max.	50 max.	51 min.									
No. 200	15 max.	25 max.	10 max.	35 max.	35 max.	35 max.	35 max.	36 min.	36 min.	36 min.	36 min.	
Characteristics of fraction passing No 40:												
Liquid limit				40 max.	41 min.	40 max.	41 min.	40 max.	41 min.	40 max.	41 min.	
Plasticity index	6 max.		NP	10 max.	10 max.	11 min.	11 min.	10 max.	10 max.	11 min.	11 min.[b]	
Usual types of significant constituent materials	Stone fragments, gravel and sand		Fine sand	Silty or clayey gravel and sand				Silty soils		Clayey soils		Organic soils
General rating as subgrade	← Excellent to good →							← Fair to poor →				poor

[a] Classification procedure: With required test data available, proceed from left to right on above chart and correct group will be found by the process of elimination. The first group from the left into which the test data will fit is the correct classification.

[b] A-7-5 if PI ≤ LL – 30; if PI > LL – 30. [c] A-8 Group refers to Peat and Muck Soils.

UNDERSTANDING THE BORING LOG



This sample boring log is a visual and descriptive representation of what was sampled in the field. The reader cannot safely infer any conclusion on any single item of information, but rather the entire log, along with the other boring logs, must be analyzed relative to the proposed structure.

Water depth is important to the designer when constructing ponds, roadways and foundations.

Lithology (see Unified Classification System or AASHTO Classification System)

Approximate stratum break

Length of sampling operation

If at 50 blows, there is less than 6" or 0.15m of penetration, then it's plotted @ 100 and actual length of sample is shown.

The total number of blows for the last two 6" (0.30m) increments of the sample is termed the blow count (N-Value). In this case: 10 + 15 = 25 which is plotted on the boring log.

Indicates Rock coring operation (ASTM D 2113). Core size diameter = 4" (100mm); core length = 5' (1.5m). Recovery = 65% is actual length recovered divided by length cored.

RQD = 25% Rock Quality Designation determined by the sum of all lengths of 4" (100mm) or greater (mechanical breaks excluded) divided by the length cored expressed as a percent.

Symbols / Boring Log Legend

SPT Sample	
Drilled/No Sample	WOH — *Weight of Hammer*
Hand Auger to clear utilities	WOR — *Weight of Rod*
Thin-Wall Shelby Tube (Undisturbed Sample)	
Rock Core	50= # — *50 blows with a specified penetration*

TEST BORING LOG

WILLIAMS
EARTH SCIENCES, INC.

Project: New Mass Burn WTE Facility
Boring Location: Refer to Boring Location Plan
Ground Elevation: N/A
Groundwater Depth: ▽ 6'
Length of Casing Set: 10'

Boring No.: B-1
Sheet: 1 of 2
Job No.: 6308-016-00
Boring Completed: 6/6/2008
Driller: R. Miller
Drill Rig: Truck-Mounted CME-55

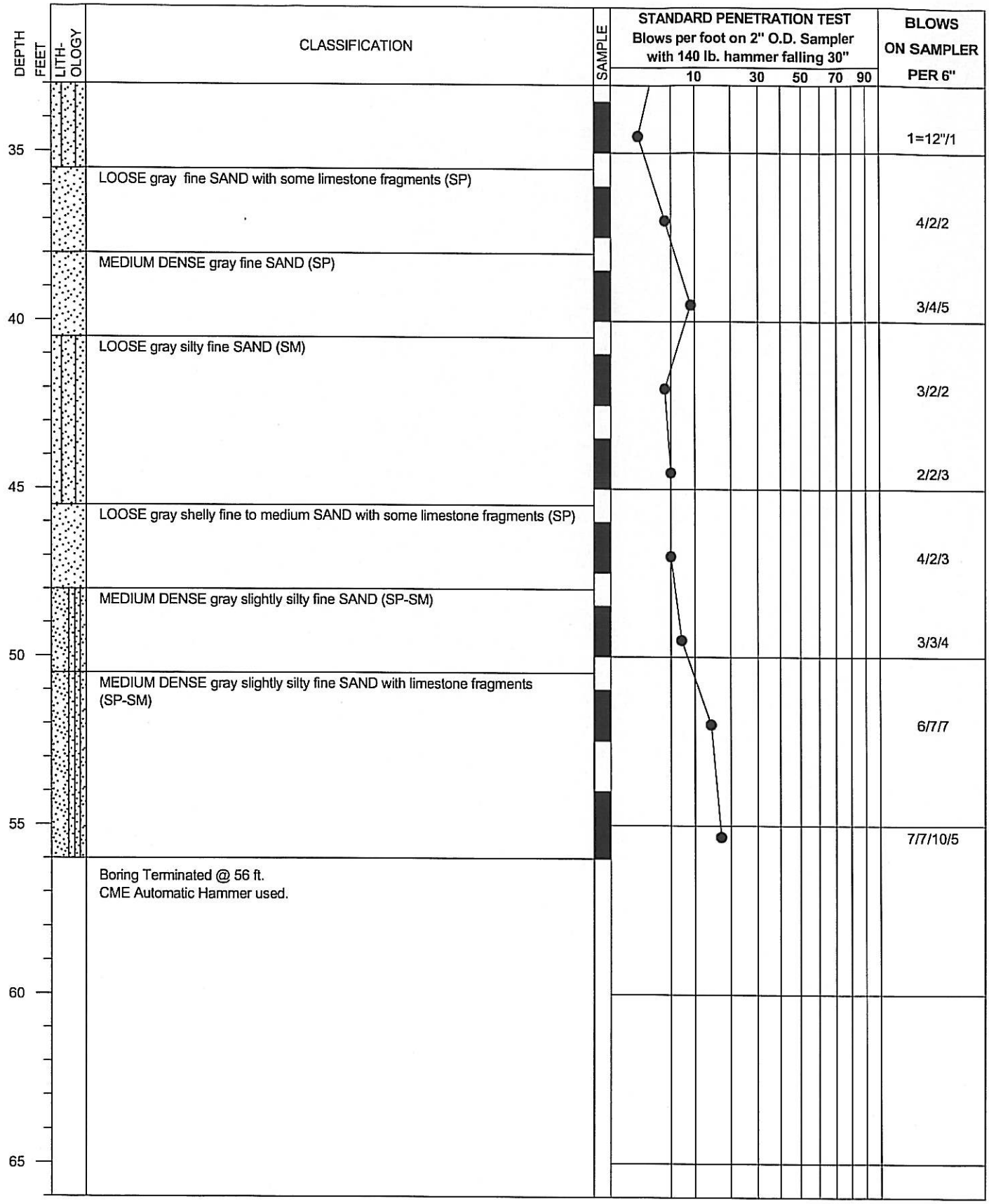
DEPTH FEET	LITH-OLOGY	CLASSIFICATION	SAMPLE	STANDARD PENETRATION TEST Blows per foot on 2" O.D. Sampler with 140 lb. hammer falling 30" (10 30 50 70 90)	BLOWS ON SAMPLER PER 6"
		MEDIUM DENSE to DENSE brown fine SAND (SP)			3/6/4
5					10/13/16
		LOOSE to MEDIUM DENSE tan to gray slightly shelly fine SAND (SP)			2/2/2
10					
					1/3/2
15					
					4/3/6
20					
		MEDIUM DENSE brown fine SAND (SP)			5/7/8
25					
		LOOSE to VERY LOOSE dark gray silty fine SAND (SM)			2/3/3
30					

TEST BORING LOG

WILLIAMS
EARTH SCIENCES, INC.

Project: New Mass Burn WTE Facility

Boring No. B-1
Sheet 2 of 2
Job No. 6308-016-00



TEST BORING LOG

WILLIAMS
EARTH SCIENCES, INC.

Project: New Mass Burn WTE Facility
Boring Location: Refer to Boring Location Plan
Ground Elevation: N/A
Groundwater Depth: ▼ 6.5'
Length of Casing Set: 10'

Boring No. B-2
Sheet 1 of 2
Job No. 6308-016-00
Boring Completed 6/6/2008
Driller R. Miller
Drill Rig Truck-Mounted CME-55

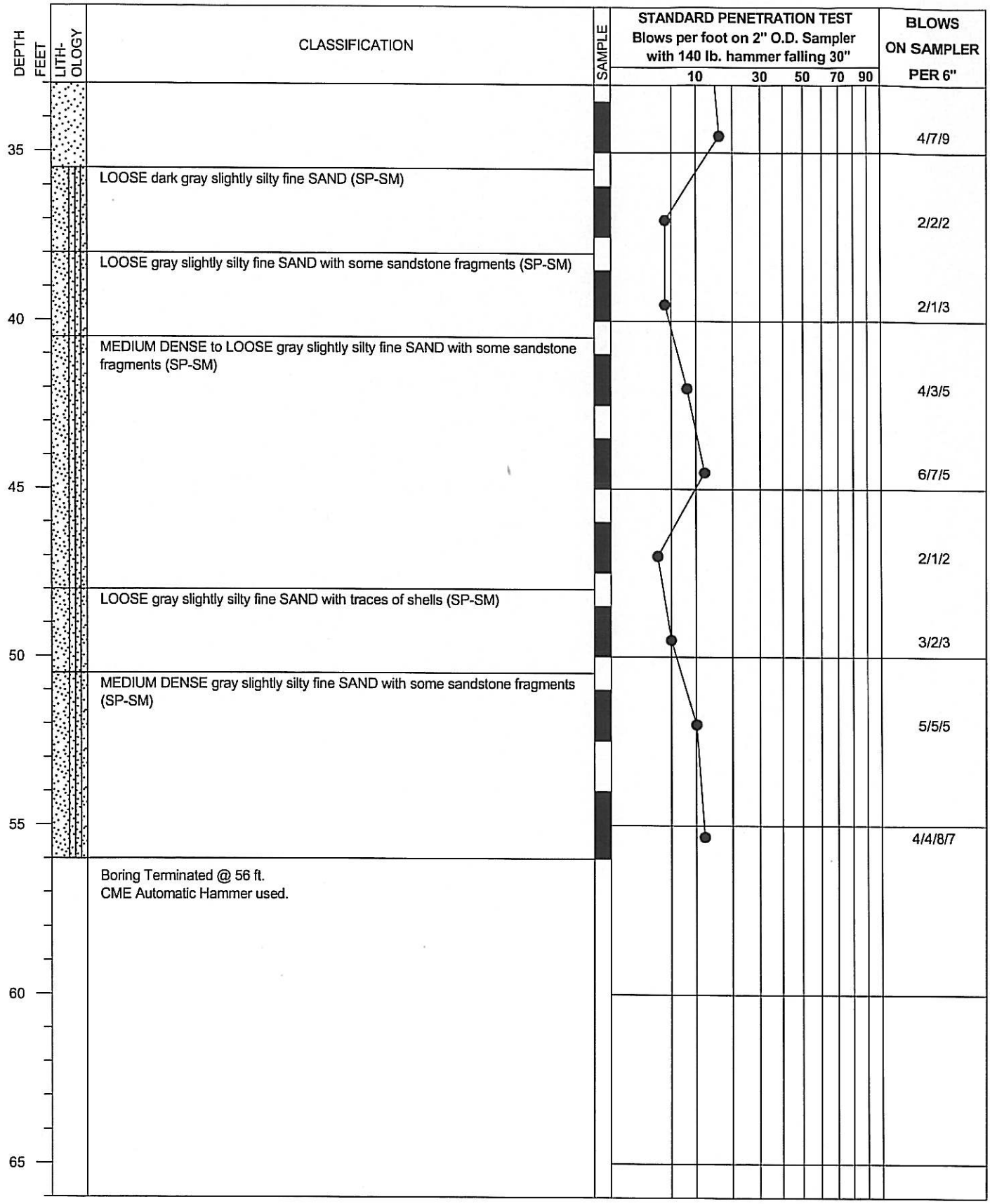
DEPTH FEET	LITH-OLOGY	CLASSIFICATION	SAMPLE	STANDARD PENETRATION TEST Blows per foot on 2" O.D. Sampler with 140 lb. hammer falling 30" (10 30 50 70 90)	BLOWS ON SAMPLER PER 6"
		MEDIUM DENSE tan to brown fine SAND (SP)			2/4/4
5					6/6/9
		MEDIUM DENSE tan fine to medium SAND with limestone fragments (SP)			3/4/4
10					
15					5/5/5
		MEDIUM DENSE brown slightly silty fine SAND (SP-SM)			3/6/6
20					
		MEDIUM DENSE brown fine SAND (SP)			4/5/5
25					
					5/5/7
30					

TEST BORING LOG

WILLIAMS
EARTH SCIENCES, INC.

Project: New Mass Burn WTE Facility

Boring No. B-2
Sheet 2 of 2
Job No. 6308-016-00



TEST BORING LOG

WILLIAMS
EARTH SCIENCES, INC.

Project: New Mass Burn WTE Facility
Boring Location: Refer to Boring Location Plan
Mudline Elevation: N/A
Water Depth: 33.5'
Length of Casing Set: 35'

Boring No.: B-3
Sheet: 1 of 1
Job No.: 6308-016-00
Boring Completed: 6/11/2008
Crew Chief: R. Miller
Drill Rig: Tri-Pod Mounted on Barge

DEPTH IN FEET	LITH-OLOGY	CLASSIFICATION	SAMPLE	STANDARD PENETRATION TEST Blows per foot on 2" O.D. Sampler with 140 lb. hammer falling 30" (10 / 30 / 50 / 70 / 90)	BLOWS ON SAMPLER PER 6"
0		WATER			
35		LOOSE brown fine SAND (SP)			11/4/3
40		LOOSE to MEDIUM DENSE light gray slightly silty fine SAND with some sandstone fragments (SP-SM)			2/3/2 5/3/3 7/6/6
45		MEDIUM DENSE gray slightly shelly clayey fine SAND with traces of limestone (SC)			3/12/5
		Boring Terminated @ 45 ft. Manual Hammer used.			

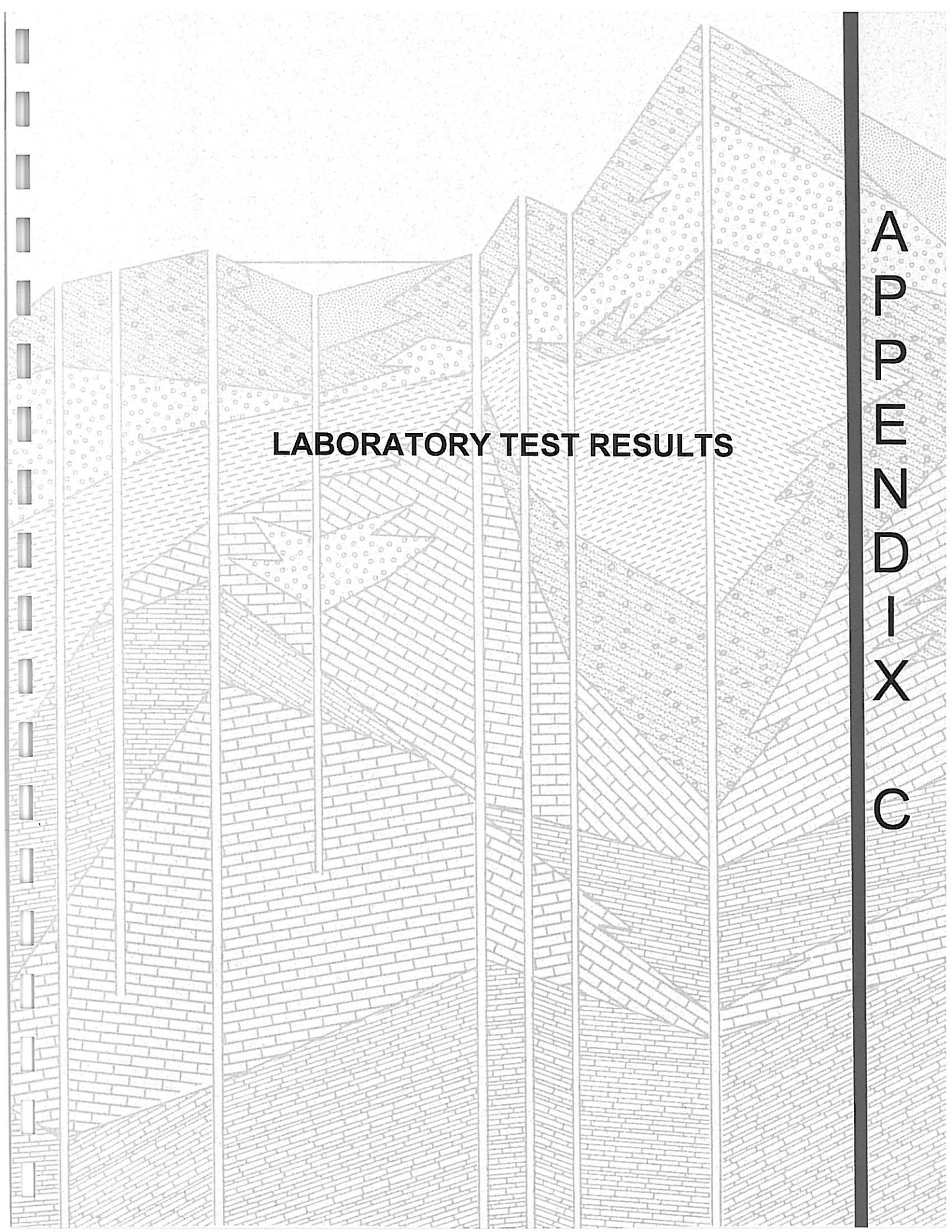
TEST BORING LOG

WILLIAMS
EARTH SCIENCES, INC.

Project: New Mass Burn WTE Facility
Boring Location: Refer to Boring Location Plan
Mudline Elevation: N/A
Water Depth: 42'
Length of Casing Set: 45

Boring No.: B-4
Sheet: 1 of 1
Job No.: 6308-016-00
Boring Completed: 6/12/2008
Crew Chief: R. Miller
Drill Rig: Tri-Pod Mounted on Barge

DEPTH IN FEET	LITH-OLOGY	CLASSIFICATION	SAMPLE	STANDARD PENETRATION TEST Blows per foot on 2" O.D. Sampler with 140 lb. hammer falling 30" (10 / 30 / 50 / 70 / 90)	BLOWS ON SAMPLER PER 6"
		WATER			
40		VERY LOOSE dark brown silty fine SAND (SM)			WOH/1/1
45		VERY LOOSE gray fine SAND (SP)			1/1/1
		LOOSE dark brown slightly silty fine SAND with traces of sandstone (SP-SM)			4/3/3
50		MEDIUM DENSE gray slightly shelly fine SAND (SP)			4/5/13
		Boring Terminated @ 50 ft. Manual Hammer used.			



LABORATORY TEST RESULTS

APPENDIX C

WILLIAMS
EARTH SCIENCES INC.
1900 NW 40th Court
Pompano Beach, FL 33064
Phone (954) 972-7570, Fax (954) 972-6608

TABLE 1: SUMMARY OF LABORATORY TEST RESULTS

Project: New Mass Burn WTE Facility
Williams Earth Sciences Project No.: 6308-016-00
Prepared for: Malcolm Pirnie, Inc.

Boring ID		Sample Depth (ft)			Soil Description	Soil Class (USC)	Sieve Analysis (Percent Passing)										Natural Moisture
		From	-	To			1"	3/4"	1/2"	3/8"	#4	#10	#40	#60	#100	#200	(%)
B1	S9	36.0	-	37.5	GRAY SAND W/LIMESTONE	SP	100	100	97	94	83	79	64	36	14	2.4	19
B1	S11	41.0	-	42.5	GREENISH GRAY SILTY F.SAND	SM	100	100	100	100	100	100	96	90	67	13	29
B1	S15	51.0	-	52.5	L. GRAY SLIGHTLY SILTY F.SAND	SP-SM	100	100	95	93	84	64	35	20	13	7.7	20
B2	S10	38.5	-	40.0	L. GRAY SLIGHTLY SILTY F.SAND & SANDSTONE	SP-SM	100	97	85	79	64	49	29	21	13	7.6	20
B2	S12	43.5	-	45.0	GRAY SLIGHTLY SILTY F.SAND & SANDSTONE	SP-SM	100	95	82	79	66	51	35	24	16	6.3	18
B2	S15	51.0	-	52.5	L. GRAY SLIGHTLY SILTY F.SAND W/S. SANDSTONE	SP-SM	87	87	80	80	74	71	63	51	33	8.6	19
B3	S1	33.5	-	35.0	BROWN FINE SAND	SP	100	100	100	100	100	100	95	69	30	3.1	27
B3	S3	38.5	-	40.0	L. GREEN SLIGHTLY SILTY F.SAND W/S. SANDSTONE	SP-SM	100	100	88	84	74	70	66	63	47	9.4	23
B4	S1	42.0	-	43.5	D. BROWN SILTY FINE SAND	SM	100	100	100	100	100	100	98	92	75	17	44
B4	S3	46.0	-	47.5	D. BROWN SLIGHTLY SILTY F.SAND W/T. SANDSTONE	SP-SM	100	100	100	98	97	96	80	43	20	5.4	26

REPORT OF PRELIMINARY GEOTECHNICAL EXPLORATION

SOLID WASTE AUTHORITY
NEW WTE FACILITY
7501 NORTH JOG ROAD
WEST PALM BEACH, FLORIDA

FOR

MALCOLM PIRNIE, INC.
1425 SOUTH ANDRES AVENUE
SECOND FLOOR
FORT LAUDERDALE, FLORIDA 33316

PREPARED BY

NUTTING ENGINEERS OF FLORIDA, INC.
1310 NEPTUNE DRIVE
BOYNTON BEACH, FLORIDA 33426

ORDER NO. 13228.9

FEBRUARY 2008

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of Florida Inc. | Established 1967
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Geotechnical and Construction Materials | Engineering, Testing and Inspections | Environmental Services

February 18, 2008

Ms. Leah K. Richter, P.E.
Malcolm Pirnie, Inc.
1425 South Andrews Avenue, 2nd Floor
Fort Lauderdale, Florida 33316
Phone: 954-761-3460 Fax: 954-761-7939

Subject: Report of Preliminary Geotechnical Exploration
Solid Waste Authority – New WTE Facility
7501 North Jog Road
West Palm Beach, Florida

Dear Ms. Richter:

Nutting Engineers of Florida, Inc. (NE), has performed a Preliminary Geotechnical Exploration for the proposed WTE Facility at the above referenced site in West Palm Beach, Florida. This exploration was performed in accordance with the written authorization to proceed provided by Malcolm Pirnie, Inc.. This preliminary evaluation was performed to develop preliminary information regarding subsurface conditions at specific test locations which along with proposed construction information provided was used to develop preliminary opinions regarding the remedial earthwork procedures for the proposed construction. This report presents our subsurface findings and preliminary general earthwork recommendations based upon the information examined at the time of this evaluation.

PROJECT INFORMATION

We understand that preliminary plans include the construction of a new WTE facility immediately north of the existing facility at the site. The new facility will consist of a main processing building ranging from two to three stories in height consisting of steel or concrete in construction. Beyond the main structure ancillary one to two story buildings, tank farms, and other processing structures similar to the existing facility will be constructed. Associated asphalt paved parking lots and roadways will also be developed.

OFFICES
Palm Beach
Miami-Dade
St. Lucie

Our office was provided a preliminary overlay of the new facility over the existing site features. The overlay indicates that the approximate southern two-thirds of the facility area will exist over existing roads, vacant land and open areas. The remaining approximate one-third portion to the north will be located over the existing lake feature at the site. Because of this part of the construction will require the backfilling of the existing lake. The depth and other information regarding the present state of the lake are currently not known.

Further discussions with Ms. Richter indicates that along the approximate southern edge of the new facility footprint elevations are approximately +17 NGVD with elevations decreasing up to the edge of the lake. We understand that the existing facility finish floor elevations are approximately +40 NGVD. The new facility is planned to have a finish floor elevation of approximately +45 NGVD. Based on this information greater than twenty-eight feet of fill will be needed to develop the construction area to final elevations. The type of fill to be used for the development (clean structural fill or recycled construction debris) is not known at this time. We note that the type of fill used affects the foundation recommendations that may be best implemented for the project.

Structural information is very preliminary at this time however based on discussions we understand that an augercast piling system may be used for support of the proposed main structures. Smaller ancillary type structures (one-story in size) may be constructed on shallow foundation systems, however additional information will be needed in order to better finalize foundation recommendations.

GENERAL SUBSURFACE CONDITIONS

Soil Survey Maps

As part of the geotechnical exploration, we have reviewed available Soil Conservation Service (SCS) survey maps for Palm Beach County. These SCS maps provide qualitative information about potential general shallow soil conditions in the project vicinity. This information was derived from approximately 6 ft. deep manual auger borings, aerial photo and surface feature interpretation at some point in the past (mid 1980's to early 1970's). The SCS data may or may not reflect actual current site conditions. A review of the Soil Survey for Palm Beach County revealed that at the time the survey was conducted, the soils at the site were described as Oldsmar sand. It is a nearly level, poorly drained, sandy soil that has a dark colored weakly cemented layer below a depth of 30 inches over a loamy layer. Mapped within the subject area were smaller pockets of Riviera, Basinger, and Jupiter Soils. We note that the soil surveys were typically penetrated to a depth of approximately six feet.

Geologic Survey Map Review

Review of the United States Geological Survey Map of this area indicates the following approximate geologic soil profile:

0'-30'	Sand with Some Proportions of Shell
30'-110'	Limestone and Sandstone with Sand
110'-160'	Sand

Note that the geologic conditions tend to vary considerably in the east-west direction and significantly less in the north-south direction.

Subsurface Exploration

NUTTING ENGINEERS OF FLORIDA, INC. was requested to perform two Standard Penetration Test (SPT) borings (ASTM D-1586) to depths of one-hundred twenty-five feet below land surface. The soil boring locations may have been altered by the geotechnical engineer through site access limitations, lithologic conditions and other considerations from that originally proposed. The locations of the test borings are indicated on the individual test boring reports presented in the Appendix of this report. The boring locations were identified in the field using approximate methods; namely, a measuring wheel and available surface controls. As such the soil boring locations should be considered to be approximate. We note that test boring B-1 was performed approximate five feet lower than test boring B-2. Please refer to the boring location plan in the appendix section of this report in order to better understand approximate test boring locations.

Test Boring Results

In general, the test borings revealed a surface layer of intermixed loose to medium dense sand with some organics or limestone fragments in the upper five to seven feet underlain by loose to medium dense brown to gray sand with some shell to depths of approximately sixty-two to sixty-eight feet below the ground surface. Medium hard to very hard gray limestone and sandstone with some intermixed sand lenses was encountered extending to depths varying from one-hundred five to one-hundred twenty feet. Below the rock formation dense gray sand with some limestone and shell fragments was encountered to a depth of one-hundred twenty-five feet, the maximum depth explored. Please see the enclosed soil classification sheet in the Appendix of this report for additional important information regarding these descriptions, the field evaluation and other related information.

We note that in test boring B-1 from twenty-six to twenty-nine feet some medium stiff brown sandy clay was encountered.

Note: Substantially different subsurface conditions may exist at intervening locations between soil borings. Buried debris may or may not be identified or adequately delineated by soil borings. Test pit excavation can provide more insight into such conditions and rock lithology if present. Such conditions may be revealed during site development activities (e.g. proof rolling, utility & foundation excavation activities) or other related activities. Should additional assurance be desired by the client, further subsurface investigation could be performed.

Laboratory Testing and Analysis

Representative soil samples were collected during the fieldwork and returned to the laboratory for testing. Specifically, natural water content test was performed on the brown sandy clay material encountered in test boring B-1 from twenty-six to twenty-nine feet below the ground surface. The natural water content was determined to be approximately 48 percent. This indicates that the soils are slightly compressible.

Groundwater Information

The immediate groundwater level was measured at the boring location at the time of drilling. The groundwater level was encountered at approximately five feet below the ground surface in test boring B-1, while the groundwater was not encountered up to ten feet below the ground surface in test boring B-2, when the drilling began using mud-rotary drilling fluid to maintain the test hole. Please review the paragraphs presented below regarding water table information and accuracy.

The immediate depth to groundwater measurements presented in this report may not provide a reliable indication of stabilized or more long term depth to groundwater at this site. Water table elevations can vary dramatically with time through rainfall, droughts, storm events, flood control activities, nearby surface water bodies, tidal activity, pumping and many other factors. For these reasons, this immediate depth to water data **should not** be relied upon alone for project design considerations.

Further information regarding stabilized groundwater elevations at the site could be developed upon specific request. Additional evaluation might include monitoring of peizomenters, survey of the project area for evidence of current groundwater elevation influences such as wellfields, obvious construction dewatering, tidal activity, flood control canals and other surface water bodies.

PRELIMINARY ANALYSIS AND RECOMMENDATIONS

At this time limited information is available pertaining to the planned construction. Because of this and due to the limited test borings performed, this report is preliminary in nature. Provided below are some preliminary findings and recommendations that should be further discussed with all interested parties, in order to determine the best possible methodology for site and foundation development. Once this has been performed and additional testing has been performed a more detailed analysis and recommendations can be provided for the proposed construction.

Preliminary Shallow Foundation Analysis

The test borings performed for this project revealed that in general loose to medium dense sands exist in the upper thirty-five feet underlain by medium dense to dense sands to a depth of approximately sixty-two to sixty-eight feet. Medium hard to hard limestone/sandstone then exists within intermixed sands to the final depth of the test borings at one-hundred twenty-five feet. We note that a stratum of brown sandy clay was encountered at a depth of twenty-six to twenty-nine feet below the ground surface at test boring B-1. This would need to be further evaluated to determine if this condition is relatively small and isolated or may represent a lens within the eastern portion of the site which may cause some slope stability concerns.

Overall, if suitable structural fill is utilized for filling of the lake portion along with the remainder of the construction site area, the proposed structures may be constructed upon a shallow foundation system with an allowable soil bearing pressure of 4,000 pounds per square foot. Based on properly monitored fill placement and compaction testing of the building pad areas settlements would be on the order of approximately one-inch.

We note that a shallow foundation design for the site is dependent upon the condition of the existing lake and the material conditions at the lake bottom. If thick deposits of silt soils exist at the bottom of the lake, the portion of the construction lying over the existing lake may be subject to long-term settlements of the bottom silt layer. Also if poor quality fill is used (high organic/silt content) to develop the pad, a shallow foundation system would not be viable. Recycled construction debris may be a possible alternative for the lake fill, however the material type, size, and other factors would need to be carefully monitored to ensure proper filling for the building construction.

Preliminary Deep Foundation Analysis

If it is determined that a deep foundation system is the more preferred foundation for the site, the piles would need to be installed to a suitable bearing location below the ground surface that can overcome the group effect of settlement. Because information regarding foundation location, type of fill used, lake conditions, etc. is not known at this time. pile depths cannot be fully determined. We note that in general a 14-inch augercast pile installed to a suitable sand stratum can provide up to 70 ton allowable compressive capacity. If needed, a properly installed 16-inch diameter augercast pile can provide a 100 ton compressive capacity. Further discussions are needed in order to fully analyze a pile foundation system.

If vibration levels can be tolerated driven piles may also be used which can provide similar capacities, however their required depths may be less than an augercast pile system.

Additional Testing

Once further discussions are held, the construction location is more firmly established, and more structural information is provided, additional testing should be performed. The testing should consist of building specific location test borings and possibly lake exploration test borings. Depending upon soils encountered more additional laboratory testing can be performed along with more in depth analysis and recommendations for the planned project.

GENERAL INFORMATION

Our client for this geotechnical evaluation was:

Ms. Leah K. Richter, P.E.
Malcolm Pirnie, Inc.
1425 South Andrews Avenue, 2nd Floor
Fort Lauderdale, Florida 33316

The contents of this report are for the exclusive use of the client, the client's design & construction team and governmental authorities for this specific project exclusively. Information conveyed in this report shall not be used or relied upon by other parties or for other projects without the expressed written consent of Nutting Engineers of Florida, Inc. This report discusses geotechnical considerations for this site based upon observed conditions and our understanding of proposed construction for foundation support. Environmental issues including (but not limited to), soil and/or groundwater contamination, methane are beyond our scope of service for this project. As such, this report should not be used or relied upon for evaluation of environmental issues.

Benefit may be realized by the performance of exploratory test pits on the site to develop additional subsurface information. The client may wish to consider performance of test pits on this project to supplement information already developed.

Prior to initiating compaction operations, we recommend that representative samples of the structural fill material to be used and acceptable in-place soils be collected and tested to determine their compaction and classification characteristics. The maximum dry density, optimum moisture content, gradation and plasticity characteristics should be determined. These tests are needed for compaction quality control of the structural fill and existing soils, and to determine if the fill material is acceptable.

If conditions are encountered which are not consistent with the findings presented in this report, or if proposed construction is moved from the location investigated, this office shall be notified immediately so that the condition or change can be evaluated and appropriate action taken.

Nutting Engineers of Florida, Inc. shall bear no liability for the implementation of recommended inspection and testing services as described in this report if implemented by others. Nutting has no ability to verify the completeness, accuracy or proper technique of such procedures if performed by others.

The vibratory compaction equipment may cause vibrations that could be felt by persons within nearby buildings and could potentially induce structural settlements. Additionally, preexisting settlements may exist within these structures that could be construed to have been caused or worsened by the proposed vibratory compaction after the fact. Pre- and post conditions surveys of these structures along with the vibration monitoring during vibratory compaction could be performed to better evaluate this concern. The contractor should exercise due care during the performance of the vibratory compaction work with due consideration of potential impacts on existing structures. If potential vibrations and impacts are not considered tolerable, then alternate foundation modification techniques should be considered.

Nutting Engineers of Florida, Inc. shall bear no liability for the implementation of recommended inspection and testing services as described in this report if implemented by others. Nutting has no ability to verify the completeness, accuracy or proper technique of such procedures if performed by others.

The Geotechnical Engineer warrants that the findings, recommendations, specifications, or professional advice contained herein, have been presented after being prepared in accordance with general accepted professional practice in the field of foundation engineering, soil mechanics and engineering geology. No other warranties are implied or expressed.

We appreciate the opportunity to provide these services for you. If we can be of any further assistance, or if you need additional information, please feel free to contact us.

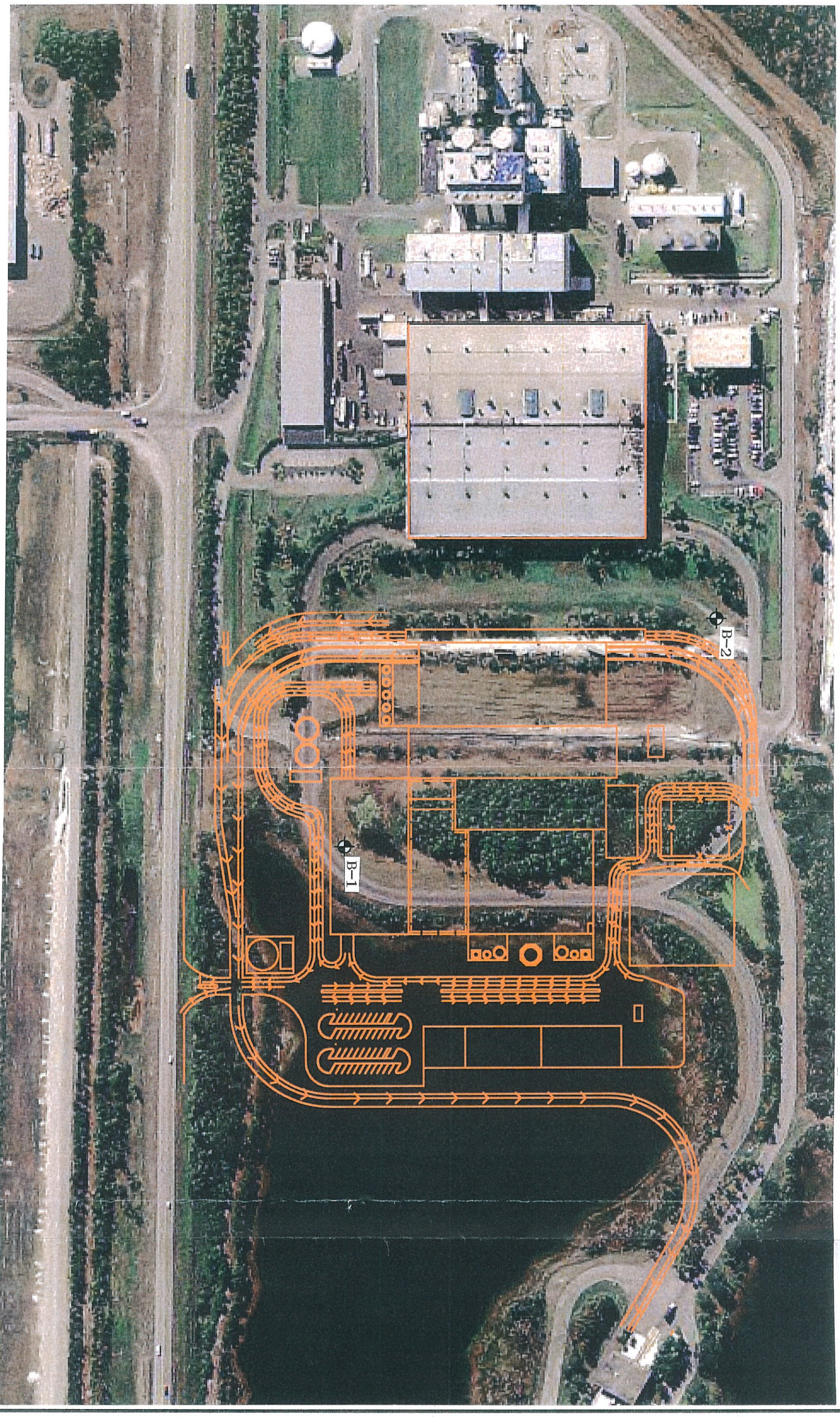
Sincerely,
NUTTING ENGINEERS OF FLORIDA, INC.

Christopher E. Gworek
Project Engineer

Reza Javidan, P.E. #60223
Senior Geotechnical Engineer

Attachments: Boring Location Plan
Test Boring Reports
Limitations of Liability
Soil Classification Criteria

REP MALCOLMPIRNIE SWA WTE FACILITY CEG



NUTTING ENGINEERS OF FLORIDA, INC. ESTABLISHED 1957

FIGURE 1

MALCOLM PIRNIE, INC.

SOLID WASTE AUTHORITY NEW WTE FACILITY

7501 NORTH JOG ROAD
WEST PALM BEACH, FLORIDA

NOT TO SCALE
PROJECT NO. 13228.9

N

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1310 Neptune Drive
Boynton Beach, 33426
Telephone: 561-736-4900
Fax: 561-737-9975

BORING NUMBER B-1

PROJECT NUMBER 13228.9

CLIENT Malcolm Pirnie, Inc.

PROJECT NAME Solid Waste Auth- New WTE Facility

PROJECT LOCATION 7501 North Jog Road, West Palm Beach, Florida

DATE STARTED 1/30/08 COMPLETED 1/31/08

SURFACE ELEVATION REFERENCE 2'-3' Below Road Crown

DRILLING METHOD Standard Penetration Boring

GROUND WATER LEVELS:

LOGGED BY D. Tyson CHECKED BY C. Gworek

▽ AT TIME OF DRILLING 5.0 ft

APPROXIMATE LOCATION OF BORING Approx. 145' S. and 35' W. of the Roadway

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	Blows	N-Value	▲ SPT N VALUE ▲ 10 20 30 40 / PL MC LL 20 40 60 80 / ☐ FINES CONTENT (%) ☐ 20 40 60 80
0		Brown quartz fine SAND, trace organics	SS 1	1-2-2-2	4	▲
		Gray quartz fine SAND, trace organics	SS 2	1-1-1-1	2	▲
5		▽ Tan quartz fine SAND	SS 3	3-5-14-15	19	▲
			SS 4	12-13-15-16	28	▲
10			SS 5	5-7-11-12	18	▲
15			SS 6	4-6-8	10	▲
20		Brown quartz fine SAND	SS 7	3-5-8	8	▲
25			SS 8	4-4-4	8	▲
		Brown sandy CLAY, some root fibers				
30		Brown quartz fine SAND	SS 9	5-4-4	9	▲
35			SS 10	4-5-6	9	▲
40			SS 11	6-5-5	11	▲
45		Light gray quartz medium SAND and shell fragments	SS 12	6-7-10	13	▲

(Continued Next Page)

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TEST NUTTING BOREHOLE 13228.9 MALCOLM PIRNIE- SOLID WASTE AUTHORITY NEW WTE FACILITY.GPJ GINT US.GDT 2/20/08

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Fax: 561-737-9975

BORING NUMBER B-1

PROJECT NUMBER 13228.9

CLIENT Malcolm Pirnie, Inc.

PROJECT NAME Solid Waste Auth- New WTE Facility

PROJECT LOCATION 7501 North Jog Road, West Palm Beach, Florida

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	Blows	N-Value	▲ SPT N VALUE ▲ 10 20 30 40 / PL MC LL 20 40 60 80 / ☐ FINES CONTENT (%) ☐ 20 40 60 80
45		Light gray quartz medium SAND and shell fragments *(continued)*				
50			SS 13	5-8-9	13	▲
55			SS 14	9-14-16	23	▲
60			SS 15	10-16-35	26	▲
65			SS 16	30-30-32	60	>>▲
70		Light gray SANDSTONE and sand	SS 17	16-17-19	33	▲
75			SS 18	18-18-21	36	▲
80			SS 19	15-16-18	31	▲
85		Gray SANDSTONE	SS 20	50-50	100	>>▲
90		Light gray quartz very fine SAND, little sandstone	SS 21	12-14-20	26	▲
95			SS 22	14-13-19	27	▲

TEST NUTTING BOREHOLE 13228.9 MALCOLM PIRNIE- SOLID WASTE AUTHORITY NEW WTE FACILITY.GPJ GINT US.GDT 2/20/08

(Continued Next Page)

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BORING NUMBER B-1

PROJECT NUMBER 13228.9

CLIENT Malcolm Pirnie, Inc.

PROJECT NAME Solid Waste Auth· New WTE Facility

PROJECT LOCATION 7501 North Jog Road, West Palm Beach, Florida

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	Blows	N-Value	▲ SPT N VALUE ▲ 10 20 30 40 / PL MC LL 20 40 60 80 / ☐ FINES CONTENT (%) ☐ 20 40 60 80
		Light gray quartz very fine SAND, little sandstone *(continued)*				
		Light gray quartz very fine SAND, some shell fragments	SS 23	15-17-21	32	▲
100						
			SS 24	16-50	66	>>▲
105		Gray SANDSTONE and gray quartz fine sand				
		Light gray quartz very fine SAND, some shell fragments, little sandstone	SS 25	15-19-21	34	▲
110						
			SS 26	20-30-24	50	▲
115						
			SS 27	19-23-28	42	▲
120						
			SS 28	50-37-35	87	>>▲
125		Bottom of hole at 125.0 feet.				

TEST NUTTING BOREHOLE 13228.9 MALCOLM PIRNIE- SOLID WASTE AUTHORITY NEW WTE FACILITY.GPJ GINT US.GDT 2/20/08

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BORING NUMBER B-2

PROJECT NUMBER 13228.9

CLIENT Malcolm Pirnie, Inc.

PROJECT NAME Solid Waste Auth- New WTE Facility

PROJECT LOCATION 7501 North Jog Road, West Palm Beach, Florida

DATE STARTED 1/29/08 COMPLETED 1/29/08

SURFACE ELEVATION REFERENCE 2' Below Road Crown

DRILLING METHOD Standard Penetration Boring

GROUND WATER LEVELS:

LOGGED BY D. Tyson CHECKED BY C. Gworek

AT TIME OF DRILLING N/A

APPROXIMATE LOCATION OF BORING Approx. 150' W. and 130' N. of the NW Corner of Existing Bldg.

DEPTH (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	Blows	N-Value
0	Gray quartz fine SAND and limestone fragments Tan quartz fine SAND, little limestone fragments	SS 1	3-5-7-9	12
		SS 2	10-11-15-20	26
5		SS 3	15-16-18-20	34
	Hard LIMESTONE	SS 4	15-16-17-50	33
	Tan quartz fine SAND and shell fragments	SS 5	7-9-11-8	20
10				
15		SS 6	7-9-8	16
	Tan quartz fine SAND	SS 7	8-5-9	13
20				
25	Brown quartz fine SAND	SS 8	5-5-7	10
30		SS 9	6-7-8	13
	Tan quartz fine SAND	SS 10	5-7-8	12
35				
40		SS 11	10-14-16	24
45		SS 12	9-11-12	20

SPT N VALUE
10 20 30 40

PL MC LL
20 40 60 80

FINES CONTENT (%)
20 40 60 80

TEST NUTTING BOREHOLE 13228.9 MALCOLM PIRNIE- SOLID WASTE AUTHORITY NEW WTE FACILITY.GPJ GINT US.GDT 1/30/08

(Continued Next Page)

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CLIENT Malcolm Pirnie, Inc.

PROJECT NAME Solid Waste Auth- New WTE Facility

PROJECT LOCATION 7501 North Jog Road, West Palm Beach, Florida

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	Blows	N-Value	▲ SPT N VALUE ▲ 10 20 30 40 / PL MC LL 20 40 60 80 / ☐ FINES CONTENT (%) ☐ 20 40 60 80
45		Tan quartz fine SAND *(continued)*				
		Gray quartz very fine SAND and shell fragments	SS 13	9-7-5	16	▲
50						
			SS 14	10-10-10	20	▲
55						
		Light gray quartz fine SAND, some gray limestone fragments	SS 15	14-16-16	30	▲
60						
		Light gray LIMESTONE and sand	SS 16	21-30-20	51	>>▲
65						
			SS 17	7-10-7	17	▲
70						
			SS 18	10-14-16	24	▲
75						
		Hard gray LIMESTONE	SS 19	50-50	100	>>▲
80						
			SS 20	50-50	100	>>▲
85						
		Light gray quartz very fine SAND, some gray limestone fragments	SS 21	12-13-14	25	▲
90						
		Gray quartz very fine slightly silty SAND, some gray sandstone	SS 22	24-23-20	47	▲
95						

TEST NUTTING BOREHOLE 13228.9 MALCOLM PIRNIE- SOLID WASTE AUTHORITY NEW WTE FACILITY.GPJ GINT US.GDT 1/30/08

(Continued Next Page)

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DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	Blows	N-Value	▲ SPT N VALUE ▲ 10 20 30 40 / PL MC LL 20 40 60 80 / ☐ FINES CONTENT (%) ☐ 20 40 60 80
		Gray quartz very fine slightly silty SAND, some gray sandstone *(continued)*				
100		Gray SANDSTONE and light gray quartz medium sand	SS 23	19-21-20	40	▲
105			SS 24	30-24-27	54	>>▲
110			SS 25	44-41-36	85	>>▲
115			SS 26	20-21-24	41	▲
120		Light gray quartz very fine SAND, little gray limestone fragments	SS 27	19-22-26	41	▲
125			SS 28	24-32-36	56	>>▲
		Bottom of hole at 125.0 feet.				

TEST NUTTING BOREHOLE 13228.9 MALCOLM PIRNIE- SOLID WASTE AUTHORITY NEW WTE FACILITY.GPJ GINT US.GDT 1/30/08

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LIMITATIONS OF LIABLILITY

WARRANTY

We warranty that the services performed by Nutting Engineers of Florida, Inc. are conducted in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing under similar conditions. ***No other warranties, expressed or implied, are made.*** While the services of Nutting Engineers of Florida, Inc. are a valuable and integral part of the design and construction teams, we do not warrant, guarantee or insure the quality, completeness, or satisfactory performance of construction plans and specifications which we have not prepared, nor the ultimate performance of building site materials.

SUBSURFACE EXPLORATION

Subsurface exploration is normally accomplished by test borings; test pits are sometimes employed. The method of determining the boring location and the surface elevation at the boring is noted in the report. This information is represented on a drawing or on the boring log. The location and elevation of the borings should be considered accurate only to the degree inherent with the method used.

The soil boring log includes sampling information, description of the materials recovered, approximate depths of boundaries between soil and rock strata and groundwater data. The log represents conditions specifically at the location where the boring was made. The boundaries between different soil strata are indicated at specific depths; however, these depths are in fact approximate and dependent upon the frequency of sampling. The transition between soil strata is often gradual. Water level readings are made at the time and under conditions stated on the boring logs. Water levels change with time, precipitation, canal level, local well drawdown and other factors.

LABORATORY AND FIELD TESTS

Tests are performed in accordance with specific ASTM Standards unless otherwise indicated. All criteria included in a given ASTM Standard are not always required and performed. Each test report indicates the measurement and determination actually made.

ANALYSIS AND RECOMMENDATIONS

The geotechnical report is prepared primarily to aid in the design of site work and structural foundations. Although the information in the report is expected to be sufficient for these purposes, it is not intended to determine the cost of construction or to stand alone as a construction specification.

Report recommendations are based primarily on data from test borings made at the locations shown on the test boring reports. Soil variations may exist between borings and may not become evident until construction. If variations are then noted, the geotechnical engineer should be contacted so that field conditions can be examined and recommendations revised if necessary.

The geotechnical report states our understanding as to the location, dimensions and structural features proposed for the site. ***Any significant changes in the nature, design, or location of the site improvements must be communicated to the geotechnical engineer*** so that the geotechnical analysis, conclusions, and recommendations can be appropriately adjusted.

CONSTRUCTION OBSERVATION

Construction observation and testing is an important element of geotechnical services. The geotechnical engineer's field representative (G.E.F.R.) is the "owner's representative" observing the work of the contractor, performing tests and reporting data from such tests and observations. ***The geotechnical engineer's field representative does not direct the contractor's construction means, methods, operations or personnel.*** The G.E.F.R. does not interfere with the relationship between the owner and the contractor and, except as an observer, does not become a substitute owner on site. The G.E.F.R. is responsible for his/her safety, but has no responsibility for the safety of other personnel at the site. The G.E.F.R. is an important member of a team whose responsibility is to observe and test the work being done and report to the owner whether that work is being carried out in general conformance with the plans and specifications.

SOIL CLASSIFICATION CRITERIA

RELATIVE DENSITY SAND

SPT N-VALUE (blows/ft.)	RELATIVE DENSITY
0 - 4	Very Loose
5 - 10	Loose
11 - 29	Medium
30 - 49	Dense
>50	Very Dense
100/6"	Refusal

SHEAR STRENGTH CLAY

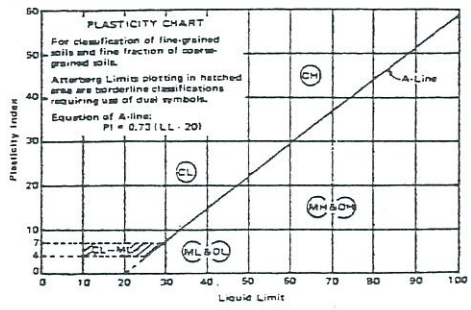
SPT N-Value (blows/ft.)	UNCONFINED COMP. STRENGTH (tons/ft.2)	CONSISTENCY
<2	<0.25	Very soft
2 - 4	0.25-0.50	Soft
5 - 8	0.50-1.00	Medium
9 - 15	1.00-2.00	Stiff
16 - 30	2.00-4.00	Very Stiff
>30	>4.00	Hard

PARTICLE SIZE

Boulder	>12 in.
Cobble	3 to 12 in.
Gravel	4.76mm to 3 in.
Sand	0.074mm to 4.76mm
Silt	0.005mm to 0.074mm
Clay	<0.005mm

DESCRIPTION MODIFIERS

0 - 5%	Slight trace
6 - 10%	Trace
11 - 20%	Little
21 - 35%	Some
>35%	And

Major Divisions			Group Symbols	Typical Names	Classification Criteria
Coarse-Grained Soils More than 50% retained on No. 200 sieve*	Gravels 50% or more of coarse fraction retained on No. 4 sieve	Clean Gravels	GW	Well-graded gravels and gravel-sand mixtures, little or no fines	$C_u = D_{60}/D_{10}$ Greater than 4; $C_z = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3
			GP	Poorly graded gravels and gravel-sand mixtures, little or no fines	Not meeting both criteria for GW
		Gravels with Fines	GM	Silty gravels, gravel-sand-silt mixtures	Atterberg limits plot below "A" line or plasticity index less than 4
			GC	Clayey gravels, gravel-sand-clay mixtures	Atterberg limits plot above "A" line and plasticity index greater than 7
	Sands More than 50% of coarse fraction passes No. 4 sieve	Clean Sands	SW	Well-graded sands and gravelly sands, little or no fines	$C_u = D_{60}/D_{10}$ Greater than 6; $C_z = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3
			SP	Poorly graded sands and gravelly sands, little or no fines	Not meeting both criteria for SW
		Sands with Fines	SM	Silty sands, sand-silt mixtures	Atterberg limits plot below "A" line or plasticity index less than 4
			SC	Clayey sands, sand-clay mixtures	Atterberg limits plot above "A" line and plasticity index greater than 7
Fine-Grained Soils 50% or more passes No. 200 sieve*	Silts and Clays Liquid limit 50% or less		ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands	
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays	
			OL	Organic silts and organic silty clays of low plasticity	
	Silts and Clays Liquid limit greater than 50%		MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts	
			CH	Inorganic clays of high plasticity, fat clays	
			OH	Organic clays of medium to high plasticity	
Highly Organic Soils			PT	Peat, muck, and other highly organic soils	Visual-Manual Identification, see ASTM Designation D 2488.

Classification on basis of percentage of fines: Less than 5% pass No. 200 sieve — GW, GP, SW, SP. More than 12% pass No. 200 sieve — GM, GC, SM, SC. 5% to 12% pass No. 200 sieve — Borderline classification requiring use of dual symbols.

Atterberg limits plotting in hatched area are borderline classifications requiring use of dual symbols.

*Based on the material passing the 3-in. (75-mm.) sieve.

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SOLID WASTE AUTHORITY OF
PALM BEACH COUNTY, FLORIDA

PALM BEACH RENEWABLE ENERGY FACILITY No. 2
PALM BEACH COUNTY, FL
GEOTECHNICAL ENGINEERING REPORT
MAY 2010



Prepared for:

Malcolm Pirnie, Inc.
8201 Peters Road, Suite 3400
Plantation, Florida 33324

Prepared by:

DUNKELBERGER
engineering & testing, inc.

DUNKELBERGER
engineering & testing, inc.
www.dunkelberger-engineering.com

- Fort Lauderdale
- Lakeland
- Port Saint Lucie
- Sarasota
- West Palm Beach

877.643.6832

Malcolm Pirnie, Inc.
8201 Peters Road
Suite 3400
Plantation, Florida 33324

May 14, 2010
Project No. WPB-09-7594

Attention: Ms. Leah Richter, P.E.

Subject: ***Geotechnical Engineering Report***
Palm Beach Renewable Energy Facility No. 2
Palm Beach County, Florida

Dear Ms. Richter:

Dunkelberger Engineering & Testing, Inc. (Dunkelberger) has completed a geotechnical engineering study for the proposed Renewable Energy Facility No. 2 in Palm Beach County, Florida. The following report presents factual data obtained from field explorations and laboratory testing, describes the methods of study, a summary of the assumptions and methodology utilized for the analysis, and provides design criteria for the geotechnical engineering aspects of the project. These design criteria are presented with the assumption that earthwork mass grading of the site, inclusive of reclamation of portions of the existing lake, has been accomplished by the Solid Waste Authority prior to the design-build-operate contractor's mobilization to the site.

We appreciate the opportunity to provide geotechnical engineering services for this very challenging project. Should you have any questions regarding the contents of this report, please call.

Very truly yours,

DUNKELBERGER ENGINEERING & TESTING, INC.

Jaime Velez, P.E.
Project Engineer
FL Registration No. 66416

Kevin E. Aubry, P.E.
Geotechnical Services Manager
FL Registration No. 38175

Z:\Projects\2009\7594 - SWA Waste to Energy Facility\21\Task Order 2\Reports\Geo Engineering Report\SWA WTE Geo Rpt Cover Ltr (05-14-10):kea

cc: Addressee (5)…*via hand delivery*

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INTRODUCTION

Pursuant to your written authorization (Task Order No. 2, dated March 5, 2010), Dunkelberger Engineering & Testing, Inc. (Dunkelberger) has completed a geotechnical engineering study in connection with the proposed Palm Beach Renewable Energy Facility No. 2 that is to be constructed at the North County Resource Recovery Facility in Palm Beach County, Florida. This report includes the methods of study, key findings from the work and includes design criteria for foundations and related maters in connection with the construction of the proposed facility. Design criteria provided herein are based upon subsurface exploration completed as part of this assignment. The subsurface exploration plan described herein has been presented to and approved by the vendors who are bidding this project as a design-build-operate contract.

PROJECT CONSIDERATIONS

The project is to include the design, construction and operation of a new renewable energy facility, located immediately north of the existing waste-to-energy facility and west of Jog Road. The project setting is provided on Sheet 1. Structural loading information has not been made available to us at the time of this writing. We have assumed that structure loadings will be relatively heavy, at least for most of the structures associated with this project. Access roadways, truck ramps and other paved areas will be provided for vehicular traffic control. Retaining walls will be used to provide grade separation between various structures and truck ramps.

The existing landform will be raised several feet above its present condition in order to reach proposed subgrade levels for the construction. The site currently slopes down from south to north, with elevations ranging from approximately +40 feet with respect to the National Geodetic Vertical Datum of 1929 (NGVD) adjacent to the existing facility to approximately +18 feet NGVD in some of the low areas of the site. Finished floor elevations are to range between +19 and +54 feet NGVD. Some of the building areas overlie an existing lake that will be reclaimed by filling. The project site will be filled to subgrade levels (including lake backfilling) by Palm Beach County Solid Waste Authority (Authority) forces under separate contract. Subsurface conditions within the areas of the proposed facilities that fall within the footprint of the existing lake will be explored subsequent to lake backfilling.

The table on the following page provides a brief description of the major project structures that are planned.

Structure Name	Plan Dimensions (feet)	Finished Floor Elevation (feet – NGVD)	Roof Elevation (feet – NGVD)
Stack	30 x 40	Assumed 24	Flue 334
APC Building – FFH Area	240 x 130	24	100
APC Building – SDA Area	280 x 50	24	146
Turbine Generator	140 x 60	24	93
Boiler Building	350 x 120	24	178
Refuse Storage Pit and Building	420 x 125	19	132
Tipping Floor and Building	420 x 150	54	105
Air Cooled Condenser	400 x 90	Assumed 24	84
Ash Management Building	300 x 150	24	76
Water Treatment Building with Storage Tanks	110 x 80 Tank Diameters = 10 to 20	Assumed 24	--
Dirty Wastewater Tank	Diameter = 50 ft	Assumed 24	--
Switch Gear Room	140 x 30	Assumed 24	--
Warehouse Storage/Facility Maintenance Offices*	380 x 80	24	46
0.5 MG Fire Water Storage Tank*	Diameter = 50 ft	Assumed 24	--

* Structures that will be located within the area of the existing lake. These structures will be constructed subsequent to lake backfilling.

Of the structures planned, the southernmost will be the Tipping Floor and Building which will also have the highest finished floor elevation of the planned structures (i.e. +54 ft NGVD). Between about 24 and 32 feet of fill will be required to bring the Tipping Floor area to the floor slab bearing level. This structure will be located about 70 feet north of the existing Waste to Energy Structure. New truck ramps will be constructed to provide access to the southeast and southwest corners of the Tipping Floor and Building. Retaining walls will be constructed to provide grade separation along the truck ramps and around the perimeter of the Tipping Floor and Building. Sloped embankments are also planned along the southern side of the proposed truck ramps.

SITE CONDITIONS

The site of the proposed construction is currently vacant, with the exception of an existing asphalt paved driveway that allows truck traffic to enter the existing facility to the south and to circulate through the site. The existing ground surface slopes down and away from the existing building in a somewhat terraced manner to a gravel covered roadway currently used for trailer storage. North of the storage area is an approximately 600 foot long by 100 foot wide stormwater retention basin. This area is open but was wet at the time of the field explorations for this project. An east-west trending berm separates the stormwater retention basin from an approximately 5 acre wooded area occupying the north-central portion of the site. This wooded area was also wet at the time of our field study and appears to be utilized for stormwater retention. Roadway areas are built up approximately 4 to 5 feet above the stormwater retention areas. A relatively large lake encroaches on the northern limits of the project site.

Photographs of the Palm Beach Renewable Energy Facility follow. Additional photographs of the site are provided in Appendix A.



Eastern roadway viewing southwest at staked location of Boring TB-24.



Northern Roadway, looking west at location of Boring TB-1

PHYSIOGRAPHIC SETTING

Based upon review of the U. S. Geological Survey Delta, FL quadrangle map, dated 1945 and photo-revised 1983, the project site is within Section 34, Township 42S, Range 42E. The map indicates the site is located on the eastern fringe of the Loxahatchee Slough, and the natural ground surface is approximately +18 feet NGVD. Research of the Soil Survey of Palm Beach County Area, FL, published by the U. S. Department of Agriculture, Soil Conservation Service (SCS) indicates the site in its natural condition was mantled by several soil associations including Riviera sand, Riviera sand-depressional, Pinellas find sand, Oldsmar sand, Anclote fine sand and others. These are described by the SCS as nearly level, poorly drained sands that are found in low areas and poorly defined drainage ways. The Riviera sands have a loamy (i.e. clayey) subsoil at relatively shallow depths (within approximately 20 to 40 inches of the natural ground surface. Prior to the implementation of local drainage improvements (i.e. canal excavations and/or pumping), the water table ranged between slightly below the natural ground surface (dry season) to above it (wet season).

According to Dr. H. K. Brooks's publication "Guide to the Physiographic Divisions of Florida" 1981, the site lies near the southern limits of the Eastern Flatwoods District (Green Ridge-Loxahatchee Karst). The Green Ridge-Loxahatchee Karst is described as poorly drained open flatwoods with cypress strands and heads. In his work entitled "Geologic Map of Florida," Dr. Brooks maps the site within the Caloosahatchee Formation (Qc), which is described as a calcareous shelly sand with diverse extinct tropical marine fauna that may contain multiple very hard sandy cap rocks.

The U. S. Geological Survey "Altitude of Water Table Aquifer for Palm Beach County, Florida" maps (dated 1984) indicate the water table in the vicinity of the Palm Beach Renewable Energy Facility No. 2 site to be near +16 feet NGVD. The groundwater gradient is generally to the east. The deep artesian aquifer has a piezometric head that is above that of the water table aquifer, resulting in an upward hydraulic gradient between the two aquifers.

The project site is located in northeast Palm Beach County, Florida. This area is not considered to be seismically active. Therefore, the liquefaction potential of the foundation soils at the project site is relatively low. Further, considering the hydrogeology of the site, there is low potential for the development of sinkholes.

SUBSURFACE CONDITIONS

Exploration Methodology

Subsurface conditions were explored using thirty-five (35) Standard Penetration Test (SPT) borings, drilled in accordance with ASTM D 1586 protocol. The SPT borings were accomplished utilizing Central Mine Equipment Models 45 and 55 (CME 45 and 55) drilling rigs employing mud rotary methodology. Four borings were drilled to 150 feet deep, twelve to 100 feet deep, sixteen to 50 feet deep and three to 25 feet deep. The borings were situated at strategic locations based upon the proposed facility. Since some of the areas were not accessible to conventional truck mounted drilling equipment, the Authority provided earth filling (i.e. fill pads) in order to improve access. Photographs of the drilling operations on the fill pads follow.





Boring locations were staked in the field and horizontal coordinates determined by aid of a hand held Magellan Model Explorist 100 GPS unit. The project surveyor determined the as-drilled horizontal and vertical locations of the borings (survey data is provided in Appendix B).

Samples of the subsurface materials were obtained continuously in the upper ten (10) to twenty (20) feet of the borings, and at 5-foot vertical centers thereafter. Groundwater levels were recorded for each SPT boring. The boreholes were sealed with cement-bentonite grout in a bottom-to-top manner when complete.

In addition to the drilling of the SPT borings, eleven auger profile borings were advanced to a depth of ten (10) feet below the ground surface. The auger profile borings were accomplished using continuous flight augers powered by the drilling rigs. Upon completion, the auger profile borings were backfilled with soil cuttings.

Lastly, forty-three soft sediment probes were conducted within the existing wooded and stormwater retention areas. These areas were under about a foot or less of water at the time the probes were performed (April 27, 2010). The probes were accomplished by pushing a hand held 3/8-inch diameter solid steel rod into the surficial soils (natural ground surface) until firm resistance was met. Locations of the soft sediment probes were recorded using the GPS device.

The locations of the SPT borings and auger profile borings are shown graphically on Sheets 1A and 1B. Sheet 1A presents the boring locations on the project topographic survey, while Sheet 1B indicates the boring locations with respect to the project building components. These sheets also show the proposed locations of Borings TB-36 through TB-40, which will be drilled at a later date once the existing lake has been reclaimed. The locations and results of the soft sediment probes are depicted on Sheet 1C.

Stratigraphy

At seven of the boring locations, a flexible pavement section consisting of asphaltic concrete over shell rock base course was present. The table below shows the boring number and asphalt and base course thicknesses measured at each location.

Boring No.	Asphaltic Concrete Thickness (inches)	Base Course Thickness (inches)
TB-1	2.8	12
TB-32	2.8	12
TB-34	2.8	12
TB-35	3.5	12
AB-2	3.6	5.4
AB-6	3.6	6.6
AB-7	1.8	4.8

Subsurface conditions disclosed by the borings generally indicate the project site to be mantled by a moderate thickness granular fill material over natural soils. The fill consists of sand with trace to some sand-sized shell fragments, gravel and silt and extends to an average depth of 7 feet (or elevation +14 feet NGVD) below surface grades at the boring locations. Underlying the fill are naturally occurring clean sands, slightly silty sands, clayey sands and interlayered shelly sands with gravel and clean to slightly silty sands that extend to an average depth of roughly 65 feet (or elevation –45 feet NGVD). A discontinuous formation of coquina limestone enters the subsurface profile at this depth and persists to the maximum depth of exploration at 150 feet (elevation –130 feet NGVD). Slightly silty to silty sands containing varying amounts of sand to gravel sized shell and gravel are present where the limestone is discontinuous. Some of the borings also disclosed relatively thin (i.e. 1 to 11 feet thick) layers of silty sands and silt within the depth interval of 30 to 75 feet below grade.

The following table provides basic subsurface profile components in terms of average elevations, material descriptions and average relative density/consistency/hardness.

Stratum No.	Elevation Interval (feet)	Material Description	Relative Density/ Consistency/Hardness
1	+21 to +14	Light brown to brown fine SAND with trace to some sand-sized shell fragments and gravel, some lenses with silt (SP, SP-SM) (FILL)	Loose to Dense
2	+14 to +11	Brown to light brown fine SAND, some lenses with silt (SP, SP-SM)	Loose to Medium Dense
3	+14 to +10	Brown to light brown clayey fine SAND (SC)	Loose to Medium Dense
4	+10 to 0	Light gray slightly silty to silty fine SAND with some sand to gravel-sized shell fragments (SP-SM, SM)	Loose to Medium Dense
5	0 to –16	Brown to light brown fine SAND, trace to some silt (SP, SP-SM)	Very Loose to Medium Dense
6	-16 to -45	Gray to light gray slightly silty to silty fine SAND with some sand to gravel-sized shell fragments and gravel, some cemented sand and shell lenses (SP-SM, SM)	Loose to Medium Dense
7	-8 to -12, -25 to -30, -40 to -45	Brown to greenish-gray silty fine SAND with trace sand-sized shell fragments (SM) and sandy SILT (ML)	Very Loose to Loose
8	-45 to -130	Light brown to light gray cemented sand and shell, sandy zones (COQUINA LIMESTONE)	Weakly cemented to Well Cemented

Note: Elevations reflect average subsurface profile conditions. Variations do exist. Refer to Sheets 2A through 2L for strata boundaries for each boring.

The Standard Penetration Test (SPT) is completed by dropping a 140-pound hammer for a vertical distance of 30 inches and summing the number of hammer blows required to drive a 2-inch diameter split barrel sampler a distance of 12 inches (the SPT after ASTM D 1586). The results of the SPT data were used to estimate the relative density of granular soils and the relative hardness of the limestone formation. The table on the following page provides the range and average SPT N-Values for each of the subsurface components that were measured in the upper 150 feet of the profiles.

Material Type	Stratum No.	SPT N-Value (blows per foot)		
		High	Low	Average
FILL	1	54	1	22
SAND	2	74	4	22
CLAYEY SAND	3	21	7	12
SAND/SHELL	4	75	2	11
SAND	5	20	1	8
SAND/SHELL	6	49	1	14
SILTY SAND	7	36	1	7
LIMESTONE	8	100	4	34

The results of the soft sediment probes indicate that the surficial soils within the stormwater retention and wooded areas consist of relatively clean fine sand with trace to some organic matter that is very loose in its uppermost 7 to 48 inches (typically 7 to 12 inches). The height of water above grade in these areas ranged from 0 to 16 inches.

Detailed subsurface profiles for each of the borings are provided on Sheets 2A through 2L of this report. In addition, a south to north geologic cross section through borings TB-1, TB-4, TB-9, TB-11 and TB-14 is provided on Sheet 3.

Groundwater

Groundwater was measured in the borings at depths that ranged between 1.5 and 13.2 feet below surface grades on the dates that the borings were drilled (March 22 through April 21, 2010). Based upon ground surface elevation data provided by the project surveyor, these depths correspond to elevations ranging from about +16 to +21 feet NGVD. Some of the values recorded are not considered representative of the groundwater level and are attributed to lack of hydraulic equilibration within the borehole at the times the readings were recorded. We estimate that the groundwater elevation across the site during the dates the borings were drilled ranged from about +17 to +19 feet NGVD. The higher values exist within the southern portion of the site and are attributed to natural groundwater mounding owing to higher grades within this area. Also, considering that the site vicinity has experienced more than normal rainfall during March and April, we anticipate that the groundwater levels at the time of drilling were near that of the average seasonal high water level.

LABORATORY TEST RESULTS

Index Properties

Representative samples of the materials recovered from the borings were tested for index properties including moisture content (ASTM D 2216) and grain size distribution (ASTM D 422). The results of these laboratory tests are presented on Sheets C1 through C23 in Appendix C. Average values of the test results are summarized in the following table.

Material Type	Stratum No.	Moisture Content (%)	Amount Passing Sieve Size (%)						
			¾"	#4	#10	#40	#60	#100	#200
FILL	1	9.9	100.0	97.1	95.2	83.5	53.7	28.8	6.1
SAND	2	18.5	100.0	100.0	100.0	94.3	71.3	44.6	5.1
CLAYEY SAND	3	39.9	100.0	100.0	100.0	94.8	76.2	52.6	14.8
SAND/SHELL	4	17.8	100.0	86.5	74.7	59.3	42.0	26.9	9.0
SAND	5	22.2	100.0	100.0	99.9	91.9	69.3	40.6	4.2
SANDSHELL	6	21.5	100.0	89.8	82.2	75.1	66.0	41.6	7.8
SILTY SAND/SILT	7	31.5	100.0	100.0	99.9	96.7	82.1	58.4	33.8

Limerock Bearing Ratio

Four (4) samples of the surficial fill materials were obtained and subjected to Limerock Bearing Ratio **(**LBR) testing and grain size distribution. The samples were taken from a depth of 0 to 6 inches below the existing grades at the locations of Borings TB-2, TB-4, 20 feet south of TB-1 and 50 feet east of TB-23. Some of the samples were taken from drill pads that were placed for access purposes. These materials were considered to be representative of those that will be used to fill the site to proposed subgrade levels. The results of the testing are provided on Sheets C24 through C31 in Appendix C. A summary of the test results are provided in the table on the following page.

Sample Description	Sample Location	Optimum Moisture Content (%)	Dry Density (pcf)	Maximum LBR Value
Light brown fine to medium SAND with some fragmental limestone (SP)	TB-4	11.5	109.9	37
Light brown fine to medium SAND with some fragmental limestone (SP)	20 ft South of TB-1	11.7	108.5	35
Dark brown fine to medium SAND with some fragmental limestone (SP)	TB-2	12.2	109.8	39
Light brown fine to medium SAND with some shell fragments (SP)	50 ft East of TB-23	14.4	107.1	34

Reference to the test results indicate that the LBR values of the fill materials sampled range from about 34 to 39 and their maximum dry densities range from 107 to 110 pounds per cubic foot (pcf).

Corrosion Testing

Three (3) soil samples collected from Borings TB-1, TB-18 and TB-23 in the depth interval of 2 to 6 feet below the ground surface and an additional sample collected from a "fill pad" in the depth interval of 0 to 2 feet at the location of Boring TB-4 were tested for the corrosion parameters of pH, resistivity, sulfate content and chloride content in order to provide an environmental classification of the subsurface materials. Results of the tests are shown in the following table.

Parameter / FDOT Classification	TB-1	TB-4	TB-18	TB-23
pH	7.9	7.7	7.7	8.1
Resistivity (ohm-centimeter)	6,000	5,900	5,100	6,900
Chloride Content (ppm)	57.6	43.2	50.4	50.4
Sulfate Content (ppm)	14.7	19.8	< 1.6	24.9
FDOT Classification	Slightly Aggressive	Slightly Aggressive	Slightly Aggressive	Slightly Aggressive

Comparison of the corrosion series test results with criteria established in Section 1.3 Environmental Classifications of the Florida Department of Transportation (FDOT) Structures Design Guidelines indicates that all of the samples tested are classified as slightly aggressive.

Moisture and Organic Content Testing

The upper 0 to 36 inches of the surficial sands from the locations of soft sediment probes MP-21, MP-26 and MP-37 were sampled and tested for moisture (ASTM D 2216) and organic (ASTM D 2974) contents. The test results indicate that the moisture contents for these soils ranged between approximately 27 and 85 percent while their organic contents ranged between 1 and 8 percent. Complete test results are provided on Sheet C32 of Appendix C.

Consolidation Testing

One dimensional consolidation testing was performed on two undisturbed samples of the silt (Stratum 7). One sample was obtained from Boring TB-22 from a depth of 35 to 36 feet below grade. The second sample was from Boring TB-26 from a depth interval of 32 to 33 feet below grade. A third sample was obtained from Boring TB-26 from the depth interval of 33 to 35 feet below grade but was too granular to be tested for consolidation characteristics. The results of the consolidation testing are provided on Sheets C33 and C34 in Appendix C. Sheet C35 in the Appendix shows the results of moisture content, Atterberg limits, fines content and specific gravity testing for the deeper Boring TB-26 sample.

The consolidation test results indicate that both silt samples are over-consolidated and have experienced a maximum past pressure of about 7 ksf. The over-consolidation ratio for these silts is between about 3.5 and 4 and the compression ratio of the consolidation curve up to the maximum past pressure is less than 0.01 (strain basis).

GEOTECHNICAL OVERVIEW

The subsurface conditions at the site are considered suitable for construction from a geotechnical perspective. A variety of foundation options are available for support of the planned structures. These include conventional spread footings, high bearing pressure spread footings after treating the underlying soils via vibro-replacement and deep foundations including augercast and driven piling. The foundation selection will be largely dependent on the structural loadings (which have not been determined at this time) which will impact foundation settlement performance. Lightly loaded columns (of about 200 kip loads or less) can be supported on shallow foundations after normal site preparation (i.e. soil compaction using a heavy vibratory roller) while foundation areas for heavier column loads will require pre-treatment by vibro-replacement (for columns loads of about 200 to 800 kips) or piling (for column loads in excess of about 800 kips). For each of the structures slab-on-grade construction may be employed for the ground level floors. Specific foundation design criteria for each of the foundation options are provided in this report.

Retaining walls for the Tipping Floor and Truck Ramps will retain up to 30 feet or more of soil and will need to rest on soils that are treated with vibro-replacement in order to limit their settlements to tolerable values.

Excavations for foundation construction and utility installation that bottom below the ambient groundwater level will need to be dewatered for these features to be constructed in the dry. It must be considered that as part of obtaining a dewatering permit with South Florida Water Management District that documentation will likely be required that demonstrates that the proposed dewatering will not create hydraulic gradients that could increase the potential for movement of highly mineralized groundwater from the areas of the landfills.

More detailed recommendations for design and construction of foundations and retaining walls, temporary excavations, pavement construction, utility installation and embankment construction for the truck ramps are provided hereafter.

EXCAVATIONS

Unbraced Excavations

Excavations needed to reach structure bottom levels will likely be made through existing and/or new granular fill, relatively clean sands, clayey sands and sand with shell. Such excavations may be completed using track-mounted hydraulic backhoes. Excavation sideslopes should be stable when cut at an inclination of 2:1 (horizontal: vertical) and when not subjected to seepage forces that result from dewatering via open pumping. However, should the excavation slopes be subjected to seepage forces that result from dewatering, we anticipate that the slopes will ravel to a more gentle inclination. The dewatering and excavation will therefore require very careful planning and permitting. If space limitations preclude the use of such open cut excavation slopes, then excavation support methods such as sheet piling will be required.

Sheet Piling

Steel sheet piling used to support the excavation sidewalls should be designed using the geotechnical parameters shown in the following table. These parameters were selected based upon the subsurface conditions disclosed in the borings and standard correlations available in the geotechnical literature.

Material	Unit Weight (pcf)		ϕ Degrees	δ Degrees	C (psf)	Coefficient of Lateral Earth Pressure			Elevation (feet-NGVD)
	Moist	Buoyant				Ka	Ko	Kp	
Sand Fill, Sand, Clayey Sand	105	48	30	17	0	0.33	0.50	3.00	+30 to +8
Sand, Sand/Shell	100	43	29	17	0	0.35	0.52	2.88	+8 to -32

Notes:
ϕ indicates angle of internal friction
δ indicates angle of wall friction
C indicates cohesion
Ka indicates coefficient of active lateral earth pressure
Ko indicates coefficient of at-rest lateral earth pressure
Kp indicates coefficient of passive lateral earth pressure

Dewatering

Should excavations bottom below the groundwater level that exists at the time of construction, dewatering may be required to enable the work to be completed in the dry. Since the project site is located very close to the existing Authority landfills, the South Florida Water Management District will likely require documentation that demonstrates the proposed dewatering will not create hydraulic gradients that could increase the potential for movement of highly mineralized groundwater from the areas of the landfills, all as part of a dewatering permit application.

CONVENTIONAL SPREAD FOOTINGS

Foundation Support

Lightly to moderately loaded columns and walls may be safely supported on conventional spread footings that are based in the granular engineered fill and/or in the native sands after normal site preparation that consists of soil compaction using heavy vibratory rollers. The footings may be designed for a net allowable bearing pressure of 4,000 pounds per square foot (psf). To provide an adequate factor of safety against a bearing capacity failure, the footing dimensions should be not less than those shown below. Please note that a slightly greater embedment depth and footing size is required for foundations within the refuse storage pit since they will likely bear below the groundwater table.

Finished Floor Elevation (feet-NGVD)	Minimum Footing Embedment Depth* (ft)	Minimum Footing Width (ft)
+19 (refuse storage pit)	3.5	3 (isolated footing), 2.5 (continuous footing)
+24 & +54	2.5	2 (isolated footing), 1.5 (continuous footing)

*Embedment depth refers to depth of footing bottom with respect to the lowest adjacent grade.

In the event that the footings are located adjacent to sloping ground (i.e. top of bank), the depth of embedment should be at least 4 feet below adjacent exterior grades, provided the fill slope is not steeper than 3:1 (horizontal:vertical). A minimum horizontal distance of 10 feet should also be maintained between the outside edge of the footing and the slope's top of bank.

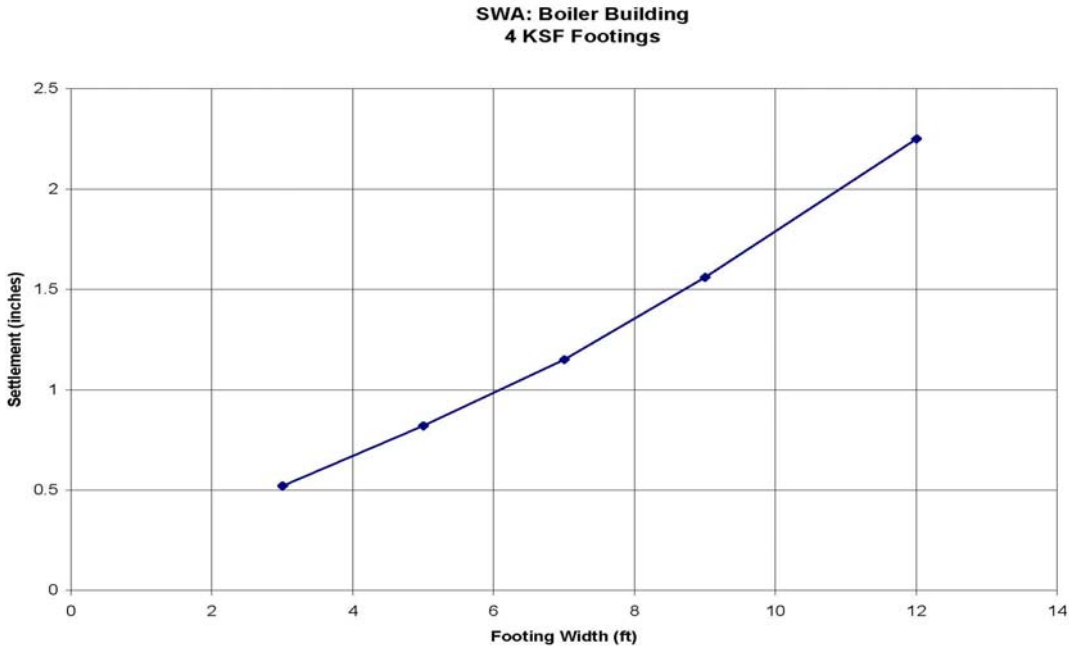
The allowable bearing pressure refers to dead and live loads and reflects a net increase in pressure over and above that exerted by the overburden soils. Consequently, the weight of the foundation concrete and soil backfill may be neglected in the sizing computations.

Individual footings should be excavated, formed and cast in the dry. The excavation bottoms should be densified (tamped) with a walk-behind type compactor prior to placement of reinforcing steel. The compactive efforts should achieve a minimum density of 95 percent of the ASTM D 1557 maximum dry density to a depth of 24 inches below the bottom of the footing.

We anticipate that some foundations within the refuse storage pit and building may bear below the groundwater level. If that is the case, groundwater lowering will be required to allow footing construction and compaction of the bearing soils. The amount of groundwater lowering can be minimized by over-excavating the foundation bottoms by 6 inches and replacing the over-excavated volumes with FDOT No. 57 coarse aggregate (that is completely enveloped within a filter fabric) in lieu of subgrade compaction.

Settlement

The settlement of the conventional spread footings that impose a net bearing pressure of 4,000 psf was estimated using the results of the borings and a method for predicting the elastic settlement of granular soils developed by Dr. John Schmmertman. The method uses the footing size and bearing pressure together with an estimate of the soil compressibility to predict the settlement of the substructure. Graphs of estimated settlement versus footing width (square) footings were developed for several of the project components using the borings drilled specifically for those structures. The graphs are provided in Appendix D. The plot of estimated settlement versus footing width for the Boiler Building foundations is shown below.



As may be expected the settlement increases with increasing footing size. Because of the granular nature of the subsoils, the settlements should occur rapidly and be virtually complete by the time the loads are fully imposed.

The settlement of spread footings is normally limited to 1 inch. In the case of the Boiler Building this occurs at a footing size of 6 feet, which corresponds to a column load of 144 kips. The load corresponding to 1 inch of settlement ranges from about 150 to 250 kips for most of the proposed structures. More heavily loaded columns and walls will require that soils beneath the spread footings be improved by vibro-replacement or that piles be used for support of the columns/walls. Design criteria for those options are described later in this report.

Lateral and Uplift Resistance

Foundations subject to lateral forces will resist the thrusts by earth pressure acting on the vertical faces of the footings located at right angles to the load direction and shearing resistance mobilized on the footing bottoms. Earth pressure resistance available from well-compacted moist granular backfill should be determined using an equivalent fluid pressure of 180 pounds per square foot per foot depth (psf/ft). The value for submerged backfill should be 90 psf/ft. Shearing resistance at the base of the footings should be calculated using a friction factor of 0.40. Use of the above values assumes that the footings can tolerate a horizontal translation on the order of three eighths to ½-inch. Resistance to sliding determined in accordance with the foregoing should be considered an ultimate value and factored for safety. A safety factor of at least 1.5 should be used.

Resistance to uplift forces that act on individual footings can be achieved with a combination of the dead weight of the foundation concrete and the weight of soil backfill overlying the foundations. We recommend that a moist soil unit weight of 115 pounds per cubic foot be used to compute the weight of soil backfill.

HIGH BEARING PRESSURE SPREAD FOOTINGS

Foundation Support

Columns and walls whose loads induce settlements of more than one inch as described in the Conventional Spread Footing section of this report will require alternative foundation support to limit such settlement. One foundation alternative is to use high bearing pressure spread footings after carrying out a program of ground improvement using vibro-replacement. Vibro-replacement consists of inserting a large vibratory probe into the ground to reinforce the soils by forming columns of gravel (i.e. stone columns) and to densify the sandy soils between stone columns. The treatment should extend to depths of twice the footing widths for column footings and four footing widths for continuous foundations, all measured from the base of the footings. Crushed limestone should be employed as add fill in the vibro-replacement points over the intervals to be treated. Foundations resting on vibro-replacement treated profile components may be designed for a net allowable bearing pressure of 8,000 pounds per square foot for dead plus normal live loads.

Vibro-Replacement

The vibro-replacement operations should be accomplished with a 150-horsepower (minimum) vibroflot having a centrifugal force of not less than 22 tons. Treatment of the profile components should extend from the footing bottoms to depths of twice the footing widths for column footings and four footing widths for continuous foundations. Add fill used in the compaction points should consist of crushed limestone meeting the gradational requirements established for Number 57 coarse aggregate within the Florida Department of Transportation *Standard Specifications for Roadways and Bridges.*

Evaluation of the adequacy of the vibro-replacement work should be based on review of vibro-replacement records that are maintained for each vibro-point. The records should include such information as add fill quantity, vibroflot withdrawal rate and amperage buildup during add fill compaction. In addition, the field quality assurance measures should include post vibro-replacement testing of the profile components using a static cone penetrometer equipped with a friction mantle (ASTM D 3441). Specifications prepared for the project should require that the granular soils over the treated interval afford an average cone penetrometer tip resistance of not less than 80 tons per square foot when tested anywhere in the compaction pattern.

Vibro-replacement operations should be performed by an experienced ground-improvement contractor using a plan that he prepares. The plan should utilize center-to-center spacings for the vibro-replacement points that are normally used in granular soils to achieve 80 percent relative density. Before adoption, the ground improvement plan should be reviewed by the geotechnical engineer and structural engineer for conformance with the intent of the foundation design.

Foundation Design and Settlement

To provide an adequate factor of safety against a bearing capacity failure the dimensions of the high bearing pressure footing should be not less than those shown below.

Finished Floor Elevation (feet-NGVD)	Minimum Footing Embedment Depth* (ft)	Minimum Footing Width (ft)
+19 (refuse storage pit)	5.0	4 (isolated footing), 3.5 (continuous footing)
+24 & +54	3.5	3 (isolated footing), 2.5 (continuous footing)

*Embedment depth refers to depth of footing bottom with respect to the lowest adjacent grade.

Settlement calculations for high bearing pressure spread footings followed the methods described earlier in this report for conventional spread footings. The estimated settlement for high bearing pressure spread footings proportioned for an allowable bearing pressure of 8 ksf are provided on Sheet D11 in Appendix D. As presented on this sheet, the anticipated settlement for an 800 kip column load should be about 1 inch. Owing to the granular nature of the subsurface materials, the settlement should occur coincident with application of load.

Lateral and Uplift Resistance

Resistance to lateral and uplift loads for high bearing pressure spread footings should be calculated using the design criteria presented earlier in this report for conventional spread footings.

TANK FOUNDATIONS

The Dirty Wastewater Tank, the Chemical Storage Tanks and the Water Treatment Storage Tanks may be supported on steel reinforced membrane slabs based in the granular engineered fill and/or in the improved native sands. The soils will first need to be improved either by compaction using a heavy vibratory roller (normal ground improvement) or vibro-replacement as described earlier. The improvement method selected should be chosen considering the anticipated tank settlements.

Settlement estimates were made for the tanks using the methods described earlier in this report for conventional spread footings. The tank diameters were anticipated to be 50 ft and 20 ft for the Dirty Wastewater Tank and the Chemical Storage Tanks, respectively. The diameters of the Water Treatment Storage Tanks were anticipated to range from 10 to 20 ft. The depth of the enclosed fluids were estimated to range up to approximately 30 feet, which is expected to result in a maximum bearing pressure of about 2 kips per square foot. The following table provides a summary of the predicted foundation settlements for the tank structures.

ESTIMATED TANK FOUNDATION SETTLEMENT (INCHES)							
Structure	**Diameter (feet) and Contact Pressure**						**Subgrade Preparation**
	10		**20**		**50**		
	1 ksf	2 ksf	1 ksf	2 ksf	1 ksf	2 ksf	
Chemical Storage	NA	NA	0.7	1.5	NA	NA	Normal Ground Improvement
Wastewater Tank	NA	NA	NA	NA	1.7	3.6	Normal Ground Improvement
Wastewater Tank	NA	NA	NA	NA	0.5	1.1	Vibro-Replacement
Water Treatment Building Storage	0.4	0.8	1.0	2.1	NA	NA	Normal Ground Improvement

Note: Normal ground improvement consists of compaction at the tank bearing levels using a heavy vibratory roller.

The results of the analyses indicate that the Chemical Storage and Water Treatment Storage Tanks should have low risk of more than normal foundation settlement (i.e. about 2 inches or less). Similarly, the 50-foot diameter tank loaded to 1 ksf should also result in foundation settlement of less than approximately 2 inches. However, if the 50-foot diameter tank is loaded to about 2 ksf then approximately 3.5 inches of total settlement is anticipated. This settlement magnitude is considered to be excessive. If the wastewater tank foundation pressure will reach 2 ksf then it will require ground improvement by preloading the tank footprint or by vibro-replacement as described earlier in this report (see High Bearing Pressure Spread Footings). The preloading would require placement of fill (with a minimum unit weight of 100 pounds per cubic foot) across the tank footprint to a height of not less than 20 feet above the proposed tank bearing level. The depth of vibro-treatment for the 50-foot diameter tank should extend to 50 feet below current grade (elevation of about -27 ft NGVD). The tank may also be supported on deep foundations as described later in this report.

The profile components in their existing condition, or after ground improvement, will have sufficient strength to safely accept the imposed loading of the tanks. We expect that the tank foundations will have a factor of safety in excess of three with respect to a shearing failure in the subsoils (provided their bearing pressures do not exceed 2 ksf), which is satisfactory.

Owing to the granular nature of the profile components, the tank foundation settlements will occur rapidly following full imposition of the weight of the fluids enclosed within the tanks. If possible, connections to the tanks should be delayed until the settlement is complete. The duration for hydrostatic or pressure testing of the tank for tightness could be utilized to pre-compress the subsurface materials, provided the test period is carried out over a several day period. Such pre-compression would likely limit the total settlement of the tanks to about one half inch upon reloading.

AUGERCAST PILES

General

The most heavily loaded foundations of the project and those structures that may need substantial resistance to overturning (e.g. the smoke stack) may be supported on deep foundations that consist of either precast prestressed concrete (PPC) piles or augercast piles (ACP). Design considerations for ACPs are presented hereafter (those for PPC Piles are provided later in the report).

Axial Capacities

Pressure grouted auger piling (ACPs) will derive their capacities from side shear in the sands and limestone formation (Stratum 8) that underlie the site. Since the top of the Strata 6 and 8 materials exist at variable elevations across the site, the limestone formation is discontinuous and the relative density and/or hardness of the materials also varies, it is clear that pile capacities will vary with respect to location. As a result we estimated the ACP allowable compressive pile capacities on a structure by structure basis. The analysis was performed for the Stack, APC Building, the Boiler Building, the Refuse Storage Pit/Building and the Tipping Floor/Building.

For each building, the borings drilled within that building were used to predict the allowable compressive capacities of 16, 18 and 24-inch diameter augercast piles of variable lengths. The allowable compressive capacities are presented in the table provided on Sheet E1 in Appendix E. Reference to the table shows that 16 inch diameter ACPs penetrating to a tip elevation of about -60 ft NGVD will have allowable compressive capacities that range from about 120 to 185 tons depending on location. For the 18 inch and 24 inch diameter ACPs the pile capacity ranges are 135 to 205 tons and 185 to 280 tons, respectively.

Piles fully reinforced for tension will be capable of safely supporting an uplift load of one half of the design vertical compressive capacities shown on Sheet E1.

The settlement of pile supported structures will be dependent on the magnitude of column/wall load, and the number, length and diameter of the piles supporting each column/wall. Provided the piling are socketed into the limestone formation, individual column foundation settlements are likely to not exceed 1 inch although this is dependent on loading. The most heavily loaded foundation is anticipated to be that of the 50 foot diameter dirty wastewater tank. If supported on piling that penetrates at least 10 feet into the limestone formation and assuming a tank load of about 2,000 tons (equivalent to 2 ksf bearing pressure at the tank base), we anticipate that the tank will settle about ½ inch when fully loaded.

Owing to the granular nature of the profile components that are to provide support to the pile foundations, the settlements should occur virtually as rapidly as the structural loads are applied and be nearly complete by full imposition of the dead load.

Lateral Capacities

The piles will resist lateral loads through a combination of pile stiffness (EI) and earth pressure. To model the pile-soil-lateral load interaction, we utilized the computer program COM624P developed by Shih Tower Wang and Dr. Lymon C. Reese. Variables in the analysis included soil properties (soil unit weight, friction angle and lateral soil modulus), pile parameters (i.e. pile length, butt width, elastic modulus and moment of inertia) and the lateral load acting at the pile head. The soil parameters used in the analysis are provided in the table on the following page.

Elevation (feet-NGVD)	Unit Weight (pcf)		ϕ Degrees	C (psf)	K (pci)
	Moist	Buoyant			
+16 to +8	105	48	30	0	27
+8 to -32	100	43	29	0	14
-20 to -32	--	43	29	0	20
-32 to -48	--	48	36	0	36
-48 to -60	--	48	38	0	50

Notes: ϕ indicates angle of internal friction
C indicates cohesion
K indicates lateral soil modulus

In our analysis the pile heads were taken to be fixed within rigid pile caps (i.e. pile heads are able to translate but not rotate). We assumed the pile heads will be located at an elevation of +16 feet NGVD and will be completely supported laterally by soil. The estimated pile lateral load capacities and maximum moments are presented in the following table.

Pile Diameter	Lateral Load Capacity Per Pile (kips)	Maximum Moment in Pile (inch-kips)
16 Inch Diameter ACP	8	675
18 Inch Diameter ACP	10	880
24 Inch Diameter ACP	15	1610

Notes: Lateral loads are assumed to act at pile head. The lateral capacity assumes that the pile heads can safely sustain a lateral translation of up to ½ inch. The capacities apply to group piles and have been reduced to account for interference effects between piles.

The results indicate that lateral load capacities of 8 to 15 kips can be anticipated for the piling. In the event that greater capacities are required, the designer should consider battering the piles. Battered ACPs can normally be installed at an angle of 6 vertical to 1 horizontal.

It should be recognized that the lateral load capacities presented in the table are based solely on stresses developed in the subsurface materials. Allowable stresses for the selected pile section should be verified by the designer.

Pile Load Testing

Pile load testing will be needed to confirm that the design capacity for the piles can be achieved at the site. Testing required for this purpose should be performed in accordance with ASTM D 1143 and Section 1806.4 of the Florida Building Code. For each pile diameter to be used on the project we recommend that two piles be load tested. We recommend that the compression test piles be instrumented with vibrating wire strain gauges to allow the load distribution in the rock socket to be determined. This will enable the mobilized side shear to be calculated. The mobilized side shear and evaluation of the pile settlement performance may then be used to finalize the embedment depths for all piles.

The piles intended for load testing should be installed with the same equipment that is to be used for the production piling. The piles that may be needed for anchorage of the load test frame should be constructed at production piling locations if feasible. Additionally, the piles should be constructed in close proximity to one of the engineering borings to allow correlation of the drilling characteristics and load-settlement relations with known subsurface conditions.

Augercast Pile Installation

The piles should be composed of grout having a 28-day unconfined compressive strength of not less than 3 times the gross bearing stress of the cross section of the pile at its design load. The piles should be installed with a minimum center-to-center spacing equivalent to three pile diameters. At cutoff, the centroids of the heads of group piles should be within 3 inches of design center. The centroids of the heads of single piles should be within 1 inch of design center.

Specifications for the installation of the augercast piles should require a grout factor (i.e. actual grout volume of pile divided by theoretical grout volume) of not less than 1.20. Lesser grout factors recorded for the production piles should be evaluated by the structural engineer and geotechnical engineer on a case-by-case basis for possible acceptance. All piles should be installed as true to vertical as practical with an out-of-plumbness that does not exceed two percent.

DRIVEN PILING

Axial Capacities

Driven precast prestressed concrete (PPC) pile axial compressive capacities were estimated using the subsurface data from borings drilled within the footprints of the Stack, the APC Building (FFH and SDA areas), the Boiler Building, the Refuse Storage Pit/Building and the Tipping Floor/Building. The capacities were estimated for 18-inch and 24-inch square PPC piles using the computer program FB-Deep. This program determines the capacity of driven piles using a methodology based on empirical correlations between cone penetrometer tests and Standard Penetration Tests for typical Florida soils and limestone. The calculated allowable pile compressive capacity is equal to half of the sum of the pile's ultimate side friction resistance plus its mobilized end-bearing capacity (which is 1/3 of the ultimate end bearing capacity). The allowable axial pile compressive capacities for various pile tip elevations extending to about elevation -80 feet NGVD are shown on Sheets E2 to E13 in Appendix E. The top of each pile was assumed to be at the existing ground surface.

Review of the analysis results shows that 18 inch square PPC piles that are driven to about elevation -70 ft NGVD will attain an allowable compressive capacity ranging from about 70 to more than 160 tons, depending on location. The 24 inch square PPC piles driven to -70 ft NGVD will attain allowable axial compressive capacities ranging from about 100 tons to more than 180 tons. It should be noted that the maximum load permissible per FDOT is 100 tons for 18 inch square PPC piles and 150 tons for 24 inch square PPC piles.

A table of the allowable pile tensile capacities is provided on Sheet E14 in Appendix E. The pile tensile capacities were taken to be one-third of the ultimate frictional resistance (determined by FB-Deep) at the pile-soil interface plus the dead weight of the pile. Eighteen inch square PPC piles with tip elevations of -70 ft NGVD are anticipated to attain allowable tensile capacities ranging from about 30 to 55 tons. Twenty four inch square PPC piles driven to this pile tip elevation are estimated to have allowable tensile capacities ranging from about 50 to 75 tons.

The allowable axial compressive load capacities presented in the Appendix are based solely on stresses mobilized in the subsurface materials. Structural stresses induced in the piles by driving may place greater restrictions on the allowable capacity and should be verified by the designer.

Lateral Capacities

The allowable lateral load capacities of the 18 inch and 24 inch Square PPC Piles were estimated as performed for the PPC piles. The estimated allowable lateral loads for the 18 and 24 inch square PPC piles are 12 kips and 20 kips, respectively. The maximum pile bending moment at these capacities is estimated to be 1,200 inch kips for the 18 inch square PPC pile and 2,500 inch kips for the 24 inch square PPC piles. These lateral load capacities and moments assume that the pile heads can safely sustain a lateral translation of up to ½ inch.

Battered piles with angles not exceeding 12 vertical to 1 horizontal may be used if additional lateral load resistance is needed.

Pile Load Testing

We recommend that the PPC piles be installed in accordance with Section 455 (Structures Foundations) of the FDOT's *Standard Specifications for Road and Bridge Construction*. The piles should be driven to a minimum blow count criteria that is determined during the implementation of a test pile program. The test pile program should include using the computer program Wave Equation Analysis of Piles (WEAP) after the performance of a dynamic load test (i.e. using the Pile Driving Analyzer). The test pile installations should be monitored by recording blows per foot over the full length of the pile's penetration. Data from the test pile monitoring should then be input into WEAP for selection of the finalized driving criteria and for ordering production pile lengths. Two piles should be load tested for each pile size (width) to be used for the project.

Vibrations from Pile Driving

Vibrations associated with pile driving operations should be monitored using a seismometer to verify that they are below the threshold levels that could damage the adjacent Waste to Energy structure. It has been our experience that ground vibrations at the location of structures supported on shallow foundations that are constructed upon loose sandy soils will need to be maintained at a peak particle velocity of 0.15 inch per second or less if seismic densification is to be avoided. In addition to vibration monitoring we recommend that surveying equipment be used to monitor vertical movement of the structure during pile driving.

A pre-construction survey should be performed for the nearby structure to identify any pre-existing cracks prior to pile driving. The survey should consist of photographic documentation of the existing facility and should be made in a concerted effort with the Authority. It should be noted that ground vibrations and noise due to pile driving may be a nuisance to occupants of the existing structure even if they do not cause structural damage to it. Further, the use of diesel hammers has been known to spray diesel fuel on adjacent facilities, particularly on windy days.

RETAINING WALLS

Ground Improvement

The retaining walls that will be needed for grade separation around the perimeter of the Tipping Floor area and along the truck ramps will retain fill heights that vary from a few feet at the base of the truck ramps to about 30 to 35 feet at the top of the ramps and around the perimeter of the Tipping Floor area. With respect to the higher walls, the magnitude of fill height to be retained will result in a relatively high vertical load being imposed on the wall foundations which could result in excessive foundation settlement.

Using the method described earlier in Conventional Spread Footings we estimated the settlement for the high walls assuming that they will consist of concrete cantilever retaining walls resting on continuous footings that are 30 feet wide. This width was estimated to be the approximate width required for the wall to be stable with respect to bearing, sliding and overturning (although the actual width must be determined by the wall designer). For an anticipated wall foundation bearing pressure of about 4,000 psf we estimated the high walls will settle about 4 inches in the event that normal site preparation is performed (i.e. vibratory roller compaction of subgrade soils). This amount of settlement is considered excessive. For this reason, the ground beneath the retaining walls should be improved using the vibro-replacement method described earlier in this report (see High Bearing Pressure Spread Footings) or should be supported on piling. We estimate that after vibro-replacement is performed the high walls will undergo a maximum total settlement of about 1-1/2 inch.

The vibro-replacement operations should be accomplished with equipment similar to that described in High Bearing Pressure Spread Footings and should extend from the footing bottoms to an elevation of -30 ft NGVD. The vibro-treatment should be accomplished as described earlier in this report (see High Bearing Pressure Spread Footings).

Foundation Design

If supported on shallow foundations, the retaining wall base for the greatest retained fill height (anticipated bearing pressure of about 4,000 psf) should be embedded at least 2 feet below the lowest adjacent grade. To avoid a global type bearing capacity failure the foundations should be not less than 16 feet wide. However, the design of the wall foundation against sliding and overturning will likely require a wider footing (as described earlier).

The retaining wall foundation should be excavated, formed and cast in the dry. The excavation bottoms should be densified (tamped) with a walk-behind type compactor prior to placement of reinforcing steel. The compactive efforts should achieve a minimum of 95 percent of the ASTM D 1557 maximum dry density to a depth of 24 inches below the bottom of the footing.

Wall Design

The retaining walls should be designed to resist lateral forces induced by granular backfill and surcharge loads from Tipping Floor traffic. Unbalanced hydrostatic pressures should be added to the lateral pressure as appropriate. Earth pressure induced by granular backfill should be computed in accordance with the following criteria:

Moist Soil Unit Weight	110 pounds per cubic foot
Buoyant Soil Unit Weight	55 pounds per cubic foot
Angle of Internal Friction	30 degrees
Earth Pressure Coefficients	
Active	0.33
Passive	3.00
At-Rest	0.50

TIPPING FLOOR

The placement of 30± feet of fill within the Tipping Floor footprint is anticipated to result in about 5 inches of settlement. This must be considered if any underground features (aside from the retaining wall foundations) will be based within or beneath the fill. Owing to the granular nature of the subsurface materials, the settlement should occur coincident with application of load. As a result, we anticipate that the settlement will be complete by the time the floor slab is to be constructed.

The settlement along the Tipping Floor perimeter is anticipated to be about 1-½ inches provided the walls are supported on soils treated with vibro-replacement. Settlement will attenuate away from the Tipping Floor with increasing distance owing to aerial subsidence. We estimate that ground subsidence will attenuate outward from the building edges at a rate of about 1/2 inch vertically per 30 feet laterally. This effect should be accounted for when selecting grades that depend upon specific gradients for proper function. To minimize differential settlement consideration should be given to delaying construction of the Refuse Storage Pit and Building until the fill within the Tipping Floor has been placed. The aerial subsidence is anticipated to result in about ½ inch of settlement at the location of the existing Waste to Energy structure.

The fill for the Tipping Floor building pad should be carefully placed so that they do not impose lateral pressures that exceed those used to design the retaining walls. The backfill should consist of clean, granular materials that are free of debris, cinders, combustibles, roots, sod, wood, cellulose and organic material. The fill should have not more than 10 percent passing the U.S. Standard No. 200 sieve (dry weight basis), have no particle size larger than 3 inches, and have not more than 2 percent organic matter (by weight). The backfill should be placed in lift thicknesses of 12 inches loose measure. Within 10 feet of the retaining walls, the backfill should be compacted with a hand-operated or walk-behind compactor. Each lift should be compacted until it meets a minimum density of 95 percent of the maximum dry density (per ASTM D 1557).

TRUCK RAMP EMBANKMENTS

Fill required to construct earthen embankments that may be needed for the truck ramps should consist of clean, granular materials as described previously under Tipping Floor. Fill slopes should be constructed at 3:1 (horizontal: vertical) or flatter. If steeper slopes are required to meet project grades then geogrid reinforcement may be needed. Establishment of grass root development on finished non-structural slopes should be promoted as early as possible in order to lessen the potential for erosion that results from stormwater runoff.

CONCRETE SLAB-ON-GRADE

Slab-on-grade construction may be used for the ground floors of the buildings. The slabs should be designed for the anticipated range of loadings that they will sustain. If the design employs elastic methods, a modulus of subgrade reaction of 200 pounds per cubic inch (pci) should be used for the supporting soils when well compacted.

Provisions should be made for the installation of an impervious membrane at the slab-on-grade and subgrade interface. Ordinarily, a 6-mil thick film of polyethylene is sufficient for most construction. However, floor coverings which are particularly sensitive to moisture flux may require a thicker membrane and/or one of different composition.

ASPHALTIC CONCRETE PAVEMENTS

The project site is underlain by sands of variable density. Earthwork construction to raise the site to proposed grades will result in densification of the subgrade in the areas to be paved. After densification, the soils will provide suitable support to a conventional flexible (asphalt surfaced) pavement section. The pavements along major haul routes should be designed specifically for the vehicle load intensities and frequencies anticipated. Pavement design for such haul routes should include layer coefficients of 0.44 for structural asphalt, 0.18 for limerock base course, and 0.08 for stabilized subbase. Properly compacted roadbed soils similar to the LBR tested fill materials should achieve a resilient modulus of at least 10,000 psi. The section presented on the following page is typically used in this geographic area for light to moderate duty pavements.

Component	Thickness and Composition
Wearing Course	1.5 inch structural asphaltic concrete
Base Course	8 inches of aggregate base course (LBR = 100 minimum)
Subbase	12 inches of stabilized subgrade material (LBR = 40 minimum)

Depending on the type of aggregate base course materials that are used, the base materials should meet the requirements of either Sections 911 or 913A of the Florida Department of Transportation "Standard Specifications for Road and Bridge Construction." They should have a Limerock Bearing Ratio (LBR) of at least 100 and be compacted to not less than 98 percent of the Modified Proctor (AASHTO T-180) maximum dry density. Subbase materials should be densified to an equivalent relative compaction.

BURIED UTILITIES

Excavations

Depending upon the actual groundwater levels that exist at the time of construction, and proposed pipeline invert elevations, portions of the proposed pipelines may bottom near the prevailing water table. The excavations for pipeline construction should be made in a dry condition. Dewatering may be accomplished most readily by pumping from sumps, wellpoints, or wells, or combinations thereof. The prevailing water table should be lowered at least 2 feet below the proposed pipeline invert elevations. Considering the proximity of the existing Authority landfills, obtaining a dewatering permit will be very difficult. For this reason, buried utility inverts should be kept as high as practical.

The results of the borings indicate that the excavations may be performed using conventional backhoe equipment. Excavated materials consisting of organic-free sands and gravels with particle sizes less than 1 inch in diameter and no more than 10 percent fines (particles passing through the U.S. Standard Number 200 Sieve) may be stockpiled and re-used for backfill. Organic soils (i.e. muck) are unsuitable as backfill and should be wasted if encountered.

Pipe Support

The granular soils found in the borings at the anticipated pipeline invert elevations should be stable and provide adequate support for the proposed pipelines.

Bedding and Backfill

Should the excavations bottom within granular soils (sands), these soils will provide for uniform bedding of the piping. Pipelines that bottom in the clayey sands should be over-excavated to a depth of 6 inches for the subsequent placement of pipe bedding materials. Such bedding materials should consist of sands having a maximum size of 1 inch and not more than 10 percent materials passing the U.S. Standard No. 200 Sieve.

Groundwater levels should be maintained at least 24 inches below the excavation bottom during tamping of the bedding soil and placing of the pipe. Over-excavations, if necessary to remove unsuitable soils, will need to be dewatered so that the bottoms can be inspected and tamped. During backfilling, groundwater should be maintained a minimum of 24 inches below the working height of the fill.

Backfill should be placed in the dry and compacted in 12-inch thick lifts to at least 100 percent of the maximum dry density as determined by ASTM D 698 (AASHTO T-99). We recommend the use of only relatively light, hand-held compaction equipment to limit the potential for damage to the pipelines.

Thrust Blocks

Thrust blocks used to provide resistance to change in momentum at pipe bends should be supported laterally by granular materials compacted to high density. Excavations for thrust blocks should be backfilled with sand or sand and gravel (ASTM D 2487), placed in 12-inch thick lifts, and each lift should be compacted to at least 100 percent of maximum density (ASTM D 698). The zone of highly compacted backfill is defined by a truncated prism that is contained within planes which extend upward and outward from the base of the thrust block at a 3:1 (horizontal:vertical) slope.

LAKE AREA STRUCTURES

As indicated earlier in this report, subsurface exploration for the new pavements and structures to be located within the area of the existing lake (i.e. the 0.5 Million Gallon Fire Water Storage Tank and the Warehouse/Facility Maintenance Offices) will be performed after the lake is backfilled. Foundation design recommendations will be provided for those structures at that time. This notwithstanding, we anticipate that the borings will show relatively loose soil conditions since the lake backfilling will likely need to be performed in the wet without benefit of soil compaction owing to the previously mentioned issues with respect to dewatering. As a result, treatment (vibro-treatment or dynamic deep compaction) will likely be needed for the planned structures to allow the structures to be supported on shallow foundations. In addition, the loose soils within the pavement areas will likely need to be improved (via surcharging) prior to pavement construction.

LIMITATIONS

Dunkelberger Engineering & Testing, Inc. has completed a geotechnical study for Malcolm Pirnie and the Solid Waste Authority of Palm Beach County, Florida in connection with the proposed Renewable Energy Facility No. 2 project in Palm Beach County, Florida. The purpose of the study was to explore the general subsurface conditions of the site and provide geotechnical related design criteria for the project. Dunkelberger warrants that the geotechnical design criteria presented in this report were promulgated based on recognized practice in the disciplines of soil mechanics, foundation engineering, and engineering geology. No other warranties are expressed or implied.

Z:\Projects\2009\7594 - AUTHORITY Waste to Energy Facility\21\Task Order 2\Reports\Geo Engineering Report\AUTHORITY WTE Geo Rpt (05-14-10):kea



SOURCE: GOOGLE EARTH.COM

0' 500' 1000' 2000'

Scale: 1" = 1000'

DRAWN	GD
CHECKED	JD
APPROVED	KA
SCALE	1"= 1000'
REVISED	

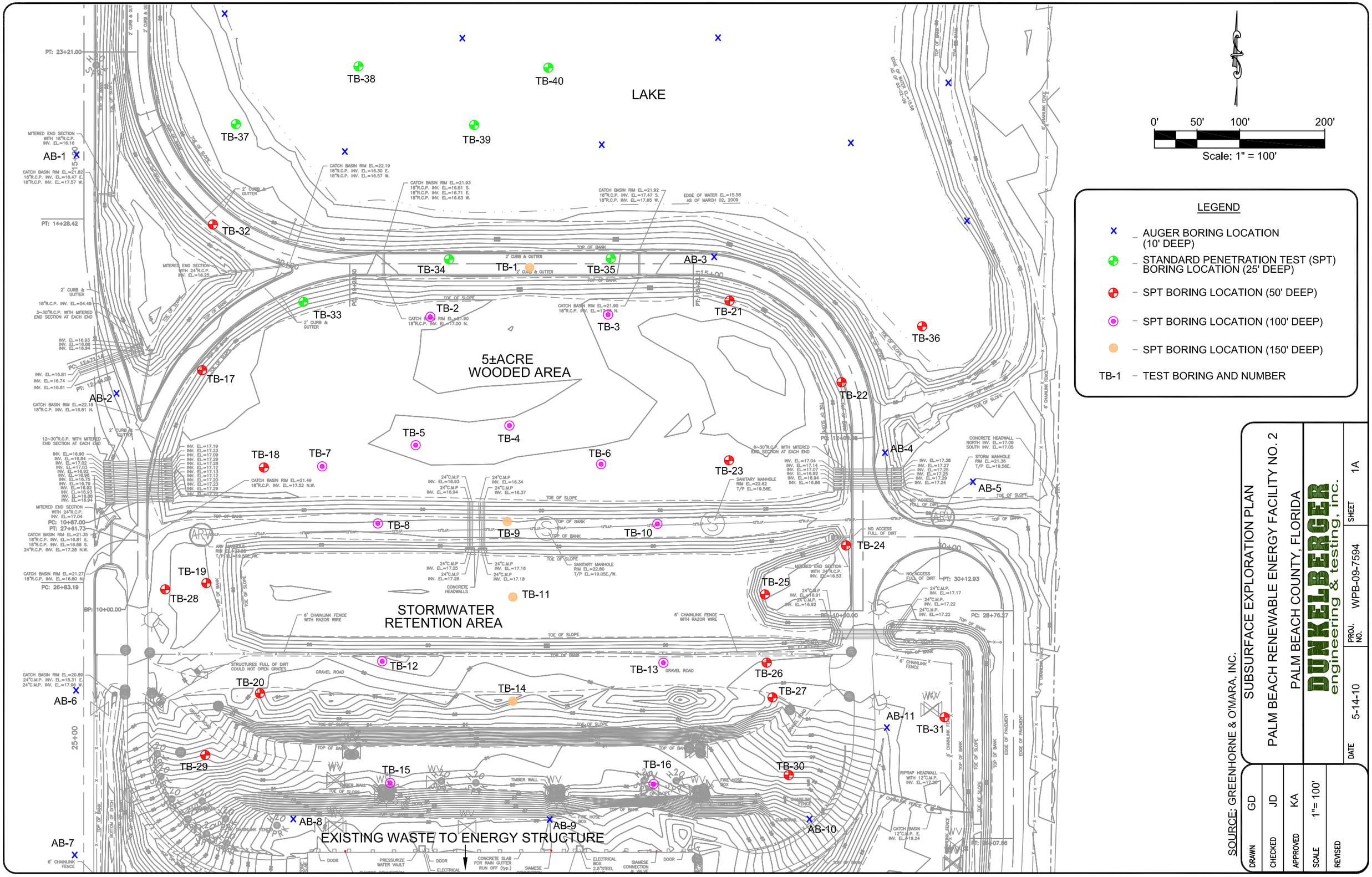
SITE LOCATION PLAN

PALM BEACH RENEWABLE ENERGY FACILITY NO. 2

PALM BEACH COUNTY, FLORIDA

DUNKELBERGER
engineering & testing, inc.

DATE	PROJ. NO.	FIGURE
5-14-10	WPB-09-7594	1


LAKE
5±ACRE
WOODED AREA
STORMWATER
RETENTION AREA
EXISTING WASTE TO ENERGY STRUCTURE
TB-1
TB-2
TB-3
TB-4
TB-5
TB-6
TB-7
TB-8
TB-9
TB-10
TB-11
TB-12
TB-13
TB-14
TB-15
TB-16
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TB-37
TB-38
TB-39
TB-40
AB-1
AB-2
AB-3
AB-4
AB-5
AB-6
AB-7
AB-8
AB-9
AB-10
AB-11
0'
50'
100'
200'
Scale: 1" = 100'
LEGEND
AUGER BORING LOCATION (10' DEEP)
STANDARD PENETRATION TEST (SPT) BORING LOCATION (25' DEEP)
SPT BORING LOCATION (50' DEEP)
SPT BORING LOCATION (100' DEEP)
SPT BORING LOCATION (150' DEEP)
TB-1 – TEST BORING AND NUMBER
SOURCE: GREENHORNE & O'MARA, INC.
SUBSURFACE EXPLORATION PLAN
PALM BEACH RENEWABLE ENERGY FACILITY NO. 2
PALM BEACH COUNTY, FLORIDA
DUNKELBERGER
engineering & testing, inc.
DRAWN GD
CHECKED JD
APPROVED KA
SCALE 1"= 100'
REVISED
DATE 5-14-10
PROJ. NO. WPB-09-7594
SHEET 1A

FACILITY MAINTENANCE AREA
FF EL 24.00'
ROOF EL 46.00'

WAREHOUSE STORAGE
FF EL 24.00'
ROOF EL 46.00'

FACILITY ADMINISTRATION OFFICES
FF EL 24.00'
ROOF EL 46.00'

PARKING AREA

TB-37 TB-38 TB-40

AB-1

TB-32

EXHAUST STACK

STACK EL 324.0 FLUE EL 334.0

TB-35

FUELING STATION

AB-3

TB-34 TB-1

CHEMICAL STORAGE

CHEMICAL STORAGE

FIRE PUMP HOUSE

EXHAUST STACKS

SWITCH YARD

SWITCH GEAR ROOM

TB-33

TB-2

TB-3

TB-21

0.5 MG FIRE WATER STORAGE TANK

TB-36

APC BUILDING – FFH AREA
FF EL 24.00'
ROOF EL 100.00'

TB-17

AB-2

TB-22

ASH MANAGEMENT BUILDING
FF EL 24.00'
ROOF EL 76.00'

APC BUILDING– SDA AREA
FF EL 24.00
ROOF EL 146.00'

TB-5 TB-4

TB-18 TB-7

TB-6

TB-23

AB-4

AB-5

TURBINE/ GENERATOR
FF EL 24.00'
ROOF EL 93.00'

BOILER BUILDING
FF EL 24.00'
ROOF EL 178.00' (MAX.)
148.00' (MIN.)

AIR COOLED CONDENSER
ROOF EL 84.00'

TB-8 TB-9 TB-10

ASH CONVEYING GALLERY

OUTAGE MAINT. SHOP

ROOF EL 41.00'

DIRTY WASTEWATER TANK

TB-24

TB-19

TB-11

REFUSE STORAGE PIT AND BUILDING
T/SLAB EL 19.00'
ROOF EL 132.00'

TB-28

TB-25

TB-12 TB-13

TB-20

TB-26 TB-27

AB-6

WATER TREATMENT BLDG.

STORAGE TANKS

AB-11

TB-31

TB-14

TIPPING FLOOR AND BUILDING
FF EL 54.00'
ROOF EL 105.00'

TB-29

TB-15 TB-16

TB-30

AB-8 AB-9 AB-10

AB-7

0' 50' 100' 200'

Scale: 1" = 100'

LEGEND

- AUGER BORING LOCATION (10' DEEP)
- STANDARD PENETRATION TEST (SPT) BORING LOCATION (25' DEEP)
- SPT BORING LOCATION (50' DEEP)
- SPT BORING LOCATION (100' DEEP)
- SPT BORING LOCATION (150' DEEP)
- TB-1 – TEST BORING AND NUMBER

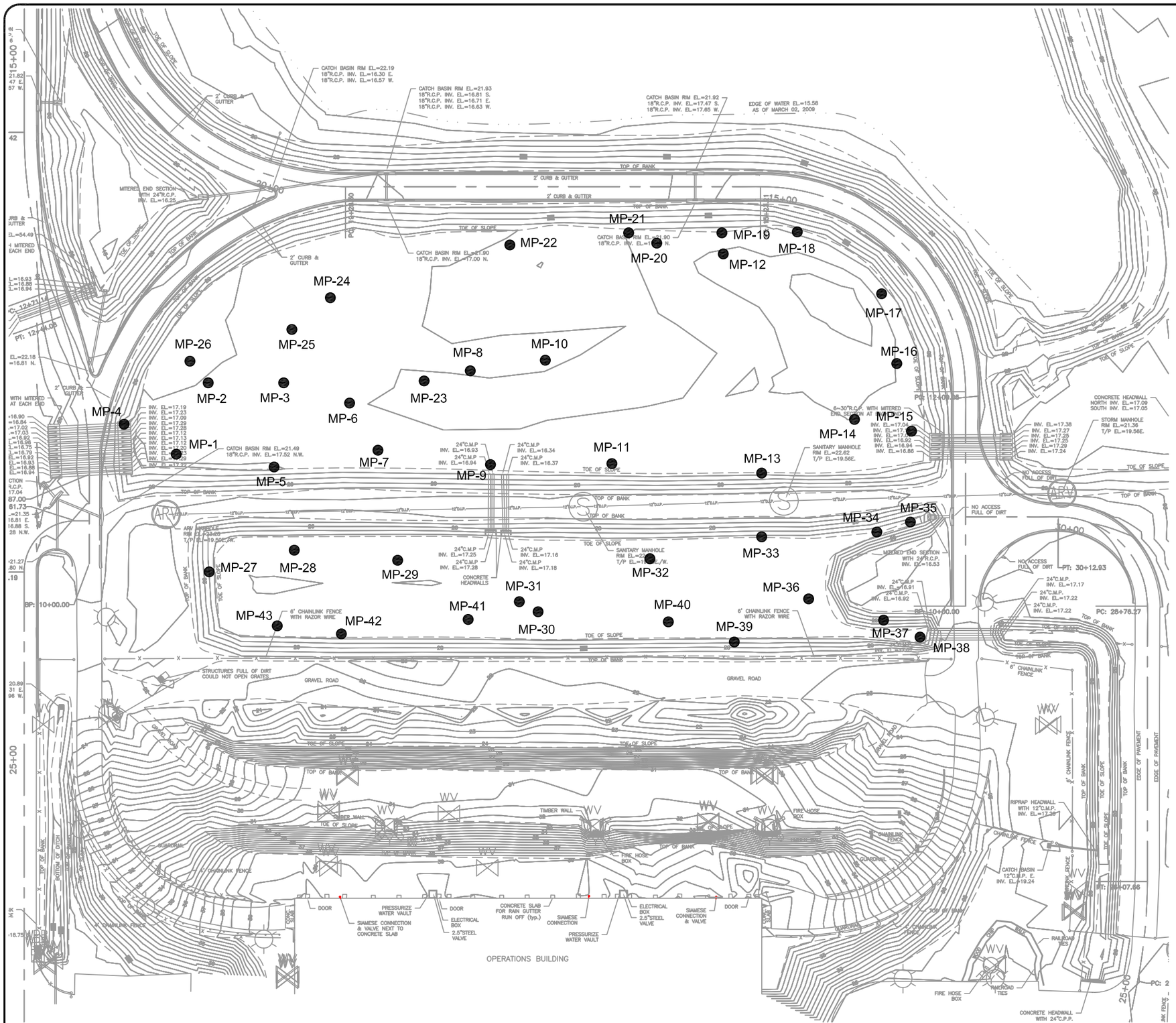
SUBSURFACE EXPLORATION PLAN

PALM BEACH RENEWABLE ENERGY FACILITY NO. 2

PALM BEACH COUNTY, FLORIDA

DUNKELBERGER engineering & testing, inc.

SHEET	1B
PROJ. NO.	WPB-09-7594
DATE	5-14-10
DRAWN	GD
CHECKED	JD
APPROVED	KA
SCALE	1"= 100'
REVISED	



SOFT SEDIMENT PROBE NO.	WATER DEPTH (INCHES)	SOFT SEDIMENT THICKNESS (INCHES)
1	10"	7"
2	0	9"
3	3"	48"
4	5"	17"
5	12"	9"
6	5"	16"
7	11"	12"
8	4.5"	28"
9	12"	12"
10	5"	12"
11	10"	11"
12	9"	40"
13	9"	9"
14	13"	12"
15	9"	12"
16	8"	16"
17	8.5"	12"
18	9.5"	18"
19	12"	13"
20	8"	23"
21	0	10"
22	8"	17"
23	3"	44"
24	12"	12"
25	5"	48"
26	0"	36"
27	14"	10"
28	16"	11"
29	16"	11"
30	16"	11"
31	16"	11"
32	14"	8"
33	13"	13"
34	13.5"	17"
35	4.5"	12"
36	15.5"	14"
37	10"	7.5"
38	11"	14"
39	12.5"	10.5"
40	12"	11"
41	16"	8"
42	14"	7"
43	13"	6.5"

LEGEND

MP-1 – SOFT SEDIMENT PROBE LOCATION AND NUMBER

SOURCE: GREENHORNE & O'MARA, INC.

SUBSURFACE EXPLORATION PLAN

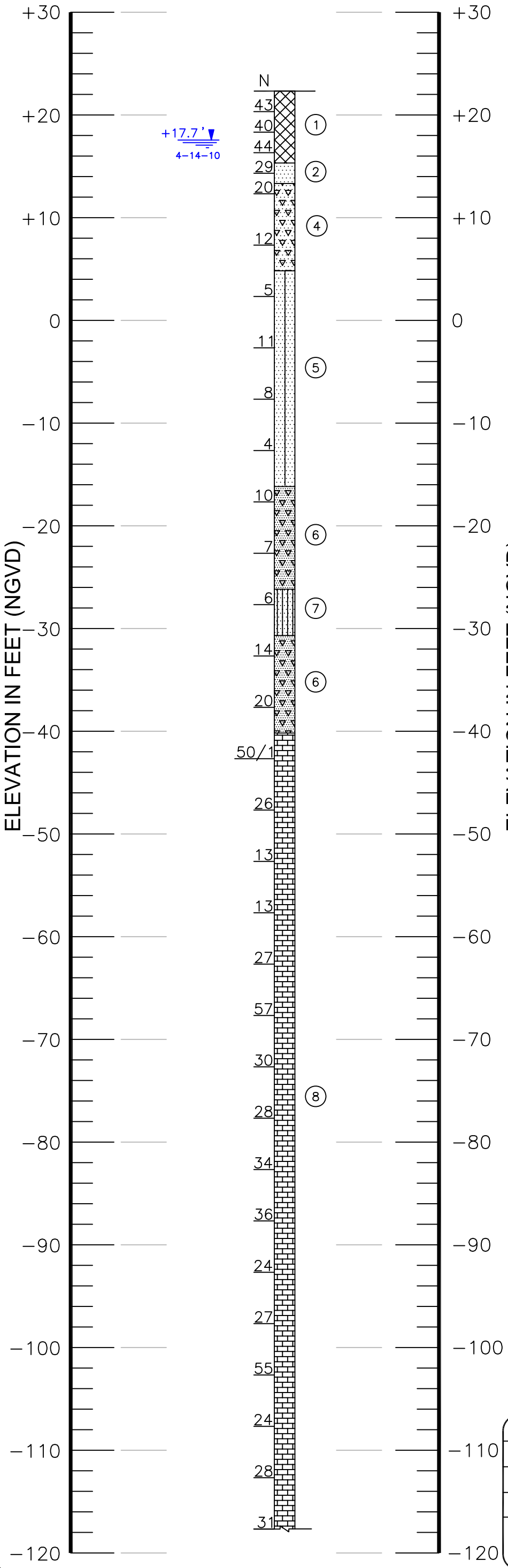
PALM BEACH RENEWABLE ENERGY FACILITY NO. 2

PALM BEACH COUNTY, FLORIDA

DUNKELBERGER
engineering & testing, inc.

DRAWN	GD
CHECKED	JD
APPROVED	KA
SCALE	1"= 100'
REVISED	
DATE	5-14-10
PROJ. NO.	WPB-09-7594
SHEET	1C

BORING NO. (STACK) TB-1
ELEVATION +22.4'



LEGEND

1. Light brown to brown fine SAND with trace to some sand-sized shell fragments and gravel, some lenses with silt (SP, SP-SM) (FILL)
2. Brown to light brown fine SAND, some lenses with silt (SP, SP-SM)
3. Brown to light brown clayey fine SAND (SC)
4. Light gray slightly silty to silty fine SAND with some sand to gravel-sized shell fragments (SP-SM, SM)
5. Brown to light brown fine SAND, trace to some silt (SP, SP-SM)
6. Gray to light gray slightly silty to silty fine SAND with some sand to gravel-sized shell fragments and gravel, some cemented sand and shell lenses (SP-SM, SM)
7. Brown to greenish-gray silty fine SAND with trace sand-sized shell fragments (SM) and sandy SILT (ML)
8. Light brown to light gray cemented sand and shell, sandy zones (COQUINA LIMESTONE)

N – Indicates the number of blows of a 140 pound hammer, freely falling a distance of 30 inches, required to drive a 2-inch diameter sampler 12 inches (ASTM D 1586)

20% – Indicates % loss of drilling fluid at depth interval shown

50/1 – Indicates fifty SPT hammer blows were required to drive the sampler 1 inch

SP – Unified Soil Classification System Group Symbol (ASTM D 2487)

TB-1 – Standard Penetration Test (SPT) boring and number

AB-1 – Auger boring and number

ST – Shelby Tube Sample

NR – No Recovery

CPT – Indicates the resistance in tsf to the advance of a Brainard-Kilman Model S-214 hand-held cone penetrometer

+17.7' / 4−14−10 – Elevation of groundwater (feet-NGVD) & date measured

GNE / 4−14−10 – Groundwater level not encountered on date drilled

SPT CONSISTENCY CHART

Silts and Clays-

Consistency	SPT (BLOWS/FOOT)
Very soft	Less than 2
Soft	2 - 4
Firm	4 - 8
Stiff	8 - 15
Very stiff	15 - 30
Hard	Greater than 30

SPT DENSITY CHART

Granular Materials-

RELATIVE DENSITY	SPT (BLOWS/FOOT)
Very loose	Less than 4
Loose	4 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very dense	Greater than 50

NOTES

(1) Borings were drilled between March 22 and April 26, 2010 using a Central Mine Equipment Model 55 (CME 55) drilling rig.

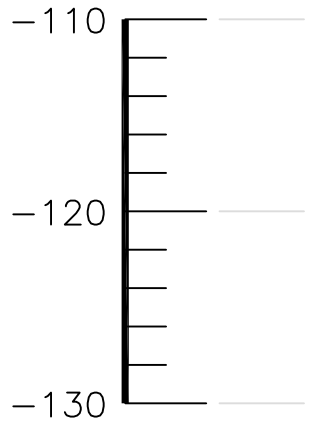
(2) Strata boundaries are approximate and represent soil strata at each test hole location only. Soil transitions may be more gradual than implied.

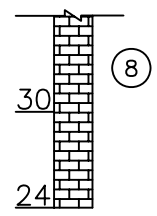
(3) Groundwater elevations shown on the subsurface profiles represent groundwater surfaces on the dates shown. Groundwater level fluctuations should be anticipated throughout the year.

(4) Underline elevations indicates elevations are approximate.

(5) Legend and notes shown on this drawing apply to Sheets 2B-2L as well

BORING NO. TB-1 CONTINUED





BOREHOLE GROUTED 0-150'

STACK

DRAWN	GD
CHECKED	JD
APPROVED	KA
SCALE	1" = 10'
REVISED	

SUBSURFACE PROFILES

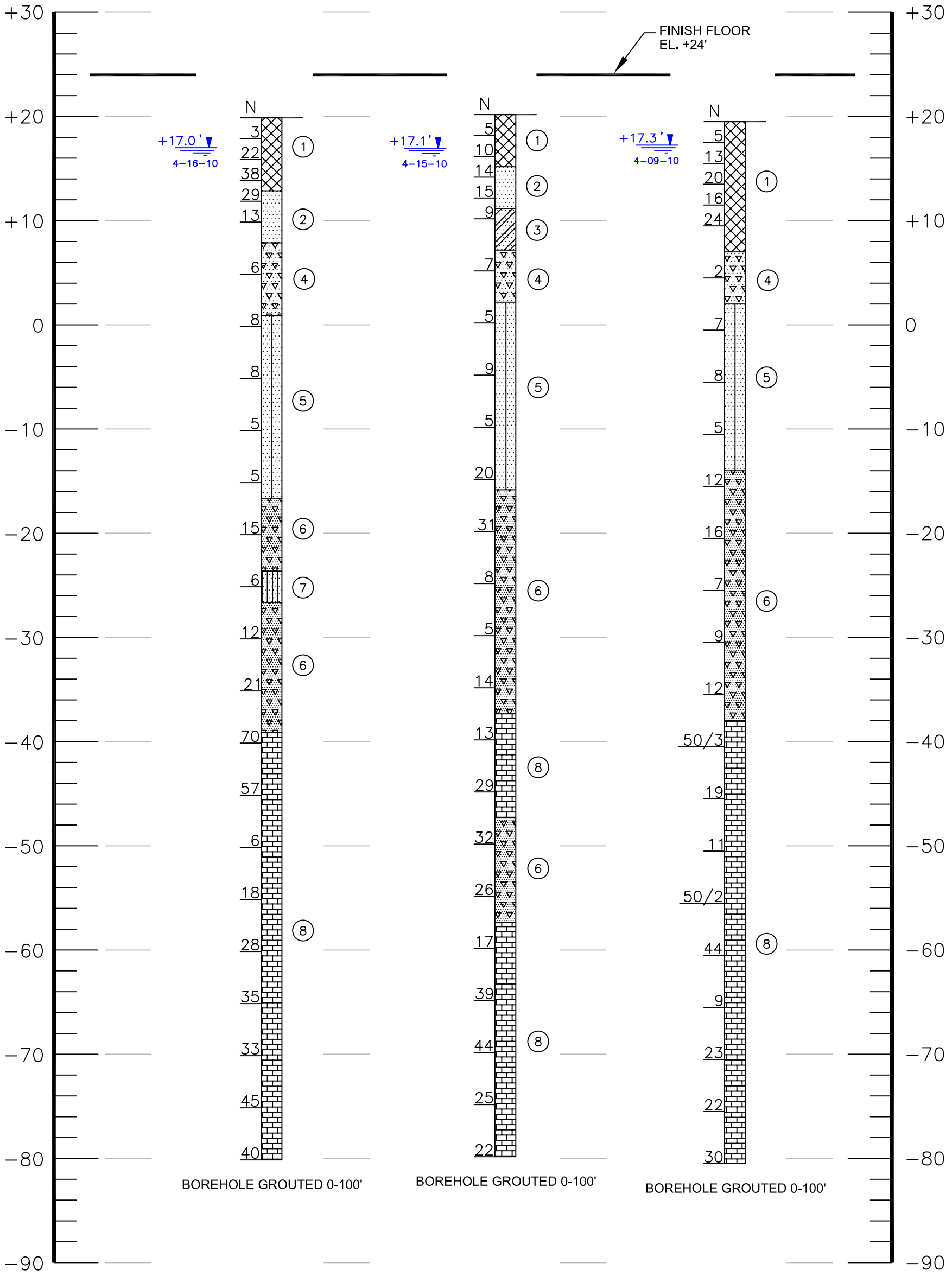
PALM BEACH RENEWABLE ENERGY FACILITY NO. 2

PALM BEACH COUNTY, FLORIDA

DUNKELBERGER engineering & testing, inc.

DATE	PROJ. NO.	SHEET
5-14-10	WPB-09-7594	2A

(APC BUILDING - FFH AREA)



NOTE: FOR DETAILED LEGEND AND NOTES, SEE SHEET 2A

1. SAND FILL (SP)
2. SAND (SP)
3. CLAYEY SAND (SC)
4. SAND/SHELL (SP-SM, SM)
5. SAND (SP)
6. SAND/SHELL (SP-SM, SM)
7. SAND-SILT (SM, ML)
8. LIMESTONE

DRAWN	GD
CHECKED	JD
APPROVED	KA
SCALE	1" = 10'
REVISED	

APC BUILDING - FFH AREA

SUBSURFACE PROFILES

PALM BEACH RENEWABLE ENERGY FACILITY NO. 2

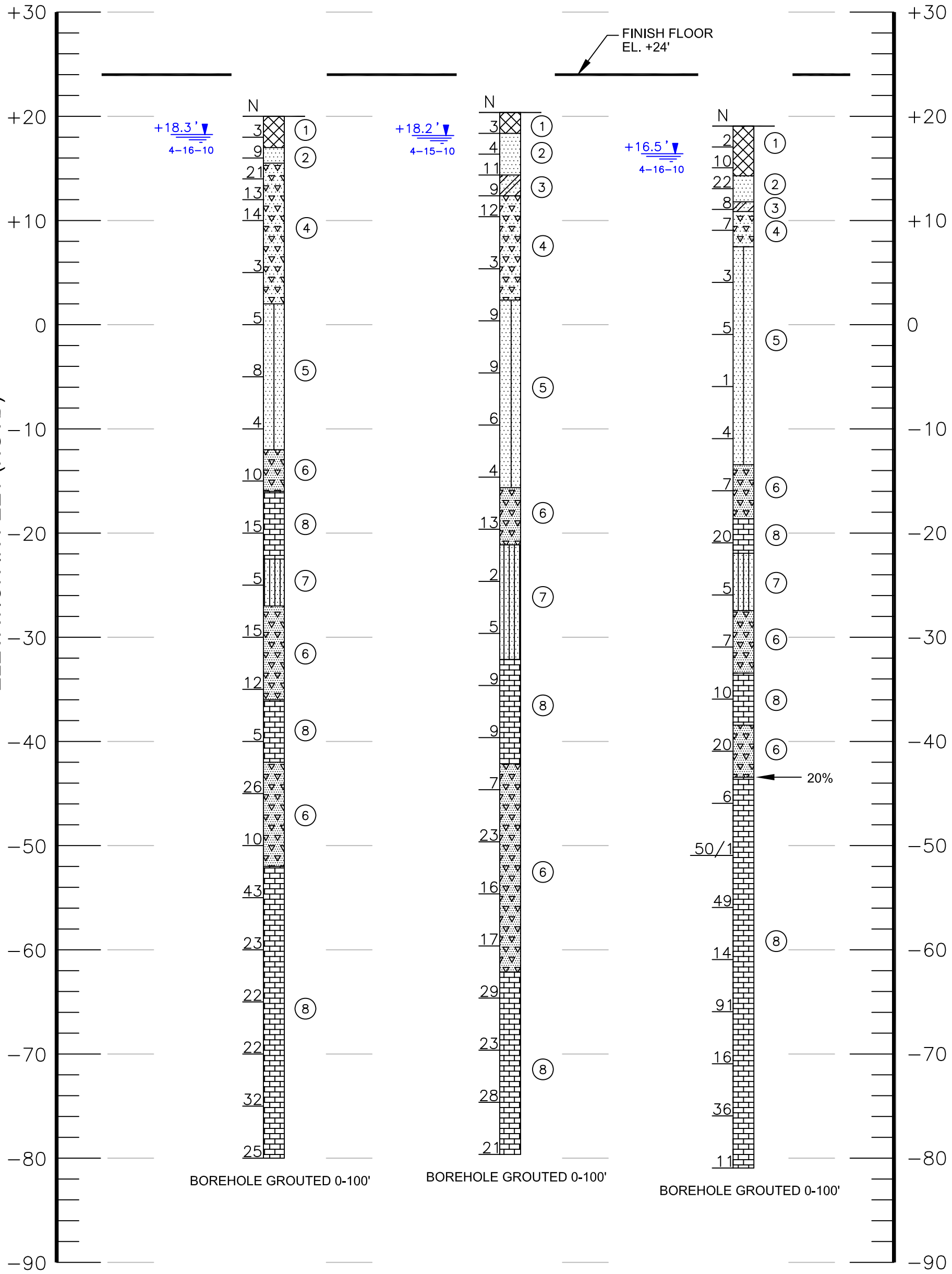
PALM BEACH COUNTY, FLORIDA

DUNKELBERGER
engineering & testing, inc.

DATE	PROJ. NO.	SHEET
5-14-10	WPB-09-7594	2B

(APC BUILDING - SDA AREA) TURBINE / GENERATOR

BORING NO.	TB-5	TB-6	TB-7
ELEVATION	+20.0'	+20.3'	+19.1'



NOTE: FOR DETAILED LEGEND AND NOTES, SEE SHEET 2A

1. SAND FILL (SP)
2. SAND (SP)
3. CLAYEY SAND (SC)
4. SAND/SHELL (SP-SM, SM)
5. SAND (SP)
6. SAND/SHELL (SP-SM, SM)
7. SAND-SILT (SM, ML)
8. LIMESTONE

APC BUILDING-SDA AREA; TURBINE GENERATOR

DRAWN	GD
CHECKED	JD
APPROVED	KA
SCALE	1" = 10'
REVISED	

SUBSURFACE PROFILES

PALM BEACH RENEWABLE ENERGY FACILITY NO. 2

PALM BEACH COUNTY, FLORIDA

DUNKELBERGER engineering & testing, inc.

DATE	PROJ. NO.	SHEET
5-14-10	WPB-09-7594	2C

(BOILER BUILDING)

BORING NO. / ELEVATION

TB-8 +21.1'

TB-9 +22.0'

TB-10 +22.3'

FINISH FLOOR EL. +24'

+17.1' 3-22-10

+17.2' 4-01-10

+17.2' 3-31-10

ELEVATION IN FEET (NGVD)

+30 +20 +10 0 −10 −20 −30 −40 −50 −60 −70 −80 −90 −100 −110 −120

TB-8

N	
12	1
10	
14	
30	2
18	3
10	4
4	
9	5
6	
4	
10	6
10	
10	
11	8
12	
5	6
28	
11	
16	8
8	
26	
21	6
17	

BOREHOLE GROUTED 0-100'

TB-9

N	
9	1
17	
20	
22	2
7	3
11	4
4	
10	5
8	
6	
5	6
10	
15	
5	7
9	6
13	8
50/3	
31	6
6	
25	
50/2	
41	
19	
10	
34	
42	8
31	
17	
50/3	

TB-10

N	
13	1
25	
8	
29	2
8	3
9	4
4	
8	5
16	7
2	
5	5
3	
4	6
13	
26	8
24	
23	
19	
26	
5	6
35	
28	
26	

BOREHOLE GROUTED 0-100'

BORING NO. / ELEVATION

TB-9 CONTINUED

31	
24	
25	
18	
17	

BOREHOLE GROUTED 0-150'

1 SAND FILL (SP)
2 SAND (SP)
3 CLAYEY SAND (SC)
4 SAND/SHELL (SP-SM, SM)
5 SAND (SP)
6 SAND/SHELL (SP-SM, SM)
7 SAND-SILT (SM, ML)
8 LIMESTONE

NOTE: FOR DETAILED LEGEND AND NOTES, SEE SHEET 2A

BOILER BUILDING

SUBSURFACE PROFILES

PALM BEACH RENEWABLE ENERGY FACILITY NO. 2

PALM BEACH COUNTY, FLORIDA

DUNKELBERGER engineering & testing, inc.

DRAWN	GD
CHECKED	JD
APPROVED	KA
SCALE	1" = 10'
REVISED	
DATE	5-14-10
PROJ. NO.	WPB-09-7594
SHEET	2D

(REFUSE STORAGE PIT AND BUILDING)

BORING NO. / ELEVATION

TB-11 +20.7'

+17.5' 4-08-10

-Black organic fine SAND (PT)

TB-12 +22.1'

+17.9' 4-02-10

TB-13 +22.3'

+17.3' 4-05-10

FINISH FLOOR EL. +19'

ELEVATION IN FEET (NGVD)

+30 +20 +10 0 −10 −20 −30 −40 −50 −60 −70 −80 −90 −100 −110 −120 −130

TB-11: N 4 4 21 21 9 5 3 5 4 7 12 5 7 12 26 22 39 18 23 50/2 21 27 37 33 58 34 50/5 50 27 23

TB-12: N 17 18 31 42 13 11 3 3 4 9 18 9 7 14 21 50/4 16 16 29 22 38 36 24

TB-13: N 18 30 37 32 13 10 6 7 10 1 11 4 6 14 36 35 26 19 24 17 23 24 23

BOREHOLE GROUTED 0-100'

BOREHOLE GROUTED 0-100'

NOTE: FOR DETAILED LEGEND AND NOTES, SEE SHEET 2A

TB-11 CONTINUED

30 29 25

BOREHOLE GROUTED 0-150'

1 SAND FILL (SP)
2 SAND (SP)
3 CLAYEY SAND (SC)
4 SAND/SHELL (SP-SM, SM)
5 SAND (SP)
6 SAND/SHELL (SP-SM, SM)
7 SAND-SILT (SM, ML)
8 LIMESTONE

REFUSE STORAGE PIT AND BUILDING

SUBSURFACE PROFILES

PALM BEACH RENEWABLE ENERGY FACILITY NO. 2

PALM BEACH COUNTY, FLORIDA

DUNKELBERGER engineering & testing, inc.

DRAWN	CHECKED	APPROVED	SCALE	REVISED	DATE	PROJ. NO.	SHEET
GD	JD	KA	1" = 10'		5-14-10	WPB-09-7594	2E

(TIPPING FLOOR AND BUILDING)

BORING NO. ELEVATION

ELEVATION IN FEET (NGVD)

+30 +20 +10 0 −10 −20 −30 −40 −50 −60 −70

TB-15 +31.0'

FINISH FLOOR EL. +54'

+20.8' 3-24-10

N		
24	1	
24		
18		
27		
30		
29	4	
48		
11		
10		
11	5	
12		
18		
8	6	
9		
12		
15		
26	7	
3		
35		
42	8	
25		
50/1		
28		

BOREHOLE GROUTED 0-100'

TB-14 +21.1'

FINISH FLOOR EL. +54'

+19.0' 3-30-10

N		
5	1	
13		
27	2	
9	3	
7		
10		
4	4	
6		
2		
8	5	
15		
7		
6	6	
13		
18	8	
2	7	
13	6	
50/3	8	
29		
19		
27	6	
16		
29		
26	8	
24	6	
34	8	
18	6	

TB-16 +31.8'

FINISH FLOOR EL. +54'

+18.6' 3-25-10

N		
21	1	
26		
35		
42		
41		
37		
52		
54	2	
74		
26		
13	4	
9		
8	5	
8		
5	6	
6		
6		
18		
24		
38		
30	8	
50		
50/5		
58		
70		

BOREHOLE GROUTED 0-100'

1 SAND FILL (SP)
2 SAND (SP)
3 CLAYEY SAND (SC)
4 SAND/SHELL (SP-SM, SM)
5 SAND (SP)
6 SAND/SHELL (SP-SM, SM)
7 SAND-SILT (SM, ML)
8 LIMESTONE

BORING NO. ELEVATION

−100 −110 −120 −130

TB-14 CONTINUED

49	6	
19		
25		
28	8	
25		
29		

BOREHOLE GROUTED 0-150'

NOTE: FOR DETAILED LEGEND AND NOTES, SEE SHEET 2A

−70 −80 −90 −100 −110

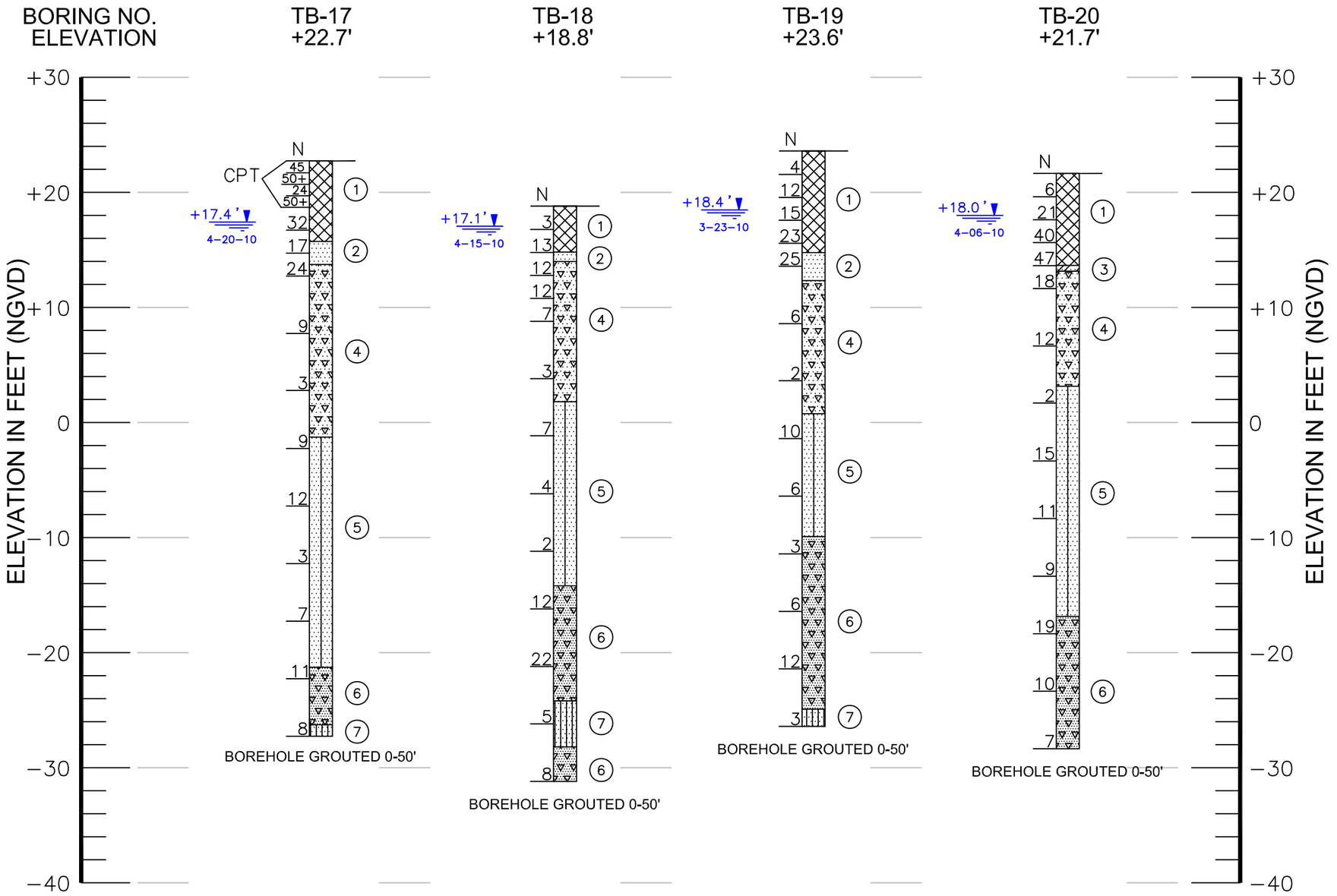
ELEVATION IN FEET (NGVD)

TIPPING FLOOR AND BUILDING
SUBSURFACE PROFILES
PALM BEACH RENEWABLE ENERGY FACILITY NO. 2
PALM BEACH COUNTY, FLORIDA

DUNKELBERGER engineering & testing, inc.

DRAWN	GD
CHECKED	JD
APPROVED	KA
SCALE	1" = 10'
REVISED	
DATE	5-14-10
PROJ. NO.	WPB-09-7594
SHEET	2F

(AIR COOLED CONDENSER)



1. SAND FILL (SP)
2. SAND (SP)
3. CLAYEY SAND (SC)
4. SAND/SHELL (SP-SM, SM)
5. SAND (SP)
6. SAND/SHELL (SP-SM, SM)
7. SAND-SILT (SM, ML)
8. LIMESTONE

NOTE: FOR DETAILED LEGEND AND NOTES, SEE SHEET 2A

AIR COOLED CONDENSER

SUBSURFACE PROFILES

PALM BEACH RENEWABLE ENERGY FACILITY NO. 2

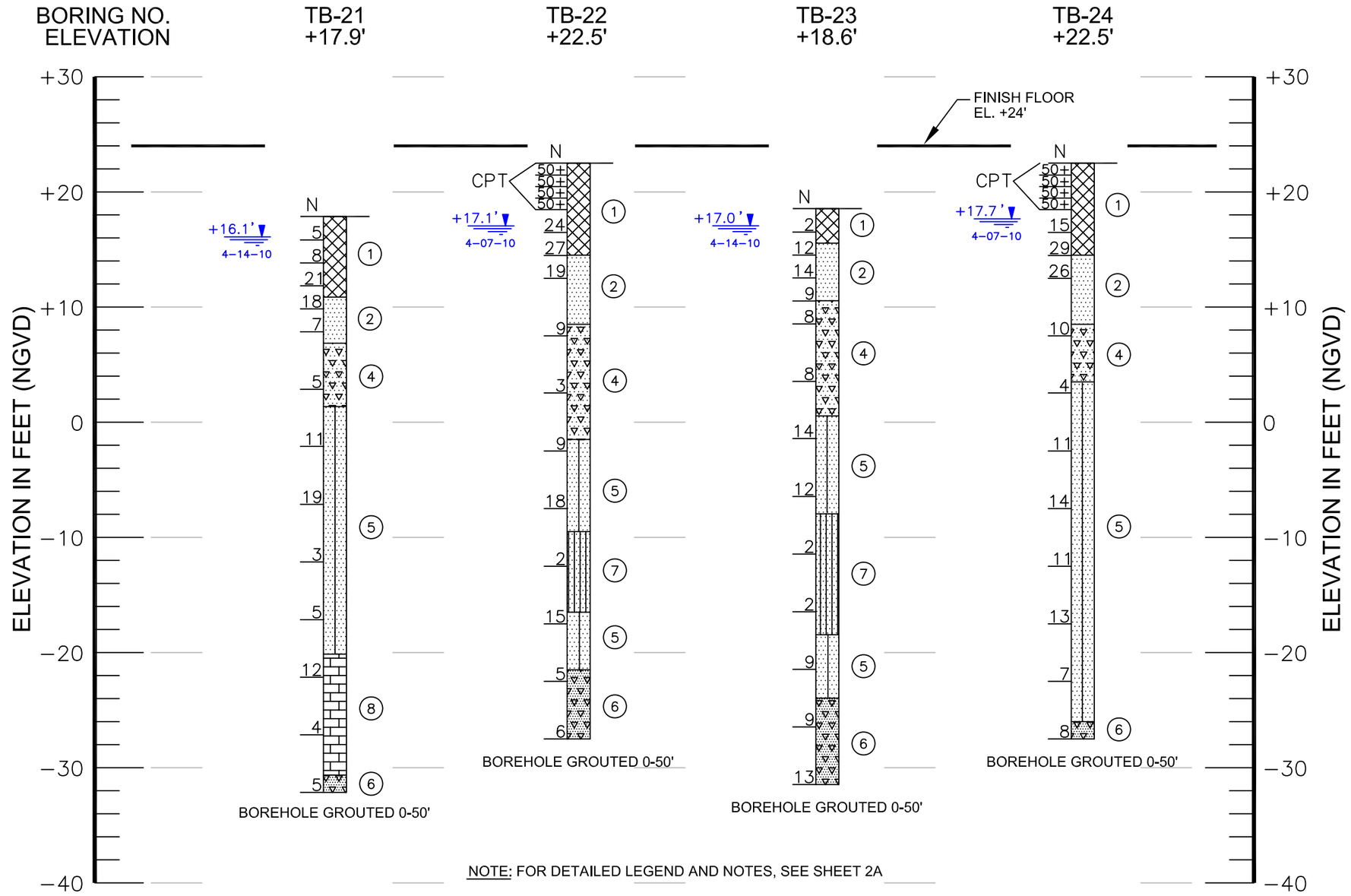
PALM BEACH COUNTY, FLORIDA

DRAWN	GD
CHECKED	JD
APPROVED	KA
SCALE	1" = 10'
REVISED	

DUNKELBERGER
engineering & testing, inc.

DATE	PROJ. NO.	SHEET
5-14-10	WPB-09-7594	2G

(ASH MANAGEMENT BUILDING)



NOTE: FOR DETAILED LEGEND AND NOTES, SEE SHEET 2A

1. SAND FILL (SP)
2. SAND (SP)
3. CLAYEY SAND (SC)
4. SAND/SHELL (SP-SM, SM)
5. SAND (SP)
6. SAND/SHELL (SP-SM, SM)
7. SAND-SILT (SM, ML)
8. LIMESTONE

ASH MANAGEMENT BUILDING

SUBSURFACE PROFILES

PALM BEACH RENEWABLE ENERGY FACILITY NO. 2

PALM BEACH COUNTY, FLORIDA

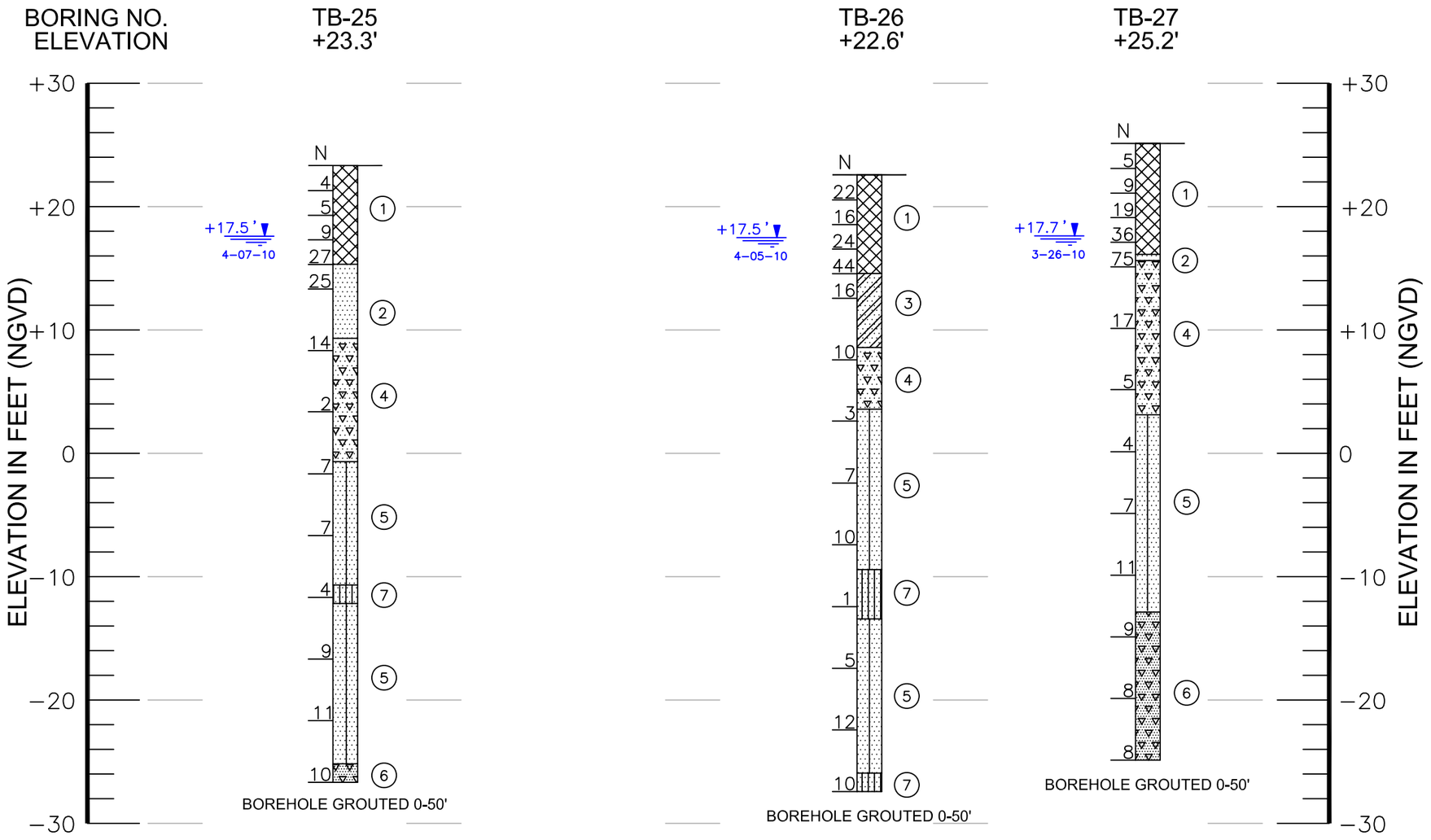
DRAWN	GD
CHECKED	JD
APPROVED	KA
SCALE	1" = 10'
REVISED	

DUNKELBERGER engineering & testing, inc.

DATE	PROJ. NO.	SHEET
5-14-10	WPB-09-7594	2H

(DIRTY WASTEWATER TANK)

(WATER TREATMENT BUILDING & STORAGE TANKS)



NOTE: FOR DETAILED LEGEND AND NOTES, SEE SHEET 2A

1 SAND FILL (SP)
2 SAND (SP)
3 CLAYEY SAND (SC)
4 SAND/SHELL (SP-SM, SM)
5 SAND (SP)
6 SAND/SHELL (SP-SM, SM)
7 SAND-SILT (SM, ML)
8 LIMESTONE

DIRTY WASTEWATER TANK
WATER TREATMENT BUILDING & STORAGE TANKS

DRAWN	GD
CHECKED	JD
APPROVED	KA
SCALE	1" = 10'
REVISED	

SUBSURFACE PROFILES

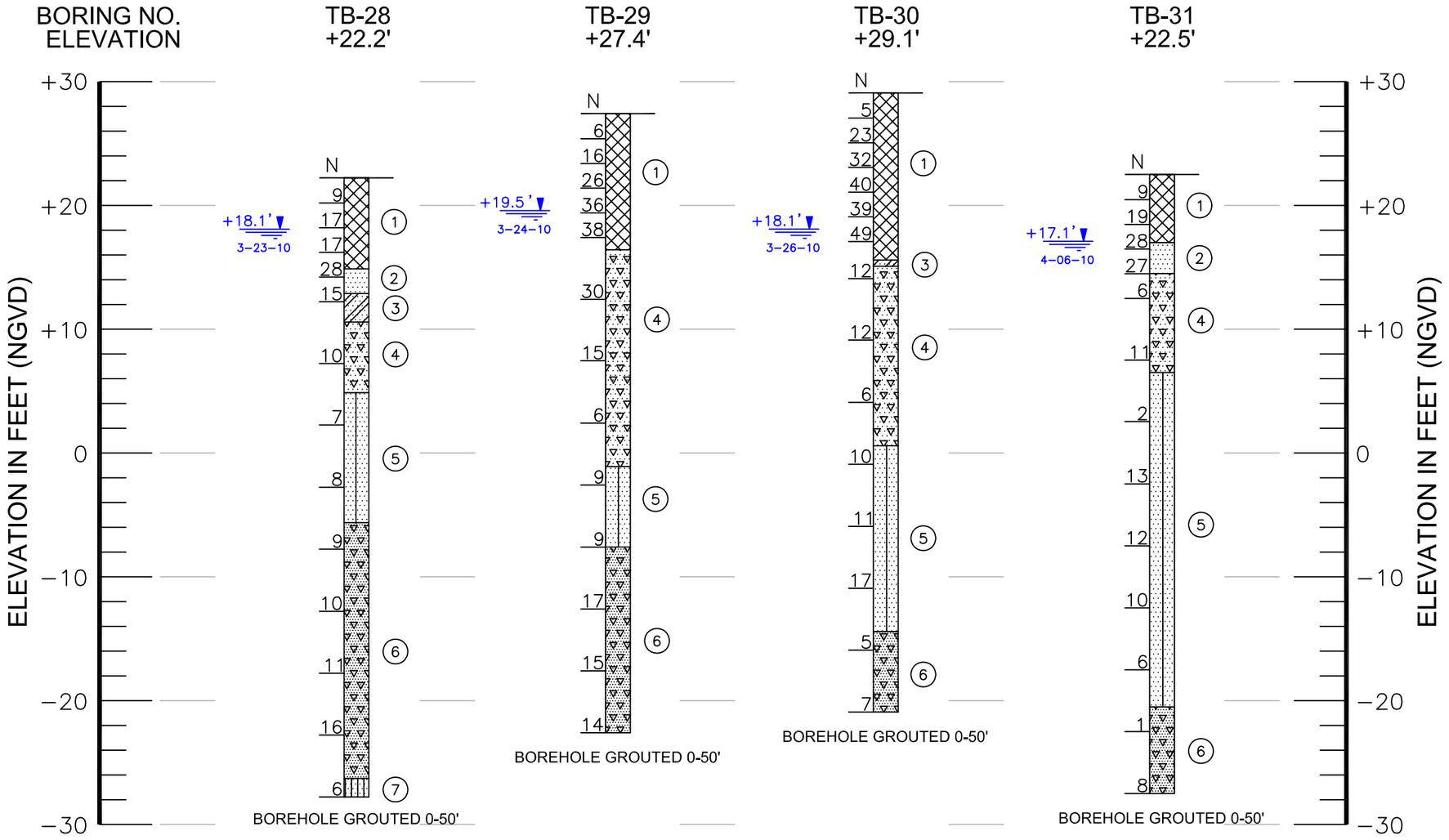
PALM BEACH RENEWABLE ENERGY FACILITY NO. 2

PALM BEACH COUNTY, FLORIDA

DUNKELBERGER
engineering & testing, inc.

DATE	PROJ. NO.	SHEET
5-14-10	WPB-09-7594	2I

(TRUCK RAMPS & RETAINING WALLS)



1. SAND FILL (SP)
2. SAND (SP)
3. CLAYEY SAND (SC)
4. SAND/SHELL (SP-SM, SM)
5. SAND (SP)
6. SAND/SHELL (SP-SM, SM)
7. SAND-SILT (SM, ML)
8. LIMESTONE

NOTE: FOR DETAILED LEGEND AND NOTES, SEE SHEET 2A

TRUCK RAMPS & RETAINING WALLS

DRAWN	GD
CHECKED	JD
APPROVED	KA
SCALE	1" = 10'
REVISED	

SUBSURFACE PROFILES

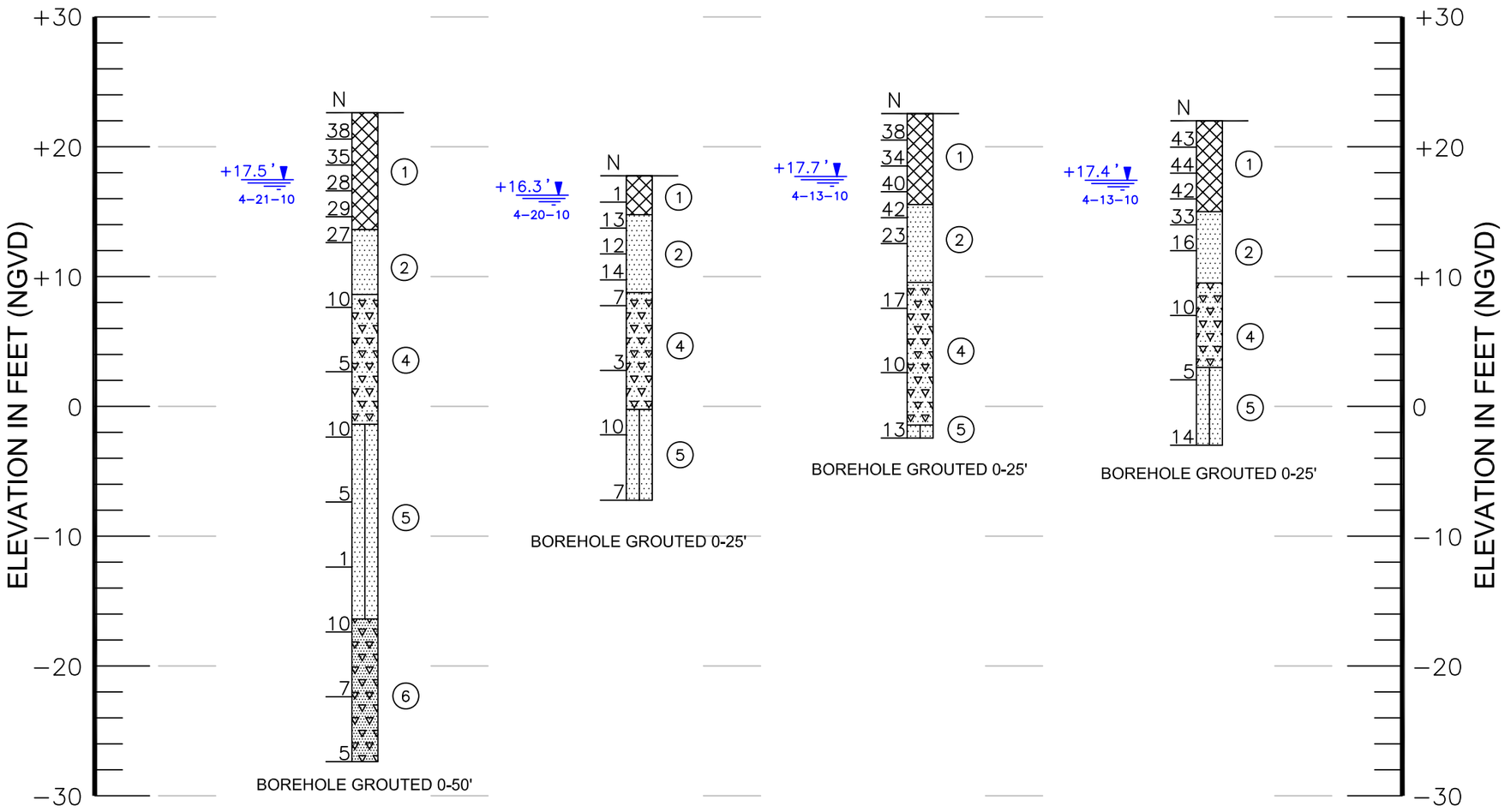
PALM BEACH RENEWABLE ENERGY FACILITY NO. 2

PALM BEACH COUNTY, FLORIDA

DUNKELBERGER
engineering & testing, inc.

DATE	PROJ. NO.	SHEET
5-14-10	WPB-09-7594	2J

(SWITCH YARD & SWITCH GEAR ROOM) (CHEMICAL STORAGE)



NOTE: FOR DETAILED LEGEND AND NOTES, SEE SHEET 2A

1. SAND FILL (SP)
2. SAND (SP)
3. CLAYEY SAND (SC)
4. SAND/SHELL (SP-SM, SM)
5. SAND (SP)
6. SAND/SHELL (SP-SM, SM)
7. SAND-SILT (SM, ML)
8. LIMESTONE

SWITCH YARD & SWITCH GEAR ROOM CHEMICAL STORAGE

SUBSURFACE PROFILES

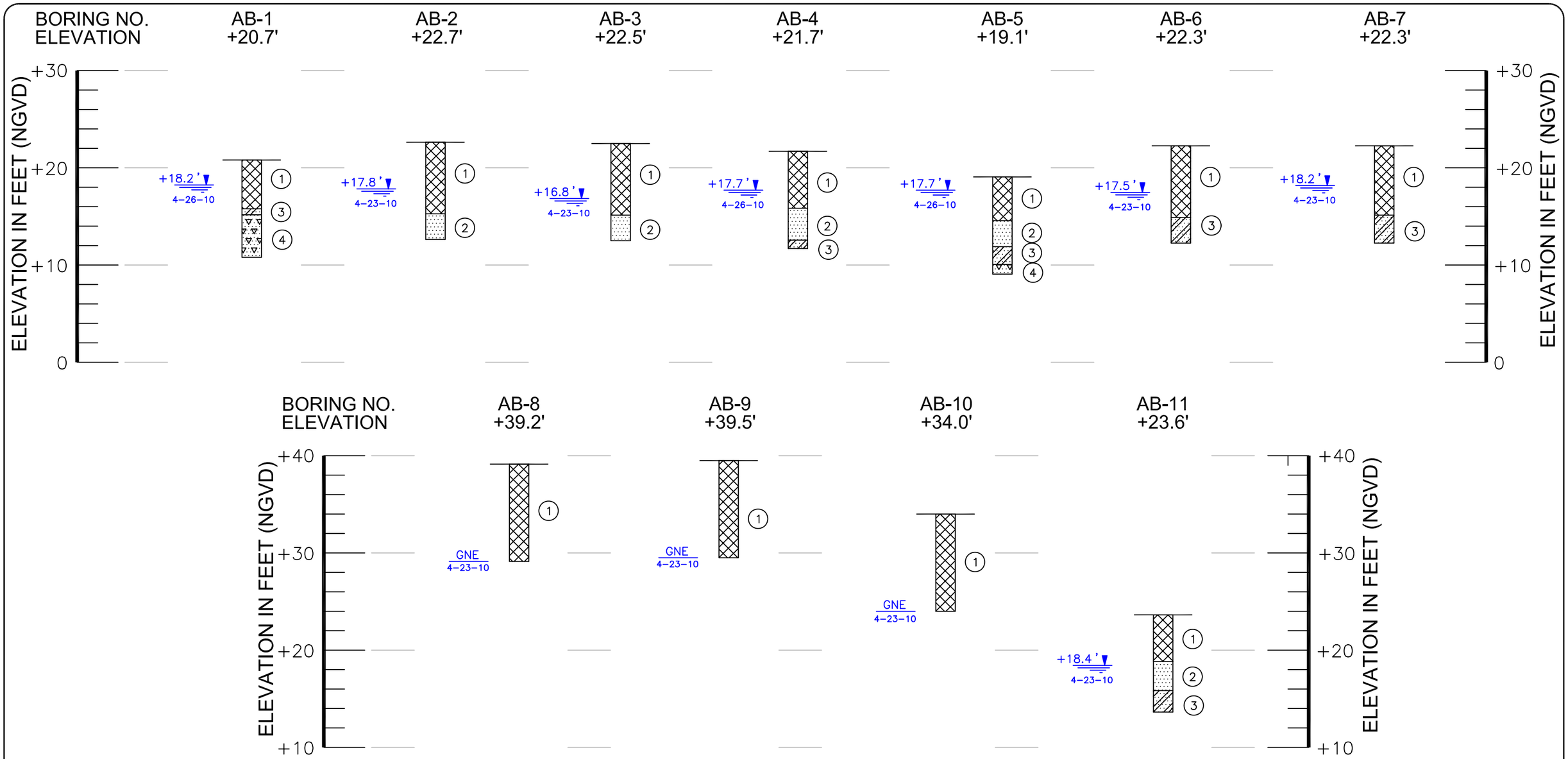
PALM BEACH RENEWABLE ENERGY FACILITY NO. 2

PALM BEACH COUNTY, FLORIDA

DRAWN	GD
CHECKED	JD
APPROVED	KA
SCALE	1" = 10'
REVISED	

DUNKELBERGER engineering & testing, inc.

DATE	PROJ. NO.	SHEET
5-14-10	WPB-09-7594	2K



NOTE: FOR DETAILED LEGEND AND NOTES, SEE SHEET 2A

DRAWN	GD
CHECKED	JD
APPROVED	KA
SCALE	1" = 10'
REVISED	

SUBSURFACE PROFILES

PALM BEACH RENEWABLE ENERGY FACILITY NO. 2

PALM BEACH COUNTY, FLORIDA

DUNKELBERGER
engineering & testing, inc.

DATE	PROJ. NO.	SHEET
5-14-10	WPB-09-7594	2L

NORTH

SOUTH

EXISTING WASTE-TO-ENERGY FACILITY

EXISTING GROUND SURFACE

TB-1 TB-4 TB-9 TB-11 TB-14

+17.7' 4-14-10

+17.3' 4-09-10

+17.2' 4-01-10

+17.5' 4-08-10

+19.0' 3-30-10

Black organic fine SAND (PT)

ELEVATION - FEET (NGVD)

40 20 0 -20 -40 -60 -80 -100 -120 -140

1 SAND FILL (SP)
2 SAND (SP)
3 CLAYEY SAND (SC)
4 SAND/SHELL (SP-SM, SM)
5 SAND (SP)
6 SAND/SHELL (SP-SM, SM)
7 SAND-SILT (SM, ML)
8 LIMESTONE

+17.8' 4-09-10 – Elevation of groundwater (feet-NGVD) & date measured

0' 25' 50' 100'

Scale: 1" = 50' HORZ.

GEOLOGIC CROSS SECTION

PALM BEACH RENEWABLE ENERGY FACILITY NO. 2

PALM BEACH COUNTY, FLORIDA

DUNKELBERGER engineering & testing, inc.

DRAWN	GD
CHECKED	JD
APPROVED	KA
SCALE	1"= 50' (H) 1"= 20' (V)
REVISED	
DATE	5-14-10
PROJ. NO.	WPB-09-7594
SHEET	3

APPENDIX A

SITE PHOTOGRAPHS



Photograph 1: Site viewed west from near NE Corner of existing facility.



Photograph 2: Site viewed NW from near NE Corner of existing facility.



Photograph 3: Site viewed north from near NE Corner of existing facility.



Photograph 4: Site viewed NE from near NE Corner of existing facility.



Photograph 5: Drilling rig located on Boring TB-10, viewing west.



Photograph 6: Lake located at northern portion of site.



Photograph 7: Wooded portion of site.



Photograph 8: Eastern portion of site viewing SE from north roadway.

APPENDIX B

SURVEY DATA (BORING COORDINATES/ELEVATIONS)

BORING LOCATIONS AT THE WASTE ENERGY PLANT

POINT NUMBER	NORTHING	EASTING	ELEVATION	DESCRIPTION
2000	888241.896	779490.790	22.17	TB#28
2001	888038.414	779556.497	27.43	TB#29
2002	888238.777	779547.779	23.61	TB#19
2003	888123.384	779585.261	21.68	TB#20
2004	888027.151	779777.042	31.04	TB#15
2005	888116.508	779897.341	21.10	TB#14
2006	888023.778	780065.514	31.82	TB#16
2007	888024.932	780253.821	29.07	TB#30
2008	888093.372	780228.190	25.17	TB#27
2009	888163.864	780222.457	22.64	TB#26
2010	888074.145	780422.139	22.51	TB#31
2011	888168.697	780089.630	22.29	TB#13
2012	888168.731	779723.821	22.13	TB#12
2013	888290.413	780303.001	22.53	TB#24
2014	888230.863	780218.316	23.34	TB#25
2015	888289.912	780316.509	19.53	TB#9

THESE WERE SHOT ON 3-22-10

2050	888485.138	780300.630	22.52	TB#22
2051	888639.739	780012.691	22.04	TB#35
2052	888620.646	779928.637	22.39	TB#1
2053	888638.844	779821.985	22.56	TB#34
2054	888697.357	779535.821	22.68	TB#32

THESE WERE SHOT ON 3-26-10

2055	888572.664	780196.386	17.86	TB#21
2056	888595.135	780050.608	18.05	TB#3
2057	888602.101	779774.813	19.83	TB#2
2058	888570.943	779646.242	17.81	TB#33
2059	888518.380	779547.073	22.66	TB#17

THESE WERE SHOT ON 4-02-10

2067	888381.291	779615.306	18.80	TB#18
2068	888382.942	779680.701	19.13	TB#7
2069	888400.095	779803.145	19.97	TB#5
2070	888436.855	779896.783	19.54	TB#4
2071	888244.622	779910.73	20.66	TB#11
2072	888396.575	780041.784	20.26	TB#6
2073	888401.613	780199.526	18.60	TB#23
2074	888335.665	779736.535	21.12	TB#8

THESE WERE SHOT ON 4-14-10

BORING LOCATIONS AT THE WASTE ENERGY PLANT

POINT NUMBER	NORTHING	EASTING	ELEVATION	DESCRIPTION
2075	888324.720	779905.058	21.96	TB#9
2076	888312.678	780112.980	22.32	TB#10

THESE WERE SHOT ON 4-19-10

2078	888598.749	780039.122	20.78	TB#3

THIS WAS SHOT ON 4-20-10

	888802.337	779377.974	20.66	AB#1
	888473.068	779442.485	22.66	AB#2
	888645.119	780131.504	22.52	AB#3
	888398.181	780344.112	21.71	AB#4
	888340.500	780452.681	19.09	AB#5
	888143.334	779397.448	22.26	AB#6
	887931.067	779396.610	22.29	AB#7
	887959.544	779665.014	39.23	AB#8
	887956.818	779917.561	39.49	AB#9
	887968.131	780234.780	34.04	AB#10
	888094.254	780348.038	23.63	AB#11

THESE WERE SHOT ON 4-22-10

APPENDIX C

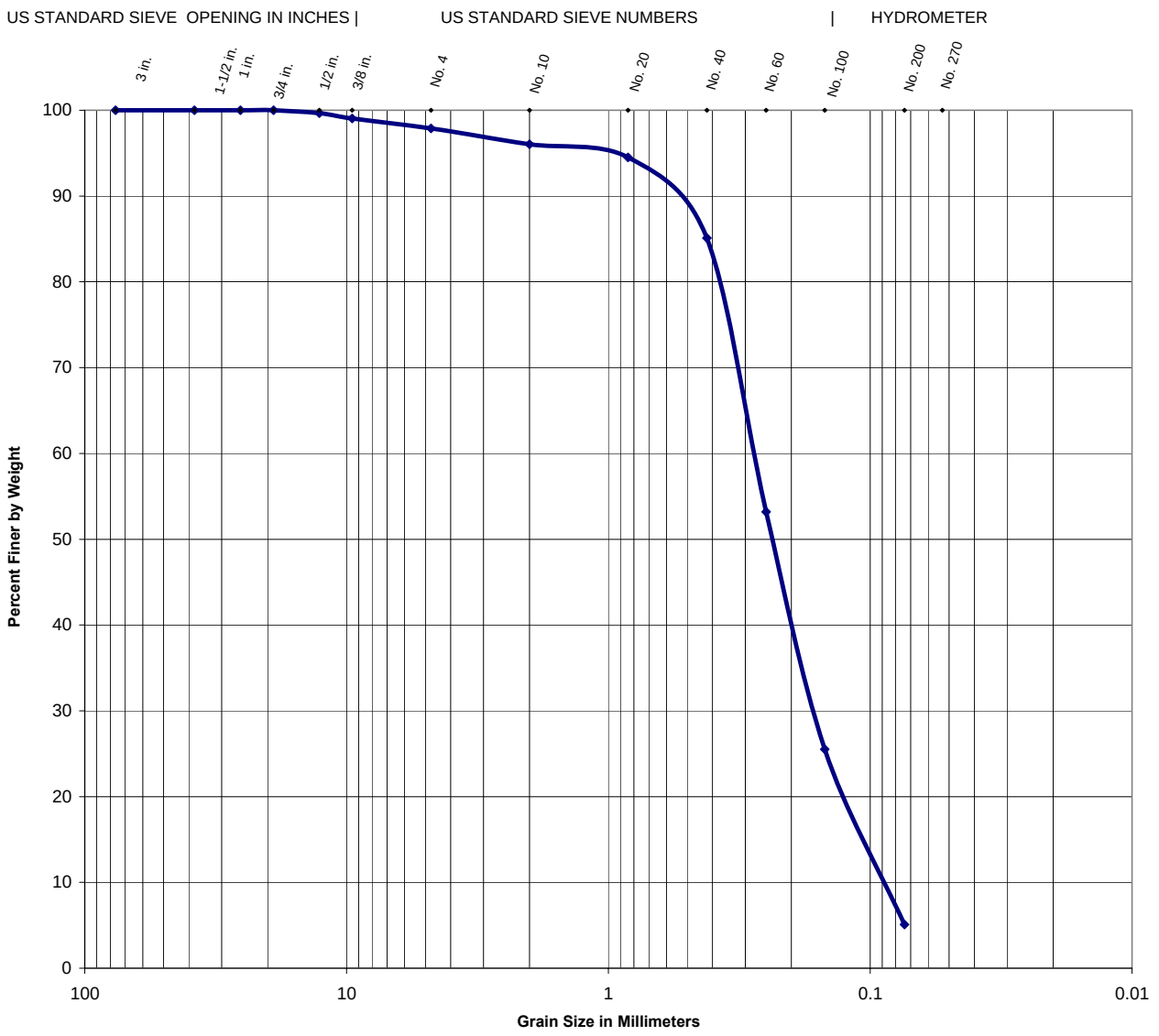
LABORATORY TEST RESULTS

SHEET C1
SUMMARY OF INDEX PROPERTY TEST RESULTS
PALM BEACH RENEWABLE ENERGY FACILITY No. 2
PALM BEACH COUNTY, FLORIDA

BORING NUMBER	SAMPLE DEPTH	MOISTURE CONTENT (%)	SIEVE ANALYSES											USCS GROUP
			1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200	
FILL														
TB - 1	3.0 - 4.0	4.6	100.0	100.0	99.7	99.1	97.9	96.0	94.5	85.1	53.2	25.5	5.1	SP-SM
TB - 8	3.0 - 4.0	13.1	100.0	100.0	100.0	98.9	95.5	92.5	90.1	77.7	46.3	23.4	4.6	SP
TB - 15	5.0 - 6.0	15.1	100.0	100.0	100.0	99.3	97.6	97.3	96.6	90.6	68.8	43.9	9.6	SP-SM
TB - 16	9.0 - 10.0	6.7	100.0	100.0	100.0	99.3	97.3	94.8	92.8	80.7	46.3	22.5	4.9	SP
Average		**9.9**	**100.0**	**100.0**	**99.9**	**99.2**	**97.1**	**95.2**	**93.5**	**83.5**	**53.7**	**28.8**	**6.1**	
SAND														
TB - 1	7.0 - 8.0	18.1	100.0	100.0	100.0	100.0	100.0	100.0	99.9	93.3	69.2	42.2	6.1	SP-SM
TB - 10	7.0 - 8.0	18.3	100.0	100.0	100.0	100.0	100.0	100.0	99.9	94.5	71.9	44.2	3.5	SP
TB - 28	7.0 - 8.0	19.0	100.0	100.0	100.0	100.0	100.0	100.0	99.9	95.0	72.9	47.3	5.8	SP-SM
Average		**18.5**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**99.9**	**94.3**	**71.3**	**44.6**	**5.1**	
CLAYEY SAND														
TB - 8	9.0 - 10.0	18.8	100.0	100.0	100.0	100.0	100.0	100.0	99.7	94.6	76.1	53.9	15.5	SC
TB - 28	9.0 - 10.0	60.9	100.0	100.0	100.0	100.0	100.0	100.0	99.9	94.9	76.2	51.3	14.0	SC
Average		**39.9**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**99.8**	**94.8**	**76.2**	**52.6**	**14.8**	
SAND WITH SHELL														
TB - 1	9.0 - 10.0	14.0	100.0	96.7	83.1	77.3	69.7	62.6	58.1	52.9	41.6	29.0	10.6	SP-SM
TB - 8	14.0 - 15.0	16.7	100.0	100.0	98.0	96.6	85.0	73.5	65.5	55.2	30.9	14.7	5.2	SP-SM
TB - 10	14.0 - 15.0	18.0	100.0	100.0	96.5	93.5	78.5	59.0	48.2	41.4	29.6	20.4	12.0	SM
TB - 15	19.0 - 20.0	22.6	100.0	100.0	100.0	100.0	96.1	91.6	87.2	81.2	65.5	45.7	9.8	SP-SM
Average		**17.8**	**100.0**	**100.0**	**98.2**	**96.7**	**86.5**	**74.7**	**67.0**	**59.3**	**42.0**	**26.9**	**9.0**	
SAND														
TB - 1	24.0 - 25.0	21.7	100.0	100.0	100.0	100.0	100.0	100.0	99.9	98.6	89.0	50.2	3.0	SP
TB - 8	29.0 - 30.0	23.5	100.0	100.0	100.0	100.0	100.0	99.8	99.7	93.1	70.6	52.0	6.0	SP-SM
TB - 10	24.0 - 25.0	21.7	100.0	100.0	100.0	100.0	100.0	100.0	99.9	92.6	72.1	46.2	3.2	SP
TB - 15	34.0 - 35.0	22.0	100.0	100.0	100.0	100.0	100.0	99.9	99.4	90.1	65.2	23.7	3.4	SP
Average		**22.2**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**99.9**	**99.7**	**91.9**	**69.3**	**40.6**	**4.2**	
SAND WITH SHELL														
TB - 1	44.0 - 45.0	26.0	100.0	100.0	100.0	99.3	97.1	94.4	92.1	88.1	81.6	67.9	9.1	SP-SM
TB - 15	49.0 - 50.0	17.1	100.0	100.0	95.8	91.8	79.8	62.5	56.6	53.1	41.6	17.4	7.5	SP-SM
TB - 16	49.0 - 50.0	21.4	100.0	100.0	97.0	97.0	92.5	89.6	87.8	84.2	74.7	39.5	6.8	SP-SM
Average		**21.5**	**100.0**	**100.0**	**97.6**	**96.0**	**89.8**	**82.2**	**78.8**	**75.1**	**66.0**	**41.6**	**7.8**	
SILTY SAND														
TB - 1	49.0 - 50.0	25.6	100.0	100.0	91.6	88.5	83.2	78.9	75.4	72.1	67.4	54.0	28.4	SM
TB - 10	33.0 - 34.0	37.3	100.0	100.0	100.0	100.0	100.0	99.9	99.6	96.7	82.1	58.4	33.8	SM
Average		**31.5**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**99.9**	**99.6**	**96.7**	**82.1**	**58.4**	**33.8**	

GRAIN SIZE DISTRIBUTION CURVES

DUNKELBERGER
engineering & testing, inc.



GRAIN SIZE DISTRIBUTION CURVE

Sample No.	Location	SOIL DESCRIPTION	W%	LL	PL	PI
TB-1, Sample No. 2	3 ft to 4 ft	Ligth brown slightly silty fine SAND with shell fragments and gravel (SP-SM) (Fill)	4.6	NA	NA	NA

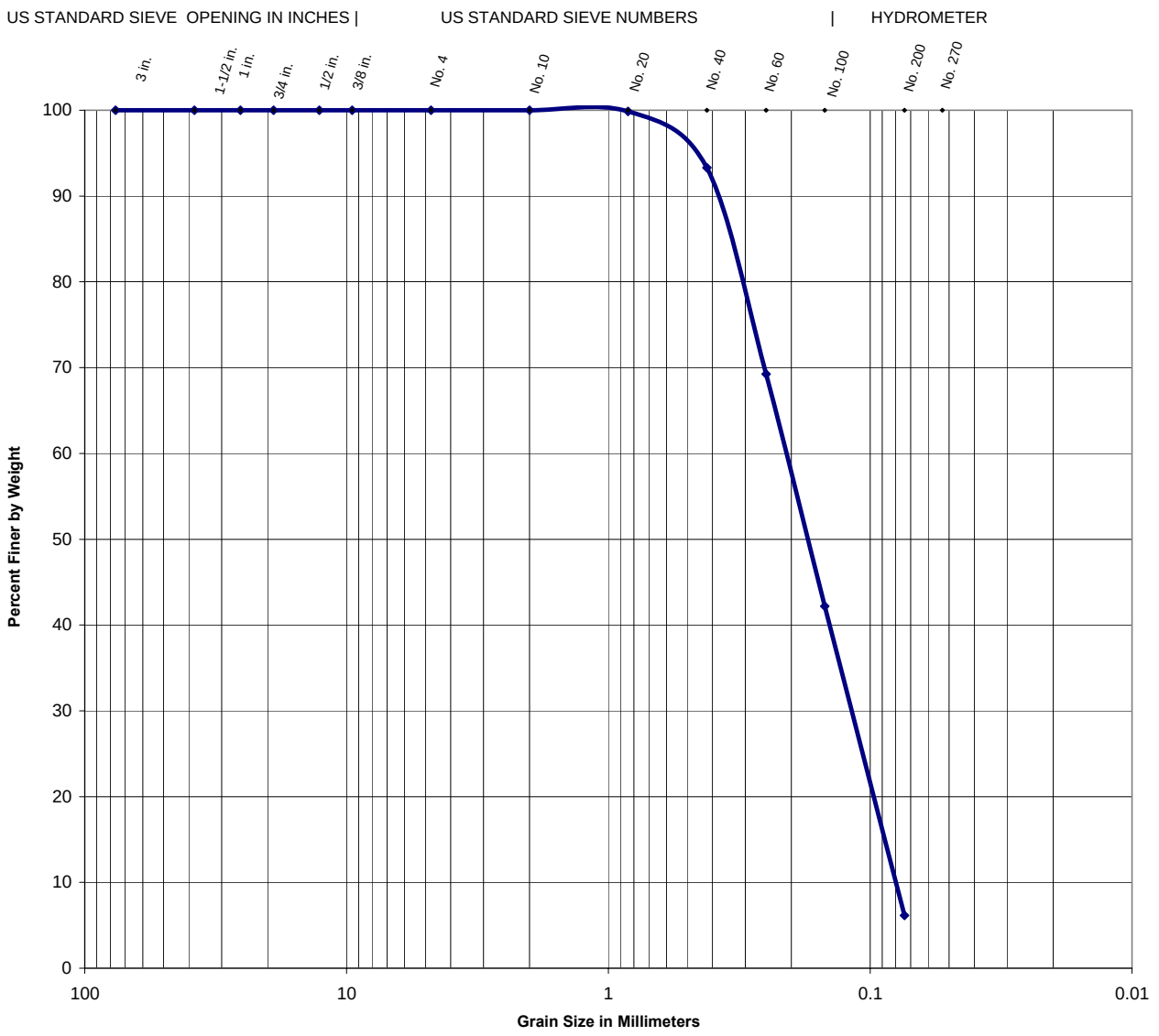
U.S. Sieve Number:	3 in.	1-1/2 in.	1 in.	3/4 in.	1/2 in.	3/8 in.	No. 4	No. 10	No. 20	No. 40	No. 60	No. 100	No. 200	No. 270
% Passing:	100.0	100	100.0	100	99.7	99.0521	97.9	96.0393	94.5	85.1	53.2	25.5	5.1	#N/A

Eff. Size (D10) = 0.09 mm **Unif. Coef. (D60/ D10) = 3.06**

*NP = Not Plastic

Palm Beach Renewable Energy Facility No. 2
Malcom Pirnie,Inc.
Palm Beach County,Florida
Project Number : WPB-09-7594
Date : 4/21/10

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GRAIN SIZE DISTRIBUTION CURVE

Sample No.	Location	SOIL DESCRIPTION	W%	LL	PL	PI
TB-1, Sample No. 4	7 ft to 8 ft	Brown slightly silty fine SAND (SP-SM)	18.1	NA	NA	NA

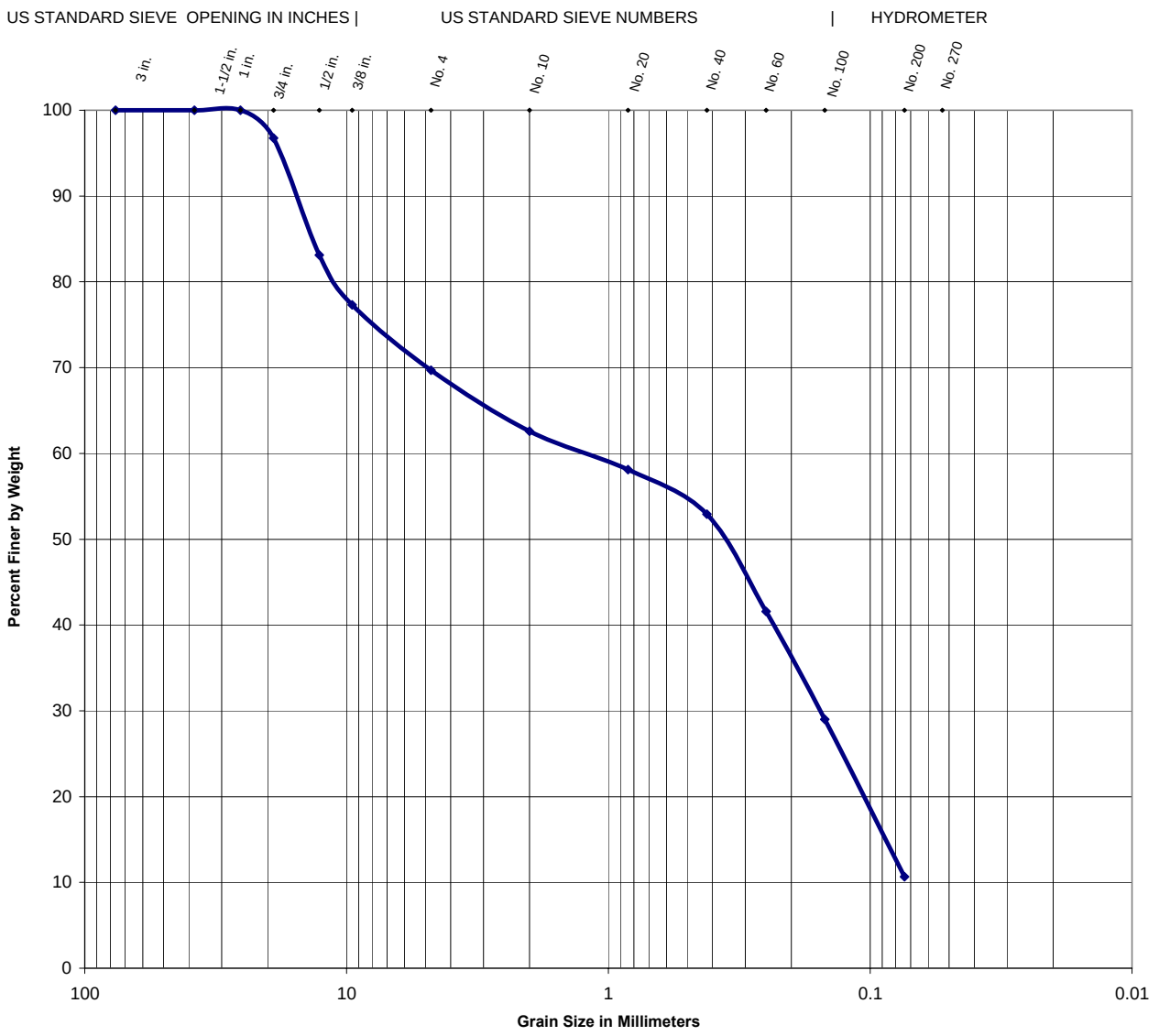
U.S. Sieve Number:	3 in.	1-1/2 in.	1 in.	3/4 in.	1/2 in.	3/8 in.	No. 4	No. 10	No. 20	No. 40	No. 60	No. 100	No. 200	No. 270
% Passing:	100.0	100	100.0	100	100.0	100	100.0	100	99.9	93.3	69.2	42.2	6.1	#N/A

Eff. Size (D10) = 0.08 mm **Unif. Coef. (D60/ D10) = 2.74**

*NP = Not Plastic

Palm Beach Renewable Energy Facility No. 2
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Date : 4/21/10

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GRAIN SIZE DISTRIBUTION CURVE

Sample No.	Location	SOIL DESCRIPTION	W%	LL	PL	PI
TB-1, Sample No. 5	9 ft to 10 ft	Gray slightly silty fine SAND with shell fragments (SP-SM)	14.0	NA	NA	NA

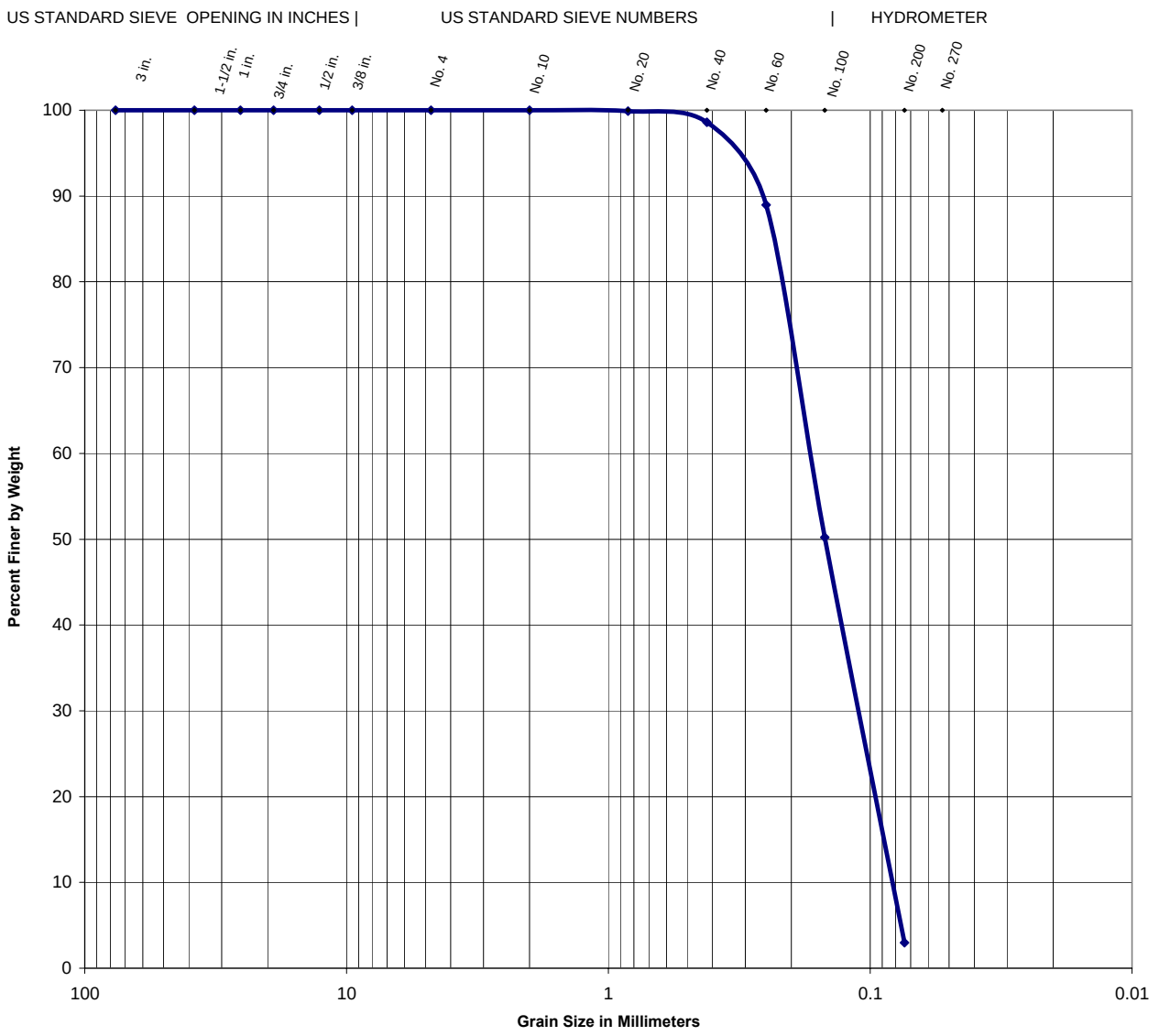
U.S. Sieve Number:	3 in.	1-1/2 in.	1 in.	3/4 in.	1/2 in.	3/8 in.	No. 4	No. 10	No. 20	No. 40	No. 60	No. 100	No. 200	No. 270
% Passing:	100.0	100	100.0	96.7467	83.1	77.3215	69.7	62.6027	58.1	52.9	41.6	29.0	10.6	#N/A

Eff. Size (D10) = 0.072 mm | **Unif. Coef. (D60/ D10) = 17.36**

*NP = Not Plastic

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GRAIN SIZE DISTRIBUTION CURVE

Sample No.	Location	SOIL DESCRIPTION	W%	LL	PL	PI
TB-1, Sample No. 8	24 ft to 25 ft	Brown fine SAND (SP)	21.7	NA	NA	NA

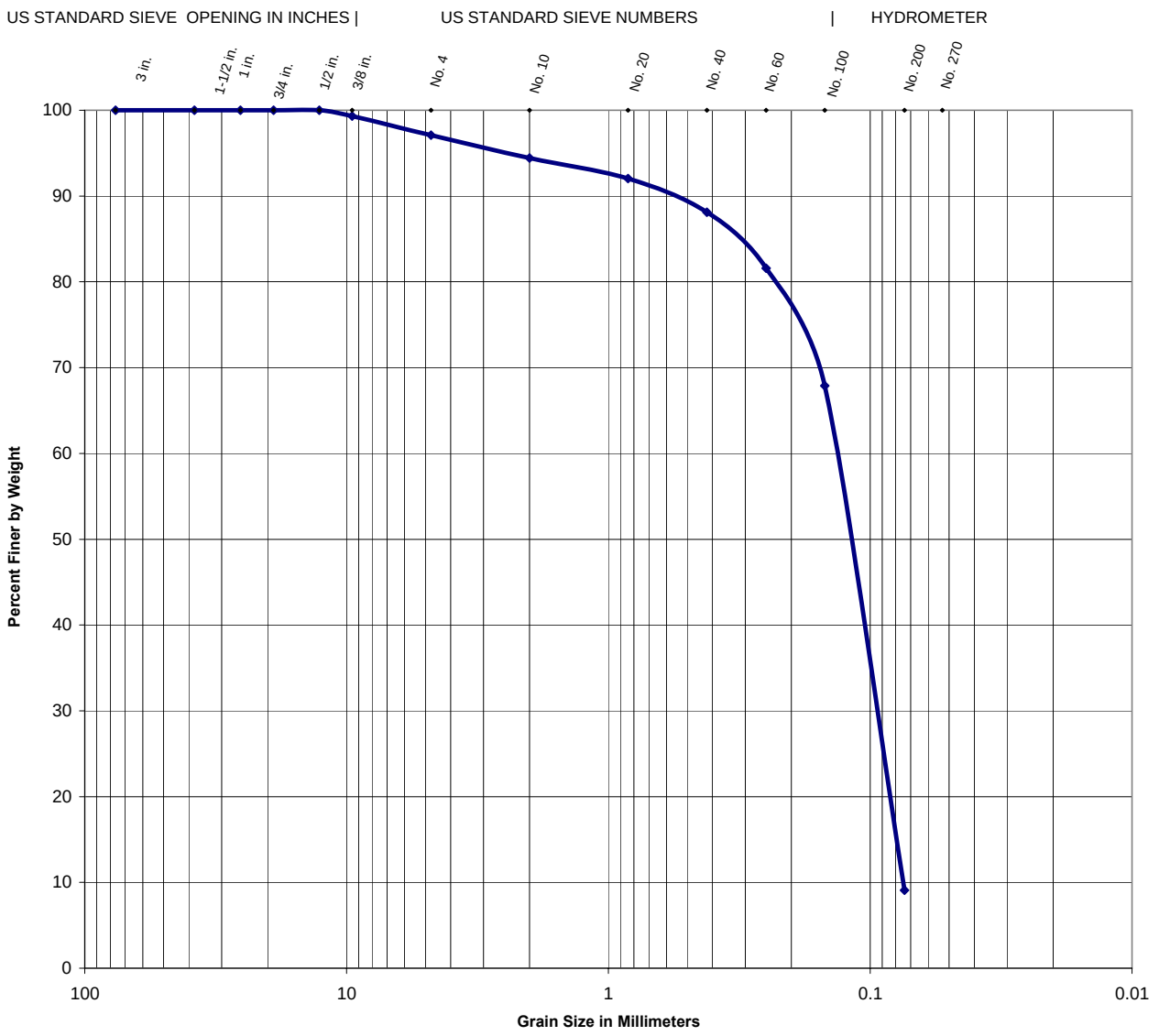
U.S. Sieve Number:	3 in.	1-1/2 in.	1 in.	3/4 in.	1/2 in.	3/8 in.	No. 4	No. 10	No. 20	No. 40	No. 60	No. 100	No. 200	No. 270
% Passing:	100.0	100	100.0	100	100.0	100	100.0	100	99.9	98.6	89.0	50.2	3.0	#N/A

Eff. Size (D10) = **0.081 mm** **Unif. Coef. (D60/ D10) =** **2.19**

*NP = Not Plastic

Palm Beach Renewable Energy Facility No. 2
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GRAIN SIZE DISTRIBUTION CURVE

Sample No.	Location	SOIL DESCRIPTION	W%	LL	PL	PI
TB-1, Sample No.12	44 ft to 45 ft	Gray slightly silty fine SAND with shell fragments (SP-SM)	26.0	NA	NA	NA

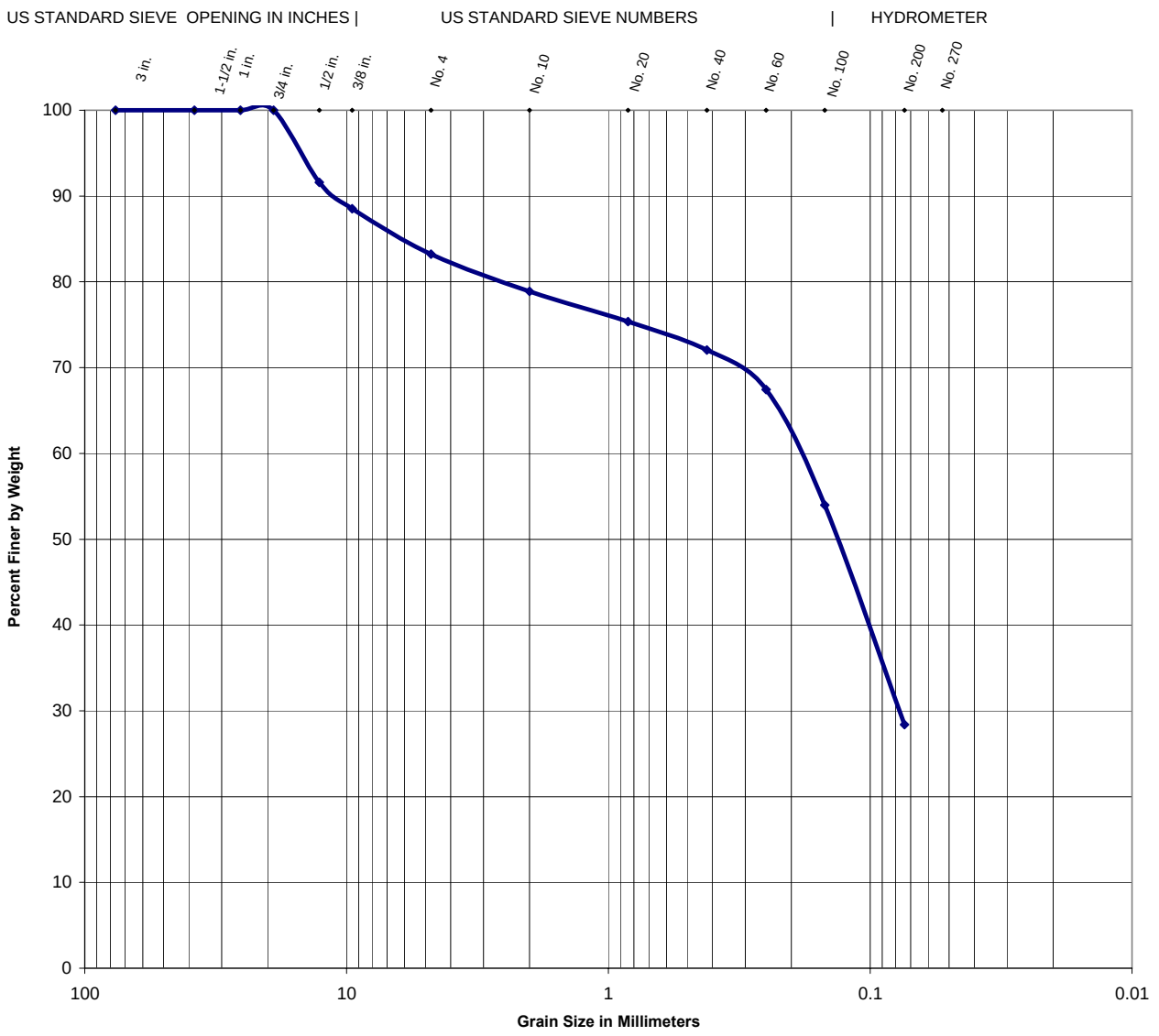
U.S. Sieve Number:	3 in.	1-1/2 in.	1 in.	3/4 in.	1/2 in.	3/8 in.	No. 4	No. 10	No. 20	No. 40	No. 60	No. 100	No. 200	No. 270
% Passing:	100.0	100	100.0	100	100.0	99.3049	97.1	94.4389	92.1	88.1	81.6	67.9	9.1	#N/A

Eff. Size (D10) = **0.075 mm** **Unif. Coef. (D60/ D10) =** **1.93**

*NP = Not Plastic

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GRAIN SIZE DISTRIBUTION CURVE

Sample No.	Location	SOIL DESCRIPTION	W%	LL	PL	PI
TB-1, Sample No. 14	49 ft to 50 ft	Light gray silty fine SAND (SM)	25.6	NA	NA	NA

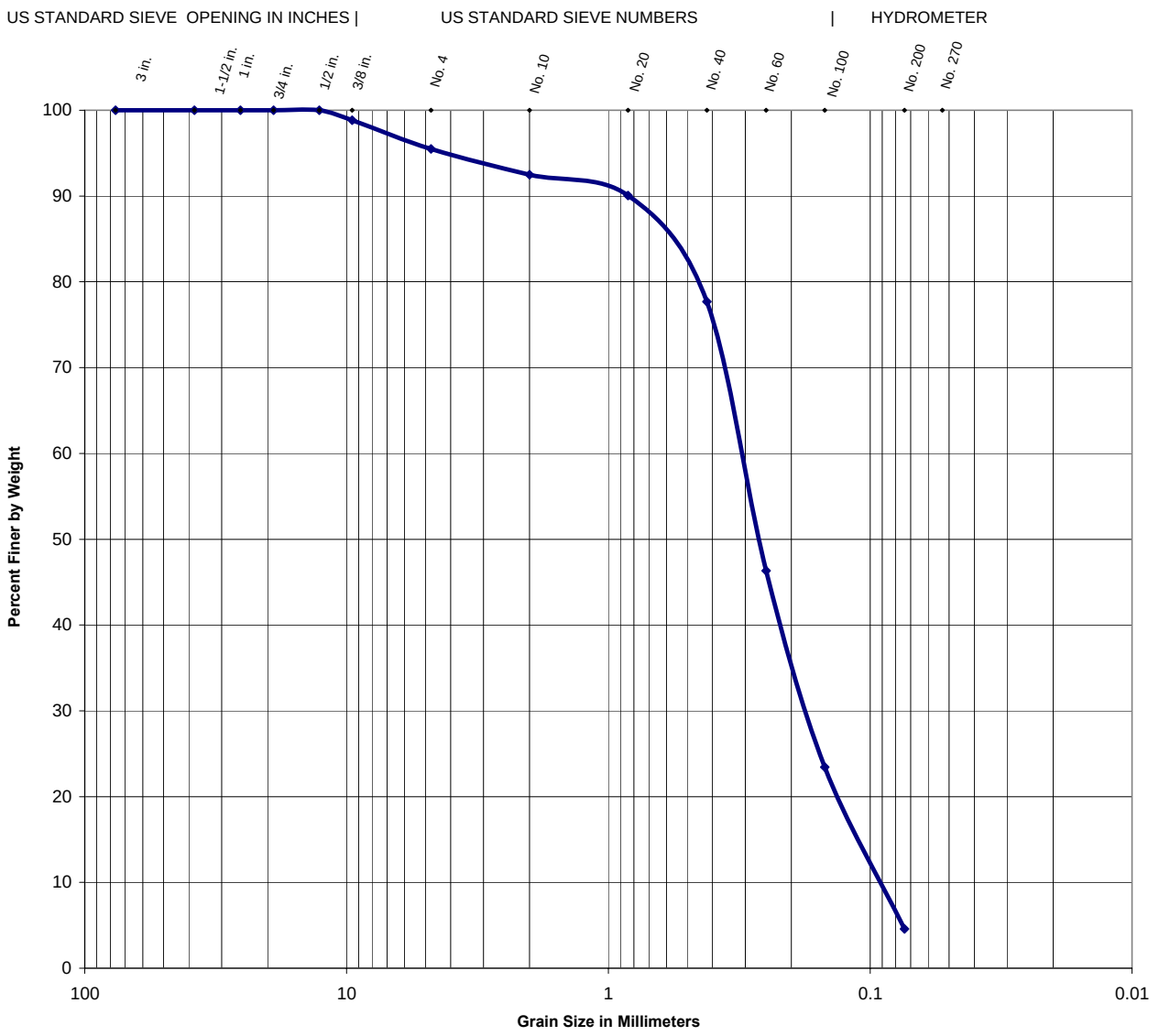
U.S. Sieve Number:	3 in.	1-1/2 in.	1 in.	3/4 in.	1/2 in.	3/8 in.	No. 4	No. 10	No. 20	No. 40	No. 60	No. 100	No. 200	No. 270
% Passing:	100.0	100	100.0	100	91.6	88.5041	83.2	78.8841	75.4	72.1	67.4	54.0	28.4	#N/A

Eff. Size (D10) = N/A **Unif. Coef. (D60/ D10) = N/A**

*NP = Not Plastic

Palm Beach Renewable Energy Facility No. 2
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Palm Beach County,Florida
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Date : 4/21/10

DUNKELBERGER
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GRAIN SIZE DISTRIBUTION CURVE

Sample No.	Location	SOIL DESCRIPTION	W%	LL	PL	PI
TB-8, Sample No. 2	3 ft to 4 ft	Brown fine SAND with shell fragments and gravel (SP) (Fill)	13.1	NA	NA	NA

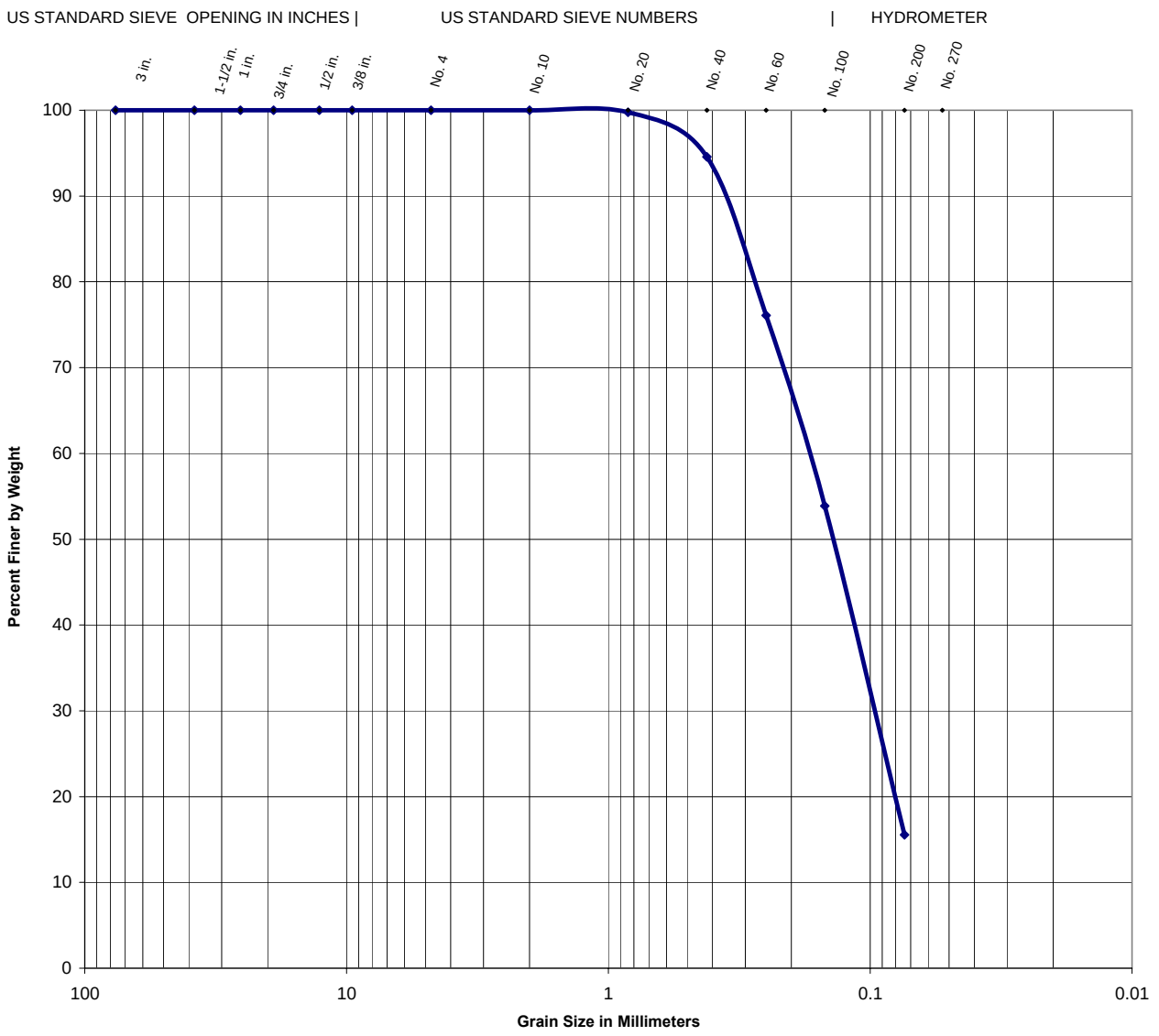
U.S. Sieve Number:	3 in.	1-1/2 in.	1 in.	3/4 in.	1/2 in.	3/8 in.	No. 4	No. 10	No. 20	No. 40	No. 60	No. 100	No. 200	No. 270
% Passing:	100.0	100	100.0	100	100.0	98.8525	95.5	92.4918	90.1	77.7	46.3	23.4	4.6	#N/A

Eff. Size (D10) = 0.09 mm | **Unif. Coef. (D60/ D10) = 3.33**

*NP = Not Plastic

Palm Beach Renewable Energy Facility No. 2
Malcom Pirnie,Inc.
Palm Beach County,Florida
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Date : 4/15/10

DUNKELBERGER
engineering & testing, inc.



GRAIN SIZE DISTRIBUTION CURVE

Sample No.	Location	SOIL DESCRIPTION	W%	LL	PL	PI
TB-8, Sample No. 6	9 ft to 10 ft	Brown clayey fine SAND (SC)	18.8	NA	NA	NA

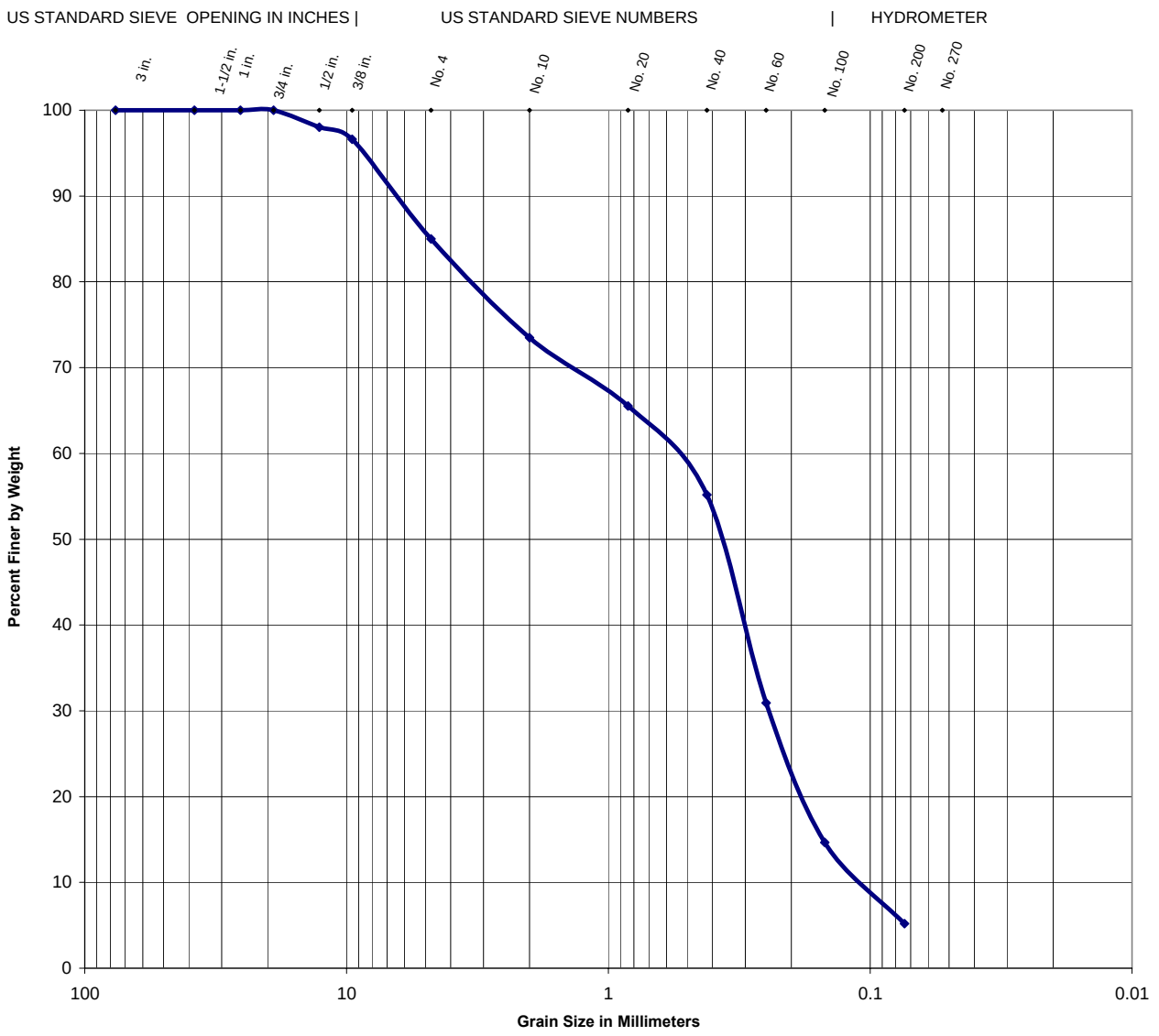
U.S. Sieve Number:	3 in.	1-1/2 in.	1 in.	3/4 in.	1/2 in.	3/8 in.	No. 4	No. 10	No. 20	No. 40	No. 60	No. 100	No. 200	No. 270
% Passing:	100.0	100	100.0	100	100.0	100	100.0	100	99.7	94.6	76.1	53.9	15.5	#N/A

Eff. Size (D10) = 0.07 mm | **Unif. Coef. (D60/ D10) = 2.57**

*NP = Not Plastic

Palm Beach Renewable Energy Facility No. 2
Malcom Pirnie,Inc.
Palm Beach County,Florida
Project Number : WPB-09-7594
Date : 4/15/10

DUNKELBERGER
engineering & testing, inc.



GRAIN SIZE DISTRIBUTION CURVE

Sample No.	Location	SOIL DESCRIPTION	W%	LL	PL	PI
TB-8, Sample No. 7	14 ft to 15 ft	Brown slightly silty fine SAND with shell fragments (SP-SM)	16.7	NA	NA	NA

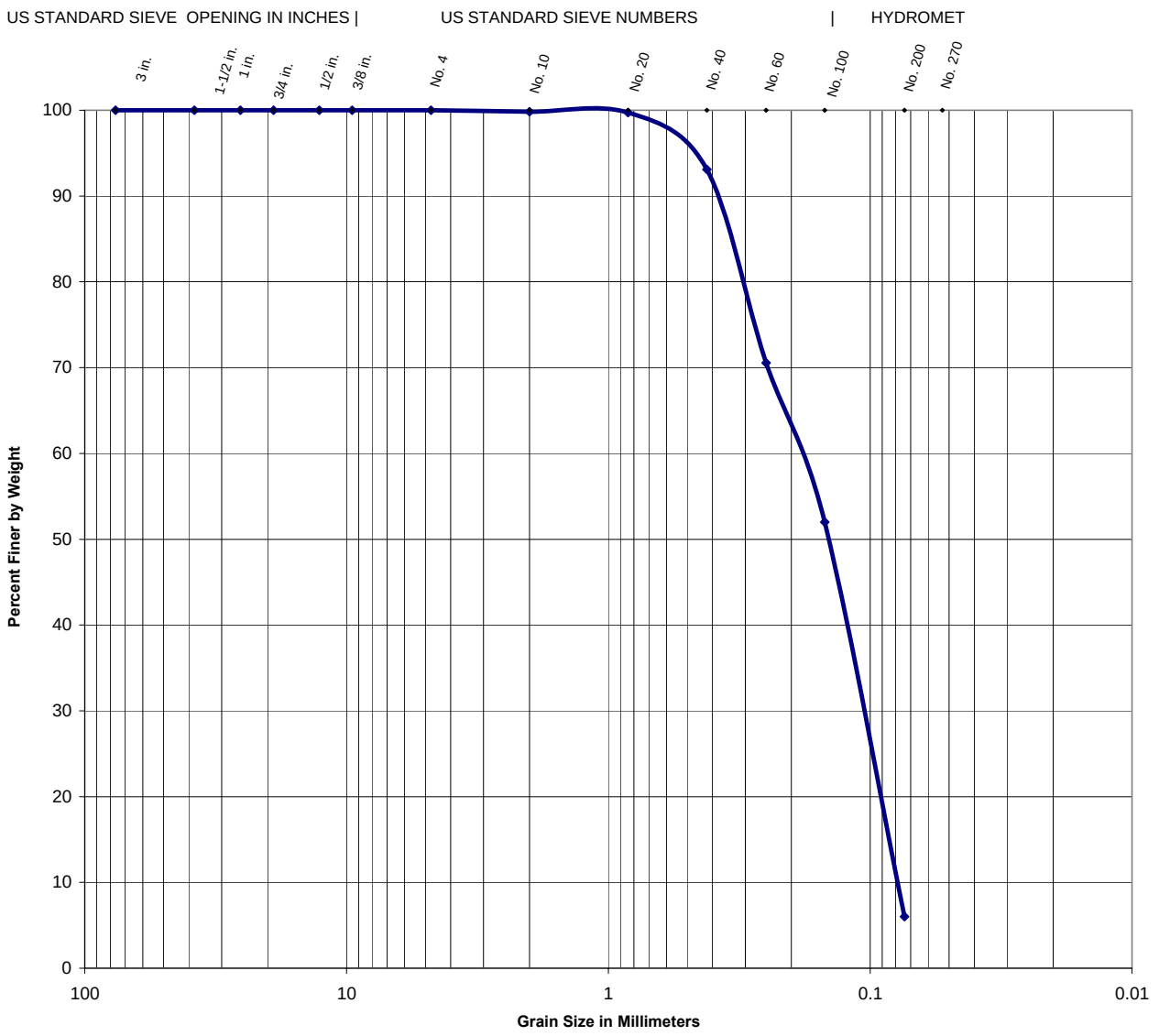
U.S. Sieve Number:	3 in.	1-1/2 in.	1 in.	3/4 in.	1/2 in.	3/8 in.	No. 4	No. 10	No. 20	No. 40	No. 60	No. 100	No. 200	No. 270
% Passing:	100.0	100	100.0	100	98.0	96.6194	85.0	73.5005	65.5	55.2	30.9	14.7	5.2	#N/A

Eff. Size (D10) = 0.11 mm **Unif. Coef. (D60/ D10) = 4.64**

*NP = Not Plastic

Palm Beach Renewable Energy Facility No. 2
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Date : 4/15/10

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GRAIN SIZE DISTRIBUTION CURVE

Sample No.	Location	SOIL DESCRIPTION	W%	LL	PL	PI
TB 8, Sample No. 10	29 ft to 30 ft	Brown slightly silty fine SAND (SP-SM)	23.5	NA	NA	NA

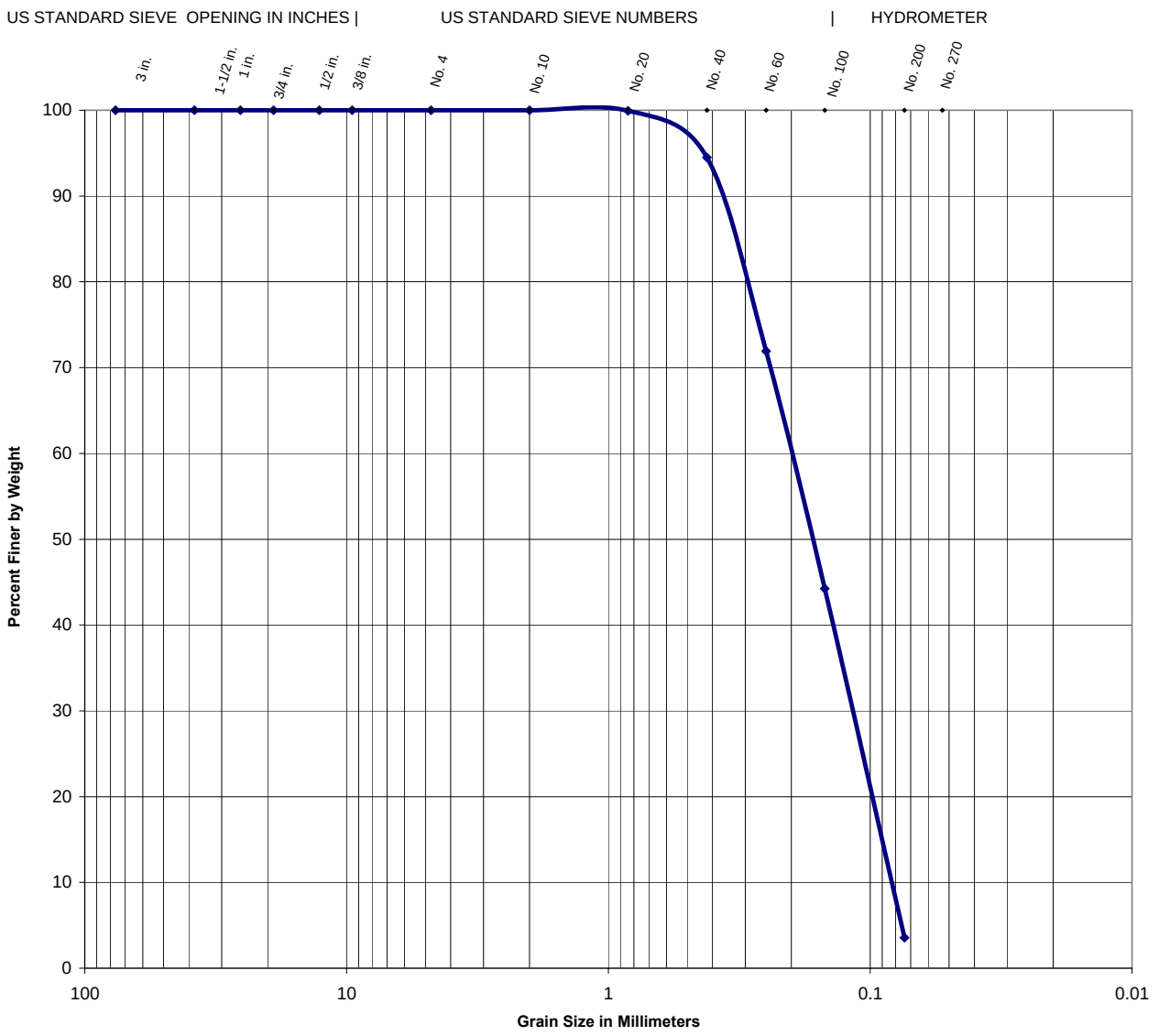
U.S. Sieve Number:	3 in.	1-1/2 in.	1 in.	3/4 in.	1/2 in.	3/8 in.	No. 4	No. 10	No. 20	No. 40	No. 60	No. 100	No. 200	No. 270
% Passing:	100.0	100	100.0	100	100.0	100	100.0	99.8127	99.7	93.1	70.6	52.0	6.0	#N/A

Eff. Size (D10) = 0.08 mm | **Unif. Coef. (D60/ D10) = 2.38**

*NP = Not Plastic

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GRAIN SIZE DISTRIBUTION CURVE

Sample No.	Location	SOIL DESCRIPTION	W%	LL	PL	PI
TB-10, Sample No. 5	7 ft to 8 ft	Brown fine SAND (SP)	18.3	NA	NA	NA

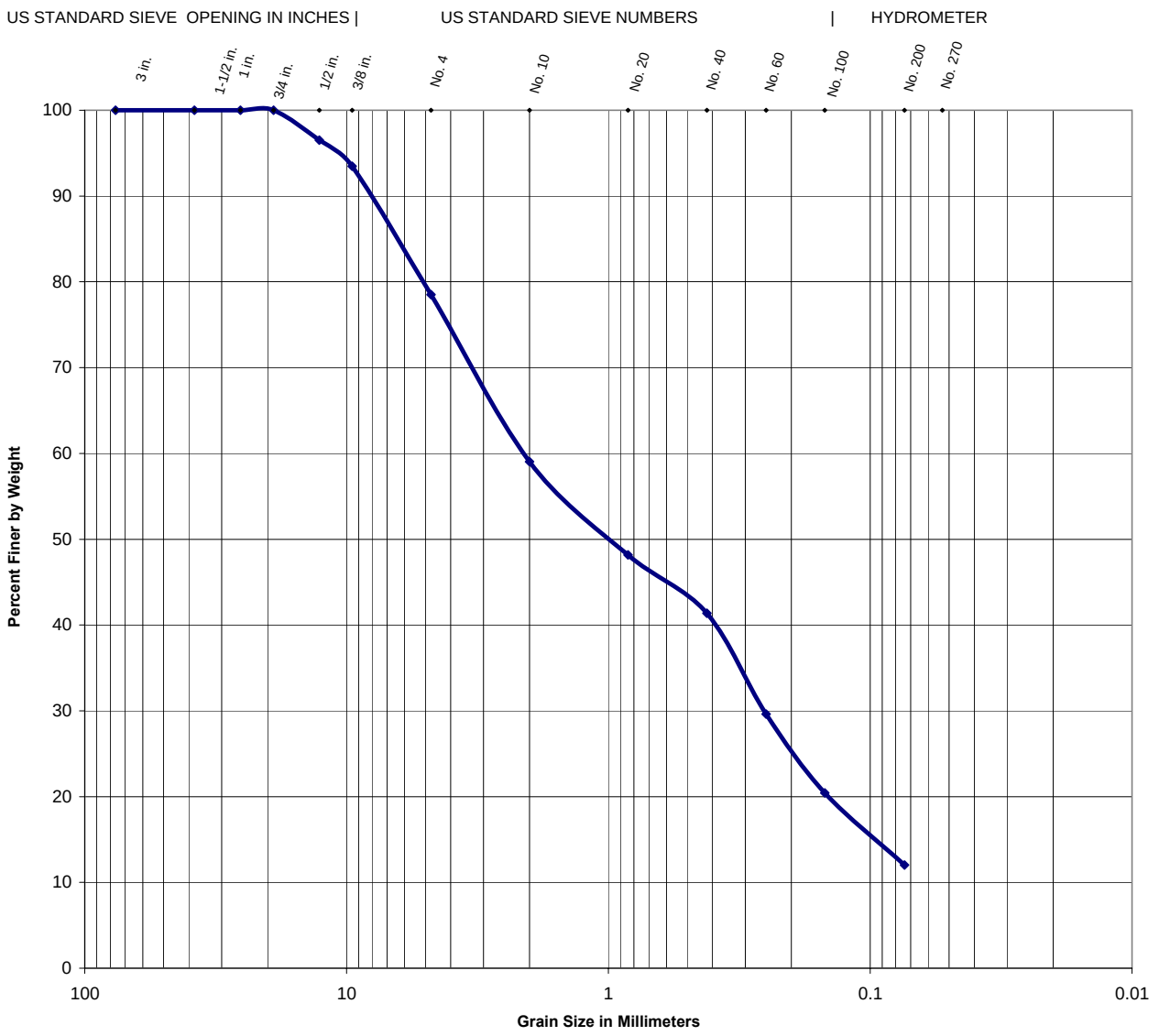
U.S. Sieve Number:	3 in.	1-1/2 in.	1 in.	3/4 in.	1/2 in.	3/8 in.	No. 4	No. 10	No. 20	No. 40	No. 60	No. 100	No. 200	No. 270
% Passing:	100.0	100	100.0	100	100.0	100	100.0	100	99.9	94.5	71.9	44.2	3.5	#N/A

Eff. Size (D10) = 0.08 mm **Unif. Coef. (D60/ D10) = 2.50**

*NP = Not Plastic

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Palm Beach County,Florida
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Date : 4/15/10

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GRAIN SIZE DISTRIBUTION CURVE

Sample No.	Location	SOIL DESCRIPTION	W%	LL	PL	PI
TB-10, Sample No. 8	14 ft to 15 ft	Light brown silty fine SAND with shell fragments (SM)	18.0	NA	NA	NA

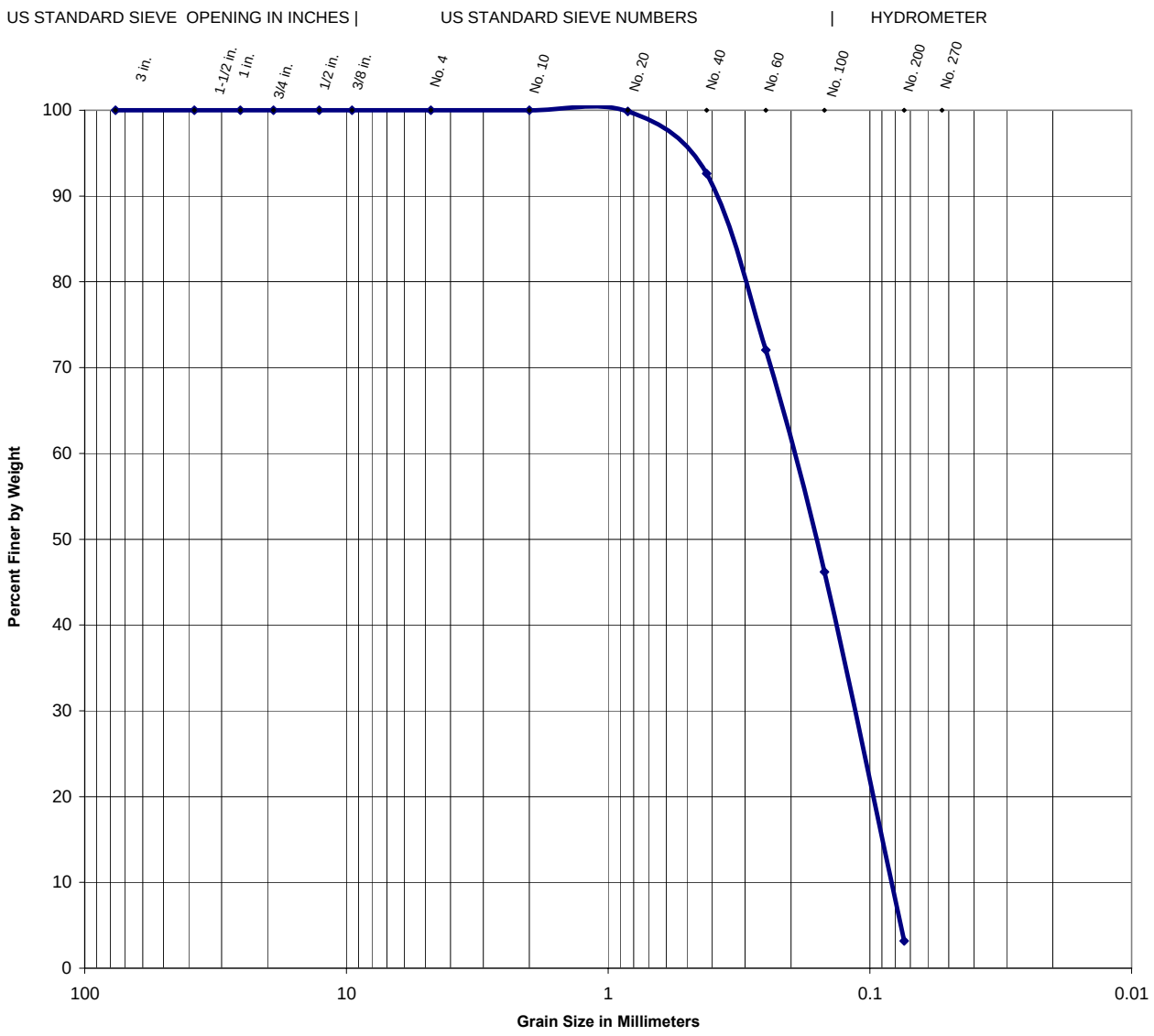
U.S. Sieve Number:	3 in.	1-1/2 in.	1 in.	3/4 in.	1/2 in.	3/8 in.	No. 4	No. 10	No. 20	No. 40	No. 60	No. 100	No. 200	No. 270
% Passing:	100.0	100	100.0	100	96.5	93.4696	78.5	59.0229	48.2	41.4	29.6	20.4	12.0	#N/A

Eff. Size (D10) = 0.06 mm | **Unif. Coef. (D60/ D10) = 35.00**

*NP = Not Plastic

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GRAIN SIZE DISTRIBUTION CURVE

Sample No.	Location	SOIL DESCRIPTION	W%	LL	PL	PI
TB-10, Sample No. 10	24 ft to 25ft	Ligth Brown fine SAND (SP)	21.7	NA	NA	NA

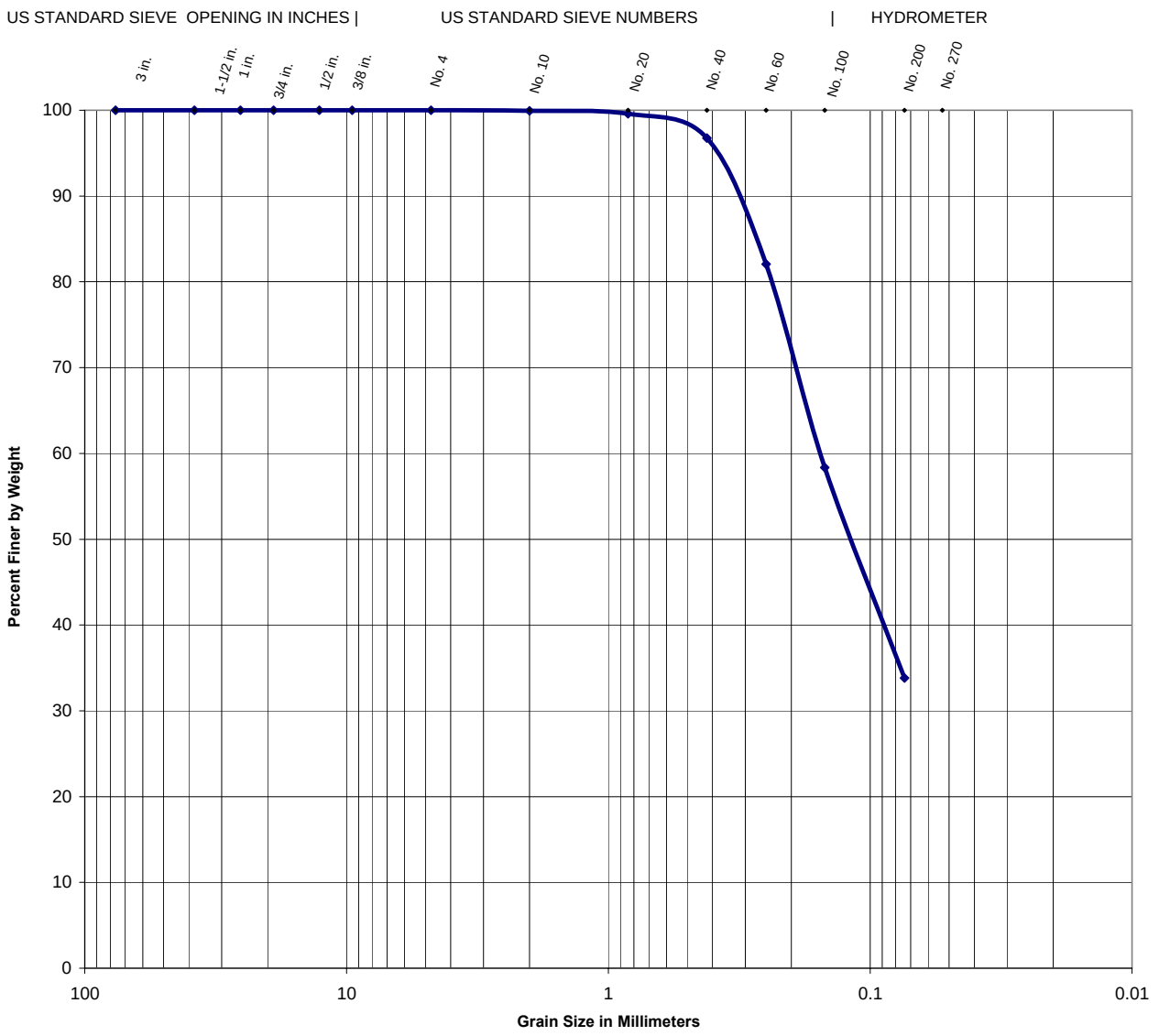
U.S. Sieve Number:	3 in.	1-1/2 in.	1 in.	3/4 in.	1/2 in.	3/8 in.	No. 4	No. 10	No. 20	No. 40	No. 60	No. 100	No. 200	No. 270
% Passing:	100.0	100	100.0	100	100.0	100	100.0	100	99.9	92.6	72.1	46.2	3.2	#N/A

Eff. Size (D10) = **0.081 mm** **Unif. Coef. (D60/ D10) =** **2.47**

*NP = Not Plastic

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GRAIN SIZE DISTRIBUTION CURVE

Sample No.	Location	SOIL DESCRIPTION	W%	LL	PL	PI
TB-10, Sample No. 12	33 ft to 34 ft	Brown very silty fine SAND (SM)	37.3	NA	NA	NA

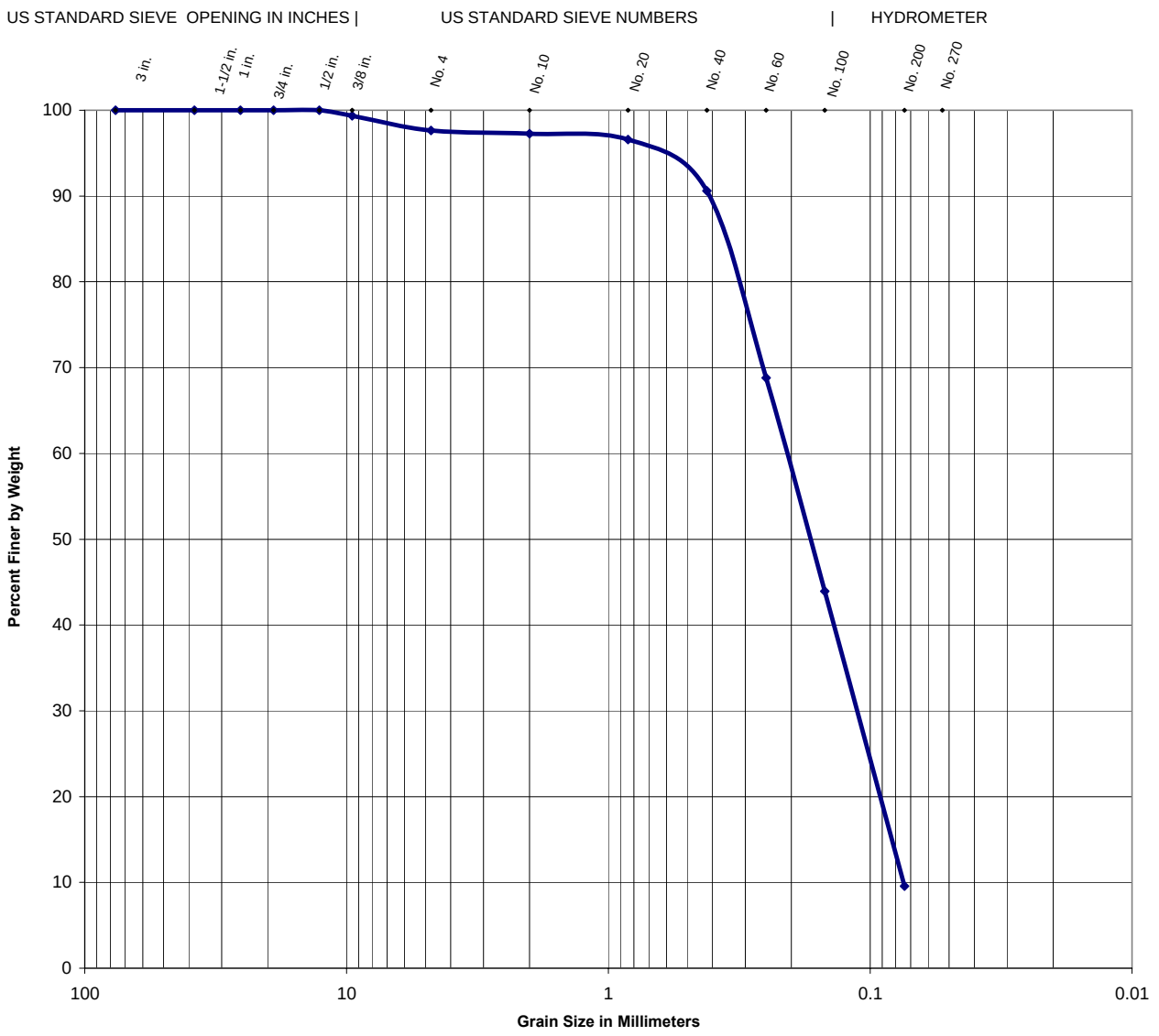
U.S. Sieve Number:	3 in.	1-1/2 in.	1 in.	3/4 in.	1/2 in.	3/8 in.	No. 4	No. 10	No. 20	No. 40	No. 60	No. 100	No. 200	No. 270
% Passing:	100.0	100	100.0	100	100.0	100	100.0	99.9321	99.6	96.7	82.1	58.4	33.8	#N/A

Eff. Size (D10) = N/A **Unif. Coef. (D60/ D10) = N/A**

*NP = Not Plastic

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GRAIN SIZE DISTRIBUTION CURVE

Sample No.	Location	SOIL DESCRIPTION	W%	LL	PL	PI
TB-15, Sample No. 6	5 ft to 6 ft	Brown slightly silty fine SAND with shell fragments and gravel (SP-SM)	15.1	NA	NA	NA

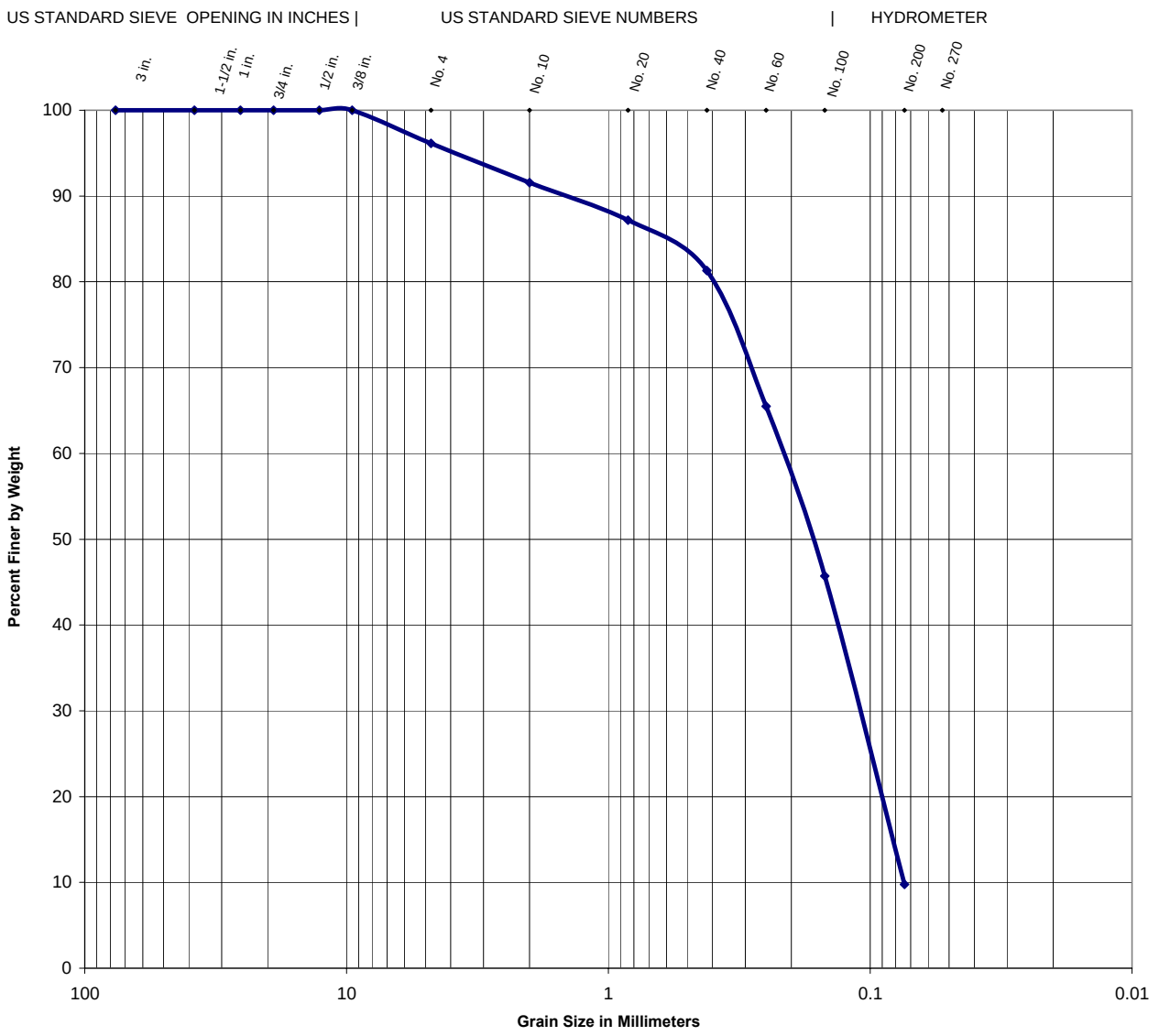
U.S. Sieve Number:	3 in.	1-1/2 in.	1 in.	3/4 in.	1/2 in.	3/8 in.	No. 4	No. 10	No. 20	No. 40	No. 60	No. 100	No. 200	No. 270
% Passing:	100.0	100	100.0	100	100.0	99.3381	97.6	97.2577	96.6	90.6	68.8	43.9	9.6	#N/A

Eff. Size (D10) = **0.075 mm** **Unif. Coef. (D60/ D10) =** **2.80**

*NP = Not Plastic

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GRAIN SIZE DISTRIBUTION CURVE

Sample No.	Location	SOIL DESCRIPTION	W%	LL	PL	PI
TB-15, Sample No. 14	19 ft to 20 ft	Brown slightly silty fine SAND with shell fragments (SP-SM)	22.6	NA	NA	NA

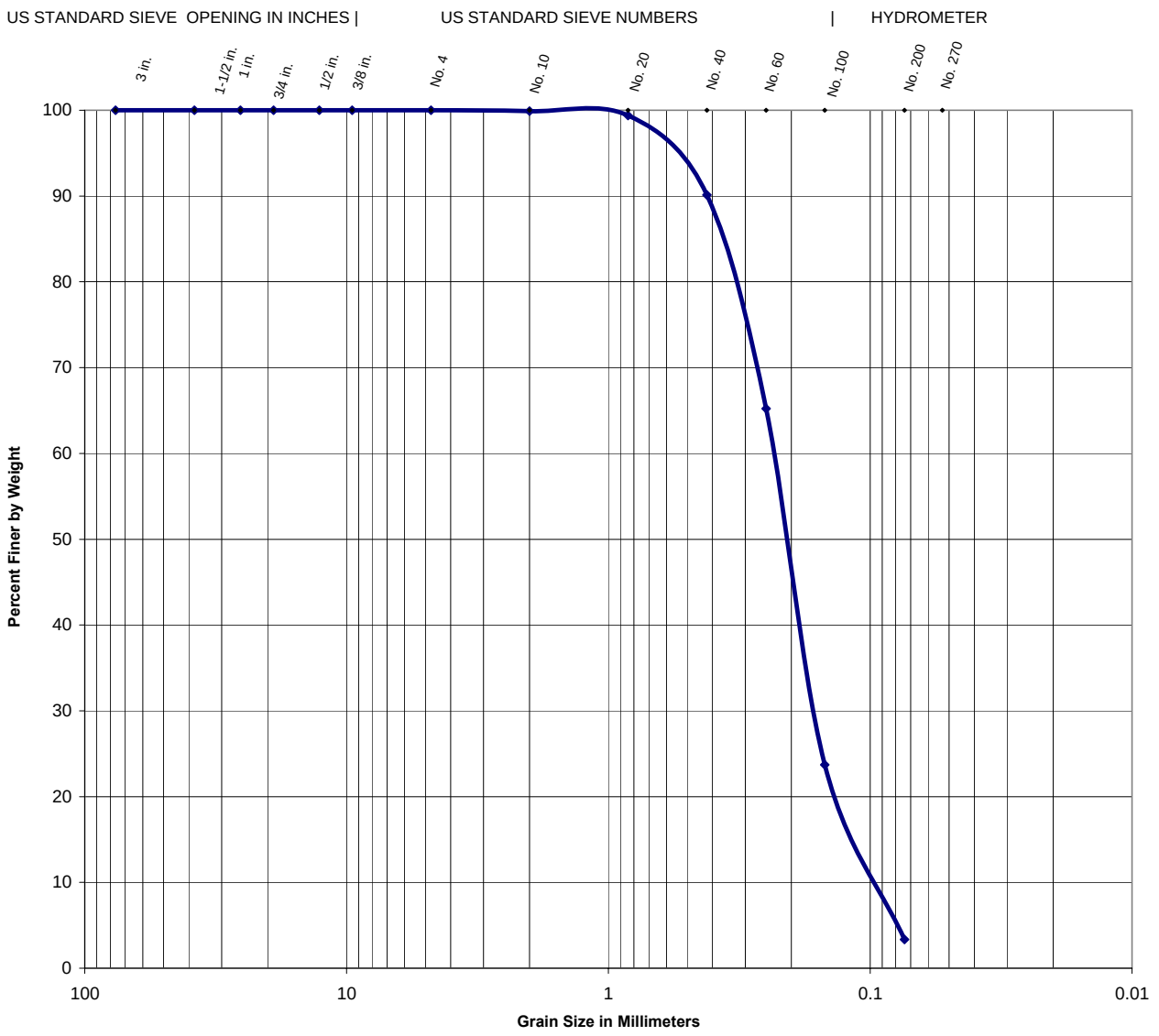
U.S. Sieve Number:	3 in.	1-1/2 in.	1 in.	3/4 in.	1/2 in.	3/8 in.	No. 4	No. 10	No. 20	No. 40	No. 60	No. 100	No. 200	No. 270
% Passing:	100.0	100	100.0	100	100.0	100	96.1	91.5688	87.2	81.3	65.5	45.7	9.8	#N/A

Eff. Size (D10) = **0.075 mm** **Unif. Coef. (D60/ D10) =** **2.80**

*NP = Not Plastic

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GRAIN SIZE DISTRIBUTION CURVE

Sample No.	Location	SOIL DESCRIPTION	W%	LL	PL	PI
TB-15, Sample No. 17	34 ft to 35 ft	Brown fine SAND (SP)	22.0	NA	NA	NA

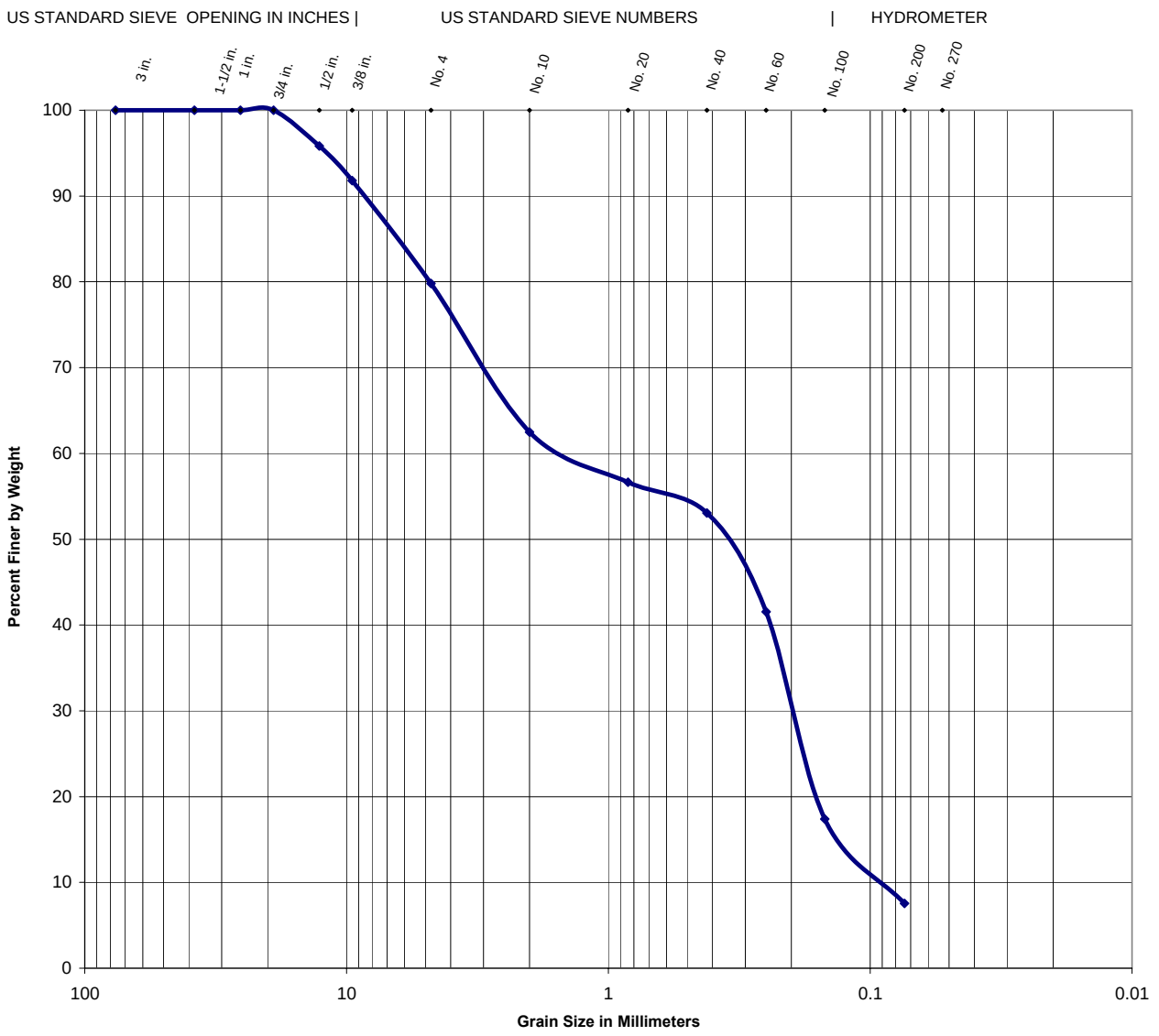
U.S. Sieve Number:	3 in.	1-1/2 in.	1 in.	3/4 in.	1/2 in.	3/8 in.	No. 4	No. 10	No. 20	No. 40	No. 60	No. 100	No. 200	No. 270
% Passing:	100.0	100	100.0	100	100.0	100	100.0	99.9099	99.4	90.1	65.2	23.7	3.4	#N/A

Eff. Size (D10) = **0.099 mm** **Unif. Coef. (D60/ D10) =** **2.42**

*NP = Not Plastic

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GRAIN SIZE DISTRIBUTION CURVE

Sample No.	Location	SOIL DESCRIPTION	W%	LL	PL	PI
TB-15, Sample No. 20	49 ft to 50 ft	Gray slightly silty fine SAND with shell fragments and gravel (SP-SM)	17.1	NA	NA	NA

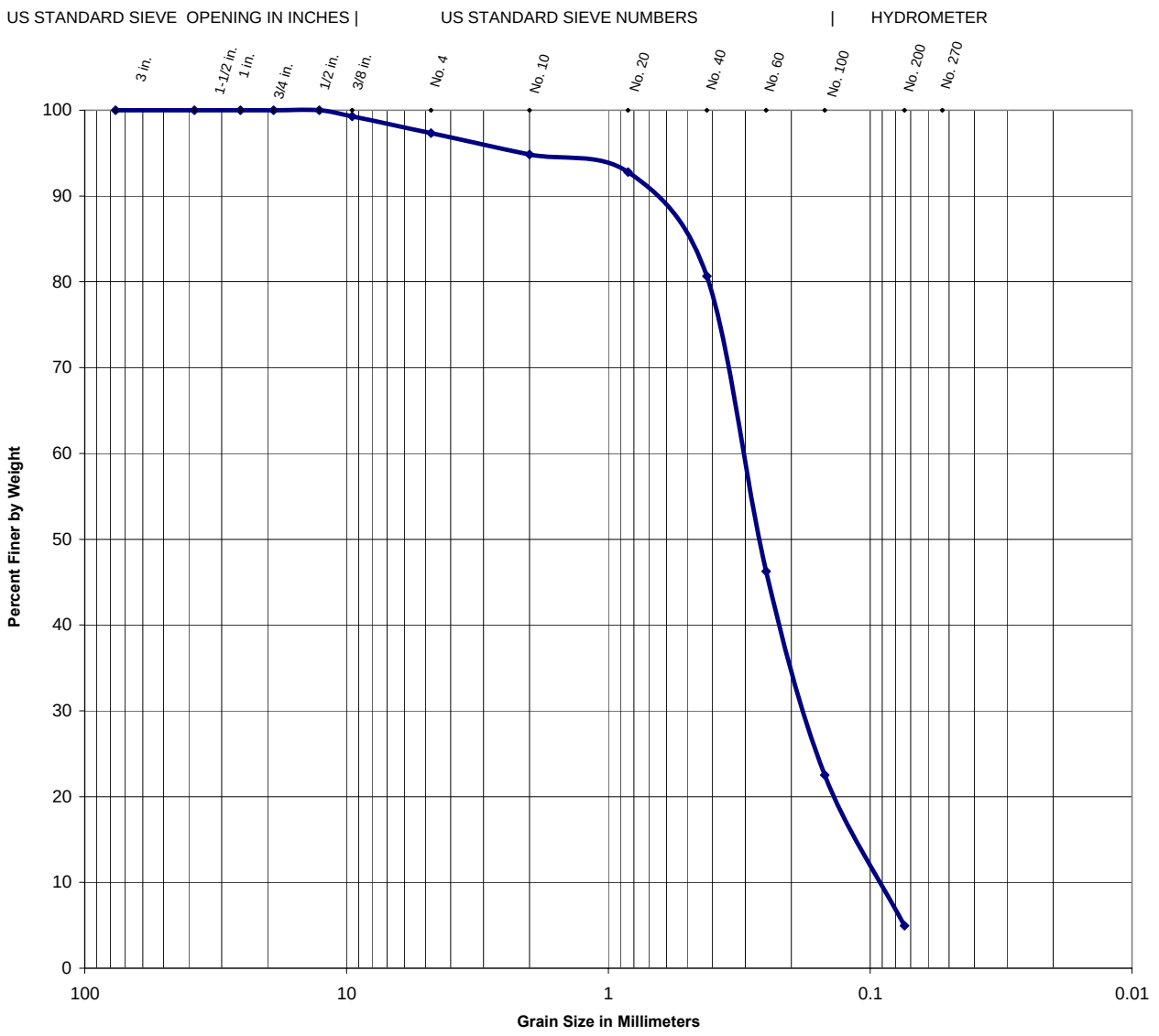
U.S. Sieve Number:	3 in.	1-1/2 in.	1 in.	3/4 in.	1/2 in.	3/8 in.	No. 4	No. 10	No. 20	No. 40	No. 60	No. 100	No. 200	No. 270
% Passing:	100.0	100	100.0	100	95.8	91.8017	79.8	62.4853	56.6	53.1	41.6	17.4	7.5	#N/A

Eff. Size (D10) = 0.09 mm | **Unif. Coef. (D60/ D10) = 18.00**

*NP = Not Plastic

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Date : 4/15/10

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GRAIN SIZE DISTRIBUTION CURVE

Sample No.	Location	SOIL DESCRIPTION	W%	LL	PL	PI
TB-16, Sample No. 7	9 ft to 16 ft	Brown fine SAND with shell fragments and gravel (SP)	6.7	NA	NA	NA

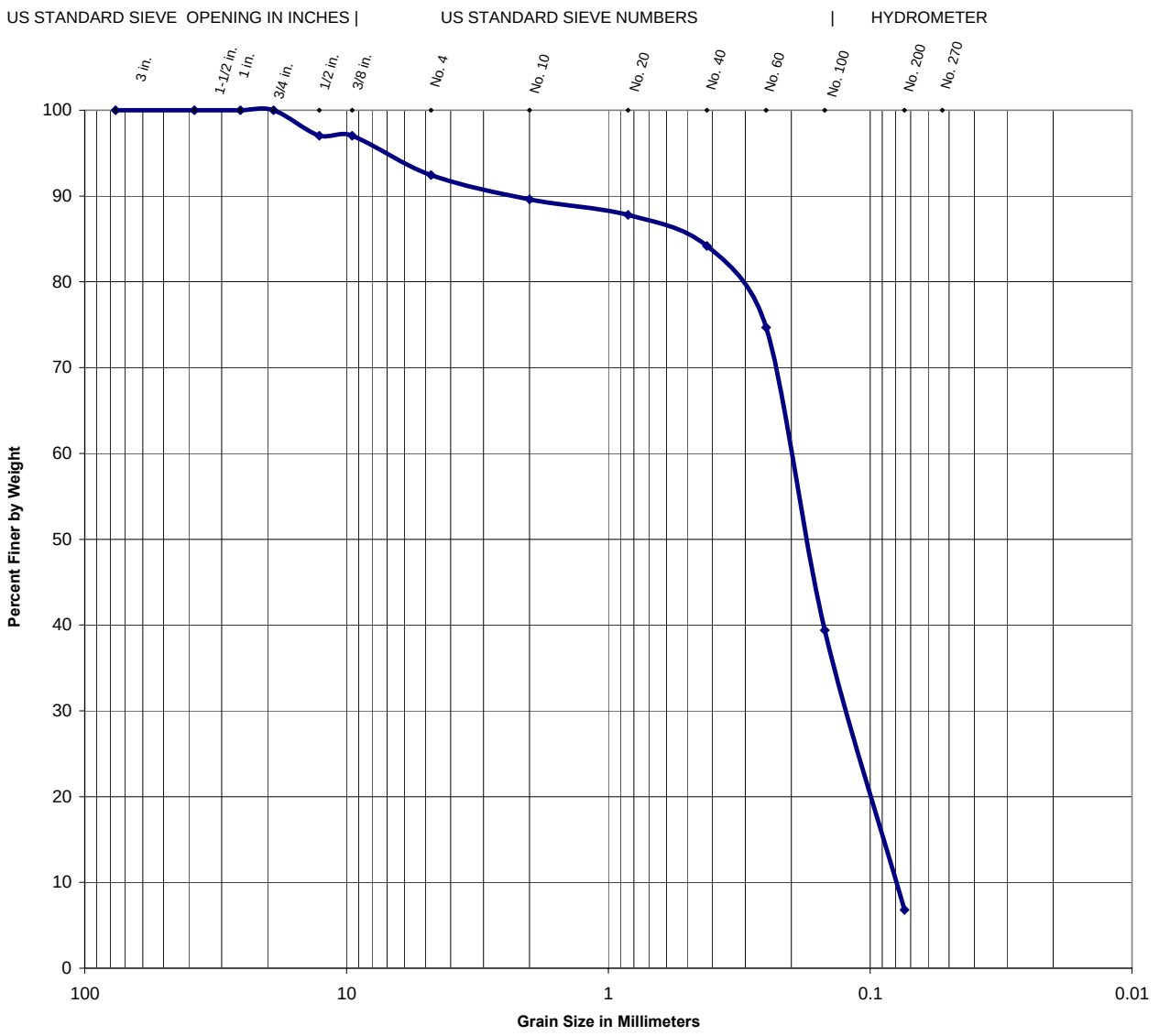
U.S. Sieve Number:	3 in.	1-1/2 in.	1 in.	3/4 in.	1/2 in.	3/8 in.	No. 4	No. 10	No. 20	No. 40	No. 60	No. 100	No. 200	No. 270
% Passing:	100.0	100	100.0	100	100.0	99.293	97.3	94.8355	92.8	80.7	46.3	22.5	4.9	#N/A

Eff. Size (D10) = 0.09 mm **Unif. Coef. (D60/ D10) = 3.33**

*NP = Not Plastic

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GRAIN SIZE DISTRIBUTION CURVE

Sample No.	Location	SOIL DESCRIPTION	W%	LL	PL	PI
TB-16, Sample No. 19	49 ft to 50 ft	Light gray slightly silty fine SAND with shell fragments and gravel (SP-SM)	21.4	NA	NA	NA

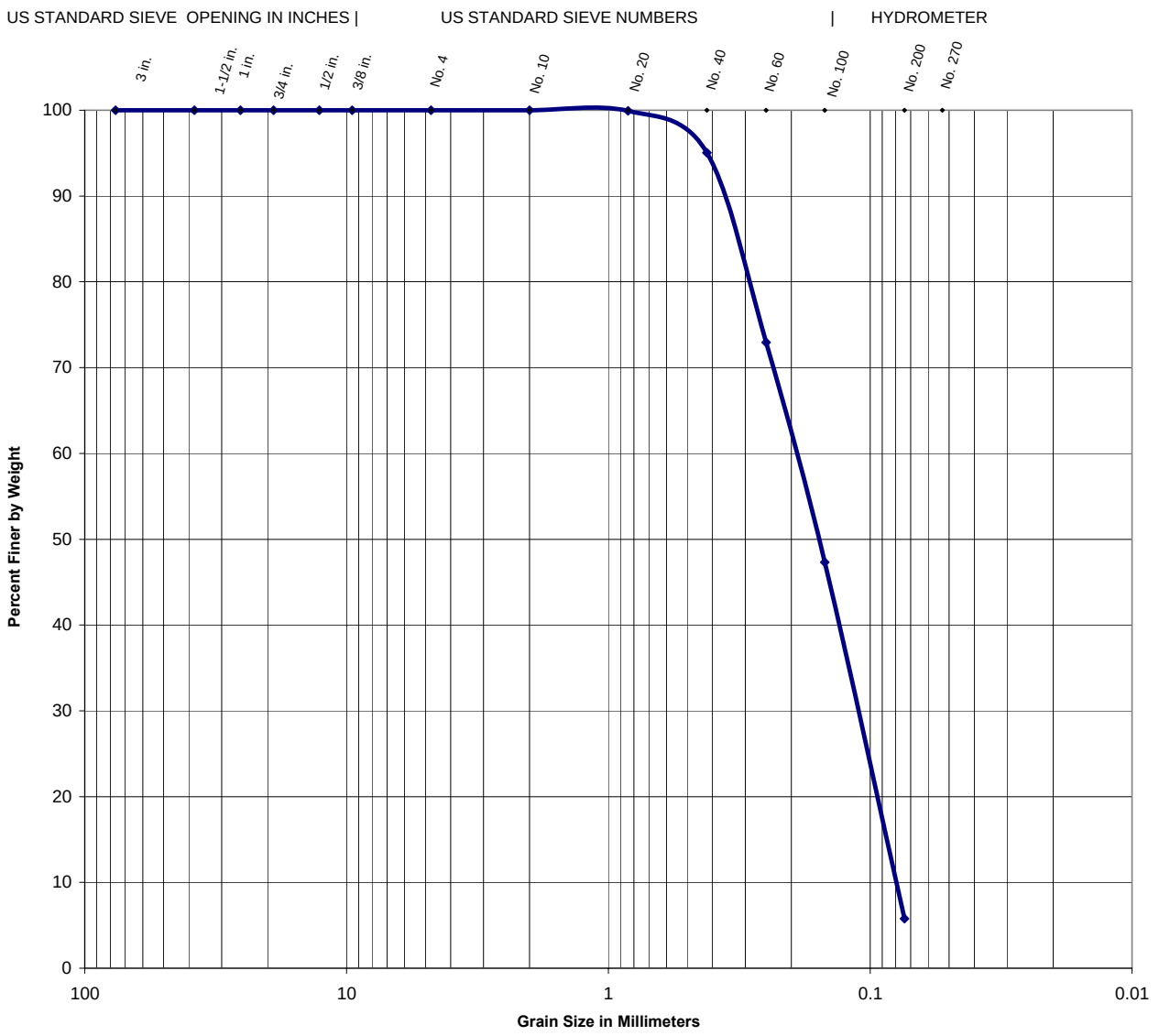
U.S. Sieve Number:	3 in.	1-1/2 in.	1 in.	3/4 in.	1/2 in.	3/8 in.	No. 4	No. 10	No. 20	No. 40	No. 60	No. 100	No. 200	No. 270
% Passing:	100.0	100	100.0	100	97.0	97.0164	92.4	89.6072	87.8	84.2	74.7	39.4	6.8	#N/A

Eff. Size (D10) = 0.079 mm
Unif. Coef. (D60/ D10) = 2.53

*NP = Not Plastic

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Date : 4/15/10

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GRAIN SIZE DISTRIBUTION CURVE

Sample No.	Location	SOIL DESCRIPTION	W%	LL	PL	PI
TB-28, Sample No. 4	7 ft to 8 ft	Brown fine SAND (SP)	19.0	NA	NA	NA

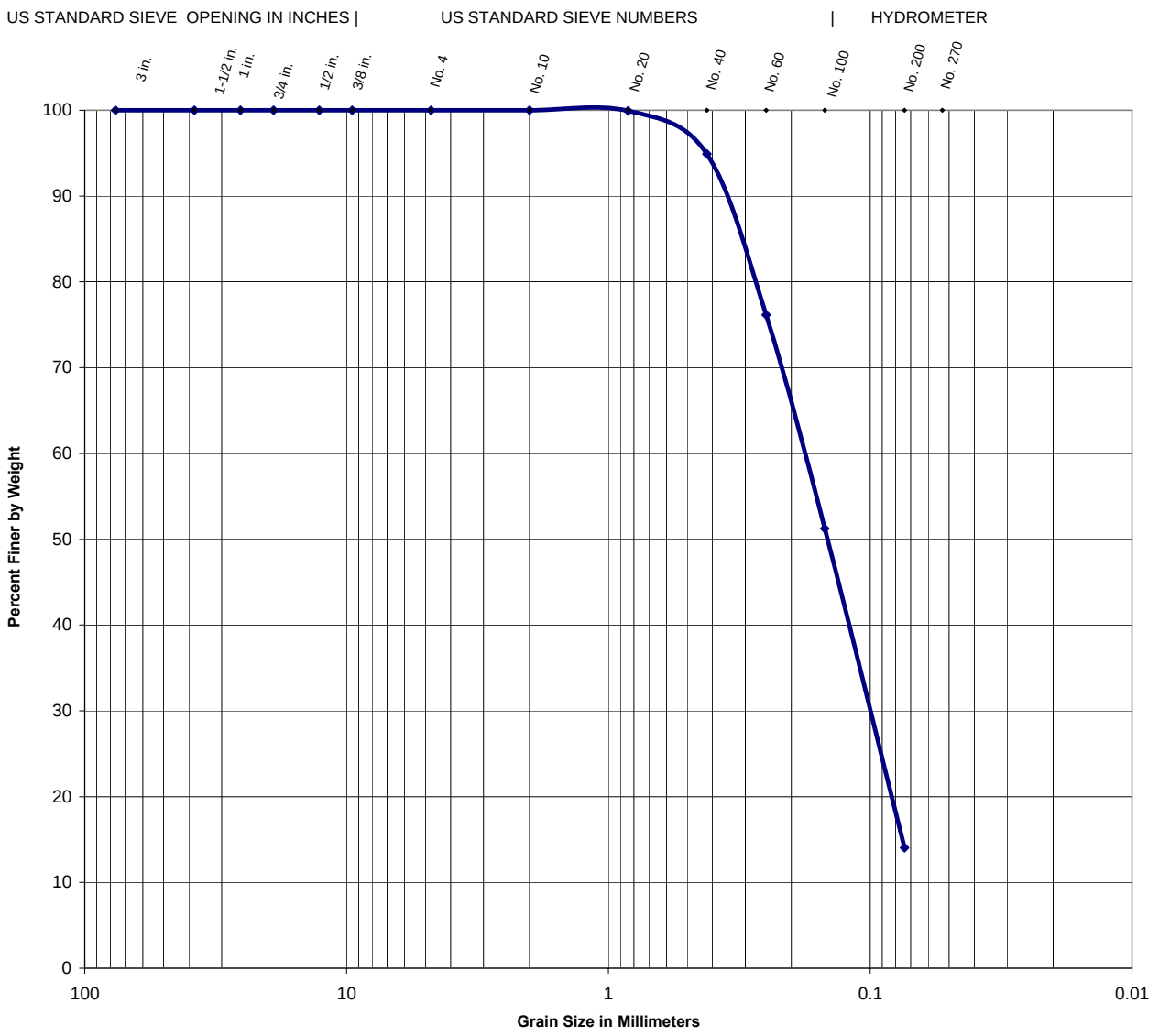
U.S. Sieve Number:	3 in.	1-1/2 in.	1 in.	3/4 in.	1/2 in.	3/8 in.	No. 4	No. 10	No. 20	No. 40	No. 60	No. 100	No. 200	No. 270
% Passing:	100.0	100	100.0	100	100.0	100	100.0	100	99.9	95.0	72.9	47.3	5.8	#N/A

Eff. Size (D10) = 0.08 mm **Unif. Coef. (D60/ D10) = 2.38**

*NP = Not Plastic

Palm Beach Renewable Energy Facility No. 2
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Palm Beach County,Florida
Project Number : WPB-09-7594
Date : 4/15/10

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GRAIN SIZE DISTRIBUTION CURVE

Sample No.	Location	SOIL DESCRIPTION	W%	LL	PL	PI
TB-28, Sample No. 6	9 ft to 10 ft	Brown clayey fine SAND (SC)	60.9	NA	NA	NA

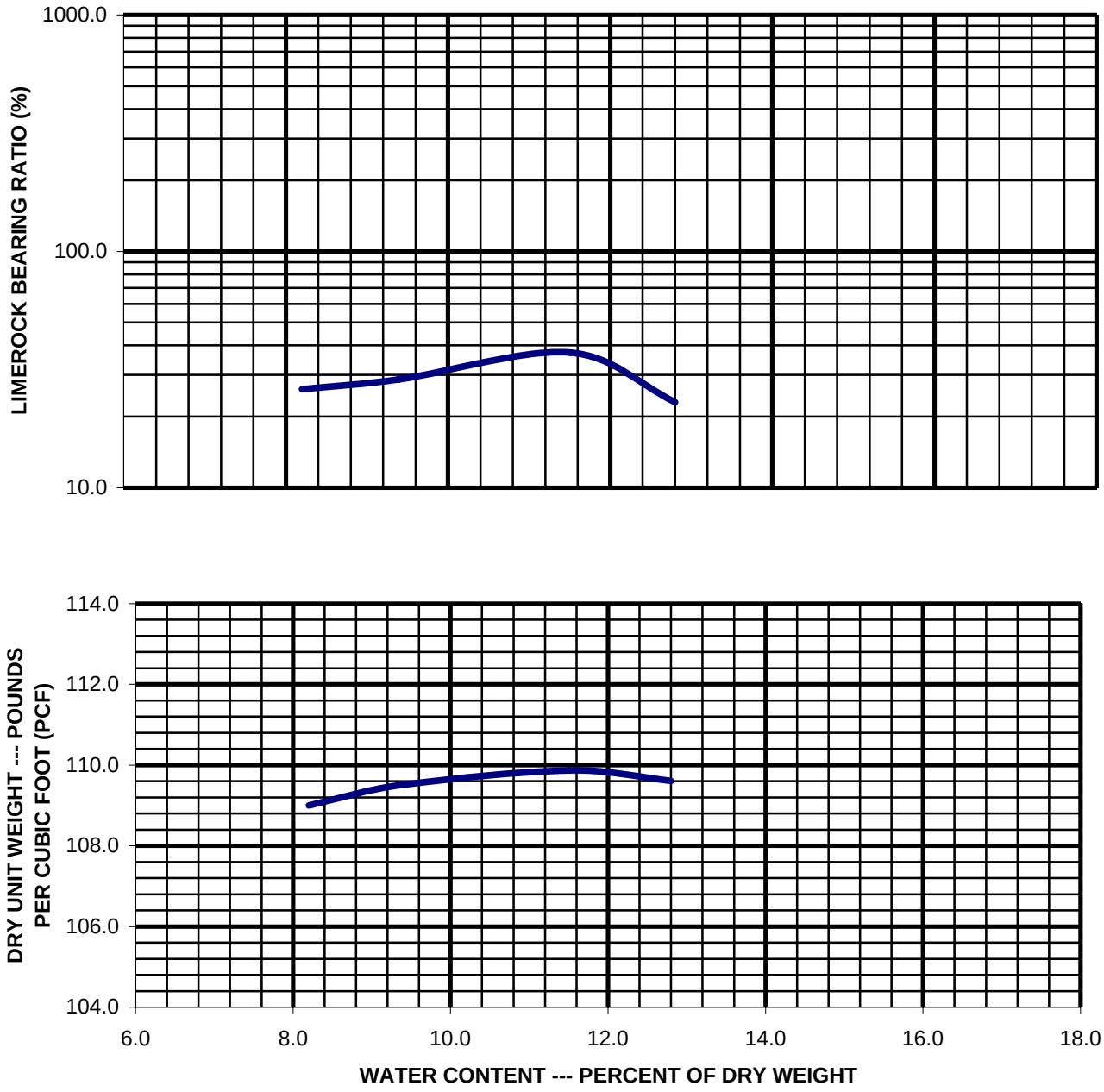
U.S. Sieve Number:	3 in.	1-1/2 in.	1 in.	3/4 in.	1/2 in.	3/8 in.	No. 4	No. 10	No. 20	No. 40	No. 60	No. 100	No. 200	No. 270
% Passing:	100.0	100	100.0	100	100.0	100	100.0	100	99.9	94.9	76.2	51.3	14.0	#N/A

Eff. Size (D10) = **0.069 mm** **Unif. Coef. (D60/ D10) =** **2.61**

*NP = Not Plastic

Palm Beach Renewable Energy Facility No. 2
Malcom Pirnie,Inc.
Palm Beach County,Florida
Project Number : WPB-09-7594
Date : 4/15/10

LIMEROCK BEARING RATIO TEST RESULTS



SUMMARY OF TEST RESULTS		POINT VALUES			
		LBR VALUES		PROCTOR VALUES	
MAXIMUM LBR VALUE (%):	37.3	8.2	26.1	8.2	109.0
MAXIMUM DRY DENSITY (pcf):	109.9	9.4	28.8	9.4	109.5
OPTIMUM WATER CONTENT (%):	11.5	11.5	37.3	11.5	109.9
		12.8	23.0	12.8	109.6

Sample No.: 10362

Location: Drill Pad @ Boring TB-4

Depth: 0 - 0.5 feet

Material Descript.: Light brown fine to medium SAND with some fragmental limestone (SP)

Project Requirement: N/A

LIMEROCK BEARING RATIO

Geotechnical Study
Palm Beach Renewable Energy Facility No. 2
Palm Beach County, Florida

DUNKELBERGER ENGINEERING & TESTING, INC.
DUNKELBERGER Geotechnicial-Materials-Testing/Inspection-Environmental

Drawn By:	AR	Date Tested:	4/12/2010	Project No.:	WPB-09-7594
Checked By:	JD	Date:	4/20/2010	Sheet:	C24

DE&T DUNKELBERGER ENGINEERING & TESTING, INC.

Geotechnical-Materials Testing-Inspection-Environmental

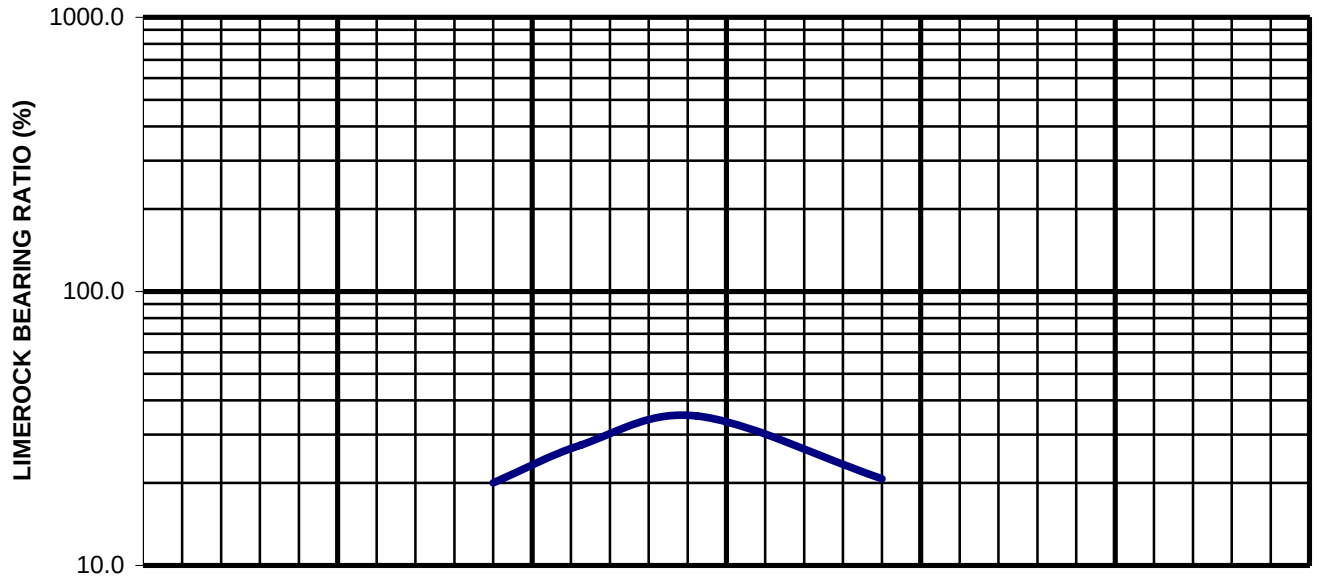


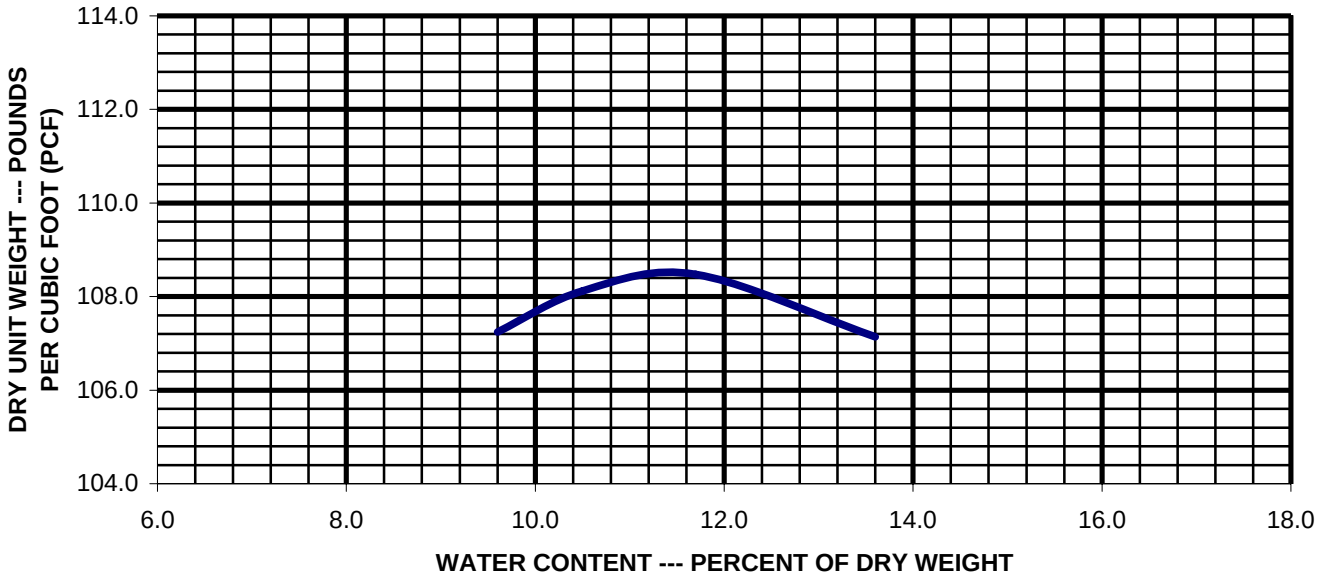
Project Name : Palm Beach Renewable Energy Facility No. 2 **Project No. :** WPB-09-7594

Date : 4/20/2010

Sample No.		SOIL DESCRIPTION	W%
10362		Light brown fine to medium SAND with some fragmental limestone (SP)	1.1

U.S. Sieve No.	% Passing
2"	100
1.5"	99.7
1"	98.8
1/2"	94.6
3/8"	93.7
#4	91.9
#10	91
#20	90
#40	83
#60	63
#100	40
#200	0.45





SUMMARY OF TEST RESULTS		POINT VALUES			
		LBR VALUES		PROCTOR VALUES	
MAXIMUM LBR VALUE (%):	35.1	9.6	20.0	9.6	107.2
MAXIMUM DRY DENSITY (pcf):	108.5	10.5	27.5	10.5	108.1
OPTIMUM WATER CONTENT (%):	11.7	11.7	35.1	11.7	108.5
		13.6	20.7	13.6	107.1

Sample No.: 10373

Location: Toe Of Slope, 20' South Of TB-1

Depth: 0 - 0.5 feet

Material Descript.: Light brown fine to medium SAND with some fragmental limestone (SP)

Project Requirement: N/A

LIMEROCK BEARING RATIO

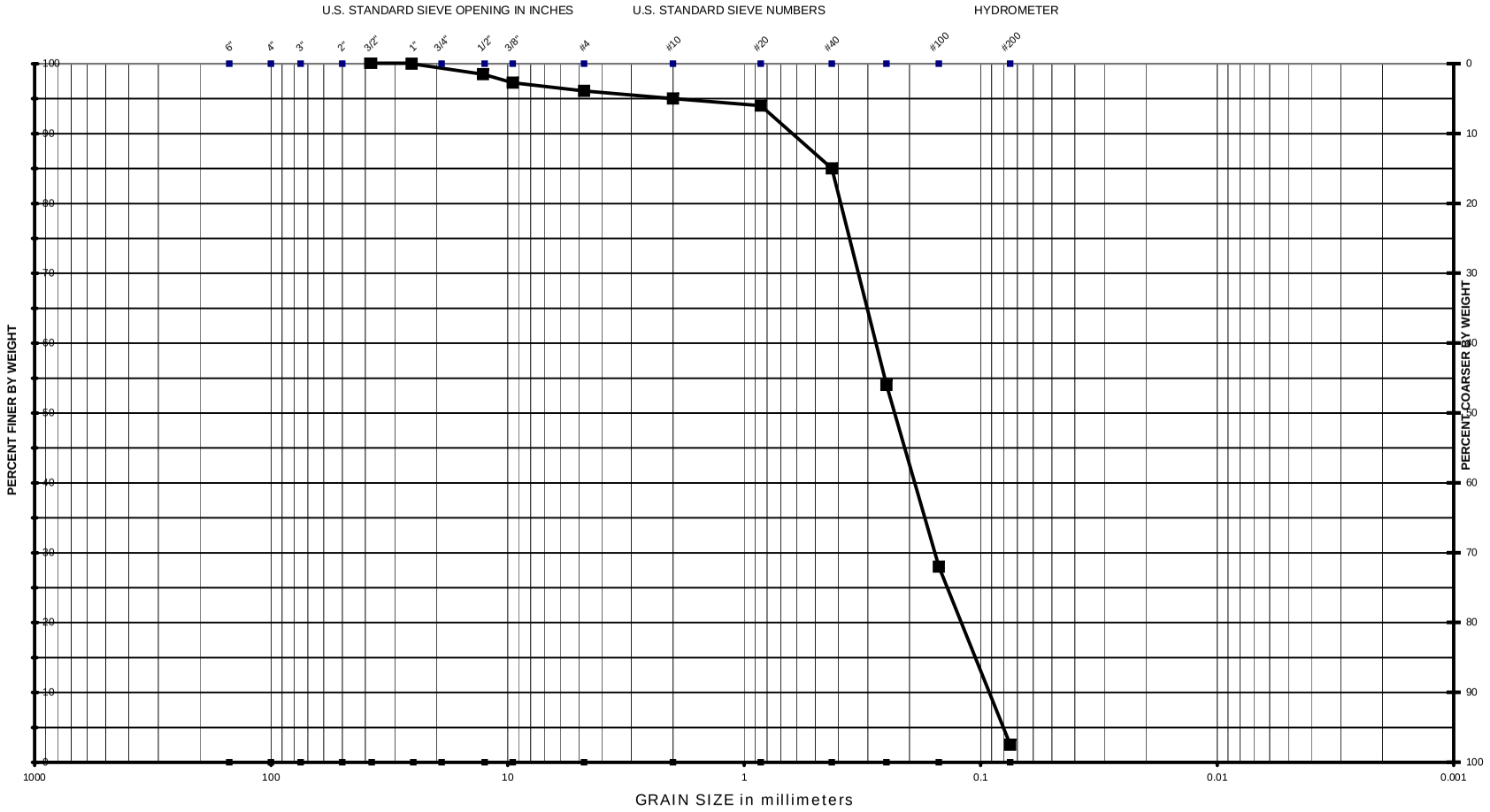
Geotechnical Study
Palm Beach Renewable Energy Facility No. 2
Palm Beach County, Florida

DUNKELBERGER ENGINEERING & TESTING, INC.
DUNKELBERGER Geotechnicial-Materials-Testing/Inspection-Environmental

Drawn By:	AR	Date Tested:	4/18/2010	Project No.:	WPB-09-7594
Checked By:	JD	Date:	4/20/2010	Sheet:	C26

DE&T DUNKELBERGER ENGINEERING & TESTING, INC.

Geotechnical-Materials Testing-Inspection-Environmental

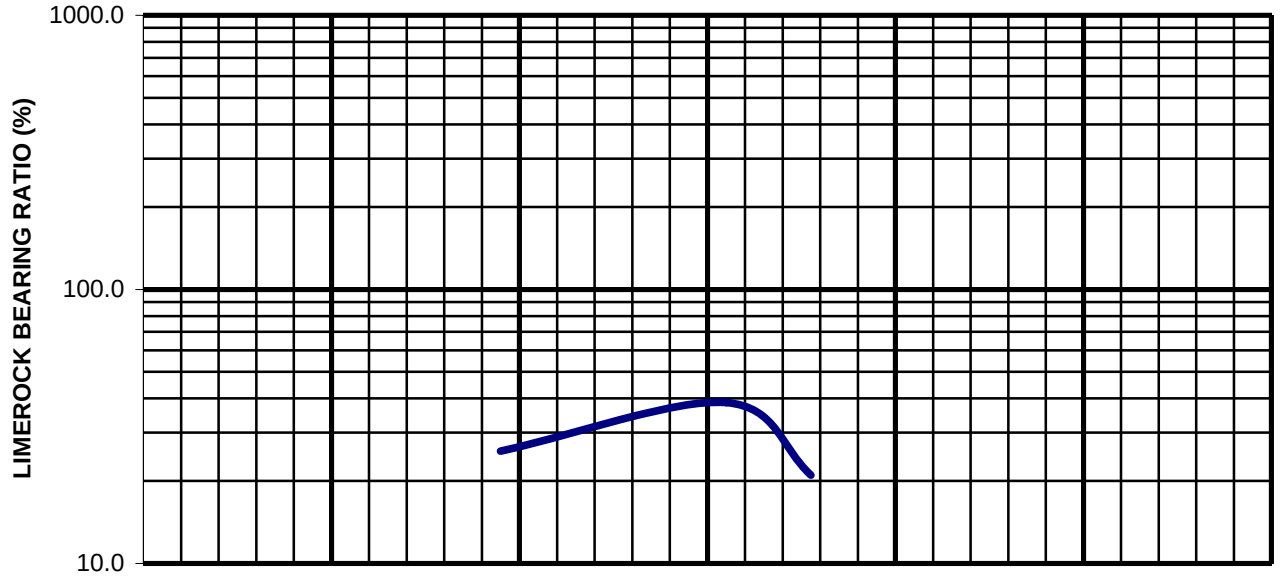


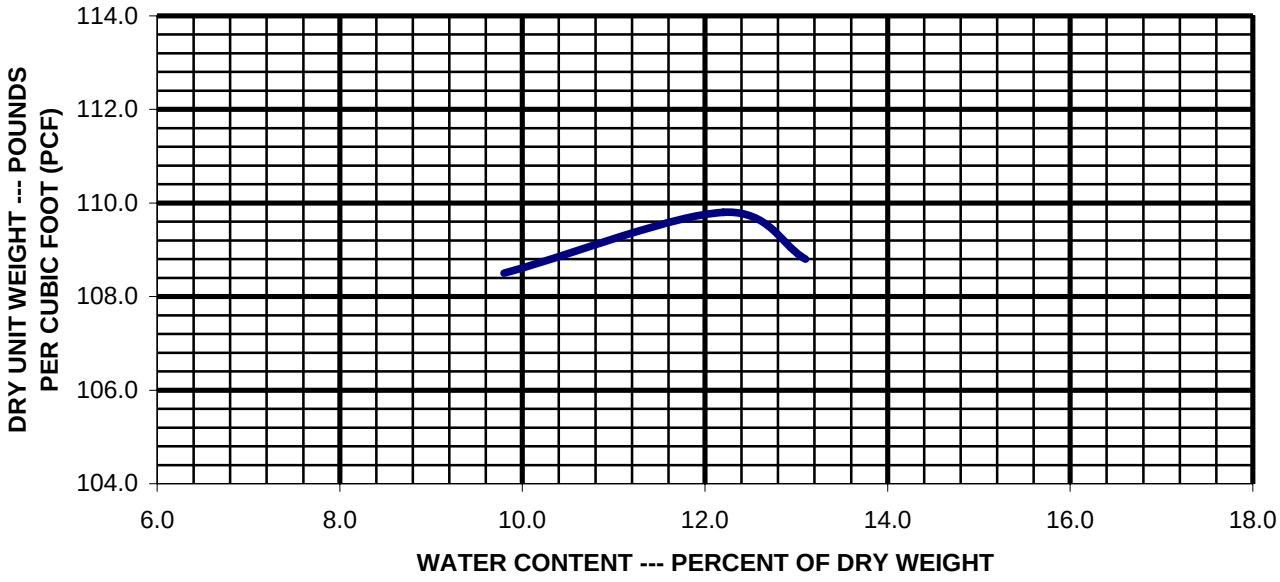
Project Name : Palm Beach Renewable Energy Facility No. 2 **Project No. :** WPB-09-7594

Date : 4/20/2010

Sample No.		SOIL DESCRIPTION	W%
10373		Light brown fine to medium SAND with some fragmental limestone (SP)	11.1

U.S. Sieve No.	% Passing
2"	100
1.5"	100
1"	100
1/2"	98.5
3/8"	97.3
#4	96.1
#10	95
#20	94
#40	85
#60	54
#100	28
#200	2.5





SUMMARY OF TEST RESULTS		POINT VALUES			
MAXIMUM LBR VALUE (%):	38.7	LBR VALUES		PROCTOR VALUES	
MAXIMUM DRY DENSITY (pcf):	109.8	9.8	25.7	9.8	108.5
OPTIMUM WATER CONTENT (%):	12.2	12.2	38.7	12.2	109.8
		13.1	21.0	13.1	108.8

Sample No.: 10379

Location: Drill Pad @ Boring TB-2

Depth: 0 - 0.5 feet

Material Descript.: Dark brown fine to medium SAND with some fragmental limestone and silt (SP-SM)

Project Requirement: N/A

LIMEROCK BEARING RATIO

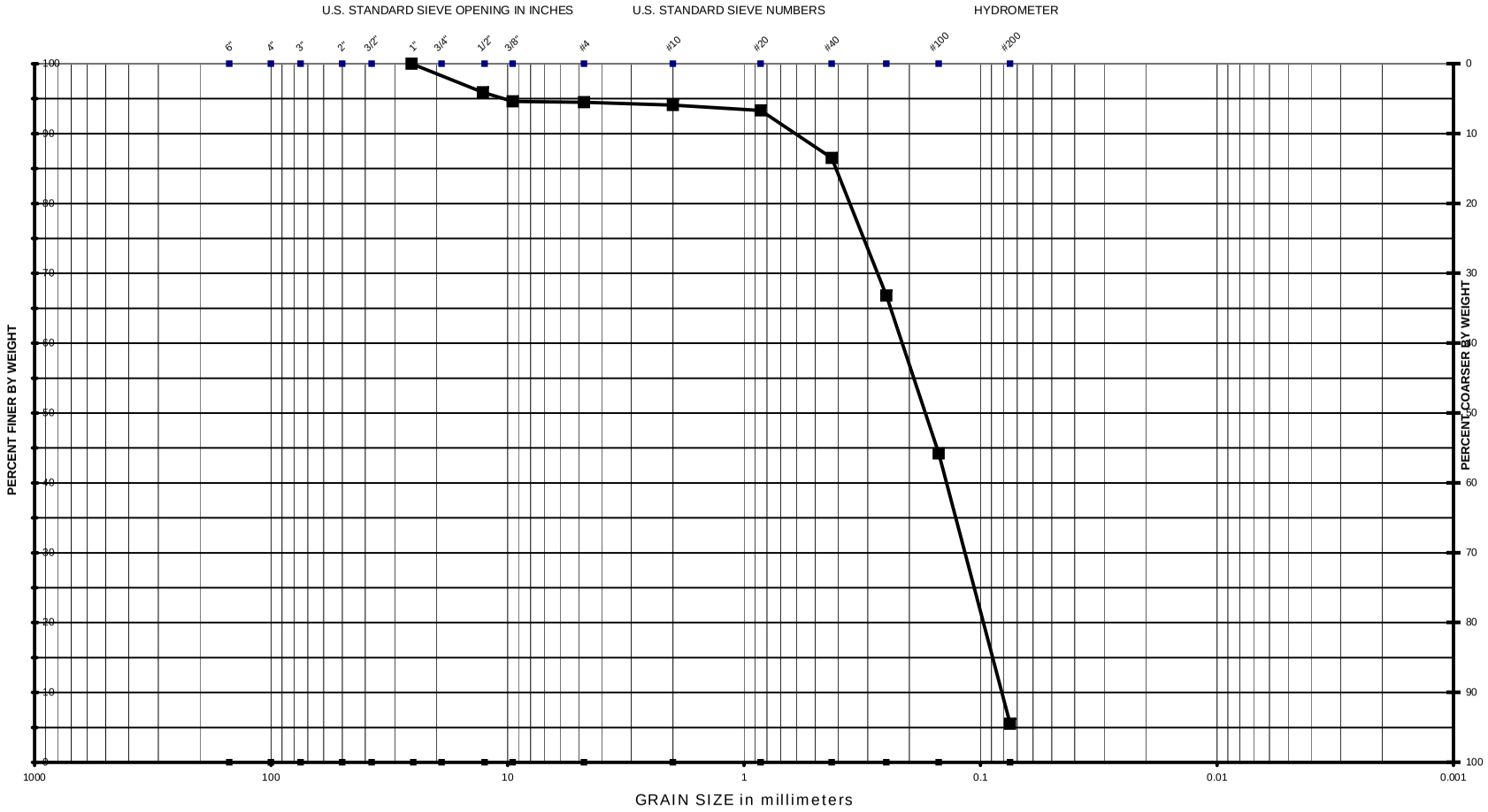
Geotechnical Study
Palm Beach Renewable Energy Facility No. 2
Palm Beach County, Florida

DUNKELBERGER ENGINEERING & TESTING, INC.
DUNKELBERGER Geotechnicial-Materials-Testing/Inspection-Environmental

Drawn By:	AR	Date Tested:	4/21/2010	Project No.:	WPB-09-7594
Checked By:	JD	Date:	4/27/2010	Sheet:	C28

DE&T DUNKELBERGER ENGINEERING & TESTING, INC.

Geotechnical-Materials Testing-Inspection-Environmental

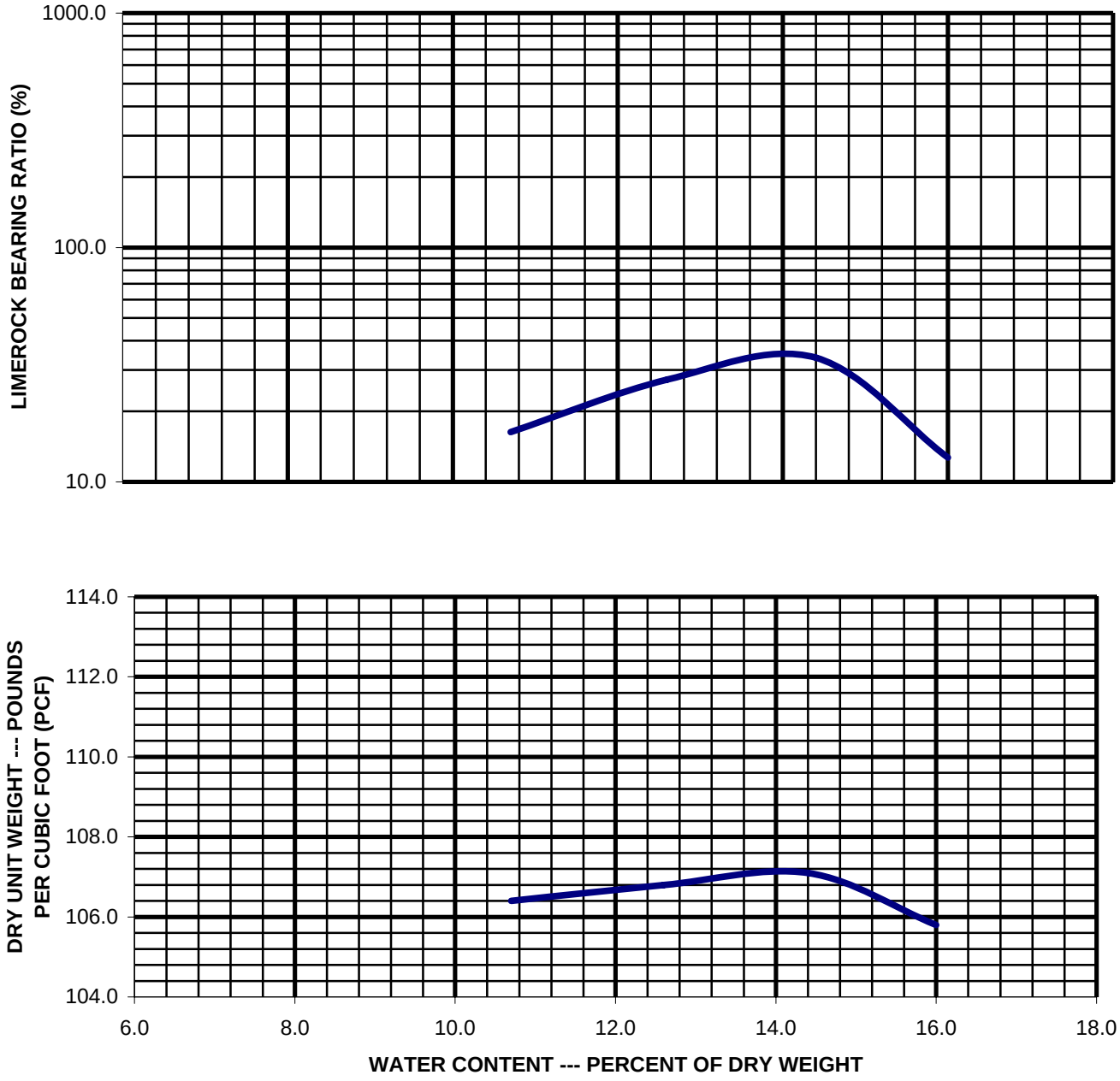


Project Name : Palm Beach Renewable Energy Facility No. 2 **Project No. :** WPB-09-7594

Date : 4/27/2010

Sample No.		SOIL DESCRIPTION	W%
10379		Dark brown fine to medium SAND with some fragmental limestone and silt	1.4
		(SP-SM)	

U.S. Sieve No.	% Passing
2"	100
1.5"	100
1"	100
1/2"	95.9
3/8"	94.6
#4	94.5
#10	94.1
#20	93.3
#40	86.5
#60	66.8
#100	44.2
#200	5.5



SUMMARY OF TEST RESULTS		POINT VALUES			
		LBR VALUES		PROCTOR VALUES	
MAXIMUM LBR VALUE (%):	33.9	10.7	16.3	10.7	106.4
MAXIMUM DRY DENSITY (pcf):	107.1	12.6	27.3	12.6	106.8
OPTIMUM WATER CONTENT (%):	14.4	14.4	33.9	14.4	107.1
		16.0	12.7	16.0	105.8

Sample No.: 10383

Location: Toe Of Slope, 50' East Of TB-23

Depth: 0 - 0.5 feet

Material Descript.: Light brown fine to medium SAND with some shell fragments (SP)

Project Requirement: N/A

LIMEROCK BEARING RATIO

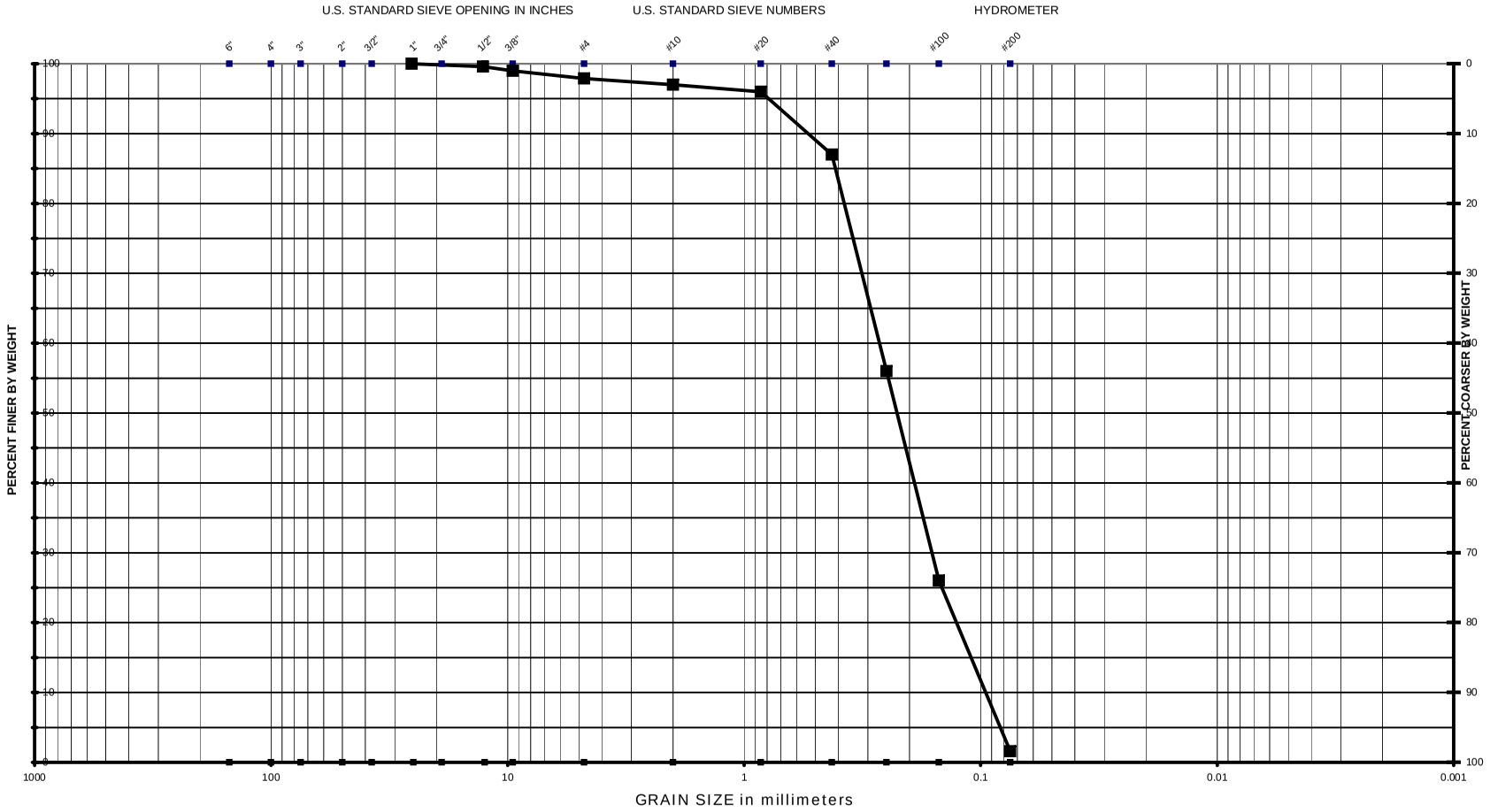
Geotechnical Study
Palm Beach Renewable Energy Facility No. 2
Palm Beach County, Florida

DUNKELBERGER ENGINEERING & TESTING, INC.
DUNKELBERGER Geotechnicial-Materials-Testing/Inspection-Environmental

Drawn By:	AR	Date Tested:	4/21/2010	Project No.:	WPB-09-7594
Checked By:	JD	Date:	5/5/2010	Sheet:	C30

DE&T DUNKELBERGER ENGINEERING & TESTING, INC.

Geotechnical-Materials Testing-Inspection-Environmental



Project Name : Palm Beach Renewable Energy Facility No. 2 **Project No. :** WPB-09-7594

Date : 5/5/2010

Sample No.		SOIL DESCRIPTION	W%
10383		Light brown fine SAND with some shell fragments (SP)	0.7

U.S. Sieve No.	% Passing
2"	100
1.5"	100
1"	100
1/2"	99.6
3/8"	99
#4	97.9
#10	97
#20	96
#40	87
#60	56
#100	26
#200	1.6

MOISTURE-ORGANIC CONTENT TEST RESULTS

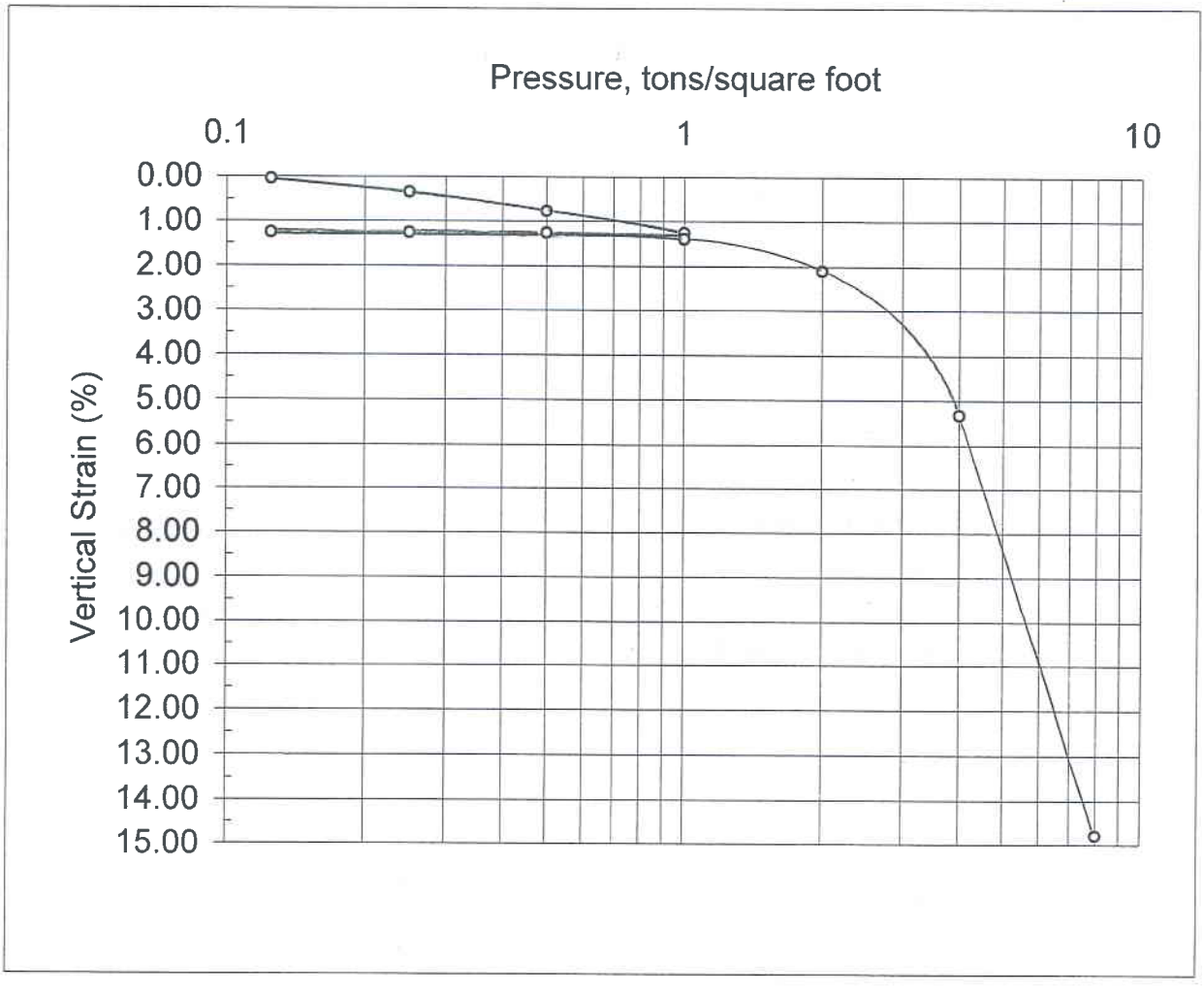
Soft Sediment Probe No.	*Depth Interval (inches)*	*Moisture Content (%)*	*Organic Content (%)*
MP-21	0 - 10	27.4	0.97
MP-26	0 – 36	84.9	8.2
MP-37	0 – 7.5	39.6	1.9

CONSOLIDATION TEST RESULTS

DUNKELBERGER
engineering & testing, inc.

CONSOLIDATION TEST REPORT

Boring No.:	TB-22	Sample No.:	--	Sample Depth (feet):	35 to 36
Sample Description:	Gray Elastic Silt (MH)				
Init. Water Content (%):	78.8	Init. Dry Unit Wt. (pcf):	53.1	Init. Saturation (%):	98.4
Final Water Content (%):	64.4	Initial Void Ratio (e):	2.1437	Specific Gravity:	2.68
Liquid Limit:	53	Plastic Limit:	37	Percent -200 (%):	88.6

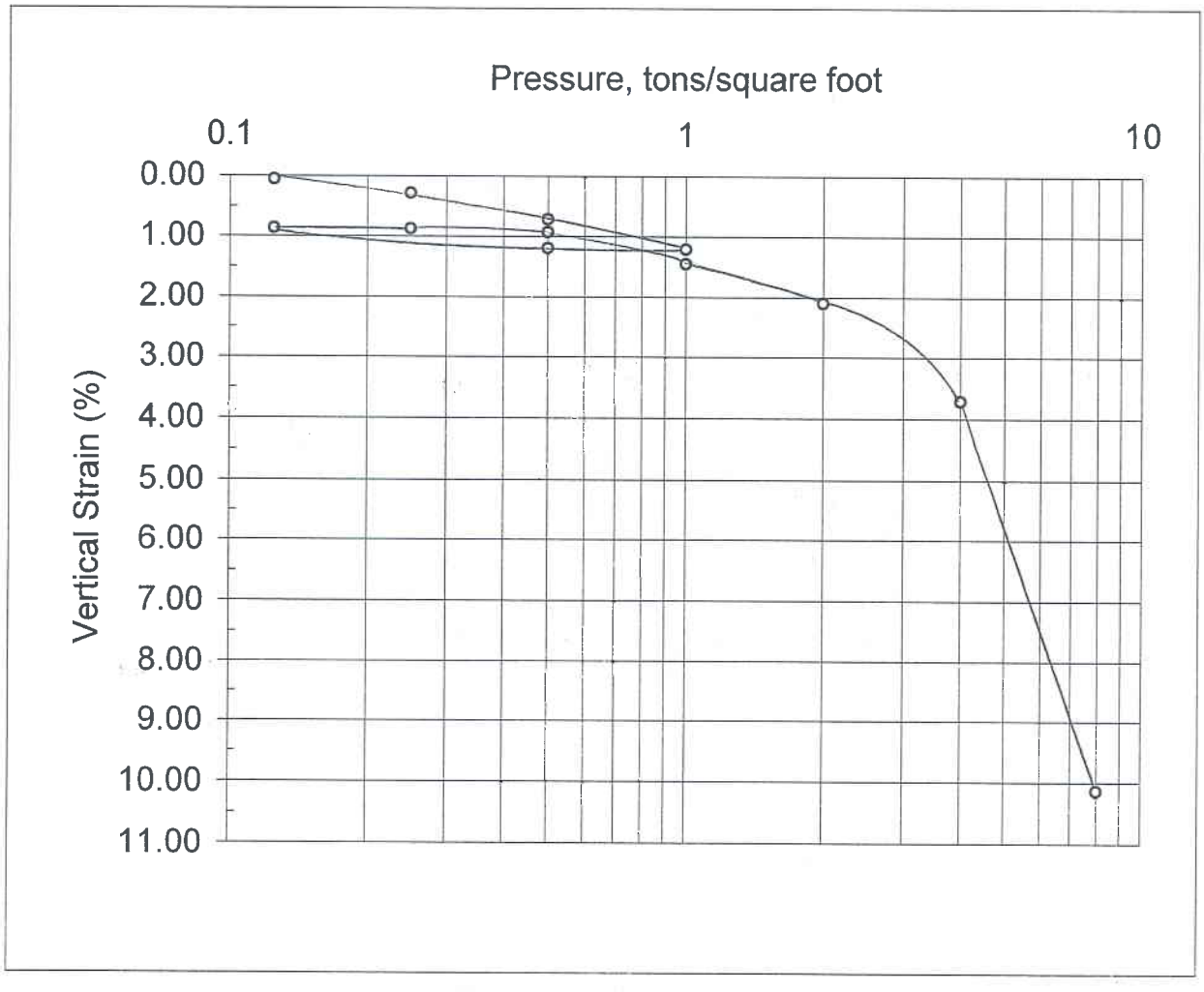


Project Name:	The Palm Beach Renewable Energy Facility No. 2
Project Location:	Palm Beach County, Florida
Project No.:	WPB-09-7594 (BG 21.2) Date: 20-Apr-10

DUNKELBERGER
engineering & testing, inc.

CONSOLIDATION TEST REPORT

Boring No.:	TB-26	Sample No.:	--	Sample Depth (feet):	32 to 33
Sample Description:	Gray sandy silt (ML)				
Init. Water Content (%):	49.1	Init. Dry Unit Wt. (pcf):	70.6	Init. Saturation (%):	96.2
Final Water Content (%):	43.3	Initial Void Ratio (e):	1.4221	Specific Gravity:	2.74
Liquid Limit:	41	Plastic Limit:	34	Percent -200 (%):	67.4



Project Name:	The Palm Beach Renewable Energy Facility No. 2
Project Location:	Palm Beach County, Florida
Project No.:	WPB-09-7594 (BG 21.2) Date: 20-Apr-10

DUNKELBERGER
engineering & testing, inc.

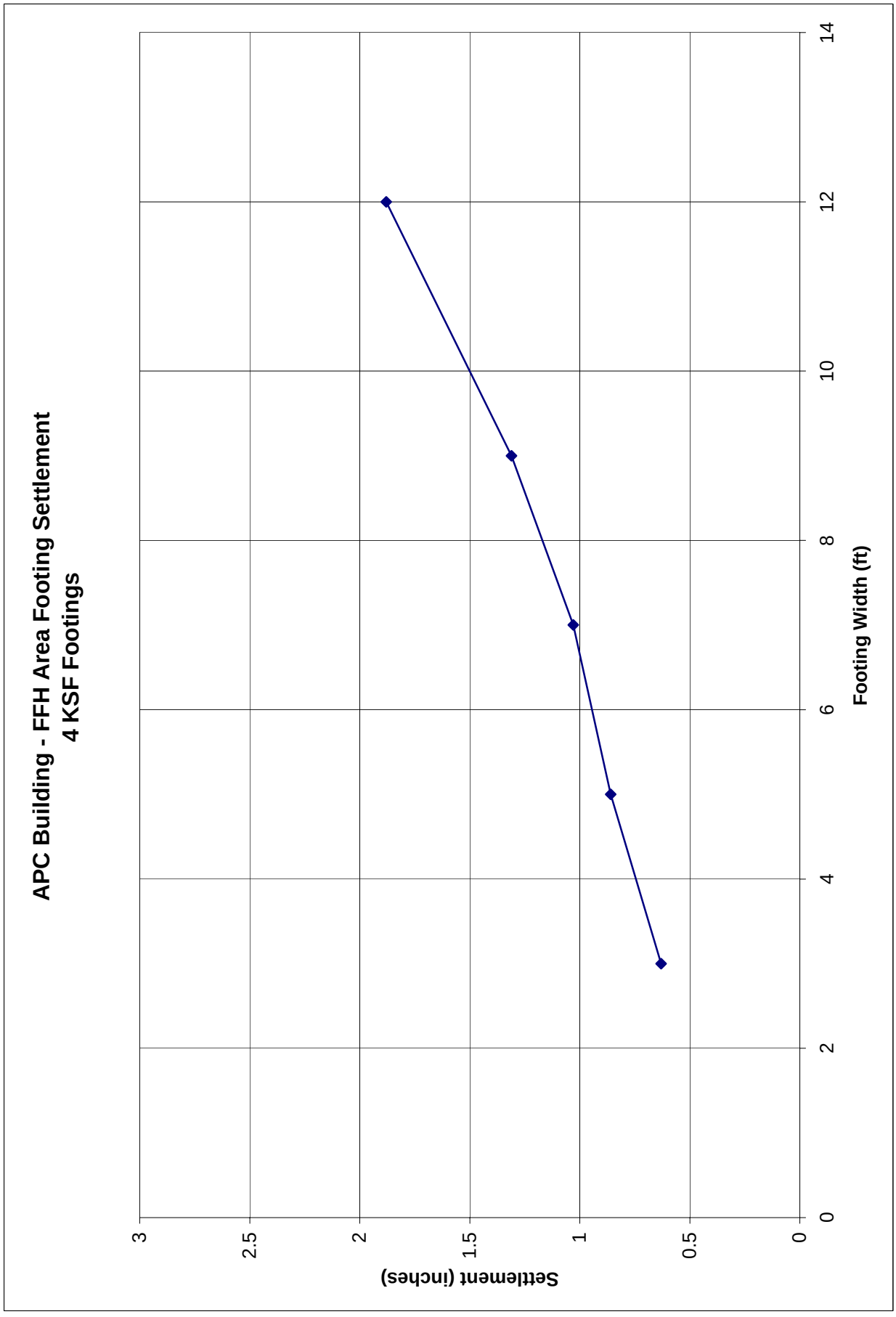
Boring No.:	TB-26	Sample No.:	--	Sample Depth (feet):	33 to 35
Sample Description:	Gray slightly silty sand with shell fragments (SP-SM)				
Init. Water Content (%):	29.1	Init. Dry Unit Wt. (pcf):		Init. Saturation (%):	
Final Water Content (%):		Initial Void Ratio (e):		Specific Gravity:	2.66
Liquid Limit:	25	Plastic Limit:	20	Percent -200 (%):	7.3

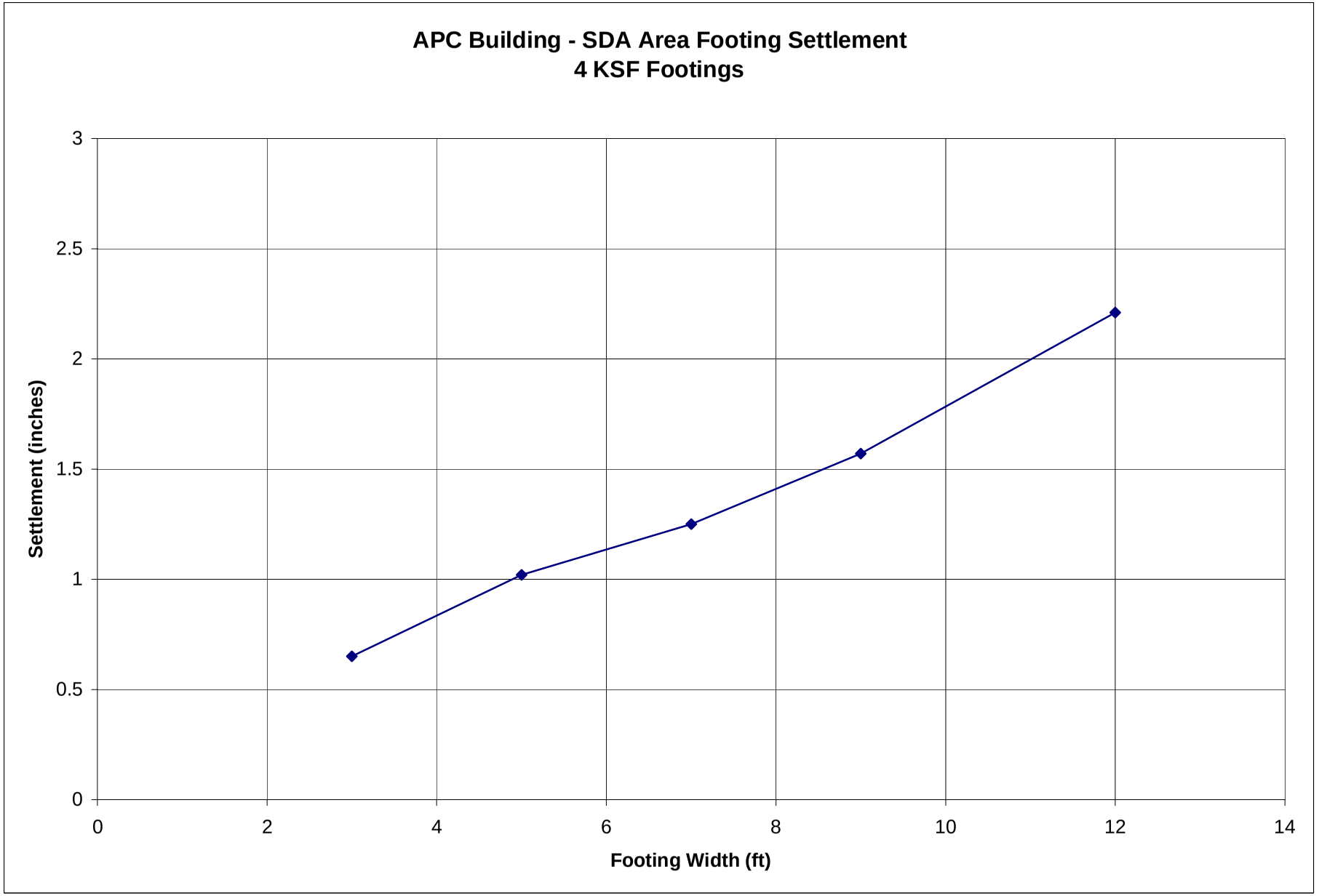
CONSOLIDATION TEST NOT PERFORMED FOR THIS SAMPLE

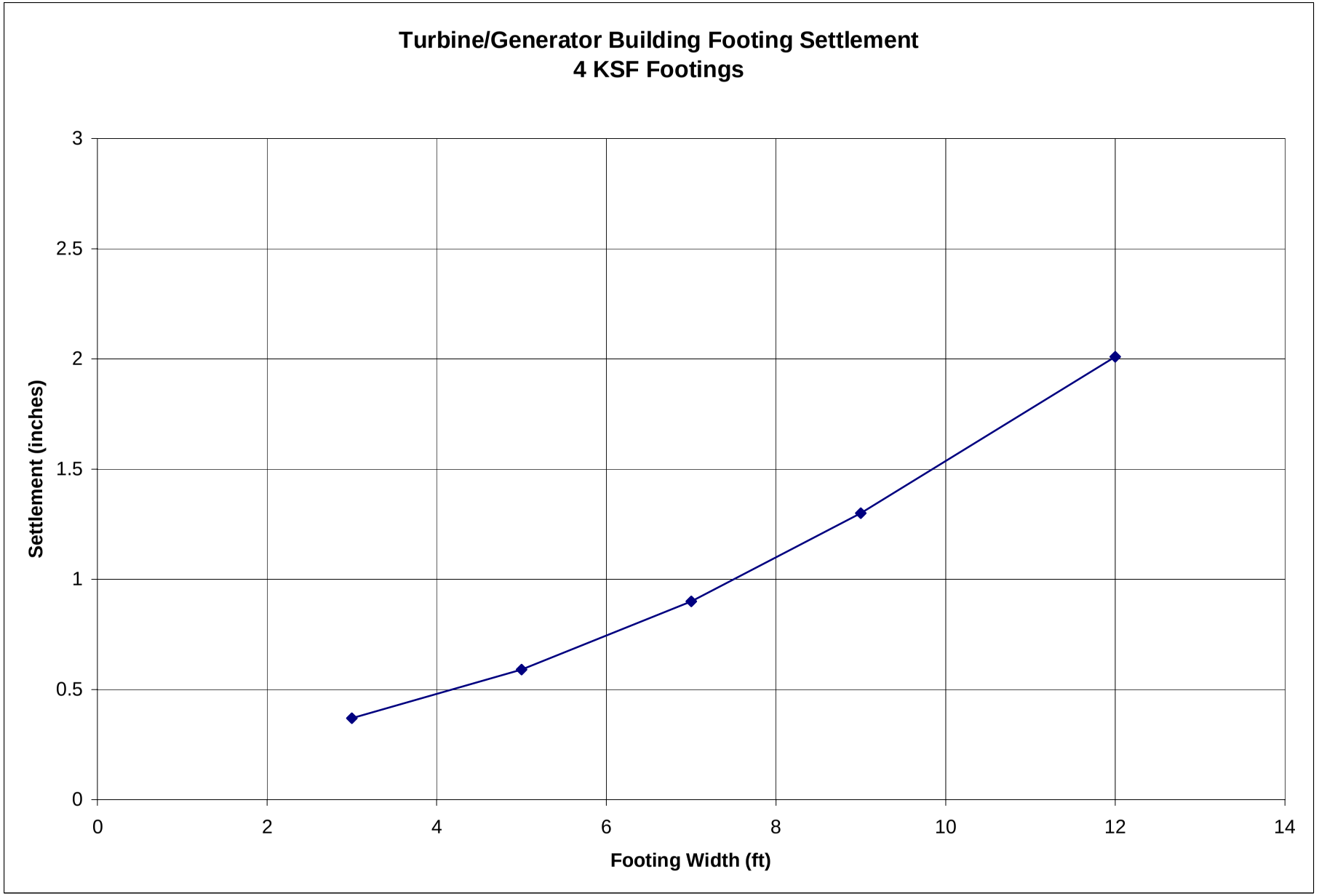
Project Name:	The Palm Beach Renewable Energy Facility No. 2		
Project Location:	Palm Beach County, Florida		
Project No.:	WPB-09-7594 (BG 21.2)	Date:	4-May-10

APPENDIX D

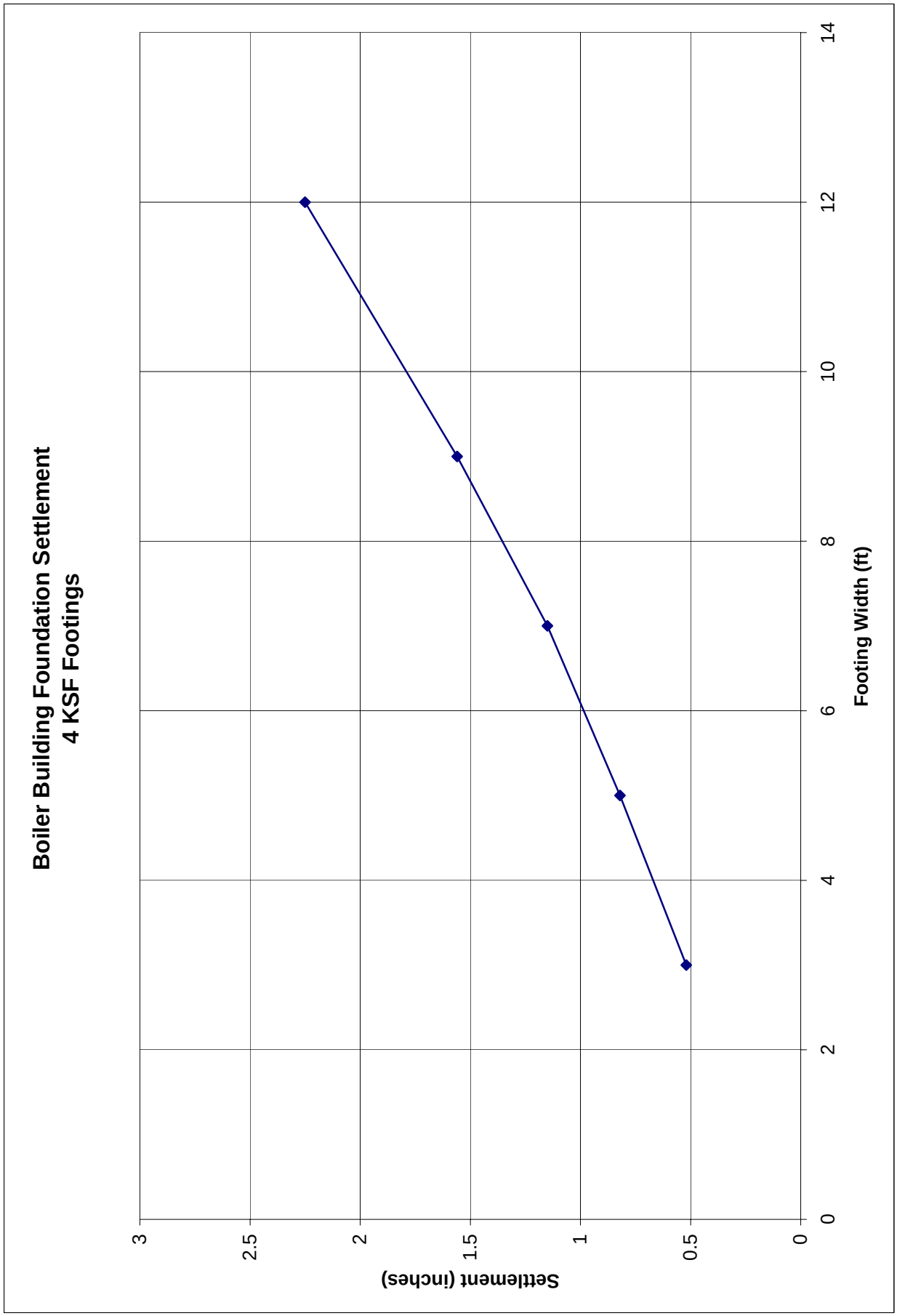
SHALLOW FOUNDATION SETTLEMENT ESTIMATES

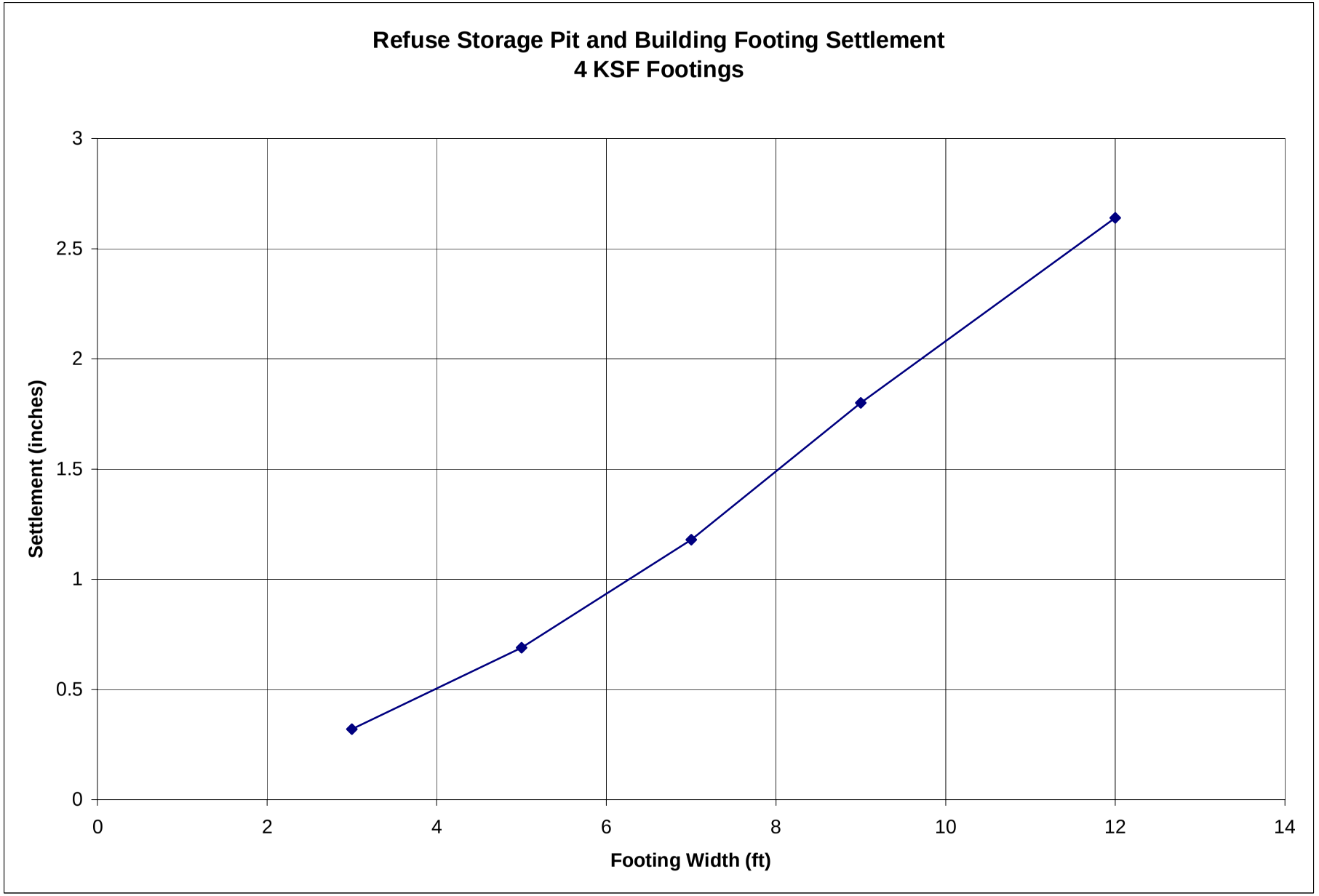

APC Building - FFH Area Footing Settlement
4 KSF Footings
Settlement (inches)
0
0.5
1
1.5
2
2.5
3
Footing Width (ft)
0
2
4
6
8
10
12
14

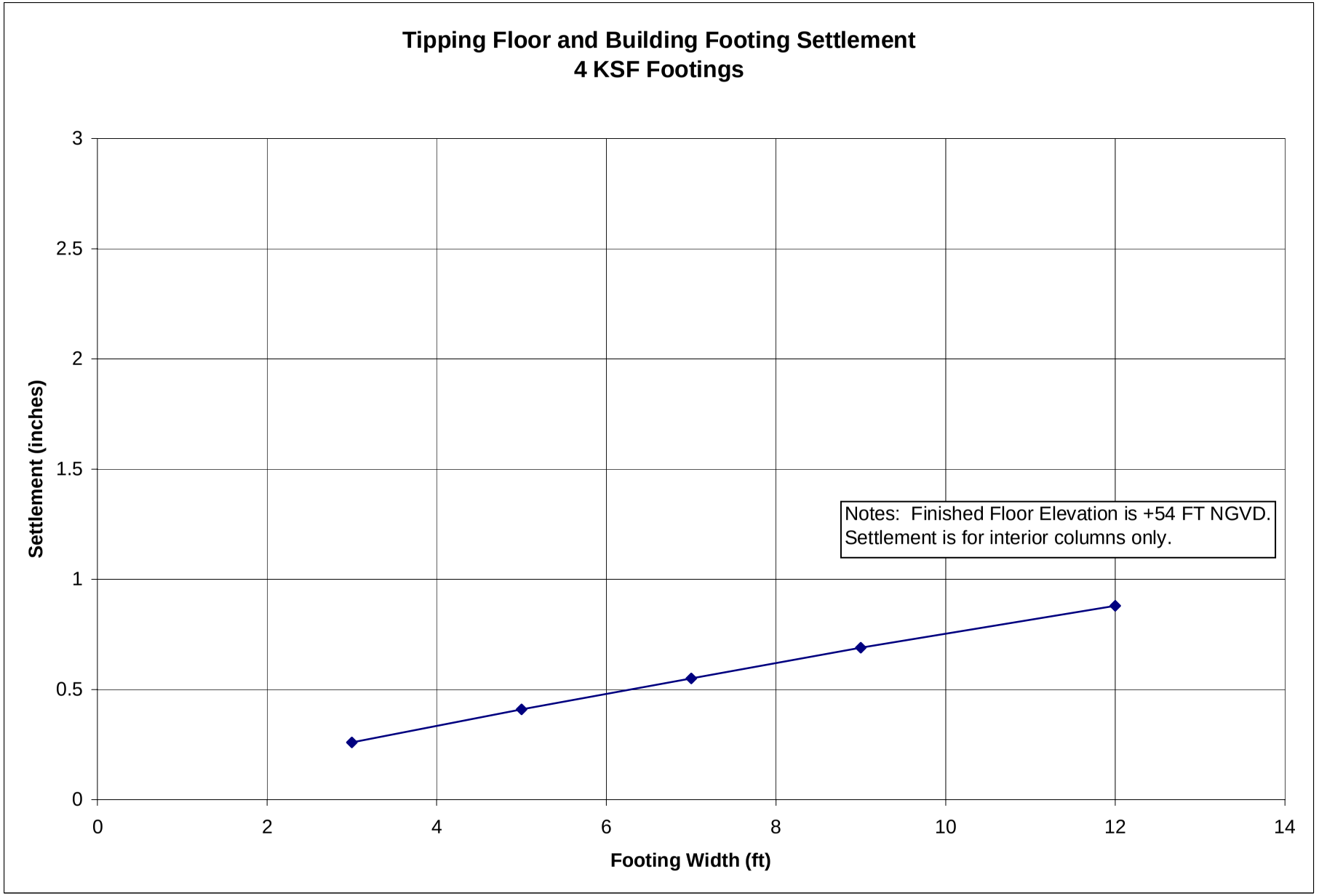

APC Building - SDA Area Footing Settlement
4 KSF Footings
Settlement (inches)
3
2.5
2
1.5
1
0.5
0
0
2
4
6
8
10
12
14
Footing Width (ft)

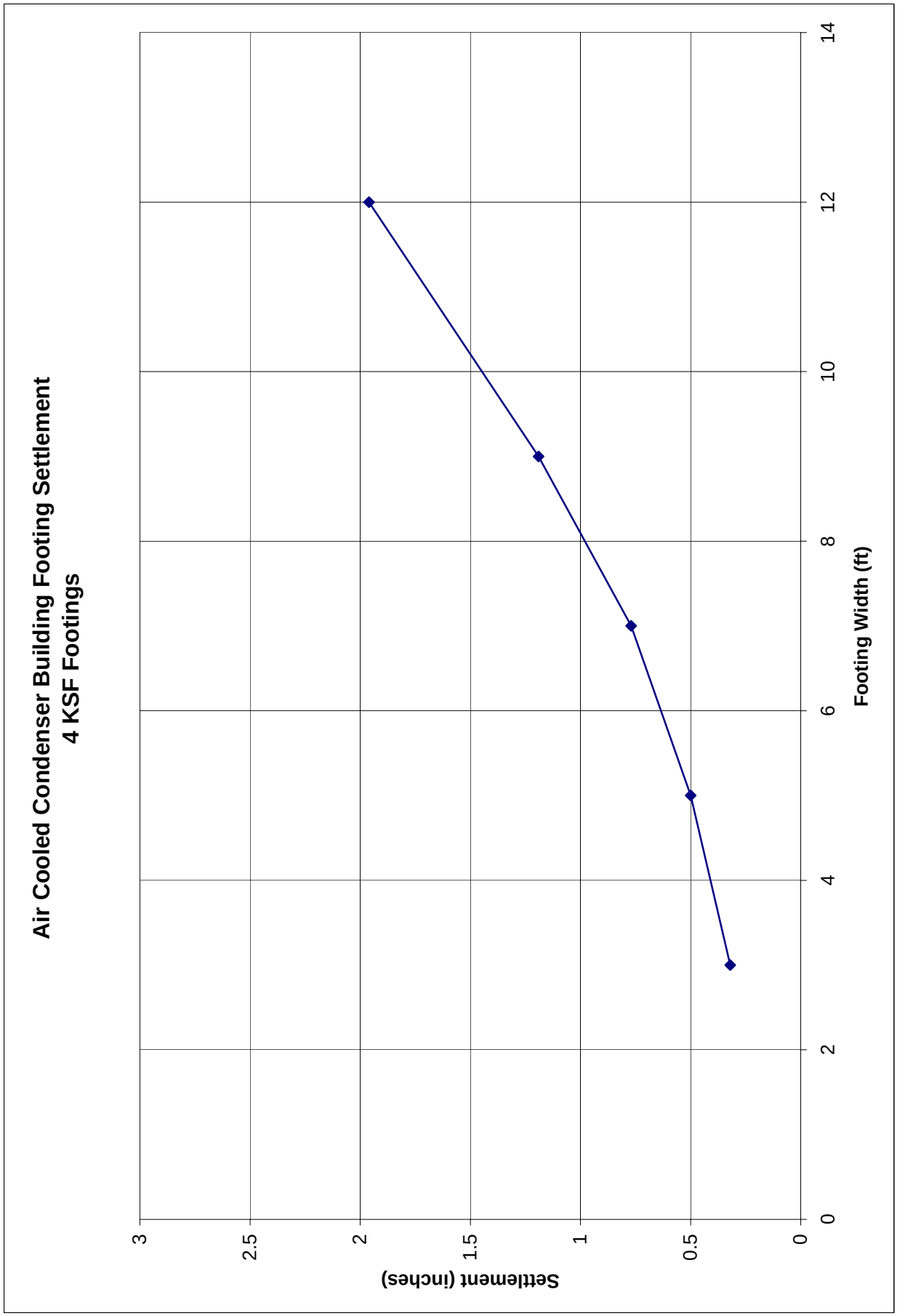

Turbine/Generator Building Footing Settlement
4 KSF Footings
Settlement (inches)
3
2.5
2
1.5
1
0.5
0
0
2
4
6
8
10
12
14
Footing Width (ft)

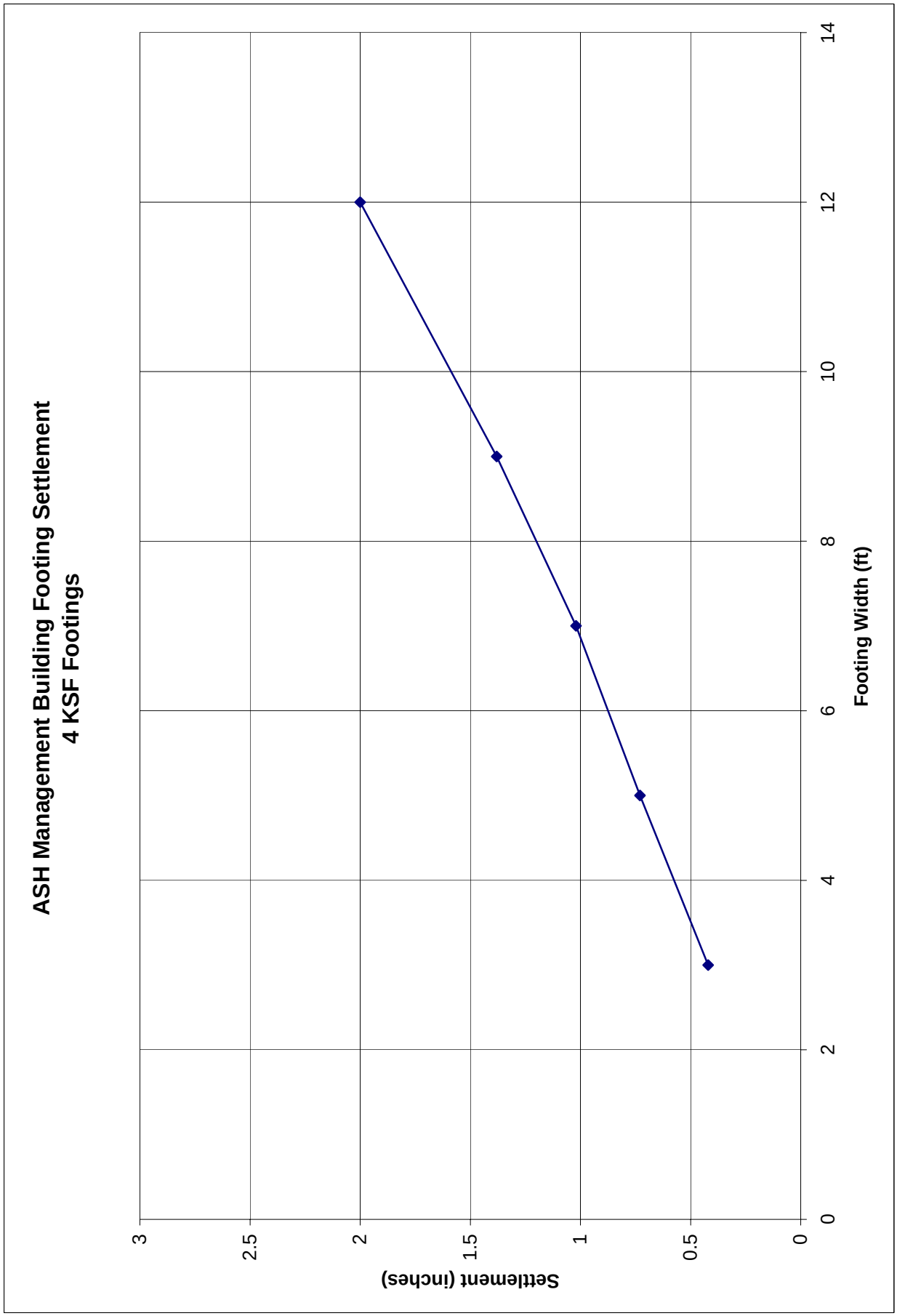
Sheet D3

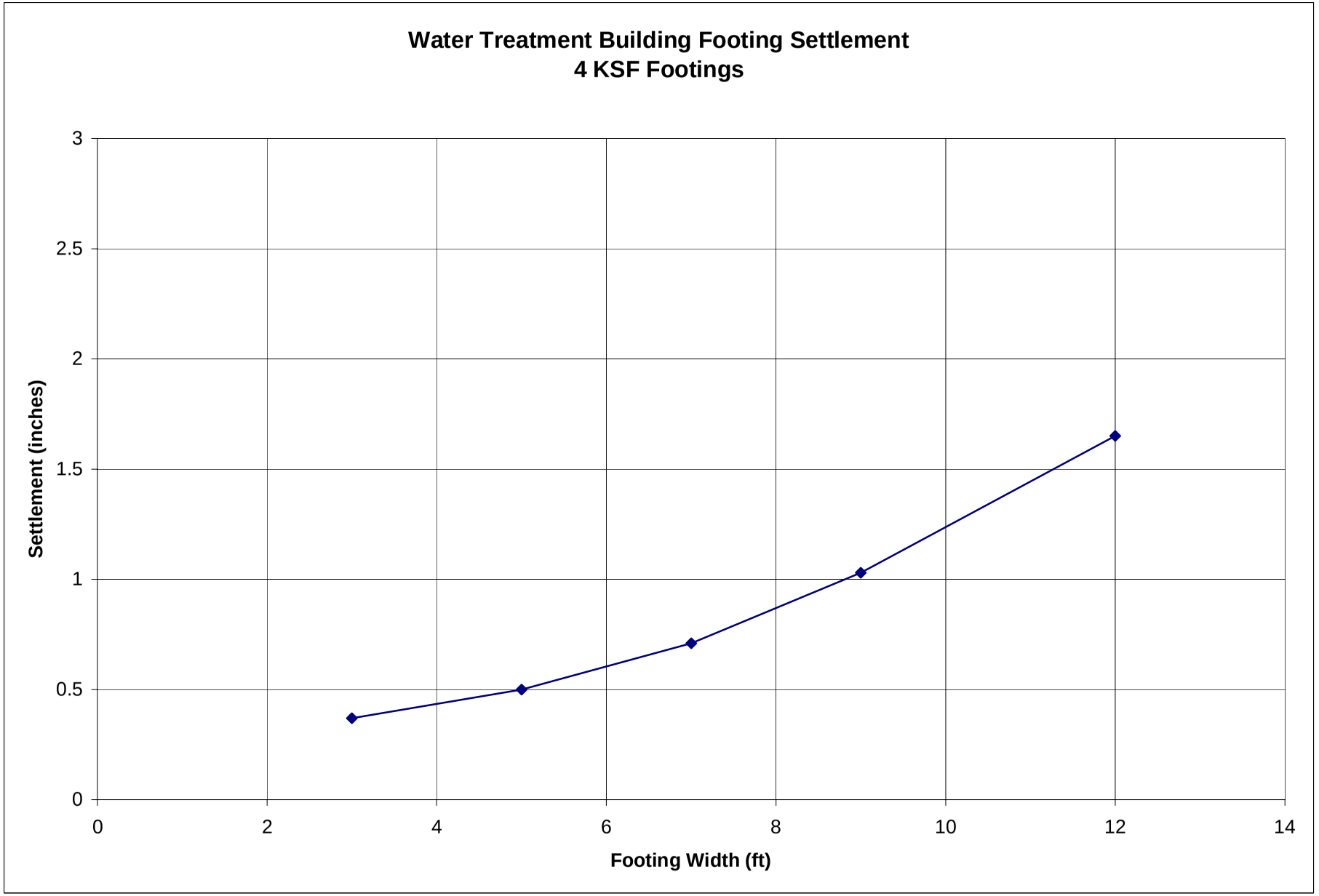

Boiler Building Foundation Settlement
4 KSF Footings
Settlement (inches)
0
0.5
1
1.5
2
2.5
3
Footing Width (ft)
0
2
4
6
8
10
12
14

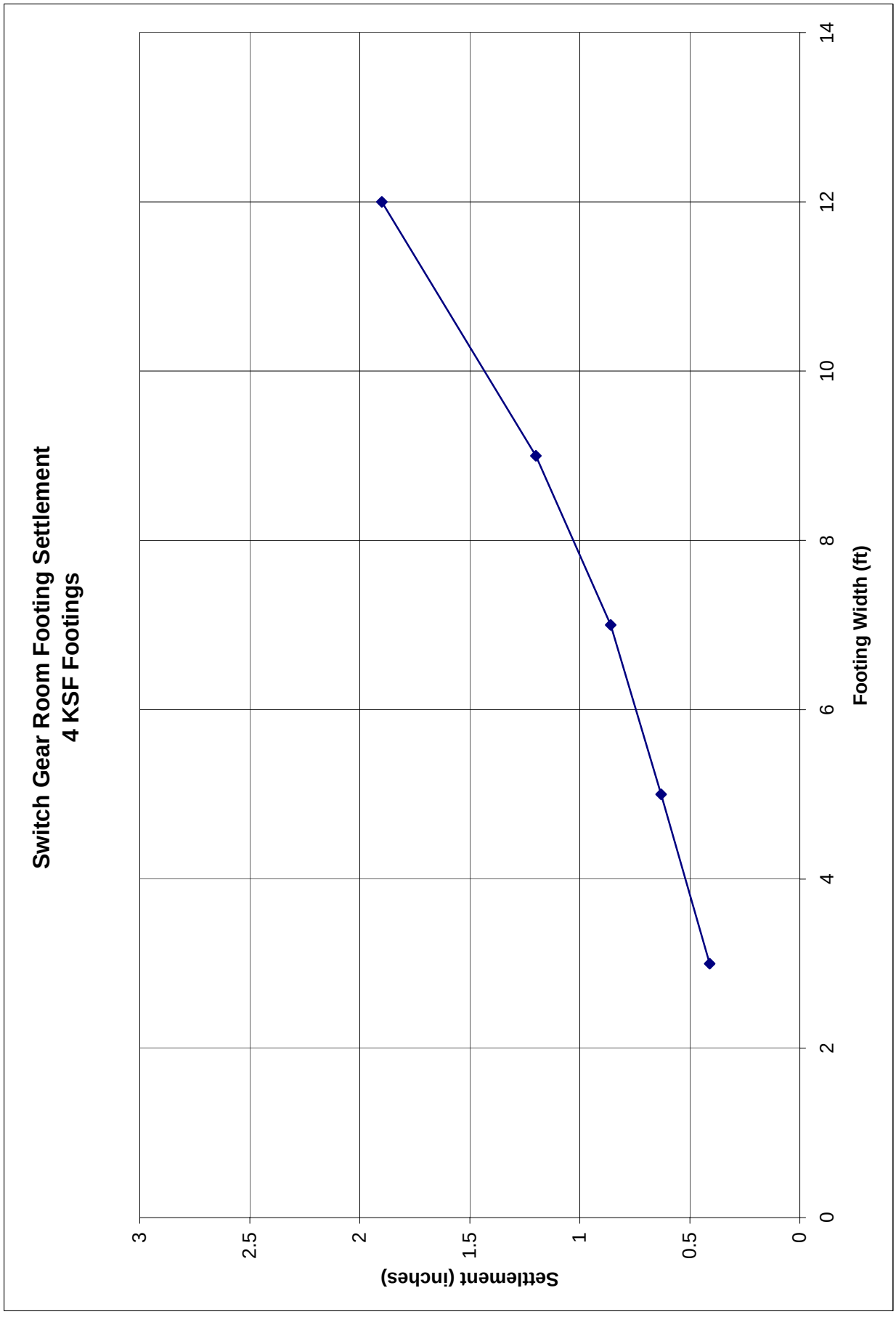

Refuse Storage Pit and Building Footing Settlement
4 KSF Footings
Settlement (inches)
0
0.5
1
1.5
2
2.5
3
0
2
4
6
8
10
12
14
Footing Width (ft)

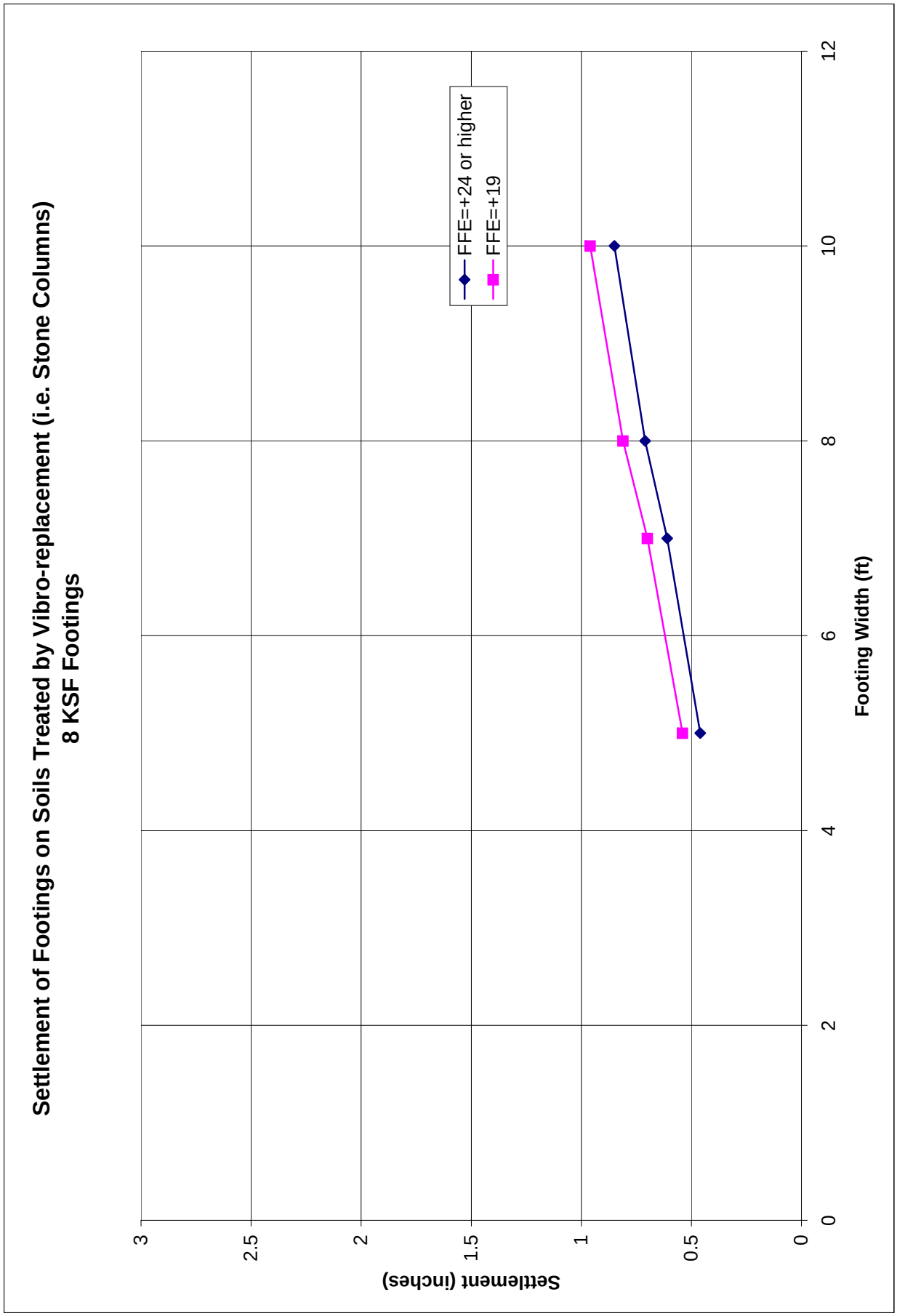

Tipping Floor and Building Footing Settlement
4 KSF Footings
Settlement (inches)
Footing Width (ft)
0
0.5
1
1.5
2
2.5
3
0
2
4
6
8
10
12
14
Notes: Finished Floor Elevation is +54 FT NGVD.
Settlement is for interior columns only.


Air Cooled Condenser Building Footing Settlement
4 KSF Footings
Settlement (inches)
0
0.5
1
1.5
2
2.5
3
Footing Width (ft)
0
2
4
6
8
10
12
14


ASH Management Building Footing Settlement
4 KSF Footings
Settlement (inches)
0
0.5
1
1.5
2
2.5
3
Footing Width (ft)
0
2
4
6
8
10
12
14


Water Treatment Building Footing Settlement
4 KSF Footings
Settlement (inches)
3
2.5
2
1.5
1
0.5
0
0
2
4
6
8
10
12
14
Footing Width (ft)


Switch Gear Room Footing Settlement
4 KSF Footings
Settlement (inches)
0
0.5
1
1.5
2
2.5
3
Footing Width (ft)
0
2
4
6
8
10
12
14

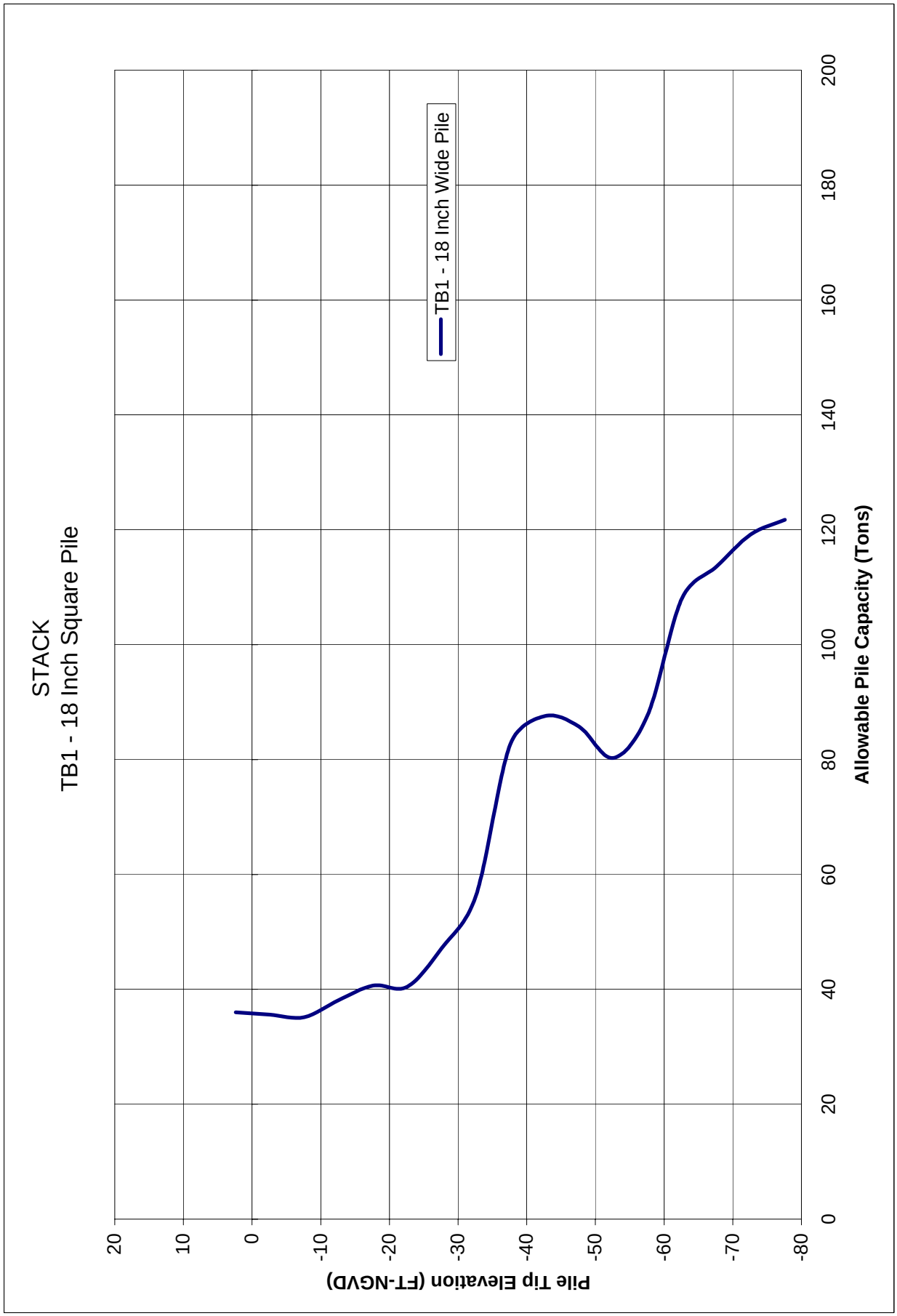

Settlement of Footings on Soils Treated by Vibro-replacement (i.e. Stone Columns)
8 KSF Footings
Settlement (inches)
0
0.5
1
1.5
2
2.5
3
Footing Width (ft)
0
2
4
6
8
10
12
FFE=+24 or higher
FFE=+19

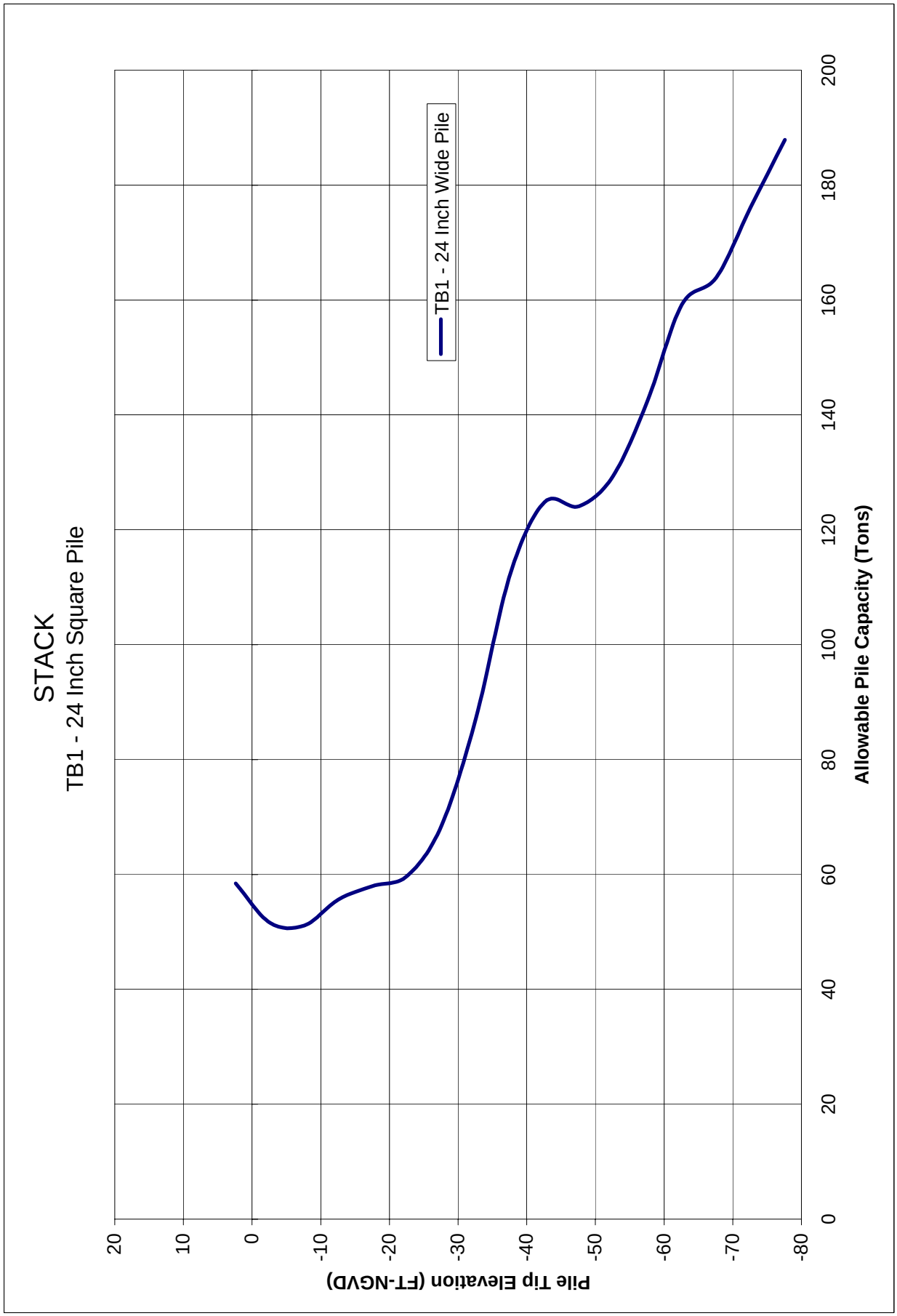
APPENDIX E

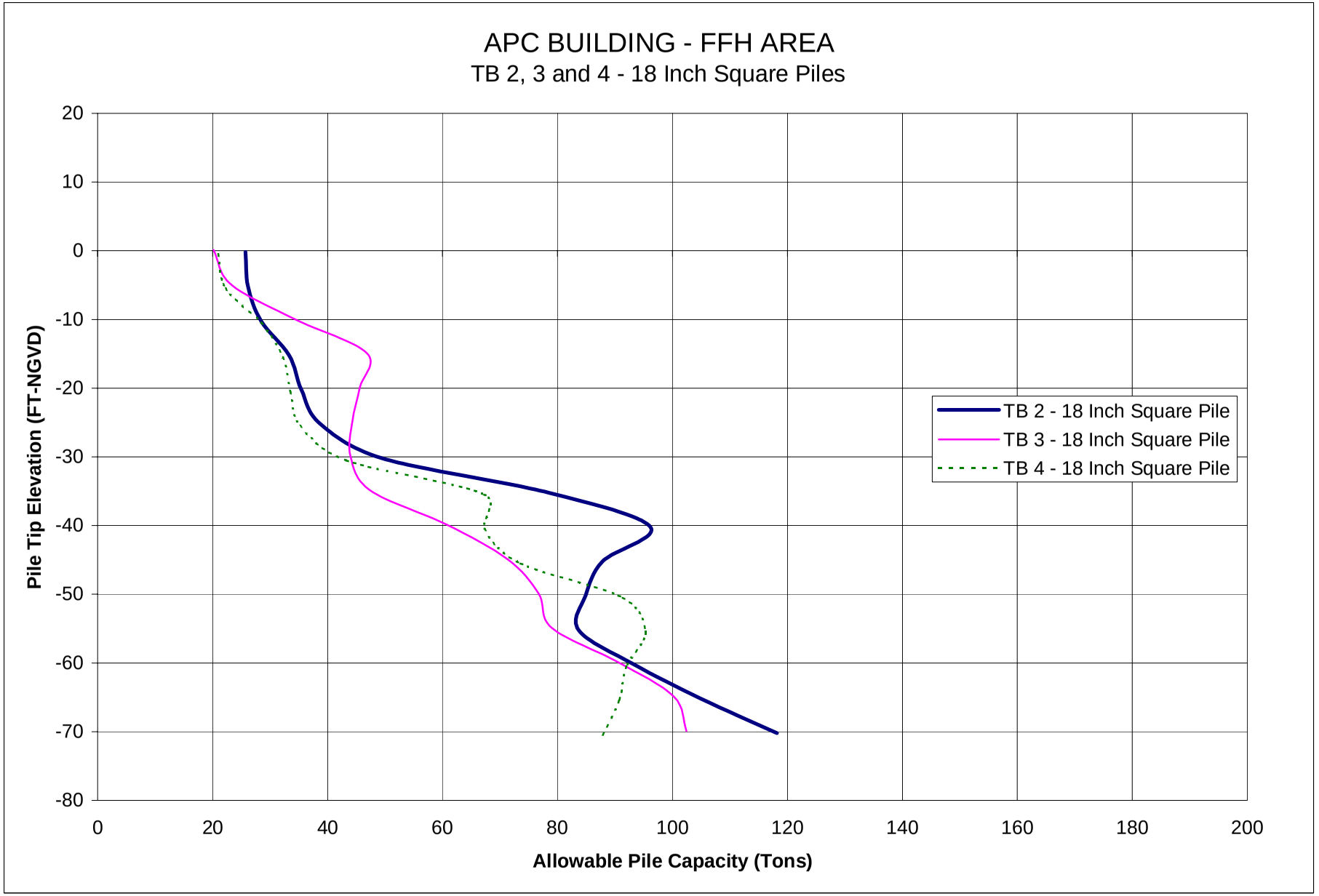
ALLOWABLE PILE AXIAL CAPACITIES

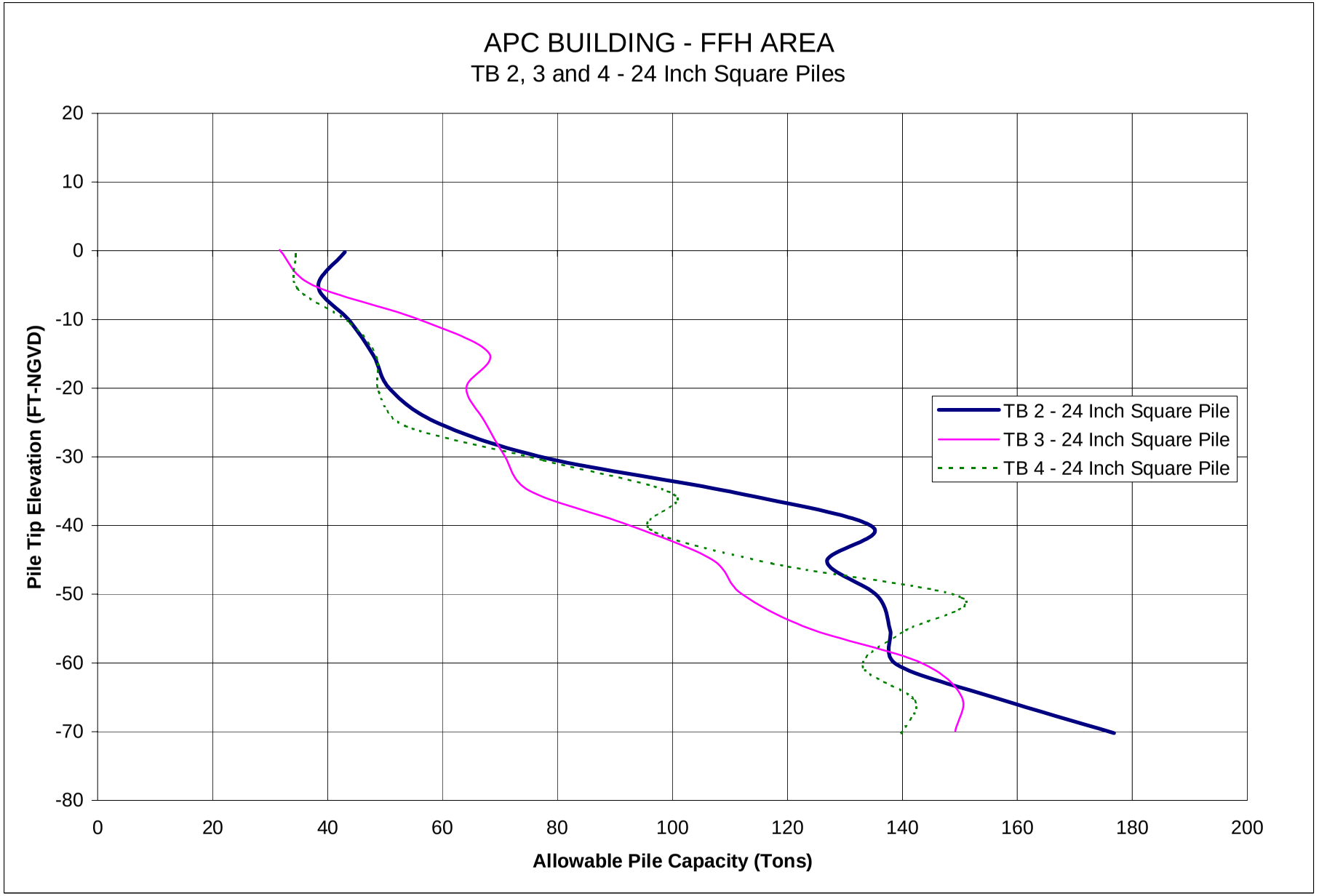
ALLOWABLE COMPRESSIVE CAPACITIES OF PRESSURE GROUTED AUGERCAST PILES (ACPS)					
Stack					
Rock Socket Length	Pile Tip	Allow. Capacity (tons) for ACP with Diam (in.) of:			Average
(feet)	Elev.	16	18	24	Tallow (tsf)
0	-32	30	35	45	0.2
10	-42	65	75	100	0.4
20	-52	135	150	200	0.8
30	-62	190	215	285	1.1
APC Bldg - FFH Area					
Rock Socket Length	Pile Tip	Allow. Capacity (tons) for ACP with Diam (in.) of:			Average
(feet)	Elev.	16	18	24	Tallow (tsf)
0	-27	25	30	40	0.2
10	-37	45	55	70	0.3
20	-47	115	130	170	0.7
30	-57	155	180	235	1.0
APC Bldg - SDA Area and Turbine/Generator					
Rock Socket Length	Pile Tip	Allow. Capacity (tons) for ACP with Diam (in.) of:			Average
(feet)	Elev.	16	18	24	Tallow (tsf)
0	-32	25	25	35	0.1
10	-42	50	55	80	0.3
20	-52	90	105	140	0.5
30	-62	155	175	235	0.9
Boiler Building					
Rock Socket Length	Pile Tip	Allow. Capacity (tons) for ACP with Diam (in.) of:			Average
(feet)	Elev.	16	18	24	Tallow (tsf)
0	-28	25	30	40	0.2
10	-38	55	60	80	0.3
20	-48	110	125	165	0.7
30	-58	140	160	210	0.9
Refuse Storage Pit and Building and Dirty Wastewater Tank					
Rock Socket Length	Pile Tip	Allow. Capacity (tons) for ACP with Diam (in.) of:			Average
(feet)	Elev.	16	18	24	Tallow (tsf)
0	-45	60	70	90	0.3
10	-55	90	105	140	0.4
20	-65	150	170	230	0.7
30	-75	210	235	315	0.9
Tipping Floor and Building					
Rock Socket Length	Pile Tip	Allow. Capacity (tons) for ACP with Diam (in.) of:			Average
(feet)	Elev.	16	18	24	Tallow (tsf)
0	-47	55	65	85	0.2
10	-57	155	175	235	0.7
20	-67	255	285	385	1.1
30	-77	265	295	395	1.1

Note: Average Tallow is the average allowable pile skin friction resistance from elevation +10 ft NGVD to pile bottom. For analysis purposes the top of the rock socket was taken to be the top of the limestone that enters the profile below the bottom of the lowest layer of silt or silty sand (Stratum 7).


STACK
TB1 - 18 Inch Square Pile
TB1 - 18 Inch Wide Pile
Pile Tip Elevation (FT-NGVD)
Allowable Pile Capacity (Tons)
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
0
20
40
60
80
100
120
140
160
180
200

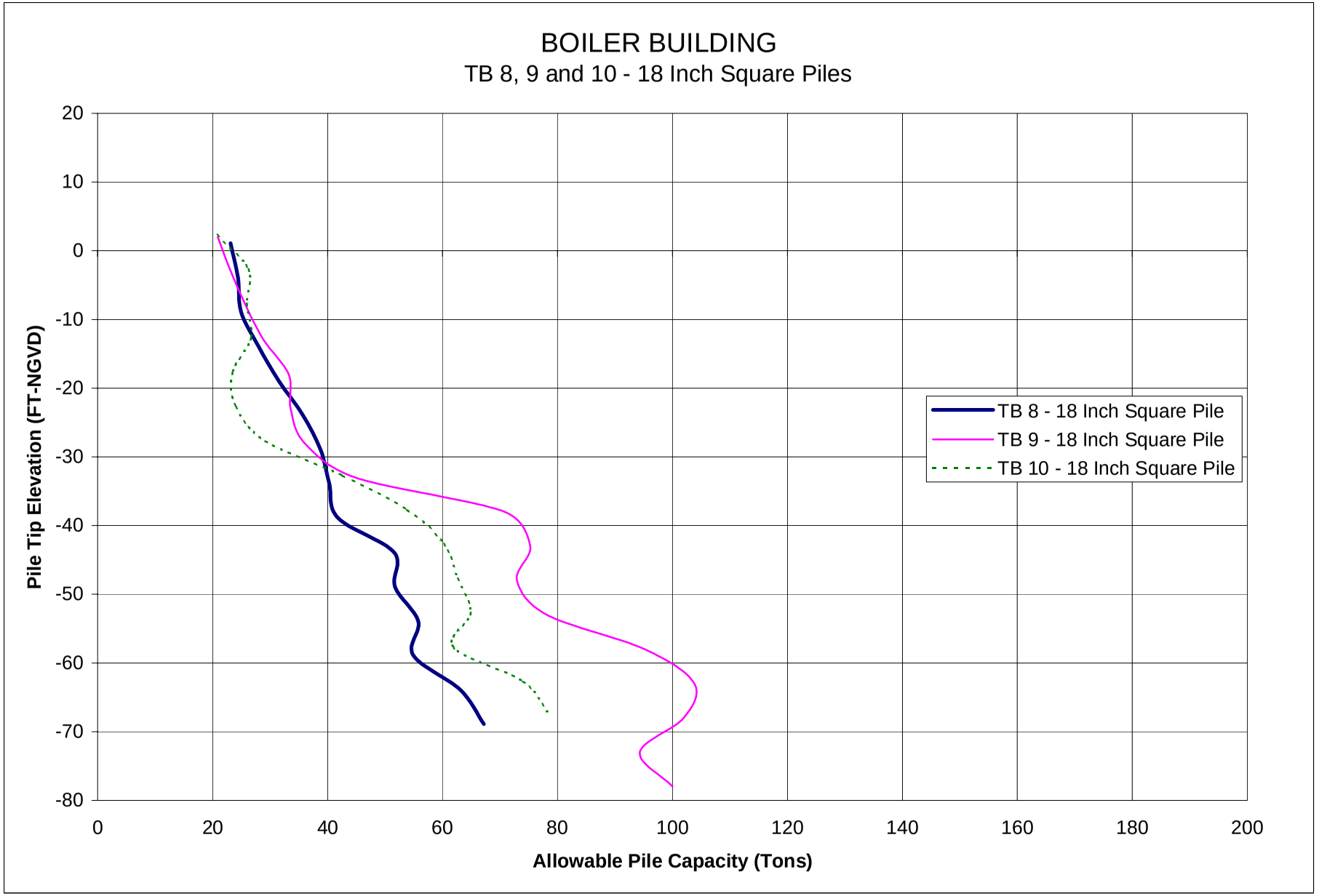

STACK
TB1 - 24 Inch Square Pile
TB1 - 24 Inch Wide Pile
Pile Tip Elevation (FT-NGVD)
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
0
20
40
60
80
100
120
140
160
180
200
Allowable Pile Capacity (Tons)

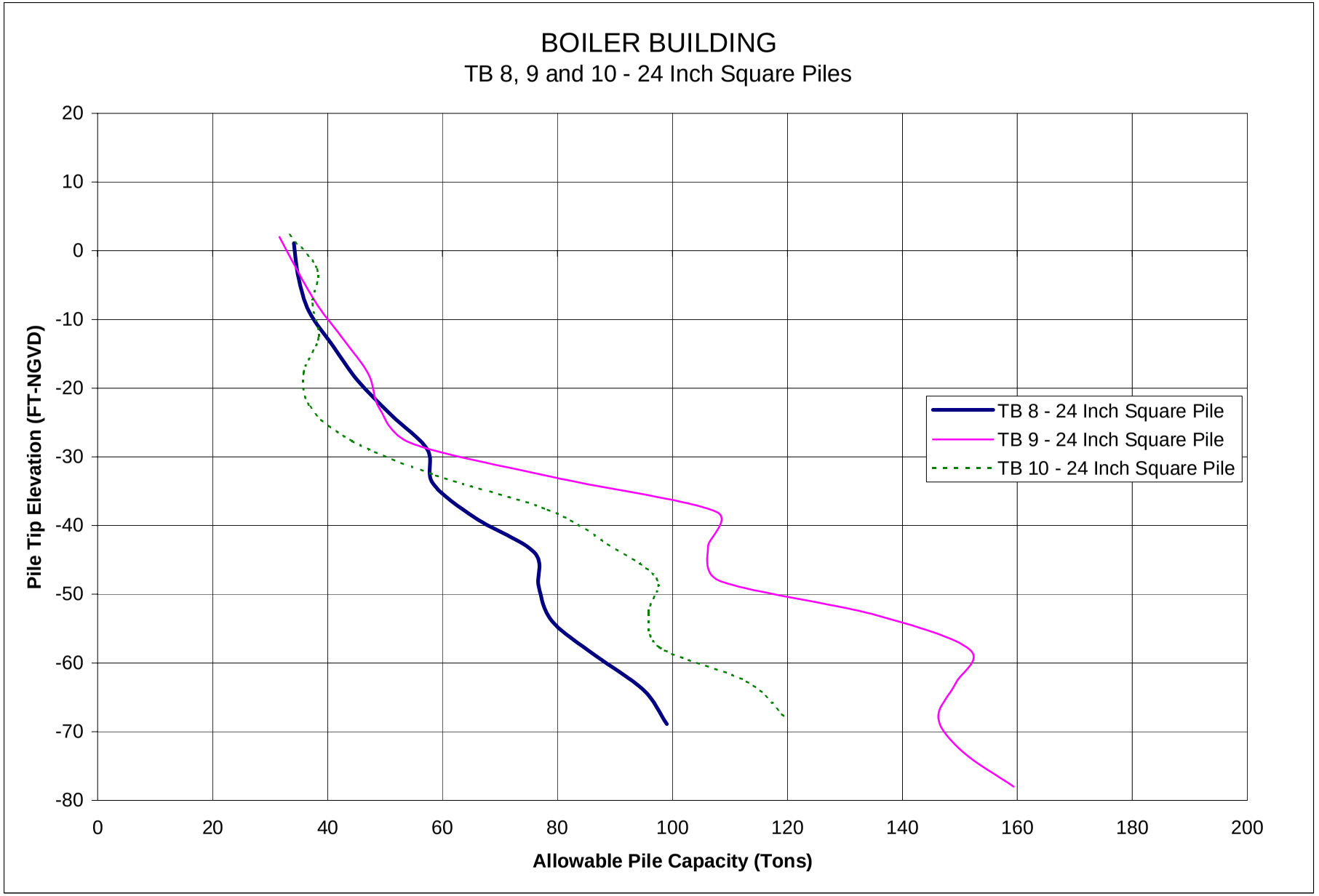

APC BUILDING - FFH AREA
TB 2, 3 and 4 - 18 Inch Square Piles
Pile Tip Elevation (FT-NGVD)
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
0
20
40
60
80
100
120
140
160
180
200
Allowable Pile Capacity (Tons)
TB 2 - 18 Inch Square Pile
TB 3 - 18 Inch Square Pile
TB 4 - 18 Inch Square Pile

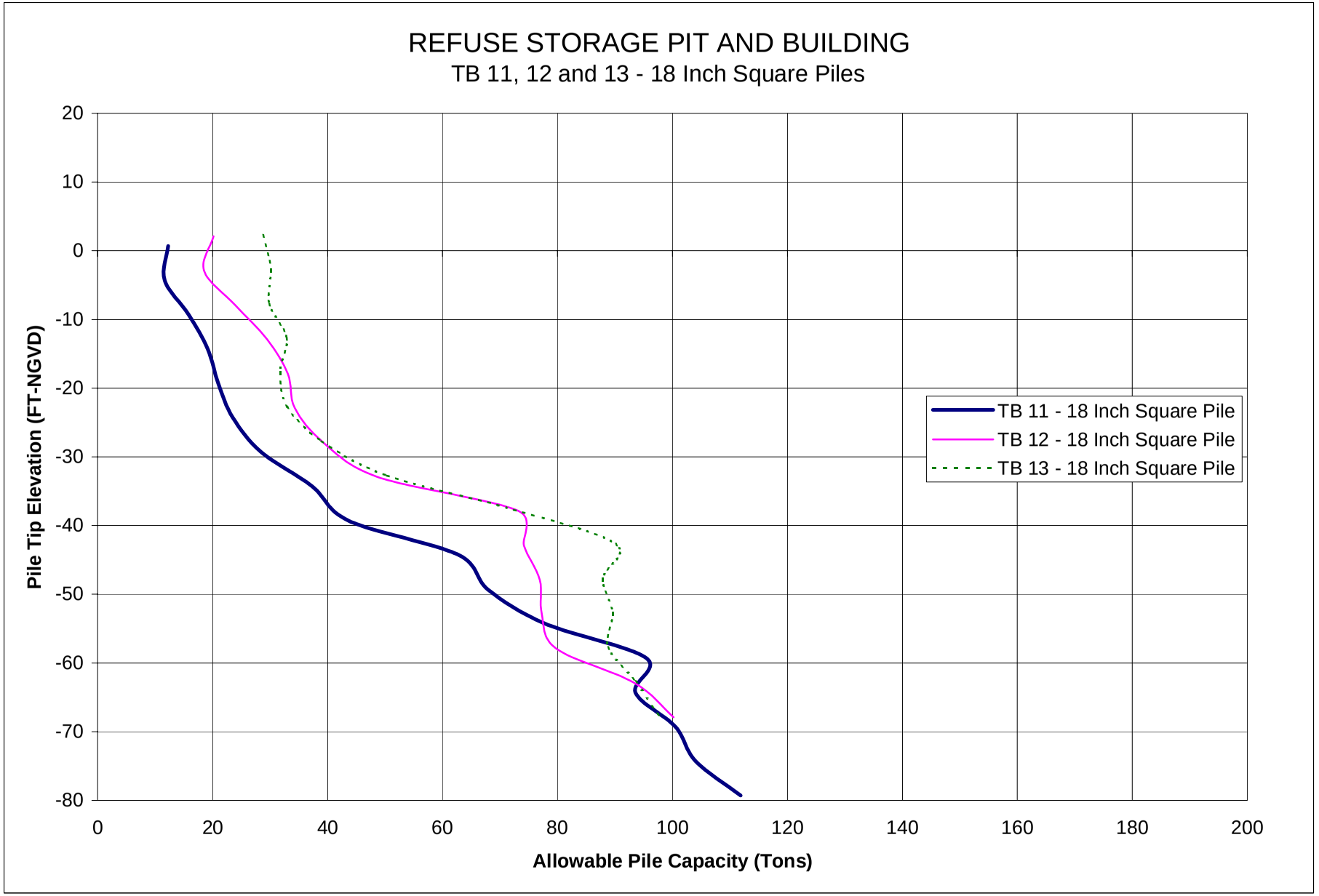

APC BUILDING - FFH AREA
TB 2, 3 and 4 - 24 Inch Square Piles
Pile Tip Elevation (FT-NGVD)
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
0
20
40
60
80
100
120
140
160
180
200
Allowable Pile Capacity (Tons)
TB 2 - 24 Inch Square Pile
TB 3 - 24 Inch Square Pile
TB 4 - 24 Inch Square Pile


APC BUILDING - SDA AREA AND TURBINE/GENERATOR
TB 5, 6 and 7 - 18 Inch Square Piles
Pile Tip Elevation (FT-NGVD)
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
0
20
40
60
80
100
120
140
160
180
200
Allowable Pile Capacity (Tons)
TB 5 - 18 Inch Square Pile
TB 6 - 18 Inch Square Pile
TB 7 - 18 Inch Square Pile

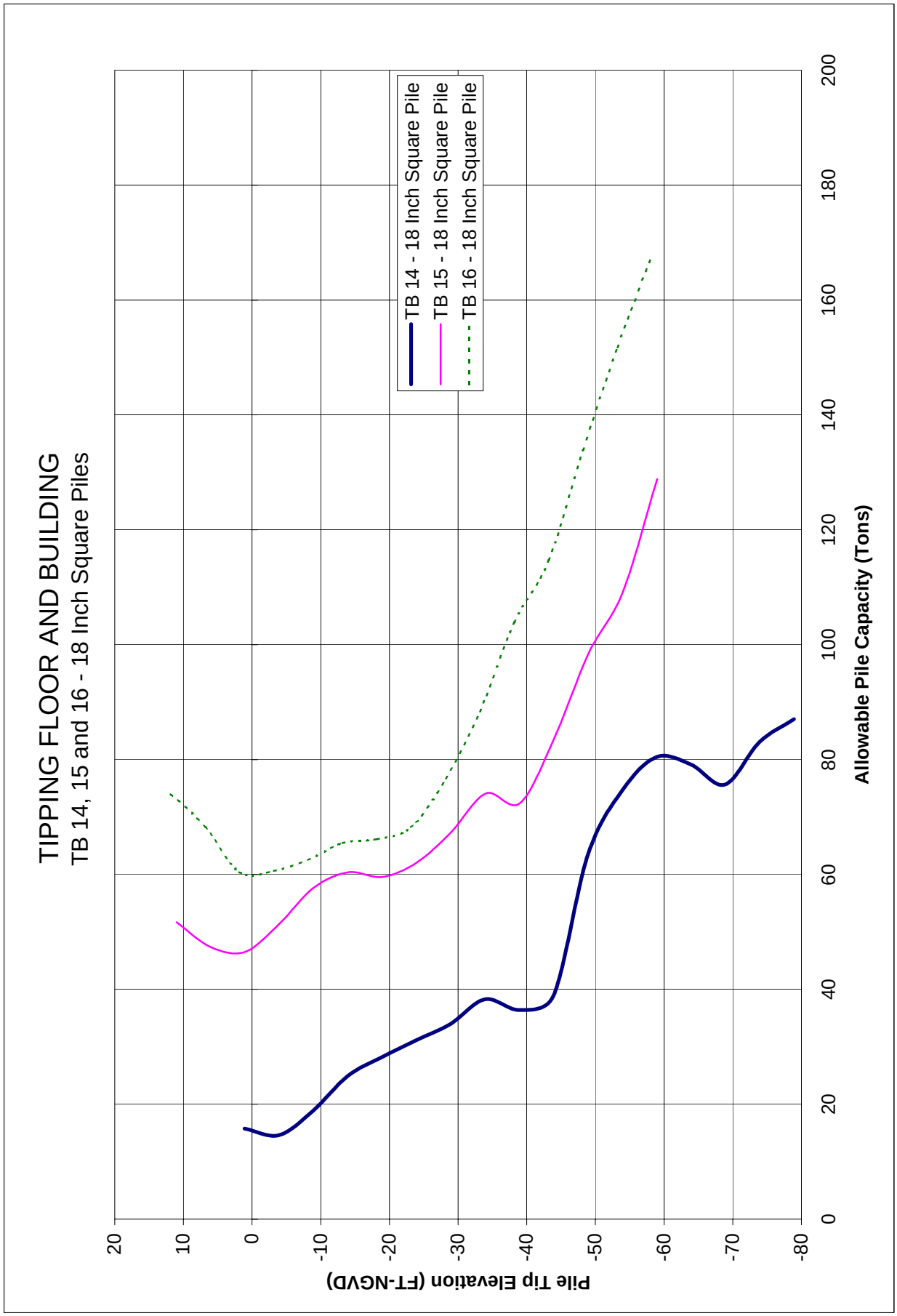

APC BUILDING - SDA AREA AND TURBINE/GENERATOR
TB 5, 6 and 7 - 24 Inch Square Piles
Pile Tip Elevation (FT-NGVD)
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
0
20
40
60
80
100
120
140
160
180
200
Allowable Pile Capacity (Tons)
TB 5 - 24 Inch Square Pile
TB 6 - 24 Inch Square Pile
TB 7 - 24 Inch Square Pile

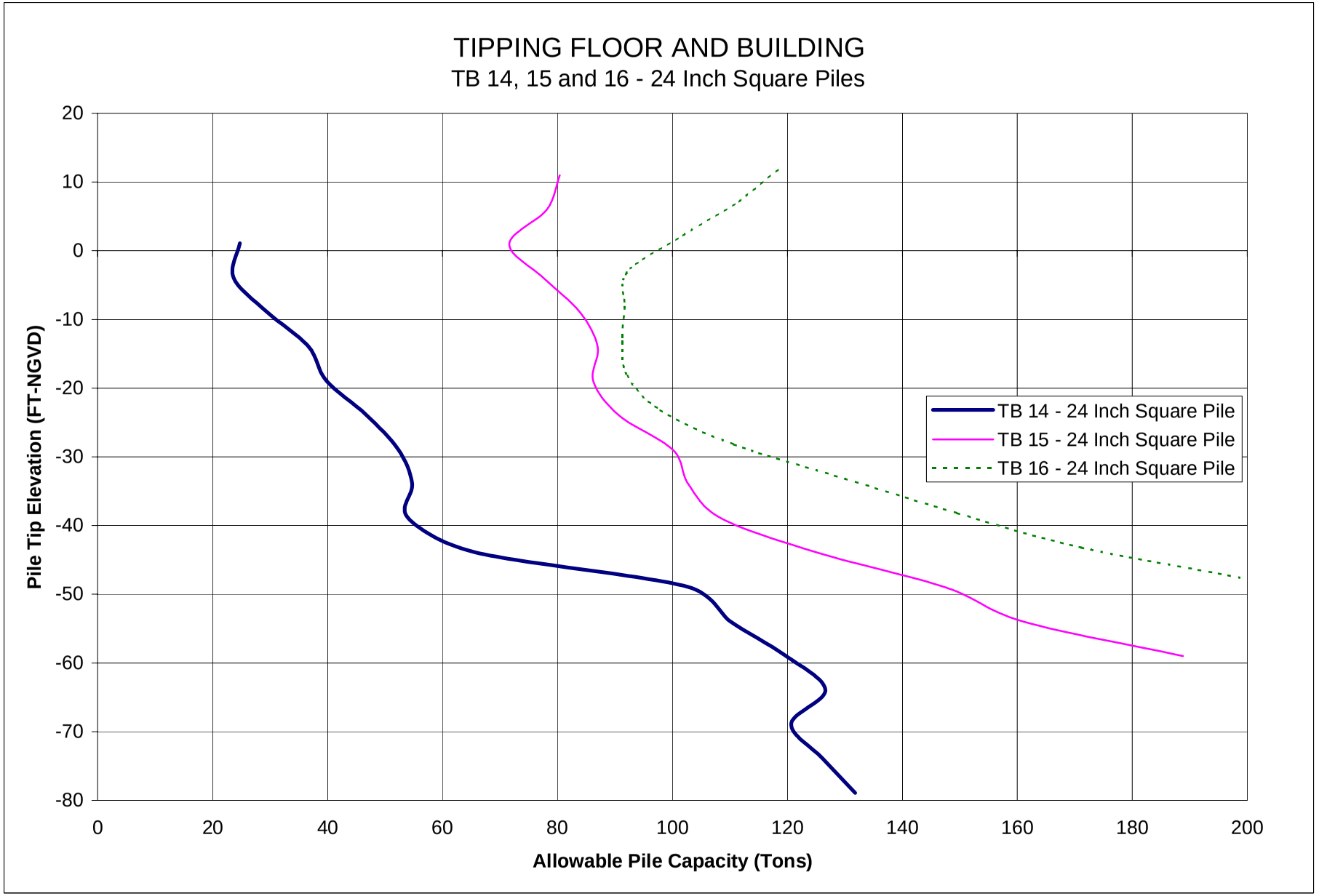

BOILER BUILDING
TB 8, 9 and 10 - 18 Inch Square Piles
Pile Tip Elevation (FT-NGVD)
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
0
20
40
60
80
100
120
140
160
180
200
Allowable Pile Capacity (Tons)
TB 8 - 18 Inch Square Pile
TB 9 - 18 Inch Square Pile
TB 10 - 18 Inch Square Pile


BOILER BUILDING
TB 8, 9 and 10 - 24 Inch Square Piles
Pile Tip Elevation (FT-NGVD)
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
0
20
40
60
80
100
120
140
160
180
200
Allowable Pile Capacity (Tons)
TB 8 - 24 Inch Square Pile
TB 9 - 24 Inch Square Pile
TB 10 - 24 Inch Square Pile


REFUSE STORAGE PIT AND BUILDING
TB 11, 12 and 13 - 18 Inch Square Piles
Pile Tip Elevation (FT-NGVD)
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
0
20
40
60
80
100
120
140
160
180
200
Allowable Pile Capacity (Tons)
TB 11 - 18 Inch Square Pile
TB 12 - 18 Inch Square Pile
TB 13 - 18 Inch Square Pile


REFUSE STORAGE PIT AND BUILDING
TB 11, 12 and 13 - 24 Inch Square Piles
TB 11 - 24 Inch Square Pile
TB 12 - 24 Inch Square Pile
TB 13 - 24 Inch Square Pile
Pile Tip Elevation (FT-NGVD)
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Allowable Pile Capacity (Tons)
0
20
40
60
80
100
120
140
160
180
200


TIPPING FLOOR AND BUILDING
TB 14, 15 and 16 - 18 Inch Square Piles
TB 14 - 18 Inch Square Pile
TB 15 - 18 Inch Square Pile
TB 16 - 18 Inch Square Pile
Pile Tip Elevation (FT-NGVD)
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Allowable Pile Capacity (Tons)
0
20
40
60
80
100
120
140
160
180
200


TIPPING FLOOR AND BUILDING
TB 14, 15 and 16 - 24 Inch Square Piles
Pile Tip Elevation (FT-NGVD)
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
0
20
40
60
80
100
120
140
160
180
200
Allowable Pile Capacity (Tons)
TB 14 - 24 Inch Square Pile
TB 15 - 24 Inch Square Pile
TB 16 - 24 Inch Square Pile

ALLOWABLE TENSILE CAPACITIES OF DRIVEN PPC PILES

18 Inch Diameter Driven Concrete Pile Allowable Uplift Capacities in Tons																
Pile Tip Elevation (FT-NGVD)	TB1	TB2	TB3	TB4	TB5	TB6	TB7	TB8	TB9	TB10	TB11	TB12	TB13	TB14	TB15	TB16
-30	29	24	23	20	19	16	15	21	20	20	14	23	24	19	39	46
-50	41	39	34	32	26	23	25	29	33	30	32	35	44	27	49	61
-70	55	52	48	47	39	33	42	36	48	39	46	47	54	40	--	--

24 Inch Diameter Driven Concrete Pile Allowable Uplift Capacities in Tons																
Pile Tip Elevation (FT-NGVD)	TB1	TB2	TB3	TB4	TB5	TB6	TB7	TB8	TB9	TB10	TB11	TB12	TB13	TB14	TB15	TB16
-30	41	34	33	28	27	23	22	30	30	28	21	33	33	27	54	64
-50	58	54	48	46	38	33	36	41	47	42	46	50	62	39	68	85
-70	77	73	68	66	55	48	58	52	69	55	64	66	75	58	--	--

Palm Beach Renewable Energy Facility No. 2

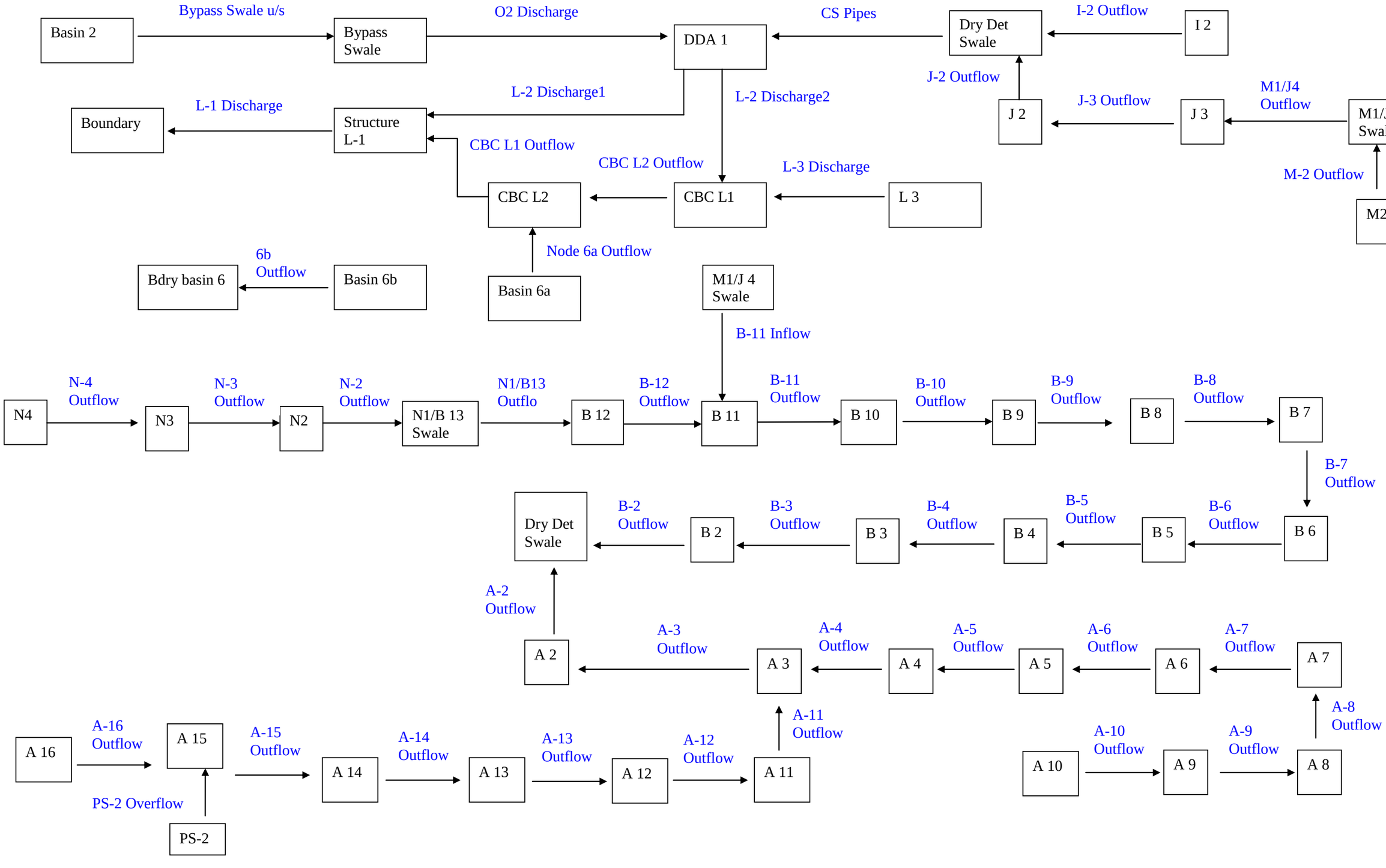
Palm Beach County, Florida

MODEL BASIN CALCULATIONS

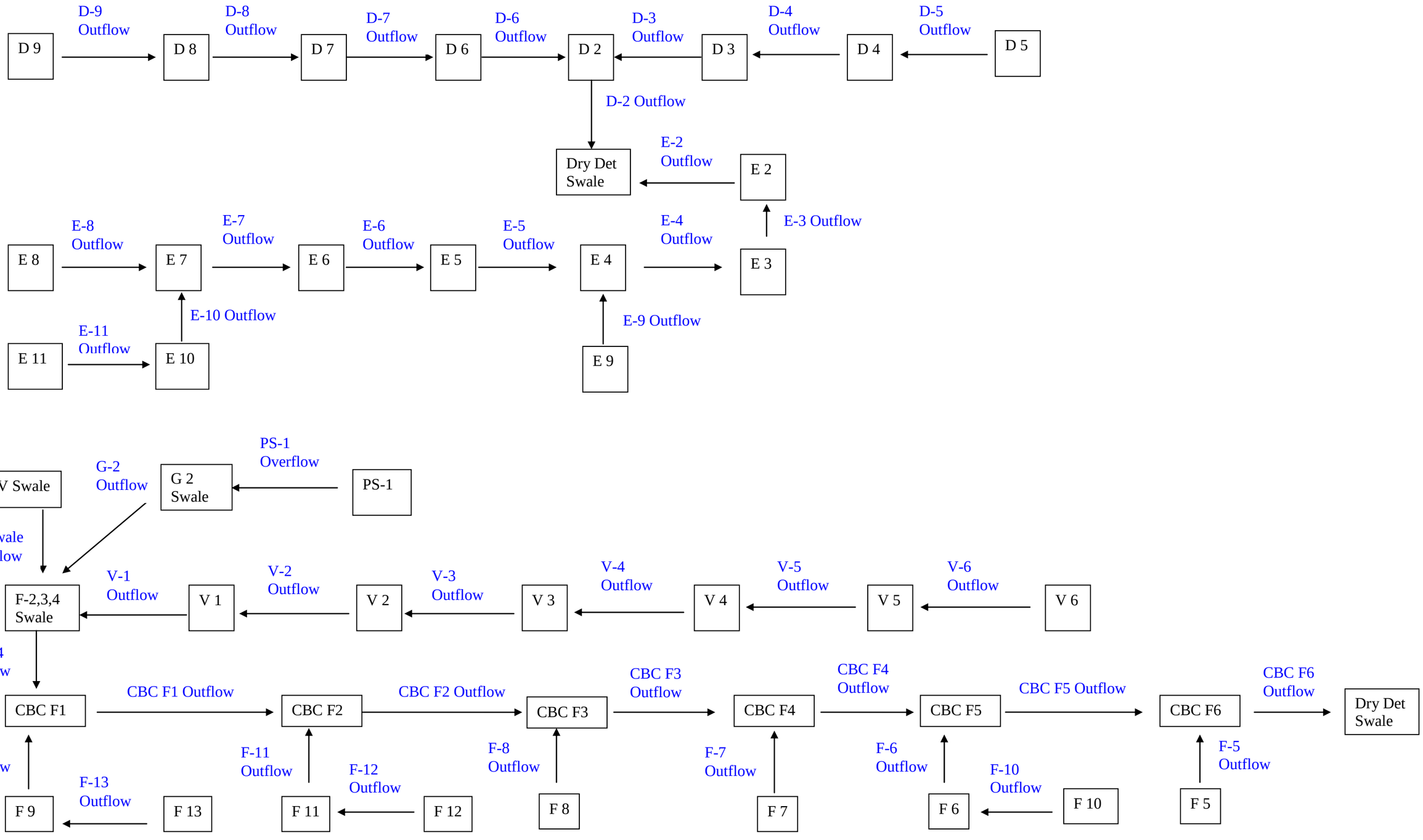
Basin No.	Sub-Basin No.	Total Ac.	Structures	Pavement	Dry Retention Area	Dry Retention Bank	Grass (Bank)	Grass (V)	Runoff Peak Flow (cfs)	Runoff Volume (ac-ft)
1		**4.3782**		**3.0499**			**1.3283**		**13.792**	**4.321**
	J-2	0.1369		0.1369					0.449	0.148
	I-2	0.1902		0.1902					0.624	0.205
2		**5.0790**					**1.0790**	**4.0000**	**12.177**	**3.812**
3	J-3	**0.3501**		**0.1204**				**0.2297**	**1.054**	**0.305**
4		**0.6970**	**0.6970**						**2.286**	**0.752**
5		**5.1676**	**0.1430**	**4.1001**	**0.0000**	**0.0000**	**0.0000**	**0.9245**	**16.7180**	**5.2870**
	A-2	0.0598		0.0598					0.196	0.064
	A-3	0.0819		0.0819					0.269	0.088
	A-4	0.0812		0.0781				0.0031	0.266	0.087
	A-5	0.1425		0.1173				0.0252	0.463	0.146
	A-6	0.1229		0.1092				0.0137	0.397	0.124
	A-7	0.1899		0.1768				0.0131	0.621	0.201
	A-8	0.1160		0.1160					0.38	0.125
	A-9	0.1321		0.1321					0.433	0.143
	A-10	0.1509		0.1509					0.495	0.163
	A-11	0.0744		0.0661				0.0083	0.243	0.077
	A-12	0.0641		0.0568				0.0073	0.209	0.067
	A-13	0.0650		0.0576				0.0074	0.213	0.068
	A-14	0.1076		0.0934				0.0142	0.351	0.112
	A-15	0.1131		0.1131					0.371	0.122
	A-16	0.1419		0.1419					0.465	0.153
	B-2	0.1281		0.0988				0.0293	0.415	0.129
	B-3	0.1558		0.1158				0.0400	0.503	0.156
	B-4	0.1545		0.1323				0.0222	0.503	0.16
	B-6	0.1628		0.0608				0.1020	0.494	0.144
	B-7	0.1898		0.1342				0.0556	0.61	0.188
	B-8	0.1281		0.0605				0.0676	0.397	0.117
	B-9	0.1989	0.0930	0.0300				0.0759	0.629	0.19
	B-10	0.4342	0.0500	0.3690				0.0152	1.422	0.464
	B-14	0.1839		0.1650				0.0189	0.601	0.193
	D-2	0.1072		0.0814				0.0258	0.347	0.108
	D-3	0.1304		0.1014				0.0290	0.422	0.132
	D-4	0.1364		0.1147				0.0217	0.444	0.141
	D-5	0.1813		0.1531				0.0282	0.59	0.187
	D-6	0.1120		0.0926				0.0194	0.364	0.115
	D-7	0.1361		0.1176				0.0185	0.444	0.141
	D-8	0.1349		0.1211				0.0138	0.441	0.141
	D-9	0.0535		0.0497				0.0038	0.175	0.057
	E-2	0.1031		0.0754				0.0277	0.332	0.103
	E-3	0.1927		0.1225				0.0702	0.613	0.186
	E-4	0.1518		0.1497				0.0021	0.498	0.163
	E-5	0.1859		0.1055				0.0804	0.586	0.176
	E-9	0.1629		0.0980				0.0649	0.516	0.156
6		**1.3176**	**0.0000**	**0.5052**	**0.0000**	**0.0000**	**0.0000**	**0.8124**	**1.1700**	**0.3330**
	L-3	0.3636		0.0676				0.2960	1.047	0.297
	6a	0.0394		0.0191				0.0203	0.123	0.036
	6b	0.9146		0.4185				0.4961	1.657	0.523
7		**3.1767**	**0.2700**	**0.7325**	**0.0000**	**0.0000**	**0.2575**	**1.9167**	**9.3370**	**2.7260**
	B-11	0.3431	0.0929	0.1286				0.1216	1.093	0.333
	B-12	0.3905	0.1581	0.1162			0.1162		1.254	0.386
	M-1/J-4	0.6106						0.6106	1.651	0.458
	M-2	0.3676		0.1547				0.2129	1.126	0.33
	N-1/B-13	0.7227						0.7227	1.954	0.542
	N-2	0.0998						0.0998	0.27	0.075
	N-3	0.1491						0.1491	0.403	0.112
	N-4	0.4933	0.0190	0.3330			0.1413		1.586	0.49
8	**C-3**	**0.5828**		**0.0027**				**0.5801**	**1.579**	**0.438**
9		**1.0330**	**1.0330**						**3.388**	**1.115**
10		**2.8116**	**0.2470**	**1.3646**	**0.1027**	**0.1000**	**0.0000**	**0.9973**	**8.8190**	**2.6620**
	E-6	0.1781		0.0758				0.1023	0.546	0.16
	E-7	0.2460		0.0802				0.1658	0.737	0.213
	E-8	1.7562	0.2470	0.7077	0.1027	0.1000		0.5988	5.509	1.648
	E-10	0.2599		0.1295				0.1304	0.809	0.24
	E-11	0.3714		0.3714					1.218	0.401
11		**4.6530**	**4.6530**						**14.995**	**5.023**
12		**1.7939**	**0.0000**	**0.6613**	**0.0000**	**0.0000**	**0.5508**	**0.5818**	**5.5670**	**1.6540**
	G-2	1.4182		0.4978			0.5000	0.4204	4.399	1.3
	F-11	0.1207		0.0699			0.0508		0.396	0.13
	F-12	0.2550		0.0936				0.1614	0.772	0.224
13		**2.1410**	**2.1410**						**6.9**	**2.311**
14		**5.6153**	**0.2460**	**2.8611**	**0.0000**	**0.0000**	**0.0000**	**2.5082**	**17.4220**	**5.3250**
	F-13	0.0952		0.0952					0.312	0.103
	F-234	0.2907						0.2907	0.796	0.222
	V-1	0.5035		0.3674				0.1361	1.622	0.502
	V-2	0.6508		0.2919				0.3589	2.005	0.59
	V-3	0.2959		0.2908				0.0051	0.971	0.323
	V-4	0.4497		0.4497					1.476	0.491
	V-5	0.4803		0.4803					1.577	0.514
	V-6	0.5403		0.4136				0.1267	1.771	0.593
	Vswale	2.3089	0.2460	0.4722				1.5907	6.892	1.987
15		**1.1302**	**0.0000**	**0.9230**	**0.0000**	**0.0000**	**0.0000**	**0.2072**	**3.6520**	**1.1570**
	F-5	0.1535		0.0919				0.0616	0.486	0.147
	F-6	0.1878		0.1714				0.0164	0.614	0.198
	F-7	0.2569		0.2432				0.0137	0.841	0.273
	F-8	0.3313		0.3145				0.0168	1.085	0.353
	F-10	0.2007		0.1020				0.0987	0.626	0.186
16		**20.7030**	**0.0000**	**0.6388**	**1.1312**	**0.9376**	**4.2910**	**13.7046**	**55.3670**	**15.7730**
	DRS	2.7076		0.6388	1.1312	0.9376				
	Bypass Swale	0.6354					0.4898	0.1456	1.704	0.473
	Cons Area	2.5100					1.2700	1.2400		
	Basin 16(N)	8.8110					2.5312	6.2800	29.902	8.498
	Basin 16(S)	6.0390						6.0390	23.761	6.802

TOTAL		**60.63**	**9.43**	**14.95956**	**1.2339**	**1.0376**	**7.5066**	**26.4625**	**174.223**	**52.994**

NODE LINK DIAGRAM



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